



ONE-STOP SERVICE

RAIN GAUGE

HUNAN MACSENSOR COMPANY LIMITED



User Manual for R66S All Stainless Steel Rain Gauge (Analog Type)



1. Product Introduction

1.1 Product Overview

This instrument is a primary instrument for precipitation measurement, and its performance meets the requirements of the national standard *GB/T 21978.2-2014 Requirements for Precipitation Observation*.

The core component of the instrument, the tipping bucket, adopts a three-dimensional streamlined design and is made of stainless steel, which makes more smooth tipping of the tipping bucket. And it has the functions of self-cleaning dust and easy cleaning.

1.2 Structural Features

As shown in Figure 1, this instrument is composed of rain gauge housing, rain collector, funnel, tipping bucket support, tipping bucket, bearing screws, water outlet bin, sealing joint, reed switch, horizontal bubble, adjustment support plate, control box, leveling device, terminals, leg bracket, rain gauge base and etc. Among them, a tipping bucket shaft, a round horizontal bubble, a reed switch bracket and a signal output terminal are installed on the rain gauge base. Unlike other tipping bucket rain gauges, the tipping bucket bushing 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 the instrument is assembled when it leaves the factory, and there is no need to install the internal structure on site, which contributes convenience to on-site installation.

The tipping bucket of this instrument is a three-dimensional streamlined design, and is designed with a drooping curved diversion tip, which is beautiful and fluent, bringing better tipping performance, easy to clean and maintain.

The tipping bucket of this instrument is equipped with constant magnetic steel, and the reed switch bracket is equipped with a reed switch. When the instrument leaves the factory, both the magnetic steel and the reed switch have been adjusted at an appropriate coupling distance, so that the output signal of the instrument and the number of flipping buckets have a definite ratio.

When the instrument leaves the factory, the tilt angle adjustment screw of the tipping bucket has been locked at the position of the best inclination angle base point, and the tilt angle screw has been sealed with red paint. When installing the instrument on site, the user only needs to adjust the horizontal bubble to the central position according to the relevant requirements of this manual and it can be used, no need to adjust the tilt angle of the tipping bucket on site.





1.3 Main Technical Parameters

Rain-bearing caliber: φ 200mm; sharp angle of cutting edge: 40° \sim 45°

Resolution:default 0.2mm, 0.5mm optional

Measurement accuracy: $\leq \pm 3\%$ (indoor artificial precipitation, subject to the drainage volume of the instrument itself)

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

Communication method:4~20mA/0~2V/0~5V/0~10V

Power supply range:4.5~30V

Maximum power consumption:0.24W

Working environment:

Environment temperature: $0 \sim 50 \,^\circ C$

Relative humidity:<95% (40°C)

1.4 Product Selection

R66S				Rain gauge
	I20-			4~20mA
	V02-			0~2V
	V05-			0~5V
	V10-			0~10V
		5-		Full stainless steel
			02	0.2mm
			05	0.5mm

Note: Please purchase the supporting sheet separately.

2. Equipment Installation Instruction

2.1 Pre-installation Check

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

(2) Carefully read the product instruction manual and product certificate.

(3) Check the appearance of the instrument for damage, especially check whether the tipping bucket is intact, and pay attention to properly placing the tipping bucket to prevent damage to the tip of the tipping bucket shaft and the arc-shaped tip of the tipping bucket at both ends, and do not touch the inner wall of the tipping bucket with your fingers so as 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 cable ties that fix the tipping bucket, and then install the outer cylinder, the preparation is complete



2.2 Outdoor Installation and Debugging

2.2.1 Base Making and Installation

When installing the outdoor ground and roof, the cement foundation should be made according to the dimensions and requirements of Figure 2, and the plane of the cement foundation should be horizontal. The size of the cement foundation is generally a 40cm×40cm square base with a height of not less than 30cm or a circular base with a diameter of 40cm. It is required that the height of the rain-bearing mouth of the instrument is 70cm from the ground level, and no shelters higher than the rain-bearing mouth of the instrument within 3 to 5 meters around the mouth of the instrument are allowed .

2.2.2 Install and Fix Instruments, Adjust the Level of Rain-bearing Mouth

Drill 3 holes of φ 12 with a depth of 8-10cm on the cement foundation according to the dimensions in Figure 2, place the expansion bolts in the holes, lock them with lock nuts, and then install the instrument base on the 3 height adjustment support nuts. Measure whether the ring mouth is in a level state by adjusting the height of the supporting nut and a leveling instrument, and finally use a lock to fix the instrument.



Figure 2

2.2.3 Adjust the Rain Gauge to Horizontal Position

Remove the stainless steel outer cylinder, and keep the dome nut in the unlocked state as shown in Figure 3, just respectively use two hands to adjust the height of the nut in the red circle, so that the bubble in the horizontal bubble is in the center. Then tighten the dome nut, and check and adjust again whether the bubble of the horizontal bubble on the tipping bucket bracket is in the middle position.



Figure 3

2.3 Wiring

Wire Color	Description	Wire Color	Description
Brown	Power +	Yellow	Signal +
Black	Power -	Blue	Signal -

3. Data Conversion Method

The standard for outputting analog signal of tipping bucket rain gauge is to start the calculation from 00:00 am of the day, the accumulated rainfall so far. The default range of 0-100mm, and 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;

	Data conversion method for each range					
Output	0~50mm	0~100mm	0~200mm			
	(by customization)		(by customization)			
$0\sim 2V DC$	H=25*V	H=50*V	H=100*V			
$0\sim 5V DC$	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 0.2/0.5mm rainfall					

4. Maintenance

4.1 Daily maintenance

The instrument is used outdoors for a long time and the operating environment is very harsh. Therefore, the inner wall of the rain bearing mouth of the instrument should be wiped with soft cloth frequently to keep it clean. If there are foreign objects such as leaves in the rain port, clean up in time to keep the waterway unblocked. When the instrument is not used for a long time, a cover should be placed on the ring mouth of the instrument for protection of the rain bearing mouth.

The instrument is generally cleaned up once a month and compulsively once every three months if it is used for a long time.

4.2 Cleaning of Tipping Bucket

The tipping bucket is a key component of the instrument, which directly affects the measurement accuracy of the instrument. Over time, a little dust or oil will be deposited on the inner wall of the tipping bucket. Therefore, the tipping bucket should be cleaned. When cleaning, the inner wall of the tipping bucket can be repeatedly rinsed with clean water or gently brushed with a degrease brush. Scrubing the inner wall of the tipping bucket is prohibited.

5. Common Problems and Solutions

The table lists the possible common failure, causes and troubleshooting methods.

Central station	Rain sensor failure	Solutions
manifestation		
Precipitation	Indicating the rain sensor has no signal output or the transmission line is faulty	On site station check
value can't be	Reed switch failure	Replace
obtained when	The distance between the magnet and the reed pipe is too far	Adjustment
raining	The welding wire falls off or the signal wire is broken or the signal wire is	Repair
	connected reversely	Exclude
	Tipping bucket is stuck	Clear
	Instrument blockage	
When it rains,	Rainfall sensor tipping bucket turning base point is out of adjustment, but this	Re-titration to adjust
the amount of	error generally does not exceed $\pm 10\%$;	the base point
rainfall received	The position of the magnet and the reed pipe is not good, so that sometimes it	Adjust the distance
is much different	normally functions normal while abnormally other times and some signals are	The objective
from that of the	missed.	situation is so, the
measured rain		instrument has no
gauge		failure
The central	Check whether the socket is immersed in water, this phenomenon often occurs	Treat water ingress
station keeps	after heavy rain	and reseal
receiving the		
precipitation, but		
it does not rain		
actually		

Note: In the table above, the failure listed is not necessarily all the faults of the rain gauge itself. After checking the fault of the instrument itself and troubleshooting, also check whether the transmission line of the instrument, the data acquisition device, and other equipment are faulty, and solve one by one.

6