

COMPANY PROFILE

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## Product Categories

I

Analog input module

II

Analog output module

III

AC input module

IV

Weighing module

V

TC/RTD temperature acquisition module

VI

Analog input and output module

VII

Switching/digital module

VIII

Develop custom modules

IX

signal isolator

X

Interface conversion module

## Application areas



Automation equipment



Medical electronics



Smart manufacturing



Remote monitoring



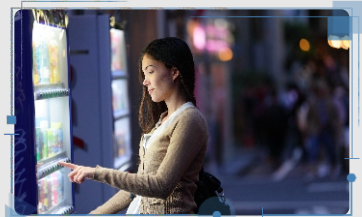
Industrial control



Smart warehousing



Instruments anemometer



new retail



# Thermocouple Acquisition Module

## Overview

The CK module is a new generation of modular data collector based on embedded system. It adopts the standard DIN35 rail mounting method, which is easy to install and flexible to use; it can cope with various on-site applications. The module is configured with 485 network port cascade interface, which can be connected to multiple modules in series, not through the switch, etc. At the same time, it is configured with RS485 interface, which can be used to communicate with PC or PLC individually, and can also be used in a network with multiple 485 modules.

CK-3046R Thermocouple Temperature Collector can collect up to 4 channels of K-type thermocouples; the conversion accuracy is up to 0.5°C. In addition, the module can support voltage-type signal input.

The CK-3046R utilizes advanced magnetic isolation technology to effectively guarantee the speed, reliability and security of data acquisition.

## Applications

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

## Technical Parameters

- ◆ Embedded Real-Time Operating System
- ◆ Thermocouple Type: K/ T/ J/ N/ S/ R/ B
- ◆ input channels: 4channel
- ◆ temperature range: -100~1370°C (K-type)
- ◆ Temperature conversion accuracy:  $\pm 0.5^{\circ}\text{C}$
- ◆ conversion rate: 25 times/second (full channel)
- ◆ AD conversion resolution: 16bit
- ◆ newsletter: 485 dual network port cascade
- ◆ Disconnect Detection: Support
- ◆ Wide power supply range: DC +10~+30V
- ◆ Address/Baud Rate is user configurable
- ◆ protocol: MODBUS-RTU
- ◆ ESD protection:  $\pm 15\text{KV}$
- ◆ Isolated Withstand Voltage: DC 2500V
- ◆ Operating Temperature Range:  $-40^{\circ}\text{C} \sim 80^{\circ}\text{C}$
- ◆ Industrial-grade plastic housing, standard DIN35 rail mounting

## Function configuration

Module model	CK-3046R	CK-3088R	CK-3168R
Thermocouple Type	type K/T/J/N/S/R/B		
AD resolution	16bit		
Channel	4	8	16
RS485	support	support	support
485 cascade	support	support	support
OLED menu	unsupported	unsupported	support

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## CK-3046R CK-3088R

## 4-ch input 8-ch input

Input: Thermocouple K/J/T type modbus-RTU  
Output: RS485

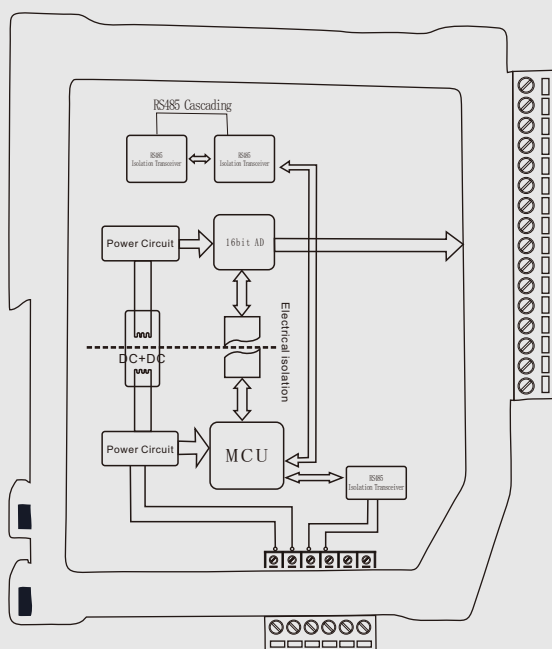
The CK-3046R is an internal 16-bit high-precision AD converter Thermocouple data collector, configured with 4-channel K-type thermocouple acquisition channel. It is suitable for collecting thermocouple data signals from

### Temperature range and conversion accuracy

Signal Type	Measurement range	Measurement range	Conversion accuracy
K	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
J	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
N	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
S	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
R	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
T	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.
B	-100°C ~ +1370°C	<300°C, ±0.5°C	≥300°C, ±0.1%F.S.



## Module working principle diagram



### High-precision data collection

CK-3046R uses an advanced  $\Delta - \Sigma$  high-precision integrated digital mode converter with a resolution of up to 16 bits and the measurement accuracy is better than 0.5 °C (typical value). It can meet the occasion of industrial scenes and security, smart buildings, smart home, power monitoring, process control, etc. with high measurement requirements.

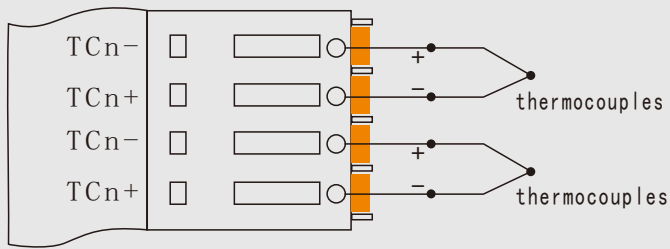
### Input and output isolation

Products for industrial application design: DC-DC transformation can be used to isolate the power supply and main control circuit power supply. At the same time, the control unit and signal acquisition unit adopt photoelectric isolation technology to achieve electrical isolation to effectively guarantee reliable and safe data collection.

### Surge protection

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

## Thermocouple Signal Input



CK-3046R Thermocouple Input Wiring Diagram

Connect the positive and negative thermocouple terminals to the CK-3046R channel.

### Disconnection Detection Function

When the thermocouple line of the input channel is disconnected or not connected to the thermocouple. When the input channel thermocouple line is disconnected or no thermocouple is connected, the corresponding conversion channel outputs 1400°C. When the user detects the corresponding channel is disconnected, the user should handle it accordingly.

### Thermocouple conversion data format

#### Modbus-RTU data format

The Modbus data format is in signed integer binary complement format. The value is 10 times the actual temperature value:

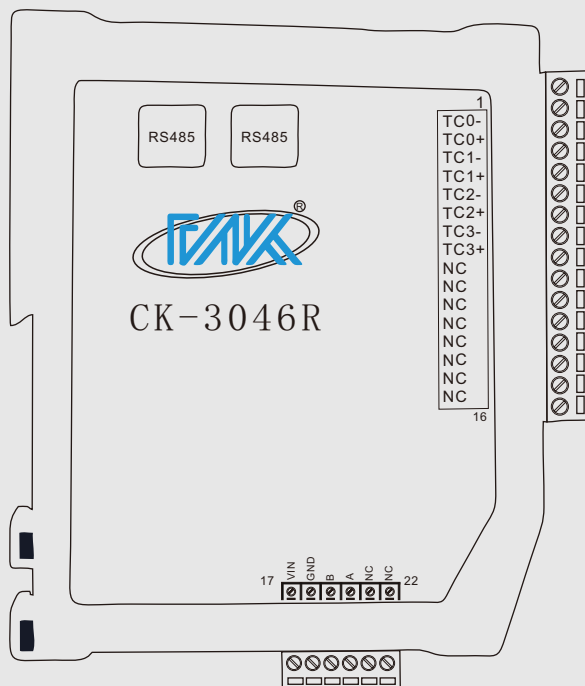
$$t = Adata / 10$$

Style:	t	----	The current temperature of this channel
	Adata	----	Modbus Return data

**example1:** A channel returns data as 0x02B0, the actual temperature value  $t = Adata / 10 = 0x02B0 / 10 = 688 / 10 = 68.8^{\circ}\text{C}$ .

**example2:** A channel return data for 0xFF33, the actual temperature value  $t = Adata / 10 = 0xFF33 / 10 = -205 / 10 = -20.5^{\circ}\text{C}$ .

## port information



### CK-3046R port description

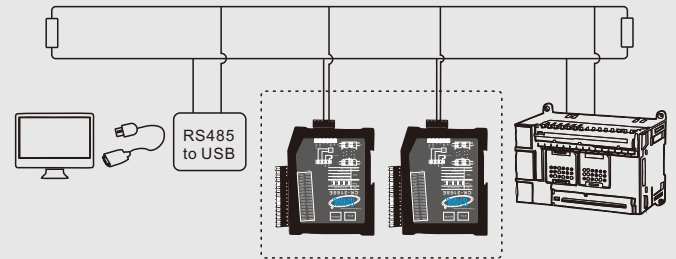
端口	端口标识	端口功能
1	TC0-	Channel 0 Input Negative
2	TC0+	Channel 0 input positive
3	TC1-	Channel 1 Input Negative
4	TC1+	Channel 1 input positive
5	TC2-	Channel 2 Input Negative
6	TC2+	Channel 2 input positive
7	TC3-	Channel 3 Input Negative
8	TC3+	Channel 3 input positive
9	NC	Null port
10	NC	Null port
11	NC	Null port
12	NC	Null port
13	NC	Null port
14	NC	Null port
15	NC	Null port
16	NC	Null port
17	VIN	Power Input Positive
18	GND	Power Ground
19	B	RS485 signal negative input
20	A	RS485 signal positive input
21	NC	Null port
22	NC	Null port

## communications interface

CK-3046R is configured with a network port 485 cascade and 1 RS485, Ethernet can be directly connected to the computer, and RS485 can be individually RS485 can be connected with PLC or other hosts, or multiple modules can be connected with PLC or other hosts after networking.

### RS485 Connection

The RS485 interface of the CK series module is a standard RS485 interface, which adopts differential signal logic. The logic "1" is represented by a voltage difference of  $+(2\sim6)V$  between the two lines; the logic "0" is represented by a voltage difference of  $-(2\sim6)V$  between the two lines. The network connection of RS485 devices is very simple. You only need to connect the positive and negative ends of the device to the bus. When the communication distance is long, you should pay special attention to the network topology. The RS485 network topology generally adopts a terminal matching bus structure, and does not support ring or star networks. The lead-out length from the bus to each node should be as short as possible to minimize the impact of the reflected signal in the lead-out line on the bus signal. For more detailed information, please refer to the relevant information

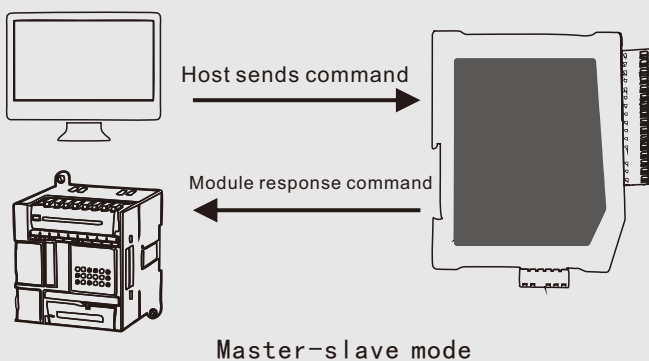


CK module through the RS485 interface and other equipment network connection diagram

## Module communication mode

### master-slave mode

The communication mode of CK-3046R module is usually master-slave mode (one question and one answer mode); the host sends commands to the module through the communication interface, and the module responds accordingly after receiving the correct command.



## Serial communication parameters (default 9600 8,N,1 address 01)

### Mailing address

The communication address range of the CK-3046R module is 01~F7(1~247), and the module address is factory set to 01; the module communication address can be modified by the user through commands according to site needs. For specific methods, please refer to the corresponding commands.

### Communication Protocol

#### MODBUS-RTU 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 MODBUS address allocation is as follows:

Order (HEX)	Register address (HEX)	Data Description	Order (HEX)	Register address (HEX)	Data Description
03	0002	Read channel 0 conversion result	03	0006	Read channel 4 conversion result
03	0003	Read channel 1 conversion result	03	0007	Read channel 5 conversion result
03	0004	Read channel 2 conversion result	03	0008	Read channel 6 conversion result
03	0005	Read channel 3 conversion result	03	0009	Read channel 7 conversion result

( 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  $1678 \div 10 = 167.8^{\circ}\text{C}$  ;  
 Measurement of K-type thermocouple, the read data is 5089, the measurement result is  $5089 \div 10 = 508.9^{\circ}\text{C}$  ;  
 Measurement of PT100 thermal resistor, the read data is -389, the measurement result is  $-389 \div 10 = -38.9^{\circ}\text{C}$

### Communication rate

CK-3046R module RS485 supports baud rates:1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps,115200bps; the module communication rate can be modified by the user through commands according to site needs. For specific methods, please refer to the corresponding commands.

CK-3046R module supports industrial standard MODBUS-RTU protocol, the module works in MODBUS slave (server) state. It can realize communication with PLC, RTU or computer of many brands. The module supports MODBUS commands as follows:

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

#### 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	01 03 00 02 00 04 E5 C9				
Module Reply	01 03 08 06 18 03 D9 01 5A 03 15 70 CC				
The main station sends analysis	01:Module slave address 03: Modbus RTU Read holding register function code 00 02:0x0002 Register start address 00 04:Number of registers    E5 C9:CRC Check digit				
Module reply analysis	01:Module slave address 03: Modbus RTU 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℃
	70 CC:CRC Check digit				



## Electrical parameters

Unless otherwise specified, the electrical parameters of the CK-3046R data acquisition module are the values when  $T_{amb}=25^{\circ}\text{C}$ .

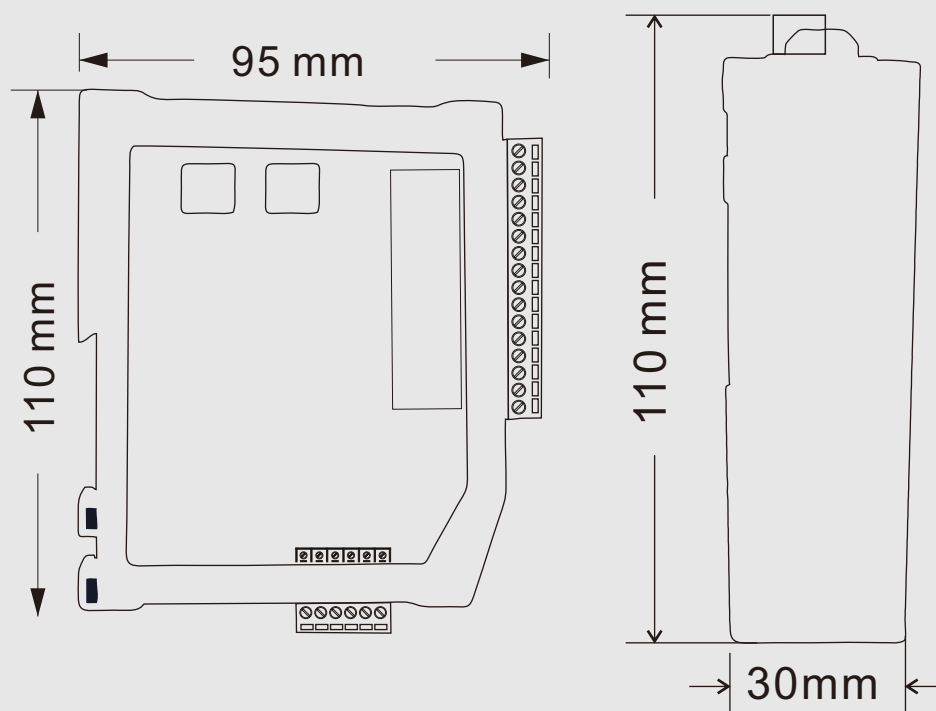
### Temperature conversion parameters

参数	Parameter	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
精度	Accuracy		$\pm 0.5$		$^{\circ}\text{C}$
隔离电压	Isolation Voltage	2500			VDC

### Module parameters

参数	Parameter	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
供电电压	Power Supply	+10	---	+30	V
看门狗 复位周期	Watchdog Period		1		S
输入保护	Input Protect		100/60		mA/V

### Mechanical dimensions



## installation method

CK-3046R 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

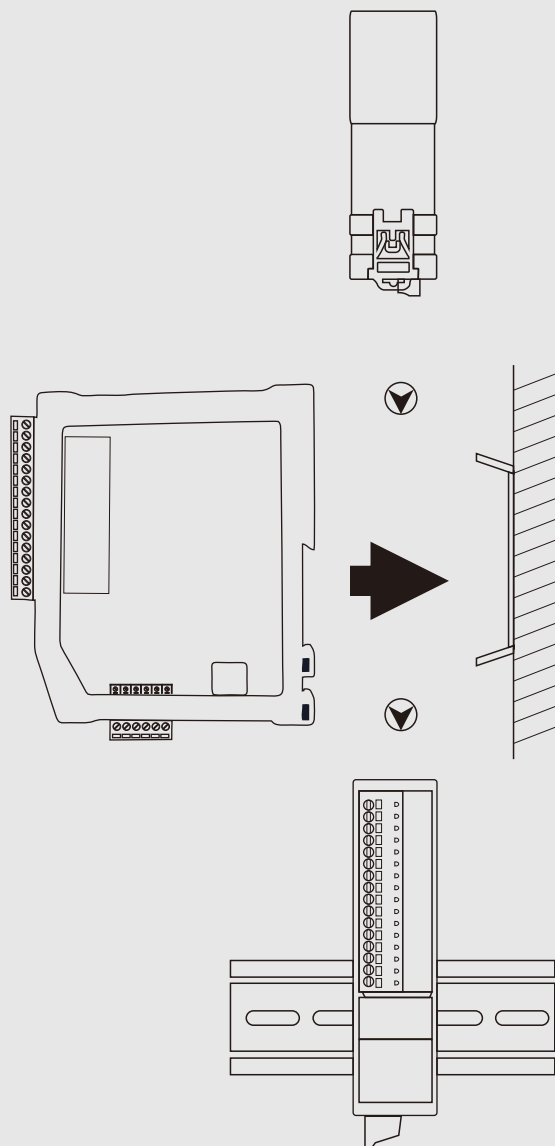
Within five years from the date of sale, if the product is damaged or the product quality is lower than the technical indicators under the conditions of storage, transportation and use, the user can return it to the factory for free repair. If the damage is caused by violation of operating regulations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

## Disclaimer

### copyright

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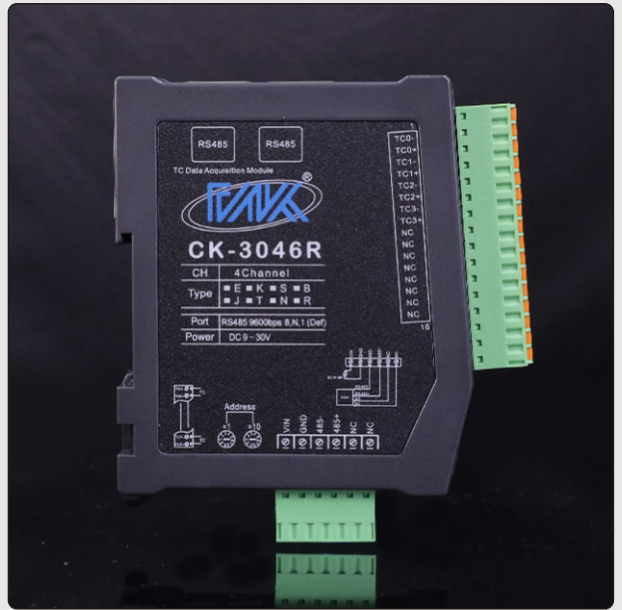
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# Product Showcase



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# Wiring Diagram

