Technical Information
Micropilot FMR20

Free space radar

Level measurement for liquids



Application

- Ingress protection: IP66/68 / NEMA 4X/6P
- Measuring range: up to 20 m (66 ft)
- Process temperature: –40 to 80 °C (–40 to 176 °F)
- Process pressure: –1 to 3 bar (–14 to 43 psi)
- Accuracy: up to +/- 2 mm (0.08 in)
- International explosion protection certificates

Your benefits

- Level measurement for liquids in storage tanks, open basins, pump shafts and canal systems
- Radar measuring device with *Bluetooth*® wireless technology and HART communication
- Simple, safe and secure wireless remote access – ideal for installation in hazardous areas or places difficult to reach
- Commissioning, operation and maintenance via free iOS / Android app SmartBlue – saves time and reduces costs
- Full PVDF body – for a long sensor lifetime
- Hermetically sealed wiring and fully potted electronics – eliminates water ingress and allows operation under harsh environmental conditions
- Most compact radar due to unique radar chip design – fits in limited space installations
- Best price-performance-ratio radar

Endress+Hauser
People for Process Automation

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Document information

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
	Visual inspection

Safety symbols

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

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
	**Hazardous area** Indicates a hazardous area.
	**Safe area (non-hazardous area)** Indicates the non-hazardous area.

Terms and abbreviations

Term/abbreviation	Explanation
BA	Document type "Operating Instructions"
KA	Document type "Brief Operating Instructions"
TI	Technical Information

Term/abbreviation	Explanation
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.

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.

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Product life cycle

Engineering

- Proven radar measuring technology
- Level- and open channel flow measurement for Ex and non-Ex
- Indication of over-flooding situation
- Wide range of installation possibilities and accessories
- Highest degree of ingress protection
- 2D / 3D drawings
- Spec Sheet Producer
- Applicator Selection tool for the selection of the perfect measurement solution

Device not compatible with transmitters and sensors of ultrasonic measurement technology (e.g. Prosonic FMU9x, FDU9x)

Procurement

- Best price-performance-ratio radar
- Global availability
- Order code includes variety of mounting accessories and remote HART indicator RIA15

Installation

- Rear- and front side thread for flexible installation
- Slip- on flange for nozzle installation
- Complete measuring point: Including mounting accessory, RIA15 and flooding protection tube

Commissioning

- Easy and fast setup via SmartBlue (app) and DeviceCare / FieldCare or RIA15
- No additional tools or adapters required
- Local languages (up to 15)

Operation

- Continuous self-monitoring
- Diagnosis information acc. NAMUR NE107 with clear text messages remedy directives
- Signal curve via SmartBlue (app) and DeviceCare / FieldCare
- Encrypted single point-to-point data transmission (Fraunhofer-Institut, third party, tested) and password-protected communication via *Bluetooth*® wireless technology

Maintenance

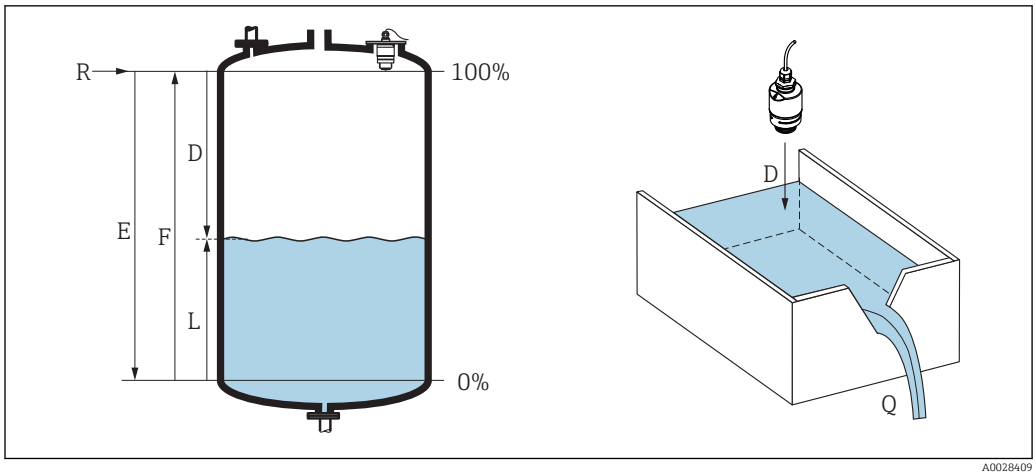
- No maintenance required
- Technical experts on-call around the global

Retirement

- Environmentally responsible recycling concepts
- RoHS compliance (Restriction of certain hazardous substances), lead-free soldering of electronic components

Measuring principle

The Micropilot is a "downward-looking" measuring system, operating based on the time-of-flight method (ToF). It measures the distance from the reference point (process connection) to the product surface. Radar impulses are emitted by an antenna, reflected off the product surface and received again by the radar system.



1 Setup parameters of the Micropilot

E Empty calibration (= zero)
F Full calibration (= span)
D Measured distance
L Level (L = E - D)
Q Flow rate at measuring weirs or channels (calculated from the level using linearization)

Input

The reflected radar impulses are received by the antenna and transmitted into the electronics. A microprocessor evaluates the signal and identifies the level echo caused by the reflection of the radar impulse at the product surface. This clear signal detection system benefits from over 30 years' experience with time-of-flight procedures.

The distance **D** to the product surface is proportional to the time of flight **t** of the impulse:

$D = c \cdot t/2$,

where **c** is the speed of light.

Based on the known empty distance **E**, the level **L** is calculated:

$L = E - D$

Output

The Micropilot is adjusted by entering the empty distance **E** (= zero point) and the full distance **F** (= span).

- Current output: 4 to 20 mA
- Digital output (HART, SmartBlue): 0 to 10 m (0 to 33 ft) or 0 to 20 m (0 to 66 ft) depending on antenna version

Input

Measured variable

The measured variable is the distance between the reference point and the product surface.

The level is calculated based on **E**, the empty distance entered.

Measuring range

Maximum measuring range

Device	Maximum measuring range
FMR20 - with 40 mm (1.5 in) antenna	10 m (33 ft)
FMR20 - with 80 mm (3 in) antenna	20 m (66 ft)

Requirements of the installation

- recommended tank height greater than 1.5 m (5 ft) in case of media with low DK value
- Open channel minimum width 0.5 m (1.6 ft)
- Calm surfaces
- No agitators
- No buildup
- Relative dielectric constant $\varepsilon_r > 4$

Usable measuring range

The usable measuring range depends on the antenna size, the medium's reflective properties, the installation position and any possible interference reflections.

The following table describes the media groups.

Media groups

ε_r	Example
4 to 10	E.g. concentrated acid, organic solvents, ester, aniline, alcohol, acetone.
> 10	Conductive liquids, aqueous solutions, diluted acids and bases

Reduction of the max. possible measuring range by:
- Media with bad reflective properties (= low ε_r value)
- Formation of buildup, particularly of moist products
- Strong condensation
- Foam generation
- Freezing of sensor

Operating frequency

K-band (~ 26 GHz)

Transmission power

Distance	Mean power density in the direction of the beam
1 m (3.3 ft)	< 12 nW/cm^2
5 m (16 ft)	< 0.4 nW/cm^2

Output

Output signal

4 to 20 mA

A 4 to 20 mA interface serves as measured value output and to power the device.

Digital output

HART®

- Signal encoding; FSK ±0.5 mA over current signal
- Data transmission rate; 1 200 Bit/s

Bluetooth® wireless technology (can be ordered as an option)

The device has a *Bluetooth*® wireless technology interface and can be operated and configured via this interface using the SmartBlue app.

- The range under reference conditions is at least 10 m (33 ft)
- Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.
- The *Bluetooth*® wireless technology interface can be deactivated

Signal on alarm

Depending on the interface, failure information is displayed as follows:
- Current output
  Alarm current: 22.5 mA
- Operating tool via digital communication (HART) or SmartBlue (app)
  - Status signal (as per NAMUR Recommendation NE 107)
  - Plain text display with remedial action

Linearization

The linearization function of the device allows the conversion of the measured value into any unit of length, weight, flow or volume. When operating using DeviceCare and FieldCare, linearization tables for volume calculation in vessels are preprogrammed (see list below).

Pre-programmed linearization curves
- Cylindrical tank
- Spherical tank
- Tank with pyramid bottom
- Tank with conical bottom
- Tank with flat bottom

Other tables of up to 32 value pairs can be entered manually.

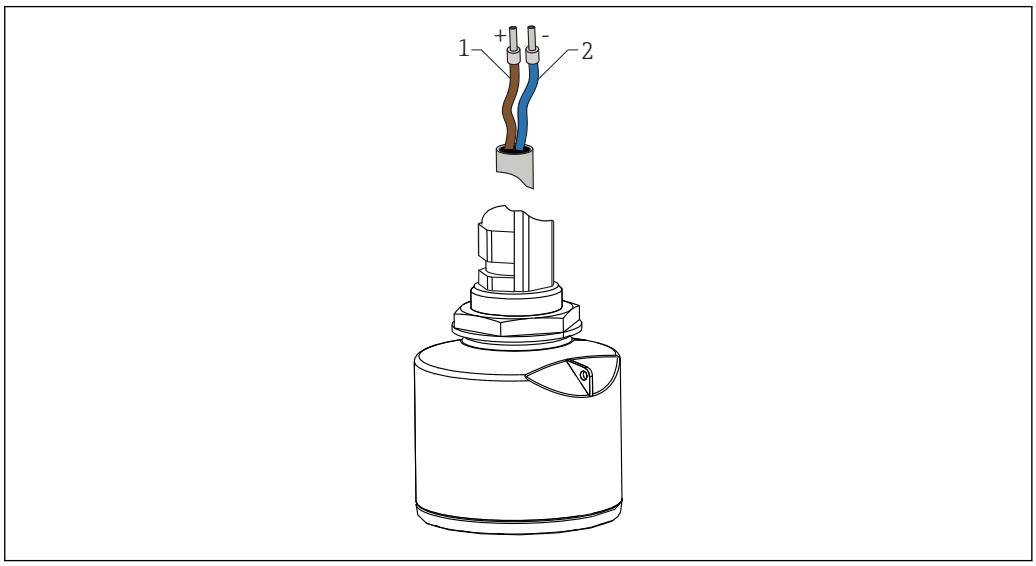
Protocol-specific data

HART

Manufacturer ID	17 (0x11)
Device type ID	44 (0x112c)
HART specification	7.0
Device description files (DTM, DD)	**Information and files under:** ▪ www.endress.com ▪ www.hartcomm.org
HART load	Min. 250 Ω
HART device variables	Assignment of HART device variables is fixed and cannot be changed. **Measured values for PV (primary variable)** Level linearized **Advanced diag. measured values for SV (secondary variable)** Distance **Advanced diag. measured values for TV (tertiary variable)** Relative echo amplitude **Advanced diag. measured values for QV (quarternary variable)** Temperature
Supported functions	Additional transmitter status
Multidrop current	4 mA
Time for connection setup	< 1 s

Electrical connection

Cable assignment

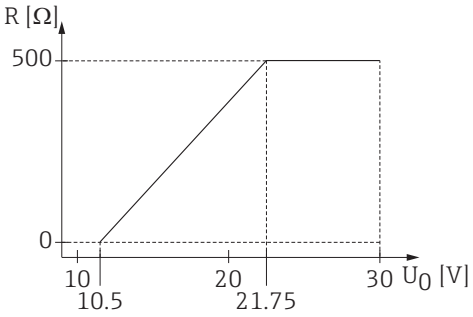


2 *Cable assignment*

1 Plus, brown wire
2 Minus, blue wire

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	

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.

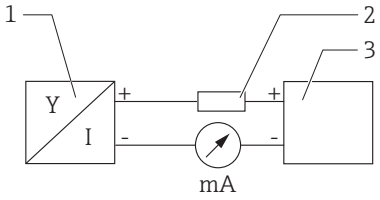
Various power supply units can be ordered from Endress+Hauser: see "Accessories" section → 50

Battery operation

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

Connection

FMR20, 4 to 20 mA HART

	Circuit diagram / Description
FMR20 connection with HART communication, voltage source and 4 to 20 mA display	 A0028908 *3 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

FMR20 with RIA15

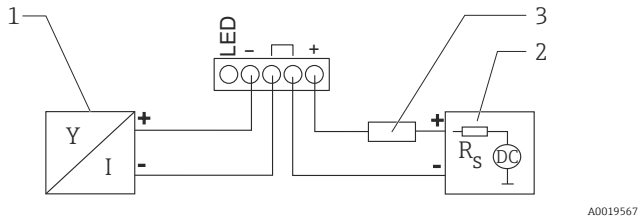
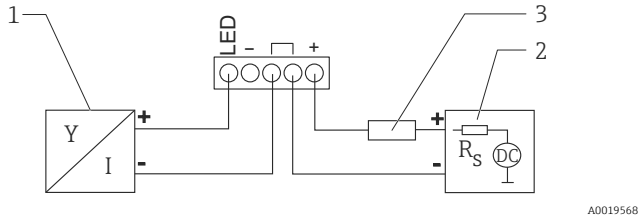
The RIA15 remote display can be ordered together with the device.

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

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

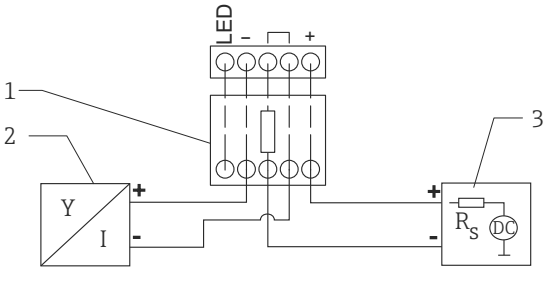
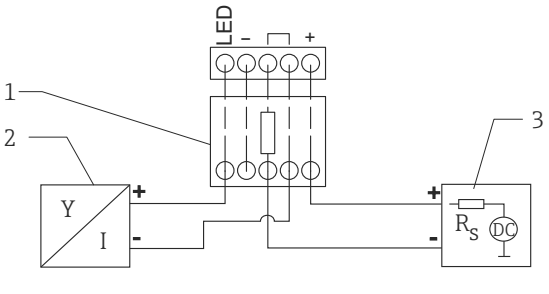
	Circuit diagram / Description
FMR20 connection, HART communication and RIA15 **without** backlight	 *4 FMR20 block diagram, HART with RIA15 process display unit without light* *1 Micropilot FMR20* *2 Power supply* *3 HART resistance*
FMR20 connection, HART communication and RIA15 **with** backlight	 *5 FMR20 block diagram, HART with RIA15 process display unit with light* *1 Micropilot FMR20* *2 Power supply* *3 HART resistance*

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	 *6 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	 *7 FMR20 block diagram, RIA15 with light, HART communication resistor module* *1 HART communication resistor module* *2 Micropilot FMR20* *3 Power supply*

Power consumption

Maximum input power: 675 mW

Current consumption

- Maximum input current: <25 mA
- Maximum start-up current: 3.6 mA

Start-up time

First stable reading after 20 s (at supply voltage = 24 V_{DC})

Power supply failure

The configuration remains stored in the sensor.

Cable specification

An unshielded cable, 2 x 0.75 mm^2, is used.

As per IEC/EN 60079-11 section 10.9, the cable is designed for a tensile strength of 30 N (over a period of 1 h).

The sensor is supplied with 5 m (16 ft) cable length as standard. Lengths 10 m (33 ft) and 20 m (66 ft) are available for an additional cost.

Lengths can be selected by the user up to an overall length of 300 m (980 ft) and are available by the meter (option "8") or foot (option "A").

Overvoltage protection The device is equipped with integrated overvoltage protection.

Performance characteristics

Reference operating conditions

- Temperature = +24 °C (+75 °F) ±5 °C (±9 °F)
- Pressure = 960 mbar abs. (14 psia) ±100 mbar (±1.45 psi)
- Humidity = 60 % ±15 %
- Reflector: metal plate with a minimum diameter of ≥ 1 m (40 in)
- No major interference reflections inside the signal beam

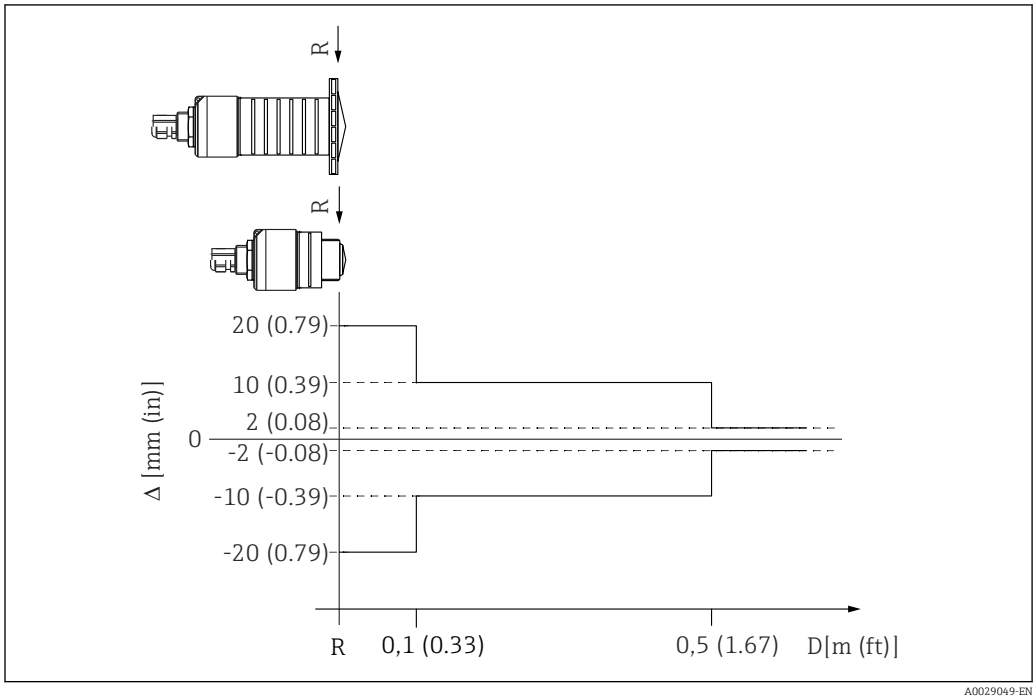
Maximum measured error

Typical data under reference operating conditions: DIN EN 61298-2, percentage values in relation to the span.

Device	Value	Output	
		digital [1]	analog, [2]
FMR20 40 mm (1.5 in)Antenna	Sum of non-linearity, non-repeatability and hysteresis	± 2 mm (0.08 in)	± 0.02 %
	Offset/Zero	± 4 mm (0.16 in)	± 0.03 %
FMR20 80 mm (3 in)Antenna	Sum of non-linearity, non-repeatability and hysteresis	± 2 mm (0.08 in)	± 0.02 %
	Offset/Zero	± 4 mm (0.16 in)	± 0.03 %

1) , HART, SmartBlue (app)
2) relevant only to 4-20mA current output; add error of the analog value to the digital value

Differing values in near-range applications



8 Maximum measured error in near-range applications; values for standard version

Δ Maximum measured error
R Reference point of the distance measurement
D Distance from the reference point of the antenna

Measured value resolution

Dead band as per EN61298-2:
- Digital: 1 mm (0.04 in)
- Analog: 4 µA

Response time

The response time can be configured. The following step response times (as per DIN EN 61298-2) [1] apply if the damping is switched off:

Tank height	Sampling rate	Response time
< 20 m (66 ft)	1 s^{-1}	< 3 s

Influence of ambient temperature

The measurements are carried out in accordance with EN 61298-3.

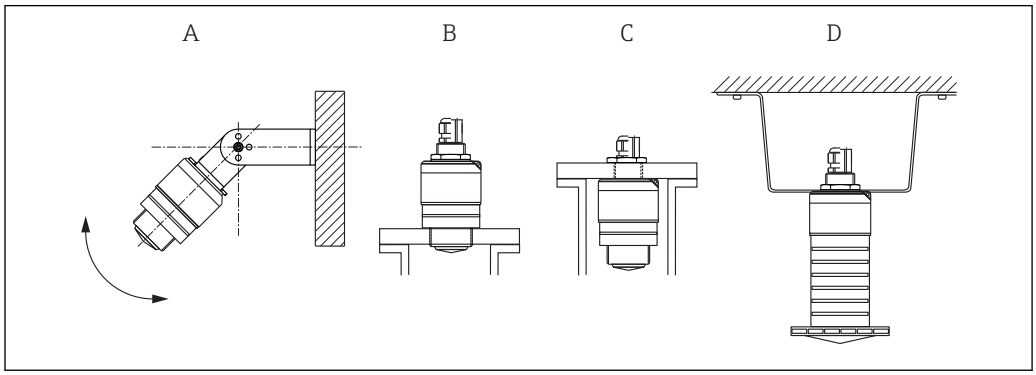
- Digital (HART, *Bluetooth*® wireless technology):
  Standard version: average T_K = ± 3 mm (0.12 in)/10 K
- Analog (current output):
  - Zero point (4 mA): average T_K = 0.02 %/10 K
  - Span (20 mA): average T_K = 0.05 %/10 K

1) According to DIN EN 61298-2 the step response time is the time which passes after a sudden change of the input signal until the output signal assumes 90% of the steady-state value for the first time.

Installation

Installation conditions

Installation types



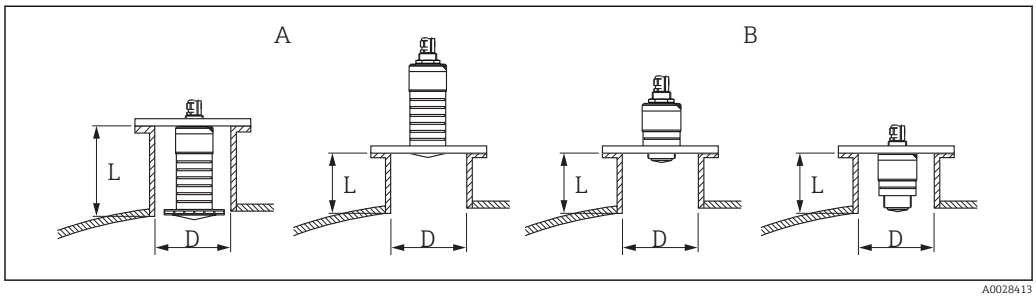
9 *Wall, ceiling or nozzle installation*

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.

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.

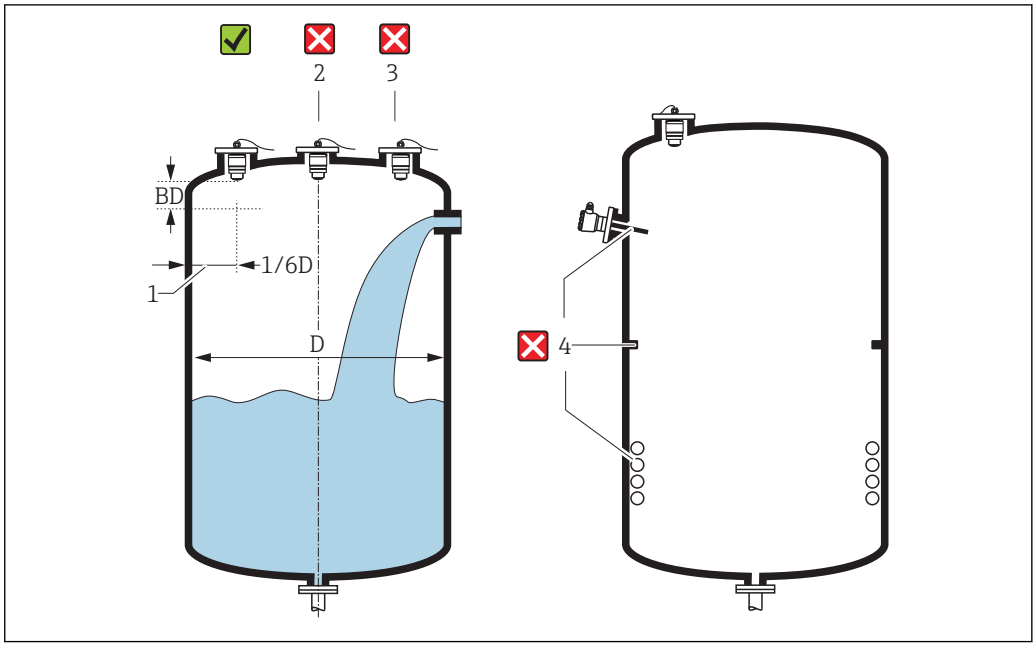


10 *FMR20 nozzle installation*

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

Orientation

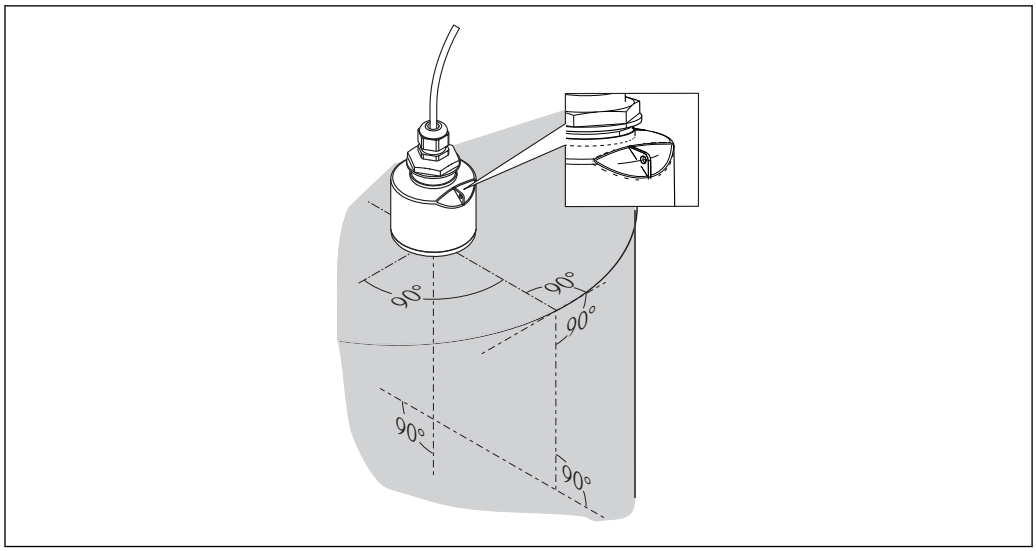


11 *Tank installation position*

- 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.

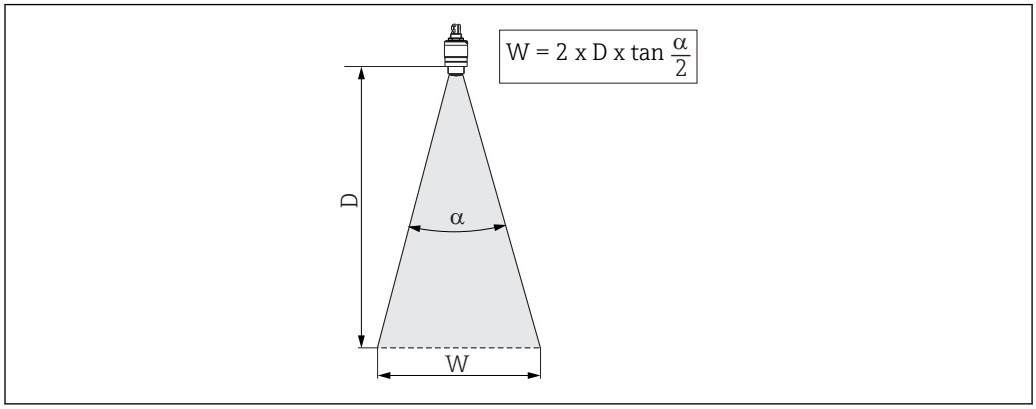
Alignment

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



12 Sensor alignment when mounting in tank

Beam angle



13 Relationship between beam angle α, distance D and beamwidth diameter W

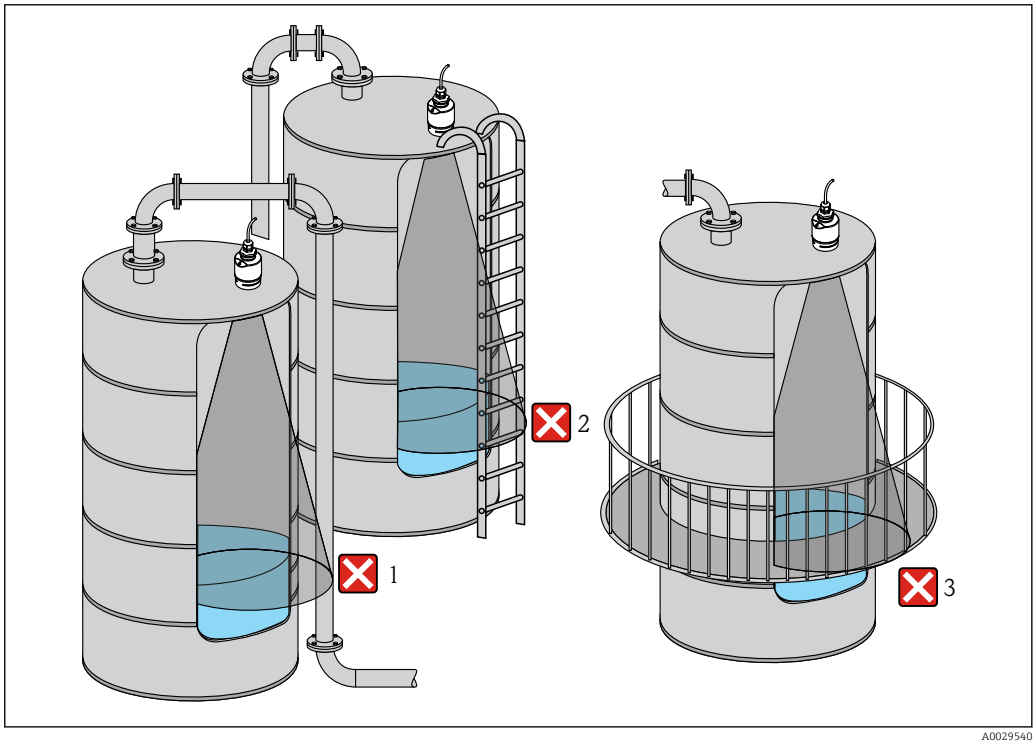
The beam angle is defined as the angle **α** at which the power density of the radar waves reaches half the value of the maximum power density (3dB width). Microwaves are also emitted outside the signal beam and can be reflected off interfering installations.

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)

Measurement in plastic vessels

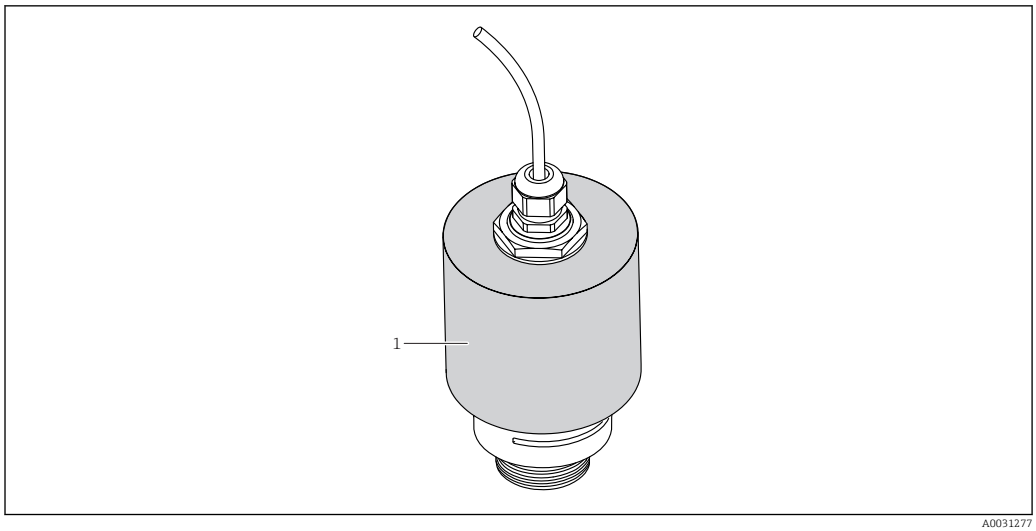
If the outer wall of the vessel is made of a non-conductive material (e.g. GFR) microwaves can also be reflected off interfering installations outside of the vessel (e.g. metallic pipes (1), ladders (2), grates (3), ...). Therefore there should be no such interfering installations in the signal beam.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



14 *Measurement in a plastic vessel*

Weather protection cover

For outdoor use, the use of a weather protection cover(1) is recommended



15 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. → 37

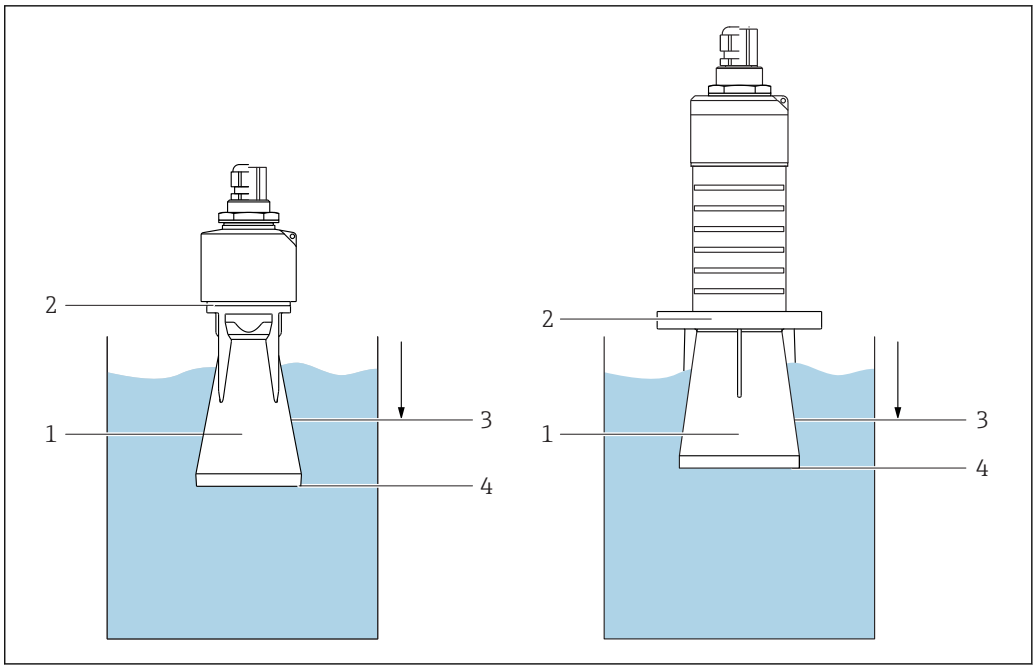
The sensor is not completely covered.

The weather protection cover is available as an accessory. → 37

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

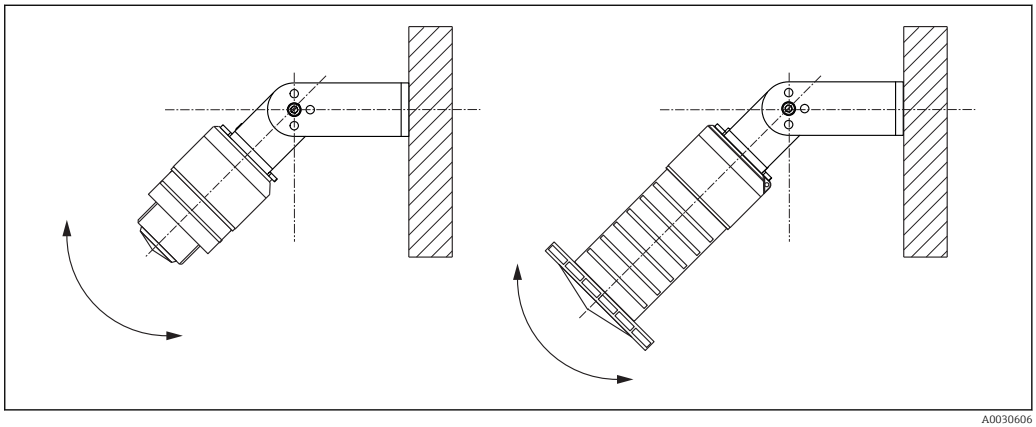


16 *Function of flooding protection tube*

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

The flooding protection tube is available as an accessory. → 37

Installation with mounting bracket, adjustable



17 *Installation with mounting bracket, adjustable*

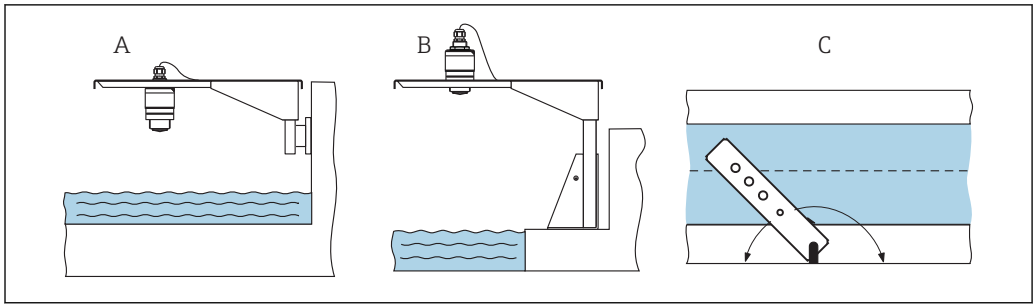
- Wall or ceiling installation is possible.
- Using the mounting bracket, position the antenna so that it is perpendicular to the product surface.

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. → 37

Cantilever installation, with pivot



18 *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. → 37

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?

Environment

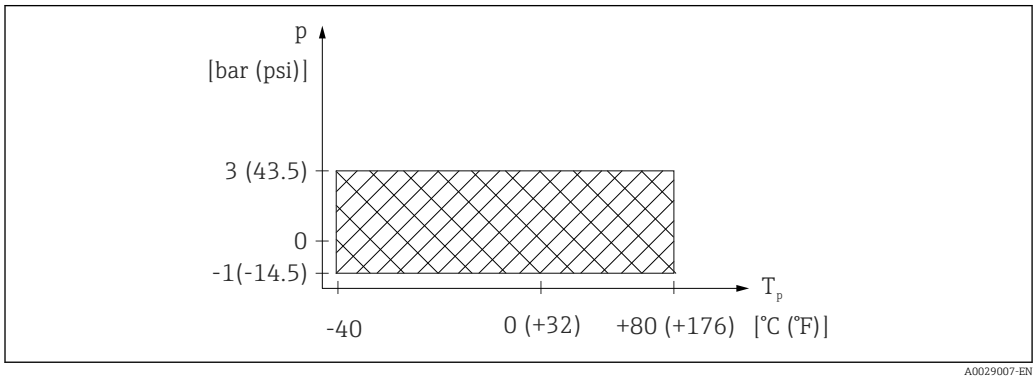
Ambient temperature range	Measuring device: −40 to +80 °C (−40 to +176 °F) It may not be possible to use the Bluetooth connection at ambient temperatures > 60 °C (140 °F). Outdoor operation in strong sunlight: ▪ Mount the device in the shade. ▪ Avoid direct sunlight, particularly in warm climatic regions. ▪ Use a weather protection cover → 37.
Storage temperature	−40 to +80 °C (−40 to +176 °F)
Climate class	DIN EN 60068-2-38 (test Z/AD)
Installation height as per IEC 61010-1 Ed.3	Generally up to 2 000 m (6 600 ft) above sea level.
Degree of protection	Tested acc. to: IP68, NEMA 6P (24 h at 1.83 m under water)
Vibration resistance	DIN EN 60068-2-64/IEC 60068-2-64: 20 to 2 000 Hz, 1 $(m/s^2)^2/Hz$
Cleaning the antenna	The antenna may become contaminated depending on the application. Emission and reception of microwaves can thus be hindered. The level of contamination leading to an error depends firstly on the medium and secondly on the reflectivity, mainly determined by the dielectric constant ε_r. If the medium tends to cause contamination and buildup, cleaning on a regular basis is recommended. Care must be taken to ensure the antenna is not damaged in the process of mechanical or hose-down cleaning. Material compatibility must be taken into account if cleaning agents are used! The maximum permitted temperatures must not be exceeded.
Electromagnetic compatibility (EMC)	Electromagnetic compatibility in accordance with all of the relevant requirements outlined in the EN 61000 series and NAMUR Recommendation EMC (NE 21). For details, please refer to the Declaration of Conformity [2)]

2) Available for download at www.endress.com.

Process

Process temperature, process pressure

FMR20



19 *FMR20: Permitted range for process temperature and process pressure*

Feature 100 "Process connection"	Process temperature range	Process pressure range
▪ VEE: Thread ASME MNPT1-1/2; PVDF ▪ VFE: Thread ASME MNPT2; PVDF ▪ WFE: Thread ISO228 G1-1/2; PVDF ▪ WFE: Thread ISO228 G2; PVDF	−40 to +80 °C (−40 to +176 °F)	p_{rel} = −1 to 3 bar (−14.5 to 43.5 psi) p_{abs} < 4 bar (58 psi) [1]
▪ RPF: UNI slip-on flange 3"/DN80/80; PP ▪ RRF: UNI slip-on flange 4"/DN100/100; PP ▪ RSF: UNI slip-on flange 6"/DN150/150; PP	−40 to +80 °C (−40 to +176 °F)	p_{rel} = −1 to 1 bar (−14.5 to 14.5 psi) p_{abs} < 4 bar (58 psi) [2]

1) The pressure range may be further restricted in the event of a CRN approval.
2) The pressure range may be further restricted in the event of a CRN approval.

Dielectric constant

For liquids

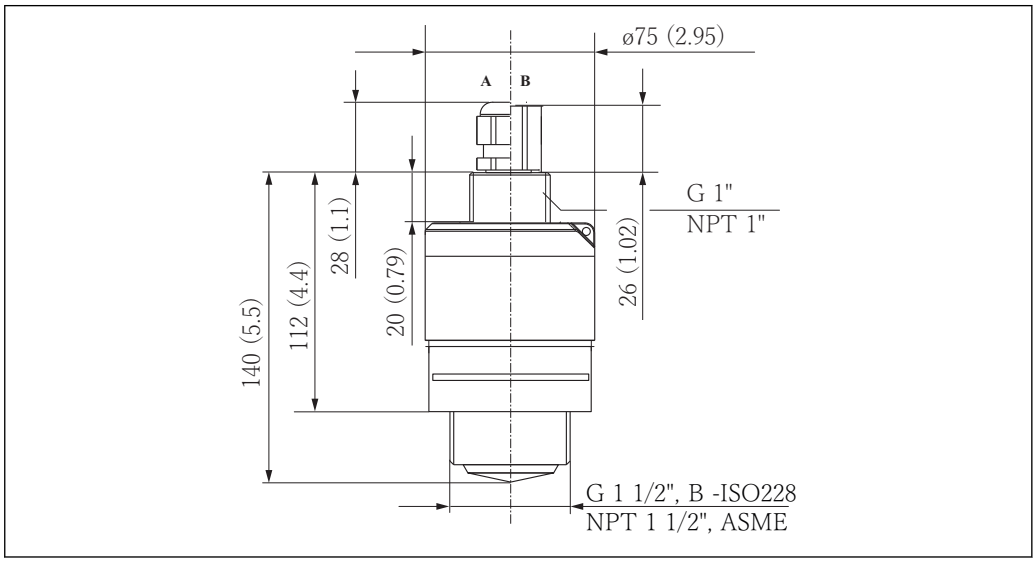
$\varepsilon_r \geq 4$

For dielectric constants (DC values) of many media commonly used in various industries refer to:
- the Endress+Hauser DC manual (CP01076F)
- the Endress+Hauser "DC Values App" (available for Android and iOS)

Mechanical construction

Dimensions

FMR20 with G 1-1/2 or MNPT 1-1/2 thread

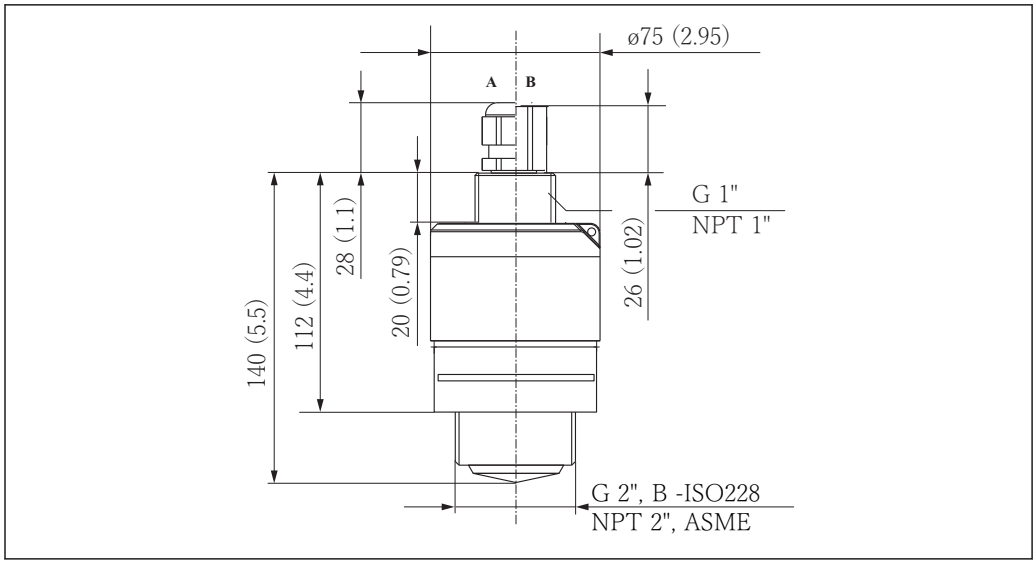


20 Dimensions of FMR20 with G 1-1/2 or MNPT 1-1/2 thread, engineering unit: mm (in)

Applies to the following device versions

- **Feature 095 "Process connection rear side"**
  - VCE: Thread ASME MNPT1; PVDF
  - WDE: Thread G1 ISO228; PVDF
- **Feature 100 "Process connection front side"**
  - VEE: Thread ASME MNPT1-1/2; PVDF
  - WFE: Thread ISO228 G1-1/2; PVDF

FMR20 with G 2 or MNPT 2 thread

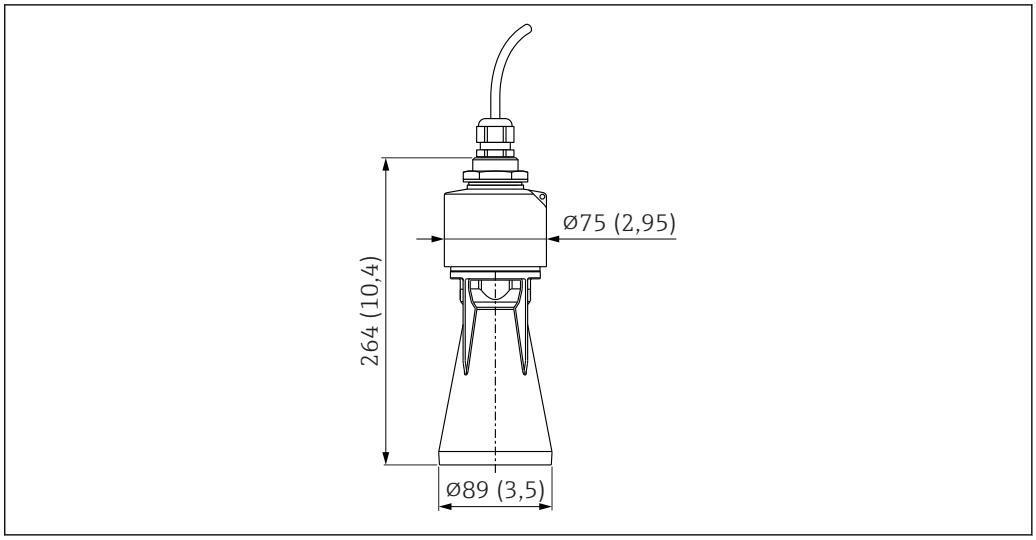


2 1 Dimensions of FMR20 with G 2 or MNPT 2 thread, engineering unit: mm (in)

Applies to the following device versions

- **Feature 095 "Process connection rear side"**
  - VCE: Thread ASME MNPT1; PVDF
  - WDE: Thread G1 ISO228; PVDF
- **Feature 100 "Process connection front side"**
  - VFE: Thread ASME MNPT2; PVDF
  - WGE: Thread ISO228 G2; PVDF

FMR20 with flooding protection tube

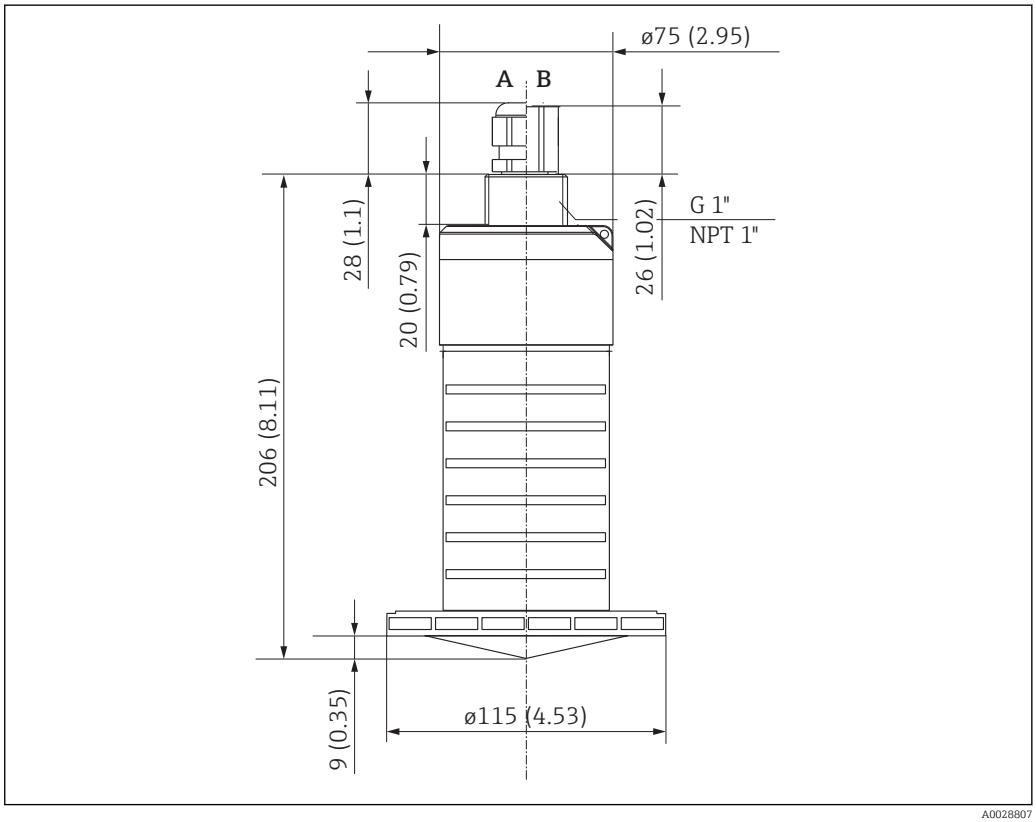


22 Dimensions of FMR20 with flooding protection tube, engineering unit: mm (in)

Applies to the following device versions

- **Feature 100 "Process connection front side"**
  WFE: Thread ISO228 G1-1/2; PVDF
- **Feature 620 "Accessory enclosed"**
  Option R7 "Flooding protection tube, metallized PBT-PC suitable for 40 mm (1.5 in) antenna with process connection on front G1-1/2".

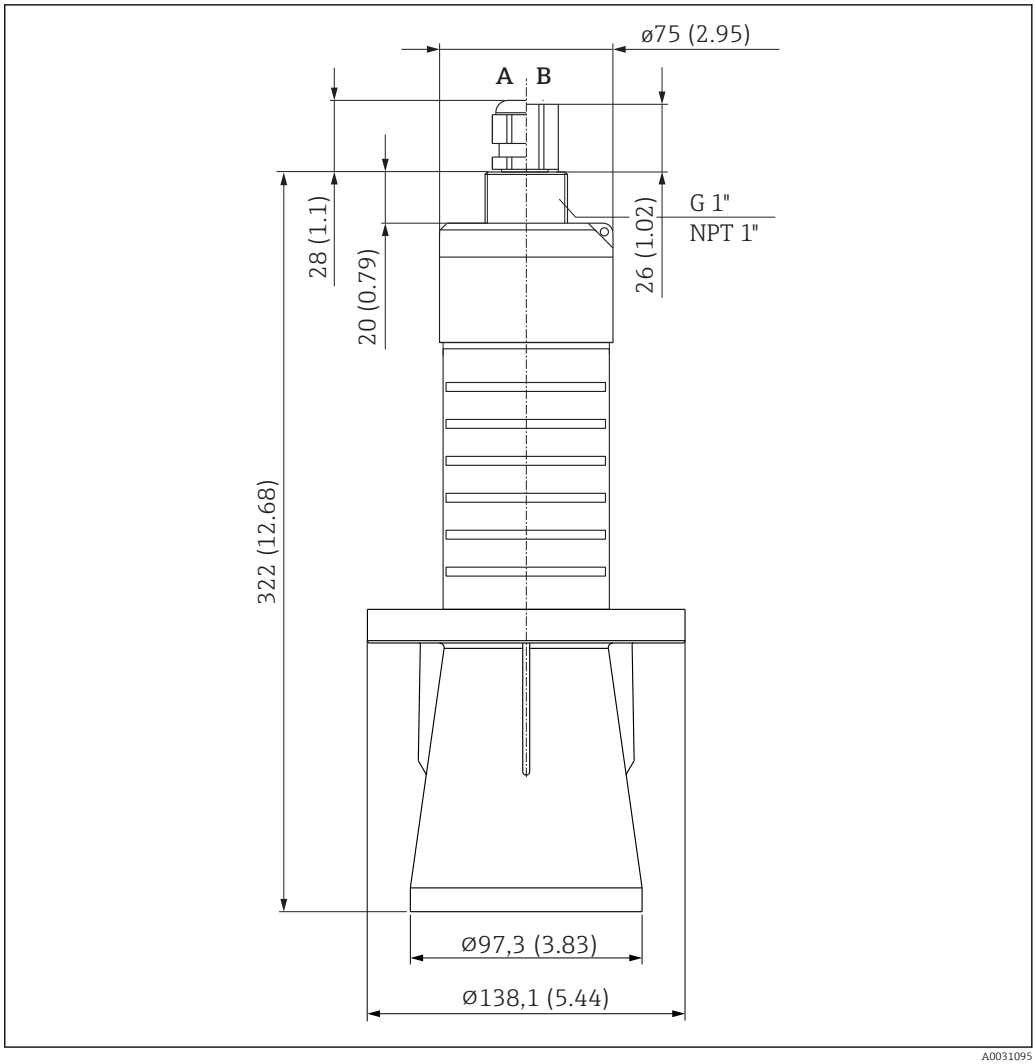
FMR20 80 mm (3 in) antenna



23 Dimensions of FMR20 80 mm (3 in) antenna; engineering unit: mm (in)

Applies to the following device versions
Feature 095 "Process connection rear side"
- VCE: Thread ASME MNPT1; PVDF
- WDE: Thread G1 ISO228; PVDF

FMR20 80 mm (3 in) antenna with flooding protection tube

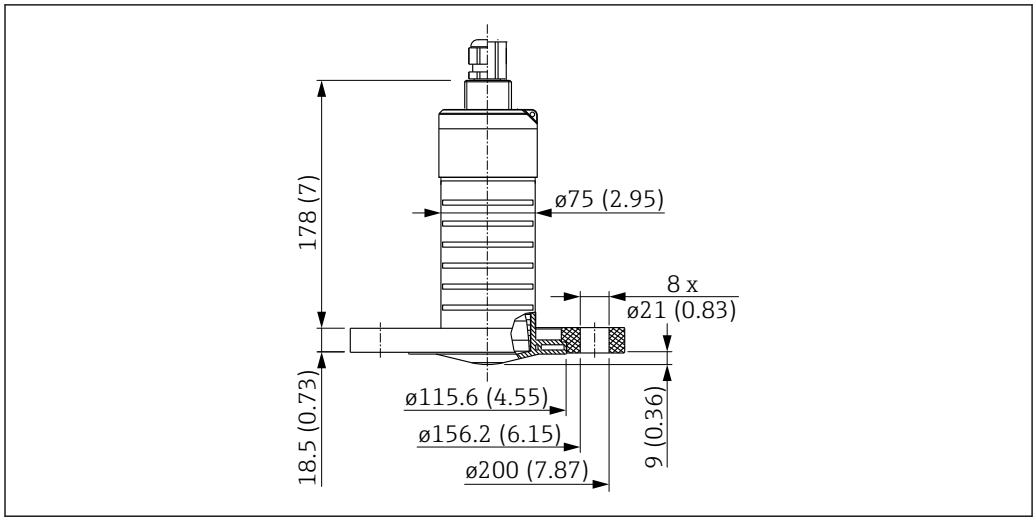


24 Dimensions of FMR20 80 mm (3 in) antenna with flooding protection tube; engineering unit: mm (in)

Applies to the following device versions

- **Feature 100 "Process connection front side"**
  XR0: Mounting customer side w/o flange
- **Feature 620 "Accessory enclosed"**
  Option R8 "Flooding protection tube, metallized PBT-PC suitable for 80 mm (3 in) antenna

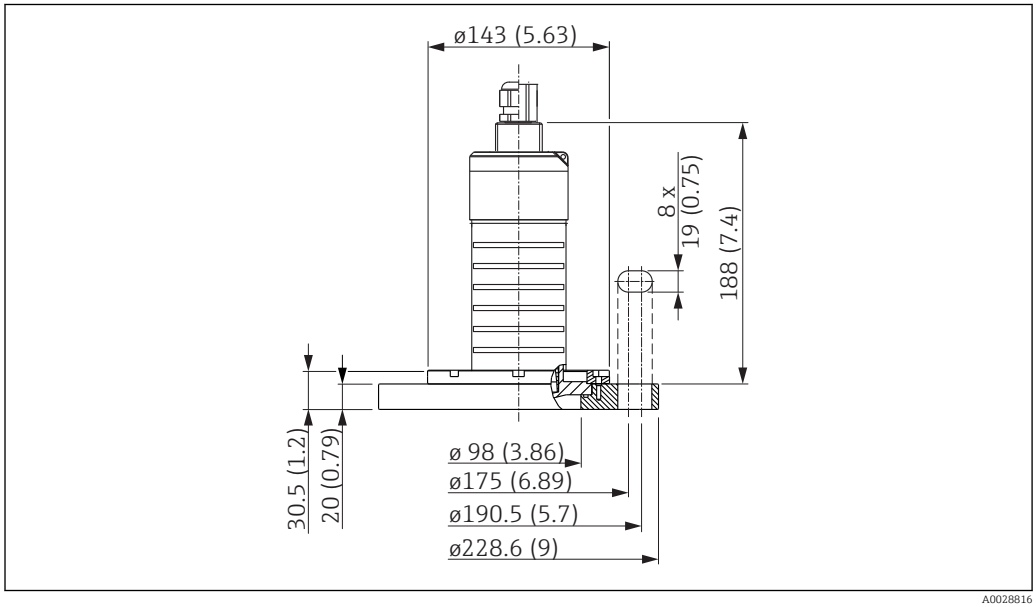
FMR20 80 mm (3 in) antenna with UNI slip-on flange 3"/DN80



25 Dimensions of FMR20 80 mm (3 in) antenna with slip-on flange 3"/DN80, engineering unit: mm (in)

Applies to the following device versions
- **Feature 095 "Process connection rear side"**
  - VCE: Thread ASME MNPT1; PVDF
  - WDE: Thread G1 ISO228; PVDF
- **Feature 100 "Process connection front side"**
  RPF: UNI slip-on flange 3"/DN80/80; PP, suitable for 3" 150 lbs/DN80 PN16/10K 80

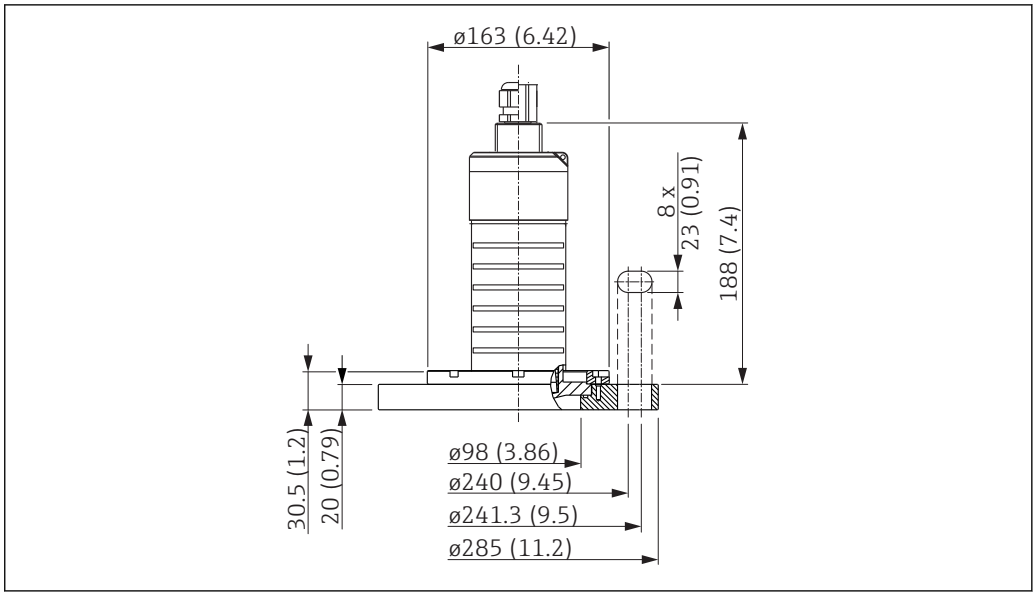
FMR20 80 mm (3 in) antenna with slip-on flange 4"/DN100



26 Dimensions of FMR20 80 mm (3 in) antenna with slip-on flange 4"/DN100, engineering unit: mm (in)

Applies to the following device versions
- **Feature 095 "Process connection rear side"**
  - VCE: Thread ASME MNPT1; PVDF
  - WDE: Thread G1 ISO228; PVDF
- **Feature 100 "Process connection front side"**
  RRF: UNI slip-on flange 4"/DN100/100; PP, suitable for 4" 150 lbs/DN100 PN16/10K 100

FMR20 80 mm (3 in) antenna with slip-on flange 6"/DN150



27 *Dimensions of FMR20 80 mm (3 in) antenna with slip-on flange 6"/DN150, engineering unit: mm (in)*

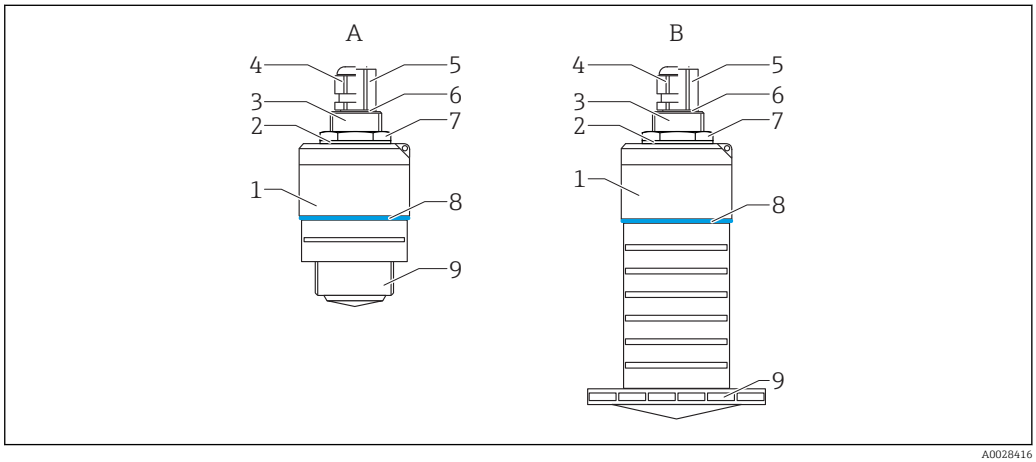
Applies to the following device versions

- **Feature 095 "Process connection rear side"**
  - VCE: Thread ASME MNPT1; PVDF
  - WDE: Thread G1 ISO228; PVDF
- **Feature 100 "Process connection front side"**
  RSF: UNI slip-on flange 6"/DN150/150; PP, suitable for 6" 150 lbs/DN150 PN16/10K 150

Weight

Micropilot	Weight (incl. 5 m (16.4 ft) cable)
FMR20, 40 mm (1.5 in) antenna	Approx. 2.5 kg (5.5 lb)
FMR20, 80 mm (3 in) antenna	Approx. 2.8 kg (6.2 lb)

Housing/process connection materials



28 *FMR20 materials*

A 40 mm (1.5 in)Antenna
B 80 mm (3 in)Antenna

Item	Component part	Material
1	Sensor housing	PVDF
2	Seal	EPDM

Item	Component part	Material
3	Process connection rear side	PVDF
4	Cable gland	PA
5	Pipe adapter	CuZn, nickel-plated
6	O-ring	EPDM
7	Counter nut	PA6.6
8	Design ring	PBT PC
9	Process connection front side	PVDF

Connecting cable

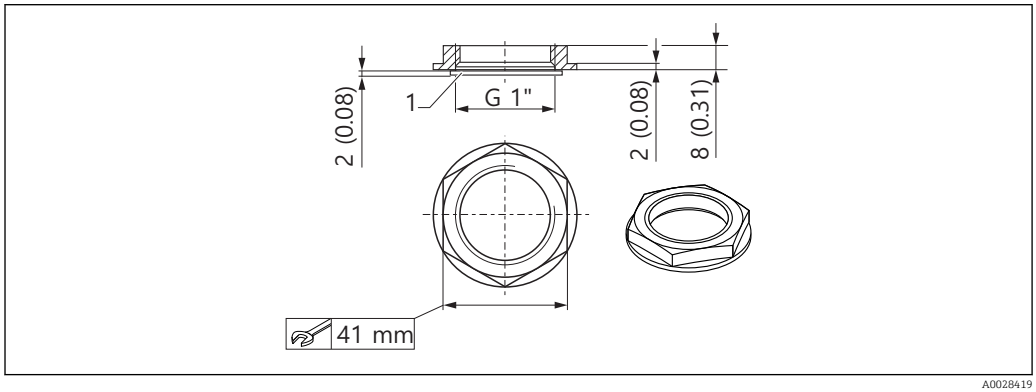
Available cable length: 1 to 30 m (3.3 to 98 ft)

If longer cable lengths are required, an extension cable must be used.

In this case, the total cable length (sensor cable + extension cable) must not exceed 300 m (984 ft).

Material : PVC

Counter nut G 1



29 Dimensions of counter nut G 1, engineering unit: mm (in)

1 Seal

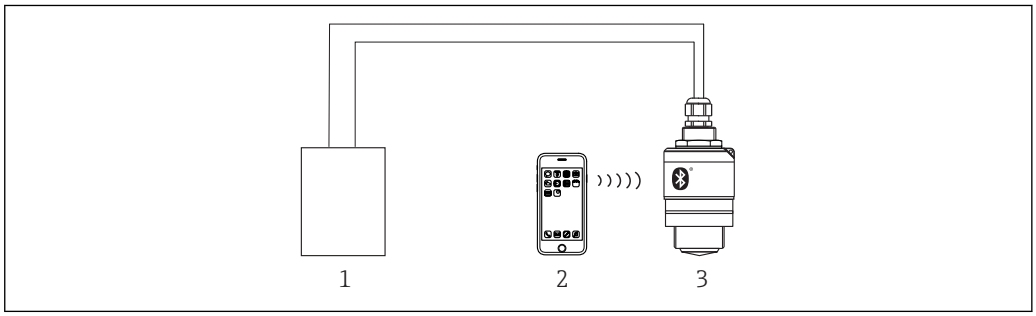
- The counter nut with seal (EPDM) is included in the scope of supply.
- Material: PA6.6

Operability

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

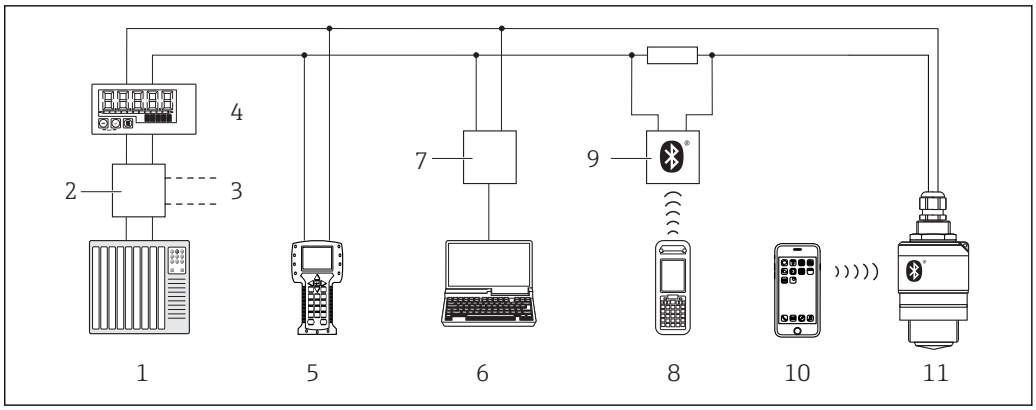
Via Bluetooth® wireless technology



30 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

Via HART protocol



31 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

Certificates and approvals

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.

RoHS

The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS 2).

RCM-Tick marking

The supplied product or measuring system meets the ACMA (Australian Communications and Media Authority) requirements for network integrity, interoperability, performance characteristics as well as health and safety regulations. Here, especially the regulatory arrangements for electromagnetic compatibility are met. The products are labelled with the RCM- Tick marking on the name plate.



A0029561

Ex-Zulassung

- Non-hazardous area
- ATEX II 1 G Ex ia IIC T4 Ga
- ATEX II 1/2 G Ex ia IIC T4 Ga/Gb
- CSA C/US General Purpose
- CSA C/US IS CI.I Div.1 Gr.A-D, AEx ia / Ex ia T4
- IEC Ex ia IIC T4 Ga/Gb

Additional safety instructions must be followed for use in hazardous areas. Please refer to the separate "Safety Instructions" (XA) document included in the delivery. Reference to the applicable XA can be found on the nameplate.

Details on the available certificates and associated XAs can be found in the **Associated documentation** section under **Safety instructions**: → 📄 51.

Explosion-protected smartphones and tablets

Only mobile end devices with Ex approval may be used in hazardous areas.

Pressure Equipment Directive

The Micropilot does not fall within the scope of Pressure Equipment Directive 97/23/EC as it does not have a pressurized housing as defined in Article 1, Section 2.1.4 of the directive.

Radio standard EN 302729-1/2

Micropilot FMR20 devices comply with the LPR (Level Probing Radar) radio standard EN 302729-1/2. The devices are approved for unrestricted use inside and outside of closed vessels in countries of the EU and EFTA that have implemented this standard.

The following countries are those that have currently implemented the directive:

Belgium, Bulgaria, Germany, Denmark, Estonia, France, Greece, UK, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Latvia, Malta, The Netherlands, Norway, Austria, Poland, Portugal, Romania, Sweden, Switzerland, Slovakia, Spain, Czech Republic and Cyprus.

Implementation is still underway in all of the countries not listed.

Please note the following for operation of the devices outside of closed vessels:

1. The device must be installed according to the instructions mentioned in the chapter "Installation". → 📄 20
2. Installation must be carried out by properly trained, expert staff.
3. The device antenna must be installed in a fixed location pointing vertically downwards.
4. The installation site must be located at a distance of 4 km from the astronomy stations listed below or otherwise approval must be provided by the relevant authority. If the device is installed at a distance of 4 to 40 km from one of the listed stations, it must not be installed at a height of more than 15 m (49 ft) above the ground.

Astronomy stations

Country	Name of the station	Latitude	Longitude
Germany	Effelsberg	50°31'32" North	06°53'00" East
Finland	Metsähovi	60°13'04" North	24°23'37" East
	Tuorla	60°24'56" North	24°26'31" East
France	Plateau de Bure	44°38'01" North	05°54'26" East
	Floirac	44°50'10" North	00°31'37" West
Great Britain	Cambridge	52°09'59" North	00°02'20" East
	Damhall	53°09'22" North	02°32'03" West
	Jodrell Bank	53°14'10" North	02°18'26" West
	Knockin	52°47'24" North	02°59'45" West
	Pickmere	53°17'18" North	02°26'38" West
Italy	Medicina	44°31'14" North	11°38'49" East
	Noto	36°52'34" North	14°59'21" East
	Sardinia	39°29'50" North	09°14'40" East
Poland	Fort Skala Krakow	50°03'18" North	19°49'36" East
Russia	Dmitrov	56°26'00" North	37°27'00" East
	Kalyazin	57°13'22" North	37°54'01" East
	Pushchino	54°49'00" North	37°40'00" East
	Zelenchukskaya	43°49'53" North	41°35'32" East
Sweden	Onsala	57°23'45" North	11°55'35" East
Switzerland	Bleien	47°20'26" North	08°06'44" East
Spain	Yebes	40°31'27" North	03°05'22" West
	Robledo	40°25'38" North	04°14'57" West
Hungary	Penc	47°47'22" North	19°16'53" East

As a general rule, the requirements outlined in EN 302729-1/2 must be observed.

FCC / Industry Canada

This device complies with Part 15 of the FCC Rules [and with Industry Canada licence-exempt RSS standard(s)]. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

[Any] Changes or modifications made to this equipment not expressly approved by Endress+Hauser may void the FCC authorization to operate this equipment.

Other standards and guidelines

- IEC/EN 61010-1
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use
- IEC/EN 55011
  "EMC Emission, RF Emission for Class B". Industrial, scientific and medical equipment – Electromagnetic disturbance characteristics - Limits and methods of measurement
- IEC/EN 61000-4-2
  EMC Immunity, ESD (Performance Criteria A). Electromagnetic compatibility (EMC): Testing and measurement techniques - Electrostatic discharge immunity test (ESD)
- IEC/EN 61000-4-3
  EMC Immunity, RF field susceptibility (Performance Criteria A). Electromagnetic compatibility (EMC): Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
- IEC/EN 61000-4-4
  EMC Immunity, bursts (Performance Criteria B). Electromagnetic compatibility (EMC): Testing and measurement techniques - Electrical fast transient/burst immunity test
- IEC/EN 61000-4-5
  EMC Immunity, surge (Performance Criteria B). Electromagnetic compatibility (EMC): Testing and measurement techniques - Surge immunity test
- IEC/EN 61000-4-6
  EMC Immunity, conducted HF (Performance Criteria A). Electromagnetic compatibility (EMC): Testing and measurement techniques - Immunity to conducted disturbances induced by radio-frequency fields
- IEC/EN 61000-4-8
  EMC Immunity, magnetic fields 50 Hz. Electromagnetic compatibility (EMC): Testing and measurement techniques - Power frequency magnetic field immunity test
- EN 61000-6-3
  EMC Emission, conducted HF. EMC: Radiated interference - Residential, commercial and light industry environment
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 107
  Status classification as per NE107
- NAMUR NE 131
  Requirements for field devices for standard applications.
- IEEE 802.15.1
  Requirements for *Bluetooth*® wireless technology interface

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

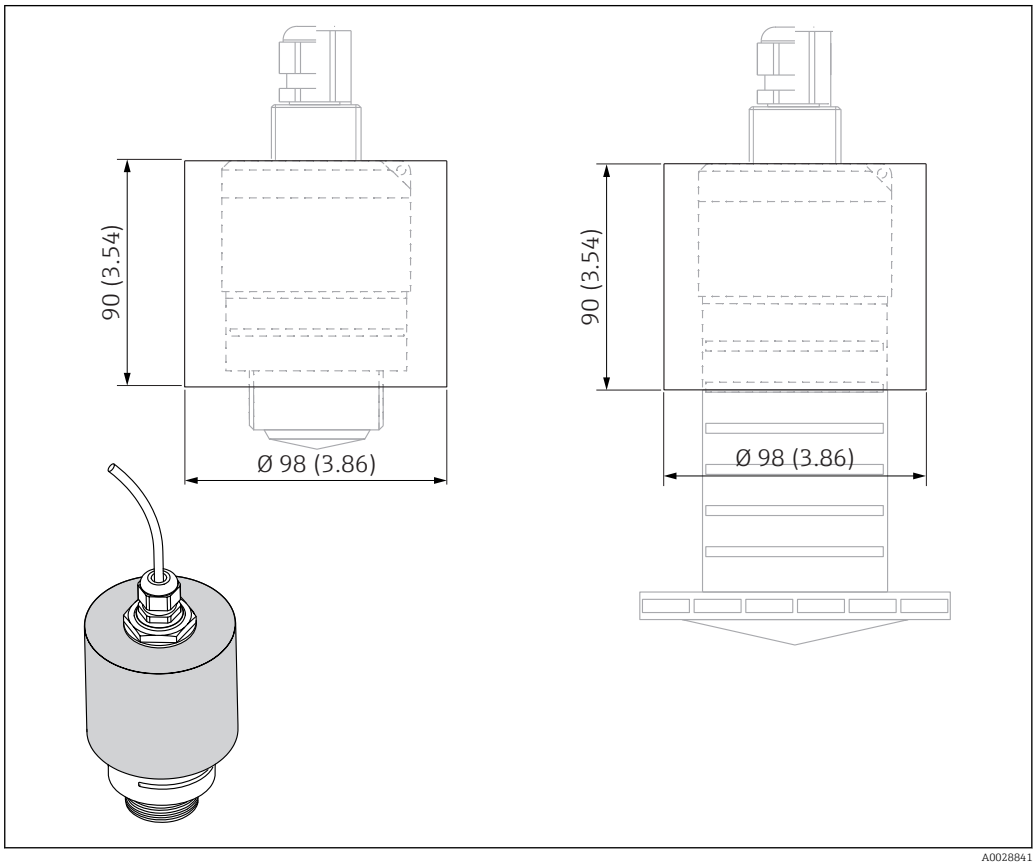
Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Accessories

Device-specific accessories

Weather protection cover



32 *Dimensions of weather protection cover, engineering unit: mm (in)*

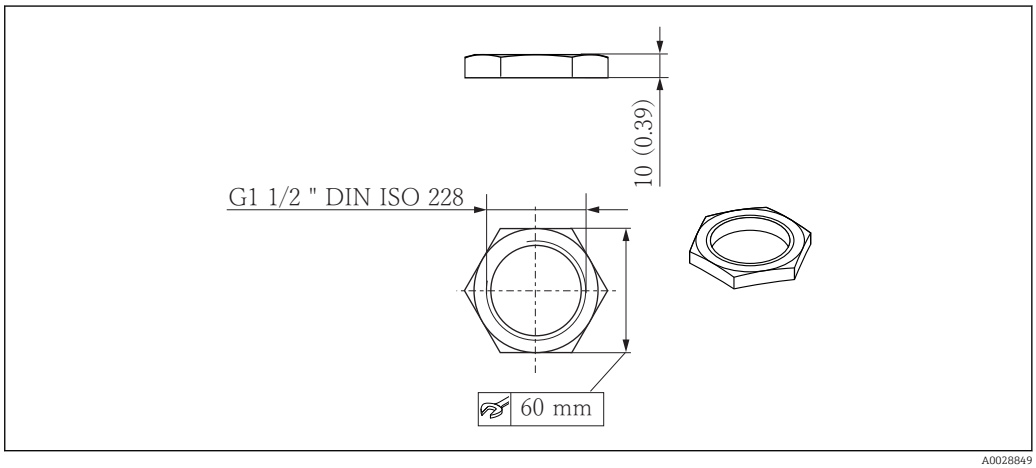
Material: PVDF

The weather protection cover can be ordered with the device (product structure, feature 620 "Accessory enclosed", option R1 "weather protection cover").

Alternatively it can be ordered separately as an accessory; order number 52025686.

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

Securing nut G1-1/2



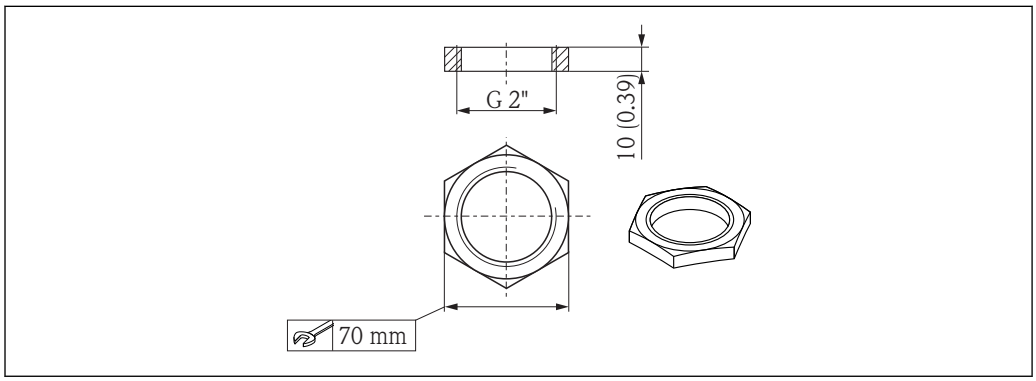
33 *Dimensions of securing nut, engineering unit: mm (in)*

Suitable for use with devices with G 1-1/2 and MNPT 1-1/2 process connection.

Material: PC

Order number: 52014146

Securing nut G2



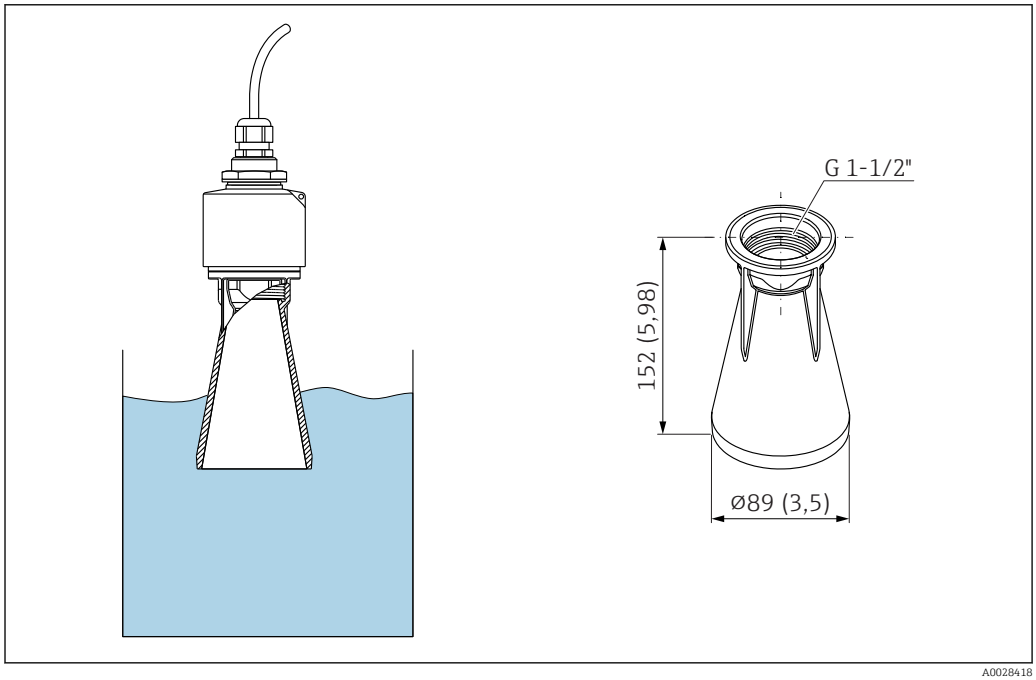
34 *Dimensions of securing nut, engineering unit: mm (in)*

Suitable for use with devices with G 2 and MNPT 2 process connection at front.

Material: PC

Order number: 52000598

Flooding protection tube 40 mm (1.5 in) antenna, metallized PBT-PC



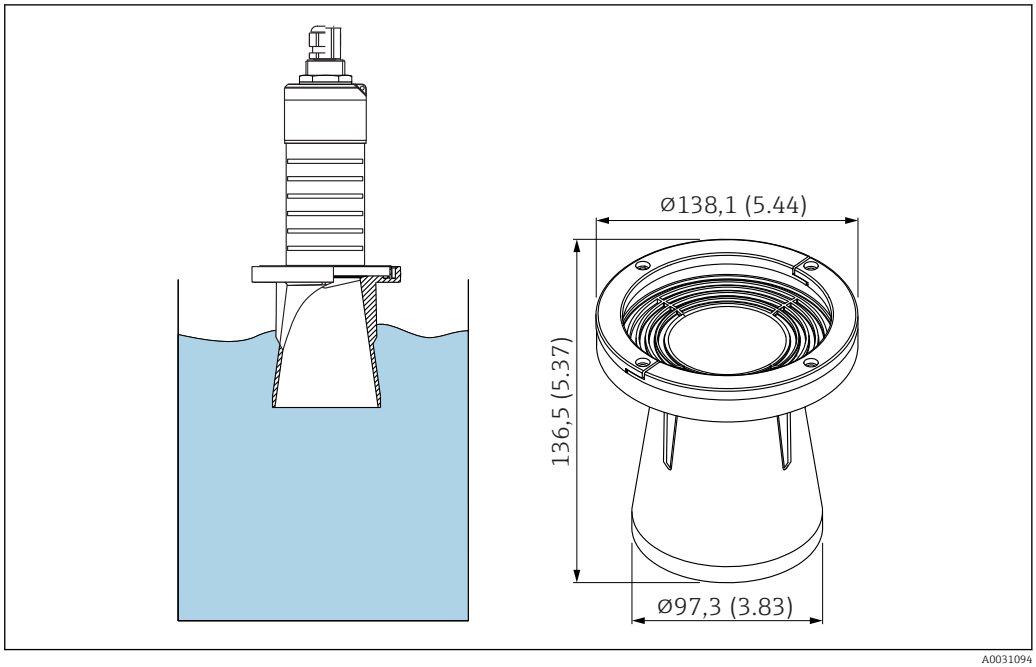
For use with devices in product structure, feature 100 "Process connection front", option WFE "Thread ISO228 G1-1/2".

Material: PBT-PC, metallized

The flooding protection tube can be ordered with the device. Product structure, feature 620 "Accessory enclosed", option R7 "Flooding protection tube, metallized PBT-PC suitable for 40 mm (1.5 in) antenna with process connection on front G1-1/2".

Alternatively available as an accessory; order number 71325090.

Flooding protection tube 80 mm (3 in) antenna, metallized PBT-PC



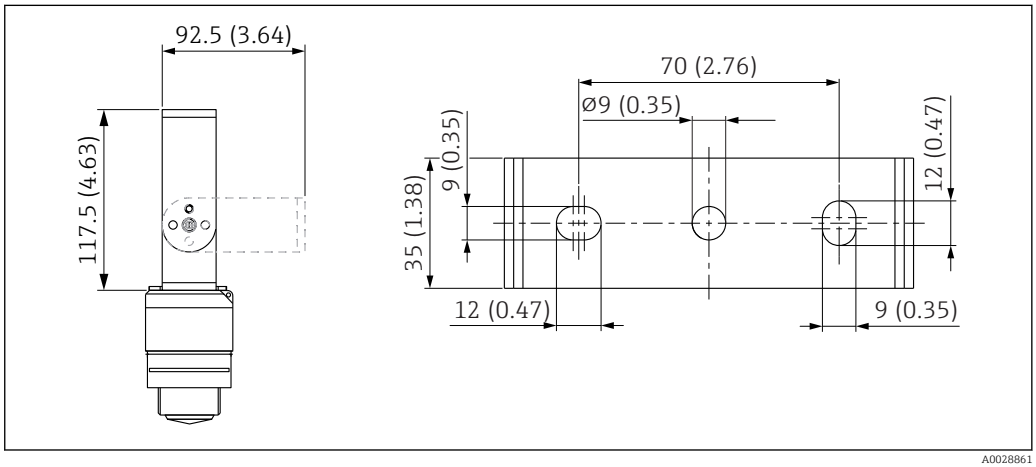
For use with devices in product structure, feature 100 "Process connection front", option XR0 "Mounting customer side w/o flange".

Material: PBT-PC, metallized

The flooding protection tube can be ordered with the device. Product structure, feature 620 "Accessory enclosed", option R8 "Flooding protection tube, metallized PBT-PC suitable for 80 mm (3 in) antenna.

Alternatively available as an accessory; order number 71327051.

Mounting bracket, adjustable



35 Dimensions of mounting bracket, engineering unit: mm (in)

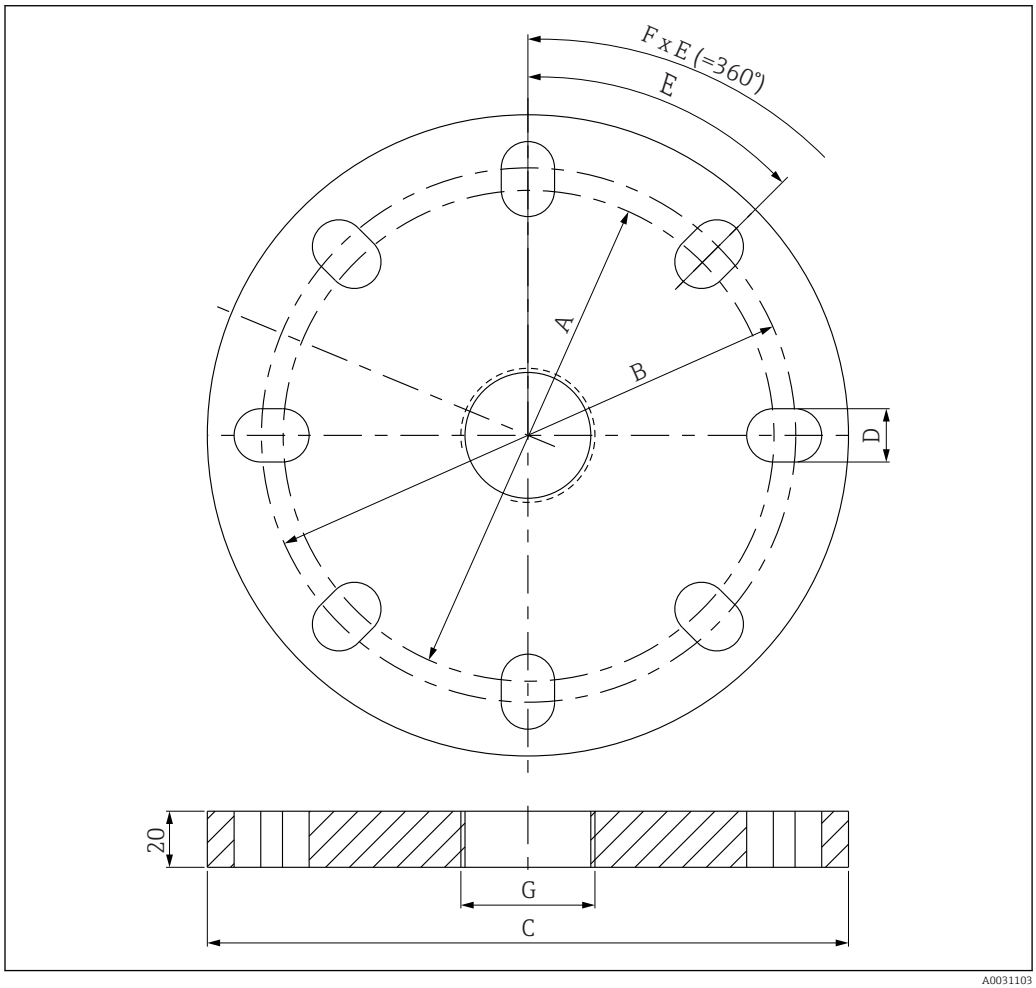
A Ceiling installation
B Wall mounting

Consists of:
- Mounting bracket: 316 (1.4404)
- Angle bracket: 316L (1.4404)
- Screws: A4
- Retaining rings: A4

The mounting bracket can be ordered with the device (product structure, feature 620 "Accessory enclosed", option R3 "Mounting bracket adjustable, 316L").

Alternatively, it is available as an accessory, order number 71325079.

UNI flange

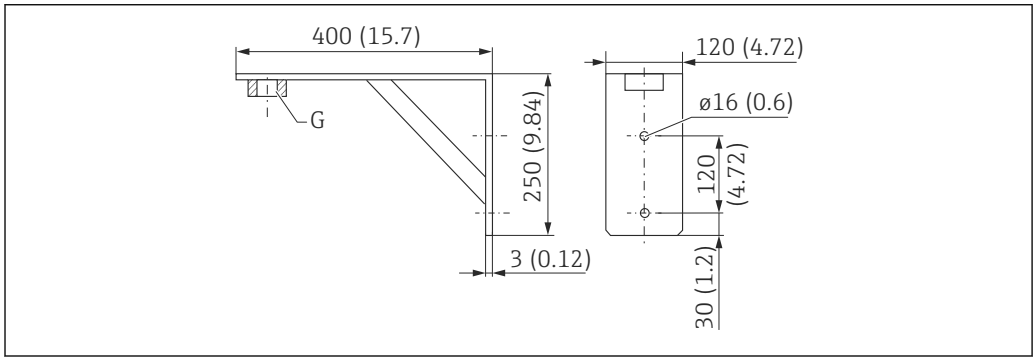


36 *Dimensions of UNI flange, engineering unit: mm*

Product structure Feature 620 "Accessory enclosed" Option:	A (mm)	B (mm)	C (mm)	D (mm)	E	F Number of drills	G Product structure Feature 95 "Process connection front side" Option:	G Product structure Feature 100 "Process connection rear side" Option:	Order Code Accessory
RA UNI flange 2"/DN50/50, PP, front side	120	125	165	19	90°	4	VEE Thread ASME MNPT1-1/2		FAX50-XIGG
RA UNI flange 2"/DN50/50, PP, front side	120	125	165	19	90°	4	WFE Thread ISO228 G1-1/2		FAX50-XIGC
RA UNI flange 2"/DN50/50, PP, front side	120	125	165	19	90°	4	VFE Thread ASME MNPT2		FAX50-XIGH
RA UNI flange 2"/DN50/50, PP, front side	120	125	165	19	90°	4	WGE Thread ISO228 G2		FAX50-XIGD
RB *UNI flange 2"/DN50/50, PP, rear side	120	125	165	19	90°	4		VCE Thread ASME MNPT1	FAX50-XIGF
RB *UNI flange 2"/DN50/50, PP, rear side	120	125	165	19	90°	4		WDE Thread G1 ISO228	FAX50-XIGB
RD UNI flange 3"/DN80/80, PP, front side	150	160	200	19	45°	8	VEE Thread ASME MNPT1-1/2		FAX50-XJGG
RD UNI flange 3"/DN80/80, PP, front side	150	160	200	19	45°	8	WFE Thread ISO228 G1-1/2		FAX50-XJGC
RD UNI flange 3"/DN80/80, PP, front side	150	160	200	19	45°	8	VFE Thread ASME MNPT2		FAX50-XJGH
RD UNI flange 3"/DN80/80, PP, front side	150	160	200	19	45°	8	WGE Thread ISO228 G2		FAX50-XJGD
RE UNI flange 3"/DN80/80, PP, rear side	150	160	200	19	45°	8		VCE Thread ASME MNPT1	FAX50-XJGF

Product structure Feature 620 "Accessory enclosed" Option:	A (mm)	B (mm)	C (mm)	D (mm)	E	F Number of drills	G Product structure Feature 95 "Process connection front side" Option:	G Product structure Feature 100 "Process connection rear side" Option:	Order Code Accessory
RE UNI flange 3"/DN80/80, PP, rear side	150	160	200	19	45°	8		WDE Thread G1 ISO228	FAX50-XJGB
RG UNI flange 4"/ DN100/100, PP, front side	175	190.5	228.6	19	45°	8	VEE Thread ASME MNPT1-1/2		FAX50-XKGG
RG UNI flange 4"/ DN100/100, PP, front side	175	190.5	228.6	19	45°	8	WFE Thread ISO228 G1-1/2		FAX50-XKGC
RG UNI flange 4"/ DN100/100, PP, front side	175	190.5	228.6	19	45°	8	VFE Thread ASME MNPT2		FAX50-XKGH
RG UNI flange 4"/ DN100/100, PP, front side	175	190.5	228.6	19	45°	8	WGE Thread ISO228 G2		FAX50-XKGD
RH UNI flange 4"/ DN100/100, PP, rear side	175	190.5	228.6	19	45°	8		VCE Thread ASME MNPT1	FAX50-XKGF
RH UNI flange 4"/ DN100/100, PP, rear side	175	190.5	228.6	19	45°	8		WDE Thread G1 ISO228	FAX50-XKGB

Angle bracket for wall mount

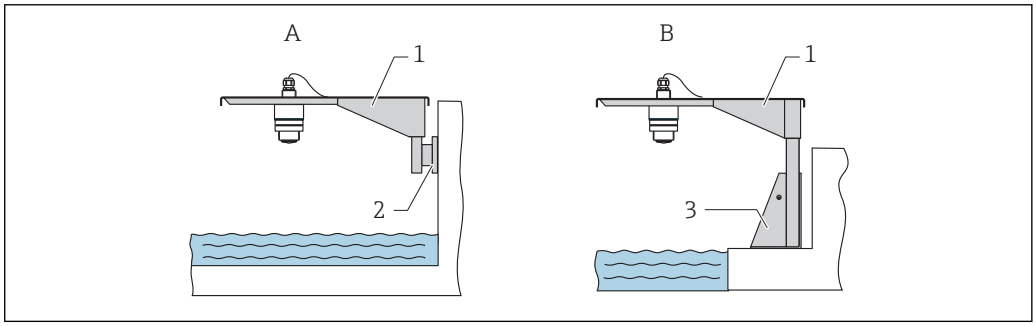


37 *Dimensions of angle bracket, engineering unit: mm (in)*

Process connection	Order No.	Material	Weight
G 1-1/2	942669-0000	316 Ti (1.4571)	3.4 kg (7.5 lb)
G2	942669-0001		
also suitable for MNPT 1-1/2 and MNPT 2			

Cantilever with pivot

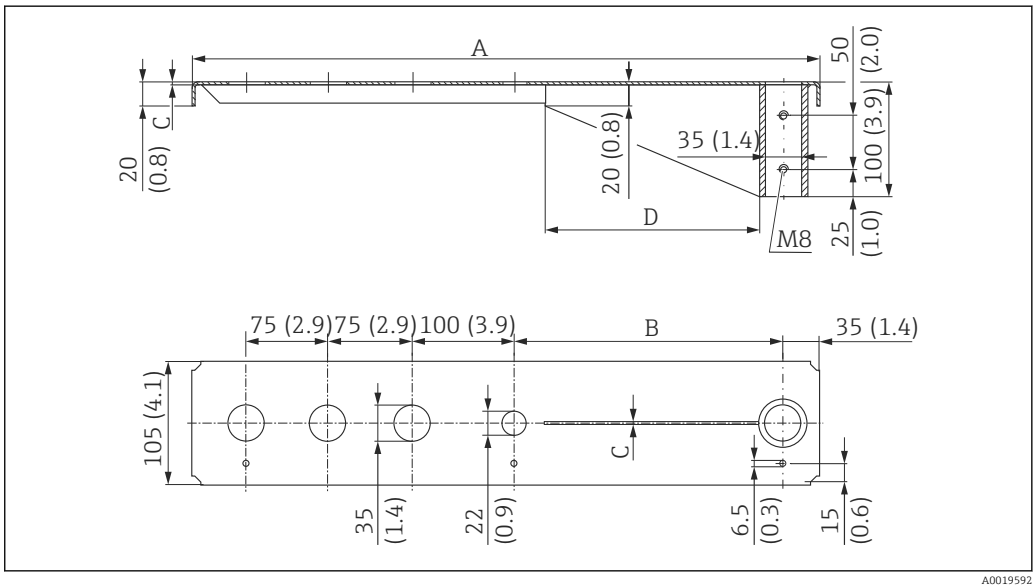
Installation type sensor process connection rear side



38 *Installation type sensor process connection rear side*

A Installation with cantilever and wall bracket
B Installation with cantilever and mounting frame
1 Cantilever
2 Wall bracket
3 Mounting frame

Cantilever with pivot, sensor process connection on rear



39 *Dimensions of cantilever with pivot for sensor process connection on rear, engineering unit: mm (in)*

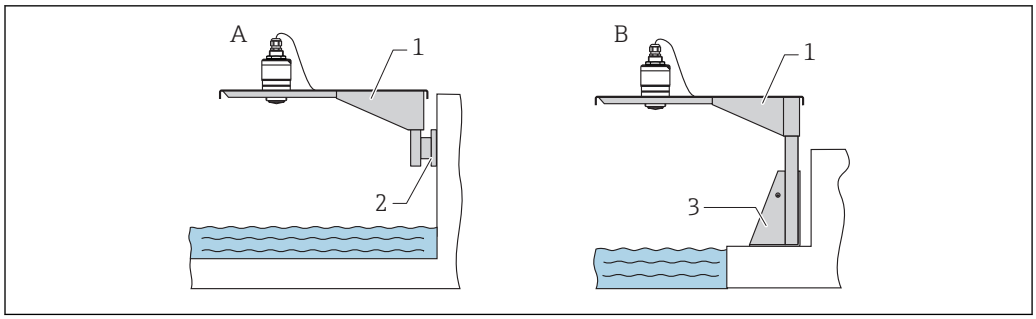
A	B	C	D	Weight	Material	Order No.
585 mm (23 in)	250 mm (9.84 in)	2 mm (0.08 in)	200 mm (7.87 in)	2.1 kg (4.63 lb)	Steel, hot-dip galvanized	919790-0000
				2.0 kg (4.41 lb)	316Ti (1.4571)	919790-0001

A	B	C	D	Weight	Material	Order No.
1085 mm (42.7 in)	750 mm (29.5 in)	3 mm (0.12 in)	300 mm (11.8 in)	4.5 kg (9.92 lb)	Steel, hot-dip galvanized	919790-0002
				4.3 kg (9.48 lb)	316Ti (1.4571)	919790-0003

- 35 mm (1.38 in) Openings for all G 1 or MNPT 1 connections on rear.
- 22 mm (0.87 in) Opening can be used for an additional sensor.

Retaining screws are included in delivery.

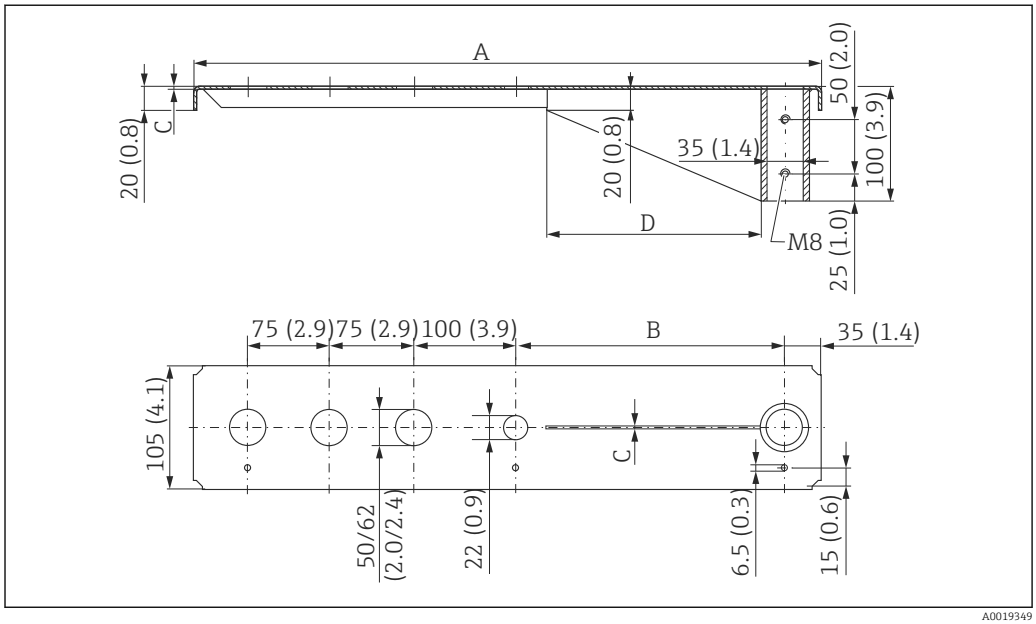
Installation type sensor process connection front side



40 Installation type sensor process connection front side

A Installation with cantilever and wall bracket
B Installation with cantilever and mounting frame
1 Cantilever
2 Wall bracket
3 Mounting frame

Cantilever with pivot, sensor process connection on front



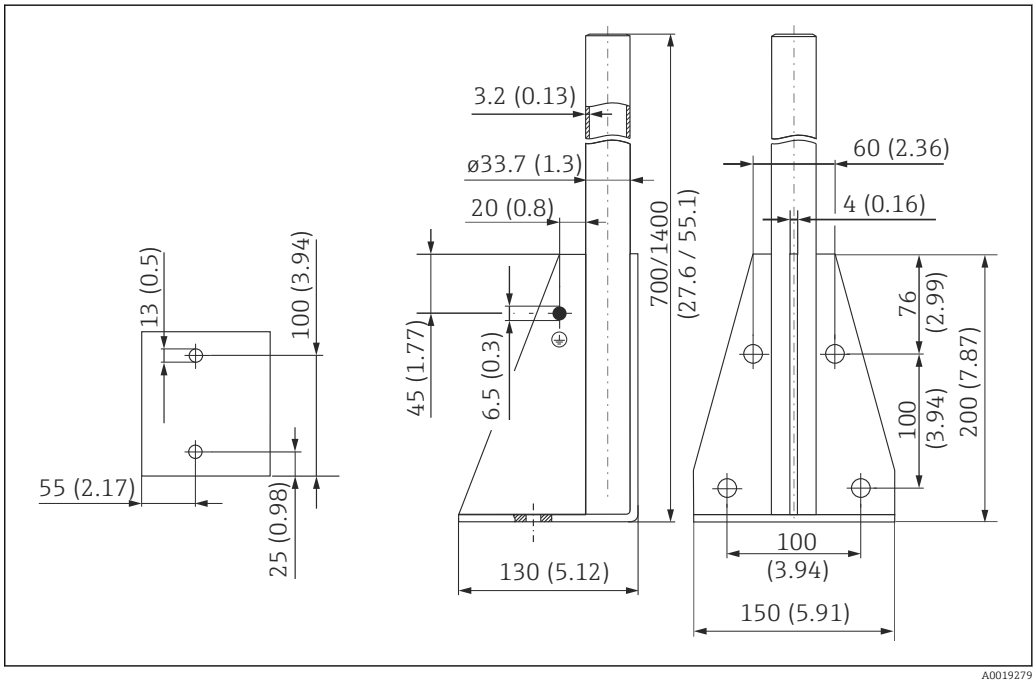
41 Dimensions of cantilever with pivot for sensor process connection on front, engineering unit: mm (in)

A	B	C	D	Weight	Sensor	Material	Order No.
585 mm (23 in)	250 mm (9.84 in)	2 mm (0.08 in)	200 mm (7.87 in)	1.9 kg (4.19 lb)	1-1/2	Steel, hot-dip galvanized	52014131
						316Ti (1.4571)	52014132
					2	Steel, hot-dip galvanized	52014135
						316Ti (1.4571)	52014136
1085 mm (42.7 in)	750 mm (29.5 in)	3 mm (0.12 in)	300 mm (11.8 in)	4.4 kg (9.7 lb)	1-1/2	Steel, hot-dip galvanized	52014133
						316Ti (1.4571)	52014134
					2	Steel, hot-dip galvanized	52014137
						316Ti (1.4571)	52014138

- 50 mm (2.17 in) or 62 mm (2.44 in) openings for all connections on front G 1-1/2 (MNPT 1-1/2) or G 2 (MNPT 2).
- 22 mm (0.87 in) Opening can be used for an additional sensor.

Retaining screws are included in delivery.

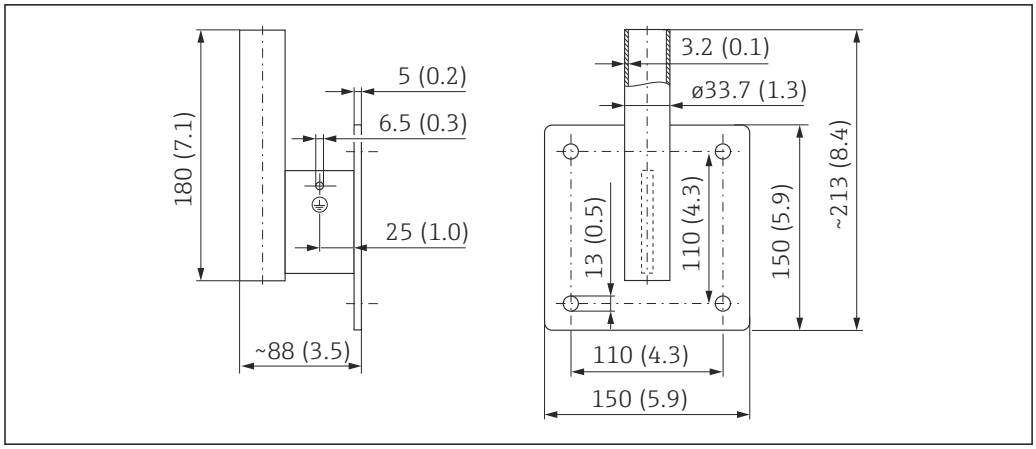
Mounting stand for cantilever with pivot



42 *Dimensions of mounting frame, engineering unit: mm (in)*

Height	Material	Weight	Order No.
700 mm (27.6 in)	Steel, galvanized	3.2 kg (7.06 lb)	919791-0000
700 mm (27.6 in)	316Ti (1.4571)		919791-0001
1400 mm (55.1 in)	Steel, galvanized	4.9 kg (10.08 lb)	919791-0002
1400 mm (55.1 in)	316Ti (1.4571)		919791-0003

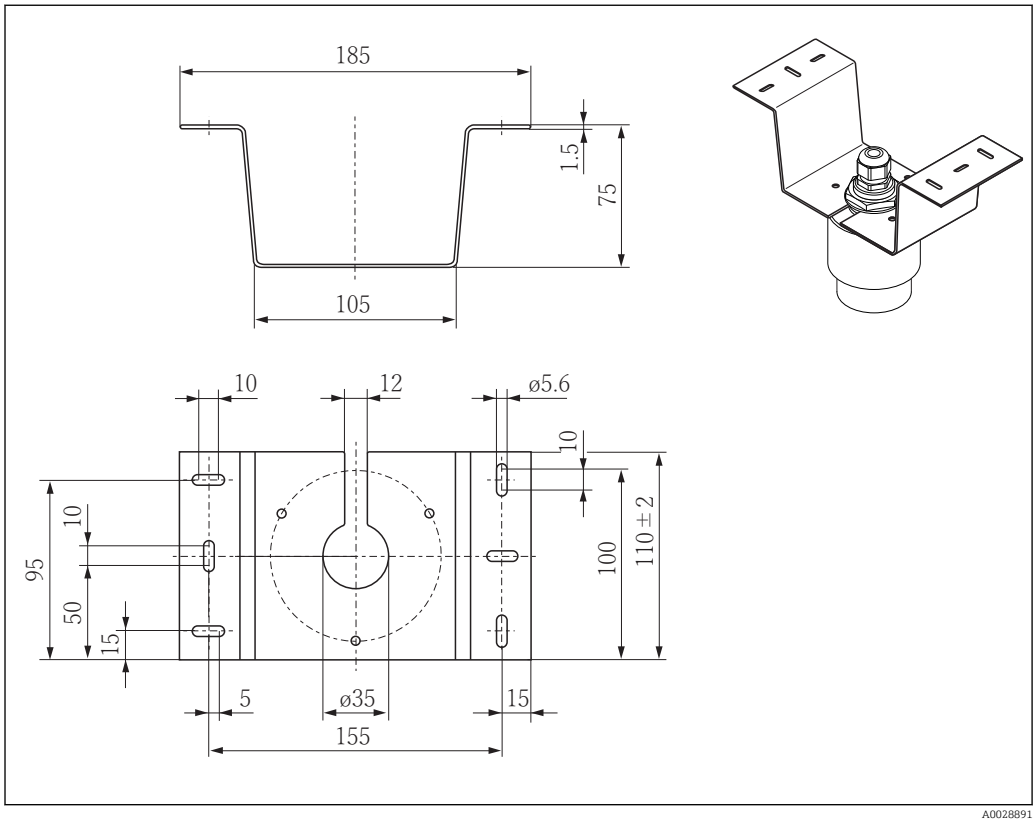
Wall bracket for cantilever with pivot



43 *Dimensions of wall bracket, engineering unit: mm (in)*

Material	Weight	Order No.
Steel, galvanized	1.4 kg (3.09 lb)	919792-0000
316Ti (1.4571)		919792-0001

Ceiling mounting bracket



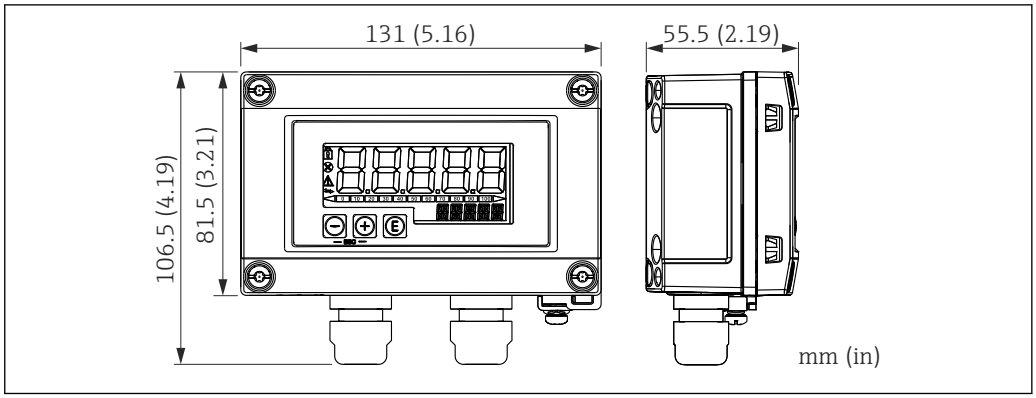
44 *Dimensions of ceiling mounting bracket, engineering unit: mm (in)*

Material: 316L (1.4404)

The mounting bracket can be ordered with the device (product structure, feature 620 "Accessory enclosed", option R2 "Ceiling mounting bracket, 316L").

Alternatively, it is available as an accessory; order number 71093130.

RIA15 in the field housing



45 *Dimensions of RIA15 in field housing, engineering unit: mm (in)*

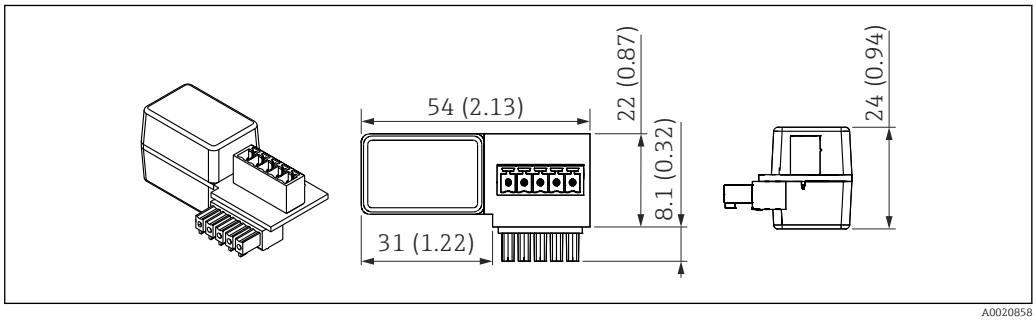
The RIA15 remote display can be ordered together with the device. Product structure, feature 620 "Accessory enclosed":

- 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

HART Kommunikationswiderstand

HART communication resistor

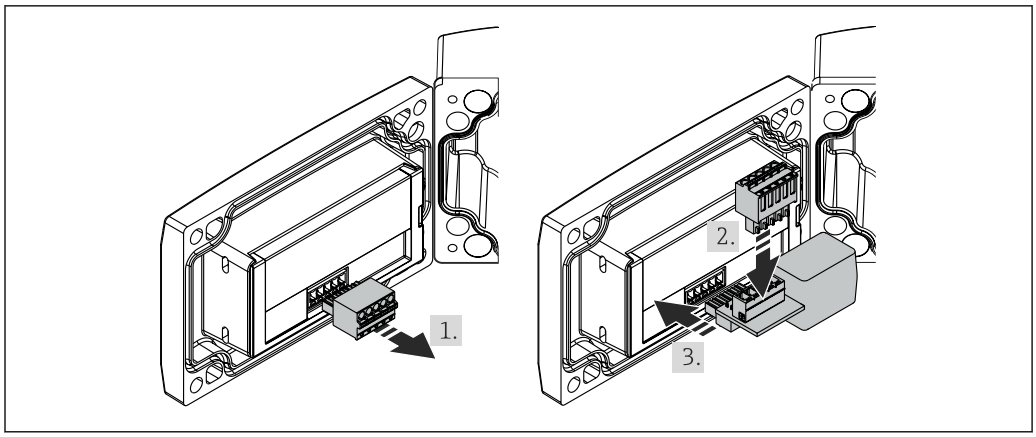


46 *Dimensions of HART communication resistor, engineering unit: mm (in)*

A communication resistor is required for HART communication. If this is not already present (e.g. in the power supply RMA, RN221N, RNS221, ...), it can be ordered with the device via the product structure, feature 620 "Accessory enclosed": option R6 "HART communication resistor hazardous / non-hazardous area".

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

The HART communication resistor is specially designed for use with the RIA15 and can be attached easily.



A0020844

1. Disconnect plug-in terminal block.
2. Insert the terminal block into the slot provided on the HART communication resistor module.
3. Insert the HART communication resistor in the slot in the housing.

Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare / DeviceCare via USB interface. For details, see Technical Information TI00404F

Accessories	Description
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. Order number: 71063562 For details, see Technical Information TI00429F and Operating Instructions BA00371F

Accessories	Description
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

Accessories	Description
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

Accessories	Description
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

Accessories	Description
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

Accessories	Description
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

Accessory	Description
FieldCare / DeviceCare	Endress+Hauser's FDT-based Plant Asset Management tool. Helps to configure and maintain all field devices of your plant. By supplying status information it also supports the diagnosis of the devices. For details refer to Operating Instructions BA00027S and BA00059S.

System components

Accessories	Description
Memograph M graphic display recorder	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 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
RMA42	Digital process transmitter for monitoring and visualizing analog measured values For details, see Technical InformationTI00150R and Operating Instructions BA00287R
RIA452	Digital process meter RIA452, in panel mounted housing for monitoring and displaying analog measured values, batch, pump control functions and can be used as a preset counter and for measuring flow For details, see Technical Information TI113R nd 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

Supplementary documentation

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

Standard documentation

Device	Document type	Document code
FMR20	Brief Operating Instructions	KA01248F

Device	Document type	Document code
FMR20	Operating Instructions	BA01578F

Supplementary documentation

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

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.



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