Quick Setup Guide

Radar sensor for continuous level measurement of bulk solids

NCR-80

4-20 mA/HART–four-wire

BINMASTER

www.binmaster.com

Mounting

Mounting preparations, mounting strap

The strap is supplied unassembled and must be attached to the sensor before setup with three hexagon screws M5 x 10 and spring washers. Required tools: Allen wrench size 4.

There are two ways to attach the strap onto the sensor. Depending on the selected version, the sensor can be swivelled in the strap as follows:

- Single chamber housing
  - Angle of inclination 180°, infinitely variable
  - Angle of inclination in three steps 0°, 90° and 180°
- Double chamber housing
  - Angle of inclination 90°, infinitely variable
  - Angle of inclination in two steps 0° and 90°

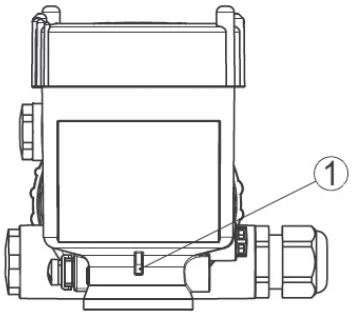


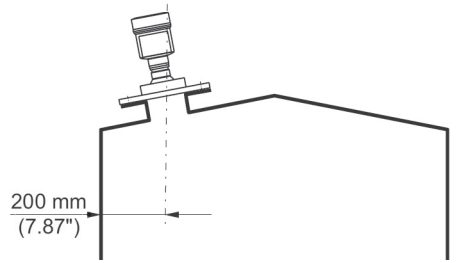
Fig. 1: Position of the polarization
1 Notch for marking the direction of polarization

Polarization

Mounting instructions
Radar sensors for level measurement emit electromagnetic waves. The polarization is the direction of the electrical component of these waves.

The polarization direction is marked by a notch on the housing. (Fig. 1.)

Note:
When the housing is rotated, the direction of the polarization of the radar signal changes. This influences the effect of the false signal suppression on the measured value, so please keep this in mind when mounting or making changes later.



Installation position

Mount the sensor at least 200 mm (7.874 in.) away from the vessel wall.

Fig. 2: Mounting the radar sensor on the vessel top

If you cannot maintain minimum sidewall distance, it is important to carry out a false signal suppression during setup.

Connecting to power supply

Connection

The voltage supply and signal output are connected via the springloaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

Fig. 3: Connection steps 5 and 6

Connection procedure

1. Unscrew the housing cover.
2. Loosen compression nuts of the cable glands.
3. Remove approx. 10 cm (4 in) of the cable mantle (signal output). Strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires.
4. Insert the cable into the sensor through the cable entry.
5. Insert the wire ends into the terminals according to the wiring plan.

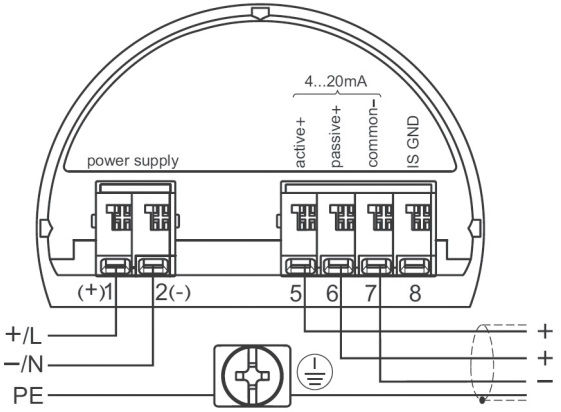
Note:
Solid wires as well as stranded wires with ferules can be inserted directly into the terminal blocks. For stranded wires without ferules, be sure to open the terminal block fully with a small screwdriver and insert the wires. Be careful not to allow strands to bend out of the terminal and contact other wires or metal.

6. Check the hold of the wires in the terminals by lightly pulling on them.
7. For signal wiring, connect the cable shield wire to the internal ground on the signal wiring connector.
8. For power wiring, connect the supply ground wire to the enclosure ground lug.
9. Tighten the compression nut of the cable glands. The seal ring must completely encircle the cables.
10. Screw the housing cover back on.

Note:
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in place.

Wiring plan, double chamber housing

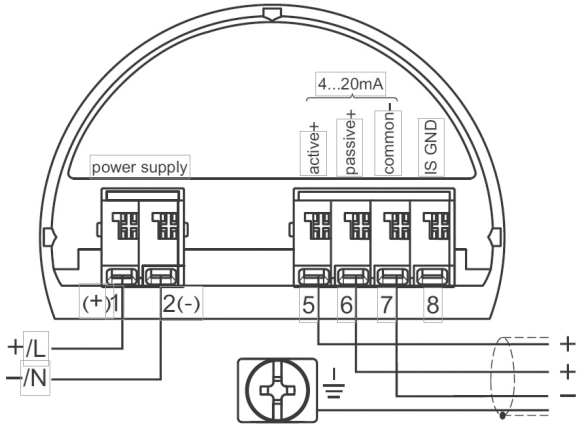
Connection compartment with mains voltage



Terminal	Function	Polarity
1	Voltage supply	+/L
2	Voltage supply	-/N
5	4–20 mA output (active)	+
6	4–20 mA output (passive)	+
7	Mass - output	-
8	Function ground with installation according to CSA	

Fig. 4: Connection compartment with double chamber housing with mains voltage

Connection compartment with low voltage



Terminal	Function	Polarity
1	Voltage supply	+/L
2	Voltage supply	-/N
5	4–20 mA output (active)	+
6	4–20 mA output (passive)	+
7	Mass - output	-
8	Function ground with installation according to CSA	

Fig. 5: Connection compartment with double chamber housing with low voltage

Set up with the display and adjustment module

Insert display and adjustment module

The BinDisc display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each at 90° intervals. It is not necessary to interrupt the power supply.

1. Unscrew the housing cover.
2. Place the BinDisc display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in place.
3. Screw housing cover with inspection window tightly back on.

Disassembly is carried out in reverse order.

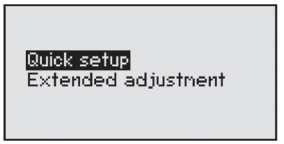
The BinDisc display and adjustment module is powered by the sensor, an additional connection is not necessary.

Fig. 6: Insertion of the display and adjustment module with single chamber housing

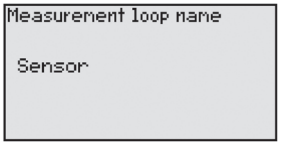
Note:
The BinDisc display is used to monitor the measured value on the unit. If you intend to add a BinDisc display module to an instrument that did not originally have one, you will also need a raised cover with a glass window.

Parameter adjustment - Quick setup

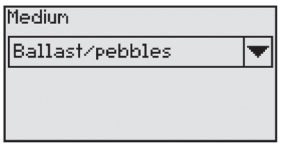
To quickly and easily adapt the sensor to the application, select the menu item “Quick setup” in the start graphic on the display and adjustment module.



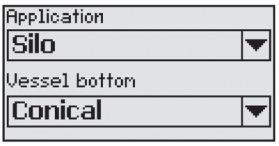
Carry out the following steps in sequence.



1. Measurement loop name
Assign a suitable measurement loop name. Names can have a maximum of 19 characters.

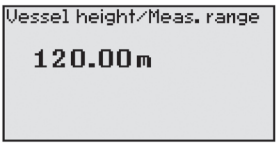


2. Medium
Select the type of bulk solid. The selection comprises different granulate sizes.



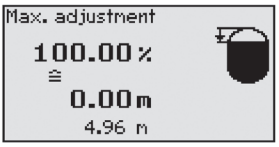
3. Application/Vessel bottom

Specify the application and the form of the vessel bottom.



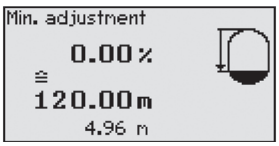
4. Vessel height/Measuring range

Enter the height of the vessel and the active measuring range.



5. Max. adjustment

Enter the measuring distance for 100% filling.



6. Min. adjustment

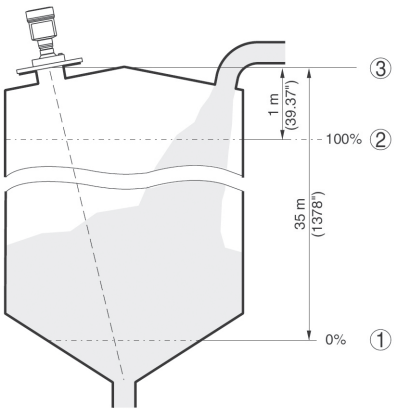
Enter the measuring distance for 0% filling.

The quick setup is finished.

Parameter adjustment - Extended adjustment

Since the radar sensor is a distance measuring instrument, the distance from the sensor to the product surface is measured. For indication of the product level, a ratio of the measured distance to the percentage height must be carried out.

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



Setup - adjustment

1. Min. level = max. meas. distance
2. Max. level = min. meas. distance
3. Reference plane

Fig. 7: Parameter adjustment example min./max. adjustment

If these values are not known, an adjustment with the distances of, for example, 10% and 90% is possible. Starting point for these distance specifications is always the seal surface of the thread or flange.

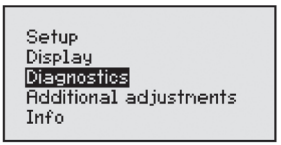
The product level during this adjustment is not important because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

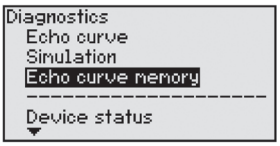
Diagnostics - Echo curve memory
The function “Setup” allows the echo curve to be saved at the time of installation.

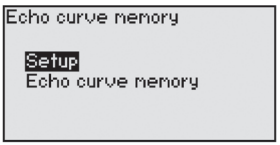
> **Note:**
> Saving the echo curve is generally recommended. However, for use of the Asset Management functions it is absolutely necessary. Saving should be carried out with a very low level.

The “Echo curve memory” function allows up to ten individual echo curves to be stored, for example to detect the measurement behavior of the sensor in different operating conditions.

With the adjustment software PACTware and the PC, the stored echo curves can be displayed with high resolution and used to recognize signal changes over time. In addition, the echo curve saved during setup can also be displayed in the echo curve window and compared with the actual echo curve.







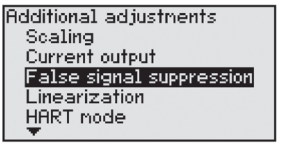
Additional adjustments - False signal suppression

The following circumstances cause interfering reflections and can influence the measurement:

- High standpipes
- Vessel installations such as structures, cages or ladders
- Agitators
- Buildup or welded joints on vessel walls

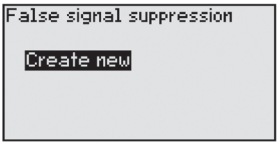
> **Note:**
> A false signal suppression detects, marks and saves these false signals so they are no longer taken into account in the level measurement.

This should be done with a low level so all potential interfering reflections can be detected.

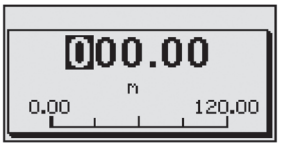


1. Select with [->] the menu item “False signal suppression” and confirm with [OK].

2. Confirm again with [OK].



3. Confirm again with [OK].



4. Confirm again with [OK] and enter the actual distance from the sensor to the product surface.

5. All interfering signals in this section are detected by the sensor and stored after confirming with [OK].

Note:
It is critical to know the distance to the product level before doing a false signal suppression. If the false signal suppression distance range includes actual product level, then the product level will be stored as a false signal and not detectable in this area.

If a false signal suppression has already been created in the sensor, the following menu window appears when selecting “False signal suppression”:

Delete: An already created false signal suppression will be completely deleted. This is useful if the saved false signal suppression no longer matches the physical conditions in the vessel.

Extend: is used to extend an already created false signal suppression. This is useful if a false signal suppression was carried out with a too high level and not all false signals could be detected. When selecting “Extend”, the distance to the product surface of the created false signal suppression is displayed. This value can now be changed, and the false signal suppression can be extended to this range.

Supplement

Technical data

Electromechanical data - version IP 66/IP 67

Cable gland	M20 x 1.5 or ½ NPT
Wire cross-section (spring-loaded terminals)	
– Massive wire, stranded wire	0.2–2.5 mm² (AWG 24–14)
– Stranded wire with end sleeve	0.2–1.5 mm² (AWG 24–16)

Voltage supply

Operating voltage	
– Version for low voltage	9.6–48 V DC, 20–42 V AC, 50/60 Hz
– Version for mains voltage	90–253 V AC, 50/60 Hz
Reverse voltage protection	Integrated
Max. power consumption	4 VA; 2.1 W