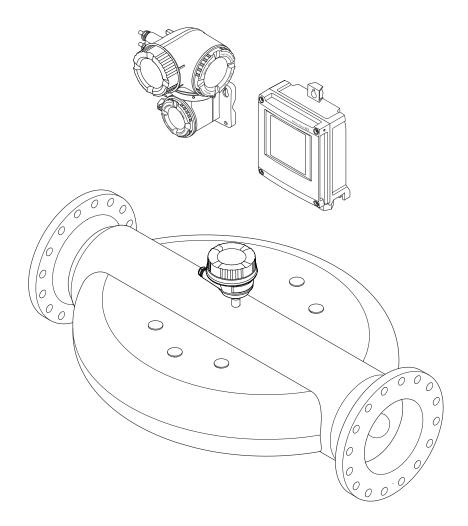
Valid as of version 01.00.zz (Device firmware) Products Solutions

Solutions Services

Operating Instructions **Proline Promass X 500**

Coriolis flowmeter PROFINET over 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 organization will supply you with current information and updates to this manual.

Table of contents

1	About this document	6	6	Installation	22
1.1 1.2	Document function	6 6 6	6.1	Installation requirements	22 25 27
	1.2.4 Tool symbols	7	6.2	Installing the device	30 30
1.3	1.2.6 Symbols in graphics	8		6.2.3 Installing the measuring instrument .6.2.4 Installing the transmitter housing:	30
1.4	Registered trademarks	8		Proline 500 – digital	31
2 2.1	Safety instructions			Proline 500	
2.2 2.3	Intended use	9		Proline 500	
2.4 2.5	Operational safety	10	6.3	Post-installation check	
2.6 2.7	IT security		7	Electrical connection	36
	2.7.1 Protecting access via hardware write		7.1	Electrical safety	
	1	11	7.2	Connecting requirements	
	J 1	11 12		7.2.1 Required tools	
	2.7.4 Access via service interface (port 2):	14		7.2.2 Requirements for connection cable 7.2.3 Terminal assignment	
	CDI-RJ45	13		7.2.4 Available device plugs for Proline 500	40
3	Product description	14		7.2.5 Pin assignment of device plug7.2.6 Shielding and grounding	41 41
3.1	Product design			7.2.7 Preparing the device	42
	3.1.1 Proline 500 – digital		7.3	Connecting the device: Proline 500 – digital 7.3.1 Connecting the connecting cable	43 43
4	Incoming acceptance and product			7.3.2 Connecting the transmitter7.3.3 Integrating the transmitter into a	46
	identification	16	. .	network	49
4.1	Incoming acceptance	16	7.4	Connecting the device: Proline 500 7.4.1 Connecting the connecting cable	
4.2	Product identification			7.4.1 Connecting the connecting cable	
	1	17		7.4.3 Integrating the transmitter into a	
	1	19		network	56
	4.2.3 Symbols on the device	20	7.5	Potential equalization	
5	Storage and transport 21		7.6	Special connection instructions	. 57
5.1	Storage conditions	21	7 7	7.6.1 Connection examples	
5.2	Transporting the product	21	7.7	Hardware settings	
	5.2.1 Measuring devices without lifting			7.7.1 Setting the device fiame	
	3	21	7.8	Ensuring the degree of protection	
E O	5.2.3 Transporting with a fork lift		7.9	Post-connection check	
5.3	Packaging disposal	Z	8	Operation options	64
			8.1	Overview of operation options	
			0.1	overview of operation options	U-

3.2	Structure and function of the operating menu	10.6	Configuring the device	
	8.2.1 Structure of the operating menu 65		10.6.2 Displaying the communication	
2 2	8.2.2 Operating philosophy		interface	109
3.3	Access to operating menu via local display 67		10.6.3 Setting the system units	111
	8.3.1 Operational display 67		10.6.4 Selecting and setting the medium	114
	8.3.2 Navigation view		10.6.5 Configuration of the Analog Inputs .	117
	8.3.3 Editing view		10.6.6 Displaying the I/O configuration	120
	8.3.4 Operating elements		10.6.7 Configuring the current input	121
	8.3.5 Opening the context menu		10.6.8 Configuring the status input	122
	8.3.6 Navigating and selecting from list 75		10.6.9 Configuring the current output	123
	8.3.7 Calling the parameter directly		10.6.10 Configuring the pulse/frequency/	100
	8.3.8 Calling up help text		switch output	128
	8.3.9 Changing the parameters 76		10.6.11 Configuring the relay output	137
	8.3.10 User roles and related access		10.6.12 Configuring the local display	140
	authorization		10.6.13 Configuring the low flow cut off	
	8.3.11 Disabling write protection via access	10.7	10.6.14 Partially filled pipe detection	146
	code	10.7	Advanced settings	147
	8.3.12 Enabling and disabling the keypad		10.7.1 Using the parameter to enter the	4.0
	lock		access code	148
3.4	Access to operating menu via web browser 78		10.7.2 Calculated process variables	
	8.4.1 Function range		10.7.3 Carrying out a sensor adjustment	
	8.4.2 Requirements		10.7.4 Configuring the totalizer	153
	8.4.3 Connecting the device 80		10.7.5 Carrying out additional display	456
	8.4.4 Logging on 82		configurations	
	8.4.5 User interface		10.7.6 WLAN configuration	
	8.4.6 Disabling the Web server 84		10.7.7 Viscosity application package	164
	8.4.7 Logging out		10.7.8 Concentration Measurement	
3.5	Operation via SmartBlue app 85		application package	
3.6	Access to the operating menu via the		10.7.9 Petroleum application package	165
	operating tool		10.7.10 Heartbeat Technology application	
	8.6.1 Connecting the operating tool 86		package	165
	8.6.2 FieldCare		3	165
	8.6.3 DeviceCare 90		10.7.12 Using parameters for device	
	8.6.4 SIMATIC PDM 90		administration	166
		10.8	Simulation	168
9	System integration	10.9	Protecting settings from unauthorized access	
9.1	Overview of device description files 91		10.9.1 Write protection via access code	172
J. 1	9.1.1 Current version data for the device 91		10.9.2 Write protection via write protection	
	9.1.2 Operating tools 91		switch	173
9.2	Device master file (GSD)			
7.4	9.2.1 File name of the manufacturer-	11	Operation	176
	specific device master file (GSD) 92	11.1	Reading the device locking status	176
	9.2.2 File name of the PA Profile device	11.2	Adjusting the operating language	176
	master file (GSD) 92	11.3	Configuring the display	176
9.3	Cyclic data transmission 93	11.4	Reading off measured values	176
7.5	9.3.1 Overview of the modules 93	11.1	11.4.1 "Measured variables" submenu	177
	9.3.2 Description of the modules 94		11.4.2 Totalizer	187
	9.3.3 Status coding		11.4.2 "Input values" submenu	188
	9.3.4 Factory setting		11.4.4 Output values	189
9.4	System redundancy S2	11.5	Adapting the measuring device to the process	109
7. 4	System redundancy 32 103	11.7	conditions	191
		116		191
10	Commissioning 106	11.6	Performing a totalizer reset	エフエ
10.1	Post-installation and post-connection check 106		11.6.1 Function scope of "Control Totalizer" parameter	192
10.2	Switching on the measuring instrument 106		11.6.2 Function range of "Reset all	174
10.3	Connecting via FieldCare 106		totalizers" parameter	192
10.4	Setting the operating language 106	11.7	Displaying the measured value history	193
10.5	Initializing the measuring instrument 107	11./	Displaying the incasured value motory	1))

11.8	Gas Fraction Handler	197 197 199
12		200
12.1	General troubleshooting	200
12.2	Diagnostic information via LEDs	202
12.2	12.2.1 Transmitter	202
	12.2.2 Sensor connection housing	204
12.3	Diagnostic information on local display	206
12.5	12.3.1 Diagnostic message	206
	5	208
12.4	Diagnostic information in the web browser	208
12.1	12.4.1 Diagnostic options	208
	12.4.2 Calling up remedial actions	209
12.5	Diagnostic information in FieldCare or	20)
12.5	DeviceCare	209
	12.5.1 Diagnostic options	209
	12.5.2 Calling up remedy information	210
12.6	Adapting the diagnostic information	211
12.0	12.6.1 Adapting the diagnostic behavior	211
12.7	Overview of diagnostic information	212
12.7	12.7.1 Diagnostic of sensor	213
	12.7.2 Diagnostic of electronic	225
	3	253
	12.7.4 Diagnostic of process	264
12.8	Pending diagnostic events	278
12.9	Diagnostic list	279
12.10	Event logbook	279
12.10	12.10.1 Reading out the event logbook	279
	12.10.2 Filtering the event logbook	280
	5	280
12.11		282
	12.11.1 Function scope of the "Device reset"	
	<u>=</u>	282
12.12	*	282
	Firmware history	284
13		285
13.1	Maintenance work	285
	13.1.1 Cleaning	285
13.2	Measuring and test equipment	285
13.3	Maintenance services	285
14	Repair	286
14.1	General notes	286
14.1	14.1.1 Repair and conversion concept	286
	14.1.1 Repair and conversion concept	286
14.2	-	286
14.3	Repair services	286
14.5 14.4	-	286
14.4	Disposal	287
14.ノ	14.5.1 Removing the measuring	20/
	5	287
	14.5.2 Disposing of the measuring	۷0/
		287
	1110ti WillClift	201

Accessories	288
Device-specific accessories	288
15.1.1 For the transmitter	288
Communication-specific accessories	289
Service-specific accessories	290
System components	290
Technical data	291
	291
	291
	292
	295
	300
Performance characteristics	302
Installation	306
Environment	306
Process	307
Mechanical construction	310
User interface	312
Certificates and approvals	316
Application packages	319
Accessories	320
Documentation	321
K	323
	Device-specific accessories

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 potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

↑ CALITION

This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

1.2.2 Electrical symbols

Symbol	Meaning
	Direct current
~	Alternating current
$\overline{\sim}$	Direct current and alternating current
=	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective earth (PE) 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: Interior ground terminal: protective earth is connected to the mains supply. 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 area network
•	LED LED is off.

Symbol	Meaning
菜	LED is on.
	LED flashing.

1.2.4 Tool symbols

Symbol	Meaning
Torx screwdriver	
96	Phillips screwdriver
Ó	Open-end wrench

1.2.5 Symbols for certain types of information

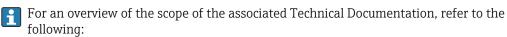
Symbol	Meaning
✓	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
X	Forbidden Procedures, processes or actions that are forbidden.
i	Tip Indicates additional information.
Ĩ	Reference to documentation
	Reference to page
	Reference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

1.2.6 Symbols in graphics

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

Symbol	Meaning
×	Safe area (non-hazardous area)
≋➡	Flow direction

1.3 Documentation



- *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.

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads), depending on the device version:

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 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. These are an integral part of the Operating Instructions.
	The nameplate indicates which Safety Instructions (XA) apply to the device.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is a constituent 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 instrument described in this manual is intended only for the flow measurement of liquids and gases.

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

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

To ensure that the measuring instrument remains in proper condition during the operating time:

- ▶ Only use the measuring instrument in full compliance with the data on the nameplate and the general conditions listed in the manual and supplementary documentation.
- ▶ Using 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 instrument only for media against which the materials in contact with the process are sufficiently resistant.
- ▶ Keep within the specified pressure and temperature range.
- ► Keep within the specified ambient temperature range.
- ▶ Protect the measuring instrument permanently against corrosion from environmental influences.

Incorrect use

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

▲ WARNING

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

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

NOTICE

Verification for borderline cases:

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

Residual risks

▲ WARNING

Risk of hot or cold burns! The use of media and electronics with high or low temperatures can produce hot or cold surfaces on the device.

▶ Mount suitable touch protection.

A WARNING

Danger of housing breaking due to measuring tube breakage!

If a measuring tube ruptures, the pressure inside the sensor housing will rise according to the operating process pressure.

▶ Use a rupture disk.

A WARNING

Danger from medium escaping!

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

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

2.3 Workplace safety

For work on and with the device:

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

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 state-of-the-art device is designed and tested in accordance with good engineering practice to meet operational safety standards. It 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.

2.6 IT security

The manufacturer 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 inoperation 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 $\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	Not enabled	On an individual basis following risk assessment
Access code (also applies to web server login or FieldCare connection) → 🖺 12	Not enabled (0000)	Assign a customized access code during commissioning
WLAN (order option in display module)	Enabled	On an individual basis following risk assessment
WLAN security mode	Enabled (WPA2- PSK)	Do not change
WLAN passphrase (Password) → 🖺 12	Serial number	Assign an individual 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
Service interface CDI-RJ45 → 🖺 13	Enabled	-

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.

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

Local display, web browser and operating tool (e.g. FieldCare, DeviceCare)

- 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 → 172.
- When delivered, the device does not have an access code; the default value is 0000 (open).

WLAN passphrase: Operation as WLAN access point

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter $(\rightarrow \implies 164)$.

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 for security reasons.
- 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 "Write protection via access code" → 🖺 172.

2.7.3 Access via web server

The integrated web server can be used to operate and configure the device by means of a web browser via Ethernet-APL, the service interface (CDI-RJ45) or via WLAN interface.

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

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.

2.7.4 Access via service interface (port 2): CDI-RJ45

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

The use of relevant industrial standards and quidelines 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.



For detailed information on connecting transmitters with an Ex de approval, see separate document "Safety instructions" (XA) for the device.

3 Product description

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

3.1 Product design

Two versions of the transmitter are available.

3.1.1 Proline 500 – digital

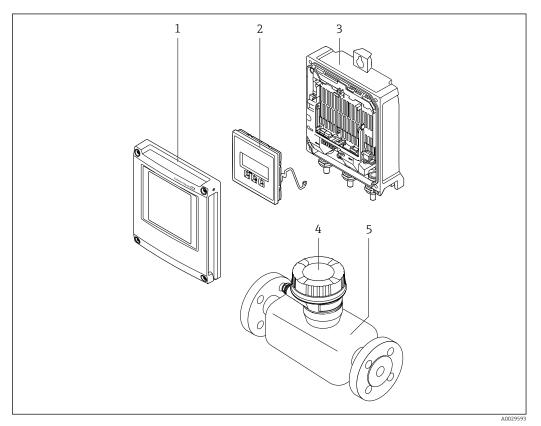
Signal transmission: digital

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

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

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

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



 \blacksquare 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 Sensoi

3.1.2 Proline 500

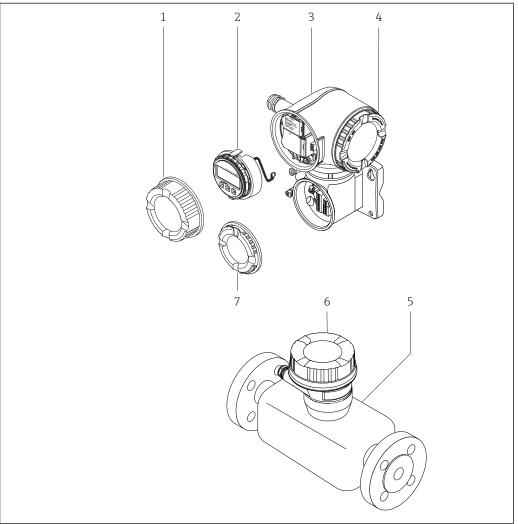
Signal transmission: analog

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.



A002958

■ 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

On receipt of the delivery:

- 1. Check the packaging for damage.
 - Report all damage immediately to the manufacturer. Do not install damaged components.
- 2. Check the scope of delivery using the delivery note.
- 3. Compare the data on the nameplate with the order specifications on the delivery note.
- 4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.
- If one of the conditions is not satisfied, contact the manufacturer.

4.2 Product identification

The device can be identified in the following ways:

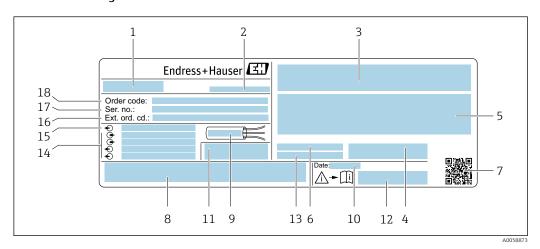
- Nameplate
- Order code with details of the device features on the delivery note
- Enter the serial numbers from the nameplates in the *Device Viewer* (www.endress.com/deviceviewer): all the information about the device is displayed.
- Enter the serial numbers from the nameplates into the *Endress+Hauser 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 "Additional standard device documentation" and "Supplementary device-dependent documentation" sections
- 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

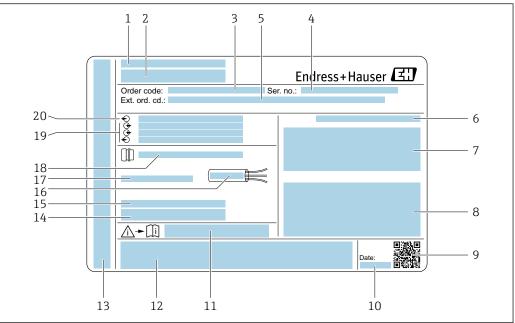
Proline 500 - digital



■ 3 Example of a transmitter nameplate

- 1 Name of the transmitter
- 2 Manufacturer/certificate holder
- 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 symbol
- 9 Permitted temperature range for cable
- 10 Manufacturing date: year-month
- 1 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

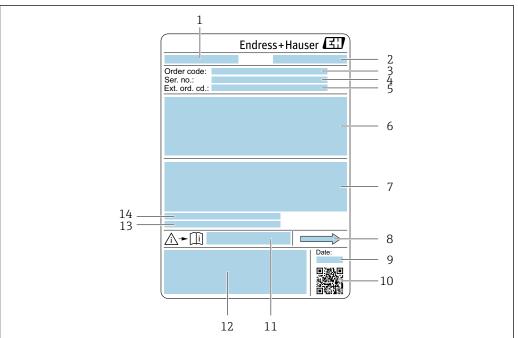


A0058872

■ 4 Example of a transmitter nameplate

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

4.2.2 Sensor nameplate



.....

■ 5 Example of a sensor nameplate

- 1 Name of sensor
- 2 Manufacturer/certificate holder
- 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 symbol
- 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 approvalrelated specifications are listed (e.g. LA). If other optional specifications are also ordered, these are indicated collectively using the # placeholder symbol (e.g. #LA#).
- If the ordered optional specifications do not include any safety and approval-related specifications, they are indicated by the + placeholder symbol (e.g. XXXXXX-ABCDE +).

4.2.3 Symbols on the device

Symbol	Meaning
\triangle	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. Please consult the documentation for the measuring instrument to discover the type of potential danger and measures to avoid it.
<u> </u>	Reference to documentation Refers to the corresponding device documentation.
	Protective ground connection A terminal that must be connected to the ground prior to establishing any other connections.

5 Storage and transport

5.1 Storage conditions

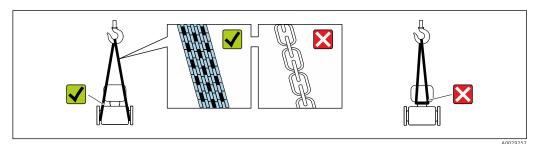
Observe the following notes for storage:

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

Storage temperature $\rightarrow \triangleq 306$

5.2 Transporting the product

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



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

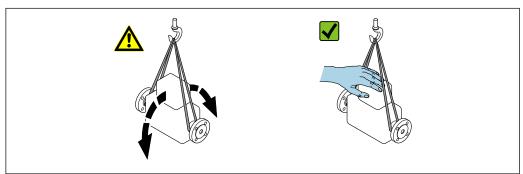
5.2.1 Measuring devices without lifting lugs

A 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

A 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:

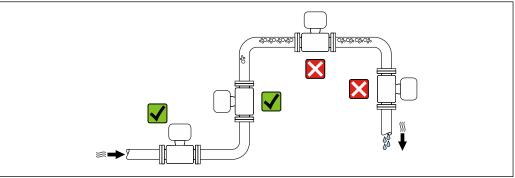
- Outer packaging of device
 - Stretch wrap made of polymer in accordance with EU Directive 2002/95/EC (RoHS)
- Packaging
 - Wood crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
 - Cardboard box in accordance with European packaging guideline 94/62/EC, recyclability confirmed by Resy symbol
- Transport material and fastening fixtures
 - Disposable plastic pallet
 - Plastic straps
 - Plastic adhesive strips
- Filler material Paper pads

6 Installation

6.1 Installation requirements

6.1.1 Installation position

Mounting location



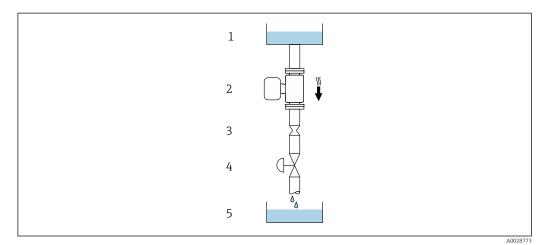
A00287

To avoid measurement errors caused by gas bubble formation in the measuring tube, avoid the following installation locations in the pipe:

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

Installation in down pipes

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



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

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

DN/	DN/NPS		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]	
300	12	210	8.27	
350	14	210	8.27	
400	16	210	8.27	

Orientation

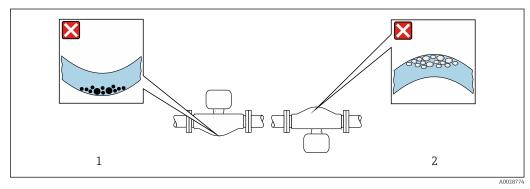
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation			Recommendation
A	Vertical orientation	A0015591	√ √ ¹⁾
В	Horizontal orientation, transmitter at top	A0015589	✓ ✓ ²⁾ → 1 7, 1 24

Orientation			Recommendation
С	Horizontal orientation, transmitter at bottom	A0015590	✓ ✓ ³) → • 7, • 24
D	Horizontal orientation, transmitter at side	A0015592	⊘ → 2 4

- 1) This orientation is recommended to ensure self-draining.
- 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.

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



- 7 Orientation of sensor with curved measuring tube
- 1 Avoid this orientation for media with entrained solids: Risk of solids accumulating
- 2 Avoid this orientation for outgassing media: Risk of gas accumulating

Inlet and outlet runs



Installation dimensions

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

6.1.2 Environmental and process requirements

Ambient temperature range

Measuring instrument	 -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: 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 $\rightarrow \implies 307$
- ► If operating outdoors: Avoid direct sunlight, particularly in warm climatic regions.
- You can order a weather protection cover from Endress+Hauser. $\rightarrow \triangleq 288$.

Static pressure

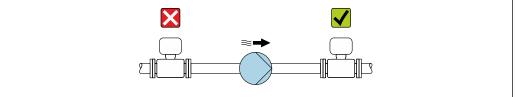
It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas.

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 static pressure is sufficiently high to prevent cavitation and outgassing.

For this reason, the following mounting locations are recommended:

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



Thermal insulation

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

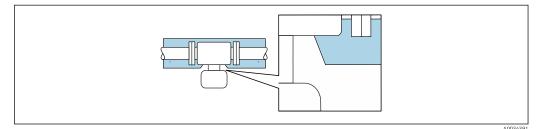
The following device versions are recommended for applications with thermal insulation: Version with extended neck:

Order code for "Measuring tube material", option SA with an extended neck length of 105 mm (4.13 in).

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: $80 \,^{\circ}\text{C} (176 \,^{\circ}\text{F})$
- ► Thermal insulation with exposed extension neck: We recommend that you do not insulate the extension neck in order to ensure optimum dissipation of heat.



■ 8 Thermal insulation with exposed extension neck

Thermal trisulation with exposed extension nect

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.
- Under critical climatic conditions, in particular, it is important to ensure that the temperature difference between the ambient temperature and the medium temperature is not >100 K. Suitable measures must be taken, such as heating or insulation.

NOTICE

Danger of overheating when heating

- ▶ Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 $^{\circ}$ C (176 $^{\circ}$ F).
- ► Ensure that sufficient convection takes place at the transmitter neck.
- ► Ensure that a sufficiently large area of the transmitter neck remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.
- ▶ 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.

Heating options

If a medium 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

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".

Vibrations

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

6.1.3 Special installation instructions

Drainability

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

Hygienic compatibility



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

Rupture disk

Process-related information: $\rightarrow \implies 309$.

▲ WARNING

Danger from medium escaping!

Medium escaping under pressure can cause injury or material damage.

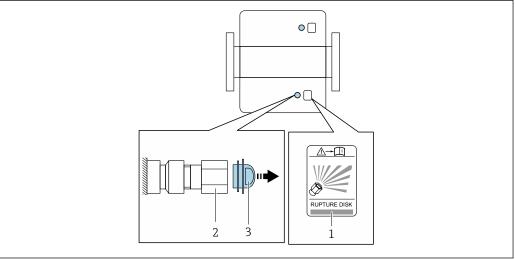
- ► Take precautions to prevent danger to persons and damage if the rupture disk is actuated.
- ▶ Observe the information on the rupture disk sticker.
- ► Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- ▶ Do not use a heating jacket.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

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

The transportation quard must be removed.

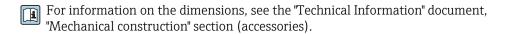
The existing connecting nozzles are not intended for the purpose of rinsing or pressure monitoring, but instead serve as the mounting location for the rupture disk.

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



A002994

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



Zero point verification and zero adjustment

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

- To achieve maximum measurement accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity media).
- For gas applications with low pressure.
- To achieve the highest possible measurement accuracy at low flow rates, the installation must protect the sensor from mechanical stress during operation.

To get a representative zero point, ensure that

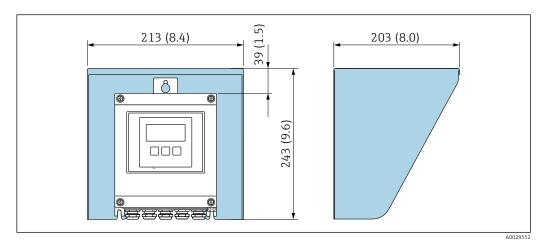
- any flow in the device is prevented during the adjustment
- the process conditions (e.g. pressure, temperature) are stable and representative

Verification and adjustment cannot be performed if the following process conditions are present:

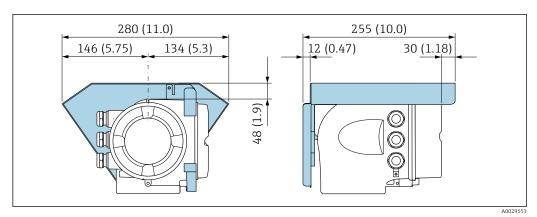
- Gas pockets
 - Ensure that the system has been sufficiently flushed with the medium. Repeat flushing can help to eliminate gas pockets
- Thermal circulation
 - In the event of temperature differences (e.g. between the measuring tube inlet and outlet section), induced flow can occur even if the valves 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.

Protective cover



 \blacksquare 9 Weather protection cover for Proline 500 – digital; unit mm (in)



■ 10 Weather protection cover for Proline 500 – unit mm (in)

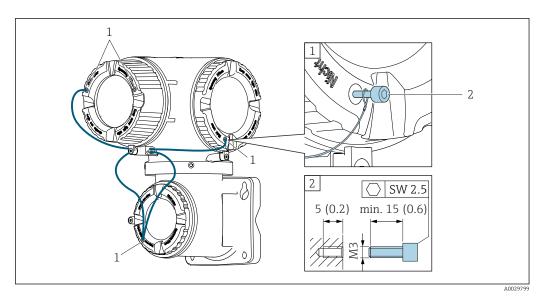
Cover locking: Proline 500

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.



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

6.2 Installing the 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 \emptyset 6.0 mm

For sensor

For flanges and other process connections: Use a suitable mounting tool.

6.2.2 Preparing the measuring instrument

- 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.

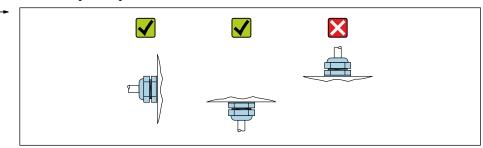
6.2.3 Installing the measuring instrument

▲ 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 and sealing surfaces 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 instrument or turn the transmitter housing so that the cable entries do not point upwards.



6.2.4 Installing the transmitter housing: Proline 500 – digital

NOTICE

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.

NOTICE

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

Required tools:

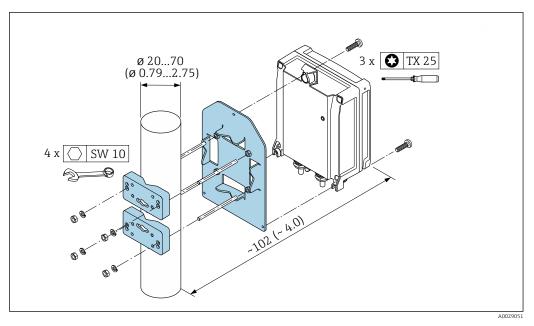
- Open-ended wrench AF 10
- Torx screwdriver TX 25

NOTICE

Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

► Tighten the fixing screws as per the tightening torque: 2.5 Nm (1.8 lbf ft)

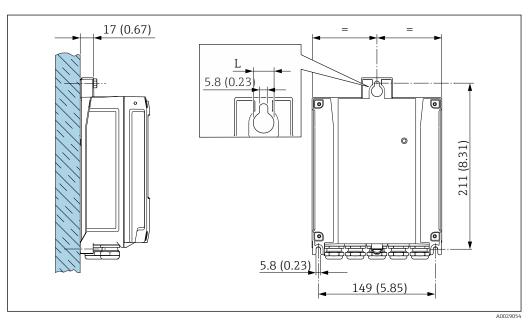


■ 11 Unit mm (in)

Wall mounting

Required tools:

Drill with drill bit Ø 6.0 mm



■ 12 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 loosely.
- 4. Fit the transmitter housing over the securing screws and mount in place.

5. Tighten the securing screws.

6.2.5 Installing the transmitter housing: Proline 500

NOTICE

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.

NOTICE

Excessive force can damage the housing!

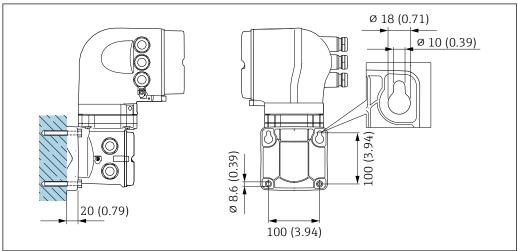
► Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

Wall mounting

Required tools Drill with drill bit Ø 6.0 mm



■ 13 Unit mm (in)

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

Pipe mounting

Required tools

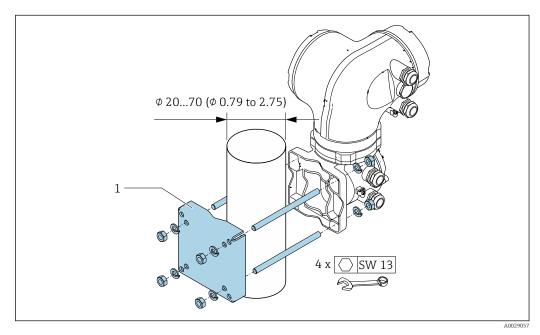
Open-ended wrench AF 13

MARNING

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.

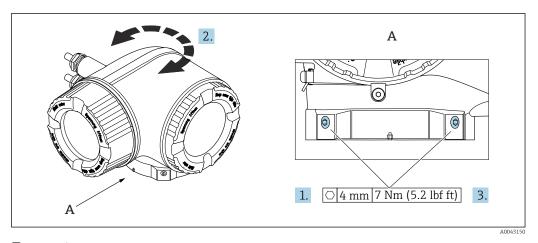
▶ Only mount the transmitter on a secure, fixed post on a stable surface.



■ 14 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.

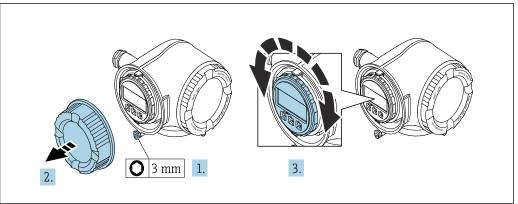


■ 15 Ex housing

- 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.



A003003

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

6.3 Post-installation check

Is the device undamaged (visual inspection)?		
Does the measuring instrument correspond to the measuring point specifications? For example: Process temperature → 307 Pressure (refer to the "Pressure-temperature ratings" section of the "Technical Information" document). Ambient temperature Measuring range		
Has the correct orientation for the sensor been selected → 🗎 23? • According to sensor type • According to medium temperature • According to medium properties (outgassing, with entrained solids)		
Does the arrow on the sensor match the direction of flow of the medium? → 🖺 23?		
Is the tag name and labeling correct (visual inspection)?		
Is the device sufficiently protected from precipitation and direct sunlight?		
Are the securing screw and securing clamp tightened securely?		

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 appropriate tool
- 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 connection cable

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

Protective grounding cable for the outer ground terminal

Conductor cross-section < 6 mm² (10 AWG)

Larger cross-sections can be connected using a cable lug.

The grounding impedance must be less than 2 Ω .

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

For custody transfer, all signal lines must be shielded cables (tinned copper braiding, optical coverage ≥ 85 %). The cable shield must be connected on both sides.

4 to 20 mA current input

Standard installation cable is sufficient.

Pulse/frequency/switch output

Standard installation cable is sufficient.

Relay output

Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

Ethernet-APL

Shielded twisted-pair cable. Cable type A is recommended.



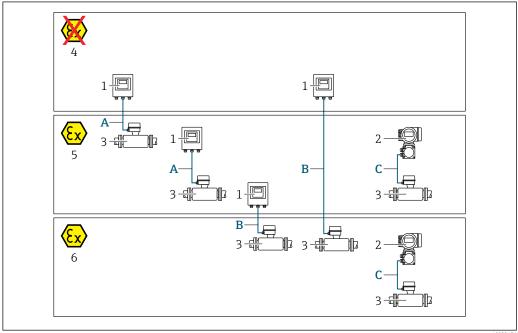
See https://www.profibus.com Ethernet-APL White Paper "

Cable diameter

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

Choice of connecting cable between the transmitter and sensor

Depends on the type of transmitter and the installation zones



- Proline 500 digital transmitter
- 2 Proline 500 transmitter
- Sensor Promass
- Non-hazardous area
- Hazardous area: Zone 2; Class I, Division 2
- Hazardous area: Zone 1; Class I, Division 1
- Standard cable to 500 digital transmitter $\rightarrow \implies 38$ 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
- Standard cable to 500 digital transmitter $\rightarrow \implies 38$ Transmitter installed in the hazardous area: Zone 2; Class I, Division 2/sensor installed in the hazardous area: Zone 1; Class I, Division 1
- 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		
Shield	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.		
Device plug, side 1	M12 socket, 5-pin, A-coded.		
Device plug, side 2	M12 plug, 5-pin, A-coded.		
Pins 1+2	Connected cores as twisted pair.		
Pins 3+4	Connected cores as twisted pair.		

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	$2 \times 2 \times 0.34~\text{mm}^2$ (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
Shield	Tin-plated copper braid, optical cover ≥ 85 %
Continuous 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) BN WT YE GN A B Fraction of the state o
3 x 2 x 0.50 mm ² (AWG 20)	100 m (300 ft)	3 x 2 x 0.50 mm ² (AWG 20) BN WT GY PK YE GN A B Fraction of the state of the s
4 x 2 x 0.50 mm ² (AWG 20)	150 m (450 ft)	4 x 2 x 0.50 mm ² (AWG 20) BN WT GY PK RD BU + - A B B GY YE GN • +, - = 1.5 mm ² • A, B = 0.5 mm ²

Optionally available connecting cable

Connecting cable for	Zone 1; Class I, Division 1		
Standard cable	$2\times2\times0.5~\text{mm}^2$ (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

	T		
Design	$6\times0.38\ mm^2$ PVC cable $^{1)}$ with individual shielded cores and common copper shield		
	With order code for "Test, certificate", option JQ $7\times0.38~\text{mm}^2$ PUR cable $^{1)}$ with individual shielded cores and common copper shield		
Conductor resistance	\leq 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: Standard version: 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: 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: 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.

PROFINET over Ethernet-APL

Supply voltage		_	Input/output 1 (Port 1)		output 2	Input/	output 3	Input/	output	Service interface (Port 2 ²⁾)
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)	CDI-RJ45
				Device-specific terminal assignment: adhesive label in terminal cover.						

- 1) Input/output only available for Proline 500 digital.
- 2) No PROFINET communication available on port 2

Transmitter and sensor connection housing: connecting cable

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

Terminal assignment and connection of the connecting cable:

- Proline 500 digital \rightarrow $\stackrel{ riangle}{ riangle}$ 43
- Proline 500 → 🖺 50

7.2.4 Available device plugs for Proline 500

Poevice plugs may not be used in hazardous areas!

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

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

7.2.5 Pin assignment of device plug

	Pin	Assignment	Coding	Plug/socket
3 4	1	Ethernet-APL signal -	A	Socket
2 1	2	Ethernet-APL signal +		
	3	Cable shield ¹		
	4	Not used		
	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 quaranteed.

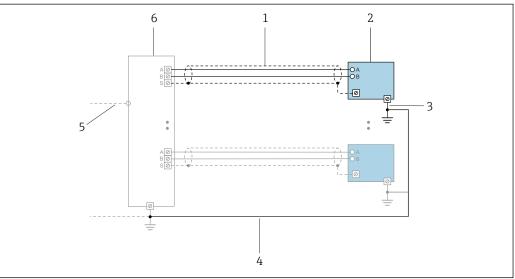
- 1. Observe national installation requirements and quidelines during installation.
- 2. Where there are large differences in potential between the individual grounding points,
 - connect only one point of the shielding directly to the reference ground.
- 3. In systems without potential equalization,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



■ 16 Connection example for PROFINET over Ethernet-APL

A004753

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

7.2.7 Preparing the 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 instrument is supplied without cable glands: Provide suitable cable gland for corresponding connecting cable.
- 3. If the measuring instrument is supplied with cable glands: Observe requirements for connecting cables $\rightarrow \blacksquare$ 36.

7.3 Connecting the device: Proline 500 - digital

NOTICE

An incorrect connection compromises electrical safety!

- Only properly trained specialist staff may perform electrical connection work.
- 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.

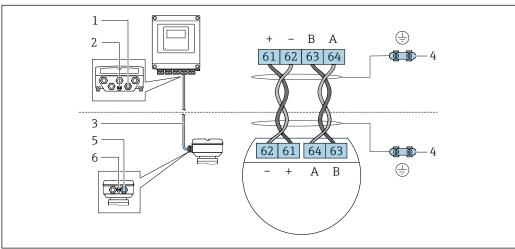
7.3.1 Connecting the connecting cable

NOTICE

Risk of damaging the electronic components!

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

Connecting cable terminal assignment



- Cable entry for cable on transmitter housing
- Protective earth (PE) 2
- 3 Connecting cable ISEM communication
- 4 Grounding via ground connection; in the version with a device plug, grounding is ensured through the plug
- 5 Cable entry for cable or connection of device plug on sensor connection housing
- Protective earth (PE)

Connecting the connecting cable to the sensor connection housing

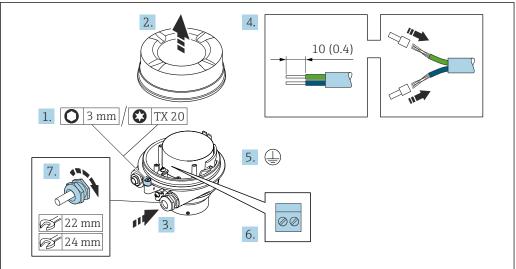
Connection via terminals with order code for "Sensor connection housing": Option L "Cast, stainless" → 🖺 44

Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals $\rightarrow \triangle 45$.

Connecting the sensor connection housing via terminals

For the device version with the order code for "Sensor connection housing": Option ${\bf L}$ "Cast, stainless"



A0029616

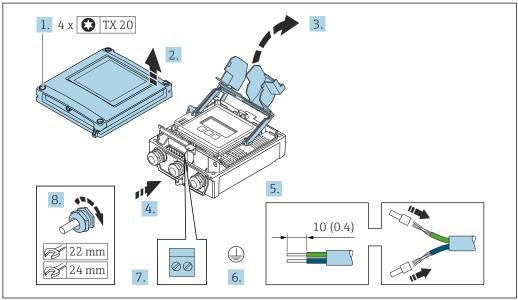
- 1. Loosen the securing clamp of the housing cover.
- 2. Unscrew the housing cover.
- 3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
- 5. Connect 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.

MARNING

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

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

Connecting the connecting cable to the transmitter

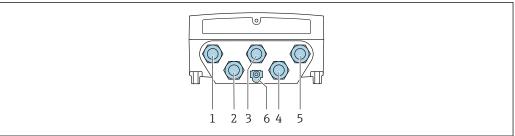


A002959

- 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.
- 8. Firmly tighten the cable glands.
 - ► The process for connecting the connecting cable is now complete.
- 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 →

 46.

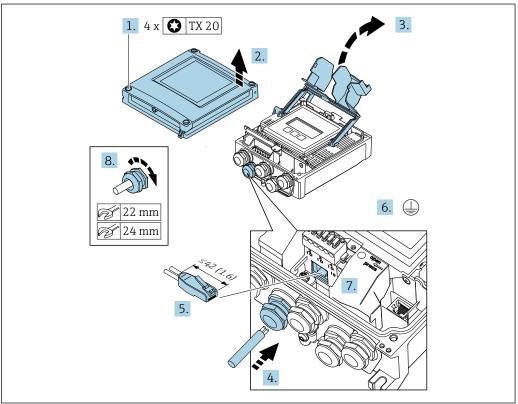
7.3.2 Connecting the transmitter



A002820

- 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)
- 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) → 49.

Connecting the plug

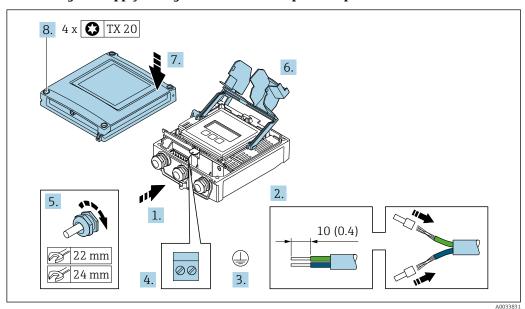


A003398

- 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.

- 5. Firmly tighten the cable glands.
 - ► This concludes the cable connection process.
- 6. Close the terminal cover.
- 7. Close the housing cover.

A WARNING

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

► Screw in the screw without using any lubricant.

NOTICE

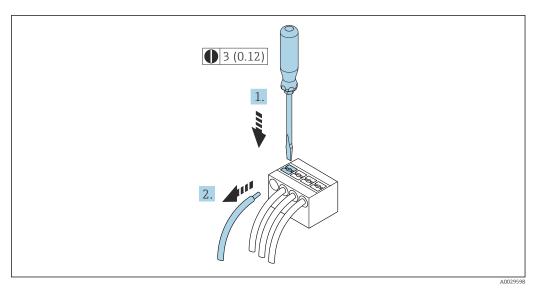
Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

- ► Tighten the fixing screws as per the tightening torque: 2.5 Nm (1.8 lbf ft)
- 8. Tighten the 4 fixing screws on the housing cover.

Removing a cable

To remove a cable from the terminal:



■ 17 Unit mm(in)

- 1. Use a flat-blade screwdriver to press down on the slot between the two terminal holes.
- 2. Remove the cable end from the terminal.

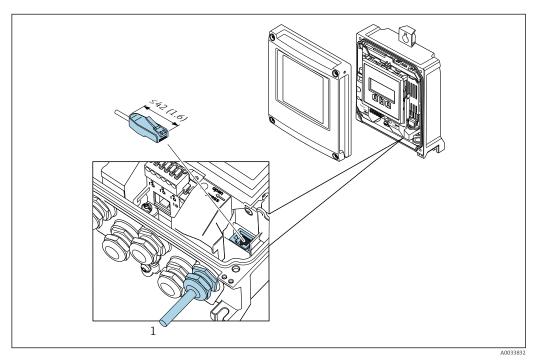
7.3.3 Integrating the transmitter into a network

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 thus be established via an M12 plug without opening the device.

7.4 Connecting the device: Proline 500

NOTICE

An incorrect connection compromises electrical safety!

- ► Only properly trained specialist staff may perform electrical connection work.
- ▶ 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.

7.4.1 Connecting the connecting cable

NOTICE

Risk of damaging the electronic components!

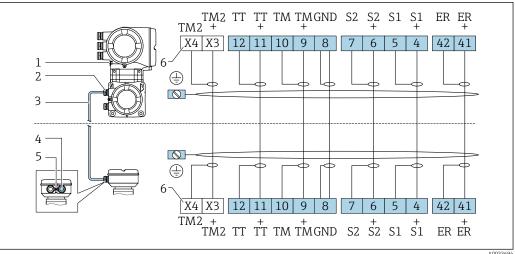
- ► Connect the sensor and transmitter to the same potential equalization.
- Only connect the sensor to a transmitter with the same serial number.

A CAUTION

Measurement error due to shortening of the connecting cable

► The connecting cable is ready for installation and must be used in the length supplied. Shortening the connecting cable can affect the sensor's measurement accuracy.

Connecting cable terminal assignment



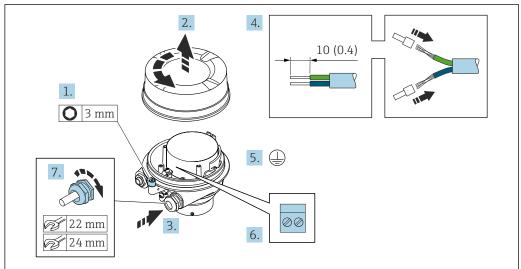
- 1 Protective earth (PE)
- 2 Cable entry for connecting cable on transmitter connection housing
- 3 Connecting cable
- Cable entry for connecting cable on sensor connection housing
- Protective earth (PE)
- Terminals X3, X4: temperature sensor

Connecting the connecting cable to the sensor connection housing

Connection via terminals with order code for "Housing":

Connecting the sensor connection housing via terminals

For the device version with the order code for "Housing": Option ${\bf L}$ "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.
 - The process for connecting the connecting cable is now complete.

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.

3. (0.4) (5. (1.4) (6. (2.4) (1.4) (

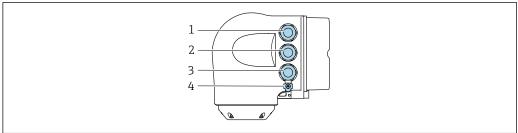
Attaching the connecting cable to the transmitter

A002959

- 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.
- 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.

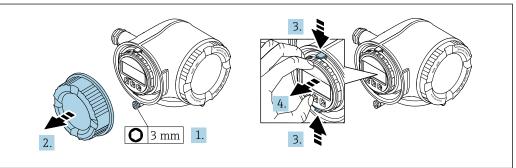
7.4.2 Connecting the transmitter



A0026781

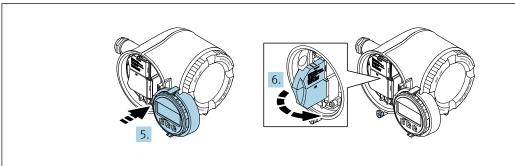
- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission, input/output or terminal connection for network connection via service interface (CDI-RJ45)
- 4 Protective earth (PE)
- In addition to connecting the device via PROFINET over Ethernet-APL and the available inputs/outputs, an additional connection option is also available: Integrate into a network via the service interface (CDI-RJ45) → 🖺 56.

Connecting connector



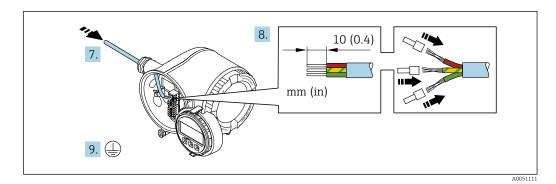
A002981

- 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.



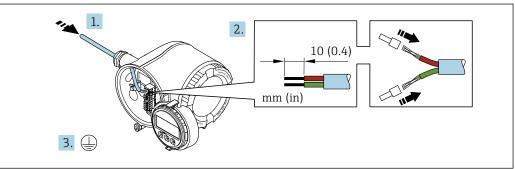
Δ002981

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

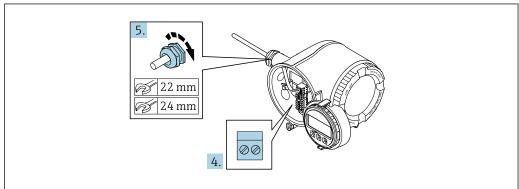


- 7. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 8. Strip the cable and cable ends and connect to terminals 26-27. In the case of stranded cables, also fit ferrules.
- 9. Connect protective earth (PE).
- 10. Firmly tighten the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

Connecting the supply voltage and additional inputs/outputs



- A00511
- 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.



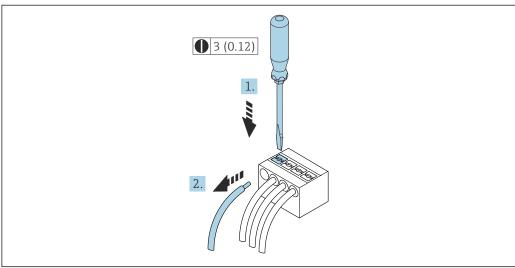
A003398

- 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.

- 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

To remove a cable from the terminal:



A0029598

■ 18 Unit mm(in)

- 1. Use a flat-blade screwdriver to press down on the slot between the two terminal holes.
- 2. Remove the cable end from the terminal.

7.4.3 Integrating the transmitter into a network

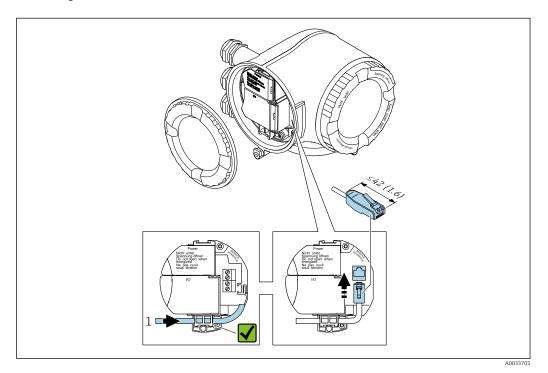
This section only presents the basic options for integrating the device into a network. For information on the procedure to follow to connect the transmitter correctly $\rightarrow \blacksquare 50$.

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. manufacturer 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:
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 thus be established via an M12 plug without opening the device.

7.5 Potential equalization

7.5.1 Requirements

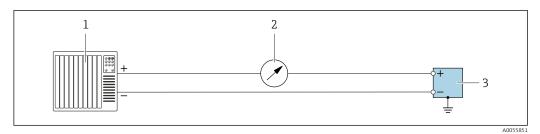
For potential equalization:

- 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 electric potential
- Use a ground cable with a minimum cross-section of 6 mm² (10 AWG) and a cable lug for potential equalization connections

7.6 Special connection instructions

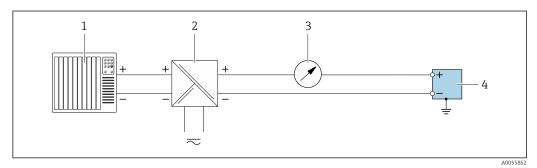
7.6.1 Connection examples

Current output 4 to 20 mA (without HART)



■ 19 Connection example for 4 to 20 mA current output (active)

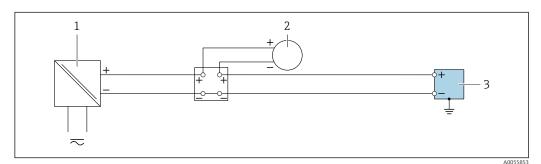
- 1 Automation system with current input (e.g. PLC)
- 2 Optional additional display unit: Observe maximum load
- B Flowmeter with current output (active)



20 Connection example for 4 to 20 mA current output (passive)

- 1 Automation system with current input (e.g. PLC)
- 2 Power supply
- 3 Optional additional display unit: Observe maximum load
- 4 Transmitter with current output (passive)

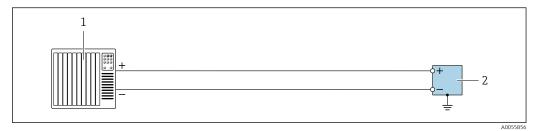
Current input 4 to 20 mA



 $lap{1}{2}$ 21 Connection example for 4 to 20 mA current input

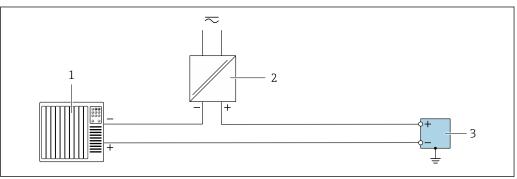
- 1 Power supply
- 2 External measuring instrument with 4 to 20 mA passive current output. e.g. pressure or temperature)
- 3 Transmitter with 4 to 20 mA current input

Pulse output/frequency output/switch output



■ 22 Connection example for pulse output/frequency output/switch output (active)

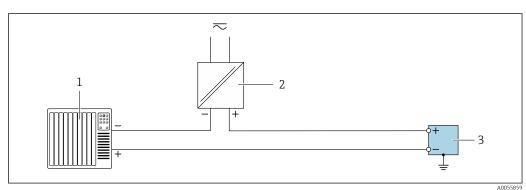
- 1 Automation system with pulse input/frequency input/switch input (e.g. PLC)
- 2 Transmitter with pulse output/frequency output/switch output (active)



A0055

- 23 Connection example for pulse output/frequency output/switch output (passive)
- 1 Automation system with pulse input/frequency input/switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter with pulse output/frequency output/switch output (passive)

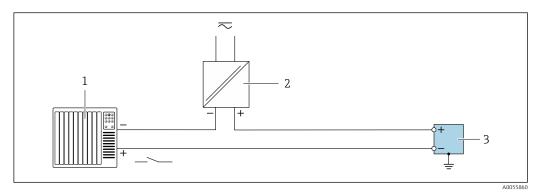
Relay output



 \blacksquare 24 Connection example for relay output

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

Status input



■ 25 Connection example for status input

- Automation system with switch output passive e.g. PLC)
- Power supply
- Transmitter with status input

Ethernet-APL



See https://www.profibus.com Ethernet-APL White Paper "

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

ЕН	Endress+Hauser		
Promass	nstrument family		
500	Transmitter		
XXXX	Serial number of the device		

The device name currently used is displayed in Setup \rightarrow 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	
2	64	
3	32	
4	16	Configurable part of the device name
5	8	
6	4	

DIP switch	Bit	Description
7	2	
8	1	

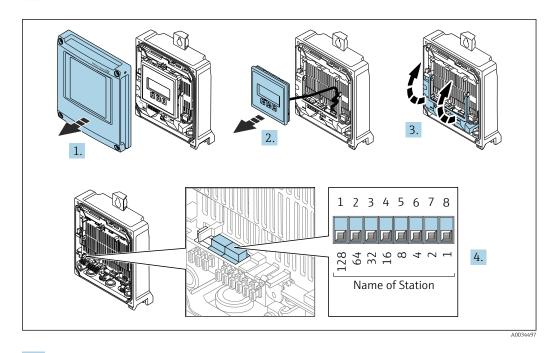
Example: setting the device name EH-PROMASS500-065

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

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 $\rightarrow \triangleq 61$.

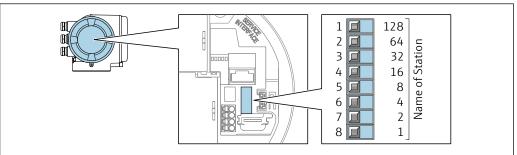


- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- 3. Fold open the terminal cover.
- 4. Set the desired device name using the corresponding DIP switches on the I/O electronics module.
- 5. Reassemble the transmitter in the reverse order.
- 6. Reconnect the device to 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 $\rightarrow \triangleq 62$.



40034408

- 1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
- 2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary .
- 3. Set the desired device name using the corresponding DIP switches on the I/O electronics module.
- 4. 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.

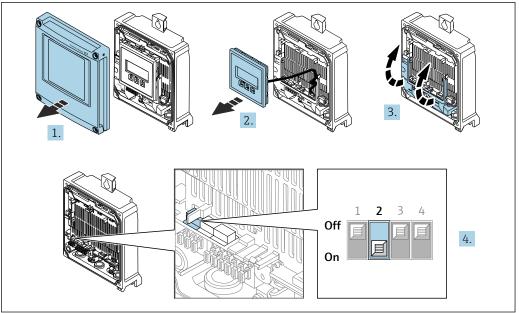
- The serial number used as part of the device name in the factory setting is not saved. It is not possible to reset the device name to the factory setting with the serial number. The device name is empty following the reset.
 - When assigning the device name via the automation system: assign the device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



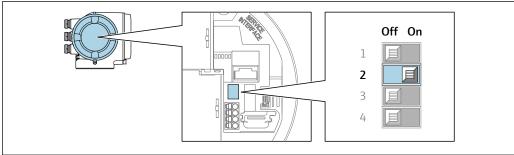
A003450

- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- 3. Fold open the terminal cover.
- 4. Set DIP switch no. 2 on the I/O electronics module from **OFF** \rightarrow **ON**.
- 5. 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. DIP switch no. 2 on the I/O electronics module from **OFF** \rightarrow **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.

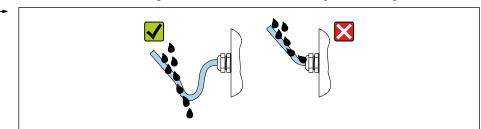
7.8 Ensuring the degree of protection

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

To ensure degree of protection IP66/67, Type 4X enclosure, carry out the following steps after making 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").



A0029278

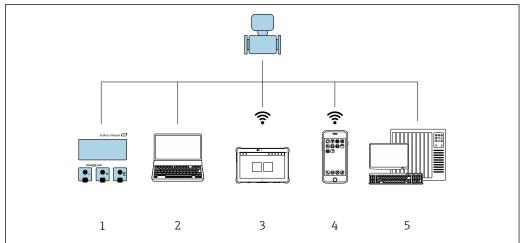
6. The supplied cable glands and plastic dummy plugs used for the threaded cable entries do not ensure degree of protection IP66/67, Type 4X enclosure. To achieve this degree of protection, cable glands and plastic dummy plugs that are not used must be replaced by threaded dummy plugs with the degree of protection IP66/67, Type 4X enclosure.

7.9 Post-connection check

Are the device and cable undamaged (visual inspection)?	
Is the protective earthing established correctly?	
Do the cables used meet the requirements ?	
Are the mounted cables strain-relieved and fixed securely in place?	
Are all cable glands installed, securely tightened and leak-tight? Cable run with "water trap" → 🖺 63?	
Is the terminal assignment correct ?	
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

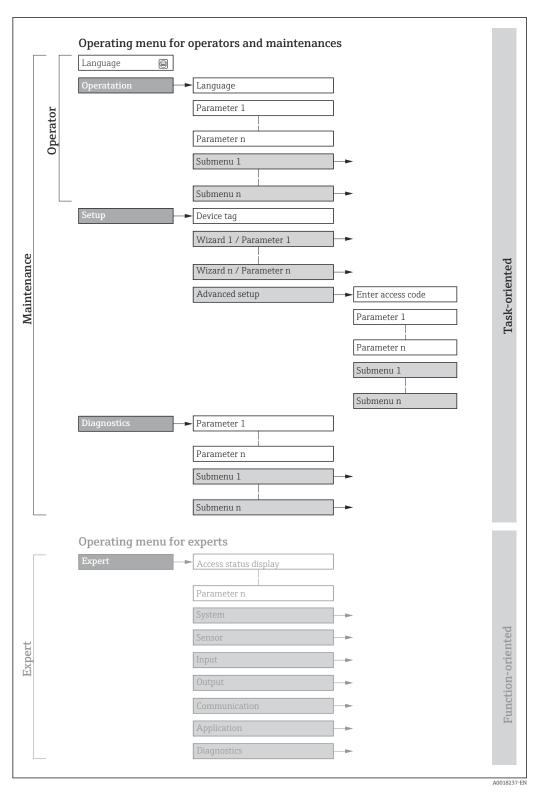


A004622

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

8.2 Structure and function of the operating menu

8.2.1 Structure of the operating menu



 \blacksquare 26 Schematic structure of the operating menu

8.2.2 Operating philosophy

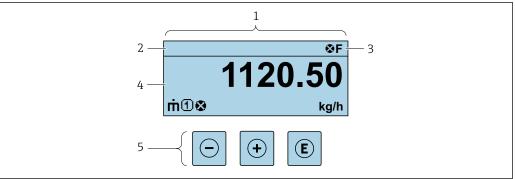
The individual parts of the operating menu are assigned to certain user roles (e.g. operator, maintenance etc.). Each user role contains typical tasks within the device life cycle.

Menu/pa	arameter	User role and tasks	Content/meaning
Language	Task-	Role "Operator", "Maintenance"	Defining the operating language
Operation	oriented	Tasks during operation: Configuring the operational display Reading measured values	 Defining the operating language Defining the web server operating language Resetting and controlling totalizers Configuring the operational display (e.g. display format, display contrast) Resetting and controlling totalizers
Setup		"Maintenance" role Commissioning: Configuring the measurement Configuring the inputs and outputs Configuring the communication interface	Wizard for quick commissioning: Configuring the system units Configuring the communication interface Defining the medium Displaying the I/O configuration Configuring the inputs Configuring the outputs Configuring the low flow cut off Configuring the low flow cut off Configuring the detection of partially filled and empty pipes Advanced setup For more customized configuration of the measurement (adaptation to special measuring conditions) Calculated process variables Sensor adjustment Configuring the display Configuring the WLAN settings Data backup Administration (define access code, reset measuring instrument)
Diagnostics		"Maintenance" role Troubleshooting: Diagnostics and elimination of process and device errors Measured value simulation	Contains all parameters for error detection and analyzing process and device errors: Diagnostic list Contains up to 5 currently pending diagnostic messages. Event logbook Contains event messages that have occurred. Device information Contains information for identifying the device. Measured values Contains all current measured values. Data logging submenu with the "Extended HistoROM" order option Storage and visualization of measured values Heartbeat Technology The functionality of the device is checked on demand and the verification results are documented. Simulation Used to simulate measured values or output values. Testpoints

Menu/pa	arameter	User role and tasks	Content/meaning
Expert	Function- oriented	Tasks that require detailed knowledge of the function of the device: Commissioning measurements under difficult conditions Optimal adaptation of the measurement to difficult conditions Detailed configuration of the communication interface Error diagnostics in difficult cases	Contains all the parameters of the device and makes it possible to access these parameters directly using an access code. The structure of this menu is based on the function blocks of the device: System Contains all higher-level device parameters that do not affect measurement or measured value communication. Sensor Configuring the measurement. Input Configuring the status input. Output Configuring the analog current outputs as well as the pulse/frequency and switch output. Communication Configuring the digital communication interface and the web server. Application Configuring 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 the Heartbeat Technology menu.

8.3 Access to operating menu via local display

8.3.1 Operational display



A002934

- 1 Operational display
- 2 Tag name
- 3 Status area
- 4 Display area for measured values (up to 4 lines)
- 5 Operating elements $\rightarrow \Box 73$

Status area

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

- Status signals → 🗎 206
 - **F**: Failure
 - **C**: Function check
 - **S**: Out of specification
 - **M**: Maintenance required
- Diagnostic behavior → 🖺 207
 - Alarm
 - <u></u> : 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
ṁ	Mass flow
Ü	 Volume flow Corrected volume flow
ρ	 Density Reference density
4	Temperature

The number and display format of the measured variables can be configured via the **Format display** parameter ($\Rightarrow \triangleq 142$).

Totalizer

Symbol	Meaning	
Σ	Totalizer The measurement channel number indicates which of the three totalizers is displayed.	

Input

Symbol	Meaning
€	Status input

Measurement channel numbers

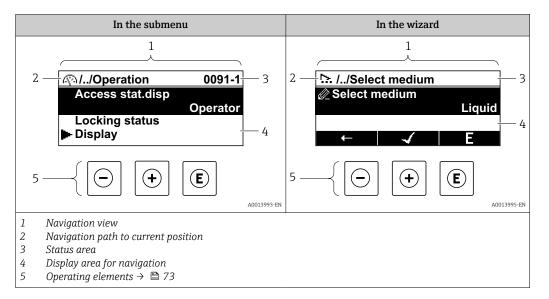
Symbol	Meaning	
	Measurement channel 1 to 4	
1 4	The measurement channel number is displayed only if more than one channel is present for the same measured variable type (e.g. Totalizer 1 to 3).	

Diagnostic behavior

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

The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable.

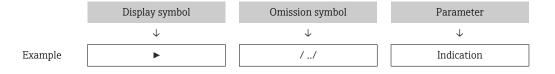
8.3.2 Navigation view

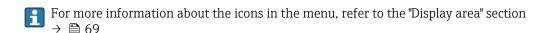


Navigation path

The navigation path to the current position is displayed at the top left in the navigation view and consists of the following elements:

- The display symbol for the menu/submenu (►) or the wizard (►).
- An omission symbol (/ ../) for operating menu levels in between.
- Name of the current submenu, wizard or parameter





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 to the parameter (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 $\rightarrow \stackrel{ riangle}{=} 206$

Display area

Menus

Symbol	Meaning
P	Operation Is displayed: ■ In the menu next to the "Operation" selection ■ At the left in the navigation path in the Operation menu

۶	Setup Is displayed: In the menu next to the "Setup" selection At the left in the navigation path in the Setup menu
ય	Diagnosis Is displayed: ■ In the menu next to the "Diagnostics" selection ■ At the left in the navigation path in the Diagnostics menu
₹.	Expert Is displayed: 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
75.	Wizards
Ø.	Parameters within a wizard No display symbol exists for parameters in submenus.

Locking procedure

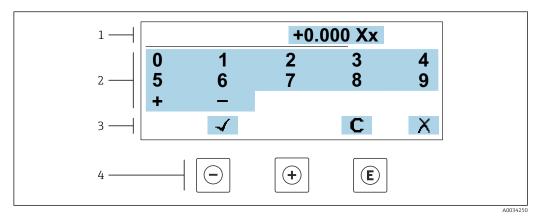
Symbol	Meaning
û	Parameter locked When displayed in front of a parameter name, indicates that the parameter is locked. ■ By a user-specific access code ■ By the hardware write protection switch

Wizards

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

8.3.3 Editing view

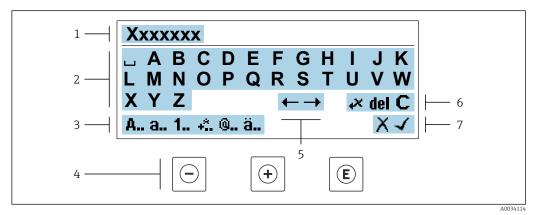
Numeric editor



■ 27 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



■ 28 For entering text in parameters (e.g. device tag)

- 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

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

Operating key	Meaning
E	 Enter key Pressing the key briefly confirms your 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
А	Upper case
a	Lower case
1	Numbers
+*.	Punctuation marks and special characters: = + - * / 2 3 1 /4 1 /2 3 /4 () [] < > { }
@	Punctuation marks and special characters: ' " `^. , ; : ? ! % μ ° € \$ £ ¥ § @ # / \ I ~ & _
ä	Umlauts and accents

Controlling data entries

Symbol	Meaning
←→	Move entry position
X	Reject entry
4	Confirm entry
_* ×	Delete character immediately to the left of the entry position
del	Delete character immediately to the right of the entry position
С	Clear all the characters entered

8.3.4 Operating elements

Operating key	Meaning
	Minus key In menu, submenu Moves the selection bar upwards in a picklist In wizards Goes to previous parameter In the text and numeric editor Move the entry position to the left.
(+)	Plus key In menu, submenu Moves the selection bar downwards in a picklist In wizards Goes to the next parameter In the text and numeric editor Move the entry position to the right.
E	Enter key In the operational display Pressing the key briefly opens the operating menu. In menu, submenu Pressing the key briefly: Opens the selected menu, submenu or parameter. Starts the wizard. If help text is open, closes the help text of the parameter. Pressing the key for 2 s in a parameter: If present, opens the help text for the function of the parameter. In wizards Opens the editing view of the parameter and confirms the parameter value In the text and numeric editor Pressing the key briefly confirms your selection. Pressing the key for 2 s confirms your entry.
-++	Escape key combination (press keys simultaneously) In menu, submenu Pressing the key briefly: Exits the current menu level and takes you to the next higher level. If help text is open, closes the help text of the parameter. Pressing the key for 2 s returns you to the operational display ("home position"). In wizards Exits the wizard and takes you to the next higher level In the text and numeric editor Exits the Editing view without applying the changes.
-+E	 Minus/Enter key combination (press and hold down the keys simultaneously) If keypad lock is active: Pressing the key for 3 s deactivates the keypad lock. If keypad lock is not active: Pressing the key for 3 s opens the context menu including the option for activating the keypad lock.

8.3.5 Opening the context menu

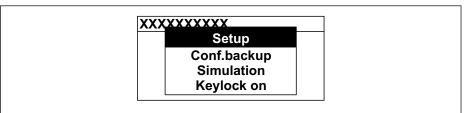
Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Data backup
- Simulation

Calling up and closing the context menu

The user is in the operational display.

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



A0034608-EN

- 2. Press \Box + \pm 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 **E** to confirm the selection.
 - ► The selected menu opens.

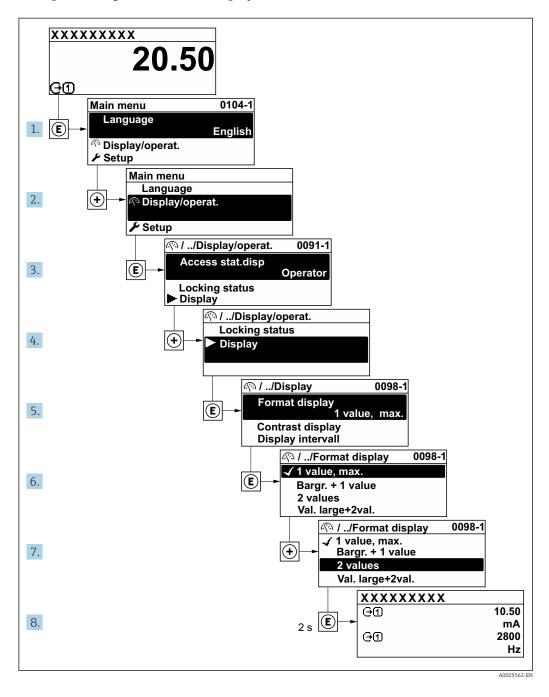
74

8.3.6 Navigating and selecting from list

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

For an explanation of the navigation view with symbols and operating elements $\Rightarrow \triangleq 69$

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



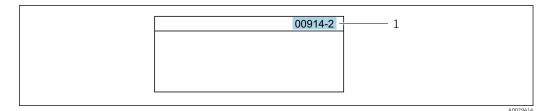
8.3.7 Calling the parameter directly

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

Navigation path

Expert → 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

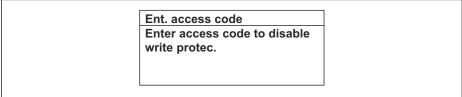
8.3.8 Calling up help text

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 E for 2 s.
 - ► The help text for the selected parameter opens.



A0014002-EN

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

8.3.9 Changing the parameters

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

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

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 $\rightarrow \implies 71$, for a description of the operating elements $\rightarrow \implies 73$

8.3.10 User roles and related access authorization

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).	V	V
After an access code has been defined.	V	✓ 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.	V	_ 1)

- 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

Parameter write protection via local operation can be disabled by entering the user-specific access code in the **Enter access code** parameter ($\rightarrow \implies 148$) 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 Function range

The integrated web server can be used to operate and configure the device via a web browser via Ethernet-APL, service interface (CDI-RJ45) or via WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is displayed and can be used to monitor device health. Furthermore the device data can be managed and the network parameters can be configured.

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

For additional information on the web server, see the Special Documentation for the device. $\rightarrow \stackrel{\triangle}{=} 322$

8.4.2 Requirements

Computer hardware

Hardware	Interface		
	RJ45	WLAN	
Interface	The computer must have a RJ45 interface. ¹⁾	The operating unit must have a WLAN interface.	
Connection	Standard Ethernet cable	tandard Ethernet cable Connection via wireless local area network.	
Screen	Recommended size: ≥12" (depends on the screen resolution)		

¹⁾ Recommended cable: CAT5e, CAT6 or CAT7, with shielded plug (e.g. YAMAICHI product; part no. Y-ConProfixPlug63/Prod. ID: 82-006660)

Computer software

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

Computer settings

Settings	Interface		
	RJ45	WLAN	
User rights	Appropriate user rights (e.g. administrator rights) for TCP/IP and proxy server settings are necessary (e.g. for adjusting the IP address, subnet mask etc.).		
Proxy server settings of the web browser	The web browser's <i>Use a Proxy Server for Your LAN</i> setting must be deselected .		
JavaScript	JavaScript must be enabled.	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.	The WLAN display requires JavaScript support.	
	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	Use only the active network connections for the measuring instrument.		
	Switch off all other network connections such as WLAN for example.	Switch off all other network connections.	

In the event of connection problems: \rightarrow $\stackrel{ riangle}{ riangle}$ 201

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 → 🖺 84

Measuring device: via WLAN interface

Device	WLAN interface	
Measuring device	The measuring device has a WLAN antenna: Transmitter with integrated WLAN antenna Transmitter with external WLAN antenna	
Web server	Web server and WLAN must be enabled; factory setting: ON For information on enabling the Web server → 84	

8.4.3 Connecting the device

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 connecting cable..

Configuring the Internet protocol of the computer

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

IP address of the device: 192.168.1.212 (factory setting)

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 ($\Rightarrow \triangleq 110$).
- 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 \mathbf{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 $\rightarrow \triangleq 86$.
- 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 \rightarrow 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 device

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

Please note the following to avoid a network conflict:

- ► Avoid accessing the measuring instrument simultaneously from the same mobile device 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

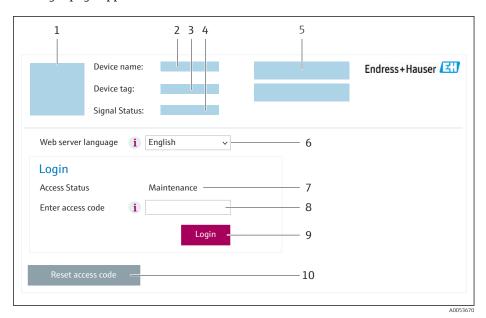
► After configuring the device:

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 (→ 🖺 167)
- If a login page does not appear, or if the page is incomplete $\rightarrow \stackrel{\triangle}{=} 201$

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.

82

8.4.5 User interface



1 Function row

- 2 Local display language
- 3 Navigation area

Header

The following information appears in the header:

- Device name
- Device tag
- Device status with status signal \rightarrow 🖺 209
- Current measured values

Function row

Functions	Meaning		
Measured values	Displays the measured values of the measuring instrument		
Menu	 Access to the operating menu from the measuring instrument The structure of the operating menu is the same as for the local display Detailed information on the "Description of Device Parameters" operating menu 		
Device status	Displays the diagnostic messages currently pending, listed in order of priority		
Data management	Data exchange between computer and measuring instrument: Device configuration: Load settings from the device (XML format, save configuration) Save settings to the device (XML format, restore configuration) Logbook - Export Event logbook (.csv file) Documents - Export documents: Export backup data record (.csv file, create documentation of the measuring point configuration) Verification report (PDF file, only available with the "Heartbeat Verification" application package) Firmware update - Flashing a firmware version		
Network	Configuration and checking of all the parameters required for establishing the connection to the measuring instrument: 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 \rightarrow Communication \rightarrow Web server

Parameter overview with brief description

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

Function scope of the "Web server functionality" parameter

Option	Description
Off	The Web server is completely disabled.Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	 The complete 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.

84

- 3. If no longer needed: Reset the modified properties of the Internet protocol (TCP/IP) $\rightarrow \blacksquare 80$.
- 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 $ON \rightarrow OFF$). Afterwards, the IP address of the device is active again for network communication.

8.5 Operation via SmartBlue app

The device can be operated and configured with the SmartBlue App.

- The SmartBlue app must be downloaded onto a mobile device for this purpose
- For information on the compatibility of the SmartBlue app with mobile devices, see Apple App Store (iOS devices) or Google Play Store (Android devices)
- Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.
- The Bluetooth® function can be deactivated after initial device setup.



■ 30 QR code for free Endress+Hauser SmartBlue App

Download and installation:

- 1. Scan the QR code or enter **SmartBlue** in the search field of the Apple App Store (iOS) or Google Play Store (Android).
- 2. Install and start the SmartBlue app.
- 3. For Android devices: enable location tracking (GPS) (not required for iOS devices).
- 4. Select a device that is ready to receive from the device list displayed.

Login:

- 1. Enter the user name: admin
- 2. Enter the initial password: serial number of the device
- 3. Change the password after logging in for the first time

Information on password and reset code

For devices that meet the requirements of IEC 62443-4-1 "Secure product developement lifecycle management" ("ProtectBlue"):

- If the user-defined password is lost: refer to the user management instructions and the reset button in the operating manual.
- Refer to the associated Security Manual (SD).

For all other devices (without "ProtectBlue"):

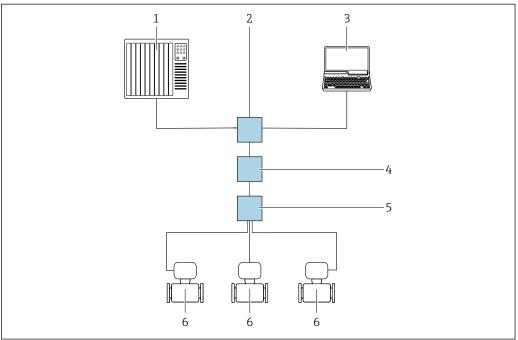
- If the user-defined password is lost, access can be restored via a reset code. The reset code is the serial number of the device in reverse. The original password is once again valid after the reset code has been entered.
- The reset code can also be changed in addition to the password.
- If the user-defined reset code is lost, the password can no longer be reset via the SmartBlue app. Contact Endress+Hauser Service in this case.

8.6 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.

8.6.1 Connecting the operating tool

Via APL network



A00461

■ 31 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 for accessing the 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 instrument

Service interface

Via service interface (CDI-RJ45)

To configure the device on site, a point-to-point connection can be established. The connection is made with the housing open, directly via the device's service interface (CDI-RJ45).

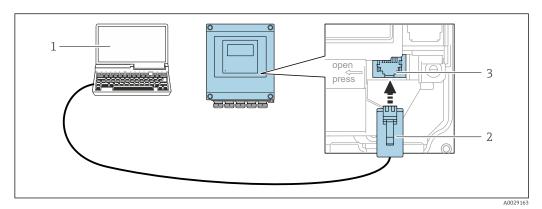


An adapter for the RJ45 to the M12 connector is optionally available for the non-hazardous area:

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

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

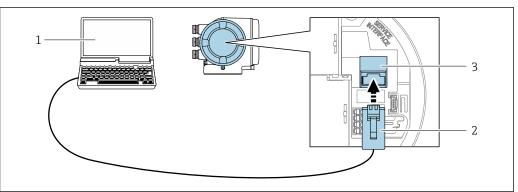
Proline 500 – digital transmitter



■ 32 Connection via service interface (CDI-RJ45)

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

Proline 500 transmitter



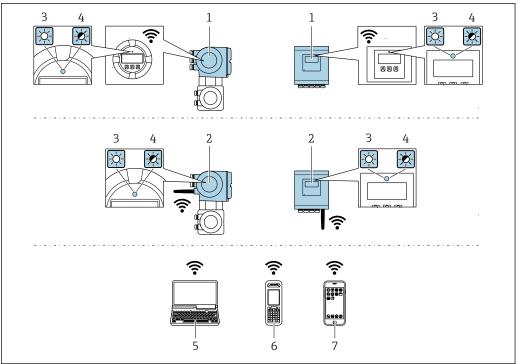
A0027563

■ 33 Connection via service interface (CDI-RJ45)

- 1 Computer with web browser for accessing integrated web server or with operating tool e.g, "FieldCare", "DeviceCare", with COM DTM "CDI Communication TCP/IP" or Modbus DTM
- 2 Standard Ethernet connecting cable with RJ45 connector
- 3 Service interface (CDI-RJ45) of the measuring instrument 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"



A003456

- 1 Transmitter with integrated WLAN antenna
- 2 Transmitter with external WLAN antenna
- 3 LED lit constantly: WLAN reception is enabled on measuring instrument
- 4 LED flashing: WLAN connection established between operating unit and measuring instrument
- 5 Computer with WLAN interface and web browser for accessing integrated device web server or with operating tool e.g FieldCare, DeviceCare)
- 6 Mobile handheld terminal with WLAN interface and web browser for accessing integrated device web server or operating tool (e.g. FieldCare, DeviceCare)
- 7 Smartphone 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	IP66/67
Available antennas	 Internal antenna External 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	 Internal antenna: typically 10 m (32 ft) External antenna: typically 50 m (164 ft)
Materials (external 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

Configuring the Internet protocol of the mobile device

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

Please note the following to avoid a network conflict:

- ► Avoid accessing the measuring instrument simultaneously from the same mobile device 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

- 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.

8.6.2 FieldCare

Function range

FDT-based (Field Device Technology) 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 → 🖺 86
- WLAN interface → 🗎 87

Typical functions:

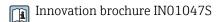
- Transmitter parameter configuration
- Loading and saving of device data (upload/download)
- Documentation of the measuring point
- Visualization of the measured value memory (line recorder) and event logbook
- Operating Instructions BA00027SOperating Instructions BA00059S
- Source for device description files $\rightarrow = 91$

8.6.3 DeviceCare

Function range

Tool for connecting and configuring 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.



Source for device description files → 🖺 91

8.6.4 SIMATIC PDM

Function range

Standardized, vendor-independent program from Siemens for the operation, configuration, maintenance and diagnosis of intelligent field devices via the PROFINET protocol.

Source for device description files → 🖺 91

9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

Firmware version	01.00.zz	 On the title page of the manual 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 \rightarrow Communication \rightarrow Physical block \rightarrow Device type
Device revision	1	_
PROFINET over Ethernet-APL version	2.43	Version of the PROFINET specification

For an overview of the various firmware versions for the device $\rightarrow \triangleq 284$

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	 www.endress.com → Downloads area USB stick (contact Endress+Hauser) E-mail → Downloads area
DeviceCare	 www.endress.com → Downloads area E-mail → Downloads area
SIMATIC PDM (Siemens)	www.endress.com → Downloads area

9.2 Device master file (GSD)

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

Two different device master files (GSD) can be used: Manufacturer-specific GSD and 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	
ЕН	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 line	
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	
	Analog input	Mass flow	
	Analog input	Density	
0x9700	Analog input	Temperature	
	Totalizer	Totalizer value: mass/mass Totalizer Control	

Where to acquire the manufacturer-specific GSD:

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

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.

	Measuring device		Direction	Control	
API	Modules	Slot	Sub-slot	Data flow	system
	Analog Input 1 (Mass flow)	1	1	→	
	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	→ ←	
0x9700	Totalizer 2	70	1	<i>→</i>	PROFINET
	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	→	1
	Binary Output 2	211	1	+	1
	Enumerated Output	240	1	+	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
2032	1	Mass flow Volume flow Corrected volume flow Density Reference density Temperature Signal asymmetry Exciter current Application-specific output 0 Application-specific output 1 Index inhomogeneous medium Index sensor asymmetry Current output 1 Current output 1 Current output 2 Current output 2 Current output 3 Additional input variables with the Heartbeat Verification application amplitude 0 Oscillation amplitude 0 Oscillation amplitude 0 Oscillation amplitude 1 Exciter current Socillation amplitude 1 Carrier pipe temperature Oscillation amplitude 1 Exciter current 1 HBSI Additional input variables with the Concentration Measurement application package Carrier routput 1 Tube damping fluctuation 1 Exciter current 1 HBSI Additional input variables with the Concentration Measurement application package Carrier routme flow Carrier mass flow Target volume flow Carrier routme flow Carrier corrected volume flow Carrier corrected volume flow Additional input variables with the Petroleum application package Alternative reference density GSV flow Alternative GSV flow SSW volume flow Adternative GSV flow SSW volume flow Water density Water density Will mass flow Unit of the Measure of the Petroleum application SSW volume flow Water density Water density Will mass flow Unit woulme flow Water mass flow Unit of the Measure of the Petroleum application Maternative GSV flow SSW volume flow Water density Unit mass flow Unit woulme flow Water density Unit mass flow Unit woulme flow Water volume flow
		Oil corrected volume flowWater corrected volume flow

Data structure

Output data of Analog Output

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

1) Status coding $\rightarrow \blacksquare 103$

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

i

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

Slot	Compensation value
2032	Application-specific Input module 0
2032	Application-specific Input module 1

Data structure

Input data of Application-specific Input module

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Measure	Status 1)			

1) Status coding $\rightarrow \blacksquare 103$

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)
	1	0	Verification was not performed.	O (device function not active)
		1	The device has failed the verification.	1 (device function active)
80		2	Currently performing verification.	
		3	Verification ended.	
		4	The device has failed the verification.	

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

Selection: device function, binary input, slot 81

Slot	Sub-slot	Bit	Device function	Status (meaning)	
	1	0	Partially filled pipe detection	• 0 (device function not active)	
		1	Low flow cut off	1 (device function active)	
		2	Reserved		
81		1	3	Reserved	
01		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 $\rightarrow \blacksquare 103$

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	
Measure	Measured value: floating point number (IEEE 754)				

1) Status coding \rightarrow $\stackrel{\triangle}{=}$ 103

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
Measure	Measured value: floating point number (IEEE 754)			

1) Status coding $\rightarrow \blacksquare$ 103

Selection: output variable

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

Slot	Sub-slot	Value	Input variable
	1	1	Reset to "0"
7071		2	Preset value
/0/1		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	Mass flow Volume flow Corrected volume flow Target mass flow Target mass flow Target volume flow Carrier volume flow Carrier volume flow Carrier corrected volume flow GSV flow SW flow NSV flow NSV alternative NSV flow NSV alternative flow SW volume flow Oil mass flow Water mass flow Oil volume flow Oil corrected volume flow Oil corrected volume flow Raw value mass flow Raw value mass flow

- $\label{eq:concentration} \textbf{Only available with the Concentration application package}$
- 2) Only available with the Petroleum application package

Data structure

Totalizer input data

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

1) Status coding → 🖺 103

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.

Slot	Sub-slot	Input variable
70 to 71	1	■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Target mass flow ¹⁾ ■ Carrier mass flow ■ Target volume flow ■ Carrier volume flow ■ Carrier corrected volume flow ■ Carrier corrected volume flow ■ GSV flow ²⁾ ■ Alternative GSD flow ²⁾ ■ Alternative NSV flow ²⁾ ■ Alternative NSV flow ²⁾ ■ Alternative NSV flow ²⁾ ■ Oil mass flow ²⁾ ■ Oil wass flow ²⁾ ■ Water mass flow ²⁾ ■ Oil volume flow ²⁾ ■ Oil corrected 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
Measure	Measured value: floating point number (IEEE 754)			Status 1)

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"
70 to 71		2	Preset value
70 to 71		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

i

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

Slot	Sub-slot	Compensation value
160		Pressure
161		Temperature
162		Reference density
163	1	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
Measure	Measured value: floating point number (IEEE 754)		EEE 754)	Status 1)

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 fails afe mode: Expert \rightarrow Sensor \rightarrow 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.
- $\, \blacksquare \,$ Off option: The fails afe 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)
		0	Start the verification.	A change of status from 0 to 1
		1	Reserved	starts the Heartbeat Verification 1)
		2	Reserved	
210	1	3	Reserved	
210	1	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)
		0	Flow override	O (disable device function)
		1	Zero adjust	■ 1 (enable device function)
		2	Relay output	Relay output value:
211	1	3	Relay output	• 0 • 1
211	1	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 $\rightarrow \blacksquare 103$
- 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

102

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 instrument. Short-term maintenance is needed to ensure that the measuring instrument 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. Maintenance of the device due 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 instrument is performing an internal function check. The function check does not have any noticeable effect on the process.

9.3.4 Factory setting

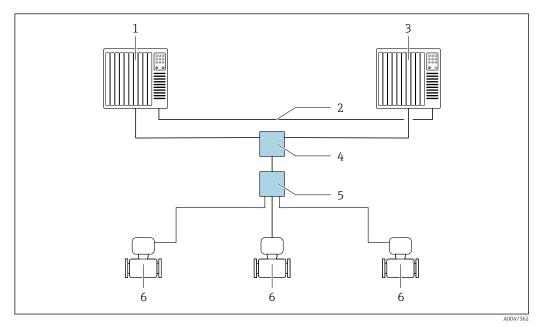
The slots are already assigned in the automation system for initial commissioning.

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

For system-redundant operation in a continuous process, two mutually synchronized automation systems are required. If one system fails the second system guarantees continued, uninterrupted operation. The measuring instrument supports S2 system redundancy and can communicate with both automation systems simultaneously.



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

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

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.
- Checklist for "Post-connection" check → 🗎 63

10.2 Switching on the measuring instrument

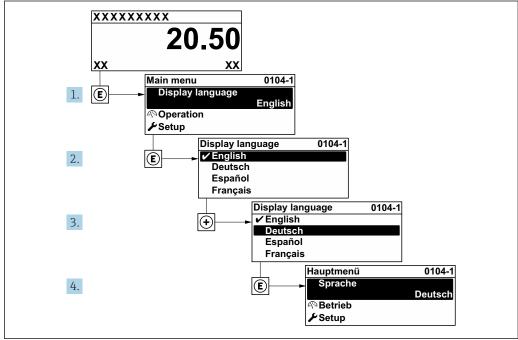
- ▶ Switch on the device upon successful completion of the post-mounting and postconnection check.
 - └ After a successful startup, the local display switches automatically from the startup display to the operational display.
- If nothing appears on the local display or if a diagnostic message is displayed, refer to

10.3 Connecting via FieldCare

- For connecting via FieldCare
- For user interface of FieldCare

10.4 Setting the operating language

Factory setting: English or ordered local language



■ 35 Taking the example of the local display

10.5 Initializing the measuring instrument

- 1. Fill the system with liquid (density: $800 \text{ to } 1500 \text{ kg/m}^3 (1764 \text{ to } 3307 \text{ lb/cf})$).
- 2. Prevent any flow.
- 3. Repeated flushing can help to eliminate gas pockets.
- Perform device initialization: Expert → Sensor → Disposable component
 → Commissioning, Modbus register 26321-1 or Profinet.
- 5. Heartbeat Verification and zero point adjustment are performed. This diagnostic message is displayed during this time: Device initialization active.
- 6. Heartbeat Verification and zero point adjustment have been performed: No diagnostic message is displayed.

The measuring instrument is initialized.

Navigation

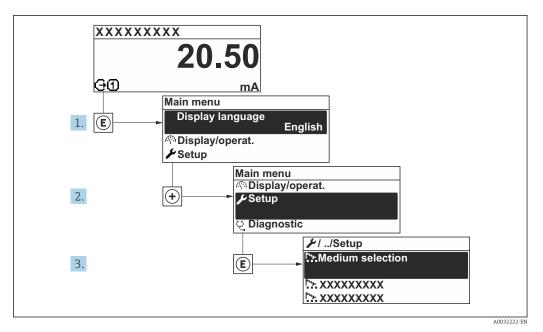
"Expert" menu \rightarrow Sensor \rightarrow Disposable component

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Commissioning	Start commissioning of the sensor manually if does not start automatically.	StartBusyDoneNot done	Not done

10.6 Configuring the device

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



Navigation to the "Setup" menu using the example of the local display

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 Operating Instructions. Instead a description is provided in the Special Documentation for the device ("Supplementary documentation").

⊁ Setup	
PROFINET device name	→ 🖺 109
▶ Communication	→ 🖺 109
➤ System units	→ 🖺 111
► Medium selection	→ 🖺 114
► Analog inputs	→ 🖺 117
► I/O configuration	→ 🖺 120
► Current input 1 to n	→ 🖺 121
➤ Status input 1 to n	→ 🖺 122
► Current output 1 to n	→ 🖺 123
► Pulse/frequency/switch output 1 to n	→ 🖺 128
▶ Relay output 1 to n	→ 🖺 137
► Display	→ 🖺 140

► Low flow cut off	→ 🖺 145
▶ Partially filled pipe detection	→ 🖺 146
► Advanced setup	→ 🖺 147

10.6.1 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

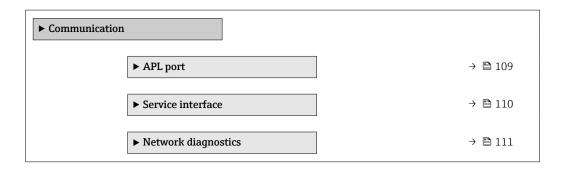
Parameter	Description	User interface	Factory setting
PROFINET device name	Name of the measuring point.	Max. 32 characters such as letters and numbers.	EH-PROMASS500 serial number of the device

10.6.2 Displaying the communication interface

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

Navigation

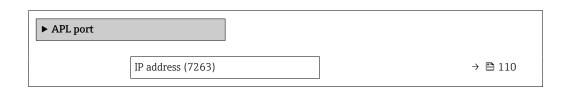
"Setup" menu → Communication



"APL port" submenu

Navigation

"Setup" menu \rightarrow Communication \rightarrow APL port



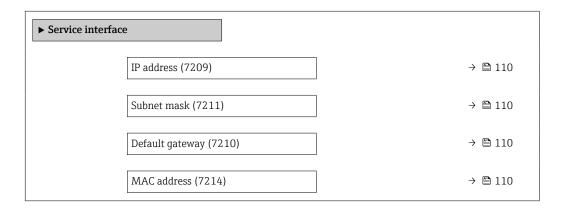
Subnet mask (7265)	→ 🖺 110
Default gateway (7264)	→ 🖺 110
MAC address (7262)	→ 🖺 110

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 \rightarrow Communication \rightarrow Service interface



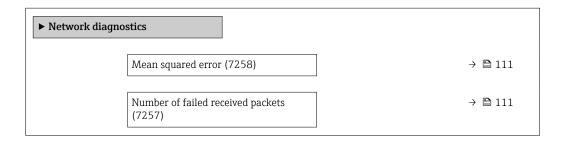
Parameter overview with brief description

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 instrument. MAC = Media Access Control	Unique 12-digit character string comprising letters and numbers, e.g.: 00:07:05:10:01:5F	Each measuring instrument is given an individual address.

"Network diagnostics" submenu

Navigation

"Setup" menu \rightarrow Communication \rightarrow Network diagnostics



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

10.6.3 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 Operating Instructions. Instead a description is provided in the Special Documentation for the device ("Supplementary documentation").

Navigation

"Setup" menu \rightarrow System units



Temperature unit	→ 🖺 113
Pressure unit	→ 🖺 113

Parameter	Description	Selection	Factory setting
Mass flow unit	Select mass flow unit. Effect The selected unit applies to: Output Low flow cut off Simulation process variable	Unit choose list	Country-specific: kg/h lb/min
Mass unit	Select mass unit.	Unit choose list	Country-specific: kg lb
Volume flow unit	Select volume flow unit. Effect The selected unit applies to: Output Low flow cut off Simulation process variable	Unit choose list	Country-specific: l/h gal/min (us)
Volume unit	Select volume unit.	Unit choose list	Country-specific: l (DN > 150 (6"): m³ option) gal (us)
Corrected volume flow unit	Select corrected volume flow unit. Effect The selected unit applies to: Corrected volume flow parameter $(\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Unit choose list	Country-specific: NI/h Sft³/min
Corrected volume unit	Select corrected volume unit.	Unit choose list	Country-specific: NI Sft³
Reference density unit	Select reference density unit.	Unit choose list	Country-specific kg/Nl lb/Sft³
Density unit	Select density unit. Effect The selected unit applies to: Output Simulation process variable Density adjustment (Expert menu)	Unit choose list	Country-specific: kg/l lb/ft³
Density 2 unit	Select second density unit.	Unit choose list	Country-specific: • kg/l • lb/ft³

112

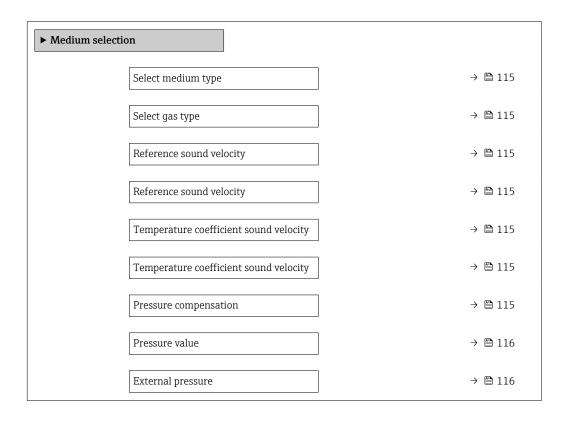
Parameter	Description	Selection	Factory setting
Temperature unit	Select temperature unit. Effect The selected unit applies to: • Electronic temperature parameter (6053) • Maximum value parameter (6051) • Minimum value parameter (6052) • Maximum value parameter (6108) • Minimum value parameter (6109) • Carrier pipe temperature parameter (6027) • Maximum value parameter (6029) • Minimum value parameter (6030) • Reference temperature parameter (1816) • Temperature parameter	Unit choose list	Country-specific: ■ °C ■ °F
Pressure unit	Select process pressure unit. Effect The unit is taken from: ■ Pressure value parameter (→ 🗎 116) ■ External pressure parameter (→ 🖺 116) ■ Pressure value	Unit choose list	Country-specific: • bar a • psi a

10.6.4 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 \rightarrow Medium selection



Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
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).	LiquidGasOther	Liquid
Select gas type	In the Medium selection submenu, the Gas option is selected.	Select measured gas type.	■ Air ■ Ammonia NH3 ■ Argon Ar ■ Sulfur hexafluoride SF6 ■ Oxygen O2 ■ Ozone O3 ■ Nitrogen oxide NOx ■ Nitrogen N2 ■ Nitrogen N2 ■ Nitrous oxide N2O ■ Methane CH4 ■ Methane CH4 + ■ 10% Hydrogen H2 ■ Methane CH4 + ■ 20% Hydrogen H2 ■ Methane CH4 + ■ 30% Hydrogen H2 ■ Hydrogen H2 ■ Hydrogen chloride ■ Hydrogen sulfide HCI ■ Hydrogen sulfide HCS ■ Ethylene C2H4 ■ Carbon dioxide CO2 ■ Carbon monoxide CO ■ Chlorine Cl2 ■ Butane C4H10 ■ Propane C3H8 ■ Propylene C3H6 ■ Ethane C2H6 ■ Other	Methane CH4
Reference sound velocity	In the Select gas type parameter, the Other option is selected.	Enter sound velocity of the gas at 0 $^{\circ}$ C (32 $^{\circ}$ F).	1 to 99999.9999 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	1456 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.	Off Fixed value External value Current input 1 Current input 2 Current input 3*	Off

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
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 1n option is selected.	Shows the external process pressure value.		-

^{*} Visibility depends on order options or device settings

10.6.5 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

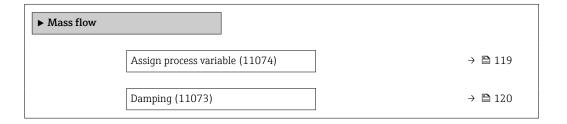
"Setup" menu \rightarrow Analog inputs



"Analog inputs" submenu

Navigation

"Setup" menu \rightarrow Analog inputs \rightarrow Mass flow



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

Parameter	Description	User interface / User entry	Factory setting
Parameter Assign process variable	Select a process variable.	• Mass flow • Volume flow • Density • Temperature • Carrier pipe temperature • Electronics temperature • Oscillation frequency 0 • 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 • Carrier wolume flow • Target corrected volume flow • Target corrected volume flow • Carrier corrected volume flow • Water native • S&W volume flow • Water cut • Oil density • Water density • Oil mass flow • Water mass flow • Oil volume flow • Water mass flow • Oil volume flow • Water mass flow • Oil volume flow • Water cut • Oil density • Water density • Oil mass flow • Water mass flow • Oil volume flow • Water corrected volume flow	Factory setting 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

10.6.6 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	→ 🖺 120
I/O module 1 to n information	→ 🖺 120
I/O module 1 to n type	→ 🗎 120
Apply I/O configuration	→ 🖺 120
I/O alteration code	→ 🖺 120

Parameter overview with brief description

Parameter	Description	User interface / Selection / User entry	Factory setting
I/O module 1 to n terminal numbers	Shows the terminal numbers used by the I/O module.	 Not used 26-27 (I/O 1) 24-25 (I/O 2) 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.	Not pluggedInvalidNot configurableConfigurablePROFINET	-
I/O module 1 to n type	Shows the I/O module type.	 Off Current 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.	No Yes	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

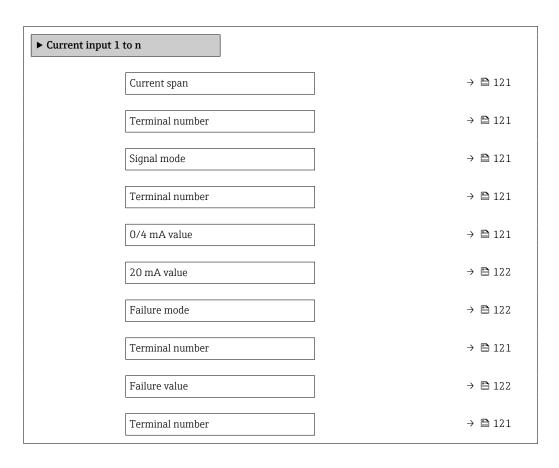
120

10.6.7 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 \rightarrow Current input



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Current span	-	Select current range for process value output and upper/lower level for alarm signal.	 420 mA (4 20.5 mA) 420 mA NE (3.820.5 mA) 420 mA US (3.920.8 mA) 020 mA (0 20.5 mA) 	420 mA NE (3.820.5 mA)
Terminal number	-	Shows the terminal numbers used by the current input module.	 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.	• Passive • Active*	Active
0/4 mA value	-	Enter 4 mA value.	Signed floating-point number	0

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
20 mA value	-	Enter 20 mA value.	Signed floating-point number	Depends on country and nominal diameter
Failure mode	-	Define input behavior in alarm condition.	AlarmLast valid valueDefined value	Alarm
Failure value	In the Failure mode parameter, the Defined value option is selected.	Enter value to be used by the device if input value from external device is missing.	Signed floating-point number	0

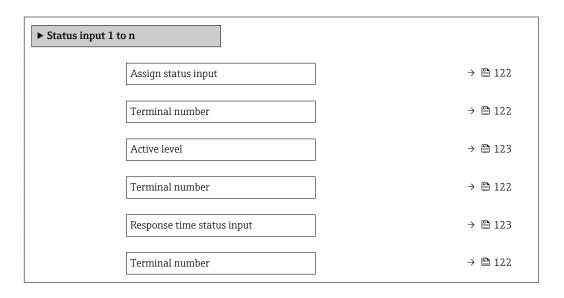
Visibility depends on order options or device settings

10.6.8 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 \rightarrow Status input 1 to n



Parameter overview with brief description

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

Parameter	Description	Selection / User interface / User entry	Factory setting
Active level	Define input signal level at which the assigned function is triggered.	HighLow	High
Response time status input	Define the minimum amount of time the input signal level must be present before the selected function is triggered.	5 to 200 ms	50 ms

Visibility depends on order options or device settings

10.6.9 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 \rightarrow Current output

· Current	output 1 to n	
	Process variable current output	→ 🖺 125
	Terminal number	→ 🖺 124
	Current range output	→ 🗎 126
	Terminal number	→ 🗎 124
	Signal mode	→ 🖺 124
	Terminal number	→ 🖺 124
	Lower range value output	→ 🖺 126
	Upper range value output	→ 🖺 126
	Fixed current	→ 🖺 126
	Terminal number	→ 🖺 124
	Damping current output	→ 🖺 126
	Failure behavior current output	→ 🖺 127
	Terminal number	→ 🖺 124
	Failure current	→ 🖺 127
	Terminal number	→ 🗎 124

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	-	Shows the terminal numbers used by the current output module.	 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.	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.	■ Off* ■ Mass flow ■ Volume flow ■ Corrected volume flow* ■ Density ■ Reference density* ■ Temperature ■ Target mass flow* ■ Carrier mass flow* ■ Carrier volume flow* ■ Carrier corrected volume flow* ■ Carrier corrected volume flow ■ Carrier corrected volume flow ■ Reference density alternative* ■ GSV flow ■ INSV flow ■ INSV flow ■ NSV flow ■ NSV flow ■ NSV flow ■ NSV flow ■ Oil density* ■ Oil density* ■ Oil mass flow* ■ Water cut* ■ Oil volume flow* ■ Water wolume flow* ■ Water cut ■ Oil corrected volume flow ■ Water orrected volume flow ■ Water 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 fluctuation 0 ■ Oscillation frequency 0 ■ Frequency fluctuation 0 ■ Oscillation frequency 0 ■ Frequency fluctuation 0 ■ Oscillation frequency 0 ■ Frequency fluctuation 0 ■ Signal asymmetry ■ Carrier pipe temperature ■ Frequency fluctuation 0	Mass flow

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
			 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.	 420 mA NE (3.820.5 mA) 420 mA US (3.920.8 mA) 420 mA (4 20.5 mA) 020 mA (0 20.5 mA) Fixed value 	Depends on country: 420 mA NE (3.820.5 mA) 420 mA US (3.920.8 mA)
Lower range value output	In Current span parameter (→ 126), one of the following options is selected: 420 mA NE (3.820.5 mA) 420 mA US (3.920.8 mA) 420 mA (4 20.5 mA) 020 mA (0 20.5 mA)	Enter lower range value for the measured value range.	Signed floating-point number	Depends on country: • 0 kg/h • 0 lb/min
Upper range value output	In Current span parameter (→ 🖹 126), one of the following options is selected: • 420 mA NE (3.820.5 mA) • 420 mA US (3.920.8 mA) • 420 mA (4 20.5 mA) • 020 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 (→ 🖺 126).	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 (→ 🖺 125) and one of the following options is selected in the Current span parameter (→ 🖺 126): • 420 mA NE (3.820.5 mA) • 420 mA US (3.920.8 mA) • 420 mA (4 20.5 mA) • 020 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 (→ 🖺 125) and one of the following options is selected in the Current span parameter (→ 🖺 126): • 420 mA NE (3.820.5 mA) • 420 mA US (3.920.8 mA) • 420 mA (4 20.5 mA) • 020 mA (0 20.5 mA)	Define output behavior in alarm condition.	 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

10.6.10 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 \rightarrow Advanced setup \rightarrow Pulse/frequency/switch output



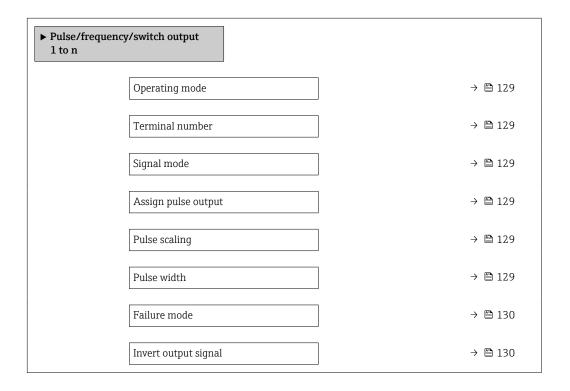
Parameter overview with brief description

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

Configuring the pulse output

Navigation

"Setup" menu → Pulse/frequency/switch output



128

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	 Not used 24-25 (I/O 2) 22-23 (I/O 3) 20-21 (I/O 4)* 	-
Signal mode	-	Select the signal mode for the PFS output.	 Passive Active * Passive NE 	Passive
Assign pulse output	The Pulse option is selected in Operating mode parameter.	Select process variable for pulse output.	Off Mass flow Volume flow Corrected volume flow* Target mass flow Target volume flow* Carrier volume flow* Carrier volume flow* Carrier corrected volume flow* Carrier volume flow* Carrier volume flow* Carrier corrected volume flow* Carrier corrected volume flow* Carrier corrected volume flow* Carvier corrected volume flow* Cavrier corrected volume flow* Cavrier corrected volume flow* Coll mass flow* Vater mass flow* Oil volume flow* Oil corrected volume flow* Vater corrected volume flow* Vater corrected volume flow*	Off
Pulse scaling	The Pulse option is selected in the Operating mode parameter (→ 🖺 128) and a process variable is selected in the Assign pulse output parameter (→ 🖺 129).	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 (→ 🖺 128) and a process variable is selected in the Assign pulse output parameter (→ 🖺 129).	Define time width of the output pulse.	0.05 to 2000 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 (→ 🖺 128) and a process variable is selected in the Assign pulse output parameter (→ 🖺 129).	Define output behavior in alarm condition.	Actual valueNo pulses	No pulses
Invert output signal	_	Invert the output signal.	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	→ 🖺 131
Terminal number	→ 🖺 131
Signal mode	→ 🖺 131
Assign frequency output	→ 🖺 132
Minimum frequency value	→ 🖺 133
Maximum frequency value	→ 🖺 133
Measuring value at minimum frequency	→ 🖺 133
Measuring value at maximum frequency	→ 🖺 133
Failure mode	→ 🖺 133
Failure frequency	→ 🖺 133
Invert output signal	→ 🖺 133

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	 Not used 24-25 (I/O 2) 22-23 (I/O 3) 20-21 (I/O 4)* 	-
Signal mode	-	Select the signal mode for the PFS output.	 Passive Active * Passive NE 	Passive

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign frequency output	The Frequency option is selected in Operating mode parameter (→ 🖺 128).	Select process variable for frequency output.	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 alternative* NSV flow alternative* S&W volume flow* Reference density alternative* Water cut* Oil density* Water density* Oil mass flow* Oil volume flow* Water wolume flow* Water volume flow* Water corrected volume flow* Water corrected volume flow* Carrier mass flow* Carrier mass flow* Carrier wolume flow* Carrier volume flow* Carrier volume flow* Carrier wolume flow* Carrier wolume flow* Carrier corrected volume flow* Carrier corrected volume flow* Carrier volume flow Carrier corrected volume flow Target corrected volume flow Target corrected volume flow Carrier corrected volume flow Target corrected volume flow Target corrected volume flow Carrier volume flow Carrier volume flow Target corrected volume flow Carrier volume flow Carrier corrected volume flow Target mass flow Target wolume flow Target mass flow	Off

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
			 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 (→ 🖺 128) and a process variable is selected in the Assign frequency output parameter (→ 🖺 132).	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 (→ 🖺 128) and a process variable is selected in the Assign frequency output parameter (→ 🖺 132).	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 (→ 🖺 128) and a process variable is selected in the Assign frequency output parameter (→ 🖺 132).	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 (→ 🖺 128) and a process variable is selected in the Assign frequency output parameter (→ 🖺 132).	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 (→ 🖺 128) and a process variable is selected in the Assign frequency output parameter (→ 🖺 132).	Define output behavior in alarm condition.	Actual valueDefined value0 Hz	0 Hz
Failure frequency	In the Operating mode parameter (→ 🖺 128), the Frequency option is selected, in the Assign frequency output parameter (→ 🖺 132) 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.	■ No ■ Yes	No

 $^{^{\}star}$ 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	→ 🗎 134
Terminal number	→ 🖺 134
Signal mode	→ 🖺 134
Switch output function	→ 🖺 135
Assign diagnostic behavior	→ 🖺 135
Assign limit	→ 🖺 136
Assign flow direction check	→ 🖺 136
Assign status	→ 🗎 137
Switch-on value	→ 🗎 137
Switch-off value	→ 🗎 137
Switch-on delay	→ 🗎 137
Switch-off delay	→ 🖺 137
Failure mode	→ 🖺 137
Invert output signal	→ 🗎 137

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	 Not used 24-25 (I/O 2) 22-23 (I/O 3) 20-21 (I/O 4)* 	-
Signal mode	-	Select the signal mode for the PFS output.	 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.	 Off On Diagnostic behavior Limit Flow direction check Status 	Off
Assign diagnostic behavior	 In the Operating mode parameter, the Switch option is selected. In the Switch output function parameter, the Diagnostic behavior option is selected. 	Select diagnostic behavior for switch output.	AlarmAlarm or warningWarning	Alarm

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign limit	The Switch option is selected in Operating mode parameter. The Limit option is selected in Switch output function parameter.	Select process variable for limit function.	Mass flow Volume flow Corrected volume flow* Target mass flow * Carrier mass flow * Target volume flow * Carrier volume flow * Carrier corrected volume flow * Col density * Vater cut * Oil density * Vater density * Oil volume flow * Vater volume flow * Vater volume flow * Vater corrected volume flow * Vater corrected volume flow * Concentration * Temperature Totalizer 1 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	 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.		Mass flow

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign status	 The Switch option is selected in Operating mode parameter. The Status option is selected in Switch output function parameter. 	Select device status for switch output.	 Partially filled pipe detection Low flow cut off Binary output * Binary output * Binary output * 	Partially filled pipe detection
Switch-on value	 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	Depends on country: • 0 kg/h • 0 lb/min
Switch-off value	 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	Depends on country: • 0 kg/h • 0 lb/min
Switch-on delay	 The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Define delay for the switch-on of status output.	0.0 to 100.0 s	0.0 s
Switch-off delay	 The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Define delay for the switch-off of status output.	0.0 to 100.0 s	0.0 s
Failure mode	-	Define output behavior in alarm condition.	Actual statusOpenClosed	Open
Invert output signal	-	Invert the output signal.	NoYes	No

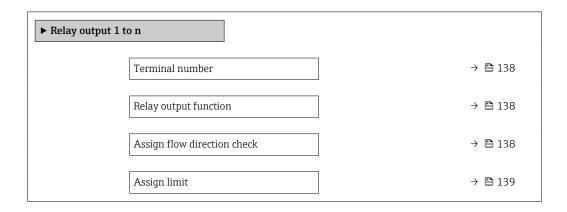
^{*} Visibility depends on order options or device settings

10.6.11 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 \rightarrow Relay output 1 to n



Assign diagnostic behavior	→ 🖺 139
Assign status	→ 🖺 139
Switch-off value	→ 🖺 139
Switch-off delay	→ 🖺 140
Switch-on value	→ 🖺 140
Switch-on delay	→ 🖺 140
Failure mode	→ 🖺 140
Switch state	→ 🖺 140
Powerless relay status	→ 🖺 140

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	-	Shows the terminal numbers used by the relay output module.	 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.	 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.		Mass flow

138

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Assign limit	The Limit option is selected in Relay output function parameter.	Select process variable for limit function.	Mass flow Volume flow Corrected volume flow* Carrier mass flow * Target mass flow * Target volume flow * Carrier volume flow * Carrier corrected volume flow * Carrier corrected volume flow * Density Reference density * Reference density alternative * GSV flow alternative * NSV flow alternative * NSV flow alternative * S&W volume flow * Water cut * Oil density * Water density * Water density * Water mass flow * Water volume flow * Water corrected volume flow * Water corrected volume flow * Temperature 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.	AlarmAlarm or warningWarning	Alarm
Assign status	In the Relay output function parameter, the Digital Output option is selected.	Select device status for switch output.	 Partially filled pipe detection Low flow cut off Binary output * Binary output * Binary output * 	Partially filled pipe detection
Switch-off value	The Limit option is selected in the Relay output function parameter.	Enter measured value for the switch-off point.	Signed floating-point number	Depends on country: • 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	Depends on country: Okg/h Olb/min
Switch-on delay	In the Relay output function parameter, the Limit option is selected.	Define delay for the switch-on of status output.	0.0 to 100.0 s	0.0 s
Failure mode	-	Define output behavior in alarm condition.	Actual statusOpenClosed	Open
Switch state	_	Shows the current relay switch status.	OpenClosed	-
Powerless relay status	-	Select quiescent state for relay.	OpenClosed	Open

Visibility depends on order options or device settings

10.6.12 Configuring the local display

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

Navigation

"Setup" menu → Display

▶ Display		
Forma	nt display	→ 🖺 142
Value	1 display	→ 🖺 143
0% ba	argraph value 1	→ 🖺 144
100%	bargraph value 1	→ 🗎 144
Value	2 display	→ 🖺 144
Value	3 display	→ 🗎 144
0% ba	urgraph value 3	→ 🖺 144
100%	bargraph value 3	→ 🖺 144
Value	4 display	→ 🖺 144
Value	5 display	→ 🗎 144
Value	6 display	→ 🖺 144

Value 7 display	→ 🖺 144
Value 8 display	→ 🖺 144

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	1 value, max. size

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.	Mass flow Volume flow Corrected volume flow* Density Reference density* Temperature Pressure Totalizer 1 Totalizer 2 Totalizer 3 GSV flow* GSV flow alternative* NSV flow alternative* 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* Water volume flow* Vater corrected volume flow* Vater corrected volume flow* Concentration* Target mass flow* Carrier mass flow* Carrier mass flow* Carrier wolume flow* Carrier wolume flow* Carrier wolume flow* Carrier orrected volume flow* Carrier corrected volume flow* Carrier volume flow* Carrier orrected volume flow* Carrier torrected volume flow* Carrier corrected volume flow* Carrier corrected volume flow* Carrier orrected volume flow* Carrier orrected volume flow* Carrier orrected volume flow* Carrier volume flow* Carrier orrected vol	Mass flow

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
			 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: Okg/h Olb/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 Value 1 display parameter (→ 143)	None
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 143)	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: Okg/h Olb/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 Value 1 display parameter (→ 143)	None
Value 5 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 🖺 143)	None
Value 6 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 143)	None
Value 7 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 🖺 143)	None
Value 8 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 🖺 143)	None

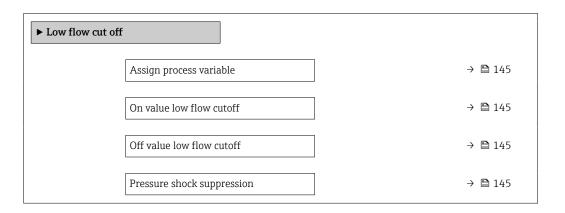
^{*} Visibility depends on order options or device settings

10.6.13 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 \rightarrow Low flow cut off



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	-	Select process variable for low flow cut off.	 Off Mass flow Volume flow Corrected volume flow* 	Mass flow
On value low flow cutoff	A process variable is selected in the Assign process variable parameter ($\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Enter on value for low flow cut off.	Positive floating- point number	Depends on country and nominal diameter
Off value low flow cutoff	A process variable is selected in the Assign process variable parameter ($\rightarrow \implies 145$).	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 (→ 🖺 145).	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	0 s

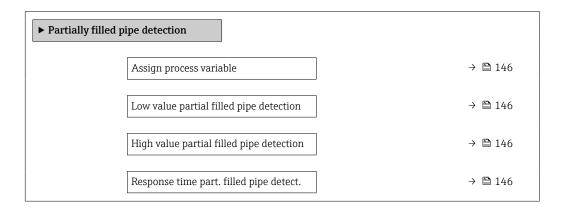
^{*} Visibility depends on order options or device settings

10.6.14 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 \rightarrow Partially filled pipe detection



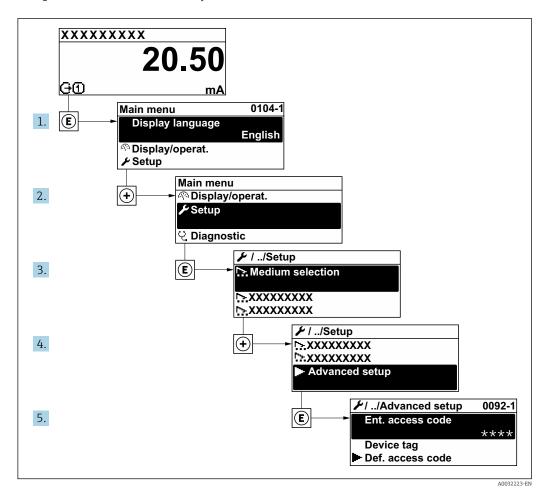
Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	-	Select process variable for partially filled pipe detection.	 Off Density Calculated reference density	Density
Low value partial filled pipe detection	A process variable is selected in the Assign process variable parameter ($\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Enter lower limit value for deactivating partialy filled pipe detection.	Signed floating-point number	Depends on country: • 200 kg/m³ • 12.5 lb/ft³
High value partial filled pipe detection	A process variable is selected in the Assign process variable parameter ($\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Enter upper limit value for deactivating partialy filled pipe detection.	Signed floating-point number	Depends on country: • 6 000 kg/m ³ • 374.6 lb/ft ³
Response time part. filled pipe detect.	A process variable is selected in the Assign process variable parameter ($\rightarrow \implies 146$).	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	1s

10.7 Advanced settings

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

Navigation to the "Advanced setup" submenu

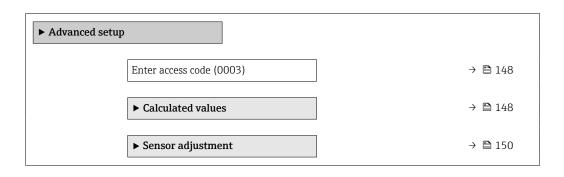


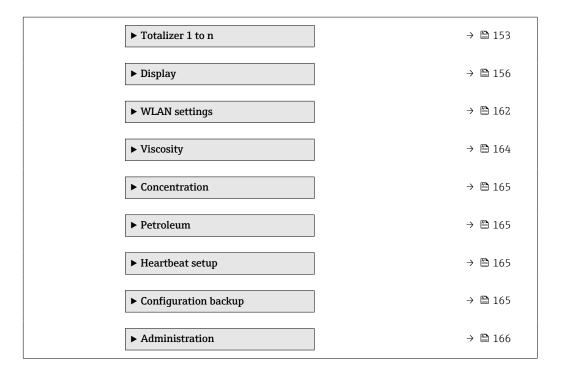
The number of submenus and parameters can vary depending on the device version and the available application packages. These submenus and their parameters are explained in the Special Documentation for the device and not in Operating Instructions.

For detailed information on the parameter descriptions for application packages or for operation in custody transfer mode: Special Documentation for the device $\rightarrow \stackrel{\text{\tiny le}}{=} 322$

Navigation

"Setup" menu → Advanced setup





10.7.1 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	1	Max. 16-digit character string comprising numbers, letters and special characters

10.7.2 Calculated process variables

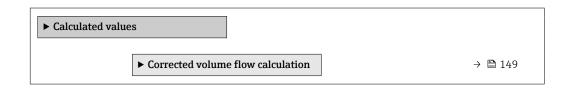
The **Calculated values** submenu contains parameters for calculating the corrected volume flow.



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



"Corrected volume flow calculation" submenu

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Calculated values \rightarrow Corrected volume flow calculation

► Corrected volume flow calculation	
Select reference density (1812)	→ 🖺 149
External reference density (6198)	→ 🖺 149
Fixed reference density (1814)	→ 🖺 149
Reference temperature (1816)	→ 🖺 149
Linear expansion coefficient (1817)	→ 🖺 150
Square expansion coefficient (1818)	→ 🖺 150

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.	 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 99999 °C	Country-specific: • +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/K²

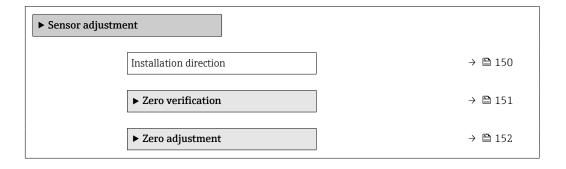
Visibility depends on order options or device settings

10.7.3 Carrying out a sensor adjustment

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

Navigation

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



Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Installation direction	Select sign of flow direction.	Forward flowReverse flow	Forward flow

Zero verification and zero adjustment

All measuring instruments are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions $\Rightarrow \boxminus 302$. 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 measurement accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity media).
- For gas applications with low pressure.
- To achieve the highest possible measurement accuracy at low flow rates, the installation must protect the sensor from mechanical stress during operation.

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 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 \rightarrow Advanced setup \rightarrow Sensor adjustment \rightarrow Zero verification

➤ Zero verification		
Process condit	ions	→ 🖺 151
Progress		→ 🖺 151
Status		→ 🖺 152
Additional inf	ormation	→ 🗎 152
Recommendat	ion:	→ 🗎 152
Root cause		→ 🖺 152
Abort cause		→ 🖺 152
Zero point me	asured	→ 🖺 152
Zero point sta	ndard deviation	→ 🖺 152

Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Process conditions	Ensure process conditions as follows.	 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 %	-

Parameter	Description	Selection / User interface	Factory setting
Status	Shows the status of the process.	BusyFailedDone	-
Additional information	Indicate whether to display additional information.	HideShow	Hide
Recommendation:	Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point.	Do not adjust zero pointAdjust zero point	-
Abort cause	Indicates why the wizard was aborted.	Check process conditions! A technical issue has occurred	-
Root cause	Shows the diagnostic and remedy.	 Zero point too high. Ensure no-flow. Zero point is unstable. Ensure no-flow. Fluctuation high. Avoid 2-phase medium. 	-
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

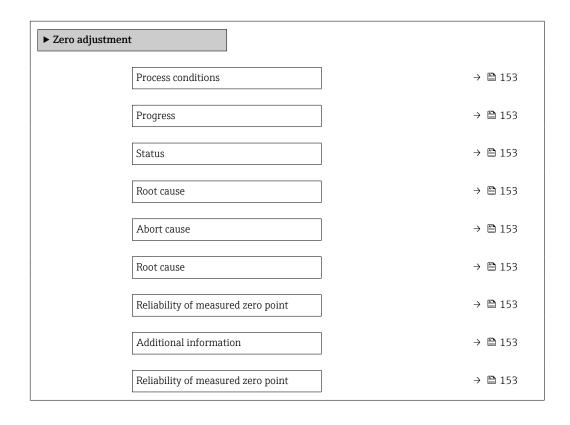
The zero point can be adjusted with the **Zero adjustment** wizard.



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

Navigation

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



Zero point measured	→ 🖺 153
Zero point standard deviation	→ 🖺 153
Select action	→ 🖺 153

Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Process conditions	Ensure process conditions as follows.	 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.	BusyFailedDone	-
Abort cause	Indicates why the wizard was aborted.	Check process conditions! A technical issue has occurred	-
Root cause	Shows the diagnostic and remedy.	 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.	Not doneGoodUncertain	-
Additional information	Indicate whether to display additional information.	HideShow	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.	 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

10.7.4 Configuring the totalizer

In the "Totalizer 1 to n" submenu, you can configure the specific totalizer.

 $\label{eq:Navigation} \begin{tabular}{ll} \b$

▶ Totalizer 1 to n	
Assign process variable 1 to n (11104–1 to n)	→ 🖺 154
Process variable unit 1 to n (11107–1 to n)	→ 🖺 154
Totalizer 1 to n operation mode (11102–1 to n)	→ 🖺 154
Totalizer 1 to n control (11101–1 to n)	→ 🖺 155
Totalizer 1 to n failure behavior (11103–1 to n)	→ 🖺 155

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Assign process variable 1 to n	Select process variable for totalizer.	Mass flow Volume flow Corrected volume flow Target mass flow Carrier mass flow Target volume flow Carrier volume flow Carrier corrected volume flow Carrier corrected volume flow Solv flow Solv flow Solv flow NSV flow NSV flow alternative Solv flow NSV flow Solv 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.	NetForwardReverse	Forward

Parameter	Description	Selection	Factory setting
Totalizer 1 to n control	Operate the totalizer.	Reset + holdPreset + holdHoldTotalize	Totalize
Totalizer 1 to n failure behavior	Select totalizer behavior in the event of a device alarm.	HoldContinueLast valid value + continue	Continue

^{*} Visibility depends on order options or device settings

10.7.5 Carrying out additional display configurations

In the ${f Display}$ submenu you can set all the parameters associated with the configuration of the local display.

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Display

► Display		
	Format display	→ 🖺 158
	Value 1 display	→ 🖺 159
	0% bargraph value 1	→ 🖺 160
	100% bargraph value 1	→ 🖺 160
	Decimal places 1	→ 🗎 160
	Value 2 display	→ 🖺 160
	Decimal places 2	→ 🗎 160
	Value 3 display	→ 🖺 160
	0% bargraph value 3	→ 🖺 160
	100% bargraph value 3	→ 🖺 160
	Decimal places 3	→ 🖺 160
	Value 4 display	→ 🖺 161
	Decimal places 4	→ 🖺 161
	Value 5 display	→ 🖺 161
	0% bargraph value 5	→ 🖺 161
	100% bargraph value 5	→ 🖺 161
	Decimal places 5	→ 🖺 161
	Value 6 display	→ 🖺 161
	Decimal places 6	→ 🖺 161
	Value 7 display	→ 🖺 161

156

0% bargraph value 7	→ 🖺 161
100% bargraph value 7	→ 🖺 161
Decimal places 7	→ 🖺 161
Value 8 display	→ 🖺 161
Decimal places 8	→ 🖺 162
Display language	→ 🖺 162
Display interval	→ 🖺 162
Display damping	→ 🖺 162
Header	→ 🖺 162
Header text	→ 🖺 162
Separator	→ 🖺 162
Backlight	→ 🖺 162

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	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.	Mass flow Volume flow Corrected volume flow* Density Reference density* Temperature Pressure Totalizer 1 Totalizer 2 Totalizer 3 GSV flow GSV flow alternative* NSV flow alternative* NSV flow alternative* S&W volume flow* Reference density alternative* Weighted density average* Weighted temperature average* Water cut Oil density* Oil mass flow Water mass flow* Oil volume flow* Vater mass flow Vater mass flow Oil corrected volume flow* Concentration Target mass flow Carrier mass flow Target volume flow Carrier mass flow Carrier mass flow Target volume flow Carrier orlected volume flow Carrier volume flow Carrier orlected volume flow Target corrected volume flow Suspended bubbles index HBSI Raw value mass flow Exciter current O Oscillation damping o Oscillation damping fluctuation o specific output 1 Inhomogeneous medium index Suspended bubbles index* HBSI Raw value mass flow Exciter current O Oscillation damping o	Mass flow

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
			 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: Okg/h Olb/min
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Decimal places 1	A measured value is specified in the Value 1 display parameter.	Select the number of decimal places for the display value.	X.X X.XX X.XXX X.XXXX X.XXXX X.XXXXX	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 Value 1 display parameter (→ 🖺 143)	None
Decimal places 2	A measured value is specified in the Value 2 display parameter.	Select the number of decimal places for the display value.	X X.X X.XX X.XXX X.XXXX X.XXXXX X.XXXXX	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 Value 1 display parameter (→ 🖺 143)	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: Okg/h Olb/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
Decimal places 3	A measured value is specified in the Value 3 display parameter.	Select the number of decimal places for the display value.	X X.X X.XX X.XXX X.XXXX X.XXXXX X.XXXXXX	x.xx

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see Value 1 display parameter (→ 143)	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.	X X.X X.XX X.XXX X.XXXX X.XXXX X.XXXXX	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 Value 1 display parameter (→ 🖺 143)	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: • 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.	 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 Value 1 display parameter (→ 143)	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.	 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 Value 1 display parameter (→ 143)	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: Okg/h Olb/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
Decimal places 7	A measured value is specified in the Value 7 display parameter.	Select the number of decimal places for the display value.	• X • X.X • X.XX • X.XXX • X.XXXX • X.XXXXX • X.XXXXX	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 Value 1 display parameter (> \Bar{1} 143)	None

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Decimal places 8	A measured value is specified in the Value 8 display parameter.	Select the number of decimal places for the display value.	X X.X X.XX X.XXX X.XXXX X.XXXXX X.XXXXX X.XXXXX	x.xx
Display language	A local display is provided.	Set display language.	 English Deutsch Français Español Italiano Nederlands Portuguesa Polski русский язык (Russian) Svenska Türkçe 中文 (Chinese) 日本語 (Japanese) 한국어 (Korean) tiếng Việt (Vietnamese) čeština (Czech) 	English (alternatively, the ordered language is preset in the device)
Display interval	A local display is provided.	Set time measured values are shown on display if display alternates between values.	1 to 10 s	5 s
Display damping	A local display is provided.	Set display reaction time to fluctuations in the measured value.	0.0 to 999.9 s	0.0 s
Header	A local display is provided.	Select header contents on local display.	Device tagFree text	Device tag
Header text	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.	. (point), (comma)	. (point)
Backlight	One of the following conditions is met: Order code for "Display; operation", option F "4-line, illum.; touch control" Order code for "Display; operation", option G "4-line, illum.; touch control +WLAN"	Switch the local display backlight on and off.	DisableEnable	Enable

^{*} Visibility depends on order options or device settings

10.7.6 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 \rightarrow Advanced setup \rightarrow WLAN settings

► WLAN settings	
WLAN	→ 🖺 163
WLAN mode	→ 🖺 163
SSID name	→ 🖺 163
Network security	→ 🖺 164
Security identification	→ 🖺 164
User name	→ 🖺 164
WLAN password	→ 🖺 164
WLAN IP address	→ 🖺 164
WLAN MAC address	→ 🗎 164
WLAN passphrase	→ 🗎 164
WLAN MAC address	→ 🗎 164
Assign SSID name	→ 🖺 164
SSID name	→ 🖺 164
Connection state	→ 🖺 164
Received signal strength	→ 🗎 164

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
WLAN	-	Switch WLAN on and off.	DisableEnable	Enable
WLAN mode	-	Select WLAN mode.	WLAN access pointWLAN Client	WLAN access point
SSID name	The client is activated.	Enter the user-defined SSID name (max. 32 characters).	-	-

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Network security	-	Select the security type of the WLAN network.	 Unsecured WPA2-PSK EAP-PEAP with MSCHAPv2* EAP-PEAP MSCHAPv2 no server authentic.* EAP-TLS* 	WPA2-PSK
Security identification	-	Select security settings and download these settings via menu Data management > Security > WLAN.	Trusted issuer certificateDevice certificateDevice 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.	Device tagUser-defined	User-defined
SSID name	 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.	ConnectedNot connected	Not connected
Received signal strength	-	Shows the received signal strength.	LowMediumHigh	High

^{*} Visibility depends on order options or device settings

10.7.7 Viscosity application package

For detailed information on the parameter descriptions for the Viscosity application package, see the Special Documentation for the device $\rightarrow \implies 322$

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Viscosity

10.7.8 Concentration Measurement application package



For detailed information on the parameter descriptions for the Concentration application package, see the Special Documentation for the device $\rightarrow \implies 322$

Navigation

"Setup" menu → Advanced setup → Concentration

10.7.9 Petroleum application package



For detailed information on the parameter descriptions for the Petroleum application package, see the Special Documentation for the device \rightarrow \implies 322

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Petroleum

10.7.10 Heartbeat Technology application package



For detailed information on the parameter descriptions of the application packages, see the Special Documentation for the device. $\rightarrow \implies 322$

Navigation

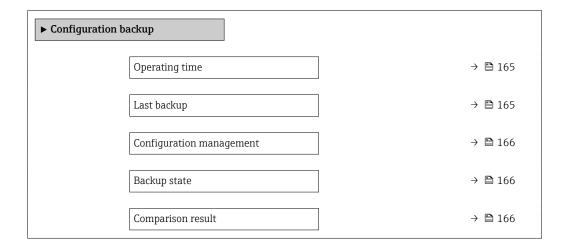
"Setup" menu → Advanced setup → Heartbeat setup

10.7.11 Configuration management

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

Navigation

"Setup" menu → Advanced setup → Configuration backup



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.	 Cancel Execute backup Restore* Compare* Clear backup data 	Cancel
Backup state	Shows the current status of data saving or restoring.	 None Backup in progress Restoring in progress Delete in progress Compare in progress Restoring failed Backup failed 	None
Comparison result	Comparison of current device data with HistoROM backup.	 Settings identical Settings not identical No backup available Backup settings corrupt Check not done Dataset incompatible 	Check not done

Visibility depends on order options or device settings

Function range of "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 display module 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.

10.7.12 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 \rightarrow Advanced setup \rightarrow Administration



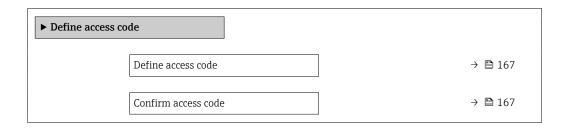
► Reset access code	→ 🖺 167
Device reset	→ 🖺 168

Using the parameter to define the access code

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

Navigation

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



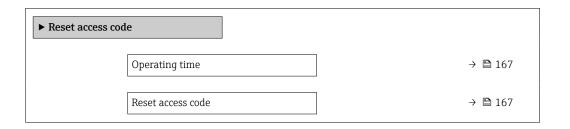
Parameter overview with brief description

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 \rightarrow Advanced setup \rightarrow Administration \rightarrow Reset access code



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.	Character string comprising numbers, letters and special characters	0x00
	The reset code can only be entered via: Web browser DeviceCare, FieldCare (via CDI-RJ45 service interface) Fieldbus		

Using the parameter to reset the device

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Administration

Parameter overview with brief description

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

Visibility depends on order options or device settings

10.8 Simulation

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 \rightarrow Simulation

▶ Simulation		
	Assign simulation process variable	→ 🖺 170
	Process variable value	→ 🖺 170
	Current input 1 to n simulation	→ 🖺 171
	Value current input 1 to n	→ 🖺 171
	Status input 1 to n simulation	→ 🖺 171
	Input signal level 1 to n	→ 🖺 171
	Current output 1 to n simulation	→ 🖺 170
	Current output value	→ 🖺 170
	Frequency output 1 to n simulation	→ 🖺 170
	Frequency output 1 to n value	→ 🖺 170
	Pulse output simulation 1 to n	→ 🖺 171
	Pulse value 1 to n	→ 🖺 171

Switch output simulation 1 to n	→ 🗎 171
Switch state 1 to n	→ 🖺 171
Relay output 1 to n simulation	→ 🖺 171
Switch state 1 to n	→ 🖺 171
Device alarm simulation	→ 🖺 171
Diagnostic event category	→ 🖺 171
Diagnostic event simulation	→ 🖺 171

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.	Off Mass flow Volume flow Corrected volume flow* Target mass flow * Carrier mass flow * Carrier corrected volume flow * Carrier volume flow * Carrier corrected volume flow * Carrier corrected volume flow * Carrier corrected volume flow * Density Reference density alternative * GSV flow * GSV flow alternative * NSV flow alternative * NSV flow valternative * S&W volume flow * Water cut * Oil density * Water density * Water mass flow * Water volume flow * Water volume flow * Water volume flow * Water 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 (→ 🖺 170).	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.	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.	• 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 (→ 129) defines the pulse width of the pulses output.	Off Fixed value Down-counting value	Off
Pulse value 1 to n	In the Pulse output simulation 1 to n parameter, the Down-counting value option is selected.	Enter the number of pulses for simulation.	0 to 65 535	0
Switch output simulation 1 to n	In the Operating mode parameter, the Switch option is selected.	Switch the simulation of the switch output on and off.	• Off • On	Off
Switch state 1 to n	-	Select the status of the status output for the simulation.	OpenClosed	Open
Relay output 1 to n simulation	-	Switch simulation of the relay output on and off.	Off On	Off
Switch state 1 to n	The On option is selected in the Switch output simulation 1 to n parameter parameter.	Select status of the relay output for the simulation.	OpenClosed	Open
Device alarm simulation	-	Switch the device alarm on and off.	Off On	Off
Diagnostic event category	-	Select a diagnostic event category.	SensorElectronicsConfigurationProcess	Process
Diagnostic event simulation	-	Select a diagnostic event to simulate this event.	 Off Diagnostic event picklist (depends on the category selected) 	Off
Current input 1 to n simulation	-	Switch simulation of the current input on and off.	■ 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.	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.	■ High ■ Low	High

^{*} Visibility depends on order options or device settings

10.9 Protecting settings from unauthorized access

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

- Protect access to parameters via access code → 172
- Protect access to measuring device via write protection switch \rightarrow 🗎 173

10.9.1 Write protection via access code

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

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

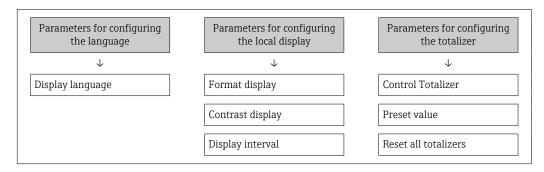
Defining the access code via the local display

- 1. Navigate to the **Define access code** parameter ($\Rightarrow \triangleq 167$).
- 2. Maximum of 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 ($\rightarrow \triangleq 167$) to confirm.
 - ► The 🗈 symbol appears in front of all write-protected parameters.
- \blacksquare Disabling parameter write protection via access code \rightarrow \blacksquare 77.

 - The user role with which the user is currently logged in is displayed in **Access status** parameter.
 - Navigation path: Operation → Access status
 - User roles and their access rights $\rightarrow \triangleq 77$
- 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.

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 ($\rightarrow \triangleq 167$).
- 2. Define a 16-digit (max.) numeric code as the access code.

- 3. Enter the access code again in the **Confirm access code** parameter ($\rightarrow \triangleq 167$) to confirm.
 - ► The web browser switches to the login page.
- Disabling parameter write protection via access code \rightarrow $\stackrel{\triangle}{=}$ 77.
 - If the access code is lost: Resetting the access code \rightarrow $\stackrel{\blacksquare}{=}$ 173.
 - The Access status parameter shows which user role the user is currently logged in with.
 - Navigation path: Operation → Access status
 - User roles and their access rights $\rightarrow \triangleq 77$

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

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 ($\rightarrow \triangleq 167$).
 - The access code has been reset to the factory setting **0000**. It can be redefined $\rightarrow \boxminus 172$.
- 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.

10.9.2 Write protection via write protection switch

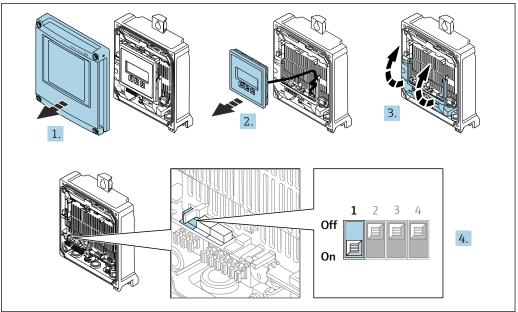
Unlike parameter write protection via a user-specific access code, this allows the user to lock write access to the entire operating menu - apart from the **"Contrast display" parameter**.

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

Enable/disable 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/setting to **OFF** (factory setting) disables hardware write protection.

In the Locking status parameter, the Hardware locked option is displayed
 → ■ 176. When hardware write protection is enabled, the ® symbol appears in the header of the measured value display and in the navigation view in front of the parameters.



A002942

- 5. Insert the display module.
- 6. Close the housing cover.

7. NOTICE

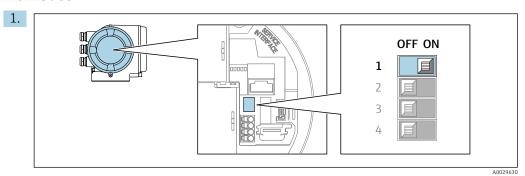
Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

► Tighten the fixing screws as per the tightening torque: 2.5 Nm (1.8 lbf ft)

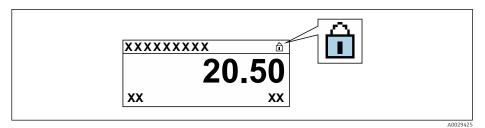
Tighten the fixing screws.

Proline 500



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

└ In the **Locking status** parameter, the **Hardware locked** option is displayed $\rightarrow \stackrel{\triangle}{=} 176$. In addition, on the local display the $\stackrel{\triangle}{=}$ symbol appears in front of the parameters in the header of the operational display and in the navigation view.



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

11 Operation

11.1 Reading 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 → 🖺 77. 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) $\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
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 again.

11.2 Adjusting the operating language



Detailed information:

- For information on the operating languages supported by the measuring device \rightarrow $\stackrel{ o}{=}$ 312

11.3 Configuring the display

Detailed information:

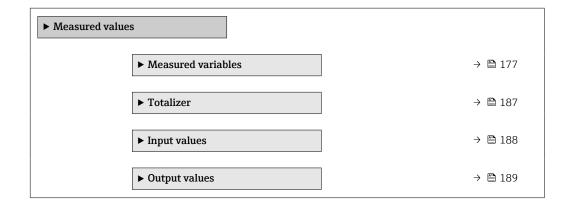
- On the advanced settings for the local display → 🗎 156

11.4 Reading off measured values

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

Navigation

"Diagnostics" menu → Measured values



11.4.1 "Measured variables" submenu

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

Navigation

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

► Measured varia	ablas	
▶ Ivieasureu varia	aules	
	Mass flow	→ 🖺 179
	Volume flow	→ 🖺 179
	Corrected volume flow	→ 🖺 179
	Density	→ 🖺 179
	Reference density	→ 🖺 179
	Temperature	→ 🖺 179
	Pressure	→ 🖺 179
	Concentration	→ 🖺 179
	Target mass flow	→ 🖺 180
	Carrier mass flow	→ 🖺 180
	Target corrected volume flow	→ 🖺 180
	Carrier corrected volume flow	→ 🖺 180
	Target volume flow	→ 🖺 180
	Carrier volume flow	→ 🖺 181
	CTL	→ 🖺 181
	CPL	→ 🖺 181
	CTPL	→ 🖺 181
	S&W volume flow	→ 🖺 182
	S&W correction value	→ 🖺 182
	Reference density alternative	→ 🗎 182

GSV flow	→ 🖺 182	
GSV flow alternative	→ 🖺 182	
NSV flow	→ 🖺 183	
NSV flow alternative	→ 🖺 183	
Oil CTL	→ 🖺 183	
Oil CPL	→ 🖺 183	
Oil CTPL	→ 🖺 183	
Water CTL	→ 🖺 184	
CTL alternative	→ 🖺 184	
CPL alternative	→ 🖺 184	
CTPL alternative	→ 🖺 184	
Oil reference density	→ 🖺 184	
Water reference density	→ 🖺 185	
Oil density	→ 🖺 185	
Water density	→ 🖺 185	
Water cut	→ 🖺 185	
Oil volume flow	→ 🖺 185	
Oil corrected volume flow	→ 🖺 186	
Oil mass flow	→ 🖺 186	
Water volume flow	→ 🖺 186	
Water corrected volume flow	→ 🖺 186	
Water mass flow	→ 🖺 186	
Weighted density average	→ 🖺 187	
Weighted temperature average	→ 🖺 187	

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface	Factory setting
Mass flow	-	Displays the mass flow that is currently measured. Dependency The unit is taken from: Mass flow unit parameter (→ 🖺 112)	Signed floating-point number	-
Volume flow	-	Displays the volume flow that is currently calculated. Dependency The unit is taken from the Volume flow unit parameter (→ 🖺 112).	Signed floating-point number	-
Corrected volume flow	_	Displays the corrected volume flow that is currently calculated. Dependency The unit is taken from: Corrected volume flow unit parameter (> 112)	Signed floating-point number	-
Density	-	Shows the density currently measured. Dependency The unit is taken from the Density unit parameter (→ 🖺 112).	Signed floating-point number	-
Reference density	-	Displays the reference density that is currently calculated. Dependency The unit is taken from: Reference density unit parameter (→ 112)	Signed floating-point number	-
Temperature	_	Shows the medium temperature currently measured. Dependency The unit is taken from: Temperature unit parameter (→ 🖺 113)	Signed floating-point number	_
Pressure	-	Displays either a fixed or external pressure value. Dependency The unit is taken from the Pressure unit parameter (→ 🖺 113).	Signed floating-point number	-
Concentration	For the following order code: Order code for "Application package", option ED "Concentration" The software options currently enabled are displayed in the Software option overview parameter.	Displays the concentration that is currently calculated. Dependency The unit is taken from the Concentration unit parameter.	Signed floating-point number	_

Parameter	Prerequisite	Description	User interface	Factory setting
Target mass flow	With the following conditions: Order code for "Application package", option ED "Concentration" The software options currently enabled are displayed in the Software option overview parameter.	Displays the mass flow that is currently measured for the target medium. Dependency The unit is taken from: Mass flow unit parameter (→ 112)	Signed floating-point number	_
Carrier mass flow	With the following conditions: Order code for "Application package", option ED "Concentration" The software options currently enabled are displayed in the Software option overview parameter.	Displays the mass flow of the carrier medium that is currently measured. Dependency The unit is taken from: Mass flow unit parameter (→ 112)	Signed floating-point number	-
Target corrected volume flow	With the following conditions: 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 software options currently enabled are displayed in the Software option overview parameter.	Displays the corrected volume flow that is currently measured for the target fluid. Dependency The unit is taken from the Volume flow unit parameter (→ 🖺 112).	Signed floating-point number	_
Carrier corrected volume flow	With the following conditions: Order code for "Application package", option ED "Concentration" In the Liquid type parameter, the Ethanol in water option or %mass / %volume option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the corrected volume flow currently measured for the carrier fluid. Dependency The unit is taken from the Volume flow unit parameter (→ 🖺 112).	Signed floating-point number	
Target volume flow	With the following conditions: 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. The software options currently enabled are displayed in the Software option overview parameter.	Displays the volume flow currently measured for the target medium. Dependency The unit is taken from the Volume flow unit parameter (→ 🖺 112).	Signed floating-point number	

Parameter	Prerequisite	Description	User interface	Factory setting
Carrier volume flow	With the following conditions: 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. The software options currently enabled are displayed in the Software option overview parameter.	Displays the volume flow currently measured for the carrier medium. Dependency The unit is taken from the Volume flow unit parameter (→ 112).	Signed floating-point number	
CTL	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the calibration 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	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the calibration 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	-
CTPL	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the combined calibration 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.	Positive floating- point number	_

Parameter	Prerequisite	Description	User interface	Factory setting
S&W volume flow	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the S&W volume flow which is calculated from the measured total volume flow minus the net volume flow. Dependency The unit is taken from: Volume flow unit parameter	Signed floating-point number	-
S&W correction value	For the following order code: • "Application package", option EJ "Petroleum" • The External value option or Current input 1n option is selected in the S&W input mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Shows the correction value for sediment and water.	Positive floating- point number	
Reference density alternative	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the fluid density at the alternative reference temperature. Dependency The unit is taken from: Reference density unit parameter	Signed floating-point number	-
GSV flow	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the measured total volume flow, corrected to the reference temperature and the reference pressure. Dependency The unit is taken from: Corrected volume flow unit parameter	Signed floating-point number	_
GSV flow alternative	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the measured total volume flow, corrected to the alternative reference temperature and the alternative reference pressure. Dependency The unit is taken from: Corrected volume flow unit parameter	Signed floating-point number	_

Parameter	Prerequisite	Description	User interface	Factory setting
NSV flow	For the following order code: "Application package", option EJ "Petroleum" The API referenced correction option is selected in Petroleum mode parameter. The software options currently enabled are displayed in the Software option overview parameter.	Displays the net volume flow which is calculated from the measured total volume flow minus the value for sediment & water and minus the shrinkage. Dependency The unit is taken from: Corrected volume flow unit parameter	Signed floating-point number	-
NSV flow alternative	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the net volume flow which is calculated from the measured alternative total volume minus the value for sediment & water and minus the shrinkage. Dependency The unit is taken from: Corrected volume flow unit parameter	Signed floating-point number	_
Oil CTL	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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.	Positive floating- point number	-
Oil CPL	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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.	Positive floating- point number	_
Oil CTPL	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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	-

Parameter	Prerequisite	Description	User interface	Factory setting
Water CTL	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	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
Oil reference density	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Shows the oil density at the reference temperature.	Signed floating-point number	_

Parameter	Prerequisite	Description	User interface	Factory setting
Water reference density	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the	Shows the water density at the reference temperature.	Signed floating-point number	-
	Software option overview parameter.			
Oil density	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option	Displays the density of the oil currently measured.	Signed floating-point number	-
Water density	overview parameter. For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the density of the water currently measured.	Signed floating-point number	_
Water cut	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the percentage water volume flow in relation to the total volume flow of the fluid.	0 to 100 %	-
Oil volume flow	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated volume flow of the oil. Dependency: 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
Oil corrected volume flow	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated volume flow of the oil, calculated to values at reference temperature and reference pressure. Dependency: 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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated mass flow of the oil. Dependency: 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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated volume flow of the water. Dependency: Based on the value displayed in the Water cut parameter The unit is taken from: Volume flow unit parameter	Signed floating-point number	_
Water corrected volume flow	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated volume flow of the water, calculated to values at reference temperature and reference pressure. Dependency: 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	For the following order code: "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the Net oil & water cut option is selected. The software options currently enabled are displayed in the Software option overview parameter.	Displays the currently calculated mass flow of the water. Dependency: Based on the value displayed in the Water cut parameter The unit is taken from: Mass flow unit parameter	Signed floating-point number	-

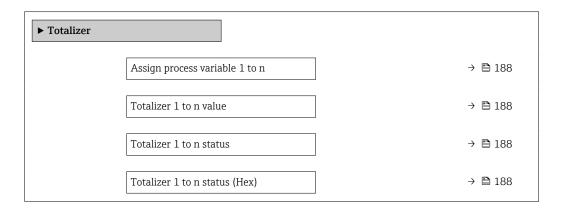
Parameter	Prerequisite	Description	User interface	Factory setting
Weighted density average	For the following order code: • "Application package", option EJ "Petroleum" • "Application package", option EM "Petroleum + Locking function" The software options currently enabled are displayed in the Software option overview parameter.	Displays the weighted average for the density since the last time the density averages were reset. Dependency: 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	For the following order code: "Application package", option EJ "Petroleum" "Application package", option EM "Petroleum + Locking function" The software options currently enabled are displayed in the Software option overview parameter.	Displays the weighted average for the temperature since the last time the temperature averages were reset. Dependency: 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	_

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



Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Assign process variable 1 to n	Select process variable for totalizer.	■ Mass flow ■ Volume flow ■ Corrected volume flow* ■ Target mass flow ■ Target mass flow ■ Target volume flow ■ Target volume flow ■ Target corrected volume flow ■ GSV flow ■ GSV flow ■ GSV flow alternative ■ NSV flow ■ NSV flow alternative ■ NSV flow ■ Oil mass flow ■ Oil volume flow ■ Oil volume flow ■ Water volume flow ■ Water volume flow ■ Water 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').	■ 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

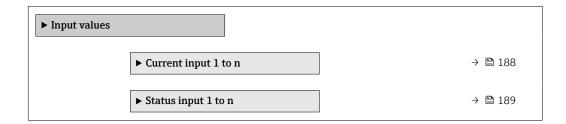
^{*} Visibility depends on order options or device settings

11.4.3 "Input values" submenu

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

Navigation

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



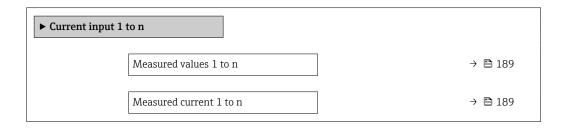
Input values of current input

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

188

Navigation

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



Parameter overview with brief description

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

Input values of status input

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

Navigation

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



Parameter overview with brief description

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

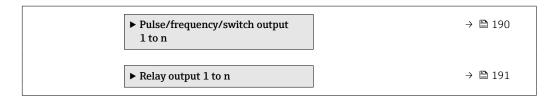
11.4.4 Output values

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

Navigation

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



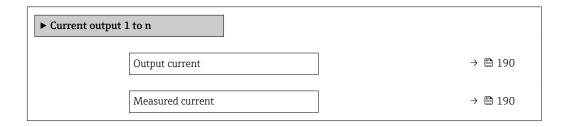


Output values of current output

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

Navigation

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



Parameter overview with brief description

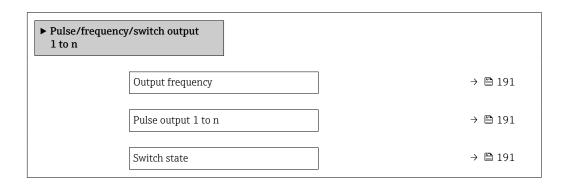
Parameter	Description	User interface
Output current	Displays the current value currently calculated for the current output.	3.59 to 22.5 mA
Measured current	Displays the current value currently measured for the current output.	0 to 30 mA

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



190

Parameter overview with brief description

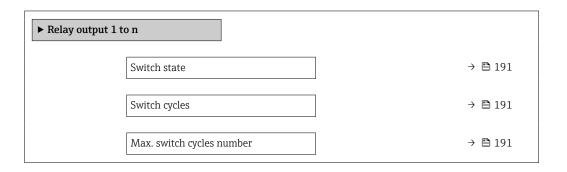
Parameter	Prerequisite	Description	User interface
Output frequency	In the Operating mode parameter, the Frequency option is selected.	Displays the value currently measured for the frequency output.	0.0 to 12 500.0 Hz
Pulse output 1 to n	The Pulse option is selected in the Operating mode parameter parameter.	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.	■ Open ■ Closed

Output values for relay output

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

Navigation

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



Parameter overview with brief description

Parameter	Description	User interface
Switch state	Shows the current relay switch status.	OpenClosed
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 (→ 🗎 107)
- Advanced settings using the Advanced setup submenu (→ 🖺 147)

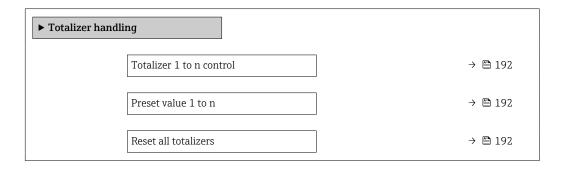
11.6 Performing a totalizer reset

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

- Control Totalizer
- Reset all totalizers

Navigation

"Operation" menu → Totalizer handling



Parameter overview with brief description

Parameter	Description	Selection / User entry	Factory setting
Totalizer 1 to n control	Operate the totalizer.	 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.	CancelReset + 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 range of "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 previously aggregated flow values.	

Displaying the measured value history 11.7

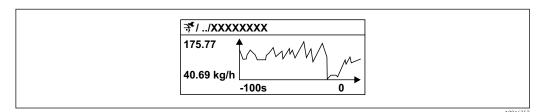
The **Extended HistoROM** application package must be enabled in the device (order option) for the Data logging submenu to appear. This contains all the parameters for the measured value history.



Pata logging is also available via:

Function scope

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



№ 37 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	→ 🖺 195
Assign channel 2	→ 🖺 196
Assign channel 3	→ 🗎 196
Assign channel 4	→ 🗎 196
Logging interval	→ 🗎 196
Clear logging data	→ 🖺 196
Data logging	→ 🖺 196
Logging delay	→ 🖺 196
Data logging control	→ 🗎 196

Data logging status	→ 🖺 197
Entire logging duration	→ 🖺 197

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Assign channel 1	The Extended HistoROM application package is available.	Assign process variable to logging channel.	 Off Mass flow Volume flow Corrected volume flow* Density Reference density* Temperature Pressure GSV flow GSV flow alternative* NSV flow alternative flow* Reference density alternative Water cut Oil density Water density Oil mass flow* Water was flow Oil corrected volume flow* Water volume flow Water volume flow Target mass flow Carrier corrected volume flow Carrier corrected volume flow Carrier corrected volume flow Target volume flow Carrier corrected volume flow Target corrected volume flow Earrier volume flow Carrier corrected volume flow Excriter currected volume flow Carrier corrected volume flow Carrier corrected volume flow Coscillation specific output 1 Inhomogeneous medium index Suspended bubbles index HBSI Raw value mass flow Exciter current 0 Oscillation damping 0 Oscillation frequency 0 Frequency 0 Foundation amplitude 	Off

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
			 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	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign a process variable to logging channel.	For the picklist, see Assign channel 1 parameter (→ 195)	Off
Assign channel 3	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign a process variable to logging channel.	For the picklist, see Assign channel 1 parameter (→ 🖺 195)	Off
Assign channel 4	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign a process variable to logging channel.	For the picklist, see Assign channel 1 parameter (→ 🖺 195)	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.	Cancel Clear data	Cancel
Data logging	-	Select the type of data logging.	OverwritingNot 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.	NoneDelete + startStop	None

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

Visibility depends on order options or device settings

Gas Fraction Handler 11.8

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

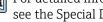
The function continuously checks for the presence of gas bubbles in liquids or droplets in gases, as this second phase influences the output values for flow and density.

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 process 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.

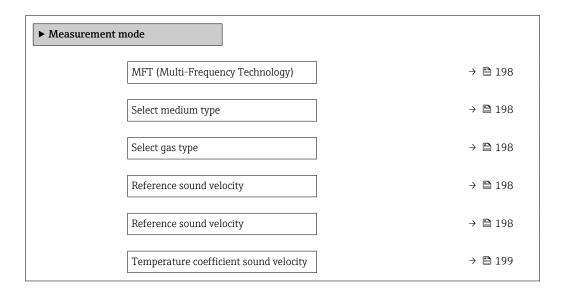


For detailed information on the parameter descriptions of the Gas Fraction Handler, see the Special Documentation for the device $\rightarrow \implies 322$

"Measurement mode" submenu 11.8.1

Navigation

"Expert" menu → Sensor → Measurement mode



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
MFT (Multi-Frequency Technology)	-	Enable/disable multi- frequency technology to increase the measuring accuracy in the event of microbubbles in the medium.	• 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).	LiquidGasOther	Liquid
Select gas type	In the Medium selection submenu, the Gas option is selected.	Select measured gas type.	 Air Ammonia NH3 Argon Ar Sulfur hexafluoride SF6 Oxygen O2 Ozone O3 Nitrogen oxide N2O Nitrogen N2 Nitrogen N2 Nitrous oxide N2O Methane CH4 + 10% Hydrogen H2 Methane CH4 + 20% Hydrogen H2 Methane CH4 + 30% Hydrogen H2 Helium He Hydrogen H2 Helium He Hydrogen sulfide HCI Hydrogen sulfide H2S Ethylene C2H4 Carbon dioxide CO2 Carbon monoxide CO Chlorine CI2 Butane C4H10 Propane C3H8 Propylene C3H6 Ethane C2H6 Other 	Methane CH4
Reference sound velocity	In the Select gas type parameter, the Other option is selected.	Enter sound velocity of the gas at 0 $^{\circ}$ C (32 $^{\circ}$ F).	1 to 99999.9999 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	1456 m/s

198

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
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
Gas Fraction Handler	-	Activates the Gas Fraction Handler function for two phase media.	OffModeratePowerful	Moderate

11.8.2 "Medium index" submenu

Navigation

"Expert" menu \rightarrow Application \rightarrow Medium index

► Medium index	
Inhomogeneous medium index (6368)	→ 🖺 199
Cut off inhomogeneous wet gas (6375)	→ 🗎 199
Cut off inhomogeneous liquid (6374)	→ 🖺 199
Suspended bubbles index (6376)	→ 🖺 199
Cut off suspended bubbles (6370)	→ 🖺 199

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

Fault	Possible causes	Remedial action
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 dark and no output signals	Supply voltage does not match the voltage specified on the nameplate.	Apply the correct supply voltage .
Local display dark and no output signals	Supply voltage has incorrect polarity.	Reverse polarity of supply voltage.
Local display dark and no output signals	No contact between connecting cables and terminals.	Check the electrical contact between the cable and terminals 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 → 🗎 286.
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 cannot be read, but signal output is within the valid range	Display is set too bright or too dark.	■ Set the display brighter by simultaneously pressing
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part → 🖺 286.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial actions → 🖺 212
Text on local display appears in a language that cannot be understood.	The selected operating language cannot be understood.	1. Press □ + ⊕ for 2 s ("home position"). 2. Press □. 3. Configure the required language in the Display language parameter (→ □ 162).
Message on local display: "Communication Error" "Check Electronics"	Communication between the display module and the electronics is interrupted.	 Check the cable and the connector between the main electronics module and display module. Order spare part → 286.

For output signals

Fault	Possible causes	Remedial action
Signal output outside the valid range	Main electronics module is defective.	Order spare part → 🖺 286.
Device shows correct value on local display, but signal output is incorrect, though in the valid range.	Parameter configuration error	Check and adjust parameter configuration.
Device is measuring incorrectly.	Configuration error or device is operated outside the application.	Check and correct parameter configuration. Observe limit values specified in the "Technical Data". "Technical Data".

For access

Fault	Possible causes	Remedial action
Write access to parameters is not possible.	Hardware write protection is enabled.	Set the write protection switch on the main electronics module to the OFF position → 🖺 173.
Write access to parameters is not possible.	Current user role has limited access authorization.	 Check user role → □ 77. Enter correct customer-specific access code → □ 77.
Connection to the web server is not possible.	Web server is disabled.	Use the "FieldCare" or "DeviceCare" operating tool to check if the web server of the device is enabled and enable if necessary → ■ 84.
	The Ethernet interface on the PC is incorrectly configured.	 Check the properties of the Internet protocol (TCP/IP)→ ≅ 80. Check the network settings with the IT manager.
Connection to the web server is not possible.	WLAN access data are incorrect.	Check WLAN network status. Log on to the device again using WLAN access data. Check that WLAN is enabled on the measuring instrument and operating unit 80.
	WLAN communication is disabled.	-
Unable to connect to web server, FieldCare or DeviceCare.	WLAN network is not available.	 Check if WLAN reception is present: LED on display module is lit blue. Check if WLAN connection is enabled: LED on display module flashes blue. Switch on instrument function.
Network connection not present or unstable	WLAN network is weak.	 Operating unit outside reception range: Check network status on operating unit. To improve network performance, use an external WLAN antenna.
	Parallel WLAN and Ethernet communication	 Check network settings. Temporarily enable only the WLAN as an interface.
Web browser is frozen and operation no longer possible	Data transfer is active.	Wait until data transfer or current action is finished.
	Connection lost	 Check cable connection and power supply. Refresh the web browser and restart if necessary.
Display of web browser content is difficult to read or incomplete.	Web browser version used is not optimal.	 ► Use correct web browser version → ₱ 79. ► Empty the web browser cache. ► Restart the web browser.
	Unsuitable view settings.	Change the font size/display ratio of the web browser.
Incomplete or no display of content in the web browser	JavaScript is not enabled.JavaScript cannot be enabled.	 ► Enable JavaScript. ► Enter http://XXX.XXX.X.X.XX/servlet/basic.html as the IP address.
Operation with FieldCare or DeviceCare via service interface CDI-RJ45 (port 8000) is not possible.	Firewall of the PC or network is blocking communication.	Depending on the settings of the firewall used on the PC or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.
Flashing the firmware with FieldCare or DeviceCare via service interface CDI-RJ45 (port 8000 or TFTP ports) is not possible.	Firewall of the PC or network is blocking communication.	Depending on the settings of the firewall used on the PC or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.

For system integration

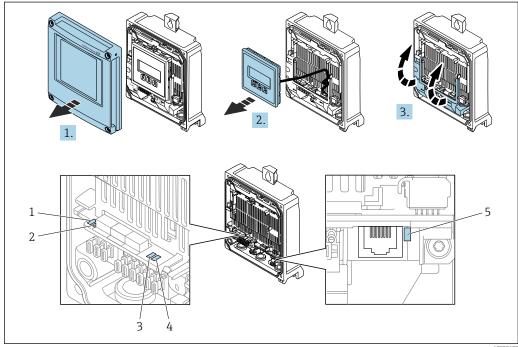
Error	Possible causes	Remedy
The PROFINET device name is not displayed correctly and contains coding.	A device name containing one or more underscores has been specified via the automation system.	Specify a correct device name (without underscores) via the automation system.

Diagnostic information via LEDs 12.2

12.2.1 Transmitter

Proline 500 - digital

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



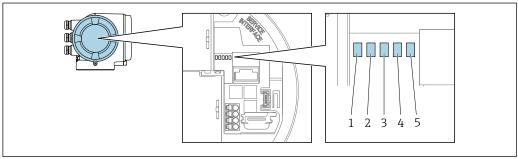
- Supply voltage
- 2 Device status
- 3 Flashing/network status
- Port 1 active: PROFINET over Ethernet-APL
- Port 2 active: service interface (CDI)
- 1. Open the housing cover.
- Remove the display module.
- 3. Fold open the terminal cover.

LED		Color	Meaning
1	Supply voltage	Off	Supply voltage is off or too low.
		Green	Supply voltage is OK.
2 Device status/module	Off	Firmware error	
	status (normal operation)	Green	Device status is OK.
	-	Flashing green	Device is not configured.

LED		Color	Meaning
		Flashing red	A diagnostic event with "Warning" diagnostic behavior has occurred.
		Red	A diagnostic event with "Alarm" diagnostic behavior has occurred.
		Red/green flashing	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
4	Port 1 active:	Off	Not connected or no connection established.
	PROFINET over Ethernet-APL	Green	Connection available, no active communication
		Flashing green	Connection with active communication
5	Port 2 active:	Off	Not connected or no connection established.
	Service interface (CDI)	Orange	Connection available but no activity.
		Flashing orange	Activity present.

Proline 500

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



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

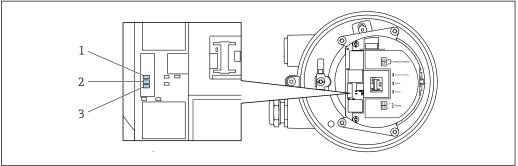
LED		Color	Meaning
1	Supply voltage	Off	Supply voltage is off or too low.
		Green	Supply voltage is OK.
2	2 Device beards, module	Off	Firmware error
	status (normal operation)	Green	Device status is OK.
	-	Flashing green	Device is not configured.
		Flashing red	A diagnostic event with "Warning" diagnostic behavior has occurred.

LED		Color	Meaning
		Red	A diagnostic event with "Alarm" diagnostic behavior has occurred.
		Red/green flashing	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
4	Port 1 active:	Off	Not connected or no connection established.
	PROFINET over Ethernet-APL	White	Connection available, no active communication
		Flashing white	Connection with active communication
5	Port 2 active:	Off	Not connected or no connection established.
	Service interface CDI- RJ45	Orange	Connection available but no activity.
		Flashing orange	Activity present.

12.2.2 Sensor connection housing

Proline 500 - digital

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



A0029699

- 1 Communication
- 2 Device status
- 3 Supply voltage

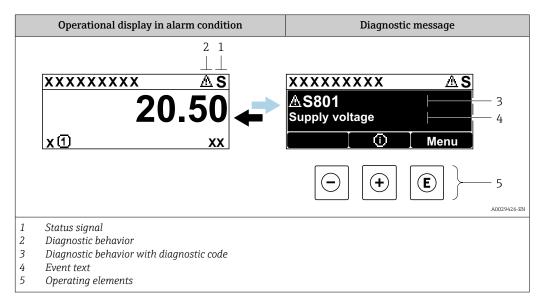
LED		Color	Meaning
1	Communication	White	Communication active.
2	2 Device status (normal	Red	Fault
operation)	Flashing red	Warning	
2	2 Device status (during	Flashes red slowly	If > 30 seconds: problem with the boot loader.
	start-up)	Flashes red quickly	If > 30 seconds: compatibility problem when reading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

LED		Color	Meaning
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 instrument 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 \rightarrow 🗎 278
 - Via submenus \rightarrow 🖺 279

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 in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
 - F = Failure
 - C = Function Check
 - S = Out of Specification
 - M = Maintenance Required

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

Diagnostic behavior

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

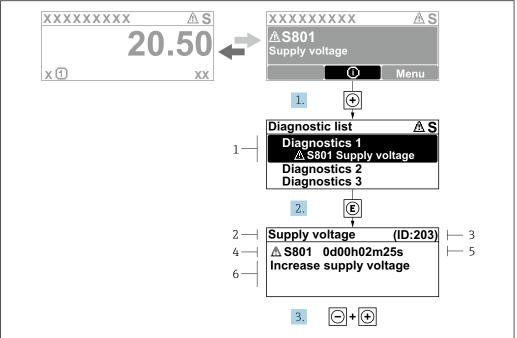
Diagnostic information

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

Operating elements

Operating key	Meaning	
	Plus key	
(+)	In menu, submenu Opens the message about the remedial measures.	
	Enter key	
E	In menu, submenu Opens the operating menu.	

12.3.2 Calling up remedial actions



A0029431-EN

- 38 Message for remedial actions
- 1 Diagnostic information
- 2 Event text
- 3 Service ID
- 4 Diagnostic behavior with diagnostic code
- 5 Operating time of occurrence
- 6 Remedial actions
- 1. The user is in the diagnostic message.

Press ± (① symbol).

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

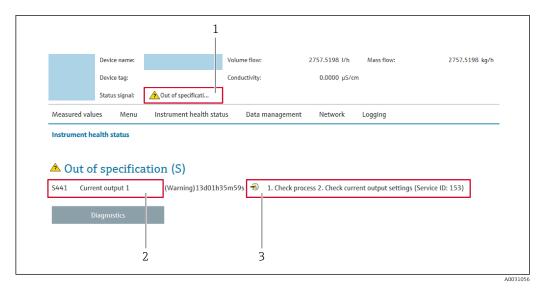
The user is in the **Diagnostics** menu in the **Diagnostic list** submenu. A list of active diagnostics is displayed. The user can select a diagnostic event.

- 1. Press E.
 - ► The message for the remedial actions for the selected diagnostic event opens.
- 2. Press \Box + \pm simultaneously.
 - ► The message about the remedial actions 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
- In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
 - Via parameter →

 278
 - Via submenu → 🗎 279

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
8	Failure A device error has occurred. The measured value is no longer valid.
Function check The device is in service mode (e.g. during a simulation).	
<u>^</u> ?	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 remains valid.

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

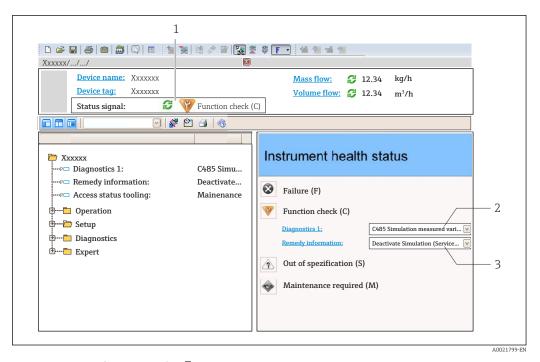
12.4.2 Calling up remedial actions

Remedial actions are provided for each diagnostic event to ensure that problems can be rectified quickly. These actions are displayed along with the diagnostic event and the related diagnostic information.

12.5 Diagnostic information in FieldCare or DeviceCare

12.5.1 Diagnostic options

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



- 1 Status area with status signal $\rightarrow \triangleq 206$
- *2* Diagnostic information \rightarrow $\stackrel{\triangle}{=}$ 207
- 3 Remedial actions with service ID
- In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:

 - Via submenu → 🗎 279

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 \rightarrow System \rightarrow Diagnostic handling \rightarrow Diagnostic behavior

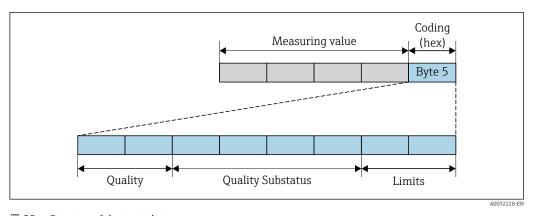
Available diagnostic behaviors

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.



39 Structure of the status byte

The contents 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 over 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.

12.7.1 Diagnostic of sensor

Diagnostic information			Remedy instructions
No.	Io. Short text		
002	Sensor unknown Measured variable status		1. Check if the correct sensor is mounted
			2. Check if the 2-D matrix code on the sensor is undamaged
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow Carrier pipe temperature Target corrected volume flo Carrier corrected volume flo Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Test point Dynamic viscosity 	w • Suspended bubbles	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 Cy 1 Volume flow Water volume flow Water volume flow Water cut

	Diagnostic in	formation	Remedy instructions
No.	. Short text		
022	Temperature sensor defective		If available: Check connection cable between sensor and transmitter
	Measured variable status		Check or replace sensor electronic module (ISEM) Replace sensor
	Quality	Good	
	Quality substatus C)k	
	Coding (hex)	0x80 to 0x83	
	Status signal F	7	
	Diagnostic behavior A	Alarm	
	Influenced measured variables		
 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Signal asymmetry Carrier mass flow Carrier pipe temperature Target corrected volume flow Carrier corrected volume flow Sensor index coil asymmetry Oscillation damping 1 Oscillation damping 2 Density Water current 2 Oscillation frequence Water current 2 Oscillation frequence Water current 1 Exciter current 2 Oscillation frequence Water density Test point Dynamic viscosity Reference density Reference density Reference density Reference density Reference density 		GSV flow alternati Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternati External pressure Exciter current 1 Exciter current 2 Oscillation frequer Raw value mass floe S&W volume flow Torsion signal asyn	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index 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 volume flow Water cut

	Diagnostic in	nformation	Remedy instructions
No.	o. Short text		
046	Sensor limit exceeded		Check process conditions
	Measured variable status [fro	m the factory] ¹⁾	2. Check sensor
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variable	es	
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	HBSI NSV flow NSV flow NSV flow alterna External pressure Exciter current 1 Exciter current 2 Oscillation freque Oscillation freque Raw value mass f S&W volume flow Torsion signal as	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 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 in:	formation	Remedy instructions
No.	Sho	ort text	
062	Sensor connection faulty	,	
	Measured variable status		Check or replace sensor electronic module (ISEM) Replace sensor
	Quality	Good	•
	Quality substatus (Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal F	7	
	Diagnostic behavior A	Alarm	
	Influenced measured variables		
	 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 	GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Coscillation frequent Raw value mass floe S&W volume flow Torsion signal asynte	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 1 Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature cy 1 Volume flow Oil volume flow Water volume flow Water cut

	Diagnostic inf	formation	Remedy instructions
No.	Shor	rt text	
063	Exciter current faulty Measured variable status		I. If available: Check connection cable between sensor and transmitter
			Check or replace sensor electronic module (ISEM) Replace sensor
	Quality G	ood	•
	Quality substatus O)k	
	Coding (hex)	x80 to 0x83	
	Status signal F		
	Diagnostic behavior A	larm	
	Influenced measured variables		
	 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 	GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mass glow HBSI NSV flow NSV flow Sternal pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequenter away value mass flow S&W volume flow Torsion signal asyrter	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 1 Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature cy 1 Volume flow Oil volume flow Water volume flow Water cut

	Diagnostic	information	Remedy instructions
No.	Si	hort 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		
	 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 Dynamic viscosity 	w • Suspended bubbles	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature Volume flow Oil volume flow Water volume flow Water volume flow Water cut

	Diagnostic i	nformation			Remedy instructions
No.	Short text				
083	Memory content inconsistent		1. Restart device		
	Measured variable status			2. Restore S-DAT data 3. Replace S-DAT	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	 Kinematic viscosit Mass flow Oil mass flow Water mass flow Inhomogeneous now Suspended bubble 		edium index s index ve	 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				
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	С			
	Diagnostic behavior	Warning			
	Influenced measured variables				
	 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 Dynamic viscosity 	W	 Sensor electronics of GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass floe S&W volume flow Torsion signal asyn 	edium index index ve cy 1 cy 2 w	 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.	SI	hort text	
140	Sensor signal asymmetrical		1. If available: Check connection cable between sensor and transmitter
	Measured variable status [from the factory] 1)		Check or replace sensor electronic module (ISEM) Replace sensor
	Quality	Good	•
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Alarm	
	Influenced measured variables 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 Carrier corrected volume flow Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Water density Oscillation frequen Test point Sensor signal asym Coscillation frequen Raw value mass flow Sensor index coil asymmetry Suspended bubbles		
			Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temperature cy 1 Volume flow Water 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 i	nformation	Remedy instructions
No.	Sł	nort text	
141	Zero adjustment failed		1. Check process conditions
	Measured variable status		Repeat commissioning procedure Check sensor
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	w ■ Suspended bubble	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temperature cy 1 Volume flow Water volume flow Water volume flow Water cut

	Diagnostic	information			Remedy instructions
No.	S	hort text			
142	42 Sensor index coil asymmetry too high			Check sensor	
	Measured variable status [fr	om the factory] 1)			
	Quality	Good			
	Quality substatus Ok				
	Coding (hex) Ox80 to 0x83 Status signal S				
	Diagnostic behavior	Warning			
	Influenced measured variables				
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output 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 Measured values Oscillation damping 1 Oscillation damping 2 Density Water density Test point Passw Volume flow Sensor index coil asymmetry Rexiter current 1 Rexiter current 2 Oscillation frequenting 1 Rexiter current 2 Oscillation frequenting 2 Exciter current 3 Saw Volume flow Test point Saw Volume flow Torsion signal asym Torsion signal asymmetry Torsion signal asymmetry 		edium index s index ve	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 2 Target mass flow Carrier volume flow Target volume flow Temp. compensated dynamic 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 i	nformation	Remedy instructions
No.	SI	nort text	
144	Measurement error too high		1. Check process conditions
	Measured variable status [fro	om the factory] 1)	2. Check or change sensor
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 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 temperate 	W HBSI NSV flow NSV flow alternati External pressure Exciter current 1 Exciter current 2 Oscillation frequer Raw value mass fle S&W volume flow Torsion signal asy	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index 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 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.	Si	hort text		
201	Electronics faulty			1. Restart device
	Measured variable status		2. Replace el	ectronics
	Quality	Good		
	Quality substatus	Ok		
	Coding (hex)	0x80 to 0x83		
	Status signal	F		
	Diagnostic behavior	Alarm		
	Influenced measured variables Oscillation amplitude 1 Oscillation specific output Application specific output Signal asymmetry Carrier mass flow Carrier pipe temperature Target corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Water density Test point Sensor electronics t GSV flow GSV flow GSV flow alternativ Kinematic viscosity Kinematic viscosity Mass flow Oil mass flow Oil mass flow Inhomogeneous me Suspended bubbles Suspended bubbles Suspended bubbles External pressure Exciter current 1 Exciter current 1 Exciter current 2 Oscillation frequence Raw value mass flow Saw volume flow Torsion signal asym		<u> </u>	
			ernative scosity v flow ous medium index ubbles index ernative ssure nt 1 nt 2 requency 1 requency 2 ass flow of flow flow flow	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 i	nformation			Remedy instructions
No.	Short text				
242	Firmware incompatible	Firmware incompatible		1. Check firmware ver	
	Measured variable status			2. Flash or replace elec	ctronic module
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variables				
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 Dynamic viscosity 	V N	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve ucy 1 ucy 2	 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.	SI	hort text	
252	Managed variable status		1. Check electronic modules
			Check if correct modules are available (e.g. NEx, Ex) Replace electronic modules
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 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 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 	w • Suspended bubbles	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature Volume flow Oil volume flow Water volume flow Water volume flow Water cut

	Diagnostic i	information		Remedy instructions
No.	Short text			
262	Module connection interrupted			Check or replace connection cable between sensor electronic module
	Measured variable status			(ISEM) and main electronics 2. Check or replace ISEM or main electronics
	Quality	Good		
	Quality substatus	Ok		
	Coding (hex)	0x80 to 0x83		
	Status signal	F		
	Diagnostic behavior	Alarm		
	Influenced measured variables			
	 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 Dynamic viscosity 	V W	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	Reference density alternative ve

	Diagnostic	information	Remedy instructions
No.	o. Short text		
270			1. Restart device
			2. Replace main electronic module
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 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 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 	w • Suspended bubbles	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature cy 1 Volume flow Water volume flow Water volume flow Water volume flow Water cut

	Diagnostic i	nformation			Remedy instructions
No.	Sł	Short text			
271	Main electronics faulty		1. Restart device		
	Measured variable status	Measured variable status		2. Replace main electr	onic module
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 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 Mass flow Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oscillation frequentente Water density Test point Sensor electronics of GSV flow Kinematic viscosity Mass flow Oil mass flow Oil mass flow Water mass flow Inhomogeneous ments Suspended bubbles Suspended bubbles Suspended bubbles Suspended bubbles External pressure Exciter current Exciter current 1 Exciter current 1 Exciter current 2 Oscillation frequententententententententententententente		edium index s index ve ccy 1 ccy 2 ow	 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.	SI	hort 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			
	 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 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 	w • Suspended bubbles	edium index s index ve acy 1 acy 2	 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 i	nformation			Remedy instructions
No.	SI	nort text			
273	Main electronics defective			play emergency operation	
	Measured variable status		2. Replace main electr	onics	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variables			,	
 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output 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 Mass flow Oil mass flow Inhomogeneous me Suspended bubbles Sensor index coil asymmetry HBSI Concentration Measured values Oscillation damping 1 External pressure Oscillation damping 2 Exciter current 1 Exciter current 2 Oil density Oscillation frequence Water density Test point Raw value mass flow Sensor electronics to GSV flow HSSI Noll mass flow External pressure Exciter current 1 Exciter current 2 Oscillation frequence Raw value mass flow Sew volume flow Torsion signal asym 		edium index s index ve acy 1 acy 2 aw	 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.	Si	hort 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			
	 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 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 	w • Suspended bubbles	edium index s index ve ucy 1 ucy 2 ow	 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.	Si	hort text			
276	I/O module faulty			Restart device	
	Measured variable status			2. Change I/O module	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83		-	
	Status signal	F		-	
	Diagnostic behavior	Alarm		-	
	Influenced measured variables				
	 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 	v w	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequer Oscillation frequer Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve	 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.	Si	hort 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			
	 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 Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Dynamic viscosity 	w • Suspended bubbles	edium index s index ve ucy 1 ucy 2 uw	 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				
302	Device verification active	Device verification active		Device verification activ	e, please wait.
	Measured variable status [fro	om the factory] 1)		
	Quality	Good			
	Quality substatus	Function check			
	Coding (hex)	0xBC to 0xBF			
	Status signal	С			
	Diagnostic behavior	Warning			
	Influenced measured variables Oscillation amplitude 1 Oscillation specific output Application specific output Signal asymmetry Carrier mass flow Carrier pipe temperature Target corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Water density Test point Sensor electronics to GSV flow GSV flow GSV flow Kinematic viscosity Mass flow Oil mass flow Inhomogeneous me Suspended bubbles				
			edium index index ve cy 1 cy 2	 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.

	Diagno	stic 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')
	Measured variable status		2. Afterwards reload device description and check wiring
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	M	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

	Diagnostic i	nformation	Remedy instructions
No.	Short text		
304	Device verification failed		1. Check verification report
	Measured variable status [fro	om the factory] 1)	Repeat commissioning procedure Check sensor
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variable	es	
	 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 Mass flow Oil mass flow Inhomogeneous metal suspended bubbles Sensor index coil asymmetry Measured values Oscillation damping 1 Oscillation damping 2 Density Oscillation frequent Water density Test point Dynamic viscosity 		Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index 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 volume flow Water cut

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

	Diagnostic i	information			Remedy instructions
No.	Short text				
311	Sensor electronics (ISEM) fault	Sensor electronics (ISEM) faulty		Maintenance required!	
	Measured variable status			Do not reset device	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	М			
	Diagnostic behavior	Warning			
	Influenced measured variable	es			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output 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 Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles Sensor index coil asymmetry HBSI Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oscillation frequen Water density Test point Raw value mass flow Torsion signal asyr 		edium index index ve cy 1 cy 2	 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		Rem	nedy instructions
No.	Short text				
330	Flash file invalid		1. Update firmware of device		
	Measured variable status		2. Restart device		
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	M			
	Diagnostic behavior	Warning			
	Influenced measured variables				
	 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 Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Dynamic viscosity 	GSV flo GSV flo GSV flo Kinema Mass f Oil ma: Water W Inhome G HBSI NSV flo Extern Exciter Exciter Oscilla Raw va S&W v	ow alternatic viscosity ow ss flow mass flow ogeneous med bubble.	Reve	ference density ference density alternative rrected volume flow I corrected volume flow ater corrected volume flow cillation damping fluctuation 1 cillation damping fluctuation 2 equency fluctuation 1 equency fluctuation 2 rget mass flow rrier volume flow rget volume flow mp. compensated dynamic viscosity mp. compensated kinematic viscosity mperature olume flow I volume flow ater cut

	Diagnostic i	information			Remedy instructions
No.	Si	hort text			
331	Firmware update failed			1. Update firmware of	device
	Measured variable status			2. Restart device	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Warning			
	Influenced measured variables				
	 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 Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Dynamic viscosity 	W	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flot S&W volume flow Torsion signal asyr 	edium index s index ve ucy 1 ucy 2	 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 i	nformation			Remedy instructions
No.	Sł	nort text			
332	Writing in HistoROM backup fa	ailed		1. Replace user interfa	
	Measured variable status			2. Ex d/XP: replace tra	ınsmitter
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 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 	N	 Sensor electronics GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve acy 1 acy 2 acy 2	 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.	Sł	nort text			
361	I/O module 1 to n faulty			1. Restart device	
	Measured variable status			2. Check electronic mo 3. Change I/O module	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 Dynamic viscosity 	V W	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve ccy 1 ccy 2 ow	 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.	Si	hort 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 variable	es	
	 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 Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Dynamic viscosity 	w • Suspended bubbles	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temperature cy 1 Volume flow Water volume flow Water volume flow Water cut

	Diagnostic i	information		Remedy instructions
No.	SI	nort text		
371	Temperature sensor defective		Contact service	
	Measured variable status			
	Quality	Good		
	Quality substatus	Ok		
	Coding (hex)	0x80 to 0x83		
	Status signal	M		
	Diagnostic behavior	Warning		
	Influenced measured variable	28		
	 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 Dynamic viscosity 	 GSV flow GSV flow alte Kinematic vis Mass flow Oil mass flow Water mass f Inhomogened Suspended bu 	ow us medium index bbles index mative ure t 1 t 2 quency 1 quency 2 ss flow clow	 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 i	nformation			Remedy instructions
No.	SI	ort text			
372	Sensor electronics (ISEM) fault	у		1. Restart device	
	Measured variable status			2. Check if failure recur 3. Replace sensor electr	-
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	V N	 Sensor electronics GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyr 	edium index s index ve ccy 1 ccy 2	 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 i	nformation			Remedy instructions
No.	SI	nort text			
373	Sensor electronics (ISEM) fault	у		Transfer data or reset of	levice
	Measured variable status				
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 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 Dynamic viscosity 	W	 Sensor electronics of GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyn 	edium index index ve cy 1 cy 2 w	 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 in	formation	Remedy instructions
No.	Short text		
374	Sensor electronics (ISEM) faulty		1. Restart device
	Measured variable status [fron	n the factory] ¹⁾	Check if failure recurs Replace sensor electronic module (ISEM)
	Quality	Good	
	Quality substatus (Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal S	5	
	Diagnostic behavior \(\text{\tint{\tilitet{\text{\tin}}\\ \text{\text{\text{\text{\text{\text{\text{\text{\text{\ti}\text{\texiti}\text{\text{\texi}\text{\texititt{\text{\texi}\text{\text{\texi}\text{\text{\text{\text{\text{\texi}\texit{\text{\text{\t	Warning	
	Influenced measured variables		
	 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 temperatur 	 NSV flow NSV flow alternati External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequenter Raw value mass flowed to signal asyn Torsion signal asyn 	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 1 Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature cy 1 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 i	information			Remedy instructions
No.	SI	nort text			
375	I/O- 1 to n communication fail	ed		1. Restart device	
	Measured variable status			2. Check if failure recurs 3. Replace module rack	s inclusive electronic modules
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 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 		 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve	 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 i	nformation			Remedy instructions
No.	SI	ort text			
378	Supply voltage ISEM faulty				onnection cable between sensor and transmitter
	Measured variable status			2. Replace main electr 3. Replace sensor electr	
	Quality	Good			, ,
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variable	es			
	 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 Dynamic viscosity 	N	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flot S&W volume flow Torsion signal asyr 	edium index s index ve ucy 1 ucy 2 ow	 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 i	nformation			Remedy instructions
No.	SI	nort text			
382	Data storage			1. Insert T-DAT	
	Measured variable status			2. Replace T-DAT	
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variables				
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	V N	 Sensor electronics GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	edium index s index ve ccy 1 ccy 2	 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.	Si	hort 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 variable	es		
	 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 Carrier corrected volume flow Sensor index coil asymmetry Concentration Measured values Oscillation damping 1 Oscillation damping 2 Density Oil density Water density Test point Dynamic viscosity 	w • Suspended bubbles	ve dedium index s index ve ncy 1 ncy 2 ncy 2 ncy 2	 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				
387	HistoROM data faulty			Contact service organiz	ation
	Measured variable status				
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	F			
	Diagnostic behavior	Alarm			
	Influenced measured variables				
	 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 Measured values Oscillation damping 1 Oscillation damping 2 Density Water mass flow Inhomogeneous Suspended bubble NSV flow NSV flow NSV flow alternation Desciter current 1 Exciter current 1 Oscillation frequ Water density Test point Raw value mass S&W volume flow 		SV flow SV flow alternativ inematic viscosity lass flow il mass flow Jater mass flow shomogeneous me uspended bubbles BSI SV flow SV flow alternativ external pressure exciter current 1 exciter current 2 excillation frequence executes and value mass flow	edium index index ve cy 1 cy 2 w	 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

12.7.3 Diagnostic of configuration

	Diagnostic	information		Remedy instructions		
No.	S	hort text				
410			1. Retry data transfer			
			2. Check connection			
	Quality	Good				
	Quality substatus	Ok	-			
	Coding (hex)	0x80 to 0x83	-			
	Status signal	F	-			
	Diagnostic behavior	Alarm	_			
	Influenced measured variables					
	 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 	w • Suspended bubbles	edium index s index ve acy 1 acy 2	 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	e wait	
	Measured variable status				
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	С			
	Diagnostic behavior	Warning			
	Influenced measured variable	es			
	 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 Dynamic viscosity 	W	 Sensor electronics of GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyn 	edium index index ve cy 1 cy 2	 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

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

	Diagnostic i	information		Remedy instructions
No.	SI	hort text		
437	Configuration incompatible		1. Update firmware	
	Measured variable status		2. Execute factory reset	
	Quality	Good		
	Quality substatus	Ok		
	Coding (hex)	0x80 to 0x83		
	Status signal	F		
	Diagnostic behavior	Alarm	-	
	Influenced measured variables			
	 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 Dynamic viscosity 	w • Suspended bubbles	edium index s index ve acy 1 acy 2 acw 2	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.	o. Short text				
438	Dataset different Measured variable status		1. Check dataset file		
			2. Check device parameterization3. Download new device parameterization		
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	М			
	Diagnostic behavior	Warning			
	Influenced measured variables				
 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 		N W	 Sensor electronics GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyr 	Reference density alte Corrected volume flow Oil corrected volume f Water corrected volume Oscillation damping fl Oscillation damping fl Oscillation damping fl Gridium index Frequency fluctuation Target mass flow Carrier volume flow Target volume flow Temp. compensated d Temp. compensated d Temp. compensated k Temperature Volume flow Volume flow Water volume flow Water volume flow Water cut	vilow ne flow luctuation 1 luctuation 2 1 2

	Diagnos	stic information	Remedy instructions
lo.	. Short text		
41	Current output 1 to n saturated		1. Check current output settings
	Measured variable status		2. Check process
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
ŀ	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

	Diagno	stic information	Remedy instructions
No.	. Short text		
42	Frequency output 1 satura	ated	Check frequency output settings
	Measured variable status		2. Check process
	Quality	Good	1
	Quality substatus	Ok	7
	Coding (hex)	0x80 to 0x83	7
	Status signal	S	7
	Diagnostic behavior	Warning	7
	Influenced measured variables		
	_		

	Diagnos	tic information	Remedy instructions
No.	o. Short text		
443	Pulse output 1 saturated		1. Check pulse output settings
	Measured variable status [from the factory] 1)		2. Check process
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	_		

	Diagnost	cic information	Remedy instructions
No.	o. Short text		
444	Current input 1 to n saturat	ed	1. Check current input settings
	Managered variable status [from the factory] 1)		2. Check connected device 3. Check process
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured varia	ables	
	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	С			
	Diagnostic behavior	Warning			
	Influenced measured variable	S			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	V	GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mass flow Suspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flow S&W volume flow Torsion signal asyn Reference density	edium index index ve cy 1 cy 2	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				
484	Failure mode simulation active			Deactivate simulation	
	Measured variable status				
	Quality	Good			
	Quality substatus ()k			
	Coding (hex)	0x80 to 0x83			
	Status signal (2			
	Diagnostic behavior	Alarm			
	Influenced measured variables				
	 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 temperatur 	 Suspend HBSI NSV flov NSV flov External Exciter of Oscillation Raw value S&W volume Torsion 	v alternativ ic viscosity w flow hass flow geneous me ed bubbles v v alternativ pressure urrent 1 urrent 2 on frequen he mass flo ume flow signal asym	edium index index ve cy 1 cy 2	 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	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	С			
	Diagnostic behavior	Warning			
	Influenced measured variables				
	 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 temperate 	w 7	 GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asynt Reference density 	edium index index ve cy 1 cy 2	 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.	S	hort text	
486	Current input 1 to n simulation	n active	Deactivate simulation
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
Influenced measured variables		les	
	Measured values		

	Diagnostic	information	Remedy instructions
No.	Short text		
491	Current output 1 to n simulati	on active	Deactivate simulation
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

Diagnostic information			Remedy instructions
).		Short text	
2	Frequency output 1 to n simulation active		Deactivate simulation frequency output
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		
ľ	-		

	Diagnostic information		Remedy instructions
lo.		Short text	
93	Pulse output simulation ac	tive	Deactivate simulation pulse output
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		
İ	_		

	Diagno	stic information	Remedy instructions
lo.		Short text	
94	Switch output 1 to n simulation active		Deactivate simulation switch output
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		,
	-		

	Diagnosti	c information	Remedy instructions
No.		Short text	
495	Diagnostic event simulation a	active	Deactivate simulation
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

Diagnostic information		Remedy instructions
	Short text	
Status input 1 to n simula	tion active	Deactivate simulation status input
Measured variable statu	s	
Quality	Good	
Quality substatus	Ok	
Coding (hex)	0x80 to 0x83	
Status signal	С	
Diagnostic behavior	Warning	
Influenced measured va	riables	
-		
	Status input 1 to n simula Measured variable statu Quality Quality substatus Coding (hex) Status signal Diagnostic behavior Influenced measured variable status	Short text Status input 1 to n simulation active Measured variable status Quality Good Quality substatus Ok Coding (hex) Ox80 to 0x83 Status signal C Diagnostic behavior Warning Influenced measured variables

	Diagnosti	information	Remedy instructions
No.	Short text		
520	I/O 1 to n hardware configuration invalid		1. Check I/O hardware configuration
	Measured variable status		Replace wrong I/O module Plug the module of double pulse output on correct slot
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	-		

Diagnostic information			Remedy instructions
lo.		Short text	
1 1	Out of valid range of the selected calculation algorithm		
	Measured variable status		Check concentration settings Check measured values, e.g. density or temperature
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	 Carrier mass flow Target corrected volume flow Carrier corrected volume flow Carrier mass flow Carrier mass flow Carrier volume flow Carrier volume flow 		Target volume flowVolume flow

	Diagnost	ic information	Remedy instructions
No.		Short text	
529	Concentration calculation not accurate		Out of valid range of the selected calculation algorithm
	Measured variable status		Check concentration settings Check measured values, e.g. density or temperature
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	 Carrier mass flow Target corrected volume flow Carrier corrected volume flow Concentration Density Mass flow Target mass flow Carrier volume flow 		Target volume flowVolume flow

	Diagnost	c information	Remedy instructions
Io.		Short text	
37	Configuration		1. Check IP addresses in network
	Measured variable status		2. Change IP address
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Warning	
	Influenced measured variables		
İ	-		

	Diagnostic	information	Remedy instructions
No.	:	Short text	
594	Relay output 1 to n simulation active		Deactivate simulation switch output
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	С	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

12.7.4 Diagnostic of process

	Diagno	stic information	Remedy instructions
No.		Short text	
	Loop current 1 faulty		1. Check wiring
	Measured variable status		2. Change I/O module
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	-		

	Diagnostic in:	formation	Remedy instructions
No.	Sho	ort 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	5	
	Diagnostic behavior V	Warning	
	Influenced measured variables		
	 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 	 NSV flow NSV flow alternati External pressure Exciter current 1 Exciter current 2 Oscillation frequer Oscillation frequer Raw value mass fleen S&W volume flow Torsion signal asy 	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index 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 volume flow Water cut

	Diagnostic i	nformation			Remedy instructions
No.	Sh	ort text			
831	Ambient temperature too low			Increase 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				
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 temperatu 	,	 GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyn Reference density 	edium index index ve cy 1 cy 2	 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 i	information			Remedy instructions
No.	SI	nort text			
832	Electronics temperature too hig	gh		Reduce ambient tempe	erature
	Measured variable status [fro	leasured 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				
	 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 Dynamic viscosity 	N W	 Sensor electronics GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flots S&W volume flow Torsion signal asyr 	edium index s index ve ucy 1 ucy 2 ow	 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.	Si	hort text			
833	Electronics temperature too lov	N		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				
	 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 Dynamic viscosity 	W	 Sensor electronics of GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequent Oscillation frequent Raw value mass flow S&W volume flow Torsion signal asyn 	edium index index ve cy 1 cy 2 w	 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 i	nformation	Remedy instructions
No.	Sh	ort 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		
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	HBŚI NSV flow NSV flow alterna External pressure Exciter current 1 Exciter current 2 Oscillation freque Oscillation freque Raw value mass f S&W volume flow Torsion signal as	• Oil corrected volume flow • Water corrected volume flow • Oscillation damping fluctuation 1 • Oscillation damping fluctuation 2 • Frequency fluctuation 1 • Frequency fluctuation 2 • 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 volume flow • Water cut

	Diagnostic i	nformation			Remedy instructions
No.	Sł	ort text			
835	Process temperature too low			Increase process tempera	ature
	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				
	 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 	v	 GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flow S&W volume flow Torsion signal asyn Reference density 	edium index index ve cy 1 cy 2 w	 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 in	nformation		Remedy instructions
No.	She	ort text		
842	Process value below limit			е
	leasured variable status [from the factory] 1)		Check application Check sensor	
	Quality	Good		
	Quality substatus	Ok		
	Coding (hex)	0x80 to 0x83		
	Status signal	S		
	Diagnostic behavior	Warning		
	Influenced measured variables			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyr	edium index s index ve ccy 1 ccy 2 ow	 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 i	nformation	Remedy instructions
No.	SI	nort text	
862	Partly filled pipe		1. Check for gas in process
	Measured variable status [fro	om the factory] 1)	2. Adjust detection limits
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	 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 Kinematic viscosity Water mass flow Inhomogeneous m Suspended bubble HBSI NSV flow NSV flow NSV flow alternation S&W volume flow Reference density Reference density Reference density 		 Oil corrected volume flow Water corrected volume flow Target mass flow edium index Carrier volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature Volume flow Oil volume flow Water volume flow

	Diagnostic i	nformation			Remedy instructions
No.	Si	nort text			
882	Input signal faulty			1. Check input signal parameterization	
	Measured variable status		2. Check external devic 3. Check process condit		
	Quality	Bad		*	
	Quality substatus	Maintenance alarm			
	Coding (hex)	0x24 to 0x27			
	Status signal F				
	Diagnostic behavior	Alarm			
	Influenced measured variables				
	 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 Dynamic viscosity 	GSV f GSV f GSV f Kiner Mass Oil m Wate V Inhor N Suspe HBSI NSV f NSV f Exter Excite Coscill Oscill Raw V SW	low low alternativ natic viscosity flow ass flow r mass flow nogeneous me	edium index index ve cy 1 cy 2 w	 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

	Diagno	estic information	Remedy instructions
lo.	. Short text		
10			1. If available: Check connection cable between sensor and transmitter
	Management reminded attacks		Check or replace sensor electronic module (ISEM) Check sensor
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	_		

	Diagnostic inf	formation	Remedy instructions
No.	Sho	rt text	
912	Medium inhomogeneous		1. Check process cond.
	Measured variable status [from	n the factory] 1)	2. Increase system pressure
	Quality	Good	
	Quality substatus Ok Coding (hex) 0x80 to 0x83)k	
	Status signal S	}	
	Diagnostic behavior V	Varning	
	Influenced measured variables		
	 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 	GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyne	Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index 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				
913	Medium unsuitable		1. Check proces		
	Measured variable status [fro	om the factory] ¹)	2. Check electro	onic modules or sensor
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	S			
	Diagnostic behavior	Warning			
	Influenced measured variable	es			
	 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 temperate 	V W	GSV flow GSV flow alternativ Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous me Suspended bubbles HBSI NSV flow NSV flow alternativ External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass flo S&W volume flow Torsion signal asyn Reference density	edium index s index ve acy 1 acy 2	 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.

274

	Diagnostic i	information	Remedy instructions
No.	Short text		
915	Viscosity ouf of specification Measured variable status [from the factory] 1)		1. Avoid 2-phase flow
			Increase system pressure Verify viscosity and density are within range
	Quality	Good	4. Check process conditions
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	 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 Water density Test point Test point Dynamic viscosity 	w • Suspended bubbles	Reference density alternative Corrected volume flow Oil corrected volume flow Water corrected volume flow Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 edium index Frequency fluctuation 2 Target mass flow Carrier volume flow Target volume flow Target volume flow Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity Temperature cy 1 Volume flow Oil volume flow Water volume flow Water volume flow Water cut

	Diagnostic information		Remedy instructions
No.	S	hort text	
941	API/ASTM temperature out of	specificat.	1. Check process temperature with selected API/ASTM commodity group
	Measured variable status [from the factory] 1)		2. Check API/ASTM-related parameters
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variable	es	
	 Oil density Water density GSV flow GSV flow alternative Mass flow Oil mass flow 	 Water mass flow NSV flow NSV flow alternatives S&W volume flow Reference density and corrected volume for 	Water volume flowWater cut

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

	Diagnostic	information	Remedy instructions
.	Short text		
2	API/ASTM density out of specification Measured variable status [from the factory] 1)		1. Check process density with selected API/ASTM commodity group
			2. Check API/ASTM-related parameters
	Quality	Good	
Ī	Quality substatus	Ok	
ı	Coding (hex)	0x80 to 0x83	
Ī	Status signal	S	
	Diagnostic behavior	Warning	
Ī	Influenced measured variables		
	 Oil density Water density GSV flow GSV flow alternative Mass flow Oil mass flow 	 Water mass flow NSV flow NSV flow alternation S&W volume flow Reference density Corrected volume flow 	Water volume flowWater cut

	Diagnostic	information	Remedy instructions
No.	Short text		
943			Check process pressure with selected API commodity group
	Measured variable status [from the factory] 1)		2. Check API related parameters
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	 Oil density Water density GSV flow GSV flow alternative Mass flow Oil mass flow 	 Water mass flow NSV flow NSV flow alternatives S&W volume flow Reference density and Corrected volume flow 	Water volume flowWater cut

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

	Diagnostic i	information	Remedy instructions
No.	SI	hort text	
944	Monitoring failed		Check process conditions for Heartbeat Monitoring
	Measured variable status [fro	om the factory] 1)	
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variable	es	
	 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 	 Dynamic viscosity Kinematic viscosity Inhomogeneous me Suspended bubbles HBSI Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen 	edium index index Oscillation damping fluctuation 1 Oscillation damping fluctuation 2 Frequency fluctuation 1 Frequency fluctuation 2 Temp. compensated dynamic viscosity Temp. compensated kinematic viscosity

	Diagnostic info	formation	Remedy instructions
Vo.	Shor	rt text	
48	Oscillation damping too high		Check process conditions
	Measured variable status [from	the factory] 1)	
	Quality	ood	
	Quality substatus O)k	
	Coding (hex)	x80 to 0x83	
	Status signal S		
	Diagnostic behavior W	Varning	
	Influenced measured variables		
	 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 	GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous m Suspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequer Oscillation frequer Raw value mass floes S&W volume flow Torsion signal asyner (ISEM) Reference density	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		1. Decrease ambient te	*	
	Measured variable status [fro	om the factory] 1)		2. Increase medium tei	mperature
	Quality	Good			
	Quality substatus	Ok			
	Coding (hex)	0x80 to 0x83			
	Status signal	S			
	Diagnostic behavior	Warning			
	Influenced measured variable	es			
	 Oscillation amplitude 1 Oscillation amplitude 2 Application specific output Application specific output Signal asymmetry Carrier mass flow 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 	W	Sensor electronics of GSV flow GSV flow alternative Kinematic viscosity Mass flow Oil mass flow Water mass flow Inhomogeneous mesuspended bubbles HBSI NSV flow NSV flow alternative External pressure Exciter current 1 Exciter current 2 Oscillation frequen Oscillation frequen Raw value mass floe S&W volume flow Torsion signal asyn	edium index s index ve ccy 1 ccy 2 ow	 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

12.8 Pending diagnostic events

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

Accessing the remedial action for a diagnostic event:

■ Via local display →

□ 206

■ Via web browser → 🗎 208

■ Via web blowsel → ■ 200

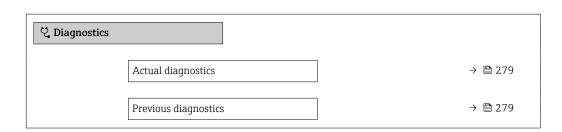
■ Via "FieldCare" operating tool \rightarrow 🖺 209

■ Via "DeviceCare" operating tool \rightarrow 🖺 209

Other pending diagnostic events can be displayed in the **Diagnostic list** submenu $\rightarrow \stackrel{\triangle}{=} 279$.

Navigation

"Diagnostics" menu



Operating time from restart	→ 🖺 279
Operating time	→ 🖺 279

Parameter overview with brief description

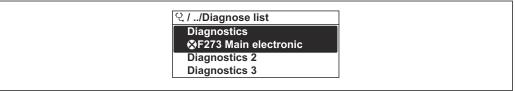
Parameter	Prerequisite	Description	User interface
Actual diagnostics A diagnostic event has occurred.		Shows the current occured diagnostic event along with its diagnostic information.	Symbol for diagnostic behavior, diagnostic code and short message.
		If two or more messages occur simultaneously, the message with the highest priority is shown on the display.	
Previous diagnostics	Two diagnostic events have already occurred.	Shows the diagnostic event that occurred prior to the current diagnostic event along with its diagnostic information.	Symbol for diagnostic behavior, diagnostic code and short message.
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 are 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



A0014006-E

40 Using the example of the local display

i

Accessing the remedial action for a diagnostic event:

- Via local display → 🖺 206
- Via web browser → 🖺 208
- Via "FieldCare" operating tool → 🖺 209
- Via "DeviceCare" operating tool → 🖺 209

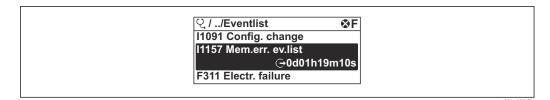
12.10 Event logbook

12.10.1 Reading out the event logbook

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

Navigation path

Diagnostics menu → **Event logbook** submenu → Event logbook



 \blacksquare 41 Using 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 logbook can contain up to 100 entries.

The event history includes entries for:

- Diagnostic events → 🖺 212
- Information events → 🗎 280

In addition to the operating time when the event occurred, each event is also assigned a symbol that indicates whether the event has occurred or is finished:

- Diagnostic event
 - ①: Occurrence of the event
 - 🕒: End of the event
- Information event
 - €: Occurrence of the event
- Accessing the remedial action for a diagnostic event:

 - Via web browser \rightarrow $\stackrel{ riangle}{ riangle}$ 208
 - Via "FieldCare" operating tool → 🗎 209
 - Via "DeviceCare" operating tool \rightarrow 🖺 209
- $box{ }$ Filtering the displayed event messages $ightarrow binom{1}{2}$ 280

12.10.2 Filtering the event logbook

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

Navigation path

 $Diagnostics \rightarrow Event logbook \rightarrow Filter options$

Filter categories

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

12.10.3 Overview of information events

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

Info number	Info name
I1000	(Device ok)
I1079	Sensor changed

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 verific. failed
I1512	Download started
I1513	Download finished
I1514	Upload started
I1515	Upload finished
I1618	I/O module 2 replaced
I1619	I/O module 3 replaced
I1621	I/O module 4 replaced
I1622	Calibration changed
I1624	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 device

The entire device configuration or some of the configuration can be reset to a defined state with the **Device reset** parameter ($\rightarrow \triangleq 168$).

12.11.1 Function scope of the "Device reset" parameter

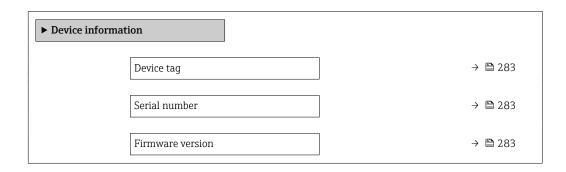
Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart 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 \rightarrow Device information



Device name	→ 🖺 283
Manufacturer	→ 🖺 283
Order code	→ 🗎 283
Extended order code 1	→ 🖺 283
Extended order code 2	→ 🖺 283
Extended order code 3	→ 🖺 284
ENP version	→ 🖺 284

Parameter overview with brief description

Parameter	Description	User interface	Factory setting	
Device tag	Shows name of measuring point.	Shows name of measuring point. Character string comprising numbers, letters and special characters		
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.	The name can be found on the		
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	BA02131D/06/EN/01.21

- It is possible to flash the firmware to the current version or an existing previous version via 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:
 - \blacksquare In the Download Area of the Endress+Hauser Web site: www.endress.com \to Downloads
 - Specify the following details:
 - Product root: e.g. 8X5B
 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 work

No special maintenance work is required.

13.1.1 Cleaning

Cleaning of surfaces not in contact with the medium

- 1. Recommendation: Use a lint-free cloth that is either dry or slightly dampened using water.
- 2. Do not use sharp objects or aggressive cleaning agents that could damage surfaces (e.g. displays, housing) and seals.
- 3. Do not use high-pressure steam.
- 4. Ensure compliance with the protection class of the device.

NOTICE

Cleaning agents can damage the surfaces!

Incorrect cleaning agents can damage the surfaces!

▶ Do not use cleaning agents containing concentrated mineral acids, alkalis or organic solvents e.g. benzyl alcohol, methylene chloride, xylene, concentrated glycerol cleaners or acetone.

Cleaning of surfaces in contact with the medium

Note the following for cleaning and sterilization in place (CIP/SIP):

- Use only cleaning agents to which the materials in contact with the medium are sufficiently resistant.
- Observe the permitted maximum medium temperature.

13.2 Measuring and test equipment

Endress+Hauser offers a variety of measuring and testing equipment, such as Netilion or device tests.

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

List of some of the measuring and testing equipment: $\rightarrow \triangleq 290$

13.3 Maintenance 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 notes

14.1.1 Repair and conversion concept

The Endress+Hauser repair and conversion concept provides for the following:

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

14.1.2 Notes for repair and conversion

For repair and conversion 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 all repairs and conversions and enter the details in 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.

14.3 Repair 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: https://www.endress.com
- 2. If returning the device, pack the device in such a way that it is reliably protected against impact and external influences. The original packaging provides the best protection.

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 instrument

1. Switch off the device.

WARNING

Danger to persons from process conditions!

- ▶ Beware of hazardous process conditions such as pressure in the measuring instrument, high temperatures or aggressive media.
- 2. Carry out the installation and connection steps from the "Installing the device" and "Connecting the device" sections in reverse order. Observe the safety instructions.

14.5.2 Disposing of the measuring instrument

A 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

Accessory	Description		
Transmitter Proline 500 – digital Proline 500	Transmitter for replacement or storage. Use the order code to define the following specifications: Approvals Output Input Display/operation Housing Software Proline 500 – digital transmitter: Order number: 8X5BXX-********A Proline 500 transmitter: Order number: 8X5BXX-***********B 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. Proline 500 – digital transmitter: Installation Instructions EA01151D Proline 500 transmitter: Installation Instructions EA01152D		
External WLAN antenna			
Pipe mounting set	Pipe mounting set for transmitter. Proline 500 – digital transmitter Order number: 71346427 Installation Instructions EA01195D Proline 500 transmitter Order number: 71346428		
Protective cover Transmitter Proline 500 – digital Proline 500	Is used to protect the measuring instrument from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. Proline 500 – digital transmitter Order number: 71343504 Proline 500 transmitter Order number: 71343505 Installation Instructions EA01191D		

Display guard Proline 500 – digital	Is used to protect the display against impact or scoring, for example from sand in desert areas. Order number: 71228792 Installation Instructions EA01093D
Connecting cable Proline 500 – digital Sensor – Transmitter	The connecting cable can be ordered directly with the measuring instrument (order code for "Cable, sensor connection") or as an accessory (order number DK8012). The following cable lengths are available: order code for "Cable, sensor connection" Option B: 20 m (65 ft) Option E: User-configurable up to max. 50 m Option F: User-configurable up to max. 165 ft Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1000 ft)
Connecting cable Proline 500 Sensor – Transmitter	The connecting cable can be ordered directly with the measuring instrument (order code for "Cable, sensor connection") or as an accessory (order number DK8012). The following cable lengths are available: order code for "Cable, sensor connection" Option 1: 5 m (16 ft) Option 2: 10 m (32 ft) Option 3: 20 m (65 ft) Possible cable length for a Proline 500 connecting cable: max. 20 m (65 ft)

15.2 Communication-specific accessories

Accessories	Description
Fieldgate FXA42	Transmission of the measured values of connected 4 to 20 mA analog measuring instruments, as well as digital measuring instruments
	 Technical Information TI01297S Operating Instructions BA01778S Product page: www.endress.com/fxa42
Field Xpert SMT50	The Field Xpert SMT50 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. 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.
	 Technical Information TI01555S Operating Instructions BA02053S Product page: www.endress.com/smt50
Field Xpert SMT70	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. 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.
	 Technical Information TI01342S Operating Instructions BA01709S Product page: www.endress.com/smt70
Field Xpert SMT77	The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1.
	 Technical Information TI01418S Operating Instructions BA01923S Product page: www.endress.com/smt77

15.3 Service-specific accessories

Accessory	Description	
Applicator	Software for selecting and sizing Endress+Hauser measuring instruments: Choice of measuring instruments for industrial requirements Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and measurement accuracy. Graphic display of the calculation results Determining the partial order code. Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project. Applicator is available: Via the Internet: https://portal.endress.com/webapp/applicator	
Netilion	lloT ecosystem: Unlock knowledge With the Netilion IIoT ecosystem, Endress+Hauser allows you to optimize your plant performance, digitize workflows, share knowledge, and enhance collaboration. Based on decades of experience in process automation, Endress+Hauser offers the process industry an IIoT ecosystem that enables you to gain useful insights from data. These insights can be used to optimize processes, leading to increased plant availability, efficiency, and reliability - ultimately resulting in a more profitable plant. www.netilion.endress.com	
FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all intelligent 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. Operating Instructions BA00027S and BA00059S	
DeviceCare	Tool to connect and configure Endress+Hauser field devices. Technical Information: TI01134S Innovation brochure: IN01047S	

15.4 System components

Accessories	Description
Memograph M graphic data manager	The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.
	Technical Information TI00133ROperating Instructions BA00247R
Cerabar M	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. Technical Information TI00426P and TI00436P Operating Instructions BA00200P and BA00382P
Cerabar S	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. Technical Information TI00383P Operating Instructions BA00271P
iTEMP	The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature. [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	The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables.
	For information on the structure of the measuring instrument $\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $

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 range full scal	e values $\dot{m}_{\min(F)}$ to $\dot{m}_{\max(F)}$
[mm]	[in]	[t/h]	[tn. sh./h]
300	12	0 to 4 100	0 to 4520
350	14	0 to 4 100	0 to 4520
400	16	0 to 4 100	0 to 4520

Measuring range for gases

The full scale value depends on the density and the speed of sound of the gas used. The full scale value can be calculated with the following formulas:

$$\dot{m}_{\;max\;(G)}$$
 = minimum of
$$(\dot{m}_{max(F)}\cdot\rho_{G}:x\;)\;\text{and}\;$$

$$(\rho_G \cdot (c_G/2) \cdot d_i^2 \cdot (\pi/4) \cdot 3600 \cdot n)$$

m _{max(G)}	Maximum full scale value for gas [kg/h]	
m _{max(F)}	Maximum full scale value for liquid [kg/h]	
$\dot{m}_{\max(G)} < \dot{m}_{\max(F)}$	$\dot{n}_{\max(G)}$ can never be greater than $\dot{m}_{\max(F)}$	
ρ_{G}	Gas density in [kg/m³] at operating conditions	
х	Limitation constant for max. gas flow [kg/m³]	
c_G	Speed of sound (gas) [m/s]	
d _i	Measuring tube internal diameter [m]	
π	Pi	
n = 4	Number of measuring tubes	

DN		x
[mm]	[in]	[kg/m³]
300	12	200
350	14	200
400	16	200

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 $\rightarrow \triangleq 309$

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

To increase the measurement accuracy of certain measured variables or to calculate the corrected volume flow for gases, the automation system can continuously write different measured values to the measuring instrument:

- Operating pressure to increase measurement accuracy (Endress+Hauser recommends the use of a pressure measuring instrument for absolute pressure, e.g. Cerabar M or Cerabar S)
- Medium temperature to increase measurement accuracy (e.g. iTEMP)
- Reference density for calculating the corrected volume flow for gases
- Various pressure and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section → 🗎 290

It is recommended to read in external measured values to calculate the corrected volume flow.

Current input

Digital communication

The measured values are written by the automation system via PROFINET over Ethernet-APL.

Current input 0/4 to 20 mA

Current input	0/4 to 20 mA (active/passive)
Current span	 4 to 20 mA (active) 0/4 to 20 mA (passive)
Resolution	1 μΑ
Voltage drop	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
Maximum input voltage	≤ 30 V (passive)
Open-circuit voltage	≤ 28.8 V (active)
Possible input variables	PressureTemperatureDensity

Status input

Maximum input values	■ DC -3 to 30 V ■ If status input is active (ON): $R_i > 3 \text{ k}\Omega$
Response time	Configurable: 5 to 200 ms

Input signal level	 Low signal: DC -3 to +5 V High signal: DC 12 to 30 V
Assignable functions	 Off Reset the individual totalizers separately Reset all totalizers Flow override

16.4 Output

Output signal

PROFINET over Ethernet-APL

Device use	Device connection to an APL field switch
	The device may only be operated according to the following APL port
	classifications:
	• If used in hazardous areas: SLAA or SLAC 1)
	If used in non-hazardous areas: SLAX
	Connection values of APL field switch (corresponds to APL port classification SPCC or SPAA, for instance):
	 Maximum input voltage: 15 V_{DC} Minimum output values: 0.54 W
	 Device connection to an SPE switch In non-hazardous areas, the device can be used with an appropriate 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 connected. The SPE switch must support the 10BASE-T1L standard and PoDL power classes 10, 11 or 12 and have a function to disable power class detection.
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 • Max. 400 mA(24 V) • Max. 200 mA (110 V) 50 (60 V) 230 V 50 (60 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: Active Passive
Current range	Can be set to: 4 to 20 mA NAMUR 4 to 20 mA US 4 to 20 mA 0 to 20 mA for independent of 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 700Ω
Resolution	0.38 μΑ

Damping	Configurable: 0 to 999.9 s
Assignable measured variables	 Mass flow Volume flow Corrected volume flow Density Reference density Temperature Electronics temperature Oscillation frequency 0 Oscillation damping 0 Signal asymmetry Exciter current 0 The range of options increases if the measuring device has one or more application packages.

Pulse/frequency/switch output

Function	Can be configured as pulse, frequency or switch output
Version	Open collector
	Can be set to: • Active
	■ Passive
	Passive NAMUR
	Ex-i, passive
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Pulse width	Configurable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Configurable
Assignable measured	Mass flow
variables	Volume flow Corrected volume flow
	The range of options increases if the measuring device has one or more
	application packages.
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 $10000\text{Hz}(f_{max}=12500\text{Hz})$
Damping	Configurable: 0 to 999.9 s
Pulse/pause ratio	1:1

Assignable measured variables	 Mass flow Volume flow Corrected volume flow Density Reference density Temperature Electronics temperature Oscillation frequency 0 Oscillation damping 0 Signal asymmetry Exciter current 0 The range of options increases if the measuring device has one or more application packages.
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	 Disable On Diagnostic behavior Limit Mass flow Volume flow Corrected volume flow Density Reference density Temperature Totalizer 1-3 Flow direction monitoring Status Partially filled pipe detection Low flow cut off The range of options increases if the measuring device has one or more application packages.

Relay output

Function	Switch output
Version	Relay output, galvanically isolated
Switching behavior	Can be set to: NO (normally open), factory setting NC (normally closed)

Maximum switching capacity (passive)	■ DC 30 V, 0.1 A ■ AC 30 V, 0.5 A
Assignable functions	 Disable On Diagnostic behavior Limit Mass flow Volume flow Corrected volume flow Density Reference density Temperature Totalizer 1-3 Flow direction monitoring Status Partially filled pipe detection Low flow cut off
	The range of options increases if the measuring device has one or more application packages.

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 over Ethernet-APL

Device diagnostics	Diagnostics according to PROFINET PA Profile 4.02
--------------------	---

Current output

Current output 4-20 mA	
Failure mode	Configurable: 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
Current output 4-20 mA	
Failure mode	Configurable: Maximum alarm: 22 mA Definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output	
Failure mode	Configurable: • Actual value • No pulses

Frequency output	
Failure mode	Configurable: Actual value O Hz Definable value between: 2 to 12 500 Hz
Switch output	
Failure mode	Configurable: Current status Open Closed

Relay output

Failure mode	Choose from:
	Current status
	■ Open
	■ Closed

Local display

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



Status signal as per NAMUR recommendation NE 107

Interface/protocol

- Via digital communication: PROFINET over Ethernet-APL
- Via service interface
 - Service interface CDI-RJ45
 - WLAN interface
- Plain text display

With information on cause and remedial actions

Web browser

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

LEDs

Status information	Status indicated by various LEDs		
	The following information is displayed depending on the device version: Supply voltage active Data transmission active Device alarm/error has occurred Network available Connection established PROFINET blinking feature		
	Diagnostic information via LEDs → 202		

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 protective ground connection (PE)

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			
Data transfer	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 4.02 (Application interface identifier API: 0x9700)			
Manufacturer ID	17			
Device type ID	0xA43B			
Device description files (GSD, DTM, FDI)	Information and files available at: ■ www.endress.com → Downloads area ■ www.profibus.com			
Supported connections	 2x AR (IO Controller AR) 2x AR (IO Supervisor Device AR connection allowed) 			
Configuration options for measuring instrument	 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 instrument. 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	 Identification & Maintenance, simple device identifier via: 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 . Cyclic data transmission Overview and description of the modules Status coding Factory setting			

16.5 Power supply

Terminal assignment

→ 🖺 40

Available device plugs	→ 🖺 41				
Available device plugs	→ 🖺 41				
Supply voltage	Order code for "Power supply"	Terminal voltag	e	Frequency range	
	Option D	DC 24 V	±20%	-	
	Option E	AC 100 to 240 V	-15 to 10%	50/60 Hz	
	Ontion I	DC 24 V	±20%	-	
	Option I	AC 100 to 240 V	-15 to 10%	50/60 Hz	
Power consumption	Transmitter Max. 10 W (active p	ower)			
	switch-on current	Max. 36 A (<5 ms) as pe	r NAMUR Recom	nmendation NE 21	
Power supply failure	 Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz) Totalizers stop at the last value measured. Depending on the device version, the configuration is retained in the device memory or in the plug-in memory (HistoROM DAT). Error messages (incl. total operated hours) are stored. 				
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. 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.				
Electrical connection	■ → 🖺 43 ■ → 🖺 50				
Potential equalization	→ 🖺 56				
Terminals	Spring-loaded terminals: Suitable for strands and strands with ferrules. Conductor cross-section 0.2 to 2.5 mm ² (24 to 12 AWG).				
Cable entries	 Cable gland: M20 Thread for cable ender the NPT ½" G ½" M20 	× 1.5 with cable Ø 6 to 1 ntry:	.2 mm (0.24 t	to 0.47 in)	
Cable specification	→ 🖺 36				

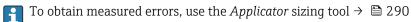
Overvoltage protection

Mains voltage fluctuations	→ 🗎 301
Overvoltage category	Overvoltage category II
Short-term, temporary overvoltage	Between cable and ground up to 1200 V, for max. 5 s
Long-term, temporary overvoltage	Between cable and ground up to 500 V

16.6 Performance characteristics

Reference operating conditions

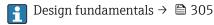
- Error limits based on ISO 11631
- Water
 - +15 to +45 °C (+59 to +113 °F)
 - 2 to 6 bar (29 to 87 psi)
- Data as indicated in the calibration protocol
- Accuracy based on accredited calibration rigs according to ISO 17025



Maximum measurement error

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

Base accuracy



Mass flow and volume flow (liquids)

- \blacksquare ± 0.05 % o.r. (optional for mass flow: PremiumCal; order code for "Calibration flow", option D)
- ±0.10 % o.r. (standard)

Mass flow (gases)

±0.35 % o.r.

Density (liquids)

Under reference conditions	Standard density calibration Extended density calibration	
[g/cm³]	[g/cm³]	[g/cm³]
±0.0005	±0.0005	±0.0005

- 1) Valid range for extended density calibration: 0 to 2 g/cm^3 , +20 to +60 °C (+68 to +140 °F)
- 2) order code for "Application package", option E1 "Extended density"

Temperature

 $\pm 0.5 \,^{\circ}\text{C} \pm 0.005 \cdot \text{T} \,^{\circ}\text{C} \, (\pm 0.9 \,^{\circ}\text{F} \pm 0.003 \cdot (\text{T} - 32) \,^{\circ}\text{F})$

Zero point stability

DN		Zero poin	t stability
[mm]	[in]	[kg/h]	[lb/min]
300	12	137	5.03
350	14	137	5.03
400	16	137	5.03

Flow values

Flow values as turndown parameters depending on nominal diameter.

SI units

DN	1:1	1:10	1:20	1:50	1:100	1:500
[mm]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]
300	4100000	410 000	205 000	82 000	41000	8200
350	4100000	410 000	205 000	82 000	41000	8200
400	4100000	410 000	205 000	82 000	41000	8200

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]
12	150700	15 070	7535	3 0 1 4	1507	301.4
14	150700	15 070	7535	3 0 1 4	1507	301.4
16	150700	15 070	7535	3 0 1 4	1507	301.4

Accuracy of outputs

The outputs have the following base accuracy specifications:

Current output

Accuracy	±5 μA
----------	-------

Pulse/frequency output

o.r. = of reading

Accuracy	Max. ±50 ppm o.r. (over the entire ambient temperature range)
----------	---

Repeatability

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

Base repeatability

Design fundamentals → 🗎 305

Mass flow and volume flow (liquids)

 ± 0.025 % o.r. (PremiumCal) ± 0.05 % o.r.

Mass flow (gases)

±0.25 % o.r.

Density (liquids)

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

Temperature

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

Response time

The response time depends on the configuration (damping).

Influence of ambient temperature

Current output

Temperature coefficient	Max. 1 μA/°C
-------------------------	--------------

Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.
-------------------------	---

Influence of medium temperature

Mass flow

o.f.s. = of full scale value

If there is a difference between the temperature during zero adjustment and the process temperature, the additional measurement error of the sensors is typically ± 0.0002 %o.f.s./°C (± 0.0001 % o.f.s./°F).

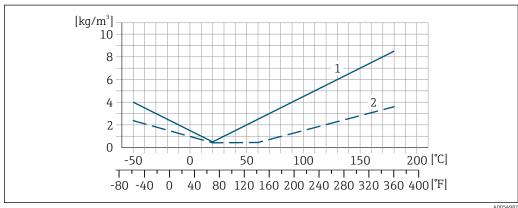
The influence is reduced when the zero adjustment is performed at process temperature.

Density

- If there is a difference between the density calibration temperature and the process temperature, the measurement error of the sensors is typically $\pm 0.00005 \text{ g/cm}^3/^{\circ}\text{C}$ ($\pm 0.000025 \text{ g/cm}^3/^{\circ}\text{F}$). Field density adjustment is possible.
- •

Extended density specification

If the process temperature is outside the valid range ($\rightarrow \triangleq 302$) the measurement error is $\pm 0.000025 \text{ g/cm}^3$ /°C ($\pm 0.0000125 \text{ g/cm}^3$ /°F)



A005498

- 1 Field density adjustment, for example at +20 $^{\circ}$ C (+68 $^{\circ}$ F)
- 2 Extended density calibration

Temperature

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

Influence of medium pressure

The following shows how the process pressure (gauge pressure) affects the accuracy of the mass flow.

304

o.r. = of reading

- i
- 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 .

DN		[% o.r./bar]	[% o.r./psi]
[mm]	[in]		
300	12	-0.009	-0.0006
350	14	-0.009	-0.0006
400	16	-0.009	-0.0006

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

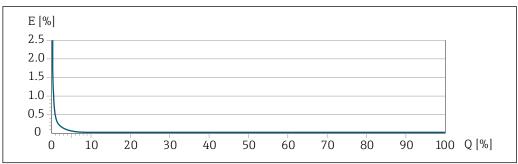
Calculation of the maximum measured error as a function of the flow rate

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

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

Flow rate	Maximum repeatability in % o.r.
$\geq \frac{\frac{1}{2} \cdot ZeroPoint}{BaseRepeat} \cdot 100$	± BaseRepeat
A0021335	A0021340
$<\frac{\frac{1}{2} \cdot ZeroPoint}{BaseRepeat} \cdot 100$	$\pm \frac{1}{2} \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$
A0021336	A0021337

Example of maximum measurement error



E Maximum measurement error in % o.r. (example with PremiumCal)

Q Flow rate in % of maximum full scale value

Endress+Hauser 305

A002880

16.7 Installation

Installation requirements

→ ■ 22

16.8 Environment

Ambient temperature range

→ 🖺 2.5

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

 $-50 \text{ to } +80 \degree \text{C} (-58 \text{ to } +176 \degree \text{F})$

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

According to EN 61010-1 ≤ 2 000 m (6 562 ft)

Degree of protection

Transmitter

- 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

Sensor

- IP66/67, Type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2

Optional

Order code for "Sensor options", option CM "IP69"

External WLAN antenna

IP66/67, type 4X enclosure

Vibration resistance and shock resistance

Sinusoidal vibration similar to IEC 60068-2-6

Sensor: order code for "Meas. tube mat., wetted surface", option LA, SD, SE, SF, TH, TT, TU

- 2 to 8.4 Hz, 3.5 mm peak
- 8.4 to 2 000 Hz, 1 g peak

Sensor: order code for "Meas. tube mat., wetted surface", option HA, SA, SB, SC

- 2 to 8.4 Hz, 7.5 mm peak
- 8.4 to 2 000 Hz, 2 g peak

Transmitter

- 2 to 8.4 Hz, 7.5 mm peak
- 8.4 to 2 000 Hz, 2 q peak

Broadband random vibration similar to IEC 60068-2-64

Sensor: order code for "Meas. tube mat., wetted surface", option LA, SD, SE, SF, TH, TT, TU

- 10 to 200 Hz, 0.003 g²/Hz
- 200 to 2000 Hz, 0.001 q²/Hz
- Total: 1.54 g rms

Sensor: order code for "Meas. tube mat., wetted surface", option HA, SA, SB, SC

- 10 to 200 Hz, 0.01 q²/Hz
- 200 to 2000 Hz, 0.003 q²/Hz
- Total: 2.70 g rms

Transmitter

- 10 to 200 Hz, 0.01 g²/Hz
- 200 to 2000 Hz, 0.003 q²/Hz
- Total: 2.70 g rms

Half-sine shocks similar to IEC 60068-2-27

- Sensor: order code for "Meas. tube mat., wetted surface", option LA, SD, SE, SF, TH, TT, TU
 6 ms 30 g
- Sensor: order code for "Meas. tube mat., wetted surface", option HA, SA, SB, SC 6 ms 50 g
- Transmitter6 ms 50 q

Rough handling shocks similar to IEC 60068-2-31

Mechanical load

Transmitter housing and sensor connection housing:

- Protect against mechanical effects, such as shock or impact
- Do not use as a ladder or climbing aid

Electromagnetic compatibility (EMC)



Details are provided in the Declaration of Conformity.



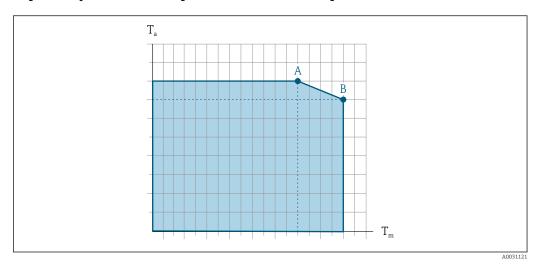
This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

16.9 Process

Medium temperature range

-50 to +180 °C (-58 to +356 °F)

Dependency of ambient temperature on medium temperature



 \blacksquare 42 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
- Values for devices that are used in the hazardous area: Separate Ex documentation (XA) for the device $\Rightarrow \triangleq 321$.

	Not insulated			Insulated				
	A		В	B A		В		
Version	Ta	T _m	Ta	T _m	Ta	T _m	T_{a}	T _m
Promass X 500 – digital	60 °C (140 °F)	180 °C (356 °F)	-	-	60 °C (140 °F)	150°C (302°F)	55 ℃ (131 ℉)	180 °C (356 °F)
Promass X 500								

Medium density

0 to 5000 kg/m^3 (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 dry nitrogen gas and protects the electronics and mechanics inside.

If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing.

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. Use only low pressure to purge.

Maximum pressure: 2 bar (29.0 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]	
300	12	28	406	
350	14	28	406	
400	16	28	406	



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

Rupture disk

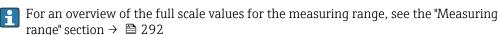
To increase the level of safety, a device version with a rupture disk with a trigger pressure of 5.5 to 6.5 bar (80 to 94 psi) can be used (order code for "Sensor option", option CA "rupture disk").



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.



- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- For the most common 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).
- For gas measurement the following rules apply:
 - The flow velocity in the measuring tubes should not exceed half the speed of sound (0.5 Mach)
 - The maximum mass flow depends on the density of the gas: formula

To calculate the flow limit, use the *Applicator* sizing tool $\rightarrow \triangleq 290$

Pressure loss



To calculate the pressure loss, use the Applicator sizing tool $\rightarrow \triangleq 290$

System pressure

→ 🖺 25

16.10 Mechanical construction

Design, dimensions



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

Weight

All values (weight exclusive of packaging material) refer to devices with ASME B16.5 Class 150 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)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)

Sensor

Sensor with cast connection housing version, stainless:

Weight in SI units

DN [mm]	Weight [kg]	
300	557	
350	581	
400	605	

Weight in US units

DN [in]	Weight [lbs]	
12	1227	
14	1280	
16	1333	

Materials

Transmitter housing

Housing of Proline 500 – digital transmitter

Order code for "Transmitter housing":

- Option A "Aluminum coated": aluminum, AlSi10Mq, coated
- Option **D** "Polycarbonate": polycarbonate

Housing of Proline 500 transmitter

Order code for "Transmitter housing":

Option L "Cast, stainless": cast, stainless steel, 1.4409 (CF3M) similar to 316L

310

Window material

Order code for "Transmitter housing":

- Option **A** "Aluminum, coated": glass
- Option **D** "Polycarbonate": plastic
- Option L "Cast, stainless": glass

Fixing components for pipe mounting

- 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 L "Cast, stainless": 1.4409 (CF3M) similar to 316L

Cable entries/cable glands

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
 Adapter for cable entry with female thread G ½" Adapter for cable entry with female thread NPT ½" 	Nickel-plated brass
Only available for certain device versions: Order code for "Transmitter housing": Option A "Aluminum, coated" Option D "Polycarbonate" Order code for "Sensor connection housing": Proline 500 – digital: Option L "Cast, stainless" Proline 500: Option L "Cast, stainless"	
 Adapter for cable entry with female thread G ½" Adapter for cable entry with female thread NPT ½" 	Stainless steel, 1.4404 (316L)
Only available for certain device versions: Order code for "Transmitter housing": Option L "Cast, stainless" Order code for "Sensor connection housing": Option L "Cast, stainless"	

Connecting cable



UV radiation 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

- PVC cable with copper shield
- Devices with order code for "Test, certificate", option JQ: PUR with copper shield

Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel, 1.4404 (316L)

Measuring tubes

Stainless steel, 1.4404 (316/316L); Manifold: stainless steel, 1.4404 (316/316L)

Process connections

Flanges in accordance with EN 1092-1 (DIN2501) / ASME B 16.5: Stainless steel, 1.4404 (F316/F316L)



Available process connections $\rightarrow \implies 312$

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



Process connection materials $\rightarrow \implies 312$

Surface roughness

All data relate to parts in contact with medium.

The following surface roughness categories can be ordered: Not polished

16.11 User interface

Languages

Can be operated in the following languages:

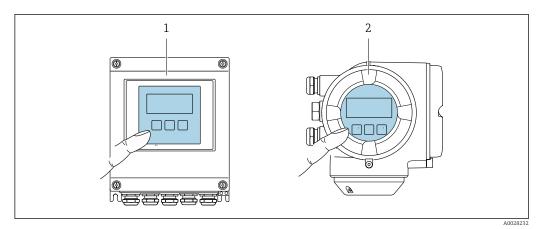
- Via local operation
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
- Via web browser
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

Onsite operation

Via display module

Equipment level:

- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"
- Information about WLAN interface $\rightarrow \triangleq 87$



■ 43 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: \boxdot , \boxdot ,
- Operating elements also accessible in the various zones of the hazardous area

Remote operation $\rightarrow \stackrel{ riangle}{ riangle}$ 86

Service interface $\rightarrow \stackrel{ riangle}{ riangle}$ 86

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	Service interface CDI- RJ45WLAN interface	Special Documentation for device → 🖺 322
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	 Service interface CDI- RJ45 WLAN interface Fieldbus protocol 	→ 🖺 290

Supported operating tools	Operating unit	Interface	Additional information
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	 Service interface CDI- RJ45 WLAN interface Fieldbus protocol 	→ 🖺 290
Field Xpert	SMT70/77/50	 All fieldbus protocols WLAN interface Bluetooth Service interface CDI-RJ45 	Operating Instructions BA01202S Device description files: Use update function of handheld terminal

- 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:
 - Emersons TREX → www.emerson.com
 - 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

The integrated web server can be used to operate and configure the device via a web browser via Ethernet-APL, service interface (CDI-RJ45) or via WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is displayed and can be used to monitor device health. Furthermore the device data can be managed and the network parameters can be configured.

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

Supported functions

Data exchange between the operating unit (such as a notebook, for example,) and measuring instrument:

- Upload the configuration from the measuring instrument (XML format, configuration backup)
- Save the configuration to the measuring instrument (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 Technology verification report (PDF file, only available with the **Heartbeat Verification** → 🖺 319 application package)
- Flash firmware version for device firmware upgrade, for example
- Download driver for system integration

HistoROM data management

The measuring instrument 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	 Event logbook, e.g. diagnostic events Parameter data record backup Device firmware package Driver for system integration for exporting via web server, e.g.: GSD for PROFINET 	 Measured value logging ("Extended HistoROM" order option) Current parameter data record (used by firmware at run time) Indicator (minimum/maximum values) Totalizer value 	 Sensor data: e.g. nominal diameter Serial number Calibration data Device configuration (e.g. SW options, fixed I/O or multi I/O)
Storage location	Fixed on the user interface PC board in the connection compartment	Can be plugged into the user interface PC 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.:
 GSD 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:

- Recording of 1 to 4 channels of up to 1000 measured values (up to 250 measured values per channel)
- User configurable recording interval
- 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 for the product are available at www.endress.com on the relevant product page:

- 1. Select the product using the filters and search field.
- 2. Open the product page.
- 3. Select **Downloads**.

CE mark

The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

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

UKCA marking

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.

Contact address Endress+Hauser UK:

Endress+Hauser Ltd.

Floats Road

Manchester M23 9NF

United Kingdom

www.uk.endress.com

PROFINET over Ethernet-APL certification

PROFINET interface

The measuring instrument is certified and registered by the PROFIBUS Nutzerorganisation e.V. (PNO). The measuring system meets all the requirements of the following specifications:

- Certified according to:
 - Test specification for PROFINET devices
 - PROFINET PA Profile 4.02
 - PROFINET Netload Robustness Class 2 10 Mbit/s
 - 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) PESR/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 PESR) are designed and manufactured according to sound engineering practice. They meet the requirements of
 - a) Art. 4, Section 3 of the Pressure Equipment Directive 2014/68/EU or
 - b) Part 1, Section 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) in Schedule 3, Section 2 of Statutory Instruments 2016 No. 1105.

Radio approval

The measuring instrument has radio approval.



For detailed information on the radio approval, see the Special Documentation $\rightarrow \stackrel{ riangle}{=} 322$

Additional certification

Marine approval

Currently valid certificates are available:

- Specify the following details:
 - Product root, e.g. 8E5B
 - Search: Approval & Certificates → Marine

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

- ISO 23277 ZG2x (PT) + ISO 10675-1 ZG1 (RT) measuring tube (PT) + process connection (RT) welded seam, test report
- Penetrant+Radiographic testing ASME B31.3 NFS (RT) measuring tube (PT) + process connection (RT) welded seam, test report
- Penetrant+Radiographic testing ASME VIII Div.1(RT) measuring tube (PT) + process connection (RT) welded seam, test report
- Visual+Penetrant+Radiographic testing NORSOK M-601 (RT) measuring tube (VT+PT) + process connection. (VT + RT) welded seam, test report
- EN10204-3.1 material certificate, wetted parts
- Pressure test, internal process, test report (order code for "Test, certificate", option JB)
- Material identification check (PMI), internal procedure, wetted parts, test report (option JK)

Testing of welded connections

Option	Test standard			Compo	onent	
	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	Test procedure
KF	Х				PT	RT
KK		х			PT	RT
KP			х		PT	RT

Option	Test standard			Compo	onent	
	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	Test procedure
KR	R X VT, PT VT, RT					
PT = penetrant testing, RT = radiographic testing, VT = visual testing All options with test report						

External standards and quidelines

■ EN 60529

Degrees of protection provided by enclosure (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

■ GB 30439.5

Safety requirements for industrial automation products - Part 5: Flowmeter safety requirements

■ EN 61326-1/-2-3

EMC requirements for electrical equipment for measurement, control and laboratory use

■ 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 $% \left(1\right) =\left(1\right) \left(

■ NAMUR NE 107

Self-monitoring and diagnostics of field devices

■ NAMUR NE 131

Requirements for field devices for standard applications

■ NAMUR NE 132

Coriolis mass meter

■ NACE MR0103

Materials resistant to sulfide stress cracking in corrosive petroleum refining environments.

■ NACE MR0175/ISO 15156-1

Materials for use in H2S-containing Environments in Oil and Gas Production.

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 →

321

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 in accordance with DIN ISO 9001:2015 Clause 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 total test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk evaluation.

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 the process influences (e.g. corrosion, abrasion, deposit buildup etc.) have on measuring performance over time.
- Schedule servicing in time.
- Monitor the process or product quality, e.g. gas pockets.



Concentration Order code for "Application package", option ED "Concentration" measurement 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
- 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.

Extended density

Order code for "Application package", option E1 "Extended density"

For volume-based applications, the device can calculate and output a volume flow rate by dividing the mass flow rate by the measured density.

This application package is the standard calibration for custody transfer applications according to national and international standards (e.g. OIML, MID). It is recommended for volume-based fiscal dosing applications over a wide temperature range.

The calibration certificate supplied describes the density performance in air and water at various temperatures in detail.



For detailed information, see the Operating Instructions for the device.

Petroleum

Order code for "Application package", option EJ "Petroleum"

The most important parameters for the Oil & Gas Industry can be calculated and displayed with this application package.

- 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



For detailed information, see the Special Documentation for the device.

Petroleum & locking function

Order code for "Application package", option EM "Petroleum & locking function"

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.

- 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



For detailed information, see the Special Documentation for the device.

16.14 Accessories



Overview of accessories available to order $\rightarrow \triangleq 288$

320

16.15 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

Brief Operating Instructions for the sensor

Measuring instrument	Documentation code
Proline Promass X	KA01288D

Brief operating instructions for transmitter

Measuring instrument	Documentation code
Proline 500	KA01520D
Proline 500 – digital	KA01521D

Technical information

Measuring instrument	Documentation code
Promass X 500	TI01289D

Description of Device Parameters

Measuring instrument	Documentation code
Promass 500	GP01173D

Device-dependent additional documentation

Safety instructions

Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
	Measuring instrument
ATEX/IECEx Ex ia	XA01473D
ATEX/IECEx Ex ec	XA01474D
cCSAus IS	XA01475D
cCSAus Ex ia	XA01509D
cCSAus Ex ec	XA01510D
EAC Ex ia	XA01658D
EAC Ex ec	XA01659D
JPN Ex ia	XA01780D
KCs Ex ia	XA03287D
INMETRO Ex ia	XA01476D
INMETRO Ex ec	XA01477D
NEPSI Ex ia	XA01478D

Contents	Documentation code
	Measuring instrument
NEPSI Ex nA	XA01479D
UKEX Ex ia	XA02570D
UKEX Ex ec	XA02572D

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
Gas fraction handler	SD02584D

Installation Instructions

Contents	Note
Installation instructions for spare part sets and accessories	 Access the overview of all the available spare part sets via <i>Device Viewer</i> →

Index

A	Connecting the signal cable/supply voltage cable
Access authorization to parameters	Proline 500 – digital transmitter 46
Read access	Connecting the signal cables 53
Write access	Connecting the supply voltage cables 53
Access code	Connection
Incorrect input	see Electrical connection
Adapting the diagnostic behavior	Connection cable
Additional certification	Connection preparations 42
Ambient conditions	Connection tool
Mechanical load	Context menu
Operating height	Calling up
Relative humidity	Closing
Storage temperature	Explanation
Vibration resistance and shock resistance 306	Current consumption
Ambient temperature	Cyclic data transmission
Influence	_
Ambient temperature range 306	D
Analog Output module	Declaration of Conformity
Application	Defining the access code 172
Application packages	Degree of protection 63, 306
Applicator	Design
Approvals	Measuring device
Attaching the connecting cable	Design fundamentals
Proline 500 transmitter	Measurement error
	Repeatability
В	Device
Binary input module	Configuring
Binary output module	Preparing for electrical connection 42
	Device components
C	Device description files
Cable entries	Device locking, status
Technical data	Device master file
Cable entry	GSD
Degree of protection 63	Device name
CE mark	Sensor
Certificates	Transmitter
Check	Device repair
Connection	Device revision
Received goods	Device type ID
Checklist	Device Viewer
Post-connection check 63	DeviceCare
Post-installation check	Device description file
Climate class	Diagnostic behavior
Commissioning	Explanation
Advanced settings	Symbols
Configuring the device	Diagnostic information
Connecting the connecting cable	Design, description 207, 210
Proline 500 – digital transmitter 45	DeviceCare
Proline 500 terminal assignment 50	FieldCare
Sensor connection housing, Proline 500 50	LED
Sensor connection housing, Proline 500 - digital 43	Local display
Terminal assignment of Proline 500 - digital 43	Overview
Connecting the device	Remedial measures
Proline 500	Web browser
Proline 500 – digital	Diagnostic list
	Diagnostic message 206

Diagnostics Symbols	Flow limit
DIP switch	SIMATIC PDM
see Write protection switch	Functions
Direct access	see Parameter
Disabling write protection	See Faranietei
3 1	G
Display	Galvanic isolation
see Local display	Gas Fraction Handler
Display area	Gas Flaction Handlet
For operational display	Н
In the navigation view 69	Hardware write protection
Display values	
For locking status	Help text
Displaying the measured value history 193	Calling up
Disposal	Closing
Document	Explanation
Function 6	HistoROM
Symbols 6	Ţ
Document function 6	-
Documentation	Identifying the measuring instrument
Down pipe	Incoming acceptance
	Indication
E	Current diagnostic event 278
Editing view	Previous diagnostic event 278
Input screen	Influence
Using operating elements 71, 72	Ambient temperature
Electrical connection	Medium pressure
Degree of protection	Medium temperature
Measuring instrument	Information about this document 6
Operating tools	Initializing the measuring instrument 107
Via APL network	Inlet runs
Via service interface (CDI-RJ45) 86	Input variables
Via WLAN interface	Inspection
RSLogix 5000	Installation
Web server	Installation
WLAN interface	Installation dimensions
Electromagnetic compatibility	Installation requirements
Electronics module	Down pipe
Enabling write protection	Inlet and outlet runs 24
Enabling/disabling the keypad lock	Installation dimensions 24
	Mounting location
Error messages see Diagnostic messages	Orientation
	Rupture disk
Event logbook	Sensor heating
Extended order code	Thermal insulation
Sensor	Vibrations
Transmitter	Intended use
F	michaea abe
Field of application	L
Residual risks	Languages, operation options
FieldCare	Line recorder
Device description file	Local display
Function	Navigation view
Filtering the event logbook	see Diagnostic message
Firmware	see In alarm condition
Release date	see Operational display
	Text editor
Version	Low flow cut off
Firmware history	20 110 64.611
Flow direction	

324

M	N
Main electronics module	Nameplate
Maintenance work	Sensor
Managing the device configuration 165	Transmitter
Manufacturer ID	Navigation path (navigation view) 69
Manufacturing date	Navigation view
Mass module	In the submenu 69
Mass Totalizer Control module	In the wizard 69
Materials	Netilion
Maximum measurement error	Numeric editor
Measured variables	
see Process variables	0
Measurement accuracy	Onsite display
Measuring and test equipment 285	Numeric editor
Measuring device	Operable flow range
Conversion	Operating elements
Design	Operating height
Repairs	Operating keys
Measuring instrument	see Operating elements
Disposal	Operating menu
Installing the sensor	Menus, submenus
Preparing for mounting	Structure
Removing	Submenus and user roles
Switch on	Operating philosophy
Measuring principle	Operation
Measuring range	Operation options
For gases	Operational display
For liquids	Operational safety
Measuring range, recommended 309	Order code
Measuring system	Orientation (vertical, horizontal)
Mechanical load	Output signal
Medium density	Output variables
Medium pressure	Output variables
Influence	P
Medium temperature Influence	Packaging disposal
Menu S04	Parameter
	Changing
Diagnostics 278 Setup 109	Entering values or text
Menus	Parameter settings
For device configuration	Administration (Submenu)
For specific settings	Advanced setup (Submenu)
Module	APL port (Submenu)
Analog output	Configuration backup (Submenu) 165
Binary input	Corrected volume flow calculation (Submenu) 149
Binary output	Current input
Mass	Current input (Wizard)
Mass Totalizer Control	Current input 1 to n (Submenu) 188
Totalizer	Current output
Totalizer	Current output (Wizard)
Totalizer Control	Data logging (Submenu)
Mounting dimensions	Define access code (Wizard) 167
see Installation dimensions	Device information (Submenu) 282
Mounting location	Diagnostics (Menu)
Mounting preparations	Display (Submenu)
Mounting requirements	Display (Wizard)
Static pressure	Disposable component (Submenu) 107
Mounting tool	I/O configuration
	I/O configuration (Submenu) 120

Low flow cut off (Wizard) 145	Recalibration
Mass flow (Submenu)	Reference operating conditions 302
Measured variables (Submenu) 177	Registered trademarks
Measurement mode (Submenu) 197	Remedial actions
Medium index (Submenu) 199	Calling up
Medium selection (Wizard)	Closing
Network diagnostics (Submenu) 111	Remote operation
Partially filled pipe detection (Wizard) 146	Repair
Pulse/frequency/switch output 128	Notes
Pulse/frequency/switch output (Wizard)	Repair of a device
	Repeatability
Pulse/frequency/switch output 1 to n (Submenu) 190	Replacement
Relay output	Device components
Relay output 1 to n (Submenu) 191	Requirements for personnel 9
Relay output 1 to n (Wizard)	Response time
Reset access code (Submenu) 167	Return
Sensor adjustment (Submenu) 150	Rupture disk
Service interface (Submenu)	Safety instructions
Setup (Menu)	Triggering pressure
Simulation (Submenu)	0
Status input	S
Status input 1 to n (Submenu) 189	Safety
Status input 1 to n (Wizard)	Sensor
System units (Submenu)	Installing
Totalizer (Submenu)	Sensor heating
Totalizer 1 to n (Submenu)	Sensor housing
Totalizer handling (Submenu) 191	Serial number
Value current output 1 to n (Submenu) 190	Services
Web server (Submenu)	Maintenance
WLAN settings (Wizard)	Repair
Zero adjustment (Wizard)	Setting the operating language
Zero verification (Wizard)	Settings
Performance characteristics	Adapting the measuring device to the process
Post-connection check	conditions
Post-connection check (checklist)	Administration
Post-installation check	Advanced display configurations
Post-installation check (checklist)	Analog Input
Potential equalization	
Power consumption	Current input
Power supply failure	-
Pressure Equipment Directive	I/O configuration
Pressure loss	Local display
Pressure/temperature ratings	Low flow cut off
Process connections	Managing the device configuration
Calculated	Medium
Measured	Operating language
Product safety	Partially filled pipe detection
PROFINET over Ethernet-APL certification	Pulse output
Proline 500 – digital transmitter	Pulse/frequency/switch output 128, 130
Connecting the signal cable/supply voltage cable 46	Relay output
Proline 500 connecting cable terminal assignment	Resetting the device
Sensor connection housing 50	Resetting the totalizer
Protecting parameter settings	Sensor adjustment
	Simulation
R	Status input
Radio approval	Switch output
Read access	System units
Reading off measured values 176	Tag name
=	-

m + 1:	0
Totalizer	Status input 1 to n
Totalizer reset	System units
WLAN	Totalizer
Signal on alarm	Totalizer 1 to n
SIMATIC PDM	Totalizer handling
Function	Value current output 1 to n 190
Software release	Viscosity
Spare part	Web server
Spare parts	Supply voltage
Special connection instructions 57	Surface roughness
Special mounting instructions	Switch output
Hygienic compatibility	Symbols
Standards and guidelines	Controlling data entries
Static pressure	For communication 67
Status area	For diagnostic behavior 67
For operational display 67	For locking
In the navigation view 69	For measured variable
Status signals	For measurement channel number
Storage concept	For menus
9 -	
Storage conditions	For parameters
Storage temperature	For status signal
Storage temperature range	For submenu
Structure	For wizards
Operating menu	In the status area of the local display 67
Submenu	Input screen
Administration	Operating elements
Advanced setup	System design
Analog inputs	Measuring system 291
APL port	see Measuring device design
Calculated values	System integration 91
Communication	System redundancy S2
Concentration	
Configuration backup	T
Corrected volume flow calculation 149	Technical data, overview 291
Current input 1 to n	Temperature range
Data logging	Ambient temperature for display 313
Device information	Medium temperature
Display	Storage temperature
Disposable component	Terminal assignment
Event logbook	Terminal assignment of connecting cable for Proline
Heartbeat setup	500- digital
	Sensor connection housing
I/O configuration	Terminals
Input values	Tests and certificates
Mass flow	
Measured values	Text editor
Measured variables	Thermal insulation
Measurement mode	Tool
Medium index	For electrical connection
Network diagnostics	For mounting
Output values	Transportation
Overview	Tool tip
Petroleum	see Help text
Process variables	Totalizer
Pulse/frequency/switch output 1 to n 190	Assign process variable
Relay output 1 to n	Configuring
Reset access code	Totalizer Control module
Sensor adjustment	Totalizer module
Service interface	Transmitter
Simulation	Turning the display module
	J 1 7

Turning the nousing	
Troubleshooting	
General	
Turning the display module	 34
Turning the electronics housing	
see Turning the transmitter housing	2.4
Turning the transmitter housing	 . 54
U	
- UKCA marking	 316
Use of measuring instrument	
Borderline cases	 9
Incorrect use	 9
see Intended use	
User roles	 . 66
V	
•	Ω1
Version data for the device	
Vibrations	
vibrations	 47
W	
W@M Device Viewer	 . 16
Weight	
SI units	
Transport (notes)	
US units	 . 310
Wizard	
Current input	 . 121
Current output	
Define access code	
Display	
Low flow cut off	
Partially filled pipe detection	
Pulse/frequency/switch output	
Relay output 1 to n	
Status input 1 to n	
WLAN settings	 . 162
Zero adjustment	
Zero verification	
WLAN settings	
Workplace safety	
Write access	
Write protection	
Via access code	
Via write protection switch	
Write protection switch	173



www.addresses.endress.com