Product Manual

# Polycarbonate Wind Direction Sensor

## Model · WD01

Product version · V1.0



# 1. Product Overview

The WD01 polycarbonate wind direction sensor is compact and lightweight, made of polycarbonate composite material, resistant to corrosion and erosion, with a smooth internal bearing to ensure measurement accuracy. The device supports measurement of 16 indicated directions, outputs using the standard ModBus-RTU protocol, and is widely used for wind direction monitoring in greenhouses, weather stations, ship docks, and environmental protection fields.

# 2. Features

- High-precision measurement: The range is 16 indicated directions. It uses high-performance imported bearings internally, with low rotational resistance, a dynamic response speed ≤0.5s, and precise measurement.
- Durable and sturdy: Polycarbonate housing with high mechanical strength, high hardness, corrosion resistance, and rust resistance, suitable for long-term use in harsh outdoor environments.
- Electromagnetic interference protection: Features electromagnetic interference protection, ensuring stable signal output.
- Standard protocol: Supports the standard ModBus-RTU communication protocol, allowing convenient and quick connection to systems such as PLC and DCS.
- Exquisite structure: The device structure and weight are carefully designed and distributed, resulting in a small moment of inertia and sensitive response.
- HA Smart Linkage (Optional HA version): The HA version can be optionally selected to seamlessly integrate with the Home Assistant smart home system, enabling real-time wind direction data monitoring and scene automation linkage (such as adjusting awnings based on wind direction). Supports the MQTT protocol.

# 3. Application Scenarios

1. Meteorological and environmental monitoring: Used for wind direction data collection in weather stations and environmental monitoring stations.

2. Agriculture and greenhouses: Used for small climate monitoring in farmland and ventilation control in greenhouse sheds.

3. Ships and Docks: Used for meteorological environment safety monitoring in ports and docks.

4. Construction and Industry: Used for safety wind prevention warnings for high-altitude work and lifting machinery.

## 4. Structural Interface

- Housing material: Polycarbonate composite material.
- Mounting interface: Bottom flange mounting, base diameter Φ80mm, with 4 Φ4.5mm mounting holes on the Φ68mm circumference.
- Cable exit method: Supports bottom cable exit and side cable exit (selected based on on-site environment).

## 5. Technical Parameters

| Parameter Item | Specification Description |
|---|---|
| Product Model | WD01 |
| Product Name | Polycarbonate Wind Direction Sensor |
| Supply Voltage | DC 12-24V |
| Dimensions | Overall height 190mm, main shaft height 142mm, base height 71mm, base diameter Φ80mm |
| Weight | 500g |
| Power Consumption | 0.15W |
| Measurement Range | 16 indication directions (0~359.9°) |
| Dynamic Response Speed | ≤0.5s |
| Communication Interface | RS485 (ModBus-RTU protocol) |
| Default Baud Rate | 4800bit/s (settable to 2400, 4800, 9600) |
| Data Bits/Parity/Stop Bits | 8 bits / No parity / 1 bit |
| Default Communication Address | 1 |
| Supported Function Codes | 03 |
| Operating Environment | Temperature -40℃~+60℃, Humidity 0%RH~80%RH |
| Optional Versions | Standard Modbus version / HA version (Wi-Fi + MQTT) |

# 6. Installation and Wiring

Installation Note: During installation, the "arrow" mark on the sensor base must face true north to avoid measurement errors.

- Fixing Method: Use bolts to pass through the 4 mounting holes on the flange to firmly secure it to the bracket, ensuring the instrument maintains optimal levelness.
- Wiring Definition:
- Brown wire: Power positive
- Black wire: Power negative
- Yellow (Green) wire: 485-A
- Blue wire: 485-B
- Wiring Tip: When wiring the 485 signal lines, ensure that the A and B lines are not reversed, and that the addresses of multiple devices on the bus do not conflict.

# 7. Configuration and Usage

1. Connect the sensor to the computer using a USB to 485 module and power it on.

2. Open the accompanying "485 Parameter Configuration Software" and select the correct COM port.

3. Click "Test Baud Rate" in the software; the software will automatically identify the current device's baud rate (default 4800) and address (default 1).

4. The device address and baud rate can be modified in the software according to usage needs, and the current status can be queried.

5. *Note: It is recommended to connect only one device to the bus during testing. If the test fails, please check the wiring and driver installation.*

# 8. Communication Protocol

This product adopts the standard Modbus-RTU communication protocol, supports function code 0x03 (read register data), 16bits data high byte first, with CRC16 checksum.

Register address table:

| Register Address | PLC or Configuration Address | Content | Operation | Data Type |
|---|---|---|---|---|
| 0000 H | 40001 | Wind Direction (0-359.9°) | Read-only | UINT16 |

| | | | | |
|---|---|---|---|---|
| 0001 H | 40002 | Wind Direction (0-15 levels) | Read-only | UINT16 |

Data conversion relationship:

- Angle value (0x0000): The read value needs to be divided by 10. For example, if the read value is 0129H (decimal 297), the actual wind direction angle is 29.7°.
- Level value (0x0001): The read value is 0~15, corresponding to 16 directions respectively:
- 0: North wind (348.75°~11.25°)
- 1: North-Northeast wind (11.25°~33.75°)
- 2: Northeast wind (33.75°~56.25°)
- 3: East-Northeast wind (56.25°~78.75°)
- 4: East wind (78.75°~101.25°)
- 5: East-Southeast wind (101.25°~123.75°)
- 6: Southeast wind (123.75°~146.25°)
- 7: South-Southeast wind (146.25°~168.75°)
- 8: South wind (168.75°~191.25°)
- 9: South-Southwest wind (191.25°~213.75°)
- 10: Southwest wind (213.75°~236.25°)
- 11: West-Southwest wind (236.25°~258.75°)
- 12: West wind (258.75°~281.25°)
- 13: West-Northwest wind (281.25°~303.75°)
- 14: Northwest wind (303.75°~326.25°)
- 15: North-Northwest wind (326.25°~348.75°)

## 9. Applicable Conditions and Limitations

- Environmental limitations: Use only in environments with a temperature of -40℃~+60℃ and humidity of 0%RH~80%RH. Do not use for long periods in environments with condensation or extreme temperatures. Strictly prevent thermal shock.
- Usage limitations: It is strictly prohibited to use this device as a safety device, emergency stop device, or in any situation where equipment failure could result in personal injury. This device is limited to use according to its design purpose.

## 10. Troubleshooting

If the device cannot connect to the PLC or computer, the possible causes are as follows:

1. The computer has multiple COM ports, and the selected port is incorrect.

2. The device address is incorrect, or there are devices with duplicate addresses on the bus (factory default is all 1).

3. Incorrect settings for baud rate, parity, data bits, or stop bits.

4. The host polling interval and response waiting time are too short; it is recommended to set them to 200ms or more.

5. The 485 bus is disconnected, or the A and B lines are connected in reverse.

6. There are too many devices or the wiring is too long; power should be supplied nearby, a 485 booster should be added, and a 120Ω terminal resistor should be added at the end of the bus.

7. The USB to 485 driver is not installed or is damaged; the device is damaged.

## 11. Safety Maintenance

- Users must not disassemble the device on their own, and must not touch the sensor core, in order to avoid damage.
- The power must be disconnected before installing or removing the transmitter; water entering the transmitter will cause irreversible damage.
- Keep as far away as possible from high-power interference equipment (such as inverters, motors, etc.) to avoid inaccurate measurements.
- Prevent direct damage to the sensor by chemical reagents, oil, dust, etc.

## 12. Others

- Warranty period: 12 months (circuit warranty 24 months), based on valid purchase vouchers. Free repair is provided for failures caused by material or process defects within the warranty period.
- Usage notes: Damage caused by incorrect installation/operation, unauthorized disassembly/modification, negligence leading to water ingress, natural disasters, or use beyond the working parameter range is not covered by the warranty.

## 13. Packing List

- Polycarbonate Wind Direction Sensor WD01 x 1