Blue Guardian Temperature Control: Precise Temperature Regulation

Temperature Collector (TSD 61xx Series) User Manual

V1.20

Update record for the manual			
Date	Edition	Update content	Remarks
2025-03-12	V1.00	Initial release	
2025-07-07	V1.01	Correct the wiring labels in <2.2.3>section	
2025-07-25	V1.10	Update product type	
2025-09-04	V1.20	Add the content description and protocol for the TSD61xxN model	

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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Blue Guardian Temperature Control: Precise Temperature Regulation

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trademark declaration

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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 TSD61xx and TSD61xxN series products.

Catalogue

Preface

Company Profile

Guangzhou Blue Guardian 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	Remarks
Temperature collector	TSD6104、TSD6108、TSD6112 TSD6116、TSD6120、TSD6124 (Model with "N" at the end supports negative temperature measurement)	Max24 path

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	

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

TSD61xx/TSD61xxN is a multi-channel temperature data logger. The device provides 4 to 24 temperature acquisition channels and supports

The PT100 (3-wire/2-wire) sensor is connected. It features an RS485 serial port for uplink communication, supports the standard Modbus RTU protocol, and can connect up to 16 devices.

The device uses an RS485 bus.

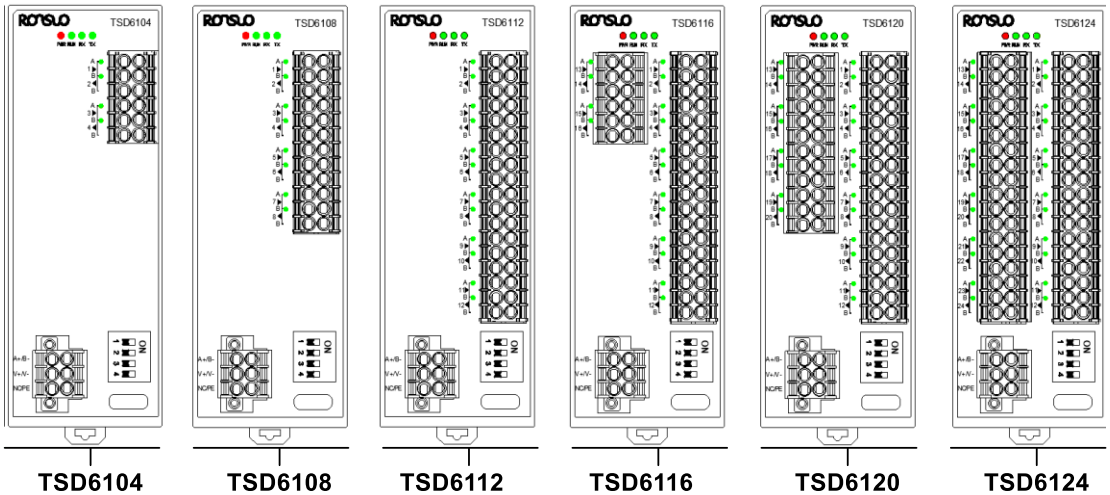
The temperature collector features an industrial-grade design, capable of stable long-term operation in environments ranging from-20°C to 85°C. It is equipped with temperature response acquisition capabilities.

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

Alarm function, convenient fault location, improve production efficiency.

1.2 Product Model

1、 Product Front View:



Note: The "N" after the product model indicates support for negative temperature measurement.

2、 Model List:

Order number	class	Name	Model	Explain
1	Collector 4~ 24 channels	Temperature collector	TSD6104	4 3-wire PT100 data collector with plastic housing and DIN35 rail mounting
2			TSD6108	8 3-wire PT100 data collector with plastic housing and DIN35 rail mounting
3			TSD6112	12 3-wire PT100 data logger with plastic housing and DIN35 rail mounting
4			TSD6116	16 3-wire PT100 data logger with plastic housing and DIN35 rail mounting
5			TSD6120	20 3-wire PT100 data logger with plastic housing and DIN35 rail mounting
6			TSD6124	24 3-wire PT100 data logger with plastic housing and DIN35 rail mounting

Note: The "N" after the product model indicates support for negative temperature measurement.

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 85°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 Modbu RTU protocol.

1.3.4 Functional Characteristics

- Supports PT100 sensor
- Supports 4 to 24 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
- Supports automatic compensation for temperature errors in sensor wire lengths
- Temperature sampling cycle ≤100ms
- Wide temperature range: -50 to 250°C

1.4 Product Parameter

1.4.1 Collector Parameters

Technical Parameters of Temperature Collector for 4~24 V			
Project		TSD61xx parameters	TSD61xxN parameter
Power supply for equipment	Mode of connection	2P-3.5mm Industrial wiring terminals	
	Working voltage	24VDC（12~36V）	
	Plant capacity	≤1W	
	Power protection	Reverse connection, static electricity, surge protection	
CI	Mode of connection	2P-3.5mm Industrial wiring terminals	
	Uplink communication	1 RS485 (A+/B-)	
	Protocol type	Modbus-RTU (Function Codes 03,06,16)	
	Haul up	≤1000M	
	Mailing address	Station number 1~16 (4-digit pull-out code setting)	
	Serial port baud rate	9600,19200,38400, and 115200	
	Default communication parameters	38400,N,8,1	
Sensor interface	Mode of connection	3P-3.5mm Industrial terminal	
	Sensor type	PT100 (3-wire/2-wire)	
	Channel count	4、 8、12、16、20、24 channel	
	Sampling period	≤100ms	
	Temperature range	0~250℃	-50~250℃
	Resolution ratio	0.01℃	
	Temperature measurement accuracy	≤±0.5℃	
Service environment	Working temperature	-20~85℃	
	Storage temperature	-20~105℃	
	Relative humidity	10~90% (no condensation)	
Structural installation	Outer shell material	High temperature resistant and flame retardant PC	
	Way to install	Standard DIN35 guide rail installation	
	Product size	37.5mm*70.95mm*100mm (width*depth*height)	

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 of the equipment and its installation and connection	

pay attention to ：

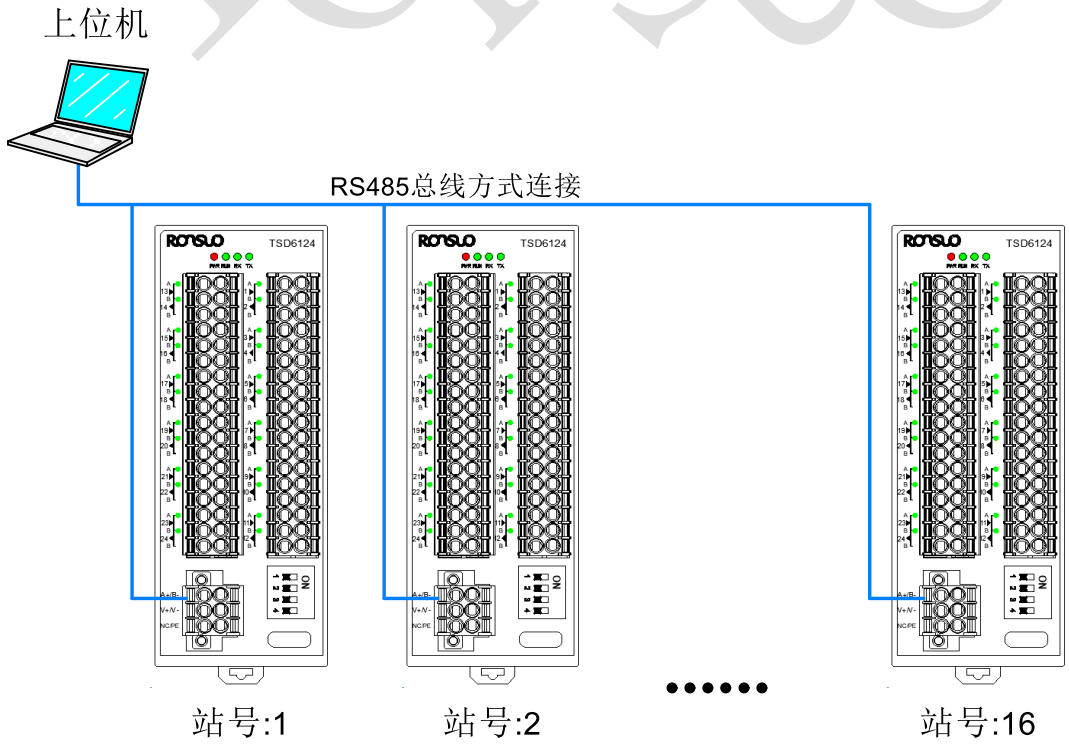
The temperature collector must be properly installed to achieve its designed functionality. Always read the user manual carefully before installation.

For any issues, please contact our company.

2.1 External Dimensions

2.1.1 Application Connection

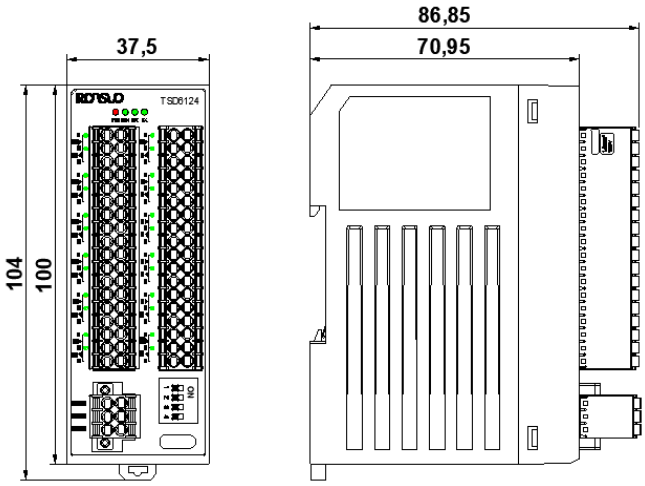
The temperature data collector (TSD61xx/TSD61xxN) communicates via the RS485 bus, with typical network configurations as shown in the diagram below.



Note: The TSD61xx/TSD61xxN temperature transmitters can be connected individually or in groups (up to 16 units) to a host computer or our company's temperature controllers via a 485 bus.

2.1.2 Collector Size

The temperature data logger (TSD61xx/TSD61xxN) features 4 to 24 channels, with detailed dimensions as shown in the figure below.

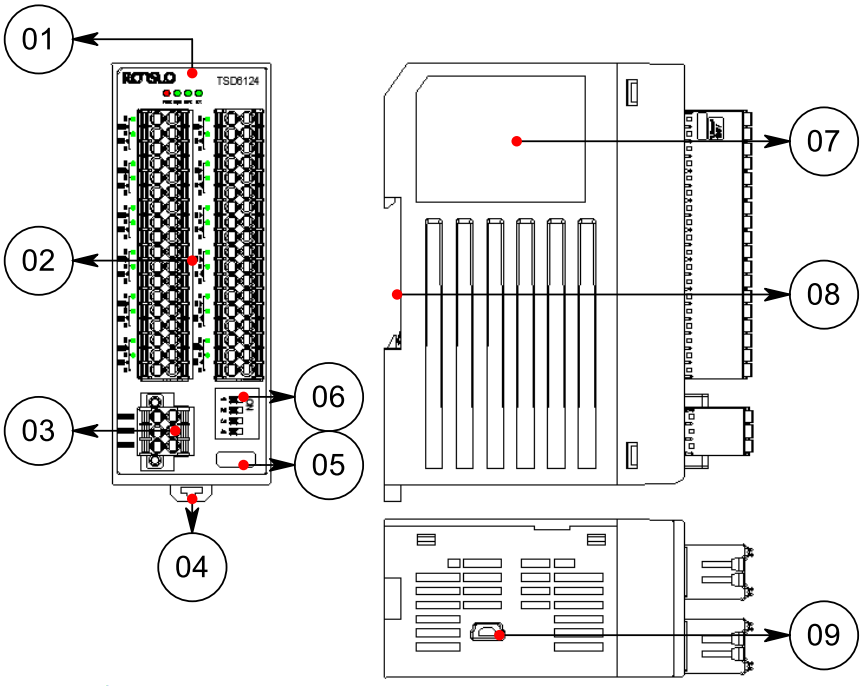


Note: The TSD61xx temperature collector (4-24 channels) has the same external dimensions, differing only in channel count.

2.2 Interface Function Introduction

2.2.1 Collector Interface Functionality

1、 The temperature data logger (TSD61xx/TSD61xxN) features 4 to 24-channel interface functions, as detailed in the diagram below.



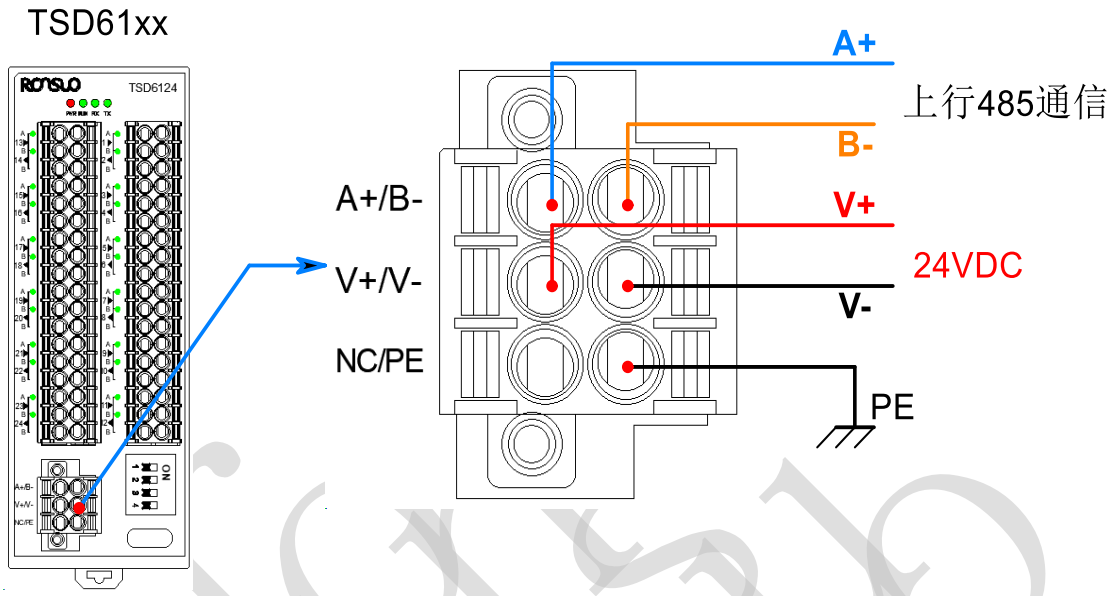
Note: The TSD61xx temperature data logger (4-24 channels) shares the same interface functions as the first product, differing only in the number of acquisition channels.

2、 TSD61xx (4-24 channels) product interface specifications:

Number	Definition	Explain	Remarks
01	Face-plate	LOGO: RONSUO (Rongshuo) Indicator light: PWR (red): Power indicator, remains on when the device is powered on RUN (green): Status indicator light, flashing once per second when the device is operating normally RX (green): The collector flashes when receiving data TX (green): The data collector flashes when sending data Channel indicator (green): The light stays on when the sensor is properly connected, flashes when exceeding the range, and turns off when the signal is invalid. Model:**The "N" indicates support for negative temperature acquisition** TSD6104 (4-channel collector) TSD6108 (8-channel data logger) TSD6112 (12-channel data logger) TSD6116 (16-channel data logger) TSD6120 (20-channel data logger) TSD6124 (24-channel data logger)	
02	Sensor channel	Sensor type: PT100 (3-wire/2-wire) Detailed wiring (see 2.2.3)	
03	The 485 interface and power interface	Up A+/B-: Connects to the host computer or our company's thermostat for communication Default communication parameters: 38400, N, 8, 1 Power Supply V+/V-: 12~36VDC input Detailed wiring (see 2.2.2)	
04	Guide rail installation clip	03-2: DIN35 Guide Rail Installation Clip	
05	TYPE-C mouth	Device debugging dedicated interface	
06	Code decoding switch	The 485 communication address is: Station 1~16 (configured via the pull-tab switch). Detailed barcode scanning (see 2.2.4)	
07	Label Information Plate	Print basic information of the device, such as model, power supply, and operating temperature	
08	Device installation position	The device features a standard DIN35 rail mounting slot on its back.	
09	Mini-USB port	Firmware burning interface	

2.2.2 Power and RS485 Interface

The temperature data logger (TSD61xx/TSD61xxN) employs 6P terminals to establish power supply and RS-485 communication connections, as illustrated in the diagram below.

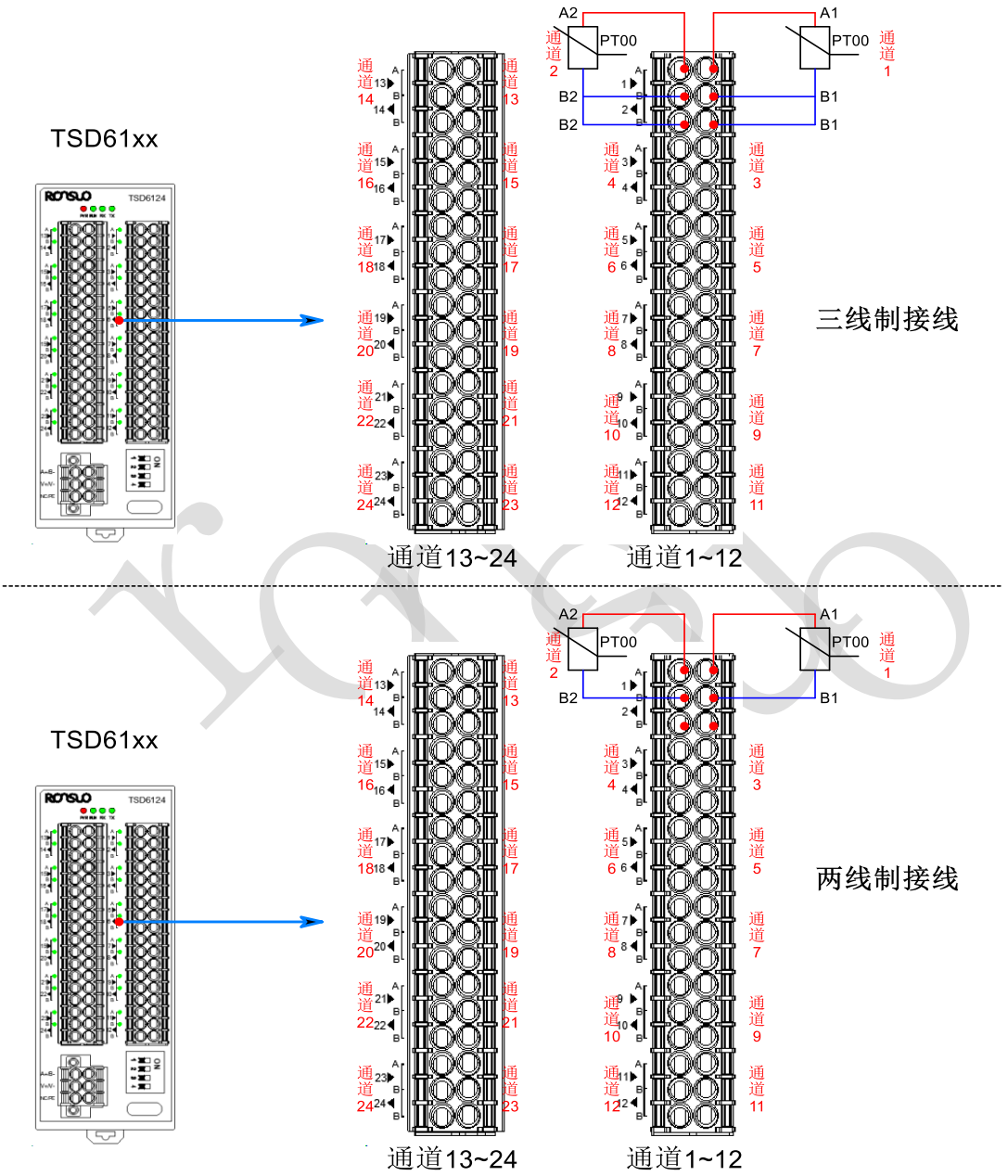


Power input and RS485 port specifications:

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

The temperature data logger (TSD61xx/TSD61xxN) employs dual-row 3.50mm spring terminals for all acquisition channels. The terminal wiring diagram (compatible with PT100 three-wire/two-wire sensors) is illustrated below:



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

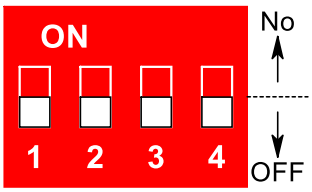
2) The connector cable must be securely fastened without any looseness.

3) Connect correctly according to the number of device channels.

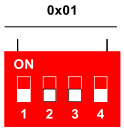
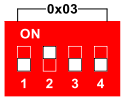
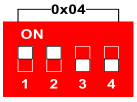
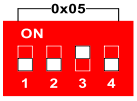
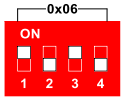
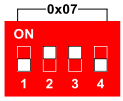
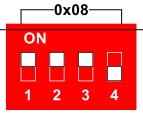
2.2.4 Code Switch Definition

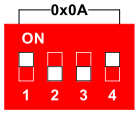
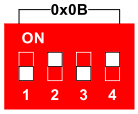
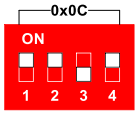
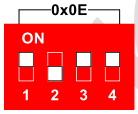
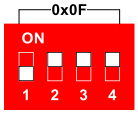
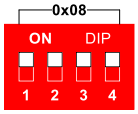
The temperature data logger (TSD61xx/TSD61xxN) defines the uplink communication address using a 4-bit front-side pull-up switch, as shown in the figure below.

4位拔码



4 RS458 Communication Address Definition(reboot the Device to Take Effect After Changing the Address):

RS485 communication station number address					
ON=1 OFF=0	4 16-bit address				Address
	1	2	3	4	
	0	0	0	0	0x01
	1	0	0	0	0x02
	0	1	0	0	0x03
	1	1	0	0	0x04
	0	0	1	0	0x05
	1	0	1	0	0x06
	0	1	1	0	0x07
	1	1	1	0	0x08

	0	0	0	1	0x09
	1	0	0	1	0x0A
	0	1	0	1	0x0B
	1	1	0	1	0x0C
	0	0	1	1	0x0D
	1	0	1	1	0x0E
	0	1	1	1	0x0F
	1	1	1	1	0x10

3 Product Debugging

About this chapter

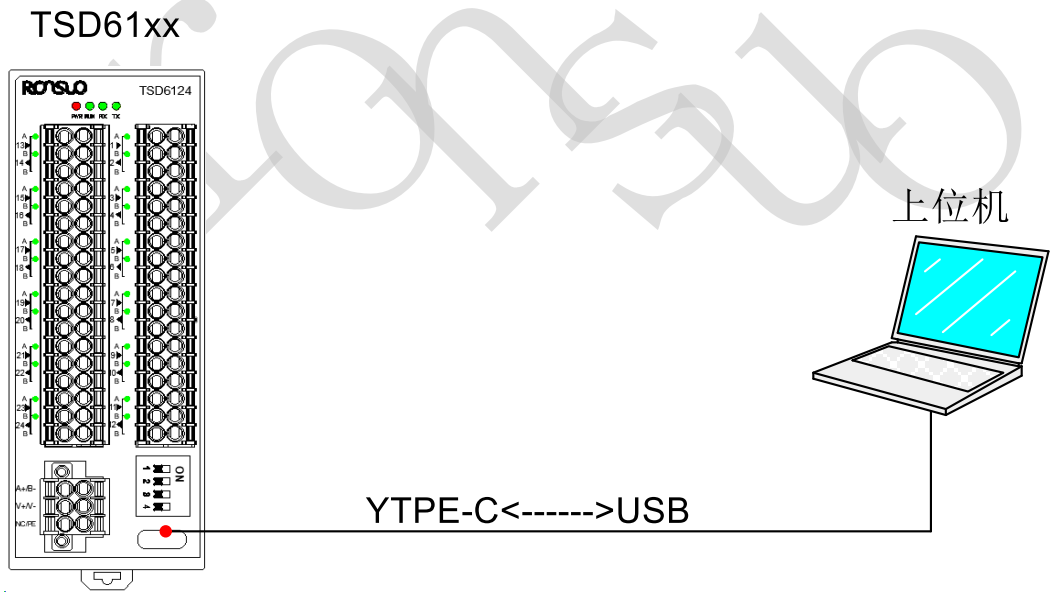
Chapters and sections	Content	Remarks
3.1 Debug connection	Connection instructions for device setup	
3.2 communicating protocol	Introduction to the Equipment Standard Modbus RTU Protocol	

3.1 Debug Connection

The default configuration parameters of the temperature collector (TSD61xx/TSD61xxN) for factory uplink 485 communication are (**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.

For debugging, connect the device using the following configuration (TYPE-C debug interface, 921600, N, 8, 1), as shown in the figure below:



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

2) The temperature collector (TSD61xx/TSD61xxN) connects to a PC via its front panel RS485 interface for debugging.

3) When reading the channel temperature value from the temperature collector register via the Modbus protocol, ensure the correct register address specified in <3.2>Chapter> is used.

3.2 Communicating Protocol

Temperature Collector TSD61xx/TSD61xxN Series Modbus RTU Communication Protocol:

Register declaration	MODBUS component			Read-write	Remarks
	Component type	Number of registers	Modbus address (10-based)		
SN code	Read-only register	3	0~2	Read only	
Hardware version	Read-only register	1	3	Read only	
Firmware version	Read-only register	1	4	Read only	10000 representation 1.00.00
Unit run time	Read-only register	2	5~6	Read only	Unit ：s 5 Register runtime low address, 6 register runtime high address
Device type	Read-only register	1	7	Read only	
Device temperature	Read-only register	1	8	Read only	Temperature value: *100, unit 0.01℃
Sensor type	Read write register	1	9	Read-write	18-Two-wire PT100 sensor 19-wire PT100 sensor (default)
Correction value type	Read write register	1	10	Read-write	0-Absolute value correction (default) 1-Proportional Correction
Filter level	Read write register	1	11	Read-write	0-No filter 1-9, filter by weight (9 means the previous value weight is 9, the current value weight is 1) Default: 7
Temperature acquisition accuracy	Read write register	1	12	Read-write	10-Register value = actual value × 10 (accuracy: 0.1℃); 100-Register value = actual value × 100 (accuracy: 0.01℃); Default: 100
Device station number address	Read-only register	1	13	Read only	1~16-indicates the device station number address Default: 1
Temperature control value	Read-only register	N/N+1	100～100+N	Read only	**TSD61xx corresponds to the register value:** The register value is the actual temperature multiplied by 100. 0xFFFF-Temperature probe circuit failure (-1) 0xFFFE-Temperature probe short circuit (-2) 0xFFFC-Temperature value below 0 degrees (-4)
Temperature control correction value	Read write register	N/N+1	200～200+N	Read-write	Absolute value correction: -10000 to 0 to +10000 (±100℃) Proportion correction: 700~1000~1300 (±30%)
Temperature control value	Read-only register	N/N+1	100～100+N	Read only	**TSD61xxN corresponds to the register value:** The register value is the actual temperature multiplied by 100. 0x7FFF-Temperature probe circuit failure (32767) 0x7FFE-Temperature probe short circuit (32766) 0x7FFC-temperature value below-50°C (32764)
Temperature control correction value	Read write register	N/N+1	200～200+N	Read-write	+10000 (±100℃) Proportion correction: 700~1000~1300 (±30%) Absolute value correction: -10000 to 0 to

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 failure

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 communication address of the host computer.

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 equipment.

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.