

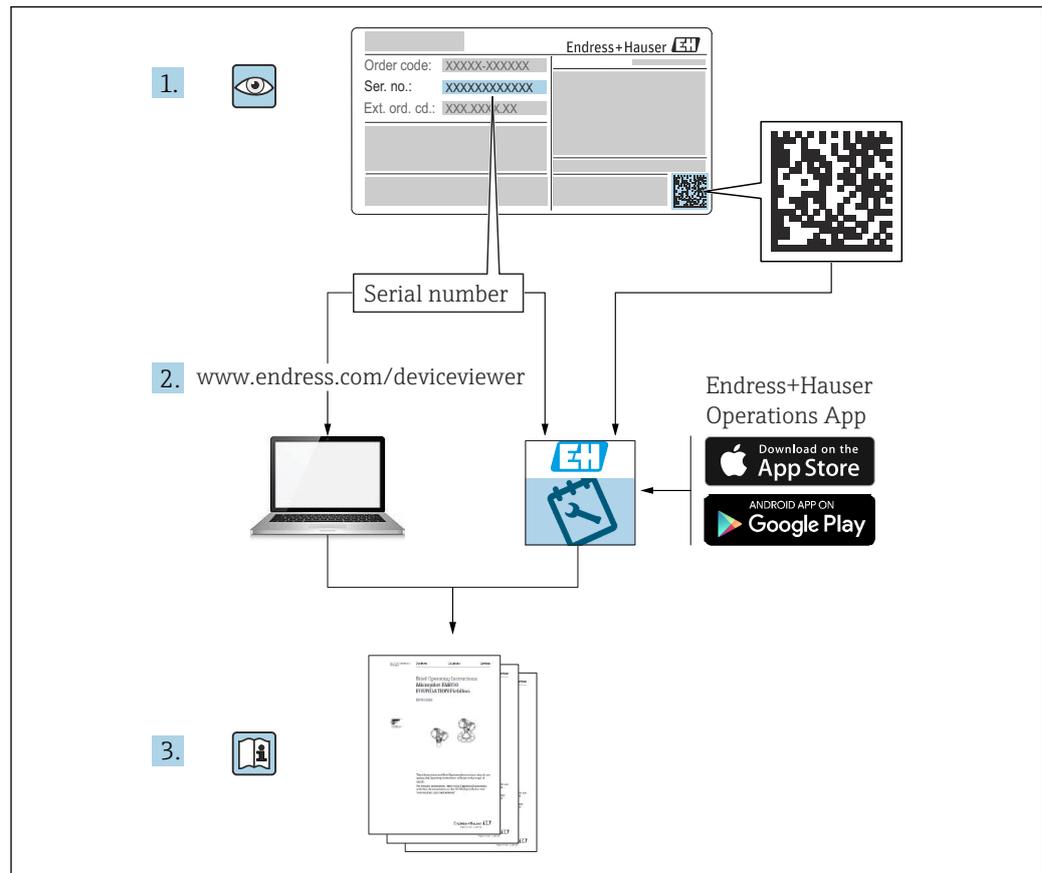
# Operating Instructions

## Micropilot FWR30

Free-space radar

Battery-operated level sensor for monitoring remote and mobile applications





- 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.

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# 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 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.

#### NOTICE

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

### 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

All available documents can be downloaded using:

- the serial number of the device (see cover page for description) or
- the data matrix code of the device (see cover page for description) or
- the "Downloads" area of the website [www.endress.com](http://www.endress.com)

### 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.

## 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 Designated 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 damage caused by improper or non-designated use.

Clarification of 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 the interference-free operation of the device.

#### **Modifications to the device**

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:

- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

#### **Repair**

To ensure continued operational safety and reliability:

- ▶ Carry out repairs on the device only if they are expressly permitted.

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

#### **Hazardous area**

To avoid danger to individuals or the facility when the device is used in the approval-related area (e. g. explosion protection, pressure vessel safety):

- ▶ Check the nameplate to verify if the device ordered can be put to its intended use in the approval-related area.
- ▶ Observe the specifications in the separate supplementary documentation that is an integral part of these instructions.

### **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 measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EC directives listed in the device-specific EC Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

## **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.

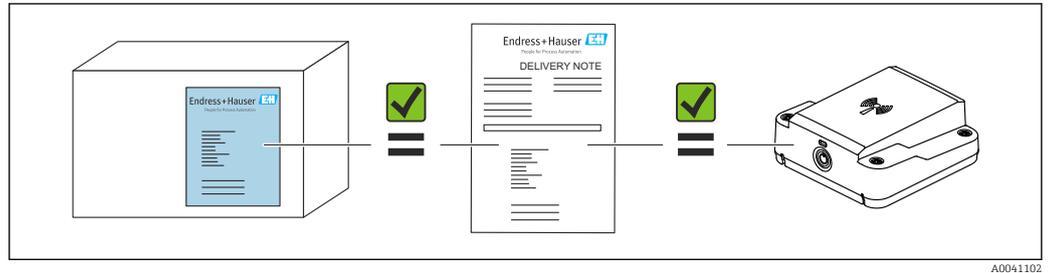
## **3 Product description**

### **3.1 Product design**

The Micropilot FWR30 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 Netilion Value, Netilion Inventory or SupplyCare Hosting digital applications.

## 4 Incoming acceptance and product identification

### 4.1 Incoming acceptance



A0041102

### 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).

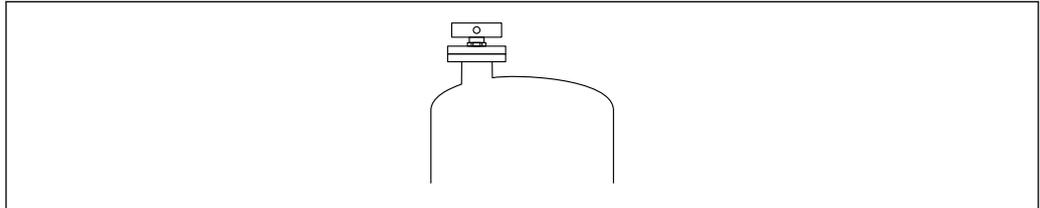
## 5 Mounting

### 5.1 Mounting the measuring device

#### 5.1.1 Mounting location

The device can be mounted indoors or outdoors.

#### Mounting on metal vessels and silos with threaded adapter



A0045526

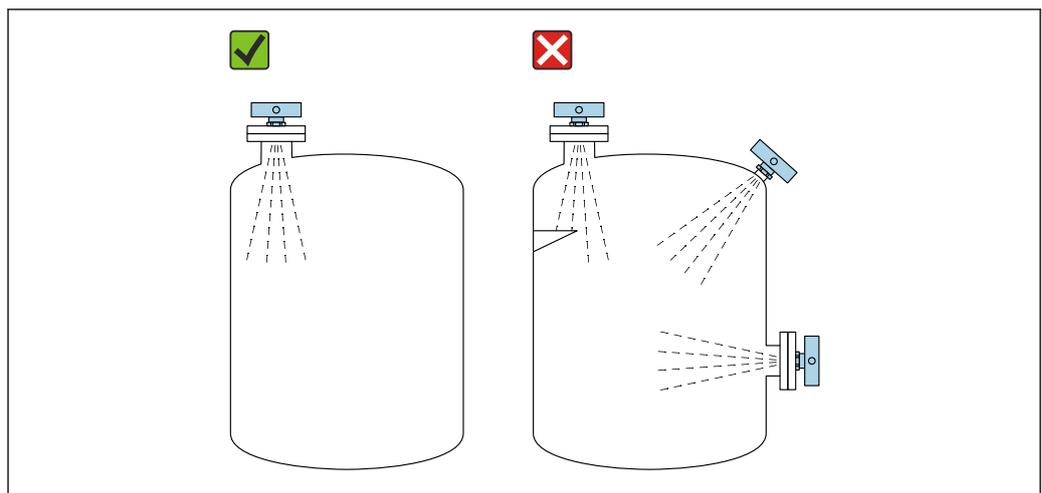
1 Silo with threaded adapter

#### Threaded adapter

- G 1½" (process pressure max. 4 bar abs. (58 psi))
- MNPT 1½" (process pressure max. 4 bar abs. (58 psi))

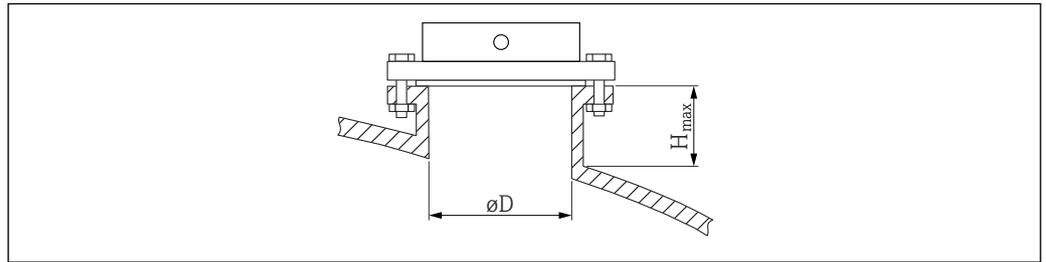
#### Mounting instructions

- 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
- 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)



A0045540

Maximum nozzle height and distance to wall

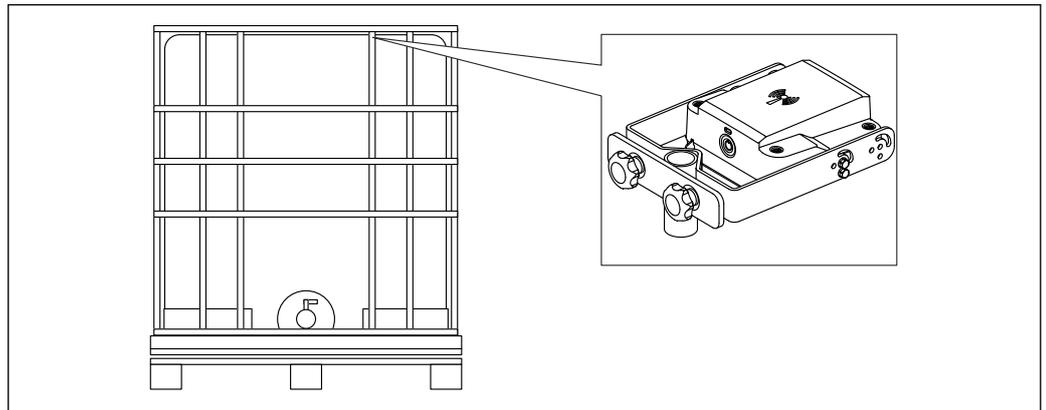


A0046856

Diameter D [mm]	H <sub>max</sub> [mm]	Measuring distance [mm]	Radiation width <sup>1)</sup> [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



A0040689

2 Mounting with mounting bracket pipe/IBC

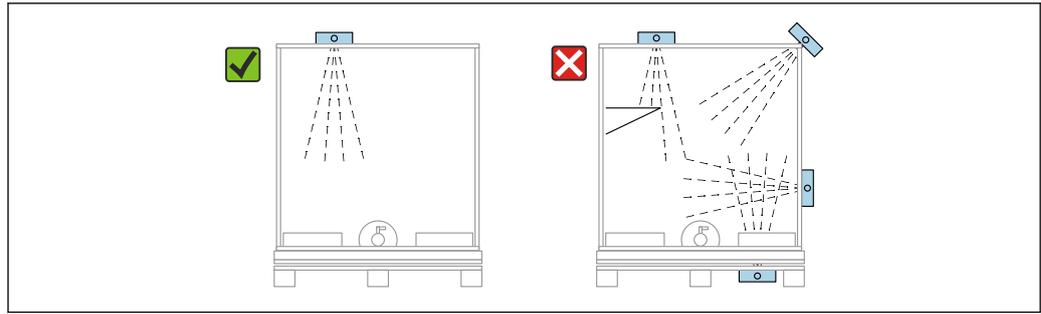
Mounting on non-conductive plastic IBC tanks with tubular cage or mesh frame

Mounting with "mounting bracket pipe/IBC".

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

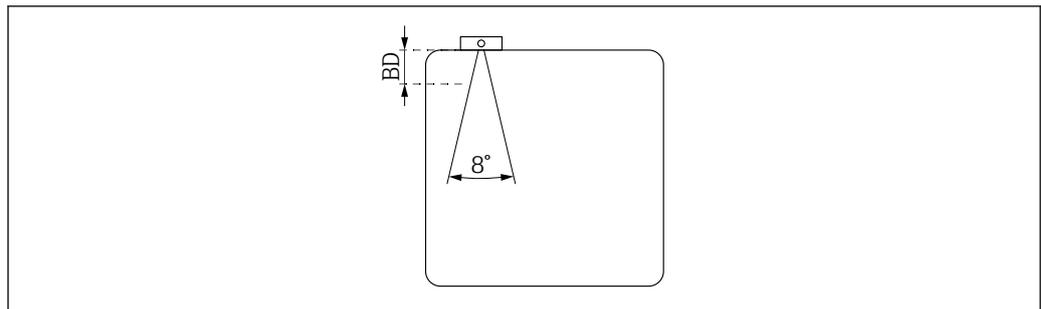
Mounting instructions

- 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)



A0043048

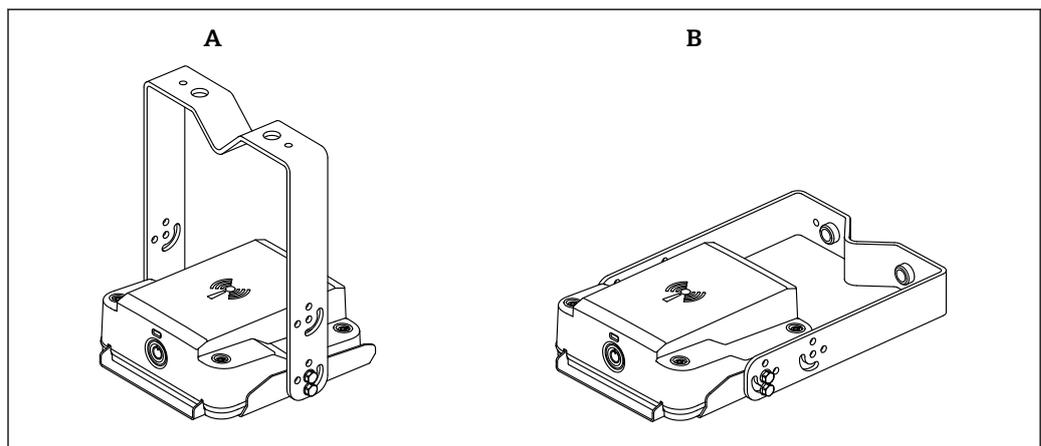
*Blocking distance*



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: 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**



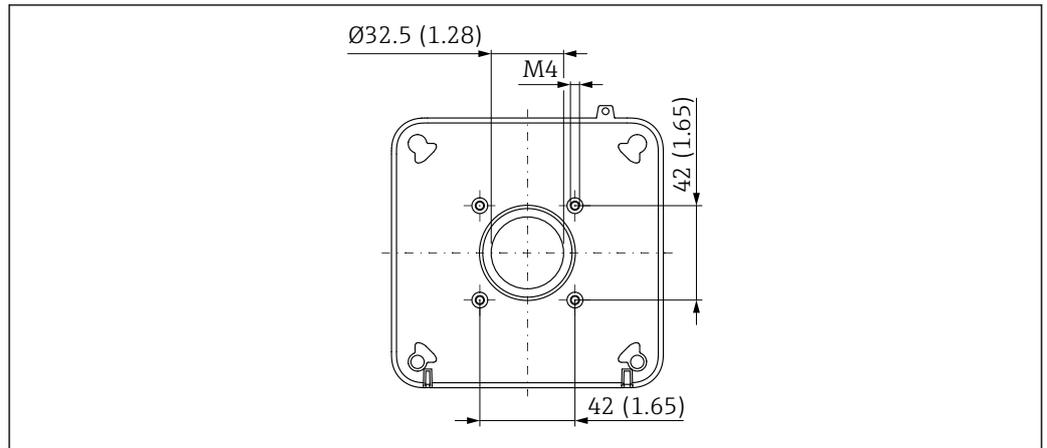
A0040688

- A *Mounting on the ceiling*
- B *Mounting on the wall*

**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. 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

Unit of measurement mm (in)

## 5.2 Post-mounting check

- Is the device undamaged (visual inspection)?
- Does the device meet 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 in accordance with IEC: ER34615 (primary battery lithium thionyl chloride);  
product recommendation: Tadiran SL-2880 (Europe), Tadiran TL-4930 (outside Europe)

 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.

 The battery status is indicated as full, medium, low or 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 battery (outside Europe), 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
  - Transmission intervals < 1 h have a considerable impact on the battery life
  - Calculation applies to operation without GPS. If GPS localization is performed in free field conditions during each transmission, the battery life is halved.

## 7 Operation options

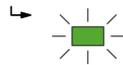
### 7.1 Overview of operation options

#### 7.1.1 Operation via activation button on device

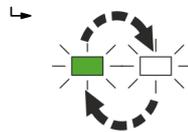
**i** The blue activation button is locked while an action is being performed and until the action has been completed.

##### Activating the measuring instrument - measure and transmit

1. Press the blue activation button briefly (>2 seconds) until the LED is lit green.



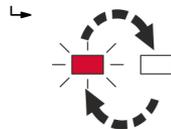
2. The LED flashes green during transmission.



3. The LED is lit green continuously (for 10 seconds) if transmission is successful.



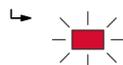
4. The LED flashes red or is lit red (for 10 seconds) if transmission fails.



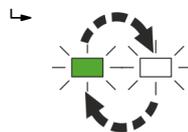
See Section 10.1.3

##### 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.

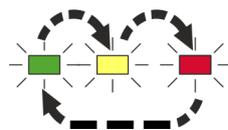


2. The LED flashes green during transmission.

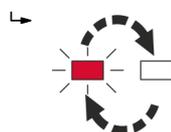


3. The LED flashes green, yellow and red alternately if transmission is successful.

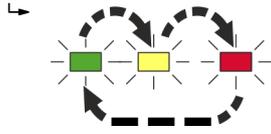
↳ The measuring instrument is now deactivated.  
This status is then displayed in the digital application.



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 device, press the blue activation button again (see Step 1).

-  The measuring 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: <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:

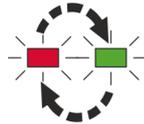
- Netilion Value: <https://Netilion.endress.com/app/value>
- Netilion Inventory: <https://Netilion.endress.com/app/inventory>
- SupplyCare Hosting: <https://inventory.endress.com>  
SupplyCare Hosting is commissioned by Endress+Hauser Service staff.

 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 Netilion Value, Netilion Inventory oder SupplyCare Hosting.

 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 device 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 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 in the



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 in the



Technical Information of SupplyCare Hosting

### 9.4 Use cases

#### 9.4.1 Status transmission

If the measuring device has not yet been commissioned and the user presses the activation button, a status transmission is activated nonetheless.

- The measuring device updates the status values
- The measuring device synchronizes the time if necessary
- The measuring device transmits all status values to the cloud

The following status values are transmitted to the cloud:

- Activation status
- Battery status
- Position
- Signal quality of connectivity
- Current event (event 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 device synchronizes the configuration from the cloud
- The measuring device transmits all of the saved measured values and status values to the cloud such as
  - Level
  - Position
  - Ambient temperature

 If the device does not have any 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 device is connected to the cloud, the firmware is transmitted to the device. After it has been checked by the measuring device, the firmware is updated. Once it has been updated successfully, the measuring device sends a message to the cloud.

The LED flashes orange during the firmware update.

#### 9.4.5 Deactivating the measuring device

There are two possible ways to deactivate the measuring device:

- Deactivation is initiated via the cloud
  - The next time the measuring device 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

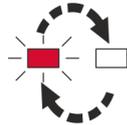
#### 9.4.6 Activating the measuring device after deactivation

To activate the device after deactivation, the device must first be reactivated with its settings in the cloud. Then the blue activation button on the device must be pressed until the LED shows a green light.

## 10 Diagnostics and troubleshooting

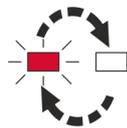
### 10.1 Diagnostic information via LED

#### 10.1.1 The LED flashes red every 10 seconds



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

#### 10.1.2 The LED flashes red for 10 seconds



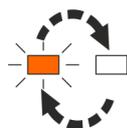
- **Reason:** Cloud transmission error:
  - No SIM card or card blocked
  - No network service
  - Data connection to provider has failed
- **Solution:**
  - Check whether the SIM card is correctly inserted and enabled
  - Check whether the network service is available
  - Notify the Service Department

#### 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.
- **Solution:** 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
- **Solution:** Wait until the update is finished

## 10.2 List of diagnostic events

**Diagnostic number:** F270

**Short text:** Main electronics defective

**Remedial measures:**

- Contact the Service Department
- Replace device

**Diagnostic number:** F331

**Short text:** Firmware update failed

**Remedial measures:**

Repeat firmware update

**Diagnostic number:** F400

**Short text:** Communication error

**Remedial measures:**

Check connection and repeat

**Diagnostic number:** F430

**Short text:** Configuration incorrect

**Remedial measures:**

- Reconfigure in the cloud
- Contact the Service Department

**Diagnostic number:** F465

**Short text:** SIM card is defective

**Remedial measures:**

Check the SIM card

**Diagnostic number:** S825

**Short text:** Operating temperature

**Remedial measures:**

- Check the ambient temperature
- Check the process temperature

**Diagnostic number:** C890

**Short text:** Battery weak

**Remedial measures:**

Prepare to replace the battery

**Diagnostic number:** M891

**Short text:** Empty battery

**Remedial measures:**

Replace the battery

**Diagnostic number:** F909

**Short text:** Request overload

**Remedial measures:**

- Wait > 15 minutes between the data requests
- Contact the Service Department

**Diagnostic number:** S911

**Short text:** Device location invalid or unknown

**Remedial measures:**

Contact the Service Department

**Diagnostic number:** S914

**Short text:** Device location inaccurate

**Remedial measures:**

Check if device is in free field. Move device outside of buildings

**Diagnostic number:** S941

**Short text:** Lost echo

**Remedial measures:**

Check sensitivity settings

# 11 Maintenance

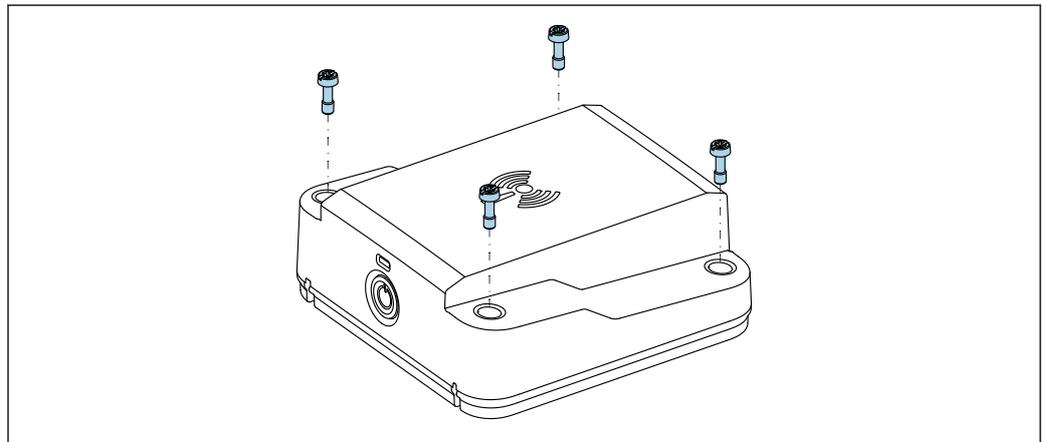
## 11.1 Maintenance tasks

### 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
- MNPT 1½" adapter

## 14 Technical data

### 14.1 Input

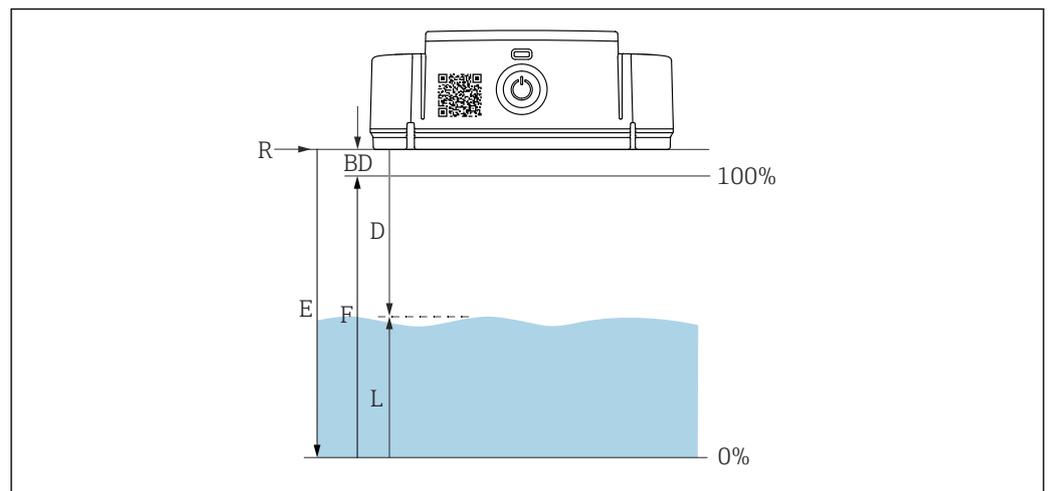
#### 14.1.1 Measured variable

##### Measured process variables

- **Level:** 0 to 30 m (0 to 98 ft)  $\pm 2$  mm (0.08 in)
- **Ambient temperature:**  $-20$  to  $+60$  °C ( $-4$  to  $+140$  °F) with an accuracy of  $\pm 2$  °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:**
  - $\pm 20$  m (66 ft) in free field conditions

#### 14.1.2 Measuring range

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



3 Calibration parameter

- E* Empty calibration (= zero)
- 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.

#### **i** 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.

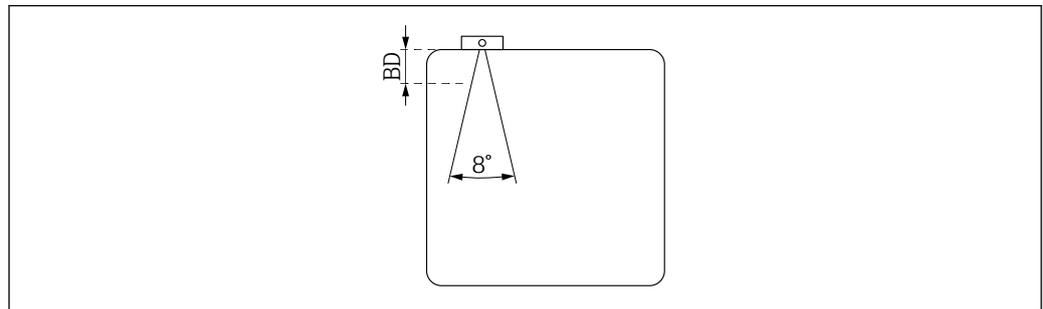
If measurements must be performed in one of these media, please contact Endress +Hauser.

### 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)
  - 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 030 option B: GPS + 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 030 option C: GPS + 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

### 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

## 14.2.2 Protocol-specific data

The FWR30 uses:

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

## 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 directly through the tank (electrically non-conductive tank walls). No contact is made with the process medium.
- Measurement in the tank with a G1½" threaded adapter: process pressure max. 4 bar abs. (58 psi).
- Measurement in the tank with an MNPT1½" threaded adapter: process pressure max. 4 bar abs. (58 psi).

## 14.5 Accessories

- Mounting bracket pipe/IBC
- Mounting bracket wall/ceiling
- G 1½" adapter
- MNPT 1½" adapter

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