Integrated Modbus-TCP bus remote IO module

MODEL:CK-TP7 series

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Analog 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 Ethernet cascade communication, which can communicate with PC, PLC, touch screen and other devices that support Modbus-TCP protocol.

CK-TP7XXX analog input data collector can collect up to 32 single-ended analog signals; the module adopts high-performance 24-bit AD chip, and the collection and measurement accuracy is ±0.1%. It is suitable for collecting various voltage and current signals in industrial sites.

CK-TP7XXX adopts photoelectric isolation technology to effectively ensure reliable and safe data collection.

Technical Parameters

◆Embedded real-time operating system
◆Analog input signal range: 4-20mA, ±20mA, 0-10V, ±10V, 0-5V, ±5V (factory preset)
◆Wide power supply range: DC 10-30V
◆Dual network ports support on-chip cascading
◆Support Modbus TCP slave protocol
◆±15KV ESD protection
◆Power consumption: 2W
◆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	Channels	Modbus TCP	Input form	Range	Accuracy	Sampling rate
CK-TP7082I1	8	support	Single-ended	4-20mA/±20mA	0.1%	100SPS (Omnichanneland)
CK-TP7082I6				0-10V/±10V		
CK-TP7082I5				0-5V/±5V		
CK-TP7160I1	16			4-20mA/±20mA		150SPS (Omnichanneland)
CK-TP7160I6				0-10V/±10V		
CK-TP7160I5				0-5V/±5V		
CK-TP7320I1	32			4-20mA/±20mA		150SPS (Omnichanneland)
CK-TP7320I6				0-10V/±10V		
CK-TP7320I5				0-5V/±5V		

contents

CK-TP7082 **8 single-ended inputs**
CK-TP7160 **16 single-ended inputs**

Input Current: 4-20mA/±20mA
Input voltage: 0-5V/±5V/0-10V/±10V

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 field applications. The modules are configured with Modbus-TCP communication, and can communicate with devices that support the Modbus TCP protocol, such as PCs, PLCs, and touch screens.

High-precision data acquisition

CK-TP7XXX adopts advanced △-∑ high-precision integrated digital-to-analog converter, and the module adopts high-speed, high-resolution ADC, with a measurement accuracy better than 0.1% (typical value). It can meet the 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 DC-DC conversion, 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 using photoelectric isolation technology, effectively ensuring reliable and safe 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

Analog input

◆Number of input channels:

CK-TP7082 Up to 8 single-ended channels

CK-TP7160 Up to 16 single-ended channels

CK-TP7320 Up to 32 single-ended channels

◆Input range: 4-20mA, ±20mA,

0-10V, ±10V, 0-5V, ±5V

◆Conversion rate:

CK-TP7082: 100SPS (full channel)

CK-TP7160: 150SPS (full channel)

CK-TP7320: 150SPS (full channel)

◆Measurement accuracy: ±0.1%

◆Input overvoltage protection,

overcurrent protection, and low-pass filtering

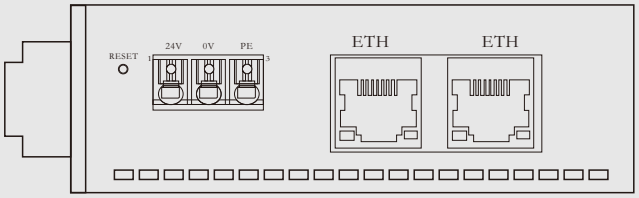
◆Normal mode rejection (NMR):

60 dB (1kΩ Source Imbalance @ 50/60 Hz)

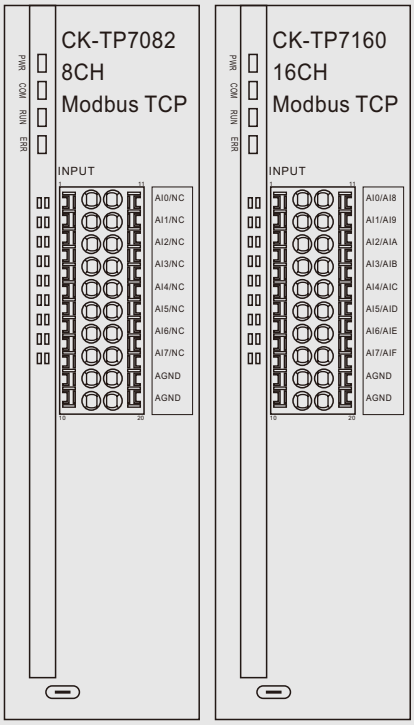
◆Common mode rejection (CMR):

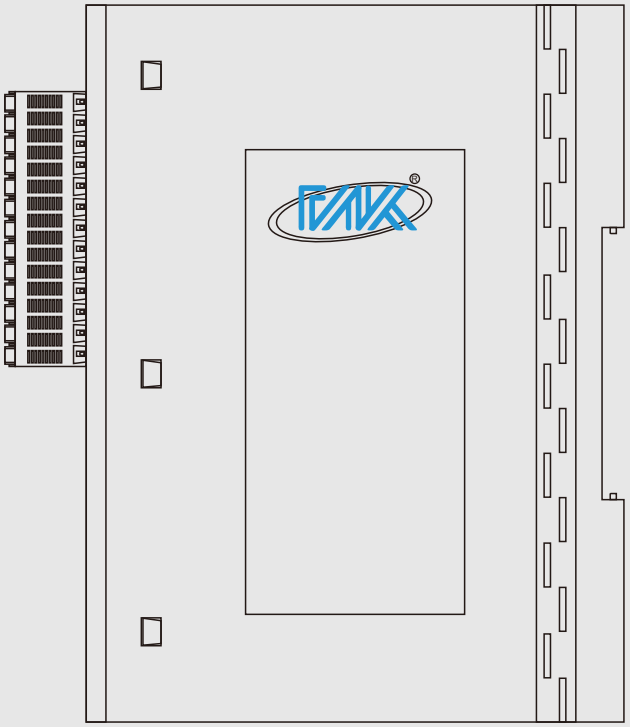
120 dB (1kΩ Source Imbalance @ 50/60 Hz)

Port Information



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





Port Information

CK-TP7082 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Single-ended AI Input	1	AI0	NC	11	Null Port
	2	AI1	NC	12	
	3	AI2	NC	13	
	4	AI3	NC	14	
	5	AI4	NC	15	
	6	AI5	NC	16	
	7	AI6	NC	17	
	8	AI7	NC	18	
Analog input ground	9	AGND	AGND	19	Analog input ground
	10	AGND	AGND	20	

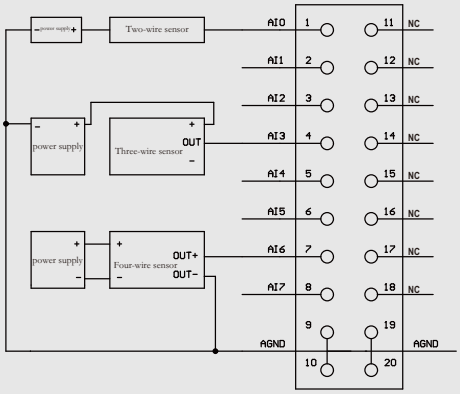
CK-TP7160 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
Single-ended AI Input	1	AI0	AI8	11	Single-ended AI Input
	2	AI1	AI9	12	
	3	AI2	AIA	13	
	4	AI3	AIB	14	
	5	AI4	AIC	15	
	6	AI5	AID	16	
	7	AI6	AIE	17	
	8	AI7	AIF	18	
Analog input ground	9	AGND	AGND	19	Analog input ground
	10	AGND	AGND	20	

Wiring Diagram

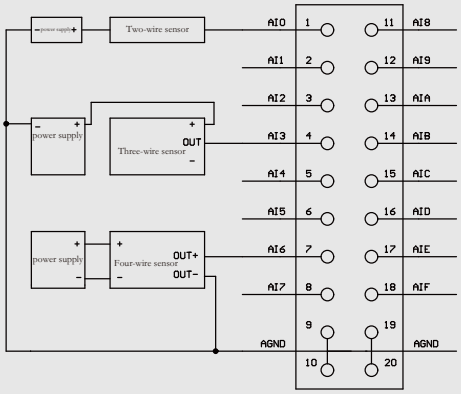
CK-TP7082 wiring diagram

8-channel AI input



CK-TP7160 wiring diagram

16-channel AI input

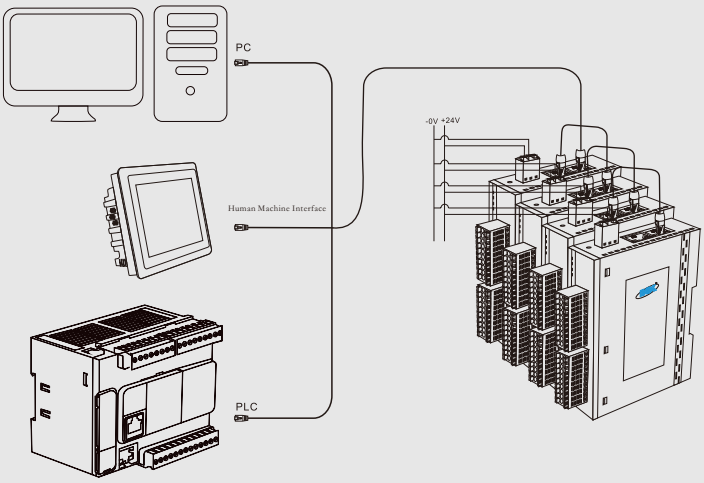


It is recommended to use cables with a core diameter less than 1mm². The cold terminal parameters are as follows:

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).

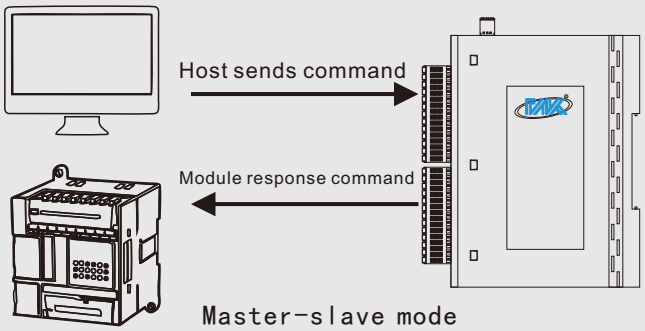


Schematic diagram of cascading network connection of CK modules through Ethernet interface

Module communication mode

Master-slave mode

The communication mode of CK-TP7XXX 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-TCP 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 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 AD conversion results and module information	

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

Command (HEX)	Register address (HEX)	Corresponding PLC address (DEC)	the data shows
03	0060	40097	AD channel 0 collects the results of amplifying 1000 times according to the range(1)
03	0061	40098	AD channel 1 collects the results and amplifies them 1000 times according to the range
03	0062	40099	AD channel 2 collects the results and amplifies them 1000 times according to the range
03	0063	40100	AD channel 3 collects the results and amplifies them 1000 times according to the range
03	0064	40101	AD channel 4 collects the results and amplifies them 1000 times according to the range
03	0065	40102	AD channel 5 collects the results and amplifies them 1000 times according to the range
03	0066	40103	AD channel 6 collects the results and amplifies them 1000 times according to the range
03	0067	40104	AD channel 7 collects the results and amplifies them 1000 times according to the range
03	0068	40105	AD channel 8 collects the results and amplifies them 1000 times according to the range
03	0069	40106	AD channel 9 collects the results and amplifies them 1000 times according to the range
03	006A	40107	AD channel 10 collects the results and amplifies them 1000 times according to the range
03	006B	40108	AD channel 11 collects the results and amplifies them 1000 times according to the range
03	006C	40109	AD channel 12 collects the results and amplifies them 1000 times according to the range
03	006D	40110	AD channel 13 collects the results and amplifies them 1000 times according to the range
03	006E	40111	AD channel 14 collects the results and amplifies them 1000 times according to the range
03	006F	40112	AD channel 15 collects the results and amplifies them 1000 times according to the range

(I)The total number of channels varies depending on the module model。

Modbus TCP communication example of AD acquisition module:

Example	
Module Description	Channel quantity: 4, address: 1, range: ±10V
Master sends	00 01 00 00 00 06 01 03 00 60 00 04
Module Reply	00 01 00 00 00 0B 01 03 08 11 68 16 39 09 26 F6 D7
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 60:0x0060 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	Receive data	Hexadecimal	10 hex	Parsing results
0	11 68	0x1168	4456	4.456V
1	16 39	0x1639	5689	5.689V
2	09 26	0x0926	2342	2.342V
3	F6 D7	0xF6D7	-2345	-2.345V

AD type acquisition module Modbus output data calculation:

The read data result is a 16-bit signed number, and the result value is related to the range.

$$\text{Measurement results} = \frac{\text{Data Results}}{1000}$$

for example:

Range±20mA, The data read out is16781, The measurement results are16781÷1000 = 16.781mA;

Range±10V, The data read out is5089, The measurement results are5089÷1000 = 5.089V;

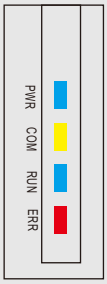
Range±5V, The data read out is-3511, The measurement results are-3511÷1000 = -3.511V;

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.

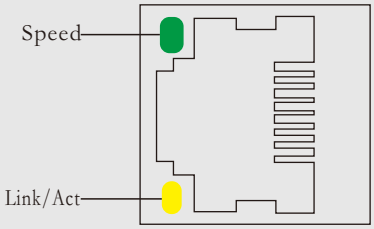
Module status indicator

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



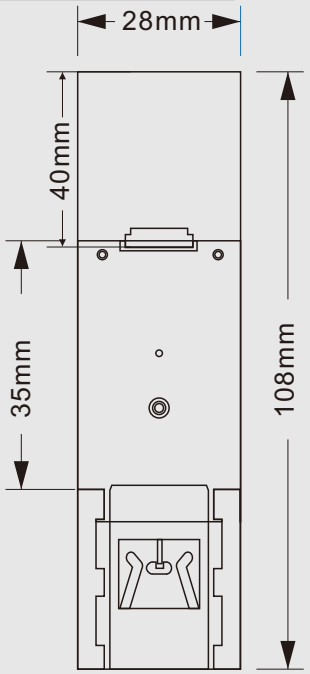
Electrical parameters

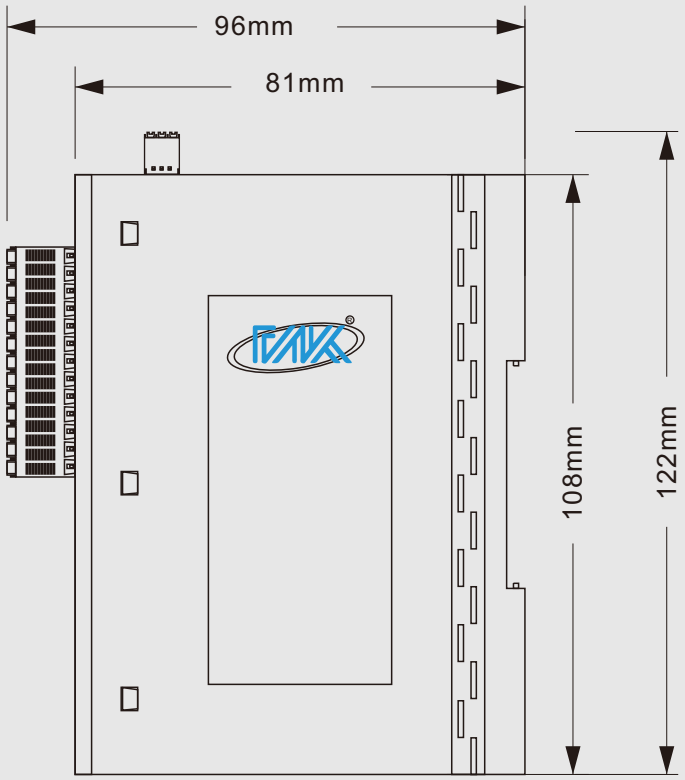
Unless otherwise specified, the electrical parameters of the CK-TP7XXX data acquisition module are the values when Tamb=25℃.

Module parameters

Entry	Parameter
Power supply	10-30VDC (nominal 24VDC)
Power consumption	2W
Communication Protocol	Modbus TCP
Network Interface	2*RJ45
Connection rate	10/100Mbps
Range	4-20mA,±20mA, 0-10V,±10V,0-5V,±5V
wiring	I/Owiring:Maximum 1mm²
Operating temperature	-35-75℃
Ambient humidity	5%-95% (no condensation)
Protection level	IP20

Mechanical specifications



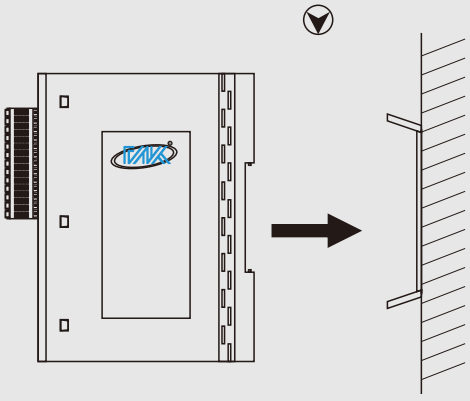


Installation Method

CK-TP7XXX 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.



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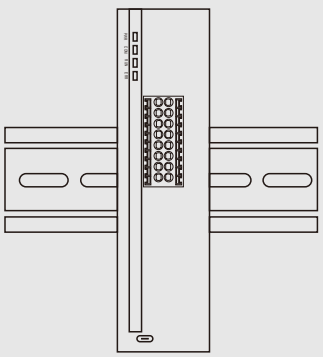

Product display picture

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