

Mounting and wiring instruction manual

control module **QTC1**

No. QTC11E4 2023.03

Preface

Thank you for purchasing our control module [QTC1]. This manual contains instructions for the mounting and wiring when operating the control module [QTC1].

To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

For details on how to use it, refer to the instruction manual (detailed version) of each model.

Please access our website from the following URL or QR code to download the instruction manual (detailed version).

https://shinko-technos.co.jp/e/download/d_manual_download.html#Q

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
The contents of this instruction manual are subject to change without notice.
Care has been taken to ensure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
This instrument is designed to be installed on a DIN rail within a control panel indoors. If it is not, measures must be taken to ensure that the operator does not touch power terminals or other high voltage sections.
Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
Shinko Technos Co., Ltd. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

SAFETY PRECAUTIONS

(Be sure to read these precautions before using our products.)

The safety precautions are classified into categories: "Warning" and "Caution". Depending on circumstances, procedures indicated by Caution may result in serious consequences, so be sure to follow the directions for usage.

Warning Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

Warning To prevent an electrical shock or fire, only Shinko or qualified service personnel may handle the inner assembly.

To prevent an electrical shock, fire, or damage to instrument, parts replacement may only be undertaken by Shinko or qualified service personnel.

Safety Precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Proper periodic maintenance is also required.
This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Meaning of Warning Message on Model Label

Caution If do not handle this instrument correctly, may suffer minor or moderate injury or property damage due to fire, malfunction, or electric shock. Please read this manual carefully and fully understand it before using it.

Caution with Respect to Export Trade Control Ordinance To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.

In the case of resale, ensure that this instrument is not illegally exported.

Precautions for Use

Installation Precautions

Caution This instrument is intended to be used under the following environmental conditions (IEC61010-1):

- Pollution degree 2
Ensure the mounting location corresponds to the following conditions:
A minimum of dust, and an absence of corrosive gases
No flammable, explosive gases
No mechanical vibrations or shocks
No exposure to direct sunlight, an ambient temperature of -10 to 50°C(14°F to 122°F) that does not change rapidly, and no icing
An ambient non-condensing humidity of 35 to 85 %RH
No large capacity electromagnetic switches or cables through which large current is flowing
No water, oil or chemicals or the vapors of these substances can come into direct contact with the unit.
When installing this unit within a control panel, please note that ambient temperature of this unit – not the ambient temperature of the control panel – must not exceed 50°C (122°F).
Otherwise the life of electronic components (especially electrolytic capacitor) may be shortened.
Avoid setting this instrument directly on or near flammable material even though the case of this instrument is made of flame-resistant resin.

Wiring Precautions

Caution Do not leave bits of wire in the instrument, because they could cause a fire and malfunction. When wiring, use a crimping pliers and a solderless terminal with an insulation sleeve in which an M3 screw fits. The terminal block of this instrument has a structure that is wired from the left side. Be sure to insert the lead wire into the terminal of the instrument from the left side and tighten the terminal screw. Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the screw or case may be damaged. Do not pull or bend the lead wire with the terminal as the base point during or after wiring work. It may cause malfunction. This instrument does not have a built-in power switch, circuit breaker and fuse. It is necessary to install an appropriate power switch, circuit breaker and fuse near the instrument. When wiring the power supply (24 VDC), do not confuse the polarities. Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor. Use the thermocouple and compensation lead wire that match the sensor input specifications of the instrument. Use a RTD of 3-conducting wire type that meets the sensor input specifications of this instrument. When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact. Separate the input line (thermocouple, RTD, etc.) from the power line and load line.

Operation and Maintenance Precautions

Caution It is recommended that auto-tuning (AT) be performed on the trial run. Do not touch live terminals. This may cause electrical shock or problems in operation. Turn the power supply to the instrument OFF when retightening the terminal or cleaning. Working on or touching the terminal with the power switched ON may result in severe injury or death due to electrical shock. Use a soft, dry cloth when cleaning the instrument. (Alcohol based substances may tarnish or deface the unit.) As the panel part is vulnerable, be careful not to put pressure on, scratch or strike it with a hard object.

Compliance with Safety Standards

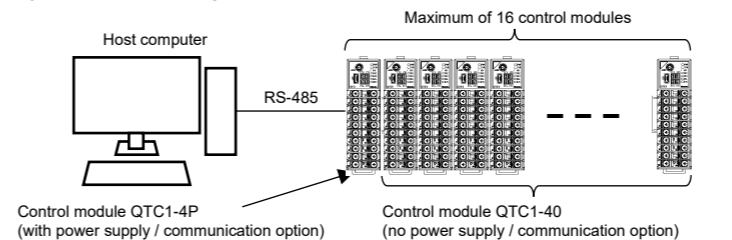
Caution Use the recommended fuse as described in the instruction manual. For analog input - When inputting voltage or current, set the input type to match the input specification. Do not use for measurement of circuits that fall into measurement categories II, III, or IV. Do not use for measurement of objects to which a voltage exceeding 30 Vrms or 60 V DC is applied. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Use equipment that is reinforced-insulated or double-insulated from the primary power supply for external circuits connected to this instrument.

1. Specifications

Table with specifications: Power supply voltage (24 V DC), Allowable voltage fluctuation (20 to 28 V DC), Power consumption (5 W or less), Indication accuracy (Ambient temp.: 23°C), Event input, CT input, Control output, Event output, Control type, Ambient temperature, Ambient humidity, Altitude, Weight, Installation environment, Memory protection.

2. Overview

This instrument is a control module that can be 2ch or 4ch controlled. A multi-point control system can be configured with the control module alone, or via a host computer or PLC. A maximum of 16 instruments can be connected via BUS, and a maximum of 64 points can be controlled. One block connected to BUS is called "1 unit".



3. Model

Table with columns for QTC1- and options for ch (2, 4), Power supply / communication option, Wiring type, CH1-4 Control output, CH1-4 Input, Heater burnout alarm option, Event input/output option.

(*1): For the QTC1-2, CH3 and CH4 are not available.
(*2): Cannot be added to DC current output type, DC voltage output type, or Triac output type.
(*3): CT and connector harness are sold separately.
(*4): Single-phase or 3-phase is available for the QTC1-2.
(*5): Connector harness is sold separately.
(*6): For the QTC1-2, 2 points of Event input/output.

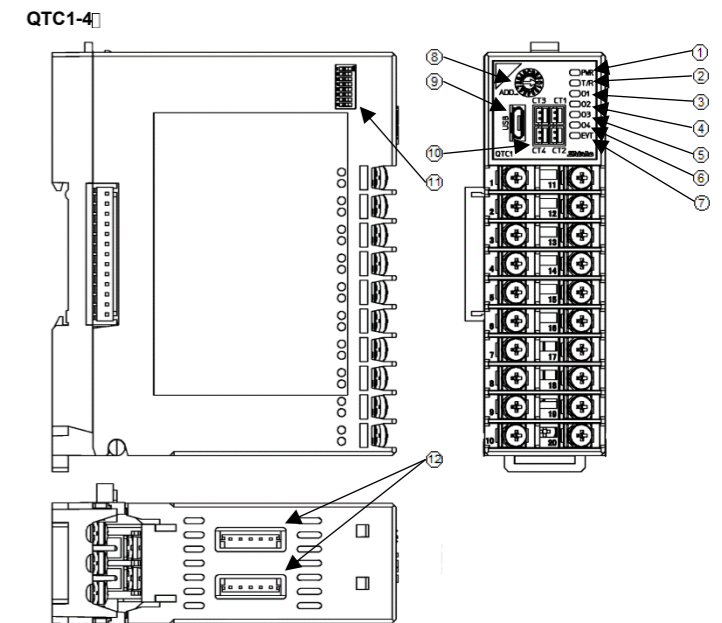
Output code table

Table with columns: Output code, Output type. Includes Relay contact output, Non-contact voltage output, DC current output, DC voltage output, Open collector output, Triac output.

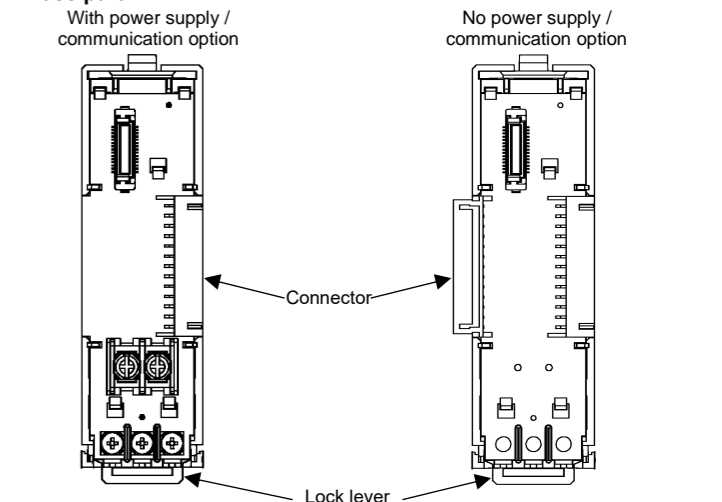
Input code table

Table with columns: Input code, Input type, Range. Includes Thermocouple input, RTD input, DC voltage input, DC current input, DC voltage input.

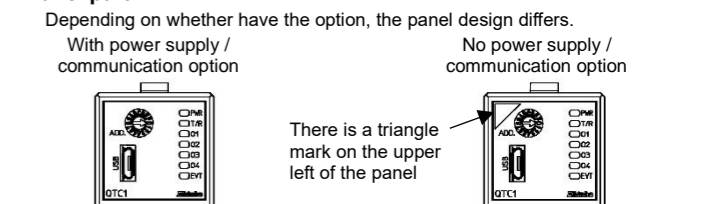
4. Name and Functions



Base part



Panel part



Operation indicator

Table with columns: No., Symbol (color), Name and Function. Lists indicators for Power (Green), Communication (Yellow), CH1-4 control outputs, and Event (Red).

(*): For the QTC1-2, O3 and O4 are not available.

Switch and connector

Table with columns: No., Symbol (color), Name and Function. Lists switches for address selection, communication connector, and CT input connectors, and a dip switch for communication specification.

(*1): When the Heater burnout alarm option is added
(*2): When the Event input/output option is added
(*3): For the QTC1-2, Event3 and Event4 are not available.

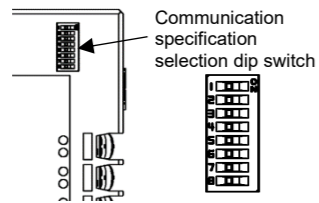
5. Communication Parameter Setting

5.1 Selection of Communication Specifications

Caution

When connecting to the communication expansion module QMC1, the communication specification selection is not required. Use it in the factory default (all OFF).

Use the communication specification selection dip switch on the left side of the instrument to select communication specifications. Select the communication speed, data bit, parity, stop bit and communication protocol.



All are off when shipped from the factory.

- Communication speed: 57600 bps
- Data bit: 8 bits
- Parity: Even
- Stop bit: 1 bit
- Communication protocol: MODBUS specification

(1) Selection of communication speed

| Communication specification selection dip switch | | Communication speed |
|--------------------------------------------------|-----|---------------------|
| 1 | 2 | |
| OFF | OFF | 57600 bps |
| ON | OFF | 38400 bps |
| OFF | ON | 19200 bps |
| ON | ON | 9600 bps |

(2) Selection of data bit, parity and stop bit

| Communication specification selection dip switch | | | Data bit, parity and stop bit |
|--------------------------------------------------|-----|-----|-------------------------------|
| 3 | 4 | 5 | |
| OFF | OFF | OFF | 8 bits, Even, 1 bit |
| ON | OFF | OFF | 8 bits, Even, 2 bits |
| OFF | ON | OFF | 8 bits, Odd, 1 bit |
| ON | ON | OFF | 8 bits, Odd, 2 bits |
| OFF | OFF | ON | 8 bits, None, 1 bit |
| ON | OFF | ON | 8 bits, None, 2 bits |

(3) Selection of communication protocol

| Communication specification selection dip switch | Communication protocol |
|--------------------------------------------------|------------------------|
| 6 | |
| OFF | MODBUS specification |
| ON | SIF specification |

Dip switches No.7 and No.8 does not use. Leave it OFF.

5.2 Selection of Module Address

Caution

When SIF specification is selected in "Selection of communication protocol", select module addresses from 1 to consecutive numbers. If select MODBUS specification, select any number from 0 to F (1 to 16).

The module address is selected with the rotary switch.

Use a small flat blade screwdriver to select the module address.

The value obtained by adding 1 to the value of the selected rotary switch becomes the module address.

Module address selection rotary switch



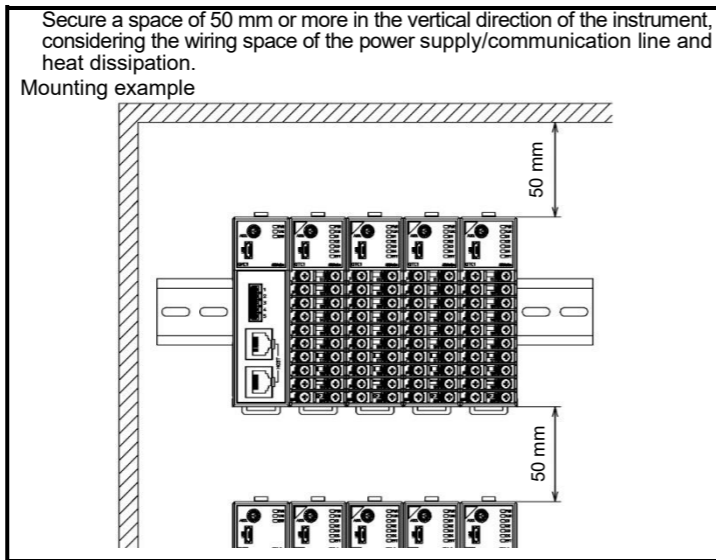
Module address: 0 to F(1 to 16)

| Rotary switch | 0 | 1 | 9 | A | B | F |
|----------------|---|---|----|----|----|----|
| Module address | 1 | 2 | 10 | 11 | 12 | 16 |

6. Mounting

Caution

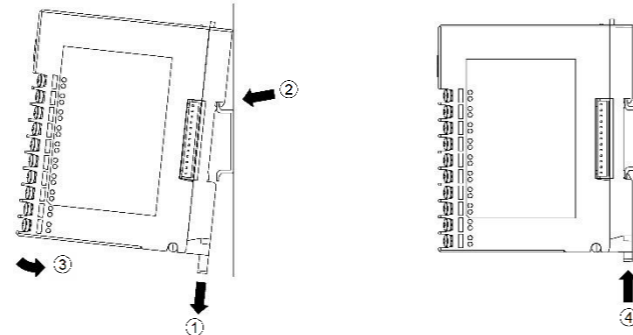
- Mount the DIN rail horizontally.
- This instrument fits the following DIN rails. Top hat rail TH35 JIS C 2812-1988
- If this instrument is mounted in a position susceptible to vibration or shock, mount commercially available end plate at both ends of the instrument.
- When installing, make sure that the orientation (upper and lower) of this instrument is correct.
- When mounting or removing this instrument on the DIN rail, it must be tilted slightly.



6.1 Mounting

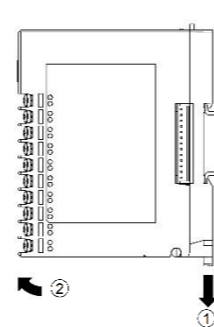
Mounting to the DIN rail

- ① Lower the lock lever of this instrument. (The lock lever of this instrument has a spring structure, but if lower it in the direction of the arrow until it stops, it will be locked in that position.)
- ② Hook the part ② of this instrument onto the top of the DIN rail.
- ③ Insert the lower part of this instrument with the part ② as a fulcrum.
- ④ Raise the lock lever of this instrument. Make sure it is fixed to the DIN rail.



Removal from the DIN rail

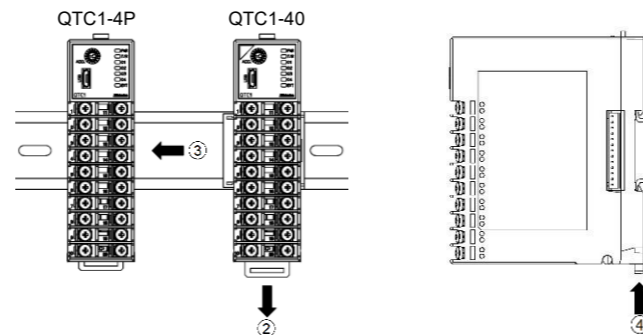
- ① Insert a flat blade screwdriver into the lock lever of this instrument and lower the lock lever until it stops.
- ② Remove this instrument from the DIN rail by lifting it from below.



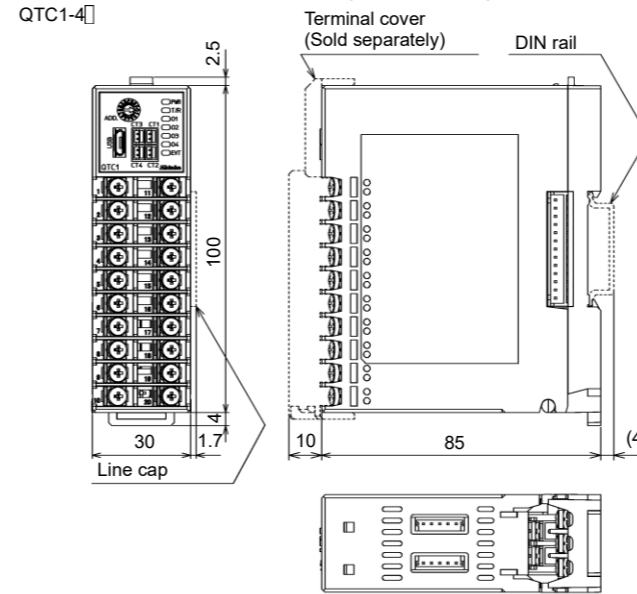
Mounting multiple modules to the DIN rail

This section describes an example of mounting multiple control modules QTC1-4P on the DIN rail.

- ① Remove the line cap on the right side of the QTC1-4P.
- ② Lower the lock lever of the QTC1-40, and mounting the QTC1-40 to the DIN rail.
- ③ Slide the QTC1-40 to the left and connect the connectors to each other.
- ④ Raise the lock lever of this instrument. Make sure it is fixed to the DIN rail.



6.2 External Dimensions(Scale: mm)



7. Wiring

Warning

Turn off the power supply to this instrument before wiring. If you work while the power is supplied, you may get an electric shock, which could result in an accident resulting in death or serious injury.

7.1 Recommended Terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. Use the Ring-type for the power supply and serial communication section.

| Solderless Terminal | Manufacturer | Model | Compatible wire size | Tightening torque |
|---------------------|---------------------------------------|-------------|----------------------|---------------------------------------------------------------------|
| Y-type | NICHIFU TERMINAL INDUSTRIES CO., LTD. | TMEX1.25Y-3 | AWG22 to 16 | Input/output section: 0.63 N · m Power supply section: 0.5 N · m |
| | J.S.TMFG.CO.,LTD. | VD1.25-B3A | AWG22 to 16 | |
| Ring-type | NICHIFU TERMINAL INDUSTRIES CO., LTD. | TMEX1.25-3 | AWG22 to 16 | serial communication section: 0.3 N · m |
| | J.S.TMFG.CO.,LTD. | V1.25-3 | AWG22 to 16 | |
| | J.S.TMFG.CO.,LTD. | V2-MS3 | AWG16 to 14 | |

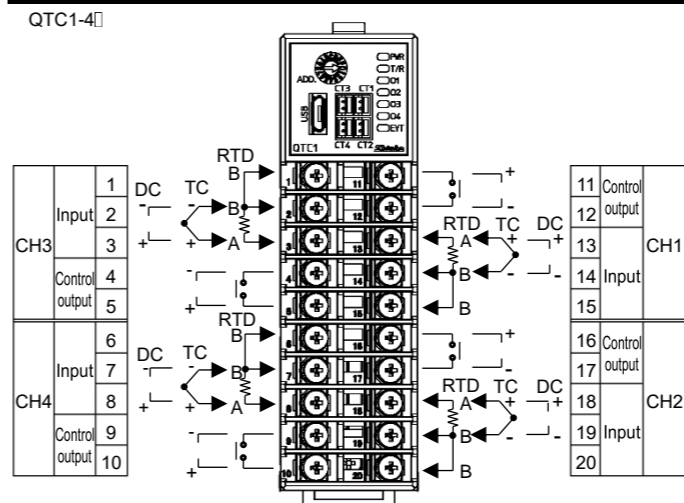


7.2 Terminal Arrangement

7.2.1 Input and Output Terminal Arrangement

Caution

Please note that CH1, CH2 and CH3, CH4 have different terminal arrangements. For the QTC1-2, CH3 and CH4 are not available.



7.2.2 Power Supply and Serial Communication Terminal Arrangement

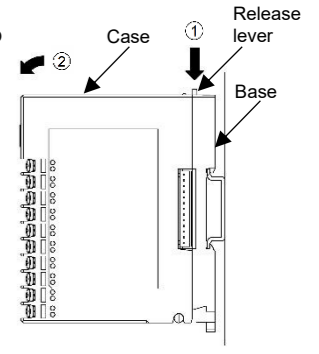
Caution

Do not confuse the polarities.

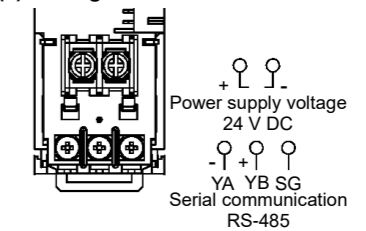
The terminal block for power supply and serial communication is located on the base of this instrument. Wiring by the following procedure.

(1) Case removal

- ① Push the release lever on the top of this instrument to unlock it.
- ② Remove the case.

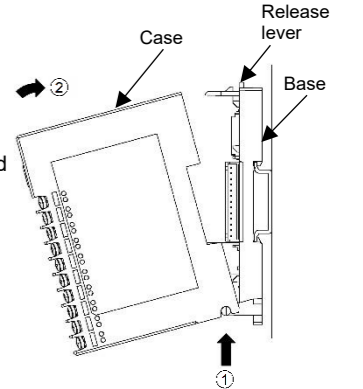


(2) Wiring



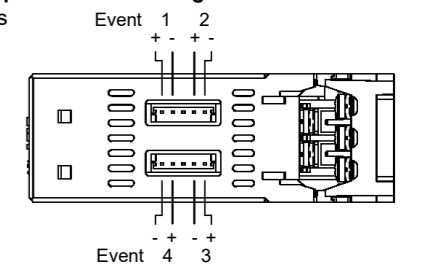
(3) Case mounting

- ① Hook the case on the lower part ① of this instrument.
- ② Mount the case so that the lower part ① of this instrument is the fulcrum and covers the release lever. There is a clicking sound.



7.2.3 Event Input and Output Terminal Arrangement

Using the connector harness EVQ for event input/output. For the QTC1-2, Event3 and Event4 are not available.



7.2.4 CT Input Connector Layout

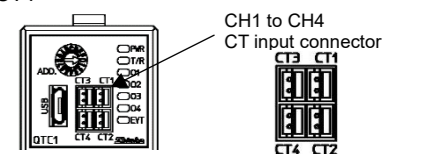
Using the connector harness WQ for heater burnout alarm. For the QTC1-2, wiring by the following procedure.

Single-phase

- CH1 CT1 input: CT1 or CT3
- CH2 CT1 input: CT2 or CT4

3-phase

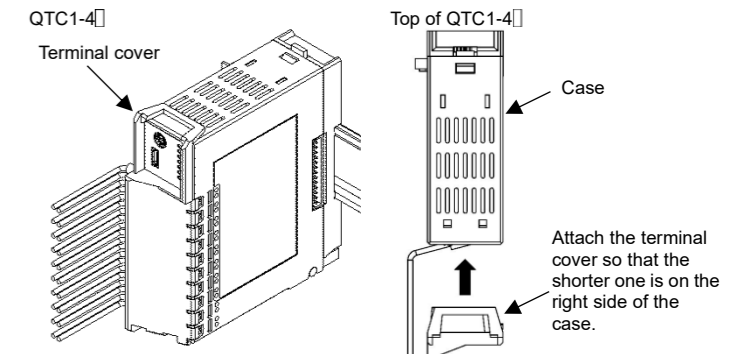
- CH1 CT1 input: CT1
- CT2 input: CT3
- CH2 CT1 input: CT2
- CT2 input: CT4



7.3 Using Terminal Cover Precaution

Attach the terminal cover TC-QTC (sold separately) so that the shorter one is on the right side of the case.

For the wiring of terminal numbers 11 to 20, pass through the left side of the terminal cover.



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