



MBMet-200 Series Rain Sensor

Product Manual



1 Introduction

MBMet-200 Series Rain Sensor is a hydrological and meteorological instrument used to measure natural rainfall, and at the same time convert the rainfall into digital information output in the form of switching value, so as to meet the requirements of information transmission, processing, recording and display, etc. needs.

This instrument is a primary instrument for measuring precipitation, and its performance meets the requirements of the Relevant Standards.

The tipping bucket, the core component of the instrument, adopts a three-dimensional streamlined design, which makes the tipping bucket turn water more smoothly and is easy to clean.

This instrument is a precision double tipping bucket rain gauge. During use, it is necessary to regularly maintain and clean the tipping bucket and the water outlet of the diversion funnel.

The inclination of the tipping bucket has been adjusted and locked at the optimal inclination position when the instrument leaves the factory. When installing the instrument, it is only necessary to install the tipping bucket and adjust the level of the base according to the requirements of this manual, and it can be put into use. The tipping bucket inclination adjustment screw cannot be readjusted any more on site.

2 Characteristics

- (1) High precision and good stability.
- (2) Good linearity, long transmission distance and strong anti-interference ability.
- (3) Small size and easy installation.
- (4) Mesh holes are designed at the funnel to prevent debris such as leaves from blocking the downflow of rainfall.
- (5) The shell of the instrument is made of ABS engineering plastics/polycarbon, which does not rust and has good appearance quality.

(6) The rain-bearing mouth is made of ABS engineering plastic/polycarbon injection molding, with high smoothness and small error caused by stagnant water.

(7) There is a leveling bubble inside the chassis, which can assist the bottom angle to adjust the levelness of the equipment.

3 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 (stations), hydrological stations, agriculture and forestry, national defense, field observation and reporting stations and other relevant departments. It can provide original data for flood control, water supply scheduling, and water regime management of power stations and reservoirs.

4 Technical Parameters

Rain Inlet Size: $\Phi 200\text{mm}$; Acute Angle of Edge: $40^{\circ}\text{-}45^{\circ}$

Resolution: 0.2/0.5mm

Rain Intensity Range: 0.01mm-4mm/min (The maximum rain intensity allowed to pass is 8mm/min)

Accuracy: $\leq \pm 3\%$

Output signal: A: voltage signal (Choose one of 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 0.2/0.5mm rainfall)

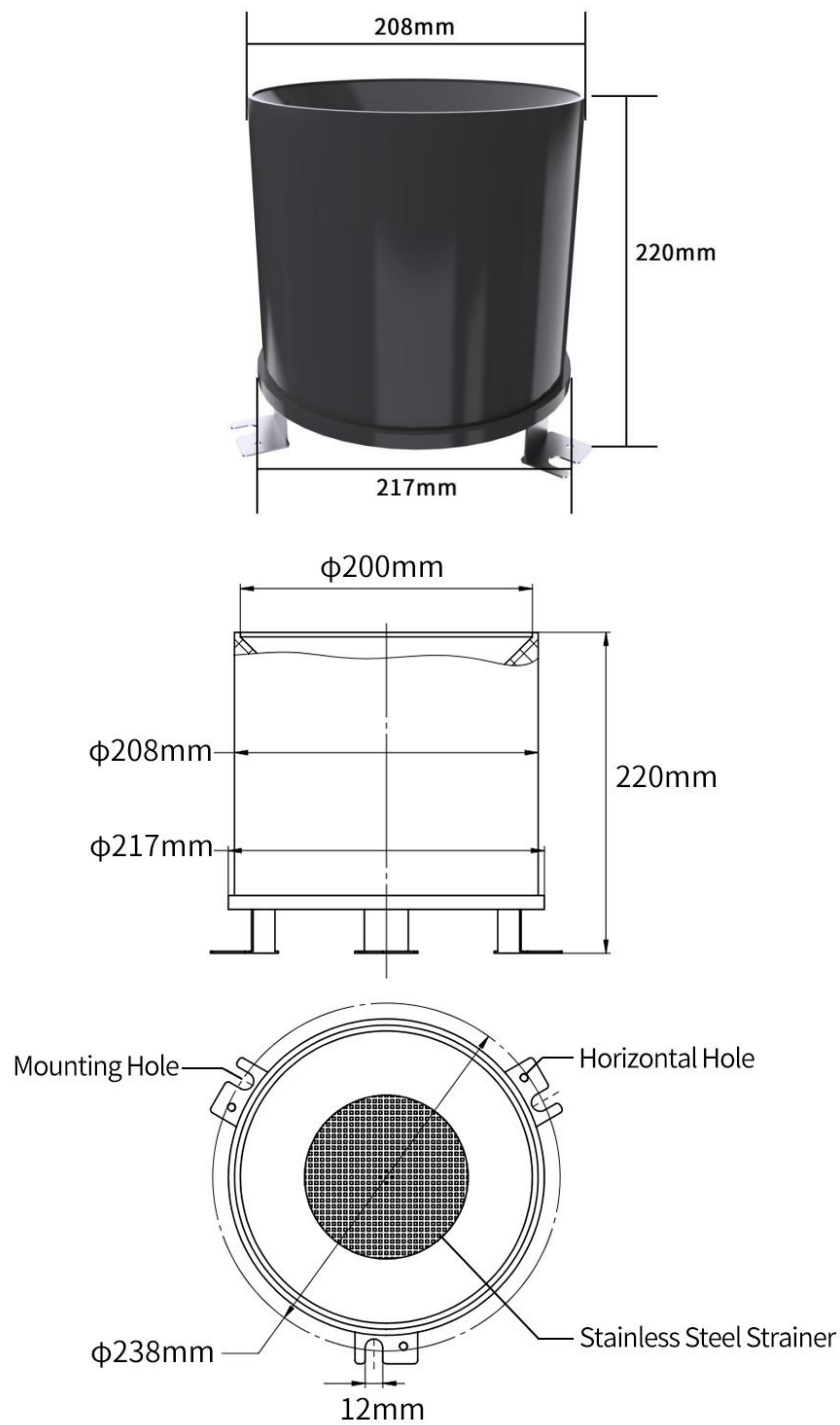
Supply voltage: 5-24 V DC (When the output signal is 0~2V, RS485)

12-24 V DC (When the output signal is 0~5V, 0~10V, 4~20mA)

Working temperature: $0^{\circ}\text{C}\text{-}70^{\circ}\text{C}$

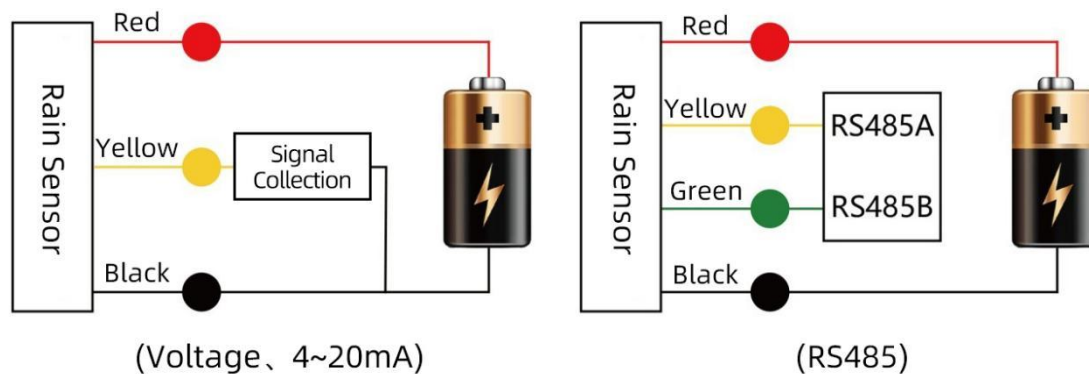
Working humidity: <100% (non-condensing)

5 Form Factor



6 Using Method

Rain Sensor can be connected to various data collectors with differential input, data acquisition cards, remote data acquisition modules and other equipment. The wiring instructions are as follows:



7 Data Conversion Method

The standard for the output analog signal of the tipping bucket rain gauge is to start the calculation of the cumulative rainfall from zero (00:00) of the day until so far, the default range is 0 ~ 100mm, other ranges can also be selected.

H: rainfall, unit: mm;

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

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

Output Signal	Data Conversion Method for Each 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		

RS485 signal (default address 01:

Standard Modbus-RTU protocol, baud rate: 9600; check bit: none; data bit: 8;

stop bit: 1

7.1 Modification Address

For example: Change the sensor with address 1 to address 2, host→slave

Original Address	Function Code	Register Address High	Register Address Low	Start Address High	Start Address Low	CRC16 Low	CRC16 High
0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

If the sensor receives the correct data, the data will be returned in the same way.

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.

7.2 Query/Set Time

Query time, host→slave

Original Address	Function Code	Register Address High	Register Address Low	Register Length High	Register Length Low	CRC16 Low	CRC16 High
0X01	0X03	0X00	0X34	0X00	0X03	0X44	0X05

If the sensor is received correctly, it will return the following data, slave → host.

Address	Function Code	Data Length	Year	Month	Day	Hour	Minute	Second	CRC16 Low	CRC16 High
0X01	0X03	0X06	0X20	0X03	0X30	0X10	0X25	0X10	77	8C
BCD code, means 30th March, 20 10:25:10										

If the clock is skewed, the clock can be calibrated, host→slave

Address	0X01	
Function Code	0X10	
Start Register Address High	0X00	
Start Register Address Low	0X34	
Register Length High	0X00	
Register Length Low	0X03	
Data Length	0X06	
Year	0X20	BCD code indicating: April 3, 20 17:06:28
Month	0X04	
Day	0X03	
Hour	0X17	
Minute	0X06	
Second	0X28	
CRC16Low	0XE2	
CRC16High	0XF4	

If the sensor receives correctly, the following data will be returned, slave → host

Address	Function Code	Start Register Address High	Start Register Address Low	Register Length High	Register Length Low	CRC16 Low	CRC16 High
0X01	0X10	0X00	0X34	0X00	0X03	0XC1	0XC6

7.3 Rainfall Query

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

Address	Function Code	Start Register Address High	Start Register Address Low	Register Length High	Register Length Low	CRC16 Low	CRC16 High
0X01	0X03	0X00	0X00	0X00	0X0A	0XC5	0XCD

If the sensor is received correctly, it will return the following data, slave → host.

Address	0X01	
Function Code	0X03	
Data Length	0X14	
Register 0 Data High	0X00	Rainfall on the day: 10.0 mm Rainfall from 0:00 a.m. to the present
Register 0 Data Low	0X64	
Register 1 Data High	0X00	Instant rainfall: 1.6 mm Rainfall between two queries
Register 1 Data Low	0X10	
Register 2 Data High	0X00	Rainfall yesterday: 8.0mm Rainfall in 24 hours yesterday
Register 2 Data Low	0X50	
Register 3 Data High	0X06	Total rainfall: 166.5mm Total rainfall after sensor power up
Register 3 Data Low	0X81	
Register 4 Data High	0X00	Hourly rainfall: 0.2mm
Register 4 Data Low	0X02	
Register 5 Data High	0X00	0.2mmRainfall in the last hour: 0.2mm
Register 5 Data Low	0X02	
Register 6 Data High	0X00	24-hour maximum rainfall: 10.0mm
Register 6 Data Low	0X64	
Register 7 Data High	0X01	24-hour maximum rainfall period 01:00~02:00
Register 7 Data Low	0X02	
Register 8 Data High	0X00	24 hours minimum rainfall: 0.0mm
Register 8 Data Low	0X00	
Register 9 Data High	0X03	24-hour minimum rainfall period 03:00~04:00
Register 9 Data Low	0X04	
CRC16 Low	0X24	
CRC16 High	0XDC	

7.4 Rainfall Data Reset Setting

Rainfall data reset setting, host→slave

Original Address	Function Code	Register Address High	Register Address Low	Data Content High	Data Content Low	CRC16 Low	CRC16 High
0X01	0X06	0X00	0X37	0X00	0X03	0X78	0X05

If the sensor receives correctly, the data will be returned in the same way.

Note: Before installation and use, it is necessary to set the rainfall to zero.

8 Troubleshooting

This table lists the general failure phenomena, causes and troubleshooting methods that may occur in the instrument.

Central Station Performance	Rain Sensor Failure	Solution
Can't receive data when it rains	Indicates that the rain sensor has no signal output or the transmission line is faulty ① Reed switch failure ② The distance between the magnet and the reed switch is too far ③ The welding wire falls off or the signal wire is broken ④ The tipping bucket is stuck ⑤ The instrument is blocked	Inspection ① Replace the reed switch ② Adjust the reed switch distance ③ Repair ④ Exclude ⑤ Clear the blockage
When it rains, the rainfall data received is quite different from that of the test rainfall.	① The tilt angle of the tipping bucket of the rain sensor is out of balance, but this error generally does not exceed $\pm 10\%$. ② The position of the magnetic steel and the reed switch is not good, resulting in good times and bad times, so that some signals are missing. ③ The anti-jitter function of the data collector is invalid. ④ The distance between the test rain gauge and the system rain	① Re-titration to adjust the inclination ② Adjust the distance ③ Adjust the parameters of the anti-vibration circuit ④ Objective reasons, not instrument failures

	sensor is farther or there is strong wind.	
The number of rains keeps coming, but the actual situation is not raining	Check whether the socket is flooded, this phenomenon often occurs after heavy rain	Dispose of incoming water, reinstall

Note: The faults listed in the table are not necessarily the faults of the rain gauge itself. After checking the faults of the instrument itself, you should also check whether there are faults in the transmission lines, data acquisition devices, telemetry terminals and other equipment of the instrument, and eliminate them one by one.

9 Warranty

The Standard warranty period for this product is one year. From the date of delivery, within 12 months, the company is responsible for free repair or replacement of the failure caused by the quality of the sensor (Human damage, Damages due to Surge, Animals, etc, are not covered).