



Nitrogen dioxide transmitter

User manual

(Type 485)

文档版本：V1.1







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1. product description

1.1 product description

The nitrogen dioxide transmitter designed by our company adopts the imported first-line brand electrochemical nitric oxide sensor, which has the characteristics of rapid response and strong anti-interference ability. After our company's unique compensation algorithm and multi-stage standard gas calibration, It has long life, high precision, high repeatability and high stability. Suitable for applications where it is necessary to monitor the concentration of nitrogen dioxide leakage.

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 0-20ppm, 0-2000ppm optional, other ranges can also be customized.
- High measurement accuracy, up to $\pm 3\%$ FS, repeatability up to $\pm 2\%$.
- 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 technical indicators

Power supply	10~30V DC
Average power consumption	0.18W
output signal	485
Temperature measurement range	-40°C~80°C
Temperature accuracy	$\pm 0.5^\circ\text{C}$
Humidity measurement range	0~100%RH
Humidity accuracy	$\pm 5\%$ RH
Operating temperature	-20~50°C
Working humidity	15~90%RH No condensation



Work pressure	91~111Kpa
NO2 resolution	20ppm: 0.1ppm
	2000ppm: 1ppm
stability	≤ 2% signal value / month
Response time	20ppm: ≤30S
	2000ppm: ≤60S
Detection accuracy	±3%FS
Repeatability	≤2%
Zero drift	20ppm: ≤±0.5ppm
	2000ppm: ≤±20ppm

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.

1.4 product model

RS-				Company code		
	NO2-				NO2 transmission sensor	
	NO2WS-				NO2 concentration temperature and humidity three-in-one transmitter sensor	
		N01-				RS485 (Modbus 协议)
			2-			Wall-mounted king shell
		OLED -				Wangzi shell with OLED screen (nitrogen dioxide temperature and humidity integrated without this model)
						-20P The range is 20ppm
						-2000P The range is 2000ppm

1.5 System framework



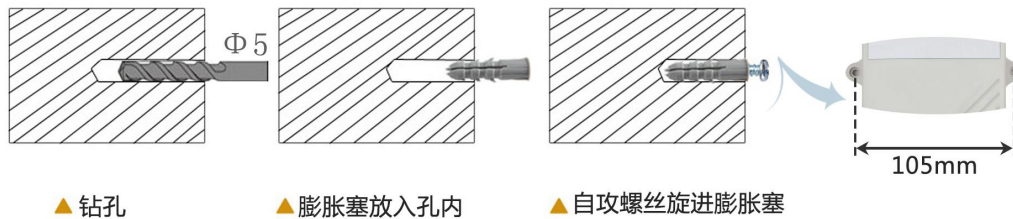
2. Equipment installation instructions

2.1 Equipment inspection before installation

Equipment List:

- 1 NO2 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



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.

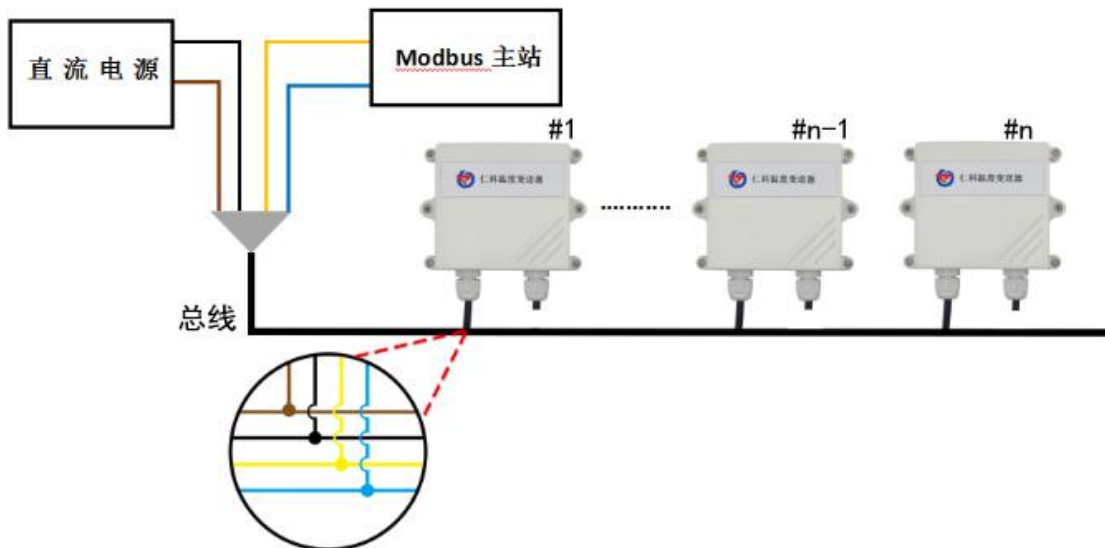
	Line color	Description
power supply	brown	Power supply (10~30V DC)
	black	Negative power supply



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

3.1 Software selection

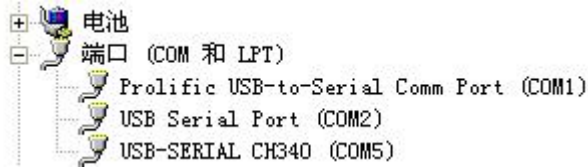
Open the package and select "Debug Software"---"485 Parameter Configuration Software" to

find  Open it

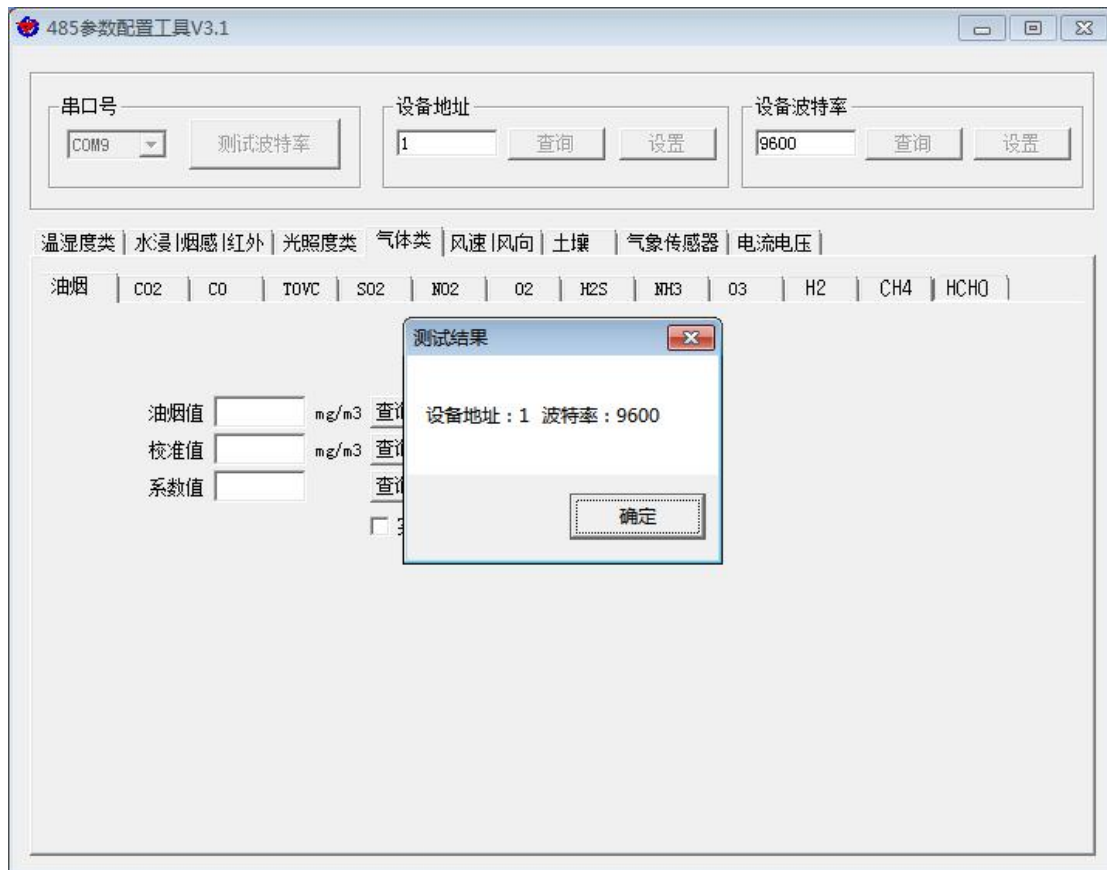


3.2 parameter settings

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 to directly view the current real-time value of the gas.
- 6 Note: This software can only set 2400bit/s, 4800bit/s, 9600bit/s baud rate



4. letter of agreement

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 \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: 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 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 byte	2 byte	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 byte	2 byte	2 byte	2 byte

4.3 register address

Single NO2 device (other registers are the same)

Register address	PLC or configuration address	content	operating	Scope and definition



0000 H	40001	NO2 concentration value	Read only	20ppm range transmitter expands 10 times value upload, 2000ppm transmitter actual value upload
0002 H	40003			

NO2 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	Nitrogen dioxide concentration	Read only	20ppm range transmitter expands 10 times value upload, 2000ppm transmitter actual value upload
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	NO2 calibration value	Read and write	When the measuring range is 20ppm, the writing is expanded by 10 times, and when the measuring range is 2000ppm, the actual value is written.
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 2 represents 9600
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4.4 Communication protocol example and explanation

4.4.1 Read the NO₂ value of device address 0x01

Inquiry frame

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, reading NO₂ is 5.0ppm)

address code	function code	Returns the number of valid bytes	NO ₂ value	Check code low	Check code high
0x01	0x03	0x02	0x00 0x64	0xB8	0x53

NO₂:

1F4 H (hexadecimal) = 100 => NO₂ = 100 ppm

4.4.2 Reading the temperature and humidity and NO₂ 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	0x05	0xCB

Response frame

address code	function code	Number of bytes	Humidity value	Temperature value	NO ₂ value	Check code low	Check code high
0x01	0x03	0x06	0x01 0x67	0xFF 0xB5	0x00 0x64	0x34	0x89

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



NO₂ value: when the transmitter is 20ppm range

1F4 H (hexadecimal) =100 =>NO₂=10 ppm

When the transmitter has a range of 2000ppm:

1F4 H (hexadecimal) =100 =>NO₂=100 ppm

4.5 NO₂ measurement unit ppm and ug/m³ conversion relationship

At standard atmospheric pressure, the conversion is based on the following conversion formula, which is only applicable to the calculation of NO₂:

1ppm = 46/22.4 = 2.05mg / m³ = 2050ug / m³

1ppb =46/22.4=2.05ug/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 a duplicate address (all the factory defaults to 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 120 Ω terminal.
- 7) The USB to 485 driver is not installed or damaged.
- 8) Equipment damage.

6.Contact information

Shandong Renke Control Technology Co., Ltd.

Address: 2 / F, East Block, Building 8, Shun Tai Plaza, High-tech Zone, Jinan City, Shandong Province

Post code: 250101

Phone: 400-085-5807

Website: www.renkeer.com

Cloud platform address: en.0531yun.cn Or: eniot.0531yun.cn



Web QR:Website: www.rkckth.com

Cloud platform address: www.0531yun.cn



7.Document history

The V1.0 documentation was created.

V1.2 Modify product parameters

8.Appendix: Housing dimensions

Overall size: 110 × 85 × 44mm

