JXCT®

JXBS-3001-GHFS-RS

Photosynthetically active radiation

Sensor User Manual

RS485 Modubus

Version: 2.0

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Status: Released

www.jxct-iot.com

I. Production

1.1 General Description

JXBS-3001-GHFS FPH photosynthetically active radiometer, also known as photon number, is mainly used to measure the photosynthetic active radiation of natural light in the wavelength range of 400-700nm. It is simple to use and can be directly connected to a digital voltmeter or data collector. Use under all weather conditions.

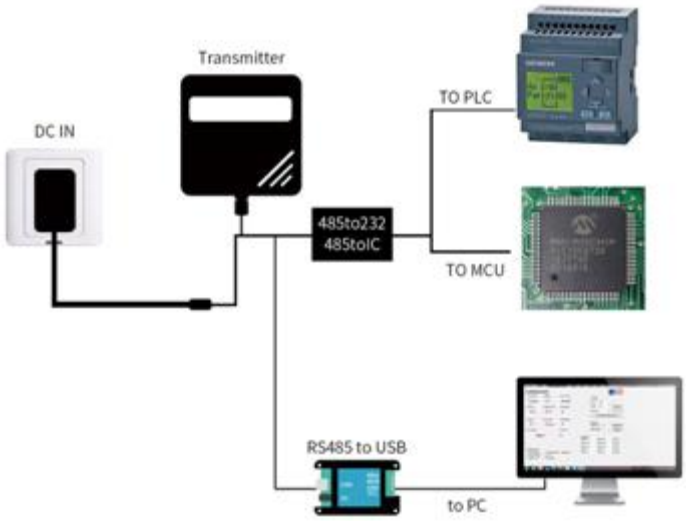
The watch uses a silicon photodetector and passes a 400-700nm optical filter. When light is irradiated, a voltage signal proportional to the intensity of the incident radiation is generated, and its sensitivity is proportional to the cosine of the direct angle of the incident light. Each photosynthetically active pyranometer has its own sensitivity and can be read directly The unit is μmol/m2•s. This table is widely used in agricultural meteorology and research on crop growth.

1.2 Main Specs

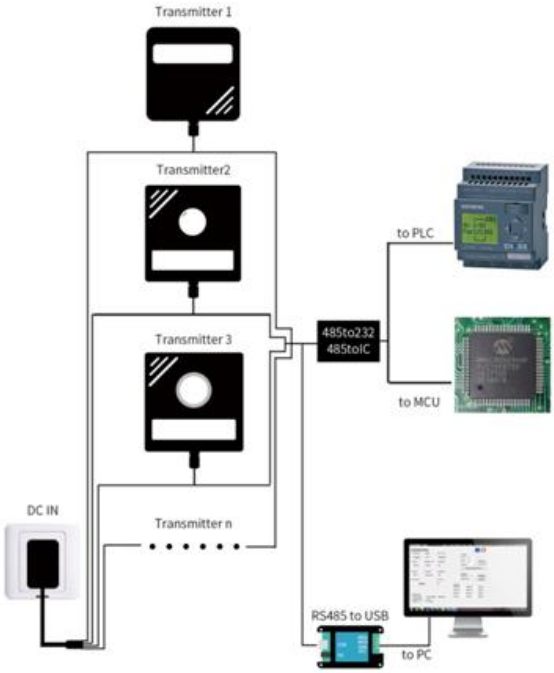
Specs	Detailed Parameters
DC Power (Default)	9-24V DC
Power Consumption	≤0.15W (@12V DC , 25℃)
Detect Range	0-2000w/m^2
Spectral range	400-700nm
Resolution	1w/m^2
Output Signal	RS485 Mondbus
Working Condition	-45-85℃ 0-100%RH
Response Speed	≤5s
Cosine correction	Up to 80° incident angle

1.3 System Layout

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.



This product can also be used by combining multiple sensors on a single 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 the single-chip microcomputer, or use USB to 485 to connect to the computer, and use the sensor configuration tool provided by our company to configure and test.



II.Hardware Connection

2.1 Check before Installation

Please check the equipment list before installing the equipment:

Name	Qty
Photosynthetically active radiation sensor	1Pc
12V Charger Adapter	1Pc (Optional)
USB to 485 Converter	1Pc (Optional)
Warranty Card	1Pc

2.2 Port Instruction

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

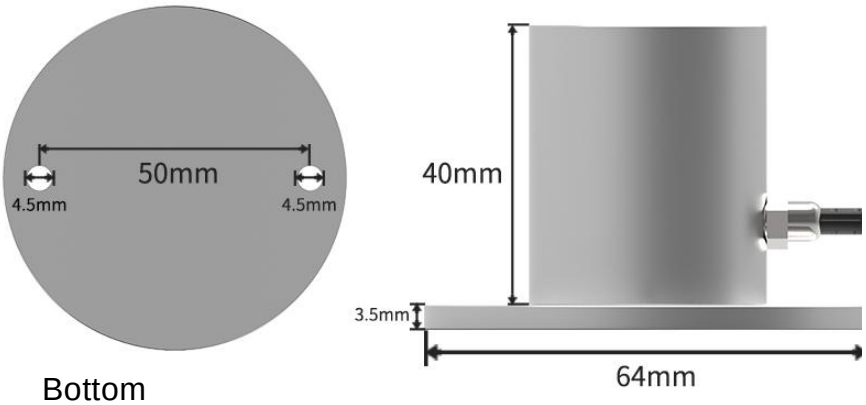
Function	Cable Color	Specs
Power	Brown	Power supply +
	Black	Power supply -
Communication	Yellow (grey)	485-A
	Blue	485-B

Note: Please be careful not to connect the wrong 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.

2.3 Product Dimension & Installation



Bottom

Site selection: The ideal photosynthetically active pyranometer should be located without any obstacles on the upper end of its sensing element, to ensure that there is no obstacle with an altitude angle of more than 5° in the sunrise and sunset azimuth, and avoid shadows falling on the sensing surface The phenomenon.

Product installation: It is recommended that users check whether the delivered products are damaged due to transportation before installation, and they should contact the manufacturer in time. The FPH photosynthetically active radiometer has 2 screw holes and 2 stainless steel screws. First, fix the photosynthetically active radiance meter firmly on the bracket, adjust the horizontal position, and fasten it, then connect the output wire to the data collector box for observation.

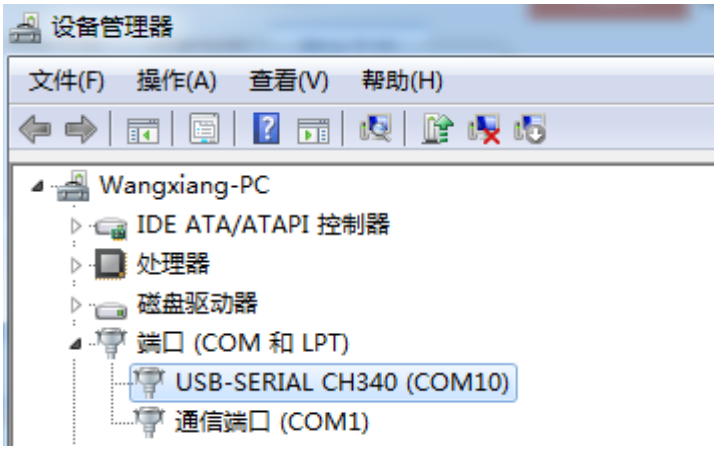
Product maintenance: The photosynthetically active radiometer that works continuously is checked at least once a week. The content of the check mainly depends on whether the cosine corrector is clean. If ice, snow, dust, etc. appear, try to remove these deposits.

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:

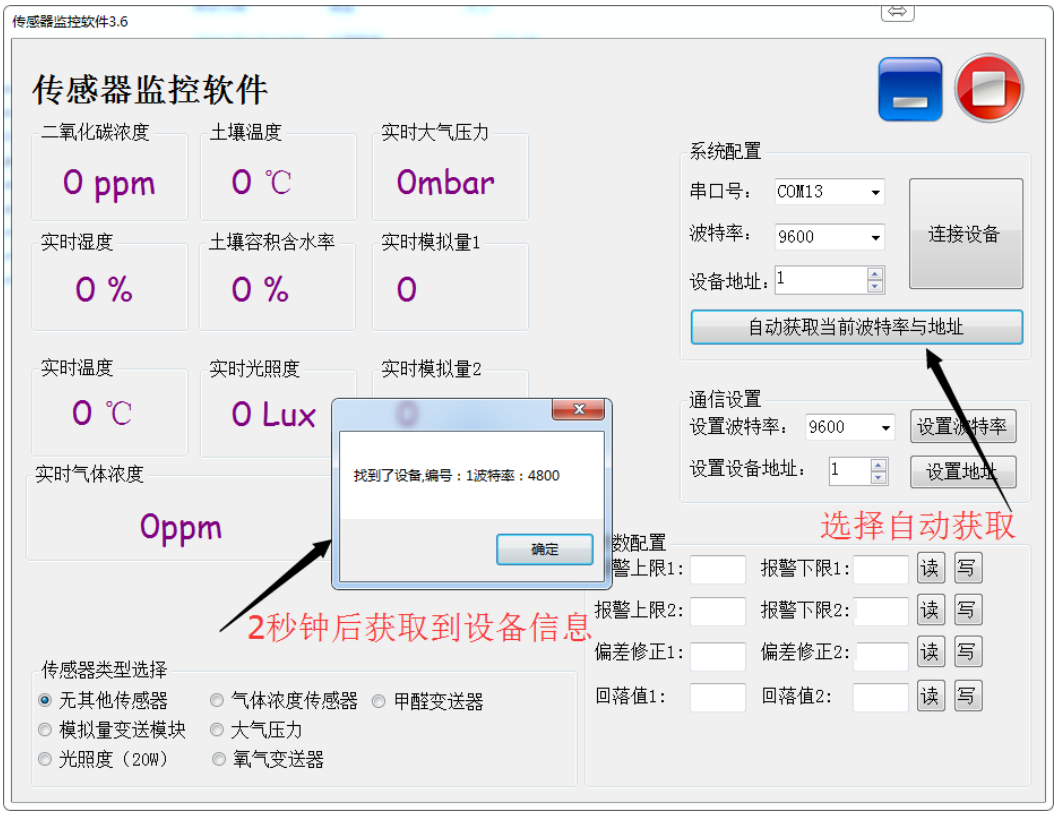


As shown in above, serial port number is COM10 at this time. Please remember this serial port. It shall be filled in the serial port number in the sensor monitoring software.

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

2.4 Register Address

Register Address	PLC configuration address	Content	Operation
0006H	40007	Photosynthetically active radiation (1w/ m^2)	Read Only
0100H	40101	Device Address (0-252)	Read Write
0101H	40102	Baud Rate (2400/4800/9600)	Read Write

2.5 Communication protocol example and explanation

Read the photosynthetically effective radiation value of the device address 0x01

Enquiry Frame

Address Code	Function Code	Register Start Address	Data Length	Check Code Low Bit	Check Code High Bit
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

Answer Frame

(For example, it is read that the photosynthetically active radiation is 71 μmol/ m2•s)

Address Code	Function Code	Returns the number of valid bytes	Data Zone	Check Code Low Bit	Check Code High Bit
0x01	0x03	0x02	0x00 0x47	0xD8	0x15

Description of photosynthetically active radiation calculation:

0047H (hexadecimal) = 71 => photosynthetically active radiation = 71 w/ m2

III. Appendix: 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 in 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.