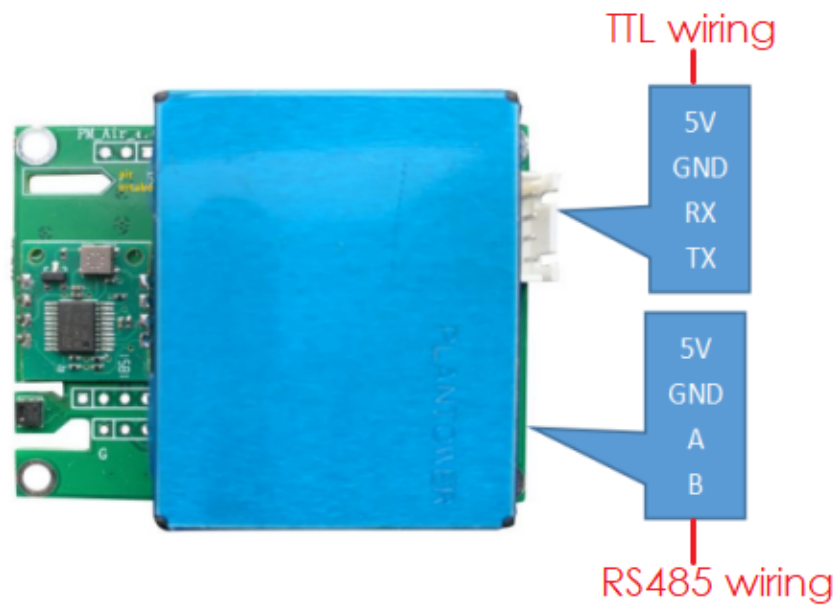


# 8 in 1 air quality sensor module

## Manual (485 communication)

### Model: RK14V



# Catalogue

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## **1. Description**

PN:RK14V, 8-in-1 sensor module is an environmental monitoring sensor module based on 485 wired network developed and produced by our company.

This module integrates CO<sub>2</sub>, formaldehyde, TVOC, laser PM<sub>2.5</sub>, PM<sub>1.0</sub>, PM<sub>10</sub>, temperature and humidity.

It can conduct real-time and comprehensive detection of the environment, has good stability and easy to use.

### **Main Application**

- Hotel room air quality monitoring
- Fresh air ventilation system
- Air purifier, air conditioner
- Air quality monitoring equipment
- Kitchen and bathroom ventilation control system
- Smart home equipment
- Environmental monitoring of agricultural greenhouses and outdoor breeding places etc...

The dust detection of this product adopts laser technology and uses the principle of Mie scattering to detect dust particles in the air, with good consistency and stability.

## 2.Parameter

Item	Measurement resolution	Measurement range	Measurement accuracy
eCO2		400ppm~5000ppm	±100ppm
eCH2O	1ug/m3	1ug~2000ug	
TVOC	1ug/m3	0ug~5000ug	
PM1.0		0ug~1000ug/m3	±10%
PM2.5		0ug~1000ug/m3	±10%
PM10		0ug~1000ug/m3	±10%
Temperature	0.01℃	-40℃~125℃	±0.5℃
Humidity	0.04%	0~100%	±3%RH
interface	DC power supply		
output	485		
Working Voltage	5.0±0.2VDC ((default 5V)		
Working current	≤60mA		
Preheat time	2 minutes (only CO2, CH2O and TVOC need to be preheated, other parameters will be displayed when power is on)		
Working temperature	-10℃~60℃		
Working humidity	≤95%RH		
Size	145mm x 110mm x 45mm(H)mm (L×W×H)		
Waterproof level	IPx4		
life	5years (in air)		

### 3. Hardware connection

The sensor leads out 4 wires of white.

The default power supply of the sensor is 5V.

For RS485 wiring as below,

From top to bottom, the corresponding interfaces are 5V, GND, A, B

For TTL wiring as below,

From top to bottom, the corresponding interfaces are 5V, GND, RX, TX

Software debugging:

You can use the serial port debugging assistant to debug according to the communication protocol and serial port interaction.

Or use the dedicated control host computer software provided by the company.

letter of agreement:

Adopt modbus protocol, (8 data bits, 1 stop bit, no parity, default rate 9600), the factory address of the module defaults to 01, after the command is set, the setting data is automatically saved. The module address is 1~254, and 255 is the broadcast address.

Command description:

1 .Query module data command (a register quantity corresponds to 2 bytes)

address code	function code	Register start high byte	Register start low byte	High byte of the number of registers	Low byte of register number	CRC check
0xXX	0x03	0x00	0x10	0x00	0x08	High byte, low byte

Response

address code	function code	Return the number of bytes	High byte of valid data	CRC check
0xXX	0x03	0x0E	eCO2 , eCH2O , TVOC, PM1.0, PM2.5 , PM10 Temperature , Humidity	High byte, low byte

Command example:

Send 01 03 00 10 00 08 45 C9

Returns 01 03 10 01 90 00 00 00 00 10 00 27 00 32 10 08 36 08 85 C7

Serial data stream format description:

data	Name	Explain
01	address	
03	read	
10	Number of bytes	
01	data	CO2 high byte
90	data	CO2 low byte
00	data	CH2O high byte
0D	data	eCH2Olow byte
00	data	TVOC High byte
00	data	TVOC low byte
00	data	PM1.0 High byte
10	data	PM1.0 low byte
00	data	PM2.5 High byte
27	data	PM2.5 low byte
00	data	PM10 High byte
32	data	PM10 low byte
10	data	Temperature Integer part
08	data	Temperature decimal part
36	data	Humidity Integer part
08	data	Humidity decimal part
85	CRC check	CRC check
C7	CRC check	CRC check

Description:

The temperature is accurate to 0.1°C, and the humidity is accurate to 0.1%.

When the integer part of the temperature data is greater than 0x80, it represents a negative temperature.

When it is less than 0x80, it is a positive temperature.

For example, when the temperature is 9B01h, bit7=1 at this time, which means that it is a negative temperature, and the actual temperature at this time is -27.1°C;

For example, 1B02h, bit7=0 at this time, it represents a positive temperature, and the actual temperature at this time is 27.2°C.

## 2 .Query the version number

address code	function code	Register address high byte	Register address low byte	High byte of the number of registers	Low byte of register number	CRC check
0xXX	0x03	0x00	0x24	0x00	0x06	High byte, low byte

Response

address code	function code	Return the number of bytes	High byte of valid data	CRC check
0xXX	0x03	0x0C	(This machine version number)	High byte, low byte

Command example:

Send 01 03 00 24 00 06 85 C3

Return 01 03 0C 32 30 32 30 30 36 32 38 30 31 30 31 5B 18 (2020 06 28 01 01)

## 3 .Modify the module ground

address code	function code	Register address high byte	Register address low byte	Write high byte of data	Write data low byte	CRC check
0xXX	0x06	0x00	0x02	0x00	0x02	High byte, low byte

Response

address code	function code	Register address high byte	Register address low byte	High byte of valid data	CRC check
0xXX	0x06	0x00	0x02	0x00XX (new address)	High byte, low byte

eg:

Send 01 06 00 02 00 02 A9 CB

Return 01 06 02 00 02 61 88

#### 4 .Set the baud rate

address code	function code	Register address high byte	Register address low byte	Write high byte of data	Write high byte of data	CRC check
0xXX	0x06	0x00	0x06	0x00	0x01	High byte, low byte

#### Response

address code	function code	Register address high byte	Register address low byte	High byte of valid data	CRC check
0xXX	0x06	0x00	0x06	0x00XX (new baud rate)	High byte, low byte

0x0000: Represents 4800

0x0001: Represents 9600 and defaults to 9600

0x0002: Represents 19200

0x0004: Represents 57600

0x0008: Represents 115200

Command example:

Send 01 06 00 06 00 08 68 0D

Return 01 06 00 06 00 01 A8 0B

#### 5 .Broadcast command

Address FF is the broadcast address. When using this command, the module needs to be linked separately

Query the address of the machine: (1 register corresponds to 2 bytes)

Broadcast address	function code	Register address high byte	Register address low byte	High byte of the number of registers	Low byte of register number	CRC check
0xFF	0x03	0x00	0x02	0x00	0x01	High byte, low byte

#### Response

address code	function code	Return the number of bytes	High byte of valid data	CRC check
0x00	0x03	0x02	0xXX (local address)	High byte, low byte

eg:

Send FF 03 00 02 00 01 30 14

Return FF 03 02 00 01 50 50



Register address:

Register address	content	byte	operating
0002	Module address	2	Read/write
0006	Baud rate	2	Read/write
0010	eCO2	2	Read only
0011	eCH2O	2	Read only
0012	TVOC	2	Read only
0013	PM1.0	2	Read only
0014	PM2.5	2	Read only
0015	PM10	2	Read only
0016	Temperature	2	Read only
0017	Humidity	2	Read only
0024	version number	12	Read only

# Air quality module test method

Need to prepare test environment:

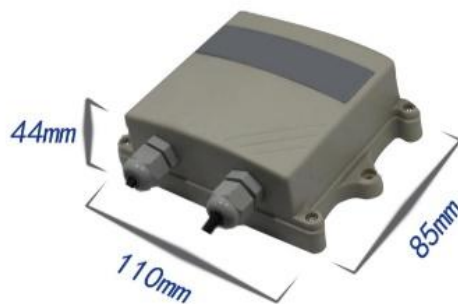
1) One DC power supply, recommended 5V, 1A (NOTE: the output voltage of the power supply and the direction of the positive and negative poles)



2) One 485 adapter cable and one computer



3) One Environmental Monitoring Transmitter (please refer to specific label definition for line definition)



Red-5V  
Green-GND

Blue-485-A  
Yellow-485-B

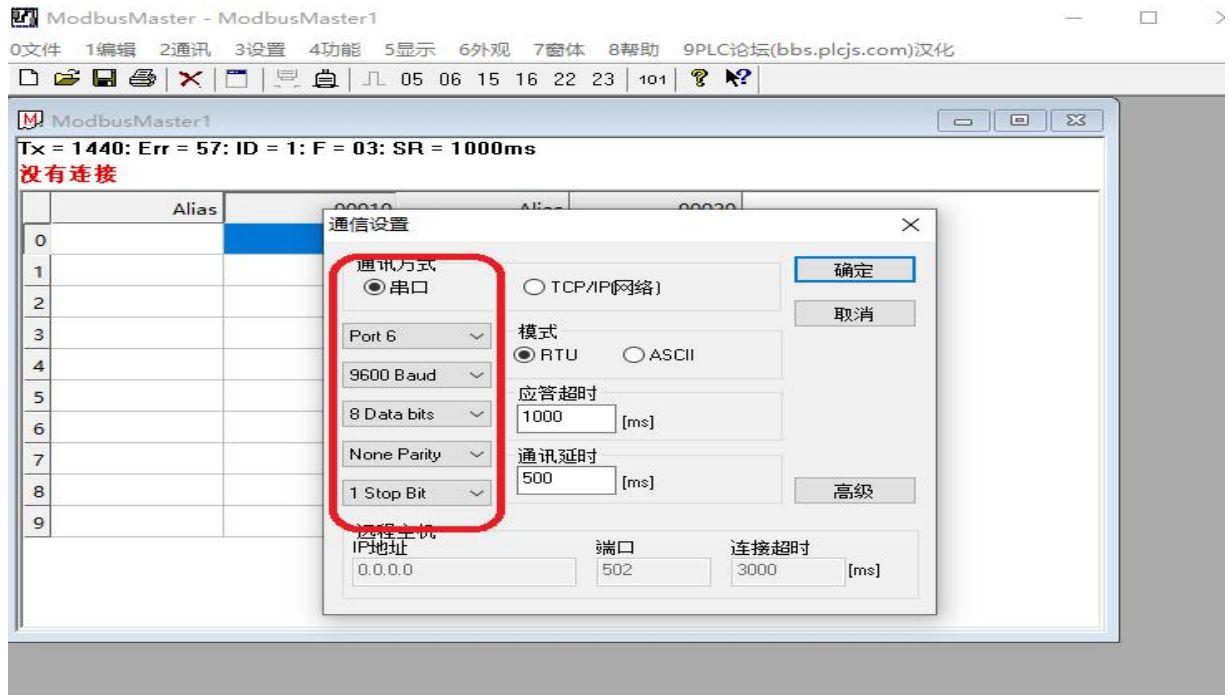
- Wiring instructions

Note: Do not connect the AB line sequence wrongly, and the positive and negative poles of the power supply must correspond.

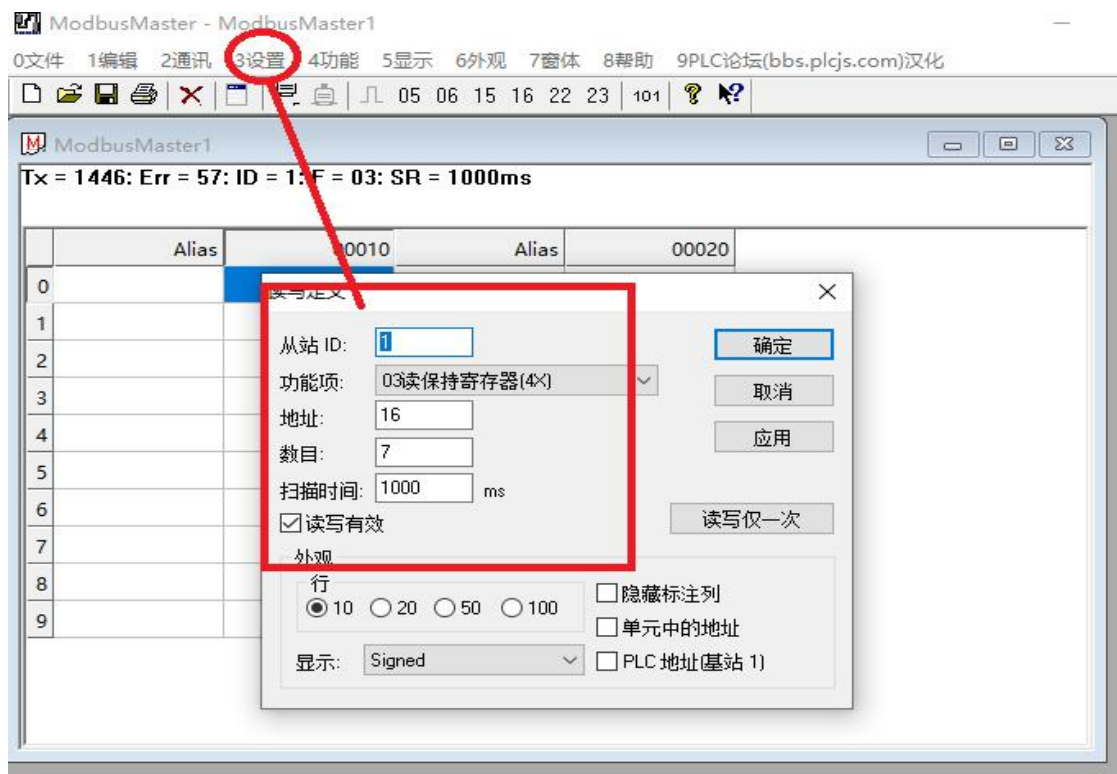


- Modbus software instructions

Pay attention to the port number, choose the port number according to the actual situation, click OK.



Then select settings, read definition, click OK.



Then you can see the data normally

ModbusMaster - ModbusMaster1

0文件 1编辑 2通讯 3设置 4功能 5显示 6外观 7窗体 8帮助 9PLC论坛(bbs.plcjs.com)汉化

05 06 15 16 22 23 | 101 | ?

ModbusMaster1

Tx = 1588: Err = 116: ID = 1: F = 03: SR = 1000ms

	Alias	00010	Alias	00020
0				14
1				5123
2				11273
3				
4				
5				
6		503		
7		7		
8		148		
9		13		

503 represents the Co2 parameter

7 means formaldehyde parameter

148 means TVOC parameter

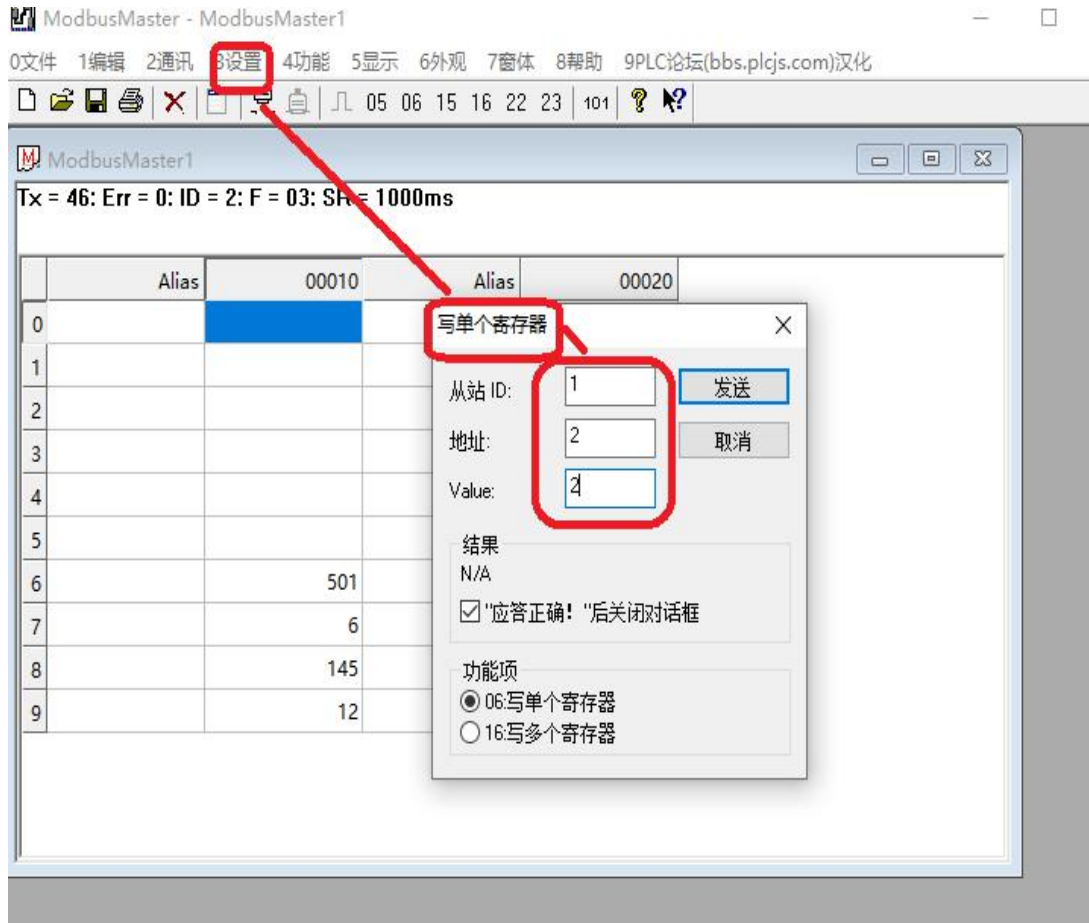
13 means PM2.5 is 19

14 means PM10 is 20

5123 means temperature 20.03C

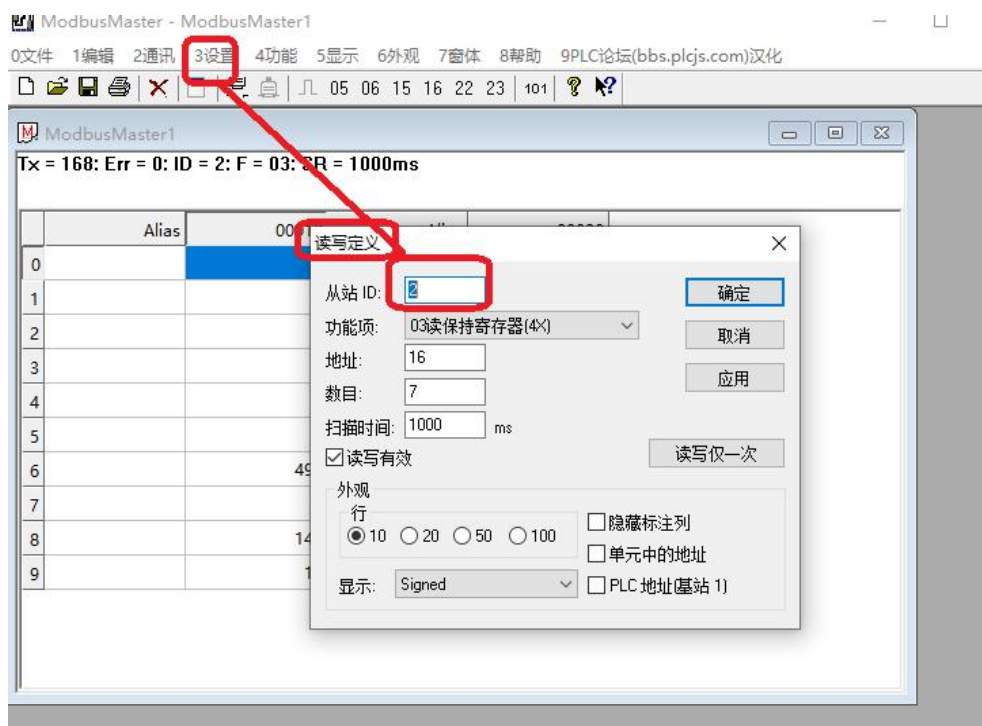
11273 indicates that the humidity is 44.09%

○ Modbus software modifies the module address. The register address is 2, the current address is 1, change to 2.

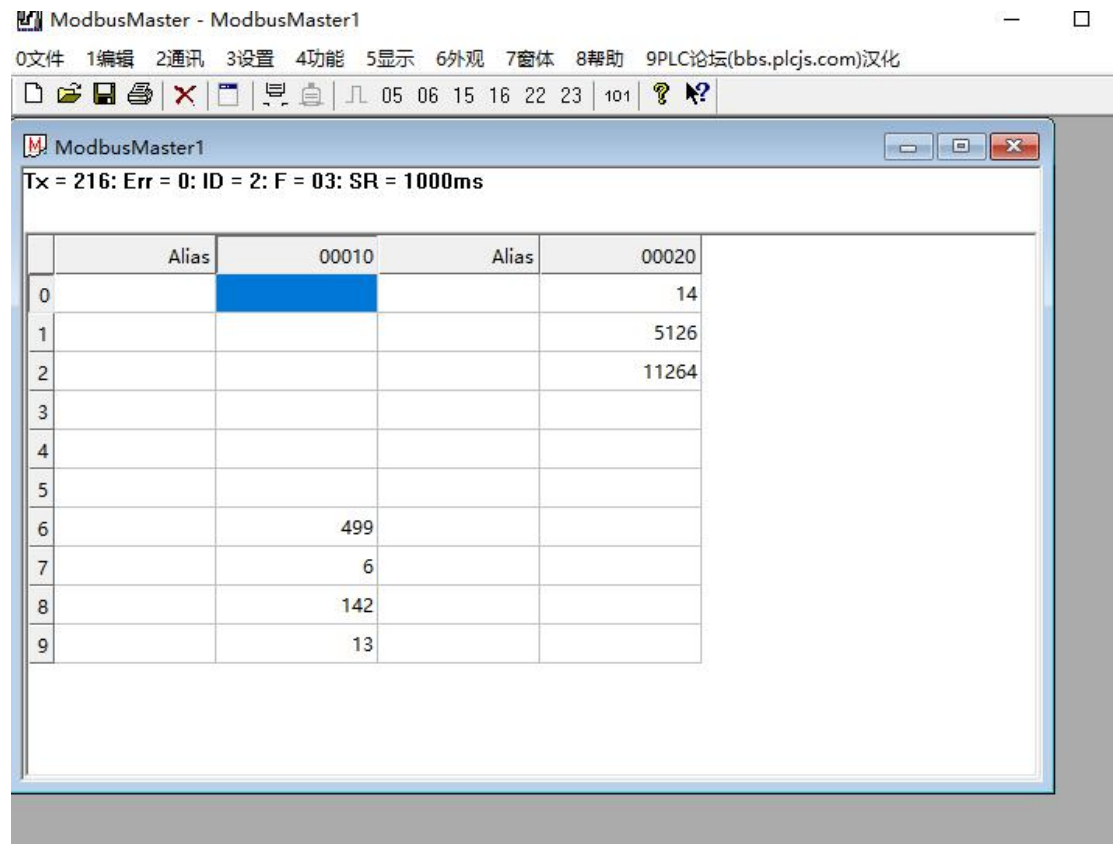


After setting, click send

After setting, the address of reading parameter should be changed to 2, otherwise the communication cannot be successful.



Then the data is confirmed.



For more command settings, refer to the supporting communication protocol documentation