Oxygen transmitter User manual (Type 485)

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1. Product introduction

1.1 Product Overview

The oxygen transmitter designed by our company adopts the imported first-line brand electrochemical oxygen sensor. It has the characteristics of rapid response and strong anti-interference ability. It has long life, after our unique compensation algorithm and multi-stage standard gas calibration. High precision, high repeatability and high stability. Applicable to warehouses, workshops, chemical plants, greenhouse farms, closed living places, etc. where real-time monitoring of oxygen concentration is required.

The device adopts wide voltage 10-30V DC power supply, 485 signal output, standard Modbus-RTU communication protocol, ModBus address can be set, baud rate can be changed, communication distance is up to 2000 meters.

1.2 Features

■It adopts imported one-line large brand electrochemical sensor, which is stable and durable.

■ Range 0-25% VOL, other ranges can also be customized.

■ High measurement accuracy, up to ±3% FS, repeatability up to ±1%.

■ 485 communication interface standard ModBus-RTU communication protocol, address, baud rate can be set, the communication distance is up to 2000 meters.

■Optional high-quality OLED display, the value can be directly viewed on the spot, and the night can be clearly displayed.

■ On-site power supply adopts 10~30V DC wide voltage power supply, which can adapt to various DC power supplies in the field.

■The product adopts wall-mounted waterproof case, which is easy to install and has high protection level and can be applied to harsh environment.

1.3 Main Specifications

Power supply	10~30V DC
output signal	485
Power consumption	0.12W
Temperature measurement range	-40℃~+80℃

Temperature accuracy	±0.5℃
Humidity measurement range	0~100%RH
Humidity accuracy	±3%RH
Operating temperature	-20~50℃
Working humidity	5~95%RH No condensation
Pressure range	90~110Kpa
Stability (months)	≤5% signal value / year
Response time:	≤10S
Zero drift (-20~40°C)	±0.3%Vol
Repeatability	≤1% output value
Service life	≥24 months
Range	0~25%Vol
Precision	±3%FS
Resolution	0.1%VOL

All the above specifications are measured under ambient conditions: temperature 20 ° C, relative humidity 50% RH, 1 atmosphere, and the gas concentration to be measured does not exceed the sensor range.

1. 4product model

Oxygen transmitter selection

RS				Company code
	O2-			Oxygen transmitter
		N01-		485 (Modbus protocol)
			2-	Wall-mounted king shell
			OLED-	Wall-mounted king shell with OLED display
			25VOL	Range 0~25%Vol

Oxygen temperature and humidity three-in-one transmitter selection:

RS				Company code
	O2WS-			Oxygen temperature and humidity three-in-one transmitter
		N01-		485 (Modbus protocol)
			2-	Wall-mounted king shell
			25VOL	Range 0~25%Vol

1. 5System framework
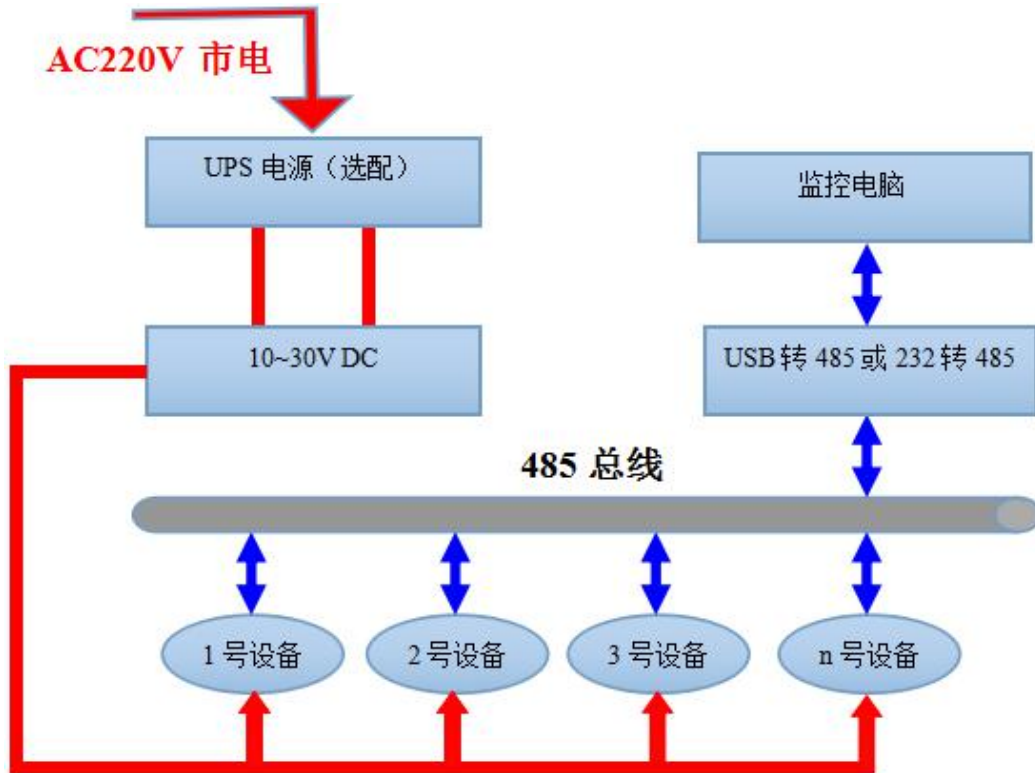
2.Equipment installation instructions

2. 1Equipment inspection before installation

Equipment List:

■1 oxygen transmitter equipment

■ Self-tapping screws (2), expansion plugs (2)

■Product certificate, warranty card, wiring instructions, etc.

■USB to 485 (optional)

2.2 Installation step description

▲ 钻孔   ▲ 膨胀塞放入孔内   ▲ 自攻螺丝旋进膨胀塞
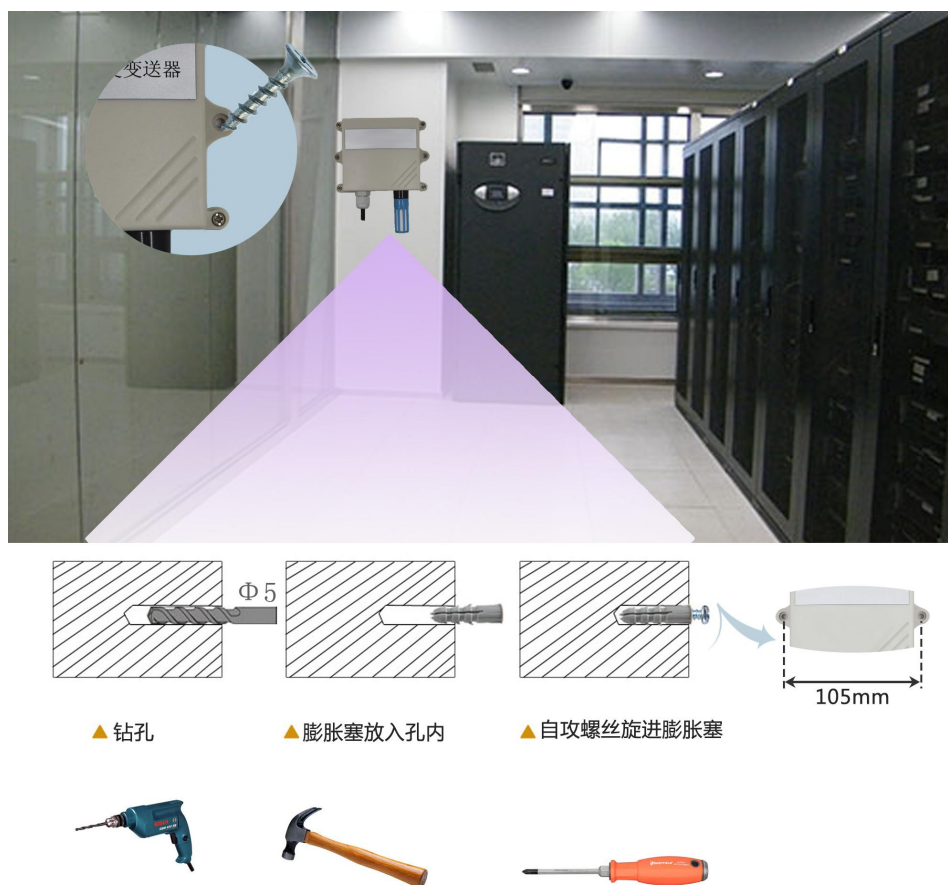
2.3 Interface Description

Wide voltage power input can be 10~30V. When wiring the 485 signal line, note that the A\B lines cannot be connected in reverse, and the addresses between multiple devices on the bus cannot conflict.

	Line color	Description
power supply	brown	Power supply (10~30V DC)
	black	Negative power supply
Communication	yellow	485-A
	blue	485-B

2.4 485 field wiring instructions

When multiple 485 models are connected to the same bus, there are certain requirements for field wiring. For details, please refer to the 485 Equipment Field Wiring Manual in the data package.。

3.Configuration software installation and use

3. 1Software selection

Open the package and select "Debug Software"---"485 Parameter Configuration Software" to

find Open it.

3. 2parameter settings

①、Select the correct COM port ("My Computer - Properties - Device Manager - Port" to view the

COM port), the following figure lists the drive names of several different 485 converters.
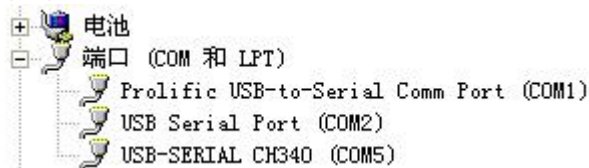
2. Connect only one device and power on, click on the software. The test baud rate, the

software will test the baud rate and address of the current device, the default baud rate is 4800bit / s,

the default address is 0x01.

3. Modify the address and baud rate according to the needs of use, and query the current

functional status of the device.

4. If the test is not successful, please re-check the equipment wiring and 485 driver

installation.

5, click on the corresponding gas, you can directly view the current real-time value of the

gas

6, note: this software can only set 2400bit / s, 4800bit / s, 9600bit / s three baud rate
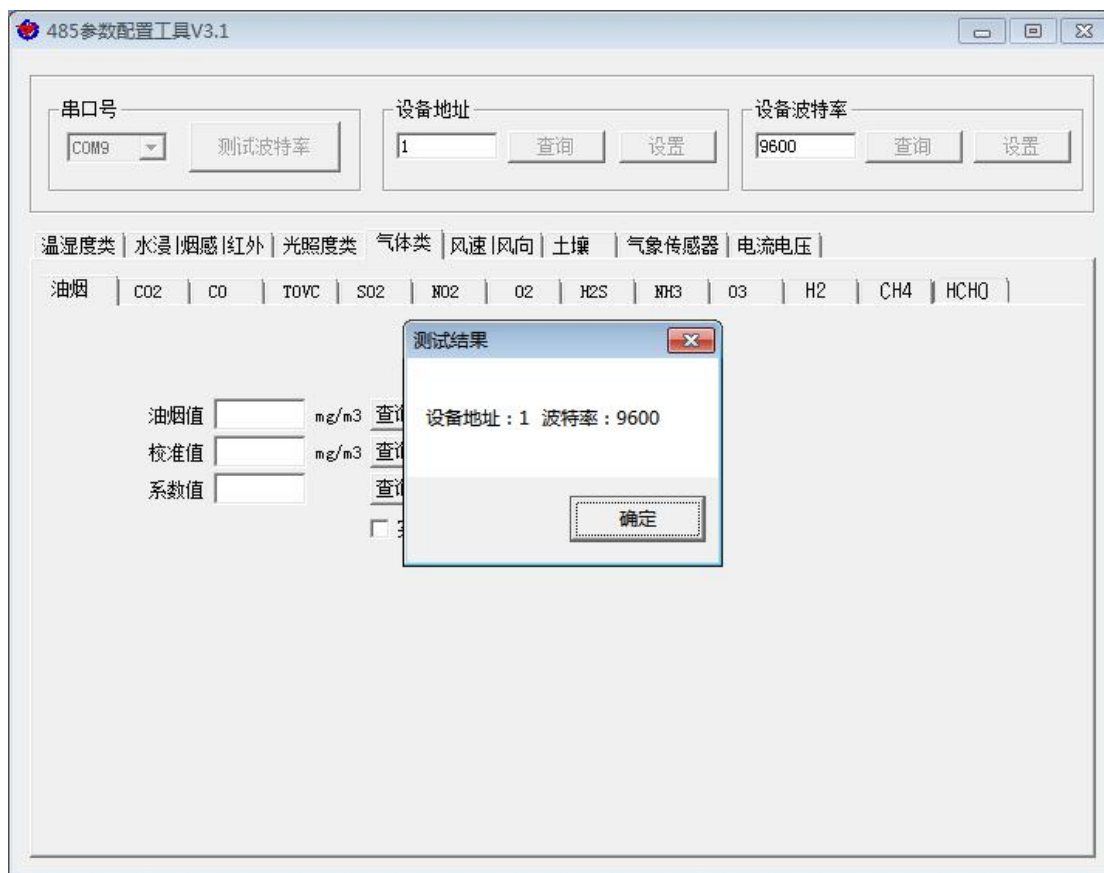
4. Communication protocol

4.1 Basic communication parameters

Code	8-bit binary
Data bit	8 digits
Parity bit	no
Stop bit	1 person
Error check	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

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. The transmitter can use function code 0x03 (read register data) 0x06, 0x10 (write register data). Data area: The data area is the specific communication data. Note that the 16-bit data high byte is in front!

CRC code: Two-byte check code.

Host inquiry frame structure：

address code	function code	Register start address	Register length	Check code low	Check code high
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave response frame structure:

address code	function code	Effective number of 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. 3Register address

Single oxygen equipment

Register address	PLC or configuration address	content	operating	Scope and definition
0000 H	40001	Oxygen concentration value	Read only	0~250 （The value after expanding 10 times）
0002 H	40003			

Oxygen temperature and humidity integrated equipment

Register address	PLC or configuration address	content	operating	Scope and definition
0000 H	40001	Humidity value	Read only	0~1000 （The value after expanding 10 times）
0001 H	40002	Temperature value	Read only	-400~800 （The value after expanding 10 times）

0002 H	40003	Oxygen concentration value	Read only	0~250 （The value after expanding 10 times）
0032 H	40051	Temperature calibration value	Read and write	Write 10 times later
0035 H	40054	Humidity calibration value	Read and write	Write 10 times later
0038 H	40057	Oxygen calibration value	Read and write	Write 10 times later
07D0 H	42001	Device address	Read and write	1~255 (factory default 1)
07D1H	42002	Device baud rate	Read and write	0 for 2400 1 for 4800

4. 4Communication protocol example and explanation

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

Inquirer frame (for example: address is 0x01 baud rate is 4800)

address code	function code	initial address	Data length	Check code low	Check code high
0x01	0x03	0x07 0xD0	0x00 0x02	0xC4	0x86

Response frame

address code	function code	Effective number of bytes	Baud rate	address	Check code low	Check code high
0x01	0x03	0x04	0x00 0x01	0x00 0x01	0x6A	0x33

4.4.2Change address

Inquiry frame (assuming the modified address is 0x02 Note: After the address is modified, the device needs to be powered off to restart the device)

address code	function code	initial address	Modify value	Check code low	Check code high
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Response frame

address code	function code	initial address	Modify value	Check code low	Check code high
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

4.4.3Modify the baud rate of address 0x01

Inquirer frame (assuming the modified baud rate is 9600. Note: After modifying the address, you need to power off and restart the device)

address code	function code	initial address	Modify value	Check code low	Check code high
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

Response frame

address code	function code	initial address	Modify value	Check code low	Check code high
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

4.4.4 Read the O2 value of device address 0x01

Inquiry frame (single oxygen device can read 00 register or 02 register, 3-in-1 device can only read 02 register)

address code	function code	initial address	Data length	Check code low	Check code high
0x01	0x03	0x00 0x02	0x00 0x01	0x25	0xCA

Response frame (for example, read oxygen to 10%Vol)

address code	function code	Returns the number of valid bytes	O2 value	Check code low	Check code high
0x01	0x03	0x02	0x00 0x64	0xB9	0xAF

Oxygen:

0064 (hexadecimal) =100=>O2=10%Vol

4.4.5 Reading the Temperature, Humidity and O2 Value of Device Address 0x01

Inquiry frame

address code	function code	initial address	Data length	Check code low	Check code high
0x01	0x03	0x00 0x00	0x00 0x03	0x59	0x85

Response frame

address code	function code	Number of bytes	Humidity value	Temperature value	O2 值	Check code low	Check code high
0x01	0x03	0x06	0x01 0x67	0xFF 0xB5	0x00 0x64	0x35	0x75

Temperature: When the temperature is below 0 ° C, the temperature is uploaded in complement form.

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

humidity:

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

Oxygen:

0064 (hexadecimal) =100 => oxygen = 10%Vol

4.5Oxygen measurement unit Vol and ppm, mg/m3 conversion relationship

At standard atmospheric pressure and normal temperature, the conversion according to the following conversion formula is only applicable to the calculation of oxygen (O2):

1%Vol=10000ppm 1ppm=1.429mg/m3

5. Common problems and solutions

Device cannot connect to PLC or computer

possible reason：

1) The computer has multiple COM ports, and the selected port is incorrect.

  2) The device address is incorrect, or there is a device with duplicate addresses (factory default is 1)。

3) Baud rate, check mode, data bit, stop bit error.

4) The host polling interval and the waiting response time are too short and need to be set to more than 200ms.

5) The 485 bus is disconnected, or the A and B lines are reversed.

6) If the number of devices is too large or the wiring is too long, the power should be supplied nearby, add 485 enhancer, and increase the resistance of 120Ω terminal.

7) The USB to 485 driver is not installed or damaged.

8) Equipment damage.

6. Contact information

Shandong Renke Measurement & Control Technology Co., Ltd.

Address: 2886 Fengjing Road, High-tech Zone, Jinan City, Shandong Province

Zip code: 250101

Phone: 400-085-5807

Fax: (86)0531-67805165

Website: www.rkckth.com

Cloud platform address: www.0531yun.cn

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7.Document history

V1.0 document creation
V1.1 modify parameters

Appendix: Housing dimensions

Overall size: 110 × 85 × 44mm