

# **Type 485 evaporation Sensor instruction manual**

**JXBS-3001-ZFL**

**Ver1.1**

**威海精讯畅通电子科技有限公司**

Weihai JXCT Electronics Co., Ltd.



# Chapter 1 Product Introduction

## 1.1 Product overview

JXBS-3001-ZFL water surface evaporation sensor is an instrument used to observe water surface evaporation. The product adopts a double-layer stainless steel structure design, which can prevent evaporation errors caused by direct sunlight and has better measurement accuracy.

The JXBS-3001-ZFL water surface evaporation sensor uses the pressure measurement principle to measure the change in the weight of the liquid in the evaporating dish, and then calculate the height of the page to measure the evaporation. Water surface evaporation measurement that can adapt to various environments, is not affected by liquid icing, and overcomes the inaccurate measurement when the liquid level is measured using the ultrasonic principle, the sensor is easily damaged when there is no water, and the measurement accuracy is low.

The equipment adopts imported pressure sensor, which has passed many certifications at home and abroad to ensure that the linearity of the sensor reaches a sufficient standard.

## 1.1 Product advantages

- Stainless steel design prevents evaporation errors caused by direct sunlight, at the same time, it is corrosion-resistant,

does not rust, and has a beautiful appearance to ensure the service life of the sensor; Applying the pressure measurement principle, measuring the weight change of the liquid in the evaporating dish through the high-precision imported weighing principle, and then calculating the liquid level, so as to measure the evaporation volume, the measurement is more accurate, and the data is more scientific;

- The wiring method with bottom outlet is adopted to reduce open wires, avoid line faults, convenient installation and simple operation;
- High-performance intelligent program design, strong adaptability, normal observation under wind, wave and rainy weather conditions without loss of accuracy;
- Anti-electromagnetic interference, even if the power is turned on after a power failure, the output data is still correct.
- It can be equipped with an automatic water adding device to achieve 365 days maintenance-free.

## 1.1 main parameters

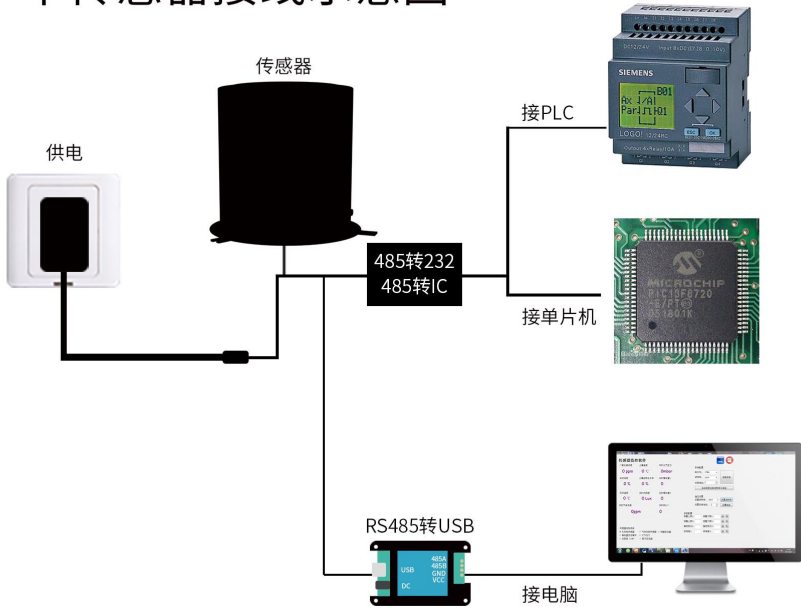
parameter name	Parameter content
DC power supply (default)	9-24V DC
Power consumption	$\leq 0.15W$ (@12V DC , 25°C )
Measuring range	0-200mm
measurement accuracy	1%F.s
Resolution	$\leq 0.01mm$

<b>output signal</b>	RS485Output (Modbus protocol)
<b>working environment</b>	0-85℃ 0-100%RH
<b>responding speed</b>	≤1s
<b>Maximum weighing</b>	6500g(Overweight damages equipment)
<b>Inner cylinder diameter</b>	φ 200mm

## 1.1 System framework diagram

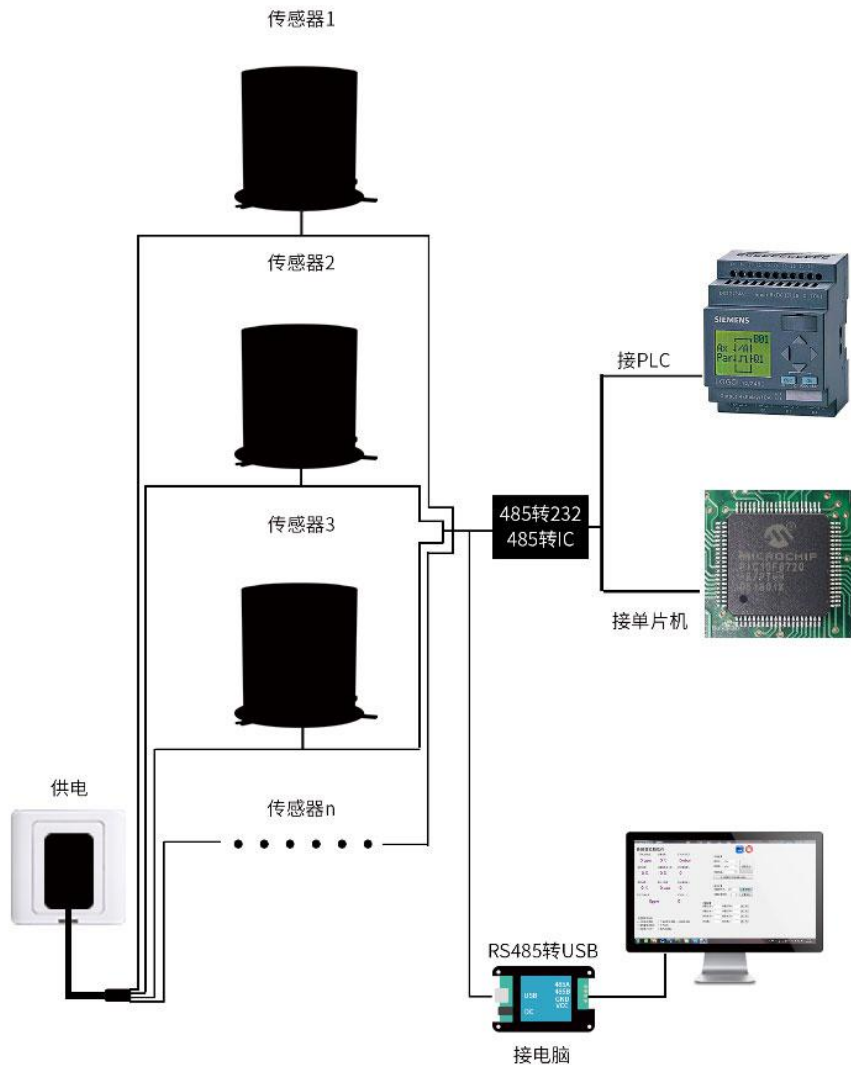
This sensor can be connected and used alone. First, use 12V DC power supply. The device can be directly connected to a PLC with a 485 interface, and it can be connected to a single-chip microcomputer through a 485 interface chip. The single-chip microcomputer and PLC can be programmed through the modbus protocol specified later to cooperate with the sensor. At the same time, use USB to 485 to connect to the computer, and use the sensor configuration tool provided by our company for configuration and testing.

## 单传感器接线示意图



This product can also be used by combining multiple sensors on a 485 bus. Please follow the "485 bus field wiring rules" (see appendix) when performing 485 bus combination. In theory, one bus can be connected to more than 16 485 sensors. If you need to connect more 485 sensors, you can use a 485 repeater to expand more 485 devices, and the other end is connected to a PLC with a 485 interface through a 485 interface chip. Connect to the MCU, or use USB to 485 to connect to the computer, use the sensor configuration tool provided by our company for configuration and testing

# 多传感器接线示意图



## Chapter 1 Hardware Connection

### 1.1 Inspection before equipment installation

Please check the equipment list before installing the equipment:

name	Quantity
Evaporation sensor	1 set
12V waterproof power supply	1 set (Optional)
USB to 485 device	1 set (Optional)
Warranty card/certificate	1 serving

### 1.1 Interface description

Wide voltage power input is 12-24V. When wiring the 485 signal line, pay attention to the two lines A/B not to be reversed, and the addresses of multiple devices on the bus must not conflict.

	Thread color	Description
power supply	brown	Power is positive (12-24V DC)
supply	black	Power negative
Communication	Yellow (gray) color	485-A
on	blue	485-B

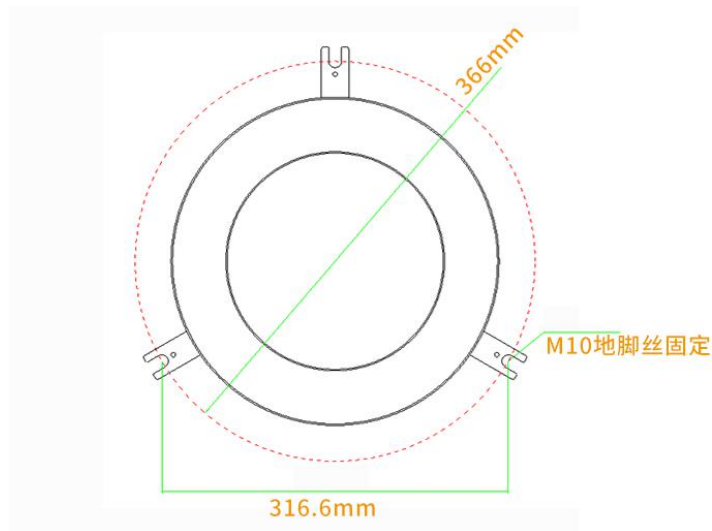


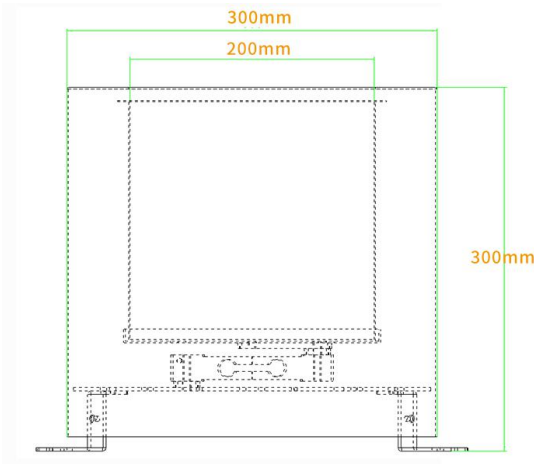
Note: Please be careful not to connect the wrong wiring sequence, the wrong wiring will cause the equipment to burn.

The factory default provides 0.6 meters long wire, customers can extend the wire as needed or wire in order.

Note that there is no yellow line in the line sequence that may be provided in some factory batches. At this time, the gray line is equivalent to replace the yellow line.

## 1.1 Product size and installation instructions





(Product size

chart)

- (1) Ensure that the mounting bracket is parallel to the ground;
- (2) Take out the equipment from the package, first unscrew the mounting bolts on the cylinder wall, take off the shell, remove the packaging materials, and then install the inner cylinder correctly and install the outer cylinder in place
- (3) Use on the ground? Drill holes for the model drill bit according to the installation size, and install screws, and fix the sensor on the ground through the 3 mounting holes on the sensor;

## 1.1 Normal product maintenance and automatic water addition

This product is an evaporation sensor. It is necessary to ensure that there is enough water in the equipment at all times, so regular maintenance is required to ensure sufficient water in

the evaporation pan.

This product can be equipped with an automatic water filling device. The automatic water filling device is an automatic control device. When it detects that the amount of water is small, it will automatically control the solenoid valve to open and add water to the equipment. When the system determines that the water volume is sufficient, it will automatically turn off. Open the solenoid valve to stop adding water.

## Chapter 1 Configuration Software

### Installation and Use

Our company provides supporting "sensor monitoring software", which can easily use the computer to read the sensor parameters, and flexibly modify the device ID and address of the sensor.

#### 1.1 Connect the sensor to the computer

After connecting the sensor to the computer through USB to 485 and supplying power, you can see the correct COM port in the computer (check the COM port in "My Computer-Properties-Device Manager-Port").



As shown in the figure above, your serial port number is COM10 at this time, please remember this serial port, you need to fill in this serial port number in the sensor monitoring software.

If the COM port is not found in the device manager, it means that you have not plugged in the USB to 485 or the driver has not been installed correctly, please contact a technician for help.

## 1.1 Use of sensor monitoring software

The configuration interface is as shown in the figure. First, obtain the serial port number and select the correct serial port according to the method in chapter 3.1, and then click to automatically obtain the current baud rate and address to automatically detect all devices and baud rates on the current 485 bus . Please note that you need to ensure that there is only one sensor on the 485 bus when using the software to automatically obtain it.



Then click to connect the device to get the sensor data information in real time.

If your device is a gas concentration sensor, please select "gas concentration sensor" in the sensor type, "formaldehyde transmitter" for formaldehyde sensor, "analog transmission module" for analog transmitter, and "atmospheric pressure sensor", illuminance sensor selects "Illuminance 20W", oxygen sensor selects "Oxygen transmitter", and other sensors select the default "No other sensor".

### 1.1 Modify the baud rate and device ID

When the device is disconnected, click the device baud rate and set address in the communication settings to complete the related settings. Please note that after setting, please restart the device, and then "automatically obtain the current baud rate and address" to find the address And the baud rate has been

changed to the address and baud rate you need.

If you need to use modbus commands to modify the baud rate and address, you can refer to the appendix "How to use modbus commands to modify the baud rate and address".

## Chapter 1 Communication Protocol

### 1.1 Basic communication parameters

parameter	content
<b>coding</b>	8-bit binary
<b>Data bit</b>	8-bit
<b>Parity bit</b>	no
<b>Stop bit</b>	1 person
<b>Wrong calibration</b>	CRC lengthy cyclic code
<b>Baud rate</b>	2400bps/4800bps/9600bps can be set, the factory default is 9600bps

#### 1.1 Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows:

Time of initial structure  $\geq$  4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

Time to end structure  $\geq$  4 bytes

Address code: It is the function indicator of the transmitter. This transmitter only uses function code 0x03 (read register data).

Data area: The data area is a specific address, which is

unique in the communication network (factory default 0x01).

Function code: command communication data sent by the host, pay attention to the high byte of 16bits data first!

CRC code: two-byte check code.

Interrogation frame

address code	function code	Register start address	Register length	Check code low bit	Check code high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Reply frame

address code	function code	Effective number of bytes	First data area	Second data area	Nth data area
1 byte	1 byte	2 byte	2 byte	2 byte	2 byte

## 1.1 Register address 1.1 Register address

Register address	PLC configuration address	content	操作
0006H	40007	Water weight (1g)	Read only
0100H	40101	Device address (0-252)	Read and write
0101H	40102	Baud rate (2400/4800/9600)	Read and write
0102H	40103	Tare weight	just write

## 1.2 Communication protocol example and explanation

Read the evaporation of the device address 0x01

Interrogation frame

address code	function code	initial address	Data length	Check code low bit	Check code high
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

Reply frame(For example, read that the weight of water is 71g)

address code	function code	返回有效 byte数	数据区	Check code low bit	Check code high
0x01	0x03	0x02	0x00 0x47	0xD8	0x15

Water weight calculation instructions:

0047H(hexadecimal)=71=>evaporation=71 g

What is read out is the water weight. We first need to calculate the liquid level based on the water weight:

According to the inner diameter of the evaporation barrel is 20cm, the radius is 10cm, and the bottom area is 314.1593cm<sup>2</sup>, the height of the water surface = water weight/bottom area

At this time, the height of the liquid level=71g/314.1593cm=0.226cm=2.26mm

Evaporation amount = water surface height change/time within a period of time, assuming that the liquid level height calculated 1 hour ago is 3.26mm, then the evaporation amount at this time should be: (3.26mm-2.26mm)/1h=1mm/h.



## 1.2 Tare command

After a long time of use, the bottom weight of the sensor may not be 0 without adding water. In this case, the bottom weight will automatically become zero after sending the command without adding water to the device.

Interrogation frame

address code	function code	initial address	data input	Check code low bit	Check code high
0x01	0x06	0x01 0x02	0x00 0x01	0xe8	0x36

Reply frame(Return correctly)

address code	function code	initial address	data input	Check code low bit	Check code high
0x01	0x06	0x01 0x02	0x00 0x01	0xe8	0x36

## Chapter 2 Appendix

### 1.2 Product additional instructions

"485 Device Field Wiring Manual": Describes the wiring guidelines for 485 products, please check and follow the guidelines, otherwise it may cause unstable communication.

"Revision of temperature and humidity deviation of 485 sensor": describes how to confirm and adjust temperature and humidity deviation when you feel that there is a deviation in temperature and humidity.

"Using modbus to modify device baud rate and address": describes if you do not use software, use modbus commands to modify the baud rate and slave station number.

"How to use single-chip microcomputer for 485 communication": describes how to use 51 single-chip microcomputer to read sensor information, and popularize some basic knowledge.

"How to calculate CRC16": Describes how to calculate CRC16 in modbus RTU protocol and an example C language program.

"How to use USB to 485 auxiliary debugging when there is a problem with the reading sensor communication": describes how to use auxiliary tools to solve and troubleshoot when there is a communication problem.

"How to use and set the product alarm function": Describes the optional product alarm function, how to use, how to wire and other issues.

## 1.2 Warranty and after-sales

The warranty clauses follow the sensor after-sales clauses of Weihai Jingxun Changtong Electronic Technology Co., Ltd., the sensor host circuit part is guaranteed for two years, the gas-sensitive probe is guaranteed for one year, and the accessories (shell/plug/cable, etc.) are guaranteed for three months.