

Carbon Dioxide Transmitter

Manual

SC01

V1.0



Version Updating

Date	Version	Revise	Note
2020.08.10	V1.0	Create manual	

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1. Product Overview

SC01 is an instrument for measuring CO₂ concentration with two versions of external/internal sensors. It uses the non-dispersive infrared (NDR) principle to detect the presence of CO₂ in the air with good selectivity, no oxygen dependence, and long life. Built-in temperature compensation: both digital output and PWM output are available for ease of use. The sensor is a high-performance sensor that combines proven infrared absorption gas detection technology with precise optical circuit design and sophisticated circuit design.

1.1 Features

- ◆ MCU adopts ST's professional and leading high-quality low-power chips to ensure processing power and stability;
- ◆ High sensitivity, high resolution and low power consumption;
- ◆ Provide UART, PWM waveform and other output methods;
- ◆ Fast response time;
- ◆ Temperature compensation, excellent linear output
- ◆ Excellent stability;
- ◆ Long service life;
- ◆ Standard RS485 output communication interface, strong stability, can realize long distance communication;
- ◆ Uses the standard Modbus-RTU communication protocol widely used in industry;
- ◆ Communication address and baud rate can be set;
- ◆ Original imported high-density material shell, IP65 protection level;
- ◆ Wall-mounted design, compact appearance, both sides of the mounting screws, easy installation and space saving

1.2 Parameter

Parameter	
Supply voltage	5-28V DC 1A
Power	<0.4W
Measurement range	0-5000PPM
Measurement accuracy	±5% (@25°C)
Communication mode	RS485 Modbus-RTU
Device address	Default: 1; 1-252 can be set
Communication baud rate	Default: 9600 1200,2400,4800,9600,57600,115200 can be set,
Dimension	110*85*44mm
Installation	Wall-mounted

Note: Device address, please do not exceed the settable range

1.3 Application

It can be widely used in agricultural greenhouses, flower culture and other applications where CO2 concentration measurement is required.

1.4 Installation

Wall-mounted structure design, easy to install.

2. Description

2.1 Size



2.2 Wiring

Red wire	Blue wire	Yellow wire	Green wire
Power positive	GND	485A	485B

Note: The actual product wire, subject to the label on the back of the product.

3. Communication Protocol

3.1 Communication Basic Parameter

Code	8-bit binary
Data bits	8 bits
Parity bits	No
Stop bit	1
Error check	CRC (Redundant Cyclic Code)
Baud rate	1200bit/s, 2400bit/s, 4800bit/s, 9600 bit/s, 38400bit/s, 57600bit/s, 115200bit/s settable, factory default is 9600bit/s

3.2 RTU message frame format

Modbus-RTU communication protocol is used in the following format:

Initial structure \geq 4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure \geq 4 bytes of time

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

Function code: The function indication of the command sent by the host, this transmitter only uses the function code 0x03 (read register data).

Data area: data area is specific communication data, note that the high byte of 16bits data in front!

CRC code: two-byte check code.

Host interrogation frame format:

Address code	Function code	Start Address	Data length	Check digit low bit	Check digit high bit
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave answer frame format:

Address code	Function code	Data length	CO ₂ concentration value	Check digit low bit	Check digit high bit
1 byte	1 byte	1 byte	2 bytes	1 byte	1 byte

3.3 Register Address Description

Function Code	Register address	PLC/ configuration address	Content	Description
03	4X0010/016	0017	CO ₂ concentration	Read-only, integer int16 actual value
03/06/10	4X0105/261	0262	Device address (1-252)	read-write, default 1
03/06/10	4X0106/262	0263	Baud rate	read-write, default 3:9600, 0:1200,1:2400,2:4800, 3:9600,4:57600,5:115200
03/06/10	4X0107/263	0264	CO ₂ concentration calibration	Signed number (positive or negative), 1 times of offset value, for example, the current read out CO ₂ value is 400ppm, if we set this CO ₂ offset value to -28, then the read out temperature value after setting is: 400-28=372ppm
03/06/10	4X0108/264	0265	Parity calibration	Read and write, default is 0:None,1:Even,2:Odd

(Note: the PLC needs to add 1 to the address code, if the 03 function code to read the 1st register, you need to write 40002)

3.4 Host reads transmitter measured values

Host interrogation frame format:

Address code	Function code	Start address of register	Number of read registers	Check digit low bit	Check digit high bit
0X01	0X03	0X00 0X10	0X00 0X01	0X85	0XCF

Answer frame:

Address code	Function code	Data Length	CO2 concentration value	Check digit low bit	Check digit high bit
0X01	0X03	0X22	0X01 0XF4	0XB8	0X53

Data conversions:

01F4 H (hexadecimal) = 500 PPM

3.5 Modify baud rate

Baud rate modified to 115200

Host interrogation frame

Address code	Function code	Start address of register	Number of read registers	Check digit low bit	Check digit high bit
0X01	0X06	0X01 0X06	0X00 0X05	0XA8	0X34

0X00 0X05 where 0X05 represents baud rate 115200

The remaining baud rates are 0:1200, 1:2400 , 2:4800, 3:9600, 4:57600, 5:115200

Answer frame

Address code	Function code	Start address of register	Number of read registers	Check digit low bit	Check digit high bit
0X01	0X06	0X01 0X01	0X00 0X05	0XA8	0X34

3.6 Modify device address

Address change to 2

Host interrogation frame

Address code	Function code	Start address of register	Number of read registers	Check digit low bit	Check digit high bit
0X01	0X06	0X01 0X05	0X00 0X02	0X19	0XF6

Answer frame

Address code	Function code	Start address of register	Number of read registers	Check digit low bit	Check digit high bit
0X01	0X06	0X01 0X05	0X00 0X02	0X19	0XF6

4. FAQ and Solutions

If the computer cannot communicate with the device during the test, the possible causes are as follows.

- ◆ Whether the device power is correctly connected, the device light will flash after correct connection
- ◆ The device address is wrong, or there is a duplicate address of the device (factory default is all 1).
- ◆ The baud rate, parity, data bits, and stop bits are incorrect.
- ◆ The host polling interval and waiting time are too short, both need to be set above 200ms.
- ◆ The 485 bus is disconnected, or the A and B lines are reversed.
- ◆ The number of devices is too many or the wiring is too long, so power should be supplied nearby, add a 485 booster, and increase the 120Ω terminal resistor.
- ◆ USB to 485 driver is not installed or damaged.
- ◆ The computer has more than one COM port, and the selected port is not correct.
- ◆ The device is damaged.

5. After-sale Service Commitment

OneFex provides after-sales service of the device within one year from the date of sale. But for damage caused by improper use, you need to send it back and take the freight for repair or adjust. Make sure that the package is in good condition to avoid damage during transportation. Repair the damage of device instrument is free.

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