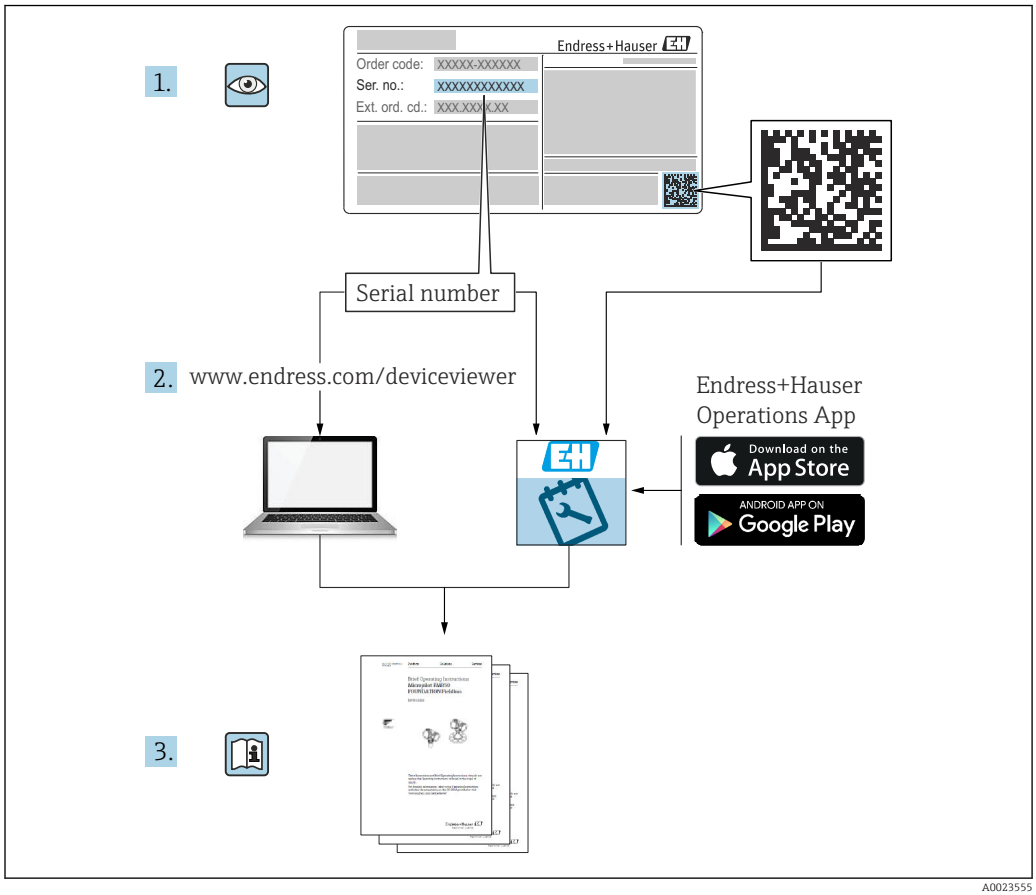
BA02591F/00/EN/01.26-00
71753359
2026-01-31

Valid as of version
10.00.zz (Device firmware)

Operating Instructions
Micropilot FWR30 for dynamic water level monitoring

Free-space radar
Battery-powered radar sensor for monitoring water levels

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.

This manual can be used for the configuration and operation of the FWR30 for dynamic water level monitoring.

We recommend you receive training on this system from Endress+Hauser during commissioning in order to perform the administrative functions of the software and operate the FWR30 for dynamic water level monitoring (“System”).

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 Figures

The screen views shown in this manual are examples and may differ from those displayed on your device. The screen views depend on personal settings, the terminal used, and the application.

1.4 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 provides all technical data for the device and gives an overview of the accessories and additional items that can be ordered for it.
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.

1.4.1 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.

This documentation refers to the Micropilot FWR30 product versions with order code 050, option W (Endress+Hauser Netilion Service for dynamic water level monitoring).

Follow Operating Instructions BA01991F and Technical Information TI01499F for the Micropilot FWR30 for all other product versions.

1.5 Change history

BA02591F/01.26
Valid for device version: 10.00.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 system described in the instructions is intended for measuring water levels.

The Micropilot FWR30 for dynamic water level monitoring is a battery-powered water level sensor with cellular radio transmission.

Application:
Self-sufficient radar sensor for remote monitoring of water levels in water applications.

2.2.1 Incorrect use

Use of the device for any purpose other than that described poses a threat to the safety of people and of the entire measuring system, and is therefore not permitted.

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, 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 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

The manufacturer warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

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 System overview

The Micropilot FWR30 for dynamic water level monitoring device is an Endress+Hauser product that enables operators to consolidate the monitoring network in natural and enclosed water bodies through autonomous, local collection of water level data. The device links real-time measurements to historical data. Based on the individual sensor measurements, a consolidated overview is generated for the operator. The user can define specific monitoring limits.

The system consists of level sensors and the Netilion cloud platform. The measuring instruments send the measured data to the cloud via cellular radio [1]. The user accesses the system via Netilion. The views available in Netilion depend on the access rights assigned to each user.

The system can be used as an additional tool for flood prevention, but must not be the only measure. Operators can implement further measures using this and additional information obtained from other flood prevention components. However, there is always the possibility that the system may malfunction and fail to warn in time or before the water level rises. The operator must therefore always monitor the actual situation on site before introducing measures.

Measuring instrument

Recording water levels

The water level is determined by measuring the distance between the water surface and the sensor.

1) The cloud has an annual average availability of at least 99 %.

The user must select appropriate monitoring limits for water levels. The transmission interval is adjusted depending on the monitoring limits.

Risk: Lack of availability

For reasons beyond Endress+Hauser's control (“force majeure”), e.g. faulty data transmission by the network provider or Internet provider, severe weather, animal damage, or tampering with individual components, the measuring instrument may not function properly in certain circumstances. This is due to the technical limitations and restrictions of the measuring instrument.

If cellular transmission is not guaranteed, there is a risk that the measuring instrument may not be available.

To use the system, operators require their own IT infrastructure, i.e. computer, browser, firewall, email account, mobile device, etc., which is their sole responsibility.

3.2 Radar sensor product design

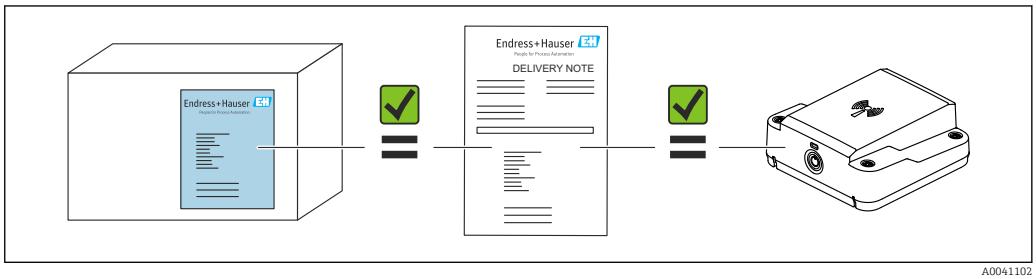
The device is powered by an internal battery. The IP66/68 housing contains a sensor. The sensor detects the water level. The device indicates the water level to the cloud via a cellular connection. The values can be accessed via the digital applications Netilion Value and Netilion.

The following measured values are recorded and transmitted to the cloud:
- Water level in mm
- Distance in mm
- Internal temperature in °C
- Orientation angle in °
- Battery status in %

Product versions with order code 050, option W cannot transmit location data. The location data must be stored in the cloud.

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

The set-up and design of the measuring points depend on local conditions. The measuring instruments are typically mounted on bridges or other solid structures. Due to applicable bridge rights, installation must be carried out by the municipality, local authority, or bridge owner.

Ideally, the measuring instrument should be installed downstream of the bridge in the direction of flow. Mounting the measuring instrument in the direction of flow upstream of the bridge can affect the measured values, e.g. if floating debris causes backwater to form upstream of the bridge.

All sensors are factory-equipped with a SIM card and communicate with the cloud via cellular networks. If there is no wireless reception at a desired installation point, another installation point must be selected.

Consider accessibility for maintenance work, e.g., when changing the battery, when choosing the location.

5.1 Installing the measuring instrument

5.1.1 Installation location

The device can be mounted indoors or outdoors.

⚠ CAUTION

Risk of injury from components falling!

The weight of the components can injure personnel or cause crushing injuries.

- ▶ During installation and disassembly, use suitable fasteners that are designed for the weight of the components and the installation site. Depending on the installation location, ask a second person to assist with the installation.
- ▶ Wear suitable protective equipment during installation and removal.
- ▶ Mount the components securely so that they cannot fall down.

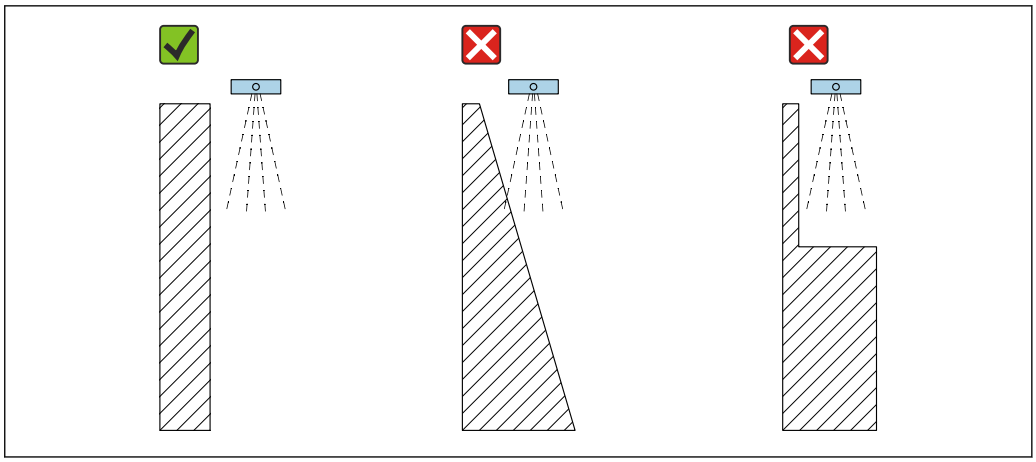
NOTICE

Loss of the protection rating if the device is opened in a damp or wet environment!

- ▶ Only open the device in a dry environment.

Installation instructions

- Install the measuring instrument horizontally and parallel to the water surface Otherwise, undesired reflections from the surroundings can cause interference signals
- The radar antenna should never be covered by metal objects
- When installing on bridges/walls, ensure that no edges, slopes or other obstacles obstruct the measurement (see the following diagram)
- In general, no interfering objects may be located in the radiation range of the sensor (see the following table)
- Protect the measuring instrument against vandalism as much as possible; use removal protection for mounting bracket



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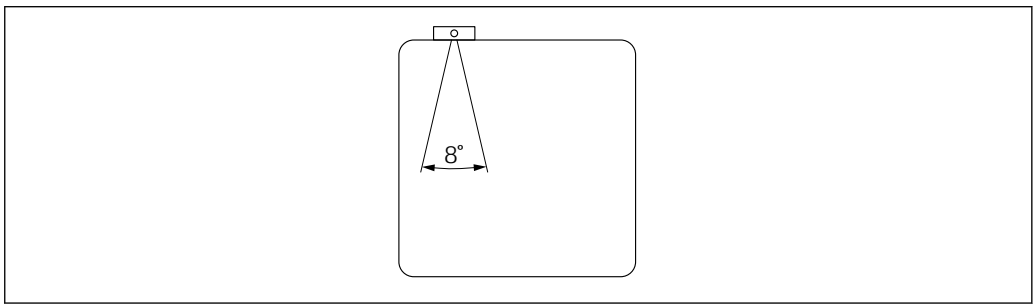
Radiation range and wall distance

Measuring distance [mm]	Radiation width [1] [mm]	Minimum distance to wall [mm]
500	70	25
1000	140	70
2000	280	140
5000	699	350
10000	1399	700

1) The beam angle is 8°.



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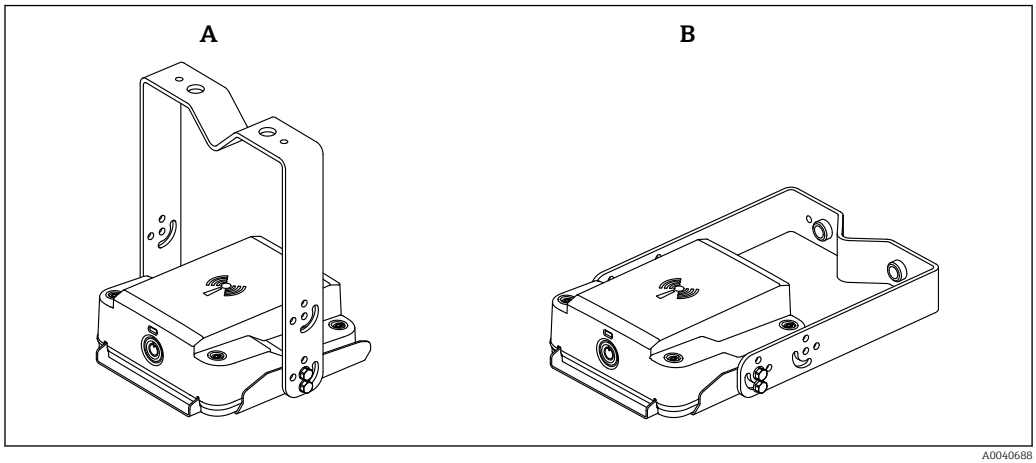
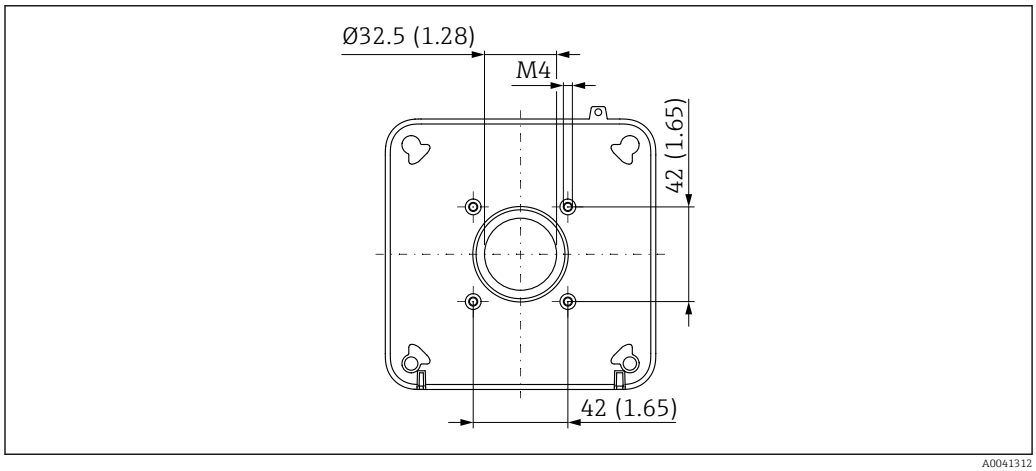
Mounting on ceilings or walls



A Mounting on the ceiling
B Mounting on the wall

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.

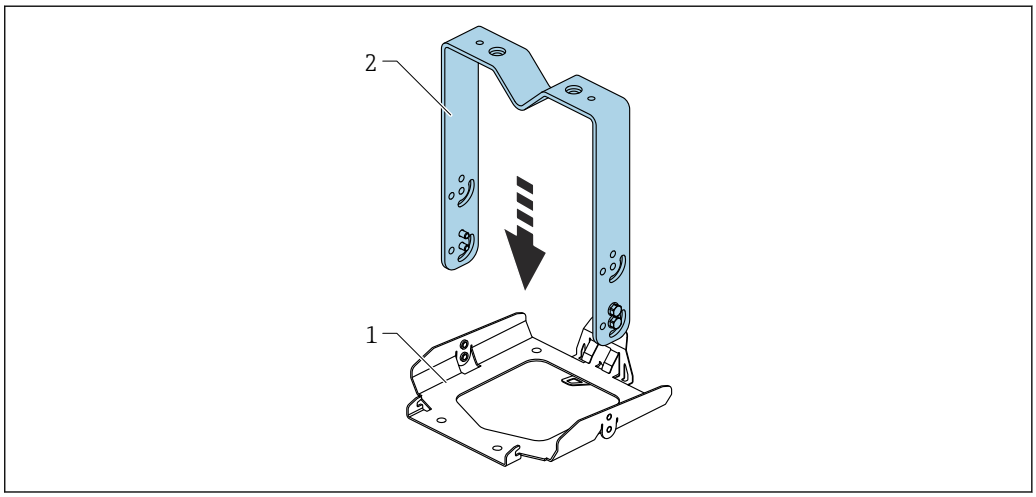


Unit of measurement mm (in)

5.1.2 Mounting bracket wall/ceiling

Use adapter plate with mounting bracket.

Installing the mounting bracket



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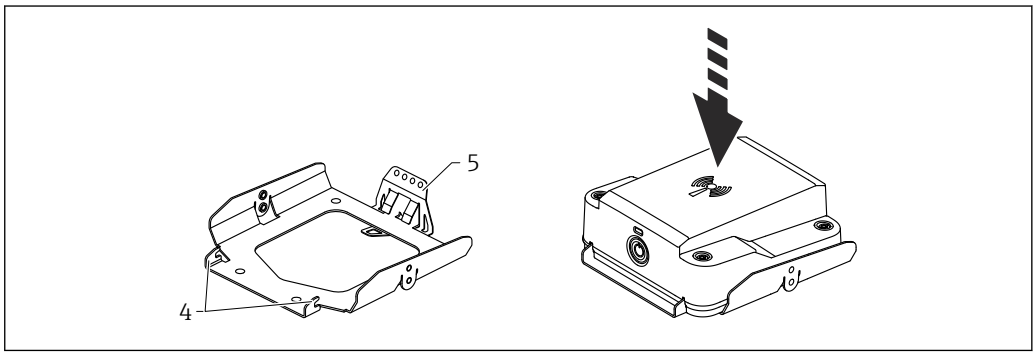
▶ Attach the mounting bracket (2) to the adapter plate (1).

Installing the measuring instrument on the adapter plate



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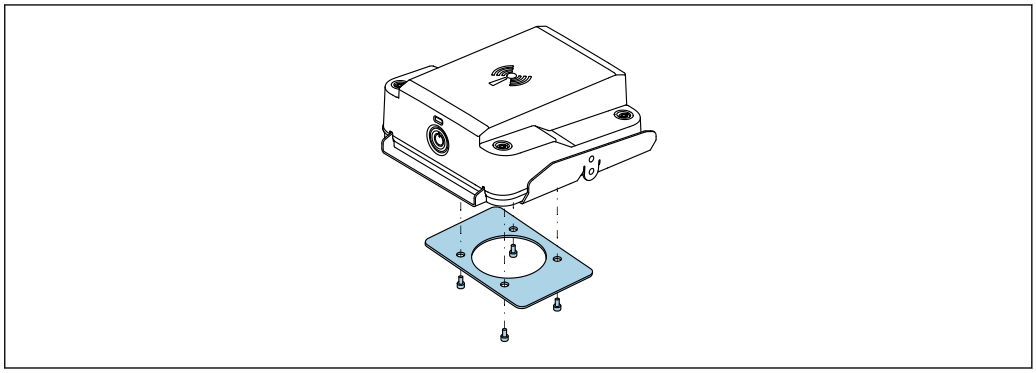
▶ Use the hooks (4) and spring (5) to secure the measuring instrument in the adapter plate.

The spring (5) is used to release the measuring instrument from the adapter plate.

5.1.3 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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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 securely tightened.
- 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.

The battery status is indicated as an approximate percentage.

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 1 min
Battery life > 1 year:
- Transmission interval 5 min for 14 days and
- Transmission interval 12 h for the rest of the year

- 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
- Battery life is reduced if monitoring limits are exceeded frequently/above average

Monitoring limits

You can set three monitoring limits. In all cases, measurements are taken once per minute.

A transmission to the Endress+Hauser cloud is triggered immediately every time a monitoring limit is exceeded.

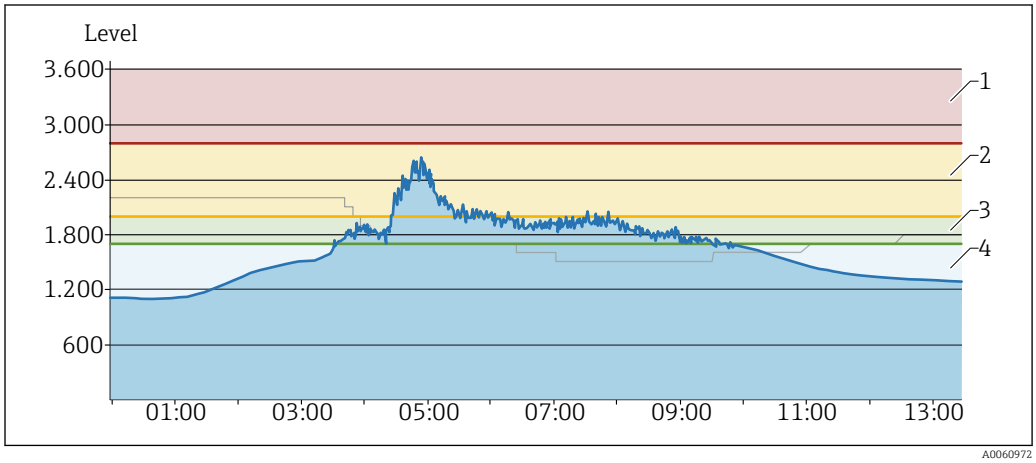
Below the first monitoring limit, the transmission interval is twice daily by default. If the first monitoring limit is exceeded, the transmission interval automatically increases to every 60 minutes. If the next monitoring limit is exceeded, the transmission interval increases automatically to every 5 minutes and a notification (e.g. e-mail) is triggered for users.

The third monitoring limit triggers an additional notification. The transmission interval remains unchanged.

A transmission interval of every 5 minutes can only be guaranteed if the signal strength is as follows:
- LTE-M: > −75 dBm
- NB-IoT: > −85 dBm

The operator must select appropriate monitoring limits for water levels.

Sample diagram for monitoring limits:



1 Upper monitoring limit exceeded:
- One measured value per minute
- Transmission every 5 min
- Notification to users

2 Middle monitoring limit exceeded:
- One measured value per minute
- Transmission every 5 min
- Notification to users

3 Lower monitoring limit exceeded:
- One measured value per minute
- Transmission hourly (every 60 min)

4 Below the lower monitoring limit:
- One measured value per minute
- Transmission twice daily (every 12 h)
- Average value over 15 minutes

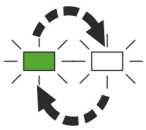
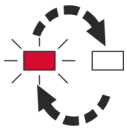
7 Operation options

7.1 Overview of operation options

7.1.1 Operation via activation button on device

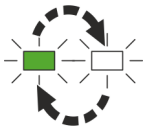
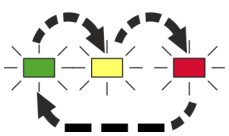
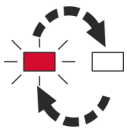
The blue activation button is locked while an action is being performed and until the action has been completed.

Activating the measuring instrument - measure and transmit

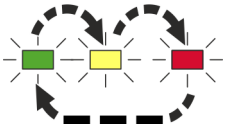
1. Press the blue activation button briefly (>2 seconds) until the LED is lit green.
   ↳ 
2. The LED flashes green during transmission.
   ↳ 
3. The LED is lit green continuously (for 10 seconds) if transmission is successful.
   ↳ 
4. The LED flashes red or is lit red (for 10 seconds) if transmission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

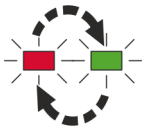
8 Commissioning

The device can be commissioned with the following digital applications:
Netilion: https://netilion.endress.com

8.1 Function check

Perform the function check:

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



8.2 Commissioning the measuring instrument

- "Wake up" the battery and sensor with the blue activation button. See also "Overview of operation options".
  - The LED flashes in a specific way, the cellular radio connection is established.

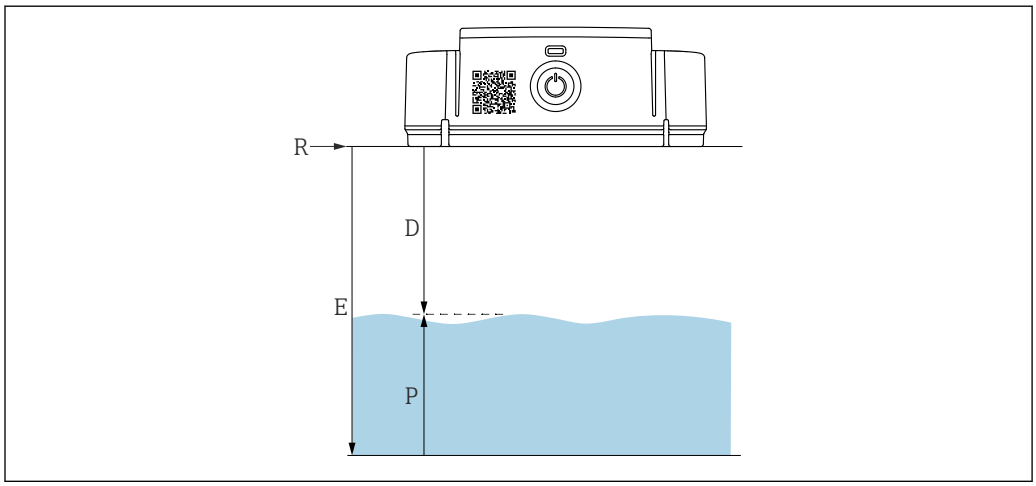
- LED green: Connection available
- LED red (and never activated before): Measuring point potentially not optimal
  Change the measuring point. The sensor is set to sleep mode again
- LED red (and was activated once before): Cellular radio connection lost
  Measurements continue and are stored, and are then uploaded to the cloud once the connection is restored

Measurements can be repeated by pressing the blue activation button, even if the cellular radio connection is not available or cannot be established.

If the blue activation button is pressed while the device is activated, the device runs through a measuring and transmission cycle, depending on the water level.

Set the monitoring limits for water levels in advance in Netilion. Carry out water level calibration on site.

Calibrating the water level



E Empty calibration (= river bed)
D Distance to water surface measured by sensor
P Water level (P = E - D)
R Reference point

1. Determine the water level P (in mm) and select the measuring point in the cloud → Edit device → Perform level calibration.
2. Press the blue activation button on the device to confirm the water level.

8.3 Defining monitoring limits

Monitoring limits must be defined in order to use dynamic data transmission (see "Battery life"). 3 monitoring limits can be stored. A lower (first) monitoring limit for power save mode, a middle (second) monitoring limit and an upper (third) monitoring limit are saved individually in the system. The monitoring limits can be adapted over time if necessary.

The monitoring limits are defined in Netilion: https://netilion.endress.com.

8.4 Configuration management

All parameters can be accessed via Netilion.

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

9 Operation

⚠ WARNING

Risk of injury!

This system is an information system, not an alarm system. Therefore, 100% availability cannot be guaranteed.

- ▶ Operation of the system does not exempt users from the obligation to maintain other flood prevention measures.

After logging into Netilion, users can display their area with the installed measuring instruments on a map view.

If a defined monitoring limit is reached, a notification is sent to the saved users, e.g. by e-mail.

User management allows you to set up different users with customized information messages, e.g., the fire department, the 'THW' (Federal Agency for Technical Relief), the mayor. The notification may differ depending on the user role, e.g. notification only if monitoring limits are exceeded or diagnostic messages for maintenance.

9.1 Operating modes

9.1.1 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
- Signal quality of connectivity
- Current event (event number)

9.1.2 Performing a manual measurement

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

9.1.3 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:
  - Water level
  - Ambient temperature

If the device has no reception, up to 250 measured values are saved in the device and transmitted during the next connection.

9.1.4 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.

9.1.5 Deactivating the measuring instrument

The measuring instrument can be deactivated as follows:
Deactivation is initiated via the cloud
The next time the measuring instrument is connected to the cloud, the status values are transmitted and deactivation is displayed in the cloud.

9.1.6 Activating the measuring instrument after deactivation

To activate the measuring instrument after deactivation, it must first be activated in the cloud. Then the blue activation button on the device must be pressed briefly (>2 seconds) until the LED shows a green light.

10 Diagnostics and troubleshooting

Netilion generates a warning if no measured values are received from a sensor (transmission interval has not been met). Check the sensor and the sensor's power supply.

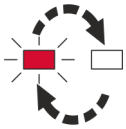
10.1 General diagnostic information

The measuring instrument is no longer sending or transmitting data. No data are received by Netilion

- **Cause:**
  - Measuring instrument faulty
  - Empty battery
- **Remedial action:**
  - Contact the Service team
  - Check and replace the battery

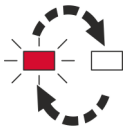
10.2 Diagnostics information via LED

10.2.1 The LED flashes red every 10 seconds



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

10.2.2 The LED flashes red for 10 seconds

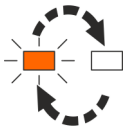


- **Reason:** Cloud transmission error:
  - No SIM card or card blocked
  - No network service
  - Data connection to provider has failed
- **Remedial action:**
  - Check whether the SIM card is correctly inserted and enabled
  - Check whether the network service is available
  - Notify the Service team

10.2.3 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).

10.2.4 LED flashing orange



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

10.3 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 error
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 defective
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: M892
Event text: Angular deviation detected
Remedial action:
- Check the measuring instrument on site
- Configure the measuring instrument correctly again
- Replace the measuring instrument if damaged

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

NOTICE

Loss of the protection rating if the device is opened in a damp or wet environment!

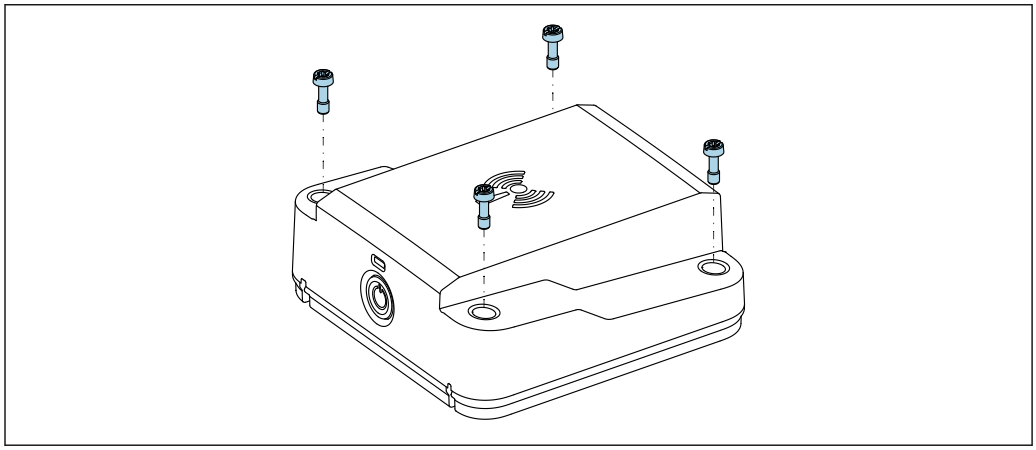
▶ Only open the device in a dry environment.

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.

11.1.2 Visual inspection of sensors

Check the position and installation of the measuring instruments once a year and after every flood event.

See "Post-installation check".

11.1.3 Check settings

Check the settings (water level, monitoring limits, etc.) in Netilion once a year. New values may be necessary based on user experience or structural changes in the area.

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
- Removal guard

14 Technical data

14.1 Input

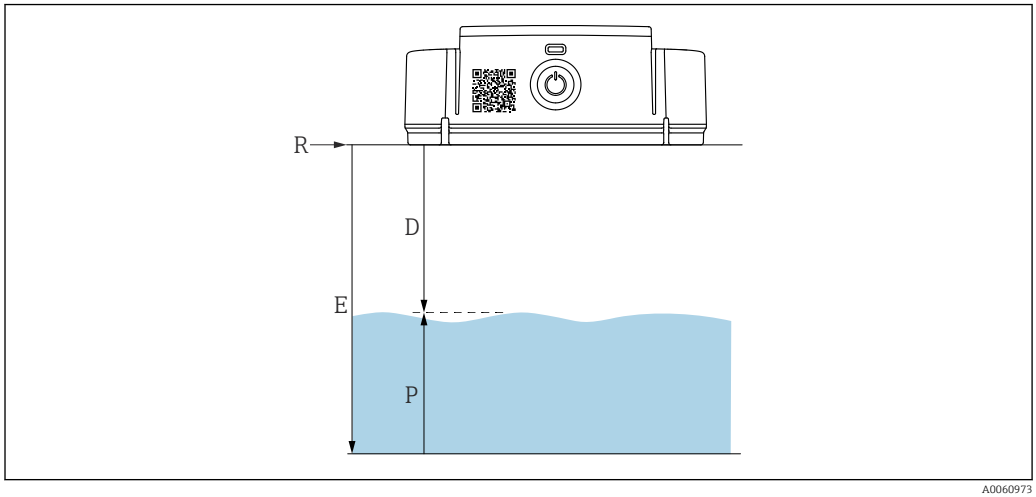
14.1.1 Measured variable

Measured process variables

- **Distance to water surface:** 0 to 30 m (0 to 98 ft) with an accuracy of ±2 mm (0.08 in)
  If conditions deviate from the reference operating conditions, the offset/zero point that results from the installation conditions can be up to ±4 mm (0.16 in). This additional offset/zero point can be eliminated by entering a correction ("Level correction" parameter) during commissioning.
- **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 angle of inclination can only be measured if the sensor is not moving
- **Orientation/acceleration, 3-axis (x, y, z):**
  ±−1 to 1 g

14.1.2 Measuring range

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



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E Empty calibration (= river bed)
D Distance measured to surface of water
P Water level (P = E - D)
R Reference point

Medium

Information on the nameplate:
Dev.Rev.1 (Device Revision): liquid applications

14.1.3 Operating frequency

80 GHz

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

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

Transmission interval

The transmission interval cannot be configured and is adjusted automatically if the set monitoring limits are reached.

Transmission interval:
- Below the 1st monitoring limit: 12 h
- 1. Monitoring limit exceeded: 60 min
- 2. Monitoring limit exceeded: 5 min
- 3. Monitoring limit exceeded: 5 min

The battery life depends on the transmission interval.

A transmission interval of every 5 minutes can only be guaranteed if the signal strength is as follows:
- LTE-M: > −75 dBm
- NB-IoT: > −85 dBm

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.

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