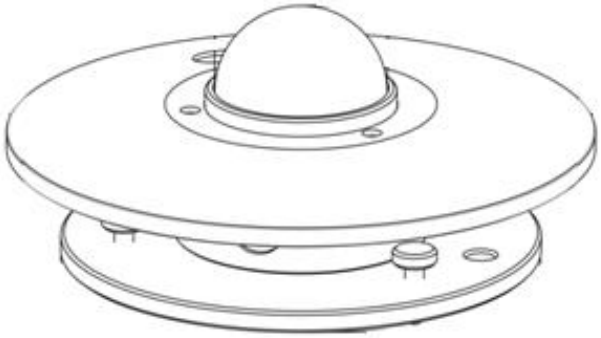
RK200-03 Pyranometer

User Manual



Revision Time	Reviser	Current Version	Remarks
20250329	SUN	V5.0	

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User Notice

Pre-Use Instructions

- Thoroughly read this manual before operation and retain it for future reference.
- Strictly comply with the operating procedures and safety precautions outlined in this manual.

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.

Troubleshooting Protocol

- Do not attempt unauthorized disassembly or repairs.
- Contact the manufacturer's after-sales department directly for technical support.

Parts List

Item	Quantity	Remarks
Pyranometer	1	
Cable	1	The length depends on the order
Leveling screw	3	

1. Product Introduction

The RK200-03 total radiation sensor operates on the thermoelectric induction principle and can be used with various radiation recorders or radiation voltmeters to accurately measure solar total radiation. The core sensing element employs a wire-wound electroplated multi-junction thermopile coated with a high-absorption black layer on its surface. The dual-layer glass dome reduces the impact of air convection on the radiometer, with the inner dome designed to block infrared radiation from the outer dome. This instrument measures solar total radiation across the spectral range of 300-3200nm and can also assess radiation incident on inclined surfaces. When facing downward, it measures reflected radiation, and when equipped with a shading ring, it measures diffuse radiation. Consequently, it is widely applicable for solar energy utilization, meteorology, agriculture, building material aging studies, and atmospheric pollution monitoring to quantify solar radiation energy.

2. Product Features

- Complies with WMO standards
- Complies with ISO9060:2018
- Suitable for harsh environments
- High sensitivity
- Double-layer transmissive glass
- Easy installation

3. Specification

Item	Specification		
ISO9060:2018	Class A	Class B	Class C
ISO9060:1990	Secondary standard	First class	Second class
Spectral Range	280~3000 nm	280~3000 nm	300~3200 nm
Supply	12-24VDC	12-24VDC	5VDC,12-24VDC
Range	0-4000W/m^2	0-2000W/m^2	0-2000W/m^2
Output	0-20mV,4-20mA,RS485		0-20mV,0-5V,4-20mA, RS485,SDI-12
Sensitivity	7-14μV/(W/m²)		
Non-linearity	<±0.2% (100~1000W/ m²)	±1% (100~1000W/ m²)	<±3%
Response Time	≤5s (95%)	≤ 30s (95%)	≤60s (95%)
Zero Drift (Temperature drift:5k/h)	<±2W/m^2	<±4W/m^2	±8W/m^2
Stability	<±0.8%/year	<±1.5%/year	<±3%/year
Directional Response	±10W/ m^2	±20W/ m^2	≤±30W/ m^2
Temperature Effect	<1%(-10℃-+40℃)	<4%(-10℃-+40℃)	<8%(-10℃-+40℃)
Operating Temperature	-40℃-+80℃		
Recalibration Interval	2 Years		
Calibration Basis	ISO9847		
Desiccant	Built-in		
Weight(Unpacked)	0.8kg		1.2kg
Dimension	ø154*101.5mm		ø185*120mm
Installation Bracket(Optional)	Horizontal bracket or adjustable angle bracket		
Transmission Module	4-20mA:external RS485:built-in	4-20mA:external RS485:built-in	RS485/SDI-12:built-in 4-20mA/0-5V:external
Ingress Protection	IP67		
Storage Condition	10℃-60℃@20%-90%RH		

4. Electrical Connections

Type:Class A&Class B			
Cable	**RS485**	**Cable**	**Voltage/Current**
Red	V+	Brown	V+
Black	V-	Blue	V-
Yellow	RS485A	Yellow	Signal+
Green	RS485B		

Type:Class C			
Cable	**RS485/RS232**	**Cable**	**Voltage/Current**
Red	V+	Red	V+
Black	V-	Green	V-
Yellow	RS485A / RXD	Yellow	Signal+
Blue	RS485B / TXD		

5. Output Types & Formulas

Single Header 0-20mV Voltage Output Type:	F=H/N*1000	
Current Type (0–2000 or 4000 W/m²):	4-20mA	F=(I-4)/16*2000 or 4000
Voltage Type (0–2000 or 4000 W/m²):	0-2.5V	F=V/2.5*2000 or 4000
	0-5V	F=V/5*2000 or 4000

F: Radiation Data in W/m²;

H: Millivolt output voltage from the sensor head in mV;

N: Sensitivity of the sensor head in μV·m²/W;

V: Transmitter output voltage in V;

I: Transmitter output current in mA.

6. Product Dimensions

Unit:mm

Type:Class A&Class B

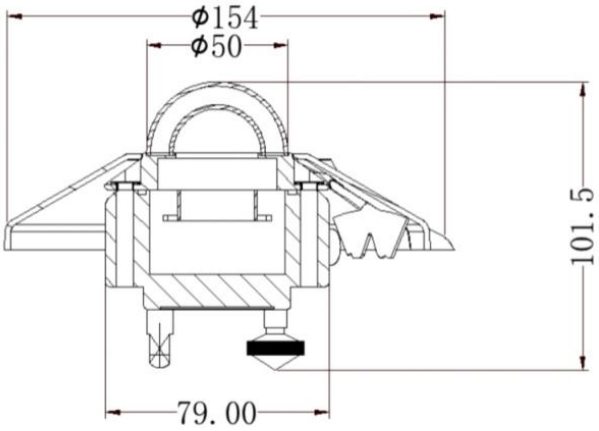

Figure 6.1 Dimensions

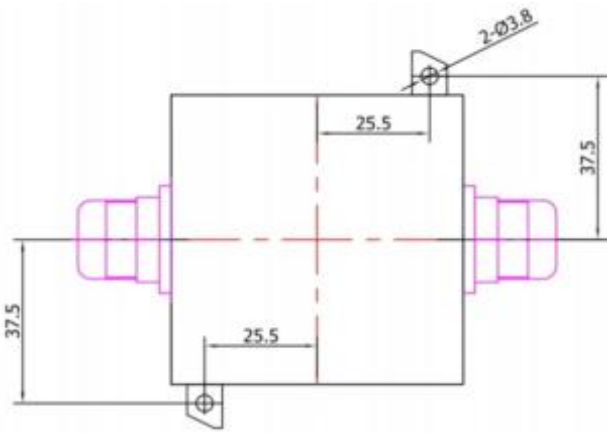

Figure 6.2 Transmission module for 4-20mA

Type:Class C

Figure 6.3 Dimensions

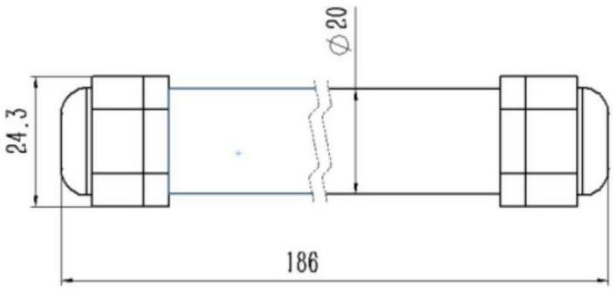

Figure 6.4 With external transmitter.(Round tube type)

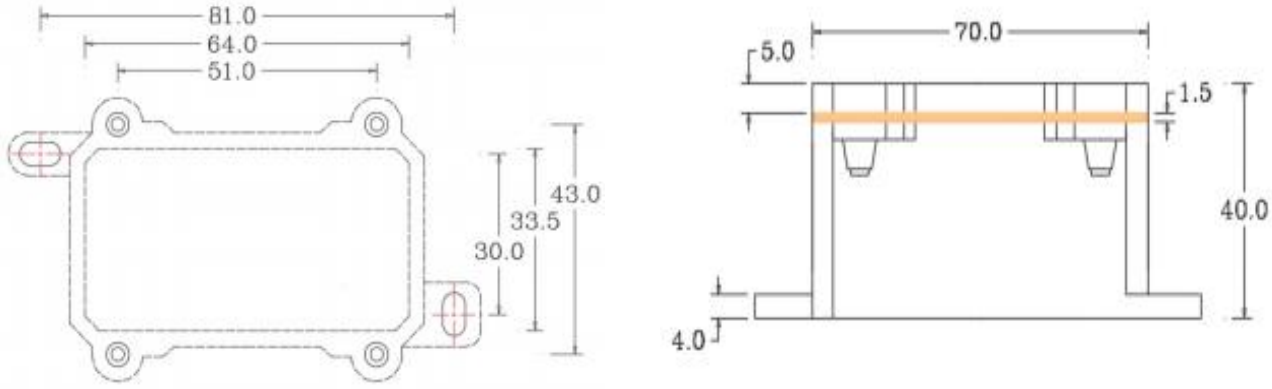

Figure 6.5 With external transmitter.(Square Type)

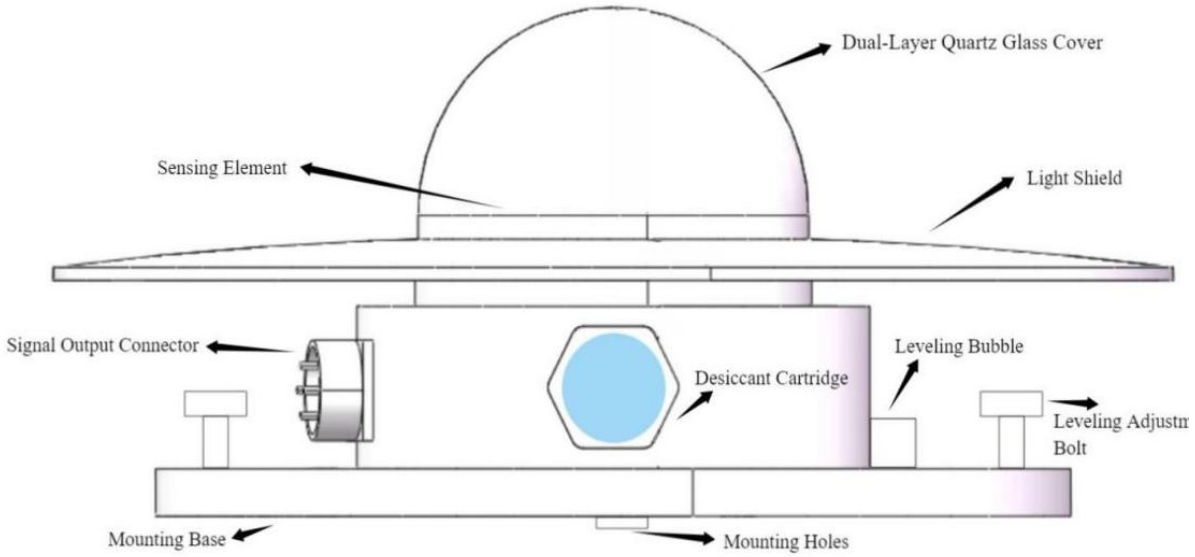

Figure 6.6 Total Radiation Schematic

7. Communication Protocol(MODBUS-RTU)

Parameter	Value
Data Bits	8 bits
Check Bit	None
Stop Bit	1 bit
Baud Rate	9600 bps
Slave Address	0x01 (Factory Default)

7.1 Read Real-Time Data(Type:Class C)

Client sends:

01 03 00 00 00 01 840A

Return:

01 03 02 03 B4 B8 C3

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	0x02	2bytes
4	Data block	2	Radiation Data	0x03B4(948W/m^2)
5	Check block	2		0xB8 0xC3

7.2 Modify Slave Address

Client sends:(Change the slave address from 01H to 02H.)

Slave id	Function code	New Address	CRC_L	CRC_H
0x00	0x10	0x02	0xFD	0xC1

Response:

Slave id	Function code	CRC_L	CRC_H
0x00	0x10	0x00	0x7C

7.3 Read Sensor Address

Client sends:

Slave id	Function code	CRC_L	CRC_H
0x00	0x20	0x00	0x68

Return:

Slave id	Function code	Current Address	CRC_L	CRC_H
0x00	0x20	0x01	0xA9	0xC0

7.4 Read Real-Time Data(Type:Class A&Class B)

Client sends:

01 03 00 00 00 01 840A

Return:

01 03 02 03 B4 B8 C3

7.4.1 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	0x02	2bytes
4	Data block	2	Radiation data	0x03B4(948W/m^2)
5	Check block	2		0xB8 0xC3

7.5 Modify Slave Address(Example: Changing the sensor address from 01H to 02H.)

Client sends:

Slave id	Function code	Set Reg_H	Set Reg_L	Reg Num_H	Reg Num_L	Data Len	New Addr	Data Len	CRC_L	CRC_H
0x01	0x10	0x05	0x01	0x00	0x01	0x02	0x02	0x00	0xF3	0xE1

Response:

Slave id	Function code	Set Reg_H	Set Reg_L	Data Len_H	Data Len_L	CRC_L	CRC_H
0x02	0x10	0x05	0x01	0x00	0x01	0x50	0xF6

8. Installation Guidelines

The sensor must be installed in an open area with no obstructions above its sensing surface. Level the radiometer horizontally, secure it firmly, remove the protective cover, and connect its output cable to the data acquisition system to initiate observation.

8.1 Installation Method

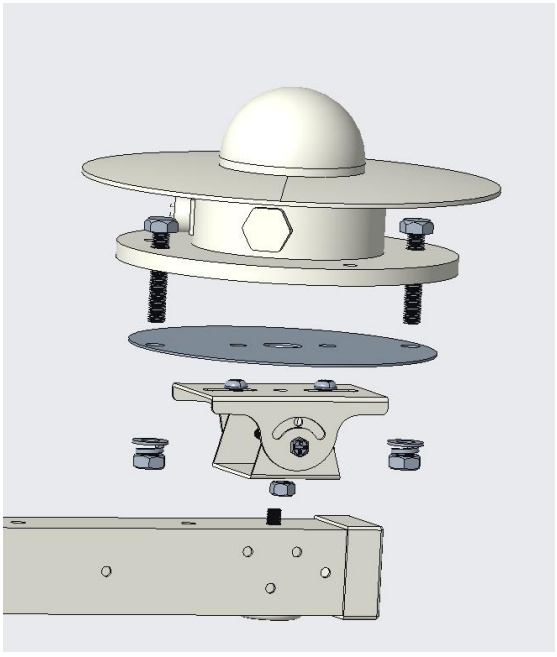

Figure 8.1.1
Tilted Installation Compatible with RK95-56 Bracket
(Adjust the angle on-site as needed)

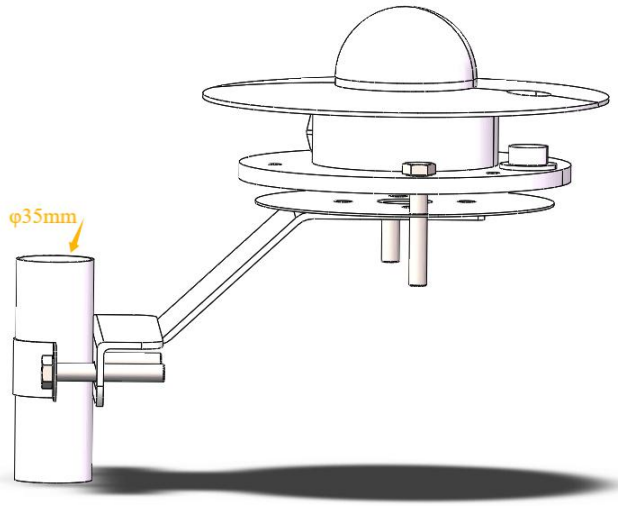

Figure 8.1.2
Horizontal Installation Compatible with RK95-55 Bracket

Note: The installation methods described above do not include vertical pole mounting. Both the RK95-55 and RK95-56 brackets are equipped with mounting screws.

9. Precautions

- Check that the packaging is intact and verify the product model matches the selected specifications. The transmitter and sensor head must have matching serial numbers and must be used as a matched set; do not replace components arbitrarily.
- Never perform wiring while the device is powered on. Ensure all connections are correct before powering up.
- The sensor cable length affects signal output. Do not modify the product (e.g., cutting/extending cables). Contact the manufacturer for customization requests.
- The sensor is a precision instrument. Do not disassemble it or expose it to sharp objects or corrosive liquids. Clean only with a dry, soft cloth.

  Note: Unauthorized modifications void the warranty.

10. Troubleshooting

Zero Reading on Display:

- Check if the protective cover is removed.
- Ensure the sensor is exposed to sunlight (if applicable),the photosensitive part is not obstructed.
- Do not discard the protective cover after removal.

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.

  Note: Retain the protective cover for recalibration or storage.

11. Product Maintenance

- Handle the protective cover with extreme care when opening or closing it, as the glass cover is fragile and valuable. Keep the glass cover clean by regularly wiping it with a soft cloth or chamois.
- Ensure no water ingress into the glass cover, and prevent condensation inside. Regularly check the desiccant in the drying chamber. If the desiccant turns dark (from its original orange), replace it immediately or dry it in an oven until it regains its orange color.
- During heavy rain, snow, ice, or prolonged precipitation, cover the radiometer to protect it. Remove the cover promptly after the weather clears.
- The sensitivity of the RK200-03 pyranometer must be recalibrated by the manufacturer or a certified calibration institution after two years of use.

  Note: Follow these steps to ensure measurement accuracy and prolong device lifespan.

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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