Blue Guardian Temperature Control: Precise Temperature Regulation

Temperature Collector (TSD 80xx Series) User Manual

V1.06

Update record for the manual			
Date	Edition	Update content	Remarks
2023-12-05	V1.00	Initial version	
2023-12-18	V1.01	Optimize content	
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2025-08-29	V1.06	Correct some content descriptions	

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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claim of trademark

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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 is applicable to the **TSD80xx** series thermocouple temperature collector 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	TSD80xx	4~32 channel acquisition

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 Failures 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

The TSD80xx is a multi-channel thermocouple temperature data logger. It supports 1 upstream RS 485 communication channel and thermocouple temperature measurement.

The sensor access can provide 4~32 channels of temperature acquisition. The standard Modbus RTU protocol is supported.

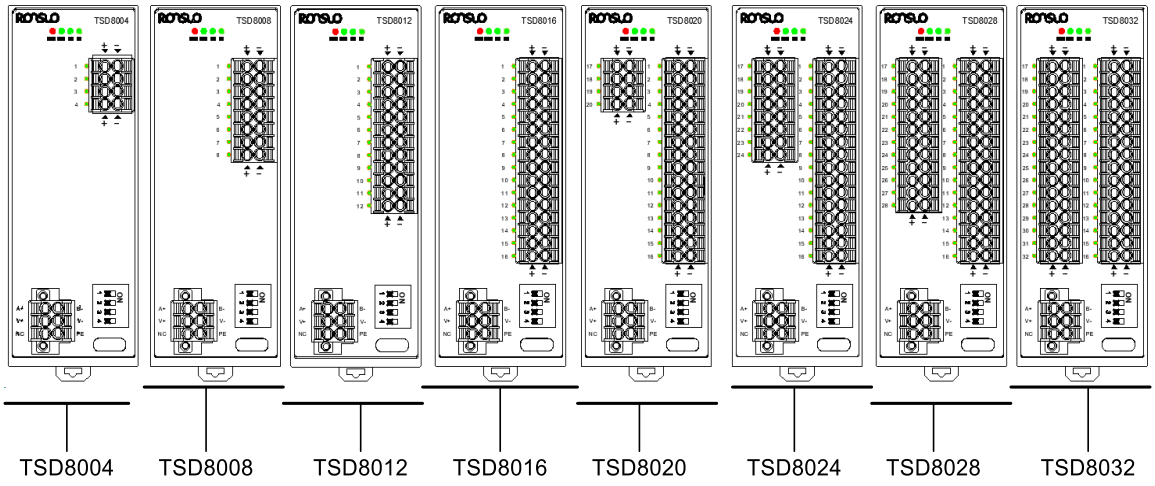
The temperature collector adopts an industrial-grade design, enabling long-term stable operation in environments ranging from-20°C to 85°C. The device is equipped with temperature response acquisition capabilities.

The equipment has the characteristics of fast speed, accurate temperature, stable work and strong anti-interference ability, and has the function of collecting channel circuit break alarm.

It is convenient for fault location and improve production efficiency.

1.2 Product Model

Product panel diagram:



Product model list:

Order number	class	Name	Model	Explain
1	TSD80xx Series	Temperature co-llector	TSD8004	4 Thermocouple data collector with plastic housing and DIN35 rail mounting
2			TSD8008	8 Thermocouple data collector with plastic housing and DIN35 rail mounting
3			TSD8012	12 Thermocouple data collector with plastic housing and DIN35 rail mounting
4			TSD8016	16 Thermocouple data collector with plastic housing and DIN35 rail mounting
5			TSD8020	20 A thermocouple data logger with a plastic housing and DIN35 rail mounting
6			TSD8024	24 Thermocouple data collector with plastic housing and DIN35 rail mounting
7			TSD8028	28 Thermocouple data collector with plastic housing and DIN35 rail mounting
8			TSD8032	32 A thermocouple data logger with a plastic housing and DIN35 rail mounting

1.3 Product Features

1.3.1 Industrial Design

- Equipped with a high-performance industrial-grade 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
- Power Supply and 485 Interface with Built-in Surge and Static Protection
- The acquisition channel is equipped with built-in electrostatic protection.
- Power input interface reverse protection

1.3.3 Product Usability

- The device uses spring-type terminals for convenient construction
- 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 K/N/E/J/T thermocouple sensors
- Supports 4 to 32 temperature acquisition channels
- Supports the Modbus RTU standard protocol and function codes 03,06, and 16.
- The device features multiple acquisition channels, compact size, and minimal space occupation
- The device supports DIN35 standard guide rail installation.
- Device parameter power-off memory retention function
- Support temperature correction and filter settings
- Temperature sampling cycle ≤100ms
- Wide temperature range of 0~1200℃
- The equipment has strong anti-interference capability.

1.4 Product Parameter

1.4.1 TSD80xx Temperature Collector Specifications

Technical Parameters of Temperature Collector for 4~32 Route		
Project		**Parameter**
Power supply for equipment	Mode of connection	2P-3.50mm Industrial-grade terminal blocks
	Working voltage	24VDC（12~36V）
	Plant capacity	≤1W
	Power protection	Reverse connection, static electricity, surge protection
RS485 communication interface	Mode of connection	2P-3.5mm Industrial wiring terminals
	Interface type	RS485
	Serial port count	1 Road (upbound)
	Protocol type	Modbus-RTU (Function Codes 03,06,16)
	Haul up	≤1000M
	Mailing address	0x01~0x10 (bit mask settings)
	Serial port baud rate	9600,19200,38400, and 115200 are configurable
	Default communication parameters	Baud rate: 38400, parity bit: off, data bit: 8, stop bit: 1
Sensor interface	Mode of connection	2P-3.50mm Industrial terminal
	Sensor type	K/N/E/J/T thermocouple
	Channel count	4、 8, 12,16,20,24,28, and 32 channels
	Sampling period	≤100ms
	Temperature measurement range	0.1 Accuracy: K/N/J type (0~1200.0℃), E type (0~1000.0℃), T type (0~400.0℃); 0.01 Precision: K/N/E/J type (0~650.00℃), T type (0~400.00℃); Default: 0.01
	Resolution ratio	0.01°C (100x) / 0.1°C (10x), default: 100
	Temperature measurement accuracy	≤±1℃
TYPE-C debugging interface	Communication parameters	波特率: 921600, parity bit: off, data bit: 8, stop bit: 1
Service environment	Working temperature	-20~85℃
	Storage temperature	-20~105℃
	Relative humidity	10~95% (no condensation)
Structural installation	Outer shell material	High temperature resistant 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 Installation and Connection	Introduce the typical application and appearance installation size of the equipment	
2.2 Interface Function and Wiring	Introduce the functions of each interface of the equipment and installation wiring	

pay attention to ：

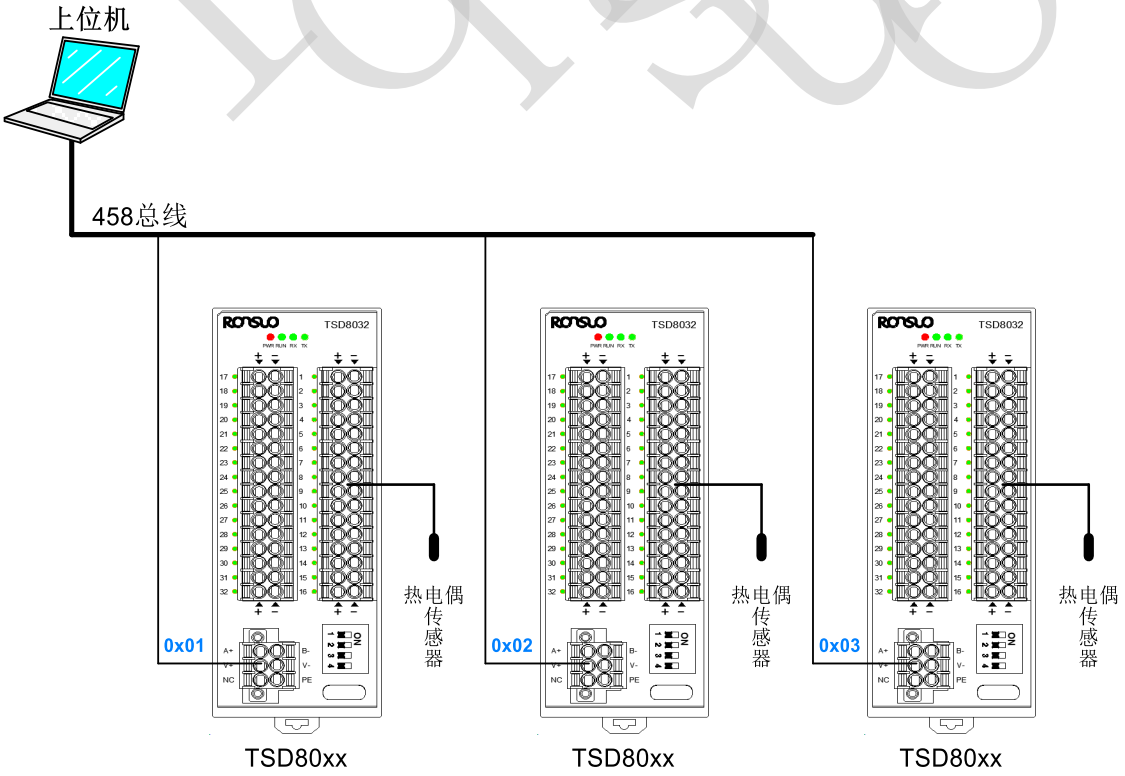
The temperature collector must be properly installed to achieve its designed functionality. Always read the user manual carefully before installation.

For any issues, please contact our company.

2.1 Installation and Connection

2.1.1 Application Connection

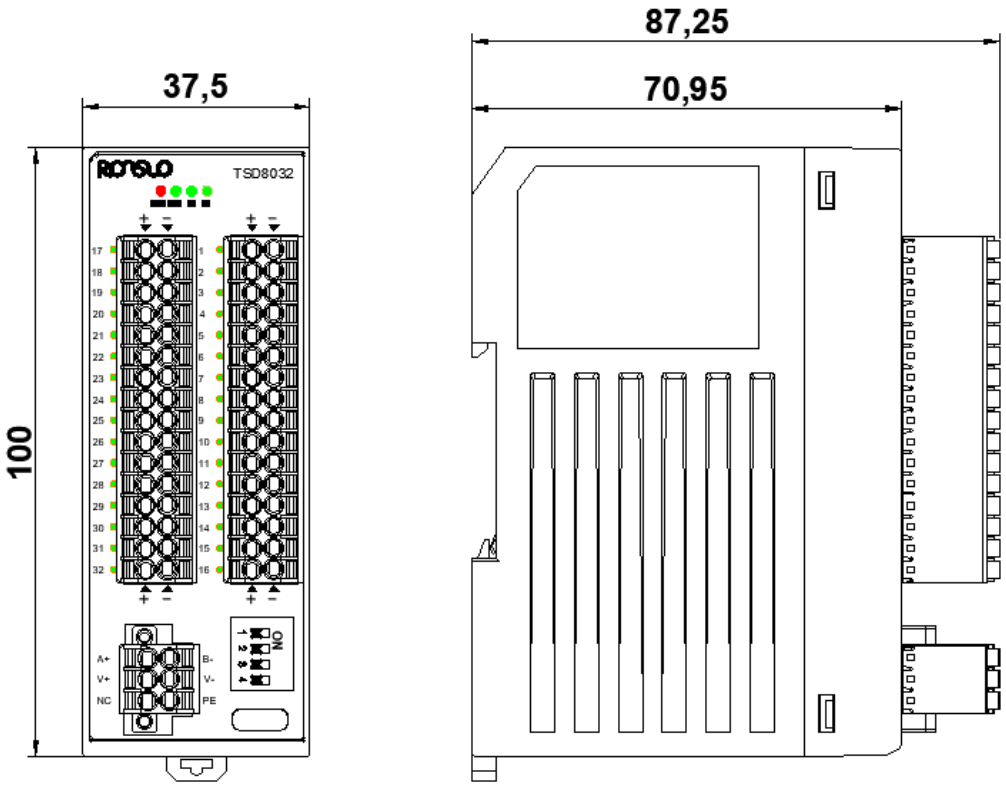
The temperature data logger (TSD80xx) communicates via the RS485 bus, with typical network configurations as shown in the diagram below.



Note: The TSD80xx temperature collector can be connected to a host computer or our company's temperature controller via a 485 bus, either individually or in groups.

2.1.2 Product Size

The installation dimensions of the Temperature Sensor Data Logger (TSD80xx) are detailed in the figure below:



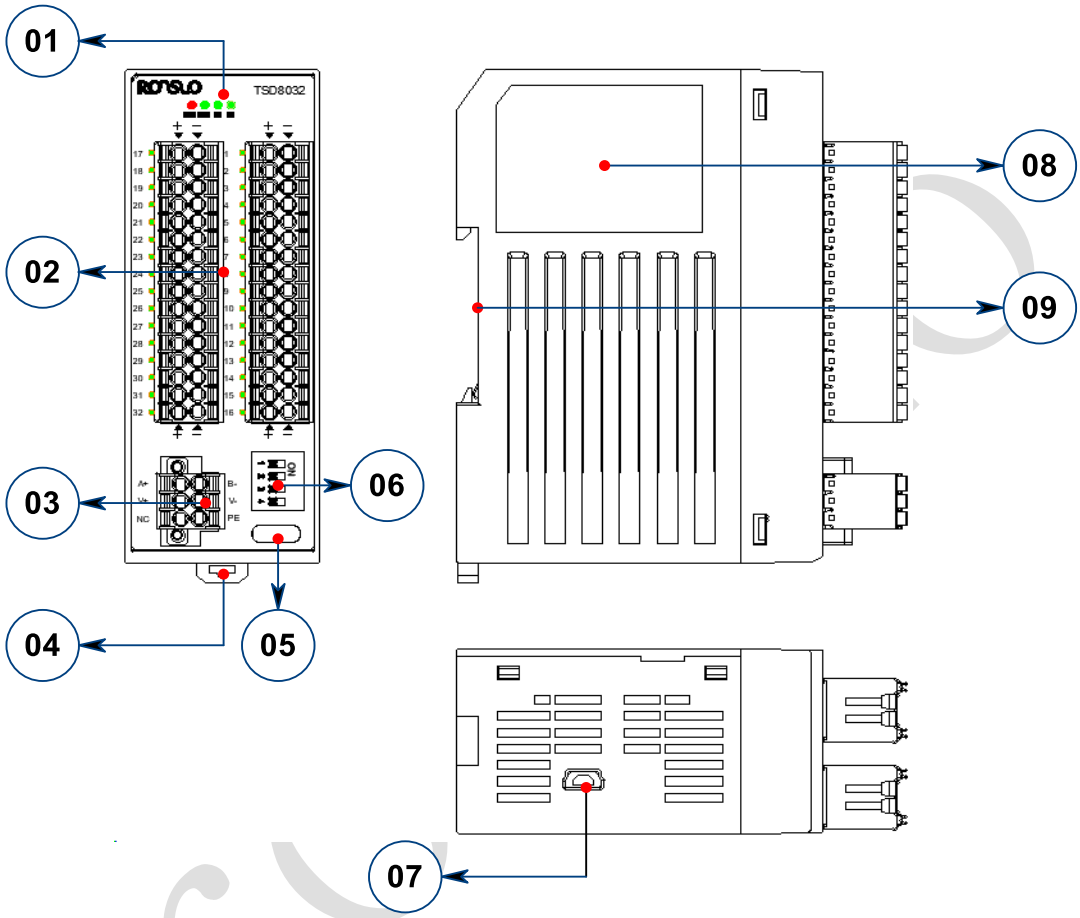
TSD80xx外观尺寸

Note: The TSD8xx temperature collector (with different channel configurations) has identical external dimensions, differing only in the number of channels.

2.2 Interface Function and Wiring

2.2.1 Collector Interface Function

1、 The interface functions of the temperature data logger (TSD80xx) are detailed in the figure below:



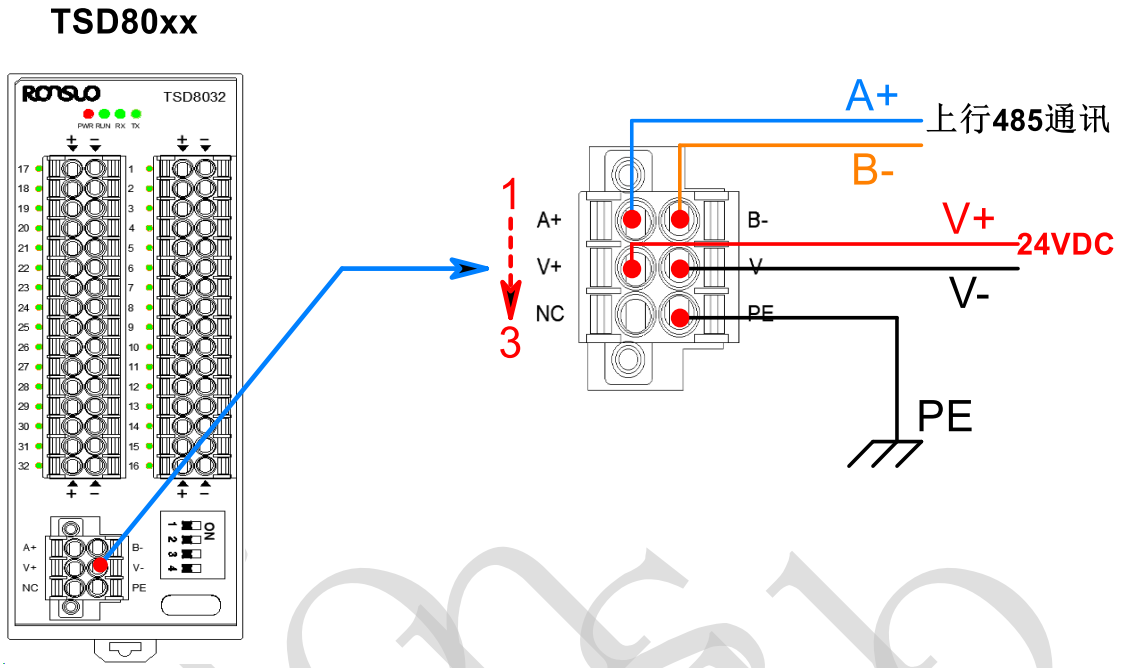
Note: The interface of the temperature collector TSD8xx (with different acquisition channels) varies only in the number of channels.

2、 TSD80xx Product Interface Specifications:

Number	Definition	Explain
01	Panel LOGO and indicator light	RONSUO: Brand Logo Model: TSD80xx (where 'xx' indicates the number of temperature acquisition channels) PWR (Red): Power indicator light, remains on during power-on RUN (green): Status indicator light, flashes once per second when the device is operating normally RX (green): The device flashes when receiving data TX (Yellow): The device flashes when sending data 1~32 (Green): The sensor indicator light remains on when connected to the sensor
02	Sensor channel terminal	2 Group 323.50 spring terminal (see 2.2.3) The example is as follows (4-way spacing is one model): 4 Channel: Label: 1+/1- ~ 4+/4- 32 Channel: Label: 1+/1- ~ 32+/32-
03	485 and power terminals	6 3.50mm spring terminal (see 2.2.2) A+/B-: 485 uplink port V+/V-：24VDC (12~36V) NC/PE: NC is not enabled/PE is grounded (connected to earth)
04	Guide rail mounting clip	Standard DIN35 Guide Rail Installation and Fixing Clip
05	Debugging interface	USB: Type-C Debugging Interface (default 921600, N, 8, 1)
06	Code decoding switch	4 Bit position code switch, device station number address setting (address 1~16)
07	Firmware upgrade interface	Mini USB port for firmware upgrade
08	Label Information Tag	Print basic information of the device, such as model, power supply, and operating temperature
09	Device installation position	The device features a standard DIN35 rail mounting slot on its back.

2.2.2 Power Supply and 485 Communication Wiring

The temperature data logger (TSD80xx) shares the same 6-pin 3.5V spring terminal wiring for both power supply and RS485 interface, as detailed below:



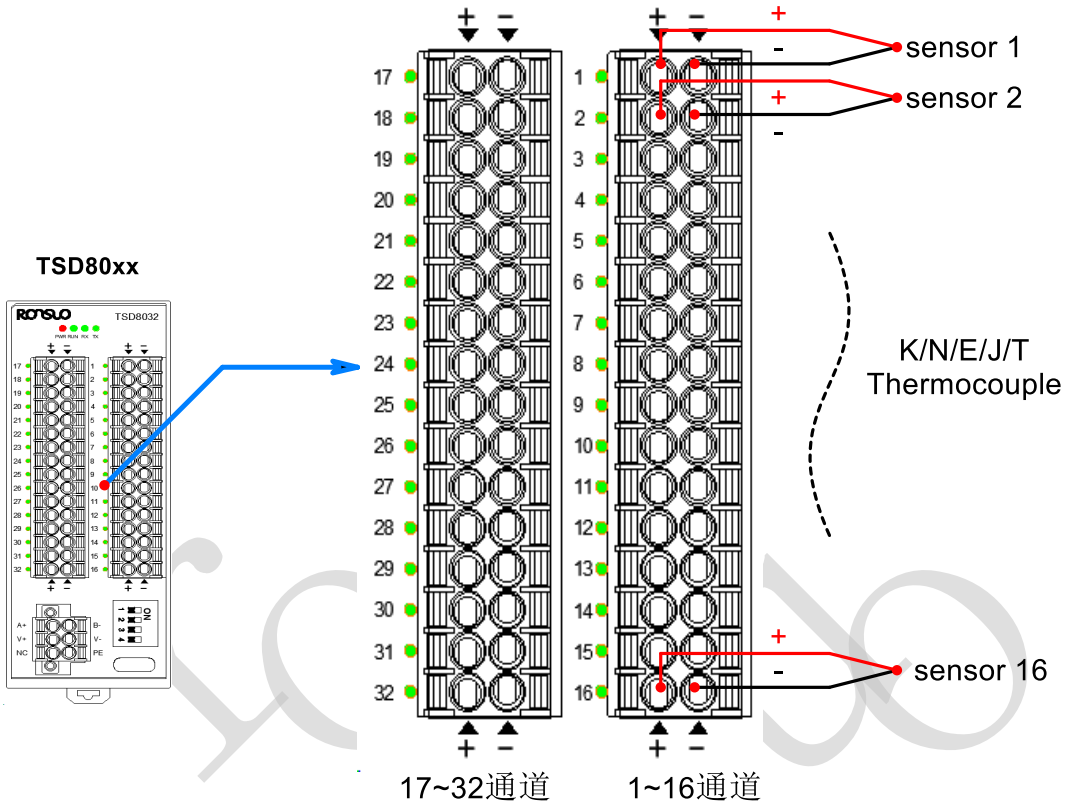
Power supply and 485 interface terminal specifications:

Number	Definition	Explain
1	A+	Connect the RS485 port to the host computer or our company's thermostat.
	B−	
2	V+	24VDC power input positive terminal
	V−	Negative terminal of the 24VDC power input
3	NC	Keep (no connection required)
	PE	Connect to the Earth

2.2.3 Collection Channel Wiring

The temperature data logger (TSD80xx) employs dual-row 3.50mm spring terminals for all acquisition channels. The following diagram illustrates a single-terminal wiring configuration (compatible with K/N/E/J/T terminals).

The type of thermocouple sensor is connected, as shown in the figure below:



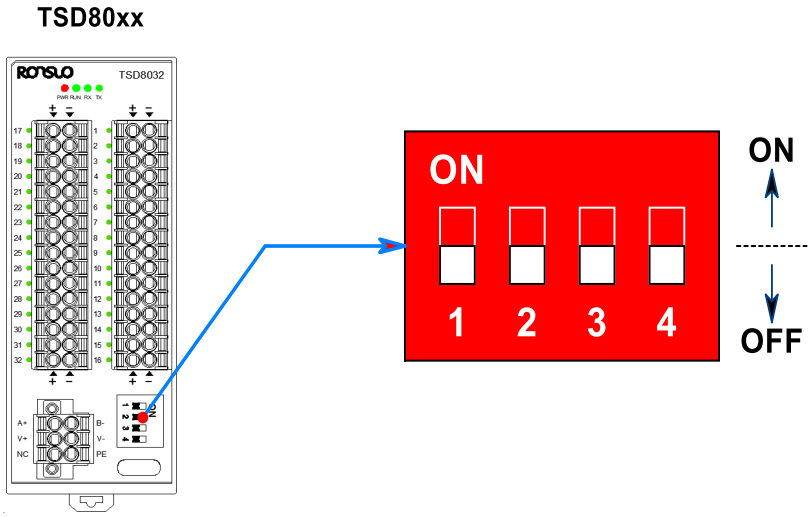
Note: TSD8xx (where xx indicates channel number: 04/08/12/16/20/24/28 and 32), with the only difference being the number of terminal interfaces.

Sensor interface terminal definition:

Number	Definition	Explain
1	1+/1−	Sensor Channel 1
2	2+/2−	Sensor Channel 2
…	…	…
16	16+/16−	Sensor Channel 16
17	17+/17−	Sensor Channel 17
18	18+/18−	Sensor Channel 18
…	…	…
32	32+/32−	Sensor Channel 32

2.2.5 Code Switch Definition

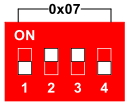
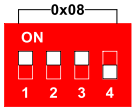
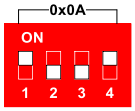
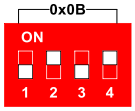
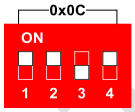
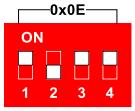
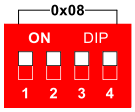
The temperature data logger (TSD80xx) uses a 4-bit front-side pull-tab switch to set the uplink communication station address, as shown in the figure below.



Note: If all pins 1 to 4 are set to OFF in the diagram above, the 485 communication address will be 0 x01.

RS458 Communication Station Number Address Definition(requires device restart after changing the pull-out code address):

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

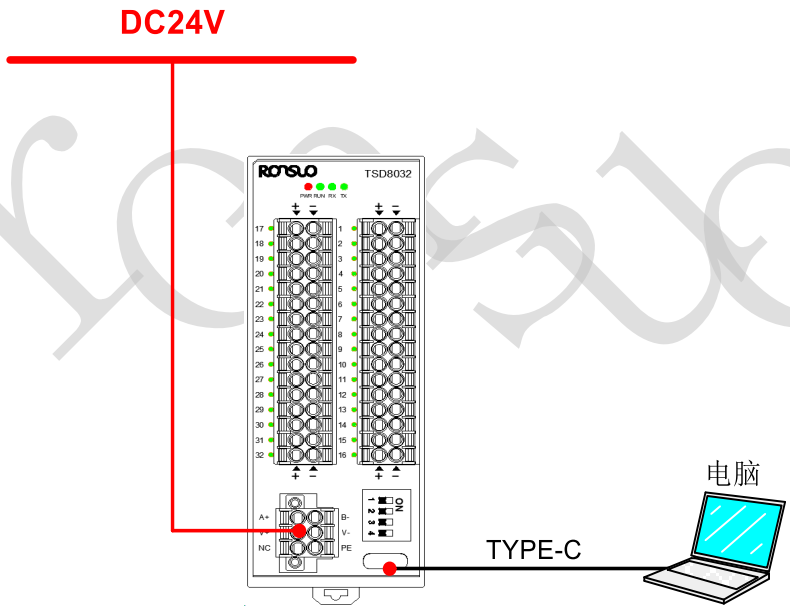
3 Product Debugging

About this chapter

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

3.1 Debug Connection

The temperature data collector (TSD80xx) comes with factory-configured default parameters (TYPC-C interface: 921600, N, 8,1). For configuration during operation, users can connect and debug the device as shown in the figure below.



TSD80xx连接图示

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

2) The TYPE-C interface on the front panel of the temperature data logger (TSD80xx) is for debugging purposes. To perform debugging, connect the device to a computer via a TYPE-C cable for configuration and adjustment.

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

3.2 Protocol

Temperature Collector TSD80xx 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-low address 6 register-high address
Device type	Read-only register	1	7	Read only	0-thermocouple collector
Board temperature	Read-only register	1	8	Read only	Temperature value: *100, unit 0.01℃
Sensor type	Holding register	1	9	Read-write	48-K (default) Type 49-N Type 50-E Type 51-J 52-T type
Correction type	Holding register	1	10	Read-write	0-Absolute value correction (default) 1-Proportional Correction
Filter level	Holding register	1	11	Read-write	0-No filter 1-9, filter by weight (9 indicates the previous value has a weight of 9, the current value has a weight of 1) Default: 7
Temperature acquisition accuracy	Holding register	1	12	Read-write	10-Register value=actual value*10 (accuracy 0.1℃), temperature measurement range 0~1200.0 degrees; 100-Register value=actual value*100 (accuracy 0.01℃), temperature measurement range 0~650.00 degrees; Default: 100
Postal address	Holding register	1	13	Read only	1~16-represents the Modbus station number address 0x01~0x10. Default: 1
Temperature data collected	Read-only register	N	100～100+N-1	Read only	All temperature values are stored as double-byte INTs, while register values are either the actual value multiplied by 100 or 10 (corresponding to register 12). Alarm value: The temperature probe reading is below 0℃ (-4) when set to 0xFFFC. 0xFFFF-Temperature probe circuit failure or exceeded upper limit (-1);
Temperature correction value	Holding register	N	200～200+N-1	Read-write	Correction value type and register 10 configuration type used: The correction range of the ratio value is 700~1000~1300 (±30%). Absolute value correction range: -3000 to 0 to +3000 (±30℃).

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 company.

power failure

The fault is that the indicator lights on the back panel are not on 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).

485 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 the temperature sensor wiring + / -pole is correct.

2、 Check if the terminal is securely fastened.

3、 Check whether the temperature sensor is in good contact with the object.

4、 Check whether the model of the access temperature sensor matches the device configuration model.

5、 Check whether the register address and the number of reads are correct.

5 Maintenance

When maintenance is required, disconnect the power supply first. Under normal operating conditions, the equipment requires no routine maintenance. Simply check the equipment status and verify that the wiring terminals are securely connected every 12 months, then 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.

Damage. To avoid potential hazards, this product must be used strictly within the specified parameters.

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

Use the appropriate power source.

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

Connect and disconnect correctly.

Do not disconnect the data communication cable while the device is powered on.

equipment ground 。

To prevent electric shock, the casing grounding wire must be connected to the earth. Before connecting to the input or output terminals of this product, ensure that this

The device is properly grounded. The resistance of the grounding wire should be less than 1 Ω.

Correct connection.

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

Avoid contact with exposed circuits.

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

Do not operate when a suspected fault is present.

If you suspect this product is damaged, please have it repaired by our authorized service personnel.

Provide good ventilation.

Handle this device carefully to avoid strong impacts or vibrations. Do not install it in areas with severe shaking. Never touch the power switch or this

device with wet hands.

Do not operate in humid environments.

Do not operate in explosive environments.