Sulfur Dioxide (SO2) Sensor/Transmitter

RS485/4-20mA/0-5V/0-10V

User Manual

Product Briefing

Product Overview

The transmitter is widely used in air quality testing equipment, fresh air ventilation system, smart home and other occasions that require SO2 and temperature and humidity monitoring. Input power, sensing probe and signal output are completely isolated. Safe and reliable, beautiful appearance, easy to install.

The sensor uses more advanced and professional electrochemical probe, compared with the traditional semiconductor probe with higher accuracy and stability.

Functional features

The product adopts high sensitivity gas detection probe with stable signal and high precision. It has the features of wide measuring range, good linearity, easy to use, easy to install, and long transmission distance.

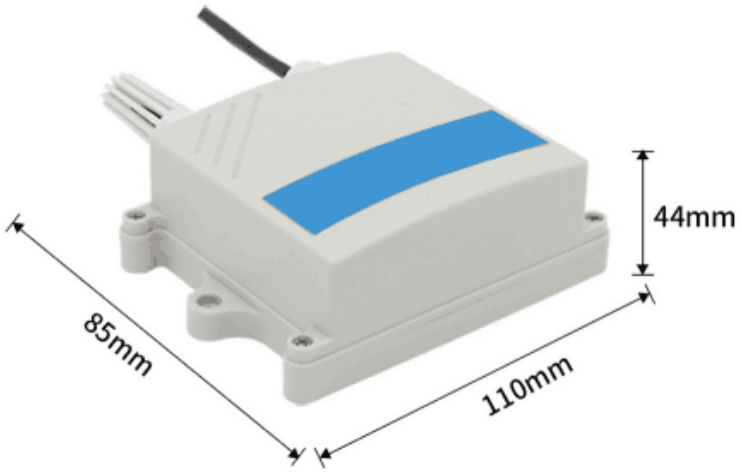
Main Parameters

Power Supply	10~30V DC
Average Power Consumption	0.18W
Output Signal	RS485/4-20mA/0-5V/0-10V
Measuring Range	20ppm/2000ppm
Temperature Measurement Range	-40°C ~+80°C
Humidity Measurement Range	0~100%RH
SO2 Resolution	20ppm: 0.1ppm/2000ppm: 1ppm
Detection Accuracy	±5%FS/±10%
Working Pressure	90-110 kPa
Working Humidity	15%RH-90%RH non-condensing
Humidity Accuracy	≥3%RH (60%, 25°C)
Operating Temperature	-20~50℃
Temperature Accuracy	≤0.5°C (25°C)
Stability	≤2% signal value/month
Temperature Measurement Range	-40°C~80°C
Warm-up Time	≥5min
Repeatability	≤2%
Response Time	20ppm: ≤45s/2000ppm: ≤70s
Zero Drift	20ppm:≤±0.5ppm/2000ppm:≤±4ppm

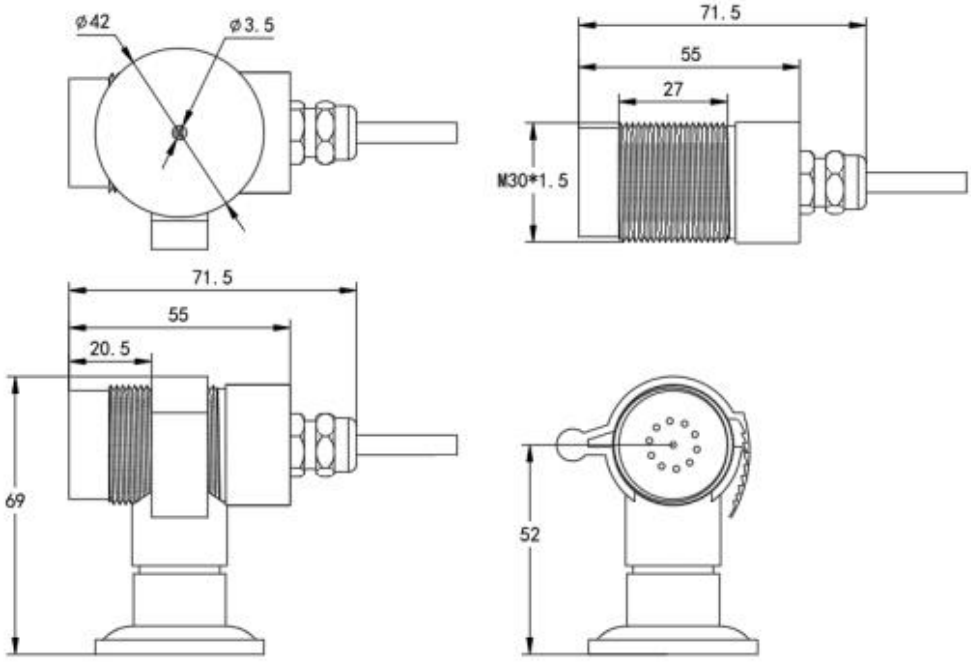
Note: All of the above specifications were measured under ambient conditions: temperature 20 °

C, relative humidity 50% RH, 1 atmospheric pressure, and the concentration of the gas to be measured does not exceed the sensor's maximum range.

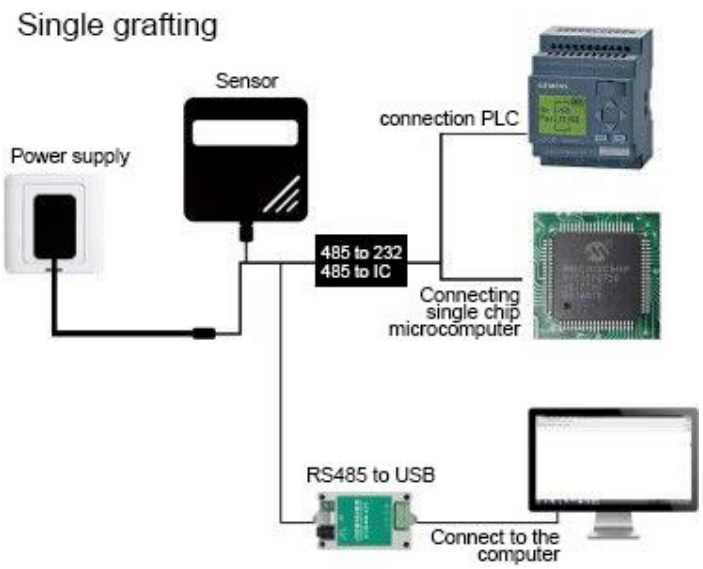
Overall Size：110×85×44mm



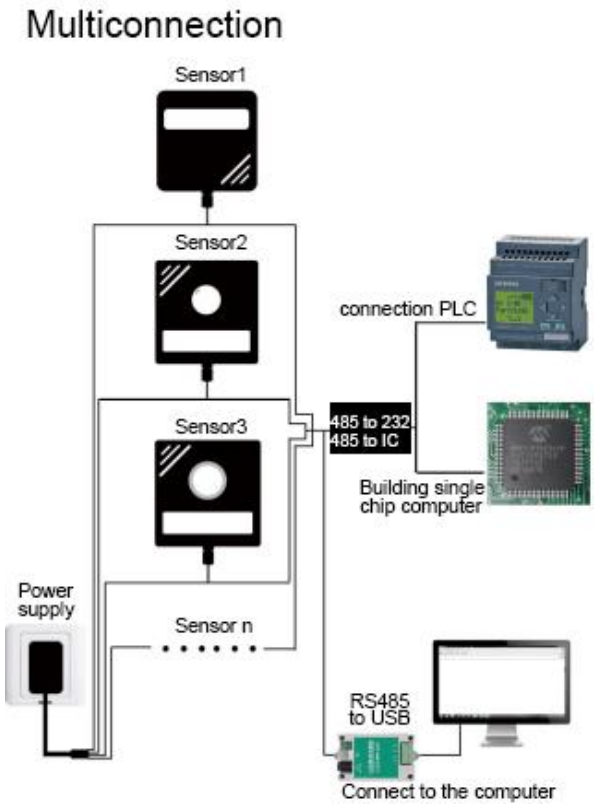
Epitaxial probe size：



System Framework Diagram



This product can also be a combination of multiple sensors in a 485 bus, theoretically a bus can be connected to 254 485 sensors, the other end of the access with a 485 interface PLC, through the 485 interface chip connected to the microcontroller, or the use of USB to 485 can be connected to the computer, the use of my company to provide the sensor configuration tool for the configuration and testing (in the use of the configuration software can only be used) (only one device can be connected when using the configuration software).



Hardware Connections

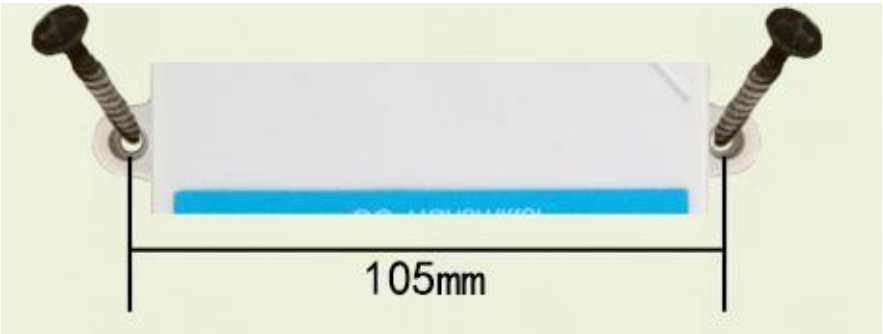
Interface Description

The power supply interface is a wide-voltage power supply input of 10-30 V. When wiring the 485 signal line, pay attention to the fact that the A\B lines should not be reversed, and the addresses of multiple devices on the bus should not be in conflict with each other.

Sensor Wiring

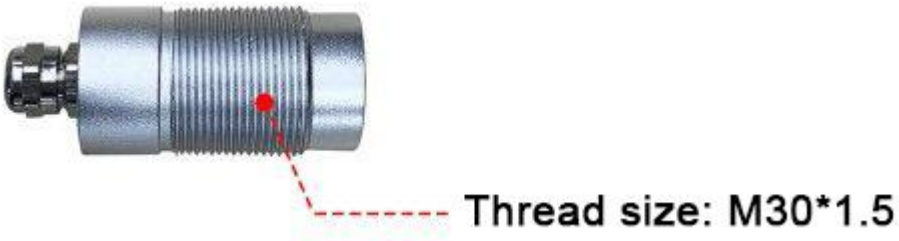
	Thread Colour	Clarification
Power Supply	Yellow-brown	Power Positivity（10~30V DC）
	Black	Power Negative
Communication	Yellow	485-A
	Blue	485-B

Installation

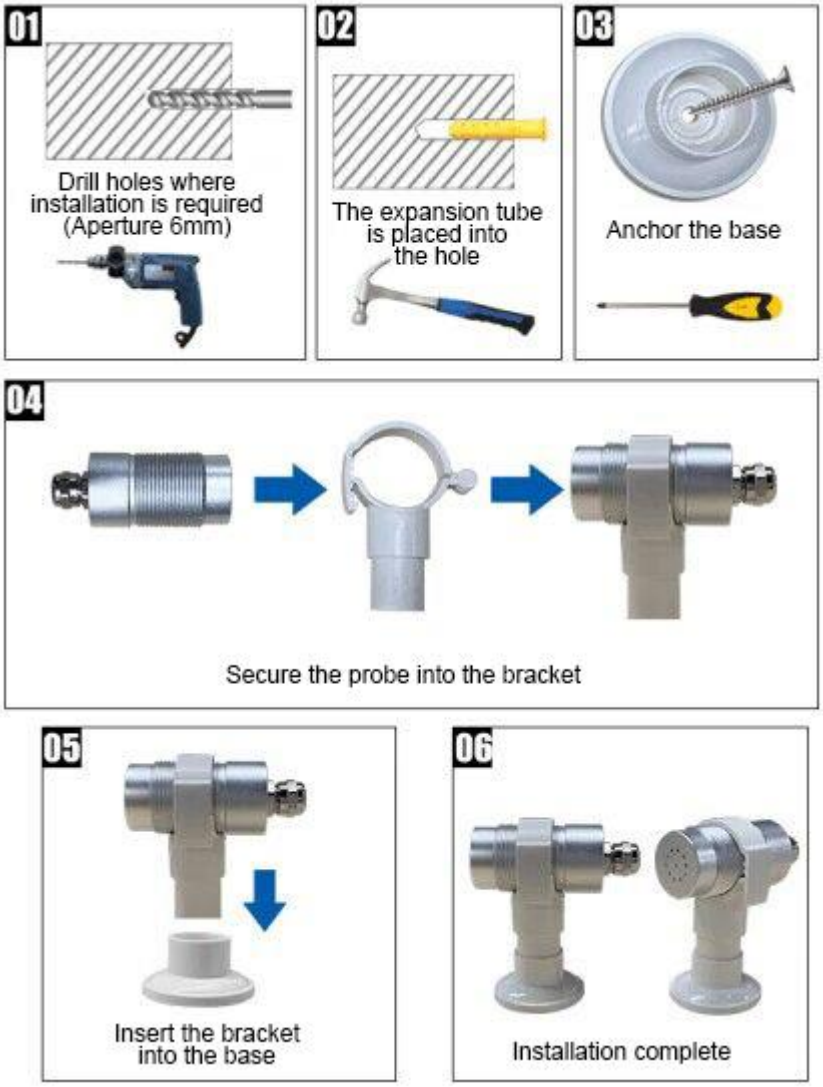


Installation steps for epitaxial probes:

Threaded mounting:



Bracket Installation:



Communications Protocol

Communication Basic Parameters

Encoding	8-bit binary
Data Bits	8 bits
Parity Bit	None
Stop Bit	1 bit
Error Check	CRC (Cyclic Redundancy Check)
Baud Rate	Configurable to 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps,57600bps, 115200bps; factory default is 4800bps

Data Frame Format Definitions

Using ModBus-RTU communication protocol, the format is as follows:

Initial Structure: ≥ 4 bytes of time

Address Code: 1 byte

Function Code: 1 byte

Data Field: N bytes

Error Check: 16-bit CRC code

End Structure: ≥ 4 bytes of time

Details:

Address Code: This is the address of the transmitter, which is unique in the communication network (factory default is 0x01).

Function Code: This indicates the function of the command sent by the host.

Data Field: This field contains the specific communication data. Note that for 16-bit data, the high byte comes first!

CRC Code: A two-byte checksum code.

Host Query Frame Structure：

Address Code	Function Code	Register Start Address	Register Length	Checksum Low Byte	Checksum High Byte
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave Reply Frame Structure：

Address Code	Function Code	Number of Valid Bytes	Data Area 1	Data Area 2	Data Area N	Checksum
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

Register Addresses

SO2 Device (other registers are the same)

Register Address	PLC or Configuration Address	Element	Support Function code	Scope and Definition Statement
0000 H	40001	SO2 concentration value	0x03/0x04	20ppm range transmitter uploaded with 10x expansion, 2000ppm transmitter uploaded with actual value
0002 H	40003			

Communication Protocol Example and Explanation

Read the SO2 value of device address 0x01

Query Frame

Address Code	Function Code	Start Address	Data Length	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x00 0x02	0x00 0x01	0x25	0xCA

Answer frame (e.g. reading SO2 at 500ppm)

Address Code	Function Code	Number of Valid Bytes Returned	SO2 Value	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x02	0x00 0x64	0XB8	0x53

SO2: 1F4 H (hexadecimal) =100 =>SO2=100 ppm

Read the temperature, humidity and SO2 value at device address 0x01

Query Frame

Address Code	Function Code	Start Address	Data Length	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x00 0x00	0x00 0x03	0x05	0xCB

Answer Frame

Address Code	Function Code	Byte Count	Humidity Value	Temperature Value	SO2 Value	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x06	0x01 0x67	0xFF 0xB5	0x01 0x64	0x34	0x89

Temperature: Temperature is uploaded as a complementary code when it is below 0℃.

FFB5 H (hexadecimal) = -75 => temp= -7.5℃

Humidity level: 167 H (hexadecimal)= 359 => moisture= 35.9%RH
SO2: When the transmitter range is 20 ppm:
1F4 H (hex) = 100 => SO2 = 10 ppm
When the transmitter range is 2000 ppm:
1F4 H(hex) =100 => SO2=100 ppm

Conversion of SO2 measurement units ppm and ug/m³

The conversion formula is based on 25℃ and 1 atmosphere:

X ppm = (Y mg/m³)(24.45)/(molecular weight) or Y mg/m³ = (X ppm)(molecular weight)/24.45

Only for calculations SO2: 1ppm=2.62mg/m³ 1mg/m³ =0.38ppm

Common Problems and Solutions

No output or output error

Possible reasons:

①The computer has COM port and the selected port is not correct, the baud rate is wrong.

③The 485 bus is disconnected, or A and B lines are reversed.

④The number of devices is too many or the wiring is too long, should be near the power supply, add 485 enhancer, and increase the 120Ω termination resistor.

⑤USB to 485 driver is not installed or damaged.

⑥The device is damaged.

Caveat

- Do not apply this device in systems involving personal safety.
- Do not install the device in environments with strong air convection.
- The device should avoid contact with organic solvents (including silicone and other adhesives), paints, pharmaceuticals, oils, and high-concentration gases.
- The device should not be used for extended periods in environments containing corrosive gases, as these gases can damage the sensor.
- Do not leave the device in high concentrations of organic gases for long periods, as this can cause sensor zero drift, which recovers slowly.
- Do not store or use the device in high concentrations of alkaline gases for extended periods.
- Although this product is highly reliable, we recommend checking the device's response to target gases before use to ensure safety in the field.
- When testing the device's response with target gases, it is recommended to use standard substances corresponding to concentrations within the device's range. Our company is not responsible for abnormal measurements resulting from testing methods not recommended.
- The device should not be used in environments with an oxygen content of less than 10% VOL. Our company is not responsible for abnormal measurements resulting from usage in low-oxygen environments.

Warning:

Despite the high reliability of our products, we recommend checking the response of the equipment to the target gas before use to ensure safe use on site.