Operation manual

LRD102

80GHz radar level meter

V1.0

Catalogue

1 Product introduction

1.1 Product Overview

80GHz frequency modulated continuous wave (FMCW) radar products (also known as millimeter wave radar), using the millimeter wave band with a higher frequency than Ku-band radar, have important applications in remote target detection, strong smoke and dust environment, remote imaging, multi-spectral imaging, etc., and can detect smaller targets than microwave radar and achieve more accurate positioning. With higher resolution and stronger confidentiality.

As the 80GHz band radar for industrial measurement, high precision, non-contact level and liquid level measurement. It has incomparable advantages over other ordinary microwave pulse radar and guided wave radar. The extremely narrow beam and penetration capability make it more adaptable to ultra-complex operating conditions without compromising measurement performance.

1.2 Technical parameters

frequency	80GHz
range	8m, 15m
accuracy	3mm
Beam Angle	3 °
output	4~20mA(2-wire)、RS-485(4-wire)
Debugging	APP
Operation temp.(Humid	-20℃ ~ 70℃, (0% ~ 95%RH)
Case Material	PP/ PVDF / PTFE / PFA
Process connection	Thread G1 ", G1 1/2 ", G2"
pressure	- 1... 3bar
Output	4~20mA(2-wire)、RS-485(4-wire)
Power	DC 24V
IP protection	IP68
weight	0.5 kg
Size	Diameter 75mm x height 145.5mm

1.3 Scope of Application

1.3.1 Media

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

1.3.2 Radar level meter ambient temperature

The ambient temperature range of radar level meter is: -20℃ ~ +70℃. In the northern region, it is recommended to use the instrument protection box, in the area of direct sunlight, it is recommended to install the instrument in a cool place or use a sunshade, so that not only can avoid excessive temperature caused by exposure to the sun, but also good ventilation and heat dissipation.

1.3.3 Protection level: IP68

1.4 Dimensions

The outline structure of radar level meter is shown in Figure 1:

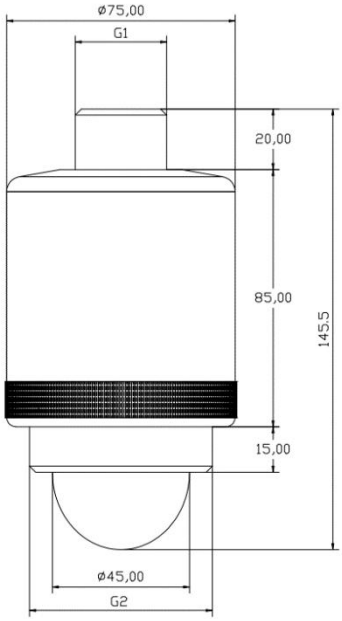


Figure 1 Outline structure of radar level meter

2. Wiring of radar level meter

The radar level meter leads to two power lines, red to connect the positive terminal of the power supply, blue to connect the negative terminal of the power supply.

Interface description:

Leads	Instructions
Red (+)	DC 24V power supply positive
Blue (-)	DC 24V power supply negative
Green (+)	RS-485 A+
Yellow (-)	RS-485 A-

3.Parameters

3.1 Parameters description of User menu

Basic Parameters	Range
	Migration amount
	4mA position
	20mA position
	Blind area
	Damping time
	Device address
	Baud rate
	Backups
	Restore

3.2 Range and definition of basic parameter Settings

- Basic Settings:

Range (500~10000) mm: depending on operating conditions; Indicates the farthest distance that the level gauge can measure.

Migration (-9999~9999) mm: according to the 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 area: The value range is 200mm to the measuring range, which is set according to the specific working condition.

Display type: Display level value/space value.

Damping time: In order to improve the stability of the measured output value, a larger

[damping time] can be set to achieve the stability of the measured value and increase the anti-interference ability. For example, the damping time is 10, the measured object has a step change at time t, and the measured output value follows the actual position of the measured object after 10 seconds.

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

Baud rate: The baud rate of the machine during RS-485 communication, the default is 9600.

- Backup user parameters:

After the backup of working parameters, if you forget the original working parameters after manually modifying the parameters, you can "restore" in the basic Settings.

- Restore user parameters:

Used to restore the backup user parameters.

4. Installation and Debugging

4.1 Preparation before installation

- Understand the installation position structure and measuring range.
- Tools required: DC 24V power supply, etc.
- After the tools are ready, unpack the products and check the packing list to ensure that the materials are complete.

4.2 Precautions for radar level meter installation

1) Ensure that the radar level meter points perpendicular to the water surface.

Due to the small beam Angle of the radar level meter, the tilt of the installation will result in weaker echoes and even affect normal measurements.

2) Avoid transmitting the beam to surrounding jammers.

When installing, the radar level meter main engine should be at least 20cm away from the side wall, and the underground pipe network should be installed as close as possible to the center of the water well.

4.3 Selection of radar installation location

Avoid mounting the instrument in a central position or near the edge of the container, where it is likely to produce false readings.

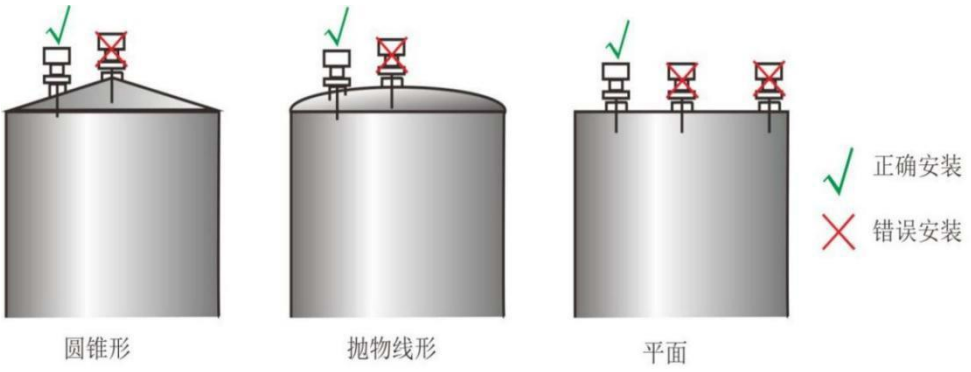


Figure 2 Schematic diagram of radar installation location

- Avoid false echo diagram

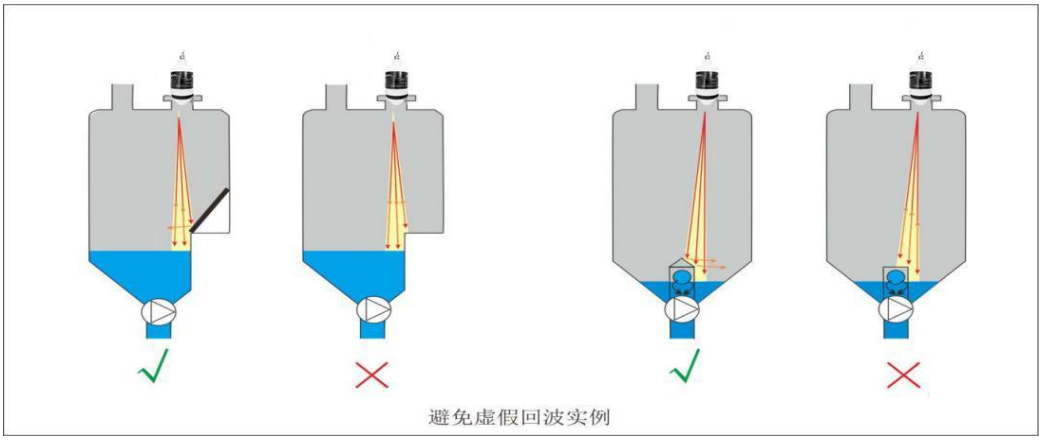
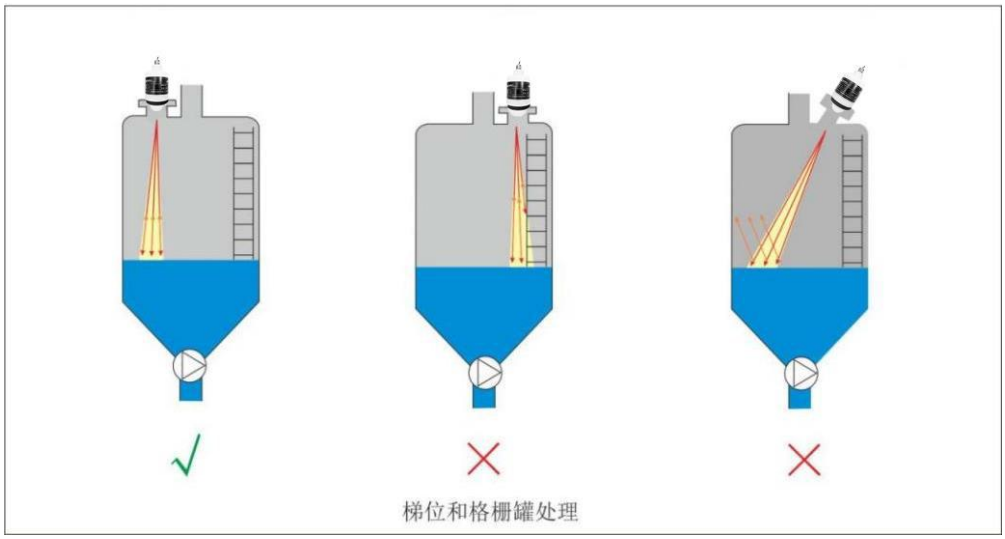


Figure 3 Schematic diagram of false echoes

- Ladder position and grille Installation



- Wall hanging and grille Installation

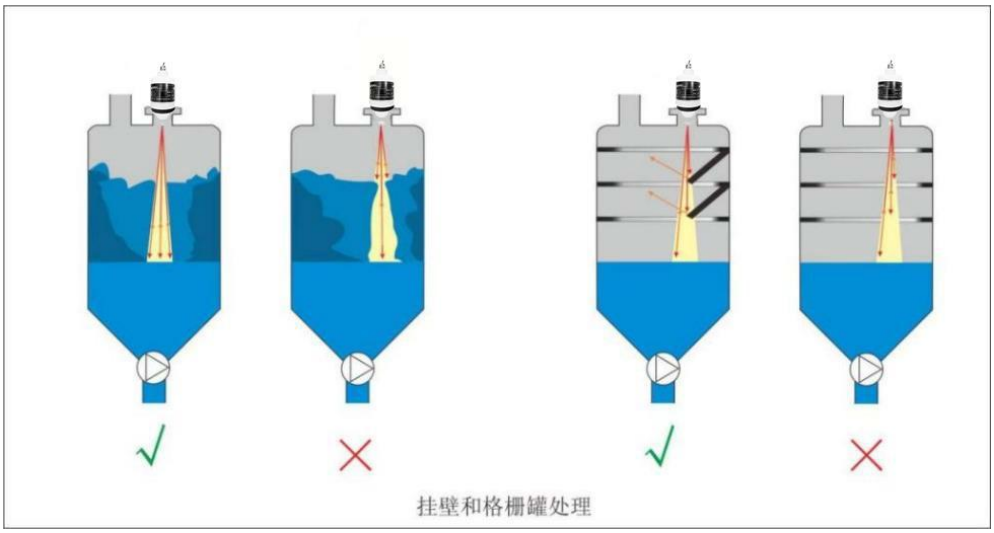


Figure 5 Schematic diagram of wall hanging and grille tank Installation

5.Software configuration instructions

Meter connection

Connect power cord to meter DC 24V terminal; Pay attention to the positive and negative terminals, do not connect the reverse.

Set instrument parameters

Open the mobile APP to display the device connection interface. As shown in the picture below:

Figure 6

Directly click the device name to enter the main interface, as shown below.

Figure 7

Click the "Curve" or "Setting" button at the bottom of the screen to enter the echo curve int erface and parameter setting interface respectively. Click the "Set" button here to enter the pa rameter setting interface, as shown in the picture below.

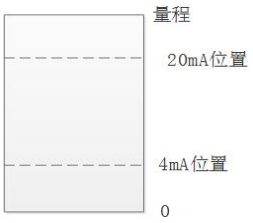
Figure 8

Click "Basic Parameters" to enter the basic Settings screen. As shown in the picture below.

Figure 9

To set "range" according to the working condition, directly click the digital input box at the back to modify the other parameters in the same way. After parameter modification, you need to click the "Setting" button to set it before it takes effect. You can click "Read" button to refresh the parameters.

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



As shown in the figure, when the object level is lower than the 4mA position, the main interface displays the object level as 0, and when the object level is higher than the 20mA position, the main interface displays the object level value of the 20mA position.

6. MODBUS 485 communication

The MODBUS 485 communication protocol for the LRD102 is based on the standard Modbus-RTU mode. The serial port default Settings are as follows: 8 data bit, none parity bit, and 1 stop bit. The default baud rate is 9600, and the communication address is 1.

For this device, only the device address and baud rate can be set for MODBUS communication parameters.

Other parameters are the default values, as shown in the picture on the right:

The Settings of the baud rate:
Baud rate is available in the device User Parameters -> Basic Parameters -> Baud rate parameter can be set, also can be communicated via 485 Example Set the baud rate. The default is 9600.

Setting of mailing address:
Communication address can be in the device User parameters -> Basic parameters -> The device address param- eter can be set, also via 485 Set the communication address. The default is 1.

Figure 10

The MODBUS 485 communication protocol is as follows:

(1) Read the data. The command number is 0x03.

Register list: (data type is 16-bit unsigned integer)

Register address	Logical access address	Name	Data type	type Instructions
0002H	0001H	Level value	16bit uinsigned integer	Unit: mm
0003H	0002H	Range	16bit uinsigned integer	Unit: mm
0004H	0003H	Migration amount	16bit signed integer	Unit: mm
0005H	0004H	Baud rate	16bit uinsigned integer	Unit: bps
0006H	0005H	Device address	16bit uinsigned integer	Values: 1-255

Read the current Level Value Communication demonstration

Read the current level value at address 01 as the 5000mm value

Send 01 03 00 01 00 01 D5 CA to return 01 03 02 13 88 B5 12

The hexadecimal integer 13 88 corresponds to a decimal integer of 5000mm in mm

(2) Set the parameters with the command number 0x10

Register list: (data type is 16-bit unsigned integer)

Register address	Logical access address	Name	Data type	type Instructions
0003H	0002H	Range	16bit uinsigned integer	Unit: mm
0004H	0003H	Migration amount	16bit signed integer	Unit: mm
0005H	0004H	Baud rate	16bit uinsigned integer	Unit: bps
0006H	0005H	Device address	16bit uinsigned integer	Values: 1-255

7. Maintenance and repair

(1) Pay attention to keep the radar level meter clean, try to do waterproof, moisture-proof, anti-corrosion and avoid being hit by other objects.

(2) Avoid direct sunlight on the radar level meter body, keep away from heat sources and pay attention to ventilation,if the ambient temperature exceeds the rated temperature, corresponding cooling protection measures should be taken.

(3) When the ambient temperature is too low, the instrument protection box or other protective devices can be used for anti-freezing protection, and pay attention to keep the radar dry.

(4) The radar should be tested regularly. (The detection period shall be determined by the user according to the specific situation)

8.Troubleshooting

Fault symptom	Cause of the fault	Solutions
Meter not working	Power supply error	Check whether the DC 24V voltage and current meet the requirements.
	Wiring error	Check that the wiring is correct.
The display value is unstable	Too much fluctuation	Change the radar installation position or reduce the fluctuation of the object to be measured.
	Weak echoes	Try fine-tuning the mounting Angle of the level meter.
	There is strong electromagnetic interference	Ground or shield the main engine

9. Warranty and service scope of radar level meter

From the date of delivery, the warranty period of the radar level meter is one year, and the warranty period of repair and maintenance is six months. This warranty is limited to the user of the original purchaser or the designated dealer, and does not apply to any user who is damaged by human error, modification, negligence or use due to accidents and abnormal circumstances.

For faulty radar level meters returned within the scope of the warranty, free repair is provided. For warranty service, please contact the after-sales Service Department at 021-61042610 with a fault description and send the radar to the after-sales Service Department with permission from the company.

If the radar level meter has expired the warranty period or the fault is confirmed to be caused by wrong use, modification, negligence, accident and use under abnormal conditions, the maintenance cost budget will be provided according to the relevant maintenance fee standard, and the repair will be carried out after approval. After the radar level meter is repaired, it will be sent back to the customer, who will pay for the maintenance and transportation costs.

10.Unpacking inspection and precautions

10.1 Unpacking Inspection

- Operating manual
- Radar level meter Certificate
- Radar level meter packing list
- Radar level meter main engine
- Check the name, model number, etc. on the nameplate
- Check that the case is in good condition
- Check random items against the packing list

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

10.2 Precautions

- Read this manual before installing a radar level meter
- Modifications due to product upgrades are subject to change without prior notice

11. Storage and shipping

11.1 Storage Conditions

- Allowable storage temperature: -40 ~ +60 ℃
- Use original packaging

11.2 Transport the product to the measuring point

- Transport the measuring equipment to the measuring point using the original packaging
- It should be protected from collision, moisture and chemical attack during transportation and storage

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