



IoT Air Quality Sensor

Product Manual

(V1.1)





● Important statement

Thank you very much for choosing our products, we will serve you sincerely forever. The company pursues excellent quality and pays more attention to excellent after-sales service.

Operation errors will shorten the life of the product, reduce its performance, and may cause accidents in severe cases. Please hand over this manual to the end user and read it carefully before using the product. And please keep it in a safe place for reference when needed. The company reserves the right to modify this manual due to product technology and process updates. If there is any change, no further notice will be given, and the final interpretation of this manual is reserved.

● Product overview

The air quality transmitter produced by our company is an industrial-grade general-purpose particle concentration transmitter. It adopts the principle of laser scattering measurement and sieves through unique data dual-frequency acquisition technology to obtain the equivalent particle size of particles per unit volume. The number of particles, and the unique scientific algorithm is used to calculate the particle mass concentration of equivalent particle size per unit volume, and the data is output through the Modbus-RTU protocol through the RS485 interface. It can be used in outdoor weather stations, dust monitoring, libraries, archives, industrial plants and other places that require PM2.5 or PM10 concentration monitoring.

● Features

- ◇ Range: 0-1000ug/m³, resolution 1ug/³
- ◇ Simultaneously output PM2.5 and PM10
- ◇ Unique dual-frequency data acquisition and automatic calibration technology, the consistency can reach ±10%
- ◇ Adopt advanced laser anti-attenuation technology to ensure long-term stability of equipment
- ◇ Standard Modbus-RTU communication protocol, easy access

● Technical indicators

DC power supply (default)	10 ~ 30VDC
Transmitter circuit operating temperature	-10°C ~ +60°C, 0%RH ~ 99%RH (no condensation)
Communication Interface	RS485 communication (Modbus) protocol
Parameter settings	Use the provided configuration software to configure through the RS485 interface
Resolution	1ug/ <i>m</i> ³

Precision	$\pm 10\%$ (@100~500 $\mu\text{g}/\text{m}^3$) $\pm 10\mu\text{g}/\text{m}^3$ (@0~100 $\mu\text{g}/\text{m}^3$)	
Measuring range	PM2.5	0 ~ 1000 $\mu\text{g}/\text{m}^3$
	PM10	0 ~ 1000 $\mu\text{g}/\text{m}^3$
Responding speed	$\leq 30\text{s}$	
Preheat time	$\leq 60\text{s}$	
Output method	(0-5)V, (0-10)V, (4-20)mA, RS485 (Modbus RTU communication protocol)	
Wiring	Red: positive power supply Black: GND Green: RS485-A White: RS485-B	
	Red: positive power supply Black: GND Green: +Out(PM2.5) White: -Out(PM2.5) Blue: +Out(PM10) Yellow: -Out(PM10)	

Note: The specific wiring method is subject to the product line standard.

(RS485) MODBUS Communication Protocol

• Basic settings of communication protocol

Transmission mode: MODBUS-RTU mode.

Communication parameters: default baud rate 9600bps (optional 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, can be configured according to user requirements), 1 start bit, 8 data bits, no parity (optional odd parity, even parity), 1 stop bit, after changing the communication parameters, it is recommended to power on the sensor again.

Slave address: The factory default is 1, which can be configured according to user requirements.

• Holding register list

Parameter	MODBUS holding register address (16 bits)
PM2.5 value	Address: 0000H The read value is the measured value of PM2.5. For example, the read value is 0x0079, converted to 121 in decimal, and the measured value of PM2.5 is 121 $\mu\text{g}/\text{m}^3$.

PM10 value	Address: 0001H The read value is the measured value of PM10. For example, the read value is 0x009D, converted to 157 in decimal, and the measured value of PM10 is 157µg/m3.
Baud rate	Address: 0014H The setting value is 24, 48, 96, 192, 384, 576, 1152, corresponding to the baud rate respectively, 2400, 4800, 9600, 19200, 38400, 57600, 115200, for example, the default baud rate is 9600, the setting value is 0x0060
Check Digit	Address: 0015H 0x0000 means no parity, 0x0001 means odd parity, 0x0002 means even parity
Slave address	Address: 0017H Default: 0x0001

Note: Access to other addresses is prohibited.

● Modbus RTU command

Supported MODBUS function codes: 0x03, 0x06

03H function code example: read the PM2.5 measurement data of the sensor whose slave address is No. 1.

★Host query command:

Slave Address	01H	Slave address
Function	03H	Function code
Starting Address Hi	00H	The high 8 bits of the start register address
Starting Address Lo	00H	The lower 8 bits of the start register address
No. of Registers Hi	00H	The upper 8 bits of the number of registers
No. of Registers Lo	01H	The lower 8 bits of the number of registers
CRC Check Lo	84H	CRC check code lower 8 bits
CRC Check Hi	0AH	CRC check code high 8 bits

★Slave response:

Slave Address	01H	Slave address
Function	03H	Function code
Byte Count	02H	Length is 2 bytes

Data Hi	00H	PM2.5 为: 121 μ g/m ³
Data Lo	79H	PM2.5 为: 121 μ g/m ³
CRC Check Lo	79H	CRC check code lower 8 bits
CRC Check Hi	A6H	CRC check code high 8 bits

06H function code example: modify the baud rate (in this case, modify it to 57600bps)

★Host query command:

Slave Address	01H	Slave address
Function	06H	Function code
Starting Address Hi	00H	The baud rate holding register address is 0014H
Starting Address Lo	14H	The baud rate holding register address is 0014H
Data Hi	02H	When the baud rate is 57600bps, the value of the register is 576, which is 0x0240
Data Lo	40H	When the baud rate is 57600bps, the value of the register is 576, which is 0x0240
CRC Check Lo	C9H	CRC check code lower 8 bits
CRC Check Hi	5EH	CRC check code high 8 bits

★Slave response:

Slave Address	01H	Slave address
Function	06H	Function code
Starting Address Hi	00H	The baud rate holding register address is 0014H
Starting Address Lo	14H	The baud rate holding register address is 0014H
Data Hi	02H	When the baud rate is 57600bps, the value of the register is 576, which is 0x0240
Data Lo	40H	When the baud rate is 57600bps, the value of the register is 576, which is 0x0240
CRC Check Lo	C9H	CRC check code lower 8 bits
CRC Check Hi	5EH	CRC check code high 8 bits