

# **Radar water level gauge (with display)**

**Instruction Manual (Ver: 2.0)**

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# 1.Warranty and Service Scope of Radar Level Gauge

The warranty period for the radar level gauge is one year from the date of shipment, and the warranty period for repairs and maintenance is six months. This warranty is only applicable to the original purchaser or users of designated distributors, and does not apply to any users whose damage is caused by improper use due to human reasons, modification, negligence, accidents, or use under abnormal conditions.

For faulty radar level gauges returned within the warranty period, free repairs are provided. To obtain warranty service, please contact the after-sales service department and attach a description of the fault. After obtaining permission from our company, send the radar to the after-sales service department.

If the radar level gauge is beyond the warranty period, or if it is confirmed that the fault is caused by incorrect use, modification, negligence, accident, or use under abnormal conditions, a maintenance cost estimate will be provided in accordance with the relevant maintenance fee standards, and maintenance will be carried out after approval. After the radar level gauge is repaired, it will be sent back to the customer, who shall pay the maintenance and transportation costs. (Attachment: Warranty Card)

## 2.Unpacking Inspection and Precautions

### 2.1 Unpacking Inspection

- Instruction Manual
- Certificate of Conformity for Radar Level Gauge
- Packing List for Radar Level Gauge
- Radar level gauge host
- Check the name, model and other contents on the nameplate
- Check if the outer shell is intact and whether the glass cover of the observation window is cracked.
- Check the random items against the packing list

Check whether the specifications, models and accessories are correct and complete according to the packing list of the radar level gauge. If there is any problem, please contact the customer service center in time for replacement

## 2.2 Notes

- Please read this instruction manual before installing the radar level gauge.
- Modifications due to product upgrades will not be notified separately. Please refer to the actual product

## 3.Storage and Transportation

### 3.1 Storage Conditions

- Allowable storage temperature:  $-40\sim+60$  °C
- Use the original packaging

### 3.2 Transport the product to the measuring point

- Transport the measuring equipment to the measuring point using the original packaging.
- During transportation and storage, collision, moisture, and chemical erosion should be prevented.

## 4.Product Introduction

### 4.1 Product Overview

76-81GHz frequency-modulated continuous wave (FMCW) radar products (also known as millimeter-wave radars) adopt the millimeter-wave band with a higher frequency than Ku-band radars. They have important applications in long-range target detection, long-distance imaging and multispectral imaging in environments with heavy smoke and dust, etc. Moreover, they can detect smaller targets than microwave radars, achieve more precise positioning, and have higher resolution and stronger confidentiality.

As a 78GHz band radar used in the field of industrial measurement, it enables high-precision, non-contact level and liquid level measurement. It has incomparable advantages over other ordinary microwave pulse radars and guided wave radars. Its extremely narrow beam and penetration capability make it more adaptable to ultra-complex working conditions without reducing measurement performance.

## 4.2 Technical Parameters

<b>Radar level gauge</b>	two-wire system
<b>Range specifications</b>	5m、10m、15m、20m
<b>Measurement error</b>	±1%FS、±2%FS、±5%FS
<b>Signal output</b>	4~20mA/Modbus
<b>Power supply</b>	DC 24V (22V~30V)
<b>Ambient temperature in use</b>	-20°C~+70°C
<b>Ambient humidity in use</b>	(0%~95%) RH
<b>Protection level</b>	IP67
<b>display</b>	LCD, mobile APP
<b>Host weight</b>	Approximately 215 grams
<b>Host Dimensions</b>	99mm×73mm×122mm
<b>Install the interface thread</b>	G1.5

## 4.3 Scope of Application

### 4.3.1 Medium

Under normal circumstances, the dielectric constant of the measured medium is required to be greater than 2, so that a good reflection cross-section can be achieved.

### 4.3.2 Ambient Temperature of Radar Level Gauge

The operating ambient temperature range of the radar level gauge is: -20°C ~ +70°C. In northern regions, it is recommended to use an instrument protection box. In areas with strong direct sunlight, it is advisable to install the instrument in a shaded place or use a sunshade. This can not only prevent excessive temperature inside the instrument caused by exposure to the sun but also ensure good ventilation and heat dissipation.

### 4.3.3 Protection Level

The waterproof and dustproof rating is: IP67

## 5. External Structure of Radar Level Gauge

- The external structure of the radar is shown in Figure 1.

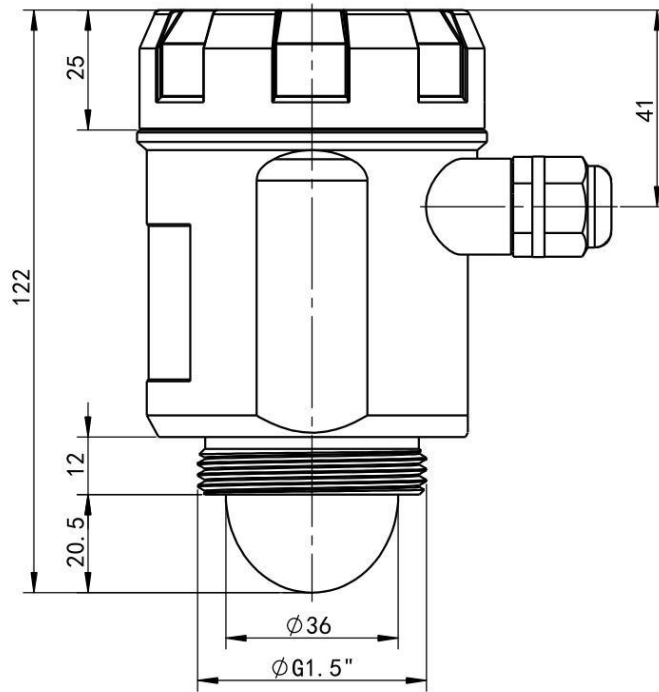


Figure 1 Structural Diagram of Radar Appearance

## 6. Radar Level Gauge Terminal Block

- The terminal block is shown in Figure 2.

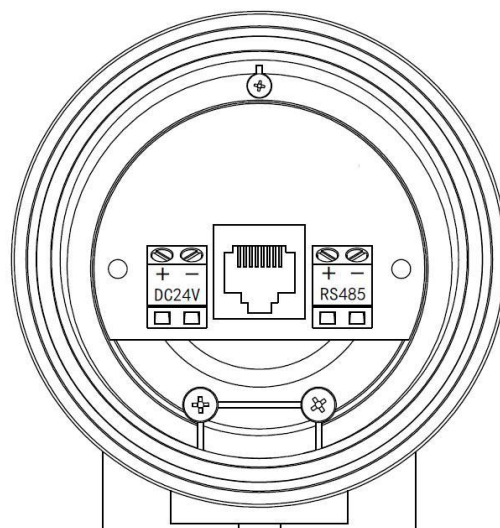


Figure 2 Schematic Diagram of Radar Terminal Blocks

- Interface Description

terminal	Explanation
DC 24V (+)	DC 24V positive pole of the power supply
DC 24V (-)	DC 24V Power supply negative pole
RS-485 (+)	RS - 485 Communication Positive Pole
RS-485 (-)	RS - 485 Communication Negative Pole

## 7.Debug Parameter Description

### 7.1 Parameter Setting Human-Machine Interface

1.The instrument sets parameters through buttons, as shown in Figure 4:

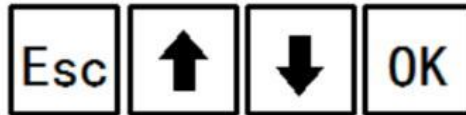


Figure 3 Schematic Diagram of Instrument Buttons

Button function:

button	Function
ESC	Return key / Enter echo waveform interface
UP	Up key / Increase key
DN	Down key / Shift key
OK	Confirmation key / Enter the parameter setting interface

2. Description of the LCD Main Interface of the Radar Level Gauge



Figure 4 Main Interface Diagram of Radar Level Gauge LCD

①	Work instructions	Flashing prompt during work
②	Level display	Liquid level value (m/cm/mm/in/ft)

③	fault code	00: No fault (no fault not displayed) 01: Target not detected 02: Liquid level jump occurred 08: Radar measurement communication error
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### 3. Description of LCD Waveform Interface for Radar Level Gauge

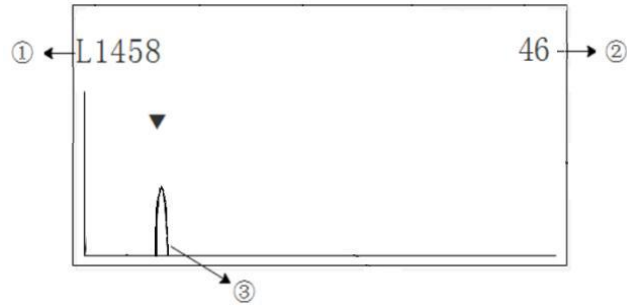


Figure 5 LCD Waveform Interface Diagram of Radar Level Gauge

①	Empty distance value
②	Echo quality
③	Echo position

## 7.2 Radar Parameter Menu

### 7.2.1 Description of User Parameter Menu

Basic parameters	range
	migration volume
	4mA position
	20mA position
	blind spot
	damping time
	Device address
	baud rate
	backup
	Recovery

## 7.2.2 Scope and Definition of Basic Parameter Settings

- Basic Settings:

Range (500~50000) mm: Determined according to working conditions; indicates the maximum distance that the level meter can measure.

Migration amount (-9999~9999) mm: Determined according to specific working conditions.

4mA position: The level corresponding to the 4mA current output, in mm.

20mA position: The level corresponding to the 20mA current output, in mm.

Blind zone: The value range is 200mm to the range, set according to specific working conditions.

Display type: Display level value/empty distance value.

Damping time: To improve the stability of the measured output value, a larger [damping time] can be set to achieve stable measured values and enhance anti-interference ability. For example, if the damping time is 10, and the measured level changes stepwise at time t, the measured output value will follow to the actual position of the measured object after 10 seconds.

Device address: The slave address during RS-485 communication, i.e., the local address (value range: 1-99, default value is 1).

Baud rate: The local baud rate during RS-485 communication, default is 9600.

- Backup user parameters:

After the working parameters are backed up, if you manually modify the parameters incorrectly and forget the original working parameters, you can "restore" them in the basic settings.

- Restore user parameters:

Used to restore the backed-up user parameters.

## 8. Radar Installation and Commissioning

### 8.1 Preparations before Installation

- Understand information such as the structure of the installation location and the range.
- Required tools: DC 24V power supply, etc.
- After the tools are fully prepared, conduct an unpacking inspection of the product, check against the packing list, and confirm whether the materials are complete.

## 8.2 Selection of Radar Installation Location

Avoid installing the instrument in a central position or close to the edge of the container, otherwise, it is likely to produce incorrect readings.

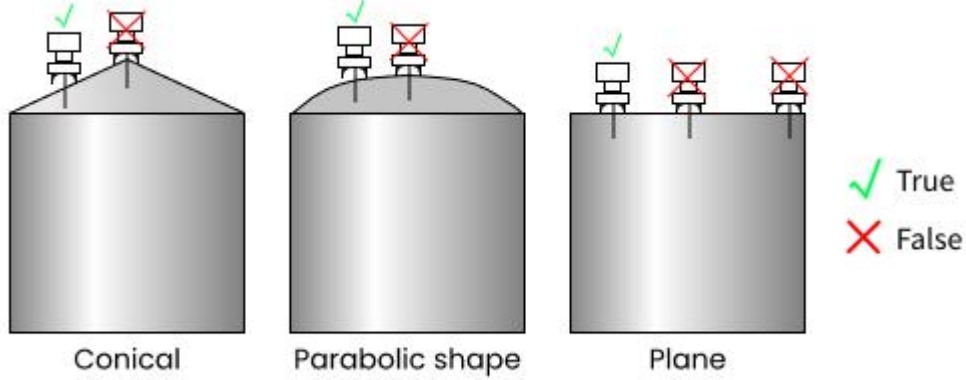


Figure 4 Schematic Diagram of Radar Installation Position

- Avoid false echo diagrams

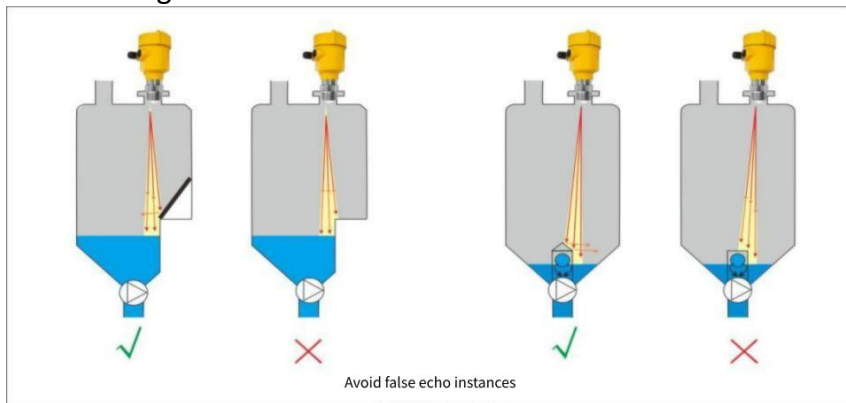


Figure 5 Schematic Diagram of False Echoes

- Treatment of ladder positions and grille tanks

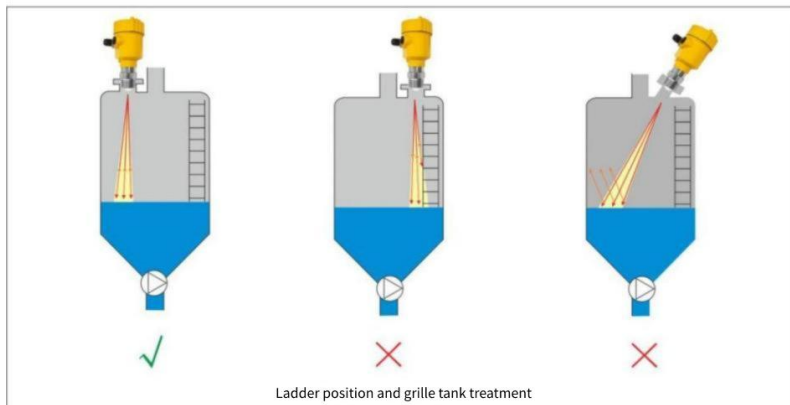


Figure 6 Schematic Diagram of Ladder Position and Grille Tank Treatment

- Treatment of hanging walls and grid tank

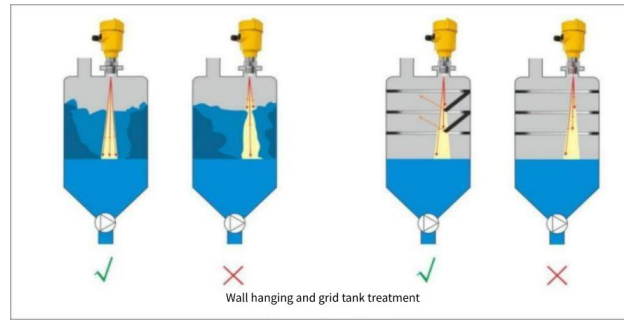


Figure 7 Schematic Diagram of Wall-mounted and Grille Tank Treatment

## 8.3 Parameter Settings

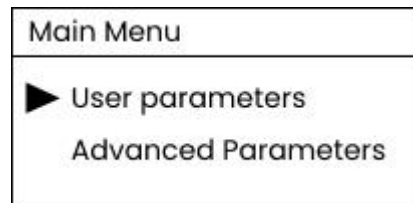
### 8.3.1 Key Setting Parameters

- Instrument connection

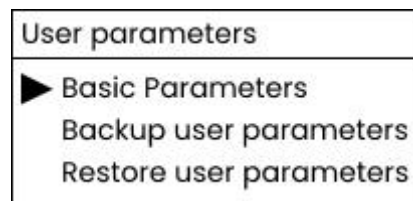
Connect the power cord to the instrument's DC 24V terminal; pay attention to the positive and negative poles, and do not reverse the connection.

- Set instrument parameters

Press the "OK" button, and the instrument will display "Main Menu" as shown in the figure below:



Press the "OK" button to enter "User Parameters".



Press the "OK" button to enter "Basic Settings".

Basic Parameters	
▶ Range:10000	mm
Migration volume:0	mm
4mA position:0	mm

Basic Parameters	
▶ 20mA position:10000	mm
Blind spot:XXXXX	mm
Display type:level	

Basic Parameters	
▶ damping time:200	
Device address:1	
Baud rate:9600	

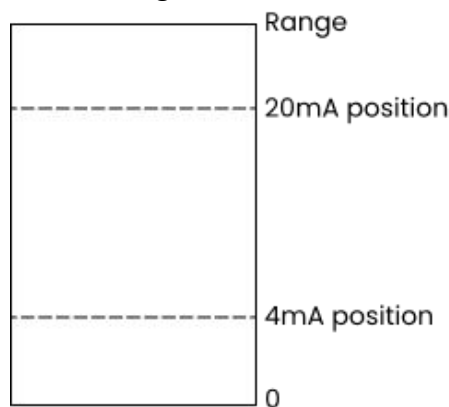
Set the "range" according to the working conditions, press the "OK" key. After the range value is displayed in reverse, use the "increase key" and "shift key" together to input the range value, and then press the "OK" key to confirm.

Press the "Down Arrow key" to select "Migration Volume" downward. Press the "OK" key, and the migration volume value will be highlighted in reverse. Enter the migration volume value and press the "OK" key to confirm.

The same steps can be used to modify "4mA position", "20mA position", "blind zone", "damping time", and display type. After completing the settings, press the "ESC" key to return.

When the display type is set to "level", the main interface shows the actual level value; when the display type is set to empty distance, the main interface shows the empty distance value measured by the radar. Set the display type as needed.

The 4mA position and 20mA position must be within the range. The relationship between the 4mA position, 20mA position and the range is shown in the following figure:



As shown in the figure, when the material level is lower than the 4mA position, the main interface displays the material level as 0; when the material level is higher than the 20mA position, the main interface displays the material level value at the 20mA position.

### 8.3.2 APP Setting Parameters

#### ■ Set instrument parameters

Open the mobile app, and the device connection interface will be displayed. As shown in the following figure:



Figure 8

Click directly on the name of the device you want to set up to enter the main interface, as shown in the figure below.



Figure 9

Click the "Settings" button to enter the parameter settings interface, as shown in the following figure.



Figure 10

Click "Basic Parameters" to enter the basic settings interface. As shown in the figure below.



Figure 11

Set the "range" according to the working conditions. Directly click the number input box behind it to modify. The modification method for other parameters is the same. After modifying the parameters, click the "Set" button to make the settings take effect. You can click the "Read" button to read back the parameters.

The 4mA position and 20mA position must be within the range. The relationship between the 4mA position, 20mA position and the range is shown in the following figure:

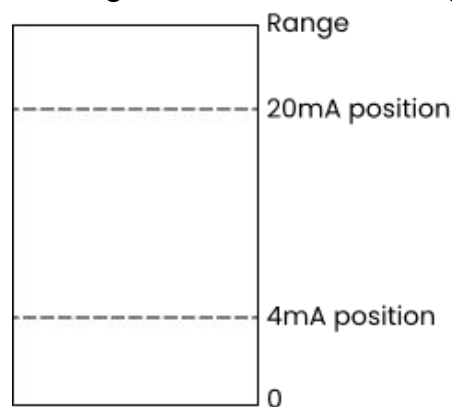


Figure 12

As shown in the figure, when the material level is lower than the 4mA position, the main interface displays the material level as 0; when the material level is higher than the 20mA position, the main interface displays the material level value at the 20mA position.

Click the "Curve" button at the bottom of the screen to enter the echo curve interface and check the waveform quality.

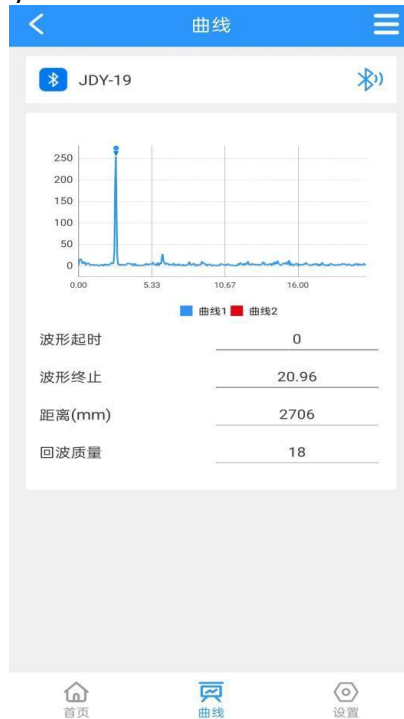


Figure 13

## 9.Maintenance and Repair

- Please keep the radar level gauge clean, and try to make it waterproof, moisture-proof, corrosion-resistant, and avoid severe collisions or impacts from other objects.
- Avoid direct sunlight on the main body of the radar level gauge, keep it away from heat sources and ensure ventilation. If the ambient temperature exceeds the rated temperature, corresponding cooling protection measures should be taken.
- When the ambient temperature is too low, instrument protection boxes or other protective devices can be used for anti-freezing protection, and attention should be paid to keeping the radar dry.
- Radar should be inspected regularly. (The inspection cycle shall be determined by the user according to specific circumstances)

## 10.Fault Handling

Fault phenomenon	Cause of the fault	Solution
The instrument has no display.	Power supply error	Check whether the DC 24V voltage and current meet the requirements.
	Wiring error	Check if the wiring is correct.
The indicated value is unstable	The fluctuation is too large.	Change the radar installation position or reduce the fluctuation of the object to be measured.
	Weak echo	Try angle calibration or rotate the radar installation position.