Technical Parameters

	wind speed	wind direction
Measuring range	0～40m/s	0～360°
Accuracy	**Low wind speed: ±0.5m/s**	**Low wind speed: ±3°**
	High wind speed: ±1m/s	**High wind speed: ±5°**
Resolution	0.01m/s	1°

Power supply: DC12V-24V
Communication output: RS485
Communication baud rate: 9600
Communication protocol: MODBUS communication protocol
Shell material: engineering plastic
Operating temperature: -40°C-70°C
Storage temperature: -50°C – 80°C
Working humidity: 0-100%
Appearance size/weight: φ90 X 140mm/0.6Kg
Protection class: IP65
Overall power consumption: 0.2W

Preface

Welcome to the ultrasonic weather instrument produced by our company. In order to use the instrument better, we recommend that you read the product manual carefully before use.

The company has been in the process of continuous exploration and research and development, and we reserve the right to improve some performance and design without prior notice.

Product introduction

The mini small ultrasonic wind speed and wind direction sensor is a mini fully digital sensor, highly integrated ultrasonic wind speed and wind direction sensor, small size, high integration, light weight, strong and durable;

This product does not have any moving parts, and does not require on-site maintenance and calibration. It can accurately and quickly detect the wind speed and wind direction values in the on-site environment. The high-strength structure design can accurately detect in harsh climate environments, and can be widely used in meteorology, environment, environmental protection , transportation, smart city, industrial testing and other fields.

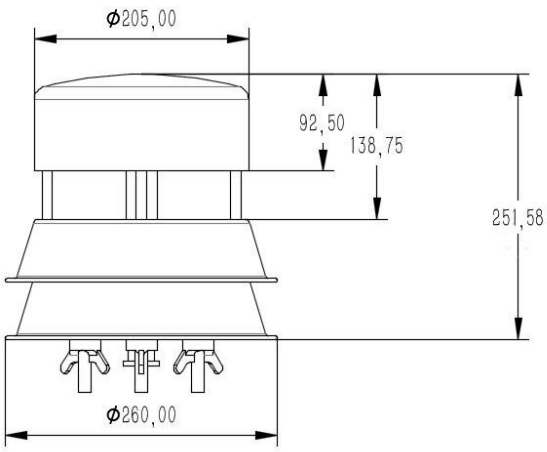
Connection method

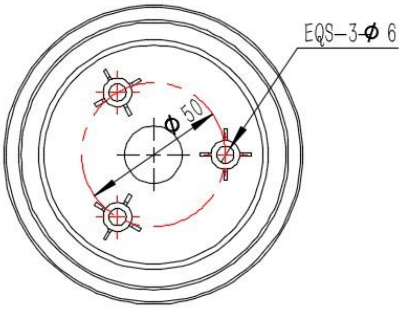
(1) There is an 8-pin aviation plug at the bottom of the sensor, and the corresponding pin definitions of its pins:
1-Power + 2-485 + 3-485 - 4-GND
(2) If equipped with the collector produced by our company, directly connect the sensor to the corresponding interface on the collector using the sensor cable.
(3) If the transmitter is purchased separately, the matching line sequence of the transmitter is as follows:

Line color	Output signals
	Communication type
Red	+
Black	-
Yellow	RS485+/A+/TX
Blue	RS485-/B-/RX

Note: In the end, the wiring label on the communication cable shall prevail。

Structural dimensions





Notice:
(1) For M5 screws and studs, the angle between the mounting holes is 120 degrees;
(2) The installation diameter is 50mm;

Installation Precautions

The mini ultrasonic wind speed and direction sensor can meet many specifications and can be used in different environments around the world without complex maintenance and calibration on site.

- Check frequently to ensure that the sensors are not interfered with by other running equipment that may not fully comply with common standards, such as radio/radar transmitters, ship engines, engines, etc.;
- Do not install on a plane with any radar scanning device, at least keep a distance of more than 2M;
- It is recommended to keep a distance from some surrounding radio receiving antennas;
- Use the cables recommended by our company;
- If there is no correct connection after the cable is cut, or the shielded wire of the cable is not properly connected, there is no need to create a ground loop, and the wiring can be performed according to the installation instructions;
- Ensure that the equipment is continuously powered during operation;
- Avoid flocculation generated by surrounding buildings such as trees, utility poles, tall buildings, etc., which can affect the accuracy of the ultrasonic anemometer;

The World Meteorological Organization makes the following recommendations:

- Meteorological instrument installation standard: more than 10 meters above the ground in open areas; the definition of open areas is that the meteorological instrument is more than 10 meters above the height of any obstacle;
- If it is installed on a building, theoretically, the installation height of the meteorological instrument should be 1.5 times the height of the building;
- If mounted on a derrick on a mast, tower or branch of a mast, the length of the derrick or branch must be twice the minimum diameter or diagonal of the tower. The boom needs to be installed on the side of the prevailing wind;

Installation method

The installation method is as follows:
Positioning: Generally, the equipment is installed on a vertical installation pipe to ensure the measurement on the same horizontal plane;
For indoor use, the sensor can be installed in any desired direction, and the meteorological instrument measures the wind speed and direction on different wind surfaces;
Alignment: The detector should be fixed with the pointing point pointing north.
Note: During installation, it is ideal to use a standard compass to determine the geographic North Pole direction, and to keep the instrument's north pointing direction consistent with the compass direction;

Installation: The installation pipe needs 3 equidistant holes, tap M5 screws, the position is 7.5mm from the top of the pipe, and pass the cable through the installation pipe;

NOTE: The user must apply proper strain relief to the cables. The plug can be connected to the plug of the device by rotating the plug and applying light pressure inward. When the plug is connected, turn the outer sleeve clockwise to lock the plug. The device can be fastened to the mounting tube with 3 stainless steel screws. The customer must ensure that the equipment is installed in an open area so that surrounding buildings do not obstruct airflow or cause flocculation. Do not install the device next to radar or radio transmitters.

After-sale and service

- The equipment does not have any moving parts, and complex routine maintenance is not required on site.
- If the user opens the device by himself or damages the safety seal on it, he will no longer enjoy our quality assurance and standards.
- If there is any problem with the equipment, you can contact the staff of the company to analyze and answer the problem;
- If the equipment needs to be returned, please pack the instrument carefully according to the original packaging, mail it to our company, and attach the detailed failure manual of the instrument.

MODBUS Communication protocol

Communication parameters: baud rate 9600 data bits 8 bits no parity bit

The interval between two communications should be at least 1000ms or more

【1】Write the device address

Send: 00 10 Address CRC (5 bytes)

Returns: 00 10 CRC (4 bytes)

Description: 1. The address bit of the read and write address command must be 00

2. Address is 1 byte, the range is 0-255

For example: send 00 10 01 BD C0

Returns: 00 10 00 7C

【2】Read the device address

Send: 00 20 CRC (4 bytes)

Returns: 00 20 Address CRC (5 bytes)

Description: Address is 1 byte, the range is 0-255

For example: send 00 20 00 68

Returns: 00 20 01 A9 C0

A. Read real-time data:

Suppose the device address is: 0X01, the valid range is 0~254, and 0 is the broadcast address.

Such as: 01 03 00 00 00 02 C4 0B

No.	implication	offset	byte count	explanation
1	Device address	0	1	Device Unique Address
2	opcode (read)	1	1	Fixed value 0x03
3	Register start number	2	2	The first register number read
4	Read the number of registers	4	2	2 sensors
5	CRC16 Check	6	2	low front high back

The device returns:

01 03 04 xx xx xx xx CRC16

No.	implication	offset	byte count	explanation
1	Address field	0	1	Address(0x01)
2	opcode	1	1	Read only(0x03)
3	data length field	2	1	
4	data field	3	2	Wind speed: 0x7FFF table invalid/missed
		5	2	Wind direction:

				0x7FFF table invalid/missed
5	check field	7	2	low front high back

Opcode: fixed at 0x03, that is, read operation, other operations are not supported.

Start number: range 0-15, indicating the first register number to be read.

Number of registers: the range is 1-16, which means that the last register number + 1 is read. The read data does not include the register content of this number, but is only used as an end marker, and its value must be greater than or equal to the "start number".

B. The device returns a data frame:

01 03 04 xx xx xx xx CRC16

Data length: does not contain itself, only the number of bytes in the data field. Maximum 4, minimum 0. Determined according to the "start number" and "number of registers" of the read instruction sequence.

Data length = (end number – number of registers)*2

Communication example (obtain data from ultrasonic wind speed and direction sensor):

Send:01 03 00 00 00 02 C4 0B

Return:01 03 04 01 10 00 B0 FB BE

01 10 is wind speed data, which is a hexadecimal integer, converted to decimal is 272, and the wind speed resolution is 0.01, which is 2.72m/s

00 B0 is wind direction data, which is a hexadecimal integer, converted to decimal is 176, and the wind direction resolution is 1, that is, the wind direction is 176 degrees.

C. Calculation of CRC16 check code

1) Preset a 16-bit register as hexadecimal FFFF (that is, all 1s); call this register a CRC register;

2) XOR the first 8-bit binary data (that is, the first byte of the communication information frame) with the lower 8 bits of the 16-bit CRC register, and place the result in the CRC register;

3) Shift the contents of the CRC register to the right by one bit (toward the lower bit) and fill the highest bit with 0, and check the shifted out bit after the right shift;

4) If the shift out bit is 0: repeat step 3 (shift right one bit again);

If the shift-out bit is 1: XOR the CRC register with the polynomial A001 (1010 0000 0000 0001);

5) Repeat steps 3 and 4 until right-shifting 8 times, so that the entire 8-bit data has been processed;

6) Repeat step 2 to step 5 to process the next byte of the communication information frame;

7) After all bytes of the communication information frame are calculated according to the above steps, the high and low bytes of the obtained 16-bit CRC register are exchanged;

8) The content of the CRC register finally obtained is the CRC16 code. (Note that the obtained CRC code is the order of low front and high back)

Attached table: wind (wind speed) rating table

RATE	Characteristics of terrestrial objects	Wind speed (m/s)
0	The smoke goes straight up	0～0.2
1	The smoke can indicate the direction of the wind, and the leaves sway slightly	0.3～1.5
2	The human face feels the wind, and the leaves move slightly	1.6～3.3
3	Leaves and twigs swayed, flags spread, tall grass swayed	3.4～5.4
4	Can blow dust and paper from the ground, shake branches, and undulate tall grass	5.5～7.9
5	Small leafy trees sway, inland water surface has small waves, tall grass has distinct undulating waves	8.0～10.7
6	The big branches are shaking, the wires are whistling by the wind, it is difficult to hold an umbrella, and the tall grass falls to the ground from time to time	10.8～13.8
7	The whole tree shakes, the big branches bend down, and it is	13.9～17.1

	inconvenient to walk in the wind	
8	Small branches can be broken, and people feel great resistance when moving against the wind	17.2～20.7
9	The thatched house is damaged, the roof tiles are lifted, and the big branches can be broken。	20.8～24.4
10	Trees can be blown down and buildings in general damaged	24.5～28.4
11	Large trees can be blown down, and general buildings are severely damaged	28.5～32.6
12	There are few on land, and its destructing power is extremely large	>32.6

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