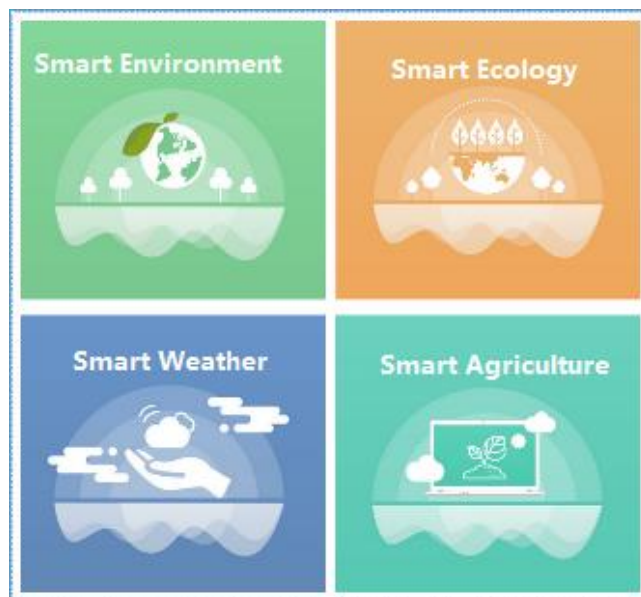


Micro-meteorometer series manual



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Introduction:

☞ This manual describes the product parameters and uses of the HCD6810 series. Please read and understand them carefully before use.

☞ This manual also describes how to secure, connect, and operate the device.

☞ This manual describes the communication protocol of the device.

Before use:



Incorrect identification, operation may cause equipment damage.



A warning sign that the operation may cause the device to malfunction.



Prompt logo, instructions for the use of the device.



The calibration period of SO₂\NO₂\CO\O₃\PM_{2.5}\PM₁₀ is one year, which will be shortened due to improper maintenance of environmentally rigorous goods.

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1. Product introduction

1.1 Overview

Our company's meteorological series products are series of products developed according to the actual situation of the site, combined with years of experience in the development of meteorological environment monitoring products. This series of products can collect temperature, humidity, air pressure, wind speed, wind direction, rainfall, radiation, illuminance, PM2.5, PM10, CO, SO2, CO2, NO2, O3, noise and other parameters, high product integration, high value, free installation. It is free of wiring and can completely replace the traditional patchwork small automatic meteorological environment observatory.

1.2 Features

- Real-time measurement using advanced sensing technology
- Works around the clock, free from heavy rain, snow, frost and weather
- High measurement accuracy and stable performance
- Compact and beautiful structure,
- High integration, easy to install and disassemble
- Maintenance free, no on-site calibration
- Using ASA engineering plastics outdoor application does not change color all the year round

1.3 Application field

- Weather monitoring
- Urban environmental monitoring
- Wind power
- Navigation ship
- Airport
- Bridge tunnel

2. Product parameters

2.1 Micro meteorological instrument series selection table

Type NO. Parameter	HD- WSM- U-02	HD- WSM- U-05	HD- WSM- U-06	HD-WSM -U-06A	HD- WSM- UTR- 07 -1	HD- WSM- U-07	HD-WSM-U- 07A
Air temperature		√	√	√	√	√	√
Air humidity		√	√	√	√	√	√
Atmospheric pressure		√	√	√	√	√	√
Wind speed	√	√	√	√	√	√	√
Wind direction	√	√	√	√	√	√	√
Rainfall			√		√	√	√
Illuminance						√	
Sun radiation				√ (Thermoelectric)	√		√ (Photoelectric)

2.2 Micro meteorological instrument series selection table

Type NO. Parameter	HD-WSM-U-08B	HD-WSM-U-08	HD-WSM-U-08B-TR	HD-WSM-U-08C	HD-WSM-U-09E	HD-WSM-U-12
PM2.5	√	√	√	√	√	√
PM10	√	√	√	√	√	√
CO		√				√
SO ₂		√				√
NO ₂		√				√
O ₃		√				√
Air temperature	√	√	√	√	√	√
Air humidity	√	√	√	√	√	√
Atmospheric pressure	√		√	√	√	√
Wind speed	√		√	√	√	√
Wind direction	√		√	√	√	√
Rainfall			√	√	√	√
Illuminance						
Sun radiation			√ (Thermoelectric)	√ (Photoelectric)		
Noise	√				√	
Ultraviolet					√	

2.3 Air quality transmitter selection table

Type NO. Parameter	HD-WSM-2510	HDWSM-2512	HD-WSM-2-6
Air temperature		√	√
Air humidity		√	√
Illumination			√

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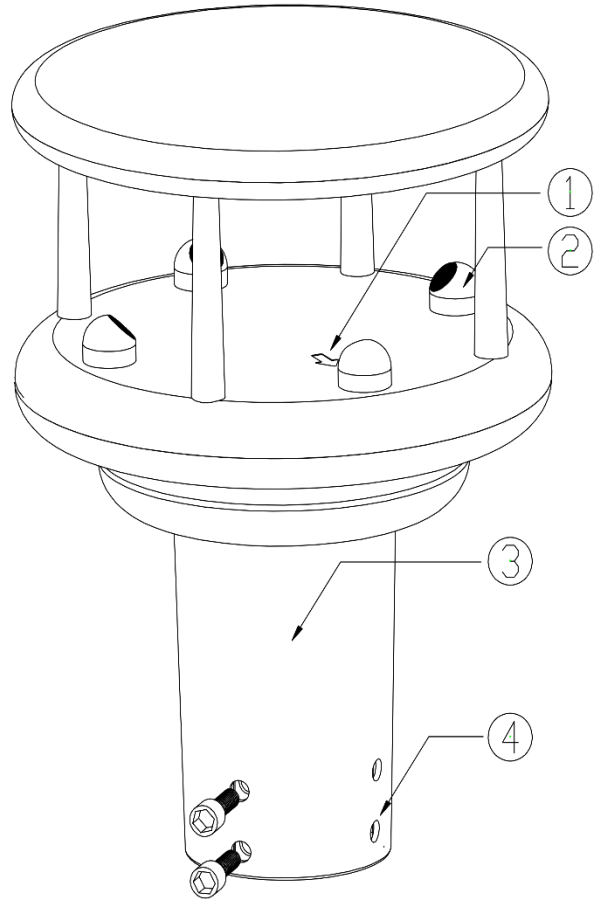
Noise			√
PM2.5	√	√	√
PM10	√	√	√

2.4 Technical Data Sheet

parameter	Range	Resolution	Accuracy	Configuration
PM _{2.5}	0-1000ug/m ³	1ug/m ³	±10% Measurements(<500 mcg)	Optional
PM ₁₀	0-1000ug/m ³	1ug/m ³	±15% Measurements(<500 mcg)	Optional
CO	0-20ppm	≤10ppb	±1.5%F.S	Optional
SO ₂	0-2000ppb	≤10ppb	±1.5%F.S	Optional
NO ₂	0-2000ppb	≤10ppb	±1.5%F.S	Optional
O ₃	0-2000ppb	≤10ppb	±1.5%F.S	Optional
Temperature	-40-60°C	0.01°C	±0.3°C (25°C)	Optional
Relative humidity	0-100%RH	0.01%	±3%RH	Optional
Wind speed	0-60m/s	0.01m/s	(0-30m/s) ±0.3m/s or ±3% (30-60m/s) ±5%	Optional
Wind direction	0-360°	0.1°	±2°	Optional
Atmospheric pressure	300-1100hpa	0.1hpa	±0.5hpa (0-30°C)	Optional
Rainfall	0-200mm/h	0.1mm	Error ±10%	Optional
Illuminance	0-100klux	10lux	3%	Optional
Solar radiation (photoelectric / thermoelectric)	0-2000W/M2	1W	3% 5%	Optional
Noise	30-130dB	0.1dB	±1.5dB	Optional
Ultraviolet	0-15	/	/	Optional
CO2	0-5000PPM	1PPM	±40PPM ±3%FS	Optional

3. Product specification

3.1 HD-WSM-U-02 ultrasonic wind speed and direction instrument



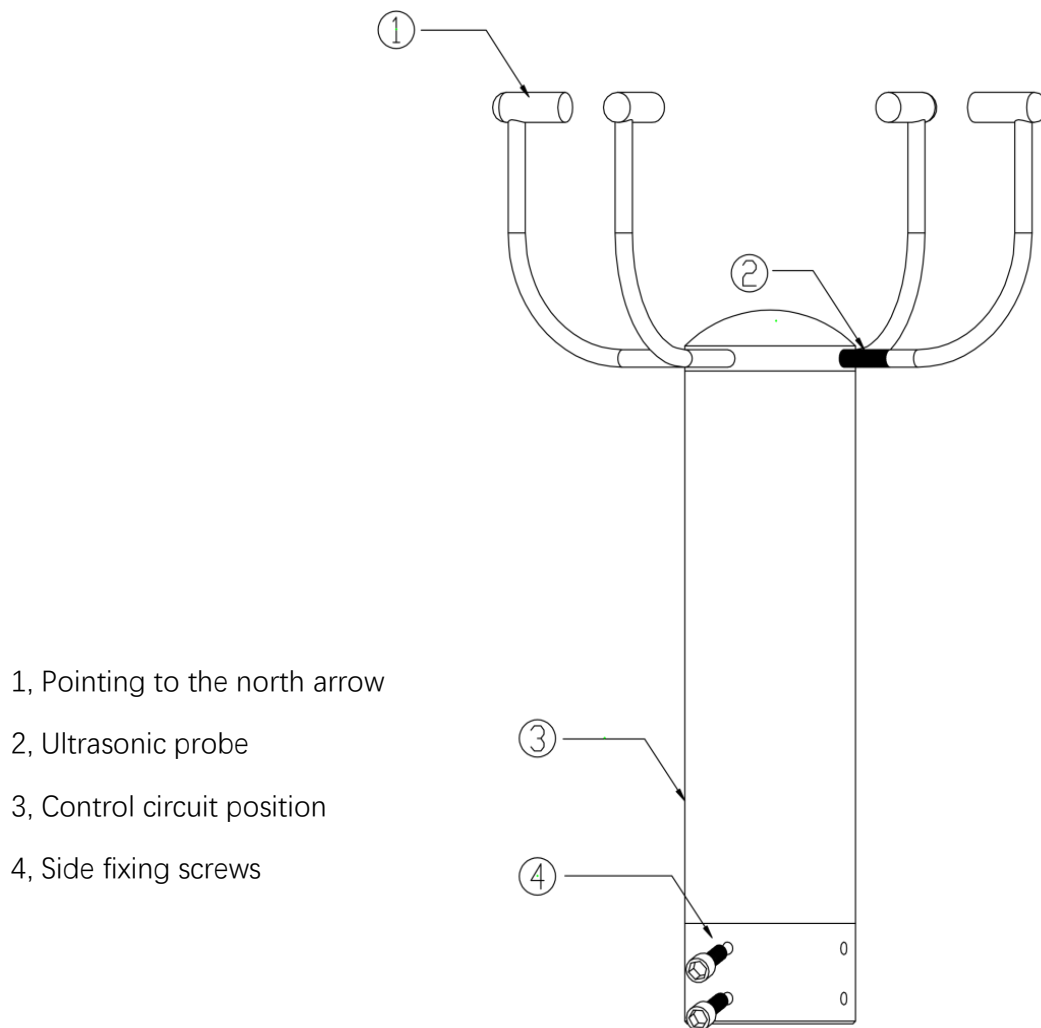
1, Pointing to the north arrow

2, Ultrasonic probe

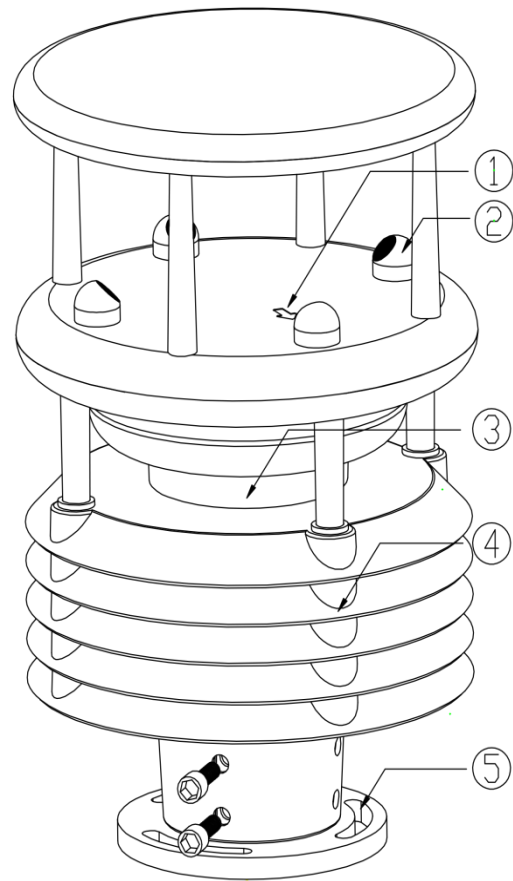
3, Control circuit position

4, Side fixing screws

3.2 HCD6812A ultrasonic wind speed and direction instrument



3.3 HD-WSM-U-05 five-element micro-meteorometer (temperature and humidity, wind speed and direction)



1, Pointing to the north arrow

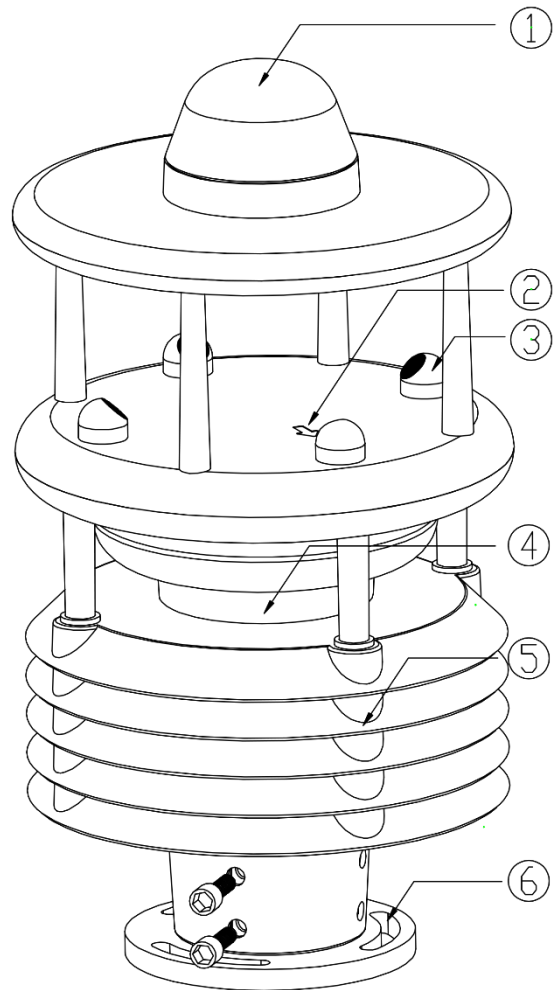
2, Ultrasonic probe

3, The control circuit

4, Shutter box (temperature, humidity, air pressure monitoring position)

5, The bottom fixed flange

3.4 HD-WSM-U-06 six-element micro-meteorometer (warm and wet pressure, wind speed and direction, rainfall)



1, Rain sensor

2, Pointing to the north arrow

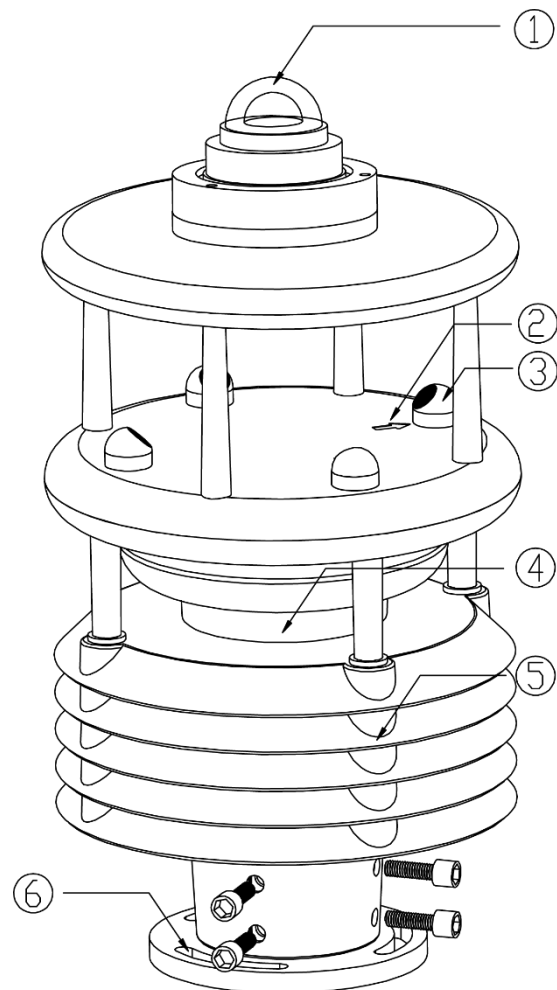
3, Ultrasonic probe

4, The control circuit

5, Blind box (temperature, humidity, air pressure monitoring position)

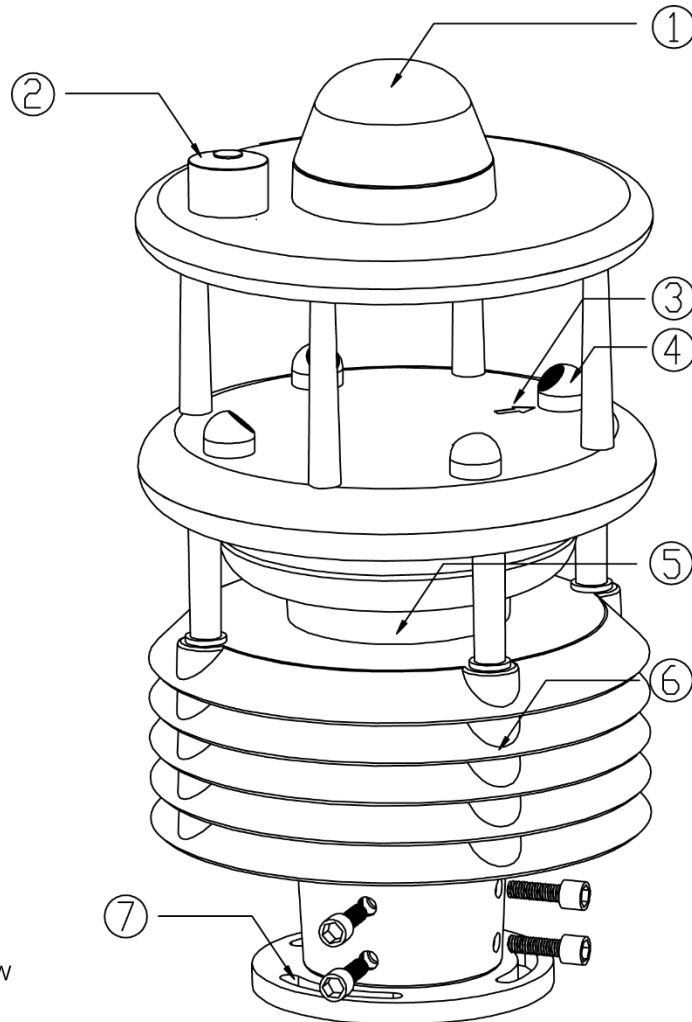
6, The bottom fixed flange

3.5 HCD6816A six-element micro-meteorometer (warm and wet pressure, wind speed and direction, thermoelectric total radiation)



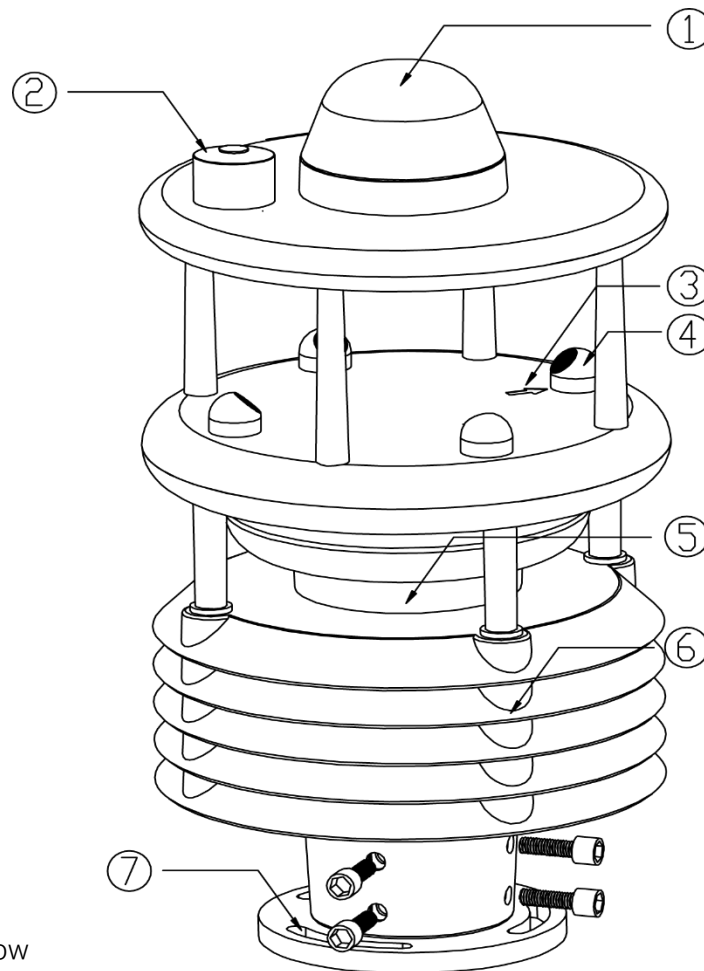
- 1, Thermoelectric radiation meter
- 2, Pointing to the north arrow
- 3, Ultrasonic probe
- 4, The control circuit
- 5, Blind box (temperature, humidity, air pressure monitoring position)
- 6. Bottom fixing flange

3.6 HD-WSM-U-07 seven-element micro-meteorometer (temperature and humidity, wind speed, rainfall, illuminance)



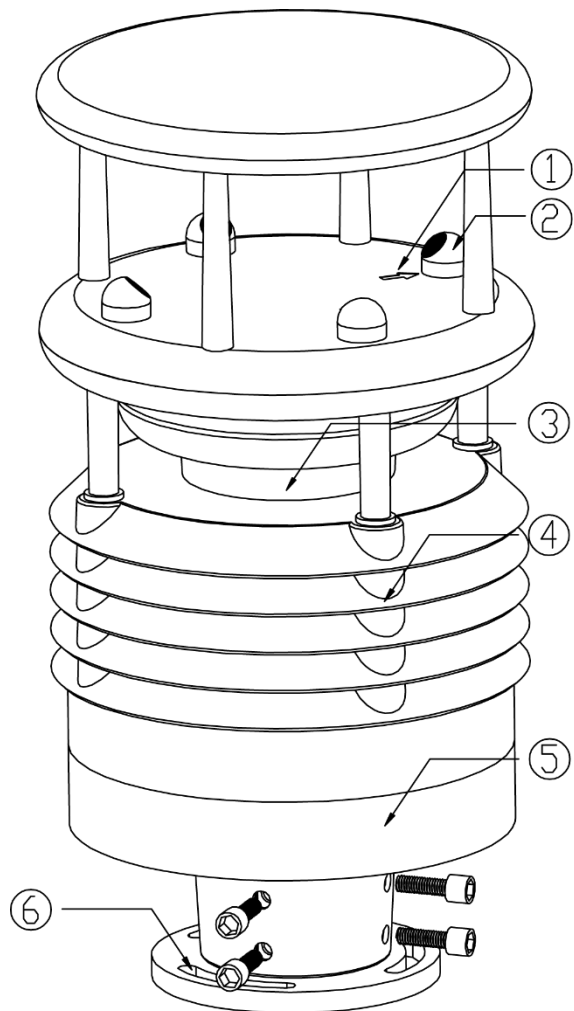
- 1. Optical rainfall
- 2. Illuminance
- 3. Pointing to the north arrow
- 4. Ultrasonic probe
- 5. The control circuit
- 6. Louver box (temperature, humidity, air pressure monitoring position)
- 7. The bottom fixed flange

3.7 HCD6817A seven-factor integrated weather station ((temperature and humidity, wind speed, rainfall, photoelectric radiation)



1. Optical rainfall
2. Photoelectric radiometer
3. Pointing to the north arrow
4. Ultrasonic probe
5. The control circuit
6. Louver box (temperature, humidity, air pressure monitoring position)
7. The bottom fixed flange

3.8 HD-WSM-U-08B dust online monitor (temperature and humidity, wind speed, PM2.5, PM10, noise)



1, Pointing to the north arrow

2, Ultrasonic probe

3, The control circuit

4, Shutter box (temperature, humidity, air pressure monitoring position)

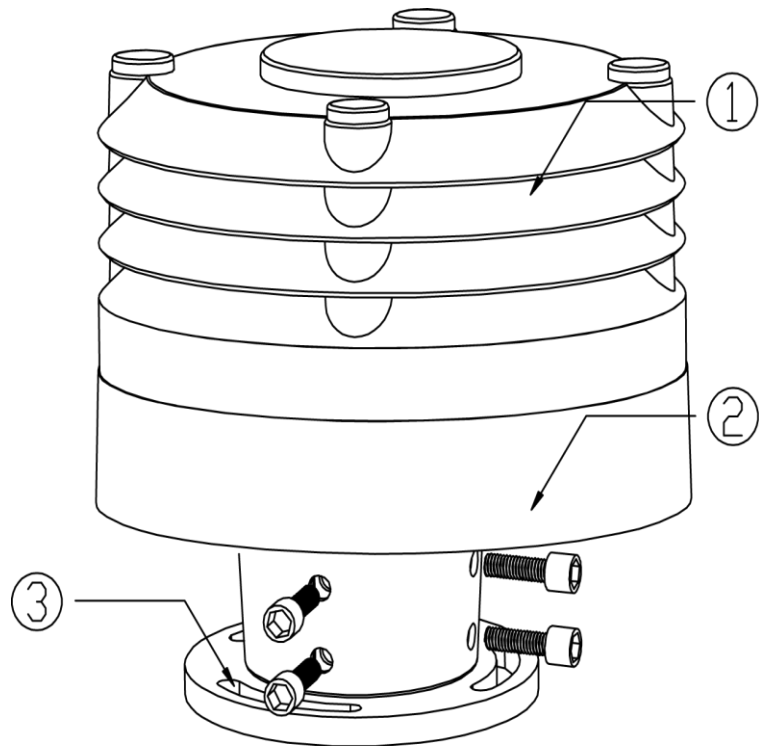
5, PM2.5, PM10, noise

6, The bottom fixed flange

3.9 HCD6818 air quality transmitter

HCD6818B dust online monitor air quality transmitter low version

(Temperature, humidity, PM2.5, PM10, CO, NO2, SO2, O3)

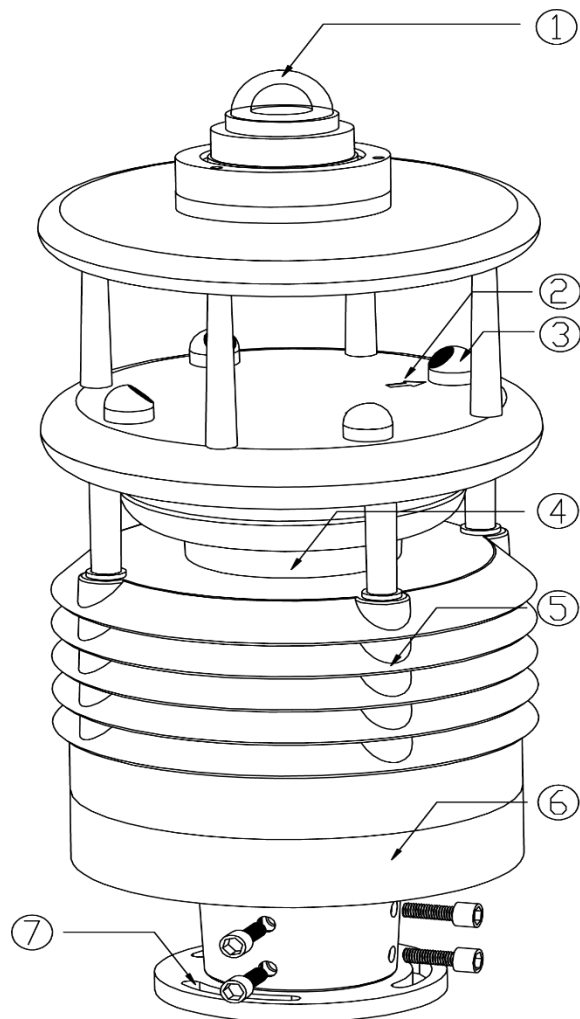


1. Louver box (temperature, humidity, air pressure monitoring position)

2, PM2.5, PM10, CO, NO2, SO2, O3

3, The bottom fixing flange

3.10 HD-WSM-U-08B-TR eight-element integrated weather station (temperature and humidity, wind speed and direction, total solar radiation, PM2.5, PM10)



1, Total thermal radiation

2, Pointing to the north arrow

3, Ultrasonic probe

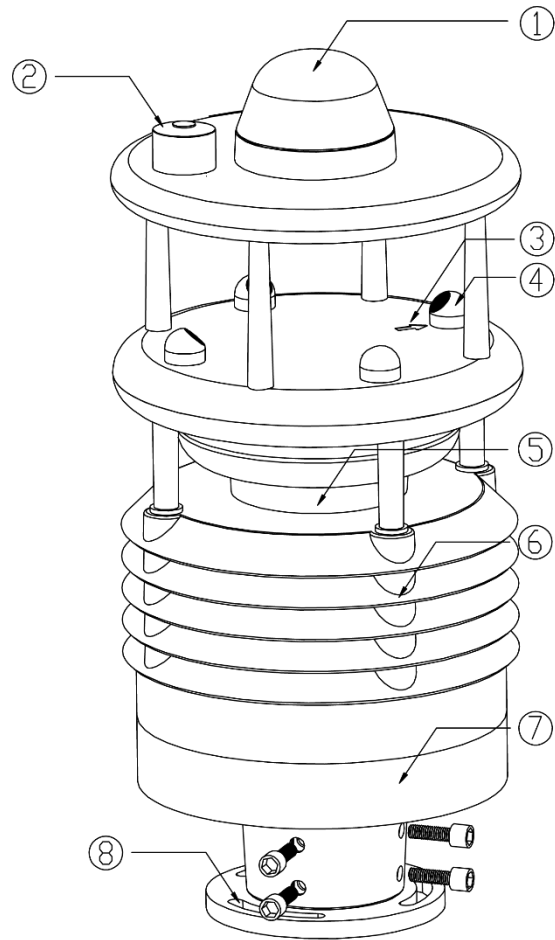
4, The control circuit

5, Blind box (temperature, humidity, air pressure monitoring position)

6, PM2.5, PM10

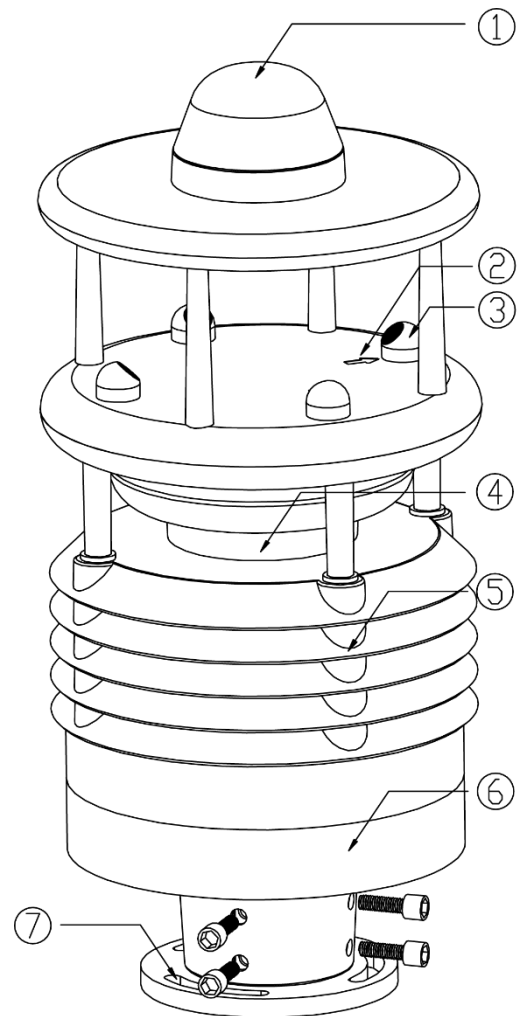
7, The bottom fixed flange

3.11 HD-WSM-U-08C Eight-element integrated weather station (temperature, humidity, air pressure, wind speed, wind direction, photoelectric radiation, rainfall, PM2.5, PM10, Ultraviolet)



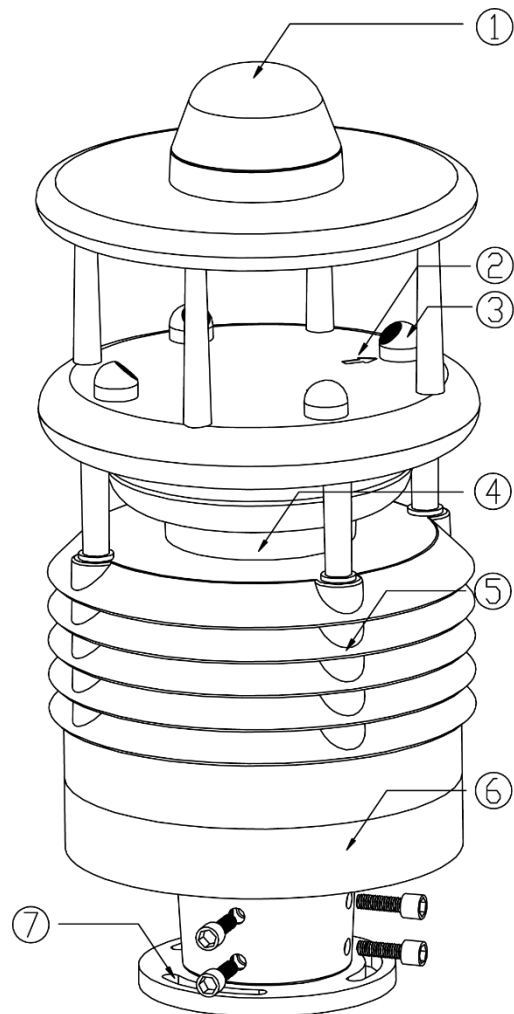
1. Optical rainfall
2. Ultraviolet
3. Pointing to the north arrow
4. Ultrasonic probe
5. The control circuit
6. Louver box (temperature, humidity, air pressure monitoring position)
7. PM2.5, PM10
8. The bottom fixed flange

3.12 HD-WSM-U-09E (Air temperature, humidity, wind speed, wind direction, atmospheric pressure, rainfall, PM2.5, PM10, Ultraviolet)



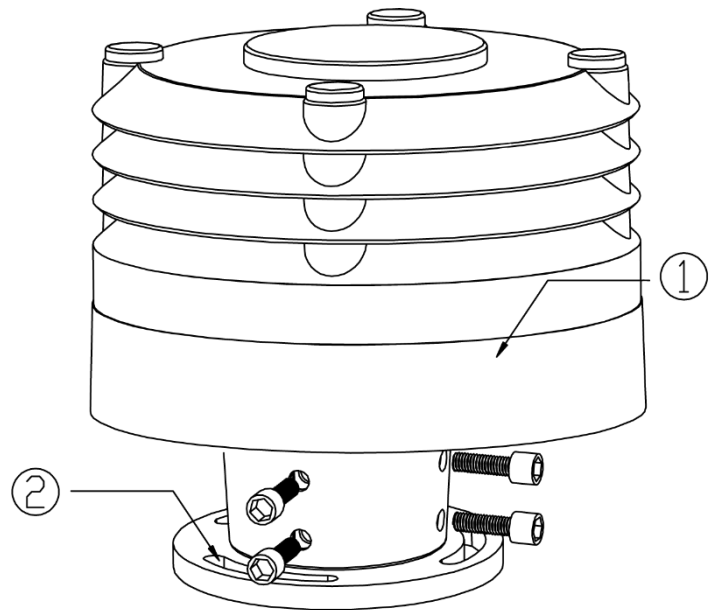
1. Optical rainfall
2. Ultraviolet
3. Pointing to the north arrow
4. Ultrasonic probe
5. The control circuit
6. Blind box (temperature, humidity, air pressure monitoring position)
7. PM2.5, PM10
8. The bottom fixed flange

3.12 HD-WSM-U-12 Air Pollution Environmental Monitor (Air temperature, humidity, wind speed, wind direction, atmospheric pressure, rainfall, PM2.5, PM10, CO, NO2, SO2, O3)



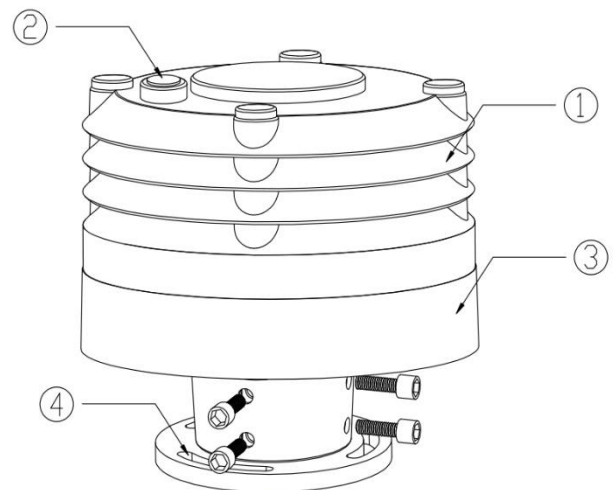
- 1. Optical rainfall
- 2, Pointing to the north arrow
- 3, Ultrasonic probe
- 4, The control circuit
- 5, Blind box (temperature, humidity, air pressure monitoring position)
- 6, PM2.5, PM10, CO, NO2, SO2, O3
- 9, The bottom fixed flange

3.13 HD-WSM-2510 Air Quality Transmitter (PM2.5, PM10)



1. PM2.5 ,PM10 Monitoring
2. The bottom fixed flange

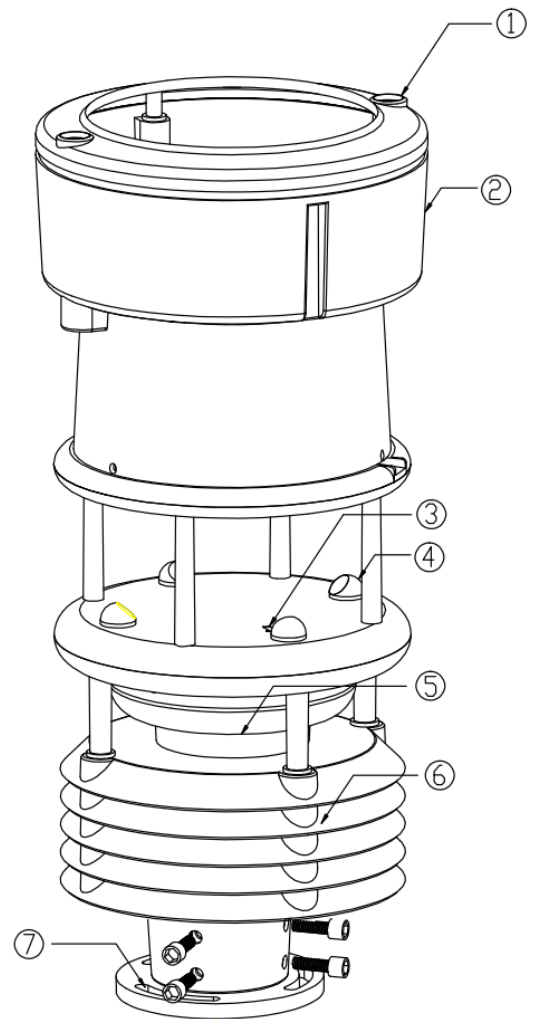
3.14 HD-WSM-2-6 Air Quality Transmitter



1. Louver (temperature, humidity) monitoring
2. Illumination
3. PM2.5, PM10, noise monitoring
4. Bottom fixing flange

3.15 HD-WSM-2-6 Air Quality Transmitter

1. Illumination/solar radiation
2. Tipping bucket rain gauge
3. Ultrasonic wind speed
4. Ultrasonic wind direction
5. Control circuit
6. Louver box (temperature, humidity, air pressure measurement location)
7. Bottom fixed flange



4. Installation

4.1 Direction selection



Note: Positioning indicator arrow

When installing the device, point the arrow pointing to the positioning indicator on the device to the north direction. The instrument is 0° north and increases clockwise.



It is best to use a device with magnetic declination correction when looking for the north direction. If it is not, it can be corrected according to the latitude and longitude installed by the device.

4.2 Installation location selection

When choosing an installation location, the following guidelines should be followed:

1. Ensure that there are no ultrasonic devices of the same type around to avoid mutual interference;
2. The installation location should choose open area, along the wind side;
3. The installation height should not be less than 1.5m, the installation distance from the nearest obstacle should be more than 10 times the height of the brick house;
4. When the radiation parameters are included, they should be installed in an open space; from sunrise to sunset in the entire altitude range, the elevation angle of obstacles within the range is not more than 5° to avoid heat radiation (above 200 °C), steam and bright color

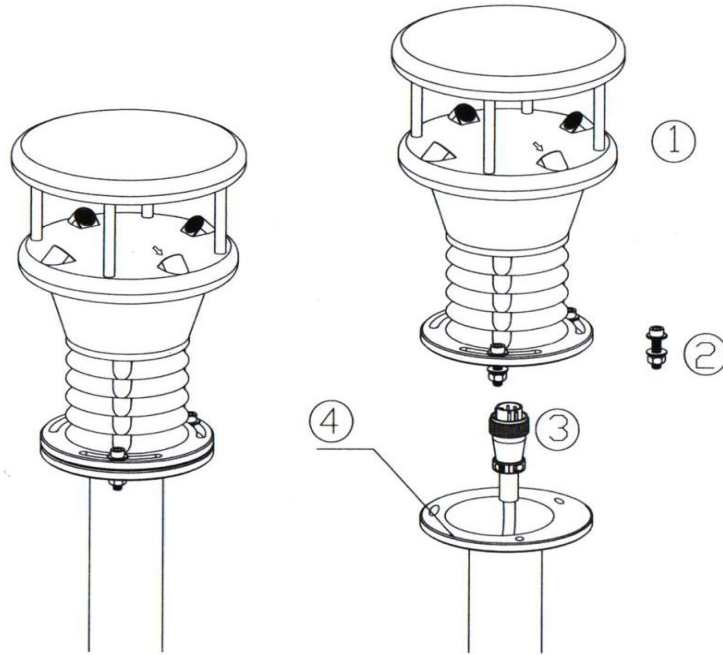
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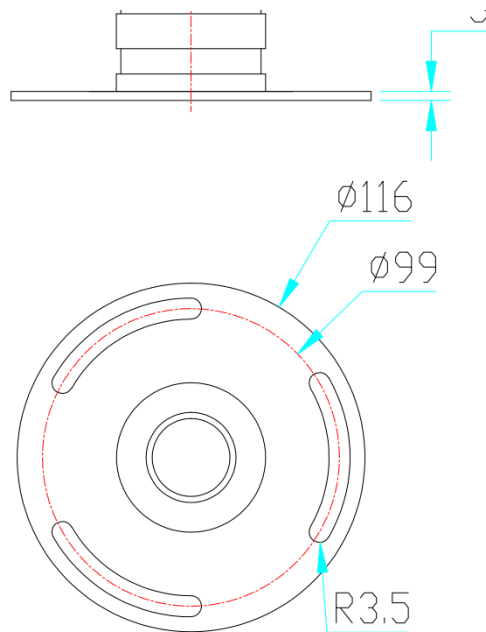
buildings.

4.3 Fixed way

4.3.1 Flange fixing



4.3.2 Flange size

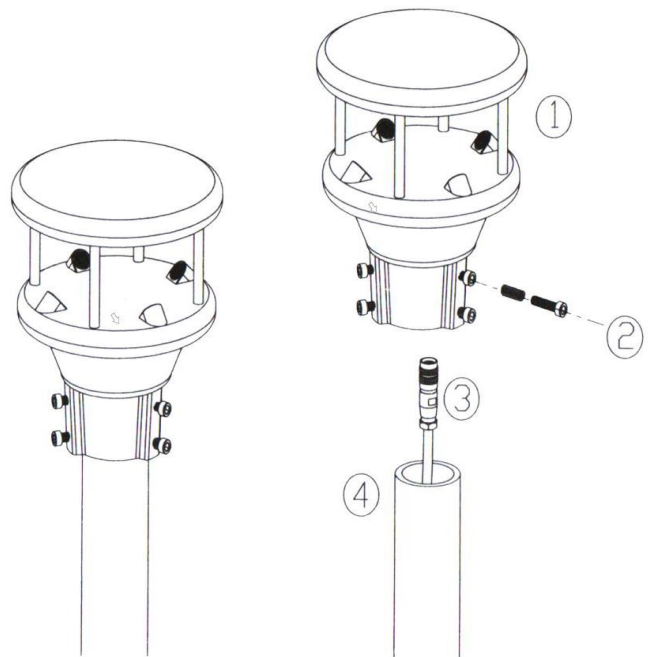


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4.3.3 Bucket type fixing

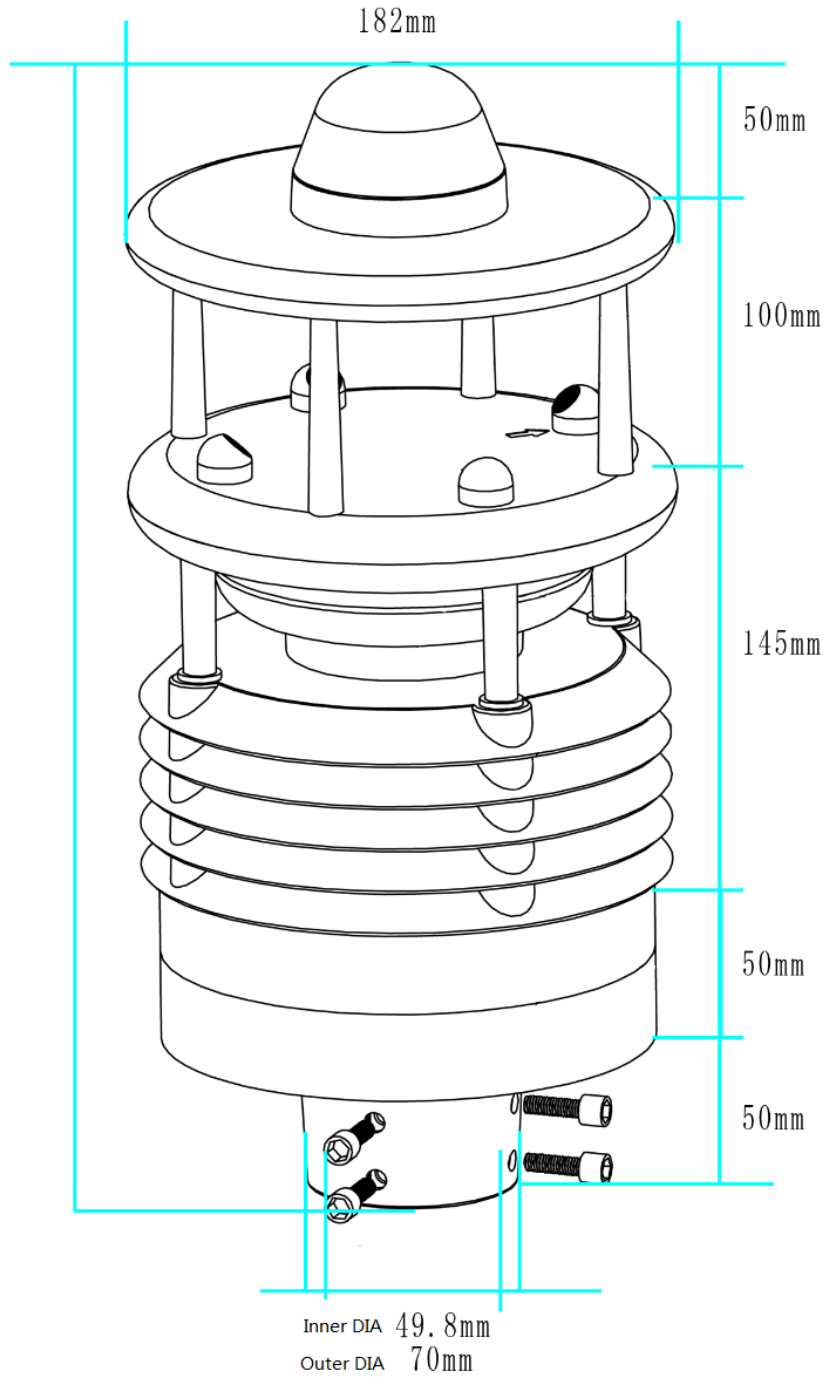
- 1, Micro-meteorometer
- 2, The screw
- 3, Communication cable + aerial plu
- 4, Fixed bracket



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4.4 Product Size



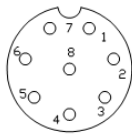
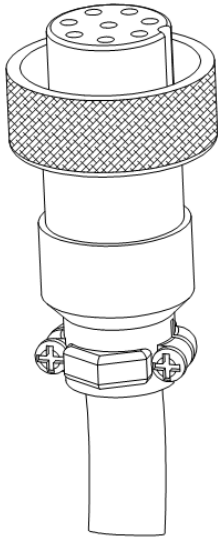
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4.5 Line order definition

Figure 1

The eight-core cable is defined as follows 4-20mA Output



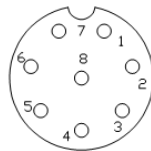
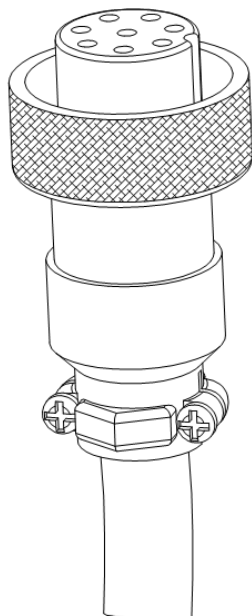
Three-wire system

- 1. Positive power supply**
- 2. Negative power supply**
- 3. Wind speed signal line 4-20mA**
- 4. Wind direction signal line 4-20mA**

The rest is empty

Figure 2

The definition of the eight-core cable is as follows RS485 Output

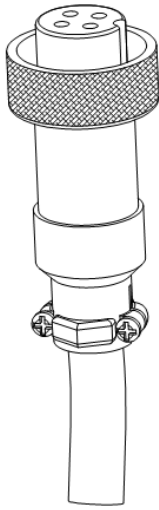


- 1. Positive power supply**
- 2. Negative power supply**
- 3. RS485A**
- 4. RS485B**

The rest is empty

Figure 3

Four-core cable navigation is defined as follows RS485 Output



- 1. Positive power supply**
- 2. Negative power supply**
- 3. RS485 A**
- 4. RS485 B**

4.6 Wiring definition

Line Colour		Note
Red	Positive Power Supply	DC12V-24V , recommend DC12V
Black	Negative Power Supply	
Yellow	RS 485+	Analog output is wind speed signal
Blue	RS 485-	Analog output is wind direction signal



WRONG

Incorrect wiring can cause permanent damage to the device!

5. RS485 Protocol

5.1 Communication specifications

Baud rate: 9600

Data bits: 8

Stop position: 1

Check digit: none

5.2 CRC description

In all of the following descriptions, the CRC16 two bytes in the MODBUS RTU protocol are specified in MODBUS: the low byte is first and the high byte is after.

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

5.3 Return error code specification

The sensor does not return the error code mode for the reception of the wrong command (including the CRC16 check error). The host computer can think that the instruction fails when the return data is received after the instruction is sent for 100ms, and the instruction can be resent.

5.4 Standard MODBUS Register Description

Special Note: The number or length of registers in the MODBUS command is two bytes and 16 bits in one unit (high byte first and low byte last), instead of single byte 8 bits is one unit. The user should ensure that the range of the address and number of registers in the command is within the scope of this system. If it is out of range, the output of the sensor will be unpredictable. The user should ensure that the MODBUS command meets the requirements of this manual in the PC software design.

5.5 Input register: read with function code 03

Address	Operating	Content	Note
0x0001	Read only	Noise, amplify 10 times hexadecimal number, such as 0x0193 means the noise is 40.3dB	
0x0002	Read only	Hydrogen sulfide	
0x0003	Read only	SO ₂ concentration, hexadecimal number, such as 0x0172, indicating SO ₂ concentration	

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		is 370ppb	
0x0004	Read only	NO ₂ concentration, hexadecimal number, such as 0x0036, indicating NO ₂ concentration is 54ppb	
0x0005	Read only	CO concentration, hexadecimal number, such as 0x0A00, indicating CO concentration is 2560ppb	
0x0006	Read only	O ₃ concentration, hexadecimal number, such as 0x0123, indicating O ₃ concentration is 291ppb	
0x0007	Read only	PM2.5 concentration, hexadecimal number, such as 0x0172, the PM2.5 concentration is 370ppm	
0x0008	Read only	PM10 concentration, hexadecimal number, such as 0x0193, the PM10 concentration is 403ppm	
0x0009	Read only	Air temperature, plus 40 to enlarge 100 times the hexadecimal number, such as 0x1B00 means $6912/100-40=29.12$ °C	
0x000A	Read only	Air humidity, magnified 100 times hexadecimal number, such as 0x1603 means $5635/100=56.35\%$	
0x000B	Read only	Atmospheric pressure, 10 times the hexadecimal number, such as 0x2784 means $10116/10=1016$ hPa	
0x000C	Read only	Wind speed, magnified 100 times hexadecimal number, such as 0x0125 means $293/100=2.93$ m/s	
0x000D	Read only	Wind direction, magnify 10 times the hexadecimal number, such as 0x0C14 means $3092/10=309.2$ °	North is 0°, East is 90°, South is 180°, West is 270°
0x000E	Read only	10 minutes of rainfall, zoom in 10 times the hexadecimal number, such as 0x0016 said 2.2mm	
0x000F	Read only	Radiation, hexadecimal number, such as 0x0172, the radiation intensity is 370W/m ²	
0x0010	Read only	Illumination, magnify 100 times the hexadecimal number, for example, 0x0123 means the light intensity is 2.91. Klux	
0x0011	Read only	UV index, hexadecimal number, such as 0x05 means the UV index is 5	

0x0012	Read only	CO2, hexadecimal number, such as 0x01F4 means that the CO2 concentration is 500ppm	
0x0013	Read only	Negative oxygen ions, reduced by 10 times the hexadecimal number, such as 0x01F4 means that the number of negative oxygen ions is 5000	
0x0014-0x001f	Reserved		
0x0020	Read only	Electronic compass, hexadecimal number, such as 0x0036 indicates that it is currently pointing at 54 °	North is 0
0x0021	Read only	Pitch angle 1	custom made
0x0022	Read only	Pitch angle 2	custom made
0x0023	Read only	Pitch angle 3	custom made
0x0024	Read only	Longitude -1	custom made
0x0025	Read only	Longitude -2	custom made
0x0026	Read only	Latitude-1	custom made
0x0027	Read only	Latitude-2	custom made
0x0028	Read only	Altitude	custom made

5.6 . Internal register: read with function code 03; function code 06 write

Address	Operating	Content	Note
0x0000	Read and write	Sensor address, range 0x01-0xFF (decimal), factory set to 0xFF	

Note: The data in the address part is expressed in hexadecimal. For example, the address 20 (decimal) read/write value is 0x14.

5.7 Communication example

The following example shows how to access the system registers using the Modbus RTU command:

1. Read multiple input registers (5 real-time data) commands

Send: FF 03 00 09 00 05 40 15

Address	function code	Register address	Number of registers	CRC16 check digit
FF	03	00 09	00 05	40 15

Reply: FF 03 0A 1A 57 0C 5F 27 83 00 00 0C 14 36 E0

Data segment data is

System address	function code	Number of bytes in the data segment	Data segment data	CRC16 check digit
FF	03	0A	1A 57 0C 5F 27 83 00 00 0C 14	36 E0

Analytical data:

$$0x1A57 = 0x1A * 256 + 0x57 = 6743, \text{ Temperature} = 6743 / 100 - 40 = 27.43 \text{ } ^\circ\text{C}$$

$$0x0C5F = 0x0C * 256 + 0x5F = 3167, \text{ Humidity} = 3167/100 = 31.67\% \text{ RH}$$

$$0x2783 = 0x27 * 256 + 0x83 = 10115, \text{ Air pressure} = 10115/10 = 1011.5\text{hPa}$$

$$0x0000 = 0, \text{ Wind speed} = 0/100 = 0.00\text{m / s}$$

$$0x0C14 = 0x0C * 256 + 0x14 = 3092, \text{ Wind direction} = 3092/10 = 309.2 \text{ } ^\circ$$

2. Read a single input register command

Send: FF 03 00 01 00 01 C0 14

Address	function code	Register address	Number of registers	CRC16 check digit
FF	03	00 01	00 01	C0 14

Reply: FF 03 02 02 1C 91 39

System address	function code	Number of bytes in the data segment	Data segment data	CRC16 check digit
FF	03	02	02 1C	91 39

Analytical data:

$$0x021C = 0x02 * 256 + 0x1C = 540, \text{ Noise} = 540/10 = 54.0\text{dB}$$

3. Read address register command

Send: 00 03 00 00 00 01 85 DB

	function code	Register address	Number of registers	CRC16 check digit
00	03	0000	0001	85 DB

Reply: 00 03 02 00 01 44 44

	function code	Number of bytes in the data segment	Data segment data	CRC16 check digit
00	03	02	00 01	44 44

Data segment data is 0x0001 =01 indicates system address 01

4. Modify the internal register (system address) command (change the address to 0x33)

Send: 00 06 00 00 00 33 C8 0E

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	function code	Register address	New Address	CRC16 check digit
00	06	0000	0033	C8 0E

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

	function code	Start address	New address	CRC16 check digit
00	06	00 00	00 33	C8 0E

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

	function code	Start address	New address	CRC16 check digit
00	06	00 00	00 33	C8 0E

5. Read the electronic compass (the output value is the angle between the compass north and the sensor north arrow)

Send: FF 03 00 20 00 01 90 1E

System address	function code	Register address	Number of registers	CRC16 check digit
FF	03	00 20	00 01	90 1E

Reply: FF 03 02 00 36 11 86

System address	function code	Number of bytes in the data segment	Data segment data	CRC16 check digit
FF	03	02	01 61	51 E8

The angle between the compass north and the sensor north arrow is 353°

6. Set rain accumulation time

Send: FF 06 01 07 00 0A AC 2E

	function code	Start address	Accumulated time (minutes)	CRC16 check digit
FF	06	01 07	00 0A	AC 2E

Reply: FF 06 01 07 00 0A AC 2E

	function code	Start address	Accumulated time (minutes)	CRC16 check digit
FF	06	01 07	00 0A	AC 2E

The factory default immediate time of the device is 10 minutes. When the rainfall accumulation time is set to 0, the device does not automatically clear the rainfall, and it has been accumulated. The rainfall can be reset to zero by restarting the power or resetting the rainfall accumulation time.

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7. Set the magnetic declination correction (only for the optional electronic compass)

Send : FF 06 01 06 00 05 BD EA

	Function code	Register address	Correction angle	CRC16 check digit
FF	06	01 06	00 05	BD EA

Reply: FF 06 01 06 00 05 BD EA

	function code	Start address	Correction angle	CRC16 check digit
FF	06	01 06	00 05	BD EA

Corrected corner meaning

The high eight bits indicate the correction direction, 0x00 represents positive correction, and 0x01 is negative correction

The lower eight digits are the angles that need to be corrected

Example 0x00 05 means that the output value needs to be increased by 5 degrees.

0x01 03 means that the output value needs to be reduced by 3 degrees

8. GPRS setting network information (for optional GPRS models)

Set IP AT + GPRSIP = xxx.xxx.xxx.xxx #

Set port AT + GPRSPORT = xxxxx #

Save and validate the settings AT + GPRSRESET

Read IP, port RD + GPRSADD =

9. Read latitude and longitude information

Send AT+GPS#

Reply

GPS: 36.12345,N;114.12345,E;2019-01-01,D;10:20:00,T;0040.2,H#

Supplementary agreement: (The default device address is FF)

Active reporting cycle (register address 0x01 0A) The unit is min, 0 means no reporting

FF 06 01 0A 00 0A 3D ED (Set the active reporting period to 10 minutes)

Actively report the length (register address 0x01 0B)

FF 06 01 0B 09 05 2A 79 (proactively report register address 09-0D)

Baud rate (register address 0x0102)

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

FF 06 01 02 00 02 BD E9 (Set the baud rate to 9600, non-professionals should not change it by themselves)

10. Others

Protocols can be customized according to user requirements, including protocols such as ASCII and NMEA.

6. System parameters

- Stability: less than 1% of sensor life cycle
- Reaction time: less than 10 seconds
- Warm-up time: 30S (SO₂\NO₂\CO\O₃ 48 hours)
- Working current: DC12V≤60ma(HCD6815)-DC12V≤180ma(HCD6820)
- Power consumption: DC12V≤0.72W (HCD6815); DC12V≤2.16W (HCD6820)
- Life expectancy: Except for SO₂\NO₂\CO\O₃\PM_{2.5}\PM₁₀ (normal environment for 1 year, high pollution environment is not guaranteed), the service life is not less than 3 years.
- Output: RS485, MODBUS communication protocol
- Housing Material: ASA Engineering Plastics
- Working environment: temperature -30 ~ 70 ° C, working humidity: 0-100%
- Storage conditions: -40~60°C
- Standard wiring length: 3 meters
- The farthest lead length: RS485 1000 meters
- Protection level: IP65

7. Fault description

Phenomenon	Solution
No communication	Check the power supply and connect the cable Check communication configuration parameters
Abnormal data	Check if the sensor is contaminated by foreign matter Check if there is any interference source around

If the fault still cannot be ruled out, please contact the manufacturer. If you open the equipment, you will no longer enjoy the warranty. If you are involved in the infringement, you will be investigated for legal responsibility!