JXCT®

JXBS-3001-TVOC

Total Volatile Organic Compounds User Manual

RS485 Modbus

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Status: Released

www.jxct-iot.com

Content

1. Introduction

1.1 Product Overview

This product adopts the British high-sensitivity optical gas detection probe with stable signal and high precision. With a wide measuring range, good linearity, easy to use, easy installation, transmission distance and other characteristics.

1.2 Main Parameters

TABLE 1 Main Parameters

Parameters	Technical Specifications
TVOC Measuring Range	0-1000ppb
TVOC Measuring Method	Optical detection method
TVOC Measuring Precision	5%F.s
Carbon Dioxide Measuring Range	400-5000ppm
Carbon Dioxide Measuring Method	Gas Sensitive Equivalent Measurement
Carbon Dioxide Precision	Equivalent
Service Life	5 years
Warranty Period	2 years (Host) / 1 year (Sensor)
Baud Rate	2400/4800/9600
Communication Port	RS485
Power Supply	12V-24V DC
Power Consumption	≤0.15W (@12V DC , 25℃)

Pressure Range	Standard atmospheric pressure ±10%
Repeatability	<2% output value
Response Time	≤15S
Operating Temperature	0-50℃
Working Humidity Environment	20-90%Rh
Pressure Range	0.9-1.1atm
Case Size	110×85×44mm3
Working Humidity	15-90%

1.3 System Frame Diagram

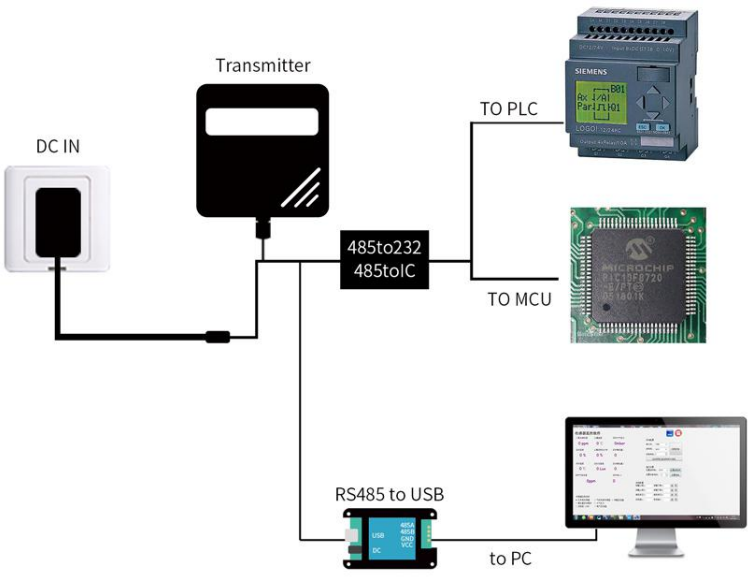


Figure 1 Single-Ended

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.

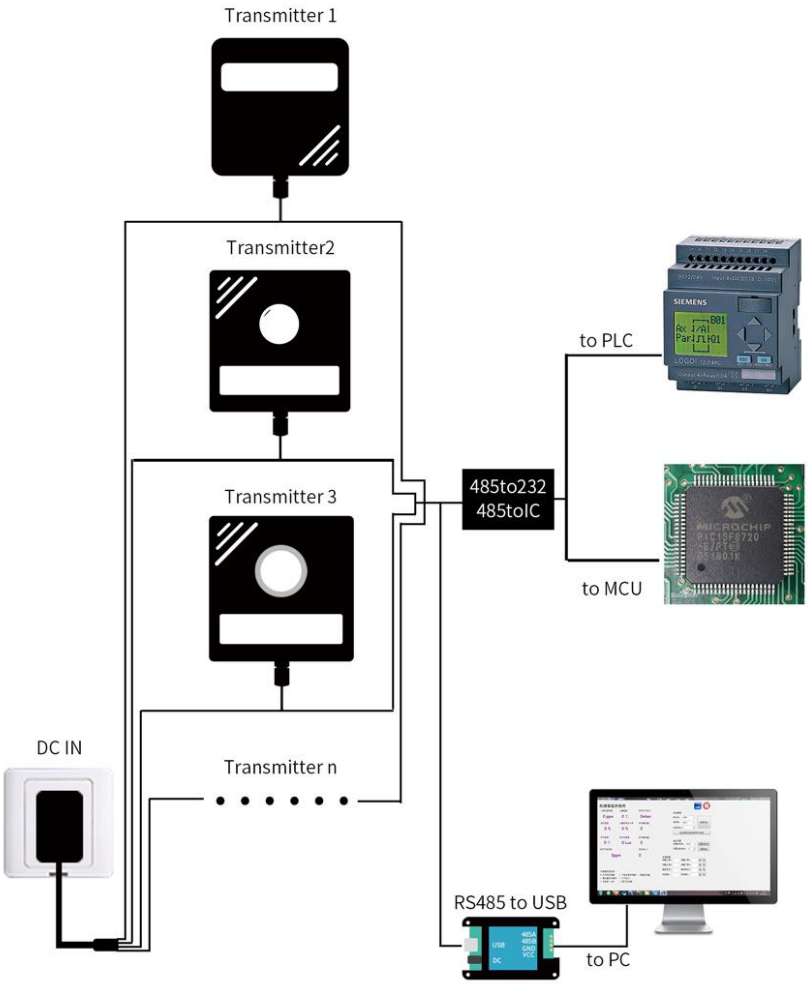


Figure 2 Mutiple-Ended

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.

2.Hardware connection

2.1 Product & Accessories

Check the list of devices before installation:

Table 2 List of Devices

Name	Number
The Sensor Device	1
12V Power Adapter（Optional）	1
Warranty Card / Certificate	1
The Usb To 485 Device（Optional）	1

2.2 Interface Description

Before you wiring and use, please read this article in detail, Improper use may result in irreversible damage to the product.

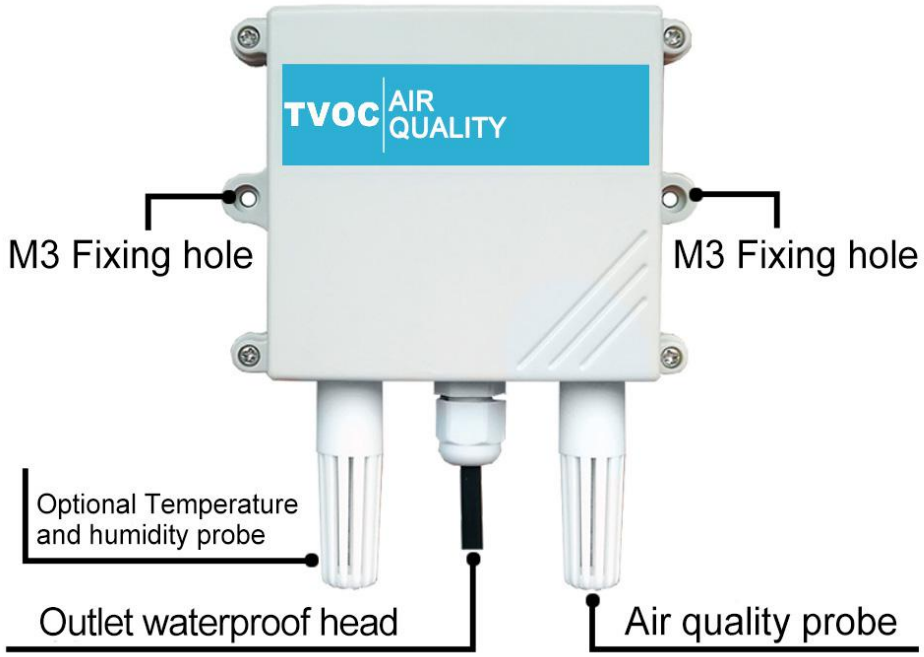


Figure 3 Physical Picture

Table 3 Wiring Sequence

Function	Line Color	Description
Power	Brown	Power supply Positive (12-24V DC)
	Black	Power supply Negative
Communication	Yellow (Gray)	485-A
	Blue	485-B

We provide default cable length of 0.6 meters, you can extend the cable yourself according to your needs.

2.3 Installation Description

The equipment needs to be placed in an environment where there is no wind and no rain. The equipment needs to be installed vertically. The device has two fixed holes with a spacing of 105mm. The size of each fixing hole is 3mm.

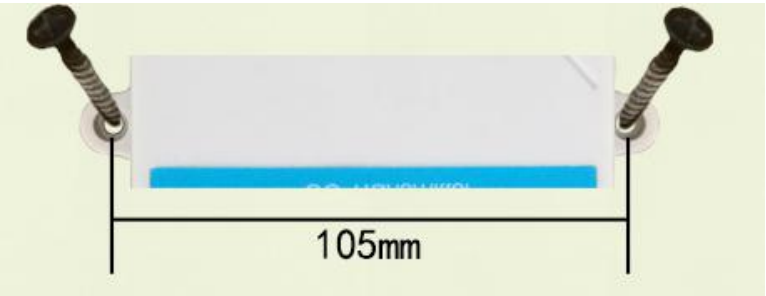


Figure 4 How Fixtures

3. Software

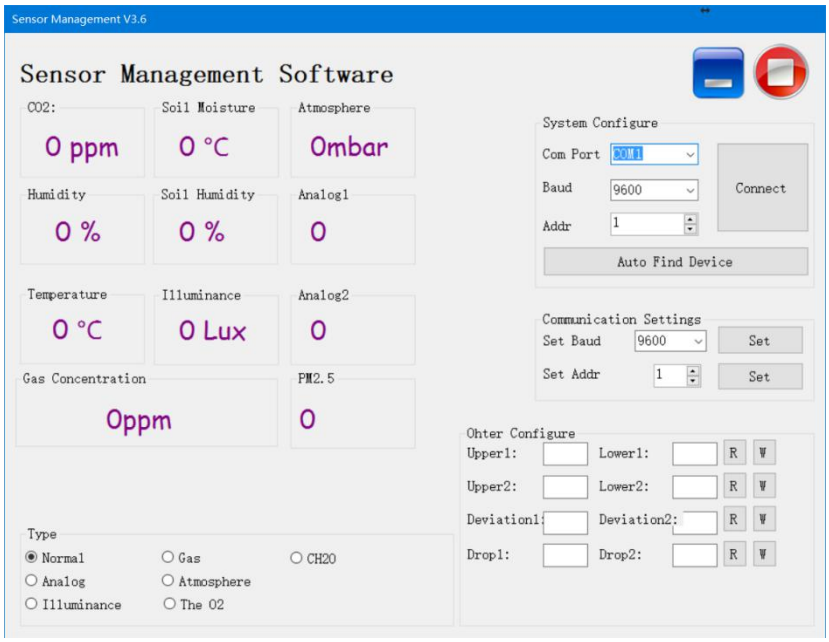
We provide **CONFIGURATION TOOL** , which can be easily used to test our sensor device.

3.1 Sensor Access 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



Please note that this software can only test one device at the same time. After connecting the physical device, click the **CONNECT** button to read the information. In the UNCONNET state, you can modify BAUD and ADDR in COMMUNICATION SETTINGS.

Under the software, different check boxes can be selected according to different situations. For example, you can choose the GAS option to test the RS485 OXYGEN SENSOR , you can choose the NORMAL option to test the RS485 TEMPERATURE AND HUMIDITY SENSOR .

4 .Communication Protocol

4.1 Communication Basic Parameters

Table 4 Communication Basic Parameters

PARAMETERS	CONTENT
Protocol	Modbus RTU
Data bits	8 bit
Parity bit	No
Stop bit	1 bit
Error checking	CRC (redundant loop code)
Baud rate	2400 bps/ 4800 bps/ 9600 bps can be set factory defaults to 9600 bps

For more information about **MODBUS RTU** please visit the website"www.modbus.org ".

4.2 Register Address

Register Address	Plc Configuration Address	Content	Operation
0000H	40001	Humidity (Unit 0.1%RH)	Read-Only
0001H	40002	Temperature (Unit 0.1℃)	Read-Only
0004H	40005	PM2.5（Unit 1ug/m3）	Read-Only

0009H	4000a	PM10（Unit 1ug/m3）	Read-Only
0005H	40006	Carbon Dioxide （Unit 1ppm)	Read-Only
0006H	40007	TVOC (Unit 1ppb)	Read-Only
0100H	40101	Device Address (0-252)	R/W
0101H	40102	Baud Rate (2400/4800/9600)	R/W

Table 5 Register Address

4.3 Communication example

4.3.1 Read Device Address 0x01's TVOC Concentration

Table 6 Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

Table 7 Answer Frames

(For example, the reading is 209ppb)

Address Code	Function Code	Returns to The Number Of Valid Bytes	Carbon Dioxide Value	Check Digit Low	Check Digit High
0x01	0x03	0x02	0x00 0xD1	0x78	0x18

$TVOC_2$：

00D1 H(hexadecimal)=209=> TVOC =209ppb

4.3.2 Read Device Address 0x01's Carbon Dioxide Concentration

Table 8 Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00 0x05	0x00 0x01	0x94	0x0B

Table 9 Answer Frames

(For example, the reading is 18.9ppm)

Address Code	Function Code	Returns to The Number Of Valid Bytes	Carbon Dioxide Value	Check Digit Low	Check Digit High
0x01	0x03	0x02	0x01 0xC3	0x78	0x35

Carbon Dioxide：

01C3 H (hexadecimal) =451=> Carbon Dioxide =451ppm

4.3.3 Read Device Address 0x01's Temperature And Humidity Value

Table 10 Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00,0x00	0x00,0x02	0xC4	0x0B

Table 11 Answer Frame

Address Code	Function Code	Number Of Valid Bytes	Humidity Value	Temperature Value	CRC_L	CRC_H
0x01	0x03	0x04	0x00 0xFE	0x00 0xAF	0xDB	0xBF

Temperature：

00AF H (hexadecimal) =175=> Temperature =17.5 ℃

Humidity：

00FE H (hexadecimal) =254=> Humidity =25.4%RH

4.3.4 Read Device Address 0x01's Temperature And Humidity, Carbon Dioxide , TVOC Concentration Value

Table 12 Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00,0x00	0x00,0x07	0x04	0x08

Table 13 Answer Frame

Address Code	Function Code	Number Of Valid Bytes	Humidity Value	Temperature Value
0x01	0x03	0x0C	0x03 0x14	0x01 0x1B
6 Useless Bytes		Carbon	TVOC	Check code

Dioxide Value			
0x00 ...	0x01 0xC3	0x00 0xD1	0x50 0x3B

Temperature：

011B H (hexadecimal) =283=> Temperature =28.3 ℃

Humidity：

0314 H (hexadecimal) =788=> Humidity =78.8%RH

Carbon Dioxide：

01C3 H (hexadecimal) =451=> Carbon Dioxide =451ppm

$TVOC_2$：

00D1 H(hexadecimal)=209=>TVOC=209ppb