

Shutter Box Integrated Meteorological Environment Monitoring Sensor

Product Manual

(V1.2)



● Product overview

The sensor can be widely used in environmental detection. It integrates temperature and humidity, atmospheric pressure, illuminance, carbon dioxide, and PM2.5. It is installed in the housing of the shutter box. The device adopts the standard MODBUS-RTU communication protocol and RS485 signal output. The sensor can be widely used in urban environment measurement, agricultural monitoring, industrial governance and other occasions.

● Features

- 10-30V wide DC voltage power supply;
- Standard MODBUS-RTU communication protocol;
- Simultaneous measurement of various parameters such as atmospheric pressure, temperature and humidity, and illuminance;
- Wide air pressure range, applicable to various altitudes.

● Technical indicators

Supply voltage	10~30V DC	
Precision	Temperature	±0.8°C (-20°C~80°C)
	Relative humidity	±3%RH (20%RH~80%RH, 25°C)
	Atmospheric pressure	±0.15kPa (30kPa~110kPa, 0~65°C)
	Illumination	±7%(25°C)
	Carbon dioxide	±(50ppm+5% of reading value)
	PM2.5 and PM10	±10%(25°C)

	Noise	±0.5dB (at reference pitch, 94dB@1kHz)
Measuring range	Temperature	-10~50°C (subject to order, can support -40-80°C)
	Relative humidity	0%RH~100%RH
	Atmospheric pressure	30~120kPa
	Illumination	0~65535Lux, 0~200000Lux
	Carbon dioxide	400~5000ppm
	PM2.5 and PM10	0~1000ug/m3
	Noise	30dB~120dB
Display resolution	Temperature	0.1°C
	Relative humidity	0.1%RH
	Atmospheric pressure	0.1kPa
	Illumination	1Lux
	Carbon dioxide	1ppm
	PM2.5 and PM10	1 ug/m3
	Noise	0.1 dB
Output signal	RS485 (Modbus RTU communication protocol)	
Operating temperature	-10~50°C	

● Electrical interface and wiring method



Direct lead

MODBUS(RS485/RS232)



1	Red	+Vcc
2	Black	GND
3	Yellow	RS485 B
4	White	RS485 A

● Precautions

1. After opening the product package, please check whether the appearance of the product is intact, check whether the relevant content of the product instruction manual is consistent with the product, and keep the product instruction manual for more than one year;
2. Wiring strictly according to the wiring diagram of the product, and work under the permissible excitation voltage of the product, and do not use it with overvoltage;
3. Do not knock the product, so as not to damage the appearance and internal structure of the ring;
4. The product has no customer-repairable parts, please contact our company in case of failure;
5. If the company's products fail under normal conditions, the warranty period is one year (13 months from the date of delivery by our company to the date of return). Whether the failure occurs under normal conditions can be tested by our company's quality inspector as the basis. For maintenance beyond the time limit, the company will charge the cost of production, and all products of the company will be maintained for life;
6. Please refer to our company website or call us for details.

(RS485) MODBUS RTU communication protocol

● Basic settings of communication protocol

Transmission mode: MODBUS-RTU mode.

Communication parameters: default baud rate 9600bps (optional 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, the sensor needs to be powered on again.

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

● Holding register list

Note: This register address table corresponds to the sensor parameters of standard products. If you choose other sensors, please contact our technical support.

Parameter	MODBUS holding register address (16 bits)
Temperature	Address: 0000H The temperature data is uploaded in the form of complement code, and the measured value of the temperature can be obtained by dividing the read value by 10. For example, the read value is 0xFF9B, converted to decimal is -101, and the measured value of the temperature is -10.1°C.
Relative humidity	Address: 0001H The measured value of relative humidity can be obtained by dividing the read value by 10. For example, the read value is 0x0149, converted to 329 in decimal, and the measured value of relative humidity is 32.9%RH.
Atmospheric pressure	Address: 0002H The read value is the measured value of atmospheric pressure. For example, the read value is 0x03ED, converted to 1005 in decimal, and the measured value of atmospheric pressure is 1005hPa or 100.5kPa.
Illumination	Address: 0004H~0005H 0004H stores the two high bytes of the illuminance measurement value, 0005H stores the two low bytes of the illuminance measurement value, for example, the read value of 0004H is 0x0000, and the read value of 0005H is 0x1388, then the illuminance measurement value It is 0x1388, converted to 5000 in decimal, that is, the measured value of illuminance is 5000Lux.
Carbon dioxide	Address: 0006H The read value is the measured value of CO2. For example, the read value is 0x0498, which is converted to 1176 in decimal, and the measured value of CO2 is 1176ppm.
PM2.5	Address: 0007H 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 121µg/m3.
PM10	Address: 0008H 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.
Noise	Address: 0009H, the read value divided by 10 is the noise measurement value, for example, the read value is 0x0258, converted to 600 in decimal, then the noise measurement value is 60.0dB.
Baud rate	Address: 0014H The setting value is 48, 96, 192, 384, 576, 1152, corresponding to the baud rate 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

Transmission mode: MODBUS-RTU mode.

Supported MODBUS function codes: 0x03, 0x06

03H function code example: read the temperature 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	At this point the temperature is: 24.7°C
Data Lo	F7H	At this point the temperature is: 24.7°C
CRC Check Lo	F9H	CRC check code lower 8 bits
CRC Check Hi	C2H	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