

Integrated Level Meter User Manual



1. Product Introduction

1.1 Features

This level meter supports the RS485 protocol and 4-20mA two-wire output. The maximum measuring range reaches 15 m, with the blind zone as low as 5 cm under small-range conditions. The sensor adopts a high-performance acoustic transducer assembly with a shorter wavelength, delivering excellent adaptability for solid material detection; it withstands high temperatures up to +70 °C and performs stably in complex conditions such as heavy dust and harsh temperature fields. The instrument uses a threaded mounting structure for simple installation and removal, enabling convenient on-site deployment.

Main advantages are as follows:

- Equipped with a high-performance acoustic transducer assembly, the circuit architecture is compact and streamlined with a high signal-to-noise ratio, effectively reducing the measurement blind zone.
- Excellent acoustic directivity with minimal interference from the external environment, suitable for various on-site installation scenarios.
- The shorter wavelength delivers good detection on solid material surfaces; stable detection is achieved with conventional mounting posture, without requiring an additional universal flange for calibration and alignment.
- Performance complies with the national standard DB50/T 826-2017 General Technical Requirements for Water Level Meters. Core components adopt a fully sealed structure with an IP67 ingress protection rating, providing excellent waterproof and dustproof capability.

1.2 Communication and Debugging

On site, the instrument can be debugged via the LCD, or with the optional host computer software on a PC.

Communication between the 485 interface and the PC is achieved as follows:

- (1) USB-to-RS485 serial port module;

2. Technical Parameters

Range	0.05~15m	Display Temperature	-10°C~70°C
Accuracy	±2mm	Sensor Operating Temperature	-40°C~70°C
Blind Zone	5 cm (liquid)	Two-Wire Sampling Frequency	1500 ms / configurable
Beam Angle	±6 °	485 Sampling Frequency	200 ms / configurable
Signal Output	4-20mA / RS485 (switchable)	Housing Material	PC material
Ingress Protection Rating	IP67	Temperature Detection Range	-70°C~150°C
Two-Wire Power Supply	DC 22~26V	Screen Backlight	Supported
485 Power Supply	DC 9~26V	Communication Protocol	Modbus
Recommended Cable	4-8 mm outer diameter cable	Pulse Current	Inrush current 58 mA at startup

3. Key Operation Instructions

Key	Main Interface Function	Settings Interface Function
SET	Enter system settings	Return to previous level
▲	Enter system settings	Move up / increase value
▼	Enter system settings	Move down / decrease value
OK	Enter system settings	Enter submenu / confirm / save

4. Structural Dimensions

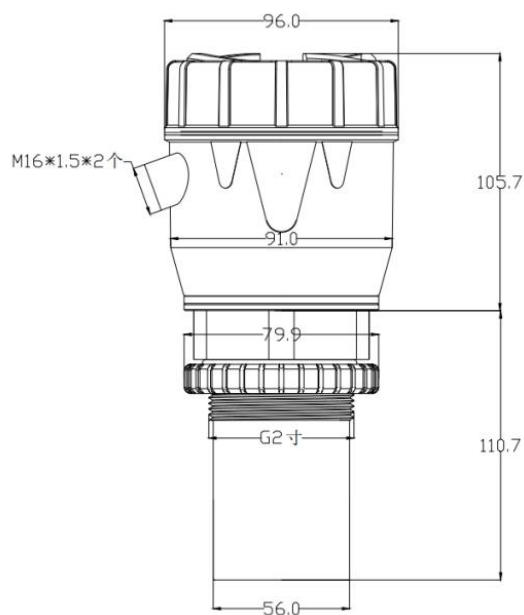


Fig. 4-1 Product Dimension Drawing

5、 Product Wiring

5.1 Two-Wire 4-20mA Communication Product Wiring Diagram

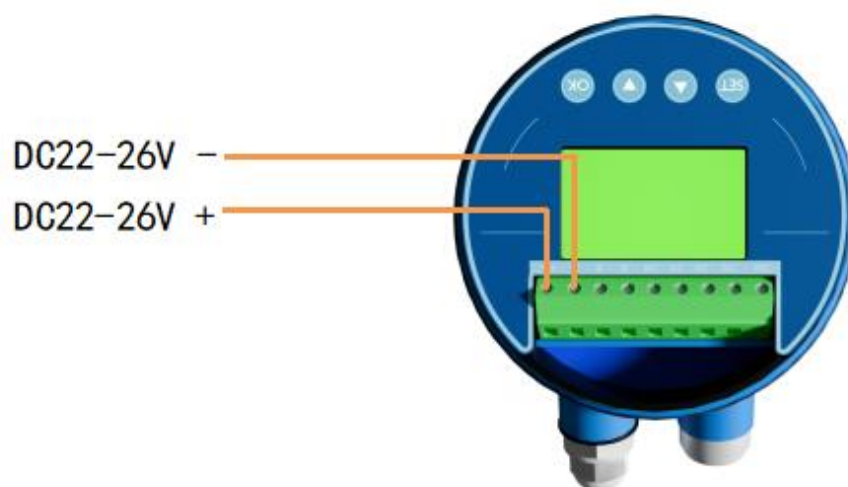


Fig. 5-1 Two-Wire 4-20mA Wiring Diagram

Power on for output; 4 mA = low end of range, 20 mA = high end of range.

5.2 RS485 Communication Product Wiring Diagram

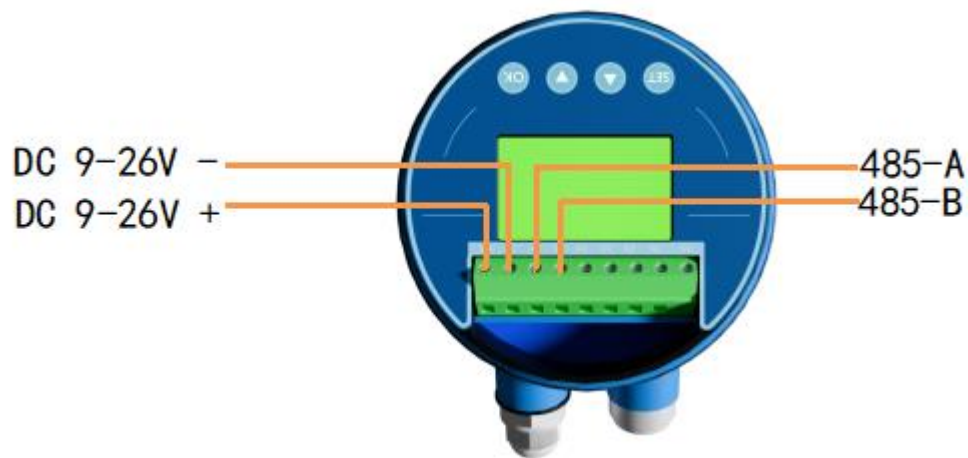


Fig. 5-2 485 Wiring Diagram

Default address code 127, baud rate 9600, Modbus protocol.

5.3 Three-Wire 4-20mA + 485 Communication Product Wiring Diagram

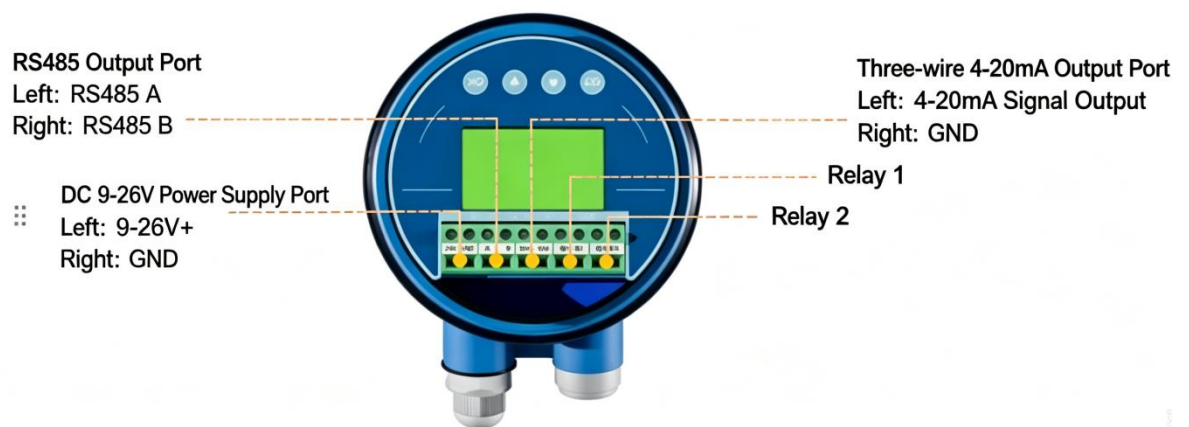


Fig. 5-3 Three-Wire Wiring Diagram

From left to right:

- (1) Two sensor power ports: 9-26V, GND
- (2) Two 485 communication output ports: 485 A, 485 B
- (3) Three-wire 4-20mA output ports (two): 4-20mA signal line, GND
- (3) Two relay channels (four ports): Relay 1, Relay 2

6. Installation Requirements (Must Be Followed)

Vertical installation: Keep the antenna surface as perpendicular as possible to the measured material or water surface to ensure the strongest echo.

Away from the feed inlet: The device must not be aimed at the feed inlet to avoid interference from falling material.

No obstacles within the beam: Ensure there are no obstacles such as ladders, steps, or beams within the beam angle ($\pm 6^\circ$).

Conical vessels: Try to aim the beam directly at the lowest point of the tank bottom; avoid oblique incidence that causes inaccurate bottom measurement.

6.1 Installation Example — Sealed Tank Scenario

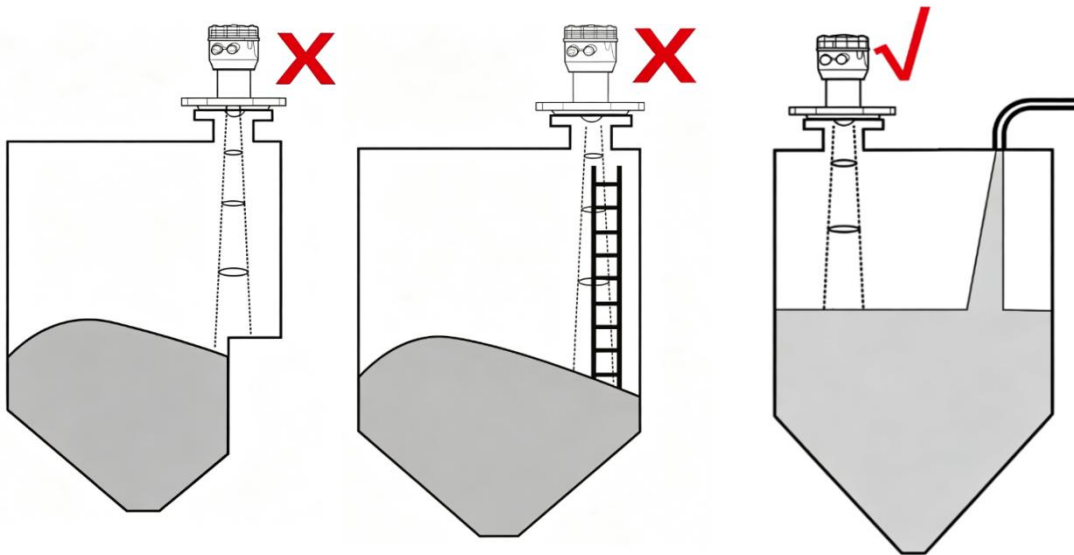


Fig. 6-1 Installation Example for Sealed Scenario

- The radar installation position must keep the beam completely clear of ladders and steps, and away from the feed and material-drop zone, ensuring no interference below.

10cm away from tank wall

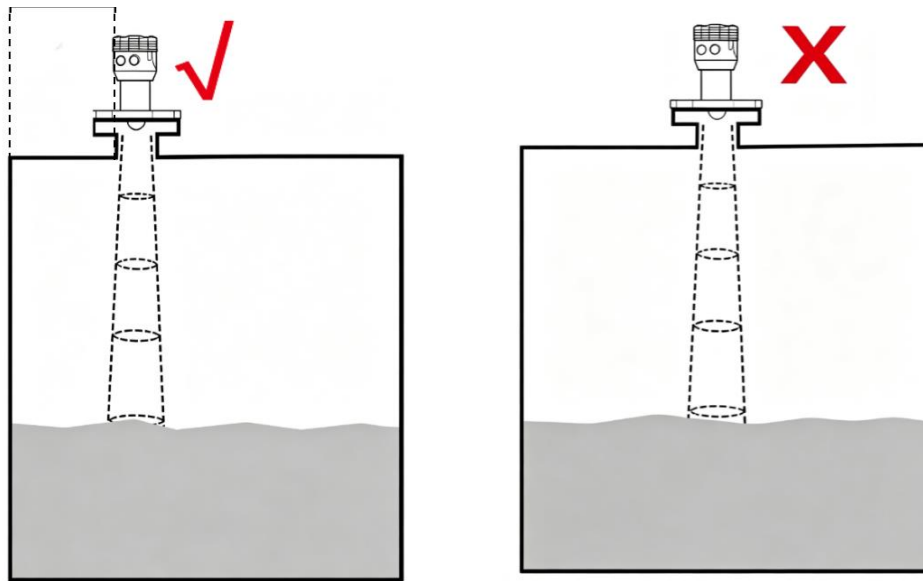


Fig. 6-2 Installation Example for Sealed Scenario

- It is recommended to keep the radar installation position about 10cm from the tank wall (the wall must be smooth). Installing at the center of the tank tends to cause multiple internal reflections, resulting in secondary echo interference.

6.2 Installation Example — Open Scenario

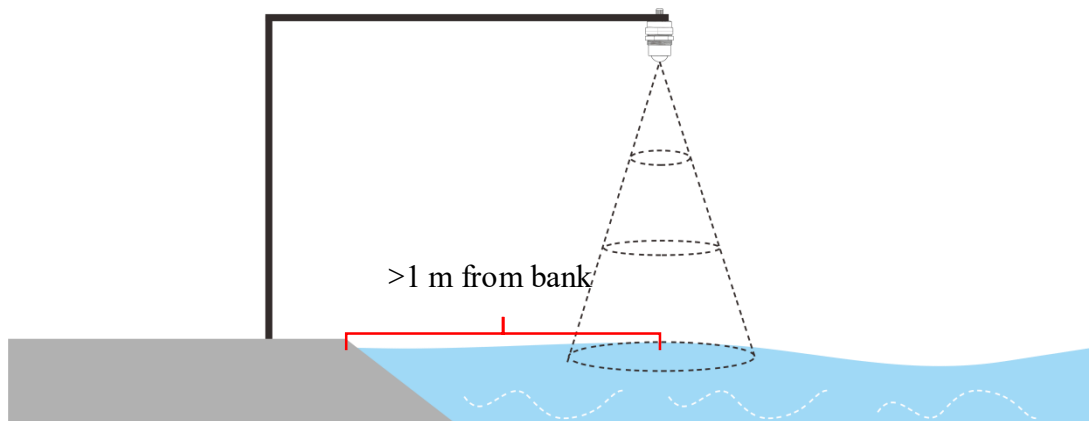


Fig. 5-3 Installation Example for Open Scenario

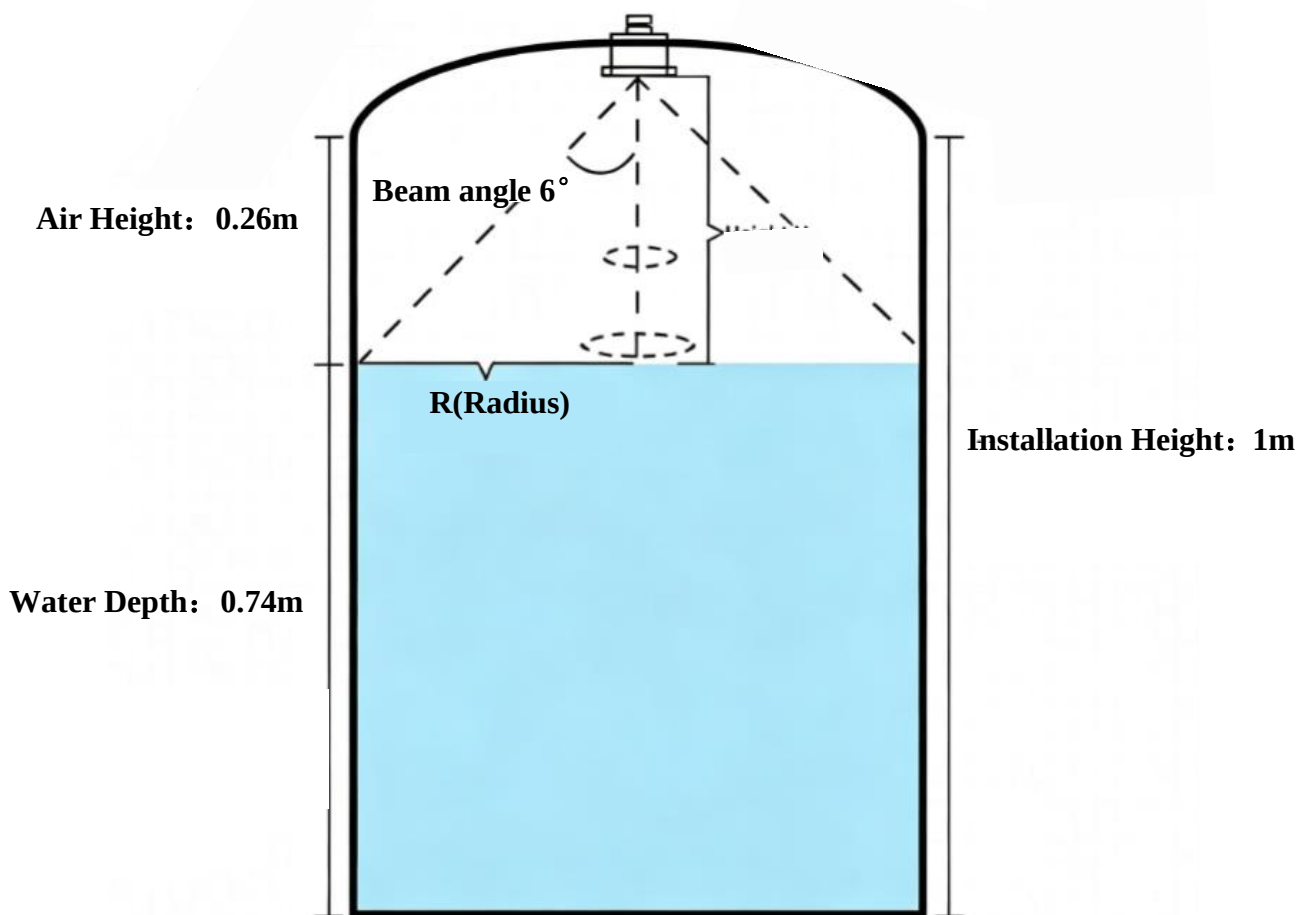
- The radar installation position should be at least 1m from the bank, and the mounting point should avoid areas with large waves or heavy surging, as large waves cause echo distortion and increased measurement error.
- Keep away from bank obstacles, foam, and floating objects to avoid false echoes.

7. Terminology Diagram

Air Height: distance from the sensor probe to the liquid surface / measured surface

Water Depth: distance from the tank bottom / water bottom to the liquid surface

Installation Height: distance from the sensor probe to the tank bottom;



Measurement height formula: $H = R(\text{Radius}) / \tan(\text{Beam angle})$

Example: $H = R / \tan 6^\circ$

Fig. 7-1 Beam Parameter Principle Schematic

8. Quick Debugging [Ready in 3 Steps]

Step	Operation
1	Power-on confirmation: for 4-20mA mode, connect a DC 22-26V power supply; for 485 mode, connect DC 9-26V. The screen lights up and shows the menu interface, indicating successful power-on. Δ After power-on, if using two-wire mode, use a multimeter to check whether the sensor supply voltage is between 22V-26V. If the measured voltage is slightly below 22V, turn off the sensor backlight to reduce operating current and avoid inaccurate current output caused by undervoltage.
2	Set installation height or installation water depth (choose one): Press SET → select "Water Level Config" → press OK → select "Installation Height" or "Installation Water Depth" • Installation height = distance from the sensor probe position to the bottom of the water / vessel (to be measured manually). • Installation water depth = distance from the current water surface to the bottom of the water / vessel (to be measured manually); after entering the value, press OK to save.
3	Return to main interface: press SET to return level by level; the main interface shows the real-time liquid / material level value. Debugging completed.

9. Common Setting Paths

Requirement	Menu Path
Switch mounting mode	Application Config → Mounting Mode → Conventional / Suspended
4-20mA Calibration	Calibration Config → Current Calibration → 4mA / 20mA
4-20mA Range Mapping	Calibration Config → Parameter Config → 4mA Corresponds To / 20mA Corresponds To
Switch signal output	Output Signal → RS485 / 4-20mA
485 Parameter Setting	485 Config → Address Code / Baud Rate
Large data fluctuation	Data Smoothing → Variation Range + Duration + Sliding Window Filter
Weak echo energy	Application Config → Power Adjustment → set to level 2~5
Multiple echoes in enclosed space	Application Config → Application Algorithm → select nearest frequency point
Language switch	Sensor Config → System Language → Chinese/English
Restore current to factory default	Calibration Config → Restore Default → Confirm
Screen Backlight	Sensor Config → Screen Backlight → On / Off
Blind zone setting	Application Config → Mounting Mode → Microwave Blind Zone

Suspended mounting mode: directly masks the distance of about 20 cm downward from the probe; suitable for open environments.

Conventional mounting mode: for materials / water levels that may rise close to or even touch the sensor probe antenna, e.g., material bins, vessels, etc.

10. Common Troubleshooting

Symptom	Possible Cause and Handling
Sensor cannot communicate	(1) For a 485 communication sensor, use a multimeter to check whether the voltage is within 9-26V. (2) For a two-wire communication sensor, use a multimeter to check whether the voltage is within 22-26V. (3) Confirm correct wiring: for a 485 communication sensor, connect sensor A to A and B to B. (4) Confirm the baud rate: the sensor default baud rate is 9600; please confirm the baud rate matches. (5) Confirm the serial tool: short the serial tool's TX to RX, and A to B respectively, and perform a loopback (self-transmit/receive) test to verify whether the serial tool's transmit/receive function works properly.
Values occasionally jump randomly	Enter "Data Smoothing" and appropriately increase the duration (e.g., 45s).
Blind zone indicated	(1) Check whether the installation is vertical; confirm the measured surface is outside the blind zone (5 cm). (2) Enable suspended mounting and set the blind zone to 0.3 m (recommended for open environments).
Prompt: insufficient echo energy	(1) Confirm whether the installation is vertical; (2) Confirm whether there are interference objects around the installation position, such as floating objects, foam, etc.; (3) Confirm the measured surface is flat; severe fluctuation and turbulence cause echo energy attenuation;
Fixed interference object present	Learn away the fixed interference via false echo learning.
Air height value often too large	Possible false echo (vessel wall, obstacles); adjust the installation position; enable the nearest frequency point.
Air height value often too small	(1) Possible false echo (vessel wall, obstacles); adjust the installation position; (2) Learn away the fixed interference via false echo learning.
Device data response is slow	Find the "Data Smoothing" function option and set both the duration and sliding window parameters to 0.

Precautions

- The supply voltage must not exceed the range specified in the wiring diagram; never use AC power.
- Always disconnect power during wiring and installation; hot-plugging is prohibited.
- The sensor can penetrate clothing, plastic, acrylic board, wood, glass, etc.; pay attention to the measured substance.
- When measuring liquids, the medium dielectric constant is generally greater than 2.5. Too low a dielectric constant easily causes weak echo, abnormal measurement, or direct penetration through the liquid.
- Ensure the probe is perpendicular to the medium surface during installation, avoiding the vessel wall, nozzles, and internal obstacles.
- Do not disassemble the sensor by yourself; contact the manufacturer's technical support if a fault occurs.