

Technical Information

Micropilot FMR10

Free space radar

Level measurement for liquids



Application

- Ingress protection: IP66 / NEMA 4X
- Measuring range: up to 5 m (16.4 ft)
- Process temperature: -40 to 60 °C (-40 to 140 °F)
- Process pressure: -1 to 3 bar (-14 to 43 psi)
- Accuracy: up to +/- 5 mm (0.2 in)

Your benefits









- Level measurement for liquids in storage tanks, open basins, pump shafts and canal systems
- Radar measuring device with *Bluetooth*[®] wireless technology
- Simple, safe and secure wireless remote access – ideal for installation in 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

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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
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.
BD	Blocking Distance; no signals are analyzed within the BD.

Registered trademarks

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.

Product life cycle

Engineering

- Proven radar measuring technology
 - Indication of over-flooding situation
 - 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
 - Easy to order via Global E-direct Portal with 48h delivery time
 - Global availability
-

Installation

Rear- and front side thread for flexible installation

Commissioning

- Easy and fast setup via SmartBlue (app)
 - 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)
 - Encrypted single point-to-point data transmission (Fraunhofer-Institut, third party, tested) and password-protected communication via *Bluetooth*[®] wireless technology
-

Maintenance

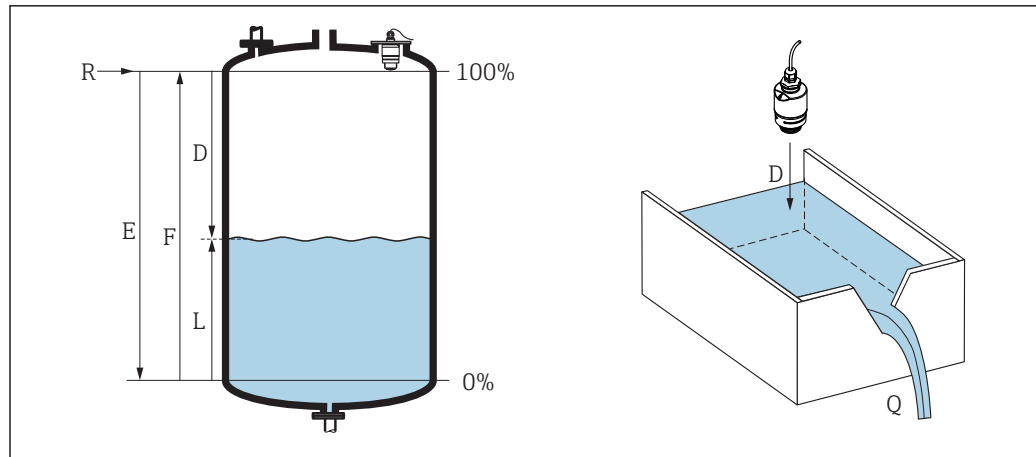
- No maintenance required
 - Technical experts on-call around the global
-

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.



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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 (SmartBlue): 0 to 5 m (0 to 16 ft)

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
FMR10	5 m (16 ft)

Requirements of the installation

- Tank height greater than 1.5 m (5 ft)
- Open channel minimum width 0.5 m (1.6 ft)
- Calm surfaces

- No agitators
- No buildup
- Relative dielectric constant $\epsilon_r > 4$

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)
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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**Bluetooth® wireless technology**

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
 - SmartBlue (app)
 - Status signal (as per NAMUR Recommendation NE 107)
 - Plain text display with remedial action
-

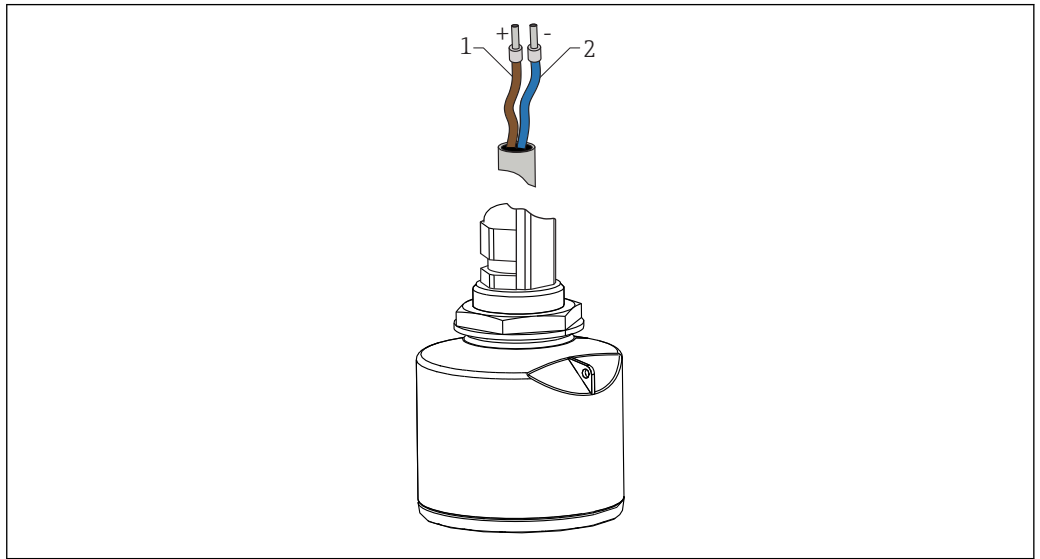
Linearization

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 SmartBlue (app), up to 32 value pairs can be entered manually into the table.

Electrical connection

Cable assignment



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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	<p>The graph plots Maximum load R [Ω] on the y-axis (0 to 500) against supply voltage U_0 [V] on the x-axis (10 to 30). A linear relationship is shown from 10.5 V (0 Ω) to 21.75 V (500 Ω). From 21.75 V to 30 V, the load R is constant at 500 Ω.</p>

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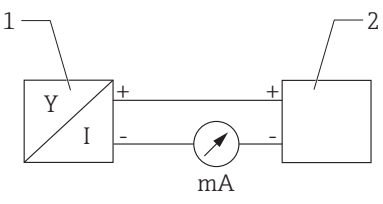
Potential equalization

No special measures for potential equalization are required.

Various power supply units can be ordered from Endress+Hauser.

Battery operation

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

Connection 4 to 20 mA FMR10 connection with voltage source and 4 to 20 mA display	Circuit diagram / Description  <p style="text-align: right;">A0028907</p> <p>3 FMR10 block diagram</p> <p>1 Micropilot FMR10, 4 to 20 mA</p> <p>2 Power supply</p>
Power consumption	Maximum input power: 675 mW
Current consumption	<ul style="list-style-type: none"> ▪ 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	<p>An unshielded cable, 2 x 0.75 mm², is used.</p> <p>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).</p> <p>The sensor is supplied with 10 m (33 ft) cable length as standard.</p>
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

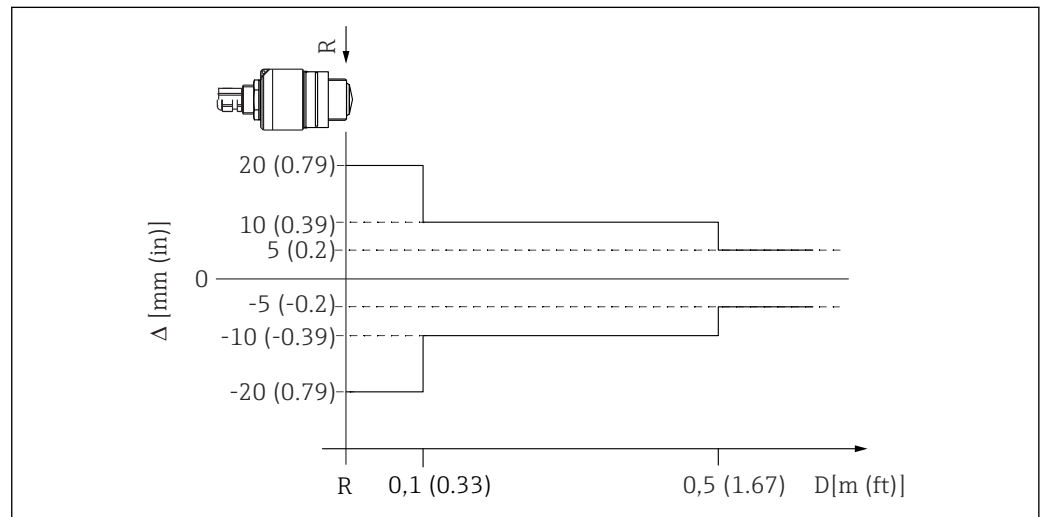
Typical data under reference operating conditions: DIN EN 61298-2, percentage values in relation to the span.

Device	Value	Output	
		digital ¹⁾	analog ²⁾
FMR10	Sum of non-linearity, non-repeatability and hysteresis	± 5 mm (0.2 in)	± 0.02 %
	Offset/Zero	± 4 mm (0.16 in)	± 0.03 %

1) SmartBlue (App)

2) for 4-20mA current output; add error of the analog value to the digital value

Differing values in near-range applications



4 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 μ A

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
< 5 m (16 ft)	1 s ⁻¹	< 3 s

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.

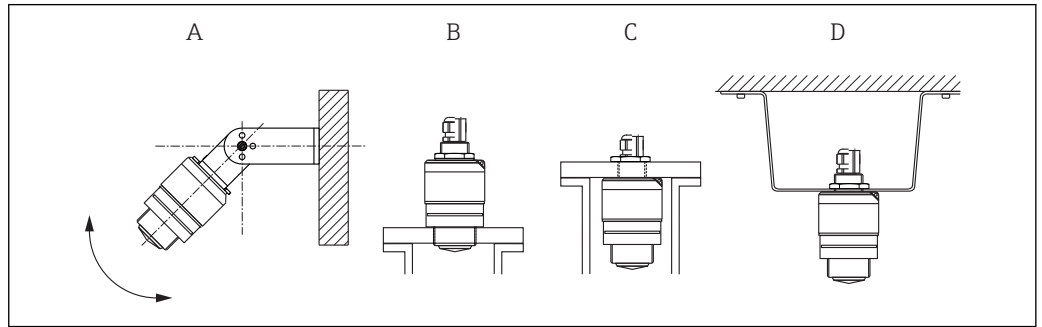
Influence of ambient temperature**The measurements are carried out in accordance with EN 61298-3.**

- Digital (*Bluetooth*[®] wireless technology):
Standard version: average $T_K = \pm 3 \text{ mm (0.12 in)}/10 \text{ K}$
- Analog (current output):
 - Zero point (4 mA): average $T_K = 0.02 \text{ %}/10 \text{ K}$
 - Span (20 mA): average $T_K = 0.05 \text{ %}/10 \text{ K}$

Installation

Installation conditions

Installation types



5 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)

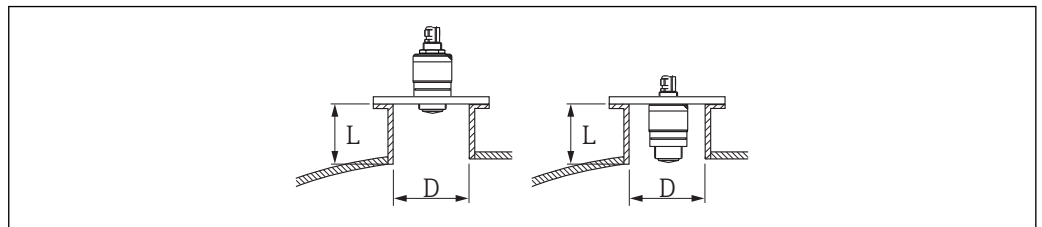


Caution!

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

Nozzle installation

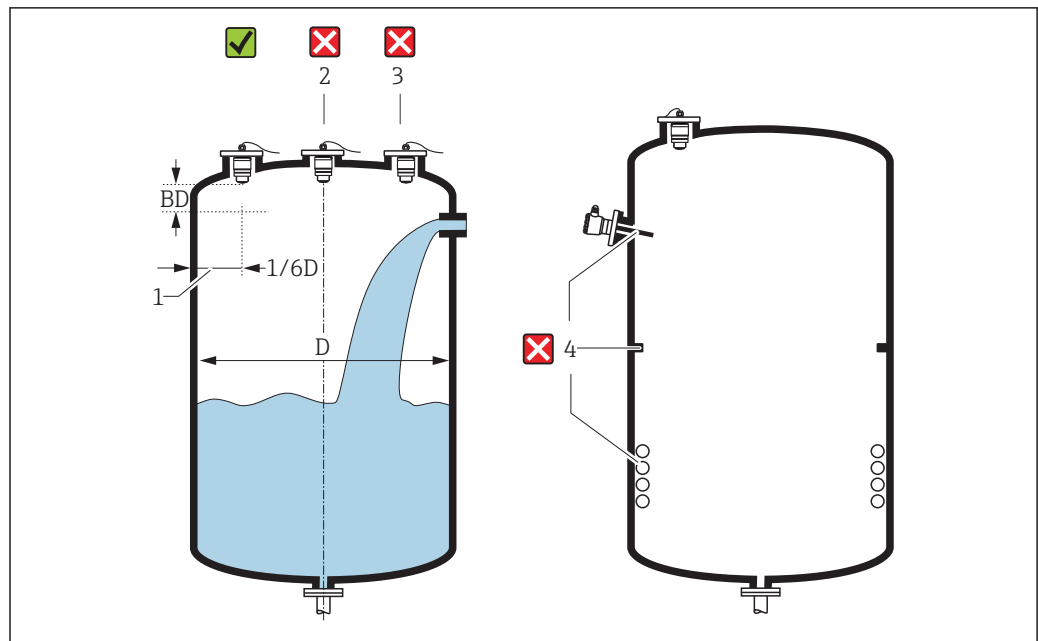
The antenna should be just out of the nozzle for optimum measurement. The interior of the nozzle must be smooth and may not contain any edges or welded joints. The edge of the nozzle should be rounded if possible. The maximum nozzle length **L** depends on the nozzle diameter **D**. Please note the specified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



6 FMR10 nozzle installation

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

Orientation

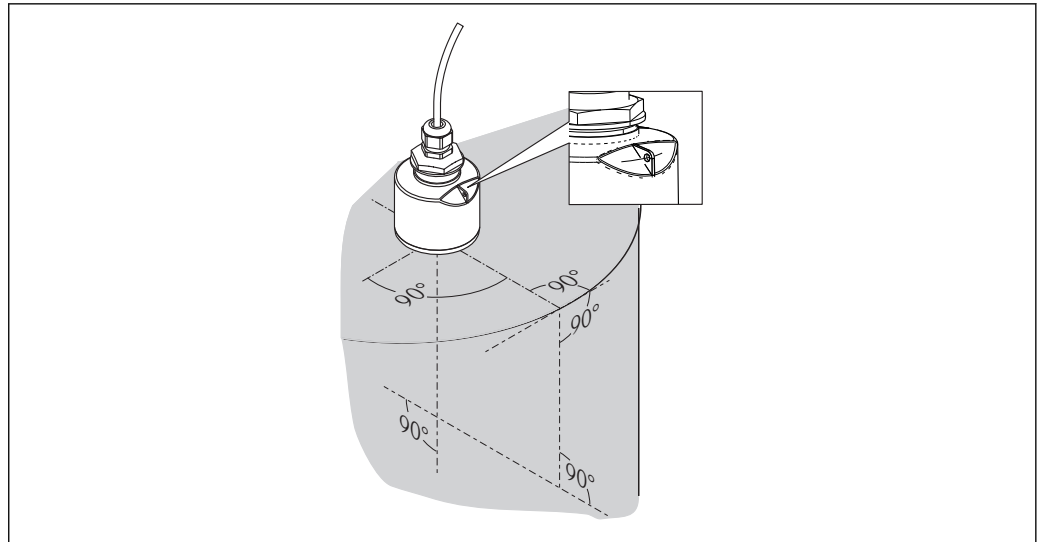


7 Tank installation position

- 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: $\sim 1/6$ 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

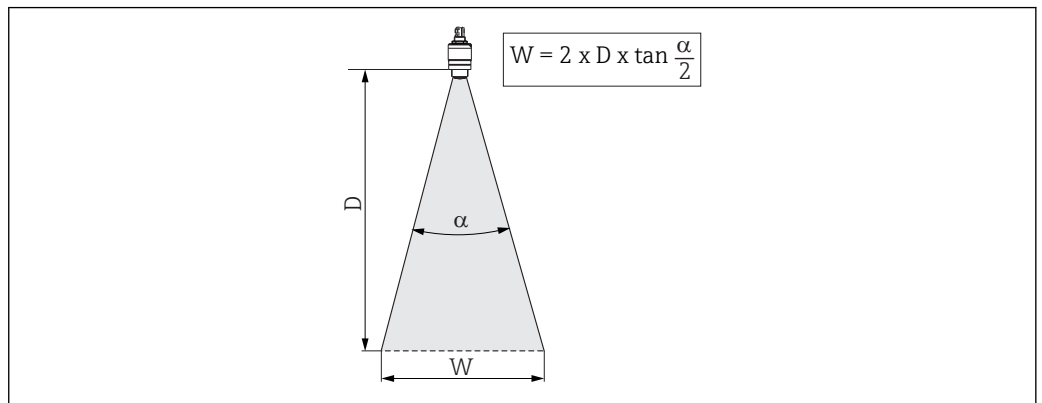
- Align the antenna vertically to the product surface.
- Align the eyelet with the mounting eye as well as possible towards the tank wall.



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8 Sensor alignment when mounting in tank

Beam angle



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

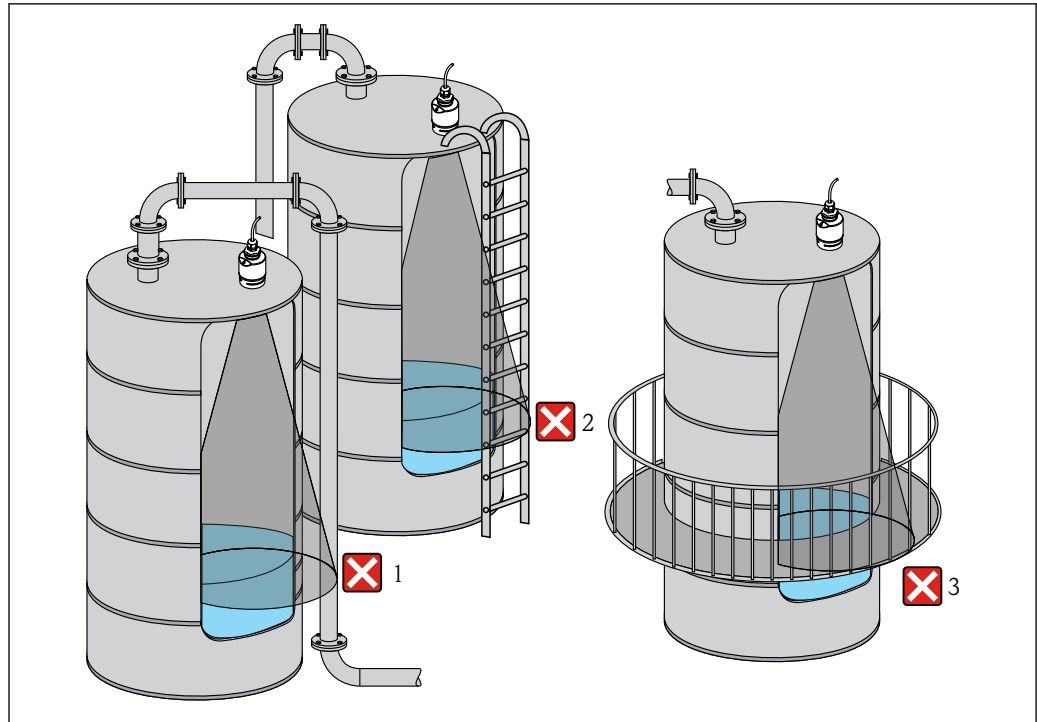
The beam angle is defined as the angle α at which the power density of the radar waves reaches half the value of the maximum power density (3dB width). Microwaves are also emitted outside the signal beam and can be reflected off interfering installations.

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

FMR10	
Antenna size	40 mm (1.5 in)
Beam angle α	30°
Distance (D)	Beamwidth diameter W
3 m (9.8 ft)	1.61 m (5.28 ft)
5 m (16.4 ft)	2.68 m (8.79 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.

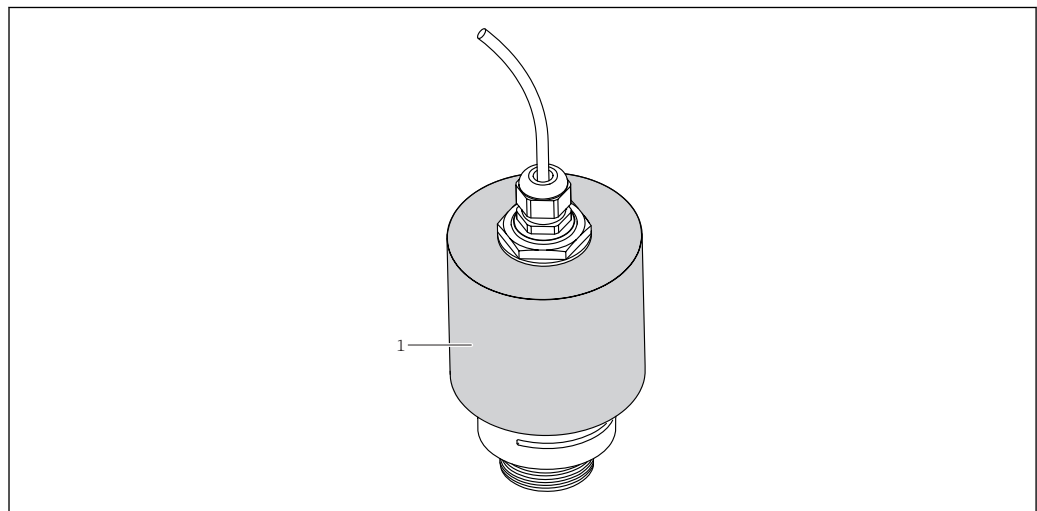


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❗ 10 Measurement in a plastic vessel

Weather protection cover

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



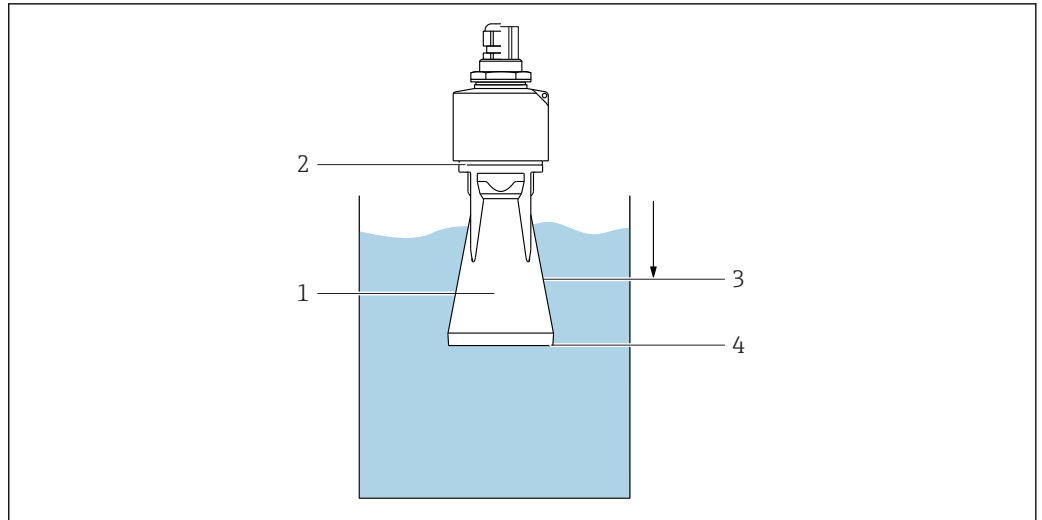
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❗ 11 Weather protection cover, e.g with 40 mm (1.5") antenna

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



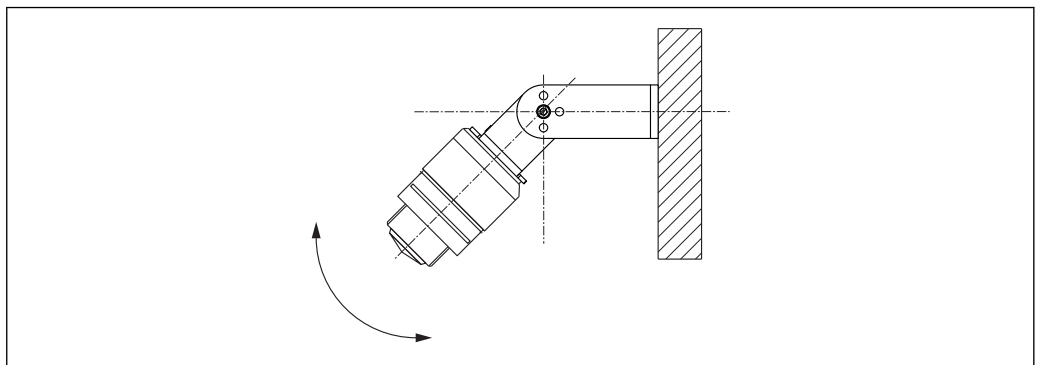
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12 Function of flooding protection tube

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

i The flooding protection tube is available as an accessory. → 27

Installation with mounting bracket, adjustable



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13 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.

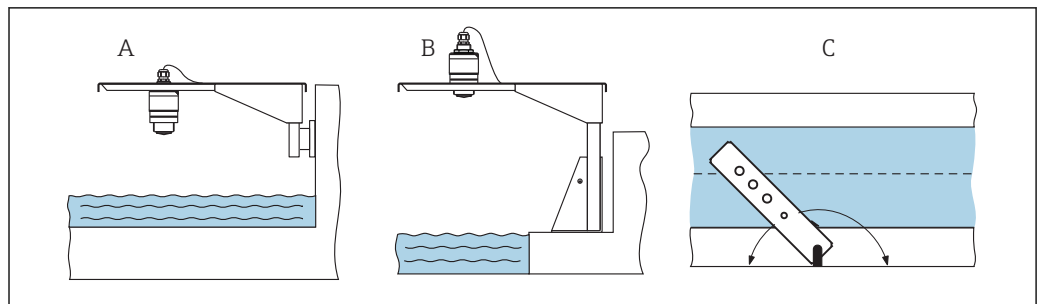
NOTICE

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.

i The mounting bracket is available as an accessory. → 27

Cantilever installation, with pivot



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14 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)

Post-installation check

<input type="checkbox"/>	Is the device undamaged (visual inspection)?
<input type="checkbox"/>	Is the device adequately protected from wet conditions and direct sunlight?
<input type="checkbox"/>	Is the device properly secured?

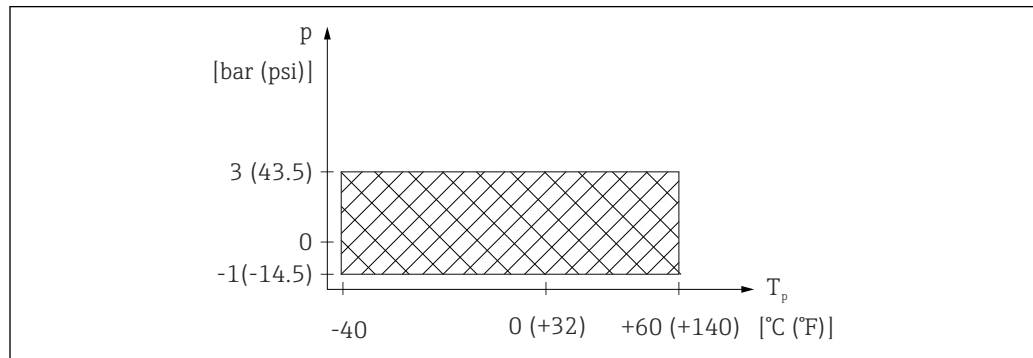
Environment

Ambient temperature range	Measuring device: -40 to +60 °C (-40 to +140 °F) Outdoor operation in strong sunlight: <ul style="list-style-type: none"> ■ Mount the device in the shade. ■ Avoid direct sunlight, particularly in warm climatic regions. ■ Use a weather protection cover →  27.
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: IP66, NEMA 4X
Vibration resistance	DIN EN 60068-2-64/IEC 60068-2-64: 20 to 2 000 Hz, 1 (m/s ²)/Hz
Cleaning the antenna	<p>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.</p> <p>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.</p>
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 **FMR10**



A0030443-EN

15 FMR10: Permitted range for process temperature and process pressure

Feature 100 "Process connection"	Process temperature range	Process pressure range
<ul style="list-style-type: none"> ▪ VEE: Thread ASME MNPT1-1/2; PVDF ▪ WFE: Thread ISO228 G1-1/2; PVDF 	-40 to +60 °C (-40 to +140 °F)	$p_{rel} = -1$ to 3 bar (-14.5 to 43.5 psi) $p_{abs} < 4$ bar (58 psi)

Dielectric constant

For liquids

$$\epsilon_r \geq 4$$

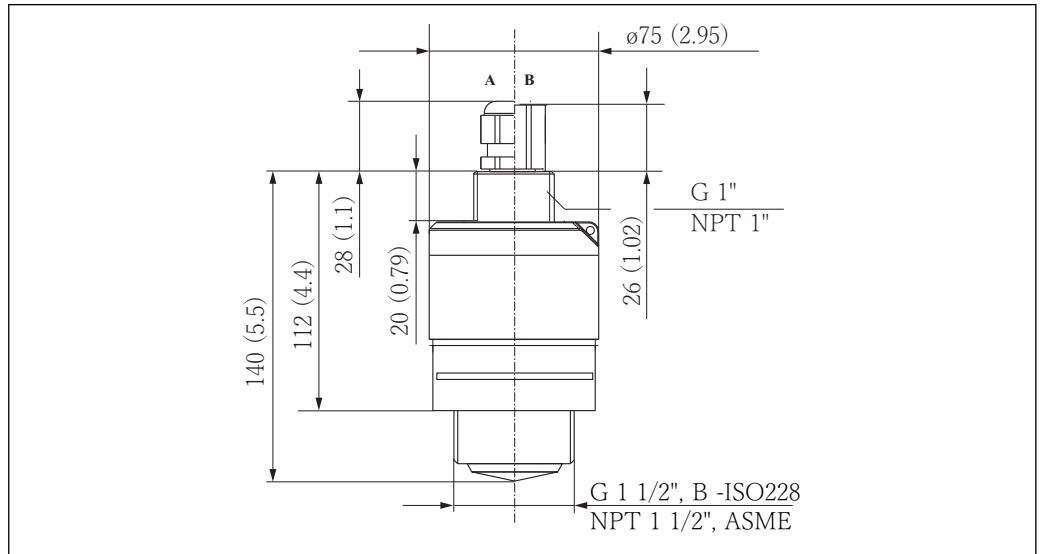
i For dielectric constants (DC values) of many media commonly used in various industries refer to:

- the Endress+Hauser DC manual (CP01076F)
- the Endress+Hauser "DC Values App" (available for Android and iOS)

Mechanical construction

Dimensions

FMR10 with G 1-1/2 or MNPT 1-1/2 thread



16 Dimensions of FMR10 with G 1-1/2 or MNPT 1-1/2 thread, engineering unit: mm (in)

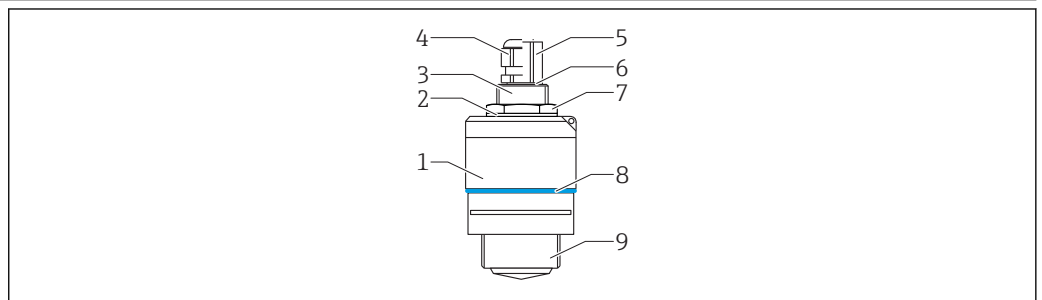
Applies to the following device versions

- **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

Weight

Micropilot	Weight (incl. 10 m (32.8 ft) cable)
FMR10	Approx. 3.0 kg (6.6 lb)

Housing/process connection materials



17 FMR10 materials

Item	Component part	Material
1	Sensor housing	PVDF
2	Seal	EPDM
3	Process connection rear side	PVDF
4	Cable gland	PA
5	Pipe adapter	CuZn, nickel-plated
6	O-ring	EPDM

Item	Component part	Material
7	Counter nut	PA6.6
8	Design ring	PBT PC
9	Process connection front side	PVDF

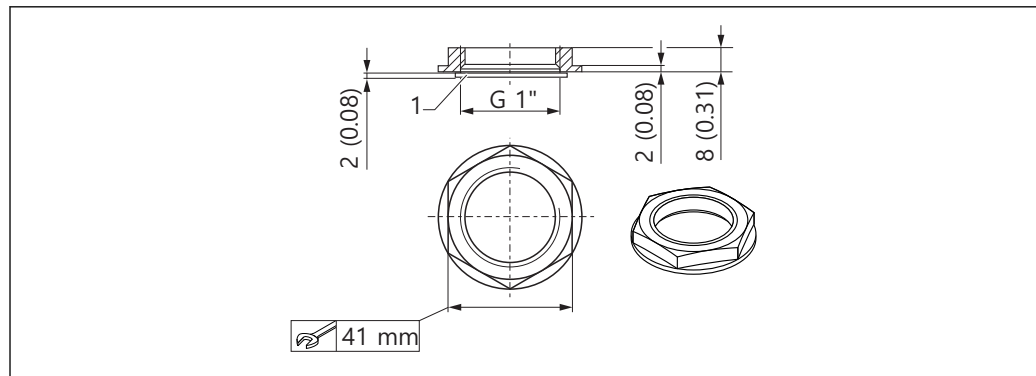
Connecting cable

Standard length: 10 m (33 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

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

1 Seal

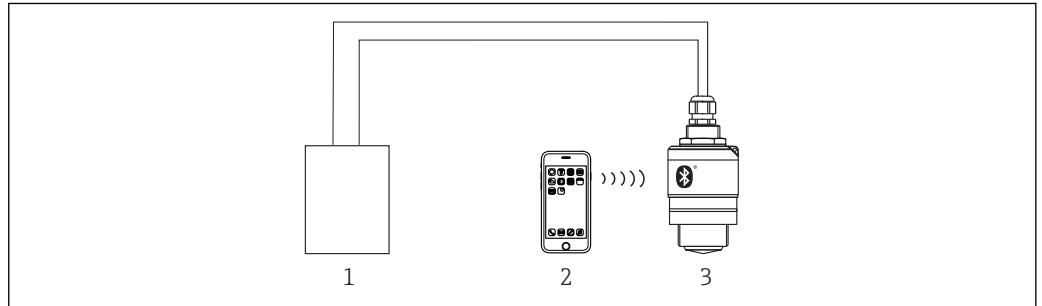
- The counter nut with seal (EPDM) is included in the scope of supply.
- Material: PA6.6

Operability

Operating concept

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

Via *Bluetooth*® wireless technology



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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

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.



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Ex-Zulassung

- Non-hazardous area
- CSA C/US General Purpose

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 FMR10 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". → 16
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

Country	Name of the station	Latitude	Longitude
	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



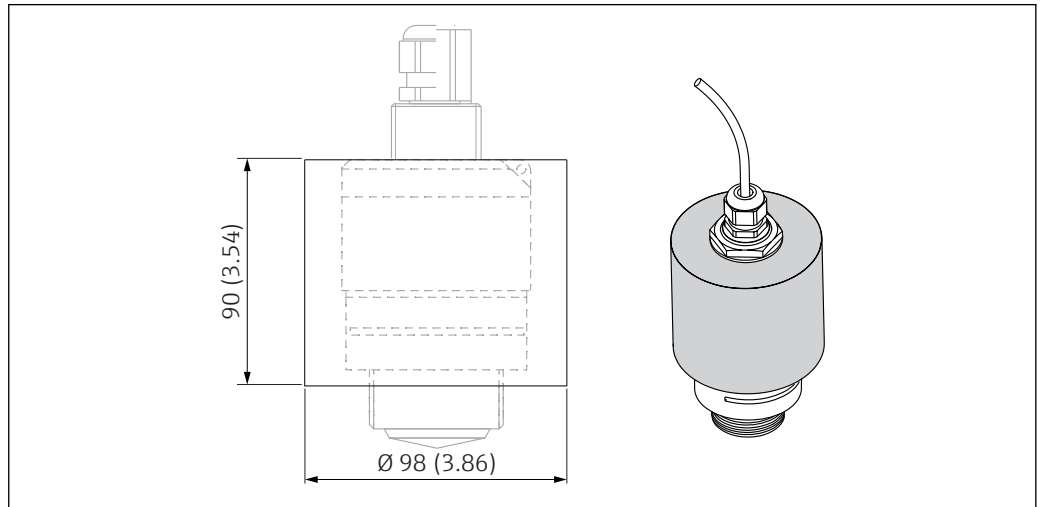
Product Configurator - the tool for individual product configuration

- 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



A0028181

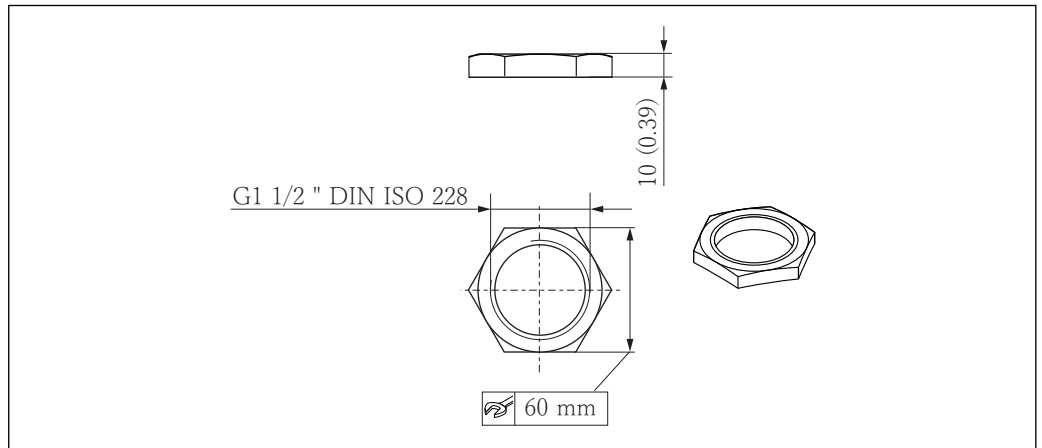
20 Dimensions of weather protection cover, engineering unit: mm (in)

Material: PVDF



The weather protection cover is available as an accessory; order number 52025686
The sensor is not completely covered.

Securing nut G1-1/2



A0028849

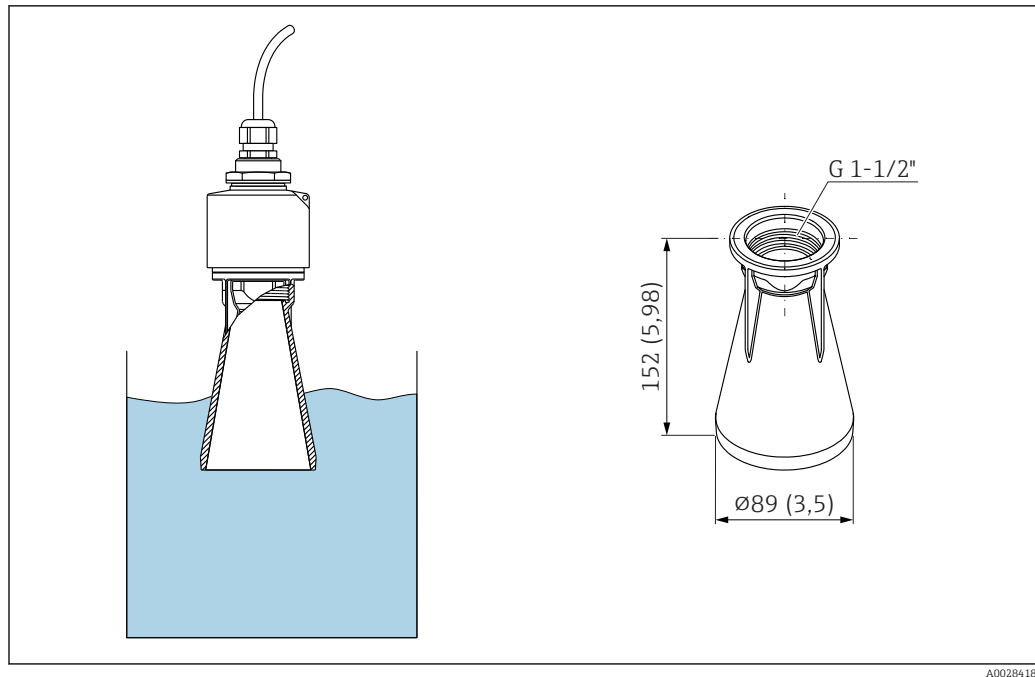
21 Dimensions of securing nut, engineering unit: mm (in)

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

Material: PC

Order number: 52014146

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



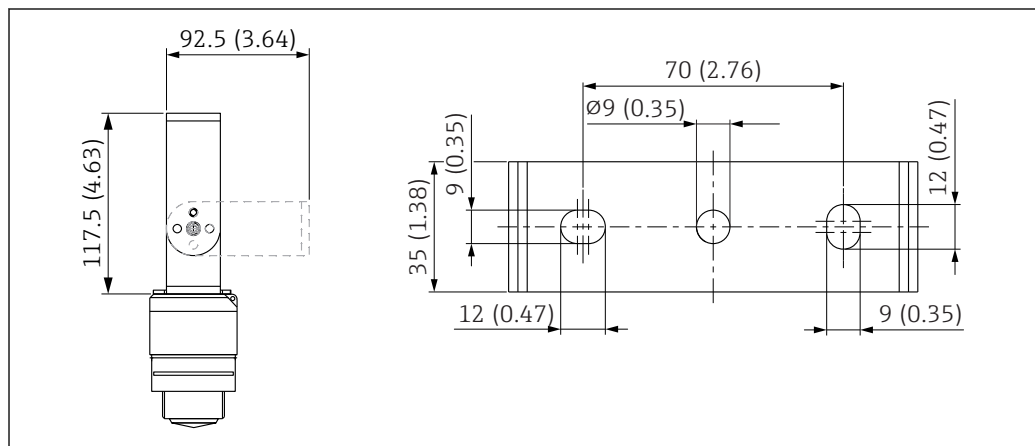
A0028418

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

Material: PBT-PC, metallized

i The flooding protection tube is available as an accessory; order number 71325090.

Mounting bracket, adjustable



A0028861

22 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


i The mounting bracket is available as an accessory; order number 71325079.

Additional accessories






For additional suitable accessories, see Technical Information TI01267F (FMR20)

Communication-specific accessories

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

System components

Accessories	Description
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, batch, pump control functions and can be used as a preset counter and for measuring flow  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

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
FMR10	Brief Operating Instructions	KA01247F

Device	Document type	Document code
FMR10	Operating Instructions	BA01577F



www.addresses.endress.com
