

# GZ01 CO<sub>2</sub> temperature and humidity Transmitter instruction manual (Type 485)



SIBO.X INDUSTRIAL CO.,LTD.

Add: No. Building 1, No. 1, Jingshi Road, Cicheng Town Industrial Park, Jiangbei District,  
Ningbo City, Zhejiang, China

<https://www.sbxsun.com>

Email: [info@sbxsun.com](mailto:info@sbxsun.com)

Tel: +86-15958288207

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# 1. product description

## 1.1 product description

In order to meet the needs of detecting CO<sub>2</sub> concentration, light intensity, temperature and humidity in agricultural greenhouses, flower cultivation and other occasions, our company independently developed this GZ01 CO<sub>2</sub> temperature and humidity transmitter. The transmitter adopts imported NDIR sensor for CO<sub>2</sub> concentration measurement, which is quick and sensitive, avoiding the life and long-term drift problems of traditional electrochemical sensors; adopts high-precision photosensitive transmitter to measure illuminance, and the output value measurement unit is Lux; adopts Switzerland The imported temperature and humidity measuring unit measures temperature and humidity, with high measurement accuracy and strong anti-interference ability.

The transmitter adopts 485 communication, standard ModBus-RTU communication protocol, communication address and baud rate can be set, and the farthest communication distance is 2000 meters. The equipment has 10-30V wide voltage power supply, and the enclosure has a high degree of protection, which can adapt to various harsh conditions on site.

## 1.2 Features

- High-precision illuminance detection measuring range 0-65535 Lux, 0-200,000 Lux is optional.
- Imported NDIR sensor is used for CO<sub>2</sub> concentration measurement, with high accuracy, small drift and long life
- The temperature and humidity measurement unit imported from Switzerland is used to measure temperature and humidity, with high measurement accuracy and strong anti-interference ability.
- Wide measuring range, default 0-5000ppm (default), with temperature compensation, little influence by temperature.
- 485 communication, standard ModBus-RTU communication protocol, communication address and baud rate can be set, the farthest communication distance is 2000 meters
- The product adopts a wall-mounted waterproof shell, which is easy to install and has a high degree of protection.

## 1.3 Main Specifications

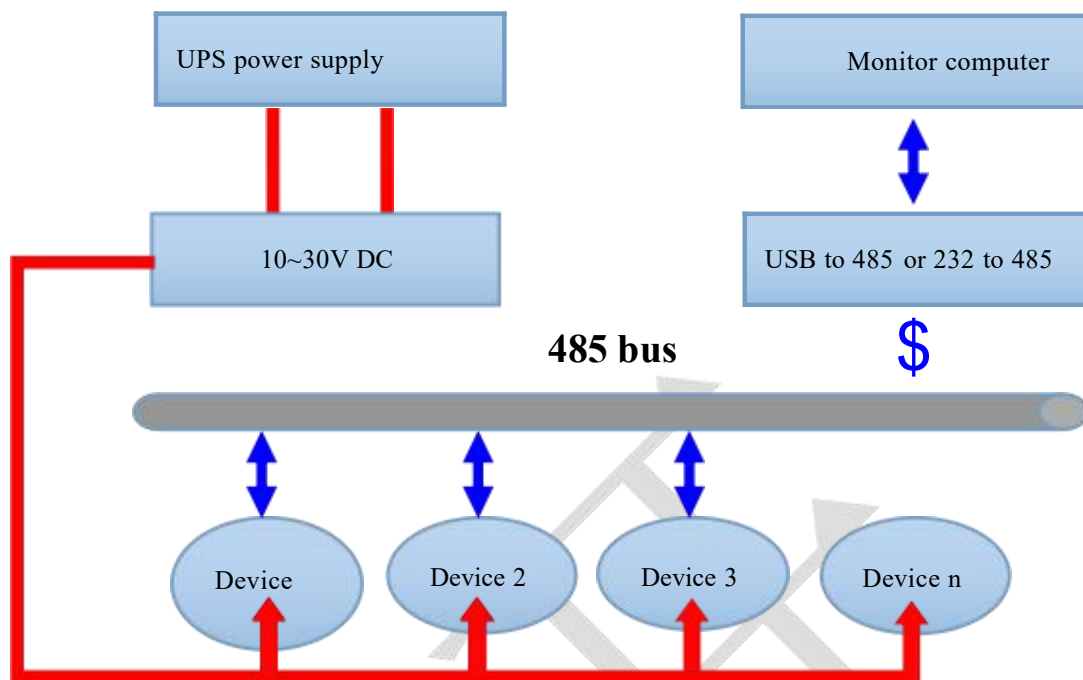
|                                |  |                                       |
|--------------------------------|--|---------------------------------------|
| DC power supply (default)      | 10-30VDC                                   |                                       |
| Maximum power consumption      | 0.8W (24V DC)                              |                                       |
| Precision                      | humidity                                   | ±3%RH(60%RH,25℃)                      |
|                                | temperature                                | ±0.5℃ (25℃)                           |
|                                | Light intensity                            | ±7%(25℃)                              |
|                                | CO <sub>2</sub>                            | ±(40ppm+ 3%F · S) (25℃)               |
| Operating temperature          | -10℃~+50℃                                  |                                       |
| Working humidity               | 0%RH~80%RH                                 |                                       |
| Light intensity range          | 0-65535 Lux; 0-20 million Lux              |                                       |
| Temperature and humidity range | -40℃~+60℃, 0%RH~80%RH                      |                                       |
| CO <sub>2</sub> range          | 0~5000ppm                                  |                                       |
| Long-term stability            | temperature                                | ≤0.1℃/y                               |
|                                | humidity                                   | ≤1%/y                                 |
|                                | Light intensity                            | ≤5%/y                                 |
|                                | CO <sub>2</sub>                            | Stability: <2%FS Non-linearity: <1%FS |
| Response time                  | temperature                                | ≤18s (1m/s wind speed)                |
|                                | humidity                                   | ≤6s (1m/s wind speed)                 |
|                                | Light intensity                            | 0.1s                                  |
|                                | CO <sub>2</sub>                            | ≤90s                                  |
| output signal                  | RS485 (Modbus protocol)                    |                                       |
| Preheat time                   | 2min (available), 10min (maximum accuracy) |                                       |
| Data update interval           | 2s   |                                       |

### 1.4 product model

|      |      |    |       |  |
|------|------|----|-------|--|
| GZ01 |      |    |       | Illumination CO <sub>2</sub> temperature and humidity integrated transmitter |
|      | N01- |    |       | RS485 (Modbus protocol)  |
|      |      | 2- |       | Wall-mounted king-shaped shell with built-in probe                           |
|      |      |    | 65535 | Illumination range 0~65535Lux  |
|      |      |    | 20W   | Illumination range 0~200000Lux   |

### 1.5 System frame diagram

## AC220V mains



System scheme block diagram

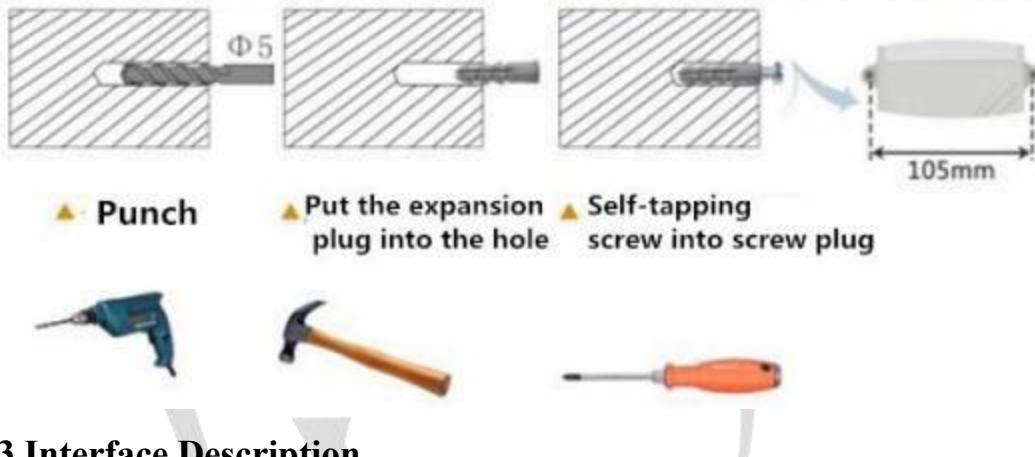
## 2. Equipment installation instructions

### 2.1 Inspection before equipment installation

Equipment List:

- 1 set of GZ01 CO<sub>2</sub> temperature and humidity transmitter equipment
- Self-tapping screw GZ01 (2 pcs), expansion plugs (2 pcs)
- Product Certificate, Warranty Card
- USB to 485 (optional)

### 2.2 Installation step instructions



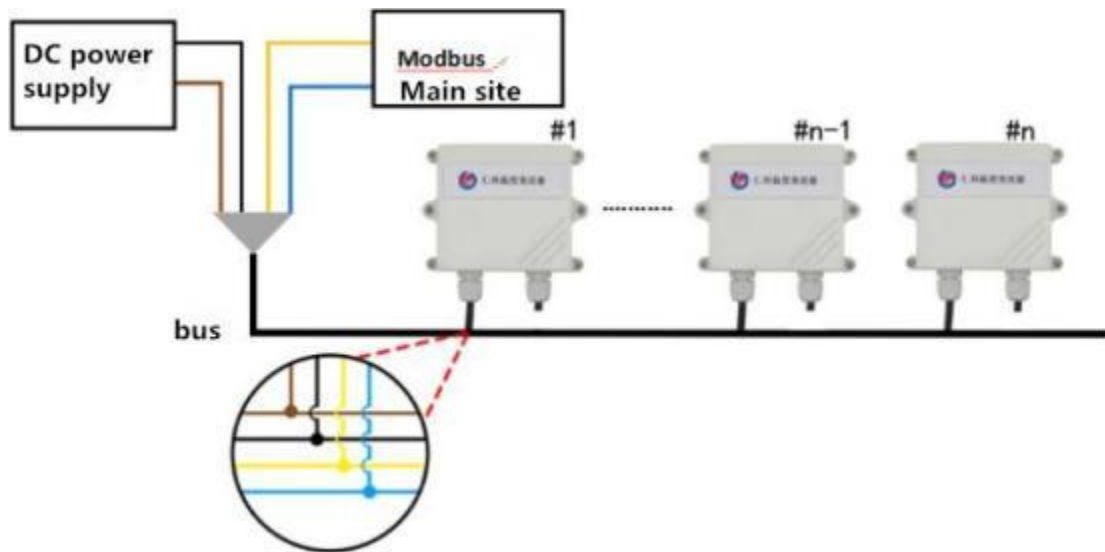
### 2.3 Interface Description

Wide-voltage power input can be 10~30V. When wiring the 485 signal line, pay attention to the two wires A/B not to be reversed, and the addresses of multiple devices on the bus cannot be conflicted.

|                    | Thread color | Description                       |
|--------------------|--------------|-----------------------------------|
| Electricity source | brown        | Positive power supply (10~30V DC) |
|                    | black        | Power negative                    |
| through letter     | yellow       | 485-A                             |
|                    | blue         | 485-B                             |

### 2.4 485 field wiring instructions

When multiple 485 devices are connected to the same bus, there are certain requirements for field wiring. For details, please refer to the "485 Device Field Wiring Manual" in the information package.



### 3. Configuration software installation and use

#### 3.1 Software selection

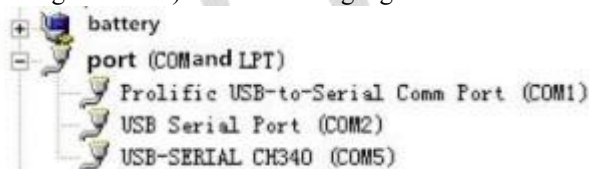
Open the data package, select "Debug software" --- "485 parameter configuration

software",  
find Just  
open it.



#### 3.2 parameter settings

①. Select the correct COM port (check the COM port in "My Computer—Properties—Device Manager—Port"). The following figure lists the driver names of several different 485 converters.



- ② Connect only one device alone and power it on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.
- ③. Modify the address and baud rate according to the needs of use, and at the same time, you can query the current function status of the device.
- ④. If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation.



## 4. letter of agreement

### 4.1 Basic communication parameters

|                |   |
|----------------|---|
| Code           | 8-bit binary  |
| Data bit       | 8-bit   |
| Parity bit     | no  |
| Stop bit       | 1 person  |
| Error checking | CRC (Redundant Cyclic Code)   |
| Baud rate      | 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s |

### 4.2 Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows: 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 Time to end structure  $\geq 4$  bytes

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

Function code: The command function instruction issued by the host, the transmitter uses function code 0x03 (read register data) 06 (write register).

Data area: The data area is the specific communication data, pay attention to the high byte of the



16bits data first!

CRC code: two-byte check code. Host

query frame structure:

| address | function | Register start | Register | Check code low | High bit of check |
|---------|----------|----------------|----------|----------------|-------------------|
| code    | code     | address        | length   | bit            | code              |
| 1 byte  | 1 byte   | 2 bytes        | 2 bytes  | 1 byte         | 1 byte            |

Slave machine response frame structure:

| address code | function code | Number of valid bytes | Data area | Second data area | Nth data area | Check code |
|--------------|---------------|-----------------------|-----------|------------------|---------------|------------|
| 1 byte       | 1 byte        | 1 byte                | 2 bytes   | 2 bytes          | 2 bytes       | 2 bytes    |

### 4.3 Register address

| Register address | PLC or configuration address | content  | operating      | Scope and definition |
|------------------|------------------------------|--|----------------|----------------------|
| 0000 H           | 40001                        | Humidity value   | Read only      | 0~1000               |
| 0001 H           | 40002                        | Temperature value  | Read only      | -400~1000            |
| 0002 H           | 40003                        | CO <sub>2</sub> concentration value  | Read only      | 0~5000               |
| 0003 H           | 40004                        | 0~65535 range light value or<br>0~200,000 range illumination value<br>high 16 bits | Read only      | 0~65535              |
| 0004 H           | 40005                        | 0~200,000 range illumination value<br>lower 16 bits                                | Read only      | 0~65535              |
| 0050H            | 40051                        | Temperature calibration value  | Read and write | -400~1000            |
| 0051 H           | 40052                        | Humidity calibration value   | Read and write | -400~1000            |
| 0052 H           | 40053                        | CO <sub>2</sub> calibration value  | Read and write | -2000~2000           |
| 0053 H           | 40054                        | 0~65535 range illumination value   | Read and       | -32768~32767         |

|        |       |   |                      |                              |
|--------|-------|---|----------------------|------------------------------|
|        |       | calibration value or<br>0~200,000 range<br>illumination value<br>high 16-bit<br>calibration value | write                |                              |
| 0054H  | 40065 | 0~200,000 range<br>illumination value<br>low 16-bit calibration<br>value                          | Read<br>and<br>write | -32768~32767                 |
| 07D0 H | 42001 | Device address  | Read<br>and<br>write | 1~254 (factory<br>default 1) |
| 07D1H  | 42002 | Device baud rate  | Read<br>and<br>write | 0 means 2400 1 means<br>4800 |

## 4.4 Communication protocol example and explanation

### 4.4.1 Read the address and baud rate of the device with address 0x01

Inquiry frame (for example: the address is 0x01 and the baud rate is 4800)

| address code | function code | initial address | Data length | Check code<br>low bit | High bit of<br>check code |
|--------------|---------------|-----------------|-------------|-----------------------|---------------------------|
| 0x01         | 0x03          | 0x07 0xD0       | 0x00 0x02   | 0xC4                  | 0x86                      |

Reply frame

| address<br>code | function code | Number of<br>valid bytes | Baud rate | address   | Check code<br>low bit | High bit of<br>check code |
|-----------------|---------------|--------------------------|-----------|-----------|-----------------------|---------------------------|
| 0x01            | 0x03          | 0x04                     | 0x00 0x01 | 0x00 0x01 | 0x6A                  | 0x33                      |

### 4.4.2 Change address

Inquiry frame (assuming that the modified address is 0x02 Note: power off and restart the device after modifying the address)

| address code | function code | initial address | Modify value | Check code<br>low bit | High bit of<br>check code |
|--------------|---------------|-----------------|--------------|-----------------------|---------------------------|
| 0x01         | 0x06          | 0x07 0xD0       | 0x00 0x02    | 0x08                  | 0x86                      |

Reply frame

| address code | function code | initial address | Modify value | Check code<br>low bit | High bit of<br>check code |
|--------------|---------------|-----------------|--------------|-----------------------|---------------------------|
| 0x01         | 0x06          | 0x07 0xD0       | 0x00 0x02    | 0x08                  | 0x86                      |

### 4.4.3 Modify the baud rate of address 0x01

Inquiry frame (assuming to modify the baud rate to 9600. Note: power off and restart the device after modifying the address)

| address code | function code | initial address | Modify value | Check code low bit | High bit of check code |
|--------------|---------------|-----------------|--------------|--------------------|------------------------|
| 0x01         | 0x06          | 0x07 0xD1       | 0x00 0x02    | 0x59               | 0x46                   |

Reply frame

| address code | function code | initial address | Modify value | Check code low bit | High bit of check code |
|--------------|---------------|-----------------|--------------|--------------------|------------------------|
| 0x01         | 0x06          | 0x07 0xD1       | 0x00 0x02    | 0x59               | 0x46                   |

#### 4.4.4 Read the CO<sub>2</sub> value of the device address 0x01

Interrogation frame

| address code | function code | initial address | Data length | Check code low bit | High bit of check code |
|--------------|---------------|-----------------|-------------|--------------------|------------------------|
| 0x01         | 0x03          | 0x00 0x02       | 0x00 0x01   | 0x25               | 0xCA                   |

Response frame (for example, read CO<sub>2</sub> is 3000ppm)

| address code | function code | Returns the number of valid bytes | CO <sub>2</sub> value | Check code low bit | High bit of check code |
|--------------|---------------|-----------------------------------|-----------------------|--------------------|------------------------|
| 0x01         | 0x03          | 0x02                              | 0x0B 0xB8             | 0xBF               | 0x06                   |

CO<sub>2</sub>:

BB8 H (hexadecimal) =3000 => CO<sub>2</sub>=3000 ppm

#### 4.4.5 Read the temperature and humidity, CO<sub>2</sub> value and light value of the device address 0x01 (taking 200,000 Lux range as an example)

Interrogation frame

| address code | function code | initial address | Data length | Check code low bit | High bit of check code |
|--------------|---------------|-----------------|-------------|--------------------|------------------------|
| 0x01         | 0x03          | 0x00 0x00       | 0x00 0x05   | 0x85               | 0xC9                   |

Response frame (for example, temperature value -7.5 °C , humidity value 35.9%, CO<sub>2</sub> value 3000ppm, light value 500Lux)

| address code | function code | Number of bytes | Humidity value | Temperature value | CO <sub>2</sub> | High illumination 16 bits | Low 16 bits of light | Check code low bit | High bit of check code |
|--------------|---------------|-----------------|----------------|-------------------|-----------------|---------------------------|----------------------|--------------------|------------------------|
| 0x01         | 0x03          | 0x0A            | 0x01 0x67      | 0xFF 0xB5         | 0x0B 0xB8       | 0x00 0x00                 | 0x01 0xF4            | 0xF1               | 0xF9                   |

Temperature: When the temperature is lower than 0°C, upload in the form of complement code.

FFB5 H (hexadecimal) = -75 => temperature = -7.5°C

humidity:

167 H (hexadecimal) = 359 => humidity = 35.9%RH

CO<sub>2</sub>:

BB8 H (hexadecimal) =3000 => CO<sub>2</sub>=3000 ppm

Illumination calculation instructions:

This protocol is only used under 0~200,000 Lux range transmitters, the unit is 1Lux

1F4H (Hexadecimal) = 500 => Illuminance = 500Lux

## 5. Common problems and solutions

### The device cannot connect to the PLC or computer

possible reason:

- 1) The computer has multiple COM ports, and the selected port is incorrect.
- 2) The device address is wrong, or there are devices with duplicate addresses (the factory defaults are all 1).
- 3) The baud rate, check method, data bit, stop bit are wrong.
- 4) The host polling interval and waiting response time are too short, and both need to be set above 200ms.
- 5) The 485 bus is disconnected, or the A and B wires are connected reversely.
- 6) If the number of equipment is too much or the wiring is too long, power supply should be nearby, add a 485 booster, and add a 120 Ω terminal resistance.
- 7) The USB to 485 driver is not installed or damaged.
- 8) The equipment is damaged.

## 6. Appendix: Shell siz

Overall size: 110×105×45mm