RK400-13 Radar Rainfall Sensor

User Manual

Revision Time	Reviser	Current Version	Remarks
20250825	SUN	V5.0	

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User Notice

Please read this manual carefully before use to ensure safe and optimal operation. Retain this manual for future reference.

Pre-Use Instructions

- Carefully review this manual and follow all operational and safety guidelines to prevent malfunctions and hazards.

Unpacking Inspection

- Upon receipt, carefully inspect the sensor device and accessories for any shipping damage.
- If damage is detected:
- Immediately notify the manufacturer and distributor.
- Retain all packaging materials for return or replacement processing.

Parts List

Item	Quantity	Remarks
Radar rainfall sensor	1	
Cable	1	The length depends on the order

1. Product Introduction

RK400-13 is a sensor that uses radar wave technology to detect rainfall. It can distinguish the types of rain, snow and hail and rainfall intensity. Compared with the traditional mechanical rain gauge, the detection is more sensitive and faster, and there is no need to worry about the influence of the cover of leaves and other objects on the surface of the detector for rainfall detection, and no need for heating device to prevent icing. There are no moving parts inside the product, which is maintenance-free, small in size and low in energy consumption.

2. Product Features

- Easy installation
- High accuracy, good stability
- Maintenance-free
- Compact size for easy use
- Distinguish rain, snow and hail

3. Rainfall Intensity Scale

Scale	24-hour Rainfall(mm)
Light rain	1-9.9
Moderate rain	10-24.9
Heavy rain	25-49.9
Rainstorm	50-99.9
Torrential rain	100-200
Super-Torrential rain	>200

4. Specifications

Item	Technical Specification
Measurement Object	Rain,snow,hail
Measured Rainfall Intensity	0-200mm/h (Rainfall)
Sample Interval	1s
Resolution	0.1mm
Precipitation Diameter	0.5-5.0mm
Accuracy(2mm/min)	± 5% (@Wind speed <5 m/s)
Power Consumption	<2W
Supply	7-24VDC
Output	RS485,RS232,SDI-12 optional
Protocol	Modbus-RTU (default),NEMA-0183,SDI-12
Operating Temperature	-30 - +70℃
Main Material	Aluminum Alloy+ ABS/ABS
Weight(Unpacked)	0.65kg/0.38kg

5. Electrical Connections

Connector(Cable)	RS485
Red	V+
Black	V-
Yellow	RS485A
Green	RS485B

6. Product Dimensions

Unit:mm

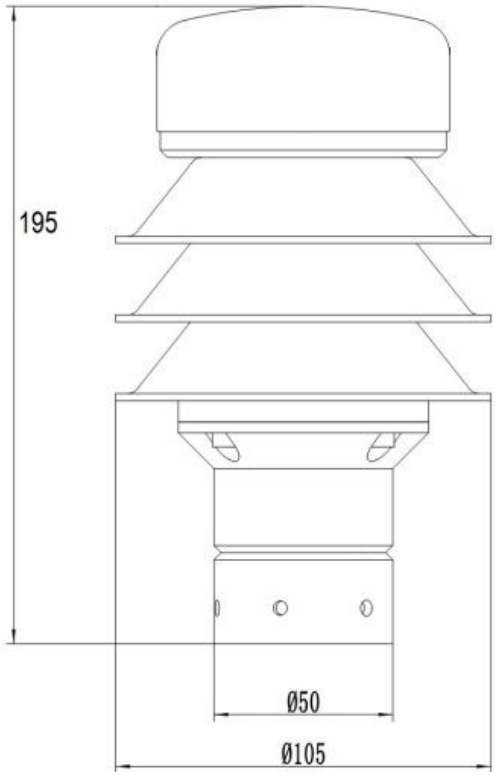

Figure 6.1 Dimensional Specification

7. Communication Protocol（MODBUS-RTU）

Parameter	Value
Data Bits	8 bits
Check Bit	EVEN
Stop Bit	1 bit
Baud Rate	9600 bps
Slave Address	0x01 (Factory Default)

7.1 Read Real-Time Data

Client sends:

01 03 00 0B 00 05 F40B

Return:

01 03 0A 0001 3333413B CCCD400C 1C9A

7.1.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X0A	10bytes
4	Data block	2	Falling object type	(0001)H=(1)D=>Rainfall
5	Data block	4	Rainfall	(413B3333)H≈(11.7)D≈11.7mm/h
6	Data block	4	Rainfall acc.	(400CCCCD)H≈(2.2)D≈2.2mm
7	Check block	2		0x1C 0x9A

Note: The rainfall and cumulative rainfall are **32-bit floating-point numbers**, with high bits in the back and low bits in the front (the order is CDAB)

7.2 Register Description

Register name	Function code	Register address	Data type	Data length（Byte）	R/W	Remark
Falling object type	0x03	0x000B	Integer	1	R	Rain:0x0001 Snow:0x0010 Solid(such as hail):0x0100
Rainfall	0x03	0x000C	Float point	2	R	mm/h
Rainfall acc.	0x03	0x000E	Float point	2	R	mm

7.3 Instrument Configuration(you can choose ASCII or Hex)

Through the connecting with the instrument, some parameters of the instrument can be configured, such as changing the communication address and changing the Baud rate

Steps:

1. Set the address

'Command one' => 'Command three' => 'Command four'

2. Set the serial port configuration

'Command one' => 'Command two' =>' Command four'

- **Command one:Enter the Settings mode**

Sent

（ASCII） >*\r\n

（Hex） 3E 2A 0D 0A

Response

（ASCII） \n>CONFIGURE MODE\r\n

（Hex） 0A 3E 43 4F 4E 46 49 47 55 52 45 20 4D 4F 44 45 0D 0A

- **Command two: Set the serial port configuration**

Sent

（ASCII） >CUS 9600 8-N-1\r\n

（Hex） 3E 43 55 53 20 39 36 30 30 20 38 2D 4E 2D 31 0D 0A

Response

（ASCII） >CMD IS SET\r\n

（Hex） 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note: The CUS is required followed by the serial port parameters that will need to be set.If it is not followed by the parameters, the command becomes the current query configuration.(Such as sent: '>ID\r\n',Response:' \n>COM USART SET : 9600 N-8-1\r\n')

- **Command three:Set the address**

Sent

（ASCII） >ID 2\r\n

（Hex） 3E 49 44 20 32 0D 0A

Response

（ASCII） >CMD IS SET\r\n

（Hex） 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note: This 2 is the address you want to set(set according to the need,1-255),which must be in decimal format,If 'ID' is not followed by address,the command becomes the current query address(Such as sent: >ID\r\n,Response: ID(HEX) : 02\r\n)

- **Command four: Manually exit the Settings mode**

Sent:

（ASCII） >!\r\n

（Hex） 3E 21 0D 0A

Response:

（ASCII） \n>NORMAL MODE\r\n

（Hex） 0A 3E 4E 4F 52 4D 41 4C 20 4D 4F 44 45 0D 0A

Note:

1. There are two spaces in the 'CUS 9600 8-N-1'to note,'8-N-1' separated by '-',no spaces.

Baud Rate	Data Bits	Parity	Stop Bits
2400-115200	8	N:NONE, E:EVEN, O:ODD	1 2

2. Any setting instruction (2, 3) must first let the instrument enter the setting mode,and the setting mode will be automatically closed if no operates on setting within 15-second. so the setting instruction must be input within 15 seconds.and the 15-second countdown reset restart after successful input.

3. "\r\n" is the carriage return line feed, corresponding to HEX (0x0D,0x0A)

8. Installation Guidelines

- Avoid areas with strong electromagnetic interference (e.g., high-voltage power lines, motors) and corrosive environments.
- There should be no obstructions (such as trees, eaves, wires) above the sensor to ensure that the radar beam area is not disturbed.

8.1 Installation Method

- RK95-53 bracket

Figure 8.1.1
Bracket with slot-holed mounting plate

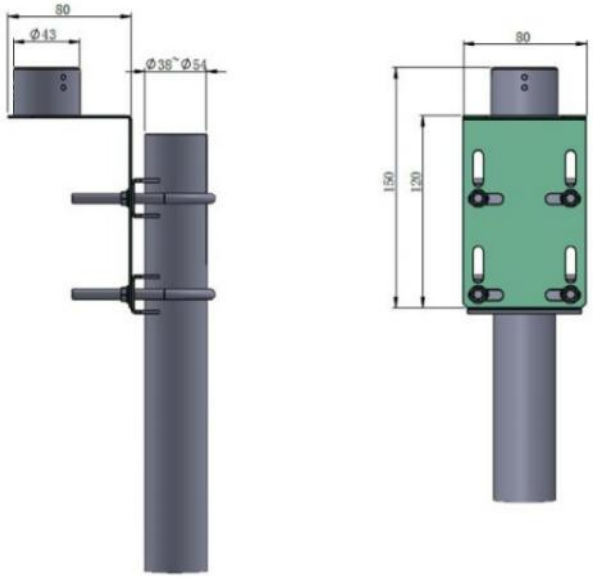

Figure 8.1.2
Bracket dimensions and hole spacing details

- RK95-54 bracket

Figure 8.1.3
Bracket Mounting Diagram

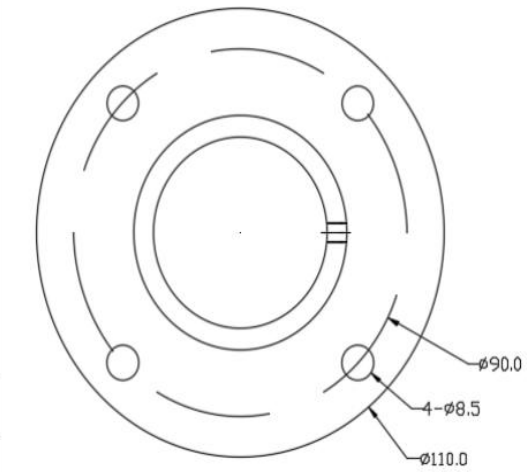

Figure 8.1.4
Bottom Dimension Diagram

9. Precautions

Package and Model Verification

- Ensure the packaging is intact and verify the sensor model and specifications match your purchased product.

Powered Wiring Prohibition

- Do not connect wires while powered. Only energize the sensor after confirming correct wiring.

Component Modification Restriction

- Do not alter factory-soldered components or pre-connected wires.

Precision Handling Requirement

The sensor is a precision device. Avoid:

- Unauthorized disassembly
- Structural components are strictly prohibited from being compressed under stress.

  Note: Unauthorized modifications void the warranty.

10. Troubleshooting

Incorrect Output Signals (Analog/RS232/RS485):

- Verify wiring correctness and secure connections.
- Check if the serial port is occupied or malfunctioning.
- Confirm serial port settings (baud rate, data/stop bits) match device requirements.

Persistent Issues:

- Contact the manufacturer if the above steps fail to resolve the problem.

11. Product Maintenance

Maintenance and Safety

- Regularly clean and inspect the sensor to maintain performance.
- Do not expose the sensor to extreme temperatures, moisture, or corrosive substances unless explicitly specified.
- Unauthorized disassembly, modification,or repairs may void the warranty and lead to malfunctions.

Troubleshooting Protocol

- In case of malfunction, refer to the troubleshooting section of this manual.
- Do not attempt unauthorized disassembly or repairs.
- Contact the manufacturer's after-sales department directly for technical support.

12. Warranty Terms

This product comes with a one-year warranty, starting from the date of delivery. Within twelve months, the Company shall be responsible for free repair or replacement of any failure caused by sensor quality issues (non-human damage). Fees will be charged for repairs or replacements after the warranty period expires.

CE Complies with applicable CE directives.

Manual subject to change without notice.

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