Weihai Jinghe Digital Mine Co., Ltd

RS485/4-20mA CO2 Gas Sensor

Manual

Chapter I Product Overview

1.1 Introduction

Ghhb-004-485 carbon dioxide sensor is a new integrated sensor, which can obtain the value of carbon dioxide concentration in the environment of the equipment through the acquisition equipment.

1.2 Sensor characteristics

Carbon dioxide sensor is a constant potential electrolytic sensor. Carbon dioxide produces a series of redox reactions in the sensor and releases charges to form a current. The size of the current is directly proportional to the concentration of carbon dioxide. The concentration of carbon dioxide can be determined by testing the size of the current.

1.3 Applicable scenarios

The product can be widely used in environmental monitoring, meteorological monitoring, intelligent agriculture, orchard nursery, flowers and soil research. Compared with the traditional Internet of things sensors, it has the advantages of high precision and easy installation.

1.4 Precautions for use

The sensor is made of waterproof, dustproof and impact resistant materials, but the precision instrument needs to be used and maintained carefully to avoid impact and use in harsh environments such as corrosive liquid or gas.the aging time before use shall not be less than 48 hours. the

air inlet of the sensor shall not be blocked or polluted. Electrolyte leakage will cause damage. Do not disassemble the sensor at will.do not use if the shell is damaged or deformed. The sensor shall avoid contact with organic solvents (including silicone rubber and other adhesives), coatings, chemicals and fuel oils.

Chapter II Product Introduction

2.1 Product Appearance

2.2 Power Supply

The user provides the equipment with a DC power supply with an input of 9 ~ 18V. We can use the 220VAC to DC power supply provided by us, or use 12V solar panel and battery for power supply to meet the needs of different occasions.

2.3 Main Product Parameters

Basic Edition

Name	Parameter
POWER SUPPLY	9-18V DC

Maximum power consumption	0.4W
Output Signal	RS485/0-5V/0-10V/4-20MA
Measuring Range	400-60000ppm
Accuracy	±50ppm±3%
Response Time	≥600s
Size	110mm*85mm
Working Temperature	-20℃~60℃
Waterproof Grade	IP67

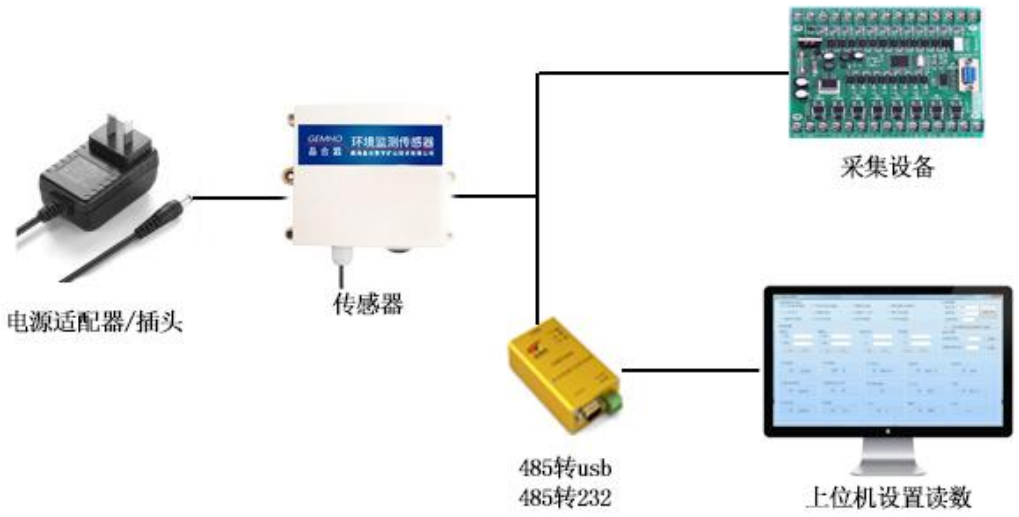
High configuration version

Name	**Parameter**
POWER SUPPLY	9-18V DC
Maximum power consumption	1W
Output Signal	RS485/0-5V/0-10V/4-20MA
Measuring Range	400-60000，0-2000
Accuracy	±50ppm±5%
Response Time	<60s
Size	110mm*85mm
Working Temperature	-20℃~60℃
Waterproof Grade	IP67

Chapter III System Architecture

3.1 RS485 Output Signal

The sensor is powered by 12V DC power supply and connected to PLC with RS485 interface. It can also be connected to MCU through RS485 interface chip. The MCU and PLC are programmed through the Modbus protocol specified later. Or use USB to RS485 to connect with the computer and use the sensor configuration tool provided by our company for configuration and testing. Theoretically, one bus can connect more than 16 RS485 sensors. If more RS485 sensors need to be connected, RS485 repeaters can be used to expand more RS485 devices.



3.2 Analog Output

Using 12V DC power supply, the sensor can be connected with acquisition equipment such as PLC or single chip microcomputer. Through the measured voltage or current value, the real-time data collected by the sensor can be obtained.

Chapter IV Installation And Wiring Instructions

4.1 Equipment List

■NH3 Gas Sensor

■2pcs M3 screws

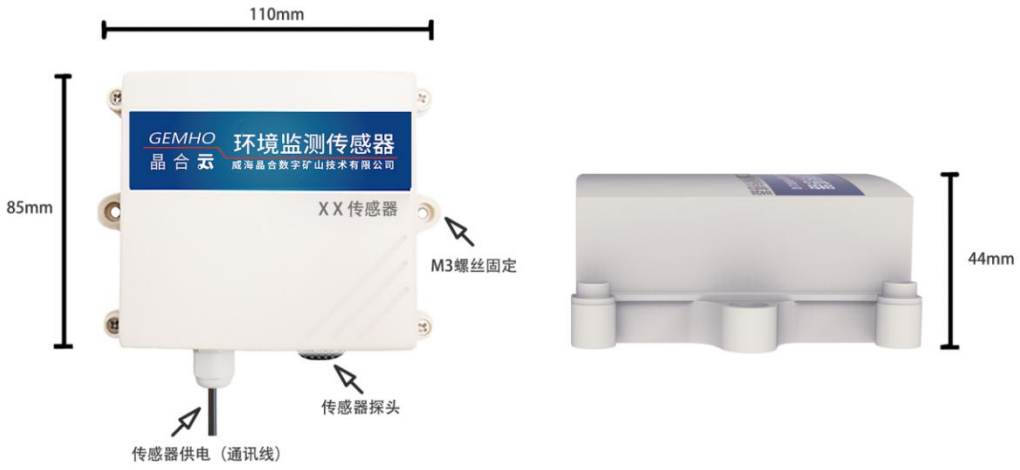
■Product Certificate, Warranty Card And Manual

■Power Adapter (optional)

4.2 Installation Instructions

The equipment adopts wall mounted installation design.

Installation openings are reserved on both sides and can be vertically fixed on the wall through m3 screws or expansion screws.

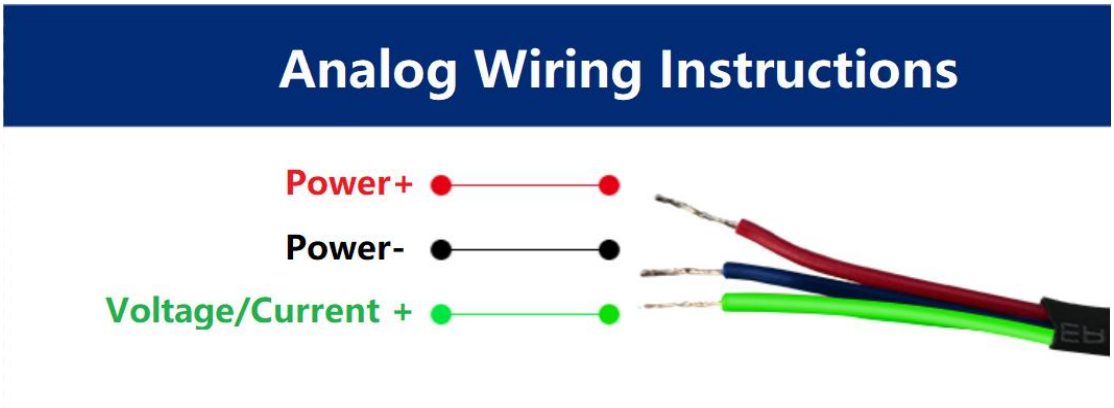


4.3 Wiring Instructions

RS485 Description

	Line Name	Line Color
Power Supply	Positive power supply	Red
	Negative power supply	Black
Output Signal	RS485A	Green
	RS485B	Yellow

Analog Description



Name	Line Name	Line Color
Power Supply	Positive power supply	Red
	Negative power supply	Black
Output Signal	Current / voltage output	Green
	Without	Without

Be Careful:

Please follow the wiring instructions strictly, otherwise it is easy to cause excessive current and damage the equipment.

If the power adapter is not purchased in our company, it is equipped with 4-core wire, and the customer needs to prepare 9-18vdc power supply by himself.

For customers who have purchased power adapters from our company, we will connect the DC female head to the equipment before the equipment leaves the factory. After receiving the product, the customer can plug in directly to supply power to the equipment.

Chapter V RS485 Protocol And Host Configuration

5.1 RS485 Communication Protocol And Description

Parameter	Content
Coding	8 bit Binary
Data bit	8-bit
Parity bit	Without
Stop bit	1-bit
Error Check	CRC（redundant cyclic code）
Baud Rate	9600 bit/s

5. 2 Data frame format definition

Adopt Modbus-RTU communication protocol, the format is as follows:

Initial structure ≥ 4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure ≥ 4 bytes of time

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

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

Data area: The data area is the specific communication data. Note that the16-bit data high byte is in front!

CRC code: Two-byte check code.

（1）Read CO2 concentration value of device address 0x01

Inquiry Frame：

Address Code	Function Code	Register Start Address	Register Length	CRC L	CRC H
0x01	0x03	0x00,0x04	0x00,0x01	0x84	0x0A

Answer Frame：（For example, it is read that the concentration of carbon dioxide is 2093 ppm）

Address Code	Function Code	Effective number of bytes	Value of CO2	CRC L	CRC H
0x01	0x03	0x02	0x08,0x2D	0x7F	0x99

082DH(hexadecimal)=-2093=>CO2 concentration=2093ppm

（2）Query device address

Reading the current device address can only be completed independently by a single offline sensor.

Example of querying equipment address:

Send: FF 03 00 0f 00 01 A1 D7

Return: FF 03 01 00 60

The data returned by the sensor 0x01 is the device address 0x01.

（3）Example of modifying equipment address

The format of communication protocol for writing data is shown in the table below：

Code Address	Function Code	Data Address •	New Address	CRC L	CRC H
	06	0x00,0x0F	H, L		

explain:

1. The range of address code is 0x01 ~ 0xFE, and the default value is 0x01;

2. This machine only supports writing the sensor address value. When writing, the high-order address is in the front and the low-order address is in the back.

3. When the device address is not known, the address code is written to FF

Example of writing sensor address:

Change 01 address to 09 address:

Send: 01 06 00 0f 00 09 79 CF

Return: 01 06 01 09 20 4F

5.3 Upper computer reads equipment data and software configuration

（1）Connect the device to the computer

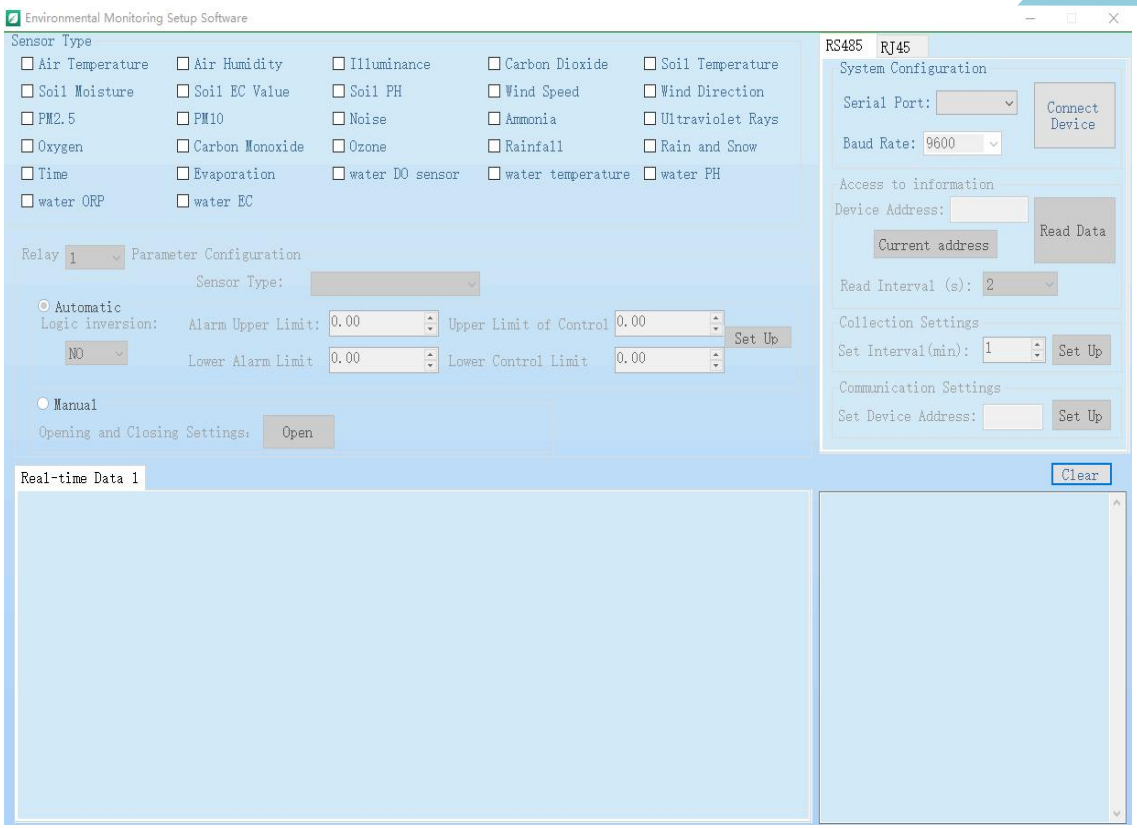
The device is connected to the computer serial port through "RS485 to USB" or "RS485 to 232" devices.

（2）Check whether the device is connected

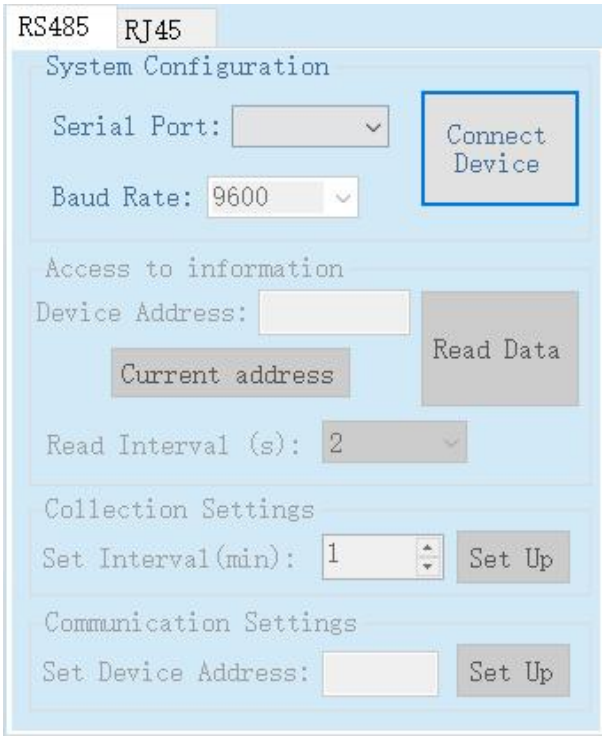
1）Open the computer device manager, check whether a new device is added under the port (COM and LPT), and remember the port number of this device (the following figure is only a schematic diagram, and the port numbers displayed on different computers are different)

（3）**Read Data**

1）Run "environmental monitoring setting software".

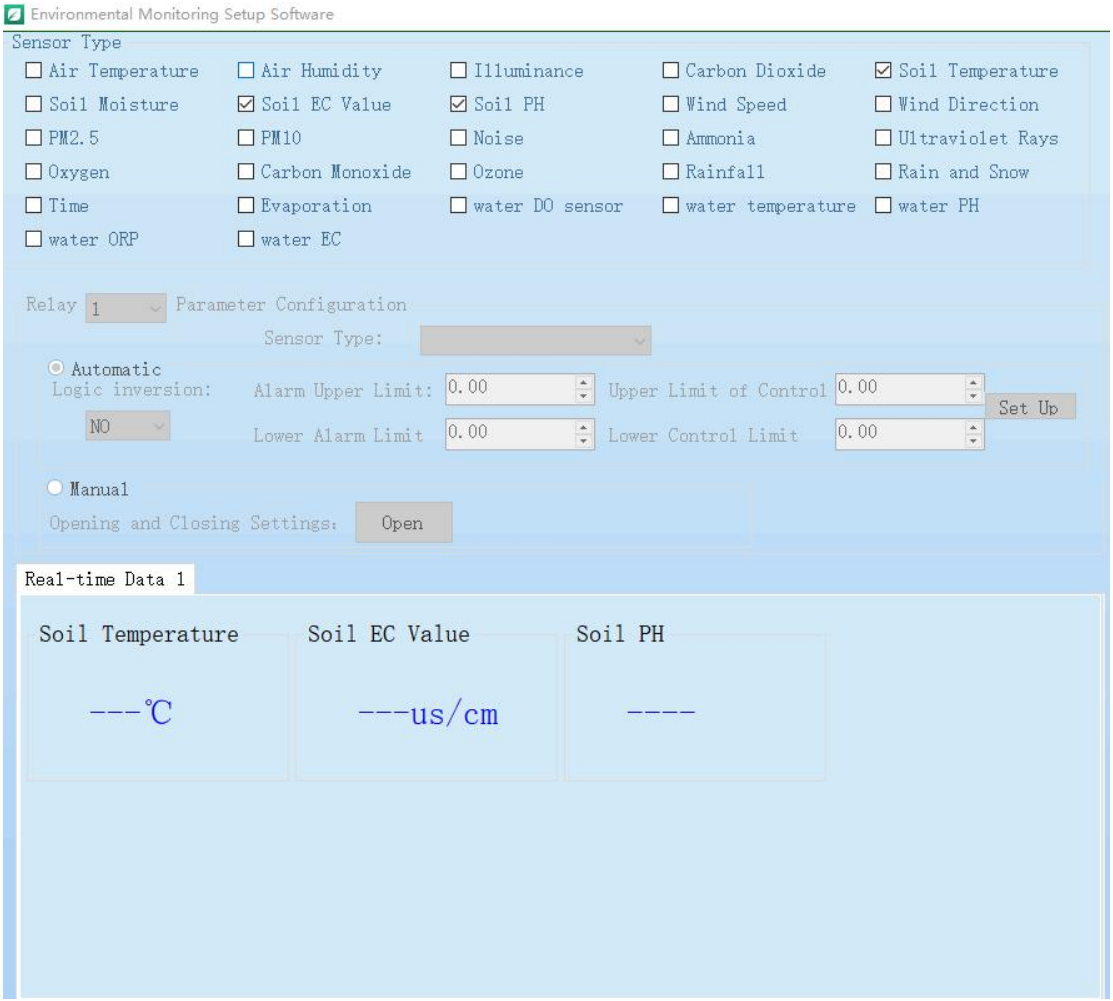


2）RS485：



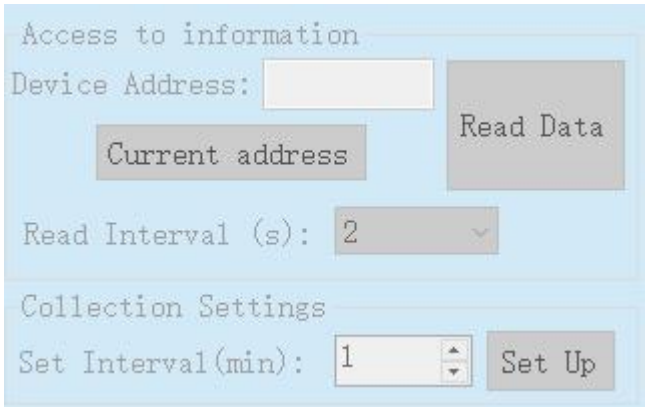
Select serial port number and baud rate (9600 by default, don’t selected),

After the device is connected, the device address in [information acquisition] is loaded; In [sensor type selection], the function set in the current panel is checked by default; The checked function list is displayed in [real time data]. As shown in the figure:



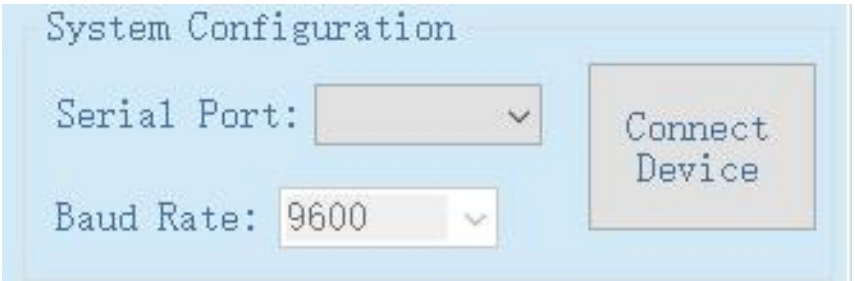
If the current device address is changed or empty, you can manually click the [get current device address] button to get the latest device address：

（4）To modify the device address: select [communication settings], fill in the address to be modified in [set device address], and click [settings] to complete the modification.



After the modification is completed, you will be prompted that the modification is successful

（ **5** ） To modify the baud rate of the equipment: select [communication setting], select the baud rate to be modified in [serial port setting] - [baud rate], and click [setting] to complete the modification.



After the modification is completed, you will be prompted that the modification is successful

Chapter VI Analog Signal

The default range is 400-60000ppm. Because the range is too large, the measurable range of analog equipment is set to 0-10000ppm

6. 2 4-20mA Output Signal

Current	CO2 Concentration
4mA	0 ppm
20mA	5000 ppm

The calculation formula of CO2 concentration is:

CO2=（I（current）-4mA）*312.5

6.2 0-5V Output Signal

Voltage	CO2 Concentration
0V	0 ppm
5V	5000 ppm

The calculation formula of CO2 concentration is:

CO2=V（Voltage）*1000

6.3 0-10V Output Signal

Voltage	CO2 Concentration
0V	0 ppm
10V	10000 ppm

The calculation formula of CO2 concentration is:

CO2=V（Voltage）*500

Chapter VII Fault analysis and quality assurance

7.Fault Analysis

NUM	Performance	Possible Faults	Solution
1	No communication signal	Cable fault	Check the power supply circuit with a multimeter
2	No Data	Interface connection failure	Interface connection failure
3	Wrong Data	Probe Wrong	Contact Us