JXBS-3001-ZFS-RS

Total Solar Radiation Sensor User Manual

RS485 Modubus
Version: 2.0
Date: 2020-10-24
Status: Released

www.jxct-iot.com

I Product Introduction

1.1 Product Description

JXBS-3001-ZFS Total Solar Radiation Sensor (Transmitter) is a sensor that can measure total solar radiation with a spectral range of 0.3-3μm. If the sensing surface is facing downwards, it can measure reflected radiation, and a light-shielding ring can also measure scattering radiation.

The core component of the radiation sensor is a high-precision photosensitive element, which has good stability and high accuracy. At the same time, a quartz glass cover made of precision optical cold processing is installed outside the sensing element, which effectively prevents environmental factors from affecting its performance. The product can be widely used in meteorology, energy, agriculture, construction and other fields.

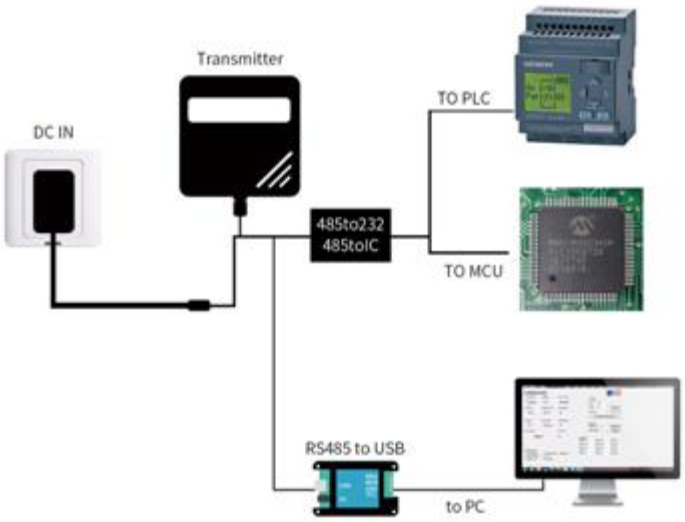
1.2 Main Specs

Specs	Detailed Parameters
DC Power (Default)	9-24V DC
Power Consumption	≤0.15W @12V DC , 25℃
Detect Range	0-1500W/m^2
Spectural Range	0.3-3um
Resolution	1 W/m^2
Output Signal	RS485 Modbus
Working Condition	-45-85℃ 0-100%RH
Response Time	≤5s

1.3 System Layout

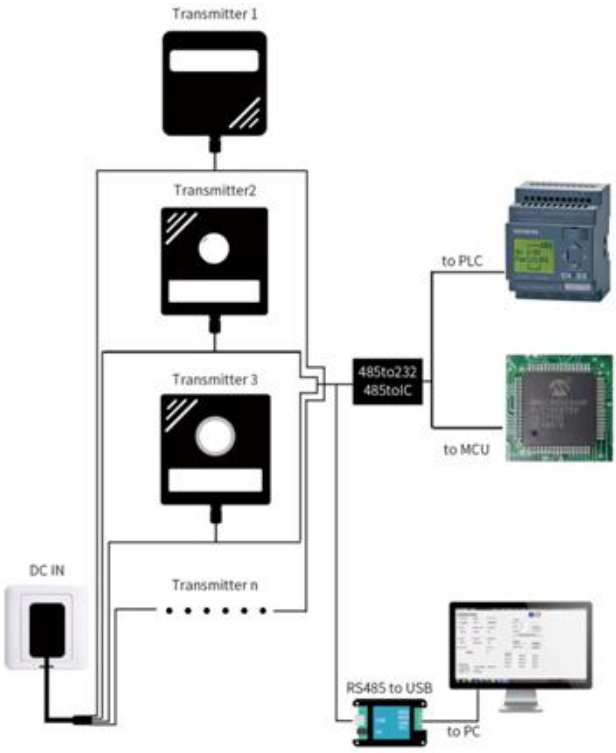
The device can be connected directly to the PLC with 485 interface, and it can be connected to the MCU through the 485 interface chip. The microcontroller and PLC can be programmed to match the sensor by the modbus protocol specified later. User can also connect the sensor to the computer by using USB to 485 converter, and use the sensor configuration tool provided by JXCT for configuration and testing.

Picture 1: *Single Sensor Working Diagram*



This product can also be used in combination with multiple sensors on one 485 bus. Please observe the “485 Bus Field Wiring Code” when performing 485 bus combination (see Appendix). In theory, one bus can connect more than 16 485 sensors. If you need to connect more 485 sensors, you can use 485 repeater to expand more 485 devices, and the other end to connect PLC with 485 interface and pass 485 interface chip. Connect to the micro-controller, or use USB to 485 to connect to the computer, use the sensor configuration tool provided by our company for configuration and testing.

Picture 2: *Multiple Sensors Working Diagram*



II Hardware Connections

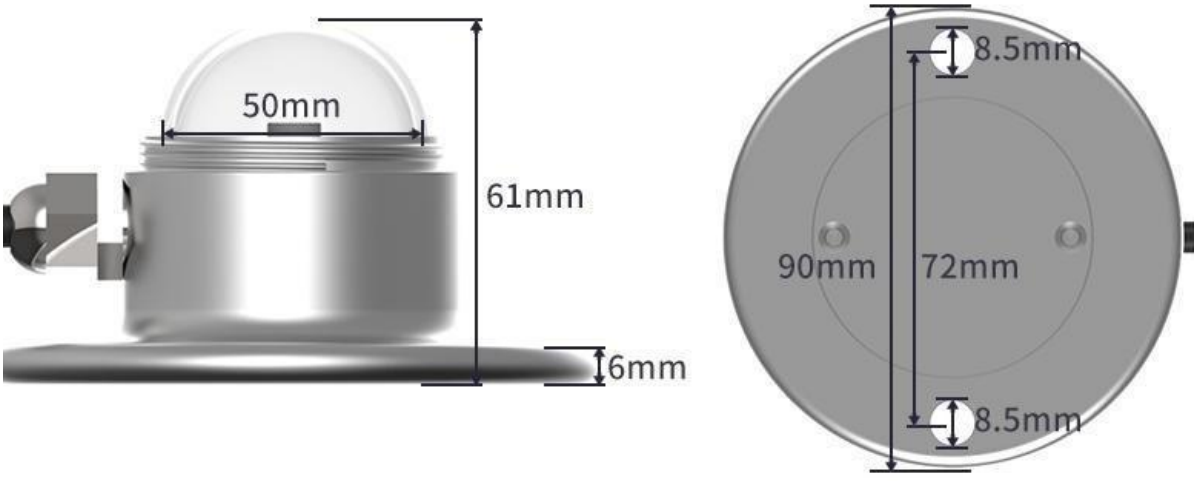
2.1 Interface Description

The power interface can be 12-24V for wide voltage power supply. When wiring the 485 signal line, note that the A/B lines cannot be connected in reverse, and the addresses between multiple devices on the bus cannot conflict.

Function	Cable Color	Specs
Power	Brown	Power supply +
	Black	Power supply -
Communication	Yellow (grey)	485-A
	Blue	485-B

Note: Please be careful not to connect the wrong line sequence. The wrong wiring will cause the device to burn out.
The factory default supply of 1.5 meters long wire, customers can extend the wire as needed or in sequence.
Note that there is no yellow line in the line sequence that may be provided in some factory batches, in which case the gray line is equivalently replaced by the yellow line.

2.2 Product Dimension & Installation Guidance



(1) Ensure that the mounting bracket is parallel to the ground;

(2) Use M6 screws and nuts to fix the sensor on the cross arm through the 2 mounting holes on the sensor;
(3) Please avoid disassembling the sensor during installation.
(4) When using, please unscrew the protective cover above the sensor. In order to protect the sensor, tighten the protective cover above the sensor when it is not in use or during transportation.

III Configuration Tool Installation

JXCT provides the matching "SENSOR MONITORING SOFTWARE", which can conveniently use the computer to read the parameters of the sensor, and flexibly modify the device ID and address of the sensor.

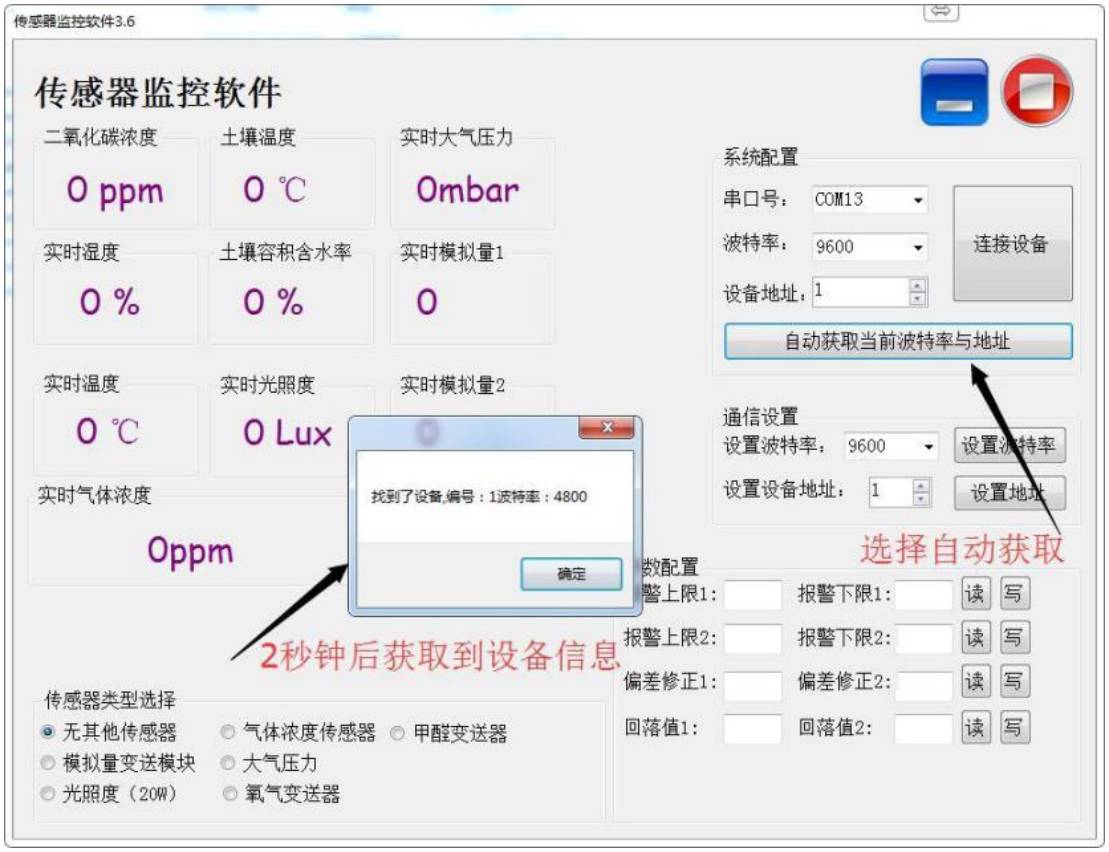
3.1 Sensor access to the computer

After the sensor is properly connected to the computer via USB to 485 and powered, find COM port in the computer ("My Computer - Properties - Device Manager - Port" to view the COM port). Shown as in below screenshot:

As shown in above, serial port number is COM10 at this time. Please remember this serial port. It shall be filled in the 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 did not install the driver correctly, please contact the technical staff for assistance.

3.2 Use of sensor monitoring software

The configuration interface is as shown in the figure. First, obtain the serial port number according to the method in section 3.1 and select the correct serial port, 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 there is only one sensor on the 485 bus that needs to be automatically acquired using the software.



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

If your device is a gas concentration sensor, please select “Gas Concentration Sensor” at the sensor type, “Formaldehyde Transmitter” for the formaldehyde sensor, “Analog Transmitter Module” for the analog transmitter, and “Atmospheric Pressure” for the atmospheric pressure sensor. “Sensor”, the illuminance sensor selects “Optical Light 20W”, the oxygen sensor selects “Oxygen Transmitter”, and the other sensors select the default “No Other Sensor”.

3.3 Modify the baud rate and device ID

In the case of disconnecting the device, click the device baud rate and setting address in the communication settings to complete the relevant settings. Please note that after the setting, please restart the device, and then "automatically obtain the current baud rate and address", you can find the address. And the baud rate has been changed to the address and baud rate you need.

If you need to modify the baud rate and address using the modbus command, you can refer to the appendix "How to Modify the Baud Rate and Address Using the modbus Command".

IV Communication Protocol

4.1 Communication Basic Parameters

Parameters	Specs
Coding	8-bit binary
Data bit	8-bit
Parity bit	no
Stop bit	1-bit
Error check	CRC(redundant cyclic code)
Baud Rate	2400bps/4800bps/9600bps.Can customize. Default 9600bps

4.2 Data Frame Format Definition

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

Initial structure ≥ 4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure ≥ 4 bytes of time

Address code: is the address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: The instruction function of the command sent by the host. This transmitter only uses function code 0x03 (read register data).

Data area: The data area is the specific communication data. Note that the 16-bit data high byte is in front!

CRC code: Two-byte check code.

Enquiry Frame

Address Code	Function Code	Register Start Address	Register Length	Check Code Low bit	Check Code High Bit
1 Byte	1 Byte	2 Bytes	2 Bytes	1 Byte	1 Byte

Answer Frame

Address Code	Function Code	No.of Effective Bytes	1st Data Zone	2nd Data Zone	Nth Data Zone
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes	2 Bytes

4.3 Register Address

Register Address	PLC Configuration Address	Content	Operation
0000H	40001	Total Solar Radiation(1W/m^2)	Read Only
0100H	40101	Device Address (0-252)	Read Write
0101H	40102	Baud Rate (2400/4800/9600)	Read Write

4.4 Communication protocol example and explanation

Read the total solar radiation value of the device address 0x01

Enquiry Frame

Address Code	Function Code	Register Start Address	Register Length	Check Code Low bit	Check Code High Bit
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0A

Answer Frame (For example, read that the total solar radiation value is 71 W/m2)

Address Code	Function Code	No. of Returned Effective Bytes	Data Zone	Check Code Low bit	Check Code High Bit
0x01	0x03	0x02	0x00 0x47	0xD8	0x15

Explanation of total solar radiation calculation:

0047H(Hexadecimal)=71=>Total solar radiation=71 W/m2