Integrated Modbus-TCP bus remote IO module

Model: CK-TP3 series

Formulated by: Jiang Beiqiao Reviewer: Fan Xin Version number: Vr1.1

Temperature acquisition module

Overview

The CK-TP series module is a new generation of modular data collector based on embedded system. It adopts standard DIN35 rail installation method, which is simple to install on site and flexible to use; it can cope with various field applications. The module is equipped with Modbus-TCP communication, which can communicate with PC, PLC, touch screen and other devices that support Modbus protocol.

The CK-TP3 series temperature signal data collector can collect up to 16 thermocouple signals or 8 thermal resistor signals. It is suitable for collecting various temperature signals in industrial sites.

The CK-TP3 series adopts photoelectric isolation technology to effectively ensure reliable and safe data collection.

Technical Parameters

◆Embedded real-time operating system
◆Input: thermocouple, thermal resistor input
◆Thermocouple type: K, T, J
◆Thermal resistor type: PT100, PT1000
◆Wide power supply range: DC 10-30V
◆Nominal power supply voltage: DC 12/24V
◆Module power consumption: 2W
◆Support Modbus TCP protocol
◆ ±15KV ESD protection
◆Isolation withstand voltage: DC 2500V
◆Operating temperature range: -35℃ ～75℃
◆Industrial grade plastic housing, standard DIN35 rail installation

Application

Automation equipment
Remote monitoring and data collection
Intelligent manufacturing/smart factory
Industrial site control
Smart warehousing and monitoring
Medical and industrial control product development
Packaging and material transfer
Electronic product manufacturing

Function Configuration

Model	Thermocouple	Thermal resistor PT100	Thermal resistor PT1000
CK-TP3043		4	
CK-TP3045			4
CK-TP3049	4		
CK-TP3083		8	
CK-TP3085			8
CK-TP3089	8		
CK-TP3169	16		

CATALOG

CK-TP3049/TP3089/TP3169 4/8/16-CH TC
CK-TP3043/ 3045/ 3083/ 3085 4/8-CH RTD

Input Type: K/T/J ;PT100/PT1000

CK-TP series modules are a new generation of modular data loggers based on embedded systems. They are installed using standard DIN35 rails, are easy to install on site, and are flexible to use. They can handle a variety of on-site applications. The modules are configured with Modbus TCP communication and can communicate with devices that support the Modbus protocol, such as PCs, PLCs, and touch screens.

Temperature data collection

The CK-TP3 series uses advanced data processing technology, and different models of modules can collect up to 16 thermocouple signals or 8 thermal resistor signals. It can meet the requirements of industrial sites with high measurement requirements, security, smart buildings, smart homes, power monitoring, process control and other occasions.

Input and output isolation

The product is designed for industrial applications: through photoelectric isolation technology, the measurement circuit and the main control circuit power supply are isolated; at the same time, the control unit and the signal acquisition unit are electrically isolated by using photoelectric isolation technology, which effectively ensures the reliability and safety of data acquisition.

Surge protection

The module is equipped with a transient suppression circuit, which can effectively suppress various surge pulses and protect the module to work reliably in harsh environments.

Technical indicators

Thermocouple input

◆Number of input channels: up to 16 channels

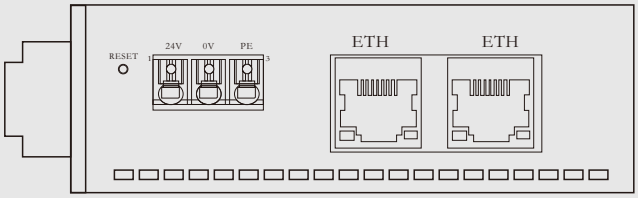
◆Input type: K, T, J type switchable

Thermal resistor input

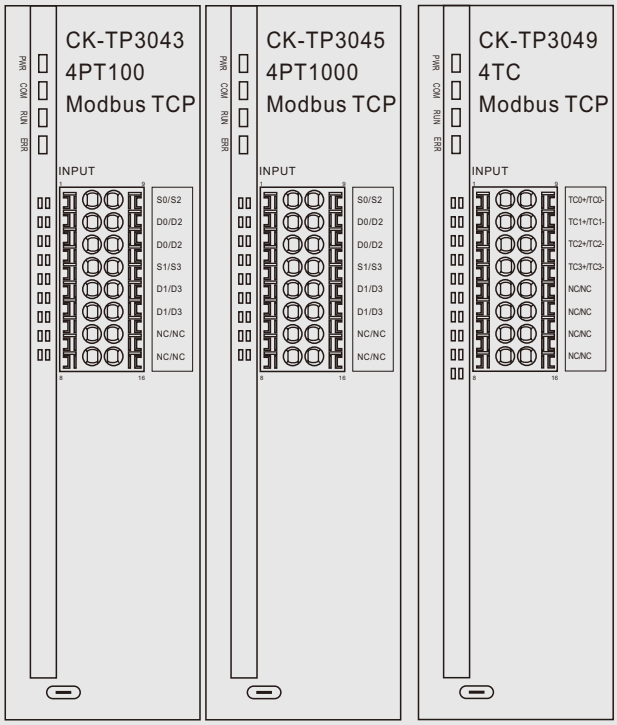
◆Number of input channels: up to 8

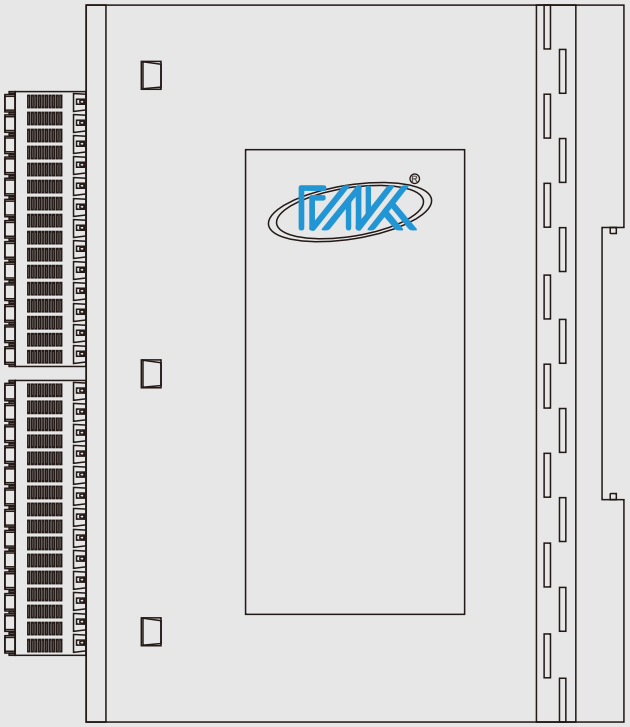
◆Input type: CK-TP30X3; supports PT100 input
CK-TP30X5; supports PT1000 input

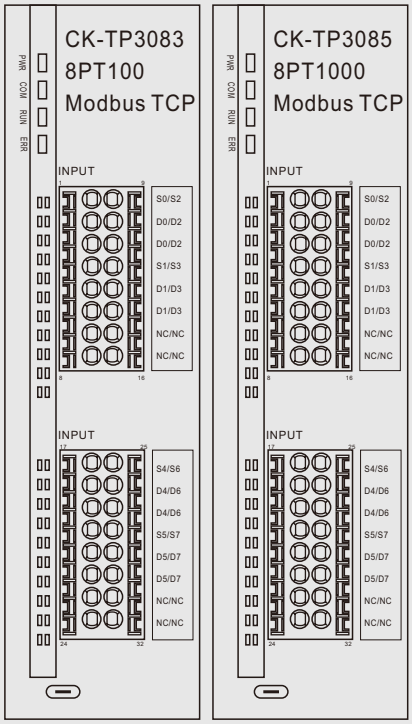
Port Information

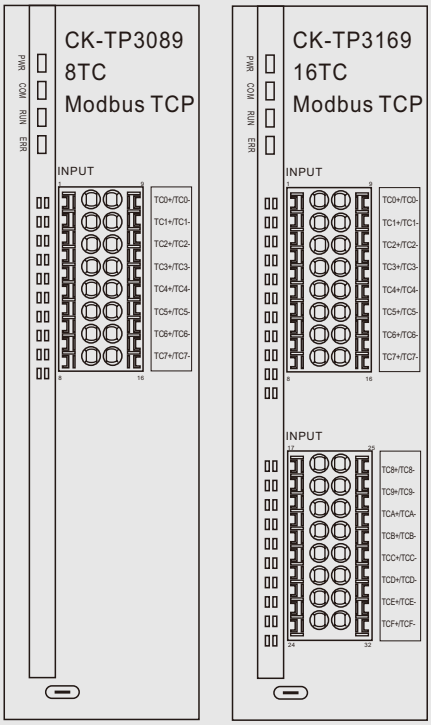


Serial Number	Mark	Definition
1	24V	Power input positive
2	0V	Power input negative
3	PE	Ground terminal









Port Information

CK-TP3043 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermal resistor PT100 input	1	S0	S2	9	Thermal resistor PT100 input
	2	D0	D2	10	
	3	D0	D2	11	
	4	S1	S3	12	
	5	D1	D3	13	
	6	D1	D3	14	
	7	NC	NC	15	
	8	NC	NC	16	

CK-TP3045 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermal resistor PT1000 input	1	S0	S2	9	Thermal resistor PT1000 input
	2	D0	D2	10	
	3	D0	D2	11	
	4	S1	S3	12	
	5	D1	D3	13	
	6	D1	D3	14	
	7	NC	NC	15	
	8	NC	NC	16	

CK-TP3083 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermal resistor PT100 input	1	S0	S2	9	Thermal resistor PT100 input
	2	D0	D2	10	
	3	D0	D2	11	
	4	S1	S3	12	
	5	D1	D3	13	
	6	D1	D3	14	
	7	NC	NC	15	
	8	NC	NC	16	
Thermal resistor PT100 input	17	S4	S6	25	Thermal resistor PT100 input
	18	D4	D6	26	
	19	D4	D6	27	
	20	S5	S7	28	
	21	D5	D7	29	
	22	D5	D7	30	
	23	NC	NC	31	
	24	NC	NC	32	

CK-TP3085 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermal resistor PT1000 input	1	S0	S2	9	Thermal resistor PT1000 input
	2	D0	D2	10	
	3	D0	D2	11	
	4	S1	S3	12	
	5	D1	D3	13	
	6	D1	D3	14	
	7	NC	NC	15	
	8	NC	NC	16	
Thermal resistor PT1000 input	17	S4	S6	25	Thermal resistor PT1000 input
	18	D4	D6	26	
	19	D4	D6	27	
	20	S5	S7	28	
	21	D5	D7	29	
	22	D5	D7	30	
	23	NC	NC	31	
	24	NC	NC	32	

CK-TP3049 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermocouple Input	1	TC0+	TC0-	9	Thermocouple Input
	2	TC1+	TC1-	10	
	3	TC2+	TC2-	11	
	4	TC3+	TC3-	12	
	5	NC	NC	13	
	6	NC	NC	14	
	7	NC	NC	15	
	8	NC	NC	16	

CK-TP3169 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermocouple Input	1	TC0+	TC0-	9	Thermocouple Input
	2	TC1+	TC1-	10	
	3	TC2+	TC2-	11	
	4	TC3+	TC3-	12	
	5	TC4+	TC4-	13	
	6	TC5+	TC5-	14	
	7	TC6+	TC6-	15	
	8	TC7+	TC7-	16	
Thermocouple Input	17	TC8+	TC8-	25	Thermocouple Input
	18	TC9+	TC9-	26	
	19	TCA+	TCA-	27	
	20	TCB+	TCB-	28	
	21	TCC+	TCC-	29	
	22	TCD+	TCD-	30	
	23	TCE+	TCE-	31	
	24	TCF+	TCF-	32	

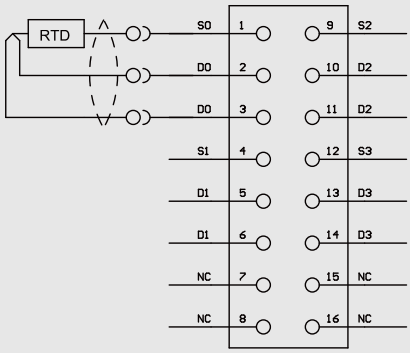
CK-TP3089 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Thermocouple Input	1	TC0+	TC0-	9	Thermocouple Input
	2	TC1+	TC1-	10	
	3	TC2+	TC2-	11	
	4	TC3+	TC3-	12	
	5	TC4+	TC4-	13	
	6	TC5+	TC5-	14	
	7	TC6+	TC6-	15	
	8	TC7+	TC7-	16	

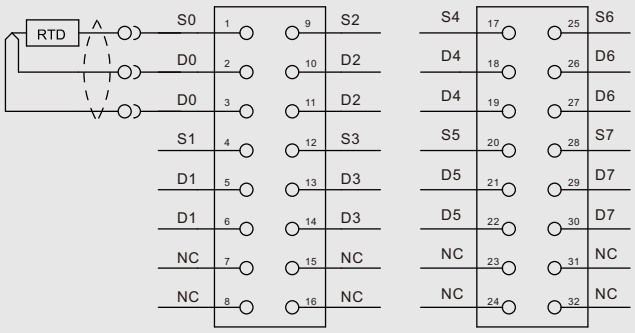
Wiring Diagram

RTD Wiring Diagram

CK-TP3043/TP3045 Wiring



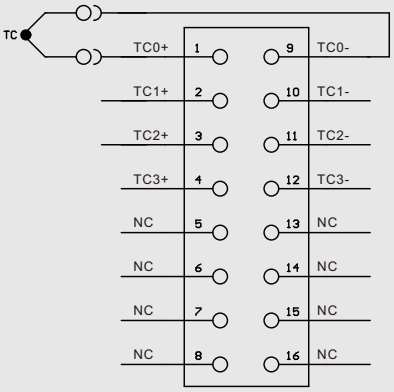
CK-TP3083/TP3085 Wiring



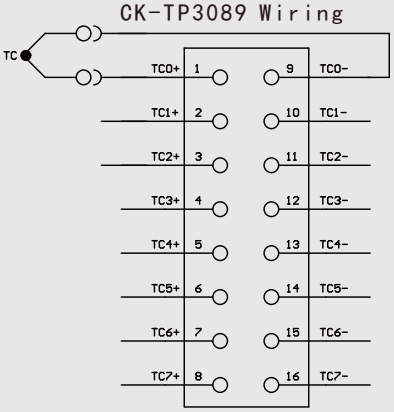
It is recommended to use cables with a core diameter less than 1mm². The cold terminal parameters are as follows:

TC Wiring Diagram

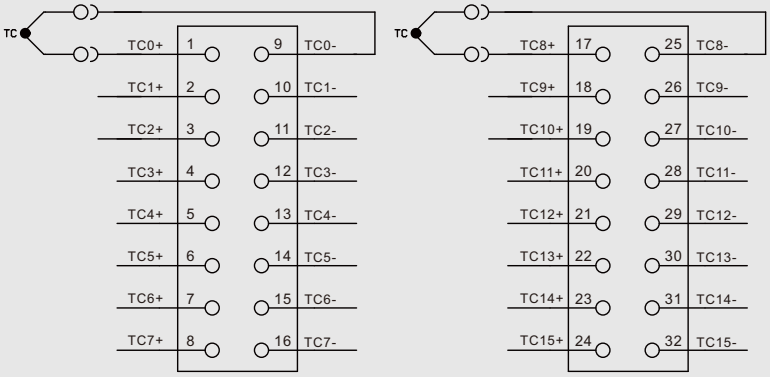
CK-TP3049 Wiring



CK-TP3089 Wiring



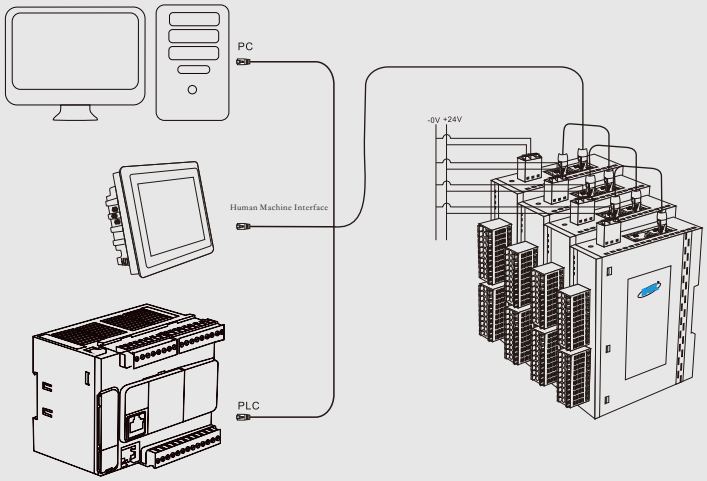
CK-TP3169 Wiring



Communication interface

Ethernet connection

Some modules of the CK series support 100M/10M standard Ethernet interface. Support Modbus TCP protocol, support network port cascading, and automatic polarity recognition (AUTO MDIX).

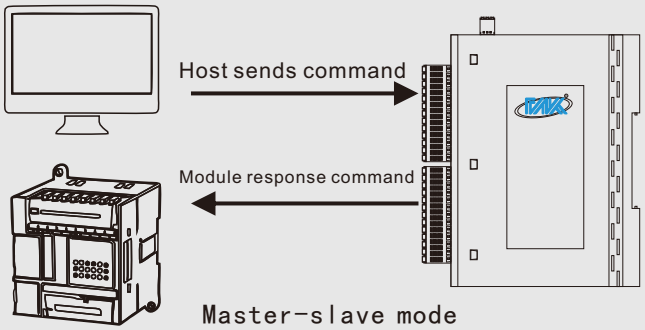


Schematic diagram of cascading network connection of CK modules through Ethernet interface

Module communication mode

Master-slave mode

The communication mode of CK-TP3XXX module is usually master-slave mode (question-answer mode); the host sends commands to the module through the communication interface, and the module responds accordingly after receiving the correct command.



Master-slave mode

Ethernet communication parameters (default IP 192.168.1.30 port number 502)

Communication Protocol

Modbus protocol is a universal communication protocol that has been widely used in today's industrial control field. Through this protocol, controllers can communicate with each other or with other devices via a network (such as Ethernet).

The CK-TP3XXX module supports the industrial standard MODBUS-TCP (Ethernet) protocol. The module works in the MODBUS slave (server) state. It can communicate with PLCs, RTUs or computers of various brands. The module supports the following MODBUS commands:

Serial number	Order(HEX)	Function	Remark
1	03	Read module temperature conversion results and module information	

The MODBUS address allocation of the CK module is as follows:

Command (HEX)	Register address (HEX)	Data Description
03	0002	Read conversion channel 0 conversion result (the read result ÷ 10 is the actual Celsius temperature value, the same below)
03	0003	Read conversion result of conversion channel 1
03	0004	Read conversion result of conversion channel 2
03	0005	Read conversion result of conversion channel 3
03	0006	Read conversion channel 4 conversion result (only TP3089/TP3169)
03	0007	Read conversion channel 5 conversion result (only TP3089/TP3169)
03	0008	Read conversion channel 6 conversion result (only TP3089/TP3169)
03	0009	Read conversion channel 7 conversion result (only TP3089/TP3169)
03	000A	Read conversion result of conversion channel 8 (only TP3169)
03	000B	Read conversion result of conversion channel 9 (only TP3169)
03	000C	Read conversion result of conversion channel 10 (only TP3169)
03	000D	Read conversion result of conversion channel 11 (only TP3169)
03	000E	Read conversion result of conversion channel 12 (only TP3169)
03	000F	Read conversion result of conversion channel 13 (only TP3169)
03	0010	Read conversion result of conversion channel 14 (only TP3169)
03	0011	Read conversion result of conversion channel 15 (only TP3169)
03/06/10	580	Read and write channel 0 range (decimal 26: K type 27: J type 28: T type 31: E type the same below)
03/06/10	581H	Read and write channel 1 range
03/06/10	582H	Read and write channel 2 range
03/06/10	583H	Read and write channel 3 range
03/06/10	584H	Read and write channel 4 range (only TP3089/TP3169)
03/06/10	585H	Read and write channel 5 range (only TP3089/TP3169)
03/06/10	586H	Read and write channel 6 range (only TP3089/TP3169)
03/06/10	587H	Read and write channel 7 range (only TP3089/TP3169)
03/06/10	588H	Read and write channel 8 range (only TP3169)
03/06/10	589H	Read and write channel 9 range (only TP3169)
03/06/10	58AH	Read and write channel 10 range (only TP3169)
03/06/10	58BH	Read and write channel 11 range (only TP3169)
03/06/10	58CH	Read and write channel 12 range (only TP3169)
03/06/10	58DH	Read and write channel 13 range (only TP3169)
03/06/10	58EH	Read and write channel 14 range (only TP3169)
03/06/10	58FH	Read and write channel 15 range (only TP3169)

(Ⅰ) Total number of channels varies by module model。

Temperature acquisition module Modbus output data calculation:

The read data result is a 16-bit signed number, and the result value is 10 times the Celsius value.

$$\text{Measurement result} = \frac{\text{Data Results}}{10}$$

For example:

Measurement of PT100 thermal resistor, the read data is 1678, the measurement result is 1678÷10=167.8℃;
Measurement of K-type thermocouple, the read data is 5089, the measurement result is 5089÷10=508.9℃
Measurement of PT100 thermal resistor, the read data is -389, the measurement result is -389÷10=-38.9℃

Temperature acquisition module Modbus RTU communication example:

In actual use, due to different module configuration addresses and different input signal amplitudes, the data is not completely consistent with the example.When using PLC and other communication, you may not need to understand the underlying communication protocol, so you do not need to understand the following table.Please refer to the communication examples of related products.

Example	Read PT100 thermal resistance acquisition results
Module Description	Number of channels: 4, address: 1
Master sends	00 01 00 00 00 06 01 03 00 02 00 04
Module Reply	00 01 00 00 00 0B 01 03 08 06 18 03 D9 01 5A 03 15
The main station sends analysis	00 01:Message sequence number 00 00:Modbus TCP communication protocol identifier 00 06:Indicates that the following data length is six bytes 01:Module slave address 03: Modbus TCP read holding register function code 00 02:0x0002 Register start address 00 04:Number of registers
Module reply analysis	00 01:Message sequence number 00 00:Modbus TCP communication protocol identifier 00 0B:Indicates that the following data length is 11 bytes 01:Module slave address 03: Modbus TCP read holding register function code 08:Number of data bytes

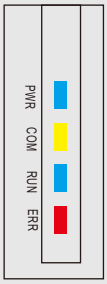
Channel	Receiving Data	Hexadecimal	Decimal	Parsing results
0	06 18	0x0618	1560	156.0℃
1	03 D9	0x03D9	985	98. 5℃
2	01 5A	0x015A	346	34.6℃
3	03 15	0x0315	789	78.9℃

Indicator Lights

The user can judge the operation and communication status of the module, as well as the status of the DIO channel through the LED status indicator.

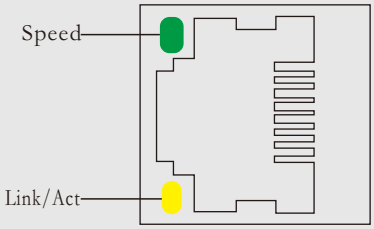
Module status indicator

Light logo	Color	Explanation
PWR	Blue	On: The module is powered on.
COM	Yellow	Flashing: The module is communicating with the master station
RUN	Blue	Flashing: The device program is running
ERR	Red	On: The module detects an error



EtherNET port indicator

Light logo	color	Explanation
Speed	Green	Link speed indicator light: On: 100M Off: 10M
Link/Act	Yellow	Link status indicator Steady on:Physical link connected,no communication Blinking:Communicating Off:Link not connected



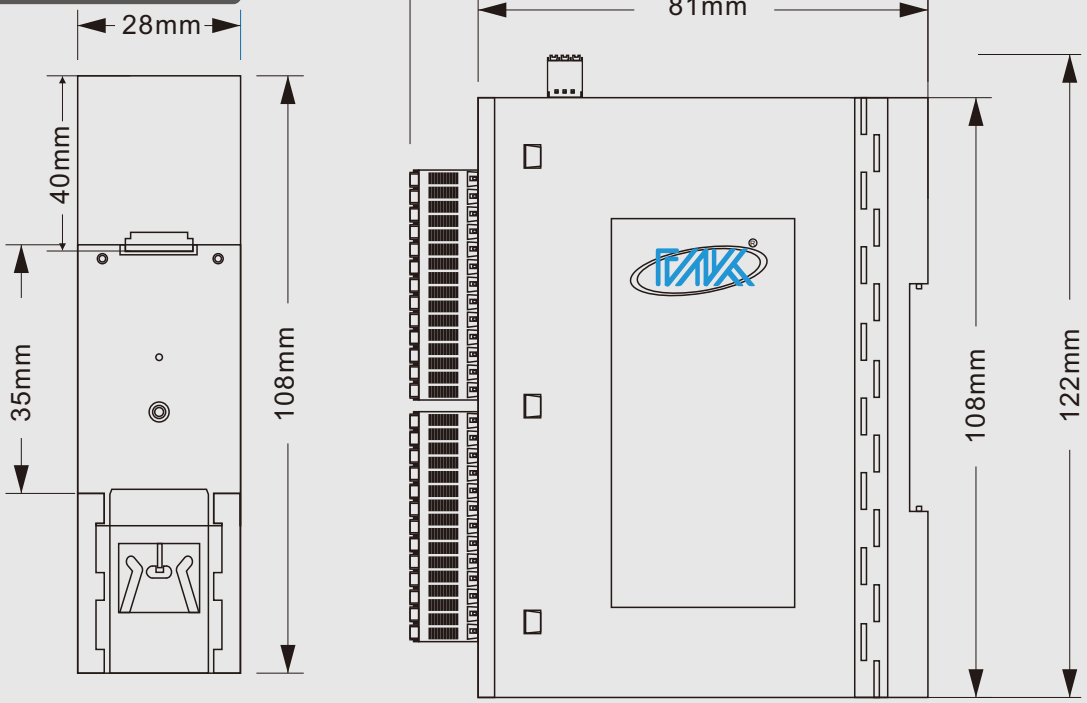
Electrical parameters

Unless otherwise specified, the electrical parameters of the CK-TP3XXX data acquisition module are the values when Tamb=25℃.

Module parameters

Entry	Parameter	Entry	Parameter
Power supply	10-30VDC (nominal 24VDC)	Thermal resistor support type	PT100、PT1000
Power consumption	2W	wiring	I/Owiring:Maximum 1mm²
Communication Protocol	Modbus TCP	Operating temperature	-35-75℃
Network Interface	2*RJ45	Ambient humidity	5%-95% (no condensation)
Connection rate	10/100Mbps	Protection level	IP20
Thermocouple Support Types	K、T、J		

Mechanical specifications

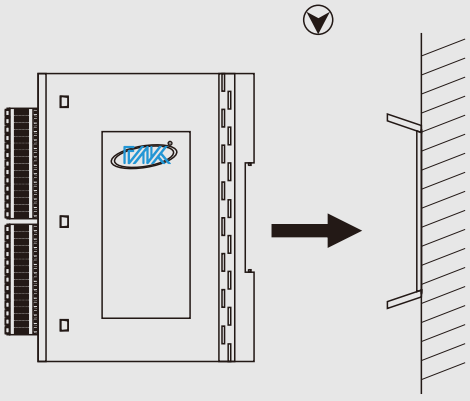


Installation Method

CK-TP3XXX supports DIN35 rail installation. Users can easily install or remove the module on the rail, providing assistance for industrial site application and installation.

Three guarantees and maintenance instructions

Within two years from the date of sale, if the product is damaged or the product quality is lower than the technical indicators under the conditions of storage, transportation and use, the user can return it to the factory for free repair. If the damage is caused by violation of operating regulations and requirements, the device fee and repair fee shall be paid.

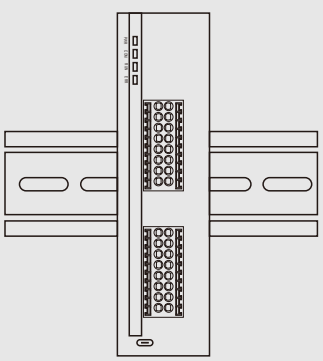


Disclaimer

copyright

The copyright of the product text and related software described in this manual belongs to Shenzhen Chengkong Electronics Co., Ltd., and its property rights are absolutely protected by national laws. Without the authorization of our company, other companies, units, agents and individuals shall not illegally use and copy them, otherwise the company has the right to impose severe sanctions on national laws.

Shenzhen Chengkong Electronics Co., Ltd. reserves the right to modify this data sheet at any time without prior notice.



Product display picture

精工品质 独具匠心