

Technical Information

Micropilot FWR30

Free space radar



Battery-operated level sensor for monitoring remote and mobile applications

Application

- Degree of protection: IP66/IP68
- Maximum measuring range: 15 m (49 ft)
- Ambient temperature: -20 to +60 °C (-4 to +140 °F)
- Connectivity: NB-IoT, LTE-M, 2G
- Accuracy: 10 mm (0.39 in)

Your benefits

- Transparency - easy monitoring of level and location of applications
- Flexible and secure integration into cloud platforms, such as Netilion or SupplyCare
- Easy commissioning and flexible installation
- Reliable 80 GHz radar sensor

Table of contents

About this document	3	Ordering information	12
Symbols	3	Accessories	12
Function and system design	3	Device-specific accessories	12
Measuring principle	3	Supplementary documentation	13
Input	4	Supplementary device-dependent documentation	13
Measured variable	4		
Measuring range	4		
Operating frequency	4		
Blocking distance	4		
Operable flow range	4		
Output	5		
Output signal	5		
Protocol-specific data	5		
Power supply	5		
Supply voltage	5		
Performance characteristics	6		
Reference operating conditions	6		
Maximum measured error	6		
Influence of ambient temperature	6		
Installation	6		
Mounting location	6		
Mounting kit	8		
Beam angle	9		
Environment	9		
Ambient temperature range	9		
Storage temperature	9		
Humidity	9		
Climate class	9		
Operating altitude according to DIN EN 61010-1 Ed. 3 ...	10		
Degree of protection	10		
Vibration and shock resistance	10		
Electromagnetic compatibility	10		
Process	10		
Mechanical construction	10		
Dimensions	10		
Weight	11		
Materials	11		
Human interface	12		
Operating concept	12		
Certificates and approvals	12		
RoHS	12		
CE mark	12		
Radio approval	12		
Other standards and guidelines	12		

About this document

Symbols

Safety symbols



This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.



This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.



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



This symbol contains information on procedures and other facts which do not result in personal injury.

Communication symbols

Symbols for certain types of information

Permitted:

Procedures, processes or actions that are permitted.

Forbidden:

Procedures, processes or actions that are forbidden.

Additional information:

Reference to documentation:

Reference to page:

Series of steps: [1.](#), [2.](#), [3.](#)

Result of an individual step:

Symbols in graphics

Item numbers: 1, 2, 3 ...

Series of steps: [1.](#), [2.](#), [3.](#)

Views: A, B, C, ...

Function and system design

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 to the product surface. Radar pulses are emitted by an antenna, reflected off the product surface and received again by the radar system.

Input

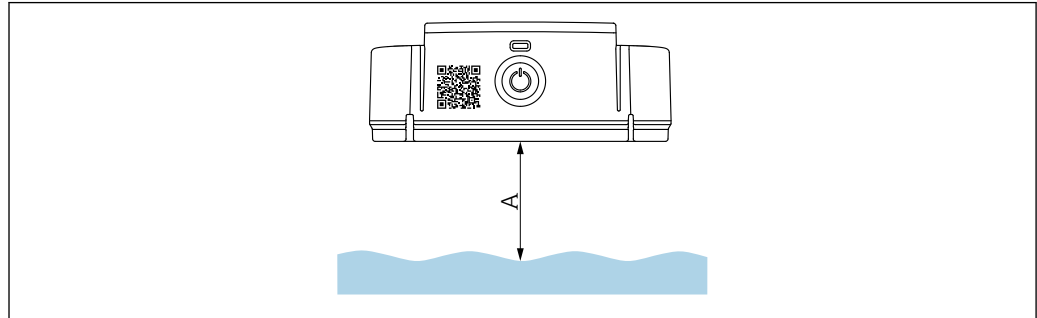
Measured variable

Measured process variables

- Level: 0 to 15 m (0 to 49 ft) ±10 mm (0.39 in)
- Ambient temperature: -20 to +60 °C (-4 to +140 °F) with an accuracy of ± 2 °C (4 °F)
- Position: Angle of device to the horizontal
The measurement is perpendicular to the product surface
Range: 0 to 180°

Measuring range

0 to 15 m (0 to 49 ft)



A0040731

A Distance to level surface

Level in mm = tank empty - distance to level surface

Level in % = (tank empty - distance to level surface) / tank full · 100 %

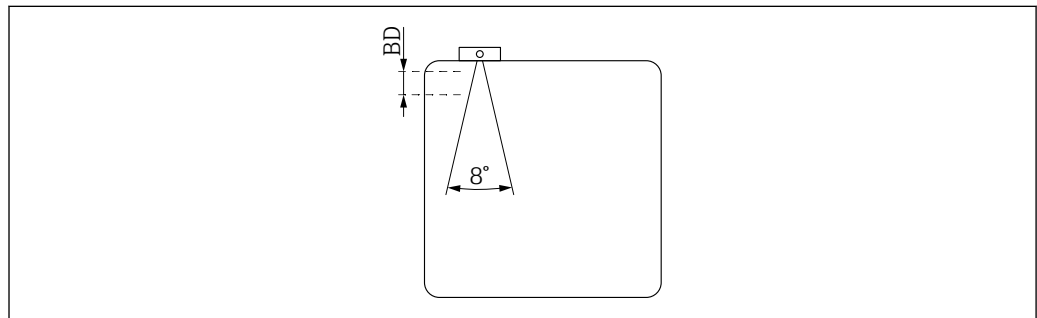
Tank empty = from the measuring device to the bottom

Tank full = from the bottom to the measuring device

Operating frequency

80 GHz

Blocking distance



A0041499

- No signals are analyzed within the blocking distance (BD)
For this reason, the blocking distance can be used to suppress interference signals (e.g. from condensate) near the antenna
- Factory setting: 0 mm
- The blocking distance (BD) can be defined in the cloud or set automatically
The setting is made in the blocking distance parameter
The following formula is used for the automatic setting:
Empty tank - full tank - 100 mm (3.94 in) = blocking distance (min. 0 mm)

Operable flow range

The sensitivity of the sensor can be configured using a "sensitivity parameter" (high, medium, low).

Output

Output signal

Cellular radio NB-IoT, LTE-M with 2G fallback

- 2G GPRS/EDGE
- 4G LTE-M1 (LTE Cat-M1)
- 4G LTE-NB1 (NB-IoT)

The cellular radio signal is selected automatically by the device. The selection depends on availability. The priority is 4G (LTE-M1 or LTE-NB1). If neither of the two cellular radio signals is available, the 2G (GPRS or EDGE) cellular radio signal is selected.

Transmission interval

15 minutes to 24 hours.

The battery life depends on the transmission interval.

Protocol-specific data

The FWR30 uses

- internet protocol TCP/IP and the secure transport layer TLS (v1.2)
- application layer protocol HTTPS

Power supply

Supply voltage

Replaceable battery, standard size, lithium (D), 3.6 V, 19 Ah (included in the delivery)

Designation in accordance with IEC: ER34615 (primary battery lithium thionyl chloride); product recommendation: Tadiran SL-2880



The measuring device determines the battery charge state automatically. The LED flashes red every 10 seconds if the battery charge state is low or critical.

Safety notice for the device battery



Risk of fire or burns if the device battery is handled incorrectly!

- ▶ Do not charge or open the battery, expose it to fire or heat it above 100 °C (212 °F).
- ▶ Only replace the battery with a ER34615 battery (lithium-thionyl chloride primary battery, size D). The use of any other battery can present a fire or explosion hazard.
- ▶ Dispose of the used battery immediately as per national regulations.
- ▶ Keep used batteries out of the reach of children. Do not open used batteries or expose them to fire.

Battery life

A ¹⁾	B ²⁾	D ^{3) 4)}
1 hour	24 hours	> 15 years
6 hours	12 hours	> 10 years
8 hours	8 hours	> 8 years
1 hour	4 hours	> 5 years
1 hour	1 hour	500 days
1 minute	1 hour	400 days
1 minute	15 minutes	140 days

1) Measuring interval

2) Transmission interval

3) Battery life approx.

4) Calculation only applies to TADIRAN SL-2880 battery at approx. +25 °C (+77 °F). A strong cellular radio signal is required. The actual battery life can vary greatly and depends on a number of factors including the network provider, temperature or humidity. High transmission rates reduce the battery life.

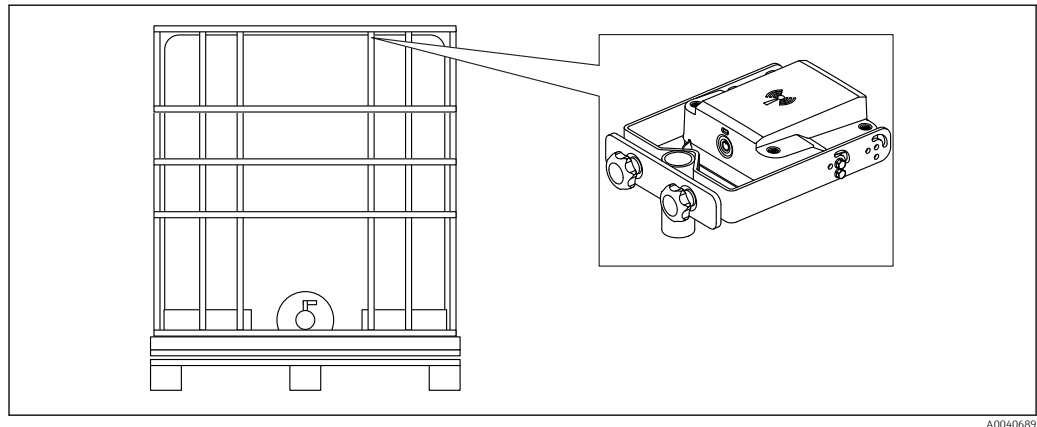
Performance characteristics

Reference operating conditions	<ul style="list-style-type: none"> ■ 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 diameter ≥ 1 m (40 in) ■ No major interference reflections inside the signal beam
Maximum measured error	Accuracy: ±10 mm (0.39 in) within the entire measuring range
Influence of ambient temperature	Temperature coefficient: ≤ ± 4 mm (0.16 in) per 10 K

Installation

Mounting location Indoors or outdoors.

Installation on vertical pipes



A0040689

Installation with mounting bracket pipe/IBC.

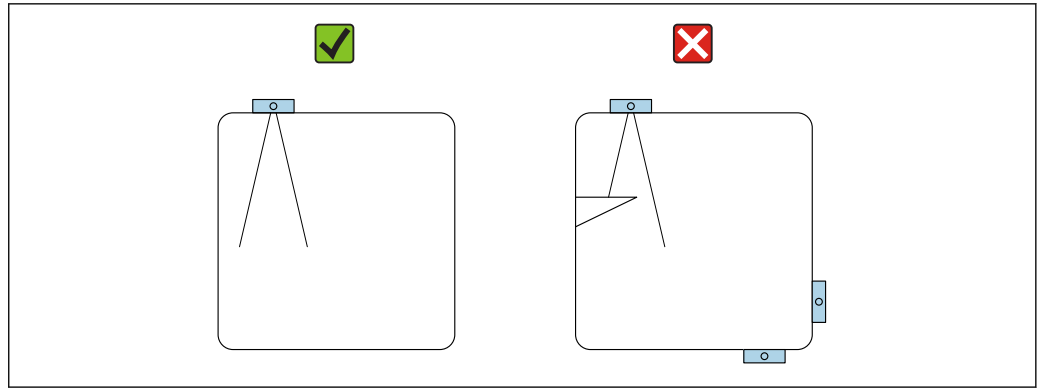
Installation on non-conductive plastic IBC tanks with tubular cage or mesh frame

Installation with "Mounting bracket pipe/IBC".

The mounting bracket pipe/IBC is also suitable for IBC tanks with mesh.

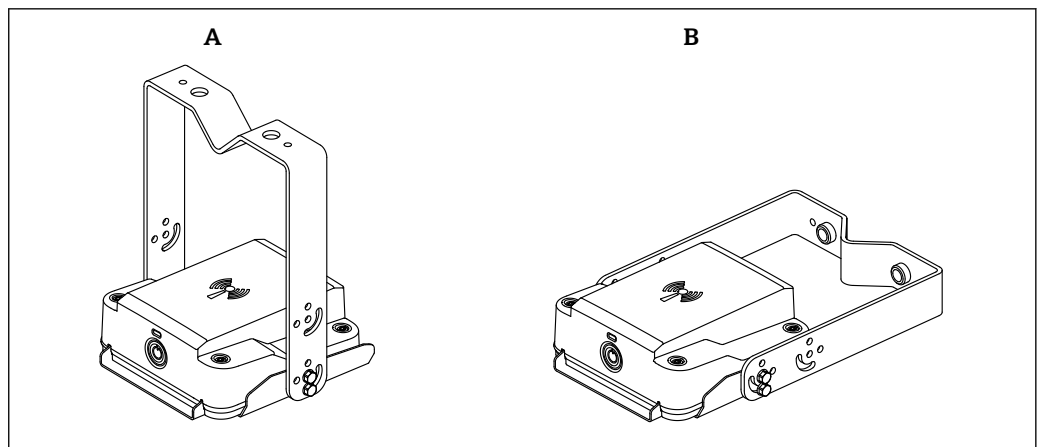
Mounting instructions

- Mount the measuring device in a horizontal position so that it is parallel to the tank ceiling
Otherwise, undesired reflections from the surroundings can cause interference signals
- The radar antenna should never be covered by metal objects
- If mounting outdoors, do not mount on a depression of the IBC tank
Water can collect and interfere with the measurement. The measuring device may not stand in water.
- Do not mount any objects which may cause interference, such as tank internal fittings, grids or agitators, below or in the direct vicinity of the radar (see the graphic below)



A0041498

Installation on ceiling or walls

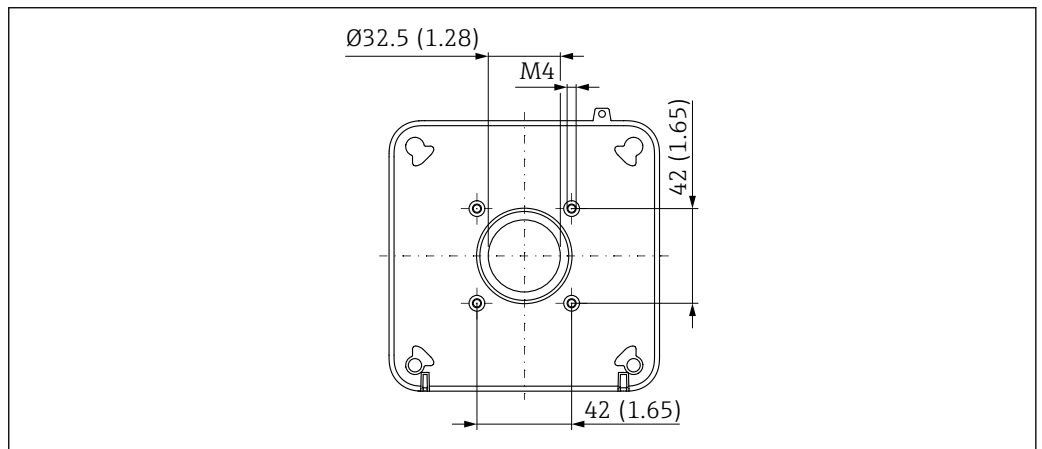


A0040688

Installation with "Mounting bracket wall/ceiling".

Individual installation

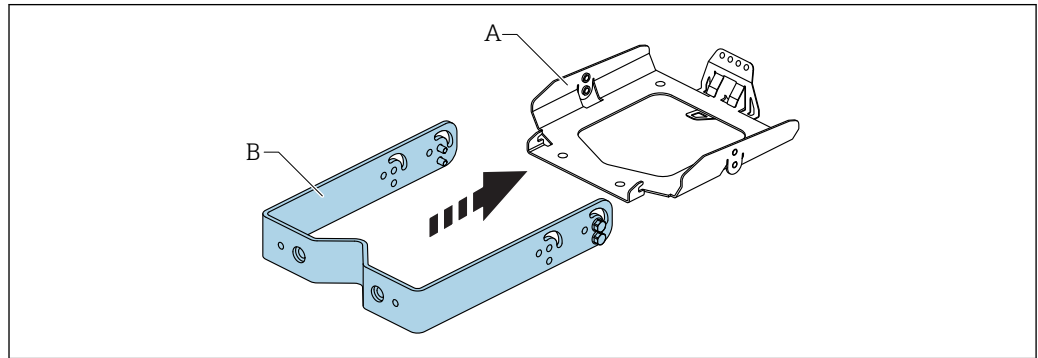
The measuring device can also be installed without using the two mounting brackets. An individual bracket can be attached to the underside using the screw thread. The measuring device can also be attached using commercially available Velcro or adhesive tape. Both mounting kits available include the same base plate, which makes other custom installations possible. If the radar antenna is covered by metal objects, the measuring signal will be distorted.



A0041312

Mounting kit

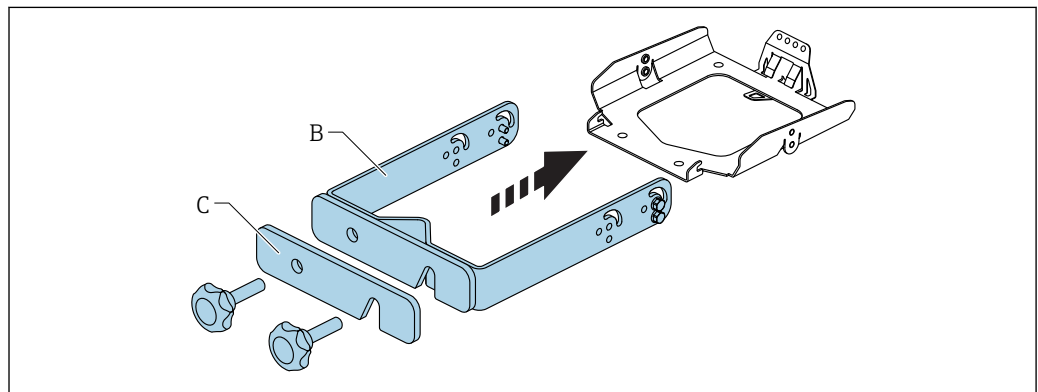
Mounting kit pipe / IBC

Mounting bracket IBC/pipe

A0040718

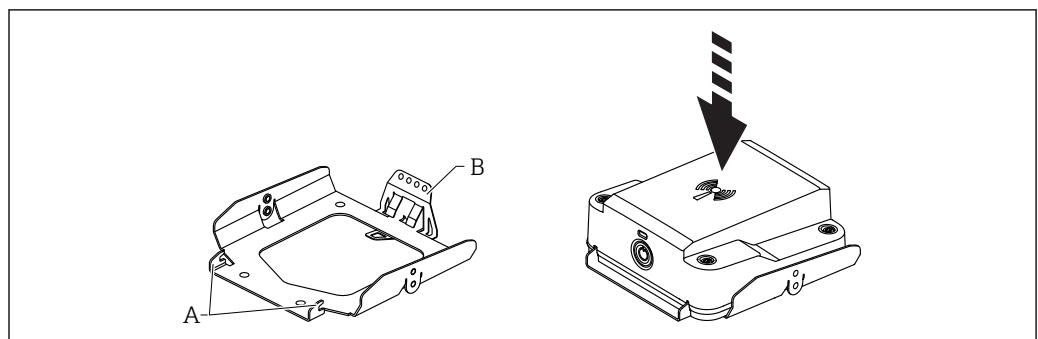
The IBC base holder (B) is attached to the adapter plate (A).

The base holder (B) can be mounted on struts with a diameter of 15 to 30 mm (0.59 to 1.18 in) and on square pipes.

IBC mesh-frame adapter

A0040719

The IBC mesh-frame adapter (C) is attached to the IBC base holder (B).

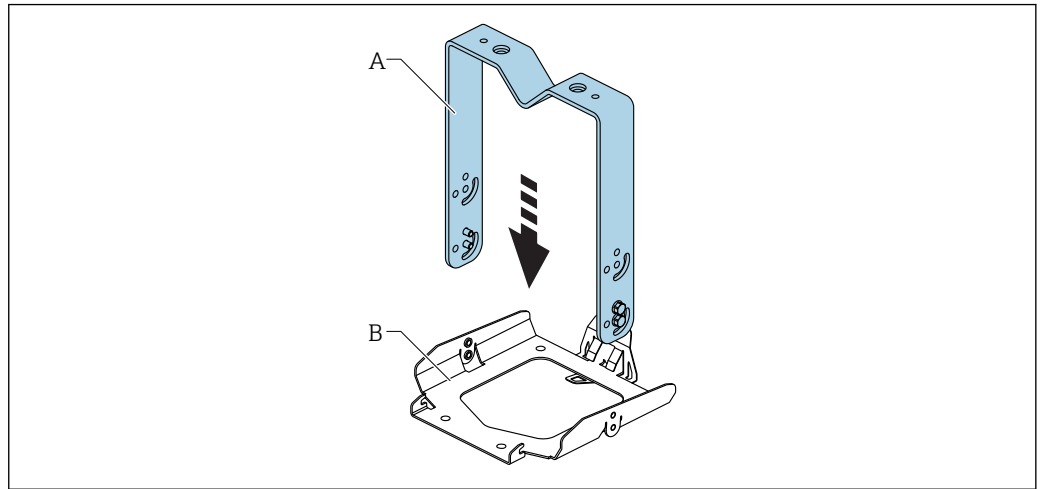
Mounting the FWR30 on the adapter plate

A0040715

1. The hooks (A) and the spring (B) are used to secure the FWR30 in the adapter plate.
2. The spring (B) is used to release the FWR30 from the adapter plate.

Mounting bracket wall/ceiling

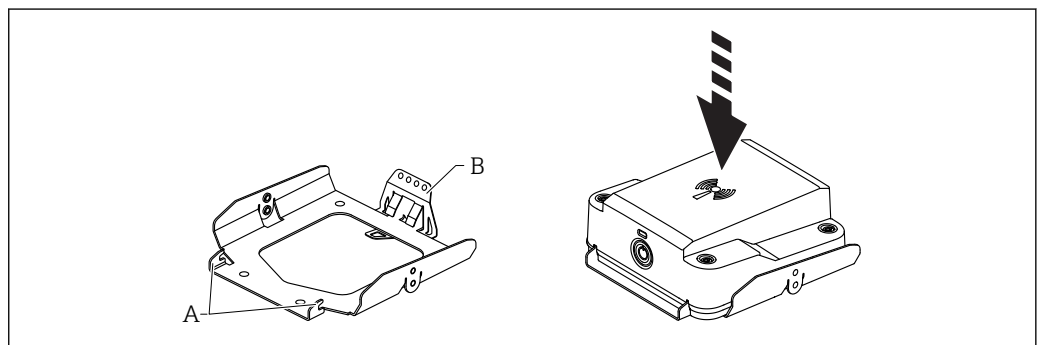
Mounting bracket



A0040720

The mounting bracket (A) is attached to the adapter plate (B).

Mounting the FWR30 on the adapter plate



A0040715

1. The hooks (A) and the spring (B) are used to secure the FWR30 in the adapter plate.
2. The spring (B) is used to release the FWR30 from the adapter plate.

Beam angle 8°

Environment

Ambient temperature range -20 to +60 °C (-4 to +140 °F)

Storage temperature -20 to +60 °C (-4 to +140 °F)

Battery discharge is at its lowest if the battery is stored at temperatures from 0 to +30 °C (+32 to +86 °F).

Humidity 0 to 95%

Climate class DIN EN 60068-2-38/IEC 68-2-38: Test Z/AD

Operating altitude according to DIN EN 61010-1 Ed. 3 Up to 2 000 m (6 600 ft) above sea level.

Degree of protection IP66, IP68

Vibration and shock resistance In accordance with DIN EN 60068-2-27 / IEC 60068-2-27: 18 ms, 30g, half-sine

Electromagnetic compatibility In accordance with IEC/EN 61326-1

Process

Measurement directly through the tank (electrically non-conductive tank walls). No contact is made with the process medium.

Mechanical construction

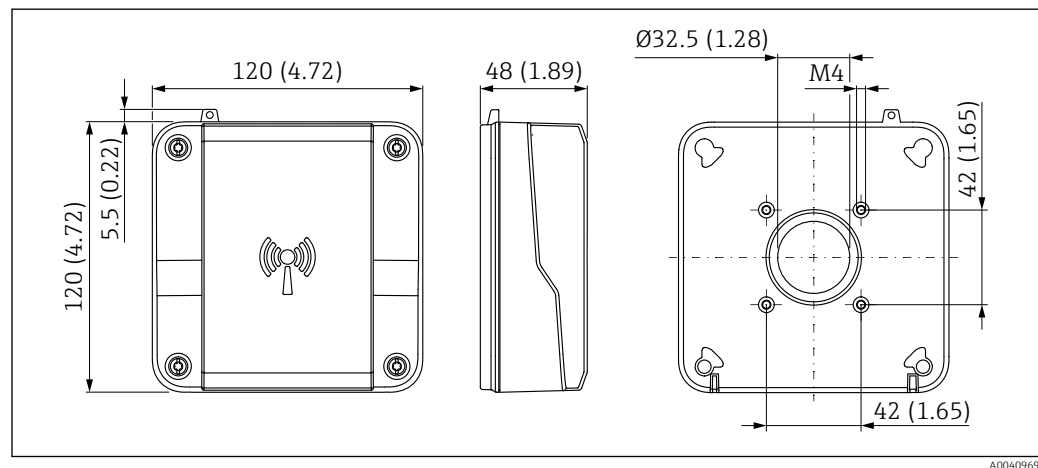
i For the dimensions, see the Product Configurator: www.endress.com

Search for product → click "Configuration" to the right of the product image → after configuration click "CAD"

The following dimensions are rounded values. For this reason, they may deviate slightly from the dimensions given on www.endress.com.

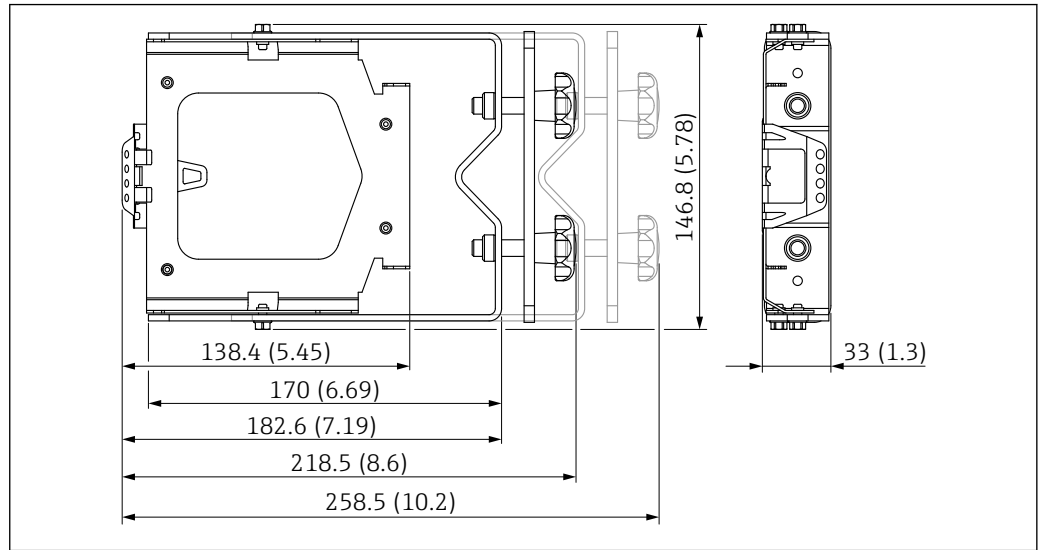
Dimensions

Housing



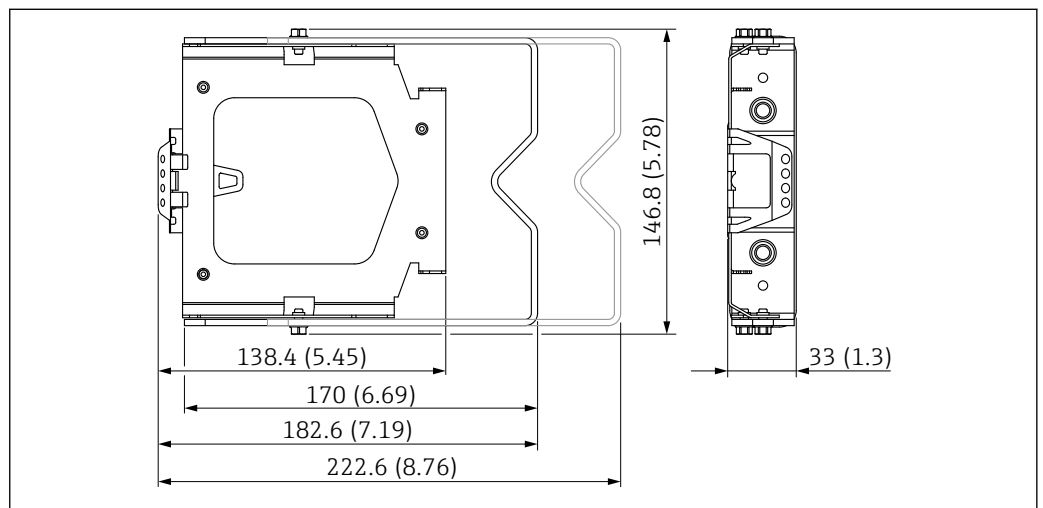
Accessories

Mounting bracket pipe/IBC



A0040971

Mounting bracket wall/ceiling



A0040970

Weight

Housing

- Weight with original battery: 0.5 kg (1.1 lb)
- Weight without battery: 0.4 kg (0.88 lb)

Accessories

- Mounting bracket pipe/IBC: 0.86 kg (1.90 lb)
- Mounting bracket wall/ceiling: 0.45 kg (0.99 lb)

Materials

Housing

Plastic PBT/PC


Accessories

- Mounting bracket pipe/IBC: AISI316 L (1.4404)
- Mounting bracket universal: AISI316 L (1.4404)

Human interface

Operating concept	<ul style="list-style-type: none"> ▪ Straightforward operation without wiring ▪ Configuration via cloud using Web application ▪ Connection status displayed via LED
--------------------------	--

Certificates and approvals

 Currently available certificates and approvals can be called up via the product configurator.

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

CE mark	The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.
----------------	--

Radio approval	<ul style="list-style-type: none"> ▪ Radar: EN 302 729-1/-2 (LPR free-field) ▪ Cellular radio: RED approvals
-----------------------	--


Other standards and guidelines	<ul style="list-style-type: none"> ▪ EN 61010-1 ▪ EN 61326-1 EMC
---------------------------------------	--

Ordering information

Detailed ordering information is available for your nearest sales organization www.addresses.endress.com or in the Product Configurator under www.endress.com :

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

The Configuration button to the right of the product image opens the Product Configurator.

-  **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	<ul style="list-style-type: none"> ▪ Mounting bracket pipe/IBC ▪ Mounting bracket wall/ceiling
------------------------------------	--

Supplementary documentation



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

- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

Supplementary device-dependent documentation

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



71461921

www.addresses.endress.com
