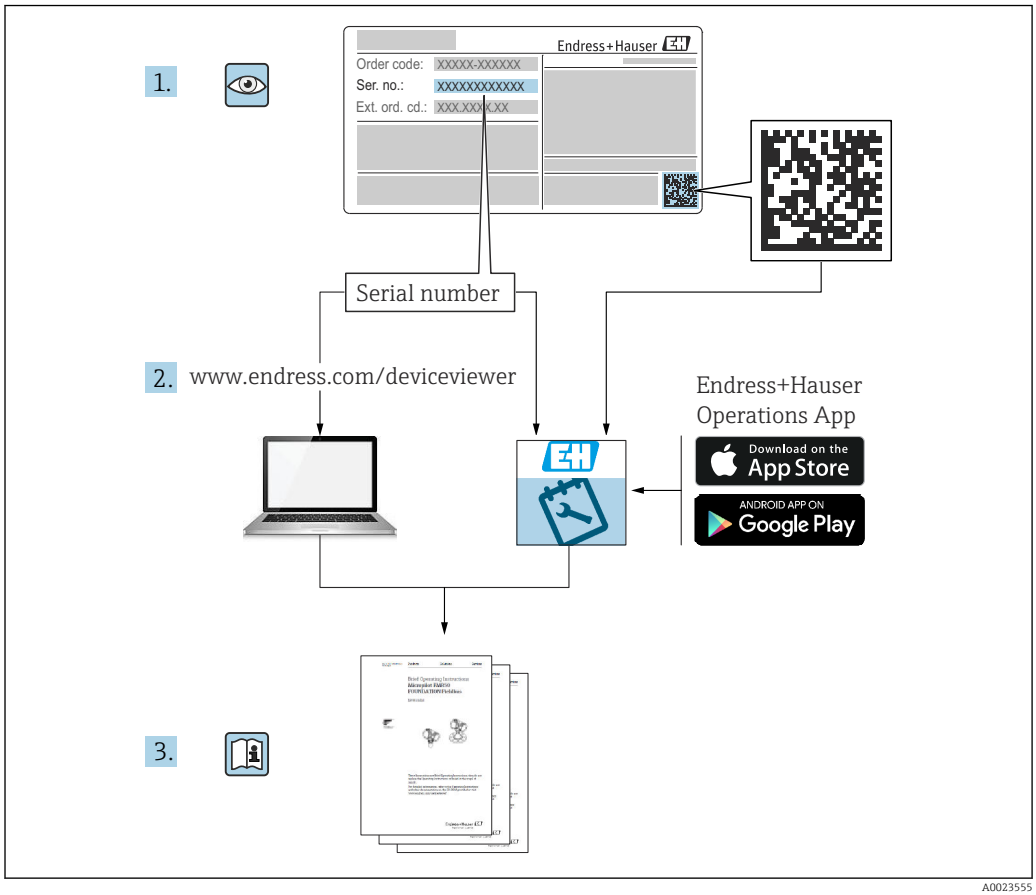
BA01991F/00/EN/08.26-00
71753357
2026-01-31

Valid as of version
02.00.zz (Device firmware)

Operating Instructions
Micropilot FWR30

Free-space radar
Battery-operated level sensor for monitoring remote and mobile applications

Endress+Hauser
People for Process Automation



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

Table of contents

1 About this document

1.1 Document function

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

1.2 Symbols

1.2.1 Safety symbols

⚠ 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 potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION

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

NOTICE

This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

1.2.2 Symbols for certain types of information

Permitted: ✓

Procedures, processes or actions that are permitted.

Forbidden: ✗

Procedures, processes or actions that are forbidden.

Additional information:

Series of steps: 1., 2., 3.

1.2.3 Symbols in graphics

Item numbers: 1, 2, 3 ...

Views: A, B, C, ...

1.3 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads), depending on the device version:

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid for your device** The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions (KA)	**Guide that takes you quickly to the 1st measured value** The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Your reference document** The Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to installation, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety Instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. These are an integral part of the Operating Instructions. The nameplate indicates which Safety Instructions (XA) apply to the device.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation.

1.3.1 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.

Refer to Operating Instructions BA02591F "Micropilot FWR30 for dynamic water level monitoring" for product versions of the Micropilot FWR30 with order feature 050 option W (Endress+Hauser Netilion Service for dynamic water level monitoring) for dynamic

water level monitoring). The product version with order code 050 option W must be integrated into a separate process. This product version has product characteristics and functions that differ from other product versions and cannot be applied across devices.

1.4 Change history

BA01991F/08.26
Valid for device version: 02.00.zz
Introduction to product versions:
- with PVDF washer for process pressure
- Netilion for dynamic water level monitoring

BA01991F/01.19
Valid for device version: 01.01.zz
Initial version

2 Basic safety instructions

2.1 Requirements for the personnel

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

The operating personnel must fulfill the following requirements:
- Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- Following the instructions in these Operating Instructions

2.2 Intended use

The Micropilot FWR30 is a battery-operated level sensor with cellular radio transmission.

Application:
Independent radar sensor for remote monitoring of levels.

2.2.1 Incorrect use

The manufacturer is not liable for harm caused by improper or unintended use.

Clarification for borderline cases:
- For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the resistance of fluid-wetted materials, but does not accept any warranty or liability.

2.3 Workplace safety

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

2.4 Operational safety

Risk of injury!
- Operate the device only if it is in proper technical condition, free from errors and faults.
- The operator is responsible for ensuring that the device is in good working order.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:
- If modifications are nevertheless required, consult Endress+Hauser.

Repair

To ensure continued operational safety and reliability:
- Carry out repairs on the device only if they are expressly permitted.

- Observe national regulations pertaining to the repair of an electrical device.
- Use original spare parts and accessories from Endress+Hauser only.

Hazardous area

To eliminate the risk of danger to persons or the facility when the device is used in the hazardous area (e.g. explosion protection, pressure equipment safety):
- Check the nameplate to verify if the device ordered can be put to its intended use in the hazardous area.
- Comply with the instructions in the separate supplementary documentation, which is an integral part of this manual.

2.4.1 Safety notice for the device battery

⚠ CAUTION

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.

Replacement battery

For use in North America: The replacement battery must have CSA/UL approval.

2.5 Product safety

This state-of-the-art device is designed and tested in accordance with good engineering practice to meet operational safety standards. It left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU declaration of conformity. The manufacturer confirms this by affixing the CE mark.

2.6 IT security

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

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

2.7 Device-specific IT security

The device was developed in accordance with the requirements of the IEC 62443-4-1 "Secure product development lifecycle management" standard.

Link to the cybersecurity website: https://www.endress.com/cybersecurity

Further information on cybersecurity: see product-specific security manual (SD).

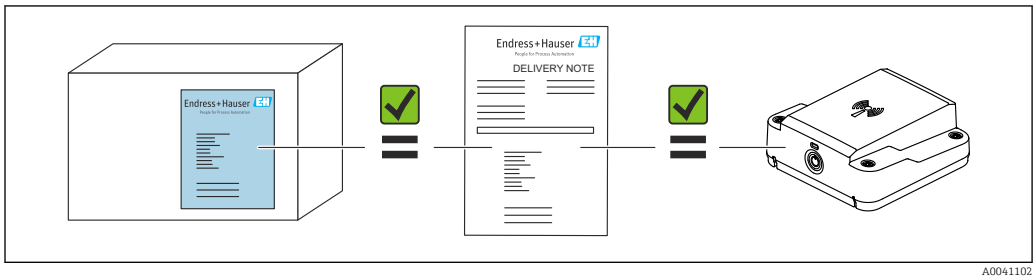
3 Product description

3.1 Product design

The Micropilot FWR30 device is powered by an internal battery. The IP66/68 housing contains a sensor. The sensor measures the level. The device reports the level to the Endress+Hauser cloud via a cellular radio connection. The values can be accessed via the SupplyCare Hosting, Netilion Value, Netilion Inventory or Netilion digital applications.

4 Incoming acceptance and product identification

4.1 Incoming acceptance



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4.2 Product identification

4.2.1 Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

Place of manufacture: See nameplate.

4.3 Storage and transport

4.3.1 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).

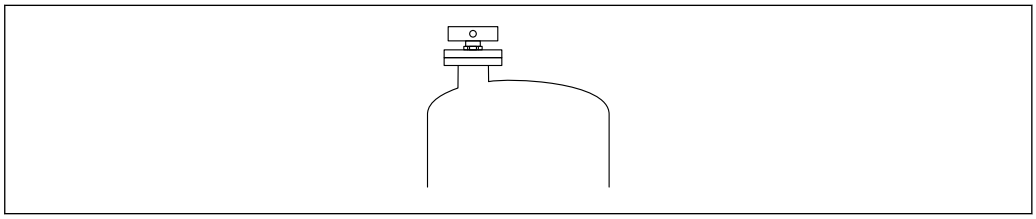
5 Installation

5.1 Installing the measuring instrument

5.1.1 Installation location

The device can be mounted indoors or outdoors.

Mounting on metal vessels and silos with threaded adapter



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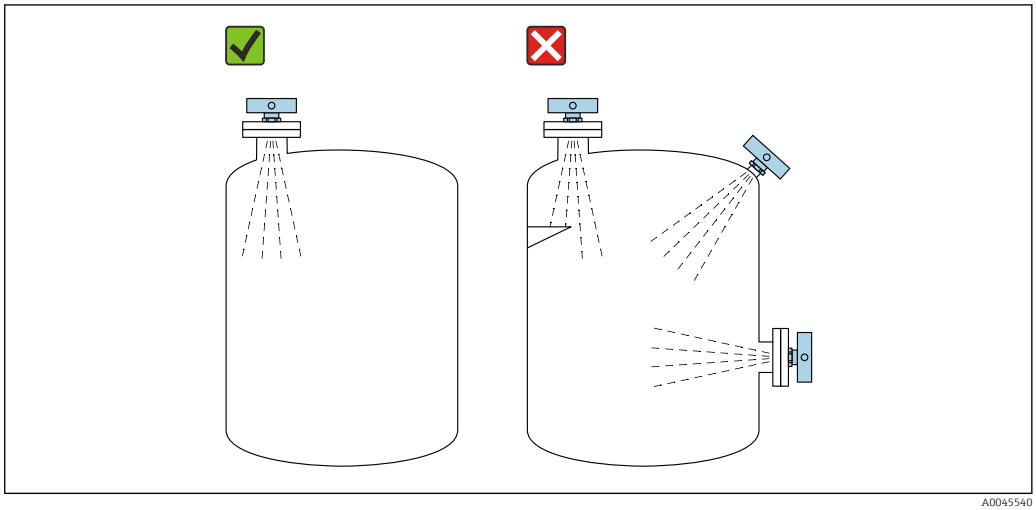
1 *Silo with threaded adapter*

Threaded adapter
- G 1½"
- MNPT 1½"
- G 1½" with PVDF washer
- MNPT 1½" with PVDF washer

Installation instructions

- Mount the measuring instrument 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
- 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)



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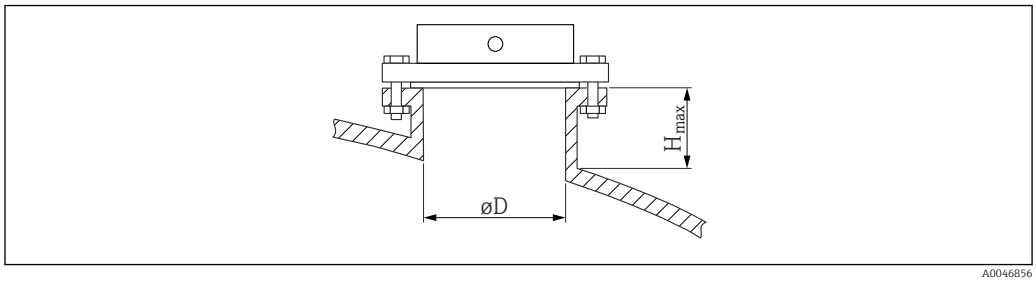
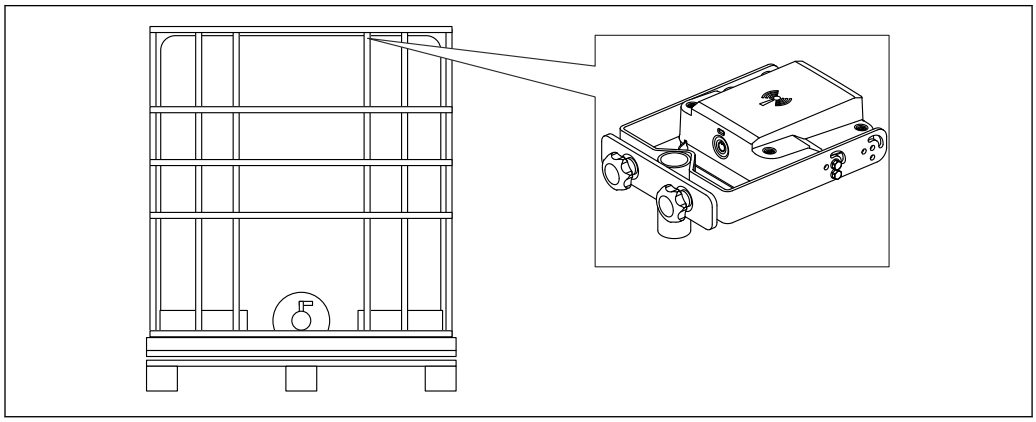
Maximum nozzle height and distance to wall



Diameter D [mm]	H_{max} [mm]	Measuring distance [mm]	Radiation width [1] [mm]
40	230	500	70
50	300	1000	140
80	520	2000	280
100	660	5000	699
150	1020	10000	1399

1) The beam angle is 8°.

Mounting on vertical pipes



2 *Mounting with mounting bracket pipe/IBC*

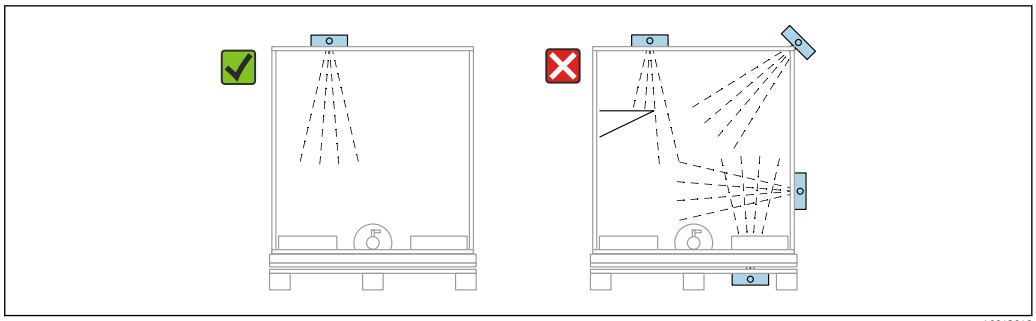
Mounting on non-conductive plastic IBC tanks with tubular cage or mesh frame

Mounting with "mounting bracket pipe/IBC".

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

Installation instructions

- Mount the measuring instrument 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 instrument 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)



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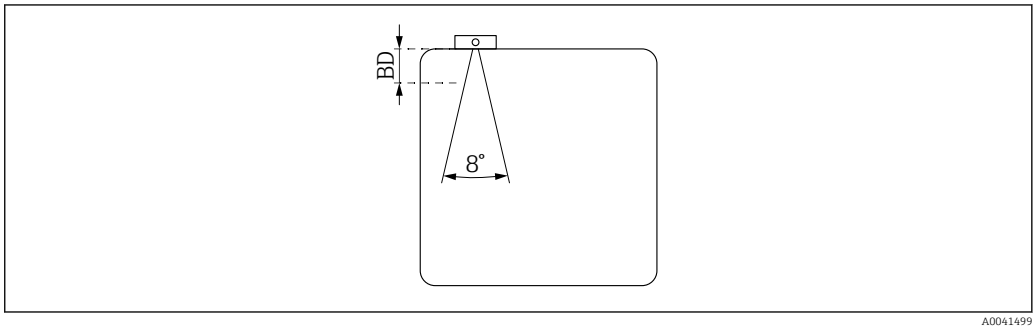
Blocking distance



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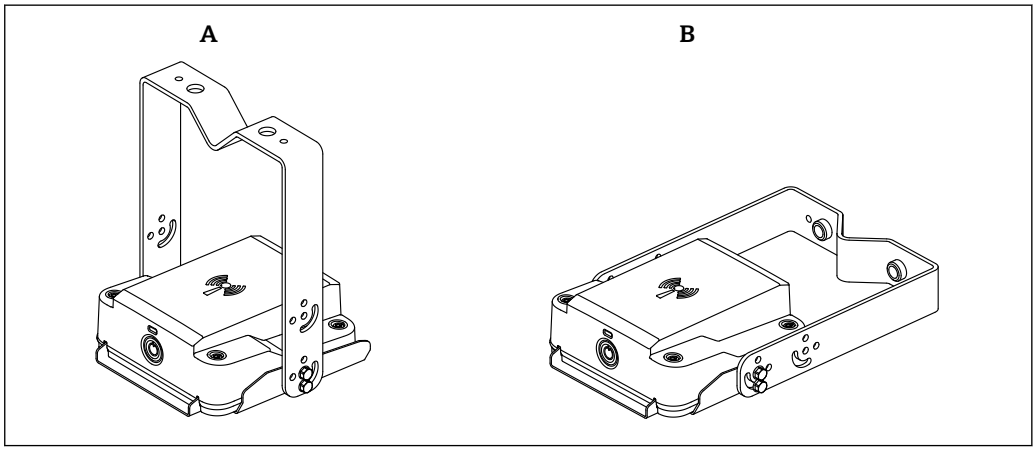
- No signals are analyzed within the blocking distance (BD)
  For this reason, the blocking distance can be used to suppress interference signals (e.g. from condensate) near the antenna
- Factory setting: automatic
- The blocking distance (BD) can be defined in the cloud or set automatically
  The setting 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)

Mounting on ceilings or walls



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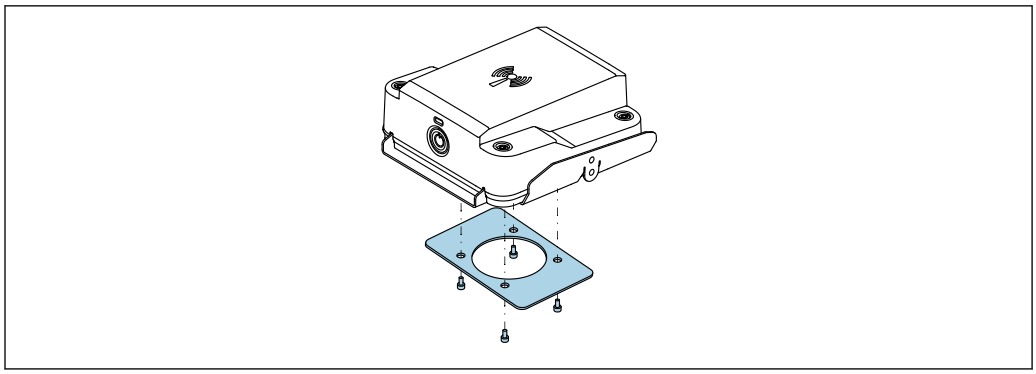
A Mounting on the ceiling
B Mounting on the wall

Removal guard

Once the measuring instrument has been mounted in the adapter plate, the metal plate for the removal guard can be installed with the 4 screws supplied. The removal guard prevents the sensor from popping out when the bracket is released.



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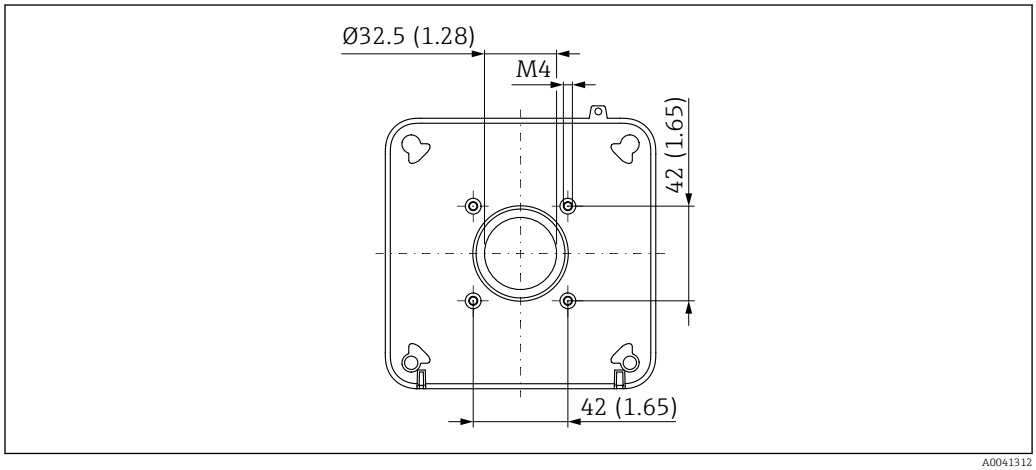
Individual installation

The measuring instrument can also be installed without using the two mounting brackets. An individual bracket can be attached to the underside using the screw thread. 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.



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Unit of measurement mm (in)

5.2 Post-installation check

- Is the device undamaged (visual check)?
- Does the device comply with the measuring point specifications?
  - Ambient temperature
  - Measuring range
  - Process temperature
- Are the measuring point identification and labeling correct (visual inspection)?
- Check that all screws are firmly seated.
- Is the device properly secured?

6 Electrical connection

6.1 Supply voltage

Replaceable battery, standard size lithium (D), 3.6 V, 19 Ah (included in the delivery)
Designation as per IEC: ER34615 (primary battery lithium thionyl chloride); product recommendation: Tadiran SL-2880 (Europe), Tadiran TL-4930 (outside of Europe)

The measuring instrument determines the battery charge state automatically. If the battery status is low or critical, the LED flashes red at intervals of 10 seconds.

Battery status is indicated as full, medium, low, critical.

In addition to the recommended battery types Tadiran SL-2880 (Europe), Tadiran TL-4930 (outside Europe), it is also possible to use the battery type Tadiran SL-2870 (Europe) or Tadiran TL-5930 (outside Europe). The indicated battery lives can differ in this case, however.

6.1.1 Safety notice for the device battery

⚠ CAUTION

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.

Replacement battery

For use in North America: The replacement battery must have CSA/UL approval.

6.1.2 Battery life

Measuring interval 8 h
Transmission interval 8 h: battery life > 8 years

Measuring interval 6 h
Transmission interval 12 h: battery life > 10 years

Measuring interval 1 h
- Transmission interval 24 h: battery life > 10 years
- Transmission interval 4 h: battery life > 5 years
- Transmission interval 1 h: battery life approx. 500 days

Measuring interval 1 min
- Transmission interval 1 h: battery life approx. 400 days
- Transmission interval 15 min: battery life approx. 140 days
- Transmission interval < 1 h: cannot be set for GPS operation

- Calculation only applies to Tadiran SL-2880 battery (Europe), Tadiran TL-4930 (outside Europe) at approx. 25 °C (77 °F)
- A strong cellular 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
- Transmission intervals < 1 h have a significant impact on the battery life
- Calculation valid for operation without GPS. If, for every transmission, a GPS localization is carried out in free field, halves the battery life.

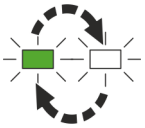
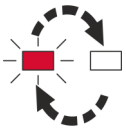
7 Operation options

7.1 Overview of operation options

7.1.1 Operation via activation button on device

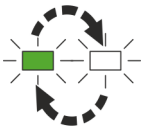
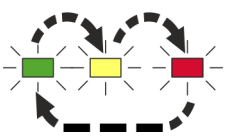
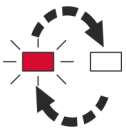
The blue activation button is locked while an action is being performed and until the action has been completed.

Activating the measuring instrument - measure and transmit

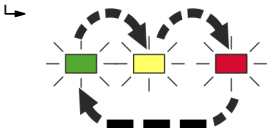
1. Press the blue activation button briefly (>2 seconds) until the LED is lit green.
   ↳ 
2. The LED flashes green during transmission.
   ↳ 
3. The LED is lit green continuously (for 10 seconds) if transmission is successful.
   ↳ 
4. The LED flashes red or is lit red (for 10 seconds) if transmission fails.
   ↳ 

   See "Diagnostic information via LED".

Deactivating the measuring instrument – measure, transmit and switch off

1. Press the blue activation button for longer (>7 seconds) until the LED is lit red.
   ↳ 
2. The LED flashes green during transmission.
   ↳ 
3. The LED flashes green, yellow and red alternately if transmission is successful.
   ↳ The measuring instrument is now deactivated.
   This status is then displayed in the digital application.
   
4. The LED flashes red or is lit red (for 10 seconds) if transmission fails.
   ↳ 

5. The LED then flashes green, yellow and red alternately to indicate the deactivation of the measuring instrument.



Here, the deactivation status is not displayed in the digital application because transmission did not take place.
To subsequently activate the measuring instrument, press the blue activation button again (see Step 1).

The device can also be deactivated via the cloud.

7.1.2 Operation via cloud and app

The measuring instrument is operated via:
- Netilion Value / Netilion Inventory / Netilion: https://netilion.endress.com
- SupplyCare Hosting: https://inventory.endress.com

8 Commissioning

8.1 Preliminaries

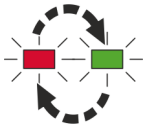
The device can be commissioned with the following digital applications:
- Netilion Value: https://Netilion.endress.com/app/value
- Netilion Inventory: https://Netilion.endress.com/app/inventory
- SupplyCare Hosting: https://inventory.endress.com
  SupplyCare Hosting is commissioned by Endress+Hauser Service staff.
- Netilion: https://netilion.endress.com
  Netilion is commissioned by Endress+Hauser Service staff.

Commissioning is completed by pressing the blue activation button on the measuring instrument.

8.2 Function check

Perform the function check:

▶ Press the blue activation button 3 times.
  ↳ The LED flashes red and green alternately 6 times.



8.3 Configuration management

All parameters can be accessed via SupplyCare Hosting, Netilion Value, Netilion Inventory or Netilion.

If a parameter is changed in the cloud, the change becomes active with the next transmission.

9 Operation

9.1 Initiating the measurement

The measuring and transmission interval is configured using Endress+Hauser cloud services.

The measuring instrument can be activated by the following events:
- if the next measuring interval is reached (time-based)
- if the activation button is pressed (user-activated)

9.2 Reading off measured values

The measured values can be read via the services offered.

Additional functions of Endress+Hauser services available at https://netilion.endress.com

or

Technical Information of SupplyCare Hosting

9.3 Displaying the measured value history

The measured value history can be read via the services offered.

Additional functions of Endress+Hauser services available at https://netilion.endress.com

or

Technical Information of SupplyCare Hosting

9.4 Operating modes

9.4.1 Status transmission

If the measuring instrument has not yet been commissioned and the user presses the activation button, a status transmission is activated nonetheless.
- The measuring instrument updates the status values
- The measuring instrument synchronizes the time if necessary
- The measuring instrument transmits all status values to the cloud

The following status values are transmitted to the cloud:
- Activation status
- Battery status
- Position (except order code 030 A and 050 W)
- Signal quality of connectivity
- Current event (service ID)

9.4.2 Performing a manual measurement

1. Press the activation button.
2. The measurement is performed.
3. Measured values are transmitted to the cloud.

9.4.3 Automatic transmission of measured values

When the transmission interval is reached:
- The measuring instrument synchronizes the configuration from the cloud
- The measuring instrument transmits all of the saved measured values and status values to the cloud, such as
  - Level
  - Position
  - Ambient temperature

If the device has no reception, up to 100 measured values are saved in the device and transmitted during the next connection.

9.4.4 Firmware update

Update via cloud

A firmware update can be performed via the cloud. The next time the measuring instrument is connected to the cloud, the firmware is transmitted to the device. After it has been checked by the measuring instrument, the firmware is updated. Once it has been updated successfully, the measuring instrument sends a message to the cloud.

The LED flashes orange during the firmware update.

9.4.5 Deactivating the measuring instrument

There are two possible ways to deactivate the measuring instrument:
- Deactivation is initiated via the cloud
  The next time the measuring instrument is connected to the cloud, the status values are transmitted and the deactivation is indicated in the cloud.
- Deactivation by pressing and holding the blue activation button until the red LED is lit

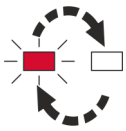
9.4.6 Activating the measuring instrument after deactivation

To reactivate the measuring instrument following deactivation, the blue activation button on the device must be pressed briefly (>2 seconds) until the LED shows a green light.

10 Diagnostics and troubleshooting

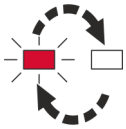
10.1 Diagnostics information via LED

10.1.1 The LED flashes red every 10 seconds



- **Reason:** Battery charge state is low or critical
- **Remedial action:** Replace the battery

10.1.2 The LED flashes red for 10 seconds

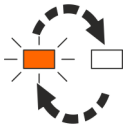


- **Reason:** Cloud transmission error:
  - No SIM card or card blocked
  - No network service
  - Data connection to provider has failed
- **Remedial action:**
  - Check whether the SIM card is correctly inserted and enabled
  - Check whether the network service is available
  - Notify the Service team

10.1.3 The LED is lit red continuously for 10 seconds

- **Reason:** Cloud transmission error. Energy is low or hardware error which cannot be communicated to the cloud.
- **Remedial action:** Wait for 1 hour and then commission the device again (initiate cloud transmission).

10.1.4 LED flashing orange



- **Reason:** Firmware or certificate being updated
- **Remedial action:** Wait until the update is finished

10.2 List of diagnostic events

Diagnostic number: F270
Event text: Main electronics defective
Remedial action:
- Contact the Service team
- Replace the device

Diagnostic number: F331
Event text: Firmware update failed
Remedial action:
Repeat firmware update

Diagnostic number: F400
Event text: Communication faulty
Remedial action:
Check connection and repeat

Diagnostic number: F430
Event text: Configuration incorrect
Remedial action:
- Reconfigure in the cloud
- Contact the Service team

Diagnostic number: F465
Event text: SIM card is faulty
Remedial action:
Check the SIM card

Diagnostic number: S825
Event text: Operating temperature
Remedial action:
- Check the ambient temperature
- Check the process temperature

Diagnostic number: C890
Event text: Battery is low
Remedial action:
Prepare to replace the battery

Diagnostic number: M891
Event text: Empty battery
Remedial action:
Replace the battery

Diagnostic number: F909
Event text: Request overload
Remedial action:
- Wait > 15 minutes between the data requests
- Contact the Service team

Diagnostic number: S911
Event text: Device location invalid or unknown
Remedial action:
Contact the Service team

Diagnostic number: S914
Event text: Device location inaccurate
Remedial action:
Check whether the device is outdoors. Move device outside of buildings

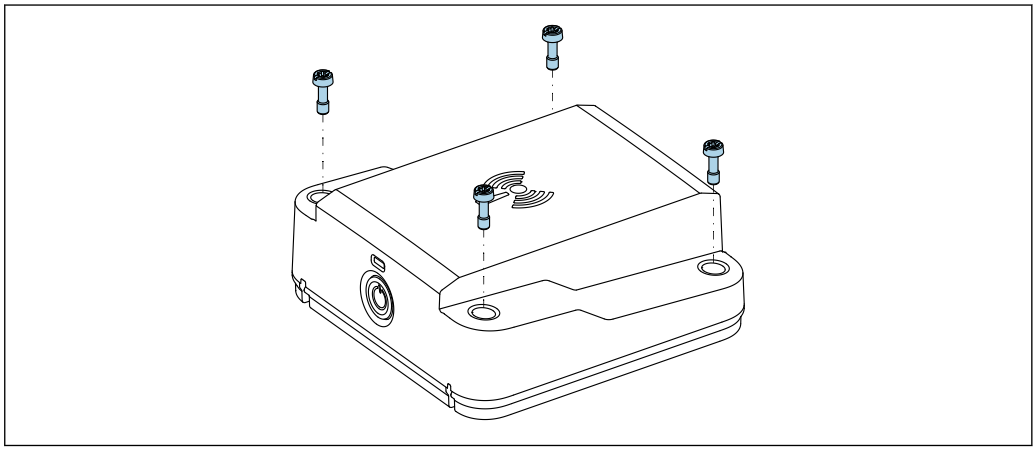
Diagnostic number: S941
Event text: Lost echo
Remedial action:
Check sensitivity settings

11 Maintenance

11.1 Maintenance tasks

11.1.1 Replacing the battery

Environmental protection and measures
Note the following before, during and after battery replacement:
- Replace the battery in a dry place.
- Do not move the seal when replacing the battery.
- After replacement, dispose of the old battery in an environmentally friendly manner.
  "Disposal" section.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Replacing the battery

1. Loosen all 4 screws.
2. Replace the battery.
3. Tighten the screws with 1.2 Nm (0.89 lbf ft).
4. Press the activation button.
   ↳ Status transmission is triggered.

The device is operational again.

If the energy accumulator was completely empty and the battery is replaced, it can take up to 15 minutes until a measured value is sent again. The blue button must be pressed once 15 minutes have elapsed.

Battery type:
- Standard size, lithium (D), 3.6 V, 19 Ah
- Specification according to IEC:
  ER34615 (primary lithium-thionyl chloride battery)
- Product recommendation:
  In addition to the recommended battery types Tadiran SL-2880 (Europe), Tadiran TL-4930 (outside Europe), it is also possible to use the battery type Tadiran SL-2870 (Europe) or Tadiran TL-5930 (outside Europe)

Replacement battery

For use in North America: The replacement battery must have CSA/UL approval.

12 Repair

Repairs are not possible.

12.1 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the website for more information:
   http://www.endress.com/support/return-material
2. Return the device if the wrong device was ordered or delivered.

12.2 Disposal

As required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), Endress+Hauser products are marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Such products may not be disposed of as unsorted municipal waste and can be returned to Endress+Hauser for disposal under the conditions stipulated in the General Terms and Conditions or as individually agreed by Endress+Hauser.

12.2.1 Battery disposal

- In some countries, the end user is legally obliged to return used batteries.
- The end user can return old batteries to Endress+Hauser free of charge.

In accordance with German law regulating the use of batteries (BattG §17 Para Number 3), this symbol is used to denote electronic assemblies that must not be disposed of as municipal waste.

13 Accessories

- Mounting bracket pipe/IBC
- Mounting bracket wall/ceiling
- G 1½" adapter
- G 1½" with PVDF washer
- MNPT 1½" adapter
- MNPT 1½" with PVDF washer
- Removal guard

14 Technical data

14.1 Input

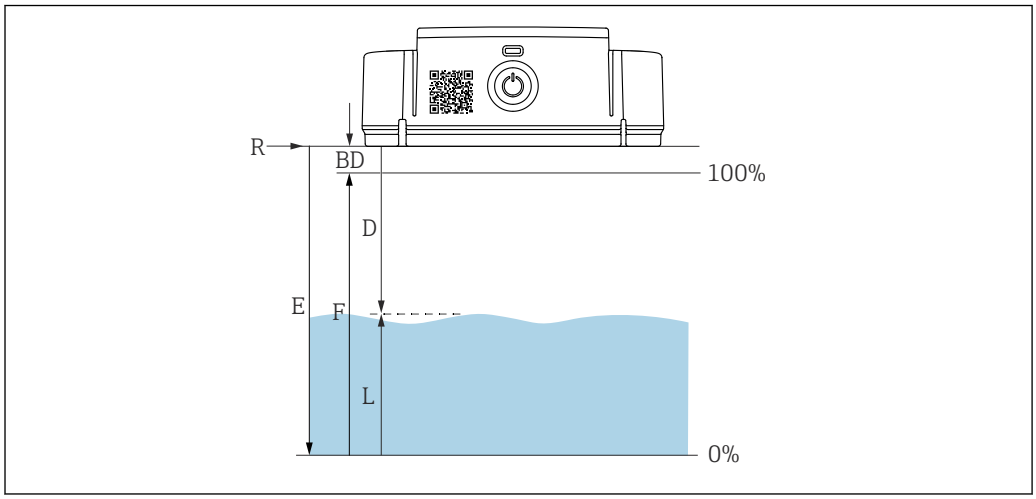
14.1.1 Measured variable

Measured process variables

- **Level:** 0 to 30 m (0 to 98 ft) ±2 mm (0.08 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
  - Range: 0 to 180°
  - The position angle can only be measured if the sensor does not move
- **GPS:**
  ±20 m (66 ft) in free field conditions
  GPS is deactivated and therefore positioning is not possible for order codes 030 A, 050 W and for transmission intervals < 1 h.

14.1.2 Measuring range

Maximum measuring range 0 to 30 m (0 to 98 ft)



3 Calibration parameter

E Empty calibration (= Zero point)
F Full calibration (= span)
D Measured distance
L Level (L = E - D)
R Reference point
BD Blocking distance

Medium

Information on the nameplate:
- Dev.Rev.1 (Device Revision): liquid applications
- Dev.Rev.2 (Device Revision): liquid and solid applications

Usable measuring range for solid applications

The usable measuring range depends on the reflection properties of the medium, the installation position and possible interference echoes.

Measurement of the following media with absorbing gas phase
For example:
- Ammonia (pure - 100%)
- Acetone
- Methylene chloride
- Methyl ethyl ketone
- Propylene oxide
- VCM (vinyl chloride monomer)

To measure absorbing gases, either use a guided radar, measuring devices with another measuring frequency or another measuring principle.

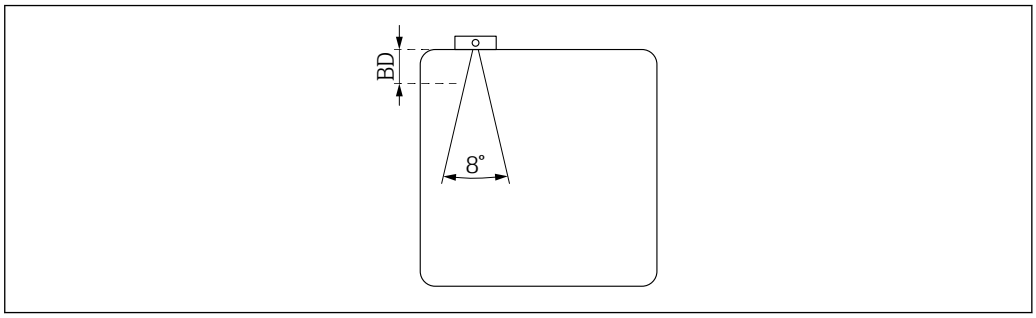
If measurements must be performed in one of these media, please contact Endress +Hauser.

14.1.3 Operating frequency

80 GHz

The operating frequency is for measurement purposes only and is not used for communication.

14.1.4 Blocking distance



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- 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: automatic
- 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)

14.1.5 Sensitivity

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

14.2 Output

14.2.1 Output signal

Cellular radio LTE-M, NB-IoT and GPRS, EDGE

- Order code 030 option A, cellular radio + SIM card (NB-IoT/LTE-M/GPRS, EDGE): selection "for dynamic water level monitoring"
  - GPRS/EDGE GSM850, E-GSM900, DCS1800, PCS1900
  - 4G LTE-M1 (LTE Cat-M1) LTE-FDD: B2/B3/B4/B5/B8/B20/B26 LTE-TDD
  - 4G LTE-NB1 (NB-IoT) LTE-FDD: B2/B3/B8/B20
- Order code for 030 option B: SIM card + cellular radio EU (NB-IoT, LTE-M, GPRS, EDGE) optimized for Europe, Asia, Africa
  - GPRS/EDGE GSM850, E-GSM900, DCS1800, PCS1900
  - 4G LTE-M1 (LTE Cat-M1) LTE-FDD: B1/B2/B3/B4/B5/B8/B20/B26 LTE-TDD
  - 4G LTE-NB1 (NB-IoT) LTE-FDD: B3/B5/B8/B20
- Order code for 030 option C: SIM card + cellular radio US (NB-IoT, LTE-M, GPRS, EDGE) optimized for America, Australia, New Zealand
  - GPRS/EDGE GSM850, DCS1800, PCS1900
  - 4G LTE-M1 (LTE Cat-M1) LTE-FDD: B2/B3/B4/B5/B12/B13/B20/B28 LTE-TDD
  - 4G LTE-NB1 (NB-IoT) LTE-FDD: B2/B4/B12/B13/B28

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 GPRS or EDGE cellular radio signal is selected. The priorities are: LTE-M → GPRS, EDGE → NB-IoT

Order option 030, option A, does not support GPS positioning.

Transmission interval

The transmission interval can be set between 15 minutes and 24 hours.

The battery life depends on the transmission interval.

- In the event of a poor network connection, select a transmission interval > 1 hour
- If GPS is set, the transmission interval is limited to ≥1 hour

For product versions with order code 050 option W, the transmission interval and measuring interval are automatically selected by the system.

14.2.2 Protocol-specific data

The device uses the following transmission protocols:
- TCP/IP (Transmission Control Protocol/Internet Protocol)
- TLS 1.2 (Transport Layer Security 1.2)
- HTTPS (Hypertext Transfer Protocol Secure)

14.3 Environment

14.3.1 Ambient temperature

–20 to 60 °C (–4 to 140 °F)

14.3.2 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).

14.3.3 Relative humidity

0 to 95%

14.3.4 Climate class

DIN EN 60068-2-38/IEC 68-2-38: test Z/AD

14.3.5 Operating altitude according to DIN EN 61010-1 Ed. 3

Up to 2 000 m (6 600 ft) above sea level.

14.3.6 Degree of protection

IP66, IP68, NEMA Type 4X/6P

14.3.7 Vibration and shock resistance

In accordance with DIN EN 60068-2-27/IEC 60068-2-27/DIN EN 60068-2-64: 18 ms, 30g, half-sine

14.3.8 Electromagnetic compatibility

In accordance with IEC/EN 61326-1

14.4 Process

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

14.4.1 Process temperature, process pressure

The maximum pressure for the device depends on the lowest-rated element with regard to pressure.

Components are: process connection, optional mounting parts, or accessories.

⚠ WARNING

Incorrect design or use of the device may cause injury due to bursting parts!

- ▶ Only operate the device within the specified limits for the components!
- ▶ MWP (Maximum Working Pressure): The MWP is specified on the nameplate. This value refers to a reference temperature of 20 °C (68 °F) and may be applied to the device for an unlimited time. Note temperature dependence of MWP.

Process temperature range
−20 to 60 °C (−4 to 140 °F)

Process pressure range, without process connection
For unpressurized applications

Process pressure range, thread without PVDF washer
- p_{gauge} = −1 to 1 bar (−14.5 to 14.5 psi)
- p_{abs} < =2 bar (29 psi)

Process pressure range, thread process connection with PVDF washer
- p_{gauge} = −1 to 6 bar (−14.5 to 87 psi)
- p_{abs} < =7 bar (101.5 psi)

The pressure range may be further restricted in the case of a CRN approval.

www.addresses.endress.com

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