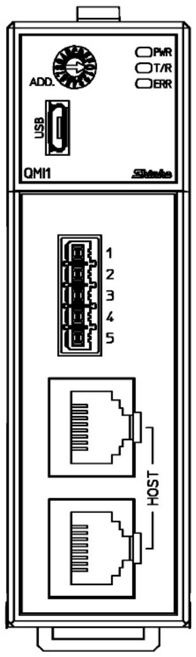
Communication Expansion Module

QMC1

INSTRUCTION MANUAL


ADD.
PWR
T/R
ERR
USB
QMI1
Shinko
1
2
3
4
5
HOST

Preface

Thank you for purchasing our communication expansion module [QMC1] (hereinafter referred to as this instrument or QMC1).
This instruction manual (hereinafter referred to as this manual) describes the mounting method, functions, operation method, and handling of this instrument.
Please read this manual carefully and fully understand it before using it.
Also, be sure to give this manual to users of this instrument to prevent accidents due to mishandling.

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

1. Installation Precautions

⚠ Caution

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

- Overvoltage category , 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.

2. Wiring Precautions

⚠ Caution

- Do not connect two or more control module QTC1-2P (with power supply / communication option) (hereinafter referred to as QTC1-2P) or QTC1-4P (with power supply / communication option) (hereinafter referred to as QTC1-4P) in one unit.
- When wiring, do not drop wire scraps into the ventilation window of this instrument.
  It may cause fire or malfunction.
- When wiring, use a crimping pliers and a solderless terminal with an insulation sleeve in which an M3 screw fits.
- 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.

3. Operation and Maintenance Precautions

⚠ Caution

- 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.

The following abbreviations are used in the text, figures, and tables of this manual.

Symbol	Term
PV	Process variable (PV)
SV	Desired value (SV)
MV	Output manipulated variable (MV)
AT	Auto-tuning (AT)
CT	Current transformer (CT) [for heater burnout alarm (option)]

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1 Overview

1.1 Overview of QMC1

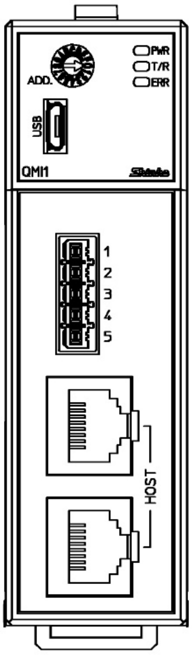
This instrument is a communication extension module that can configure a multi-point control system via a host computer or PLC.

A maximum of 16 control modules QTC1-20 (no power supply / communication option) (hereinafter referred to as QTC1-20) or QTC1-40 (no power supply / communication option) (hereinafter referred to as QTC1-40) can be connected via BUS, and a maximum of 64 points can be controlled.

One block connected to BUS is called "1 unit".

In addition, a maximum of 16 units can be connected and a maximum of 1024 points can be controlled.

1.2 Description of Module



(Fig. 1.2-1)

This instrument is the communication expansion module for communication translation and data management.

It is used to configure the control system through the host computer or PLC.

The SIF function (Smart InterFace, programless communication function) enables programless connection to the PLC.

Moreover, it is used also when it configuring the control system of two or more units through the host computer or PLC.

1.3 System Configuration

⚠ Caution

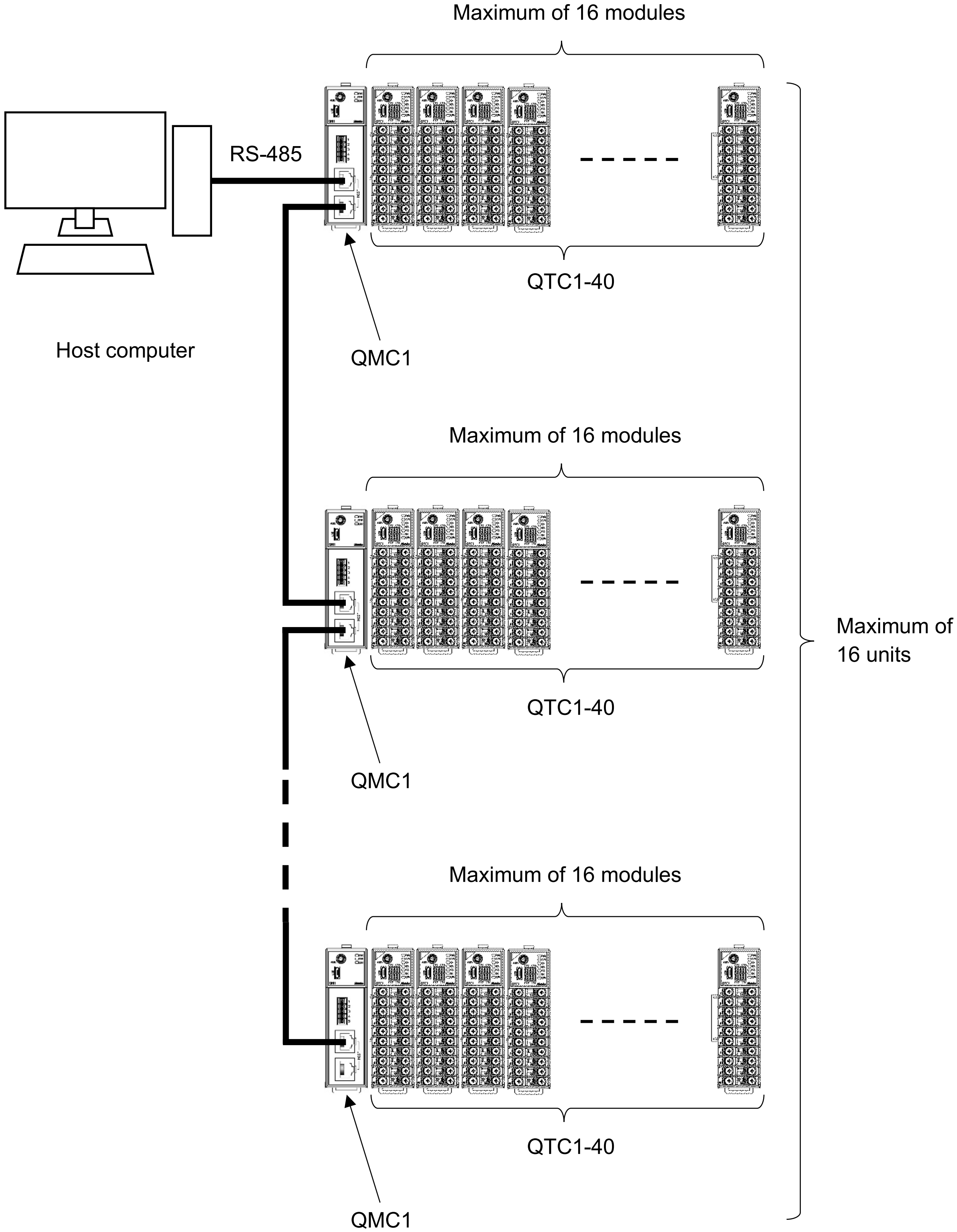
Do not connect QTC1-2P or QTC1-4P in the same unit.

1.3.1 Connecting to Host Computer [Console selection (MODBUS RTU/SIF function)]

Up to 16 units (QTC1-20 or QTC1-40) can be connected in one unit.

Also, by connecting QMC1, up to 16 units can be connected.

Connection example of QMC1 and QTC1-40


Maximum of 16 modules
RS-485
QTC1-40
Host computer
QMC1
Maximum of 16 modules
Maximum of 16 units
QTC1-40
QMC1
Maximum of 16 modules
QTC1-40
QMC1

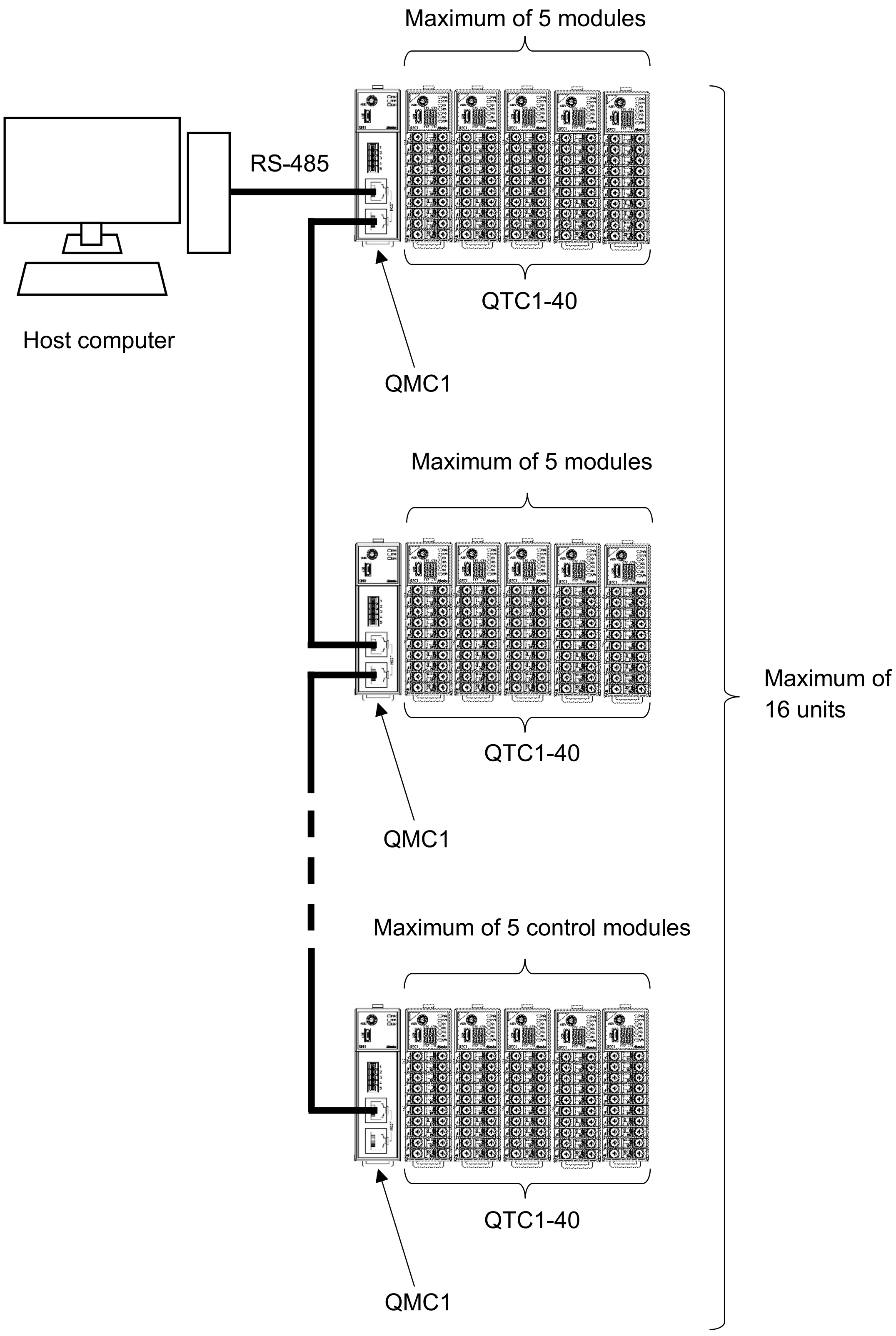
(Fig. 1.3.1-1)

1.3.2 Connecting to Host Computer (C series compatible)

Up to 5 units (QTC1-20 or QTC1-40) can be connected in one unit.

Also, by connecting QMC1, up to 16 units can be connected.

Connection example of QMC1 and QTC1-40


Maximum of 5 modules
RS-485
Host computer
QTC1-40
QMC1
Maximum of 5 modules
QTC1-40
QMC1
Maximum of 16 units
Maximum of 5 control modules
QTC1-40
QMC1

(Fig. 1.3.2-1)

1.3.3 Connecting to PLC [Console selection (MODBUS RTU/SIF function)]

When using the SIF function

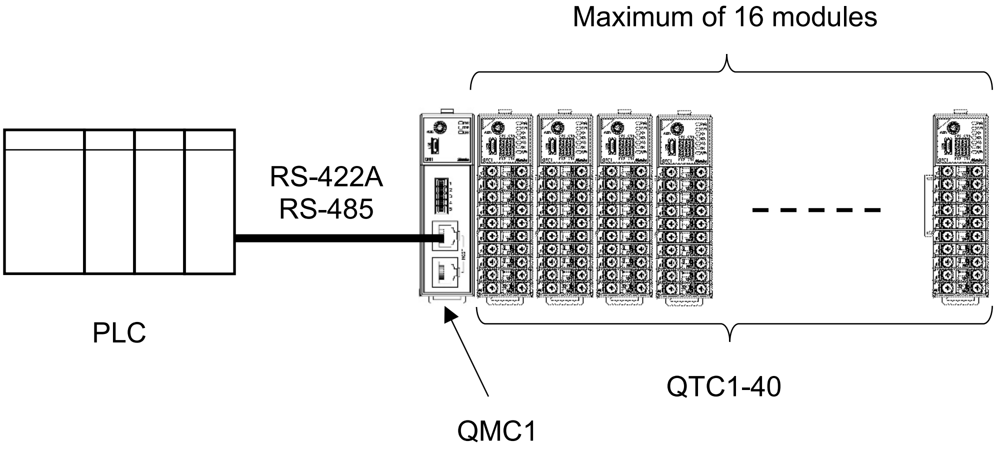
One QMC1 is required per unit for upper-level communication, when connecting to a Mitsubishi Electric PLC, OMRON PLC (*) or KEYENCE PLC(*).

The power supply and communication lines to QTC1-20 or QTC1-40 are connected to the BUS using connectors.

Up to 16 modules can be connected.

(*) When using the SIF function to connect to a PLC manufactured by OMRON Corporation or KEYENCE CORPORATION, cannot be connected with RS-485 communication method. Only RS-422A communication type can be connected.

Connection example of QMC1 and QTC1-40

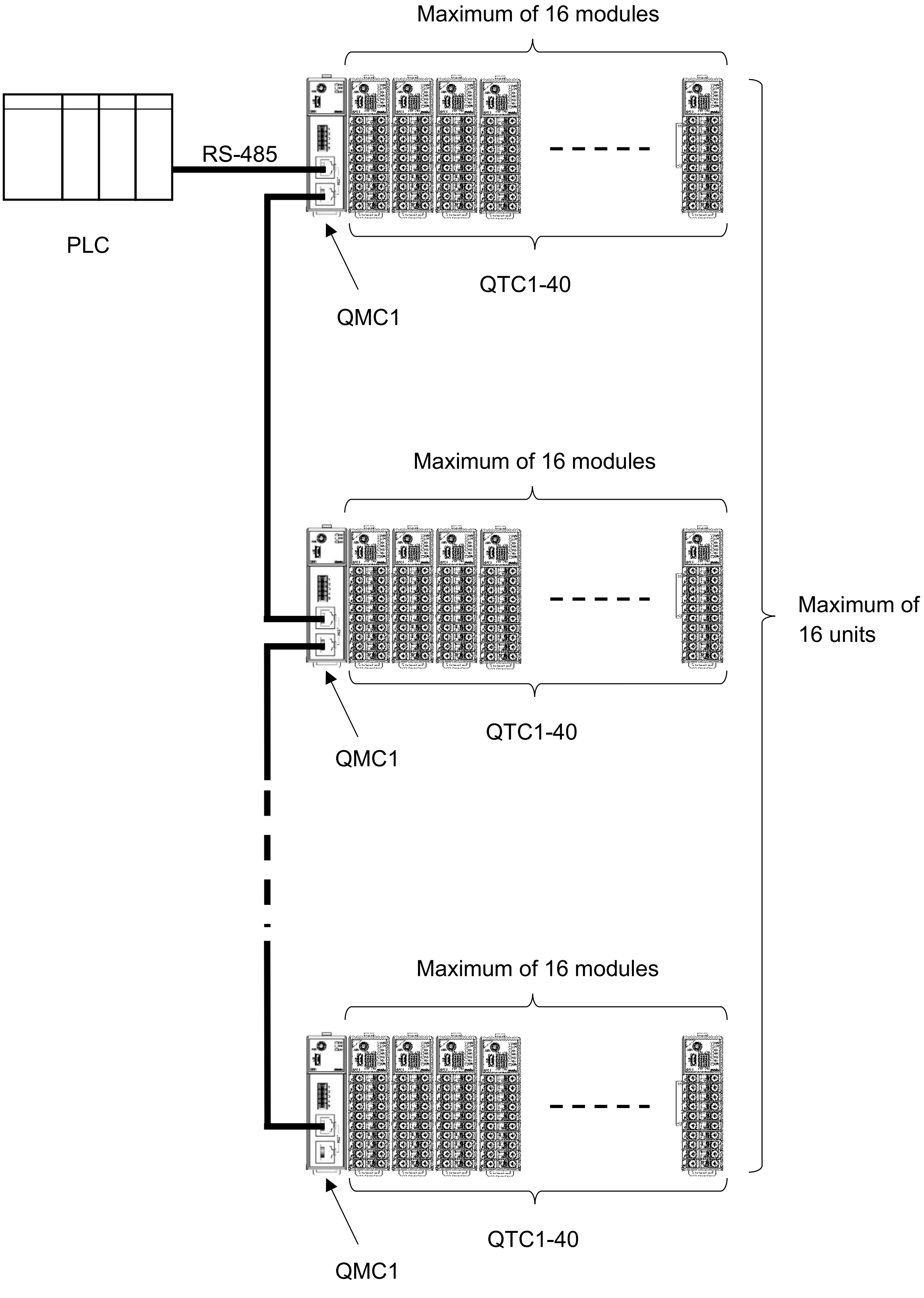


(Fig. 1.3.3-1)

When not using the SIF function

Up to 16 units can be connected by connecting QMC1 to each other.

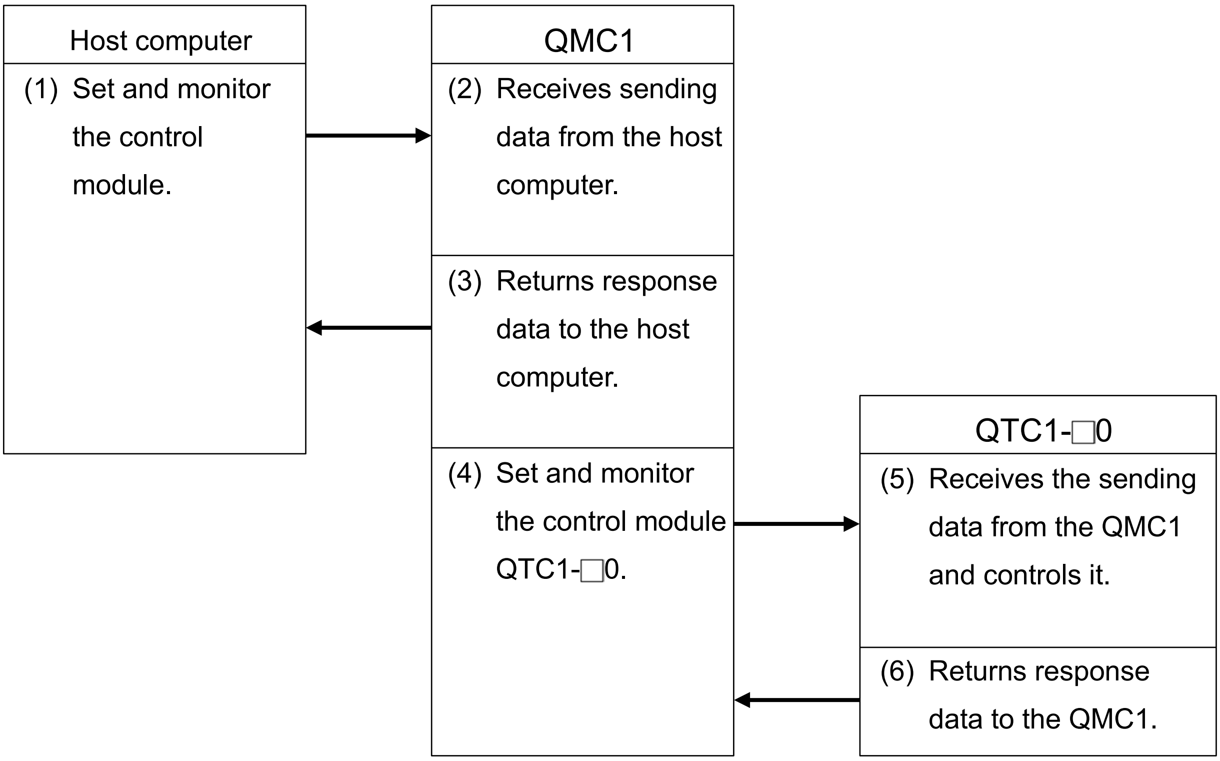
Connection example of QMC1 and QTC1-40


Maximum of 16 modules
RS-485
PLC
QTC1-40
QMC1
Maximum of 16 modules
Maximum of
16 units
QTC1-40
QMC1
Maximum of 16 modules
QTC1-40
QMC1

(Fig. 1.3.3-2)

1.4 Parameter Passing

The parameters are passed as follows.


Host computer
(1) Set and monitor the control module.
QMC1
(2) Receives sending data from the host computer.
(3) Returns response data to the host computer.
(4) Set and monitor the control module QTC1-□0.
QTC1-□0
(5) Receives the sending data from the QMC1 and controls it.
(6) Returns response data to the QMC1.

(Fig. 1.4-1)

2 Model

2.1 Model

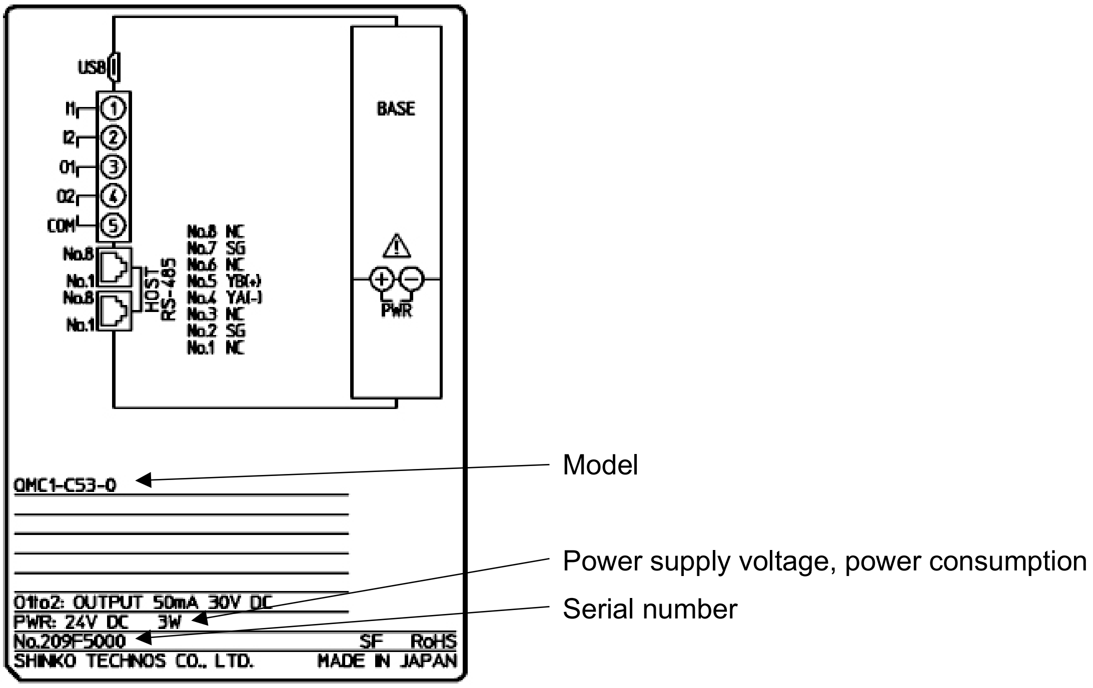
QMC1	-□□	□	-□	
Communication type	C4			RS-422A
	C5			RS-485 (*1)
Event input/output (Option)		0		No option
		1		Event input (4 points) (*2)
		2		Event output (4 points) (*2)
		3		Event input (2 points), Event output (2 points) (*2)
Communication protocol			0	Console selection (MODBUS RTU/SIF function) (*1)
			1	C series compatible

(*1) When using the SIF function to connect to a PLC manufactured by OMRON Corporation or KEYENCE CORPORATION, cannot be connected with RS-4855 communication method.
Only RS-422A communication type can be connected.

(*2): The plug side (wiring connector) of the event input / output connector is sold separately.

2.2 How to Read the Model Label

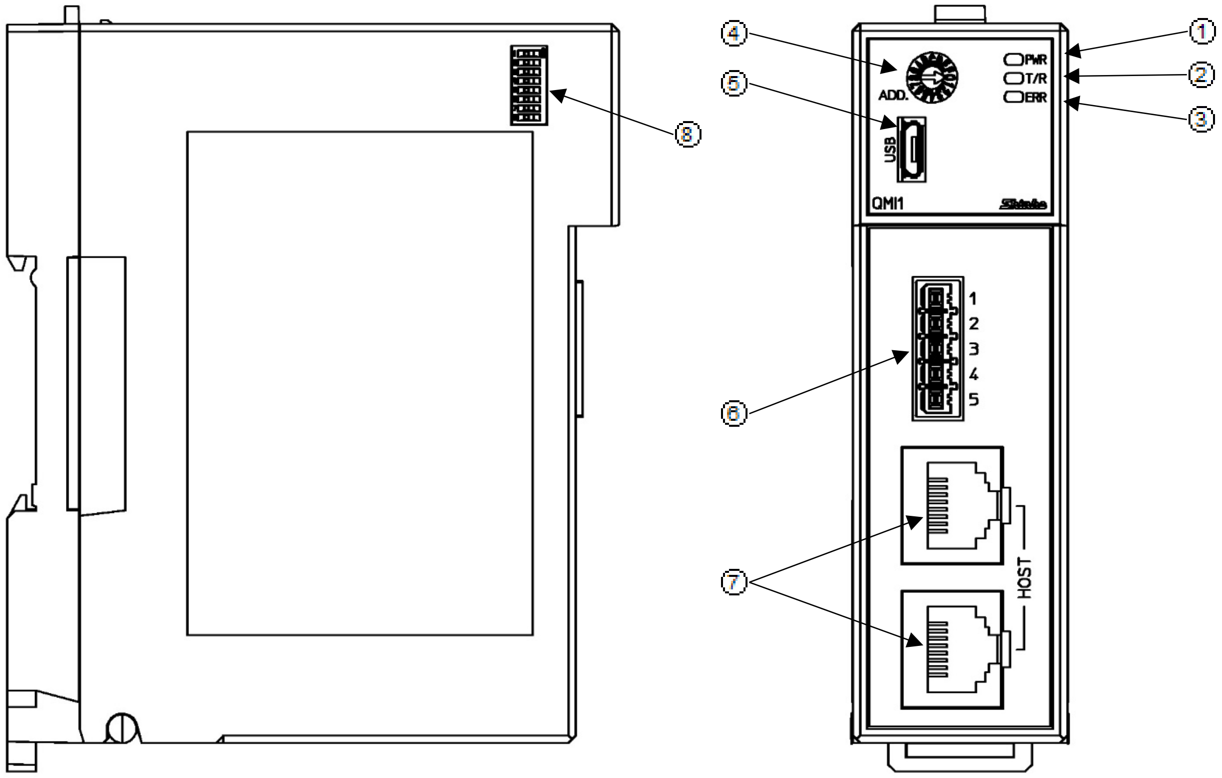
The model label is attached to the right side of this instrument.



USB
I1
I2
O1
O2
COM
1
2
3
4
5
No.8
No.1
No.8
No.1
HOST
RS-485
No.8 NC
No.7 SG
No.6 NC
No.5 YB(+)
No.4 YA(-)
No.3 NC
No.2 SG
No.1 NC
BASE
PWR
QMC1-C53-0
O1to2: OUTPUT 50mA 30V DC
PWR: 24V DC 3W
No.209F5000
SF RoHS
SHINKO TECHNOS CO., LTD.
MADE IN JAPAN
Model
Power supply voltage, power consumption
Serial number

(Fig. 2.2-1)

3 Name and Functions



(Fig. 3-1)

Operation indicator

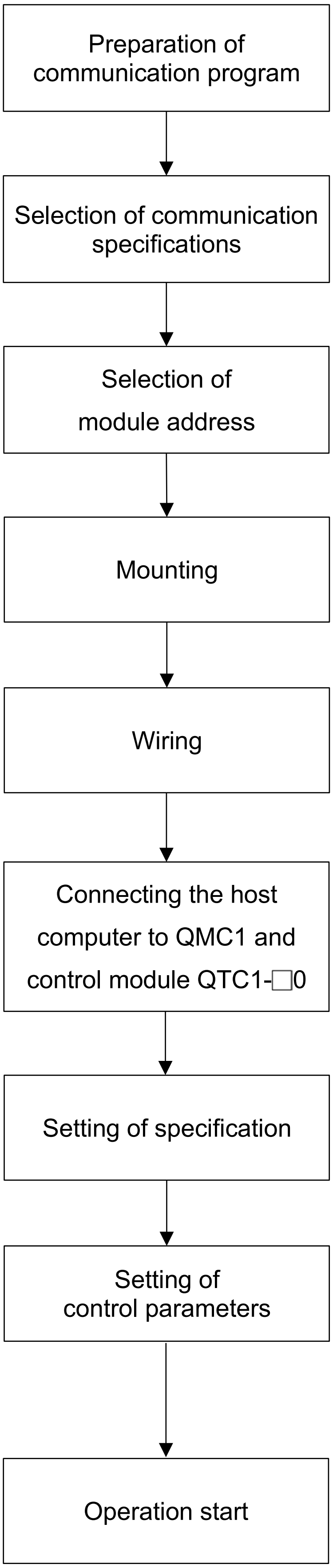
No.	Symbol (color)	Name and Function
①	PWR (Green)	**Power indicator** • Lights off (always): No power supply to the instrumen • Lights up (always): Power supply to the instrumen • Flashing for 500 ms (3 seconds): Warming up the instrument • Flashing for 500 ms (always): Non-volatile IC memory error
②	T/R (Yellow)	**Communication indicator** • Lights off (always): Communication error (no response) or USB communication • Flashing (slow): Communication error (reception error) • Flashing (fast): Communication is normal
③	ERR (Red)	**ERR indicator** • Lights off (always): No abnormality • Lights up (1 second): After warming up, communication abnormality with the connected module (e.g.) If the host computer or PLC sends data out of the set range, the ERR indicator will light up for 1 second depending on the negative acknowledgement from the connected module. • Flashing for 250 ms (always): when powered by bus power from the PC

Switch and connnector

No.	Symbol	Name and Function
④	ADD.	**Module address selection rotary switch** Rotary switch for module address selection. • QMC1-□□□-0 [Console selection (MODBUS RTU/SIF function)] The module address is the value of the selected rotary switch plus one. • QMC1-□□□-1 (C series compatible) The module address is the value of the selected rotary switch.
⑤	USB	**Console communication connector** Connector for console communication tool cable.
⑥		**Event input/output connector [0225-3705 (by DINKLE)] (Option)** Connector for ervent input or event output. Operation is selected by event input assignment selection or event output assignment selection.
⑦		**Serial communication connector [Modular jack (RJ45)]** Modular jack for connecting to the host computer or PLC. This modular jack is used for connection with the QMC1, when connecting two or more units.
⑧		**Communication specification selection dip switch** DIP switch for selecting communication specifications. Select communication speed, data bit, parity and stop bit.

4 Procedure Before Starting Operation

The procedure up to the start of operation when connecting to a host computer is shown below.


Preparation of communication program
Selection of communication specifications
Selection of module address
Mounting
Wiring
Connecting the host computer to QMC1 and control module QTC1-□0
Setting of specification
Setting of control parameters
Operation start

A communication program is required to connect and use the host computer.
Refer to “10 MODBUS Protocol (P.10-1 to P.10-5)”, to create the communication program.

Select the communication specifications such as communication speed, data bit, and parity.
Refer to “5.1 Selection of Communication Specifications (P.5-1, P.5-2)”.

Select the module address.
Refer to “5.1.2 Selection of Module Address (P.5-3)”.

Mount the QMC1 to the DIN rail.
Refer to “6.3 Mounting (P.6-3 to P.6-5)”.

Wire the QMC1.
Refer to “7.3 Wiring (P.7-5 to P.7-7)”.

Connect the QMC1 and control module QTC1-□0 to the host computer.
Refer to “7.4 Connection of QMC1 and Control Module QTC1-□0 to Host Computer (P.7-8, P.7-9)”.

Set the items of through USB and the event input/output items.
Refer to “8 Setting of Specification (P.8-4 to P.8-19)”.

Set QTC1-□0 control parameters such as SV and alarm.
Refer to “11 Communication Command List (P.11-1 to P.11-87)”.
When using with C series compatible, refer to “13.4 Communication Command List (P.13-6 to P.13-10)”.

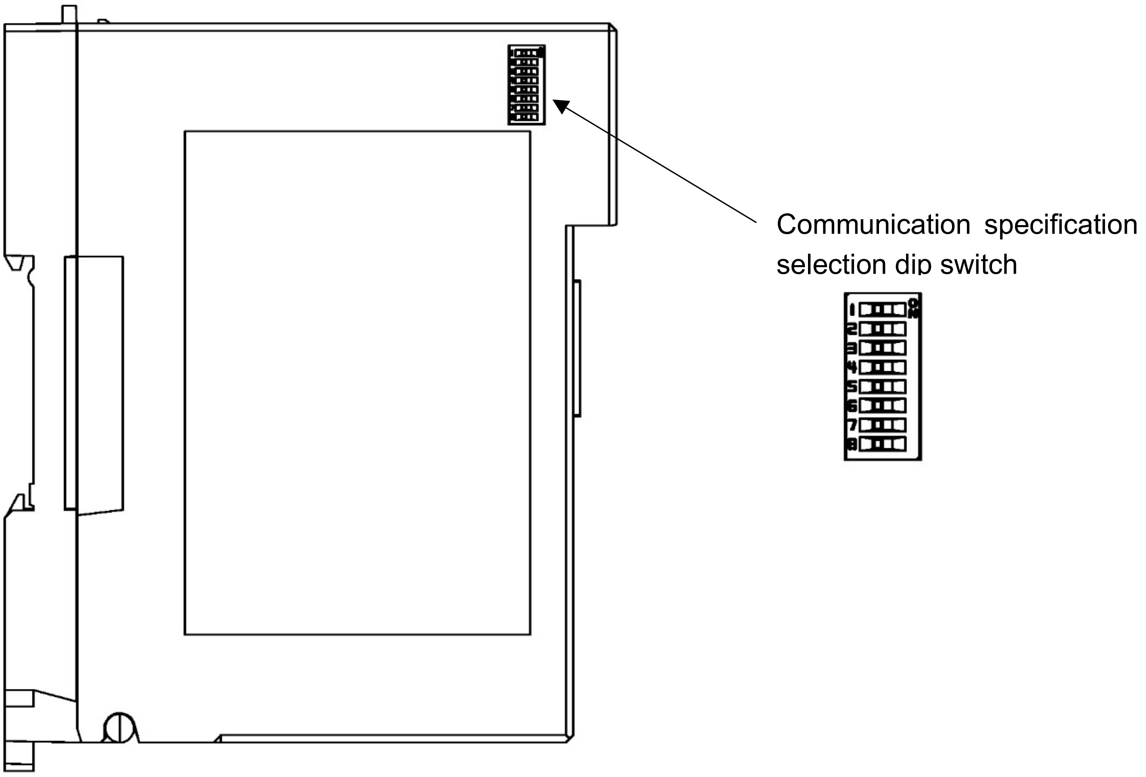
Send the control enable command and start operation.
Refer to “12 Operation (P.12-1 to P.12-7)”.

(Fig. 4-1)

5 Communication Parameter Setting

5.1 Selection of Communication Specifications

Use the communication specification selection dip switch on the left side of this instrument to select communication specifications.


Communication specification selection dip switch

(Fig. 5.1-1)

Select the communication speed, data bit, parity and stop bit.

All are off when shipped from the factory.

• Communication speed:	9600 bps
• Data bit:	8 bits
• Parity Enable/Disable:	Enable
• Parity Even / Odd:	Even
• Stop bit:	1 bit

(1) Communication speed

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

(2) Data bit

Communication specification selection dip switch	Data bit
3	
OFF	8 bits
ON	7 bits

(3) Parity Enable/Disable

Communication specification selection dip switch	Parity Enable/Disable
4	
OFF	Enable
ON	Disable

(4) Parity Even/Odd

Communication specification selection dip switch	Parity Even/Odd
5	
OFF	Even
ON	Odd

(5) Stop bit

Communication specification selection dip switch	Stop bit
6	
OFF	1 bit
ON	2 bits

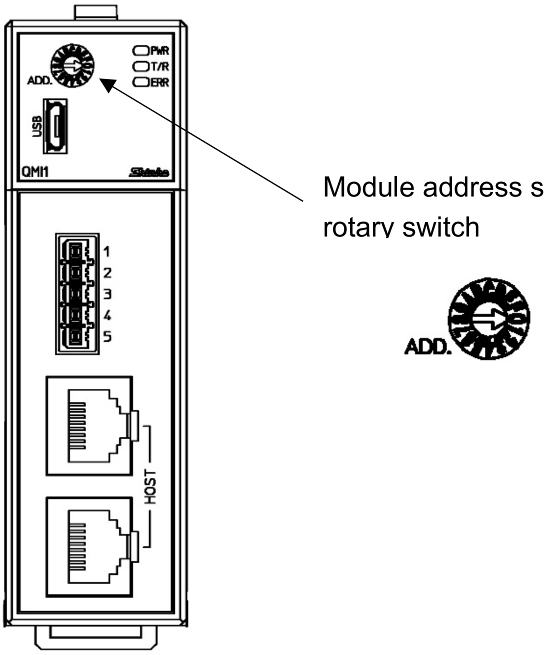
Dip switches No.7 and No.8 does not use. Leave it OFF.

5.2 Selection of Module Address

⚠ Caution

- The QMC1 module address selection is required to communicate with the host computer or PLC. The QTC1-20 or QTC1-40 module address selection is required to communicate with the QMC1.
- The module address of QMC1 differs depending on the model name.

The module address is selected with the rotary switch.



(Fig. 5.2-1)

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

The module address of QMC1 differs depending on the model name.

For QMC1-□□□-0 [Console selection (MODBUS RTU/SIF function)]

When using the SIF function, it is not necessary to select the module address.

Leave it at 0.

Module address: 0 to F (1 to 16)

Value of rotary switch	0	1		9	A	B		F
Module address	1	2		10	11	12		16

For QMC1-□□□-1 (C series compatible)

The value of the selected rotary switch becomes the module address.

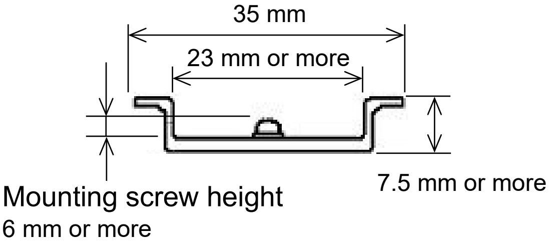
Module address: 0 to F (0 to 15)

Value of rotary switch	0	1		9	A	B		F
Module address	0	1		9	10	11		15

6 Mounting

⚠ Caution

- Do not connect QTC1-2P or QTC1-4P in the same unit.
- For the QMC1-□□□-1 (C series compatible), the maximum connection "modules / channels" is "5 modules / 20 channels".
- Mount the DIN rail horizontally.
- This instrument fits the following DIN rails.
  Top hat rail TH35 JIS C 2812-1988

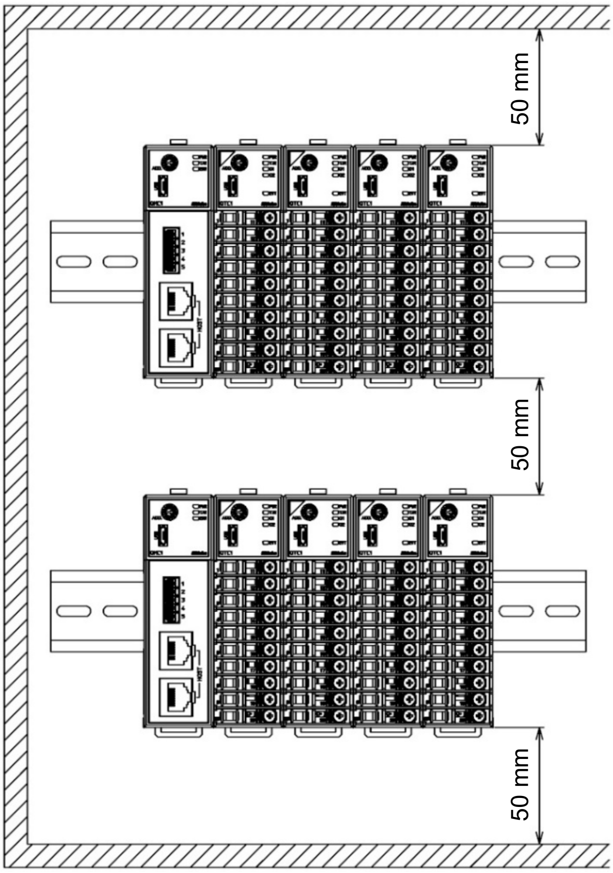


Width: 35 mm
Height: 7.5 mm or more
Groove width: 23 mm or more
DIN rail mounting screw height:
6 mm or more
(For DIN rail height 7.5 mm)

(Fig. 6-1)

- 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.

Spacing when QMC1 and QTC1-40 are connected



(Fig. 6-2)

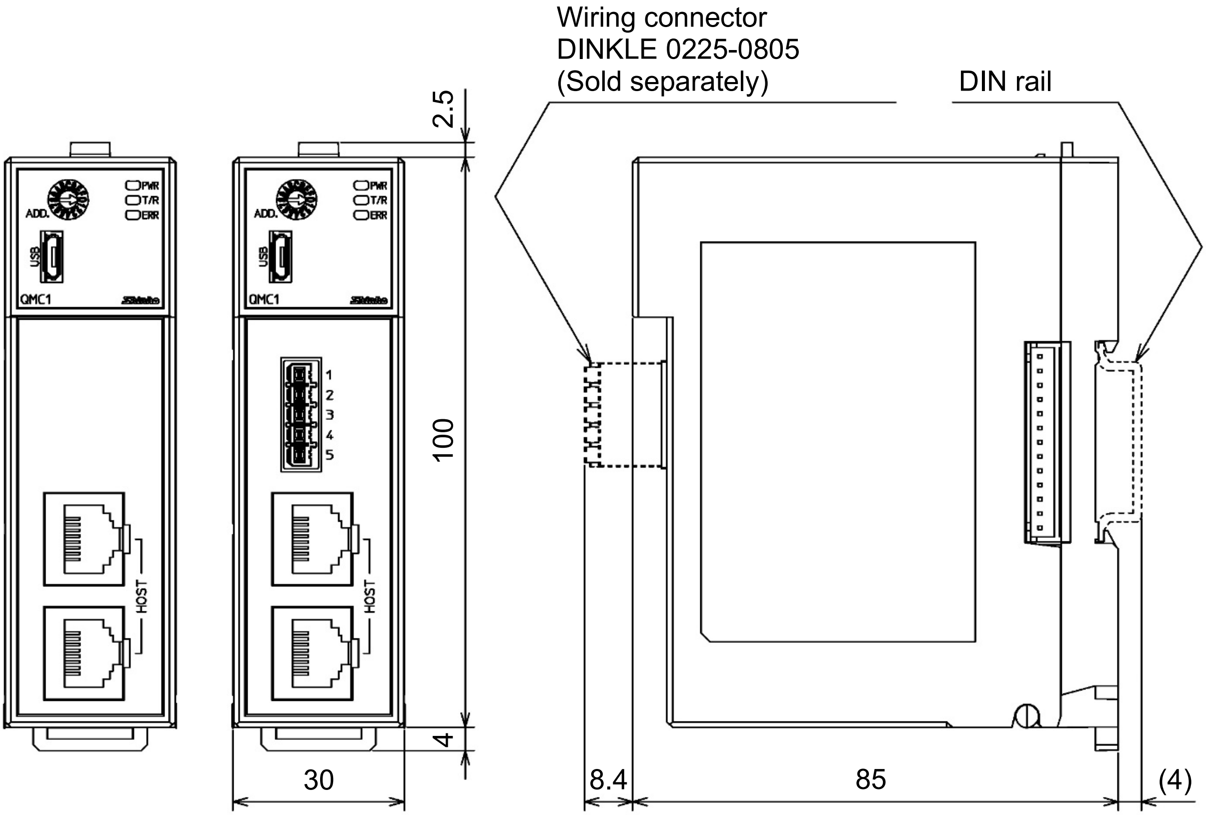
6.1 Selection of Location

[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 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.
  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.

6.2 External Dimensions (Unit: mm)



(Fig. 6.2-1)

6.3 Mounting

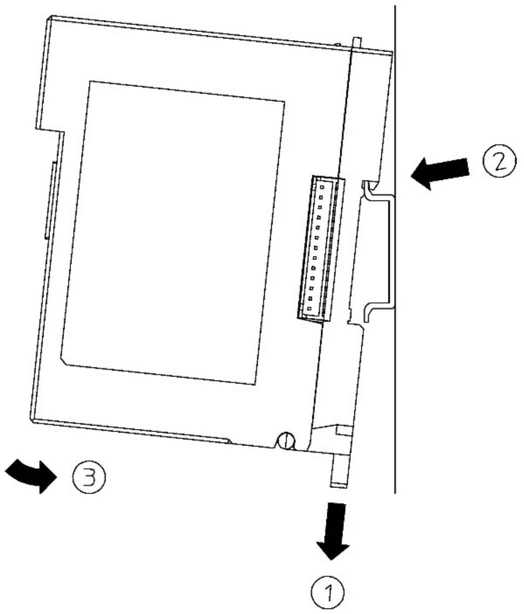
Mounting to the DIN rail

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.)

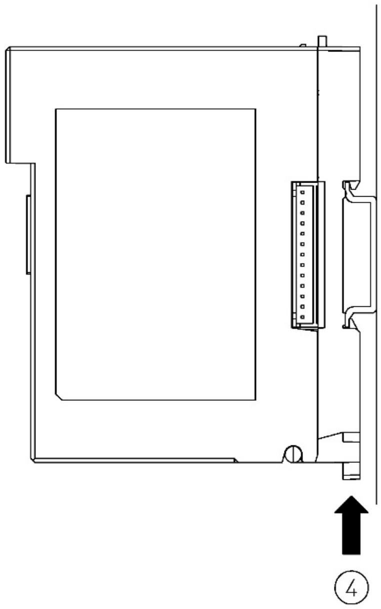
② Hook the part ② of this instrument onto the top of the DIN rail.

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.



(Fig. 6.3-1)

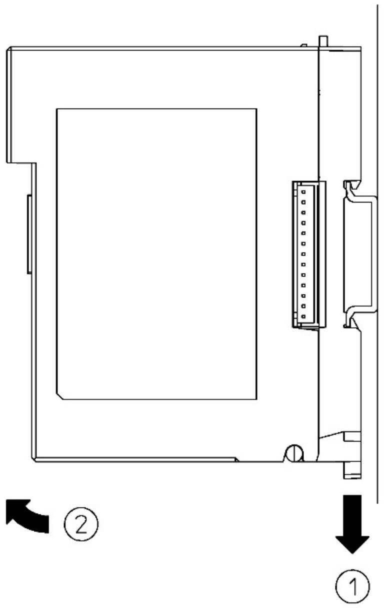


(Fig. 6.3-2)

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.



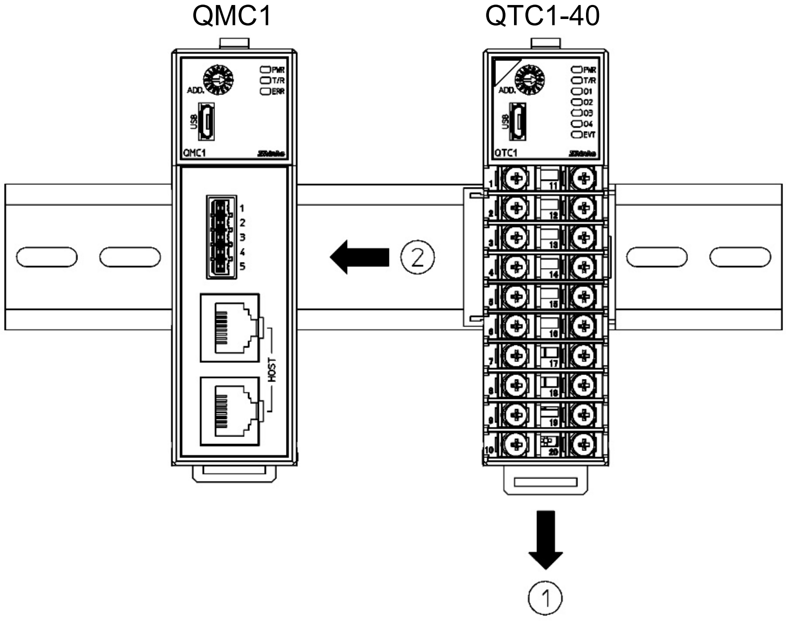
(Fig. 6.3-3)

Mounting multiple modules to the DIN rail

This section describes an example of mounting this instrument and QTC1-40 on the DIN rail.

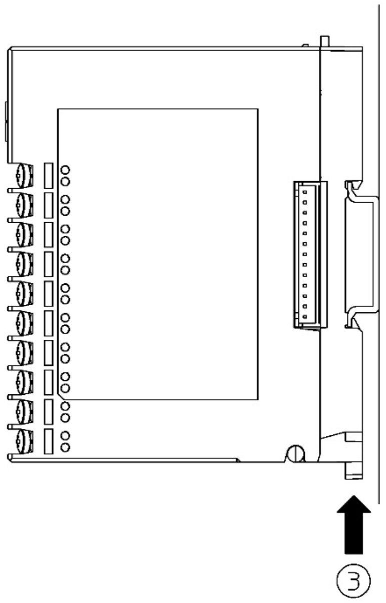
① Lower the lock lever of the QTC1-40, and mounting the QTC1-40 to the DIN rail.

② Slide the QTC1-40 to the left and connect the connectors to each other.



(Fig. 6.3-4)

③ Raise the lock lever of the QTC1-40.
Make sure it is fixed to the DIN rail.



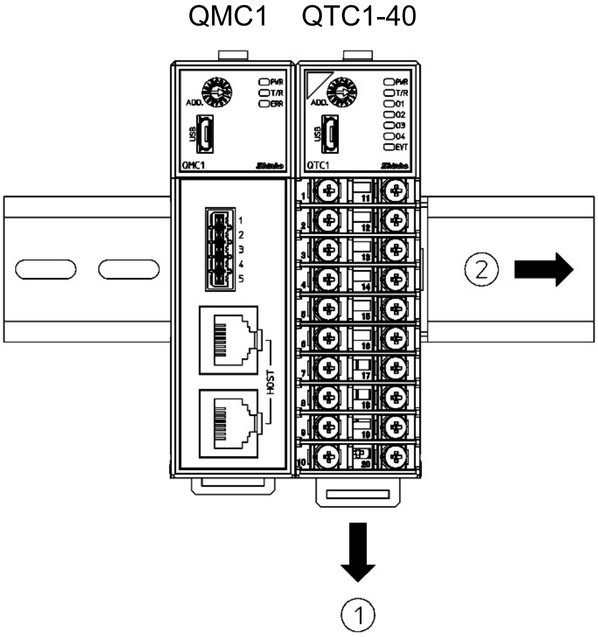
(Fig. 6.3-5)

Removal multiple modules from the DIN rail

This section describes an example of removing multiple QTC1-40 on the DIN rail.

① Insert a flat blade screwdriver into the lock lever of the QTC1-40 and lower the lock lever until it stops.

② Slide the QTC1-40 to the right side and disconnect it from the connector, then remove it from the DIN rail.



(Fig. 6.3-6)

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.

⚠ Caution

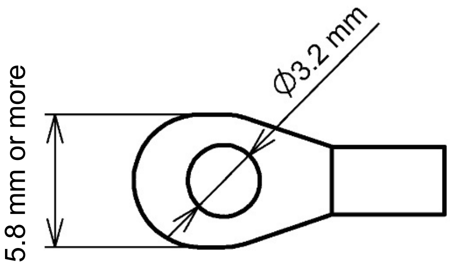
Do not connect QTC1-2P or QTC1-4P in the same unit.

7.1 Recommended Terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below.

Specify 0.5 N•m for the tightening torque.

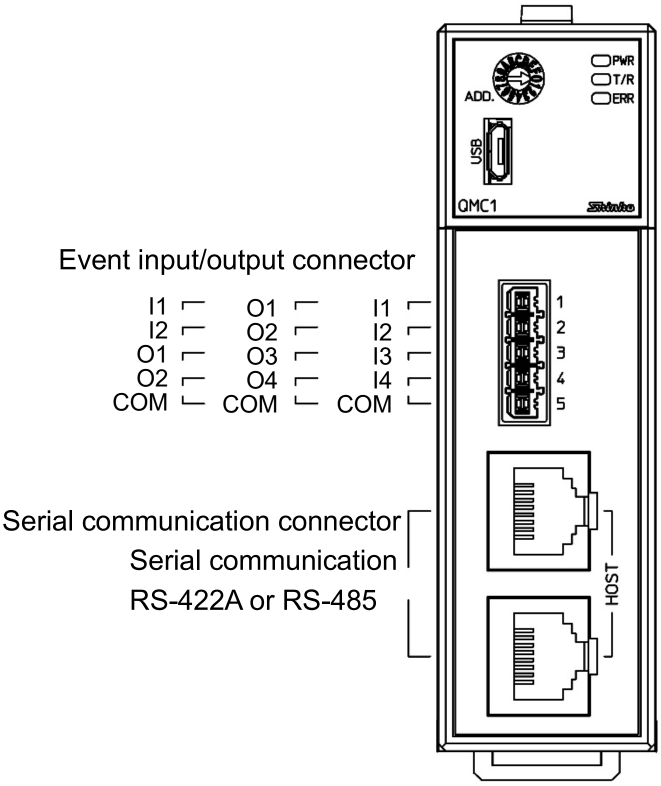
Solderless Terminal	Manufacturer	Model	Tightening torque
Ring-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3	0.5 N•m
	Japan Solderless Terminal MFG Co., Ltd.	V1.25-3	



(Fig. 7.1-1)

7.2 Pin Assignment and Terminal Arrangement

7.2.1 Pin Assignment of Event Input/Output (option) and Serial Communication Part


ADD.
PWR
T/R
ERR
USB
QMC1
Shinko
Event input/output connector
I1 I2 O1 O2 COM
O1 O2 O3 O4 COM
I1 I2 I3 I4 COM
1
2
3
4
5
Serial communication connector
Serial communication
RS-422A or RS-485
HOST

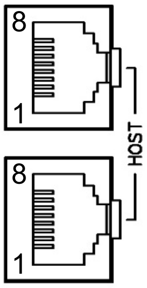
(Fig. 7.2.1-1)

(1) Pin assignment of event input / output connector

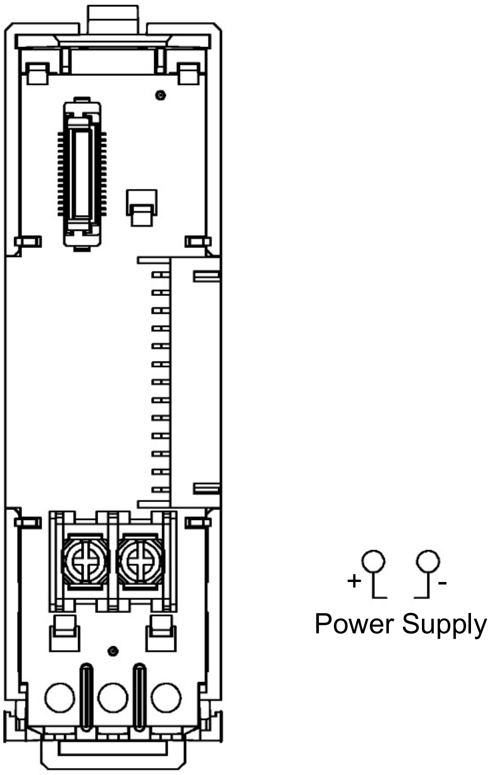
Model Pin No.	QMC1-□□1-□	QMC1-□□2-□	QMC1-□□3-□
1	I1 (Event input 1)	O1 (Event output 1)	I1 (Event input 1)
2	I2 (Event input 2)	O2 (Event output 2)	I2 (Event input 2)
3	I3 (Event input 3)	O3 (Event output 3)	O1 (Event output 1)
4	I4 (Event input 4)	O4 (Event output 4)	O2 (Event output 2)
5	COM	COM	COM

(2) Pin assignment of serial communication connector

Upper connector and Lower connector are common.

Model Pin No.		QMC1-C4□-□	QMC1-C5□-□
	8	NC	NC
	7	SG	SG
	6	RD(+)	NC
	5	SD(+)	YB(+)
	4	SD(-)	YA(-)
	3	RD(-)	NC
	2	SG	SG
	1	NC	NC

7.2.2 Power Supply Terminal Arrangement


+
-
Power Supply

(Fig. 7.2.2-1)

7.3 Wiring

7.3.1 Wiring for Power Supply

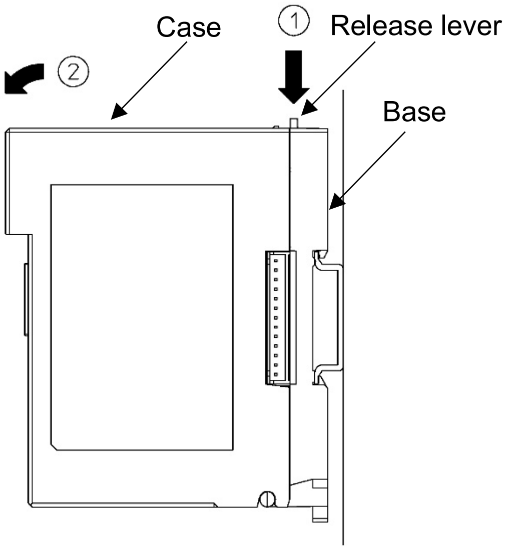
The terminal block for power supply and serial communication is located on the base of this instrument.

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.

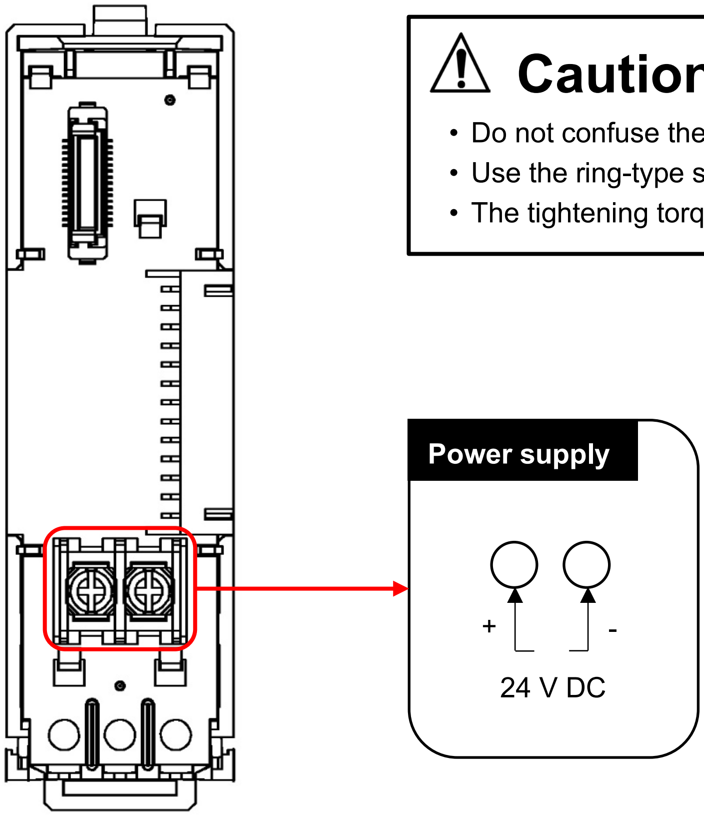


(Fig. 7.3.1-1)

(2) Wiring

⚠ **Caution**

- Do not confuse the polarities.
- Use the ring-type solderless terminal.
- The tightening torque should be 0.5 N•m.

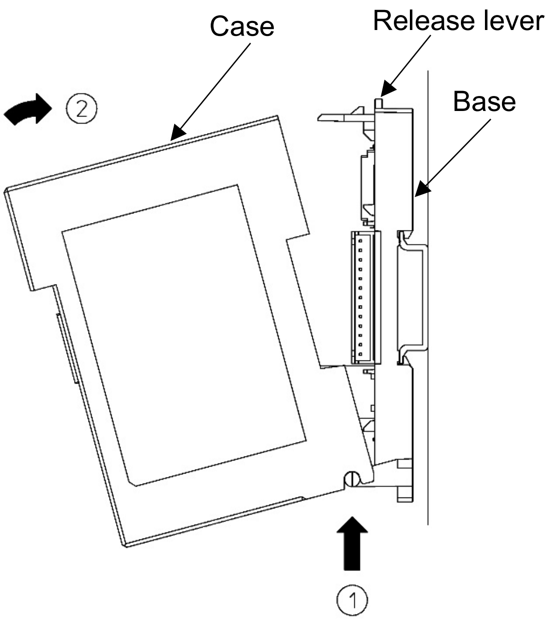


(Fig. 7.3.1-2)

(3) Case mounting

① Hook the case on the lower part ① of this instrument.

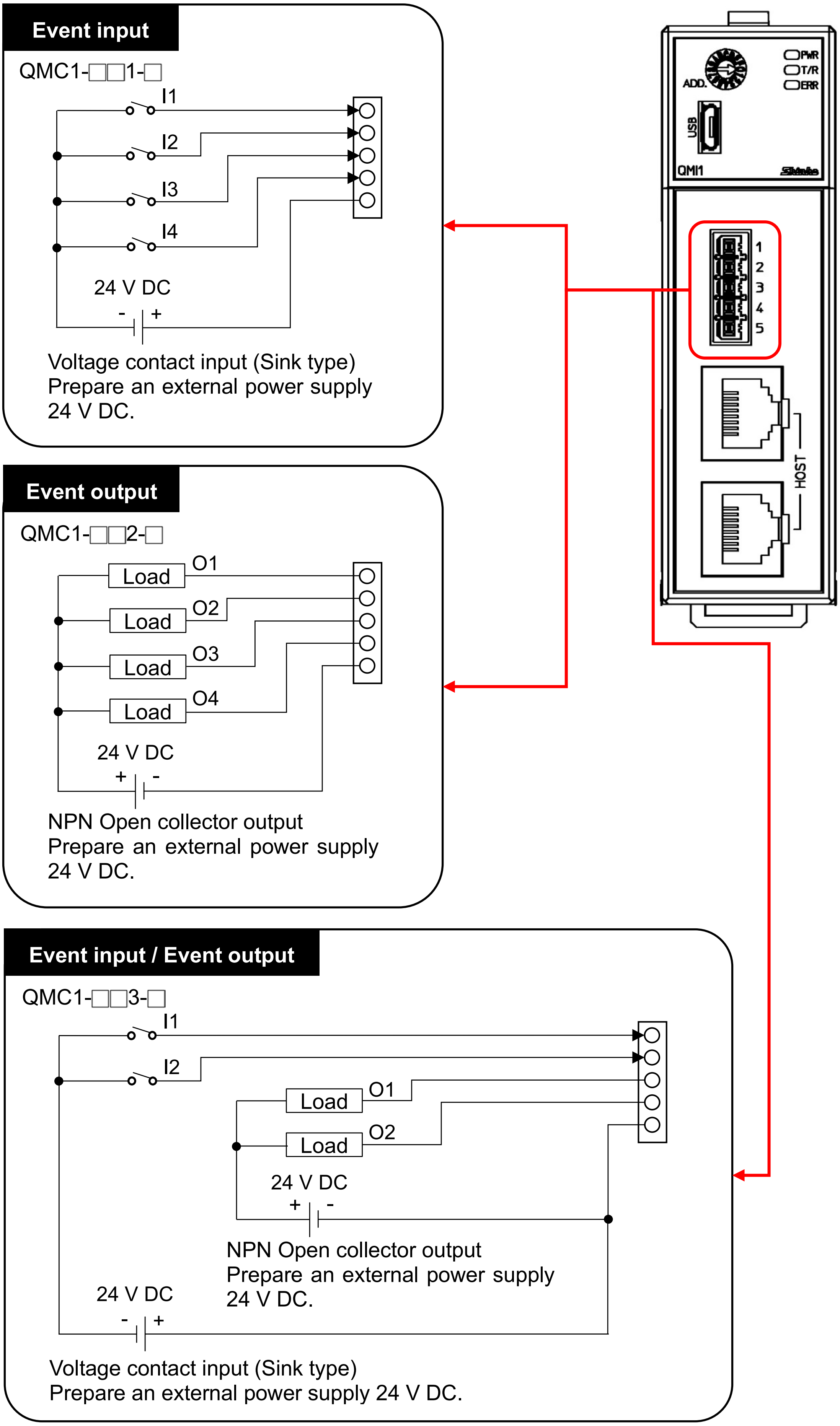
② Mount the case so that the lower part ① of this instrument is the fulcrum and covers the release lever.
There is a clicking sound.


Case
Release lever
Base
②
①

(Fig. 7.3.1-3)

7.3.2 Wiring for Event Input and Event Output

For wiring of the event input/output, use the wiring connector [0225-0805 (made by DINKLE)] (sold separately).


Event input
QMC1-□□1-□
I1
I2
I3
I4
24 V DC
-
+
Voltage contact input (Sink type)
Prepare an external power supply
24 V DC.
Event output
QMC1-□□2-□
Load
O1
O2
O3
O4
24 V DC
+
-
NPN Open collector output
Prepare an external power supply
24 V DC.
Event input / Event output
QMC1-□□3-□
I1
I2
Load
O1
O2
24 V DC
+
-
NPN Open collector output
Prepare an external power supply
24 V DC.
24 V DC
-
+
Voltage contact input (Sink type)
Prepare an external power supply 24 V DC.
ADD.
PWR
T/R
ERR
USB
QMI1
1
2
3
4
5
HOST

7.4 Connection of QMC1 and QTC1-□0 to Host Computer

⚠ **Caution**

Do not connect QTC1-2P or QTC1-4P in the same unit.

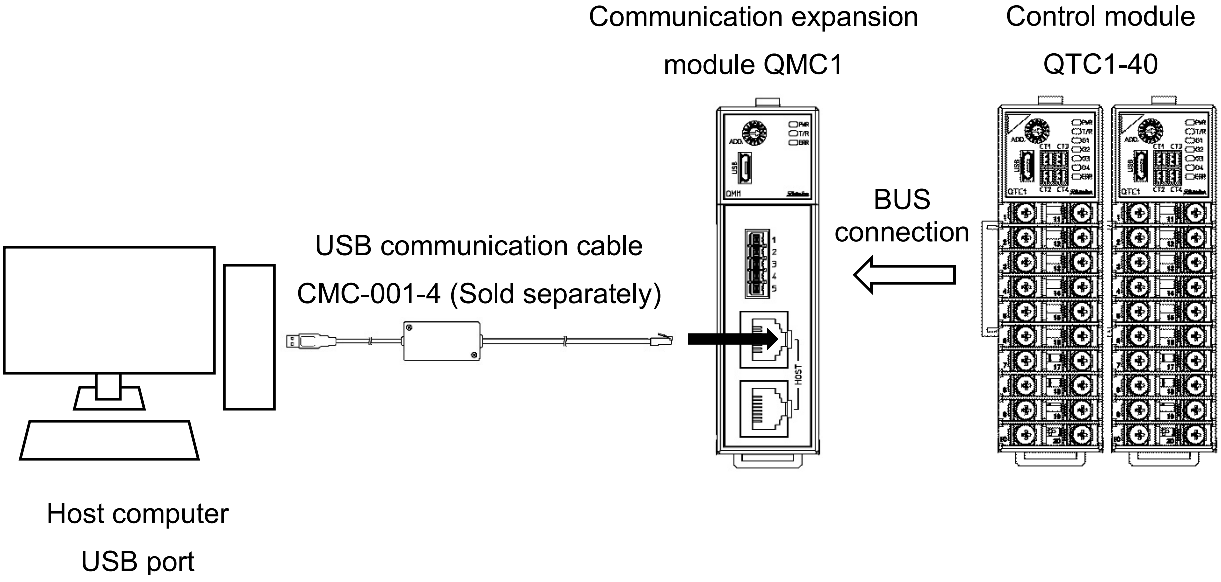
For the connection between the host computer - QMC1 and between QMC1 - QMC1, use the following communication cables (sold separately).

Between host computer - QMC1
USB Communication Cable (CMC-001-4) [USB - Modular]
Communication Cable (CQM-001) [Y terminal (C5, 3-wire) - Modular]
Communication Cable(CQM-002) [Y terminal (C4, 5-wire) - Modular]

Between QMC1 - QMC1
Communication Cable(CQQ-001) [Modular - Modular]

7.4.1 Wiring Example: When Using the USB Communication Cable CMC-001-4 (Sold separately)

Connection example of QMC1 and QTC1-40

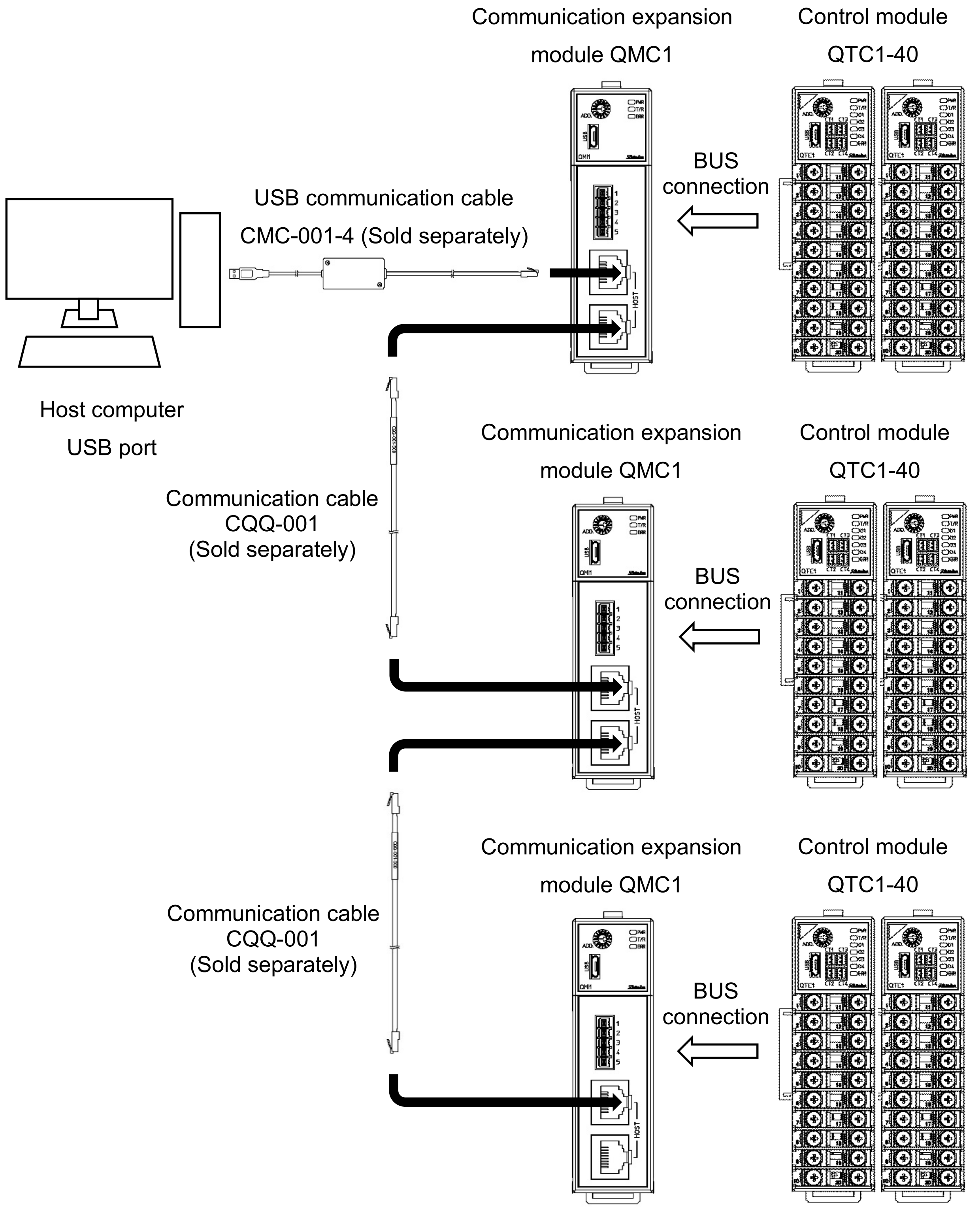

Communication expansion module QMC1
Control module QTC1-40
BUS connection
USB communication cable CMC-001-4 (Sold separately)
Host computer USB port

(Fig. 7.4.1-1)

7.4.2 Wiring Example: When Connecting Multiple Units

Use the communication cable CQQ-001 (sold separately) to connect the units.

Connection example of QMC1 and QTC1-40


Communication expansion module QMC1
Control module QTC1-40
BUS connection
USB communication cable CMC-001-4 (Sold separately)
Host computer USB port
Communication expansion module QMC1
Control module QTC1-40
BUS connection
Communication cable CQQ-001 (Sold separately)
Communication expansion module QMC1
Control module QTC1-40
BUS connection
Communication cable CQQ-001 (Sold separately)
HOST
QMC1
QTC1
USB
ADD.

(Fig. 7.4.2-1)

8 Setting of Specification

Set the specifications.

This section describes how to set specifications using console software (SWC-QMC101M).

8.1 Preparation

8.1.1 Preparation of USB Communication Cable and Console Software

Please prepare the USB communication cable and the console software.

- USB communication cable
  USB-micro USB Type-B (commercial item)
- Console software (SWC-QMC101M)
  Please download from our website and install.
  Click https://shinko-technos.co.jp/e/ → Support/Download → Software

8.1.2 Connecting to Host Computer

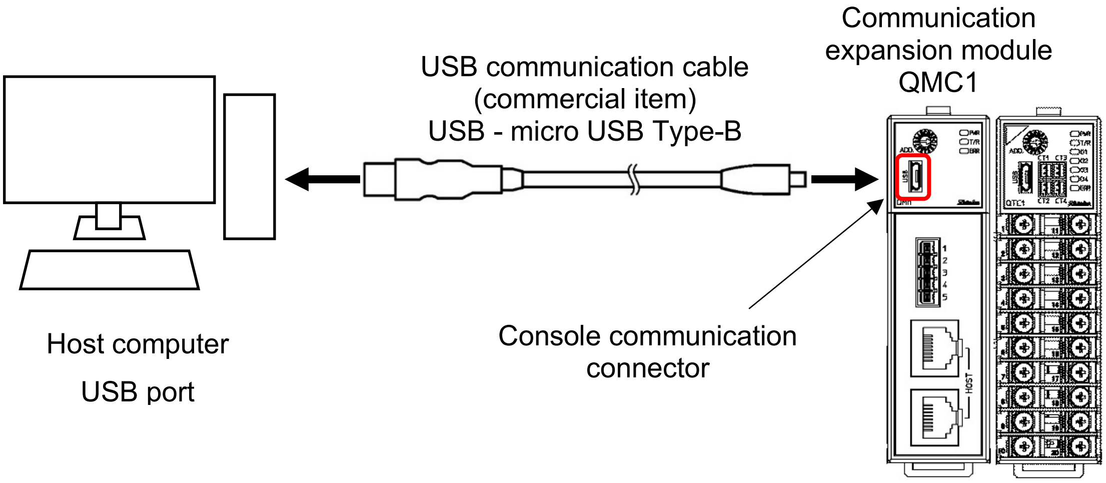
⚠ Caution

Do not use the logging function of the console software when communicating by connecting a USB communication cable.

(1) Connect the micro USB Type-B side of the USB communication cable to the console communication connector of this instrument.

(2) Connect the USB plug of the USB communication cable to the USB port of the host computer.

Connection example of QMC1 and QTC1-40


Communication expansion module QMC1
USB communication cable (commercial item) USB - micro USB Type-B
Host computer USB port
Console communication connector

(Fig. 8.1.2-1)

(3) Checking the COM port number

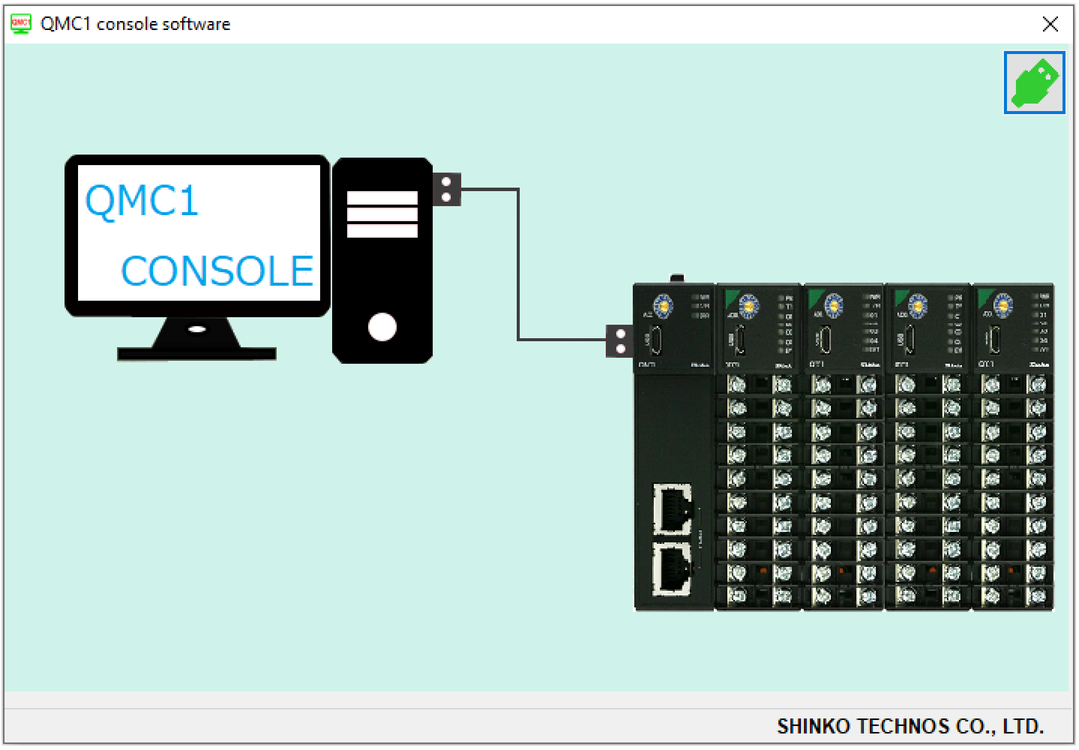
Follow the procedure below to check the COM port number.

① Right-click “Start” → Click “Device manager” from menu.

② When “USB Serial Port (COM3)” is displayed in “Port (COM and LPT)”, the COM port is assigned to No. 3.

Check the COM port number, and then close “Device Manager”.

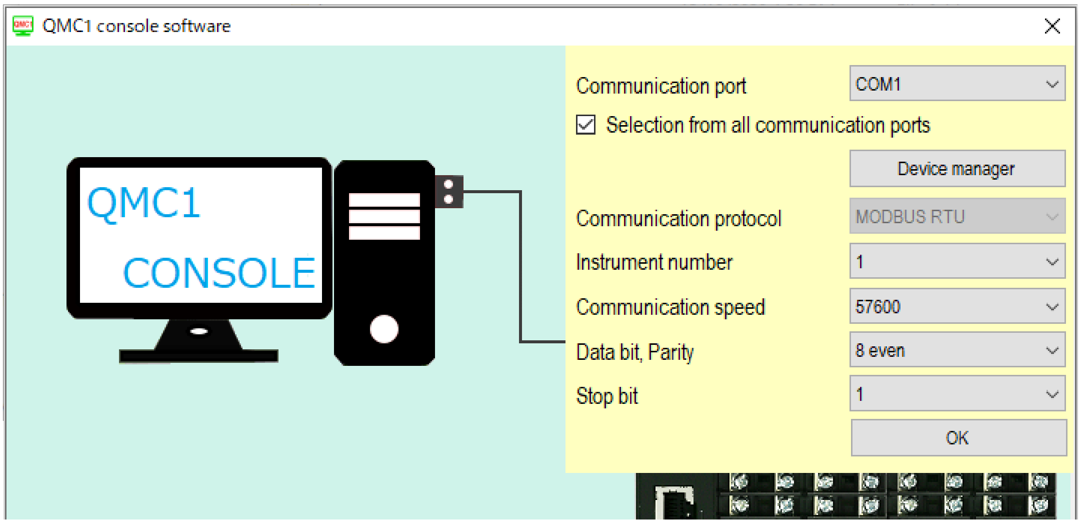
③ Start the console software (SWC-QMC101M).


QMC1 console software
QMC1
CONSOLE
SHINKO TECHNOS CO., LTD.

(Fig. 8.1.2-2)

④ When start the console software for the first time, the communication condition setting screen is displayed.

If the communication condition settings have been completed, proceed to 7.


QMC1 console software
QMC1
CONSOLE
Device manager
OK

Communication port: COM1

☑ Selection from all communication ports

Communication protocol: MODBUS RTU

Instrument number: 1

Communication speed: 57600

Data bit, Parity: 8 even

Stop bit: 1

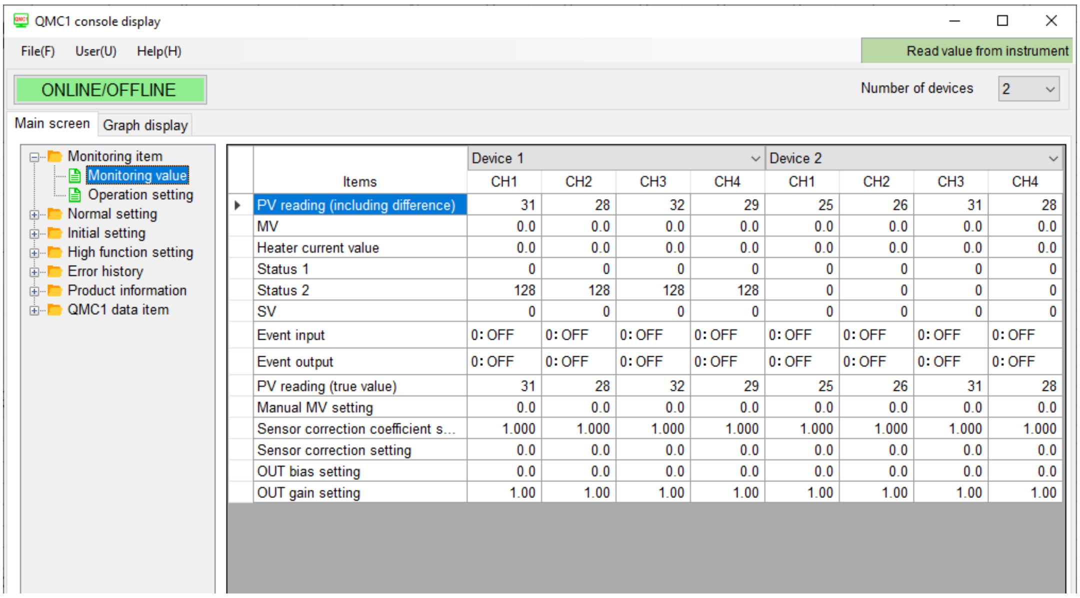
(Fig. 8.1.2-3)

⑤ Set the communication condition as shown below.

Setup Items	Setting Value
Communication port	Select the COM port number confirmed in ②.
Communication protocol	MODBUS RTU

⑥ Click [OK].

⑦ Display the Main screen.

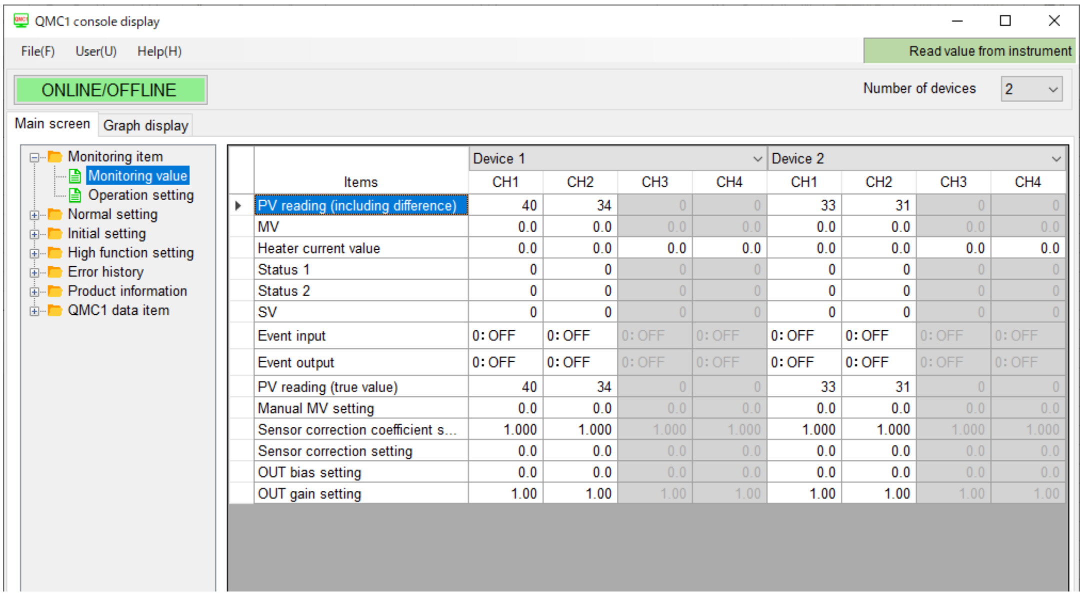

QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Initial setting
High function setting
Error history
Product information
QMC1 data item

Number of devices: 2

Items	Device 1 CH1	Device 1 CH2	Device 1 CH3	Device 1 CH4	Device 2 CH1	Device 2 CH2	Device 2 CH3	Device 2 CH4
PV reading (including difference)	31	28	32	29	25	26	31	28
MV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heater current value	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Status 1	0	0	0	0	0	0	0	0
Status 2	128	128	128	128	0	0	0	0
SV	0	0	0	0	0	0	0	0
Event input	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
Event output	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
PV reading (true value)	31	28	32	29	25	26	31	28
Manual MV setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sensor correction coefficient s...	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sensor correction setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OUT bias setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OUT gain setting	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(Fig. 8.1.2-4)

When QTC1-20 is connected, the data of CH3 and CH4 which cannot be set, are grayed out.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Initial setting
High function setting
Error history
Product information
QMC1 data item

Number of devices: 2

Items	Device 1 CH1	Device 1 CH2	Device 1 CH3	Device 1 CH4	Device 2 CH1	Device 2 CH2	Device 2 CH3	Device 2 CH4
PV reading (including difference)	40	34	0	0	33	31	0	0
MV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heater current value	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Status 1	0	0	0	0	0	0	0	0
Status 2	0	0	0	0	0	0	0	0
SV	0	0	0	0	0	0	0	0
Event input	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
Event output	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
PV reading (true value)	40	34	0	0	33	31	0	0
Manual MV setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sensor correction coefficient s...	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sensor correction setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OUT bias setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OUT gain setting	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(Fig. 8.1.2-5)

The specifications are ready.

8.2 Specification Setting

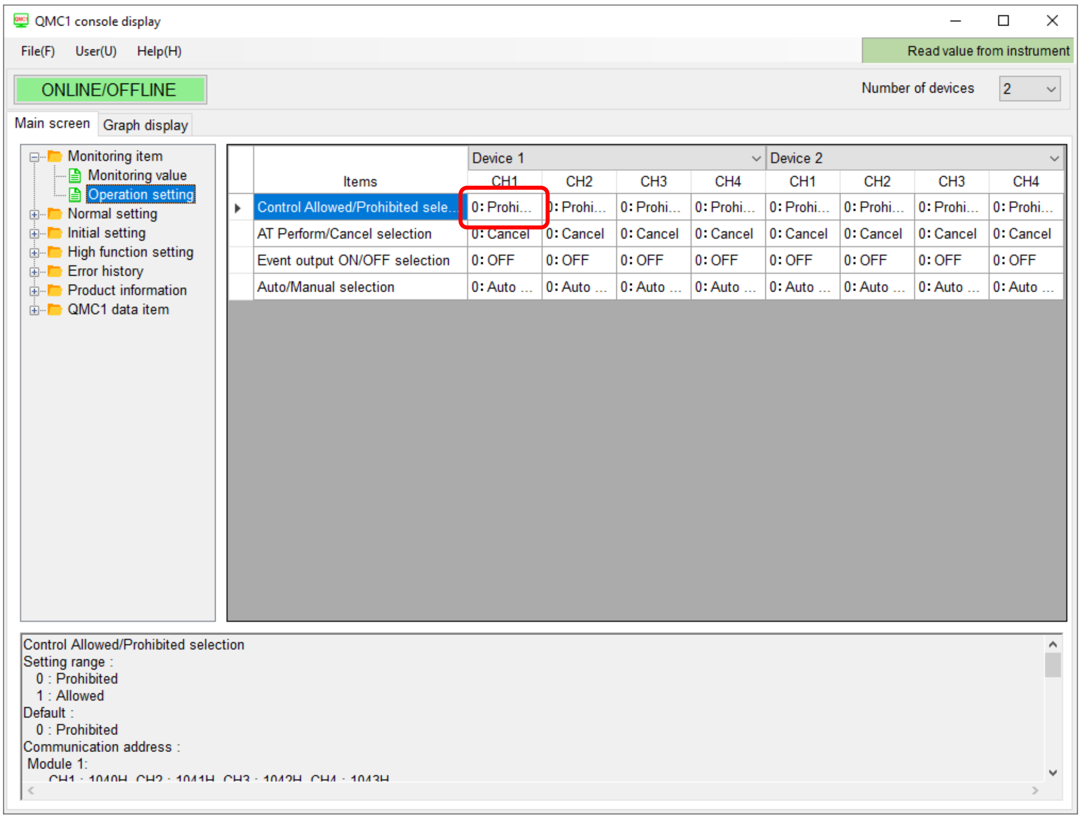
Basic operation of specification setting

Before setting the specifications, how to select the selection item and how to set the setting item are explained.

Select the selection item

This section explains how to select the selection item by using “Control Allowed/Prohibited selection” as an example.

Click the selection item.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Initial setting
High function setting
Error history
Product information
QMC1 data item

Items	Device 1 CH1	Device 1 CH2	Device 1 CH3	Device 1 CH4	Device 2 CH1	Device 2 CH2	Device 2 CH3	Device 2 CH4
Control Allowed/Prohibited sele...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...
AT Perform/Cancel selection	0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel
Event output ON/OFF selection	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
Auto/Manual selection	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...

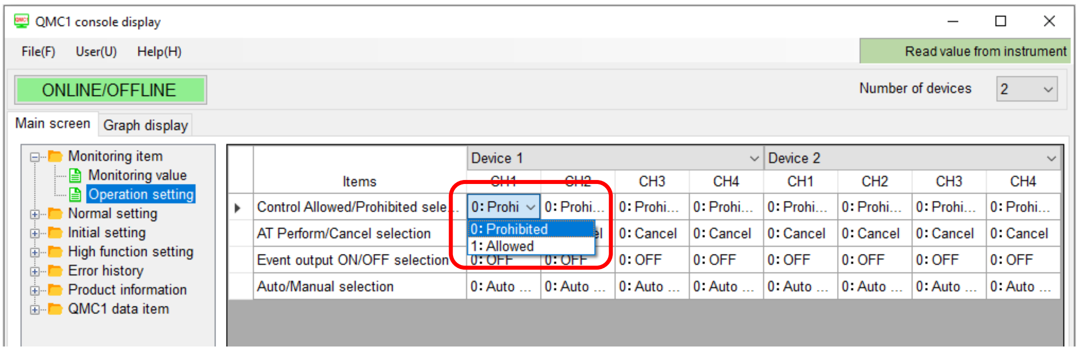
Control Allowed/Prohibited selection
Setting range :
0 : Prohibited
1 : Allowed
Default :
0 : Prohibited
Communication address :
Module 1:
CH1 : 1040H CH2 : 1041H CH3 : 1042H CH4 : 1043H

(Fig. 8.2-1)

Display the selection item list.

Click “0: Prohibited” or “1: Allowed”.

Transfer the selected contents to this instrument.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Initial setting
High function setting
Error history
Product information
QMC1 data item
0: Prohibited
1: Allowed

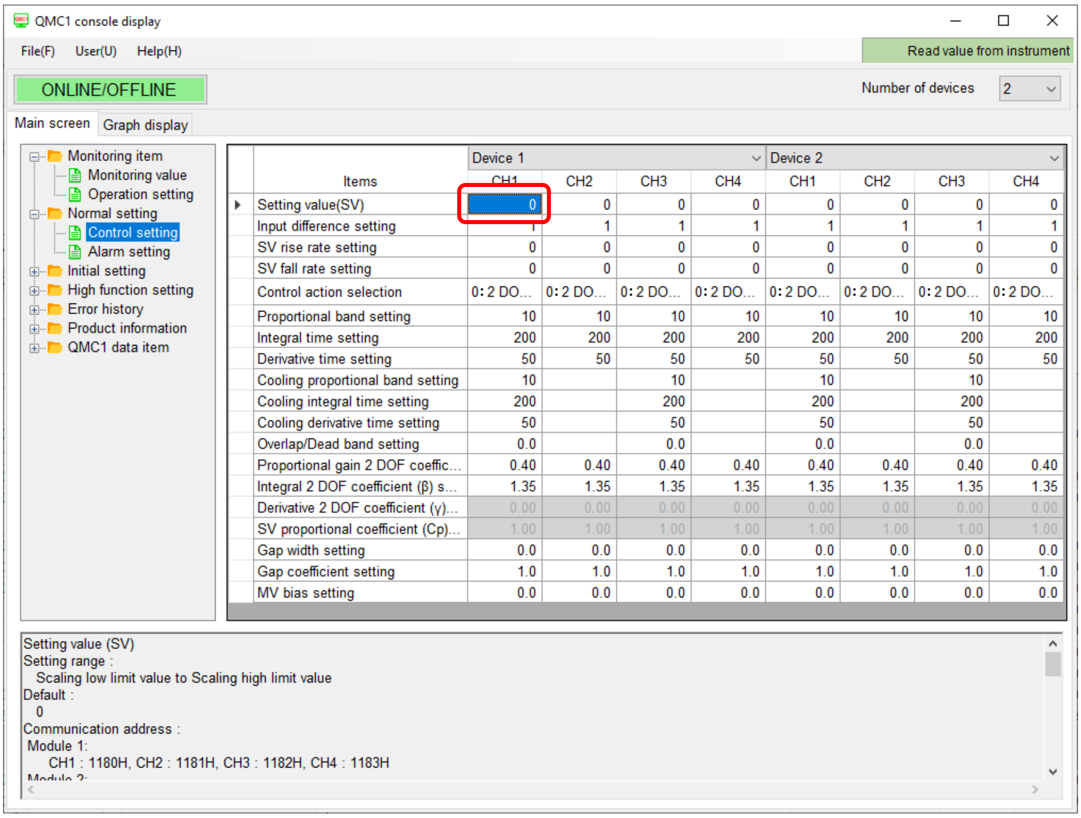
Items	Device 1 CH1	Device 1 CH2	Device 1 CH3	Device 1 CH4	Device 2 CH1	Device 2 CH2	Device 2 CH3	Device 2 CH4
Control Allowed/Prohibited sele...	0: Prohi	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...	0: Prohi...
AT Perform/Cancel selection			0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel	0: Cancel
Event output ON/OFF selection	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF	0: OFF
Auto/Manual selection	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...	0: Auto ...

(Fig. 8.2-2)

Set the setting item

This section explains how to set the setting item by using “Stting value (SV)” as an example.

Click on the setting value.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Control setting
Alarm setting
Initial setting
High function setting
Error history
Product information
QMC1 data item

	Device 1				Device 2			
Items	CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH4
Setting value(SV)	0	0	0	0	0	0	0	0
Input difference setting	1	1	1	1	1	1	1	1
SV rise rate setting	0	0	0	0	0	0	0	0
SV fall rate setting	0	0	0	0	0	0	0	0
Control action selection	0: 2 DO...	0: 2 DO...	0: 2 DO...	0: 2 DO...	0: 2 DO...	0: 2 DO...	0: 2 DO...	0: 2 DO...
Proportional band setting	10	10	10	10	10	10	10	10
Integral time setting	200	200	200	200	200	200	200	200
Derivative time setting	50	50	50	50	50	50	50	50
Cooling proportional band setting	10		10		10		10	
Cooling integral time setting	200		200		200		200	
Cooling derivative time setting	50		50		50		50	
Overlap/Dead band setting	0.0		0.0		0.0		0.0	
Proportional gain 2 DOF coeffic...	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Integral 2 DOF coefficient (β) s...	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Derivative 2 DOF coefficient (γ)...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SV proportional coefficient (Cp)...	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Gap width setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gap coefficient setting	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MV bias setting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Setting value (SV)
Setting range :
Scaling low limit value to Scaling high limit value
Default :
0
Communication address :
Module 1:
CH1 : 1180H, CH2 : 1181H, CH3 : 1182H, CH4 : 1183H

(Fig. 8.2-3)

Display the numeric keypad screen.

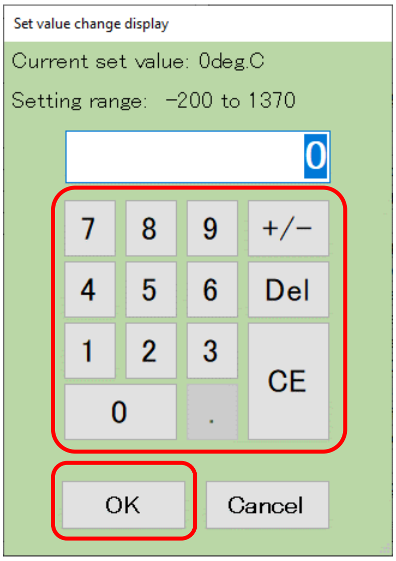
The current setting value and setting range are displayed on the numeric keypad screen.

Set within the setting range.

Input the setting value, and click [OK]. (*)

Transfer the setting value to this instrument.

(*): The setting value can also be entered from the keyboard of the host computer.


Set value change display
7
8
9
+/−
4
5
6
Del
1
2
3
CE
0
.
OK
Cancel

Current set value: 0deg.C

Setting range: −200 to 1370

0

(Fig. 8.2-4)

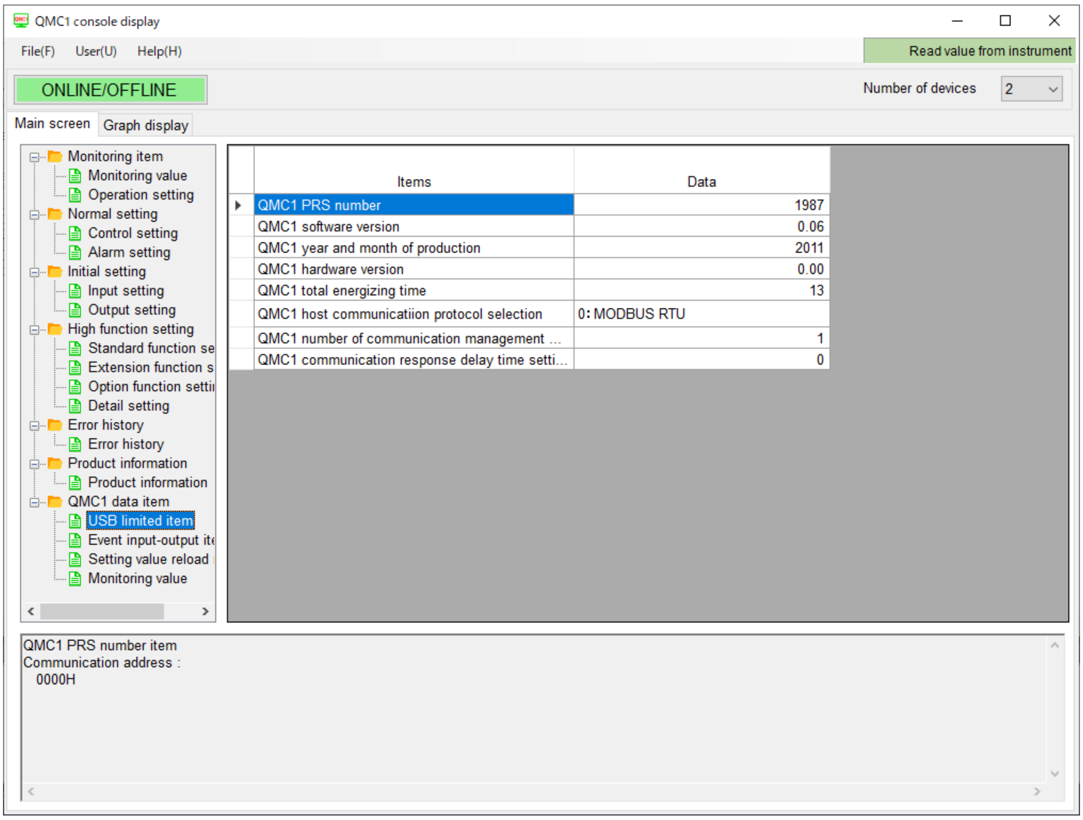
8.2.1 Setting Items of through USB

Display the software version, manufacturing date, total energizing time, etc. of this instrument.

Host communication protocol, number of communication management modules and communication response delay time.

Click [Main screen] tab → [QMC1 data item] → [USB limited item].

Display the USB limited item screen.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Control setting
Alarm setting
Initial setting
Input setting
Output setting
High function setting
Standard function se
Extension function s
Option function setti
Detail setting
Error history
Error history
Product information
Product information
QMC1 data item
USB limited item
Event input-output it
Setting value reload
Monitoring value

Items	Data
QMC1 PRS number	1987
QMC1 software version	0.06
QMC1 year and month of production	2011
QMC1 hardware version	0.00
QMC1 total energizing time	13
QMC1 host communicatiion protocol selection	0: MODBUS RTU
QMC1 number of communication management ...	1
QMC1 communication response delay time setti...	0

QMC1 PRS number item
Communication address :
0000H

(Fig. 8.2.1-1)

Item	Description	Product information example
QMC1 PRS number	Reads the PRS number of this instrument.	1987: QMC1
QMC1 software version	Reads the software version of this instrument.	2: Ver. 0.02
QMC1 year and month of production	Reads the manufacturing date of this instrument.	2011: November 2020
QMC1 hardware version	Reads the hardware version of this instrument. Ver. 0.00: 0000H	0: Ver. 0.00
QMC1 total energizing time	Reads the total energizing time of this instrument. It can be used to check the product life of this instrument. 1 hour/1 count	48: 48 hours

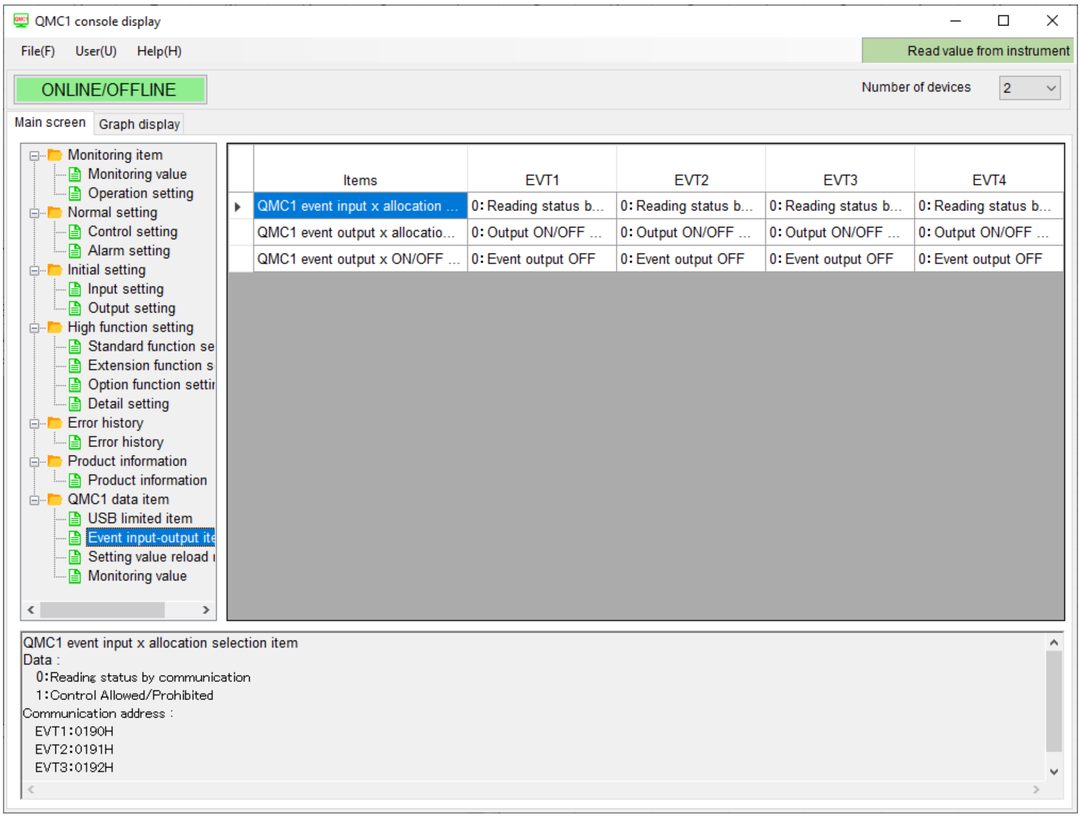
Setting item	Description and setting range	Factory default
QMC1 host communication protocol selection	Select the host communication protocol of this instrument. Selection item: 0: MODBUS RTU 1: Made by Mitsubishi Electric Corporation D register QR/QW 2: Made by Mitsubishi Electric Corporation R register QR/QW 3: Made by Mitsubishi Electric Corporation D register WR/WW 4: Made by Mitsubishi Electric Corporation R register WR/WW 5: Made by OMRON Corporation DM register FINS command 6: Made by KEYENCE CORPORATION DM register RDS/WRS	0: MODBUS RTU
QMC1 number of communication management modules setting	Set the number of modules managed by this instrument. Setting range: 1 to 16 modules	1 module
QMC1 communication response delay time setting	Set the delay time for this instrument to return a response after receiving a command from the host. Setting range: 0 to 1000 ms [Additional Explanation] Set the communication response delay time of the connected QTC1-□0 to 0 ms.	0 ms

8.2.2 Setting Event Input / Output Items

Set the event input/output items such as event input allocation and event output allocation.

Click [Main screen] tab → [QMC1 data item] → [Event input-output item].

Display the Event input-output item screen.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Control setting
Alarm setting
Initial setting
Input setting
Output setting
High function setting
Standard function se
Extension function s
Option function settir
Detail setting
Error history
Error history
Product information
Product information
QMC1 data item
USB limited item
Event input-output ite
Setting value reload i
Monitoring value

Items	EVT1	EVT2	EVT3	EVT4
QMC1 event input x allocation ...	0: Reading status b...	0: Reading status b...	0: Reading status b...	0: Reading status b...
QMC1 event output x allocatio...	0: Output ON/OFF ...	0: Output ON/OFF ...	0: Output ON/OFF ...	0: Output ON/OFF ...
QMC1 event output x ON/OFF ...	0: Event output OFF	0: Event output OFF	0: Event output OFF	0: Event output OFF

QMC1 event input x allocation selection item
Data :
 0:Reading status by communication
 1:Control Allowed/Prohibited
Communication address :
 EVT1:0190H
 EVT2:0191H
 EVT3:0192H

(Fig. 8.2.2-1)

Setting item	Description, setting range and selection item	Factory default
QMC1 Event input 1 allocation selection item	Select the event input 1 allocation of this instrument. Selection item: 0: Read status by communication It can be used for any operation by reading the event input 1 status flag. When event input 1 is turned OFF, 0 is set in the event input 1 status flag, and when event input 1 is turned ON, 1 is set in the event input 1 status flag. 1: Control Allowed/Prohibited Control is enabled when event input 1 is turned ON, and control is disabled when event input 1 is turned OFF for all connected QTC1-□0 channels. However, if control is enabled / disabled by the event input of QTC1-□0, the event input of QTC1-□0 has priority.	0: Read status by communication
QMC1 Event input 2 allocation selection item	Select the event input 2 allocation of this instrument. Selection item: 0: Read status by communication It can be used for any operation by reading the event input 2 status flag. When event input 2 is turned OFF, 0 is set in the event input 2 status flag, and when event input 2 is turned ON, 1 is set in the event input 2 status flag. 1: Control Allowed/Prohibited Control is enabled when event input 2 is turned ON, and control is disabled when event input 2 is turned OFF for all connected QTC1-□0 channels. However, if control is enabled / disabled by the event input of QTC1-□0, the event input of QTC1-□0 has priority.	0: Read status by communication

Setting item	Description, setting range and selection item	Factory default
QMC1 Event input 3 allocation selection item	Select the event input 3 allocation of this instrument. Selection item: 0: Read status by communication It can be used for any operation by reading the event input 3 status flag. When event input 3 is turned OFF, 0 is set in the event input 3 status flag, and when event input 3 is turned ON, 1 is set in the event input 3 status flag. 1: Control Allowed/Prohibited Control is enabled when event input 3 is turned ON, and control is disabled when event input 3 is turned OFF for all connected QTC1-□0 channels. However, if control is enabled / disabled by the event input of QTC1-□0, the event input of QTC1-□0 has priority.	0: Read status by communication
QMC1 Event input 4 allocation selection item	Select the event input 4 allocation of this instrument. Selection item: 0: Read status by communication It can be used for any operation by reading the event input 4 status flag. When event input 4 is turned OFF, 0 is set in the event input 4 status flag, and when event input 43 is turned ON, 1 is set in the event input 4 status flag. 1: Control Allowed/Prohibited Control is enabled when event input 4 is turned ON, and control is disabled when event input 4 is turned OFF for all connected QTC1-□0 channels. However, if control is enabled / disabled by the event input of QTC1-□0, the event input of QTC1-□0 has priority.	0: Read status by communication

Setting item	Description, setting range and selection item	Factory default
QMC1 Event output 1 allocation selection item	Select the event output 1 allocation of this instrument. Selection item: 0: Event output 1 ON / OFF specification by communication By selecting the event output 1 ON / OFF selection, it can output arbitrarily from the host. In the event output 1 ON/OFF selection, set 0 (event output OFF) to turn event output 1 OFF and set 1 (event output ON) to turn event output 1 ON. 1: Alarm 1 If alarm 1 on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON. 2: Alarm 2 If alarm 2 on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON. 3: Alarm 3 If alarm 3 on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON. 4: Alarm 4 If alarm 4 on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON. 5: Heater burnout alarm If heater burnout alarm on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON. 6: Loop break alarm If loop break alarm on any of the connected QTC1-□0 is turned ON, event output 1 will be turned ON.	0: Event output 1 ON / OFF specification by communication

Setting item	Description, setting range and selection item	Factory default
QMC1 Event output 2 allocation selection item	Select the event output 2 allocation of this instrument. Selection item: 0: Event output 2 ON / OFF specification by communication By selecting the event output 2 ON / OFF selection, it can output arbitrarily from the host. In the event output 2 ON/OFF selection, set 0 (event output OFF) to turn event output 2 OFF and set 1 (event output ON) to turn event output 2 ON. 1: Alarm 1 If alarm 1 on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON. 2: Alarm 2 If alarm 2 on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON. 3: Alarm 3 If alarm 3 on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON. 4: Alarm 4 If alarm 4 on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON. 5: Heater burnout alarm If heater burnout alarm on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON. 6: Loop break alarm If loop break alarm on any of the connected QTC1-□0 is turned ON, event output 2 will be turned ON.	0: Event output 2 ON / OFF specification by communication

Setting item	Description, setting range and selection item	Factory default
QMC1 Event output 3 allocation selection item	Select the event output 3 allocation of this instrument. Selection item: 0: Event output 3 ON / OFF specification by communication By selecting the event output 3 ON / OFF selection, it can output arbitrarily from the host. In the event output 3 ON/OFF selection, set 0 (event output OFF) to turn event output 3 OFF and set 1 (event output ON) to turn event output 3 ON. 1: Alarm 1 If alarm 1 on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON. 2: Alarm 2 If alarm 2 on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON. 3: Alarm 3 If alarm 3 on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON. 4: Alarm 4 If alarm 4 on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON. 5: Heater burnout alarm If heater burnout alarm on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON. 6: Loop break alarm If loop break alarm on any of the connected QTC1-□0 is turned ON, event output 3 will be turned ON.	0: Event output 3 ON / OFF specification by communication

Setting item	Description, setting range and selection item	Factory default
QMC1 Event output 4 allocation selection item	Select the event output 4 allocation of this instrument. Selection item: 0: Event output 4 ON / OFF specification by communication By selecting the event output 4 ON / OFF selection, it can output arbitrarily from the host. In the event output 4 ON/OFF selection, set 0 (event output OFF) to turn event output 4 OFF and set 1 (event output ON) to turn event output 4 ON. 1: Alarm 1 If alarm 1 on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON. 2: Alarm 2 If alarm 2 on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON. 3: Alarm 3 If alarm 3 on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON. 4: Alarm 4 If alarm 4 on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON. 5: Heater burnout alarm If heater burnout alarm on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON. 6: Loop break alarm If loop break alarm on any of the connected QTC1-□0 is turned ON, event output 4 will be turned ON.	0: Event output 4 ON / OFF specification by communication

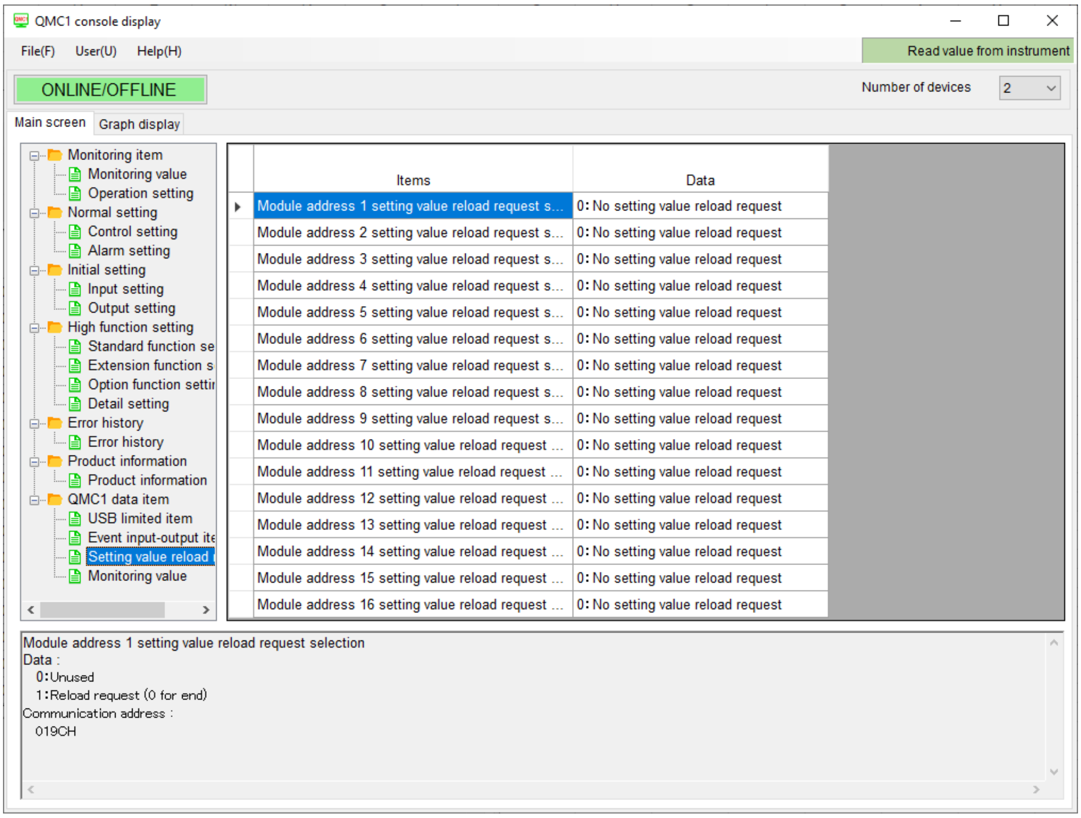
Setting item	Description, setting range and selection item	Factory default
QMC1 Event output 1 ON/OFF selection	Select the event output 1 ON or OFF of this instrument from the host. Valid when 0 (event output 1 ON / OFF specification by communication) is selected by the event output 1 allocation selection. Selection item: 0: Event output 1 OFF 1: Event output 1 ON	0: Event output 1 OFF
QMC1 Event output 2 ON/OFF selection	Select the event output 2 ON or OFF of this instrument from the host. Valid when 0 (event output 2 ON / OFF specification by communication) is selected by the event output 2 allocation selection. Selection item: 0: Event output 2 OFF 1: Event output 2 ON	0: Event output 2 OFF
QMC1 Event output 3 ON/OFF selection	Select the event output 3 ON or OFF of this instrument from the host. Valid when 0 (event output 3 ON / OFF specification by communication) is selected by the event output 3 allocation selection. Selection item: 0: Event output 3 OFF 1: Event output 3 ON	0: Event output 3 OFF
QMC1 Event output 4 ON/OFF selection	Select the event output 4 ON or OFF of this instrument from the host. Valid when 0 (event output 4 ON / OFF specification by communication) is selected by the event output 4 allocation selection. Selection item: 0: Event output 4 OFF 1: Event output 4 ON	0: Event output 4 OFF

8.2.3 Selecting Setting Value Reload Request

Select a setting value reload request for the connected modules.

Click [Main screen] tab → [QMC1 data item] → [Setting value reload request].

Display the Setting value reload request screen.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Control setting
Alarm setting
Initial setting
Input setting
Output setting
High function setting
Standard function se
Extension function s
Option function settir
Detail setting
Error history
Error history
Product information
Product information
QMC1 data item
USB limited item
Event input-output ite
Setting value reload
Monitoring value

Items	Data
Module address 1 setting value reload request s...	0: No setting value reload request
Module address 2 setting value reload request s...	0: No setting value reload request
Module address 3 setting value reload request s...	0: No setting value reload request
Module address 4 setting value reload request s...	0: No setting value reload request
Module address 5 setting value reload request s...	0: No setting value reload request
Module address 6 setting value reload request s...	0: No setting value reload request
Module address 7 setting value reload request s...	0: No setting value reload request
Module address 8 setting value reload request s...	0: No setting value reload request
Module address 9 setting value reload request s...	0: No setting value reload request
Module address 10 setting value reload request ...	0: No setting value reload request
Module address 11 setting value reload request ...	0: No setting value reload request
Module address 12 setting value reload request ...	0: No setting value reload request
Module address 13 setting value reload request ...	0: No setting value reload request
Module address 14 setting value reload request ...	0: No setting value reload request
Module address 15 setting value reload request ...	0: No setting value reload request
Module address 16 setting value reload request ...	0: No setting value reload request

Module address 1 setting value reload request selection
Data :
 0:Unused
 1:Reload request (0 for end)
Communication address :
 019CH

(Fig. 8.2.3-1)

Setting item	Description, setting range and selection item	Factory default
Module address 1 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 1. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 2 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 2. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 3 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 3. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 4 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 4. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 5 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 5. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 6 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 6. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 7 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 7. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request

(*): When the setting value reload finishes, it will be 0000H.

Setting item	Description, setting range and selection item	Factory default
Module address 8 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 8. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 9 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 9. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 10 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 10. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 11 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 11. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 12 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 12. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 13 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 13. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 14 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 14. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request

(*): When the setting value reload finishes, it will be 0000H.

Setting item	Description, setting range and selection item	Factory default
Module address 15 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 15. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request
Module address 16 Setting value reload request selection	Select either no setting value reload request or a setting value reload request for module address 16. Selection item: 0: No setting value reload request 1: Setting value reload request (*)	0: No setting value reload request

(*): When the setting value reload finishes, it will be 0000H.

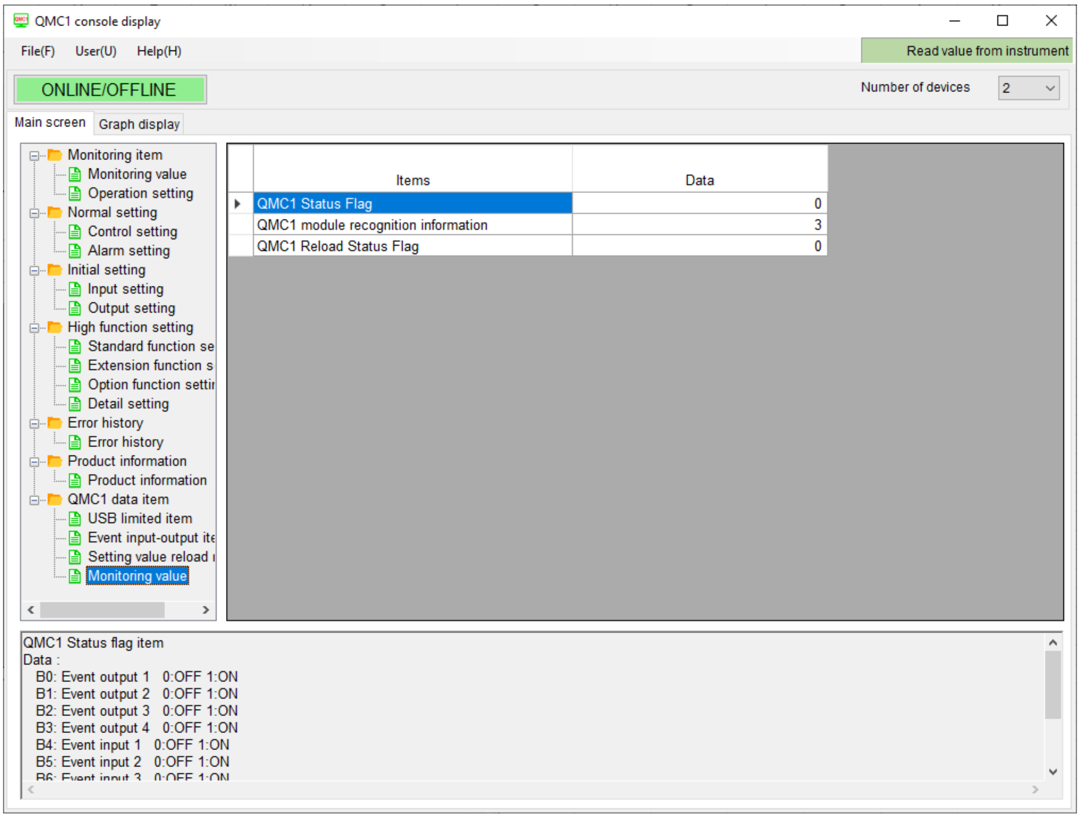
8.2.4 Reading Monitor Values

Read a setting value reload request for the connected modules.

Reads the state flag, module recognition information and reload state flag of QMC1.

Click [Main screen] tab → [QMC1 data item] → [Monitoring value].

Display the Monitoring value screen.


QMC1 console display
File(F)
User(U)
Help(H)
Read value from instrument
ONLINE/OFFLINE
Number of devices
2
Main screen
Graph display
Monitoring item
Monitoring value
Operation setting
Normal setting
Control setting
Alarm setting
Initial setting
Input setting
Output setting
High function setting
Standard function se
Extension function s
Option function settir
Detail setting
Error history
Error history
Product information
Product information
QMC1 data item
USB limited item
Event input-output ite
Setting value reload i
Monitoring value

Items	Data
QMC1 Status Flag	0
QMC1 module recognition information	3
QMC1 Reload Status Flag	0

QMC1 Status flag item
Data :
B0: Event output 1 0:OFF 1:ON
B1: Event output 2 0:OFF 1:ON
B2: Event output 3 0:OFF 1:ON
B3: Event output 4 0:OFF 1:ON
B4: Event input 1 0:OFF 1:ON
B5: Event input 2 0:OFF 1:ON
B6: Event input 3 0:OFF 1:ON

(Fig. 8.2.4-1)

Data item	Data
QMC1 Status flag	B0: Event output 1 0: OFF 1: ON B1: Event output 2 0: OFF 1: ON B2: Event output 3 0: OFF 1: ON B3: Event output 4 0: OFF 1: ON B4: Event input 1 0: OFF 1: ON B5: Event input 2 0: OFF 1: ON B6: Event input 3 0: OFF 1: ON B7: Event input 4 0: OFF 1: ON B8: Not used B9: Not used B10: Not used B11: Not used B12: Not used B13: Not used B14: Power supply identification (*) 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error
QMC1 Module recognition information	B0: Module address 1 0: No connection 1: Connection B1: Module address 2 0: No connection 1: Connection B2: Module address 3 0: No connection 1: Connection B3: Module address 4 0: No connection 1: Connection B4: Module address 5 0: No connection 1: Connection B5: Module address 6 0: No connection 1: Connection B6: Module address 7 0: No connection 1: Connection B7: Module address 8 0: No connection 1: Connection B8: Module address 9 0: No connection 1: Connection B9: Module address 10 0: No connection 1: Connection B10: Module address 11 0: No connection 1: Connection B11: Module address 12 0: No connection 1: Connection B12: Module address 13 0: No connection 1: Connection B13: Module address 14 0: No connection 1: Connection B14: Module address 15 0: No connection 1: Connection B15: Module address 16 0: No connection 1: Connection

(*): When power is supplied from 24 V DC and USB bus power, 0: 24 V DC is returned.

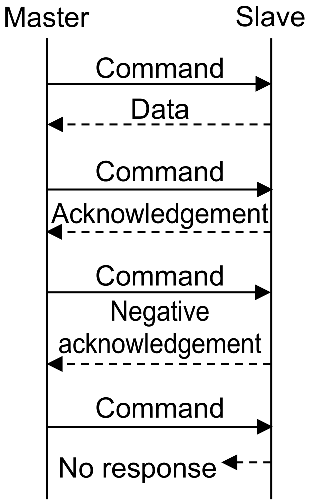
Data item	Data		
QMC1 Setting value reload status flag	B0:	Module address 1	0: No setting value reload request 1: Reloading setting value
	B1:	Module address 2	0: No setting value reload request 1: Reloading setting value
	B2:	Module address 3	0: No setting value reload request 1: Reloading setting value
	B3:	Module address 4	0: No setting value reload request 1: Reloading setting value
	B4:	Module address 5	0: No setting value reload request 1: Reloading setting value
	B5:	Module address 6	0: No setting value reload request 1: Reloading setting value
	B6:	Module address 7	0: No setting value reload request 1: Reloading setting value
	B7:	Module address 8	0: No setting value reload request 1: Reloading setting value
	B8:	Module address 9	0: No setting value reload request 1: Reloading setting value
	B9:	Module address 10	0: No setting value reload request 1: Reloading setting value
	B10:	Module address 11	0: No setting value reload request 1: Reloading setting value
	B11:	Module address 12	0: No setting value reload request 1: Reloading setting value
	B12:	Module address 13	0: No setting value reload request 1: Reloading setting value
	B13:	Module address 14	0: No setting value reload request 1: Reloading setting value
	B14:	Module address 15	0: No setting value reload request 1: Reloading setting value
	B15:	Module address 16	0: No setting value reload request 1: Reloading setting value

QMC1 power OFF → ON

Turn the QMC1 power OFF → ON. The set value becomes effective.

9 Communication Procedure

Communication starts with command transmission from the host computer (hereafter Master), and ends with the response of this instrument (hereafter Slave).



(Fig. 9-1)

- Response with data

  When the master sends the Read command, the slave responds with the corresponding set value or current status.
- Acknowledgement

  When the master sends the Write command, the slave responds by sending the acknowledgement after the processing is terminated.
- Negative acknowledgement

  When the master sends a non-existent command or value out of the setting range, the slave returns a negative acknowledgement.
- No response

  The slave will not respond to the master in the following cases:

  • Broadcast address is set.

  • Communication error (framing error, parity error)

  • CRC-16 discrepancy

Communication timing of the RS-485

Master Side (Take note while programming)

When the master starts transmission through the RS-485 communication line, the master is arranged so as to provide an idle status (mark status) transmission period of 1 or more characters before sending the command to ensure synchronization on the receiving side.

Set the program so that the master can disconnect the transmitter from the communication line within a 1 character transmission period after sending the command in preparation for reception of the response from the slave.

To avoid collision of transmissions between the master and the slave, send the next command after carefully checking that the master has received the response.

If a response to the command is not returned due to communication errors, set the Retry Processing to send the command again. (It is recommended to execute Retry twice or more.)

Slave Side

When the slave starts transmission through the RS-485 communication line, the slave is arranged so as to provide an idle status (mark status) transmission period of 1 ms or more (*) before sending the response to ensure synchronization on the receiving side.

The slave is arranged so as to disconnect the transmitter from the communication line within a 1 character transmission period after sending the response.

(*): Can be set in “Response delay time (P.8-7)” within a range of 0 to 1000 ms.

10 MODBUS Protocol

10.1 Transmission Mode

It becomes the RTU mode, and 8-bit binary data in command is transmitted as it is.

Data format	Start bit:	1 bit
	Data bit:	8 bits
	Parity:	Even (Odd, No parity) (Selectable)
	Stop bit:	1 bit (2 bits) (Selectable)
Error detection:		CRC-16 (Cyclic Redundancy Check)

10.2 Data Communication Interval

1.5 character transmission times or less

(Communication speed 9600 bps, 19200 bps: 1.5 character transmission times,

Communication speed 38400 bps, 57600 bps: 750 μs)

To transmit continuously, an interval between characters which consist of one message, must be within 1.5 character transmission times.

If an interval lasts longer than 1.5 character transmission times, the PCA1 assumes that transmission from the master is finished, which results in a communication error, and will not return a response.

10.3 Message Configuration

Message is configured to start after idle time is processed for more than 3.5 character transmissions, and end after idle time is processed for more than 3.5 character transmissions.

(Communication speed 9600 bps, 19200 bps: 3.5 character transmission times,

Communication speed 38400 bps, 57600 bps: 1.75 ms)

The data part has a maximum of 252 bytes.

3.5 idle characters	Slave address	Function code	Data	Error check CRC-16	3.5 idle characters

(1) Slave Address

Slave address is an individual instrument number on the slave side, and is set within the range 1 to 16 (01H to 10H). The master identifies slaves by the slave address of the requested message.

The slave informs the master which slave is responding to the master by placing its own address in the response message.

Slave address 0 (00H, Broadcast address) can identify all the slaves connected. However, slaves do not respond.

(2) Function Code

The function code is the command code for the slave to undertake one of the following actions.

Type	Function Code	Sub Function Code	Contents
Data access	03(03H)		Reads a single or multiple piece(s) of data from slave(s) (Amount of data: Max. 100).
	06(06H)		Writes a single piece of data to slave(s).
	16(10H)		Writes multiple pieces of data to slave(s) (Amount of data: Max. 100).

The function code is used to discern whether the response is normal (acknowledgement) or if any error (negative acknowledgement) has occurred when the slave returns the response message to the master.

When acknowledgement is returned, the slave simply returns the original function code.

When negative acknowledgement is returned, the MSB of the original function code is set as 1 for the response.

For example, if the master sends request message setting 13H to the function code by mistake, slave returns 93H by setting the MSB to 1, because the former is an illegal function.

For negative acknowledgement, the exception codes below are set to the data of the response message, and returned to the master in order to inform it of what kind of error has occurred.

Exception Code	Contents
1(01H)	Illegal function (Non-existent function)
2(02H)	Illegal data address (Non-existent data address)
3(03H)	Illegal data value (Value out of the setting range)
17(11H)	Status unable to be written. (AT is performing.)

(3) Data

Data differs depending on the function code.

A request message from the master is composed of a data item, amount of data and setting data.

A response message from the slave is composed of the byte count , data and exception codes in negative acknowledgements, corresponding to the request message.

The effective range of data is -32768 to 32767 (8000H to 7FFFH).

Refer to “11.1 Communication Command List (P.11-1 to P.11-87)”.

(4) Error Check

After calculating CRC-16 (Cyclic Redundancy Check) from the slave address to the end of the data, the calculated 16-bit data is appended to the end of message in sequence from low order to high order.

[How to calculate CRC-16]

In the CRC-16 system, the information is divided by the polynomial series. The remainder is added to the end of the information and transmitted. The generation of a polynomial series is as follows. (Generation of polynomial series: $X^{16} + X^{15} + X^2 + 1$)

① Initialize the CRC-16 data (assumed as X) (FFFFH).

② Calculate exclusive OR (XOR) with the 1st data and X. This is assumed as X.

③ Shift X one bit to the right. This is assumed as X.

④ When a carry is generated as a result of the shift, XOR is calculated by X of ③ and the fixed value (A001H). This is assumed as X. If a carry is not generated, go to step ⑤.

⑤ Repeat steps ③ and ④ until shifting 8 times.

⑥ XOR is calculated with the next data and X. This is assumed as X.

⑦ Repeat steps ③ to ⑤.

⑧ Repeat steps ③ to ⑤ up to the final data.

⑨ Set X as CRC-16 to the end of message in sequence from low order to high order.

10.4 Message Example

Numerals written below the command represent the number of characters.

(1) Read [Slave address 1, CH1 Control enable/disable (1040H)]

- A request message from the master

Idle 3.5 characters	Slave address	Function code	Data item	Amount of data	Error check CRC-16	Idle 3.5 characters
	(01H)	(03H)	(1040H)	(0001H)	(811EH)	
	1	1	2	2	2	

- Response message from the slave in normal status [When control disable (0000H)]

Idle 3.5 characters	Slave address	Function code	Response byte count	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(03H)	(02H)	(0000H)	(B844H)	
	1	1	1	2	2	

(2) Write [Slave address 1, CH1 Control enable/disable (1040H)]

- A request message from the master [When writing control enable (0001H)]

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1040H)	(0001H)	(4D1EH)	
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1040H)	(0001H)	(4D1EH)	
	1	1	2	2	2	

- Response message from the slave in exception (error) status (When a value out of the setting range is set)

  The function code MSB is set to 1 for the response message in exception (error) status, and 86H is returned.

  The exception code 03H (Value out of the setting range) is returned (error).

Idle 3.5 characters	Slave address	Function code	Exception code	Error check CRC-16	Idle 3.5 characters
	(01H)	(86H)	(03H)	(0261H)	
	1	1	1	2	

(3) Read [Slave address 1, CH1 SV(1180H)]

- A request message from the master

Idle 3.5 characters	Slave address (01H)	Function code (03H)	Data item (1180H)	Amount of data (0001H)	Error check CRC-16 (80DEH)	Idle 3.5 characters
	1	1	2	2	2	

- Response message from the slave in normal status [When SV 600 °C (0258H)]

Idle 3.5 characters	Slave address (01H)	Function code (03H)	Response byte count (02H)	Data (0258H)	Error check CRC-16 (B8DEH)	Idle 3.5 characters
	1	1	1	2	2	

- Response message from the slave in exception (error) status (When data item is incorrect)

The function code MSB is set to 1 for the response message in exception (error) status, and 83H is returned.

The exception code 02H (Non-existent data address) is returned (error).

Idle 3.5 characters	Slave address (01H)	Function code (83H)	Exception code (02H)	Error check CRC-16 (C0F1H)	Idle 3.5 characters
	1	1	1	2	

(4) Write [Slave address 1, CH1 SV to CH4 SV] (Writing multiple pieces of data)

The configuration of the data is as follows.

Amount of data : 4(0004H)
Byte count : 8(08H)
Data : Data is converted to Hexadecimal.

Data Item		Data	Data (Converted to Hexadecimal)
1180H	CH1 SV setting	600 °C	0258H
1181H	CH2 SV setting	600 °C	0258H
1182H	CH3 SV setting	600 °C	0258H
1183H	CH4 SV setting	600 °C	0258H

- A request message from the master (When writing the above data)

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1180H)	Data (0004080258025802580258H)	Error check CRC-16 (70D7H)	Idle 3.5 characters
	1	1	2	11	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1180H)	Data (0004H)	Error check CRC-16 (C51EH)	Idle 3.5 characters
	1	1	2	2	2	

(5) Read [Slave address 1, CH1 SV to CH4 SV] (Reading multiple pieces of data)

- A request message from the master (When writing the above data)

Idle 3.5 characters	Slave address (01H)	Function code (03H)	Data item (1180H)	Amount of data (0004H)	Error check CRC-16 (40DDH)	Idle 3.5 characters
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (03H)	Response byte count (08H)	Data (0258025802580258H)	Error check CRC-16 (6D15H)	Idle 3.5 characters
	1	1	1	8	2	

The data the response message is as follows.

Data Item		Data	Data (Converted to Hexadecimal)
1180H	CH1 SV setting	600 °C	0258H
1181H	CH2 SV setting	600 °C	0258H
1182H	CH3 SV setting	600 °C	0258H
1183H	CH4 SV setting	600 °C	0258H

11 Communication Command List

11.1 List of QMC1 Communication Commands (For Console Software)

This section explains each item of communication command.

- Data Item

  This is a setting item for the QMC1.
- Address [HEX (Hexadecimal)]

  This is an each channel address of the QMC1.
- Attribute

  R/W: Read and write (Host ↔ QMC1)

  RO: Read only (Host ← QMC1)
- Data

  This is an explanation of the setting range and setting conditions for each data.

Data Item	Address (HEX)	Attribute	Data
QMC1 PRS Number	0000	RO	1987: QMC1
QMC1 Software version	0001	RO	2: Ver. 0.02
Reservation (*)	0002	RO	
QMC1 Manufacturing date	0003	RO	2011: November 2020
QMC1 Hardware version	0004	RO	0: Ver. 0.00
Reservation (*)	0005 to 000F		
QMC1 Total energizing time	0010	RO	1 hour / 1 count
QMC1 Host communication protocol selection	0011	R/W	0000H: MODBUS RTU 0001H: Made by Mitsubishi Electric Corporation D register QR/QW 0002H: Made by Mitsubishi Electric Corporation R register QR/QW 0003H: Made by Mitsubishi Electric Corporation D register WR/WW 0004H: Made by Mitsubishi Electric Corporation R register WR/WW 0005H: Made by OMRON Corporation DM register FINS command 0006H: Made by KEYENCE CORPORATION DM register RDS/WRS
QMC1 Number of communication management modules setting	0012	R/W	1 to 16 modules
QMC1 Communication response delay time setting	0013	R/W	0 to 1000 ms

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)	Attribute	Data
Reservation (*)	0014		
Not used (*2)	0015 to 0063		
Default setting of SIF function item	0064 to 0173		This is the initial setting item for PLC communication using the SIF function. Refer to “14. Communication with PLC Using SIF Function (P. 14-1)”.
Not used (*2)	0174 to 018F		

(*1): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

(*2): The Not used item returns error code 02H (non-existent data address) with negative acceptance when reading single or multiple data or writing single or multiple data.

11.2 List of QMC1 Communication Commands (For Communication Program)

This section explains each item of communication command.

- Data Item

  This is a setting item for the QMC1.
- Address [HEX (Hexadecimal)]

  This is an each channel address of the QMC1.
- Attribute

  R/W: Read and write (Host ↔ QMC1)

  RO: Read only (Host ← QMC1)
- Data

  This is an explanation of the setting range and setting conditions for each data.

Data Item	Address (HEX)	Attribute	Data
QMC1 Event input 1 Allocation selection	0190	R/W	0000H: State readout by communication 0001H: Control enable/disable
QMC1 Event input 2 Allocation selection	0191	R/W	
QMC1 Event input 3 Allocation selection	0192	R/W	
QMC1 Event input 4 Allocation selection	0193	R/W	
QMC1 Event output 1 Allocation selection	0194	R/W	0000H: ON/OFF of event output 1 is specified by communication 0001H: Alarm 1 0002H: Alarm 2 0003H: Alarm 3 0004H: Alarm 4 0005H: Heater burnout alarm 0006H: Loop error alarm
QMC1 Event output 2 Allocation selection	0195	R/W	0000H: ON/OFF of event output 2 is specified by communication 0001H: Alarm 1 0002H: Alarm 2 0003H: Alarm 3 0004H: Alarm 4 0005H: Heater burnout alarm 0006H: Loop error alarm
QMC1 Event output 3 Allocation selection	0196	R/W	0000H: ON/OFF of event output 3 is specified by communication 0001H: Alarm 1 0002H: Alarm 2 0003H: Alarm 3 0004H: Alarm 4 0005H: Heater burnout alarm 0006H: Loop error alarm

Data Item	Address (HEX)	Attribute	Data
QMC1 Event output 4 Allocation selection	0197	R/W	0000H: ON/OFF of event output 4 is specified by communication 0001H: Alarm 1 0002H: Alarm 2 0003H: Alarm 3 0004H: Alarm 4 0005H: Heater burnout alarm 0006H: Loop error alarm
QMC1 Event output 1 ON/OFF selection	0198	R/W	0000H: Event output 1 OFF 0001H: Event output 1 ON
QMC1 Event output 2 ON/OFF selection	0199	R/W	0000H: Event output 2 OFF 0001H: Event output 2 ON
QMC1 Event output 3 ON/OFF selection	019A	R/W	0000H: Event output 3 OFF 0001H: Event output 3 ON
QMC1 Event output 4 ON/OFF selection	019B	R/W	0000H: Event output 4 OFF 0001H: Event output 4 ON
Module address 1 Setting value reload request selection	019C	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 2 Setting value reload request selection	019D	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 3 Setting value reload request selection	019E	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 4 Setting value reload request selection	019F	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 5 Setting value reload request selection	01A0	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 6 Setting value reload request selection	01A1	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 7 Setting value reload request selection	01A2	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 8 Setting value reload request selection	01A3	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 9 Setting value reload request selection	01A4	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 10 Setting value reload request selection	01A5	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 11 Setting value reload request selection	01A6	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 12 Setting value reload request selection	01A7	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 13 Setting value reload request selection	01A8	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)
Module address 14 Setting value reload request selection	01A9	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*)

(*): When the setting value reload finishes, it will be 0000H.

Data Item	Address (HEX)	Attribute	Data
Module address 15 Setting value reload request selection	01AA	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*1)
Module address 16 Setting value reload request selection	01AB	R/W	0000H: No setting value reload request 0001H: Setting value reload request (*1)
Not used (*2)	01AC to 01F3		
QMC1 Status flag	01F4	RO	B0: Event output 1 0: OFF 1: ON B1: Event output 2 0: OFF 1: ON B2: Event output 3 0: OFF 1: ON B3: Event output 4 0: OFF 1: ON B4: Event input 1 0: OFF 1: ON B5: Event input 2 0: OFF 1: ON B6: Event input 3 0: OFF 1: ON B7: Event input 4 0: OFF 1: ON B8: Not used B9: Not used B10: Not used B11: Not used B12: Not used B13: Not used B14: Power supply identification (*3) 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error

(*1): When the setting value reload finishes, it will be 0000H.

(*2): The Not used item returns error code 02H (non-existent data address) with negative acceptance when reading single or multiple data or writing single or multiple data.

(*3): When power is supplied from 24 V DC and USB bus power, 0: 24 V DC is returned.

Data Item	Address (HEX)	Attribute	Data
QMC1 Module recognition information	01F5	RO	B0: Module address 1 0: No connection 1: Connection B1: Module address 2 0: No connection 1: Connection B2: Module address 3 0: No connection 1: Connection B3: Module address 4 0: No connection 1: Connection B4: Module address 5 0: No connection 1: Connection B5: Module address 6 0: No connection 1: Connection B6: Module address 7 0: No connection 1: Connection B7: Module address 8 0: No connection 1: Connection B8: Module address 9 0: No connection 1: Connection B9: Module address 10 0: No connection 1: Connection B10: Module address 11 0: No connection 1: Connection B11: Module address 12 0: No connection 1: Connection B12: Module address 13 0: No connection 1: Connection B13: Module address 14 0: No connection 1: Connection B14: Module address 15 0: No connection 1: Connection B15: Module address 16 0: No connection 1: Connection

Data Item	Address (HEX)	Attribute	Data
QMC1 Setting value reload status flag	01F6	RO	B0: Module address 1 0: No setting value reload request 1: Reloading setting value B1: Module address 2 0: No setting value reload request 1: Reloading setting value B2: Module address 3 0: No setting value reload request 1: Reloading setting value B3: Module address 4 0: No setting value reload request 1: Reloading setting value B4: Module address 5 0: No setting value reload request 1: Reloading setting value B5: Module address 6 0: No setting value reload request 1: Reloading setting value B6: Module address 7 0: No setting value reload request 1: Reloading setting value B7: Module address 8 0: No setting value reload request 1: Reloading setting value B8: Module address 9 0: No setting value reload request 1: Reloading setting value B9: Module address 10 0: No setting value reload request 1: Reloading setting value B10: Module address 11 0: No setting value reload request 1: Reloading setting value B11: Module address 12 0: No setting value reload request 1: Reloading setting value B12: Module address 13 0: No setting value reload request 1: Reloading setting value B13: Module address 14 0: No setting value reload request 1: Reloading setting value B14: Module address 15 0: No setting value reload request 1: Reloading setting value B15: Module address 16 0: No setting value reload request 1: Reloading setting value

Data Item	Address (HEX)	Attribute	Data
Not used(*)	01F7 to 0FFF		

(*): The Not used item returns error code 02H (non-existent data address) with negative acceptance when reading single or multiple data or writing single or multiple data.

11.3 List of Communication Commands for Modules Connected to QMC1

⚠ Caution

QMC1 does not check the setting range of the connected modules.
Perform the setting range restriction on the host side.
When QTC1-20 is connected, CH3 and CH4 of the setting items other than the heater burnout alarm setting do not work even if they are set..

This section explains each item of communication command, using the case of connecting QTC1-40 as an example.

- Data Item
  This is a setting item for QTC1-40.
- Module
  This is a module address of QTC1-40.
- Channel
  This is a channel number of QTC1-40.
- Address [HEX (Hexadecimal), DEC (Decimal)]
  This is an each channel address of QTC1-40.
- Attribute
  R/W: Read and write (Host ↔ QMC1 ↔ QTC1-40)
  RO: Read only (Host ← QMC1 ↔ QTC1-40)
- Data
  This is an explanation of the setting range and setting conditions for each data.

Data Item		Address (HEX)				Attribute	Data
System		Channel				RO	**This is a system item for internal processing.** **Please do not use.**
	Module	CH1	CH2	CH3	CH4		
	1	1000	1001	1002	1003		
	2	1004	1005	1006	1007		
	3	1008	1009	100A	100B		
	4	100C	100D	100E	100F		
	5	1010	1011	1012	1013		
	6	1014	1015	1016	1017		
	7	1018	1019	101A	101B		
	8	101C	101D	101E	101F		
	9	1020	1021	1022	1023		
	10	1024	1025	1026	1027		
	11	1028	1029	102A	102B		
	12	102C	102D	102E	102F		
	13	1030	1031	1032	1033		
	14	1034	1035	1036	1037		
	15	1038	1039	103A	103B		
	16	103C	103D	103E	103F		
Control Allowed/ Prohibited selection		Channel				R/W	0000H: Control Prohibited 0001H: Control Allowed
	Module	CH1	CH2	CH3	CH4		
	1	1040	1041	1042	1043		
	2	1044	1045	1046	1047		
	3	1048	1049	104A	104B		
	4	104C	104D	104E	104F		
	5	1050	1051	1052	1053		
	6	1054	1055	1056	1057		
	7	1058	1059	105A	105B		
	8	105C	105D	105E	105F		
	9	1060	1061	1062	1063		
	10	1064	1065	1066	1067		
	11	1068	1069	106A	106B		
	12	106C	106D	106E	106F		
	13	1070	1071	1072	1073		
	14	1074	1075	1076	1077		
	15	1078	1079	107A	107B		
	16	107C	107D	107E	107F		

Data Item		Address (HEX)				Attribute	Data
AT Perform/ Cancel selection		Channel				R/W	0000H: AT Cancel 0001H: AT Perform
	Module	CH1	CH2	CH3	CH4		
	1	1080	1081	1082	1083		
	2	1084	1085	1088	1087		
	3	1088	1089	108A	108B		
	4	108C	108D	108E	108F		
	5	1090	1091	1092	1093		
	6	1094	1095	1096	1097		
	7	1098	1099	109A	109B		
	8	109C	109D	109E	109F		
	9	10A0	10A1	10A2	10A3		
	10	10A4	10A5	10A6	10A7		
	11	10A8	10A9	10AA	10AB		
	12	10AC	10AD	10AE	10AF		
	13	10B0	10B1	10B2	10B3		
	14	10B4	10B5	10B6	10B7		
	15	10B8	10B9	10BA	10BB		
	16	10BC	10BD	10BE	10BF		
Event output ON/OFF selection		Channel				R/W	0000H: Event output OFF 0001H: Event output ON
	Module	CH1	CH2	CH3	CH4		
	1	10C0	10C1	10C2	10C3		
	2	10C4	10C5	10C6	10C7		
	3	10C8	10C9	10CA	10CB		
	4	10CC	10CD	10CE	10CF		
	5	10D0	10D1	10D2	10D3		
	6	10D4	10D5	10D6	10D7		
	7	10D8	10D9	10DA	10DB		
	8	10DC	10DD	10DE	10DF		
	9	10E0	10E1	10E2	10E3		
	10	10E4	10E5	10E6	10E7		
	11	10E8	10E9	10EA	10EB		
	12	10EC	10ED	10EE	10EF		
	13	10F0	10F1	10F2	10F3		
	14	10F4	10F5	10F6	10F7		
	15	10F8	10F9	10FA	10FB		
	16	10FC	10FD	10FE	10FF		

Data Item		Address (HEX)				Attribute	Data
Auto/Manual selection		Channel				R/W	0000H: Auto control 0001H: Manual control
	Module	CH1	CH2	CH3	CH4		
	1	1100	1101	1102	1103		
	2	1104	1105	1106	1107		
	3	1108	1109	110A	110B		
	4	110C	110D	110E	110F		
	5	1110	1111	1112	1113		
	6	1114	1115	1116	1117		
	7	1118	1119	111A	111B		
	8	111C	111D	111E	111F		
	9	1120	1121	1122	1123		
	10	1124	1125	1126	1127		
	11	1128	1129	112A	112B		
	12	112C	112D	112E	112F		
	13	1130	1131	1132	1133		
	14	1134	1135	1136	1137		
	15	1138	1139	113A	113B		
	16	113C	113D	113E	113F		
Manual MV (*)		Channel				R/W	-5.0 to 105.0 %
	Module	CH1	CH2	CH3	CH4		
	1	1140	1141	1142	1143		
	2	1144	1145	1146	1147		
	3	1148	1149	114A	114B		
	4	114C	114D	114E	114F		
	5	1150	1151	1152	1153		
	6	1154	1155	1156	1157		
	7	1158	1159	115A	115B		
	8	115C	115D	115E	115F		
	9	1160	1161	1162	1163		
	10	1164	1165	1166	1167		
	11	1168	1169	116A	116B		
	12	116C	116D	116E	116F		
	13	1170	1171	1172	1173		
	14	1174	1175	1176	1177		
	15	1178	1179	117A	117B		
	16	117C	117D	117E	117F		

(*): Effective when the Manual control is selected in the Auto/Manual selection.
When the Auto control is selected, it returns the negative acknowledgement.

Data Item	Address (HEX)					Attribute	Data
Setting value (SV)	Channel					R/W	Scaling lower limit to Scaling high limit
	Module	CH1	CH2	CH3	CH4		
	1	1180	1181	1182	1183		
	2	1184	1185	1188	1187		
	3	1188	1189	118A	118B		
	4	118C	118D	118E	118F		
	5	1190	1191	1192	1193		
	6	1194	1195	1196	1197		
	7	1198	1199	119A	119B		
	8	119C	119D	119E	119F		
	9	11A0	11A1	11A2	11A3		
	10	11A4	11A5	11A6	11A7		
	11	11A8	11A9	11AA	11AB		
	12	11AC	11AD	11AE	11AF		
	13	11B0	11B1	11B2	11B3		
	14	11B4	11B5	11B6	11B7		
	15	11B8	11B9	11BA	11BB		
	16	11BC	11BD	11BE	11BF		
Proportional band setting	Channel					R/W	1 to input span °C (°F) or 0.1 to input span °C (°F) when DC current and DC voltage input 0.10 to 100.00 %
	Module	CH1	CH2	CH3	CH4		
	1	11C0	11C1	11C2	11C3		
	2	11C4	11C5	11C6	11C7		
	3	11C8	11C9	11CA	11CB		
	4	11CC	11CD	11CE	11CF		
	5	11D0	11D1	11D2	11D3		
	6	11D4	11D5	11D6	11D7		
	7	11D8	11D9	11DA	11DB		
	8	11DC	11DD	11DE	11DF		
	9	11E0	11E1	11E2	11E3		
	10	11E4	11E5	11E6	11E7		
	11	11E8	11E9	11EA	11EB		
	12	11EC	11ED	11EE	11EF		
	13	11F0	11F1	11F2	11F3		
	14	11F4	11F5	11F6	11F7		
	15	11F8	11F9	11FA	11FB		
	16	11FC	11FD	11FE	11FF		

Data Item	Address (HEX)					Attribute	Data
Integral time setting	Channel					R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds When select “2: Slow-PID control” of control action selection 1 to 3600 seconds or 0.1 to 2000.0 seconds
	Module	CH1	CH2	CH3	CH4		
	1	1200	1201	1202	1203		
	2	1204	1205	1206	1207		
	3	1208	1209	120A	120B		
	4	120C	120D	120E	120F		
	5	1210	1211	1212	1213		
	6	1214	1215	1216	1217		
	7	1218	1219	121A	121B		
	8	121C	121D	121E	121F		
	9	1220	1221	1222	1223		
	10	1224	1225	1226	1227		
	11	1228	1229	122A	122B		
	12	122C	122D	122E	122F		
	13	1230	1231	1232	1233		
	14	1234	1235	1236	1237		
	15	1238	1239	123A	123B		
	16	123C	123D	123E	123F		
Derivative time setting	Channel					R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds
	Module	CH1	CH2	CH3	CH4		
	1	1240	1241	1242	1243		
	2	1244	1245	1246	1247		
	3	1248	1249	124A	124B		
	4	124C	124D	124E	124F		
	5	1250	1251	1252	1253		
	6	1254	1255	1256	1257		
	7	1258	1259	125A	125B		
	8	125C	125D	125E	125F		
	9	1260	1261	1262	1263		
	10	1264	1265	1266	1267		
	11	1268	1269	126A	126B		
	12	126C	126D	126E	126F		
	13	1270	1271	1272	1273		
	14	1274	1275	1276	1277		
	15	1278	1279	127A	127B		
	16	127C	127D	127E	127F		

Data Item	Address (HEX)					Attribute	Data
Proportional cycle setting	Channel					R/W	0.1 to 100.0 seconds
	Module	CH1	CH2	CH3	CH4		
	1	1280	1281	1282	1283		
	2	1284	1285	1288	1287		
	3	1288	1289	128A	128B		
	4	128C	128D	128E	128F		
	5	1290	1291	1292	1293		
	6	1294	1295	1296	1297		
	7	1298	1299	129A	129B		
	8	129C	129D	129E	129F		
	9	12A0	12A1	12A2	12A3		
	10	12A4	12A5	12A6	12A7		
	11	12A8	12A9	12AA	12AB		
	12	12AC	12AD	12AE	12AF		
	13	12B0	12B1	12B2	12B3		
	14	12B4	12B5	12B6	12B7		
	15	12B8	12B9	12BA	12BB		
	16	12BC	12BD	12BE	12BF		
ON/OFF hysteresis setting	Channel					R/W	0.1 to 1000.0 °C (0.1 to 1800.0 °F) when DC current and DC voltage input 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	12C0	12C1	12C2	12C3		
	2	12C4	12C5	12C6	12C7		
	3	12C8	12C9	12CA	12CB		
	4	12CC	12CD	12CE	12CF		
	5	12D0	12D1	12D2	12D3		
	6	12D4	12D5	12D6	12D7		
	7	12D8	12D9	12DA	12DB		
	8	12DC	12DD	12DE	12DF		
	9	12E0	12E1	12E2	12E3		
	10	12E4	12E5	12E6	12E7		
	11	12E8	12E9	12EA	12EB		
	12	12EC	12ED	12EE	12EF		
	13	12F0	12F1	12F2	12F3		
	14	12F4	12F5	12F6	12F7		
	15	12F8	12F9	12FA	12FB		
	16	12FC	12FD	12FE	12FF		

Data Item	Address (HEX)					Attribute	Data
OUT high limit setting	Channel					R/W	OUT low limit setting to 100.0 % when current output OUT low limit setting to 105.0 %
	Module	CH1	CH2	CH3	CH4		
	1	1300	1301	1302	1303		
	2	1304	1305	1306	1307		
	3	1308	1309	130A	130B		
	4	130C	130D	130E	130F		
	5	1310	1311	1312	1313		
	6	1314	1315	1316	1317		
	7	1318	1319	131A	131B		
	8	131C	131D	131E	131F		
	9	1320	1321	1322	1323		
	10	1324	1325	1326	1327		
	11	1328	1329	132A	132B		
	12	132C	132D	132E	132F		
	13	1330	1331	1332	1333		
	14	1334	1335	1336	1337		
	15	1338	1339	133A	133B		
	16	133C	133D	133E	133F		
OUT low limit setting	Channel					R/W	0.0 % to OUT high limit setting when current output -5.0 % to OUT high limit setting
	Module	CH1	CH2	CH3	CH4		
	1	1340	1341	1342	1343		
	2	1344	1345	1346	1347		
	3	1348	1349	134A	134B		
	4	134C	134D	134E	134F		
	5	1350	1351	1352	1353		
	6	1354	1355	1356	1357		
	7	1358	1359	135A	135B		
	8	135C	135D	135E	135F		
	9	1360	1361	1362	1363		
	10	1364	1365	1366	1367		
	11	1368	1369	136A	136B		
	12	136C	136D	136E	136F		
	13	1370	1371	1372	1373		
	14	1374	1375	1376	1377		
	15	1378	1379	137A	137B		
	16	137C	137D	137E	137F		

Data Item	Address (HEX)					Attribute	Data
Alarm 1 action		Channel				R/W	0000H: No event 0001H: High limit alarm 0002H: Low limit alarm 0003H: High/Low limits alarm 0004H: High/Low limits range alarm 0005H: Process high alarm 0006H: Process low alarm 0007H: High limit with standby 0008H: Low limit with standby 0009H: High/Low limits alarm with standby 000AH: High/Low limits alarm individually 000BH: High/Low limits range alarm individually 000CH: High/Low limits alarm with standby individually
	Module	CH1	CH2	CH3	CH4		
	1	1380	1381	1382	1383		
	2	1384	1385	1388	1387		
	3	1388	1389	138A	138B		
	4	138C	138D	138E	138F		
	5	1390	1391	1392	1393		
	6	1394	1395	1396	1397		
	7	1398	1399	139A	139B		
	8	139C	139D	139E	139F		
	9	13A0	13A1	13A2	13A3		
	10	13A4	13A5	13A6	13A7		
	11	13A8	13A9	13AA	13AB		
	12	13AC	13AD	13AE	13AF		
	13	13B0	13B1	13B2	13B3		
	14	13B4	13B5	13B6	13B7		
	15	13B8	13B9	13BA	13BB		
	16	13BC	13BD	13BE	13BF		
Alarm 2 action		Channel				R/W	0000H: No event 0001H: High limit alarm 0002H: Low limit alarm 0003H: High/Low limits alarm 0004H: High/Low limits range alarm 0005H: Process high alarm 0006H: Process low alarm 0007H: High limit with standby 0008H: Low limit with standby 0009H: High/Low limits alarm with standby 000AH: High/Low limits alarm individually 000BH: High/Low limits range alarm individually 000CH: High/Low limits alarm with standby individually
	Module	CH1	CH2	CH3	CH4		
	1	13C0	13C1	13C2	13C3		
	2	13C4	13C5	13C6	13C7		
	3	13C8	13C9	13CA	13CB		
	4	13CC	13CD	13CE	13CF		
	5	13D0	13D1	13D2	13D3		
	6	13D4	13D5	13D6	13D7		
	7	13D8	13D9	13DA	13DB		
	8	13DC	13DD	13DE	13DF		
	9	13E0	13E1	13E2	13E3		
	10	13E4	13E5	13E6	13E7		
	11	13E8	13E9	13EA	13EB		
	12	13EC	13ED	13EE	13EF		
	13	13F0	13F1	13F2	13F3		
	14	13F4	13F5	13F6	13F7		
	15	13F8	13F9	13FA	13FB		
	16	13FC	13FD	13FE	13FF		

Data Item	Address (HEX)					Attribute	Data
Alarm 3 action	Channel					R/W	0000H: No event 0001H: High limit alarm 0002H: Low limit alarm 0003H: High/Low limits alarm 0004H: High/Low limits range alarm 0005H: Process high alarm 0006H: Process low alarm 0007H: High limit with standby 0008H: Low limit with standby 0009H: High/Low limits alarm with standby 000AH: High/Low limits alarm individually 000BH: High/Low limits range alarm individually 000CH: High/Low limits alarm with standby individually
	Module	CH1	CH2	CH3	CH4		
	1	1400	1401	1402	1403		
	2	1404	1405	1406	1407		
	3	1408	1409	140A	140B		
	4	140C	140D	140E	140F		
	5	1410	1411	1412	1413		
	6	1414	1415	1416	1417		
	7	1418	1419	141A	141B		
	8	141C	141D	141E	141F		
	9	1420	1421	1422	1423		
	10	1424	1425	1426	1427		
	11	1428	1429	142A	142B		
	12	142C	142D	142E	142F		
	13	1430	1431	1432	1433		
	14	1434	1435	1436	1437		
	15	1438	1439	143A	143B		
	16	143C	143D	143E	143F		
Alarm 4 action	Channel					R/W	0000H: No event 0001H: High limit alarm 0002H: Low limit alarm 0003H: High/Low limits alarm 0004H: High/Low limits range alarm 0005H: Process high alarm 0006H: Process low alarm 0007H: High limit with standby 0008H: Low limit with standby 0009H: High/Low limits alarm with standby 000AH: High/Low limits alarm individually 000BH: High/Low limits range alarm individually 000CH: High/Low limits alarm with standby individually
	Module	CH1	CH2	CH3	CH4		
	1	1440	1441	1442	1443		
	2	1444	1445	1446	1447		
	3	1448	1449	144A	144B		
	4	144C	144D	144E	144F		
	5	1450	1451	1452	1453		
	6	1454	1455	1456	1457		
	7	1458	1459	145A	145B		
	8	145C	145D	145E	145F		
	9	1460	1461	1462	1463		
	10	1464	1465	1466	1467		
	11	1468	1469	146A	146B		
	12	146C	146D	146E	146F		
	13	1470	1471	1472	1473		
	14	1474	1475	1476	1477		
	15	1478	1479	147A	147B		
	16	147C	147D	147E	147F		

Data Item		Address (HEX)				Attribute	Data
Alarm 1 hysteresis		Channel				R/W	0.1 to 1000.0 °C (0.1 to 1800.0°F) For DC current input and DC voltage input: 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	1480	1481	1482	1483		
	2	1484	1485	1488	1487		
	3	1488	1489	148A	148B		
	4	148C	148D	148E	148F		
	5	1490	1491	1492	1493		
	6	1494	1495	1496	1497		
	7	1498	1499	149A	149B		
	8	149C	149D	149E	149F		
	9	14A0	14A1	14A2	14A3		
	10	14A4	14A5	14A6	14A7		
	11	14A8	14A9	14AA	14AB		
	12	14AC	14AD	14AE	14AF		
	13	14B0	14B1	14B2	14B3		
	14	14B4	14B5	14B6	14B7		
	15	14B8	14B9	14BA	14BB		
	16	14BC	14BD	14BE	14BF		
Alarm 2 hysteresis		Channel				R/W	0.1 to 1000.0 °C (0.1 to 1800.0°F) For DC current input and DC voltage input: 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	14C0	14C1	14C2	14C3		
	2	14C4	14C5	14C6	14C7		
	3	14C8	14C9	14CA	14CB		
	4	14CC	14CD	14CE	14CF		
	5	14D0	14D1	14D2	14D3		
	6	14D4	14D5	14D6	14D7		
	7	14D8	14D9	14DA	14DB		
	8	14DC	14DD	14DE	14DF		
	9	14E0	14E1	14E2	14E3		
	10	14E4	14E5	14E6	14E7		
	11	14E8	14E9	14EA	14EB		
	12	14EC	14ED	14EE	14EF		
	13	14F0	14F1	14F2	14F3		
	14	14F4	14F5	14F6	14F7		
	15	14F8	14F9	14FA	14FB		
	16	14FC	14FD	14FE	14FF		

Data Item	Address (HEX)					Attribute	Data
Alarm 3 hysteresis	Channel					R/W	0.1 to 1000.0 °C (0.1 to 1800.0°F) For DC current input and DC voltage input: 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	1500	1501	1502	1503		
	2	1504	1505	1506	1507		
	3	1508	1509	150A	150B		
	4	150C	150D	150E	150F		
	5	1510	1511	1512	1513		
	6	1514	1515	1516	1517		
	7	1518	1519	151A	151B		
	8	151C	151D	151E	151F		
	9	1520	1521	1522	1523		
	10	1524	1525	1526	1527		
	11	1528	1529	152A	152B		
	12	152C	152D	152E	152F		
	13	1530	1531	1532	1533		
	14	1534	1535	1536	1537		
	15	1538	1539	153A	153B		
	16	153C	153D	153E	153F		
Alarm 4 hysteresis	Channel					R/W	0.1 to 1000.0 °C (0.1 to 1800.0°F) For DC current input and DC voltage input: 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	1540	1541	1542	1543		
	2	1544	1545	1546	1547		
	3	1548	1549	154A	154B		
	4	154C	154D	154E	154F		
	5	1550	1551	1552	1553		
	6	1554	1555	1556	1557		
	7	1558	1559	155A	155B		
	8	155C	155D	155E	155F		
	9	1560	1561	1562	1563		
	10	1564	1565	1566	1567		
	11	1568	1569	156A	156B		
	12	156C	156D	156E	156F		
	13	1570	1571	1572	1573		
	14	1574	1575	1576	1577		
	15	1578	1579	157A	157B		
	16	157C	157D	157E	157F		

Data Item	Address (HEX)					Attribute	Data
Alarm 1 value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1580	1581	1582	1583		
	2	1584	1585	1588	1587		
	3	1588	1589	158A	158B		
	4	158C	158D	158E	158F		
	5	1590	1591	1592	1593		
	6	1594	1595	1596	1597		
	7	1598	1599	159A	159B		
	8	159C	159D	159E	159F		
	9	15A0	15A1	15A2	15A3		
	10	15A4	15A5	15A6	15A7		
	11	15A8	15A9	15AA	15AB		
	12	15AC	15AD	15AE	15AF		
	13	15B0	15B1	15B2	15B3		
	14	15B4	15B5	15B6	15B7		
	15	15B8	15B9	15BA	15BB		
	16	15BC	15BD	15BE	15BF		
Alarm 1 high limit value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	15C0	15C1	15C2	15C3		
	2	15C4	15C5	15C6	15C7		
	3	15C8	15C9	15CA	15CB		
	4	15CC	15CD	15CE	15CF		
	5	15D0	15D1	15D2	15D3		
	6	15D4	15D5	15D6	15D7		
	7	15D8	15D9	15DA	15DB		
	8	15DC	15DD	15DE	15DF		
	9	15E0	15E1	15E2	15E3		
	10	15E4	15E5	15E6	15E7		
	11	15E8	15E9	15EA	15EB		
	12	15EC	15ED	15EE	15EF		
	13	15F0	15F1	15F2	15F3		
	14	15F4	15F5	15F6	15F7		
	15	15F8	15F9	15FA	15FB		
	16	15FC	15FD	15FE	15FF		

Data Item		Address (HEX)				Attribute	Data
Alarm 2 value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1600	1601	1602	1603		
	2	1604	1605	1606	1607		
	3	1608	1609	160A	160B		
	4	160C	160D	160E	160F		
	5	1610	1611	1612	1613		
	6	1614	1615	1616	1617		
	7	1618	1619	161A	161B		
	8	161C	161D	161E	161F		
	9	1620	1621	1622	1623		
	10	1624	1625	1626	1627		
	11	1628	1629	162A	162B		
	12	162C	162D	162E	162F		
	13	1630	1631	1632	1633		
	14	1634	1635	1636	1637		
	15	1638	1639	163A	163B		
	16	163C	163D	163E	163F		
Alarm 2 high limit value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1640	1641	1642	1643		
	2	1644	1645	1646	1647		
	3	1648	1649	164A	164B		
	4	164C	164D	164E	164F		
	5	1650	1651	1652	1653		
	6	1654	1655	1656	1657		
	7	1658	1659	165A	165B		
	8	165C	165D	165E	165F		
	9	1660	1661	1662	1663		
	10	1664	1665	1666	1667		
	11	1668	1669	166A	166B		
	12	166C	166D	166E	166F		
	13	1670	1671	1672	1673		
	14	1674	1675	1676	1677		
	15	1678	1679	167A	167B		
	16	167C	167D	167E	167F		

Data Item	Address (HEX)					Attribute	Data
Alarm 3 value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1680	1681	1682	1683		
	2	1684	1685	1688	1687		
	3	1688	1689	168A	168B		
	4	168C	168D	168E	168F		
	5	1690	1691	1692	1693		
	6	1694	1695	1696	1697		
	7	1698	1699	169A	169B		
	8	169C	169D	169E	169F		
	9	16A0	16A1	16A2	16A3		
	10	16A4	16A5	16A6	16A7		
	11	16A8	16A9	16AA	16AB		
	12	16AC	16AD	16AE	16AF		
	13	16B0	16B1	16B2	16B3		
	14	16B4	16B5	16B6	16B7		
	15	16B8	16B9	16BA	16BB		
	16	16BC	16BD	16BE	16BF		
Alarm 3 high limit value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	16C0	16C1	16C2	16C3		
	2	16C4	16C5	16C6	16C7		
	3	16C8	16C9	16CA	16CB		
	4	16CC	16CD	16CE	16CF		
	5	16D0	16D1	16D2	16D3		
	6	16D4	16D5	16D6	16D7		
	7	16D8	16D9	16DA	16DB		
	8	16DC	16DD	16DE	16DF		
	9	16E0	16E1	16E2	16E3		
	10	16E4	16E5	16E6	16E7		
	11	16E8	16E9	16EA	16EB		
	12	16EC	16ED	16EE	16EF		
	13	16F0	16F1	16F2	16F3		
	14	16F4	16F5	16F6	16F7		
	15	16F8	16F9	16FA	16FB		
	16	16FC	16FD	16FE	16FF		

Data Item	Address (HEX)					Attribute	Data
Alarm 4 value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1700	1701	1702	1703		
	2	1704	1705	1706	1707		
	3	1708	1709	170A	170B		
	4	170C	170D	170E	170F		
	5	1710	1711	1712	1713		
	6	1714	1715	1716	1717		
	7	1718	1719	171A	171B		
	8	171C	171D	171E	171F		
	9	1720	1721	1722	1723		
	10	1724	1725	1726	1727		
	11	1728	1729	172A	172B		
	12	172C	172D	172E	172F		
	13	1730	1731	1732	1733		
	14	1734	1735	1736	1737		
	15	1738	1739	173A	173B		
	16	173C	173D	173E	173F		
Alarm 4 high limit value		Channel				R/W	Refer to “Alarm 1 to 4 value setting range table (P.11-29)”.
	Module	CH1	CH2	CH3	CH4		
	1	1740	1741	1742	1743		
	2	1744	1745	1746	1747		
	3	1748	1749	174A	174B		
	4	174C	174D	174E	174F		
	5	1750	1751	1752	1753		
	6	1754	1755	1756	1757		
	7	1758	1759	175A	175B		
	8	175C	175D	175E	175F		
	9	1760	1761	1762	1763		
	10	1764	1765	1766	1767		
	11	1768	1769	176A	176B		
	12	176C	176D	176E	176F		
	13	1770	1771	1772	1773		
	14	1774	1775	1776	1777		
	15	1778	1779	177A	177B		
	16	177C	177D	177E	177F		

Data Item	Address (HEX)					Attribute	Data
Heater burnout alarm		Channel				R/W	For 20 A is selected: 0.0 to 20.0 A For 100 A is selected: 0.0 to 100.0 A
	Module	CH1	CH2	CH3	CH4		
	1	1780	1781	1782	1783		
	2	1784	1785	1788	1787		
	3	1788	1789	178A	178B		
	4	178C	178D	178E	178F		
	5	1790	1791	1792	1793		
	6	1794	1795	1796	1797		
	7	1798	1799	179A	179B		
	8	179C	179D	179E	179F		
	9	17A0	17A1	17A2	17A3		
	10	17A4	17A5	17A6	17A7		
	11	17A8	17A9	17AA	17AB		
	12	17AC	17AD	17AE	17AF		
	13	17B0	17B1	17B2	17B3		
	14	17B4	17B5	17B6	17B7		
	15	17B8	17B9	17BA	17BB		
	16	17BC	17BD	17BE	17BF		
Loop break alarm band		Channel				R/W	0 to 150 °C (0 to 270 °F) or 0.0 to 150.0 °C (0.0 to 270.0 °F) For DC current input and DC voltage input: 0 to1500
	Module	CH1	CH2	CH3	CH4		
	1	17C0	17C1	17C2	17C3		
	2	17C4	17C5	17C6	17C7		
	3	17C8	17C9	17CA	17CB		
	4	17CC	17CD	17CE	17CF		
	5	17D0	17D1	17D2	17D3		
	6	17D4	17D5	17D6	17D7		
	7	17D8	17D9	17DA	17DB		
	8	17DC	17DD	17DE	17DF		
	9	17E0	17E1	17E2	17E3		
	10	17E4	17E5	17E6	17E7		
	11	17E8	17E9	17EA	17EB		
	12	17EC	17ED	17EE	17EF		
	13	17F0	17F1	17F2	17F3		
	14	17F4	17F5	17F6	17F7		
	15	17F8	17F9	17FA	17FB		
	16	17FC	17FD	17FE	17FF		

Data Item		Address (HEX)				Attribute	Data
Loop break alarm time		Channel				R/W	0 to 200 minutes
	Module	CH1	CH2	CH3	CH4		
	1	1800	1801	1802	1803		
	2	1804	1805	1806	1807		
	3	1808	1809	180A	180B		
	4	180C	180D	180E	180F		
	5	1810	1811	1812	1813		
	6	1814	1815	1816	1817		
	7	1818	1819	181A	181B		
	8	181C	181D	181E	181F		
	9	1820	1821	1822	1823		
	10	1824	1825	1826	1827		
	11	1828	1829	182A	182B		
	12	182C	182D	182E	182F		
	13	1830	1831	1832	1833		
	14	1834	1835	1836	1837		
	15	1838	1839	183A	183B		
	16	183C	183D	183E	183F		
Sensor correction factor		Channel				R/W	0.000 to 10.000
	Module	CH1	CH2	CH3	CH4		
	1	1840	1841	1842	1843		
	2	1844	1845	1846	1847		
	3	1848	1849	184A	184B		
	4	184C	184D	184E	184F		
	5	1850	1851	1852	1853		
	6	1854	1855	1856	1857		
	7	1858	1859	185A	185B		
	8	185C	185D	185E	185F		
	9	1860	1861	1862	1863		
	10	1864	1865	1866	1867		
	11	1868	1869	186A	186B		
	12	186C	186D	186E	186F		
	13	1870	1871	1872	1873		
	14	1874	1875	1876	1877		
	15	1878	1879	187A	187B		
	16	187C	187D	187E	187F		

Data Item	Address (HEX)					Attribute	Data
Sensor correction		Channel				R/W	-100.0 to 100.0 °C (-180.0 to 180.0 °F) For DC current input and DC voltage input: -1000 to 1000
	Module	CH1	CH2	CH3	CH4		
	1	1880	1881	1882	1883		
	2	1884	1885	1888	1887		
	3	1888	1889	188A	188B		
	4	188C	188D	188E	188F		
	5	1890	1891	1892	1893		
	6	1894	1895	1896	1897		
	7	1898	1899	189A	189B		
	8	189C	189D	189E	189F		
	9	18A0	18A1	18A2	18A3		
	10	18A4	18A5	18A6	18A7		
	11	18A8	18A9	18AA	18AB		
	12	18AC	18AD	18AE	18AF		
	13	18B0	18B1	18B2	18B3		
	14	18B4	18B5	18B6	18B7		
	15	18B8	18B9	18BA	18BB		
	16	18BC	18BD	18BE	18BF		
PV filter time constant		Channel				R/W	0.0 to 10.0 seconds
	Module	CH1	CH2	CH3	CH4		
	1	18C0	18C1	18C2	18C3		
	2	18C4	18C5	18C6	18C7		
	3	18C8	18C9	18CA	18CB		
	4	18CC	18CD	18CE	18CF		
	5	18D0	18D1	18D2	18D3		
	6	18D4	18D5	18D6	18D7		
	7	18D8	18D9	18DA	18DB		
	8	18DC	18DD	18DE	18DF		
	9	18E0	18E1	18E2	18E3		
	10	18E4	18E5	18E6	18E7		
	11	18E8	18E9	18EA	18EB		
	12	18EC	18ED	18EE	18EF		
	13	18F0	18F1	18F2	18F3		
	14	18F4	18F5	18F6	18F7		
	15	18F8	18F9	18FA	18FB		
	16	18FC	18FD	18FE	18FF		

Data Item	Address (HEX)					Attribute	Data
SV rise rate	Channel					R/W	0 to 10000 °C/min (0 to 18000 °F/min) or 0.0 to 1000.0 °C/min (0.0 to 1800.0 °F/min) For DC current input and DC voltage input: 0 to 10000/min
	Module	CH1	CH2	CH3	CH4		
	1	1900	1901	1902	1903		
	2	1904	1905	1906	1907		
	3	1908	1909	190A	190B		
	4	190C	190D	190E	190F		
	5	1910	1911	1912	1913		
	6	1914	1915	1916	1917		
	7	1918	1919	191A	191B		
	8	191C	191D	191E	191F		
	9	1920	1921	1922	1923		
	10	1924	1925	1926	1927		
	11	1928	1929	192A	192B		
	12	192C	192D	192E	192F		
	13	1930	1931	1932	1933		
	14	1934	1935	1936	1937		
	15	1938	1939	193A	193B		
	16	193C	193D	193E	193F		
SV drop rate	Channel					R/W	0 to 10000 °C/min (0 to 18000 °F/min) or 0.0 to 1000.0 °C/min (0.0 to 1800.0 °F/min) For DC current input and DC voltage input: 0 to 10000/min
	Module	CH1	CH2	CH3	CH4		
	1	1940	1941	1942	1943		
	2	1944	1945	1946	1947		
	3	1948	1949	194A	194B		
	4	194C	194D	194E	194F		
	5	1950	1951	1952	1953		
	6	1954	1955	1956	1957		
	7	1958	1959	195A	195B		
	8	195C	195D	195E	195F		
	9	1960	1961	1962	1963		
	10	1964	1965	1966	1967		
	11	1968	1969	196A	196B		
	12	196C	196D	196E	196F		
	13	1970	1971	1972	1973		
	14	1974	1975	1976	1977		
	15	1978	1979	197A	197B		
	16	197C	197D	197E	197F		

Data Item	Address (HEX)					Attribute	Data
MV bias		Channel				R/W	0.0 to 100.0 %
	Module	CH1	CH2	CH3	CH4		
	1	1980	1981	1982	1983		
	2	1984	1985	1988	1987		
	3	1988	1989	198A	198B		
	4	198C	198D	198E	198F		
	5	1990	1991	1992	1993		
	6	1994	1995	1996	1997		
	7	1998	1999	199A	199B		
	8	199C	199D	199E	199F		
	9	19A0	19A1	19A2	19A3		
	10	19A4	19A5	19A6	19A7		
	11	19A8	19A9	19AA	19AB		
	12	19AC	19AD	19AE	19AF		
	13	19B0	19B1	19B2	19B3		
	14	19B4	19B5	19B6	19B7		
	15	19B8	19B9	19BA	19BB		
	16	19BC	19BD	19BE	19BF		
Reservation (*)		19C0 to 1FFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Alarm 1 to 4 value setting range table

Alarm action	Setting range
No event	
High limit alarm	-(Input span) to Input span (*1)
Low limit alarm	-(Input span) to Input span (*1)
High/Low limits alarm	0 to Input span (*1)
High/Low limits range alarm	0 to Input span (*1)
Process high alarm	Input range low limit to Input range high limit (*2)
Process low alarm	Input range low limit to Input range high limit (*2)
High limit with standby	-(Input span) to Input span (*1)
Low limit with standby	-(Input span) to Input span (*1)
High/Low limits alarm with standby	0 to Input span (*1)
High/Low limits alarm individually	0 to Input span (*1)
High/Low limits range alarm individually	0 to Input span (*1)
High/Low limits alarm with standby individually	0 to Input span (*1)

(*1): For DC voltage, current input, the input span is the same as the scaling span.

(*2) For DC voltage, current input, input range low (or high) limit value is the same as scaling low (or high) limit value.

Data Item		Address (HEX)				Attribute	Data
Input type selection		Channel				R/W	When input code M is specified 0000H: K -200 to 1370 °C 0001H: K -200.0 to 400.0 °C 0002H: J -200 to 1000 °C 0003H: R 0 to 1760 °C 0004H: S 0 to 1760 °C 0005H: B 0 to 1820 °C 0006H: E -200 to 800 °C 0007H: T -200.0 to 400.0 °C 0008H: N -200 to 1300 °C 0009H: PL-Ⅱ 0 to 1390 °C 000AH: C(W/Re5-26) 0 to 2315 °C 000BH: Pt100 -200.0 to 850.0 °C 000CH: 0 to 1 V DC -2000 to 10000 000DH: 4 to 20 mA DC -2000 to 10000 000EH: 0 to 20 mA DC -2000 to 10000 When input code A is specified 0000H: 4 to 20 mA DC (Built in receiving resistor) -2000 to 10000 0001H: 0 to 20 mA DC (Built in receiving resistor) -2000 to 10000 When input code V is specified 0000H: 0 to 5 V DC -2000 to 10000 0001H: 1 to 5 V DC -2000 to 10000 0002H: 0 to 10 V DC -2000 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	2000	2001	2002	2003		
	2	2004	2005	2006	2007		
	3	2008	2009	200A	200B		
	4	200C	200D	200E	200F		
	5	2010	2011	2012	2013		
	6	2014	2015	2016	2017		
	7	2018	2019	201A	201B		
	8	201C	201D	201E	201F		
	9	2020	2021	2022	2023		
	10	2024	2025	2026	2027		
	11	2028	2029	202A	202B		
	12	202C	202D	202E	202F		
	13	2030	2031	2032	2033		
	14	2034	2035	2036	2037		
	15	2038	2039	203A	203B		
	16	203C	203D	203E	203F		
Temperature unit selection		Channel				R/W	0000H: deg. C 0001H: deg. F Valid when input code M is specified.
	Module	CH1	CH2	CH3	CH4		
	1	2040	2041	2042	2043		
	2	2044	2045	2046	2047		
	3	2048	2049	204A	204B		
	4	204C	204D	204E	204F		
	5	2050	2051	2052	2053		
	6	2054	2055	2056	2057		
	7	2058	2059	205A	205B		
	8	205C	205D	205E	205F		
	9	2060	2061	2062	2063		
	10	2064	2065	2066	2067		
	11	2068	2069	206A	206B		
	12	206C	206D	206E	206F		
	13	2070	2071	2072	2073		
	14	2074	2075	2076	2077		
	15	2078	2079	207A	207B		
	16	207C	207D	207E	207F		

Data Item	Address (HEX)					Attribute	Data
Scaling high limit setting	Channel					R/W	Scaling lowh limit to Rated high limit
	Module	CH1	CH2	CH3	CH4		
	1	2080	2081	2082	2083		
	2	2084	2085	2088	2087		
	3	2088	2089	208A	208B		
	4	208C	208D	208E	208F		
	5	2090	2091	2092	2093		
	6	2094	2095	2096	2097		
	7	2098	2099	209A	209B		
	8	209C	209D	209E	209F		
	9	20A0	20A1	20A2	20A3		
	10	20A4	20A5	20A6	20A7		
	11	20A8	20A9	20AA	20AB		
	12	20AC	20AD	20AE	20AF		
	13	20B0	20B1	20B2	20B3		
	14	20B4	20B5	20B6	20B7		
	15	20B8	20B9	20BA	20BB		
	16	20BC	20BD	20BE	20BF		
Scaling low limit setting	Channel					R/W	Rated low limit to Scaling high limit
	Module	CH1	CH2	CH3	CH4		
	1	20C0	20C1	20C2	20C3		
	2	20C4	20C5	20C6	20C7		
	3	20C8	20C9	20CA	20CB		
	4	20CC	20CD	20CE	20CF		
	5	20D0	20D1	20D2	20D3		
	6	20D4	20D5	20D6	20D7		
	7	20D8	20D9	20DA	20DB		
	8	20DC	20DD	20DE	20DF		
	9	20E0	20E1	20E2	20E3		
	10	20E4	20E5	20E6	20E7		
	11	20E8	20E9	20EA	20EB		
	12	20EC	20ED	20EE	20EF		
	13	20F0	20F1	20F2	20F3		
	14	20F4	20F5	20F6	20F7		
	15	20F8	20F9	20FA	20FB		
	16	20FC	20FD	20FE	20FF		

Data Item	Address (HEX)					Attribute	Data
Input sampling selection	Channel					R/W	0000H: 125 ms 0001H: 50 ms 0002H: 20 ms It is fixed at 125 ms for thermocouple input and RTD input. If select a value other than 125 ms, it will be invalid.
	Module	CH1	CH2	CH3	CH4		
	1	2100	2101	2102	2103		
	2	2104	2105	2106	2107		
	3	2108	2109	210A	210B		
	4	210C	210D	210E	210F		
	5	2110	2111	2112	2113		
	6	2114	2115	2116	2117		
	7	2118	2119	211A	211B		
	8	211C	211D	211E	211F		
	9	2120	2121	2122	2123		
	10	2124	2125	2126	2127		
	11	2128	2129	212A	212B		
	12	212C	212D	212E	212F		
	13	2130	2131	2132	2133		
	14	2134	2135	2136	2137		
	15	2138	2139	213A	213B		
	16	213C	213D	213E	213F		
Direct/reverse action selection	Channel					R/W	0000H: Reverse action 0001H: Direct action
	Module	CH1	CH2	CH3	CH4		
	1	2140	2141	2142	2143		
	2	2144	2145	2146	2147		
	3	2148	2149	214A	214B		
	4	214C	214D	214E	214F		
	5	2150	2151	2152	2153		
	6	2154	2155	2156	2157		
	7	2158	2159	215A	215B		
	8	215C	215D	215E	215F		
	9	2160	2161	2162	2163		
	10	2164	2165	2166	2167		
	11	2168	2169	216A	216B		
	12	216C	216D	216E	216F		
	13	2170	2171	2172	2173		
	14	2174	2175	2176	2177		
	15	2178	2179	217A	217B		
	16	217C	217D	217E	217F		

Data Item		Address (HEX)				Attribute	Data
AT action mode selection		Channel				R/W	0000H: Normal AT 0001H: Start-up AT
	Module	CH1	CH2	CH3	CH4		
	1	2180	2181	2182	2183		
	2	2184	2185	2188	2187		
	3	2188	2189	218A	218B		
	4	218C	218D	218E	218F		
	5	2190	2191	2192	2193		
	6	2194	2195	2196	2197		
	7	2198	2199	219A	219B		
	8	219C	219D	219E	219F		
	9	21A0	21A1	21A2	21A3		
	10	21A4	21A5	21A6	21A7		
	11	21A8	21A9	21AA	21AB		
	12	21AC	21AD	21AE	21AF		
	13	21B0	21B1	21B2	21B3		
	14	21B4	21B5	21B6	21B7		
	15	21B8	21B9	21BA	21BB		
	16	21BC	21BD	21BE	21BF		
AT bias setting		Channel				R/W	0 to 50 °C (0 to 90 °F) or 0.0 to 50.0 °C (0.0 to 90.0 °F)
	Module	CH1	CH2	CH3	CH4		
	1	21C0	21C1	21C2	21C3		
	2	21C4	21C5	21C6	21C7		
	3	21C8	21C9	21CA	21CB		
	4	21CC	21CD	21CE	21CF		
	5	21D0	21D1	21D2	21D3		
	6	21D4	21D5	21D6	21D7		
	7	21D8	21D9	21DA	21DB		
	8	21DC	21DD	21DE	21DF		
	9	21E0	21E1	21E2	21E3		
	10	21E4	21E5	21E6	21E7		
	11	21E8	21E9	21EA	21EB		
	12	21EC	21ED	21EE	21EF		
	13	21F0	21F1	21F2	21F3		
	14	21F4	21F5	21F6	21F7		
	15	21F8	21F9	21FA	21FB		
	16	21FC	21FD	21FE	21FF		

Data Item	Address (HEX)					Attribute	Data
AT gain setting	Channel					R/W	0.1 to 10.0 times
	Module	CH1	CH2	CH3	CH4		
	1	2200	2201	2202	2203		
	2	2204	2205	2206	2207		
	3	2208	2209	220A	220B		
	4	220C	220D	220E	220F		
	5	2210	2211	2212	2213		
	6	2214	2215	2216	2217		
	7	2218	2219	221A	221B		
	8	221C	221D	221E	221F		
	9	2220	2221	2222	2223		
	10	2224	2225	2226	2227		
	11	2228	2229	222A	222B		
	12	222C	222D	222E	222F		
	13	2230	2231	2232	2233		
	14	2234	2235	2236	2237		
	15	2238	2239	223A	223B		
	16	223C	223D	223E	223F		
Alarm 1 value 0 Enabled/ Disabled selection	Channel					R/W	0000H: Disabled 0001H: Enabled
	Module	CH1	CH2	CH3	CH4		
	1	2240	2241	2242	2243		
	2	2244	2245	2246	2247		
	3	2248	2249	224A	224B		
	4	224C	224D	224E	224F		
	5	2250	2251	2252	2253		
	6	2254	2255	2256	2257		
	7	2258	2259	225A	225B		
	8	225C	225D	225E	225F		
	9	2260	2261	2262	2263		
	10	2264	2265	2266	2267		
	11	2268	2269	226A	226B		
	12	226C	226D	226E	226F		
	13	2270	2271	2272	2273		
	14	2274	2275	2276	2277		
	15	2278	2279	227A	227B		
	16	227C	227D	227E	227F		

Data Item		Address (HEX)				Attribute	Data
Alarm 2 value 0 Enabled/ Disabled selection		Channel				R/W	0000H: Disabled 0001H: Enabled
	Module	CH1	CH2	CH3	CH4		
	1	2280	2281	2282	2283		
	2	2284	2285	2288	2287		
	3	2288	2289	228A	228B		
	4	228C	228D	228E	228F		
	5	2290	2291	2292	2293		
	6	2294	2295	2296	2297		
	7	2298	2299	229A	229B		
	8	229C	229D	229E	229F		
	9	22A0	22A1	22A2	22A3		
	10	22A4	22A5	22A6	22A7		
	11	22A8	22A9	22AA	22AB		
	12	22AC	22AD	22AE	22AF		
	13	22B0	22B1	22B2	22B3		
	14	22B4	22B5	22B6	22B7		
	15	22B8	22B9	22BA	22BB		
	16	22BC	22BD	22BE	22BF		
Alarm 3 value 0 Enabled/ Disabled selection		Channel				R/W	0000H: Disabled 0001H: Enabled
	Module	CH1	CH2	CH3	CH4		
	1	22C0	22C1	22C2	22C3		
	2	22C4	22C5	22C6	22C7		
	3	22C8	22C9	22CA	22CB		
	4	22CC	22CD	22CE	22CF		
	5	22D0	22D1	22D2	22D3		
	6	22D4	22D5	22D6	22D7		
	7	22D8	22D9	22DA	22DB		
	8	22DC	22DD	22DE	22DF		
	9	22E0	22E1	22E2	22E3		
	10	22E4	22E5	22E6	22E7		
	11	22E8	22E9	22EA	22EB		
	12	22EC	22ED	22EE	22EF		
	13	22F0	22F1	22F2	22F3		
	14	22F4	22F5	22F6	22F7		
	15	22F8	22F9	22FA	22FB		
	16	22FC	22FD	22FE	22FF		

Data Item	Address (HEX)					Attribute	Data
Alarm 4 value 0 Enabled/ Disabled selection	Channel					R/W	0000H: Disabled 0001H: Enabled
	Module	CH1	CH2	CH3	CH4		
	1	2300	2301	2302	2303		
	2	2304	2305	2306	2307		
	3	2308	2309	230A	230B		
	4	230C	230D	230E	230F		
	5	2310	2311	2312	2313		
	6	2314	2315	2316	2317		
	7	2318	2319	231A	231B		
	8	231C	231D	231E	231F		
	9	2320	2321	2322	2323		
	10	2324	2325	2326	2327		
	11	2328	2329	232A	232B		
	12	232C	232D	232E	232F		
	13	2330	2331	2332	2333		
	14	2334	2335	2336	2337		
	15	2338	2339	233A	233B		
	16	233C	233D	233E	233F		
Event output allocation selection	Channel					R/W	0000H: No action Any value can be output by setting a value in the event output status flag from the host. Setting the event output status flag to 0 turns off the event output, and setting it to 1 turns on the event output. 0001H: Event output (CH alone) The event output turns ON when any of the selected channel's alarm, heater burnout alarm, or loop error alarm is activated. 0002H: Event output (CH interlock) The event output turns on when an alarm, heater burnout alarm, or loop error alarm occurs on all channels.
	Module	CH1	CH2	CH3	CH4		
	1	2340	2341	2342	2343		
	2	2344	2345	2346	2347		
	3	2348	2349	234A	234B		
	4	234C	234D	234E	234F		
	5	2350	2351	2352	2353		
	6	2354	2355	2356	2357		
	7	2358	2359	235A	235B		
	8	235C	235D	235E	235F		
	9	2360	2361	2362	2363		
	10	2364	2365	2366	2367		
	11	2368	2369	236A	236B		
	12	236C	236D	236E	236F		
	13	2370	2371	2372	2373		
	14	2374	2375	2376	2377		
	15	2378	2379	237A	237B		
	16	237C	237D	237E	237F		

Data Item	Address (HEX)					Attribute	Data
Event input allocation selection	Channel					R/W	0000H: No action It can be used for any operation by reading the event input status flag. When the event input is turned off, the event input status flag is set to 0, and when the event input is turned on, the event input status flag is set to 1. 0001H: Control start/stop (CH alone) For the selected channel only, control will start when the event input turns ON, and control will stop when the event input turns OFF. 0002H: Control start/stop (CH interlock) For all channels, turning on the event input starts the control, and turning off the event input stops the control.
	Module	CH1	CH2	CH3	CH4		
	1	2380	2381	2382	2383		
	2	2384	2385	2388	2387		
	3	2388	2389	238A	238B		
	4	238C	238D	238E	238F		
	5	2390	2391	2392	2393		
	6	2394	2395	2396	2397		
	7	2398	2399	239A	239B		
	8	239C	239D	239E	239F		
	9	23A0	23A1	23A2	23A3		
	10	23A4	23A5	23A6	23A7		
	11	23A8	23A9	23AA	23AB		
	12	23AC	23AD	23AE	23AF		
	13	23B0	23B1	23B2	23B3		
	14	23B4	23B5	23B6	23B7		
	15	23B8	23B9	23BA	23BB		
	16	23BC	23BD	23BE	23BF		
CH Enabled/ Disabled selection	Channel					R/W	0000H: Disabled 0001H: Enabled
	Module	CH1	CH2	CH3	CH4		
	1	23C0	23C1	23C2	23C3		
	2	23C4	23C5	23C6	23C7		
	3	23C8	23C9	23CA	23CB		
	4	23CC	23CD	23CE	23CF		
	5	23D0	23D1	23D2	23D3		
	6	23D4	23D5	23D6	23D7		
	7	23D8	23D9	23DA	23DB		
	8	23DC	23DD	23DE	23DF		
	9	23E0	23E1	23E2	23E3		
	10	23E4	23E5	23E6	23E7		
	11	23E8	23E9	23EA	23EB		
	12	23EC	23ED	23EE	23EF		
	13	23F0	23F1	23F2	23F3		
	14	23F4	23F5	23F6	23F7		
	15	23F8	23F9	23FA	23FB		
	16	23FC	23FD	23FE	23FF		

Data Item		Address (HEX)				Attribute	Data
Number of moving average setting		Channel				R/W	1 to 10 times
	Module	CH1	CH2	CH3	CH4		
	1	2400	2401	2402	2403		
	2	2404	2405	2406	2407		
	3	2408	2409	240A	240B		
	4	240C	240D	240E	240F		
	5	2410	2411	2412	2413		
	6	2414	2415	2416	2417		
	7	2418	2419	241A	241B		
	8	241C	241D	241E	241F		
	9	2420	2421	2422	2423		
	10	2424	2425	2426	2427		
	11	2428	2429	242A	242B		
	12	242C	242D	242E	242F		
	13	2430	2431	2432	2433		
	14	2434	2435	2436	2437		
	15	2438	2439	243A	243B		
	16	243C	243D	243E	243F		
Reservation (*)		2440 to 2FFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item		Address (HEX)				Attribute	Data
Input math function selection		Channel				R/W	0000H: Standard 0001H: Difference input (*) [(CH1-CH2) or (CH3-CH4)] 0002H: Addition input (*) [(CH1+CH2) or (CH3+CH4)] (*): Select CH1 or CH3 for differential input and addition input. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	3000	3001	3002	3003		
	2	3004	3005	3006	3007		
	3	3008	3009	300A	300B		
	4	300C	300D	300E	300F		
	5	3010	3011	3012	3013		
	6	3014	3015	3016	3017		
	7	3018	3019	301A	301B		
	8	301C	301D	301E	301F		
	9	3020	3021	3022	3023		
	10	3024	3025	3026	3027		
	11	3028	3029	302A	302B		
	12	302C	302D	302E	302F		
	13	3030	3031	3032	3033		
	14	3034	3035	3036	3037		
	15	3038	3039	303A	303B		
	16	303C	303D	303E	303F		
Input difference selection		Channel				R/W	0000H: Disable 0001H: CH1 0002H: CH2 0003H: CH3 0004H: CH4
	Module	CH1	CH2	CH3	CH4		
	1	3040	3041	3042	3043		
	2	3044	3045	3046	3047		
	3	3048	3049	304A	304B		
	4	304C	304D	304E	304F		
	5	3050	3051	3052	3053		
	6	3054	3055	3056	3057		
	7	3058	3059	305A	305B		
	8	305C	305D	305E	305F		
	9	3060	3061	3062	3063		
	10	3064	3065	3066	3067		
	11	3068	3069	306A	306B		
	12	306C	306D	306E	306F		
	13	3070	3071	3072	3073		
	14	3074	3075	3076	3077		
	15	3078	3079	307A	307B		
	16	307C	307D	307E	307F		

Data Item	Address (HEX)					Attribute	Data
Input difference setting	Channel					R/W	1 to 1000 °C (1 to 1800 °F) or 0.1 to 1000.0 °C (0.1 to 1800.0 °F) when DC current and DC voltage input 1 to 10000
	Module	CH1	CH2	CH3	CH4		
	1	3080	3081	3082	3083		
	2	3084	3085	3088	3087		
	3	3088	3089	308A	308B		
	4	308C	308D	308E	308F		
	5	3090	3091	3092	3093		
	6	3094	3095	3096	3097		
	7	3098	3099	309A	309B		
	8	309C	309D	309E	309F		
	9	30A0	30A1	30A2	30A3		
	10	30A4	30A5	30A6	30A7		
	11	30A8	30A9	30AA	30AB		
	12	30AC	30AD	30AE	30AF		
	13	30B0	30B1	30B2	30B3		
	14	30B4	30B5	30B6	30B7		
	15	30B8	30B9	30BA	30BB		
	16	30BC	30BD	30BE	30BF		
Control action selection	Channel					R/W	0000H: 2 DOF PID control 0001H: Fast-PID control 0002H: Slow-PID control 0003H: ON-OFF control 0004H: Gap-PID control This item can be selected only when Control Disable is set. When integral time is 0 or 0.0, if Slow-PID control is selected or control action is selected when control is enabled (during control execution), error code 17 (11H) is returned with negative acknowledgement.
	Module	CH1	CH2	CH3	CH4		
	1	30C0	30C1	30C2	30C3		
	2	30C4	30C5	30C6	30C7		
	3	30C8	30C9	30CA	30CB		
	4	30CC	30CD	30CE	30CF		
	5	30D0	30D1	30D2	30D3		
	6	30D4	30D5	30D6	30D7		
	7	30D8	30D9	30DA	30DB		
	8	30DC	30DD	30DE	30DF		
	9	30E0	30E1	30E2	30E3		
	10	30E4	30E5	30E6	30E7		
	11	30E8	30E9	30EA	30EB		
	12	30EC	30ED	30EE	30EF		
	13	30F0	30F1	30F2	30F3		
	14	30F4	30F5	30F6	30F7		
	15	30F8	30F9	30FA	30FB		
	16	30FC	30FD	30FE	30FF		

Data Item	Address (HEX)					Attribute	Data
Proportional gain 2 DOF coefficient (α)	Channel					R/W	0.00 to 1.00 **When select “1: Fast-PID control”, “2: Slow-PID control”, “3: ON-OFF control”, or “4: Gap-PID control” in control action, do not change this setting item.**
	Module	CH1	CH2	CH3	CH4		
	1	3100	3101	3102	3103		
	2	3104	3105	3106	3107		
	3	3108	3109	310A	310B		
	4	310C	310D	310E	310F		
	5	3110	3111	3112	3113		
	6	3114	3115	3116	3117		
	7	3118	3119	311A	311B		
	8	311C	311D	311E	311F		
	9	3120	3121	3122	3123		
	10	3124	3125	3126	3127		
	11	3128	3129	312A	312B		
	12	312C	312D	312E	312F		
	13	3130	3131	3132	3133		
	14	3134	3135	3136	3137		
	15	3138	3139	313A	313B		
	16	313C	313D	313E	313F		
Integral 2 DOF coefficient (β)	Channel					R/W	0.00 to 10.00 **When select “1: Fast-PID control”, “2: Slow-PID control”, “3: ON-OFF control”, or “4: Gap-PID control” in control action, do not change this setting item.**
	Module	CH1	CH2	CH3	CH4		
	1	3140	3141	3142	3143		
	2	3144	3145	3146	3147		
	3	3148	3149	314A	314B		
	4	314C	314D	314E	314F		
	5	3150	3151	3152	3153		
	6	3154	3155	3156	3157		
	7	3158	3159	315A	315B		
	8	315C	315D	315E	315F		
	9	3160	3161	3162	3163		
	10	3164	3165	3166	3167		
	11	3168	3169	316A	316B		
	12	316C	316D	316E	316F		
	13	3170	3171	3172	3173		
	14	3174	3175	3176	3177		
	15	3178	3179	317A	317B		
	16	317C	317D	317E	317F		

Data Item	Address (HEX)					Attribute	Data
Differential 2 DOF coefficient (γ)	Channel					R/W	0.00 to 1.00 **Do not change this setting item.**
	Module	CH1	CH2	CH3	CH4		
	1	3180	3181	3182	3183		
	2	3184	3185	3188	3187		
	3	3188	3189	318A	318B		
	4	318C	318D	318E	318F		
	5	3190	3191	3192	3193		
	6	3194	3195	3196	3197		
	7	3198	3199	319A	319B		
	8	319C	319D	319E	319F		
	9	31A0	31A1	31A2	31A3		
	10	31A4	31A5	31A6	31A7		
	11	31A8	31A9	31AA	31AB		
	12	31AC	31AD	31AE	31AF		
	13	31B0	31B1	31B2	31B3		
	14	31B4	31B5	31B6	31B7		
	15	31B8	31B9	31BA	31BB		
	16	31BC	31BD	31BE	31BF		
Desired value proportional coefficient (Cp)	Channel					R/W	0.00 to 1.00 **Do not change this setting item.**
	Module	CH1	CH2	CH3	CH4		
	1	31C0	31C1	31C2	31C3		
	2	31C4	31C5	31C6	31C7		
	3	31C8	31C9	31CA	31CB		
	4	31CC	31CD	31CE	31CF		
	5	31D0	31D1	31D2	31D3		
	6	31D4	31D5	31D6	31D7		
	7	31D8	31D9	31DA	31DB		
	8	31DC	31DD	31DE	31DF		
	9	31E0	31E1	31E2	31E3		
	10	31E4	31E5	31E6	31E7		
	11	31E8	31E9	31EA	31EB		
	12	31EC	31ED	31EE	31EF		
	13	31F0	31F1	31F2	31F3		
	14	31F4	31F5	31F6	31F7		
	15	31F8	31F9	31FA	31FB		
	16	31FC	31FD	31FE	31FF		

Data Item	Address (HEX)					Attribute	Data
Gap width		Channel				R/W	0.0 to 10.0 % Proportional band × Gap width
	Module	CH1	CH2	CH3	CH4		
	1	3200	3201	3202	3203		
	2	3204	3205	3206	3207		
	3	3208	3209	320A	320B		
	4	320C	320D	320E	320F		
	5	3210	3211	3212	3213		
	6	3214	3215	3216	3217		
	7	3218	3219	321A	321B		
	8	321C	321D	321E	321F		
	9	3220	3221	3222	3223		
	10	3224	3225	3226	3227		
	11	3228	3229	322A	322B		
	12	322C	322D	322E	322F		
	13	3230	3231	3232	3233		
	14	3234	3235	3236	3237		
	15	3238	3239	323A	323B		
	16	323C	323D	323E	323F		
Gap coefficient		Channel				R/W	0.0 to 1.0
	Module	CH1	CH2	CH3	CH4		
	1	3240	3241	3242	3243		
	2	3244	3245	3246	3247		
	3	3248	3249	324A	324B		
	4	324C	324D	324E	324F		
	5	3250	3251	3252	3253		
	6	3254	3255	3256	3257		
	7	3258	3259	325A	325B		
	8	325C	325D	325E	325F		
	9	3260	3261	3262	3263		
	10	3264	3265	3266	3267		
	11	3268	3269	326A	326B		
	12	326C	326D	326E	326F		
	13	3270	3271	3272	3273		
	14	3274	3275	3276	3277		
	15	3278	3279	327A	327B		
	16	327C	327D	327E	327F		

Data Item	Address (HEX)					Attribute	Data
Output minimum ON/OFF time	Channel					R/W	0 to 1000 ms
	Module	CH1	CH2	CH3	CH4		
	1	3280	3281	3282	3283		
	2	3284	3285	3288	3287		
	3	3288	3289	328A	328B		
	4	328C	328D	328E	328F		
	5	3290	3291	3292	3293		
	6	3294	3295	3296	3297		
	7	3298	3299	329A	329B		
	8	329C	329D	329E	329F		
	9	32A0	32A1	32A2	32A3		
	10	32A4	32A5	32A6	32A7		
	11	32A8	32A9	32AA	32AB		
	12	32AC	32AD	32AE	32AF		
	13	32B0	32B1	32B2	32B3		
	14	32B4	32B5	32B6	32B7		
	15	32B8	32B9	32BA	32BB		
	16	32BC	32BD	32BE	32BF		
Integral/ differential decimal point position	Channel					R/W	0000H: Without decimal point 0001H: With decimal point
	Module	CH1	CH2	CH3	CH4		
	1	32C0	32C1	32C2	32C3		
	2	32C4	32C5	32C6	32C7		
	3	32C8	32C9	32CA	32CB		
	4	32CC	32CD	32CE	32CF		
	5	32D0	32D1	32D2	32D3		
	6	32D4	32D5	32D6	32D7		
	7	32D8	32D9	32DA	32DB		
	8	32DC	32DD	32DE	32DF		
	9	32E0	32E1	32E2	32E3		
	10	32E4	32E5	32E6	32E7		
	11	32E8	32E9	32EA	32EB		
	12	32EC	32ED	32EE	32EF		
	13	32F0	32F1	32F2	32F3		
	14	32F4	32F5	32F6	32F7		
	15	32F8	32F9	32FA	32FB		
	16	32FC	32FD	32FE	32FF		

Data Item		Address (HEX)				Attribute	Data
Power-on restore action		Channel				R/W	0000H: Stopped state 0001H: Continuous state (State before power OFF)
	Module	CH1	CH2	CH3	CH4		
	1	3300	3301	3302	3303		
	2	3304	3305	3306	3307		
	3	3308	3309	330A	330B		
	4	330C	330D	330E	330F		
	5	3310	3311	3312	3313		
	6	3314	3315	3316	3317		
	7	3318	3319	331A	331B		
	8	331C	331D	331E	331F		
	9	3320	3321	3322	3323		
	10	3324	3325	3326	3327		
	11	3328	3329	332A	332B		
	12	332C	332D	332E	332F		
	13	3330	3331	3332	3333		
	14	3334	3335	3336	3337		
	15	3338	3339	333A	333B		
	16	333C	333D	333E	333F		
Reservation (*)		3340 to 3FFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Control function	Channel					R/W	0000H: Standard 0001H: Heating/cooling control (*) 0002H: Cascade control (*) 0003H: Output selection function Selectable only when control is prohibited. (*): Select CH1 or CH3 for heating/cooling control and cascade control. It is disabled when CH2 or CH4 is selected.
	Module	CH1	CH2	CH3	CH4		
	1	4000	4001	4002	4003		
	2	4004	4005	4006	4007		
	3	4008	4009	400A	400B		
	4	400C	400D	400E	400F		
	5	4010	4011	4012	4013		
	6	4014	4015	4016	4017		
	7	4018	4019	401A	401B		
	8	401C	401D	401E	401F		
	9	4020	4021	4022	4023		
	10	4024	4025	4026	4027		
	11	4028	4029	402A	402B		
	12	402C	402D	402E	402F		
	13	4030	4031	4032	4033		
	14	4034	4035	4036	4037		
	15	4038	4039	403A	403B		
	16	403C	403D	403E	403F		
Cooling P-band	Channel					R/W	0 to Iinput span °C (°F) or 0.0 to Iinput span °C (°F) For DC current input and DC voltage input: 0.00 to 100.00 % Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4040	4041	4042	4043		
	2	4044	4045	4046	4047		
	3	4048	4049	404A	404B		
	4	404C	404D	404E	404F		
	5	4050	4051	4052	4053		
	6	4054	4055	4056	4057		
	7	4058	4059	405A	405B		
	8	405C	405D	405E	405F		
	9	4060	4061	4062	4063		
	10	4064	4065	4066	4067		
	11	4068	4069	406A	406B		
	12	406C	406D	406E	406F		
	13	4070	4071	4072	4073		
	14	4074	4075	4076	4077		
	15	4078	4079	407A	407B		
	16	407C	407D	407E	407F		

Data Item	Address (HEX)					Attribute	Data
Cooling Integral time	Channel					R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds When “2: Slow-PID control” is selected in control action: 1 to 3600 seconds or 0.1 to 2000.0 seconds Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4080	4081	4082	4083		
	2	4084	4085	4088	4087		
	3	4088	4089	408A	408B		
	4	408C	408D	408E	408F		
	5	4090	4091	4092	4093		
	6	4094	4095	4096	4097		
	7	4098	4099	409A	409B		
	8	409C	409D	409E	409F		
	9	40A0	40A1	40A2	40A3		
	10	40A4	40A5	40A6	40A7		
	11	40A8	40A9	40AA	40AB		
	12	40AC	40AD	40AE	40AF		
	13	40B0	40B1	40B2	40B3		
	14	40B4	40B5	40B6	40B7		
	15	40B8	40B9	40BA	40BB		
	16	40BC	40BD	40BE	40BF		
Cooling differential time	Channel					R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	40C0	40C1	40C2	40C3		
	2	40C4	40C5	40C6	40C7		
	3	40C8	40C9	40CA	40CB		
	4	40CC	40CD	40CE	40CF		
	5	40D0	40D1	40D2	40D3		
	6	40D4	40D5	40D6	40D7		
	7	40D8	40D9	40DA	40DB		
	8	40DC	40DD	40DE	40DF		
	9	40E0	40E1	40E2	40E3		
	10	40E4	40E5	40E6	40E7		
	11	40E8	40E9	40EA	40EB		
	12	40EC	40ED	40EE	40EF		
	13	40F0	40F1	40F2	40F3		
	14	40F4	40F5	40F6	40F7		
	15	40F8	40F9	40FA	40FB		
	16	40FC	40FD	40FE	40FF		

Data Item	Address (HEX)					Attribute	Data
Cooling proportional cycle	Channel					R/W	0.1 to 100.0 seconds Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4100	4101	4102	4103		
	2	4104	4105	4106	4107		
	3	4108	4109	410A	410B		
	4	410C	410D	410E	410F		
	5	4110	4111	4112	4113		
	6	4114	4115	4116	4117		
	7	4118	4119	411A	411B		
	8	411C	411D	411E	411F		
	9	4120	4121	4122	4123		
	10	4124	4125	4126	4127		
	11	4128	4129	412A	412B		
	12	412C	412D	412E	412F		
	13	4130	4131	4132	4133		
	14	4134	4135	4136	4137		
	15	4138	4139	413A	413B		
	16	413C	413D	413E	413F		
Cooling ON/OFF hysteresis	Channel					R/W	0.1 to 1000.0 °C (0.1 to 1800.0 °F) For DC current input and DC voltage input: 1 to 10000 Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4140	4141	4142	4143		
	2	4144	4145	4146	4147		
	3	4148	4149	414A	414B		
	4	414C	414D	414E	414F		
	5	4150	4151	4152	4153		
	6	4154	4155	4156	4157		
	7	4158	4159	415A	415B		
	8	415C	415D	415E	415F		
	9	4160	4161	4162	4163		
	10	4164	4165	4166	4167		
	11	4168	4169	416A	416B		
	12	416C	416D	416E	416F		
	13	4170	4171	4172	4173		
	14	4174	4175	4176	4177		
	15	4178	4179	417A	417B		
	16	417C	417D	417E	417F		

Data Item		Address (HEX)				Attribute	Data
Overlap/Dead band		Channel				R/W	-100.0 to 100.0 °C (-180.0 to 180.0 °F) For DC current input and DC voltage input: -1000 to 1000 % Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4180	4181	4182	4183		
	2	4184	4185	4188	4187		
	3	4188	4189	418A	418B		
	4	418C	418D	418E	418F		
	5	4190	4191	4192	4193		
	6	4194	4195	4196	4197		
	7	4198	4199	419A	419B		
	8	419C	419D	419E	419F		
	9	41A0	41A1	41A2	41A3		
	10	41A4	41A5	41A6	41A7		
	11	41A8	41A9	41AA	41AB		
	12	41AC	41AD	41AE	41AF		
	13	41B0	41B1	41B2	41B3		
	14	41B4	41B5	41B6	41B7		
	15	41B8	41B9	41BA	41BB		
	16	41BC	41BD	41BE	41BF		
Cooling output high limit		Channel				R/W	Cooling output low limit to 100.0 % For current output: Cooling output low limit to 105.0 % Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	41C0	41C1	41C2	41C3		
	2	41C4	41C5	41C6	41C7		
	3	41C8	41C9	41CA	41CB		
	4	41CC	41CD	41CE	41CF		
	5	41D0	41D1	41D2	41D3		
	6	41D4	41D5	41D6	41D7		
	7	41D8	41D9	41DA	41DB		
	8	41DC	41DD	41DE	41DF		
	9	41E0	41E1	41E2	41E3		
	10	41E4	41E5	41E6	41E7		
	11	41E8	41E9	41EA	41EB		
	12	41EC	41ED	41EE	41EF		
	13	41F0	41F1	41F2	41F3		
	14	41F4	41F5	41F6	41F7		
	15	41F8	41F9	41FA	41FB		
	16	41FC	41FD	41FE	41FF		

Data Item	Address (HEX)					Attribute	Data
Cooling output low limit	Channel					R/W	0.0 % to Cooling output high limit For current output: -5.0 % to Cooling output high limit Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4200	4201	4202	4203		
	2	4204	4205	4206	4207		
	3	4208	4209	420A	420B		
	4	420C	420D	420E	420F		
	5	4210	4211	4212	4213		
	6	4214	4215	4216	4217		
	7	4218	4219	421A	421B		
	8	421C	421D	421E	421F		
	9	4220	4221	4222	4223		
	10	4224	4225	4226	4227		
	11	4228	4229	422A	422B		
	12	422C	422D	422E	422F		
	13	4230	4231	4232	4233		
	14	4234	4235	4236	4237		
	15	4238	4239	423A	423B		
	16	423C	423D	423E	423F		
Cooling action mode	Channel					R/W	0000H: Air cooling (Linear characteristics) 0001H: Oil cooling (1.5th power of the linear characteristics) 0002H: Water cooling (2nd power of the linear characteristics) Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4240	4241	4242	4243		
	2	4244	4245	4246	4247		
	3	4248	4249	424A	424B		
	4	424C	424D	424E	424F		
	5	4250	4251	4252	4253		
	6	4254	4255	4256	4257		
	7	4258	4259	425A	425B		
	8	425C	425D	425E	425F		
	9	4260	4261	4262	4263		
	10	4264	4265	4266	4267		
	11	4268	4269	426A	426B		
	12	426C	426D	426E	426F		
	13	4270	4271	4272	4273		
	14	4274	4275	4276	4277		
	15	4278	4279	427A	427B		
	16	427C	427D	427E	427F		

Data Item	Address (HEX)					Attribute	Data
Slave scale high limit		Channel				R/W	Slave scale low limit to Slave input range high limit Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	4280	4281	4282	4283		
	2	4284	4285	4288	4287		
	3	4288	4289	428A	428B		
	4	428C	428D	428E	428F		
	5	4290	4291	4292	4293		
	6	4294	4295	4296	4297		
	7	4298	4299	429A	429B		
	8	429C	429D	429E	429F		
	9	42A0	42A1	42A2	42A3		
	10	42A4	42A5	42A6	42A7		
	11	42A8	42A9	42AA	42AB		
	12	42AC	42AD	42AE	42AF		
	13	42B0	42B1	42B2	42B3		
	14	42B4	42B5	42B6	42B7		
	15	42B8	42B9	42BA	42BB		
	16	42BC	42BD	42BE	42BF		
Slave scale low limit		Channel				R/W	Slave input range low limit to Slave scale high limit Set with CH1 or CH3. It is disabled when set with CH2 or CH4.
	Module	CH1	CH2	CH3	CH4		
	1	42C0	42C1	42C2	42C3		
	2	42C4	42C5	42C6	42C7		
	3	42C8	42C9	42CA	42CB		
	4	42CC	42CD	42CE	42CF		
	5	42D0	42D1	42D2	42D3		
	6	42D4	42D5	42D6	42D7		
	7	42D8	42D9	42DA	42DB		
	8	42DC	42DD	42DE	42DF		
	9	42E0	42E1	42E2	42E3		
	10	42E4	42E5	42E6	42E7		
	11	42E8	42E9	42EA	42EB		
	12	42EC	42ED	42EE	42EF		
	13	42F0	42F1	42F2	42F3		
	14	42F4	42F5	42F6	42F7		
	15	42F8	42F9	42FA	42FB		
	16	42FC	42FD	42FE	42FF		

Data Item		Address (HEX)				Attribute	Data
Output bias		Channel				R/W	0.0 to 100.0 %
	Module	CH1	CH2	CH3	CH4		
	1	4300	4301	4302	4303		
	2	4304	4305	4306	4307		
	3	4308	4309	430A	430B		
	4	430C	430D	430E	430F		
	5	4310	4311	4312	4313		
	6	4314	4315	4316	4317		
	7	4318	4319	431A	431B		
	8	431C	431D	431E	431F		
	9	4320	4321	4322	4323		
	10	4324	4325	4326	4327		
	11	4328	4329	432A	432B		
	12	432C	432D	432E	432F		
	13	4330	4331	4332	4333		
	14	4334	4335	4336	4337		
	15	4338	4339	433A	433B		
	16	433C	433D	433E	433F		
Output gain		Channel				R/W	0.00 to 10.00 times
	Module	CH1	CH2	CH3	CH4		
	1	4340	4341	4342	4343		
	2	4344	4345	4346	4347		
	3	4348	4349	434A	434B		
	4	434C	434D	434E	434F		
	5	4350	4351	4352	4353		
	6	4354	4355	4356	4357		
	7	4358	4359	435A	435B		
	8	435C	435D	435E	435F		
	9	4360	4361	4362	4363		
	10	4364	4365	4366	4367		
	11	4368	4369	436A	436B		
	12	436C	436D	436E	436F		
	13	4370	4371	4372	4373		
	14	4374	4375	4376	4377		
	15	4378	4379	437A	437B		
	16	437C	437D	437E	437F		

Data Item		Address (HEX)				Attribute	Data
Output channel		Channel				R/W	0000H: CH1 0001H: CH2 0002H: CH3 0003H: CH4 This is valid when “Output selection function” is selected in “Control function (P.11-46)”.
	Module	CH1	CH2	CH3	CH4		
	1	4380	4381	4382	4383		
	2	4384	4385	4388	4387		
	3	4388	4389	438A	438B		
	4	438C	438D	438E	438F		
	5	4390	4391	4392	4393		
	6	4394	4395	4396	4397		
	7	4398	4399	439A	439B		
	8	439C	439D	439E	439F		
	9	43A0	43A1	43A2	43A3		
	10	43A4	43A5	43A6	43A7		
	11	43A8	43A9	43AA	43AB		
	12	43AC	43AD	43AE	43AF		
	13	43B0	43B1	43B2	43B3		
	14	43B4	43B5	43B6	43B7		
	15	43B8	43B9	43BA	43BB		
	16	43BC	43BD	43BE	43BF		
Output rate-of-change		Channel				R/W	0.00 to 100.00 %/sec
	Module	CH1	CH2	CH3	CH4		
	1	43C0	43C1	43C2	43C3		
	2	43C4	43C5	43C6	43C7		
	3	43C8	43C9	43CA	43CB		
	4	43CC	43CD	43CE	43CF		
	5	43D0	43D1	43D2	43D3		
	6	43D4	43D5	43D6	43D7		
	7	43D8	43D9	43DA	43DB		
	8	43DC	43DD	43DE	43DF		
	9	43E0	43E1	43E2	43E3		
	10	43E4	43E5	43E6	43E7		
	11	43E8	43E9	43EA	43EB		
	12	43EC	43ED	43EE	43EF		
	13	43F0	43F1	43F2	43F3		
	14	43F4	43F5	43F6	43F7		
	15	43F8	43F9	43FA	43FB		
	16	43FC	43FD	43FE	43FF		
Reservation (*)		4400 to 4FFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Communication response delay time	Channel					R/W	0 to 1000 ms The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5000	5001	5002	5003		
	2	5004	5005	5006	5007		
	3	5008	5009	500A	500B		
	4	500C	500D	500E	500F		
	5	5010	5011	5012	5013		
	6	5014	5015	5016	5017		
	7	5018	5019	501A	501B		
	8	501C	501D	501E	501F		
	9	5020	5021	5022	5023		
	10	5024	5025	5026	5027		
	11	5028	5029	502A	502B		
	12	502C	502D	502E	502F		
	13	5030	5031	5032	5033		
	14	5034	5035	5036	5037		
	15	5038	5039	503A	503B		
	16	503C	503D	503E	503F		
Expanded function	Channel					R/W	0000H: Without expanded function 0001H: Peak power suppression function 0002H: Auto balance control function The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5040	5041	5042	5043		
	2	5044	5045	5046	5047		
	3	5048	5049	504A	504B		
	4	504C	504D	504E	504F		
	5	5050	5051	5052	5053		
	6	5054	5055	5056	5057		
	7	5058	5059	505A	505B		
	8	505C	505D	505E	505F		
	9	5060	5061	5062	5063		
	10	5064	5065	5066	5067		
	11	5068	5069	506A	506B		
	12	506C	506D	506E	506F		
	13	5070	5071	5072	5073		
	14	5074	5075	5076	5077		
	15	5078	5079	507A	507B		
	16	507C	507D	507E	507F		

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Total current setting		Channel				R/W	0.0 to 400.0 A The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5080	5081	5082	5083		
	2	5084	5085	5088	5087		
	3	5088	5089	508A	508B		
	4	508C	508D	508E	508F		
	5	5090	5091	5092	5093		
	6	5094	5095	5096	5097		
	7	5098	5099	509A	509B		
	8	509C	509D	509E	509F		
	9	50A0	50A1	50A2	50A3		
	10	50A4	50A5	50A6	50A7		
	11	50A8	50A9	50AA	50AB		
	12	50AC	50AD	50AE	50AF		
	13	50B0	50B1	50B2	50B3		
	14	50B4	50B5	50B6	50B7		
	15	50B8	50B9	50BA	50BB		
	16	50BC	50BD	50BE	50BF		
Current value setting		Channel				R/W	0.0 to 100.0 A
	Module	CH1	CH2	CH3	CH4		
	1	50C0	50C1	50C2	50C3		
	2	50C4	50C5	50C6	50C7		
	3	50C8	50C9	50CA	50CB		
	4	50CC	50CD	50CE	50CF		
	5	50D0	50D1	50D2	50D3		
	6	50D4	50D5	50D6	50D7		
	7	50D8	50D9	50DA	50DB		
	8	50DC	50DD	50DE	50DF		
	9	50E0	50E1	50E2	50E3		
	10	50E4	50E5	50E6	50E7		
	11	50E8	50E9	50EA	50EB		
	12	50EC	50ED	50EE	50EF		
	13	50F0	50F1	50F2	50F3		
	14	50F4	50F5	50F6	50F7		
	15	50F8	50F9	50FA	50FB		
	16	50FC	50FD	50FE	50FF		

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item		Address (HEX)				Attribute	Data
Output ON delay setting		Channel				R/W	0 to 100 ms The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5100	5101	5102	5103		
	2	5104	5105	5106	5107		
	3	5108	5109	510A	510B		
	4	510C	510D	510E	510F		
	5	5110	5111	5112	5113		
	6	5114	5115	5116	5117		
	7	5118	5119	511A	511B		
	8	511C	511D	511E	511F		
	9	5120	5121	5122	5123		
	10	5124	5125	5126	5127		
	11	5128	5129	512A	512B		
	12	512C	512D	512E	512F		
	13	5130	5131	5132	5133		
	14	5134	5135	5136	5137		
	15	5138	5139	513A	513B		
	16	513C	513D	513E	513F		
Auto balance control Interlock/Single		Channel				R/W	0000H: Single 0001H: Interlock The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5140	5141	5142	5143		
	2	5144	5145	5146	5147		
	3	5148	5149	514A	514B		
	4	514C	514D	514E	514F		
	5	5150	5151	5152	5153		
	6	5154	5155	5156	5157		
	7	5158	5159	515A	515B		
	8	515C	515D	515E	515F		
	9	5160	5161	5162	5163		
	10	5164	5165	5166	5167		
	11	5168	5169	516A	516B		
	12	516C	516D	516E	516F		
	13	5170	5171	5172	5173		
	14	5174	5175	5176	5177		
	15	5178	5179	517A	517B		
	16	517C	517D	517E	517F		

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Auto balance control Master/Slave	Channel					R/W	0000H: Slave channel 0001H: CH1 master channel 0002H: CH2 master channel 0003H: CH3 master channel 0004H: CH4 master channel The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5180	5181	5182	5183		
	2	5184	5185	5188	5187		
	3	5188	5189	518A	518B		
	4	518C	518D	518E	518F		
	5	5190	5191	5192	5193		
	6	5194	5195	5196	5197		
	7	5198	5199	519A	519B		
	8	519C	519D	519E	519F		
	9	51A0	51A1	51A2	51A3		
	10	51A4	51A5	51A6	51A7		
	11	51A8	51A9	51AA	51AB		
	12	51AC	51AD	51AE	51AF		
	13	51B0	51B1	51B2	51B3		
	14	51B4	51B5	51B6	51B7		
	15	51B8	51B9	51BA	51BB		
	16	51BC	51BD	51BE	51BF		
Auto balance control Enable/Disable	Channel					R/W	0000H: Disable 0001H: Enable
	Module	CH1	CH2	CH3	CH4		
	1	51C0	51C1	51C2	51C3		
	2	51C4	51C5	51C6	51C7		
	3	51C8	51C9	51CA	51CB		
	4	51CC	51CD	51CE	51CF		
	5	51D0	51D1	51D2	51D3		
	6	51D4	51D5	51D6	51D7		
	7	51D8	51D9	51DA	51DB		
	8	51DC	51DD	51DE	51DF		
	9	51E0	51E1	51E2	51E3		
	10	51E4	51E5	51E6	51E7		
	11	51E8	51E9	51EA	51EB		
	12	51EC	51ED	51EE	51EF		
	13	51F0	51F1	51F2	51F3		
	14	51F4	51F5	51F6	51F7		
	15	51F8	51F9	51FA	51FB		
	16	51FC	51FD	51FE	51FF		

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Auto balance control start output	Channel					R/W	0.00 to 1.00 (corresponding to 0 to 100 %)
	Module	CH1	CH2	CH3	CH4		
	1	5200	5201	5202	5203		
	2	5204	5205	5206	5207		
	3	5208	5209	520A	520B		
	4	520C	520D	520E	520F		
	5	5210	5211	5212	5213		
	6	5214	5215	5216	5217		
	7	5218	5219	521A	521B		
	8	521C	521D	521E	521F		
	9	5220	5221	5222	5223		
	10	5224	5225	5226	5227		
	11	5228	5229	522A	522B		
	12	522C	522D	522E	522F		
	13	5230	5231	5232	5233		
	14	5234	5235	5236	5237		
	15	5238	5239	523A	523B		
	16	523C	523D	523E	523F		
Auto balance control cancel area	Channel					R/W	0 to Input span °C (°F) × 10 % or 0.0 to Input span °C (°F) × 10 % For DC current input and DC voltage input: 0 to Scaling span × 10 % If set to 0, the auto balance control cancel area is twice the proportional band of the master channel.
	Module	CH1	CH2	CH3	CH4		
	1	5240	5241	5242	5243		
	2	5244	5245	5246	5247		
	3	5248	5249	524A	524B		
	4	524C	524D	524E	524F		
	5	5250	5251	5252	5253		
	6	5254	5255	5256	5257		
	7	5258	5259	525A	525B		
	8	525C	525D	525E	525F		
	9	5260	5261	5262	5263		
	10	5264	5265	5266	5267		
	11	5268	5269	526A	526B		
	12	526C	526D	526E	526F		
	13	5270	5271	5272	5273		
	14	5274	5275	5276	5277		
	15	5278	5279	527A	527B		
	16	527C	527D	527E	527F		

Data Item	Address (HEX)					Attribute	Data
Number of communication management module setting	Channel					R/W	1 to 16 modules The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5280	5281	5282	5283		
	2	5284	5285	5288	5287		
	3	5288	5289	528A	528B		
	4	528C	528D	528E	528F		
	5	5290	5291	5292	5293		
	6	5294	5295	5296	5297		
	7	5298	5299	529A	529B		
	8	529C	529D	529E	529F		
	9	52A0	52A1	52A2	52A3		
	10	52A4	52A5	52A6	52A7		
	11	52A8	52A9	52AA	52AB		
	12	52AC	52AD	52AE	52AF		
	13	52B0	52B1	52B2	52B3		
	14	52B4	52B5	52B6	52B7		
	15	52B8	52B9	52BA	52BB		
	16	52BC	52BD	52BE	52BF		
Non-volatile IC memory save selection	Channel					R/W	0000H: Save 0001H: Not save The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	52C0	52C1	52C2	52C3		
	2	52C4	52C5	52C6	52C7		
	3	52C8	52C9	52CA	52CB		
	4	52CC	52CD	52CE	52CF		
	5	52D0	52D1	52D2	52D3		
	6	52D4	52D5	52D6	52D7		
	7	52D8	52D9	52DA	52DB		
	8	52DC	52DD	52DE	52DF		
	9	52E0	52E1	52E2	52E3		
	10	52E4	52E5	52E6	52E7		
	11	52E8	52E9	52EA	52EB		
	12	52EC	52ED	52EE	52EF		
	13	52F0	52F1	52F2	52F3		
	14	52F4	52F5	52F6	52F7		
	15	52F8	52F9	52FA	52FB		
	16	52FC	52FD	52FE	52FF		

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Host setting value change flag clearing		Channel				R/W	0000H: Clear 0001H: Do not clear (Change setting value) The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5300	5301	5302	5303		
	2	5304	5305	5306	5307		
	3	5308	5309	530A	530B		
	4	530C	530D	530E	530F		
	5	5310	5311	5312	5313		
	6	5314	5315	5316	5317		
	7	5318	5319	531A	531B		
	8	531C	531D	531E	531F		
	9	5320	5321	5322	5323		
	10	5324	5325	5326	5327		
	11	5328	5329	532A	532B		
	12	532C	532D	532E	532F		
	13	5330	5331	5332	5333		
	14	5334	5335	5336	5337		
	15	5338	5339	533A	533B		
	16	533C	533D	533E	533F		
USB setting value change flag clearing		Channel				R/W	0000H: Clear 0001H: Do not clear (Change setting value) The addresses of CH2 to CH4 are reserved items. (*)
	Module	CH1	CH2	CH3	CH4		
	1	5340	5341	5342	5343		
	2	5344	5345	5346	5347		
	3	5348	5349	534A	534B		
	4	534C	534D	534E	534F		
	5	5350	5351	5352	5353		
	6	5354	5355	5356	5357		
	7	5358	5359	535A	535B		
	8	535C	535D	535E	535F		
	9	5360	5361	5362	5363		
	10	5364	5365	5366	5367		
	11	5368	5369	536A	536B		
	12	536C	536D	536E	536F		
	13	5370	5371	5372	5373		
	14	5374	5375	5376	5377		
	15	5378	5379	537A	537B		
	16	537C	537D	537E	537F		
Reservation (*)		5380 to 5FFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
PV reading		Channel				RO	Value of control range (*) Corresponding to Input calculation function (Difference input, Addition input) and Input difference detection. When power is supplied from the host computer by USB bus power, 0 is returned.
	Module	CH1	CH2	CH3	CH4		
	1	6000	6001	6002	6003		
	2	6004	6005	6006	6007		
	3	6008	6009	600A	600B		
	4	600C	600D	600E	600F		
	5	6010	6011	6012	6013		
	6	6014	6015	6016	6017		
	7	6018	6019	601A	601B		
	8	601C	601D	601E	601F		
	9	6020	6021	6022	6023		
	10	6024	6025	6026	6027		
	11	6028	6029	602A	602B		
	12	602C	602D	602E	602F		
	13	6030	6031	6032	6033		
	14	6034	6035	6036	6037		
	15	6038	6039	603A	603B		
	16	603C	603D	603E	603F		
MV reading		Channel				RO	Output low limit to Output high limit
	Module	CH1	CH2	CH3	CH4		
	1	6040	6041	6042	6043		
	2	6044	6045	6046	6047		
	3	6048	6049	604A	604B		
	4	604C	604D	604E	604F		
	5	6050	6051	6052	6053		
	6	6054	6055	6056	6057		
	7	6058	6059	605A	605B		
	8	605C	605D	605E	605F		
	9	6060	6061	6062	6063		
	10	6064	6065	6066	6067		
	11	6068	6069	606A	606B		
	12	606C	606D	606E	606F		
	13	6070	6071	6072	6073		
	14	6074	6075	6076	6077		
	15	6078	6079	607A	607B		
	16	607C	607D	607E	607F		

(*): Control range for thermocouple input (no decimal point)
    Input range low limit - 50 °C (90°F) to Input range high limit + 50 °C (90°F)
  Control range for thermocouple input (with decimal point) and RTD input
    Input range low limit - (Input span × 1 %) °C (°F) to Input range high limit + 50.0 °C (90°F)
  Control range for DC current input and DC voltage input
    Scaling low limit - Scaling width × 1 % to Scaling high limit + Scaling width × 10 %

Data Item		Address (HEX)				Attribute	Data
SV reading		Channel				RO	Scaling low limit to Scaling high limit
	Module	CH1	CH2	CH3	CH4		
	1	6080	6081	6082	6083		
	2	6084	6085	6088	6087		
	3	6088	6089	608A	608B		
	4	608C	608D	608E	608F		
	5	6090	6091	6092	6093		
	6	6094	6095	6096	6097		
	7	6098	6099	609A	609B		
	8	609C	609D	609E	609F		
	9	60A0	60A1	60A2	60A3		
	10	60A4	60A5	60A6	60A7		
	11	60A8	60A9	60AA	60AB		
	12	60AC	60AD	60AE	60AF		
	13	60B0	60B1	60B2	60B3		
	14	60B4	60B5	60B6	60B7		
	15	60B8	60B9	60BA	60BB		
	16	60BC	60BD	60BE	60BF		

Data Item	Address (HEX)					Attribute	Data
Status flag 1 reading	Channel					RO	B0: Control Enable/Diseble 0: Diseble 1: Enable B1: AT Perform/Cancel 0: Cancel 1: Perform B2: Auto/Manual control 0: Automatic 1: Manual B3: Control output 0: OFF 1: ON B4: Input error (Overscale) 0: Normal 1: Error B5: Input Error (Underscale) 0: Normal 1: Error B6: Alarm 1 output 0: OFF 1: ON B7: Alarm 2 output 0: OFF 1: ON B8: Alarm 3 output 0: OFF 1: ON B9: Alarm 4 output 0: OFF 1: ON B10: Loop break alarm output 0: OFF 1: ON B11: Heater burnout alarm output 0: OFF 1: ON B12: Input difference 0: Within range 1: Without range B13: Not used B14: Power supply identification (*) 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error
	Module	CH1	CH2	CH3	CH4		
	1	60C0	60C1	60C2	60C3		
	2	60C4	60C5	60C6	60C7		
	3	60C8	60C9	60CA	60CB		
	4	60CC	60CD	60CE	60CF		
	5	60D0	60D1	60D2	60D3		
	6	60D4	60D5	60D6	60D7		
	7	60D8	60D9	60DA	60DB		
	8	60DC	60DD	60DE	60DF		
	9	60E0	60E1	60E2	60E3		
	10	60E4	60E5	60E6	60E7		
	11	60E8	60E9	60EA	60EB		
	12	60EC	60ED	60EE	60EF		
	13	60F0	60F1	60F2	60F3		
	14	60F4	60F5	60F6	60F7		
	15	60F8	60F9	60FA	60FB		
	16	60FC	60FD	60FE	60FF		

(*): When power is supplied from 24 V DC and USB bus power, 0: 24 V DC is returned.

Data Item	Address (HEX)					Attribute	Data
Status flag 2 reading	Channel					RO	B0: Auto balance control 0: None 1: During auto balance control B1: Not used B2: Not used B3: Not used B4: Cold junction error 0: Normal 1: Error B5: Sensor error 0: Normal 1: Error B6: ADC error 0: Normal 1: Error B7: Host setting value change flag 0: Without flag 1: With flag B8: USB setting value change flag 0: Without flag 1: With flag B9: Not used B10: Not used B11: Not used B12 to B15: **System bit for internal processing. Do not use.**
	Module	CH1	CH2	CH3	CH4		
	1	6100	6101	6102	6103		
	2	6104	6105	6106	6107		
	3	6108	6109	610A	610B		
	4	610C	610D	610E	610F		
	5	6110	6111	6112	6113		
	6	6114	6115	6116	6117		
	7	6118	6119	611A	611B		
	8	611C	611D	611E	611F		
	9	6120	6121	6122	6123		
	10	6124	6125	6126	6127		
	11	6128	6129	612A	612B		
	12	612C	612D	612E	612F		
	13	6130	6131	6132	6133		
	14	6134	6135	6136	6137		
	15	6138	6139	613A	613B		
	16	613C	613D	613E	613F		
Heater current value reading	Channel					RO	0.0 to 20.0 A or 0.0 to 100.0 A
	Module	CH1	CH2	CH3	CH4		
	1	6140	6141	6142	6143		
	2	6144	6145	6146	6147		
	3	6148	6149	614A	614B		
	4	614C	614D	614E	614F		
	5	6150	6151	6152	6153		
	6	6154	6155	6156	6157		
	7	6158	6159	615A	615B		
	8	615C	615D	615E	615F		
	9	6160	6161	6162	6163		
	10	6164	6165	6166	6167		
	11	6168	6169	616A	616B		
	12	616C	616D	616E	616F		
	13	6170	6171	6172	6173		
	14	6174	6175	6176	6177		
	15	6178	6179	617A	617B		
	16	617C	617D	617E	617F		

Data Item		Address (HEX)				Attribute	Data
Event input reading		Channel				RO	0000H: OFF
	Module	CH1	CH2	CH3	CH4		0001H: ON
	1	6180	6181	6182	6183		
	2	6184	6185	6188	6187		
	3	6188	6189	618A	618B		
	4	618C	618D	618E	618F		
	5	6190	6191	6192	6193		
	6	6194	6195	6196	6197		
	7	6198	6199	619A	619B		
	8	619C	619D	619E	619F		
	9	61A0	61A1	61A2	61A3		
	10	61A4	61A5	61A6	61A7		
	11	61A8	61A9	61AA	61AB		
	12	61AC	61AD	61AE	61AF		
	13	61B0	61B1	61B2	61B3		
	14	61B4	61B5	61B6	61B7		
	15	61B8	61B9	61BA	61BB		
	16	61BC	61BD	61BE	61BF		
Event output reading		Channel				RO	0000H: OFF
	Module	CH1	CH2	CH3	CH4		0001H: ON
	1	61C0	61C1	61C2	61C3		
	2	61C4	61C5	61C6	61C7		
	3	61C8	61C9	61CA	61CB		
	4	61CC	61CD	61CE	61CF		
	5	61D0	61D1	61D2	61D3		
	6	61D4	61D5	61D6	61D7		
	7	61D8	61D9	61DA	61DB		
	8	61DC	61DD	61DE	61DF		
	9	61E0	61E1	61E2	61E3		
	10	61E4	61E5	61E6	61E7		
	11	61E8	61E9	61EA	61EB		
	12	61EC	61ED	61EE	61EF		
	13	61F0	61F1	61F2	61F3		
	14	61F4	61F5	61F6	61F7		
	15	61F8	61F9	61FA	61FB		
	16	61FC	61FD	61FE	61FF		

Data Item	Address (HEX)					Attribute	Data
PV (process variable) reading		Channel				RO	Value of control range (*) The input value of each channel is read regardless of the calculation function (Difference input, Addition input) and input difference detection. When power is supplied from the host computer by USB bus power, 0 is returned.
	Module	CH1	CH2	CH3	CH4		
	1	6200	6201	6202	6203		
	2	6204	6205	6206	6207		
	3	6208	6209	620A	620B		
	4	620C	620D	620E	620F		
	5	6210	6211	6212	6213		
	6	6214	6215	6216	6217		
	7	6218	6219	621A	621B		
	8	621C	621D	621E	621F		
	9	6220	6221	6222	6223		
	10	6224	6225	6226	6227		
	11	6228	6229	622A	622B		
	12	622C	622D	622E	622F		
	13	6230	6231	6232	6233		
	14	6234	6235	6236	6237		
	15	6238	6239	623A	623B		
	16	623C	623D	623E	623F		
Ambient temperature reading		Channel				RO	Read the input terminal temperature of each channel. When thermocouple input, convert it to a value according to temperature unit selection. For the read value, the value of the first decimal place is returned regardless of the presence or absence of a decimal point in the input range. (Example) If 0.0 °C (32.0 °F), the read value will be 0 (320). When RTD input, DC current input, and DC voltage input, 0 is returned.
	Module	CH1	CH2	CH3	CH4		
	1	6240	6241	6242	6243		
	2	6244	6245	6246	6247		
	3	6248	6249	624A	624B		
	4	624C	624D	624E	624F		
	5	6250	6251	6252	6253		
	6	6254	6255	6256	6257		
	7	6258	6259	625A	625B		
	8	625C	625D	625E	625F		
	9	6260	6261	6262	6263		
	10	6264	6265	6266	6267		
	11	6268	6269	626A	626B		
	12	626C	626D	626E	626F		
	13	6270	6271	6272	6273		
	14	6274	6275	6276	6277		
	15	6278	6279	627A	627B		
	16	627C	627D	627E	627F		
Reservation (*)		6280 to EFFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

Data Item	Address (HEX)					Attribute	Data
Alarm history 1 Error No.	Channel					RO	B0: Alarm 1 0: Normal 1: Error B1: Alarm 2 0: Normal 1: Error B2: Alarm 3 0: Normal 1: Error B3: Alarm 4 0: Normal 1: Error B4: Heater burnout alarm 0: Normal 1: Error B5: Not used B6: Loop break alarm 0: Normal 1: Error B7: Sensor error 0: Normal 1: Error B8: Input error (Overscale) 0: Normal 1: Error B9: Input error (Underscale) 0: Normal 1: Error B10: Cold junction error 0: Normal 1: Error B11: Non-volatile IC memory error 0: Normal 1: Error B12: ADC error 0: Normal 1: Error B13: Not used B14: Not used B15: Not used
	Module	CH1	CH2	CH3	CH4		
	1	F000	F001	F002	F003		
	2	F004	F005	F006	F007		
	3	F008	F009	F00A	F00B		
	4	F00C	F00D	F00E	F00F		
	5	F010	F011	F012	F013		
	6	F014	F015	F016	F017		
	7	F018	F019	F01A	F01B		
	8	F01C	F01D	F01E	F01F		
	9	F020	F021	F022	F023		
	10	F024	F025	F026	F027		
	11	F028	F029	F02A	F02B		
	12	F02C	F02D	F02E	F02F		
	13	F030	F031	F032	F033		
	14	F034	F035	F036	F037		
	15	F038	F039	F03A	F03B		
	16	F03C	F03D	F03E	F03F		
Alarm history 2 Error No.	Channel					RO	
	Module	CH1	CH2	CH3	CH4		
	1	F040	F041	F042	F043		
	2	F044	F045	F046	F047		
	3	F048	F049	F04A	F04B		
	4	F04C	F04D	F04E	F04F		
	5	F050	F051	F052	F053		
	6	F054	F055	F056	F057		
	7	F058	F059	F05A	F05B		
	8	F05C	F05D	F05E	F05F		
	9	F060	F061	F062	F063		
	10	F064	F065	F066	F067		
	11	F068	F069	F06A	F06B		
	12	F06C	F06D	F06E	F06F		
	13	F070	F071	F072	F073		
	14	F074	F075	F076	F077		
	15	F078	F079	F07A	F07B		
	16	F07C	F07D	F07E	F07F		

Data Item		Address (HEX)				Attribute	Data
Alarm history 3 Error No.		Channel				RO	B0: Alarm 1 0: Normal 1: Error B1: Alarm 2 0: Normal 1: Error B2: Alarm 3 0: Normal 1: Error B3: Alarm 4 0: Normal 1: Error B4: Heater burnout alarm 0: Normal 1: Error B5: Not used B6: Loop break alarm 0: Normal 1: Error B7: Sensor error 0: Normal 1: Error B8: Input error (Overscale) 0: Normal 1: Error B9: Input error (Underscale) 0: Normal 1: Error B10: Cold junction error 0: Normal 1: Error B11: Non-volatile IC memory error 0: Normal 1: Error B12: ADC error 0: Normal 1: Error B13: Not used B14: Not used B15: Not used
	Module	CH1	CH2	CH3	CH4		
	1	F080	F081	F082	F083		
	2	F084	F085	F088	F087		
	3	F088	F089	F08A	F08B		
	4	F08C	F08D	F08E	F08F		
	5	F090	F091	F092	F093		
	6	F094	F095	F096	F097		
	7	F098	F099	F09A	F09B		
	8	F09C	F09D	F09E	F09F		
	9	F0A0	F0A1	F0A2	F0A3		
	10	F0A4	F0A5	F0A6	F0A7		
	11	F0A8	F0A9	F0AA	F0AB		
	12	F0AC	F0AD	F0AE	F0AF		
	13	F0B0	F0B1	F0B2	F0B3		
	14	F0B4	F0B5	F0B6	F0B7		
	15	F0B8	F0B9	F0BA	F0BB		
	16	F0BC	F0BD	F0BE	F0BF		
Alarm history 4 Error No.		Channel				RO	
	Module	CH1	CH2	CH3	CH4		
	1	F0C0	F0C1	F0C2	F0C3		
	2	F0C4	F0C5	F0C6	F0C7		
	3	F0C8	F0C9	F0CA	F0CB		
	4	F0CC	F0CD	F0CE	F0CF		
	5	F0D0	F0D1	F0D2	F0D3		
	6	F0D4	F0D5	F0D6	F0D7		
	7	F0D8	F0D9	F0DA	F0DB		
	8	F0DC	F0DD	F0DE	F0DF		
	9	F0E0	F0E1	F0E2	F0E3		
	10	F0E4	F0E5	F0E6	F0E7		
	11	F0E8	F0E9	F0EA	F0EB		
	12	F0EC	F0ED	F0EE	F0EF		
	13	F0F0	F0F1	F0F2	F0F3		
	14	F0F4	F0F5	F0F6	F0F7		
	15	F0F8	F0F9	F0FA	F0FB		
	16	F0FC	F0FD	F0FE	F0FF		

Data Item	Address (HEX)					Attribute	Data
Alarm history 5 Error No.		Channel				RO	B0: Alarm 1 0: Normal 1: Error B1: Alarm 2 0: Normal 1: Error B2: Alarm 3 0: Normal 1: Error B3: Alarm 4 0: Normal 1: Error B4: Heater burnout alarm 0: Normal 1: Error B5: Not used B6: Loop break alarm 0: Normal 1: Error B7: Sensor error 0: Normal 1: Error B8: Input error (Overscale) 0: Normal 1: Error B9: Input error (Underscale) 0: Normal 1: Error B10: Cold junction error 0: Normal 1: Error B11: Non-volatile IC memory error 0: Normal 1: Error B12: ADC error 0: Normal 1: Error B13: Not used B14: Not used B15: Not used
	Module	CH1	CH2	CH3	CH4		
	1	F100	F101	F102	F103		
	2	F104	F105	F106	F107		
	3	F108	F109	F10A	F10B		
	4	F10C	F10D	F10E	F10F		
	5	F110	F111	F112	F113		
	6	F114	F115	F116	F117		
	7	F118	F119	F11A	F11B		
	8	F11C	F11D	F11E	F11F		
	9	F120	F121	F122	F123		
	10	F124	F125	F126	F127		
	11	F128	F129	F12A	F12B		
	12	F12C	F12D	F12E	F12F		
	13	F130	F131	F132	F133		
	14	F134	F135	F136	F137		
	15	F138	F139	F13A	F13B		
	16	F13C	F13D	F13E	F13F		
Alarm history 6 Error No.		Channel				RO	
	Module	CH1	CH2	CH3	CH4		
	1	F140	F141	F142	F143		
	2	F144	F145	F146	F147		
	3	F148	F149	F14A	F14B		
	4	F14C	F14D	F14E	F14F		
	5	F150	F151	F152	F153		
	6	F154	F155	F156	F157		
	7	F158	F159	F15A	F15B		
	8	F15C	F15D	F15E	F15F		
	9	F160	F161	F162	F163		
	10	F164	F165	F166	F167		
	11	F168	F169	F16A	F16B		
	12	F16C	F16D	F16E	F16F		
	13	F170	F171	F172	F173		
	14	F174	F175	F176	F177		
	15	F178	F179	F17A	F17B		
	16	F17C	F17D	F17E	F17F		

Data Item	Address (HEX)					Attribute	Data
Alarm history 7 Error No.	Channel					RO	B0: Alarm 1 0: Normal 1: Error B1: Alarm 2 0: Normal 1: Error B2: Alarm 3 0: Normal 1: Error B3: Alarm 4 0: Normal 1: Error B4: Heater burnout alarm 0: Normal 1: Error B5: Not used B6: Loop break alarm 0: Normal 1: Error B7: Sensor error 0: Normal 1: Error B8: Input error (Overscale) 0: Normal 1: Error B9: Input error (Underscale) 0: Normal 1: Error B10: Cold junction error 0: Normal 1: Error B11: Non-volatile IC memory error 0: Normal 1: Error B12: ADC error 0: Normal 1: Error B13: Not used B14: Not used B15: Not used
	Module	CH1	CH2	CH3	CH4		
	1	F180	F181	F182	F183		
	2	F184	F185	F188	F187		
	3	F188	F189	F18A	F18B		
	4	F18C	F18D	F18E	F18F		
	5	F190	F191	F192	F193		
	6	F194	F195	F196	F197		
	7	F198	F199	F19A	F19B		
	8	F19C	F19D	F19E	F19F		
	9	F1A0	F1A1	F1A2	F1A3		
	10	F1A4	F1A5	F1A6	F1A7		
	11	F1A8	F1A9	F1AA	F1AB		
	12	F1AC	F1AD	F1AE	F1AF		
	13	F1B0	F1B1	F1B2	F1B3		
	14	F1B4	F1B5	F1B6	F1B7		
	15	F1B8	F1B9	F1BA	F1BB		
	16	F1BC	F1BD	F1BE	F1BF		
Alarm history 8 Error No.	Channel					RO	
	Module	CH1	CH2	CH3	CH4		
	1	F1C0	F1C1	F1C2	F1C3		
	2	F1C4	F1C5	F1C6	F1C7		
	3	F1C8	F1C9	F1CA	F1CB		
	4	F1CC	F1CD	F1CE	F1CF		
	5	F1D0	F1D1	F1D2	F1D3		
	6	F1D4	F1D5	F1D6	F1D7		
	7	F1D8	F1D9	F1DA	F1DB		
	8	F1DC	F1DD	F1DE	F1DF		
	9	F1E0	F1E1	F1E2	F1E3		
	10	F1E4	F1E5	F1E6	F1E7		
	11	F1E8	F1E9	F1EA	F1EB		
	12	F1EC	F1ED	F1EE	F1EF		
	13	F1F0	F1F1	F1F2	F1F3		
	14	F1F4	F1F5	F1F6	F1F7		
	15	F1F8	F1F9	F1FA	F1FB		
	16	F1FC	F1FD	F1FE	F1FF		

Data Item	Address (HEX)					Attribute	Data
Alarm history 9 Error No.	Channel					RO	B0: Alarm 1 0: Normal 1: Error B1: Alarm 2 0: Normal 1: Error B2: Alarm 3 0: Normal 1: Error B3: Alarm 4 0: Normal 1: Error B4: Heater burnout alarm 0: Normal 1: Error B5: Not used B6: Loop break alarm 0: Normal 1: Error B7: Sensor error 0: Normal 1: Error B8: Input error (Overscale) 0: Normal 1: Error B9: Input error (Underscale) 0: Normal 1: Error B10: Cold junction error 0: Normal 1: Error B11: Non-volatile IC memory error 0: Normal 1: Error B12: ADC error 0: Normal 1: Error B13: Not used B14: Not used B15: Not used
	Module	CH1	CH2	CH3	CH4		
	1	F200	F201	F202	F203		
	2	F204	F205	F206	F207		
	3	F208	F209	F20A	F20B		
	4	F20C	F20D	F20E	F20F		
	5	F210	F211	F212	F213		
	6	F214	F215	F216	F217		
	7	F218	F219	F21A	F21B		
	8	F21C	F21D	F21E	F21F		
	9	F220	F221	F222	F223		
	10	F224	F225	F226	F227		
	11	F228	F229	F22A	F22B		
	12	F22C	F22D	F22E	F22F		
	13	F230	F231	F232	F233		
	14	F234	F235	F236	F237		
	15	F238	F239	F23A	F23B		
	16	F23C	F23D	F23E	F23F		
Alarm history 10 Error No.	Channel					RO	
	Module	CH1	CH2	CH3	CH4		
	1	F240	F241	F242	F243		
	2	F244	F245	F246	F247		
	3	F248	F249	F24A	F24B		
	4	F24C	F24D	F24E	F24F		
	5	F250	F251	F252	F253		
	6	F254	F255	F256	F257		
	7	F258	F259	F25A	F25B		
	8	F25C	F25D	F25E	F25F		
	9	F260	F261	F262	F263		
	10	F264	F265	F266	F267		
	11	F268	F269	F26A	F26B		
	12	F26C	F26D	F26E	F26F		
	13	F270	F271	F272	F273		
	14	F274	F275	F276	F277		
	15	F278	F279	F27A	F27B		
	16	F27C	F27D	F27E	F27F		

Data Item	Address (HEX)					Attribute	Data
Alarm history 1 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F280	F281	F282	F283		
	2	F284	F285	F288	F287		
	3	F288	F289	F28A	F28B		
	4	F28C	F28D	F28E	F28F		
	5	F290	F291	F292	F293		
	6	F294	F295	F296	F297		
	7	F298	F299	F29A	F29B		
	8	F29C	F29D	F29E	F29F		
	9	F2A0	F2A1	F2A2	F2A3		
	10	F2A4	F2A5	F2A6	F2A7		
	11	F2A8	F2A9	F2AA	F2AB		
	12	F2AC	F2AD	F2AE	F2AF		
	13	F2B0	F2B1	F2B2	F2B3		
	14	F2B4	F2B5	F2B6	F2B7		
	15	F2B8	F2B9	F2BA	F2BB		
	16	F2BC	F2BD	F2BE	F2BF		
Alarm history 2 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F2C0	F2C1	F2C2	F2C3		
	2	F2C4	F2C5	F2C6	F2C7		
	3	F2C8	F2C9	F2CA	F2CB		
	4	F2CC	F2CD	F2CE	F2CF		
	5	F2D0	F2D1	F2D2	F2D3		
	6	F2D4	F2D5	F2D6	F2D7		
	7	F2D8	F2D9	F2DA	F2DB		
	8	F2DC	F2DD	F2DE	F2DF		
	9	F2E0	F2E1	F2E2	F2E3		
	10	F2E4	F2E5	F2E6	F2E7		
	11	F2E8	F2E9	F2EA	F2EB		
	12	F2EC	F2ED	F2EE	F2EF		
	13	F2F0	F2F1	F2F2	F2F3		
	14	F2F4	F2F5	F2F6	F2F7		
	15	F2F8	F2F9	F2FA	F2FB		
	16	F2FC	F2FD	F2FE	F2FF		

Data Item	Address (HEX)					Attribute	Data
Alarm history 3 Total energizing time		Channel				RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F300	F301	F302	F303		
	2	F304	F305	F306	F307		
	3	F308	F309	F30A	F30B		
	4	F30C	F30D	F30E	F30F		
	5	F310	F311	F312	F313		
	6	F314	F315	F316	F317		
	7	F318	F319	F31A	F31B		
	8	F31C	F31D	F31E	F31F		
	9	F320	F321	F322	F323		
	10	F324	F325	F326	F327		
	11	F328	F329	F32A	F32B		
	12	F32C	F32D	F32E	F32F		
	13	F330	F331	F332	F333		
	14	F334	F335	F336	F337		
	15	F338	F339	F33A	F33B		
	16	F33C	F33D	F33E	F33F		
Alarm history 4 Total energizing time		Channel				RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F340	F341	F342	F343		
	2	F344	F345	F346	F347		
	3	F348	F349	F34A	F34B		
	4	F34C	F34D	F34E	F34F		
	5	F350	F351	F352	F353		
	6	F354	F355	F356	F357		
	7	F358	F359	F35A	F35B		
	8	F35C	F35D	F35E	F35F		
	9	F360	F361	F362	F363		
	10	F364	F365	F366	F367		
	11	F368	F369	F36A	F36B		
	12	F36C	F36D	F36E	F36F		
	13	F370	F371	F372	F373		
	14	F374	F375	F376	F377		
	15	F378	F379	F37A	F37B		
	16	F37C	F37D	F37E	F37F		

Data Item	Address (HEX)					Attribute	Data
Alarm history 5 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F380	F381	F382	F383		
	2	F384	F385	F388	F387		
	3	F388	F389	F38A	F38B		
	4	F38C	F38D	F38E	F38F		
	5	F390	F391	F392	F393		
	6	F394	F395	F396	F397		
	7	F398	F399	F39A	F39B		
	8	F39C	F39D	F39E	F39F		
	9	F3A0	F3A1	F3A2	F3A3		
	10	F3A4	F3A5	F3A6	F3A7		
	11	F3A8	F3A9	F3AA	F3AB		
	12	F3AC	F3AD	F3AE	F3AF		
	13	F3B0	F3B1	F3B2	F3B3		
	14	F3B4	F3B5	F3B6	F3B7		
	15	F3B8	F3B9	F3BA	F3BB		
	16	F3BC	F3BD	F3BE	F3BF		
Alarm history 6 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F3C0	F3C1	F3C2	F3C3		
	2	F3C4	F3C5	F3C6	F3C7		
	3	F3C8	F3C9	F3CA	F3CB		
	4	F3CC	F3CD	F3CE	F3CF		
	5	F3D0	F3D1	F3D2	F3D3		
	6	F3D4	F3D5	F3D6	F3D7		
	7	F3D8	F3D9	F3DA	F3DB		
	8	F3DC	F3DD	F3DE	F3DF		
	9	F3E0	F3E1	F3E2	F3E3		
	10	F3E4	F3E5	F3E6	F3E7		
	11	F3E8	F3E9	F3EA	F3EB		
	12	F3EC	F3ED	F3EE	F3EF		
	13	F3F0	F3F1	F3F2	F3F3		
	14	F3F4	F3F5	F3F6	F3F7		
	15	F3F8	F3F9	F3FA	F3FB		
	16	F3FC	F3FD	F3FE	F3FF		

Data Item	Address (HEX)					Attribute	Data
Alarm history 7 Total energizing time		Channel				RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F400	F401	F402	F403		
	2	F404	F405	F406	F407		
	3	F408	F409	F40A	F40B		
	4	F40C	F40D	F40E	F40F		
	5	F410	F411	F412	F413		
	6	F414	F415	F416	F417		
	7	F418	F419	F41A	F41B		
	8	F41C	F41D	F41E	F41F		
	9	F420	F421	F422	F423		
	10	F424	F425	F426	F427		
	11	F428	F429	F42A	F42B		
	12	F42C	F42D	F42E	F42F		
	13	F430	F431	F432	F433		
	14	F434	F435	F436	F437		
	15	F438	F439	F43A	F43B		
	16	F43C	F43D	F43E	F43F		
Alarm history 8 Total energizing time		Channel				RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F440	F441	F442	F443		
	2	F444	F445	F446	F447		
	3	F448	F449	F44A	F44B		
	4	F44C	F44D	F44E	F44F		
	5	F450	F451	F452	F453		
	6	F454	F455	F456	F457		
	7	F458	F459	F45A	F45B		
	8	F45C	F45D	F45E	F45F		
	9	F460	F461	F462	F463		
	10	F464	F465	F466	F467		
	11	F468	F469	F46A	F46B		
	12	F46C	F46D	F46E	F46F		
	13	F470	F471	F472	F473		
	14	F474	F475	F476	F477		
	15	F478	F479	F47A	F47B		
	16	F47C	F47D	F47E	F47F		

Data Item	Address (HEX)					Attribute	Data
Alarm history 9 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F480	F481	F482	F483		
	2	F484	F485	F488	F487		
	3	F488	F489	F48A	F48B		
	4	F48C	F48D	F48E	F48F		
	5	F490	F491	F492	F493		
	6	F494	F495	F496	F497		
	7	F498	F499	F49A	F49B		
	8	F49C	F49D	F49E	F49F		
	9	F4A0	F4A1	F4A2	F4A3		
	10	F4A4	F4A5	F4A6	F4A7		
	11	F4A8	F4A9	F4AA	F4AB		
	12	F4AC	F4AD	F4AE	F4AF		
	13	F4B0	F4B1	F4B2	F4B3		
	14	F4B4	F4B5	F4B6	F4B7		
	15	F4B8	F4B9	F4BA	F4BB		
	16	F4BC	F4BD	F4BE	F4BF		
Alarm history 10 Total energizing time	Channel					RO	Total energizing time when an error occurs
	Module	CH1	CH2	CH3	CH4		
	1	F4C0	F4C1	F4C2	F4C3		
	2	F4C4	F4C5	F4C6	F4C7		
	3	F4C8	F4C9	F4CA	F4CB		
	4	F4CC	F4CD	F4CE	F4CF		
	5	F4D0	F4D1	F4D2	F4D3		
	6	F4D4	F4D5	F4D6	F4D7		
	7	F4D8	F4D9	F4DA	F4DB		
	8	F4DC	F4DD	F4DE	F4DF		
	9	F4E0	F4E1	F4E2	F4E3		
	10	F4E4	F4E5	F4E6	F4E7		
	11	F4E8	F4E9	F4EA	F4EB		
	12	F4EC	F4ED	F4EE	F4EF		
	13	F4F0	F4F1	F4F2	F4F3		
	14	F4F4	F4F5	F4F6	F4F7		
	15	F4F8	F4F9	F4FA	F4FB		
	16	F4FC	F4FD	F4FE	F4FF		

Data Item	Address (HEX)					Attribute	Data
Contact switching total number of times (High)	Channel					RO	Contact switching total number of times (High)
	Module	CH1	CH2	CH3	CH4		
	1	F500	F501	F502	F503		
	2	F504	F505	F506	F507		
	3	F508	F509	F50A	F50B		
	4	F50C	F50D	F50E	F50F		
	5	F510	F511	F512	F513		
	6	F514	F515	F516	F517		
	7	F518	F519	F51A	F51B		
	8	F51C	F51D	F51E	F51F		
	9	F520	F521	F522	F523		
	10	F524	F525	F526	F527		
	11	F528	F529	F52A	F52B		
	12	F52C	F52D	F52E	F52F		
	13	F530	F531	F532	F533		
	14	F534	F535	F536	F537		
	15	F538	F539	F53A	F53B		
	16	F53C	F53D	F53E	F53F		
Contact switching total number of times (Low)	Channel					RO	Contact switching total number of times (Low)
	Module	CH1	CH2	CH3	CH4		
	1	F540	F541	F542	F543		
	2	F544	F545	F546	F547		
	3	F548	F549	F54A	F54B		
	4	F54C	F54D	F54E	F54F		
	5	F550	F551	F552	F553		
	6	F554	F555	F556	F557		
	7	F558	F559	F55A	F55B		
	8	F55C	F55D	F55E	F55F		
	9	F560	F561	F562	F563		
	10	F564	F565	F566	F567		
	11	F568	F569	F56A	F56B		
	12	F56C	F56D	F56E	F56F		
	13	F570	F571	F572	F573		
	14	F574	F575	F576	F577		
	15	F578	F579	F57A	F57B		
	16	F57C	F57D	F57E	F57F		

Data Item	Address (HEX)					Attribute	Data
Total energizing time (High, Low)	Channel					RO	Total energizing time CH1: Count value (High) CH2: Count value (Low) 1 count/10 mins Data for CH3 and CH4 are indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F580	F581	F582	F583		
	2	F584	F585	F588	F587		
	3	F588	F589	F58A	F58B		
	4	F58C	F58D	F58E	F58F		
	5	F590	F591	F592	F593		
	6	F594	F595	F596	F597		
	7	F598	F599	F59A	F59B		
	8	F59C	F59D	F59E	F59F		
	9	F5A0	F5A1	F5A2	F5A3		
	10	F5A4	F5A5	F5A6	F5A7		
	11	F5A8	F5A9	F5AA	F5AB		
	12	F5AC	F5AD	F5AE	F5AF		
	13	F5B0	F5B1	F5B2	F5B3		
	14	F5B4	F5B5	F5B6	F5B7		
	15	F5B8	F5B9	F5BA	F5BB		
	16	F5BC	F5BD	F5BE	F5BF		
Heater accumulated energizing time (High)	Channel					RO	Heater accumulated energizing time (High) 1 count/1 min
	Module	CH1	CH2	CH3	CH4		
	1	F5C0	F5C1	F5C2	F5C3		
	2	F5C4	F5C5	F5C6	F5C7		
	3	F5C8	F5C9	F5CA	F5CB		
	4	F5CC	F5CD	F5CE	F5CF		
	5	F5D0	F5D1	F5D2	F5D3		
	6	F5D4	F5D5	F5D6	F5D7		
	7	F5D8	F5D9	F5DA	F5DB		
	8	F5DC	F5DD	F5DE	F5DF		
	9	F5E0	F5E1	F5E2	F5E3		
	10	F5E4	F5E5	F5E6	F5E7		
	11	F5E8	F5E9	F5EA	F5EB		
	12	F5EC	F5ED	F5EE	F5EF		
	13	F5F0	F5F1	F5F2	F5F3		
	14	F5F4	F5F5	F5F6	F5F7		
	15	F5F8	F5F9	F5FA	F5FB		
	16	F5FC	F5FD	F5FE	F5FF		

Data Item	Address (HEX)					Attribute	Data
Heater accumulated energizing time (Low)	Channel					RO	Heater accumulated energizing time (Low) 1 count/1 min
	Module	CH1	CH2	CH3	CH4		
	1	F600	F601	F602	F603		
	2	F604	F605	F606	F607		
	3	F608	F609	F60A	F60B		
	4	F60C	F60D	F60E	F60F		
	5	F610	F611	F612	F613		
	6	F614	F615	F616	F617		
	7	F618	F619	F61A	F61B		
	8	F61C	F61D	F61E	F61F		
	9	F620	F621	F622	F623		
	10	F624	F625	F626	F627		
	11	F628	F629	F62A	F62B		
	12	F62C	F62D	F62E	F62F		
	13	F630	F631	F632	F633		
	14	F634	F635	F636	F637		
	15	F638	F639	F63A	F63B		
	16	F63C	F63D	F63E	F63F		
Output form	Channel					RO	0000H: Relay contact output 0001H: Non-contact voltage (for SSR drive) output 0002H: Open collector output 0003H: Triac output 0004H: DC current output 4 to 20 mA DC 0005H: DC current output 0 to 20 mA DC 0006H: DC voltage output 0 to 1 V DC 0007H: DC voltage output 0 to 5 V DC 0008H: DC voltage output 1 to 5 V DC 0009H: DC voltage output 0 to 10 V DC
	Module	CH1	CH2	CH3	CH4		
	1	F640	F641	F642	F643		
	2	F644	F645	F646	F647		
	3	F648	F649	F64A	F64B		
	4	F64C	F64D	F64E	F64F		
	5	F650	F651	F652	F653		
	6	F654	F655	F656	F657		
	7	F658	F659	F65A	F65B		
	8	F65C	F65D	F65E	F65F		
	9	F660	F661	F662	F663		
	10	F664	F665	F666	F667		
	11	F668	F669	F66A	F66B		
	12	F66C	F66D	F66E	F66F		
	13	F670	F671	F672	F673		
	14	F674	F675	F676	F677		
	15	F678	F679	F67A	F67B		
	16	F67C	F67D	F67E	F67F		

Data Item	Address (HEX)					Attribute	Data
Input form	Channel					RO	0000H: Input code M 0001H: Input code A 0002H: Input code V
	Module	CH1	CH2	CH3	CH4		
	1	F680	F681	F682	F683		
	2	F684	F685	F688	F687		
	3	F688	F689	F68A	F68B		
	4	F68C	F68D	F68E	F68F		
	5	F690	F691	F692	F693		
	6	F694	F695	F696	F697		
	7	F698	F699	F69A	F69B		
	8	F69C	F69D	F69E	F69F		
	9	F6A0	F6A1	F6A2	F6A3		
	10	F6A4	F6A5	F6A6	F6A7		
	11	F6A8	F6A9	F6AA	F6AB		
	12	F6AC	F6AD	F6AE	F6AF		
	13	F6B0	F6B1	F6B2	F6B3		
	14	F6B4	F6B5	F6B6	F6B7		
	15	F6B8	F6B9	F6BA	F6BB		
	16	F6BC	F6BD	F6BE	F6BF		
Product code	Channel					RO	Product code The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F6C0	F6C1	F6C2	F6C3		
	2	F6C4	F6C5	F6C6	F6C7		
	3	F6C8	F6C9	F6CA	F6CB		
	4	F6CC	F6CD	F6CE	F6CF		
	5	F6D0	F6D1	F6D2	F6D3		
	6	F6D4	F6D5	F6D6	F6D7		
	7	F6D8	F6D9	F6DA	F6DB		
	8	F6DC	F6DD	F6DE	F6DF		
	9	F6E0	F6E1	F6E2	F6E3		
	10	F6E4	F6E5	F6E6	F6E7		
	11	F6E8	F6E9	F6EA	F6EB		
	12	F6EC	F6ED	F6EE	F6EF		
	13	F6F0	F6F1	F6F2	F6F3		
	14	F6F4	F6F5	F6F6	F6F7		
	15	F6F8	F6F9	F6FA	F6FB		
	16	F6FC	F6FD	F6FE	F6FF		

Data Item		Address (HEX)				Attribute	Data
Presence of communication option		Channel				RO	0000H: No option 0001H: With power supply/upper communication function The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F700	F701	F702	F703		
	2	F704	F705	F706	F707		
	3	F708	F709	F70A	F70B		
	4	F70C	F70D	F70E	F70F		
	5	F710	F711	F712	F713		
	6	F714	F715	F716	F717		
	7	F718	F719	F71A	F71B		
	8	F71C	F71D	F71E	F71F		
	9	F720	F721	F722	F723		
	10	F724	F725	F726	F727		
	11	F728	F729	F72A	F72B		
	12	F72C	F72D	F72E	F72F		
	13	F730	F731	F732	F733		
	14	F734	F735	F736	F737		
	15	F738	F739	F73A	F73B		
	16	F73C	F73D	F73E	F73F		
Wiring type		Channel				RO	0000H: Terminal type 0001H: Connector type The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F740	F741	F742	F743		
	2	F744	F745	F746	F747		
	3	F748	F749	F74A	F74B		
	4	F74C	F74D	F74E	F74F		
	5	F750	F751	F752	F753		
	6	F754	F755	F756	F757		
	7	F758	F759	F75A	F75B		
	8	F75C	F75D	F75E	F75F		
	9	F760	F761	F762	F763		
	10	F764	F765	F766	F767		
	11	F768	F769	F76A	F76B		
	12	F76C	F76D	F76E	F76F		
	13	F770	F771	F772	F773		
	14	F774	F775	F776	F777		
	15	F778	F779	F77A	F77B		
	16	F77C	F77D	F77E	F77F		

Data Item	Address (HEX)					Attribute	Data
Presence of heater burnout alarm option	Channel					RO	0000H: No option 0001H: Single-phase 20 A 0002H: Single-phase 100 A The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F780	F781	F782	F783		
	2	F784	F785	F788	F787		
	3	F788	F789	F78A	F78B		
	4	F78C	F78D	F78E	F78F		
	5	F790	F791	F792	F793		
	6	F794	F795	F796	F797		
	7	F798	F799	F79A	F79B		
	8	F79C	F79D	F79E	F79F		
	9	F7A0	F7A1	F7A2	F7A3		
	10	F7A4	F7A5	F7A6	F7A7		
	11	F7A8	F7A9	F7AA	F7AB		
	12	F7AC	F7AD	F7AE	F7AF		
	13	F7B0	F7B1	F7B2	F7B3		
	14	F7B4	F7B5	F7B6	F7B7		
	15	F7B8	F7B9	F7BA	F7BB		
	16	F7BC	F7BD	F7BE	F7BF		
Presence of event option	Channel					RO	0000H: No option 0001H: Event input (4 points) 0002H: Event output (4 points) The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F7C0	F7C1	F7C2	F7C3		
	2	F7C4	F7C5	F7C6	F7C7		
	3	F7C8	F7C9	F7CA	F7CB		
	4	F7CC	F7CD	F7CE	F7CF		
	5	F7D0	F7D1	F7D2	F7D3		
	6	F7D4	F7D5	F7D6	F7D7		
	7	F7D8	F7D9	F7DA	F7DB		
	8	F7DC	F7DD	F7DE	F7DF		
	9	F7E0	F7E1	F7E2	F7E3		
	10	F7E4	F7E5	F7E6	F7E7		
	11	F7E8	F7E9	F7EA	F7EB		
	12	F7EC	F7ED	F7EE	F7EF		
	13	F7F0	F7F1	F7F2	F7F3		
	14	F7F4	F7F5	F7F6	F7F7		
	15	F7F8	F7F9	F7FA	F7FB		
	16	F7FC	F7FD	F7FE	F7FF		

Data Item		Address (HEX)				Attribute	Data
Software version		Channel				RO	Software version The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F800	F801	F802	F803		
	2	F804	F805	F806	F807		
	3	F808	F809	F80A	F80B		
	4	F80C	F80D	F80E	F80F		
	5	F810	F811	F812	F813		
	6	F814	F815	F816	F817		
	7	F818	F819	F81A	F81B		
	8	F81C	F81D	F81E	F81F		
	9	F820	F821	F822	F823		
	10	F824	F825	F826	F827		
	11	F828	F829	F82A	F82B		
	12	F82C	F82D	F82E	F82F		
	13	F830	F831	F832	F833		
	14	F834	F835	F836	F837		
	15	F838	F839	F83A	F83B		
	16	F83C	F83D	F83E	F83F		
Manufacturing date		Channel				RO	Manufacturing date The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F840	F841	F842	F843		
	2	F844	F845	F846	F847		
	3	F848	F849	F84A	F84B		
	4	F84C	F84D	F84E	F84F		
	5	F850	F851	F852	F853		
	6	F854	F855	F856	F857		
	7	F858	F859	F85A	F85B		
	8	F85C	F85D	F85E	F85F		
	9	F860	F861	F862	F863		
	10	F864	F865	F866	F867		
	11	F868	F869	F86A	F86B		
	12	F86C	F86D	F86E	F86F		
	13	F870	F871	F872	F873		
	14	F874	F875	F876	F877		
	15	F878	F879	F87A	F87B		
	16	F87C	F87D	F87E	F87F		

Data Item		Address (HEX)				Attribute	Data
Hardware version		Channel				RO	Hardware version The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F880	F881	F882	F883		
	2	F884	F885	F888	F887		
	3	F888	F889	F88A	F88B		
	4	F88C	F88D	F88E	F88F		
	5	F890	F891	F892	F893		
	6	F894	F895	F896	F897		
	7	F898	F899	F89A	F89B		
	8	F89C	F89D	F89E	F89F		
	9	F8A0	F8A1	F8A2	F8A3		
	10	F8A4	F8A5	F8A6	F8A7		
	11	F8A8	F8A9	F8AA	F8AB		
	12	F8AC	F8AD	F8AE	F8AF		
	13	F8B0	F8B1	F8B2	F8B3		
	14	F8B4	F8B5	F8B6	F8B7		
	15	F8B8	F8B9	F8BA	F8BB		
	16	F8BC	F8BD	F8BE	F8BF		
Maintenance mode		Channel				R/W	0000H: Normal mode 0001H: Maintenance mode The data for CH2 to CH4 is indefinite.
	Module	CH1	CH2	CH3	CH4		
	1	F8C0	F8C1	F8C2	F8C3		
	2	F8C4	F8C5	F8C6	F8C7		
	3	F8C8	F8C9	F8CA	F8CB		
	4	F8CC	F8CD	F8CE	F8CF		
	5	F8D0	F8D1	F8D2	F8D3		
	6	F8D4	F8D5	F8D6	F8D7		
	7	F8D8	F8D9	F8DA	F8DB		
	8	F8DC	F8DD	F8DE	F8DF		
	9	F8E0	F8E1	F8E2	F8E3		
	10	F8E4	F8E5	F8E6	F8E7		
	11	F8E8	F8E9	F8EA	F8EB		
	12	F8EC	F8ED	F8EE	F8EF		
	13	F8F0	F8F1	F8F2	F8F3		
	14	F8F4	F8F5	F8F6	F8F7		
	15	F8F8	F8F9	F8FA	F8FB		
	16	F8FC	F8FD	F8FE	F8FF		

Data Item	Address (HEX)					Attribute	Data
Control output forced ON/OFF	Channel					R/W	0000H: Control output OFF 0001H: Control output ON
	Module	CH1	CH2	CH3	CH4		
	1	F900	F901	F902	F903		
	2	F904	F905	F906	F907		
	3	F908	F909	F90A	F90B		
	4	F90C	F90D	F90E	F90F		
	5	F910	F911	F912	F913		
	6	F914	F915	F916	F917		
	7	F918	F919	F91A	F91B		
	8	F91C	F91D	F91E	F91F		
	9	F920	F921	F922	F923		
	10	F924	F925	F926	F927		
	11	F928	F929	F92A	F92B		
	12	F92C	F92D	F92E	F92F		
	13	F930	F931	F932	F933		
	14	F934	F935	F936	F937		
	15	F938	F939	F93A	F93B		
	16	F93C	F93D	F93E	F93F		
Event output forced ON/OFF	Channel					R/W	0000H: Event output OFF 0001H: Event output ON
	Module	CH1	CH2	CH3	CH4		
	1	F940	F941	F942	F943		
	2	F944	F945	F946	F947		
	3	F948	F949	F94A	F94B		
	4	F94C	F94D	F94E	F94F		
	5	F950	F951	F952	F953		
	6	F954	F955	F956	F957		
	7	F958	F959	F95A	F95B		
	8	F95C	F95D	F95E	F95F		
	9	F960	F961	F962	F963		
	10	F964	F965	F966	F967		
	11	F968	F969	F96A	F96B		
	12	F96C	F96D	F96E	F96F		
	13	F970	F971	F972	F973		
	14	F974	F975	F976	F977		
	15	F978	F979	F97A	F97B		
	16	F97C	F97D	F97E	F97F		

<table>
<tr><th colspan="2">Data Item</th><th colspan="4">Address (HEX)</th><th>Attribute</th><th>Data</th></tr>
<tr><td colspan="2">Contact switching total number of times setting (High)</td><td colspan="4">Channel</td><td rowspan="18">R/W</td><td rowspan="18">Contact switching total number of times (High)</td></tr>
<tr><td rowspan="17"></td><td>Module</td><td>CH1</td><td>CH2</td><td>CH3</td><td>CH4</td></tr>
<tr><td>1</td><td>F980</td><td>F981</td><td>F982</td><td>F983</td></tr>
<tr><td>2</td><td>F984</td><td>F985</td><td>F988</td><td>F987</td></tr>
<tr><td>3</td><td>F988</td><td>F989</td><td>F98A</td><td>F98B</td></tr>
<tr><td>4</td><td>F98C</td><td>F98D</td><td>F98E</td><td>F98F</td></tr>
<tr><td>5</td><td>F990</td><td>F991</td><td>F992</td><td>F993</td></tr>
<tr><td>6</td><td>F994</td><td>F995</td><td>F996</td><td>F997</td></tr>
<tr><td>7</td><td>F998</td><td>F999</td><td>F99A</td><td>F99B</td></tr>
<tr><td>8</td><td>F99C</td><td>F99D</td><td>F99E</td><td>F99F</td></tr>
<tr><td>9</td><td>F9A0</td><td>F9A1</td><td>F9A2</td><td>F9A3</td></tr>
<tr><td>10</td><td>F9A4</td><td>F9A5</td><td>F9A6</td><td>F9A7</td></tr>
<tr><td>11</td><td>F9A8</td><td>F9A9</td><td>F9AA</td><td>F9AB</td></tr>
<tr><td>12</td><td>F9AC</td><td>F9AD</td><td>F9AE</td><td>F9AF</td></tr>
<tr><td>13</td><td>F9B0</td><td>F9B1</td><td>F9B2</td><td>F9B3</td></tr>
<tr><td>14</td><td>F9B4</td><td>F9B5</td><td>F9B6</td><td>F9B7</td></tr>
<tr><td>15</td><td>F9B8</td><td>F9B9</td><td>F9BA</td><td>F9BB</td></tr>
<tr><td>16</td><td>F9BC</td><td>F9BD</td><td>F9BE</td><td>F9BF</td></tr>
<tr><td colspan="2">Contact switching total number of times setting (Low)</td><td colspan="4">Channel</td><td rowspan="18">R/W</td><td rowspan="18">Contact switching total number of times (Low)</td></tr>
<tr><td rowspan="17"></td><td>Module</td><td>CH1</td><td>CH2</td><td>CH3</td><td>CH4</td></tr>
<tr><td>1</td><td>F9C0</td><td>F9C1</td><td>F9C2</td><td>F9C3</td></tr>
<tr><td>2</td><td>F9C4</td><td>F9C5</td><td>F9C6</td><td>F9C7</td></tr>
<tr><td>3</td><td>F9C8</td><td>F9C9</td><td>F9CA</td><td>F9CB</td></tr>
<tr><td>4</td><td>F9CC</td><td>F9CD</td><td>F9CE</td><td>F9CF</td></tr>
<tr><td>5</td><td>F9D0</td><td>F9D1</td><td>F9D2</td><td>F9D3</td></tr>
<tr><td>6</td><td>F9D4</td><td>F9D5</td><td>F9D6</td><td>F9D7</td></tr>
<tr><td>7</td><td>F9D8</td><td>F9D9</td><td>F9DA</td><td>F9DB</td></tr>
<tr><td>8</td><td>F9DC</td><td>F9DD</td><td>F9DE</td><td>F9DF</td></tr>
<tr><td>9</td><td>F9E0</td><td>F9E1</td><td>F9E2</td><td>F9E3</td></tr>
<tr><td>10</td><td>F9E4</td><td>F9E5</td><td>F9E6</td><td>F9E7</td></tr>
<tr><td>11</td><td>F9E8</td><td>F9E9</td><td>F9EA</td><td>F9EB</td></tr>
<tr><td>12</td><td>F9EC</td><td>F9ED</td><td>F9EE</td><td>F9EF</td></tr>
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<tr><td>15</td><td>F9F8</td><td>F9F9</td><td>F9FA</td><td>F9FB</td></tr>
<tr><td>16</td><td>F9FC</td><td>F9FD</td><td>F9FE</td><td>F9FF</td></tr>
</table>

Data Item	Address (HEX)					Attribute	Data
Heater accumulated energizing time setting (High)	Channel					R/W	Heater accumulated energizing time (High) 1 count/1 min
	Module	CH1	CH2	CH3	CH4		
	1	FA00	FA01	FA02	FA03		
	2	FA04	FA05	FA06	FA07		
	3	FA08	FA09	FA0A	FA0B		
	4	FA0C	FA0D	FA0E	FA0F		
	5	FA10	FA11	FA12	FA13		
	6	FA14	FA15	FA16	FA17		
	7	FA18	FA19	FA1A	FA1B		
	8	FA1C	FA1D	FA1E	FA1F		
	9	FA20	FA21	FA22	FA23		
	10	FA24	FA25	FA26	FA27		
	11	FA28	FA29	FA2A	FA2B		
	12	FA2C	FA2D	FA2E	FA2F		
	13	FA30	FA31	FA32	FA33		
	14	FA34	FA35	FA36	FA37		
	15	FA38	FA39	FA3A	FA3B		
	16	FA3C	FA3D	FA3E	FA3F		
Heater accumulated energizing time setting (Low)	Channel					R/W	Heater accumulated energizing time (Low) 1 count/1 min
	Module	CH1	CH2	CH3	CH4		
	1	FA40	FA41	FA42	FA43		
	2	FA44	FA45	FA46	FA47		
	3	FA48	FA49	FA4A	FA4B		
	4	FA4C	FA4D	FA4E	FA4F		
	5	FA50	FA51	FA52	FA53		
	6	FA54	FA55	FA56	FA57		
	7	FA58	FA59	FA5A	FA5B		
	8	FA5C	FA5D	FA5E	FA5F		
	9	FA60	FA61	FA62	FA63		
	10	FA64	FA65	FA66	FA67		
	11	FA68	FA69	FA6A	FA6B		
	12	FA6C	FA6D	FA6E	FA6F		
	13	FA70	FA71	FA72	FA73		
	14	FA74	FA75	FA76	FA77		
	15	FA78	FA79	FA7A	FA7B		
	16	FA7C	FA7D	FA7E	FA7F		
Reservation (*)		FA80 to FFFF					

(*): A single or multiple data are read, the reserved item returns the initial value (0) in acknowledgment. When writing single or multiple, Acknowledgement is returned and the data is discarded.

11.4 Data

11.4.1 Notes About Write/Read Command

- The data (set value, decimal) is converted to a hexadecimal number.
  Negative numbers are represented in 2's complement.
- Do not use undefined Data items. If they are used, negative acknowledgement will be returned or a random value will be written or read, resulting in malfunction.
- MODBUS protocol uses Holding Register addresses. The Holding Register addresses are created as follows.
  A data item is converted to decimal number, and the offset of 40001 is added. The result is the Holding Register address.
  (Example) When using the module 1 CH1 SV (1140H), the data item in the sending message is 1140H, however, MODBUS protocol Holding Register address is 44417(4416+40001).

11.4.2 Write Command

- The lifetime of the non-volatile IC memory is about 10 trillion writes.
  Do not change the set value frequently by communication, as the set value storage retention time may be shortened if the number of times is exceeded. (If the set value is the same as the value before setting, it is not written to the non-volatile IC memory.)
- When data (set value) has a decimal point, a whole number (hexadecimal) without a decimal point is used.
- If the operation is changed with Alarm 1 action to Alarm 4 action (1380H to 147FH), Alarm 1 value to Alarm 4 value (1580H to 177FH) will return to the factory default values.
  For the items to be initialized, refer to “11.7 Initialization Items by Changing Settings (P.11-90)”.
- Even if options are not ordered, writing via software communication will be possible. However, their command contents will not function.
- Communication parameters such as module address and communication speed of this instrument cannot be written by software communication. Set it with the rotary switch for module address selection and the dip switch for selecting communication specifications.
- When Write is executed using the Broadcast address [(00H) MODBUS protocol] command, the command is sent to all the connected slaves. However, a response is not returned.

11.4.3 Read Command

- When the data (set value) has a decimal point, a whole number (hexadecimal) without a decimal point is used for a response.

11.5 Negative Acknowledgement

11.5.1 Error Code 2 (02H)

The slave will return Error code 2 (02H) in the following case.

- When non-existent data item is read or written.

11.5.2 Error Code 3(03H)

The slave will return Error code 3 (03H) in the following case.

- When a value out of the setting range is written.

11.5.3 Error Code 17(11H)

The slave will return Error code 17 (11H) in the following case.

- When AT execution (0001H) is written with AT execution/stop selection (1080H to 10BFH) during PI operation or ON/OFF operation.
- When AT execution (0001H) is written with AT execution/stop selection (1080H to 10BFH) during AT execution.
  When the control enable/disable selection (1040H to 107FH) is written during AT execution.
- When manual control MV setting (1140H to 117FH) is written during automatic control.

11.6 Notes on Programming Monitoring Software

11.6.1 How to Speed up the Scan Time

When monitoring multiple this instrument, set the program so that the requisite minimum pieces of data such as PV (6000H to 603FH), MV (6040H to 607FH), Status flag 1 (60C0H to 60FFH) can be read.
For other data, set the program so that they can be read only when their set value has changed.
This will speed up the scan time.

11.6.2 How to Read PID Parameters after AT or Start-up AT Finishes

While AT or Start-up AT is performing, this instrument sets “B1: AT Perform/Cancel” of “Status flag 1 (60C0H to 60FFH)” to “1: AT Perform”.
After AT or Start-up AT is finished, PID parameters are updated.
On the monitoring software side, check that “B1: AT Perform/Cancel” of “Status flag 1 (60C0H to 60FFH)” has been set to “0: AT Cancel”, then read parameters such as P, I, D.

11.6.3 Notes on Batch Transmission of All Setting Values

- If the operation is changed with Alarm 1 action to Alarm 4 action (1380H to 147FH), Alarm 1 value to Alarm 4 value (1580H to 177FH) will return to the factory default values.
  Send the Alarm action and then the Alarm value.
  For the items to be initialized, refer to “11.7 Initialization Items by Changing Settings (P.11-90)”.
- If the input type is changed with Input type (2000H to 203FH), the setting values such as SV, Proportional band, and Alarm 1 value are initialized.
  Send the Input type and then the other setting values.
  For the items to be initialized, refer to “11.7 Initialization Items by Changing Settings (P.11-90)”.

11.7 Initialization Items by Changing Settings

The items that are initialized by changing the settings are shown below.

○: Initialize

—: Not initialize

Setting change item / Initialized item	Input type (2000H to 203FH)	Temperature unit (2040H to 207FH)	Alarm 1 action (1380H to 13BFH)	Alarm 2 action (13C0H to 13FFH)	Alarm 3 action (1400H to 143FH)	Alarm 4 action (1440H to 147FH)
SV(1180H to 11BFH)	○	○	—	—	—	—
Proportional band (11C0H to 11FFH)	○	○	—	—	—	—
ON/OFF hysteresis (12C0H to 12FFH)	○	○	—	—	—	—
Alarm 1 hysteresis (1480H to 14BFH)	○	○	○	—	—	—
Alarm 2 hysteresis (14C0H to 14FFH)	○	○	—	○	—	—
Alarm 3 hysteresis (1500H to 153FH)	○	○	—	—	○	—
Alarm 4 hysteresis (1540H to 157FH)	○	○	—	—	—	○
Alarm 1 value (1580H to 15BFH)	○	○	○	—	—	—
Alarm 1 high limit value (15C0H to 15FFH)	○	○	○	—	—	—
Alarm 2 value (1600H to 163FH)	○	○	—	○	—	—
Alarm 2 high limit value (1640H to 167FH)	○	○	—	○	—	—
Alarm 3 value (1680H to 16BFH)	○	○	—	—	○	—
Alarm 3 high limit value (16C0H to 16FFH)	○	○	—	—	○	—
Alarm 4 value (1700H to 173FH)	○	○	—	—	—	○
Alarm 4 high limit value (1740H to 177FH)	○	○	—	—	—	○
Loop break alarm band (17C0H to 17FFH)	○	○	—	—	—	—
Loop break alarm time (1800H to 183FH)	○	○	—	—	—	—
Sensor correction factor (1840H to 187FH)	○	○	—	—	—	—
Sensor correction (1880H to 18BFH)	○	○	—	—	—	—
SV rise rate (1900H to 193FH)	○	○	—	—	—	—
SV drop rate (1940H to 197FH)	○	○	—	—	—	—
Scaling high limit (2080H to 20BFH)	○	○	—	—	—	—
Scaling low limit (20C0H to 20FFH)	○	○	—	—	—	—
AT bias (21C0H to 21FFH)	○	○	—	—	—	—
Input difference detection setting (3080H to 30BFH)	○	○	—	—	—	—
Cooling P-band (4040H to 407FH)	○	○	—	—	—	—
Slave scale high limit (4280H to 42BFH)	○	○	—	—	—	—
Slave scale low limit (42C0H to 42FFH)	○	○	—	—	—	—
Auto balance control cancel area (5240H to 527FH)	○	○	—	—	—	—

12 Operation

This section describes the operation when operating by communicating with the host computer.
Refer to “11 Communication Command List (P.11-1 to P.11-87)” for setting the control parameters such as SV and alarm required for operation.

12.1 Control Permission

(1) Before turning the power ON

Check the following contents before turning the power ON to this instrument.

- Preparation of communication program
  A communication program is required to connect and use the host computer.
  Refer to “10 MODBUS Protocol (P.10-1 to P.10-5)” to create the communication program.
- Select communication specifications
  Select the communication specifications such as communication speed, data bit, and parity.
  Refer to “5.1 Selection of Communication Specifications (P.5-1, P.5-2)”.
- Select module address
  Select the module address.
  Refer to “5.2 Selection of Module Address (P.5-3)”.
- Mounting
  Mount this instrument to the DIN rail.
  Refer to “6.3 Mounting (P.6-3)”.
- Wiring
  Wire this instrument.
  Refer to “7.3 Wiring (P.7-5 to P.7-7)”.
- Connection of the QMC1 and QTC1-40 to the host computer
  Connect the QMC1 and QTC1-40 to the host computer.
  Refer to “7.4 Connection of QMC1 and QTC1-40 to Host Computer (P.7-8, P.7-9)”.

(2) After turning the power ON

Check the following contents after turning the power ON to this instrument.

- Specification setting
  Set the specifications of through USB items and event input/output items.
  Refer to “8.2 Specification Setting (P.8-4 to P.8-19)”.
- Control parameters setting
  Set the control parameters of QTC1-40 such as SV and alarm.
  Refer to “11 Communication Command List (P.11-1 to P.11-87)”.

(3) Turn OFF → ON the power of QMC1 and OTC1-□0

Turn OFF → ON the power of QMC1 and QTC1-□0. The set value becomes effective.

(4) Turn ON the load circuit power

(5) Permission of control

Select “Control enabled” in “Control enable/disable”.

The control operation starts so that the controlled object keeps CH1 SV.

Control enabled [Slave address 1, Control enable/disable of CH1] (Single data writing)

- Request message from the master

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1040H)	(0001H)	(4D1EH)	
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1040H)	(0001H)	(4D1EH)	
	1	1	2	2	2	

Selecting control enable for slave address 1, CH1 control enable/disable (1040H) to slave address 5, CH4 control enable/disable (1053H) (multiple data writing for 20 commands)

Amount of data : 20 (0014H)

Byte count : 40 (28H)

Data : Control enable (0001H)

- Request message from the master (When writing the above data)

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(10H)	(1040H)	(001428000100010001...0001H)	(F16EH)	
	1	1	2	43	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(10H)	(1040H)	(0014H)	(C512H)	
	1	1	2	2	2	

12.2 Set PID Constants (Execute AT)

⚠ Caution

- Perform the AT during the trial run.
- During AT, the all setting items can not be set.
- If a power failure occurs during AT execution, AT will be stopped.
- If AT is cancelled during the process, each setting values of P, I, D will revert to the values before AT was performed.
- If AT does not end about 4 hours after starting AT, AT is automatically stopped.
- If AT is executed near normal temperature, the temperature may not change and AT may not end normally.
- When AT is executed under Gap-PID control, D is calculated in 0 seconds.

Execute AT to set the PID constant.

There are two types of AT for this instrument, Normal AT and Start-up AT.

Refer to “AT action (00E0H to 00E3H) (P.11-33)” for AT action selection.

To perform AT, refer “AT Perform/Cancel selection (1080H to 10BFH) (P.11-11)” and select AT Perform.

AT perform [Slave address 1, AT Perform/Cancel selection of CH1] (Single data writing)

- Request message from the master

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1080H)	(0001H)	(4D22H)	
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(06H)	(1080H)	(0001H)	(4D22H)	
	1	1	2	2	2	

AT perform [Slave address 1, AT Perform/Cancel selection of CH1] to [Slave address 5, AT Perform/Cancel selection of CH4] (Multiple data writing for 20 commands)

Amount of data : 20 (0014H)
Byte count : 40 (28H)
Data : AT perform (0001H)

- Request message from the master

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(10H)	(1080H)	(001428000100010001...0001H)	(61FEH)	
	1	1	2	43	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address	Function code	Data item	Data	Error check CRC-16	Idle 3.5 characters
	(01H)	(10H)	(1080H)	(0014H)	(C52EH)	
	1	1	2	2	2	

While AT is running, set "AT perform (1)" in B1: AT perform/cancel of status flag 1 (60C0H to 60FFH). At the end of AT, set "AT cancel (0)" in B1: AT perform/cancel of status flag 1 (60C0H to 60FFH) and takes control with the PID constant set by AT.

If the AT does not end after about 4 hours after the start of AT, the AT is automatically canceled.

12.3 Set Alarm

For Alarm output, the alarm value is set by deviation from the SV (excluding Process alarm), and if the PV goes outside the range, the Alarm output is turned ON (turned OFF for High/Low limit range alarm).

It can select from High limit alarm, Low limit alarm, High/Low limits alarm, High/Low limit range alarm, Process high alarm, Process low alarm, High limit with standby alarm, Low limit with standby alarm, High/Low limits with standby alarm, High/Low limits alarm individually, High/Low limit range alarm individually, High/Low limits with standby alarm individually or no operation.

Refer to the control module QTC1-☐ instruction manual “14.5.3 Alarm Action (14-31)” for detail of alarm action.

Alarm settings are made using Alarm action and Alarm value.

If the operation is changed with Alarm 1 action to Alarm 4 action (1380H to 147FH), Alarm 1 value to Alarm 4 value (1580H to 177FH) will return to the factory default values.

Send the Alarm action and then the Alarm value.

This section describes the CH1 alarm 1 setting example and alarm operation.

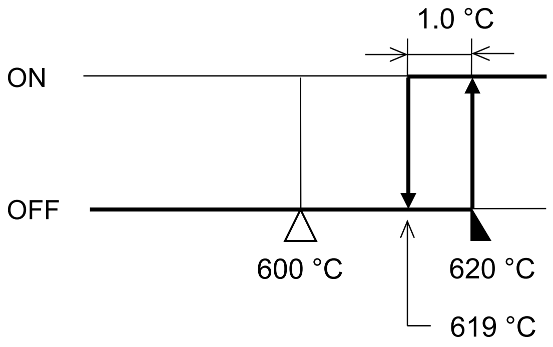
[Setting example]

Setting item	Setting value
SV	600 °C
Alarm 1 action	High limit alarm
Alarm 1 value	20 °C
Alarm 1 hysteresis	1.0 °C

[Alarm action]

When PV will be more than 620 °C, Alarm 1 output turns ON.

When PV will be less than 619 °C, Alarm 1 output turns OFF.



(Fig. 12.3-1)

High limit alarm [Slave address 1, Alarm 1 action of CH1] (Single data writing)

- A request message from the master

Idle 3.5 characters	Slave address (01H)	Function code (06H)	Data item (1380H)	Data (0001H)	Error check CRC-16 (4D66H)	Idle 3.5 characters
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (06H)	Data item (1380H)	Data (0001H)	Error check CRC-16 (4D66H)	Idle 3.5 characters
	1	1	2	2	2	

20 °C (0014H) [Slave address 1, Alarm 1 value of CH1] (Single data writing)

- A request message from the master

Idle 3.5 characters	Slave address (01H)	Function code (06H)	Data item (1580H)	Data (0014H)	Error check CRC-16 (8C21H)	Idle 3.5 characters
	1	1	2	2	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (06H)	Data item (1580H)	Data (0014H)	Error check CRC-16 (8C21H)	Idle 3.5 characters
	1	1	2	2	2	

High limit alarm [Slave address 1, Alarm 1 action (1380H) of CH1] to [Slave address 5, Alarm 1 action (1393H) of CH4] (Multiple data writing for 20 commands)

Amount of data : 20 (0014H)
Byte count : 40 (28H)
Data : High limit alarm (0001H)

- Request message from the master (When writing the above data)

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1380H)	Data (001428000100010001...0001H)	Error check CRC-16 (D20FH)	Idle 3.5 characters
	1	1	2	43	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1380H)	Data (0014H)	Error check CRC-16 (C56AH)	Idle 3.5 characters
	1	1	2	2	2	

20 °C (0014H) [Slave address 1, Alarm 1 value (1580H) of CH1] to [Slave address 5, Alarm 1 value (1593H) of CH4] (Multiple data writing for 20 commands)

Amount of data : 20 (0014H)
Byte count : 40 (28H)
Data : 20 °C (0014H)

- Request message from the master (When writing the above data)

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1580H)	Data (001428001400140014...0014H)	Error check CRC-16 (F369H)	Idle 3.5 characters
	1	1	2	43	2	

- Response message from the slave in normal status

Idle 3.5 characters	Slave address (01H)	Function code (10H)	Data item (1580H)	Data (0014H)	Error check CRC-16 (C5E2H)	Idle 3.5 characters
	1	1	2	2	2	

13 C Series Compatible Protocol

When using the C series compatible protocol, up to 5 modules (QTC1-20 or QTC1-40) can be connected to one unit.

The maximum number of data is 20 data.

Even when QTC1-20 is connected, it is recognized as 4 channels. However, CH3 and CH4 do not function.

For five QTC1-40 modules connected, the channel numbers of the C series for each module's channel number are as follows.

QTC1-40 - C series channel number table

QTC1-40		C series		
Module address 0	CH1	Device number 1	CH1	Data 1
	CH2		CH2	Data 2
	CH3	Device number 2	CH1	Data 3
	CH4		CH2	Data 4
Module address 1	CH1	Device number 3	CH1	Data 5
	CH2		CH2	Data 6
	CH3	Device number 4	CH1	Data 7
	CH4		CH2	Data 8
Module address 2	CH1	Device number 5	CH1	Data 9
	CH2		CH2	Data 10
	CH3	Device number 6	CH1	Data 11
	CH4		CH2	Data 12
Module address 3	CH1	Device number 7	CH1	Data 13
	CH2		CH2	Data 14
	CH3	Device number 8	CH1	Data 15
	CH4		CH2	Data 16
Module address 4	CH1	Device number 9	CH1	Data 17
	CH2		CH2	Data 18
	CH3	Device number 10	CH1	Data 19
	CH4		CH2	Data 20

13.1 Communication Procedure

Communication starts with command transmission from the host computer (Master), and ends with the response of this instrument (Slave).

When the master sends the Read command, the slave responds with the corresponding set value or current status.

When the master sends the Write command, the slave responds by sending the acknowledgement after the processing is terminated.

When the master sends a non-existent command or value out of the setting range, the slave returns a negative acknowledgement.

If a framing error or checksum error is detected, it does not return a response.

13.2 Data Configuration

The commands are all configured in ASCII code.
Numerals written below the command represent the number of characters.
The data (setting value) converts a decimal number to a hexadecimal number.
Negative numbers are represented by the 2's complement.

(1) Setting commands

Header (02H)	Address	Subaddress (20H)	Command type (52H)	Data item	Data 1	Data 2		Data 20	Checksum	Delimiter (03H)
1	1	1	1	4	4	4		4	2	1

20 words (for 5 modules)

(2) Read command

Header (02H)	Address	Subaddress (20H)	Command type (22H)	Data item	Checksum	Delimiter (03H)
1	1	1	1	4	2	1

(3) Response with data

Header (06H)	Address	Subaddress (20H)	Command type (22H)	Data item	Data 1	Data 2		Data 20	Checksum	Delimiter (03H)
1	1	1	1	4	4	4		4	2	1

20 words (for 5 modules)

(4) Acknowledgement

Header (06H)	Address	Checksum	Delimiter (03H)
1	1	2	1

(5) Negative acknowledgement

Header (15H)	Address	Error code	Checksum	Delimiter (03H)
1	1	1	2	1

Header : Control code for the command or the beginning of the response, using ASCII code.
STX (02H) is fixed for setting command and read command.
ACK (06H) is fixed for response with data and acknowledgement.
NAK (15H) is fixed for negative acknowledgement.

Address : A number for the master to identify each slave.
Use the ASCII code (20H to 2FH), which is the module address 0 to 15 (00H to 0FH) plus 20H.

Subaddress : 20H is fixed.

Command type: This is a code for identifying the reading and setting.

Command type	Content	Description
22H	Reading block data (multiple data)	Reads for multiple consecutive data.
52H	Setting block data (multiple data)	Sets up for multiple consecutive data.

Data item : The data classification to be targeted by the command.
The 4-digit hexadecimal number is represented by ASCII code.
Refer to “13.4. Communication Command List (P.13-6 to P.13-10)”.

Data : For read commands, there is no data section.
The contents of the data (setting value) vary depending on the setting command.
The 4-digit hexadecimal number is represented by ASCII code.
Set 20 words (for 5 modules) from data 1 to data 20.
If the number of data is 16 (four QTC1-40 units connected), set 0 for data 17 to 20.
Refer to “13.4. Communication Command List (P.13-6 to P.13-10)”.

Checksum : Two characters of data for communication error detection.

Delimiter : The control code that represents the end of the command, and is fixed to ASCII code ETX (03H).

Error code : It is the type of error, the following numbers are represented by ASCII code.

Error code	Content
0(30H)	Unexplained error
1(31H)	For non-existent command
2(32H)	Not used
3(33H)	Value outside the setting range
4(34H)	For non-configurable conditions (during warm-up when the power is turned on)

(*): If data outside the setting range is included in the setting, it returns the negative acknowledgement with error code 3 (33H). However, data within the setting range will be set as valid data.

How to calculate the checksum

Checksum is used to detect receiving errors in the command or data.

Set the program for the master side as well to calculate the checksum of the response data from the slaves so that the communication errors can be checked.

The ASCII code (hexadecimal) corresponding to the characters which range from the address to that before the checksum is converted to binary notation, and the total value is calculated.

The lower one byte of the total value is converted to 2's complement, and then to hexadecimal numbers, that is, ASCII code for the checksum.

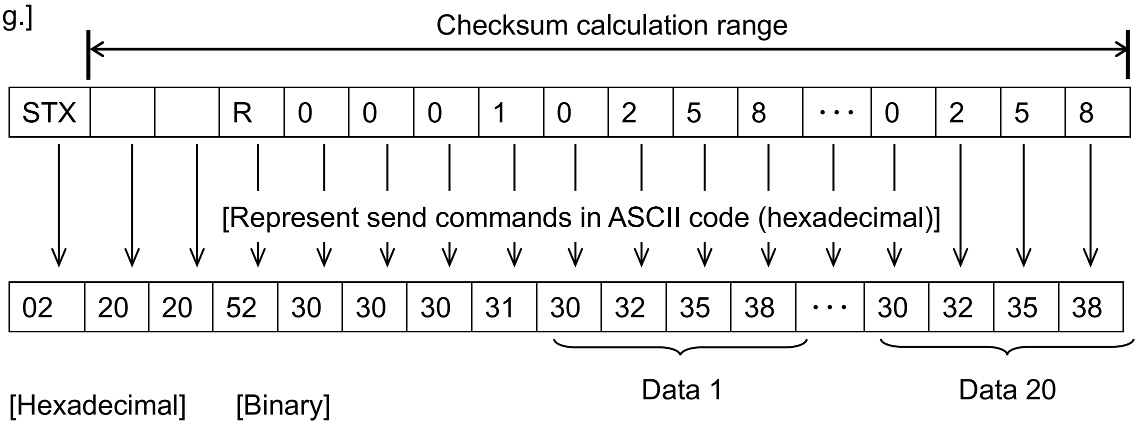
●Checksum calculation example

Calculation example when SV of Data 1 to Data 20 is set to 600 °C (0258H)

Address (module address): 0 (20H)

- 1's complement: Reverse each binary bit. 0 will become 1 and vice versa.
- 2's complement: Add 1 to 1's complement.

[e.g.]


Checksum calculation range
STX | | | R | 0 | 0 | 0 | 1 | 0 | 2 | 5 | 8 | ··· | 0 | 2 | 5 | 8
[Represent send commands in ASCII code (hexadecimal)]
02 | 20 | 20 | 52 | 30 | 30 | 30 | 31 | 30 | 32 | 35 | 38 | ··· | 30 | 32 | 35 | 38
Data 1
Data 20

[Hexadecimal]	[Binary]
20H	0010 0000
20H	0010 0000
52H	0101 0010
30H	0011 0000
.	.
.	.
.	.
30H	0011 0000
32H	0011 0010
35H	0011 0101
+ 38H	0011 1000
	1 0001 1010 1111

1 0001 1010 1111 → [1's complement] 0101 0000

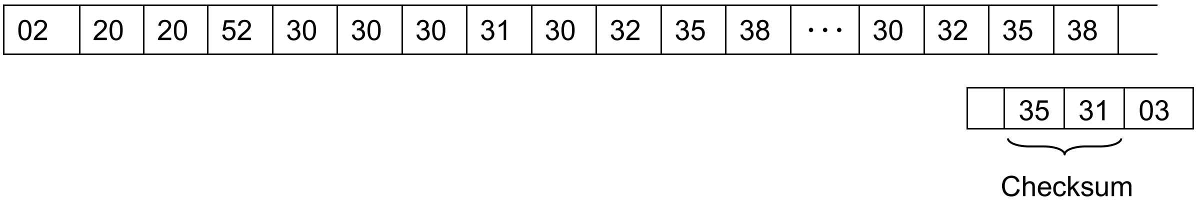
+ 1

[2's complement] 0101 0001

[Hexadecimal] 5 1

[ASCII code] 35H 31H

[Sending code]


02 | 20 | 20 | 52 | 30 | 30 | 30 | 31 | 30 | 32 | 35 | 38 | ··· | 30 | 32 | 35 | 38 |
| 35 | 31 | 03
Checksum

13.3 Message Example

Numerals written below the command represent number of characters.

(1) Setting [Address 0, Data 1 to Data 20, SV=600 °C (0258H)]

- Stting command from the master

Header	Address	Subaddress	Command	Data item
(02H)	(20H)	(20H)	type (52H)	(30H)(30H)(30H)(31H)
1	1	1	1	4

	Data 1		Data 20	Checksum	Delimiter
	(30H)(32H)(35H)(38H)		(30H)(32H)(35H)(38H)	(35H)(31H)	(03H)
	4		4	2	1

20 words (for 5 modules)

- A response from the slave in normal status

Header	Address	Checksum	Delimiter
(06H)	(20H)	(44H)(41H)	(03H)
1	1	2	1

(2) Reading [Address 0, Data 1 to Data 20, SV]

- Stting command from the master

Header	Address	Subaddress	Command	Data item	Checksum	Delimiter
(02H)	(20H)	(20H)	type (22H)	(30H)(30H)(30H)(31H)	(44H)(42H)	(03H)
1	1	1	1	4	2	1

- Response with data

Header	Address	Subaddress	Command	Data item
(06H)	(20H)	(20H)	type (22H)	(30H)(30H)(30H)(31H)
1	1	1	1	4

	Data 1		Data 20	Checksum	Delimiter
	(30H)(32H)(35H)(38H)		(30H)(32H)(35H)(38H)	(38H)(31H)	(03H)
	4		4	2	1

20 words (for 5 modules)

13.4 Communication Command List

Command type	Data item		Data section
22H/52H	0001H	SV setting	Setting value
22H/52H	0002H	Proportional band setting (*1)	Setting value
22H/52H	0003H	Integral time setting	Setting value
22H/52H	0004H	Derivative time setting	Setting value
22H/52H	0005H	Alarm 1 (high limit) setting	Setting value
22H/52H	0006H	Alarm 2 (low limit) setting	Setting value
22H/52H	0007H	Proportional cycle setting	Setting value
22H/52H	0008H	Heater burnout alarm setting(*2)	Setting value
22H/52H	0009H	Control action execution / stop selection	0000H: Control stop 0001H: Control execution
22H/52H	000AH	AT perform/cancel selection	0000H: AT cancel 0001H: AT perform
22H/52H	000BH	Alarm 1 (high limit) hysteresis setting	Setting value
22H/52H	000CH	Alarm 2 (low limit) hysteresis setting	Setting value
22H/52H	000DH	Control output ON/OFF hysteresis setting	Setting value
22H/52H	000EH	Control output high limit setting	Setting value
22H/52H	000FH	Control output low limit setting	Setting value
22H/52H	0010H	PV filter setting	Setting value
22H/52H	0011H	Temperature unit selection	0000H: °C 0001H: °F
22H/52H	0012H	Control action selection	0000H: Heating (Reverse action) 0001H: Cooling (Direct action)

(*1): The setting range of the proportional band is different between the QTC1-□0 and the C series. For thermocouple or RTD input, convert the C series setting to °C (°F).

	QTC1-□0	C series
Proportional band range	1 to Input span °C or 0.1 to Input span °C For DC current input and DC voltage input: 0.10 to 100.00 %	0.0 to 100.0 %

(*2): CH1 to CH4 correspond to the CT input connectors CT1 to CT4 respectively.
When the CT is connected to CT3 in single phase, set to CH3.
When the CT is connected to CT1 and CT3 in 3 phase , set to CH1 and CH3.

Command type	Data item		Data section
22H/52H	0013H	Alarm 1 type selection(*1)	0000H: No action 0001H: High limit 0002H: High limit with standby 0003H: Low limit 0004H: Low limit with standby 0005H: High/Low limits 0006H: High/Low limits with standby 0007H: High/Low limits range 0008H: High/Low limits range with standby 0009H: Process high limit 000AH: Process high limit with standby 000BH: Process low limit 000CH: Process low limit with standby
22H/52H	0014H	Alarm 2 type selection(*1)	Same as alarm 1 type selection
22H/52H	0015H	Loop break alarm band setting	Setting value
22H/52H	0016H	Loop break alarm time setting	Setting value
22H/52H	0017H	Reservation(*2)	
22H/52H	0018H	Reservation(*2)	
22H/52H	0019H	Sensor correction setting	Setting value
22H/52H	001AH	Reservation(*2)	
22H/52H	001BH	Reservation(*2)	

(*1): The selected value of alarm type selection of QTC1-□0 is different from the selected value of alarm type selection of C series.

Refer to the table below and replace the selected value of C series with the selected value of QTC1-□0.

Alarm type	C series	QTC1-□0
No action	0000H	0000H
High limit	0001H	0001H
High limit with standby	0002H	0007H
Low limit	0003H	0002H
Low limit with standby	0004H	0008H
High/Low limits	0005H	0003H
High/Low limits with standby	0006H	0009H
High/Low limits range	0007H	0004H
High/Low limits range with standby	0008H	Cannot select
Process high limit	0009H	0005H
Process high limit with standby	000AH	Cannot select
Process low limit	000BH	0006H
Process low limit with standby	000CH	Cannot select

(Example)

If high/Low limits alarm is used for C series, change 0005H to 0003H when replacing with QTC1-□0.

(*2): The reservation item returns 0 of acknowledgement when it is read.

When it is set, it returns acknowledgement and discards the data.

Command type	Data item		Data section
22H/52H	001CH	Cooling P-band setting (*1)	Setting value
22H/52H	001DH	Cooling proportional cycle setting	Setting value
22H/52H	001EH	Overlap/Dead band setting	Setting value
22H/52H	001FH	Cooling action mode selection	0000H: Air cooling 0001H: Oil cooling 0002H: Water cooling
22H/52H	0020H	Cooling ON/OFF hysteresis setting	Setting value
	0040H	Reservation(*2)	
22H/52H	0041H	Event output selection (*3)	CH1 B0: DO1 0: OFF 1: ON B1: DO2 0: OFF 1: ON B2: DO3 0: OFF 1: ON B3: DO4 0: OFF 1: ON
22H	0042H	Event input state reading (*4)	CH1 B0: DI1 0: OFF 1: ON B1: DI2 0: OFF 1: ON B2: DI3 0: OFF 1: ON B3: DI4 0: OFF 1: ON

(*1): The setting range of the cooling P-band is different between the QTC1-□0 and the C series. For thermocouple or RTD input, convert the C series setting to °C (°F).

	QTC1-□0	C series
Cooling P-band range	1 to Input span °C or 0.1 to Input span °C For DC current input and DC voltage input: 0.10 to 100.00 %	Magnification against the heating P-band. 0.0 to 10.0

(*2): The Reservation item returns 0 of acknowledgement when it is read.
When it is set, it returns acknowledgement and discards the data.

(*3): Event output selection is enabled when "no action" is selected in the event output allocation selection.
If set the data from data 2 to data 20, the acknowledgement will be returned and the data will be discarded.

(*4): The event input status reading always returns the event input status as data.
If read the data from data 2 to data 20, the acknowledgement returns 0.

Read only

Command type	Data item		Data section
22H	0080H	Read PV	PV
22H	0081H	Read MV	MV
22H	0082H	Read heater current value	Heater current value
22H	0083H	Read state 1	B0: Control output 0: OFF 1: ON B1: Alarm 1 (high limit) 0: OFF 1: ON B2: Alarm 2 (low limit) 0: OFF 1: ON B3: Heater burnout alarm 0: OFF 1: ON B4: Overscale 0: Normal 1: Error B5: Underscale 0: Normal 1: Error B6: Reservation Always 0 B7: AT state 0: Stop 1: During execution B8: Initial Communications Always 0 B9: Direct/reverse action 0: Reverse action 1: Direct action B10: Control state 0: Prohibited 1: Allowed B11: With/without heater burnout alarm 0: Without alarm 1: With alarm B12: Data update requests Always 0 B13: Loop error alarm 0: OFF 1: ON B14: Temperature error Always 0 B15: Instrument failure (*)

(*): Set to 1, if the QMC1 cannot communicate with the QTC1-20 or QTC1-40.
On the instrument failure channel, reading other data returns an undefined value.

Command type	Data item		Data section
22H	0084H	Read state 2	B0: Control output 0: OFF 1: ON B1: Control state 0: Prohibited 1: Allowed B2: Alarm 1 (high limit) 0: OFF 1: ON B3: Alarm 2 (low limit) 0: OFF 1: ON B4: Overscale 0: Normal 1: Error B5: Heater burnout alarm 0: OFF 1: ON B6: AT state 0: Stop 1: During execution B7: Underscale 0: Normal 1: Error B8 to B15: Reservation Always 0
22H	00A0H	Read CPU version number	Version number (CH1 and CH3 of each QTC1-□0)
22H	00A1H	Read model information	Sensor Range (CH1 and CH3 of each QTC1-□0) When specify the input code M 0000H: K -200 to 1370 °C 0001H: K -200.0 to 400.0 °C 0002H: J -200 to 1000 °C 0003H: R 0 to 1760 °C 0004H: S 0 to 1760 °C 0005H: B 0 to 1820 °C 0006H: E -200 to 800 °C 0007H: T -200.0 to 400.0 °C 0008H: N -200 to 1300 °C 0009H: PL-Ⅱ 0 to 1390 °C 000AH: C(W/Re5-26) 0 to 2315 °C 000BH: Pt100 -200.0 to 850.0 °C 000CH: 0 to 1 V DC -2000 to 10000 000DH: 4 to 20 mA DC -2000 to 10000 000EH: 0 to 20 mA DC -2000 to 10000
			When specify the input code A 0000H: 4 to 20 mA DC (Built-in receiving resistor) -2000 to 10000 0001H: 0 to 20 mA DC (Built-in receiving resistor) -2000 to 10000
			When specify the input code V 0000H: 0 to 5 V DC -2000 to 10000 0001H: 1 to 5 V DC -2000 to 10000 0002H: 0 to 10 V DC -2000 to 10000

Command type	Data item		Data section
22H	00A1H	Reading model information (continued)	Output form and with/without of options (CH2 and CH4 for each QTC1-□0) B0: Heater burnout alarm 0: Without alarm 1: With alarm B1: Heater break alarm current capacity 0: 20 A 1: 100 A B2: 1: CH1 DC current output B3: 1: CH1 Relay contact output B4: 1: CH1 Non-contact voltage output B5: 1: CH2 DC current output B6: 1: CH2 Relay contact output B7: 1: CH2 Non-contact voltage output B8, B9: Reservation Always 0 B10: Heating/cooling output 0: Without output 1: With output B11 to B9: Reservation Always 0

14 Communication with PLC Using SIF Function

The SIF function is a function that reads and writes various data to the PLC register using the PLC communication protocol through a serial connection with a Mitsubishi Electric PLC, OMRON PLC (*), or KEYENCE PLC(*).

(*) When using the SIF function to connect to a PLC manufactured by OMRON Corporation or KEYENCE CORPORATION, cannot be connected with RS-485 communication method.
Only RS-422A communication type can be connected.

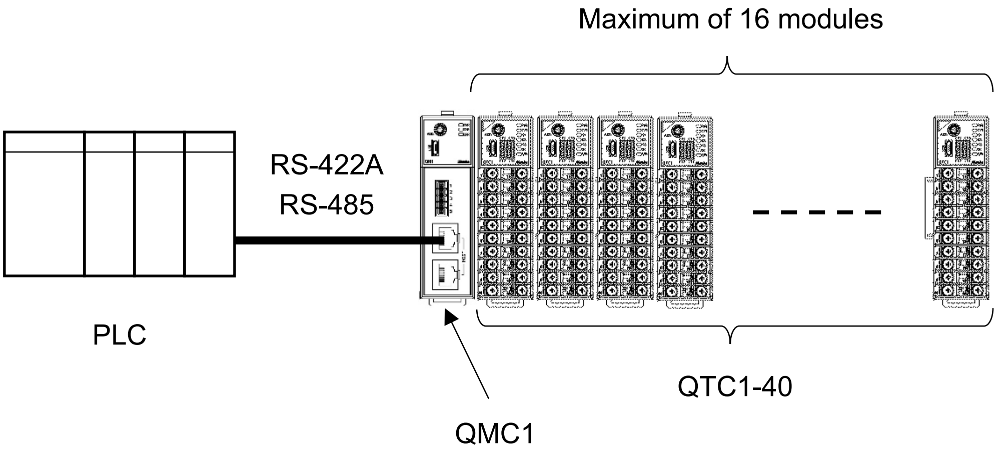
The following communication protocols and commands are supported.
The station number of the PLC is fixed at 0.

PLC manufacturer name	Communication protocol	Communication command
Mitsubishi Electric Corporation	Form 4	A compatible 1C frame AnA/AnU common command (QR/QW)
OMRON Corporation		FINS command I/O memory type: 82(DMxxxxxx) Command code 0101/0102
KEYENCE CORPORATION	KV mode (upper link)	KV command (RDS/WRS)

In the console software (SWC-QMC101M), select the start number of the PLC register, the address of the PLC register, and the linked monitor item and setting item to set the specifications.

This product acts as a master and writes the selected items to the PLC register cyclically using each communication command, and updates the PLC register value constantly.
In addition, the selected setting item is read from the PLC register by setting request using each communication command, and if the read data is changed, the setting value of QTC1-40 is updated.
When QTC1-20 is connected, CH3 and CH4 do not function.

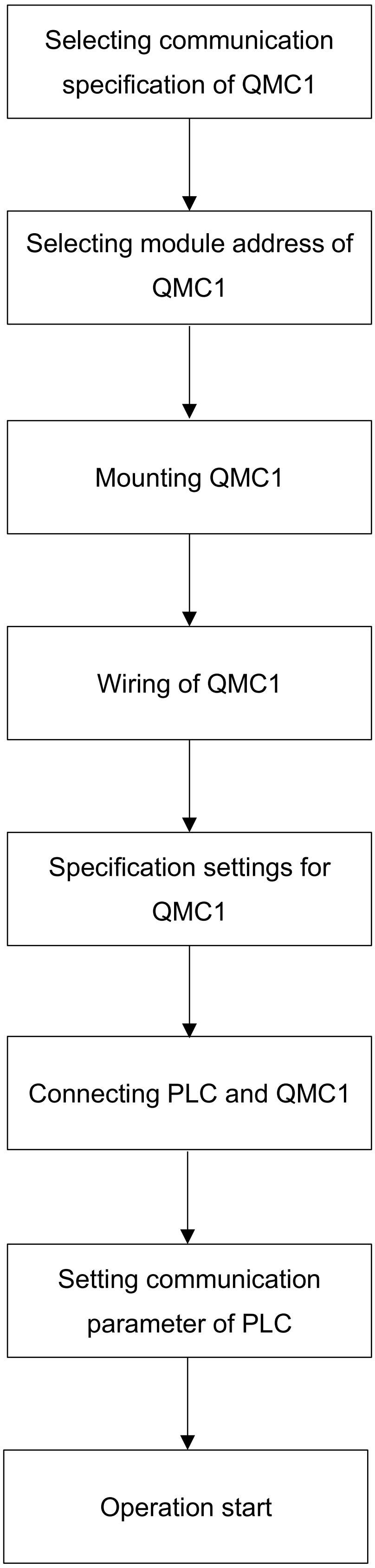
Connection example of QMC1 and QTC1-40



(Fig. 14-1)

14.1 Procedure Before Starting Operation

The procedure up to the start of operation when connecting to the PLC is shown below.


Selecting communication specification of QMC1
Selecting module address of QMC1
Mounting QMC1
Wiring of QMC1
Specification settings for QMC1
Connecting PLC and QMC1
Setting communication parameter of PLC
Operation start

Selects the communication specifications of QMC1, such as communication speed, data bits, and parity.

Select the module address of QMC1.

Mount the QMC1 to the DIN rail.

Wire the QMC1.

To communicate with the PLC, set the specifications of QMC1.

Connect the PLC to the QMC1.

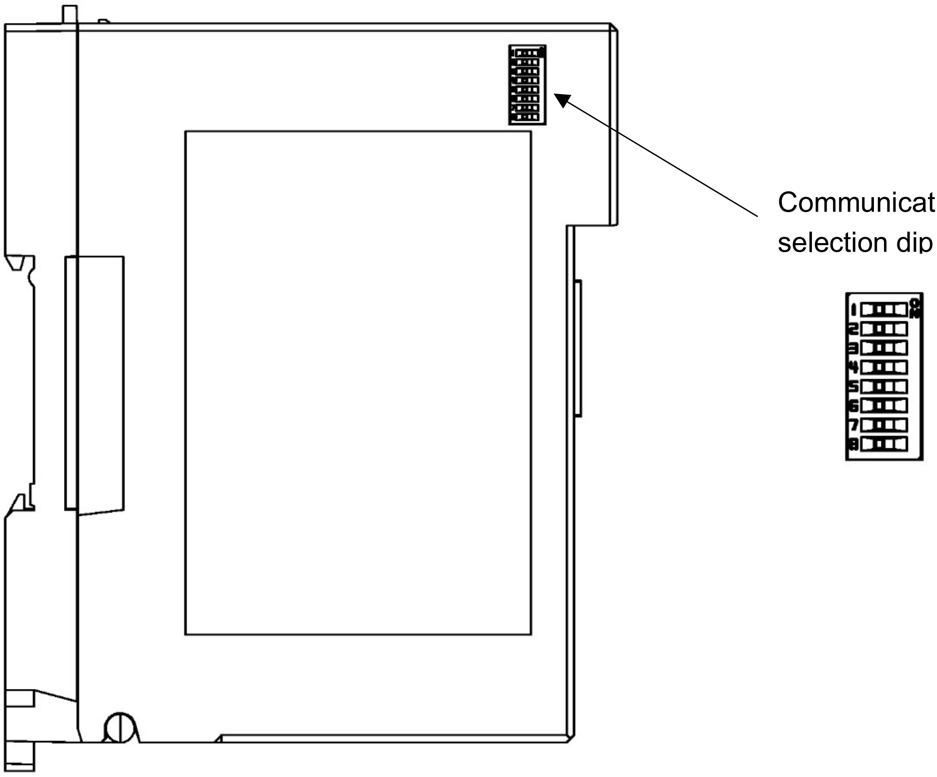
Select the communication parameters of the PLC.

Communication between PLC and QMC1 is performed, and operation is started.

(Fig. 14.1-1)

14.2 Selecting Communication Specification of QMC1

The communication specification can be selected by the communication specification selection dip switch on the left side of this instrument.



Communication specification selection dip switch

(Fig. 14.2-1)

Select the communication speed, data bit, parity, and stop bit.

The factory default settings are all OFF.

- Communication speed: 9600 bps
- Data bit: 8 bits
- Parity Enable/Disable: Enable
- Parity Even/Odd: Even
- Stop bit: 1 bit

(1) Communication speed

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

(2) Data bit

Communication specification selection dip switch	Data bit
3	
OFF	8 bits
ON	7 bits

(3) Parity Enable/Disable

Communication specification selection dip switch	Parity Enable/Disable
4	
OFF	Enable
ON	Disable

(4) Parity Even/Odd

Communication specification selection dip switch	Parity Even/Odd
5	
OFF	Even
ON	Odd

(5) St op bit

Communication specification selection dip switch	St op bit
6	
OFF	1 bit
ON	2 bits

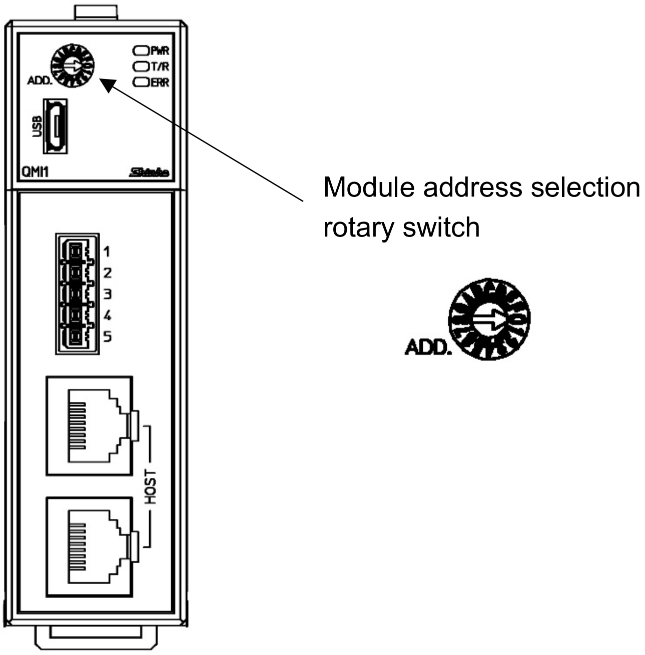
Dip switches No.7 and No.8 does not use. Leave it OFF.

14.3 Selecting Module Address of QMC1

⚠ Caution

- When used with the SIF function, it is not necessary to select the module address.

The module address is selected with the rotary switch.


Module address selection rotary switch

(Fig. 14.3-1)

When used with the SIF function, it is not necessary to select the module address.

Please leave it as 0.

14.4 Mounting QMC1

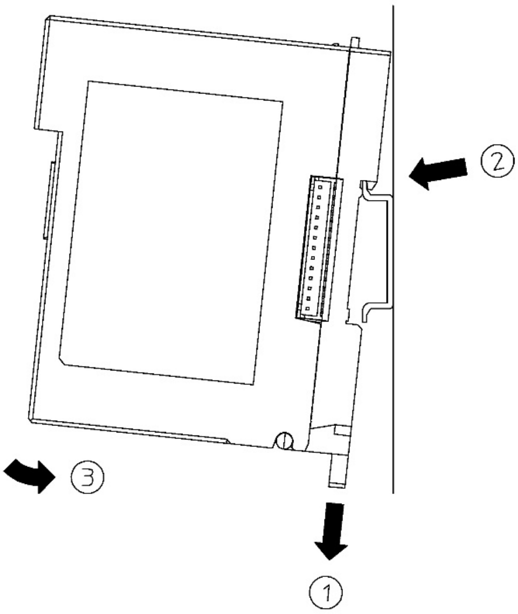
Mounting to the DIN rail

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.)

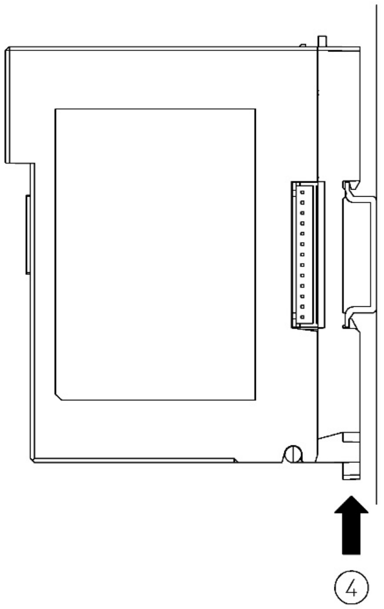
② Hook the part ② of this instrument onto the top of the DIN rail.

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.



(Fig. 14.4-1)

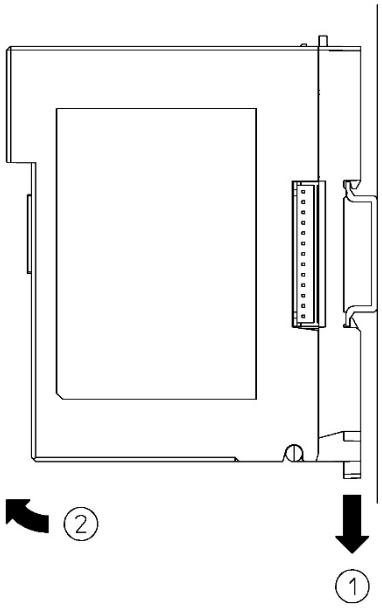


(Fig. 14.4-2)

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.



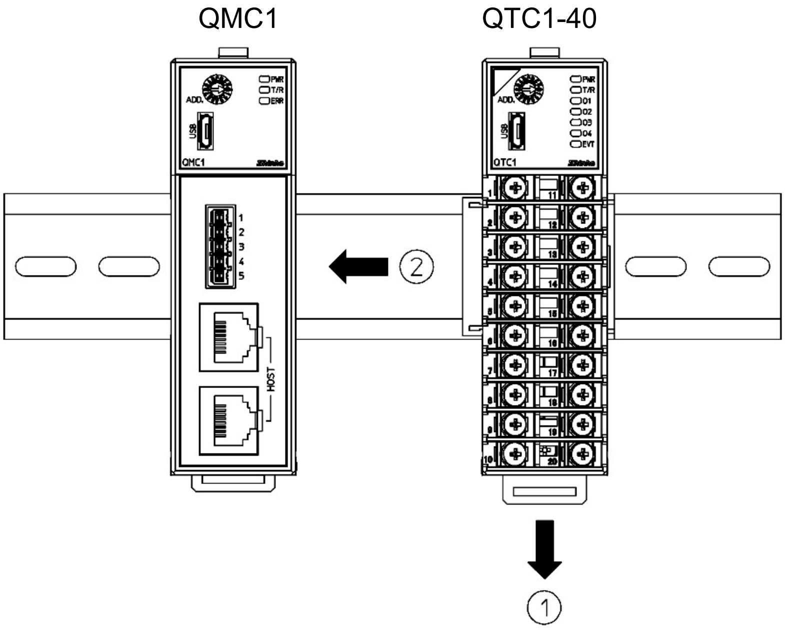
(Fig. 14.4-3)

Mounting multiple modules to the DIN rail

This section describes an example of mounting this instrument and QTC1-40 on the DIN rail.

① Lower the lock lever of the QTC1-40, and mounting the QTC1-40 to the DIN rail.

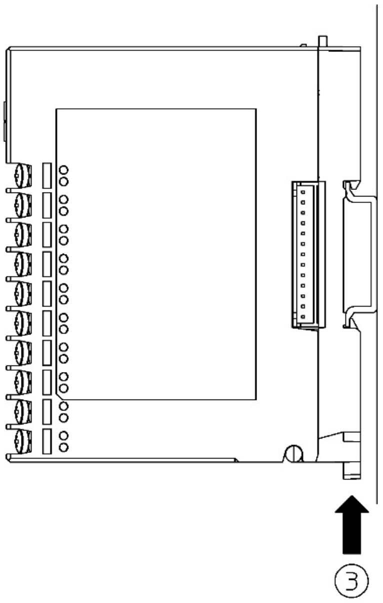
② Slide the QTC1-40 to the left and connect the connectors to each other.


QMC1
QTC1-40
ADD.
USB
PWR
T/R
ERR
O1
O2
O3
O4
EVT
QMC1
QTC1
1
2
3
4
5
HOST
②
①

(Fig. 14.4-4)

③ Raise the lock lever of the QTC1-40.

Make sure it is fixed to the DIN rail.



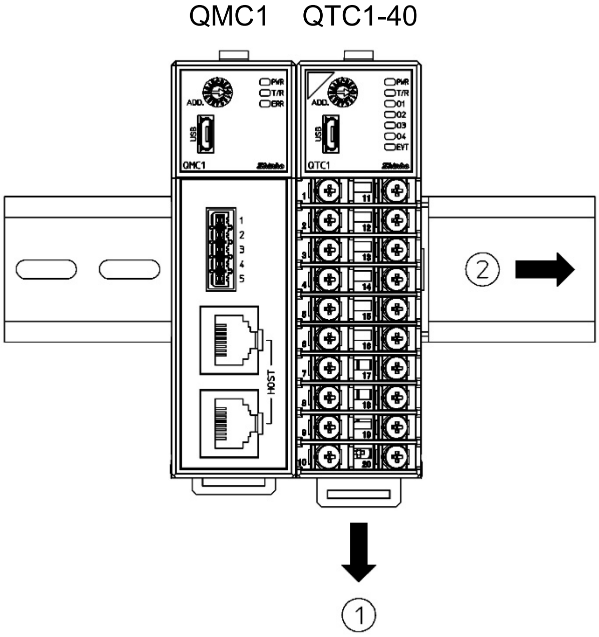
(Fig. 14.4-5)

Removal multiple modules from the DIN rail

This section describes an example of removing multiple control modules QTC1-40 on the DIN rail.

① Insert a flat blade screwdriver into the lock lever of the QTC1-40 and lower the lock lever until it stops.

② Slide the QTC1-40 to the right side and disconnect it from the connector, then remove it from the DIN rail.


QMC1
QTC1-40
PWR
T/R
ERR
ADD.
USB
QMC1
QTC1
O1
O2
O3
O4
EVT
HOST
②
①

(Fig. 14.4-6)

14.5 Wiring of QMC1

14.5.1 Wiring for Power Supply

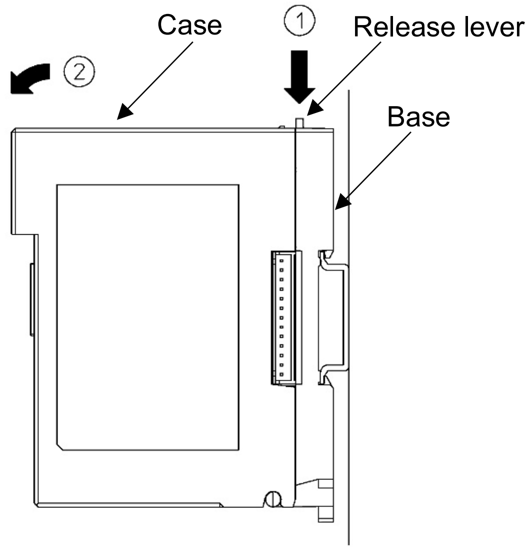
The terminal block for power supply is located on the base of this instrument.

Wiring by the following procedure.

(1) Case removal

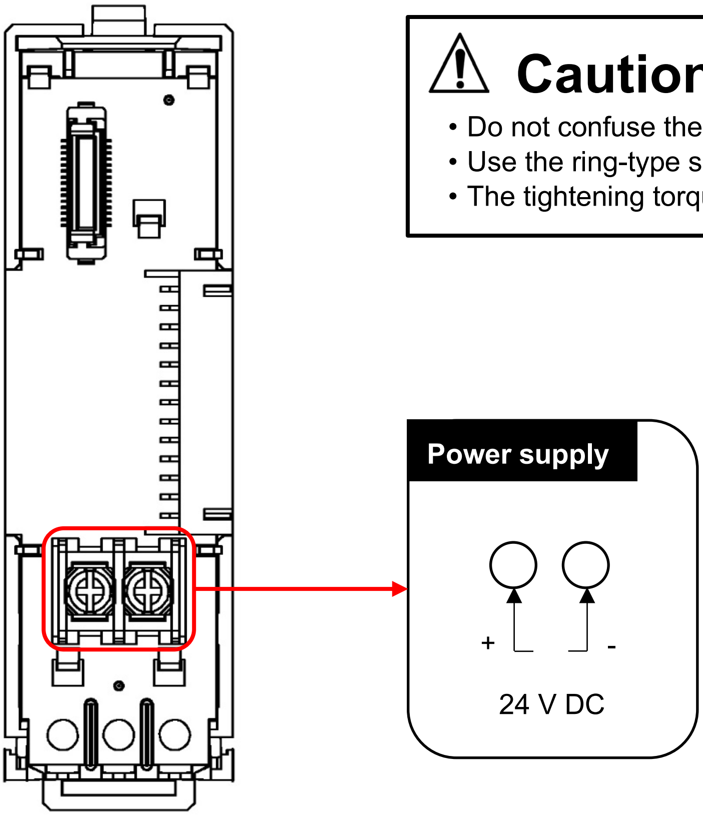
① Push the release lever on the top of this instrument to unlock it.

② Remove the case.


Case
①
Release lever
②
Base

(Fig. 14.5.1-1)

(2) Wiring


Power supply
+
-
24 V DC

⚠ **Caution**

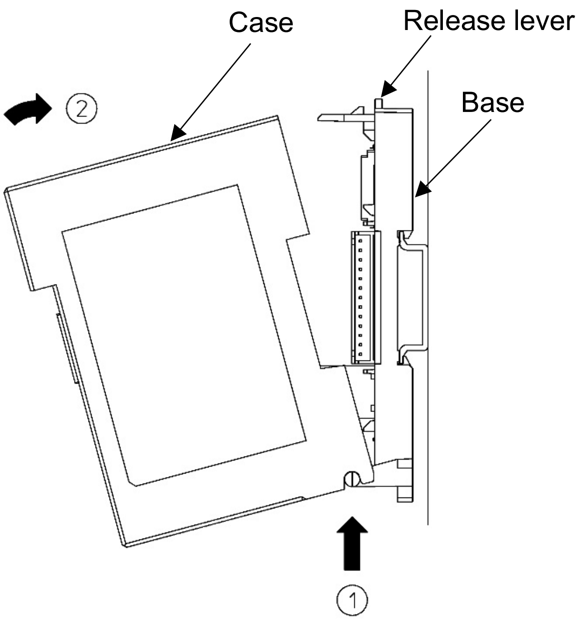
- Do not confuse the polarities.
- Use the ring-type solderless terminal.
- The tightening torque should be 0.5 N•m.

(Fig. 14.5.1-2)

(3) Case mounting

① Hook the case on the lower part ① of this instrument.

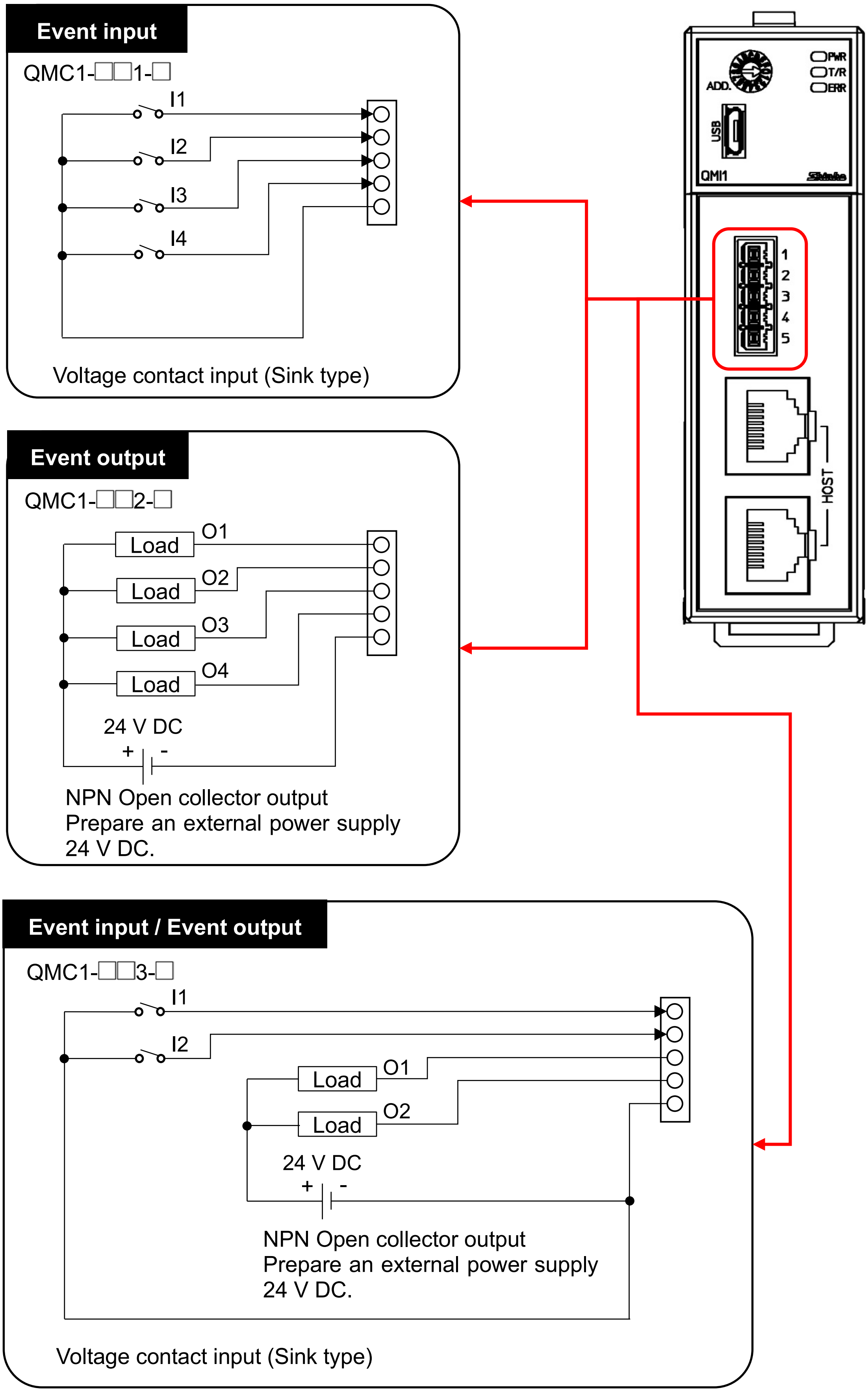
② Mount the case so that the lower part ① of this instrument is the fulcrum and covers the release lever.
There is a clicking sound.


Case
Release lever
Base
②
①

(Fig. 14.5.1-3)

14.5.2 Wiring for Event Input and Event Output

For wiring of the event input/output, use the wiring connector [0225 0805 (made by DINKLE)] (sold separately).



Event input
QMC1-□□1-□
I1
I2
I3
I4
Voltage contact input (Sink type)
Event output
QMC1-□□2-□
Load
O1
O2
O3
O4
24 V DC
+
-
NPN Open collector output
Prepare an external power supply
24 V DC.
Event input / Event output
QMC1-□□3-□
ADD.
PWR
T/R
ERR
USB
QMI1
1
2
3
4
5
HOST

(Fig. 14.5.2-1)

14.6 Specification settings for QMC1

Set the specifications of this instrument for communication with the PLC.

This section describes how to set specifications using console software (SWC-QMC101M).

14.6.1 Preparation of USB Communication Cable and Console Software

Please prepare the USB communication cable and the console software.

- USB commu nication cable
  USB - micro USB Type B (commercial item)
- Console software SWC-QMC101M)
  Please download from our website and install.
  Click https://shinko-technos.co.jp/e/ → Support/Download → Software

14.6.2 Connecting to Host Computer

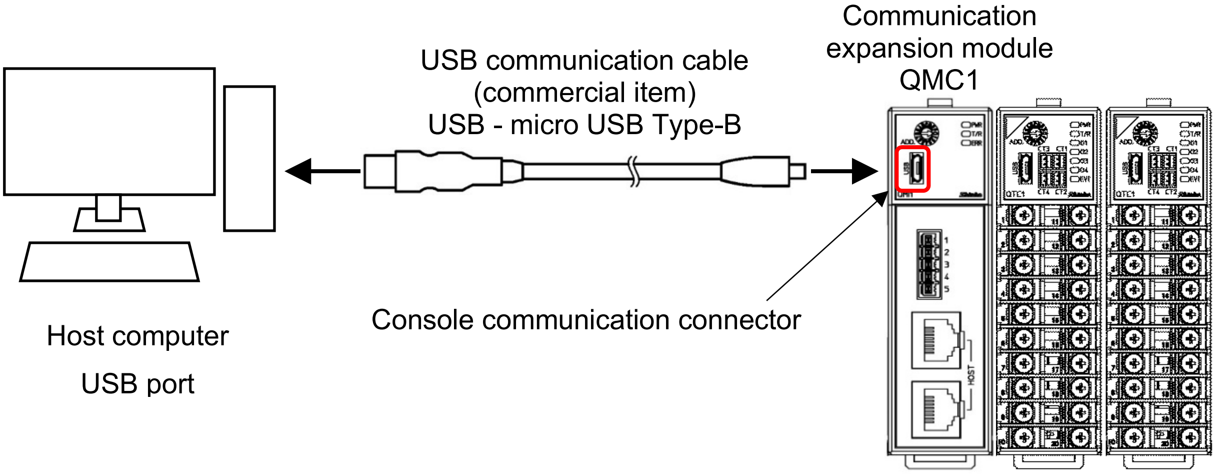
⚠ **Caution**

Do not use the logging function of the console software when communicating by connecting the USB communication cable.

(1) Connect the micro USB Type B side of the USB communication cable to the console communication connector of this instrument.

(2) Connect the USB plug of the USB communication cable to the USB port of the host computer.

Connection example of QMC1 and QTC1-40


Communication expansion module QMC1
USB communication cable (commercial item) USB - micro USB Type-B
Console communication connector
Host computer USB port

(Fig. 14.6.2-1)

(3) Checking the COM port number

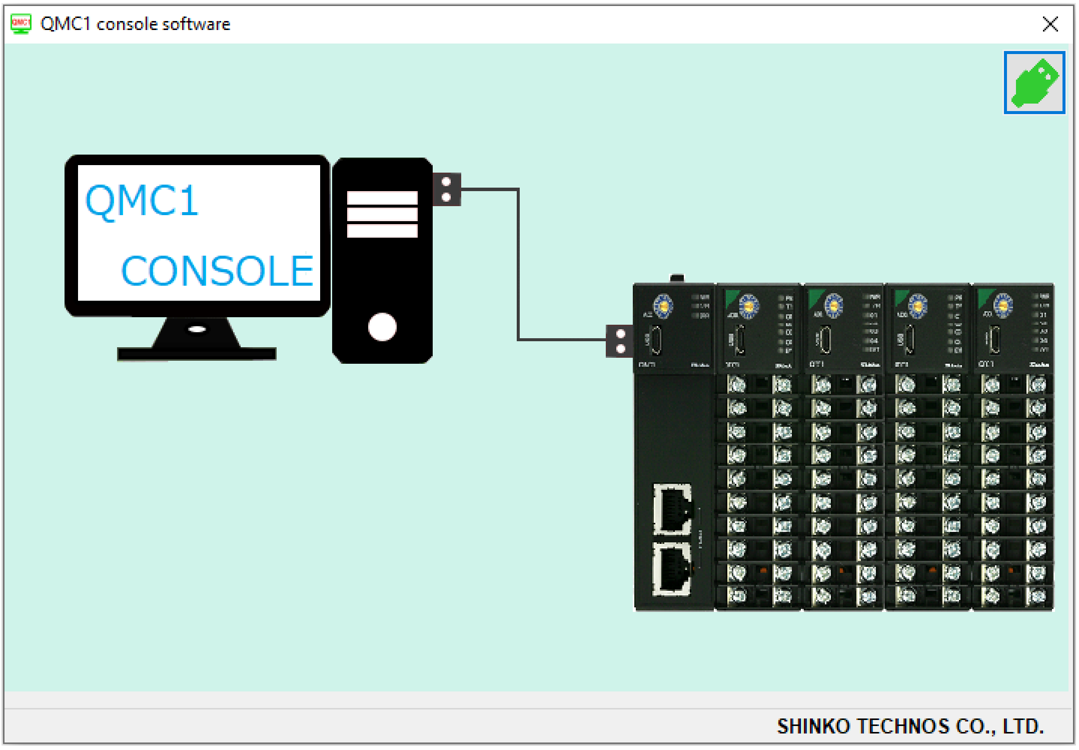
Follow the procedure below to check the COM port number.

① Right-click “Start” → Click “Device manager” from menu.

② When “USB Serial Port (COM3)” is displayed in “Port (COM and LPT)”, the COM port is assigned to No. 3.

Check the COM port number, and then close “Device Manager”.

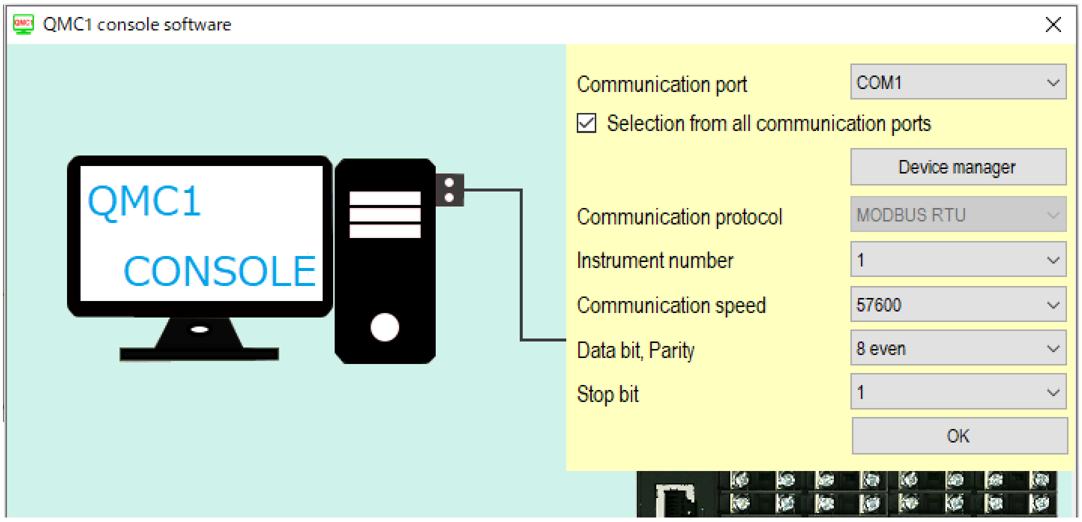
③ Start the console software (SWC-QMC101M).


QMC1 console software
QMC1
CONSOLE
SHINKO TECHNOS CO., LTD.

(Fig. 14.6.2-2)

④ When start the console software for the first time, the communication condition setting screen is displayed.

If the communication condition settings have been completed, proceed to ⑦.


QMC1 console software
QMC1
CONSOLE
Device manager
OK

Communication port: COM1

☑ Selection from all communication ports

Communication protocol: MODBUS RTU

Instrument number: 1

Communication speed: 57600

Data bit, Parity: 8 even

Stop bit: 1

(Fig. 14.6.2-3)

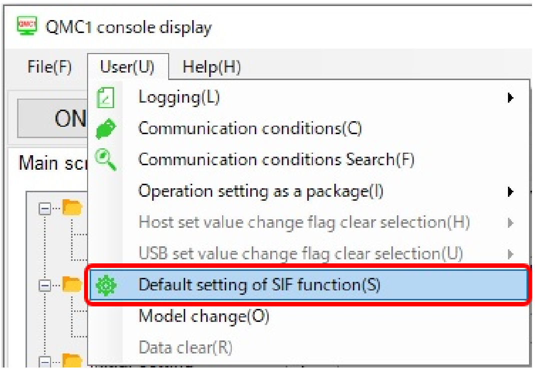
⑤ Set the communication condition as shown below.

Setup Items	Setting Value
Communication port	Select the COM port number confirmed in ②.
Communication protocol	MODBUS RTU

⑥ Click [OK].

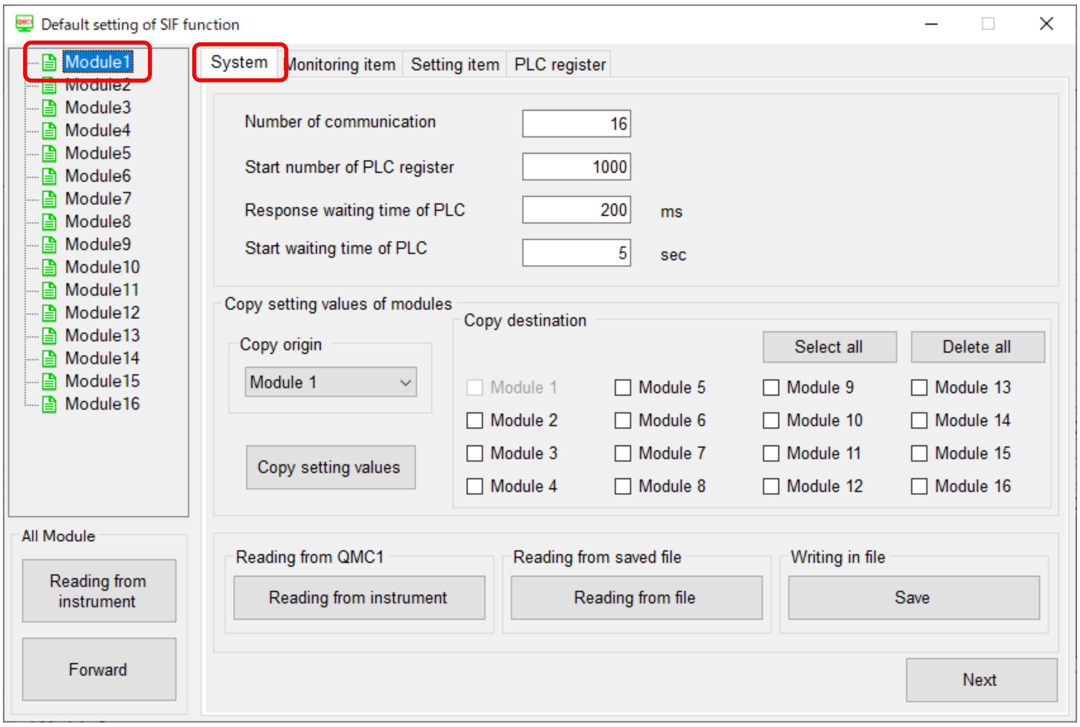
⑦ Click “User (U)” in the menu bar – “Default setting of SIF function (S)”.

Display “Default setting of SIF function” screen.


QMC1 console display
File(F)
User(U)
Help(H)
ON
Main scr
Logging(L)
Communication conditions(C)
Communication conditions Search(F)
Operation setting as a package(I)
Host set value change flag clear selection(H)
USB set value change flag clear selection(U)
Default setting of SIF function(S)
Model change(O)
Data clear(R)

(Fig. 14.6.2-4)

⑧ Select “Module 1” and click “System” tab.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
Copy setting values of modules
Copy origin
Copy destination
Select all
Delete all
Copy setting values
All Module
Reading from instrument
Forward
Reading from QMC1
Reading from instrument
Reading from saved file
Reading from file
Writing in file
Save
Next

Number of communication: 16

Start number of PLC register: 1000

Response waiting time of PLC: 200 ms

Start waiting time of PLC: 5 sec

Copy origin: Module 1

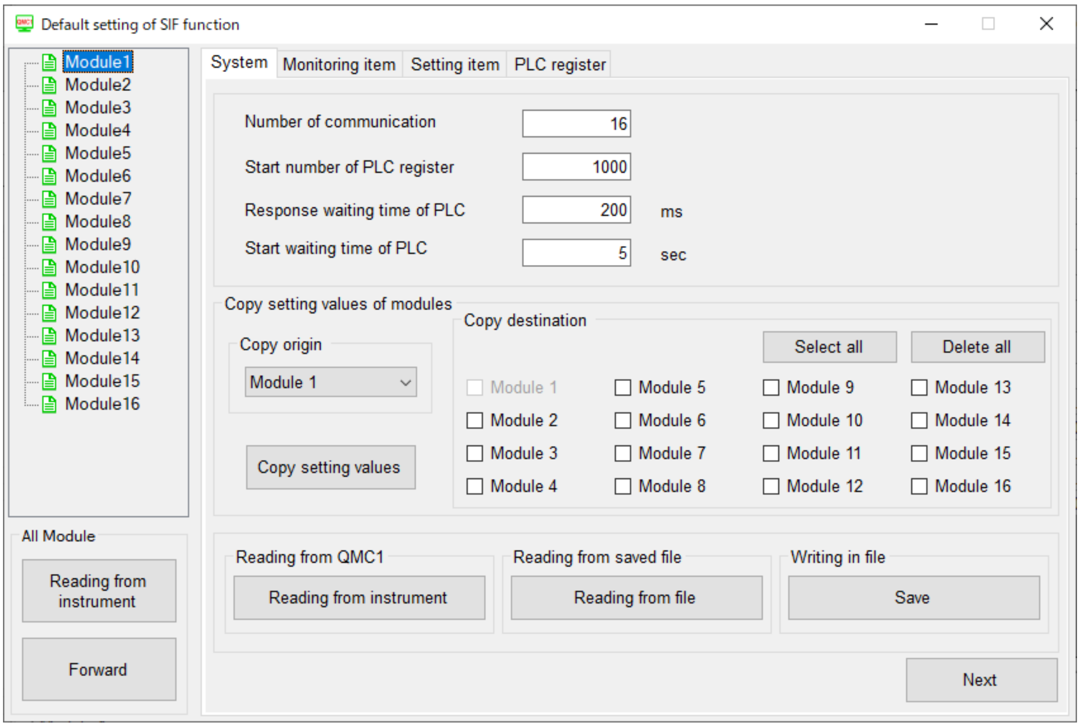
☐ Module 1 ☐ Module 5 ☐ Module 9 ☐ Module 13
☐ Module 2 ☐ Module 6 ☐ Module 10 ☐ Module 14
☐ Module 3 ☐ Module 7 ☐ Module 11 ☐ Module 15
☐ Module 4 ☐ Module 8 ☐ Module 12 ☐ Module 16

(Fig. 14.6.2-5)

Ready to set the specifications.

14.6.3 Specification settings for QMC1

Default setting of SIF function



Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
All Module
Reading from instrument
Forward
Copy setting values of modules
Copy setting values
Select all
Delete all
Reading from QMC1
Reading from instrument
Reading from saved file
Reading from file
Writing in file
Save
Next

Number of communication: 16

Start number of PLC register: 1000

Response waiting time of PLC: 200 ms

Start waiting time of PLC: 5 sec

Copy origin: Module 1

Copy destination

☐ Module 1	☐ Module 5	☐ Module 9	☐ Module 13
☐ Module 2	☐ Module 6	☐ Module 10	☐ Module 14
☐ Module 3	☐ Module 7	☐ Module 11	☐ Module 15
☐ Module 4	☐ Module 8	☐ Module 12	☐ Module 16

(Fig. 14.6.3-1)

Please refer to the Default setting of SIF function item to set the specifications.

Default setting of SIF function item

Module 1

MODBUS address	Name	Setting and selection range	Factory default
5280	Number of communication	1 to 16 modules	1
0064	Start number of PLC register	0 to 65535	1000
0074	Response waiting time of PLC	100 to 3000 ms	200
0084	Start waiting time of PLC	1 to 255 seconds	5
0094	Reservation (Not used)		0
00A4	Reservation (Not used)		0
00B4	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C4	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D4	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E4	Reservation (Not used)		0
00F4	Reservation (Not used)		0
0104	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0114	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0124	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0134	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0144	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0154	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0164	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

(1) Number of communication

Set the number of units to be managed by this instrument.
Set the number of control modules that are connected to this instrument.

(2) Start number of PLC register

Set the start number of the register used for PLC communication.
Set it in the range of 0 to 65535.
In the case of Mitsubishi Electric Corporation's PLC (A compatible 1C frame AnA/AnU), set the number in the range of 0 to 8191.
Initial value: Value of module 1 + {(module address - 1)×100}

For module 1: initial value=1000+{(1-1)×100}=1000
For module 2: initial value=1000+{(2-1)×100}=1100
For module 16: initial value=1000+{(16-1)×100}=2500

A maximum of 170 registers are used per control module. System area: 10 registers, monitoring items: 80 registers (20 x 4 ch), setting items: 80 registers (20 x 4 ch)]

When using multiple control modules, be careful not to duplicate them.

(3) Response waiting time of PLC

Sets the retransmission interval time when there is no response from the PLC.

Set it in the range of 100 to 3000 ms.

(4) Start waiting time of PLC

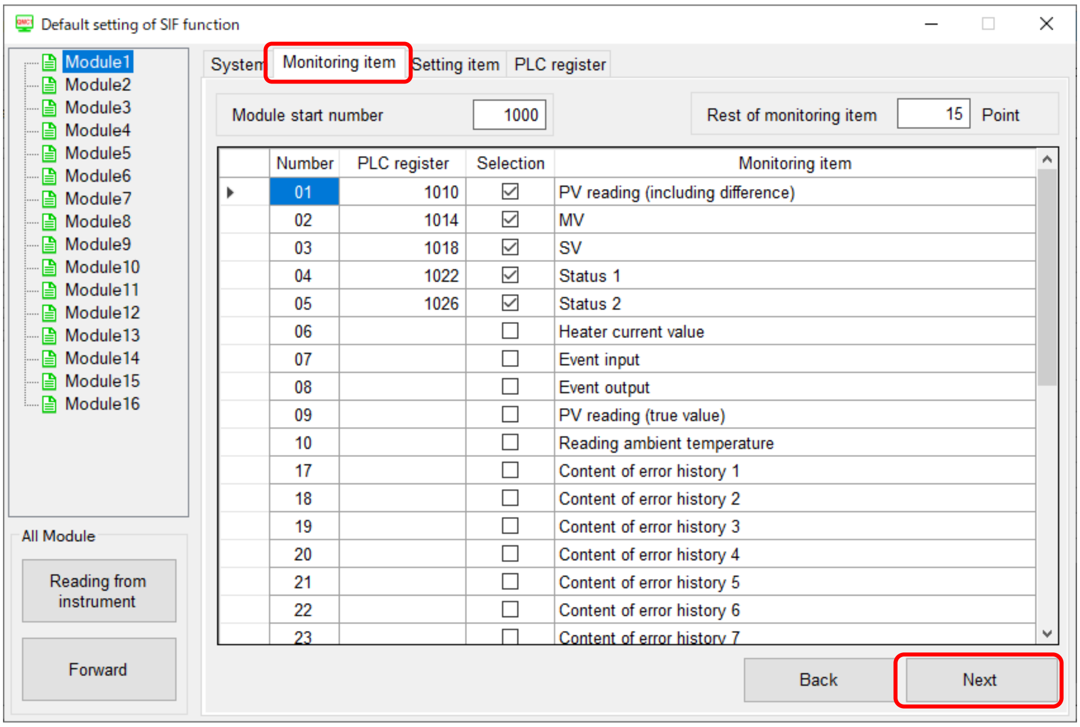
Set the time until communication with the PLC starts after this instrument is turned on.

Set it in the range of 1 to 255 seconds.

(5) Monitoring items 1 to 3 selection

Click “Monitoring Item” tab or [Next] button.

Display “Monitoring item” screen.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
All Module
Reading from instrument
Forward
System
Monitoring item
Setting item
PLC register
Back
Next

Module start number 1000

Rest of monitoring item 15 Point

Number	PLC register	Selection	Monitoring item
01	1010	☑	PV reading (including difference)
02	1014	☑	MV
03	1018	☑	SV
04	1022	☑	Status 1
05	1026	☑	Status 2
06		☐	Heater current value
07		☐	Event input
08		☐	Event output
09		☐	PV reading (true value)
10		☐	Reading ambient temperature
17		☐	Content of error history 1
18		☐	Content of error history 2
19		☐	Content of error history 3
20		☐	Content of error history 4
21		☐	Content of error history 5
22		☐	Content of error history 6
23		☐	Content of error history 7

(Fig. 14.6.3-2)

Select any of the monitoring items 1 to 3.

1: Enable, 0: Disable.

The maximum number of items that can be selected is 20.

This is common for all channels in the control module, and excess data is invalid.

Monitoring item 1 selection (Initial value: 31)

Bit	Number	Selection	Description
0	01	1	PV resding (including difference)
1	02	1	MV
2	03	1	SV
3	04	1	Status 1
4	05	1	Status 2
5	06	0	Heater current value
6	07	0	Event input
7	08	0	Event output
8	09	0	PV resding (true value)
9	10	0	Reading ambient temperature
10	11	0	Not used
11	12	0	Not used
12	13	0	Not used
13	14	0	Not used
14	15	0	Not used
15	16	0	Not used

Monitoring item 2 selection (Initial value: 0)

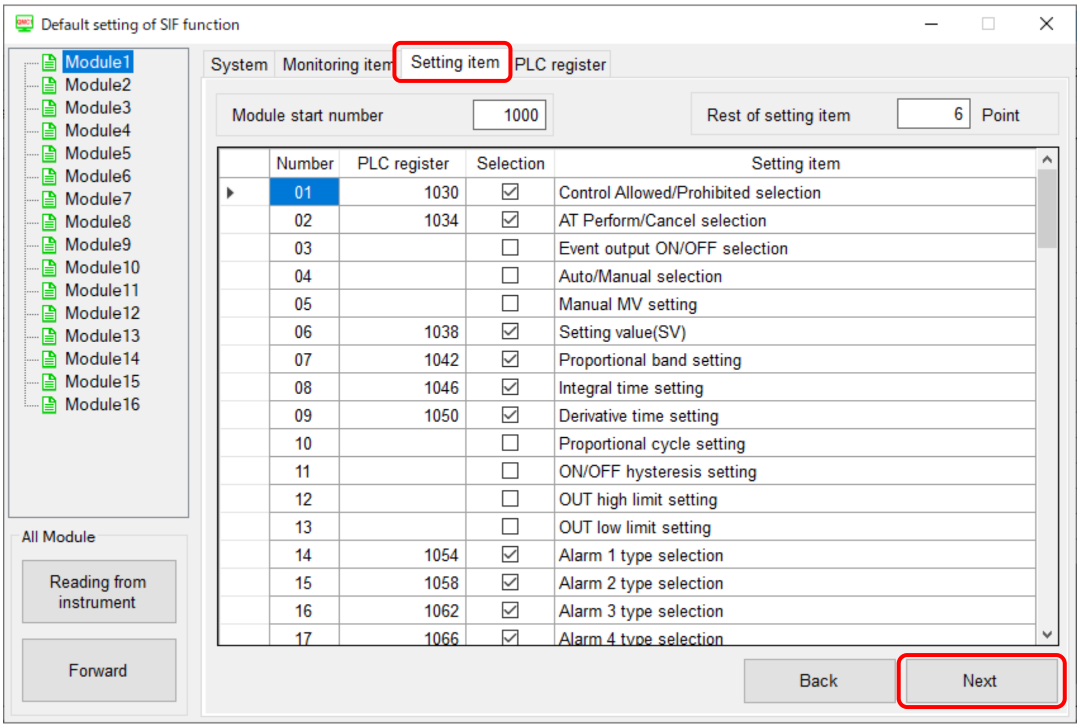
Bit	Number	Selection	Description
0	17	0	Content of error history 1
1	18	0	Content of error history 2
2	19	0	Content of error history 3
3	20	0	Content of error history 4
4	21	0	Content of error history 5
5	22	0	Content of error history 6
6	23	0	Content of error history 7
7	24	0	Content of error history 8
8	25	0	Content of error history 9
9	26	0	Content of error history 10
10	27	0	Energizing integrated time of error history 1
11	28	0	Energizing integrated time of error history 2
12	29	0	Energizing integrated time of error history 3
13	30	0	Energizing integrated time of error history 4
14	31	0	Energizing integrated time of error history 5
15	32	0	Energizing integrated time of error history 6

Monitoring item 3 selection (Initial value: 0)

Bit	Number	Selection	Description
0	33	0	Energizing integrated time of error history 7
1	34	0	Energizing integrated time of error history 8
2	35	0	Energizing integrated time of error history 9
3	36	0	Energizing integrated time of error history 10
4	37	0	Contact switching total number of times setting (High)
5	38	0	Contact switching total number of times setting (Low)
6	39	0	Total energizing time (High, Low)
7	40	0	Heater accumulated energizing time (High)
8	41	0	Heater accumulated energizing time (Low)
9	42	0	Not used
10	43	0	Not used
11	44	0	Not used
12	45	0	Not used
13	46	0	Not used
14	47	0	Not used
15	48	0	Not used

(6) Setting items 1 to 7 selection

Click “Setting Item” tab or [Next] button.
Display “Settinging item” screen.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
All Module
Reading from instrument
Forward
Back
Next

Module start number 1000

Rest of setting item 6 Point

Number	PLC register	Selection	Setting item
01	1030	☑	Control Allowed/Prohibited selection
02	1034	☑	AT Perform/Cancel selection
03		☐	Event output ON/OFF selection
04		☐	Auto/Manual selection
05		☐	Manual MV setting
06	1038	☑	Setting value(SV)
07	1042	☑	Proportional band setting
08	1046	☑	Integral time setting
09	1050	☑	Derivative time setting
10		☐	Proportional cycle setting
11		☐	ON/OFF hysteresis setting
12		☐	OUT high limit setting
13		☐	OUT low limit setting
14	1054	☑	Alarm 1 type selection
15	1058	☑	Alarm 2 type selection
16	1062	☑	Alarm 3 type selection
17	1066	☑	Alarm 4 type selection

(Fig. 14.6.3-3)

Select any of the setting items 1 to 7.
1: Enable, 0: Disable.
The maximum number of items that can be selected is 20.
This is common for all channels in the control module, and excess data is invalid.

Setting item 1 selection (Initial value: 57827)

Bit	Setting request item number	Selection	Description
0	1	1	Control Allowed/Prohibited selection
1	2	1	AT Perform/Cancel selection
2	3	0	Event output ON/OFF selection
3	4	0	Auto/Manual selection
4	5	0	Manual MV setting
5	6	1	Setting value (SV)
6	7	1	Proportional band setting
7	8	1	Integral time setting
8	9	1	Derivative time setting
9	10	0	Proportional cycle setting
10	11	0	ON/OFF hysteresis setting
11	12	0	OUT high limit setting
12	13	0	OUT low limit setting
13	14	1	Alarm 1 type selection
14	15	1	Alarm 2 type selection
15	16	1	Alarm 3 type selection

Setting item 2 selection (Initial value: 2721)

Bit	Setting request item number	Selection	Description
0	17	1	Alarm 4 type selection
1	18	0	Alarm 1 hysteresis setting
2	19	0	Alarm 2 hysteresis setting
3	20	0	Alarm 3 hysteresis setting
4	21	0	Alarm 4 hysteresis setting
5	22	1	Alarm 1 value setting
6	23	0	Alarm 1 high limit value setting
7	24	1	Alarm 2 value setting
8	25	0	Alarm 2 high limit value setting
9	26	1	Alarm 3 value setting
10	27	0	Alarm 3 high limit value setting
11	28	1	Alarm 4 value setting
12	29	0	Alarm 4 high limit value setting
13	30	0	Heater burnout alarm setting
14	31	0	Loop break alarm band setting
15	32	0	Loop break alarm time setting

Setting item 3 selection (Initial value: 0)

Bit	Setting request item number	Selection	Description
0	33	0	Sensor correction factor setting
1	34	0	Sensor correction setting
2	35	0	PV filter time constant setting
3	36	0	SV rise rate setting
4	37	0	SV drop rate setting
5	38	0	MV bias setting
6	39	0	Not used
7	40	0	Not used
8	41	0	Not used
9	42	0	Not used
10	43	0	Not used
11	44	0	Not used
12	45	0	Not used
13	46	0	Not used
14	47	0	Not used
15	48	0	Not used

Setting item 4 selection (Initial value: 0)

Bit	Setting request item number	Selection	Description
0	49	0	Input type selection
1	50	0	Temperature unit selection
2	51	0	Scaling high limit setting
3	52	0	Scaling low limit setting
4	53	0	Input sampling selection
5	54	0	Direct/reverse action selection
6	55	0	AT action mode selection
7	56	0	AT bias setting
8	57	0	AT gain setting
9	58	0	Alarm 1 value 0 Enabled/ Disabled selection
10	59	0	Alarm 2 value 0 Enabled/ Disabled selection
11	60	0	Alarm 3 value 0 Enabled/ Disabled selection
12	61	0	Alarm 4 value 0 Enabled/ Disabled selection
13	62	0	Event output allocation selec tion
14	63	0	Event input allocation selection
15	64	0	CH Enabled/ Disabled selection

Setting item 5 selection (Initial value: 0)

Bit	Setting request item number	Selection	Description
0	65	0	Number of moving average setting
1	66	0	Input math function selection
2	67	0	Input difference selection
3	68	0	Input difference setting
4	69	0	Control action selection
5	70	0	Proportional gain 2 DOF coefficient setting (α)
6	71	0	Integral 2 DOF coefficient setting (β)
7	72	0	Differential 2 DOF coefficient setting (γ, Cd)
8	73	0	Desired value proportional coefficient setting (Cp)
9	74	0	Gap width setting
10	75	0	Gap coefficient setting
11	76	0	Output minimum ON/OFF time setting
12	77	0	Integral/ differential decimal point position selection
13	78	0	Power on restore action selection
14	79	0	Not used
15	80	0	Not used

Setting item 6 selection (Initial value: 0)

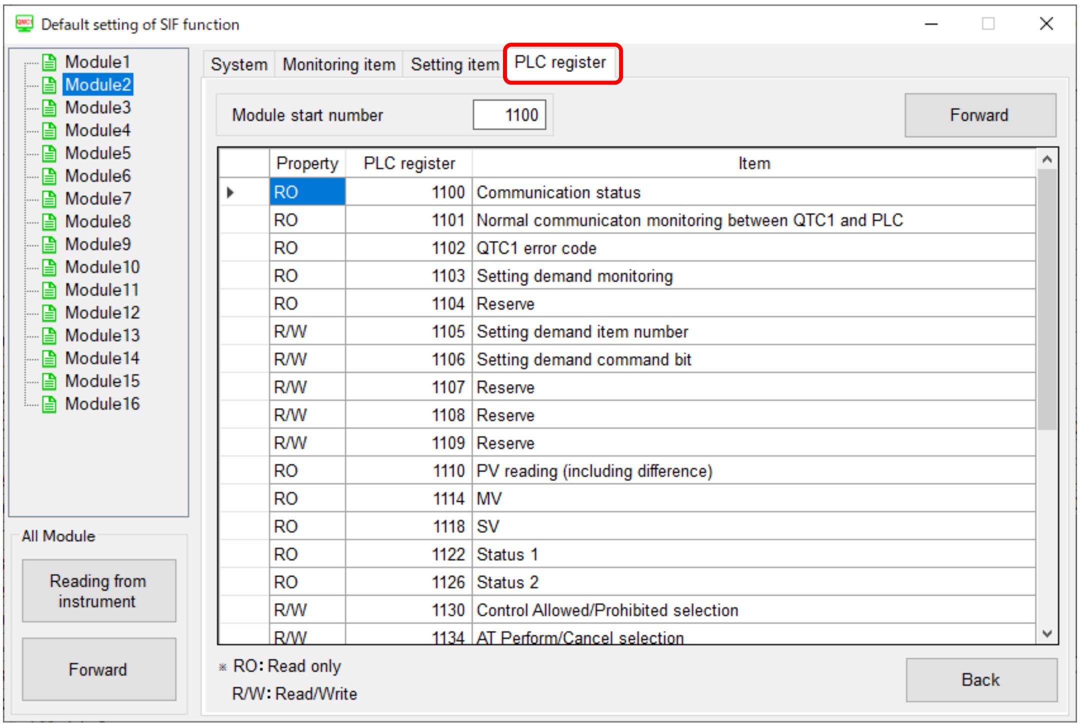
Bit	Setting request item number	Selection	Description
0	81	0	Control function selection
1	82	0	Cooling P-band setting
2	83	0	Cooling integral time setting
3	84	0	Cooling differential time setting
4	85	0	Cooling proportional cycle setting
5	86	0	Cooling ON/OFF hysteresis setting
6	87	0	Overlap/Dead band setting
7	88	0	Cooling output high limit setting
8	89	0	Cooling output low limit setting
9	90	0	Cooling action mode selection
10	91	0	Slave scale high limit setting
11	92	0	Slave scale low limit setting
12	93	0	Output bias setting
13	94	0	Output gain setting
14	95	0	Output channel selection
15	96	0	Output rate-of-change setting

Setting item 7 selection (Initial value: 0)

Bit	Setting request item number	Selection	Description
0	97	0	Communication response delay time setting
1	98	0	Expanded function selection
2	99	0	Total current setting
3	100	0	Current value setting
4	101	0	Output ON delay setting
5	102	0	Auto balance control Interlock/Single selection
6	103	0	Auto balance control Master/Slave selection
7	104	0	Auto balance control Enable/Disable selection
8	105	0	Auto balance control start output setting
9	106	0	Auto balance control cancel area setting
10	107	0	Number of communication management module setting
11	108	0	Non-volatile IC memory save selection
12	109	0	Not used
13	110	0	Not used
14	111	0	Not used
15	112	0	Not used

(7) PLC register check

Click “PLC register” tab or [Next] button.
Display “PLC register” screen.
Check the settings.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
All Module
Reading from instrument
Forward
System
Monitoring item
Setting item
PLC register
Forward
Back

Module start number 1100

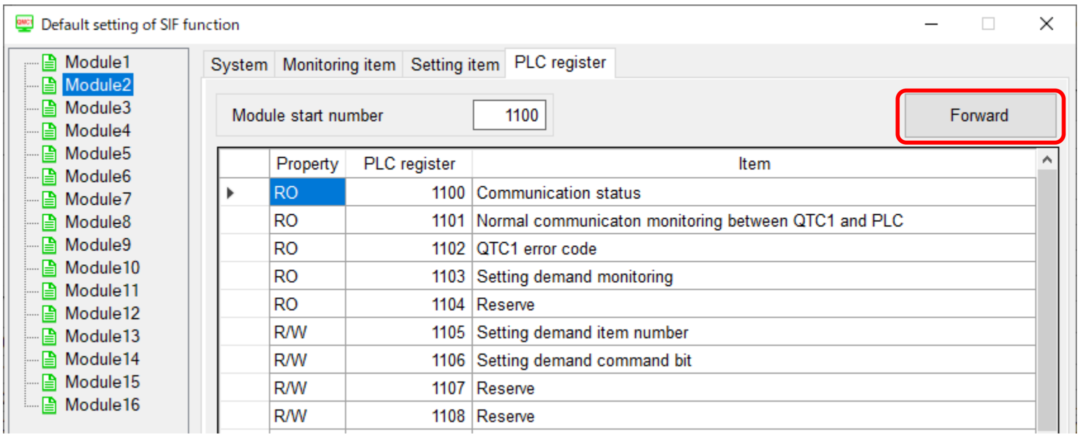
Property	PLC register	Item
RO	1100	Communication status
RO	1101	Normal communicaton monitoring between QTC1 and PLC
RO	1102	QTC1 error code
RO	1103	Setting demand monitoring
RO	1104	Reserve
R/W	1105	Setting demand item number
R/W	1106	Setting demand command bit
R/W	1107	Reserve
R/W	1108	Reserve
R/W	1109	Reserve
RO	1110	PV reading (including difference)
RO	1114	MV
RO	1118	SV
RO	1122	Status 1
RO	1126	Status 2
R/W	1130	Control Allowed/Prohibited selection
R/W	1134	AT Perform/Cancel selection

※ RO: Read only
R/W: Read/Write

(Fig. 14.6.3-4)

(8) Transfer of setting values

Click [Forward] button.
Transfer the setting value to module 1.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
Forward

Module start number 1100

Property	PLC register	Item
RO	1100	Communication status
RO	1101	Normal communicaton monitoring between QTC1 and PLC
RO	1102	QTC1 error code
RO	1103	Setting demand monitoring
RO	1104	Reserve
R/W	1105	Setting demand item number
R/W	1106	Setting demand command bit
R/W	1107	Reserve
R/W	1108	Reserve

(Fig. 14.6.3-5)

(9) Turn OFF → ON the QMC-1 power.

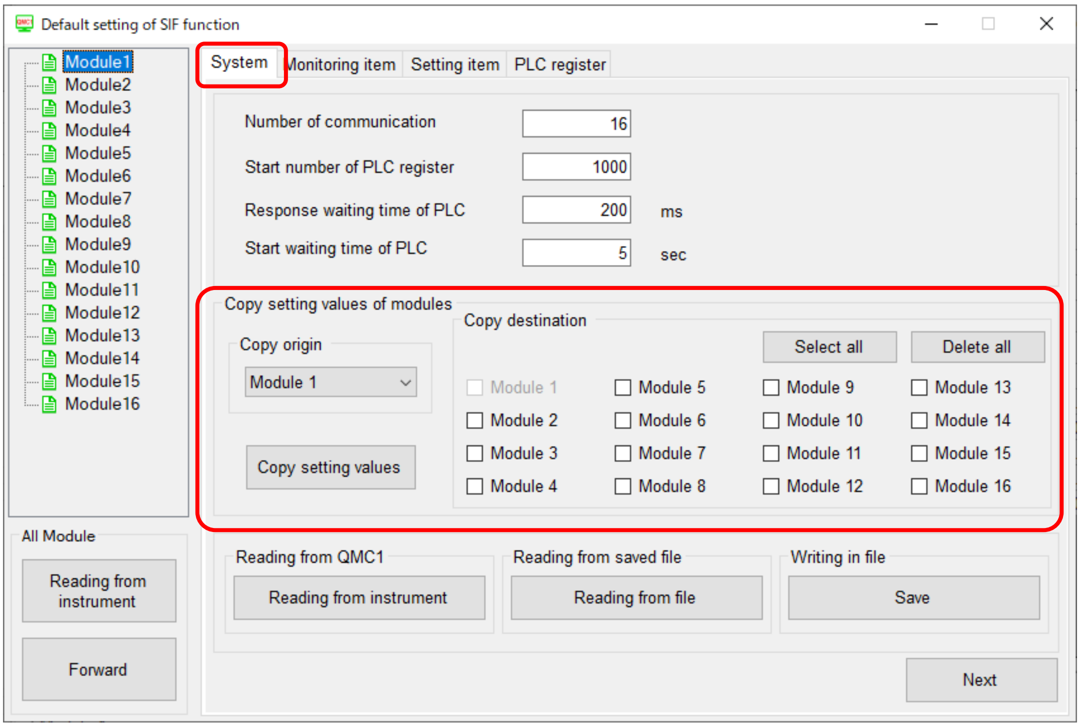
Turn OFF → ON the power of QMC-1. The set value will become effective.

This completes the specification setting.

[Useful Functions] Copying the set values of modules

When you select the source module and the destination module, and then click the Copy Setting Value button, the selected contents of the monitor items 1 to 3 and the setting items 1 to 7 can be copied by the Copy Setting Value of Module in the System tab of Module 1.

The module set value copy is a copy function on the console software screen.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
All Module
Reading from instrument
Forward
Copy setting values of modules
Copy origin
Copy destination
Select all
Delete all
☐ Module 1
☐ Module 2
☐ Module 3
☐ Module 4
☐ Module 5
☐ Module 6
☐ Module 7
☐ Module 8
☐ Module 9
☐ Module 10
☐ Module 11
☐ Module 12
☐ Module 13
☐ Module 14
☐ Module 15
☐ Module 16
Copy setting values
Reading from QMC1
Reading from instrument
Reading from saved file
Reading from file
Writing in file
Save
Next

Number of communication 16

Start number of PLC register 1000

Response waiting time of PLC 200 ms

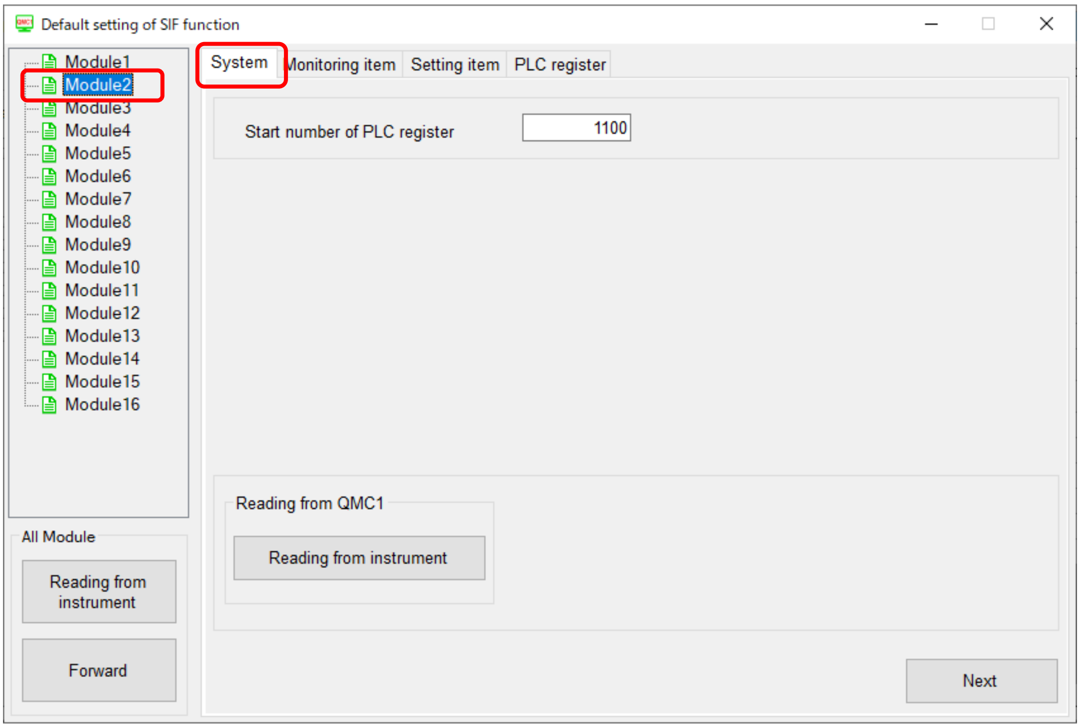
Start waiting time of PLC 5 sec

Copy origin: Module 1

(Fig. 14.6.3-6)

Specification settings when multiple control modules are connected

When multiple control modules are connected, select the connected module number (e.g. Module 2), and click the System tab.


Default setting of SIF function
Module1
Module2
Module3
Module4
Module5
Module6
Module7
Module8
Module9
Module10
Module11
Module12
Module13
Module14
Module15
Module16
System
Monitoring item
Setting item
PLC register
All Module
Reading from instrument
Forward
Reading from QMC1
Reading from instrument
Next

Start number of PLC register 1100

(Fig. 14.6.3-7)

(10) Setting the specifications for Module 2

Set “(2) Start number of PLC register”, “(5) Monitoring items 1 to 3 selection”, “(6) Setting items 1 to 7 selection”,and then “(7) PLC register check”, “(8) Transfer of setting values”, “(9) Turn the QMC1 power OFF → ON”.

Module 2

MODBUS address	Name	Setting and selection range	Factory default
0065	Start number of PLC register	0 to 65535	1100
0075	Reservation (Not used)		0
0085	Reservation (Not used)		0
0095	Reservation (Not used)		0
00A5	Reservation (Not used)		0
00B5	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C5	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D5	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E5	Reservation (Not used)		0
00F5	Reservation (Not used)		0
0105	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0115	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0125	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0135	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0145	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0155	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0165	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

(11) Setting the specifications for Module 3 and later

The SIF function initial setting items for Module 3 and later are shown below.

If necessary, set the specifications in the same way.

Module 3

MODBUS address	Name	Setting and selection range	Factory default
0066	Start number of PLC register	0 to 65535	1200
0076	Reservation (Not used)		0
0086	Reservation (Not used)		0
0096	Reservation (Not used)		0
00A6	Reservation (Not used)		0
00B6	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C6	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D6	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E6	Reservation (Not used)		0
00F6	Reservation (Not used)		0
0106	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0116	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0126	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0136	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0146	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0156	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0166	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 4

MODBUS address	Name	Setting and selection range	Factory default
0067	Start number of PLC register	0 to 65535	1300
0077	Reservation (Not used)		0
0087	Reservation (Not used)		0
0097	Reservation (Not used)		0
00A7	Reservation (Not used)		0
00B7	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C7	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D7	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E7	Reservation (Not used)		0
00F7	Reservation (Not used)		0
0107	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0117	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0127	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0137	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0147	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0157	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0167	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 5

MODBUS address	Name	Setting and selection range	Factory default
0068	Start number of PLC register	0 to 65535	1400
0078	Reservation (Not used)		0
0088	Reservation (Not used)		0
0098	Reservation (Not used)		0
00A8	Reservation (Not used)		0
00B8	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C8	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D8	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E8	Reservation (Not used)		0
00F8	Reservation (Not used)		0
0108	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0118	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0128	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0138	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0148	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0158	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0168	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 6

MODBUS address	Name	Setting and selection range	Factory default
0069	Start number of PLC register	0 to 65535	1500
0079	Reservation (Not used)		0
0089	Reservation (Not used)		0
0099	Reservation (Not used)		0
00A9	Reservation (Not used)		0
00B9	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00C9	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00D9	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00E9	Reservation (Not used)		0
00F9	Reservation (Not used)		0
0109	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0119	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0129	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0139	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0149	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0159	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0169	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 7

MODBUS address	Name	Setting and selection range	Factory default
006A	Start number of PLC register	0 to 65535	1600
007A	Reservation (Not used)		0
008A	Reservation (Not used)		0
009A	Reservation (Not used)		0
00AA	Reservation (Not used)		0
00BA	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CA	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DA	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00EA	Reservation (Not used)		0
00FA	Reservation (Not used)		0
010A	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011A	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012A	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013A	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014A	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015A	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016A	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 8

MODBUS address	Name	Setting and selection range	Factory default
006B	Start number of PLC register	0 to 65535	1700
007B	Reservation (Not used)		0
008B	Reservation (Not used)		0
009B	Reservation (Not used)		0
00AB	Reservation (Not used)		0
00BB	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CB	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DB	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00EB	Reservation (Not used)		0
00FB	Reservation (Not used)		0
010B	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011B	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012B	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013B	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014B	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015B	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016B	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 9

MODBUS address	Name	Setting and selection range	Factory default
006C	Start number of PLC register	0 to 65535	1800
007C	Reservation (Not used)		0
008C	Reservation (Not used)		0
009C	Reservation (Not used)		0
00AC	Reservation (Not used)		0
00BC	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CC	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DC	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00EC	Reservation (Not used)		0
00FC	Reservation (Not used)		0
010C	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011C	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012C	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013C	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014C	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015C	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016C	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 10

MODBUS address	Name	Setting and selection range	Factory default
006D	Start number of PLC register	0 to 65535	1900
007D	Reservation (Not used)		0
008D	Reservation (Not used)		0
009D	Reservation (Not used)		0
00AD	Reservation (Not used)		0
00BD	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CD	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DD	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00ED	Reservation (Not used)		0
00FD	Reservation (Not used)		0
010D	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011D	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012D	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013D	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014D	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015D	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016D	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 11

MODBUS address	Name	Setting and selection range	Factory default
006E	Start number of PLC register	0 to 65535	2000
007E	Reservation (Not used)		0
008E	Reservation (Not used)		0
009E	Reservation (Not used)		0
00AE	Reservation (Not used)		0
00BE	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CE	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DE	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00EE	Reservation (Not used)		0
00FE	Reservation (Not used)		0
010E	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011E	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012E	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013E	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014E	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015E	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016E	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 12

MODBUS address	Name	Setting and selection range	Factory default
006F	Start number of PLC register	0 to 65535	2100
007F	Reservation (Not used)		0
008F	Reservation (Not used)		0
009F	Reservation (Not used)		0
00AF	Reservation (Not used)		0
00BF	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00CF	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00DF	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00EF	Reservation (Not used)		0
00FF	Reservation (Not used)		0
010F	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
011F	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
012F	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
013F	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
014F	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
015F	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
016F	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 13

MODBUS address	Name	Setting and selection range	Factory default
0070	Start number of PLC register	0 to 65535	2200
0080	Reservation (Not used)		0
0090	Reservation (Not used)		0
00A0	Reservation (Not used)		0
00B0	Reservation (Not used)		0
00C0	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00D0	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00E0	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00F0	Reservation (Not used)		0
0100	Reservation (Not used)		0
0110	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0120	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0130	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0140	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0150	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0160	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0170	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 14

MODBUS address	Name	Setting and selection range	Factory default
0071	Start number of PLC register	0 to 65535	2300
0081	Reservation (Not used)		0
0091	Reservation (Not used)		0
00A1	Reservation (Not used)		0
00B1	Reservation (Not used)		0
00C1	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00D1	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00E1	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00F1	Reservation (Not used)		0
0101	Reservation (Not used)		0
0111	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0121	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0131	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0141	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0151	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0161	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0171	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 15

MODBUS address	Name	Setting and selection range	Factory default
0072	Start number of PLC register	0 to 65535	2400
0082	Reservation (Not used)		0
0092	Reservation (Not used)		0
00A2	Reservation (Not used)		0
00B2	Reservation (Not used)		0
00C2	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00D2	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00E2	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00F2	Reservation (Not used)		0
0102	Reservation (Not used)		0
0112	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0122	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0132	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0142	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0152	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0162	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0172	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

Module 16

MODBUS address	Name	Setting and selection range	Factory default
0073	Start number of PLC register	0 to 65535	2500
0083	Reservation (Not used)		0
0093	Reservation (Not used)		0
00A3	Reservation (Not used)		0
00B3	Reservation (Not used)		0
00C3	Monitoring item 1 selection	See monitoring item 1 table. (P.14-18)	31
00D3	Monitoring item 2 selection	See monitoring item 2 table. (P.14-18)	0
00E3	Monitoring item 3 selection	See monitoring item 3 table. (P.14-19)	0
00F3	Reservation (Not used)		0
0103	Reservation (Not used)		0
0113	Setting item 1 selection	See setting item 1 table. (P.14-20)	57827
0123	Setting item 2 selection	See setting item 2 table. (P.14-21)	2721
0133	Setting item 3 selection	See setting item 3 table. (P.14-21)	0
0143	Setting item 4 selection	See setting item 4 table. (P.14-22)	0
0153	Setting item 5 selection	See setting item 5 table. (P.14-22)	0
0163	Setting item 6 selection	See setting item 6 table. (P.14-23)	0
0173	Setting item 7 selection	See setting item 7 table. (P.14-23)	0

PLC data register layout

In the example of the initial setting of the SIF function, the layout of the PLC data registers is as follows.

Module number	Information between QMC1 and PLC (System data)	Monitoring item	Setting item
Module 1	1000 to 1009	1010 to 1029	1030 to 1085
Module 2	1100 to 1109	1110 to 1129	1130 to 1185
Module 3	1200 to 1209	1210 to 1229	1230 to 1285
Module 4	1300 to 1309	1310 to 1329	1330 to 1385
Module 5	1400 to 1409	1410 to 1429	1430 to 1485
Module 6	1500 to 1509	1510 to 1529	1530 to 1585
Module 7	1600 to 1609	1610 to 1629	1630 to 1685
Module 8	1700 to 1709	1710 to 1729	1730 to 1785
Module 9	1800 to 1809	1810 to 1829	1830 to 1885
Module 10	1900 to 1909	1910 to 1929	1930 to 1985
Module 11	2000 to 2009	2010 to 2029	2030 to 2085
Module 12	2100 to 2109	2110 to 2129	2130 to 2185
Module 13	2200 to 2209	2210 to 2229	2230 to 2285
Module 14	2300 to 2309	2310 to 2329	2330 to 2385
Module 15	2400 to 2409	2410 to 2429	2430 to 2485
Module 16	2500 to 2509	2510 to 2529	2530 to 2585

14.7 Communication with PLC Manufactured by Mitsubishi Electric Corporation

This section describes communication with the PLC manufactured by Mitsubishi Electric Corporation.

14.7.1 Communication parameter setting

The communication parameter settings should be set as follows.

For details, refer to the instruction manual of the PLC to be used.

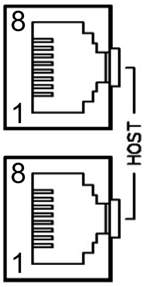
Setting item	Setting description
Communication Protocol Setting	Format 4
Station number	00
Computer link/multidrop link selection	Computer link
Operation setting	Independence
Data bits	7 bits
Parity bit	With parity/even
Stop bit	1 bit
Thumb check code	With thumb check code
Write during RUN	Permission
Setting change	Permission
Communication speed setting	Set the same communication speed as this instrument.

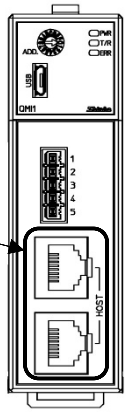
14.7.2 Connecting PLC and QMC1

Serial communication connector pin assignment

The pin assignment of the serial communication connector differs depending on the model name.

The connector is common to the upper and lower sections.

Model / Pin No.		QMC1-C4□-□	QMC1-C5□-□
	8	NC	NC
	7	SG	SG
	6	RD(+)	NC
	5	SD(+)	YB(+)
	4	SD(-)	YA(-)
	3	RD(-)	NC
	2	SG	SG
	1	NC	NC

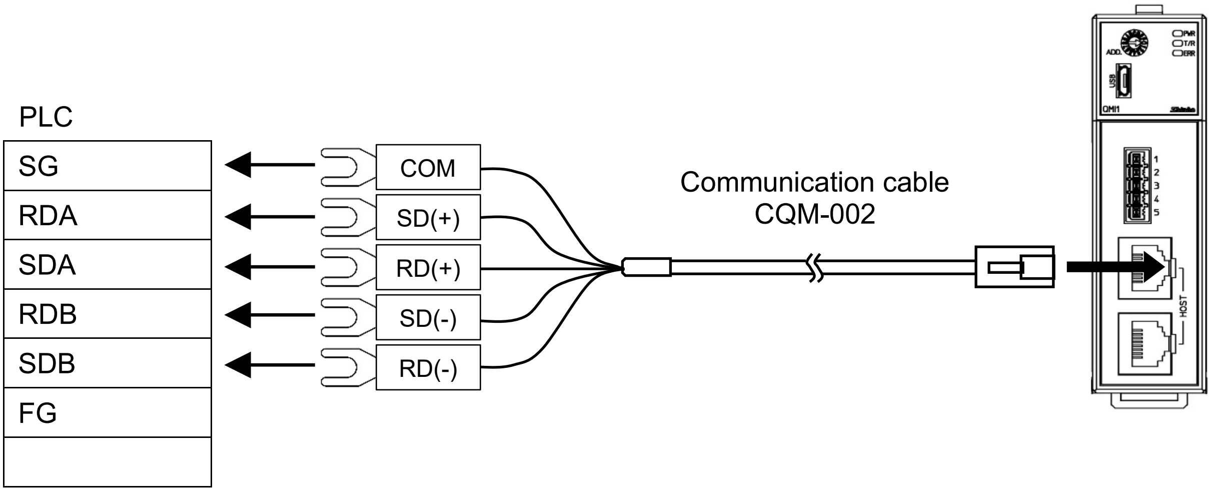


Serial communication connector

(Fig. 14.7.2-1)

For RS-422A

Use the communication cable CQM-002 (sold separately) for connection.

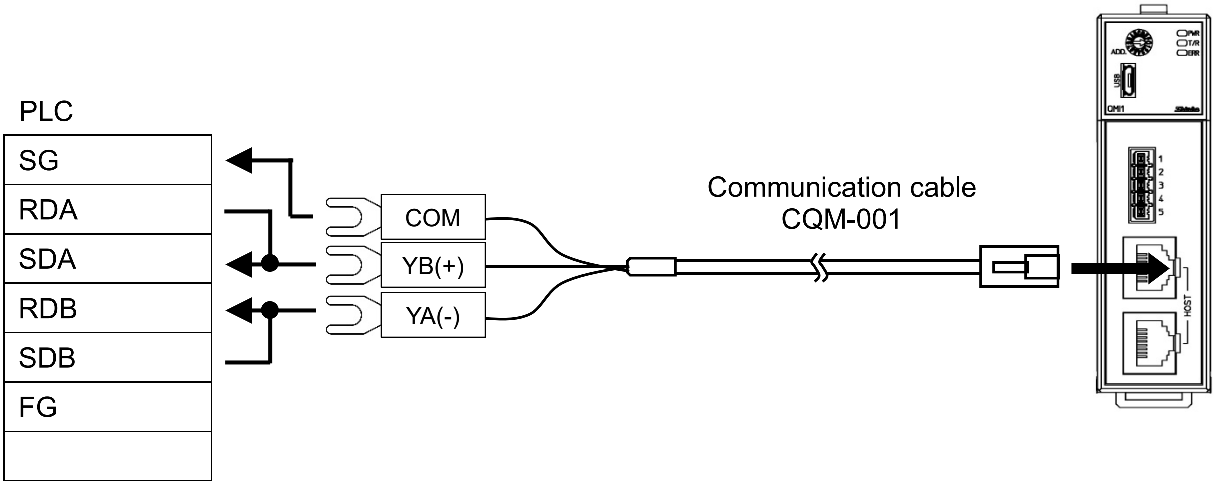

PLC
SG
RDA
SDA
RDB
SDB
FG
COM
SD(+)
RD(+)
SD(-)
RD(-)
Communication cable
CQM-002

For details of the PLC side terminals, refer to the instruction manual of the PLC to be used.

(Fig. 14.7.2-2)

For RS-485

Use the communication cable CQM-001 (sold separately) for connection.

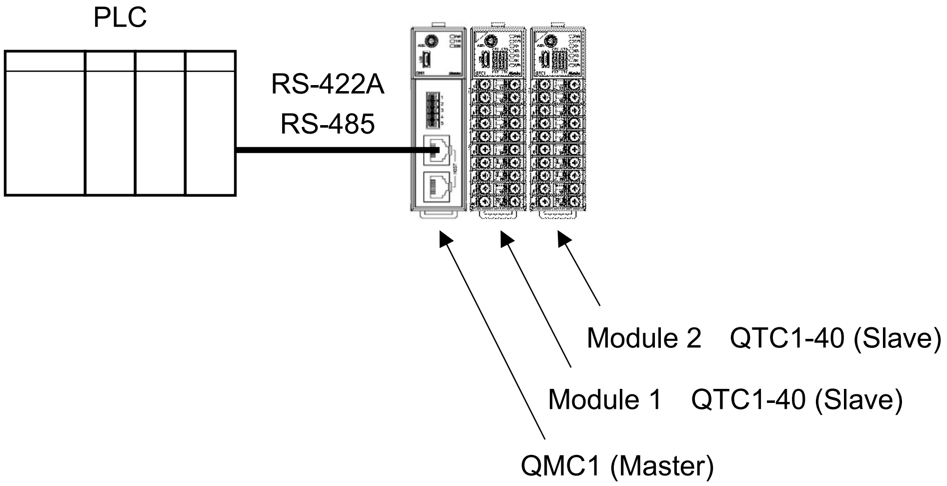

PLC
SG
RDA
SDA
RDB
SDB
FG
COM
YB(+)
YA(-)
Communication cable
CQM-001

For details of the PLC side terminals, refer to the instruction manual of the PLC to be used.

(Fig. 14.7.2-3)

14.7.3 Communication Procedure

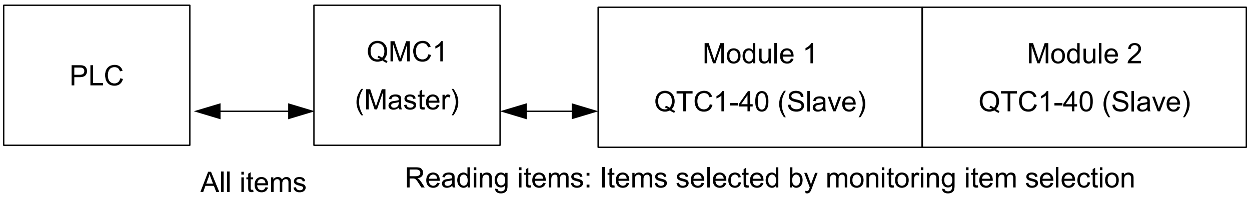
This section describes the case where this instrument and two QTC1-40 modules are connected to PLC.


PLC
RS-422A
RS-485
Module 2 QTC1-40 (Slave)
Module 1 QTC1-40 (Slave)
QMC1 (Master)

(Fig. 14.7.3-1)

(1) This instrument becomes the master and collects the valid monitor items and setting items of module 1 and module 2 [QTC1-40 (slave)].

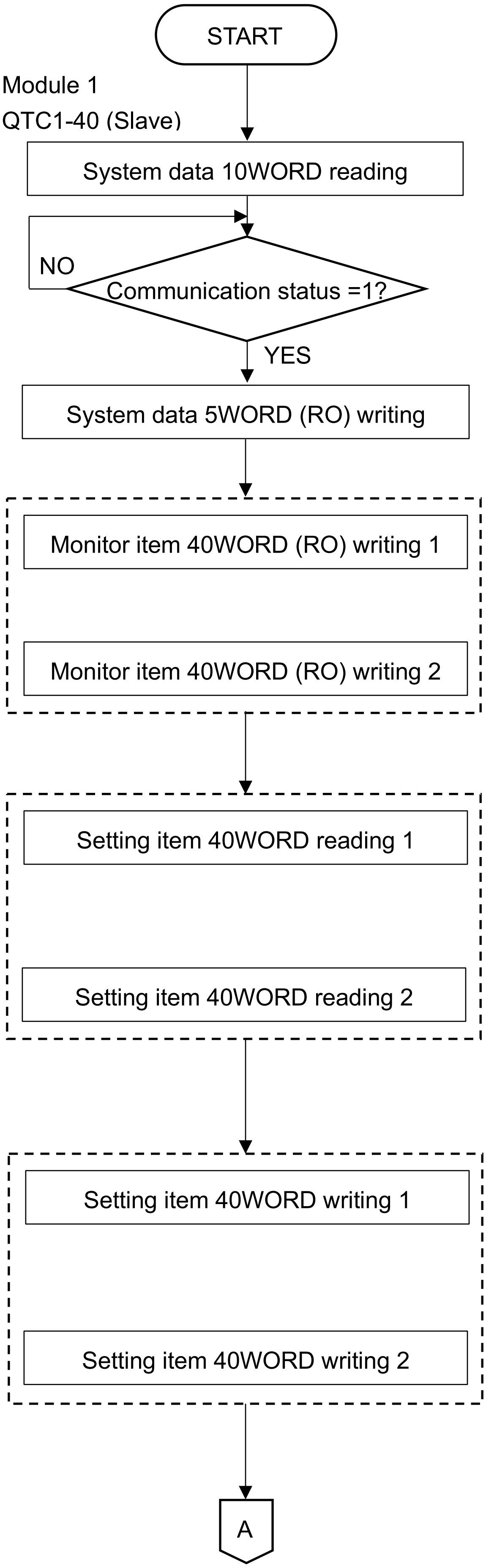
(2) After the PLC communication start waiting time elapses, this instrument periodically writes the item selected in the monitor item to the PLC register.
In addition, the item selected in the setting item is read from the PLC register by the setting request.


PLC
QMC1
(Master)
Module 1
QTC1-40 (Slave)
Module 2
QTC1-40 (Slave)
All items

Reading items: Items selected by monitoring item selection
Writing items: At startup: Items selected by setting item selection
After startup: Items set by setting request item number

(Fig. 14.7.3-2)

14.7.4 Handshake between QMC1 and PLC


START
Module 1
QTC1-40 (Slave)
System data 10WORD reading
NO
Communication status =1?
YES
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
A

After the PLC communication start waiting time elapses, QMC1 reads the system data in PLC registers 0 to 9.

When QMC1 completes data collection, the communication status becomes 1, and it is ready to communicate with the PLC.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

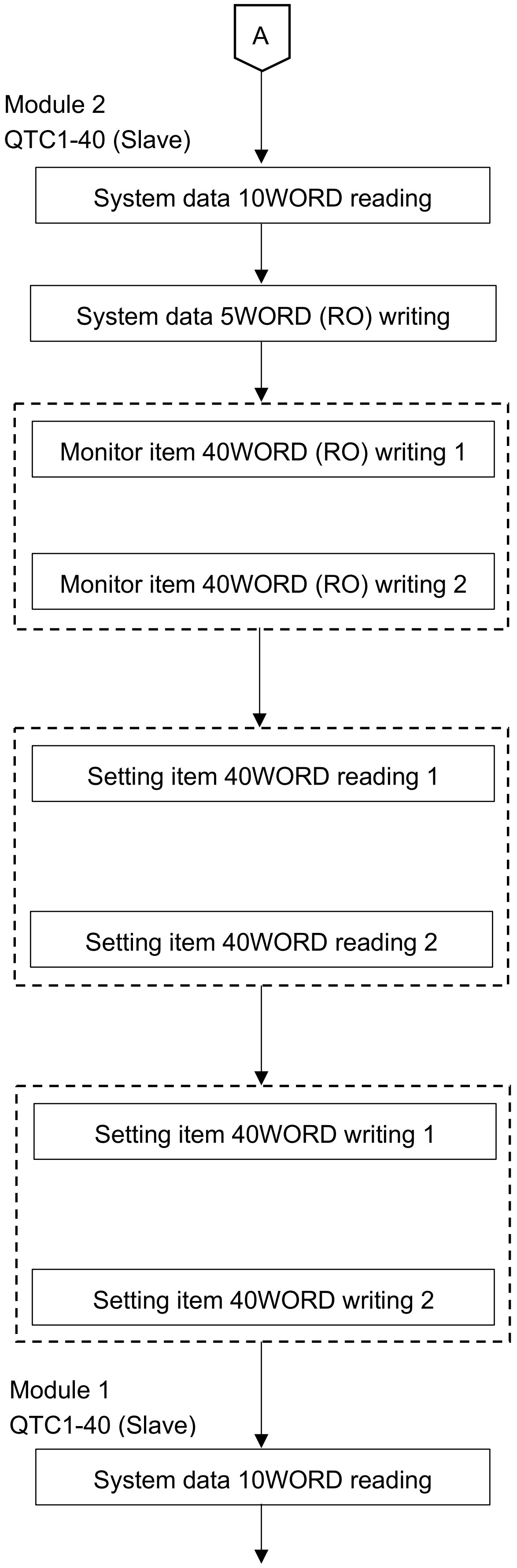
QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.


A
Module 2
QTC1-40 (Slave)
System data 10WORD reading
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
Module 1
QTC1-40 (Slave)
System data 10WORD reading

QMC1 reads the system data in PLC registers 0 to 9.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.

System data of QTC1-40 (slave)
Returns to the 10WORD reading process.
Thereafter, the process for each control module is repeated.

14.7.5 PLC communication data map

The following table shows the PLC communication data map when set with the SIF function initial setting example.

SIF function initial setting example

Name	Module 1 QTC1-40 (Slave)		Module 2 QTC1-40 (Slave)	
	MODBUS address	Setting value	MODBUS address	Setting value
Start number of PLC register	0064	1000	0065	1100
Response waiting time of PLC	0074	200	0075	200
Start waiting time of PLC	0084	5	0085	5
Reservation (Not used)	0094	0	0095	0
Reservation (Not used)	00A4	0	00A5	0
Monitoring item 1 selection	00B4	31	00B5	31
Monitoring item 2 selection	00C4	0	00C5	0
Monitoring item 3 selection	00D4	0	00D5	0
Reservation (Not used)	00E4	0	00E5	0
Reservation (Not used)	00F4	0	00F5	0
Setting item 1 selection	0104	57827	0105	57827
Setting item 2 selection	0114	2721	0115	2721
Setting item 3 selection	0124	0	0125	0
Setting item 4 selection	0134	0	0135	0
Setting item 5 selection	0144	0	0145	0
Setting item 6 selection	0154	0	0155	0
Setting item 7 selection	0164	0	0165	0

PLC data register layout

	Module 1 QTC1-40 (Slave)	Module 2 QTC1-40 (Slave)
Information between QMC1 and PLC (System data)	D1000 to D1009	D1100 to D1109
Monitor item	D1010 to D1029	D1110 to D1129
Setting item	D1030 to D1085	D1130 to D1185

Details of information between QMC1 and PLC (System data)

Module 1 QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	D1000	RO	0: QMC1 is collecting data from QTC1-40. 1: QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	D1001	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	D1002	RO	B0: PLC register R/W error 0: Normal 1: Error B1: Between QMC1 and PLC communication error 0: Normal 1: Error B2: Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006) 0: Normal 1: Error
Setting request monitor	D1003	RO	B0: At setting (Reflect and set to B0 of 1006.) B1: At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	D1004	RO	
Setting request item number	D1005	R/W	0: All items selected in the setting item 1 to 7 selection 1 to 112: Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	D1006	R/W	B0: Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1: Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	D1007	R/W	
Reservation	D1008	R/W	
Reservation	D1009	R/W	

(*): When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 2　QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	D1100	RO	0: QMC1 is collecting data from QTC1-40. 1: QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	D1101	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	D1102	RO	B0: PLC register R/W error 0: Normal 1: Error B1: Between QMC1 and PLC communication error 0: Normal 1: Error B2: Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006) 0: Normal 1: Error
Setting request monitor	D1103	RO	B0: At setting (Reflect and set to B0 of 1006.) B1: At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	D1104	RO	
Setting request item number	D1105	R/W	0: All items selected in the setting item 1 to 7 selection 1 to 112: Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	D1106	R/W	B0: Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1: Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	D1107	R/W	
Reservation	D1108	R/W	
Reservation	D1109	R/W	

(*): When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 1, Module 2　Details of monitoring item and setting item between QMC1 and PLC

Module 1　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	D1010 D1011 D1012 D1013	RO	Value of control range (*) Corresponding to Input calculation function (Difference input, Addition input) and Input difference detection
MV reading	CH1 CH2 CH3 CH4	D1014 D1015 D1016 D1017	RO	Output low limit to Output high limit
SV reading	CH1 CH2 CH3 CH4	D1018 D1019 D1020 D1021	RO	Scaling low limit to Scaling high limit

(*): Control range

Control range for thermocouple input (no decimal point)

Input range low limit 50 °C (90 °F) to Input range high limit + 50 °C (90 °F)

Control range for thermocouple input (with decimal point) and RTD input

Input range low limit (Input span × 1 %) °C (°F) to Input range high limit + 50.0 °C (90 °F)

Control range for DC current input and DC voltage input

Scaling low limit Scaling width × 1 % to Scaling high limit + Scaling width × 10 %

Data item	Channel	PLC Data register	Attribute	Data
Status flag 1	CH1 CH2 CH3 CH4	D1022 D1023 D1024 D1025	RO	B0: Control Enable/Diseble 0: Diseble 1: Enable B1: AT Perform/Cancel 0: Cancel 1: Perform B2: Auto/Manual control 0: Automatic 1: Manual B3: Control output 0: OFF 1: ON B4: Input error (Overscale) 0: Normal 1: Error B5: Input Error (Underscale) 0: Normal 1: Error B6: Alarm 1 output 0: OFF 1: ON B7: Alarm 2 output 0: OFF 1: ON B8: Alarm 3 output 0: OFF 1: ON B9: Alarm 4 output 0: OFF 1: ON B10: Loop break alarm output 0: OFF 1: ON B11: Heater burnout alarm output 0: OFF 1: ON B12: Input difference 0: Within range 1: Without range B13: Not used B14: Power supply identification 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error

Data item	Channel	PLC Data register	Attribute	Data
Status flag 2	CH1 CH2 CH3 CH4	D1026 D1027 D1028 D1029	RO	B0: Auto balance control 0: None 1: During auto balance control B1: Not used B2: Not used B3: Not used B4: Cold junction error 0: Normal 1: Error B5: Sensor error 0: Normal 1: Error B6: ADC error 0: Normal 1: Error B7: Host setting value change flag 0: Without flag 1: With flag B8: USB setting value change flag 0: Without flag 1: With flag B9: Not used B10: Not used B11: Not used B12 to B15: **System bit for internal processing. Do not use.**
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	D1030 D1031 D1032 D1033	R/W	0: Control prohibited 1: Control allowed
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	D1034 D1035 D1036 D1037	R/W	0: AT cancel 1: AT perform
Setting value (SV)	CH1 CH2 CH3 CH4	D1038 D1039 D1040 D1041	R/W	Scaling lower limit to Scaling high limit
Proportional band setting	CH1 CH2 CH3 CH4	D1042 D1043 D1044 D1045	R/W	1 to input span °C (°F) or 0.1 to input span °C (°F) when DC current and DC voltage input 0.10 to 100.00 %
Integral time setting	CH1 CH2 CH3 CH4	D1046 D1047 D1048 D1049	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds When select “2: Slow PID control” of control action selection 1 to 3600 seconds or 0.1 to 2000.0 seconds
Derivative time setting	CH1 CH2 CH3 CH4	D1050 D1051 D1052 D1053	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1 CH2 CH3 CH4	D1054 D1055 D1056 D1057	R/W	0: No event 1: High limit alarm 2: Low limit alarm 3: High/Low limits alarm 4: High/Low limits range alarm 5: Process high alarm 6: Process low alarm 7: High limit with standby 8: Low limit with standby 9: High/Low limits alarm with standby 10: High/Low limits alarm individually 11: High/Low limits range alarm individually 12: High/Low limits alarm with standby individually
Alarm 2 action selection	CH1 CH2 CH3 CH4	D1058 D1059 D1060 D1061	R/W	
Alarm 3 action selection	CH1 CH2 CH3 CH4	D1062 D1063 D1064 D1065	R/W	
Alarm 4 action selection	CH1 CH2 CH3 CH4	D1066 D1067 D1068 D1069	R/W	
Alarm 1 value setting	CH1 CH2 CH3 CH4	D1070 D1071 D1072 D1073	R/W	Refer to “Alarm 1 to 4 value setting range table”.
Alarm 2 value setting	CH1 CH2 CH3 CH4	D1074 D1075 D1076 D1077	R/W	
Alarm 3 value setting	CH1 CH2 CH3 CH4	D1078 D1079 D1080 D1081	R/W	
Alarm 4 value setting	CH1 CH2 CH3 CH4	D1082 D1083 D1084 D1085	R/W	

Alarm 1 to 4 value setting range table

Alarm action	Setting range
No event	
High limit alarm	-(Input span) to Input span (*1)
Low limit alarm	-(Input span) to Input span (*1)
High/Low limits alarm	0 to Input span (*1)
High/Low limits range alarm	0 to Input span (*1)
Process high alarm	Input range low limit to Input range high limit (*2)
Process low alarm	Input range low limit to Input range high limit (*2)
High limit with standby	-(Input span) to Input span (*1)
Low limit with standby	-(Input span) to Input span (*1)
High/Low limits alarm with standby	0 to Input span (*1)
High/Low limits alarm individually	0 to Input span (*1)
High/Low limits range alarm individually	0 to Input span (*1)
High/Low limits alarm with standby individually	0 to Input span (*1)

(*1): For DC voltage, current input, the input span is the same as the scaling span.

(*2) For DC voltage, current input, input range low (or high) limit value is the same as scaling low (or high) limit value.

Module 2　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	D1110 D1111 D1112 D1113	RO	QTC1-40 (Slave) Same as module address 1
MV reading	CH1 CH2 CH3 CH4	D1114 D1115 D1116 D1117	RO	QTC1-40 (Slave) Same as module address 1
SV reading	CH1 CH2 CH3 CH4	D1118 D1119 D1120 D1121	RO	QTC1-40 (Slave) Same as module address 1
Status flag 1	CH1 CH2 CH3 CH4	D1122 D1123 D1124 D1125	RO	QTC1-40 (Slave) Same as module address 1
Status flag 2	CH1 CH2 CH3 CH4	D1126 D1127 D1128 D1129	RO	QTC1-40 (Slave) Same as module address 1
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	D1130 D1131 D1132 D1133	R/W	QTC1-40 (Slave) Same as module address 1
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	D1134 D1135 D1136 D1137	R/W	QTC1-40 (Slave) Same as module address 1
Setting value (SV)	CH1 CH2 CH3 CH4	D1138 D1139 D1140 D1141	R/W	QTC1-40 (Slave) Same as module address 1
Proportional band setting	CH1 CH2 CH3 CH4	D1142 D1143 D1144 D1145	R/W	QTC1-40 (Slave) Same as module address 1
Integral time setting	CH1 CH2 CH3 CH4	D1146 D1147 D1148 D1149	R/W	QTC1-40 (Slave) Same as module address 1
Derivative time setting	CH1 CH2 CH3 CH4	D1150 D1151 D1152 D1153	R/W	QTC1-40 (Slave) Same as module address 1

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1	D1154	R/W	QTC1-40 (Slave) Same as module address 1
	CH2	D1155		
	CH3	D1156		
	CH4	D1157		
Alarm 2 action selection	CH1	D1158	R/W	
	CH2	D1159		
	CH3	D1160		
	CH4	D1161		
Alarm 3 action selection	CH1	D1162	R/W	
	CH2	D1163		
	CH3	D1164		
	CH4	D1165		
Alarm 4 action selection	CH1	D1166	R/W	
	CH2	D1167		
	CH3	D1168		
	CH4	D1169		
Alarm 1 value setting	CH1	D1170	R/W	QTC1-40 (Slave) Same as module address 1
	CH2	D1171		
	CH3	D1172		
	CH4	D1173		
Alarm 2 value setting	CH1	D1174	R/W	
	CH2	D1175		
	CH3	D1176		
	CH4	D1177		
Alarm 3 value setting	CH1	D1178	R/W	
	CH2	D1179		
	CH3	D1180		
	CH4	D1181		
Alarm 4 value setting	CH1	D1182	R/W	
	CH2	D1183		
	CH3	D1184		
	CH4	D1185		

14.7.6 Exchange of data between QMC1 and PLC

Data is exchanged between QMC1 and PLC by the setting request item number and setting request command.

(1) Setting request item number

Set whether to transfer the data of all items selected by setting items 1 to 7 or only the data (1 data) of the selected item.

0: The data of all items selected by setting items 1 to 7 is transferred.
1 to 112: Transfers only the data (1 data) of the item selected by setting items 1 to 7.

(2) Setting request command

The setting request command is a setting request and a monitoring request.

B0: Setting request (PLC → QMC1)
This command requests QMC1 to read out the data of the setting item of PLC register.
B1: Monitoring request (QMC1 → PLC)
This command requests QMC1 to write the data of the setting item to the PLC register.

When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).
If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

14.7.7 Data Settings

⚠ Caution

When setting data, write all the data of the setting items to the PLC register first.
If you change the setting items of the QTC1-40 without writing all the data of the setting items, they may be rewritten to indefinite values and malfunction may occur.

Data setting procedure

Module 1 When selecting "control allowed" in the control allowed/prohibited selection of QTC1-40.

(1) Set 0 to the setting request item number
To write all the data of the setting items to the PLC register, set 0 to D1005 (setting request item number).

(2) Set B1 (monitoring request) of setting request command
Set 1 (decimal: 2) to B1 (monitoring request) of D1006 (setting request command).
QMC1 starts to write the data of the setting item to the PLC register.

(3) Check B1 (monitoring request) of setting request command
B1 (monitoring request) of D1006 (setting request command) is cleared when writing the data of the setting item to the PLC register is completed.

(4) Data setting
Set 1 (control allowed) to D1030 to D1033 (control allowed/prohibited selection) in the PLC register.

(5) Set 1 to the setting request item number
To read out the control allowed/prohibited selection data in the PLC register, set 1 to D1005 (setting request item number).

(6) Set B0 (setting request) of setting request command
Set 1 (decimal: 1) to B0 (setting request) of D1006 (setting request command).
QMC1 starts to read the data of the setting item of PLC register.

(7) Check B0 (setting request) of setting request command
B0 (setting request) of D1006 (setting request command) is cleared when reading the data of the setting item to the PLC register is completed.

14.8 Communication with PLC Manufactured by OMRON Corporation

This section describes communication with the PLC manufactured by OMRON Corporation.

14.8.1 Communication parameter setting

The communication parameter settings should be set as follows.

For details, refer to the instruction manual of the PLC to be used.

Setting item	Setting description
Serial communication mode	Host link
Unit No.	0
Data bits	7 bits
Parity bit	With parity/even
Stop bit	2 bits
Communication speed setting	Same setting as this instrument
Termination resistor ON/OFF	ON

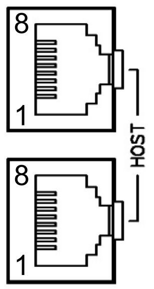
14.8.2 Connecting PLC and QMC1

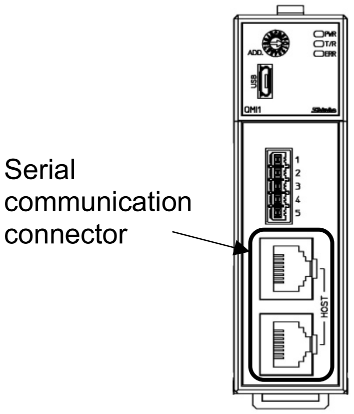
When connecting to an OMRON PLC with the SIF function, the RS-485 communication type cannot be used. Only RS-422A communication type can be connected.

Serial communication connector pin assignment

The pin assignment of the serial communication connector is as follows

The connector is common to the upper and lower sections.

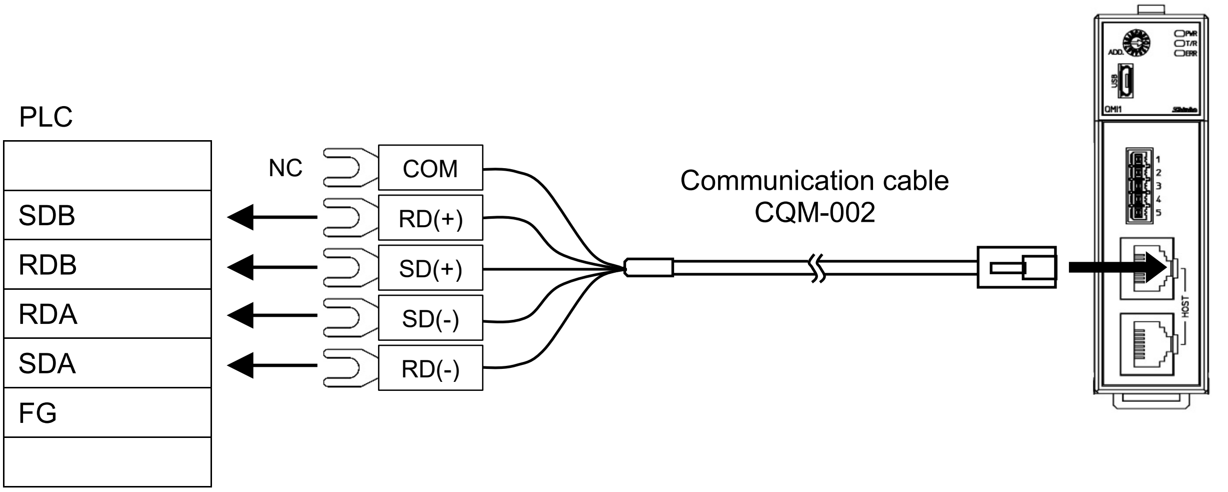
Model Pin No.		QMC1-C4□-□
	8	NC
	7	SG
	6	RD(+)
	5	SD(+)
	4	SD(-)
	3	RD(-)
	2	SG
	1	NC



(Fig. 14.8.2-1)

For RS-422A

Use the communication cable CQM-002 (sold separately) for connection.

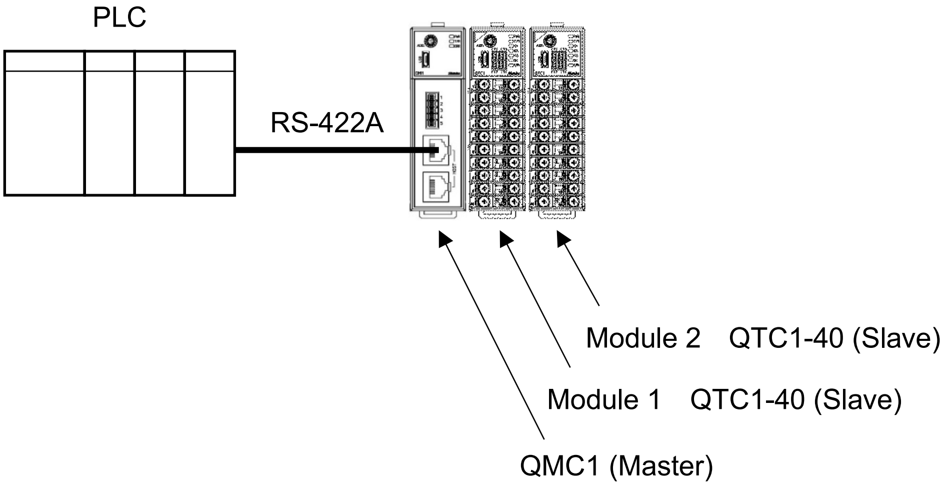

PLC
SDB
RDB
RDA
SDA
FG
NC
COM
RD(+)
SD(+)
SD(-)
RD(-)
Communication cable
CQM-002
HOST

For details of the PLC side terminals, refer to the instruction manual of the PLC to be used.

(Fig. 14.8.2-2)

14.8.3 Communication Procedure

This section describes the case where this instrument and two QTC1-40 modules are connected to PLC.

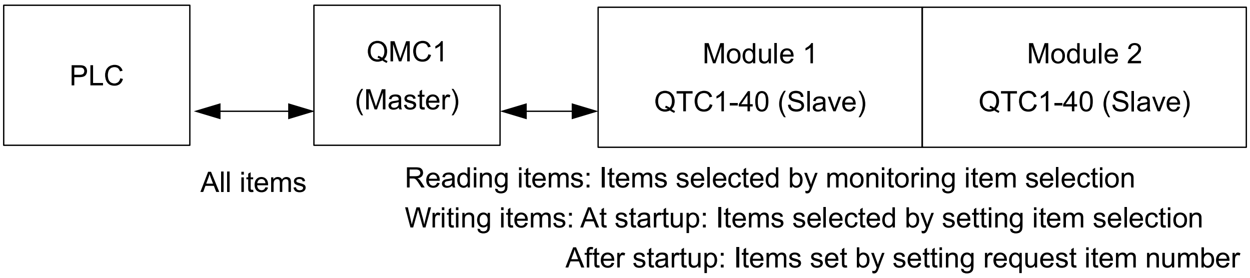

PLC
RS-422A
Module 2 QTC1-40 (Slave)
Module 1 QTC1-40 (Slave)
QMC1 (Master)

(Fig. 14.8.3-1)

(1) This instrument becomes the master and collects the valid monitor items and setting items of module 1 and module 2 [QTC1-40 (slave)].

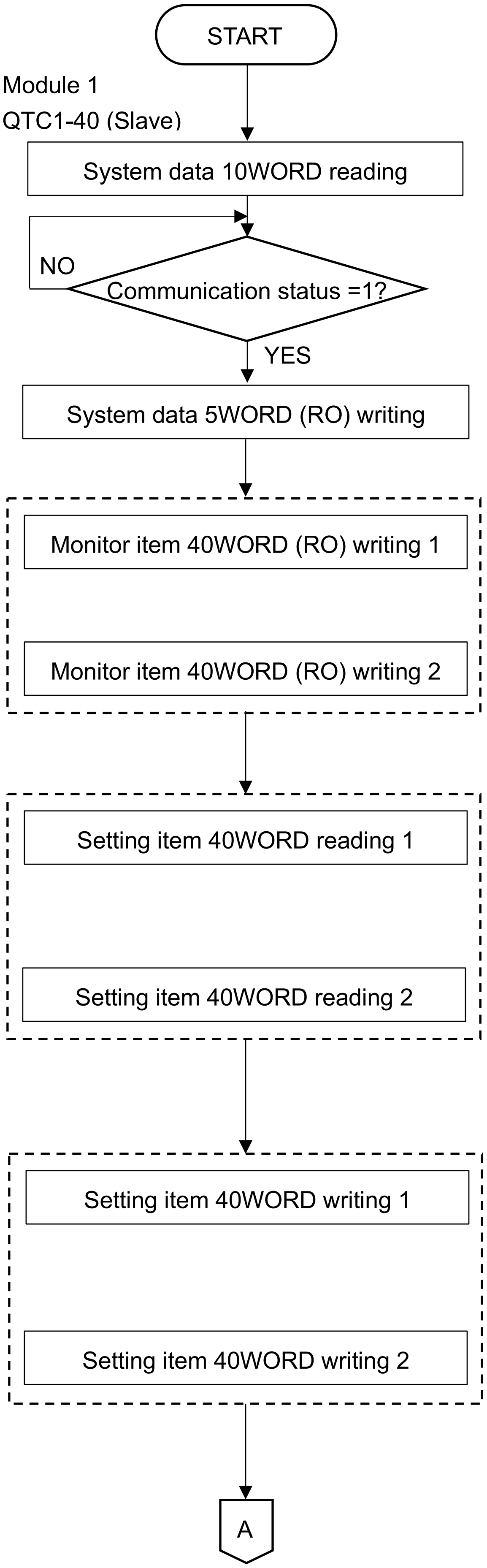
(2) After the PLC communication start waiting time elapses, this instrument periodically writes the item selected in the monitor item to the PLC register.

In addition, the item selected in the setting item is read from the PLC register by the setting request.


PLC
QMC1
(Master)
Module 1
QTC1-40 (Slave)
Module 2
QTC1-40 (Slave)
All items
Reading items: Items selected by monitoring item selection
Writing items: At startup: Items selected by setting item selection
After startup: Items set by setting request item number

(Fig. 14.8.3-2)

14.8.4 Handshake between QMC1 and PLC


START
Module 1
QTC1-40 (Slave)
System data 10WORD reading
NO
Communication status =1?
YES
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
A

After the PLC communication start waiting time elapses, QMC1 reads the system data in PLC registers 0 to 9.

When QMC1 completes data collection, the communication status becomes 1, and it is ready to communicate with the PLC.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

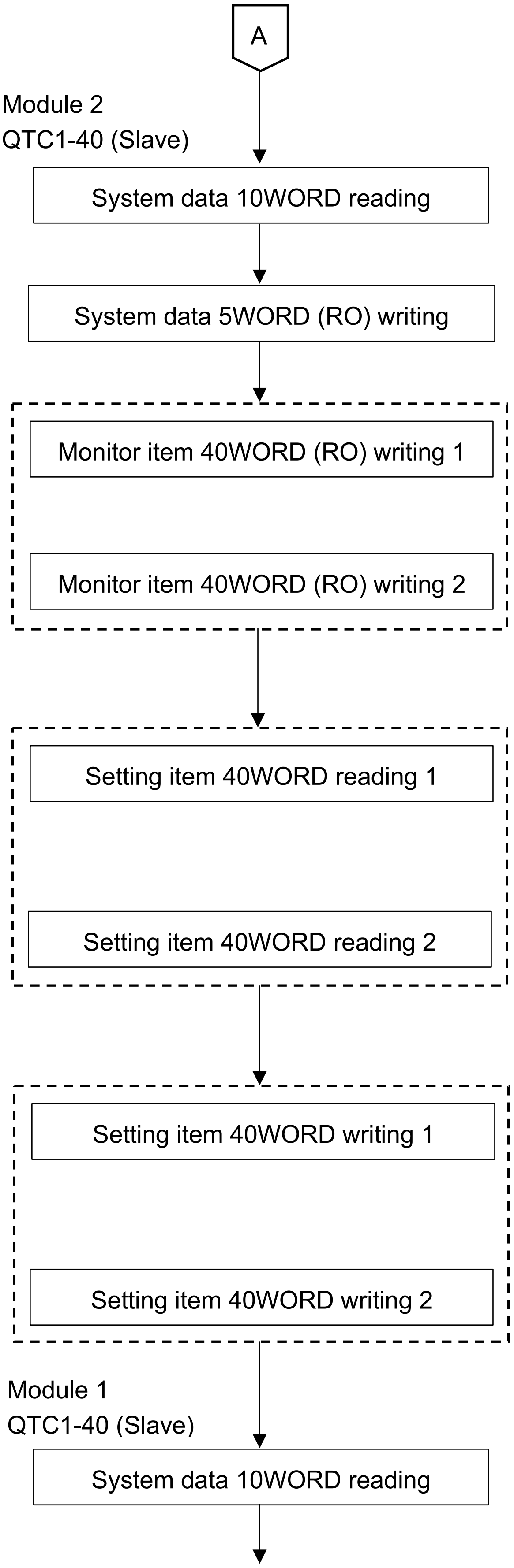
QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.


A
Module 2
QTC1-40 (Slave)
System data 10WORD reading
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
Module 1
QTC1-40 (Slave)
System data 10WORD reading

QMC1 reads the system data in PLC registers 0 to 9.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.

System data of QTC1-40 (slave)
Returns to the 10WORD reading process.
Thereafter, the process for each control module is repeated.

14.8.5 PLC communication data map

The following table shows the PLC communication data map when set with the SIF function initial setting example.

SIF function initial setting example

Name	Module 1 QTC1-40 (Slave)		Module 2 QTC1-40 (Slave)	
	MODBUS address	Setting value	MODBUS address	Setting value
Start number of PLC register	0064	1000	0065	1100
Response waiting time of PLC	0074	200	0075	200
Start waiting time of PLC	0084	5	0085	5
Reservation (Not used)	0094	0	0095	0
Reservation (Not used)	00A4	0	00A5	0
Monitoring item 1 selection	00B4	31	00B5	31
Monitoring item 2 selection	00C4	0	00C5	0
Monitoring item 3 selection	00D4	0	00D5	0
Reservation (Not used)	00E4	0	00E5	0
Reservation (Not used)	00F4	0	00F5	0
Setting item 1 selection	0104	57827	0105	57827
Setting item 2 selection	0114	2721	0115	2721
Setting item 3 selection	0124	0	0125	0
Setting item 4 selection	0134	0	0135	0
Setting item 5 selection	0144	0	0145	0
Setting item 6 selection	0154	0	0155	0
Setting item 7 selection	0164	0	0165	0

PLC data register layout

	Module 1 QTC1-40 (Slave)	Module 2 QTC1-40 (Slave)
Information between QMC1 and PLC (System data)	DM1000 to DM1009	DM1100 to DM1109
Monitor item	DM1010 to DM1029	DM1110 to DM1129
Setting item	DM1030 to DM1085	DM1130 to DM1185

Details of information between QMC1 and PLC (System data)

Module 1 QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	DM1000	RO	0: QMC1 is collecting data from QTC1-40. 1: QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	DM1001	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	DM1002	RO	B0: PLC register R/W error 0: Normal 1: Error B1: Between QMC1 and PLC communication error 0: Normal 1: Error B2: Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006) 0: Normal 1: Error
Setting request monitor	DM1003	RO	B0: At setting (Reflect and set to B0 of 1006.) B1: At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	DM1004	RO	
Setting request item number	DM1005	R/W	0: All items selected in the setting item 1 to 7 selection 1 to 112: Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	DM1006	R/W	B0: Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1: Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	DM1007	R/W	
Reservation	DM1008	R/W	
Reservation	DM1009	R/W	

(*): When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 2　QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	DM1100	RO	0: QMC1 is collecting data from QTC1-40. 1: QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	DM1101	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	DM1102	RO	B0: PLC register R/W error 0: Normal 1: Error B1: Between QMC1 and PLC communication error 0: Normal 1: Error B2: Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006) 0: Normal 1: Error
Setting request monitor	DM1103	RO	B0: At setting (Reflect and set to B0 of 1006.) B1: At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	DM1104	RO	
Setting request item number	DM1105	R/W	0: All items selected in the setting item 1 to 7 selection 1 to 112: Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	DM1106	R/W	B0: Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1: Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	DM1107	R/W	
Reservation	DM1108	R/W	
Reservation	DM1109	R/W	

(*): When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 1, Module 2　Details of monitoring item and setting item between QMC1 and PLC

Module 1　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	DM1010 DM1011 DM1012 DM1013	RO	Value of control range (*) Corresponding to Input calculation function (Difference input, Addition input) and Input difference detection
MV reading	CH1 CH2 CH3 CH4	DM1014 DM1015 DM1016 DM1017	RO	Output low limit to Output high limit
SV reading	CH1 CH2 CH3 CH4	DM1018 DM1019 DM1020 DM1021	RO	Scaling low limit to Scaling high limit

(*): Control range

Control range for thermocouple input (no decimal point)

Input range low limit 50 °C (90 °F) to Input range high limit + 50 °C (90 °F)

Control range for thermocouple input (with decimal point) and RTD input

Input range low limit (Input span × 1 %) °C (°F) to Input range high limit + 50.0 °C (90 °F)

Control range for DC current input and DC voltage input

Scaling low limit Scaling width × 1 % to Scaling high limit + Scaling width × 10 %

Data item	Channel	PLC Data register	Attribute	Data
Status flag 1	CH1 CH2 CH3 CH4	DM1022 DM1023 DM1024 DM1025	RO	B0: Control Enable/Diseble 0: Diseble 1: Enable B1: AT Perform/Cancel 0: Cancel 1: Perform B2: Auto/Manual control 0: Automatic 1: Manual B3: Control output 0: OFF 1: ON B4: Input error (Overscale) 0: Normal 1: Error B5: Input Error (Underscale) 0: Normal 1: Error B6: Alarm 1 output 0: OFF 1: ON B7: Alarm 2 output 0: OFF 1: ON B8: Alarm 3 output 0: OFF 1: ON B9: Alarm 4 output 0: OFF 1: ON B10: Loop break alarm output 0: OFF 1: ON B11: Heater burnout alarm output 0: OFF 1: ON B12: Input difference 0: Within range 1: Without range B13: Not used B14: Power supply identification 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error

Data item	Channel	PLC Data register	Attribute	Data
Status flag 2	CH1 CH2 CH3 CH4	DM1026 DM1027 DM1028 DM1029	RO	B0: Auto balance control 0: None 1: During auto balance control B1: Not used B2: Not used B3: Not used B4: Cold junction error 0: Normal 1: Error B5: Sensor error 0: Normal 1: Error B6: ADC error 0: Normal 1: Error B7: Host setting value change flag 0: Without flag 1: With flag B8: USB setting value change flag 0: Without flag 1: With flag B9: Not used B10: Not used B11: Not used B12 to B15: **System bit for internal processing. Do not use.**
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	DM1030 DM1031 DM1032 DM1033	R/W	0: Control prohibited 1: Control allowed
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	DM1034 DM1035 DM1036 DM1037	R/W	0: AT cancel 1: AT perform
Setting value (SV)	CH1 CH2 CH3 CH4	DM1038 DM1039 DM1040 DM1041	R/W	Scaling lower limit to Scaling high limit
Proportional band setting	CH1 CH2 CH3 CH4	DM1042 DM1043 DM1044 DM1045	R/W	1 to input span °C (°F) or 0.1 to input span °C (°F) when DC current and DC voltage input 0.10 to 100.00 %
Integral time setting	CH1 CH2 CH3 CH4	DM1046 DM1047 DM1048 DM1049	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds When select “2: Slow PID control” of control action selection 1 to 3600 seconds or 0.1 to 2000.0 seconds
Derivative time setting	CH1 CH2 CH3 CH4	DM1050 DM1051 DM1052 DM1053	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1 CH2 CH3 CH4	DM1054 DM1055 DM1056 DM1057	R/W	0: No event 1: High limit alarm 2: Low limit alarm 3: High/Low limits alarm 4: High/Low limits range alarm 5: Process high alarm 6: Process low alarm 7: High limit with standby 8: Low limit with standby 9: High/Low limits alarm with standby 10: High/Low limits alarm individually 11: High/Low limits range alarm individually 12: High/Low limits alarm with standby individually
Alarm 2 action selection	CH1 CH2 CH3 CH4	DM1058 DM1059 DM1060 DM1061	R/W	
Alarm 3 action selection	CH1 CH2 CH3 CH4	DM1062 DM1063 DM1064 DM1065	R/W	
Alarm 4 action selection	CH1 CH2 CH3 CH4	DM1066 DM1067 DM1068 DM1069	R/W	
Alarm 1 value setting	CH1 CH2 CH3 CH4	DM1070 DM1071 DM1072 DM1073	R/W	Refer to “Alarm 1 to 4 value setting range table”.
Alarm 2 value setting	CH1 CH2 CH3 CH4	DM1074 DM1075 DM1076 DM1077	R/W	
Alarm 3 value setting	CH1 CH2 CH3 CH4	DM1078 DM1079 DM1080 DM1081	R/W	
Alarm 4 value setting	CH1 CH2 CH3 CH4	DM1082 DM1083 DM1084 DM1085	R/W	

Alarm 1 to 4 value setting range table

Alarm action	Setting range
No event	
High limit alarm	-(Input span) to Input span (*1)
Low limit alarm	-(Input span) to Input span (*1)
High/Low limits alarm	0 to Input span (*1)
High/Low limits range alarm	0 to Input span (*1)
Process high alarm	Input range low limit to Input range high limit (*2)
Process low alarm	Input range low limit to Input range high limit (*2)
High limit with standby	-(Input span) to Input span (*1)
Low limit with standby	-(Input span) to Input span (*1)
High/Low limits alarm with standby	0 to Input span (*1)
High/Low limits alarm individually	0 to Input span (*1)
High/Low limits range alarm individually	0 to Input span (*1)
High/Low limits alarm with standby individually	0 to Input span (*1)

(*1): For DC voltage, current input, the input span is the same as the scaling span.

(*2) For DC voltage, current input, input range low (or high) limit value is the same as scaling low (or high) limit value.

Module 2　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	DM1110 DM1111 DM1112 DM1113	RO	QTC1-40 (Slave) Same as module address 1
MV reading	CH1 CH2 CH3 CH4	DM1114 DM1115 DM1116 DM1117	RO	QTC1-40 (Slave) Same as module address 1
SV reading	CH1 CH2 CH3 CH4	DM1118 DM1119 DM1120 DM1121	RO	QTC1-40 (Slave) Same as module address 1
Status flag 1	CH1 CH2 CH3 CH4	DM1122 DM1123 DM1124 DM1125	RO	QTC1-40 (Slave) Same as module address 1
Status flag 2	CH1 CH2 CH3 CH4	DM1126 DM1127 DM1128 DM1129	RO	QTC1-40 (Slave) Same as module address 1
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	DM1130 DM1131 DM1132 DM1133	R/W	QTC1-40 (Slave) Same as module address 1
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	DM1134 DM1135 DM1136 DM1137	R/W	QTC1-40 (Slave) Same as module address 1
Setting value (SV)	CH1 CH2 CH3 CH4	DM1138 DM1139 DM1140 DM1141	R/W	QTC1-40 (Slave) Same as module address 1
Proportional band setting	CH1 CH2 CH3 CH4	DM1142 DM1143 DM1144 DM1145	R/W	QTC1-40 (Slave) Same as module address 1
Integral time setting	CH1 CH2 CH3 CH4	DM1146 DM1147 DM1148 DM1149	R/W	QTC1-40 (Slave) Same as module address 1
Derivative time setting	CH1 CH2 CH3 CH4	DM1150 DM1151 DM1152 DM1153	R/W	QTC1-40 (Slave) Same as module address 1

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1	DM1154	R/W	QTC1-40 (Slave) Same as module address 1
	CH2	DM1155		
	CH3	DM1156		
	CH4	DM1157		
Alarm 2 action selection	CH1	DM1158	R/W	
	CH2	DM1159		
	CH3	DM1160		
	CH4	DM1161		
Alarm 3 action selection	CH1	DM1162	R/W	
	CH2	DM1163		
	CH3	DM1164		
	CH4	DM1165		
Alarm 4 action selection	CH1	DM1166	R/W	
	CH2	DM1167		
	CH3	DM1168		
	CH4	DM1169		
Alarm 1 value setting	CH1	DM1170	R/W	QTC1-40 (Slave) Same as module address 1
	CH2	DM1171		
	CH3	DM1172		
	CH4	DM1173		
Alarm 2 value setting	CH1	DM1174	R/W	
	CH2	DM1175		
	CH3	DM1176		
	CH4	DM1177		
Alarm 3 value setting	CH1	DM1178	R/W	
	CH2	DM1179		
	CH3	DM1180		
	CH4	DM1181		
Alarm 4 value setting	CH1	DM1182	R/W	
	CH2	DM1183		
	CH3	DM1184		
	CH4	DM1185		

14.8.6 Exchange of data between QMC1 and PLC

Data is exchanged between QMC1 and PLC by the setting request item number and setting request command.

(1) Setting request item number

Set whether to transfer the data of all items selected by setting items 1 to 7 or only the data (1 data) of the selected item.

0: The data of all items selected by setting items 1 to 7 is transferred.
1 to 112: Transfers only the data (1 data) of the item selected by setting items 1 to 7.

(2) Setting request command

The setting request command is a setting request and a monitoring request.

B0: Setting request (PLC → QMC1)
This command requests QMC1 to read out the data of the setting item of PLC register.
B1: Monitoring request (QMC1 → PLC)
This command requests QMC1 to write the data of the setting item to the PLC register.

When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).
If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

14.8.7 Data Settings

⚠ Caution

When setting data, write all the data of the setting items to the PLC register first.
If you change the setting items of the QTC1-40 without writing all the data of the setting items, they may be rewritten to indefinite values and malfunction may occur.

Data setting procedure

Module 1 When selecting "control allowed" in the control allowed/prohibited selection of QTC1-40.

(1) Set 0 to the setting request item number

To write all the data of the setting items to the PLC register, set 0 to DM1005 (setting request item number).

(2) Set B1 (monitoring request) of setting request command

Set 1 (decimal: 2) to B1 (monitoring request) of DM1006 (setting request command).
QMC1 starts to write the data of the setting item to the PLC register.

(3) Check B1 (monitoring request) of setting request command

B1 (monitoring request) of DM1006 (setting request command) is cleared when writing the data of the setting item to the PLC register is completed.

(4) Data setting

Set 1 (control allowed) to DM1030 to DM1033 (control allowed/prohibited selection) in the PLC register.

(5) Set 1 to the setting request item number

To read out the control allowed/prohibited selection data in the PLC register, set 1 to DM1005 (setting request item number).

(6) Set B0 (setting request) of setting request command

Set 1 (decimal: 1) to B0 (setting request) of DM1006 (setting request command).
QMC1 starts to read the data of the setting item of PLC register.

(7) Check B0 (setting request) of setting request command

B0 (setting request) of DM1006 (setting request command) is cleared when reading the data of the setting item to the PLC register is completed.

14.9 Communication with PLC Manufactured by KEYENCE CORPORATION

This section describes communication with the PLC manufactured by KEYENCE CORPORATION.

14.9.1 Communication parameter setting

The communication parameter settings should be set as follows.

For details, refer to the instruction manual of the PLC to be used.

Setting item	Setting description
Station No.	00
Operation mode	KV mode (host link)
Data bits	8 bits
Parity bit	With parity/even
Stop bit	1 bit
Checksum	None
Baud rate	Set the same communication speed as this instrument.

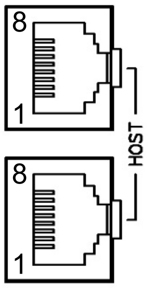
14.9.2 Connecting PLC and QMC1

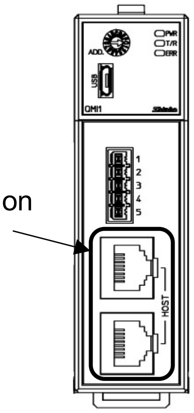
When connecting to an KEYENCE PLC with the SIF function, the RS-485 communication type cannot be used. Only RS-422A communication type can be connected.

Serial communication connector pin assignment

The pin assignment of the serial communication connector differs depending on the model name.

The connector is common to the upper and lower sections.

Model Pin No.		QMC1-C4□-□
	8	NC
	7	SG
	6	RD(+)
	5	SD(+)
	4	SD(-)
	3	RD(-)
	2	SG
	1	NC

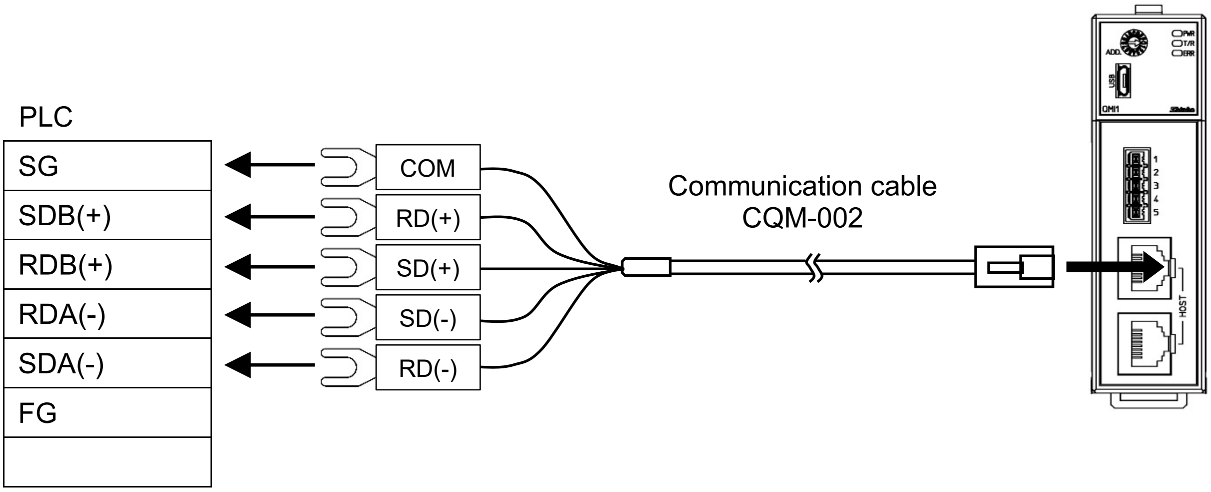


Serial communication connector

(Fig. 14.9.2-1)

For RS-422A

Use the communication cable CQM-002 (sold separately) for connection.

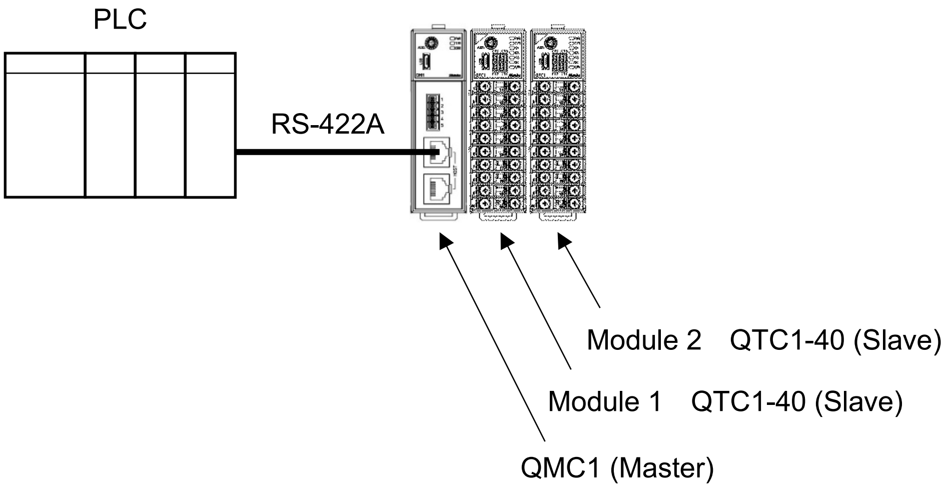

PLC
SG
SDB(+)
RDB(+)
RDA(-)
SDA(-)
FG
COM
RD(+)
SD(+)
SD(-)
RD(-)
Communication cable
CQM-002
ADD.
PWR
T/R
ERR
USB
QMI1
1
2
3
4
5
HOST

For details of the PLC side terminals, refer to the instruction manual of the PLC to be used.

(Fig. 14.9.2-2)

14.9.3 Communication Procedure

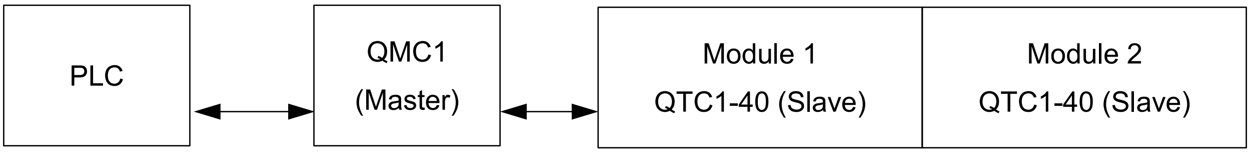
This section describes the case where this instrument and two QTC1-40 modules are connected to PLC.


PLC
RS-422A
Module 2 QTC1-40 (Slave)
Module 1 QTC1-40 (Slave)
QMC1 (Master)

(Fig. 14.9.3-1)

(1) This instrument becomes the master and collects the valid monitor items and setting items of module 1 and module 2 [QTC1-40 (slave)].

(2) After the PLC communication start waiting time elapses, this instrument periodically writes the item selected in the monitor item to the PLC register.
In addition, the item selected in the setting item is read from the PLC register by the setting request.

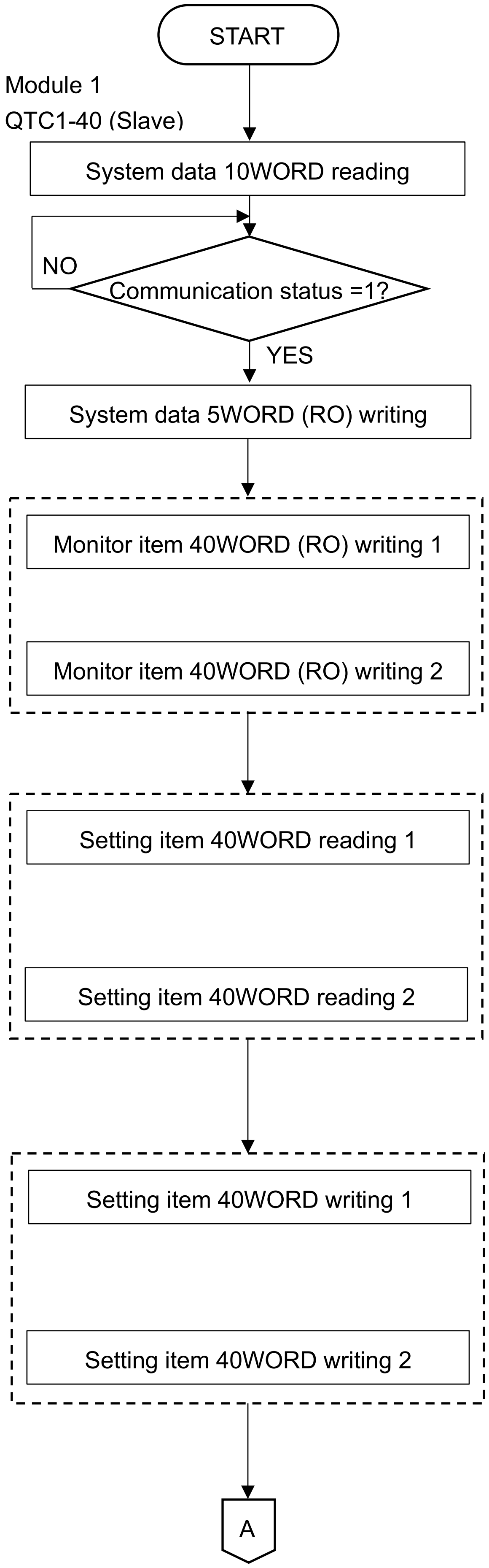

PLC
QMC1
(Master)
Module 1
QTC1-40 (Slave)
Module 2
QTC1-40 (Slave)

All items

Reading items: Items selected by monitoring item selection
Writing items: At startup: Items selected by setting item selection
After startup: Items set by setting request item number

(Fig. 14.9.3-2)

14.9.4 Handshake between QMC1 and PLC


START
Module 1
QTC1-40 (Slave)
System data 10WORD reading
NO
Communication status =1?
YES
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
A

After the PLC communication start waiting time elapses, QMC1 reads the system data in PLC registers 0 to 9.

When QMC1 completes data collection, the communication status becomes 1, and it is ready to communicate with the PLC.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

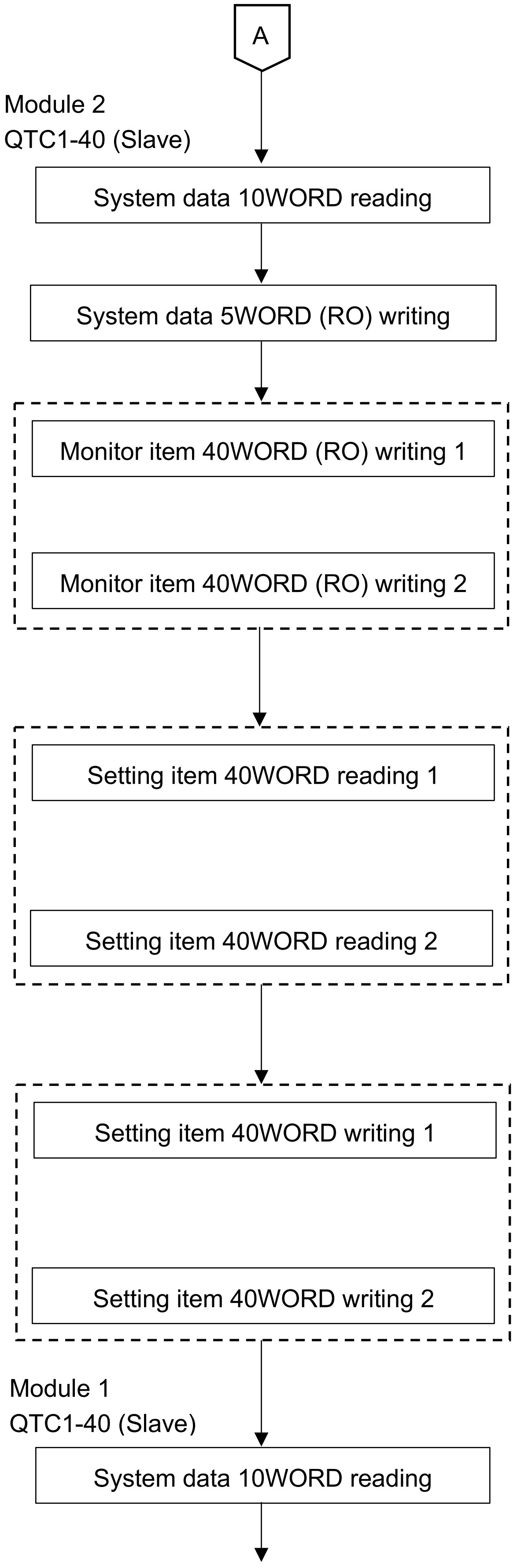
QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.


A
Module 2
QTC1-40 (Slave)
System data 10WORD reading
System data 5WORD (RO) writing
Monitor item 40WORD (RO) writing 1
Monitor item 40WORD (RO) writing 2
Setting item 40WORD reading 1
Setting item 40WORD reading 2
Setting item 40WORD writing 1
Setting item 40WORD writing 2
Module 1
QTC1-40 (Slave)
System data 10WORD reading

QMC1 reads the system data in PLC registers 0 to 9.

QMC1 writes system data to PLC registers 0 to 4.

QMC1 writes the monitoring item in PLC registers 10 to 49. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 writes the monitoring item in PLC registers 50 to 89. However, if it is not selected in the monitoring item selection, it is skipped.

QMC1 reads the data of the setting item of PLC register 90 to 129. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 reads the data of the setting item of PLC register 130 to 169. However, if the setting request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 90 to 129. However, if the monitor request of the setting request command is not set, it is skipped.

QMC1 writes the data of the setting item to PLC registers 130 to 169. However, if the monitor request of the setting request command is not set, it is skipped.

System data of QTC1-40 (slave)
Returns to the 10WORD reading process.
Thereafter, the process for each control module is repeated.

14.9.5 PLC communication data map

The following table shows the PLC communication data map when set with the SIF function initial setting example.

SIF function initial setting example

Name	Module 1 QTC1-40 (Slave)		Module 2 QTC1-40 (Slave)	
	MODBUS address	Setting value	MODBUS address	Setting value
Start number of PLC register	0064	1000	0065	1100
Response waiting time of PLC	0074	200	0075	200
Start waiting time of PLC	0084	5	0085	5
Reservation (Not used)	0094	0	0095	0
Reservation (Not used)	00A4	0	00A5	0
Monitoring item 1 selection	00B4	31	00B5	31
Monitoring item 2 selection	00C4	0	00C5	0
Monitoring item 3 selection	00D4	0	00D5	0
Reservation (Not used)	00E4	0	00E5	0
Reservation (Not used)	00F4	0	00F5	0
Setting item 1 selection	0104	57827	0105	57827
Setting item 2 selection	0114	2721	0115	2721
Setting item 3 selection	0124	0	0125	0
Setting item 4 selection	0134	0	0135	0
Setting item 5 selection	0144	0	0145	0
Setting item 6 selection	0154	0	0155	0
Setting item 7 selection	0164	0	0165	0

PLC data register layout

	Module 1 QTC1-40 (Slave)	Module 2 QTC1-40 (Slave)
Information between QMC1 and PLC (System data)	DM1000 to DM1009	DM1100 to DM1109
Monitor item	DM1010 to DM1029	DM1110 to DM1129
Setting item	DM1030 to DM1085	DM1130 to DM1185

Details of information between QMC1 and PLC (System data)

Module 1　QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	DM1000	RO	0:　QMC1 is collecting data from QTC1-40. 1:　QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	DM1001	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	DM1002	RO	B0:　PLC register R/W error　0: Normal　1: Error B1:　Between QMC1 and PLC communication error　0: Normal　1: Error B2:　Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006)　0: Normal　1: Error
Setting request monitor	DM1003	RO	B0:　At setting (Reflect and set to B0 of 1006.) B1:　At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	DM1004	RO	
Setting request item number	DM1005	R/W	0:　All items selected in the setting item 1 to 7 selection 1 to 112:　Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	DM1006	R/W	B0:　Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1:　Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	DM1007	R/W	
Reservation	DM1008	R/W	
Reservation	DM1009	R/W	

(*):　When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 2　QTC1-40 (Slave)

Data	PLC Data register	Attribute	Description
Communication status	DM1100	RO	0: QMC1 is collecting data from QTC1-40. 1: QMC1 completed data collection for QTC1-40 (At startup: Initial setting values for each slave)
QMC1 - PLC Normal communication monitor	DM1101	RO	Increment counter Repeat 0 to 65535 → 0 to 65535
QMC1 Error code	DM1102	RO	B0: PLC register R/W error 0: Normal 1: Error B1: Between QMC1 and PLC communication error 0: Normal 1: Error B2: Negative acknowledgement when setting from QMC1 to QTC1-40 (Cleared at B0 clear of 1006) 0: Normal 1: Error
Setting request monitor	DM1103	RO	B0: At setting (Reflect and set to B0 of 1006.) B1: At monitoring (Reflect and set until B1 of 1006 is cleared.)
Reservation	DM1104	RO	
Setting request item number	DM1105	R/W	0: All items selected in the setting item 1 to 7 selection 1 to 112: Item (1 data) selected in the setting item 1 to 7 selection Only the data (one data) of the selected item is read or written. However, since communication with the PLC is a batch process, all the selected items are read or written.
Setting request command (*)	DM1106	R/W	B0: Setting request (PLC → QMC1) QMC1 requests to read the data of the setting item of PLC register. B1: Monitoring request (QMC1 → PLC) QMC1 requests to write the data of the setting item to the PLC register. After the setting request or monitoring request is completed, QMC1 clears each bit.
Reservation	DM1107	R/W	
Reservation	DM1108	R/W	
Reservation	DM1109	R/W	

(*): When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).

If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

Module 1, Module 2　Details of monitoring item and setting item between QMC1 and PLC

Module 1　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	DM1010 DM1011 DM1012 DM1013	RO	Value of control range (*) Corresponding to Input calculation function (Difference input, Addition input) and Input difference detection
MV reading	CH1 CH2 CH3 CH4	DM1014 DM1015 DM1016 DM1017	RO	Output low limit to Output high limit
SV reading	CH1 CH2 CH3 CH4	DM1018 DM1019 DM1020 DM1021	RO	Scaling low limit to Scaling high limit

(*):　Control range

Control range for thermocouple input (no decimal point)

Input range low limit 50 °C (90 °F) to Input range high limit + 50 °C (90 °F)

Control range for thermocouple input (with decimal point) and RTD input

Input range low limit (Input span × 1 %) °C (°F) to Input range high limit + 50.0 °C (90 °F)

Control range for DC current input and DC voltage input

Scaling low limit Scaling width × 1 % to Scaling high limit + Scaling width × 10 %

Data item	Channel	PLC Data register	Attribute	Data
Status flag 1	CH1 CH2 CH3 CH4	DM1022 DM1023 DM1024 DM1025	RO	B0: Control Enable/Diseble 0: Diseble 1: Enable B1: AT Perform/Cancel 0: Cancel 1: Perform B2: Auto/Manual control 0: Automatic 1: Manual B3: Control output 0: OFF 1: ON B4: Input error (Overscale) 0: Normal 1: Error B5: Input Error (Underscale) 0: Normal 1: Error B6: Alarm 1 output 0: OFF 1: ON B7: Alarm 2 output 0: OFF 1: ON B8: Alarm 3 output 0: OFF 1: ON B9: Alarm 4 output 0: OFF 1: ON B10: Loop break alarm output 0: OFF 1: ON B11: Heater burnout alarm output 0: OFF 1: ON B12: Input difference 0: Within range 1: Without range B13: Not used B14: Power supply identification 0: 24 V DC 1: USB bus power B15: Non-volatile IC memory error 0: Normal 1: Error

Data item	Channel	PLC Data register	Attribute	Data
Status flag 2	CH1 CH2 CH3 CH4	DM1026 DM1027 DM1028 DM1029	RO	B0: Auto balance control 0: None 1: During auto balance control B1: Not used B2: Not used B3: Not used B4: Cold junction error 0: Normal 1: Error B5: Sensor error 0: Normal 1: Error B6: ADC error 0: Normal 1: Error B7: Host setting value change flag 0: Without flag 1: With flag B8: USB setting value change flag 0: Without flag 1: With flag B9: Not used B10: Not used B11: Not used B12 to B15: **System bit for internal processing. Do not use.**
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	DM1030 DM1031 DM1032 DM1033	R/W	0: Control prohibited 1: Control allowed
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	DM1034 DM1035 DM1036 DM1037	R/W	0: AT cancel 1: AT perform
Setting value (SV)	CH1 CH2 CH3 CH4	DM1038 DM1039 DM1040 DM1041	R/W	Scaling lower limit to Scaling high limit
Proportional band setting	CH1 CH2 CH3 CH4	DM1042 DM1043 DM1044 DM1045	R/W	1 to input span °C (°F) or 0.1 to input span °C (°F) when DC current and DC voltage input 0.10 to 100.00 %
Integral time setting	CH1 CH2 CH3 CH4	DM1046 DM1047 DM1048 DM1049	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds When select “2: Slow PID control” of control action selection 1 to 3600 seconds or 0.1 to 2000.0 seconds
Derivative time setting	CH1 CH2 CH3 CH4	DM1050 DM1051 DM1052 DM1053	R/W	0 to 3600 seconds or 0.0 to 2000.0 seconds

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1 CH2 CH3 CH4	DM1054 DM1055 DM1056 DM1057	R/W	0: No event 1: High limit alarm 2: Low limit alarm 3: High/Low limits alarm 4: High/Low limits range alarm 5: Process high alarm 6: Process low alarm 7: High limit with standby 8: Low limit with standby 9: High/Low limits alarm with standby 10: High/Low limits alarm individually 11: High/Low limits range alarm individually 12: High/Low limits alarm with standby individually
Alarm 2 action selection	CH1 CH2 CH3 CH4	DM1058 DM1059 DM1060 DM1061	R/W	
Alarm 3 action selection	CH1 CH2 CH3 CH4	DM1062 DM1063 DM1064 DM1065	R/W	
Alarm 4 action selection	CH1 CH2 CH3 CH4	DM1066 DM1067 DM1068 DM1069	R/W	
Alarm 1 value setting	CH1 CH2 CH3 CH4	DM1070 DM1071 DM1072 DM1073	R/W	Refer to “Alarm 1 to 4 value setting range table”.
Alarm 2 value setting	CH1 CH2 CH3 CH4	DM1074 DM1075 DM1076 DM1077	R/W	
Alarm 3 value setting	CH1 CH2 CH3 CH4	DM1078 DM1079 DM1080 DM1081	R/W	
Alarm 4 value setting	CH1 CH2 CH3 CH4	DM1082 DM1083 DM1084 DM1085	R/W	

Alarm 1 to 4 value setting range table

Alarm action	Setting range
No event	
High limit alarm	-(Input span) to Input span (*1)
Low limit alarm	-(Input span) to Input span (*1)
High/Low limits alarm	0 to Input span (*1)
High/Low limits range alarm	0 to Input span (*1)
Process high alarm	Input range low limit to Input range high limit (*2)
Process low alarm	Input range low limit to Input range high limit (*2)
High limit with standby	-(Input span) to Input span (*1)
Low limit with standby	-(Input span) to Input span (*1)
High/Low limits alarm with standby	0 to Input span (*1)
High/Low limits alarm individually	0 to Input span (*1)
High/Low limits range alarm individually	0 to Input span (*1)
High/Low limits alarm with standby individually	0 to Input span (*1)

(*1): For DC voltage, current input, the input span is the same as the scaling span.

(*2) For DC voltage, current input, input range low (or high) limit value is the same as scaling low (or high) limit value.

Module 2　QTC1-40 (Slave)

Data item	Channel	PLC Data register	Attribute	Data
PV reading (including difference)	CH1 CH2 CH3 CH4	DM1110 DM1111 DM1112 DM1113	RO	QTC1-40 (Slave) Same as module address 1
MV reading	CH1 CH2 CH3 CH4	DM1114 DM1115 DM1116 DM1117	RO	QTC1-40 (Slave) Same as module address 1
SV reading	CH1 CH2 CH3 CH4	DM1118 DM1119 DM1120 DM1121	RO	QTC1-40 (Slave) Same as module address 1
Status flag 1	CH1 CH2 CH3 CH4	DM1122 DM1123 DM1124 DM1125	RO	QTC1-40 (Slave) Same as module address 1
Status flag 2	CH1 CH2 CH3 CH4	DM1126 DM1127 DM1128 DM1129	RO	QTC1-40 (Slave) Same as module address 1
Control Allowed/Prohibited selection	CH1 CH2 CH3 CH4	DM1130 DM1131 DM1132 DM1133	R/W	QTC1-40 (Slave) Same as module address 1
AT Perform/Cancel selection	CH1 CH2 CH3 CH4	DM1134 DM1135 DM1136 DM1137	R/W	QTC1-40 (Slave) Same as module address 1
Setting value (SV)	CH1 CH2 CH3 CH4	DM1138 DM1139 DM1140 DM1141	R/W	QTC1-40 (Slave) Same as module address 1
Proportional band setting	CH1 CH2 CH3 CH4	DM1142 DM1143 DM1144 DM1145	R/W	QTC1-40 (Slave) Same as module address 1
Integral time setting	CH1 CH2 CH3 CH4	DM1146 DM1147 DM1148 DM1149	R/W	QTC1-40 (Slave) Same as module address 1
Derivative time setting	CH1 CH2 CH3 CH4	DM1150 DM1151 DM1152 DM1153	R/W	QTC1-40 (Slave) Same as module address 1

Data item	Channel	PLC Data register	Attribute	Data
Alarm 1 action selection	CH1 CH2 CH3 CH4	DM1154 DM1155 DM1156 DM1157	R/W	QTC1-40 (Slave) Same as module address 1
Alarm 2 action selection	CH1 CH2 CH3 CH4	DM1158 DM1159 DM1160 DM1161	R/W	
Alarm 3 action selection	CH1 CH2 CH3 CH4	DM1162 DM1163 DM1164 DM1165	R/W	
Alarm 4 action selection	CH1 CH2 CH3 CH4	DM1166 DM1167 DM1168 DM1169	R/W	
Alarm 1 value setting	CH1 CH2 CH3 CH4	DM1170 DM1171 DM1172 DM1173	R/W	QTC1-40 (Slave) Same as module address 1
Alarm 2 value setting	CH1 CH2 CH3 CH4	DM1174 DM1175 DM1176 DM1177	R/W	
Alarm 3 value setting	CH1 CH2 CH3 CH4	DM1178 DM1179 DM1180 DM1181	R/W	
Alarm 4 value setting	CH1 CH2 CH3 CH4	DM1182 DM1183 DM1184 DM1185	R/W	

14.9.6 Exchange of data between QMC1 and PLC

Data is exchanged between QMC1 and PLC by the setting request item number and setting request command.

(1) Setting request item number

Set whether to transfer the data of all items selected by setting items 1 to 7 or only the data (1 data) of the selected item.

0: The data of all items selected by setting items 1 to 7 is transferred.
1 to 112: Transfers only the data (1 data) of the item selected by setting items 1 to 7.

(2) Setting request command

The setting request command is a setting request and a monitoring request.

B0: Setting request (PLC → QMC1)

This command requests QMC1 to read out the data of the setting item of PLC register.

B1: Monitoring request (QMC1 → PLC)

This command requests QMC1 to write the data of the setting item to the PLC register.

When setting request and monitoring request are set at the same time, processing is done in the order of setting request (reading PLC register data for QMC1) and monitoring request (writing data to PLC register).
If the setting request is set during the monitoring request, the monitor request is discarded and the monitoring request is made again after the setting request.

14.9.7 Data Settings

⚠ Caution

When setting data, write all the data of the setting items to the PLC register first.
If you change the setting items of the QTC1-40 without writing all the data of the setting items, they may be rewritten to indefinite values and malfunction may occur.

Data setting procedure

Module 1 When selecting "control allowed" in the control allowed/prohibited selection of QTC1-40.

(1) Set 0 to the setting request item number

To write all the data of the setting items to the PLC register, set 0 to DM1005 (setting request item number).

(2) Set B1 (monitoring request) of setting request command

Set 1 (decimal: 2) to B1 (monitoring request) of DM1006 (setting request command).
QMC1 starts to write the data of the setting item to the PLC register.

(3) Check B1 (monitoring request) of setting request command

B1 (monitoring request) of DM1006 (setting request command) is cleared when writing the data of the setting item to the PLC register is completed.

(4) Data setting

Set 1 (control allowed) to DM1030 to DM1033 (control allowed/prohibited selection) in the PLC register.

(5) Set 1 to the setting request item number

To read out the control allowed/prohibited selection data in the PLC register, set 1 to DM1005 (setting request item number).

(6) Set B0 (setting request) of setting request command

Set 1 (decimal: 1) to B0 (setting request) of DM1006 (setting request command).
QMC1 starts to read the data of the setting item of PLC register.

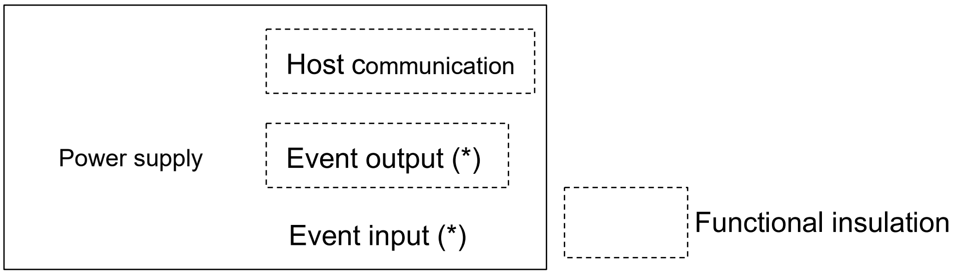
(7) Check B0 (setting request) of setting request command

B0 (setting request) of DM1006 (setting request command) is cleared when reading the data of the setting item to the PLC register is completed.

15 Specifications

15.1 Standard Specifications

Power supply

Power supply voltage	24 V DC Allowable voltage fluctuation: 20 to 28 V DC
Power consumption	3 W or less
Circuit insulation configuration	 Host communication Power supply Event output (*) Event input (*) Functional insulation (*): When option is added When event input / output is added at the same time, between event output - power supply is not insulated.
Insulation resistance	500 V DC 10 MΩ or more
Dielectric strength	Between Power terminal – Ground (GND): 1.5 kV AC for 1 minute Between Power terminal – Communication: 1.5 kV AC for 1 minute

Communication interface

Between hosts	QMC1-C4: EIA RS-422A QMC1-C5: EIA-485
Between modules	Internal bus

Event input / output

<table>
<tr><td>Event input</td><td><table>
<tr><td>Input points</td><td>4 points or 2 points</td></tr>
<tr><td>Input type</td><td>Voltage contact input sink type</td></tr>
<tr><td>Circuit current when closed</td><td>Approx. 6 mA</td></tr>
<tr><td>Import judgment time</td><td>Approx. 100 ms</td></tr>
</table></td></tr>
<tr><td>Event output</td><td><table>
<tr><td>Output points</td><td>4 points or 2 points</td></tr>
<tr><td>Circuit</td><td>NPN open collector</td></tr>
<tr><td>Max. load voltage</td><td>30 V DC</td></tr>
<tr><td>Max. load capacity</td><td>50 mA</td></tr>
</table></td></tr>
</table>

Recommended Environment

Ambient temperature	-10 to 55 °C (no condensation or freezing)
Ambient humidity	35 to 85 %RH (no condensation)
Environmental specification	RoHS directive compliant (RoHS2)

General Structure

<table>
<tr><td>Weight</td><td>Approx. 130 g</td></tr>
<tr><td>External dimensions</td><td>30 × 100 × 85 mm (W × H × D)</td></tr>
<tr><td>Mounting type</td><td>DIN rail mounting type</td></tr>
<tr><td>Case</td><td>Flame-resistant resin, Color: Black</td></tr>
<tr><td>Panel</td><td>Polycarbonate sheet</td></tr>
<tr><td>Applicable standard</td><td>
<table>
<tr><td>EN</td><td>EN61010-1
(Pollution degree 2, overvoltage category II)</td></tr>
<tr><td>EC Directive</td><td>EMI: EN61326
Radiated interference field strength:
EN55011 Group1 ClassA
Terminal noise voltage: EN55011 Group1 ClassA
EMS: EN61326</td></tr>
</table>
</td></tr>
</table>

Setting Structure

Communication specification selection	Select the communication speed, data bit, parity, and stop bit using the DIP switch.
Module address selection	Select the module address 0 to F (1 to 16) with the rotary switch. For QMC1-□□□-0 [Console selection (MODBUS RTU)] The value obtained by adding 1 to the value of the selected rotary switch becomes the module address. For QMC1-□□□-1 (C SERIES COMPATIBLE) The value of the selected rotary switch becomes the module address.

Standard Function

<table>
<tr>
<td>Host-to-module communication</td>
<td>Relay communication between the external computer or PLC made by each company and this instrument.
<table>
<tr><td>Communication line</td><td>EIA RS-422A, EIA RS-485</td></tr>
<tr><td>Communication method</td><td>Half-duplex communication</td></tr>
<tr><td>Synchronization method</td><td>Start-stop synchronization</td></tr>
<tr><td>Communication speed</td><td>9600 bps, 19200 bps, 38400 bps or 57600 bps can be selected by DIP switch</td></tr>
<tr><td>Data bit/Parity/Stop bit</td><td>Select the following with the DIP switch
Data bit: 8
Parity: Even, Odd, No parity
Stop bit: 1 or 2</td></tr>
<tr><td>Communication response delay time</td><td>Set the delay time to return the response from this instrument after receiving the command from the host.
0 to 1000 ms</td></tr>
<tr><td>Number of connections</td><td>This instrument: Max 16 modules
For C SERIES COMPATIBLE, max 5 modules</td></tr>
<tr><td>SIF function</td><td>A function to read and write various data to PLC registers using the communication protocol of PLCs made by each company.</td></tr>
</table>
Communication protocol
MODBUS RTU protocol , C SERIES COMPATIBLE protocol</td>
</tr>
<tr>
<td>Module-to-module communication</td>
<td>
<table>
<tr><td>Communication line</td><td>Internal Bus</td></tr>
<tr><td>Communication method</td><td>Half-duplex communication</td></tr>
<tr><td>Synchronization method</td><td>Start-stop synchronization</td></tr>
<tr><td>Communication speed</td><td>57600 bps</td></tr>
<tr><td>Data bit/Parity/Stop bit</td><td>Data bit: 8
Parity: Even
Stop bit: 1</td></tr>
</table>
</td>
</tr>
</table>

Attached Function

<table>
<tr><td>Power failure countermeasure</td><td>The setting data is backed up in the non-volatile IC memory.</td></tr>
<tr><td>Self-diagnosis</td><td>The CPU is monitored by a watchdog timer, and if an abnormal status occurs, the controller is switched to warm-up status, turning all outputs OFF.</td></tr>
<tr><td>Warm up indication</td><td>The power indicator flashes every 500 ms for about 3 seconds after the power is turned on.</td></tr>
<tr><td>Total energizing time measurement function</td><td>It can check the time that the power is on.
If the accumulated time exceeds 65535 hours, it will be added from 0 hours.
It can grasp the approximate usage time from the accumulated time. However, since the save cycle is 1 hour, the time within 1 hour may not be saved due to a power failure.
Total energizing time: 1 hour/count</td></tr>
<tr><td>Console communication</td><td>Connect USB communication cable (commercial item) to the console communication connector, and the following operations can be performed from an external computer using the console software (SWC-QMC101M).
(1) Reading and setting of host communication protocol, event input allocation and event output allocation
(2) Operation status reading
(3) Read and set the each setting value of the SIF function
(4) Change of function
<table>
<tr><td>Communication protocol</td><td>Shinko protocol</td></tr>
<tr><td>Communication cable</td><td>USB - micro USB Type-B (commercial item)</td></tr>
<tr><td>Software</td><td>Console software (SWC-QMC101M)</td></tr>
</table></td></tr>
<tr><td>Firmware update function</td><td>Connect USB communication cable (commercial item) to the console communication connector, and the following operations can be performed from an external computer using the console software (SWC-QMC101M).</td></tr>
</table>

Other Item

Accessories	Mounting and wiring instruction manual: 1 Power supply terminal cover: 1
Sold separately	USB communication cable (CMC-001-4) [USB - Modular] Communication cable (CQM-001) [Y terminal (C5, 3-wire) - Modular] Communication cable (CQM-002) [Y terminal (C4, 5-wire) - Modular] Communication cable (CQQ-001) [Modular - Modular] Wiring connector (0225-0805) [made by DINKLE]

15.2 Optional Specifications

<table>
<tr>
<td>Event input</td>
<td>Operates with the content selected in event input allocation selection.
<table>
<tr><th>Setting value</th><th>Action</th><th>Contents</th></tr>
<tr><td>0</td><td>Read status by communication</td><td>It can be used for any operation by reading the event input status flag.
When the event input □ is turned off, the event input status flag is set to 0, and when the event input □ is turned on, the event input status flag is set to 1.</td></tr>
<tr><td>1</td><td>Control start/stop</td><td>Control is started when event input □ is turned on for all channels of all connected QTC1-□0, and control is stoped when event input □ is turned off. However, if control is start/stop by the event input of QTC1-□0, the event input of QTC1-□0 has priority.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Event output</td>
<td>Operates with the content selected in event output allocation selection.
<table>
<tr><th>Setting value</th><th>Action</th><th>Contents</th></tr>
<tr><td>0</td><td>Specify event output ON/OFF by communication</td><td>Any value can be output by setting a value in the event output status flag from the host.
Setting the event output st atus flag to 0 turns off the event output, and setting it to 1 turns on the event output.</td></tr>
<tr><td>1</td><td>Alarm 1</td><td>When alarm 1 of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
<tr><td>2</td><td>Alarm 2</td><td>When alarm 2 of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
<tr><td>3</td><td>Alarm 3</td><td>When alarm 3 of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
<tr><td>4</td><td>Alarm 4</td><td>When alarm 4 of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
<tr><td>5</td><td>Heater burnout alarm</td><td>When heater burnout alarm of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
<tr><td>6</td><td>Loop break alarm</td><td>When loop break alarm of any of the connected QTC1-□0 turns ON, the event output □ turns ON.</td></tr>
</table>
</td>
</tr>
</table>

16 Troubleshooting

If any malfunctions occur, refer to the following items after checking that power is being supplied to the master module and slave module.

16.1 Communication

Problem	Possible Cause	Solution
Cannot communicate.	Is the communication cable disconnected?	Check the communication cable.
	Is the communication cable wiring correct?	Refer to “7.4 Connection of QMC1 and QTC1-40 to Host Computer (P.7-8, P.7-9)”, and check the communication cable.
	Is there any disconnection or contact failure of the communication cable?	Check the communication cable.
	Is communication speed of the master and slave same?	Refer to “5.1 Selection of Communication Specifications (P.5-1, P.5-2)”, and check the communication speed of the master and slave.
	Are data bits, parity, and stop bits of the master and slave same?	Refer to “5.1 Selection of Communication Specifications (P.5-1, P.5-2)”, and check the data bit, parity, and stop bit of the master and slave.
	Is the module address of the command and slave same?	Refer to “5.2 Selection of Module Address (P.5-3)”, and check the module address of the command and slave.
	Are there any slaves that have the same module address?	Refer to “5.2 Selection of Module Address (P.5-3)”, and check the module address.
	Is the program considering the transmission timing?	Refer to “9. Communication Procedure (P.9-1)”, and check the program.
Communication is possible, but a negative acknowledgement is returned.	Are sending a command code that does not exist?	Refer to “11.1 Communication Command List (P.11-1 to P.11-87)”, and check the command code.
	Is the data of the write command exceeding the setting range?	Refer to “11.1 Communication Command List (P.11-1 to P.11-87)”, and check the setting range of write command.
	Is it not possible to write (Warming up when power is turned on)?	Check the state of a slave.

16.2 Status Flag

Problem	Possible Cause	Solution
"1: Error" is set in B15: Non-volatile IC memory error.	The nonvolatile IC memory is defective.	Contact our agency or us.

◆If you have any questions, please contact our sales office or branch office.

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