Mounting and wiring instruction manual

control module **QTC1** No. QTC11E2 2021.03

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).
http://www.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. 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.

⚠ 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):
• Overvoltage category II, 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 55°C(14°F to 131°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 55°C (131°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 connect two or more control module QTC1-2P (with power supply / communication option) or QTC1-4P (with power supply / communication option) in one unit.
- 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 a power switch, circuit breaker and fuse near the instrument. (Recommended fuse: Time-lag fuse, rated voltage 250 V AC, rated current 2 A)
- 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.

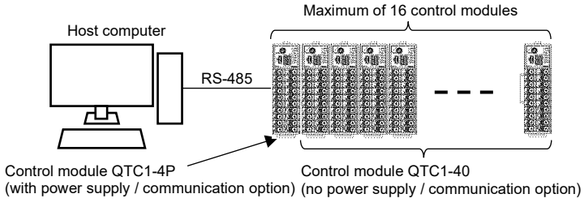
Operation and Maintenance Precautions

⚠ 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 display section is vulnerable, be careful not to put pressure on, scratch or strike it with a hard object.

1. 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".



2. Model

QTC1-	□	□	□	-	□	□	□	□	□	□	□	-	□	□

ch	2	2ch
	4	4ch
Power supply / communication option	0	No option
	P	With power supply / communication option
Wiring type	T	Terminal block type
CH1 Control output	□	Refer to output code table
CH2 Control output	□	
CH3 Control output (*1)	□	
CH4 Control output (*1)	□	
CH1 Input	□	Refer to input code table
CH2 Input	□	
CH3 Input (*1)	□	
CH4 Input (*1)	□	

Heater burnout alarm option	No option	0
	CT 4 points 20 A (*2) (*3)	2
	CT 4 points 100 A (*2) (*3)	A
Event input/output option	No option	0
	Event input (4 points) (*4) (*5)	1
	Event output (4 points) (*4) (*5)	2

(*1): For the QTC1-2□ , CH3 and CH4 are not available.
(*2): CT and connector harness are sold separately.
(*3): Single-phase or 3-phase is available for the QTC1-2□ .
(*4): Connector harness is sold separately.
(*5): For the QTC1-2□ , 2 points of Event input/output.

Output code table

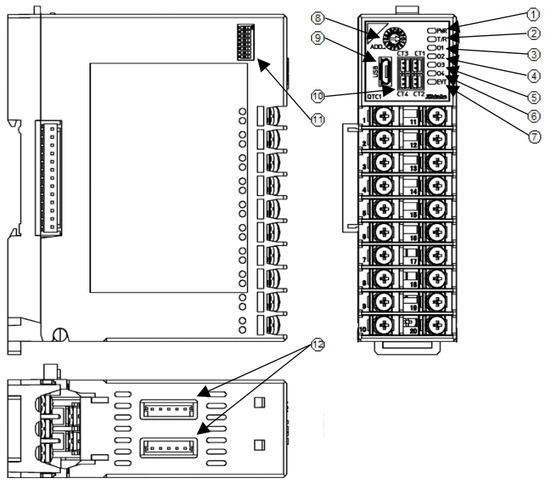
Output code	Output type
R	Relay contact output
S	Non-contact voltage output (For SSR drive)
A	DC current output 4 to 20 mA DC
0	DC current output 0 to 20 mA DC
V	DC voltage output 0 to 1 V DC
1	DC voltage output 0 to 5 V DC
2	DC voltage output 1 to 5 V DC
3	DC voltage output 0 to 10 V DC
C	Open collector output
T	Triac output

Input code table

Input code	Input type		Range
M	Thermocouple input	K	-200 to 1370 °C
		K	-200.0 to 400.0 °C
		J	-200 to 1000 °C
		R	0 to 1760 °C
		S	0 to 1760 °C
		B	0 to 1820 °C
		E	-200 to 800 °C
		T	-200.0 to 400.0 °C
		N	-200 to 1300 °C
		PL-II	0 to 1390 °C
		C(W/Re5-26)	0 to 2315 °C
		K	-328 to 2498 °F
		K	-328.0 to 752.0 °F
		J	-328 to 1832 °F
		R	32 to 3200 °F
		S	32 to 3200 °F
		B	32 to 3308 °F
		E	-328 to 1472 °F
		T	-328.0 to 752.0 °F
		N	-328 to 2372 °F
		PL-II	32 to 2534 °F
		C(W/Re5-26)	32 to 4199 °F
	RTD input	Pt100	-200.0 to 850.0 °C
		Pt100	-328.0 to 1562.0 °F
	DC voltage input	0 to 1 V DC	-2000 to 10000
	DC current input	4 to 20 mA DC	-2000 to 10000
		0 to 20 mA DC	-2000 to 10000
A	DC current input	4 to 20 mA DC (Built-in receiving resistor)	-2000 to 10000
		0 to 20 mA DC (Built-in receiving resistor)	-2000 to 10000
V	DC voltage input	0 to 5 V DC	-2000 to 10000
		1 to 5 V DC	-2000 to 10000
		0 to 10 V DC	-2000 to 10000

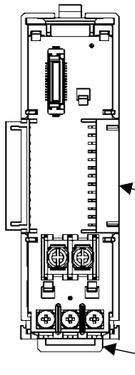
3. Name and Functions

QTC1-4□

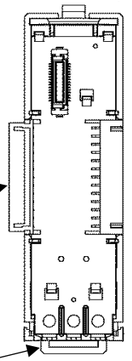


Base part

With power supply / communication option



No power supply / communication option



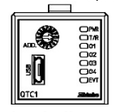
Connector

Lock lever

Panel part

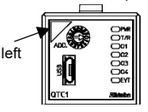
Depending on whether have the option, the panel design differs.

With power supply / communication option



There is a triangle mark on the upper left of the face plate

No power supply / communication option



Operation indicator

No.	Symbol (color)	Name and Function
①	PWR (Green)	Power indicator
②	T/R (Yellow)	Communication indicator
③	O1 (Green)	CH1 control output indicator
④	O2 (Green)	CH2 control output indicator
⑤	O3 (Green)	CH3 control output indicator (*)
⑥	O4 (Green)	CH4 control output indicator (*)
⑦	EVT (Red)	Event indicator

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

Switch and connector

No.	Symbol (color)	Name and Function
⑧	ADD.	Module address selection rotary switch
⑨	USB	Console communication connector
⑩	CT1	CH1 CT input connector (*1)
	CT2	CH2 CT input connector (*1)
	CT3	CH3 CT input connector (*1)
	CT4	CH4 CT input connector (*1)
⑪		Communication specification selection dip switch
⑫		Event input/output connector (*2)(*3)

(*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.

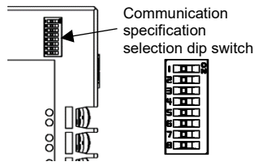
4. Communication Parameter Setting

4.1 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.

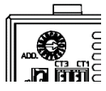
4.2 Selection of Module Address

⚠ 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)

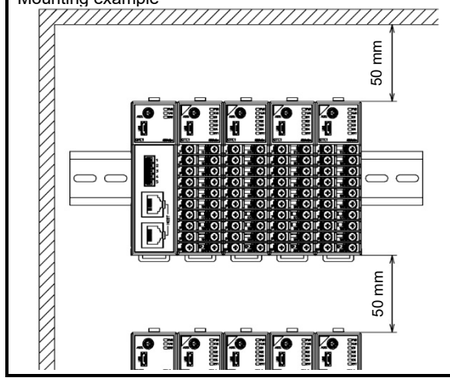
Rotary switch	0	1		9	A	B		F
Module address	1	2		10	11	12		16

5. Mounting

⚠ Caution

- Do not connect two or more control module QTC1-2P (with power supply / communication option) or QTC1-4P (with power supply / communication option) in one unit.
- 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
  Secure a space of 50 mm or more in the vertical direction of the instrument, considering the wiring space of the power supply/communication line and heat dissipation.

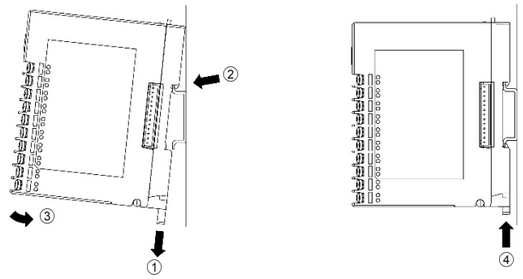
Mounting example



5.1 Mounting

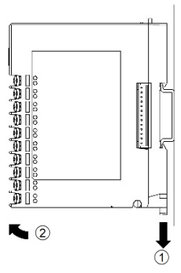
Mounting to the DIN rail

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

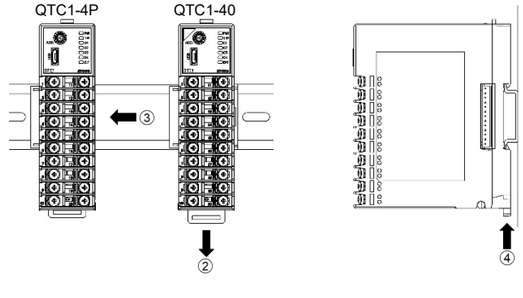
① Insert a flat blade screwdriver into the lock lever of this instrument and lower the lock lever until it stops.
② Remove this instrument from the DIN rail by lifting it from below.



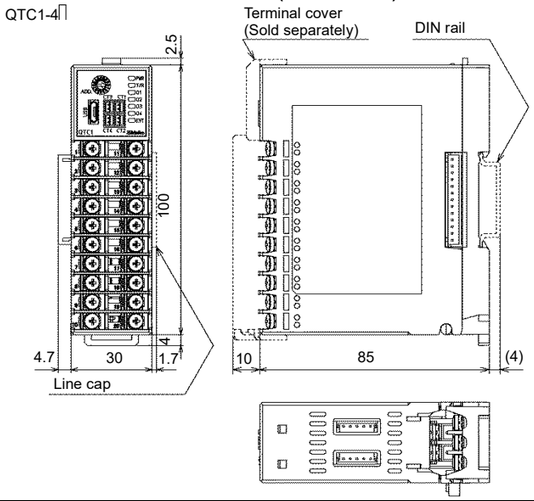
Mounting multiple modules to the DIN rail

This section describes an example of mounting multiple control modules QTC1-4□ 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.



5.2 External Dimensions(Scale: mm)



6. Wiring

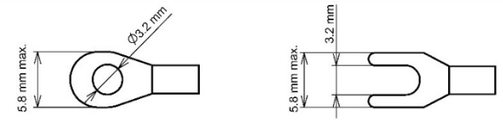
⚠ Warning

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.

6.1 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	Tightening torque
Y-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25Y-3	Input/output section: 0.63 N・m Power supply section: 0.5 N・m serial communication section: 0.3 N・m
	Japan Solderless Terminal MFG Co., Ltd.	VD1.25-B3A	
Ring-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3	
	Japan Solderless Terminal MFG Co., Ltd.	V1.25-3	



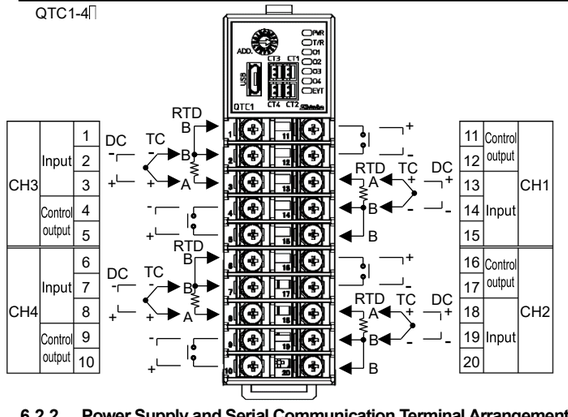
6.2 Terminal Arrangement

6.2.1 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.

QTC1-4□



6.2.2 Power Supply and Serial Communication Terminal Arrangement

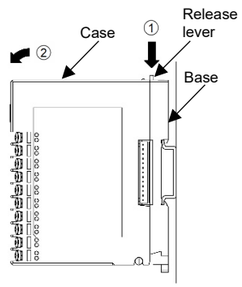
⚠ Caution

Do not confuse the polarities.

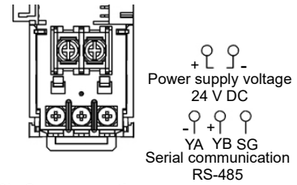
The terminal block for power supply and serial communication is located on the base of this instrument. Wiring by the following procedure.

(1) Case removal

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

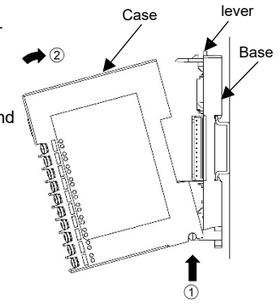


(2) Wiring



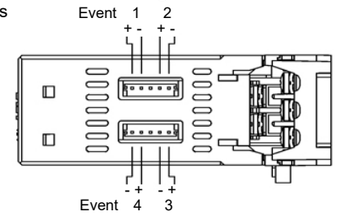
(3) Case mounting

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.



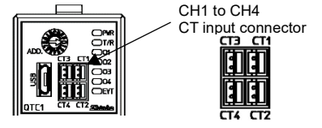
6.2.3 Event Input and Output Terminal Arrangement

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



6.2.4 CT Input Connector Layout

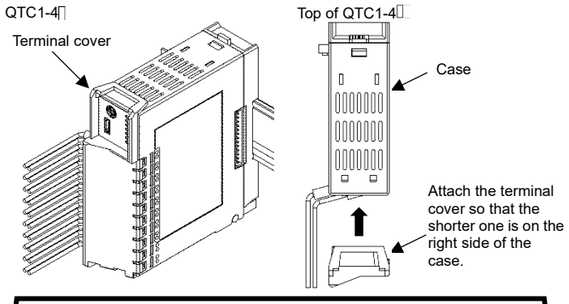
Using the connector harness WQ for heater burnout alarm.
For the QTC1-2□, wiring by the following procedure.
Single-phase
CH1 CT1 input: CT1 or CT3
CH2 CT1 input: CT2 or CT4
3-phase
CH1 CT1 input: CT1
CT2 input: CT3
CH2 CT1 input: CT2
CT2 input: CT4



6.3 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.

QTC1-4□



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