Ultrasonic wind speed and direction sensor Manual

1.1 Product overview

The small ultrasonic wind speed and direction sensor is a wind speed and direction measuring instrument developed based on the principle of ultrasonic waves.

It uses the transmitted sound wave pulse to measure the phase difference at the receiving end to calculate the wind speed and direction. The sensor can

To measure the instantaneous value of wind speed and wind direction at the same time, it is widely used in meteorology, ocean, environment, airports, ports,

Wind speed and direction measurement in laboratories, industry, agriculture, and transportation.

1.2 Features

◆ No angle limit, can measure wind speed and direction data at the same time

◆ No moving parts, low wear and long service life

◆ Using random error recognition technology, it can ensure low dispersion error of measurement even under strong wind, making the output more stable

◆ Adopt ABS engineering plastic shell, the design is light, portable, easy to install and disassemble

◆ The product adopts 485 communication interface, standard ModBus-RTU communication protocol, communication address and baud rate can be

Setting, the farthest communication distance is 2000 meters

◆ No maintenance and on-site calibration

1.3 Main parameters

DC power supply (default)	10-30V DC	
Power consumption	0.12W	
Range	Wind speed	0～40m/s (customizable)
	Wind direction	0~360 °
Precision	Wind speed	±0.5+2%FS
	Wind direction	±3 °
Resolution	Wind speed	0.01 m/s
	Wind direction	1 °
Working environment	-40～80℃, 0～95%RH	
Wind resistance	75 m/s	
Response time	1S	
Protection grade	IP65	
Output signal	485 (Modbus-RTU protocol)	

Equipment size (unit mm):
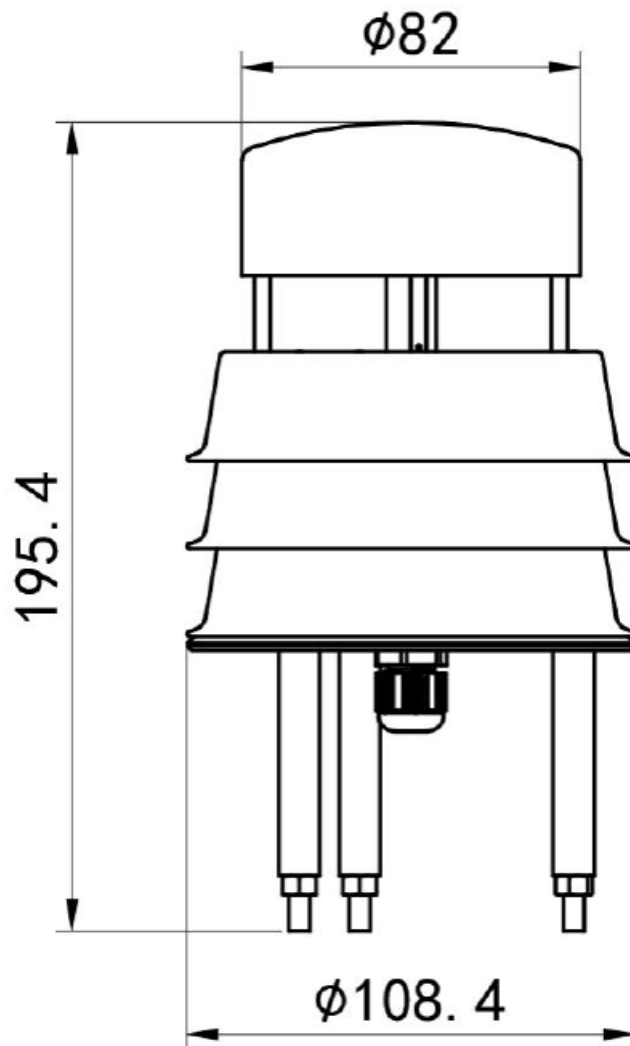
1.4 Working principle

Ultrasonic wind measurement is an application of ultrasonic detection technology in gaseous media. It uses ultrasonic waves in the air

The propagation velocity in the air is affected by the air flow (wind) to measure the wind speed. With conventional wind cup or rotary wing wind

The biggest feature of the tachometer compared to this measurement method is that the entire wind measurement system does not have any mechanical rotating parts.

Since there is no inertial measurement, it can accurately measure the high frequency components of the gust pulsation in the natural wind.

The ultrasonic wind speed and direction transmitter uses four ultrasonic probes to send and receive cyclically in a two-dimensional plane

Ultrasonic waves are used to measure wind speed and direction through the principle that ultrasonic waves are affected by wind speed and therefore increase or decrease.

1.5 Sensor wiring

Line color	description	remarks
Brown	power supply	10~30V DC
Black	power ground	GND
Green	485-A	485-A
Blue	485-B	485-B
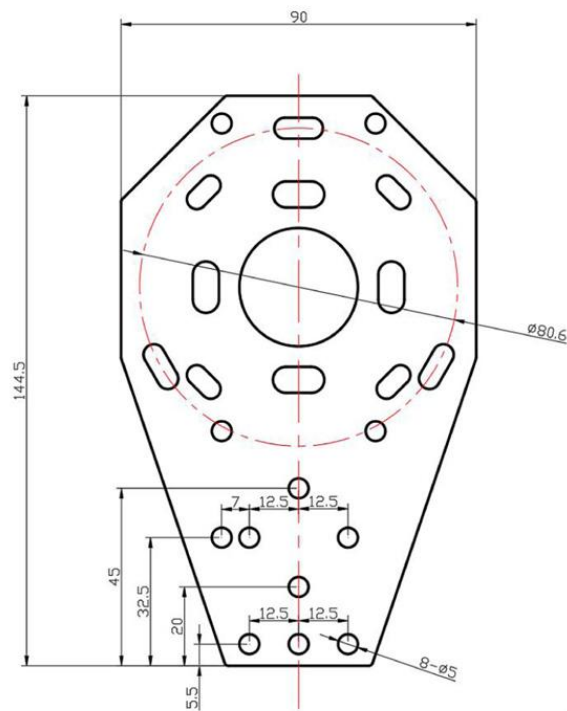
Unit:mm

1.6. Basic communication parameters

Encoding	8-bit binary
Data bits	8 bits
parity	No parity
Stop bit	1 bit
Error check	CRC (redundant cyclic code)
Baud rate	2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s

1.7 Data frame format definition

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

Time for initial structure ≥ 4 bytes

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, this transmitter only uses function code 0x03 (read register number

according to).

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	low bit check code	high bit check code
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Slave machine response frame structure:

Address code	function code	effective bytes	data area	second data area	N data area	check code
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

1.8 Register address

Register address	PLC or configuration address	content	operation	definition instructions
0000 H	40001 (decimal)	Instantaneous wind speed	read-only	real-time value of wind speed (enlarged by 100 times)
0001 H	40002 (decimal)	Wind direction	read only	Real-time wind direction value (Integer, true north direction is 0° straight The hour hand increases the degree, and the east is 90°)
0002 H	40003 (decimal)	Maximum wind speed	read only	Maximum wind speed after the equipment is powered on (Expanded by 100 times)
0003H	40004 (decimal)	Wind scale	read only	Wind level value corresponding to current wind speed (Integer, 0~17

				levels)
07D0 H	42001 (Decimal)	Device address	read and write	1~254 (factory default 1)
07D1 H	42002 (Decimal)	Device baud rate	read and write	0 means 2400 1 is 4800 2 is 9600

1.9 Communication protocol example and explanation

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

Interrogation frame:

Address code	function code	register start address	register length	low bit check code	high bit check code
0x01	0x03	0x00 0x00	0x00 0x02	0xC4	0x0B

Reply frame:

Address code	function code	Return valid Number of bytes	Real-time value of wind speed	Real-time value of wind direction	Check code Low byte	Check code High byte
0x01	0x03	0x04	0x00 0x7D	0x00 0x5A	0x EA	0x10

Real-time wind speed calculation:

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

Real-time wind direction calculation:

Wind direction: 005A (hexadecimal) = 90 => Wind direction = East wind

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

Interrogation frame:

Address code	function code	register start address	register length	low bit check code	high bit check code
0x01	0x03	0x00 0x03	0x00 0x01	0x74	0x0A

Reply frame:

Address code	function code	Return valid Number of bytes	Wind scale	Check code Low byte	Check code High byte
0x01	0x03	0x02	0x00 0x01	0x79	0x84

Real-time wind power rating calculation:

Wind power level: 0001 (hexadecimal) = 1=> Wind power level = 1 level