

User Manual

White Radar Module

JJY-YLD138M-32

1. Product Introduction

Millimeter-wave radar modules mainly consist of an RF unit, a processing unit, and a printed-circuit-board antenna. The millimeter-wave radar can detect targets through obstacles such as light, rainfall, dust, fog, or frost. It is a compact sensor operating all-weather and around the clock, featuring high integration, small size, and flexible interfaces.

This liquid-level radar is developed based on millimeter-wave radar technology and measures the height from the radar antenna to the liquid surface. It is widely used in:

- Hydrological measurement for rivers, reservoirs, etc.
- Tank liquid level, sewage well, and manhole liquid level measurement;

Main advantages are as follows:

- Based on a domestic CMOS millimeter-wave RF chip, achieving a more compact RF architecture, higher signal-to-noise ratio, and smaller blind zone.
- A 5 GHz modulation bandwidth gives the product higher measurement resolution and accuracy.
- The narrowest $\pm 3^\circ$ antenna beam angle reduces the impact of environmental interference on the instrument, making installation more convenient.
- With a shorter wavelength and better emission characteristics on solid surfaces, there is no need to use a special universal flange for aiming.

2. Technical Parameters

Communication Type	TTL (32mm)
Operating Voltage	2.8-3.0V
Average Current	3.0V/6mA
RF Pulse Current	400mA
Beam Angle	$\pm 3^{\circ}$
Measurement Accuracy	$\pm 2\text{mm}$
Range / Blind Zone	【 0.05–10m】 / 【Radar Blind Zone 5cm】
Sampling Frequency	200ms / configurable
Communication Protocol	Customizable Modbus / text protocol
Operating Temperature	$-40^{\circ}\text{C}\sim 75^{\circ}\text{C}$
Housing Material	PTFE
Operating Humidity	0~95%
PCB Size	Diameter 32mm,
Connecting Thread	M32*1.5

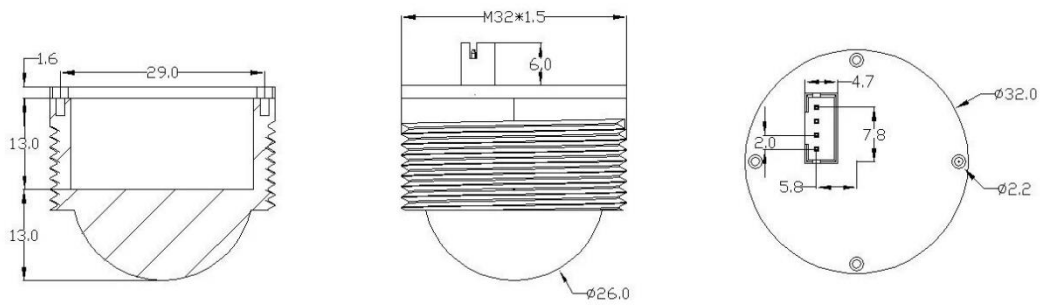
3. Product Photos

Module Photo - TTL-M47*1.5



Module Photo - TTL-M32*1.5

4. Product Dimension Drawings



5. Wiring Instructions

5.1 TTL Serial Communication Product Wiring Diagram

TTL UART			RS-485		
No.	Colour	Pinout	No.	Colour	Pinout
1	Red	3v	1	Red	5-12v
2	Black	GND	2	Black	GND
3	Yellow	TX	3	Yellow	A
4	Green	RX	4	Green	B

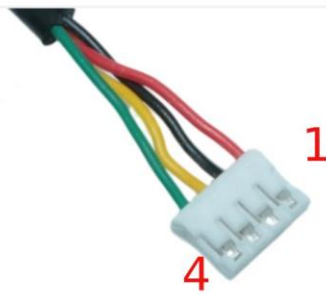


Fig. 5-1 TTL Wiring Diagram

Red: DC (2.8-3.0V supply) Green: TTL-RX Yellow: TTL-TX Black: GND.

6. Installation Requirements (Must Be Followed)

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

Keep away from the feed inlet: the device must not aim at the feed inlet to avoid interference from falling material.

No obstacles within the beam: ensure no obstacles such as ladders, steps, or beams within the beam angle ($\pm 2.75^\circ$).

Conical vessel: aim the beam directly at the lowest point of the vessel bottom to avoid inaccurate bottom measurement caused by oblique incidence.

6.1 Installation Example - Sealed Vessel Scenario

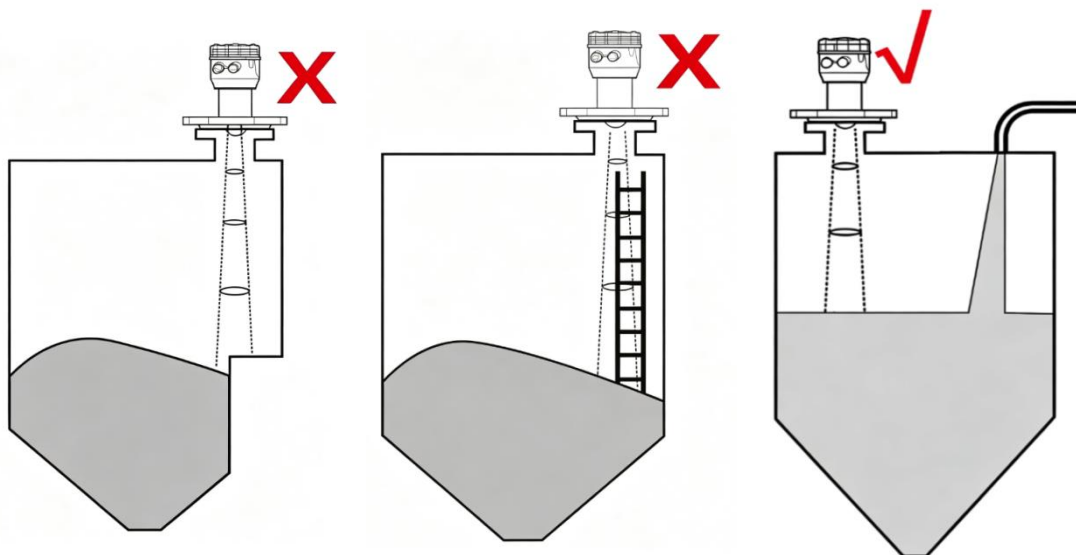


Fig. 6-1 Installation Example for Sealed Scenario

- The radar mounting position must keep the beam completely clear of ladders and steps, and away from the feed/discharge area, ensuring no interference below.

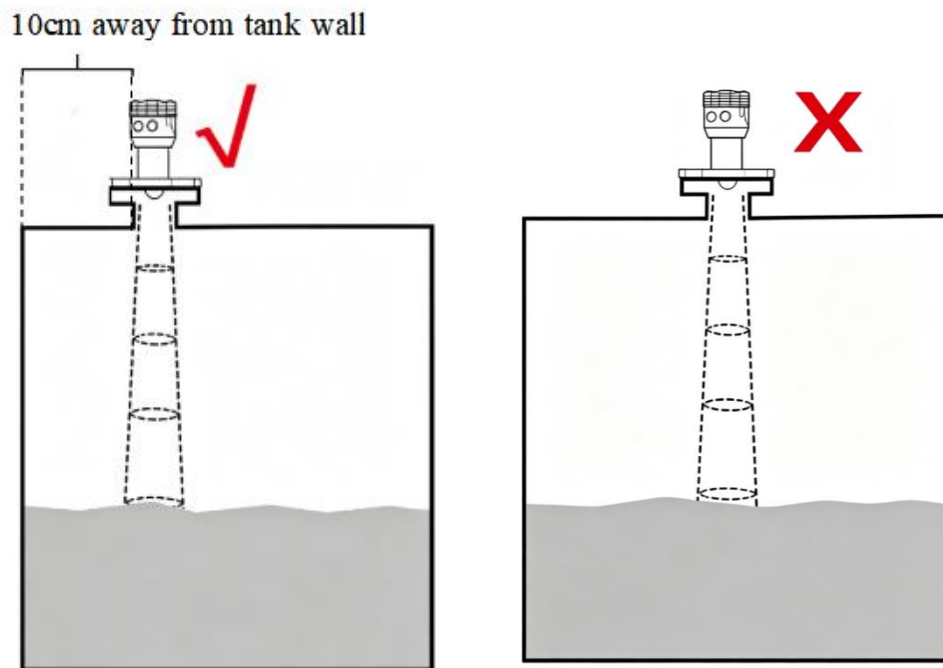


Fig. 6-2 Installation Example for Sealed Scenario

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

6.2 Installation Example - Open Scenario

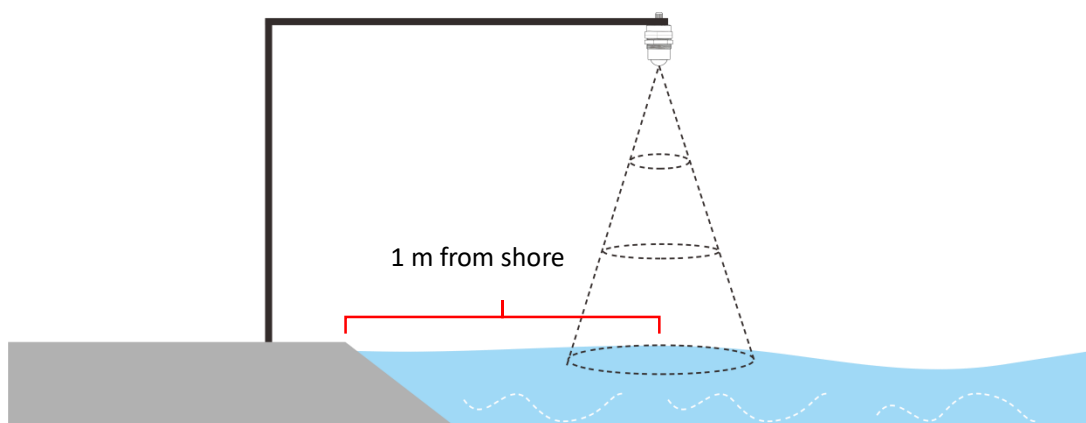


Fig. 6-3 Installation Example for Open Scenario

- The radar mounting position should be at least 1 m from the shore; avoid locations with large waves or severe swells. Large waves cause echo distortion and increase measurement error.

- Keep away from shore obstacles, foam, and floating objects to avoid false echoes.

7. Professional Terminology Diagram

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

Liquid level: distance from the bottom of the water / vessel to the water surface

Installation height: distance from the sensor probe to the bottom of the water / vessel.

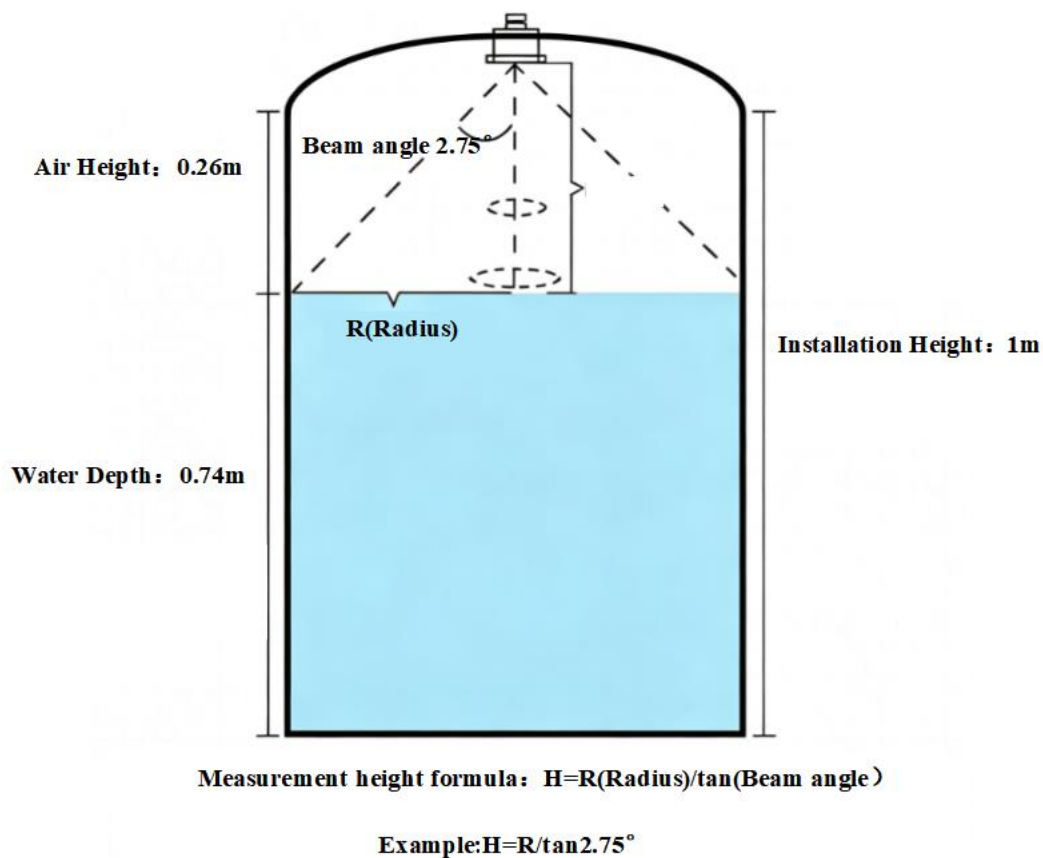
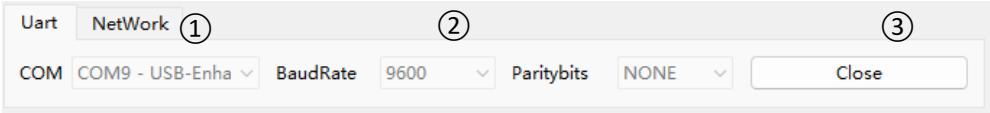
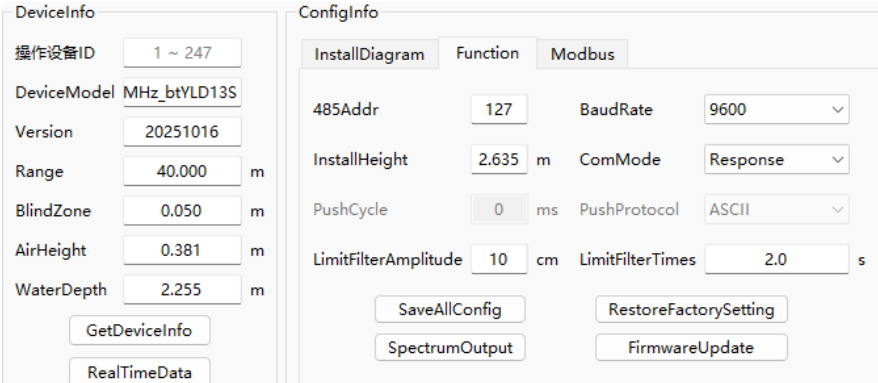
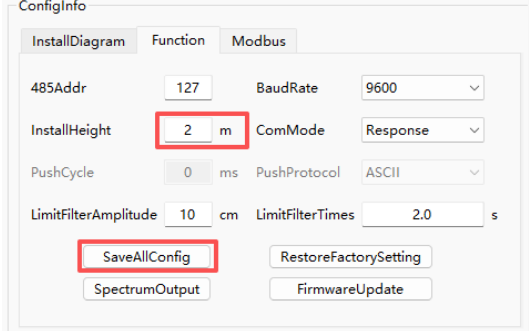


Fig. 7-1 Beam Parameter Principle Diagram

8. Host Computer Quick Debugging

Step 1	Power-on confirmation: for TTL communication radar, connect a DC 2.8-3.0V power supply; for 485 communication radar, connect DC 9-26V.
Step 2	Set the installation height on the host computer: (1) Open the host computer software and enter the device communication configuration interface. Select the USB serial port currently connected to the radar (if no port appears, check the driver); the default baud rate is 9600, then complete the hardware connection.  (2) Click "Detect Current Device". When the host computer displays the radar information, communication with the radar is successful.  (3) Configure the installation height parameter. As shown, set the installation height to 2m, click "Save All Configurations", and upon the reply "ok" the parameter is set successfully. Installation Height = Water Depth + Air Height. Installation Height: distance from the tank bottom to the sensor probe. Real-time Air Height: distance from the sensor probe to the water surface.  <pre data-bbox="912 1451 1327 1706">[2026-08-28 14:15:43:460]# SEND AT+INSTALLHEIGHT=2 [2026-08-28 14:15:44:215]# RECV AT+INSTALLHEIGHT=2 OK</pre>
Step 3	Set a reasonable antenna threshold (mandatory operation): (1) If you have your own enclosure, you must connect your own enclosure to set the antenna threshold;

(2) Lock to gear 1 and send AT+RFPOWER=1,1\n;

Command

AT+RFPOWER=1,1

\n

Send

Log

ClearLog

StopScroll

SaveLog

ReceiveTimeout

[2026-08-30 21:26:41:430]# SEND

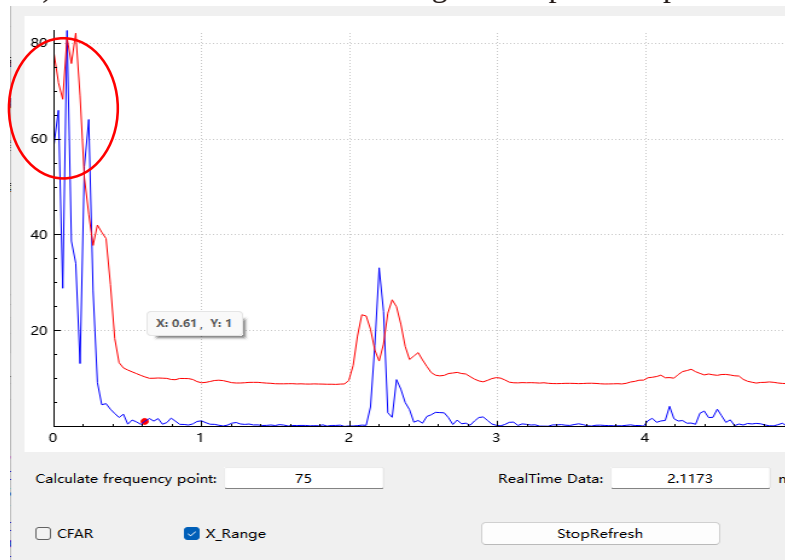
AT+RFPOWER=1,1

[2026-08-30 21:26:41:646]# RECV

AT+RFPOWER=1,1

OK

(3) Tilt the device toward the target and open the spectrum diagram:



(4)Record the peak of the preceding echo signal strength, e.g., the peak in the figure above is about 80; then send AT+ANTPEAKTHRE=100\n. The set value must be greater than the maximum peak in the spectrum.

Command

AT+ANTPEAKTHRE=100

\n

Log

ClearLog

StopScroll

SaveLog

[2026-08-30 21:28:46:067]# SEND

AT+ANTPEAKTHRE=100

[2026-08-30 21:28:46:263]# RECV

AT+ANTPEAKTHRE=100

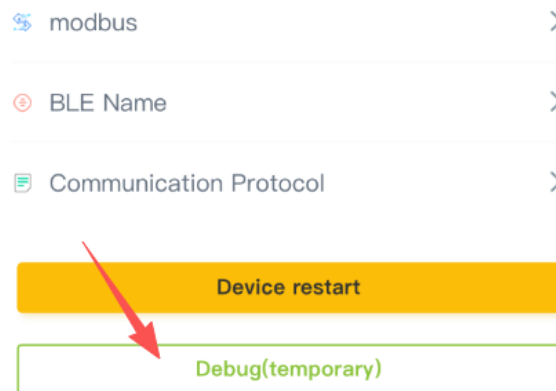
OK

(5) Restore the transmit power to the default value.
Send AT+RFPOWER=1,4\n.

9. Bluetooth Mini-Program Quick Debugging

Step 1	Power-on confirmation: for TTL communication radar, connect a DC 2.8-3.0V power supply; for 485 communication radar, connect DC 9-26V.
Step 2	(1) WeChat: search for the "宇宙物联 (Universe IoT)" mini-program, enable Bluetooth and location permissions, and tap Search Bluetooth; (2) Enter the connection password "2016"; (3) Confirm whether the "Air Height" distance shown on the mini-program home page is correct. Air height: distance from the sensor probe to the water surface. (4) Tap "Water Level Config", tap "Set Water Depth", and set the current water depth value. After setting the water depth, the device automatically calculates the installation height.
Step 3	Set a reasonable antenna threshold (mandatory operation): (1) If you have your own enclosure, you must connect your own enclosure to set the antenna threshold; (2) Open the "FFT Spectrum", and set both the minimum and maximum transmit power to gear 1;  (3) Record the peak of the preceding echo signal strength, e.g., the peak in the figure above is about 55;

(4) Swipe the mini-program page to the bottom and tap the "Debug (Temporary)" button



Enter the following command into the send box and tap Send:

cmd=atCmd

atCmdKey=ANTPEAKTHRE

atCmdValue=100 (the sent value must be greater than the echo peak in the FFT spectrum above)



(5) After sending, the log at the top shows "errInf=Success", meaning the setting is successful.

10. Common Parameter Settings

Requirement	Setting Command
Set installation mode	AT+INSTALLTYPE=1\n (Conventional installation = 0, Suspended installation = 1)
Enable nearest frequency point	AT+NEARESTPEAK=1\n (Off = 0, On = 1)
Set blind zone	AT+BLINDZONE=x\n (x is the value to be set; the minimum blind zone is 5 cm)
Set sliding window filter	AT+SLIDWINFILTERNUM=4\n (saves the latest 4 samples and outputs their average to filter out glitches)
Set amplitude-limiting filter	AT+LIMITFILTEROFFXCM=5cm,10\n
Set radar transmit power	AT+RFPOWER=1,5\n (1,5 means auto-adjust transmit power; 1,1 means use gear 1 transmit power)
Set antenna threshold	AT+ANTPEAKTHRE=200\n (sets the antenna threshold to 200)

11. Common Troubleshooting

Symptom	Possible Cause and Handling
Device cannot communicate	(1)For a 485 communication radar, use a multimeter to check whether the voltage is within 9-26V. (2)For a TTL communication radar, use a multimeter to check whether the voltage is within 2.8-3.0V. (3)Confirm correct wiring: for a TTL device, connect device TX to serial RX and device RX to serial TX (cross-connection); for a 485 device, connect 485-A to A and 485-B to B. (4)Confirm the baud rate: the device 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	Appropriately increase the duration (e.g., 45s) Send command: AT+LIMITFILTEROFFXCM=10cm,90\n
Blind zone indicated	(1) Check whether the installation is vertical; confirm the measured surface is outside the blind zone (5 cm). (2) Enable suspended installation 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;

Symptom	Possible Cause and Handling
Fixed interference object present	Learn away the fixed interference via false echo learning.
Air height value often too large	(1) Possible false echo (vessel wall, obstacles); adjust the installation position; (2) 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	Send the following commands to disable filtering: (1) Disable amplitude-limiting filter: AT+LIMITFILTEROFXCM=10,0\n (2) Disable sliding window filter: AT+SLIDWINFILTERNUM=0\n

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 radar 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 device by yourself; contact the manufacturer's technical support if a fault occurs.