Product Manual

Polycarbonate Wind Speed Sensor

Model · WS01

Product version · V1.0



1. Product Overview

This product (WS01) adopts the traditional three-cup anemometer structure. The cups are made of carbon fiber material, featuring high strength and fast startup. The built-in signal processing unit can output corresponding wind speed signals according to user needs. It uses the standard ModBus-RTU communication protocol and can be widely used in meteorology, ocean, environment, airports, ports, laboratories, industry and agriculture, and transportation.

2. Features

- Range and Accuracy: The range is 0~70m/s, with a resolution of 0.1m/s.
- Material and Structure: Polycarbonate housing with high mechanical strength, high hardness, corrosion resistance, and rust resistance; the cups are made of carbon fiber material.
- Waterproof Design: Uses bottom cable exit, completely eliminating the problem of rubber gasket aging in aviation plugs, ensuring waterproof performance during long-term use.
- Mechanical Performance: Uses high-performance imported bearings with low rotational resistance for precise measurement; the equipment structure and weight are carefully designed and distributed, resulting in low moment of inertia and sensitive response.
- Anti-interference: Features electromagnetic interference protection, standard ModBus-RTU communication protocol, and convenient connection.
- Optional HA version: HA small box Wi-Fi version, can be connected to Home Assistant, supports MQTT protocol, enabling real-time wind speed data monitoring and automated linkage (such as strong wind alarms, equipment protection.

3. Application Scenarios

1. Meteorological and Environmental Monitoring: Used for wind speed data collection in meteorological stations and environmental monitoring stations.

2. Transportation and Aviation Ports: Used for wind speed warning and monitoring in airports, ports, and expressways.

3. Industrial and Agricultural: Used for wind speed monitoring in industrial plant ventilation, agricultural greenhouses, and small-scale field climates.

4. Scientific Research and Laboratory: Used for wind speed measurement in scientific scenarios such as ocean research and laboratory fluid mechanics.

4. Structural Interface

- Overall Structure: Three-cup anemometer structure, flange mounting base.
- Dimensional Parameters:
- Overall Height: 160mm
- Main Shaft Height: 144mm
- Base Height: 71mm
- Base Diameter: Φ80mm
- Mounting Holes: The base has four mounting holes of Φ4.5mm each, evenly distributed on a circle of Φ68mm.
- Cable Exit: Supports both bottom exit and side exit methods (selected based on the actual on-site application environment).

5. Technical Parameters

- Product Model: WS01
- Supply Voltage: RS485 version DC 10~30V (wide voltage input), HA small box DC12-24V power supply
- Weight: 500g
- Power Consumption: ≤0.3W
- Measurement Range: 0~70m/s
- Resolution: 0.1m/s
- Accuracy: ±(0.2+0.03V)m/s, @(0~30m/s,25℃) (V represents wind speed measurement range)
- Dynamic Response Time: ≤1s
- Cut-in Wind Speed: ≤0.2m/s
- Circuit Operating Environment: -40℃~+60℃, 0%RH~80%RH (no condensation)
- Communication Interface: RS485 (Modbus-RTU protocol)
- RS485 Default Baud Rate: 4800bit/s (settable to 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200)
- Data bits/Parity bits/Stop bits: 8 data bits / No parity / 1 stop bit
- Default ModBus communication address: 1 (Range 1~254)
- Supported function codes: 03 / 04 / 06

6. Installation and Wiring

Safety Notice: The power supply must be disconnected before installing or removing the transmitter.

- Wiring definition (subject to the physical product):
- Brown wire: Power positive
- Black wire: Power negative
- Yellow (Green) wire: 485-A
- Blue wire: 485-B
- Installation method:
- Flange installation is used. Bolts are passed through the 4 Φ4.5mm mounting holes on the base to firmly secure it to the bracket.
- Please ensure the device is kept at the optimal level to guarantee the accuracy of wind speed data.
- When wiring the 485 signal lines, note that the A and B lines must not be reversed, and the addresses of multiple devices on the bus must not conflict.

7. Configuration and Usage

- The device supports reading via Modbus software (a USB to 485 module and driver must be provided by the user).
- After correctly connecting the sensor to the computer via USB to 485 and powering it on, confirm the corresponding COM port in the computer's Device Manager.
- Open the configuration software, select the correct serial port number, select the corresponding serial port baud rate and address, and click "Connect".
- The device's address and baud rate can be modified via software according to usage needs.
- *Note: When using the software to automatically retrieve information, ensure that there is only one sensor on the 485 bus.*

8. Communication Protocol

This product adopts the standard Modbus-RTU communication protocol and supports function codes 03 (read), 04 (read), and 06 (write). The 16bits data in the data area has the high byte first and includes a CRC16 checksum.

- Start structure: ≥4 bytes of time
- Address code: 1 byte (factory default 0x01)
- Function code: 1 byte
- Data area: N bytes

- Error check: 16-bit CRC code
- End structure: ≥4 bytes of time

Register address table:

Register Address	PLC or Configuration Address	Content	Supported Function Codes	Remarks
0000H	40001	Instantaneous wind speed	03/04	Uploaded data is 10 times the true value
07D0H	42001	Device address	03/04/06/10	1~254 (factory default 1)
07D1H	42002	Device baud rate	03/04/06/10	0 represents 2400; 1 represents 4800 (default); 2 represents 9600; 3 represents 19200; 4 represents 38400; 5 represents 57600; 6 represents 115200; 7 represents 1200

Communication example (reading the wind speed value of device address 0x01):

- Query frame (sent by master): 0x01 0x03 0x00 0x00 0x00 0x01 0x84 0x0A
- Response frame (replied by slave): 0x01 0x03 0x02 0x00 0x56 0x38 0x7A
- Data parsing: Current wind speed value 0x0056 (hexadecimal) = 86 (decimal). Since the data is 10 times the actual value, the actual wind speed = 8.6m/s.

9. Applicable Conditions and Limitations

- Environmental limitations: For long-term use, please keep the environmental wind speed below 30m/s. Do not use for long periods in environments with condensation or extreme temperatures; strictly prevent thermal shock.
- Usage limitations: This device is limited to use within its design purpose and authorized scope. It is strictly prohibited to use this device as a safety device, emergency stop device, or in any situation where equipment failure could lead to personal injury.
- Protection limitations: Prevent direct damage to the sensor by chemical reagents, oil, dust, etc.

10. Troubleshooting

Possible causes for no output or output errors:

1. The computer has a COM port, but the selected port is incorrect.

2. Incorrect baud rate.

3. The 485 bus is disconnected, or the A and B lines are reversed.

4. Too many devices or wiring is too long; power supply should be provided nearby, a 485 booster should be added, and a 120Ω terminal resistor should be added simultaneously.

5. The USB to 485 driver is not installed or is corrupted.

6. Equipment damage.

11. Safety Maintenance

1. It is strictly prohibited to use the equipment in situations where equipment failure could lead to personal injury.

2. Users must not disassemble the device on their own, and must not touch the sensor core, in order to avoid damage to the product.

3. Keep as far away as possible from high-power interference equipment, such as frequency converters, motors, etc., to avoid inaccurate measurements.

4. The power supply must be disconnected before installing or removing the transmitter.

5. Water entering the transmitter will cause irreversible changes. Please ensure that the terminal block and housing are well sealed.

12. Packing List

- Wind speed transmitter equipment x 1