AX-WEA-US

Ultrasonic Weather Station

Product Overview

The AX-WEA-US is an integrated weather station which can be widely used in environmental detection, integrating wind speed, wind direction, temperature and humidity, noise collection, PM2.5 and PM10, CO2, atmospheric pressure, and light etc.

The equipment works on standard MODBUS-RTU communication protocol and RS485 signal output. The communication distance is up to 2000 meters, and the data can be uploaded to the customer's monitoring software or PLC configuration screen through 485 communication.

Products Features

- Easy to install
- Dedicated 485 connection
- IP66 Ingress Protection
- Long Term Stability
- Quick response time
- RS485 standard Modbus communication

Product Specifications

Power Supply:	10-30V DC
Max Power Consumption:	RS485 output : 1.2W
Output:	RS485 (standard Modbus communication protocol)

Accuracy

Wind Speed	±(0.2m/s±0.02*v) (v is the real wind speed)
Wind Direction	±3°
Humidity	±3%RH(60%RH,25℃)
Temperature	±0.5℃（25℃）
Atmospheric Pressure	±0.15Kpa@25℃ 101Kpa
Noise	±0.5dB (at reference pitch, 94dB@1kHz
PM2.5	Particle counting efficiency: 50%@0.3um, 98%@>=0.5um. ±10ug/m3@0~100ug/m3
CO2	±(50ppm+ 3%F·S) (25℃)
Light Intensity	±7%(25℃)

Range

Wind Speed	0~60m/s
Wind Direction	0~359°
Humidity	0%RH~99%RH
Temperature	-40℃~+80℃
Atmospheric Pressure	0-120Kpa
Noise	30dB~120dB
PM10 PM2.5	0-1000ug/m3
CO2	0-5000ppm
Light Intensity	0~200000 Lux

Product Order Codes

Order Code	Description
AX-WEA-US-BWSD	Base Unit - Ultrasonic Weather Station with Rain Sensor, Wind Speed+ Direction, Modbus
AX-WEA-US-MOD-1	Temp + Humidity Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-2	Atmospheric Pressure Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-3	Light Level Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-4	Noise Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-5	PM2.5 Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-6	PM10 Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-7	CO2 Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-8	Solar Radiation Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-MOD-9	Optical Rain Sensor Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-RGB-MOD	Rain Guage Tipping Bucket Module for Ultrasonic Weather Station, Modbus
AX-WEA-US-BRK	Installation Pole Bracket for Ultrasonic Weather Station
AX-WEA-US-SH	Shutter Housing for Ultrasonic Weather Station, Modbus

ANNICOM Ltd Unit 21, Highview, High Street, Bordon, Hampshire, GU35 0AX

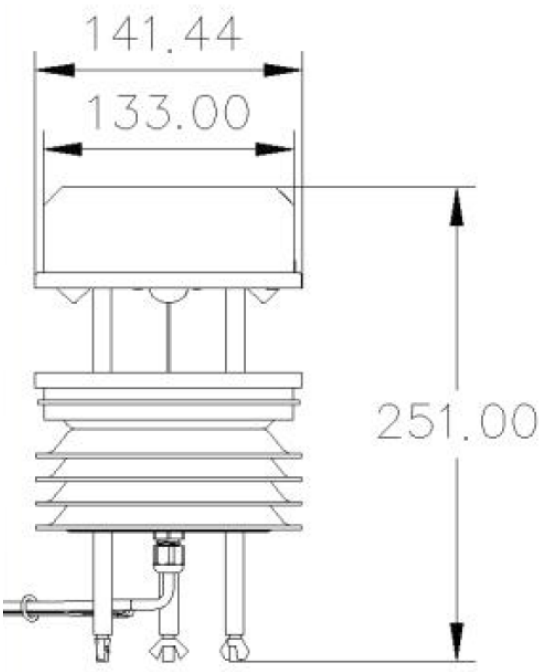
Long Term Stability

Temperature	≤0.1℃/y
Humidity	≤1%/y
Atmospheric Pressure	-0.1Kpa/y
Noise	≤3db/y
PM10 PM2.5	≤1%/y
CO2	≤1%/y
Light Intensity	≤5%/y

Response Time

Temperature	≤0.1℃/y
Humidity	≤1%/y
Atmospheric Pressure	-0.1Kpa/y
Noise	≤3db/y
PM10 PM2.5	≤1%/y
CO2	≤1%/y
Light Intensity	≤5%/y

Dimensions

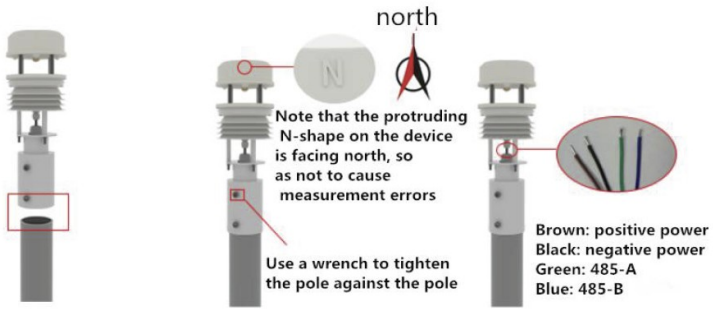


Installation Methods

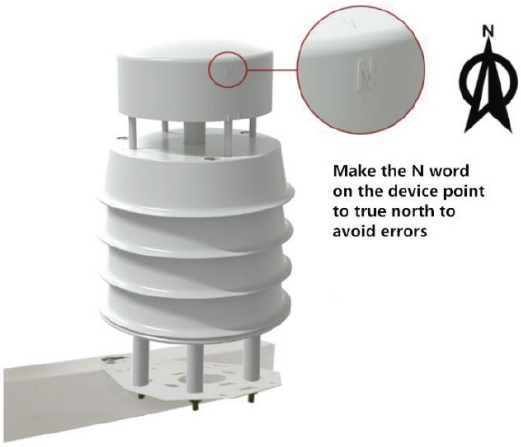
The installation of equipment without electronic compass is shown in the figure below, and

equipment with built-in electronic compass only needs to be installed horizontally.

Hugging seat installation:



Beam installation:



Interface Description

DC power supply 10-30V power supply. 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
	Black	Power negative
Communication	Green	485-A
	Blue	485-B

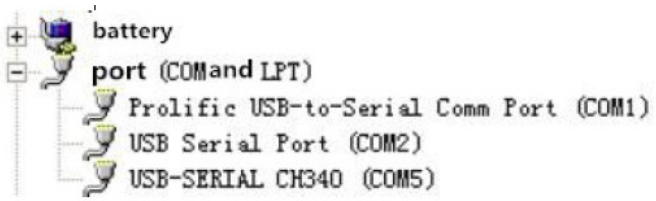
Configuration

Software selection:

Open the data package, select "Debugging Software"
--- "485 Parameter Configuration Software", find "485 Parameter Configuration Tool" and open it.

Parameters Setting:

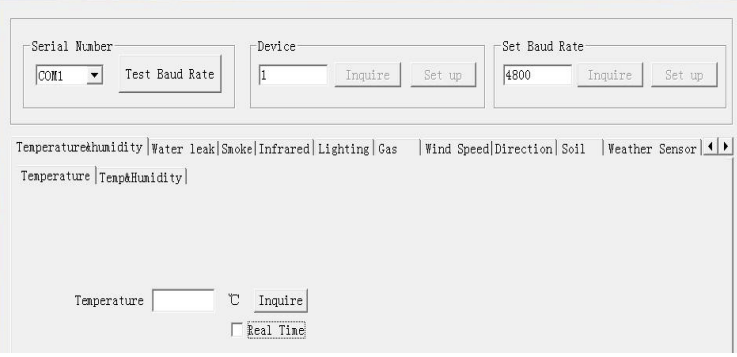
1- Select the correct COM port (check the COM port in "My Computer—Properties—Device Manager—Port").
The following figure lists the driver names of several different 485 converters.



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 query the current function status of the device.

4- If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation.



Communication Parameters

Code	8-bit binary
Data Bit	8-bit
Parity Bit	No
Stop Bit	1
Error Check-ing	CRC (Redundant Cyclic Code)
Baud Rate	2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s

Data frame format definition

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

Initial structure ≥ 4 bytes 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 starting address of the transmitter, which is unique in the communication

network (factory default 0x01).

Function code: the command function instruction issued by the host, this transmitter only

uses function code 0x03 (read register data).

Data area: The data area is the specific communication data, pay attention to the high byte of

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 byte**	**Check code high**
1byte	1byte	2byte	2byte	1byte	1byte

Slave machine response frame structure:

Address code	**Function Code**	**Effective bytes**	**Data area**	**Data area two**	**Data N area**
1byte	1byte	1byte	2byte	2byte	2byte

Check code low byte	**Check code high byte**
1byte	1byte

Communication Register Address Description

Register address	PLC or configuration address	Content	Operating	Definition description
500	40501	Wind speed value	Read only	100 times the actual value
501	40502	Wind force	Read only	Actual value
502	40503	Wind direction (0-7 files)	Read only	(Wind level value corresponding to current wind speed)
503	40504	Wind direction (0-360°)	Read only	Actual value (0 for true north, increase the value clockwise, 2 for true east)
504	40505	Humidity value	Read only	Actual value (the direction of true north is 0° and the degree increases clockwise, and the direction of true east is 90°)
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	10 times the actual value
508	40509	PM10 value (if CO2 type equipment is selected, this register is empty)	Read only	Actual value
509	40510	Atmospheric pressure value (unit Kpa,)	Read only	Actual value
510	40511	20W Lux value high 16-bit value	Read only	10 times the actual value
511	40512	Low 16-bit value of Lux value of 20W	Read only	Actual value
2000	42001	The address 0*03/0*04/0*06,	Read/write，	Address of 1~254(default of 1)
2001	42002	The baud 0*03/0*04/0*06,	Read/write，	0 stands for 2400 1 stands for 4800 2 stands for 9600 3 stands for 19200

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 default is all 1).

3) The baud rate, check method, data bit and 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 large or the wiring is too long, power should be supplied nearby, and a 485 booster should be added and a 120Ω terminal resistance should be added.

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

8) The equipment is damaged.

Datasheet Contents

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