

Split-type Ultrasonic

JJY-YCD238SP



White [Corrosion-resistant and high-temperature Teflon]

Black [ABS]

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1. Product Introduction

1.1 Features

Ultrasonic level meter, supports 485 protocol and 4-20mA three-wire system, 4-20mA two-wire system application. The maximum range of the product can reach 20m, and the blind area can reach 5cm when using a small range. Because it has a higher working frequency and shorter wavelength, it is especially suitable for solid applications; the working method of transmitting and receiving electromagnetic waves through a lens has unique advantages in high dust and harsh temperature environments (+75°C); the instrument provides a threaded fixing method, which makes installation convenient and simple.

The main advantages are as follows:

- Based on the self-developed COMS millimeter-wave RF chip, it realizes a more compact RF architecture, higher signal-to-noise ratio, and smaller blind area.
- 5GHz working bandwidth enables the product to have higher measurement resolution and measurement accuracy.
- The antenna beam angle is as narrow as ± 2.75 degrees, minimizing interference effects on the instrument in installation environments while ensuring easier setup.
- Shorter wavelength, better emission characteristics on solid surfaces, so there is no need to use a universal flange for aiming.
- The performance meets the national standard DB50/T 826-2017 General technical requirements for water level gauges, and the core components adopt a fully sealed IP68 waterproof design.

1.2 Communication and Debugging

On-site debugging of the instrument can be done through the LCD, or debugging can be done on the PC side using the optional host computer software.

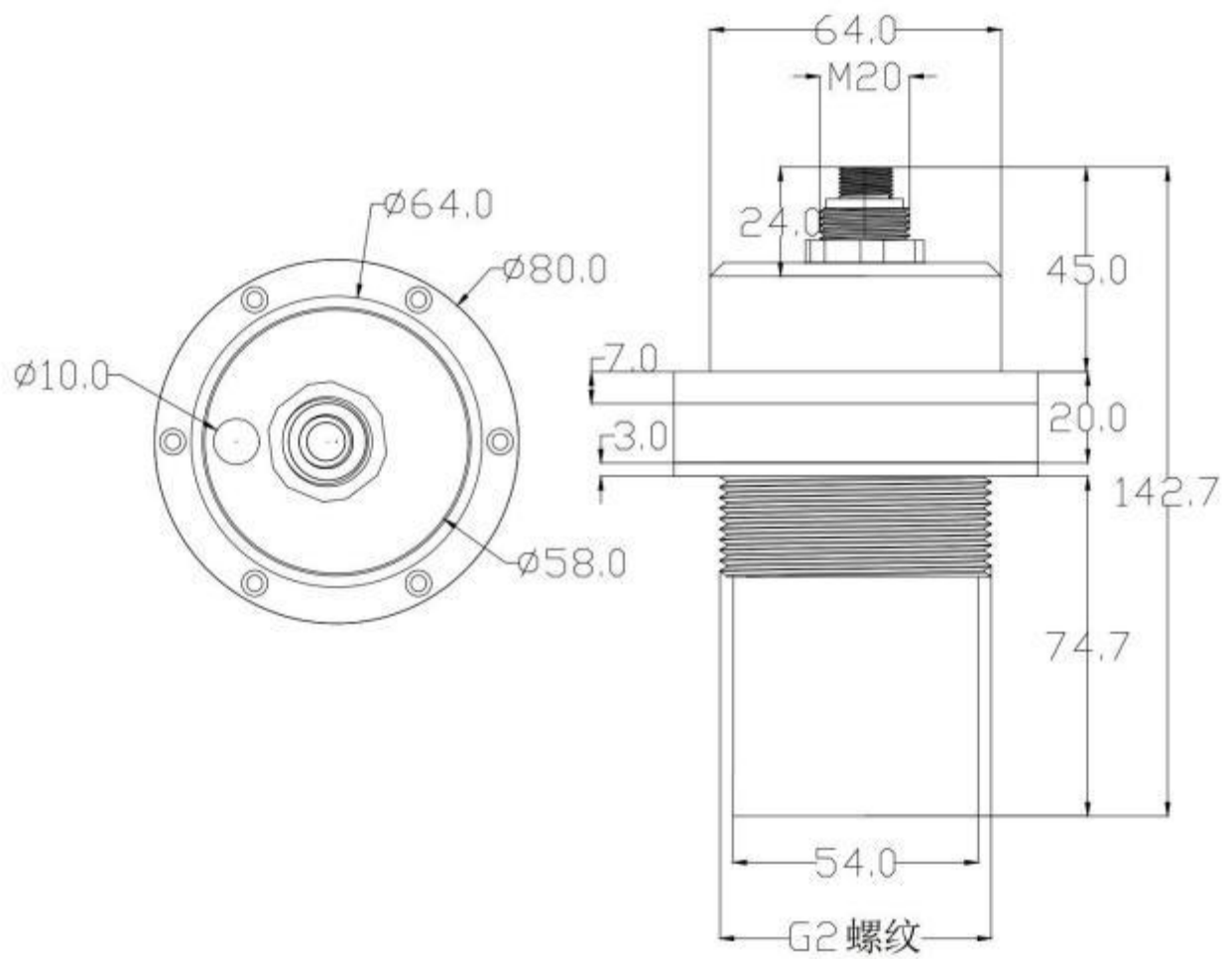
Communication between 485 and PC is done in the following ways:

1. USB to RS485 serial port module;

2. Technical Specifications

Communication Category	RS485	RS-232	RJ45	4-20mA Three-Wire	4-20mA Two-Wire
Acquisition Frequency	200ms/Configurable				1500ms/Configurable
Working Voltage	DC 9-24V				DC 24V
Average Current	18mA/12V				3.4mA/24V
Pulse current	100mA/10ms				60mA/24V
Average Current	18mA/12V				3.4mA/24V
Measurement accuracy	±2mm				
Communication protocol	Modbus/text protocol				
Resolution	1mm				
Antenna beam angle	±6°				
Appearance material	ABS/Teflon				
Measuring range	0.05-20m				
Working humidity	0-95%				
Working temperature	ABS:-40℃-75℃ Teflon: -40℃-120℃ (high temperature resistance)				
Protection level	IP68				
Cable length	5 meters/RJ45 (0.5 meters)				

3. Structural dimensions



Schematic diagram of instrument structure dimensions

4. Installation

Two points to note during installation:

- (1) Align with the target material level and try to ensure vertical incidence to the material level;
- (2) Avoid false echoes.

Refer to the following points for typical working conditions.

- Ensure that there are no obstructions within the beam range, such as ladders or steps.

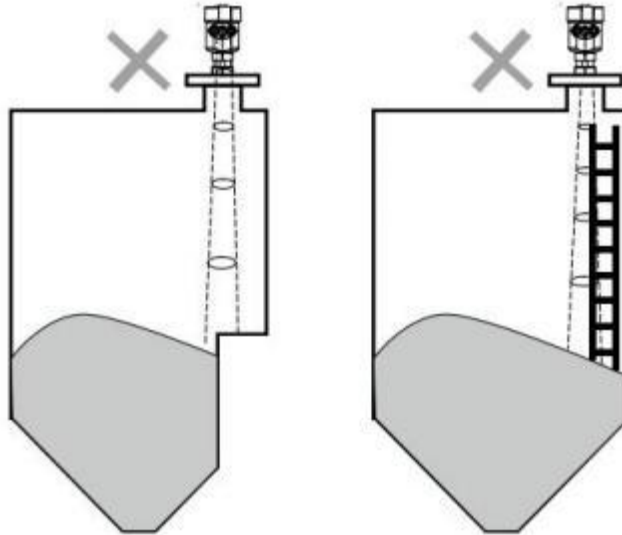


Figure 4-1 Schematic diagram of instrument installation location

- The instrument installation should ensure that the antenna beam avoids the feed port, as shown in Figure 4-2.

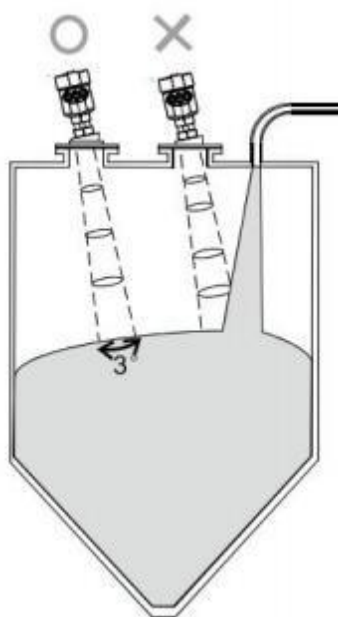


Figure 4-2 Antenna beam avoids the feed port

■ The instrument installation should be at least 20cm away from the container wall, otherwise it is likely to produce incorrect readings, as shown in Figure 4-3.

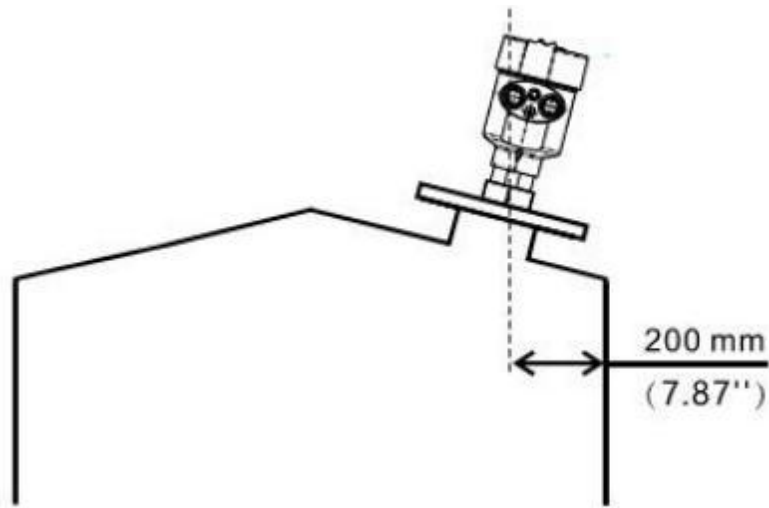


Figure 4-3 Installation at least 10cm from the container wall

■ For conical containers, ensure that the beam is directed straight into the tank, otherwise the measurement results at the bottom of the tank may be inaccurate, as shown in Figure 4-4.

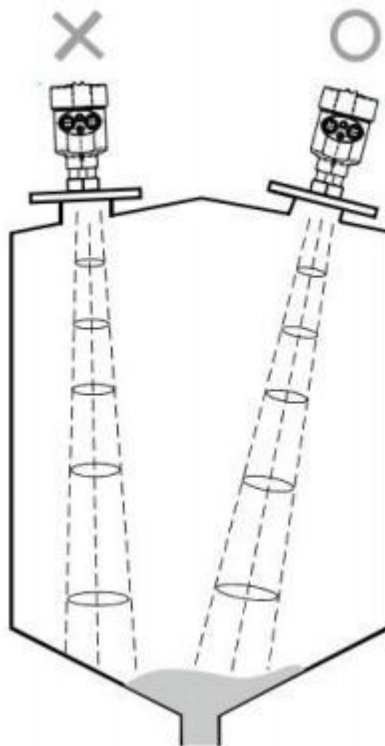


Figure 4-4 Conical tank should ensure that the beam is directed straight to the bottom of the tank

5. Connection

5.1 RS485Communication product wiring diagram



UARTRS485version

Figure 5-1 RS485 wiring diagram

5.2 Analog4-20mAThree-wire wiring diagram



Three-wire 4-20mA Bluetooth Version

Figure 5-2 Three-wire connection diagram for 4-20mA analog quantity

5.3 4-20mA Two-Wire Connection Diagram for Analog Quantity



Two-wire 4-20mA Bluetooth Version

Figure 5-3 Two-wire connection diagram for 4-20mA analog quantity

5.4 RS-232 Serial Communication Product Wiring Diagram



RS232version

Figure 5-4 RS232 Wiring Diagram

5.5 Network Port RJ-45 Communication Product Wiring Diagram

The device is powered by 12V and uses a transparent transmission communication mode for the network module.



Figure 5-5 Network Port RJ-45 Communication Product Wiring Diagram

6. Software Testing Operation

Software download address: http://iot.jjyip.com:90/doc/JJY-Public/UartTool_20260103.exe

Protocol download address: http://iot.jjyip.com:90/doc/JJY-Public/80G_Protocol.pdf

Bluetooth Mini Program (scan the QR code below with WeChat)



6.1 Sensor Installation Requirements

Test sensor installation requirements: The sensor must be installed horizontally and fixed, and the sensor must not be held by hand. (See Figure 6-1)

Radar Module Test Environment

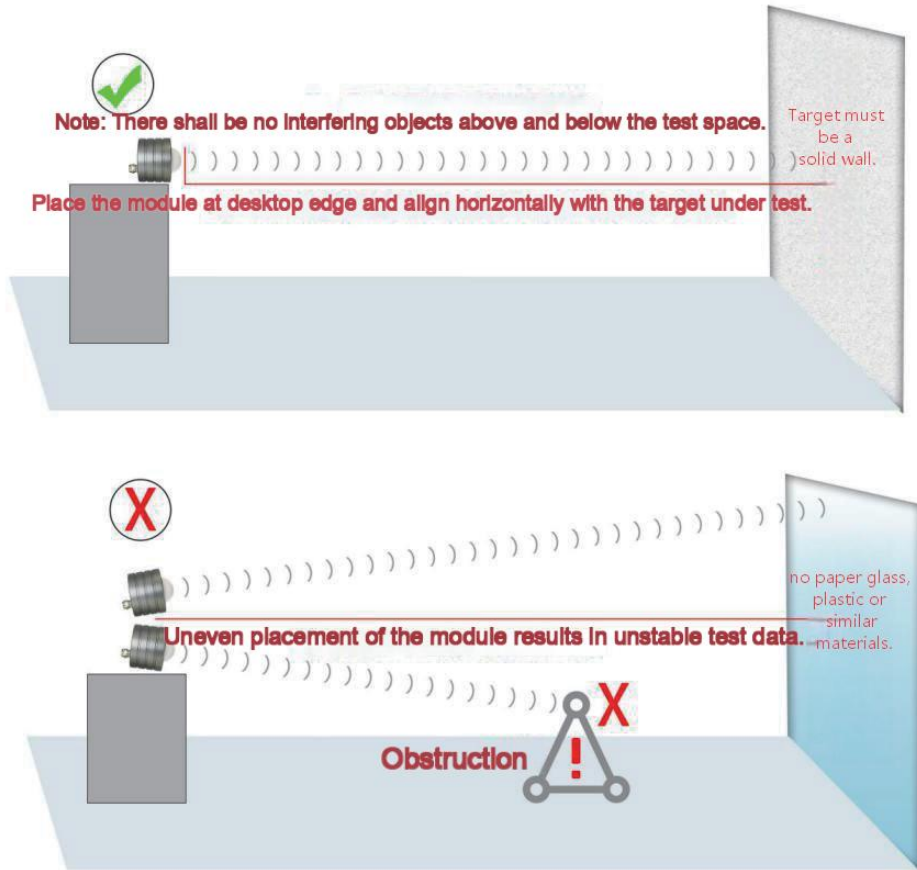


Figure 6-1 Schematic Diagram of Sensor Installation Requirements

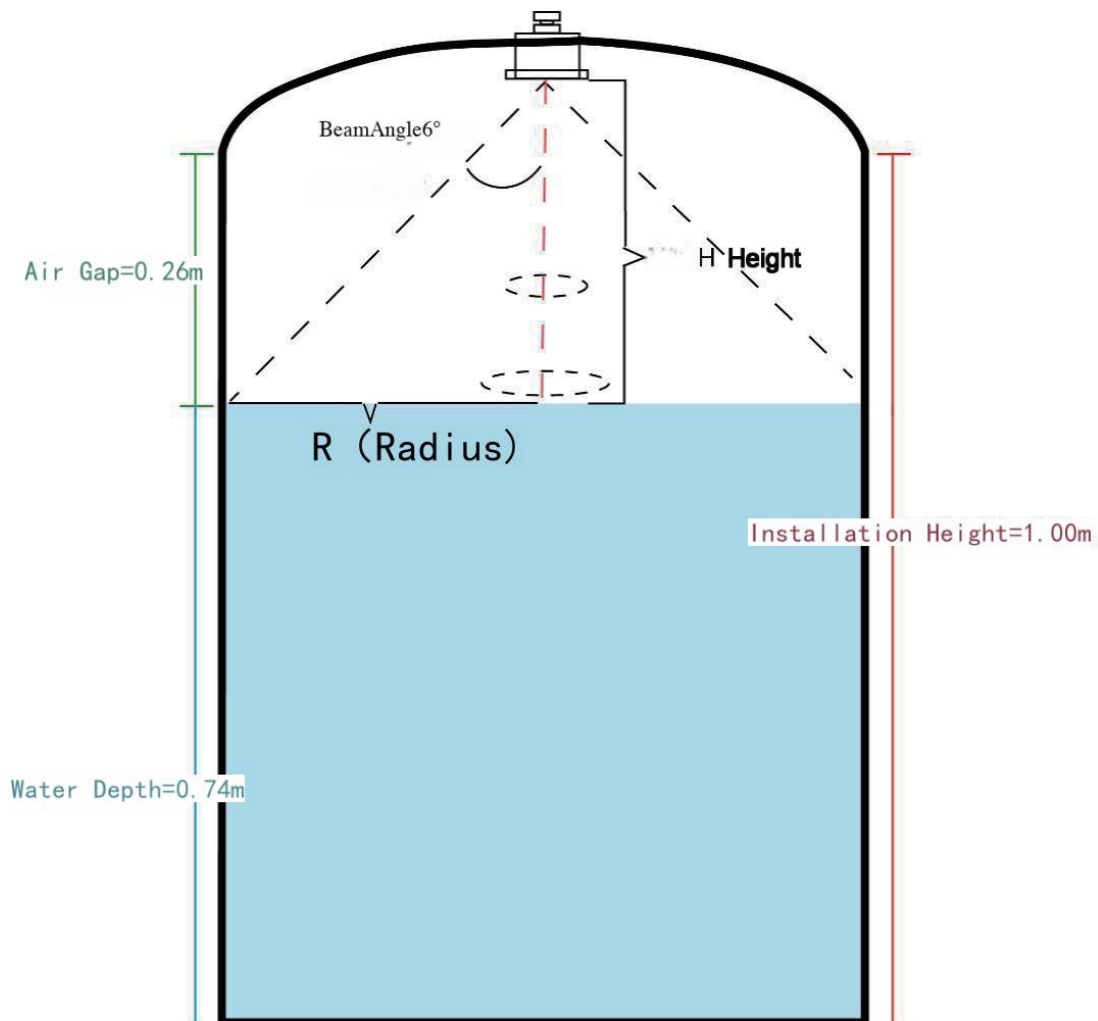
6.2 Requirements for the Object to be Measured

Requirements for the object to be measured: It is recommended to use a wall or liquid as the target object, not paper, glass, or similar items. The surface of the object to be measured should be horizontal, flat, and free of protruding parts.

6.3 Schematic Diagram of Professional Terminology

Air Height: Distance from the sensor to the liquid surface.

Liquid Level: Depth of the liquid level.



Calculation Formula for Measuring Height:

$$H = R (\text{Radius}) / \tan (\text{Beam Angle Calculation})$$

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

Installation

Height: Distance from the sensor to the bottom of the liquid.

6.4 Software Menu Configuration Description

After installing the driver for the serial port conversion module, open the host computer debugging software

6.4.1 [Software Communication Configuration]

■ **Configuration 1:** Click COM and select the correct serial port module (see Figure 6-4-1). If the driver installation fails, there will be no serial port.

■ **Configuration 2:** Select the baud rate, which is 9600 by default. (See Figure 6-4-1).

■ **Configuration 3:** Click to open the serial port.

■ 2. Click the [Get Device Information] interface to display the device version number, range, and blind zone, indicating successful communication.

language

ComInterface

Uart NetWork

COM COM9 - USB-Enhanced-SERIAL BaudRate 9600 Paritybits NONE Open

80G

DeviceInfo

DeviceModel

Version

Range m

BlindZone m

AirHeight m

WaterDepth m

GetDeviceInfo

RealTimeData

ConfigInfo

InstallDiagram Function Modbus

485Addr

InstallHeight m

PushCycle 0 ms

LimitFilterAmplitude cm

BaudRate 4800

ComMode Response

PushProtocol Modbus

LimitFilterTimes s

SaveAllConfig

RestoreFactorySetting

SpectrumOutput

FirmwareUpdate

Command

Sending text does not require adding \n here

\n

Send

☐ Modbus

DeviceInfo		ConfigInfo	
DeviceModel	2MHz_btYLD18	InstallDiagram	Function
Version	20251016	485Addr	127
Range	30.000 m	InstallHeight	5.000 m
BlindZone	0.050 m	PushCycle	0 ms
AirHeight	2.175 m	LimitFilterAmplitude	0 cm
WaterDepth	2.825 m	BaudRate	9600
GetDeviceInfo		ComMode	Response
RealTimeData		PushProtocol	ASCII
		LimitFilterTimes	0.0 s
		SaveAllConfig	RestoreFactorySetting
		SpectrumOutput	FirmwareUpdate

Command

Sending text does not require adding \n here \n Send ☐ Modbus

Log

ClearLog StopScroll SaveLog

```
AT+CALIBRATION=40
AT+RANGERES=0.038
AT+COLLECTFREQ=200
AT+LIMITFILTEROFXCM=0cm,0
AT+MBCFGREALAIRHEIGHT=0x0A0F,0x04,1,4,4
AT+MBCFGREALWATERDEPTH=0x0A0B,0x04,1,4,4
AT+MBCFGINSTALLHEIGHT=0x204A,0x03,1,4,4
AT+MBCFGREALAIRHEIGHTCM=0x0000,0x03,1,0,2
AT+MBCFGREALAIRHEIGHTMM=0x0001,0x03,1,0,1
AT+GETCONFIG
OK
```

[Installation Height Configuration]

■ Installation Height Configuration: Click the [Function] option, configure the [Installation Height] to 1 meter, and click [Save All Configurations]. The installation height refers to the distance from the bottom of the water to the bottom of the sensor probe. Example: If the air gap is 0.314m and the configured installation height is 1m, the liquid level is $1\text{m} - 0.314\text{m} = 0.686\text{m}$. At this point, the installation configuration is successful.

The screenshot displays the configuration interface for an 80G device. It is divided into two main sections: DeviceInfo and ConfigInfo.

DeviceInfo Section:

- DeviceModel: 2MHz_btYLD18
- Version: 20251217
- Range: 30.000 m
- BlindZone: 0.200 m
- AirHeight: 0.615 m
- WaterDepth: 0.385 m
- Buttons: GetDeviceInfo, RealTimeData

ConfigInfo Section (Function Tab):

- 485Addr: 127
- BaudRate: 9600
- InstallHeight: 1.000 m (highlighted with a red box)
- ComMode: Response
- PushCycle: 0 ms
- PushProtocol: ASCII
- LimitFilterAmplitude: 10 cm
- LimitFilterTimes: 2.0 s
- Buttons: SaveAllConfig, RestoreFactorySetting, SpectrumOutput, FirmwareUpdate

Command Section:

Sending text does not require adding \n here. \n Send ☐ Modbus

Log Section:

```
AT+REALWATERDEPTH

[2026-01-29 16:16:41:185]# RECV
REALAIRHEIGHT=LackEnergy
REALWATERDEPTH=LackEnergy

[2026-01-29 16:16:45:298]# SEND
AT+REALAIRHEIGHT
AT+REALWATERDEPTH

[2026-01-29 16:16:45:514]# RECV
REALAIRHEIGHT=0.615m
REALWATERDEPTH=0.385m
```

6.4.2[Software Communication Configuration]

■1. Active Push Data Configuration: Click the [Function] option, set the actual installation height, select [Active Push] for the communication mode, select [Push Protocol] which defaults to ASCII code, set the [Push Cycle] to the default of 300ms, and click [Save All Configurations]. The device will then continuously push the current real-time air height and water level data, configured as follows:

■2. Query reply data configuration: Click the [Function] option, select [Query Reply] for the communication mode, and click [Save All Configurations]. Finally, click [Read Real-time Data], and the device will return the current real-time air height or water level, indicating that the query reply data configuration is successful.

80G

DeviceInfo

DeviceModel 2MHz_btYLD18

Version 20251217

Range 30.000 m

BlindZone 0.050 m

AirHeight 0.883 m

WaterDepth 0.117 m

GetDeviceInfo

RealTimeData

ConfigInfo

InstallDiagram **Function** Modbus

485Addr 127 BaudRate 9600

InstallHeight 1.000 m ComMode **ActivePush**

PushCycle 300 ms PushProtocol ASCII

LimitFilterAmplitude 10 cm LimitFilterTimes 2.0 s

SaveAllConfig RestoreFactorySetting

SpectrumOutput FirmwareUpdate

Command

Sending text does not require adding \n here \n Send ☐ Modbus

Log

ClearLog StopScroll SaveLog ReceiveTime

[2026-01-29 15:56:56:458]# RECV
REALWATERDEPTH=0.118m

[2026-01-29 15:56:56:775]# RECV
REALWATERDEPTH=0.118m

[2026-01-29 15:56:57:064]# RECV
REALWATERDEPTH=0.117m

[2026-01-29 15:56:57:375]# RECV
REALWATERDEPTH=0.117m

RealTimeData

SpectrumOutput

FirmwareUpdate

Command

Sending text does not require adding \n here

\n

Send

☐ Modbus

Log

ClearLog

StopScroll

SaveLog

Rece

[2026-01-29 15:57:12:297]# RECV
REALWATERDEPTH=0.115m

[2026-01-29 15:57:12:564]# SEND
AT+AUTOOUTDATAACycle=0

[2026-01-29 15:57:12:602]# RECV
REALWATERDEPTH=0.115m

[2026-01-29 15:57:13:267]# RECV
AT+AUTOOUTDATAACycle=0
OK

6.4.3[Modbus Communication Query]

■1. Select the function option, the default [485] address is 127, and the default [Baud Rate] is 9600.

Taking querying air height as an example:

Check the Modbus option

Enter 7F 04 0A 0F 00 02 48 0E in the custom instruction sending box, and click [Send].

Reply: 7F 04 04 F4 09 3F 9B D7 EA

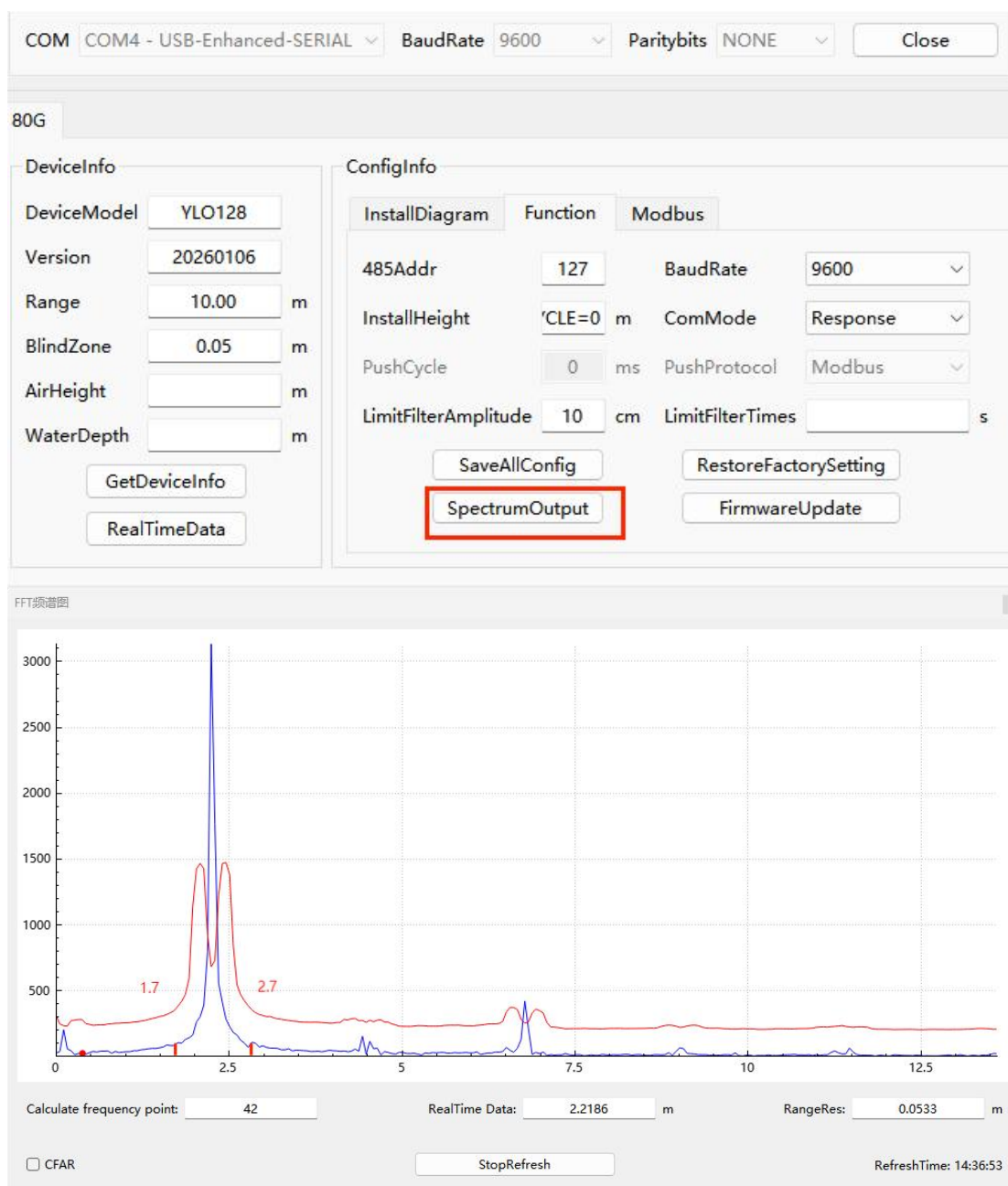
Parse F4 09 3F 9B in CDAB format, and the result is: 1.214m, which means the real-time air height is successfully obtained. (The CDAB illustration is shown in the second picture)

The screenshot displays the 80G Modbus communication interface. It is divided into several sections:

- DeviceInfo:** Contains fields for DeviceModel (2MHz_btYLD18), Version (20251217), Range (30.000 m), BlindZone (0.050 m), AirHeight (0.885 m), and WaterDepth (0.115 m). Buttons for GetDeviceInfo and RealTimeData are present.
- ConfigInfo:** Includes tabs for InstallDiagram, Function, and Modbus. The Modbus tab is active, showing 485Addr (127), BaudRate (9600), InstallHeight (1.000 m), ComMode (Response), PushCycle (0 ms), PushProtocol (ASCII), LimitFilterAmplitude (10 cm), and LimitFilterTimes (2.0 s). Buttons for SaveAllConfig, RestoreFactorySetting, SpectrumOutput, and FirmwareUpdate are available.
- Command:** A text input field contains the command "7F 04 0A 0F 00 02 48 0E". A "Send" button is next to it. A checkbox labeled "Modbus" is checked.
- Log:** A scrollable area showing communication logs. The latest log entry is highlighted in red: "[2026-01-29 15:58:30:777]# RECV 7F 04 04 7E 74 3F C5 EC 12".
- Conversion:** A section at the bottom showing the decimal number 1.21838 and its hexadecimal equivalent 3FC57E74, with buttons to convert between the two.

6.4.4[Fake Echo Learning Operation Instructions]

Add effective fake echo learning: Click Output Spectrum to view the spectrum diagram.



Send the command AT+FALSEECHO=2,a,b (perform false echo learning on the distance range between a and b, for example, the range of the false echo in the schematic diagram is 1.7-2.7)

RealTimeData

Command

AT+FALSEECHO=2,1,7,2,7

\n

Send

☐ Modbus

Log

ClearLog

AT+FALSEECHO=2,1,7,2,7

Undefined

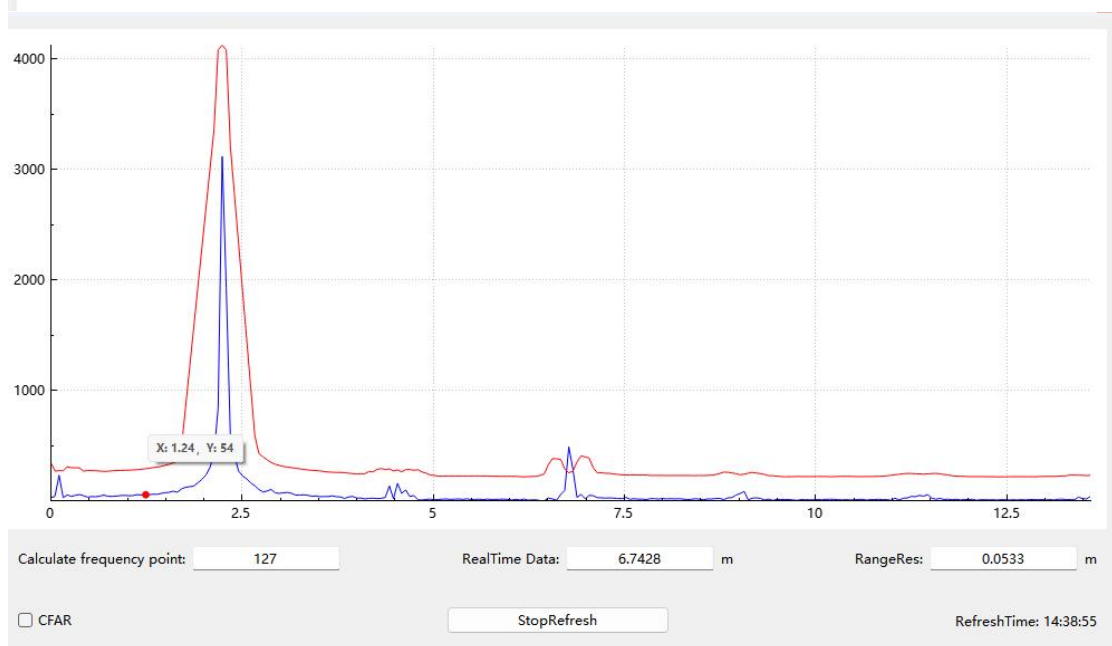
[2026-01-31 16:24:32:851]# SEND

AT+FALSEECHO=2,1,7,2,7

[2026-01-31 16:24:33:234]# RECV

AT+FALSEECHO=2,1,7,2,7

OK



6.5 Data error prompt

6.5.1[In the blind zone]

■ Real-time altitude data is displayed in the blind zone: The distance between the sensor and the object being measured is less than the blind zone distance of 20cm, it will be displayed in the blind zone. Solution: The distance between the sensor and the object being measured is greater than the blind zone distance

The screenshot displays the configuration interface for an 80G device. It is divided into four main sections: DeviceInfo, ConfigInfo, Command, and Log.

- DeviceInfo:** Contains fields for DeviceModel (2MHz_btYLD18), Version (20251217), Range (30.000 m), BlindZone (0.200 m), AirHeight (InBlindZone m), and WaterDepth (InBlindZone m). A 'RealTimeData' button is located at the bottom of this section.
- ConfigInfo:** Contains tabs for InstallDiagram, Function, and Modbus. The Function tab is active, showing fields for 485Addr (127), BaudRate (9600), InstallHeight (1.000 m), ComMode (Response), PushCycle (0 ms), PushProtocol (ASCII), LimitFilterAmplitude (10 cm), and LimitFilterTimes (2.0 s). There are buttons for SaveAllConfig, RestoreFactorySetting, SpectrumOutput, and FirmwareUpdate.
- Command:** Contains a text input field with 'AT+RFPOWER=1,1', a '\n' button, a 'Send' button, and a 'Modbus' checkbox.
- Log:** Displays a log of commands and responses. A red box highlights a specific log entry: '[2026-01-29 16:13:56:536]# RECV REALAIRHEIGHT=InBlindZone REALWATERDEPTH=InBlindZone'.

6.5.2[Insufficient echo energy]

■ There are interfering objects between the sensor and the object being measured, resulting in insufficient reflected echo energy:

■ As long as one of the sensor and the object being measured is not horizontal, it will lead to insufficient reflected echo energy:

■ The object being measured is not a flat object or liquid, resulting in insufficient reflected echo energy:

80G

DeviceInfo

DeviceModel 2MHz_btYLD18

Version 20251016

Range 30.000 m

BlindZone 0.050 m

AirHeight LackEnergy m

WaterDepth LackEnergy m

GetDeviceInfo

RealTimeData

ConfigInfo

InstallDiagram Function Modbus

485Addr 127 BaudRate 9600

InstallHeight 1.000 m ComMode Response

PushCycle 0 ms PushProtocol ASCII

LimitFilterAmplitude 200 cm LimitFilterTimes 0.0 s

SaveAllConfig RestoreFactorySetting

SpectrumOutput FirmwareUpdate

Command

AT+REALWATERDEPTH \n Send ☐ Modbus

Log

ClearLog StopScroll SaveLog

[2026-01-24 17:40:02:405]# SEND
AT+REALWATERDEPTH

[2026-01-24 17:40:02:577]# RECV
REALWATERDEPTH=LackEnergy

7. Bluetooth debugging configuration

7.1 Find Bluetooth devices

Open the WeChat app, search for "宇宙物联" (Universe IoT) and enter (see Figure 8-1). After entering, click [Search Bluetooth] (see Figure 8-1-1) → Click on the searched device model to enter the device main interface.

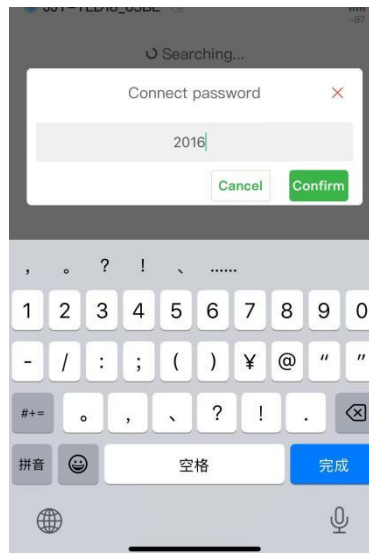
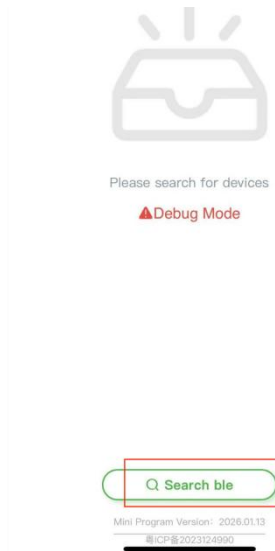


Figure 8-1 Figure 8-1-1

7.2 Water Level Configuration

After entering the device interface, click [Water Level Configuration], fill in the actual current water depth, and save (see Figure 8-2).

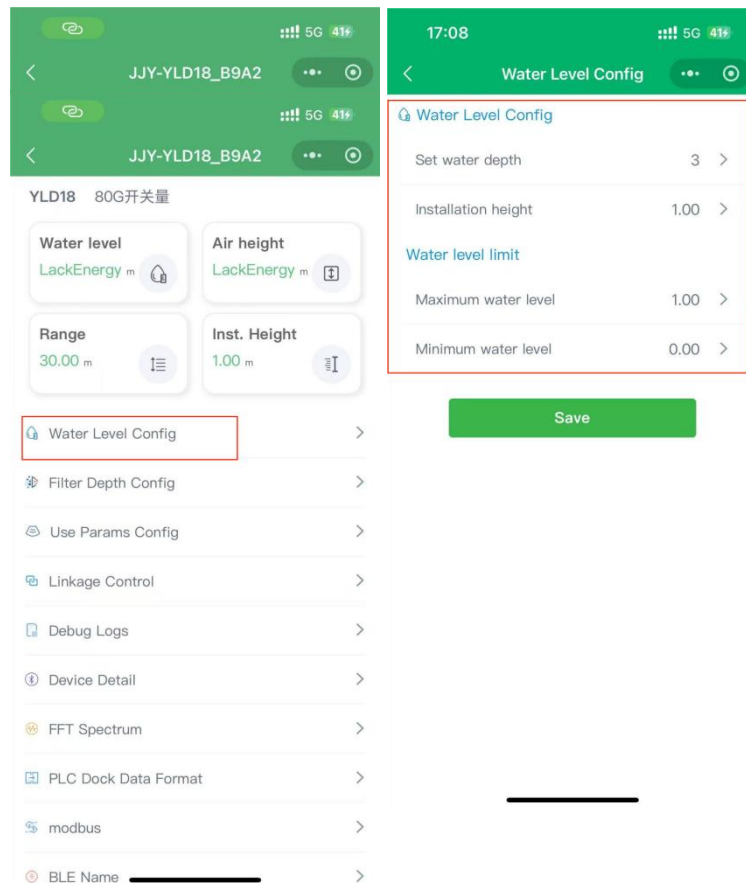


Figure 8-2

7.3 RS485 Baud Rate Address Code Configuration

Return to the device interface, click [Address Code Baud Rate Configuration], fill in the baud rate configuration parameters according to the actual situation and save (see Figure 8-3).

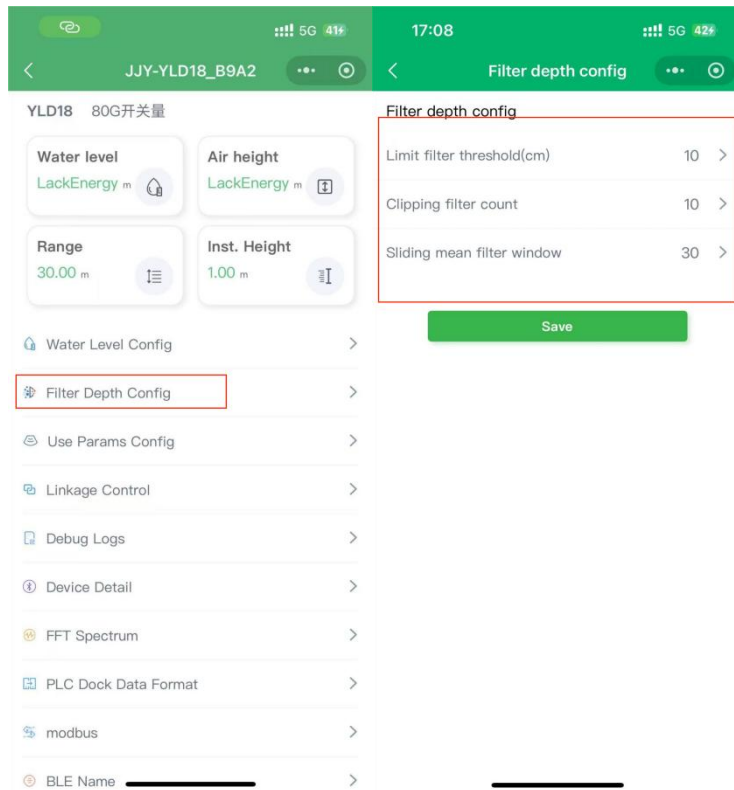


Figure 8-3

Return to the device interface, click [Modbus], click [Configuration], and fill in the communication protocol configuration parameters according to the actual situation (8-4)

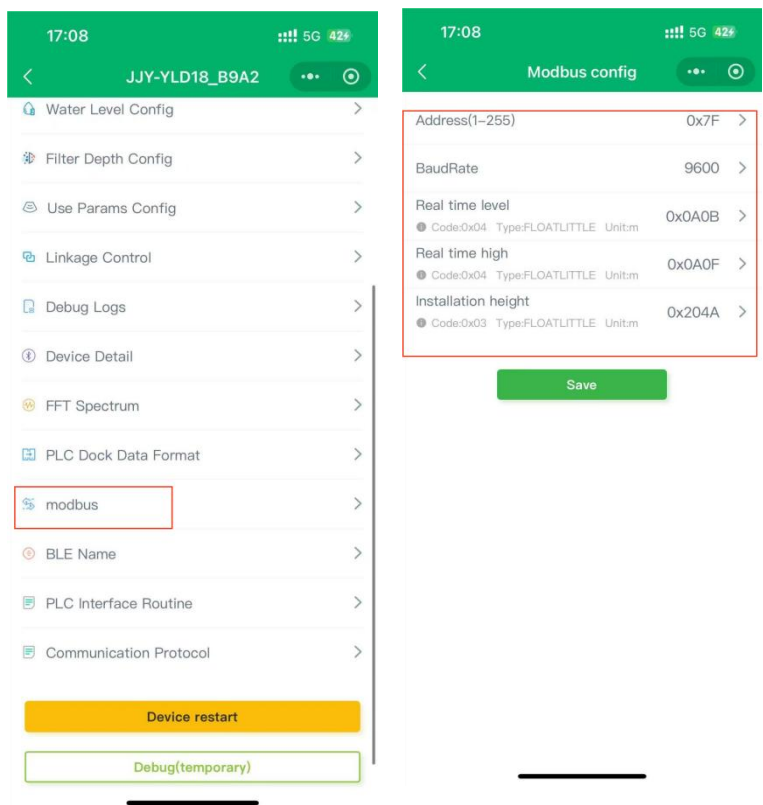


Figure8-4

7.5 Analog Quantity4-20MARange Configuration

Return to the device interface, click [Range Configuration], fill in the range configuration parameters according to the actual situation and save (see Figure 8-5).

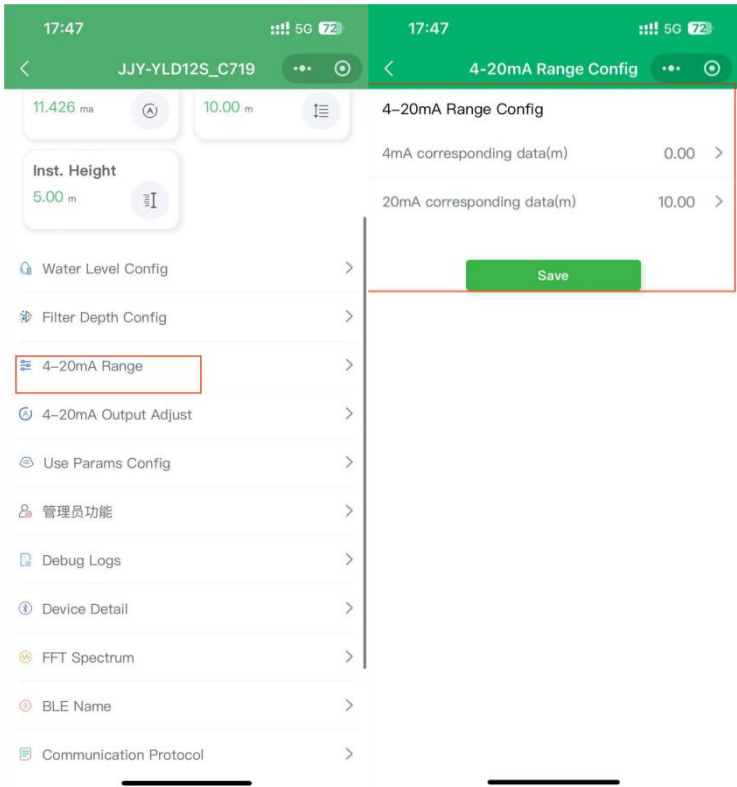


Figure8-5

7.6Analog Quantity4-20MAData Calibration

Return to the device interface, click [Data Correction], adjust the data correction parameters according to the actual situation and save (see Figure 8-6).

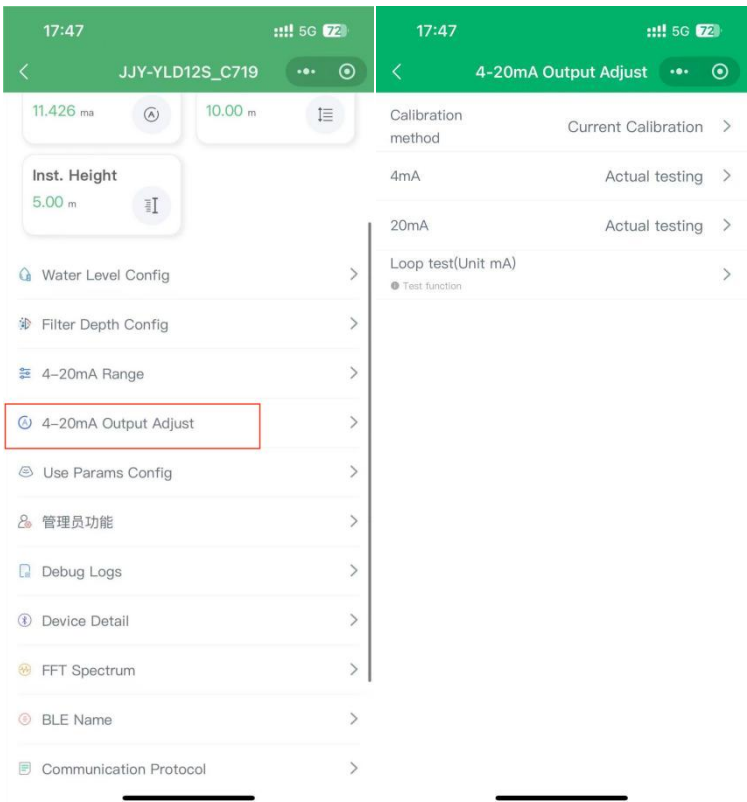
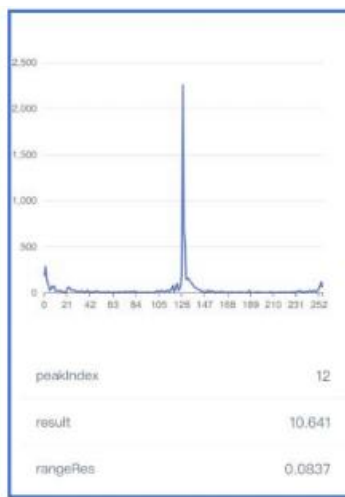


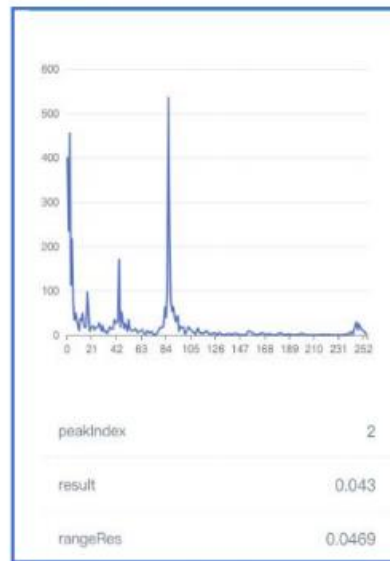
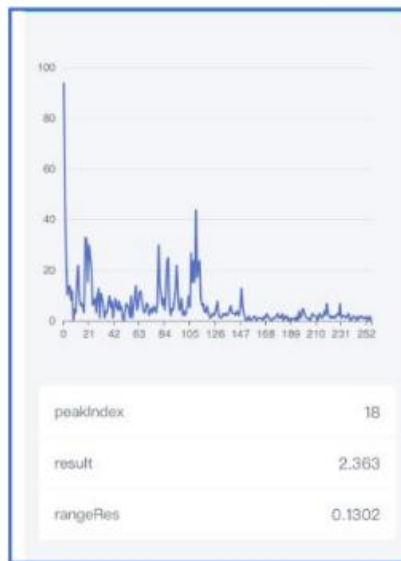
Figure8-6

7.7Acquisition Data Filtering

Return to the device interface and click [Data Update Time] to make the data smoother. Adjust the update time configuration parameters according to the actual situation and save (see Figure 8-7).



Correct Radar Echo



Radar Echo with Interfering Objects

Figure8-7

8. Appendix: Glossary

Range Resolution: Refers to the ability of ultrasound to distinguish between two closely spaced objects.

Accuracy: If there is only one object and this object moves a very small distance, can the level ultrasonic wave recognize the distance change? The indicator to distinguish the moving distance of a single object is called accuracy.

Blind Zone: Refers to the near-end measurement limit of the instrument, and the instrument cannot measure data within the blind zone.

Echo: The signal reflected by the ultrasonic wave.

False Echo: Any echo that is not generated by the desired target. Generally speaking, false echoes are generated by obstacles in the container.

Multiple Echoes: Multiple reflected echoes appearing at the target echo distance, possibly 2 or 3 times.

Range: (1) Refers to the farthest measuring distance of the instrument; (2) Refers to the farthest distance set manually, beyond which the instrument processes data without considering it.

When considering data.

Repeatability: The degree of deviation of the measurement results when measuring the same reflection target multiple times under the same test environment.