Integrated Modbus-TCP bus remote IO module

MODEL：CK-TP5163

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Switching input relay output module

Overview

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 equipped with Ethernet cascade communication and can communicate with PCs, PLCs, touch screens, and other devices that support the Modbus-TCP protocol.

CK-TP5163 switch input relay output data logger can collect up to 16 switch signals (optical coupler input); output 12 digital signals (relay type). It is suitable for collecting and controlling various IO signals in industrial sites.

CK-TP5163 adopts photoelectric isolation technology to effectively ensure reliable and safe data collection.

Technical Parameters

◆Embedded real-time operating system
◆Input and output channels:
16 switch inputs/12 relay outputs
◆Input type: compatible with NPN, PNP and dry nodes
◆Output type: relay type
◆Wide power supply range: DC 10-30V
◆Nominal power supply voltage: DC 12/24V
◆Module power consumption: 2W
◆Support Modbus-TCP protocol
◆Dual network ports support on-chip cascading
◆ESD protection: ±15KV
◆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	DI (Optocoupler)	DO (NPN)	DO (Relay)	ETH cascade
CK-TP5162	16	16		support
CK-TP5163	16		12	support
CK-TP5161	16			support
CK-TP5016		16		support
CK-TP5321	32			support
CK-TP5032		32		support

contents

CK-TP5162 16CHDI+16CHDO(NPN)
CK-TP5163 16CHDI+12CHDO(Relay)

Input type: Optocoupler compatible with NPN and PNP types
Output type: NPN/relay

CK-TPseriesmodulesareanewgenerationof modulardataloggersbasedonembeddedsystems. Theyareinstalledusingstandard DIN 35rails,areeasyto installonsite,andareflexibletouse.Theycanhandlea varietyoffieldapplications.Themodulesareequipped withEthernetcascadecommunicationandcan communicatewithPCs,PLCs,touchscreens,andother devicesthatsupporttheModbus-TCPprotocol.

Switching data acquisition

CK-TP5163 adopts advanced data processing technology to collect various active and passive switch/digital signals in industrial sites. It can meet the requirements of industrial sites with high measurement requirements, security, smart buildings, smart homes, power monitoring, process control and other occasions.

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.

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 photoelectric isolation technology, which effectively ensures the reliability and safety of data acquisition.

Technical indicators

Switch input

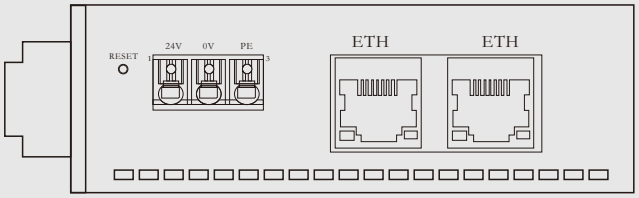
◆Number of input channels: up to 16 channels
◆Input type: Optocoupler compatible with NPN and PNP types

Each group of 8 inputs shares a common COM terminal. When the COM terminal is connected to 12/24V, the DI in the group can be connected to an NPN sensor. When the COM terminal is connected to 0V, the DI in the group can be connected to a PNP sensor. Regardless of whether the COM terminal is connected to 0V or 12/24V, the DI in the group can be connected to a dry node (passive contact, button, etc.).

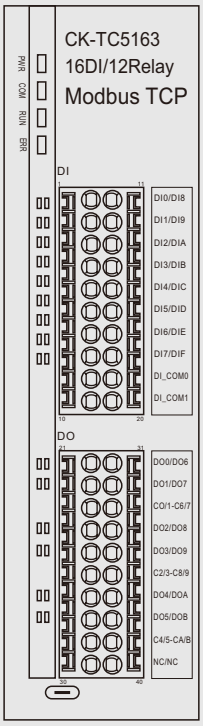
Relay output

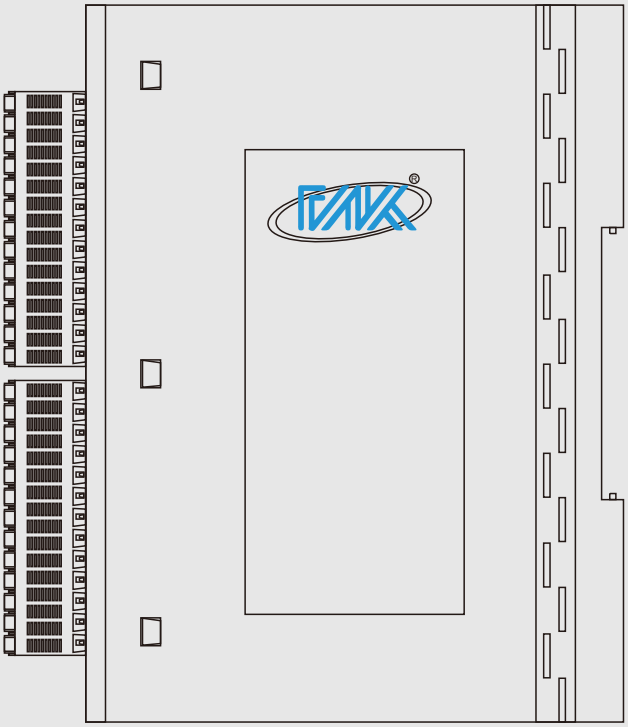
◆Numberofoutputchannels:12
◆Outputtype:relay
◆Loadcapacity:maximum3A@resistiveload,2A@inductiveload
◆Loadswitchingvoltage:maximum30V

Port Information



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





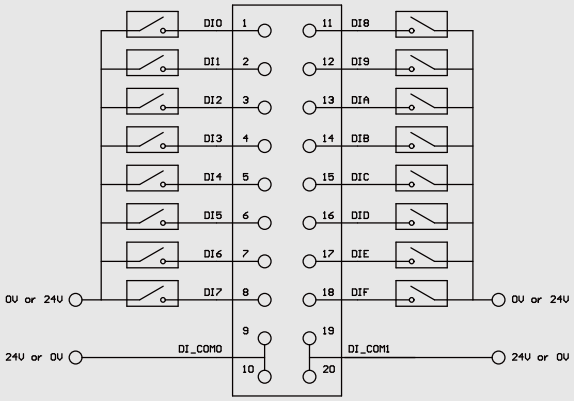
CK-TP5163 Port Description

Description	Serial number	Mark	Mark	Serial number	Description
DI signal Input	1	DI0	DI8	11	DI signal Input
	2	DI1	DI9	12	
	3	DI2	DI10	13	
	4	DI3	DI11	14	
	5	DI4	DI12	15	
	6	DI5	DI13	16	
	7	DI6	DI14	17	
	8	DI7	DI15	18	
Common port0	9	0V or 24V	0V or 24V	19	Common port1
	10			20	
Relay signal output	21	DO0	DO6	31	Relay signal output
	22	DO1	DO7	32	
Output common0/1	23	C0/1	C6/7	33	Output common6/7
Relay signal output	24	DO2	DO8	34	Relay signal output
	25	DO3	DO9	35	
Output common2/3	26	C2/3	C8/9	36	Output common8/9
Relay signal output	27	DO4	DOA	37	Relay signal output
	28	DO5	DOB	38	
Output common4/5	29	C4/5	CA/B	39	Output commonA/B
Empty terminal	30	NC	NC	40	Empty terminal

Wiring Diagram

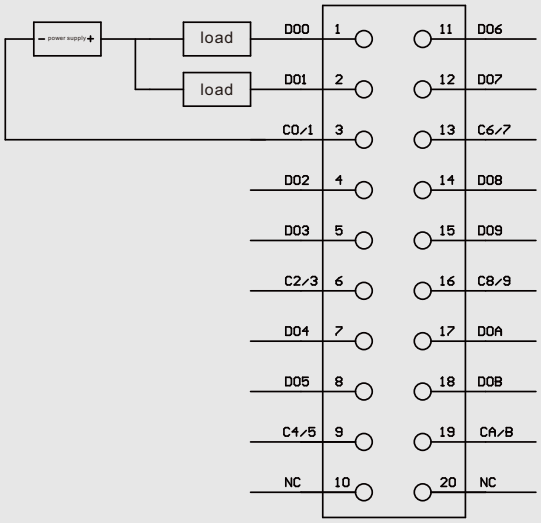
CK-TP5163 Wiring Diagram

16-CH DI INPUT



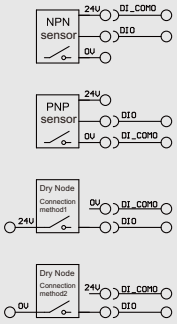
Terminals 9 and 10 are internally connected
Terminals 19 and 20 are internally connected
DI_COM0 and DI_COM1 can be connected to the same or different signals.

12-CH Relay OUTPUT



DI inputsensoraccessexampledіagram

DI input sensor connection example

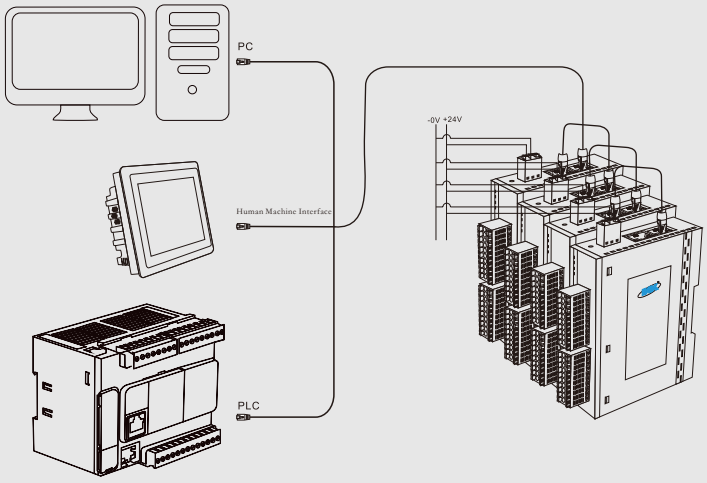


It is recommended to use cables with a core diameter less than 1mm². The cold terminal

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).

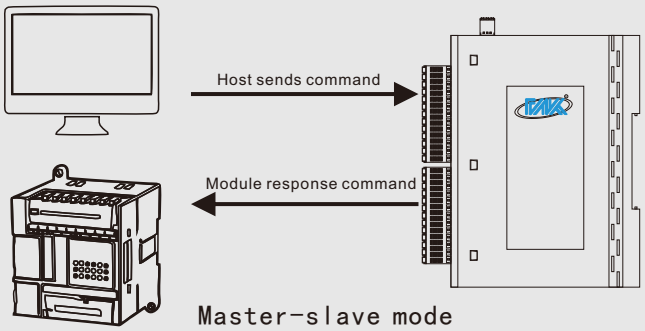


Schematic diagram of cascading network connection of Ck modules through Ethernet interface

Module communication mode

Master-slave mode

The communication mode of the CK-TP5163 module is usually the 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 CK-TP5163 module supports the industrial standard MODBUS-TCP (Ethernet) protocol, and the module works in the MODBUS slave (server) state. It can communicate with PLCs and computers of various brands.

The module supports MODBUS commands as shown in the figure:

Serial number	Order(HEX)	Function	Remark
1	01	Read single/multi-channel switch output status (bit)	Output Channel
2	02	Read single/multi-channel switch input status (bit)	Input Channels
3	03	Read switch status (byte)	Input and output channels
4	05	Set the single-channel switch output status (bit)	Output Channel
5	06	Write switch output status (byte)	Output Channel
6	0F	Set the multi-channel switch output status (bit)	Output Channel

01,02,05,0F Bitwise operation allows users to read and write one or more consecutive input and output channels at a time;

03, 06, 10 are byte-based operations. Users can read and write up to 16 input and output channels at a time.

The MODBUS address allocation of CK module is as follows: (CK-TP5163)

Bit operation register description:

Bit operation function code: 01H (read multi-channel output switch status), 02H (read multi-channel input switch status), 05H (set single-channel switch output status), 0FH (set multi-channel switch output status)

Order (HEX)	Register address (HEX)	Data Description
02	0	Read digital input 0 status
02	1	Read digital input 1 status
02	2	Read digital input 2 status
02	3	Read digital input 3 status
02	4	Read digital input 4 status
02	5	Read digital input 5 status
02	6	Read digital input 6 status
02	7	Read digital input 7 status
02	8	Read digital input 8 status
02	9	Read digital input 9 status
02	A	Read digital input 10 status
02	B	Read digital input 11 status
02	C	Read digital input 12 status
02	D	Read digital input 13 status
02	E	Read digital input 14 status
02	F	Read digital input 15 status
03	22	Read switch input status 0~15 channels, (bit 0 indicates channel 0)

Order (HEX)	Register address (HEX)	Data Description
01/05/0F	0	Read and write DO output 0 output status (write 1 load to get power)
01/05/0F	1	Read and write DO output 1 output status (write 1 load is powered)
01/05/0F	2	Read and write DO output 2 output status (write 1 load is powered)
01/05/0F	3	Read and write DO output 3 output status (write 1 load is powered)
01/05/0F	4	Read and write DO output 4 output status (write 1 load is powered)
01/05/0F	5	Read and write DO output 5 output status (write 1 load is powered)
01/05/0F	6	Read and write DO output 6 output status (write 1 load is powered)
01/05/0F	7	Read and write DO output 7 output status (write 1 load is powered)
01/05/0F	8	Read and write DO output 8 output status (write 1 load is powered)
01/05/0F	9	Read and write DO output 9 output status (write 1 load is powered)
01/05/0F	A	Read and write DO output 10 output status (write 1 load is powered)
01/05/0F	B	Read and write DO output 11 output status (write 1 load is powered)
03/06/10	20	Read and write switch output status 0~11 channels, (bit 0 represents channel 0)

Modbus TCP communication example of DI type acquisition module:

Example	Read DI input status
Module Description	Number of channels: 8, address: 1
Master sends	00 01 00 00 00 06 01 02 00 00 00 08
Module Reply	00 01 00 00 00 04 01 02 01 21
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 6 bytes 01:Module slave address 02: Modbus Read input discrete quantity function code 00 00:0x0000 Register start address 00 08:Read register quantity
Module reply analysis	00 01:Message sequence number 00 00: Modbus TCP Communication protocol identifier 00 04: Indicates that the following data length is four bytes 01:Module slave address 02: Modbus Read input discrete quantity function code 01:Number of data bytes 21:Input status data, the binary corresponding to 0x21 is 0 0 1 0 0 0 0 1.

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reading Data	0	0	1	0	0	0	0	1
Channel Number	7	6	5	4	3	2	1	0
Channel Status	Low	Low	high	Low	Low	Low	Low	high

DO type output module Modbus TCP communication example:

Example	Set DO output status
Module Description	Number of channels: 8, address: 1
Master sends	00 01 00 00 00 08 01 0F 00 00 00 08 01 C3
Module Reply	00 01 00 00 00 06 01 0F 00 00 00 08
The main station sends analysis	00 01:Message sequence number 00 00: Modbus TCP Communication protocol identifier 00 08: Indicates that the following data length is 8 bytes 01:Module slave address 0F: Modbus Continuously write coil function code 00 00:0x0000 Register start address 00 08:Number of registers written 01:Number of data bytes C3:Output status data, the binary corresponding to 0xC3 is 1 1 0 0 0 0 1 1.
Module reply analysis	00 01:Message sequence number 00 00: Modbus TCP communication protocol identifier 00 06: Indicates that the following data length is 6 bytes 01:Module slave address 0F: Modbus continuous write coil function code 00 00:0x0000 Register start address 00 08:Number of registers written

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Writing Data	1	1	0	0	0	0	1	1
Channel Number	7	6	5	4	3	2	1	0
Set Status	1	1	0	0	0	0	1	1

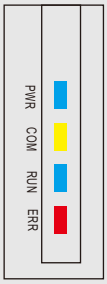
Relay output type: Set state 1 to relay energized.
0C output type: Set state 1 to 0C gate open (connected to GND).

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.

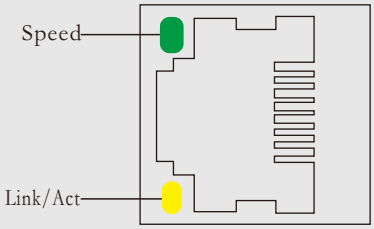
Module status indicator

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



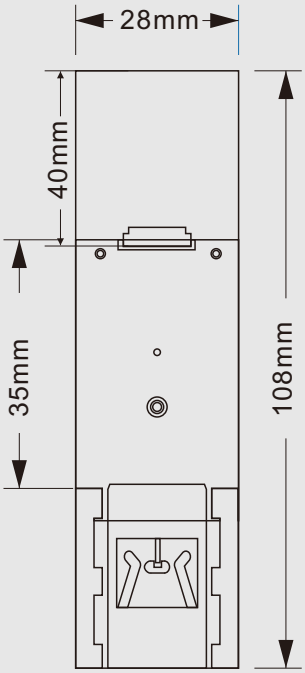
Electrical parameters

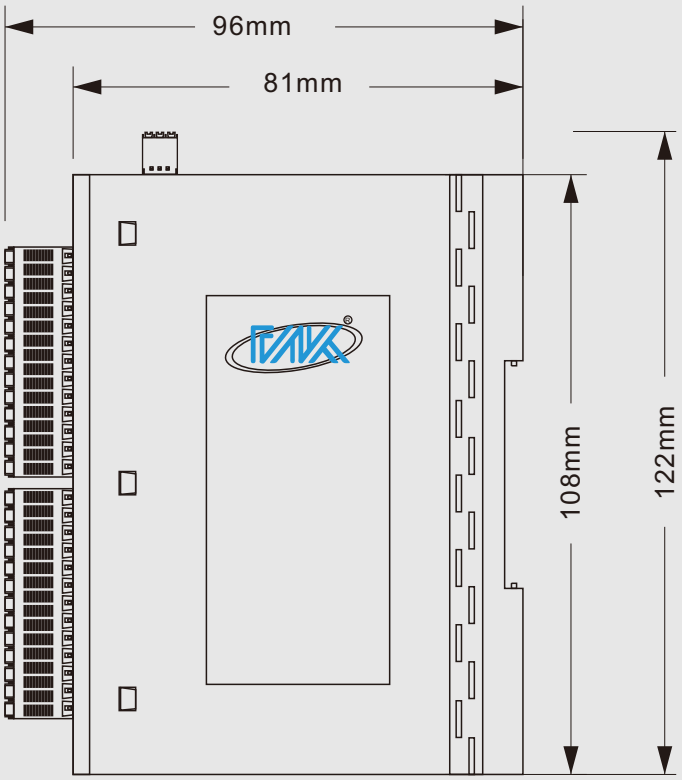
Unless otherwise specified, the electrical parameters of the CK-TP5163 data acquisition module are the values when Tamb=25℃.

Module parameters

Entry	Parameter	Entry	Parameter
Power supply	10-30VDC (nominal 24VDC)	Input isolation voltage	2500V rms
Power consumption	2W	Turn-on voltage	8V-30V (relative to the common terminal)
Communication Protocol	EtherCAT	Input Impedance	>8KΩ
Network Interface	2*RJ45	Input Delay	Max. 2mS
Connection rate	10/100Mbps	Input signal type	Both NPN and PNP support common terminal connection of 24V for NPN and 0V for PNP.Every 8 inputs share one common terminal.
Number of DI input channels	16		
Number of DO output channels	12	Maximum switching voltage	DC30V
Rated output current	Single channel maximum 3A@resistive load, 2A@inductive load	Output Type	Relay
wiring	I/Owiring:Maximum 1mm^2	Operating temperature	-35-75℃
Protection level	IP20	Ambient humidity	5%-95% (no condensation)

Mechanical specifications



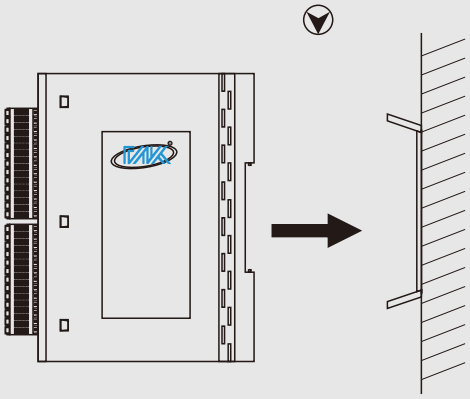


Installation Method

CK-TP5163 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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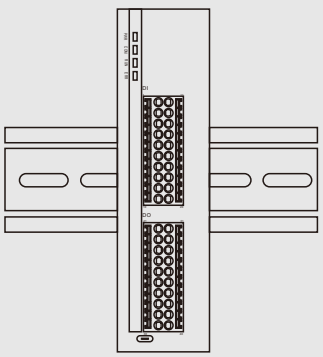

Product display picture

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