

**YM7779****Air-plug-type Waterproof Stainless - steel Radar Ranging Sensor  
User Manual**

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YM7779 using the standard ,easy access to PLC , DCS and other instruments or systems for monitoring 毫米波 liquid level 雷达 15 米 state quantities.The internal use of high-precision sensing core and related devices to ensure high reliability and excellent long-term stability,can be customized RS232,RS485,CAN,4-20mA,DC0~5V\10V,ZIGBEE,Lora,WIFI,GPRS and other output methods.

**Technical Parameters**

| Technical parameter | Parameter value     |
|---------------------|---------------------|
| Interface           | RS485/4-20mA/DC0-5V |
| Power               | DC12~24V 1A         |
| Running temperature | -30~80℃             |
| Working humidity    | 5%RH~90%RH          |

### Product Selection

Product Design RS485, 4-20mA, DC0-5V Multiple output methods, the products are divided into the following models depending on the output method.

| Product model | output method |
|---------------|---------------|
| YM7779B       | RS485 总线      |
| YM7779M       | 4-20mA        |
| YM7779V5      | DC0-5V        |

### Product Size



**Note:** Manual measurement, please refer to the actual product

In the case of broken wires, wire the wires as shown in the figure. If the product itself has no leads, the core color is for reference.

### How to use?

Protective radar sensors are widely used in reservoirs, rivers, tunnels, oil tanks, sewer wells, lakes, urban roads and other environments



## Product List



**Waterproof stainless steel radar sensor Quantity 1**

(The actual delivery is subject to user selection)

## Communication Protocol

The product uses the RS485 MODBUS-RTU standard protocol format, and all operation or reply commands are in hexadecimal data. When the device leaves the factory, the default device address is 1, and the default baud rate is: for modules and non-recording instruments: 9600, 8, n, 1 (for the recorder series products, the default is: 115200, 8, n, 1).

### 1. Read data (Function code 0x03)

The inquiry frame (in hexadecimal). Example of sending: To query 1 piece of data of device No. 1, the host computer sends the command: 01 03 00 00 00 01 84 0A .

| Address | Function code | Starting address | Data length | Checksum |
|---------|---------------|------------------|-------------|----------|
| 01      | 03            | 00 00            | 00 01       | 84 0A    |

For a correct inquiry frame, the device will respond with data: 01 03 02 02 18 B9 2E , and the response format is:

| Address | Function code | Length | Data 1 | Checksum |
|---------|---------------|--------|--------|----------|
| 01      | 03            | 02     | 02 18  | B9 2E    |

Data description: The data in the command is in hexadecimal. Taking Data 1 as an example, 02 18 converted to decimal value is 536. Assuming the data magnification factor is 100, then the true value is  $536/100 = 5.36$ , and the others can be deduced by analogy.

### 2. Common Data Address Table

| Configuration Address | Register Address | Register Description | Data Type | Value Range |
|-----------------------|------------------|----------------------|-----------|-------------|
|-----------------------|------------------|----------------------|-----------|-------------|

|       |       |                                     |            |              |
|-------|-------|-------------------------------------|------------|--------------|
| 40001 | 00 00 | 毫米波 liquid level<br>雷达 15 米         | Read Only  | 0~65535      |
| 40101 | 00 64 | Model Code                          | Read-only  | 0~59999      |
| 40102 | 00 65 | Total Number of<br>Measuring Points | Read-only  | 1~1600       |
| 40103 | 00 66 | Device Address                      | Read/Write | 1~249        |
| 40104 | 00 67 | Baud Rate                           | Read/Write | 0~6          |
| 40105 | 00 68 | Communication<br>Mode               | Read/Write | 1 Query      |
| 40106 | 00 69 | Protocol Type                       | Read/Write | 1 MODBUS-RTU |

### 3. Read and modify the device address

#### (1) Read or query the device address

If you don't know the current device address and there is only one device on the bus, you can query the device address through the command FA 03 00 66 00 01 71 9E .

| Device address | Function code | Starting address | Data length | Checksum |
|----------------|---------------|------------------|-------------|----------|
| FA             | 03            | 00 66            | 00 01       | 71 9E    |

FA, which is 250, is the universal address. When you don't know the address, you can use 250 to obtain the real device address. 00 66 is the register of the device address.

For a correct query command, the device will respond. For example, the response data is: 01 03 02 00 01 79 84. The format analysis is shown in the following table:

| Device address | Function code | Starting address | Address ID | Checksum |
|----------------|---------------|------------------|------------|----------|
| 01             | 03            | 02               | 00 01      | 79 84    |

In the response data, the first byte 01 represents the real address of the current device.

#### (2) Change the device address

For example, if the current device address is 1 and you want to change it to 02, the command is: 01 06 00 66 00 02 E8 14 .

| Device address | Function code | Register address | Target address | Checksum |
|----------------|---------------|------------------|----------------|----------|
| 01             | 06            | 00 66            | 00 02          | E8 14    |

After the change is successful, the device will return the information: 02 06 00 66 00 02 E8 27. The format analysis is shown in the following table:

| Device address | Function code | Register address | Target address | Checksum |
|----------------|---------------|------------------|----------------|----------|
| 02             | 06            | 00 66            | 00 02          | E8 27    |

In the response data, after the modification is successful, the first byte is the new device address. Generally, after the device address is changed, it takes effect immediately. At this time, users need to modify the query commands in their own software accordingly.

### 4. Read and modify the baud rate

#### (1) Read the baud rate

The default factory baud rate of the device is 9600. If you need to change it, you can perform the change operation according to the following table and the corresponding communication protocol. For example, to read the baud rate ID of the current device, the command is: 01 03 00 67 00 01 35 D5 . The format analysis is as follows.

| Device address | Function code | Starting address | Data length | Checksum |
|----------------|---------------|------------------|-------------|----------|
| 01             | 03            | 00 67            | 00 01       | 35 D5    |

Read the baud rate code of the current device. Baud rate codes: 1 for 2400; 2 for 4800; 3 for 9600; 4 for 19200; 5 for 38400; 6 for 115200.

For a correct query command, the device will respond. For example, the response data is: 01 03 02 00 03 F8 45. The format analysis is shown in the following table:

| Device address | Function code | Data length | Baud rate code | Checksum |
|----------------|---------------|-------------|----------------|----------|
| 01             | 03            | 02          | 00 03          | F8 45    |

According to the baud rate code, 03 represents 9600, which means the current baud rate of the device is 9600.

## (2) Change the baud rate

For example, to change the baud rate from 9600 to 38400, that is, change the code from 3 to 5, the command is: 01 06 00 67 00 05 F8 16 .

| Device address | Function code | Register address | Target baud rate | Checksum |
|----------------|---------------|------------------|------------------|----------|
| 01             | 06            | 00 67            | 00 05            | F8 16    |

Change the baud rate from 9600 to 38400, that is, change the code from 3 to 5. The new baud rate will take effect immediately. At this time, the device will stop responding, and the query command for the device's baud rate needs to be modified accordingly.

## 5. Read and modify the correction value (valid for some products)

### (1) Read the correction value

When there is an error between the data and the reference standard, we can reduce the display error by adjusting the "correction value". The adjustable range of the correction difference is plus or minus 1000, that is, the value range is 0 - 1000 or 64535 - 65535. For example, when the displayed value is 100 less than the actual value, we can correct it by adding 100. The command is: 01 03 00 6B 00 01 F5 D6 . In the command, 100 is the hexadecimal value 0x64. If you need to decrease the value, you can set a negative value. For example, - 100 corresponds to the hexadecimal value FF 9C. The calculation method is 100 - 65535 = 65435, and then convert it to hexadecimal, which is 0x FF 9C. The device correction value starts from 00 6B. We take the first parameter as an example for illustration. When there are multiple parameters, the methods for reading and modifying the correction value are the same.

| Device address | Function code | Starting address | Data length | Checksum |
|----------------|---------------|------------------|-------------|----------|
| 01             | 03            | 00 6B            | 00 01       | F5 D6    |

For a correct query command, the device will respond. For example, the response data is: 01 03 02 00 64 B9 AF. The format analysis is shown in the following table:

| Device address | Function code | Data length | Correction value | Checksum |
|----------------|---------------|-------------|------------------|----------|
| 01             | 03            | 02          | 00 64            | B9 AF    |

In the response data, the first byte 01 represents the real address of the current device, and 00 6B is the register for the correction value of the first state variable. If the device has multiple parameters, the operation methods for other parameters are the same. Generally, temperature and humidity sensors have this parameter, while light sensors usually do not.

### (2) Change the correction value

For example, if the current state variable value is too small and we want to increase its real - value by 1, the command to correct the current value by adding 100 is: 01 06 00 6B 00 64 F9 FD .

| Device address | Function code | Register address | Target address | Checksum |
|----------------|---------------|------------------|----------------|----------|
| 01             | 06            | 00 6B            | 00 64          | F9 FD    |

After the operation is successful, the device will return the information: 01 06 00 6B 00 64 F9 FD. After the change is successful, the parameter takes effect immediately.

For example, the range is 0~15Lux, the analog output is 4~20mA current signal, Illuminance and current The calculation relationship is as shown in the formula:  $C = (A2-A1) * (X-B1) / (B2-B1) + A1$ , where A2 is Illuminance range upper limit, A1 is the lower limit of the range, B2 is current output range upper limit, B1 is the lower limit, X is the currently read Illuminance value, and C is the calculated current value. The list of commonly used values is as follows:

| current(mA) | IlluminanceValue (Lux) | Calculation Process         |
|-------------|------------------------|-----------------------------|
| 4           | 0.0                    | $(15-0)*(4-4)\div(20-4)+0$  |
| 5           | 0.9                    | $(15-0)*(5-4)\div(20-4)+0$  |
| 6           | 1.9                    | $(15-0)*(6-4)\div(20-4)+0$  |
| 7           | 2.8                    | $(15-0)*(7-4)\div(20-4)+0$  |
| 8           | 3.8                    | $(15-0)*(8-4)\div(20-4)+0$  |
| 9           | 4.7                    | $(15-0)*(9-4)\div(20-4)+0$  |
| 10          | 5.6                    | $(15-0)*(10-4)\div(20-4)+0$ |
| 11          | 6.6                    | $(15-0)*(11-4)\div(20-4)+0$ |
| 12          | 7.5                    | $(15-0)*(12-4)\div(20-4)+0$ |
| 13          | 8.4                    | $(15-0)*(13-4)\div(20-4)+0$ |
| 14          | 9.4                    | $(15-0)*(14-4)\div(20-4)+0$ |
| 15          | 10.3                   | $(15-0)*(15-4)\div(20-4)+0$ |
| 16          | 11.3                   | $(15-0)*(16-4)\div(20-4)+0$ |
| 17          | 12.2                   | $(15-0)*(17-4)\div(20-4)+0$ |
| 18          | 13.1                   | $(15-0)*(18-4)\div(20-4)+0$ |
| 19          | 14.1                   | $(15-0)*(19-4)\div(20-4)+0$ |
| 20          | 15.0                   | $(15-0)*(20-4)\div(20-4)+0$ |

As shown in the above formula, when measuring 8mA, current current is 7.75Lux。

For example, the range is 0~15Lux, the analog output is 0~5V DC0-5Vvoltage signal, Illuminance and DC0-5Vvoltage The calculation relationship is as shown in the formula:  $C = (A2-A1) * (X-B1) / (B2-B1) + A1$ , where A2 is Illuminance range upper limit, A1 is the lower limit of the range, B2 is DC0-5Vvoltage output range upper limit, B1 is the lower limit, X is the currently read Illuminance value, and C is the calculated DC0-5Vvoltage value. The list of commonly used values is as follows:

| DC0-5Vvoltage(V) | IlluminanceValue (Lux) | Calculation Process       |
|------------------|------------------------|---------------------------|
| 0                | 0.0                    | $(15-0)*(0-0)\div(5-0)+0$ |
| 1                | 3.0                    | $(15-0)*(1-0)\div(5-0)+0$ |
| 2                | 6.0                    | $(15-0)*(2-0)\div(5-0)+0$ |
| 3                | 9.0                    | $(15-0)*(3-0)\div(5-0)+0$ |
| 4                | 12.0                   | $(15-0)*(4-0)\div(5-0)+0$ |
| 5                | 15.0                   | $(15-0)*(5-0)\div(5-0)+0$ |

As shown in the above formula, when measuring 2.5V, current DC0-5Vvoltage is 7.5Lux。

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