

Mitsubishi Programmable Controller

MELSEC iQ-R
series

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



- R04CPU
- R08CPU
- R08PCPU
- R16CPU
- R16PCPU
- R32CPU
- R32PCPU
- R120CPU
- R120PCPU

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.

[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.

[Design Precautions]

WARNING

- 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 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. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - 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.
-

[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 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 also may cause malfunction or failure of the module.
 - When changing the operating status of the CPU module from external devices (such as the 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 the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.
-

[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.
-

[Installation Precautions]

CAUTION

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with 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 SD 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 the 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 can 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.
 - 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.
-

[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 and 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.
 - 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.
-

[Operating 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.
-

[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.
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[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.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC iQ-R series programmable controllers.

This manual describes the performance specifications, procedures before operation, and troubleshooting of the relevant products listed below.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.

Please make sure that the end users read this manual.

Relevant products

Item	Model
CPU module	R04CPU, R08CPU, R08PCPU, R16CPU, R16PCPU, R32CPU, R32PCPU, R120CPU, R120PCPU
Extended SRAM cassette	NZ2MC-1MBS, NZ2MC-2MBS, NZ2MC-4MBS, NZ2MC-8MBS, NZ2MC-8MBSE

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

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 (This manual is included with the 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 maintains EMC and Low Voltage Directives, please refer to one of the following manuals.

- MELSEC iQ-R Module Configuration Manual
- Safety Guidelines (This manual is included with the base unit.)

CONTENTS

SAFETY PRECAUTIONS	1
CONDITIONS OF USE FOR THE PRODUCT	8
INTRODUCTION	8
COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES	9
RELEVANT MANUALS	12
TERMS	13
CHAPTER 1 PART NAMES	14
1.1 CPU Module	14
1.2 Extended SRAM Cassette	16
CHAPTER 2 SPECIFICATIONS	17
2.1 CPU Module	17
2.2 Extended SRAM Cassette	20
CHAPTER 3 FUNCTION LIST	21
CHAPTER 4 PROCEDURES BEFORE OPERATION	23
4.1 Installing a Battery	24
Installation procedure	24
4.2 Inserting or Removing an Extended SRAM Cassette	25
Insertion procedure	25
Removal procedure	25
4.3 Inserting and Removing an SD Memory Card	26
Insertion procedure	26
Removal procedure	26
4.4 Creating a Project	27
4.5 Connecting a Personal Computer	27
4.6 Initializing the CPU Module	28
4.7 Setting Parameters	28
4.8 Programming	30
Registering labels	30
Inserting program elements	31
Inserting POUs by key input	33
4.9 Converting the Program	34
4.10 Saving the Project	34
4.11 Writing Data to the Programmable Controller	34
4.12 Resetting the CPU Module	35
4.13 Executing the Program	35
4.14 Monitoring the Program	36
4.15 Troubleshooting	38
Troubleshooting procedure	38
Troubleshooting with LED indicators	39
Troubleshooting using the engineering tool	39
APPENDIX	42
Appendix 1 External Dimensions	42
CPU module	42

INDEX

44

REVISIONS.

46

WARRANTY

47

TRADEMARKS

48


RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R CPU Module User's Manual (Startup) [SH-081263ENG] (this manual)	Performance specifications, procedures before operation, and troubleshooting of the CPU module	Print book
		e-Manual EPUB PDF
MELSEC iQ-R CPU Module User's Manual (Application) [SH-081264ENG]	Memory, functions, devices, and parameters of the CPU module	Print book
		e-Manual EPUB PDF

This manual does not include detailed information on the following:

- General specifications
- Applicable CPU modules and the number of mountable modules
- Installation

For details, refer to the following.

 MELSEC iQ-R Module Configuration Manual

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

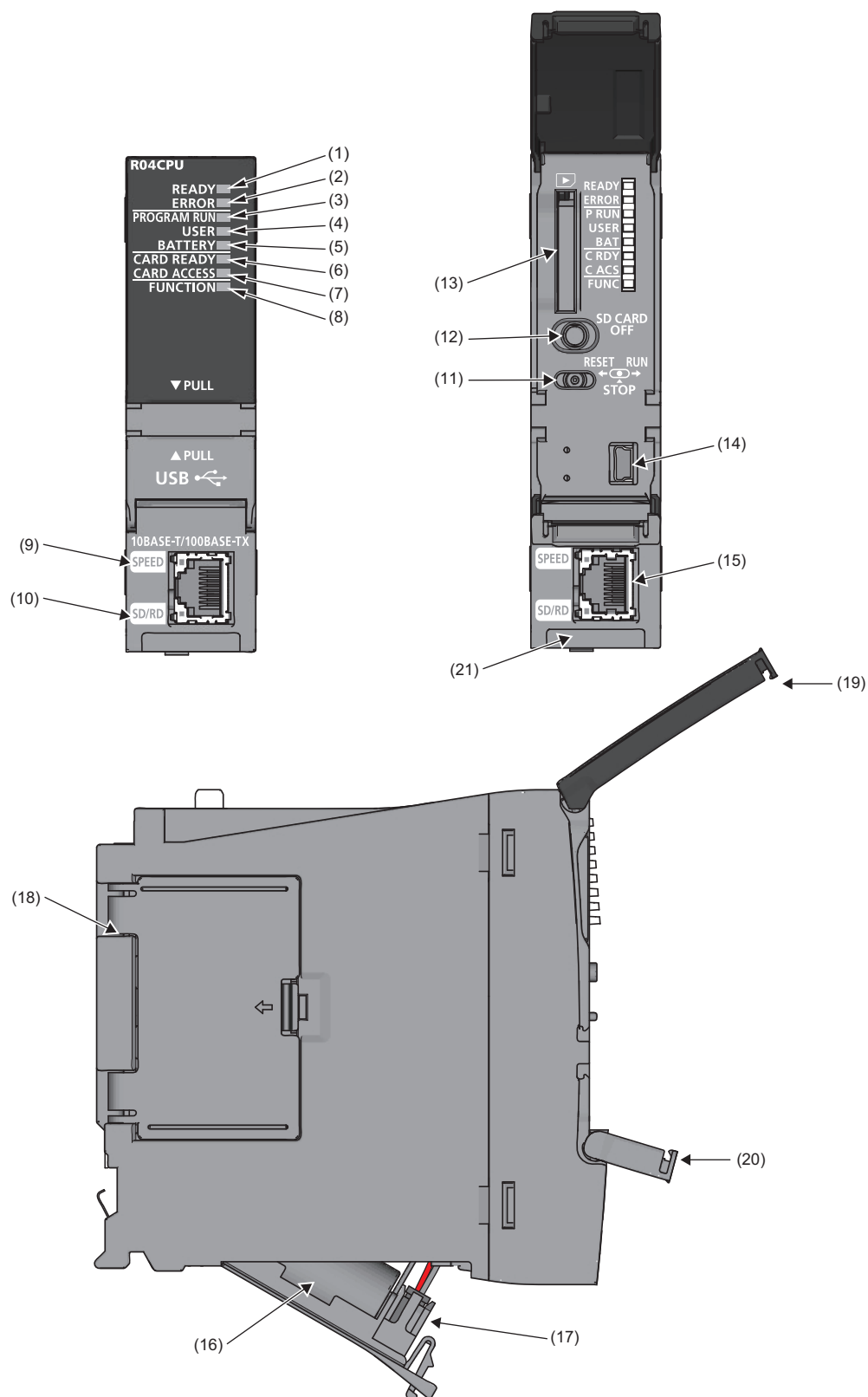
Unless otherwise specified, this manual uses the following terms.

TERMS	Description
Base unit	A generic term for main base units, extension base units, and RQ extension base units
CPU module	A generic term for the MELSEC iQ-R series CPU module
Device	A device (X, Y, M, D, or others) in a CPU module
Engineering tool	Another term for the software package for the MELSEC programmable controllers
FB instance	A function block that is inserted to a sequence program
Global label	A label that is valid for all the program data when multiple program data are created in the project. There are two types of global label: a module specific label (module label), which is generated automatically by GX Works3, and an optional label, which can be created for any specified device.
I/O module	A generic term for the input module, output module, I/O combined module, and interrupt module
Intelligent function module	A module that has functions other than input and output, such as an A/D converter module and D/A converter module
Label	A label that represents a device in a given character string
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.
Network module	A generic term for the following modules: <ul style="list-style-type: none">• Ethernet interface module• CC-Link IE Controller Network module• Module on CC-Link IE Field Network• MELSECNET/H module• MELSECNET/10 module
POU	A unit that configures a program. Units are categorized and provided in accordance with functions. Use of POUs enables dividing the lower-layer processing in a hierarchical program into some units in accordance with processing or functions, and creating programs for each unit.
Power supply module	A generic term for the MELSEC iQ-R series power supply modules
Process CPU	A generic term for the R08PCPU, R16PCPU, R32PCPU, and R120PCPU
Program block	A group of POUs that configure a program
Programmable controller CPU	A generic term for the R04CPU, R08CPU, R16CPU, R32CPU, and R120CPU
RAS	The abbreviation for Reliability, Availability, and Serviceability. This term refers to usability of automated equipment.

1 PART NAMES

1.1 CPU Module

This section describes the part names of the CPU module. (The R04CPU is used as an example.)

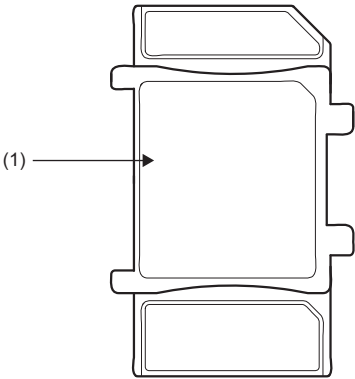


No.	Name	Description
(1)	READY LED	Indicates the operating status of the CPU module and the error level. (☞ Page 39 LED status of the CPU module)
(2)	ERROR LED	<p>● READY LED—ERROR LED status</p> <p>On—off: Normal operation</p> <p>On—on: Minor error</p> <p>On—flashing: Moderate error</p> <p>Flashing—on: Minor error (Changing module online)</p> <p>Flashing (every 2s)—off: Initial processing</p> <p>Flashing (every 400ms)—off: Changing module online</p> <p>Off—on/flashing: Major error</p>
(3)	PROGRAM RUN LED	<p>Indicates the operating status of the program.</p> <p>On: Being executed (RUN state)</p> <p>Flashing: Being suspended (PAUSE state)</p> <p>Off: Stopped (STOP state) or stop error</p>
(4)	USER LED	<p>Indicates the status of the annunciator (F). (☞ MELSEC iQ-R CPU Module User's Manual (Application))</p> <p>On: Annunciator (F) on</p> <p>Off: Normal operation</p>
(5)	BATTERY LED	<p>Indicates the battery status.</p> <p>Flashing: Battery low</p> <p>Off: Normal operation</p>
(6)	CARD READY LED	<p>Indicates the availability of the SD memory card.</p> <p>On: Available</p> <p>Flashing: Ready</p> <p>Off: Not available or not inserted</p>
(7)	CARD ACCESS LED	<p>Indicates the access status of the SD memory card.</p> <p>On: Being accessed</p> <p>Off: Not accessed</p>
(8)	FUNCTION LED	Indicates the status of the function being executed. (☞ MELSEC iQ-R CPU Module User's Manual (Application))
(9)	SPEED LED	<p>Indicates the communication speed and link status of Ethernet.</p> <p>On: Link up (100Mbps)</p> <p>Off: Link-down or link-up (10Mbps)</p>
(10)	SD/RD LED	<p>Indicates the data communication status over Ethernet.</p> <p>On: Data being sent or received</p> <p>Off: Data not being sent nor received</p>
(11)	RUN/STOP/RESET switch	<p>A switch for controlling the operating status of the CPU module (☞ Page 35 Executing the Program)</p> <p>RUN: Executes the program.</p> <p>STOP: Stops the program.</p> <p>RESET: Resets the CPU module. (Keep the switch in the RESET position for approximately one second.)</p> <p>Operate the RUN/STOP/RESET switch with your fingers. To prevent the switch from being damaged, do not use any tool such as a screwdriver.</p>
(12)	SD memory card access control switch	A switch for disabling access to the SD memory card to remove it from the CPU module (☞ Page 26 Inserting and Removing an SD Memory Card)
(13)	SD memory card slot	A slot where an SD memory card is inserted
(14)	USB port*1	A connector for a USB-compatible peripheral (connector type: miniB)
(15)	Ethernet port	A connector for Ethernet-compatible devices (RJ45 connector)
(16)	Battery	A backup battery to hold clock data and to use the backup power function for the device/label memory
(17)	Battery connector pin	<p>A pin for connecting a lead wire of the battery</p> <p>(To save the battery, the lead wire is disconnected from the connector before shipment.)</p>
(18)	Cassette cover	A cover for the connector where an extended SRAM cassette is inserted. To use an extended SRAM cassette, open the cover, and insert the cassette. (☞ Page 25 Inserting or Removing an Extended SRAM Cassette)
(19)	LED cover	<p>A cover for the LED indicators, SD memory card slot, and switches. Open this cover and insert or remove an SD memory card or set the RUN/STOP/RESET switch.</p> <p>Otherwise, keep the cover closed to prevent entry of foreign matter such as dust.</p>
(20)	USB cover	<p>A cover for the USB port. Open this cover and connect a USB-compatible peripheral.</p> <p>Otherwise, keep the cover closed to prevent entry of foreign matter such as dust.</p>
(21)	Production information marking	Shows the production information (16 digits) of the module.

*1 When a cable is connected to the USB connector at all times, clamp the cable to prevent a poor connection, moving, and disconnection by unintentional pulling.

1.2 Extended SRAM Cassette

This section describes the part names of the extended SRAM cassette.



No.	Name	Description
(1)	Tab for cassette insertion/removal	A part which is held when an extended SRAM cassette is inserted or removed

2 SPECIFICATIONS

2.1 CPU Module

This section describes the specifications of the CPU module.

Hardware specifications

Item			R04CPU	R08CPU, R08PCPU	R16CPU, R16PCPU	R32CPU, R32PCPU	R120CPU, R120PCPU
Operation control method			Stored program cyclic operation				
I/O control mode			Refresh mode (The direct access input/output is available by specifying the direct access input/output (DX, DY).)				
Instruction processing time	LD X0		0.98ns				
	MOV D0 D1		1.96ns				
Instruction processing time (structured text)	IF		1.96ns				
	CASE		1.96ns				
	FOR		1.96ns				
Memory capacity	Program capacity		40K steps (160K bytes)	80K steps (320K bytes)	160K steps (640K bytes)	320K steps (1280K bytes)	1200K steps (4800K bytes)
	Program memory		160K bytes	320K bytes	640K bytes	1280K bytes	4800K bytes
	SD memory card		Differs depending on the SD memory card used. (SD/SDHC memory card: 32G bytes maximum)				
	Device/label memory	Total	400K bytes	1188K bytes	1720K bytes	2316K bytes	3380K bytes
		Device area*1	80K bytes				
		Label area*1	60K bytes	80K bytes	100K bytes	180K bytes	220K bytes
		Latch label area*1	4K bytes				8K bytes
		File storage area*1	256K bytes	1024K bytes	1536K bytes	2048K bytes	3072K bytes
	Data memory		2M bytes	5M bytes	10M bytes	20M bytes	40M bytes
	CPU buffer memory		1072K bytes (536K words) (including the fixed scan communication area (24K words))				
Refresh memory		2048K bytes*2					
Number of storable files	Program memory (P: number of program files, FB: number of FB files)		188 (P: 124, FB: 64 (One FB file can store 64 function blocks.))	380 (P: 252, FB: 128 (One FB file can store 64 function blocks.))			
	Device/label memory (file storage area)*3		324 (with or without an extended SRAM cassette)				
	Data memory*4		256	512			
	SD memory card*4		• NZ1MEM-2GBSD: 256 • NZ1MEM-4GBSD and later: 32767				
Number of storable folders	Data memory*4		256	512			
	SD memory card*4		• NZ1MEM-2GBSD: 256 • NZ1MEM-4GBSD and later: 32767				
USB port			USB2.0 High Speed (miniB)×1				
Ethernet port			10BASE-T/100BASE-TX×1 📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)				
Clock function			Year, month, date, hour, minute, second, and day of the week (automatic leap year adjustment) -1.00 to +1.00s/d at 0 to 55°C				
Allowable momentary power failure time			The time differs depending on the power supply module used. (📖 MELSEC iQ-R Module Configuration Manual)				
Internal current consumption (5VDC)			• Programmable controller CPU: 0.67A • Process CPU: 0.76A				
External dimensions	Height		106mm (Base unit mounting side: 98mm)				
	Width		27.8mm				
	Depth		110mm				

Item	R04CPU	R08CPU, R08PCPU	R16CPU, R16PCPU	R32CPU, R32PCPU	R120CPU, R120PCPU
Weight	0.20kg				

- *1 The capacity of device area, label area, latch label area, and file storage area can be changed in parameter. The capacity of the device/label memory can be increased by inserting an extended SRAM cassette.
- *2 This is the total capacity of the device area and module label area.
- *3 System files are included.
- *4 The number indicates the number of files and folders (including system files and system folders) can be created in the root directory on the condition that the number of characters in the file or folder name is 13 or less. In a subdirectory, up to 32767 folders can be created. Note that the number of storable files and folders will decrease if many folders with a long name, more than 13 characters (including an extension), are created.

Programming specifications

Item			R04CPU	R08CPU, R08PCPU	R16CPU, R16PCPU	R32CPU, R32PCPU	R120CPU, R120PCPU
Programming language			Ladder diagram (LD), structured text (ST), function block diagram (FBD)				
Programming supporting function			Function block (FB), label programming (system/local/global)				
Program operation	Execution type		Initial execution type, scan execution type, fixed scan execution type, event execution type, standby type				
	Type of interrupt		Internal timer interrupt (I28 to I31), high-speed internal timer interrupt 1 (I49), high-speed internal timer interrupt 2 (I48), interrupt by modules, inter-module synchronous interrupt (I44), multiple CPU synchronous interrupt (I45)				
Number of executable programs			124	252			
Number of FB files			64	128			
Tact performance	Constant scan		0.2 to 2000ms (The value can be set in increments of 0.1ms.)				
	Fixed scan interrupt	Interrupt using the internal timer (I28 to I31)	0.5 to 1000ms (The value can be set in increments of 0.5ms.)				
		High-speed internal timer interrupt 1 (I49)	0.05 to 1000ms (The value can be set in increments of 0.05ms.)				
		High-speed internal timer interrupt 2 (I48)	0.05 to 1000ms (The value can be set in increments of 0.05ms.)				
		Inter-module synchronous interrupt (I44)	0.1 to 10.00ms (The value can be set in increments of 0.05ms.)				
		Multiple CPU synchronous interrupt (I45)	0.1 to 10.00ms (The value can be set in increments of 0.05ms.)				
Timer performance	Low-speed timer		1 to 1000ms (Default: 100ms)				
	High-speed timer		0.01 to 100ms (Default: 10ms)				
	Long timer		0.001 to 1000ms (Default: 0.001ms)				
Number of I/O points			4096 points				
Number of user device points (default)	Input (X)		12288 points (fixed)				
	Output (Y)		12288 points (fixed)				
	Internal relay (M)		12288 points (user-changeable)*1				
	Latch relay (L)		8192 points (user-changeable)*1				
	Link relay (B)		8192 points (user-changeable)*1				
	Link special relay (SB)		2048 points (user-changeable)*1				
	Annunciator (F)		2048 points (user-changeable)*1				
	Edge relay (V)		2048 points (user-changeable)*1				
	Timer device	Timer (T)	1024 points (user-changeable)*1				
		Long timer (LT)	1024 points (user-changeable)*1				
	Retentive timer device	Retentive timer (ST)	0 points (user-changeable)*1				
		Long retentive timer (LST)	0 points (user-changeable)*1				
	Counter device	Counter (C)	512 points (user-changeable)*1				
		Long counter (LC)	512 points (user-changeable)*1				
	Data register (D)		18432 points (user-changeable)*1				
	Link register (W)		8192 points (user-changeable)*1				
	Link special register (SW)		2048 points (user-changeable)*1				
Number of system device points	Special relay (SM)		4096 points (fixed)				
	Special register (SD)		4096 points (fixed)				
	Function input (FX)		16 points (fixed)				
	Function output (FY)		16 points (fixed)				
	Function register (FD)		5 points × 4 words (fixed)				
Number of file register points (default)	File register (R/ZR)		0 points (user-changeable)*1				

Item		R04CPU	R08CPU, R08PCPU	R16CPU, R16PCPU	R32CPU, R32PCPU	R120CPU, R120PCPU
Number of index register points (default)	Index register (Z)	20 points (user-changeable, up to 24 points)				
	Long index register (LZ)	2 points (user-changeable, up to 12 points)				
Number of pointer points	Pointer (P) (global/local) (default)	8192 points (user-changeable, up to 16384 points)				16384 points (user-changeable, up to 32768 points)
	Interrupt pointer (I)	1024 points (fixed)				
Number of link direct device points	Link input (J□\X□)	16384 points maximum* ²				
	Link output (J□\Y□)	16384 points maximum* ²				
	Link relay (J□\B□)	32768 points maximum* ²				
	Link register (J□\W□)	131072 points maximum* ²				
	Link special relay (J□\SB□)	512 points maximum* ²				
	Link special register (J□\SW□)	512 points maximum* ²				
Number of module access device points	Intelligent function module device (U□\G□)	268435456 points maximum* ²				
Number of CPU buffer memory access device points	Buffer memory (U3E□\G□)	524288 points				
	Fixed scan communication area in the buffer memory (U3E□\HG□)	12288 points maximum* ³				
Number of refresh data register points (default)	Refresh data register (RD)	524288 points (1048576 points maximum)				
Number of nesting points	Nesting (N)	15 points				

*1 The number of points can be changed by parameters within the capacity of the CPU module built-in memory and extended SRAM cassette.

*2 These are the maximum points that can be handled in the CPU module. The number of points actually used differs depending on the module used.

*3 The maximum point differs depending on the parameter setting (Multiple CPU Setting).

2.2 Extended SRAM Cassette

This section describes the performance specifications of the extended SRAM cassette.

Item		NZ2MC-1MBS	NZ2MC-2MBS	NZ2MC-4MBS	NZ2MC-8MBS	NZ2MC-8MBSE
Capacity		1M bytes	2M bytes	4M bytes	8M bytes	
Number of insertions and removals		Limited to 50 times				
External dimensions	Height	49mm				
	Width	32mm				
	Depth	18.5mm				
Weight		20g				
Applicable CPU module		Programmable controller CPU, Process CPU				Process CPU

3 FUNCTION LIST

The following table lists the functions of the CPU module.

Numbers in the Availability column indicate the CPU modules: (1) programmable controller CPU, (2) Process CPU.

○: Supported, ×: Not supported

Function		Description	Availability	
			(1)	(2)
Scan monitoring function		Detects a hardware failure or program error by monitoring that the END processing is performed within a set scan time.	○	○
Clock function		Manages time for the system functions such as time stamps for the event history function and date information for the data logging function.	○	○
Online change	Changing ladder blocks while online	Writes the part of a program edited on the ladder editor using the engineering tool to the CPU module in units of ladder blocks. Edited contents spanning multiple files or multiple portions can be written to the CPU module at once.	○	○
Interrupt function	Multiple interrupt function	When an interrupt occurs while an interrupt program triggered by another cause is running, stops the program if its priority is lower than that of the new interrupt, and runs the higher-priority program whenever its execution condition is satisfied.	○	○
PID control function		Performs PID control by using PID control instructions. There are two kinds of PID control instructions: exact differential form instructions and inexact differential form instructions.	○	○
Process control function		Performs various types of process control by using process control instructions, such as two-degree-of-freedom PID control, sample PI, and auto tuning, in combination.	×	○
Constant scan		Repeatedly runs a program while retaining the scan time constant.	○	○
Database function		Manages tabular data such as product information or production information as a database on the programmable controller, and accesses the database using the database access instructions.	○	○
Remote operation		Remotely controls the operating status of the CPU module, keeping the position of the RUN/STOP/RESET switch at RUN.	○	○
Device/label memory area setting		Sets the capacity of each area in the device/label memory.	○	○
Internal buffer capacity setting		Sets the capacity of the area (internal buffer) used by the system to temporarily store the results of data logging and memory dump processing.	○	○
Initial device/label value setting		Sets the initial values of devices and labels used in the program directly (not via the program) to the devices, labels, and buffer memory areas of intelligent function modules.	○	○
Output mode setting when the status changed from STOP to RUN		Sets the output (Y) status when the operating status of the CPU module is switched from STOP to RUN.	○	○
Label access setting from external device		Enables communications specifying the global label name from the GOT and external devices using SLMP.	○	○
Routing setting		Sets the communication path required for transient communication to the stations on the different network.	○	○
Latch function		Holds the device/label data even at power-off.	○	○
Memory card function	SD memory card forced disable	Forcibly disables an access to the SD memory card without powering off the system even when the function that accesses the SD memory card is being executed.	○	○
	Boot operation	Transfers files in the SD memory card to the built-in memory of the CPU module when the CPU module is powered off and on or reset.	○	○
Device/label access service processing setting		Sets the time or execution timing of the device/label access service processing performed in the END processing in parameter.	○	○
Data logging function		Collects data at the specified interval or any desired timing, and stores them as a file on the SD memory card.	○	○
Memory dump function		Saves the data in the devices of the CPU module at a desired timing.	○	×
Real-time monitor function		Monitors the data in the specified device of the CPU module at a specified interval or at a desired timing in real time.	○	×

Function		Description	Availability	
			(1)	(2)
RAS function	Self-diagnostics function	Self-diagnoses the CPU module to see whether an error exist or not.	○	○
	Error clear	Batch-clears all the continuation errors being detected.	○	○
	Event history function	Collects operations executed and errors detected from the modules, and saves them in the CPU module. The saved logs can be checked in chronological order.	○	○
	Online module change	Replaces a module without stopping the system. (📖 MELSEC iQ-R Online Module Change Manual)	×	○
	Program cache memory auto recovery function	Automatically detects and recovers the data stored in the program cache memory of the CPU module at the time of program execution if the data is overwritten due to the factors such as excessive electrical noise.	○	○
Monitor function	Device/buffer memory batch monitor	Monitors values in devices and buffer memory using the engineering tool connected.	○	○
	Program monitor list	Monitors the execution time of each program and the number of executions using the engineering tool connected.	○	○
	Interrupt program monitor list	Monitors the number of executions of interrupt programs using the engineering tool connected.	○	○
Multiple CPU system function	Out-of-group I/O fetch	Enables loading the input and output data of non-controlled modules.	○	○
	Multiple CPU synchronized startup	Synchronizes the startup of CPU modules in a multiple CPU system so that operations of all the CPU modules start at the unified time.	○	○
	Data communications between CPU modules	Communicates data between CPU modules in a multiple CPU system.	○	○
	Multiple CPU synchronous interrupt	Executes an interrupt program at the fixed communication timing set in parameter.	○	○
SLMP communication function		Enables accesses to devices/labels and remote operations from external devices other than the engineering tool by sending request messages using SLMP. (📖 SLMP Reference Manual)	○	○
Security function		Prevents the programs saved in the personal computer or modules from unauthorized access (theft or alteration), faulty operation, and unauthorized execution.	○	○
Inter-module synchronization function		Controls multiple modules synchronously. (📖 MELSEC iQ-R Inter-Module Synchronization Function Reference Manual)	○	○
Ethernet function		Accesses the CPU module over Ethernet. Using this function, the CPU module can connect to MELSOFT products and GOTs, perform socket communications, and transfer FTP files. (📖 MELSEC iQ-R Ethernet User's Manual (Application))	○	○

4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operations.

1. Installing a battery

Install a battery to the CPU module. (🔗 Page 24 Installing a Battery)

2. Inserting an extended SRAM cassette and an SD memory card

Insert an extended SRAM cassette or an SD memory card or both to the CPU module as needed. (🔗 Page 25 Inserting or Removing an Extended SRAM Cassette, 🔗 Page 26 Inserting and Removing an SD Memory Card).

3. Mounting modules and connecting cables

Mount modules on the base unit, and connect cables. (📖 MELSEC iQ-R Module Configuration Manual)

4. Powering on the system

Check the following items, and then power on the system.

- A cable is correctly connected to the power supply.
- Power supply voltage is within the specified range.
- The CPU module is in the STOP state.

5. Connecting a personal computer

Connect a personal computer where an engineering tool has been installed to the CPU module. (🔗 Page 27 Connecting a Personal Computer)

6. Initializing the CPU module

Initialize the CPU module using the engineering tool. (🔗 Page 28 Initializing the CPU Module)

7. Setting parameters

Set system parameters, CPU parameters, and module parameters. (🔗 Page 28 Setting Parameters)

Parameters other than above need to be set to use the built-in Ethernet function of the CPU module, to execute functions accessing the SD memory card, or when any intelligent function module is mounted. (📖 User's Manual (Application) for the module used)

System parameters are automatically set by loading an actual system configuration to the Module Configuration window of the engineering tool.

8. Programming

Create a program using the engineering tool. (🔗 Page 30 Programming)

9. Writing data to the programmable controller

Write the parameters set and the program created by using the engineering tool to the programmable controller. (🔗 Page 34 Writing Data to the Programmable Controller)

10. Resetting the CPU module

Restart the system in either of the following ways.

- Power off and on the system.
- Reset the CPU module. (🔗 Page 35 Resetting the CPU Module)

11. Checking for errors

Check the status of the READY LED and ERROR LED of the CPU module. If an error is detected, identify the error using the engineering tool, and eliminate the error cause. (🔗 Page 38 Troubleshooting)

12. Executing the program

Run the CPU module, and check that the PROGRAM RUN LED turns on. (🔗 Page 35 Executing the Program)

13. Monitoring the program

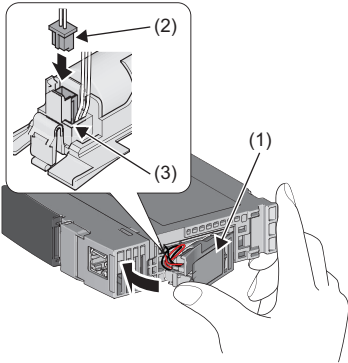
Check that the program operates normally using the engineering tool. (🔗 Page 36 Monitoring the Program)

4.1 Installing a Battery

Install a battery to the CPU module.

Installation procedure

The connector plug of the Q6BAT is disconnected from the jack of the CPU module before shipment. To use the battery, connect the connector, following the procedure below.



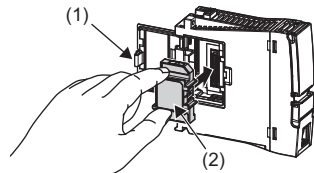
- 1.** Open the battery cover located on the bottom of the CPU module.
- 2.** Check that the Q6BAT (1) is correctly installed.
- 3.** Check the direction and securely insert the connector plug of the Q6BAT (2) to the jack (3) of the CPU module.
- 4.** Close the battery cover.


4.2 Inserting or Removing an Extended SRAM Cassette

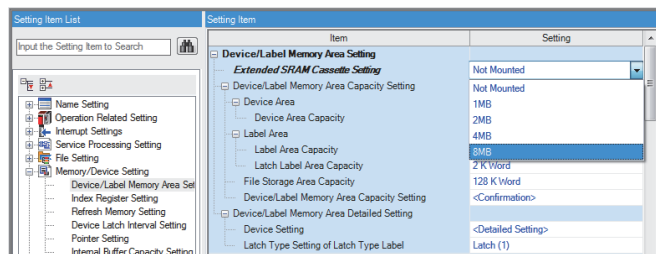
Insert an extended SRAM cassette to the CPU module as needed.

Insertion procedure

Insert an extended SRAM cassette while the programmable controller is powered off.



1. Open the cassette cover (1) located on the side of the CPU module.
2. Hold the top and bottom of the tab (2) of an extended SRAM cassette (with the notched edge facing to the right), and insert the cassette straight into the connector. After inserting the cassette, check that it is inserted completely.
3. Close the cover, and mount the CPU module on the base unit.
4. Power on the programmable controller.
5. Set the capacity of the inserted cassette in the CPU parameters ("Extended SRAM Cassette Setting") using the engineering tool.
 [CPU Parameter] ⇒ [Memory/Device Setting] ⇒ [Device/Label Memory Area Setting] ⇒ [Extended SRAM Cassette Setting]
6. Using the engineering tool, check that SM626 (Extended SRAM cassette insertion flag) is on.



Precautions

- When the extended SRAM cassette is removed, all of the data on the device/label memory are erased. Back up the program and data before replacing the cassette.
- If the capacity of the extended SRAM cassette differs before and after the replacement, the ERROR LED of the CPU module may flash. But, it is not an error. Change the capacity setting in the CPU parameters. (Refer to step 5 above.)

Restriction

- The extended SRAM cassette for the Universal model QCPU (Q4MCA-□MBS) cannot be used.
- The programmable controller CPU does not support the use of NZ2MC-□MBSE.

Removal procedure

Remove the extended SRAM cassette while the programmable controller is powered off.

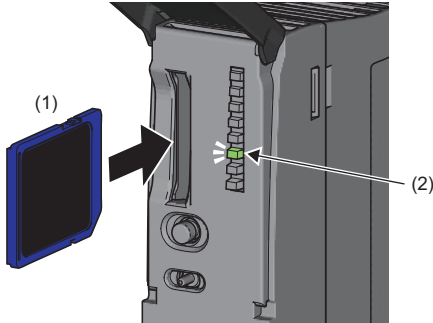
1. Read the data on the device/label memory from the CPU module, and save it in advance using the engineering tool. (When the extended SRAM cassette is removed, all of the data on the device/label memory are erased.)
2. Power off the programmable controller.
3. Remove the CPU module from the base unit, and open the cassette cover located on the side of the CPU module.
4. Hold the top and bottom of the tab of the extended SRAM cassette, and pull the cassette straight out of the connector.
5. Close the cover, and mount the CPU module back on the base unit.
6. Power on the programmable controller.
7. Set the "Extended SRAM Cassette Setting" in the CPU parameters to "Not Mounted".

4.3 Inserting and Removing an SD Memory Card

Insert an SD memory card to the CPU module as needed.

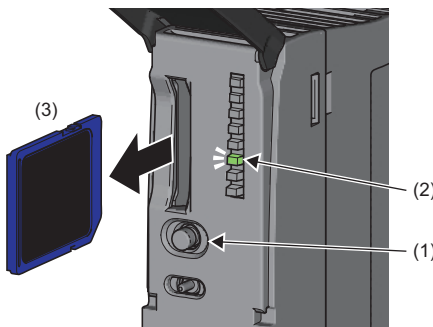
Insertion procedure

Check the direction and insert an SD memory card, following the procedure below.



1. Insert an SD memory card (1) into the card slot until it clicks with the notched edge in the direction as illustrated. After inserting the cassette, check that it is inserted completely. Poor contact may cause malfunction.
2. The CARD READY LED (2) starts flashing. When the card is ready to be used, the CARD READY LED stops flashing and turns on.
3. If the CARD READY LED does not turn on even after the card is inserted, check that SM606 (SD memory card forced disable instruction) and SM607 (SD memory card forced disable status flag) are off.

Removal procedure



1. Press the SD memory card access control switch (1) for one second or longer to disable access to the card.
2. The CARD READY LED (2) flashes during the access stop processing, and turns off upon completion of the processing.
3. Push in and release the SD memory card (3), and then pull the card out of the slot.

Precautions

- Follow the procedure above when inserting or removing the SD memory card while the system is powered on. If not, the data on the SD memory card may corrupt.
- If any function that accesses the SD memory card is being executed when the SD memory card access control switch is pressed to remove the card, the CARD READY LED turns off after the processing of the function is completed. For this reason, the time required until the LED turns off differs depending on the function being executed.
- If SM605 (Memory card remove/insert prohibit flag) is on, the CARD READY LED does not turn off even if the SD memory card access control switch is pressed. If not, turn on SM606 (SD memory card forced disable instruction) to forcibly disable access to the card.

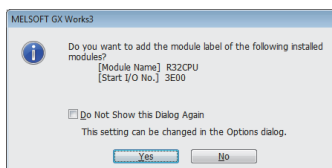
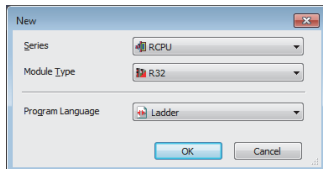
4.4 Creating a Project

Activate the engineering tool and create a project.

 [Project] ⇒ [New]

Procedure

Create a program, following the procedure below. The procedure is for the program described in ladder diagrams.



1. Select the model of the CPU module used. Then, specify a programming language used for the project. Select "Ladder", and click the [OK] button.
2. Click the [Yes] button when the window for adding module labels of the CPU module appears.

4

Point

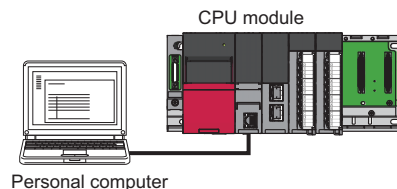
Module label is a label where the I/O signals and buffer memory areas of a module have already been defined. Use of module labels allows programming without being aware of module internal addresses.

4.5 Connecting a Personal Computer

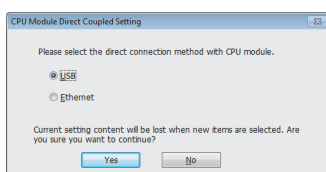
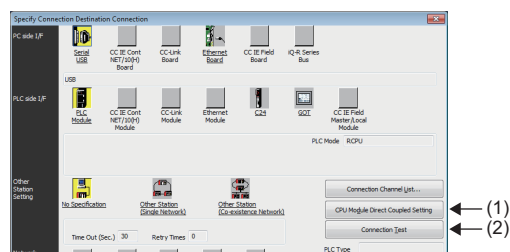
Connect a personal computer where an engineering tool has been installed to the CPU module.

Procedure


Connect a personal computer directly to the CPU module, following the procedure below.



1. Connect a personal computer to the CPU module using a USB cable or Ethernet cable.
2. Select [Online] ⇒ [Specify Connection Destination] on the menu bar of the engineering tool.
3. Click the [CPU Module Direct Coupled Setting] button (1) on the "Specify Connection Destination Connection" window.



4. Select the connection method, and click the [Yes] button.
5. Click the [Connection Test] button (2), and check if the personal computer is connected to the CPU module.

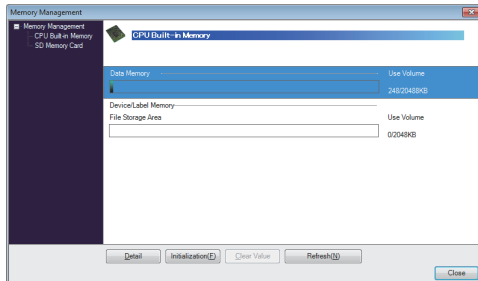
Install a USB driver to use a USB cable for the first time. ( GX Works3 Operating Manual)

4.6 Initializing the CPU Module

Initialize the CPU module.

 [Online] ⇒ [CPU Memory Operation]

Procedure




1. Select "Data Memory" on the "Memory Management" window, and click the [Initialization] button.
2. Select "File Storage Area", and click the [Initialization] button.
3. After the initialization processing completes, click the [Close] button.

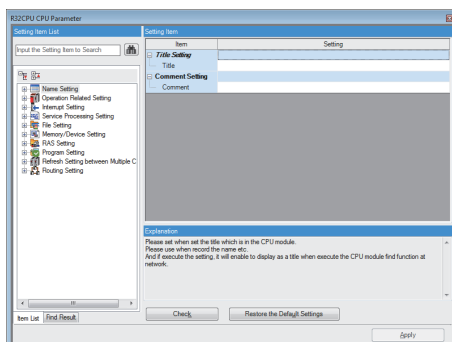
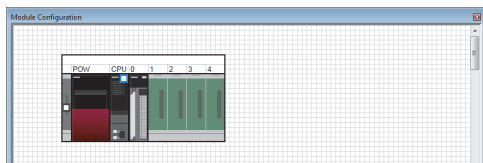
4.7 Setting Parameters

Set system parameters and parameters for each module.

When the engineering tool is connected to the actual system

Set parameters by loading an actual system configuration to the Module Configuration window of the engineering tool.

 "Navigation window" ⇒ "Module Configuration"



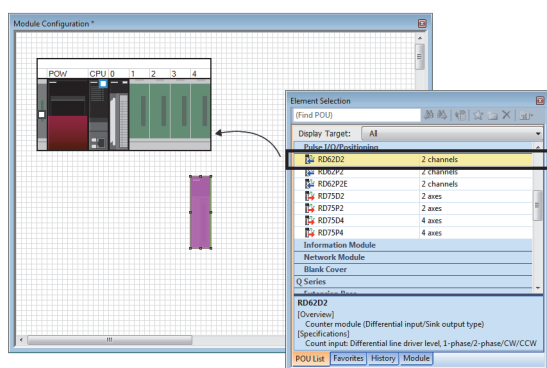
1. Open the Module Configuration window, and select [Online] ⇒ [Read Module Configuration from PLC] on the menu bar.
2. Click the [Yes] button when the window for adding module labels of the mounted modules appears.
3. The system parameters are automatically set, and the actual system configuration is displayed on the Module Configuration window.
4. Double-click each module (CPU module, I/O module, or intelligent function module) to display the corresponding module parameter editor.
5. Set parameters, and click the [Apply] button to close the window.

■Precautions

The RQ extension base units, MELSEC-Q series extension base units, and modules mounted on those base units cannot be loaded. For those cannot be loaded, select the units and modules on the Element Selection window, and drag and drop them to the system configured on the Module Configuration window.

When the engineering tool is not connected to the actual system

Set parameters by configuring a system manually on the Module Configuration window of the engineering tool.



1. Select a base unit on the Element Selection window, and drag and drop it to the Module Configuration window.
2. Drag and drop modules to be used on the base unit placed.
3. Select [Edit] ⇒ [Parameter] ⇒ [Fix] on the menu bar.
4. Click the [Yes] button when the window for adding module labels of the configured modules appears.
5. Open the parameter editor of each module by double-clicking the module.
6. Set parameters, and click the [Apply] button to close the window.

Setting parameters from the Navigation window

Set the following parameters from the Navigation window.

■System parameters

These parameters need to be set from the Navigation window in the following cases: to change the number of slots on the base unit or the number of occupied points of the module; for a multiple CPU system; and for module synchronization operations.

☞ "Navigation window" ⇒ "Parameter" ⇒ "System Parameter"

■Module parameters of the CPU module

These parameters are required to execute the built-in Ethernet function of the CPU module.

☞ "Navigation window" ⇒ "Parameter" ⇒ (CPU module) ⇒ "Module Parameter"

■Memory card parameters

These parameters are required to execute functions that access the SD memory card.

☞ "Navigation window" ⇒ "Parameter" ⇒ (CPU module) ⇒ "Memory Card Parameter"

■Multiple module parameters and module extension parameters

Some intelligent function modules require multiple module parameters and module extension parameters.

☞ "Navigation window" ⇒ "Parameter" ⇒ "Module Information" ⇒ (intelligent function module) ⇒ "Module Parameter" or "Module Extended Parameter"



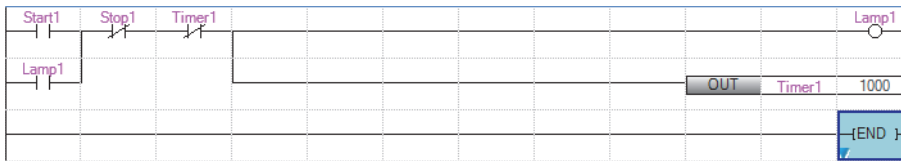
System parameters can be set on the following windows. Select the window depending on their application purposes.

- Module Configuration window: Use this window when using the module specific data (such as number of occupied points) as is.
- System Parameter window: Use this window when changing the number of slots or the number of occupied points.

4.8 Programming

Create a program. This section describes how to create a program using the following program example.

Program example



- When Start1 turns on, Timer1 starts counting, and Lamp1 turns on.
- When the current value of Timer1 reaches 1000, Lamp1 turns off.
- When Stop1 turns on, Lamp1 turns off.

Registering labels

Label is a variable whose name and data type can be declared by a user.

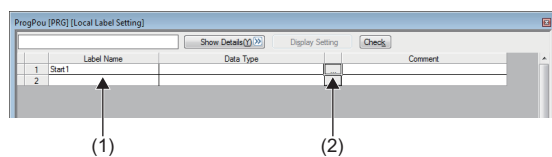
Use of labels allows programming without being aware of devices and buffer memory addresses. For this reason, programs using labels can be used in other systems where the module configuration is different.

Labels can be registered on the label editor.

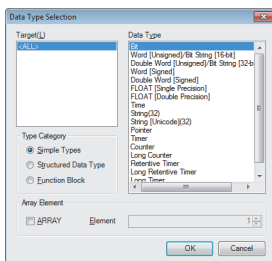
Navigation window ⇒ "Program" ⇒ "Scan" ⇒ "MAIN" ⇒ "ProgPou" ⇒ "Local Label"

Procedure

Register the label "Start1" in the program example, following the procedure below.



1. Enter the name, "Start1", in the "Label Name" field (1).
2. Click the button (2) on the right of the "Data Type" field to open the "Data Type Selection" window.
3. Specify the data type. Select "Bit", and click the [OK] button.



Register other labels in the program example in the same way.

Point

- The class, initial value, and constant of labels can be set as needed by clicking the [Show Details] button on the label editor.
- Labels can also be registered while programming without opening the label editor. (Page 33 Inserting POU's by key input)
- Devices can be assigned to global labels. Open the global label editor, and enter a device in the "Assign (Device/Label)" field.

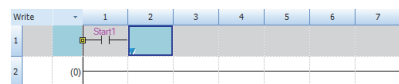
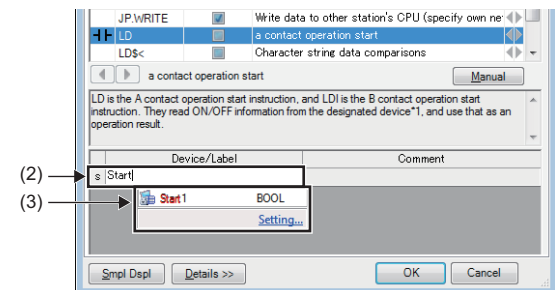
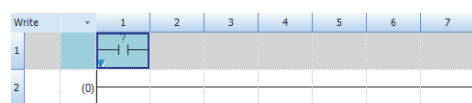
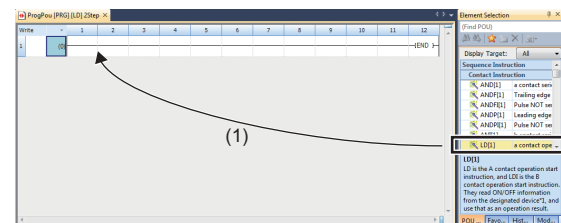
Inserting program elements

Drag and drop required program elements to the ladder editor.

"Navigation window" ⇒ "Program" ⇒ "Scan" ⇒ "MAIN" ⇒ "ProgPou" ⇒ "Program"

Procedure

Insert a normally open contact of "Start1" in the program example, following the procedure below.

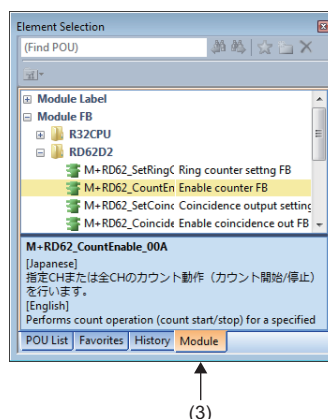
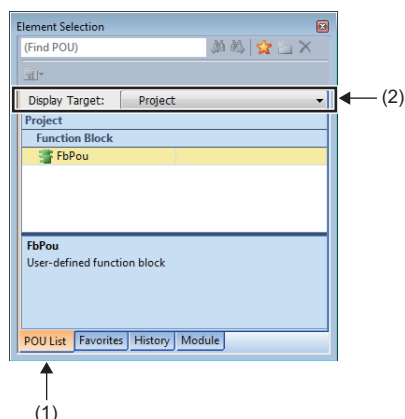


1. Select a program element from the Element Selection window, and drag and drop (1) it to the desired position on the ladder editor. In this example, drag and drop "LD[1]".
2. Double-click the inserted program element, and click the [ExtD Dspl] button to open the ladder entry window.
3. Specify the operand. In this example, enter "Start" for "s" in the "Device/Label" field.
4. Select an item from the displayed list (3). In this example, select "Start1".
5. The normally open contact of "Start1" is inserted to the program.

Insert other program elements in the program example in the same way.

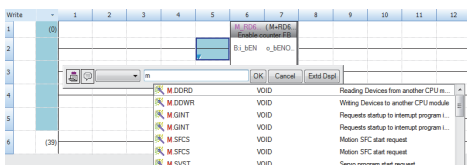
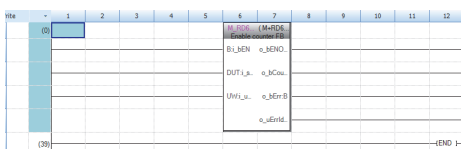
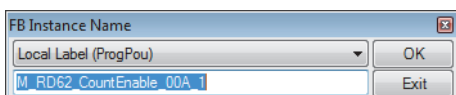
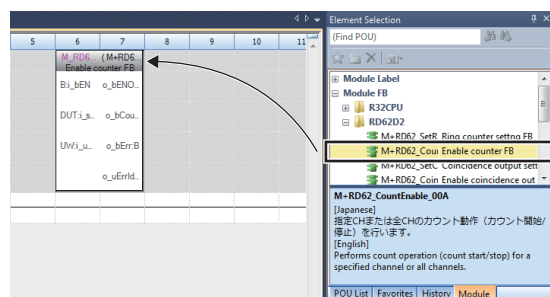
Point

- Common instructions, such as contacts and coils, standard functions/function blocks, and user-defined function blocks/functions can be found in the [POU List] (1) in the Element Selection window. Narrow the list using the drop-down menu (2) for "Display Target", and select program elements.
- Module labels and module function blocks can be found in the [Module] list (3). Programs are efficiently created only by dragging and dropping the module labels and module function blocks on the editor.



■Inserting function blocks

Insert function blocks, following the procedure below.



1. Select a function block from the Element Selection window, and drag and drop it to the desired position on the ladder editor.

2. The "FB Instance Name" window opens. Select the target label (global label or local label), and enter an instance name.

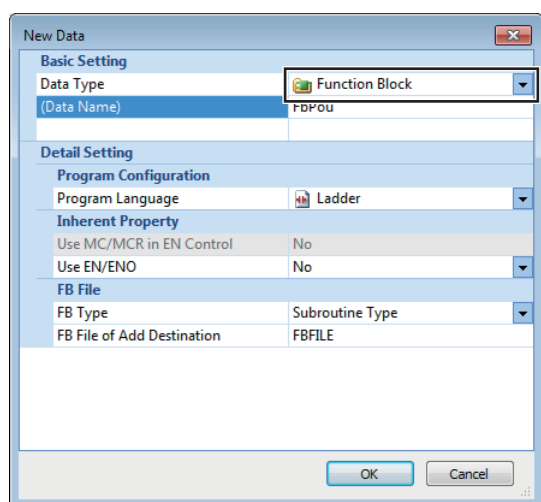
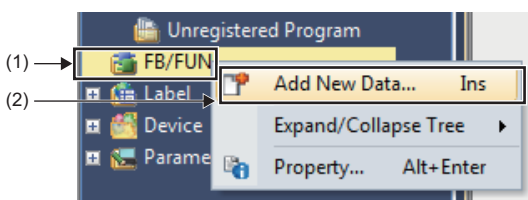
3. Select [Convert] ⇒ [Convert] on the menu bar. The ladder is converted, and the rungs are connected to the input and output labels of the FB instance.

4. Add the input and output parts of the inserted function block to complete the program. For details on the input and output parts, refer to the following.

📖 Function Block Reference for the module used

■Creating function blocks/functions

User-defined function blocks/functions must be created before inserted to the program.



1. Right-click "FB/FUN" (1) on the Navigation window, and select "Add New Data" (2) to open the setting window.

2. To create a function block, set the data type to "Function Block" using the drop-down list. To create a function, set the data type to "Function". Then, click the [OK] button.

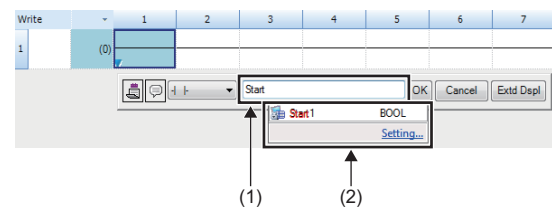
3. Create the processing of the function block or function on the "Program" window.

Inserting POUs by key input

POUs can be inserted by key input.

Procedure

Inserting a normally open contact of "Start1" in the program example, following the procedure below.

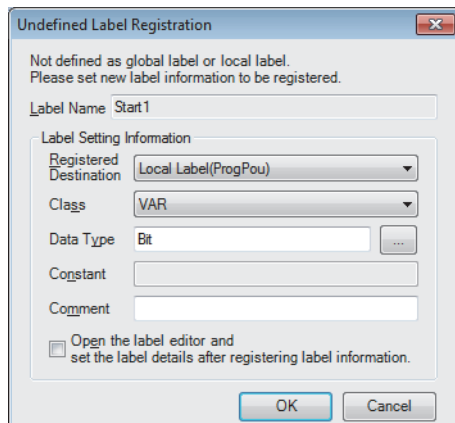


1. Click the insertion position on the ladder editor, and press **[F5]**.
2. Enter the name, "Start1", in the entry field (1). Select "Start1" from the displayed list (2).
3. The normally open contact of "Start1" is inserted to the program.

4

Point

A new label can be registered during insertion. Enter the name of a new label on the ladder entry window, and click the [OK] button. Then, specify the registered destination, class, and data type of the label on the "Undefined Label Registration" window, and click the [OK] button.



4.9 Converting the Program


Determine the input ladder blocks.

Procedure

1. Select [Convert] ⇒ [Convert] on the menu bar.
2. When the conversion processing completes and the input ladder blocks are determined, the color of those ladder blocks changes from gray to white.

4.10 Saving the Project

Save the created project.

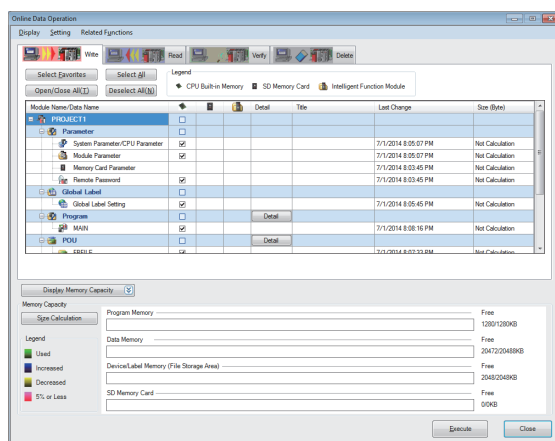
 [Project] ⇒ [Save as]

4.11 Writing Data to the Programmable Controller

Write the set parameters and the created program to the programmable controller.

 [Online] ⇒ [Write to PLC]

Procedure



1. Select the system parameter file, CPU parameter file, module parameter file, and program file on the "Online Data Operation" window. If any function block is used, select the corresponding FB/FUN file as well.
2. Click the [Execute] button.
3. After the write processing completes, click the [Close] button.

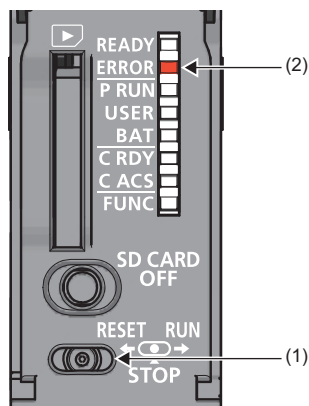
Point

- For the operation of the CPU module, the system parameter file, CPU parameter file, and program file must be written. For the operation of the I/O modules and intelligent function modules, the module parameter files and module extension parameter file must be written as well.
- Use of the [Select Favorites] button enables users to easily select frequently-used files, such as the system parameter file, CPU parameter file, and program file. Register items as favorites on the window opened by selecting [Setting] ⇒ [Register Favorites Selection] on the menu bar.

4.12 Resetting the CPU Module

Reset the CPU module using the RUN/STOP/RESET switch located on the front of the CPU module.

Procedure



1. Set the RUN/STOP/RESET switch (1) to the RESET position for a second or longer.
2. Check that the ERROR LED (2) flashes for several times and turns off.
3. Set the switch back to the STOP position.

4

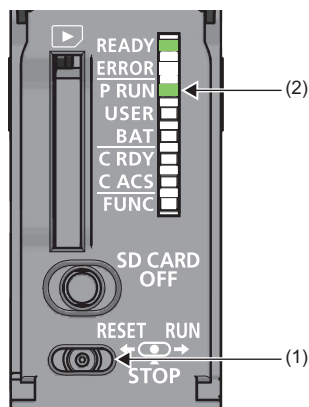
Point

Operate the RUN/STOP/RESET switch with your fingers. Use of a tool such as a screwdriver may damage the switch.

4.13 Executing the Program

Execute the program written to the programmable controller by using the RUN/STOP/RESET switch.

Procedure



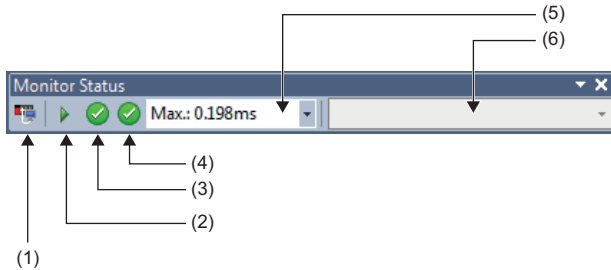
1. Set the RUN/STOP/RESET switch (1) to the RUN position.
2. Check that the PROGRAM RUN LED (P RUN) (2) turns on.

4.14 Monitoring the Program

Monitor the program operation using the engineering tool.












Monitoring on the monitor status bar

The LED status of the CPU module and the scan time can be monitored on the monitor status bar.



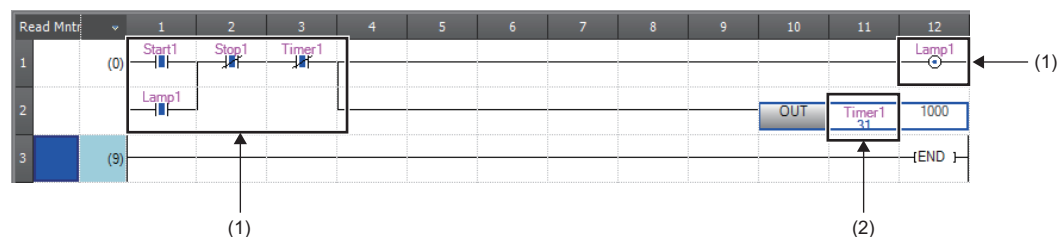
1. Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] on the menu bar.
2. Monitor the LED status of the CPU module and the scan time.

■Displayed item

No.	Item	Description	Icon	Meaning
(1)	Connection status	The connection status with the CPU module is displayed.	 	Connected with the CPU module Not connected with the CPU module
(2)	Operating status	The operating status of the CPU module in accordance with the RUN/STOP/RESET switch of the CPU module or the remote operation by the engineering tool is displayed.	  	RUN STOP PAUSE
(3)	ERROR LED status	The ERROR LED status of the CPU module is displayed. The "Module Diagnostics" window opens by clicking the icon. (Page 40 Module diagnostics)	  	Off On Flashing
(4)	USER LED status	The USER LED status of the CPU module is displayed. The "Module Diagnostics" window opens by clicking the icon. (Page 40 Module diagnostics)	  	Off On Flashing
(5)	Scan time details	The scan time details are displayed. Select the value to be displayed from the drop-down list (current value, maximum value, or minimum value).		
(6)	Monitor target selection	Specify the monitor target FB instance when monitoring a FB program.		

Monitoring on the ladder editor

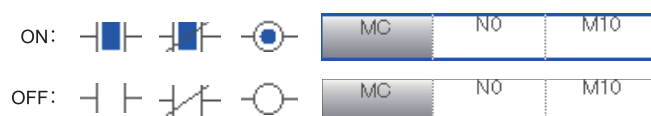
The on/off states of contacts and coils and the current values of word devices and labels can be monitored on the ladder editor.



1. Select [Online] ⇒ [Monitor] ⇒ [Start Monitoring] on the menu bar.
2. Monitor the on/off states of contacts and coils and the current values of word devices and labels.

■On/off state display

The on/off states are displayed on the editor as follows:



■Changing the current value

To change the current value, select the cell on the ladder editor, and press **[Shift]** + double-click the cell or press **[Shift]** + **[Enter]** while the program is being monitored.




The program can also be monitored on the Device/Buffer Memory Batch window or the Watch window.
(GX Works3 Operating Manual)

4.15 Troubleshooting








This section describes errors that may occur during system operation, error causes, and actions to be taken.
For the troubleshooting specific to each module, refer to the manual for the module used.

Point

Saving the program and devices at the time of an error helps to analyze the error cause. ( GX Works3 Operating Manual)

Troubleshooting procedure

When the system has any trouble, perform troubleshooting in the following order.

- 1.** Check the LED status of the power supply module.
( MELSEC iQ-R CPU Module User's Manual (Application))
- 2.** Check the LED status of the CPU module. ( Page 39 LED status of the CPU module)
- 3.** Check the LED status of each I/O module and intelligent function module. ( User's Manual (Application) for the module used)
- 4.** Connect an engineering tool, and execute the system monitor function. The error module can be identified. ( Page 40 System monitor)
- 5.** Select the error module, and execute the module diagnostics function. The error cause and the action to be taken can be displayed. ( Page 40 Module diagnostics)
- 6.** If the error cause cannot be identified by the module diagnostics, check the executed operations and detected error logs on the event history window. ( Page 41 Event history)
- 7.** If the error cause cannot be identified in steps 1 to 6, perform troubleshooting by symptom. ( User's Manual (Application) for the module used)

Troubleshooting with LED indicators

Check the LED status of each module as primary diagnostics.

LED status of the CPU module

The following table lists the check points on the LED status of the CPU module.

The error status can be checked visually using the READY LED and ERROR LED.

LED indicator		Error status	Program execution status	Description	Action
READY	ERROR				
On	Off	No error	Continued	Normal operation	—
	On	Minor error		A minor error or warning has been detected. Program execution and data communications with network stations are continued.	Identify the error cause using the engineering tool, and take an action.
	Flashing	Moderate error	Stopped	A programming error, parameter setting error, or temporal noise has been detected. Program execution and data communications with network stations are stopped.	Identify the error cause using the engineering tool, and take an action.
Off	On/ flashing	Major error		A hardware failure has been detected. No operation cannot be performed.	Perform troubleshooting for the error module. If the problem still exists after troubleshooting, replace the error module. (GX MELSEC iQ-R CPU Module User's Manual (Application))
	Off	Hardware failure		A hardware failure has been detected. No operation cannot be performed.	Check that the power is supplied to the system. If the power is supplied properly, the possible cause is a hardware failure. Perform troubleshooting for the error module. If the problem still exists after troubleshooting, replace the error module. (GX MELSEC iQ-R CPU Module User's Manual (Application))
		No error		Power is not supplied or power went out.	—
Flashing	On	Minor error		A minor error has been detected during online module change.	Identify the error cause using the engineering tool, and take an action.
	Off	No error		<ul style="list-style-type: none"> The READY LED is flashing every 400ms: A module is being changed online. The READY LED is flashing every 2s: Initial processing is being performed. 	—



The LED status can also be checked on the module diagnostics window using the engineering tool. (GX Works3 Operating Manual)

Troubleshooting using the engineering tool

Check the error or history using the engineering tool, and identify the error cause. More detailed information on the error as well as the error cause and action to be taken can be checked by using the engineering tool.

The engineering tool has the following functions for troubleshooting.


Function	Description
System monitor	Displays the module configuration, and detailed information and error status of each module. (Page 40 System monitor)
Module diagnostics	Diagnoses the module. (The current error and its details can be checked.) (Page 40 Module diagnostics)
Event history	Displays the event information collected by the CPU module, such as errors occurred in each module, executed operations, and network errors. (Page 41 Event history)

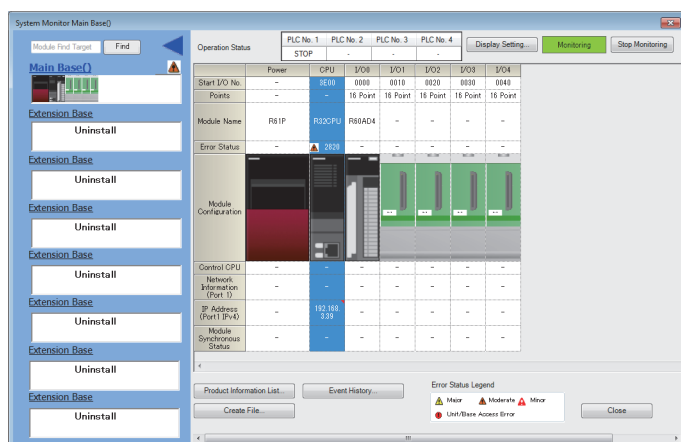
For details on each function, refer to the following.

GX Works3 Operating Manual

System monitor

This function displays the module configuration, and detailed information and error status of each module.
For the error module identified, the module diagnostics function can be executed from this window.

 [Diagnostics] ⇒ [System Monitor]



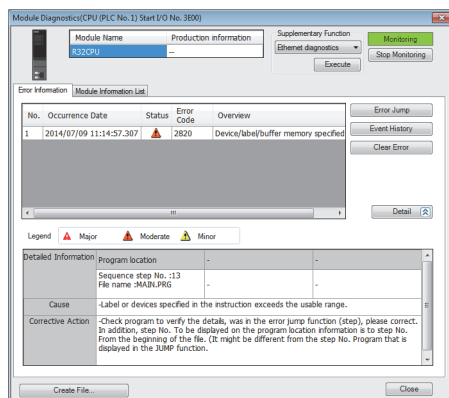
Module diagnostics

This function diagnoses the module. (The current error and its details can be checked.)

Information required for troubleshooting, such as the current error, details and cause of the error, and action to be taken, are displayed. The incorrect parameter setting and program error location can also be identified by selecting the error and clicking the [Error Jump] button.

On the [Module Information List] tab, the LED status and the switch status of the target module can be checked.

 [Diagnostics] ⇒ [System Monitor] ⇒ Click the error module.



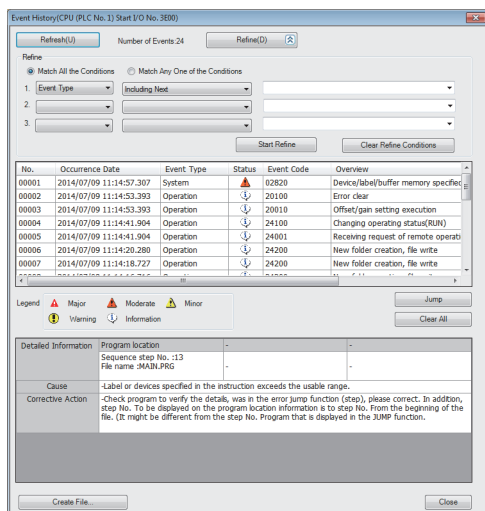
Event history

This function displays the event information, such as errors occurred in the module(s) mounted, executed operations, and network errors.

Since information collected before the CPU module is powered off or reset can also be displayed, the error cause can be identified based on the past operations and errors.

The displayed information can also be saved in CSV file format.

 [Diagnostics] ⇒ [System Monitor] ⇒ [Event History] button



No.	Occurrence Date	Event Type	Status	Event Code	Overview
00001	2014/07/09 11:14:57.307	System	▲	02620	Device/label/buffer memory specifier
00002	2014/07/09 11:14:53.393	Operation	↓	20100	Error clear
00003	2014/07/09 11:14:53.393	Operation	↓	20010	Offset/gain setting execution
00004	2014/07/09 11:14:41.904	Operation	↓	24100	Changing operating status(RUN)
00005	2014/07/09 11:14:41.904	Operation	↓	24001	Receiving request of remote operat
00006	2014/07/09 11:14:20.280	Operation	↓	24200	New folder creation, file write
00007	2014/07/09 11:14:18.727	Operation	↓	24200	New folder creation, file write

Legend: Major (▲), Moderate (↓), Minor (▲), Warning (⚠), Information (i)

Detailed Information: Program location: Sequence step No.: 13, File name: 3MABLP6G

Cause: Label or devices specified in the instruction exceeds the usable range.

Corrective Action: Check program to verify the details, was in the error jump function (step), please correct. In addition, step No. To be displayed on the program location information is to step No. From the beginning of the Re. (It might be different from the step No. Program that is displayed in the JMP function.

4



Use this function for the following purposes:

- To check the error status of all the modules in the system and identify the cause of error occurred in machinery or equipment
- To check when and how the program and parameters of the programmable controller have been changed
- To check for unauthorized access

For details on this function and collected information, refer to the following.

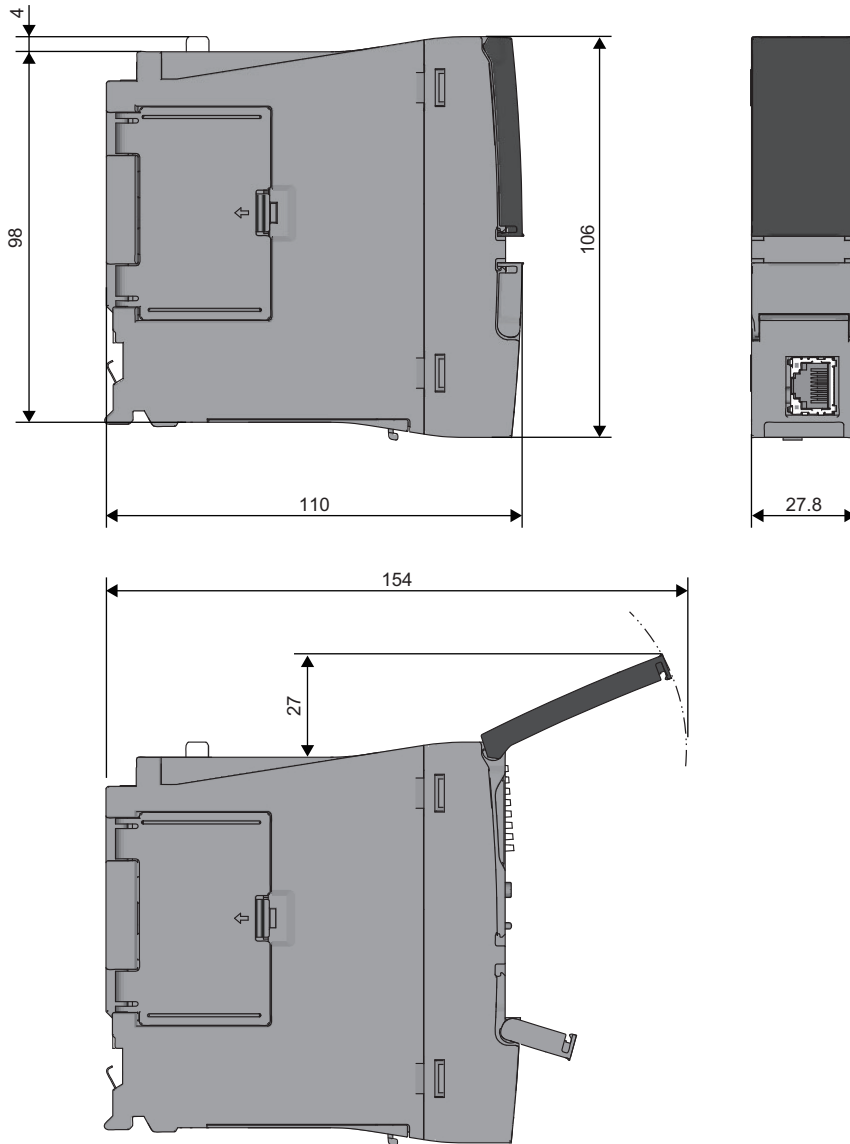
 MELSEC iQ-R CPU Module User's Manual (Application)

APPENDIX

Appendix 1 External Dimensions

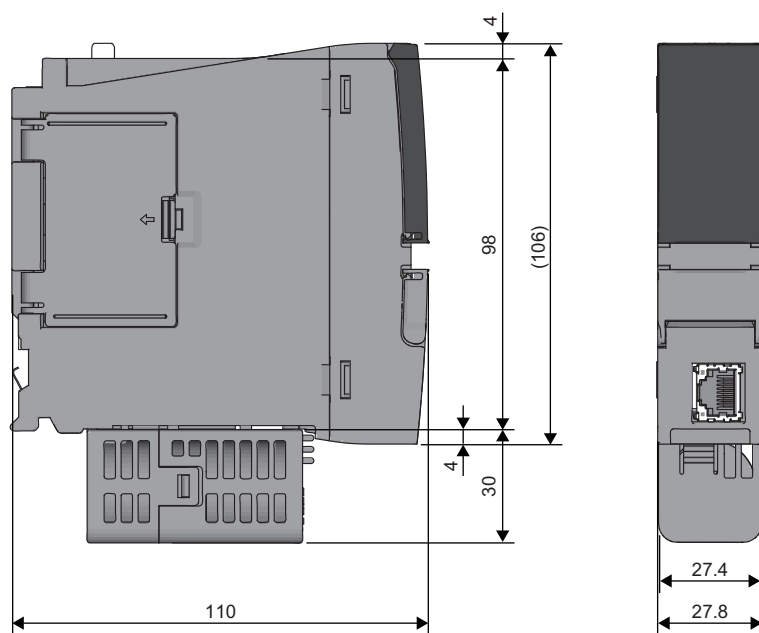
CPU module

- Programmable controller CPU, Process CPU



(Unit: mm)

- With the Q7BAT-SET



(Unit: mm)

INDEX

A

Annunciator (F) 19

B

Battery 15,24
BATTERY LED 15

C

CARD ACCESS LED 15
CARD READY LED 15,26
Constant scan 19
Counter (C) 19
CPU buffer memory 17
CPU buffer memory access device 20
CPU module 17,42
CPU parameter 34

D

Data memory 17
Data register (D) 19
Device area 17
Device/label memory 17

E

Edge relay (V) 19
ERROR LED 15,35,36,39
Ethernet port 15,17
Extended SRAM cassette 20,25
External dimensions 17,20,42

F

File register (R/ZR) 19
File storage area 17
Function block 32
Function input (FX) 19
FUNCTION LED 15
Function output (FY) 19
Function register (FD) 19

H

High-speed internal timer interrupt 1 (I49) 19
High-speed internal timer interrupt 2 (I48) 19

I

Index register (Z) 20
Initializing the CPU module 28
Input (X) 19
Inter-module synchronous interrupt (I44) 19
Internal current consumption (5VDC) 17
Internal relay (M) 19
Interrupt pointer (I) 20
Interrupt using the internal timer (I28 to I31) 19

L

Label 30
Label area 17
Latch label area 17
Latch relay (L) 19
Link direct device 20
Link register (W) 19
Link relay (B) 19
Link special register (SW) 19
Link special relay (SB) 19
Long counter (LC) 19
Long index register (LZ) 20
Long retentive timer (LST) 19
Long timer (LT) 19

M

Memory capacity 17
Module access device 20
Module extension parameter 34
Module label 27
Module parameter 34
Multiple CPU synchronous interrupt (I45) 19

N

Nesting (N) 20
Number of FB files 19
Number of I/O points 19
NZ2MC-1MBS 20
NZ2MC-2MBS 20
NZ2MC-4MBS 20
NZ2MC-8MBS 20
NZ2MC-8MBSE 20

O

Output (Y) 19

P

Parameter 28
Pointer (P) 20
Process CPU 13
Production information marking 15
Program capacity 17
Program file 34
Program memory 17
PROGRAM RUN LED 15,35
Programmable controller CPU 13
Programming language 19,27

Q

Q6BAT 24
Q7BAT-SET 43

R

READY LED	15,39
Refresh data register	20
Refresh memory	17
Resetting the CPU module	35
Retentive timer (ST)	19
RUN/STOP/RESET switch	15,35,36

S

SD memory card	17,26
SD memory card access control switch	15
SD/RD LED	15
Special register (SD)	19
Special relay (SM)	19
SPEED LED	15
System parameter	34

T

Timer (T)	19
Troubleshooting	38

U

USB port	15,17
USER LED	15,36

W

Weight	18,20
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REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
June 2014	SH(NA)-081263ENG-A	First edition
October 2014	SH(NA)-081263ENG-B	■Added functions Memory dump function, real-time monitor function, LED indication expansion ■Added or modified parts SAFETY PRECAUTIONS, TERMS, Section 1.1, Chapter 3, Section 4.4, 4.5, 4.7, 4.8, 4.11
January 2015	SH(NA)-081263ENG-C	■Added models R08PCPU, R16PCPU, R32PCPU, R120PCPU, NZ2MC-8MBSE ■Added functions Process control function, online module change function ■Added or modified parts INTRODUCTION, TERMS, Section 1.1, 2.1, 2.2, Chapter 3, Section 4.2, 4.8, 4.15, Appendix 1

Japanese manual number: SH-081223-C

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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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MODEL: RCPU-U-IN-E

MODEL CODE: 13JX02

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

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