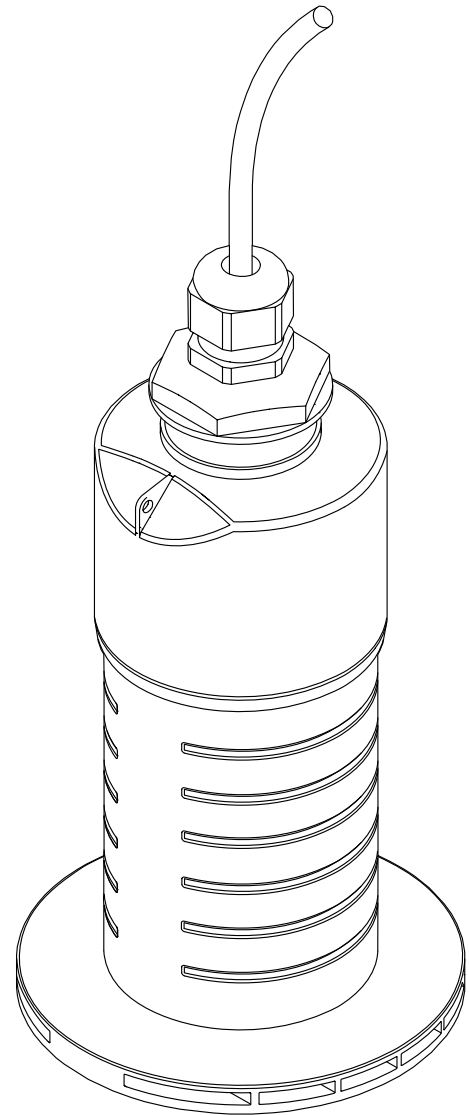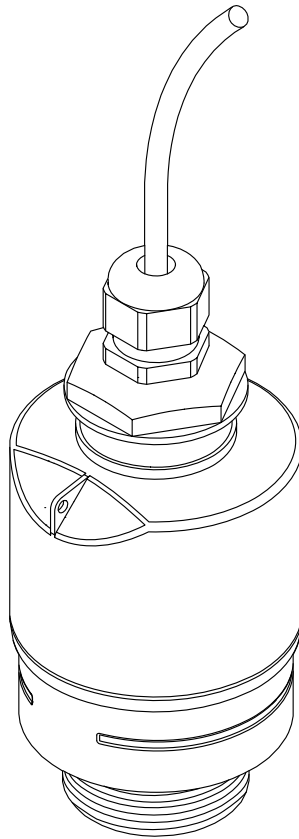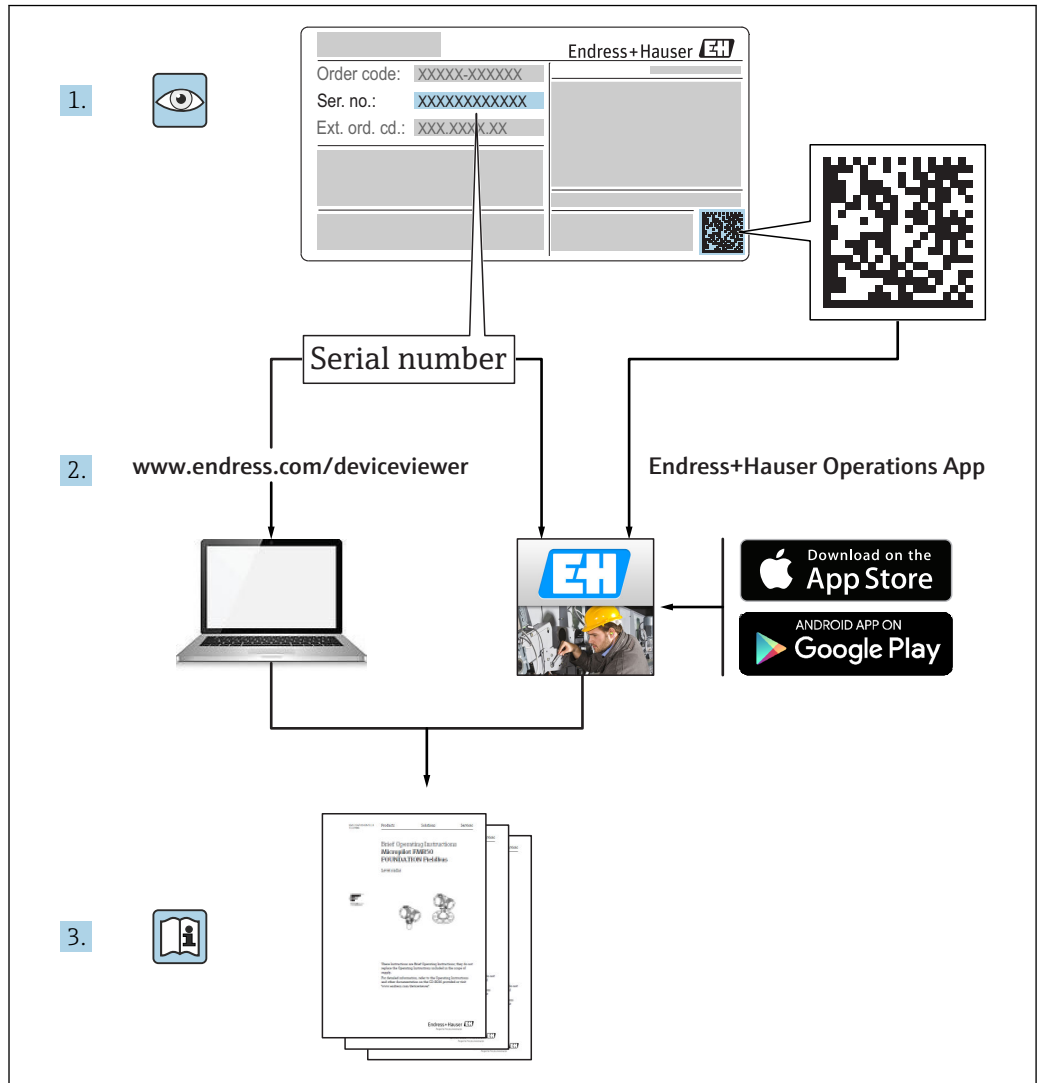# Operating Instructions
Micropilot FMR20
HART

Free space radar

Endress+Hauser

People for Process Automation

1.

Order code:	XXXXX-XXXXXX
Ser. no.:	XXXXXXXXXXXX
Ext. ord. cd.:	XXX.XXXX.XX

Endress+Hauser

Serial number

2. **www.endress.com/deviceviewer**   **Endress+Hauser Operations App**

Download on the App Store

ANDROID APP ON Google Play

3.

A0023555

Table of contents

Endress+Hauser

1   Document information

1.1   Symbols for certain types of information

Symbol	Meaning
☑	**Permitted** Procedures, processes or actions that are permitted.
☑☑	**Preferred** Procedures, processes or actions that are preferred.
☒	**Forbidden** Procedures, processes or actions that are forbidden.
🛈	**Tip** Indicates additional information.
📖	Reference to documentation
🗎	Reference to page
🖼	Reference to graphic
1. , 2. , 3. ...	Series of steps
↳	Result of a step
❓	Help in the event of a problem
👁	Visual inspection

1.2   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.

1.3   Symbols in graphics

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

Symbol	Meaning
⚠EX	**Hazardous area** Indicates a hazardous area.
⚠	**Safe area (non-hazardous area)** Indicates the non-hazardous area.

2 Terms and abbreviations

Term/abbreviation	Explanation
BA	Document type "Operating Instructions"
KA	Document type "Brief Operating Instructions"
TI	Technical Information
SD	Document type "Special Documentation"
XA	Document type "Safety Instructions"
PN	Nominal pressure
MWP	Maximum Working Pressure The MWP can also be found on the nameplate.
ToF	Time of Flight
FieldCare	Scalable software tool for device configuration and integrated plant asset management solutions
DeviceCare	Universal configuration software for Endress+Hauser HART, PROFIBUS, FOUNDATION Fieldbus and Ethernet field devices
DTM	Device Type Manager
DD	Device Description for HART communication protocol
DK	Relative dielectric constant ε_r
Operating tool	The term "operating tool" is used in place of the following operating software: • SmartBlue (app), for operation using an Android or iOS smartphone or tablet. • FieldCare / DeviceCare, for operation via HART communication and PC
BD	Blocking Distance; no signals are analyzed within the BD.

3 Basic safety instructions

3.1 Requirements for personnel

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

The operating personnel must fulfill the following requirements:
- ▶ Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Follow the instructions in this manual.

3.2 Designated use

Application and media

The measuring device described in these Operating Instructions is intended for continuous, non-contact level measurement in liquids. Because of its operating frequency of approx. 26 GHz, a maximum radiated pulsed power of 5.7 mW and an average power output of 0.015 mW, use outside of closed, metallic vessels is also permitted. For operation outside of closed vessels the device must be installed according to the instructions mentioned in the chapter "Installation" → 🖺 18. Operation does not pose a risk to health or the environment.

If the limit values specified in the "Technical data" and the conditions listed in the instructions and additional documentation are observed, the measuring device may be used for the following measurements only:
- ▶ Measured process variables: distance
- ▶ Calculated process variables: volume or mass in vessels of any shape; flow through measuring weirs or flumes (calculated from the level by the linearization functionality)

To ensure that the measuring device remains in proper condition for the operation time:
- ▶ Use the measuring device only for media against which the process-wetted materials are adequately resistant.
- ▶ Observe the limit values in "Technical data".

Incorrect use

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

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.

Residual risks

Due to heat transfer from the process as well as power dissipation within the electronics, the temperature of the electronics housing and the assemblies contained therein may rise to 80 ℃ (176 ℉) during operation. When in operation, the sensor can reach a temperature close to the medium temperature.

Danger of burns from contact with surfaces!
- ▶ For elevated fluid temperature, ensure protection against contact to prevent burns.

3.3   Workplace safety

For work on and with the device:
▸ Wear the required personal protective equipment according to federal/national regulations.

3.4   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 the manufacturer.

Repair

To ensure continued operational safety and reliability,
▸ Carry out repairs on the device only if they are expressly permitted.
▸ Observe federal/national regulations pertaining to repair of an electrical device.
▸ Use original spare parts and accessories from the manufacturer only.

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):
▸ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
▸ Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

3.5   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.

3.5.1   CE mark

The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied.

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

4   Registered trademarks

HART
COMMUNICATION PROTOCOL
Registered trademark of the FieldComm Group, Austin, USA

Bluetooth
The *Bluetooth*® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by Endress+Hauser is under license. Other trademarks and trade names are those of their respective owners."

Apple®
Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

Android®
Android, Google Play and the Google Play logo are trademarks of Google Inc.

5 Supplementary documentation

The following document types are available in the Download Area of the Endress+Hauser Internet site: www.endress.com → Download:

5.1 Standard documentation

Device	Document type	Document code
FMR20	Brief Operating Instructions	KA01248F

Device	Document type	Document code
FMR20	Technical Information	TI01267F

5.2 Supplementary documentation

Device	Document type	Document code
RIA15	Technical Information	TI01043K
	Operating Instructions	BA01170K

5.3 Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

Feature 020 "Power Supply; Output"	Approval	Available for A [1], P [2]
BA	ATEX: II 1 G Ex ia IIC T4 Ga	XA01443F
BB	ATEX: II 1/2 G Ex ia IIC T4 Ga/Gb	
IA	IEC: Ex ia IIC T4 Ga	
IB	IEC: Ex ia IIC T4 Ga/Gb	
CB	CSA C/US IS CI.I Div.1 Gr.A-D, AEx ia / Ex ia T4	XA01445F

1) 2-Draht; 4-20 mA HART
2) 2-Draht; 4-20 mA HART /Bluetooth®

The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

6 Product description

6.1 Product design

6.1.1 Micropilot FMR20
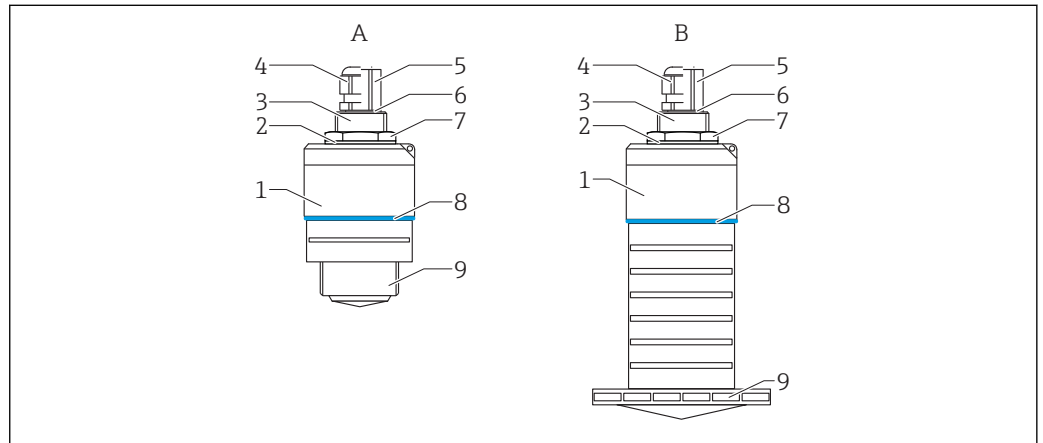
A0028416

 1   Design of the Micropilot FMR20 (26 GHz)

A   FMR20 with 40 mm antenna
B   FMR20 with 80 mm antenna
1   Sensor housing
2   Seal
3   Process connection rear side
4   Cable gland
5   Pipe adapter
6   O-ring
7   Counter nut
8   Design ring
9   Process connection front side

7 Incoming acceptance and product identification

7.1 Incoming acceptance
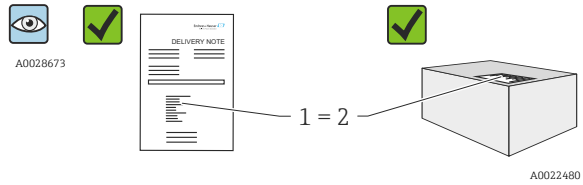
Are the order codes on the delivery note (1) and the product sticker (2) identical?
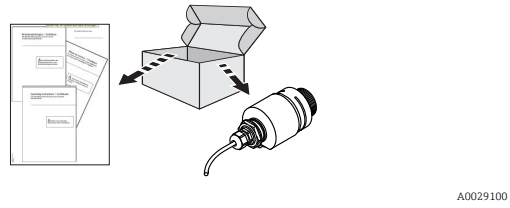
Are the goods undamaged?
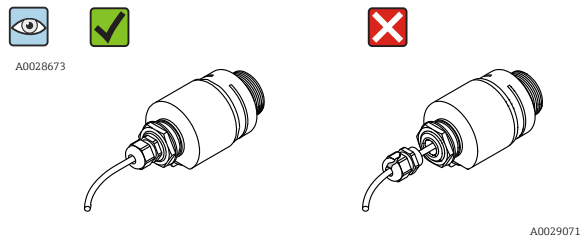
Do the nameplate data match the ordering information on the delivery note?
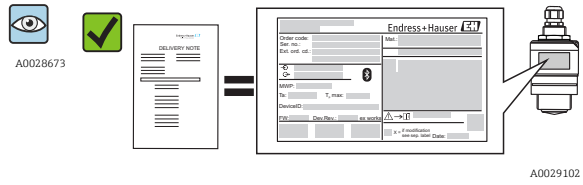
Is the DVD with the operating tool present? If required (see nameplate): Are the safety instructions (XA) present?
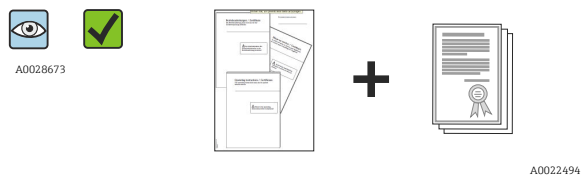
If one of these conditions is not satisfied, contact your Endress+Hauser Sales Center.

7.2   Product identification

The following options are available for identification of the measuring device:
- Nameplate specifications
- Extended 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 and an
  overview of the scope of the associated Technical Documentation 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 information about the measuring device and an
  overview of the scope of the associated Technical Documentation is displayed.
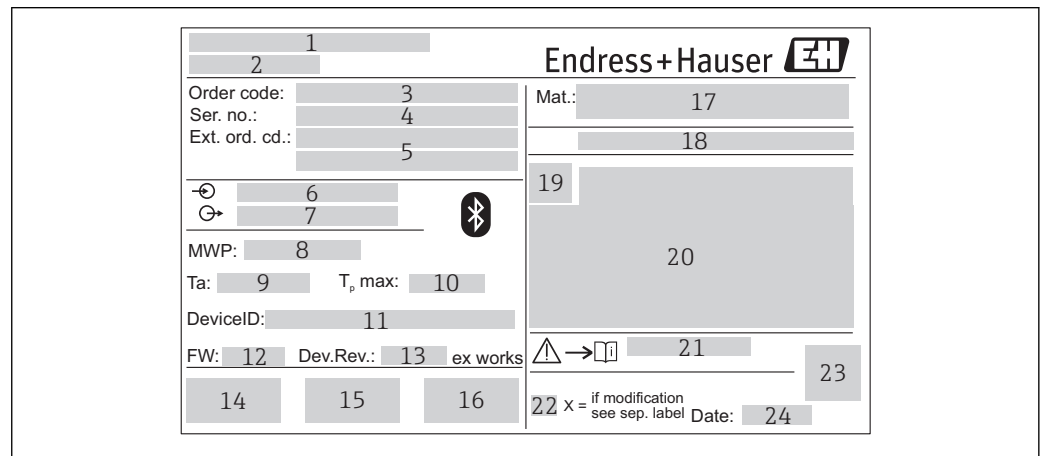
A0029096

🖾 *2   Nameplate of Micropilot*

1   Manufacturer's address
2   Device name
3   Order code
4   Serial number (ser. no.)
5   Extended order code (Ext. ord. cd.)
6   Supply voltage
7   Signal outputs
8   Process pressure
9   Permitted ambient temperature (T_a)
10   Maximum process temperature
11   Device ID
12   Firmware version (FW)
13   Device revision (Dev.Rev.)
14   CE mark
15   Additional information about the device version (certificates, approvals)
16   C-Tick
17   Materials in contact with process
18   Degree of protection: e.g. IP, NEMA
19   Certificate symbol
20   Certificate and approval relevant data
21   Document number of the Safety Instructions: e.g. XA, ZD, ZE
22   Modification mark
23   2-D matrix code (QR code)
24   Manufacturing date: year-month

8 Installation

8.1 Installation conditions

8.1.1 Installation types
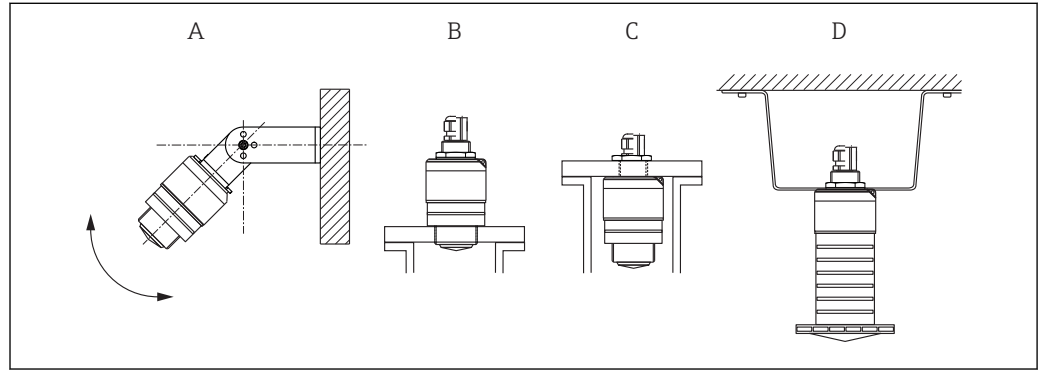
🔲 3   Wall, ceiling or nozzle installation

A   Wall or ceiling mount, adjustable
B   Mounted at front thread
C   Mounted at rear thread
D   Ceiling installation with counter nut (included in delivery)

Caution!
The sensor cable is not designed as supporting cable. Do not use as a suspension wire.

8.1.2 Nozzle installation

The antenna should be just out of the nozzle for optimum measurement. The interior of the nozzle must be smooth and may not contain any edges or welded joints. The edge of the nozzle should be rounded if possible. The maximum nozzle length **L** depends on the nozzle diameter **D**. Please note the specified limits for the diameter and length of the nozzle.
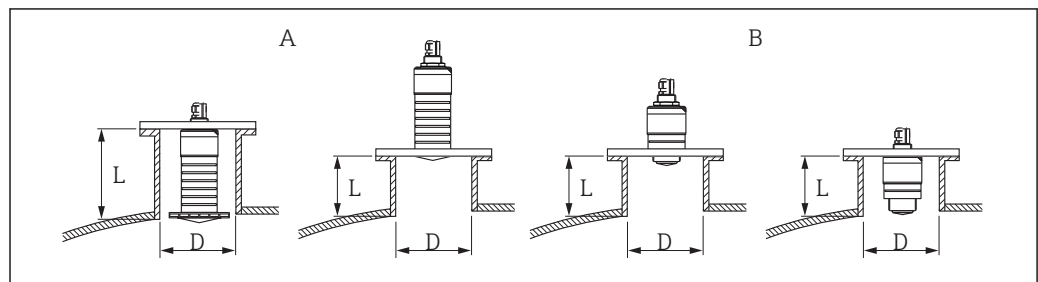
🔲 4   FMR20 nozzle installation

A   FMR20 80 mm (3 in) antenna
B   FMR20 40 mm (1.5 in) antenna

	80 mm (3 in) Antenna, inside nozzle	80 mm (3 in) Antenna, outside nozzle	40 mm (1.5 in) Antenna, outside nozzle	40 mm (1.5 in) Antenna, inside nozzle
D	min. 120 mm (4.72 in)	min. 80 mm (3 in)	min. 40 mm (1.5 in)	min. 80 mm (3 in)
L	max. 205 mm (8.07 in) + D x 4.5	max. D x 4.5	max. D x 1.5	max. 140 mm (5.5 in) + D x 1.5

8.1.3   Orientation
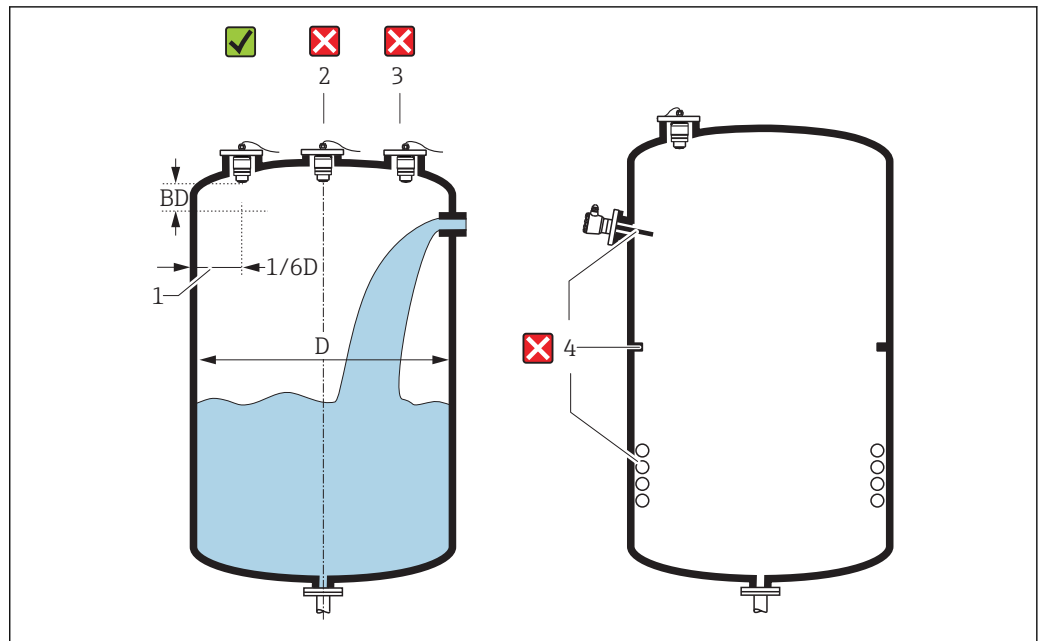
⊞ 5   *Tank installation position*

- If possible install the sensor so that its lower edge projects into the vessel.
- Do not install the sensor in the middle of the tank (2). We recommend leaving a distance (1) between the sensor and the tank wall measuring 1/6 of the tank diameter.
  Recommended distance **A** wall - nozzle outer edge: ~ 1/6 of the tank diameter **D**.
  However, the device must not under any circumstances be mounted closer than 15 cm (5.91 in) to the tank wall.
- Avoid measurements through the filling curtain (3).
- Avoid equipment (4) such as limit switches, temperature sensors, baffles, heating coils etc.
- Multiple devices can be operated in one tank without influencing each other.
- No signals are analyzed within the Blocking distance. It can therefore be used to suppress interference signals (e.g. the effects of condensate) close to the antenna.
  By default an automatic Blocking distance of at least 0.1 m (0.33 ft) is preset. However it can be manually overwritten (even 0 m (0 ft) is allowed).
  Automatic calculation:
  Blocking distance = Empty calibration - Full calibration - 0.2 m (0.656 ft).
  The **Blocking distance** parameter is recalculated according to this formula every time a new value is entered into the **Empty calibration** parameter or **Full calibration** parameter.
  If this calculation results in a value <0.1 m (0.33 ft), the blocking distance of 0.1 m (0.33 ft) is used instead.

8.1.4   Alignment

- Align the antenna vertically to the product surface.
- Align the eyelet with the mounting eye as well as possible towards the tank wall.
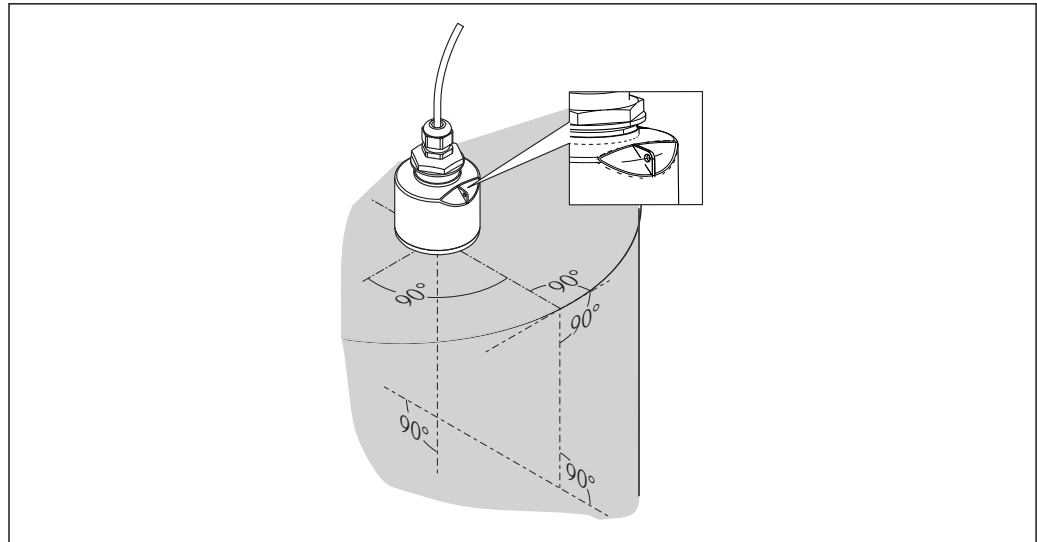
A0028927

⊠ 6   *Sensor alignment when mounting in tank*

8.1.5   Beam angle

$$W = 2 \times D \times \tan \frac{\alpha}{2}$$
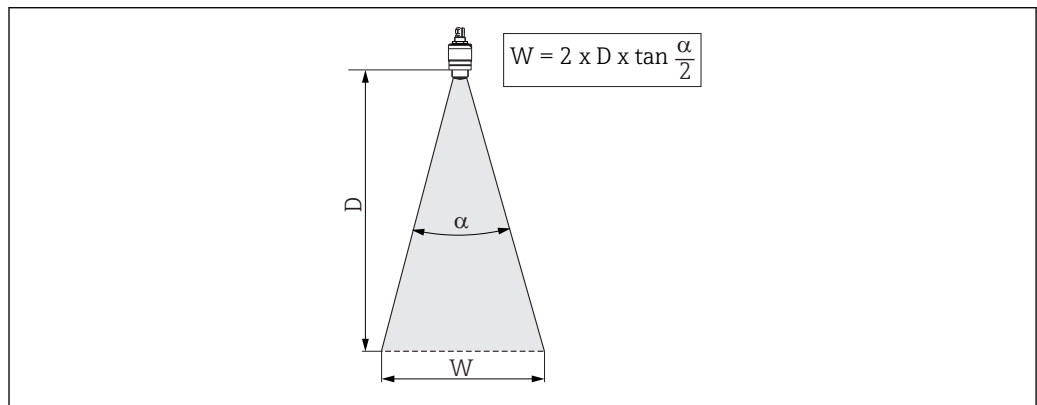
A0029053-EN

⊠ 7   *Relationship between beam angle α, distance D and beamwidth diameter W*

The beam angle is defined as the angle **α** at which the power density of the radar waves reaches half the value of the maximum power density (3dB width). Microwaves are also emitted outside the signal beam and can be reflected off interfering installations.

Beam diameter **W** as a function of beam angle **α** and measuring distance **D**.

FMR20		
Antenna size	40 mm (1.5 in)	80 mm (3 in)
Beam angle α	30°	12°
Distance (D)	Beamwidth diameter W	
3 m (9.8 ft)	1.61 m (5.28 ft)	0.63 m (2.1 ft)
5 m (16.4 ft)	2.68 m (8.79 ft)	1.05 m (3.45 ft)
10 m (33 ft)	5.36 m (17.59 ft)	2.1 m (6.9 ft)
15 m (49 ft)		3.15 m (10.34 ft)
20 m (66 ft)		4.2 m (13.79 ft)

8.1.6   Measurement in plastic vessels

If the outer wall of the vessel is made of a non-conductive material (e.g. GFR) microwaves can also be reflected off interfering installations outside of the vessel (e.g. metallic pipes (1), ladders (2), grates (3), ...). Therefore there should be no such interfering installations in the signal beam. For more information, please contact Endress+Hauser.
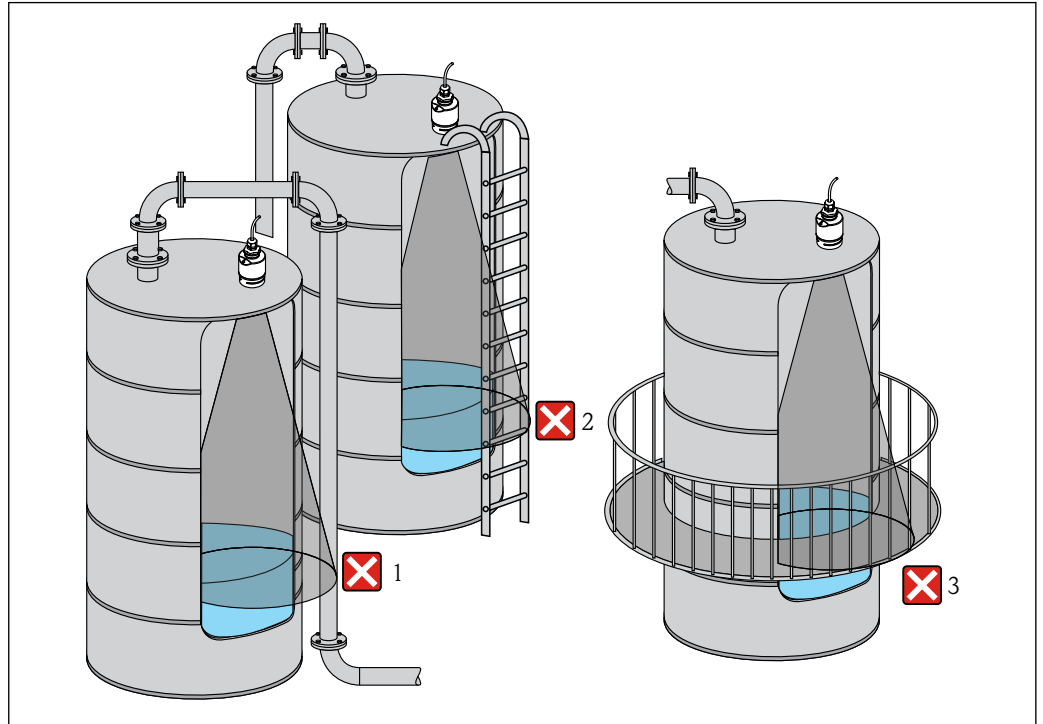
🖻 8   Measurement in a plastic vessel

8.1.7   Weather protection cover

For outdoor use, the use of a weather protection cover(1) is recommended
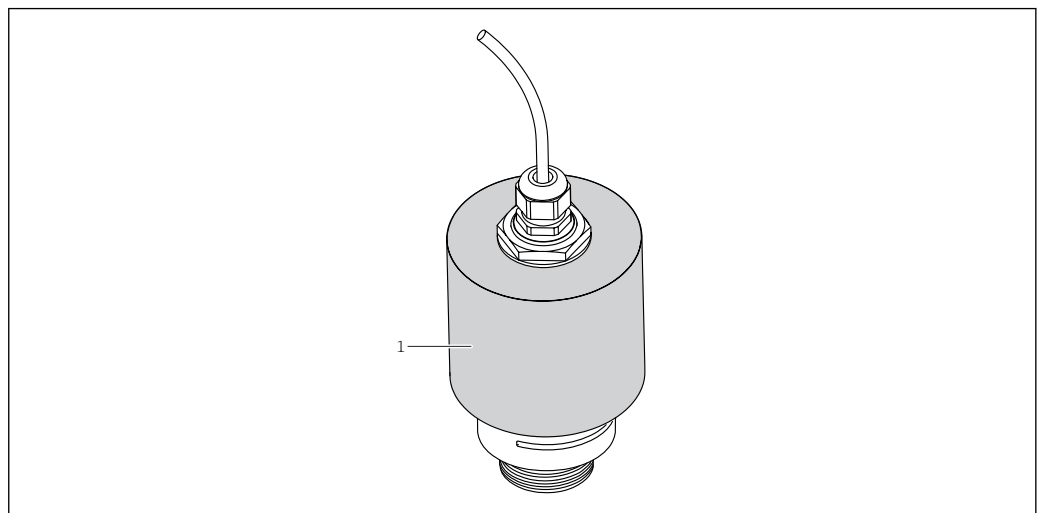
🖻 9   Weather protection cover, e.g with 40 mm (1.5") antenna

The sensor is not completely covered in the case of the 40 mm (1.5 in) antenna or the 80 mm (3 in) antenna.

The weather protection cover is available as an accessory. → 🖺 45

8.1.8   Free-field measurement with flooding protection tube

The flooding protection tube guarantees a definitive analysis of the maximum level even in the event that the sensor is completely flooded.

In free-field installations and / or in applications where there is a risk of flooding, it is recommended to use a flooding protection tube
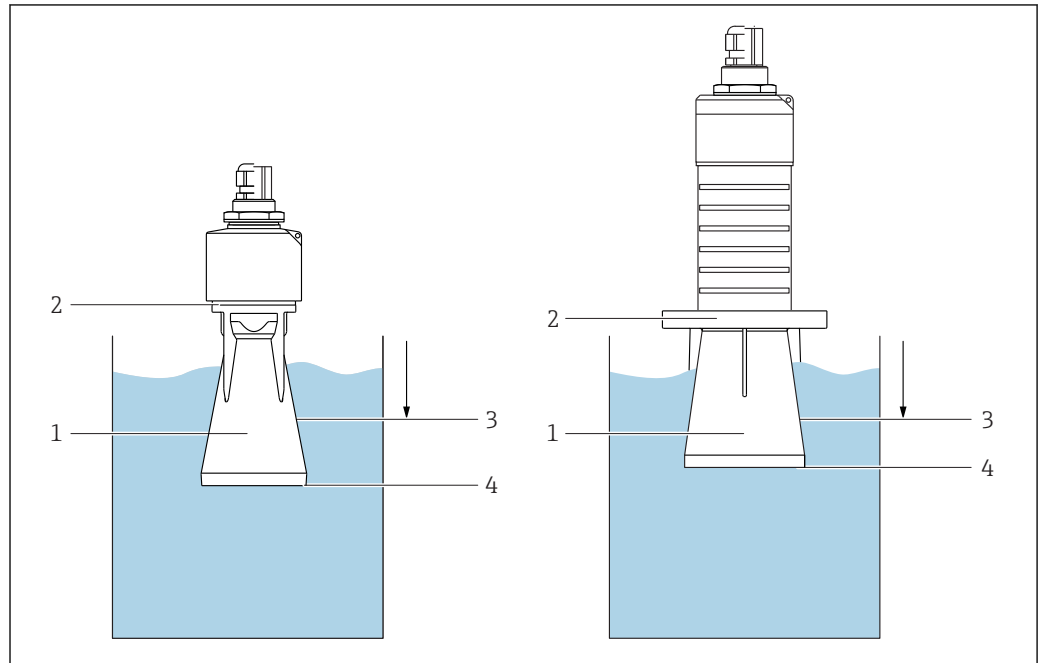
□ 10   Function of flooding protection tube

1   Air pocket
2   O-ring (EPDM) seal
3   Blocking distance
4   Max. Level

The flooding protection tube is available as an accessory. → 🖺 45

The tube is screwed directly onto the sensor and seals off the system by means of an O-ring (2) making it air-tight. In the event of flooding, the air pocket (1) that develops in the tube ensures a definitive detection of the maximum level (4) directly at the end of the tube. Due to the fact that the Blocking distance (3) is inside the tube, multiple echoes are not analyzed.

Configuring the blocking distance when using the flooding protection tube

▶ Navigate to: Main menu → Setup → Advanced setup → Blocking distance
   ↳ Enter 100 mm (4 in).

8.1.9   Installation with mounting bracket, adjustable

A0030606
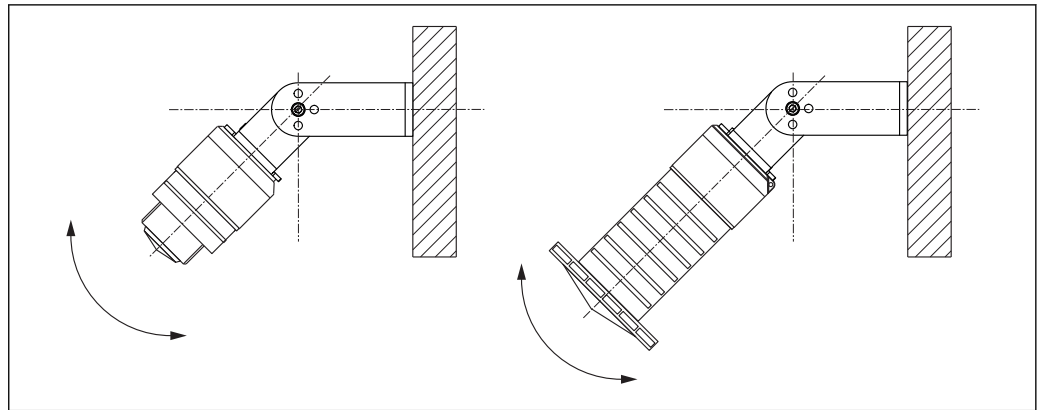
🖾 *11   Installation with mounting bracket, adjustable*

- Wall or ceiling installation is possible.
- Using the mounting bracket, position the antenna so that it is perpendicular to the product surface.

NOTICE

There is no conductive connection between the mounting bracket and transmitter housing.
Risk of electrostatic charge.
▸ Integrate the mounting bracket in the local potential equalization system.

The mounting bracket is available as an accessory. → 🖺 45

8.1.10   Cantilever installation, with pivot

A0028412
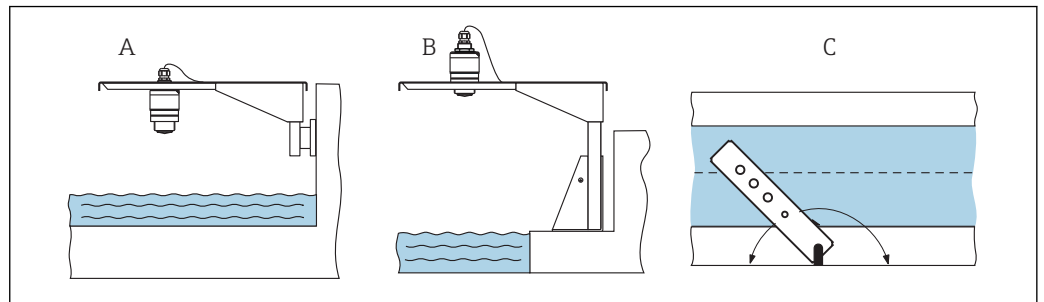
🖾 *12   Cantilever installation, with pivot*

A   Installation with cantilever and wall bracket
B   Installation with cantilever and mounting frame
C   The cantilever can be turned (e.g. in order to position the sensor over the center of the channel, for example)

The cantilever, wall bracket and mounting frame are available as accessories.
→ 🖺 45

8.1.11   Post-installation check

❑	Is the device undamaged (visual inspection)?
❑	Is the device adequately protected from wet conditions and direct sunlight?
❑	Is the device properly secured?

9 Electrical connection

9.1 Cable assignment
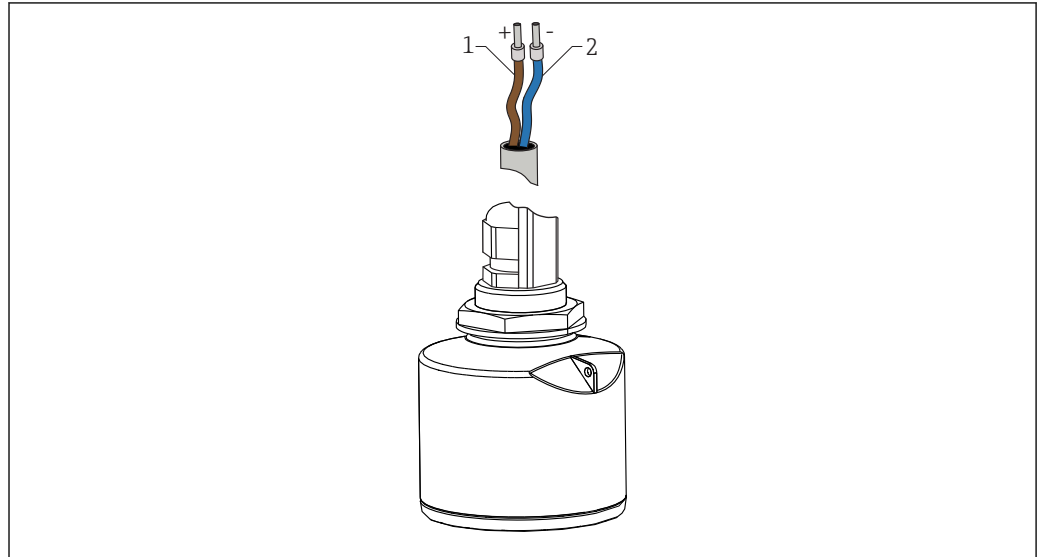
A0028954

⊡ *13   Cable assignment*

1   Plus, brown wire
2   Minus, blue wire

9.2 Supply voltage

An external power supply is necessary.

Terminal voltage U at device	Maximum load R, depending on supply voltage U_0 of power supply unit
10.5 to 30 V_{DC}2-wire	A0029226

Potential equalization
No special measures for potential equalization are required.

In the case of a device for the hazardous area, please comply with the safety instructions in the separate "Safety Instructions" (XA, ZD) document.

Various power supply units can be ordered from Endress+Hauser: see "Accessories" section → 🗎 48
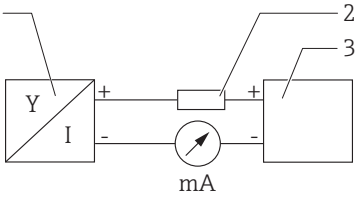
Battery operation

The sensor's *Bluetooth*® wireless technology communication can be disabled to increase the operating life of the battery.

→ 🗎 39

9.3   Connection

9.3.1   FMR20, 4 to 20 mA HART

	Circuit diagram / Description
FMR20 connection with HART communication, voltage source and 4 to 20 mA display	 🖼 *14 FMR20 block diagram, HART* *1 Micropilot FMR20* *2 HART resistance* *3 Power supply*

The HART communication resistor of 250 Ω in the signal line is always necessary in the case of a low-impedance power supply.

The voltage drop to be taken into account is:
Max. 6 V with 250 Ω communication resistor

9.3.2   FMR20 with RIA15

ℹ️ The RIA15 remote display can be ordered together with the device.

Product structure, feature 620 "Accessory enclosed":
- Option R4 "Remote display RIA15 non-hazardous area, field housing"
- Option R5 "Remote display RIA15 Ex= explosion protection approval, field housing"

📖 Alternatively it can be ordered separately as an accessory, for details: Technical Information TI01043K and Operating Instructions BA01170K

ℹ️ The RIA15 process display unit is loop-powered and does not require any external power supply.

The voltage drop to be taken into account is:
- ≤1 V in the standard version with 4 to 20 mA communication
- ≤1.9 V with HART communication
- and an additional 2.9 V if display light is used

	Circuit diagram / Description
FMR20 connection, HART communication and RIA15 **without** backlight	A0019567 🖼 *15 FMR20 block diagram, HART with RIA15 process display unit without light* *1 Micropilot FMR20* *2 Power supply* *3 HART resistance*
FMR20 connection, HART communication and RIA15 **with** backlight	A0019568 🖼 *16 FMR20 block diagram, HART with RIA15 process display unit with light* *1 Micropilot FMR20* *2 Power supply* *3 HART resistance*
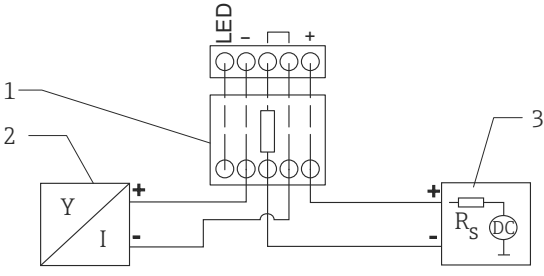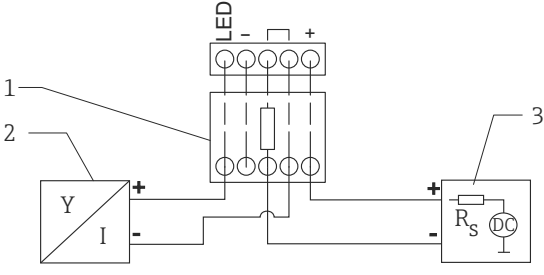
9.3.3 FMR20, RIA15 with installed HART communication resistor module

The HART communication module for installation in the RIA15 can be ordered together with the device.

Product structure, feature 620 "Accessory enclosed":
- Option R6 "HART communication resistor hazardous / non-hazardous area"
- The **voltage drop** to be taken into account is max. **7 V**

Alternatively it can be ordered separately as an accessory, for details: Technical Information TI01043K and Operating Instructions BA01170K

	Circuit diagram / Description
FMR20 connection and RIA15 **without** backlight	
	⊡ *17 FMR20 block diagram, RIA15 without light, HART communication resistor module*
	1 HART communication resistor module *2 Micropilot FMR20* *3 Power supply*
FMR20 connection and RIA15 **with** backlight	
	⊡ *18 FMR20 block diagram, RIA15 with light, HART communication resistor module*
	1 HART communication resistor module *2 Micropilot FMR20* *3 Power supply*

9.4 Post-connection check

❑	Is the device or cable undamaged (visual check)?
❑	Do the cables have adequate strain relief?
❑	Are the cable glands mounted and firmly tightened?
❑	Does the supply voltage match the specifications on the nameplate?
❑	No reverse polarity, is terminal assignment correct?
❑	Has the voltage drop across the process display unit and communication resistor been taken into account?

10   Operability

10.1   Operating concept

- 4 to 20 mA, HART
- Menu guidance with brief explanations of the individual parameter functions in the operating tool
- Optional: SmartBlue (app) via *Bluetooth*® wireless technology

10.2   Via Bluetooth® wireless technology
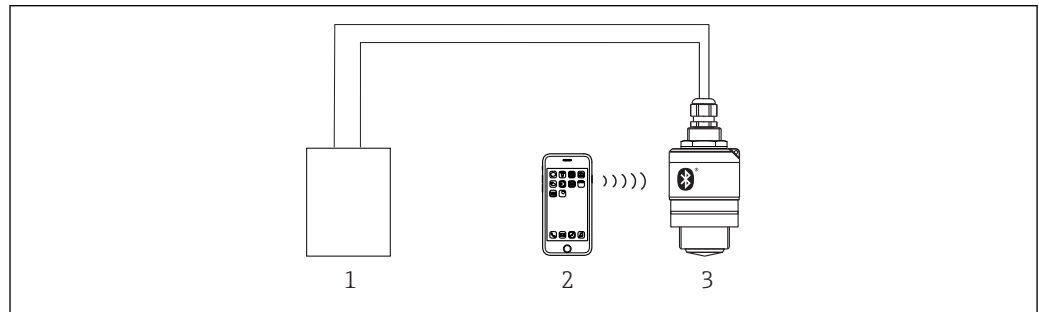
A0028895

🔲 *19   Possibilities for remote operation via Bluetooth® wireless technology*

1   Transmitter power supply unit
2   Smartphone / tablet with SmartBlue (app)
3   Transmitter with Bluetooth® wireless technology

10.3   Via HART protocol
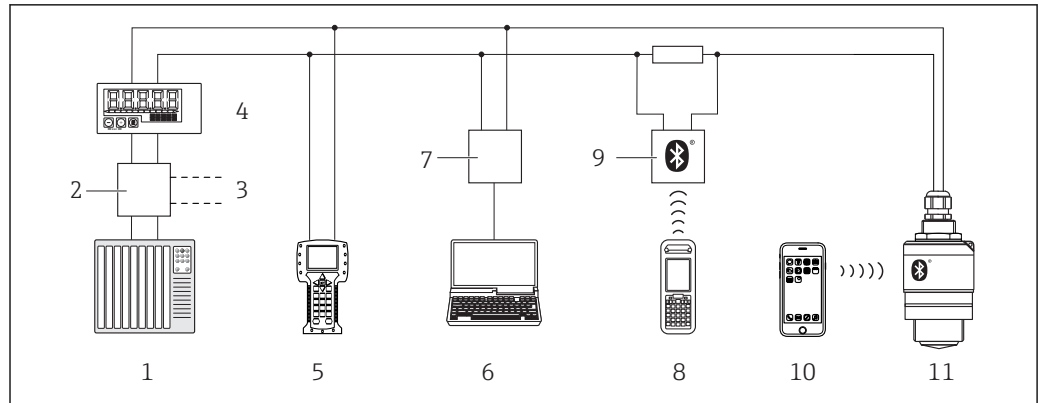
A0028894

🔲 *20   Options for remote operation via HART protocol*

1   PLC (programmable logic controller)
2   Transmitter power supply unit, e.g. RN221N (with communication resistor)
3   Connection for Commubox FXA195 and Field Communicator 375, 475
4   RIA15 loop-powered process display unit
5   Field Communicator 475
6   Computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM)
7   Commubox FXA195 (USB)
8   Field Xpert SFX350/SFX370
9   VIATOR with Bluetooth® wireless technology modem
10   Smartphone / tablet with SmartBlue (app)
11   Transmitter with Bluetooth® wireless technology

11 Commissioning and operation

11.1 Installation and function check

Make sure that all final checks have been completed before you start up your measuring point.

11.2 Operation and settings via SmartBlue (app)

SmartBlue is available as download for Android devices from the Google Play Store and for iOS devices from the iTunes Store.

If you scan the QR code, you will be brought directly to the app:

A0031189-EN

 21   Download Links

System requirements
- iOS devices: iPhone 4S or higher from iOS9.0; iPad2 or higher from iOS9.0; iPod Touch 5. Generation or higher from iOS9.0
- Android devices: from Android 4.4 KitKat and *Bluetooth*® 4.0

1. Download and install SmartBlue

2. Start SmartBlue

A0029747

3. Select device from livelist. All available devices are displayed.
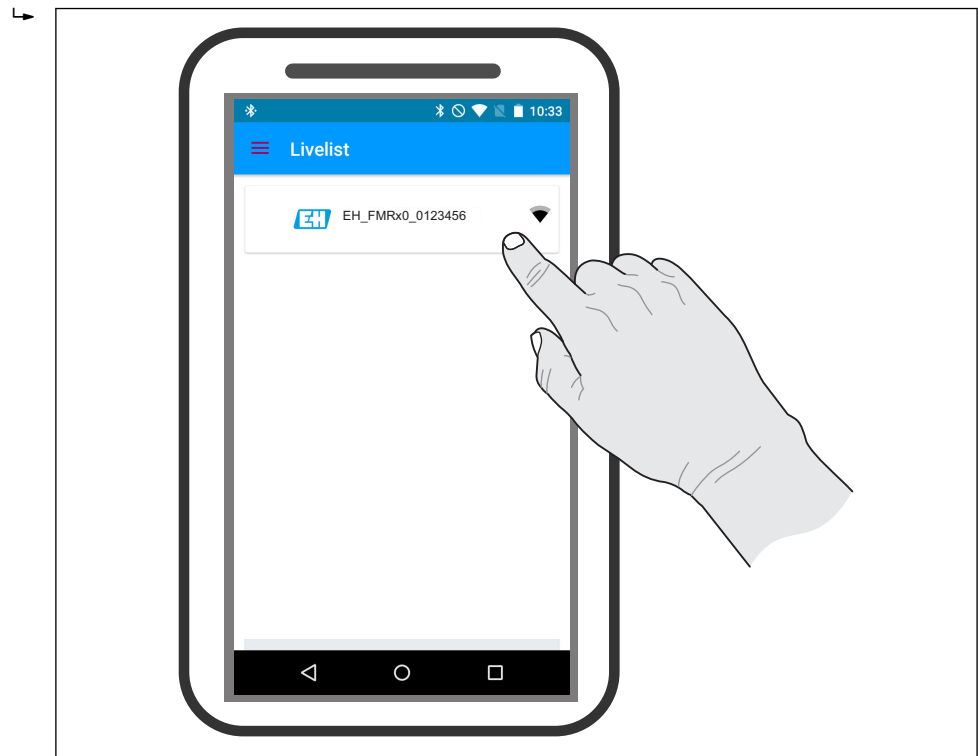
22 Livelist

4. Perform login
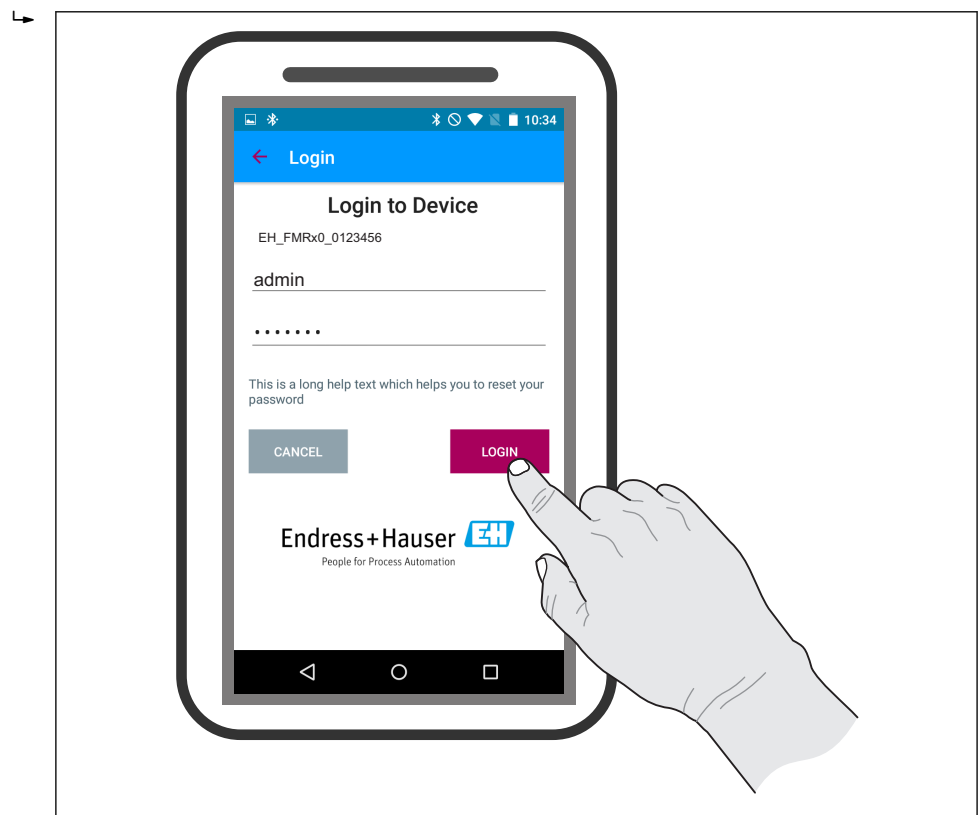
23 Login

5. Enter user name -> admin

6. Enter initial password -> device serial number

7. Change the password after logging in for the first time

8. You can drag additional information (e.g. main menu) onto the screen by swiping across the screen.

A0029504
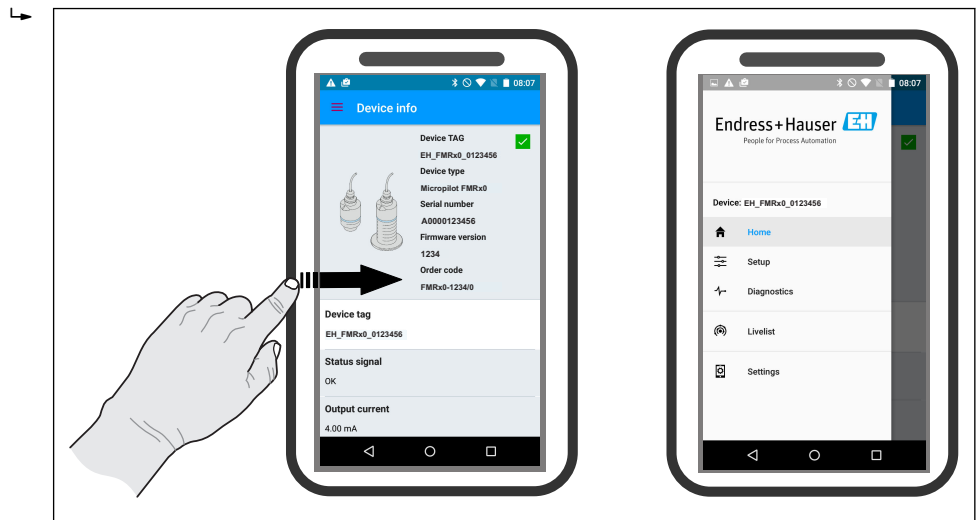
 24   Main menu

Envelope curves can be displayed and recorded

Additionally to the envelope curve, the following values are displayed:
- D = Distance
- L = Level
- A = Absolute amplitude

- At screenshots, the displayed section (zoom function) is saved
- In video sequences, always the whole area without zoom function is saved

It is also possible to send envelope curves (video sequences) using the relevant smartphone or tablet functions
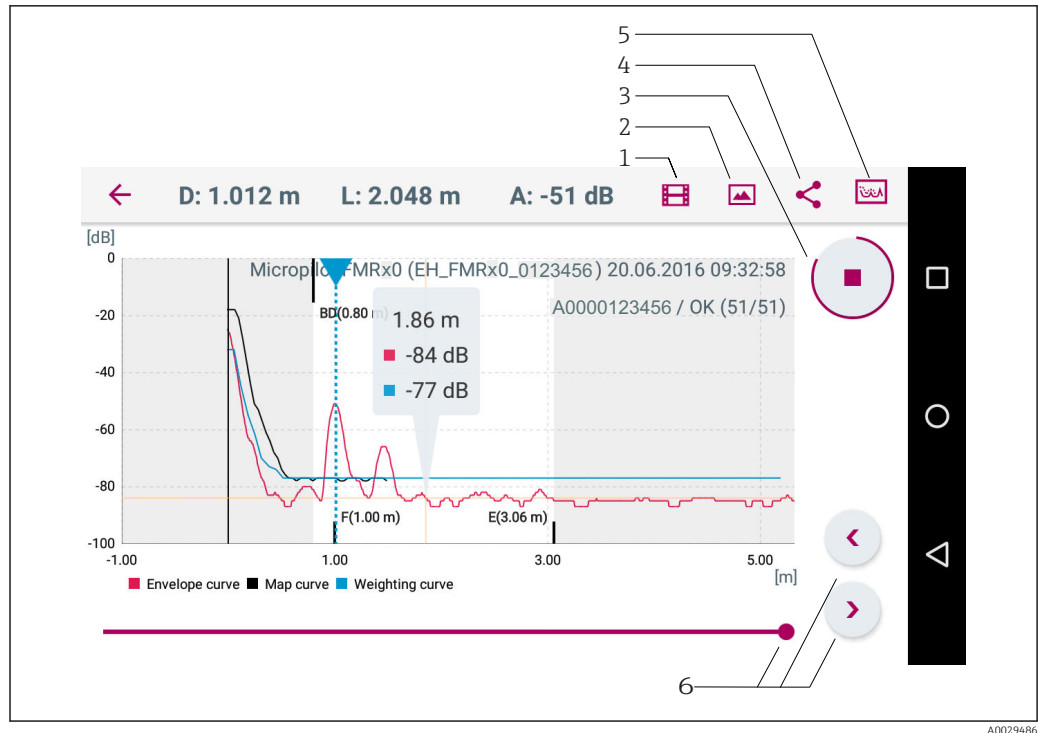
25   Android view

1   Record video
2   Create screenshot
3   Start / stop video recording
4   Send video
5   Navigate to mapping menu
6   Move time on time axis
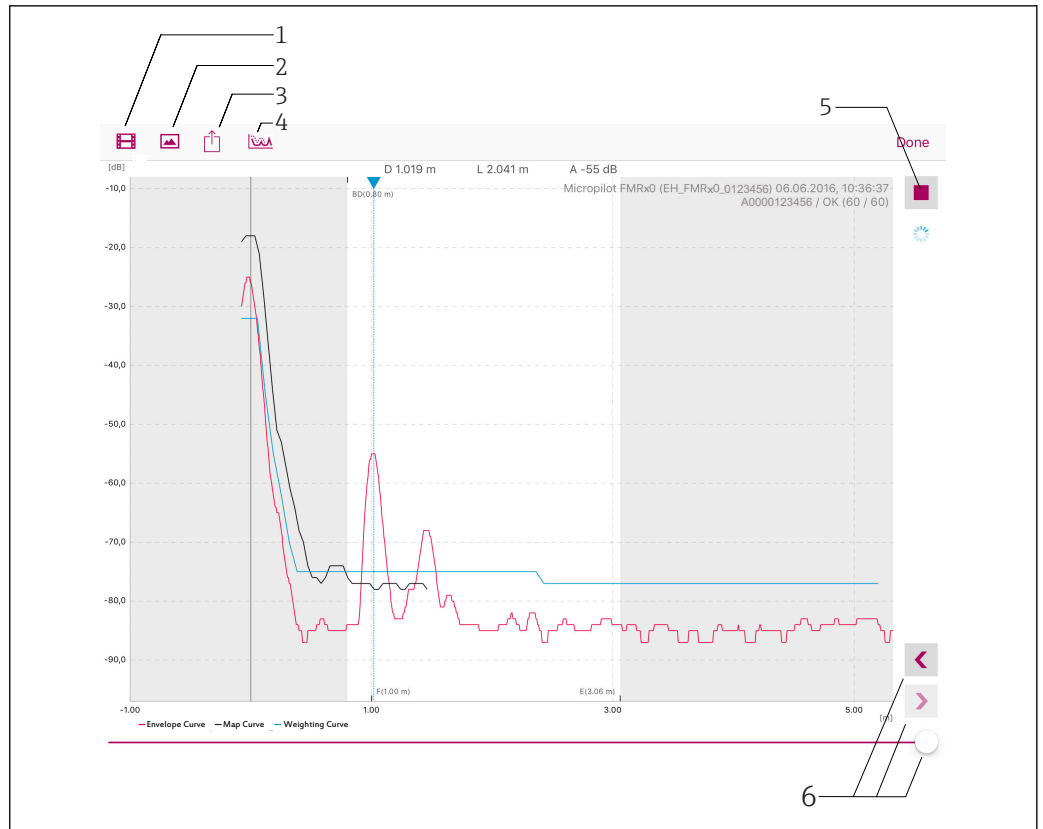
🖾 26   iOS view

1   Record video
2   Create screenshot
3   Send video
4   Navigate to mapping menu
5   Start / stop video recording
6   Move time on time axis

11.3   System integration via HART protocol

11.3.1   Overview of the Device Description Files (DD)

Manufacturer ID	17 (0x11)
Device type ID	44 (0x112c)
HART specification	7.0
DD files	Information and files under: • www.endress.com • www.hartcomm.org

11.3.2   Measured variables via HART protocol

The following measured values are assigned to the HART variables:

HART variable	Measured value
Primary variable (PV)	Level linearized (PV)
Secondary variable (SV)	Distance (SV)
Tertiary variable (TV)	Relative echo amplitude (TV)
Quaternary variable (QV)	Temperature (QV)

11.4   Operation and settings via RIA15
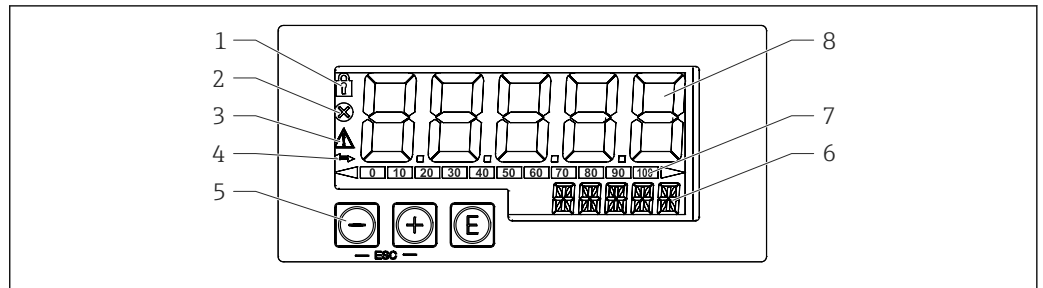
A0017719

◧ 27   Display and operating elements of the process display unit

1   Symbol: operating menu disabled
2   Symbol: error
3   Symbol: warning
4   Symbol: HART communication active
5   Operating keys "-", "+", "E"
6   14-segment display for unit/TAG
7   Bar graph with indicators for under range and over range
8   5-digit 7-segment display for measured value, digit height 17 mm (0.67 in)

The device is operated using three operating keys on the front of the housing. The device setup can be disabled with a 4-digit user code. If the setup is disabled, a padlock symbol appears on the display when an operating parameter is selected.

ⓔ A0017716	Enter key; calling up the operating menu, confirming the option/setting parameters in the operating menu
⊕ A0017715	Selecting and setting/changing values in the operating menu; pressing the '-' and '+' keys simultaneously takes the user back up a menu level. The configured value is not saved.
⊖ A0017714	

11.4.1   Operating functions

The operating functions of the process display unit are divided into the following menus. The individual parameters and settings are described in the "Commissioning" section.

ℹ If the operating menu is disabled by means of a user code, the individual menus and parameters can be displayed but not changed. To change a parameter, the user code must be entered. As the display unit can only display digits in the 7-segment display and not alphanumeric characters, the procedure for number parameters is different to that for text parameters. If the operating position contains only numbers as parameters, the operating position is displayed in the 14-segment display and the configured parameter is displayed in the 7-segment display. To edit, press the 'E'-button followed by the user code. If the operating position contains text parameters, only the operating position is initially displayed in the 14-segment display. If the 'E' button is pressed again, the configured parameter is displayed in the 14-segment display. To edit, press the '+' button followed by the user code.

Setup (SETUP)	Basic device settings
Diagnostics (DIAG)	Device information, display of error messages
Expert (EXPRT)	Expert settings for device setup. The Expert menu is protected from editing by an access code (default 0000).

11.4.2 Operating modes

The process display unit can be used in two different operating modes:

- 4 to 20 mA mode:
  In this operating mode, the process display unit is incorporated into the 4 to 20 mA current loop and measures the transmitted current. The variable calculated based on the current value and range limits is displayed in digital form on the 5-digit LCD. In addition, the associated unit and a bar graph can be displayed. In this mode of operation, the measured value corresponds to 0 to 100 %.
- HART mode:
  The display unit is powered via the current loop.
  The FMR20 can be adjusted under the "Setup Level" menu (see operating matrix). The measured value displayed corresponds to the distance measured or, if linearization is enabled, to a percentage value.
  HART communication operates according to the master/slave principle.
  In the HART loop, the process display unit has the option of functioning either as a primary master or as a secondary master (default). When it functions as a master, the device can read process values from the measuring device and display them.
  In HART mode, the process display unit can show up to four device variables of a multivariable measuring device. These variables are referred to as the Primary Variable (PV), Secondary Variable (SV), Tertiary Variable (TV) and Quaternary Variable (QV). These variables are placeholders for measured values that can be retrieved using HART communication.

As a general rule, the sensor is a slave and transmits information only if a request has been made by the master. A HART loop can have a maximum of two HART masters at any one time. With these HART masters, a distinction is made between the primary master (e.g. the distributed control system) and the secondary master (e.g. handheld terminal for local operation of the measuring devices). The two masters in the loop/in the network cannot be masters of the same type, e.g. they cannot be two "secondary masters". If a third HART master is added to the network, one of the other masters must be disabled; otherwise a collision occurs in the network. If the process display unit (RIA15) is operating as a "secondary master", for example, and another "secondary master" (e.g. a handheld device) is added to the network, the device interrupts HART communication as soon as it detects the presence of another "secondary master". The display alternates between error message C970 "Multi master collision" and "- - -". A measured value is not displayed in this case. The device leaves the HART loop for 30 seconds and then tries to re-establish HART communication once again. Once the additional "secondary master" is removed from the network, the device continues communication and displays the measured values of the sensor/actor once more.

11.4.3 Operating matrix

After power-up:

▶ Activate the ⓔ key x2
  ↳ The menu "Level" is available

MENU SETUP -> LEVEL		
Parameters	**Values**	**Description**
UNIT	m	Select the displayed unit
	FT	
EMPTY	Numeric value 0 to 100 m, default 2 m	Empty calibration using keys -,+,E. Enter distance from process connection to min. level
FULL	Numerical value 0.001 to 100 m, default 2 m	Full calibration using keys -,+,E. Enter span from max. level to min. level

MENU SETUP -> LEVEL		
Parameters	**Values**	**Description**
DIST	Measured value (distance measured)	
MAP	DI OK	To be selected if the distance displayed matches the actual distance. The device then records a mapping.
	MAN	To be selected if the range of mapping is to be defined manually in the 'Mapping end point' parameter. A comparison between the distance displayed and the actual distance is not necessary in this case. It takes about 20 s until the mapping is active.
	DI UN	To be selected if the actual distance is unknown. No mapping is recorded.
	FACT	To be selected if the present mapping curve (if one exists) is to be deleted. The device returns to the "Confirm distance" parameter and a new mapping can be recorded.
	ⓘ The end point of the current mapping is not indicated in the RIA 15. If a new mapping is recorded ("DI OK" or "MAN"), the new mapping is superimposed on the existing mapping. In order to bring about a defined state, perform a factory mapping ("FACT") if required. This deletes any previous mapping.	

Using the following operating matrix, a display in percent can be set. To do this, select "Mode" parameter => 4-20 and "Unit" parameter => %

MENU SETUP			
Parameters	**Values**	**visible at**	**Description**
MODE	**4-20** HART		Select the operating mode for the display unit 4-20: The circuit's 4 to 20 mA signal is displayed. HART: Up to four HART variables (PV, SV, TV, QV) per sensor/actuator can be displayed in the loop.
DECIM	0 DEC **1 DEC** 2 DEC 3 DEC 4 DEC	MODE = 4-20	Number of decimal places for display
SC__4	Numerical value −19 999...99 999 Default: **0.0**	MODE = 4-20	5-digit value (number of decimal places as configured under DECIM) for scaling the measured value at 4 mA Example: SC__4 = 0.0 => 0.0 displayed for 4 mA measuring current The unit selected under UNIT is used to display the value.
SC_20	Zahlenwert −19 999...99 999 Default: **100.0**	MODE = 4-20	5-digit value (number of decimal places as configured under DECIM) for scaling the measured value at 20 mA Example: SC__20 = 100.0 => 100.0 displayed for 20 mA measuring current The unit selected under UNIT is used to display the value.

MENU SETUP			
Parameters	Values	visible at	Description
UNIT	**%** ℃ ℉ K USER	MODE = 4-20	Use this function to select the unit for displaying the value. If "USER" is selected, a user-defined unit can be entered in the TEXT parameter.
TEXT	Customized text, 5-digit	MODE = 4-20	User-defined unit, only visible if the "USER" option has been selected under UNIT.

Any additional settings such as linearizations must be made using FieldCare, DeviceCare or SmartBlue.

Additional information is available in the RIA15 Operating Instructions BA01170K.

11.5   Configuring level measurement via operating software

A0028417
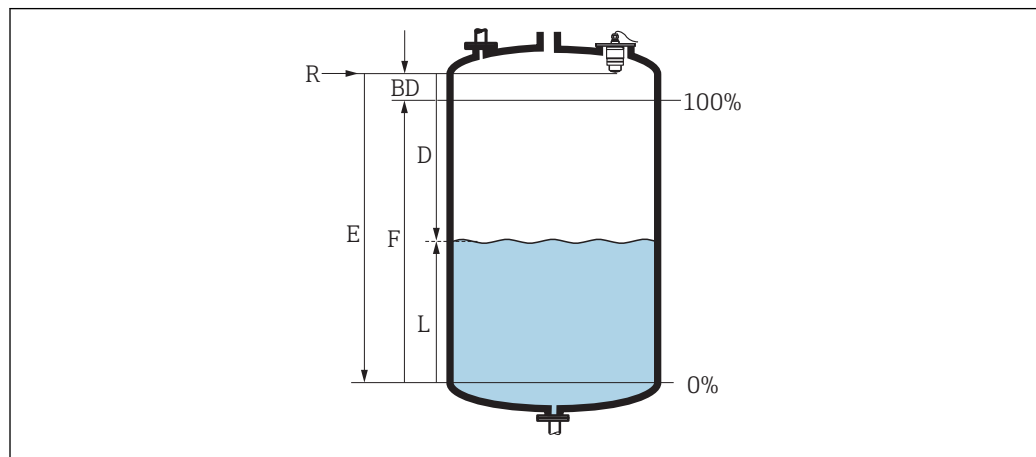
⊡ 28   *Configuration parameters for level measurement in liquids*

R   *Reference point of measurement*
D   *Distance*
L   *Level*
E   *Empty calibration (= zero point)*
F   *Full calibration (= span)*
BD   *Blocking distance*

1. Navigate to: Setup → Device tag
   ↳ Enter device tag

2. Navigate to: Setup → Distance unit
   ↳ Select unit of length for distance calculation

3. Navigate to: Setup → Empty calibration
   ↳ Specify empty distance E (distance from reference point R to minimum level)

4. Navigate to: Setup → Full calibration
   ↳ Specify full distance F (span: max. level - min. level)

5. Navigate to: Setup → Distance
   ↳ Shows the distance D that is currently measured from the reference point (lower edge of flange / last thread of the sensor) to the level

6. Navigate to: Setup → Level
   ↳ Shows the level L measured

7. Navigate to: Setup → Signal quality
   ↳ Displays the signal quality of the analyzed level echo

8. Navigate to: Setup → Confirm distance
   ↳ Compare the distance displayed with the actual value to start recording an interference echo map

9. Navigate to: Setup → Mapping end point
   ↳ This parameter determines the distance up to which the new mapping is to be recorded

10. Navigate to: Setup → Present mapping
    ↳ Displays the distance up to which a mapping has already been recorded

11.5.1   Displaying level value as %

In combination Full calibration with Empty calibration and given 4 to 20 mA output signal, the level value for 4 mA (=Empty) and the level value for 20 mA (=Full) can be determined directly in the unit of length used.

The Full calibration can be used to calculate a standardized signal proportionate to the level e.g. 0 to 100 % level. The two basic values of 0 % and 100 % can in turn be assigned directly to the analog output values 4 mA and 20 mA.

X	Level in m	Y	Output signal as %
X1	0.00 m (0.00 ft)	Y1	0 %
X2	Value F (=Full)	Y2	100 %

Configuration using DeviceCare or FieldCare

1. Navigate to: Setup → Advanced setup
   ↳ Select table as the linearization type

2. Call up the linearization table

3. X1 = Specify level value in m / ft for 0 %

4. X2 = X1 = Specify level value in m / ft for 100 %

5. Confirm table as the linearization type

Configuration using SmartBlue

1. Navigate to: Main menu → Setup → Advanced setup → Linearization type
   ↳ Select table as the linearization type

2. Select linearization table

3. X1 = Specify level value in m / ft for 0 %

4. X2 = Specify level value in m / ft for 100 %

5. Activate linearization table

11.6   Configuring Flow measurement via operating software

11.6.1   Installation conditions for Flow measurement

- In order to realize a flow measurement, a channel or a weir is required
- Place the sensor in the middle of the channel or weir
- Align the sensor perpendicular to the water surface
- Use a weather protection cover to protect the device against sunlight and rain
- We recommend the use of the accessories "flooding protection tube"
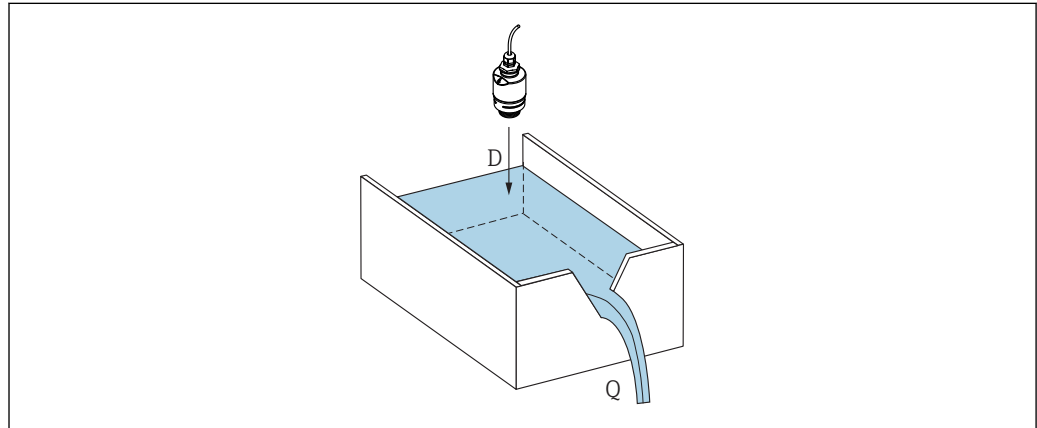
A0028414

🖼 29   Configuration parameters for flow measurement in liquids

D   Distance
Q   Flow of weirs or flumes (from the level by linearization calculated)

11.6.2   Configuring Flow measurement
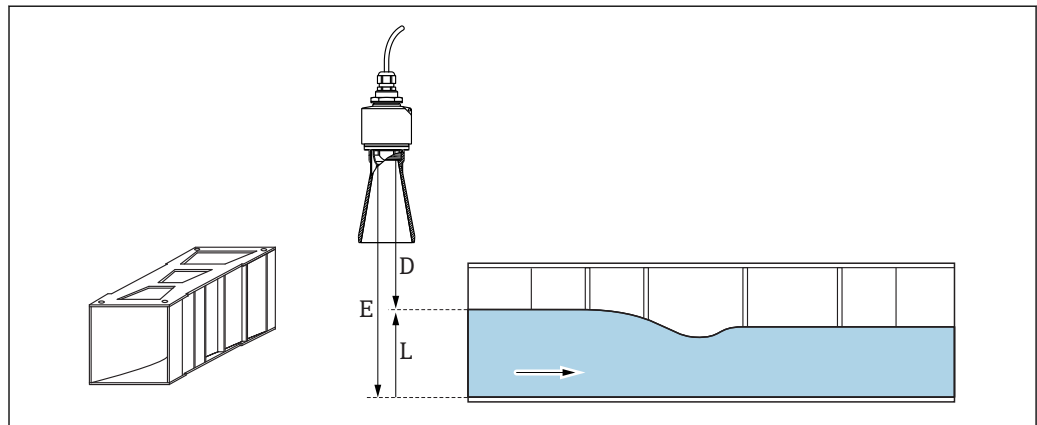
A0030325

🖼 30   Sample: Khafagi Venturi flume

E   Empty calibration
D   Distance
L   Level
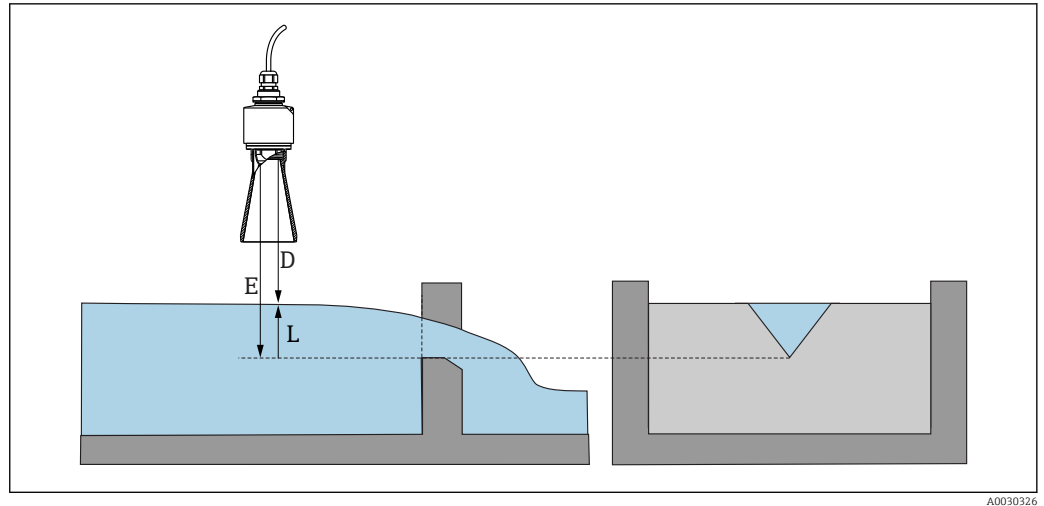
31   Sample: Notch weir

E   Empty calibration
D   Distance
L   Level

1. Navigate to: Setup → Device tag
   ↳ Enter device tag.

2. Navigate to: Setup → Distance unit
   ↳ Select unit of length for distance calculation.

3. Navigate to: Setup → Empty calibration
   ↳ Specify empty distance E (distance from reference point R to minimum level)
      At flumes the zero point is the bottom at the narrowest point.

4. Navigate to: Setup → Full calibration
   ↳ Specify full distance F (span: max. level - min. level)

5. Navigate to: Setup → Distance
   ↳ Shows the distance D that is currently measured from the reference point (lower
      edge of sensor) to the level.

6. Navigate to: Setup → Level
   ↳ Shows the level L measured.

7. Navigate to: Setup → Signal quality
   ↳ Displays the signal quality of the analyzed level echo.

8. Navigate to: Setup → Confirm distance
   ↳ Compare the distance displayed with the actual value to start recording an
      interference echo map.

9. Navigate to: Setup → Mapping end point
   ↳ This parameter determines the distance up to which the new mapping is to be
      recorded.

10. Navigate to: Setup → Present mapping
    ↳ Displays the distance up to which a mapping has already been recorded.

Linearization via DeviceCare / FieldCare

1. Select Linearization Table

2. Start QH Program

3. Save calculated data and then write to the device

Linearization via SmartBlue

1. Navigate to: Setup → Advanced setup
   ↳ Linearization table

2. Select unit for lenght

3. Select unit displayed after linearization

4. Linearization type Select table

5. Select table mode "manuel"

6. Manually insert value pairs (maximum of 32) into table. Table has to be in mode "diasabled"

7. Enable table

11.7   Data access - Security

11.7.1   Software locking via access code in FieldCare / DeviceCare

The configuration data can be write-protected using an access code (software locking).

▸ Navigate to: Setup → Advanced setup → Administration → Define access code →
   Confirm access code

The entered code must be different from "0000" and the last release code.

Once the access code has been defined, write-protected devices can be switched to
maintenance mode only if the access code is entered in the **Enter access code** parameter.
If the factory setting is not changed or if 0000 is entered, the device is in maintenance
mode and its configuration data are therefore **not** write-protected and can be changed at
any time.

11.7.2   Unlocking via FieldCare / DeviceCare

▸ Navigate to: Setup → Advanced setup → Enter access code

11.7.3   Software locking via access code in SmartBlue

The configuration data can be write-protected using an access code (software locking).

▸ Navigate to: Setup → Advanced setup → Administration → Administration1 → Define
   access code → Confirm access code

The entered code must be different from "0000" and the last release code.

Once the access code has been defined, write-protected devices can be switched to
maintenance mode only if the access code is entered in the **Enter access code** parameter.
If the factory setting is not changed or if 0000 is entered, the device is in maintenance
mode and its configuration data are therefore **not** write-protected and can be changed at
any time.

11.7.4   Unlocking via SmartBlue

▸ Navigate to: Setup → Advanced setup → Zugriffsrechte Bediensoftware → Enter access
   code

11.7.5   Bluetooth® wireless technology

**Signal transmission via Bluetooth® wireless technology is done by an ecryption
method tested by the Fraunhofer-Institut (Third Party).**
- Without the SmartBlue App, the device is not visible via *Bluetooth*® wireless technology
- Only one point-to-point connection between **one** sensor and **one** smartphone or tablet is
  established.
- The *Bluetooth*® wireless technology interface can be deactivated in SmartBlue, FieldCare
  and DeviceCare

Deactivate Bluetooth® wireless technology interface

▸ Navigate to: Setup → Communication → Bluetooth configuration → Bluetooth mode
   ↳ Switch off *Bluetooth*® wireless technology interface. "Off" position disables remote
      access via app

Re-activate Bluetooth® wireless technology interface

If *Bluetooth*® wireless technology interface was disabled, it can be re-activated anytime via FieldCare / DeviceCare

▶ Navigate to: Setup → Communication → Bluetooth configuration → Bluetooth mode
  ↳ Switch on *Bluetooth*® wireless technology interface. "On" position enables remote access via app

The *Bluetooth*® wireless technology interface can also be re-enabled after performing the following recovery sequence:

1. Connect device to voltage supply
   ↳ After a waiting time of 10 minutes, a time window of 2 minutes opens
2. During this time window it is possible to re-activate the FMR20*Bluetooth*® wireless technology interface using SmartBlue (app)
3. Navigate to: Setup → Communication → Bluetooth configuration → Bluetooth mode
   ↳ Switch on *Bluetooth*® wireless technology interface. "On" position enables remote access via app

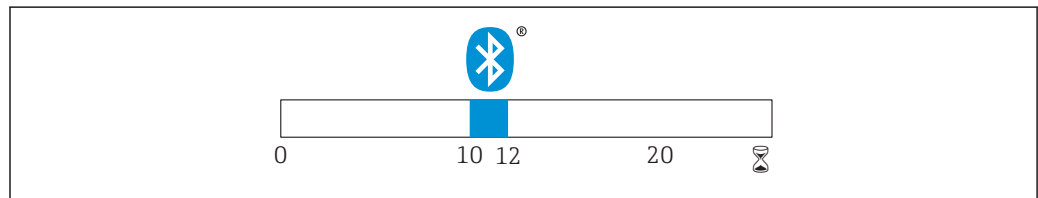*32 Timeline for Bluetooth® wireless technology recovery sequence , time in minutes*

11.7.6   Locking RIA15

The device setup can be disabled with a 4-digit user code

📖 Additional information is available in the RIA15 Operating Instructions BA01170K

12 Diagnostics and troubleshooting

12.1 General trouble shooting

12.2 General errors

Error	Possible cause	Remedy
Device is not responding.	Supply voltage does not match the value indicated on the nameplate	Apply correct voltage
	The polarity of the supply voltage is wrong	Correct the polarity
	Connecting cables are not in contact with the terminals	Check the connection of the cables and correct if necessary
HART communication is not working	Communication resistor missing or incorrectly installedand.	Install the communication resistor (250 Ω) correctly
	Commubox is not properly connected	Connect Commubox correctly
	Commubox is not set to "HART"	Set Commubox selector switch to "HART"
Device measures incorrectly	Configuration error	• Check and correct the parameter configuration • Perform mapping
Display values not plausible (linearization)	SmartBlue and FieldCare/DeviceCare simultaneously active	Log off FieldCare/DeviceCare and disconnect or Log off SmartBlue and disconnect (connection via SmartBlue has priority)
Linearized output value not plausible	Linearization error	SmartBlue : Check linearization table FieldCare/DeviceCare : Check linearization table, check tank selection in linearization module
RIA15 no display	The polarity of the supply voltage is wrong	Correct the polarity
	Connecting cables are not in contact with the terminals	Check the connection of the cables and correct if necessary
	RIA15 defective	Replace RIA15
RIA15 start sequence keeps running through	Supply voltage too low	• Increase supply voltage • Switch off backlight
Device not accessible via SmartBlue	No Bluetooth connection	Enable Bluetooth function on smartphone or tablet
		Bluetooth function of sensor disabled, perform recovery sequence
		Device already linked to another smartphone / tablet
Login via SmartBlue not possible	Device is being put into operation for the first time	Enter initial password (device serial number) and change.
Device cannot be operated via SmartBlue	Incorrect password entered	Enter correct password
	Password forgotten	Contact Endress+Hauser Service

12.3 Diagnostic event

12.3.1 Diagnostic event in the operating tool

If a diagnostic event is present in the device, the status signal appears in the top left status in the operating tool along with the corresponding symbol for event level in accordance with NAMUR NE 107:

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

Calling up remedy information

1. Navigate to the **Diagnostics** menu.
   ↳ In the **Actual diagnostics** parameter, the diagnostic event is shown with event text

2. On the right in the display range, hover the cursor over the **Actual diagnostics** parameter.
   ↳ A tool tip with remedy information for the diagnostic event appears

12.3.2 Diagnostic event in the RIA15

In RIA15 a diagnostic event of FMR20 is not directly displayed. On RIA15 the error F911 is displayed only when the FMR20 issues an alarm.

Display the FMR20 diagnostic event in RIA15

1. Navigate to: DIAG/TERR
2. press Ⓔ
3. press ⊕
4. press Ⓔ
5. press 3x ⊕
6. press Ⓔ
   ↳ The diagnostic event from FMR20 appears on the RIA15 display

12.4 List of diagnostic events

Diagnostic number	Short text	Remedy instructions	Status signal [from the factory]	Diagnostic behavior [from the factory]
Diagnostic of electronic				
270	Main electronic failure	Exchange device	F	Alarm
271	Main electronic failure	1. Restart device 2. If failure remains, exchange device.	F	Alarm
272	Main electronic failure	1. Restart device 2. Check enviroment for strong EMC fields 3. If failure remains, exchange device.	F	Alarm
283	Memory content	1. Transfer data or reset device 2. Contact service	F	Alarm

Diagnostic number	Short text	Remedy instructions	Status signal [from the factory]	Diagnostic behavior [from the factory]
Diagnostic of configuration				
410	Data transfer	1. Check connection 2. Retry data transfer	F	Alarm
411	Up-/download active	Up-/download active, please wait	C	Warning
435	Linearization	Check linearization table	F	Alarm
438	Dataset	1. Check data set file 2. Check device configuration 3. Up- and download new configuration	M	Warning
441	Current output 1	1. Check process 2. Check current output settings	S	Warning
491	Current output 1 simulation	Deactivate simulation	C	Warning
585	Simulation distance	Deactivate simulation	C	Warning
586	Record map	Recording of mapping please wait	C	Warning
Diagnostic of process				
801	Energy too low	Increase supply voltage	S	Warning
825	Operating temperature	1. Check ambient temperature 2. Check process temperature	S	Warning
941	Echo lost	Check parameter 'Evaluation sensitivity'	S	Warning
941	Echo lost		F	Alarm

12.5   Overview of information events

Info number	Info name
I1000	--------(Device ok)

13   Maintenance

No special maintenance work is required.

13.1   Exterior cleaning

When cleaning the exterior, always use cleaning agents that do not attack the device surfaces or the seals.

13.2   Seals

The process seals of the sensor (at the process connection) should be replaced periodically. The interval between changes depends on the frequency of the cleaning cycles, the cleaning temperature and the medium temperature.

14   Repair

14.1   General notes

14.1.1   Repair concept

The Endress+Hauser repair concept is devised in such a way that repairs can only be carried out through device replacement.

14.1.2   Replacing a device

After the device has been replaced, parameters can be loaded onto the device once again via FieldCare/DeviceCare.

Condition: The configuration of the old device must have been saved using FieldCare/DeviceCare.

You can continue to measure without performing a new calibration. Only interference echo suppression may need to be carried out once again.

14.1.3   Return

The measuring device must be returned if the wrong device has been ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with 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

14.1.4   Disposal

When disposing, separate and recycle the device components based on the materials.

15   Accessories

15.1   Overview

Device-specific accessories

Accessories	Description	Order number
Weather protection cover	Material: PVDF ℹ The sensor is not completely covered.	52025686 Product structure, feature 620 "Accessory enclosed", option R1 "Weather protection cover"
Securing nut G1-1/2	Suitable for use with devices with G 1-1/2 and MNPT 1-1/2 process connection. Material: PC	52014146
Securing nut G2	Suitable for use with devices with G 2 and MNPT 2 process connection at front. Material: PC	52000598
Flooding protection tube 40 mm (1.5 in) Antenne	Material: metallized PBT-PC	71325090 Product structure, feature 620 "Accessory enclosed", option R7 "Flooding protection tube, metallized PBT-PC suitable for 40 mm (1.5 in) antenna with G1-1/2 process connection on front
Flooding protection tube 80 mm (3 in) antenna	Material: metallized PBT-PC	71327051 Product structure, feature 620 "Accessory enclosed", option R8 "Flooding protection tube, metallized PBT-PC suitable for 80 mm (3 in) antenna
Mounting bracket, adjustable	Consists of: • Mounting bracket: 316L (1.4404) • Angle bracket: 316L (1.4404) • Screws: A4 • Retaining rings: A4	71325079 Product structure, feature 620 "Accessory enclosed", option R3 "Mounting bracket, adjustable, 316L"
Angle bracket for wall mount	Suitable for G 1-1/2 and MNPT 1-1/2 process connection Material: 316Ti (1.4571)	942669-0000
	Suitable for G 2 and MNPT 2 process connection Material: 316Ti (1.4571)	942669-0001
Ceiling mounting bracket	Material: 316L (1.4404)	71093130 Product structure, feature 620 "Accessory enclosed", option R2 "Ceiling mounting bracket, 316L"
RIA15 in the field housing	Remote display RIA15 non-hazardous	Product structure, feature 620 "Accessory enclosed", option R4 "Remote display RIA15 non-hazardous area, field housing"
	Remote display RIA15 hazardous	Product structure, feature 620 "Accessory enclosed", option R5 "Remote display RIA15 Ex= explosion protection approval, field housing"
HART communication resistor	HART communication resistor, hazardous / non-hazardous area, for use with RIA15	Product structure, feature 620 "Accessory enclosed", option R6 "HART communication resistor hazardous / non-hazardous area"

Device-specific accessories - flanges

Accessories	Description	Order number
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: Thread ASME MNPT1-1/2 Product structure, feature 100 "Process Connection Front Side" option: VEE	FAX50-XIGG Product structure, feature 620 "Accessory enclosed", option RA "UNI flange 2"/ DN50/50, PP, front side"
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: Thread ISO228 G1-1/2 Product structure, feature 100 "Process Connection Front Side" option: WFE	FAX50-XIGC Product structure, feature 620 "Accessory enclosed", option RA "UNI flange 2"/ DN50/50, PP, front side"
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: Thread ASME MNPT2 Product structure, feature 100 "Process Connection Front Side" option: VFE	FAX50-XIGH Product structure, feature 620 "Accessory enclosed", option RA "UNI flange 2"/ DN50/50, PP, front side"
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: ThreadISO228 G2 Product structure, feature 100 "Process Connection Front Side" option: WGE	FAX50-XIGD Product structure, feature 620 "Accessory enclosed", option RA "UNI flange 2"/ DN50/50, PP, front side"
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: Thread ASME MNPT1 Product structure, feature 95 "Process Connection Rear Side" option: VCE	FAX50-XIGF Product structure, feature 620 "Accessory enclosed", option RB "UNI flange 2"/ DN50/50, PP, rear side"
UNI flange 2"/ DN50/50, PP	Suitable for devices with process connection: Thread G1 ISO228 Product structure, feature 95 "Process Connection Rear Side" option: WDE	FAX50-XIGB Product structure, feature 620 "Accessory enclosed", option RB "UNI flange 2"/ DN50/50, PP, rear side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread ASME MNPT1-1/2 Product structure, feature 100 "Process Connection Front Side" option: VEE	FAX50-XJGG Product structure, feature 620 "Accessory enclosed", option RD "UNI flange 3"/ DN80/80, PP, front side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread ISO228 G1-1/2 Product structure, feature 100 "Process Connection Front Side" option: WFE	FAX50-XJGC Product structure, feature 620 "Accessory enclosed", option RA "UNI flange 2"/ DN50/50, PP, front side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread ASME MNPT2 Product structure, feature 100 "Process Connection Front Side" option: VFE	FAX50-XJGH Product structure, feature 620 "Accessory enclosed", option RD "UNI flange 3"/ DN80/80, PP, front side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread ISO228 G2 Product structure, feature 100 "Process Connection Front Side" option: WGE	FAX50-XJGD Product structure, feature 620 "Accessory enclosed", option RD "UNI flange 3"/ DN80/80, PP, front side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread ASME MNPT1 Product structure, feature 95 "Process Connection Rear Side" option: VCE	FAX50-XJGF Product structure, feature 620 "Accessory enclosed", option RE "UNI flange 3"/ DN80/80, PP, rear side"
UNI flange 3"/ DN80/80, PP	Suitable for devices with process connection: Thread G1 ISO228 Product structure, feature 95 "Process Connection Rear Side" option: WDE	FAX50-XJGB Product structure, feature 620 "Accessory enclosed", option RE "UNI flange 3"/ DN80/80, PP, rear side"

Accessories	Description	Order number
UNI flange 4"/ DN100/100,PP	Suitable for devices with process connection: Thread ASME MNPT1-1/2 Product structure, feature 100 "Process Connection Front Side" option: VEE	FAX50-XKGG Product structure, feature 620 "Accessory enclosed", option RG "UNI flange 4"/ DN100/100,PP, front side"
UNI flange 4"/ DN100/100,PP	Suitable for devices with process connection: Thread ISO228 G1-1/2 Product structure, feature 100 "Process Connection Front Side" option: WFE	FAX50-XKGC Product structure, feature 620 "Accessory enclosed", option RG "UNI flange 4"/ DN100/100,PP, front side"
UNI flange 4"/ DN100/100,PP	Suitable for devices with process connection: Thread ASME MNPT2 Product structure, feature 100 "Process Connection Front Side" option: VFE	FAX50-XKGH Product structure, feature 620 "Accessory enclosed", option RG "UNI flange 4"/ DN100/100,PP, front side"
UNI flange 4"/ DN100/100,PP	Suitable for devices with process connection: Thread ISO228 G2 Product structure, feature 100 "Process Connection Front Side" option: WGE	FAX50-XKGD Product structure, feature 620 "Accessory enclosed", option RG "UNI flange 4"/ DN100/100,PP, front side"
UNI flange 4"/ DN100/100, PP	Suitable for devices with process connection: Thread ASME MNPT1 Product structure, feature 95 "Process Connection Rear Side" option: VCE	FAX50-XKGF Product structure, feature 620 "Accessory enclosed", option RH "UNI flange 4"/ DN100/100,PP, rear side"
UNI flange 4"/ DN100/100, PP	Suitable for devices with process connection: Thread G1 ISO228 Product structure, feature 95 "Process Connection Rear Side" option: WDE	FAX50-XKGB Product structure, feature 620 "Accessory enclosed", option RH "UNI flange 4"/ DN100/100,PP, rear side"
Flanges	Material: miscellaneous	🔲 For details, see Technical Information TI00426F

Device-specific accessories - cantilever pivotally

Zubehör	Beschreibung	Bestellnummer
Cantilever with pivot, sensor process connection on rear G 1 or MNPT 1	Length: 585 mm (23 in)	• Steel, hot-dip galvanized: 919790-0000 • 316Ti (1.4571): 919790-0001
	Length: 1 085 mm (42.7 in)	• Steel, hot-dip galvanized: 919790-0002 • 316Ti (1.4571): 919790-0003
Cantilever with pivot, sensor process connection on front G 1 -1/2 or MNPT 1-1/2	Length: 585 mm (23 in)	• Steel, hot-dip galvanized: 52014131 • 316Ti (1.4571): 52014132
	Length: 1 085 mm (42.7 in)	• Steel, hot-dip galvanized: 52014133 • 316Ti (1.4571): 52014134
Cantilever, sensor process connection on front G 2 or MNPT 2	Length: 585 mm (23 in)	• Steel, hot-dip galvanized: 52014135 • 316Ti (1.4571): 52014136
	Length: 1 085 mm (42.7 in)	• Steel, hot-dip galvanized: 52014137 • 316Ti (1.4571): 52014138
Mounting stand for cantilever with pivot	Height: 700 mm (27.6 in)	• Steel, galvanized: 919791-0000 • 316Ti (1.4571): 919791-0001
	Height: 1 400 mm (55.1 in)	• Steel, galvanized: 919791-0002 • 316Ti (1.4571): 919791-0003
Wall bracket for cantilever with pivot		• Steel, galvanized: 919792-0000 • 316Ti (1.4571): 919792-0001

Communication-specific accessories

Accessories	Description	Reference
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare / DeviceCare via USB interface.	For details, see Technical Information TI00404F
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.	For details, see Technical Information TI00429F and Operating Instructions BA00371F Order number: 71063562
WirelessHART adapter SWA70	Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks.	For details, see Operating Instructions BA00061S
Fieldgate FXA320	Gateway for remote monitoring of field devices with 4 to 20 mA and digital output signal	For details, see Technical Information TI00025S and Operating Instructions BA00053S
Fieldgate FXA520 HART	Gateway for remote monitoring of field devices with HART / 4 to 20 mA and digital output signal	For details, see Technical Information TI00025S and Operating Instructions BA00051S
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 **non-hzardous areas**.	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 **non-hazardous areas** and **hazardous areas**.	For details, see Operating Instructions BA01202S

Service-specific accessories

Accessories	Description	Reference
FieldCare / DeviceCare	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

System components

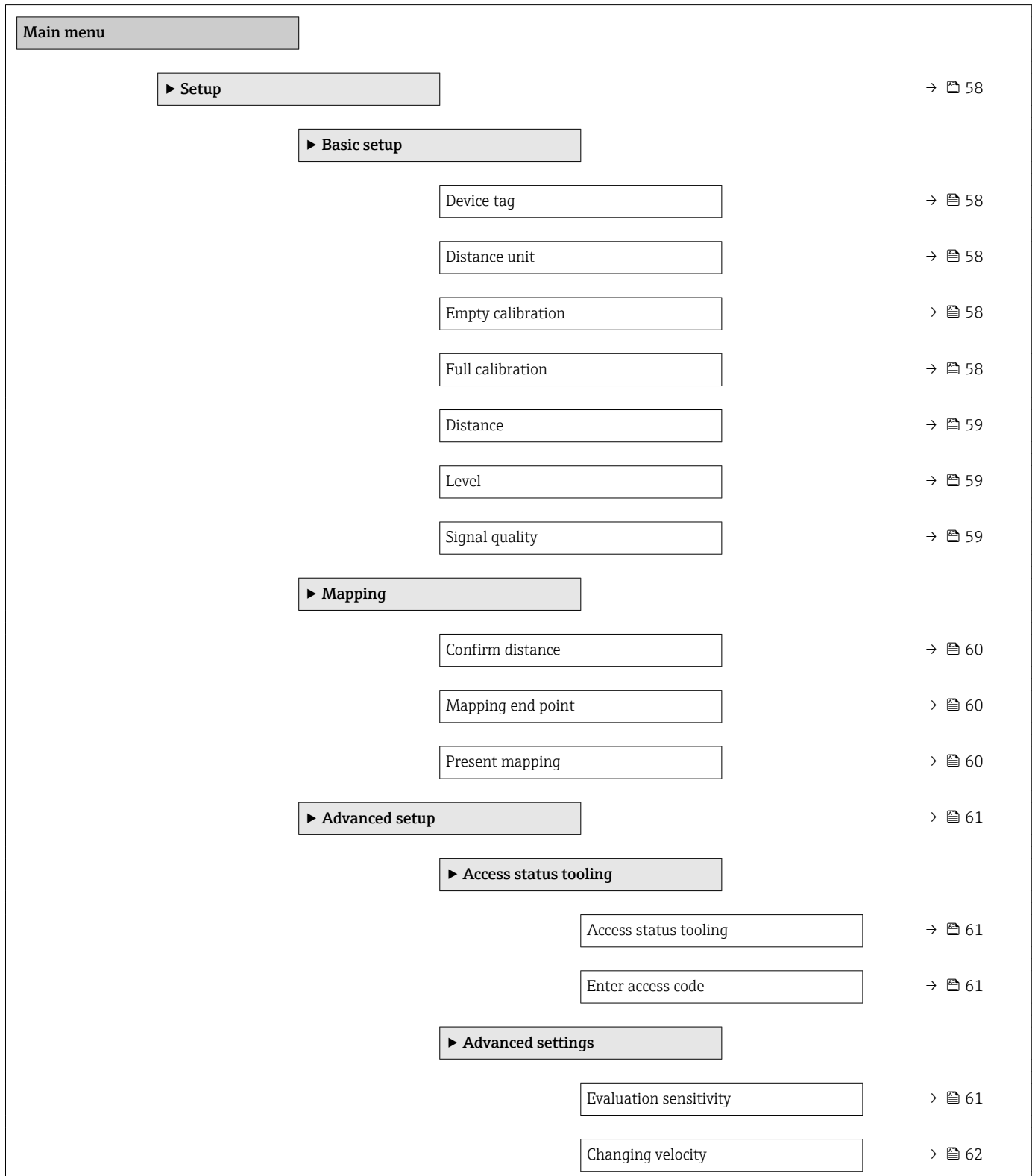| Accessories	Description	Reference
Memograph M graphic data manager	The Memograph M graphic data manager provides information on all the relevant process variables. Measured values are recorded safely, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on an SD card or USB stick.	For details, see Technical Information TI01180R and Operating Instructions BA01338R
RNS221	Supply unit for powering two 2-wire measuring devices. Bidirectional communication is possible via the HART communication jacks.	For details, see Technical Information TI00081R and Brief Operating Instructions KA00110R
RN221N	Active barrier with power supply for safe separation of 4...20 mA current circuits Bi-directional HART®-communication is possible using the built-in communication sockets (with resistance R=250 Ω)	For details, see Technical Information TI073R and Operating Instructions BA202R

Accessories	Description	Reference
RMA42	Digital process transmitter for monitoring and visualizing analog measured values	📖 For details, see Technical Information TI00150R and Operating Instructions BA00287R
RIA452	Digital process meter RIA452 in panel mounted housing for monitoring and displaying analog measured values with pump control and batch functions and flow calculation	📖 For details, see Technical Information TI113R and Operating Instructions BA00254R
HAW562	Surge arrester for DIN rail according to IEC 60715, used to protect electronic components from being destroyed by overvoltage	📖 For details, see Technical Information TI01012K

16   Operating menu

16.1   Overview operating menue (SmartBlue)

Navigation   ▣▤   Operating menu

Main menu			
‣ Setup		→ 🖹 58
	‣ Basic setup		
		Device tag	→ 🖹 58
		Distance unit	→ 🖹 58
		Empty calibration	→ 🖹 58
		Full calibration	→ 🖹 58
		Distance	→ 🖹 59
		Level	→ 🖹 59
		Signal quality	→ 🖹 59
	‣ Mapping		
		Confirm distance	→ 🖹 60
		Mapping end point	→ 🖹 60
		Present mapping	→ 🖹 60
	‣ Advanced setup	→ 🖹 61	
		‣ Access status tooling	
			Access status tooling	→ 🖹 61
			Enter access code	→ 🖹 61
		‣ Advanced settings	
			Evaluation sensitivity	→ 🖹 61
			Changing velocity	→ 🖹 62

‣ Linearization table			
	Distance unit	→ 📄 58	
	Linearization type	→ 📄 64	
	Level linearized	→ 📄 64	
‣ Communication		→ 📄 71	
	‣ HART configuration		
		HART short tag	→ 📄 71
		HART address	→ 📄 71
		No. of preambles	→ 📄 71
	‣ HART info		
		Device type	→ 📄 71
		Device revision	→ 📄 72
		Device ID	→ 📄 72
		HART revision	→ 📄 72
		HART descriptor	→ 📄 72
		HART message	→ 📄 72
		Hardware revision	→ 📄 73
		Software revision	→ 📄 73
		HART date code	→ 📄 73
	‣ Hart output		
		Level linearized (PV)	→ 📄 73
		Distance (SV)	→ 📄 73

16.2   Overview of operating menu (FieldCare / DeviceCare)

Navigation   ⌨▣   Operating menu

Main menu

    ► Setup

        Device tag

        Distance unit

        Empty calibration

        Full calibration

        Distance

        Level

        Signal quality

        Confirm distance

        Mapping end point

        Present mapping

        ► Advanced setup

                Access status tooling

                Enter access code

                Evaluation sensitivity

                Changing velocity

                First Echo sensitivity

                Output mode

                Blocking distance

                Level correction

                Evaluation distance

                Linearization type

Level linearized

▶ Safety settings

Delay time echo lost

Diagnostics echo lost

▶ Current output

Output current

Damping output

Turn down

4 mA value

20 mA value

Trim

Trim value high

Trim value low

▶ Administration

Define access code

Confirm access code

Device reset

Free field special

▶ Communication

HART short tag

HART address

No. of preambles

Device type

Device revision

Device ID

HART revision

HART descriptor

HART message

Hardware revision

Software revision

HART date code

Level linearized (PV)

Distance (SV)

Relative echo amplitude (TV)

Temperature (QV)

▶ Bluetooth configuration

Bluetooth mode

▶ Diagnostics

Actual diagnostics

Previous diagnostics

Delete previous diagnostic

Signal quality

▶ Device information

Device name

Firmware version

Extended order code 1

Extended order code 2

Extended order code 3

Order code

Serial number

ENP version

▸ Simulation

Simulation

Value current output 1

Process variable value

16.3   "Setup" menu

ℹ️ • 🖥 : Indicates how to navigate to the parameter using operating tools
    • 🔒 : Indicates parameters that can be locked via the access code.

Navigation   🖥   Setup

Device tag	🔒

Navigation	🖥 Setup → Device tag
Description	Enter a unique name for the measuring point to identify the device quickly within the plant.
Factory setting	EH_FMR20_####### (last 7 digits of the device serial number)

Distance unit	🔒

Navigation	🖥 Setup → Distance unit
Description	Used for the basic calibration (Empty / Full).
Selection	*SI units* *US units* m ft
Factory setting	m

Empty calibration	🔒

Navigation	🖥 Setup → Empty calibr.
Description	Distance between process connection and minimum level (0%).
User entry	0.0 to 20 m
Factory setting	Depending on antenna design

Full calibration	🔒

Navigation	🖥 Setup → Full calibr.
Description	Distance between minimum level (0%) and maximum level (100%).

User entry	0.0 to 20 m
Factory setting	Depending on antenna design

Distance	
Navigation	⌷ Setup → Distance
Description	Displays the current measured distance D from the reference point (lower edge of the flange / last thread of the sensor) to the level.
User interface	0.0 to 20 m

Level	
Navigation	⌷ Setup → Level
Description	Displays the measured level L (before linearization). The unit is defined in the 'Distance unit' parameter (factory setting = m).
User interface	–99 999.9 to 200 000.0 m
Factory setting	0.0 m

Signal quality	
Navigation	⌷ Setup → Signal quality
Description	Displays the signal quality of the level echo. Meaning of the display options - Strong: The evaluated echo exceeds the threshold by at least 10 dB. - Medium: The evaluated echo exceeds the threshold by at least 5 dB. - Weak: The evaluated echo exceeds the threshold by less than 5 dB. - No signal: The device does not find an usable echo. The signal quality indicated in this parameter always refers to the currently evaluated echo, either the level echo or the tank bottom echo. In case of a lost echo ('Signal quality' = No signal) the device generates the following error message: 'Diagnostic echo lost' = Warning (factory setting) or Alarm, if the other option has been selected in 'Diagnostic echo lost'.
User interface	• Strong • Medium • Weak • No signal

Confirm distance	🔒

Navigation	🖥	Setup → Confirm distance

Description

Does the measured distance match the real distance? Select one of the options: - Manual map To be selected if the range of mapping is to be defined manually in the 'Mapping end point' parameter. A comparison between actual and indicated distance is not required in this case. - Distance ok To be selected if the measured distance matches the actual distance. The device performs a mapping. - Distance unknown To be selected if the actual distance is unknown. A mapping can not be performed in this case. - Factory map To be selected if the present mapping curve (if one exists) is to be deleted. The device returns to the 'Confirm distance' parameter and a new mapping can be recorded.

Selection

• Manual map
• Distance ok
• Distance unknown
• Factory map

Factory setting

Distance unknown

Mapping end point	🔒

Navigation	🖥	Setup → Map. end point

Description

This parameter defines up to which distance the new mapping is to be recorded. The distance is measured from the reference point, i.e. from the lower edge of the mounting flange or sensor.

User entry

0 to 21.8 m

Factory setting

0 m

Present mapping	

Navigation	🖥	Setup → Present mapping

Description

Indicates up to which distance a mapping has already been recorded.

User interface

0 to 100 m

16.3.1   "Advanced setup" submenu

Navigation   ▤▣   Setup → Advanced setup

Access status tooling

Navigation	▣ Setup → Advanced setup → Access stat.tool
Description	Shows the access authorization to the parameters via the operating tool.
User interface	• Operator • Maintenance • Service • Production • Development
Factory setting	Maintenance

Enter access code

Navigation	▣ Setup → Advanced setup → Ent. access code
Description	To change from operator to maintenance, the customer-specific access code, which has been defined in the **Define access code** parameter has to be entered. If an incorrect access code is entered, the device remains in the Operator Mode. Please contact your Endress+Hauser Sales Center if you lose your access code.
User entry	0 to 9999
Factory setting	0

Evaluation sensitivity   🔒

Navigation	▣ Setup → Advanced setup → Evaluation sens.
Description	Selection of the evaluation sensitivity Options to select from: - Low The weighting curve is high for low evaluation sensitivity. Interferers but also small level signals are not recognized. - Medium The weighting curve is in a medium region. - High The weighting curve is low for high evaluation sensitivity. Interferers but also small level signals can be reliably detected.
Selection	• Low • Medium • High
Factory setting	Medium

| Changing velocity | 🔒 |

| Navigation | ⊟ | Setup → Advanced setup → Changing vel. |

Description   Selection of the expected draining or filling speed of the measured level.

Selection   • Slow <10 cm (0,4 in)/min
                       • Standard <1 m (40 in)/min
                       • Fast >1 m (40 in)/min
                       • No filter / test

Factory setting   Standard <1 m (40 in)/min

| First Echo sensitivity | 🔒 |

| Navigation | ⊟ | Setup → Advanced setup → First Echo sens. |

Description   This parameter describes the band for First Echo evaluation. Is measured / calculated
                       down from the peak of the current level echo. Options to select from: - Low The band for
                       the first echo evaluation is very narrow. The evaluation stays longer at the found echo
                       respectively does not jump to the next Echo or distortion signal. - Medium The band for
                       the first echo evaluation has an average width. - High The band for the first echo
                       evaluation is broad. The evaluation jumps earlier to the next echo or distortion signal.

Selection   • Low
                       • Medium
                       • High

Factory setting   Medium

| Output mode | 🔒 |

| Navigation | ⊟ | Setup → Advanced setup → Output mode |

Description   Select output mode between: Ullage = The remaining space in the tank or silo is indicated.
                       or Level linearized = The level is indicated (more precisely: the linearized value if a
                       linearization has been activated).

Selection   • Ullage
                       • Level linearized

Factory setting   Level linearized

Blocking distance   ⓐ

Navigation	▣ Setup → Advanced setup → Blocking dist.
Description	Specify blocking distance (BD). No signals are evaluated within the blocking distance. Therefore, BD can be used to suppress interference signals in the vicinity of the antenna. Note: The measuring range should not overlap with the blocking distance.
User entry	0.0 to 20 m
Factory setting	By default an automatic Blocking distance of at least 0.1 m (0.33 ft) is preset. However it can be manually overwritten (even 0 m (0 ft) is allowed). Automatic calculation of the Blocking distance = Empty calibration - Full calibration - 0.2 m (0.656 ft). The **Blocking distance** parameter is recalculated according to this formula every time a new value is entered into the **Empty calibration** parameter or **Full calibration** parameter. If this calculation results in a value <0.1 m (0.33 ft), the blocking distance of 0.1 m (0.33 ft) is used instead.

Level correction   ⓐ

Navigation	▣ Setup → Advanced setup → Level correction
Description	The measured level is corrected by this value to compensate for a constant level error. Level correction > 0: The level is increased by this value. Level correction < 0: The level is decreased by this value.
User entry	−25 to 25 m
Factory setting	0.0 m

Evaluation distance   ⓐ

Navigation	▣ Setup → Advanced setup → Evaluation dist.
Description	Extended signal search area. Is generally greater than the empty distance. If the signal is found below the empty distance, '0' (empty) is indicated as measured value. Only for signals, detected below the 'Evaluation distance', the error 'Echo Lost' is issued. e.g. flow measurement in overflow weirs.
User entry	0 to 21.8 m
Factory setting	21.8 m

Linearization type	⌂

Navigation	▣ Setup → Advanced setup → Lineariz. type

Description	**Linearization types**
	Meaning of the options:
	• None:
	  The level is transmitted in the level unit without linearization.
	• Table:
	  The relationship between the measured level L and the output value(volume/flow/ weight) is given by a linearization table consisting of up to 32 pairs of values "level - volume" or "level - flow"or "level - weight", respectively.
	• Remark:
	  To create / modify a linearization table please open the linearization module in DTM

Selection	• None • Table

Factory setting	None

Level linearized	

Navigation	▣ Setup → Advanced setup → Level linearized

Description	Currently measured level.

User interface	Signed floating-point number

"Safety settings" submenu

Navigation   ⊞⊟   Setup → Advanced setup → Safety sett.

Delay time echo lost   🔒

Navigation	⊟ Setup → Advanced setup → Safety sett. → Delay echo lost
Description	Define the delay time in the case of an echo loss. After an echo loss, the device waits for the time specified in this parameter before reacting as specified in the Diagnostic echo lost parameter. This helps to avoid interruptions of the measurement by short-term interferences.
User entry	0 to 600 s
Factory setting	300 s

Diagnostics echo lost   🔒

Navigation	⊟ Setup → Advanced setup → Safety sett. → Diagn. echo lost
Description	At this parameter it can be set if in case of a lost echo a warning or an alarm is issued.
Selection	• Warning • Alarm
Factory setting	Warning

"Current output" submenu

Navigation   ⧉▣   Setup → Advanced setup → Curr.output

Output current

Navigation	▣ Setup → Advanced setup → Curr.output → Output curr.
Description	Shows the actual calculated value of the output current.
User interface	3.59 to 22.5 mA

Damping output   🔒

Navigation	▣ Setup → Advanced setup → Curr.output → Damping out.
Description	Define time constant τ for the damping of the output current. Fluctuations of the measured value affect the output current with an exponential delay, the time constant τ of which is defined in this parameter. With a small time constant the output reacts immediately to changes of the measrued value. With a big time constant the reaction of the output is more delayed. For τ = 0 there is no damping.
User entry	0.0 to 300 s
Factory setting	1.0 s

Turn down   🔒

Navigation	▣ Setup → Advanced setup → Curr.output → Turn down
Description	Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4-20mA). The section is defined by the '4 mA value' and '20 mA value' parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20mA).
Selection	• Off • On
Factory setting	Off

4 mA value	🔒

Navigation	▤ Setup → Advanced setup → Curr.output → 4 mA value
Description	Value for 4-mA at 'Turn down parameter' = On Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4-20mA). The section is defined by the '4 mA value' and '20 mA value' parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20mA). Note: If '20 mA value' is smaller than '4 mA value', the current output is inverted, which means that an increase of the process variable results in a decrease of the output current.
User entry	Signed floating-point number
Factory setting	0 m

20 mA value	🔒

Navigation	▤ Setup → Advanced setup → Curr.output → 20 mA value
Description	Value for 20-mA at 'Turn down' parameter = On Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4-20mA). The section is defined by the '4 mA value' and '20 mA value' parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20mA). Note: If '20 mA value' is smaller than '4 mA value', the current output is inverted, which means that an increase of the process variable results in a decrease of the output current.
User entry	Signed floating-point number
Factory setting	20 m

Trim	🔒

Navigation	▤ Setup → Advanced setup → Curr.output → Trim
Description	Select action for the recalibration of the current output. The trim can be used to compensate a drift of the current output (which might be caused by very long cables or by a connected Ex barrier, for example). Steps of the trim: 1. Select 'Trim' = 4 mA. 2. Measure the output current with a gauged multimeter. If it is not equal to 4 mA: Enter measured value in the 'Trim value low' parameter. 3. Select 'Trim' = 20 mA. 4. Measure the output current with a gauged multimeter. If it is not equal to 20 mA: Enter the measured current into the 'Trim value high' parameter. 5. Select 'Trim' = Calculate. The device calculates the new scaling of the output current and stores it in the RAM.

Selection
• Off
• 4 mA
• 20 mA
• Calculate
• Reset

Factory setting
Off

Trim value high	🔒

Navigation   🖥 Setup → Advanced setup → Curr.output → Trim value high

Description   Enter upper measured value for the trim (around 20 mA). After this value has been entered: Select 'Trim' = Calculate. This initiates the recalibration of the current output.

User entry   18.0 to 22.0 mA

Factory setting   20.0 mA

Trim value low	🔒

Navigation   🖥 Setup → Advanced setup → Curr.output → Trim value low

Description   Enter lower measured value for the trim (around 4 mA). After this value has been entered: Select 'Trim' = Calculate. This initiates the recalibration of the current output.

User entry   3.0 to 5.0 mA

Factory setting   4.0 mA

"Administration" submenu

Navigation   ⊠⊟   Setup → Advanced setup → Administration

Define access code	ᐁ

Navigation	⊟	Setup → Advanced setup → Administration → Def. access code

Description   Define release code for changing device operation mode. If the factory setting is not changed or 0000 is defined as the access code, the device works in maintenance mode without write-protection and the configuration data of the device can then always be modified. Once the access code has been defined, write-protected devices can only be changed to maintenance mode if the access code is entered in the 'Enter access code' parameter. The new access code is only valid after it has been confirmed in the 'Confirm access code' parameter. Please contact your Endress+Hauser Sales Center if you lose your access code.

User entry   0 to 9999

Factory setting   0

Confirm access code	ᐁ

Navigation	⊟	Setup → Advanced setup → Administration → Confirm code

Description   Re-enter the entered access code to confirm.

User entry   0 to 9999

Factory setting   0

Device reset	ᐁ

Navigation	⊟	Setup → Advanced setup → Administration → Device reset

Description   Reset the device configuration - either entirely or in part - to a defined state.

Selection   • Cancel
                               • To factory defaults

Factory setting   Cancel

| **Free field special** | ⊗ |

| **Navigation** | ▣ | Setup → Advanced setup → Administration → Free field spec. |

Description   Switch the free field option on or off. This parameter can be switched on for free field applications (e.g. below bridges). Caution: The customer map (if one exists) is reset to the factory map!.

Selection   • Off
                          • On

Factory setting   Off

16.3.2   "Communication" submenu

Navigation   ⧉⊟   Setup → Communication

HART short tag	🔒

Navigation	⊟	Setup → Communication → HART short tag

Description   Short description of the measuring point

User entry   Max. 8 characters: A … Z, 0 … 9 and some special characters (for example, punctuation marks, @,%)

Factory setting   SHORTTAG

HART address	🔒

Navigation   ⊟   Setup → Communication → HART address

User entry   0 to 63

Factory setting   0

No. of preambles	🔒

Navigation   ⊟   Setup → Communication → No. of preambles

Description   Defines the number o preambles in the HART telegram.

User entry   5 to 20

Factory setting   5

Device type	

Navigation   ⊟   Setup → Communication → Device type

Description   Shows the device type with which the measuring device is registered with the HART Communication Foundation.

Device revision

Navigation	▣	Setup → Communication → Device revision
Description		Shows the device revision with which the device is registered with the HART Communication Foundation.

Device ID

Navigation	▣	Setup → Communication → Device ID
Description		Shows the device ID for identifying the device in a HART network.

HART revision

Navigation	▣	Setup → Communication → HART revision
Description		Indicates HART revision of the device

HART descriptor

Navigation	▣	Setup → Communication → HART descriptor
Description		Enter descriptor for the measuring point
Factory setting		Descriptor

HART message

Navigation	▣	Setup → Communication → HART message
Description		Define HART message which is sent via the HART protocol if requested by the master
Factory setting		Message

Hardware revision

Navigation	🖼	Setup → Communication → Hardware rev.
Description		Indicates hardware revision of the device

Software revision

Navigation	🖼	Setup → Communication → Software rev.
Description		Indicates software revision of the device

HART date code   🔒

Navigation	🖼	Setup → Communication → HART date code
Description		Enter date of the last configuration change
Additional information		Date format: YYYY-MM-DD

Level linearized (PV)

Navigation	🖼	Setup → Communication → Level lin. (PV)
Description		Displays linearized level
User interface		Signed floating-point number
Factory setting		0 m
Additional information		The unit is defined by the Unit after linearization parameter

Distance (SV)

Navigation	🖼	Setup → Communication → Distance (SV)
User interface		Signed floating-point number
Factory setting		0 m

Relative echo amplitude (TV)

Navigation	⊟ Setup → Communication → Rel.echoampl(TV)
User interface	Signed floating-point number
Factory setting	0 dB

Temperature (QV)

Navigation	⊟ Setup → Communication → Temperature (QV)
User interface	Signed floating-point number
Factory setting	−273.15 ℃

"Bluetooth configuration" submenu

Navigation   ▣▢   Setup → Communication → Bluetooth conf.

Bluetooth mode   🔒

Navigation	⊟ Setup → Communication → Bluetooth conf. → Bluetooth mode
Description	Enable or disable Bluetooth function.. Remark: Switching to position 'Off' will disable remote access via the app with immediate effect. To re-establish a Bluetooth connection via the app: Please follow the advices in the manual.
Selection	• Off • On
Factory setting	On

16.4   "Diagnostics" submenu

Navigation   ▣▣   Diagnostics

Actual diagnostics

Navigation   ▣   Diagnostics → Actual diagnos.

Description   Displays current diagnostic message. If several messages are active at the same time, the messages with the highest priority is displayed.

Previous diagnostics

Navigation   ▣   Diagnostics → Prev.diagnostics

Description   Displays the last diagnostic message, with its diagnostic information, which has been active before the current message. The condition displayed may still apply.

Delete previous diagnostic   🔒

Navigation   ▣   Diagnostics → Del. prev. diag.

Description   Delete previous diagnostic message? It is possible that the diagnostic message remains valid.

Selection   ▪ No
                       ▪ Yes

Factory setting   No

Signal quality

Navigation   ▣   Diagnostics → Signal quality

Description   Displays the signal quality of the level echo. Meaning of the display options - Strong: The evaluated echo exceeds the threshold by at least 10 dB. - Medium: The evaluated echo exceeds the threshold by at least 5 dB. - Weak: The evaluated echo exceeds the threshold by less than 5 dB. - No signal: The device does not find an usable echo. The signal quality indicated in this parameter always refers to the currently evaluated echo, either the level echo or the tank bottom echo. In case of a lost echo ('Signal quality' = No signal) the device generates the following error message: 'Diagnostic echo lost' = Warning (factory setting) or Alarm, if the other option has been selected in 'Diagnostic echo lost'.

User interface
- Strong
- Medium
- Weak
- No signal

16.4.1   "Device information" submenu

Navigation   ⊞⊡   Diagnostics → Device info

Device name

Navigation	⊡ Diagnostics → Device info → Device name
Description	Shows the name of the transmitter.
Factory setting	Micropilot FMR20

Firmware version

Navigation	⊡ Diagnostics → Device info → Firmware version
Description	Shows the device firmware version installed.

Extended order code 1

Navigation	⊡ Diagnostics → Device info → Ext. order cd. 1
Description	Shows the 1st part of the extended order code.

Extended order code 2

Navigation	⊡ Diagnostics → Device info → Ext. order cd. 2
Description	Shows the 2nd part of the extended order code.

Extended order code 3

Navigation	⊡ Diagnostics → Device info → Ext. order cd. 3
Description	Shows the 3rd part of the extended order code.

Order code

Navigation	▣	Diagnostics → Device info → Order code
Description		Shows the device order code.

Serial number

Navigation	▣	Diagnostics → Device info → Serial number
Description		Shows the serial number of the measuring device.

ENP version

Navigation	▣	Diagnostics → Device info → ENP version
Description		Shows the version of the electronic nameplate (ENP).

16.4.2 "Simulation" submenu

Navigation   ▣▣   Diagnostics → Simulation

Simulation	ⓐ

Navigation	▣ Diagnostics → Simulation → Simulation
Description	Select process variable to be simulated. The Simulation is used to simulate specific measuring values or other conditions. This helps to check the correct configuration of the device and connected control units.
Selection	• Off • Current output • Distance
Factory setting	Off

Value current output	ⓐ

Navigation	▣ Diagnostics → Simulation → Value curr.out 1
Description	Defines the value of the simulated output current.
User entry	3.59 to 22.5 mA
Factory setting	3.59 mA

Process variable value	ⓐ

Navigation	▣ Diagnostics → Simulation → Proc. var. value
Description	Value of the simulated process variable. Downstream measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.
User entry	0 to 21.8 m
Factory setting	0 m

Index

Endress+Hauser

Endress+Hauser

People for Process Automation

www.addresses.endress.com