# MINIRADAR S-810/S-812 SMARTLINE

**NON CONTACT RADAR 76-81GHz FMCW**

## WATER LEVEL SENSORS

## OPERATING MANUAL
## Wireless setup

See also the SERVICE pages on SMERI website:
tutorial for wireless programming

SERVICE - TUTORIAL

# 1. Product Introduction：

## 1.1 Main Feature:

**MINIRADAR S-810/S-812** product refers to a frequency modulated continuous wave (FMCW) radar product operating at 76-81GHz.

It has a high operating frequency and a larger bandwidth, so the measurement accuracy is higher.

The maximum range of the product can reach 20m, and the blind zone is within 20 cm.

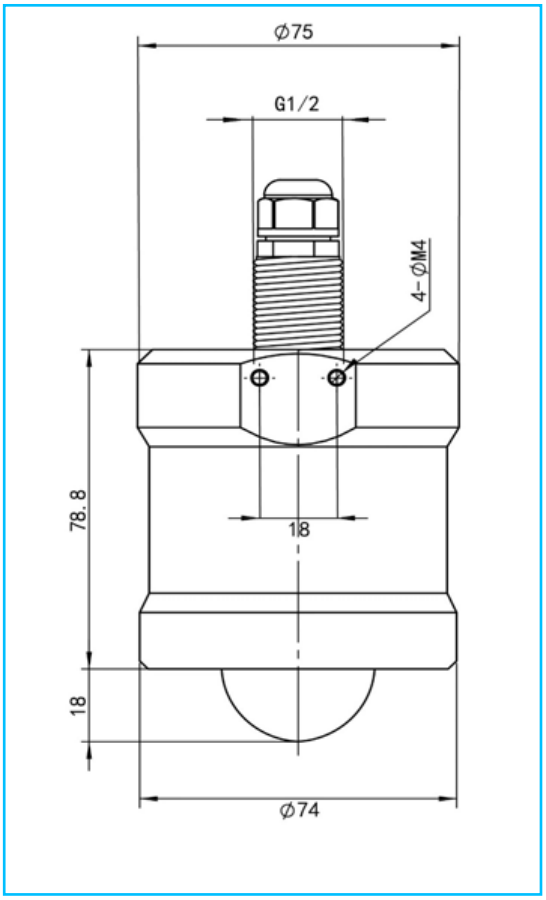
## 1.2 Technical Parameters

| | |
|---|---|
| Transmit Frequency | 76GHz~81GHz |
| Measuring Range | 10m, 20m ; 30m upon request |
| Accuracy | ±5 mm (10 m) / ±12 mm (20 m) / ±15 mm (30 m) |
| Beam Angle | **3°** |
| Power Supply | 24V DC (22V ~ 30V) |
| Signal output | 4~20mA |
| Antenna type/Material | Lens Antenna/PP |
| Housing Material | ABS or SS304 |
| Working Temperature | -20~+70℃ |
| Working Humidity | (0%~95%) RH |
| Electrical connection | S-810: screened cable outlet PUR, length<br>S-812: double cable gland M12x1.5 |
| Display | APP on Mobile phone (Bluetooth) "RadarMe" |
| Protection Grade | IP66/67 |

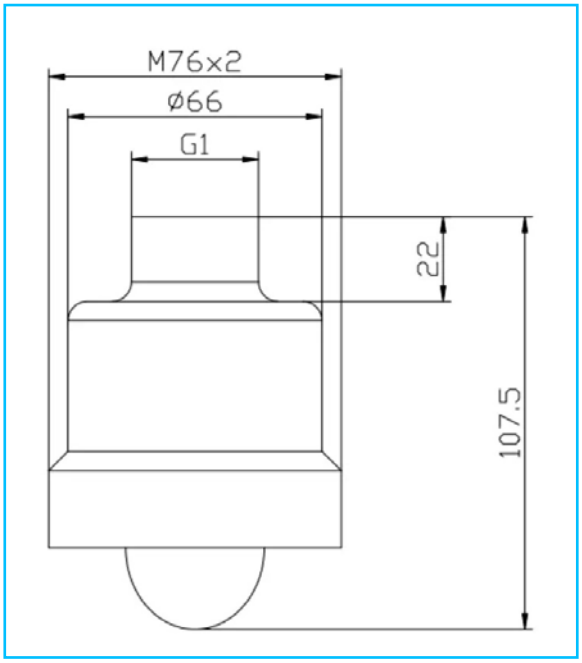
## 1.3 Outer Dimensions

Unit:mm

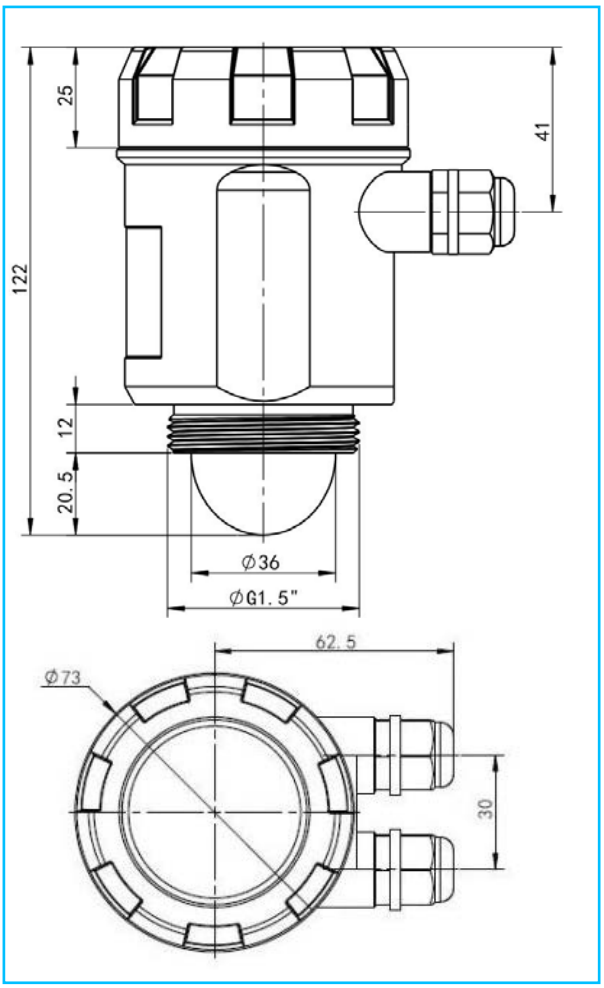
S-810 stainless steel 304,
threaded connection




S-810 ABS,
threaded connection




S-812 ABS, threaded connection



## 2.Installation

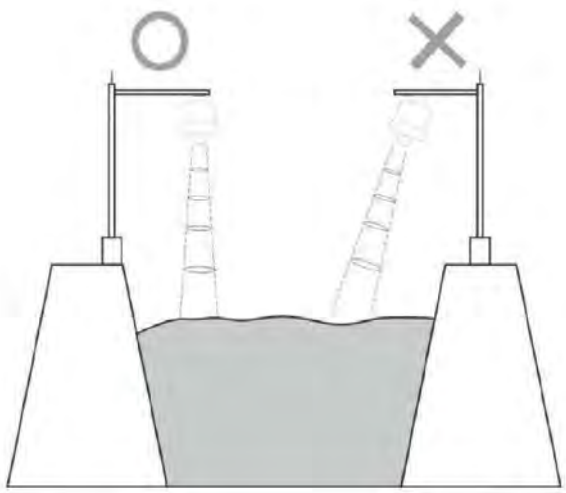
Two points need to be paid attention to during installation:

(1) Ensure that the meter is perpendicular to the water surface

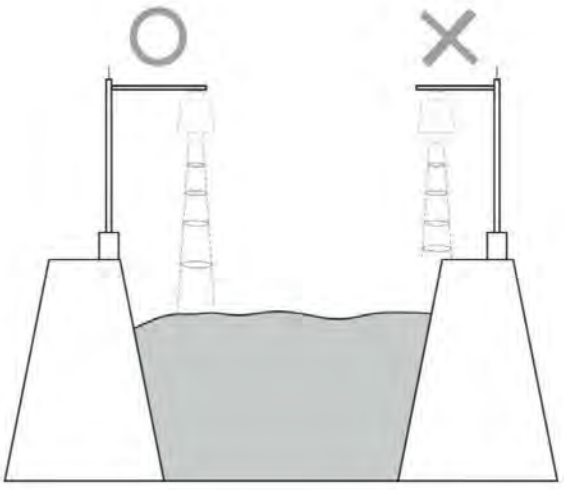
(2) Avoid the emission beam irradiating the interference object and generating false echoes.

Please check the following points for typical operating conditions.

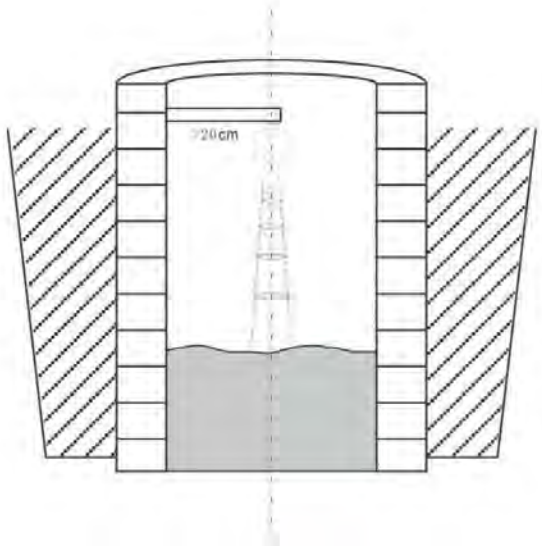
- Ensure that the water level sensor is installed perpendicular to the water surface, and the tilt will weaken the received signal amplitude and affect the normal ranging.



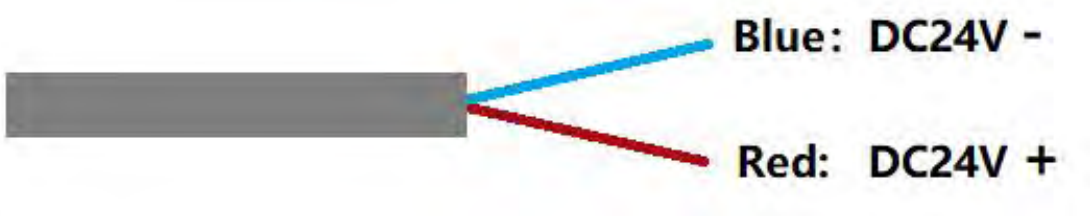
- Make sure that there are no interfering objects within the beam range, such as river banks.



- The installation of the instrument should be at least 20cm away from the side wall, and the installation of the underground pipe network should be as close to the center of the water well as possible, otherwise the well wall will easily generate interference signals, which will affect the measurement and judgment, as shown in the figure below.




## 3.Wiring




Model S-810 comes with a 10m shielded cable output with two conductors; the red core is connected to the positive terminal of the power supply, while the black core is connected to the negative terminal.

Moedel S-812 is equipped with two M12x1.5 cable glands and an internal terminal block.

| CONDUCTOR/TERMINAL | |
|---|---|
| RED（+） | 24V DC positive pole |
| BLUE（-） | 24V DC negative pole |
| RS-485 (+) * | RS-485 positive pole * |
| RS-485 (-) * | RS-485 negative pole * |

* pending

# 4. Debugging and Setting

MINIRADAR S-810 performs liquid level measurement tasks according to the settings, which can be modified via Bluetooth and APP on Mobile.

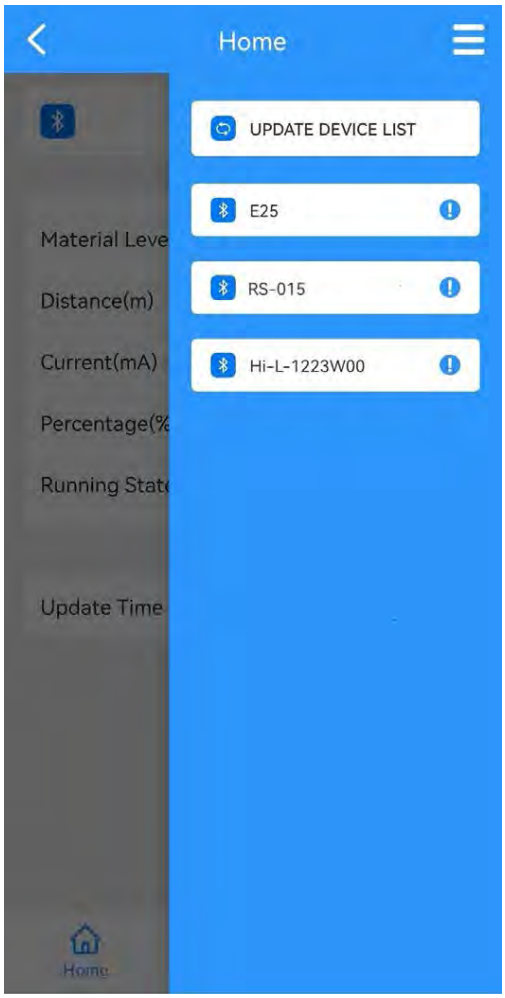
App RadarMe on Play Store for Android/Apple

See also the SERVICE pages on SMERI website: tutorial for wireless programming


SERVICE - TUTORIAL

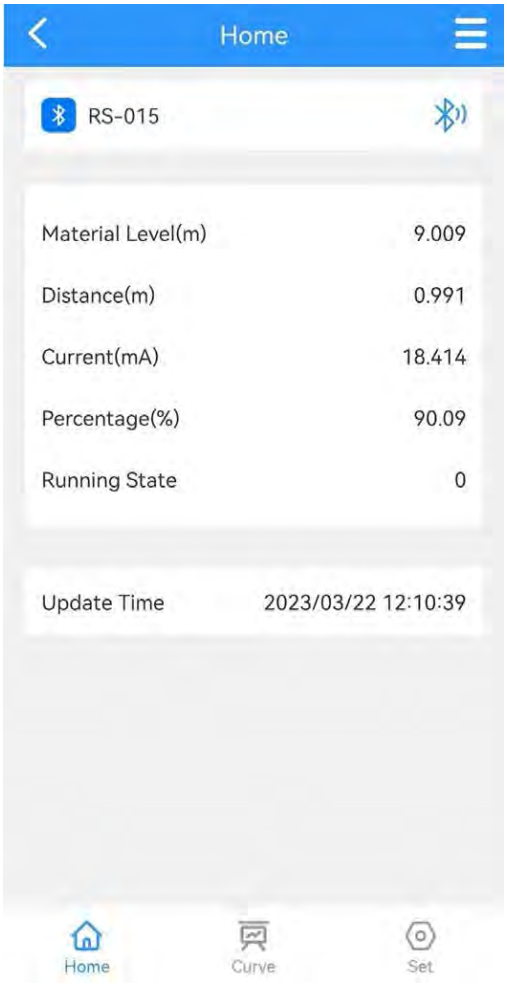
## 4.1 Software Setting

Open the APP in the Mobile Phone, it display the device connection interface, as shown in the figure below:




Click the name of the device to be set to enter the main interface, as shown in the figure.

## 4.2 Main interface




**Home:**

**Material Level:** Liquid Level Value

**Distance:** The distance from radar sensor to the liquid surface.

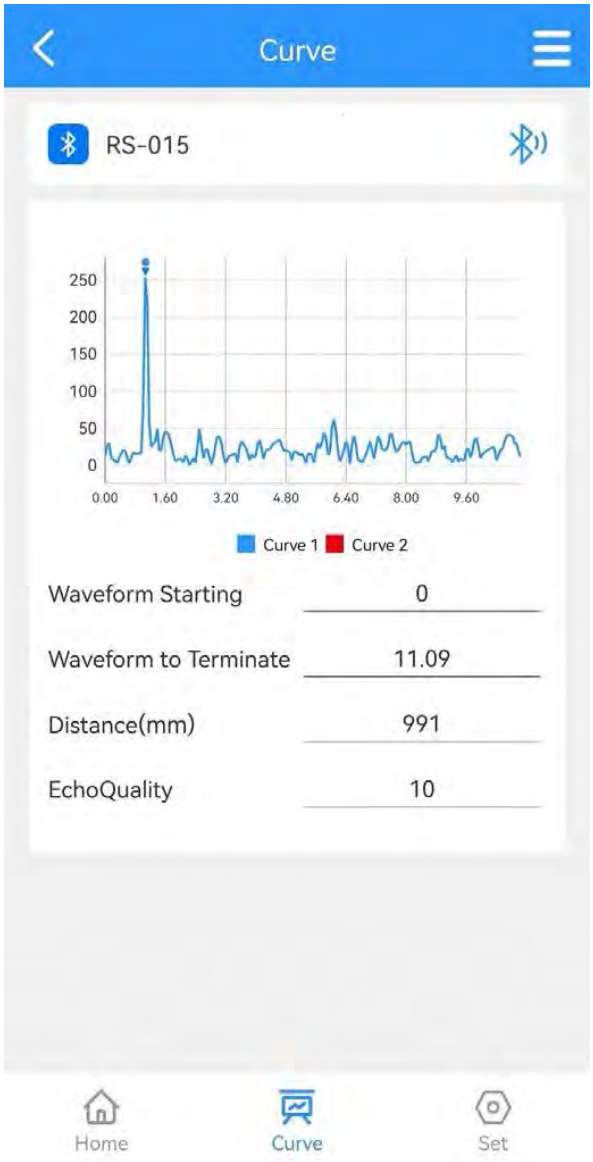
**Current:** Analog signal output corresponding to liquid level

**Percentage:** The percentage of liquid level and max range

**Running State:** Working stage = 0 is work well, = 1 is error.

Click the “Curve” button at the bottom of the screen to enter the echo curve interface, as shown in the figure below:

### 4.3 Echo Curve Interface




**Waveform Starting:** The starting position of the waveform

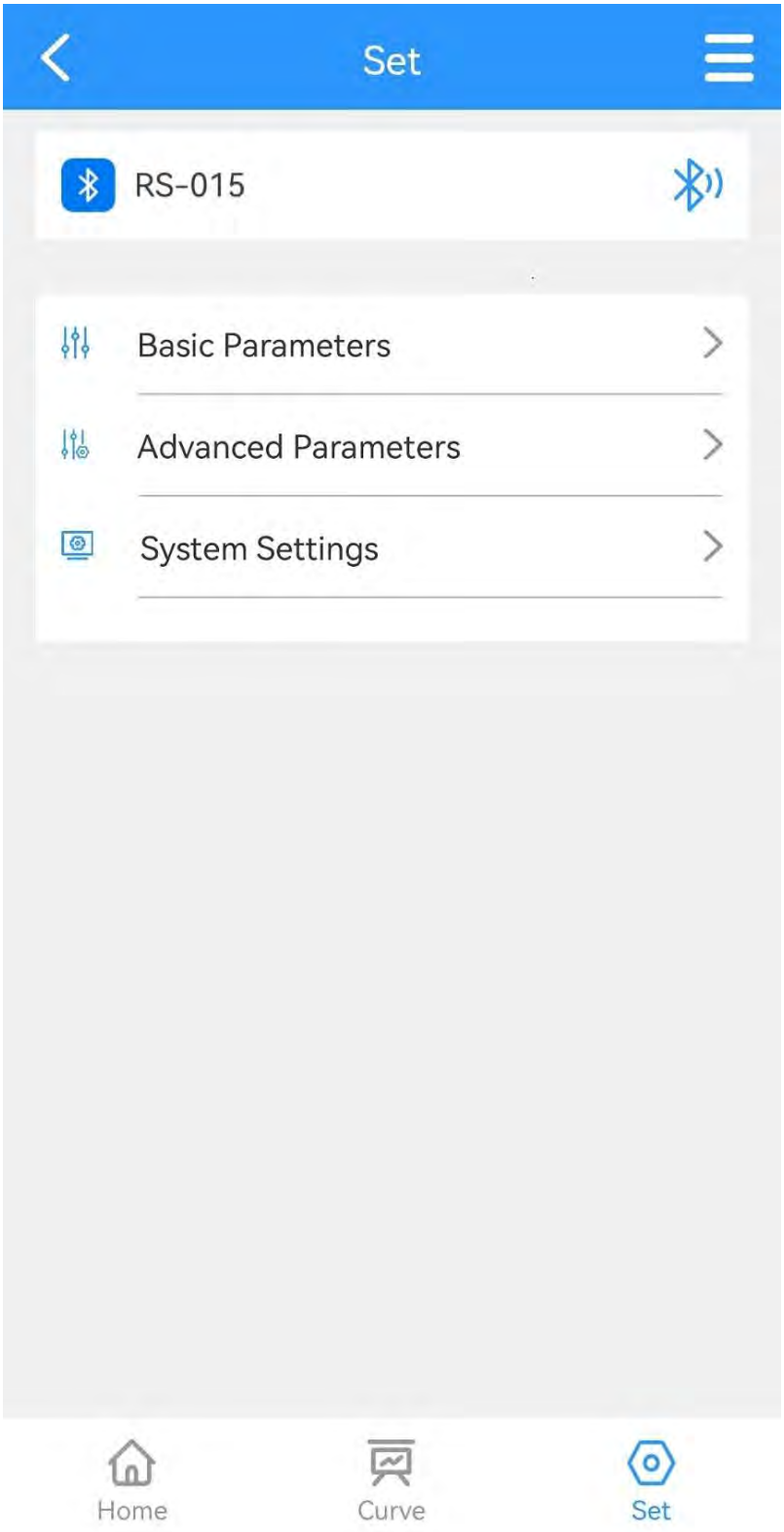
**Waveform to terminate:** The stopping position of the waveform

**Distance:** The distance from radar sensor to the liquid surface.

**Echo Quality:** The quality of Echo, unit is DB.

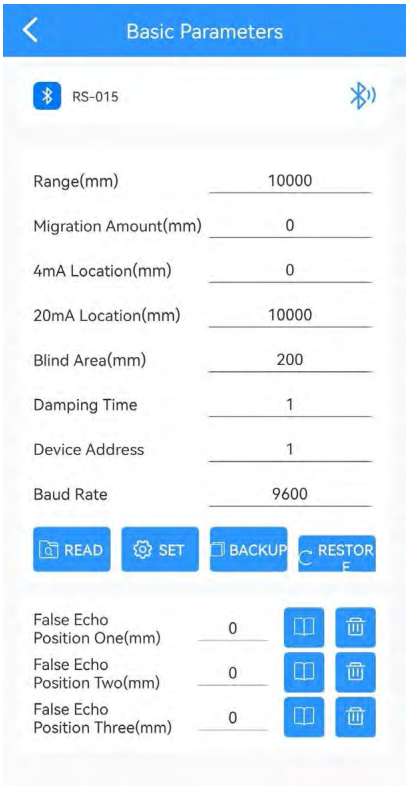
Click the “Set” button at the bottom of the screen to enter the parameter setting interface, as shown in the figure below.

## 4.4 Setting


Set
RS-015
Basic Parameters
Advanced Parameters
System Settings
Home
Curve
Set

## Basic Parameters

Click the “Basic parameters” on the above interface, it shows below:




Set the “Range” according to the working conditions and directly click the number input box behind to modify it.

The rest of the parameters are modified in the same way.

Click the “ Read” button to refresh the parameters.


As shown in the figure, when the liquid level is lower than 4mA Location, the main interface displays the liquids level as 0;

when the liquid level is higher than the 20mA location, the main interface displays the liquid level value as the value of 20mA location.

**Basic Parameters**

**Range**: max Measure range

**Migration Amount**: range less then max measure range

**4mA Location:** liquid level value corresponding to 4mA

**20mA Location**: liquid level value corresponding to 20mA

**Blind Area**: areas that cannot be measured by radar sensor.

**Damping Time**: speed at which the actual liquid level is displayed on screen. The longer the damping time value, the slower the response.

**Device Address**: Device No, can be modified.

**Baud Rate**: default Baud Rate is 9600

**False Echo Position One**: location of the first false echo. If you know the location of the obstacle and input the level value, the system will automatically block this false echo.

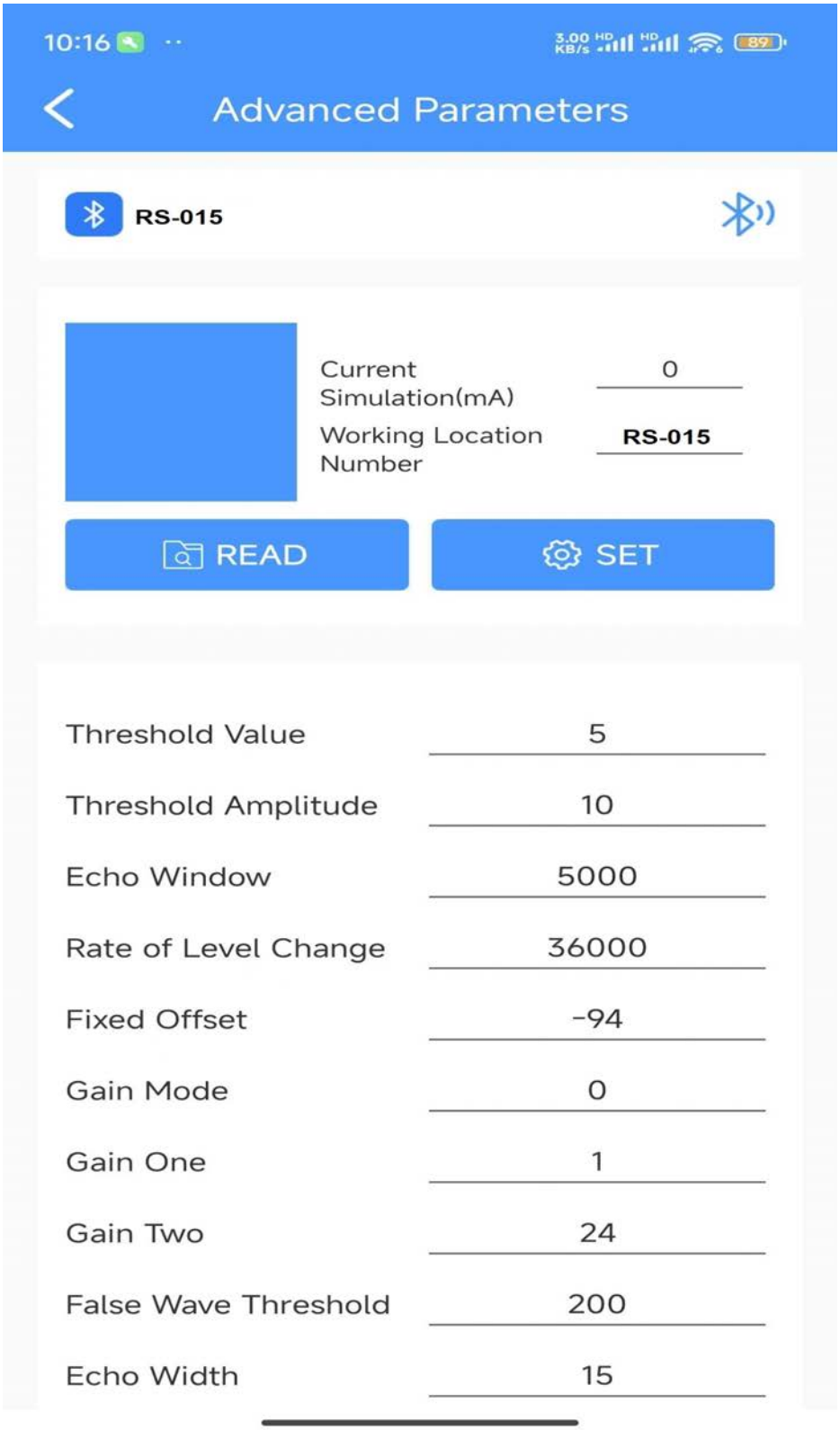
**False Echo Position Two**: location of the second false echo. If you know the location of the obstacle and input the level value, the system will automatically block this false echo.

**False Echo Position Three**: location of the third false echo. If you know the location of the obstacle and input the level value, the system will automatically block this false echo.

**Backup the parameters:** After the working parameters are backed up, if there is an error in manually modifying the parameters and the original working parameters are forgotten, the working parameters can be " restore" in the basic settings.

**Restore the parameters:** It is used to restore the backup parameters.

## Advanced Parameters



## Advanced Parameters

**Threshold Value:** setting parameters used to distinguish between signals and noise.It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Threshold Amplitude**: threshold value used to distinguish between signal and noise, with a minimum parameter setting of no less than 6. It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Echo Window:** setting an area centered around the echo signal, only searching for echo signals within the area, and echo signals outside the area are invalid. It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Rate of Level Change**: the maximum allowable level change rate for each detection. It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Fixed Offset:** it is recommended to use the default automatic gain mode and not modify it. If you have other requirements, please contact company technical support.

**Gain Mode**: gain mode is divided into manual adjustment signal gain mode and automatic adjustment signal gain mode. When gain model = 0, it is in automatic gain mode; Gain model = 1, in manual gain mode Automatic gain can be automatically adjusted based on the strength of the ADC signal

It is recommended to use the default automatic gain mode and not modify it. If you have other requirements, please contact company technical support.

**Gain One**: signal gain control value in the TIA gain chip is between 0-3, and manual adjustment is not required in automatic gain mode.

It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Gain Two**: signal gain control value in the VGA gain chip is between 0-24, and manual adjustment is not required in automatic gain mode

It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**False Wave Threshold:** used in conjunction with false echo position: The false wave threshold only takes effect when the false echo position is specified. The false wave threshold is a multiplier coefficient used to filter the height of false echoes.

It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Echo Width**: default parameters are not recommended for modification. If you have any requirements, please contact company technical support.

**Power**: when Power is configured to 0, the PGA gain is adjusted first, and the TIA gain is not automatically increased. It is recommended to use the default of 0.

It is recommended to use default parameters. If you have any requirements, please contact company technical support.

**Power One**: this parameter is for the search target mode;

When Power 1 is set to 1, it means that the target is the distance corresponding to the maximum amplitude of the echo that exceeds the set threshold, which is the maximum value search.

When Power 1 is set to 0, it means that the target is identified as the distance corresponding to the target with the echo exceeding the set threshold and the farthest forward in distance.

It is recommended to use the default parameter 1 and search by the maximum value. If you have any requirements, please contact company technical support.

## 5. Maintenance

- Pay attention to keep the radar level sensor clean, try to be waterproof,moisture-proof , anti-corrosion and avoid violent collisions and blows from other objects.
- Avoid direct sunlight on the main body of radar level sensor, keep away from heat sources and pay attention to ventilation. If the ambient temperature exceed the rated temperature,corresponding cooling protection measures should be taken.
- When the ambient temperature is too low, an instrument protection box or other protective devices can be used for antifreeze protection, and keep the radar dry.
- The radar should be tested regularly.( the detection cycle is determined by the user according to the specific situation)

## 6. Measurement problem analysis

| Symptoms | Cause of issue | Solution |
|---|---|---|
| No display | Power Supply | Check whether the DC 24V voltage and current meet the requirements or not. |
| | Wiring | Check the wiring is correct or not. |
| Unstable Value | Strong fluctuating | Change the installation position of the radar or reduce the fluctuation of the object to be measured. |
| | Weak Echo | Try angle alignment or rotate the radar mount. |
| | Strong Electromagnetic interference | Connect to the host to the ground or add a shield. |

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