MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R C Controller Module User's Manual(Application)

-R12CCPU-V

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully, and pay full attention to safety to handle the product correctly.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Considerations for using this manual]

- Replace the terms used in the following pages in this manual with the terms shown on the right, respectively.

  Corresponding page: SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, and COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

  (1) "Programmable controller" → "C Controller module"

  (2) "Programmable controller system" → "C Controller system"

- For details on a fail-safe circuit for C Controller module, refer to the following section.

  ☞ Page 196 General Safety Requirements

[Design Precautions]

⚠WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
  (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
    • Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
    • Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
  (3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.
  (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.
- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

[Design Precautions]

⚠WARNING

- Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Incorrect output or malfunction due to a communication failure may result in an accident.
- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.

[Precautions for using C Controller modules]

- In refresh parameter settings, the device Y cannot be specified for the link output (LY) refresh device or the remote output (RY) refresh device. Therefore, C Controller module holds the device status as is even after the module status is changed to STOP.

[Design Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
- Do not power off the programmable controller or do not reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so may cause malfunction or failure of the module.
- When changing the operating status of the CPU module from external devices (such as remote RUN/STOP functions), select "Do Not Open in Program" for "Open Method Setting" in the module parameters. If "Open in Program" is selected, an execution of remote STOP causes the communication line to close. Consequently, the CPU module cannot reopen the communication line, and the external device cannot execute the remote RUN.

[Installation Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Precautions for using C Controller modules]

- Do not mount C Controller module on the right end of the base unit. Attach a blank cover module (RG60) to prevent entrance of foreign material such as dust when no module is mounted on the right side of C Controller module.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets general specifications written in Safety Guidelines included in the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
- When using an SD memory card, fully insert it into the memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette into the cassette connector of a CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, or connector. Doing so may cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact. Do not clamp the extension cables with the jacket stripped.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.

[Wiring Precautions]

⚠CAUTION

- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury or fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette. Doing so may cause malfunction or failure of the module.
- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.

[Startup and Maintenance Precautions]

⚠CAUTION

- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Operation Precautions]

⚠CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so can cause malfunction or failure of the module.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

CONSIDERATIONS FOR USE

Considerations for the Wind River Systems product

C Controller module has an embedded real-time operating system, VxWorks, manufactured by Wind River Systems, Inc. in the United States. We, Mitsubishi, make no warranty for the Wind River Systems product and will not be liable for any problems and damages caused by the Wind River Systems product during use of C Controller module.
For the problems or specifications of the Wind River Systems product, refer to the corresponding manual or consult Wind River Systems, Inc.
Contact information is available on the following website.
- Wind River Systems, Inc. http://www.windriver.com/

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC iQ-R series programmable controllers.
This manual describes the performance specifications, procedures up to operation, wiring, and communication examples to use the module listed below. Before using the product, please read this manual and relevant manuals carefully and develop familiarity with the performance of MELSEC iQ-R series programmable controller to handle the product correctly.
When applying the example programs provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.
Please make sure that the end users read this manual.

Relevant product

R12CCPU-V

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

Programmable controller system

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- 📖 MELSEC iQ-R Module Configuration Manual
- 📖 Safety Guidelines (included in a base unit)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

Additional measures

To ensure that this product meets the requirements of the EMC and Low Voltage Directives, compliance with the noise immunity standards for Ethernet cable, RS-232 cable, and USB cable is required.

■Ethernet cable

For a twisted pair cable to be connected to the connector of 10BASE-T/100BASE-TX/1000BASE-T, use a shielded twisted pair cable.

■RS-232 cable

For RS-232 cable, be sure to ground the shield part of a shield cable.

CONTENTS

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R C Controller Module User's Manual (Application) [SH-081369ENG] (this manual)	Explains the functions, devices, and parameters of C Controller module.	Print book e-Manual EPUB PDF
MELSEC iQ-R C Controller Module User's Manual (Startup) [SH-081367ENG]	Explains the performance specifications, module startup procedure, and troubleshooting of C Controller module.	Print book e-Manual EPUB PDF
MELSEC iQ-R C Controller Module Programming Manual [SH-081371ENG]	Explains the programming specifications and dedicated functions of C Controller module.	e-Manual EPUB PDF
CW Workbench/CW-Sim Operating Manual [SH-081373ENG]	Explains the system configuration, specifications, functions, and troubleshooting of CW Workbench/CW-Sim.	e-Manual EPUB PDF
CW Configurator Operating Manual [SH-081382ENG]	Explains the system configuration, parameter settings, and operation methods for the online function of CW Configurator.	e-Manual EPUB PDF

Point

e-Manual refers to the Mitsubishi FA electronic book manuals that can be browsed using a dedicated tool.
e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Base unit	A generic term for the main base unit, extension base unit, and RQ extension base unit
C Controller module	An abbreviation for MELSEC iQ-R series C Controller module
C Controller module dedicated functions	A dedicated function library offered by C Controller module It controls C Controller module.
CC-Link IE	A generic term for CC-Link IE Controller Network and CC-Link IE Field Network
CC-Link IE Controller Network-equipped module	A generic term for RJ71GP21-SX CC-Link IE Controller Network module and RJ71EN71 (when the CC-Link IE Controller Network function is used)
CC-Link IE Field Network-equipped master/local module	A generic term for RJ71GF11-T2 CC-Link IE Field Network master/local module and RJ71EN71 (when the CC-Link IE Field Network function is used)
CC-Link IE module	A generic term for CC-Link IE Controller Network-equipped module and CC-Link IE Field Network-equipped master/local module
CPU module	A generic term for the CPU modules of MELSEC iQ-R series
CW Configurator	A generic product name for model names, SWnDND-RCCPU ('n' indicates version.)
CW Workbench	An abbreviation for C Controller module engineering tool, CW Workbench
Dedicated function library	A generic term for C Controller module dedicated functions and MELSEC data link functions
GOT	An abbreviation for the Mitsubishi Graphic Operation Terminal
I/O module	A generic term for input module, output module, I/O combined module, and interrupt module
Intelligent function module	A module which has functions other than input and output, such as A/D converter module and D/A converter module
MELSEC data link function	A dedicated function library offered by C Controller module It is used to access other CPU modules as a connection target via network or in a multiple CPU system.
Network module	A generic term for the following modules: • CC-Link module • CC-Link IE Controller Network module • CC-Link IE Field Network module
Power supply module	A generic term for MELSEC iQ-R series power supply module
R12CCPU-V	An abbreviation for R12CCPU-V C Controller module
SD memory card	A memory card that is compliant with the SD standards designed and developed by the SD Association
Target device	A generic term for a personal computer, GOT, other CPU modules, and others connected to CPU module for data communication
USB Mass Storage Class-compliant device	A USB device that is compliant with the standard for recognizing as a memory device (USB Mass Storage Class)
VxWorks	A product name for the real-time operating system manufactured by Wind River Systems, Inc.

MEMO

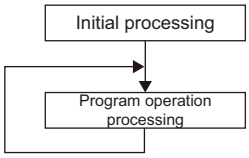
PART 1 PROGRAMMING

This part comprises the following chapters.

1 EXECUTING PROGRAMS

1.1 Execution Order

The following shows the execution order of the programs in C Controller module.



1.2 Initial Processing

The following shows the process when powering ON or resetting a module.

- I/O module initialization
- Parameter check
- Multiple CPU system parameter consistency check
- I/O number assignment of mounted module
- IP address setting of C Controller module
- Network information setting for CC-Link IE Controller Network
- Network information setting for CC-Link IE Field Network
- Network information setting for CC-Link Network
- Initial value setting for Intelligent function modules
- Script file execution

1.3 I/O Access Timing

This section explains the timings for reading input (X) and writing output (Y).

Input (X) reading timing

The read timings of input (X) are as follows:

- When a dedicated function library (such as CCPU_X_In_BitEx, mdRandREx) is executed in a user program
- When input (X) data is read out from a peripheral device (When performing device/buffer memory batch monitoring of CW Configurator.)

Output (Y) writing timing

The write timings of output (Y) are as follows:

- When a dedicated function library (such as CCPU_Y_Out_BitEx, mdRandWEx) is executed in a user program
- When output (Y) data is written from a peripheral device (When performing device/buffer memory batch monitoring of CW Configurator.)

MEMO

2 OPERATION PROCESSING IN C Controller module

This chapter explains the operation processing in C Controller module.

2.1 Operation Processing Depending on Operating Status

The operating status of C Controller module are as follows:

- RUN
- STOP
- PAUSE

Operation processing in RUN state

RUN state indicates that performing output (Y) to each module and writing data to the buffer memory from the user program*1 in C Controller module are available.

*1 The program using the C Controller module dedicated function

■Output when entering the RUN state

C Controller module outputs the following depending on the setting of the output (Y) when the module state is changed from STOP to RUN. (☞ Page 52 Output Mode Setting Function from STOP to RUN)

- Output (Y) state saved at the STOP state

Operation processing in STOP state

STOP state indicates that performing output (Y) to each module and writing data to the buffer memory from the user program*1 in C Controller module are disabled. The module status can be changed with the RESET/STOP/RUN switch or remote STOP function.

If the stop error occurred in a C Controller module, the module will be in STOP state.

*1 The program using the C Controller module dedicated function

■Output when entering the STOP state

C Controller module saves the output status right before the C Controller module is in STOP state, and clears all outputs (Y) to OFF.

Operation processing in PAUSE state

PAUSE state indicates that the output (Y) to each module and data write to buffer memory from the user program of the C Controller module are disabled, with the ON/OFF of the output (Y) retained.

Point

- Regardless of which status the C Controller module is in (RUN/STOP/PAUSE), performing output (Y) and writing data to the buffer memory are allowed from CW Configurator, SLMP communication, and MELSEC data link functions.
- Regardless of which status the C Controller module is in (RUN/STOP/PAUSE), the operation of a user program is continued. When splitting the user program in accordance with the operating status of C Controller module, use the C Controller module dedicated function (CCPU_GetCpuStatus).

2.2 Operation Processing at Momentary Power Failure

When the input power voltage fed to the Power supply module is lower than the specified range, C Controller module detects a momentary power failure and performs the following processes.

When a momentary power failure less than the allowable time has occurred

When a momentary power failure occurs, C Controller module suspends processing with its output status retained.
After power is recovered, error information is registered to the event history file. (Only at the first detection)

■When the momentary power failure is recovered

After the momentary power failure is recovered, the C Controller module continues processing.

■Check for the number of momentary power failure detection

Since C Controller module retains number of momentary power failure inside the module, it can be checked using the special register SD53 or the C Controller module dedicated function (CCPU_GetPowerStatus).

■Measurement of the watchdog timer (WDT) during a momentary power failure

C Controller module continues measuring the watchdog timer if the operation is stopped due to the momentary power failure. For example, if a momentary power failure of 15 ms has occurred when the fixed cycle processing time is 190 ms while the monitoring time of the system watchdog time is set to 200 ms, a watchdog timer error occurs.

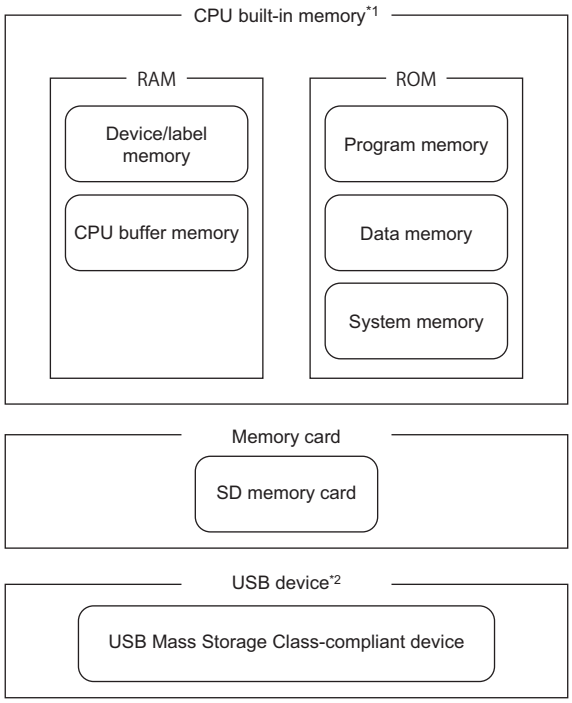
When a power failure longer than the allowable time has occurred

The initial start is performed and the operation processing will be the same as when the C Controller module is powered ON or reset.

3 MEMORY CONFIGURATION OF C Controller module

3.1 Memory Configuration

This section explains the memory configuration of C Controller module.



*1 CPU built-in memory is an abbreviation for the built-in memory in C Controller module.

*2 When using a USB device, check the firmware version of C Controller module. (☞ Page 202)

Point

The usage of the memory can be checked from CW Configurator. (📖 CW Configurator Operating Manual)

Program memory

Program memory is a memory that stores files such as user programs and script files.

System memory

System memory is a memory that stores system files.

Writing files to the system memory is not available.

CPU buffer memory

CPU buffer memory is a memory that is used for data communication among multiple CPUs.

Device/label memory

The device/label memory has the following areas.

Device area
File storage area

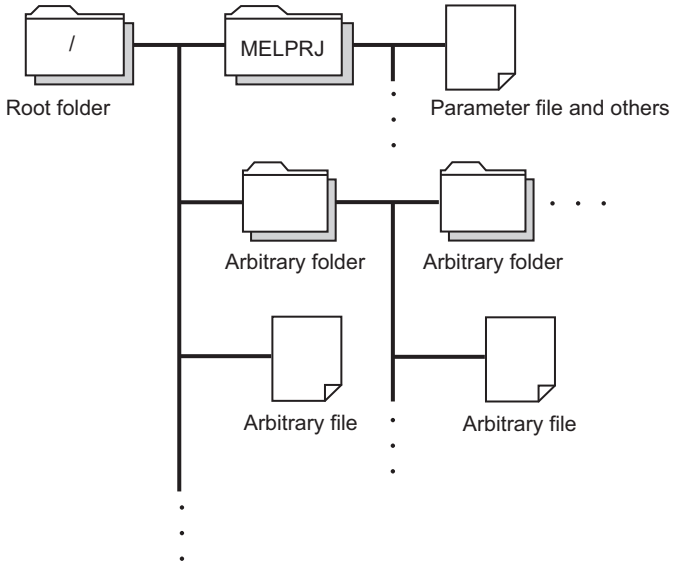
Data to be allocated

The following table shows the data to be allocated to each area.

Area	Application
Device area	User device
File storage area	File register

Data memory

Data memory is a memory to store the data such as parameter files or arbitrary folders/files. Parameter files written with CW Configurator are stored in the "MELPRJ" folder. (☞ Page 28 Access to the "MELPRJ" folder)



SD memory card

SD memory card is a memory that stores the folders/files created by a function using SD memory card as well as the arbitrary folder/file. The folder configuration is the same as the data memory. (☞ Page 28 Access to the "MELPRJ" folder)
SD memory card can be accessed from FTP, Telnet, and user programs.

USB Mass Storage Class-compliant device

USB Mass Storage Class-compliant device is a memory that stores user programs and arbitrary folders/files.
USB Mass Storage Class-compliant device can be accessed from FTP, Telnet, and user programs.

Point

For details on how to create and delete user folders and files, refer to the following manual.
CW Configurator Operating Manual

3.2 Memory Operation

Memory can be initialized and values can be cleared using CW Configurator.
For details on the memory operation, refer to the following manual.
CW Configurator Operating Manual

Item			Description
Initialization	Formatting program memory/data memory		Deletes all the folders and files in the program memory and data memory.*1
	Formatting SD memory card		Deletes all the folders and files in the SD memory card.*2
Clearing value	Device	Zero clear	Clears devices (X, Y, M, B, D, W) to zero.
	File register		Clears all the file registers (ZR) to zero.

*1 The "MELPRJ" folder is created in the data memory, and the default parameters are set.
*2 The "MELPRJ" folder is created.

Point

- If the power is turned OFF or the module is reset while initializing each memory or clearing values, the memory will be partly initialized or the value is partly cleared. In this case, perform the memory operation again.
- If the power is turned OFF or module is reset while accessing each memory, data corruption in the memory or file system error may occur. Shut down the program memory and data memory with the C Controller module dedicated function (CCPU_ShutdownRom), and then power OFF or reset the module.

3.3 Memory Lifetime

This section explains the life duration of a flash ROM which is used for program memory/data memory/system memory.

Memory lifetime

- The life of the flash ROM is represented as write count index value and writing data is allowed until it reaches to 100,000 times. When the write count index value has reached to 100,000 times, replace the C Controller module.
- Since C Controller module performs processing to extend the life to write data to the flash ROM, the write count index value will not be the same as the actual count of writing.

Point

If the write count index value exceeds 100,000 times, the following symptoms may occur.
- Decrease of writing speed to the standard ROM
- Unable to write data to memory

Method for checking write index value

The write count index value of the flash ROM can be obtained with the C Controller module dedicated function (CCPU_GetCpuStatus) from the user program. If the write count index value exceeds 100,000 times, it is registered in the event history. (☞ Page 60 Event history function)

Point

- Since the operation of the program memory/data memory is checked at factory acceptance test, the initial value of the write count index is not 0.
- Since C Controller module always checks data in the program memory/data memory, the write count index value may be increased.

3.4 Files

This section explains the files of C Controller module.

Drive names and file systems

The following shows the drive names and file systems correspond to each memory.

Type	Name	Drive name	File system
CPU built-in memory	Program memory	/0	FAT16
	Data memory	/4	FAT16
	System memory	/SYSTEMROM	FAT16
Memory card	SD memory card	/2	FAT16/FAT32
USB device	USB Mass Storage Class-compliant device	/USB0	FAT16/FAT32

File type and storage destination memory

The following shows the file type and storage destination memory.

○: Storable, ×: Not storable

File type	CPU built-in memory				SD memory card	USB Mass Storage Class-compliant device
	Program memory	Device/label memory	Data memory	System memory		
User program	○	×	×	×	○	○
Script file	○	×	×	×	○	×
File register	×	○	×	×	×	×
CPU parameter	×	×	○	×	○	×
System Parameter	×	×	○	×	○	×
Module parameter	×	×	○	×	○	×
Module extended parameter	×	×	○	×	○	×
Memory card parameter	×	×	×	×	○	×
Event history	×	×	○	×	○	×
Arbitrary folder/file	×	×	○	×	○	○

File and folder configuration

The following shows the configurations of files and folders.

○: Access allowed/Valid, ×: Access not allowed/Invalid, —: No folder

Drive	Folder	File		FTP access	Factory setting	After initialization
/0				○	×	×
/4	MELPRJ*1			○	○	○
/SYSTEMROM	OS_IMAGEFILE	R12CCPU-V_XX*2	VxWorks image file	○	○	○
	INCLUDE	CCPUFunc.h	C Controller module dedicated function header file	○	○	○
		MDFunc.h	MELSEC data link function header file	○	○	○
	—	prjParams.h	VxWorks component list file	○	○	○
	—	DriveNameInfo.txt	Drive name list file	○	○	○
/2*3	MELPRJ*1			○	×	×
/USB0*4				○	×	×

*1 The folder is created after initialization or writing parameters.
*2 The last part of the file name "XX" indicates the upper two digits of the serial number.
*3 The drive is created when an SD memory card is inserted (mounted).
*4 The drive is created when a USB Mass Storage Class-compliant device is connected (mounted).

Considerations on file operation

The following describes the restriction on memory and drive operations in C Controller module.

■Access to the "MELPRJ" folder

The "MELPRJ" folder manages data written with CW Configurator. Do not access it for a purpose other than backup or restoration. If a portion of the files stored in the folder is changed, C Controller module may not operate properly.

■Writing files

Before writing files with FTP or Telnet during user program operation, make sure that the files to be written will not affect the running user program.

■Access to the same file

For C Controller module, the access to a file being written and writing to a file being accessed cannot be performed.

■File name and folder name

The name of the file to be stored to C Controller module must be 128 characters or less. In addition, use the following characters for a file name and folder name.

- Alphanumeric characters and special characters (excluding \ / * ? < > : ¦ " $)

If invalid characters are used, the following symptoms may occur:

- Garbled file name and folder name
- Loss of file and folder

A folder name using only a special character (.) cannot be created.

- A special character (.) following the usable character codes is not included in the folder name. A folder, "a" is created when a folder name starts with "a...".

■Number of files and folders

Up to a total of 512 files and folders can be created for the root folder in the following memory. However, the maximum number may be reduced depending on a file name length and character types.

- Program memory and data memory

The number of files and folders that can be created in the root folder of the following memory differ depending on the memory capacity and a file system format. Take caution when using the memory.

- SD memory card
- USB Mass Storage Class-compliant device

The number of files in the folder must be 500 or less. Storing more than 500 files may significantly increase the file access time.

Even if it is composed of lower-case characters, the file name may be displayed all in upper-case characters when referred from FTP or Telnet.

■File writing destination

Do not write files to the program memory and data memory using a user program. Since the write count of the flash ROM is limited, doing so may reduce the life of C Controller module.

When writing files using a user program, write files to an SD memory card, USB Mass Storage Class-compliant device, or network device[*1] (via FTP/NFS/netDrv), etc.

*1 For details on devices, refer to the manual of VxWorks.

■Uninstallation of external memory

If unmount process is performed while writing data to a user file in the following memory, data corruption or file system error may occur. Perform unmount process after the file being written is closed.

- SD memory card
- USB Mass Storage Class-compliant device

■Creation of folder

Do not create a folder in the root ("/") of C Controller module. Creation of a folder may cause an error, or an unintended folder may be created. (These errors also occur when transferring a folder to the root "/" from FTP.)

MEMO

PART 2 FUNCTIONS

This part comprises the following chapters.

4 BASIC FUNCTIONS

This chapter explains the basic functions of C Controller module.

4.1 Program Monitoring Function (WDT)

The program monitoring function is a function to monitor and detect errors on the hardware and user programs from the watchdog timer (WDT), an internal timer of C Controller module.

Item	Description
System watchdog timer	A timer to monitor the system of C Controller module. Use this to detect an error in hardware and system software.
User watchdog timer	A timer to monitor user programs. Use this to detect an error in user programs.

Setting monitoring timer

Set the monitoring timer of a watchdog timer.

System watchdog timer

[CPU Parameter] ⇨ "RAS Setting" ⇨ "WDT (Watchdog Timer) Setting"

Window

Displayed items

Item	Description	Setting range	Default
Monitoring time	Set the execution monitoring time to the system WDT.	20 to 2000 ms (10 ms units)	1000 ms

User watchdog timer

Set the user watchdog timer within the range of 100 ms to 10000 ms (10 ms unit) with the C Controller module dedicated function (CCPU_StartWDT).

Point

If the monitoring range is not set with the C Controller module dedicated function, the user watchdog timer does not work.

Timeout of watchdog timer

The following shows the timeout conditions and the process of a watchdog timer.

Conditions for timeout

■System watchdog timer

In case of failure of C Controller module hardware and interrupt program execution, timeout will occur as the system processing has been suspended for a long time.

■User watchdog timer

If the user program cannot complete the processing within the time specified using the C Controller module dedicated function (CCPU_StartWDT), and also cannot execute the C Controller module dedicated function (CCPU_ResetWDT), timeout will occur.

Processing at timeout

A watchdog timer error occurs and C Controller module will be in the following status.

- The BUS RUN LED turns OFF and the ERROR LED flashes. If a system watchdog timer error occurred, the READY LED also turns OFF.

Resetting watchdog timer

The following shows how to reset a watchdog timer.

System watchdog timer

C Controller module resets system watchdog timer while executing fixed cycle processing.

User watchdog timer

User program resets user watchdog timer by executing the C Controller module dedicated function (CCPU_ResetWDT).

4.2 Clock Function

C Controller module has clock data internally. This clock is used to manage time for functions controlled by the system including time stamp for the event history.

Point

- The clock is running continuously using the internal battery of C Controller module while the module is in OFF state or a power failure longer than the allowable momentary power failure time occurred.
- For the time stamp of a file, the time of the operating system is used. Since the time of the C Controller module built-in clock and that of operating system may differ, correct the time of the operating system using a user program.

Setting clock data

The following shows the method for setting clock data.

Changing clock data

The clock data can be changed in one of the following methods:

- CW Configurator
- C Controller module dedicated function

Point

When the clock data is changed, the following operations are performed:

- The millisecond clock is reset to '0'.
- "Clock setting" (event code: 24000) is saved in the event history file.

■Using CW Configurator

[Online] ⇨ "Set Clock"

■Using C Controller module dedicated function

Write the clock data by using the C Controller module dedicated function (CCPU_SetRTC).

Point

C Controller module sets the time of its built-in clock to that of the operating system at the startup of the module after powering ON or resetting it. Use a user program in order to set the time for a running operating system.

Reading clock data

Read the clock data by using the C Controller module dedicated function (CCPU_GetRTC).

Precautions

■When using this function for the first time

Since the clock data is not set at the factory, be sure to set the certain data.

■When modifying the clock data

Even if changing a portion of the clock data, be sure to write all data to the C Controller module again.

■When changing clock data with a user program

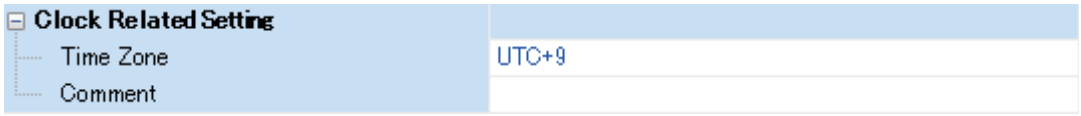
To change the clock data with a user program, be sure to use the C Controller module dedicated function (CCPU_SetRTC). If other clock data setting function is used, the accurate clock data will not be set in the C Controller module.

Setting time zone

Set the time zone used in C Controller module. Specifying the time zone enables the clock of C Controller module to work in the local time zone.

[CPU Parameter] ⇨ "Operation Related Setting" ⇨ "Clock Related Setting"

Window



Displayed items

Item	Description	Setting range	Default
Time Zone	Sets the time zone used in C Controller module.	• UTC+13 • UTC+12 • UTC+11 • UTC+10 • UTC+9:30 • UTC+9 • UTC+8 • UTC+7 • UTC+6:30 • UTC+6 • UTC+5:45 • UTC+5:30 • UTC+5 • UTC+4:30 • UTC+4 • UTC+3:30 • UTC+3 • UTC+2 • UTC+1 • UTC • UTC-1 • UTC-2 • UTC-3 • UTC-3:30 • UTC-4 • UTC-4:30 • UTC-5 • UTC-6 • UTC-7 • UTC-8 • UTC-9 • UTC-10 • UTC-11 • UTC-12	UTC+9
Comment	Enter a comment such as a name of the city for the time zone.	1 to 32 characters	—

Point

- To apply the time zone setting on the C Controller module, reset the module or power cycle after writing parameters.
- In the multiple CPU system, the time zone set in the CPU No.1 is used for other CPU modules. If the time zone is set to the CPUs from No.2 to No.4, the setting is not applied.

Precautions

Once the module is initialized, the parameters will be restored to the default setting even when overseas time zone has been set. Changing the clock of the module is required when the time zone is set again.

4.3 Remote Operation Function

The operating status of C Controller module can be controlled with CW Configurator and a user program. For a control from a user program, use C Controller module dedicated functions.
The following types of remote operation are available:

- Remote RUN/STOP
- Remote PAUSE
- Remote RESET

Remote RUN/STOP

Change the C Controller module status to RUN/STOP externally while the RESET/STOP/RUN switch is on the RUN position. Use this function to change the C Controller module status to RUN/STOP when the module is located in an inaccessible place such as in the control panel by using an external signal.

Executing remote operations

The following methods are available to execute remote RUN/STOP:

■Using CW Configurator

Refer to the following manual.
CW Configurator Operating Manual

■Using user program

Execute the C Controller module dedicated function (CCPU_Control) to perform remote RUN/STOP.
MELSEC iQ-R C Controller Module Programming Manual

■Using SLMP

Refer to the following manual.
SLMP Reference Manual

Point

When "Clear" is selected for the device/label memory at the time of performing remote RUN from CW Configurator, the following devices are cleared.

- X, Y, M, B, D, W

Precautions

Since C Controller module gives priority to STOP, observe the following considerations.

■STOP timing

C Controller module is stopped when remote STOP is performed from either of a user program or CW Configurator.

■Changing the remote STOP state to RUN again

Perform remote RUN.

■Output (Y) status during remote STOP

When "Output Mode Setting of STOP to RUN" is set to "Output the Output (Y) Status before STOP" in CW Configurator, the output (Y) state is output when the state is changed from RUN to STOP at remote RUN.

■User program during remote STOP

The user program does not stop the execution even if the C Controller module is placed into the remote STOP state. To change the processing according to the operating status of the C Controller module, use the C Controller module dedicated function (CCPU_GetCpuStatus) in the program.

Remote PAUSE

Change the C Controller module status to PAUSE externally while the RESET/STOP/RUN switch is on the RUN position. Use this function to retain the output (Y) of the C Controller module in the RUN state in such system as process control.

Executing remote operations

The following methods are available to execute remote PAUSE:

■Using CW Configurator

Refer to the following manual.

CW Configurator Operating Manual

■Using user program

Execute the C Controller module dedicated function (CCPU_Control) to perform remote PAUSE.

MELSEC iQ-R C Controller Module Programming Manual

■Using SLMP

Refer to the following manual.

SLMP Reference Manual

Precautions

The user program does not stop executing even if the C Controller module is in the remote PAUSE state. To change the processing according to the operating status of the C Controller module, use the C Controller module dedicated function (CCPU_GetCpuStatus) in the program.

Remote RESET

Reset the C Controller module externally while the module is in the STOP state (including the case in which the module is stopped due to an error). Even when the RESET/STOP/RUN switch is on the RUN position, the C Controller module can be reset while the module is in STOP state.

Enabling remote RESET

To perform the remote RESET, the remote RESET must be enabled.

[CPU Parameter] ⇨ "Operation Related Setting" ⇨ "Remote Reset Setting"

Window

Displayed items

Item	Description	Setting range	Default
Remote Reset	Set whether to enable the remote RESET.	• Disable • Enable	Disable

Executing remote operations

The following methods are available to execute remote RESET:

■Using CW Configurator

Refer to the following manual.

CW Configurator Operating Manual

■Using user program

Execute the C Controller module dedicated function (CCPU_Reset) to perform remote RESET.

MELSEC iQ-R C Controller Module Programming Manual

■Using SLMP

Refer to the following manual.

SLMP Reference Manual

Precautions

■Before performing remote RESET

Close each user program in the C Controller module before performing remote RESET. Performing remote RESET while the user program is being operated may damage the user program and data files.

■Status after the completion of remote RESET

After performing the remote RESET operation, the operating status of the C Controller module or programmable controller CPU will be in the status set with the switch.

■Remote RESET at error stop

If remote RESET is performed when the C Controller module in a single CPU system or CPU No.1 in a multiple CPU system has stopped due to an error, the C Controller module or programmable controller CPU will be in the status set with the switch.

■Remote RESET with CW Configurator

After the remote RESET is performed, the communication between CW Configurator and C Controller module will be disconnected. In this case, reconnect the connection with CW Configurator.

■Remote RESET when CPU No.1 is a programmable controller CPU in a multiple CPU system

For remote RESET of programmable controller CPU, refer to the manual for the programmable controller CPU to be used.

■The host CPU is other than bus master CPU (CPU No.1)

- The parameter ("Enable" is set to "Remote Reset") is set in the bus master CPU (No.1): (Unset: Error)
- The bus master CPU (No.1) is STOP: (CPU is RUN/PAUSE: Error)
- The bus master CPU (No.1) is a programmable controller CPU

Point

The programmable controller CPU (bus master CPU (CPU No.1) cannot be reset when other peripherals (such as GX Works3) performs remote STOP to a programmable controller CPU (bus master CPU (CPU No.1)). Therefore, cancel the remote STOP with the peripheral device performing the remote STOP. Then, place the programmable controller CPU (bus master CPU (CPU No.1)) into STOP state with its RESET/STOP/RUN switch, the remote operation with CW Configurator, or a user program (the mdControl function) of the C Controller module.

- To perform remote RESET with CW Configurator, change the C Controller module status to STOP using CW Configurator.
- To perform remote RESET with a user program, change the C Controller module status to STOP using a user program.

Remote operation and operating status of C Controller module

The following shows the relationship between remote operations and operating status changes of C Controller module.

Status change by switch operation and at stop error

The following table shows the operating status of C Controller module by switch operation and at a stop error.

—: No status change

Before changing the operating status			After changing the operating status		
Factor to determine CPU operating status	Operating status	RESET/STOP/RUN switch status	RESET/STOP/RUN switch operation		Stop error occurred
			RUN	STOP	
RESET/STOP/RUN switch operation	STOP	STOP	RUN	—	—
	RUN	RUN	—	STOP	STOP
Operation with CW Configurator or SLMP	STOP	STOP	—	—	—
	PAUSE (Actual status: STOP)	STOP	PAUSE	—	—
	RUN (Actual status: STOP)	STOP	RUN	—	—
	STOP	RUN	—	—	—
	PAUSE	RUN	—	STOP	STOP
	RUN	RUN	—	STOP	STOP
Execution of the C Controller module dedicated function	STOP	STOP	—	—	—
	PAUSE (Actual status: STOP)	STOP	PAUSE	—	—
	RUN (Actual status: STOP)	STOP	RUN	—	—
	STOP	RUN	—	—	—
	PAUSE	RUN	—	STOP	STOP
	RUN	RUN	—	STOP	STOP
Stop error occurred	STOP	STOP	— (Error STOP)	—	—
	STOP	RUN	—	— (Error STOP)	—

Status change by remote operations with CW Configurator and SLMP

The following table shows the operating status of C Controller module by remote operations with CW Configurator and SLMP.

—: No status change

Before changing the operating status			After changing the operating status			
Factor to determine CPU operating status	**Operating status**	**RESET/STOP/RUN switch status**	**Remote operation with CW Configurator and SLMP**			
			RUN	**STOP**	**PAUSE**	**RESET*1**
RESET/STOP/RUN switch operation	STOP	STOP	—	—	—	RESET
	RUN	RUN	—	STOP	PAUSE	—
Operation with CW Configurator or SLMP	STOP	STOP	—	—	—	RESET
	PAUSE (Actual status: STOP)	STOP	—	—	—	RESET
	RUN (Actual status: STOP)	STOP	—	—	—	RESET
	STOP	RUN	RUN	—	PAUSE	RESET
	PAUSE	RUN	RUN	STOP	—	—
	RUN	RUN	—	STOP	PAUSE	—
Execution of the C Controller module dedicated function	STOP	STOP	—	—	—	RESET
	PAUSE (Actual status: STOP)	STOP	—	—	—	RESET
	RUN (Actual status: STOP)	STOP	—	—	—	RESET
	STOP	RUN	RUN	—	PAUSE	RESET
	PAUSE	RUN	RUN	STOP	—	—
	RUN	RUN	—	STOP	PAUSE	—
Stop error occurred	STOP	STOP	— (Error STOP)	— (Error STOP)	— (Error STOP)	RESET
	STOP	RUN	— (Error STOP)	— (Error STOP)	— (Error STOP)	RESET

*1 Setting "Remote Reset Setting" to "Enable" of the CPU parameters is required.

Status change at the execution of the C Controller module dedicated function

The following table shows the operating status of C Controller module at the execution of the C Controller module dedicated function (CCPU_Control).

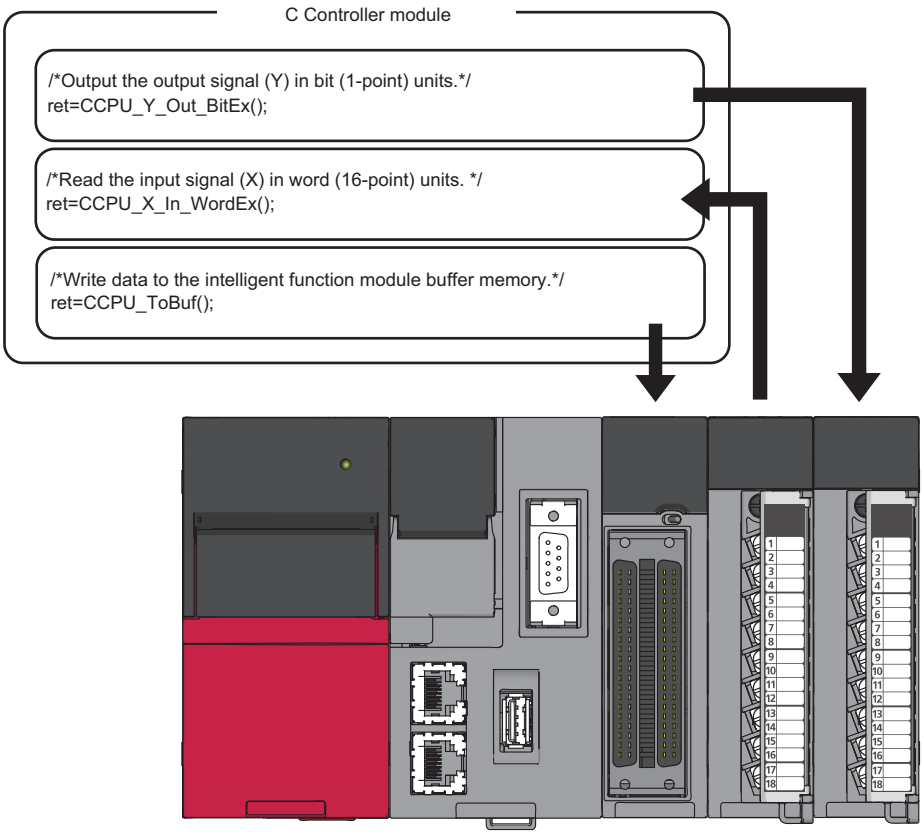
—: No status change

Before changing the operating status			After changing the operating status			
Factor to determine CPU operating status	Operating status	RESET/STOP/RUN switch status	Execution of the C Controller module dedicated function			
			RUN	STOP	PAUSE	RESET*1
RESET/STOP/RUN switch operation	STOP	STOP	—	—	—	RESET
	RUN	RUN	—	STOP	PAUSE	—
Operation with CW Configurator or SLMP	STOP	STOP	—	—	—	RESET
	PAUSE (Actual status: STOP)	STOP	—	—	—	RESET
	RUN (Actual status: STOP)	STOP	—	—	—	RESET
	STOP	RUN	RUN	—	PAUSE	RESET
	PAUSE	RUN	RUN	STOP	—	—
	RUN	RUN	—	STOP	PAUSE	—
Execution of the C Controller module dedicated function	STOP	STOP	—	—	—	RESET
	PAUSE (Actual status: STOP)	STOP	—	—	—	RESET
	RUN (Actual status: STOP)	STOP	—	—	—	RESET
	STOP	RUN	RUN	—	PAUSE	RESET
	PAUSE	RUN	RUN	STOP	—	—
	RUN	RUN	—	STOP	PAUSE	—
Stop error occurred	STOP	STOP	— (Error STOP)	— (Error STOP)	— (Error STOP)	RESET
	STOP	RUN	— (Error STOP)	— (Error STOP)	— (Error STOP)	RESET

*1 Setting "Remote Reset Setting" to "Enable" of the CPU parameters is required.

4.4 I/O Module, Intelligent Function Module Access Function

The I/O module and Intelligent function module(s), which are under the control of C Controller module, can be controlled by creating user program using the C Controller module dedicated functions and MELSEC data link functions.



Function list

The following table shows the list of functions which can be used for accessing I/O modules and Intelligent function modules.

Function name	Description
CCPU_FromBuf	Reads data from the CPU buffer memory or the intelligent function module buffer memory of the module on the specified position.
CCPU_FromBuf_ISR	
CCPU_ToBuf	Writes data to the CPU buffer memory and the intelligent function module buffer memory of the module on the specified module position.
CCPU_ToBuf_ISR	
CCPU_X_In_BitEx	Reads the input signal (X) in bit (1-point) units.
CCPU_X_In_WordEx	Reads the input signal (X) in word (16-point) units.
CCPU_X_In_Word_ISR	
CCPU_Y_In_BitEx	Reads the output signal (Y) in bit (1-point) units.
CCPU_Y_In_WordEx	Reads the output signal (Y) in word (16-point) units.
CCPU_Y_In_Word_ISR	
CCPU_Y_Out_BitEx	Outputs the output signal (Y) in bit (1-point) units.
CCPU_Y_Out_WordEx	Outputs the output signal (Y) in word (16-point) units.
CCPU_Y_Out_Word_ISR	
mdDevRstEx	Resets (turns OFF) bit device(s).
mdDevSetEx	Sets (turns ON) bit device(s).
mdRandREx	Reads device(s) randomly.
mdRandWEx	Writes device(s) randomly.
mdReceiveEx	Reads devices in batch.
mdSendEx	Writes devices in batch.

4.5 Interrupt Function from Modules

The following processes can be performed by issuing interrupt request from an input module, Intelligent function module, interrupt module, and other CPU modules.

Point

To perform the interrupt function from module, setting "module parameters" for each module is required. For more details, refer to the user's manual for the respective modules.

- The routine registered with the C Controller module dedicated function (CCPU_EntryInt) can be executed as an interrupt routine (interrupt program).
- The user program of which status is interrupt event wait state by using the C Controller module dedicated function (CCPU_WaitUnitEvent) can be re-executed.

C Controller module dedicated function	Description
CCPU_EntryInt	Registers a routine so that the routine can be called when an interrupt occurs.
CCPU_EnableInt	Enables the registered routine.
CCPU_EnableInt_ISR	
CCPU_DisableInt	Disables the registered routine.
CCPU_DisableInt_ISR	
CCPU_WaitUnitEvent	Waits for an interrupt event notification from Intelligent function module or an interrupt module.

Factor of interrupt pointer number

The following shows the interrupt factors for each interrupt pointer number.

Factor	Interrupt pointer number	Description
Interrupt from module	I0 to I15	A pointer used in the module which has an interrupt function.
Inter-module synchronous interrupt	I44	A fixed cycle interrupt pointer used for the inter-module synchronization function.
Multiple CPU synchronous interrupt	I45	A fixed cycle interrupt pointer used for the multiple CPU synchronization function.
Interrupt from module	I50 to I1023	A pointer used in the module which has an Interrupt function.

Interrupt priority

The priority has been set to each interrupt pointer. If the priority of an interrupt program of which execution conditions have been satisfied is higher than that of an interrupt program that is currently being executed, the program is executed in accordance with the priority. If the priority of an interrupt of which execution conditions have been satisfied is lower, it will be in a wait state until an interrupt program that is currently being executed is completed.

Interrupt priority		Interrupt pointer	Execution order at simultaneous occurrence
High	3	Inter-module synchronous interrupt (I44), multiple CPU synchronous interrupt (I45)	I45 → I44
Low	8	Interrupt from module (I0 to I15, I50 to I1023)	I0 → I1 → I2 → to → I1021 → I1022 → I1023

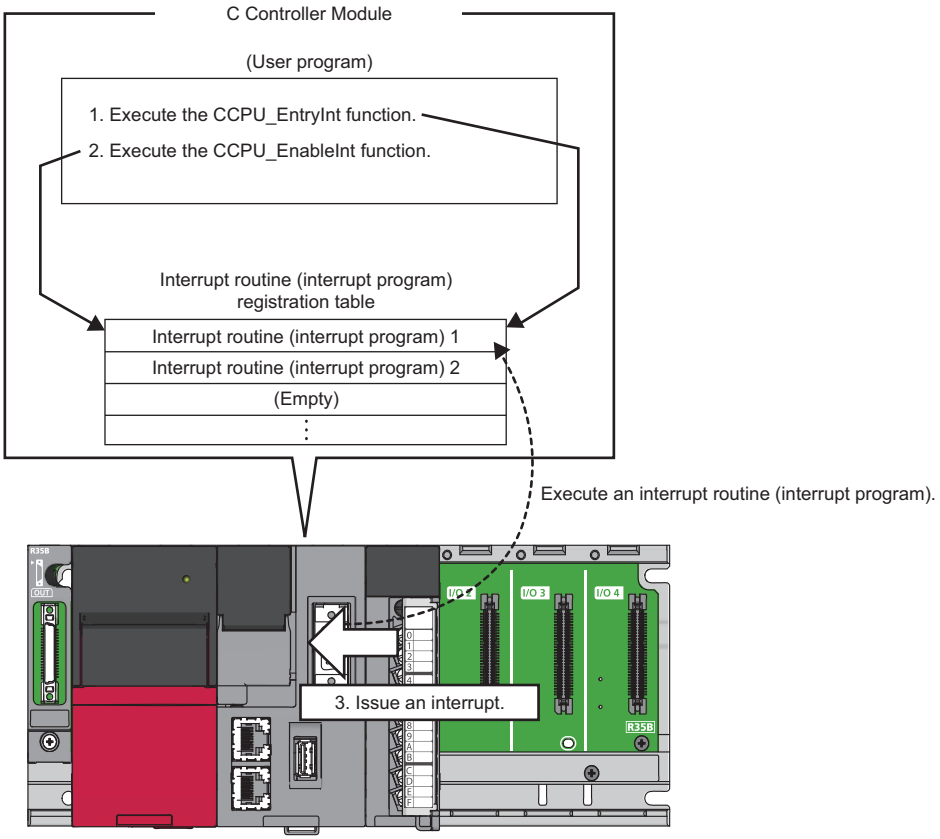
Using interrupt function

The following explains the usage of the interrupt function from module.

Executing interrupt routine

The following shows how to execute the interrupt routine.

1. Register the routine that corresponds to the interrupt from a module with the C Controller module dedicated function (CCPU_EntryInt).
2. Enable the registered routine with the C Controller module dedicated function (CCPU_EnableInt, CCPU_EnableInt_ISR).
3. When the interrupt from module is issued after the routine is enabled, the registered routine is executed as an interrupt routine.



Stopping interrupt routine

Disable the registered routine with the C Controller module dedicated function (CCPU_DisableInt, CCPU_DisableInt_ISR).

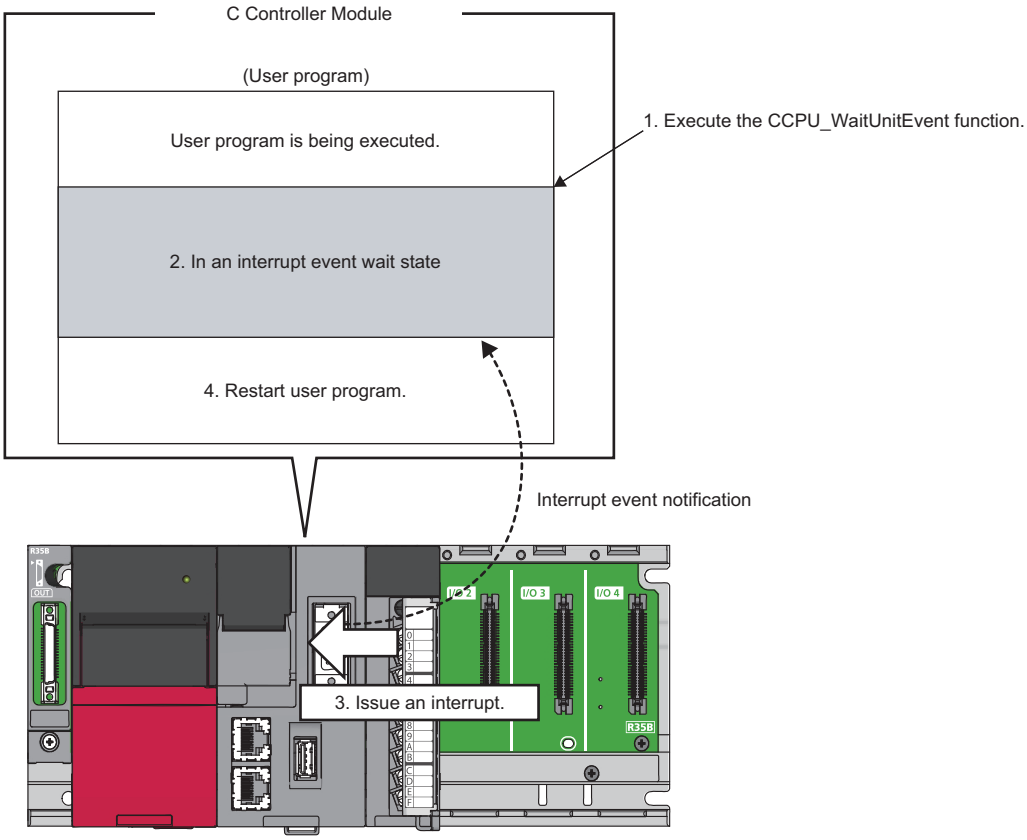
Precautions

When an interrupt from module is issued to the routine disabled with the C Controller module dedicated function (CCPU_DisableInt, CCPU_DisableInt_ISR), the interrupt from module is ignored. The routine is executed only for the interrupt from module which has been issued while the routine is enabled with the C Controller module dedicated function (CCPU_EnableInt, CCPU_EnableInt_ISR).

Restarting user programs

The following shows how to restart the user program.

1. Execute the C Controller module dedicated function (CCPU_WaitUnitEvent).
2. The user program will be in an interrupt event wait state.
3. Issue the interrupt event from the module.
4. After receiving the interrupt event, the user program is restarted.



Precautions

The following shows the considerations when using C Controller module dedicated function (CCPU_WaitUnitEvent).

■When an interrupt event has already been notified at execution of the function

When an interrupt event has already been notified from Intelligent function module or interrupt module at execution of the C Controller module dedicated function (CCPU_WaitUnitEvent), the user program is restarted from the interrupt event wait state at the same time as execution of the C Controller module dedicated function (CCPU_WaitUnitEvent). In addition, when multiple interrupt events have been notified to the same interrupt event number at execution of the C Controller module dedicated function (CCPU_WaitUnitEvent), the user program performs processing as a single interrupt event notification.

■When using the function in multiple user programs

Do not set the same CPU number and same interrupt event number in multiple user programs. Doing so results in uncertainty as to which user program receives an interrupt event.

4.6 Fixed Cycle Processing Function

The fixed cycle processing function is a function to refresh with Network modules or to perform communication with external devices.

The following processes are performed with the fixed cycle processing function.

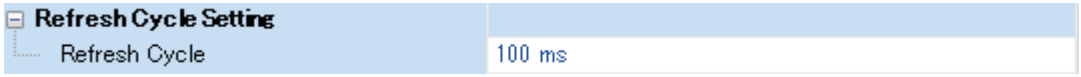
- Refresh processing with Network modules (Link refresh)
- Reset processing of watchdog timer
- Self-diagnostics processing

Setting fixed cycle processing interval

The following shows the setting method for the cycle that the fixed cycle processing function operates.

[CPU Parameter] ⇨ "Operation Related Setting" ⇨ "Refresh Cycle Setting"

Window



Displayed items

Item	Description	Setting range	Default
Refresh Cycle	Set the interval that the fixed cycle processing function operates.	1 to 2000 ms (1 ms units)	100 ms

Point

Set the value that satisfies the following relational expression for the cycle of the fixed cycle processing. An error will occur when the following expression is not satisfied.

- Setting time of the program monitoring function (WDT) > Cycle of the fixed cycle processing

Checking interval

The following shows the method to check the interval (maximum value/minimum value/current value) at which the fixed cycle processing function operates.

Checking with a function

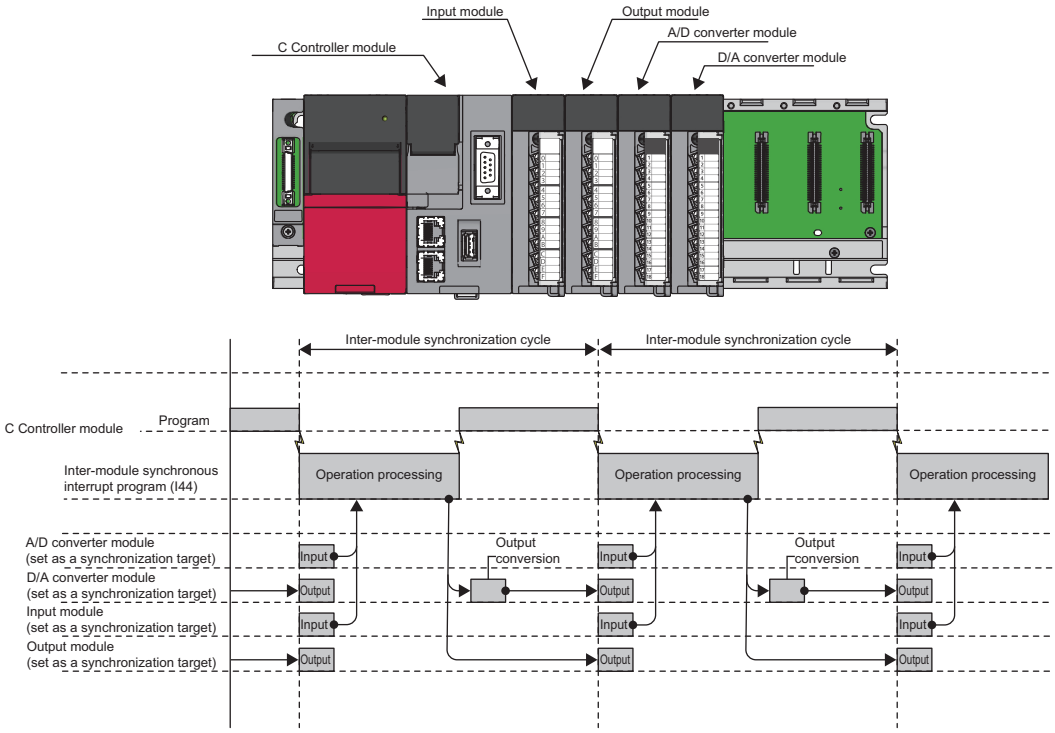
The interval can be obtained using the C Controller module dedicated function (CCPU_GetConstantProcessStatus).

Checking with special registers

The interval at which the function operates is stored in special registers (SD520/SD522/SD524). (☞ Page 176 Special Register List)

4.7 Inter-module Synchronization Function

The inter-module synchronization function is a function to adjust the input or output timing of modules to be synchronized to the inter-module synchronization cycle by matching the control timing of signals among multiple modules.



For details on the inter module synchronization function, refer to the following manual.

MELSEC iQ-R Inter-Module Synchronization Function Reference Manual

Fixed cycle synchronization function

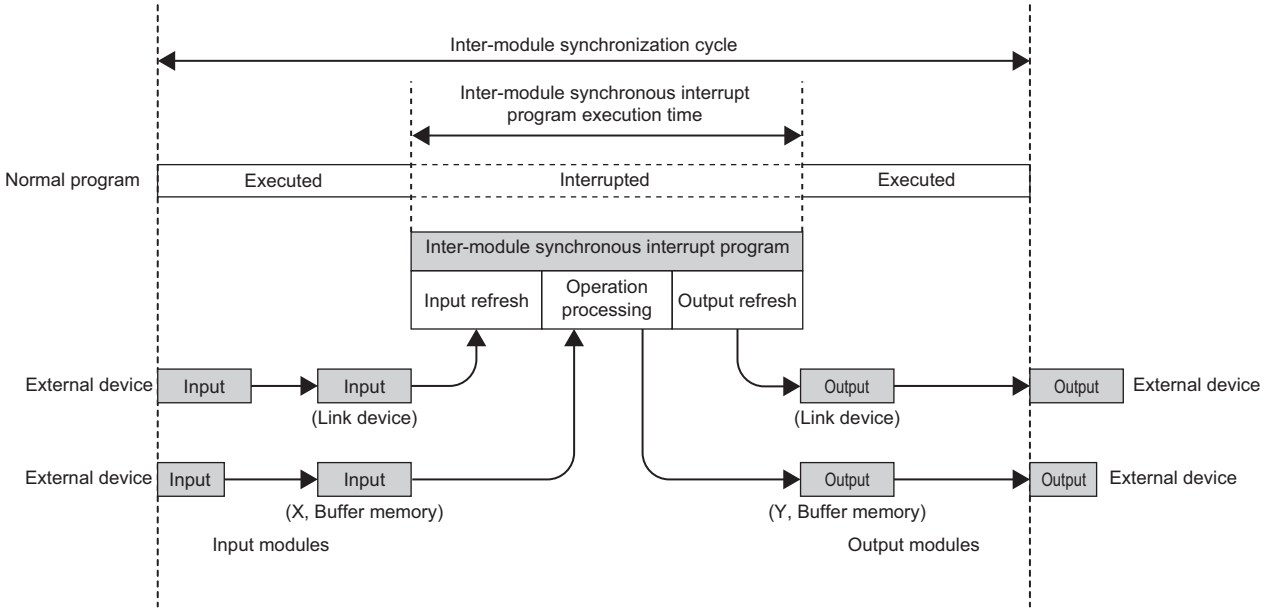
The fixed cycle synchronization function is a function to synchronize multiple modules at the timing of the inter-module synchronization cycle to perform data communication and input/output control at a fixed cycle. Using this function enables the accurate speed to be obtained by the encoder input at the fixed cycle, and also enables the highly accurate model prediction control by the accurately-tracked input/output timing.

Point

Although the shorter interval of the inter-module synchronization cycle provides the more accurate synchronous control, the size of program executable in the inter-module synchronous interrupt program will be smaller. By lengthening the interval of the inter-module synchronization cycle, the program with bigger size can be executed. However, the accuracy of the synchronous control will be reduced.
To use the fixed cycle synchronization function, consider the program size to be executed.

Synchronization timing of C Controller module

C Controller module executes the inter-module synchronous interrupt program (I44) at every inter-module synchronization cycle. Synchronization between C Controller module and respective modules is performed at the timing of refresh before and after the inter-module synchronous interrupt program (I44). This will enable C Controller module to import the input data and to write the output data at the timing of the inter-module synchronization cycle.



Inter-module synchronous interrupt

Interrupt programs are executed at the timing of the inter-module synchronization cycle set with the parameters. The interrupt programs executed at every inter-module synchronization cycle is referred to as the inter-module synchronous interrupt program (I44).

Point

- Describe the control programs to be synchronized in the inter-module synchronous interrupt program (I44).
- The operation when an interrupt factor arises and the program creation method are the same as normal interrupt program.

■Execution timing

The inter-module synchronous interrupt program (I44) is executed at the timing of the inter-module synchronization cycle. The inter-module synchronous interrupt program (I44) is registered using the interrupt function form module. (☞ Page 43 Interrupt Function from Modules)

Processing of inter-module synchronous interrupt program (I44)

The following describes the processing of the inter-module synchronous interrupt program (I44).

■Input refresh (CC-Link IE Field Network module)

At the input refresh, link devices (RX, RWr) are refreshed from the CC-Link IE Field Network module to be synchronized.

■Operation processing

- To import the input signal (X) and the input from the buffer memory, use the C Controller module dedicated functions (CCPU_X_In_Word_ISR, CCPU_FromBuf_ISR).
- To import the output signal (Y) and the output to the buffer memory, use the C Controller module dedicated functions (CCPU_Y_Out_Word_ISR, CCPU_ToBuf_ISR).

■Output refresh (CC-Link IE Field Network module)

In the output refresh, link devices (RY, RWw) are refreshed to the CC-Link IE Field Network module to be synchronized.

Refresh timing

The following describes the refresh timing depending on the operating status of C Controller module.

■Operation in the STOP state (RUN to STOP)

- C Controller module turns OFF the output when it is in the STOP state due to user operation (such as user program or switch operation). Refresh is performed continuously during the STOP state.
- C Controller module turns OFF the output and also stops the refresh when the stop error occurred because of any failure of C Controller module or respective modules.

Point

The inter-module synchronous interrupt program (I44) does not stop even if C Controller module is in the STOP state.

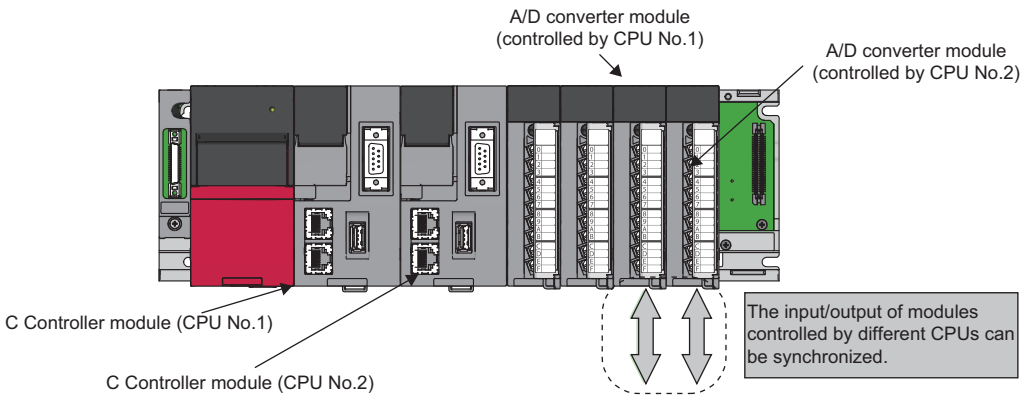
Precautions

When the system parameter of the inter-module synchronization function is rewritten while the C Controller module is in the STOP state, it will not applied by switching to the RUN state, and the C Controller module operates with the parameter before the rewrite.

Interaction with cycle of the fixed cycle communication of the multiple CPU system function

The cycle of the fixed cycle communication of the multiple CPU system function can be matched with the inter-module synchronization cycle.

By adjusting the cycle of the fixed cycle communication to the inter-module synchronization cycle, the input/output of modules having different control CPUs can be synchronized. The interaction with the multiple CPU system function is set with the parameter. (☞ Page 126 Fixed cycle communication setting)



Operation of program

Once the inter-module synchronization cycle is interacted with the cycle of the fixed cycle communication, a multiple CPU synchronous interrupt program (I45) and an inter-module synchronous interrupt program (I44) are executed in each inter-module synchronization cycle.

The multiple CPU synchronous interrupt program (I45) is executed first, and then the inter-module synchronous interrupt program (I44) is executed. Two inter-module synchronization cycles are required for data obtained by the host CPU to reach to the other CPUs, and delaying the output timing of the controlled module of the host CPU and the controlled module of other CPUs for two cycles is required for the output synchronized among CPU modules.

Point

For C Controller module, only the link devices of CC-Link IE Field Network module (RX, RY, RWr, and RWw) are refreshed at the 'input refresh' and 'output refresh' in an inter-module synchronous interrupt program. To import the I/O signals (X, Y) and the values from the buffer memory, use the C Controller module dedicated function.

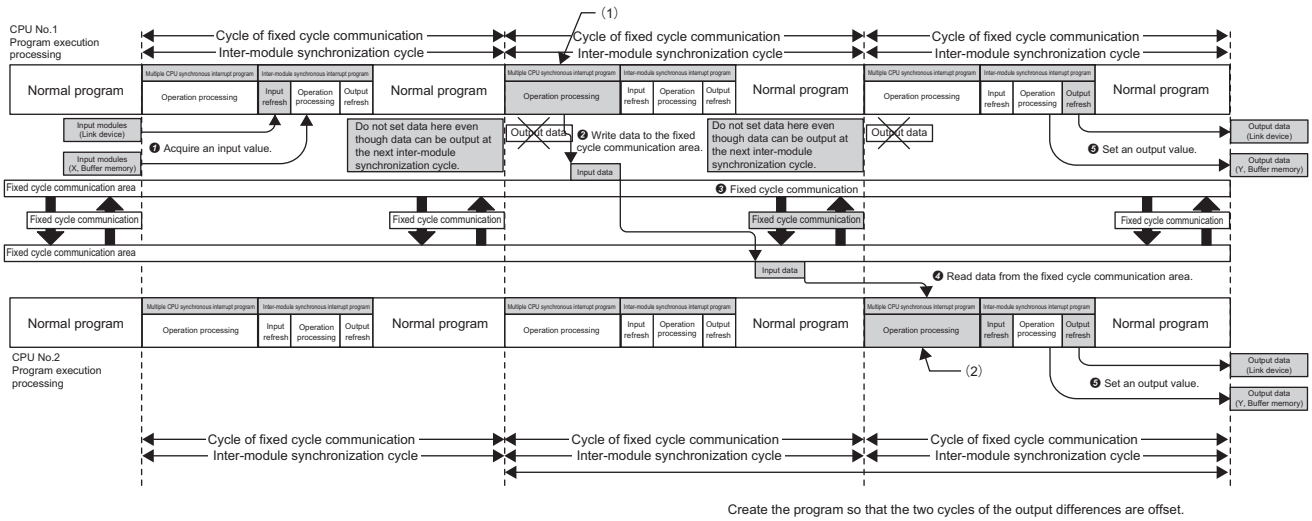
For details on processing of each interrupt program of C Controller module, refer to the following section.

• Inter-module synchronous interrupt program (I44)

☞ Page 48 Fixed cycle synchronization function

• Multiple CPU synchronous interrupt program (I45)

☞ Page 135 Multiple CPU synchronous interrupt



Create the program so that the two cycles of the output differences are offset.

(1): Write the input value to the fixed cycle communication area of CPU No.1.

(2): Set the output value by reading data from the fixed cycle communication area of CPU No.1.

Precautions

Considerations for interaction with cycle of fixed cycle communication are shown below:

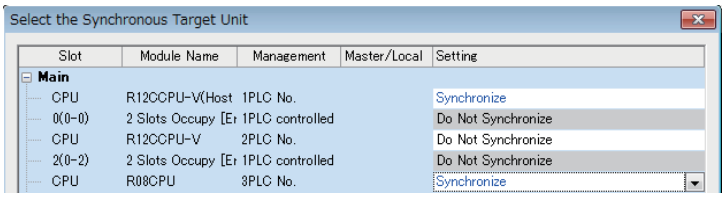
- Selecting "Use" for the inter-module synchronization function enable "Cooperate" to be selected for "Fixed Scan Communication Function and Inter-module Synchronization Function". It cannot be selected when "Not use" is selected for the inter-module synchronization function.
- Even if "I/O Setting Outside Group" is enabled in a program of other CPU, importing the input or output from the module to be synchronized is not available. Although it can be read by direct specification such as DX, DY, Un\Gn, or the C Controller module dedicated function (CCPU_FromBuf), inconsistency of data may occur.
- To adjust the start of the inter-module synchronization function among all CPUs, confirm that the inter-module synchronization function is available by checking the ready flag of CPU No.n from SM220 to SM223 turns ON. By using SM220 to SM222 in an interlock program, the start of the inter-module synchronization function can be matched among all CPUs.

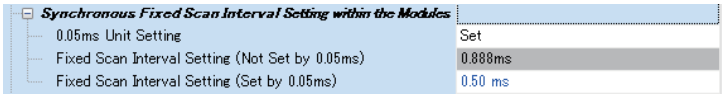
Parameter setting

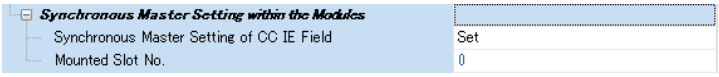
Set a module configuration diagram with CW Configurator to configure the inter-module synchronization setting.

[System Parameter] ⇨ "Synchronization Setting within the Modules" ⇨ "Synchronization Setting within the Modules"

Operating procedure







1. Select "Use" for "Use Inter-module Synchronization Function in System".
2. Click the "Detailed Setting" for "Select Synchronous Target Unit between Unit".
3. Select "Synchronize" for the module to be synchronized.
4. Set the inter-module synchronization cycle in "Synchronous Fixed Scan Interval Setting within the Modules".
5. When writing parameters, write both of the system parameter and module parameter.
6. Configure the setting for the synchronous master when a local station of CC-Link IE Field Network module is to be synchronized. (The setting is not required for a master station.)

Displayed items

Item		Description	Setting range	Default
Use Inter-module Synchronization Function in System		Set whether or not to use the inter-module synchronization function.	• Not Use • Use	Not Use
Select Synchronous Target Unit between Unit	Detailed Setting	Set the module to be synchronized.	• Do not Synchronize • Synchronize	Do not Synchronize
Synchronous Fixed Scan Interval Setting within the Modules*1	0.05ms Unit Setting	Set whether or not to set the inter-module synchronization cycle in 0.05 ms units.	• Not Set • Set	Not Set
	Fixed Scan Interval Setting (Not Set by 0.05ms)	Select the inter-module synchronization cycle from the list when it is not set in 0.05 ms units.	• 0.222ms • 0.444ms • 0.888ms • 1.777ms • 3.555ms • 7.111ms	0.888ms
	Fixed Scan Interval Setting (Set by 0.05ms)	Set the inter-module synchronization cycle when it is set in 0.05 ms units.	0.10 to 10.00 ms (in 0.05 ms units)	0.50ms
Synchronous Master Setting within the Modules	Synchronous Master Setting of CC IE Field	When "Set" is selected, a master station of CC-Link IE Field Network module is the synchronous master. When "Not Set" is selected, the CPU module (the leftmost CPU module for multiple CPU configuration) is the synchronous master.	• Not Set • Set	Not Set
	Mounted Slot No.	Set the mounting slot number for the master station of CC-Link IE Field Network module to be set as the synchronous master.	0 to 11	0

*1 The setting range for the inter-module synchronization cycle differs depending on modules. (Manual for respective modules)

Point

To interlink with the cycle of the fixed cycle communication of the multiple CPU system function, set "Fixed Scan Communication Function and Inter-module Synchronization Function" under "Fixed Scan Communication Setting" to "Cooperate". (☞ Page 126 Data Communication Between CPU Modules)

4.8 Output Mode Setting Function from STOP to RUN

This function sets the mode of the output (Y) when C Controller module operating status is switched from STOP to RUN.

[CPU Parameter] ⇨ "Operation Related Setting" ⇨ "Output Mode Setting of STOP to RUN"

Window

Displayed items

Item	Description	Setting range	Default
Output Mode Setting of STOP to RUN	Set the operation of the output (Y) when the operating status is switched from STOP to RUN.	• Output the Output (Y) Status before STOP • Clear the Output (Y)	Output the Output (Y) Status before STOP

Output the Output (Y) Status before STOP

After the output (Y) status before the operating status turns into STOP state is output, the user program is executed.

Clearing output (Y)

The output (Y) is turned OFF, and the output (Y) status is output after the program operations are executed.

Precautions

The following shows the considerations on outputs when changing the status from STOP to RUN after forcing the output (Y) ON at STOP status.

■When "Output the Output (Y) Status before STOP" is selected

- When the output (Y) is forced ON when the operating status is STOP, the status before it stopped is output.
- If the output (Y) is OFF before entering the STOP state, the ON state is not retained.

■When "Clear the Output (Y)" is selected

- When the output (Y) is forced ON when the operating status is STOP, the ON state is retained.

4.9 Memory Card Function

This section explains the functions that use an SD memory card.

Boot operation

The files stored on the SD memory card are transferred to the storage memory which is automatically determined by the C Controller module when the module is powered OFF → ON or reset.

Point

To perform the boot operation, enabling "Memory card parameter execution" under "Service Settings" is required. (☞ Page 65 Service settings)

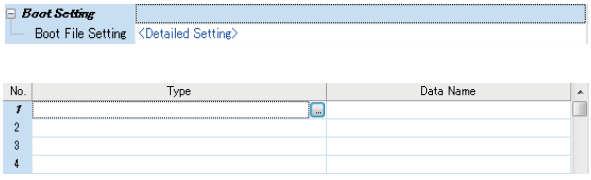
Boot operation procedure

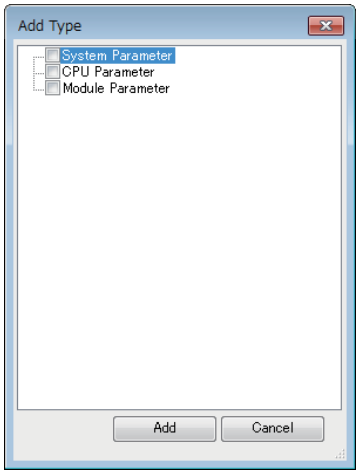
1. Configure the boot setting.
2. Insert an SD memory card.
3. Write the boot setting and boot file on the SD memory card.
4. Power OFF → ON or reset the C Controller module.

Boot setting

[Memory Card Parameter] → [Boot Setting]

Operating procedure





1. Click "<Detailed Setting>" in "Boot File Setting".
2. Click on the "Type" column. The maximum number of boot files that can be specified is the same as the number of files that can be stored in the storage memory.
3. Select the type for the boot file. (Two or more parameters can be selected.)
4. Click the [Add] button to add the file(s).

Displayed items

Item	Description	Setting range	Default
Boot File Setting	Set the file used for boot operation from the SD memory card.	—	—

Maximum number of boot files allowed

The maximum number of boot files allowed is 512. However, the maximum number of boot files is the same as the number of files possible to be stored in the transfer destination memory because more than one file is bootable for a single setting.

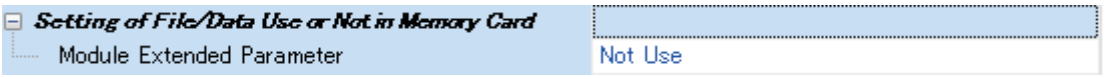
Precautions

- When a parameter file is set as a boot file, the parameter file in the transfer destination C Controller module is overwritten. In addition, if a parameter file is not set as a boot file even when it is stored on the SD memory card, the CPU module operates in accordance with the settings in the parameter file in it.

Enable/disable the use of file/data on memory card

Set whether to use files/data stored on a memory card.

Window



Displayed items

Item	Description	Setting range	Default
Module Extended Parameter	Set whether to use the module extended parameters stored on the SD memory card.	• Not Use • Use	Not Use

4.10 RAS Function

Self-diagnostic function

This function is for C Controller module to diagnose the presence of any abnormality by itself.

Self-diagnostics timing

If an error occurred when the C Controller module is powered ON or while it is in the RUN/STOP state, the detected error information is displayed, and the operation is stopped.

Point

However, depending on the error occurrence status or the instruction to execute, the C Controller module may not be able to detect the error. Configure safety circuits external to the system to ensure that the entire system operates safely even in such a case.

Error checking methods

The following are the error checking methods.

■Checking with special relays or special registers

When C Controller module detects any error, the special relays (SM0, SM1) turns ON, and an error code corresponding to the error is stored in the special register (SD0). If more than one error is detected, the latest error code is stored in the special register (SD0). Use the special relay (SM0, SM1) and special register (SD0) in the program for the C Controller module or mechanical interlock. In addition, up to 16 error codes (latest errors occurred on the system) will be stored in the special registers (SD10 to SD25). (The error codes for the 17th and onwards will not be stored.)

■Checking with CW Configurator

The error occurrence of the entire system, latest errors occurred, and event history can be checked on the module diagnostic screen. (📖 CW Configurator Operating Manual)

- In the C Controller module, maximum 16 latest errors occurred can be displayed. In addition, if an additional error occurs after a stop error, the error information is not updated.
- Error logs can be checked using the event history function. (☞ Page 60 Event history function)

Point

The maximum number of continuation errors and stop errors to be displayed is 15 and 2 respectively. If already 15 continuation errors have been displayed, then next continuation error will not be displayed. If the error of the same code has been displayed, the date and time of occurrence and the detailed information about the relevant error is updated.

Operation at error detection of Intelligent function module

If an error is detected with the self-diagnostic function, C Controller module operates in accordance with the setting of "CPU Module Operation Setting at Error Detected" as follows. (☞ Page 57 Operation setting upon an error detection in Intelligent function module)

■When "Stop" is selected in "CPU Module Operation Setting at Error Detected"

When an error is detected, the operation depends on the setting of "Output Mode upon CPU Error" in the Module Parameter of each module.

- When "Clear" is set: Output to the corresponding module is turned OFF.
- When "Hold" is set: Output to the corresponding module is retained.

Point

For the setting method of module parameter, refer to the manual for each module.

■When "Continue" is selected in "CPU Module Operation Setting at Error Detected"

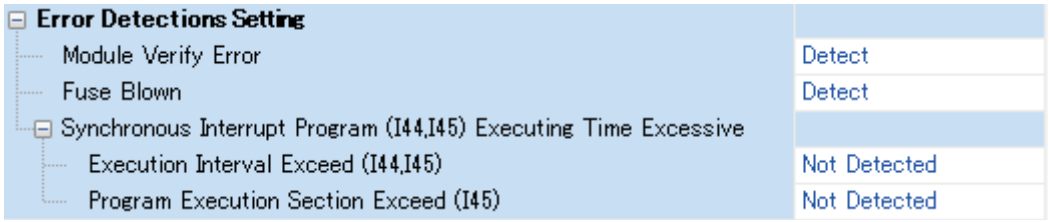
C Controller module does not stop.

Error Detections Setting

Set whether the error is detected.

[CPU Parameter] ⇨ "RAS Setting" ⇨ "Error Detections Setting"

Window



Displayed items

Item		Description	Setting range	Default
Module Verify Error*1		Set whether to detect the module verification error.	• Detect • Not Detected	Detect
Fuse Blown		Set whether to detect the fuse blown in the controlled module.		
Synchronous Interrupt Program (I44, I45) Executing Time Excessive	Execution Interval Exceed (I44, I45)	Set whether to detect the excessive execution time (I44, I45).		Not Detected
	Program Execution Section Exceed (I45)	Set whether to detect the program execution section exceed errors (I45).		

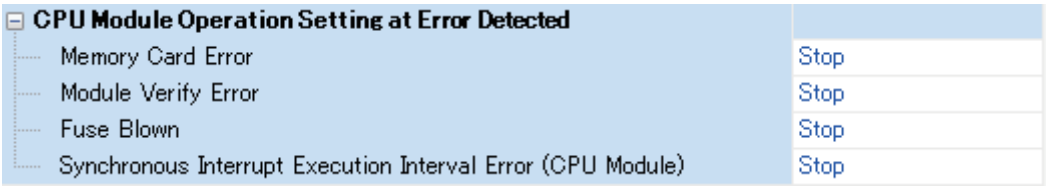
*1 If an operating module in which "Not Detected" is selected in the parameter is removed, a module verification error is not detected, however, a stop error may occur if accessing the removed module by using programs, etc. Since the removed module is not accessible even if it is mounted again, accessing the module by changing the module status from STOP to RUN may result in a stop error.

Operation settings when an error is detected

Set the operation of C Controller module when an error is detected.

[CPU Parameter] ⇨ "RAS Setting" ⇨ "CPU Module Operation Setting at Error Detected"

Window



Displayed items

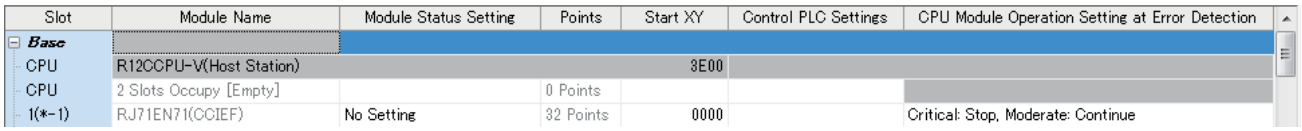
Item	Description	Setting range	Default
Memory Card Error	Set the C Controller module operation upon a memory card error.	• Stops • Continues	Stops
Module Verify Error	Set the C Controller module operation upon a module verification error.		
Fuse Blown	Set the C Controller module operation upon fuse blown error.		
Synchronous Interrupt Execution Interval Error (CPU Module)	Set the operation of CPU module at a synchronous interrupt execution interval error.		

Operation setting upon an error detection in Intelligent function module

The operation of C Controller module when an error occurred in an Intelligent function module will be determined with the parameter setting of "CPU Module Operation Setting at Error Detected" under "I/O Assignment Setting".

[System Parameter] ⇨ [I/O Assignment Setting] ⇨ "I/O Assignment Setting"

Window



Displayed items

Item	Description	Setting range	Default
CPU Module Operation Setting at Error Detection	Set the operation of C Controller module at the detection of a major error or moderate error in the configured module.	• Critical: Stop, Moderate: Continue • Critical: Stop, Moderate: Stop • Critical: Continue, Moderate: Continue	Critical: Stop, Moderate: Stop

LED display setting

Sets whether to turn the ERROR LED ON/OFF.

[CPU Parameter] ⇨ [RAS Setting] ⇨ "LED Display Setting"

Window

Displayed items

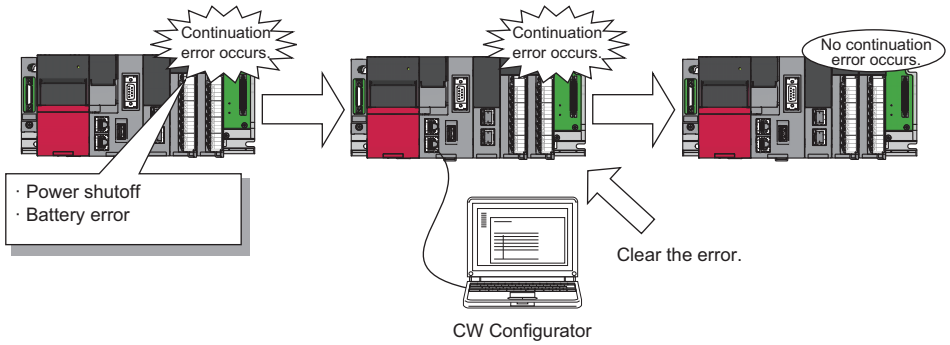
Item		Description	Setting range	Default
ERROR LED	Minor Error (Continue Error)	Set whether to turn the ERROR LED ON when a minor error occurred.	• Display • Do Not Display	Display

Operation settings at stop error in multiple CPU function

Set whether to stop all CPUs when a major or moderate error occurs on each CPU in a multiple CPU configuration. (☞ Page 118 Stop setting)

Error clear function

This function clears all the existing continuation errors at once.



Error that can be cleared

Only the following continuation errors can be cleared.

Error code	Error name
1000H	Power shutoff
1080H	ROM write count error
1100H	Memory card access error
1120H	SNTP clock setting error
1124H	Default gateway/gateway IP address error
1128H	Own node port number error
1129H	Open specification port number error
112DH	Specified IP address error
112EH	Connection establishment failed
1133H	Socket communications response send error
1134H	TCP connection timeout
1152H	IP address error
1155H	Connection number acquisition error
1157H	Receive buffer securement error
1165H	UDP/IP send failed
1166H	TCP/IP send failed
1167H	Unsend data send error
1200H, 1210H	Module moderate error
1220H	Other CPU module moderate error
1240H, 1241H	Inter-module synchronization processing error
1260H, 1262H	Multiple CPU synchronization processing error
1830H	Receive queue full
1831H	Receive processing error
1832H	Transient data error
1840H	Memory card error
1843H	Internal buttery failure
1846H	Refresh cycle exceeded
2120H, 2121H	Memory card error
2400H, 2401H	Module verification error
2420H	Fuse blown error
2441H, 2442H	Module major error
2450H	Detection of module major error
2461H, 2462H	Other CPU module major error
2470H	Other CPU module major error
2610H	Inter-module synchronization signal error

Error code	Error name
2630H	Multiple CPU synchronization signal error

Method for clearing error

The following shows how to clear errors.

■Using CW Configurator

Clear errors with the module diagnostic function of CW Configurator. (📖 CW Configurator Operating Manual)

■Using user programs

1. Check the continuation error detected by the C Controller module dedicated function (CCPU_GetErrInfo).
2. Clear the cause of the currently detected continuation errors.
3. Execute the C Controller module dedicated function (CCPU_ClearError).

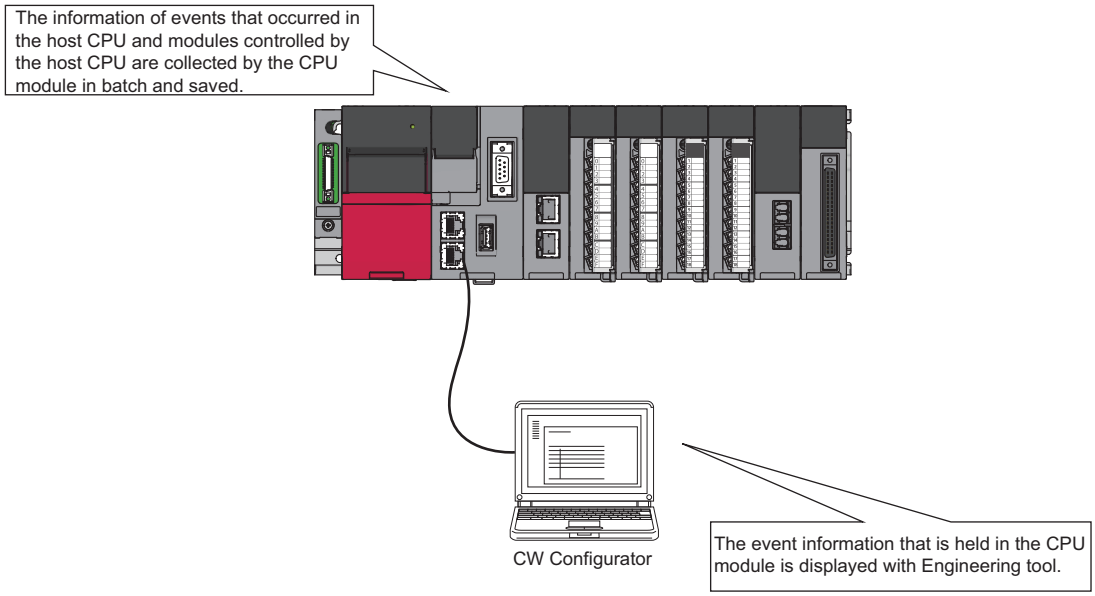
Precautions

- Since this function clears all the detected continuation errors at once, unintended errors may also get cleared.
- This function does not remove the cleared errors from the event history.
- Any errors occurred in a module other than the C Controller module cannot be cleared by this function.

Event history function

C Controller module collects and saves the error information such as errors detected by the module, operations done for the module, and network errors from each module. The saved operation and error occurrence information can be checked and viewed in chronological order.

Using this function enables to investigate the problems that have occurred in the equipment/devices, check the update related to control data in C Controller system, and detect any unauthorized access.



Point

The event history information is constantly collected regardless of the operating state of the C Controller module. In some cases; however, the event history information may not be collected due to a major error in a module, a base unit error, a cable failure, or others.

Event history settings

Under normal circumstances, the event history function can be used with its default settings and doesn't need to be manually configured. The storage memory and file size of the event history file can be changed if desired.

[CPU Parameter] ⇨ [RAS Setting] ⇨ "Event History Setting"

Window

Displayed items

Item	Description	Setting range	Default
Save Destination	Specify the storage destination of event history files.	• Data Memory • Memory Card	Data Memory
Set Save Volume of Per File	Specify the storage capacity per event history file.	1 to 2048 KB	128 KB

■Registration from user program

Event logs can be registered from a user program by executing the C Controller module dedicated function (CCPU_RegistEventLog). In this case, the event type will be "Operation".

Saving event history

■Modules from which event history information is collected

Event history information is collected from the C Controller module and other modules mounted on the same Base unit (such as the main base unit and any additional extension base units). Event history information may or may not be collected from devices on the network depending on the specifications of the Network modules used to connect to them. For more information including the coverage of event history collection regarding devices on the network, refer to the manual of each module. For a multiple CPU system, each CPU logs only events detected on the modules under its control.

■Events to be saved

The detailed information such as the operation initiator information are saved for troubleshooting purpose when the event history is saved. For the event to be saved as the event history by C Controller module, refer to the event list. (☞ Page 60 Event history function)

Event history file

The storage destination memory and file size for event history files can be changed in the event history setting. (☞ Page 60 Event history settings)

■Storage destination memory

The storage destination memory is set to either the data memory or SD memory card.
When an SD memory card is selected, disable the write protect switch of the SD memory card. If it is enabled, an event history will not be stored. (Reading the event history file in the SD memory card using CW Configurator is possible.)
If the write protect switch of SD memory card is enabled, the write error will occur, because, during system operation, an attempt to write an event occurred will failed as the write protect switch is enabled. An error can be checked with the Module Diagnostic function immediately after the error occurred, but the same information can not be checked after power cycle or reset since errors are not saved.

Point

For a system for which file write occurs frequently or the system of which state frequently changes because of the unstable communication, the file size of the event history must be larger enough to store a greater number of events. In this case, using an SD memory card is recommended as the storage memory.

■File size

If the specified size is exceeded, the records are deleted from the oldest one and the latest one is stored.
An event history file size is obtained using the following calculation formula.

- File size = File header size + Event history management information size + Number of records × Size per event history record

The sizes of each element are as follows:

Element name	Size
File header size	20 bytes
Event history management information size	12 bytes
Size per event history record*1	40 to 1112 bytes

*1 Since the events which overlaps multiple records exist depending on the event to be saved, a file size per one record will be changed.

■Conditions for collecting events

C Controller module collects event history regardless of the operating status (RUN/STOP/PAUSE/STOP error), however, the event history may not be collected under the following conditions.

- Major error
- Base unit error
- Cable failure

■Timing of file creation

An event history file is created when:

- At power OFF → ON (no event history file exists/after the change of event history settings)
- At reset (no event history file/after the change of the event history settings)
- At initialization of memory
- At registration of event history (no event history file exists)

Point

When a new event history file is created, the event that indicates a new file creation is saved.

The following shows the operations of the event history when the storage memory is an SD memory card.

Operation	Operation of event history
Removal of the SD memory card	When the memory initialization event occurs, the event history is stored in the internal memory. If the internal memory reaches the maximum allowable number for saving event history, all subsequent events will be dropped.
Insertion of an SD memory card	The event history, which have been stored in the internal memory during absence of the SD memory card, is stored to the SD memory card. If the re-inserted SD memory card contains an event history file of the same file size, the C Controller module continues to store the event history information. If the file size is different, the C Controller module removes the existing event history file and creates a new event history file.

■Parameter reflection timing

The changed parameters will be enabled at any of the following timing.

- Power cycle
- Reset

Point

If the C Controller module operating status is changed from STOP to RUN after writing the changed parameters, the changed parameters will not be enabled. The changed parameters are enabled only after power cycle or reset of the C Controller module.

Event dropping

If the event are detected frequently, some events may be dropped. In this case, the event code (*HST LOSS*) which indicates that the event is dropped is displayed.

Point

If the C Controller module is powered OFF or reset while sampling event history, the status of the source module will be unknown. Therefore, the event code (*HST LOSS*) may be displayed and the source module is not displayed.

Displaying event history

The event history can be displayed using the menus of CW Configurator. For details on the operating procedures and how to read the displayed information, refer to the following manual.

CW Configurator Operating Manual

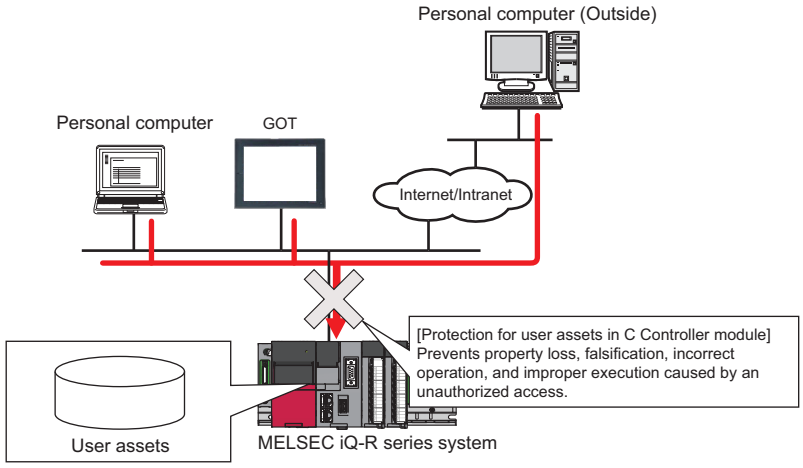
Clearing event history

The event history can be cleared on the event history window. Once the event history is cleared, all the event history stored in the specified storage memory is deleted. For details on the operating procedures, refer to the following manual.

CW Configurator Operating Manual

4.11 Security Function

This function prevents the assets stored in a personal computer or C Controller module in the MELSEC iQ-R series system from being stolen, falsified, operated incorrectly, or executed improperly due to an unauthorized access.
Apply an appropriate security function in accordance with the situation.



Individual identification information

The individual identification information of C Controller module can be read with the C Controller module dedicated function (CCPU_GetIDInfo). By implementing the activation function with a user program, the user program, which does not run in the C Controller module with other individual identification information, can be created.
For C Controller module dedicated functions, refer to the following manual.
📖 MELSEC iQ-R C Controller Module Programming Manual

File access restriction

By setting a file attribute (system file attribute or hidden file attribute) for the files under the following types of memory, alteration of the target file from an unauthorized user and data leakage to outsider can be prevented.

- Program memory
- Data memory
- SD memory card
- USB Mass Storage Class-compliant device

Point

- If the SD memory card and the USB Mass Storage Class-compliant device is inserted to a device other than C Controller module (such as a personal computer), all the files will be accessible. For restricting the access to the files in the SD memory card and the USB Mass Storage Class-compliant device, take appropriate measures so that the SD memory card and the USB Mass Storage Class-compliant device cannot be removed from C Controller module at will.
- Access restriction cannot be set for folders.

Setting access restriction

Change the file attribute using the security password set with CW Configurator.

For details on attrib() command, refer to the manual of VxWorks.

[CPU Parameter] ⇨ "Service Settings" ⇨ "Security password settings"

■Setting file attribute

Set an attribute to the file to be protected by using attrib() command.

The file attributes that can be handled in C Controller module are as follows.

Attribute		Description
S	System file attribute	When file access restriction is set, file operations can be prohibited.
R	Read-only attribute*1	File deletion and data write can be prohibited.
H	Hidden file attribute*2	When file access restriction is set, the file is not displayed to ls command or list of FTP file.

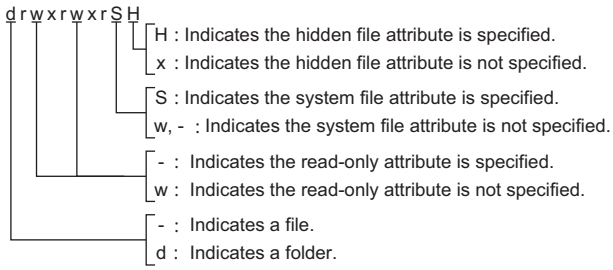
*1 File deletion and file write can be prohibited, however, this attribute is not supported by the file access restriction function.

*2 A file operation can be performed when the file name is specified directly. To prohibit file operations, add a system file attribute.

■Checking file attribute

To check the file attribute, use attrib() command.

The identification method of the output attribute is as follows:



Changing access restriction

Change the access restriction by using a shell command, script file, or C Controller module dedicated function. The security password set with CW Configurator is required.

■Changing system file attribute

The file restriction is required to be cancelled temporarily with the C Controller module dedicated function (CCPU_ChangeFileSecurity). When setting a system file attribute again, set the access restriction with the C Controller module dedicated function (CCPU_ChangeFileSecurity) or reset the C Controller module.

Point

- When accessing a file to which a system file attribute is attached in the script file "STARTUP.CMD", cancel the access restriction in the script file. In this case, add the system file attribute to the script file in order to prevent the leakage of the password.
- Do not use the files with the system file attribute attached in the script file on an SD memory card in order to prevent the leakage of password.

Checking access restrictions

Check the status of the access restriction by executing a shell command or the C Controller module dedicated function (CCPU_GetFileSecurity).

Point

The status of access restriction cannot be checked on a script file.

Precautions

■Countermeasures against illegal access from external parties

To maintain the safety of C Controller module, take appropriate measures.

■If the security password has been forgotten

Initialize the C Controller module. For the method on initialization, refer to the following manual.

MELSEC iQ-R C Controller Module User's Manual (Startup)

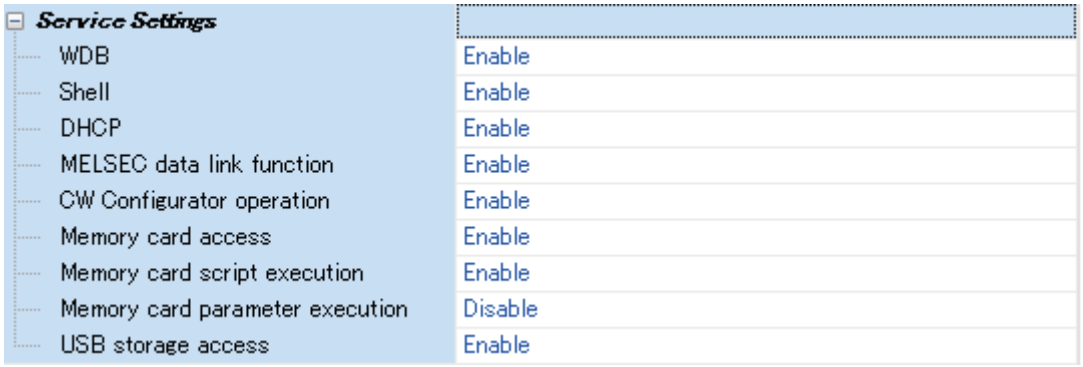
Service settings

By restricting the services on C Controller module, an illegal access from other users can be prevented.

A security password is required for changing service settings. (MELSEC iQ-R C Controller Module User's Manual (Startup))

[CPU Parameter] ⇨ "Service Settings" ⇨ "Service Settings"

Window



Displayed items

Service	Description	Setting range	Default
WDB	Required for the connection with CW Workbench.	• Disable • Enable	Enable
Shell	Required for the execution of commands.		
DHCP	Required when using a function which assigns the network settings automatically.		
MELSEC data link function	Required when performing MELSEC communication.		
CW Configurator operation	A service required for the operation of CW Configurator. If this service is disabled, the following operations cannot be performed. • Writing data to C Controller module • Reading data from C Controller module • Verifying data with C Controller module • Deleting data in C Controller module • CPU memory operation (Initialization)		
Memory card access	Required when accessing a memory card.		
Memory card script execution	Required when executing a script file "STARTUP.CMD" stored in a memory card.		
Memory card parameter execution*1	Required when performing parameters stored in a memory card.		Disable
USB storage access	Required when accessing USB devices.		Enable

*1 When changing the service, write parameters to the data memory. If the parameters are written to the memory card, the setting of the service is not changed.

Precautions

■CW Configurator operation

When the CW Configurator operation is disabled, the parameters cannot be set. To enable the service, initialize C Controller module.

■Memory card parameter execution

To select an SD memory card as a target memory of the parameters, enable "Memory card parameter execution". ("Disable" is selected as a default.)

■Stopping multiple services

When the memory card access is disabled, the memory card script execution will be disabled as well.

Locked out

If the password authentication failed for several times, the password authentication will be denied (locked out) for a period of time. This prevents a brute force attack from unauthorized users.

Lockout time

The lockout time is as follows:

Number of password input error*1	Lockout time
1st time to 5th time	0 minute
6th time	1 minutes
7th time	5 minutes
8th time	15 minutes
9th time or later	60 minutes

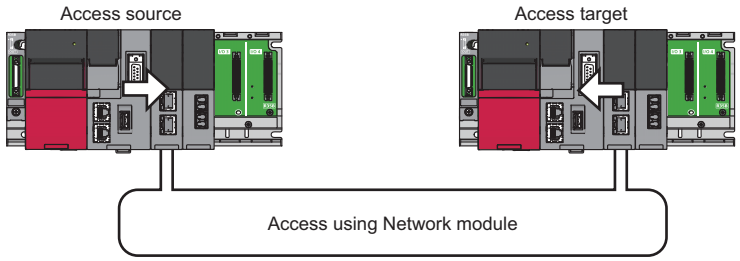
*1 Once the correct password is entered, the number of password input error will be cleared.

Point

- The password input error will not be counted during lockout. Therefore, the lockout time will not be extended additionally by one minute even if the 7th input error occurs before one minute has passed since the 6th.
- When the security setting is configured using the C Controller module dedicated function (CCPU_ChangeFileSecurity), the password authentication will not be locked out.

5 ACCESS FUNCTION USING NETWORK MODULE

C Controller module can perform data communication with a device connected to a network via each Network module.



Point

In multiple CPU system configuration, the access via a Network module which is controlled by other CPU is not available.

Applicable Network modules

Network modules that can be controlled by C Controller module are as follows:

- CC-Link IE Controller Network module
- CC-Link IE Field Network module
- CC-Link module

For the module model names, refer to the following manual.

MELSEC iQ-R C Controller Module User's Manual (Startup)

Network parameter

To use a Network module, setting of "Module Parameter" of the particular Network module is required. To perform this settings, refer to the user's manual of the respective Network modules.

5.1 Data Communication via Network

This section explains how to perform data communication using C Controller module on each network.

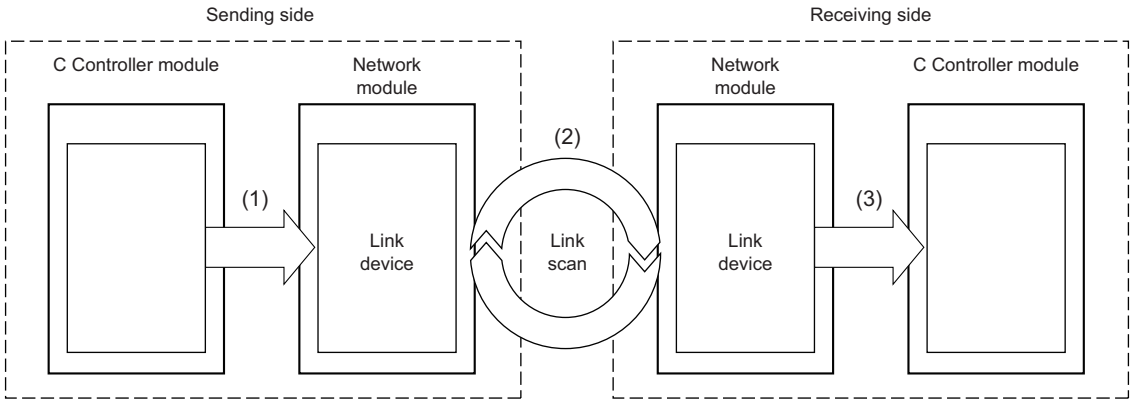
Transmission type	Description	Communication method
Cyclic transmission	Performs data communication periodically between stations on a network using link devices.	Uses link devices of the own station Network module controlled by C Controller module.
Transient transmission	Performs data communication between other station when the communication request is issued. Communication with different network can also be performed.	Uses devices or buffer memory in the other station Network module via network.

5.2 Cyclic Transmission

This section explains the specifications of the cyclic transmission when using C Controller module.

Data flow

The following shows the data flow at cyclic transmission.



(1): The sending side C Controller module writes data to the link device of the Network module.

(2): Data in the sending side link device is stored to the receiving side link device by link scan.

(3): The receiving side C Controller module reads data from the link device of the Network module.

■Link device

Link device is used for sharing data in Network module with other station on the network. The data in each station is updated every link scan.

○: Applicable, ×: Not applicable

Link device		CC-Link IE Controller Network	CC-Link IE Field Network	CC-Link
Link input	LX	○	×	×
Link output	LY	○	×	×
Link relay	LB	○	×	×
Link register	LW	○	×	×
Remote input	RX	×	○	○
Remote output	RY	×	○	○
Remote register	RWw	×	○	○
	RWr	×	○	○
Link special relay	SB	○	○	○
Link special register	SW	○	○	○

■Link scan and link scan time

In cyclic transmission, each station on the network transmits data in the specified send area of the own station within the defined time interval. The processing of data transmission of each station is called as link scan. The authority of data transmission is given to each station during every link scan. Time required for one-cycle of data transmission i.e. one link scan is called as link scan time.

To perform link scan on the network, network range assignment settings are required.

■Network range assignment

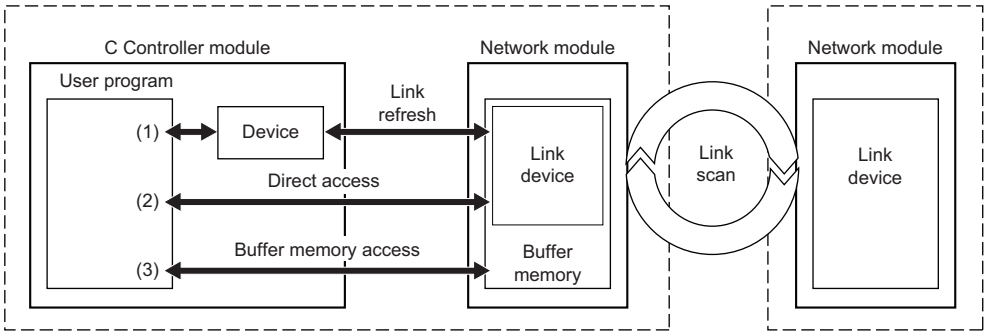
Network range assignment settings are applicable to following networks:

Network name	Setting item
CC-Link IE Controller Network	"Network Range Assignment" of the control station
CC-Link IE Field Network	"Network Configuration Settings" of the master station
CC-Link	"Network Configuration Settings" of the master station

■Link device access function

The link devices can be accessed from user program using function(s) of dedicated function library.

The following figure shows and explains how to access the link device in the controlled Network module from C Controller module.



Transmission type		Description	Data
(1)	Access by link refresh	A method to access devices of C Controller module from a user program. The data in the devices are communicated with the link devices in Network module by link refresh.	• Frequently used link device • Link device that requires station-based block data assurance
(2)	Direct access	A method to access link devices in Network module directly from a user program.	• Rarely used link device
(3)	Buffer memory access	A method to access the buffer memory in Network module from a user program.	

Point

Excluding rarely used link device from link refresh device area and not using access by link refresh may reduce link refresh time.

■Applicable access methods

The applicable methods to access controlled Network module from C Controller module are shown below.

○: Applicable, ×: Not applicable

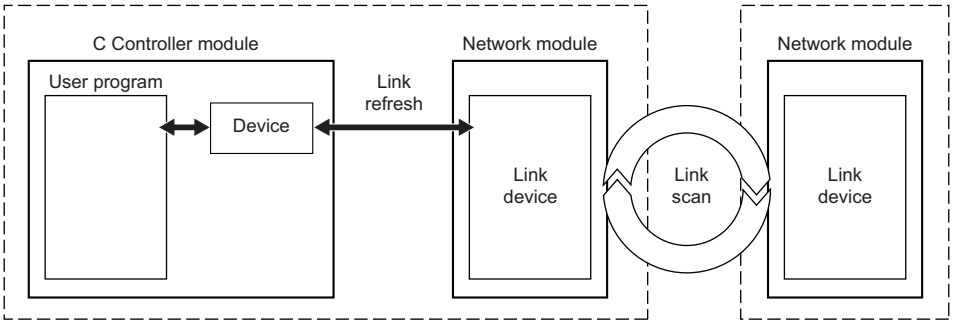
Transmission type	CC-Link IE Controller Network	CC-Link IE Field Network	CC-Link
Access by link refresh	○	○	×
Direct access	○	○	×
Buffer memory access	×	○	○

Access by link refresh

This method is used to access the device of C Controller module from user program using link refresh.

Data flow

The following figure shows and explains the data flow of link refresh.



■Device

C Controller module uses the following devices to share the data with Network modules.

Device		Number of points	Range of use
Internal relay	M	61440 points	M0 to 61439
Link relay	B	655360 points	B0 to 9FFFF
Data register	D	4184064 points	D0 to 4184063
Link register	W	1048576 points	W0 to WFFFFF
File register	ZR	1835008 points	ZR0 to 1835007

■Link refresh and its refresh cycle

The processing of data communication between devices of C Controller module and link devices of Network module is called as link refresh. The link refresh is performed in every refresh cycle of C Controller module. (☞ Page 46 Fixed Cycle Processing Function)

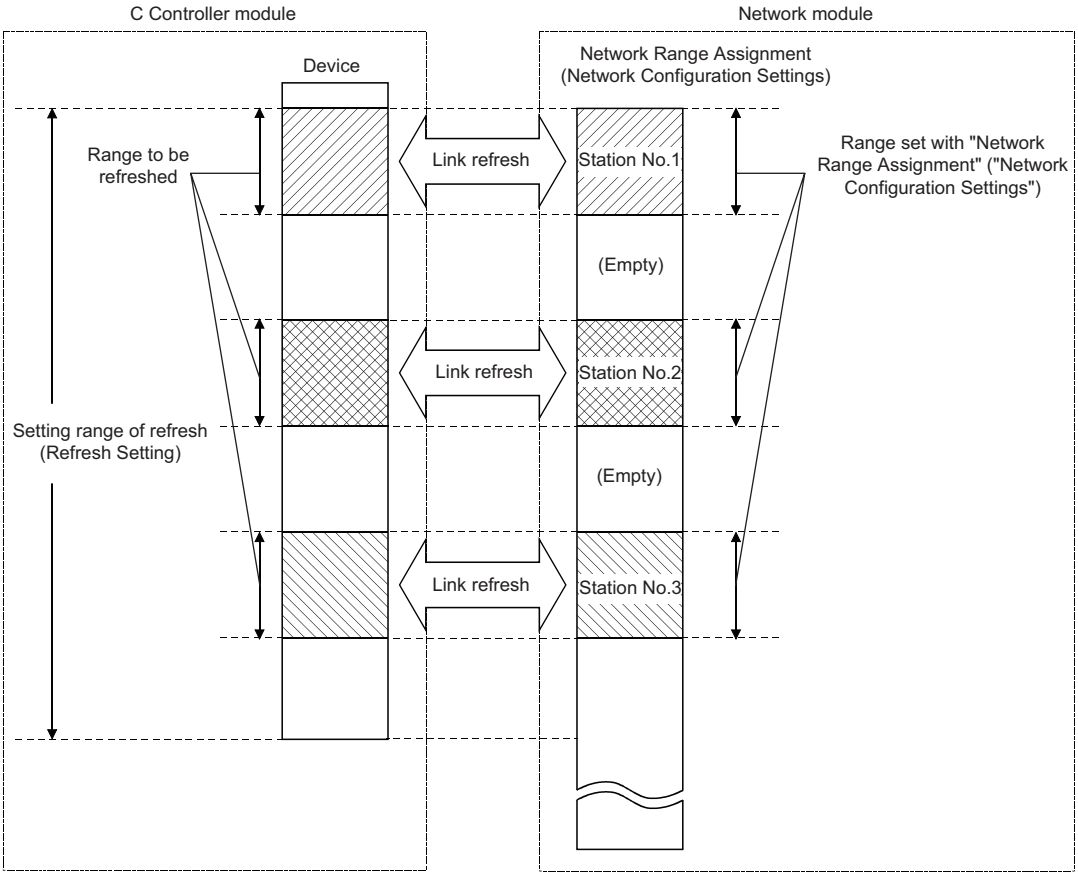
■Parameter setting

When performing link refresh, set the following parameters.

- "Refresh Setting" and "Network Configuration Settings" of each Network module
- Station-based block data assurance setting

■Refresh range

Refresh is performed for the range set in "Refresh Setting" and "Network Range Assignment" ("Network Configuration Settings"). For the access by link refresh, specify the devices within the refresh range.

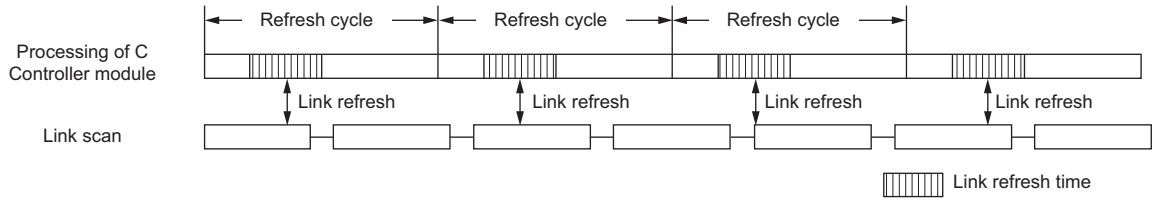


■Assurance of cyclic data consistency (Station-based block data assurance)

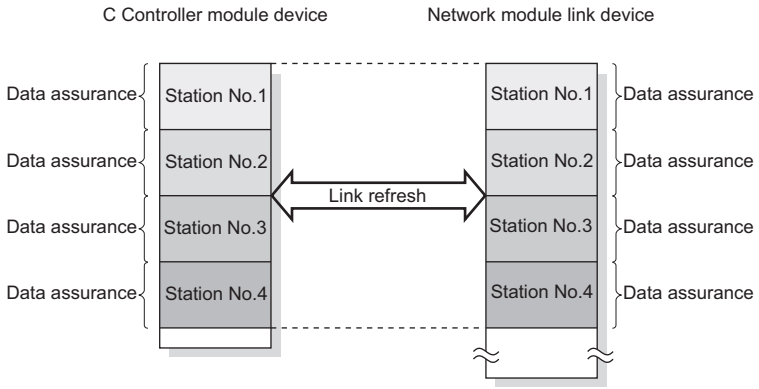
The station-based block data assurance function prevents overlapping of previous link scan data and new link scan data in one station data.

Point

Link scan is performed asynchronous to link refresh in the C Controller module. Therefore, if 32-bit or more cyclic data is handled, new data and old data may overlap due to the timing of link refresh.



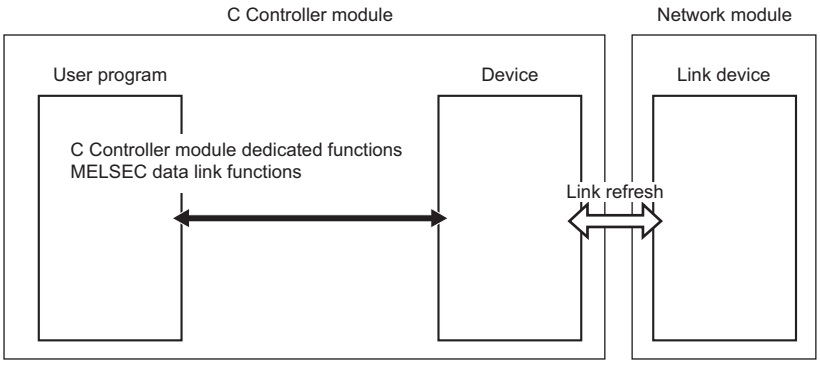
When the setting of station-based block data assurance is configured, cyclic data is assured in station units since the C Controller module does refresh cycle with Network module by handshaking.



For details of station-based block data assurance function and the other data assurance functions, refer to the user's manual for each Network module.

■Functions to be used

The devices can be accessed from user program using function(s) of dedicated function library.



Following are the functions used to access devices by link refresh.

Dedicated function library	Description
CCPU_WriteDevice	Writes data to devices and internal system devices of C Controller module.
CCPU_ReadDevice	Reads data from devices and internal system devices of C Controller module.
mdDevRstEx	Resets (turns OFF) bit device(s).
mdDevSetEx	Sets (turns ON) bit device(s).
mdRandREx	Reads device(s) randomly.
mdRandWEx	Writes device(s) randomly.
mdReceiveEx	Reads devices in batch.
mdSendEx	Writes devices in batch.

Precautions

When the station-based block data assurance function is enabled, access the devices using the CCPU_WriteDevice/CCPU_ReadDevice function. If the mdSendEx/mdReceiveEx/mdRandWEx/mdRandREx function is used, inconsistency of data may occur.

■Devices specified with a function

Devices corresponding to each link device are shown below.

In the dedicated function library, specify the device type with the device name defined for each function.

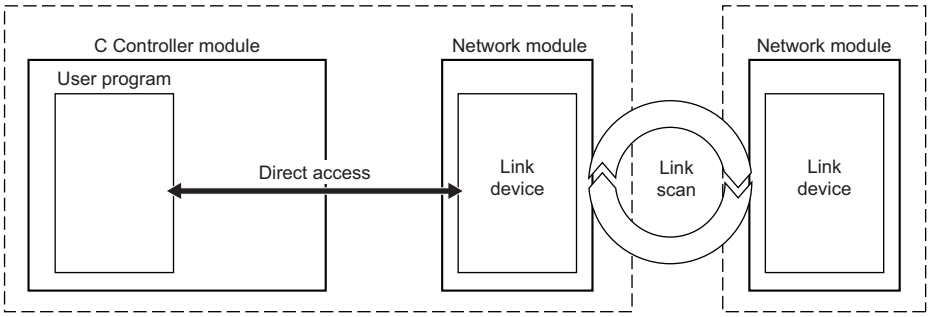
Link device		Device	C Controller module dedicated function	MELSEC data link function
Link input	LX	M, B, D, W, ZR	Dev_CCPU_M Dev_CCPU_B Dev_CCPU_D Dev_CCPU_W Dev_CCPU_ZR	DevM DevB DevD DevW DevZR
Link output	LY			
Link relay	LB			
Link register	LW			
Remote input	RX			
Remote output	RY			
Remote register	RWw			
	RWr			
Link special relay	SB	The access by link refresh is not allowed. Use the direct access.		
Link special register	SW			

Direct access

This method is used for direct access of Network module link devices from user program.

Data flow

The following figure shows and explains the data flow for direct access of Network module link devices.



■User program functions

Following are the functions used for direct access of Network module link devices.

Dedicated function library	Description
CCPU_WriteLinkDevice	Writes data to link devices of a Network module directly.
CCPU_ReadLinkDevice	Reads data from link devices of a Network module directly.

■Link devices specified with a function

Devices corresponding to each link device which can be specified with a function are shown below.

In the dedicated function library, specify the device type with the device name defined for each function.

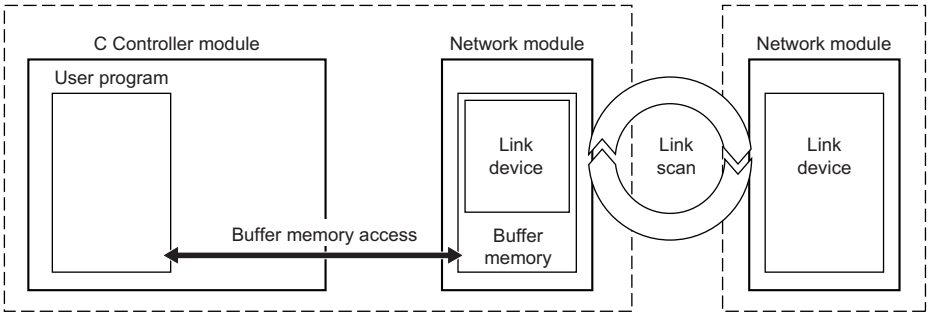
Link device		C Controller module dedicated function
Link input	LX	Dev_LX
Link output	LY	Dev_LY
Link relay	LB	Dev_LB
Link register	LW	Dev_LW
Remote input	RX	Dev_LX
Remote output	RY	Dev_LY
Remote register	RWw	Dev_LW
	RWr	Dev_LW
Link special relay	SB	Dev_LSB
Link special register	SW	Dev_LSW

Buffer memory access

This method is used to access buffer memory of Network module from user program.

Data flow

The following figure shows and explains the data flow to access buffer memory of Network module.



■User program functions

Following are the functions used to access buffer memory of Network module.

Dedicated function library	Description
CCPU_ToBuf	Writes data to the CPU buffer memory and Intelligent function module buffer memory in the module on the specified module position.
CCPU_ToBuf_ISR	
CCPU_FromBuf	Reads data from the CPU buffer memory and Intelligent function module buffer memory in the module on the specified module position.
CCPU_FromBuf_ISR	

■Link devices specified with a function (buffer memory)

Respective link devices are assigned to a specific address in the buffer memory.

In the dedicated function library, specify the device type with the device name defined for each function.

Link device		C Controller module dedicated function
Remote input	RX	Dev_SPB
Remote output	RY	
Remote register	RWw	
	RWr	
Link special relay	SB	
Link special register	SW	

When using a C Controller module dedicated function, specify the offset of the buffer memory.

For details of respective link device buffer memory addresses, refer to the user's manual of the specified Network module.

5.3 Transient Transmission

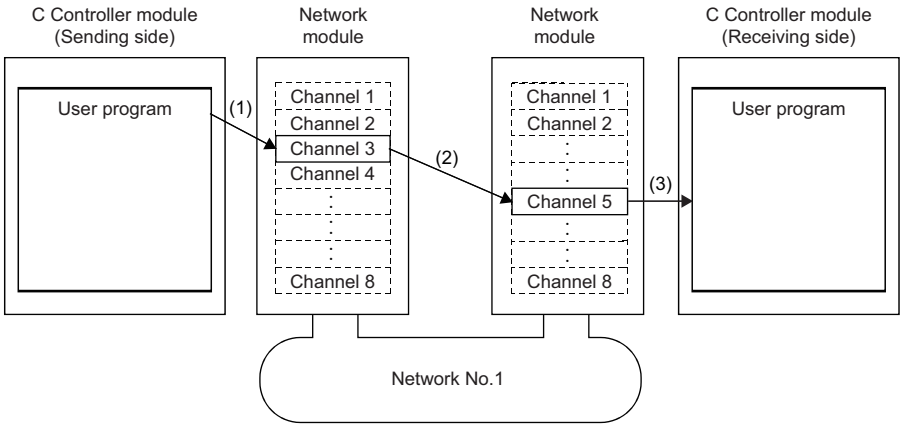
This section explains about transient transmission using C Controller module.
There are two methods available for transient transmission: message transmission using the channel of the Network module which is controlled by C Controller module, and direct access to devices of other stations.

Message communication

This method is used to read/write data using the channel of a controlled Network module from C Controller module.
The message communication function allows data communication similar to link dedicated instructions i.e. SEND/RECV instructions.

Data flow

The following figure shows and explains the data flow of message communication.



(1): The sending side C Controller module sends data by specifying the channel used in the own station and the channel used in the target station with the message send function of a user program.
(2): From the sending side channel, data is transmitted to the receiving side channel.
(3): The receiving side C Controller module (other station) reads messages from the receiving side channel with the message receive function of a user program.

Point

- The message communication function can be used even if CPU module on sending station or receiving station is other than C Controller module. For the target CPU module, use the SEND/RECV link dedicated instruction or a function equivalent to it.
- If the data is transmitted with acknowledge to be received on the same channel of receiving station, it is necessary to transmit next data only after acknowledgement of previously sent data is received i.e. receiving station has read the previously sent data using message receive function (or RECV instruction). An error will occur if the sending station transmits data on the same channel of the receiving station before the acknowledgement is received i.e. data on the receiving station has not been read. In case of an error, retry data transmission.

■Channel

Each Network module has a data area used for message communication, which is called "channel". By using multiple channels, simultaneous access from the host station to other stations, or simultaneous reading and writing to one module are allowed. The number of channels varies depending on network types.

■User program functions

Following are the functions used for message communication.

Dedicated function library	Description
CCPU_DedicatedGInst	Executes dedicated instructions categorized as 'G' or 'GP'.
CCPU_DedicatedJInst	Executes dedicated instructions categorized as 'J' or 'JP'.
mdSendEx	Sends messages.
mdReceiveEx	Receives messages.

Access to other station device

This method is used for direct access of the devices of other station via Network from user program. The Network module and its control CPU module on other station can be accessed.

User program functions

The device of other station can be accessed from user program using the C Controller module dedicated functions.

Dedicated function library	Description
mdDevRstEx	Resets (turns OFF) bit device(s).
mdDevSetEx	Sets (turns ON) bit device(s).
mdRandREx	Reads device(s) randomly.
mdRandWEx	Writes device(s) randomly.
mdReceiveEx	Reads devices in batch.
mdSendEx	Writes devices in batch.

■Accessible range of function

For the accessible range on each network, refer to the following manual.

MELSEC iQ-R C Controller Module Programming Manual

Device specified with a function

■Access to a link device of other station

To access a link device of other station, specify a direct link device (other station side).

Link device		MELSEC data link function		
		CC-Link IE Controller Network	CC-Link IE Field Network	CC-Link Network
Link input	LX	DevLX(1) to DevLX(255)	—	—
Link output	LY	DevLY(1) to DevLY(255)	—	—
Link relay	LB	DevLB(1) to DevLB(255)	—	—
Link register	LW	DevLW(1) to DevLW(255)	—	—
Remote input	RX	—	DevLX(1) to DevLX(255)	—
Remote output	RY	—	DevLY(1) to DevLY(255)	—
Remote register	RWw	—	DevLW(1) to DevLW(255)	—
	RWr	—	DevLW(1) to DevLW(255)	—
Link special relay	SB	DevLSB(1) to DevLSB(255)	DevLSB(1) to DevLSB(255)	—
Link special register	SW	DevLSW(1) to DevLSW(255)	DevLSW(1) to DevLSW(255)	—

■Access to a buffer memory of other station

To access the buffer memory of other station, specify a module access device or an intelligent function module device.

Link device		MELSEC data link function
Remote input	RX	DevSPG(0) to DevSPG(255)
Remote output	RY	
Remote register	RWw	
	RWr	
Link special relay	SB	
Link special register	SW	

■Access to a control CPU module on other station

For devices to be specified in a user program, refer to the following manual.

MELSEC iQ-R C Controller Module Programming Manual

5.4 Access Function of Each Network Module

The network module access function transmits data to the devices on the network via the Network module controlled by the C Controller module.

CC-Link IE Controller Network module

The following shows the functions to transmit data via CC-Link IE Controller Network module.

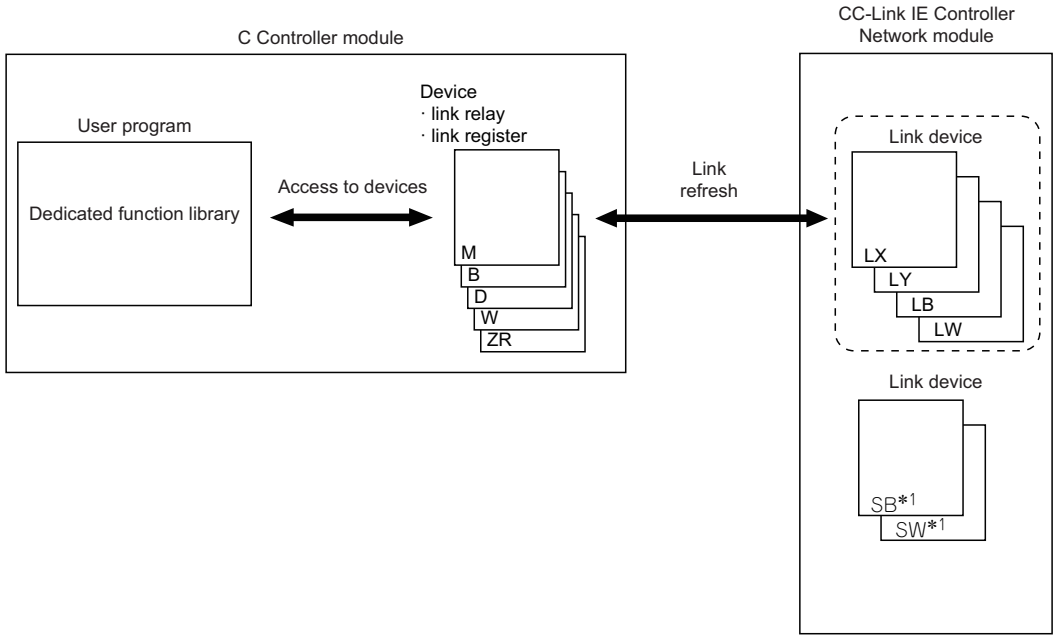
Applicable access method

The following access methods are available.

Transmission type	Access method
Cyclic transmission	Access by link refresh
	Direct access
Transient transmission	Message communication
	Access to other station device

Access by link refresh

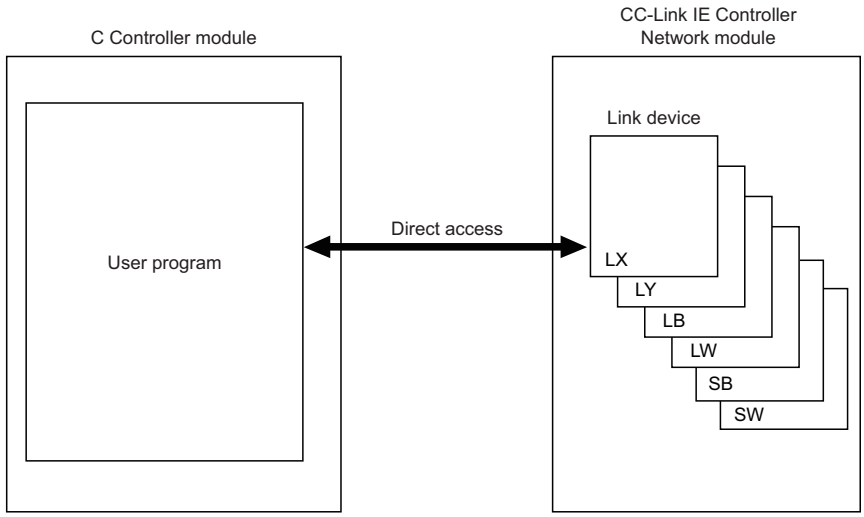
This method is used to access the device of C Controller module from user program using link refresh. Data in the devices are transmitted cyclically to other stations by reading from/writing to link devices in Network modules by link refresh.



*1 Link refresh cannot be performed for SB/SW. Use the direct access.

Direct access

This method is used for direct access of Network module devices from user program. The link device data in the Network module is transmitted cyclically to other stations.

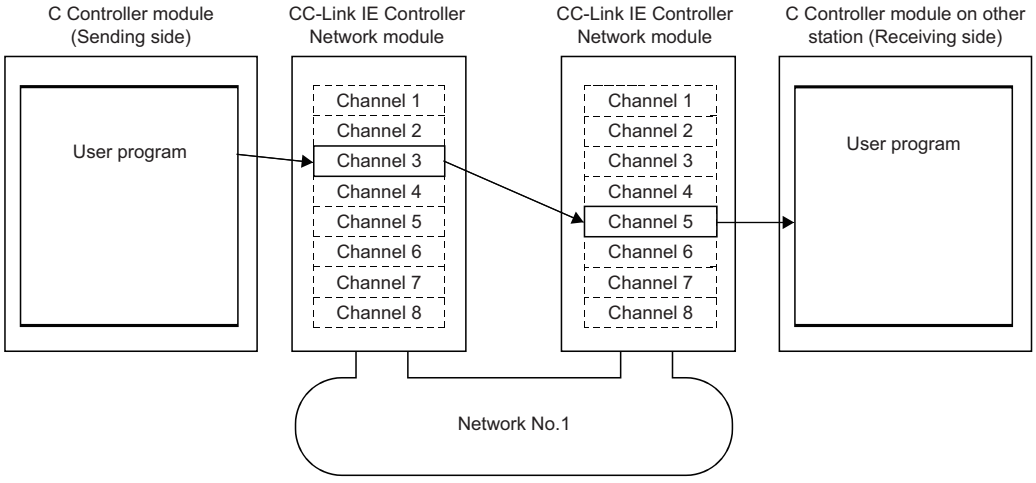


Message communication

The message communication function can be used via the CC-Link IE Controller Network module controlled by C Controller module.

■Number of channels

For CC-Link IE Controller Network module, up to eight channels can be used for message communication.



CC-Link IE Field Network module

The following shows the functions to transmit data via CC-Link IE Field Network module.

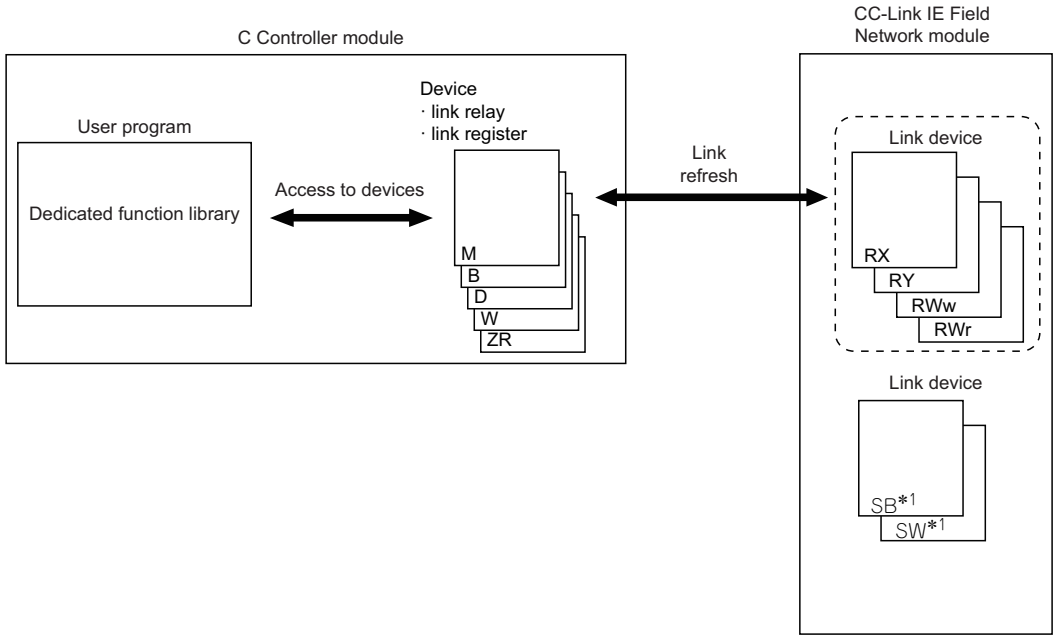
Applicable access method

The following access methods are available.

Transmission type	Access method
Cyclic transmission	Access by link refresh
	Direct access
	Buffer memory access
Transient transmission	Message communication
	Access to other station device

Access by link refresh

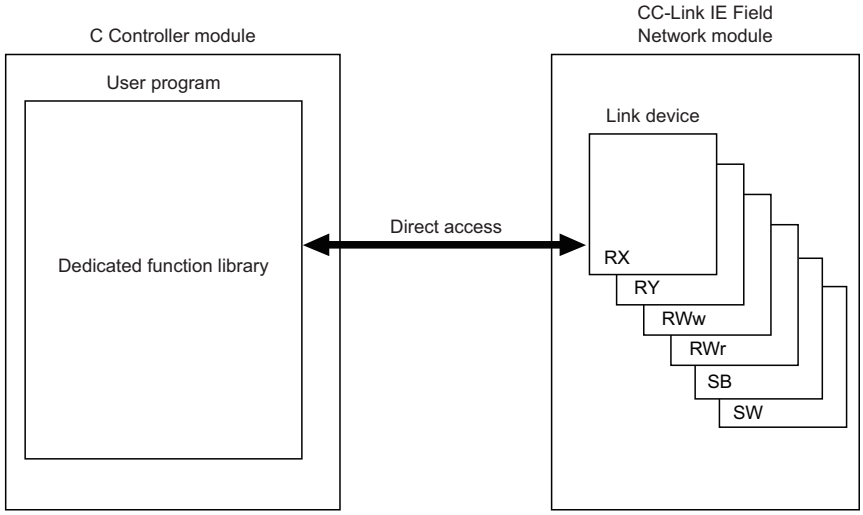
This method is used to access the device of C Controller module from user program using link refresh. Data in the device is transmitted cyclically to other stations by reading from/writing to link devices in the Network modules by link refresh.



*1 Link refresh cannot be performed for SB/SW. Use the direct access or buffer memory access.

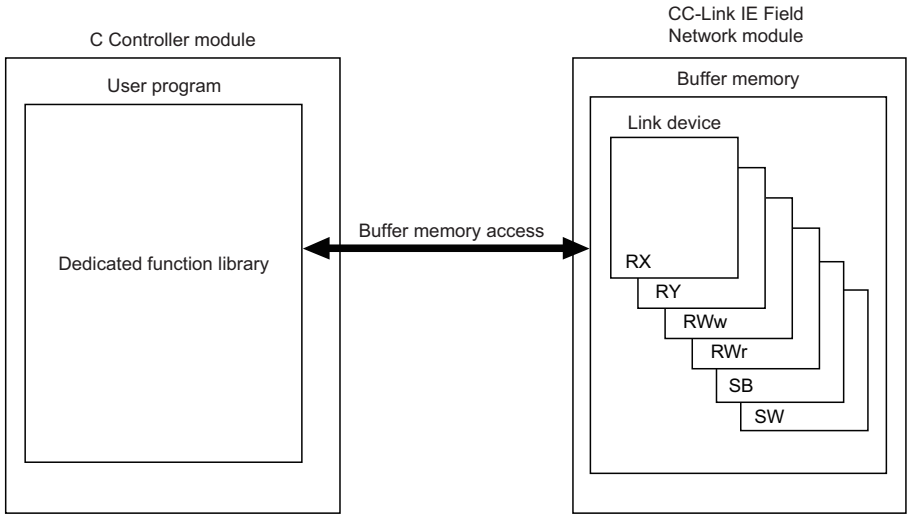
Direct access

This method is used for direct access of Network module devices from user program. The link device data in the Network module is transmitted cyclically to other stations.



Buffer memory access

This method is used to access the buffer memory of Network module from user program. The data in the buffer memory is refreshed with link device and transmitted cyclically to other stations.

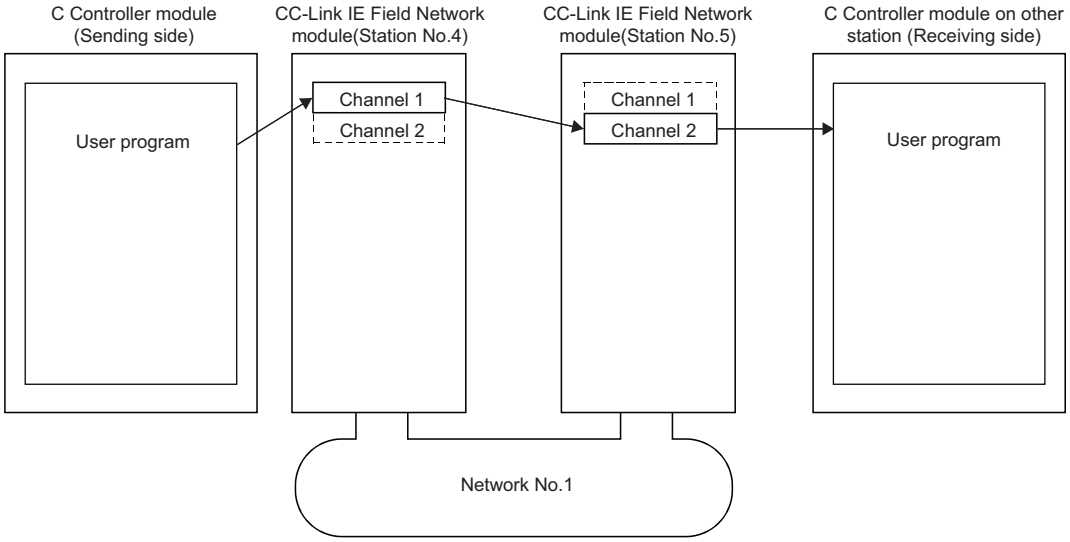


Message communication

The message communication function can be used via the CC-Link IE Field Network module controlled by C Controller module.

■Number of channels

For CC-Link IE Field Network module, up to two channels can be used for message communication.



CC-Link module

The following shows the functions to transmit data via CC-Link module.

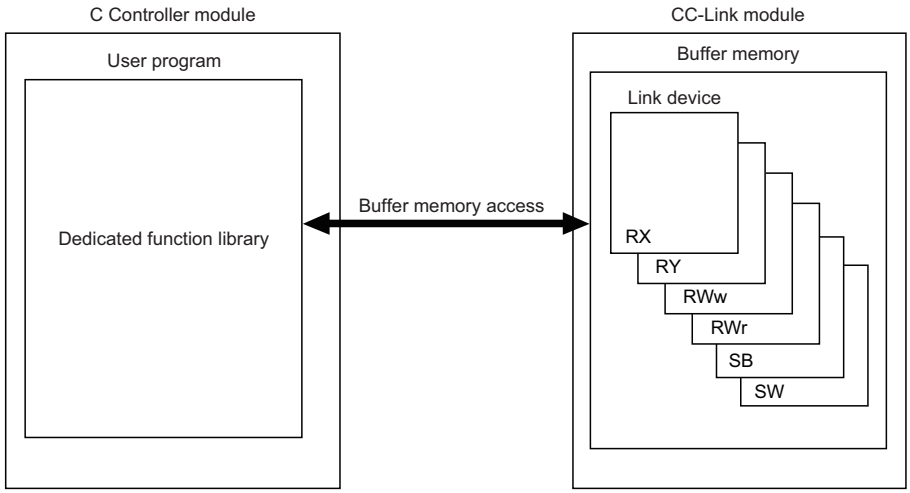
Applicable access method

The following access methods are available.

Transmission type	Access method
Cyclic transmission	Buffer memory access
Transient transmission	Access to other station device

Buffer memory access

This method is used to access the buffer memory of Network module from user program. The data in the buffer memory is refreshed with link device and transmitted cyclically to other stations.



5.5 Processing Time

This section explains the processing time of the cyclic transmission related to Network module access.
For the processing time of the transient transmission, refer to the processing time of each function.

Link refresh time

The following shows the processing time of link refresh.

CC-Link IE Controller Network

The processing time when using CC-Link IE Controller Network is as follows.

- β_T: Total link refresh time (sending side)
- β_R: Total link refresh time (receiving side)
- KM1, KM2: Constant

Network module mounting position	KM1	KM2
Main base unit	1.0	0.36×10^{-3}
Extension base unit	1.0	0.97×10^{-3}

- LB: Total number of points of link relays to be refreshed*1
- LX: Total number of points of link inputs to be refreshed*1
- LY: Total number of points of link outputs to be refreshed*1
- LW: Total number of points of link registers to be refreshed*1

*1 This is the total number of points of link devices set for the setting range of "Refresh Setting" and "Network Range Assignment" ("Network Configuration Settings"). The number of points assigned to a reserved station is not included.

Link refresh time can be calculated with the following formula depending on the number of assigned points of link devices.

Time	Formula
Link refresh time (ms)	β_T, β_R = KM1 + KM2× {((LB+LX+LY)÷16)+LW}

CC-Link IE Field Network

The processing time when using CC-Link IE Field Network is as follows.

- β_T: Total link refresh time (sending side)
- β_R: Total link refresh time (receiving side)
- KM1, KM2: Constant

Network module mounting position	KM1	KM2
Main base unit	1.0	0.41×10^{-3}
Extension base unit	1.0	0.99×10^{-3}

- RX: Total number of points of link inputs to be refreshed*1
- RY: Total number of points of link outputs to be refreshed*1
- RWw, RWr: Total number of points of link registers to be refreshed*1

*1 This is the total number of points of link devices set for the setting range of "Refresh Setting" and "Network Range Assignment" ("Network Configuration Settings"). The number of points assigned to a reserved station is not included.

Link refresh time can be calculated with the following formula depending on the number of assigned points of link devices.

Time	Formula
Link refresh time (ms)	β_T, β_R = KM1 + KM2 × {((RX+RY)÷16)+RWw+RWr}

CC-Link Network

The processing time when using CC-Link Network is as follows.

- β_T: Total link refresh time (sending side)
- β_R: Total link refresh time (receiving side)
- KM1, KM2: Constant

Network module mounting position	KM1	KM2
Main/extension base unit	1.0	0.36×10^{-3}

- RX: Total number of points of link inputs to be refreshed*1
- RY: Total number of points of link outputs to be refreshed*1
- RWw, RWr: Total number of points of link registers to be refreshed*1

*1 This is the total number of points of link devices set for the setting range of "Refresh Setting" and "Network Range Assignment" ("Network Configuration Settings"). The number of points assigned to a reserved station is not included.

Link refresh time can be calculated with the following formula depending on the number of assigned points of link devices.

Time	Formula
Link refresh time (ms)	$\beta_T, \beta_R = KM1 + KM2 \times \{((RX+RY)\div16)+RWw+RWr\}$

Refresh cycle

The following shows how to calculate the refresh cycle.

For the setting method of refresh cycle, refer to the following section.

☞ Page 46 Fixed Cycle Processing Function

How to decide the refresh cycle

Follow the procedure below to decide the refresh cycle.

1. Calculation of the total link refresh time
2. Preliminary decision of the refresh cycle
3. Pre-operation of the C Controller system
4. Decision of the refresh cycle

■Calculation of the total link refresh time

The total link refresh time is equal to the sum of the link refresh time of all of the Network modules controlled by C Controller module. The total link refresh time of C Controller system in operation can be checked with the special registers (SD526 to SD531).

For calculation method of link refresh time for respective Network modules, refer to the following section.

☞ Page 85 Link refresh time

■Preliminary decision of the refresh cycle

Set the value which satisfies the following relational expression to the refresh cycle and total link refresh time.

- Refresh cycle > Total link refresh time

Point

Pay attention to the processing of a user program so that the refresh cycle meets the system specifications of C Controller system.

■Pre-operation of the C Controller system

Confirm whether the C Controller system operates correctly by the refresh cycle decided preliminarily.

Check the following at the time of pre-operation.

Check item	Description
Any error has been occurred on the C Controller module or not.	If the processing of the C Controller module has not been completed within the refresh cycle, an error, "Refresh cycle exceeded (1846H)" occurs.
The operation of the C Controller system meets the system specifications or not.	Check that the C Controller system operates correctly. If the operation of the user program is suspended more frequently than its normal operation time, the system specification may not be met.

- Take the corrective actions shown below in order for the system to operate correctly when the C Controller system operates abnormally or the processing performance of the user program is lowered.

Corrective action	Description
Increase the refresh cycle setting value.	Set the refresh cycle again so that the following relational expression is met, by using the link refresh time (maximum value) as an indication. • Measured value of link refresh time (maximum value) < Refresh cycle
Reduce the setting number of refresh points.	Review the number of refresh points in refresh parameter settings.
Review the user program.	Review the processing contents and task structure, and correct them to meet the system specifications and the processing performance.

Transmission delay time of cyclic transmission

The following shows the transmission delay time of cyclic transmission.

CC-Link IE Controller Network

The transmission delay time when using CC-Link IE Controller Network is shown below.

The patterns of calculation formula for the calculated value are as follows:

- ❶: Data is sent from C Controller module (host CPU) to C Controller module (other CPU).
- ❷: Data is sent from C Controller module (host CPU) to programmable controller CPU.
- ❸: Data is sent from programmable controller CPU to C Controller module (host CPU).

The values used in the calculation formula for transmission delay time are as follows:

- LT: Refresh cycle of C Controller module (sending side)
- LR: Refresh cycle of C Controller module (receiving side)
- β_T: Total link refresh time of C Controller module (sending side)*1
- β_R: Total link refresh time of C Controller module (receiving side)*1
- ST: Scan time of programmable controller CPU (sending side)*2
- SR: Scan time of programmable controller CPU (receiving side)*2
- α_T: Link refresh time of programmable controller CPU (sending side)*1,*2
- α_R: Link refresh time of programmable controller CPU (receiving side)*1,*2
- LS: Link scan time*2

*1 This is the total of link refresh time for the mounted CC-Link IE Controller Network modules.

*2 For more details, refer to the following manual.

MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

Comparison between LT and LS	Station-based block data assurance	Calculated value		Transmission delay time (ms)
LT > LS	Disabled	Normal value	❶	$LT + \beta_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
			❷	$LT + \beta_T + LS \times 0.5 + (SR+\alpha_R) \times 1.5$
			❸	$ST + \alpha_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$LT + \beta_T + LS \times 1 + LR + \beta_R$
			❷	$LT + \beta_T + LS \times 1 + (SR+\alpha_R) \times 2$
			❸	$ST + \alpha_T + LS \times 1 + LR + \beta_R$
	Enabled	Normal value	❶	$(LT+\beta_T) \times 1.5 + LS \times 0.5 + (LR+\beta_R) \times 0.5$
			❷	$(LT+\beta_T) \times 1.5 + LS \times 0.5 + (SR+\alpha_R) \times 1.5$
			❸	$(ST+\alpha_T) \times 1.5 + LS \times 0.5 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$(LT+\beta_T) \times 2 + LS \times 1 + LR + \beta_R$
			❷	$(LT+\beta_T) \times 2 + LS \times 1 + (SR+\alpha_R) \times 2$
			❸	$(ST+\alpha_T) \times 2 + LS \times 1 + LR + \beta_R$
LT < LS	Disabled	Normal value	❶	$LT + \beta_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
			❷	$LT + \beta_T + LS \times 0.5 + (SR+\alpha_R) \times 1.5$
			❸	$ST + \alpha_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$LT + \beta_T + LS \times 1 + LR + \beta_R$
			❷	$LT + \beta_T + LS \times 1 + (SR+\alpha_R) \times 2$
			❸	$ST + \alpha_T + LS \times 1 + LR + \beta_R$
	Enabled	Normal value	❶	$(LT+\beta_T) + LS \times 1 + (LR+\beta_R) \times 0.5$
			❷	$(LT+\beta_T) + LS \times 1 + (SR+\alpha_R) \times 1.5$
			❸	$(ST+\alpha_T) + LS \times 1 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$(LT+\beta_T) + LS \times 2 + LR + \beta_R$
			❷	$(LT+\beta_T) + LS \times 2 + (SR+\alpha_R) \times 2$
			❸	$(ST+\alpha_T) + LS \times 2 + LR + \beta_R$

■The extended mode is selected for the station type.

The following shows the calculation formula when the extended mode is selected for the station type of CC-Link IE Controller Network module.

Comparison between LT and LS	Station-based block data assurance	Calculated value		Transmission delay time (ms)
LT > LS	Disabled	Normal value	❶	$LT + \beta_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
			❷	$LT + \beta_T + LS \times 0.5 + (SR+\alpha_R) \times 1.5$
			❸	$ST + \alpha_T + LS \times 0.5 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$LT + \beta_T + LS \times 1 + LR + \beta_R$
			❷	$LT + \beta_T + LS \times 1 + (SR+\alpha_R) \times 2$
			❸	$ST + \alpha_T + LS \times 1 + LR + \beta_R$
	Enabled	Normal value	❶	$(LT+\beta_T) \times 1.5 + LS \times 0.5 + (LR+\beta_R) \times 1.5$
			❷	$(LT+\beta_T) \times 1.5 + LS \times 0.5 + (SR+\alpha_R) \times 2.5$
			❸	$(ST+\alpha_T) \times 1.5 + LS \times 0.5 + (LR+\beta_R) \times 1.5$
		Maximum value	❶	$(LT+\beta_T) \times 2 + LS \times 1 + (LR+\beta_R) \times 2$
			❷	$(LT+\beta_T) \times 2 + LS \times 1 + (SR+\alpha_R) \times 3$
			❸	$(ST+\alpha_T) \times 2 + LS \times 1 + (LR+\beta_R) \times 2$
LT < LS	Disabled	Normal value	❶	$LT + \beta_T + LS \times 1 + (LR+\beta_R) \times 0.5$
			❷	$LT + \beta_T + LS \times 1 + (SR+\alpha_R) \times 1.5$
			❸	$ST + \alpha_T + LS \times 1 + (LR+\beta_R) \times 0.5$
		Maximum value	❶	$LT + \beta_T + LS \times 2 + LR + \beta_R$
			❷	$LT + \beta_T + LS \times 2 + (SR+\alpha_R) \times 2$
			❸	$ST + \alpha_T + LS \times 2 + LR + \beta_R$
	Enabled	Normal value	❶	$(LT+\beta_T) + LS \times 1 + (LR+\beta_R) \times 1.5$
			❷	$(LT+\beta_T) + LS \times 1 + (SR+\alpha_R) \times 2.5$
			❸	$(ST+\alpha_T) + LS \times 1 + (LR+\beta_R) \times 1.5$
		Maximum value	❶	$(LT+\beta_T) + LS \times 2 + (LR+\beta_R) \times 2$
			❷	$(LT+\beta_T) + LS \times 2 + (SR+\alpha_R) \times 3$
			❸	$(ST+\alpha_T) + LS \times 2 + (LR+\beta_R) \times 2$

Point

When the CPU module on a relay station transfers link devices to other network by using the interlink transmission function among multiple network systems, the transfer processing time of the CPU module on the relay station affects the transmission delay time. For more details, refer to the following manual.

MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

CC-Link IE Field Network

For information on the calculation formula for transmission delay time when using CC-Link IE Field Network, refer to the following manual.

📖 MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

With reference to above mentioned manual, substitute the sequence scan time of the master station (SM) and the sequence scan time of the local station (SL) with the following processing time.

SM, SL = P = R + α

- P: Processing time on C Controller system
- R: Refresh cycle
- α: Link refresh time

It does not take time for refresh when direct access or buffer memory access is used. For information on the function processing time, refer to the following section.

☞ Processing Time of Functions

CC-Link Network

For information on the calculation formula for transmission delay time when using CC-Link Network, refer to the following manual.

📖 MELSEC iQ-R CC-Link System Master/Local Module User's Manual (Application)

With reference to above mentioned manual, substitute the sequence scan time of the master station (SM) and the sequence scan time of the local station (SL) with the following processing time.

SM, SL = P = R + α

- P: Processing time on C Controller module
- R: Refresh cycle
- α: Link refresh time

Transmission delay calculation example

The following shows a calculation example for the transmission delay time for single network system

The system configuration and its settings are as shown below.

Item		Description
CPU module on sending side, receiving side		C Controller module
Total station numbers per one network		Two stations (one control station and one normal station)
Total number of points of link devices	LB/LW	1024 points
	LX/LY	0 points
	SB/SW	0 points
Refresh cycle		100 ms
Transient transmission		Disabled
Station-based block data assurance		Enabled
CC-Link IE Controller Network module		Main base unit
Error station		Disabled

■Link refresh time (β_T, β_R)

The calculation formula is as follows:

Time	Formula
Link refresh time (ms)	β_T, β_R = KM1 + KM2 × {(LB+LX+LY)÷16+LW}

The values of each variable are as follows:

- KM1: Constant= 1.0
- KM2: Constant = 0.36×10^{-3}
- LB, LW: Total number of points of link devices = 1024
- LX, LY: Total number of points of link devices = 0

Link refresh time can be found by putting the respective values in following variables of the formula:

- β_T, β_R = $1.0 + 0.36 \times 10^{-3} \times \{((1024+0+0)\div16)+1024\} \fallingdotseq 1.39$(ms)

■Transmission delay time

When the station-based block data assurance setting is enabled and LT is longer than LS (LT > LS), the calculation formula is as follows:

Calculated value	Transmission delay time (ms)
Normal value	$(LT+\beta_T) \times 1.5 + LS \times 0.5 + (LR+\beta_R) \times 0.5$
Maximum value	$(LT+\beta_T) \times 2 + LS \times 1 + LR + \beta_R$

The values of each variable are as follows:

- LT, LR: Refresh cycle = 100 (ms)
- β_T, β_R: Link refresh time $\fallingdotseq$ 1.39 (ms)
- LS: Link scan time $\fallingdotseq$ 1.25 (ms)

Transmission delay time (normal and maximum value) can be found by putting the respective values in following variables of the formula:

- Normal value = $(100+1.39) \times 1.5 + 1.25 \times 0.5 + (100+1.39) \times 0.5 = 203.405$ (ms)
- Maximum value = $(100+1.39) \times 2 + 1.25 \times 1 + 100 + 1.39 = 305.420$ (ms)

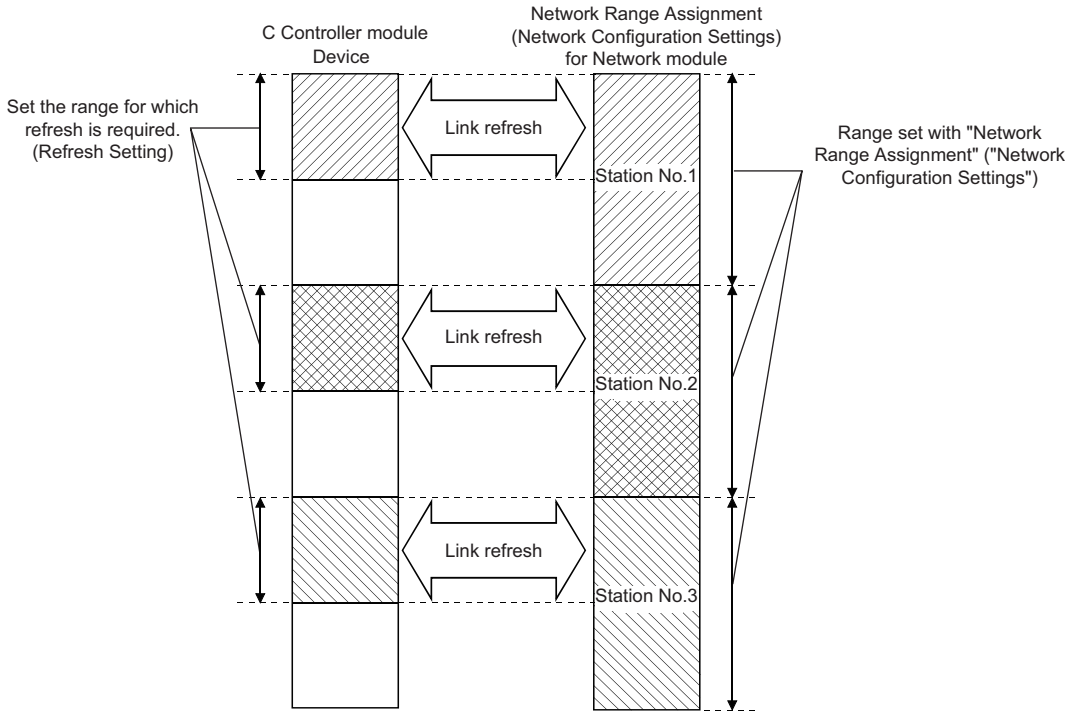
Reduction of link refresh time

The link refresh time can be shortened by reducing refresh points to C Controller module by the settings for "Refresh Setting"/ "Network Range Assignment" ("Network Configuration Settings") and with direct access of link devices.

How to reduce refresh points

■Reducing refresh points using parameters

In "Refresh Setting", set only the necessary range to be refreshed. The refresh of only necessary range can reduce the link refresh time.



■Reducing refresh points using direct access/buffer memory access

Excluding the rarely used link devices on own station from the link refresh range and using direct access or buffer access instead can reduce the link refresh time.

6 Ethernet COMMUNICATION FUNCTIONS

This chapter explains about the communication function using Ethernet ports.

6.1 Connection with MELSOFT product or GOT

Monitoring C Controller module with CW Configurator and monitoring and testing C Controller module from GOT can be performed via Ethernet. This function enables remote operations with long-distance connection and high-speed communication using Ethernet.

The section explains how to connect a C Controller module with a GOT or MELSOFT product (such as CW Configurator, MX Component).

Connection method	Description
Connection via a hub (specify IP address)	• When connecting with a C Controller module that has no network number and station number • When connecting with multiple MELSOFT products or GOT
Direct connection (Connection without specifying IP address, network number, and station number)	• When connecting with a target device on 1:1 basis using one Ethernet cable without using a hub. • When connecting to a C Controller module of which IP address in unknown

Connection via a hub

The following shows the settings when performing connection via a hub.

Setting method

■Settings on C Controller module

1. Set the IP address of the C Controller module in "Own Node Settings" under "Basic Settings" of the module parameter. (☞ Page 107 Own node settings)

When connecting devices with specifying the network number and station number, specify them in "Own Node Settings" under "Basic Settings".

2. Set the connection configuration in "External Device Configuration" under "Basic Settings". (☞ Page 108 External device configuration)

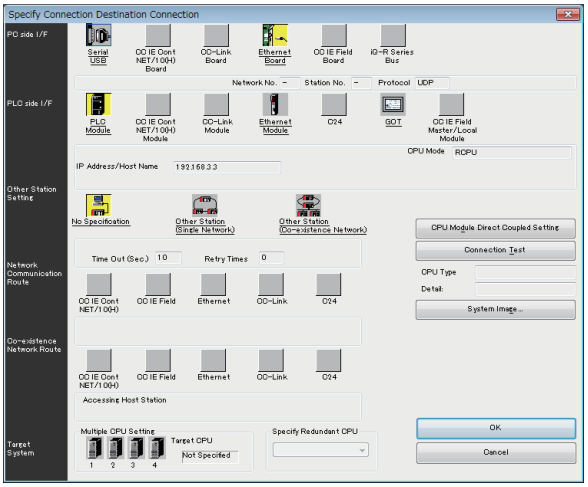
Point

When connecting multiple MELSOFT products with TCP/IP connection, drag "MELSOFT Connection Module" from the "Module List" to "List of devices" or "Device map area" in "External Device Configuration" under "Basic Settings".

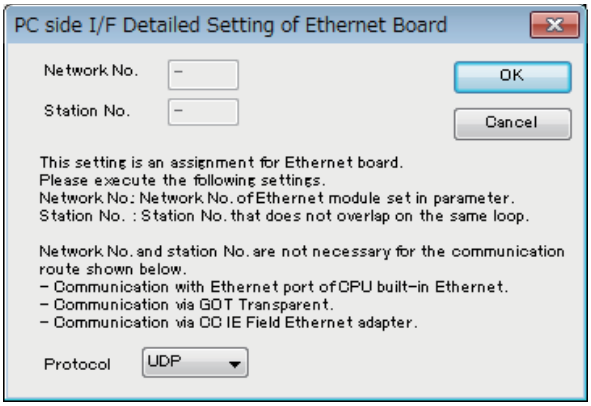
■Settings on CW Configurator side

Set the connection route to C Controller module to "Specify Connection Destination".

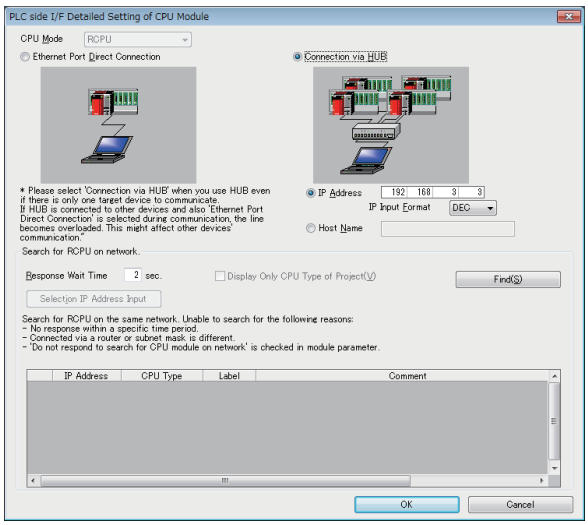
[Online] ⇨ [Specify Connection Destination]



1. Set "PC side I/F" to "Ethernet Board".
2. Double-click "Ethernet Board", and open the "PC side I/F Detailed Setting of Ethernet Board" window.



3. Set the protocol.



4. Set the module to be connected to "PLC side I/F".
5. Double-click the icon of the set module to display the "PLC side I/F Detailed Setting" window.
6. Select "Connection via HUB" for the connection method, and enter the station number and IP address or host name of the C Controller module.
7. After the settings are completed, click the [OK] button.
8. Set "Other Station Setting" and "Network Communication Route" as necessary.

Direct connection

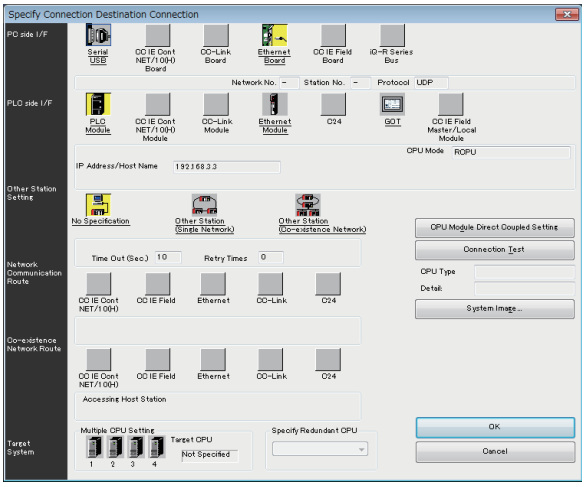
C Controller module and engineering tool can be directly connected with one Ethernet cable without using a hub. By connecting them directly, communication can be performed without setting an IP address or host name to Specify Connection Destination.

Point

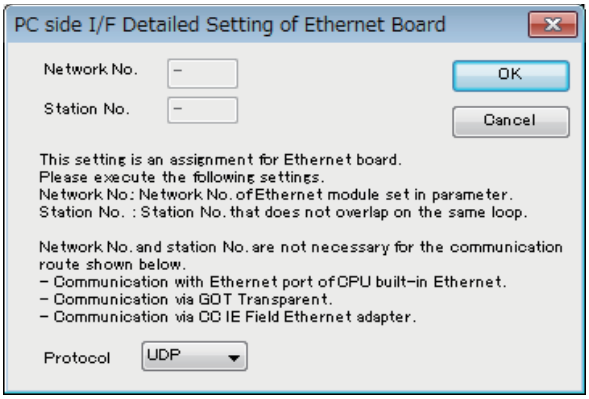
To prohibit the direct connection using an Ethernet cable, set "Disable" in "Disable Direct Connection with MELSOFT" under "Security" under the "Application Settings".

Setting method

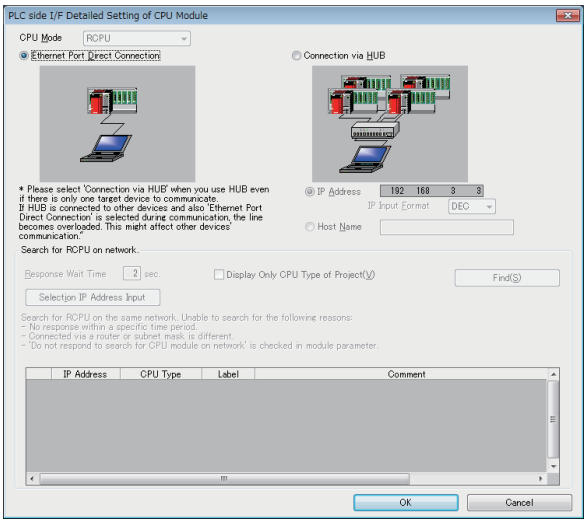
[Online]⇨ [Specify Connection Destination]



1. Set "PC side I/F" to "Ethernet Board".
2. Double-click "Ethernet Board", and open the "PC side I/F Detailed Setting of Ethernet board" window.



3. Set the protocol.



4. Set the module to be connected to "PLC side I/F".

5. Double-click the icon of the set module to display the "PLC side I/F Detailed Setting" window.

6. Select "Ethernet Port Direct Connection" for the connection method.

7. After the settings are completed, click the [OK] button.

Point

When connecting directly with C Controller module, the setting above can also be performed by clicking the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination" window.

Precautions

■Connection with LAN

Do not connect with LAN and set the direct connection. Since the data will be sent to all the target devices on the LAN, this may increase the line load and affects communication with other target devices.

■Connections that are not a direct connection

- Do not use a configuration in which C Controller module and target devices are connected via hub. Direct connection will not be established when the devices are connected via hub.
- If two or more Ethernet ports are set to "Enable" in the network setting on the personal computer, a direct connection cannot be established. Review the setting of the personal computer so that only the Ethernet port for the direct connection is set to "Enable", and the other Ethernet ports are set to "Disable".

■Conditions that cannot communicate directly

A direct connection may not be established if any of the following conditions are met. In this case, review the settings.
The examples of the error occurrence are as follows:

- When all the bits of the C Controller module-side IP address that correspond to 0 part of the personal computer-side subnet mask are ON or OFF

Item	Description
IP address for C Controller module	64.64.255.255
IP address for personal computer	64.64.1.1
Subnet mask for personal computer	255.255.0.0

- When all the bits of the C Controller module-side IP address that correspond to the host address of each class of the personal computer-side IP address are ON or OFF

Item	Description
IP address of C Controller module	64.64.255.255
IP address of personal computer	192.168.0.1
Subnet mask of personal computer	255.0.0.0

Point

IP addresses of each class are as follows:

- Class A: 0.0.0.0 to 127.255.255.255
- Class B: 128.0.0.0 to 191.255.255.255
- Class C: 192.0.0.0 to 223.255.255.255

Host addresses of each class are the '0' parts below.

- Class A: 255.0.0.0
- Class B: 255.255.0.0
- Class C: 255.255.255.0

6.2 Communication with SLMP

Device data can be read from/written to a personal computer or HMI (GOT) using SLMP.
By reading/writing device data, the operation monitoring and data analysis in C Controller module can be performed.
For details on SLMP, refer to the following manual.
SLMP Reference Manual

Accessible ranges

- The connected C Controller module can only be accessed.
- In a multiple CPU system, the access to other CPUs which are not connected with Ethernet, and communication with other stations via C Controller module cannot be performed.

Data communication frames/data codes

The following shows the data communication frames/data codes that can be used for C Controller module.
○: Applicable, ×: Not applicable

Frame	Data code	Applicability
4E frame	ASCII code	×
	Binary code	×
QnA compatible 3E frame	ASCII code	×
	Binary code	○
A compatible 1E frame	ASCII code	×
	Binary code	×

Setting method

The setting method is as shown below.
Set the connection configuration in "External Device Configuration" under "Basic Settings". (☞ Page 108 External device configuration)

1. Select "SLMP Connection Module" from the "Module List", and drag and drop it to "List of devices" or "Device map area".
2. Set the other items to the connection as necessary.

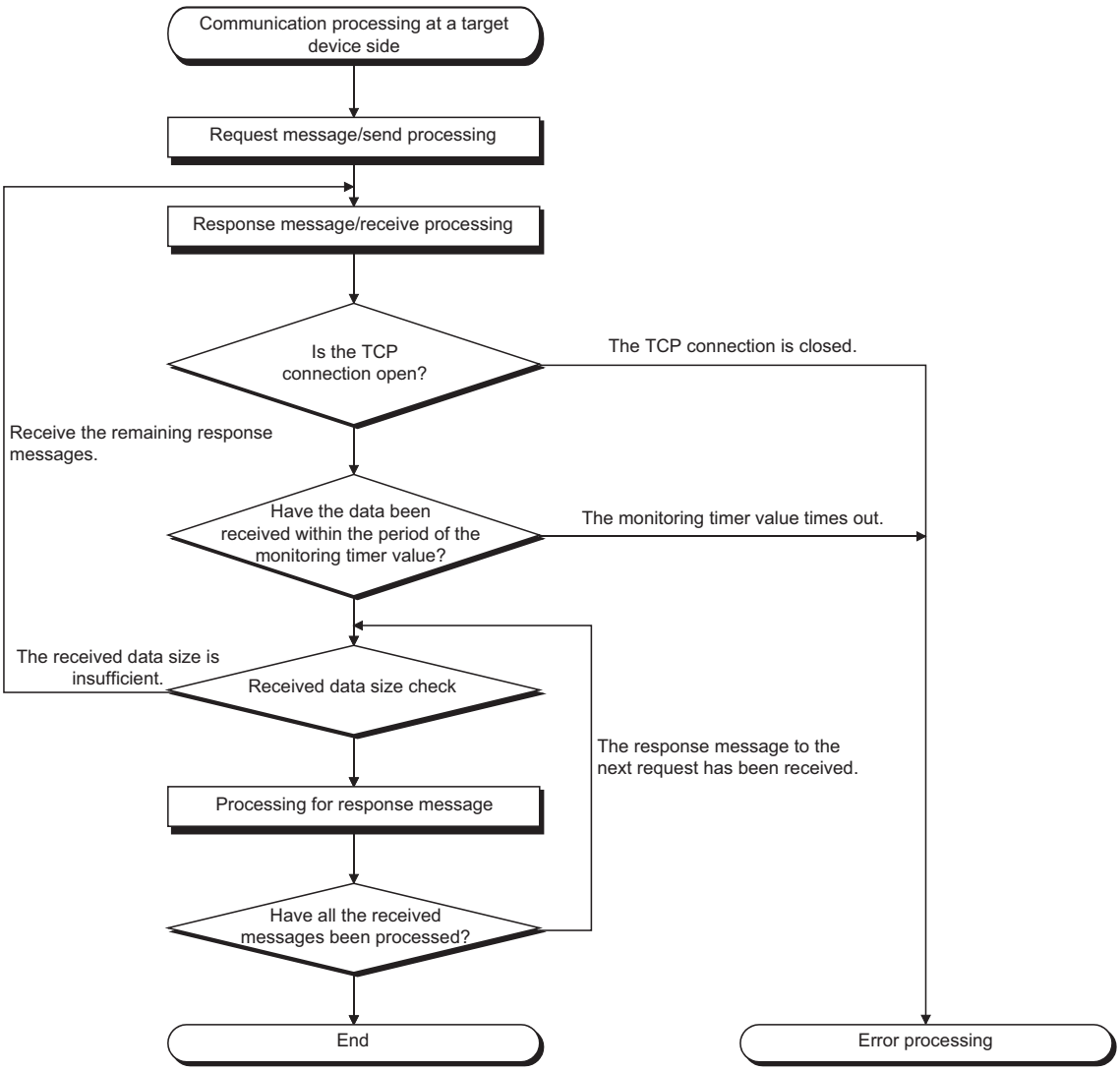
Point

- If a new request message is sent before the response message has been returned for the previous request message to one UDP port, the new request message will be discarded.
- When multiple own station port numbers are set for UDP, it will be regarded as one setting. When performing communication with the same own station port number as multiple target devices, select TCP as a protocol.

Error codes at communication

For the error codes, refer to the following manual.
SLMP Reference Manual

Receive processing of response message



Point

For Ethernet communication, the TCP socket function (socket function) is used.
When data has been sent from the sending side by calling the SEND function once, the receiving side is required to call one or more RECV function. (The ratio of the SEND function and the RECV function is not 1 to 1.) Therefore, the receive processing above is necessary for the program processing for the target device.

Command list

The following table shows the commands that can be used in C Controller module.

Item		Command	Subcommand	Description
Type	Operation			
Device	Read	0401	00□1	Reads values from bit devices (consecutive device number) in 1-point unit.
			00□0	• Reads values from bit devices (consecutive device number) in 16-point unit. • Reads values from word devices (consecutive device number) in 1-word unit.
			00□3	Reads values from bit devices (consecutive device number) in 1-point unit.
			00□2	• Reads values from bit devices (consecutive device number) in 16-point unit. • Reads values from word devices (consecutive device number) in 1-word unit.
	Write	1401	00□1	Writes values to bit devices (consecutive device number) in 1-point unit.
			00□0	• Writes values to bit devices (consecutive device number) in 16-point unit. • Writes values to word devices (consecutive device number) in 1-word unit.
			00□3	Writes values to bit devices (consecutive device number) in 1-point unit.
			00□2	• Writes values to bit devices (consecutive device number) in 16-point unit. • Writes values to word devices (consecutive device number) in 1-word unit.
	Read Random	0403	00□0	Reads values from word devices in 1-word unit or 2-word unit by specifying device number. Nonconsecutive device numbers can be specified.
			00□2	Reads values from word devices in 1-word unit or 2-word unit by specifying device number. Nonconsecutive device numbers can be specified.
	Write Random	1402	00□1	Writes values to bit devices in 1-point unit by specifying device number. Nonconsecutive device numbers can be specified.
			00□0	• Writes values to bit devices in 16-point unit by specifying device number. Nonconsecutive device numbers can be specified. • Writes values to word devices in 1-word unit or 2-word unit by specifying device number. Nonconsecutive device numbers can be specified.
			00□3	Writes values to bit devices in 1-point unit by specifying device number. Nonconsecutive device numbers can be specified.
			00□2	• Writes values to bit devices in 16-point unit by specifying device number. Nonconsecutive device numbers can be specified. • Writes values to word devices in 1-word unit or 2-word unit by specifying device number. Nonconsecutive device numbers can be specified.
	Read Block	0406	00□0	Reads data by specifying multiple blocks as regarding one block as n-point of word devices or bit devices (1-point is 16-bit). Nonconsecutive device numbers can be specified.
			00□2	
	Write Block	1406	00□0	Writes data by specifying multiple blocks as regarding one block as n-point of word devices or bit devices (1-point is 16-bit). Nonconsecutive device numbers can be specified.
			00□2	
Extend Unit	Read	0601	0000	Reads data in the buffer memory of an Intelligent function module.
	Write	1601	0000	Writes data in the buffer memory of an Intelligent function module.
Remote Control	Remote Run	1001	0000	Performs remote RUN to the access target module.
	Remote Stop	1002	0000	Performs remote STOP to the access target module.
	Remote Pause	1003	0000	Performs remote PAUSE to the access target module.
	Remote Reset	1006	0000	Performs remote RESET to the access target module.
	Read Type Name	0101	0000	Reads model and model code of the access target module.
File	Read Directory/ File	1810	0040	Reads information list of the file.
	Search Directory/ File	1811	0040	Reads fine number, file size, and existence of the specified file.
	New File	1820	0040	Reserves the storage area in the specified file.
	Delete File	1822	0040	Deletes files.
	Copy File	1824	0040	Copies the specified file.
	Change File State	1825	0040	Changes the file attribute.
	Change File Date	1826	0040	Changes the file creation date.
	Open File	1827	0040	Locks the file in order that the file content is not changed form other devices.
	Read File	1828	0000	Reads the content of a file.
	Write File	1829	0000	Writes content to a file.
	Close File	182A	0000	Unlocks a file with open processing.

■Processing points for Test (random write)

Set the processing points within the value which can be obtained with the following formula.

(Number of word access points) × 12 + (Number of double word access points) × 14 ≤ 1920

- For bit devices, 1-point equals 16-bit for word access. As for double word access, 1-point equals 32-bit.
- For word devices, 1-point equals 1-word for word access. As for double word access, 1-point equals 2-word.

Applicable devices

The following shows the applicable devices.

Device		Device code*1	Device number range	
I/O device	Input	9CH	0H to FFFH	Hex
	Output	9DH	0H to FFFH	Hex
Internal user device	Internal relay	90H	Device number within the range in the C Controller module of the target station can be specified.	Dec
	Data register	A8H		Dec
	Link relay	A0H		Hex
	Link register	B4H		Hex
Internal system device	Special relay	91H	0 to 2047	Dec
	Special register	A9H	0 to 2047	Dec

*1 ASCII code cannot be used.

6.3 File Transfer Function (FTP server)

The server function of FTP (File Transfer Protocol), which is a protocol used to transfer files with target devices, is supported. The target device with FTP client function can access the files in the C Controller module directly.

File operation

The following operations can be performed for a file in C Controller module from the target device with FTP client function.

- Read file from C Controller module (download)
- Write file to C Controller module (upload)
- Browse folders and files, and delete files in C Controller module

Setting method

To use the file transfer function, set "Use" for "FTP Server" in "FTP Server Settings" under "Application Settings". For details on other setting items, refer to the following section.

☞ Page 111 FTP server settings

Precautions

■Specifications of FTP client

For the specifications of the FTP client installed on the target device, refer to the manual of the target device.

■Operation while accessing file

Do not perform any of the following operations while accessing a file. The file may be corrupted.

- Cycling the power
- Resetting the module
- Insertion/removal of memory card

■Reconnection after timeout

If a timeout error occurred during file transfer, the TCP connection will be closed (disconnected). Log in to the C Controller module again with the FTP client before restarting the file transfer.

■File transmission time

The file transfer processing time will differ depending on the following causes.

- Load rate of Ethernet line (line congestion)
- Number of connections to be used simultaneously (processing of other connections)
- System configuration

■Number of simultaneous connections

- Up to 10 target devices (FTP client) can be logged in to C Controller module at one time.
- If a connection is attempted from other FTP client in the login state, an error will occur without establishing the connection.
- If UDP communication is performed during file transfer, an error such as timeout may occur. Either communicate after the file transfer or communicate with TCP.

■File write

- Files with read-only attributes and files that are locked from other devices/functions cannot be written. A write error occurs if attempted.
- The write files cannot be transferred if the SD memory card is write-protected. A write error occurs if attempted.
- When writing a large file to the SD memory card, change the CPU operating status to STOP.

■File deletion

Determine the timing for deleting the files for the entire system including the C Controller module and peripheral devices.

6.4 Time Setting Function

Time information is collected from the time information server (SNTP server) connected on the LAN at the specified timing, and the time in the C Controller module is set automatically.

Point

- The time information obtained from the time information server is Coordinated Universal Time (UTC). The obtained UTC time information is adjusted according to the time zone setting of the CPU module, and is set to the CPU module.
- In the multiple CPU environment, set the time only for the CPU No.1. If the time is set for the CPU modules other than the CPU No.1, the clock data in the CPU No.1 is set automatically to CPU No.2 to No.4.

Execution timing of time setting

The time setting is performed at any of the following timing.

- At power OFF → ON or reset of the C Controller module
- At specified time intervals
- At specified time
- At arbitrary timing using a program*1

*1 Obtain the clock information using the VxWorks function (sntpcTimeGet), and then execute the C Controller module dedicated function (CCPU_SetRTC).

Setting method

Set "Time Setting" under "Application Settings". (☞ Page 112 Time Setting)

Precautions

■Time information server

Install an SNTP server on the LAN to be connected.

■Delay by communication time

The time set in the module may be delayed by the time required to communicate with the SNTP server. For a high-accuracy time setting, specify an SNTP server on the network that is as close to the module as possible.

■Available period

The period within the range from 1980 to 2079 can be used.

6.5 Telnet Function

This function executes shell commands from Telnet tool in the development environment (personal computer) without using CW Workbench for TCP/IP network. This allows simple remote debugging (task information display, memory dumping, etc.) of the C Controller module.

Setting method

To use the Telnet function, set the "Telnet Server" to "Use" for "Telnet Server Settings" in "Application Settings". For details on other setting items, refer to the following section.

☞ Page 114 Telnet Server Settings

Available commands

Shell commands of CW Workbench can be used.

For details on the shell commands, refer to the manual of VxWorks.

Remote debugging with serial communication

Remote debugging using serial communication can be performed same as Telnet connection.

The standard I/O destination can be switched to the serial communication side by executing the following commands from Telnet shell or with STARTUP.CMD.

```
fd = open("/tyCo/0",2,0)
ioctl(fd,4,115200)
ioctl(fd,3,0x7F)
ioGlobalStdSet(0,fd)
ioGlobalStdSet(1,fd)
ioGlobalStdSet(2,fd)
```

Precautions

■Number of connections

Connections from multiple Telnet tools to the same C Controller module are not allowed. Connect the Telnet tool to the C Controller module on a 1:1 basis. Further, be sure to close the Telnet tool being connected and connect other Telnet tool to the C Controller module.

■Timeout

When the line is disconnected during Telnet connection, it will take 30 seconds before Telnet connection (TCP connection) times out on the C Controller module side. Telnet cannot be reconnected until it times out.

Timeout time can be changed by the command provided by VxWorks.

• Timeout time = iptcp.KeepIdle value + (iptcp.KeepIntvl value × iptcp.KeepCnt value)

iptcp.KeepIdle: Interval from line disconnection to the first retry

iptcp.KeepIntvl: Interval between retries

iptcp.KeepCnt: Number of retries

Ex.

```
ipcom_sysvar_set("iptcp.KeepIdle", "XX", 1);
ipcom_sysvar_set("iptcp.KeepIntvl", "YY", 1);
ipcom_sysvar_set("iptcp.KeepCnt", "ZZ", 1);
ipcom_ipd_kill ("iptelnets");
ipcom_ipd_start ("iptelnets");
```

XX, YY: Specify the time (in seconds). When '0' is specified, no timeout will occur.

ZZ: Specify the number of retries.

The following explains the procedure to change the Telnet connection timeout value when the C Controller module is in operation.

1. Establish the Telnet connection with a Telnet tool.
2. Execute the commands above from the shell command of the Telnet tool to change the timeout value.
3. Reboot the Telnet server.
4. Close the Telnet connection.
5. Establish the Telnet connection with a Telnet tool again.

The following explains the procedure to change the Telnet connection timeout value at the startup of the C Controller module.

1. Describe the commands above in the script file (STARTUP.CMD).
2. Power ON the C Controller module.

■Shell command

A setting shell command entered from the Telnet tool operates on a task of priority 1.

In the following cases, system errors/stop (system watchdog timer error, etc.) may occur in the C Controller module.

• Execution of commands which occupy the CPU processing

Before executing commands, be sure to check the specifications of the command.

• Reboot by executing the VxWorks (reboot) function or pressing Ctrl + X

Reset the C Controller module to reboot VxWorks.

• Execution of command in which arguments are included without specifying those argument (with the result that '0' is specified to an argument)

Before executing a command, be sure to check command specifications/argument specifications.

Ex.

Do not execute the (close) command with no argument specified. Doing so will close the resources reserved in the VxWorks system.

When the following command is executed, interrupt is prohibited for long period of time and no processing called from the interrupt routine will be performed. As a result, an interrupt that occurs at certain intervals (such as multiple CPU synchronous interrupt) may be delayed.

• Execution of command to display the status (Show)

■Message display on the shell

Message(s) issued by VxWorks during Telnet connection may be displayed on the shell.

For the messages of VxWorks, refer to manuals of VxWorks and CW Workbench.

6.6 Security Function

By restricting the access to C Controller module for each communication route, the optimal security for the network environment can be applied.

IP filter function

This function identifies the IP address of the access source and prevents access from specified illegal IP addresses.
Set the IP address of the target device to be passed or blocked in the parameters to restrict the access from target devices.
Use of this function is recommended when using C Controller module in an environment which is connected to LAN.

Point

The IP filter function is one of the methods for preventing illegal access (such as program or data corruption) from a target device. However, this function does not prevent illegal access completely. Incorporate measures other than this function if the C Controller system's safety must be maintained against illegal access from an external device. We cannot be held responsible for any system problems that may occur from illegal access.
Examples of measures for illegal access are shown below.

- Install a firewall.
- Install a personal computer as a relay station, and control the relay of send/receive data with an application program.
- Install an external device for which the access rights can be controlled as a relay station. (For details on the external devices for which access rights can be controlled, consult the network provider or equipment dealer.)

Setting method

1. Set the IP address for the IP address to be passed or blocked in "Security" under "Application Settings". (☞ Page 113 Security)
2. Write the module parameters to the C Controller module.
3. The IP filter function is enabled after the power cycle or reset of C Controller module.

Point

Even if the connection is specified by the setting of "External Device Configuration" of the C Controller module or the program, the access from the target device is either passed or blocked according to the IP filter settings.
If the IP address set to "External Device Configuration" of the C Controller module is set to be blocked in the "IP Filter Settings", the IP filter setting is enabled and communication with the target device is blocked.

Considerations

If there is a proxy server on the LAN, block the IP address of the proxy server. Otherwise, the access from the personal computers that can access the proxy server cannot be prevented.

6.7 Parameter Settings

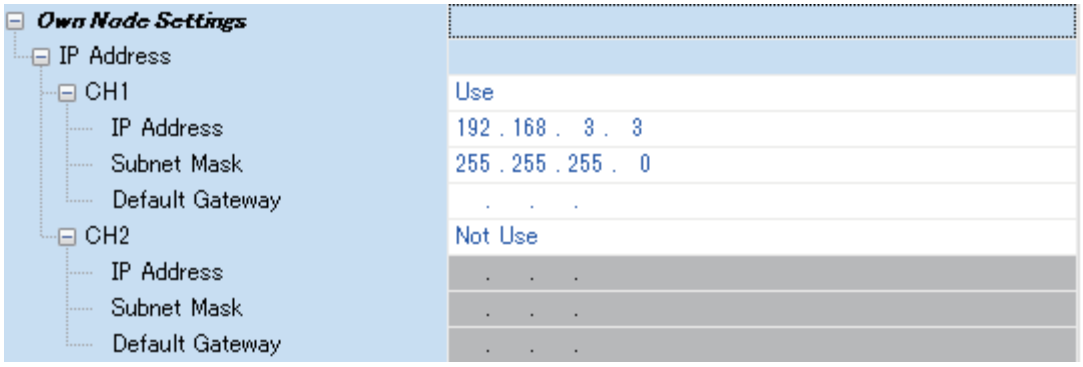
This section explains the settings required for communication with a target device in C Controller module.

Own node settings

Set the own node required for Ethernet communication.

[Module Parameter] ⇨ "Basic Settings" ⇨ "Own Node Settings"

Window



Displayed items

—: No setting

Item			Description	Setting range	Default
IP Address	CH1	—	Set whether to use the Ethernet port (CH1).	• Not Use • Use	Use
		IP Address	Set the same class and subnet address as the target device to be communicated with. Set the IP address so that CH1 belongs to the different network from CH2.	• 0.0.0.1 to 223.255.255.254	192.168.3.3
		Subnet Mask	Set the subnet mask pattern of the default gateway when IP address of the default gateway is set and perform communication with a target device on another network via a router. All the devices on a sub network must be the same subnet mask. This setting is not required when communicating in a single network.	• 128.0.0.0 to 255.255.255.252	255.255.255.0
		Default Gateway	Set the IP address for the device (default gateway) which is relayed for the access to the target device on other network. Set the value that satisfies the following conditions. • The IP address class is any of A, B, and C. • The subnet address of the default gateway is the same as that of C Controller module on the own station. • The host address bits are not all '0' or all '1'.	• — (Blank) • 0.0.0.1 to 223.255.255.254	—
	CH2	—	Set whether to use the Ethernet port (CH2).	• Not Use • Use	Not Use
		IP address	Same as CH1	• 0.0.0.1 to 223.255.255.254	—
		Subnet Mask		• 128.0.0.0 to 255.255.255.252	
		Default Gateway		• — (Blank) • 0.0.0.1 to 223.255.255.254	

Point

When using both CH1 and CH2, the IP address and subnet mask should be set with different values for CH1 and CH2, respectively.

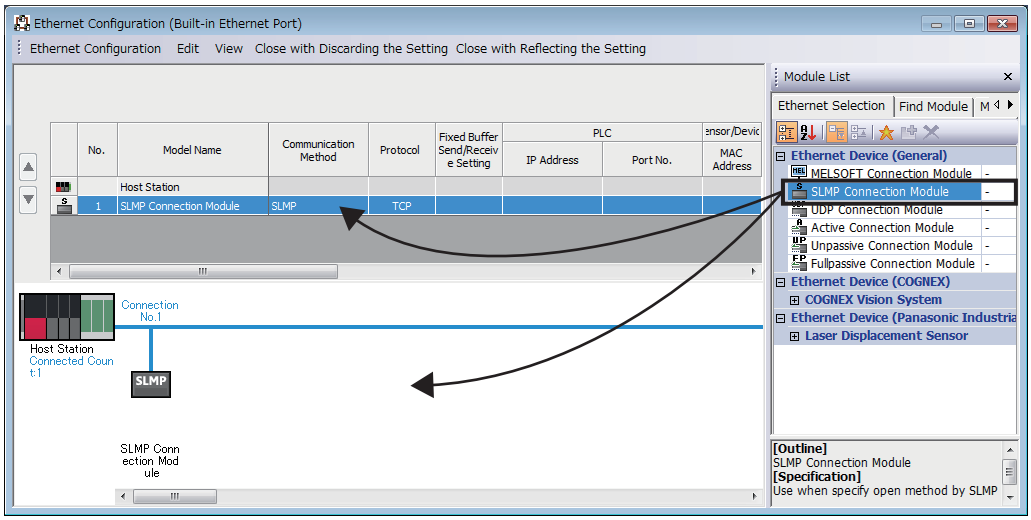
External device configuration

Select the method and protocol used for communication with a target device.

[Module Parameter] ⇨ "Basic Settings" ⇨ "External Device Configuration" ⇨ "<Detailed Setting>"

Setting method

1. Select the target device to be connected in "Module List" and drag it to "List of devices" or "Device map area".



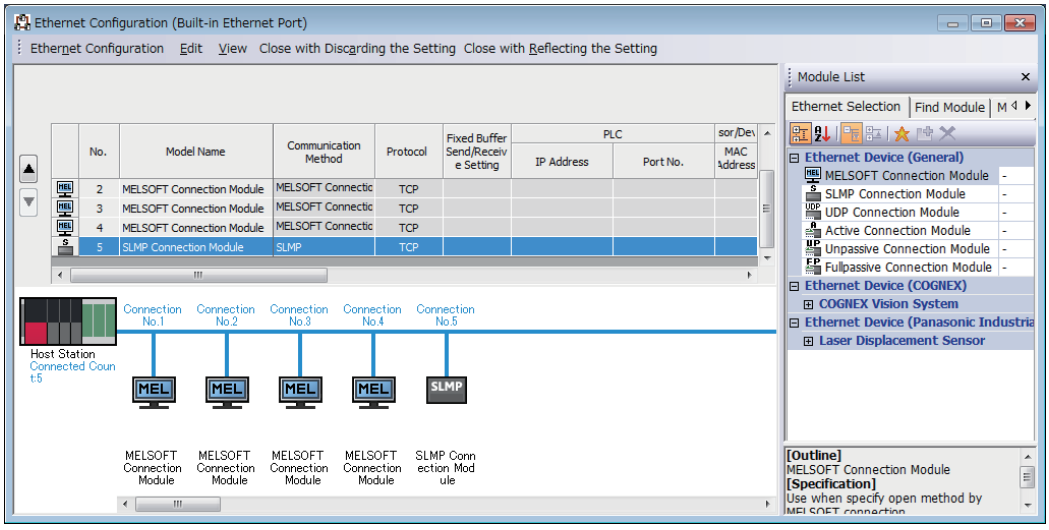
2. Set the items.

3. Select [Close with Discarding the Setting] and close the "External Device Configuration" window.

Point

In setting "External Device Configuration", setting the target device in order starting from the connection No.1 is required. To use the specific connection number, set "MELSOFT Connection Module" to the connection number which is not used.

• When using only the connection No.5



Restriction

C Controller module does not support the Active Connection Module, Unpassive Connection Module, Fullpassive Connection Module, or UDP Connection Module.

Setting items

The following shows the setting items for "External Device Configuration".

Item		Description	Setting range
No.		Connection numbers for distinguishing the settings for each user connection.	It is set in ascending order from 1 within the following range. C Controller module: 1 to 16
Model Name		Names of target devices are displayed.	—
Communication Method		Set the communication method with the target device.	• Broadcast Send • Broadcast Receive • Fixed Buffer (Procedure Exist)*1 • Fixed Buffer (No Procedure)*1 • Random Access Buffer*1 • Predefined Protocol*2 • Socket Communication • MELSOFT Connection • SLMP
Protocol		Select the communication protocol for the target device.	• TCP*3 • UDP*4
Fixed Buffer Send/Receive Setting		Not required.	—
PLC	IP Address	Not required.	—
	Port No.*5	Set the port number for each connection of Ethernet-equipped module.	1 to 4999, 5010 to 65534 (Default: blank)
Sensor/Device	MAC Address	Not required.	—
	Host Name	Not required.	—
	IP address	Set the IP address of the target device.	0.0.0.1 to 223.255.255.254 (Default: blank)
	Port No.	Set the port number of the target device. To receive data from all the port numbers, set '65535'.	1 to 65534, 65535 (Default: blank)
	Subnet Mask	Not required.	—
	Default Gateway	Not required	—

*1 C Controller module cannot set this item.

*2 Although it may be set as the communication method, C Controller module does not support it.

*3 The module can be connected up to the number equivalent to ((the maximum number of connections in the setting for external device configuration) - (the set number of connections) + 1).

*4 As simultaneous communication from multiple connected target devices can overload network, communication may not be established in such overloaded network conditions.

*5 The own station port number 1 to 1023 are the number for reserved in general (WELL KNOWN PORT NUMBERS), and the port number 61440 to 65534 are the number used for other communication functions. Using the port number within the range of 1024 to 4999 or 5010 to 61439 is recommended.

■Alive check with the KeepAlive function

When the protocol setting is TCP, perform the alive check using the KeepAlive function.

A message for alive check is sent after 22 seconds have passed since the last message received from a target device, and whether or not the response is returned from the target device is checked. When no response is returned, a message for alive check is sent every one second. When no response is confirmed for eight seconds (30 seconds since the last received message), the connection is terminated as being determined that the target device does not exist.

Point

If the target device does not support the TCP KeepAlive function (response to ACK message for KeepAlive), the connection may be terminated.

■TCP retransmission processing

In TCP connection, the retransmission processing is performed for the number of retransmission and at the retransmission interval shown below when the TCP protocol ACK response is not returned from a target device against transmission. When no TCP protocol ACK response is returned in 60 seconds after the last retransmission, the connection is terminated as being determined the target device has an error.

- Number of retransmission: 12 times[*1]
- Retransmission interval[*2]: (The number of retransmission × the number of retransmission × RTO[*3]) ÷ 1024 (seconds)

*1 After 30 seconds from establishment of the connection, destination device error is assumed and the connection is terminated even if the number of resends does not reach to 12 times.

*2 The maximum value of the retransmission time is 60 seconds.

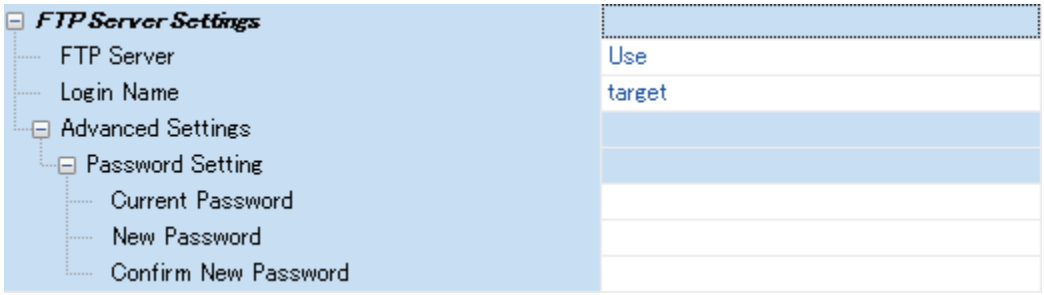
*3 RTO (retransmission timeout) is a value increases exponentially based on RTT (round-trip time).

FTP server settings

Set the file transfer function (FTP server).

[Module Parameter] ⇨ "Application Settings" ⇨ "FTP Server Settings"

Window



Displayed items

Item		Description	Setting range	Default
FTP Server		Select whether to use the FTP function of C Controller module.	• Not Use • Use	Use
Login Name		Set the login name to be used for file transfer request (login) from the target device.	Up to 12 characters	target
Advanced Settings	Password Setting	Set the password to be used for file transfer request (login) from the target device.	8 to 32 characters	—

Password Setting

■Current Password

Enter the current password for login to C Controller module.

Default password (initial setting) is set as follows:

Module	Password
C Controller module	password

Point

To prevent an illegal access, change the password when using the File transfer function.

■New Password, Confirm New Password

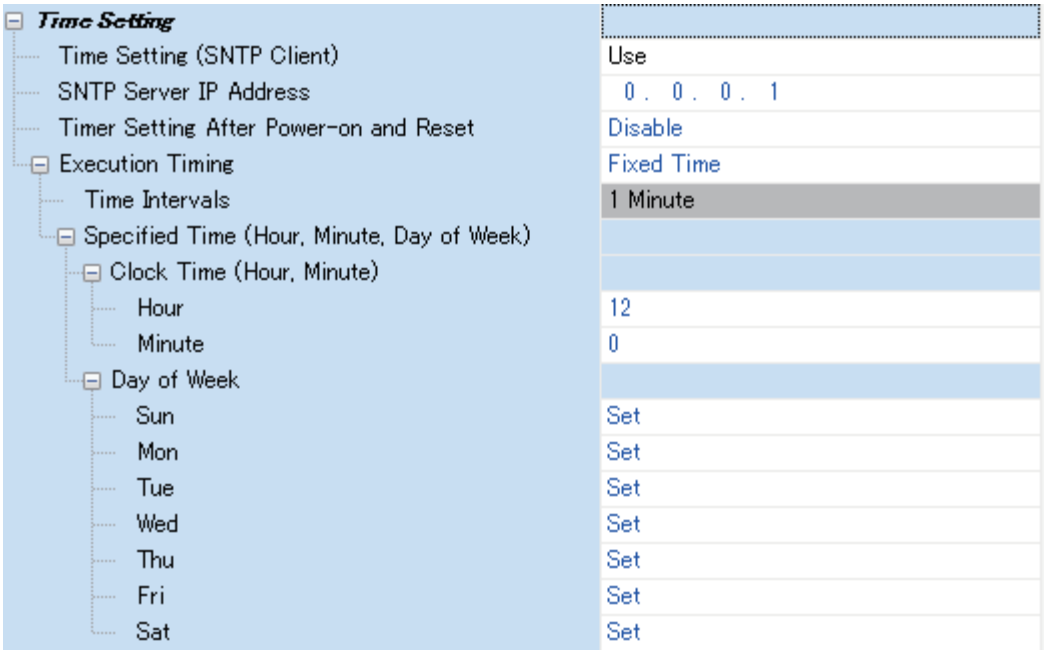
To change the password, enter the new password in "New Password" and "Confirm New Password".

Time Setting

Set the time setting function (SNTP client).

[Module Parameter] ⇨ "Application Settings" ⇨ "Time Setting"

Window



Displayed items

Item		Description	Setting range	Default
Time Setting (SNTP Client)		Select whether to use the FTP function of C Controller module.	• Not Use • Use	Not Use
SNTP Server IP Address		Set the IP address of the SNTP server.	0.0.0.1 to 223.255.255.254	0.0.0.1
Timer Setting After Power-on and Reset		Select whether to execute the time setting function after powering ON or resetting the C Controller module.	• Disable • Enable	Disable
Execution Timing	—	Set the execution timing of the time setting.	• Fixed Time • Specified Time Intervals	Fixed Time
	Time Intervals	When "Specified Time Intervals" is selected, set the time interval (minute) for the time setting.	1 to 1440	1 Minute
	Specified Time (Hour, Minute, Day of Week)	When "Fixed Time" is selected, set the day of the week and the time (hour/minute) when the time setting function is performed.	—	

Point

- Connect only one SNTP server on the system.
- The output time will be the same even if multiple modules obtains the time from the same SNTP server.

Execution timing

■Specified Time (Hour, Minute, Day of Week)

Set an execution time within the following range in "Clock Time (Hour, Minute)".

Unit	Setting range
Hour	0 to 23
Minute	0 to 59

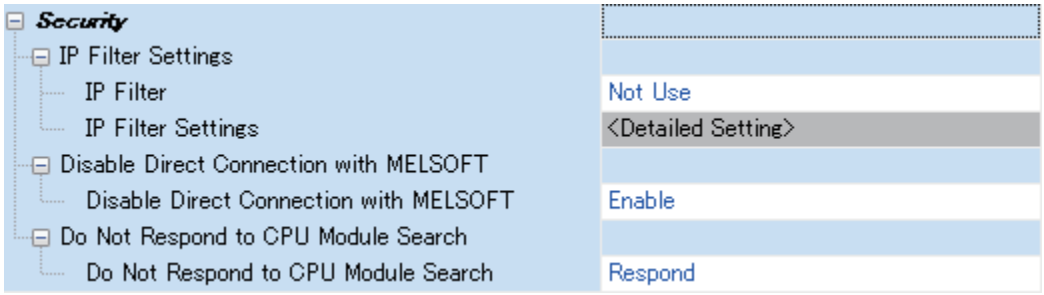
To specify the day of the week to perform the time setting, select "Not Set" for the day on which time setting is not performed under "Day of Week". Make sure that at least one day of the week is set to "Set". An error occurs if "Not Set" is selected for all the days.

Security

Set the security settings.

[Module Parameter] ⇨ "Application Settings" ⇨ "Security"

Window



Displayed items

Item		Description	Setting range	Default
IP Filter Settings	IP Filter	Set whether to use the IP filter function.	• Not Use • Use	Not Use
	IP Filter Settings	Set the IP addresses to be allowed/denied.	—	
Disable Direct Connection with MELSOFT		Enables/disables the direct connection with CW Configurator.	• Disable • Enable	Enable
Do Not Respond to CPU Module Search		Set whether to respond to the CPU module search on the network.	• Do Not Respond • Respond	Respond

IP filter settings

Up to 32 IP addresses can be set to allowed/denied using the IP filter function.

The range of IP address and IP addresses to be excluded from the specified range can be set at one setting.

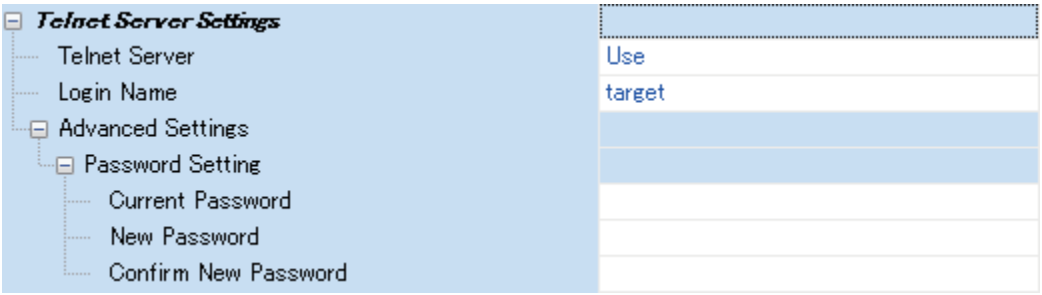
Item	Description	Setting range	Default
Access from IP address below	Set whether to allow/deny the access from the specified IP addresses.	• Allow • Deny	Allow
Range Setting	Select this when specifying IP address range.	—	Unselected
IP Address	Set the IP addresses to be allowed/denied. When a checkbox of "Range Setting" is selected, set both start IP address and end IP address within the range.	0.0.0.1 to 223.255.255.254	—
IP Address Excluded from Range	When a checkbox of "Range Setting" is selected, set the IP address to be excluded from the range in "IP Address". Up to 32 IP addresses can be set within the specified range.	0.0.0.1 to 223.255.255.254	—

Telnet Server Settings

Set the Telnet server.

[Module Parameter] ⇨ "Application Settings" ⇨ "Telnet Server Settings"

Window



Displayed items

Item		Description	Setting range	Default
Telnet Server		Set whether to use the Telnet function of C Controller module.	• Not Use • Use	Use
Login Name		Set the login name to be used for file transfer request (login) from the target device.	Up to 12 characters	target
Advanced Settings	Password	Set the password to be used for file transfer request (login) from the target device.	8 to 32 characters	—

Password Setting

■Current Password

Enter the current password for login to C Controller module.

Default password (initial setting) is set as follows:

Module	Password
C Controller module	password

Point

To prevent an illegal access, change the password when using the Telnet function.

■New password and confirmation password

To change the password, enter the new password in "New Password" and "Confirm New Password".

7 MULTIPLE CPU SYSTEM FUNCTIONS

Multiple CPU modules mounted on a base unit control I/O module and Intelligent function module each.
The data communication among CPU modules on a base unit can also be performed.

Point

- For the concept of the multiple CPU system (system configuration specifications such as mounting position of CPU modules and assignment of CPU number and I/O number), refer to the following manual.

MELSEC iQ-R Module Configuration Manual

- For the start-up (settings, operating procedures, etc) of a multiple CPU system, refer to the following manual.

CW Configurator Operating Manual

Restriction

- The startup time of the multiple CPU system may be long depending on the system configuration of the installed modules, boot operation, the configuration of the system parameters and CPU parameters. When the SD memory card diagnostics is performed due to the operation such as power OFF during the access to the SD memory card, the startup time of the multiple CPU system may be long as well.
- Create a program so that only one CPU module accesses a MELSEC-Q series module when possible. If multiple CPU modules access a MELSEC-Q series module simultaneously, the program execution processing (including the execution processing of interrupt programs) may be extended due to the access waiting time.

7.1 Out-of-Group I/O Fetch

In a multiple CPU system, the access range of the controlled module is different from that of the non-controlled module. The out-of-group I/O fetch function enables data which cannot be accessed to be imported. However, data cannot be imported from the module that is an inter-module synchronization target.

Accessing controlled module

The access range to the controlled module of the CPU module is the same as that of the single CPU system, and I/O refresh for the controlled module or read from/write to buffer memory of the Intelligent function module are enabled.

Accessing non-controlled module

Access to the non-controlled module of the CPU module is limited to reading the buffer memory of the Intelligent function module. However, the ON/OFF data of output (Y) of the non-controlled module can be imported by "I/O Setting Outside Group".

○: Accessible, ×: Not accessible

Access target		Accessibility	
		When "Import" is selected in "I/O Setting Outside Group"	When "Not Imported" is selected in "I/O Setting Outside Group"
Input (X)	Read data from other CPU module	○	×
Output (Y)	Write data to other CPU module	×	× (Non-processing)
	Read data from other CPU module	○	× (Non-processing)
Buffer memory of an Intelligent function module	Read data	○	○
	Write data	× (Error)	× (Error)

I/O Setting Outside Group

Set the I/O state outside the group.

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Other PLC Control Module Setting" ⇨ "I/O Setting Outside Group"

Window

Displayed items

Item	Description	Setting range	Default
Input Status Outside Group	Set the input state outside the group.	• Not Imported • Import	Not Imported
Output Status Outside Group	Set the output state outside the group.	• Not Imported • Import	Not Imported

Importing input (X) data

When "Import" is set for the input status in "I/O Setting Outside Group", the ON/OFF data from input module and Intelligent function module controlled by other CPUs can be imported.

■Modules from which input (X) data can be imported

Input (X) data can be imported from the following modules mounted on the main/extension base unit.

- Input module
- I/O combined module*1
- Intelligent function module

*1 For MELSEC iQ-R series, the areas assigned to the output portion (unused area) are not imported. The ON/OFF state is retained.

Point

Input (X) data can also be imported from a user program with the C Controller module dedicated functions (CCPU_X_In_BitEx, CCPU_X_In_WordEx).

Importing output (Y) data

When "Import" is set for the output status in "I/O Setting Outside Group", the ON/OFF data from output module and Intelligent function module controlled by other CPUs can be imported.

■Modules from which output (Y) data can be imported*1

Output (Y) data can be imported from the following modules mounted on the main/extension base unit.

- Output module
- I/O combined module
- Intelligent function module

*1 Data cannot be imported from MELSEC-Q series modules.

Point

Output (Y) data can also be imported from a user program using the C Controller module dedicated functions (CCPU_Y_In_BitEx, CCPU_Y_In_WordEx).

Output to output module/Intelligent function module

ON/OFF data cannot be output to non-controlled modules.

If the output state of the non-controlled module is turned ON/OFF by a program, the output state in the CPU module is changed; however, the output state of the non-controlled module is not changed.

Accessing buffer memory of Intelligent function module

■Reading data in buffer memory

Use the following functions to read data from the buffer memory of an Intelligent function module.

- C Controller module dedicated function (CCPU_FromBuf)
- MELSEC data link function (mdReceiveEx, mdRandREx)

■Writing data to buffer memory

Use the following functions to write data to the buffer memory of an Intelligent function module.

- C Controller module dedicated function (CCPU_ToBuf)
- MELSEC data link function (mdSendEx, mdRandWEx)

7.2 Operation Settings

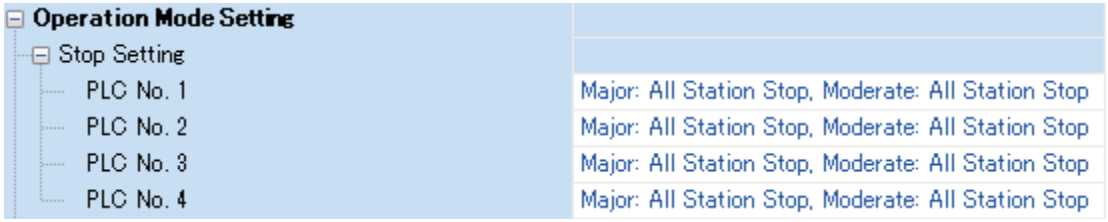
This section explains the operation settings for a multiple CPU system.

Stop setting

Set whether to stop or continue the operation in all CPUs if a major or moderate error occurred on each CPU.

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Operation Mode Setting" ⇨ "Stop Setting"

Window



Displayed items

Item	Description	Setting range	Default
PLC No.1	Specify whether to stop the operation of all CPUs if a major or moderate error occurred on CPU No.1.	• Major: All Station Stop Moderate: All Station Stop • Major: All Station Stop Moderate: All Station Continue • Major: All Station Continue Moderate: All Station Continue	Major: All Station Stop Moderate: All Station Stop
PLC No.2	Specify whether to stop the operation of all CPUs if a major or moderate error occurred on CPU No.2.		
PLC No.3	Specify whether to stop the operation of all CPUs if a major or moderate error occurred on CPU No.3.		
PLC No.4	Specify whether to stop the operation of all CPUs if a major or moderate error occurred on CPU No.4.		

Settings for synchronized startup

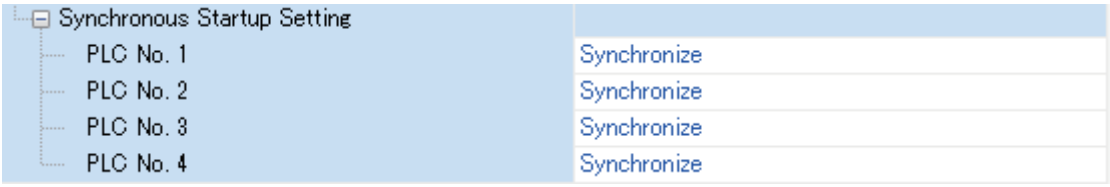
By synchronizing start-up time of each CPU module, operations can be started at the same time in the entire multiple CPU system. An interlock program that monitors the start-up time for each CPU module other than C Controller module is not required. However, this setting delays the system start-up.

An interlock program that monitors the execution completion of the script file is required for C Controller module in a multiple CPU system configuration. The execution completion of the script file can be checked by the READY LED status indication. The status indication of the READY LED can be checked by following methods:

- Using the C Controller module dedicated function (CCPU_GetLEDStatus).
- Checking the special register (SD201).

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Operation Mode Setting" ⇨ "Synchronous Startup Setting"

Window



Displayed items

Item	Description	Setting range	Default
PLC No.1	Set the CPU No. of which start-up time is to be synchronized in a multiple CPU system.	• Synchronize • Do not Synchronize	Synchronize
PLC No.2			
PLC No.3			
PLC No.4			

Point

- Group setting for start-up synchronization is available. For example, a setting in which only CPU No.1 and No.2 start synchronously in a multiple CPU system with four CPU modules is possible.
- If a reserved (empty) CPU is specified to synchronize, the reserved CPU is ignored and the other CPU will be started.
- This setting is designed to access each CPU module with no interlock in the multiple CPU system. It is not intended to be used for starting operation at the same time among the CPU modules after the startup.

Clock data

The clock data in CPU No.2 to No.4 are synchronized with the clock data set to CPU No.1 automatically. (Even if the clock data is set to each CPU, they will be overwritten). Therefore, the system-unified clock data can be used only by setting the clock data for CPU No.1. (☞ Page 34 Clock Function)

Point

As with the clock data, the time zone setting for CPU No.2 to CPU No.4 follows the setting configured to CPU No.1. (☞ Page 35 Setting time zone)

7.3 Multiple CPU Parameter Check

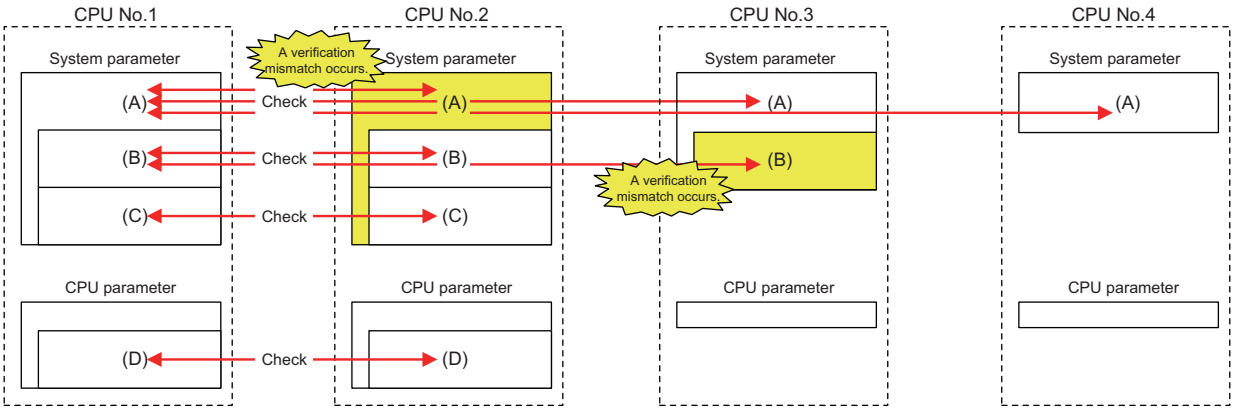
In a multiple CPU system, whether the same setting is configured for the multiple CPU refresh points between the system parameter and CPU parameter of each CPU is checked at the following timing. However, for the fixed cycle communication setting and the inter-module synchronization setting, the parameter check is performed for the only CPU which uses the respective functions.

- When the power is turned ON
- When the CPU No.1 is reset

Timing	Parameter to be checked	Check conditions for CPU No.1	Checking condition for CPU No.2 and later
Power ON or CPU No.1 is reset	System parameters (other than "Fixed Scan Communication Setting" and "Synchronization Setting within the Modules")	The check is not conducted.	Compares with the parameter of the smallest CPU number.
	Fixed Scan Communication Setting	The CPUs with no fixed cycle communication setting are not checked. The CPUs with a fixed cycle communication setting will be compared to the parameters with those of the CPU of the smallest number.	
	Synchronization Setting within the Modules	The CPUs with no inter-module synchronization setting are not checked. The CPUs with an inter-module synchronization setting will be compared to the parameters with those of the CPU of the smallest number.	
	CPU parameters (number of points for the refresh setting)	The CPUs with no fixed cycle communication setting are not checked. The CPUs with a fixed cycle communication setting will be compared to the parameters with those of the CPU of the smallest number.	

Ex.

An error is detected in CPU No.2 and 3 by parameter check, and CPU No.1 and 4 starts up normally. (Operation in error)



○: Set (* if the next number is the same, it refers to the same parameter), ×: No setting

Item			Setting conditions for each CPU			
			CPU No.1	CPU No.2	CPU No.3	CPU No.4
Presence of parameters	System parameters (other than "Fixed Scan Communication Setting" and "Synchronization Setting within the Modules")	(A)	○(1)	○(5)	○(1)	○(1)
	Setting in "Fixed Scan Communication Setting"	(B)	○(2)	○(2)	○(6)	×
	Synchronization Setting within the Modules	(C)	○(3)	○(3)	×	×
	CPU parameters (number of points of refresh settings)	(D)	○(4)	○(4)	×	×

7.4 Data Communication Between CPU Modules

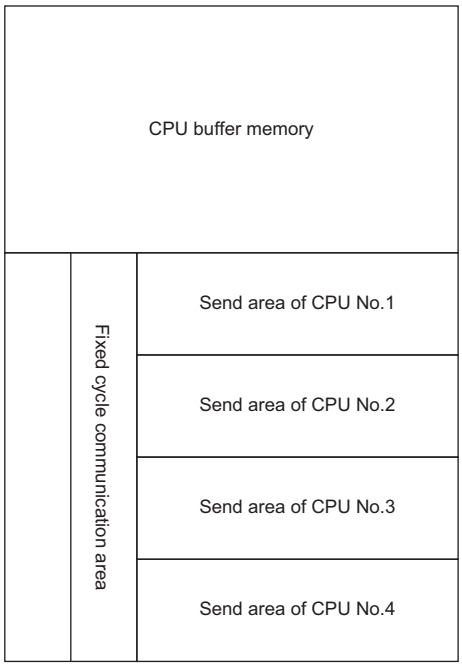
Data can be sent/received among CPU modules in a multiple CPU system. The direct access communication enables data writing or reading among CPU modules.

Communication method	Application	Description
Data communication with CPU buffer memory	Use this communication method when performing data send/receive at the timing of each CPU module.	The sending side CPU module writes data to the CPU buffer memory in the host CPU. The receiving side CPU module reads data from the CPU buffer memory of the send target CPU module (other CPU).
Data communication with fixed cycle communication area	Use this communication method when performing data send/receive with adjusting the timing between CPU modules.	The sending side CPU module writes data in the fixed cycle communication area (send area) in the host CPU. The receiving side CPU module reads data from the fixed cycle communication area (receive area) in the CPU module of the send source CPU module.

Used memory

CPU buffer memory is used for data communication among CPU modules.

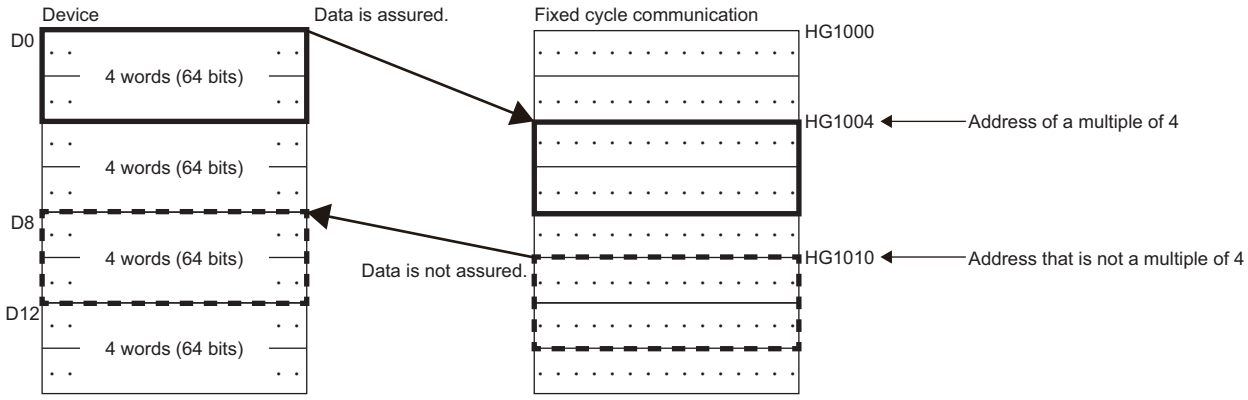
Memory configuration of CPU buffer memory



Area	Communication method	Description	Area size
CPU buffer memory	Communication through direct access	Reads/writes data in the area of the host CPU or other CPUs.	512K words fixed
Fixed cycle communication area	Communication through direct access	Performs data communication between the host CPU area and other CPU areas in accordance with the set interval.	Can be set within the range of 0 to 24K words in total. The send area per single CPU module can be set within the range of 0 to 12K words. (☞ Page 124 Setting fixed cycle communication area)

■Prevention of 64-bit data inconsistency

To avoid 64-bit data inconsistency, access the specified start address of the CPU buffer memory in multiples of four similarly to the device to be specified.

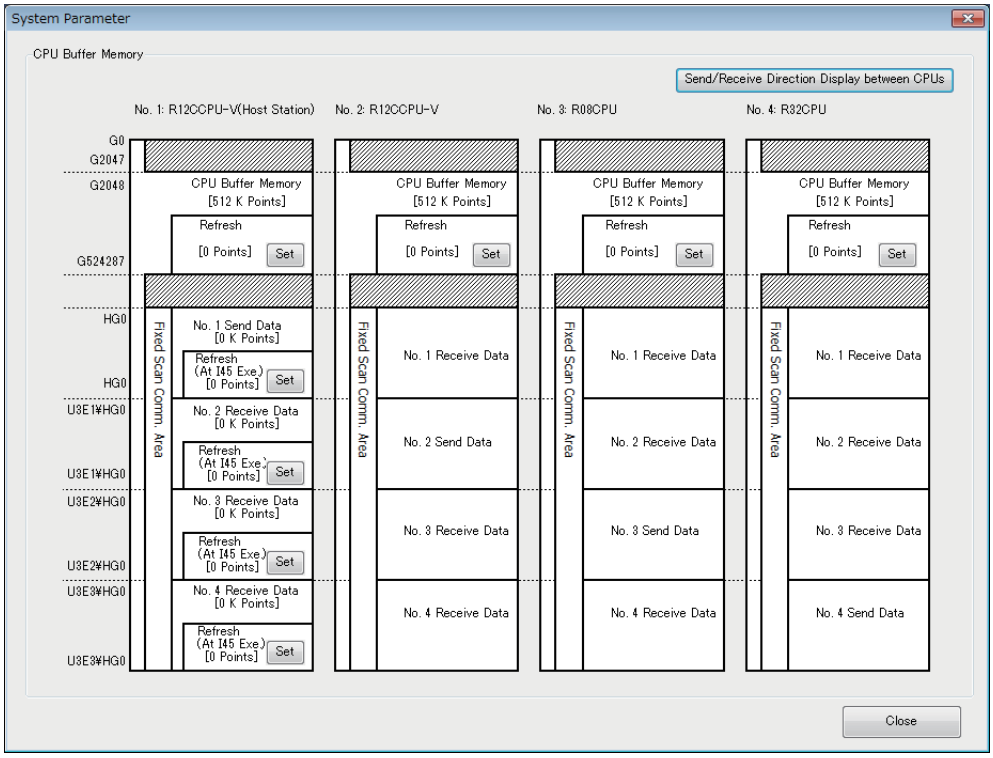


Checking memory configuration

Memory configuration can be checked with CW Configurator.

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Communication Setting between CPU" ⇨ "CPU Buffer Memory Setting" ⇨ "<Detailed Setting>"

Window



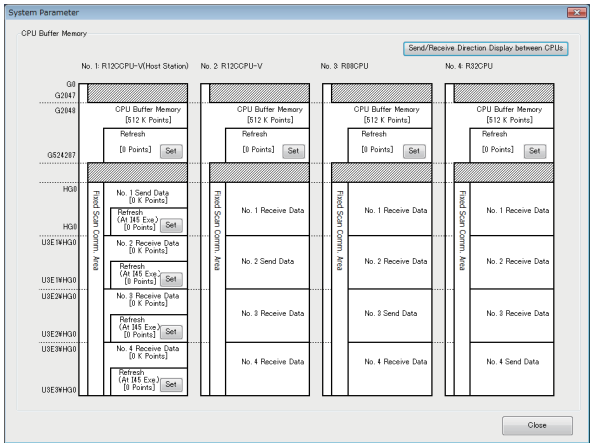
Displayed items

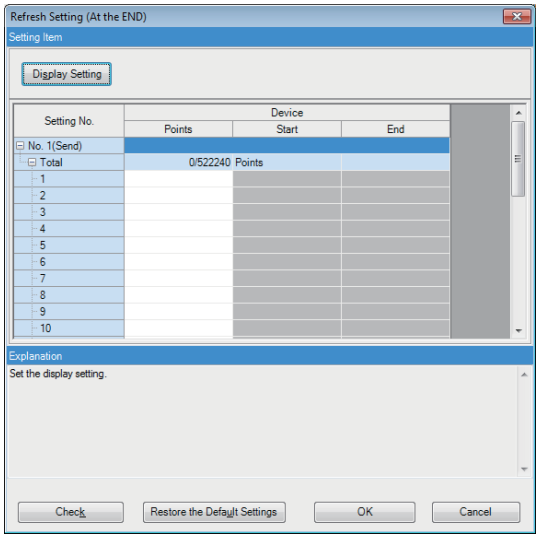
Item	Description	Setting range	Default
[Setting] button in each refresh area	Click the button to configure the refresh settings used for data communication between CPU modules.	—	0 points
[Send/Receive Direction Display between CPUs] button	Click the button to display the arrow that indicates the send/receive direction.	—	—

■Setting refresh area

For data communication with a multiple CPU synchronous interrupt program (I45) using the fixed cycle communication area, setting the refresh area is required.

Set the refresh area in accordance with other CPU module with which data to be communicated.





1. Click the [Setting] button in the refresh area to be set.
2. Set the number of points in accordance with the communication destination CPU module.
3. Click the [OK] button once the setting is completed.
4. Set the number of points for all of the refresh area used for data communication.

Other CPU module (communication destination)	Description
C Controller module	Set the number of points for refresh area as show below: • Refresh area (at the END): 0 points • Refresh area (at the execution of I45): 0 points
Programmable controller CPU	Set the number of points for refresh area as shown below: • Refresh area (at the END): Same number of points with the communication destination programmable controller • Refresh area (at the execution of I45): Same number of points with the communication destination programmable controller.

Settings of data communication using fixed cycle communication area

The following shows the settings for performing data communication using the fixed cycle communication area.

■Setting method

To communicate data using the fixed cycle communication area, select "Enable" in "Fixed Scan Communication Function".

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Communication Setting between CPU" ⇨ "Fixed Scan Communication Function"

Window

Displayed items

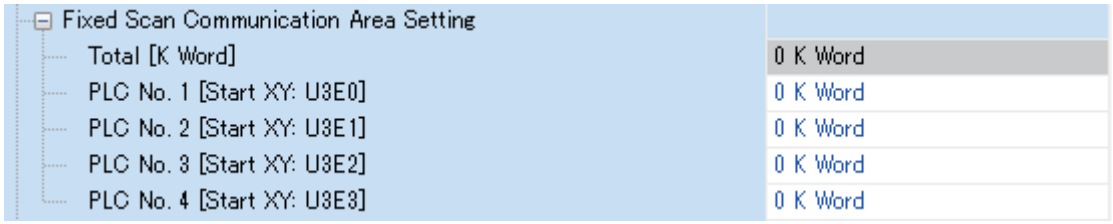
Item	Description	Setting range	Default
Fixed Scan Communication Function	Set whether to use the fixed cycle communication function. Set the same settings only for the CPUs which are used by the fixed cycle communication function.	• Not Use • Use	Not Use

■Setting fixed cycle communication area

Set the send area range (total of areas used for direct access communication) for each CPU in the fixed cycle communication area. The range of the fixed cycle communication area can only be changed with the parameter settings. The other areas cannot be changed.

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Communication Setting between CPU" ⇨ "Fixed Scan Communication Area Setting"

Window



Displayed items

Item	Description	Setting range	Default
Total [K Word]	The total value is displayed.	Entire system: 0 to 24K words	—
PLC No.1 [Start XY: U3E0]	Set the send area size for CPU No.1.	0 to 12K words	0K word
PLC No.2 [Start XY: U3E1]	Set the send area size for CPU No.2.	0 to 12K words	0K word
PLC No.3 [Start XY: U3E2]	Set the send area size for CPU No.3.	0 to 12K words	0K word
PLC No.4 [Start XY: U3E3]	Set the send area size for CPU No.4.	0 to 12K words	0K word

Precautions

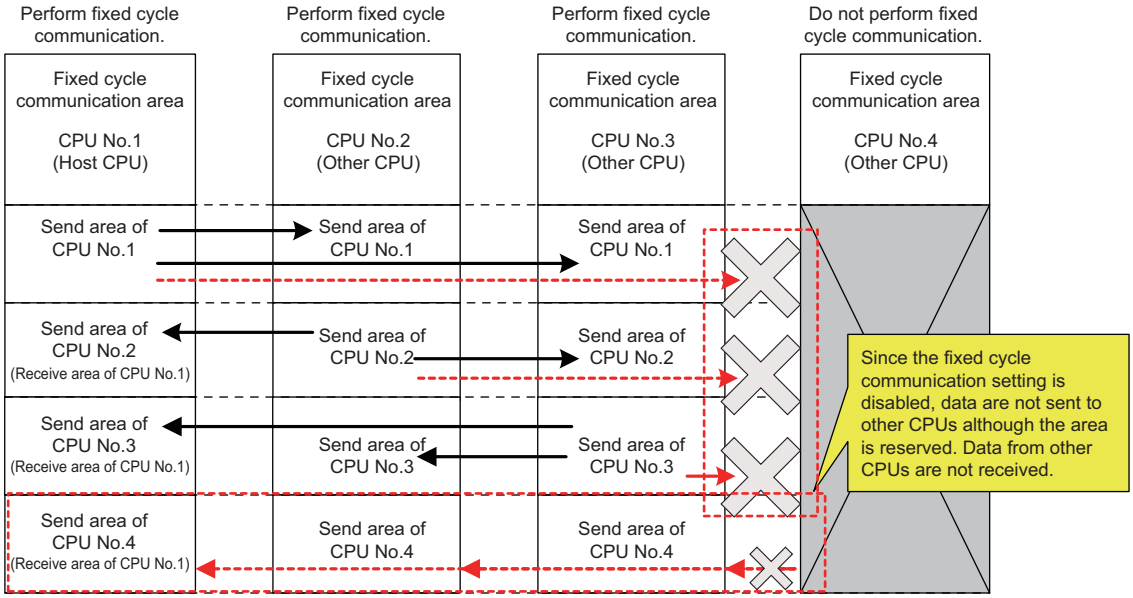
The maximum area size which can be set in the fixed cycle communication area varies depending on the fixed cycle interval.

Fixed cycle interval	Maximum area size which can be set to fixed cycle communication area
0.10 ms	12K words
0.15 ms	20K words
Other than above	24K words

Point

When CPU of which fixed cycle communication function is set to "Not Use" exists, setting the send area for the fixed cycle communication area to a CPU with the fixed cycle communication function set to "Not Use" (that is, unset) with the host CPU parameter setting will result in no error since the unset CPU is regarded as a reserved CPU for future setting.

Example: When "Not Use" is set to "Fixed Scan Communication Function" for the CPU No.4

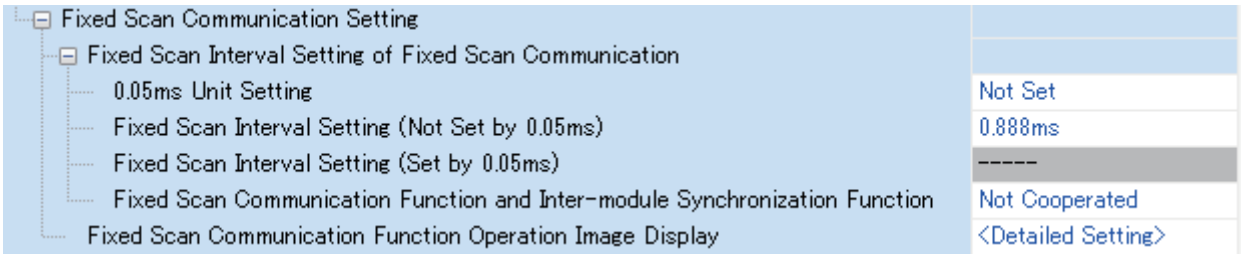


Fixed cycle communication setting

Set the interval for data transfer between CPU modules. It also can be synchronized with the timing of the inter-module synchronization cycle. (📖 MELSEC iQ-R Inter-Module Synchronization Function Reference Manual)

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Fixed Scan Communication Setting" ⇨ "Fixed Scan Interval Setting of Fixed Scan Communication"

Window



Displayed items

Item	Description	Setting range	Default
0.05 ms Unit Setting	Set whether to set the fixed cycle interval settings in 0.05 ms unit.	• Not Set • Set	Not Set
Fixed Scan Interval Setting (Not Set by 0.05ms)*1	Configure the cycle of fixed cycle communication interval by selecting from the items of the setting range. Set the same settings only for the CPUs which are used by the fixed cycle communication function.	• 0.222ms • 0.444ms • 0.888ms • 1.777ms • 3.555ms • 7.111ms	0.888ms
Fixed Scan Interval Setting (Set by 0.05 ms)*1	Set any value as a fixed cycle communication interval in 0.05 ms unit.	0.10 ms to 10.00 ms	0.10ms
Fixed Scan Communication Function and Inter-module Synchronization Function	Set whether to operate the fixed cycle communication between CPUs matched with the cycle set in "Synchronization Setting within the Modules".	• Not Cooperated • Cooperate	Not Cooperated

*1 The maximum area size which can be set in the fixed cycle communication area varies depending on the fixed cycle interval. (☞ Page 124 Setting fixed cycle communication area)

Point

- The send image for the fixed cycle communication can be checked by selecting "Fixed Scan Communication Function Operation Image Display".
- When "Fixed Scan Communication Function and Inter-module Synchronization Function" is set to "Not Cooperated", the timing will not be match even if the same value is set for the interval of both the fixed cycle communication interval and the inter-module synchronization setting.

Error detection setting

During data transfer among the CPU modules in a multiple CPU system, data inconsistency may occur because of time required for writing all data within the fixed cycle. To detect or not to detect a continuation error can be set with this setting. (☞ Page 56 Error Detections Setting)

CPU number-based data assurance

Data communication is performed in 64-bit units between CPU modules. Therefore, when data larger than 64 bits are handled, data inconsistency in which old and new data overlap may occur for each CPU, and this depends on the timing between data reading by the host CPU and data writing by other CPU/data receiving from other CPU.

Prevention of data inconsistency using the CPU number-based data assurance

The table below shows whether or not to prevent data inconsistency by enabling/disabling the CPU number-based data assurance.

○: With data inconsistency control by system, ×: Without data inconsistency control by system[*1]

Communication method	CPU buffer memory		Fixed cycle communication area	
	CPU number-based data assurance enabled	CPU number-based data assurance disabled	CPU number-based data assurance enabled	CPU number-based data assurance disabled
Communication by refresh[*2]	×	×	×	×
Communication through direct access	×	×	○[*3]	×

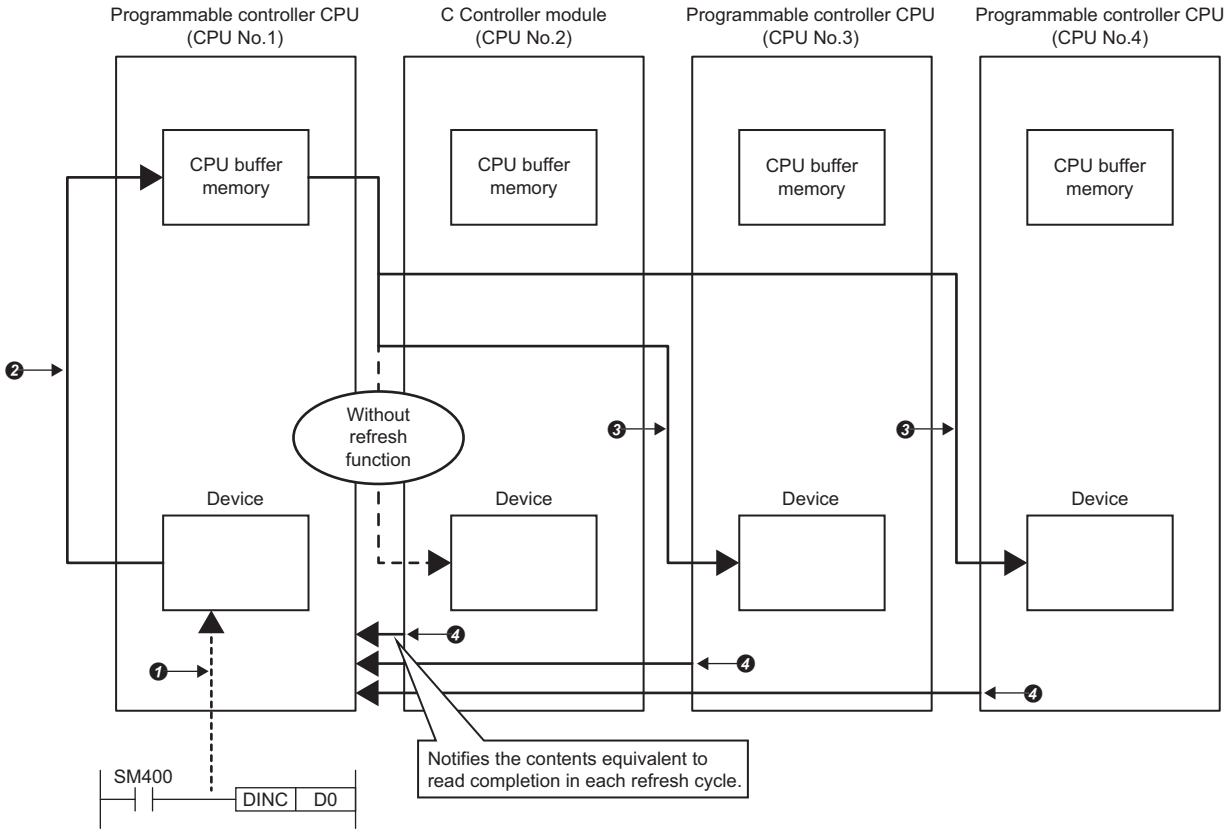
*1 The countermeasures by a program are required.
*2 Communication by refresh can not be performed since the CPU buffer memory does not have the refresh area.
*3 The access in the multiple CPU synchronous interrupt program (I45) only.

Point

- CPU No.1 does not send/receive the following data until it receives the notification of the data read completion from other CPU. The timing of sending/receiving data is the update interval of the CPU module of which scan time of the programmable controller CPU or refresh cycle of the C Controller module is the latest.
- C Controller module notifies the contents equivalent to the read completion in each refresh cycle.
- In the data communication through direct access to the CPU buffer memory excluding the fixed cycle communication area, the data in the CPU buffer memory of other CPU is directly read after the execution of the read instruction. Therefore, it will not be subject to the CPU number-based data assurance.
- When the data in the CPU buffer memory of C Controller module is read by a programmable controller CPU using the refresh, it will not be subject to the CPU number-based data assurance.

■Communication by refresh (when C Controller module is on the receiving side)

When the CPU number-based data assurance is enabled, the data is not assured.



❶The data is written from the program.

❷At END processing of the CPU No.1, the data is written.*1

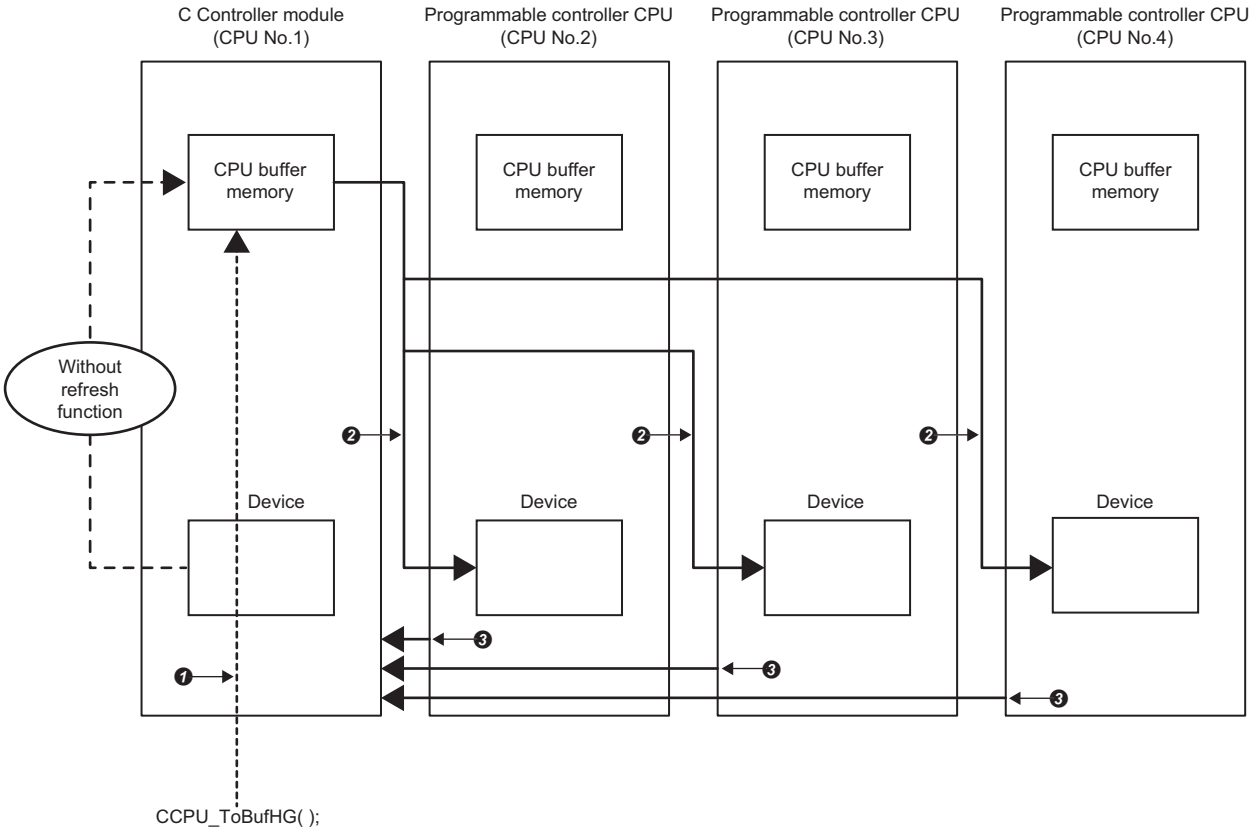
❸At END processing of each CPU, the data is read.

❹The data read completion from each CPU is notified to the CPU No.1.

*1 The update to the following data is not performed until the notification of the data read completion is received from other CPUs (No.2 to No.4).

■Communication by refresh (when C Controller module is on the sending side)

When the CPU number-based data assurance is enabled, the data is not assured.



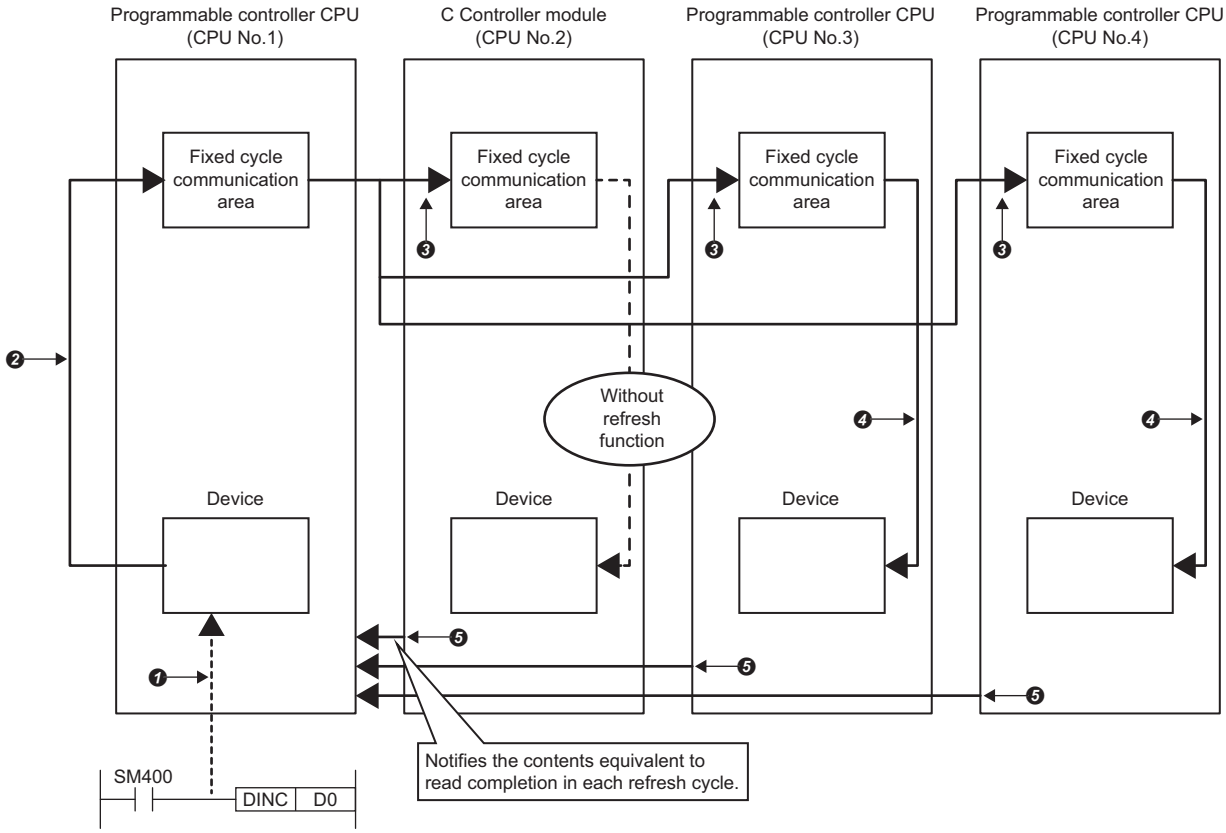
❶The data is written from the program.

❷At END processing of each CPU, the data is read.

❸The data read completion from each CPU is notified to the CPU No.1.

■Communication through direct access (when C Controller module is on the receiving side)

When the CPU number-based data assurance is enabled, the data is assured.



❶The data is written from the program.

❷At the multiple CPU synchronous interrupt program (I45) execution, the data is written.*1

❸At the multiple CPU synchronous interrupt program (I45) execution, the data is read.

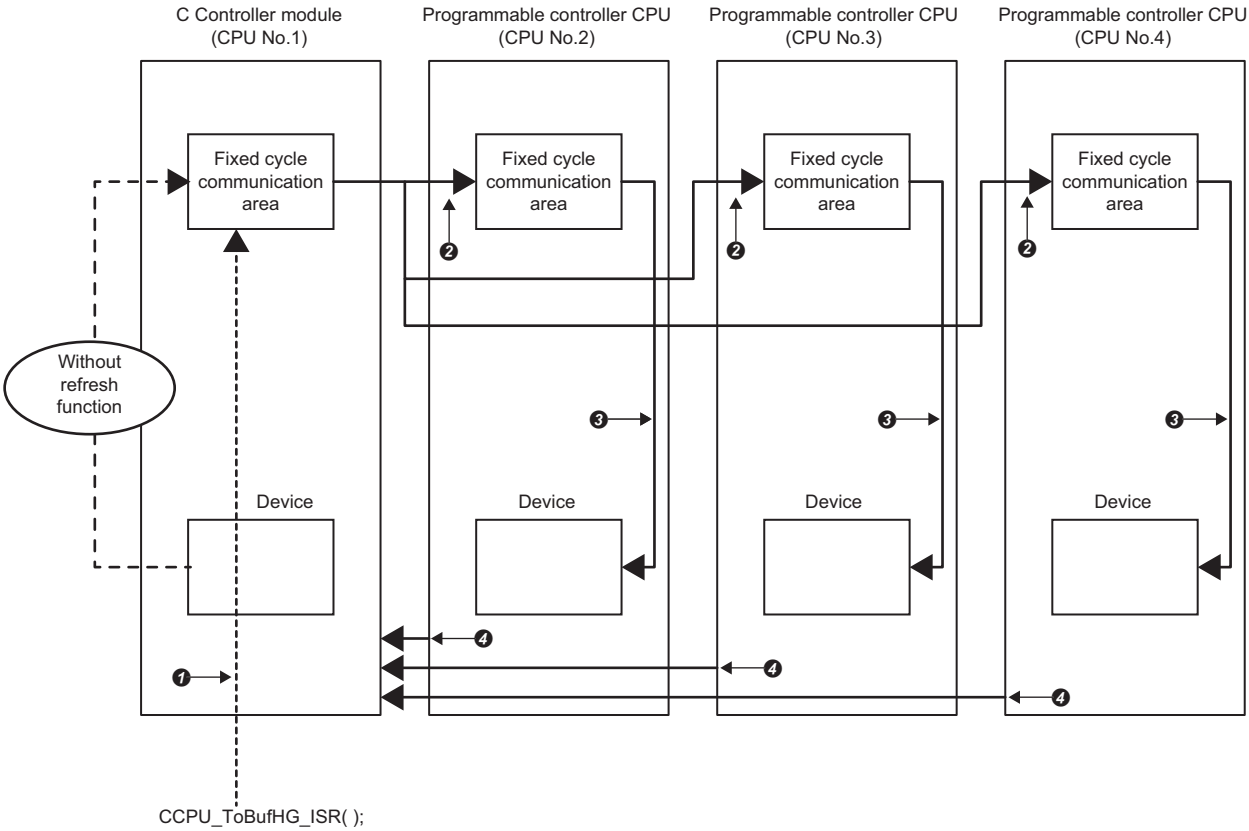
❹At the multiple CPU synchronous interrupt program (I45) execution, the data is refreshed.

❺The data read completion from each CPU is notified to the CPU No.1.

*1 The update to the following data is not performed until the notification of the data read completion is received from other CPUs (No.2 to No.4).

■Communication through direct access (when C Controller module is on the sending side)

When the CPU number-based data assurance is enabled, the data is not assured.



❶The data is written from the program.

❷At the multiple CPU synchronous interrupt program (I45) execution, the data is read.

❸At the multiple CPU synchronous interrupt program (I45) execution, the data is refreshed.

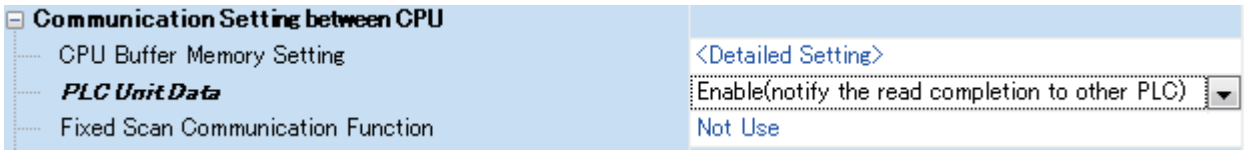
❹The data read completion from each CPU is notified to the CPU No.1.

CPU number-bases data assurance setting

Configure the CPU number-based data assurance setting.

[System Parameter] ⇨ "Multiple CPU Setting" ⇨ "Communication Setting between CPU" ⇨ "PLC Unit Data"

Window



Displayed items

Item	Description	Setting range	Default
PLC Unit Data	Select this to prevent data inconsistency in each CPU and to send/received data in data communication between CPU modules by refresh.	• Disable (not notify the read completion to other CPUs) • Enable (notify the read completion to other CPUs)	Disable (not notify the read completion to other CPUs)

Data assurance by program

Prevent data inconsistency using a program when the data inconsistency control by system is not available.

■Accessing the CPU buffer memory

A program reads data in order from the start address of the CPU buffer memory excluding the refresh area, and writes send data in order from the end address to the start address excluding the refresh area by the write instruction. Therefore, data inconsistency can be prevented by setting a device for interlock at the head of data to be communicated.

■Accessing the fixed cycle communication area

When accessing within a multiple CPU synchronous interrupt program (I45), no interlock circuit is required with the CPU number-based data assurance setting is enabled. To access the fixed cycle communication area in a program other than the above, or when the CPU number-based data assurance setting is disabled, an interlock circuit is required as with the access to the CPU buffer memory.

Functions that can be used for communication

The following shows the functions which are used for communication using each memory area in multiple CPU system.

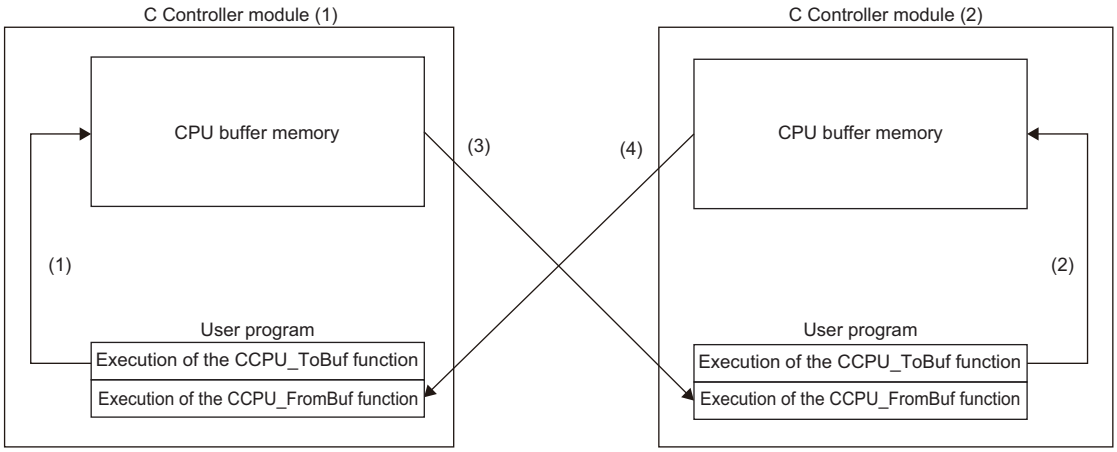
C Controller module dedicated function	Description
CCPU_FromBuf	Reads data from the CPU buffer memory and the Intelligent function module buffer memory of the module on the specified module position.
CCPU_FromBuf_ISR	
CCPU_FromBufHG	Reads data from the fixed cycle communication area of the module on the specified module position.
CCPU_FromBufHG_ISR	
CCPU_ToBuf	Writes data to the CPU buffer memory and the intelligent function module buffer memory of the module on the specified module position.
CCPU_ToBuf_ISR	
CCPU_ToBufHG	Writes data to the fixed cycle communication area of the module on the specified module position.
CCPU_ToBufHG_ISR	

Communication using CPU buffer memory

Device data of the host CPU is written to the CPU buffer memory in the host CPU by execution of the C Controller module dedicated function (CCPU_ToBuf). The data written to the CPU buffer memory is transferred after the following processing is performed in other CPU.

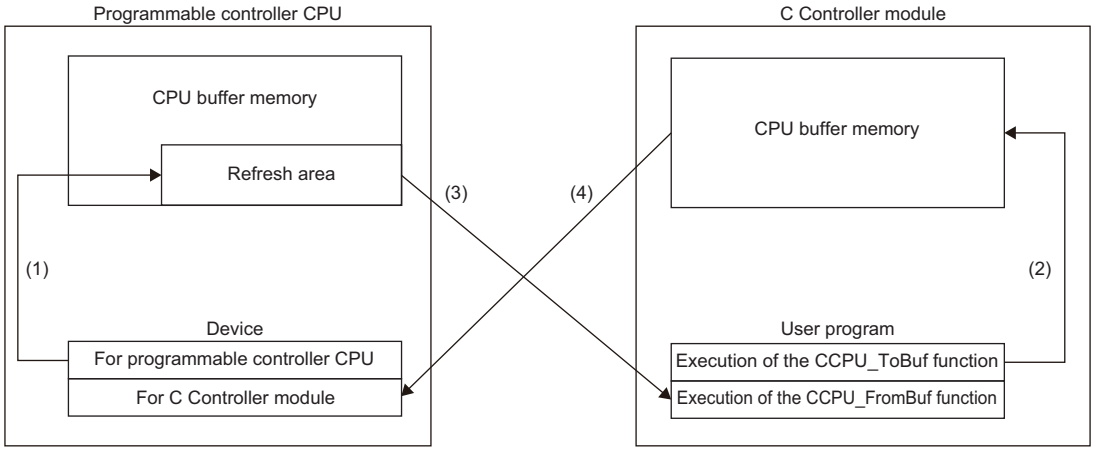
CPU module	Process
C Controller module	At execution of the C Controller module dedicated function (CCPU_FromBuf)
Programmable controller CPU	At END processing

- C Controller module (1) ⇔ C Controller module (2)



Processing order	Process when executing the function in C Controller module (1)	Process when executing the function in C Controller module (2)
(1)	Device data of the user program is written to the CPU buffer memory by executing the C Controller module dedicated function (CCPU_ToBuf).	—
(2)	—	Device data of the user program is written to the CPU buffer memory by executing the C Controller module dedicated function (CCPU_ToBuf).
(3)	—	Device data of the CPU buffer memory in the C Controller module (1) is read to the user program by executing the C Controller module dedicated function (CCPU_FromBuf).
(4)	Device data of the CPU buffer memory in the C Controller module (2) is read to the user program by executing the C Controller module dedicated function (CCPU_FromBuf).	—

• Programmable controller CPU ⇔ C Controller module



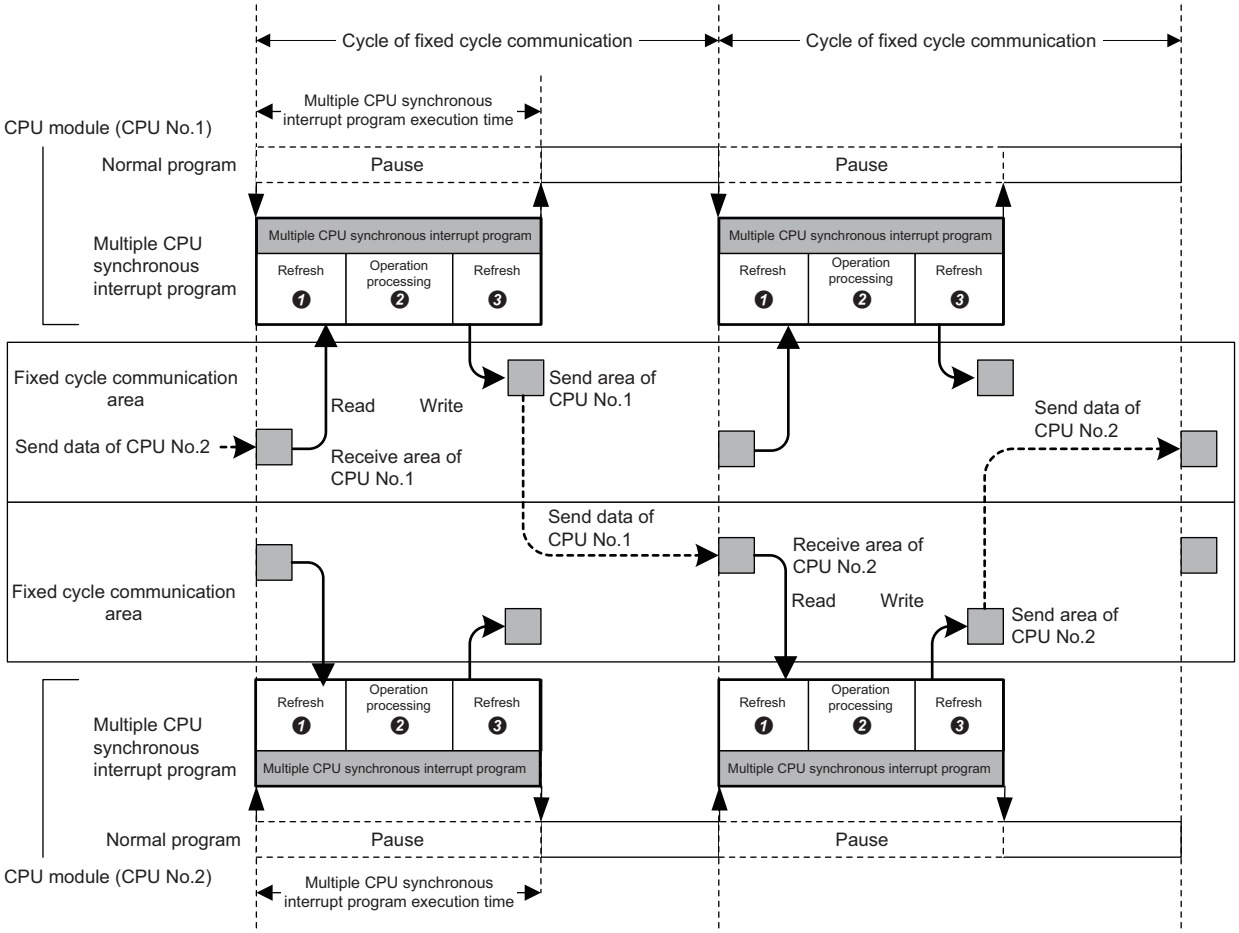
Processing order	Process at END processing in programmable controller CPU	Process at execution of the function in C Controller module
(1)	Device data for programmable controller CPU are transferred to the refresh area.	—
(2)	—	Device data of the user program is written to the CPU buffer memory by executing the C Controller module dedicated function (CCPU_ToBuf).
(3)	—	Device data in the refresh area of the programmable controller CPU is read to a user program by executing the C Controller module dedicated function (CCPU_FromBuf).
(4)	Device data of the CPU buffer memory in the C Controller module is transferred to a device for C Controller module in the programmable controller CPU.	—

Communication using fixed cycle communication area

Data communication using the fixed cycle communication area is performed by using a multiple CPU synchronous interrupt program (I45).

Multiple CPU synchronous interrupt

Execute a multiple CPU synchronous interrupt program (I45) at the timing of the cycle of the fixed cycle communication set to the parameter. By using the multiple CPU synchronous interrupt function, data can be communicated between CPU modules synchronously with the cycle of the fixed cycle communication. (The data communication timing between CPU modules is synchronized.)



No.	Processing	Description
❶	Receiving data from other CPU (refresh)*1	The data received from other CPU modules is read to a device. (The data in the host CPU receive area is read.)
❷	Operation processing	Multiple CPU synchronous interrupt program is executed.
❸	Sending data to other CPU (refresh)*1	The data to be sent to other CPU modules is written from a device. (The data is written to the host CPU send area.)

*1 Performed with the C Controller module dedicated functions (CCPU_ToBufHG_ISR, CCPU_FromBufHG_ISR).

Point

Data communication will not be performed if the multiple CPU synchronous interrupt program (I45) is not registered.

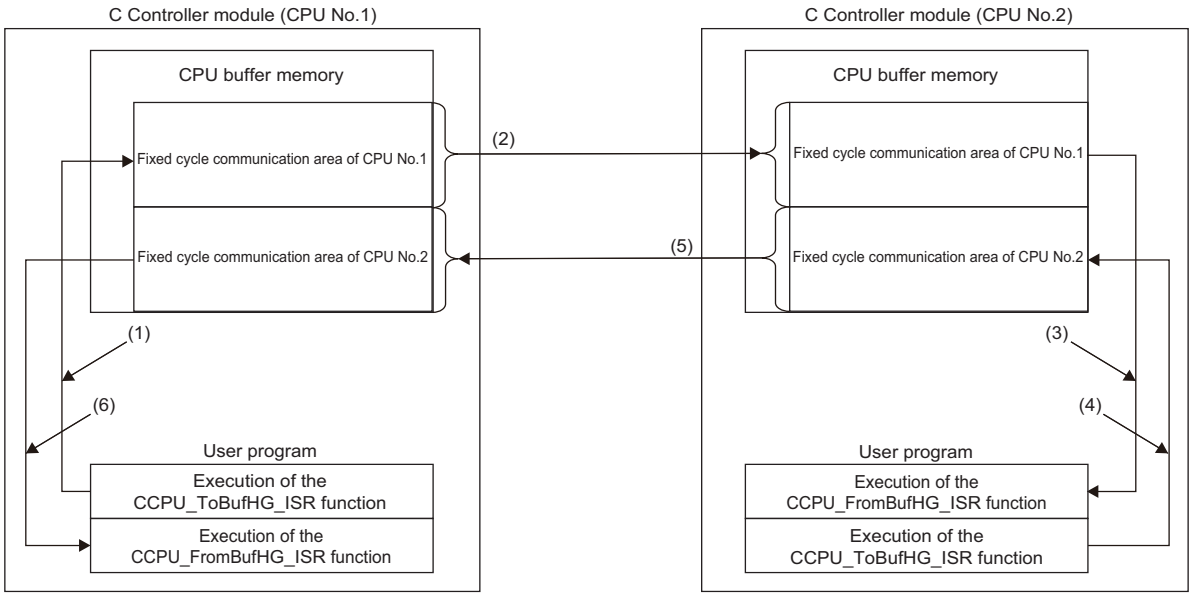
■Processing order for fixed cycle communication area

Device data of the host CPU is written to the fixed cycle communication area in the host CPU by execution of the C Controller module dedicated function (CCPU_ToBufHG_ISR). The data written to the fixed cycle communication area are read once sent to other CPU.

Point

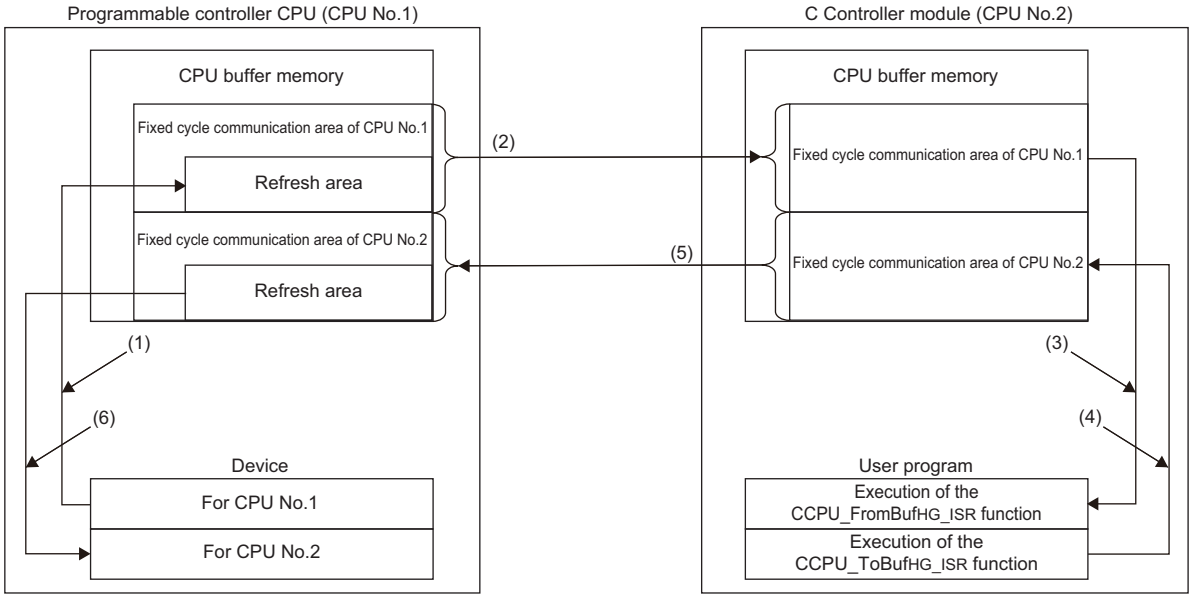
To write/read data to/from the fixed cycle communication area on a task, use the C Controller module dedicated functions (CCPU_ToBufHG, CCPU_FromBufHG).

- C Controller module (CPU No.1) ⇔ C Controller module (CPU No.2)



CPU number	Processing order	Process on C Controller module (CPU No.1)	Process on C Controller module (CPU No.2)
CPU No.1	(1)	Device data of the user program is written to the fixed cycle communication area of CPU No.1 by executing the C Controller module dedicated function (CCPU_ToBufHG_ISR).	—
	(2)	Device data in the fixed cycle communication area of CPU No.1 is sent to CPU No.2.	—
CPU No.2	(3)	—	Device data in the fixed cycle communication area of CPU No.1 is read to a user program by executing the C Controller module dedicated function (CCPU_FromBufHG_ISR).
	(4)	—	Device data of the user program is written to the fixed cycle communication area of CPU No.2 by executing the C Controller module dedicated function (CCPU_ToBufHG_ISR).
	(5)	—	Device data in the fixed cycle communication area of CPU No.2 is sent to CPU No.1.
CPU No.1	(6)	Device data in the fixed cycle communication area of CPU No.2 is read to a user program by executing the C Controller module dedicated function (CCPU_FromBufHG_ISR).	—

• Programmable controller CPU (CPU No.1) ⇔ C Controller module (CPU No.2)



CPU number	Processing order	Process on programmable controller CPU (CPU No.1)	Process on C Controller module (CPU No.2)
CPU No.1	(1)	The device data for CPU No.1 is transferred to the refresh area in CPU No.1.	—
	(2)	The device data in the refresh area of CPU No.1 is sent to CPU No.2.	—
CPU No.2	(3)	—	Device data in the refresh area of the CPU No.1 is read to a user program by executing the C Controller module dedicated function (CCPU_FromBufHG_ISR).
	(4)	—	Device data for CPU No.2 is written to the fixed cycle communication area of CPU No.2 by executing the C Controller module dedicated function (CCPU_ToBufHG_ISR).
	(5)	—	Device data in the fixed cycle communication area of CPU No.2 is sent to CPU No.1.
CPU No.1	(6)	The device data stored in the refresh area of CPU No.2 is transferred to the devices for CPU No.2.	—

■Refresh behavior of programmable controller CPU

When a programmable controller CPU and a multiple CPU system are configured, register a multiple CPU synchronous interrupt program (I45) on the interrupt routine, and enable the registered routine.

When a multiple CPU synchronous interrupt program (I45) is not registered on the interrupt routine or the registered routine is disabled on the C Controller module side, the refresh function of the programmable controller CPU does not operate.

• CPU number-based data assurance enabled

○: Data is updated, ×: Data is not updated

Processing order	Multiple CPU synchronous program (I45) is not registered on the interrupt routine.	Multiple CPU synchronous program (I45) is registered on the interrupt routine, but the registered routine is disabled.	Multiple CPU synchronous program (I45) is registered on the interrupt routine, and the registered routine is enabled.
(1)	×	×	○
(2)	○	○	○
(3)	○	○	○
(4)	○	○	○
(5)	○	○	○
(6)	×	×	○

• CPU number-based data assurance disabled

○: Data is updated, ×: Data is not updated

Processing order	Multiple CPU synchronous program (I45) is not registered on the interrupt routine.	Multiple CPU synchronous program (I45) is registered on the interrupt routine, but the registered routine is disabled.	Multiple CPU synchronous program (I45) is registered on the interrupt routine, and the registered routine is enabled.
(1)	○	○	○
(2)	○	○	○
(3)	○	○	○
(4)	○	○	○
(5)	○	○	○
(6)	×	×	○

Usage

1. Register a multiple CPU synchronous interrupt program (I45) on the interrupt routine. (☞ Page 43 Interrupt Function from Modules)
2. Enable the registered interrupt routine. (☞ Page 43 Interrupt Function from Modules)
3. Configure the refresh settings. (☞ Page 123 Setting refresh area)

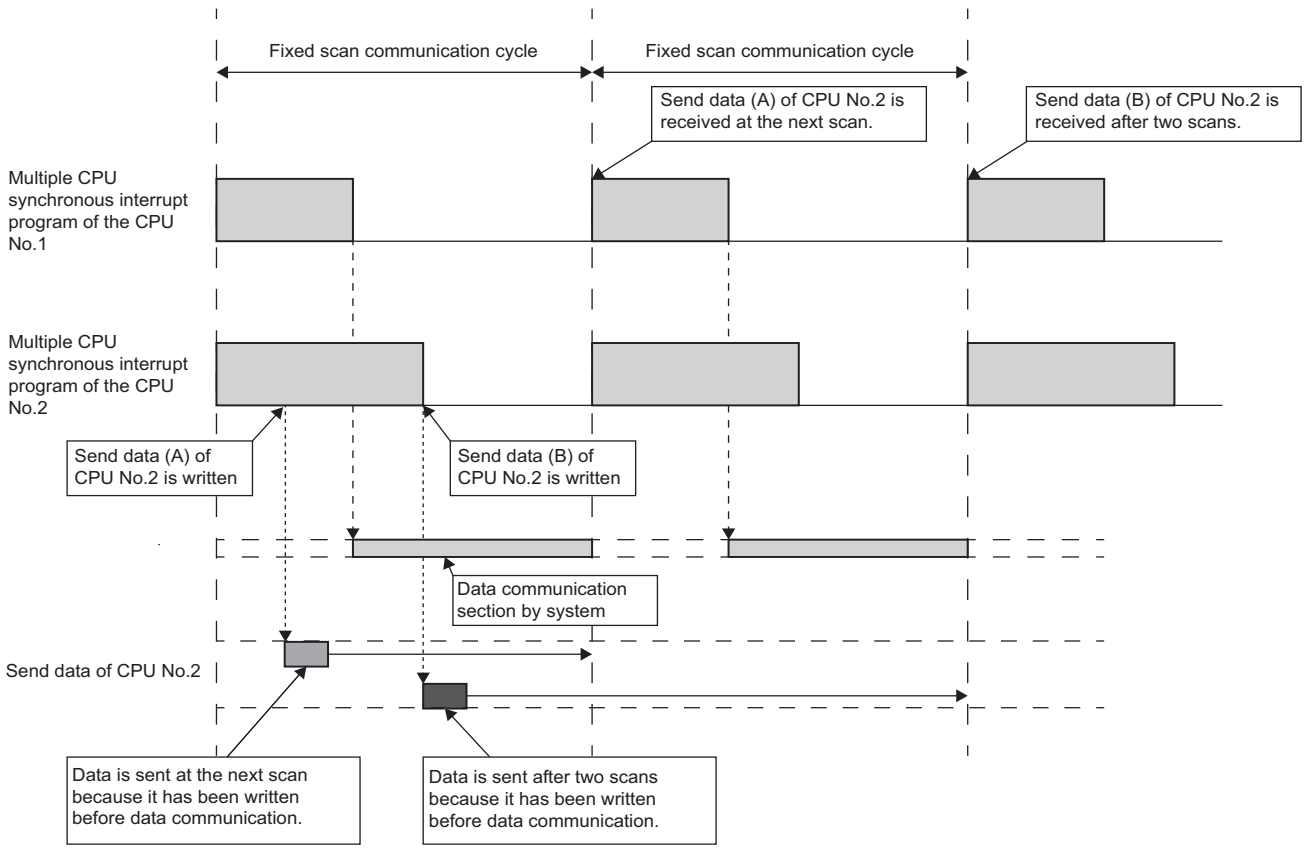
Interrupt timing

The multiple CPU synchronous interrupt program (I45) is executed at the timing for the cycle of the fixed cycle communication. The cycle of the fixed cycle communication can be changed in "Fixed Scan Communication Setting".(☞ Page 126 Fixed cycle communication setting)

Considerations

The following describes the considerations for the multiple CPU synchronous interrupt program.

- Do not create a multiple CPU synchronous interrupt program of which execution processing time is longer than the cycle of the fixed cycle communication. If so, the multiple CPU synchronous interrupt interval cannot be guaranteed. For a multiple CPU synchronous interrupt program (I45), the settings for the execution time monitoring and the operation at the time of excess can be configured by "RAS Setting" of CPU parameter. (☞ Page 56 Error Detections Setting, Page 56 Operation settings when an error is detected)
- To ensure the data transmission at the following cycle of the fixed cycle communication, set "Program Execution Section Exceed (I45)" to "Detect" in the RAS setting of the CPU parameter. An error can be detected if data have been written at the timing when data cannot be sent in the cycle of the fixed cycle communication.



7.5 Interrupt from Other CPU

An interrupt from other CPU module can restart the user program that is waiting for an interrupt event by the C Controller module dedicated function (CCPU_WaitEvent).

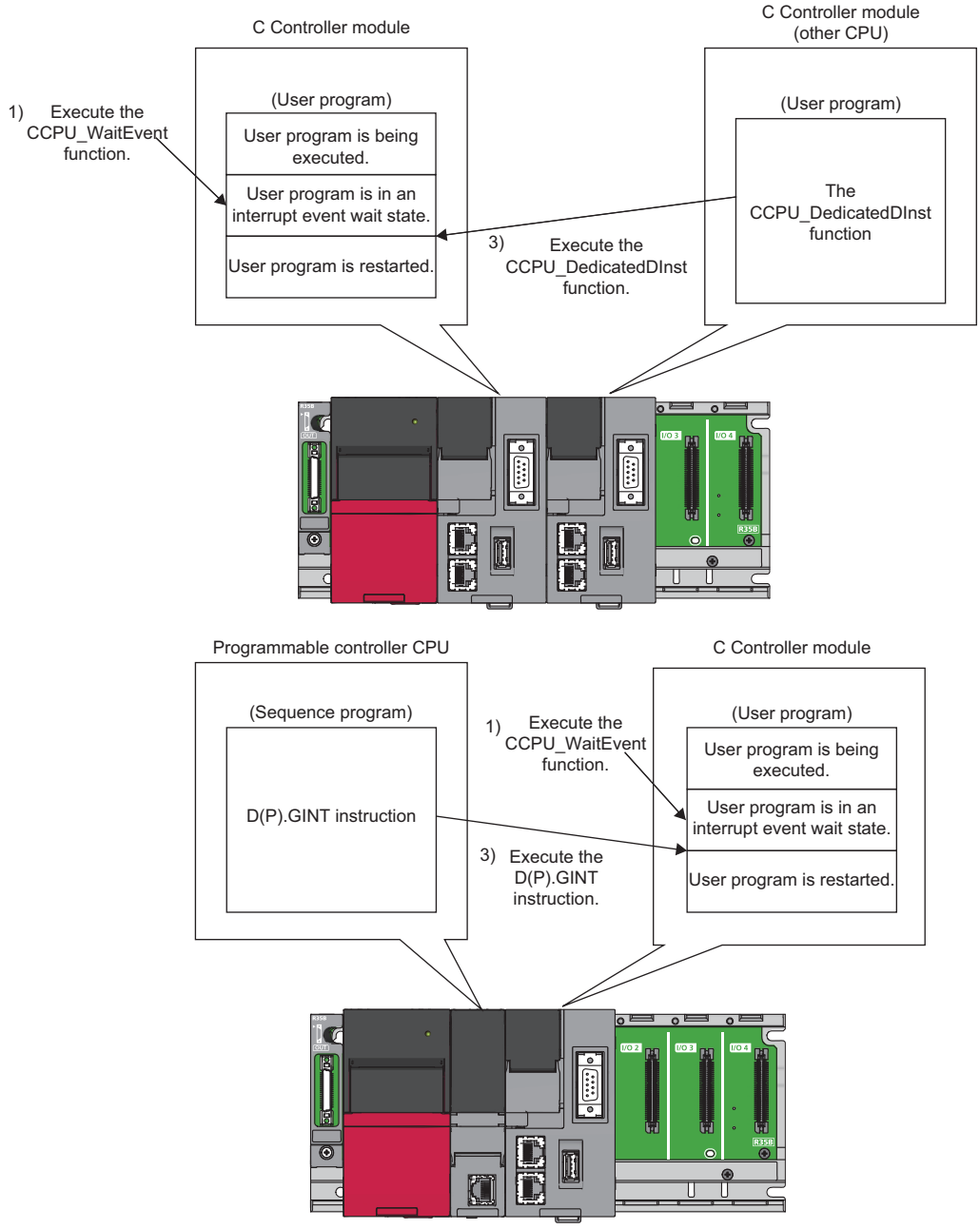
C Controller module dedicated function	Description
CCPU_WaitEvent	Waits for an interrupt event notification from other CPU.

The following shows how to restart the user program which is waiting for an interrupt event.

1. With the user program, call the C Controller module dedicated function (CCPU_WaitEvent).
2. The user program is placed into the interrupt event wait state.
3. Perform one of the following operations:

- Execute the C Controller module dedicated function (CCPU_DedicatedDInst) with a user program of C Controller module (other CPU).
- Execute the D(P).GINT instruction with a sequence program of programmable controller CPU (other CPU).

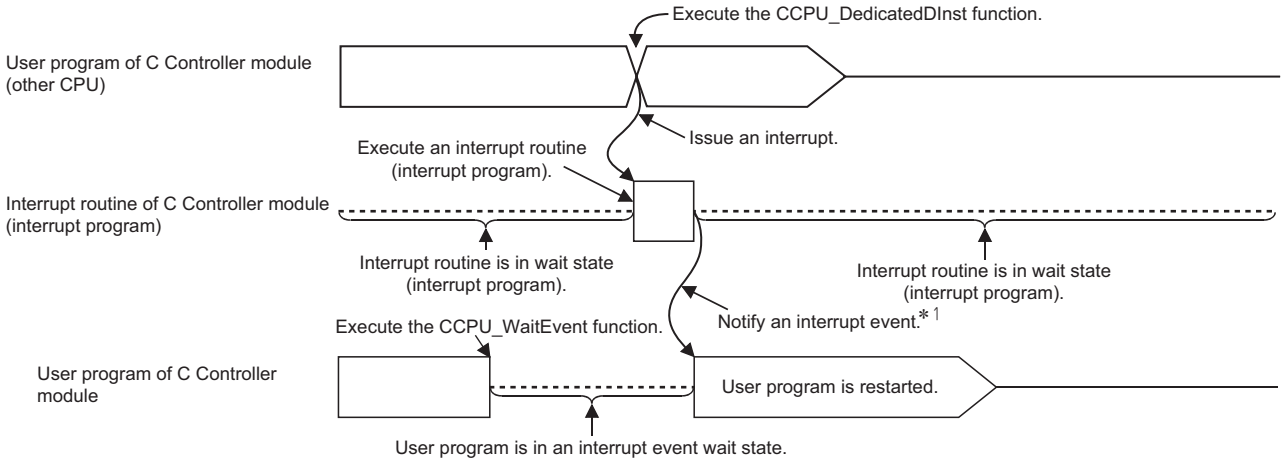
4. The user program is restarted.



Interrupt from C Controller module

The following figure explains how to interrupt from C Controller module (other CPU).

Operation timing



*1: The interrupt event is notified after the interrupt routine (interrupt program) is completed.

■Function

The function used for an interrupt from C Controller module (other CPU) is shown below.

C Controller module dedicated function	Description
CCPU_DedicatedDInst	Executes dedicated instructions categorized as 'D' or 'DP'.

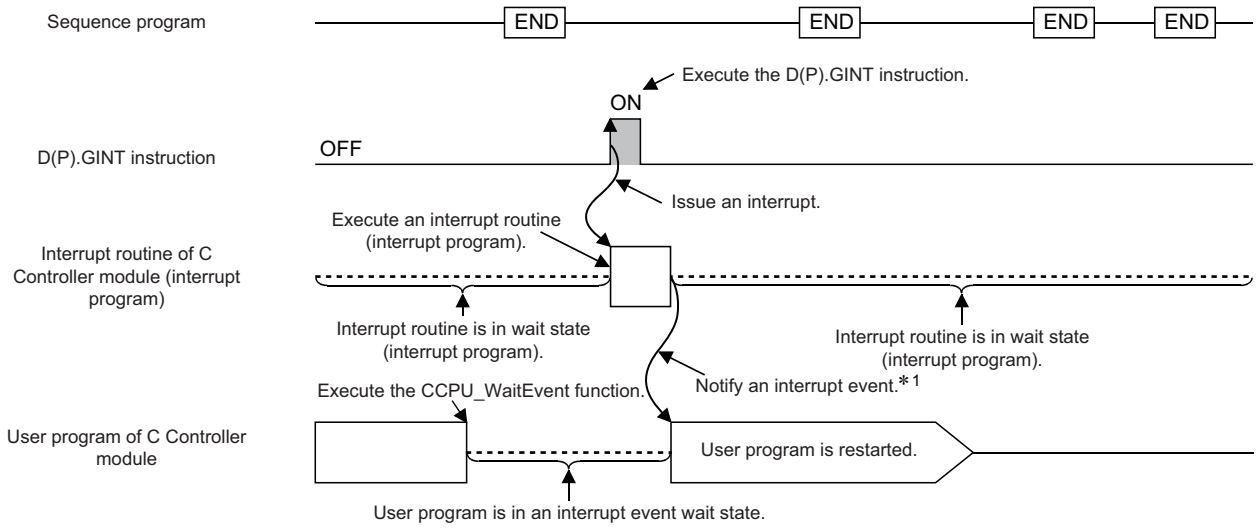
Point

The C Controller module dedicated function (CCPU_DedicatedDInst) can also execute an interrupt to a motion CPU.

Interrupt from programmable controller CPU

The following figure explains how to interrupt from programmable controller CPU.

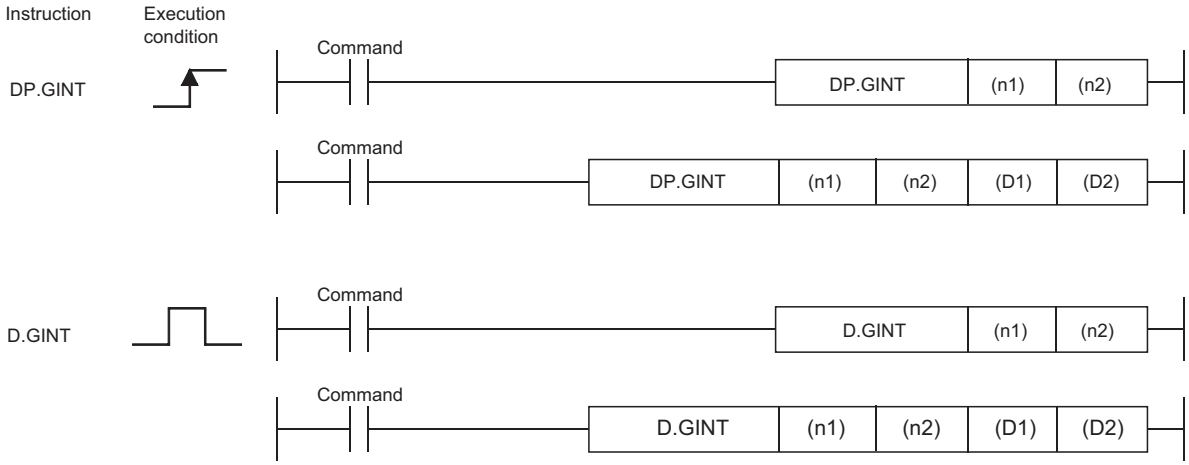
Operation timing



*1: The interrupt event is notified after the interrupt routine (interrupt program) is completed.

Dedicated instruction

The dedicated instructions used for an interrupt from programmable controller CPU are shown below.



○: Applicable, △: Partly applicable

Setting data*1	Usable devices										
	Internal device (System, user)		File register		Link direct device J□\□		Module access device J□\□		Index register Z□	Constant		Others
	Bit	Word	Bit	Word	Bit	Word	Bit	Word		Dec K, Hex H	Float, string	
(n1)	—	○	—	○	—		—		—	○	—	—
(n2)	—	○	—	○	—		—		—	○	—	—
(D1)*2	△*3	—	△*3	—	—		—		—	—		—
(D2)*2	—	△*3	—	△*3	—		—		—	—		—

*1 The setting data can be index-modified. (Constant is excluded.)
*2 Can be omitted only when both of (D1) and (D2) are omitted.
*3 Local devices cannot be used.

■Setting data

Setting data	Setting	Setting side	Data type
(n1)	Start input/output number of the target CPU divided by 16 The values to be specified actually are as follows: CPU No.1: 3E0H, CPU No.2: 3E1H, CPU No.3: 3E2H, CPU No.4: 3E3H	User	BIN 16 bits
(n2)	Interrupt pointer number (0 to 15)	User	BIN 16 bits
(D1)*1	(D1+0): Device that is turned ON for one scan upon completion of the instruction processing (D1+1): Device that is turned ON for one scan upon abnormal completion of the instruction processing (For abnormal completion, D1+0 also turns ON.)	System	Bit
(D2)*1	Device where the completion status data is stored.	System	Word

*1 Can be omitted only when both of (D1) and (D2) are omitted.

■Control details

Make an interrupt occur to C Controller module when the execution command of the D(P).GINT instruction rises (OFF→ON) using a sequence program.

When received an interrupt from programmable controller CPU, C Controller module restarts the user program that is waiting for an interrupt event by the CCPU_WaitEvent function.

■Error details

In any of the following cases, an interrupt completes abnormally, and an error code is stored in the device specified with the completion status storage device (D2).

Error code*1	Description	Corrective action
0010H	The instruction request from programmable controller CPU to C Controller module exceeds the allowable value.	Check and correct the sequence program.
2282H	The interrupt pointer number set with the D(P).GINT instruction is out of the range of 0 to 15.	

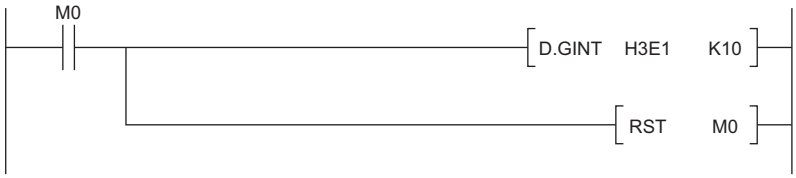
*1 "0000H" is stored when the processing is normally completed.

In any of the following cases, an operation error is caused, and the latest self-diagnostic error (SM0) turns ON. Then, an error code is stored in the latest self-diagnostic error code (SD0).

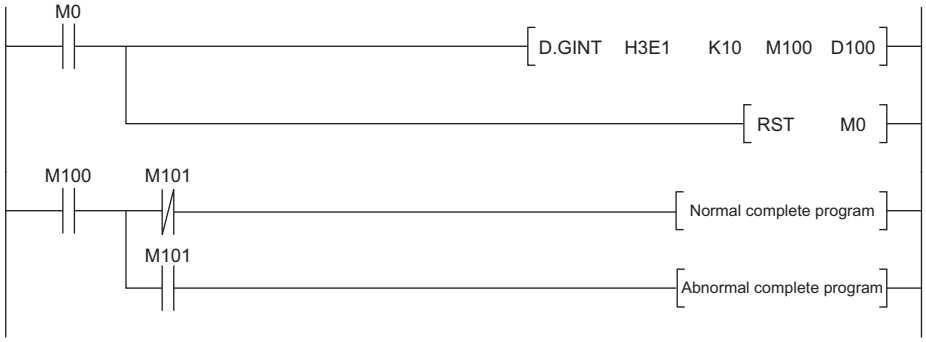
Error code	Description	Corrective action
4350	The specified target CPU module is wrong. • A CPU number set as reserved has been specified. • A CPU number of which module is not mounted has been specified. • The start I/O number of the target CPU module divided by 16 (n1) is out of the range of 3E0H to 3E3H.	Check and correct the sequence program.
4351	The instruction cannot be executed on the specified target CPU module. • The instruction name is wrong. • An instruction which is not supported by the target CPU was executed.	
4352	The number of devices of the specified instructions is incorrect.	
4353	An unavailable device is specified in the specified instruction.	

■Program example

• Program in which the completion device and completion status are omitted



• Program in which the completion device and completion status are used



Precautions

• When an interrupt event has already been notified from programmable controller CPU and C Controller module (other CPU) at the time of the CCPU_WaitEvent function execution, the user program is restored from the interrupt event wait state at the same time as the function execution.
In addition, when multiple interrupt events have been notified to the same interrupt event number at the time of the CCPU_WaitEvent function execution, the user program processes them as a single interrupt event notification.

• If the same CPU number and the same interrupt event number are set in more than one user program, it will be undefined which one of the user programs receives the interrupt event.

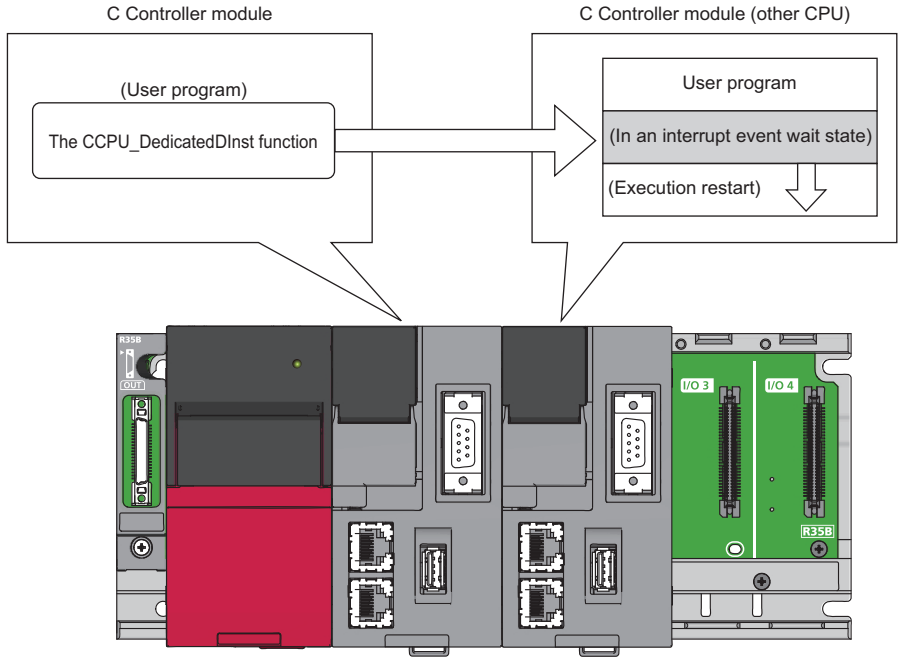
7.6 Issuing an Interrupt to Other CPU

This function allows C Controller module to issue an interrupt to other CPUs (C Controller module and motion CPU). An interrupt cannot be issued to programmable controller CPU.

C Controller module dedicated function	Description
CCPU_DedicatedDInst	Executes dedicated instructions categorized as 'D' or 'DP'.

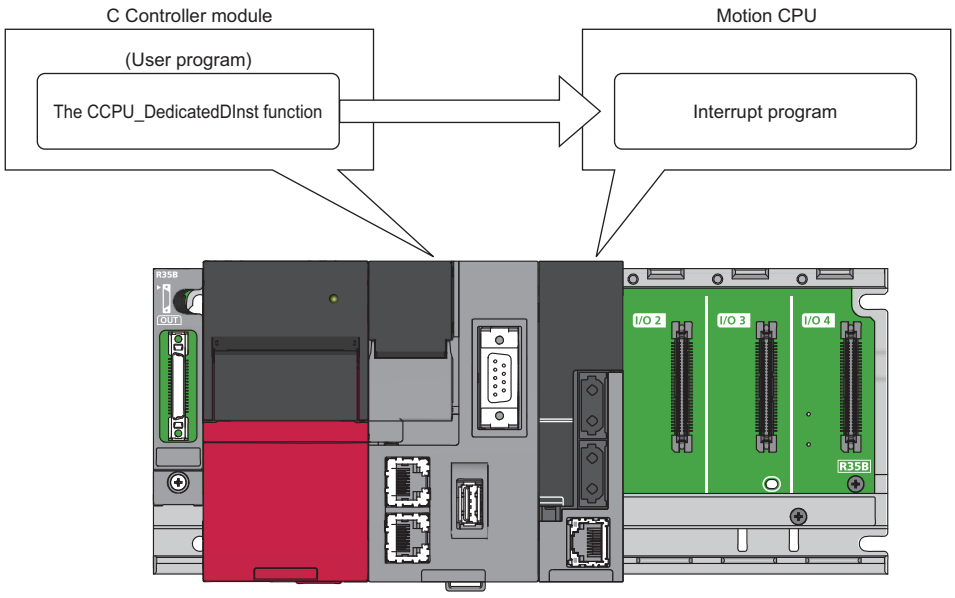
Interrupt to C Controller module (other CPU)

When an interrupt is issued to C Controller module (other CPU), the C Controller module restarts the user program that is waiting for an interrupt event by the C Controller module dedicated function (CCPU_WaitEvent).



Interrupt to motion CPU

When an interrupt is issued to a motion CPU, the motion CPU starts an interrupt program.



APPENDIX

Appendix 1 Error Code List

C Controller module stores the error code in the special register (SD) when an error is detected using a self-diagnostic function. If an error occurs when the data communication is requested from the engineering tool, Intelligent function module, or network system, the C Controller module returns the corresponding error code to the request source. The error details and cause can be identified by checking the error code.

- Module diagnostics of CW Configurator (MELSEC iQ-R C Controller Module User's Manual (Startup))
- Check with special registers (SD0 (latest self-diagnostics error code), SD10 to SD25 (self-diagnostics error code))
- Check with the C Controller module dedicated function (CCPU_GetErrInfo) (MELSEC iQ-R C Controller Module Programming Manual)
- Check with the dot matrix LED[*1](MELSEC iQ-R C Controller module User's Manual (Startup))

*1 Select "ERROR" in the operation selection mode.

Error code system

All error codes are given in hexadecimal format (4 digits) (16-bit unsigned integer). The type of error includes the error, which is detected through the self-diagnostics function of each module, and the common error, which is detected during communication between modules. The following table lists the error detection type and the error code ranges.

Error detection type	Range	Description
Detection by a self-diagnostic function of each module	0001H to 3FFFH	Error code specific to each module, such as self-diagnostic errors
Detected during communication between CPU modules	4000H to 4FFFH	Error in CPU module
	5000H to 5FFFH	Error in slice I/O module
	7000H to 7FFFH	Error in serial communication module
	9000H to 9FFFH	Error in FA controller module
	B000H to BFFFH	Error in CC-Link module
	C000H to CFFFH	Error in Ethernet module
	D000H to DFFFH	Error in CC-Link IE Field Network module
	E000H to EFFFH	Error in CC-Link IE Controller Network module
	F000H to FFFFH	Error in MELSECNET/H network modules or MELSECNET/10 network module

Detailed information

When an error is detected with a self-diagnostic function, the detailed information of the error cause is stored all together. The detailed information of each error code can be checked with CW Configurator. The following detailed information is added to each error code (Up to three types of information are stored for each error code. The types differ depending on the error code.) Information of the latest error code can be checked with the special register (SD) as well. (☞ Special Register List)

Detailed information	Item	Description
Detailed information 1	Drive/file information	Indicates information on drive names and file names.
	Parameter information	Indicates information about parameters such as storage target and type.
	System configuration information	Indicates information about system configurations such as I/O number and power supply number.
	Frequency information	Indicates information on the number of times such as number of writes to memory.
	Time information	Indicates information on time.
	Failure information	Indicates information on failures.
	Detailed event code information	Indicates the detailed code registered with the C Controller module dedicated function (CCPU_RegistEventLog).
	Script position information	Indicates script step number.
Detailed information 2	Drive/file information	Indicates information on drive names and file names.
	Annunciator information	Indicates information about annunciators.
	Parameter information	Indicates information about parameters such as storage target and type.
	System configuration information	Indicates information about system configurations such as I/O number and power supply number.
	Detailed event log information	Indicates the detailed information registered with the C Controller module dedicated function (CCPU_RegistEventLog).

Operation when an error occurs

There are two types of errors: stop errors and continuation errors.

Stop error

In C Controller module, if a stop error occurs, the output (Y) from a user program and writing to buffer memory are disabled. The communication with CPU module can be performed even after the stop error occurs in the CPU module. The external output of each module is controlled in accordance with the output mode setting in error. (☞ Page 56 Operation settings when an error is detected) Besides, if the stop error occurs in a multiple CPU system configuration, the stop error target CPU module (all CPU modules or only the relevant CPU module) can be set in the parameter. (☞ Page 118 Stop setting)

Continuation error

If a continuation error occurs, the CPU module retains the operation and continues processing.

How to clear errors

Only continuation errors can be cleared. (☞ Page 58 Error clear function)

Error code list

The following table shows the error codes detected by the self-diagnostic function.

Self-diagnostic error codes for CPU module (1000H to 3FFFH)

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
1000H	Power shutoff	• A momentary power failure has occurred. • The power supply has been shut OFF.	Check the power supply status.	—	Always
1080H	ROM write count error	The number of writes to the flash ROM (data memory and system memory) exceeded 100000 times. (Number of writes > 100000)	Replace the CPU module.	Frequency information	At power ON, RESET, or write
1100H	Memory card access error	Data cannot be written to the memory card because the write protect switch is in the locked position.	Set the write protect switch of the memory card in the unlocked position.	—	Always
1120H	SNTP clock setting error	Time setting has failed when the CPU module is powered ON or reset.	• Check if the setting of time setting function is correct. • Check if the specified SNTP server is operating normally and there is no failure on the network accessing the SNTP server computer.	—	At power ON or RESET
112EH	Connection establishment failed	A connection could not be established in the open processing.	• Check the operation of the target device. • Check if the open processing has been performed in the target device. • Review the port number of the module, IP address/port number of the target device, opening method, and the number of connections. • When the firewall is set in the target device, check if the access is permitted. • Check if the Ethernet cable is disconnected.	—	Always
1165H	UDP/IP send failed	Data was not sent correctly with UDP/IP.	• Check the settings for connection with the target device. • Check the operation of the target device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub.	—	Always

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
1166H	TCP/IP send failed	Data was not sent correctly with TCP/IP.	• Check the settings for connection with the target device. • Check the operation of the target device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub.	—	Always
1200H	Module moderate error	A moderate error has been notified from the Intelligent function module.	Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator and remove the error.	System configuration information	Always
1210H	Module moderate error	An inter-module synchronization signal error has been notified from the Intelligent function module.	Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator and remove the error.	System configuration information	Always
1220H	Other CPU module moderate error	A moderate error has been notified from other CPU modules.	• Check the detailed information (system configuration information) of the error by executing module diagnostics using CW Configurator, identify the error module, and eliminate the error cause. • Check the mounting status and reset status of other CPU modules.	System configuration information	Always
1240H	Inter-module synchronization processing error	• The execution interval of the inter-module synchronous interrupt program exceeded the setting value. • The inter-module synchronous interrupt program (I44) has not been completed within the inter-module synchronization cycle.	Check the detailed information (time information) of the error by performing module diagnostics using CW Configurator, and take any of the following corrective actions. • Review the process content of the inter-module synchronous interrupt program to complete the process within the interval specified in "Fixed Scan Interval Setting". • Modify the value specified to "Fixed Scan Interval Setting" to an appropriate value.	Time information	At interrupt occurrence
1241H	Inter-module synchronization processing error	• The execution interval of the inter-module synchronous interrupt program exceeded the setting value. • A cycle, which was not executed, has been detected by the inter-module synchronous interrupt program (I44).	Review the interrupt prohibited section and program of which interrupt priority is high in order that the inter-module synchronous interrupt program can be executed.	—	At interrupt occurrence
1260H	Multiple CPU synchronization processing error	• The execution interval of the multiple CPU synchronous interrupt program exceeded the setting value. • The multiple CPU synchronous interrupt program (I45) has not been completed within the cycle of the multiple CPU fixed cycle communication.	Check the detailed information (time information) of the error by performing module diagnostics using CW Configurator, and take any of the following corrective actions. • Review the process content of the multiple CPU synchronous interrupt program in order to complete the process within the interval specified in "Fixed Scan Interval Setting". • Modify the value specified to "Fixed Scan Interval Setting" to an appropriate value.	Time information	At interrupt occurrence
1262H	Multiple CPU synchronization processing error	• The execution interval of the multiple CPU synchronous interrupt program exceeded the setting value. • The multiple CPU synchronous interrupt program (I45) has not been completed within an execution section of the program.	Check the detailed information (time information) of the error by performing module diagnostics of CW Configurator, and take any of the following corrective actions. • Review the process content of the multiple CPU synchronous interrupt program in order to complete the process within the program execution section . • Modify the value specified to "Fixed Scan Interval Setting" to an appropriate value.	Time information	At interrupt occurrence
1830H	Receive queue full	Number of reception requests of transient transmission exceeded upper limit of simultaneously processable requests.	Lower the transient transmission usage frequency, and then perform again.	—	Always

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
1831H	Receive processing error	Transient reception failed.	Lower the transient transmission usage frequency, and then perform again.	System configuration information	Always
1832H	Transient data error	Transient transmission cannot be performed because the number of processing are too large.	Review the number of transient transmission execution.	—	Always
1840H	Memory card error	An error has been detected in the memory card.	• Replace the memory card. • Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative.	—	Always
1843H	Internal buttery failure	The battery voltage inside the CPU module decreased to the defined value or lower.	Replace the battery. Please consult your local Mitsubishi representative to replace the battery.	—	Always
1846H	Refresh cycle exceeded	The refresh time exceeded the set refresh cycle. • The time set for the refresh cycle is too short. • Too many refresh points have been set. • Tasks with the higher CPU usage rate is in operation in such case as overloaded Ethernet communication. • Debugging or restarting of the C Controller module has been performed with CW Workbench connected online. • Command was executed from Shell for debugging.	• Lengthen the time set for the refresh cycle. • Reduce the set number of refresh points. • Lower the CPU usage rate of tasks with the higher rate, or make them inactivated. • Restart the C Controller module with CW Workbench not connected online. • Review the command executed from Shell.	Time information	Always
2000H	Module configuration error	The module type set in the I/O Assignment Setting of the System Parameter differs from that of the module actually mounted.	Reconfigure the I/O Assignment Setting in the System Parameter in accordance with the Intelligent function module or CPU module actually mounted.	System configuration information	At power ON or RESET
2001H	Module configuration error	The I/O numbers set to I/O Assignment Setting in the System Parameter are overlapping between other modules.	Reconfigure the I/O Assignment Setting in the System Parameter in accordance with the Intelligent function module or I/O module actually mounted.	System configuration information	At power ON or RESET
2002H	Module configuration error	The number of points assigned to the Intelligent function module in the I/O Assignment Setting of the System Parameter is smaller than that of the module actually mounted.	Reconfigure the I/O Assignment Setting in the System Parameter in accordance with the Intelligent function module actually mounted.	System configuration information	At power ON or RESET
2004H	Module configuration error	Nine or more CC-Link IE Controller Network modules or CC-Link IE Field Network module are mounted in the entire system.	Reduce the number of CC-Link IE Controller Network modules or CC-Link IE Field Network module to eight or less in the entire system.	System configuration information	At power ON or RESET
2005H	Module configuration error	• Two or more interrupt modules, QI60 of which interrupt pointer setting has not been configured are mounted. • The interrupt pointer number is duplicated between an interrupt module, QI60 of which interrupt pointer setting has not been configured and an module with the interrupt pointer setting configured.	• Mount only one QI60. • Configure the interrupt pointer setting for QI60. • Review the interrupt pointer setting.	System configuration information	At power ON or RESET
2006H	Module configuration error	A module is mounted on the 65th slot or later.	Remove the module mounted on the 65th slot or later.	System configuration information	At power ON or RESET
2007H	Module configuration error	A module is mounted on the slot of which number is later than that specified in the I/O assignment setting.	Remove the module mounted on the slot of which number is later than that specified slot in the I/O Assignment Setting.	System configuration information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2008H	Module configuration error	• A module is mounted on the I/O points 4096 points or later. • The module is mounted over the boundary of I/O points (4096 points).	• Remove the module mounted on 4096 points or later. • Replace the module mounted on the last slot to the one that does not exceed 4096 points .	System configuration information	At power ON or RESET
2009H	Module configuration error	There is no response from the I/O module or Intelligent function module accessed.	• Review the I/O Assignment Setting in the System Parameter. • The possible cause is a hardware failure of the I/O module or Intelligent function module. Please consult your local Mitsubishi representative.	System configuration information	Always
2020H	Module configuration error	An unsupported module is mounted.	Remove the unsupported module. If all the modules are supported, the possible cause is a hardware failure of the CPU module, Base unit, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2021H	Module configuration error	In a multiple CPU system, the control CPU of the MELSEC-Q series Intelligent function module which does not support a multiple CPU system is set to other than CPU No.1.	• Replace the MELSEC-Q series Intelligent function module with the one (function version B) supporting a multiple CPU system. • Change the control CPU of the MELSEC-Q series Intelligent function module which does not support a multiple CPU system to CPU No.1.	System configuration information	At power ON or RESET
2040H	CPU module configuration error	• The number of CPU modules set in the I/O Assignment Setting of the System Parameter differs from the number of CPU modules actually mounted. • The CPU module is mounted on the slot different from the one specified to the I/O Assignment Setting.	• Set the number of CPU modules (including the empty setting) in the I/O Assignment Setting of the System Parameter correctly in accordance with the number of CPU modules actually mounted. • Set the I/O Assignment Setting in the parameter and actual CPU module mounting status correctly.	System configuration information	At power ON or RESET
2041H	CPU module configuration error	• The CPU module is not mounted on the slot that is set for the CPU module in the I/O Assignment Setting of the System Parameter. • An I/O module or Intelligent function module is mounted between the CPU modules.	• Set the number of CPU modules (including the empty setting) in the I/O Assignment Setting of the System Parameter correctly in accordance with the number of CPU modules actually mounted. • Remove the I/O module or Intelligent function module mounted between the CPU modules.	System configuration information	At power ON or RESET
2043H	CPU module configuration error	The CPU module is mounted on the inapplicable slot.	• Mount the CPU module on the applicable slot (CPU slot or I/O slot 0 to 6). • Remove the CPU module from the inapplicable slot.	System configuration information	At power ON or RESET
2044H	CPU module configuration error	The host CPU number set in the I/O Assignment Setting differs from the one determined by the mounting position of the CPU module.	Re-set the host CPU number in the system parameters in accordance with the mounting position of the CPU module.	System configuration information	At power ON or RESET
2050H	CPU module configuration error	An unsupported CPU module is mounted.	Remove the unsupported CPU module. If all the CPU modules are supported, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2060H	Base unit configuration error	Eight or more extension base units are connected.	Reduce the number of extension base units to seven or less.	System configuration information	At power ON or RESET
2061H	Base unit configuration error	Any of the following base units is connected: QA1S3□B, QA1S5□B/QA1S6□B, QA6□B, QA6ADP+A5□B/A6□B, QA1S6ADP+A1S5□B/A1S6□B.	Remove QA1S3□B, QA1S5□B/QA1S6□B, QA6□B, QA6ADP+A5□B/A6□B□B, and QA1S6ADP+A1S5□B/A1S6□B.	System configuration information	At power ON or RESET
2063H	Base unit configuration error	Extension base unit level settings are duplicated.	Review the level setting of the extension base units.	System configuration information	At power ON or RESET
2070H	Base unit configuration error	• An unsupported Base unit is connected. • A GOT is connected to the MELSEC-Q series extension base unit with a bus.	• Disconnect the unsupported Base unit. If all the Base units are supported, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative. • Disconnect the GOT connected to the MELSEC-Q series extension base unit.	System configuration information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2080H	Inter-module synchronization configuration error	An inter-module synchronization signal error has been detected.	The possible cause is a hardware failure of the CPU module, Base unit, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
20E0H	Module unrecognized	• A module that cannot be recognized by the module is mounted. • In the multiple CPU system, the module cannot be recognized because the control CPU setting of the system parameter setting differs from that of the other CPU modules.	• Mount the applicable modules. • Review the system parameters in the CPU No.2 or later and match the number with those of the smallest numbered CPU module. • The possible cause is a hardware failure of the I/O module or Intelligent function module. Please consult your local Mitsubishi representative.	System configuration information	Always
2120H	Memory card error	The memory card was removed without the card being disabled.	Disable the memory card, and then remove it.	Drive/file information	Always
2121H	Memory card error	An error has been detected in the memory card.	Re-insert the memory card. If the same error code is displayed again, the possible cause is a hardware failure of the memory card. Replace the memory card.	Drive/file information	Always
2180H	Invalid file	An invalid file has been detected.	Check the detailed information (drive/file information) of the error by performing module diagnostics using CW Configurator, check the file name and write the specified file. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Drive/file information	At power ON or RESET
21A0H	File specification error	• The file specified in the CPU parameters doe not exist. • The file specified in the boot file setting of the memory card parameters does not exist in the memory card.	Check the detailed information (drive/file information) of the error by performing module diagnostics using CW Configurator, check the file name and write the specified file. If the same error code is displayed again, the possible cause is a hardware failure of the device/label memory in the CPU module or the memory card. Please consult your local Mitsubishi representative.	Drive/file information Parameter information	At instruction execution, interrupt occurrence, power ON, or RESET
21A1H	File specification error	The file specified in parameter cannot be created.	• Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and correct the name and size of the file corresponding to the displayed number (parameter number). • Check the detailed information (drive/file information) of the error by executing module diagnostics using CW Configurator, and take any of the following action. (1) Format the corresponding drive. (2) Delete unnecessary files on the corresponding drive to increase free space. (3) Unlock the corresponding drive if it is locked.	Drive/file information Parameter information	At write, power ON, or RESET
2200H	Parameter error	The system parameter file and CPU parameter file do not exist.	Write the system parameter and CPU parameter.	Parameter information	At power ON or RESET
2220H	Parameter error	The parameter setting is corrupted.	Check the detailed information (parameter information) of the error by executing module diagnostics using CW Configurator, and write the displayed parameter to the module. If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module, memory card, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2221H	Parameter error	The set value is out of range.	Check the detailed information (parameter information) by executing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module, memory card, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON, RESET, fixed cycle processing execution, instruction execution, or module access

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2222H	Parameter error	Use of the function that is not supported by the module is enabled.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module, memory card, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2224H	Parameter error	A memory area cannot be ensured.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, increase the capacity of the area corresponding to the displayed parameter with error jump. (If the capacity of the area cannot be increased, decrease the capacity of other areas.)	Parameter information	At write, power ON, or RESET
2225H	Parameter error	• The model type (CPU module model name) set with CW Configurator differs from that of the CPU module actually mounted. • The operation set in the memory card parameters cannot be performed. (The boot function cannot be executed.)	• Correct the model type (CPU module model name) set to the CW Configurator project in accordance with the CPU module actually mounted. • Delete the memory card parameters. • Remove the memory card so that the operation set in the memory card parameters will not be performed. (Do not execute the boot operation.)	Parameter information	At write, power ON, or RESET
2240H	Parameter error (module)	In the multiple CPU system, an I/O module or Intelligent function module controlled by other CPU module is specified in the module parameter.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2241H	Parameter error (module)	• The I/O numbers set in the system parameters differ from those of the module actually mounted. • The target module is not mounted on the slot where the system parameters and module parameters are set. • The module type set in parameter differs from that of the module actually mounted.	• Check if the system configuration displayed on the System Monitor window of CW Configurator matches the actual system configuration. • Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed value (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module, I/O module, or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON, RESET, fixed cycle processing execution, instruction execution, or module access
2242H	Parameter error (module)	The Intelligent function module has detected a module parameter error.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and check the module corresponding to the displayed number (I/O number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module or the Intelligent function module. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2260H	Parameter error (network)	Network numbers are duplicated.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module or the Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2261H	Parameter error (network)	Different network types (CC IE Control extended mode/normal mode) are set between the control station and the normal station.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module or the Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2262H	Parameter error (network)	The station type set in the module parameters differs that of the module actually mounted.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number). If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module or the Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2263H	Parameter error (network)	Even though the CC-Link IE module is mounted, the different module is set in the I/O Assignment Setting of the System Parameter, or CC-Link IE module parameters are not set.	Set the system parameters and module parameters. If the same error code is displayed again, the possible cause is a hardware failure of the data memory in the CPU module or Intelligent function module. Please consult your local Mitsubishi representative.	Parameter information	At power ON or RESET
2280H	Parameter error (refresh)	• The refresh setting is not set correctly. (Data was refreshed exceeding the file register capacity.) • The refresh settings (number of points) are different from those of other CPU modules.	• Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the number (parameter number) so that the data is refreshed within the specified device range. (Take any of the following actions: Increase the number of file register points (capacity), create a file register file having a capacity for all of the target data to be refreshed, or reduce the refresh device range.) • Rewrite the refresh settings (number of points) in the CPU parameters for all the CPU modules. (Use the same number of points in the refresh settings for all the CPU modules.)	Parameter information	At power ON, RESET, fixed cycle processing execution, instruction execution, or module access
2281H	Parameter error (refresh)	A device that cannot be used as a refresh device is specified.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number).	Parameter information	At power ON or RESET
2282H	Parameter error (refresh)	The number of specified refresh points is invalid.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number).	Parameter information	At power ON or RESET
2283H	Parameter error (refresh)	The total number of refresh points exceeded the maximum limit.	Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and review the parameter setting corresponding to the displayed number (parameter number).	Parameter information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
22E0H	Parameter verification error	• In the multiple CPU system, the system parameter settings differ from those of other CPU modules. • In the multiple CPU system, the system parameters in the host CPU module are overwritten, and the settings differ from those of other CPU modules.	• Check the detailed information (parameter information) of the error by performing module diagnostics using CW Configurator, and correct the system parameters corresponding to the displayed number (parameter number) in the CPU No.2 or later. (The CPU for which the module synchronization setting and fixed cycle communication setting are used, set the same system parameters between the CPU modules used.) • Rewrite the system parameters of all the modules. (The system parameter settings must be same in all the CPUs.)	Parameter information System configuration information	At write, power ON, or RESET
2400H	Module verification error	• The module information at powered ON differs from the information of modules actually mounted. • The I/O module or Intelligent function module is not mounted properly or was removed during operation.	Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator, and check the module corresponding to the displayed number (slot number).	System configuration information	Always
2401H	Module verification error	A CPU module, I/O module, or Intelligent function module was mounted on the base unit during operation.	• Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator, and check the module corresponding to the displayed number (slot number). • Do not mount a CPU module, I/O module, nor Intelligent function module on an empty slot during operation .	System configuration information	Always
2420H	Fuse blown error	The output module with a blown fuse has been detected.	• Check the FUSE LED of the output module, and replace the one with the LED ON. • Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator, and replace the output module corresponding to the displayed number (slot number).	System configuration information	Always
2440H	Module major error	• In the multiple CPU system, the control CPU setting in the system parameters is different from that of other CPUs. • An error has been detected in the I/O module or Intelligent function module during the initial processing.	• Review the system parameters in the CPU No.2 or later and match the number with those of the smallest numbered CPU module. • The possible cause is a hardware failure of the module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2441H	Module major error	An error has been detected in the Intelligent function module when a function was executed.	The possible cause is a hardware failure of the module where the error has been detected. Please consult your local Mitsubishi representative.	—	—
2442H	Module major error	An error has been detected in the Intelligent function module when a function was executed.	The possible cause is a hardware failure of the module where the error has been detected. Please consult your local Mitsubishi representative.	—	At module access
2443H	Module major error	An error has been detected in the I/O module or Intelligent function module.	The possible cause is a hardware failure of the module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	At module access
2450H	Module major error	• A major error has been notified from the Intelligent function module. • The I/O module or Intelligent function module is not mounted properly or was removed during operation.	• Check the connection status of the extension cable. • Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator, and check the module corresponding to the displayed number (slot number). • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	Always

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2460H	Other CPU module major error	An error has been detected in other CPU modules during the initial processing.	Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the host CPU module or other CPU module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2461H	Other CPU module major error	An error has been detected in other CPU module when a function was executed.	Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the host CPU module or other CPU module where the error has been detected. Please consult your local Mitsubishi representative.	—	—
2462H	Other CPU module major error	An error has been detected in other CPU module when a function was executed.	Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the host CPU module or other CPU module where the error has been detected. Please consult your local Mitsubishi representative.	—	At fixed cycle processing execution
2463H	Other CPU module major error	An error has been detected in other CPU module.	Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the host CPU module or other CPU module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	At power ON or RESET
2470H	Other CPU module major error	A major error has been notified from other CPU modules.	Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the host CPU module or other CPU module where the error has been detected. Please consult your local Mitsubishi representative.	System configuration information	Always
2480H	Multiple CPU error	• In the multiple CPU system, an error has been detected in the CPU module where "Stop" is set in the Operation Mode Setting. • Any CPU module other than CPU No.1 is mounted in the inapplicable slot. (An error occurs in the CPU module mounted in the inapplicable slot.)	• Check the detailed information (system configuration information) of the error by performing module diagnostics using CW Configurator and remove the error. • Remove the CPU module from the inapplicable slot.	System configuration information	Always
2481H	Multiple CPU error	In the multiple CPU system, any of the CPUs other than CPU No.1 was disconnected from the Base unit during operation. Or, any CPU module other than CPU No.1 was reset.	Check the mounting status and reset status of the CPU modules other than CPU No.1.	System configuration information	Always
24C0H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	System configuration information	At module access
24C1H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	System configuration information	At module access
24C2H	System bus error	An error has been detected on the system bus.	• Check the connection status of the extension cable. • Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	System configuration information	At module access, always

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
24C3H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	System configuration information	At module access
24C4H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the I/O module, Intelligent function module, Base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information	At module access
24C5H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the I/O module, Intelligent function module, Base unit, or extension cable. Please consult your local Mitsubishi representative.	—	At module access
24C6H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module or extension cable. Please consult your local Mitsubishi representative.	—	At module access
24C8H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the I/O module, Intelligent function module, or extension cable. Please consult your local Mitsubishi representative.	—	At power ON or RESET
24D0H	System bus error	• In the extension level setting of the MELSEC-Q series extension base unit, the duplicated level setting with other extension base units is detected. • An error has been detected on the system bus.	• Review the level setting of the MELSEC-Q series extension base unit. • Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, Base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information	At module access, always
24E0H	System bus error	An error has been detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative.	System configuration information	Always
2520H	Invalid interrupt	Even though an interrupt was requested, there is no interrupt factor.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, or Base unit. Please consult your local Mitsubishi representative.	System configuration information	At interrupt occurrence
2521H	Invalid interrupt	Even though an interrupt was requested, there is no interrupt factor.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, or Base unit. Please consult your local Mitsubishi representative.	—	At interrupt occurrence
2522H	Invalid interrupt	An interrupt request from the module with no interrupt setting has been detected.	• Review the interrupt setting in the module parameter. • Take measures so that no interrupt is requested from the module with no interrupt setting exists in the module parameter. • Review the interrupt setting in the buffer memory of the Intelligent function module.	System configuration information	At interrupt occurrence

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
2610H	Inter-module synchronization signal error	• An execution interval error of the synchronous interrupt program has been detected. • An inter-module synchronization error has been detected.	• When the CC-Link IE Field Network module is a synchronous target unit between unit, check the connection status of the cable of CC-Link IE Field module. • Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	—	Always
2611H	Inter-module synchronization signal error	An inter-module synchronization error has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module, I/O module, Intelligent function module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	System configuration information	At power ON, RESET, or fixed cycle processing execution
2630H	Multiple CPU synchronization signal error	• An execution interval error of the synchronous interrupt program has been detected. • A multiple CPU synchronization error has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative.	—	Always
2631H	Multiple CPU synchronization signal error	A multiple CPU synchronization error has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module or Base unit. Please consult your local Mitsubishi representative.	System configuration information	At power ON, RESET, or fixed cycle processing execution
3000H	Boot function execution error	The boot setting in the memory card parameters is incorrect.	Review the boot setting in the memory card parameters.	Drive/file information	At power ON or RESET
3001H	Boot function execution error	When the boot function was executed, the file format processing failed.	Reset the CPU module and perform the boot function again. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Drive/file information	At power ON or RESET
3004H	Boot function execution error	When the boot function was executed, the CPU built-in memory capacity was exceeded.	• Review the boot setting. • Delete unnecessary files in the CPU built-in memory.	Drive/file information	At power ON or RESET
3042H	User WDT error	The user watchdog timer controlled by the system has detected an error because the C Controller module dedicated function (CCPU_ResetWDT) was not executed within the user watchdog timer setting time. Or, an error occurred in the user program. • The time set for the user watchdog timer is too short. • Tasks with the higher CPU usage rate is in operation. • A program causing an error in the memory or stack was executed. • Debugging has been performed with CW Workbench connected online. • Command was executed from Shell for debugging. • The following functions that increase the CPU usage rate of the system task are used. (1) Mounting/unmounting the memory card (2) Ethernet communication (3) NFS server communication	• Reset the CPU module. • Lower the CPU usage rate of tasks with the higher rate, or make them inactivated. • Review the user program. • Restart the C Controller module with CW Workbench not connected online. • Review the command executed from Shell. • Set the user watchdog timer setting time longer enough with consideration for the CPU usage rate of the system task. If an error still occurs, check the mounted modules, and replace a defective module.	—	Always
3044H	Program fault	The command in the script file cannot be executed. (The syntax is incorrect, or no command exists.)	Check that the syntax of the script file is not incorrect and a command exists.	Script position information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
3C00H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C01H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C02H	Hardware failure	• A hardware failure has been detected. • An invalid argument has been specified with the C Controller module dedicated functions for ISR.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative. • Review the argument of the C Controller module dedicated functions for ISR.	Failure information	At power ON, RESET, fixed cycle processing execution, or interrupt occurrence
3C03H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always, at power-ON, RESET, or interrupt occurrence
3C0FH	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C10H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At power ON or RESET
3C11H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At fixed cycle processing execution or instruction execution
3C12H	Hardware failure	• The waveform error has been detected in Power supply module. • A hardware failure of the Power supply module, CPU module, Base unit, or extension cable has been detected.	• Check the waveform of the voltage applied to the Power supply module. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the Power supply module, CPU module, Base unit, or extension cables. Please consult your local Mitsubishi representative.	Failure information	Always
3C13H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C14H	Hardware failure	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C20H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At power ON or RESET

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
3C21H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At fixed cycle processing execution, power ON, or RESET
3C22H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At fixed cycle processing execution, power ON, or RESET
3C2FH	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C30H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Format the memory. Write all files to the CPU module, and then reset it. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At instruction execution
3C31H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Format the memory. Write all files to the CPU module, and then reset it. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3C32H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3E40H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Reset the CPU module. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3E41H	System WDT error	The system watch dog timer controlled by the system has detected an error. Or, an error occurred in the system software. • The time set for the system watchdog timer monitoring time is too short. • Tasks with the higher CPU usage rate is in operation. • A program causing an error in the memory or stack was executed. • The operation that increase the CPU usage rate of the system task (writing parameter) was performed. • The station on which the station-based block data assurance setting is enabled on the network has been accessed when the stop error occurred. • The CPU module is running out of control or is broken down. (Malfunction due to noise or hardware failure)	• Reset the CPU module. • Lower the CPU usage rate of tasks with the higher rate, or make them inactivated. • Review the user program. • Set the system watchdog timer monitoring time longer enough with consideration for the CPU usage rate of the system task. • Review the user program to prevent the station on which the station-based block data assurance setting is enabled from being accessed when the stop error occurred. • Take measures to reduce noise. • Check that the C Controller module is properly mounted on the Base unit, and that the ambient environment is within the range of the general specifications. If the same error code is still displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always
3E48H to 3E4AH	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Format the memory. Write all files to the CPU module, and then reset it. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	Always

Error code	Error name	Error details and cause	Corrective action	Detailed information	Diagnostic timing
3E50H	Memory error	An error has been detected in the memory.	• Take measures to reduce noise. • Format the memory. Write all files to the CPU module, and then reset it. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.	Failure information	At power ON or RESET

Error code related to data communication (4000H to 4FFFH)

The table below lists the error codes detected by other than the self-diagnostic function of CPU module.

The error codes are not stored in SD0 since these error are not detected by the self-diagnostic function.

Error code	Error name	Error details and cause	Corrective action
4001H	Common error	An unsupported request was executed. (The request was issued to CPU module which does not support the request.)	• Check the command data of SLMP/MC protocol. • Check the CPU module model name selected with the engineering tool. • Check the target CPU module model name.
4002H	Common error	An unsupported request was executed.	• Check the command data of SLMP/MC protocol. • Check the CPU module model name selected with the engineering tool. • Execute the request again. If the same error code is displayed again, the possible cause is a hardware failure of the CPU module. Please consult your local Mitsubishi representative.
4003H	Common error	Command for which a global request cannot be performed was executed.	Check the command data of SLMP/MC protocol.
4004H	Common error	A request was issued to the system file.	Check the command data of SLMP/MC protocol.
4005H	Common error	The volume of data to be handled by the specified request is too large.	Check the command data of SLMP/MC protocol.
4008H	Common error	The CPU module is BUSY. (The buffer is not empty.)	Execute the request again after arbitrary period of time has elapsed.
4010H	CPU module operation related error	Because the CPU module is in the RUN state, the request cannot be executed.	Execute the request after placing the CPU module into the STOP state.
4013H	CPU module operation related error	Because the CPU module is not in the STOP state, the request cannot be executed.	Execute the request after placing the CPU module into the STOP state.
4021H	File related error	The specified drive (memory) does not exist, or has an error.	• Check the status of the specified drive (memory). • Back up the data in the CPU module, and then initialize the memory.
4022H	File related error	The file with the specified file name or file number does not exist.	Check the specified file name and file number.
4023H	File related error	The file name and file number of the specified file do not match.	Delete the file, and then create a file again.
4024H	File related error	The specified file cannot be handled.	Do not access the specified file.
4025H	File related error	The specified file is currently processing a request from other engineering tool.	Forcibly execute the request. Or, execute it again once the processing from other engineering tool has been completed.
4026H	File related error	Specifying the file password set to the target drive (memory) is required.	Specify the file password set to the target drive (memory), and access it.
4027H	File related error	The specified range exceeded the file size.	Check the specified range, and access within the range.
4028H	File related error	The same file already exists.	Forcibly execute the request. Or, change the file name and execute the request again.
4029H	File related error	The specified file capacity cannot be reserved.	Review the specified file capacity, and execute the request again.
402AH	File related error	The specified file has an error.	Back up the data in the CPU module, and then initialize the memory.
402BH	File related error	The request cannot be executed in the specified drive (memory).	Execute the request again after placing the CPU module into the STOP state.
402CH	File related error	The request cannot be executed currently.	Execute it again after a while.
4030H	Device specification error	The specified device name cannot be handled.	Check the specified device name.
4031H	Device specification error	• The specified device number is out of range. • The CPU module does not support the specified device name.	• Check the specified device number. • Check the device assignment of the CPU module. • Check the specified device name.

Error code	Error name	Error details and cause	Corrective action
4032H	Device specification error	The specified device modification is incorrect. Or, the device names (TS, TC, SS, SC, CS, or CC) which cannot be used for random read/random write (in word units)/monitor registration/ monitor command of SLMP/MC protocol have been specified.	• Check the specified device modification method. • Check the specified device name.
4033H	Device specification error	Data cannot be written to the specified device since it is for system use.	Do not write data to the specified device. Or, do not turn it ON/ OFF.
4040H	Intelligent function module specification error	The request cannot be executed to the specified Intelligent function module.	Check whether the specified module is an Intelligent function module which has the buffer memory.
4041H	Intelligent function module specification error	The access range exceeded the buffer memory range of the specified Intelligent function module.	Check the start address and number of access points, and access within the range that exists in Intelligent function module.
4042H	Intelligent function module specification error	The specified Intelligent function module cannot be accessed.	• Check whether the specified Intelligent function module operates normally. • Check whether the specified module has hardware failure.
4043H	Intelligent function module specification error	The specified Intelligent function module does not exist.	Check the I/O number of the specified Intelligent function module.
4044H	Intelligent function module specification error	A bus error occurred during the access to Intelligent function module.	Check whether the specified Intelligent function module, other modules, or Base unit have hardware failure.
4050H	Protect error	The request cannot be executed because the write protect switch of the SD memory card is ON.	Turn OFF the write protect switch of the SD memory card.
4052H	Protect error	Data cannot be written since the specified file attribute is the read-only.	Do not write data to the specified file. Or, change the file attribute.
4053H	Protect error	An error occurred when writing data to the specified drive (memory).	Check the specified drive (memory). Or, write data again after changing the target drive (memory).
4054H	Protect error	An error occurred when deleting data from the specified drive (memory).	Check the specified drive (memory). Or, delete data again after changing the target drive (memory).
4080H	Other error	Request data error	Check the specified request data.
4082H	Other error	The specified command cannot be executed since it is being executed.	Execute the command again once the request from other engineering tool has been completed.
408BH	Other error	A remote request cannot be executed.	• Execute the request again after placing the CPU module in the state where a remote request can be executed. • For the remote reset operation, set "Remote Reset" to "Enable" with the parameter.
4121H	File related error	The specified drive (memory) or file does not exist.	Check the specified drive (memory) or file, and execute the request again.
4122H	File related error	The specified drive (memory) or file does not exist.	Check the specified drive (memory) or file, and execute the request again.
4123H	File related error	The specified drive (memory) has an error.	Initialize the memory, and restore the drive (memory) to its normal state.
4124H	File related error	The specified drive (memory) has an error.	Initialize the memory, and restore the drive (memory) to its normal state.
4125H	File related error	The specified drive (memory) or file is currently being processed.	Execute it again after a while.
4129H	File related error	The request cannot be executed since the specified drive (memory) is ROM.	Change the target drive (memory), and execute the request again.
412AH	File related error	The request cannot be executed since the specified drive (memory) is ROM.	Change the target drive (memory), and execute the request again.
412BH	File related error	The specified drive (memory) is write-prohibited.	Change the write-protect conditions or drive (memory), and execute the request again.

Error code	Error name	Error details and cause	Corrective action
412DH	File related error	The specified drive (memory) does not have enough free space.	Increase the free space of the drive (memory), and execute the request again.
412EH	File related error	The specified drive (memory) does not have enough free space.	Increase the free space of the drive (memory), and execute the request again.
412FH	File related error	The drive (memory) capacity differs between the copy destination and the copy source.	Check the copy destination and copy source drive (memory), and execute the request again.
4130H	File related error	The drive (memory) type differs between the copy destination and the copy source.	Check the copy destination and copy source drive (memory), and execute the request again.
4131H	File related error	The file name of the copy destination is the same as the one of the copy source.	Check the file name, and execute the request again.
4132H	File related error	The specified number of files does not exist.	Check the specified data, and execute the request again.
4133H	File related error	The specified device (memory) has no free space.	Increase the free space of the drive (memory), and execute the request again.
4134H	File related error	The attribute specification data for a file is incorrect.	Check the specified data, and execute the request again.
4135H	File related error	The date/time data of the engineering tool (personal computer) is out of range.	Check the clock setting of the engineering tool (personal computer), and execute the request again.
4136H	File related error	The specified file already exists.	Check the specified file name, and execute the request again.
4137H	File related error	The specified file is read-only.	Change the conditions for the specified file, and execute the request again.
4138H	File related error	Simultaneously accessible files exceeded the maximum.	Reduce the file operation, and execute the request again.
4139H	File related error	The specified file exceeded the file size range of the file already exists.	Check the size of the specified file, and execute the request again.
413AH	File related error	The specified file exceeded the file size of the file already exists.	Check the size of the specified file, and execute the request again.
413EH	File related error	Operation is disabled for the specified drive (memory).	Change the target drive (memory), and execute the request again.
413FH	File related error	Writing to the file storage area is prohibited for the file.	Change the specified drive (memory), and execute the request again.
414AH	Intelligent function module specification error	Operation was performed to the Intelligent function module outside of the control group in a multiple CPU system.	Perform the operation from the control CPU module for the target module.
414CH	Intelligent function module specification error	Inaccessible buffer memory address was specified.	Check the buffer memory address, and execute the request again.
4150H	File related error	An attempt was made to initialize the drive protected by the system.	Do not initialize the target drive (memory) since it cannot be initialized.
4151H	File related error	An attempt was made to delete the file/folder protected by the system.	Do not delete the target file/folder since it cannot be deleted.
41C5H	File related error	• The specified file does not exist. • An attempt was made to write data to a read-only file.	Check the file, and execute the request again.
41DFH	File related error	The specified drive (memory) is write-protected.	Disable the write protection of the specified drive (memory), and execute the request again.
41E4H	File related error	Access to the SD memory card has failed.	• Check whether the SD memory card has been inserted, and access it again. • Replace the SD memory card, and access it again. • Back up the data, and initialize the memory.
41F8H	File related error	The same data is being accessed with other engineering tool.	Check the completion of the following functions, and execute the request again. • The function to write data to the program memory, or the function to transfer data to backup memory is being performed.
41FBH	File related error	The specified file has been operated with the same engineering tool.	Execute the request again once the currently performed operation has been completed.

Error code	Error name	Error details and cause	Corrective action
41FDH	File related error	Data is not written to the data memory.	Write file using the write to PLC function.
41FEH	File related error	• SD memory card is not inserted. • The SD memory card is in the disabled state.	• Insert an SD memory card. • Remove the SD memory card, and insert it again. • Cancel the SD memory card forced disable function.
41FFH	File related error	The type of SD memory card is different.	Check the type of the SD memory card.
4269H	Other error	The remote RUN operation cannot be performed.	Perform the remote RUN operation again after a while.
433CH	Maintenance related error	Clearing error failed. (The error clear function has been performed while an error is being cleared.)	Perform the function again after a while. If the same error occurs even when the function is performed again, the possible cause is a hardware failure of the relevant module. Please consult your local Mitsubishi representative.
433DH		The relevant module does not support the error clear function.	Check the target module of the error clear function. (Check the module on which an error occurred.)
4A00H	Network related error	• The specified station cannot be accessed because the routing parameters have not been set to the start source CPU and the relay CPU module. • The control CPU module for the Network module to which data is routed has not started for routing via a multiple CPU system. • The CPU module that relays IP packets is not the control CPU module for the CC-Link IE module on the path where IP packets travel.	• Set the routine parameters to the related stations for accessing the specified station. • Retry it after a while. Or, check the startup of the system that relays data, and start communication. • Set the CPU module that relays IP packets to the control CPU module for the CC-Link IE module on the path where IP packet travel.
4A01H	Network related error	• The network with the number set to the routing parameters does not exist. • The specified CPU module cannot be communicated via the network that is not supported by the specified CPU module.	• Check the routing parameters set to the related stations, and correct them. • Perform data communication using the communication route supported by the specified CPU module.
4A02H	Network related error	The specified station cannot be accessed.	• Check whether any error occurred on the Network module, or it is offline. • Check whether the settings for the network number and station number are correct.
4A03H	Network related error	A request for network test was issued.	Check the request data of SLMP/MC protocol.
4B00H	Target module related error	• An error occurred on the access destination or the relay station. • The connection destination specification (the I/O number of the requested module) is invalid.	• Check the error occurred on the specified access destination or relay station to the station to be accessed, and take the corrective actions. • Check the connection destination specification (Request destination module I/O No. or PC No.) for the request data of SLMP/MC protocol. • Check the stop error, and take the corrective actions.
4B02H	Target module related error	The request is not the one addressed to the CPU module.	Perform the operation to the module that can perform the specified function.
4B03H	Target module related error	• The specified route is not supported by the version of the specified CPU module. • The communication target CPU module is not mounted.	• Check whether the specified route is supported. • Check the mounting status of the CPU module. • Check the stop error, and take the corrective actions.
4B04H	Target module related error	The connection destination specification (I/O number of the requested module) is not supported.	Invalid value has been set to the start I/O number for the module in "Target settings". Change the start I/O number to the one for the target module, and perform data communication again.

Appendix 2 Event List

C Controller module collects information from each module including errors detected by the module, operations performed for the module, and errors occurred on the network, and stores them in the data memory or on an SD memory card. (☞ Page 60 Event history function). When an event occurs, its event code and description can be checked using CW Configurator.

Point

For details on events occurred on each CPU module, refer to the manual of each module used.

Guide for reference of event list

The event list contains the following information.

Item	Description
Event code	Indicates the ID number of each event. • System code: Indicates event code for the event type "System". • Security code: Indicates event code for the event type "Security". • Operation code: Indicates event code for the event type "Operation". • Application code: Indicates event code for the event type "Application".
Event type	Indicates the type of each event.
Event category	Indicates the category of each event.
Detected event	Indicates the description of detected events.
Detailed information 1 to 3	Indicates the details of each detected event.

Detailed information

Indicates the contents of Detailed information 1 to 3.

Detailed information	Item	Description
Detailed information 1	Operation initiator information	The following shows the information on the operation source. • Connection port (connection information such as Ethernet and USB) • I/O number • CPU number (CPU number in a multiple CPU system) • Network number • Station number • IP address
	Event history file information	Indicates information on the event history file.
	Detailed code	Indicates the detailed code specified with the C Controller module dedicated function (CCPU_RegistEventLog).
Detailed information 2	Communication speed and communication mode	Indicates information on the communication speed and the communication mode.
	Communication status	Indicates information on the communication status.
	Security key operation information	Indicates information on security keys.
	Remote password information	Indicates information on the remote password.
	File password information	Indicates information on the file password.
	Disconnected IP address information	Indicates information on the disconnected IP address.
	Drive and file information	Indicates information on drive names and file names.
	Copy source drive and file information	Indicates information on drive names and file names.
	Operation target information	Indicates information about the operation target (I/O number).
	Clock information (before change)	Indicates information about the clock before change.
	Remote operation type information	Indicates information about the remote operation type.
	Device and label information	Indicates information about devices and labels.
	Detailed information	Indicates the detailed information specified with the C Controller module dedicated function (CCPU_RegistEventLog).
Detailed information 3	Clock information (after change)	Indicates information about the clock after change.
	Copy destination drive and file information	Indicates information about the copied drive name and file name.

Event list

The following table shows the events related to C Controller modules.

Event code	Event type	Event category	Detected event	Description	Detailed information		
					Detailed information 1	Detailed information 2	Detailed information 3
0400	System	Information	Power ON and RESET	The C Controller module has been power ON or reset.	—	—	—
0410			Boot operation	Boot operation has been performed.			
0420			Event history file generation	A event history file has been generated.	Event history file information		
1000 or higher		Error	When a self-diagnostic error occurs, the error information is stored as an event.				
10300	Security	Information	Access acceptance from IP address prohibited with the IP Filter Settings	Access from an IP address for which access is prohibited with the IP Filter Settings was accepted.	Operation initiator information	Disconnected IP address information	—
20100	Operation		Error clear	An error was cleared.	Operation initiator information	Operation target information	—
20200			Event history clear	An event history was cleared.		—	—
20300			SD memory card available	The SD memory card was enabled.	—		—
20301			SD memory card forced disabled	The SD memory card forced disable function was performed and the SD memory card is ready for removal.			—
24000			Clock setting	The clock setting was performed.	Operation initiator information	Clock information (before change)	Clock information (after change)
24001			Remote operation request acceptance	A remote operation request (RUN/STOP/PAUSE) was accepted.		Remote operation type information	—
24100			Operating status change (RUN)	The operating status was changed to RUN.	—	—	
24101			Operating status change (STOP)	The operating status was changed to STOP.			
24102			Operating status change (PAUSE)	The operating status was changed to PAUSE.			
24200			New folder creation, data write to file/folder*1	• A new folder was created. • A new file was created or data was written to a file.	Operation initiator information	Drive and file information	
24201			File copy*1	A file was copied.	—	Copy source drive and file information	Copy destination drive and file information
24202			Folder/file rename*1	A folder or file was renamed.			
25000			Registration from user program	An event history was registered with the C Controller module dedicated function.	Detailed code	Detailed information	—
2A200		Warning	Memory initialization*1	The memory was initialized.	Operation initiator information	Drive and file information	—
2A201			Device/label zero clear	Data in the device/label memory was cleared to zero.		Device and label information	
2A202			Folder/file deletion*1	A folder or file was deleted.		Drive and file information	

*1 For the file-related events such as write to and deletion of files, operations for the following files are logged in the event history:
· Program file
· Parameter file

Appendix 3 Troubleshooting by Symptom

If any of the functions of C Controller module does not operate properly, perform troubleshooting by checking the following items. If the ERROR LED is ON or flashing, clear the error using an engineering tool.

POWER LED of Power supply module turns OFF

Check the following items.

Check item	Corrective action
The Power supply module is not mounted on the Base unit properly.	Re-mount the Power supply module, and power it ON again.
The READY LED on the C Controller module is ON.	An error occurred in the Power supply module. Replace the Power supply module.
Power supply voltage is not appropriate.	Supply the appropriate power voltage. (📖 MELSEC iQ-R Module Configuration Manual)
The rated output of the Power supply module exceeds the internal current consumption within the entire system.	Review the system configuration so that the internal current consumption does not exceed the rated output current of the module. (📖 MELSEC iQ-R Module Configuration Manual)
The POWER LED turns ON when the power is restored to the system after all the modules, except the Power supply module, have been removed.	An error occurred in a module other than Power supply module. Cycle the power, adding modules to the system one by one. An error occurred in the last module mounted immediately before the POWER LED turns OFF. Replace the corresponding module.

If the POWER LED does not turn ON even after the corrective actions listed above are taken, the possible cause is a hardware failure of the Power supply module. Please consult your local Mitsubishi representative.

READY LED on C Controller module does not turn ON (green)

Check the following items.

Check item	Corrective action
The ERROR LED is ON.	System watchdog timer error occurred. • Check if user tasks with higher priority occupy the system. • Take corrective actions against the occurrence of any system watchdog timer error (CPU error code: 3E41H).
The ERROR LED is flashing.	The hardware failure has occurred. Take corrective actions according to the event registered in the event history.
The module is started up in the hardware diagnostics mode.	Power OFF the module to terminate the hardware diagnostics mode and power ON the module again.
The power is turned OFF or the module is reset while accessing files.	Cycle the power or reset the module again to start the C Controller module.

READY LED on C Controller module is kept flashing

The READY LED flashing status indicates that the script file (STARTUP.CMD) is being executed.
After taking corrective actions corresponding to the "Check item" below, correct the script file and the user program that is activated from the script file.

Check item	Corrective action
The script file is stored in the program memory.	• Store the unprocessed script file in an SD memory card, and turn the power ON again. • Initialize the C Controller module.
The script file in the program memory cannot be overwritten.	• Store the unprocessed script file in an SD memory card, and turn the power ON again. • Secure a free space in the program memory. • Initialize the C Controller module.

Ethernet communication between C Controller module and personal computer cannot be established

Issue PING command from the personal computer to the C Controller module and check the response.

When the PING command response is incorrect

Check the following items.

Check item	Corrective action
The IP address segments of the personal computer and the C Controller module are different.	Set the same segment to both the personal computer and C Controller module. If it is relayed on another segment LAN via the gateway, contact the network administrator of the connected LAN.
The duplicate IP addresses with the personal computer and the C Controller module exist in the connected LAN.	Contact the LAN network administrator to eliminate the IP address duplication.
As a result of C Controller module replacement, PING does not respond normally.	Reset all devices on the network to which the C Controller module is connected.
The IP address outside range is specified.	Check the following items and specify a right IP address. • The IP address starts with a number from 1 to 233, excluding 127. • No space is included in the IP address.
The system in a multiple CPU system is faulty. (The self-diagnostic error such as CPU module configuration error and parameter error)	• Reset the multiple CPU system and restart it. • Connect CW Configurator after the READY LED turned ON, and write the correct parameters.
The network is in the overloaded conditions.	Disconnect the other Ethernet devices, and establish the connection only with the C Controller module.

When the PING command is correct

Perform the troubleshooting in accordance with the following symptoms.

■CW Configurator connection fails

Check item	Corrective action
The Ethernet cable is not connected to the Ethernet port.	Connect the Ethernet cable.
The connection destination of CW Configurator is set to a different route.	Set the connection destination of CW Configurator, via Ethernet.

■CW Workbench connection fails

Check item	Corrective action
The Ethernet cable is not connected to the Ethernet port.	Connect the Ethernet cable.
"Target Server Options" of CW Workbench is not set properly.	Set "Target Server Options" of CW Workbench properly.

■Telnet connection fails

Check item	Corrective action
The Ethernet cable is not connected to the Ethernet port.	Connect the Ethernet cable.
User name and password is not sure.	Initialize the C Controller module.
A message "Sorry, session limit reached." appears.	Terminate the Telnet connection from another personal computer and take any of the following actions: • Reconnect after the Telnet connection timeout time has elapsed. • Reset the C Controller system.

■FTP connection fails

Check item	Corrective action
The Ethernet cable is not connected to the Ethernet port.	Connect the Ethernet cable.
User name and password is not sure.	Initialize the C Controller module.
There are 11 or more FTP connections to one C Controller module.	Make an adjustment so that the number of FTP connections becomes 10 or less.
An FTP connection can be established normally from the Windows command prompt.	Change the FTP client tool to be used when an FTP connection can be established from the command prompt.

File access fails

Check the following items.

Check item	Corrective action
The CARD RDY LED is OFF when the read/write target is an SD memory card.	Insert an SD memory card or re-insert an SD memory card.
The USB RDY LED is OFF when the read/write target is a USB Mass Storage Class-compliant device.	Connect a USB Mass Storage Class-compliant device or reconnect a USB Mass Storage Class-compliant device.
The SD memory card is write-protected when write target is the SD memory card.	Cancel the write protection of the SD memory card. (Refer to the manual for the SD memory card used.)
There is no free space in the write target drive.	• Secure a free space in the write target drive. • Change the write target to another drive.
The user program that uses the write target file is running.	Stop the user program that uses the write target file.
A file system error occurred in an SD memory card or a USB Mass Storage Class-compliant device.	• Restore the file system in the SD memory card or the USB Mass Storage Class-compliant device. • Format the SD memory card with CW Configurator. Use an applicable SD memory card. • Format the USB Mass Storage Class-compliant device with the supported file system by using a personal computer. (☞ Page 27 Drive names and file systems) • Do not partition the drive of USB Mass Storage Class-compliant device.
The network is in the overloaded conditions.	Disconnect the other Ethernet devices, and establish the connection only with the C Controller module.

Connection with peripherals fails

Check the following items.

Check item	Corrective action
The system in a multiple CPU system is faulty.	Reset the multiple CPU system and restart it.
The network is in the overloaded conditions.	Disconnect the other Ethernet devices, and establish the connection only with the C Controller module.

File read from C Controller module fails

Check the following items.

Check item	Corrective action
Check the transfer mode of FTP.	Change the transfer mode of FTP to an appropriate mode.

An error occurs during user program execution

Check the following items.

Check item	Corrective action
An error occurs in executable file (*.out) loading.	• Set the "Build Spec" in compiling to "ARMARCH7gnu_SMP". • Download the files with all symbols required for files to load first. • Add "-mlong-calls" to the build option, For details on how to add the option, refer to "Considerations for creating user program" in the following manual. 📖 MELSEC iQ-R C Controller Module User's Manual (Startup)
Event(s) is registered in the event history.	Take appropriate actions in accordance with details of the registered event.
An error occurs in C Controller module dedicated function or MELSEC data link functions.	Take appropriate actions in accordance with the error code at the time of function execution.
An error occurs in VxWorks standard API functions.	Refer to the manual of VxWorks. If the error persists, consult Wind River Systems, Inc.
Stack size of the task that runs the user program is insufficient.	Increase the task stack size.
The pointer used in the user program refers to an invalid address.	Make correction to make the pointer refer to a valid address.
The memory area specified to the size is not reserved.	Secure the memory area.
The VX_FP_TASK option is not specified for the task that performs floating-point operations.	Specify the VX_FP_TASK option for the task that performs floating-point operations.
A VxWorks message is displayed when an error occurs.	Consult the Wind River Systems, Inc.

The serial communication cannot be established

Check the following items.

Check item	Corrective action
The option settings already configured have been changed.	Obtain the serial communication option currently set, and change the option settings. For more details on how to obtain and change the serial communication option, refer to the manuals for VxWorks of the following version. • VxWorks Version 6.9

Communication with Ethernet device cannot be established

Check the following items.

Check item	Corrective action
The Ethernet device is communicating with the C Controller module by specifying the following port number: • 1 to 1023, or 61440 to 65534	Since the port number 1 to 1023 is the number for reserved in general (WELL KNOWN PORT NUMBERS), and the port number 61440 to 65534 is the number to be used for other communication devices, these numbers cannot be used. Use the following number for the port number: • 1024 to 4999 or 5010 to 61439

Drive name of the SD memory card is not displayed properly

Check the following items.

Check item	Corrective action
Drive name of the SD memory card is not displayed properly.	Format the SD memory card with CW Configurator. Use an SD memory card supported by C Controller module. (📖 MELSEC iQ-R C Controller Module User's Manual (Startup))

Drive name of the USB Mass Storage Class-compliant device is not displayed properly

Check the following items.

Check item	Corrective action
Drive name of the USB Mass Storage Class-compliant device is not displayed properly.	• Format the USB Mass Storage Class-compliant device with the supported file system by using a personal computer. (☞ Page 27 Drive names and file systems) • Do not partition the drive of USB Mass Storage Class-compliant device.

Appendix 4 Device List

This section explains the available devices.

Device list

The following shows the device names that can be used and the range of use.

Classification	Type	Device name	Default value			Number of points setting	Setting range
			Number of points	Range of use			
User device	Bit device	Input	4096 points	X0 to FFF	HEX	N/A	—
		Output	4096 points	Y0 to FFF	HEX		
	Bit device	Internal relay	61440 points	M0 to 61439	DEC	N/A	—
		Link relay	655360 points	B0 to 9FFFF	HEX		
	Word device	Data register	4184064 points	D0 to 4184063	DEC		
		Link register	1048576 points	W0 to FFFFF	HEX		
System device	Bit device	Special relay	4096 points	SM0 to 4095	DEC	N/A	—
	Word device	Special register	4096 points	SD0 to 4095	DEC		
Link direct device*1	Bit device	Link input	16384 points	Jn\X0 to 3FFF	HEX	N/A	—
		Link output	16384 points	Jn\Y0 to 3FFF	HEX		
		Link relay	32768 points	Jn\B0 to 7FFF	HEX		
		Link special relay	512 points	Jn\SB0 to 1FF	HEX		
	Word device	Link register	131072 points	Jn\W0 to 1FFFF	HEX		
		Link special register	512 points	Jn\SW0 to 1FF	HEX		
Module access device	Word device	Module access device	268435456 points	Un\G0 to 268435455	DEC	N/A	—
CPU buffer memory access device	Word device	CPU buffer memory access device	268435456 points	U3En\G0 to 268435455	DEC	N/A	—
	Word device	Fixed cycle communication area access device	0 points	—	DEC	Available	U3En\HG0 to 12287
File register	Word device	File register	1835008 points	ZR0 to 1835007	DEC	N/A	—
Pointer	—	Interrupt pointer	1024 points	I0 to I15, I50 to I1023	DEC	N/A	—

*1 The number of points and the range to be used for the link direct device vary depending on Network modules. For the number of points and the range to be used for the link direct device, refer to the manual for the Network module in use.

Point

Do not use any devices that are not listed in the device list.

Device descriptions

The following shows the overview of the available devices.

For details of devices, refer to the following manual.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

Device name			Description
User device	Input	X	A device that provides CPU module with commands and/or data using an external device, such as pushbutton, transfer switch, limit switch, or digital switch.
	Output	Y	A device that outputs the operation results of the program to a device, such as external signal light/digital HMI/electromagnetic switch (contactor) /solenoid.
	Internal relay	M	A device that is used as an auxiliary relay within the CPU module.
	Data register	D	A device that stores numerical values.
	Link relay	B	A device that is used in a C Controller module when refreshing data between a Network module and C Controller module.
	Link register	W	
System Device	Special relay	SM	An internal relay/internal register of which specification is defined in C Controller module, where the status of the C Controller module is stored. For details of the special relay, refer to the following section. ☞ Special Relay List For details of the special register, refer to the following section. ☞ Special Register List
	Special register	SD	
Link direct device	Link input	Jn\X	A device that directly accesses link relays and/or link registers in a Network module on the CC-Link IE Controller Network and/or CC-Link IE Field Network.
	Link output	Jn\Y	
	Link relay	Jn\B	
	Link special relay	Jn\SB	
	Link register	Jn\W	
	Link special register	Jn\SW	
Module access device	Module access device	Un\G	A device that directly accesses from the CPU module to the buffer memory of an Intelligent function module mounted on the main base unit and extension base unit.
CPU buffer memory access device	CPU buffer memory access device	U3En\G	A device that accesses memory used for reading/writing data among CPU modules in a multiple CPU system, or for the CPU module built-in function such as Ethernet function
	Fixed cycle communication area access device	U3En\HG	
File register	File register	ZR	A device that retains data while the power is OFF. It exists in the file storage area of the device/label memory.
Pointer	Interrupt pointer	I	A device that performs a corresponding routine when using the interrupt function

Appendix 5 Special Relay List

The following shows how to read the list of special relay (SM).

Item	Description
No.	Indicates the number of the special relay.
Name	Indicates the name of the special relay.
Content	Indicates the content of the special relay.
Details	Indicates the details of the special relay.
Set by (when to set)	Set side and set timing of special register (Set by) S: Set by system (When to set) Error occurrence: Set if an error occurs Status change: Set only when the status is changed.

Point

Do not change the special relay set by system with the operations such as program execution or device test. Doing so may result in system down or disconnection of communication.

Diagnostic information

The following table shows the special relays related to the diagnostics information.

No.	Name	Content	Details	Set by (when to set)
SM0	Latest diagnostics error	OFF: No error ON: Error	Turns ON when the diagnostics error occurred. The ON state is retained even after the error is cleared later.	S (At error occurrence)
SM1	Latest self-diagnostic error	OFF: No error ON: Error	Turns ON when the self-diagnostics error occurred. The ON state is retained even after the error is cleared later.	S (At error occurrence)
SM53	AC/DC DOWN	OFF: AC/DC DOWN not detected ON: AC/DC DOWN detected	• Turns ON when a momentary power failure within 20 ms is detected while the AC power supply module is in use. This relay is reset after power cycle. • Turns ON when a momentary power failure within 10 ms is detected while the DC power supply module is in use. This relay is reset after power cycle.	S (At error occurrence)
SM60	Blown fuse detection	OFF: Normal ON: Module with blown fuse	• Turns ON when at least one output module is in fuse blown state. The ON state is retained even after the error is cleared later. • The fuse blown state check is also performed for output modules on the remote I/O station.	S (At error occurrence)
SM61	I/O module verify error	OFF: Normal ON: Error	• Turns ON when the state of the I/O module is different from the one registered during power ON. The ON state is retained even after the error is cleared later. • I/O module verification is also performed for modules on the remote I/O station.	S (At error occurrence)
SM80	Detailed information 1 in-use flag	OFF: Not used ON: In use	Turns ON if the detailed information 1 exists when SM0 turns ON.	S (Status change)
SM112	Detailed information 2 in-use flag	OFF: Not used ON: In use	Turns ON if the detailed information 2 exists when SM0 turns ON.	S (Status change)
SM600	Memory card usable flag	OFF: Unusable ON: Usable	Turns ON when the module is in SD memory card available state. (The flag turns ON after inserting an applicable SD memory card and it is in the available state.)	S (Status change)
SM601	Memory card protect flag	OFF: Not protected ON: Protected	Turns ON when the write protect switch on the SD memory card is ON	S (Status change)
SM603	Memory card (drive 2) flag	OFF: Not inserted ON: Inserted	Turns ON while an SD memory card in inserted. (Regardless of the availability of an SD memory card and its type.)	S (Status change)

System information

The following table shows the special relays related to system information.

No.	Name	Description	Details	Set by (when to set)
SM220*1	CPU No.1 preparation completed	OFF: CPU No.1 preparation not completed ON: CPU No.1 preparation completed	This device turns ON when the access from other CPU module to the CPU No.1 is enabled after powering ON or resetting the module.	S (Status change)
SM221*1	CPU No.2 preparation completed	OFF: CPU No.2 preparation not completed ON: CPU No.2 preparation completed	This device turns ON when the access from other CPU module to the CPU No.2 is enabled after powering ON or resetting the module.	S (Status change)
SM222*1	CPU No.3 preparation completed	OFF: CPU No.3 preparation not completed ON: CPU No.3 preparation completed	This device turns ON when the access from other CPU module to the CPU No.3 is enabled after powering ON or resetting the module.	S (Status change)
SM223*1	CPU No.4 preparation completed	OFF: CPU No.4 preparation not completed ON: CPU No.4 preparation completed	This device turns ON when the access from other CPU module to the CPU No.4 is enabled after powering ON or resetting the module.	S (Status change)

*1 These devices are used as an interlock to access the CPU No.1 when the multiple CPU synchronization setting is configured with asynchronous mode.

Appendix 6 Special Register List

The following shows how to read the list of special register (SD).

Item	Description
No.	Indicates the number of the special register.
Name	Indicates the name of the special register.
Content	Indicates the content of the special register.
Details	Indicates the details of the special register.
Set by (when to set)	Set side and set timing of special register (Set by) S: Set by system (When to set) System: Set when a fixed cycle or the status is changed in the system. Initial: Set only when performing an initial operation (such as power ON, STOP→RUN). Status change: Set only when the status is changed. Error occurrence: Set if an error occurs Switch change: Set when the switch is changed.

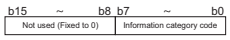
Point

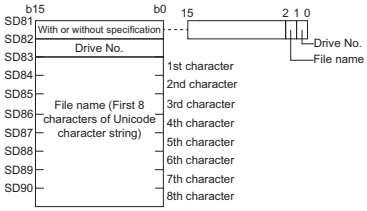
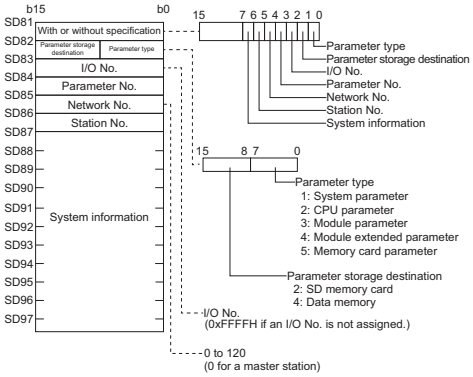
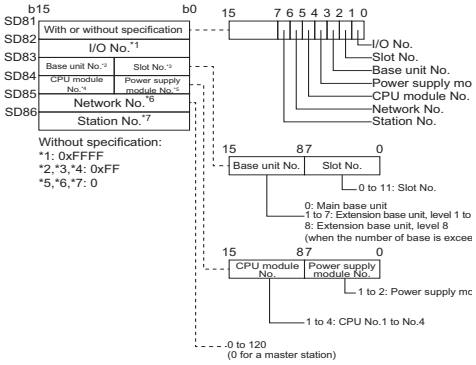
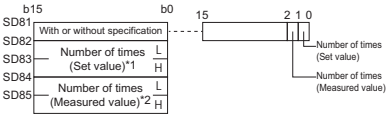
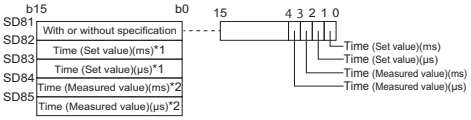
Do not change the special registers which are to be set by the system using operations such as program execution and device test. Doing so may result in system failure or disconnection of communication.

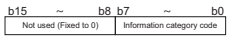
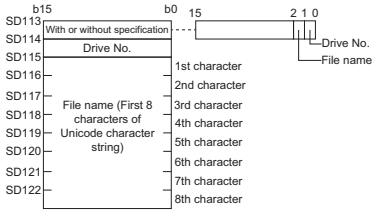
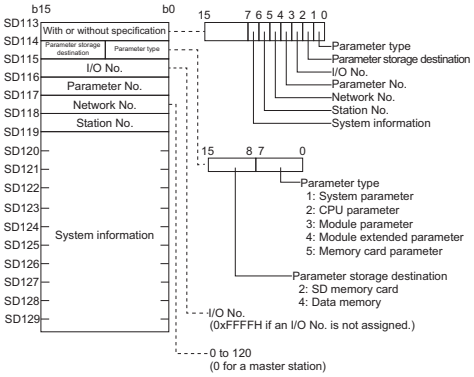
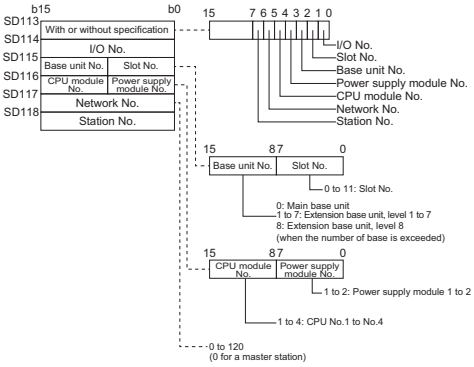
Diagnostic information

The special registers related to the diagnostics information are as follows:

No.	Name	Content	Details	Set by (when to set)
SD0	Latest self-diagnostic error code	Latest self-diagnostic error code	Error codes are stored in hexadecimal when an error is detected with the diagnostics. • The same information as the latest information displayed on the error history is displayed.	S (At error occurrence)
SD1	Self-diagnostic error occurrence time	Self-diagnostic error occurrence time	The year (four digits) when SD0 data was updated is stored as a BIN code.	S (At error occurrence)
SD2			The month when SD0 data was updated is stored as a BIN code .	
SD3			The date when SD0 data was updated is stored as a BIN code.	
SD4			The hour when SD0 data was updated is stored as a BIN code.	
SD5			The minute when SD0 data was updated is stored as a BIN code.	
SD6			The second when SD0 data was updated is stored as a BIN code.	
SD7			The day of the week when SD0 data was updated is stored as a BIN code. (0: Sun, 1: Mon, 2: Tue, 3: Wed, 4: Thu, 5: Fri, 6: Sat)	
SD10	Self-diagnostic error code	Self-diagnostic error code 1	Up to 16 types of error codes are stored to SD10 and higher when the diagnostics detects errors. (The same error code as the one already stored in SD10 and higher is not stored.) The 17th and succeeding error codes are not stored, in addition to the case that 16 types of error codes have already been stored to SD10 to SD25.	S (At error occurrence)
SD11		Self-diagnostic error code 2		
SD12		Self-diagnostic error code 3		
SD13		Self-diagnostic error code 4		
SD14		Self-diagnostic error code 5		
SD15		Self-diagnostic error code 6		
SD16		Self-diagnostic error code 7		
SD17		Self-diagnostic error code 8		
SD18		Self-diagnostic error code 9		
SD19		Self-diagnostic error code 10		
SD20		Self-diagnostic error code 11		
SD21		Self-diagnostic error code 12		
SD22		Self-diagnostic error code 13		
SD23		Self-diagnostic error code 14		
SD24		Self-diagnostic error code 15		
SD25		Self-diagnostic error code 16		
SD53	AC/DC DOWN	Number of times for AC/DC DOWN detection	Value is incremented by one each time when input voltage drops to 85% (AC power)/65% (DC power) or less of the rated value while the CPU module is in operation, and stores it as a BIN code. A counting cycle from 0 → 65535 → 0 is repeated.	S (At error occurrence)
SD60	Number of module with blown fuse	Number of module with blown fuse	The lowest I/O number of module in which a fuse blew is stored.	S (At error occurrence)
SD61	I/O module verify error module number	I/O module verify error module number	The lowest I/O number of the module in which an I/O module verification error has been detected is stored.	S (At error occurrence)

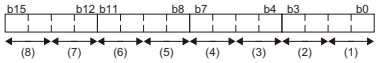
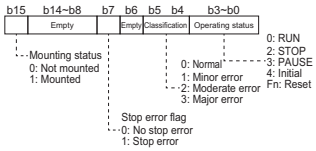
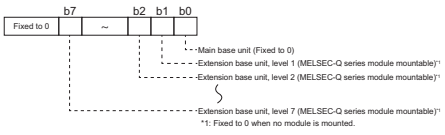
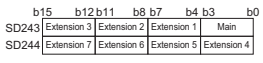
No.	Name	Content	Details	Set by (when to set)
SD80	Detailed information 1 information category	Detailed information 1 information category code	• Detailed information 1 information category code is stored.  • The following codes are stored into the information category code. 0: N/A 1: N/A 2: Drive number and file name 4: Parameter information 5: System configuration information 6: Frequency information 7: Time information 24: Failure information	S (At error occurrence)

No.	Name	Content	Details	Set by (when to set)
SD81 to SD111	Detailed information 1	Detailed information 1	• Detailed information 1 corresponding to the error code (SD0) is stored. • There are six types of information to be stored as shown in (2), (4) to (7), and (24). • The type of the detailed information 1 can be obtained from SD80. (The value of the "Detailed information 1 information category code" which is to be stored in SD80 corresponds to the number (2), (4) to (7), and (24) in the following figures.) (2) Drive number and file name  (4) Parameter information  (5) System configuration information  (6) Frequency information  *1: Set '0' when the number of times (Set value) is not specified. *2: Set '0' when the number of times (Measured value) is not specified. (7) Time information  *1: Set '0' when the time (Set value) is not specified. *2: Set '0' when the time (Measured value) is not specified. (24) Failure information The failure information is a part of system information.	S (At error occurrence)

No.	Name	Content	Details	Set by (when to set)
SD112	Detailed information 2 information category	Detailed information 2 information category code	• Detailed information 2 information category code is stored.  • The following codes are stored into the information category code. 0: N/A 2: Drive number and file name 3: N/A 4: Parameter information 5: System configuration information	S (At error occurrence)
SD113 to SD143	Detailed information 2	Detailed information 2	• Detailed information 2 corresponding to the error code (SD0) is stored. • There are three types of information to be stored as shown in (2), (4), and (5). • The type of the detailed information 2 can be obtained from SD112. (The value of the "Detailed information 2 information category code" which is to be stored to SD112 corresponds to the number (2), (4), and (5) in the following figures.) (2) Drive number and file name  (4) Parameter information  (5) System configuration information  	S (At error occurrence)

System information

The special registers related to the system information are as follows:

No.	Name	Content	Details	Set by (when to set)
SD200	Switch status	CPU switch status (RESET/STOP/RUN switch)	The switch status of the CPU module is stored as follows: 0: RUN, 1: STOP	S (when RESET/STOP/RUN switch changed)
SD201	LED status	Status of CPU-LED	This device stores the information that indicates LED status of the CPU module in the following bit patterns. 0: OFF, 1: ON, 2: Flashing (high speed/low speed)  (1) READY (2) ERROR (3) BUS RUN (4) USER (5) USB RDY (6) CARD RDY (7) Reserved (8) RS SD/RD	S (Status change)
SD203	CPU operating status	CPU operating status	The operating status of the CPU module is stored as follows: 0: RUN, 1: Reserved, 2: STOP, 3: PAUSE	S (System)
SD228	Multiple CPU system information	Number of CPU modules	The number of CPU modules in the multiple CPU system is stored (one to four, including empty CPU).	S (Initial)
SD229		CPU module number in multiple CPU system	The host station CPU number is stored when a multiple CPU system is configured.	S (Initial)
SD230		CPU No.1 operating status	The operation information for each CPU number is stored. (Information for a number of multiple CPUs which is indicated in SD228 is stored.)  	S (At error occurrence)
SD231		CPU No.2 operating status		
SD232		CPU No.3 operating status		
SD233		CPU No.4 operating status		
SD241	Number of extension base unit	0: Main base unit only 1 to 7: Number of extension base units	The maximum number of the implemented extension base units is stored.	S (Initial)
SD242	Determination of mountability of MELSEC-Q series module	Identification of the base type 0: MELSEC-Q series module is not mountable. (There is no Base unit on which MELSEC-Q series module can be mounted.) 1: MELSEC-Q series module is mountable. (There is a Base unit on which MELSEC-Q series module can be mounted.)	Determines whether or not MELSEC-Q series module can be mounted. When no module is mounted, the value is fixed to 0.  	S (Initial)
SD243	Number of base slots	Number of base slots	The number of slots of the Base unit, which is specified in the base/power supply/extension cable setting in the system parameters, is stored. When the number of slots of the Base unit is not specified in the system parameter, that of the mounted Base unit is stored.  	S (Initial)
SD244				
SD250	Latest I/O for implemented module	Latest I/O number for implemented module	The value of the last I/O number of the mounted module + 1 which is divided by 16 is stored. Example 1: Last input number: 010FH • SD250: 0011H Example 2: Last input number: 0FFFH • SD250: 0100H	S (Initial)

No.	Name	Content	Details	Set by (when to set)
SD260	Number of points assigned for bit devices	Number of points assigned for X (L)	The number of points of the device X currently set is stored as 32-bit data.	S (Initial)
SD261		Number of points assigned for X (H)		
SD262		Number of points assigned for Y (L)	The number of points of the device Y currently set is stored as 32-bit data.	S (Initial)
SD263		Number of points assigned for Y (H)		
SD264		Number of points assigned for M (L)	The number of points of the device M currently set is stored as 32-bit data. The number of points assigned is stored even when the number of points assigned to M is 32K points or less.	S (Initial)
SD265		Number of points assigned for M (H)		
SD266		Number of points assigned for B (L)	The number of points of the device B currently set is stored as 32-bit data. The number of points assigned is stored even when the number of points assigned to B is 32K points or less.	S (Initial)
SD267		Number of points assigned for B (H)		
SD280	Number of points assigned for word devices	Number of points assigned for D (L)	The number of points of the device D currently set is stored as 32-bit data. The number of points assigned is stored even when the number of points assigned to D is 32K points or less.	S (Initial)
SD281		Number of points assigned for D (H)		
SD282		Number of points assigned for W (L)	The number of points of the device W currently set is stored as 32-bit data. The number of points assigned is stored even when the number of points assigned to W is 32K points or less.	S (Initial)
SD283		Number of points assigned for W (H)		
SD306	Number of points assigned for file registers	Number of points assigned for ZR (L)	The number of points of the device ZR currently set is stored as 32-bit data. The number of points assigned is stored even when the number of points assigned to ZR is 32K points or less.	S (Initial)
SD307		Number of points assigned for ZR (H)		

Fixed cycle function information

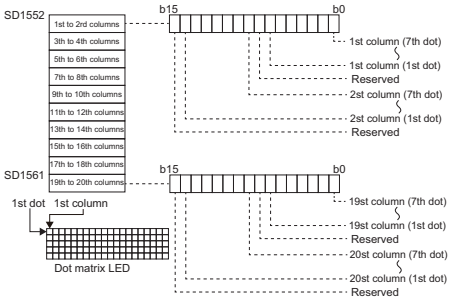
The special registers related to the fixed cycle function information are as follows:

No.	Name	Content	Details	Set by (when to set)
SD520	Current fixed cycle processing time*1	Current fixed cycle processing time (unit: ms)	The current fixed cycle processing time is stored in SD520 and SD521. (Measured in microseconds.) • SD520: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD521: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the current fixed cycle processing time is 23.6 ms; for example, it is stored as shown below: • SD520 = 23 (ms) • SD521 = 600 (μs)	S (System)
SD521		Current fixed cycle processing time (unit: μs)		
SD522	Minimum fixed cycle processing time*1	Minimum fixed cycle processing time (unit: ms)	The minimum fixed cycle processing time is stored in SD522 and SD523. (Measured in microseconds.) • SD522: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD523: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the minimum fixed cycle processing time is 23.6 ms; for example, it is stored as shown below: • SD522 = 23 (ms) • SD523 = 600 (μs)	S (System)
SD523		Minimum fixed cycle processing time (unit: μs)		
SD524	Maximum fixed cycle processing time*1	Maximum fixed cycle processing time (unit: ms)	The maximum fixed cycle processing time is stored in SD524 and SD525. (Measured in microseconds.) • SD524: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD525: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the maximum fixed cycle processing time is 23.6 ms; for example, it is stored as shown below. • SD524 = 23 (ms) • SD525 = 600 (μs)	S (System)
SD525		Maximum fixed cycle processing time (unit: μs)		
SD526	Current link refresh processing time	Current link refresh processing time (unit: ms)	The current link refresh processing time is stored in SD526 and SD527. (Measured in microseconds.) • SD526: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD527: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the current link refresh processing time is 23.6 ms; for example, it is stored as shown below. • SD526 = 23 (ms) • SD527 = 600 (μs)	S (System)
SD527		Current link refresh processing time (unit: μs)		
SD528	Minimum link refresh processing time	Minimum link refresh processing time (unit: ms)	The minimum link refresh processing time is stored in SD528 and SD529. (Measured in microseconds.) • SD528: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD529: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the minimum link refresh processing time is 23.6 ms; for example, it is stored as shown below: • SD528 = 23 (ms) • SD529 = 600 (μs)	S (System)
SD529		Minimum link refresh processing time (unit: μs)		
SD530	Maximum link refresh processing time	Maximum link refresh processing time (unit: ms)	The maximum link refresh processing time is stored in SD530 and SD531. (Measured in microseconds.) • SD530: Stores the millisecond portion of a value. (Storage range: 0 to 65535) • SD531: Stores the microsecond portion of a value. (Storage range: 0 to 999) When the maximum link refresh processing time is 23.6 ms; for example, it is stored as shown below: • SD530 = 23 (ms) • SD531 = 600 (μs)	S (System)
SD531		Maximum link refresh processing time (unit: μs)		

*1 The fixed cycle processing includes the refresh processing with Network modules, the reset processing of watchdog timer, and the self-diagnostic processing.

Special registers for C Controller module

The special registers for C Controller modules are as follows:

No.	Name	Content	Details	Set by (when to set)
SD1552 to SD1561	Dot matrix LED	Dot matrix LED	The dot matrix LED lighting status on the C Controller module is stored. 	S (System)
SD1570	CC-Link module channel number (1st module)	CC-Link module channel number (1st module)	Channel number (81 to 88) of the CC-Link module (1st module) controlled	S (Initial)
SD1571	CC-Link module channel number (2nd module)	CC-Link module channel number (2nd module)	Channel number (81 to 88) of the CC-Link module (2nd module) controlled	S (Initial)
SD1572	CC-Link module channel number (3rd module)	CC-Link module channel number (3rd module)	Channel number (81 to 88) of the CC-Link module (3rd module) controlled	S (Initial)
SD1573	CC-Link module channel number (4th module)	CC-Link module channel number (4th module)	Channel number (81 to 88) of the CC-Link module (4th module) controlled	S (Initial)
SD1574	CC-Link module channel number (5th module)	CC-Link module channel number (5th module)	Channel number (81 to 88) of the CC-Link module (5th module) controlled	S (Initial)
SD1575	CC-Link module channel number (6th module)	CC-Link module channel number (6th module)	Channel number (81 to 88) of the CC-Link module (6th module) controlled	S (Initial)
SD1576	CC-Link module channel number (7th module)	CC-Link module channel number (7th module)	Channel number (81 to 88) of the CC-Link module (7th module) controlled	S (Initial)
SD1577	CC-Link module channel number (8th module)	CC-Link module channel number (8th module)	Channel number (81 to 88) of the CC-Link module (8th module) controlled	S (Initial)
SD1578	CC-Link IE Controller Network module channel number (1st module)	CC-Link IE Controller Network module channel number (1st module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (1st module) controlled	S (Initial)
SD1579	CC-Link IE Controller Network module channel number (2nd module)	CC-Link IE Controller Network module channel number (2nd module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (2nd module) controlled	S (Initial)
SD1580	CC-Link IE Controller Network module channel number (3rd module)	CC-Link IE Controller Network module channel number (3rd module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (3rd module) controlled	S (Initial)
SD1581	CC-Link IE Controller Network module channel number (4th module)	CC-Link IE Controller Network module channel number (4th module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (4th module) controlled	S (Initial)
SD1582	CC-Link IE Controller Network module channel number (5th module)	CC-Link IE Controller Network module channel number (5th module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (5th module) controlled	S (Initial)
SD1583	CC-Link IE Controller Network module channel number (6th module)	CC-Link IE Controller Network module channel number (6th module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (6th module) controlled	S (Initial)
SD1584	CC-Link IE Controller Network module channel number (7th module)	CC-Link IE Controller Network module channel number (7th module)	Channel number (151 to 158) of the CC-Link IE Network Controller module (7th module) controlled	S (Initial)
SD1585	CC-Link IE Controller Network module channel number (8th module)	CC-Link IE Controller Network module channel number (8th module)	Channel number (151 to 158) of the CC-Link IE Controller Network module (8th module) controlled	S (Initial)
SD1586	CC-Link IE Field Network module channel number (1st module)	CC-Link IE Field Network module channel number (1st module)	Channel number (181 to 188) of the CC-Link IE Field Network module (1st module) controlled	S (Initial)
SD1587	CC-Link IE Field Network module channel number (2nd module)	CC-Link IE Field Network module channel number (2nd module)	Channel number (181 to 188) of the CC-Link IE Field Network module (2nd module) controlled	S (Initial)

No.	Name	Content	Details	Set by (when to set)
SD1588	CC-Link IE Field Network module channel number (3rd module)	CC-Link IE Field Network module channel number (3rd module)	Channel number (181 to 188) of the CC-Link IE Field Network module (3rd module) controlled	S (Initial)
SD1589	CC-Link IE Field Network module channel number (4th module)	CC-Link IE Field Network module channel number (4th module)	Channel number (181 to 188) of the CC-Link IE Field Network module (4th module) controlled	S (Initial)
SD1590	CC-Link IE Field Network module channel number (5th module)	CC-Link IE Field Network module channel number (5th module)	Channel number (181 to 188) of the CC-Link IE Field Network module (5th module) controlled	S (Initial)
SD1591	CC-Link IE Field Network module channel number (6th module)	CC-Link IE Field Network module channel number (6th module)	Channel number (181 to 188) of the CC-Link IE Field Network module (6th module) controlled	S (Initial)
SD1592	CC-Link IE Field Network module channel number (7th module)	CC-Link IE Field Network module channel number (7th module)	Channel number (181 to 188) of the CC-Link IE Field Network module (7th module) controlled	S (Initial)
SD1593	CC-Link IE Field Network module channel number (8th module)	CC-Link IE Field Network module channel number (8th module)	Channel number (181 to 188) of the CC-Link IE Field Network module (8th module) controlled	S (Initial)
SD1594	Switch status	CPU switch status (MODE/SELECT switch)	The switch status (MODE/SELECT) of the CPU module is stored as follows: 0: Neutral 1: MODE 2: SELECT	S (Switch change)

Appendix 7 Parameter List

This section shows the list of parameters.

System parameters

The list of system parameters is shown below.

Item			Parameter No.
I/O Assignment	Base/Power/Extension Cable Setting	Setting of base/power supply/extension cable model name	0203H
		Number of slots	0201H
	I/O Assignment Setting	Setting of type/number of points/start XY/module status	0200H
		Module name	0203H
		Specification of control CPU	0202H
	Setting of Points Occupied by Empty Slot		0100H
Multiple CPU Setting	Setting for Number of CPU Modules		0301H
	Communication Setting between CPU	Refresh Setting	0303H
		CPU Buffer Memory Setting (when refresh END)	0304H
		CPU Buffer Memory Setting (when refresh I45 is executed)	0308H
		PLC Unit Data	0309H
		Fixed Scan Communication Function	—
		Fixed Scan Communication Area Setting	0307H
	Fixed Scan Communication Setting	Fixed Scan Interval Setting of Fixed Scan Communication	0306H
		Fixed Scan Communication Function and Inter-module Synchronization Function	0306H
	Operation Mode Setting	Stop Setting	0302H
		Synchronous Startup Setting	030AH
	Other PLC Control Module Setting	I/O Setting Outside Group	0305H
Synchronization Setting within the Modules	Use Inter-module Synchronization Function in System		—
	Select Synchronous Target Unit between Unit		0101H
	Synchronous Fixed Scan Interval Setting within the Modules		0101H
	Synchronous Master Setting within the Modules		0102H

Point

The system parameters in all CPUs must be the same in the multiple CPU configuration.
The CPUs, in which "Not Use" is selected in "Fixed Scan Communication Function" or "Synchronization Setting within the Modules", are not regarded as a same system parameters. Set the same system parameter settings in all CPUs in the multiple CPU configuration.

CPU parameter

The list of CPU parameters is shown below.

Item			Parameter No.
Name Setting	Title Setting		3100H
	Comment Setting		3101H
Operation Related Setting	Remote Reset Setting		3202H
	Output Mode Setting of STOP to RUN		3203H
	Module Synchronous Setting		3207H
	Clock Related Setting		3209H
	Refresh Cycle Setting		6E02H
RAS Setting	WDT Setting		3500H
	Error Detections Setting		3501H
	CPU Module Operation Setting at Error Detected		3501H
	LED Display Setting		3502H
	Event History Setting		3504H
Routing Setting	Routing Setting		3800H
Service Settings	Service Settings		6E00H
	Security password settings		6E01H
MELSEC data link function settings	Timeout Value Setting	MELSEC iQ-R series bus interface (Channel No.12)	6E03H
		CC-Link IE Controller Network (Channel No.151 to 158)	6E06H
		CC-Link IE Filed Network (Channel No.181 to 188)	6E07H
		CC-Link (Channel No.81 to 88)	6E04H

Module parameter

The list of module parameters is shown below.

Item		Parameter No.
Basic Settings	Own Node Settings	A012H
	External Device Configuration	A031H
Application Settings	FTP Server Settings	A037H
	Time Setting	A039H
	Security	A034H
	Telnet Server Settings	A03BH
I/O Assignment Setting	Base/Power/Extension Cable Setting	7002H
	Module Name	7000H
	Slot/Start XY	7002H
Input module setting	Input response time setting	7102H
	Interrupt setting	7800H
	Refresh Setting	—
Output module setting	Setting of error-time output mode	7101H
	Refresh Setting	—
Intelligent function module setting	Basic setting	7100H
	Application setting	7200H
	Interrupt setting	7800H
	Refresh settings	7400H
Network module setting	Required Settings	7100H
	Station Type	7700H
	Basic Settings	7310H
	Refresh Setting	7401H
	Application Settings	7311H
	Interrupt Settings	7800H
	Interlink Transmission Settings	7500H

Memory card parameter

This section shows the list of memory card parameters.

Item		Parameter No.
Boot Setting	Boot File Setting	2000H
Setting of File/Data Usage in Memory Card	Setting of File/Data Usage in Memory Card	2010H

Appendix 8 VxWorks Component List

This section shows the list of the VxWorks components in C Controller module.

Description	Name (component list)
Address Space Allocator Show Routines	INCLUDE_ADR_SPACE_SHOW
address space shell commands	INCLUDE_ADR_SPACE_SHELL_CMD
ANSI assert	INCLUDE_ANSI_ASSERT
ANSI ctype	INCLUDE_ANSI_CTYPE
ANSI errno to erro string conversion function	INCLUDE_ANSI_STRERROR
ANSI locale	INCLUDE_ANSI_LOCALE
ANSI math	INCLUDE_ANSI_MATH
ANSI stdio	INCLUDE_ANSI_STDIO
ANSI stdio extensions	INCLUDE_ANSI_STDIO_EXTRA
ANSI stdlib	INCLUDE_ANSI_STDLIB
ANSI string	INCLUDE_ANSI_STRING
ANSI string duplication function	INCLUDE_ANSI_STRDUP
ANSI time	INCLUDE_ANSI_TIME
application initialization	INCLUDE_USER_APPL
arpLib	INCLUDE_ARP_API
Attach END to IPv4	INCLUDE_IPATTACH
AUX clock	INCLUDE_AUX_CLK
basic memory allocator	INCLUDE_MEM_MGR_BASIC
basic MMU	INCLUDE_MMU_BASIC
basic network support	INCLUDE_NETWORK
Basic PPP Components	INCLUDE_BASIC_PPP
binary semaphore creation routine	INCLUDE_SEM_BINARY_CREATE
binary semaphores	INCLUDE_SEM_BINARY
Boot parameter process	INCLUDE_NET_BOOT
BPF Support	INCLUDE_BPF
BSD socket support	INCLUDE_BSD_SOCKET
BSP Memory Configuration	INCLUDE_MEMORY_CONFIG
buffer manager	INCLUDE_BUF_MGR
built-in symbol table	INCLUDE_STANDALONE_SYM_TBL
c line interpreter	INCLUDE_SHELL_INTERP_C
C++ symbol demangler	INCLUDE_CPLUS_DEMANGLER
C++ compiler support routines	INCLUDE_CPLUS_LANG
C++ core runtime	INCLUDE_CPLUS
C++ iostream and other standard library facilities	INCLUDE_CPLUS_IOSTREAM
cache support	INCLUDE_CACHE_SUPPORT
command line interpreter	INCLUDE_SHELL_INTERP_CMD
coprocessor	INCLUDE_COPROCESSOR
coprocessor show routine	INCLUDE_COPROCESSOR_SHOW
Core NFS client	INCLUDE_CORE_NFS_CLIENT
counting semaphore creation routine	INCLUDE_SEM_COUNTING_CREATE
counting semaphores	INCLUDE_SEM_COUNTING
Create Basic PPP Framework	INCLUDE_PPP_FRAMEWORK
debug shell commands	INCLUDE_DEBUG_SHELL_CMD
debugging facilities	INCLUDE_DEBUG
Device Manager	INCLUDE_DEVICE_MANAGER
DHCP client show routines	INCLUDE_DHCPC_SHOW
DHCP client timestamp setup	INCLUDE_DHCPC_LEASE_GET
DHCP Core files	INCLUDE_DHCP_CORE
DHCPv4 boot-time client	INCLUDE_DHCPC_BOOT

Description	Name (component list)
DHCPv4 client common library	INCLUDE_DHCPC_SHARE
DHCPv4 Client Lease Verification/Assignment	INCLUDE_DHCPC_LEASE_TEST
DHCPv4 client timestamp storage	INCLUDE_DHCPC_LEASE_SAVE
DHCPv4 runtime client	INCLUDE_DHCPC
direct access to host filesystem	INCLUDE_PASSFS
DNS resolver	INCLUDE_DNS_RESOLVER
DNS resolver debug output	INCLUDE_DNS_RESOLVER_DEBUG
DOS File System Consistency Checker	INCLUDE_DOSFS_CHKDSK
DOS File System FAT12/16/32 Handler	INCLUDE_DOSFS_FAT
DOS File System Old Directory Format Handler	INCLUDE_DOSFS_DIR_FIXED
DOS File System VFAT Directory Handler	INCLUDE_DOSFS_DIR_VFAT
DOS File System Volume Fomatter Module	INCLUDE_DOSFS_FMT
DOS filesystem backward-compatibility	INCLUDE_DOSFS
dosfs File System Main Module (dosFs2)	INCLUDE_DOSFS_MAIN
doubly linked lists	INCLUDE_DLL
ED&R shell commands	INCLUDE_EDR_SHELL_CMD
ED&R show routines	INCLUDE_EDR_SHOW
enable caches	INCLUDE_CACHE_ENABLE
enable guard pages for kernel task stacks	INCLUDE_PROTECT_TASK_STACK
enable non-executable kernel task stacks	INCLUDE_TASK_STACK_NO_EXEC
END driver polled statistics support	INCLUDE_END_POLLED_STATS
END interface support	INCLUDE_END
error status table	INCLUDE_STAT_SYM_TBL
Ethernet interface support	INCLUDE_ETHERNET
Event Reporting Framework	INCLUDE_ERF
exception handling	INCLUDE_EXC_HANDLING
exception show routines	INCLUDE_EXC_SHOW
exception task	INCLUDE_EXC_TASK
Extended Block Device	INCLUDE_XBD
extended object library	INCLUDE_OBJ_OPEN
File System and Disk Utilities	INCLUDE_DISK_UTIL
File System Event Utilities	INCLUDE_FS_EVNET_UTIL
File System Monitor	INCLUDE_FS_MONITOR
file system shell commands	INCLUDE_DISK_UTIL_SHELL_CMD
file upload path initialization	INCLUDE_WVUPLOAD_FILE
floating point show routine	INCLUDE_WH_FP_SHOW
formatted IO	INCLUDE_FORMATTED_IO
formatted output routines	INCLUDE_FORMATTED_OUT_BASIC
fpp formatting for printf	INCLUDE_FLOATING_POINT
FTP client	INCLUDE_FTP
full featured memory allocator	INCLUDE_MEM_MGR_FULL
General BSP macros	INCLUDE_BSP_MACROS
get name info	INCLUDE_GETNAMEINFO
get serv by name	INCLUDE_GETSERVBYNAME
GNU compiler support routines	INCLUDE_GNU_INTRINSICS
GTF support	INCLUDE_GTF
gtf_timer_start	INCLUDE_GTF_TIMER_START
handle show routines	INCLUDE_HANDLE_SHOW
hardware fpp support	INCLUDE_HW_FP
hash library	INCLUDE_HASH
high resolution timestamping	INCLUDE_TIMESTAMP
Highly Reliable File System	INCLUDE_HRFS
host table	INCLUDE_HOST_TBL

Description	Name (component list)
Host/target breakpoint synchronization	INCLUDE_WDB_BP_SYNC
host/target modules and symbols synchronization	INCLUDE_WDB_MDL_SYM_SYNC
ICMP show routines	INCLUDE_ICMP_SHOW
ICMP v4	INCLUDE_ICMPV4
IF	INCLUDE_IF
ifIndex Initialization	INCLUDE_IFINDEX
IGMP v2/v3	INCLUDE_IGMP
Include Protocol Framework	INCLUDE_PROTOCOL_FRAMEWORK
inetLib	INCLUDE_INETLIB
initialize system symbol table	INCLUDE_SYM_TBL_INIT
IO system	INCLUDE_IO_SYSTEM
IP v4	INCLUDE_IPV4
IPv4 interface address library	INCLUDE_IFLIB
Job Queue support	INCLUDE_JOB_QUEUE
job task	INCLUDE_JOB_TASK
kernel	INCLUDE_KERNEL
link BufPool	INCLUDE_LINKBUFPOOL
linked list library	INCLUDE_LSTLIB
logical set library	INCLUDE_SET
loopback interface support	INCLUDE_LOOPBACK
mapped files shell commands	INCLUDE_MAPPED_FILES_SHOW_SHELL_CMD
md5	INCLUDE_NET_MD5
memory allocator info routines	INCLUDE_MEM_MGR_INFO
memory show routine	INCLUDE_MEM_SHOW
message logging	INCLUDE_LOGGING
message queue creation and deletion library	INCLUDE_MESSAGE_Q_CREATE_DELETE
message queue info routines	INCLUDE_MESSAGE_Q_INFO
message queue show routine	INCLUDE_MSG_Q_SHOW
message queues	INCLUDE_MESSAGE_Q
MIB2 ICMP Management APIs	INCLUDE_MIB2_ICMP
MIB2 IF Counter Instrumentation	INCLUDE_MIB2_IF
MIB2 TCP Management APIs	INCLUDE_MIB2_TCP
MIB2 UDP Management APIs	INCLUDE_MIB2_UDP
MMU global map	INCLUDE_MMU_GLOBAL_MAP
module manager	INCLUDE_MODULE_MANAGER
mutex semaphore creation routine	INCLUDE_SEM_MUTEX_CREATE
mutex semaphores	INCLUDE_SEM_MUTEX
MUX support	INCLUDE_MUX
netBufLib	INCLUDE_NETBUFLIB
netBufPool	INCLUDE_NETBUFPOOL
NetDrv for remote IO	INCLUDE_NET_DRV
netstat	INCLUDE_NETSTAT
netstat for IPv4	INCLUDE_NETSTAT_IPV4
network boot device configuration	INCLUDE_NET_BOOT_CONFIG
Network Daemon Support	INCLUDE_NET_DAEMON
network device netmask setup	INCLUDE_NETMASK_GET
Network function binding	INCLUDE_NET_FUNCBIND
network init	INCLUDE_NET_INIT
Network interface show routines	INCLUDE_NET_IF_SHOW
network remote I/O access	INCLUDE_NET_REM_IO
Network route show routines	INCLUDE_NET_ROUTE_SHOW
Network Stack Memory Pool Configuration	INCLUDE_NET_POOL
NETWORK SYSCTL	INCLUDE_NET_SYSCTL

Description	Name (component list)
NFS client All	INCLUDE_NFS_CLIENT_ALL
NFS server	INCLUDE_CORE_NFS_SERVER
NFS server All	INCLUDE_NFS_SERVER_ALL
NFS server V2	INCLUDE_NFS2_SERVER
NFS server V3	INCLUDE_NFS3_SERVER
NFS v2 client	INCLUDE_NFS2_CLIENT
NFS v3 client	INCLUDE_NFS3_CLIENT
non-blocking message logging	INCLUDE_NBIO_LOG
object management	INCLUDE_OBJ_LIB
object management ownership	INCLUDE_OBJ_OWNERSHIP
old route	INCLUDE_OLDROUTE
persistent error log	INCLUDE_EDR_ERRLOG
persistent memory	INCLUDE_EDR_PM
PING client	INCLUDE_PING
pipes	INCLUDE_PIPES
pool allocation library	INCLUDE_POOL
POSIX advisory file locking	INCLUDE_POSIX_ADVISORY_FILE_LOCKING
POSIX AIO driver	INCLUDE_POSIX_AIO_SYSDRV
POSIX asynchronous IO	INCLUDE_POSIX_AIO
POSIX clocks	INCLUDE_POSIX_CLOCKS
POSIX directory utilities	INCLUDE_POSIX_DIRLIB
POSIX ftruncate	INCLUDE_POSIX_FTRUNC
POSIX Memory Mapped Files for RTPs	INCLUDE_POSIX_MAPPED_FILES
POSIX message queue show routine	INCLUDE_POSIX_MQ_SHOW
POSIX message queues	INCLUDE_POSIX_MQ
POSIX mman	INCLUDE_POSIX_MEM
POSIX process scheduling	INCLUDE_POSIX_SCHED
POSIX PSE52 support for RTPs	INCLUDE_RTP_POSIX_PSE52
POSIX scheduling policies SCHED_FIFO/SCHED_RR/SCHED_OTHER support in RTPs	INCLUDE_PX_SCHED_DEF_PLICIES
POSIX semaphore	INCLUDE_POSIX_SEM
POSIX semaphore show routine	INCLUDE_POSIX_SEM_SHOW
POSIX Shared Memory Objects	INCLUDE_POSIX_SHM
POSIX signal	INCLUDE_POSIX_SIGNALS
POSIX thread CPU-time clock	INCLUDE_POSIX_THREAD_CPUTIME
POSIX thread scheduler in RTPs	INCLUDE_POSIX_PTHREAD_SCHEDULER
POSIX threads	INCLUDE_POSIX_PTHREADS
POSIX timers	INCLUDE_POSIX_TIMERS
process shell commands	INCLUDE_RTP_SHELL_CMD
process show shell commands	INCLUDE_RTP_SHOW_SHELL_CMD
Pseudo terminal driver	INCLUDE_PTYDRV
public hostname setup	INCLUDE_NET_HOST_SETUP
RAM Disk	INCLUDE_RAM_DISK
RAM disk driver	INCLUDE_RAMDRV
random	INCLUDE_KERN_RANDOM
raw filesystem	INCLUDE_RAWFS
RAW v4	INCLUDE_RAWV4
rBuff library	INCLUDE_RBUFF
read the bootline	INCLUDE_BOOT_LINE_INIT
Remote Command	INCLUDE_REMLIB
Reverse ARP client	INCLUDE_RARP
ring buffers	INCLUDE_RING_BUF
route	INCLUDE_ROUTE

Description	Name (component list)
route_storage	INCLUDE_ROUTE_STORAGE
Routing Socket	INCLUDE_ROUTING_SOCKET
RPC	INCLUDE_RPC
RTP	INCLUDE_RTP
RTP Hook Support	INCLUDE_RTP_HOOKS
RTP Show	INCLUDE_RTP_SHOW
RTP Startup Facility: User-defined code	INCLUDE_RTP_APPL_USER
run static initializers	INCLUDE_CTORS_DTORS
select	INCLUDE_SELECT
semaphore deletion routines	INCLUDE_SEM_DELETE
semaphore info routines	INCLUDE_SEM_INFO
semaphore show routine	INCLUDE_SEM_SHOW
SH-4A 32-Bit Address Extended Mode	INCLUDE_SH4A_EXTENDED_32BIT_SUPPORT
shared data region support in RTPs or kernel	INCLUDE_SHARED_DATA
Shared Data Show	INCLUDE_SHARE_DATA_SHOW
shared data show shell commands	INCLUDE_SHARED_DATA_SHOW_SHELL_CMD
shared library commands	INCLUDE_SHL_SHELL_CMD
Shared Library Show	INCLUDE_SHL_SHOW
shared library support in RTPs	INCLUDE_SHL
shell banner	INCLUDE_SHELL_BANNER
sigevent notification library	INCLUDE_SIGEVENT
signals	INCLUDE_SIGNALS
SIO	INCLUDE_SIO
SNTP client	INCLUDE_SNTPC
Socket API	INCLUDE_SOCKLIB
Socket API System Call support	INCLUDE_SC_SOCKLIB
spy	INCLUDE_SPY
Stack/Application Logging Utility	INCLUDE_APPL_LOG_UTIL
stdio	INCLUDE_STDIO
stricmp	INCLUDE_STRICMP
strnicmp	INCLUDE_STRNICMP
Support for reboot hooks	INCLUDE_REBOOT_HOOKS
symbol shell commands	INCLUDE_SYM_SHELL_CMD
symbol table show routine	INCLUDE_SYM_TBL_SHOW
SYSCTL	INCLUDE_SYSCTL
SYSCTL CLI	INCLUDE_SYSCTL_CLI
sysctl System Call	INCLUDE_SC_SYSCTL
System Call Hook Support	INCLUDE_SYSCALL_HOOKS
System clock	INCLUDE_SYSCLK_INIT
system debug flag	INCLUDE_EDR_SYSDBG_FLAG
System Viewer class instrumentation	INCLUDE_WINDVIEW_CLASS
System Viewer library	INCLUDE_WINDVIEW
system-defined timestamping	INCLUDE_SYS_TIMESTAMP
target loader	INCLUDE_LOADER
target loader shell command	INCLUDE_MODULE_SHELL_CMD
target symbol table	INCLUDE_SYM_TBL
target unloader	INCLUDE_UNLOADER
target-resident kernel shell	INCLUDE_SHELL
task hook show routine	INCLUDE_TASK_HOOKS_SHOW
task hooks	INCLUDE_TASK_HOOKS
task shell commands	INCLUDE_TASK_SHELL_CMD
task show routine	INCLUDE_TASK_SHOW
task variables	INCLUDE_TASK_VARS

Description	Name (component list)
TCP v4	INCLUDE_TCPV4
Telnet server	INCLUDE_TELNET
TELNET/FTP password protection	INCLUDE_SECURITY
terminal driver	INCLUDE_TTY_DEV
terminal driver support	INCLUDE_TYLIB
TFTP client	INCLUDE_TFTP_CLIENT
timex	INCLUDE_TIMEX
TSFS upload path initialization	INCLUDE_WVUPLOAD_TSFSSOCK
UDP v4	INCLUDE_UDPV4
uipc_domain	INCLUDE_DOMAIN_INIT
unix compatible environment variables	INCLUDE_ENV_VARS
unloader shell command	INCLUDE_UNLOADER_SHELL_CMD
vi-like editing mode	INCLUDE_SHELL_VI_MODE
VIO driver	INCLUDE_WDB_VIO
virtual memory show shell commands	INCLUDE_VM_SHOW_SHELL_CMD
Virtual Root File Sytem	INCLUDE_VRFS
VM library show routine	INCLUDE_VM_SHOW
VxWorks events	INCLUDE_VXEVENTS
VxSim virtual disk to emulate a VxWorks disk driver	INCLUDE_VIRTUAL_DISK
watchdog timers	INCLUDE_WATCHDOGS
watchdog timers creation and deletion library	INCLUDE_WATCHDOGS_CREATE_DELETE
WDB agent	INCLUDE_WDB
WDB banner	INCLUDE_WDB_BANNER
WDB breakpoints	INCLUDE_WDB_BP
WDB call functions	INCLUDE_WDB_FUNC_CALL
WDB callouts	INCLUDE_WDB_DIRECT_CALL
WDB eventpoints	INCLUDE_WDB_EVENTPOINTS
WDB events	INCLUDE_WDB_EVENTS
WDB exception notification	INCLUDE_WDB_EXC_NOTIFY
WDB gopher	INCLUDE_WDB_GOPHER
WDB memory access	INCLUDE_WDB_MEM
WDB network connection	INCLUDE_WDB_COMM_NETWORK
WDB post kernel initialization	INCLUDE_WDB_POST_KERNEL_INIT
WDB register access	INCLUDE_WDB_REG
WDB RTP breakpoints	INCLUDE_WDB_RTP_BP
WDB RTP control support	INCLUDE_WDB_RTP_CONTROL
WDB RTP support	INCLUDE_WDB_RTP
WDB target server file system	INCLUDE_WDB_TSFS
WDB task breakpoints	INCLUDE_WDB_TASK_BP
WDB task creation	INCLUDE_WDB_START_NOTIFY
WDB task debugging	INCLUDE_WDB_TASK
WDB task exit notification	INCLUDE_WDB_EXIT_NOTIFY
WDB task hooks	INCLUDE_WDB_TASK_HOOKS
WDB task registers	INCLUDE_WDB_TASK_REG
WDB tasks	INCLUDE_WDB_CTXT
WDB user event	INCLUDE_WDB_USER_EVENT
WDB virtual I/O library	INCLUDE_WDB_VIO_LIB
XBD Block Device	INCLUDE_XBD_BLK_DEV
XBD Disk Partition Handler	INCLUDE_XBD_PART_LIB
XBD Ram Drive	INCLUDE_XBD_RAMDRV
XDR	INCLUDE_XDR

Appendix 9 Processing Time of Functions

This section explains the time required for processing a function of dedicated function library used in user program, which is executed with the task priority set to 100.
For the specifications of dedicated function libraries, refer to the following manual.
MELSEC iQ-R C Controller Module Programming Manual

Point

The processing time of each dedicated function library vary depending on the operation status of the operating system, execution status of a user program, and module configuration of the C Controller module system.
Refer to the following processing time of each function as a guide.

C Controller module dedicated functions

I/O access time

When accessing an input module RX42C4 (input number: X0 and higher) in a single CPU system configuration

Function name		Access size	Access time
CCPU_X_In_WordEx	High speed	1 word	18 μs
		16 words	19 μs
		64 words	32 μs
	Normal	1 word	18 μs
		16 words	19 μs
		64 words	32 μs

Buffer memory access time

When accessing a CC-Link module RJ61BT11 (input number: X0 and higher) in a single CPU system configuration

Function name	Access size	Access time
CCPU_FromBuf	1 word	19 μs
	64 words	25 μs
	512 words	56 μs
CCPU_ToBuf	1 word	17 μs
	64 words	18 μs
	512 words	29 μs

CPU buffer memory access time

When accessing the buffer memory of the host CPU in a multiple CPU system configuration (CPU No.1: R120CPU, CPU No.2: C Controller module)

Function name	Access size	Access time
CCPU_FromBuf	1 word	10 μs
	64 words	15 μs
	512 words	44 μs
CCPU_ToBuf	1 word	10 μs
	64 words	14 μs
	512 words	21 μs

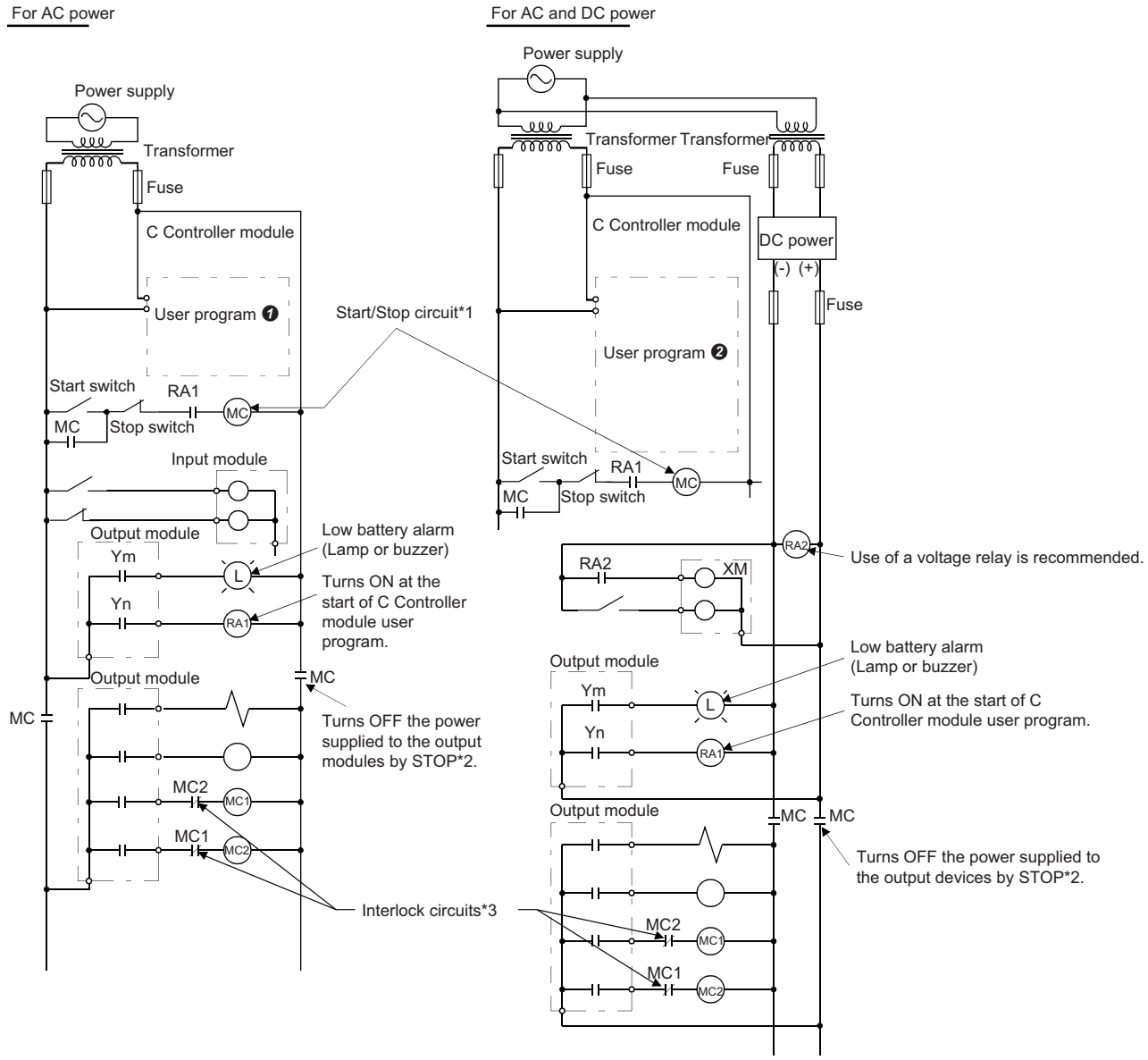
Appendix 10 General Safety Requirements

When C Controller system is powered ON from OFF, the control output may not operate properly temporarily due to differences in the delay and startup time between the power supply for the C Controller module and the external power supply (especially, DC power) for the control module.

Signals also may not be output correctly when the external power supply or the C Controller module fails. In terms of fail-safe and to prevent any incorrect output signals from leading to the entire system failure, configure safety circuits (such as emergency stop circuits, protection circuits, and interlock circuits) external to the C Controller module for the parts where the incorrect output may cause damage to the machines or accidents.

This section shows system design circuit examples, considering the points described above.

When the ERR contact of Power supply module is not used



*1 The C controller module starts when RA1 (control starting output) turns ON.

*2 A stop caused by an emergency stop switch or a limit switch.

*3 Configure external interlock circuits for conflicting operations such as forward/reverse rotations and the parts where the incorrect output may cause damage to the machines or accidents.

AC power

1. Power the C Controller module ON.
2. Run the C Controller module.
3. Turn the start switch ON.
4. The output devices are activated by using a user program❶ when the relay (MC) turns ON.

AC and DC power

1. Power the C Controller module ON.
2. Run the C Controller module.
3. RA2 turns ON when DC power is established.
4. XM turns ON when RA2 turns ON, and the processing is started with a user program❷ after DC input signal has fully been established.
5. Turn the start switch ON.
6. The output devices are activated by using a user program when the relay (MC) turns ON.

User program❶

Create a program to perform the following operations when C Controller module starts.

■Turning Ym ON when the battery voltage drop is detected

Use the C Controller module dedicated functions (CCPU_GetErrInfo, CCPU_Y_Out_BitEx).

■Turning Yn ON when the user program is started

Use the C Controller module dedicated functions (CCPU_GetErrInfo, CCPU_Y_Out_BitEx).

User program❷

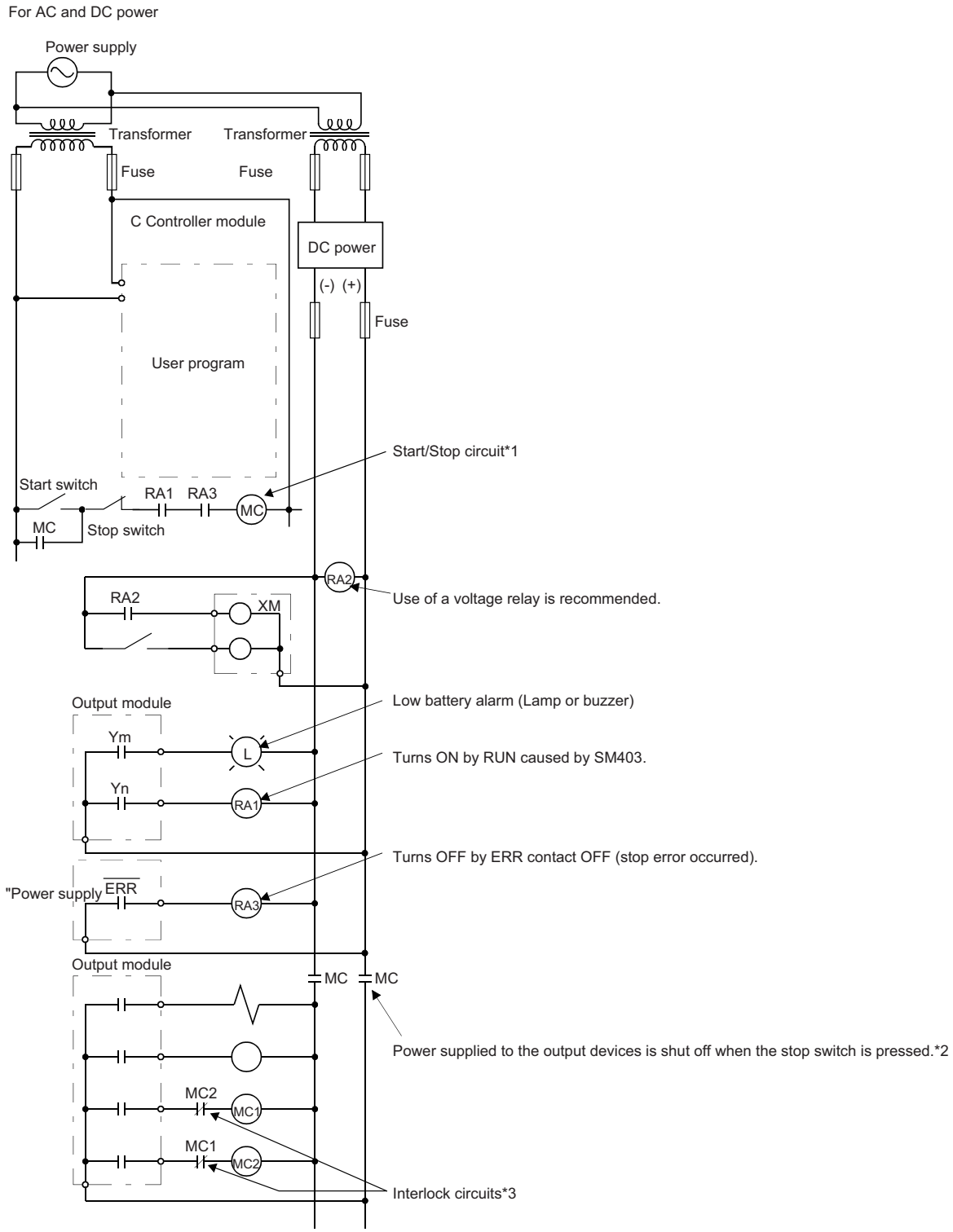
Create a program to perform the following operations when C Controller module starts.

■Starting the system processing once XM turns ON and the DC input signal has settled (after DC input signal settling time)

Create a program to start the system processing once the DC input signal setting time has passed after XM turns ON, which can be checked with the CCPU_X_In_BitEx function. (The DC input signal setting time is a time from when RA2 turns ON to when the DC input signal settles 100%. Set the time to 0.5 seconds.)

However, setting the DC input signal settling time in the user program is not required when a voltage relay is used for RA2.)

When the ERR contact of Power supply module is used



*1 The C controller module starts when RA1 (control starting output) turns ON.

*2 A stop caused by an emergency stop switch or a limit switch.

*3 Configure external interlock circuits for conflicting operations such as forward/reverse rotations and the parts where the incorrect output may cause damage to the machines or accidents.

AC and DC power

1. Power the C Controller module ON.
2. Run the C Controller module.
3. RA2 turns ON when DC power is established.
4. XM turns ON when RA2 turns ON, and the processing is started with a user program after DC input signal has fully been established.
5. Turn the start switch ON.
6. The output devices are activated by using a user program when the relay (MC) turns ON.

User program

Create a program to perform the following operations when C Controller module starts.

■Turning Ym ON when the battery voltage drop is detected

Use the C Controller module dedicated functions (CCPU_GetErrInfo, CCPU_Y_Out_BitEx).

■Turning Yn ON when the user program is started

Use the C Controller module dedicated functions (CCPU_GetErrInfo, CCPU_Y_Out_BitEx).

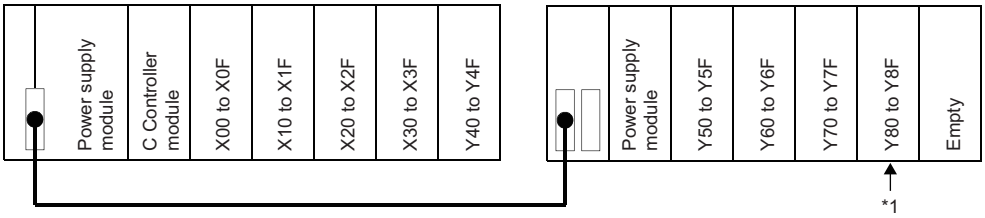
■Starting the system processing once XM turns ON and the DC input signal has settled (after DC input signal settling time)

Create a program to start the system processing once the DC input signal setting time has passed after XM turns ON, which can be checked with the CCPU_X_In_BitEx function. (The DC input signal setting time is a time from when RA2 turns ON to when the DC input signal settles 100%. Set the time to 0.5 seconds.)

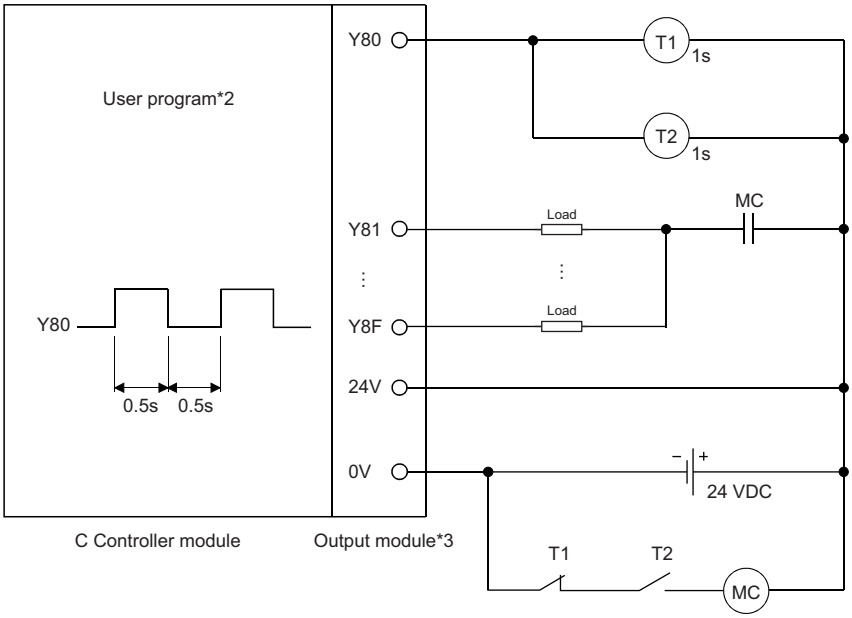
However, setting the DC input signal settling time in the user program is not required when a voltage relay is used for RA2.)

Fail-safe measures for C Controller module failure

Failures of C Controller module can be detected with the self-diagnostic function. However, failures which occur in a part, such as an I/O control part, may not be detected.
In this case, all inputs or outputs may turn ON or OFF, or normal operation and safety of the control-target device may not be ensured depending on the failure.
Even though Mitsubishi programmable controllers are manufactured under strict quality control, they may fail due to some reasons. Configure fail-safe circuits external to the C Controller module so that no machine is damaged and no accident occurs.
The system example and its fail-safe circuit example are shown below.



*1 Mount an output module for fail-safe purpose on the last slot of the system. (In the example above, the output module is mounted on Y80 to Y8F.)



*2 Create a program to make Y80 repeats ON and OFF at the interval of 0.5 seconds.
*3 Since Y80 turns ON and OFF at the interval of 0.5 seconds, use an output module without contact. (In the example above, a transistor output module is used.)

Appendix 11 Calculation Method for Heat Generation of C Controller module

The temperature inside the control panel in which C Controller module is installed must be 55℃ or lower, which is the operating ambient temperature of C Controller module. Therefore, it is required to know the average power consumption (heat generation) of the equipment and devices installed in the control panel for the heat release design of the panel.

For details on the calculation method, refer to the following manual.

MELSEC iQ-R Module Configuration Manual

It should be noted that the terms in the left column shall be replaced with the one in the right column.

Term	Replaced term
Programmable controller	C Controller module
Programmable controller system	C Controller system

Appendix 12 Added and Changed Functions

The following table shows the functions added and changed in C Controller module and CW Configurator, and the applicable firmware version to C Controller module and the applicable software version to CW Configurator.

—: Not related to the firmware version or software version

Added and changed function	Firmware version	Software version	Reference
USB devices are supported	"03" or later	—	Page 24 Memory Configuration Page 27 Files MELSEC iQ-R C Controller Module User's Manual (Startup)
Multiple CPU system configuration with a programmable controller CPU controlling MELSECNET/H module is supported	"03" or later	"1.001B" or later	MELSEC iQ-R C Controller Module User's Manual (Startup)

MEMO

INDEX

MEMO

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
February 2015	SH(NA)-081369ENG-A	First edition
March 2015	SH(NA)-081369ENG-B	■Added or modified parts Appendix 9
April 2015	SH(NA)-081369ENG-C	■Added or modified parts Section 2.1, Section 7.4, Appendix 1, Appendix 3
May 2015	SH(NA)-081369ENG-D	■Added or modified parts COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES, TERMS, Section 3.1, Section 3.4, Section 4.11, Section 7.4, Appendix 3, Appendix 12

Japanese manual number: SH-081368-D

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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SH(NA)-081369ENG-D(1505)KWIX
MODEL: R-CCPU-U-OU-E
MODEL CODE: 13JX22

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN