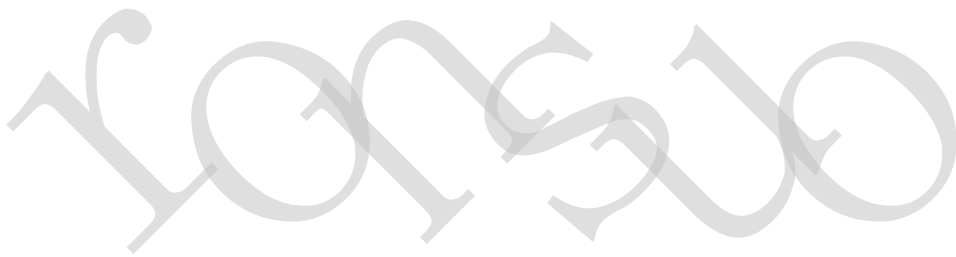


BexHuanTemperature Control: Precise Temperature Regulation

Temperature Collector (TSD 60xx Series) User Manual

V1.06



operating instruction

[illegible]

If you encounter any difficulties or technical issues while using the temperature collector, please contact us promptly. We will provide you with the most satisfactory and timely technical support. We also welcome your valuable feedback.

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BexHuanTemperature Control: Precise Temperature Regulation

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pay attention to

This document may be updated periodically due to product version upgrades or other reasons. This manual provides user guidance only. Version updates will not be notified separately.

scope of application

This instruction manual applies to the use of **TSD60xx and TSD60xx-U** products.

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Preface

Company Profile

Guangzhou BexHuan is a high-tech enterprise specializing in industrial temperature control, automation control, and information system integration. It provides precise temperature control, environmental monitoring, and industrial data interconnection solutions for industries such as optoelectronic manufacturing, semiconductors, thermal equipment, new energy, rubber and plastics, and research institutions.

With the mission of "Smart Temperature Control for More Efficient and Safe Industries", the company provides customers with a series of temperature control products featuring high-precision data acquisition and intelligent control algorithms. These include modular thermostats, TEC thermostats, integrated thermostats, power regulators, I/O acquisition modules, protocol gateways, and host computer software platforms.

product model

Product name	Model(with "-U" is UL certified)	Remarks
Temperature collector	TSD6032	32 Road
Temperature collector	TSD6024	24 Road
Temperature collector	TSD6016	16 Road

Suitable Object

This article is for the following readers:

R&D engineer, technical support engineer, end user

Brief Introduction of the Content

This document describes the use of temperature collector products.

Chapters and sections	Content	Remarks
1 product presentation	Introduce the overall function and performance index parameters of the product	
2 Product installation	Product installation	
3 Product debugging	Introduction to product application debugging and communication protocol	
4 Common faults	Introduction to common product faults and troubleshooting	
5 Maintenance	Introducing product maintenance and care	

6 safety requirements	Safety tips for product applications	
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1 Product Presentation

About this chapter

Chapters and sections	Content	Remarks
1.1 Product Overview	Background and application of the device	
1.2 product model	Display detailed device model information	
1.3 Product Features	Introduce the features of the device	
1.4 Product Parameter	Display the device's detailed specifications	

1.1 Product Overview

The TSD60xx/TSD60xx-U is a multi-channel temperature data logger. It supports 16,24, or 32 channels for temperature acquisition.

The channel supports PT100 sensor connection and features one uplink RS485 serial port operating on the standard Modbus RTU protocol.

Supports up to 8 devices on the 485 bus.

The temperature collector features an industrial-grade design, enabling long-term stable operation in environments ranging from -20°C to 125°C. It is equipped with temperature acquisition capabilities.

The equipment has the characteristics of fast response, accurate temperature acquisition, stable operation under high temperature and multiple acquisition channels, etc.

The function of road alarm is convenient for fault location and improve production efficiency.

1.2 Product Model

Order number	class	Name	Model	Explain
1	Collector 16~32 channels	Temperature collector	TSD6016	16 3-wire PT100 data acquisition unit with plastic housing
2			TSD6024	24 3-wire PT100 data acquisition unit with plastic housing
3			TSD6032	32 3-wire PT100 data acquisition unit with plastic housing

Note: Models with "-U" indicate UL certification.

1.3 Product Features

1.3.1 Industrial-Grade Design

- High performance industrial 32-bit processor
- Supports long-term stable operation in environments ranging from -20°C to 125°C
- Supports 12~36VDC wide voltage input

1.3.2 Reliability and Stability

- With a watchdog design, the system ensures long-term stable operation
- Adopt a robust protection mechanism to ensure equipment stability
- The power and RS485 interfaces are equipped with surge and electrostatic protection.
- Power input interface reverse connection protection

1.3.3 Product Usability

- The device features industrial-grade terminals for easy installation.
- Supports plug-and-play without complex configuration
- The device has an indicator light for on-site viewing
- The device supports the Modbus RTU protocol.

1.3.4 Functional Characteristics

- Supports PT100 sensor
- Supports 16 to 32 temperature acquisition channels
- Supports the Modbus RTU standard protocol and function codes 03, 06, and 16.
- Supports RS485 bus functionality and provides optically isolated 485 interface.
- The device has multiple acquisition channels, is compact, and occupies minimal space
- Device parameter power-off memory retention function
- Support temperature correction and filter settings
- Supports sensor open/circuit and short-circuit detection
- Temperature sampling cycle $\leq 100\text{ms}$
- Wide temperature range: 0~250°C

1.4 Product Parameter

Technical Parameters of Temperature Collector for 16~32 Bus		
Project		Parameter
Power supply for equipment	Mode of connection	2P-5.0mm Industrial wiring terminals
	Working voltage	24VDC (12~36V)
	Board power	$\leq 2W$
	Power protection	Reverse connection, static electricity, surge protection
CI	Mode of connection	2P-5.0mm Industrial wiring terminals
	Interface type	RS485
	Serial port count	1 Road (upbound)
	Protocol type	Modbus-RTU (Function Codes 03,06,16)
	Haul up	$\leq 1000M$
	Station address	1~8 (code selection) or register configuration supports 1~32
	Serial port baud rate	9600,19200,38400, and 115200
	Default communication parameters	38400,N,8,1
Sensor interface	Mode of connection	3P-3.81mm Industrial terminal
	Sensor type	PT100 (3-wire)
	Channel count	16、24、32 channel
	Sampling period	$\leq 100ms$
	Temperature range	0~250℃
	Resolution ratio	0.01℃
	Temperature measurement accuracy	$\leq \pm 0.5℃$
Service environment	Working temperature	-20~125℃
	Storage temperature	-20~125℃

operating instruction

	Relative humidity	10~90% (no condensation)
Structural installation	Shell material	High temperature resistant and flame retardant PC
	Way to install	Screw mounting or standard DIN35 rail mounting
	Product size	128.4mm*100.0mm*28.3mm (length*width*height)

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2 Product Installation

About this chapter

Chapters and sections	Content	Remarks
2.1 External dimensions	Describe the appearance and installation dimensions of the device.	
2.2 Interface Function Introduction	Introduce the functions of each interface and installation connection of the equipment	

pay attention to :

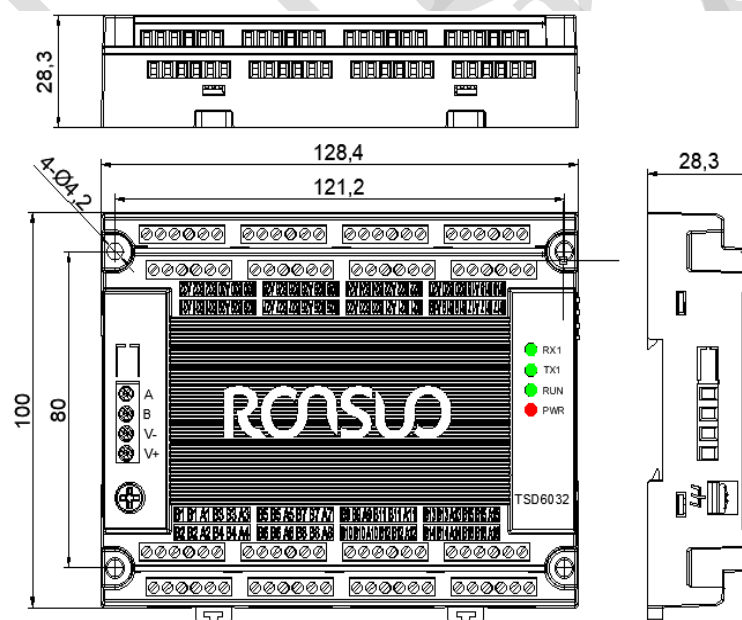
The temperature collector must be properly installed to achieve its designed functionality. Always read the user manual carefully before installation.

For any issues, please contact our company.

2.1 External Dimensions

2.1.1 Collector Size

The TSD60xx/TSD60xx-U temperature data logger features the following dimensions, as shown in the figure below:

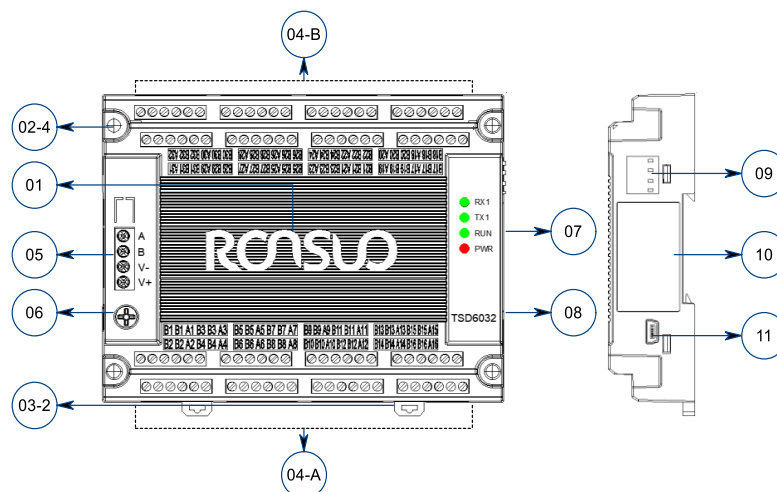


Note: The TSD60xx/TSD60xx-U series temperature transmitters share identical external dimensions, differing only in channel count.

2.2 Interface Function Introduction

2.2.1 Collector Interface Functionality

1、 The temperature data logger (TSD60xx/TSD60xx-U) features multiple interface types, as detailed in the figure below:



Note: The TSD60xx/TSD60xx-U series temperature transmitters share the same interface type (Type 1), differing only in the number of acquisition channels.

2、 Product interface specifications for TSD60xx/TSD60xx-U:

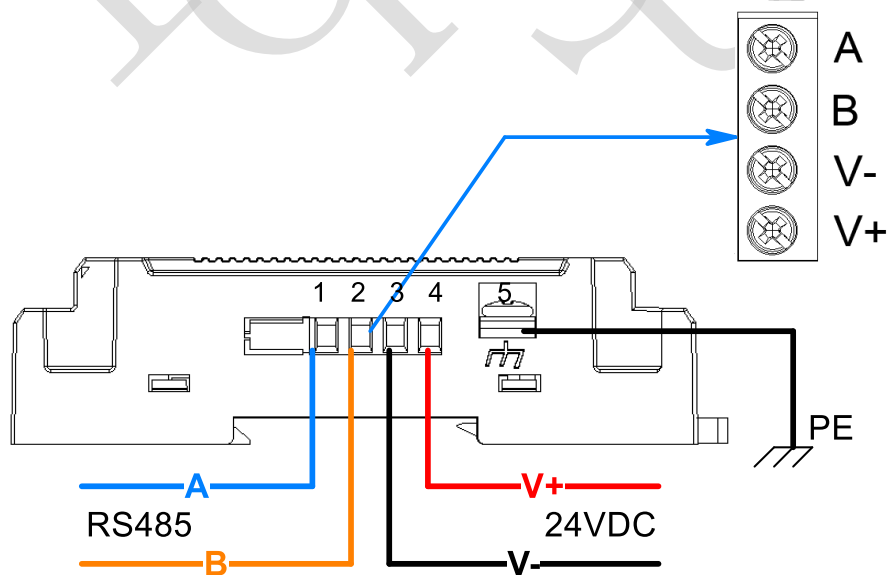
Number	Definition	Explain	Remarks
01	LOGO	Brand Logo: RONSUO (Rongshuo)	
02	Installing screw hole	02-4: 4 fixed screw holes ($\Phi=4.2\text{mm}$ /screw length> 15 mm)	Select one of the two installation methods
03	Guide rail installation clip	03-2: DIN35 Guide Rail Installation Clip	
04	Sensor channel	04-A/B: 04-A for channels 1-16,04-B for channels 17-32 (see the device's front silk-screen for detailed interface identifiers) Sensor type: PT100 (three-wire system) Detailed wiring (see 2.2.3)	
05	Upstream 485 interface and power supply interface	Uplink A/B: Connects to the host computer or our company's thermostat device (default settings: 38400, N, 8, 1) Power supply V+/V-: 12~36VDC input Detailed wiring (see 2.2.2)	
06	Grounding stud	Grounding PE: Grounding post (connected to earth)	

operating instruction

07	Status indicator	RX (green): The collector flashes when receiving data TX (green): The collector flashes when sending data RUN (green): Status indicator light, flashing once per second when the device is operating normally PWR (Red): Power indicator light that remains on during device startup	
08	Product model	Model: TSD6032/TSD60xx-U (32-channel data logger) TSD6024/TSD60xx-U (24-channel data logger) TSD6016/TSD60xx-U (16-channel data logger)	
09	Code decoding switch	485 communication address: 1~8 (set via the dial switch) Detailed barcode scanning (see 2.2.4)	
10	Label Information Plate	Print basic information of the device, such as model, power supply, and operating temperature	
11	Firmware upgrade interface	Mini USB port: dedicated to firmware upgrade	

2.2.2 Power and RS485 Interface

The temperature data logger (TSD60xx/TSD60xx-U) features a 4-pin 5.0 terminal for power supply and RS-485 communication, as shown in the diagram below.



Note: 1) When connecting the uplink communication and power supply to the data collector, ensure the panel's screen-printed labels are correctly connected.

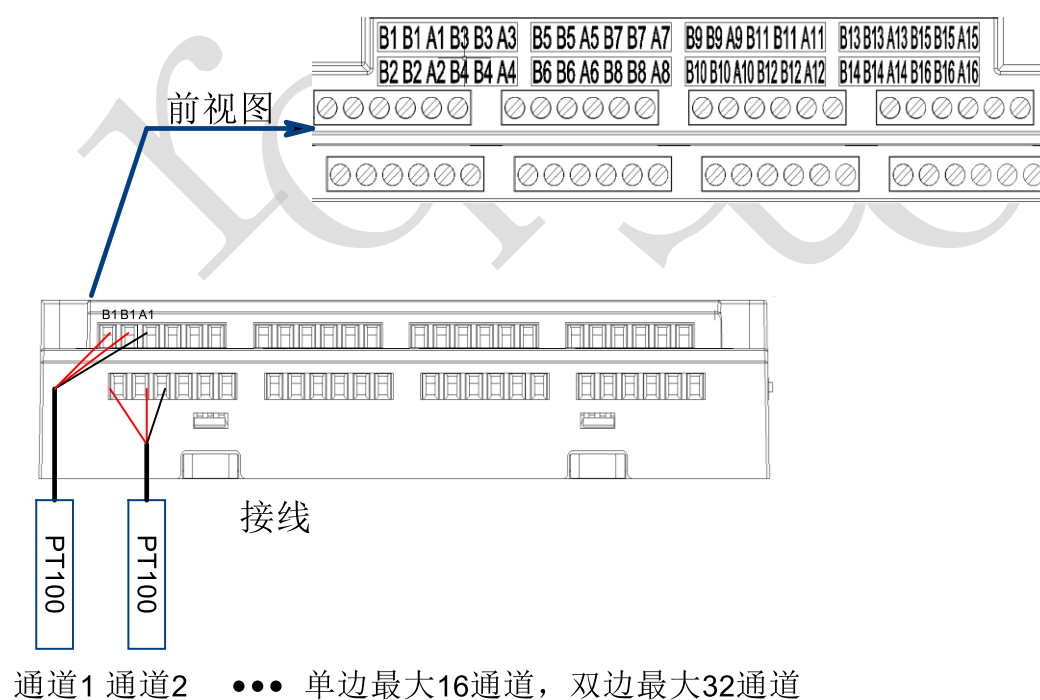
- 2) Access the communication and power lines and tighten them.
- 3) PE terminal is connected to reliable ground connection line.

Power input/RS485 terminal definition:

Number	Definition	Explain
1	A	The RS485+ port connects to a host computer or our company's thermostat.
2	B	The RS485 port connects to a host computer or our company's thermostat.
3	V+	24V DC power supply positive input terminal
4	V-	Negative input terminal of the 24V DC power supply
5	PE	Grounding

2.2.3 Sensor Channel Wiring

- 1、The temperature data logger (TSD60xx/TSD60xx-U) connects to PT100 (3-wire) sensors using 6-pin 3.81 terminals per set, as shown in the figure below.

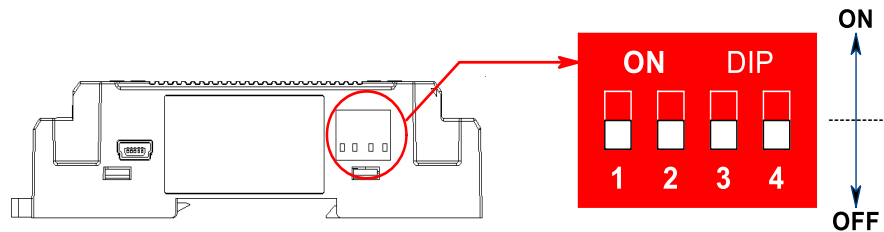


Note: 1) When connecting sensors, ensure they are properly connected according to the panel's screen-printed markings.

- 2) The connector cable must be tightened and not loosened.

2.2.4 Code Switch Definition

The temperature data logger (TSD60xx/TSD60xx-U) defines its uplink communication address via a 4-bit side-mounted pull-tab switch, as shown in the figure below.



RS458 communication address definition(after changing the pull-out code address, the device needs to be restarted to take effect):

RS485 communication address definition					
ON=1 OFF=0	4 Bit position (NC reserved for the 4th bit)				Station address
	1	2	3	4	
0x01 NC 	0	0	0	NC	1
0x02 NC 	1	0	0	NC	2
0x03 NC 	0	1	0	NC	3
0x04 NC 	1	1	0	NC	4
0x05 NC 	0	0	1	NC	5
0x06 NC 	1	0	1	NC	6
0x07 NC 	0	1	1	NC	7
0x08 NC 	1	1	1	NC	8

3 Product Debugging

About this chapter

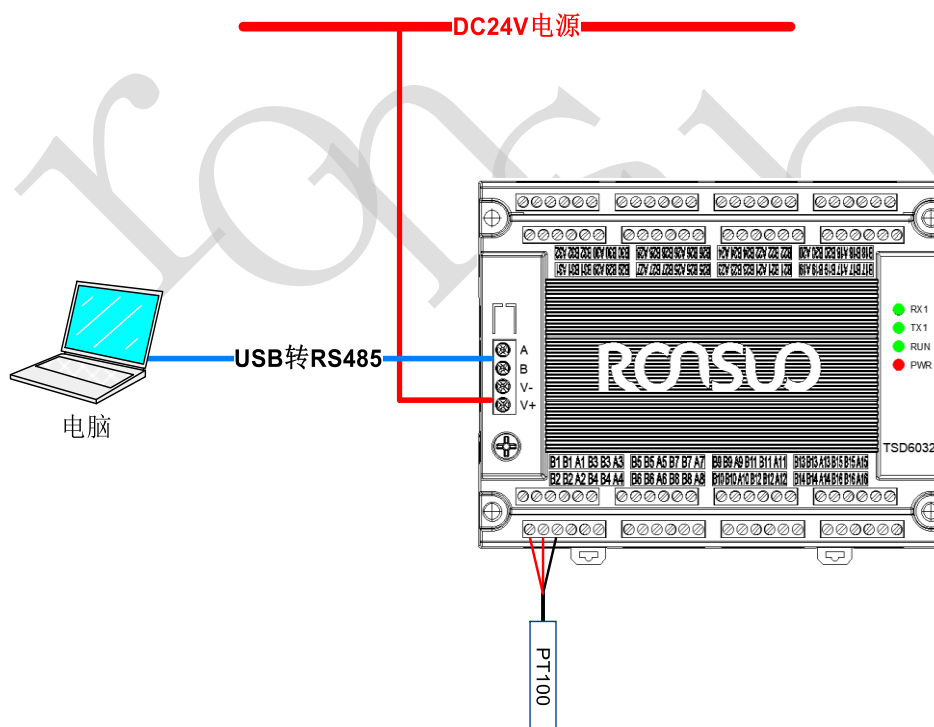
Chapters and sections	Content	Remarks
3.1 Debug connection	Connection instructions for device setup	
3.2 protocol	Introduction to the Equipment Standard Modbus RTU Protocol	

3.1 Debug Connection

Temperature collector (TSD60xx/TSD60xx-U) is manufactured with default configuration parameters (**485 communication: 38400, N, 8, 1**),

To use the device, simply configure the RS485 communication address (see 2.2.4) for normal operation. For collector debugging, refer to the relevant section.

You can connect and debug as shown in the following figure:



Note: 1) Connect the computer directly to the collector as shown in the diagram during debugging.

2) When the computer uses the upper computer software to communicate with the equipment, the communication parameters must be consistent with the equipment communication parameters.

3) Check the 485 address dial switch settings before use.

4) When reading the temperature value of the device channel, the correct register address and channel number should be read.

3.2 Protocol

Temperature Collector TSD60xx/TSD60xx-U Series Modbus-RTU Communication Protocol:

Register declaration	MODBUS component			Read-write	Remarks
	Component type	Number of registers	Modbus address (10-based)		
Total channels	Read-only register	1	0	Read only	N channel
Number of environmental sampling channels	Read-only register	1	1	Read only	1
Type	Read-only register	1	2	Read only	0-Temperature Control
Sensor type	Read-only register	1	3	Read only	0-PT100
Baud rate	Holding register	1	4	Read-write	1-9600pbs 2-19200pbs 3-38400pbs (default) 4-115200pbs
Temperature starting address	Read-only register	1	5	Read only	Default: 100
Correction value starting address	Read-only register	1	6	Read only	Default: 200
Correction value type	Holding register	1	7	Read-write	0-Absolute value correction (default) 1-Proportional Correction
Filter stage	Holding register	1	8	Read-write	0-Non-filter value range: 1-9 Default: 7
Skin break detection	Holding register	1	9	Read-write	0-Not disabled (default) 1-Enable
Moving average	Holding register	1	10	Read-write	0-Not disabled (default) 1~10-Average Rating
Continue to have	Read-only register	2	11~12	Read only	Continue to have
Current station address	Read-only register	1	13	Read only	The device is currently using this station number address Note: If the device station number address is unknown, read station number 255 and normally read register data to view the device address.
Configure station address	Holding register	1	14	Read-write	0-Use the pull-out code for station number address (default) 1~16-Use the configured station number address (if the configured value is greater than 0, the configured station number address is used, and the pull-out code is invalid)
Temperature control value	Read-only register	N/N+1	100~100+N	Read only	All temperature values are stored as double-byte INTs, with register values being the actual temperature multiplied by 100. 0xFFFF-Temperature probe circuit failure (-1) 0xFFFE-Temperature probe short circuit (-2)
Temperature control correct-	Holding register	N/N+1	200~200+N	Read-write	When N+1 is reached, the extra 1 channel is

operating instruction

ion value					interpreted as ambient temperature. The absolute value correction range is -10000 to 0 to +10000 ($\pm 100^{\circ}\text{C}$), and the proportional value correction range is 700 to 1300 ($\pm 30\%$).
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4 Common Faults

The device may experience certain malfunctions during use. Users can restore normal operation by addressing the listed issues and troubleshooting methods. If the problem persists, please contact our after-sales service.

power failure

Trouble: All panel indicators fail to illuminate after power-on.

Exclusion method:

- 1、 Check if the power wiring is properly connected to the terminals.
- 2、 Check if the positive and negative terminals of the power cord are reversed.
- 3、 Use a multimeter to check if the input voltage is within the specified range (12~36VDC).

Communication error

Fault: RS485 communication failed

Exclusion method:

- 1、 Check if the communication wiring is correct
- 2、 Check if the device parameters are configured correctly.
- 3、 Check if the device panel indicator lights are displaying correctly.
- 4、 Check if the 485 DIP switch address matches the host computer's communication address.

Abnormal temperature during collection

Abnormal temperature data

Exclusion method:

- 1、 Check whether the wiring of the temperature sensor is correct.
- 2、 Check if the terminal is properly tightened.
- 3、 Check whether the temperature sensor is in good contact with the object.
- 4、 Check whether the access temperature sensor is the model supported by the collector.
- 5、 Check whether the register address and the number of reads from the host computer are correct.

5 Maintenance

Before performing maintenance, always disconnect the power supply. When the equipment operates normally, routine maintenance is unnecessary. Simply check the equipment's condition and verify that all wiring terminals and interfaces are securely fastened every 12 months. Clean the surface dust using a dry soft-bristled brush. When not in use for extended periods, disconnect the power supply. Avoid storing the equipment in areas with extreme temperatures or high humidity.

6 Safety Requirements

Please read the following safety precautions to avoid personal injury and prevent damage to this product or any other connected products. To avoid potential hazards, this product must be used only within the specified scope.

Only authorized technicians from our company are permitted to perform the repairs.

Use the appropriate power supply.

Check the input power type, voltage value and polarity of the device.

Connect and disconnect correctly.

Do not disconnect the data communication cable when the device is operating normally.

equipment ground .

To prevent electric shock, the device's grounding wire must be connected to the earth. Before connecting to the input or output terminals of this product, ensure the device is properly grounded with a resistance below 1 Ω .

Correct connection.

Use the original accessories when connecting. If you make special connections, pay attention to the interface labels.

Avoid contact with exposed circuits.

Do not touch exposed contacts or components when the equipment is energized.

Do not operate if there is a suspected fault.

If you suspect this product is damaged, please contact our authorized repair personnel for inspection.

Provide good ventilation.

Handle this device carefully to avoid strong impacts or vibrations. Do not install it in areas with severe shaking.

Do not touch the power switch and this device with wet hands.

Do not operate in humid environments.

Do not operate in explosive environments.

Keep the surface of the device clean and dry.



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