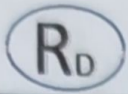# Ultrasonic Wind Velocity and Direction Sensor

HD-WSD-MI-01

1. Product introduction

Ultrasonic Wind Velocity and Direction Meter is a measuring instrument that uses the time difference of ultrasonic propagation in the air to measure wind speed and direction. Compared with the traditional mechanical anemometer, it has the characteristics of less wear, long service life and fast corresponding speed. It can be widely used in urban environmental monitoring, wind power generation, meteorological monitoring, bridges and tunnels, navigation ships, aviation airports and other fields. Maintenance and field calibration are not required.

1.1 Application field

Meteorological monitoring, UAV system environmental monitoring and grid environmental monitoring

Agricultural meteorological monitoring, traffic meteorological monitoring and photovoltaic environmental monitoring

1.2 Product characteristics

Miniaturization Output 485, Modbus

Low power consumption modularization, no moving parts

Easy installation and low cost
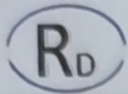
1.3 Product technical parameters

| Monitoring parameters	Measuring range	Resolution	Accuracy	Sampling frequency
Wind speed	0-40m/s	0.01 m/s	± (0.5 +0.05 V) M/S	10HZ
Wind direction	0-359.9 °	0.1 °	± 5 ° (wind speed < 10m/s)	10HZ
Operating temperature	-30 ℃-70 ℃			
Output signal	The standard products are RS485 interface and ModbusRTU;; Customizable SDI-12 (additional module required)			
Maximum output frequency	Passive Mode: 1/S Active Mode: 1/min			
Power supply	DC9-24V			
Protection level	IP65			
Fixed mode	Standard product sleeve type (optional adapter, need to be purchased separately; See matching adapter for details)			
Mounting bracket	Standard products are not available, and 1.5 m and 1.8 m brackets can be selected (need to be purchased separately)			
Matching cable	3 meters (optional 10 meters cable, need to be purchased separately)			
Remarks	1. Wind speed and wind direction: Wind speed and wind direction can be measured by ultrasonic principle, and data such as instantaneous wind speed, instantaneous wind direction, average wind speed and average wind direction can also be output.			

1.4 Product size
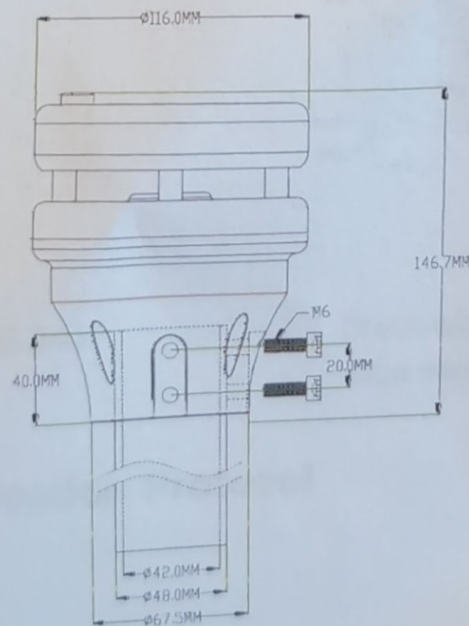
2.Matching adapter

1. Sleeve mounting

Install the sensor directly on the sleeve, When installing, note that the red arrow pointing north must be faces to north

2. Flange fixing mode(Optional)
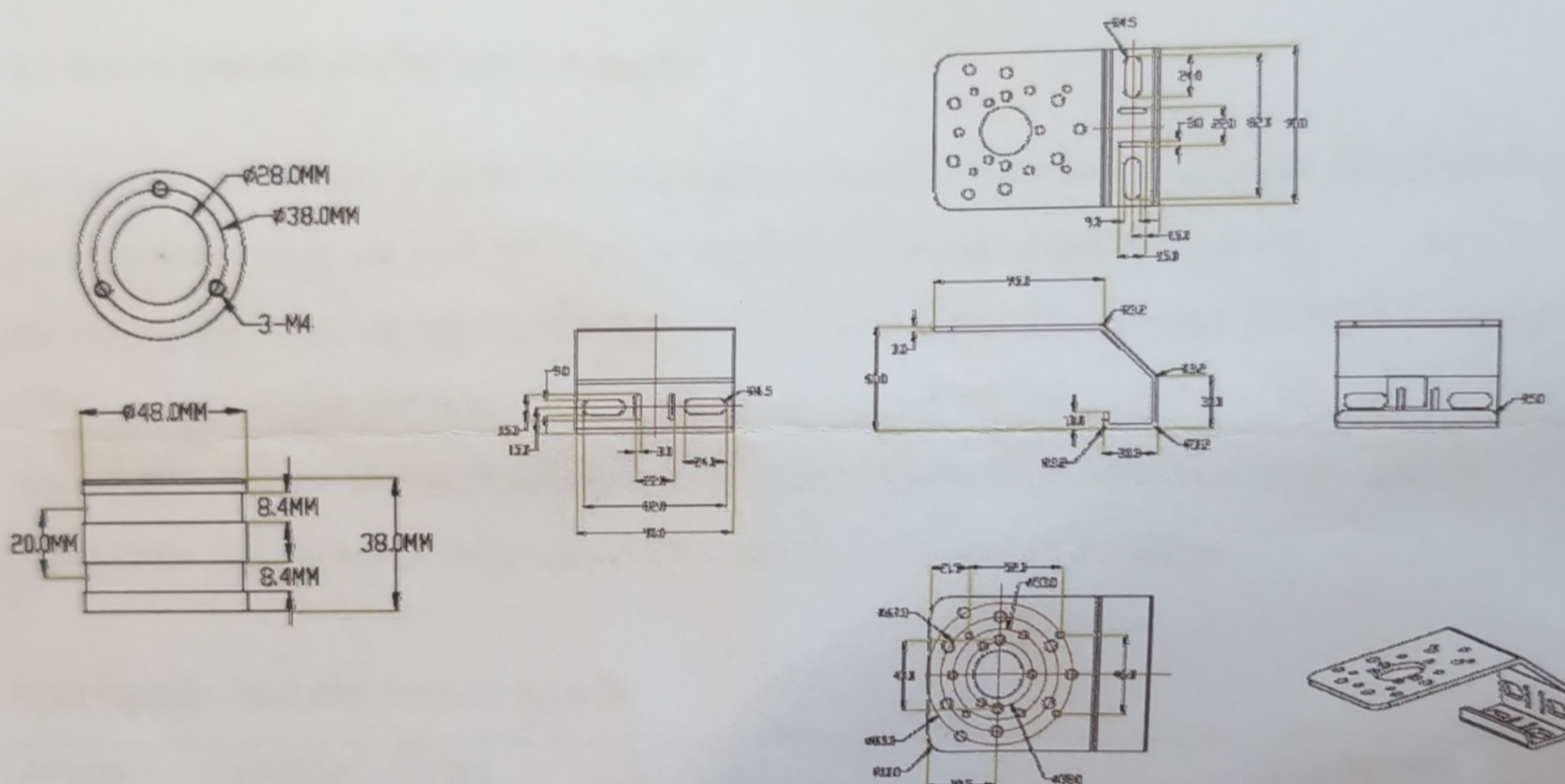
3.Wire connection

Red wire: Positive power supply:DC9-24v

Yellow wire: RS485A

Black wire: Negative power supply
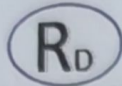
Blue wire: RS485B

3.MODBUS RTU Communication Protocol

Baud rate: 9600

Data bits: 8

Stop bit: 1

Check bit: None

3.1 CRC Description:

In all the following descriptions, CRC16 in MODBUS RTU protocol is two bytes, according to MODBUS regulations: low bytes come first and high bytes come later.

In the following description, the sensor address 0xFF is assumed (the sensor default address is FF)

3.2 Return Error Code Specification:

Sensors do not return error codes when receiving error instructions (including CRC16 validation errors). The host computer can retransmit the instruction if it fails to receive the return data 200ms after the instruction is issued.

3.3 Standard MODBUS Register Description

Special note: The number or length of registers in the MODBUS command is two bytes and 16 bits in a unit (high bytes before and low bytes after), instead of a single byte and 8 bits in a unit.

The user should ensure that the address and number of registers in the command are within the range specified by this system. If it is out of range, the output result of the sensor will be unpredictable. Users should ensure that the MODBUS command meets the requirements of this manual in the software design of the upper computer, and support the minimum inquiry period of 1S/time.

Input register: read with function code 03

| Address	Operation	Content	Remarks
0x000C	Read-only	Wind speed, hexadecimal number magnified 100 times, such as 0x0125 for 293/100 = 2.93 m/s	
0x000D	Read-only	Wind direction, hexadecimal number magnified 10 times, such as 0x0C14 for 3092/10 = 309.2	0 ° to the north

3.4 Communication Example

The following is an example of how to access system registers using Modbus RTU commands:

1. Read the wind speed and direction register command

Send: FF 03 00 0C 00 02 11 D6

FF	03	00 0C	00 02	11 D6
System address	Function code	Register address	Number of registers	CRC16 check bits automatically generated by software
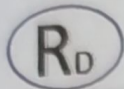
Answer: FF 03 04 00 11 0C 14 B0 F6

FF	03	04	00 11 0C 14	B0 F6
System address	Function code	Number of data segment bytes	Data segment data	CRC16 parity bit

Parsing data:

0x0011=17

Wind speed = 17/100 = 0.17 m/s

0x0C14 = 0x0C * 256 + 0x14 = 3092

Wind Direction = 3092/10 = 309.2 °

2. Read Single Input Register Command

Send: FF 03 00 0C 00 01 51 D7

FF	03	00 0C	00 01	51 D7
System address	Function code	Register address	Number of registers	CRC16 check bits automatically generated by software

Answer: FF 03 02 02 1C 91 39

FF	03	02	00 1C	90 59
System address	Function code	Number of data segment bytes	Data segment data	CRC16 parity bit

Parsing data:

0x001C = 0x00 * 256 + 0x1C = 28

Wind speed = 28/100 = 0.28 m/s

3. Read address register command

Send: 00 03 00 00 00 01 85 DB

00	03	00 00	00 01	85 DB
	Function code	Register address	Number of registers	CRC16 check bits automatically generated by software

Answer: 00 03 02 00 01 44 44

00	03	02	00 01	44 44
	Function code	Number of bytes of data segment	Data segment data	CRC16 parity bit

The data segment data is 0x0001 = 01, which means the system address is 01
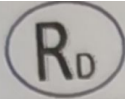
4. Change sensor address command (change address to 0x33)

Send: 00 06 00 00 00 33 C8 0E

00	06	00 00	00 33	C8 0E
	Function code	Register address	New address	CRC16 parity bit

Answer: 00 06 00 00 00 33 C8 0E (indicating successful modification)

00	06	00 00	00 33	C8 0E
	Function code	Start address	New address	CRC16 parity bit

Supplementary Protocol: (Default device address is FF)

Active reporting period (register address 0x01 0A) is in min, and 0 means no reporting

00 06 01 0A 00 0A 29 E2 (Set the active reporting period to 10 minutes)

Active Report Length (Register Address 0x01 0B)

00 06 01 0B 0C 02 7C E4 (Active Report Register Address 0C-0D)

Baud Rate (Register Address 0X0102)

00-06 for 2400, 4800, 9600, 19200, 38400, 57600, 115200 respectively

00 06 01 02 00 02 A9 E6 (Set the baud rate to 9600, please do not change it by non-professionals)