RK220-01 Paste Type Temperature Sensor User Manual

Revision time	Reviser	Current Version	Remarks
20250403	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
Paste Type Temperature Sensor	1	
Cable	1	The length depends on the order
Thermal conductive adhesive	1	
Aluminum foil tape	1	

1. Product Introduction

RK220-01 Paste type temperature sensor adopts high precision platinum resistance(PT100 Class A,complies with IEC751) as the sensing component. It is with high accuracy, good stability. The signal conversion module can convert temperature to corresponding voltage, current or RS485 optionally. RK220-01 past type temperature sensor is compact, easy-to-install, with good linearity, strong load capacity, long transmission distance and good anti- interference ability. RK220-01 complies with the regulations of IEC 61724 on PV module temperature sensors.

2. Product Features

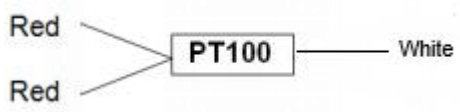
- Strong corrosion resistant ability
- High accuracy
- Wide range, good stability
- Various output signals optional
- With high temperature resistant adhesive, convenient installation
- Easy Installation

3. Specification

Item	Specifications			
Range	-50-+100℃, -20-+50℃ (Range customizable)			
Supply Voltage	5VDC,12-24VDC			
Accuracy	±0.5℃			±0.3℃
Output	4-20mA	0-5V	RS485	PT100/PT1000 3-wires
Load Capacity	≤250Ω	≥1K		
Ingress Protection	IP67			
Operating Temperature	Probe: -50℃-+120℃ Conversion module:-40℃-+85℃			
Sensor	PT100 Class A			
Probe	304SS			
Power Consumption	≤8mA, 0.1W(12V)			
Weight(Unpacked)	Probe: 85g			
Transmitter Module Dimension	Φ27*103mm			
Storage Condition	10℃-60℃@20%-90%RH			
Surface Mount Adhesive	Attached			

4. Electrical Connections

Cable	RS485	Voltage/Current
Red	V+	V+
Black	V-	V-
Yellow	RS485A	Signal+
Blue	RS485B	



PT100-3 wires:Red、Red、White

PT100-4 wires:Red、Red、White、White

5. Output Types & Formulas

Current Type (℃):	4-20mA	T=(I - 4)/16 × (Max Range - Min Range) + Min Range
Voltage Type (℃):	0-5V	T=V/5× (Max Range - Min Range) + Min Range

T: Temperature Data in ℃;

V: Transmitter output voltage in V;

I: Transmitter output current in mA.

6. Product Dimensions

Unit:mm

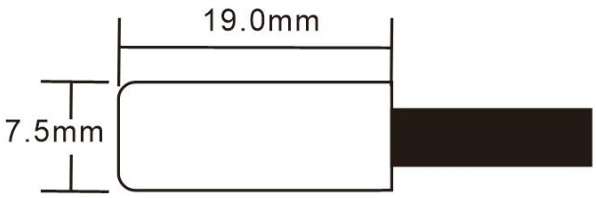


Figure 6.1
Probe: L19*W7.5*T3.5mm

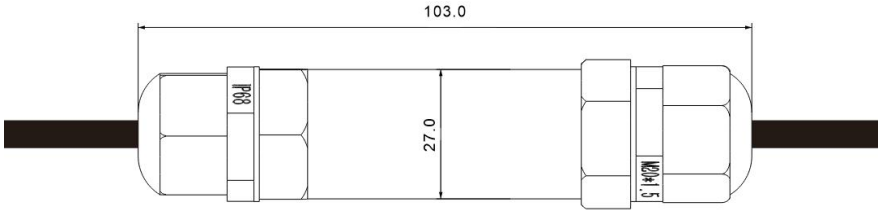


Figure 6.2
With external transmitter(Round tube type)

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

Client sends:

01 03 00 04 00 01 C5CB

Return:

01 03 02 03 88 B8 D2

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	Temperature Data	0x0388(90.4℃)
5	Check block	2		0xB8 0xD2

7.2 Password verification

Require password verification before changing the address, the password is 0x3879.

Client sends:

Slave id	Function code	Address_H	Address_L	Date_H	Date_L	CRC_L	CRC_H
0x01	0x06	0x00	0x0A	0x38	0x79	0x7B	0xEA

Response:

Slave id	Function code	Address_H	Address_L	Date_H	Date_L	CRC_L	CRC_H
0x01	0x06	0x00	0x0A	0x38	0x79	0x7B	0xEA

7.3 Modify Slave Address

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

Slave id	Function code	Address_H	Address_L	New id_H	New id_L	CRC_L	CRC_H
0x01	0x06	0x00	0x00	0x00	0x02	0x08	0x0B

Response:

Slave id	Function code	Address_H	Address_L	New id_H	New id_L	CRC_L	CRC_H
0x02	0x06	0x00	0x00	0x00	0x02	0x08	0x38

7.4 Read Sensor Address

Client sends:

Slave id	Function code	Address_H	Address_L	Quantity_H	Quantity_L	CRC_L	CRC_H
0x00	0x03	0x00	0x00	0x00	0x01	0x85	0xDB

Return:

Slave id	Function code	Byte count	Date_H	Date_L	CRC_L	CRC_H
0x03	0x03	0x02	0x00	0x03	0x81	0x85

8. Installation Guidelines

- Ensure full contact between the sensor and the photovoltaic panel, with good thermal conductivity.
- Prevent dust, grease, or other contaminants from entering between the sensor and the panel during installation.
- Preferably install it in the central area of the solar panel’s backsheet (near the hotspot-prone area of the cells), avoiding the edge frame (metal heat conduction interference) and the junction box shading area.

8.1 Installation Method

Use aluminum foil tape and thermal grease to securely attach the sensor to the photovoltaic panel.

Step 1: Clean the installation area and apply thermal conductive adhesive;

Step 2: Use aluminum foil tape to fix the sensor probe.

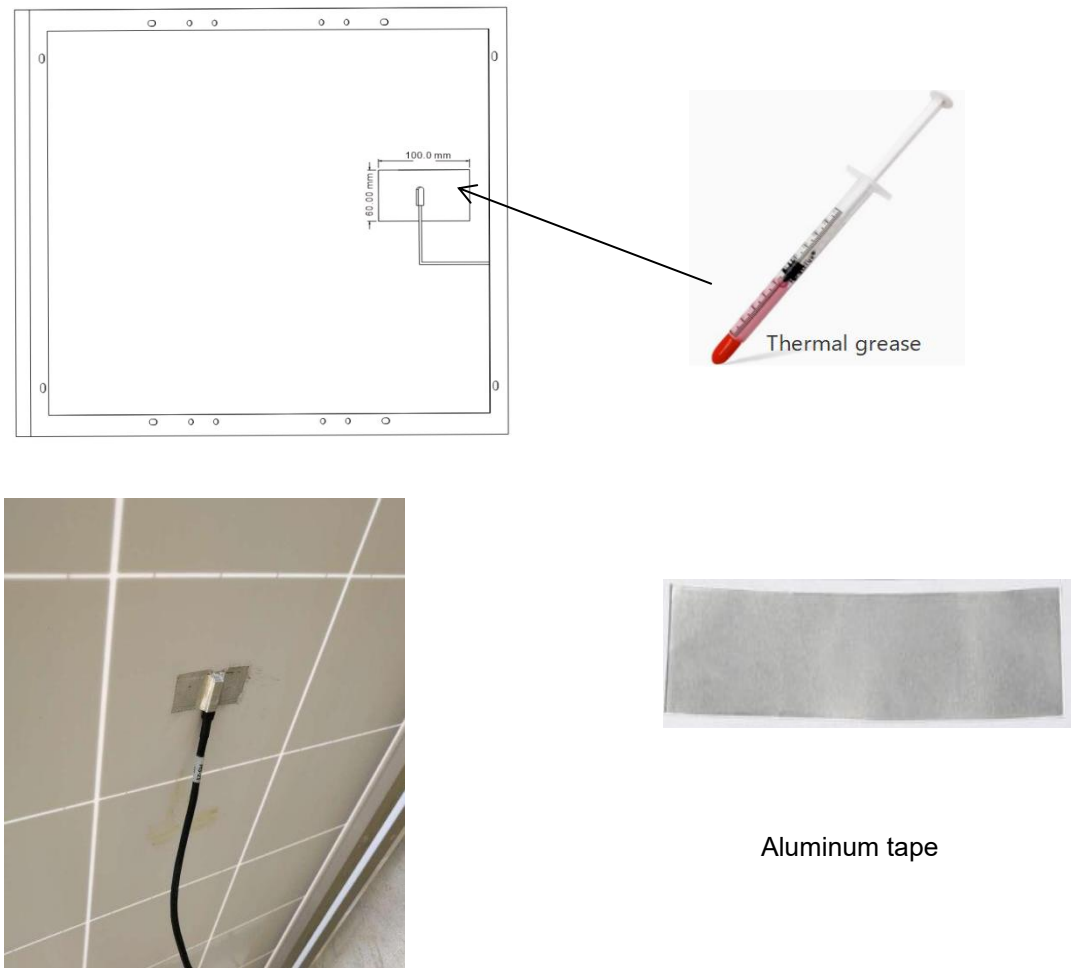


Figure 8.1.1
Installation on the back of the photovoltaic panel

9. Precautions

Powered Wiring Prohibition

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

Precision Handling Requirement

The sensor is a precision device. Avoid:

- Unauthorized disassembly
- Do not touch internal components to prevent product damage

Contact Surface Treatment

- Ensure that the bottom of the sensor is in tight contact with the object being measured, and fill any gaps with thermal grease (thickness < 0.1mm) to avoid an air layer that could cause temperature measurement delays.

Environmental Thermal Interference

- Keep away from heat-generating components (such as power chips and motor drivers), or add a thermal insulation layer to reduce interference from external heat sources.

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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