Seven& Eleven elements weather station use manual

1. Product Description

The all-in-one agricultural weather sensor is a small weather observation device developed by our company with years of experience in the meteorological industry for the application of agricultural weather monitoring. It can measure eleven parameters: atmospheric temperature, relative humidity, wind speed, wind direction, atmospheric pressure, illumination, rainfall, radiation (optional), sunshine hours (optional), dew point temperature (optional), (ET0) reference crop evapotranspiration (optional).

The products are highly integrated, cost-effective, easy to install, and suitable for promotion. It can completely replace the traditional patchwork agricultural weather station type, which is widely used in digital agricultural monitoring fields such as facility agriculture, field four conditions, and water-saving irrigation.

2. Product Features

1. Standardly equipped to monitor the measurement of **atmospheric temperature, relative humidity, wind speed, wind direction, atmospheric pressure, illumination, rainfall,** a total of seven parameters. (Optional sunshine radiation, sunshine hours, dew point temperature, evaporation ET0 parameters)
2. Standard product adopts RS485 communication, MODBUS communication protocol, optional 4G output, optional matching server and software.
3. Exquisite appearance and highly integrated structure, designed with reference to meteorological standards;
4. Reliable performance, suitable for outdoor weather harsh environment field.
5. Free installation, environmental protection and energy saving, can completely replace the traditional patchwork agricultural weather station type.

3. Applications

It can be widely used in environmental protection projects, water conservancy, fields, oceans, grasslands, highways, airports, railways, and so on.

4. Monitoring parameters:

Serial number	Monitoring parameters	Measurement range	Resolution	Accuracy	Configuration
1	Air temperature	-40-85℃	0.01°C	±0.3℃ (25℃)	
2	Air humidity	0-100%RH	0.01%	±3%RH (at 10%~80%, no condensation)	
3	Wind Speed	0-40m/s	0.01m/s	±(0.5+0.05v)m/s, v is the standard wind speed value of wind tunnel	
4	Wind direction	0-359.9°	0.1°	±5° (when wind speed <10m/S)	
5	Atmospheric pressure	300hpa-1100hpa	0.1hpa	±0.3hPa (at 25℃, 950hpa~1050hpa)	
6	Rainfall	≤4mm/min	0.2mm	±0.4mm(R≤10mm)±4%(R＞10mm)	
7	Light intensity	0-200k Lux	10Lux	±3% or 1% F.S	
8	☆ Radiation	0-2000W/㎡	1W/㎡	<±5%(600w/㎡~1000w/㎡, compare with EKO&MS802(Grade A))	
9	☆ Sunshine hours	0-24h	0.1h	5%	
10	☆ Dew point temperature	-50-40℃	0.1°C	≤0.5℃ (0℃-30℃, 40%RH~100%RH) ＞1℃（＜0℃，＜40%RH）	
11	☆ ET0 value	0-80mm/h	0.1mm/h	±25% (calculated by formula)	Hourly updates
Remarks		☆ represents optional parameters			

5. Technical parameters

Power supply method	DC12-24V power supply
Power consumption	<0.6W (only the main body of the device is counted)
Transmission method	Default RS485 output, MODBUS protocol, optional 4G transmission method
Working Environment	Temperature -40-70℃ Humidity 5-90%RH
Optional Features	Optional addition of sunshine radiation hours, dew poin temperature, ET0 (potential evaporation) parameters;
Remarks	The price of the optional features all need to be added to the standard price.

6. MODBUS RTU communication protocol

Baud rate: 9600

Data bits: 8

Stop bit: 1

Checksum bit: None

1.1 CRC Description:

In all the following descriptions, the two bytes of CRC16 in the MODBUS RTU protocol, according to the MODBUS regulations: the low byte comes first and the high byte comes second.

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

1.2 Return error code provision:

The sensor does not return error codes for the reception of error commands (including CRC16 validation errors). The upper computer can be considered to have failed to send the command when the return data is not received after 200ms, and can resend the command.

1.3 Standard MDBUS Register Description

Special note: The number or length of registers in MODBUS command is one unit of two bytes and 16 bits (high byte before, low byte after), not one unit of single byte and 8 bits.

The user should ensure that the range of the two parameters, address and number of registers in the command, is within the range specified in this system. If out of range, the output result of the sensor will be unpredictable. The user should ensure that the MODBUS command meets the requirements of this manual in the upper computer software design, which supports a minimum

interrogation period of 1s/time.

Input register: Read with function code 03

Address	Operation	Content	Remarks
0x0001	Read Only	Air temperature, plus 40 magnified 100 times the hexadecimal number, such as 0x1B00 means 6912/100-40 = 29.12 ℃	
0x0002	Read Only	Air humidity, magnified 100 times the hexadecimal number, such as 0x1603 means 5635/100 = 56.35%	
0x0003	Read Only	Atmospheric pressure intensity, magnified by 10 times the hexadecimal number, such as 0x2784 means 10116/10 = 1011.6hPa	
0x0004	Read Only	Wind speed, magnified 100 times the hexadecimal number, such as 0x0125 means 293/100 = 2.93m/s	
0x0005	Read Only	Wind direction, magnified by 10 times the hexadecimal number, e.g. 0x0C14 means 3092/10=309.2°	North is 0°
0x0006	Read Only	Continuous rainfall, magnified 10 times the hexadecimal number, such as 0x0016 means 2.2mm	Default Continuous Accumulation
0x0007	Read Only	Radiation, hexadecimal number, such as 0x0172 indicates that the radiation intensity for 370W/㎡	Optional
0x0008	Read Only	Illumination, magnified 100 times the hexadecimal number (in k Lux), e.g. 0x0123 means the light intensity is 2.91 k Lux or 2910 Lux	
0x0009	Read Only	Sunshine hours, magnified 10 times the hexadecimal number, such as 0x0023 means the sunshine hours is 3.5h	Optional Default Continuous Accumulation
0x000A	Read Only	Dew point temperature, plus 50 magnified 10 times the hexadecimal number, such as 0x0217 means the dew point temperature is 3.5 ℃	Optional
0x000B	Read Only	ET0, the hexadecimal number with 10 times magnification, such as 0x0023 means ET0 is 3.5mm	Optional Updated hourly, parameters to be set during installation

1.4 Communication example

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

1. Read multiple input registers (11 real-time data) command

Send: FF 03 00 01 00 0B 40 13

FF	03	00 01	00 0B	40 13
System Address	Function Code	Register Address	Number of registers	CRC16 check digit

Answer: FF 03 16 **1A 57 0C 5F 27 83 00 11 0C 14 00 02 01 72 01 23 00 23 02 17 00 23** 73 FA

FF	03	16	1A 57 0C 5F 27 83 00 11 0C 14 00 02 01 72 01 23 00 23 02 17 00 23	73 FA
Address	Function Code	Number of data segment bytes	Data segment data	CRC16

Parsed data:

0x1A57, = 6743, temperature = 6743/100-40 = 27.43°C

0x0C5F, = 3167, humidity = 3167/100 = 31.67%RH

0x2783, = 10115, air pressure = 10115/10 = 1011.5hPa

0x0011, = 17, wind speed = 17/100 = 0.17m/s

0x0C14, = 3092, wind direction = 3092/10 = 309.2°

0x0002, =2, rainfall = 2/10 = 0.2mm

0x0172, = 370, radiation = 370W/㎡

0x0123, = 291, illumination = 291/100 = 2.91k Lux or (291*10) 2910Lux

0x0023, = 35, sunshine hours = 35/10 = 3.5h

0x0217, = 535, dew point temperature = 535/10-50 = 3.5°C

0x0023, =35, ET0=35/10=3.5mm

2. Read Address Register Command

Send: 00 03 00 00 00 00 01 85 DB

00	03	00 00	00 01	85 DB
Fixed Address	Function Code	Register Address	Number of registers	CRC16 check digit

Answer: 00 03 02 00 01 44 44

00	03	02	00 01	44 44
Fixed Address	Function Code	Number of bytes in the data segment	Data segment data	CRC16 check digit

The data segment data is 0x0001 =01 which means the system address is 01

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

Send: 00 06 00 00 00 33 C8 0E

00	06	00 00	00 33	C8 0E
Fixed Address	Function Code	Register Address	New Address	CRC16 check digit

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

00	06	00 00	00 33	C8 0E
Fixed Address	Function Code	Start Address	New Address	CRC16 check digit

4. Setting rain accumulation time

Send: 00 06 01 07 00 0A B8 21

00	06	01 07	00 0A	B8 21
Fixed Address	Function Code	Register Address	Accumulated time (10 minutes)	CRC16 check digit

Answer: 00 06 01 07 00 0A B8 21 (indicates successful modification)

00	06	01 07	00 0A	B8 21
Fixed Address	Function Code	Start Address	Accumulated time (10 minutes)	CRC16 check digit

Note:

The device is shipped from the factory in continuous accumulation mode with no 0. When the rainfall accumulation time is set to 0, the device will not be automatically zeroed, and the rainfall value will be accumulated all the time. The rainfall can be reset by power failure or by resetting the rainfall accumulation time to zero (the command 00 06 01 07 00 00 38 26 can be sent at regular intervals to clear zero)

Longitude setting (ET0 parameter must be set)

The Western Hemisphere is positive, the Eastern Hemisphere is negative, and the missing digits are filled with zeros, for example, if your longitude is 116.56871(eastern hemisphere) and in the hemisphere, and the ASCII send: JDSD=-116.568710

Latitude setting (ET0 parameter must be set)

The northern hemisphere is positive, the southern hemisphere is negative, and the missing digits are filled with zeros, if your latitude is 40.011551 in the northern hemisphere, then send WDSD=+40.011551

ASCII send: WDSD=+40.011551

Altitude setting (ET0 parameter must be set)

Set value with one decimal, in m, there must be four digits before the decimal point, if there are not enough four digits, you need to fill in with 0, for example, set the altitude to 43.5m,

ASCII send: HBSD=+0043.5 ;(Set altitude to 43.5m)

Wind speed test point height from ground setting (ET0 parameter must be set)

Set value with one decimal, in m, there must be two digits before the decimal point, if there are not enough two digits, you need to fill in with 0, for example, set the altitude to 2.5m,

ASCII send: FSGD=02.5; (set the installation height to 2.5m)

Modify rainfall accumulation time (rainfall is cleared when the command is sent)

00 06 01 07 00 0A B8 21 (Set the rain accumulation period to 0A,10 minutes)

The device is shipped from the factory in continuous accumulation mode.

When the rainfall accumulation time is set to 0, the device does not automatically zero the rainfall, it keeps accumulating, and the rainfall can be zeroed by restarting or resetting the rainfall accumulation time through power failure (you can send 00 06 01 07 00 00 38 26 instructions to clear 0 at regular intervals)

Sunshine hours clearing (sunshine hours need to be issued at regular intervals after sunset to clear the accumulated time of the day)

ASCII send: AT+RZSS=0

RTC setting AT+TSET=20200101120000

Read RTC time RTCRED=?

Seven-parameter micrometeorograph weather station

(Temperature and humidity + atmospheric pressure + wind speed and direction + rainfall+illumination)

HD-WSM-UTR-7IN1-02

HONDE TECHNOLOGY CO.,LTD

1. Product introduce

HD-WSM-UTR-07 Type seven-element micro-meteorological instrument is an instrument developed by the company for monitoring meteorological parameters in multiple fields. The equipment innovatively implements the seven meteorological standard parameters (ambient temperature, relative humidity, wind speed, wind direction, atmospheric pressure, rainfall, illumination) through a highly integrated structure, which can achieve 24-hour continuous online monitoring of outdoor meteorological parameters through digital communication. The interface outputs seven parameters to the user at one time. In addition, the product can be expanded to add other environmental parameters (six parameters: carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, PM2.5, PM10), etc.

2. Application field

The seven-element micro-meteorological instrument can be applied to the monitoring of urban grid environment, smart street lamps, wind farms, scenic environment monitoring, agricultural meteorology, hydraulic meteorology, power environment, highway meteorological monitoring, etc. place.

3. Product features

1. Standard configuration monitors seven parameters: temperature, relative humidity, wind speed, wind direction, atmospheric pressure and rainfall and illumination, standard seven meteorological parameters monitoring, RS485 communication, MODBUS protocol communication;

2. High precision and reliable performance, suitable for outdoor meteorological harsh environments;

3. Real-time monitoring of meteorological environment data, low cost, suitable for grid layout;

4. Small size, modular design, flexible layout;

5. Optional GPS positioning can be used to achieve device tracking function;

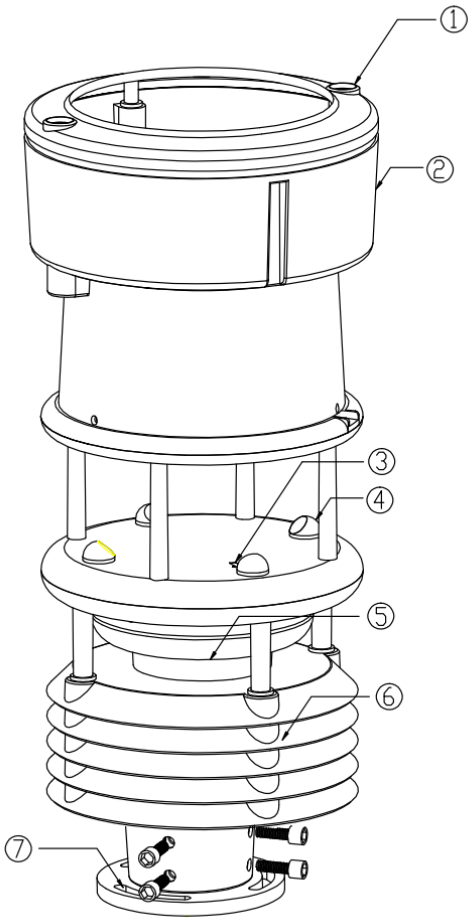
6. The data acquisition adopts 32-bit high-speed processing chip, which is stable and anti-interference.

4. Product parameters

Parameters	Measure range	Resolution	Accuracy
Temperature	-40-60℃	0.1℃	±0.3℃（@25℃）
Humidity	0-100%RH	0.1%RH	±3%RH （0-90%RH）
Air pressure	300-1100hpa	0.1hpa	±0.5hpa（0-30℃）
Wind speed	0-60m/s	0.01m/s	（0-30m/s）±0.3m/s （30-60m/s）±0.5m/s

Wind direction	0-360°	0.1°	±2°
Rainfall	0-200mm/h	0.2mm	Error<5%
Illumination	0-200KLux	10LUX	3%
customizable	Sunshine, radiation, AQI six parameters (carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, PM2.5, PM10)		
Technical parameter (☆ stands for optional equipment)			
Monitoring principle	Wind speed and direction (ultrasonic), rainfall (tipping bucket)		
Single output	RS485 communication, Modbus communication protocol		
Power supply	DC12-24V		
Fixed way	1. The sleeve is fixed; 2. Fixing flange adapter plate		
Power consumption	＜1W@12V		
Shell material	ASA engineering plastics (anti-ultraviolet, anti-weathering and anti-corrosion, no discoloration per year)		
Protection class	IP66		
☆ Fixed bracket	1.5m and 3m flange fixing; 1.8m tripod fixing		

5. Product Structure



1. Illumination
2. Rainfall
3. North arrow
4. Wind speed and wind direction Ultrasonic probe
5. Control circuit
6. Louver (temperature, humidity, air pressure measurement position)

6. Communication protocol

Please refer the document of the Micro-meteorometer series manual.

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Mini Five-parameter micro meteorograph weather station

(Temperature and humidity + atmospheric pressure + ultrasonic wind speed+ direction)

HD-WSMM-05

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1. Product introduce

HD-WSMM-05 five-element micro-meteorological instrument is an instrument developed by our company for monitoring meteorological parameters in multiple fields. The equipment innovatively implements the five meteorological standard parameters (temperature, relative humidity, atmospheric pressure, wind speed and wind direction) through a highly integrated structure, which can realize 24-hour continuous online monitoring of outdoor meteorological parameters through digital communication The interface outputs five parameters to the user at once.

2. Application field

The five-element micro-meteorological instrument can be applied to the monitoring of urban grid environment, smart street lamps, wind farms, scenic environment monitoring, agricultural meteorology, hydraulic meteorology, power environment, highway meteorological monitoring, etc. place.

3. Product features

1. Standard configuration to monitor five parameters such as temperature, relative humidity, atmospheric pressure, rainfall, wind speed, wind direction, RS485 communication, MODBUS protocol communication (customizable protocol);

2. High precision and reliable performance, suitable for outdoor weather harsh environment fields;

3. Realize parameter collection, optional extended LORA, GPRS, 4G and other wireless methods, realize automatic data upload to the network platform, and real-time view data on the PC.

4. Real-time monitoring of meteorological environment data, low cost, suitable for grid layout;

5. Small size, modular design, flexible layout;

6. Data acquisition adopts 32-bit high-speed processing chip, which is stable and anti-interference.

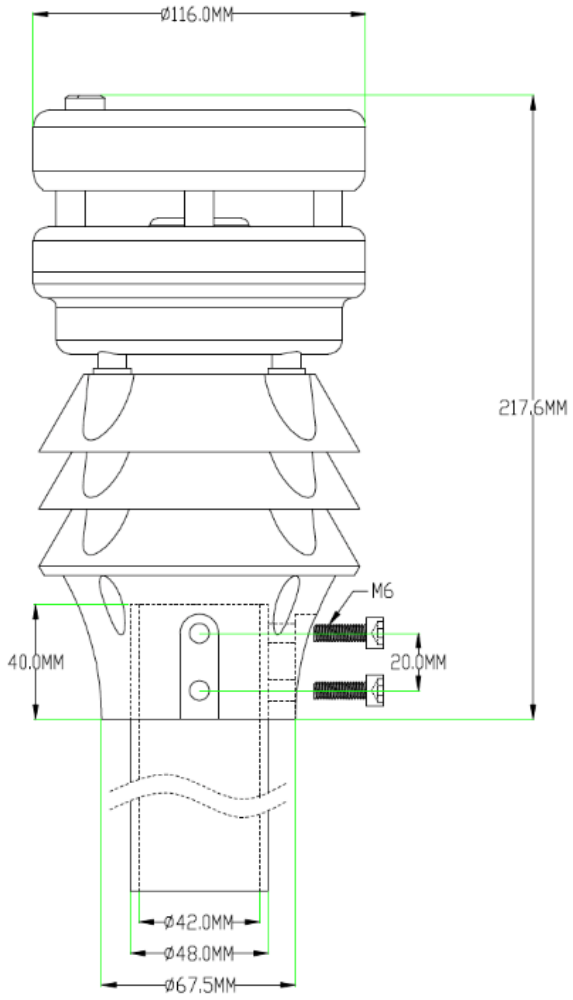
7. It can be extended to form a 10-element weather station with sensors such as wind speed, wind direction, ground temperature, ground humidity, and others.

4. Product parameters

Parameters	Measure range	Resolution	Accuracy
Temperature	-40-60℃	0.01℃	±0.3℃（@25℃）
Humidity	0-100%RH	0.01%RH	±3%RH （0-90%RH）
Air pressure	500-1100hPa	0.1hpa	±0.5hpa（25℃，950-1100hPa ）
Wind speed	0-40m/s	0.01m/s	±（0.5+0.05V）M/S
Wind direction	0-360°	0.1°	±5°（＜10M/S）

customizable	Sunshine, radiation, AQI six parameters (carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, PM2.5, PM10)
Technical parameter	
Single output	RS485 communication, Modbus communication protocol(0-5V, 0-10V, 4-20mA can be custom made)
Power supply	DC9-24V
Fixed way	1. Sleeve fixed (Default) 2. Fixing flange or adapter plate can be chsooen
Power consumption	<10mA@12V
Shell material	ASA engineering plastics (anti-ultraviolet, anti-weathering and anti-corrosion, no discoloration per year)
Protection class	IP65

5. Product Size



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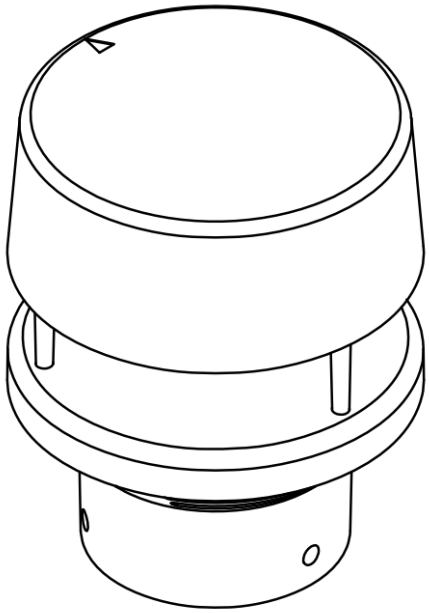
MINI Compact Weather Station

Product User Manual V.03



☞**This** manual introduces the product parameters and uses of the ultrasonic environmental monitor series. Please read and understand it carefully before use.

☞**This** manual also introduces the fixing, connection and operation methods of the equipment.

☞**This** manual introduces the communication protocol of the device.

☞**Product** upgrades and manual updates will be subject to change without prior notice.

Product Description and Application Products description and application

MINI Ultrasonic Environmental Monitor is a highly cost-effective micro-meteorological environmental monitoring instrument developed by our company. It uses low-power chips and low-power circuit design. The power consumption of the conventional 5 elements is only 0.2W, and the power consumption of the 6 elements (including rainfall) is only 0.45W. It is particularly suitable for use in solar or battery-powered environments with relatively high power consumption requirements. Due to the use of a new design, the structure is more compact and small, with a diameter of about 8CM and a height of about 10CM (conventional 5 elements).

MINI ultrasonic environmental monitor innovatively integrates six environmental monitoring elements, including wind speed, wind direction, temperature, humidity, air pressure, rainfall/illuminance/solar radiation (choose one of the three), into a compact structure , and outputs the six parameters to the user at one time through the 485 digital communication interface, thus realizing 24-hour continuous online monitoring outdoors.

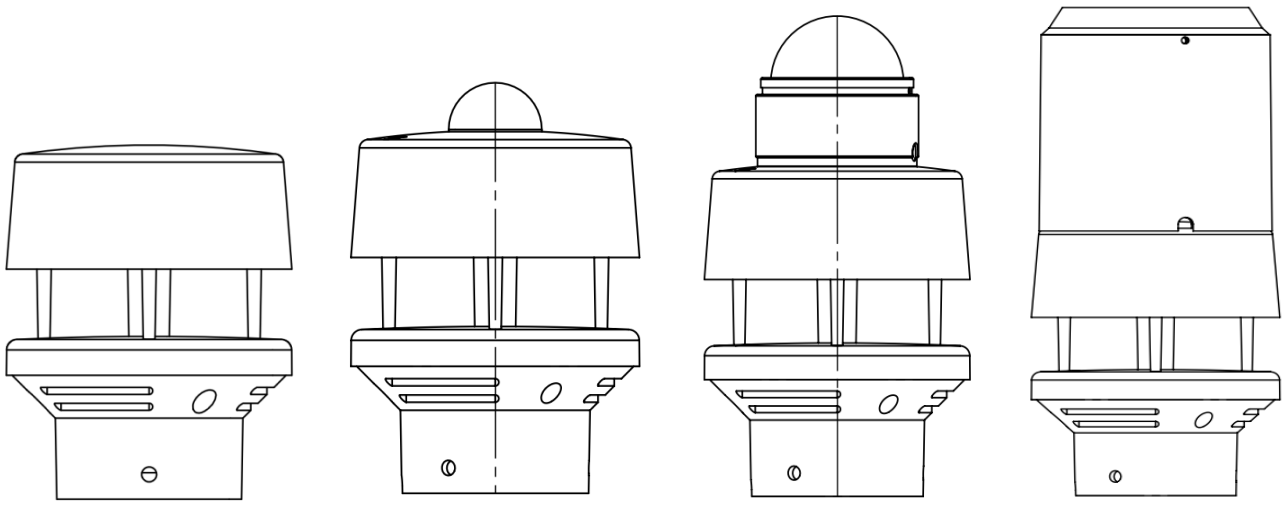
It is applicable to many fields such as agricultural meteorology, smart street lights, scenic area environmental monitoring, and highway meteorological monitoring.

Features

- Monitoring elements can be selected according to actual needs: wind speed and direction, temperature and humidity, air pressure, rainfall/illuminance/solar radiation;
- Low cost, suitable for grid deployment;
- The whole machine has low power consumption, only 0.2W, which is particularly suitable for occasions with high power consumption requirements;
- Small size and modular design make it easy to integrate and have flexible layout;
- Adopting efficient filtering algorithm and special compensation technology for rainy and foggy weather to ensure data stability and consistency;
- Each meteorological instrument is tested before leaving the factory to ensure that all environmental data meet national standards;

- Wide environmental adaptability. The product development has undergone rigorous high and low temperature, waterproof, salt spray and other environmental tests. The ultrasonic probe can still work normally in a low temperature environment of -40℃ without heating.

Product picture



2/5 elements 2/5 elements + illumination 2/5 elements + radiation 2/5 elements + rainfall

Main technical parameters			
Electrical parameters		**Mechanical structure parameters**	
Operating Voltage	DC 9V -30V or 5V	Material	ABS engineering plastics
Power consumption	200m W (standard 5 elements with compass)	Outlet mode	Aviation socket, sensor line 3 meters
output signal	RS485 Signal	Exterior color	milky
Working environment humidity	0 ~ 100%RH	Protection level	IP65
Working temperature	-40 ℃ ~ + 70 ℃	reference weight	200 g(5 parameters)

Sensor specifications

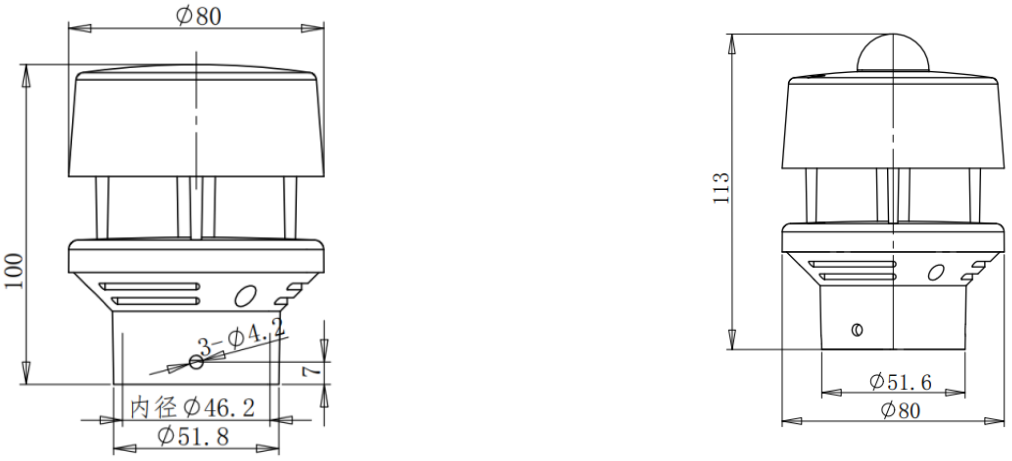
Configuration	Environmental factors	Range	Accuracy	Resolution	Power consumption
Conventional 2 elements	Wind speed	0 ～ 45 m/s	Starting wind speed ≤ 0.8 m/s , ± (0.5+0.02V)m/s ;	0. 0 1m/s	0.1 2 W
	wind direction	0 ~ 360	± 3 °	1 °	

Optional elements	□ Atmospheric	-40 ～8 0 ℃	± 0.3 ℃	0.1 ℃	1mW
	☐ Humidity	0 ～ 100%RH	± 5%RH	0.1%RH	
	☐ Atmospheric	300 ～ 1100hPa	±0.5 hPa (25 °C)	0.1 hPa	0.1mW
	☐ Electronic	0 ~ 360	± 5 °	1 °	10mW
Optional elements (only 1 out of 3)	☐ Drop-sensing rainfall	Measuring range: 0 ～ 4.00mm /	±4 % (Indoor static test, rain intensity is 2mm/min)	0.03 mm	0.24W
	☐ Illuminance	0～200000Lux	± 4%	1 Lux	0.1mW
	☐ radiation	0-1500 W/m2	± 3%	1W/m2	400mW
Total power consumption = optional sensor power consumption + mainboard basic power consumption				Mainboard basic power consumption	150mW

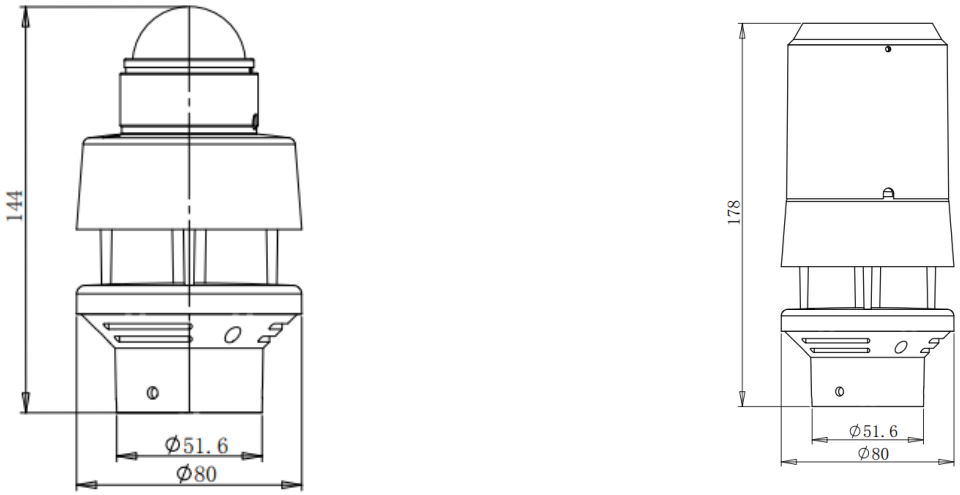
Mounting dimensions

Dimensions in millimeters

2/5 elements: 2/5 elements + illumination:



2/5 elements + radiation: 2/5 elements + rainfall:



Precautions:

The magnetic North Pole indicated by the North Arrow and the geographic North Pole do not exactly coincide, so the deviation (error) in position must be taken into account when calibrating the sensor.

The error is related to the location, and the maximum error may exceed 15 ° (e.g. Northeast China). In East China, the error is negligible (<3 °). More detailed information on this topic can be found on the Internet. Ultrasonic wind sensor is a precision instrument , please handle it with care and avoid bumping it.

Wiring diagram

485 signal output, there is a 4 -pin aviation plug at the bottom of the sensor, and the pins corresponding to the pins are defined as follows:

1—— Power supply positive VCC (red)

2—— Power negative GND (green)

3——485A+ (black)

4——485B- (yellow)

Note: Make sure the wiring is correct before turning on the power.

Communication Protocol

MODBUS commands in the MINI Ultrasonic Environmental Monitor Manual are MODBUS-RTU protocol format commands. They are configured at the factory. If you need to modify the protocol, refer to the relevant commands or ask for help. The communication baud rate is 9600 , the data bit is 8 bits, 1 stop bit, and no check. The communication interval between 2 frames of data is at least 500ms . The default address is 1. The MODBUS -RTU communication format is as follows:

Send	Address	Order	Register Address	Data	CRC test
Number of bytes	1 byte	1 byte	2 bytes	N bytes	2 bytes

1. Register address

MINI ultrasonic environmental monitor can integrate multiple meteorological elements, including wind speed, wind direction, air temperature, air humidity, illumination, rainfall, atmospheric pressure, electronic compass, and total solar radiation. Each sensor has its own register address.

The correspondence between register addresses and channels in MODBUS is as follows:

Register Address	aisle	Data example description
0x0000	Channel 1 (Digital Temperature) Signed number (-40~100 ℃)	0x7FFF (invalid / unconnected) resolution 0.1°C 0x01 0x2C=30.0 ℃
0x0001	Channel 2 (Digital Humidity) Signed number (0~100%RH)	0x7FFF (invalid / unconnected) resolution 0.1%RH 0x02 0x8D=65.3%RH
0x0002	Channel 3 (outdoor illumination) Signed number (0-20000)	0x7FFF (invalid / unconnected) resolution 10 Lux 0x01 0xF4=5000 Lux
0x0003	Channel 4 (Indoor/outdoor illumination units) Signed number 0-9 lx	0x7FFF (invalid / unconnected) resolution 1Lux 0x00 0x09 = 9 Lux
0x0004	Channel 5 (Indoor Illumination) Signed number (0~6553)	0x7FFF (invalid/unconnected) resolution 10 Lux 0x0B 0xCD=30210 Lux
0x0006	Channel 7 (Atmospheric pressure) Signed number (300~1100hPa)	0x7FFF (invalid / unconnected) resolution 0.1hPa 0x25 0xF4=971.6 hPa
0x0007	Channel 8 (Radiant) Signed number (0~1500W/ ^{m2})	0x7FFF (invalid / unconnected) resolution 1W / ^{m2} 0x02 0x1C=540 W/ ^{m2}
0x000 9	Channel 1 0 (rain intensity) Signed number 0-4mm/min	0x7FFF (Invalid / Not Connected) Resolution 0.03 mm/min 0x00 0x14 = 0.20mm /min
0x000 A	Channel 11 (Rainfall Accumulation) Signed number (0~3000 mm)	0x7FFF (invalid/unconnected) resolution 0.1mm 0x00 0xCD=20.5 mm
0x000B	Channel 12 (wind speed) Unsigned number 0- 45 m/s	0x7FFF (invalid / unconnected) resolution 0.01m/s 0x0 0 0xF4 = 2.44 m/s
0x000C	Channel 13 (actual wind direction) Actual wind direction = ultrasonic wind direction + compass Signed number 0-359 °	0x7FFF (invalid / unconnected) resolution 1° 0x00 0x59=89 °
0x000D	Channel 14 (ultrasonic wind direction) Signed number 0-359 °	0x7FFF (invalid / unconnected) resolution 1° 0x00 0x09=9 °
0x000E	Channel 15 (Compass) Signed number 0-359 °	0x7FFF (invalid / not connected) Resolution 1° 0x00 0x50 =80 °
0x 00 0 F	Channel 16 Undefined	
0x0010	Channel 17 (Device communication baud rate) Signed number (1/2/3/4/8/12/24) Support baud rate 4800 , 9600 , 14400 , 19200	0x00 0x02 Baud rate = 2*4800 = 9600
0x0014	Channel 21 (device protocol) 0=YGSERVER 1 = MODBUS-RTU 2 = YG	0x00 0x01 MODBUS-RTU
0x0020	Channel 33 (Device Address) Signed number (1-254)	0x00 0x01 Device Address 1

Note: Actual wind direction = ultrasonic wind direction + compass. When the compass is not selected, the actual wind direction = ultrasonic wind direction, that is, the values of channel 13 and channel 14 are equal.

(II) Configure address, baud rate ,and change protocol

Modify the device address, for example: change the address of any device to 1. Note: When sending commands, make sure there is only one device on the 485 Modbus.

Send	00	06	00	20	00	01	48	11
illustrate	Broadcast	Write Command	register		New device address		CRC Check	
return	00	06	00	20	00	01	48	11
illustrate	Broadcast	Return 0x86 =	register		New device address		CRC Check	

If the returned command is the same as the sent command, the command setting is successful. If it returns 01 86 **** , the configuration is unsuccessful.

Modify the device baud rate, for example: change the baud rate of the device with address 1 to 9600 .

Send	01	06	00	10	00	02	09	CE
illustrate	address	Write Command	register		New device baud rate		CRC Check	
return	01	06	00	10	00	02	09	CE
illustrate	address	Return 0x86 =	register		New device baud rate		CRC Check	

Baud rate = data * 4800. Return data 0x 00 02 , then baud rate = 4800 * 2 = 9600. Supported baud rates are 4800 , 9600 , 14400 , 19200. Return 01 86 **** means configuration is unsuccessful. If the returned command is the same as the sent command, the command setting is successful.

(III) Rainfall accumulation setting

Rainfall accumulation mode setting

Send	01	06	00	F1	00	01	19	F9
illustrate	address	Write Command	initial address register		Cumulative mode 01 Manual 02 Automatic		CRC Check	
return	01	06	00	F1	00	01	19	F9
illustrate	address	Return 0x86 =	register		Cumulative mode		CRC Check	

01 86 **** is returned , the rainfall mode configuration is unsuccessful.

After receiving the mode setting command, the sensor clears the accumulated rainfall value.

There are two modes for rainfall accumulation: manual mode and automatic mode

In manual mode, the rainfall accumulation continues until the rainfall accumulation reset command is received and the accumulated value is reset to zero.

In automatic mode, rainfall accumulation is accumulated for 24 hours (the clock error of the droplet rain sensor is 2%) and then reset to zero.

Manual mode rainfall accumulation reset

Send	01	06	00	F2	00	00	28	39
illustrate	address	Write Command	register		Rainfall accumulated to		CRC Check	
return	01	06	00	F2	00	00	28	39
illustrate	address	Return 0x86 =	register		Clear		CRC Check	

After receiving the command, clear the accumulated rainfall value. If it returns 01 86 **** , the accumulated rainfall value clearing is not successfully executed.

(IV) Obtaining sensor values

MINI ultrasonic environmental monitor can integrate a variety of different sensors, and the real-time value of each sensor can be obtained by reading the value of the Modbus register address. One or more register values can be read at a time, such as sending 01 03 00 00 00 01 84 0A to read only the temperature value of the digital temperature sensor.

For example, sending 01 03 00 00 00 02 C40B reads the values of two registers , register 0-1 , including the sensor values of digital temperature and digital humidity.

Conversion of negative sensor values (binary inversion plus 1): For example, the temperature hexadecimal code is " FF 3D ", which is converted into binary as " 11111111 00111101 ". The first bit of the binary code is " 1 ", so its value is a negative number. If the first bit is " 0 ", it is a positive number. The specific conversion steps are as follows:

(1) Replace the first bit of its binary number with “ 0 ” Result: " 01111111 00111101 "

(2) After inverting the last 15 bits, we get: " 00000000 11000010 "

(3) Add “ 1 ” to get: “ 00000000 11000011 ”

According to the positive number representation method, we get the decimal value " 195 ". Because it is a negative value, it is " -195 ". The temperature has 1 decimal place, and the result is divided by 10. The final result is " -19.5 ", so: FF 3D → -19.5 ℃.

The following are instructions for commonly used sensor reading commands. The device address of all sensors defaults to 1 , and all commands used are in MODBUS-RTU format.

(1) Read 2 parameter data (wind speed and direction sensor)

The wind speed needs to read the data of register 0x0B , and the 2 elements read 2 registers. The reading format of sensor device address 1 is as follows:

Send	01	03	00	0B	00	02	B5	C9
illustrate	address	Read	Wind speed starting		Read number		CRC Check	
return	01	03	04		0 0	2C	01	08	3B	AC
illustrate	address	Read	Data length		Wind speed		Actual wind		CRC Check	

The sensor returns data of 0x0 0 2C , which is converted to decimal 44, and the returned wind speed is 0.44 m/s . The actual wind direction returned is 0x0108, which is converted to decimal 264 , and the returned wind direction is 264 °.

(2) Read 5 parameter data (wind speed, wind direction, temperature, humidity and air pressure)

The starting address of the temperature register is 0x000 0 , and the starting address of the actual wind direction register is 0x000C. In order to read the five elements of temperature, humidity, pressure, wind speed and direction at one time, it is necessary to read the data of 13 registers. The reading format is as follows :

Send	01	03	00	00	00	0D	84	0F
illustra	address	Read	initial address		Read number		CRC Check	
return	01	03	1A		01	12	00	F9	07	FF	07	FF	07	FF
illustra	address	Read	Data length		temperature		humidity		Outdoor		Illuminance		Indoor	
return	07	FF	26	F3	07	FF	07	FF	07	FF	07	FF	01	08	00	F5	BF	E3
illustra	Reserve		Atmospheric		radiatio		Reserve		Rain		Rainfall		Wind		Actual wind		CRC Check	

The sensor returns the data:

Temperature = converted to decimal is 274 , showing the temperature as 27.4 degrees.

Temperature: 0x0112 = 274 = 27.4 °C

Humidity: 0x00F9 = 249 = 24.9%RH

Atmospheric pressure: 0x26F3 = 9971 = 997.1hPa

Wind speed: 0x0108 = 264 = 2.64 m /s

Wind direction: 0x00F5 =245= 245 °

Since no sensor is connected, the values of illumination, rainfall, radiation, etc. are all displayed as 0x07FF .

(3) Only read the rainfall sensor data

The following command is the command description for reading rainfall .

Send	01	03	00	09	00	02	14	0 9
illustrate	address	Read	initial address		Read points		CRC Check	
return	01	03	04		00	14	00	CD	7B	A2
illustrate	address	Read	Data length		Rain Intensity		Rainfall Accumulation		CRC Check	

The sensor returns two sets of data in registers 0x09 and 0x0A. The returned data is 0x0 014, which is converted to decimal 20, and the returned rainfall intensity is 0.20 mm/min . The returned rainfall accumulation 0x0 0 CD is converted to decimal 205, and the returned rainfall accumulation is 20.5 mm.

For rainfall accumulation data, please refer to the previous: (iii) Rainfall accumulation settings, set the accumulation method and obtain the value according to the needs.

(IV) Modbus CRC verification steps

1. Preset the 16 -bit register to hexadecimal FFFF , and call this register the CRC register;
2. XOR the first 8- bit data with the low bit of the CRC register and put the result in the CRC register;
3. Shift the contents of the register right one position (towards the lower position) , fill the highest position with 0 , and check the lowest position;
4. If the lowest bit is 0 : repeat step 3 (shift again) If the lowest bit is 1 : XOR the CRC register with the polynomial A001 (1010 0000 0000 0001);
5. Repeat steps 3 and 4 until the right shift is 8 times, so that the entire 8 -bit data is processed;
6. Repeat steps 2 to 5 to process the next 8 -bit data;
7. The final CRC register is the CRC code (the CRC code is low first and high last).

Matters needing attention

1. Please check whether the packaging is intact and whether the product model is consistent with the selected one;
2. Do not connect wires with power on. Only turn on the power after the wiring is completed and checked;
3. The sensor is a precision device. Please do not disassemble it by yourself or contact the sensor surface with sharp objects or corrosive liquids during use to avoid damaging the product.
4. The installation environment ensures that the sensor is not interfered by other running equipment that may not fully comply with universal standards, such as radio / radar transmitters, ship engines, motors, etc.
5. Do not install it on the same plane as any radar scanning device. Keep a distance of at least 2 meters ;
6. Avoid the flocculent flow caused by surrounding buildings, such as trees, electric poles, high-rise

buildings, etc., which will affect the accuracy of the product;

7. Please keep the calibration certificate and certificate of conformity and return them together with the product when repairing.

Troubleshooting

RS485 output. The meter may not be able to obtain data correctly due to wiring problems or communication serial port failure. Please check whether the wiring is correct and firm, whether the serial port is occupied, and whether the serial port settings are correct;

2. If it is not due to the above reasons, please contact the manufacturer.

Warranty

Warranty Commitment: The product warranty period is 12 months from the date of delivery (except for product problems caused by failure to operate in accordance with corresponding technical requirements or other human behavior).

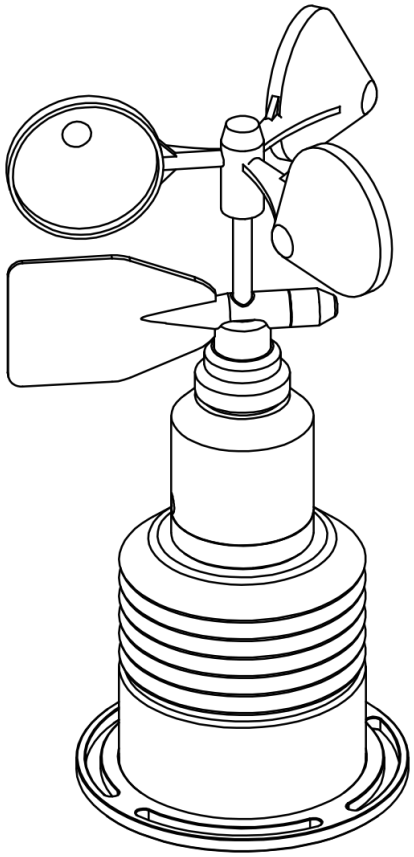
After-sales commitment: Users can consult technical issues by phone and get clear solutions. If it is a quality problem of the product itself, it can be returned to the factory for repair or replacement.

Selection Table Selection table

Model	powered by	Signal output	illustrate
HD-	9 V		9-30V power supply
	5 V-		5V power supply
		R	RS485
Example: HD-9 V- R Indicated as: MINI ultrasonic environmental monitor, 9-30V power supply, RS485 output.			

Mini All-in-One Weather Meter

Product User Manual V.03



☞**This** manual introduces the product parameters and uses of the WSM4 mini all-in-one weather meter. Please read and understand it carefully before use.

☞**This** manual also introduces the fixing, connection and operation methods of the equipment.

☞**This** manual introduces the communication protocol of the device.

☞**Product** upgrades and manual updates will be subject to change without prior notice.

Product description and application

The WSMS mini all-in-one weather meter is an integrated meteorological environment monitoring sensor with a compact design and high integration. Compared with traditional integrated environmental sensors, it is more compact in design but equally powerful in function. It can quickly and accurately measure five meteorological environmental elements, including wind speed, wind direction, air temperature and humidity, and air pressure. It is suitable for meteorological environment monitoring in the fields of agriculture, meteorology, forestry, electric power, chemical plants, ports, railways, and highways.

Features

- The integrated design can simultaneously monitor five meteorological elements including wind speed/wind direction/air temperature and humidity/air pressure.
- The monitoring elements can be selected according to actual needs, and combinations of 2 elements/4 elements/5 elements can be selected.
- The overall design is compact and light, with a height of approximately 17CM, a maximum diameter of approximately 10CM, and a weight of less than 0.25KG, making it easy to install.
- It adopts efficient filtering algorithm and special compensation technology for rainy and foggy weather to ensure the stability and consistency of data.
- Before leaving the factory, each meteorological instrument is calibrated using equipment such as wind tunnels and high and low temperature calibration boxes to ensure that the five meteorological data meet national standards.
- The product has wide environmental adaptability and has undergone rigorous environmental tests such as high and low temperature, waterproof, and salt spray resistance.

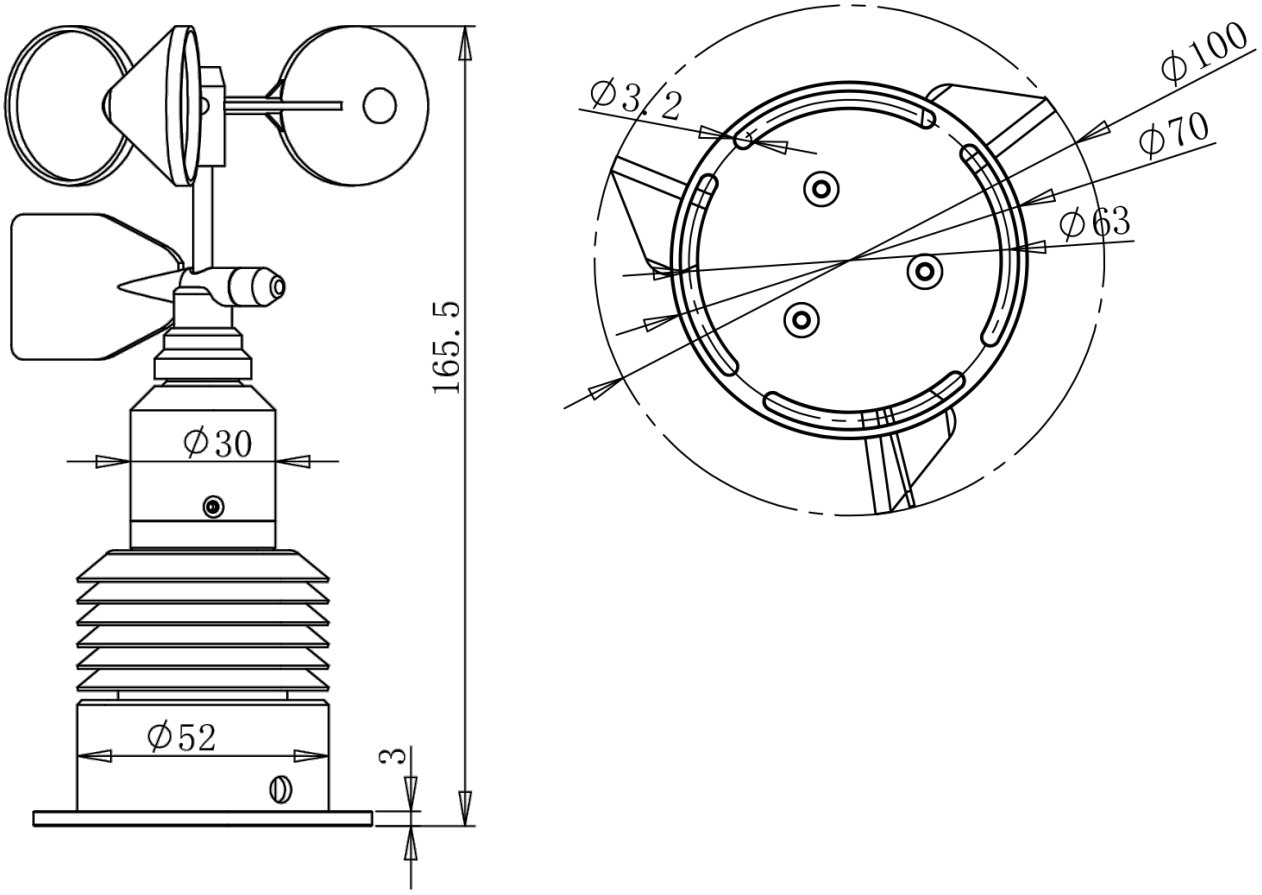
General Specifications

Measuring elements (optional)	Range	Accuracy	Resolution	Power consumption
□ Wind speed	0-45m/s	Starting wind speed ≤ 0.8m/s ±(0.5 + 0.02V) m/s	0.1m/s	40mW
□ wind direction	0-359°	± 3 °	1°	
□ Atmospheric temperature	-40~80℃	±0.3℃	0.1℃	1mW
□ Atmospheric humidity	0~100%RH	±5%RH	0.1%RH	
□ Atmospheric pressure	300~1100hPa	±0.5 hPa (25°C)	0.1 hPa	0.1mW
Total power consumption of the sensor				<150mW
Power supply	□ DC 5V □ DC 9-30V		□ Others	
communication	□ RS 485 (Modbus-RTU) □ RS 232 (Modbus-RTU) □ TTL (Modbus-RTU)			

Line length	□ Standard 2 meters □ Other	weight	240 g
working environment	0~100%RH , -40 ℃ ~+60 ℃	Protection level	IP64

Mounting dimensions

Dimensions in millimeters



Precautions :

During installation, the sensor needs to be oriented southward, with the sensor outlet hole pointing to the geographic south. The mini all-in-one weather meter is a precision instrument, so please handle it with care and avoid bumping it.

Wiring diagram Wiring diagram

485 or 232 or TTL signal output, the sensor line sequence is defined as follows:
Red - Power supply VCC
Green—— Power negative GND
Black——485A+ / 232_T / TXD
Yellow——485B- / 232_R / RXD

Note: Make sure the wiring is correct before supplying power.

Communication Protocol

MODBUS commands in the manual of the mini all-in- one weather meter are MODBUS-RTU protocol format commands. They are configured at the factory. If you need to modify the protocol, refer to the relevant commands or ask for help. The communication baud rate is 9600 , the data bit is 8 bits, 1 stop bit, and no check. The communication interval between 2 frames of data is at least 500ms . The default address is 1. The MODBUS -RTU communication format is as follows:

send	address	Order	Register Address	data	CRC test
Number of bytes	1 byte	1 byte	2 bytes	N bytes	2 bytes

1. Register address

The mini all-in-one weather meter can integrate 5 meteorological elements, namely wind speed, wind direction, air temperature, air humidity, and atmospheric pressure. Each sensor has its own register address.

The correspondence between register addresses and channels in MODBUS is as follows:

Register Address	aisle	the data shows
0x0000	Channel 1 (wind speed) Unsigned number 0-45.0m/s	0x7FFF (Invalid/Not Connected) 0x00 0x09=0.9m/s
0x000 1	Channel 2 (wind direction) Unsigned number 0-359°	0x7FFF (Invalid/Not Connected) 0x00 0x09=9°
0x0002	Channel 3 (digital temperature) Signed number (-40~100℃)	0x7FFF (Invalid/Not Connected) 0x01 0x2C=30.0℃
0x0003	Channel 4 (Digital Humidity) Signed number (0~100%RH)	0x7FFF (Invalid/Not Connected) 0x02 0x8D=65.3%RH
0x0004	Channel 5 (Atmospheric Pressure) Signed number (300~1100hPa)	0x7FFF (Invalid/Not Connected) 0x25 0xF4=971.6 hPa
0x0010	Channel 17 (device communication baud rate), supports baud rates of 4800, 9600, 14400, 19200, 38400, 57600, 115200	0x00 0x02 Baud rate = 2*4800 = 9600
0x0014	Channel 21 (device protocol), 0=YGSERVER 1= MODBUS -RTU 2=YG	0x00 0x01 MODBUS -RTU
0x0020	Channel 33 (device address) Unsigned number 1-254	0x00 0x01 Device Address 1

(II) Configure address and baud rate

for mini all -in-one weather meters are the same. For example, write 1 to the device address .

send	00	06	00	20	00	01	48	11
illustr	addr	Write Command	register		New device		CRC Check	
retur	00	06	00	20	00	01	48	11
illustr	addr	Return 0x86 =	register		New device		CRC Check	

the returned command is the same as the sent command, the command setting is successful. If it returns 01 86 **** , the configuration is unsuccessful.

the mini all-in-one weather meter are the same, for example, write baud rate 9600 .

send	01	06	00	10	00	02	09	CE
illustr	addr	Write Command	register		New		CRC Check	
retur	01	06	00	10	00	02	09	CE
illustr	addr	Return 0x86 =	register		New		CRC Check	

Baud rate = data * 4800. Return data 00 02 , then baud rate = 4800 * 2 = 9600. Supported baud rates are 4800 , 9600 , 14400 , 19200 , 38400 , 57600 , 115200. Return 01 86 **** means configuration is unsuccessful. If the returned command is the same as the sent command, the command setting is successful.

(III) Obtaining sensor values

The mini all **-in-one weather meter** can integrate up to 5 different sensors. The real-time value of each sensor can be obtained by reading the value of the Modbus register address . One or more register values can be read at a time. For example, send 0103 00 00 00 01 84 0A to read only the wind speed value of the wind speed sensor . For example, send 01 03 00 00 00 02 C40B to read the values of 2 registers from register 0-1, including the sensor values of wind speed and direction .

Conversion of negative sensor values (binary inversion plus 1): For example, the temperature hexadecimal code is "FF 3D", which is converted into binary as "11111111 00111101". The first bit of the binary code is "1", so its value is negative. If the first bit is "0", it is positive. The specific conversion steps are as follows:

Replace the first digit of the binary number with “0” to get: “01111111 00111101”

(2) After inverting the last 15 bits, we get : “00000000 11000010”

(3) After adding “1”, we get: “00000000 11000011”

According to the positive number representation method, we get the decimal value "195". Because it is a negative value, it is "-195". The temperature has 1 decimal place, and the result is divided by 10. The final result is "-19.5", so: FF 3D → -19.5℃.

The following are instructions for commonly used sensor reading commands. The device address of all sensors defaults to 1 , and all commands used are in MODBUS-RTU format.

(1) Wind speed sensor

The wind speed value reads register 0 data.

send	01	03	00	00	00	01	84	0A
illustrate	address	Read Command	initial address		Read points		CRC Check	
return	01	03	02		00	1D	78	4D
illustrate	address	Read Command	Data length		Device data		CRC Check	

The sensor returns data 0x001D which is converted to decimal as 29, and the wind speed value is 2.9m/s.

(2) Digital temperature sensor

Digital temperature needs to read the data of register 0. The reading format of sensor device address 1 is as follows:

send	01	03	00	02	00	01	25	CA
illustrate	addres	Read	initial address		Read points		CRC Check	
return	01	03	02		00	26	39	9E
illustrate	addres	Read	Data length		Device data		CRC Check	

The sensor returns data 0x0026, which is converted to decimal 38, so the temperature value is 3.8℃, with 1 decimal place.

(3) Five-element sensor

The following commands are instructions for reading wind speed, wind direction, temperature, humidity and pressure .

send	01	03	00	00	00		05				85	C9
illustr	addre	Read	initial		Read points						CRC Check	
retur	01	03	0A		00	1D	00	AB	01	30	02	26
illustr	addre	Read	Data		Wind speed		wind		temperatur		humidity	
retur	27	12	91						77			
illustr	Atmospheric		CRC Check									

The sensor returns 5 groups of register data. The data is in hexadecimal, which is converted to decimal and then converted according to the resolution and unit of the sensor as follows:

Wind speed: 0x 001D = 29 = 2.9 m/s.

Wind direction: 0x 00AB = 171 = 171°

Temperature: 0x 0130 = 304 = 30.4°C

Humidity: 0x 0226 = 550 = 55.0%RH

Air pressure: 0x 2712 = 10002 = 1000.2 hPa

(IV) Modbus CRC verification steps

1. Preset the 16 -bit register to hexadecimal FFFF , and call this register the CRC register;
2. XOR the first 8- bit data with the low bit of the CRC register and put the result in the CRC register;
3. Shift the contents of the register right one position (towards the lower position) , fill the highest

position with 0 , and check the lowest position;

4. If the lowest bit is 0 : repeat step 3 (shift again) If the lowest bit is 1 : CRC register is compared with polynomial A001 (1010 0000 0000 0001)

XOR;

5. Repeat steps 3 and 4 until the right shift is 8 times, so that the entire 8 -bit data is processed;

6. Repeat steps 2 to 5 to process the next 8 -bit data;

7. The final CRC register is the CRC code (the CRC code is low first and high last).

Points to note

1. Please check whether the packaging is intact and whether the product model is consistent with the selected one;

2. Do not connect wires with power on. Only turn on the power after the wiring is completed and checked;

3. The sensor is a precision device. Please do not disassemble it by yourself or contact the sensor surface with sharp objects or corrosive liquids during use to avoid damaging the product.

4. Due to the influence of the use environment, the flexibility of the bearings needs to be maintained regularly. For customers with extremely strict requirements on wind data , it is recommended that they return the bearings to the factory for recalibration once a year .

5. Installation environment Ensure that the sensor is not interfered by other running equipment that may not fully comply with common standards, such as radio / radar transmitters, ship engines, motors, etc.;

6. Do not install it on the same plane as any radar scanning device. Keep a distance of at least 2 meters ;

7. Avoid the flocculent flow caused by surrounding buildings, such as trees, electric poles, high-rise buildings, etc., which will affect the accuracy of the product;

8. Please keep the calibration certificate and certificate of conformity and return them together with the product when repairing.

Troubleshooting

1. RS485 output. The meter may not be able to obtain data correctly due to wiring problems or communication serial port failure. Please check whether the wiring is correct and firm, whether the serial port is occupied, and whether the serial port settings are correct;
2. If it is not due to the above reasons, please contact the manufacturer.

Warranty

Warranty Commitment: The product warranty period is 12 months from the date of delivery (except for product problems caused by failure to operate in accordance with corresponding technical requirements or other human behavior).

After-sales commitment: Users can consult technical issues by phone and get clear solutions. If it is a quality problem of the product itself, it can be returned to the factory for repair or replacement.

Selection Table Type selection table

Model	powered by	Signal output	Optional elements	illustrate
HD	9			9-30V power supply
	5			5V power supply
		R4		RS485
		R2		RS232
		TTL		TTL
			02	Wind speed and direction
			04	Wind speed and direction + temperature and humidity
			05	Wind speed and direction + temperature, humidity and air pressure

Example: HD - 9 - R4-02

Indicated as: Mini all-in-one weather meter , 9-30V power supply, RS485 output, optional elements include wind speed and direction

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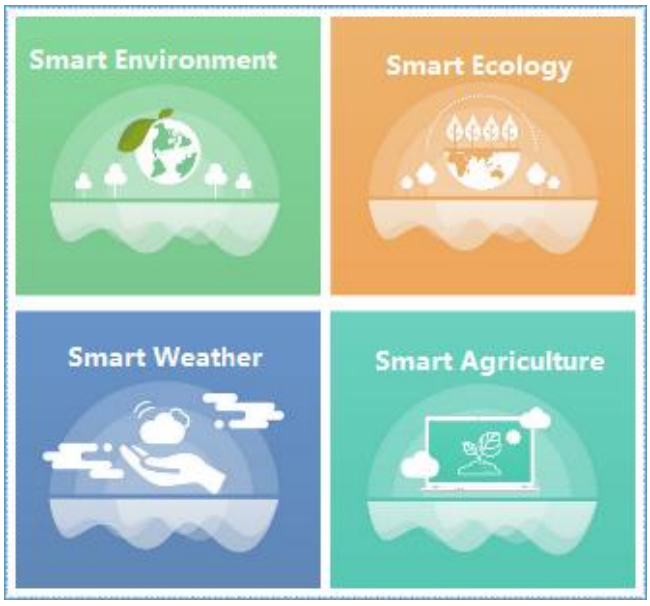
Micro-meteorometer series manual



HONDE TECHNOLOGY CO.,LTD

https://hondetec.en.alibaba.com
hondetec@163.com

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\PM2.5\PM10 is one year, which will be shortened due to improper maintenance of environmentally rigorous goods.

Catalog

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			√

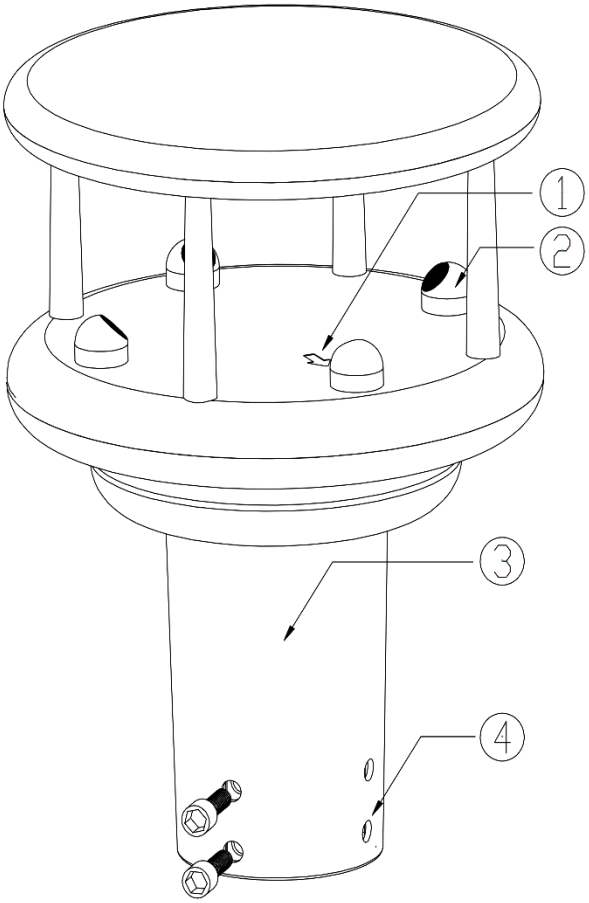
Noise			√
PM2.5	√	√	√
PM10	√	√	√

2.4 Technical Data Sheet

parameter	Range	Resolution	Accuracy	Configuration
$PM_{2.5}$	0-1000ug/m³	1ug/m³	±10% Measurements(<500 mcg)	Optional
PM_{10}	0-1000ug/m³	1ug/m³	±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℃	0.01℃	±0.3℃（25℃）	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℃）	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



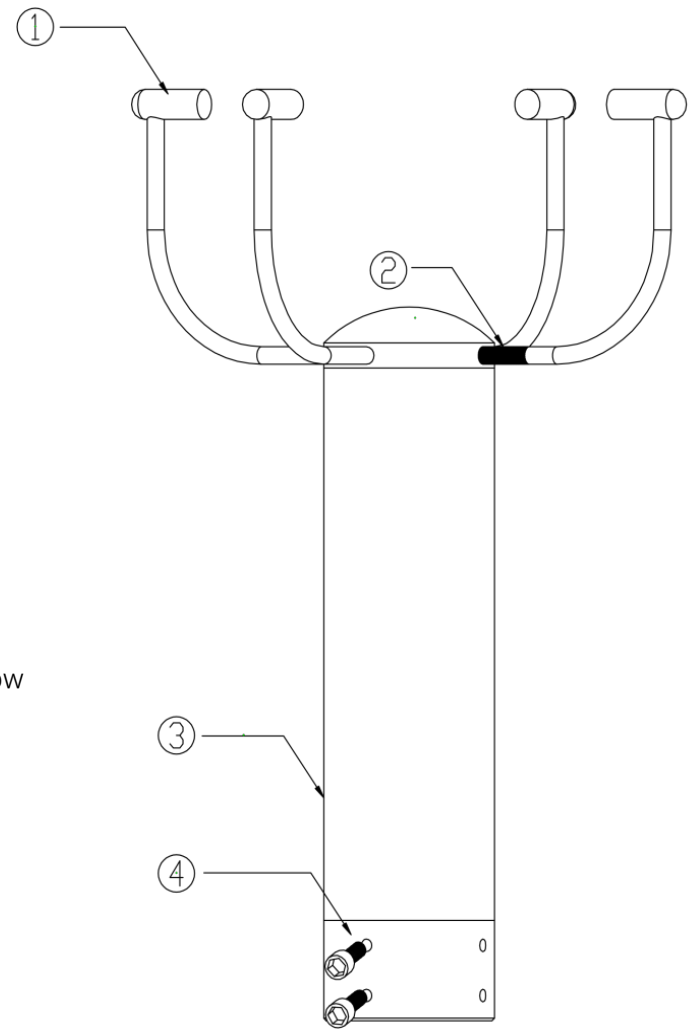
1, Pointing to the north arrow

2, Ultrasonic probe

3, Control circuit position

4, Side fixing screws

3.2 HCD6812A ultrasonic wind speed and direction instrument



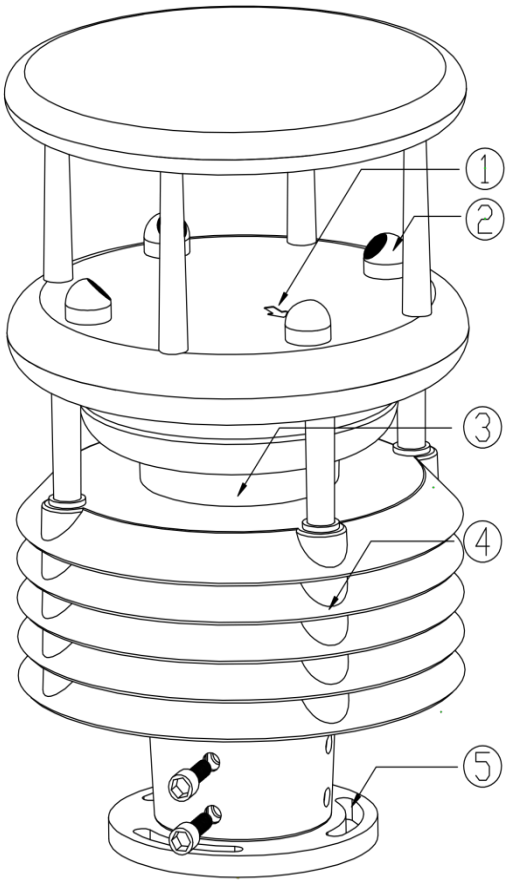
1, Pointing to the north arrow

2, Ultrasonic probe

3, Control circuit position

4, Side fixing screws

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



1, Pointing to the north arrow

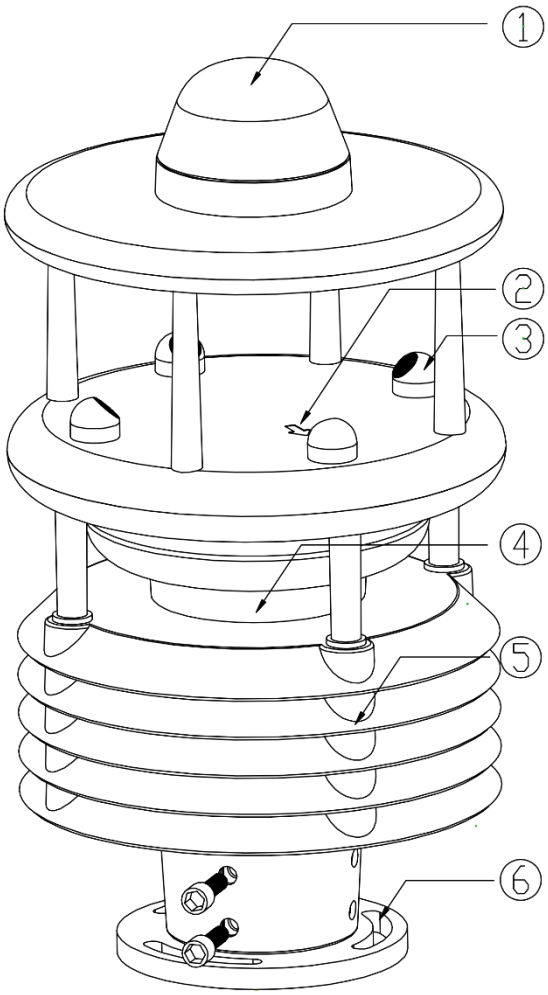
2, Ultrasonic probe

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

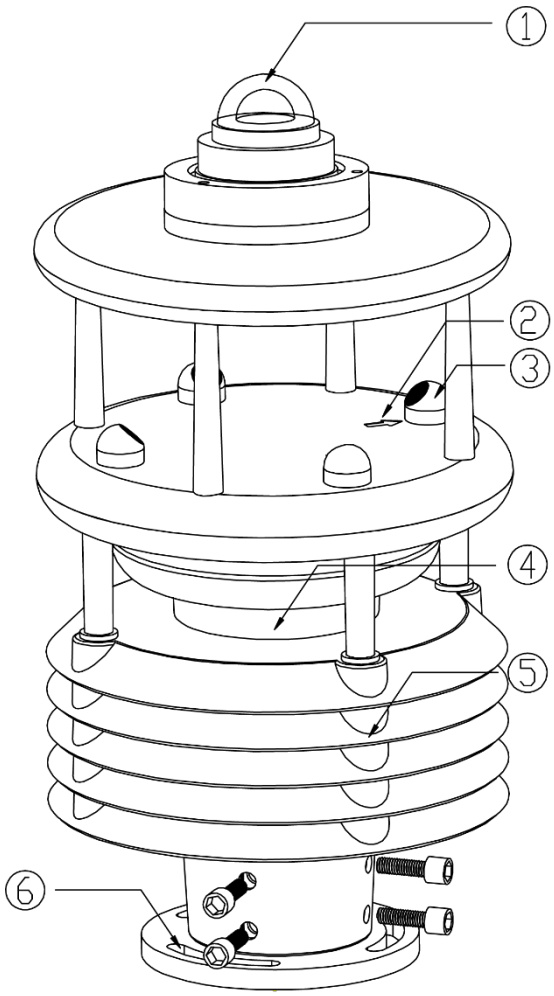
3, Ultrasonic probe

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

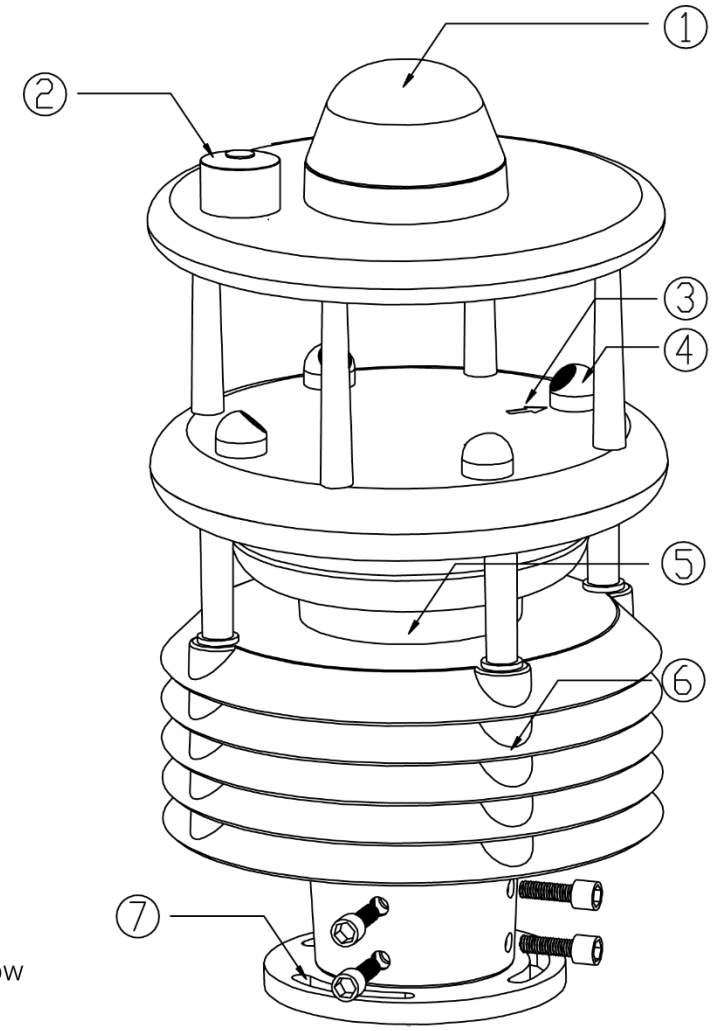
3, Ultrasonic probe

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

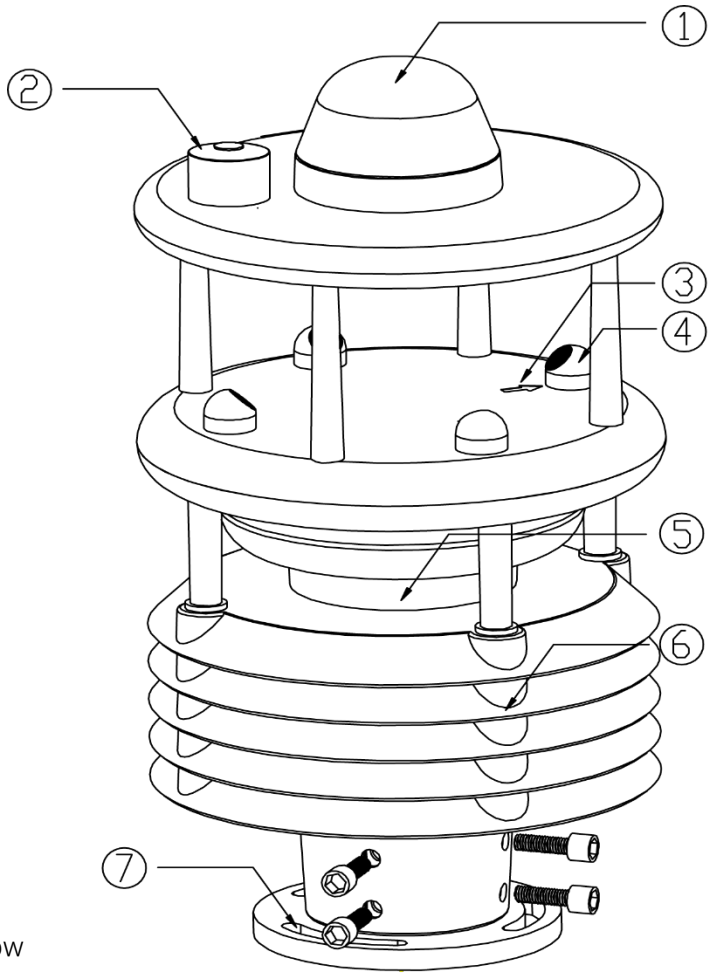
4, Ultrasonic probe

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

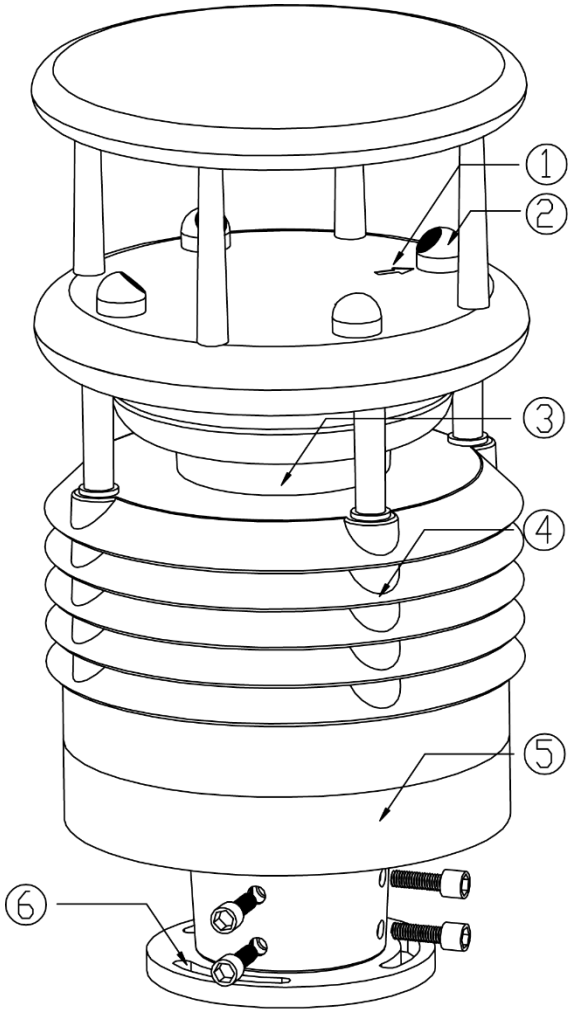
4, Ultrasonic probe

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)

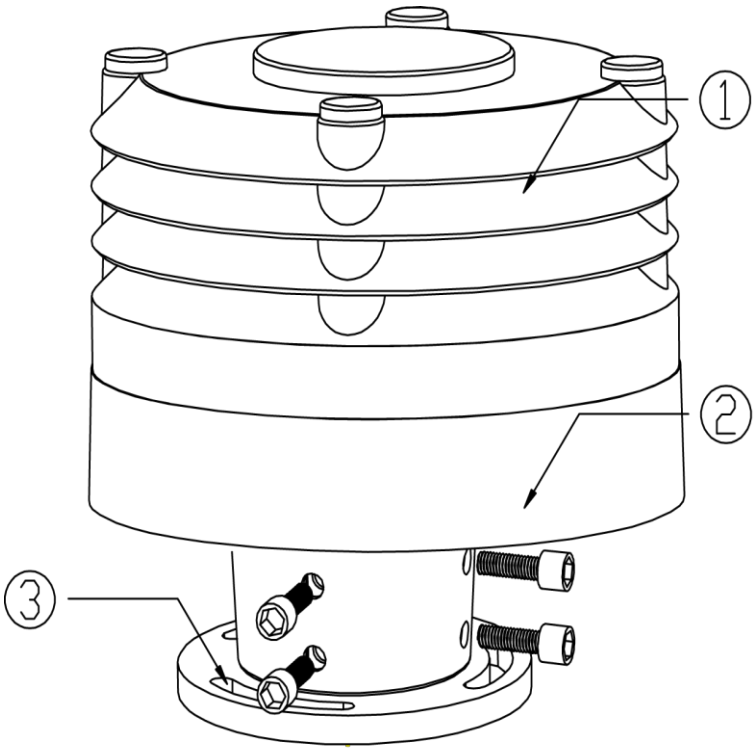
5, PM2.5, PM10, noise

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)

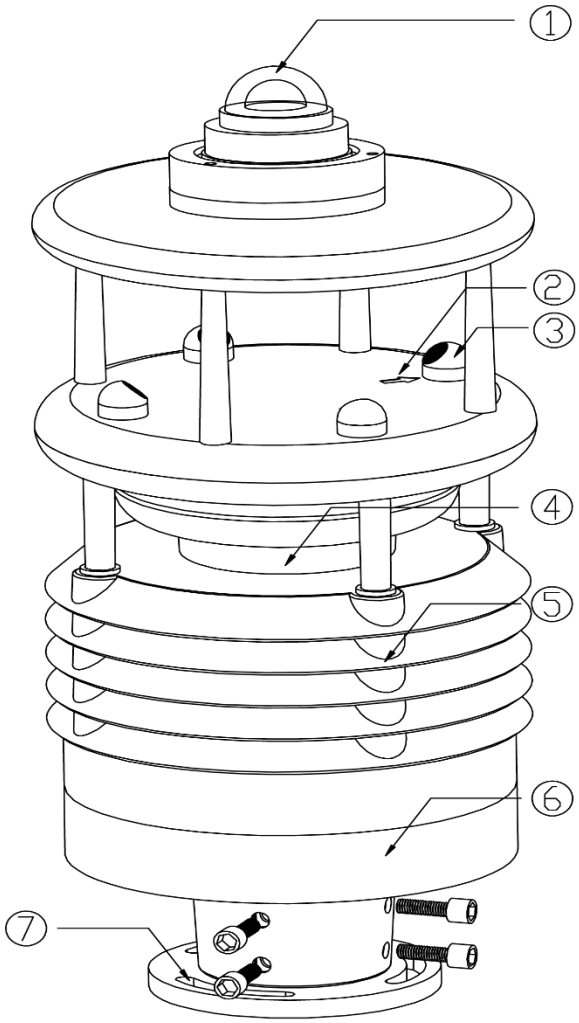


1. Louver box (temperature, humidity, air pressure monitoring position)

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

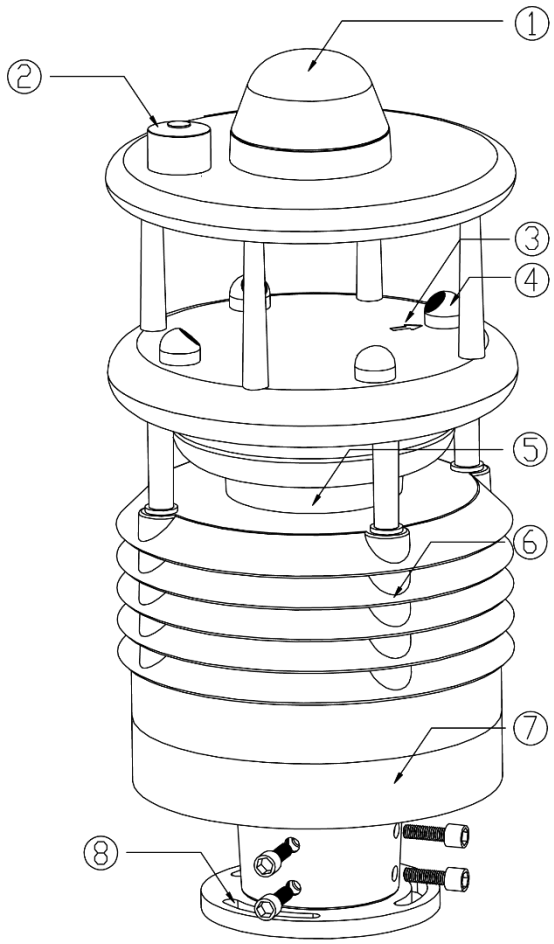
4, The control circuit

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

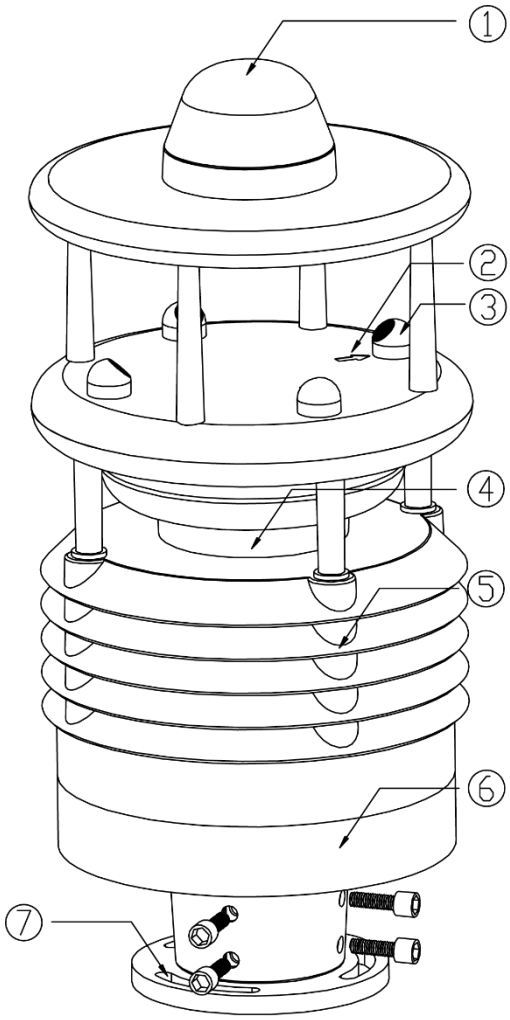
5, The control circuit

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

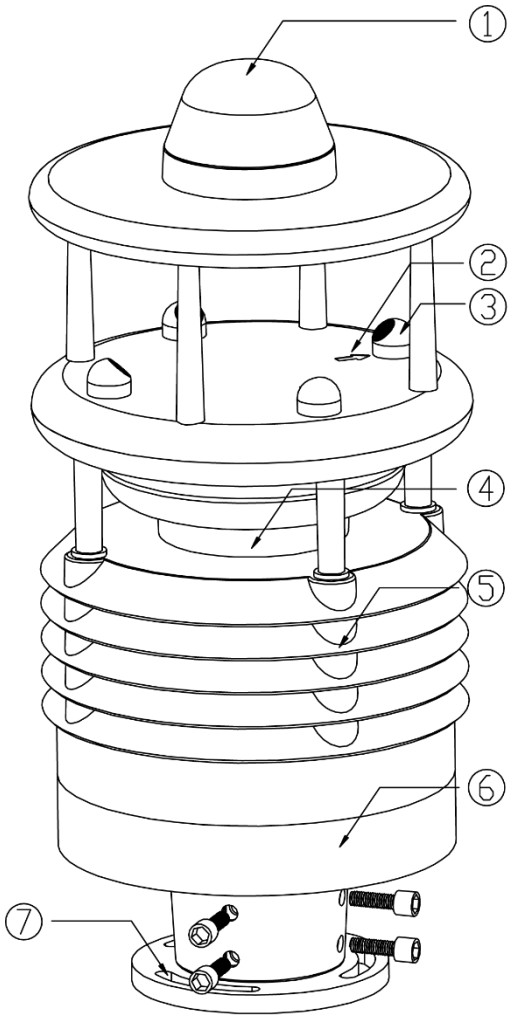
5, The control circuit

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

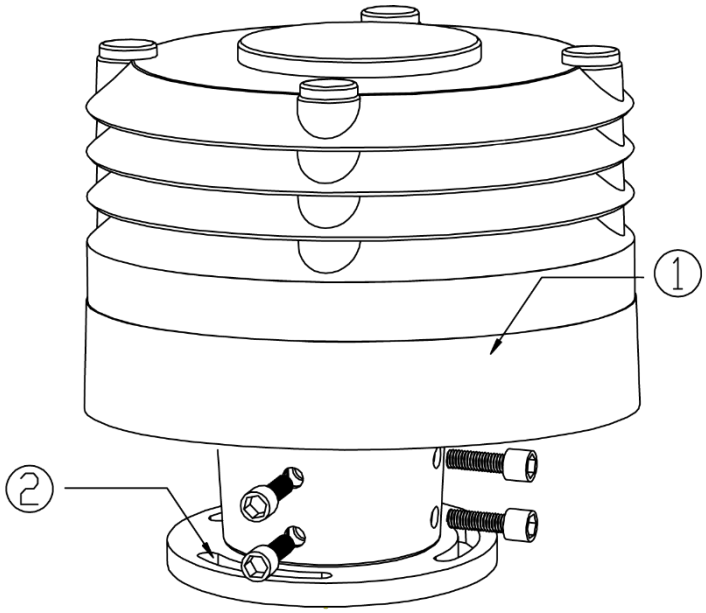
4, The control circuit

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

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

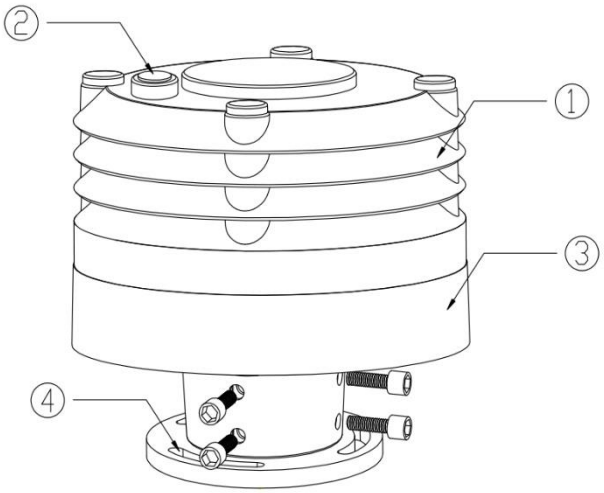
9, The bottom fixed flange

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



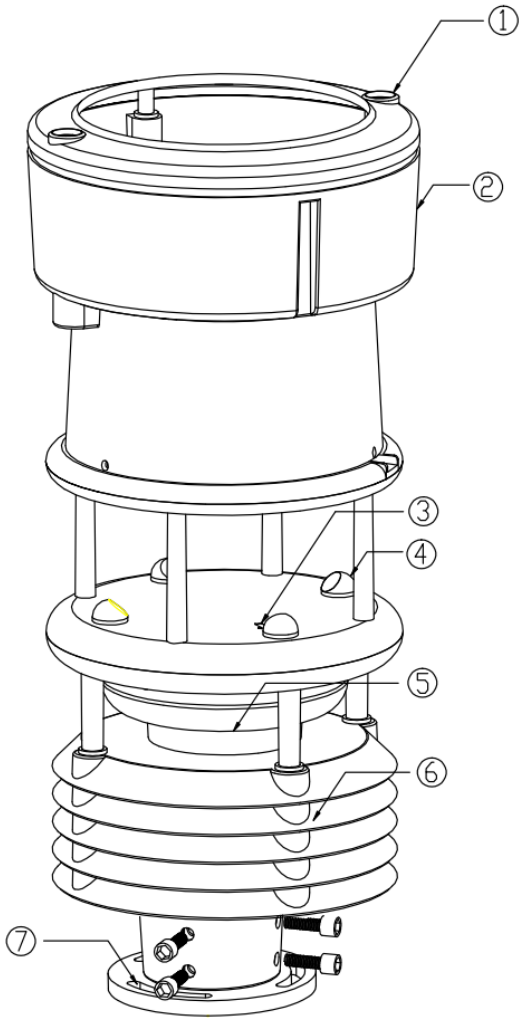
1. PM2.5 ,PM10 Monitoring
2. The bottom fixed flange

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;

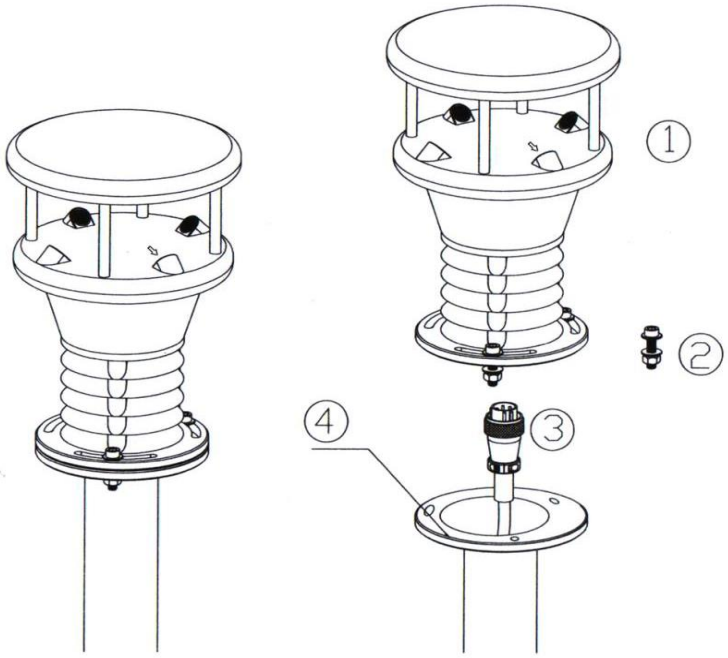
3, The installation height should not be less than 1.5m, the installation distance from the nearest obstacle should be more than 10 times the height of the brick house;

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

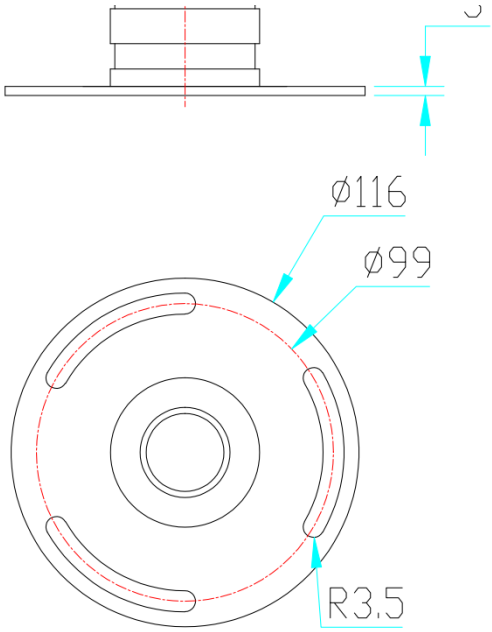
buildings.

4.3 Fixed way

4.3.1 Flange fixing



4.3.2 Flange size



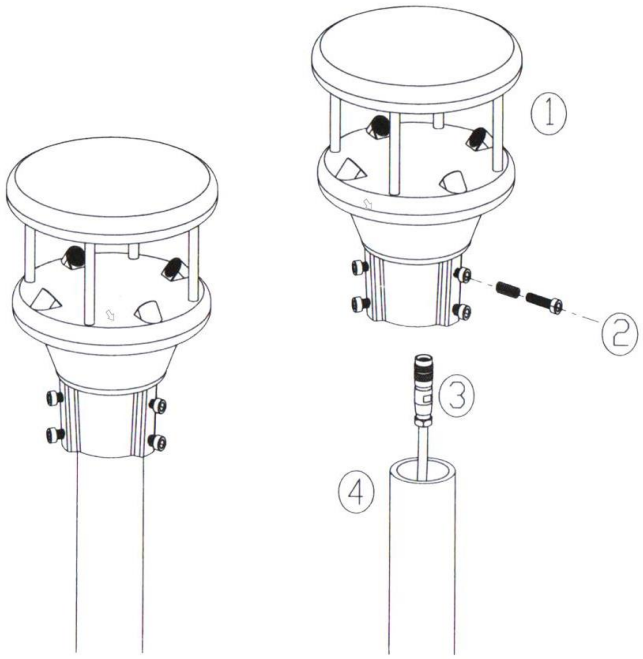
4.3.3 Bucket type fixing

1, Micro-meteorometer

2, The screw

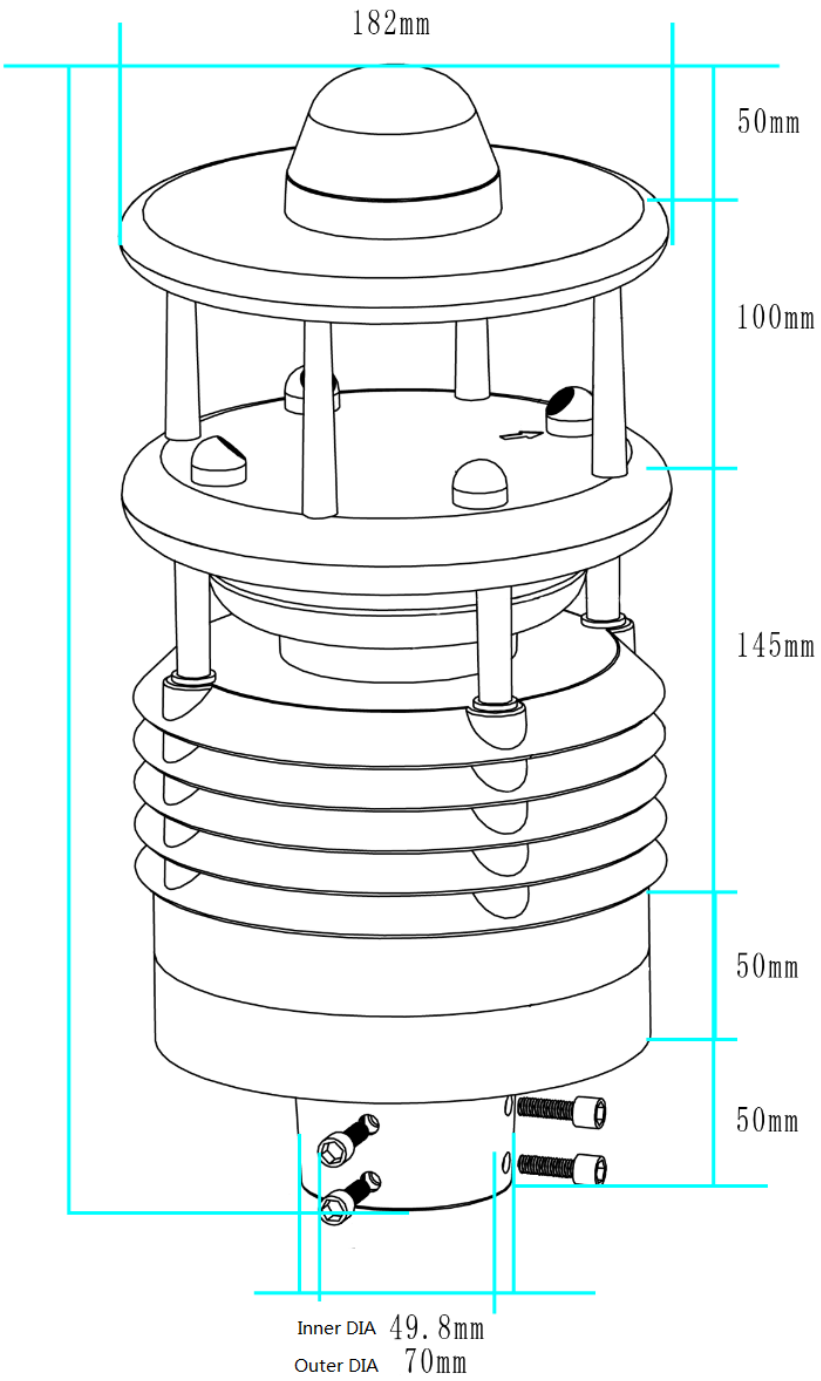
3, Communication cable + aerial plu

4, Fixed bracket



https://hondetec.en.alibaba.com
hondetec@163.com

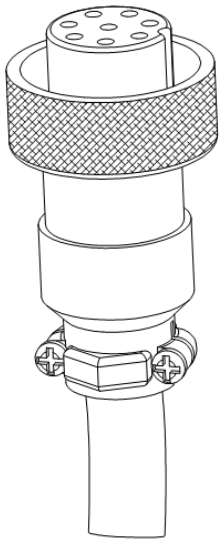
4.4 Product Size

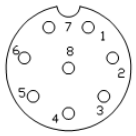


4.5 Line order definition

Figure 1

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





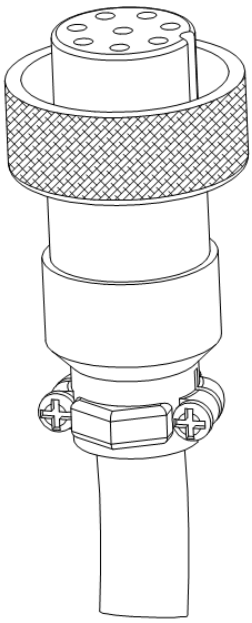
Three-wire system

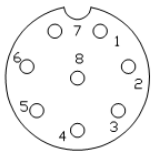
1. **Positive power supply**
2. **Negative power supply**
3. **Wind speed signal line 4-20mA**
4. **Wind direction signal line 4-20mA**

The rest is empty

Figure 2

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



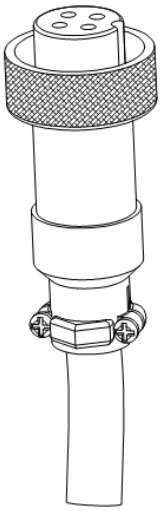


1. **Positive power supply**
2. **Negative power supply**
3. **RS485A**
4. **RS485B**

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

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	

		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=1016hPa	
0x000C	Read only	Wind speed, magnified 100 times hexadecimal number, such as 0x0125 means 293/100=2.93m/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/m2	
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, Temperature = 6743 / 100-40 = 27.43 ℃

0x0C5F = 0x0C * 256 + 0x5F = 3167, Humidity = 3167/100 = 31.67% RH
0x2783 = 0x27 * 256 + 0x83 = 10115, Air pressure = 10115/10 = 1011.5hPa
0x0000 = 0, Wind speed = 0/100 = 0.00m / s
0x0C14 = 0x0C * 256 + 0x14 = 3092, Wind direction = 3092/10 = 309.2 °

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, Noise = 540/10 = 54.0dB
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

	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.

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\PM2.5\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!

Air temperature and humidity sensor Introduce

Type NO.: RD-ATHP-R

HONDE TECHNOLOGY CO.,LTD

1. Product Introduce

The pen-type temperature, humidity sensor can simultaneously measure ambient temperature, relative humidity and after circuit processing, directly outputs the RS485 through the main control chip.

This product is designed with a pen-like appearance structure, exquisite and compact. The main application places of the product are in the fields of indoor computer room, environmental control and outdoor weather monitoring, with high integration and convenient application. The product can be equipped with an outdoor protective cover for outdoor measurement of ambient temperature, relative humidity.

The product directly outputs the RS485 communication interface, and the user can directly use the wireless DTU module to realize the wireless transmission of data.

2. Product Features

1. Wide voltage design, high cost performance.
2. Digital linearization correction, high precision and high stability.
3. Full range temperature and humidity compensation, wide temperature and humidity measurement range, optional measurement range.
4. Flexible installation and convenient use.
5. Small size, light weight and anti-vibration.
6. It can be made into a variety of shapes to meet different needs of customers.

3. Product application

It is widely used in building automation, telecommunications room, papermaking and printing, warehousing and logistics, shopping malls, hotel housing, agricultural greenhouses, cinemas, railway stations, museums, theaters, clean workshops and other fields where temperature and humidity need to be measured.

4. Product Parameter

- Measure range
  - Temperature: -40 ~ 60℃
  - Humidity : 0 ~ 100%RH (non-condensing state)
- Accuracy:
  - Temperature:±0.3℃(@25℃);
  - Humidity :±3%RH(10% ~ 90%);
- Resolution
  - Temperature: 0.01℃

- Humidity : 0.01%RH

- Power supply voltage: 9V ~ 24V
- Output signal: RS485
- Response time: <1S
- Working environment: temperature: -40℃ ~ 60℃; humidity: ≤95%RH
- Working current: DC12V <20ma (485);
- Power consumption: DC12V <0.24W (485);
- Cable length: 3 meters (customizable)
- The farthest lead length: current 200 meters, RS485 100 meters, voltage 50 meters
- Shell material: ABS engineering plastic
- Product weight: <100g
- Protect level: IP65

5. Line connection diagram

- Red line: positive power supply
- Black wire: negative power supply
- Yellow wire: RS485 A
- Blue wire: RS485 B

6. Data conversion method

1. Standard Modbus-RTU protocol

Baud rate: 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 9600bit/s

Check digit: none;

Data bit: 8; Stop bit: 1

2.Communication protocol examples and explanations

1. Modify the address, for example: change the address of the transmitter with address 00 to 33, host → slave

Original address	Function code	Starting register address	Number of registers	Data length	New address	CRC16 low	CRC16 high
00	10	00 01	00 01	02	00 33	EA	04

If success, the slave will send: 00 10 00 01 00 01 51 D8

2. Read sensor address

Original address	Function code	Starting register address	Number of registers	CRC16 low	CRC16 high
00	03	00 01	00 01	D4	1B

Feedback: 00 03 02 00 FF C5 C4

The sensor address is FF.

3. Read air temperature and humidity and pressure at device address 0x01(The default address is 01)

- Inquiry frame

Address code	Function code	Register start address	Number of registers	Low check bit	Check code high
01	03	00 00	00 02	C4	0B

- Response frame

Address code	Function code	Data length	Air temperature	Air humidity	Low check bit	Check code high
01	03	04	19 AD	1B E4	66	35

Note: Temperature: 4th and 5th bytes , 19 AD(Hexadecimal)= 6573 (Decimal) , 65.73-40=25.73℃

Humidity: 6th and 7th byte , 1B E4(Hexadecimal)= 7140 (Decimal), 7140/100=71.4%

7. Instructions

1. When receiving the product, please check whether the packaging is intact and check whether the model and specifications of the transmitter are consistent with the product you purchased;

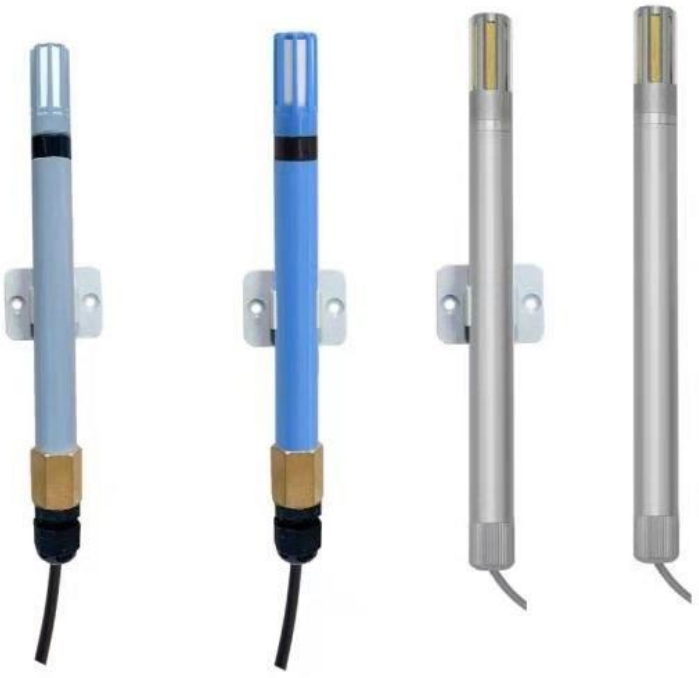
2. The installation place should be away from the chemical corrosion environment;

3. Transmitters and wires should be kept away from high voltage electricity and heat sources;

4. The transmitter is a precision instrument and should be stored in a dry, ventilated and indoor environment.

5. The sensor is a precision device. Please do not disassemble it by yourself when using it to avoid product damage

Air temperature and humidity sensor Introduce



Type NO.: RD-ATH-4A

HONDE TECHNOLOGY CO.,LTD

1. Product Introduce

The temperature and humidity sensor uses a temperature and humidity integrated probe as the temperature measurement element, collects the temperature and humidity signals, and after circuit processing, directly outputs the 4-20mA or RS485 through the main control chip.

The simple series of temperature and humidity sensors use imported digital temperature and humidity data acquisition modules, which have been accurately calibrated when they leave the factory. The relative humidity and temperature sensors have digital outputs and can be fully interchangeable. The measurement accuracy, linearity, repeatability, and mutual is outstanding in terms of conversion and consistency. It is suitable for environmental equipment matching, instrument equipment integration, and other general environmental tests.

2. Product Features

1. Wide voltage design, high cost performance.
2. Digital linearization correction, high precision and high stability.
3. Full range temperature and humidity compensation, wide temperature and humidity measurement range, optional measurement range.
4. Flexible installation and convenient use.
5. Small size, light weight and anti-vibration.
6. It can be made into a variety of shapes to meet different needs of customers.

3. Product application

It is widely used in building automation, telecommunications room, papermaking and printing, warehousing and logistics, shopping malls, hotel housing, agricultural greenhouses, cinemas, railway stations, museums, theaters, clean workshops and other fields where temperature and humidity need to be measured.

4. Product Parameter

- Temperature range: standard -40 ~ 80℃
- Humidity range: 0 ~ 100%RH (non-condensing state)
- Accuracy: ±0.3℃(@25℃); ±3%RH(10% ~ 90%);
- Repeatability: ±0.1℃; ±0.1%RH;
- Resolution: 0.01℃; 0.05%RH;
- Long-term stability: <0.04℃/year; <0.5%RH/year
- Power supply voltage: 9 ~ 24V DC
- Output signal: 4-20mA

- Response time: <1S
- Working environment: temperature: -40℃ ~ 60℃; humidity: ≤95%RH
- Working current: DC12V <20ma (485); DC12V <45ma (current)
- Power consumption: DC12V <0.24W (485); DC12V <0.54W (current)
- Cable length: 3 meters (customizable)
- The farthest lead length: current 200 meters, RS485 100 meters, voltage 50 meters
- Shell material: ABS engineering plastic
- Product weight: <100g
- Protect level: IP65

5. Line connection diagram

Wire colour	Description
Red	Positive power supply 12-24VDC
Black	Negative power & Negative analog output
Yellow	Temperature positive current output(4-20mA)
Green	Humidity positive current output(4-20mA)

6. Data conversion method

1. Analog output

T: Temperature , Unit ℃

H: Humidity, unit, %RH

A: Current value collected by the collector, unit: mA

Output signal	Temperature conversion method (-40 to 80 ° C)	Humidity conversion method
4 ~ 20mA	T = 7.5*A – 70	H = 6.25*A – 25

7. Instructions

1. When receiving the product, please check whether the packaging is intact and check whether the model and specifications of the transmitter are consistent with the product you purchased;

2. The installation place should be away from the chemical corrosion environment;

3. Transmitters and wires should be kept away from high voltage electricity and heat sources;

4. The transmitter is a precision instrument and should be stored in a dry, ventilated and indoor environment.

5. The sensor is a precision device. Please do not disassemble it by yourself when using it to avoid product damage

Wind speed sensor introduction

RD-WSM-ASA

HONDE TECHNOLOGY CO.,LTD

1.Product overview

The wind speed transmitter adopts the traditional three wind cup wind speed sensor structure. The wind cup is made of ASA material, which has high strength and good start. The cup body has better balance after dynamic balance processing. The built-in signal processing unit can output the corresponding wind speed signal according to user needs, It can be widely used in the fields of meteorology, ocean, environment, airport, port, laboratory, industry, agriculture and transportation.

2. Features

1.Range: 0-40m/s, Resolution 0.3m/s (corresponding number of pulses)

2. Anti-electromagnetic interference treatment

3. Adopt bottom outlet method

4. Use high-performance imported bearings, low rotation resistance, accurate measurement

5. ASA shell, high mechanical strength, high hardness, does not change color, can be used outdoors for a long time

6. The structure and weight of the equipment are carefully designed and distributed, with small moment of inertia and sensitive response

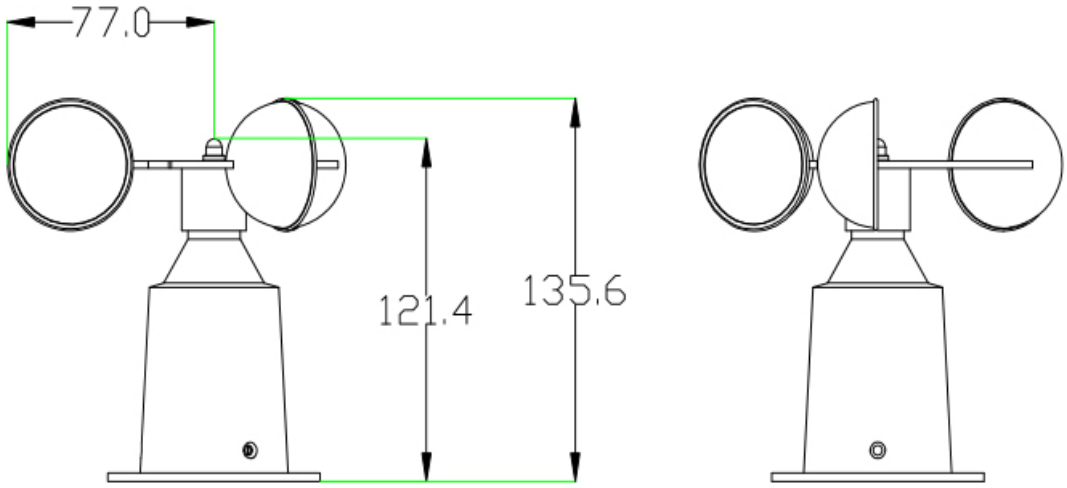
7. Output mode (optional): 0-5V, 0-10V, 4-20MA, pulse, RS485 (ModBus-RTU)

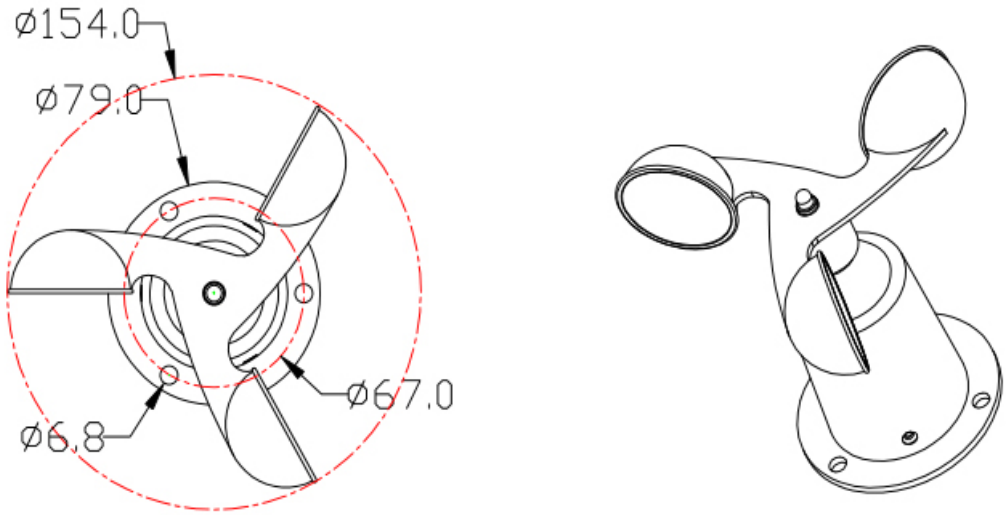
3. The main parameters

DC power supply (default)	12~24V DC
Power consumption	≤200mW
Transmitter circuit operating temperature	-20℃~+80℃，0%RH~100%RH
Output optional	0-5V，0-10V，4-20MA，pulse，RS485(ModBus-RTU)
485 Communication Interface	485 communication (modbus-RTU) protocol Baud rate: 9600 Data bit length: 8 bits Parity check method: none Stop bit length: 1 bit Default ModBus communication address: 255
Resolution	0.3m/s (corresponding number of pulses)
Precision	±（0.3+0.03V）m/s V means wind speed

Measuring range	0~40m/s
Dynamic response time	≤1s
Starting wind speed	≤0.4m/s
load capacity	< 500Ω

4. Product size





5. Communication protocol

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8;

Stop bit: 1

2. Communication protocol examples and explanations

（1）Modify the address, for example: change the address of the transmitter with address to 01, host → slave

Reserved address	Function code	Register address	New address	CRC16 low	CRC16 high
00	06	00 00	00 01	49	DB

If success, the feedback as following:

Reserved address	Function code	Register address	New address	CRC16 low	CRC16 high
00	06	00 00	00 01	49	DB

(2) Read the sensor address, for example the sensor address is 01

Reserved address	Function code	Register address	Number of registers	CRC16 low	CRC16 high
00	03	00 00	00 01	85	DB

If success, the feedback as following:

Reserved address	Function code	Data length	Address	CRC16 low	CRC16 high
00	03	02	00 01	44	44

(3) Query the data (wind speed) of the sensor (address 01, the default address is 01), host →slave

Inquiry frame

Address code	Function code	Register start address	Register length	CRC16 low	CRC 16 high
0X01	0X03	0X00 0X01	0X00 0X01	0XD5	0XCA

Response frame

Address code	Function code	Data length	Wind speed	CRC16 low	CRC 16 high
0X01	0X03	0X02	0x00 0x17	0XF8	0X4A

Data representation method:

A. Wind speed: after converting the data into decimal data ÷100

The above data shows that wind speed: 0017(HEX)=23(Decimal), wind speed =23/100=0.23m/s.

Wind direction sensor introduction

RD-WDM-ASA

HONDE TECHNOLOGY CO.,LTD

Honde Technology CO.,LTD
https://hondetec.en.alibaba.com/

1.Product overview

The wind direction sensor is small and light in appearance, easy to carry and assemble. The large wind indicator design concept can effectively obtain external environmental information. The shell is made of ASA material, which has good anti-corrosion and anti-corrosion characteristics, which can ensure that the instrument is free from rusting in long-term use. At the same time, with the internal smooth bearing system, the accuracy of information collection is ensured. It is widely used for wind direction measurement in environmental protection, weather stations, ships, docks, and breeding.

2. Features

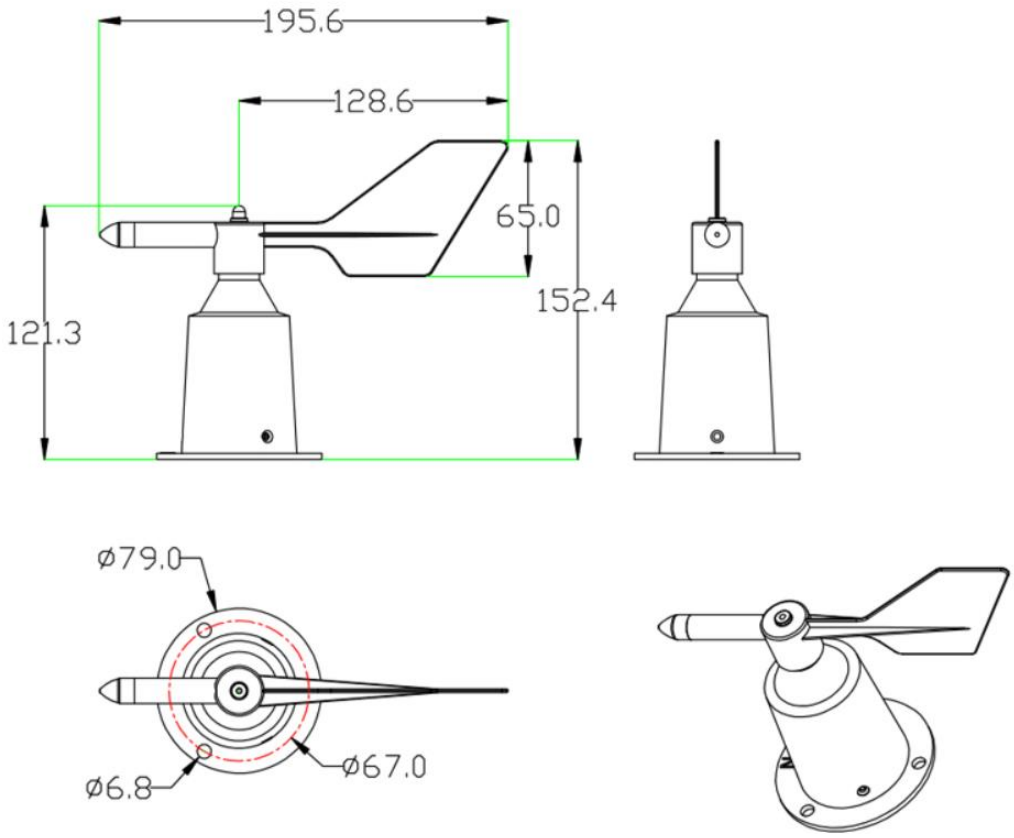
1. Range: 0~359.9°
2. Anti-electromagnetic interference treatment
3. Using high-performance imported bearings, low rotation resistance, accurate measurement
4. ASA shell, high mechanical strength, high hardness, corrosion resistance, long-term discoloration can be used outdoors for a long time
5. The structure and weight of the equipment have been carefully designed and distributed, and the moment of inertia is small, and the response is sensitive
6. Optional output mode 4-20MA, 0-5V, 0-10V, RS485 (ModBus-RTU communication protocol), easy to access

3. The main parameters

DC power supply (default)	12~24V DC
Power consumption	≤300mW
Transmitter circuit operating temperature	-20℃~+80℃，0%RH~100%RH
Output optional	0-5V，0-10V，4-20MA，pulse，RS485(ModBus-RTU)
485 Communication Interface	485 communication (modbus-RTU) protocol Baud rate: 9600 Data bit length: 8 bits Parity check method: none Stop bit length: 1 bit Default ModBus communication address: 255

Resolution	0.1°
Precision	±4°
Measuring range	0~359.9 °
Dynamic response time	≤1s
Starting wind speed	≤0.5m/s
load capacity	< 500Ω

4. Product size



Please note that the arrow of the wind direction sensor points to true north during installation.

5. Communication protocol

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8; Stop bit: 1

2. Communication protocol examples and explanations

（1）Modify the address, for example: change the address of the transmitter with address to 01, host → slave

Reserved address	Function code	Register address	New address	CRC16 low	CRC16 high
00	06	00 00	00 01	49	DB

If success, the feedback as following:

Reserved address	Function code	Register address	New address	CRC16 low	CRC16 high
00	06	00 00	00 01	49	DB

(2) Read the sensor address, for example the sensor address is 01

Reserved address	Function code	Register address	Number of registers	CRC16 low	CRC16 high
00	03	00 00	00 01	85	DB

If success, the feedback as following:

Reserved address	Function code	Data length	Address	CRC16 low	CRC16 high
00	03	02	00 01	44	44

(3) Query the data (wind direction) of the sensor (address 01, the default address is 01), host →slave, Inquiry frame

Address code	Function code	Register start address	Register length	CRC16 low	CRC 16 high
0X01	0X03	0X00 0X01	0X00 0X01	0XD5	0XCA

Response frame

Address code	Function code	Data length	Wind direction	CRC16 low	CRC 16 high
0X01	0X03	0X02	0x00 0x9E	0X39	0XEC

Data representation method:

A. Wind direction: after converting the data into decimal data ÷10

The above data shows that wind speed: 009E(HEX)=158(Decimal), wind direction =158/10=15.8°

Wind speed sensor introduce

RD-WSM-O-1

HONDE TECHNOLOGY CO.,LTD

Honde Technology CO.,LTD
https://hondetec.en.alibaba.com/

1. Product introduce

The three-cup wind speed sensor is a wind speed measuring instrument independently developed and produced by our company. The sensor housing is made of aluminum material with very small dimensional tolerances. It has high weather resistance, high strength, corrosion resistance and water resistance. Internal integrated photoelectric conversion mechanism, industrial microcomputer processor, standard current generator, current driver, etc. The circuit PCB uses military-grade A-level materials to ensure the stability of the measurement parameters and electrical performance; the electronic components are all imported industrial-grade chips, which makes the whole have extremely reliable anti-electromagnetic interference ability, and can guarantee the host at -30 ℃ ~ 75 ℃, Humidity can work normally in the range of 15-85%RH (non-condensing). After the product is upgraded, the output signals are diverse. The wired output includes: analog signal (voltage, current), digital signal RS485; wireless output includes: LoRa, Bluetooth, WIFI, GPRS, 4G, NB-IOT, CAT-1.

2. Product Features

1. The sensor has a compact design, high measurement accuracy, fast response speed, and good interchangeability.

2. Realize low cost, low price and high performance.

3. Flange installation method, can achieve the lower outlet, side outlet, simple and convenient.

4. High data transmission efficiency and reliable performance to ensure normal work.

5. Wide range of power supply adaptability, good linearity of data information, and long signal transmission distance.

6. With two parameters, wind speed and wind level, the data is reliable.

3. Range of use

This product is widely used in wind speed measurement in the environment of greenhouse, environmental protection, weather station, engineering machinery, ship, wharf, breeding and other environments.

4. Technical Parameters

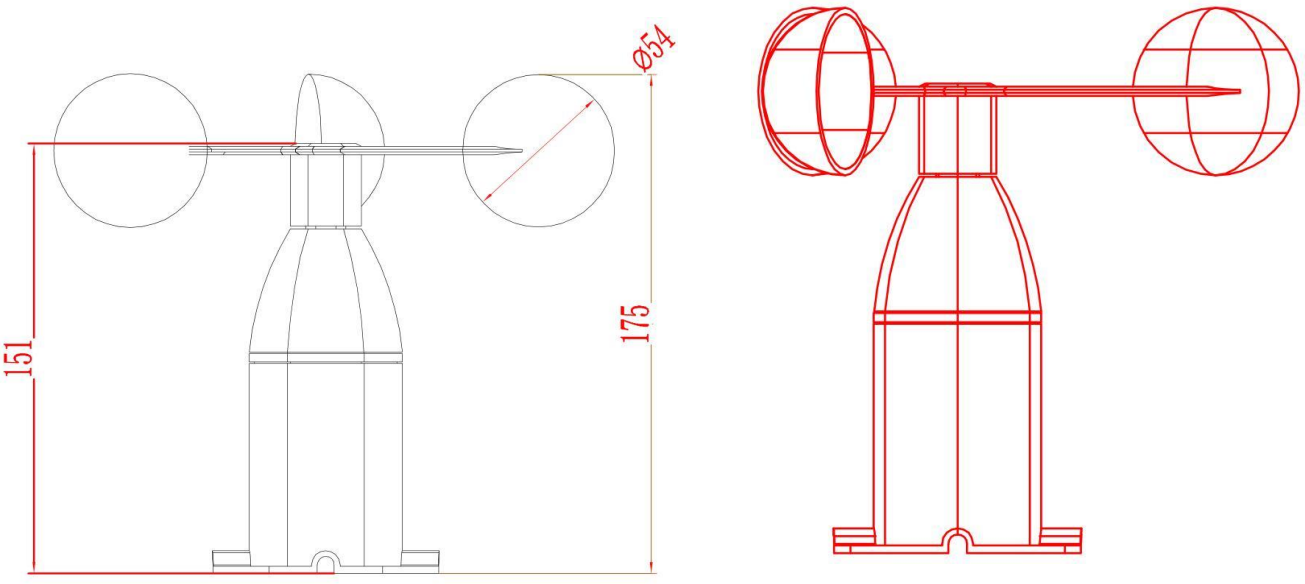
Measure range	0-30m/s,0-50m/s, 0-60m/s(The default is 0-30m/S)
Start wind speed	0.3m/s
Response time	＜1s
Resolution	0.1m/s
Accuracy	±（0.3+0.03V）m/s
Output	A: Voltage signal (select one of 0～2V, 0～5V, 0～10V)
	B: 4～20mA (current loop)

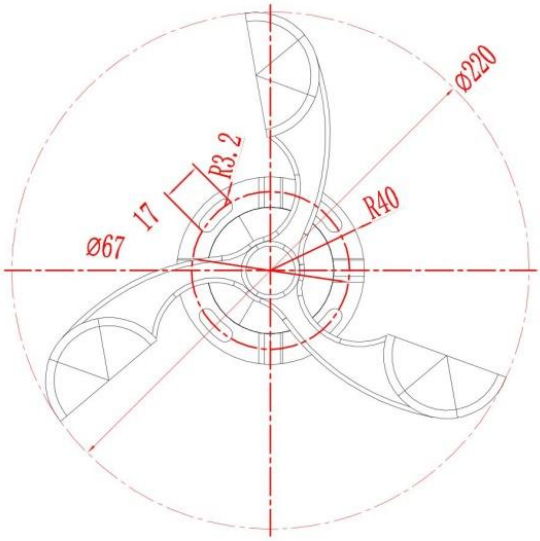
	C: RS485 (standard Modbus-RTU protocol, device default address: 01)
Power	5～24V DC (when the output signal is 0～2V, RS485)
	12～24V DC (when the output signal is 0～5V, 0～10V, 4～20mA)
Maximum power consumption	Pulse type ≤200mW；Voltage type≤300mW；Current type≤700mW
Working temperature	-30~70℃
Working humidity	≤100%RH
Signal output	0-2V,4-20mA,RS485
Wireless transmission	LoRa, Bluetooth, WIFI, GPRS, 4G, NB-IOT, CAT-1
Cable specifications	2-meter 3-wire system (analog signal); 2-meter 4-wire system (RS485) (optional cable length)

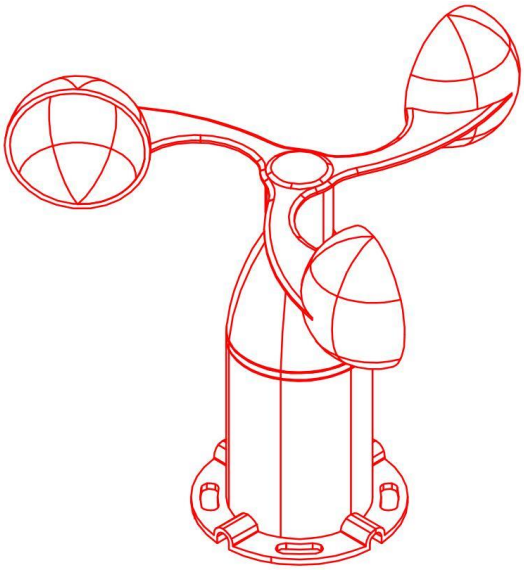
5. Current signal impedance requirements

Supply voltage	9V	12V	20V	24V
Maximum impedance	125Ω	250Ω	500Ω	>500Ω

6. Dimensions







7. Wiring definition

1.RS485 output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative
Yellow	RS485A
Green	RS485B

2. Analog output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative , Analog output common end
Yellow	Analog output

8. Installation method

1. Side outlet

2. Bottom outlet

3. Aviation joint

4. Waterproof connector

9. Analog voltage and current output

V: the voltage value collected by the collector, unit: V

A: Current value collected by the collector, unit: mA

output signal	Data conversion method for each range	
	0 ~ 30m/s	0 ~ 60m/s
0 ~ 2V DC	Wind speed = 15*V	Wind speed = 30*V
0 ~ 5V DC	Wind speed = 6*V	Wind speed = 12*V
0 ~ 10V DC	Wind speed = 3*V	Wind speed = 6*V
4 ~ 20mA	Wind speed = 1.875*A − 7.5	Wind speed = 3.75*A − 15
pulse	One pulse represents 0.083m/s	

10. Communication protocol

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8; Stop bit: 1

2. Communication protocol examples and explanations

(1) Query the data (wind speed, wind level) of the sensor (the default sensor address is 1), host →slave

- Inquiry frame

Address code	Function code	Register start address	Register length	CRC16 low	CRC 16 high
0X01	0X03	0X00 0X00	0X00 0X02	0XC4	0X0B

- Response frame

Address code	Function code	Data length	Wind speed	Wind level	CRC16 low	CRC 16 high
0X01	0X03	0X04	0x00 0x42	0x00 0x03	0x1A	0X26

Data representation method:

A. Wind speed: after converting the data into decimal data ÷10

B. Wind level: convert data to decimal

The above data shows that wind speed: 3.6 m/s, wind level: level 3.

(2) Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

Original address	Function code	Start register address high	Start register address low	Reserved 3	New address	CRC16 low	CRC16 high
0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

The data returned from the slave to the master is the same as the sent data, the same means that the setting is successful

Note: If you forget the original address of the sensor, you can use the broadcast address 0xfe instead. When using the broadcast address 0xfe, the master can only connect one slave at a time.

Wind direction sensor introduce

RD-WDM-O-1

HONDE TECHNOLOGY CO.,LTD

Honde Technology CO.,LTD
https://hondetec.en.alibaba.com/

1. Product introduce

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

The sensor housing is made of aluminum material, with very small dimensional tolerances and high surface accuracy. At the same time, it has high weather resistance, high strength, corrosion resistance and water resistance; the internal circuits are all protected, and the entire sensor has good resistance to harsh environments. Adaptability. The cable connector is a military plug, which has good anti-corrosion and anti-corrosion performance, which can ensure the long-term use of the instrument, and cooperates with the internal imported bearing system to ensure the accuracy of the wind direction collection.

The wind direction sensor adopts low inertia wind vane and precision potentiometer, with high sensitivity and high precision. The precision signal processing unit can output various signals according to user needs. The circuit module PCB uses military-grade A-grade materials to ensure the stability of the parameters and the quality of electrical performance; the electronic components are all imported industrial-grade chips, which makes the whole have extremely reliable anti-electromagnetic interference ability, which can ensure the host at -30 ℃ ~ + It can work normally in the range of 50℃, humidity 35% ~ 85% (non-condensing).

2. Product features

1. The sensor has a compact design, high measurement accuracy, fast response speed, and good interchangeability.

2. Realize low cost, low price and high performance.

3. Flange installation method, can achieve the lower outlet, side outlet, simple and convenient.

4. Reliable performance, ensure normal work and high data transmission efficiency.

5. Wide range of power supply adaptability, good linearity of data information, and long signal transmission distance.

3. Application scenario

This product can measure indoor or outdoor environment in any direction, resolution: 1°, can be widely used in the field of construction machinery (crane, crawler crane, door crane, tower crane, etc.), railway, port, wharf, power plant, meteorology, ropeway, environment, Wind direction measurement in the fields of

greenhouse, aquaculture, air conditioning, energy conservation monitoring, agriculture, medical treatment, clean space, etc.

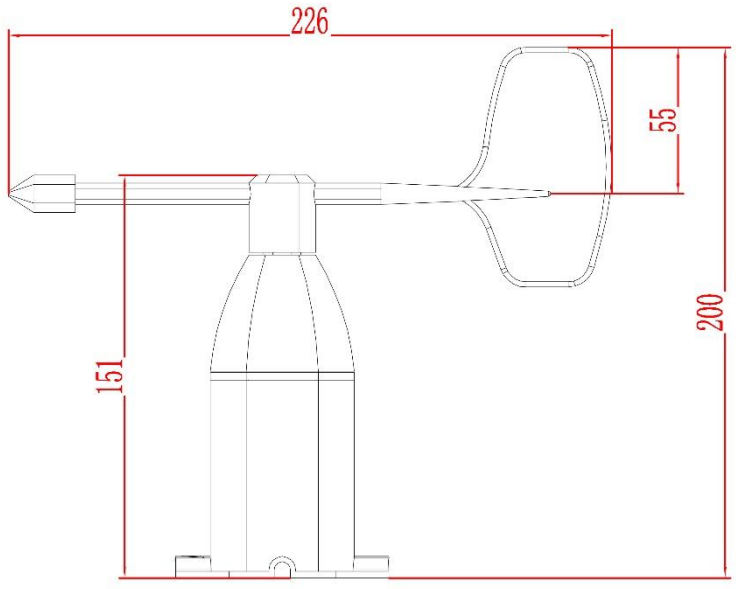
4. Technical Parameters

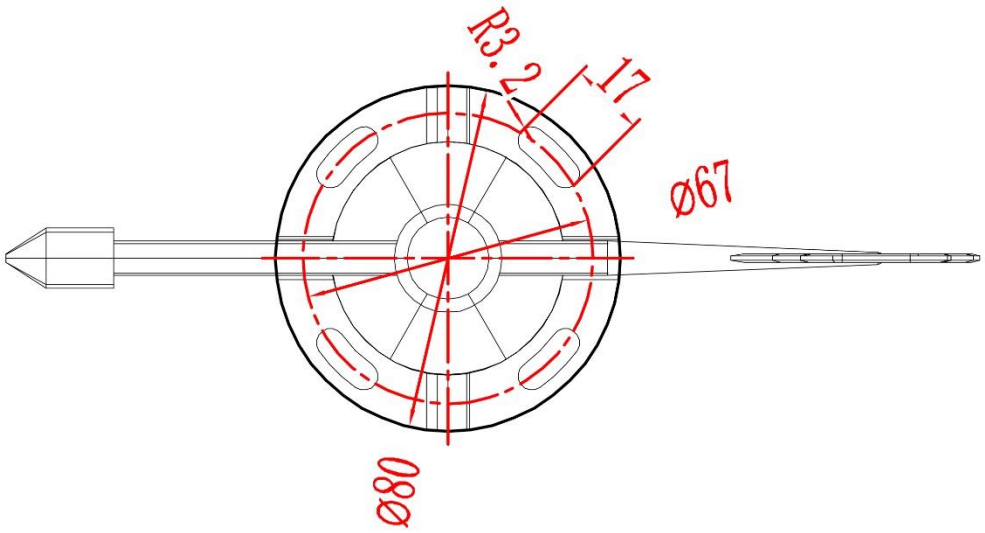
Measure range	0-360 °
Start wind	≥0.5m/s
Accuracy	±1°
Resolution	0.1°
Maximum turning radius	200mm
Output signal	Voltage signal (choose one of 0～2V, 0～5V, 0～10V)
	4～20mA (current loop)
	RS485 (standard Modbus-RTU protocol, device default address: 01)
Power	5～24V DC (when the output signal is 0～2V, RS485)
	12～24V DC (when the output signal is 0～5V, 0～10V, 4～20mA)
Maximum power consumption	RS485 ≤300mW；Voltage type≤300mW；Current type≤700mW
Working temperature	-40~75℃; Humidity ≤100%RH
Signal output	0-2V,4-20mA,RS485
Protection class	IP65
Wireless transmission	GPRS, LoRa. LoRaWAN, NB-IOT

5. Current signal impedance requirements

Supply voltage	9V	12V	20V	24V
Maximum impedance	125Ω	250Ω	500Ω	>500Ω

6. Product size





7. Wiring definition

1.RS485 output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative
Yellow	RS485A
Green	RS485B

2. Analog output

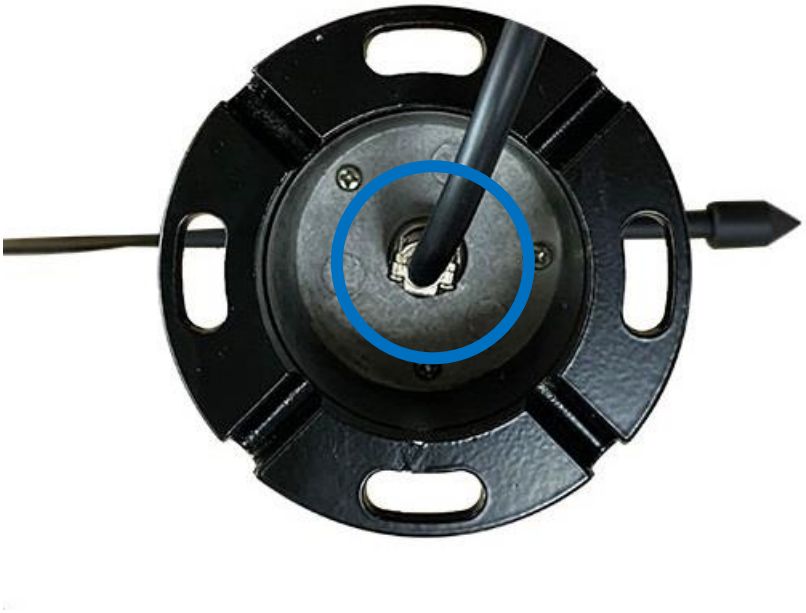
Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative , Analog output common end
Yellow	Analog output

8. Installation method

1. Side outlet

2. Bottom outlet

3. Aviation joint

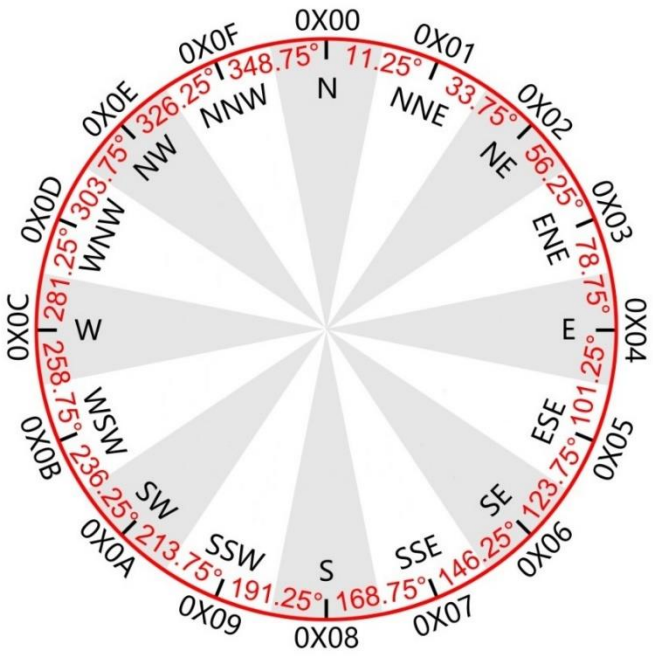


4. Waterproof connector

9. Data conversion method

1. Analog output conversion method

	0 ~ 2V	0 ~ 5V	0 ~ 10V	4 ~ 20mA	RS485
N	1.9375 ~ 0.0625	4.84368 ~ 0.156255	9.6875 ~ 0.3125	19.5 ~ 4.5	0X00
NEN	0.0625 ~ 0.1875	0.156255 ~ 0.46875	0.3125 ~ 0.9375	4.5 ~ 5.5	0X01
EN	0.1875 ~ 0.3125	0.46875 ~ 0.781245	0.9375 ~ 1.5625	5.5 ~ 6.5	0X02
EEN	0.3125 ~ 0.4375	0.781245 ~ 1.09374	1.5625 ~ 2.1875	6.5 ~ 7.5	0X03
E	0.4375 ~ 0.5625	1.09374 ~ 1.406235	2.1875 ~ 2.8125	7.5 ~ 8.5	0X04
EES	0.5625 ~ 0.6875	1.406235 ~ 1.71873	2.8125 ~ 3.4375	8.5 ~ 9.5	0X05
ES	0.6875 ~ 0.8125	1.71873 ~ 2.031225	3.4375 ~ 4.0625	9.5 ~ 10.5	0X06
SES	0.8125 ~ 0.9375	2.031225 ~ 2.34372	4.0625 ~ 4.6875	10.5 ~ 11.5	0X07
S	0.9375 ~ 1.0625	2.34372 ~ 2.656215	4.6875 ~ 5.3125	11.5 ~ 12.5	0X08
SWS	1.0625 ~ 1.1875	2.656215 ~ 2.96871	5.3125 ~ 5.9375	12.5 ~ 13.5	0X09
WS	1.1875 ~ 1.3125	2.96871 ~ 3.281205	5.9375 ~ 6.5625	13.5 ~ 14.5	0X0A
WWS	1.3125 ~ 1.4375	3.281205 ~ 3.5937	6.5625 ~ 7.1875	14.5 ~ 15.5	0X0B
W	1.4375 ~ 1.5625	3.5937 ~ 3.906195	7.1875 ~ 7.8125	15.5 ~ 16.5	0X0C
WWN	1.5625 ~ 1.6875	3.906195 ~ 4.21869	7.8125 ~ 8.4375	16.5 ~ 17.5	0X0D
WN	1.6875 ~ 1.8125	4.21869 ~ 4.531185	8.4375 ~ 9.0625	17.5 ~ 18.5	0X0E
NWN	1.8125 ~ 1.9375	4.531185 ~ 4.84368	9.0625 ~ 9.6875	18.5 ~ 19.5	0X0F



2 .RS485 Digital output method

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8; Stop bit: 1

2. Communication protocol examples and explanations

(1) Query data (wind direction angle, wind direction) of the transmitter (address 1), host→slave

- Inquiry frame

Address code	Function code	Register start address	Register length	CRC16 low	CRC 16 high
0X01	0X03	0X00 0X00	0X00 0X02	0XC4	0X0B

- Response frame

Address code	Function code	Data length	Wind direction angle	Wind direction	CRC16 low	CRC 16 high
0X01	0X03	0X04	0x02 0x9A	0x00 0x03	0x9B	0XA5

Calculation instructions:

Data representation method:

A. Wind direction angle: after converting the data into decimal data ÷10

B. Wind direction: For the specific orientation, please refer to "16 Direction Map of Wind Direction Sensor"

The above data shows that the wind direction angle: 66.6°, the wind direction: northeast and northeast

(2) Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

Original address	Function code	Start register address high	Start register address low	Reserved 3	New address	CRC16 low	CRC16 high
0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

The data returned from the slave to the master is the same as the sent data, the same means that the setting is successful

Note: If you forget the original address of the sensor, you can use the broadcast address 0xfe instead. When using the broadcast address 0xfe, the master can only connect one slave at a time.

Rainfall sensor Introduce

1 Overview

Rainfall sensor is a kind of hydrological and meteorological instrument, which is used to measure the rainfall in nature and convert the rainfall into digital information output in the form of switch value, so as to meet the needs of information transmission, processing, recording and display.

This instrument is a primary instrument for precipitation measurement, and its performance meets the requirements of national standard GB/T11832-2002 "Tipping bucket rain gauge".

The core part of this instrument, the tipping bucket, adopts three-dimensional streamlined design, which makes the tipping bucket more smooth and easy to clean.

This instrument is a precision rain gauge, which should be maintained regularly during use, and the outlet of tipping bucket and diversion funnel should be cleaned.

When the instrument leaves the factory, the tilt angle of the tipping bucket has been adjusted and locked at the best tilt angle position. When installing the instrument, it can be put into use only by installing the tipping bucket and adjusting the level of the base according to the requirements of this manual, and the tilt angle adjusting screw of the tipping bucket cannot be adjusted on site.

2 Characteristic

1. High precision and good stability.
2. Good linearity, long transmission distance and strong anti-interference ability.
3. Small size and convenient installation.
4. Mesh is designed at the funnel to prevent sundries such as leaves from blocking the downflow of rainfall.
5. The shell of the instrument is made of ABS engineering plastic/polycarbon, which has no rust and good appearance quality.
6. The rain bearing mouth is made of ABS engineering plastics/polycarbon injection molding, which has high smoothness and small error caused by stagnant water.
7. There is a horizontal adjustment bubble inside the chassis, which can assist the bottom angle to adjust the levelness of the equipment.

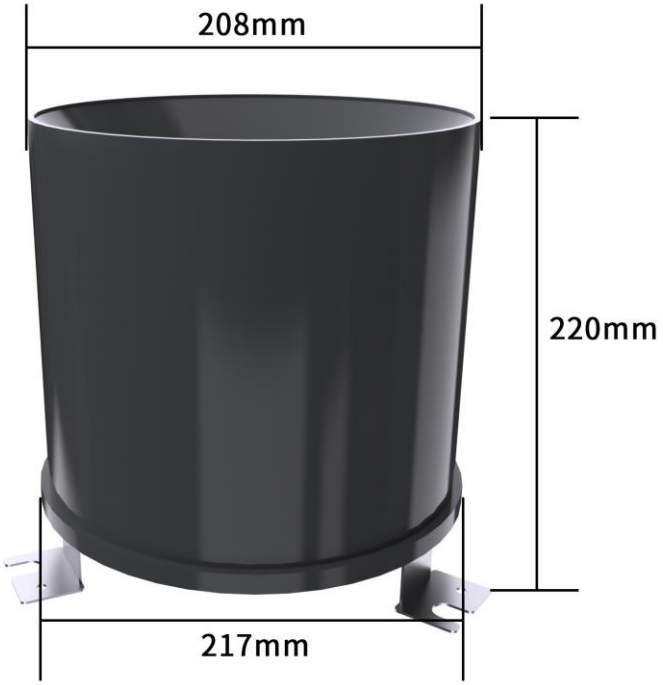
3 Scope of application

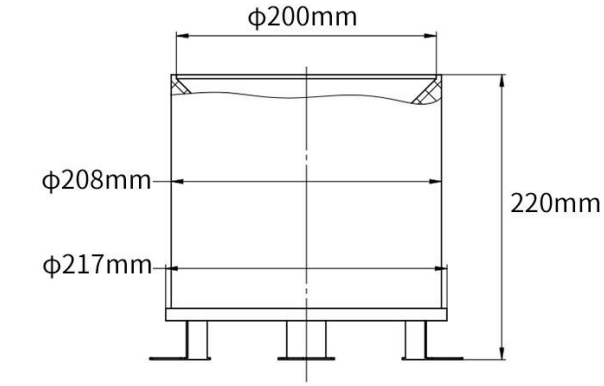
The rainfall recorder independently developed and produced by our company can measure precipitation, precipitation intensity, precipitation time, etc. It can be used in meteorological stations, hydrological stations, agriculture and forestry, national defense, field forecasting stations and other relevant departments, and can provide original data for flood control, water supply dispatching and water regime management of power stations and reservoirs.

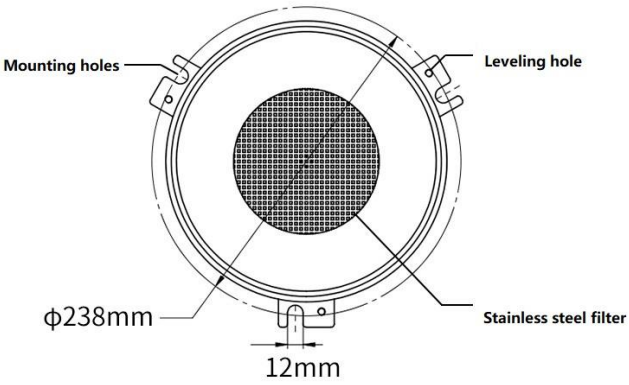
4 Technical parameters

1. Dimension of rain bearing port: φ 200 mm;; Acute angle of cutting edge: 40 ~ 45
2. Range: 0 ~ 100mm (range is limited to analog signals, RS485 signals are not measured)
3. Resolution: 0.2/0.5 mm
4. Rain intensity range: 0mm ~ 4mm/min (the maximum allowable rain intensity is 8mm/min)
5. Accuracy: ≤ ± 3%
6. Output signal:
   A: Voltage signal (0 ~ 2V, 0 ~ 5V, 0 ~ 10V)
   B: 4 ~ 20mA (current loop)
   C: RS485 (standard Modbus-RTU protocol, device default address: 01)
   D: Pulse signal (one pulse represents 0.2/0.5 mm rainfall)
7. Power supply voltage:
   5 ~ 24V DC (when output signal is 0 ~ 2V, RS485)
   12 ~ 24V DC (when the output signal is 0 ~ 5V, 0 ~ 10V, 4 ~ 20mA)
8. Working temperature: 0 ℃ ~ 70 ℃ (optional heating function, which can be as low as-40 ℃)
9. Working humidity: < 100% (no condensation)

5 Shape specification

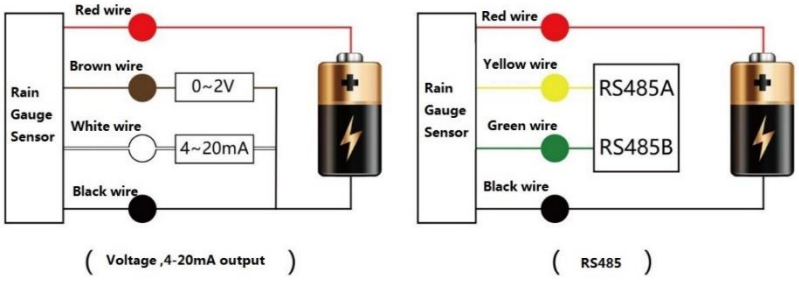






6 Usage

The rainfall sensor can be connected with various data collectors, data acquisition cards, remote data acquisition modules and other equipment with differential input. The wiring description is as follows:



7 Data conversion method

1. Analog output

The standard of analog signal output by rainfall sensor is calculated from zero point (00:00) of the same day. The default range of accumulated rainfall so far is 0 ~ 100mm, and other ranges can also be selected.

H: Rainfall in mm;

V: Voltage value collected by collector, unit: V;

A: The current value collected by the collector, unit: mA;

Output signal	Data conversion method of each measuring range		
	0 ~ 50mm	0 ~ 100mm	0 ~ 200mm
0 ~ 2V DC	H=25*V	H=50*V	H=100*V
0 ~ 5V DC	H=10*V	H=20*V	H=40*V
0 ~ 10V DC	H=5*V	H=10*V	H=20*V
4 ~ 20mA	H=3.125*A-12. 5	H=6.25*A-25	H=12.5*A-50
Pulse	One pulse represents 0.2/0.5 mm rainfall		

2. RS485 output

Standard Modbus-RTU protocol, baud rate: 9600; Check bit: None; Data bits: 8; Stop bit: 1

1. Address Modification

For example, the sensor with address 1 is changed to address 2, and the host → slave

Original address	Function code	Register address high	Register address low	High starting address	Low starting address	Low CRC16	CRC16 High

0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

If the sensor receives correctly, the data returns according to the original route.

Remarks: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only connect with one slave, and the return address is still the original address, which can be used as an address query method.

2. Query/Set Time

Query time, master → slave

Original address	Function code	Register address high	Register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X03	0X00	0X34	0X00	0X03	0X44	0X05

If the sensor receives correctly, return the following data, slave → host

Address	Function code	Data length	Year	Month	Day	Hour	Points	Seconds	Low CRC16	CRC16 High
0X01	0X03	0X06	0X20	0X03	0X30	0X10	0X25	0X10	77	8C
			BCD code, which means: 10: 25: 10 on March 30, 20							

If the clock has deviation, you can calibrate the clock, master → slave

Address	0X01	
Function code	0X10	
Start register address high	0X00	
Start register address low	0X34	
High register length	0X00	
Low register length	0X03	
Data length	0X06	
Year	0X20	BCD code Indicated: April 3, 20, 17:06:28
Month	0X04	
Day	0X03	
Hour	0X17	
Points	0X06	
Seconds	0X28	
Low CRC16	0XE2	
CRC16 High	0XF4	

If the sensor receives correctly, return the following data, slave → host

Address	Function code	Start register address high	Start register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X10	0X00	0X34	0X00	0X03	0XC1	0XC6

3. Rainfall enquiries

Inquire the data (rainfall) of sensor (address 1), host → slave

Address	Function code	Start register address high	Start register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X03	0X00	0X00	0X00	0X0A	0XC5	0XCD

If the sensor receives correctly, return the following data, slave → host

Address	0X01	
Function code	0X03	
Data length	0X14	
Register 0 data high	0X00	Rainfall for the day: 10.0 mm Rainfall from 0:00 am to now
Register 0 data low	0X64	
Register 1 data high	0X00	Instantaneous rainfall: 1.6 mm Rainfall between queries
Register 1 data low	0X10	
Register 2 Data High	0X00	Yesterday's rainfall: 8.0 mm Rainfall in 24 hours yesterday
Register 2 data low	0X50	
Register 3 Data High	0X06	Total rainfall: 166.5 mm Total rainfall after the sensor is powered on
Register 3 Low Data	0X81	
Register 4 Data High	0X00	Hourly rainfall: 0.2 mm
Register 4 Low Data	0X02	
Register 5 Data High	0X00	Precipitation last hour: 0.2 mm
Register 5 Low Data	0X02	
Register 6 Data High	0X00	Maximum rainfall in 24 hours: 10.0 mm
Register 6 Low Data	0X64	
Register 7 Data High	0X01	24-hour maximum rainfall period 01:00 ~ 02:00
Register 7 Low Data	0X02	
Register 8 Data High	0X00	24-hour minimum rainfall: 0.0mm
Register 8 Low Data	0X00	
Register 9 Data High	0X03	24-hour minimum rainfall period 03:00 ~ 04:00
Register 9 Low Data	0X04	
Low CRC16	0X24	
CRC16 High	0XDC	

4.Rainfall data clearing setting

Rainfall data clearing setting, host → slave

Original address	Function code	Register address high	Register address low	High data content	Low data content	Low CRC16	CRC16 High
0X01	0X06	0X00	0X37	0X00	0X03	0X78	0X05

If the sensor receives correctly, the data returns according to the original route.

Remarks: Before installation and use, it is necessary to set the rainfall to be cleared.

8 Troubleshooting and Troubleshooting

This table lists the possible general fault phenomena, causes and troubleshooting methods of the instrument.

Manifestation form of central station	Rainfall sensor failure	Solution
You can't get a few when it rains	It shows that the rainfall sensor has no signal output or the transmission line is faulty ① Reed tube failure ② The distance between magnetic steel and reed tube is too far ③ The welding wire falls off or the signal wire is broken ④ The tipping bucket is stuck ⑤ Instrument blockage	Lower station inspection ① Replace the reed tube ② Adjust the distance of reed tube ③ Repair ④ Exclusion ⑤ Clear the blockage
There is a big difference between the received rainfall data and the comparative rain gauge during rainfall	The tilt angle of the rainfall sensor is out of balance, but the error is generally less than ± 10% The position of magnetic steel and reed tube is not good, which causes good and bad, so that some signals are omitted ③ Failure of anti-jitter function of data collector ④ The rain gauge is far away from the system rainfall sensor or there is strong wind	① Re-titrate and adjust the inclination angle ② Adjust the distance ③ Adjust the parameters of anti-jitter circuit ④ Objective reasons, non-instrument failure
The amount of rain keeps coming, but the actual situation is not raining	Check whether the socket is flooded, which often happens after heavy rain	Treat inlet water and reinstall

Note: The fault phenomena listed in the table are not necessarily the fault of the rain gauge itself. After checking the instrument itself to eliminate the fault, we should also check whether there are faults in the transmission outlet, data acquisition device, telemetry terminal and other equipment of the instrument, and eliminate and solve them one by one.

HONDE TECHNOLOGY CO.,LTD

Stainless steel rainfall sensor

(Type 485/Pulse)

RD-RG-S-0.5/0.2-RP

https://hondetec.en.alibaba.com/

1.Product Overview

This instrument is a primary instrument for precipitation measurement, and its performance meets the requirements of national standard "Precipitation Observation Requirements".

The core part of this instrument, the tipping bucket, adopts three-dimensional streamlined design, which makes the tipping bucket turn over water more smoothly, and has the functions of self-cleaning dust and easy cleaning. Pulse to 485 signal output, rainfall can be read directly, without secondary calculation, which is simple and convenient.

2. Functional characteristics

As shown in Fig. 1, this instrument consists of rain gauge shell, rain collector, funnel, tipping bucket support, tipping bucket, bearing screw, water outlet bin, sealing joint, reed tube, horizontal bubble, adjusting support plate, control box, leveling device, wiring terminal, leg bracket, rain gauge base, etc. Wherein, the rain gauge base is provided with a tipping bucket shaft, a round horizontal bubble, a reed tube bracket and a signal output terminal. Different from other tipping bucket rain gauges, the tipping bucket shaft sleeve of this instrument is an integrated positioning structure, and the tipping bucket is installed in the shaft bearing through the tipping bucket shaft. The internal structure of this instrument is assembled when it leaves the factory, and the field installation of the internal structure is unnecessary, which brings convenience to the field installation.

The tipping bucket of this instrument is of three-dimensional streamlined design, and is designed with a drooping cambered diversion tip, which is beautiful and smooth in shape, better in turning water performance and easy to clean and maintain.

Constant magnetic steel is installed on the tipping bucket of this instrument, and reed tube is installed on the reed tube support. When the instrument leaves the factory, the magnetic steel and reed tube have been adjusted at a suitable coupling distance, so that the output signal of the instrument has a certain proportional relationship with the tipping times of the tipping bucket.

When the instrument leaves the factory, the tilt angle adjusting screw of the tipping bucket has been locked at the best tilt angle base point position and the tilt angle screw has been painted with red paint. When the user installs the instrument on site, he only needs to adjust the horizontal bubble to the center position of the whole instrument according to the relevant requirements of this manual, and can put into use without

adjusting the tilt angle of the tipping bucket on site.

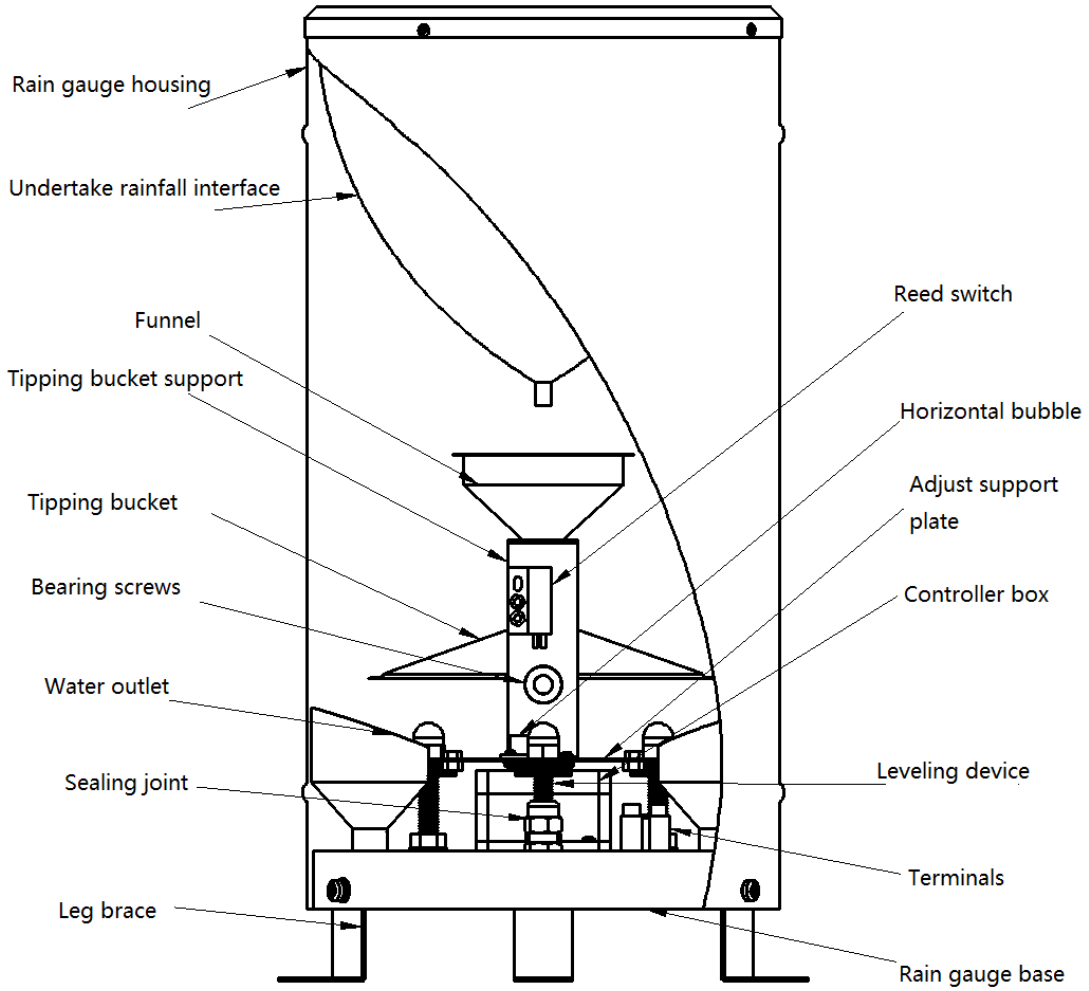


Figure 1

3. Main technical indicators

1. Rain bearing diameter: φ 200 mm;;

2. Acute angle of cutting edge: 40 ~ 45

3. Resolution: 0.2 mm/ 0.5 mm (Optional)

4.Measurement accuracy: ≤ 3% (indoor artificial precipitation, subject to the displacement of the instrument itself)

5. Rain intensity range: 0mm ~ 4mm/min (the maximum allowable rain intensity is 8mm/min)

6. Communication mode: 485 communication (standard MODBUS-RTU protocol)/Pulse

7. Power supply range: 4.5 ~ 30V Maximum power consumption: 0.24 W operating environment:

8. Ambient temperature: 0 ~ 50 ℃ Relative humidity: < 95% (40 ℃)

4. Pre-installation inspection of equipment

1. Take the instrument out of the packing box, check it carefully against the packing list in the instruction manual, and check whether the equipment accessories are complete.

2. Read the product instruction manual and product certificate carefully.

3. Check whether the appearance of the instrument is damaged, especially whether the tipping bucket is in good condition, and pay attention to properly placing the tipping bucket to prevent bumping the shaft tip of the tipping bucket shaft and the arc-shaped water diversion tips at both ends of the tipping bucket, and do not touch the inner wall of the tipping bucket with fingers to avoid fouling the tipping bucket and damaging the accuracy of the instrument.

4. Unscrew the three screws at the bottom of the equipment, take the stainless steel outer cylinder, cut off the tie that fixes the tipping bucket, and then install the outer cylinder to complete the preparation.

5. Interface Description

The power supply interface is a wide voltage power supply input of 4.5-30V. When connecting 485 signal lines, pay attention to the fact that two lines A\ B cannot be connected in reverse, and the addresses among multiple devices on the bus cannot conflict.

Line color	Description	Line color	Description
Brown thread	Positive power supply	Yellow line	485A
Black line	Power negative	Blue line	485B

6. Outdoor installation and commissioning

1. Fabrication and installation foundation

Outdoor ground and roof installation, should be in accordance with the size and requirements of Figure 2, cement installation foundation, cement foundation plane should be horizontal. The size of cement installation foundation is generally a square base of 40cm × 40cm with a height of not less than 30cm or a circular base with a diameter of 40cm. It is required that the distance between the height of the rain-bearing port of the instrument and the ground plane should be 70cm, and no shelter higher than the rain-bearing port of the instrument should be allowed within 3 ~ 5 meters around the mouth of the instrument.

2. Install fixed instruments and adjust the level of rain socket

According to the dimensions in Fig. 2, punch three installation holes with a depth of 8 ~ 10cm in φ 10 on the cement foundation, place the expansion bolt in the installation hole, lock it with a locking nut, then install the instrument base on three height-adjusting support nuts, measure whether the ring mouth is in a horizontal state by adjusting the height of the support nuts and using a level ruler, and finally fix the instrument with a locking.

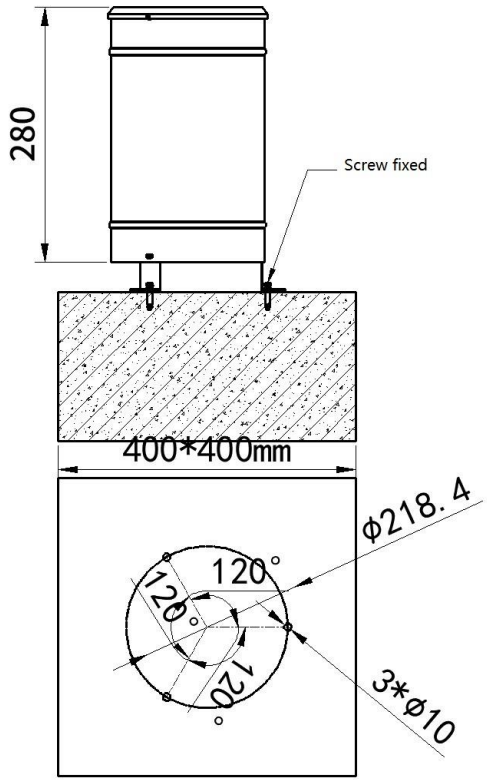


Figure 2

7. Communication Protocols

1. Basic Communication Parameters

Code	8-bit binary
Data bit	8-bit
Parity bit	None
Stop bit	1-bit
Error check	CRC (Redundant Cyclic Code)
Baud rate	2400bit/s, 4800bit/s and 9600 bit/s can be set, and the factory default is 4800bit/s

2. Data Frame Format Definition

Modbus-RTU communication protocol is adopted, and the format is as follows:

Time of initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End the time of structure ≥ 4 bytes

Address code: It is the address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: The host instruction function indication, this transmitter only uses the function code 0x03 (read register data).

Data area: Data area is specific communication data, pay attention to 16bits data high bytes in front!

CRC code: Two-byte check code.

Host query frame structure:

Address code	Function code	Register start address	Register length	Low bit of check code	High bit of check code
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave response frame structure:

Address code	Function code	Number of valid bytes	Data area one	Second data area	Nth data area	Check code
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

3. Register Address

Register address	Content	Operation (hexadecimal)	Scope content and definition
0000H	Rainfall value	03/06	The rainfall value is 10 times larger than the actual value
07D0H	Device address	03/06	1 ~ 254 (factory default 1)
07D1H	Equipment baud rate	03/06	0 for 2400 1 for 4800 2 for 9600

8. Communication Protocol Examples and Explanations

1. Query current rainfall value

Inquiry frame:

Address code	Function code	Start register	Data length	Low bit of check code	High bit of check code
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0A

Answer frame:

Address code	Function code	Returns the number of valid bytes	Rainfall value	Low bit of check code	High bit of check code
0x01	0x03	0x02	0x00 0x0A	0x38	0x43

Current rainfall value: (uploaded value is expanded by 10 times)

000A (hexadecimal) = 10 (decimal) → Rainfall value: 1.0 mm

2. Clearing rainfall data

Inquiry frame:

Address code	Function code	Start register	Clear command	Low bit of check code	High bit of check code
0x01	0x06	0x00 0x00	0x00 0x5A	0X09	0XF1

Answer frame:

Address code	Function code	Start register	Clear command	Low bit of check code	High bit of check code
0x01	0x06	0x00 0x00	0x00 0x5A	0X09	0XF1

3. Modify current address

Interrogation frame: (If the current address is 01, the address to be modified is 02)

Address code	Function code	Start address	Modified value	Low bit of check code	High bit of check code
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Answer frame:

Address code	Function code	Start address	Modified value	Low bit of check code	High bit of check code
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

4. Modify current baud rate

Inquiry frame: (If the current baud rate is 4800, it will be modified to 9600)

Address code	Function code	Start address	Modified value	Low bit of check code	High bit of check code
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

Answer frame:

Address code	Function code	Start address	Modified value	Low bit of check code	High bit of check code
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

5. Enquiry Address

When the user forgets the address, the following function code can be used to query the address. Inquiry frame:

Address code	Function code	Start address	Data length	Low bit of check code	High bit of check code
0xFF	0x03	0x07 0xD0	0x00 0x01	0x91	0x59

Answer frame

Address code	Function code	Returns the number of valid bytes	Address	Low bit of check code	High bit of check code
0xFF	0x03	0x02	0x00 0x01	0x50	0x50

The read address code is the real address of the device: 01

9. Maintenance and Maintenance

1. Daily Maintenance

This instrument has been outdoors for a long time, and its use environment is quite harsh. Therefore, the inner wall of the rain-bearing mouth of the instrument should be wiped with soft cloth frequently to keep the rain-bearing mouth clean. If foreign bodies such as leaves are found in the rain-bearing mouth, they should be cleaned in time to keep the waterway unblocked. When the instrument is not used for a long time, it should be covered with an upper cover to protect the rain bearing port;

Long-term work of instruments generally needs to be cleaned once a month and once every three months;

2. Cleaning of tipping bucket

The tipping bucket is the key component of this instrument, which directly affects the measurement accuracy of the instrument. Over time, the inner wall of the tipping bucket will deposit a little dust or oil pollution, so the tipping bucket should be cleaned. When cleaning, the inner wall of the tipping bucket can be washed repeatedly with clear water or brushed gently with degreasing brush. It is strictly forbidden to wash the inner wall of the tipping bucket by hand or other objects.

10. Frequently Asked Problems and Solutions

This paper lists the possible general fault phenomena, causes and troubleshooting methods of the instrument.

Manifestation form of central station	Rainfall sensor failure	Solution
You can't get a few when it rains	It shows that the rainfall sensor has no signal output or the transmission line is faulty Reed tube failure The distance between magnetic steel and reed tube is too far The bonding wire falls off or the signal wire is broken or the signal wire is connected backwards The tipping bucket is stuck Instrument blockage	Lower station inspection Replacement Adjustment Repair Exclude Clear
There is a big difference between the amount of rainfall received during rainfall and the specific rain gauge	The tilting base point of the rainfall sensor is out of balance, but the error is generally less than 10% The position of magnetic steel and reed tube is not good, which causes good and bad, so that some signals are missed	Re-titration adjustment base point Adjust distance The objective situation is so, the instrument is faultless
The central station keeps raining, but the actual situation is not raining	Check whether the socket is flooded, which often happens after heavy rain	Treat inlet water and reseal it

Note: In the above table, all the fault phenomena listed are not necessarily the fault of the rain gauge itself. After checking the fault of the instrument itself and troubleshooting, we should also check whether there are faults in the transmission line, data acquisition device and other equipment of the instrument, and troubleshoot them one by one.

HONDE TECHNOLOGY CO.,LTD

All Stainless Steel
Tipping Bucket Rainfall sensor

(Type RS485/Pulse)

RD-RG-8IN1S-0.5/0.2/0.1mm-R/P

https://hondetec.en.alibaba.com/

1.Product Overview

This instrument is a primary instrument for precipitation measurement, and its performance meets the requirements of national standard "Precipitation Observation Requirements".

The core part of this instrument, the tipping bucket, adopts three-dimensional streamlined design, which makes the tipping bucket turn over water more smoothly, and has the functions of self-cleaning dust and easy cleaning. Pulse to 485 signal output, rainfall can be read directly, without secondary calculation, which is simple and convenient.

2. Functional characteristics

As shown in Fig. 1, this instrument consists of rain gauge shell, rain collector, funnel, tipping bucket support, tipping bucket, bearing screw, water outlet bin, sealing joint, reed tube, horizontal bubble, adjusting support plate, control box, leveling device, wiring terminal, leg bracket, rain gauge base, etc. Wherein, the rain gauge base is provided with a tipping bucket shaft, a round horizontal bubble, a reed tube bracket and a signal output terminal. Different from other tipping bucket rain gauges, the tipping bucket shaft sleeve of this instrument is an integrated positioning structure, and the tipping bucket is installed in the shaft bearing through the tipping bucket shaft. The internal structure of this instrument is assembled when it leaves the factory, and the field installation of the internal structure is unnecessary, which brings convenience to the field installation.

The tipping bucket of this instrument is of three-dimensional streamlined design, and is designed with a drooping cambered diversion tip, which is beautiful and smooth in shape, better in turning water performance and easy to clean and maintain.

Constant magnetic steel is installed on the tipping bucket of this instrument, and reed tube is installed on the reed tube support. When the instrument leaves the factory, the magnetic steel and reed tube have been adjusted at a suitable coupling distance, so that the output signal of the instrument has a certain proportional relationship with the tipping times of the tipping bucket.

When the instrument leaves the factory, the tilt angle adjusting screw of the tipping bucket has been locked at the best tilt angle base point position and the tilt angle screw has been painted with red paint. When the user installs the instrument on site, he only needs to adjust the horizontal bubble to the center position of the whole instrument according to the relevant requirements of this manual, and can put into use without adjusting the tilt angle of the tipping bucket on site.

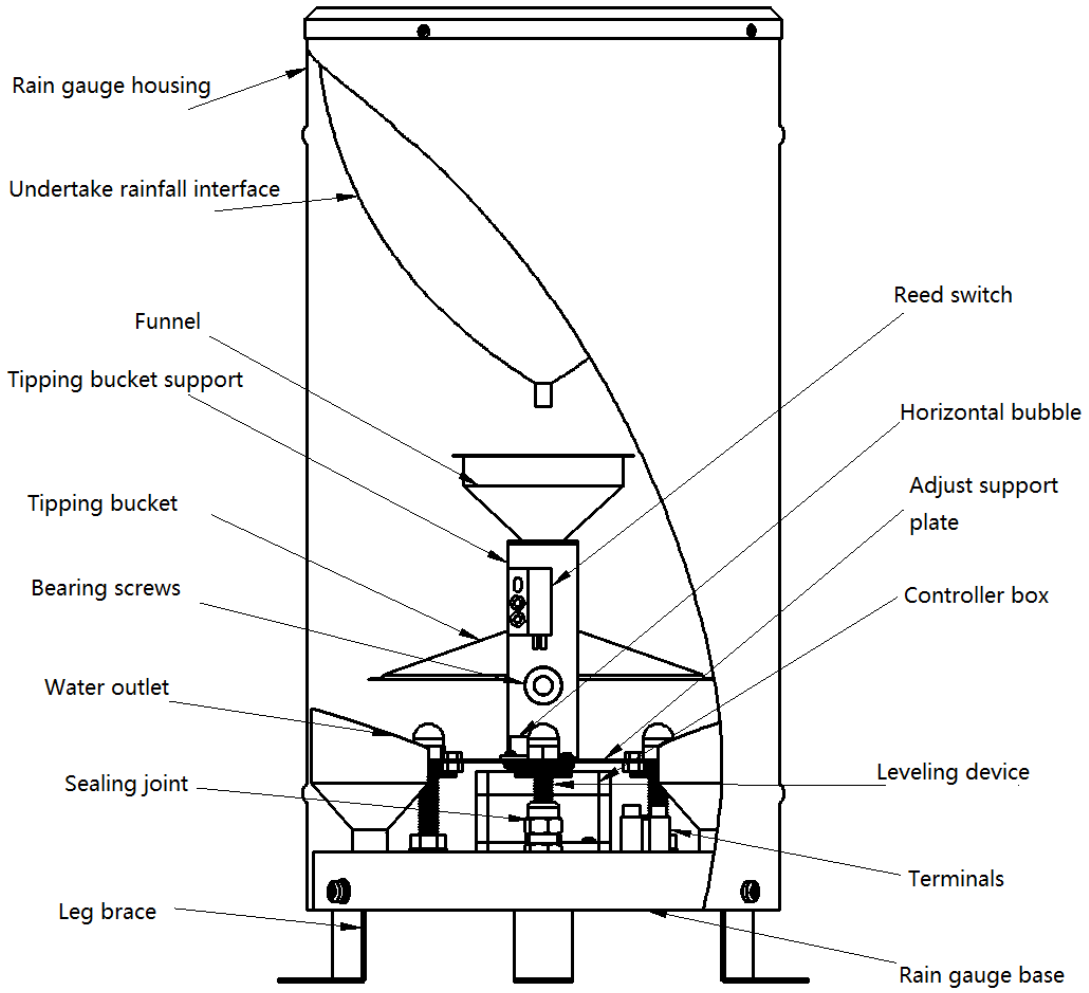


Figure 1

3. Main technical indicators

1. Rain bearing diameter: φ 200 mm;;

2. Acute angle of cutting edge: 40 ~ 45

3. Resolution: 0.5mm, 0.2mm, 0.1mm (optional)

4.Measurement accuracy: ≤ 3% (indoor artificial precipitation, subject to the displacement of the instrument itself)

5. Rain intensity range: 0mm ~ 4mm/min (the maximum allowable rain intensity is 8mm/min)

6. Communication mode: 485 communication (standard MODBUS-RTU protocol)/Pulse

7. Power supply range: 4.5 ~ 30V Maximum power consumption: 0.24 W operating environment:

8. Ambient temperature: 0 ~ 50 ℃ Relative humidity: < 95% (40 ℃)

4. Pre-installation inspection of equipment

1. Take the instrument out of the packing box, check it carefully against the packing list in the instruction manual, and check whether the equipment accessories are complete.
2. Read the product instruction manual and product certificate carefully.
3. Check whether the appearance of the instrument is damaged, especially whether the tipping bucket is in good condition, and pay attention to properly placing the tipping bucket to prevent bumping the shaft tip of the tipping bucket shaft and the arc-shaped water diversion tips at both ends of the tipping bucket, and do not touch the inner wall of the tipping bucket with fingers to avoid fouling the tipping bucket and damaging the accuracy of the instrument.
4. Unscrew the three screws at the bottom of the equipment, take the stainless steel outer cylinder, cut off the tie that fixes the tipping bucket, and then install the outer cylinder to complete the preparation.

5. Interface Description

The power supply interface is a wide voltage power supply input of 4.5-30V. When connecting 485 signal lines, pay attention to the fact that two lines A\ B cannot be connected in reverse, and the addresses among multiple devices on the bus cannot conflict.

Line color	Description	Line color	Description
Brown thread	Positive power supply	Yellow line	485A
Black line	Power negative	Blue line	485B

6. Outdoor installation and commissioning

1. Fabrication and installation foundation

Outdoor ground and roof installation, should be in accordance with the size and requirements of Figure 2, cement installation foundation, cement foundation plane should be horizontal. The size of cement installation foundation is generally a square base of 40cm × 40cm with a height of not less than 30cm or a circular base with a diameter of 40cm. It is required that the distance between the height of the rain-bearing port of the instrument and the ground plane should be 70cm, and no shelter higher than the rain-bearing port of the instrument should be allowed within 3 ~ 5 meters around the mouth of the instrument.

2. Install fixed instruments and adjust the level of rain socket

According to the dimensions in Fig. 2, punch three installation holes with a depth of 8 ~ 10cm in φ 10 on the cement foundation, place the expansion bolt in the installation hole, lock it with a locking nut, then install the instrument base on three height-adjusting support nuts, measure whether the ring mouth is in a horizontal state by adjusting the height of the support nuts and using a level ruler, and finally fix the instrument with a locking.

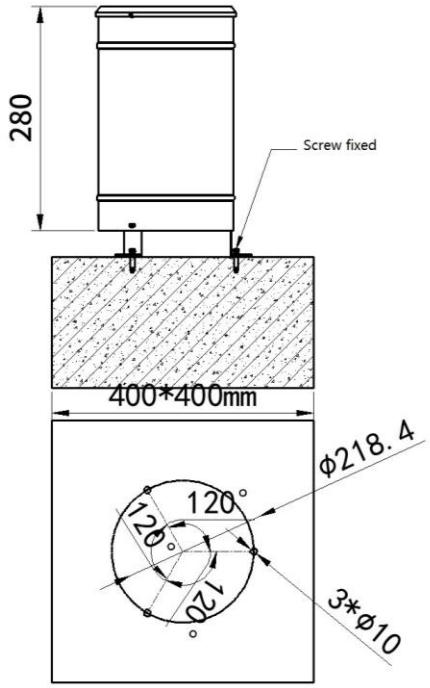


Figure 2

7. Communication Protocols

1. Basic Communication Parameters

Code	8-bit binary
Data bit	8-bit
Parity bit	None
Stop bit	1-bit
Error check	CRC (Redundant Cyclic Code)
Baud rate	2400bit/s, 4800bit/s and 9600 bit/s can be set, and the factory default is 4800bit/s

2. Data Frame Format Definition

Modbus-RTU communication protocol is adopted, and the format is as follows:

Time of initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End the time of structure ≥ 4 bytes

Address code: It is the address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: The host instruction function indication, this transmitter only uses the function code 0x03 (read register data).

Data area: Data area is specific communication data, pay attention to 16bits data high bytes in front!

CRC code: Two-byte check code.

Host query frame structure:

Address code	Function code	Register start address	Register length	Low bit of check code	High bit of check code
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave response frame structure:

Address code	Function code	Number of valid bytes	Data area one	Second data area	Nth data area	Check code
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

3. Register Address

Register address	Content	Operation (hexadecimal)	Scope content and definition
0000H	Rainfall value	03/06	The rainfall value is 10 times larger than the actual value
07D0H	Device address	03/06	1 ~ 254 (factory default 1)
07D1H	Equipment baud rate	03/06	0 for 2400 1 for 4800 2 for 9600

8. Communication Protocol Examples and Explanations

Standard Modbus-RTU protocol, baud rate: 9600; Check bit: None; Data bits: 8; Stop bit: 1

1. Address Modification

For example, the sensor with address 1 is changed to address 2, and the host → slave

Original address	Function code	Register address high	Register address low	High starting address	Low starting address	Low CRC16	CRC16 High
0X01	0X06	0X07	0XD0	0X00	0X02	0X08	0X86

If the sensor receives correctly, the data returns according to the original route.
Remarks: If you forget the original address of the sensor, you can use the broadcast address 0XFF instead. When using 0XFF, the host can only connect with one slave, and the return address is still the original address, which can be used as an address query method.

2. Query/Set Time

Query time, master → slave

Original address	Function code	Register address high	Register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X03	0X00	0X34	0X00	0X03	0X44	0X05

If the sensor receives correctly, return the following data, slave → host

Address	Function code	Data length	Year	Month	Day	Hour	Points	Seconds	Low CRC16	CRC16 High
0X01	0X03	0X06	0X20	0X03	0X30	0X10	0X25	0X10	77	8C
			BCD code, which means: 10: 25: 10 on March 30, 20							

If the clock has deviation, you can calibrate the clock, master → slave

Address	0X01	
Function code	0X10	
Start register address high	0X00	
Start register address low	0X34	
High register length	0X00	
Low register length	0X03	

Data length	0X06	
Year	0X20	BCD code Indicated: April 3, 20, 17:06:28
Month	0X04	
Day	0X03	
Hour	0X17	
Points	0X06	
Seconds	0X28	
Low CRC16	0XE2	
CRC16 High	0XF4	

If the sensor receives correctly, return the following data, slave → host

Address	Function code	Start register address high	Start register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X10	0X00	0X34	0X00	0X03	0XC1	0XC6

3. Rainfall enquiries

Inquire the data (rainfall) of sensor (address 1), host → slave

Address	Function code	Start register address high	Start register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X03	0X00	0X00	0X00	0X0A	0XC5	0XCD

If the sensor receives correctly, return the following data, slave → host

Address	0X01	
Function code	0X03	
Data length	0X14	
Register 0 data high	0X00	Rainfall for the day: 10.0 mm Rainfall from 0:00 am to now
Register 0 data low	0X64	
Register 1 data high	0X00	Instantaneous rainfall: 1.6 mm Rainfall between queries
Register 1 data low	0X10	
Register 2 Data High	0X00	Yesterday's rainfall: 8.0 mm Rainfall in 24 hours yesterday
Register 2 data low	0X50	
Register 3 Data High	0X06	Total rainfall: 166.5 mm Total rainfall after the sensor is powered on
Register 3 Low Data	0X81	
Register 4 Data High	0X00	Hourly rainfall: 0.2 mm
Register 4 Low Data	0X02	
Register 5 Data High	0X00	Precipitation last hour: 0.2 mm
Register 5 Low Data	0X02	
Register 6 Data High	0X00	Maximum rainfall in 24 hours: 10.0 mm
Register 6 Low Data	0X64	
Register 7 Data High	0X01	24-hour maximum rainfall period 01:00 ~ 02:00
Register 7 Low Data	0X02	

Register 8 Data High	0X00	24-hour minimum rainfall: 0.0mm
Register 8 Low Data	0X00	
Register 9 Data High	0X03	24-hour minimum rainfall period 03:00 ~ 04:00
Register 9 Low Data	0X04	
Low CRC16	0X24	
CRC16 High	0XDC	

4.Rainfall data clearing setting

Rainfall data clearing setting, host → slave

Original address	Function code	Register address high	Register address low	High data content	Low data content	Low CRC16	CRC16 High
0X01	0X06	0X00	0X37	0X00	0X03	0X78	0X05

If the sensor receives correctly, the data returns according to the original route.

Remarks: Before installation and use, it is necessary to set the rainfall to be cleared.

9. Maintenance and Maintenance

1. Daily Maintenance

This instrument has been outdoors for a long time, and its use environment is quite harsh. Therefore, the inner wall of the rain-bearing mouth of the instrument should be wiped with soft cloth frequently to keep the rain-bearing mouth clean. If foreign bodies such as leaves are found in the rain-bearing mouth, they should be cleaned in time to keep the waterway unblocked. When the instrument is not used for a long time, it should be covered with an upper cover to protect the rain bearing port;

Long-term work of instruments generally needs to be cleaned once a month and once every three months;

2. Cleaning of tipping bucket

The tipping bucket is the key component of this instrument, which directly affects the measurement accuracy of the instrument. Over time, the inner wall of the tipping bucket will deposit a little dust or oil pollution, so the tipping bucket should be cleaned. When cleaning, the inner wall of the tipping bucket can be washed repeatedly with clear water or brushed gently with degreasing brush. It is strictly forbidden to wash the inner wall of the tipping bucket by hand or other objects.

10. Frequently Asked Problems and Solutions

This paper lists the possible general fault phenomena, causes and troubleshooting methods of the instrument.

Manifestation form of central station	Rainfall sensor failure	Solution
You can't get a few when it rains	It shows that the rainfall sensor has no signal output or the transmission line is faulty Reed tube failure The distance between magnetic steel and reed tube is too far The bonding wire falls off or the signal wire is broken or the signal wire is connected backwards The tipping bucket is stuck Instrument blockage	Lower station inspection Replacement Adjustment Repair Exclude Clear
There is a big difference between the amount of rainfall received during rainfall and the specific rain gauge	The tilting base point of the rainfall sensor is out of balance, but the error is generally less than 10% The position of magnetic steel and reed tube is not good, which causes good and bad, so that some signals are missed	Re-titration adjustment base point Adjust distance The objective situation is so, the instrument is faultless
The central station keeps raining, but the actual situation is not raining	Check whether the socket is flooded, which often happens after heavy rain	Treat inlet water and reseal it

Note: In the above table, all the fault phenomena listed are not necessarily the fault of the rain gauge itself. After checking the fault of the instrument itself and troubleshooting, we should also check whether there are faults in the transmission line, data acquisition device and other equipment of the instrument, and troubleshoot them one by one.

Water evaporation sensor

HONDE TECHNOLOGY CO,LTD

1. Product Introduce

The water surface evaporation sensor can accurately measure the water surface evaporation per unit area.The weight of the liquid in the evaporating dish is measured by the high-precision weighing principle, and then the liquid level is calculated. Therefore, it can be used in a variety of environments, such as liquid or icing can be measured, which solves the disadvantages of using ultrasonic sensors or water pressure level sensors to measure the liquid level (1, inaccurate measurement when icing, 2, no It is easy to damage the sensor when it is water, 3, the accuracy is low), can be used with automatic weather station or professional evaporation recorder. The overall material is 304 stainless steel, which is durable, beautiful in appearance and accurate in measurement. There is a high-precision pressure sensor at the bottom. When water evaporates, the liquid level drops, and the pressure sensor data becomes smaller. By measuring this weak signal change, through the high-precision amplifier circuit and temperature compensation circuit, the evaporated liquid level height Δh can be calculated.

2. Product Features

1. High measurement accuracy
2. Stable performance and good linearity
3. Convenient installation and simple operation
4. Use 304 stainless steel, never rust, to ensure the service life of the sensor
5. Reasonable structure design and good appearance quality

3. Product application

The water surface evaporation sensor is an instrument used to measure the evaporation of the liquid surface, which is suitable for meteorology, plant and seed cultivation units, agricultural and forestry research institutions and other departments.

4. Product Parameter

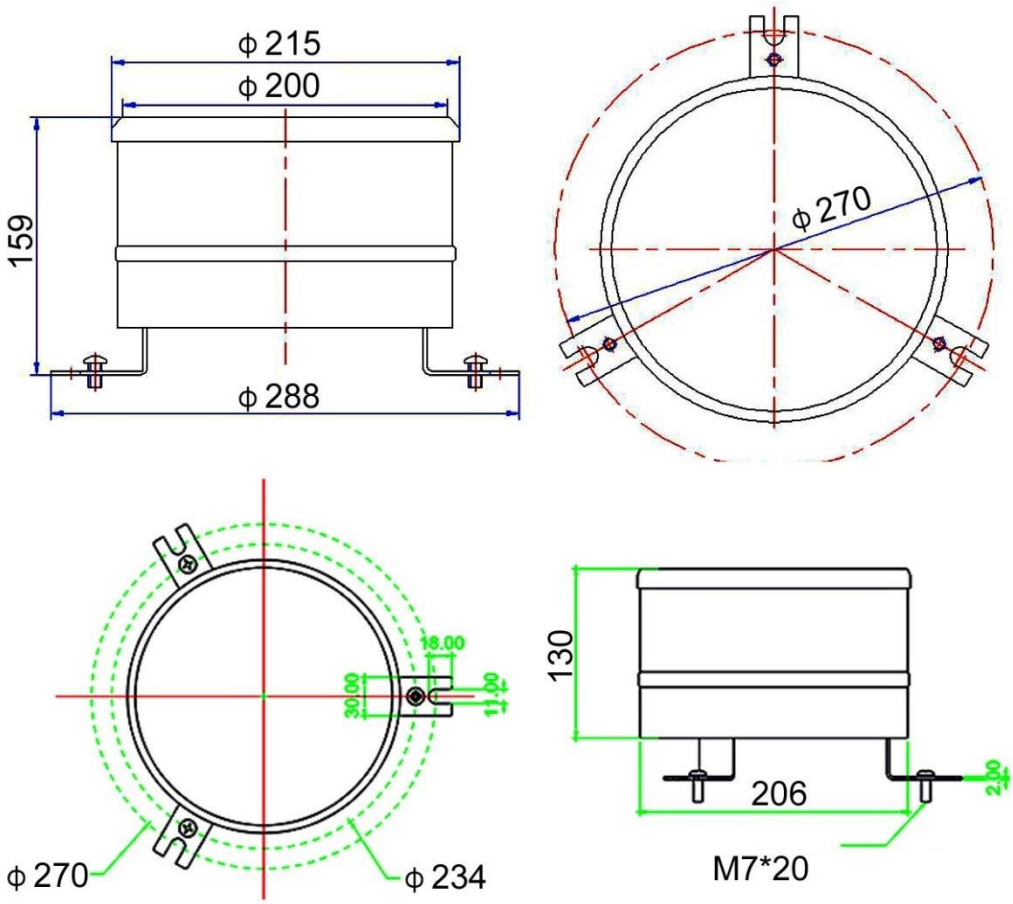
- Inner barrel diameter: 200mm (equivalent to 200mm evaporation surface)
- Outer barrel diameter: 215mm high: 80mm
- Precision: ±0.1mm
- Measuring range: 0 ~ 75mm
- Ambient temperature: -30℃ ~ 80℃
- Power supply mode: DC12 ~ 24V
- Output signal: A: Voltage signal (0 ~ 2V, 0 ~ 5V, 0 ~ 10V choose one of three)

B: 4 ~ 20mA (current loop)

C: RS485 (standard Modbus-RTU protocol, device default address: 01)

- Product weight: 2.2kg

5. Product Size



6. Connection method

The wide voltage power input can be 5~30V. When connecting the RS485 signal line, please note that the two lines of A/B cannot be reversed, and the addresses of multiple devices on the bus must not conflict. RS485 connection

M12 PIN NO.	Wire colour	Interface
1	Red	Positive power(5-30VDC)
2	Black	GND
3	Yellow	RS485 A
4	Green	RS485 B

7. Measurement methods

The evaporation sensor is set in an open and flat place in the open sky, and can be exposed to sunlight all day long. Adjust the level. The base is fixed with cement. It can be measured by injecting 75mm water before observation. If there is rain in the container, it should be reduced during observation and recording. The actual amount of evaporation is obtained by removing the rainfall. When calculating the data, the amount of evaporation will decrease, so the rainfall of this time should be added. The evaporation sensor can be connected to various data collectors with differential inputs, data acquisition cards, remote data acquisition modules and other equipment

9. Data conversion method

1. Analog output conversion

Δh: evaporation, unit: mm;

V: The voltage value collected by the collector, unit: V;

A: The current value collected by the collector, unit: mA;

Output	Conversion method（0 ~ 75mm）
0 ~ 2V DC	Δh = 37.5*V
0 ~ 5V DC	Δh = 15*V
0 ~ 10V DC	Δh = 7.5*V
4 ~ 20mA	Δh = （75/16）*A − 18.75

2. Modbus protocol

1. Standard Modbus-RTU protocol

Baud rate: 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 9600bit/s

Check digit: none;

Data bit: 8; Stop bit: 1

2.Communication protocol examples and explanations

(1) Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

Original address	Function code	Register address low	Register address high	New address low	New address high	CRC16 low	CRC16 high
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

If success, the slave will send: 01 06 00 00 00 02 08 0B

Note: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only connect to one slave, and the return address is still the original address, which can be used as an address query method.

(2). Full scale and reference zero command

A. After the sensor is installed horizontally, it is in an anhydrous state, and the full scale command is sent:

Address	Function code	Fixed character		Present value		CRC16 low	CRC16high
0X01	0XA1	0X00	0X01	0X00	0X00	0XED	0XD3

If the reception is correct, return as it is, and the full scale command is completed.

B. Measure the depth with a steel ruler, inject 75mm water, and send the reference zero command:

Address	Function code	Fixed character		Present value:75mm		CRC16 low	CRC16high
0X01	0XA2	0X00	0X01	0X02	0XEE	0X28	0XFF

If the reception is correct, return as it is, and the reference zero command is completed.

(3) Query data

Query the data (evaporation Δh) of the sensor (address 1), master→slave

Address code	Function code	Register start address	Register length	Low check bit	Check code high
0X01	0X03	0X00 0X00	0X00 0X01	0X84	0X0A

- Response frame

Address code	Function code	Number of valid bytes	Register 0 data high	Register 0 data low	CRC 16 low	CRC16 high
0X01	0X03	0X02	0X00	0X23	0XF9	0X9D

Calculation instructions:

Data representation method: ÷10 after converting the data into decimal

The above data indicates that the amount of evaporation Δh: 3.5mm

(4) If there is rainfall and the rainfall is less than the actual evaporation Δh, the evaporation data will become smaller, and the actual return evaporation Δh1 should be added to the rainfall H data.

The conversion relationship is: Δh=Δh1 + H (Δh1 > 0) Commands can be sent to introduce rainfall, and the actual evaporation Δh can be calculated. Taking rainfall of 10mm as an example, master→slave

Address	Function code	Fixed character		Rainfall value 10mm		CRC16 low	CRC16high
0X01	0X03	0X00	0X01	0X02	0XEE	0X28	0XFF

If the reception is correct, return as it is, and the rainfall compensation command is completed.

10. Precautions for use

1. When you receive the product, please check whether the packaging is intact, and check whether the sensor model and specifications are consistent with the product you purchased;

2. The installation place should be kept away from chemical corrosion environment;

3. The sensors and wires should be far away from high-voltage electricity, heat sources, etc.;

4. Install horizontally, with a water volume of 75mm, try not to install it under trees to avoid leaves falling;

5. The sensor is a precision device, please do not disassemble it by yourself when using it, so as not to damage the product;

Piezoelectric Rainfall Sensor Introduce

RD-PERFS-01

HONDE TECHNOLOGY CO,LTD

1. Product introduce

At present, there are three common sensors for measuring rainfall: weighing type, tipping bucket type and siphon type. These three types of sensors have the disadvantages of being large in size, unable to measure snow, freezing rain, and hail, and the water injection port is easily blocked by leaves, sediment and cannot measure rainfall. Therefore, the conventional rainfall measuring device needs to be manually maintained and cleaned regularly. The piezoelectric rain sensor of our company uses the impact measurement principle to measure the weight of a single raindrop, and then calculate the rainfall. The piezoelectric rain sensor has the characteristics of small size, easy to carry and install, and maintenance-free.

2. System structure and working principle

The working principle of the rain sensor is to use the piezoelectric effect of the piezoelectric vibrator to convert the mechanical displacement (vibration) into an electrical signal, and then convert the voltage waveform according to the energy of the raindrop impact, and according to the change of the voltage waveform, the size of the rainfall can be obtained. In this way, the weight of a single raindrop can be measured and the rainfall can be calculated. Raindrops are affected by the weight of raindrops and air resistance during the landing process. When they reach the ground, the speed is a constant speed. According to P=mv, the weight of the raindrops can be obtained by measuring the impact, and then the continuous rainfall can be obtained.

3. Application scenario

Rainfall measurement device is suitable for meteorological stations (stations), hydrological stations, agriculture, forestry, national defense and other related departments to remotely measure liquid precipitation, precipitation intensity, and precipitation start and end time. Used for flood control, water supply dispatching, power station and reservoir water regime management for the purpose of hydrological automatic forecasting system, automatic field forecasting station, etc.

4. Technical parameter

Power supply: DC 12V -DC 24V

Accuracy：<±5%

Resolution：0.1mm

Working temperature：-40℃~+80℃

The sampling period：10~600 seconds

Rainfall measure range：0-200mm/h

Cable length: 3 meters (Other line length can be customized)

Output : RS485 with standard Modbus protocol

Wire connection:

Red wire: 12-24VDC

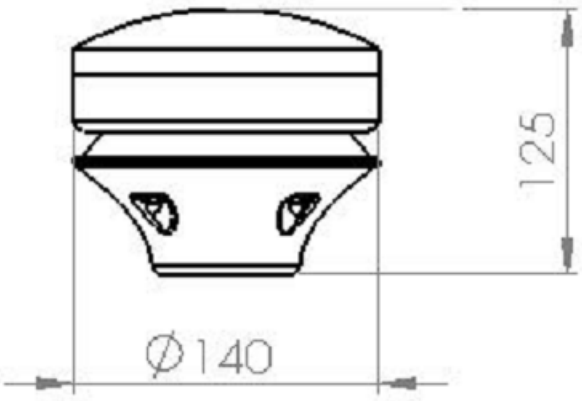
Black wire: Negative

Yellow: RS485A

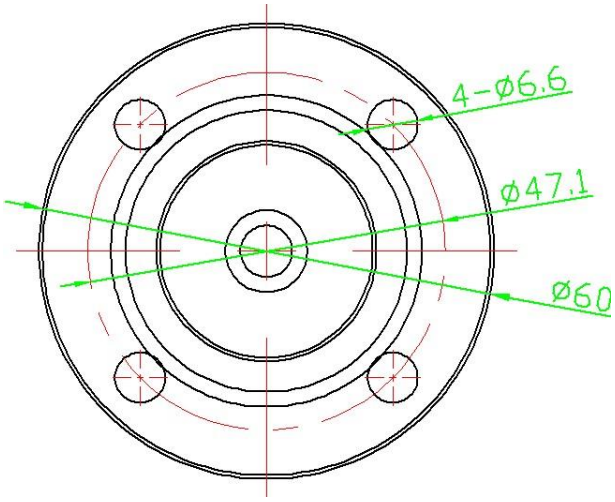
Blue: RS485B

5. Installation method

1. Dimensions



2. The diameter of the mounting flange under the sensor is Φ65mm, and the four mounting holes are Φ6mm. The installation uses flanges for fixed installation. The installation dimensions are shown in the following figure:



3. Installation location

The rain sensor should be installed on a bracket that is 500-600mm away from the horizontal plane and the height of the ground or ship deck.

Precautions:

(1) The installation site should be in an open area as far as possible, with no obstructions around.

(2) Keep away from the vibration source as far as possible.

6. Communication protocol and instruction description

1. Standard Modbus-RTU protocol

Baud rate: 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 9600bit/s

Check digit: none;

Data bit: 8; Stop bit: 1

2. Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows:

Time for initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure ≥ 4 bytes of time

Address code: the address of the transmitter, which is unique in the communication network (factory default the top layer is 0X01, the middle layer is 0X02, the bottom layer is 0x03).

Function code: The command function instruction issued by the host. The transmitter uses function codes 0x03 (read register data) and 0x06 (write register data).

Data area: The data area is the specific communication data, pay attention to the high byte of 16bits data first!

CRC code: two-byte check code

3. Get rainfall instructions

For example , get the sensor address 01 rain fall value, send the instruction:

Address code	Function code	Register start address	Register length	Low check bit	Check code high
0X01	0X03	0X00 0X2A	0X00 0X01	0XEB	0XFB

If success, it will feedback

Address code	Function code	Number of bytes	Rainfall value	Low check bit	Check code high
0X01	0X03	0X02	0X00 0XC1	0X79	0XD4

The rainfall is 00C1(HEX)=193(Decimal), it means the rainfall is 19.3mm/H.

4. Change the sensor address

For example , change the sensor address 02 to 01, send the instruction:

Address code	Function code	Register address	New Address	Low check bit	Check code high
0X02	0X06	0X20 0X00	0X00 0X01	0X43	0XF9

If success, it will feedback

02 06 20 00 00 01 43 F9

Note: After changing the address, the device needs to be powered off and restarted

5. Data clear zero mode

The sensor data clear mode can be set to four modes, namely Power-off clear mode, overflow clear mode, read clear mode, write clear mode.

(1) Query clear mode description:

Host sends:

0x01 0x03 0x40 0x02 0x00 0x01 0x30 0x0a

The sensor responds in one of the following 4 ways:

0x01 0x03 0x02 0x00 0x00 0xB8 0x44, Power-off clear mode

0x01 0x03 0x02 0x00 0x01 0x79 0x84, Overflow clear mode

0x01 0x03 0x02 0x00 0x02 0x39 0x85, Read clear mode

0x01 0x03 0x02 0x00 0x03 0xF8 0x45, Write clear mode

(2) Modify the clear mode command:

Modified to power-off reset mode

- Host sends:

0x01 0x06 0x40 0x02 0x00 0x00 0x3D 0xCA

If success, it will return same.

- Modified to overflow clear mode

Host sends:

0x01 0x06 0x40 0x02 0x00 0x01 0xFC 0x0A

If success, it will return same.

- Modified to read and clear mode

Host sends:

0x01 0x06 0x40 0x02 0x00 0x02 0xBC 0x0B

If success, it will return same.

- Modified to write clear mode

Host sends:

0x01 0x06 0x40 0x02 0x00 0x03 0x7D 0xCB

If success, it will return same.

Solar radiation and the sunshine hours 2 in 1 sensor Introduce

RD-SRS-02

1. Product introduction

The solar radiation sensor is mainly used to measure solar short-wave radiation in the wavelength range of 400-1100nm, and it is simple to use and cost-effective. It can be used continuously all-weather and can be inverted or tilted. The product can also be used to measure the number of hours of sunshine. It is widely used in the solar energy monitoring of plant growth, heat conversion box and total soil moisture evapotranspiration loss.

2. Product Principle

The solar radiation sensor is used to measure the short-wave radiation of the sun. It uses a silicon photodetector to generate a voltage output signal proportional to the incident light. In order to reduce the cosine error, a cosine corrector is installed in the instrument. The radiometer can be directly connected to the Digital voltmeter or digital logger is connected to measure radiation intensity.

3. Scope of application

This product can be widely used in agricultural and forestry ecological radiation monitoring, solar thermal utilization research, tourism environmental protection ecology, agricultural meteorology research, crop growth monitoring, greenhouse control.

4. Product furthers

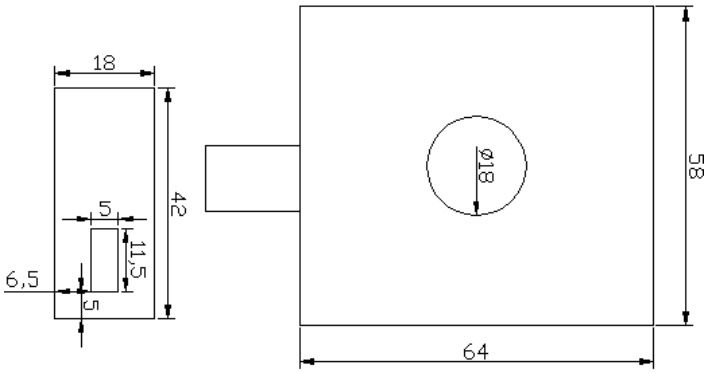
- Conforms to WMO World Meteorological Organization specifications (CIMO Guide)
- Suitable for various harsh environments
- High cost performance
- high sensitivity
- Passive precision measurement
- Simple structure, easy to use

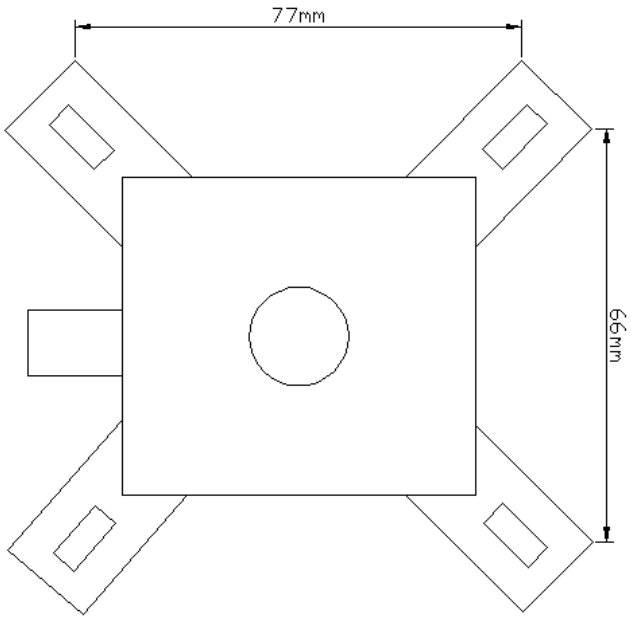
5. Technical Parameters

Spectral range	0-2000W/m2
Wavelength range	400-1100nm
Measurement accuracy	5% (ambient temperature 25℃, compared with SPLITE2 meter, radiation 1000W/m2)
Sensitivity	200 ~ 500μv•w-1•m2
Signal output	RS485 /4-20mA
Response time	＜1s（99%）

Cosine correction	< 10% (up to 80°)
Non-linear	≤±3%
Stability	⩽±3% (annual stability)
Working environment	Temperature -30 ~ 60℃, working humidity: <90%

6. Product size





7. Wiring definition

1.RS485 output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative
Yellow	RS485A
Blue	RS485B

8. Data conversion method

1. RS485 Digital output

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8; Stop bit: 1

2. Communication protocol examples and explanations

(1) Modify the address, for example: change the address of the transmitter address to 33, host → slave

Original address	Function code	Starting register address	Number of registers	Data length	New address	CRC16 low	CRC16 high
00	10	0001	0001	02	0033	EA	04

If success, the slave will send to the host:

Original address	Function code	Starting register address	Number of registers	CRC16 low	CRC16 high
00	10	0001	0001	0X51	0XD8

（2）Read Sensor address

Host send command format (For example the address is FF)

Device address	Function code	Starting register address	Number of registers	CRC Check
00	03	0001	0001	D4 1B

Slave response command format

Device address	Function code	Data length	Address data	CRC Check
00	03	02	00FF	C5 C4

(3) Read solar radiation, sunshine hours at device address 0xFF

- Inquiry frame

Address code	Function code	Register start address	Number of registers	CRC Check
FF	03	0000	0002	D1 D5

- Response frame

Address code	Function code	Data length	Sunshine hours	Solar radiation	CRC Check
FF	03	04	003C	0122	A479

Calculation instructions:

Sunshine hours: 00 3C(HEX) =6.0h;

Solar radiation: 0122(HEX)=290 W•M-2

Remarks: The sunshine hours will not be automatically cleared to 0, and the clearing command needs to be sent after sunset every day: AT+RZSS=0, the output is the daily sunshine hours.

9. Cautions

Correct maintenance and maintenance will 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. Incorrect may cause damage to the instrument.

2. Do not connect the wires with power, and only after the wiring is checked and correct, the power can be connected;

3. The sensor cable length will affect the output signal of the product. Do not change the components or wires that have been welded when the product leaves the factory. If you need to change it, please contact the manufacturer;

4. The sensor is a precision device. The user should not disassemble it by himself or touch the surface of the sensor with sharp objects or corrosive liquids to avoid damage to the product;

Photosynthetically active radiation and the sunshine hours 2 in 1 sensor Introduce

RD-PRS-02

https://hondetec.en.alibaba.com/

1. Product introduction

The photosynthetically active radiation sensor is mainly used to measure the photosynthetically active radiation of natural light in the wavelength range of 400-700nm.

The sensor uses a silicon photodetector and passes through a 400-700nm optical filter. When there is light, a voltage signal proportional to the incident radiation intensity is generated, and its sensitivity is proportional to the cosine of the direct angle of the incident light. Each photosynthetically active pyranometer gives its own sensitivity, which can be directly calculated in units of The value of μ•mol/m2•s. The table is widely used in agricultural meteorology, crop growth research.

2. Product Principle

The solar radiation sensor is used to measure the short-wave radiation of the sun. It uses a silicon photodetector to generate a voltage output signal proportional to the incident light. In order to reduce the cosine error, a cosine corrector is installed in the instrument. The radiometer can be directly connected to the Digital voltmeter or digital logger is connected to measure radiation intensity.

3. Scope of application

This product can be widely used in agricultural and forestry ecological radiation monitoring, solar thermal utilization research, tourism environmental protection ecology, agricultural meteorology research, crop growth monitoring, greenhouse control.

4. Product furthers

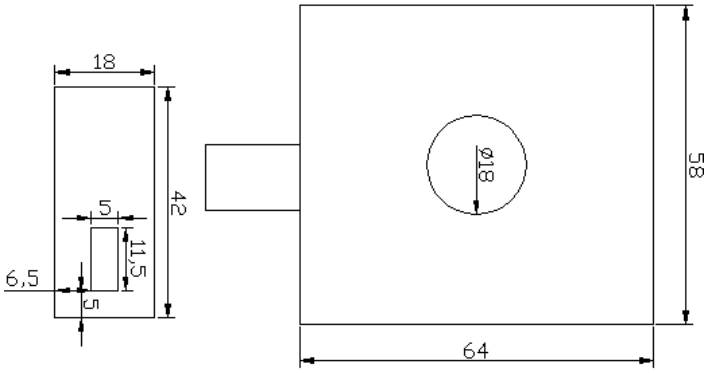
- Conforms to WMO World Meteorological Organization specifications (CIMO Guide)
- Suitable for various harsh environments
- High cost performance
- high sensitivity
- Passive precision measurement
- Simple structure, easy to use

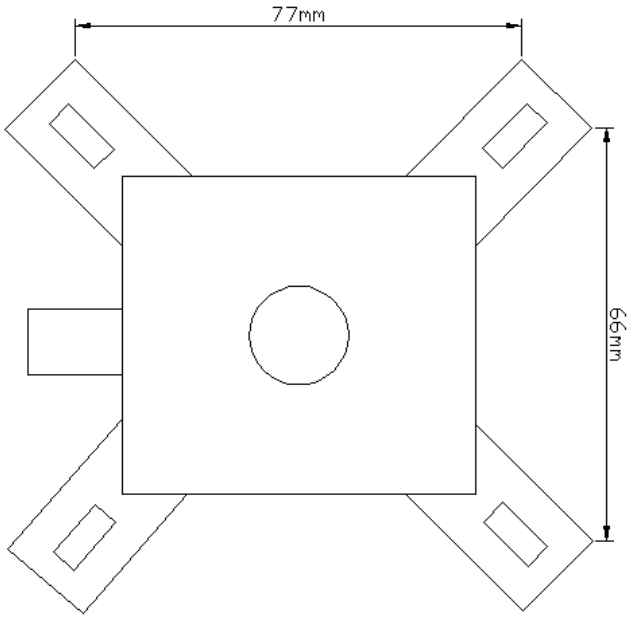
5. Technical Parameters

Wavelength range	400-700nm
Measure range	0-4000μ•mol•m2•s
Sensitivity	7—50μv/μmol•m-2•s-1
Response time	＜1s（99%）
Temperature dependent	Maximum 0.05%/℃

Sensitivity	200 ~ 500μv•w-1•m2
Cosine correction	Up to 80° angle of incidence
Internal resistance	＜2K
Working voltage	DC12-24V
Output	4-20mA、RS485
Working environment	Temperature -40 ~ 65℃, working humidity: <90%

6. Product size





7. Wiring definition

1. RS485 output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative
Yellow	RS485A
Blue	RS485B

2. 4-20mA output

Wire colour	**Interface**
Red	Power positive (12-24VDC)
Black	Power negative & current negative output
Yellow	Current positive output

8. Data conversion method

1. RS485 Digital output

1. Basic agreement

RS485 signal, standard Modbus-RTU protocol

Baud rate: 9600bps can be set, factory default is 9600bps; Check digit: none; Data bit: 8; Stop bit: 1

2. Communication protocol examples and explanations

(1) Modify the address, for example: change the address of the transmitter address to 33, host → slave

Original address	Function code	Starting register address	Number of registers	Data length	New address	CRC16 low	CRC16 high
00	10	0001	0001	02	0033	EA	04

If success, the slave will send to the host:

Original address	Function code	Starting register address	Number of registers	CRC16 low	CRC16 high
00	10	0001	0001	0X51	0XD8

（2）Read Sensor address

Host send command format (For example the address is FF)

Device address	Function code	Starting register address	Number of registers	CRC Check
00	03	0001	0001	D4 1B

Slave response command format

Device address	Function code	Data length	Address data	CRC Check
00	03	02	00FF	C5 C4

(3) Read Photosynthetically active radiation, sunshine hours at device address 0xFF

- Inquiry frame

Address code	Function code	Register start address	Number of registers	CRC Check
FF	03	0000	0002	D1 D5

- Response frame

Address code	Function code	Data length	Sunshine hours	Solar radiation	CRC Check
FF	03	04	003C	0122	A479

Calculation instructions:

Sunshine hours: 00 3C(HEX) =6.0h;

Solar radiation: 0122(HEX)= μ•mol•m2•s

Remarks: The sunshine hours will not be automatically cleared to 0, and the clearing command needs to be sent after sunset every day: AT+RZSS=0, the output is the daily sunshine hours.

9. Cautions

Correct maintenance and maintenance will 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. Incorrect may cause damage to the instrument.

2. Do not connect the wires with power, and only after the wiring is checked and correct, the power can be connected;

3. The sensor cable length will affect the output signal of the product. Do not change the components or wires that have been welded when the product leaves the factory. If you need to change it, please contact the manufacturer;

4. The sensor is a precision device. The user should not disassemble it by himself or touch the surface of the sensor with sharp objects or corrosive liquids to avoid damage to the product;

Photothermopile Pyranometer radiation sensor

https://hondetec.en.alibaba.com/

1. Instructions before use

1.1 Safety Instructions

Installation and commissioning shall only be carried out by designated qualified professionals.

It is strictly forbidden to measure or touch live parts. Pay attention to the technical parameters and storage and operating conditions of the equipment.

1.2 Specified Use

The equipment must operate within the specified technical parameters. The operating conditions and use purpose of the equipment shall not violate its original design intention.Modification or modification of equipment will not ensure its safe and normal operation.

1.3 Warranty

The warranty period is 12 months, effective from the date of delivery. If the user uses the equipment for other than the specified purpose, the warranty will no longer be valid.

2. Product Features& Advantages

2.1 Product Features

The total solar radiation sensor can be used to measure the total solar radiation intensity in the spectral range of 0.28-3 μ m. The core device of radiation sensor is high-precision photosensitive element, which has good stability and high precision. At the same time, a quartz glass cover made by precision optical cold working is installed outside the induction element, which effectively prevents the influence of environmental factors on its performance. This product conforms to the requirements of ISO9060 and WMO CIMO Guide. It can be widely used in the measurement of solar radiation energy in meteorology, solar energy utilization, agriculture and forestry, aging of building materials and atmospheric environment monitoring.

2.2 Product advantages

1. The core induction element of the watch adopts a wire-wound electroplating multi-contact thermopile, and its surface is coated with a black coating with high absorption rate. The hot junction is on the sensing surface, while the cold junction is located in the body, and the cold and hot junctions generate thermoelectric potential. In the linear range, the output signal is proportional to the intensity of solar radiation.

2. High light transmittance K9 quartz cold-ground glass cover is used, with a tolerance of less than 0.1mm, ensuring light transmittance up to 99.7%, high absorption rate 3M coating, absorption rate up to 99.2%, do not miss any opportunity to absorb energy.

3. The design of the embedded female head of the watch body is beautiful, waterproof, dustproof, and safer for monitoring; the design of the rotating male head of the watch line avoids the risk of misoperation, and the pull-out plug-in method does not need to be manually rotated and fixed, which is safer ,faster. The overall appearance is naturally IP67 waterproof.

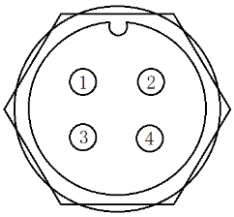
4. Built-in temperature compensation and built-in desiccant can improve the measurement error in special weather, and can ensure that the annual drift rate is less than 1%.

3. Product Parameter

Parameter name	Specification parameter	Description
Grade standard	Domestic secondary	
Time response (95%)	≤ 20s	
Internal resistance	≤ 800 Ω	
Insulation resistance	≥ 1 mega ohm M Ω	
Nonlinearity	≤ ± 3%	
Measure range	0-2000W/m2	
Measure resolution	1 W/m2	
Directional response error	≤ 30W · m-2	
Temperature response error	≤ 4%	
Zero offset	≤ 8W · m-2	
Tilt response error	≤ 5%	
Spectral response	285 ~ 3000nm	
Signal output	0 ~ 20mV	
	MODBUS	
Default cable length	2 meters	The others can be custom made
Working environment	Temperature range:-40 ~ 85 ℃	
	Humidity range: 5 ~ 90% RH	
Weight	0.4 kg	

4. Wiring instructions

Model	Aerial insertion instructions	Line color description
TBQ-2J	1: Signal + 2: Signal- 3: Empty 4: Empty	Red: Signal + Black: Signal-
TBQ-2J + current	1: Current signal 2: Empty 3: V + 4: V-	Red: V + Black: V- Yellow: Current output
TBQ-2J +485	1: RS485A 2: RS485B 3: V + 4: V-	Yellow: RS485A Green: RS485B Red: V + Black: V-



The sensor line has an XS12-4 four-core aviation plug, and the pin definition corresponding to its pins is shown in the figure

5. Radiation value calculation method

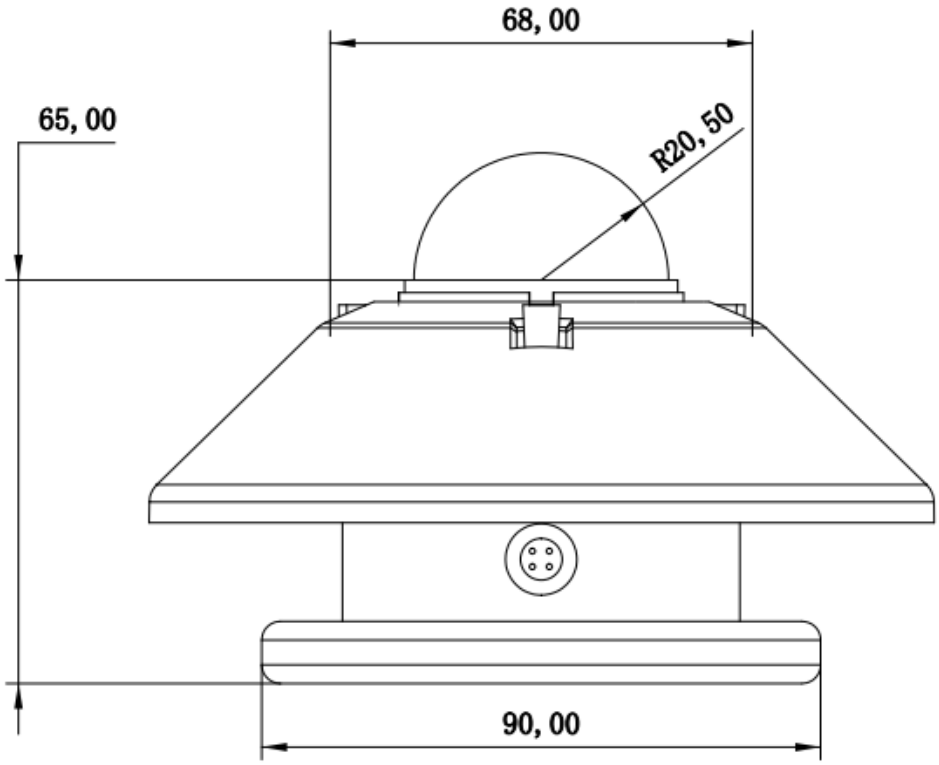
1. For the 0-20mV output, the calculation method is :

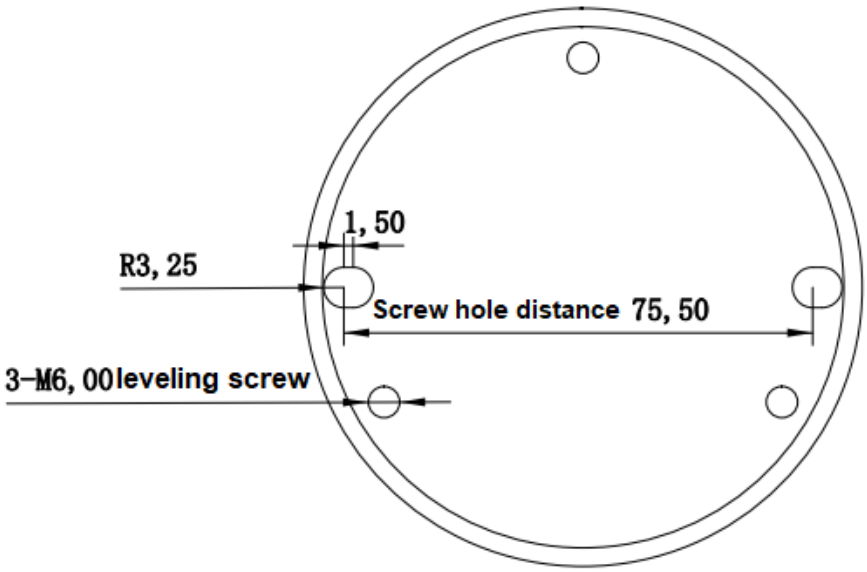
Radiation value(W/m2) = Output voltage(mV) *1000/sensitivity

Each sensor sensitivity is different and we will marked in the sensor.

2. For the RS485 output, please check the following modbus protocol.

6. Product size drawing





7. Technical parameters of RS485 MODBUS

7.1 Basic Parameters

Measuring item	All kinds of radiation sensors in our company
Precision	± 0.3%
Operating temperature	-30-60 ℃
Data protocol	Modbus-RTU
Communication mode	RS485
Operating voltage	DC 7-24V
Overall power consumption	< 0.2 W

7.2 Wiring Instructions

Red: Power Positive Black: Power Negative Yellow: 485A Blue 485B

7.3 MODBUS Communication Function Description:

The specific MODBUS-RTU table is as follows.

MODBUS-RTU	
Baud rate	4800, 9600 (default), 19200, 57600, 115200
Data bit	8-bit
Parity check	None
Stop bit	1-bit

Function code: 0x03

Register name	**Address Position**	**Read/write**	**Unit**	**Data Type**	**Length**	**Number of decimal points**
Instantaneous value of	0x00	R	W/㎡	Int	1	0
Host ID	0x100	R/W		UInt	1	0
Baud rate	0x101	R/W		UInt	1	0
High coefficients	0x108	R/W		UInt	1	0
Low coefficients	0x109	R/W		UInt	1	0

Radiation output: 2000 units w/㎡.

If you don't know the transmitter address, you can use ID 0 to get and set the address

Address: 1-254

Baud rate: 0 -4800, 1-9600 ,2-19200, 3-38400, 4-57600 ,5-115200

Coefficient calculation coefficient = (high X256 + low) * 0.01

7.4 . Examples

Send and accept characters are hexadecimal data data (0xXX) ASCII code need to be sent and accepted after background transcoding!

1. Read sensor id

Command : 01 Send 01 03 00 00 00 01 84 0A

Description: Id 01; Command 03; Register header address 00 00; Read the number of 00 01; CRC16 calibration 84 0A

Accepted 01 03 02 00 0A 38 43

Description: Id 01; Command 03; The number of data is 02; Heat flow data 00 0A (hexadecimal 0x000A decimal 10); CRC16 check value 38 43

Read data 10 W/㎡

2. Modify sensor address 1 to 2

Command: 01 06 01 00 00 02 09 F7

Description: Id 01; Command 06; Register header address 01 00; Modify data 00 02; CRC16 Calibration 09 F7

If feedback 01 06 01 00 00 02 09 F7 was modified successfully

3. Modify the baud rate. Modify the baud rate to 19200

Command: 01 06 01 01 00 02 58 37

Description: Id 01; Command 06; Register header address 01 01; Modify data 00 02; CRC16 Check 58 37

If feedback 01 06 01 01 00 02 58 37 was modified successfully

8. Daily maintenance

1. Check whether the glass window in quartz glass is clean in time every day. If there is dust and water vapor condensation, it should be blown with suction ear ball or wiped clean with soft cloth and optical lens paper.

2. Wipe clean water droplets after rain, and defrost frequently in winter to avoid numerical errors caused by refraction of water droplets.

3. Water vapor and moisture enter the table. If fine water mist is found in the table, it should be dried as soon as possible (50 ~ 55 ℃), or the desiccant should be replaced, otherwise the accuracy of data will be reduced.

4. The total solar radiation sensor should be used correctly and maintained regularly. It is recommended to return to the factory for calibration and measurement accuracy after more than two years of use. Avoid not affect the accuracy of data.

9. Precautions

1. Please check whether the packaging is in good condition and check whether the product model is consistent with the selection;

2, do not live wiring, wiring after inspection is correct before electrification;

3. When installing, the plug of the meter should be placed towards the north, and the level should be adjusted first and then fixed;

4. Please take off the protective cover on the radiation meter when measuring radiation.

10. Installation method

1. The installation site of the total solar radiation sensor should be selected without any obstacles above the plane of the sensing element, so as to ensure that there are no obstacles with height angles exceeding 5 in the azimuth of sunrise and sunset, and avoid the phenomenon that shadows fall on the sensing surface. The meter should not be close to light-colored buildings or other objects that easily reflect sunlight, nor should it be close to artificial radiation sources.

2. When installing, the plug of the meter should be placed towards the north, adjusted horizontally first and then fixed.

HONDE TECHNOLOGY CO.,LTD

Surface temperature sensor user's Guide

Product introduction

The product uses a high-precision temperature sensor as a sensitive element, an excellent sampling algorithm, strong functions, high precision and good stability. Complete protection circuit: prevent overvoltage , prevent overcurrent , and prevent reverse connection. Lightweight, compact, and waterproof design. Specifically used for component temperature monitoring. Standard MODBUSRTU communication protocol.

Features

1、Stainless steel sensor probe, special disc design, easy to contact the component surface

2. Standard MODBUS communication protocol, strong function and good stability

3. Complete protection circuit: prevent overvoltage , prevent overcurrent , prevent reverse connection

4. High precision, Low power consumption5, lightweight, compact and waterproof

Technical Parameters

Output signal	RS485.
Measuring range	-40℃～80℃
Resolution	0.01℃
Measurement accuracy	≤±0.3℃
Protocol	MODBUS RTU
Collection box size	60(length)×35(width)×25(height)mm
Probe specifications	Stainless steel Φ6x30mm long with 1 meter wire
Cable length	Transmitter 15 meters line
Product power supply	DC12V-24V power supply

Product power consumption	<15mA (12V)
Wiring definition	Red: Positive power supply Black: Negative power supply Yellow: RS485A Blue: RS485B

MODBUS RTU communication protocol

Input register: Use function code 03 to read

Address	operate	content	Remark
0x0000	Read only	Temperature value, a hexadecimal number magnified 100 times after adding 20, for example, 10F9=4345 (decimal) means the temperature is 23.45℃ in degrees Celsius.	Note 1

Note 1 : Calculate the actual temperature = (return temperature value-2000)/100, keep 2 decimal places. <Or divide by 100 -20>

The following is an example of how to use Modbus RTU commands to access the transmitter registers:

1. Read input register (soil temperature value) command

Send: FF 03 00 00 00 01 91 D4

FF	0 3	00 0 0	00 01	91 D4
Address	Function code	Register address	Number of registers	CRC16 check digit

Answer: FF 03 02 10 F9 5C 12

FF	0 3	02	10 F9	5C 12
address	function code	The number of bytes in the data segment	Data segment data	CRC16 check digit

The data segment data is soil temperature, 10F9H = 4345 =4345/100-20=23.45℃

2. Modify the internal register (device address) command (change the address to FF) **and use function code 06 to change it.**

Send: 00 06 00 01 00 FF 99 9B

00	0 6	00 0 1	00FF _	99 9B
fixed address	function code	Register address	modified new value	CRC16 check digit

Answer: 00 06 00 01 00 FF 99 9B (indicating successful modification)

HONDE TECHNOLOGY CO.,LTD

Fruit/stem growth sensor

Honde Technology CO.,LTD

https://hondetec.en.alibaba.com/

1. Product description

Fruit/stem growth sensor is a high-precision displacement increment sensor. The measurement principle is to measure the growth length of plant fruit or plant rhizome by using the moving distance of fruit/stem growth sensor, and record the growth size of complete fruit/rhizome.

2. The instrument has the following characteristics

1. High measurement accuracy and long service life.

2. Smooth engineering guide rail without noise output.

3. Excellent linearity and excellent material.

4. It is suitable for measuring fruits or rhizomes of various plants, and has no harm to plants.

3. Technical indicators

3.1 Technical Parameters

1. Measuring ranges: 0 ~ 10mm, 0 ~ 15mm, 0 ~ 25mm, 0 ~ 40mm, 0 ~ 50mm,
   0 ~ 75mm, 0 ~ 100mm, 0 ~ 125mm, 0 ~ 150mm, 0 ~ 175mm,
   0 ~ 200mm

2. Resolution: 0.01 mm

3. Output signal:

   A: Voltage signal (0 ~ 2V, 0 ~ 5V, 0 ~ 10V)

   B: 4 ~ 20mA (current loop)

   C: RS485 (standard Modbus-RTU protocol, device default address: 01)

   D: Wireless signals (4G, NB-IOT, WiFi, LoRa)

   E: Ethernet (RJ45 port)

4. Power supply voltage:

   A: 5 ~ 24V DC (when output signal is 0 ~ 2V, RS485)

B:12 ~ 24V DC (when the output signal is 0 ~ 5V, 0 ~ 10V, 4 ~ 20mA)

5. Linear accuracy: ± 0.1% FS

6. Repeatability accuracy: 0.01 mm

7. Maximum working speed: 5m/s

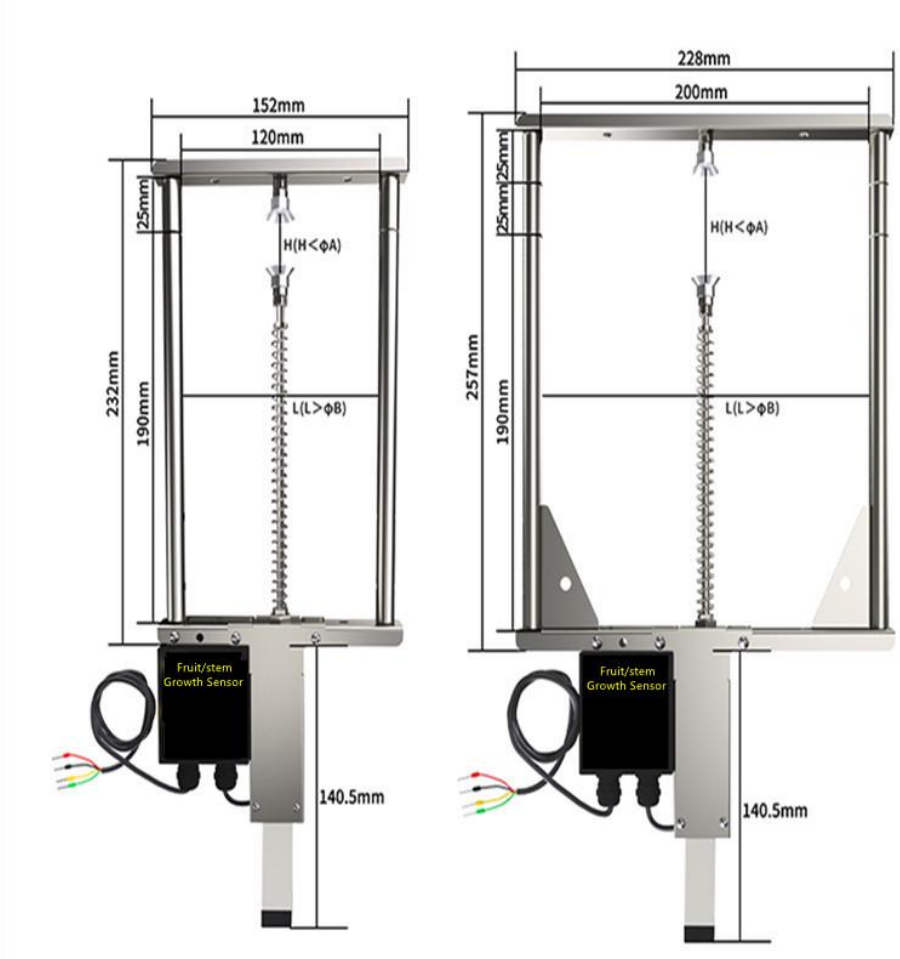
8. Use temperature range:-40 ℃ ~ 70 ℃

3.2 Impedance Requirements for Current Signals

Supply voltage	9V	12V	20V	24V
Maximum impedance	125 Ω	250 Ω	500 Ω	> 500 Ω

4. Instrument installation

4.1 Shape specification

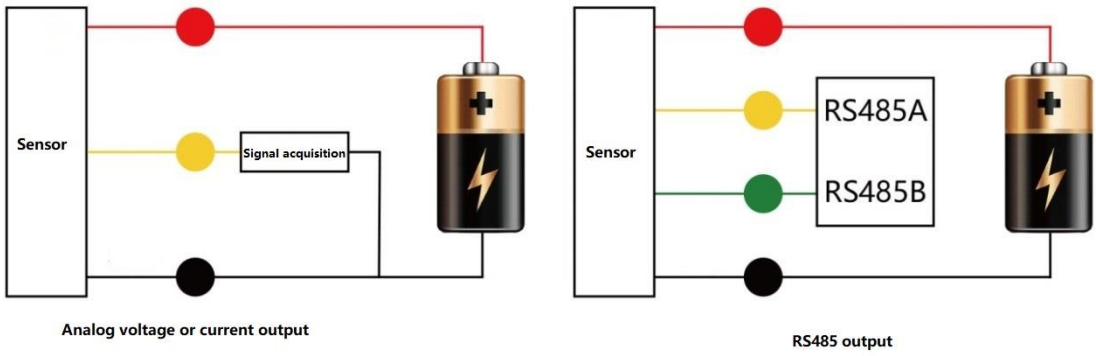


The initial diameter of the measurement stage is indicated by φ A, and the final diameter is indicated by φ B.

The growth value is expressed by S, and the conversion formula is S = φ B-φ A

4.2 Usage

The fruit/stem growth sensor can be connected with various data collectors, data acquisition cards, remote data acquisition modules and other equipment with differential input. The wiring description is as follows:



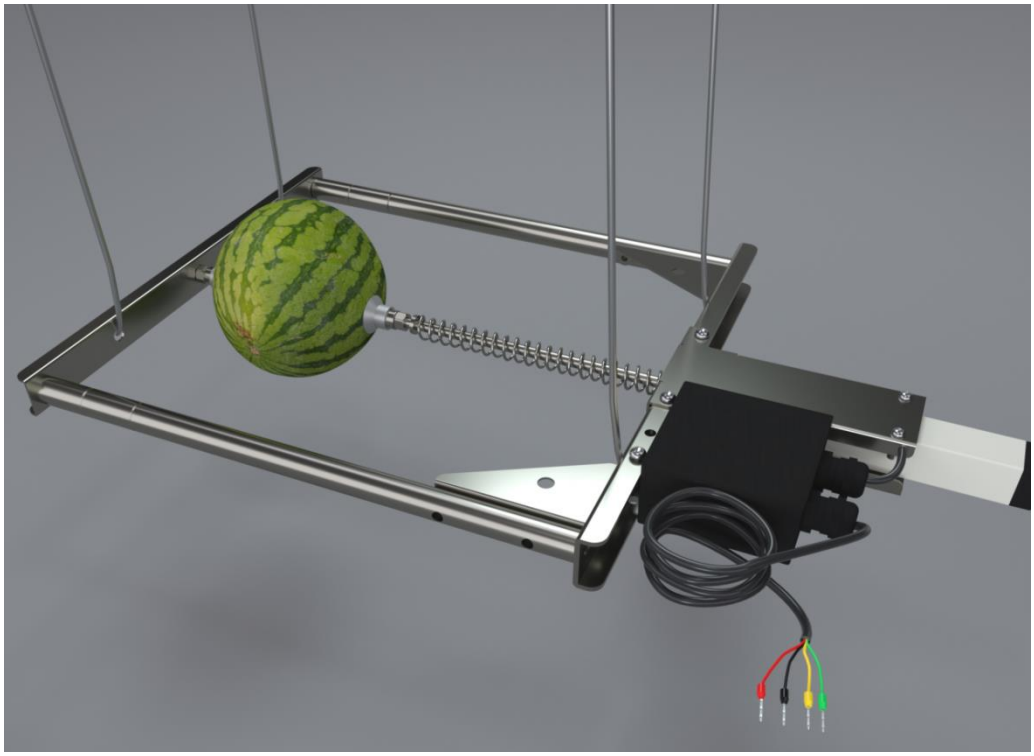
4.3 Installation mode

⚠ product is not waterproof. If it is used outdoors, please take rainproof measures.

The first step is to unscrew the screws on both sides of the upper support frame with an inner hexagon wrench. (As shown in the following figure)

The second step is to place the sensor at the position to be monitored, and then install the upper support frame. (As shown in the following figure)

The third step is to penetrate four fixing holes with iron wire and fix them on trees or fruits, or fix them with brackets to keep the sensor balanced. (As shown in the following figure)



5. Data output mode and algorithm

5.1 Analog output mode

Δ S: Growth value, unit: mm;

V: Voltage value collected by collector, unit: V;

A: The current value collected by the collector, unit: mA;

Output signal	Conversion method of each range		
	0 ~ 15mm	0 ~ 50mm	0 ~ 100mm
0 ~ 2V DC	Δ S = 7.5*V	Δ S = 25*V	Δ S = 50*V
0 ~ 5V DC	Δ S = 3*V	Δ S = 10*V	Δ S = 20*V
0 ~ 10V DC	Δ S = 1.5*V	Δ S = 5*V	Δ S = 10*V
4 ~ 20mA	Δ S = 0.9375*A-3. 75	Δ S = 3.125*A-12. 5	Δ S = 6.25*A-25

5.2 RS485 Signal (Default Address 01)

Standard Modbus-RTU protocol, baud rate: 9600; Check bit: None; Data bits: 8; Stop bit: 1

1. Register address

Sensor address	Content	Operation	Definition description
0000 H	Relative growth value of tree or fruit diameter	Read only	Real-time value of relative growth in mm (expanded 100 times), it can be cleared when install in the tree.
0001 H	Absolute value of tree or fruit diameter	Read only	Real-time value of absolute diameter in mm (expanded 100 times), Since there is a gap between the two suction cups, the default value is 7.50mm.
0054 H	Offset calibration value for the relative growth and the absolute value	Read & Write	The relative and absolute value of the measurement can be calibrated at the same time (Expanded 1000 times)
0055 H	Relative value clear	Read & Write	The initial fruit diameter can be zeroed during installation to measure the relative growth value, must send FE 06 00 55 AA AA 73 0A
0030 H	Device address	Read & Write	1~254 (factory default 1)

2. Address Modification

For example, the sensor with address 1 is changed to address 2, and the host → slave

Original address	Function code	Start register high	Start register low	High starting address	Low starting address	Low CRC16	CRC16 High
0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

If the sensor receives correctly, the data returns according to the original route.

Remarks: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only connect with one slave, and the return address is still the original address, which can be used as an address query method.

3. Query Data

Query the data of sensor (address 1), master → slave

Address	Function code	Start register address high	Start register address low	High register length	Low register length	Low CRC16	CRC16 High
0X01	0X03	0X00	0X00	0X00	0X02	0XC4	0X0B

If the sensor receives correctly, return the following data, slave → host

Address	Function code	Data length	Register 0 data high	Register 0 data low	Register 1 data high	Register 1 data low	Low CRC16	CRC16 High
0X01	0X03	0X04	0X04	0XD2	0X07	0X44	0X59	0X39
			Relative growth value		Absolute value of tree or fruit diameter			

So the relative growth value is 04D2(HEX)=1234(DEC), so the value is 12.34mm.

The absolute value of the tree and the fruit is 0744(HEX)=1860(DEC), so the value is 18.60mm

4. Command to clear measured value during installation

Address	Function code	Protocol address		Fixed character		Low CRC16	CRC16 High
0X01	0X06	0X00	0X55	0XAA	0XAA	0X67	0X05

If received correctly, return according to the original path, and the command of clearing the current size is completed.

Note: it must be the 01 06 00 55 AA AA 67 05.

5. Measurement offset calibration value, for example, add 5.5 mm for the calibration:

Address	Function code	Protocol address		Fixed character		Low CRC16	CRC16 High
0X01	0X06	0X00	0X54	0X15	0X7C	0XC7	0X6B

If received correctly, return according to the original path.

Please pay attention to that, if add the 5.5mm, it need enlarge into 1000 times for the input, that is change the 5500 into the HEX, it is 15 7c.

And after success, the relative and the absolute value all will be changed.