

PWL-R803

RADAR LEVEL SENSOR

Installation & Operation Manual

Non-Contact Radar — 4–20 mA + HART — Explosion-Proof: Ex ib IIC T6 Gb

Document prepared for reference and field use. Always confirm site-specific procedures against your facility's engineering standards and any manufacturer documentation shipped with the unit.

1. Overview

The PWL-R803 is a non-contact radar level transmitter used to continuously measure liquid or bulk solid level inside tanks, silos, or vessels without any part of the instrument touching the process material. It mounts to a flanged nozzle at the top of the vessel and directs a low-power radar pulse down toward the material surface.

Because the sensor never contacts the process, it is well suited to corrosive, viscous, dirty, or turbulent media, and it has no moving parts to wear out, foul, or require recalibration due to mechanical wear.

1.1 How It Works

The antenna at the base of the housing emits a radar pulse into the vessel. The pulse travels through the vapor space, reflects off the surface of the material, and returns to the antenna. The sensor's internal electronics precisely time this round trip.

1. The transmitter emits a radar microwave pulse downward through the process connection.
2. The pulse reflects off the surface of the liquid or solid inside the vessel.
3. The returning echo is captured by the same antenna.
4. Onboard electronics calculate distance from the time-of-flight of the pulse, since radar travels at a known, constant speed.
5. Distance is converted to a level reading (empty/full percentage or engineering units) using the configured vessel dimensions.
6. The result is output continuously as a 4–20 mA analog signal, with HART digital data superimposed on the same two wires.

Because the measurement is based on travel time rather than signal strength, accuracy is largely unaffected by changes in the material's density, dielectric properties (within the sensor's working range), or vapor conditions above the surface.

2. Safety Information

WARNING — Explosion-Proof Rating

This unit is rated Ex ib IIC T6 Gb for use in hazardous (classified) locations. Installation, wiring, and maintenance must be performed only by qualified personnel following applicable local and national electrical codes for hazardous areas (e.g., NEC Article 500 / IEC 60079). Do not open the housing while energized in a classified area unless the area is confirmed non-hazardous.

CAUTION — Pressure & Process Conditions

Confirm the process connection rating (flange class, gasket material) is suitable for the vessel's operating pressure and temperature before installation. Do not exceed the sensor's rated process conditions.

General safety guidelines:

- De-energize the 24 V DC supply before opening the housing or connecting/disconnecting wiring.
- Verify the vessel is depressurized and isolated per site lockout/tagout procedures before removing or installing the sensor.
- Do not remove or bypass the housing seals/O-rings — the IP67 rating depends on them being correctly seated.

- Use only cable and cable glands rated for the area classification.
- Ensure the enclosure ground screw is connected to facility ground before energizing the unit.

3. Specifications

Specification	Value
Model	PWL-R803 Radar Level Sensor
Measurement Range	0–100 feet
Power Supply	24 V DC
Output Signal	4–20 mA + HART
Accuracy	± 1 mm
Ingress Protection	IP67
Explosion-Proof Rating	Ex ib IIC T6 Gb
Process Connection	Flanged (see nameplate/order documentation for size and rating)
Local Display	Backlit LCD with 4-button keypad (BK / ↑ / ↵ / OK)

Refer to the nameplate on the unit for the serial number and any project-specific configuration recorded at the factory.

4. Physical Components

- Cable gland — sealed entry point for the field wiring cable, located on the upper housing.
- Local display window — yellow bezel with backlit LCD, sealed for outdoor/washdown use.
- Keypad (BK, ↑, ↵, OK) — accessed on the front face for local configuration and diagnostics.
- Nameplate — stamped with model, range, supply voltage, output type, accuracy, protection grade, explosion-proof rating, and serial number.
- Ground screw — for bonding the housing to facility ground.
- Process connection cap / plug — protective cover over an unused port; remove only as required for your installation.
- Mounting flange — bolts to the vessel nozzle; the antenna faces down into the vessel through this connection.
- Antenna (PTFE-covered horn/rod) — emits and receives the radar pulse; keep free of buildup for best performance.
- Locking bracket — secures the housing against rotation once orientation of the display is set.

5. Installation

5.1 Mechanical Installation

7. Select a nozzle location away from the fill stream, ladders, or internal obstructions (agitators, heating coils) that could interfere with the radar beam.
8. Confirm the nozzle diameter and flange rating match the sensor's process connection.
9. Install a compatible gasket between the sensor flange and the vessel nozzle flange.

10. Lower the sensor onto the nozzle with the antenna facing down into the vessel, and hand-tighten the flange bolts.
11. Tighten bolts evenly in a cross (star) pattern to the gasket manufacturer's recommended torque.
12. Loosen the locking bracket, rotate the housing so the display faces an accessible viewing angle, then re-tighten the bracket.

5.2 Electrical Installation

13. Verify the power supply is de-energized before wiring.
14. Route the field cable through the cable gland and tighten the gland to maintain the IP67 seal around the cable jacket.
15. Connect 24 V DC supply and the 4–20 mA/HART loop per the wiring diagram inside the terminal compartment.
16. Connect the ground screw to facility ground.
17. Replace and secure the terminal compartment cover before energizing the unit.
18. Energize the 24 V DC supply and confirm the local display activates.

6. Operation

6.1 Local Display & Keypad

The front keypad allows local viewing of the measured level and basic configuration without additional tools.

Key	Function
BK	Back / Escape — exits the current menu or cancels an edit without saving.
↑ (Up Arrow)	Scroll through menu items, or increase the selected digit when editing a value.
↻ (Rotate)	Move to the next digit/field when editing, or enter the main menu from the measurement screen.
OK	Confirm a selection, enter a submenu, or save an edited value.

6.2 Basic Menu Navigation

19. From the live measurement screen, press ↻ to enter the main menu.
20. Use ↑ to scroll to the desired menu item (e.g., units, range, damping, display mode).
21. Press OK to enter the selected item.
22. Use ↻ to move between digits/fields and ↑ to change a value.
23. Press OK to save the change, or BK to cancel and return without saving.
24. Press BK repeatedly to return to the live measurement screen.

Note: exact menu wording and structure can vary by firmware revision. If a menu item does not match this description, consult the configuration menu tree printed on the inside of the terminal compartment cover, or the documentation shipped with your specific unit.

6.3 HART Communication

The 4–20 mA loop carries superimposed HART digital data, allowing a HART communicator or compatible asset management software to remotely read the measurement, adjust configuration, and pull diagnostic information without interrupting the analog signal.

7. Maintenance

- Periodically inspect the antenna for buildup, condensation, or coating that could affect signal strength; clean per the material compatibility of the antenna covering.
- Check that the housing seals, cable gland, and display window remain intact to preserve the IP67 rating.
- Verify the ground connection remains tight during routine inspections.
- Confirm the 4–20 mA output against a known reference periodically, per your site's calibration schedule.
- Do not disassemble the explosion-proof enclosure beyond what is required for wiring access, and always restore all covers and seals before re-energizing.

8. Troubleshooting

Symptom	Likely Cause / Action
No display / no output	Check 24 V DC supply and wiring polarity; verify terminal compartment cover is fully seated.
Erratic or jumping level reading	Check for turbulence, foam, or an obstruction in the beam path; verify damping/filtering settings in the menu.
Reading stuck at 0% or 100%	Confirm empty/full (zero/span) calibration matches actual vessel dimensions; check antenna for buildup or blockage.
No HART communication	Confirm loop resistance is within HART communicator requirements (typically 230–1100 Ω) and connections are at the correct terminals.
Keypad unresponsive	Confirm the unit is powered; a firmware fault may require a power cycle.

9. Nameplate Reference

Record the information from your unit's nameplate here for quick reference during service calls or reordering:

Field	Value
Model	PWL-R803 Radar Level Sensor
Range	0–100 feet
Supply	24 V DC
Output	4–20 mA + HART
Precision	± 1 mm
Protection Grade	IP67
Explosion-Proof Grade	Ex ib IIC T6 Gb
Serial Number	(record from unit nameplate)