



# USER MANUAL

 ONE-STOP SOLUTION

 ONE-STOP SERVICE

## W70D Polycarbonate Wind Direction Transmitter User Manual (485 Type)

### 1. Product Introduction

#### 1.1 Product Overview



W70D wind direction sensor features a compact and lightweight design, making it easy to carry and install. The unique design effectively captures environmental wind data. The housing is made of polycarbonate composite material with an electroplated and spray-coated finish, offering excellent resistance to corrosion and environmental damage. This ensures long-term rust-free operation. Equipped with a smooth internal bearing system, the sensor provides highly accurate wind direction measurements. It is widely used in applications such as greenhouses, environmental monitoring, weather stations, ships, docks, and aquaculture facilities.

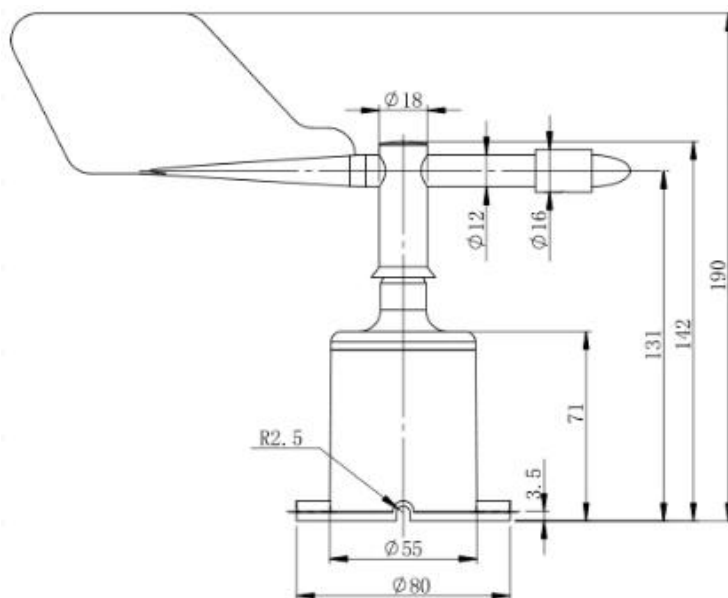
#### 1.2 Features

- Wide measuring range: 0~360°
- Anti-electromagnetic interference treatment
- Equipped with high-performance imported bearings for low rotational resistance and accurate measurement
- Polycarbonate housing with high mechanical strength, hardness, corrosion resistance, and rust-free performance for long-term outdoor use
- Optimized structural design & weight distribution for low rotational inertia & fast response
- Standard ModBus-RTU communication protocol for easy integration

### 1.3 Main Technical Indicators

|                                      |                                                                                                                                                                                      |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC power supply (default)            | 5~12V DC                                                                                                                                                                             |
| Power consumption                    | ≤0.15W                                                                                                                                                                               |
| Communication Interface              | 485 communication (Modbus) protocol<br>Baud rate: 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200<br>Default Modbus communication address: 4<br>Support function code: 03/06 |
| Parameter settings                   | Configure via 485 interface with provided configuration software                                                                                                                     |
| Working temp. of transmitter circuit | -40°C~+60°C, 0%RH~80%RH                                                                                                                                                              |
| Measuring range                      | 0~360°, support 8 or 16 indication direction conversion output                                                                                                                       |
| Dynamic response time                | ≤0.5s                                                                                                                                                                                |

### 1.4 Dimensions



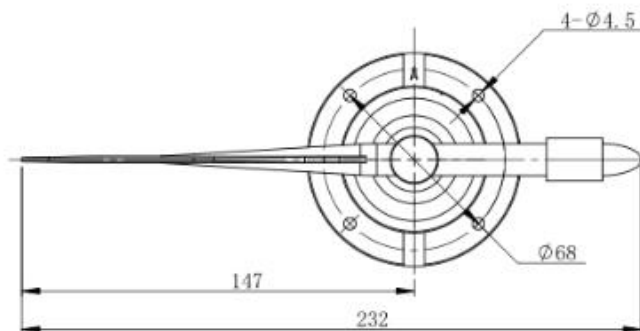
Overall height: 190

Spindle height : 142

Base height : 71

Base diameter :  $\varnothing$  80

Unit(mm)

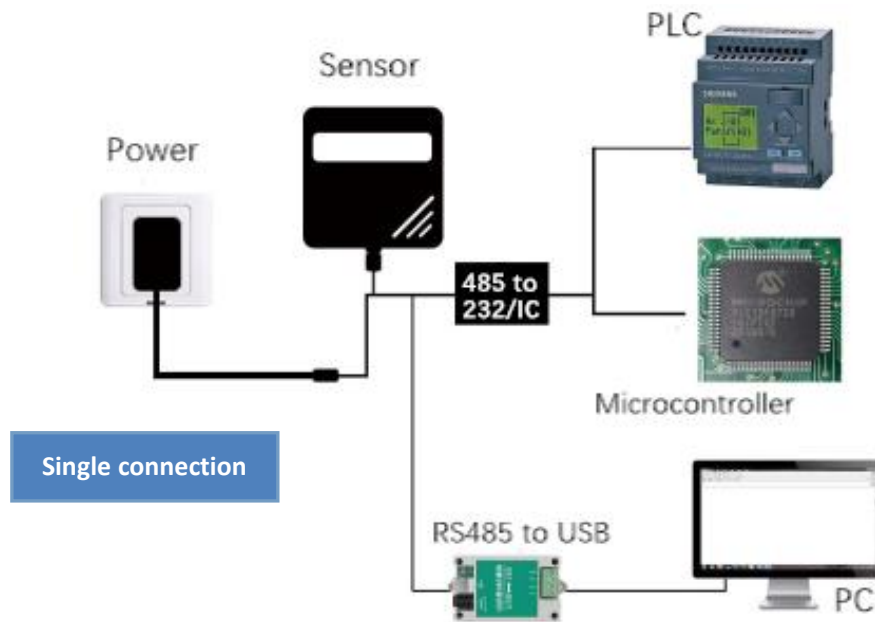


Installation aperture:  $\varnothing$  4.5

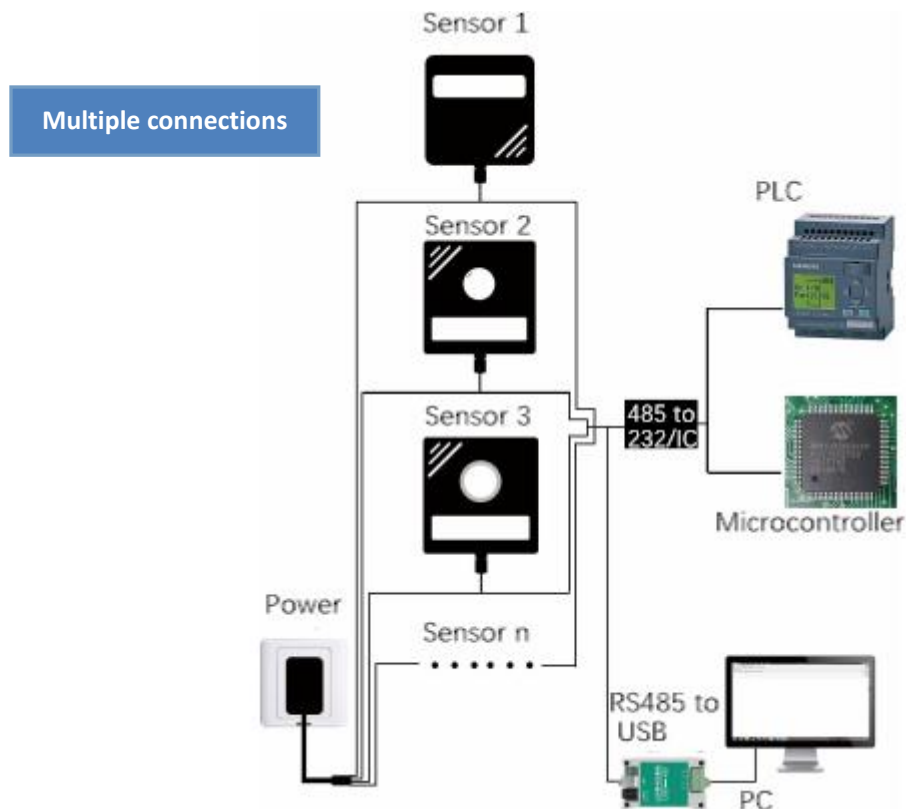
Distribution diameter:  $\varnothing$  68

Unit (mm)

### 1.5 System Frame Diagram



This product also supports connecting multiple sensors on a single RS485 bus. In theory, up to 254 RS485 sensors can be connected on the same bus. The other end can be connected to a PLC with an RS485 interface, a microcontroller via an RS485 interface chip, or to a computer using a USB-to-RS485 converter. Our sensor configuration tool can then be used for configuration and testing. (Please note: only one device can be connected at a time when using the configuration software.)



## 2 Hardware Connection

### 2.1 Port Description

Wide voltage 5~12 V DC power input. When wiring the 485 signal line, pay attention that the A\B lines cannot be reversed, and the addresses of multiple devices on the bus cannot conflict.

### 2.2 Electrical Wiring

|              | Wire Color | Description |
|--------------|------------|-------------|
| Power supply | Red        | Positive    |
|              | Black      | Negative    |
| Output       | Yellow     | 485-A       |
|              | Green      | 485-B       |

### 2.3 Installation Method

Flange installation is adopted. The threaded flange connection ensures that the lower pipe of the wind direction sensor is securely fixed onto the flange plate. The base plate has a diameter of  $\varnothing 80$  mm, with four  $\varnothing 4.5$  mm mounting holes arranged on a  $\varnothing 68$  mm pitch circle. Bolts are used to firmly secure the sensor to the bracket, keeping the entire instrument level to ensure accurate wind speed measurements. The flange connection is convenient to use and capable of withstanding high pressure.



Note:

When installing, make sure the arrow on the sensor is pointing due north to avoid measurement errors.



## 2.4 Precautions

Users must not disassemble the device or touch the sensor core to avoid damaging the product.

Keep away from high-power interference equipment such as inverters and motors to prevent inaccurate measurements. Always disconnect the power supply before installing or removing the transmitter. Water ingress can cause irreversible damage to the transmitter.

Prevent direct exposure of the sensor to chemical reagents, oil, or dust. Do not use the sensor for extended periods in environments with condensation or extreme temperatures. Avoid thermal shock.

## 3. Communication Protocol

### 3.1 Basic communication parameters

|                |                           |
|----------------|---------------------------|
| Encoding       | 8-bit binary              |
| Data bits      | 8-bit                     |
| Parity bits    | None                      |
| Stop bits      | 1-bit                     |
| Error checking | CRC                       |
| Baud rate      | Factory default 9600bit/s |

### 3.2 Data Frame Format Definition

The ModBus-RTU communication protocol is used, with the format defined as follows:

Start Structure:  $\geq 4$  bytes of idle time

Address Code: 1 byte

Function Code: 1 byte

Data Field: N bytes

Error Check: 16-bit CRC code

End Structure:  $\geq 4$  bytes of idle time

Address Code: This is the unique address of the transmitter on the communication network (default factory setting: 0x04).

Function Code: Indicates the function requested by the host. This transmitter uses only function code 0x03 (Read Holding Registers).

Data Field: Contains the actual communication data. Note that for 16-bit data, the high byte comes first!

CRC Code: Two-byte checksum used for error checking.

Host inquiry frame structure:

| Address code | Function code | Register start address | Register length | Check code low bit | Check code high bit |
|--------------|---------------|------------------------|-----------------|--------------------|---------------------|
| 1 byte       | 1 byte        | 2 bytes                | 2 bytes         | 1 byte             | 1 byte              |

Slave inquiry frame structure:

| Address code | Function code | Number of valid bytes | Data area 1 | Data area 2 | Data area N | Check code |
|--------------|---------------|-----------------------|-------------|-------------|-------------|------------|
| 1 byte       | 1 byte        | 1 byte                | 2 bytes     | 2 bytes     | 2 bytes     | 2 bytes    |

### 3.3 Register Address

| Register address | Content                          | Operation |
|------------------|----------------------------------|-----------|
| 0000H            | 0~3600, unit 0.1°                | Read-only |
| 0001H            | Wind direction (0~7 directions)  | Read-only |
| 0002H            | Wind direction (0~16 directions) | Read-only |

### 3.4 Conversion relationship between numerical values

8-Point Compass Directions and Corresponding Angles Table

| Acquisition value (0-7 levels) | Angle range  | Corresponding Directions |
|--------------------------------|--------------|--------------------------|
| 0                              | 337.5°~22.5° | North Wind               |
| 1                              | 22.5°~67.5°  | Northeast Wind           |
| 2                              | 67.5°~112.5° | East Wind                |

|   |               |                |
|---|---------------|----------------|
| 3 | 112.5°~157.5° | Southeast Wind |
| 4 | 157.5°~202.5° | South Wind     |
| 5 | 202.5°~247.5° | Southwest Wind |
| 6 | 247.5°~292.5° | West Wind      |
| 7 | 292.5°~337.5° | Northwest Wind |

16-Point Compass Directions and Corresponding Angles Table

| Acquisition value (0-15 levels) | Angle range   | Corresponding Directions |
|---------------------------------|---------------|--------------------------|
| 0                               | 348.8°~11.3°  | North Wind               |
| 1                               | 11.3°~33.8°   | North-Northeast Wind     |
| 2                               | 33.8°~56.3°   | Northeast Wind           |
| 3                               | 56.3°~78.8°   | East-Northeast Wind      |
| 4                               | 78.8°~101.3°  | East Wind                |
| 5                               | 101.3°~123.8° | East-Southeast Wind      |
| 6                               | 123.8°~146.3° | Southeast Wind           |
| 7                               | 146.3°~168.8° | South-Southeast Wind     |
| 8                               | 168.8°~191.3° | South Wind               |
| 9                               | 191.3°~213.8° | South-Southwest Wind     |
| 10                              | 213.8°~236.3° | Southwest Wind           |
| 11                              | 236.3°~258.8° | West-Southwest Wind      |
| 12                              | 258.8°~281.3° | West Wind                |
| 13                              | 281.3°~303.8° | West-Northwest Wind      |
| 14                              | 303.8°~326.3° | Northwest Wind           |
| 15                              | 326.3°~348.8° | North-Northwest Wind     |

### 3.4 Communication protocol examples and explanations

Example: Read the wind speed of device address 0x04

Inquiry frame

| Address code | Function code | Start address | Data length | Check code low bit | Check code high bit |
|--------------|---------------|---------------|-------------|--------------------|---------------------|
| 0x04         | 0x03          | 0x00 0x00     | 0x00 0x02   | 0xC4               | 0x5E                |

Answer frame (For example, the current wind speed is 8.6 m/s)

| Address code | Function code | Number of Valid Bytes Returned | Wind Direction (°) | Wind Direction (8-Point) | Check code low bit | Check code high bit |
|--------------|---------------|--------------------------------|--------------------|--------------------------|--------------------|---------------------|
| 0x04         | 0x03          | 0x04                           | 0x00 0x5A          | 0x00 0x02                | 0x5B               | 0xE1                |

Wind Direction Calculation:

(8-Point Compass):

0002H (hexadecimal) = 2  $\Rightarrow$  Wind Direction = East Wind

(0–360°):

005AH (hexadecimal) = 90  $\Rightarrow$  Wind Direction = East Wind

## 4. Common problems and solutions

No output or output error

Possible reasons:

- ① The computer has a COM port, and the selected port is incorrect.
- ② The baud rate is wrong.
- ③ The 485 bus is disconnected, or the A and B lines are connected in reverse.
- ④ There are too many devices or the wiring is too long. Power should be supplied nearby, a 485 enhancer should be added, and a 120 $\Omega$  terminal resistor should be added at the same time.
- ⑤ The USB to 485 driver is not installed or damaged.
- ⑥ The device is damaged.