Operating Instructions

Radar sensor for continuous level measurement

CNCR-230

Two-wire 4–20 mA/HART

BINMASTER

Document ID: 925-0397 Rev B

Contents

1 About this document

Information, note, tip: This symbol indicates helpful additional information and tips.

Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or facility.

Caution: Non-observance may result in personal injury.

Warning: Non-observance may result in serious or fatal personal injury.

Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.

Ex applications
This symbol indicates special instructions for Ex applications.

List
The dot set in front indicates a list with no implied sequence.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Battery disposal
This symbol indicates special information about the disposal of batteries and accumulators.

2 For your safety

2.1 Authorized personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorized by the plant operator. Required personal protective equipment must always be worn when working on or with the device.

2.2 Appropriate use

CNCR-230 is a sensor for continuous level measurement.

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions.

2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill by incorrect mounting or adjustment. Damage to property, persons or environmental contamination can result.

Safety instructions for Ex areas

Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each instrument with Ex approval and are part of the operating instructions.

3 Product Description

3.1 Configuration

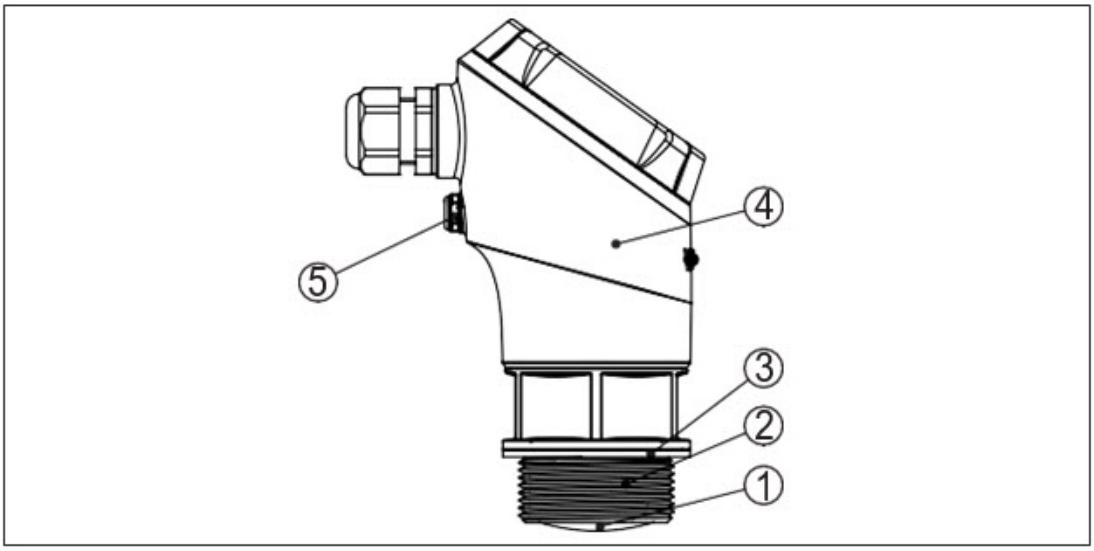


Fig. 1: Components of CNCR-230

1 Radar antenna
2 Process fitting
3 Process seal
4 Electronics housing
5 Ventilation/pressure compensation

3.2 Principle of operation

CNCR-230 is a radar sensor for continuous level measurement. It is suitable for liquids and solids in practically all industries.

The instrument emits a continuous, frequency-modulated radar signal from its antenna. The emitted signal is reflected by the material and received by the antenna as an echo with modified frequency. The frequency change is proportional to the distance to the material.

3.3 Adjustment

On-site adjustment of the device is carried out via the integrated display and adjustment unit.

Note:

The housing with display and adjustment unit can be rotated 330° for optimum readability and operability without tools.

Devices with integrated Bluetooth module can be adjusted wirelessly via standard adjustment tools:

- Smartphone/tablet (iOS or Android operating system)
- PC/notebook (Windows operating system)

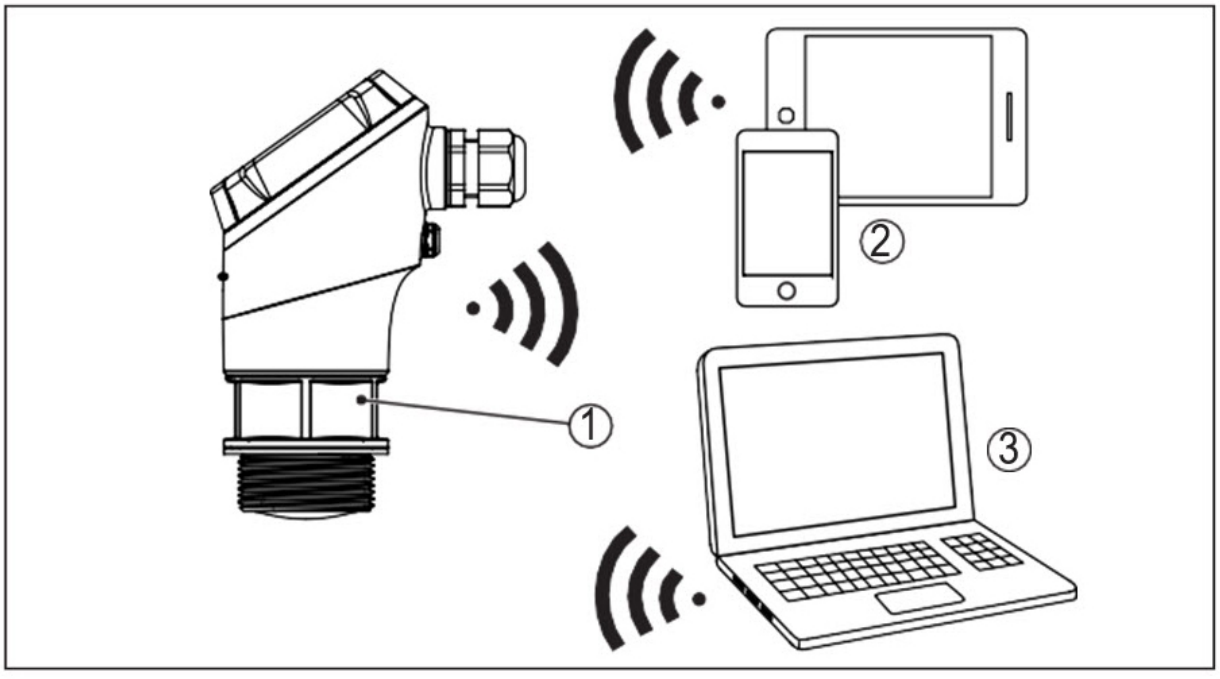


Fig. 2: Wireless connection to standard operating devices with integrated Bluetooth LE

1 Sensor
2 Smartphone/Tablet
3 PC/Notebook

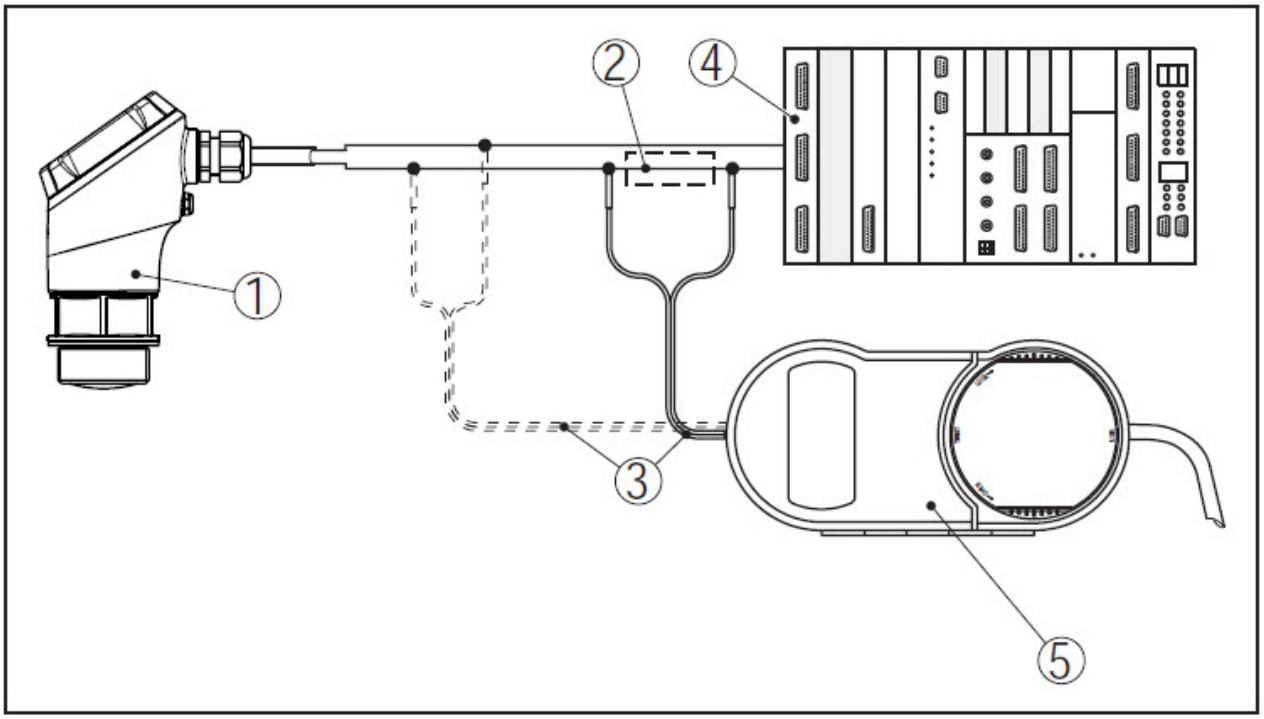


Fig. 3: Connecting the PC to the signal cable

1 Sensor
2 HART resistance 250 Ω (optional depending on evaluation)
3 Connection cable with 2 mm pins and terminals
4 Voltage supply
5 Interface adapter

4 Mounting

4.1 General instructions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable
- Tighten the cable gland or plug connector firmly
- Face the connection cable or conduit entry downward, never upward

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.

4.2 Mounting instructions

The radar emits pulses of electromagmetic waves which are polarized. By adjusting the rotation of the instrument the polarization can be changed to reduce false echoes.

The narrow portion of the radar signal is in the middle of the conduit entry on the instrument. This should be pointed towards the center of the vessel or any obstacle that may cause any unwanted reflections to minimize false echos, for example, the sidewall or vessel structure.

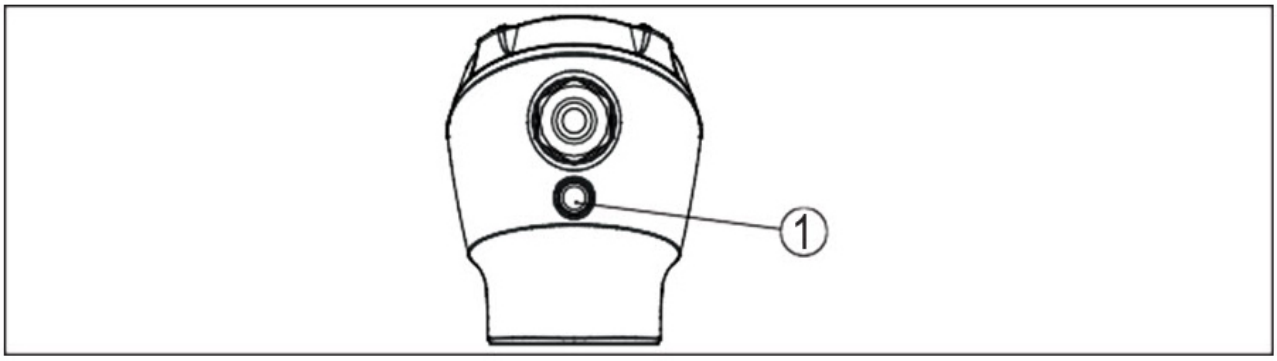


Fig. 4: Polarization Position
1. Cable conduit entry/vent

The lower side of the radar antenna is the beginning of the measuring range. It is at the same time the reference plane for the min./max. adjustment, see following diagram:

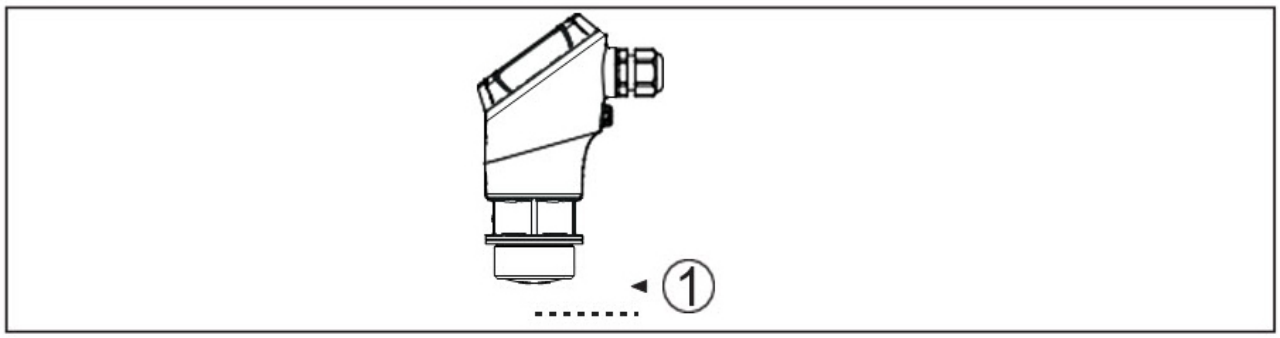


Fig. 5: Reference plane
1. Reference plane

When mounting the sensor, keep a *distance of at least 200 mm (7.874 in)* from the vessel wall. If the sensor is installed in the center of a round top vessel, multiple echoes can arise. However, these can be suppressed by a false signal suppression (see chapter *"Set up"*).

If you cannot maintain this distance, you should carry out a false signal suppression during initial setup. This applies particularly if buildup on the vessel wall is expected. If this is the case, we recommend repeating the false signal suppression later with the additional buildup.

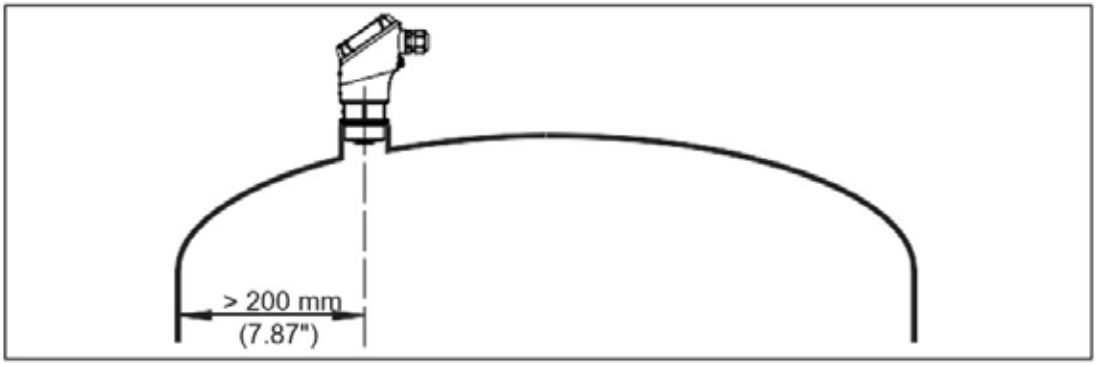


Fig. 6: Mounting the radar sensor on round vessel tops

In vessels with cone bottoms, the sensor can be mounted in the center of the vessel to measure material down to the outlet.

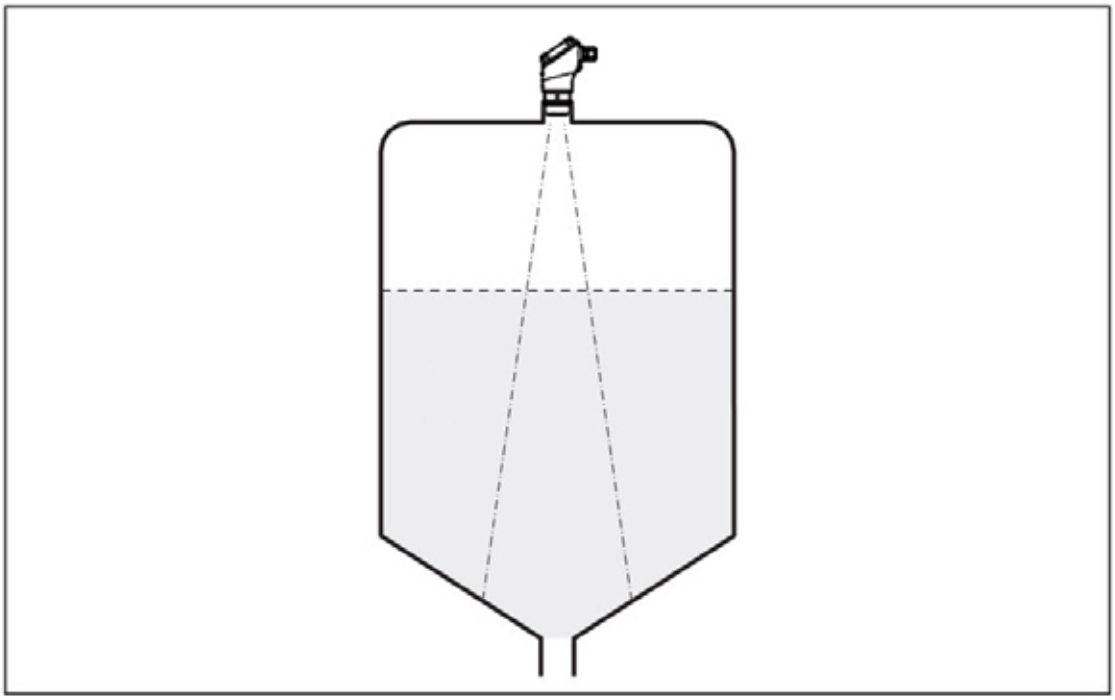


Fig. 7: Mounting the radar sensor with conical bottom

Do not mount the instruments in or above the filling stream. Make sure that you detect the material surface, not the fill stream.

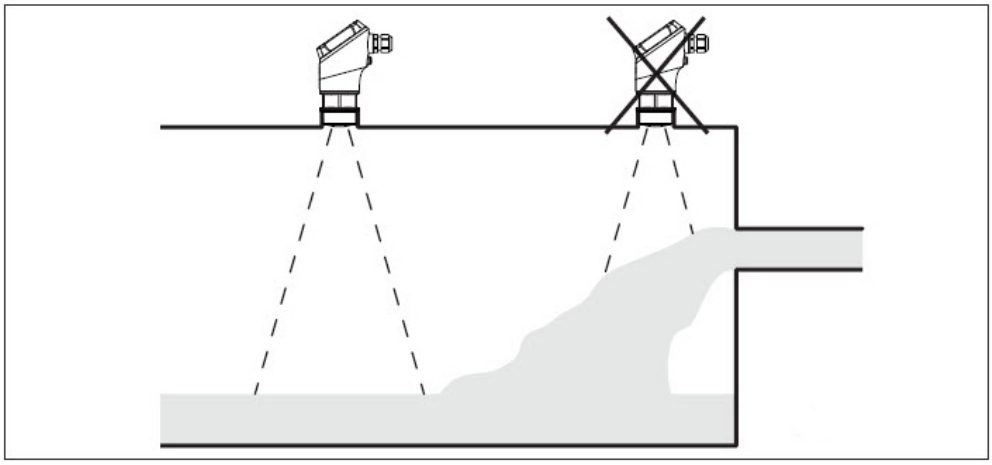


Fig. 8: Mounting the radar sensor away from the fill stream.

When using a threaded coupling, the antenna end should protrude at least 5 mm (0.2 in) out of the socket.

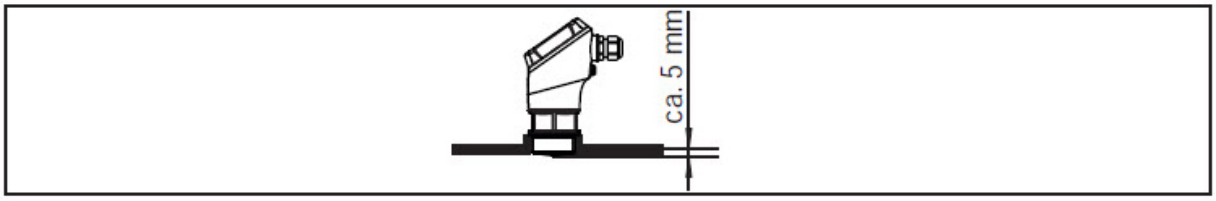


Fig. 9: Thread mounting

If the reflective properties of the medium are good, you can mount CNCR-230 on sockets or stand pipes longer than the antenna. The pipe end should be smooth, burr-free, and the end rounded.

Recommended values for socket or stand pipe lengths and heights are in the following table. The values come from typical applications.

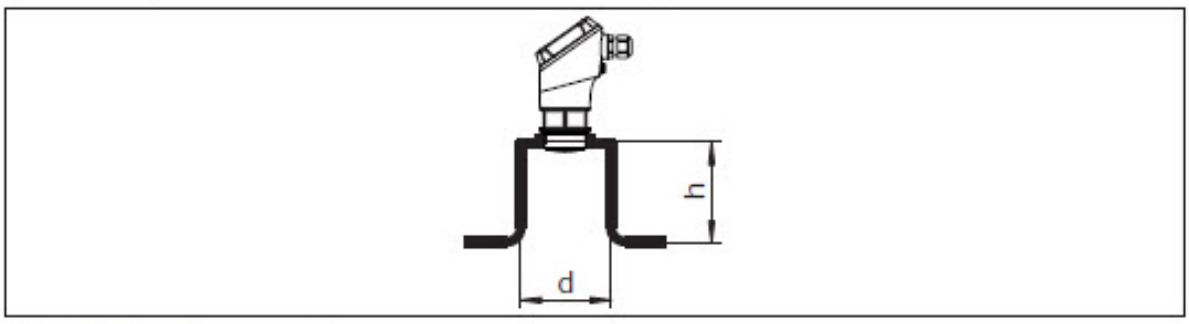


Fig. 10: Mounting the radar sensor with stand pipes

Socket diameter d		Socket length h	
40 mm	1½”	≤ 150 mm	≤ 5.9 in
50 mm	2”	≤ 200 mm	≤ 7.9 in
80 mm	3”	≤ 300 mm	≤ 11.8 in
100 mm	4”	≤ 400 mm	≤ 15.8 in
150 mm	6”	≤ 600 mm	≤ 23.6 in

Note:
The sensor should be mounted in a location where the radar signal is not interfered with by structure, such as ladders, braces or fill stream.

Make sure when planning the installation there is a clear, unobstructed view to the material to be measured. After installation a false signal suppression should be carried out to minimize any reflections from the mount or nearby structure.

5 Connecting to power supply

5.1 Preparing the connection

- Carry out electrical connection by trained, qualified personnel authorized by the plant operator
- If overvoltage surges are expected, overvoltage arresters should be installed

Warning:
Only connect or disconnect in de-energized state.

Note:
Power the instrument via an energy-limited circuit (power max. 100 W) according to IEC 61010-1, e.g.

- Class 2 power supply unit (acc. to UL1310)
- SELV power supply unit (safety extra-low voltage) with suitable internal or external limitation of the output current

Use round cable to ensure effective sealing of the cable gland to the appropriate IP rating and check the cable diameter versus the cable gland before wiring for proper fit.

The instrument is connected with standard two-wire cable. If electromagnetic interference is expected which is above the test values of EN 61326-1 for industrial areas, shielded cable should be used.

Note:
Shielded cable generally necessary in HART multidrop mode.

Note:
If the temperatures are too high, the cable insulation can be damaged.

We recommend connecting the cable screening to ground potential at one end on the supply side when using shielded cable.

5.2 Connecting

Fig. 11: Connection

Connect the instrument as described in the following wiring plan.

5.3 Wiring plan

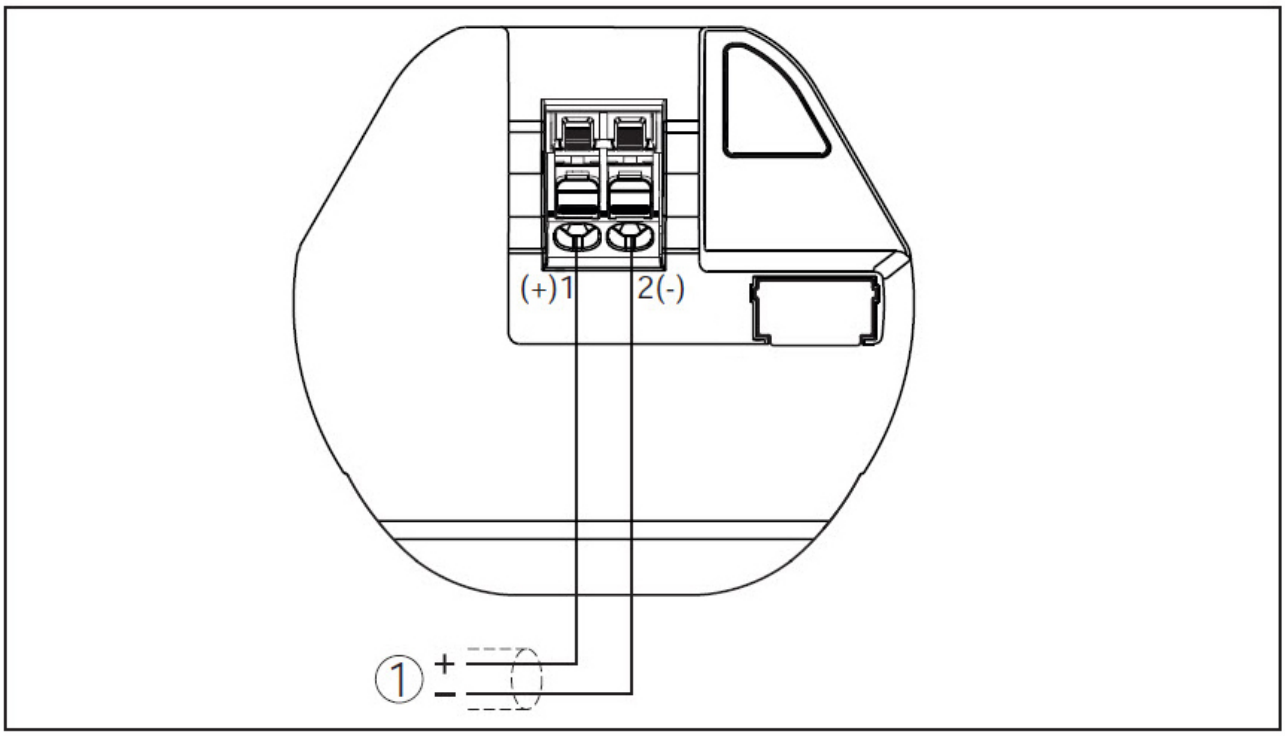


Fig. 12: Connection compartment CNCR-230
1. Voltage supply +24 VDC, signal output

6 Set up with the integrated display and adjustment unit

6.1 Adjustment system

The instrument is operated via the three keys of the integrated display and adjustment unit. The respective menu items are shown on the LCD display. You can find the function of the individual keys in the following overview.

Certain settings are only possible to a limited extent or not possible with the integrated display and adjustment unit. For these settings, we recommend using the adjustment app or PACTware with corresponding DTM.

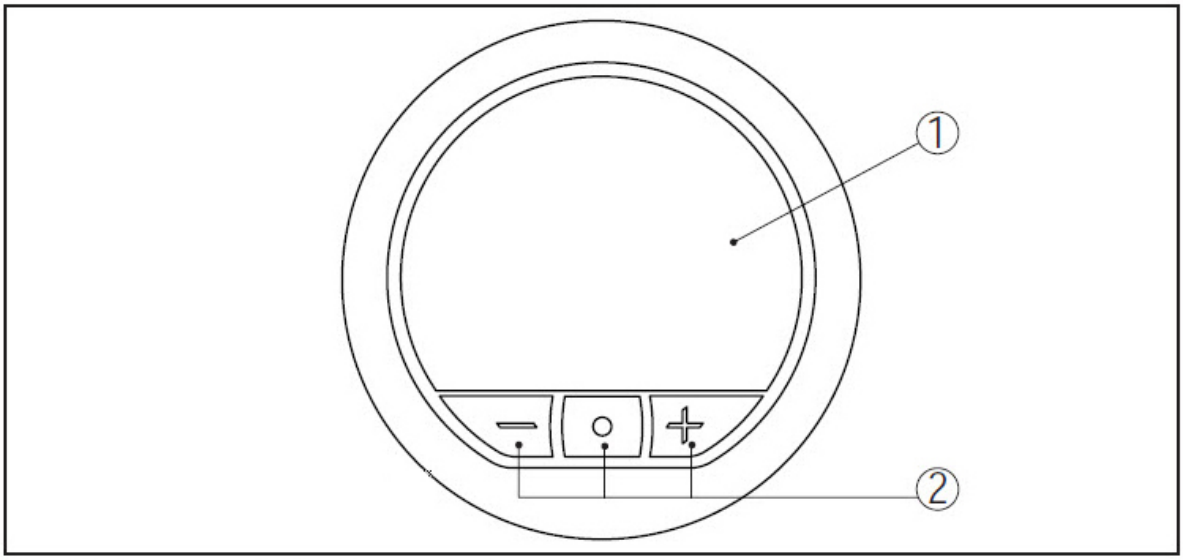


Fig. 13: Integrated display and adjustment unit

1. LCD display

2. Adjustment keys

Key	Function
[•]	Entry to the menu level Jump to selected menu item Edit parameter Select editing position Save value
[+]	Switching between the individual measured value windows Navigation in the menu items, forwards Change parameter values upwards
[-]	Switching between the individual measured value windows Navigation in the menu items, backwards Change parameter values downwards
[+] and [-] simultaneously	Jump to next higher menu Interrupt input

When the [+] and [-] keys are pressed quickly, the edited value, or the cursor, changes one value or position at a time. If the key is pressed longer than 1 s, the value or position changes continuously.

Simultaneous pressing of the [+] and [-] keys causes a return to the measured value indication.

Approximately 60 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with [O] will not be saved.

6.2 Measured value and menu item display

The measured values are displayed according to the following presentation:

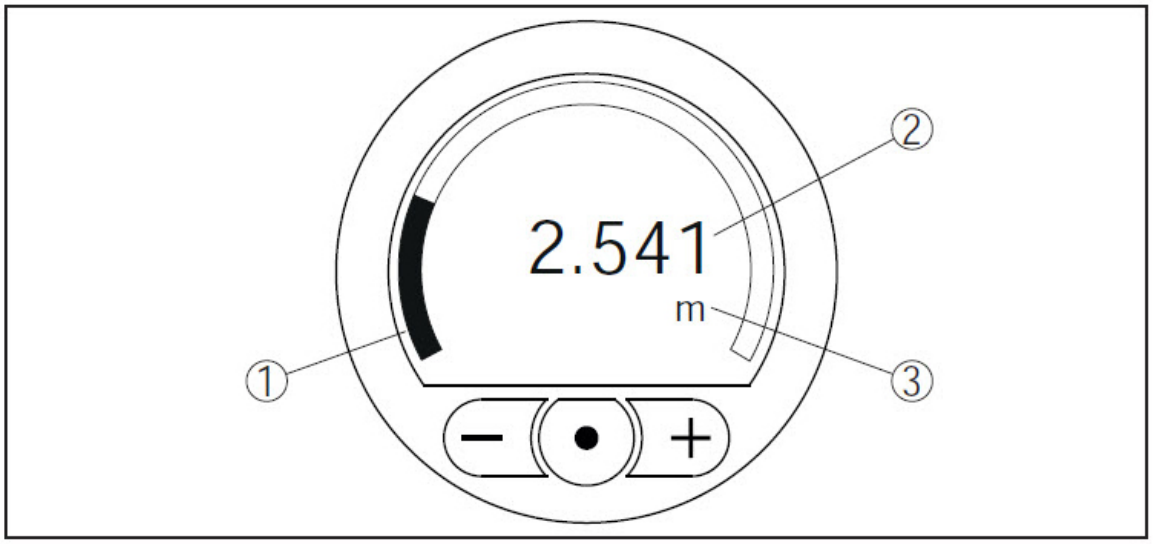


Fig. 14: Measured value display (example)

1. *Measured value as bargraph*
2. *Digital Value*
3. *Unit*

The menu items are displayed according to the following presentation:

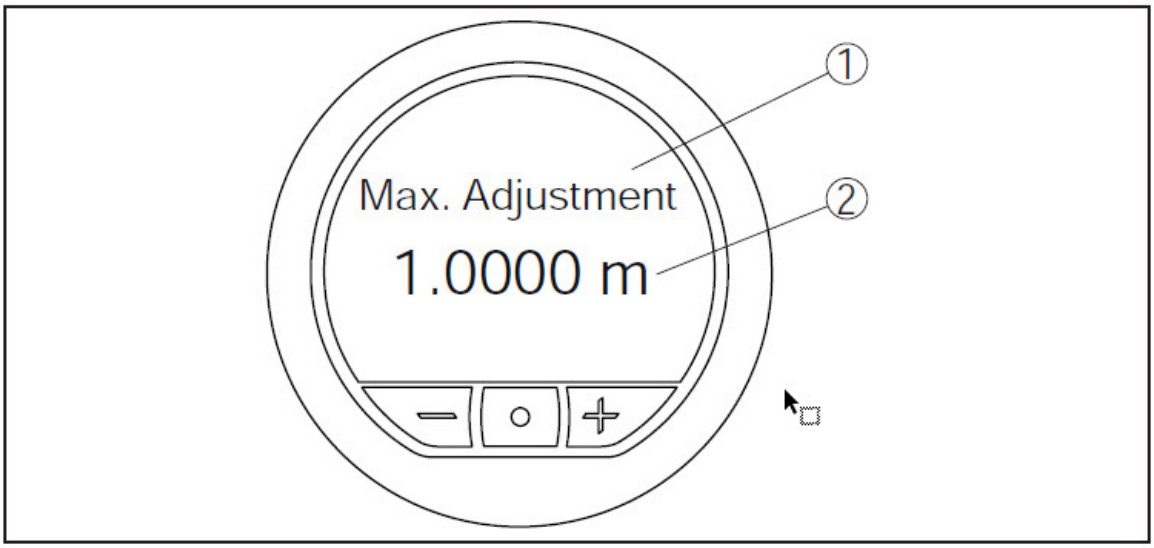


Fig. 15: Menu item display (example)

1. *Menu item*
2. *Actual parameter value*

6.3 Menu overview

Menu item	Selection	Basic settings
Medium	Liquid Bulk solid	Liquid
Application liquid	Storage tank, agitator tank, dosing tank, pumping station/ pump shaft, rain overflow basin, tank/collection basin, plastic tank (measurement through tank top), mobile plastic tank (IBC), level measurement in waters, flow measurement flume/overflow, demonstration	Storage tank
Application bulk solid	Silo (slim and high), bunker (large volume), stockpile (point measurement/ profile detection), crusher, demonstration	Silo (slender and high)
Units	Distance unit of the device Temperature unit of the instrument	Distance in ft. Temperature in °F
Adjustment	**Max. adjustment (distance A) - 20mA (100%)** **Min. adjustment (distance B) - 4mA (0%)**	**Distance from sensor** **Max. adjustment 0.0 m** **Min. adjustment 15.0 m**

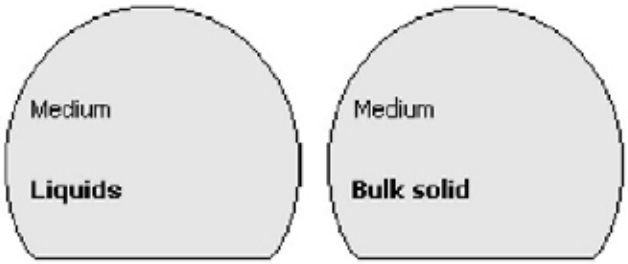
Menu item	Selection	Basic settings
Displayed value		Distance
Scaling	Scaling size Scaling unit Scaling format	0% correspond to 0 L 100% correspond to 100 L
Menu language	Language	English
Bluetooth access code	-	Activated
Parameter Protection	-	Deactivated
Reset	Delivery status, basic settings	-

Menu item	Selection	Basic settings
Status	Sensor status	-
Measurement reliability	-	-
Sensor information	Device name, serial number, hardware/software version, device revision, factory calibration date	-

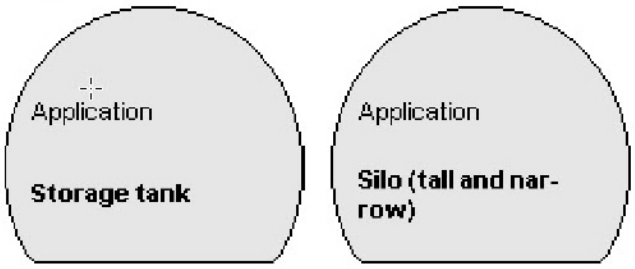
6.4 Parameter adjustment

6.4.1 Main menu

This menu item enables you to adapt the sensor to the different measuring conditions of the material *“Liquid”* or *“Bulk solid”*. This selection adapts the signal processing to the expected reflections.



This menu item enables you to optimally adapt the sensor to the application, the place of use and the measuring conditions. The adjustment possibilities depend on the selection made under *“Medium”, “Liquid”* or *“Bulk solid”.*



With *“Liquid”,* the applications are based on the following features, to which the measuring characteristic of the sensor is adjusted in particular:

Storage tank
- Vessel:
  - Large volume
  - Upright cylindrical, horizontal round
- Process/measurement conditions:
  - Slow filling and emptying
  - Smooth medium surface
  - Multiple reflections from domed vessel ceiling
  - Condensation

Stirrer vessel
- Vessel:
  - Large agitator metal blades
  - Installations like flow breakers, heating spirals
  - Mounting socket or stand pipe

- Process/measurement conditions:
  - Frequent, fast to slow filling and emptying
  - Strongly agitated surface, foam and strong spout formation
  - Multiple reflections through dished vessel ceiling
  - Condensation, buildup on the sensor
- Further recommendations
  - False signal suppression with running agitator via adjustment app or PACTware/DTM

Dosing vessel

- Vessel:
  - Small vessels
- Process/measurement conditions:
  - Frequent and fast filling/emptying
  - Tight installation situation
  - Multiple reflections through dished vessel ceiling
  - Product buildup, condensate and foam generation

Pumping station/Pump shaft

- Process/measurement conditions:
  - Partly strongly agitated surface
  - Installations such as pumps and ladders
  - Multiple reflections through flat vessel ceiling
  - Dirt and grease deposits on shaft wall and sensor
  - Condensation on the sensor
- Further recommendations
  - False signal suppression via adjustment app or PACTware/DTM

Overflow basin

- Vessel
  - Large volume
  - Partly installed underground
- Process/measurement conditions:
  - Partly strongly agitated surface
  - Multiple reflections through flat vessel ceiling
  - Condensation, dirt deposits on the sensor
  - Flooding of the sensor antenna

Vessel/Collecting basin

- Vessel
  - Large volume
  - Upright cylindrical or rectangular
- Process/measurement conditions:
  - Slow filling and emptying
  - Smooth medium surface
  - Condensation

Plastic tank (measurement through the vessel top)
- Process/measurement conditions:
  - Measurement through the tank top, if appropriate to the application
  - Condensation on the plastic ceiling
  - In outdoor facilities, water and snow on vessel top possible
- Further recommendations
  - With measurement through the tank top false signal suppression via adjustment app or PACTware/DTM
  - When measuring through the tank top in outdoor areas protective roof for the measuring point

Transportable plastic tank (IBC)
- Process/measurement conditions:
  - Material and thickness different
  - Measurement through the vessel top, if appropriate to the application
  - Changed reflection conditions as well as jumps in measured values when changing vessels
- Further recommendations
  - With measurement through the tank top false signal suppression via adjustment app or PACTware/DTM
  - When measuring through the tank top in outdoor areas protective roof for the measuring point

Gauge measurement in water
- Process/measurement conditions:
  - Slow gauge change
  - Extreme damping of output signal in case of wave generation
  - Ice and condensation on the antenna possible
  - Floating debris sporadically on the water surface

Flow measurement flume/Overfall
- Process/measurement conditions:
  - Slow gauge change
  - Smooth to agitated water surface
  - Measurement often from a short distance with the demand for accurate measurement results
  - Ice and condensation on the antenna possible

Demonstration
- Applications that are not typical level measurements, e.g. device tests
  - Instrument demonstration
  - Object recognition/monitoring
  - Fast position changes of a measuring plate during functional test

With *"Bulk solid"*, the applications are based on the following features, to which the measuring characteristic of the sensor is adjusted in particular:

Silo (slender and high)
- Process/measurement conditions:
  - Interfering reflections due to weld seams on the vessel
  - Multiple echoes/diffuse reflections due to unfavorable pouring positions with fine grain
  - Varying pouring positions due to outlet funnel and filling cone

- Further recommendations
  - False signal suppression via adjustment app or PACTware/DTM
  - Alignment of the measurement to the silo outlet

Bunker (large-volume)

- Process/measurement conditions:
  - Large distance to the medium
  - Steep angles of repose, unfavorable pouring positions due to outlet funnel and filling cone
  - Diffuse reflections due to structured vessel walls or internals
  - Multiple echoes/diffuse reflections due to unfavorable pouring positions with fine grain
  - Changing signal conditions when large amounts of material slip off
- Further recommendations
  - False signal suppression via adjustment app or PACTware/DTM

Heap (point measurement/profile detection)

- Process/measurement conditions:
  - Measured value jumps, e.g. through heap profile and traverses
  - Large angles of repose, varying pouring positions
  - Measurement near the filling stream
  - Sensor mounting on movable conveyor belts

Crusher

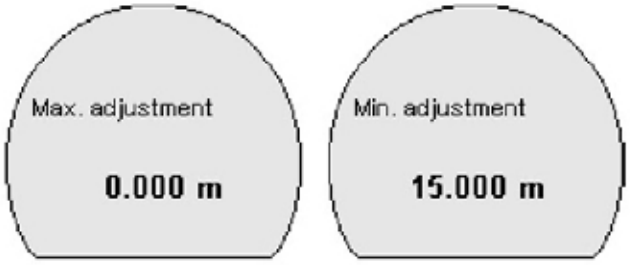
- Process/measurement conditions:
  - Measured value jumps and varying pouring positions, e.g. due to truck filling
  - Fast reaction time
  - Large distance to the medium
  - Interfering reflections from fixtures or protective devices
- Further recommendations
  - False signal suppression via adjustment app or PACTware/DTM

Demonstration

- Applications that are not typical level measurements
  - Instrument demonstration
  - Object recognition/monitoring
  - Measured value verification with higher measuring accuracy with reflection without bulk solids, e.g. via a measuring plate

In this menu item you select the unit for measured distance in mm, m, in or ft.

Since the radar sensor is a distance measuring instrument, it is the distance from the sensor to the product surface that is measured. To indicate the actual level, the measured distance must be assigned to a certain height percentage.



To perform the adjustment, enter the distance with full and empty vessel, see the following example:

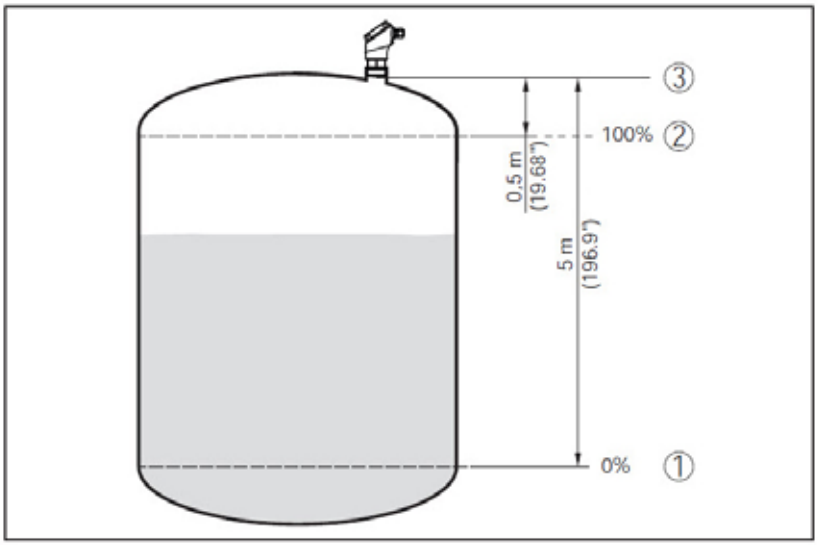


Fig. 16: Parameter example, Min./max. adjustment
1. *Min. level = max. measuring distance*
2. *Max. level = min. measuring distance*
3. *Reference plane*

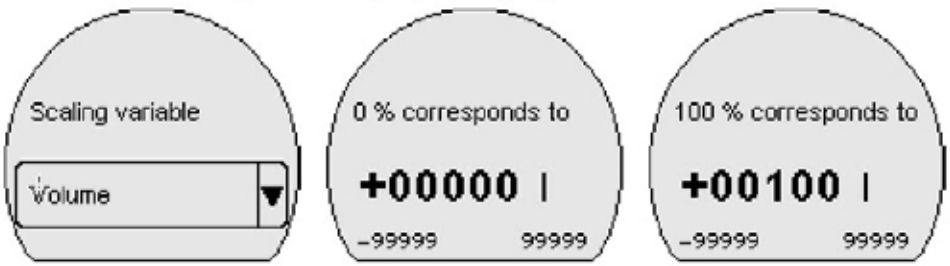
The starting point for these distance specifications is always the reference plane, i.e. the lower edge of the sensor. Information on the reference plane can be found in the chapters "*Mounting"* and "*Technical data".* The actual filling height is then calculated on the basis of these entries.

The actual product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

6.4.2 Extended Functions

In the menu item *"Display value"* you define the indication of the measured values on the indication as filling height, distance, percent, lin. percent or scaled.

In the menu item *"Scaling"* you define how the level value is shown on the indication. This includes the scaling size, unit and format as well as the assignment to 0% and 100% of the measured value. Scaling makes it possible, for example, to display the volume in m³.

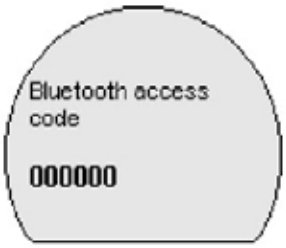


This menu item enables the setting of the requested national language for the display.

The following languages are available:
German, English, French, Spanish, Portuguese, Italian, Dutch, Russian, Chinese, Turkish

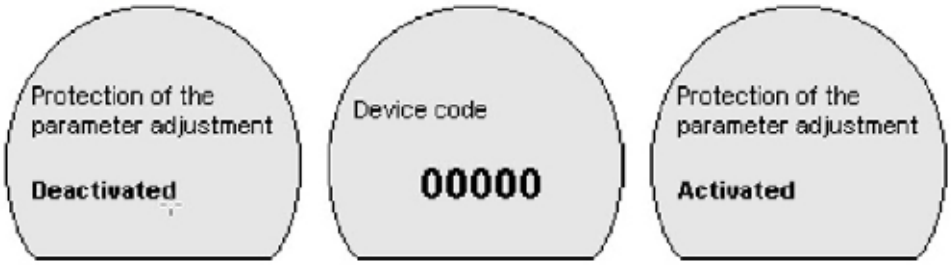
In this menu item, you can change the factory-preset Bluetooth access code to your personal Bluetooth access code.

Note:
The individual preset Bluetooth access code of the device can be found on the supplied information sheet *"PINs and Codes".* If this is changed by the user and is no longer available, access is only possible via the emergency Bluetooth unlock code on the information sheet *"Emergency unlock codes"* also supplied.



For instruments without Bluetooth function, this menu item displays *"Instrument without Bluetooth".*

In the menu item *"Protection of the parameter adjustment"* you protect the sensor parameters against unwanted or unintentional changes by entering a device code.



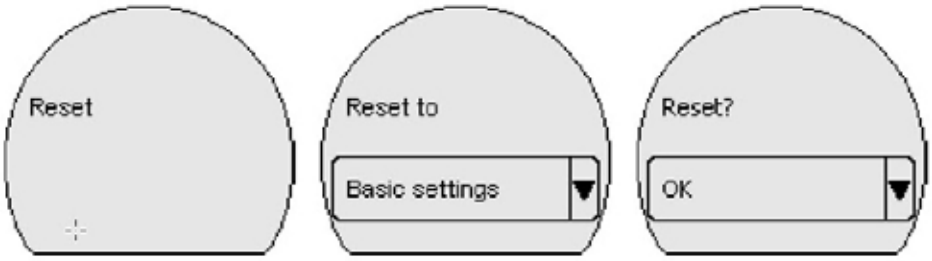
With activated protection of the parameter adjustment, the individual menu items can be selected and displayed, however the parameters can no longer be modified.

Releasing the sensor adjustment is also possible in any menu item by entering the device code.

Note:
The factory set device code is *"000000"*. If this is changed by the user and is no longer available, access is only possible via the emergency device unlock code on the information sheet *"Emergency unlock codes"* also supplied.

Caution:
With protected parameter adjustment, adjustment via the adjustment app as well as PACTware/DTM and other systems is also blocked.

During a reset, parameter settings made by the user are reset to the values of the basic setting or the delivery status (see chapter *"Menu overview"*).



Caution:
For the duration of the reset, the set trouble signal is output via the current output. Within the context of the asset management function, the message *"Maintenance"* is output.

The following reset functions are available:

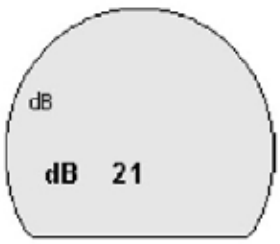
Basic settings: Resets the parameter settings to the default values of the respective device. The order-related settings are not transferred to the current parameters after this reset.

Delivery status: Resets the parameter settings to the delivery status.

6.4.3 Diagnostics

In this menu item, the device status is displayed.

The measurement reliability represents the signal strength of the level echo above the detection threshold in dB. This makes it possible to assess the quality of the measurement. The measurement reliability should be at least 20 dB.



The menu item *"Sensor information"* provides the device name and serial number as well as the hardware and software version

7 Setup with smartphone/tablet (Bluetooth)

7.1 Preparations

Make sure that your smartphone/tablet meets the following system requirements:
• Operating system: iOS 8 or newer
• Operating system: Android 5.1 or newer
• Bluetooth 4.0 LE or newer

Download the Wireless Device Configurator app from the *“Apple App Store”* or *“Google Play Store”* to your smartphone or tablet. To enable the Bluetooth software enter the BinMaster company ID code BMYQXZ.

7.2 Connecting

Start the adjustment app and select the function “Setup”. The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

The message *“Connecting …”* is displayed.

The devices found are listed and the search is automatically continued.

Select the requested instrument in the device list.

When establishing the connection for the first time, the operating tool and the sensor must authenticate each other. After the first correct authentication, each subsequent connection is made without a new authentication query.

For authentication, enter the 6-digit Bluetooth access code in the next menu window. You can find the code on the outside of the device housing.

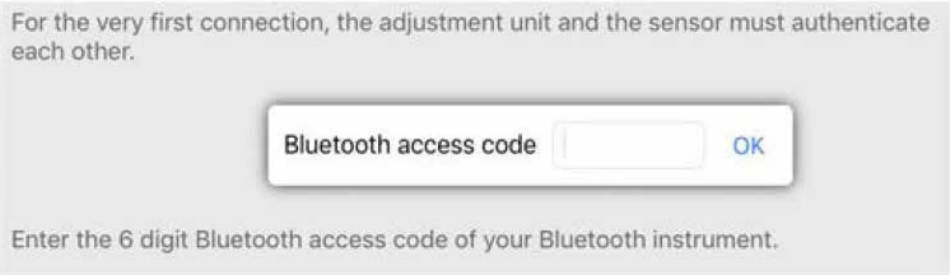


Fig. 17: Enter Bluetooth access code

Note:
If an incorrect code is entered, the code can only be entered again after a delay time and the delay time gets longer after each incorrect entry.

The message *“Waiting for authentication”* is displayed on the smartphone/tablet.

After connection, the sensor adjustment menu is displayed on the smartphone/tablet.

If the Bluetooth connection is interrupted, e.g. due to a too large distance between the two devices, this is displayed on the smartphone/tablet. The message disappears when the connection is restored.

Parameter adjustment of the device is only possible if the parameter protection is deactivated, which is default. Parameter protection can be activated later if desired.

7.3 Parameter adjustment

The sensor adjustment menu is divided into two areas, which are arranged next to each other or one below the other, depending on the adjustment tool.

- Navigation section
- Menu item display

The selected menu item can be recognized by the color change.

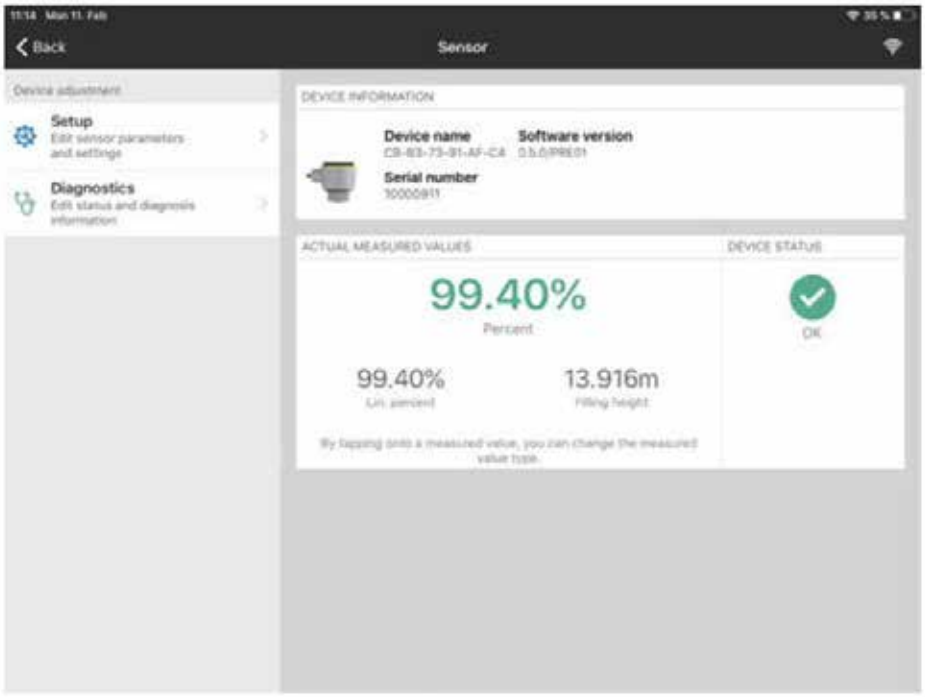


Fig. 18: Example of an app view - Setup sensor adjustment

Enter the requested parameters and confirm via the keyboard or the editing field. The settings are then active in the sensor.

Close the app to terminate connection.

Note:

If the CNCR fails to connect to the Wireless Device Configuration App (WDCA) via Bluetooth, close the (WDCA), power cycle the Bluetooth on your device, and repeat the steps above.

If further action is required, power cycle the Bluetooth on your device, and repeat the steps above.

8 Diagnostics and servicing

8.1 Maintenance

If the device is used properly, no special maintenance is required in normal operation.

In some applications, buildup on the antenna system can influence the measurement. Depending on the sensor and application, be careful to avoid heavy soiling of the antenna system. If necessary, clean the antenna system periodically.

8.2 Status messages

The status messages are divided into the following categories:

- Failure
- Function check
- Out of specification
- Maintenance required

Failure

Code Text message	Cause	Rectification	DevSpec State in CMD 48
F013 No measured value available	No measured value in the boot up phase or during operation	Check or correct installation and/ or parameter settings Clean the antenna system	Byte 5, Bit 0 of Byte 0-5
F017 Adjustment span too small	Adjustment not within specification	Change adjustment according to the limit values (difference between min. and max. ≥ 10 mm)	Byte 5, Bit 1 of Byte 0-5
F025 Error in the linearization table	Linearization values are not continuously rising, for example illogical value pairs	Check linearization table Delete table/Create new	Byte 5, Bit 2 of Byte 0-5
F036	Checksum error if software update failed or aborted	Repeat software update Send instrument for repair	Byte 5, Bit 3 of Byte 0-5
F040 Error in the electronics	Limit value exceeded in signal processing Hardware error	Restart instrument Send instrument for repair	Byte 5, Byte 5, Bit 4 of Byte 0-5
F080 General software error	General software error	Restart instrument	Byte 5, Byte 5, Bit 5 of Byte 0-5
F105 Determine measured value	The instrument is still in the boot up phase, the measured value could not yet be determined	Wait for the end of the boot up phase Duration up to 3 minutes depending on the measurement environment and parameter settings	Byte 5, Byte 5, Bit 6 of Byte 0-5
F260 Error in the calibration	Checksum error in the calibration values Error in the EEPROM	Send instrument for repair	Byte 4, Bit 0 of Byte 0-5
F261 Error in the instrument settings	Error during setup False signal suppression faulty Error when carrying out a reset	Repeat setup Resent instrument	Byte 4, Bit 1 of Byte 0-5
F265 Measurement function disturbed	Program sequence of the measuring function disturbed	Device restarts automatically	Byte 4, Bit 3 of Byte 0-5

Function check

Code Text message	Cause	Rectification	DevSpec State in CMD 48
C700 Simulation active	A simulation is active	Finish simulation Wait for the automatic end after 60 mins.	“Simulation Active” in “Standardized Status 0”

Out of specification

Code Text message	Cause	Rectification	DevSpec State in CMD 48
S600 Impermissible electronics temperature	Temperature of the electronics in the non-specified range	Check ambient temperature Insulate electronics	Byte 23, Bit 4 of Byte 14-24
S601 Overfilling	Danger of vessel overfilling	Make sure that there is no further filling Check level in the vessel	Byte 23, Bit 5 of Byte 14-24
S603 Impermissible operating voltage	Terminal voltage too small	Check terminal voltage, increase operating voltage	Byte 23, Bit 6 of Byte 14-24

Maintenance

Code Text message	Cause	Rectification	DevSpec State in CMD 48
M500 Error in the delivery status			Bit 0 of Byte 14-24
M501 Error in the delivery status			Bit 1 of Byte 14 -24
M504 Error at a device interface	Hardware defect	Check connections Exchanging the electronics Send instrument for repair	Bit 4 of Byte 14-24
M505 No echo available	Sensor does not detect an echo during operation Antenna dirty or defective	Clean the antenna Use a more suitable antenna/sensor Remove possible false echoes Optimize sensor position and orientation	Bit 5 of Byte 14-24
M507 Error in the instrument settings	Error during setup Error when carrying out a reset False signal suppression faulty	Carry out reset and repeat setup	Bit 7 of Byte 14-24
M508 Data error in program memory Bluetooth controller			Bit 8 of Byte 14-24
M509 Software update			Bit 9 of Byte 14-24
M510 No communication with the sensor			Bit 10 of Byte 14-24

9 Removal

9.1 Disposal

The device is made of recyclable materials. For this reason, it should be disposed of by a specialist recycling company. Observe the applicable national regulations.

10 Certificates and approvals

10.1 Radio licenses

Radar

The device has been tested and approved in accordance with the current edition of the applicable country-specific norms or standards.

Bluetooth

The Bluetooth radio module in the device has been tested and approved according to the current edition of the applicable countryspecific norms or standards.

11 Supplement

11.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

Materials and weights	
Materials, wetted parts	
– Antenna, process fitting	PVDF
– Process seal	FKM
Materials, non-wetted parts	
– Housing	Plastic PBT (Polyester)
– Housing seals	O-rings (silicone)
– Cable gland	PA
– Sealing, cable gland	NBR
– Blind plug, cable gland	PA
– Weight	0.7 kg (1.543 lbs)

Torques	
Max. torque mounting boss	7 Nm (5.163 lbf ft)
Max. torque for NPT cable glands and conduit tubes	10 Nm (7.376 lbf ft)

Measurement Range	
Measurement Range	The measurement range is the distance between the antenna edge of the sensor and the product surface. The antenna edge is also the reference plane for the measurement.

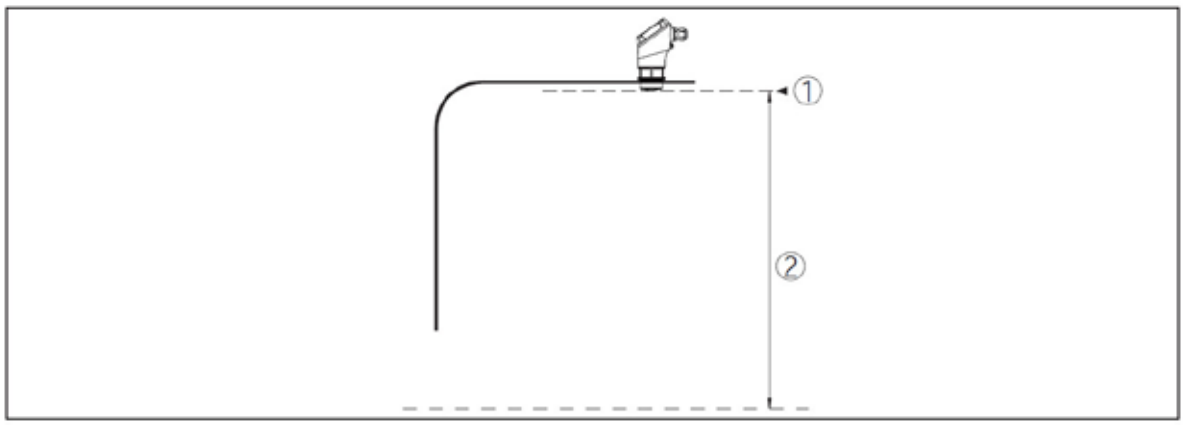


Fig. 19: Measurement Range
1 Reference plane
2 Measured variable, max. measuring range

Max. measuring range	15 m (49.21 ft)
Recommended measuring range	up to 10 m (32.81 ft)

Output	
Output signal	4 to 20 mA
Range of the output signal	3.8 to 20.5 mA (default setting)
Signal resolution	0.3 µA
Resolution, digital	1 mm (0.039 in)
Fault signal, current output (adjustable)	≤ 3.6 mA, >=21 mA, last valid measured value
Max. output current	22 mA
Load	See load resistance under Power supply
Starting current	≤ 3.6 mA; ≤ 10 mA for 5 ms after switching on
Damping (63 % of the input variable), adjustable	0 to 999 s

Ambient conditions	
Ambient temperature device	-40 to +70 °C (-40 to +158 °F)
Ambient temperature display	-25 to +80 °C (-13 to +176 °F)
Storage and transport temperature	-40 to +80 °C (-40 to +176 °F)

Process conditions	
For the process conditions, please also note the specifications on the printed label. The lowest value (amount) always applies.	
Process temperature	-40 to +80 °C (-40 to +176 °F)
Process pressure	-1 to 3 bar (-100 to 200 kPa/-14.5 to 43.51 psig)

Voltage supply	
Operating voltage UB	
– at 4 mA	12 to 35 V DC
– at 20 mA	9 to 35 V DC
Operating voltage UB - illuminated display and adjustment unit	15 to 35 V DC

Electrical protective measures	
Potential separation	Electronics potential free up to 500 V AC
Protection rating	IP66/IP67 acc. to IEC 60529
Altitude above sea level	5000 m (16404 ft)
Protection class	III
Pollution degree	4

11.2 Dimensions

CNCR-230

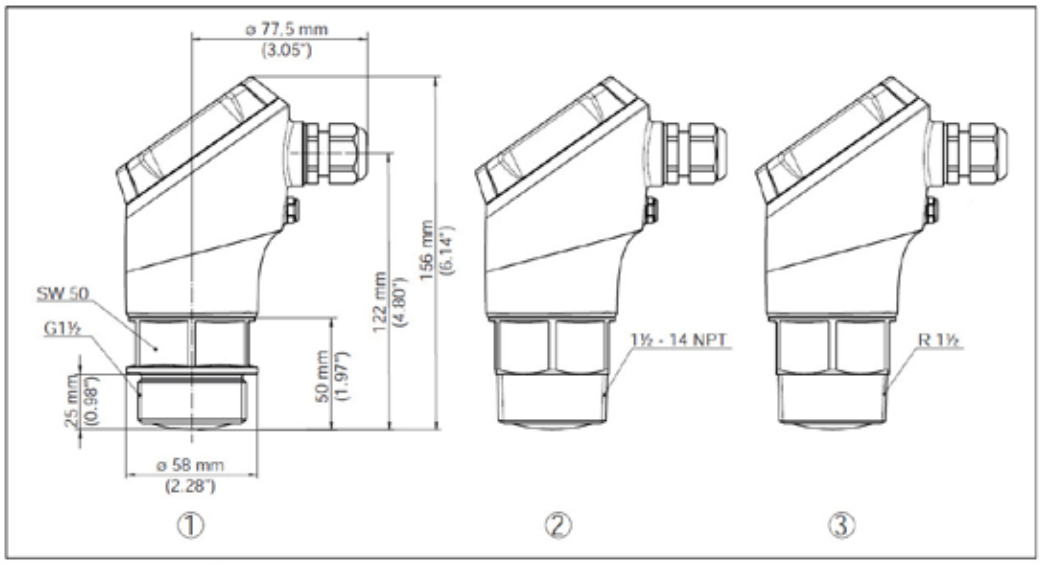


Fig. 20: Dimensions CNCR-230

1. Thread G1½
2. Thread 1½ NPT
3. Thread R1½

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice.

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