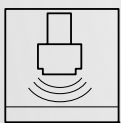


# LCR10

## Level Radar

### Manual



Your automation, our passion.

 **PEPPERL+FUCHS**

---

With regard to the supply of products, the current issue of the following document is applicable:  
The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

#### **Worldwide**

Pepperl+Fuchs Group

Lilienthalstr. 200

68307 Mannheim

Germany

Phone: +49 621 776 - 0

E-mail: [info@de.pepperl-fuchs.com](mailto:info@de.pepperl-fuchs.com)

#### **North American Headquarters**

Pepperl+Fuchs Inc.

1600 Enterprise Parkway

Twinsburg, Ohio 44087

USA

Phone: +1 330 425-3555

E-mail: [sales@us.pepperl-fuchs.com](mailto:sales@us.pepperl-fuchs.com)

#### **Asia Headquarters**

Pepperl+Fuchs Pte. Ltd.

P+F Building

18 Ayer Rajah Crescent

Singapore 139942

Phone: +65 6779-9091

E-mail: [sales@sg.pepperl-fuchs.com](mailto:sales@sg.pepperl-fuchs.com)

<https://www.pepperl-fuchs.com>

<b>1</b>	<b>Introduction</b> .....	<b>5</b>
1.1	Content of this Document .....	5
1.2	Safety Information .....	6
1.3	Symbols Used .....	6
<b>2</b>	<b>Documentation</b> .....	<b>8</b>
2.1	Technical Information (TI) .....	8
2.2	Manual (BA) .....	8
2.3	Brief Instructions (KA) .....	8
2.4	Instruction Manual (SI) .....	8
<b>3</b>	<b>Terms and Abbreviations</b> .....	<b>9</b>
3.1	Document Types .....	9
3.2	Abbreviations .....	9
<b>4</b>	<b>Registered Trademarks</b> .....	<b>10</b>
<b>5</b>	<b>Basic Safety Instructions</b> .....	<b>11</b>
5.1	Requirements for Personnel .....	11
5.2	Designated Use .....	11
5.3	Workplace safety .....	12
5.4	Operational safety .....	12
5.5	Product Safety .....	13
<b>6</b>	<b>Product Description</b> .....	<b>14</b>
6.1	Product Design .....	14
<b>7</b>	<b>Incoming Acceptance and Product Identification</b> .....	<b>15</b>
7.1	Goods Acceptance .....	15
7.2	Product Identification .....	15
7.3	Manufacturer Address .....	15
7.4	Nameplate .....	16
<b>8</b>	<b>Installation</b> .....	<b>17</b>
8.1	Installation Conditions .....	17
8.2	Post-installation Check .....	25

<b>9</b>	<b>Electrical Connection</b> .....	<b>26</b>
9.1	Cable Assignment .....	26
9.2	Supply Voltage .....	26
9.3	Connecting the Device .....	27
9.4	Post-connection Check .....	27
<b>10</b>	<b>Operability</b> .....	<b>28</b>
10.1	Operating Concept .....	28
10.2	Operation via Bluetooth® Wireless Technology .....	28
<b>11</b>	<b>Commissioning and Operation</b> .....	<b>29</b>
11.1	Installation and Function Check .....	29
11.2	Commissioning via P+F Level (App) .....	30
<b>12</b>	<b>Diagnostics and Troubleshooting</b> .....	<b>32</b>
12.1	General Errors .....	32
12.2	Error – P+F Level Operation .....	33
12.3	Diagnostic Event in the Operating Tool .....	34
12.4	List of Diagnostic Events .....	35
<b>13</b>	<b>Maintenance</b> .....	<b>36</b>
13.1	Cleaning the Antenna .....	36
13.2	Process Seals .....	36
<b>14</b>	<b>Repair</b> .....	<b>37</b>
14.1	General notes .....	37
<b>15</b>	<b>Accessories</b> .....	<b>38</b>
15.1	Enclosed Accessories .....	38
15.2	Further Accessories .....	39
<b>16</b>	<b>Operating Menu</b> .....	<b>49</b>
16.1	Overview of the Operating Menu (P+F Level) .....	49
16.2	Setup Menu .....	51
16.3	Diagnostics Menu .....	63
	<b>Index</b> .....	<b>66</b>

# 1 Introduction

## 1.1 Content of this Document

This document contains information that you need in order to use your product throughout the applicable stages of the product life cycle. These can include the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal



---

**Note**

This document does not substitute the instruction manual.

---



---

**Note**

For full information on the product, refer to the instruction manual and further documentation on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

---

The documentation consists of the following parts:

- Datasheet – product overview  
The datasheet contains the essential technical data for product selection.
- Technical information (TI) – planning aid  
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.
- Manual (BA), present document – complete information  
The manual contains all information from incoming acceptance to disposal.
- Brief instructions (KA) – guide that takes you quickly to the 1st measured value  
The brief instructions contain all the essential information from incoming acceptance to initial commissioning.
- Instruction manual (SI) – safety-relevant document  
Depending on the approval, the required instruction manuals are supplied with the device.

Additionally, the following parts may belong to the documentation, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Additional documents

## 1.2 Safety Information

### Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismantling of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

## 1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

### Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:



---

#### Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

---



---

#### Warning!

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

---



---

#### Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

---

### Informative Symbols



---

#### Note

This symbol brings important information to your attention.

---



---

#### Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

## Symbols for Certain Types of Information and Graphics



### Permitted

Procedures, processes or actions that are permitted.



### Preferred

Procedures, processes or actions that are preferred.



### Forbidden

Procedures, processes or actions that are forbidden.



### Operation

Operation via operating tool



### Parameter

Write-protected parameter

1, 2, 3 ... Item numbers

A, B, C, ... Views

## 2 Documentation

The following document types are available on the Pepperl+Fuchs website:  
[www.pepperl-fuchs.com](http://www.pepperl-fuchs.com) → search → model number → product detail page → documents.

### 2.1 Technical Information (TI)

Planning aid

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.

### 2.2 Manual (BA)

Your reference guide

This document contains all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

### 2.3 Brief Instructions (KA)

Guide that takes you quickly to the 1st measured value

This document contains all the essential information from incoming acceptance to initial commissioning.

### 2.4 Instruction Manual (SI)

Depending on the approval, the following instruction manuals (SI) are supplied with the device. These documents are an integral part of the manual.



---

#### Note

The nameplate indicates the instruction manual (SI) that are relevant to the device.

---



## 3 Terms and Abbreviations

### 3.1 Document Types

#### BA

Document type Manual

#### KA

Document type Brief Instructions

#### TI

Document type Technical Information

#### SI

Document type Instruction manual

### 3.2 Abbreviations

#### PN

Nominal pressure

#### MWP

MWP (**M**aximum **w**orking pressure/max. process pressure)

The MWP can also be found on the nameplate.

#### ToF

Time of Flight

#### $\epsilon_r$

DK value – relative dielectric constant

#### Operating tool

The term **operating tool** is used in place of the following operating software: P+F Level (app), for operation using an Android or iOS smartphone or tablet

#### BD

**B**locking **D**istance; no signals are analyzed within the BD.

#### PLC

**P**rogrammable logic controller (PLC)

## 4 Registered Trademarks

### Apple®

Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

### Android®

Android, Google Play and the Google Play logo are trademarks of Google Inc.

### Bluetooth®

The *Bluetooth*® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by Pepperl+Fuchs is under license. Other trademarks and trade names are those of their respective owners.

## 5 Basic Safety Instructions

### 5.1 Requirements for 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.
- Personnel must be authorized by the plant owner/operator.
- Be familiar with federal/national regulations.
- Before starting work: personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Personnel must follow instructions and comply with general policies.

The operating personnel must fulfill the following requirements:

- Personnel are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Personnel follow the instructions in this manual.

### 5.2 Designated Use

#### Application and media

The measuring device described in this manual is intended for continuous, non-contact level measurement in liquids. Because of its operating frequency of approx. 26 GHz, a maximum radiated pulsed power of 5.7 mW and an average power output of 0.015 mW, use outside of closed, metallic vessels is also permitted. If operated outside of closed vessels, the device must be mounted in accordance with the instructions in the **Installation** section. Operation of the devices does not pose a risk to health or the environment.

If the limit values specified in the **Technical data** and the conditions listed in the instructions and additional documentation are observed, the measuring device may be used for the following measurements only:

- Measured process variables: distance
- Calculated process variables: volume or mass in vessels of any shape; flow through measuring weirs or channels (calculated from the level by the linearization functionality)

To ensure that the measuring device remains in proper condition for the operation time:

- Use the measuring device only for media to which the process-wetted materials have an adequate level of resistance.
- Observe the limit values (see **Technical data**).

#### Incorrect use

The manufacturer is not liable for damage caused by improper or non-designated use.

Verification for borderline cases:

- With regard to special media and media used for cleaning, please contact the manufacturer. Pepperl+Fuchs will be happy to assist in clarifying the corrosion-resistant properties of wetted materials but does not accept any warranty or liability.

### Residual risks

Due to heat transfer from the process as well as power dissipation within the electronics, the temperature of the electronics housing and the assemblies contained therein may rise to 80 °C (176 °F) during operation. When in operation, the sensor can reach a temperature close to the medium temperature.

Danger of burns from contact with surfaces!

- In the event of elevated fluid temperatures, ensure protection against contact to prevent burns.

### 5.3 Workplace Safety

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.

### 5.4 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 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 modifications are nevertheless required, consult with the manufacturer.

### 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 only original spare parts and accessories from the manufacturer.

### Hazardous area

To eliminate the risk of danger to persons or the facility when the device is used in the approval-related 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 approval-related area.
- Observe the specifications in the separate supplementary documentation that is an integral part of this manual.

## 5.5 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.

### 5.5.1 CE mark

The measuring system meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

Pepperl+Fuchs confirms successful testing of the device by affixing to it the CE mark.

## 6 Product Description

### 6.1 Product Design

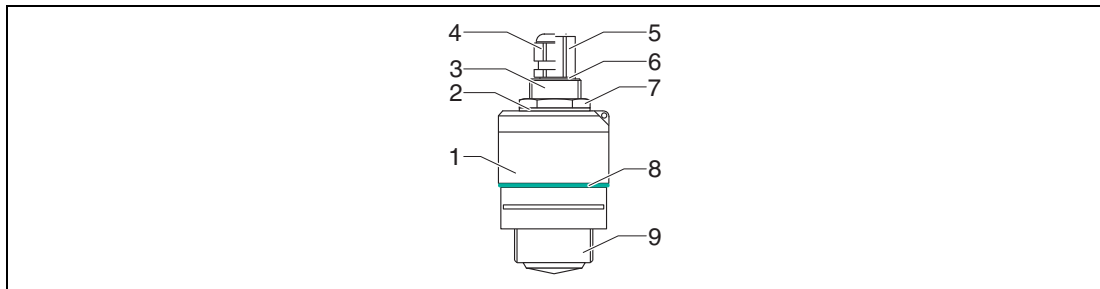


Figure 6.1 Device design

- 1 Sensor housing
- 2 Seal
- 3 Process connection rear side
- 4 Cable gland
- 5 Pipe adapter
- 6 O-ring
- 7 Counter nut
- 8 Design ring
- 9 Process connection front side

## 7 Incoming Acceptance and Product Identification

### 7.1 Goods Acceptance

Check the following during goods acceptance:

- Are the order codes on the delivery note and the product sticker identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If required (see nameplate): Are the instruction manuals (SI) provided?



---

#### Note

If one of these conditions is not met, please contact the manufacturer's sales office.

---

### 7.2 Product Identification

The following options are available for the identification of the measuring device:

- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note

### 7.3 Manufacturer Address

Pepperl+Fuchs Group Lilienthalstraße 200, 68307 Mannheim, Germany
Internet: <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a>

Address of the manufacturing plant: See nameplate.

## 7.4 Nameplate

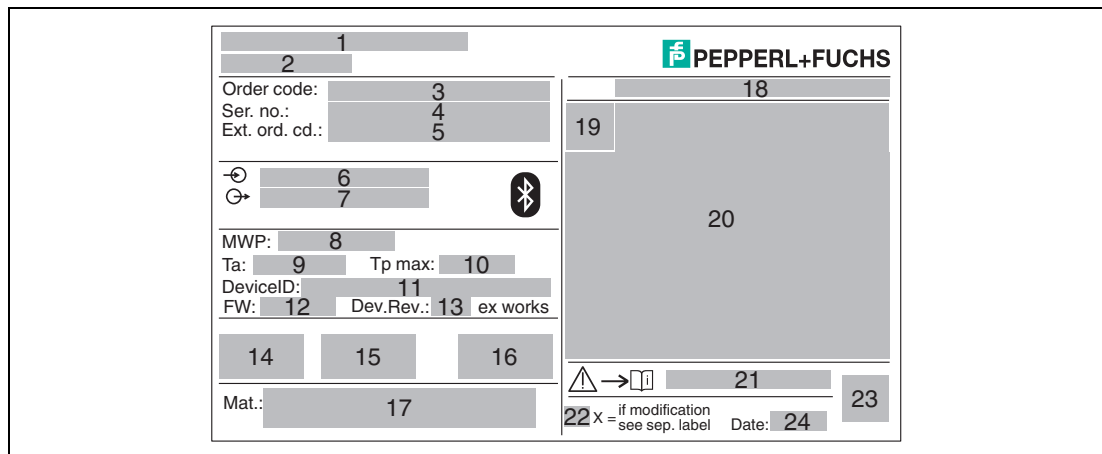


Figure 7.1 Device nameplate

- 1 Manufacturer address
- 2 Device name
- 3 Order code
- 4 Serial number (ser. no.)
- 5 Extended order code (Ext. ord. cd.)
- 6 Supply voltage
- 7 Signal outputs
- 8 Process pressure
- 9 Allowable ambient temperature ( $T_{amb}$ )
- 10 Maximum process temperature
- 11 Device ID
- 12 Firmware version (FW)
- 13 Device revision (Dev.Rev.)
- 14 CE mark
- 15 Additional information about the device version (certificates, approvals)
- 16 C-tick
- 17 Materials in contact with process
- 18 Degree of protection: e. g. IP, NEMA
- 19 Certificate symbol
- 20 Certificate and approval relevant data
- 21 Document number of the instruction manuals: e. g. SI, ZD, ZE
- 22 Modification mark
- 23 2-D matrix code (QR code)
- 24 Manufacturing date: year-month

### Note

Up to 33 characters of the extended order code are indicated on the nameplate. If the extended order code contains additional characters, these cannot be displayed.

However, the complete extended order code can also be displayed via the device operating menu: **Extended order code 1 to 3** parameter.





## 8 Installation

### 8.1 Installation Conditions

#### 8.1.1 Installation Types

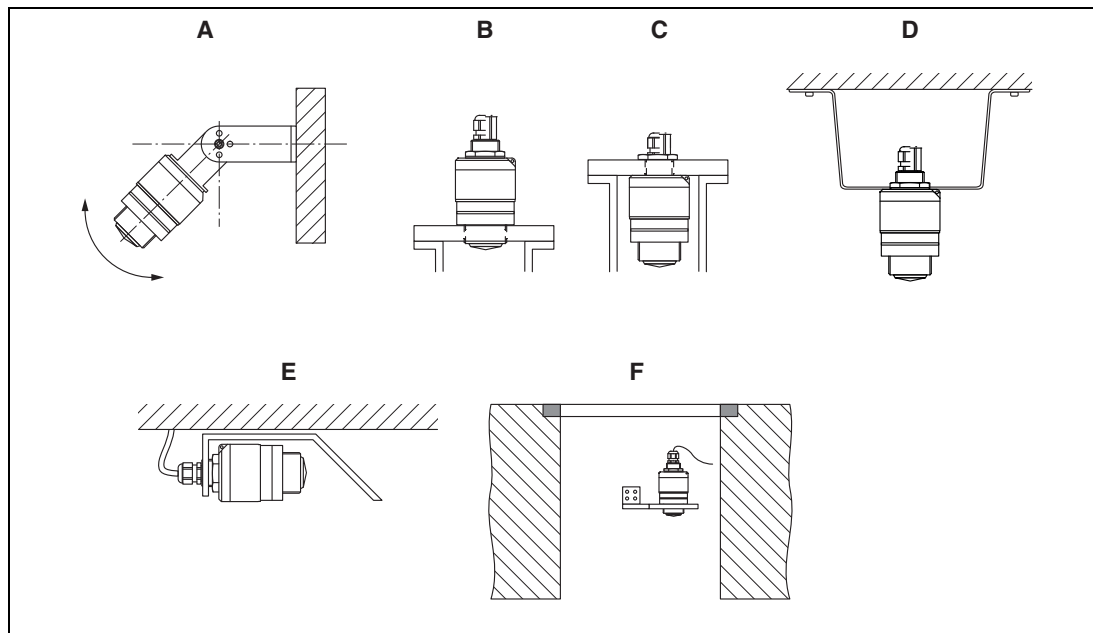


Figure 8.1 Wall, ceiling or nozzle installation

- A Wall or ceiling mount, adjustable
- B Mounted at front thread
- C Mounted at rear thread
- D Ceiling installation with counter nut (included in delivery)
- E Horizontal installation in confined spaces (sewer shaft)
- F Shaft wall mounting



#### Caution!

The sensor cables are not designed as supporting cables. Do not use them for suspension purposes.

Always operate the device in a vertical position in free-space applications.

## 8.1.2 Nozzle Installation

The antenna should be located out of the nozzle for optimum measurement.  
The interior of the nozzle must be smooth and may not contain any edges or welded joints.  
The edge of the nozzle should be rounded if possible.

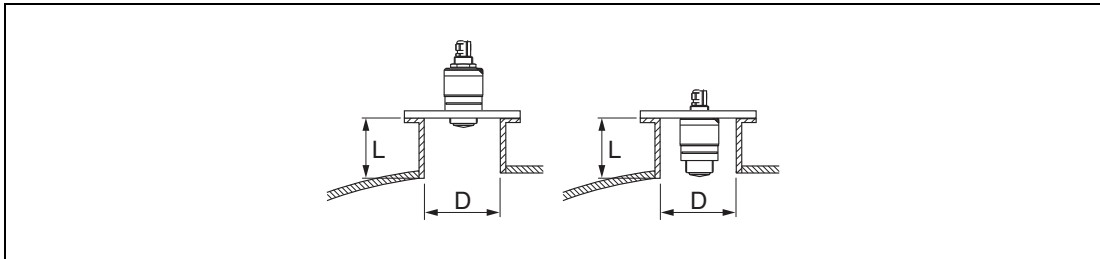


Figure 8.2 Nozzle installation

**D** Nozzle diameter

**L** Nozzle length

The maximum length of the nozzle **L** depends on the nozzle diameter **D**. Please note the limits for the diameter and length of the nozzle.

### Installation outside nozzle

- D: min. 40 mm (1.5 inch)
- L: max.  $D \times 1.5$

### Installation inside nozzle

- D: min. 80 mm (3 inch)
- L: max. 140 mm (5.5 inch) +  $D \times 1.5$

### 8.1.3 Position for Installation on a Vessel

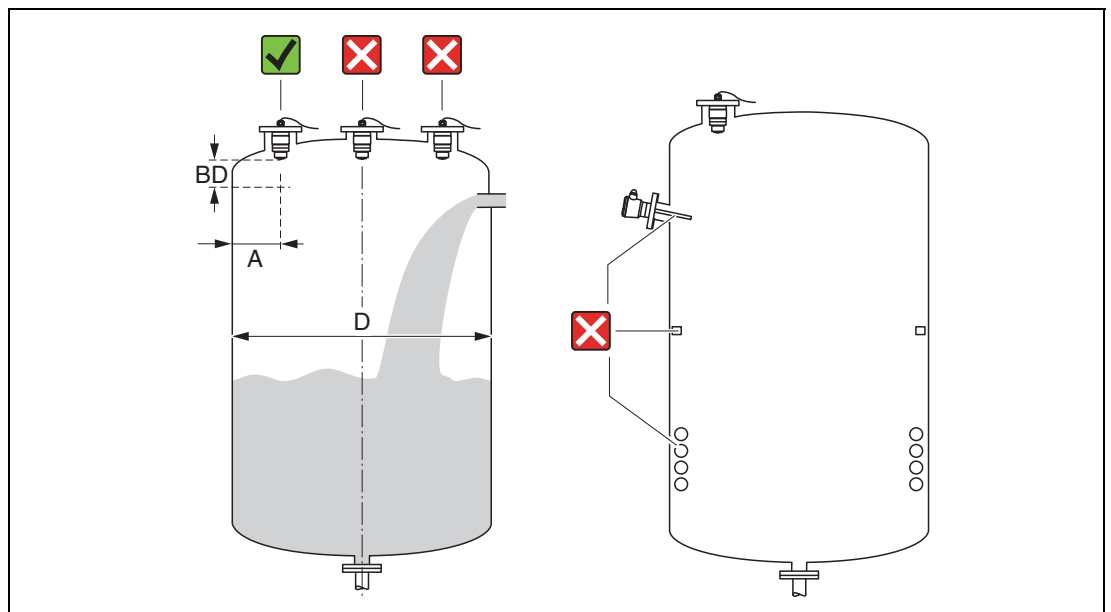


Figure 8.3 Installation position on a vessel

- If possible install the sensor so that its lower edge projects into the vessel.
- Recommended distance **A** wall – nozzle outer edge: ~ 1/6 of the vessel diameter **D**. Under no circumstances should the device be mounted closer than 15 cm (5.91 inch) to the vessel wall.
- Do not install the sensor in the middle of the vessel.
- Avoid measurements through the filling curtain.
- Avoid equipment such as limit switches, temperature sensors, baffles, heating coils etc.
- No signals are evaluated within the Blocking distance (BD). It can therefore be used to suppress interference signals (e. g. the effects of condensate) in the vicinity of the antenna.

An automatic Blocking distance of at least 0.1 m (0.33 foot) is configured as standard. However, this can be overwritten manually (0 m (0 foot) is also permitted).

Automatic calculation:

Blocking distance = Empty calibration – Full calibration – 0.2 m (0.656 foot).

Each time a new entry is made in the **Empty calibration** parameter or **Full calibration** parameter, the **Blocking distance** parameter is recalculated automatically using this formula.

If the result of the calculation is a value < 0.1 m (0.33 foot), the Blocking distance of 0.1 m (0.33 foot) will continue to be used.

### 8.1.4 Device Alignment for Installation on a Vessel

- Align the antenna vertically to the product surface.
- Align the eyelet with lug towards the vessel wall as well as possible.

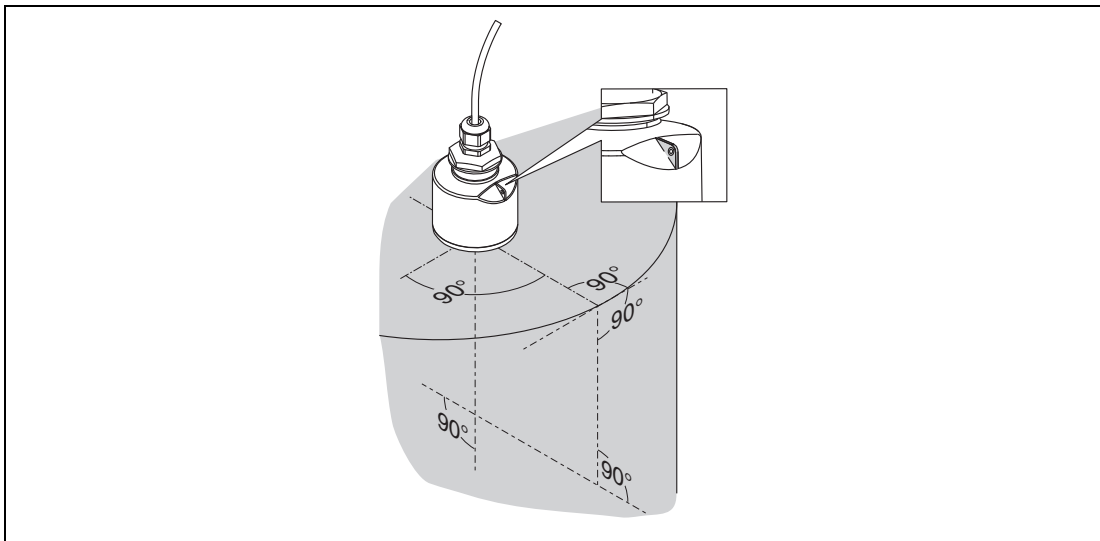


Figure 8.4 Device alignment for installation on a vessel

### 8.1.5 Beam Angle

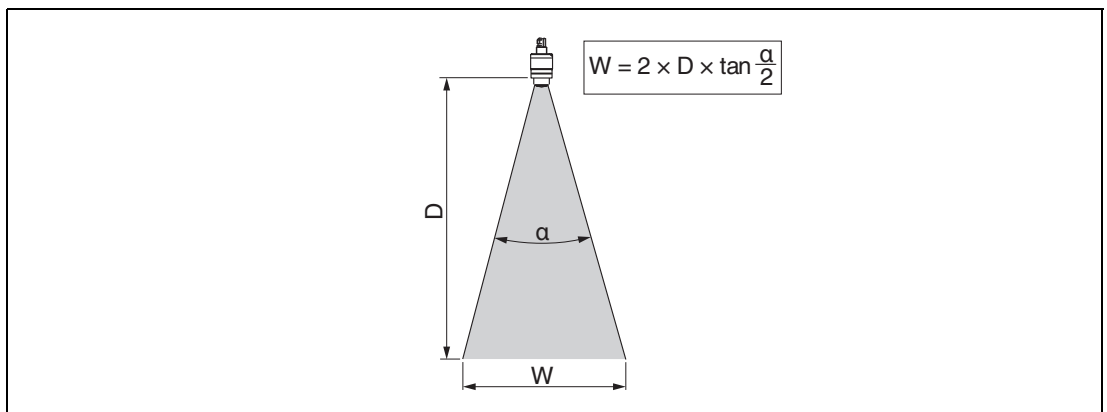


Figure 8.5 Relationship between beam angle  $\alpha$ , distance  $D$  and beamwidth diameter  $W$

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

Beam diameter  $W$  as a function of beam angle  $\alpha$  and distance  $D$ .

**40 mm (1.5 inch) antenna,  $\alpha$  30 °**

$$W = D \times 0.54$$

**40 mm (1.5 inch) antenna with flooding protection tube,  $\alpha$  12 °**

$$W = D \times 0.21$$

### 8.1.6 Measurement in Plastic Vessels

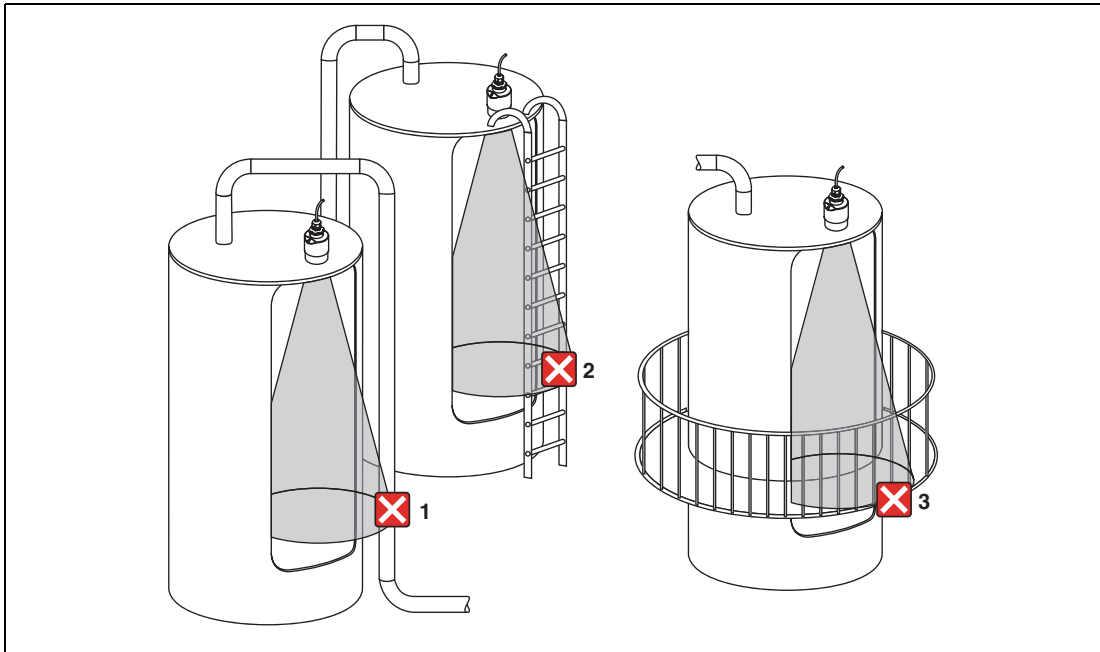


Figure 8.6 Measurement in a plastic vessel with a metallic, interfering installation outside of the vessel

- 1 Pipe, tubing
- 2 Ladder
- 3 Grate, railing

If the outer wall of the vessel is made of a non-conductive material (e. g. GFR), microwaves can also be reflected by interfering installations outside of the vessel.

Please ensure there are no interfering installations made of a conductive material in the signal beam (see the beam angle section for information on calculating the beamwidth diameter).

Please contact the manufacturer for further information.

### 8.1.7 Weather Protection Cover

For outdoor use, a weather protection cover is recommended.

The weather protection cover is available as an accessory.

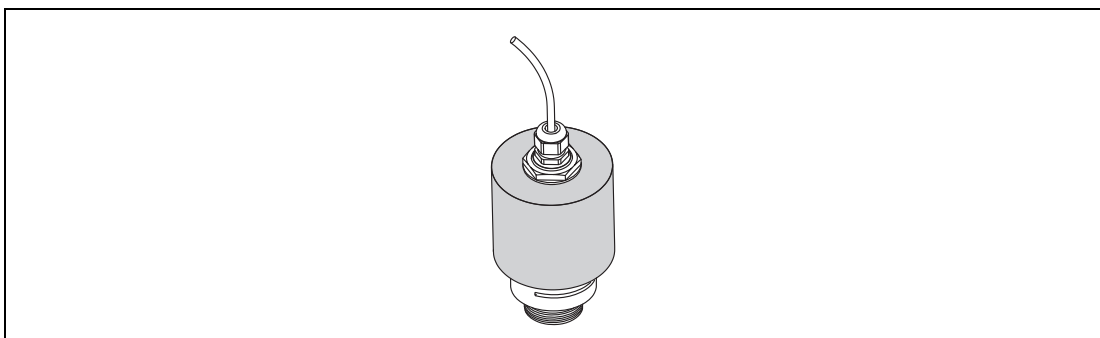


Figure 8.7 Weather protection cover with 40 mm (1.5 inch) antenna

**Note**

The sensor is not completely covered by the weather protection cover.



### 8.1.8 Using the Flooding Protection Tube

The flooding protection tube ensures the sensor measures the maximum level even if it is completely flooded.

In free-field installations and/or in applications where there is a risk of flooding, the flooding protection tube must be used.

The flooding protection tube can be ordered as an accessory or together with the device via the ordering option **Accessory enclosed**.

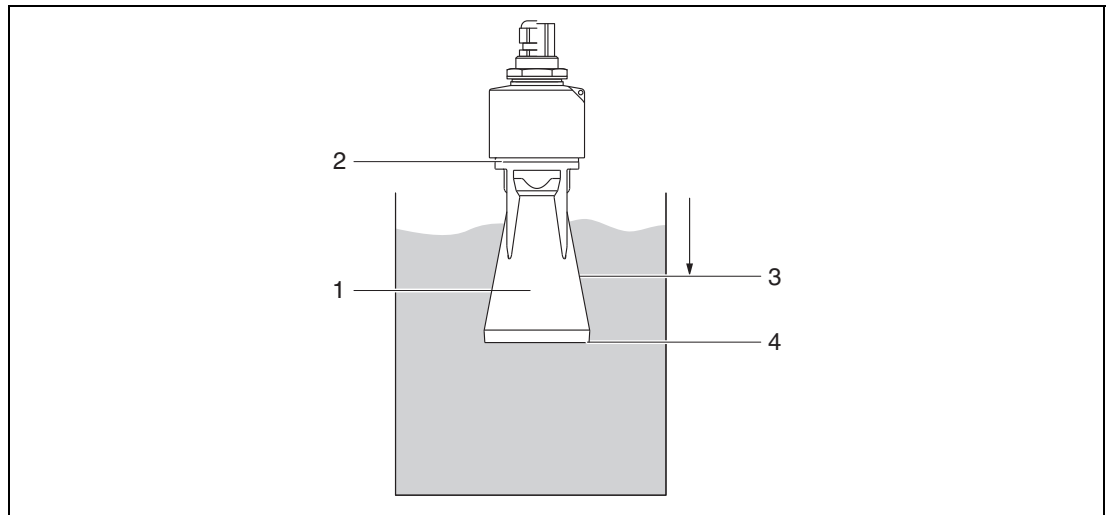


Figure 8.8 Function of flooding protection tube

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

The tube is screwed directly onto the sensor and seals off the system by means of an O-ring making it air-tight. In the event of flooding, the air pocket that formed in the tube ensures the measurement of the maximum level at the end of the tube. Due to the fact that the blocking distance is inside the tube, multiple echoes are not analyzed.

### 8.1.9 Installation with Mounting Bracket, Adjustable

The mounting bracket is available as an accessory.

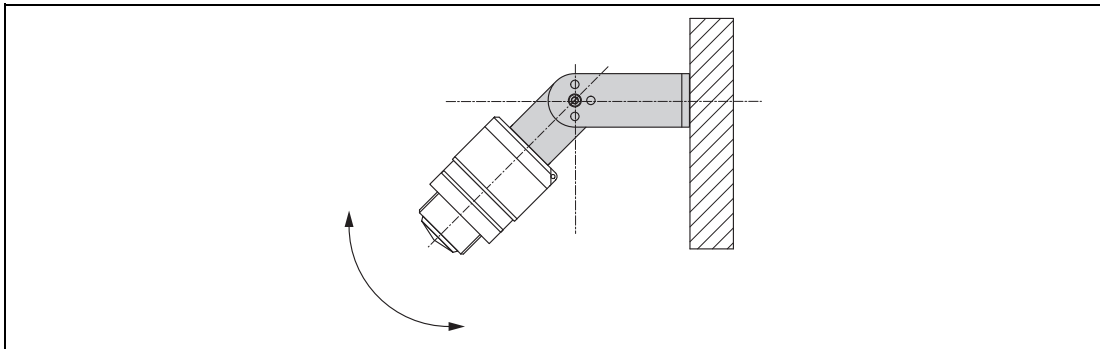


Figure 8.9 Installation with mounting bracket, adjustable

- Wall or ceiling installation is possible.
- Using the mounting bracket, position the antenna so that it is perpendicular to the product surface.



#### Caution!

There is no conductive connection between the mounting bracket and transmitter housing. Electrostatic charging possible.

Integrate the mounting bracket in the local potential equalization system.

### 8.1.10 Cantilever Installation, with Pivot

The cantilever, wall bracket and mounting frame are available as accessories.

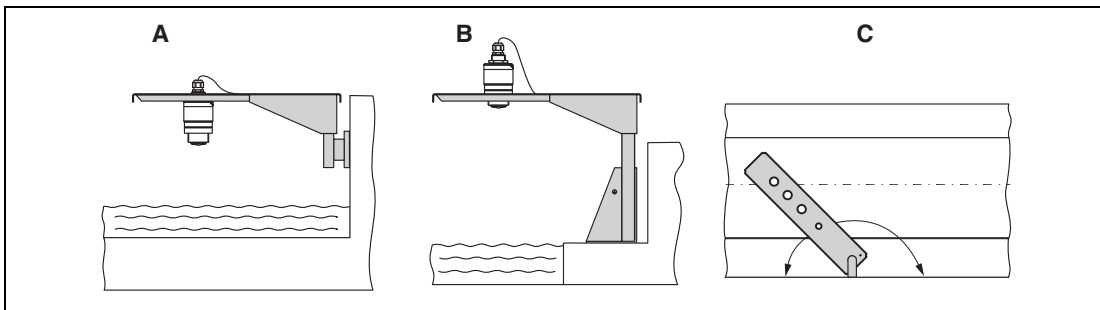


Figure 8.10 Cantilever installation, with pivot

- A** Cantilever with wall bracket
- B** Cantilever with mounting frame
- C** Cantilever can be turned (e. g., in order to position the device over the center of the flume)



### 8.1.11 Installation of Horizontal Mounting Bracket for Sewer Shafts

The horizontal mounting bracket is available as an accessory.

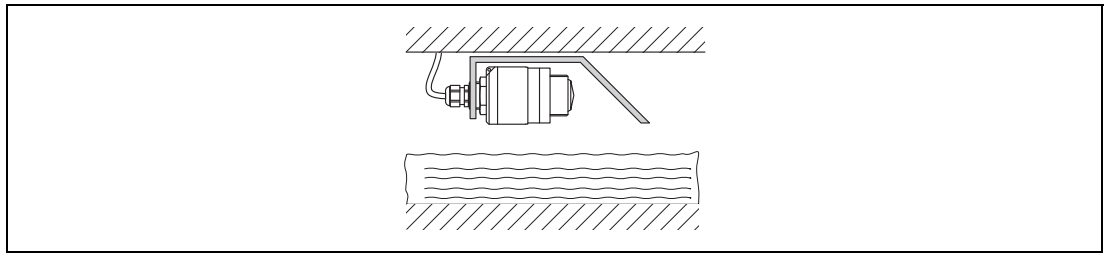


Figure 8.11 Installation of horizontal mounting bracket for sewer shafts

### 8.1.12 Mounting in a Shaft

The pivoted mounting bracket is available as an accessory.

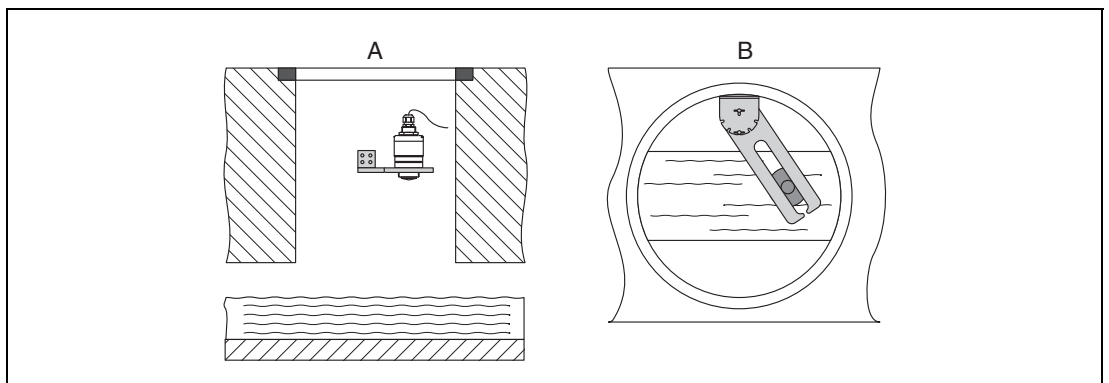


Figure 8.12 Mounting in a shaft, pivotable and adjustable

- A** Arm with wall bracket
- B** Pivotable and adjustable arm (e. g. to align the device with the center of a channel)

## 8.2 Post-installation Check

- Is the device or cable undamaged (visual inspection)?
- Is the device adequately protected from wet conditions and direct sunlight?
- Is the device properly secured?

## 9 Electrical Connection

### 9.1 Cable Assignment

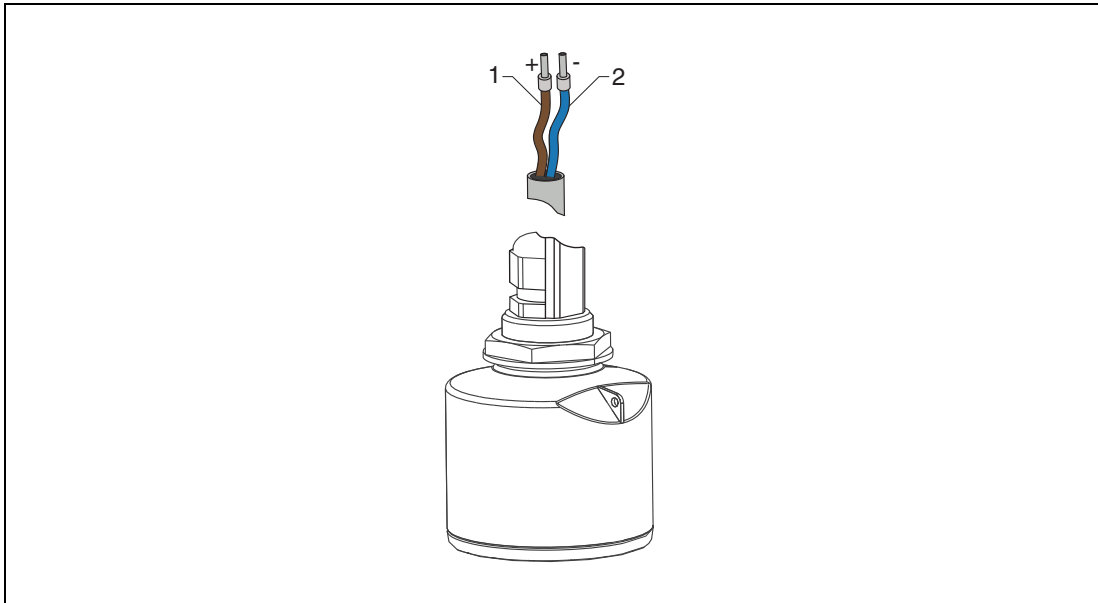


Figure 9.1 Cable assignment

- 1 Plus, brown wire
- 2 Minus, blue wire

### 9.2 Supply Voltage

10.5 to 30 V DC

An external power supply is necessary.

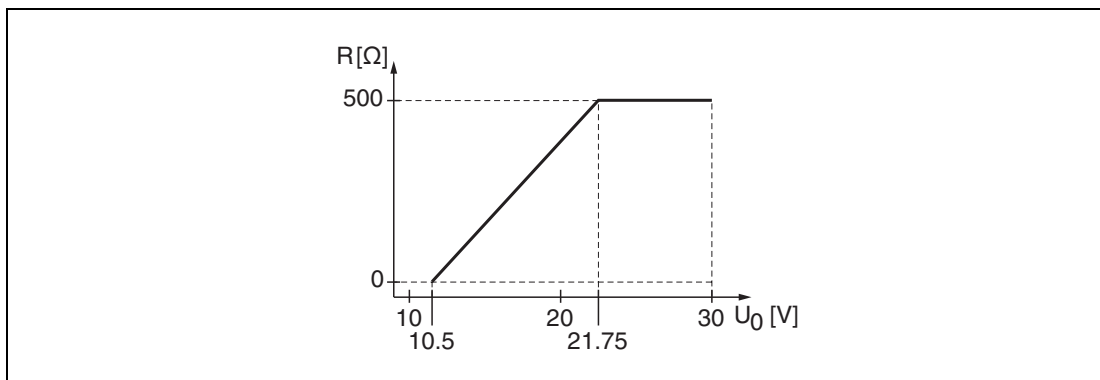


Figure 9.2 Maximum load  $R$ , depending on supply voltage  $U_0$  of power supply unit

#### Battery operation

The sensor's *Bluetooth*<sup>®</sup> wireless technology communication can be disabled to increase the operating life of the battery.

## Potential equalization

No special measures for potential equalization are required.



### Note

Various power supply units can be ordered as an accessory from Pepperl+Fuchs.

## 9.3

### Connecting the Device

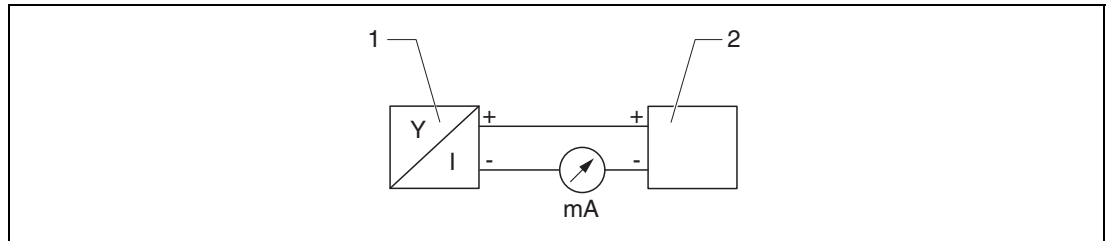


Figure 9.3 Block diagram of HART connection

- 1 Device
- 2 Power supply

## 9.4

### Post-connection Check

- Is the device or cable undamaged (visual inspection)?
- Do the mounted cables have adequate strain relief?
- Are the cable glands mounted and firmly tightened?
- Does the supply voltage match the specifications on the nameplate?
- No reverse polarity, is terminal assignment correct?

## 10 Operability

### 10.1 Operating Concept

- 4 to 20 mA
- P+F Level (app) via *Bluetooth*<sup>®</sup> wireless technology

### 10.2 Operation via *Bluetooth*<sup>®</sup> Wireless Technology

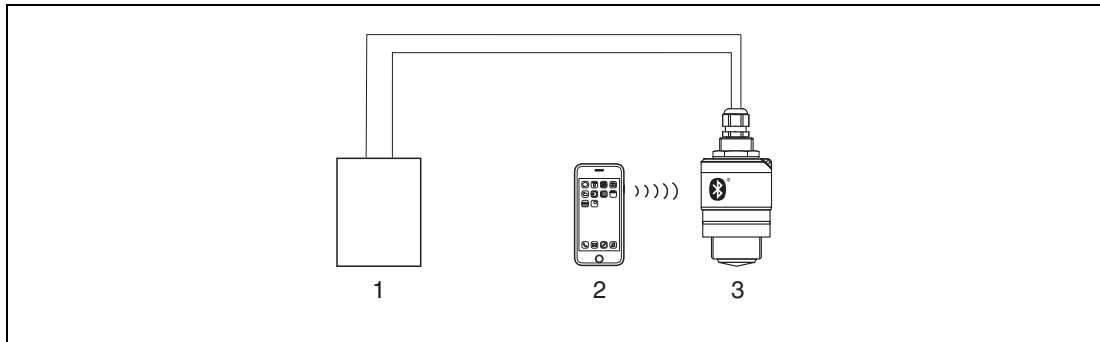


Figure 10.1 Possibilities for remote operation via *Bluetooth*<sup>®</sup> wireless technology

- 1 Transmitter power supply
- 2 Smartphone/Tablet with P+F Level (app)
- 3 Signal converter with *Bluetooth*<sup>®</sup> wireless technology

## 11 Commissioning and Operation

### 11.1 Installation and Function Check

Perform the post-installation check and the post-connection check prior to commissioning.

#### 11.1.1 Post-installation Check

- Is the device or cable undamaged (visual inspection)?
- Is the device adequately protected from wet conditions and direct sunlight?
- Is the device properly secured?

#### 11.1.2 Post-connection Check

- Is the device or cable undamaged (visual inspection)?
- Do the mounted cables have adequate strain relief?
- Are the cable glands mounted and firmly tightened?
- Does the supply voltage match the specifications on the nameplate?
- No reverse polarity, is terminal assignment correct?

## 11.2 Commissioning via P+F Level (App)

### 11.2.1 Device Requirements

Commissioning via P+F Level is only possible if the device has Bluetooth capability (Bluetooth module installed at the factory prior to delivery or retrofitted).

### 11.2.2 P+F Level System Requirements

P+F Level is available as a download from the Google Play Store for Android devices and from the iTunes Store for iOS devices.

- Devices with iOS:  
iPhone 4S or higher from iOS 9; iPad 2 or higher from iOS 9; iPod touch 5th generation or higher from iOS 9
- Devices with Android:  
From Android 4.4 KitKat and *Bluetooth*® 4.0

### 11.2.3 Commissioning

#### Downloading and Installing P+F Level



1. Enter **P+F Level** in the search field of the app store.



Figure 11.1 App stores

2. Install P+F Level.
3. Start P+F Level.
4. Select device from livelist displayed.
5. Enter the login data:  
↳ User name: admin  
Password: serial number of the device
6. Tap the icons for more information.



---

**Note!**

After logging in for the first time, change the password!

---

### 11.2.4 Envelope Curve Display in P+F Level

Envelope curves can be displayed and recorded in P+F Level.

In addition to the envelope curve, the following values are displayed:

- D = Distance
- L = Level
- A = Absolute amplitude
- With screenshots, the displayed section (zoom function) is saved.
- With video sequences, the whole area without zoom function is saved all the time.

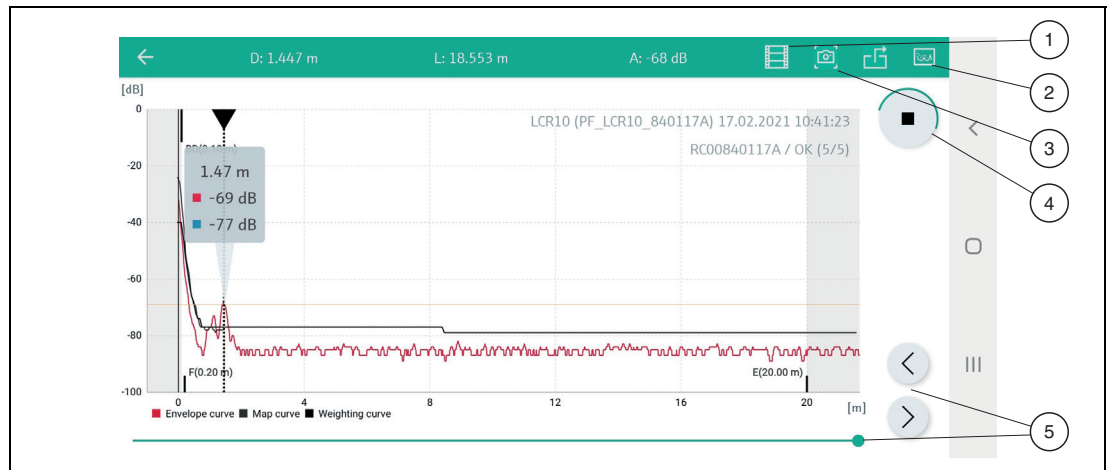


Figure 11.2 Envelope curve display (sample) in P+F Level for Android

- 1 Record video
- 2 Display mapping menu
- 3 Create screenshot
- 4 Start/stop video recording
- 5 Move time on time axis

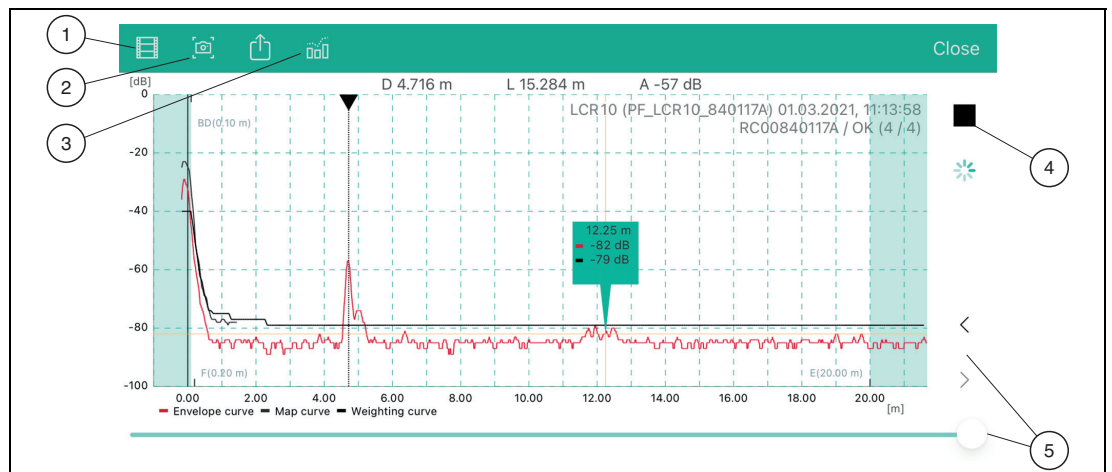


Figure 11.3 Envelope curve display (sample) in P+F Level for iOS

- 1 Record video
- 2 Create screenshot
- 3 Display mapping menu
- 4 Start/stop video recording
- 5 Move time on time axis

## 12 Diagnostics and Troubleshooting

### 12.1 General Errors

Error	Possible cause	Solution
Device does not respond.	Supply voltage does not match the specification on the nameplate.	Apply correct voltage.
	The polarity of the supply voltage is wrong.	Correct the polarity.
	The cables do not contact the terminals properly.	Ensure electrical contact between the cable and the terminal.
Device measures incorrectly.	Configuration error	<ul style="list-style-type: none"> <li>• Check and correct the parameter configuration.</li> <li>• Carry out mapping.</li> </ul>
Linearized output value not plausible.	Linearization error	PACTware: Check linearization table. P+F Level: Check linearization table. Check the vessel selection in the linearization module.

Table 12.1



## 12.2 Error – P+F Level Operation

Error	Possible case	Solution
Device is not visible in the live list.	No Bluetooth connection	Enable Bluetooth function on smartphone or tablet. Bluetooth function of sensor disabled, perform recovery sequence.
	The device is already connected with another smartphone/tablet.	Only <b>one</b> point-to-point connection is established between a sensor and a smartphone or tablet.
Device is visible in the live list but cannot be accessed via P+F Level.	Android end device	Is the location function permitted for the app, was it approved the first time?
		GPS or positioning function must be activated for certain Android versions in conjunction with Bluetooth.
		Activate GPS – close the app fully and restart – enable the positioning function for the app.
Device is visible in the live list but cannot be accessed via P+F Level.	Apple end device	Log in as standard. Enter user name <b>admin</b> . Enter initial password (device serial number) paying attention to lower/upper case.
Login via P+F Level not possible.	Device is being put into operation for the first time.	Enter initial password (device serial number) and change. Pay attention to lower/upper case when entering the serial number.
Device cannot be operated via P+F Level.	Incorrect password entered.	Enter correct password.
Device cannot be operated via P+F Level.	Password forgotten.	Contact the Pepperl+Fuchs service department.
Device cannot be operated via P+F Level.	The sensor temperature is too high.	If the ambient temperature results in an elevated sensor temperature of > 60 °C (140 °F), Bluetooth communication may be disabled. Shield the device, isolate it and cool it down if necessary.

Table 12.2

## 12.3 Diagnostic Event in the Operating Tool

If a diagnostic event is present in the device, the status signal appears in the top left status area of the operating tool along with the corresponding symbol for the event level in accordance with NAMUR NE 107:

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)



### Calling up Remedial Measures

Navigate to the **Diagnostics** menu

↳ In the **Actual diagnostics** parameter the diagnostic event is shown with event text.

## 12.4 List of Diagnostic Events

Diagnostic number	Short text	Remedy instructions	Status signal (from the factory)	Diagnostic behavior (from the factory)
Diagnostic of electronic				
270	Main electronic failure	Exchange device.	F	Alarm
271	Main electronic failure	1. Restart device. 2. If failure remains, exchange device.	F	Alarm
272	Main electronic failure	1. Restart device. 2. Check environment for strong EMC fields. 3. If failure remains, exchange device.	F	Alarm
283	Memory content	1. Transfer data or reset device. 2. Contact service.	F	Alarm
Diagnostic of configuration				
410	Data transfer	1. Check connection. 2. Retry data transfer.	F	Alarm
411	Up-/download active	Up-/download active, please wait	C	Warning
435	Linearization	Check linearization table.	F	Alarm
438	Dataset	1. Check data set file. 2. Check device configuration. 3. Up- and download new configuration.	M	Warning
441	Current output 1	1. Check process. 2. Check current output settings.	S	Warning
491	Current output 1 simulation	Deactivate simulation.	C	Warning
585	Distance simulation	Deactivate simulation.	C	Warning
586	Record mapg	Recording of mapping, please wait.	C	Warning
Diagnostic of process				
801	Energy too low	Increase supply voltage.	S	Warning
825	Operating temperature	1. Check ambient temperature. 2. Check process temperature.	S	Warning
941	Echo lost	Check parameter <b>Evaluation sensitivity</b> .	S	Warning
941	Echo lost		F	Alarm

Table 12.3

## 13 Maintenance

No special maintenance work is required.

### 13.1 Cleaning the Antenna

The antenna may become contaminated depending on the application. Emission and reception of microwaves can thus be potentially hindered. The level of contamination leading to an error depends on the medium and on the reflectivity, mainly determined by the dielectric constant  $\epsilon_r$ .

If the medium tends to cause contamination and buildup, cleaning on a regular basis is recommended.

- Care must be taken to ensure the device is not damaged in the process of mechanical or hose-down cleaning.
- Material compatibility must be taken into account if cleaning agents are used!
- Do not exceed maximum permitted temperatures.

### 13.2 Process Seals

The process seals of the sensor (at the process connection) should be replaced periodically.

The interval between changes depends on the frequency of the cleaning cycles, the cleaning temperature and the medium temperature.

## 14 Repair

### 14.1 General notes

#### 14.1.1 Repair concept

The Pepperl+Fuchs repair concept is devised in such a way that repairs can only be carried out through device replacement.

#### 14.1.2 Replacing a device

Once the device has been replaced, parameters must be reconfigured and interference echo suppression or linearization may need to be carried out once again.

#### 14.1.3 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Pepperl+Fuchs, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Pepperl+Fuchs website at ([www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)).

#### 14.1.4 Disposal



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to Pepperl+Fuchs for disposal under the applicable conditions.

## 15 Accessories

### 15.1 Enclosed Accessories

These accessories can be ordered together with the device via the ordering option **Accessory enclosed**.

#### 15.1.1 Device-Specific Accessories

##### Flooding protection tube 40 mm (1.5 inch)

Suitable for use with devices with a 40 mm (1.5 inch) antenna and G1-1/2 process connection on front.

The flooding protection tube can be ordered together with the device via the ordering option **Accessory enclosed**.

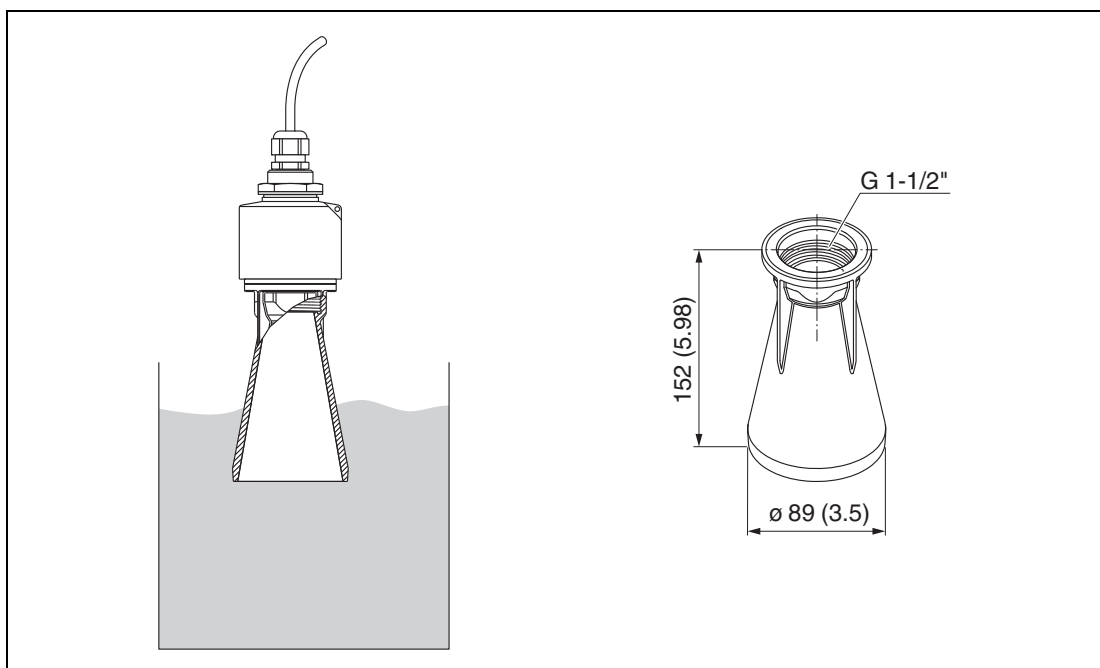


Figure 15.1 Dimensions of 40 mm (1.5 inch) flooding protection tube, engineering unit: mm (inch)

Material: PBT-PC, metalized

Option: R7

## 15.2 Further Accessories

These accessories can be ordered separately.

### 15.2.1 Device-Specific Accessories

#### Weather protection cover

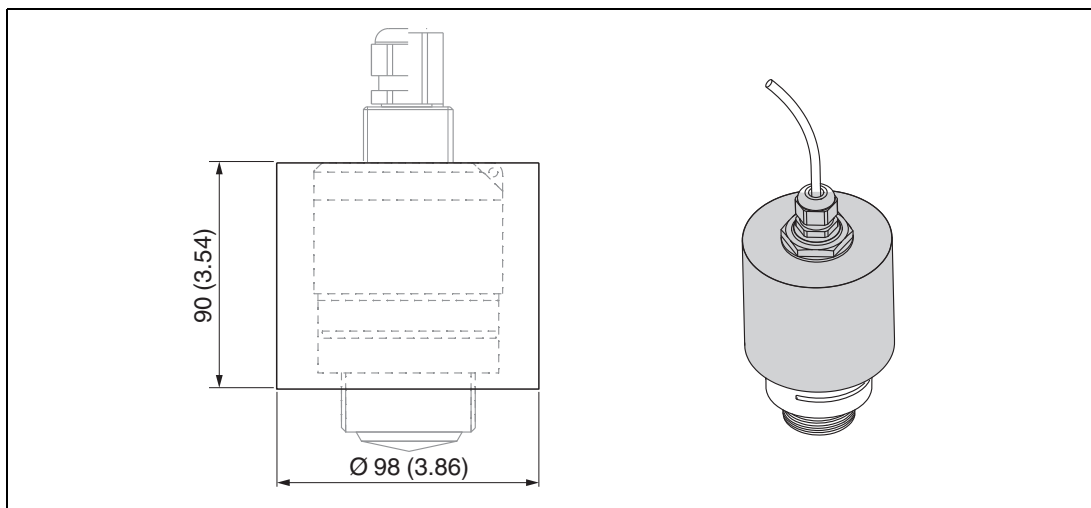


Figure 15.2 Dimensions of weather protection cover, engineering unit: mm (inch)

Material: PVDF

Order number: 52025686



#### Note

The sensor is not completely covered.

#### Securing nut G1-1/2

Suitable for devices with G1-1/2 and MNPT1-1/2 process connection.

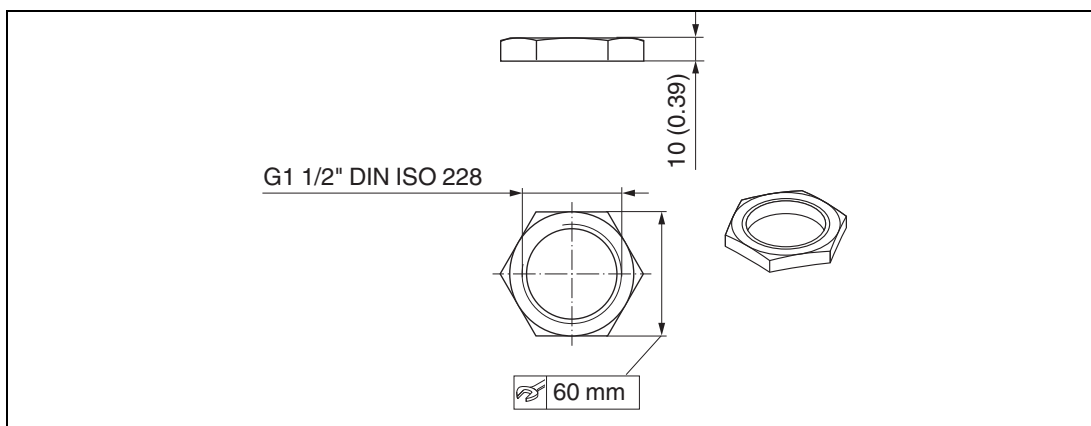


Figure 15.3 Dimensions of securing nut, engineering unit: mm (inch)

Material: PC

Order number: 52014146

## Mounting bracket, adjustable

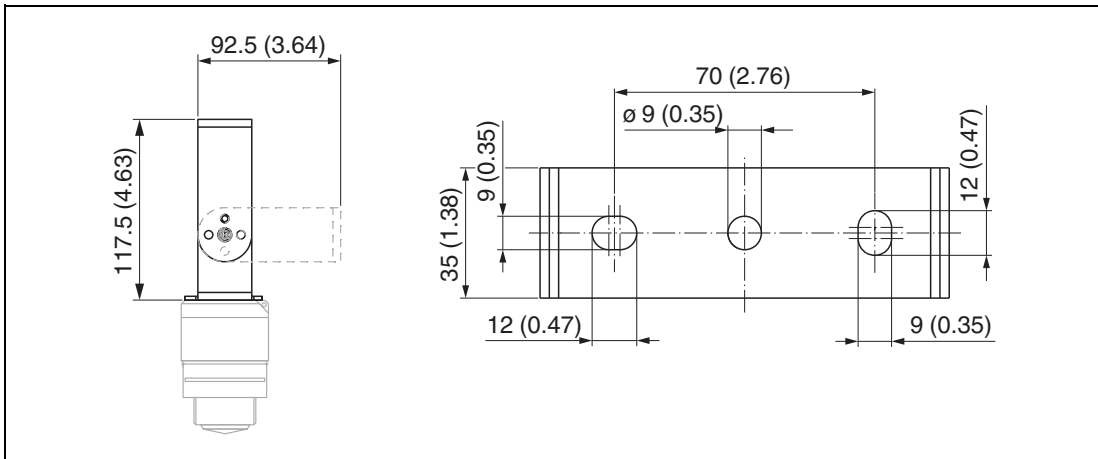


Figure 15.4 Dimensions of mounting bracket, engineering unit: mm (inch)

Consists of:

- 1 × mounting bracket, 316L (1.4404)
- 1 × mounting bracket, 316L (1.4404)
- 3 × screws, A4
- 3 × securing disks, A4

Order number: 71325079

## Angle bracket for wall mounting

Angle bracket for G1-1/2 process connection: 71452324, also suitable for MNPT1-1/2

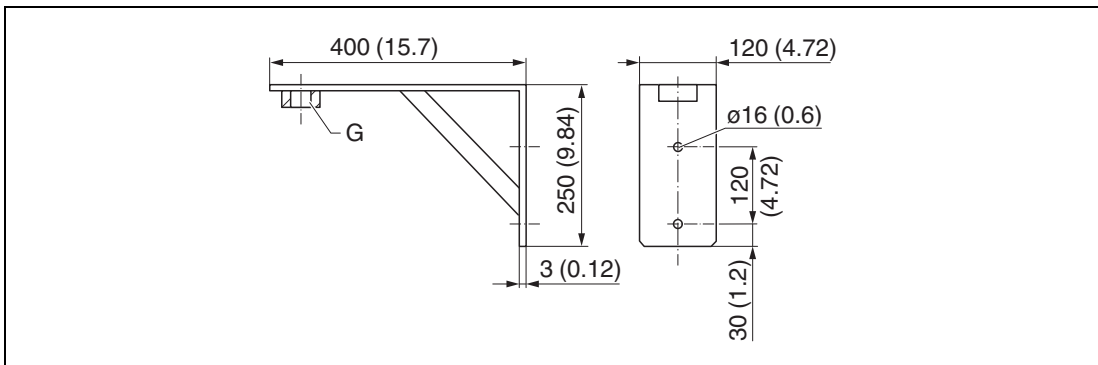


Figure 15.5 Dimensions of angle bracket, engineering unit: mm (inch)

**G** Sensor connection in accordance with ordering option **Process connection front side**

Weight: 3.4 kg (7.5 lb)

Material: 316L (1.4404)

Order number: 71452324



### Cantilever with pivot

#### Installation type sensor process connection rear side

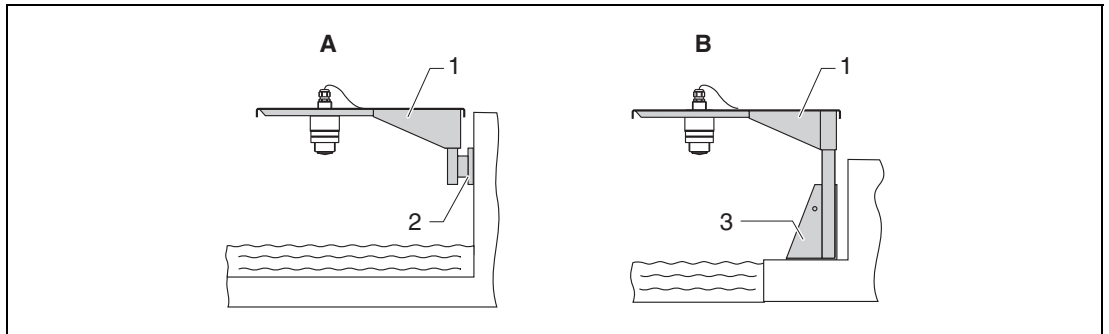


Figure 15.6 Installation type sensor process connection rear side

- A** Installation with cantilever and wall bracket
- B** Installation with cantilever and mounting frame
- 1** Cantilever
- 2** Wall bracket
- 3** Mounting frame

#### Cantilever (short) with pivot, sensor process connection on rear

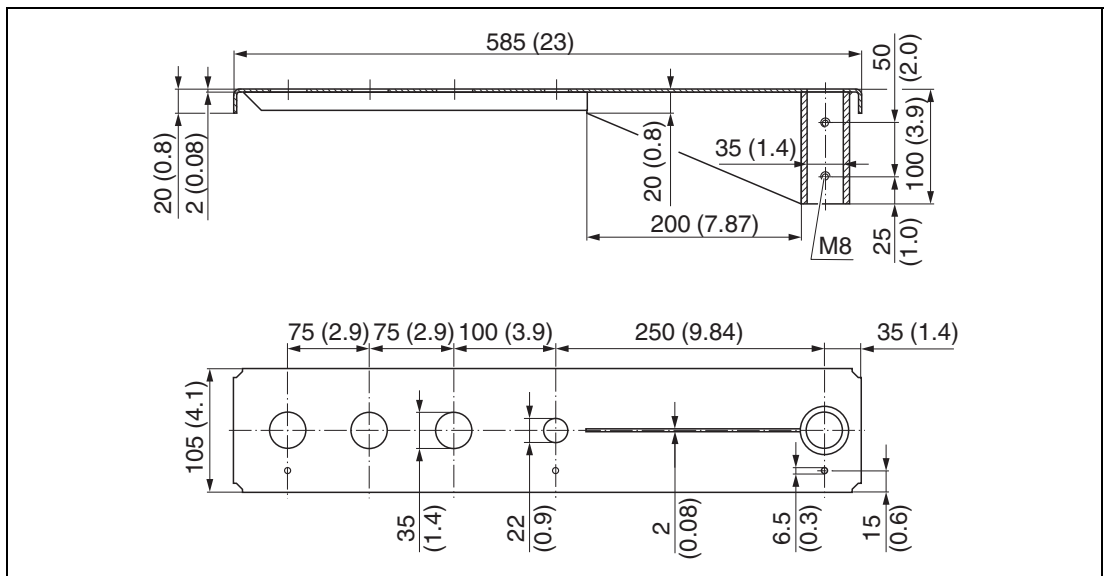


Figure 15.7 Dimensions of cantilever (short) with pivot for sensor process connection on rear, engineering unit: mm (inch)

Weight: 2.1 kg (4.63 lb)

Material: 316L (1.4404)

Order number: 71452315



#### Note

- 35 mm (1.38 inch) openings for all G1 or MNPT1 connections on rear
- 22 mm (0.87 inch) opening can be used for an additional sensor.
- Retaining screws are included in delivery.

**Cantilever (long) with pivot, sensor process connection on rear**

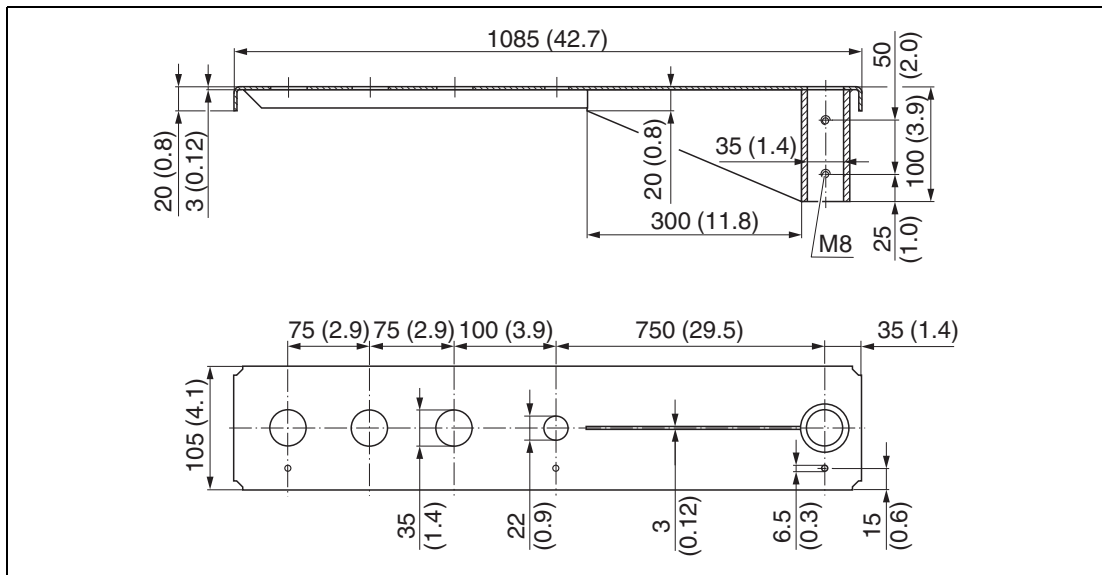


Figure 15.8 Dimensions of cantilever (long) with pivot for sensor process connection on rear, engineering unit: mm (inch)

Weight: 4.5 kg (9.92 lb)

Material: 316L (1.4404)

Order number: 71452316



**Note**

- 35 mm (1.38 inch) openings for all G1 or MNPT1 connections on rear
- 22 mm (0.87 inch) opening can be used for an additional sensor.
- Retaining screws are included in delivery.

**Installation type sensor process connection front side**

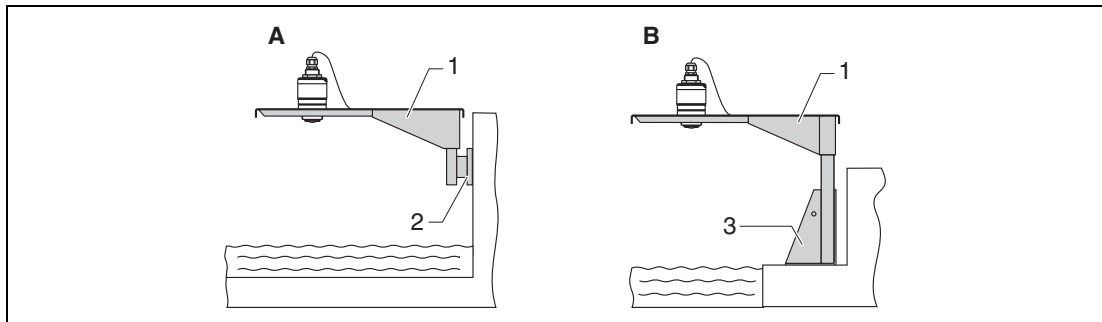


Figure 15.9 Installation type sensor process connection front side

- A** nstallation with cantilever and wall bracket  
**B** Installation with cantilever and mounting frame  
**1** Cantilever  
**2** Wall bracket  
**3** Mounting frame

**Cantilever (short) with pivot, G1-1/2 sensor process connection on front**

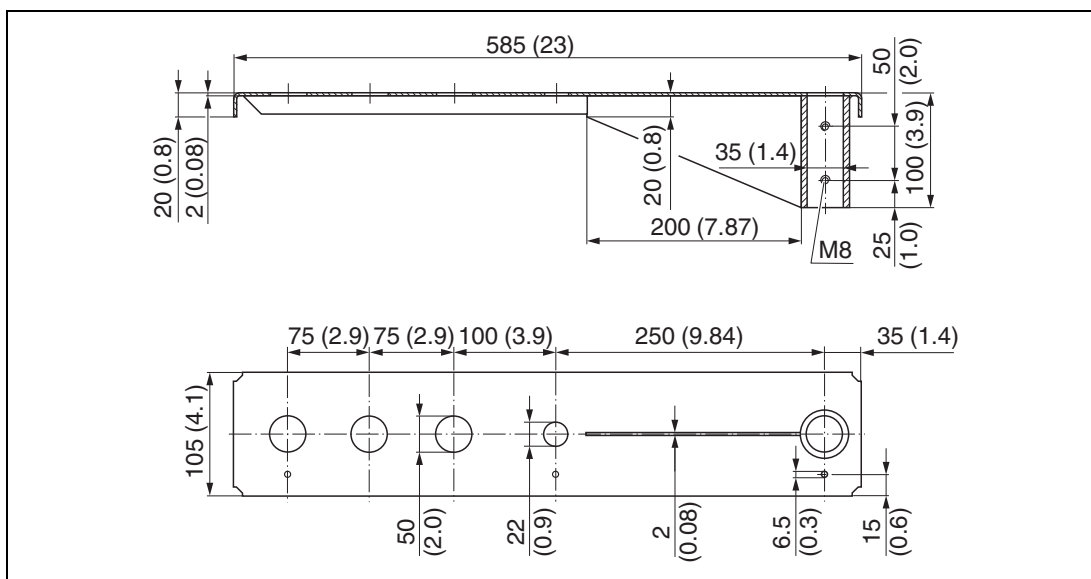


Figure 15.10 Dimensions of cantilever (short) with pivot for G1-1/2 sensor process connection on front, engineering unit: mm (inch)

Weight: 1.9 kg (4.19 lb)

Material: 316L (1.4404)

Order number: 71452318



**Note**

- 50 mm (2.17 inch) openings for all G1-1/2 (MNPT1-1/2) connections on front
- 22 mm (0.87 inch) opening can be used for an additional sensor.
- Retaining screws are included in delivery.

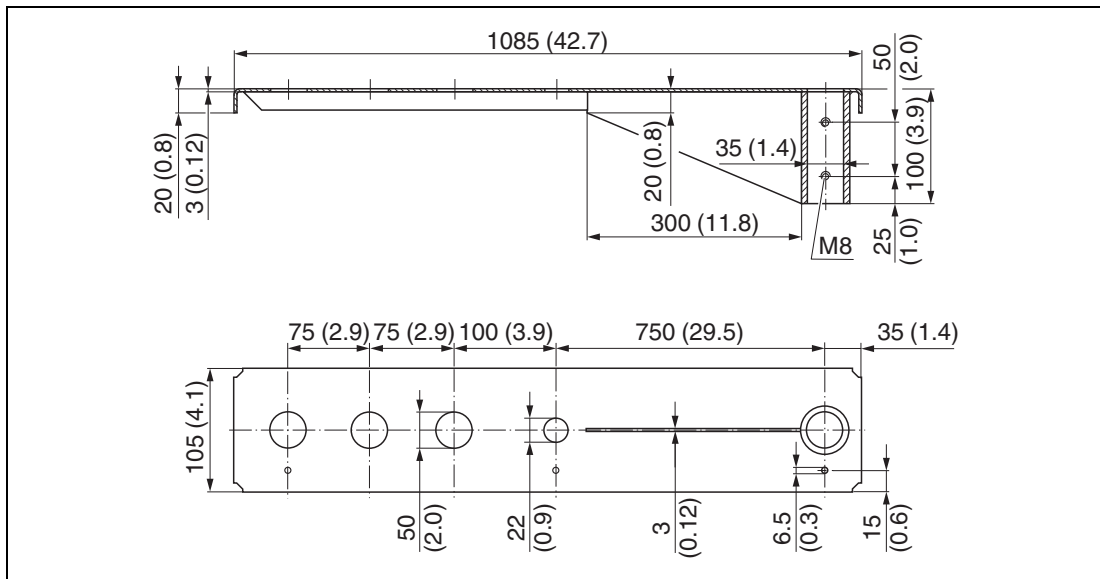
**Cantilever (long) with pivot, G1-1/2 sensor process connection on front**

Figure 15.11 Dimensions of cantilever (long) with pivot for G1-1/2 sensor process connection on front, engineering unit: mm (inch)

Weight: 4.4 kg (9.7 lb)

Material: 316L (1.4404)

Order number: 571452319

**Note**

- 50 mm (2.17 inch) openings for all G1-1/2 (MNPT1-1/2) connections on front
- 22 mm (0.87 inch) opening can be used for an additional sensor.
- Retaining screws are included in delivery.

**Mounting frame (short) for cantilever with pivot**

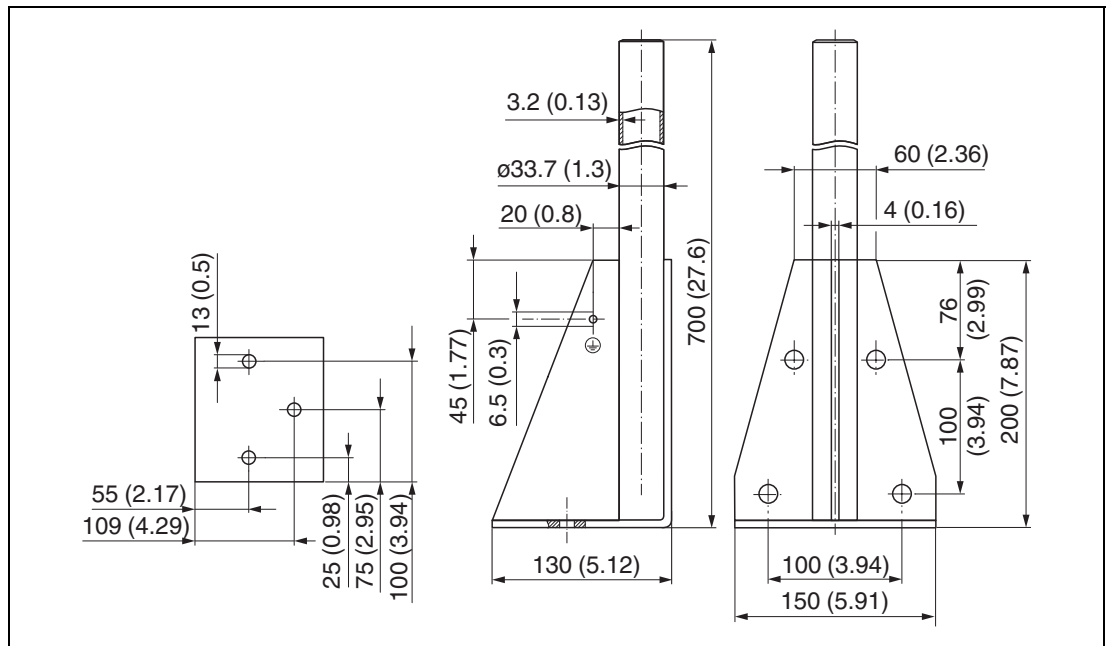


Figure 15.12 Dimensions of mounting frame (short), engineering unit: mm (inch)

Weight: 3.2 kg (7.06 lb)

Material: 316L (1.4404)

Order number: 71452327

**Mounting frame (long) for cantilever with pivot**

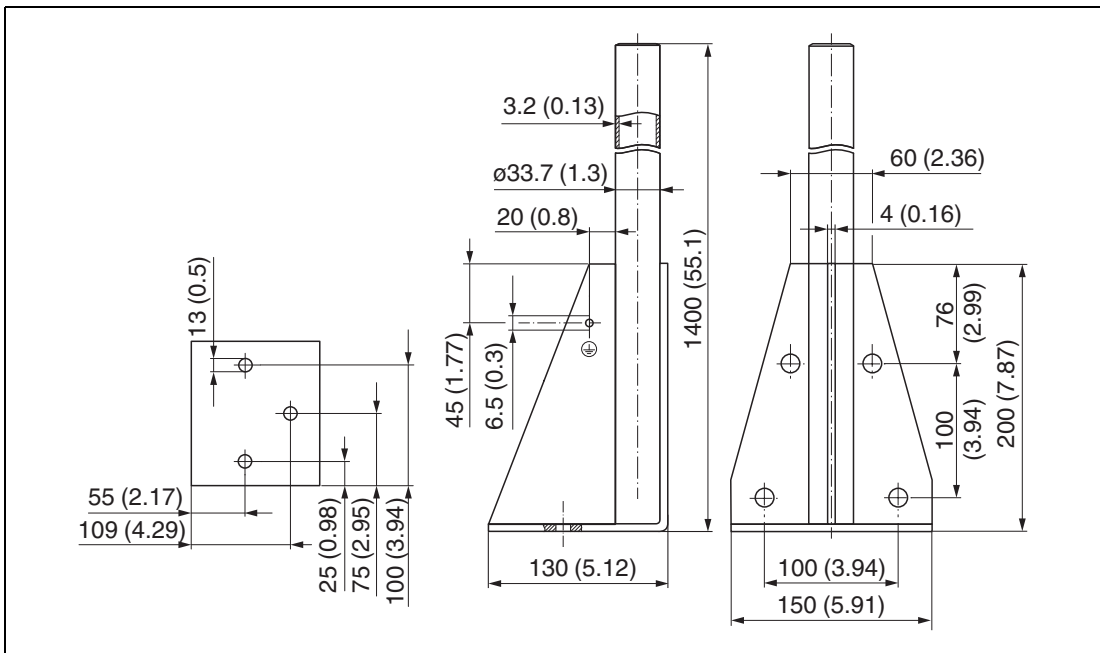


Figure 15.13 Dimensions of mounting frame (long), engineering unit: mm (inch)

Weight: 4.9 kg (10.08 lb)

Material: 316L (1.4404)

Order number: 71452326

**Wall bracket for cantilever with pivot**

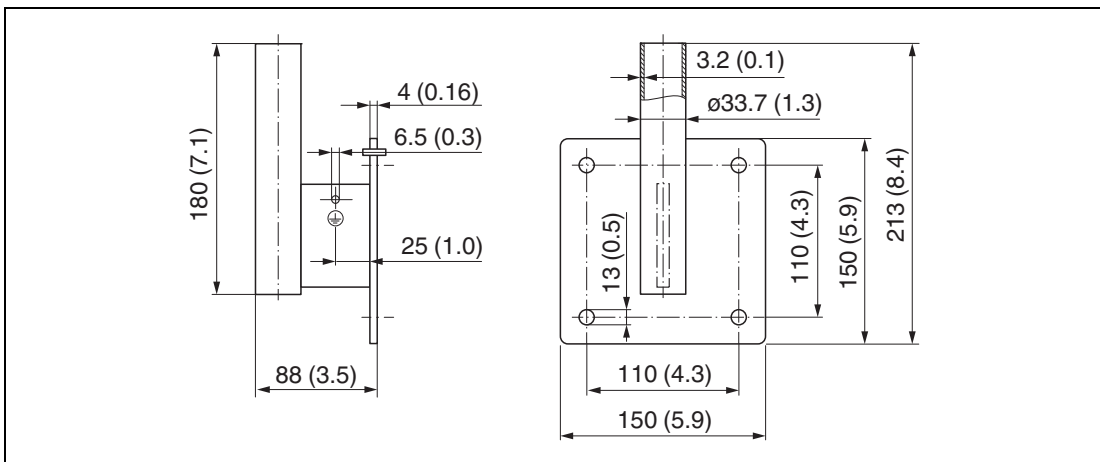


Figure 15.14 Dimensions of wall bracket, engineering unit: mm (inch)

Weight: 1.4 kg (3.09 lb)

Material: 316L (1.4404)

Order number: 71452323

### Ceiling mounting bracket

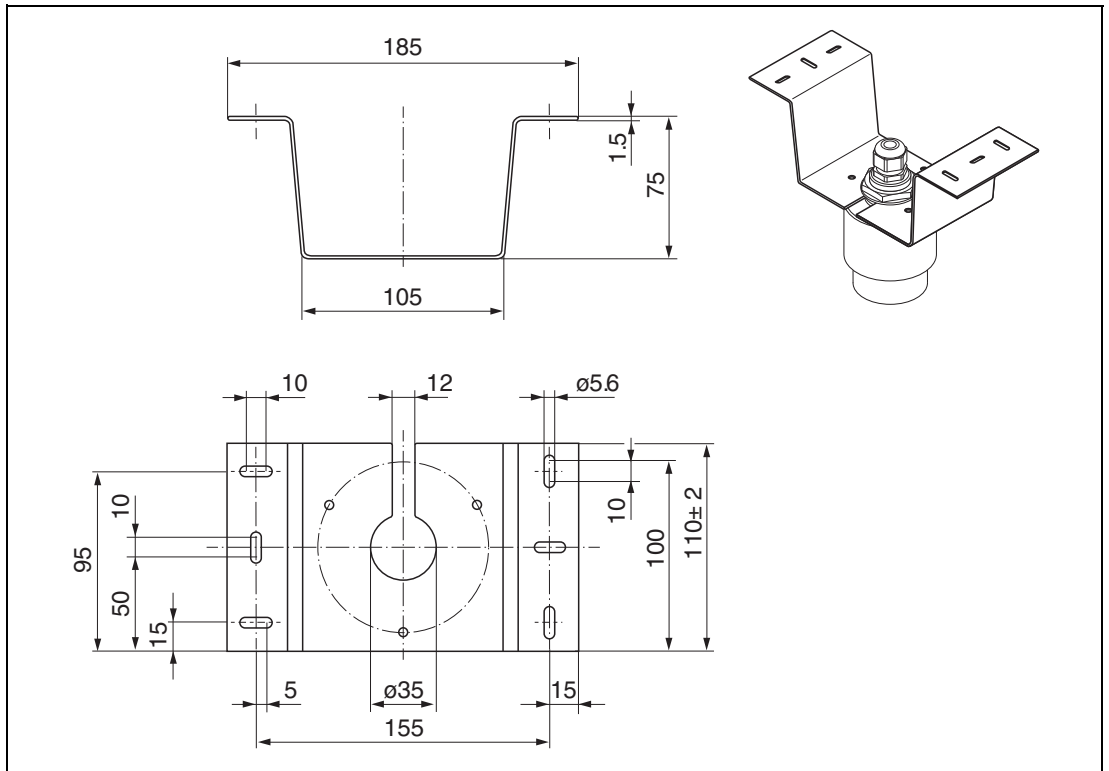


Figure 15.15 Dimensions of ceiling mounting bracket, engineering unit: mm (inch)

Material: 316L (1.4404)

Order number: 71093130

### Pivoted mounting bracket for sewer channel

The pivotable mounting bracket is used to install the device in a manhole over a sewer channel.

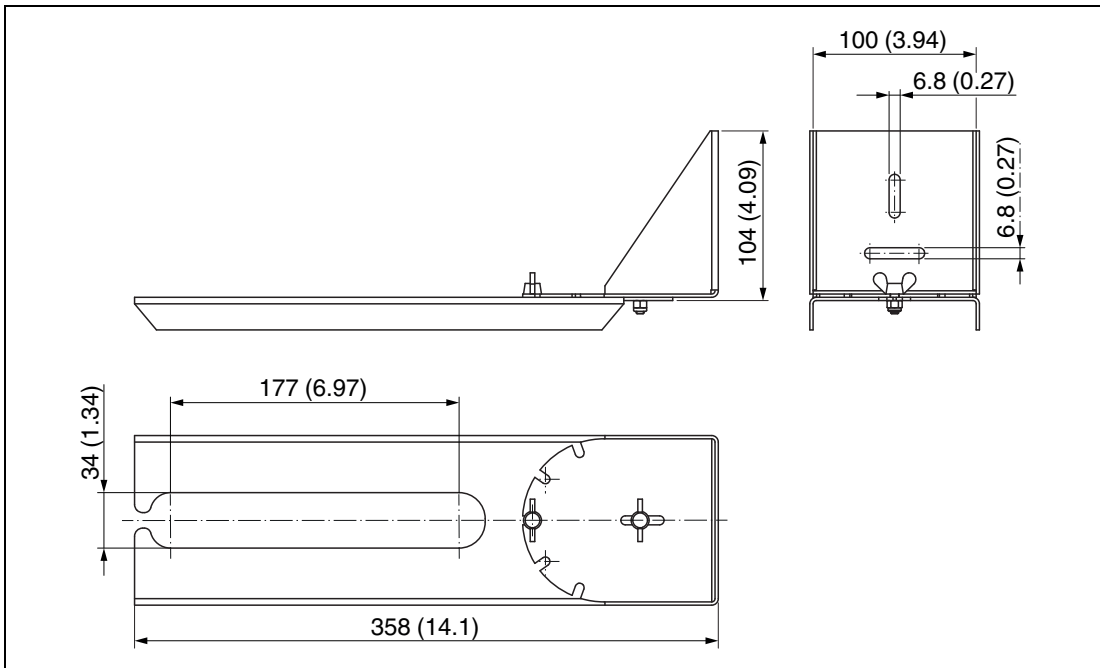


Figure 15.16 Dimensions of the pivotable mounting bracket, engineering unit: mm (inch)

Material: 316L (1.4404)

Order number: 71429910

### Horizontal mounting bracket for sewer shafts

The Horizontal mounting bracket for sewer shafts is used for installation in confined spaces.

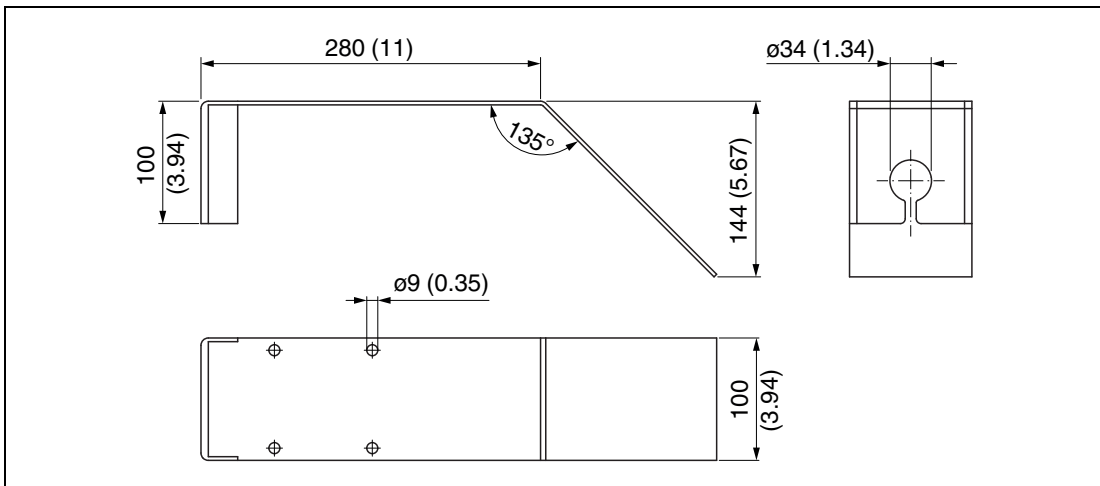


Figure 15.17 Dimensions of horizontal mounting bracket for sewer shafts, engineering unit: mm (inch)

Material: 316L (1.4404)

Order number: 71429905



## 16 Operating Menu

### 16.1 Overview of the Operating Menu (P+F Level)

**Navigation**  Operating menu

Main menu	Page
▶ Setup	51
▶ Basic setup	
Device tag	51
Distance unit	51
Empty calibration	51
Full calibration	51
Distance	51
Level	52
Signal quality	52
▶ Mapping	
Confirm distance	52
Mapping end point	53
Present mapping	53
▶ Advanced setup	54
▶ Access status tooling	
Access status tooling	54
Enter access code	54
▶ Advanced settings	
Evaluation sensitivity	54
Changing velocity	54
First echo sensitivity	55
Output mode	55
Blocking distance	55
Level correction	56
Evaluation distance	56
Linearization type	56
Level linearized	56
▶ Safety settings	57
Delay time echo lost	57
Diagnostics echo lost	57
▶ Current output	58
Output current	58
Damping output	58
Turn down	58

	4 mA value	58
	20 mA value	59
	Trim	59
	Trim value high	59
	Trim value low	60
	▶ Administration	61
	▶ Administration 1	
	Define access code	61
	Confirm access code	61
	Device reset	61
	▶ Administration 2	
	Free field special	61
	▶ Communication	62
	▶ Bluetooth configuration	62
	Bluetooth mode	62
	▶ Diagnostics	63
	▶ Diagnostics	
	Actual diagnostics	63
	Previous diagnostics	63
	Delete previous diagnostic	63
	Signal quality	63
	▶ Device information	64
	Devcie name	64
	Firmware version	64
	Extended order code 1	64
	Extended order code 2	64
	Extended order code 3	64
	Order code	64
	Serial number	64
	ENP version	64
	▶ Simulation	65
	Simulation	65
	Value current output 1	65
	Process variable value	65

## 16.2 Setup Menu



### Note

- : Indicates navigation to the parameter via the operating tool.
- : Indicates parameters that can be locked via the access code.

**Navigation** Setup

### Device tag

**Blocking**

**Navigation** Setup → Device tag

**Description** Enter a unique name for the measuring point to identify the device quickly within the plant.

**Factory setting** PF\_LCR10\_XXXXXXX (last 7 digits of the device serial number)

### Distance unit

**Blocking**

**Navigation** Setup → Distance unit

**Description** Used for the basic calibration (Empty/Full).

<b>Selection</b>	<b>SI units</b>	<b>US units</b>
	m	foot

**Factory setting** m

### Empty calibration

**Blocking**

**Navigation** Setup → Empty calibration

**Description** Distance between process connection and minimum level (0 %).

**User entry** 0.0 to 12 m

**Factory setting** 12 m

### Full calibration

**Blocking**

**Navigation** Setup → Full calibration

**Description** Distance between minimum level (0 %) and maximum level (100 %).

**User entry** 0.0 to 12 m

**Factory setting** 12 m


### Distance

**Navigation** Setup → Distance


**Description** Shows the distance D that is currently measured from the reference point (lower edge of flange/last thread of sensor) to the level.

**User interface** 0.0 to 12 m



## Level

<b>Navigation</b>	 Setup → Level
<b>Description</b>	Displays the measured level L (before linearization). The unit is defined in the <b>Distance unit</b> parameter (factory setting = m).
<b>User interface</b>	-99999.9 to 200000.0 m
<b>Factory setting</b>	0.0 m



## Signal quality

<b>Navigation</b>	 Setup → Signal quality
<b>Description</b>	<p>Displays the signal quality of the level echo. Meaning of the display options:</p> <ul style="list-style-type: none"> <li>• Strong: The evaluated echo exceeds the threshold by at least 10 dB.</li> <li>• Medium: The evaluated echo exceeds the threshold by at least 5 dB.</li> <li>• Weak: The evaluated echo exceeds the threshold by less than 5 dB.</li> <li>• No signal: The device does not find an usable echo.</li> </ul> <p>The signal quality indicated in this parameter always refers to the currently evaluated echo, either the level echo or the tank bottom echo. In case of a lost echo (<b>Signal quality = No signal</b>) the device generates the following error message: <b>Diagnostic echo lost = Warning</b> (factory setting) or <b>Alarm</b>, if the other option has been selected in <b>Diagnostic echo lost</b>.</p>
<b>User interface</b>	<ul style="list-style-type: none"> <li>• Strong</li> <li>• Medium</li> <li>• Weak</li> <li>• No signal</li> </ul>


## Confirm distance

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Confirm distance
<b>Description</b>	<p>Does the measured distance match the real distance? Select one of the options:</p> <ul style="list-style-type: none"> <li>• Manual map: To be selected if the range of mapping is to be defined manually in the <b>Mapping end point</b> parameter. A comparison between actual and indicated distance is not required in this case.</li> <li>• Distance OK: To be selected if the measured distance matches the actual distance. The device performs a mapping.</li> <li>• Distance unknown: To be selected if the actual distance is unknown. A mapping can not be performed in this case.</li> <li>• Factory map: To be selected if the present mapping curve (if one exists) is to be deleted. The device returns to the <b>Confirm distance</b> parameter and a new mapping can be recorded.</li> </ul>
<b>Selection</b>	<ul style="list-style-type: none"> <li>• Manual map</li> <li>• Distance OK</li> <li>• Distance unknown</li> <li>• Factory map</li> </ul>
<b>Factory setting</b>	Distance unknown

### Mapping end point

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Mapping end point
<b>Description</b>	This parameter defines up to which distance the new mapping is to be recorded. The distance is measured from the reference point, i. e. from the lower edge of the mounting flange or sensor.
<b>User entry</b>	0 to 12 m
<b>User interface</b>	0 m


### Present mapping

<b>Navigation</b>	 Setup → Present mapping
<b>Description</b>	Indicates up to which distance a mapping has already been recorded.
<b>User entry</b>	0 to 100 m

## 16.2.1 Advanced Setup Submenu


**Navigation**  Setup → Advanced setup

### Access status tooling

**Navigation**  Setup → Advanced setup → Access status tooling

**Description** Shows the access authorization to the parameters via the operating tool.

### Enter access code

**Navigation**  Setup → Advanced setup → Enter access code

**Description** The customer-specific access code, which has been defined in the **Define access code** parameter, must be entered to change from the operator to the maintenance mode. The device remains in the operator mode if an incorrect access code is entered. If you lose the access code, please contact your Pepperl+Fuchs sales center.

**User entry** 0 to 9999

**Factory setting** 0

### Evaluation sensitivity

**Blocking** 

**Navigation**  Setup → Advanced setup → Evaluation sensitivity

**Description** Selection of the evaluation sensitivity options to select from:

- Low: Interferers but also small level signals are not recognized. The weighting curve is located high.
- Medium: The weighting curve is in a medium region.
- High: Small level signals but also interferers can be reliably detected. The weighting curve is located low.


**Selection**

- Low
- Medium
- High

**Factory setting** Medium

### Changing velocity

**Blocking** 

**Navigation**  Setup → Advanced setup → Changing velocity



**Description** Selection of the expected draining or filling speed of the measured level.

**Selection**



- Slow < 10 cm (0.4 inch)/min
- Standard < 1 m (40 inch)/min
- Fast > 1 m (40 inch)/min
- No filter/test

**Factory setting** Standard < 1 m (40 inch)/min



## First echo sensitivity

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → First echo sensitivity
<b>Description</b>	<p>This parameter describes the band for first echo evaluation. Is measured/calculated down from the peak of the current level echo. Options to select from:</p> <ul style="list-style-type: none"> <li>• Low: The band for the first echo evaluation is very narrow. The evaluation stays longer at the found echo respectively does not jump to the next echo or distortion signal.</li> <li>• Medium: The band for the first echo evaluation has an average width.</li> <li>• High: The band for the first echo evaluation is broad. The evaluation jumps earlier to the next echo or distortion signal.</li> </ul>
<b>Selection</b>	<ul style="list-style-type: none"> <li>• Low</li> <li>• Medium</li> <li>• High</li> </ul>
<b>Factory setting</b>	Medium



## Output mode

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Output mode
<b>Description</b>	<p>Select output mode between:</p> <ul style="list-style-type: none"> <li>• Ullage = The remaining space in the tank or silo is indicated.</li> <li>• Level linearized = The level is indicated (more precisely: the linearized value if a linearization has been activated).</li> </ul>
<b>Selection</b>	<ul style="list-style-type: none"> <li>• Ullage</li> <li>• Level linearized</li> </ul>
<b>Factory setting</b>	Level linearized



## Blocking distance

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Blocking distance
<b>Description</b>	<p>Specify blocking distance (BD). No signals are evaluated within the blocking distance. Therefore, BD can be used to suppress interference signals in the vicinity of the antenna.</p> <p>Note: The measuring range should not overlap with the blocking distance.</p>
<b>User entry</b>	0 to 12 m
<b>Factory setting</b>	<p>An automatic Blocking distance of at least 0.1 m (0.33 foot) is configured as standard. However, this can be overwritten manually (0 m (0 foot) is also permitted). Automatic calculation of the <b>Blocking distance = Empty calibration – Full calibration – 0.2 m (0.656 foot)</b>.</p> <p>Each time a new entry is made in the <b>Empty calibration</b> parameter or <b>Full calibration</b> parameter, the <b>Blocking distance</b> parameter is recalculated automatically using this formula.</p> <p>If the result of the calculation is a value &lt; 0.1 m (0.33 foot), the Blocking distance of 0.1 m (0.33 foot) will continue to be used.</p>




## Level correction

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Level correction
<b>Description</b>	The measured level is corrected by this value to compensate for a constant level error. <ul style="list-style-type: none"> <li>• Level correction &gt; 0: The level is increased by this value.</li> <li>• Level correction &lt; 0: The level is decreased by this value.</li> </ul>
<b>User entry</b>	-25 to 25 m
<b>Factory setting</b>	0.0 m



## Evaluation distance

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Evaluation distance
<b>Description</b>	Extended signal search area. Is generally greater than the empty distance. If the signal is found below the empty distance, <b>0</b> (empty) is indicated as measured value. Only for signals, detected below the <b>Evaluation distance</b> , the error <b>Echo Lost</b> is issued. e. g. flow measurement in overflow weirs.
<b>User entry</b>	0 to 12 m
<b>Factory setting</b>	11.5 m

## Linearization type



<b>Blocking</b>	
<b>Navigation</b>	  Setup → Advanced setup → Linearization type
<b>Description</b>	<p><b>Linearization types</b> Meaning of the options:</p> <ul style="list-style-type: none"> <li>• None: The level is output in the level unit without being converted (linearized) beforehand.</li> <li>• Table: The relationship between the measured level L and the output value (volume/flow/weight) is defined by a linearization table. This table consists of up to 32 value pairs, i. e. <b>level - volume</b> or <b>level - flow</b> or <b>level - weight</b>.</li> </ul> <p>Note: Please use the function in P+F Level to create/modify a linearization table.</p>
<b>Selection</b>	<ul style="list-style-type: none"> <li>• None</li> <li>• Table</li> </ul>
<b>Factory setting</b>	None

## Level linearized

<b>Navigation</b>	  Setup → Advanced setup → Level linearized
<b>Description</b>	Currently measured level.
<b>User interface</b>	Signed floating-point number



### 16.2.1.1 Safety Settings Submenu

**Navigation**   Setup → Advanced setup → Safety settings

#### Delay time echo lost

**Blocking** 

**Navigation**  Setup → Advanced setup → Safety settings → Delay time echo lost


**Description** Define the delay time in the case of an echo loss. After an echo loss, the device waits for the time specified in this parameter before reacting as specified in the **Diagnostic echo lost** parameter. This helps to avoid interruptions of the measurement by short-term interferences.

**User entry** 0 to 600 s

**Factory setting** 300 s

#### Diagnostics echo lost

**Blocking** 

**Navigation**  Setup → Advanced setup → Safety settings → Diagnostics echo lost



**Description** At this parameter it can be set if in case of a lost echo a warning or an alarm is issued.

**Selection**


- Warning
- Alarm

**Factory setting** Warning

## 16.2.1.2 Current Output Submenu

**Navigation**   Setup → Advanced setup → Current output

### Output current


**Navigation**  Setup → Advanced setup → Current output → Output current

**Description** Shows the actual calculated value of the output current.

**User interface** 3.59 to 22.5 mA

### Damping output

**Blocking** 

**Navigation**  Setup → Advanced setup → Current output → Damping output

**Description** Define time constant  $\tau$  for the damping of the output current. Fluctuations of the measured value affect the output current with an exponential delay, the time constant  $\tau$  of which is defined in this parameter. With a small time constant the output reacts immediately to changes of the measured value. With a big time constant the reaction of the output is more delayed. For  $\tau = 0$  there is no damping.

**User entry** 0.0 to 300 s

**Factory setting** 1.0 s

### Turn down

**Blocking** 

**Navigation**  Setup → Advanced setup → Current output → Turn down


**Description** Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4 to 20 mA). The section is defined by the **4 mA value** and **20 mA value** parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20 mA).

**Selection**

- Off
- On

**Factory setting** Off

### 4 mA value

**Blocking** 

**Navigation**  Setup → Advanced setup → Current output → 4 mA value



**Description** Value for 4 mA at **Turn down parameter = On**. Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4 to 20 mA). The section is defined by the **4 mA value** and **20 mA value** parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20mA).

Note: If **20 mA value** is smaller than **4 mA value**, the current output is inverted, which means that an increase of the process variable results in a decrease of the output current.



**User entry** Signed floating-point number

**Factory setting** 0 m



## 20 mA value

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Current output → 20 mA value
<b>Description</b>	Value for 4 mA at <b>Turn down parameter = On</b> . Using the turn down functionality it is possible to map a section of the measuring range to the total range of the output current (4 to 20 mA). The section is defined by the <b>4 mA value</b> and <b>20 mA value</b> parameters. Without the turn down, the complete measuring range (0 to 100%) is mapped to the current output (4 to 20mA). Note: If <b>20 mA value</b> is smaller than <b>4 mA value</b> , the current output is inverted, which means that an increase of the process variable results in a decrease of the output current.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	12 m



## Trim

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Current output → Trim
<b>Description</b>	Select action for the recalibration of the current output. The trim can be used to compensate a drift of the current output (which might be caused by very long cables or by a connected Ex barrier, for example). Steps of the trim: <ol style="list-style-type: none"> <li>1. <b>Select Trim = 4 mA.</b></li> <li>2. Measure the output current with a gauged multimeter. If it is not equal to 4 mA: Enter measured value in the <b>Trim value low</b> parameter.</li> <li>3. <b>Select Trim = 20 mA.</b></li> <li>4. Measure the output current with a gauged multimeter. If it is not equal to 20 mA: Enter the measured current into the <b>Trim value high</b> parameter.</li> <li>5. <b>Select Trim = Calculate.</b> The device calculates the new scaling of the output current and stores it in the RAM.</li> </ol>
<b>Selection</b>	<ul style="list-style-type: none"> <li>• Off</li> <li>• 4 mA</li> <li>• 20 mA</li> <li>• Calculate</li> <li>• Reset</li> </ul>
<b>Factory setting</b>	Off


## Trim value high

<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Current output → Trim value high
<b>Description</b>	Enter upper measured value for the trim (around 20 mA). After this value has been entered: Select <b>Trim = Calculate</b> . This initiates the recalibration of the current output.
<b>User entry</b>	18.0 to 22.0 mA
<b>Factory setting</b>	20.0 mA

## Trim value low


<b>Blocking</b>	
<b>Navigation</b>	 Setup → Advanced setup → Current output → Trim value low
<b>Description</b>	Enter upper measured value for the trim (around 4 mA). After this value has been entered: Select <b>Trim = Calculate</b> . This initiates the recalibration of the current output.
<b>User entry</b>	3.0 to 5.0 mA
<b>Factory setting</b>	4.0 mA

### 16.2.1.3 Administration Submenu

**Navigation**  Setup → Advanced setup → Administration

#### Define access code

**Blocking** 

**Navigation**  Setup → Advanced setup → Administration → Define access code

**Description** Define release code for changing device operation mode. If the factory setting is not changed or **0000** is defined as the access code, the device works in maintenance mode without write-protection and the configuration data of the device can then always be modified.  
Once the access code has been defined, write-protected devices can only be changed to maintenance mode if the access code is entered in the **Enter access code** parameter. The new access code is only valid after it has been confirmed in the **Confirm access code** parameter. Please contact your Pepperl+Fuchs sales center if you lose your access code.

**User entry** 0 to 9999

**Factory setting** 0

#### Confirm access code

**Blocking** 

**Navigation**  Setup → Advanced setup → Administration → Confirm access code

**Description** Re-enter the entered access code to confirm.

**User entry** 0 to 9999

**Factory setting** 0

#### Device reset

**Blocking** 

**Navigation**  Setup → Advanced setup → Administration → Device reset

**Description** Reset the device configuration – either entirely or in part - to a defined state.

**Selection**

- Cancel
- To factory defaults

**Factory setting** Cancel

#### Free field special

**Blocking** 

**Navigation**  Setup → Advanced setup → Administration → Free field special

**Description** Switch the free field option on or off. This parameter can be switched on for free field applications (e. g. below bridges).  
Caution: The customer map (if one exists) is reset to the factory map!

**Selection**

- Off
- On

**Factory setting** Off

## 16.2.2 Communication Submenu

**Navigation**   Setup → Communication

### 16.2.2.1 Bluetooth Configuration Submenu

**Navigation**   Setup → Communication → Bluetooth configuration

#### Bluetooth mode

**Blocking** 

**Navigation**  Setup → Communication → Bluetooth configuration → Bluetooth mode

**Description** Enable or disable Bluetooth function.  
Remark: Switching to position **Off** will disable remote access via the app with immediate effect. To re-establish a Bluetooth connection via the app: Please follow the advices in the manual.

**Selection**

- Off
- On

**Factory setting** On

## 16.3 Diagnostics Menu

**Navigation**  Diagnostics

### Actual diagnostics

**Navigation**  Diagnostics → Actual diagnostics

**Description** Displays current diagnostic message. If several messages are active at the same time, the messages with the highest priority is displayed.


### Previous diagnostics

**Navigation**  Diagnostics → Previous diagnostics

**Description** Displays the last diagnostic message, with its diagnostic information, which has been active before the current message. The condition displayed may still apply.

### Delete previous diagnostic

**Blocking** 

**Navigation**  Diagnostics → Delete previous diagnostic

**Description** Delete previous diagnostic message? It is possible that the diagnostic message remains valid.

**Selection**

- No
- Yes

**Factory setting** No

### Signal quality

**Navigation**  Diagnostics → Signal quality

**Description** Displays the signal quality of the level echo. Meaning of the display options:

- Strong: The evaluated echo exceeds the threshold by at least 10 dB
- Medium: The evaluated echo exceeds the threshold by at least 5 dB.
- Weak: The evaluated echo exceeds the threshold by less than 5 dB.
- No signal: The device does not find an usable echo.

The signal quality indicated in this parameter always refers to the currently evaluated echo, either the level echo or the tank bottom echo. In case of a lost echo (**Signal quality = No signal**) the device generates the following error message: **Diagnostic echo lost = Warning** (factory setting) or **Alarm**, if the other option has been selected in **Diagnostic echo lost**.

**User interface**

- Strong
- Medium
- Weak
- No signal

### 16.3.1 Device Information Submenu

**Navigation**  Diagnostics → Device information


#### Device name

**Navigation**  Diagnostics → Device information → Device name

**Description** Shows the name of the device.


**Factory setting** Level radar LCR10

#### Firmware version

**Navigation**  Diagnostics → Device information → Firmware version


**Description** Shows the device firmware version installed.

#### Extended order code 1

**Navigation**  Diagnostics → Device information → Extended order code 1


**Description** Shows the 1st part of the extended order code.

#### Extended order code 2

**Navigation**  Diagnostics → Device information → Extended order code 2

**Description** Shows the 2nd part of the extended order code.

#### Extended order code 3

**Navigation**  Diagnostics → Device information → Extended order code 3

**Description** Shows the 3rd part of the extended order code.

#### Order code

**Navigation**  Diagnostics → Device information → Order code

**Description** Shows the device order code.

#### Serial number

**Navigation**  Diagnostics → Device information → Serial number

**Description** Shows the serial number of the device.

#### ENP version

**Navigation**  Diagnostics → Device information → ENP version

**Description** Shows the version of the electronic nameplate (ENP).



## 16.3.2 Simulation Submenu

**Navigation**   Diagnostics → Simulation

### Simulation

**Blocking** 

**Navigation**  Diagnostics → Simulation → Simulation

**Description** Select process variable to be simulated. The simulation is used to simulate specific measuring values or other conditions. This helps to check the correct configuration of the device and connected control units.

**Selection**

- Off
- Current output
- Distance

**Factory setting** Off

### Value current output

**Blocking** 

**Navigation**  Diagnostics → Simulation → Value current output

**Description** Defines the value of the simulated output current.

**User entry** 3.59 to 22.5 mA

**Factory setting** 3.59 mA

### Process variable value

**Blocking** 

**Navigation**  Diagnostics → Simulation → Process variable value

**Description** Value of the simulated process variable. Downstream measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

**User entry** 0 to 20 m

**Factory setting** 0 m

## Numerics

20 mA value (Parameter) .....	59
4 mA value (Parameter) .....	58

## A

Access status tooling (Parameter) .....	54
Actual diagnostics (Parameter) .....	63
Administration (Submenu) .....	61
Application .....	11

## B

Blocking distance (Parameter) .....	55
Bluetooth configuration (Submenu) .....	62
Bluetooth mode (Parameter) .....	62
Bluetooth® wireless technology .....	28
Borderline cases .....	11
Brief instructions (KA) .....	8

## C

Changing velocity (Parameter) .....	54
Communication (Submenu) .....	62
Configuring level measurement .....	31
Confirm access code (Parameter) .....	61
Confirm distance (Parameter) .....	52
Connection .....	26
Current output (Submenu) .....	58

## D

Damping output (Parameter) .....	58
Define access code (Parameter) .....	61
Delay time echo lost (Parameter) .....	57
Delete previous diagnostic (Parameter) .....	63
Designated use .....	11
Device information (Submenu) .....	64
Device name (Parameter) .....	64
Device reset (Parameter) .....	61
Device tag (Parameter) .....	51
Diagnostics .....	32
Diagnostics (Menu) .....	63
Diagnostics echo lost (Parameter) .....	57
Disposal .....	37
Distance (Parameter) .....	51
Distance unit (Parameter) .....	51
Document function .....	5

**E**

Empty calibration (Parameter) ..... 51

ENP version (Parameter) ..... 64

Enter access code (Parameter) ..... 54

Evaluation distance (Parameter) ..... 56

Evaluation sensitivity (Parameter) ..... 54

Extended order code 1 (Parameter) ..... 64

Extended order code 2 (Parameter) ..... 64

Extended order code 3 (Parameter) ..... 64

**F**

Firmware version (Parameter) ..... 64

First echo sensitivity (Parameter) ..... 55

Free field special (Parameter) ..... 61

Full calibration (Parameter) ..... 51

**I**

Incorrect use ..... 11

Installation ..... 17

Instruction manual (SI) ..... 8

**L**

Level (Parameter) ..... 52

Level correction (Parameter) ..... 56

Level linearized (Parameter) ..... 56

Linearization type (Parameter) ..... 56

**M**

Maintenance ..... 36

Manual (BA) ..... 8

Mapping end point (Parameter) ..... 53

Media ..... 11

**O**

Operational safety ..... 12

Order code (Parameter) ..... 64

Output current (Parameter) ..... 58

Output mode (Parameter) ..... 55

**P**

Present mapping (Parameter) ..... 53

Previous diagnostics (Parameter) ..... 63

Process variable value (Parameter) ..... 65

Product safety ..... 13

---

**R**

Repair concept ..... 37

Replacing a device ..... 37

Requirements for personnel ..... 11

Return ..... 37

**S**

Safety instructions ..... 11

Safety settings (Submenu) ..... 57

Serial number (Parameter) ..... 64

Setup (Menu) ..... 51

Signal quality (Parameter) ..... 52, 63

Simulation (Parameter) ..... 65

Simulation (Submenu) ..... 65

**T**

Technical information (TI) ..... 8

Trim (Parameter) ..... 59

Trim value high (Parameter) ..... 59

Trim value low (Parameter) ..... 60

Troubleshooting ..... 32

Turn down (Parameter) ..... 58

**V**

Value current output (Parameter) ..... 65

**W**

Workplace safety ..... 12



# Your automation, our passion.

## Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus
- Remote I/O Systems
- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

## Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

**Pepperl+Fuchs Quality**  
Download our latest policy here:

[www.pepperl-fuchs.com/quality](http://www.pepperl-fuchs.com/quality)

