RS-FSXCS-N01-1

Ultrasonic integrated weather station user's manual

Document version：V1.0

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1. product description

1.1 product description

This integrated weather station can be widely used for environmental detection. It integrates wind speed, wind direction, temperature and humidity, noise collection, PM2.5 and PM10, CO2, and atmospheric pressure. The equipment uses standard MODBUS-RTU communication protocol, RS485 signal output, communication The distance can be up to 2000 meters, and the data can be uploaded to the customer's monitoring software or PLC configuration screen through 485 communication. It also supports secondary development.

This product is widely used in various occasions that need to measure environmental temperature and humidity, noise, air quality, CO2, atmospheric pressure, etc. It is safe and reliable, beautiful in appearance, convenient to install, and durable.

1.2 Features

1.This product is small in size and light in weight. It is made of high-quality anti-ultraviolet material and has a long service life. It uses a high-sensitivity probe with stable signals and high accuracy. The key components are imported components, which are stable and reliable. They have the characteristics of wide measurement range, good linearity, good waterproof performance, easy use, easy installation, and long transmission distance.

2.The integrated design of multiple acquisition devices is convenient for installation.

3.The wind speed and direction are measured by the principle of ultrasound, no start wind speed limit, zero wind speed work, no angle limit, 360 ° omnidirectional, wind speed and direction data can be obtained simultaneously

4.Noise acquisition, accurate measurement, range up to 30dB ~ 120dB.

5.PM2.5 and PM10 acquisition at the same time, range: 0-1000ug / m3, resolution 1ug / m3, unique dual-frequency data acquisition and automatic calibration technology, consistency up to ± 10%。

6.CO2 range: 0-5000ppm, resolution 1ppm.

7.Measure the temperature and humidity of the environment, the measurement unit is imported from Switzerland, the measurement is accurate

8.Wide range 0-120Kpa pressure range, can be applied to various altitudes.

9.Using a dedicated 485 circuit, stable communication, and power supply in a wide voltage range of 10 ~ 30V.

1.3 Main Specifications

DC powered (default)		10-30VDC
Maximum power	RS485Output	0.8W

	consumption	
Precision	Wind speed	±(0.2m/s±0.02*v)(v For real wind speed)
	wind direction	±3°
	humidity	±3%RH(5%RH~95%RH,25℃)
	temperature	±0.5℃（25℃）
	Atmospheric pressure	±0.15Kpa@25℃ 75Kpa
	noise	±3db
	PM10 PM2.5	±10%（25℃）
	CO2	±(40ppm+ 3%F・S) (25℃)
Range	Wind speed	0~60m/s
	wind direction	0~359°
	humidity	0%RH~99%RH
	temperature	-40℃~+120℃
	Atmospheric pressure	0-120Kpa
	noise	30dB~120dB
	PM10 PM2.5	0-1000ug/m3
	CO2	0-5000ppm
Long-term stability	temperature	≤0.1℃/y
	humidity	≤1%/y
	Atmospheric pressure	-0.1Kpa/y
	noise	≤3db/y
	PM10 PM2.5	≤1%/y
	CO2	≤1%/y
Response time	Wind speed	1S
	wind direction	1S
	Temperature and humidity	≤1s
	Light intensity	≤0.1s
	Atmospheric pressure	≤1s
	noise	≤1s

	PM10 PM2.5	≤90S
	CO2	≤90S
output signal	RS485Output	RS485(Standard Mod bus communication protocol)

1.4product model

RS-			Company code
	FSXCS-		Ultrasonic integrated weather station
		N01-	485 communication (standard Modbus-RTU protocol)
		1	One-piece housing

Note: You cannot select the CO2 element when you select the PM element, and you cannot select both.

2. Equipment size

Ø141
Ø133
N
402
Ø88
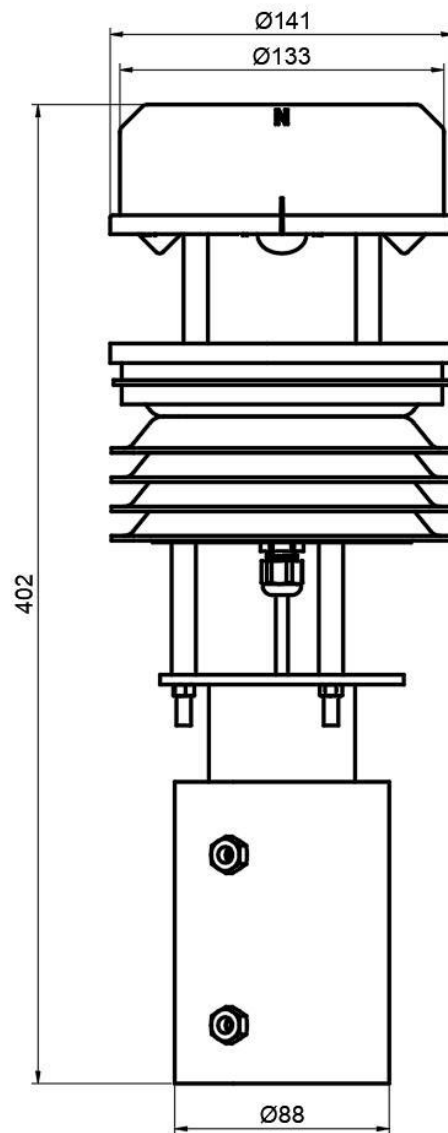
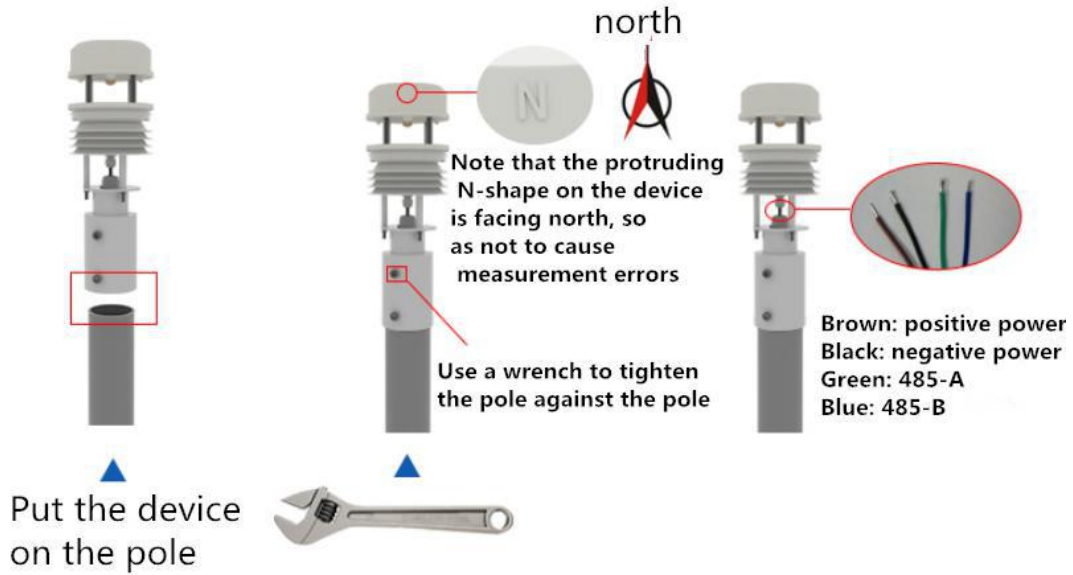**Equipment dimension drawing (unit: mm)**

3. Equipment installation instructions

3.1 Check before equipment installation

Equipment List：

■1 integrated weather station equipment

■One sleeve, one set of mounting screws

■2 m pole (optional)

■Warranty card, certificate of conformity

3.2 installation method

3.3 Interface Description

Wide voltage power input range is 10 ~ 30V. When wiring the 485 signal line, pay attention that the two A / B lines cannot be reversed, and the addresses between multiple devices on the bus must not conflict.。

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

3.4 485 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 reference package.

4. Configuration software installation and use
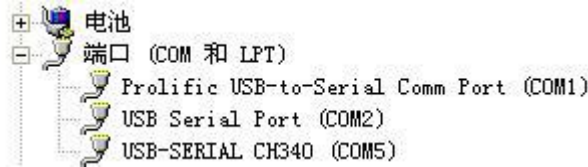
4.1 Software selection

Open the package and select "Debugging Software" --- "485 Parameter Configuration Software" and find "485 Parameter Configuration Tool"

Just open it.

4.2 parameter settings

①、 Select the correct COM port (check the COM port in "My Computer-Properties-Device Manager-Port"),

The following figure lists several different 485 converter driver names.

②、Connect only one device and power it on. Click the software to test the baud rate. The software will test the current device's baud rate and address. 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 query the current functional status of the device at the same time。

④、If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation。
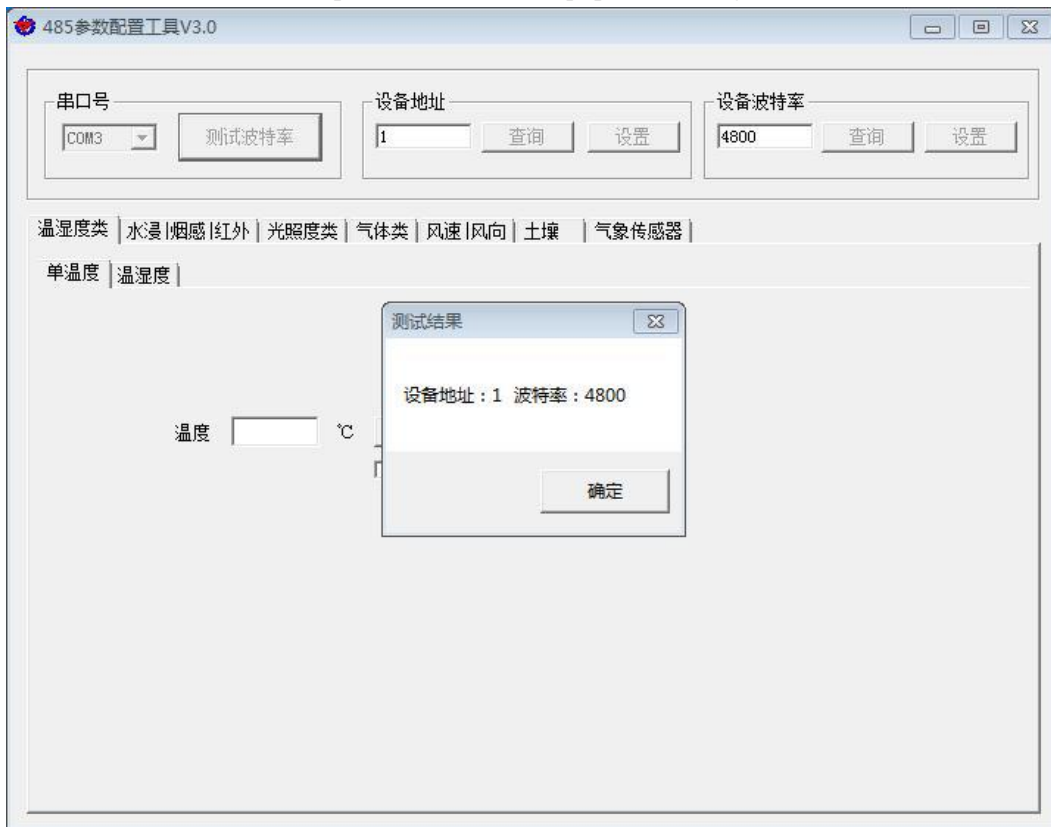
5. letter of agreement

5.1 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

5.2 Data frame format definition

Modbus-RTU communication protocol is adopted, 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

Ending structure ≥ 4 bytes of time

Address code: It is the start address of the transmitter and is unique in the communication network (factory default 0x01).

Function code: The function instruction of the command issued by the host, this transmitter only uses the function code 0x03 (reading register data).

Data area: The data area is the specific communication data. Note that the high byte of the 16bits data comes first!

CRC code: two-byte check code.

Host Inquiry Frame Structure：

address code	function code	Register start address	Register length	Checksum low byte	Checksum high byte
1byte	1byte	2byte	2byte	1byte	1byte

Slave response frame structure：

address code	function code	Number of valid bytes	Data area	Data area 2	Data N area	Checksum low byte	Checksum high byte
1byte	1byte	1byte	2byte	2byte	2byte	1byte	1byte

5.3 Communication register address description

The contents of the register are shown in the following table (support 03/04 function code)：

Register address	PLC Or configuration address	content	operating	Definition
500	40501	Wind speed	Read-only	10 times the actual value
501	40502	Wind power	Read-only	Actual value (The wind level value corresponding to the current wind speed)
502	40503	Wind direction (0-7 gear)	Read-only	Actual value (0 in north direction, increase value clockwise, 2 in positive east)

503	40504	Wind direction (0-360 °)	Read-only	Actual value (0 ° clockwise increase in degrees in the north direction, 90 ° in positive east direction)
504	40505	Humidity value	Read-only	10 times the actual value
505	40506	Temperature value	Read-only	10 times the actual value
506	40507	Noise value	Read-only	10 times the actual value
507	40508	PM2.5 value (if CO2 type device is selected, this register is CO2 value)	Read-only	Actual value
508	40509	PM10 value (if CO2 type device is selected, this register is empty)	Read-only	Actual value
509	40510	Atmospheric pressure (unit Kpa,)	Read-only	10 times the actual value

5.4 Communication protocol example and explanation

5.4.1 Example: Read the real-time wind speed value of the transmitter device (address 0x01)

Inquiry frame

address code	function code	starting address	Data length	Checksum low byte	Checksum high byte
0x01	0x03	0x01 0xF4	0x00 0x01	0x C4	0x04

Response frame

address code	function code	Returns the number of valid bytes	Wind speed	Checksum low byte	Checksum high byte
0x01	0x03	0x02	0x00 0x7D	0x78	0x65

Real-time wind speed calculation:

Wind speed: 007D (hexadecimal) = 125 => wind speed = 1.25 m / s

5.4.2 Example: Read the wind direction value of the transmitter device (address 0x01)

Inquiry frame

address code	function code	starting address	Data length	Checksum low byte	Checksum high byte

0x01	0x03	0x01 0xF6	0x00 0x01	0x65	0xC4

Response frame

address code	function code	Returns the number of valid bytes	Wind direction value	Checksum low byte	Checksum high byte
0x01	0x03	0x02	0x00 0x02	0x39	0x85

Wind direction calculation:

Wind direction: 0002 (hex) = 2 => wind direction = east wind

5.4.3 Example: Read the temperature and humidity value of the transmitter device (address 0x01)Inquiry frame

address code	function code	starting address	Data length	Low check bit	Checksum high byte
0x01	0x03	0x01 0xF8	0x00 0x02	0x44	0x06

Response frame (for example, read temperature -10.1 ℃, humidity 65.8% RH)

address code	function code	Number of valid bytes	Humidity value	Temperature value	Low check bit	Check code high
0x01	0x03	0x04	0x02 0x92	0xFF 0x9B	0x5A	0x3D

Temperature: when the temperature is lower than 0 ℃, upload in two's complement form

0xFF9B (hexadecimal) = -101 => temperature = -10.1 ℃

humidity:

0x0292 (hexadecimal) = 658 => Humidity = 65.8% RH

6. Common problems and solutions

Device cannot be connected to 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) Baud rate, check mode, data bit, stop bit error.

4) The host polling interval and waiting for response time are too short, both need to be set above 200ms.

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

6) If there are too many devices or the wiring is too long, you should supply power nearby, add a 485 booster, and increase the 120Ω terminal resistance.

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

8) The equipment is damaged.

7. contact details

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Web QR:

8. Document history

V1.0 Document Creation