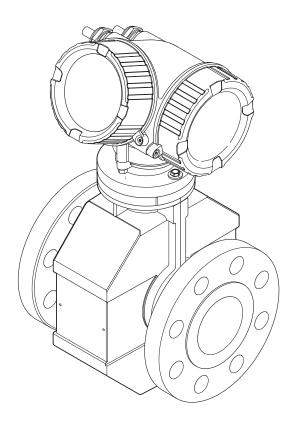
Operating Instructions **Proline Promag P 200 FOUNDATION Fieldbus**

Electromagnetic flowmeter



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

Table of contents

Document information 6		6.2.2 Preparing the measuring device	
Document function 6		3	
Symbols used 6		3	
	6.3	Post-installation check	
1.2.4 Symbols for certain types of	7		29
	7.1		
Registered trademarks 8		7.1.6 Requirements for the supply unit	
		7.1.7 Preparing the measuring device	
Basic safety instructions 9	7.2	Connecting the measuring device	
Requirements for the personnel 9			
	7.0	31 1	
	/.3	•	
Operational safety	7 4		
IT security			
Product description 12	8	Operating options	38
-	8.1		38
110ddct design	8.2	<u> </u>	39
Incoming acceptance and product		menu	
Incoming acceptance and product		8.2.1 Structure of the operating menu	39
identification	8.3	8.2.1 Structure of the operating menu8.2.2 Operating philosophy	
identification13Incoming acceptance13	8.3	8.2.1 Structure of the operating menu	39
identification13Incoming acceptance13Product identification13	8.3	8.2.1 Structure of the operating menu 8.2.2 Operating philosophy Access to the operating menu via the local display	39 40 40 40
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate14	8.3	8.2.1 Structure of the operating menu	39 40 40 40 41
identification13Incoming acceptance13Product identification134.2.1Transmitter nameplate144.2.2Sensor nameplate15	8.3	 8.2.1 Structure of the operating menu 8.2.2 Operating philosophy Access to the operating menu via the local display 8.3.1 Operational display 8.3.2 Navigation view 8.3.3 Editing view 	39 40 40 40 41 43
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate15	8.3	8.2.1 Structure of the operating menu	39 40 40 40 41 43 44
identification13Incoming acceptance13Product identification134.2.1Transmitter nameplate144.2.2Sensor nameplate154.2.3Symbols on measuring device16	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transport	8.3	8.2.1 Structure of the operating menu	39 40 40 40 41 43 44
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product17	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17	8.3	8.2.1 Structure of the operating menu	39 40 40 40 41 43 44 45 47 47 48 49
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs18	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 47 48
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 48 49 50
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs18	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 47 48 49 50
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18		8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 48 49 50
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18 Installation	8.3	8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 48 49 50 50
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18Installation19Installation conditions19		8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 48 49 50 50 51
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18Installation19Installation conditions19		8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 48 49 50 50
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transport17Storage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18Installation19Installation conditions196.1.1 Mounting position19		8.2.1 Structure of the operating menu	39 40 40 41 43 44 45 47 47 48 49 50 50 51 51
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18Installation196.1.1 Mounting position196.1.2 Requirements from environment and process216.1.3 Special mounting instructions23		8.2.1 Structure of the operating menu	39 40 40 41 43 44 47 47 47 48 49 50 50 51 53 53 54
identification13Incoming acceptance13Product identification134.2.1 Transmitter nameplate144.2.2 Sensor nameplate154.2.3 Symbols on measuring device16Storage and transportStorage conditions17Transporting the product175.2.1 Measuring devices without lifting lugs175.2.2 Measuring devices with lifting lugs185.2.3 Transporting with a fork lift18Packaging disposal18Installation196.1.1 Mounting position196.1.2 Requirements from environment and process21		8.2.1 Structure of the operating menu	39 40 40 41 43 44 47 47 47 48 49 50 50 51 53 53 54
	Symbols used 6 1.2.1 Safety symbols 6 1.2.2 Electrical symbols 6 1.2.3 Tool symbols 6 1.2.4 Symbols for certain types of information 7 1.2.5 Symbols in graphics 7 Documentation 7 1.3.1 Standard documentation 8 1.3.2 Supplementary device-dependent documentation 8 Registered trademarks 8 Basic safety instructions 9 Requirements for the personnel 9 Designated use 9 Workplace safety 10 Operational safety 10	Symbols used 6 1.2.1 Safety symbols 6 1.2.2 Electrical symbols 6 1.2.3 Tool symbols 6 1.2.4 Symbols for certain types of information 7 1.2.5 Symbols in graphics 7 Documentation 7 1.3.1 Standard documentation 8 1.3.2 Supplementary device-dependent documentation 8 Registered trademarks 8 Basic safety instructions 9 Requirements for the personnel 9 Designated use 9 Workplace safety 10 Operational safety 10 Product safety 10 IT security 11 Product description 12	Symbols used

_		1		10.00.0011: 1: 1	0.7
9	System integration	55	10.0	12.2.2 Calling up remedial measures	
9.1	Overview of device description files	55	12.3	Diagnostic information in FieldCare	
	9.1.1 Current version data for the device			12.3.1 Diagnostic options	
	9.1.2 Operating tools	55	10 (12.3.2 Calling up remedy information	
9.2	Cyclic data transmission	55	12.4	Adapting the diagnostic information	
	9.2.1 Block model	56		12.4.1 Adapting the diagnostic behavior	
	9.2.2 Assignment of the measured values		10 5	12.4.2 Adapting the status signal	
	in the function blocks	56	12.5	Overview of diagnostic information	100
				12.5.1 Diagnostic of sensor	100
10	Commissionins	EO		12.5.2 Diagnostic of electronic	101
10	Commissioning	שכ		12.5.3 Diagnostic of configuration	105
10.1	Function check	58		12.5.4 Diagnostic of process	109
10.2	Switching on the measuring device	58		Pending diagnostic events	112
10.3	Setting the operating language	58	12.7	Diagnostic messages in the DIAGNOSTIC	
10.4	Configuring the measuring device	58		Transducer Block	112
	10.4.1 Defining the tag name	59		Diagnostic list	113
	10.4.2 Setting the system units	60	12.9	Event logbook	113
	10.4.3 Configuring the analog inputs	62		12.9.1 Event history	113
	10.4.4 Configuring the local display	62		12.9.2 Filtering the event logbook	113
	10.4.5 Configuring the low flow cut off	64		12.9.3 Overview of information events	114
	10.4.6 Configuring empty pipe detection	66	12.10	Resetting the measuring device	115
10.5	Advanced settings	67		12.10.1 Function scope of the "Restart"	
	10.5.1 Carrying out a sensor adjustment			parameter	115
	10.5.2 Configuring the pulse/frequency/		12.11	Device information	116
	switch output	68	12.12	Firmware history	117
	10.5.3 Configuring the totalizer	75			
	10.5.4 Carrying out additional display		13	Maintenance	118
	configurations	77			
	10.5.5 Administration configuration	79	13.1	Maintenance tasks	
10.6	Configuration management	80		13.1.1 Exterior cleaning	
10.0	10.6.1 Function scope of the "Configuration			13.1.2 Interior cleaning	118
	management" parameter	81		13.1.3 Replacing seals	118
10.7	Simulation			Measuring and test equipment	
10.8	Protecting settings from unauthorized		13.3	Endress+Hauser services	118
10.0	access	83			
	10.8.1 Write protection via access code		14	Repair	119
	10.8.2 Write protection via write protection		14.1	General notes	
	switch	84	14.1		119
	10.8.3 Write protection via block	04		Spare parts	
	operation	Ω5			120
	operation	00		Return	
		0.6	14.5	Disposal	120
11	Operation	86		14.5.1 Removing the measuring device 14.5.2 Disposing of the measuring device	
11.1	Reading the device locking status	86		14.3.2 Disposing of the measuring device	141
11.2	Adjusting the operating language	86			
11.3	Configuring the display	86	15	Accessories	122
11.4	Reading measured values	86	15.1	Device-specific accessories	122
	11.4.1 Process variables	86		15.1.1 For the transmitter	122
	11.4.2 Totalizer	87		15.1.2 For the sensor	
11.5	Adapting the measuring device to the process		15.2	Communication-specific accessories	123
	conditions	87		Service-specific accessories	
11.6	Performing a totalizer reset			System components	
11.7	Showing data logging			,r	
	3 33 3		16	Technical data	125
12	Diagnostics and troubleshooting	91			
-4	Pragricours and troubleshooting		16.1	Application	125
12.1	General troubleshooting			Function and system design	125
12.1 12.2	General troubleshooting	93			

16.5	Power supply	130
16.6	Performance characteristics	132
16.7	Installation	133
16.8	Environment	133
16.9	Process	134
16.10	Mechanical construction	136
16.11	Operability	139
16.12	Certificates and approvals	142
16.13	Application packages	143
16.14	Accessories	143
16.15	Documentation	144
Index	ζ	146

1 Document information

1.1 Document function

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

1.2 Symbols used

1.2.1 Safety symbols

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

1.2.2 Electrical symbols

Symbol	Meaning	Symbol	Meaning	
	Direct current	~	Alternating current	
≂	Direct current and alternating current	ᆣ	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.	
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.	\$	Equipotential connection A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.	

1.2.3 Tool symbols

Symbol	Meaning
0	Flat blade screwdriver
0 6	Allen key
Ó	Open-ended wrench

1.2.4 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.
	Reference to documentation
	Reference to page
	Reference to graphic
1. , 2. , 3	Series of steps
L_	Result of a step
?	Help in the event of a problem
	Visual inspection

1.2.5 Symbols in graphics

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

1.3 Documentation

- For an overview of the scope of the associated Technical Documentation, refer to the following:
 - The CD-ROM provided for the device (depending on the device version, the CD-ROM might not be part of the delivery!)
 - The *W@M Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
 - The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.
- For a detailed list of the individual documents along with the documentation code

1.3.1 Standard documentation

Document type	Purpose and content of the document
Technical Information	Planning aid for your device The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions	Guide that takes you quickly to the 1st measured value The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1.3.2 Supplementary device-dependent documentation

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

1.4 Registered trademarks

$FOUNDATION^{TM}$ Fieldbus

Registration-pending trademark of the Fieldbus Foundation, Austin, Texas, USA

Applicator®, FieldCare®, Field XpertTM, **HistoROM®, Heartbeat Technology**TM Registered or registration-pending trademarks of the Endress+Hauser Group

2 Basic safety instructions

2.1 Requirements for the personnel

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

- ► Trained, qualified specialists must have a relevant qualification for this specific function and task
- ► Are authorized by the plant owner/operator
- ► Are familiar with federal/national regulations
- ▶ Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

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

2.2 Designated use

Application and media

The measuring device is only suitable for flow measurement of liquids with a minimum conductivity of 20 μ S/cm.

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

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

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

- ▶ Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- ► Check the nameplate to verify if the device ordered can be put to its intended use in the approval-related area (e.g. explosion protection, pressure vessel safety).
- ▶ Use the measuring device only for media against which the process-wetted materials are adequately resistant.
- ▶ If the measuring device is not operated at atmospheric temperature, compliance with the relevant basic conditions specified in the associated device documentation is absolutely essential: "Documentation" section $\rightarrow \boxdot$ 7.
- ► Protect the measuring device permanently against corrosion from environmental influences.

Incorrect use

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

A WARNING

Danger of breakage of the sensor due to corrosive or abrasive fluids or from environmental conditions!

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

Verification for borderline cases:

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

Residual risks

The external surface temperature of the housing can increase by max. 10 K due to the power consumption of the electronic components. Hot process fluids passing through the measuring device will further increase the surface temperature of the housing. The surface of the sensor, in particular, can reach temperatures which are close to the fluid temperature.

Possible burn hazard due to fluid temperatures!

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

2.3 Workplace safety

For work on and with the device:

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

For welding work on the piping:

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

If working on and with the device with wet hands:

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

2.4 Operational safety

Risk of injury.

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

Conversions to the device

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

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

Repair

To ensure continued operational safety and reliability,

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

2.5 Product safety

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

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

2.6 IT security

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

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

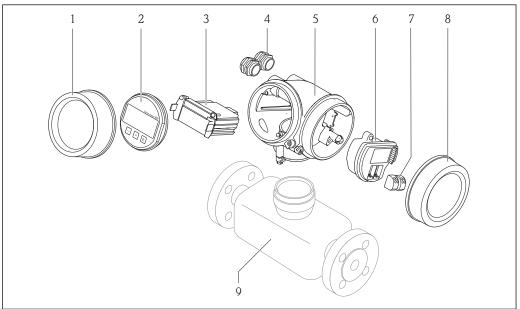
3 Product description

The device consists of a transmitter and a sensor.

The device is available as a compact version:

The transmitter and sensor form a mechanical unit.

3.1 Product design

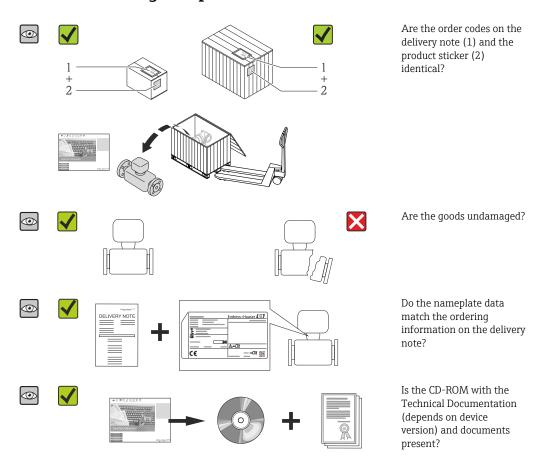


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- \blacksquare 1 Important components of a measuring device
- 1 Electronics compartment cover
- 2 Display module
- 3 Main electronics module
- 4 Cable glands
- 5 Transmitter housing (incl. integrated HistoROM)
- 6 I/O electronics module
- 7 Terminals (pluggable spring terminals)
- 8 Connection compartment cover
- 9 Sensor

4 Incoming acceptance and product identification

4.1 Incoming acceptance



- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
 Depending on the device version, the CD-ROM might not be part of the delivery!
 - Depending on the device version, the CD-ROM might not be part of the delivery! The Technical Documentation is available via the Internet or via the Endress+Hauser Operations App, see the "Product identification" section → 14.

4.2 Product identification

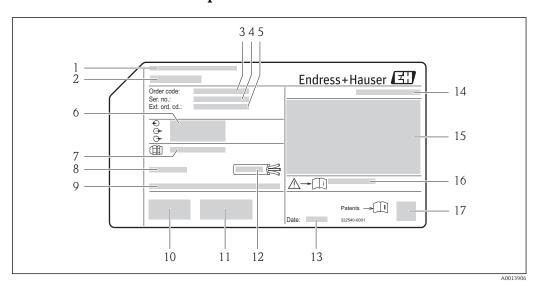
The following options are available for identification of the measuring device:

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

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

- The chapters "Additional standard documentation on the device" \rightarrow \blacksquare 8 and "Supplementary device-dependent documentation" \rightarrow \blacksquare 8
- The *W@M Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

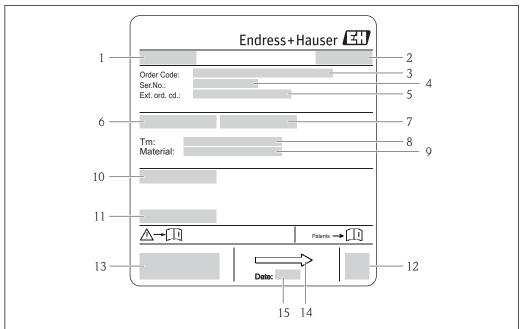
4.2.1 Transmitter nameplate



■ 2 Example of a transmitter nameplate

- 1 Manufacturing location
- 2 Name of the transmitter
- 3 Order code
- 4 Serial number (Ser. no.)
- 5 Extended order code (Ext. ord. cd.)
- 6 Electrical connection data, e.g. available inputs and outputs, supply voltage
- 7 Type of cable glands
- 8 Permitted ambient temperature (T_a)
- *9* Firmware version (FW) from the factory
- 10 CE mark, C-Tick
- 11 Additional information on version: certificates, approvals
- 12 Permitted temperature range for cable
- 13 Manufacturing date: year-month
- 14 Degree of protection
- 15 Approval information for explosion protection
- 16 Document number of safety-related supplementary documentation
- 17 2-D matrix code

4.2.2 Sensor nameplate



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■ 3 Example of sensor nameplate

- 1 Name of the sensor
- 2 Manufacturing location
- 3 Order code
- 4 Serial number (ser. no.)
- 5 Extended order code (ext. ord. cd.)
- 6 Nominal diameter of sensor
- 7 Test pressure of the sensor
- 8 Fluid temperature range
- 9 Material of lining and electrodes
- 10 Degree of protection: e.g. IP, NEMA
- 11 Permitted ambient temperature (T_a)
- 12 2-D matrix code
- 13 CE mark, C-Tick
- 14 Flow direction
- 15 Manufacturing date: year-month

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 measuring device

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

5 Storage and transport

5.1 Storage conditions

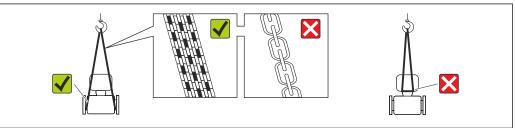
Observe the following notes for storage:

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

Storage temperature → 🖺 133

5.2 Transporting the product

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



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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.

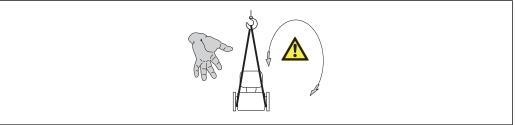
5.2.1 Measuring devices without lifting lugs

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).



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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.

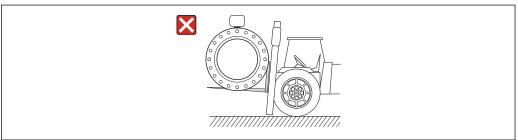
5.2.3 Transporting with a fork lift

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

A CAUTION

Risk of damaging the magnetic coil

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



A002372

5.3 Packaging disposal

All packaging materials are environmentally friendly and 100% recyclable:

- Measuring device secondary packaging: polymer stretch film that conforms to EC Directive 2002/95/EC (RoHS).
- Packaging:
 - $\,$ Wood crate, treated in accordance with ISPM 15 standard, which is confirmed by the affixed IPPC logo.

or

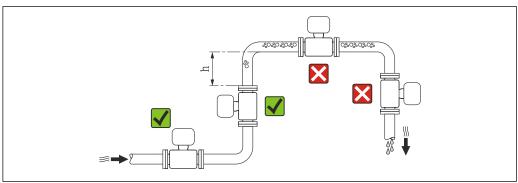
- Carton in accordance with European Packaging Directive 94/62EC; recyclability is confirmed by the affixed RESY symbol.
- Seaworthy packaging (optional): Wood crate, treated in accordance with ISPM 15 standard, which is confirmed by the affixed IPPC logo.
- Carrying and mounting hardware:
 - Disposable plastic pallet
 - Plastic straps
 - Plastic adhesive strips
- Dunnage: Paper cushion

6 Installation

6.1 Installation conditions

6.1.1 Mounting position

Mounting location



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

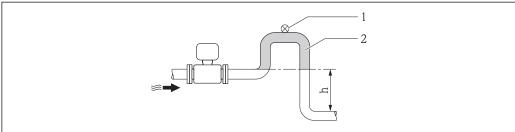
To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:

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

Installation in down pipes

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

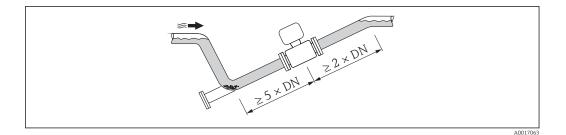
For information on the liner's resistance to partial vacuum



- € 4 Installation in a down pipe
- Vent valve
- Pipe siphon
- Length of down pipe

Installation in partially filled pipes

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



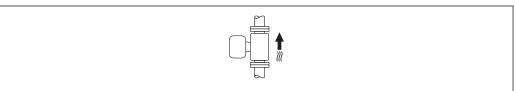
Orientation

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).

An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

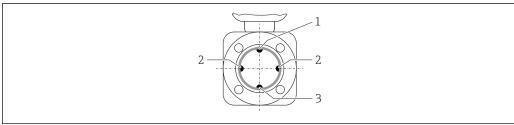
The measuring device also offers the empty pipe detection function to detect partially filled measuring pipes in the event of outgassing fluids or variable process pressures.

Vertical



Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.

Horizontal



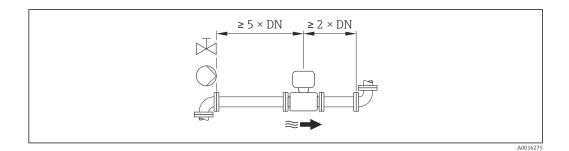
- EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection
- Reference electrode for potential equalization



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

Inlet and outlet runs

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



Installation dimensions

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

6.1.2 Requirements from environment and process

Ambient temperature range

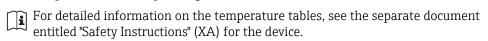
Transmitter	-40 to +60 °C (-40 to +140 °F)	
Local display	-20 to $+60$ °C (-4 to $+140$ °F), the readability of the display may be impaired at temperatures outside the temperature range.	
Sensor	 Process connection material, carbon steel: −10 to +60 °C (+14 to +140 °F) Process connection material, stainless steel: −40 to +60 °C (−40 to +140 °F) 	
Liner	Do not exceed or fall below the permitted temperature range of the liner .	

If operating outdoors:

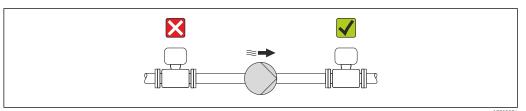
- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

Temperature tables

Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.



System pressure



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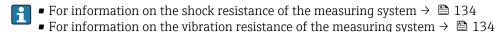
Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

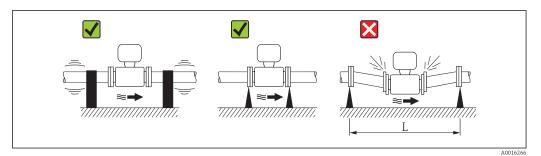
- Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.
- For information on the liner's resistance to partial vacuum $\rightarrow = 135$

 - For information on the vibration resistance of the measuring system $\rightarrow \blacksquare 134$

Vibrations

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



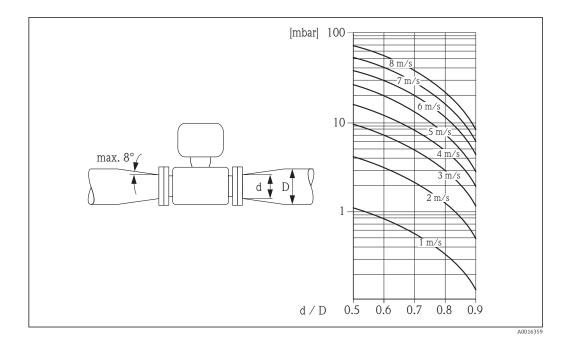


■ 5 Measures to avoid device vibrations (L > 10 m (33 ft))

Adapters

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

- The nomogram only applies to liquids with a viscosity similar to that of water.
- 1. Calculate the ratio of the diameters d/D.
- 2. From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the d/D ratio.



6.1.3 Special mounting instructions

Display protection

► To ensure that the optional display protection can be easily opened, maintain the following minimum head clearance: 350 mm (13.8 in)

6.2 Mounting the measuring device

6.2.1 Required tools

For transmitter

- For turning the transmitter housing: Open-ended wrench8 mm
- For opening the securing clamps: Allen key3 mm

For sensor

For flanges and other process connections:

- Screws, nuts, seals etc. are not included in the scope of supply and must be provided by the customer.
- Appropriate mounting tools

6.2.2 Preparing the measuring device

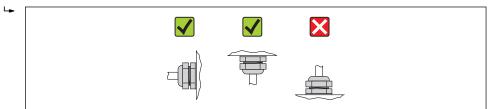
- 1. Remove all remaining transport packaging.
- 2. Remove any protective covers or protective caps present from the sensor.
- 3. Remove stick-on label on the electronics compartment cover.

6.2.3 Mounting the sensor

A WARNING

Danger due to improper process sealing!

- ► Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- ► Ensure that the gaskets are clean and undamaged.
- ► Install the gaskets correctly.
- 1. Ensure that the direction of the arrow on the sensor matches the flow direction of the medium.
- 2. To ensure compliance with device specifications, install the measuring device between the pipe flanges in a way that it is centered in the measurement section.
- 3. If using ground disks, comply with the Installation Instructions provided.
- 4. Observe required screw tightening torques $\rightarrow \stackrel{\triangle}{=} 24$.
- 5. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



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Mounting the seals

CAUTION

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

▶ Do not use electrically conductive sealing compounds such as graphite.

Comply with the following instructions when installing seals:

- Make sure that the seals do not protrude into the piping cross-section.
- For DIN flanges: only use seals according to DIN EN 1514-1.
- For "PFA" lining: generally additional seals are **not** required.
- For "PTFE" lining: generally additional seals are **not** required.

Mounting the ground cable/ground disks

Screw tightening torques

Please note the following:

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

Screw tightening torques for EN 1092-1 (DIN 2501), PN 40/25

Nominal diameter	Pressure rating	Threaded fasteners	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	PTFE	PFA
15	PN 40	4 × M12	11	-
25	PN 40	4 × M12	26	20

Nominal diameter	Pressure rating	Threaded fasteners	Max. screw tighte	ning torque [Nm]
[mm]	[bar]	[mm]	PTFE	PFA
32	PN 40	4 × M16	41	35
40	PN 40	4 × M16	52	47
50	PN 40	4 × M16	65	59
65 ¹⁾	PN 16	8 × M16	43	40
65	PN 40	8 × M16	43	40
80	PN 16	8 × M16	53	48
80	PN 40	8 × M16	53	48
100	PN 16	8 × M16	57	51
100	PN 40	8 × M20	78	70
125	PN 16	8 × M16	75	67
125	PN 40	8 × M24	111	99
150	PN 16	8 × M20	99	85
150	PN 40	8 × M24	136	120
200	PN 10	8 × M20	141	101
200	PN 16	12 × M20	94	67
200	PN 25	12 × M24	138	105
250	PN 10	12 × M20	110	_
250	PN 16	12 × M24	131	_
250	PN 25	12 × M27	200	_
300	PN 10	12 × M20	125	_
300	PN 16	12 × M24	179	_
300	PN 25	16 × M27	204	_
350	PN 10	16 × M20	188	_
350	PN 16	16 × M24	254	_
350	PN 25	16 × M30	380	_
400	PN 10	16 × M24	260	_
400	PN 16	16 × M27	330	-
400	PN 25	16 × M33	488	-
450	PN 10	20 × M24	235	_
450	PN 16	20 × M27	300	_
450	PN 25	20 × M33	385	_
500	PN 10	20 × M24	265	_
500	PN 16	20 × M30	448	_
500	PN 25	20 × M33	533	-
600	PN 10	20 × M27	345	_
600 ¹⁾	PN 16	20 × M33	658	-
600	PN 25	20 × M36	731	-

¹⁾ Designed acc. to EN 1092-1 (not to DIN 2501)

Screw tightening torques for ASME B16.5, Class 150/300

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

Screw tightening torques for JIS B2220, 10/20K

Nominal diameter	Pressure rating	Threaded fasteners	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	PTFE	PFA
25	10K	4 × M16	32	27
25	20K	4 × M16	32	27
32	10K	4 × M16	38	-
32	20K	4 × M16	38	-
40	10K	4 × M16	41	37
40	20K	4 × M16	41	37
50	10K	4 × M16	54	46
50	20K	8 × M16	27	23
65	10K	4 × M16	74	63
65	20K	8 × M16	37	31
80	10K	8 × M16	38	32
80	20K	8 × M20	57	46
100	10K	8 × M16	47	38
100	20K	8 × M20	75	58

Nominal diameter	Pressure rating	Threaded fasteners	Max. screw tightening torque [Nm	
[mm]	[bar]	[mm]	PTFE	PFA
125	10K	8 × M20	80	66
125	20K	8 × M22	121	103
150	10K	8 × M20	99	81
150	20K	12 × M22	108	72
200	10K	12 × M20	82	54
200	20K	12 × M22	121	88
250	10K	12 × M22	133	_
250	20K	12 × M24	212	_
300	10K	16 × M22	99	_
300	20K	16 × M24	183	_

Screw tightening torques for AS 2129, Table E

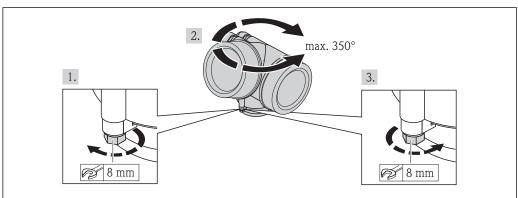
Nominal diameter	Threaded fasteners	Max. screw tightening torque [Nm]
[mm]	[mm]	PTFE
25	4 × M12	21
50	4 × M16	42

Screw tightening torques for AS 4087, PN 16

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

6.2.4 Turning the transmitter housing

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

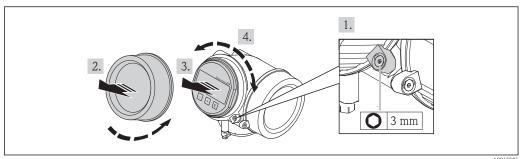


A0013713

- 1. Release the fixing screw.
- 2. Turn the housing to the desired position.
- 3. Firmly tighten the securing screw.

6.2.5 Turning the display module

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



- A00139
- 1. Loosen the securing clamp of the electronics compartment cover using an Allen key.
- 2. Unscrew cover of the electronics compartment from the transmitter housing.
- 3. Optional: pull out the display module with a gentle rotational movement.
- 4. Rotate the display module into the desired position: Max. $8 \times 45^{\circ}$ in each direction.
- 5. Without display module pulled out:
 Allow display module to engage at desired position.
- 6. With display module pulled out:

 Feed the cable into the gap between the housing and main electronics module and plug the display module into the electronics compartment until it engages.
- 7. Reverse the removal procedure to reassemble the transmitter.

6.3 Post-installation check

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

7 Electrical connection



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

7.1 Connection conditions

7.1.1 Required tools

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

7.1.2 Connecting cable requirements

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

Electrical safety

In accordance with applicable federal/national regulations.

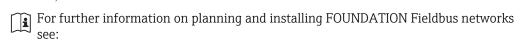
Permitted temperature range

- $-40 \,^{\circ}\text{C} \, (-40 \,^{\circ}\text{F}) \text{ to } +80 \,^{\circ}\text{C} \, (+176 \,^{\circ}\text{F})$
- Minimum requirement: cable temperature range ≥ ambient temperature +20 K

Signal cable

FOUNDATION Fieldbus

Twisted, shielded two-wire cable.



- Operating Instructions for "FOUNDATION Fieldbus Overview" (BA00013S)
- FOUNDATION Fieldbus Guideline
- IEC 61158-2 (MBP)

Pulse/frequency/switch output

Standard installation cable is sufficient.

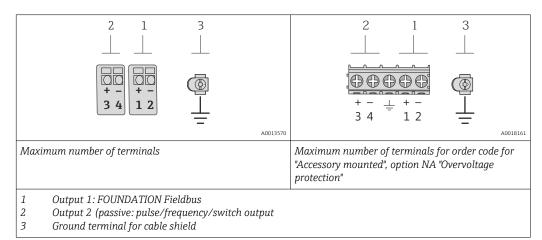
Cable diameter

- Cable glands supplied:
 M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Plug-in spring terminals for device version without integrated overvoltage protection: wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- Screw terminals for device version with integrated overvoltage protection: wire crosssections 0.2 to 2.5 mm² (24 to 14 AWG)

7.1.3 Terminal assignment

Transmitter

Connection version for FOUNDATION Fieldbus, pulse/frequency/switch output



Order code for "Output"		Terminal	numbers		
	Output 1		Outp	out 2	
	1 (+)	2 (-)	3 (+)	4 (-)	
Option E ^{1) 2)}	FOUNDATION Fieldbus			y/switch output sive)	

- 1) Output 1 must always be used; output 2 is optional.
- 2) FOUNDATION Fieldbus with integrated reverse polarity protection.

7.1.4 Pin assignment, device plug

FOUNDATION Fieldbus

Device plug for signal transmission (device side)

	Pin		Assignment	Coding	Plug/socket
$2 \longrightarrow 3$	1	+	Signal +	A	Plug
1 4	2	-	Signal –		
A0019021	3		Not assigned		
	4		Grounding		

7.1.5 Shielding and grounding

FOUNDATION Fieldbus

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

- To ensure an optimum EMC protective effect, connect the shield as often as possible to the reference ground.
- For reasons of explosion protection, you should refrain from grounding however.

To comply with both requirements, the fieldbus system allows three different types of shielding:

- 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.

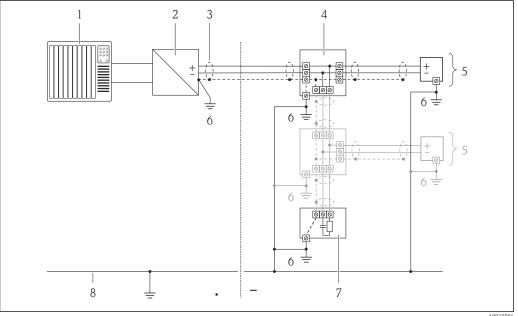
Where applicable, national installation regulations and guidelines must be observed during the installation!

Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground. In systems without potential equalization, therefore, cable shielding of fieldbus systems should only be grounded on one side, for example at the fieldbus supply unit or at safety barriers.

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.



- 1 Controller (e.g. PLC)
- Power Conditioner (FOUNDATION Fieldbus) 2
- 3 Cable shield
- T-box
- 5 Measuring device
- Local grounding
- Bus terminator
- Potential matching line

7.1.6 Requirements for the supply unit

Supply voltage

Transmitter

An external power supply is required for each output.

The following supply voltage values apply for the outputs available:

Order code for "Output"	Minimum terminal voltage	Maximum terminal voltage
Option E ¹⁾ : FOUNDATION Fieldbus, pulse/frequency/switch output	≥ DC 9 V	DC 32 V

For device version with SD03 local display: The terminal voltage must be increased by DC 0.5 V if backlighting is used.

7.1.7 Preparing the measuring device

- 1. Remove dummy plug if present.
- 2. **NOTICE!** Insufficient sealing of the housing! Operational reliability of the measuring device could be compromised. Use suitable cable glands corresponding to the degree of protection.

If measuring device is delivered without cable glands:

Provide suitable cable gland for corresponding connecting cable .

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

7.2 Connecting the measuring device

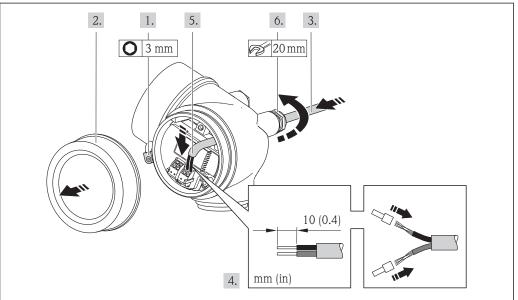
NOTICE

Limitation of electrical safety due to incorrect connection!

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

7.2.1 Connecting the transmitter

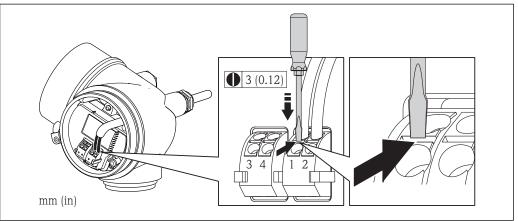
Connection via terminals



- 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. **WARNING!** Housing degree of protection may be voided due to insufficient sealing of the housing. Screw in the screw without using any lubricant. The threads on the cover are coated with a dry lubricant.

Reverse the removal procedure to reassemble the transmitter.

Removing a cable



To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes while simultaneously pulling the cable end out of the terminal.

7.2.2 Ensuring potential equalization

Requirements

A CAUTION

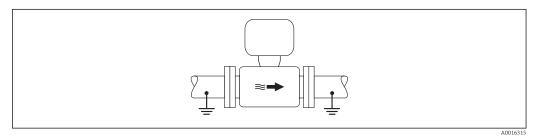
Electrode damage can result in the complete failure of the device!

- ▶ Same electrical potential for the fluid and sensor
- ► Company-internal grounding concepts
- ▶ Pipe material and grounding

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

Connection example, standard scenario

Metal, grounded pipe



Potential equalization via measuring tube

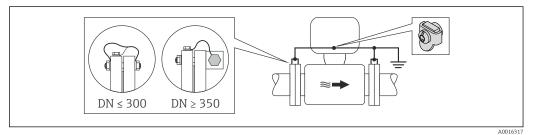
Connection example in special situations

Unlined and ungrounded metal pipe

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present

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



■ 7 Potential equalization via ground terminal and pipe flanges

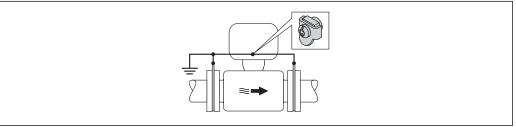
- 1. Connect both sensor flanges to the pipe flange via a ground cable and ground them.
- 2. If DN \leq 300 (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws. If DN \geq 350 (14"): Mount the ground cable directly on the metal transport bracket. Observe torques \rightarrow $\stackrel{\triangle}{=}$ 24.
- 3. Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose.

Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present

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



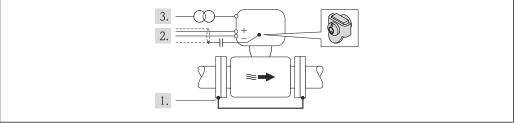
- 8 Potential equalization via ground terminal and ground disks
- 1. Connect the ground disks to the ground terminal via the ground cable.
- 2. Connect the ground disks to ground potential.

Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:

- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment

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



A0016319

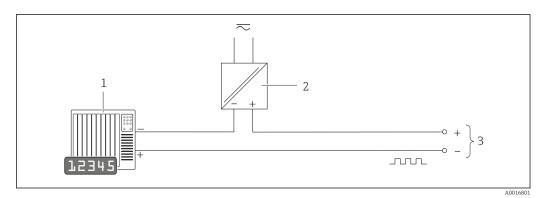
Prerequisite: The sensor is installed in the pipe in a way that provides electrical insulation.

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

7.3 Special connection instructions

7.3.1 **Connection examples**

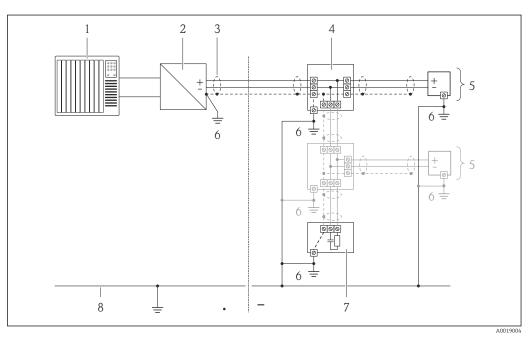
Pulse/frequency output



Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC)
- 3

FOUNDATION Fieldbus



Connection example for FOUNDATION Fieldbus

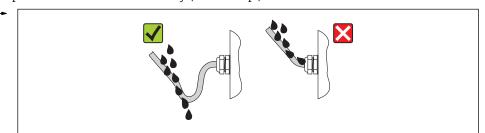
- Control system (e.g. PLC) Power Conditioner (FOUNDATION Fieldbus) 2
- 3 Cable shield
- T-box
- 5 Measuring device
- Local grounding
- Bus terminator
- Potential matching line

7.4 Ensuring the degree of protection

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

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

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



A001396

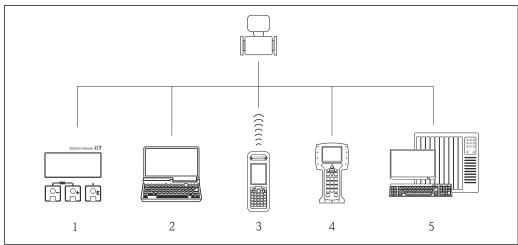
5. Insert dummy plugs into unused cable entries.

7.5 Post-connection check

Are cables or the device undamaged (visual inspection)?	
Do the cables comply with the requirements ?	
Do the cables have adequate strain relief?	
Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" $\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	
Depending on the device version: are all the device plugs firmly tightened ?	
Does the supply voltage match the specifications on the transmitter nameplate ?	
Is the terminal assignment correct ?	
If supply voltage is present, do values appear on the display module?	
Is the potential equalization established correctly → 🖺 34?	
Are all housing covers installed and firmly tightened?	
Is the securing clamp tightened correctly?	

8 Operating options

8.1 Overview of operating options



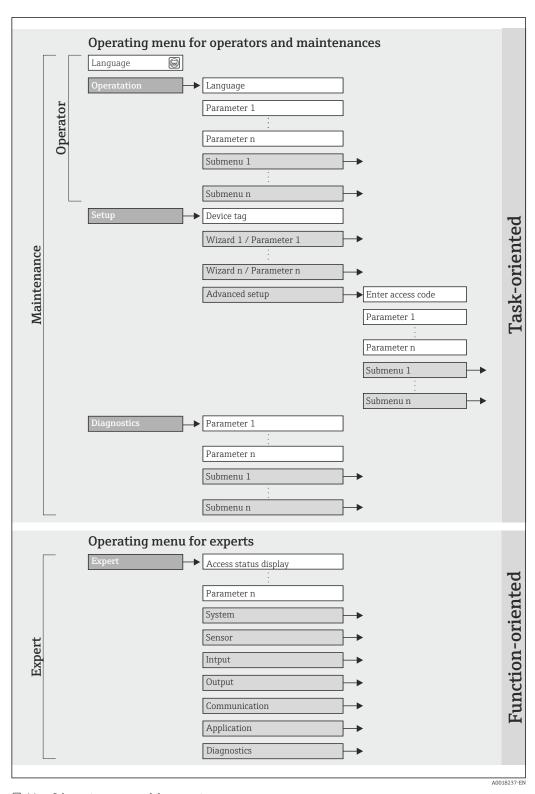
A00156

- 1 Local operation via display module
- 2 Computer with operating tool (e.g. FieldCare, AMS Device Manager)
- 3 Field Xpert SFX350 or SFX370
- 4 Field Communicator 475
- 5 Automation system (e.g. PLC)

8.2 Structure and function of the operating menu

8.2.1 Structure of the operating menu

For an overview of the operating menu with menus and parameters



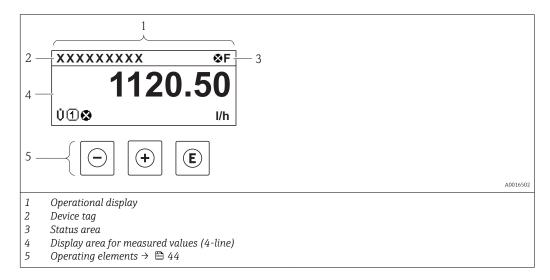
 $\blacksquare 11$ Schematic structure of the operating menu

8.2.2 Operating philosophy

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

8.3 Access to the operating menu via the local display

8.3.1 Operational display



Status area

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

- Status signals → 🗎 93
 - **F**: Failure
 - C: Function check
 - **S**: Out of specification
 - **M**: Maintenance required
- Diagnostic behavior → 🖺 94
 - 🔉: Alarm
 - <u>∧</u>: Warning
- $\ \blacksquare$: 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
Ü	Volume flow
ṁ	Mass flow
Σ	Totalizer The measurement channel number indicates which of the three totalizers is displayed.

Measurement channel numbers

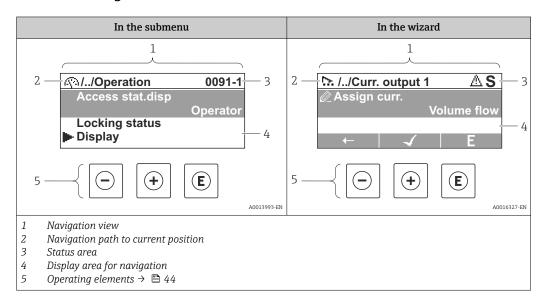
Symbol	Meaning
14	Measurement channel 1 to 4

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

Diagnostic behavior

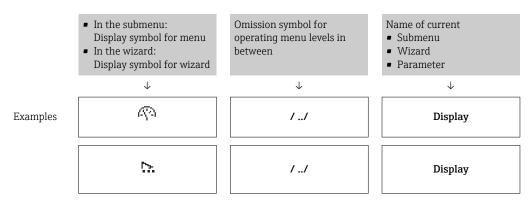
The number and display format of the measured values can be configured via the **"Format display" parameter** \rightarrow \cong 62. "Operation" menu \rightarrow Display \rightarrow Format display

8.3.2 Navigation view



Navigation path

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



For more information about the menu icons, refer to the "Display area" section $\rightarrow \stackrel{\cong}{=} 42$

Status area

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

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

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



- For information on the function and entry of the direct access code → 🖺 47

Display area

Menus

Symbol	Meaning
ক্ষ	Operation Appears: In the menu next to the "Operation" selection At the left in the navigation path in the "Operation" menu
۶	Setup Appears: In the menu next to the "Setup" selection At the left in the navigation path in the "Setup" menu
્ય	Diagnostics Appears: In the menu next to the "Diagnostics" selection At the left in the navigation path in the "Diagnostics" menu
÷,**c	Expert Appears: In the menu next to the "Expert" selection At the left in the navigation path in the "Expert" menu

Submenus, wizards, parameters

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

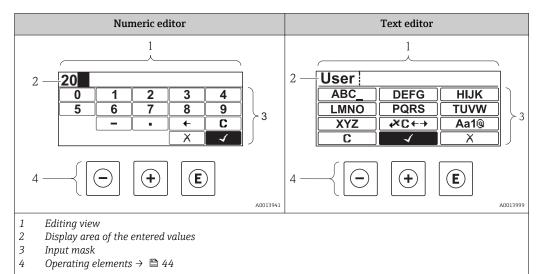
Locking

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

Wizard operation

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

8.3.3 Editing view



Input mask

The following input symbols are available in the input mask of the numeric and text editor:

Numeric editor

Symbol	Meaning
9	Selection of numbers from 0 to 9.
·	Inserts decimal separator at the input position.
_	Inserts minus sign at the input position.
4	Confirms selection.
+	Moves the input position one position to the left.
X	Exits the input without applying the changes.
C	Clears all entered characters.

Text editor

Symbol	Meaning
Aa1@	Toggle Between upper-case and lower-case letters For entering numbers For entering special characters
ABC_ XYZ	Selection of letters from A to Z.

abc _ xyz	Selection of letters from a to z.
""^ _ ~& _	Selection of special characters.
4	Confirms selection.
(×C←→	Switches to the selection of the correction tools.
X	Exits the input without applying the changes.
C	Clears all entered characters.

Symbol	Meaning
C	Clears all entered characters.
-	Moves the input position one position to the right.
€	Moves the input position one position to the left.
**	Deletes one character immediately to the left of the input position.

8.3.4 Operating elements

Key	Meaning
	Minus key
	In a menu, submenu Moves the selection bar upwards in a choose list.
\bigcirc	With a Wizard Confirms the parameter value and goes to the previous parameter.
	With a text and numeric editor In the input mask, moves the selection bar to the left (backwards).
	Plus key
	In a menu, submenu Moves the selection bar downwards in a choose list.
(+)	With a Wizard Confirms the parameter value and goes to the next parameter.
	With a text and numeric editor Moves the selection bar to the right (forwards) in an input screen.

Key	Meaning
	Enter key
E	For operational display ■ Pressing the key briefly opens the operating menu. ■ Pressing the key for 2 s opens the context menu.
	 In a menu, submenu Pressing the key briefly: Opens the selected menu, submenu or parameter. Starts the wizard. If help text is open, closes the help text of the parameter. Pressing the key for 2 s for parameter: If present, opens the help text for the function of the parameter.
	With a Wizard Opens the editing view of the parameter.
	With a text and numeric editor ■ Pressing the key briefly: - Opens the selected group. - Carries out the selected action. ■ Pressing the key for 2 s confirms the edited parameter value.
	Escape key combination (press keys simultaneously)
(-)+(+)	In a menu, submenu Pressing the key briefly: Exits the current menu level and takes you to the next higher level. If help text is open, closes the help text of the parameter. Pressing the key for 2 s returns you to the operational display ("home position").
	With a Wizard Exits the wizard and takes you to the next higher level.
	With a text and numeric editor Closes the text or numeric editor without applying changes.
-+E	Minus/Enter key combination (press the keys simultaneously)
	Reduces the contrast (brighter setting).
++E	Plus/Enter key combination (press and hold down the keys simultaneously)
	Increases the contrast (darker setting).
	Minus/Plus/Enter key combination (press the keys simultaneously)
	For operational display Enables or disables the keypad lock (only SD02 display module).

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:

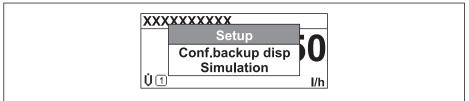
- Setup
- Conf. backup disp.
- Simulation

Calling up and closing the context menu

The user is in the operational display.

1. Press E for 2 s.

└ The context menu opens.



A0016326-EN

- 2. Press \Box + \pm simultaneously.
 - $\buildrel \buildrel \bui$

Calling up the menu via the context menu

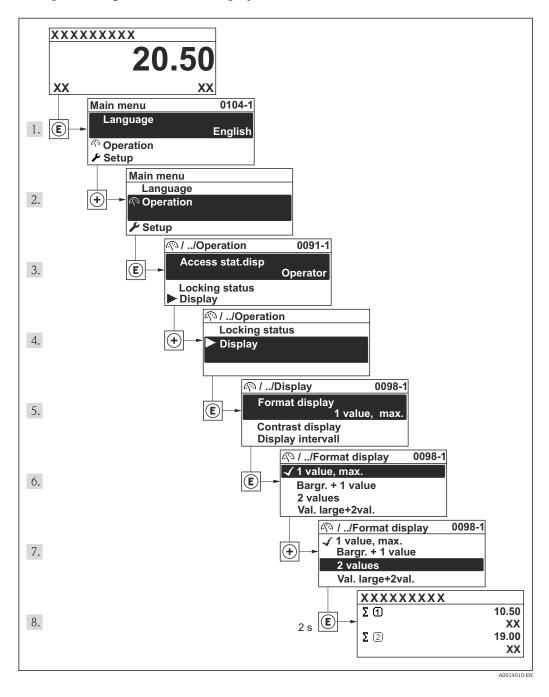
- 1. Open the context menu.
- 2. Press \pm to navigate to the desired menu.
- 3. Press 🗉 to confirm the selection.
 - ► The selected menu opens.

8.3.6 Navigating and selecting from list

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

For an explanation of the navigation view with symbols and operating elements $\Rightarrow \implies 41$

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



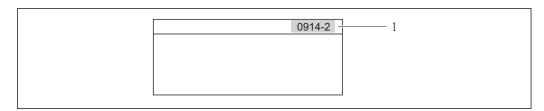
8.3.7 Calling the parameter directly

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" menu → Direct access

The direct access code consists of a 4-digit number and the channel number, which identifies the channel of a process variable: e.g. 0914-1. 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: Input of "914" instead of "0914"
- If no channel number is entered, channel 1 is jumped to automatically.
 Example: Input of "0914" → Parameter Totalizer 1
- If a different channel is jumped to: Enter the direct access code with the corresponding channel number.

Example: Input of "0914-2" → Parameter **Totalizer 2**

For the direct access codes of the individual parameters

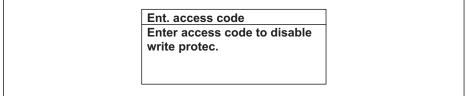
8.3.8 Calling up help text

For some parameters, help texts exist, which the user can call up from the navigation view. These briefly describe the function of the parameter and thus support fast and reliable 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.



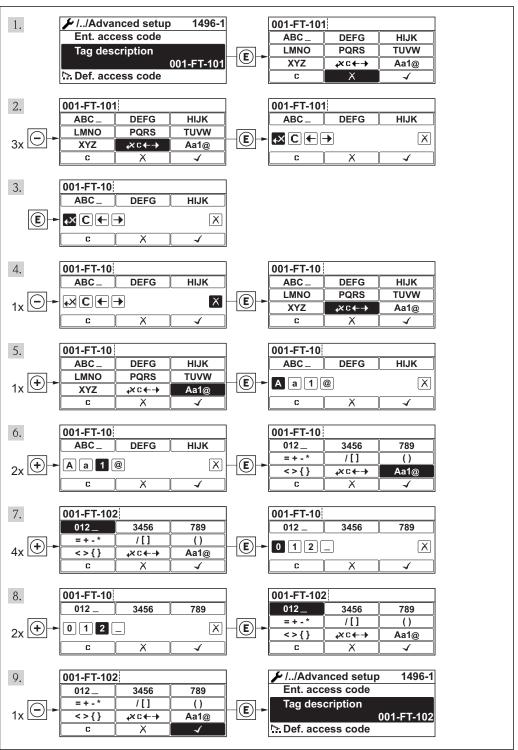
A0014002-EN

■ 12 Example: Help text for parameter "Enter access code"

- 2. Press \Box + \pm simultaneously.
 - ► The help text is closed.

8.3.9 Changing the parameters

Example: Changing the tag name in the "Tag description" parameter from 001-FT-101 to 001-FT-102



A0014020-EN

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-EI

8.3.10 User roles and related access authorization

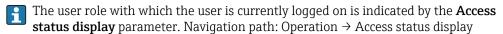
The two user roles "Operator" and "Maintenance" have different write access to the parameters if the customer defines a user-specific access code. This protects the device configuration via the local display from unauthorized access .

Access authorization to parameters

User role	Read a	access	Write	access
	Without access code (from the factory) With access code		Without access code (from the factory)	With access code
Operator	V	V	V	1)
Maintenance	V	V	V	V

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

If an incorrect access code is entered, the user obtains the access rights of the "Operator" role.



8.3.11 Disabling write protection via access code

If the $\widehat{\mathbb{H}}$ -symbol appears on the local display in front of a parameter, the parameter is write-protected by a user-specific access code and its value cannot be changed at the moment using the local display .

The locking of the write access via local operation can be disabled by entering the customer-defined access code via the respective access option.

- 1. After you press **E**, the input prompt for the access code appears.
- 2. Enter the access code.

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.

Local operation with mechanical push buttons (display module SD02)

Display module SD02: order characteristic "Display; Operation", option C

The keypad lock is switched on and off in the same way:

Switching on the keypad lock

- ► The device is in the measured value display.
 - Press the \Box + \pm + \blacksquare keys simultaneously.
 - ightharpoonup The message **Keylock on** appears on the display: The keypad lock is switched on.
- If the user attempts to access the operating menu while the keypad lock is active, the message **Keylock on** appears.

Switching off the keypad lock

- ► The keypad lock is switched on.
 - Press the \Box + \pm + \blacksquare keys simultaneously.
 - The message **Keylock off** appears on the display: The keypad lock is switched off.

Local operation with touch control (display module SD03)

Display module SD03: Order characteristic "Display; Operation", option **E**

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

Switching on the keypad lock

The keypad lock is switched on automatically:

- Each time the device is restarted.
- If the device has not been operated for longer than one minute in the measured value display.
- 1. The device is in the measured value display.
 - Press the E key for longer than 2 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 message **Keylock on** appears.

Switching off the keypad lock

- 1. The keypad lock is switched on.
 - Press the E key for longer than 2 seconds.
 - ► A context menu appears.
- 2. In the context menu, select the **Keylock off** option.
 - ► The keypad lock is switched off.

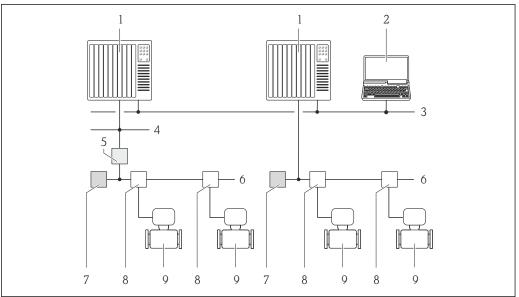
8.4 Access to the operating menu via the operating tool

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

8.4.1 Connecting the operating tool

Via FOUNDATION Fieldbus network

This communication interface is available in device versions with FOUNDATION Fieldbus.

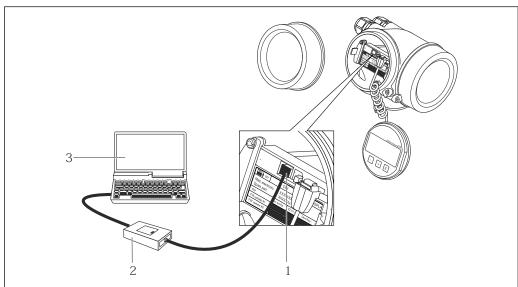


A0023460

 \blacksquare 13 Options for remote operation via FOUNDATION Fieldbus network

- 1 Automation system
- 2 Computer with FOUNDATION Fieldbus network card
- *3 Industry network*
- 4 High Speed Ethernet FF-HSE network
- 5 Segment coupler FF-HSE/FF-H1
- 6 FOUNDATION Fieldbus FF-H1 network
- 7 Power supply FF-H1 network
- 8 T-box
- 9 Measuring device

Via service interface (CDI)



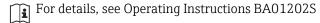
A0014019

- 1 Service interface (CDI = Endress+Hauser Common Data Interface) of the measuring device
- 2 Commubox FXA291
- 3 Computer with "FieldCare" operating tool with COM DTM "CDI Communication FXA291"

8.4.2 Field Xpert SFX350, SFX370

Function scope

Field Xpert SFX350 and Field Xpert SFX370 are mobile computers for commissioning and maintenance. They enable efficient device configuration and diagnostics for HART and FOUNDATION fieldbus devices in the **non-Ex area** (SFX350, SFX370) and the **Ex area** (SFX370).



Source for device description files

See data $\rightarrow \implies 55$

8.4.3 FieldCare

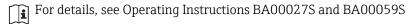
Function scope

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

Access is via:

Typical functions:

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



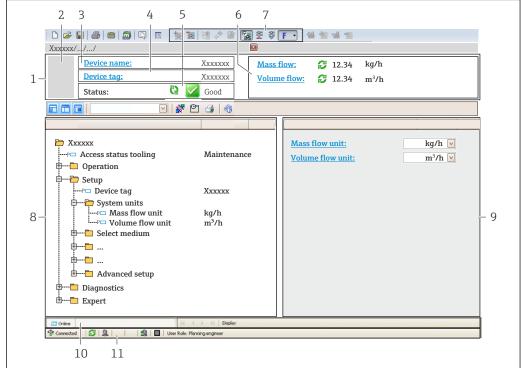
Source for device description files

See data $\rightarrow \implies 55$

Establishing a connection

 $\hfill \hfill \hfill$

User interface



A0021051-EN

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

8.4.4 AMS Device Manager

Function scope

Program from Emerson Process Management for operating and configuring measuring devices via FOUNDATION Fieldbus H1 protocol.

Source for device description files

See data $\rightarrow \blacksquare 55$

8.4.5 Field Communicator 475

Function scope

Industrial handheld terminal from Emerson Process Management for remote configuration and measured value display via FOUNDATION Fieldbus H1 protocol.

Source for device description files

See data → 🖺 55

9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

Firmware version	01.00.zz	 On the title page of the Operating instructions On the transmitter nameplate → ≅ 13 Firmware version "Diagnostics" menu → Device information → Firmware version
Release date of firmware version	06.2015	
Manufacturer ID	0x11	Manufacturer ID "Diagnostics" menu → Device information → Manufacturer ID
Device type ID	0x????	Device type "Diagnostics" menu → Device information → Device type
Device revision	1	 On the transmitter nameplate → □ 14 Device revision "Diagnostics" menu → Device information → Device revision
DD revision	Information and f	
CFF revision	www.endress.cwww.fieldbus.c	

For an overview of the different firmware versions for the device $\rightarrow \triangleq 117$

9.1.2 Operating tools

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

Operating tool via FOUNDATION Fieldbus	Sources for obtaining device descriptions	
Field Xpert SFX350Field Xpert SFX370	Use update function of handheld terminal	
FieldCare	 www.endress.com → Download Area CD-ROM (contact Endress+Hauser) DVD (contact Endress+Hauser) 	
AMS Device Manager (Emerson Process Management)	www.endress.com → Download Area	
Field Communicator 475 (Emerson Process Management)	Use update function of handheld terminal	

9.2 Cyclic data transmission

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

9.2.1 Block model

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

Display text (xxxx = serial number)	Base index	Description
RESOURCE_ xxxxxxxxxxx	400	Resource block
SETUP_xxxxxxxxxxx	600	"Setup" Transducer block
ADVANCED_SETUP_ xxxxxxxxxxx	800	"Advanced setup" Transducer block
DISPLAY_ xxxxxxxxxxx	1000	"Display" Transducer block
HISTOROM_ xxxxxxxxxx	1200	"HistoROM" Transducer block
DIAGNOSTIC_xxxxxxxxxxx	1400	"Diagnostic" Transducer block
EXPERT_CONFIG_xxxxxxxxxxx	1600	"Expert configuration" Transducer block
EXPERT_INFO_xxxxxxxxxx	1800	"Expert information" Transducer block
SERVICE_SENSOR_xxxxxxxxxxx	2000	"Service sensor" Transducer block
SERVICE_INFO_xxxxxxxxxxx	2200	"Service info" Transducer block
TOTAL_INVENTORY_COUNTER_xxxxxxxx xxx	2400	"Totalizer" Transducer block
HEARTBEAT_RESULTS1_ xxxxxxxxxxx	2600	"Heartbeat results 1" Transducer block
HEARTBEAT_RESULTS2_xxxxxxxxxxx	2800	"Heartbeat results 2" Transducer block
HEARTBEAT_RESULTS3_xxxxxxxxxxx	3000	"Heartbeat results 3" Transducer block
HEARTBEAT_RESULTS4_ xxxxxxxxxxx	3200	"Heartbeat results 4" Transducer block
HEARTBEAT_TECHNOLOGY_xxxxxxxxxxx	3400	"Heartbeat" Transducer block
ANALOG_INPUT_1_xxxxxxxxxxx	3600	Analog Input function block 1 (AI)
ANALOG_INPUT_2_xxxxxxxxxxx	3800	Analog Input function block 2 (AI)
ANALOG_INPUT_3_xxxxxxxxxxx	4000	Analog Input function block 3 (AI)
ANALOG_INPUT_4_xxxxxxxxxxx	4200	Analog Input function block 4 (AI)
DIGITAL_INPUT_1_ xxxxxxxxxxx	4400	Digital Input function block 1 (DI)
DIGITAL_INPUT_2_xxxxxxxxxxx	4600	Digital Input function block 2 (DI)
MULTI_DIGITAL_OUTPUT_ xxxxxxxxxxx	4800	Multiple Digital Output block (MDO)
PID_ xxxxxxxxxx	5000	PID function block (PID)
INTEGRATOR_xxxxxxxxxxx	5200	Integrator function block (INTG)

9.2.2 Assignment of the measured values in the function blocks

The input value of a function block is defined via the CHANNEL parameter.

AI module (Analog Input)

Description

Four Analog Input blocks are available.

CHANNEL	Measured variable
0	Uninitialized (factory setting)
7	Temperature
9	Volume flow
11	Mass flow

CHANNEL	Measured variable
16	Totalizer 1
17	Totalizer 2
18	Totalizer 3

DI module (Discrete Input)

Two Discrete Input blocks are available.

Description

CHANNEL	Device function	State
0	Uninitialized (factory setting)	_
101	Switch output state	0 = off, 1 = active
102	Empty pipe detection	0 = full, 1 = empty
103	Low flow cut off	0 = off, 1 = active
105	Status verification 1)	0 = good, 1 = bad

1) Only available with the Heartbeat Verification application package

MDO module (Multiple Discrete Output)

Description

Channel	Name
122	Channel_DO

Structure

Channel_DO							
Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8

Value	Device function	State
Value 1	Reset totalizer 1	0 = off, 1 = execute
Value 2	Reset totalizer 2	0 = off, 1 = execute
Value 3	Reset totalizer 3	0 = off, 1 = execute
Value 4	Flow override	0 = off, 1 = active
Value 5	Start heartbeat verification 1)	0 = off, 1 = start
Value 6	Status switch output	0 = off, 1 = on
Value 7	Not assigned	-
Value 8	Not assigned	-

 ${\hbox{\it 1)}} \qquad \hbox{\it Only available with the Heartbeat Verification application package} \\$

10 Commissioning

10.1 **Function check**

Before commissioning the measuring device:

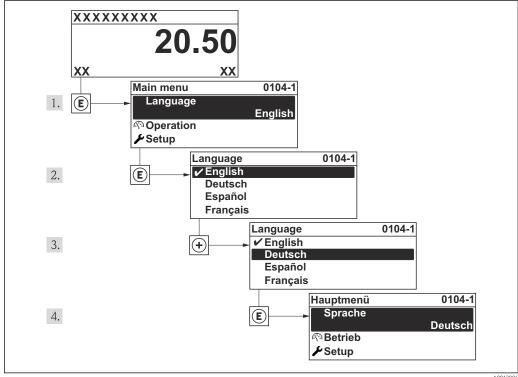
- ▶ Make sure that the post-installation and post-connection checks have been performed.
- "Post-installation check" checklist → 🗎 28
- "Post-connection check" checklist \rightarrow \triangleq 37

10.2 Switching on the measuring device

- After a successful function check, switch on the measuring device.
 - ► After a successful startup, the local display switches automatically from the startup display to the operational display.
- If nothing appears on the local display or a diagnostic message is displayed, refer to

10.3 Setting the operating language

Factory setting: English or ordered local language

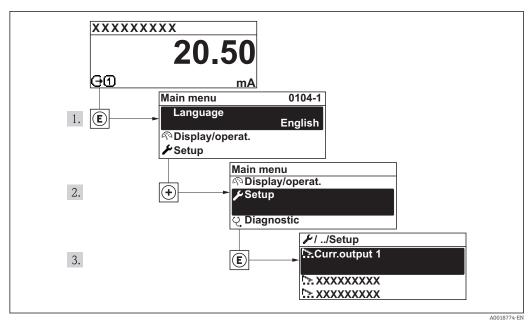


■ 14 Taking the example of the local display

10.4 Configuring the measuring device

The Setup menuwith its quided wizards contains all the parameters needed for standard operation.

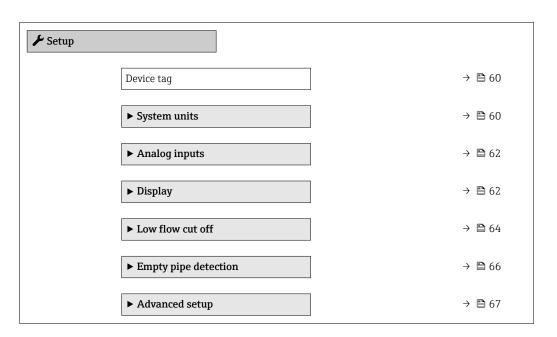
Navigation to the **Setup** menu



d Illustrated using the example of the local display

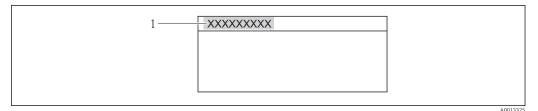
Navigation

"Setup" menu



10.4.1 Defining the tag name

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



 \blacksquare 16 Header of the operational display with tag name

1 Device tag

♀ The number of characters displayed depends on the characters used.

■ Enter the tag name in the "FieldCare" operating tool \rightarrow $\stackrel{\triangle}{=}$ 54

Navigation

"Setup" menu \rightarrow Device tag

Parameter overview with brief description

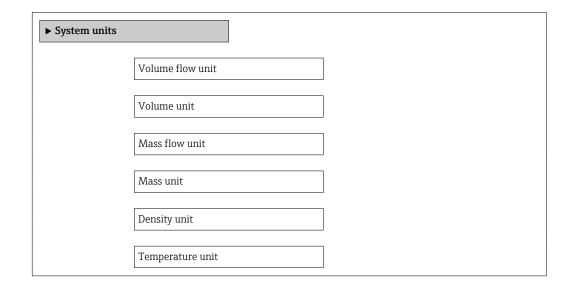
Parameter Description		User entry	Factory setting
Device tag	Enter the name for the measuring point.	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	Promag 200

10.4.2 Setting the system units

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

Navigation

"Setup" menu \rightarrow System units



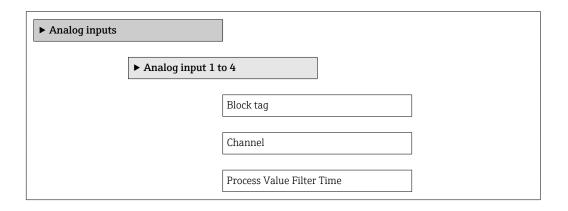
Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Volume flow unit	Select volume flow unit. Result The selected unit applies for: Output Low flow cut off Simulation process variable	Unit choose list	Country-specific: l/h gal/min (us)
Volume unit	Select volume unit.	Unit choose list	Country-specific: m³ gal (us)
Mass flow unit	Select mass flow unit. Result The selected unit applies for: Output Low flow cut off Simulation process variable	Unit choose list	Country-specific: kg/h lb/min
Mass unit	Select mass unit.	Unit choose list	Country-specific: kg lb
Density unit	Select density unit. Result The selected unit applies for: Output Simulation process variable	Unit choose list	Country-specific: kg/l lb/ft ³
Temperature unit	Select temperature unit. Result The selected unit applies for: Maximum value Minimum value Maximum value Minimum value Average value	Unit choose list	Country-specific: °C °F

10.4.3 Configuring the analog inputs

Navigation

"Setup" menu \rightarrow Analog inputs



Parameter overview with brief description

Parameter	Description	User entry / Selection	Factory setting
Block tag	Unique name of the measuring device.	Character string composed of letters, numbers and certain punctuation marks.	-
Channel	Select the process variable.	 Uninitialized Volume flow Mass flow Totalizer 1 Totalizer 2 Totalizer 3 	Uninitialized
Process Value Filter Time	Specify a time to suppress signal peaks. During the specified time the totalizer does not respond to an erratic increase in the process variable.	Positive floating-point number	0 s

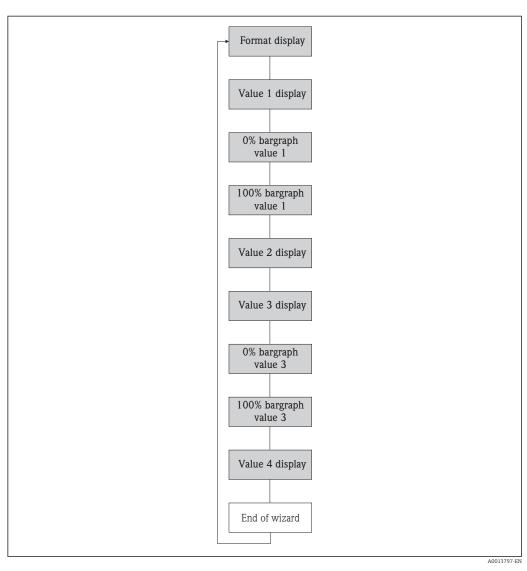
10.4.4 Configuring the local display

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

Navigation

"Setup" menu → Display

Structure of the wizard



■ 17 "Display" wizard in the "Setup" menu

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	1 value, max. size
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	 Volume flow Mass flow Totalizer 1 Totalizer 2 Totalizer 3 	Volume flow

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: 0 l/h 0 gal/min (us)
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Value 2 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	None
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	None
0% bargraph value 3	A selection has been made in the Value 3 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: 0 1/h 0 gal/min (us)
100% bargraph value 3	An option was selected in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	None

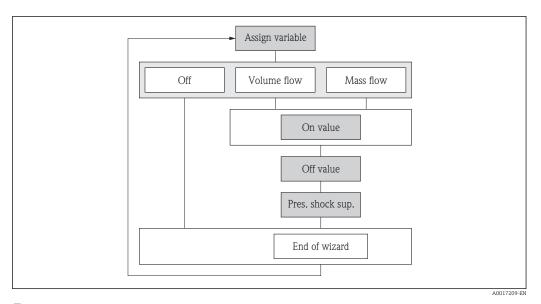
10.4.5 Configuring the low flow cut off

The **Low flow cut off** wizard guides you systematically through all the parameters that have to be set for configuring the low flow cut off.

Navigation

"Setup" menu \rightarrow Low flow cut off

Structure of the wizard



 \blacksquare 18 "Low flow cut off" wizard in the "Setup" menu

Parameter overview with brief description

Parameter	Description	Selection / User entry	Factory setting
Assign process variable	Select process variable for low flow cut off.	 Off Volume flow Mass flow	Volume flow
On value low flow cutoff	Enter on value for low flow cut off.	Signed floating-point number	0 l/h
Off value low flow cutoff	Enter off value for low flow cut off.	0 to 100.0 %	50 %
Pressure shock suppression	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	0 s

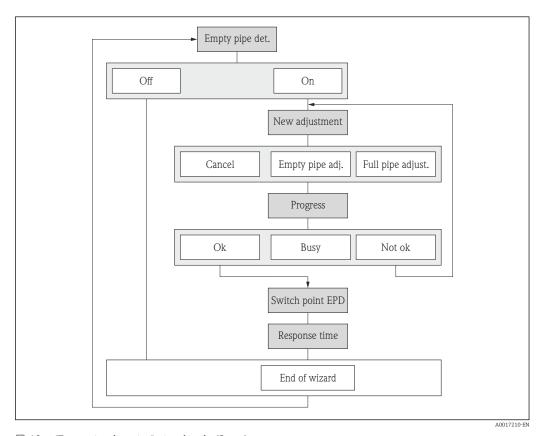
10.4.6 Configuring empty pipe detection

The **Empty pipe detection** wizard guides you systematically through all the parameters that have to be set for configuring empty pipe detection.

Navigation

"Setup" menu \rightarrow Empty pipe detection

Structure of the wizard



 $\blacksquare \ 19$ "Empty pipe detection" wizard in the "Setup" menu

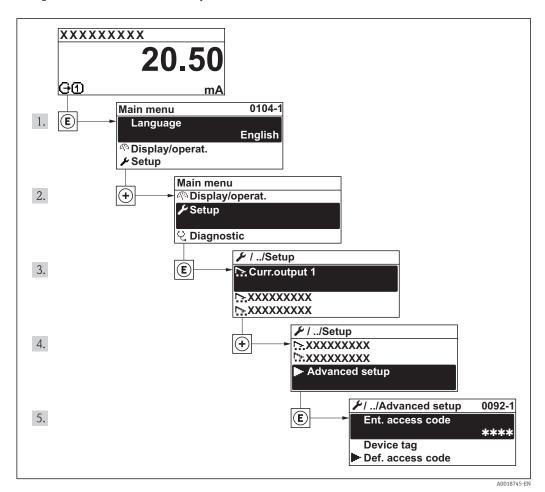
Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User interface / User entry	Factory setting
Empty pipe detection	-	Switch empty pipe detection on and off.	Off On	Off
New adjustment	-	Select type of adjustment.	CancelEmpty pipe adjustFull pipe adjust	Cancel
Progress	The On option is selected in the Empty pipe detection parameter.	Shows the progress.	OkBusyNot ok	_
Switch point empty pipe detection	-	Enter hysteresis in %, below this value the measuring tube will detected as empty.	1 to 99 %	10 %
Response time empty pipe detection	-	Enter the time before diagnostic message S862 "Pipe empty" is displayed for empty pipe detection.	0 to 100 s	1 s

10.5 Advanced settings

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

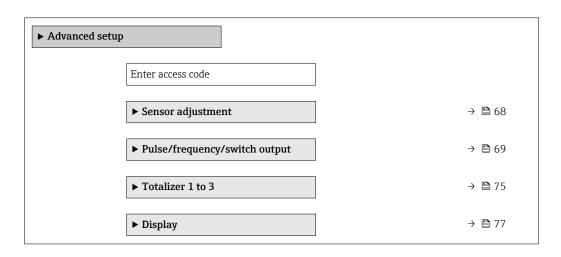
Navigation to the "Advanced setup" submenu

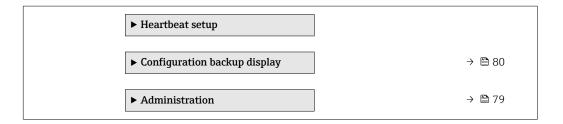


For detailed information on the parameter descriptions of the **Heartbeat Verification** application package, see the Special Documentation for the device

Navigation

"Setup" menu → Advanced setup





10.5.1 Carrying out a sensor adjustment

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

Navigation

"Setup" menu → Advanced setup → Sensor adjustment



Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Installation direction	Set sign of flow direction to match the direction of the arrow on the sensor.	Flow in arrow directionFlow against arrow direction	Flow in arrow direction
Zero point adjustment control	Start zero point adjustment.	CancelBusyZero point adjust failureStart	Cancel

10.5.2 Configuring the pulse/frequency/switch output

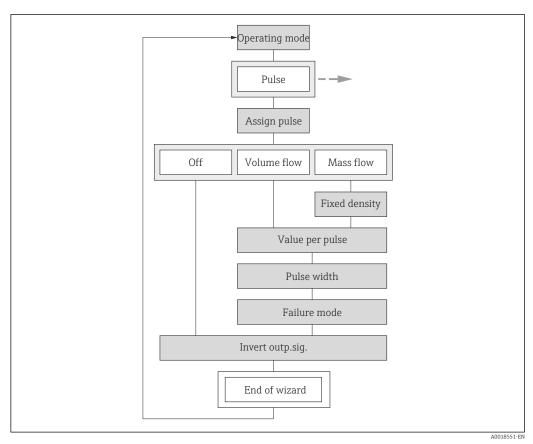
The **Pulse/frequency/switch output** wizard guides you systematically through all the parameters that can be set for configuring the selected output type.

Configuring the pulse output

Navigation

"Setup" menu → Pulse/frequency/switch output

Structure of the wizard for the pulse output



 \blacksquare 20 "Pulse/frequency/switch output" wizard in the "Setup" menu: "Operating mode" parameter "Pulse" option

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Assign pulse output	In Operating mode parameter, the Pulse option is selected.	Select process variable for pulse output.	OffMass flowVolume flow	Off
Value per pulse	In the Operating mode parameter, the Pulse option is selected and one of the following options is selected in the Assign pulse output parameter (→ 🗎 69): Mass flow Volume flow	Enter measured value at which a pulse is output.	Signed floating-point number	0

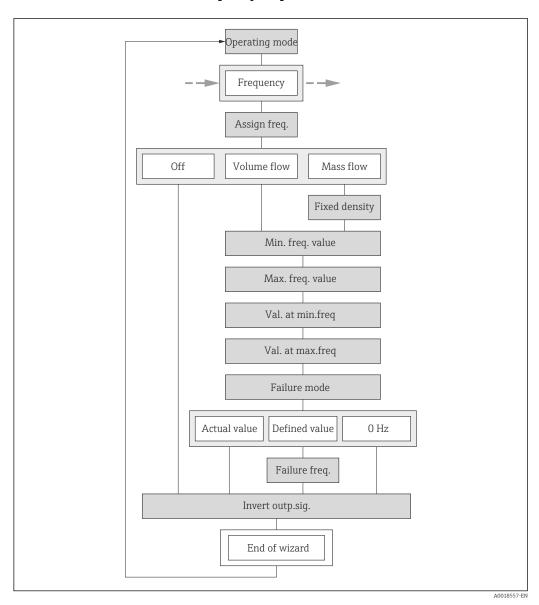
Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Pulse width	In the Operating mode parameter, the Pulse option is selected and one of the following options is selected in the Assign pulse output parameter (→ 🖺 69): • Mass flow • Volume flow	Define time width of the output pulse.	5 to 2 000 ms	100 ms
Failure mode	In the Operating mode parameter, the Pulse option is selected and one of the following options is selected in the Assign pulse output parameter (→ 🗎 69): • Mass flow • Volume flow	Define output behavior in alarm condition.	Actual valueNo pulses	No pulses
Invert output signal	-	Invert the output signal.	NoYes	No

Configuring the frequency output

Navigation

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

Structure of the wizard for the frequency output



 \blacksquare 21 "Pulse/frequency/switch output" wizard in the "Advanced setup" submenu: "Operating mode" parameter "Frequency" option

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Assign frequency output	In Operating mode parameter (→ 🖺 69), the Frequency option is selected.	Select process variable for frequency output.	OffVolume flowMass flow	Off

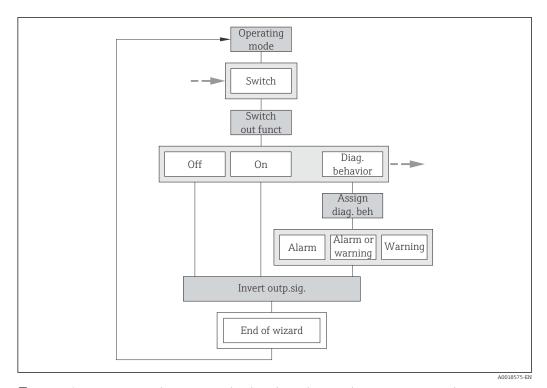
Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Minimum frequency value	In the Operating mode parameter, the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 🖺 71): Volume flow Mass flow	Enter minimum frequency.	0 to 1000 Hz	0 Hz
Maximum frequency value	In the Operating mode parameter, the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 🖺 71): ■ Volume flow ■ Mass flow	Enter maximum frequency.	0 to 1000 Hz	1000 Hz
Measuring value at minimum frequency	In the Operating mode parameter, the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 🖺 71): ■ Volume flow ■ Mass flow	Enter measured value for minmum frequency.	Signed floating-point number	Depends on country and nominal diameter
Measuring value at maximum frequency	In the Operating mode parameter, the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 71): Volume flow Mass flow	Enter measured value for maximum frequency.	Signed floating-point number	Depends on country and nominal diameter
Failure mode	In the Operating mode parameter (→ 🖺 69), the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 🖺 71): Volume flow Mass flow	Define output behavior in alarm condition.	Actual valueDefined value0 Hz	0 Hz
Failure frequency	In the Operating mode parameter (→ 🖺 69), the Frequency option is selected and one of the following options is selected in the Assign frequency output parameter (→ 🖺 71): ■ Volume flow ■ Mass flow	Enter frequency output value in alarm condition.	0.0 to 1250.0 Hz	0.0 Hz
Invert output signal	-	Invert the output signal.	NoYes	No

Configuring the switch output

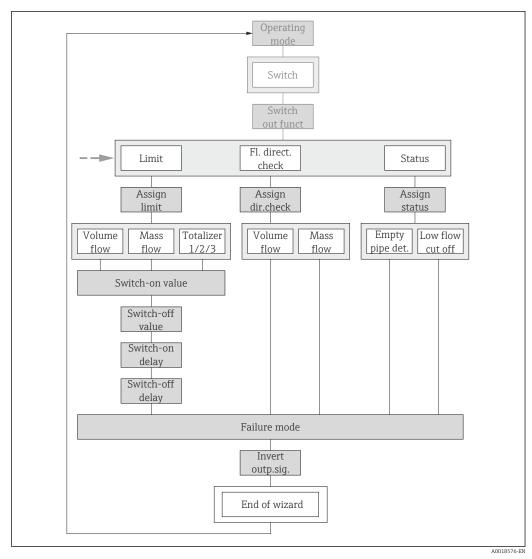
Navigation

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

Structure of the wizard for the switch output



■ 22 "Pulse/frequency/switch output" wizard in the "Advanced setup" submenu: "Operating mode" parameter"Switch" option (part 1)



23 "Pulse/frequency/switch output" wizard in the "Advanced setup" submenu: "Operating mode" parameter"Switch" option (part 2)

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
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	The Diagnostic behavior option is selected in the Switch output function parameter.	Select diagnostic behavior for switch output.	AlarmAlarm or warningWarning	Alarm

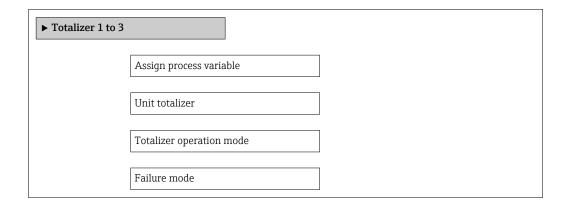
Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Assign limit	In Switch output function parameter, the Limit option is selected.	Select process variable for limit function.	 Volume flow Mass flow Totalizer 1 Totalizer 2 Totalizer 3 	Volume flow
Assign flow direction check	The Flow direction check option is selected in the Switch output function parameter.	Select process variable for flow direction monitoring.	Volume flowMass flow	Volume flow
Assign status	The Status option is selected in the Switch output function parameter.	Select device status for switch output.	Empty pipe detectionLow flow cut offDigital output 6	Empty pipe detection
Switch-on value	In Switch output function parameter, the Limit option is selected.	Enter measured value for the switch-on point.	Signed floating-point number	Country-specific: 0 1/h 0 gal/min (us)
Switch-off value	In Switch output function parameter, the Limit option is selected.	Enter measured value for the switch-off point.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
Switch-on delay	The 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 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.	■ No ■ Yes	No

10.5.3 Configuring the totalizer

In the **"Totalizer 1 to 3" submenu** the individual totalizer can be configured.

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Totalizer 1 to 3



Parameter overview with brief description

Parameter	Prerequsite	Description	Selection	Factory setting
Assign process variable	-	Select process variable for totalizer.	 Off Volume flow Mass flow	Volume flow
Unit totalizer	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Select process variable totalizer unit.	Unit choose list	Country-specific: 1 gal (us)
Totalizer operation mode	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Select totalizer calculation mode.	Net flow totalForward flow totalReverse flow total	Net flow total
Failure mode	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Define totalizer behavior in alarm condition.	StopActual valueLast valid value	Stop

76

10.5.4 Carrying out additional display configurations

In the $\bf Display$ 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	
	Value 1 display	
	0% bargraph value 1	
	100% bargraph value 1	
	Decimal places 1	
	Value 2 display	
	Decimal places 2	
	Value 3 display	
	0% bargraph value 3	
	100% bargraph value 3	
	Decimal places 3	
	Value 4 display	
	Decimal places 4	
	Language	
	Display interval	
	Display damping	
	Header	
	Header text	
	Separator	
	Backlight	

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	1 value, max. size
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	 Volume flow Mass flow Totalizer 1 Totalizer 2 Totalizer 3 	Volume flow
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: Ol/h Ogal/min (us)
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Decimal places 1	A measured value is specified in the Value 1 display parameter.	Select the number of decimal places for the display value.	• x • x.x • x.xx • x.xxx	x.xx
Value 2 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	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.xx
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	None
0% bargraph value 3	A selection has been made in the Value 3 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: 0 l/h 0 gal/min (us)
100% bargraph value 3	An option was selected in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
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.xx
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	Picklist see Value 1 display parameter	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.	XX.XX.XXX.XXXX.XXX	x.xx

Prerequsite	Description	Selection / User entry	Factory setting
A local display is provided.	Set display language.	 English Deutsch* Français* Español* Italiano* Nederlands* Portuguesa* Polski* pyccкий язык (Russian)* Svenska* Türkçe* 中文 (Chinese)* 日本語 (Japanese)* 한국어 (Korean)* 誠너 (Arabic)* Bahasa Indonesia* ภาษาไทย (Thai)* tiếng Việt (Vietnamese)* čeština (Czech)* 	English (alternatively, the ordered language is preset in the device)
A local display is provided.	Set time measured values are shown on display if display alternates between values.	1 to 10 s	5 s
A local display is provided.	Set display reaction time to fluctuations in the measured value.	0.0 to 999.9 s	0.0 s
A local display is provided.	Select header contents on local display.	Device tagFree text	Device tag
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. @, %, /)	
A local display is provided.	Select decimal separator for displaying numerical values.	. (point), (comma)	. (point)
-	Switch the local display backlight on and off. Only for device version with local display SD03 (touch control)	DisableEnable	Disable
	A local display is provided. The Free text option is selected in the Header parameter. A local display is provided.	A local display is provided. Set display language. Set time measured values are shown on display if display alternates between values. A local display is provided. Set display reaction time to fluctuations in the measured value. A local display is provided. Select header contents on local display. The Free text option is selected in the Header parameter. Enter display header text. Select decimal separator for displaying numerical values. Switch the local display backlight on and off.	A local display is provided. Set display language. Benglish Deutsch Français Español Italiano Nederlands Portuguesa Polski Pycckuй язык (Russian) Svenska Türkçe 中文 (Chinese) 日本語 (Japanese) 日本語 (Japanese) ・한국의 (Korean) ・ はは (Vietnamese) 日本語 (Japanese) ・한국의 (Korean) ・ はば (Vietnamese) ・ さきting (Vietnamese)

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

10.5.5 Administration configuration

The **Administration** submenu contains administrative parameters.

Navigation

 $\texttt{"Setup"} \ menu \rightarrow Advanced \ setup \rightarrow Administration$

► Administration		
Define a	access code	
Restart		

Parameter overview with brief description

Parameter	Description	User entry / Selection	Factory setting
Define access code	Restrict write-access to parameters to protect the configuration of the device against unintentional changes via the local display.	0 to 9 999	0
Device reset		CancelTo factory defaultsTo delivery settingsRestart device	Cancel

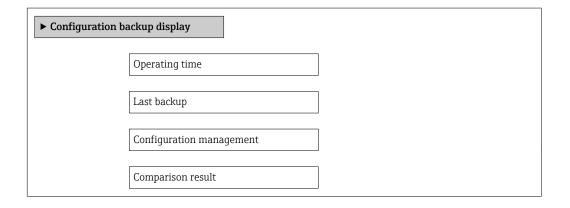
10.6 Configuration management

After commissioning, you can save the current device configuration, copy it to another measuring point or restore the previous device configuration.

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Configuration backup display



Parameter overview with brief description

Parameter	Prerequsite	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	A local display is provided.	Indicates when the last data backup was saved to the display module.	Days (d), hours (h), minutes (m) and seconds (s)	_

Parameter	Prerequsite	Description	User interface/ Selection	Factory setting
Configuration management	A local display is provided.	Select action for managing the device data in the display module.	 Cancel Execute backup Restore Duplicate Compare Clear backup data Display incompatible 	Cancel
Comparison result	A local display is provided.	Comparison between present device data and display backup.	 Settings identical Settings not identical No backup available Backup settings corrupt Check not done Dataset incompatible 	Check not done

10.6.1 Function scope of the "Configuration management" parameter

Options	Description
Execute backup	The current device configuration is backed up from the integrated HistoROM to the device's display module. 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 to the device's integrated HistoROM. The backup copy includes the transmitter data of the device.
Duplicate	The transmitter configuration from another device is duplicated to the device using the display module.
Compare	The device configuration saved in the display module is compared with the current device configuration of the integrated HistoROM.
Clear backup data	The backup copy of the device configuration is deleted from the display module of the device.

- Integrated HistoROM
 - 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 Simulation

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

Navigation

"Diagnostics" menu \rightarrow Simulation

► Simulation

Assign simulation process variable

Process variable value

Simulation current output 1 to 2

Value current output 1 to 2

Frequency Output Simulation

Frequency Value

Pulse output simulation

Pulse value

Switch output simulation

Switch status

Simulation device alarm

Diagnostic event category

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Assign simulation process variable	-	Select a process variable for the simulation process that is activated.	 Off Volume flow Mass flow	Off
Process variable value	One of the following options is selected in the Assign simulation process variable parameter (→ 🖺 82): Volume flow Mass flow	Enter the simulation value for the selected process variable.	Depends on the process variable selected	0
Simulation current output 1 to 2	-		Off On	Off
Value current output 1 to 2	In the Simulation current output 1 to 2 parameter, the On option is selected.		3.59 to 22.5 mA	3.59 mA
Frequency Output Simulation	The Frequency option is selected in the Operating mode parameter.	Switch the simulation of the frequency output on and off.	• Off • On	Off
Frequency Value	The On option is selected in the Frequency Output Simulation parameter.	Enter the frequency value for the simulation.	0.0 to 1250.0 Hz	0.0 Hz

Diagnostic event simulation

82

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Pulse output simulation	The Pulse option is selected in the Operating mode parameter.	Set and switch off the pulse output simulation. For Fixed value option: Pulse width parameter (→ 🖺 70) defines the pulse width of the pulses output.	OffFixed valueDown-counting value	Off
Pulse value	In the Pulse output simulation parameter (→ 🖺 83), the Down- counting value option is selected.	Enter the number of pulses for simulation.	0 to 65 535	0
Switch output simulation	The Switch option is selected in the Operating mode parameter.	Switch the simulation of the switch output on and off.	• Off • On	Off
Switch status	The On option is selected in the Switch output simulation parameter ($\rightarrow \cong 83$).	Select the status of the status output for the simulation.	OpenClosed	Open
Simulation device alarm	-	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

10.8 Protecting settings from unauthorized access

The following options exist for protecting the configuration of the measuring device from unintentional modification after commissioning:

- Write protection via access code
- Write protection via write protection switch
- Write protection via keypad lock \rightarrow \triangleq 50
- FOUNDATION Fieldbus: write protection via block operation \rightarrow 🗎 85

10.8.1 Write protection via access code

With the customer-specific access code, the parameters for the measuring device configuration are write-protected and their values can no longer be changed via local operation.

Navigation

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

▶ Define access code	
Define access code	
Confirm access code	

Defining the access code via local display

- 1. Navigate to the **Enter access code** parameter.
- 2. Max. Define a max. 4-digit numeric code as an access code.
- 3. Enter the access code again to confirm the code.
 - ► The 🖹-symbol appears in front of all write-protected parameters.

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



- If write access is activated via access code, it can be also be deactivated only via the access code $\rightarrow \stackrel{\triangle}{=} 50$.
- The user role with which the user is currently logged on via the local display
 → □ 50 is indicated by the Access status display parameter. Navigation path:
 "Operation" menu → Access status display

Parameters which can always be modified via the local display

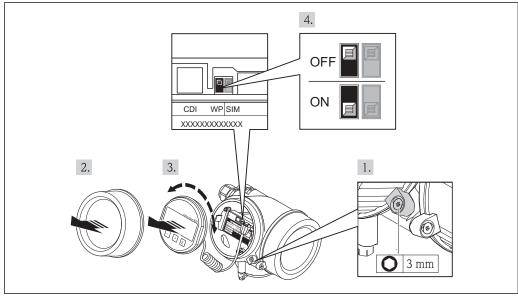
Certain parameters that do not affect the measurement are excepted from write protection via the local display. Despite the defined access code, these parameters can always be modified even if the other parameters are locked.

10.8.2 Write protection via write protection switch

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

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

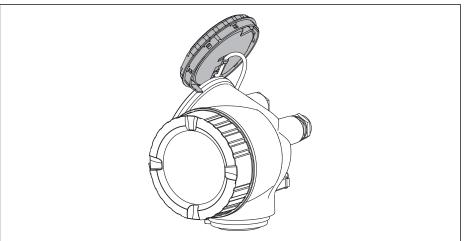
- Via local display
- Via FOUNDATION Fieldbus



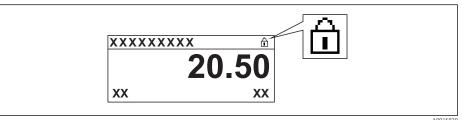
A001376

- 1. Loosen the securing clamp.
- 2. Unscrew the electronics compartment cover.

- 3. Pull out the display module with a gentle rotational movement. To make it easier to access the write protection switch, attach the display module to the edge of the electronics compartment.
 - ► Display module is attached to the edge of the electronics compartment.



- 4. Setting the write protection switch (WP) on the main electronics module to the **ON** position enables hardware write protection. Setting the write protection switch (WP) on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.
 - If hardware write protection is enabled, the **Locking status** parameter displays the **Hardware locked** option . In addition, on the local display the 🛍-symbol appears in front of the parameters in the header of the operational display and in the navigation view.



If hardware write protection is disabled, no option is displayed in the Locking **status** parameter . On the local display, the 🛍-symbol disappears from in front of the parameters in the header of the operational display and in the navigation

- 5. Feed the cable into the gap between the housing and main electronics module and plug the display module into the electronics compartment in the desired direction until it engages.
- 6. Reverse the removal procedure to reassemble the transmitter.

10.8.3 Write protection via block operation

Locking via block operation:

- Block: **DISPLAY (TRDDISP)**; parameter: **Define access code**
- Block: EXPERT_CONFIG (TRDEXP); parameter: Enter access code

11 Operation

11.1 Reading the device locking status

Device active write protection: Locking status parameter

Navigation

"Operation" menu → Locking status

Function scope of the "Locking status" parameter

Options	Description
None	The access status displayed in "Access status display" parameter applies $\rightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
Hardware locked	The DIP switch for hardware locking is activated on the main electronics module. This prevents write access to the parameters .
Temporarily locked	Write access to the parameters is temporarily lock due to device-internal processing (e.g. data upload/download, reset). Once the internal processing has been completed, the parameters can be changed once again.

11.2 Adjusting the operating language

Information \rightarrow \triangleq 58

For information on the operating languages supported by the measuring device $\Rightarrow \stackrel{ riangle}{=} 142$

11.3 Configuring the display

- Basic settings for local display \rightarrow \triangleq 62

11.4 Reading measured values

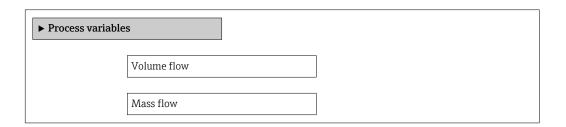
With the **Measured values** submenu, it is possible to read all the measured values.

11.4.1 Process variables

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

Navigation

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



Parameter overview with brief description

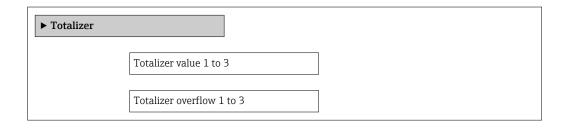
Parameter	Description	User interface
Volume flow	Displays the volume flow currently measured.	Signed floating-point number
	Dependency The unit is taken from the Volume flow unit parameter	
Mass flow	Displays the mass flow currently calculated.	Signed floating-point number
	Dependency The unit is taken from the Mass flow unit parameter	

11.4.2 Totalizer

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Totalizer



Parameter overview with brief description

Parameter	Prerequsite	Description	User interface
Totalizer value 1 to 3	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Displays the current totalizer counter value.	Signed floating-point number
Totalizer overflow 1 to 3	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Displays the current totalizer overflow.	Integer with sign

11.5 Adapting the measuring device to the process conditions

The following are available for this purpose:

- Basic settings using the **Setup** menu
- Advanced settings using the **Advanced setup** submenu

11.6 Performing a totalizer reset

In the **Operation** submenu the totalizers are reset:

- Control Totalizer
- Reset all totalizers

Function scope of the "Control Totalizer" parameter

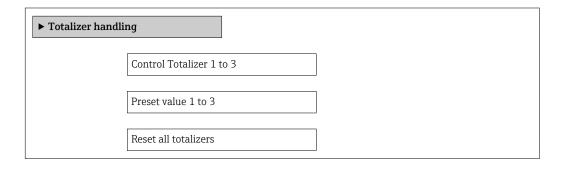
Options	Description
Totalize	The totalizer is started.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold	The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.
Reset + totalize	The totalizer is reset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

Function scope of the "Reset all totalizers" parameter

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

Navigation

"Operation" menu → Totalizer handling



Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Control Totalizer 1 to 3	One of the following options is selected in the Assign process variable parameter (→ 🖺 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Control totalizer value.	 Totalize Reset + hold Preset + hold Reset + totalize Preset + totalize Hold 	Totalize
Preset value 1 to 3	One of the following options is selected in the Assign process variable parameter (→ 🗎 76) of the Totalizer 1 to 3 submenu: Volume flow Mass flow	Specify start value for totalizer. Dependency The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ ■ 76).	Signed floating-point number	Country-specific: 0 l 0 gal (us)
Reset all totalizers	-	Reset all totalizers to 0 and start.	CancelReset + totalize	Cancel

11.7 Showing data logging

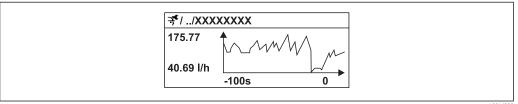
The **Extended HistoROM** application package must be enabled in the device (order option) for the **Data logging** submenu to appear. This contains all the parameters for the measured value history.



The measured value history is also accessible via the FieldCare plant asset management tool $\rightarrow \blacksquare$ 53.

Function scope

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



A0016222

■ 24 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" submenu

► Data logging	
	Assign channel 1
	Assign channel 2
	Assign channel 3
	Assign channel 4
	Logging interval
	Clear logging data
	▶ Display channel 1
	▶ Display channel 2

▶ Display channel 3

▶ Display channel 4

Parameter overview with brief description

Parameter	Prerequsite	Description	Selection / User entry	Factory setting
Assign channel 1 to 4	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign process variable to logging channel.	 Off Volume flow Mass flow Electronic temperature Current difference potential 	Off
Logging interval	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Define the logging interval for data logging. This value defines the time interval between the individual data points in the memory.	1.0 to 3 600.0 s	10.0 s
Clear logging data	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Clear the entire logging data.	CancelClear data	Cancel

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

Problem	Possible causes	Remedy
		,
Local display dark and no output signals	Supply voltage does not match the value indicated on the nameplate.	Apply the correct supply voltage .
Local display dark and no output signals	The polarity of the supply voltage is wrong.	Correct the polarity.
Local display dark and no output signals	No contact between connecting cables and terminals.	Check the connection of the cables and correct if necessary.
Local display dark and no output signals	Terminals are not plugged into the I/O electronics module correctly.	Check terminals.
Local display dark and no output signals	I/O electronics module is defective.	Order spare part → 🖺 119.
Local display is dark, but signal output is within the valid range	Display is set too bright or too dark.	 Set the display brighter by simultaneously pressing ± + E. Set the display darker by simultaneously pressing □+ E.
Local display is dark, but signal output is within the valid range	The cable of the display module is not plugged in correctly.	Insert the plug correctly into the main electronics module and display module.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part → 🖺 119.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Perform remedial measures → 🖺 100
Text on local display appears in a foreign language and cannot be understood.	Incorrect operating language is configured.	1. Press 2 s □ + ⊕ ("home position"). 2. Press Ē. 3. Set the desired language in the Language parameter.
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 → 119.

For output signals

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

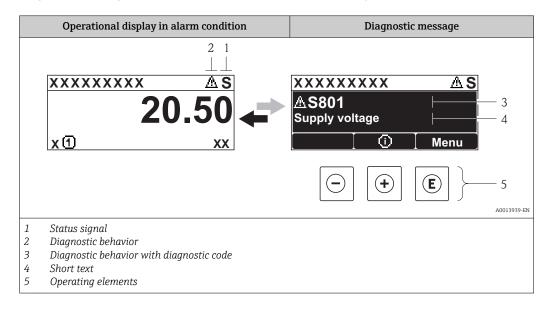
For access

Problem	Possible causes	Remedy
No write access to parameters	Hardware write protection enabled	Set the write protection switch on the main electronics module to the OFF position .
No write access to parameters	Current user role has limited access authorization	1. Check user role → 🗎 50. 2. Enter correct customer-specific access code → 🗎 50.
No connection via service interface	Incorrect configuration of USB interface on PC or driver not installed correctly.	Observe the documentation for the Commubox. FXA291: Document "Technical Information" TI00405C

12.2 Diagnostic information on local display

12.2.1 Diagnostic message

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



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

- Other diagnostic events that have occurred can be called up in the **Diagnostics** menu:

 - Via submenus $\rightarrow \blacksquare 113$

Status signals

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

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

Symbol	Meaning
A0013956	Failure A device error has occurred. The measured value is no longer valid.
C	Function check The device is in service mode (e.g. during a simulation).
S	Out of specification The device is operated: Outside its technical specification limits (e.g. outside the process temperature range)
A0013957	Maintenance required Maintenance is required. The measured value remains valid.

Diagnostic behavior

Symbol	Meaning
A0013961	Alarm Measurement is interrupted. Signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. For local display with touch control: the background lighting changes to red.
A0013962	Warning Measurement is resumed. The signal outputs and totalizers are not affected. A diagnostic message is generated.

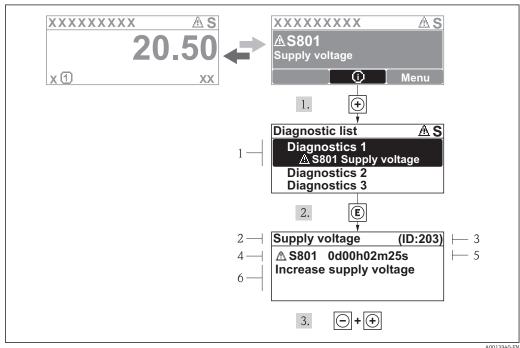
Diagnostic information

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

Operating elements

Key	Meaning
	Plus key
A00139	In a menu, submenu Opens the message about remedy information.
	Enter key
A00139	In a menu, submenu Opens the operating menu.

12.2.2 Calling up remedial measures



■ 25 Message for remedial measures

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

A0013340 EN

The user is in the diagnostic message.

- 1. Press ± (i) symbol).
 - ► The **Diagnostic list** submenu opens.
- 2. Select the desired diagnostic event with \pm or \Box and press \blacksquare .
 - └ The message for the remedial measures for the selected diagnostic event opens.
- 3. Press \Box + \pm simultaneously.
 - ► The message for the remedial measures closes.

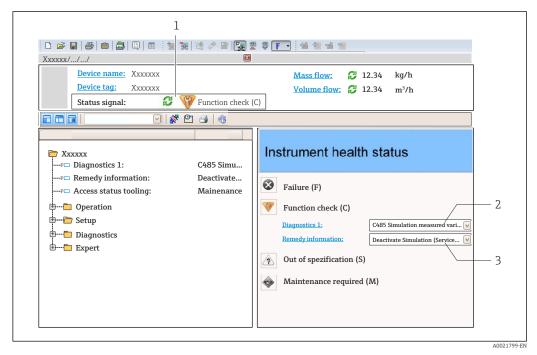
The user is in the **Diagnostics** menu at an entry for a diagnostics event, e.g. in the **Diagnostic list** submenu or the **Previous diagnostics** parameter.

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

12.3 Diagnostic information in FieldCare

12.3.1 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 $\rightarrow \implies 93$
- 2 Diagnostic information → 🖺 94
- 3 Remedy information with Service ID
- Furthermore, diagnostic events that have occurred can be viewed in the **Diagnostics** menu:
 - Via parameter \rightarrow 🗎 112
 - Via submenu $\rightarrow \blacksquare 113$

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.

12.3.2 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.

12.4 Adapting the diagnostic information

12.4.1 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 certain diagnostic information in the **Diagnostic behavior** submenu.

"Expert" menu → System → Diagnostic handling → Diagnostic behavior

12.4.2 Adapting the status signal

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

"Expert" menu \rightarrow Communication \rightarrow Diagnostic event category

Available status signals

Configuration as per FOUNDATION Fieldbus Specification (FF912), in accordance with NAMUR NE107.

Symbol	Meaning
A0013956	Failure A device error has occurred. The measured value is no longer valid.
C	Function check The device is in service mode (e.g. during a simulation).
S	Out of specification The device is operated: Outside its technical specification limits (e.g. outside the process temperature range) Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)
A0013957	Maintenance required Maintenance is required. The measured value remains valid.

Enabling the configuration of the diagnostic information according to FF912

For compatibility reasons, the configuration of the diagnostic information according to FOUNDATION Fieldbus Specification FF912 is not enabled when the device is delivered from the factory.

Enabling the configuration of the diagnostic information according to FOUNDATION Fieldbus Specification FF912

- 1. Open the Resource Block.
- 2. In the **FEATURE_SEL** parameter select the **Multi-bit Alarm Support** option.
 - The diagnostic information can be configured according to FOUNDATION Fieldbus Specification FF912.

Grouping the diagnostic information

Diagnostic information is assigned to different groups. The groups differ depending on the weighting (severity) of the diagnostic event:

- Highest weighting
- High weighting
- Low weighting

Assignment of the diagnostic information (default value)

The assignment of the diagnostic information ex-works is indicated in the following tables.

boundarrow Overview and description of all diagnostic information ightarrow ho 100

Weighting	Status signal (factory setting)	Allocation	Diagnostic information range
Highest weighting	Failure (F)	Sensor	F000 to 199
		Electronics	F200 to 399
		Configuration	F400 to 700
		Process	F800 to 999

Weighting	Status signal (factory setting)	Allocation	Diagnostic information range
High weighting	Function check (C)	Sensor	C000 to 199
		Electronics	C200 to 399
		Configuration	C400 to 700
		Process	C800 to 999

Weighting	Status signal (factory setting)	Allocation	Diagnostic information range
Low weighting	Out of specification (S)	Sensor	S000 to 199
		Electronics	S200 to 399
		Configuration	S400 to 700
		Process	S800 to 999

Weighting	Status signal (factory setting)	Allocation	Diagnostic information range
Low weighting	Maintenance required (M)	Sensor	M000 to 199
		Electronics	M200 to 399
		Configuration	M400 to 700
		Process	M800 to 999

Changing the assignment of the diagnostic information

The individual ranges of the diagnostic information can be assigned to another status signal. This is done by changing the bit in the associated parameter. The bit change always applies for the entire range of the diagnostic information.

Some diagnostic information can be assigned individually, irrespective of their range $\Rightarrow \stackrel{\square}{=} 99$

Each status signal has a parameter in the Resource Block in which it is possible to define the diagnostic event for which the status signal is transmitted:

- Failure (F): **FD_FAIL_MAP** parameter
- Function check (C): **FD_CHECK_MAP** parameter
- Out of specification (S): **FD OFFSPEC MAP** parameter
- Maintenance required (M): **FD_MAINT_MAP** parameter

Structure and assignment of the parameters for the status signals (factory setting)

Weighting	Allocation	Bit	FD_ FAIL_ MAP	FD_ CHECK_ MAP	FD_ OFFSPEC_ MAP	FD_ MAINT_ MAP
Highest weighting	Sensor	31	1	0	0	0
	Electronics	30	1	0	0	0
	Configuration	29	1	0	0	0
	Process	28	1	0	0	0
High weighting	Sensor	27	0	1	0	0
	Electronics	26	0	1	0	0
	Configuration	25	0	1	0	0
	Process	24	0	1	0	0
Low weighting	Sensor	23	0	0	1	0
	Electronics	22	0	0	1	0
	Configuration	21	0	0	1	0
	Process	20	0	0	1	0
Low weighting	Sensor	19	0	0	0	1
	Electronics	18	0	0	0	1
	Configuration	17	0	0	0	1
	Process	16	0	0	0	1
Configurable range → 🖺 99		15 to 1	0	0	0	0
Reserved (Fieldbus Foundation)		0	0	0	0	0

Changing the status signal for a range of diagnostic information

Example: The status signal for the diagnostic information for electronics with the "Highest weighting" is to be changed from failure (F) to function check (C).

- 1. Set the Resource Block to the **OOS** block mode.
- 2. Open the **FD FAIL MAP** parameter in the Resource Block.
- 3. Change **Bit 30** to **0** in the parameter.
- 4. Open the **FD_CHECK_MAP** parameter in the Resource Block.
- 5. Change **Bit 26** to **1** in the parameter.
 - If a diagnostic event occurs for electronics with the "Highest weighting", the diagnostic information to this effect is displayed with the function check (C) status signal.
- 6. Set the Resource Block to the **AUTO** block mode.

NOTICE

No status signal is assigned to an area of diagnostic information.

If a diagnostic event occurs in this area, no status signal is transmitted to the control system.

- ▶ If you are changing the parameters, make sure that a status signal is assigned to all areas
- If FieldCare is used, the status signal is enabled/disabled using the check box of the particular parameter.

Assigning diagnostic information individually to a status signal

Some diagnostic information can be individually assigned to a status signal, irrespective of their original range.

Assigning diagnostic information individually to a status signal via FieldCare

- 1. In the FieldCare navigation window: **Expert** → **Communication** → **Field diagnostics** → **Alarm detection enable**
- 2. Select the desired diagnostic information from one of the fields **Configurable Area Bits 1** to **Configurable Area Bits 15**.
- 3. Press Enter to confirm.
- 4. When selecting the desired status signal (e.g. Offspec Map), also select the **Configurable Area Bit 1** to **Configurable Area Bit 15** that was assigned previously to the diagnostic information (step 2).
- 5. Press Enter to confirm.
 - ► The diagnostic event of the selected diagnostic information is recorded.
- 6. In the FieldCare navigation window: **Expert** → **Communication** → **Field diagnostics** → **Alarm broadcast enable**
- 7. Select the desired diagnostic information from one of the fields **Configurable Area Bits 1** to **Configurable Area Bits 15**.
- 8. Press Enter to confirm.
- 9. When selecting the desired status signal (e.g. Offspec Map), also select the **Configurable Area Bit 1** to **Configurable Area Bit 15** that was assigned previously to the diagnostic information (step 7).
- 10. Press Enter to confirm.
 - The selected diagnostic information is transmitted over the bus when a diagnostic event to this effect occurs.
- A status signal change does not affect diagnostic information that already exists. The new status signal is only assigned if this error occurs again after the change has been made.

Transmitting the diagnostic information over the bus

Prioritizing diagnostic information for transmission over the bus

Diagnostic information is only transmitted over the bus if its priority is between 2 and 15. Priority 1-events are displayed but are not transmitted over the bus. Diagnostic information with priority 0 (default value) is ignored.

It is possible to change the priority individually for the different status signals. The following parameters of the Resource Block are used for this purpose:

- FD FAIL PRI
- FD CHECK PRI
- FD OFFSPEC PRI
- FD MAINT PRI

Suppressing certain diagnostic information

It is possible to suppress certain events during transmission over the bus using a mask. While these events are displayed they are not transmitted over the bus. This mask is in FieldCare $\mathbf{Expert} \to \mathbf{Communication} \to \mathbf{Field\ diagnostics} \to \mathbf{Alarm\ broadcast\ enable}$. The mask is a negative selection mask, i.e. if a field is selected the associated diagnostic information is not transmitted over the bus.

12.5 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.

12.5.1 Diagnostic of sensor

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	Short text			variables
004			1. Change sensor	■ Empty pipe detection
	Measuring variable status [from the factory] 1)		2. Contact service	Low flow cut offMass flow
	Quality Bad			Switch output statusVolume flow
	Quality substatus	Sensor failure		- volume now
	2)			
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] ³⁾	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	Short text		variables
004	Sensor		1. Change sensor	-
	Measuring variable status		2. Contact service	
	Quality Good Quality substatus Non specific	Good		
		Non specific		
	. 1)			
	Status signal [from the factory] 1) S			
	Diagnostic behavior	Warning		

Status signal can be changed.

	Diagnostic	information	Remedy instructions	Influenced measuring variables
No.	SI	nort text		variables
082	Data storage		1. Change main electronic module	Empty pipe detection
	Measuring variable status		2. Change sensor	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Sensor failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
083	Memory content		1. Restart device	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Sensor failure		- Volume now
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

12.5.2 Diagnostic of electronic

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
222	Electronic drift		Change main electronic module	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		- volume now
	- 1)			
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	nort text		variables
242	Software incompatible		1. Check software	■ Empty pipe detection
	Measuring variable status		Flash or change main electronics module	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	2	-		
	Status signal [from the factory] 1)	F .		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
252	Modules incompatible		Check electronic modules	■ Empty pipe detection
	Measuring variable status		Change I/O or main electronic module	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	2)			
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
261	Electronic modules		1. Restart device	-
	Measuring variable status		Check electronic modules Change I/O Modul or main	
	Quality	Good	electronics	
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	nort text		variables
262	Module connection		Check module connections	■ Empty pipe detection
	Measuring variable status		2. Change electronic modules • Low flow cut of • Mass flow	
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		- volume now
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
270	Main electronics failure		Change main electronic module	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		- Volume now
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

102

No.	Diagnostic information No. Short text		Remedy instructions	Influenced measuring variables
271		1. Restart device	Empty pipe detection	
	Measuring variable status		2. Change main electronic module	ule ■ Low flow cut off ■ Mass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
272	Main electronics failure		Restart device	Empty pipe detection
	Measuring variable status		2. Contact service	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	2 15 15 11	_		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	nort text		variables
273	Main electronics failure		1. Emergency operation via display	■ Empty pipe detection
	Measuring variable status		2. Change main electronics	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		- volume now
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
275	I/O module failure		Change I/O module	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
276	276 I/O module failure		1. Restart device	■ Empty pipe detection
	Measuring variable status		2. Change I/O module	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	hort text		variables
282	Data storage		1. Restart device	Empty pipe detection
	Measuring variable status		Mass flowSwitch out	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	Short text			variables
283	Memory content		Transfer data or reset device	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		- volume now
		-		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
302	Device verification active Measuring variable status		Device verification active, please	Mass flow
			wait. • Volur	■ Volume flow
	Quality	Uncertain		
	Quality substatus	Non specific		
	1)			
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	nort text		variables
311			Transfer data or reset device	■ Empty pipe detection
	Measuring variable status		2. Contact service	Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Device failure		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
311	Electronic failure		Maintenance required!	■ Empty pipe detection
	Measuring variable status		Do not perform reset Contact service	Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		- Volume now
	Status signal [from the factory] 1)	M		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	nort text		variables
323	Electronic drift		Perform verification manually	■ Empty pipe detection
	Measuring variable status		2. Change electronic	Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		
	- 11	_		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

12.5.3 Diagnostic of configuration

	Diagnostic information		Remedy instructions	Influenced measuring	
No.	SI	nort text		variables	
410	Data transfer		1. Check connection	■ Empty pipe detection	
	Measuring variable status		2. Retry data transfer		Low flow cut offMass flow
	Quality	Bad		Switch output statusVolume flow	
	Quality substatus	Configuration error			
	- 1)				
	Status signal [from the factory] 1)	F			
	Diagnostic behavior	Alarm			

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
412	Processing download		Download active, please wait	■ Empty pipe detection
	Measuring variable status		■ N ■ St	Low flow cut offMass flowSwitch output statusVolume flow
	Quality	Uncertain		
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	С		
	Status signal [from the factory]	C		
	Diagnostic behavior	Warning		

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	hort text		variables
437	Configuration incompatible		1. Restart device	Empty pipe detection
	Measuring variable status		2. Contact service Low flow cut o Mass flow Switch output Volume flow	
	Quality	Bad		Switch output statusVolume flow
	Quality substatus	Configuration error		
	Status signal [from the factory] 1)	F		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	Short text			variables
438	Dataset			■ Empty pipe detection
	Measuring variable status		Check device configuration Up- and download new	Low flow cut offMass flow
	Quality	Bad	configuration	Switch output statusVolume flow
	Quality substatus	Configuration error		
	Status signal [from the factory] 1)	M		
	Diagnostic behavior	Warning		

Status signal can be changed.

	Diagnostic information		Remedy instructions	Influenced measuring
No.	SI	hort text		variables
442	Frequency output		1. Check process	-
	Measuring variable status		2. Check frequency output settings	
	Quality	Good		
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	S		
	Diagnostic behavior [from the factory] ²⁾	Warning		

- 1)
- Status signal can be changed. Diagnostic behavior can be changed. 2)

106

	Diagnostic	information	Remedy instructions	Influenced measuring
No.	SI	hort text		variables
443	Pulse output		1. Check process	_
	Measuring variable status		2. Check pulse output settings	
	Quality	Good		
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	S		
	Diagnostic behavior [from the factory] ²⁾	Warning		

- 1) Status signal can be changed.
- 2) Diagnostic behavior can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
453	Flow override		Deactivate flow override	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measuring
No.	SI	nort text		variables
484	Simulation Failure Mode		Deactivate simulation	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Good		Switch output statusVolume flow
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	C		
	Diagnostic behavior	Alarm		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
485	Simulation measured variable	mulation measured variable		Empty pipe detectionLow flow cut offMass flow
	Measuring variable status			
	Quality	Good		Switch output statusVolume flow
	Quality substatus	Non specific		
	. 1)			
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

Diagnostic information			Remedy instructions	Influenced measuring
No.	SI	hort text		variables
492	Simulation frequency output		Deactivate simulation frequency output	Empty pipe detectionLow flow cut offMass flow
	Measuring variable status			
	Quality	Good		Switch output statusVolume flow
	Quality substatus	Non specific		
	C	6		
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measuring
No.	Short text			variables
493	Simulation pulse output			Empty pipe detection
	Measuring variable status			Low flow cut offMass flow
	Quality	Good		Switch output statusVolume flow
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

Diagnostic information			Remedy instructions	Influenced measuring
No.	SI	nort text		variables
494	Switch output simulation		Deactivate simulation switch output	■ Empty pipe detection
	Measuring variable status			Low flow cut offMass flowSwitch output statusVolume flow
	Quality	Good		
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

Diagnostic information			Remedy instructions	Influenced measuring
No.	Short text			variables
495	Diagnostic event simulation		Deactivate simulation	-
	Measuring variable status			
	Quality	Good		
	Quality substatus	Non specific		
	. 1)			
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring variables
No.	Short text			variables
497	Simulation block output		Deactivate simulation	-
	Measuring variable status			
	Quality	Good		
	Quality substatus	Non specific		
	Status signal [from the factory] 1)	С		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
531	Empty pipe detection		Execute EPD adjustment	■ Empty pipe detection
	Measuring variable status [from the factory] 1)			Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		- volume now
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] ³⁾	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

12.5.4 Diagnostic of process

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
801	Supply voltage too low		Increase supply voltage	■ Empty pipe detection
	Measuring variable status [from the factory] 1)			Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		- volume now
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] 3)	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

	Diagnostic i	information	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
832	Electronic temperature too high		Reduce ambient temperature	Empty pipe detection
	Measuring variable status [from the factory] 1)			Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		- volume now
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] 3)	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) 3) Status signal can be changed.
- Diagnostic behavior can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring		
No.	SI	nort text		variables		
833	B Electronic temperature too low		Increase ambient temperature	■ Empty pipe detection		
	Measuring variable status [from	the factory] 1)		Low flow cut offMass flow		
	Quality	Uncertain		Switch output statusVolume flow		
	Quality substatus	Non specific		- volume now		
	Status signal [from the factory] 2)	S				
	Diagnostic behavior [from the factory] ³⁾	Warning				

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) 3)
- Status signal can be changed. Diagnostic behavior can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	Short text			variables
842	Process limit		Low flow cut off active!	Mass flow
	Measuring variable status		Check low flow cut off configuration	Volume flow
	Quality	Uncertain	-	
	Quality substatus	Non specific		
		-		
	Status signal [from the factory] 1)	S		
	Diagnostic behavior	Warning		

1) Status signal can be changed.

110

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	SI	nort text		variables
861	Process fluid Measuring variable status [from the factory] 1)		Check process conditions	■ Empty pipe detection
				Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		- volume now
	Status signal [from the factory] 2)	4		
	-			
	Diagnostic behavior [from the factory] ³⁾	Alarm		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

	Diagnostic i	nformation	Remedy instructions	Influenced measuring
No.	Short text			variables
862	Empty pipe		Check for gas in process	Mass flow
	Measuring variable status [from the factory] 1)		2. Adjust empty pipe detection	■ Volume flow
	Quality	Uncertain		
	Quality substatus	Non specific		
	2)			
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] 3)	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

No.	Diagnostic information No. Short text		Remedy instructions	Influenced measuring variables
937	EMC interference		Change main electronic module	Empty pipe detection
	Measuring variable status [from	the factory] 1)		Low flow cut offMass flow
	Quality	Uncertain		Switch output statusVolume flow
	Quality substatus	Non specific		• volume now
	Status signal [from the factory] 2)	S		
	Diagnostic behavior [from the factory] 3)	Warning		

- 1) Quality can be changed. This causes the overall status of the measured variable to change.
- 2) Status signal can be changed.
- 3) Diagnostic behavior can be changed.

12.6 Pending diagnostic events

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

- To call up the measures to rectify a diagnostic event:
 - Via local display → 🖺 94
 - Via "FieldCare" operating tool → 🖺 96
- Other pending diagnostic events can be displayed in the **Diagnostic list** submenu $\rightarrow \implies 113$

Navigation

"Diagnostics" menu

Structure of the submenu

Diagnostics	\rightarrow	Actual diagnostics
		Previous diagnostics
		Operating time from restart
		Operating time

Parameter overview with brief description

Parameter	Prerequsite	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)

12.7 Diagnostic messages in the DIAGNOSTIC Transducer Block

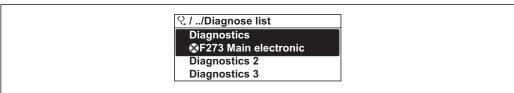
- The **Actual Diagnostics** parameter shows the message with the highest priority.
- You can view a list of the active alarms via the **Diagnostics 1** to **Diagnostics 5** parameters. If more than 5 messages are pending, the messages with the highest priority are shown on the display.
- You can view the last alarm that is no longer active via the **Previous Diagnostics** parameter.

12.8 Diagnostic list

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

Navigation path

Diagnostics menu → **Diagnostic list** submenu



A0014006-E

 \blacksquare 26 Illustrated using the example of the local display

- To call up the measures to rectify a diagnostic event:
 - Via local display → 🖺 94
 - Via "FieldCare" operating tool → 🗎 96

12.9 Event logbook

12.9.1 Event history



A0014008-E

27 Taking the example of the local display

- To call up the measures to rectify a diagnostic event:
 - Via local display →

 94
 - Via "FieldCare" operating tool → 🖺 96
- For filtering the displayed event messages $\rightarrow \stackrel{\triangle}{=} 113$

12.9.2 Filtering the event logbook

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

Navigation path

"Diagnostics" menu → Event logbook → Filter options

Filter categories

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

12.9.3 Overview of information events

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

Info number	Info name
I1000	(Device ok)
I1079	Sensor changed
I1089	Power on
I1090	Configuration reset
I1091	Configuration changed
I1092	Trend data deleted
I1110	Write protection switch changed
I1137	Electronic changed
I1151	History reset
I1154	Reset terminal voltage min/max
I1155	Reset electronics temperature
I1156	Memory error trend
I1157	Memory error event list
I1185	Display backup done
I1186	Restore via display done
I1187	Settings downloaded with display
I1188	Display data cleared
I1189	Backup compared
I1227	Sensor emergency mode activated
I1228	Sensor emergency mode failed
I1256	Display: access status changed
I1264	Safety sequence aborted
I1335	Firmware changed
I1351	Empty pipe detection adjustment failure
I1353	Empty pipe detection adjustment ok
I1397	Fieldbus: access status changed
I1398	CDI: access status changed
I1440	Main electronic module changed
I1442	I/O module changed
I1444	Device verification passed
I1445	Device verification failed
I1459	I/O module verification failed
I1461	Sensor verification failed
I1512	Download started
I1513	Download finished
I1514	Upload started
I1515	Upload finished
I1552	Failed: Main electronic verification
I1554	Safety sequence started

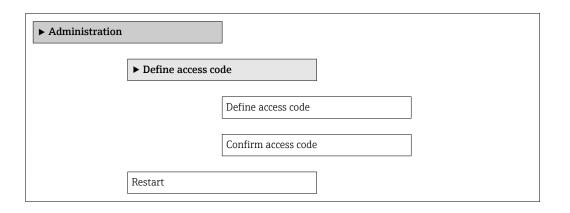
Info number	Info name
I1555	Safety sequence confirmed
I1556	Safety mode off

12.10 Resetting the measuring device

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

Navigation

 $\texttt{"Setup"} \ menu \rightarrow Advanced \ setup \rightarrow Administration \rightarrow Restart$



Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Restart	Restart or reset device manually.	 Uninitialized Run Resource Defaults Processor To factory defaults To delivery settings ENP restart To transducer defaults Factory Default Blocks 	Uninitialized

12.10.1 Function scope of the "Restart" parameter

Options	Description
Uninitialized	Has no effect on the device.
Run	Has no effect on the device.
Resource	Has no effect on the device.
Defaults	All FOUNDATION Fieldbus blocks are reset to their default values. Example: Al channel to the value "Uninitialized".
Processor	The device is restarted.
To factory defaults	The extended FOUNDATION Fieldbus parameters (FOUNDATION Fieldbus blocks, schedule information) and the device parameters are reset to the factory settings.
To delivery settings	The extended FOUNDATION Fieldbus parameters (FOUNDATION Fieldbus blocks, schedule information) and the device parameters are reset to the as-delivered settings.

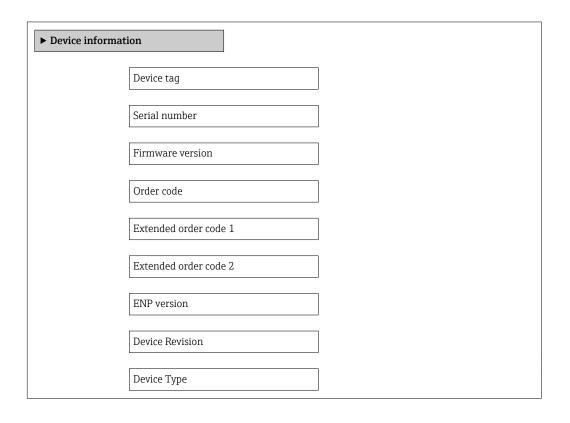
Options	Description
ENP restart	The parameters of the electronic name plate are reset. The device is restarted.
To transducer defaults	Certain device parameters are reset. The parameters of the FOUNDATION Fieldbus blocks remain unchanged.
Factory Default Blocks	The extended FOUNDATION Fieldbus parameters (FOUNDATION Fieldbus blocks, schedule information) are reset to the default settings.

12.11 Device information

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

Navigation

"Diagnostics" menu \rightarrow Device information



Parameter overview with brief description

Parameter	Description	User interface	Factory setting
Serial number		A maximum of 11-digit character string comprising letters and numbers.	-
Firmware version		Character string with the following format: xx.yy.zz	01.01.zz
Device name		Promag 200	-
Order code		Character string composed of letters, numbers and certain punctuation marks (e.g. /).	-
Extended order code 1		Character string	-

Parameter	Description	User interface	Factory setting
Extended order code 2		Character string	_
Extended order code 3		Character string	-
ENP version			2.02.00

12.12 Firmware history

Release date	Firmwar e version	Order code for "Firmware version"	Firmware changes	Documentation type	Documentation
06.2015	01.00.zz	Option 76	Original firmware	Operating Instructions	BA01378D/06/EN/ 01.15

- Flashing the firmware to the current version or to the previous version is possible via the service interface (CDI) .
- For the compatibility of the firmware version with the previous version, the installed device description files and operating tools, observe the information about the device in the "Manufacturer's information" document.
- The manufacturer's information is available:
 - \blacksquare In the Download Area of the Endress+Hauser Internet site: www.endress.com \to Download
 - Specify the following details:
 - Text search: Manufacturer's information
 - Search range: documentation

13 Maintenance

13.1 Maintenance tasks

No special maintenance work is required.

13.1.1 Exterior cleaning

When cleaning the exterior of measuring devices, always use cleaning agents that do not attack the surface of the housing or the seals.

13.1.2 Interior cleaning

No interior cleaning is planned for the device.

13.1.3 Replacing seals

The sensor's seals (particularly aseptic molded seals) must be replaced periodically.

The interval between changes depends on the frequency of the cleaning cycles, the cleaning temperature and the medium temperature.

Replacement seals (accessory) → 🖺 143

13.2 Measuring and test equipment

Endress+Hauser offers a wide variety of measuring and test equipment, such as W@M or device tests.

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

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

13.3 Endress+Hauser services

Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service or device tests.

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

14 Repair

14.1 General notes

Repair and conversion concept

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

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

Notes for repair and conversion

For repair and modification of a measuring device, observe the following notes:

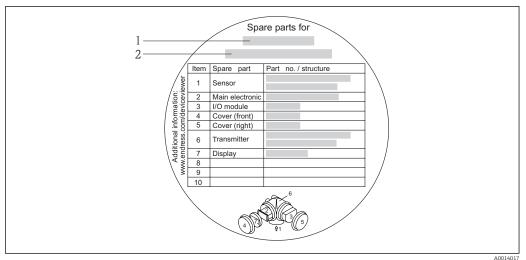
- Use only original Endress+Hauser spare parts.
- Carry out the repair according to the Installation Instructions.
- Observe the applicable standards, federal/national regulations, Ex documentation (XA) and certificates.
- Document every repair and each conversion and enter them into the W@M life cycle management database.

14.2 Spare parts

Some interchangeable measuring device components are listed on an overview sign in the connection compartment cover.

The spare part overview sign contains the following information:

- A list of the most important spare parts for the measuring device, including their ordering information.
- The URL for the W@M Device Viewer (www.endress.com/deviceviewer):
 All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.



■ 28 Example for "Spare part overview sign" in connection compartment cover

A001401

- 1 Measuring device name
- 2 Measuring device serial number
- Measuring device serial number:
 - Is located on the device nameplate and the spare part overview sign.
 - Can be read out via the Serial number parameter in the Device information submenu.

14.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

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

14.4 Return

The measuring device must be returned if it is need of repair or a factory calibration, or if the wrong measuring device has been delivered or ordered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.

To ensure safe, swift and professional device returns, please refer to the procedure and conditions for returning devices provided on the Endress+Hauser website at http://www.endress.com/support/return-material

14.5 Disposal

14.5.1 Removing the measuring device

- 1. Switch off the device.
- 2. **WARNING!** Danger to persons from process conditions. Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids.

Carry out the mounting and connection steps from the chapters "Mounting the measuring device" and "Connecting the measuring device" in the logically reverse sequence. Observe the safety instructions.

14.5.2 Disposing of the measuring device

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

Accessories	Description
Remote display FHX50	FHX50 housing to accommodate a display module → ■ 140. FHX50 housing suitable for: SD02 display module (push buttons) SD03 display module (touch control) Housing material: Plastic PBT Stainless steel CF-3M (316L, 1.4404) Length of connecting cable: up to max. 60 m (196 ft) (cable lengths available for order: 5 m (16 ft), 10 m (32 ft), 20 m (65 ft), 30 m (98 ft))
	The measuring device can be ordered with the FHX50 housing and a display module. The following options must be selected in the separate order codes: Order code for measuring device, feature 030: Option L or M "Prepared for FHX50 display" Order code for FHX50 housing, feature 050 (device version): Option A "Prepared for FHX50 display" Order code for FHX50 housing, depends on the desired display module in feature 020 (display, operation): Option C: for an SD02 display module (push buttons) Option E: for an SD03 display module (touch control) The FHX50 housing can also be ordered as a retrofit kit. The measuring device display module is used in the FHX50 housing. The following options must be selected in the order code for the FHX50 housing: Feature 050 (measuring device version): option B "Not prepared for FHX50 display"
	• Feature 020 (display, operation): option A "None, existing displayed used" For details, see Special Documentation SD01007F
Overvoltage protection for 2-wire devices	Ideally, the overvoltage protection module should be ordered directly with the device. See product structure, characteristic 610 "Accessory mounted", option NA "Overvoltage protection". Separate order necessary only if retrofitting. OVP10: For 1-channel devices (characteristic 020, option A): OVP20: For 2-channel devices (characteristic 020, options B, C, E or G) For details, see Special Documentation SD01090F.
Weather protection cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight or extreme cold in winter. For details, see Special Documentation SD00333F
Ground cable	Set, consisting of two ground cables for potential equalization.

122

15.1.2 For the sensor

Accessories	Description
Ground disks	Are used to ground the fluid in lined measuring tubes to ensure proper measurement. For details, see Installation Instructions EA00070D

15.2 Communication-specific accessories

Accessories	Description
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.
	For details, see the "Technical Information" document TI405C/07
Field Xpert SFX350	Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the non-Ex area . For details, see Operating Instructions BA01202S
Field Xpert SFX370	Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the non-Ex area and the Ex area . For details, see Operating Instructions BA01202S

15.3 Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: Calculation of all the data needed to determine the optimum flowmeter: e.g. nominal diameter, pressure drop, performance characteristics or process connections. Graphic illustration of the calculation results
	Administration, documentation and access to all project-related data and parameters throughout the entire life cycle of a project.
	Applicator is available: • Via the Internet: https://wapps.endress.com/applicator • On CD-ROM for local PC installation.
W@M	Life cycle management for your plant W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant information is available for every measuring device over time entire life cycle, such as the device status, spare parts, device-specific documentation, etc. The application already contains the data of your Endress+Hauser device. Endress +Hauser also takes care of maintaining and updating the data records. W@M is available: Via the Internet: www.endress.com/lifecyclemanagement On CD-ROM for local PC installation.
FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.
	For details, see Operating Instructions BA00027S and BA00059S

15.4 System components

Accessories	Description
Memograph M graphic display recorder	The Memograph M graphic display recorder provides information on all 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.
	For details, see "Technical Information" TI00133R and Operating Instructions BA00247R

16 Technical data

16.1 Application

The measuring device is only suitable for flow measurement of liquids with a minimum conductivity of 20 μ S/cm.

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

To ensure that the device remains in proper operating condition for its service life, use the measuring device only for media against which the process-wetted materials are adequately resistant.

16.2 Function and system design

Measuring principle E

Electromagnetic flow measurement on the basis of Faraday's law of magnetic induction.

Measuring system

The device consists of a transmitter and a sensor.

The device is available as a compact version:

The transmitter and sensor form a mechanical unit.

For information on the structure of the measuring device $\rightarrow = 12$

16.3 Input

Measured variable

Direct measured variables

Volume flow (proportional to induced voltage)

Calculated measured variables

Mass flow

Measuring range

Typically v = 0.01 to 10 m/s (0.03 to 33 ft/s) with the specified accuracy

Flow characteristic values in SI units

Nominal diameter		Recommended flow	Factory settings		
		Min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
15	1/2	4 to 100	25	0,2	0,5
25	1	9 to 300	75	0,5	1
32	-	15 to 500	125	1	2
40	1 ½	25 to 700	200	1,5	3
50	2	35 to 1100	300	2,5	5
65	-	60 to 2 000	500	5	8
80	3	90 to 3 000	750	5	12

Nominal diameter		Recommended flow	Factory settings		
		Min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
100	4	145 to 4700	1200	10	20
125	-	220 to 7500	1850	15	30
150	6	20 to 600 m ³ /h	150 m ³ /h	0.03 m ³	2.5 m ³ /h
200	8	35 to 1100 m ³ /h	300 m ³ /h	0.05 m ³	5 m ³ /h

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		Min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/2	15	1.0 to 27	6	0,1	0,15
1	25	2.5 to 80	18	0,2	0,25
1 1/2	40	7 to 190	50	0,5	0,75
2	50	10 to 300	75	0,5	1,25
3	80	24 to 800	200	2	2,5
4	100	40 to 1250	300	2	4
6	150	90 to 2 650	600	5	12
8	200	155 to 4850	1200	10	15

Recommended measuring range

Operable flow range

Over 1000:1

16.4 Output

Output signal Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Passive, open collector
Maximum input values	■ DC 35 V ■ 50 mA
Voltage drop	■ For ≤ 2 mA: 2 V ■ For 10 mA: 8 V
Residual current	≤ 0.05 mA
Pulse output	
Pulse width	Adjustable: 5 to 2 000 ms
Maximum pulse rate	100 Impulse/s

Pulse value	Adjustable
Assignable measured variables	Volume flowMass flow
Frequency output	
Output frequency	Adjustable: 0 to 1 000 Hz
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	Volume flowMass flow
Switch output	
Switching behavior	Binary, conductive or non-conductive
Switching delay	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	 Off On Diagnostic behavior Limit value Volume flow Mass flow Flow direction monitoring Status Empty pipe detection Low flow cut off

FOUNDATION Fieldbus

Signal encoding	Manchester Bus Powered (MBP)
Data transfer	31.25 KBit/s, Voltage mode

Signal on alarm

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

Pulse/frequency/switch output

Pulse output

Failure mode	Choose from:
	Actual value
	■ No pulses

Frequency output

Failure mode	Choose from:
	 Actual value
	■ 0 Hz
	■ Defined value: 0 to 1250 Hz

Switch output

Failure mode	Choose from:
	Current status
	■ Open
	■ Closed

FOUNDATION Fieldbus

Status and alarm messages	Diagnostics in accordance with FF-912
Error current FDE (Fault Disconnection Electronic)	0 mA

Local display

Plain text display	With information on cause and remedial measures
Backlight	Additionally for device version with SD03 local display: red lighting indicates a device error.



Status signal as per NAMUR recommendation NE 107

Operating tool

- Via digital communication: FOUNDATION Fieldbus
- Via service interface

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

Low flow cut off

The switch points for low flow cut off are user-selectable.

Galvanic isolation

All outputs are galvanically isolated from one another.

Protocol-specific data

FOUNDATION Fieldbus

Manufacturer ID	0x452B48
Ident number	0x1048
Device revision	1
DD revision	Information and files under:
CFF revision	www.endress.comwww.fieldbus.org
Device Tester Version (ITK version)	6.1.1
ITK Test Campaign Number	IT094200
Link Master capability (LAS)	Yes
Choice of "Link Master" and "Basic Device"	Yes Factory setting: Basic Device
Node address	Factory setting: 247 (0xF7)
Supported functions	The following methods are supported: Restart ENP Restart Diagnostic
Virtual Communication Relation	onships (VCRs)
Number of VCRs	44
Number of link objects in VFD	50
Permanent entries	1

Client VCRs	0
Server VCRs	10
Source VCRs	43
Sink VCRs	0
Subscriber VCRs	43
Publisher VCRs	43
Device Link Capabilities	
Slot time	4
Min. delay between PDU	8
Max. response delay	Min. 5

Transducer Blocks

Block	Contents	Output values
Setup Transducer Block (TRDSUP)	All parameters for standard commissioning.	No output values
Advanced Setup Transducer Block (TRDASUP)	All parameters for more accurate measurement configuration.	No output values
Display Transducer Block (TRDDISP)	Parameters for configuring the local display.	No output values
HistoROM Transducer Block (TRDHROM)	Parameters for using the HistoROM function.	No output values
Diagnostic Transducer Block (TRDDIAG)	Diagnostics information.	Process variables (AI Channel) Temperature (7) Volume flow (9) Mass flow (11)
Expert Configuration Transducer Block (TRDEXP)	Parameters that require the user to have indepth knowledge of the operation of the device in order to configure the parameters appropriately.	No output values
Expert Information Transducer Block (TRDEXPIN)	Parameters that provide information about the state of the device.	No output values
Service Sensor Transducer Block (TRDSRVS)	Parameters that can only be accessed by Endress +Hauser Service.	No output values
Service Information Transducer Block (TRDSRVIF)	Parameters that provide Endress+Hauser Service with information about the state of the device.	No output values
Total Inventory Counter Transducer Block (TRDTIC)	Parameters for configuring all the totalizers and the inventory counter.	Process variables (AI Channel) Totalizer 1 (16) Totalizer 2 (17) Totalizer 3 (18)
Heartbeat Technology Transducer Block (TRDHBT)	Parameters for the configuration and comprehensive information about the results of the verification.	No output values
Heartbeat Results 1 Transducer Block (TRDHBTR1)	Information about the results of the verification.	No output values
Heartbeat Results 2 Transducer Block (TRDHBTR2)	Information about the results of the verification.	No output values

Block	Contents	Output values
Heartbeat Results 3 Transducer Block (TRDHBTR3)	Information about the results of the verification.	No output values
Heartbeat Results 4 Transducer Block (TRDHBTR4)	Information about the results of the verification.	No output values

Function blocks

Block	Number of blocks	Contents	Process variables (Channel)
Resource Block (RB)	1	This Block (extended functionality) contains all the data that uniquely identify the device; it is the equivalent of an electronic nameplate for the device.	_
Analog Input Block (AI)	4	This Block (extended functionality) receives the measurement data provided by the Sensor Block (can be selected via a channel number) and makes the data available for other blocks at the output.	Process variables (AI Channel) Temperature (7) Volume flow (9) Mass flow (11)
		Execution time: 25 ms	
Discrete Input Block (DI)	2	This Block (standard functionality) receives a discrete value (e.g. indicator that measuring range has been exceeded) and makes the value available for other blocks at the output.	 Switch output state (101) Empty pipe detection (102) Low flow cut off (103) Status verification (105)
		Execution time: 19 ms	
PID Block (PID)	1	This Block (standard functionality) acts as a proportional-integral-differential controller and can be used universally for control in the field. It enables cascading and feedforward control.	_
		Execution time: 25 ms	
Multiple Digital Output Block (MDO)	1	This Block (standard functionality) receives several discrete values and makes them available for other blocks at the output. Execution time: 19 ms	Channel_DO (122) Value 1: Reset totalizer 1 Value 2: Reset totalizer 2 Value 3: Reset totalizer 3 Value 4: Flow override Value 5: Start heartbeat verification Value 6: Status switch output Value 7: Not assigned Value 8: Not assigned
Integrator Block (IT)	1	This Block (standard functionality) integrates a measured variable over time or totalizes the pulses from a Pulse Input Block. The Block can be used as a totalizer that totalizes until a reset, or as a batch totalizer whereby the integrated value is compared against a target value generated before or during the control routine and generates a binary signal when the target value is reached.	_
		Execution time: 21 ms	

16.5 Power supply

Terminal assignment

→ 🖺 30

Pin assignment, device plug $\rightarrow \stackrel{\triangle}{=} 30$

Supply voltage

Transmitter

An external power supply is required for each output.

The following supply voltage values apply for the outputs available:

Order code for "Output"	Minimum terminal voltage	Maximum terminal voltage
Option E ¹⁾ : FOUNDATION Fieldbus, pulse/frequency/switch output	≥ DC 9 V	DC 32 V

) For device version with SD03 local display: The terminal voltage must be increased by DC 0.5 V if backlighting is used.

Power consumption

Transmitter

Order code for "Output"	Maximum power consumption
Option E : FOUNDATION Fieldbus, pulse/	Operation with output 1: 576 mW
frequency/switch output	Operation with output 1 and 2: 2 576 mW

Current consumption

FOUNDATION Fieldbus

16 mA

Power supply failure

- Totalizers stop at the last value measured.
- Configuration is retained in the device memory (HistoROM).
- Error messages (incl. total operated hours) are stored.

Electrical connection

→ 🖺 32

Potential equalization

→ 🖺 34

Terminals

- For device version without integrated overvoltage protection: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- \blacksquare For device version with integrated overvoltage protection: screw terminals for wire cross-sections 0.2 to 2.5 mm² (24 to 14 AWG)

Cable entries

- Cable gland: M20 × 1.5 with cable ϕ 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
 - NPT ½"
 - G ½"

Cable specification

→ 🖺 29

Overvoltage protection

The device can be ordered with integrated overvoltage protection for diverse approvals: *Order code for "Accessory mounted", option NA "Overvoltage protection"*

Input voltage range	Values correspond to supply voltage specifications 1)
Resistance per channel	2 · 0.5 Ω max

DC sparkover voltage	400 to 700 V
Trip surge voltage	< 800 V
Capacitance at 1 MHz	< 1.5 pF
Nominal discharge current (8/20 μs)	10 kA
Temperature range	−40 to +85 °C (−40 to +185 °F)

- The voltage is reduced by the amount of the internal resistance I_{min} : R_i
- Depending on the temperature class, restrictions apply to the ambient temperature for device versions with overvoltage protection.
- For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

16.6 **Performance characteristics**

Reference operating conditions

In accordance with DIN EN 29104

- Water, typically 15 to 45 °C (59 to 113 °F); 2 to 6 bar (29 to 87 psi)
- Data as indicated in the calibration protocol ± 5 °C (± 41 °F) and ± 2 bar (± 29 psi)
- Accuracy based on accredited calibration rigs traced to ISO 17025
- Medium temperature: $+28 \pm 2$ °C ($+82 \pm 4$ °F)
- Ambient temperature: $+22 \pm 2$ °C ($+72 \pm 4$ °F)
- Warm-up period: 30 min

Installation

- Inlet run > 10 × DN
- Outlet run > 5 × DN
- Sensor and transmitter grounded.
- The sensor is centered in the pipe.

Maximum measured error

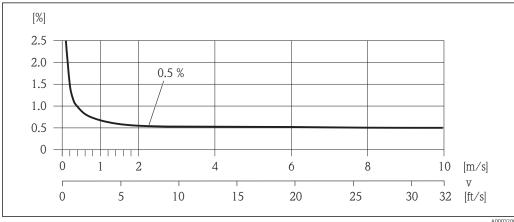
Error limits under reference operating conditions

o.r. = of reading

Volume flow

 ± 0.5 % o.r. ± 2 mm/s (0.08 in/s)

Fluctuations in the supply voltage do not have any effect within the specified range.



■ 29 Maximum measured error in % o.r.

Accuracy of outputs

The outputs have the following base accuracy specifications.

Pulse/frequency output

o.r. = of reading

Accuracy Max. ±100 ppm o.r.

Repeatability

o.r. = of reading

Volume flow

Max. ± 0.2 % o.r. ± 2 mm/s (0.08 in/s)

Influence of ambient temperature

Pulse/frequency output

o.r. = of reading

Temperature coefficient	Max. ±100 ppm o.r.
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16.7 Installation

"Mounting requirements" → 🖺 19

16.8 Environment

Ambient temperature range

→ 🖺 21

Temperature tables



Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.



For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

Storage temperature

The storage temperature corresponds to the operating temperature range of the measuring transmitter and the appropriate measuring sensors.

- Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner.
- If protection caps or protective covers are mounted these should never be removed before installing the measuring device.

Degree of protection

Transmitter

- As standard: IP66/67, type 4X enclosure
- When housing is open: IP20, type 1 enclosure
- Display module: IP20, type 1 enclosure

Sensor

IP66/67, type 4X enclosure

Connector

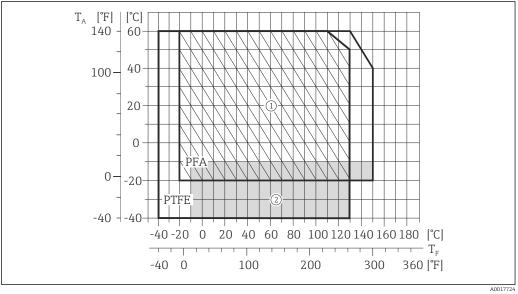
IP67, only in screwed situation

Shock resistance	As per IEC/EN 60068-2-31
Vibration resistance	Acceleration up to 2 g, according to IEC 60068-2-6
Mechanical load	 Protect the transmitter housing against mechanical effects, such as shock or impact. Never use the transmitter housing as a ladder or climbing aid.
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) For details, refer to the Declaration of Conformity.

16.9 **Process**

Medium temperature range

- -20 to +150 °C (-4 to +302 °F) for PFA
- -40 to +130 °C (-40 to +266 °F) for PTFE



- T_{A} Ambient temperature
- $T_{\rm F}$ Medium temperature
- Hatched area: harsh environment only up to +130 $^{\circ}$ C (+266 $^{\circ}$ F) 1
- 2 Gray area: the ambient and fluid temperature range of -10 to -40 °C (-14 to -40 °F) applies to stainless flanges only

Conductivity ≥ 20 µS/cm for liquids in general An overview of the pressure-temperature ratings for the process connections is Pressure-temperature provided in the "Technical Information" document ratings

Pressure tightness

"-" = no specifications possible

Liner: PFA

Nominal	diameter	Limit values for absolute pressure in [mbar] ([psi]) for fluid temperature			
[mm]	[in]	+25 °C (+77 °F)	+25 °C (+77 °F) +80 °C (+176 °F)		
25	1	0 (0)	0 (0)	0 (0)	
32	-	0 (0)	0 (0)	0 (0)	
40	1 1/2	0 (0)	0 (0)	0 (0)	
50	2	0 (0)	0 (0)	0 (0)	
65	-	0 (0)	-	0 (0)	
80	3	0 (0)	-	0 (0)	
100	4	0 (0)	-	0 (0)	
125	-	0 (0)	-	0 (0)	
150	6	0 (0)	-	0 (0)	
200	8	0 (0)	-	0 (0)	

Liner: PTFE

Nominal	diameter	Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:				
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)	
15	1/2	0 (0)	0 (0)	0 (0)	100 (1.45)	
25	1	0 (0)	0 (0)	0 (0)	100 (1.45)	
32	-	0 (0)	0 (0)	0 (0)	100 (1.45)	
40	1 ½	0 (0)	0 (0)	0 (0)	100 (1.45)	
50	2	0 (0)	0 (0)	0 (0)	100 (1.45)	
65	-	0 (0)	_	40 (0.58)	130 (1.89)	
80	3	0 (0)	_	40 (0.58)	130 (1.89)	
100	4	0 (0)	_	135 (1.96)	170 (2.47)	
125	-	135 (1.96)	_	240 (3.48)	385 (5.58)	
150	6	135 (1.96)	_	240 (3.48)	385 (5.58)	
200	8	200 (2.90)	_	290 (4.21)	410 (5.95)	

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:

- v < 2 m/s (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry)
- v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludges)
- A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.

Pressure loss

- No pressure loss occurs if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545
 →
 ⇒ 22

System pressure

→ 🖺 21

Vibrations

→ 🖺 22

16.10 Mechanical construction

Design, dimensions

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

Weight

Compact version

- Including the transmitter (1.9 kg (4.2 lbs))
- Weight specifications apply to standard pressure ratings and without packaging material.

Weight in SI units

Nominal d	liameter	EN (DIN), AS	L)	ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
15	1/2	PN 40	5.0	Class 150	5.0	10K	5.0
25	1	PN 40	5.8	Class 150	5.8	10K	5.8
32	1 1/4	PN 40	6.5	Class 150	-	10K	5.8
40	1 1/2	PN 40	7.9	Class 150	7.9	10K	6.8
50	2	PN 40	9.1	Class 150	9.1	10K	7.8
65	2 1/2	PN 16	10.5	Class 150	-	10K	9.6
80	3	PN 16	12.5	Class 150	12.5	10K	11.0
100	4	PN 16	14.5	Class 150	14.5	10K	13.2
125	5	PN 16	20.0	Class 150	-	10K	19.5
150	6	PN 16	24.0	Class 150	24.0	10K	23.0
200	8	PN 10	43.5	Class 150	43.5	10K	40.4

¹⁾ For flanges to AS, only DN 25 and 50 are available.

Weight in US units

Nominal diameter		ASME		
[mm]	[in]	Pressure rating	[lbs]	
15	1/2	Class 150	11.0	
25	1	Class 150	12.8	
32	1 1/4	Class 150	_	
40	1 ½	Class 150	17.4	
50	2	Class 150	20.1	
65	2 ½	Class 150	-	
80	3	Class 150	27.6	
100	4	Class 150	32.0	
125	5	Class 150	-	

Nominal diameter		ASME		
[mm]	[in]	Pressure rating	[lbs]	
150	6	Class 150	52.9	
200	8	Class 150	95.9	

Measuring tube specification

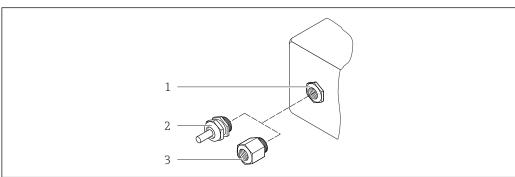
	ninal neter		Pressure rating				Process connection internal dia			diameter
		EN (DIN)	ASME	AS 2129	AS 4087	JIS	PFA		PTFE	
[mm]	[in]	[bar]	[psi]	[bar]	[bar]	[bar]	[mm]	[in]	[mm]	[in]
15	1/2	PN 40	Class 150	-	-	20K	-	-	15	0.59
25	1	PN 40	Class 150	Table E	-	20K	23	0.91	26	1.02
32	-	PN 40	-	-	-	20K	32	1.26	35	1.38
40	1 1/2	PN 40	Class 150	-	-	20K	36	1.42	41	1.61
50	2	PN 40	Class 150	Table E	PN 16	10K	48	1.89	52	2.05
65	-	PN 16	-	-	-	10K	63	2.48	67	2.64
80	3	PN 16	Class 150	-	-	10K	75	2.95	80	3.15
100	4	PN 16	Class 150	-	-	10K	101	3.98	104	4.09
125	-	PN 16	-	-	-	10K	126	4.96	129	5.08
150	6	PN 16	Class 150	-	-	10K	154	6.06	156	6.14
200	8	PN 10	Class 150	-	-	10K	201	7.91	202	7.95

Materials

Transmitter housing

- Order code for "Housing", option **C** "Compact, aluminum coated": Aluminum, AlSi10Mg, coated
- Window material: glass

Cable entries/cable glands



A0020640

- 30 Possible cable entries/cable glands
- Cable entry in transmitter housing with internal thread M20 x 1.5
- 2 Cable gland M20 x 1.5
- Adapter for cable entry with internal thread G $\frac{1}{2}$ " or NPT $\frac{1}{2}$ "

Order code for "Housing", option C "GT20 two-chamber, aluminum coated"

Cable entry/cable gland	Type of protection	Material
Cable gland M20 × 1.5	Non-ExEx iaEx ic	Plastic
	Adapter for cable entry with internal thread G ½"	Nickel-plated brass
Adapter for cable entry with internal thread NPT ½"	For non-Ex and Ex (except for CSA Ex d/XP)	Nickel-plated brass
Thread NPT ½" via adapter	For non-Ex and Ex	

Device plug

Electrical connection	Material
Plug M12x1	 Socket: stainless steel, 1.4401/316 Contact housing: plastic, PUR, black Contacts: metal, CuZn, gold-plated Threaded connection seal: NBR

Sensor housing

Coated aluminum AlSi10Mg

Measuring tubes

Stainless steel, 1.4301/304/1.4306/304L; for flanges made of carbon steel with Al/Zn protective coating

Liner

- PFA
- PTFE

Process connections

EN 1092-1 (DIN 2501)

Stainless steel, 1.4571 (F316L); carbon steel, FE410WB/S235JRG2; Alloy C22, 2.4602 (UNS N06022) (with Al/Zn protective varnish)

ASME B16.5

Stainless steel, F316L; carbon steel, A105 (with Al/Zn protective varnish)

JIS B2220

Stainless steel, 1.0425 (F316L); carbon steel, S235JRG2/HII (with Al/Zn protective varnish)

Electrodes

Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium

Seals

In accordance with DIN EN 1514-1

Accessories

Weather protection cover

Stainless steel 1.4404 (316L)

Ground disks

Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum; titanium

Fitted electrodes

Measuring electrodes, reference electrodes and electrodes for empty pipe detection:

- Standard: stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum, titanium
- Optional: only platinum measuring electrodes

Process connections

- EN 1092-1 (DIN 2501); dimensions as per DIN 2501, DN 65 PN 16 only as per EN 1092-1
- ASME B16.5
- JIS B2220
- AS 2129 Table E
- AS 4087 PN 16
- For information on the materials of the process connections $\rightarrow \triangleq 138$

Surface roughness

Stainless steel electrodes, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium:

 ≤ 0.3 to 0.5 µm (11.8 to 19.7 µin)

(All data relate to parts in contact with fluid)

Liner with PFA:

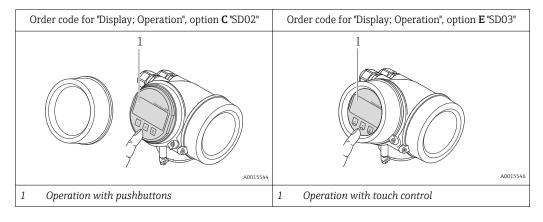
 $\leq 0.4 \ \mu m \ (15.7 \ \mu in)$

(All data relate to parts in contact with fluid)

16.11 Operability

Local operation

Via display module



Display elements

- 4-line display
- With order code for "Display; operation", option E:
 White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -20 to +60 °C (-4 to +140 °F) The readability of the display may be impaired at temperatures outside the temperature range.

Operating elements

- With order code for "Display; operation", option C:
 Local operation with 3 push buttons: ⊙, ⊙, ⊚
- With order code for "Display; operation", option **E**: External operation via touch control; 3 optical keys: ⑤, ⑥,⑥
- Operating elements also accessible in various hazardous areas

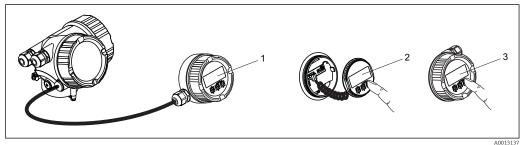
Additional functionality

Data backup function

module.

- The device configuration can be saved in the display module.
- Data comparison function
 The device configuration saved in the display module can be compared to the current device configuration.
- Data transfer function
 The transmitter configuration can be transmitted to another device using the display

Via remote display and operating module FHX50



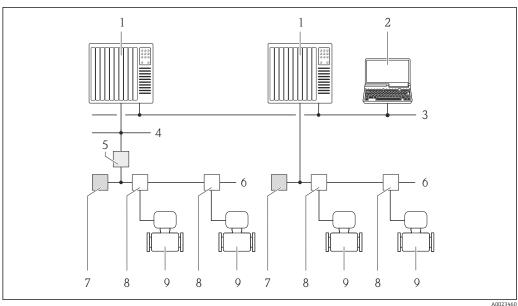
■ 31 Operating options via FHX50

- 1 Housing of remote display and operating module FHX50
- 2 SD02 display and operating module, push buttons: cover must be opened for operation
- 3 SD03 display and operating module, optical buttons: operation possible through cover glass

Remote operation

Via FOUNDATION Fieldbus network

This communication interface is available in device versions with FOUNDATION Fieldbus.

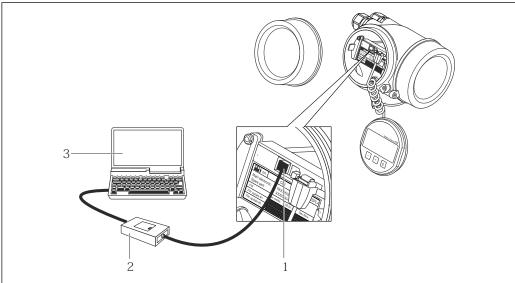


■ 32 Options for remote operation via FOUNDATION Fieldbus network

- 1 Automation system
- 2 Computer with FOUNDATION Fieldbus network card
- 3 Industry network
- 4 High Speed Ethernet FF-HSE network
- 5 Segment coupler FF-HSE/FF-H1
- 6 FOUNDATION Fieldbus FF-H1 network
- 7 Power supply FF-H1 network
- 8 T-box
- 9 Measuring device

Service interface

Via service interface (CDI)



A0014019

- 1 Service interface (CDI = Endress+Hauser Common Data Interface) of the measuring device
- 2 Commubox FXA291
- 3 Computer with "FieldCare" operating tool with COM DTM "CDI Communication FXA291"

Languages

Can be operated in the following languages:

■ Via local display:

English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Swedish, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech

■ Via "FieldCare" operating tool:

English, German, French, Spanish, Italian, Chinese, Japanese

16.12 Certificates and approvals

CE mark

The measuring system is in conformity with the statutory requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.

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

C-Tick symbol

The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".

Ex approval

The devices are certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.

FOUNDATION Fieldbus certification

FOUNDATION Fieldbus interface

The measuring device is certified and registered by the Fieldbus FOUNDATION. The measuring system meets all the requirements of the following specifications:

- Certified in accordance with FOUNDATION Fieldbus H1
- Interoperability Test Kit (ITK), revision version 6.1.1 (certificate available on request)
- Physical Layer Conformance Test
- The device can also be operated with certified devices of other manufacturers (interoperability)

Other standards and quidelines

■ EN 60529

Degrees of protection provided by enclosures (IP code)

■ EN 61010-1

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

■ IEC/EN 61326

Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).

■ ANSI/ISA-61010-1 (82.02.01): 2004

Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements

CAN/CSA-C22.2 No. 61010-1-04

Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements

■ NAMUR NE 21

Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment

■ NAMUR NE 32

Data retention in the event of a power failure in field and control instruments with microprocessors

■ NAMUR NE 43

Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.

- NAMUR NE 53
- Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
 - Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
 - Self-monitoring and diagnosis of field devices
- NAMUR NE 131

Requirements for field devices for standard applications

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.

Diagnostics functions

Package	Description
HistoROM extended function	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 (basic 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. • Data logging is visualized via the local display or FieldCare.

Heartbeat Technology

Package	Description
Heartbeat Verification	Heartbeat Verification: Makes it possible to check the device functionality on demand when the device is installed, without having to interrupt the process. Access via local operation or other operating interfaces, such as FieldCare for instance. Documentation of device functionality within the framework of manufacturer specifications, for proof testing for instance. End-to-end, traceable documentation of the verification results, including report. Makes it possible to extend calibration intervals in accordance with operator's risk assessment.

16.14 Accessories

16.15 Documentation



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

- The CD-ROM provided for the device (depending on the device version, the CD-ROM might not be part of the delivery!)
- The *W@M Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

Standard documentation

Brief Operating Instructions

Measuring device	Documentation code
Promag P 200	KA01121D

Device Parameters

Measuring device	Documentation code				
	HART FOUNDATION Fieldbus PROFIBUS PA				
Promag 200	GP01026D	GP01028D	GP01027D		

Technical Information

Measuring device	Documentation code		
Promag P 200	TI01062D		

Supplementary devicedependent documentation

Safety Instructions

Contents	Documentation code
ATEX/IECEx Ex d[ia], Ex tb	XA01015D
ATEX/IECEx Ex ia, Ex tb	XA01016D
ATEX/IECEx Ex nA, Ex ic	XA01017D
cCSAus XP (Ex d)	XA01018D
cCSAus IS (Ex i)	XA01019D
NEPSI Ex d	XA01179D
NEPSI Ex i	XA01178D
NEPSI Ex nA, Ex ic	XA01180D
INMETRO Ex d	XA01309D
INMETRO Ex i	XA01310D
INMETRO Ex nA	XA01311D

Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01056D
Heartbeat Technology	SD01452D

Installation Instructions

Contents	Documentation code			
Installation Instructions for spare part sets	Overview of accessories available for order → 🖺 122			

Index

A	Device description files
Access authorization to parameters	Device documentation
Read access	Supplementary documentation 8
Write access	Device locking, status
Access code	Device name
Incorrect input 50	Sensor
Adapters	Transmitter
Adapting the diagnostic behavior 96	Device repair
Adapting the status signal	Device revision
Ambient temperature	Device type ID
Influence	Diagnostic behavior
Ambient temperature range 21	Explanation
AMS Device Manager	Symbols
Function	Diagnostic information
Application	Design, description
Applicator	FieldCare
Approvals	Local display
С	Overview
	Remedy information
C-Tick symbol	Diagnostic list
Technical data	Diagnostic message
Cable entry	Diagnostics
Degree of protection	Symbols
CE mark	DIP switches
Certificates	see Write protection switch
Checklist	Direct access
Post-connection check	Direct access code
Post-installation check	Disabling write protection
Cleaning	Display
Exterior cleaning	Current diagnostic event
Interior cleaning	Previous diagnostic event
Commissioning	see Local display
Advanced settings 67	Display area
Configuring the measuring device 58	For operational display 40
Conductivity	In the navigation view 42
Connecting cable	Display values
Connecting the measuring device	For locking status
Connection	Disposal
see Electrical connection	Document
Connection examples, potential equalization 34	Function 6
Connection preparations	Symbols used
Connection tools	Document function
Context menu	Documentation
Closing	Down pipe
Explanation	E
Opening	
Current consumption	Electrical connection Commubox FXA291
Cyclic data transmission	Degree of protection
D	Measuring device
Declaration of Conformity	Operating tools
Define access code	Via FOUNDATION Fieldbus network 51, 140
Degree of protection	Via service interface (CDI) 52, 141
Designated use	Electromagnetic compatibility
Device components	Enabling write protection
2 ccc components	

146

Endress+Hauser services Maintenance	Explanation
Repair	ī
Environment	-
Ambient temperature	I/O electronics module
Mechanical load	Identifying the measuring device
Shock resistance	Incoming acceptance
Storage temperature	Influence
Vibration resistance	Ambient temperature
Error messages	Information on the document 6
see Diagnostic messages	Inlet runs
Event history	Input
Events list	Input mask
Ex approval	Inspection
Extended order code	Installation
Sensor	Received goods
Transmitter	Inspection check
Exterior cleaning	Connection
Exterior cleaning	Installation
F	Installation conditions
Field Communicator	Adapters
Function	
Field Communicator 475	Down pipe
Field of application	Mounting location
Residual risks	Orientation
Field Xpert	Partially filled pipe
Function	System pressure
Field Xpert SFX350	Vibrations
FieldCare	Installation dimensions
Device description file	Interior cleaning
Establishing a connection 53	
Function	K
User interface	Keypad lock
Filtering the event logbook	Disabling
Firmware	Enabling
Release date	
Version	L
Firmware history	Languages, operation options
Fitted electrodes	Line recorder
Flow direction	Local display
Flow limit	Editing view
FOUNDATION Fieldbus certification	Navigation view 41
Function check	see Diagnostic message
Function scope	see In alarm condition
AMS Device Manager	see Operational display
Field Communicator	Low flow cut off
	20.1.10.1.04.04.11.11.11.11.11.11.11.11.11.11.11.11.11
Field Communicator 475	M
Field Xpert	Main electronics module
Functions	Maintenance tasks
see Parameter	Replacing seals
c	Managing the device configuration 80
G G L L L L L L L L L L L L L L L L L L	Manufacturer ID
Galvanic isolation	
TT	Manufacturing date
H	Materials
Hardware write protection	Maximum measured error
Help text	Measured variables
Calling up	Calculated
Close	Measured
	see Process variables

Measuring and test equipment	Operation
Measuring device	Operational display 40
Configuration	Operational safety
Conversion	Order code
Disposal	Orientation (vertical, horizontal) 20
Integrating via communication protocol 55	Outlet runs
Mounting the sensor 24	Output
Mounting the ground cable/ground disks 24	Output signal
Mounting the seals 24	
Screw tightening torques 24	P
Preparing for electrical connection	Packaging disposal
Preparing for mounting	Parameter
Removing	Changing
Repair	Enter a value
	Parameter settings
Structure	Administration (Submenu) 79, 115
Switch-on	Analog inputs (Submenu)
Measuring principle	
Measuring range	Configuration backup display (Submenu) 80
Measuring system	Data logging (Submenu)
Measuring tube specification	Device information (Submenu)
Mechanical load	Diagnostics (Menu)
Media	Display (Submenu)
Medium temperature range	Display (Wizard) 62
Menu	Empty pipe detection (Wizard) 66
Diagnostics	Low flow cut off (Wizard) 64
Operation	Process variables (Submenu) 86
Setup	Pulse/frequency/switch output (Wizard) 69, 71, 73
Menus	Sensor adjustment (Submenu) 68
For measuring device configuration 58	Setup (Menu)
For specific settings 67	Simulation (Submenu) 81
Mounting dimensions	System units (Submenu) 60
see Installation dimensions	Totalizer (Submenu)
Mounting location	Totalizer 1 to 3 (Submenu)
Mounting preparations	Totalizer handling (Submenu)
Mounting requirements	Partially filled pipe
Installation dimensions	Performance characteristics
Mounting tools	Post-connection check (checklist)
wiounting tools	Post-installation check
N	Post-installation check (checklist)
Nameplate	Potential equalization
Sensor	Power consumption
Transmitter	Power supply failure
	Pressure loss
Navigation path (navigation view) 41	
Navigation view	Pressure tightness
In the submenu	Pressure-temperature ratings
In the wizard	Process conditions
Numeric editor	Conductivity
0	Flow limit
	Medium temperature
Operable flow range	Pressure loss
Operating elements	Pressure tightness
Operating keys	Process connections
see Operating elements	Product safety
Operating menu	Protecting parameter settings 83
Menus, submenus	D
Structure	R
Submenus and user roles 40	Read access
Operating options	Reading measured values
Operating philosophy	Recalibration

148

Reference operating conditions	Storage temperature
Remedial measures	Structure
Calling up	Measuring device
Closing	Operating menu
Remote operation	Submenu
Repair	Administration
Notes	Advanced setup 67
Repair of a device	Analog inputs 62
Repeatability	Configuration backup display 80
Replacement	Data logging
<u>-</u>	Device information
Device components	
Replacing seals	Display
Requirements for personnel	Events list
Return	Overview
C	Process variables
S	Sensor adjustment
Safety	Simulation
Screw tightening torques	System units 60
Sensor	Totalizer
Mounting	Totalizer 1 to 3
Serial number	Totalizer handling
Setting the operating language	Supply unit
Settings	Requirements
Adapting the measuring device to the process	Supply voltage
conditions	
Administration	Surface roughness
	Symbols
Advanced display configurations	For communication
Analog input	For correction
Device reset	For diagnostic behavior
Device tag	For locking
Empty pipe detection (EPD) 66	For measured variable 40
Local display 62	For measurement channel number 40
Low flow cut off	For menus
Managing the device configuration 80	For parameters
Operating language	For status signal
Pulse output	For submenu 42
Pulse/frequency/switch output 68, 71	For wizard
Resetting the totalizer 87	In the status area of the local display 40
Restart device	In the text and numeric editor
Sensor adjustment	System design
Simulation	Measuring system
Switch output	see Measuring device design
System units 60	System integration
Totalizer	System pressure
Totalizer reset	System pressure
Shock resistance	T
Showing data logging	Technical data, overview
Signal on alarm	Temperature range
Software release	Ambient temperature range for display 139
Spare part	Storage temperature
Spare parts	Terminal assignment
Special connection instructions	Terminals
Standards and guidelines	Text editor
Status area	Tool tip
For operational display 40	see Help text
In the navigation view 42	Tools
Status signals	Electrical connection 29
Storage conditions	For mounting
J	J

Transport
Transmitter
Connecting the signal cables
Turning the display module
Turning the housing
Transporting the measuring device
Troubleshooting
General
Turning the display module
Turning the electronics housing
see Turning the transmitter housing
Turning the transmitter housing
U
Use of the measuring device
Borderline cases
Incorrect use
see Designated use
User roles
352 2535 7777 7777 7777 7777 7777 7777 7
V
Version data for the device
Vibration resistance
Vibrations
W
W@M
W@M Device Viewer
Weight Compact version
Transport (notes)
Wizard
Define access code
Display
Empty pipe detection
Low flow cut off
Pulse/frequency/switch output 69, 71, 73
Workplace safety
Write access
Write protection
Via access code
Via block operation 85
Via write protection switch 84
Write protection switch



