WSD304 WIND SPEED AND WIND DIRECTION SENSOR

Users Manual

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1. Product overview

The wind speed and wind direction integrated sensor is used to measure the wind speed and wind direction value, and convert it into an electrical signal, which can be directly transmitted to the recording device for processing.

The sensor shell and wind cup are made of aluminum alloy, using special mold precision die-casting process, with small dimensional tolerances and high surface accuracy. The internal circuits are all protected. The entire sensor has high strength, weather resistance, corrosion resistance and water resistance. The cable connector is an aviation four-core plug, which has good anti-corrosion and anti-corrosion performance, which can ensure the long-term use of the instrument. At the same time, the internal bearing system of the wind speed sensor is used in conjunction with the wind speed sensor to ensure the accuracy of wind speed collection.

The circuit PCB material ensures the stability of the parameters and the quality of the electrical performance; the electronic components are all industrial-grade chips, so that the whole has a reliable anti-electromagnetic interference ability, and can ensure that the host is at -20℃～+55℃, and the humidity is 35%～85% (It can work normally within the range of non-condensing.

2. Scope of application

The wind direction of this product can measure the indoor and outdoor environment in 16 directions, including the Middle East, West, South, North, Southeast, Southwest, Northeast, Northwest, etc. It can be widely used in construction machinery (cranes, crawler cranes, portal cranes, tower cranes, etc.), railways, Wind speed and direction measurement in ports, docks, power plants, meteorology, cableway, environment, greenhouses, breeding, air conditioning, energy-saving monitoring, agriculture and other fields.

3. Technical parameters

<table>
<tr><td>Project</td><td colspan="2">Wind speed technical parameters</td><td colspan="2">Wind direction technical parameters</td></tr>
<tr><td>Measuring range</td><td colspan="2">□0-30m/s □0-60m/s □Other customization</td><td colspan="2">□ 16 directions □ 8 directions □ 0-360 degrees</td></tr>
<tr><td rowspan="4">Signal</td><td>Current output type</td><td>□4-20mA</td><td>Current output type</td><td>□4-20mA</td></tr>
<tr><td>RS485 communication</td><td>□RS485 communication type (MODBUS-RTU protocol)</td><td>RS485 communication</td><td>□RS485 communication type (MODBUS-RTU protocol)</td></tr>
<tr><td>Voltage output type</td><td>□0-2VDC □0-5VDC □0-10VDC</td><td rowspan="2">Voltage output type</td><td rowspan="2">□0.4-2VDC □0-2VDC
□1-5VDC □0-5VDC</td></tr>
<tr><td>Pulse output type</td><td>□ NPN output □ PNP output
□ NPN output with internal pull-up (4.7KΩ)</td></tr>
<tr><td>Supply</td><td colspan="2">Depending on the output type, the required voltage source range is different:</td><td colspan="2">DC12~24V</td></tr>
</table>

voltage	□Current output type: DC12~24V □RS485 output type: DC5~24V □Voltage output type: Output 0-2VDC: DC6~24V Output 0-5VDC: DC6~24V Output 0-10VDC: DC12~24V	
Maximum power consumption (DC24V)	Pulse type MAX≤200mW	RS485 MAX≤300mW
	Voltage type MAX≤300mW	Voltage type MAX≤300mW
	Current type MAX≤700mW	Current type MAX≤700mW
load capacity	□Others □<500Ω □＞2kΩ Pulse load current: source current: sensor power supply ÷ (user equipment internal resistance +10Ω) Pulse load current: sink current: user power supply ÷ (user equipment internal resistance + 10Ω)	□Others □<500Ω □＞2kΩ
Way out	□Side outlet (aviation plug) □Side outlet (PG metal waterproof connector) □Bottom outlet	□Side outlet (aviation plug) □Side outlet (PG metal waterproof connector) □Bottom outlet
Wiring system	□Voltage output type: three-wire system □Current output type: three-wire system, two-wire system □RS485 output: four-wire system □current/voltage dual output: four-wire system □TTL level: three-wire system □pulse output: three-wire system	□Voltage output type: three-wire system □Current output type: three-wire system □RS485 output: four-wire system □current/voltage dual output: four-wire system
Use environment	Temperature: -20℃~+55℃ Relative humidity: 35%-85% (non-condensing)	Temperature: -20℃~+55℃ Relative humidity: 35%-85% (non-condensing)

Start wind	0.4m/s~0.8m/s	Response time	≤2S	Start wind	0.8m/s	Response time	≤2S
Resolution	0.1m/s	Precision	0.1	Resolution	1°	Precision	0.1

Error	±3%	Overall weight	≈0.5Kg(Main body)	total size	Height 195mm*width 244mm (tail wing)*34m (body diameter)

4.Functional characteristics

Since the product was put into the market, it has won praise from the majority of users and has the following characteristics:

◆ Integrated design structure, easy and quick installation

◆ Aluminum alloy material, electroplating and plastic spraying, good weather resistance, corrosion resistance and anti-invasion performance

◆ Four-core aerial plug connection to prevent wrong wiring, with fault-tolerant rate

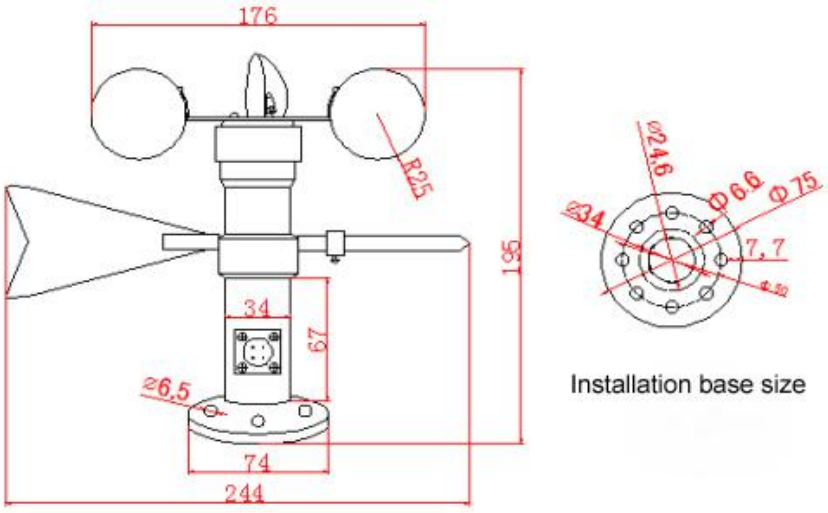
◆ The eight-hole base is easy to fix to the north, firm and stable

◆ Good dynamic characteristics, strong anti-interference ability and high measurement accuracy.

◆ Low power consumption, long circuit life, long-term stable work;

◆ The power supply has a wide adaptable range, good linearity of data information, and long signal transmission distance.

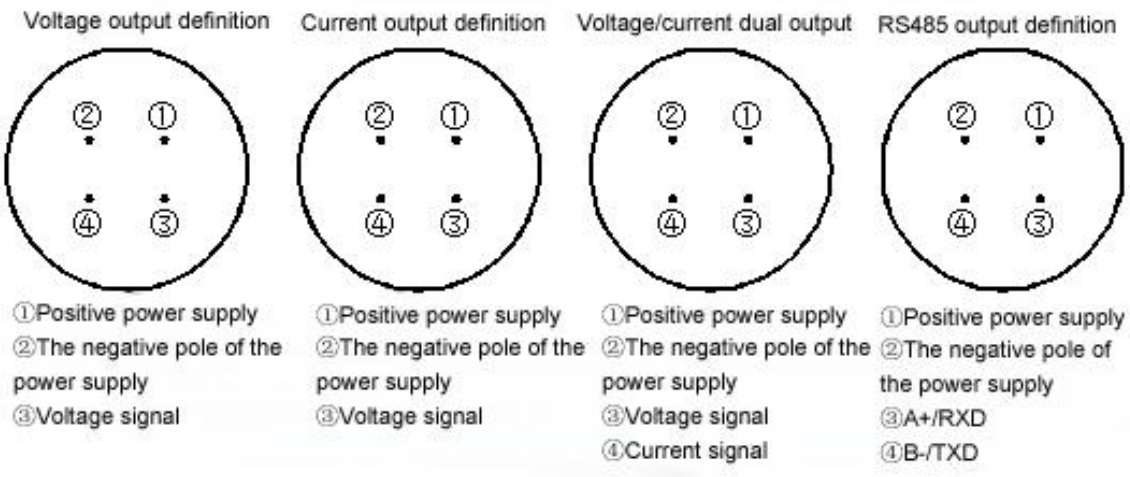
5.Structure size chart



6.Fixed way

The sensor should be installed horizontally to ensure the accuracy of the data; (the position marked with a small white dot on the sensor cup is the default north direction.) Flange installation is adopted, the diameter of the mounting flange under the sensor is Φ7mm, and the four mounting holes are Φ6 .6mm, eight mounting holes are evenly distributed on the circumference of Φ50mm, and the installation is fixed with flanges. The installation dimensions are as shown in the figure above.

7. Signal output definition



8. Thread color definition

Output / Thread color	Voltage output type (Single output)	Current output type (Single output)	Voltage and current (Dual output)	RS485 signal	Pulse signal
Red	Power positive	Power positive	Power positive	Power positive	Power positive
black	Power negative	Power negative	Power negative	Power negative	Power negative
yellow	(null)	Current signal	Current signal	A+	Pulse signal
blue	Voltage signal	null	Voltage signal	B-	(null)

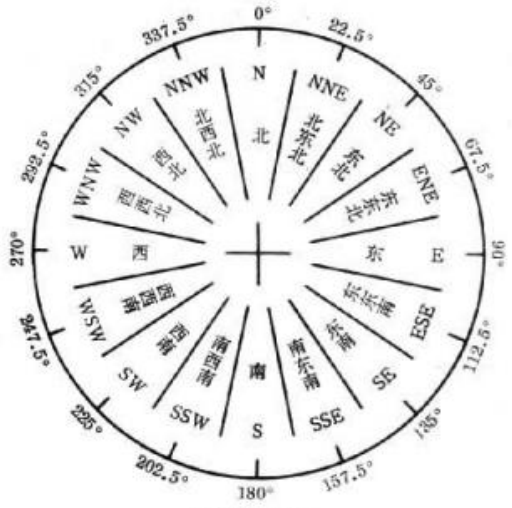
9.Wind speed, current and voltage signal output calculation formula

4-20mA: Wind speed=((current current value-4mA)/(20mA-4mA))*range

0-2V: Wind speed=(current voltage value/2V)*range

For details, see the corresponding table of wind speed and output information

10.16-bit wind direction map



风向 16 方位图

11.Correspondence of wind speed signal output

Range: 0-30m/s

Wind speed （m/s）	Current output 4-20mA	Voltage output (0-5V)	Voltage output (1-5V)	Voltage output (0-2V)	Voltage output (0-10V)
1	4.52	0.17	1.13	0.07	0.34
2	5.08	0.33	1.27	0.13	0.66
3	5.6	0.5	1.4	0.2	1
4	6.12	0.67	1.53	0.27	1.34
5	6.68	0.83	1.67	0.33	1.66
6	7.2	1	1.8	0.4	2
7	7.72	1.17	1.93	0.47	2.34
8	8.28	1.33	2.07	0.53	2.66
9	8.8	1.5	2.2	0.6	3
10	9.32	1.67	2.33	0.67	3.34
11	9.88	1.83	2.47	0.73	3.66
12	10.4	2	2.6	0.8	4
13	10.92	2.17	2.73	0.87	4.34
14	11.48	2.33	2.87	0.93	4.66
15	12	2.5	3	1	5
16	12.52	2.67	3.13	1.07	5.34
17	13.08	2.83	3.27	1.13	5.66
18	13.6	3	3.4	1.2	6
19	14.12	3.17	3.53	1.27	6.34
20	14.68	3.33	3.67	1.33	6.66
21	15.2	3.5	3.8	1.4	7
22	15.72	3.67	3.93	1.47	7.34
23	16.28	3.83	4.07	1.53	7.66
24	16.8	4	4.2	1.6	8
25	17.32	4.17	4.33	1.67	8.34
26	17.88	4.33	4.47	1.73	8.66
27	18.4	4.5	4.6	1.8	9
28	18.92	4.67	4.73	1.87	9.34
29	19.48	4.83	4.87	1.93	9.66
30	20	5	5	2	10

Range: 0-60m/s

Wind speed （m/s）	Current output 4-20mA	Voltage output (0-5V)	Voltage output (1-5V)	Voltage output (0-2V)	Voltage output (0-10V)
1	4.27	0.08	1.07	0.04	0.16

2	4.53	0.17	1.13	0.07	0.34
4	5.08	0.33	1.27	0.13	0.66
6	5.6	0.5	1.4	0.2	1
8	6.12	0.67	1.53	0.27	1.34
10	6.68	0.83	1.67	0.33	1.66
12	7.2	1	1.8	0.4	2
14	7.72	1.17	1.93	0.47	2.34
16	8.28	1.33	2.07	0.53	2.66
18	8.8	1.5	2.2	0.6	3
20	9.32	1.67	2.33	0.67	3.34
22	9.88	1.83	2.47	0.73	3.66
24	10.4	2	2.6	0.8	4
26	10.92	2.17	2.73	0.87	4.34
28	11.48	2.33	2.87	0.93	4.66
30	12	2.5	3	1	5
32	12.52	2.67	3.13	1.07	5.34
34	13.08	2.83	3.27	1.13	5.66
36	13.6	3	3.4	1.2	6
38	14.12	3.17	3.53	1.27	6.34
40	14.68	3.33	3.67	1.33	6.66
42	15.2	3.5	3.8	1.4	7
44	15.72	3.67	3.93	1.47	7.34
46	16.28	3.83	4.07	1.53	7.66
48	16.8	4	4.2	1.6	8
50	17.32	4.17	4.33	1.67	8.34
52	17.88	4.33	4.47	1.73	8.66
54	18.4	4.5	4.6	1.8	9
56	18.92	4.67	4.73	1.87	9.34
58	19.48	4.83	4.87	1.93	9.66
60	20	5	5	2	10

12.Correspondence of wind direction signal output

Correspondence of voltage signal output (0-10V) (comprehensive voltage accuracy ±2%)

North: 10V North-northeast: 0.61V Northeast: 1.27V East-northeast: 1.88V

East: 2.5V East-southeast: 3.12V Southeast: 3.76V South-southeast: 4.37V

South: 5V South-southwest: 5.62V South-west: 6.26V West-southwest: 6.87V

West: 7.49V West-northwest: 8.12V Northwest: 8.76V North-northwest: 9.39V

Correspondence of voltage signal output (0-5V) (comprehensive voltage accuracy ±2%)

North: 5V North-northeast: 0.31V Northeast: 0.63V East-northeast: 0.94V

East: 1.25V East-southeast: 1.56V Southeast: 1.88V South-southeast: 2.19V

South: 2.5V South-southwest: 2.81V Southwest: 3.13V West-southwest: 3.44V

West: 3.75V West-northwest: 4.06V Northwest: 4.38V North-northwest: 4.69V

Correspondence of voltage signal output (1-5V) (comprehensive voltage accuracy ±2%)
North: 1V North-northeast: 1.25V Northeast: 1.5V East-northeast: 1.75V
East: 2V East-southeast: 2.25V Southeast: 2.5V South-southeast: 2.75V
South: 3V South-southwest: 3.25V Southwest: 3.5V West-southwest: 3.75V
West: 4V West-northwest: 4.25V Northwest: 4.5V North-northwest: 4.75V

Correspondence of voltage signal output (0-2V) (comprehensive voltage accuracy ±2%)
North: 2V North-northeast: 0.13V Northeast: 0.25V East-northeast: 0.38V
East: 0.5V East-southeast: 0.62V Southeast: 0.75V South-southeast: 0.88V
South: 1.0V South-southwest: 1.12V Southwest: 1.25V West-southwest: 1.38V
West: 1.5V West-northwest: 1.62V Northwest: 1.75V North-northwest: 1.88V

Correspondence of voltage signal output (0.4-2V) (comprehensive voltage accuracy ±2%)
North: 2V North-northeast: 0.4V Northeast: 0.51V East-northeast: 0.61V
East: 0.72V East-southeast: 0.82V Southeast: 0.93V South-southeast: 1.04V
South: 1.14V South-southwest: 1.25V Southwest: 1.35V West-southwest: 1.46V
West: 1.57V West-northwest: 1.67V Northwest: 1.78V North-northwest: 1.88V

Correspondence of current signal output (current comprehensive accuracy ±2%)
North: 4mA or 20mA North-northeast: 5mA Northeast: 6mA East-northeast: 7mA
East: 8mA East-southeast: 9mA Southeast: 10mA South-southeast: 11mA
South: 12mA South-southwest: 13mA Southwest: 14mA West-southwest: 15mA
West: 16mA West by Northwest: 17mA Northwest: 18mA Northwest by Northwest: 19mA

13.RS485/232 communication protocol
The command subset of the MODBUS-RTU protocol is adopted, and the read (write) register command (03) (06) is used (the following command descriptions are expressed in hexadecimal by default, and the default address of the device is 0x02)
1. Data transmission method:
8 data bits, 1 stop bit, no parity bit.
2. Data transmission rate:
The default baud rate is 9600bps and cannot be modified. If the user wants to use other baud rates, please declare it when ordering. Support baud rate: 9600bps, 4800bps, 2400bps, 1200bps.
3. Data message format
(1)Function code 0x03---Query the contents of the slave device register

Master message	Correct message from the device
Slave device address (0x01-0xFE 1 byte)	Slave device address (0x01-0xFE 1 byte)
Function code (0x03 1 byte)	Function code (0x03 1 byte)
Starting register address (2 bytes)	Number of bytes in data area (2*Number of registers 1 byte)

Number of registers (2 bytes)	Data area (register content 2*register number 1 byte)
CRC check code (2 bytes)	CRC check code (2 bytes)

(2)Function code 0x06---set the number of the slave device register

Master message	Correct message from the device
Slave device address (0x01-0xFE 1 byte)	Slave device address (0x01-0xFE 1 byte)
Function code (0x06 1 byte)	Function code (0x06 1 byte)
Starting register address (2 bytes)	Number of bytes in data area (2*Number of registers 1 byte)
Data written to the register (2* number of registers 1 byte)	Data area (register content 2* register number 1 byte)
CRC check code (2 bytes)	CRC check code (2 bytes)

Note: 1. CRC check code low bit first, high bit behind, register address, register number, data are high bit first, low bit behind; 2. The register word length is 16bit (two bytes);

4. Register description and command format

(1) Parameter data register definition table

The sensor wind speed value register address is 0x002A

The address of the sensor wind direction value register is 0x002B

Register address (Hex) Register content Register number Register status Data range (Hex)

0x002A Wind speed 1 Read only 0~300 (0x00-0x012C)

The data range 0x0000-0x0BB8 represents 0-30.00 m/s wind speed.

Register address (Hex)	Register content	Number of registers	Register status	Data range (Hex)
0x002A	Wind speed	1	Read only	0~300 (0x00-0x012C)

Data range 0x0000-0x012C represents 0-30.0 m/s

Register address (Hex)	Register content	Number of registers	Register status	Data range (Hex)
0x002B	Wind direction	1	Read only	0~3600 (0x00-0x0E10)

Data range 0x0000-0x0E10 represents 0-360.0°

Sensor storage device address register address: 0x2000

Register address (Hex)	Register content	Number of registers	Register status	Data range (Hex)
0x2000	Device address	1	Read and write	1~254（0x01~0xFE）

(2) Examples of commands:

In the command, all register address bytes, register digits, and data bytes are high-order first, and low-order second;

The low-order byte of the CRC check code is in front, and the high-order byte is in the back;

Read the current value of the sensor: (Slave address 02, baud rate 9600, N, 8, 1)

Slave device address	Function code	Start register address		Number of registers		CRC-L	CRC-H
0x02	0x03	0x00	0x2A	0x00	0x01	0XA5	0xF1

Response from device:

Slave device address	Function code	Number of bytes in data area	Register data		CRC-L	CRC-H
0x02	0x03	0x02	0x00	0x00	0xFC	0x44

Modify the device address: (slave device address 02, modified to 03)

Slave device address	Function code	Start register address		Modified data		CRC-L	CRC-H
0x02	0x06	0x20	0x00	0x00	0x03	0XC2	0x38

Response from device:

Slave device address	Function code	Start register address		Modified data		CRC-L	CRC-H
0x02	0x06	0x20	0x00	0x00	0x03	0XC2	0x38

Note: After the sensor has modified the new address, it must be powered on again, otherwise the sensor will keep the original address before the modification.

14. Maintenance and maintenance

This instrument is a sophisticated electronic product. Proper maintenance can help protect the performance of the instrument and prolong the service life of the instrument. Please pay attention to the following points:

1. Please use the instruction correctly according to the requirements of the instruction manual. If receiving the money incorrectly, it may cause damage to the instrument.

2. Do not wipe the instrument with volatile liquids, otherwise it may cause discoloration and deformation of the instrument; wipe with a soft cloth to avoid scratches on the external protective film of the instrument and prolong the service life of the instrument.

3. The instrument should be handled with care, and shall not be dropped or pressed, otherwise it will cause deformation of the instrument and damage to the internal circuit board.
4. Do not touch the sensing part when the instrument is electrified, in order to affect the measurement result or cause damage to the internal circuit of the instrument.
5. Do not disassemble or modify the instrument privately to avoid damage to the instrument.
6. The instrument should be firmly fixed with screws when in use, otherwise the instrument may be damaged.
7. Regularly check the power supply voltage of the instrument to ensure the normal operation of the instrument