Ammonia transmitter User Manual (Type 485)

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1.product description

1.1product description

Since the excretion of animals will produce a large amount of ammonia gas over time, it is necessary to accurately detect the concentration of these gases at this time to avoid accidents during manual operations. In pesticide manufacturing plants, chemical plants, fertilizer plants and other occasions where ammonia is produced, real-time concentration detection or control of ammonia is also required.

The ammonia transmitter designed by our company adopts the imported first-line brand ammonia sensor. It has the characteristics of rapid response and strong anti-interference ability. After our unique compensation algorithm, multi-stage standard gas calibration, it also has a long life, Features of high precision, high repeatability and high stability. It is suitable for occasions requiring real-time monitoring and control of ammonia gas, such as agricultural greenhouses, breeding farms, pesticide manufacturers, and chemical plants.

The equipment 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, and the communication distance is up to 2000 meters.

1.2Features

1. Imported first-line brand electrochemical sensors are used, which are stable and durable.

2. Multiple choices of measuring range, 0~50PPM, 0~100PPM, 0~500PPM.

3. High measurement accuracy, up to ±2% FS, repeatability up to within 2%.

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

5. Optional high-quality OLED display, the value can be viewed directly on site, and can be displayed clearly at night.

6. The on-site power supply adopts 10~30V DC wide-voltage power supply, which can adapt to a variety of on-site DC power supplies.

7. The product adopts a wall-mounted waterproof shell, which is easy to install and has a high degree of protection, which can be used in harsh on-site environments.

1.3 Main Specifications

Power supply	10~30V DC
output signal	485
Power consumption	0~50ppm（High precision）±8%
	0~100ppm （High precision）±8%
	0~500ppm 0.9W
Temperature measurement range	-40℃~+80℃

Humidity measurement range	0~100%RH
Temperature accuracy	±0.5℃(25℃)
Humidity accuracy	±3%RH（60%RH,25℃）
Operating temperature	-20~50℃
Working humidity	15~90%RH No condensation
Pressure range	90~110Kpa
stability	≤2% signal value/month
Response time	50、100ppm≦90S 500ppm≤25S
Preheat time	0~50ppm（High precision）≥5 minutes
	0~100ppm （High precision）≥5 minutes
	0~500ppm ≥48 hours
Ammonia zero drift (-20~40℃)	0~50ppm（High precision）≤±2ppm
	0~100ppm （v）≤±2ppm
	0~500ppm ≤±15ppm
Repeatability	0~50ppm（High precision）≤2%
	0~100ppm （High precision）≤2%
	0~500ppm ≤5%
Service life	≥12 months
Precision	0~50ppm（High precision）±8%FS
	0~100ppm（High precision）±8%FS
	0~500ppm：20%FS O2 content：≥18%VOL
Resolution	0-50ppm：0.1ppm
	0-100、0-500：1ppm

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

1.4 product model

Selection of Ammonia Temperature and Humidity Three-in-One Transmitter:

RS				Company code
	NH3WS-			Ammonia temperature and humidity three-in-one transmitter
		N01-		485 (Modbus protocol)
			2-	Wall-mounted

					king-shaped shell
				50P	Corresponding range 0~50ppm model
				100P	Corresponding range 0~100ppm model
				500P	Corresponding range 0~500ppm model

Selection of NH3 concentration transmitter:

RS					Company code
	NH3-				NH3 sensor
		N01-			485 (Modbus protocol)
			2-		Wall-mounted king-shaped shell
			OLED-		Wall-mounted king-shaped shell with OLED display
				50P	Corresponding range 0~50ppm model
				100P	Corresponding range 0~100ppm model
				500P	Corresponding range 0~500ppm model

1.5 System frame diagram
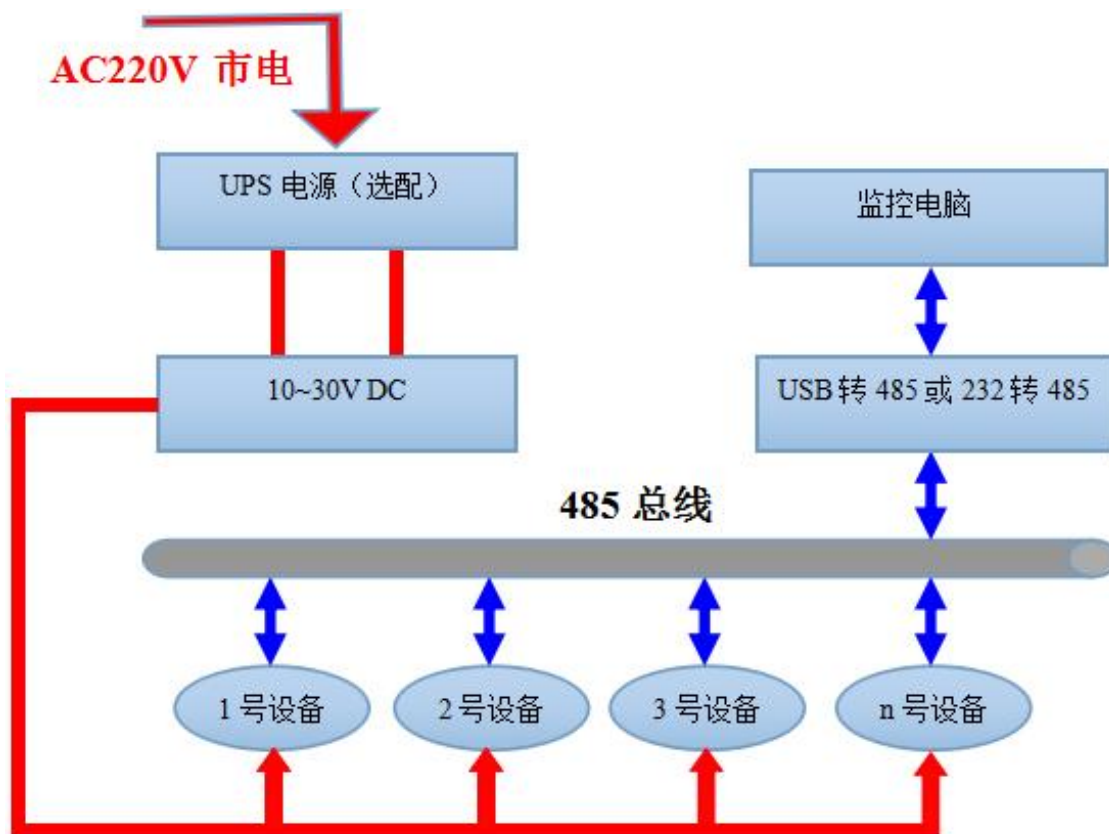
2.Equipment installation instructions

2.1 Inspection before equipment installation

Equipment List:

1. One NH3 sensor device

2. Self-tapping screws (2 pcs), expansion plugs (2 pcs)

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

4. USB to 485 (optional)

2.2 Installation step instructions
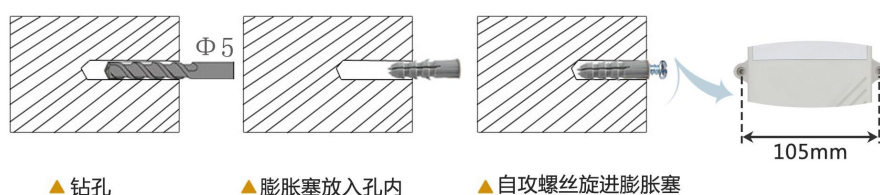
▲ 钻孔   ▲ 膨胀塞放入孔内   ▲ 自攻螺丝旋进膨胀塞

2.3 Interface Description

Wide-voltage power input can be 10~30V. When wiring the 485 signal line, 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
power supply	brown	Positive power supply (10~30V DC)
	black	Power negative
Communicatio n	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

3.1Software selection

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

software"，turn up 485参数配置工具V3.1.exe Just open it。

3.2parameter 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.

battery
port (COMand LPT)
Prolific USB-to-Serial Comm Port (COM1)
USB Serial Port (COM2)
USB-SERIAL CH340 (COM5)
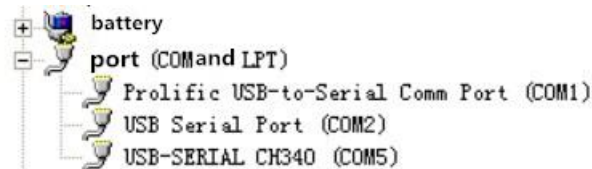
② Connect only one device alone and power it on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.

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.

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 three baud rates of 2400bit/s, 4800bit/s, and 9600bit/s
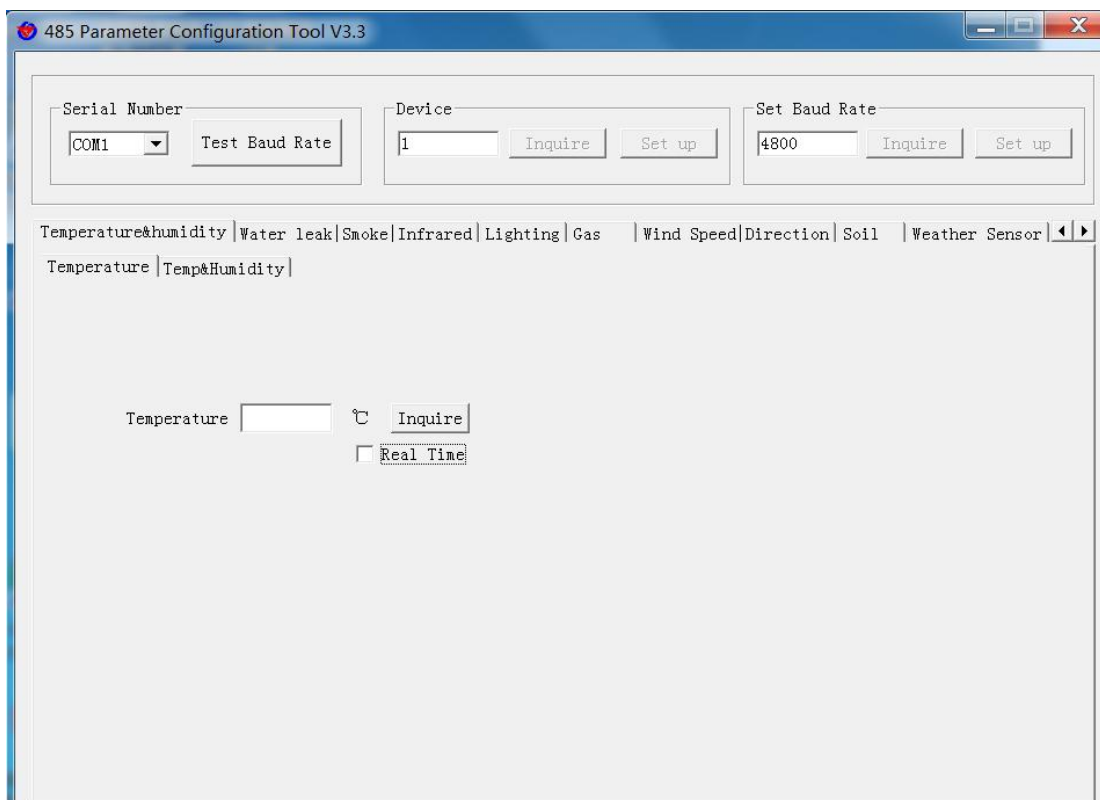
4.letter of agreement

4.1Basic 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

4.2Data frame format definition

Using 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

Time to end structure ≥ 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 can use function code 0x03 (read register data) 0x06, 0x10 (write register data).

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

Slave machine response frame structure:

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

4.3Register address

Single ammonia equipment (other registers are the same)

Register address	PLC or configuration address	content	operating	Scope and definition
0000 H	40001	Ammonia concentration value	Read only	When the range is 50ppm, the value will be expanded by 10 times to upload, when it is 100ppm or 500ppm, the actual value will be uploaded
0002 H	40003			

Ammonia 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
0001 H	40002	Temperature value	Read only	(The value after 10 times expansion)

0002 H	40003	Ammonia concentration value	Read only	When the range is 50ppm, the value will be expanded by 10 times to upload, when it is 100ppm or 500ppm, the actual value will be uploaded
0032 H	40051	Temperature calibration value	Read and write	10 times larger write
0035 H	40054	Humidity calibration value	Read and write	10 times larger write
0038 H	40057	Ammonia calibration value	Read and write	0-50ppm: expand 10 times to write to other ranges and write actual values
07D0 H	42001	Device address	Read and write	1~254 (factory default 1)
07D1H	42002	Device baud rate	Read and write	0 means 2400 1 means 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	starting address	Data length	Check code low bit	High bit of check code
0x01	0x03	0x07 0xD0	0x00 0x02	0xC4	0x86

Reply frame

address code	function code	Number of valid bytes	Baud rate	address	Check code low bit	High bit of 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	starting address	Modify value	Check code low bit	High bit of check code
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Reply frame

address code	function code	starting address	Modify value	Check code low bit	High bit of 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	starting 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	starting 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 NH3 value of the device address 0x01

Inquiry frame (single ammonia equipment can read 00 register or 02 register, three-in-one equipment can only read 02 register)

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

Reply frame

address code	function code	Returns the number of valid bytes	NH3 value	Check code low bit	High bit of check code
0x01	0x03	0x02	0x00 0x64	0x9B	0xAF

NH3：

0064 (hexadecimal) =100=> NH3=100ppm

4.4.5 Read the temperature, humidity and ammonia value of the device address 0x01

Interrogation frame

address code	function code	starting address	Data length	Check code low bit	High bit of check code
0x01	0x03	0x00 0x00	0x00 0x03	0x05	0xCB

Reply frame

address code	function code	Number of bytes	Humidity value	Temperature value	NH3	Check code low bit	High bit of check cod

			e				e
0x01	0x03	0x06	0x01 0x67	0xFF 0xB5	0x00 0x64	0xD7	0x5E

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

FFB5 H (hexadecimal) = -75 => temperature = -7.5℃

humidity:

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

Ammonia:

When the range is 50ppm

0064 (Hexadecimal) = 100 => Ammonia = 10 ppm

When the range is 100ppm or 500ppm

0064 (Hexadecimal) = 100 => Ammonia = 100 ppm

4.5 Ammonia measurement unit ppm and mg/m3 conversion relationship

The conversion formula is based on 25°C and 1 atmosphere: X ppm = (Y mg/m3)(24.45)/(molecular weight) or Y mg/m3 = (X ppm)(molecular weight)/24.45
Only applicable to calculation of ammonia (NH3): 1ppm=1.44mg/m3 1mg/m3=0.70ppm

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 120Ω terminal resistance.

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

8) The equipment is damaged.

6.contact details

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Phone: 400-085-5807

Website: www.renkeer.com

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

Web QR:

7.Document history

V1.0 document creation

V1.1 modify parameters

8.Appendix: Shell size

total measurement：110×85×44mm