MITSUBISHI ELECTRIC

Changes for the Better

Automating the World

FACTORY AUTOMATION

SERVO SYSTEM CONTROLLER

Migration Guide of Motion Controller [Q17nDCPU(-S1) ⇒ RnMTCPU]

● 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.
The precautions given in this manual are concerned with this product only. Refer to MELSEC iQ-R Module Configuration Manual for a description of the PLC system safety precautions.
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.
- Configure a circuit so that the external power supply is turned off first and then the programmable controller. If the programmable controller is turned off 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 for the network used. For the manuals, please consult your local Mitsubishi representative.
  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.
  When a Safety CPU is used, data cannot be modified while the Safety CPU is in SAFETY MODE.

[Design Precautions]

⚠WARNING

- 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. For areas used for safety communications, they are protected from being written by users, and thus safety communications failure caused by data writing does not occur.
- 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.
  When safety communications are used, an interlock by the safety station interlock function protects the system from 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.
- 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.
- If safety standards (ex., robot safety rules, etc.,) apply to the system using the module, servo amplifier and servomotor, make sure that the safety standards are satisfied.
- Construct a safety circuit externally of the module or servo amplifier if the abnormal operation of the module or servo amplifier differs from the safety directive operation in the system.
- Do not remove the SSCNETIII cable while turning on the control circuit power supply of modules and servo amplifier. Do not see directly the light generated from SSCNETIII connector of the module or servo amplifier and the end of SSCNETIII cable. When the light gets into eyes, you may feel something wrong with eyes. (The light source of SSCNETIII complies with class1 defined in JISC6802 or IEC60825-1.)

[Design Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to electromagnetic interference. Keep a distance of 100 mm or more between.
- 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 and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card 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 by Program" for "Opening Method" of “Module Parameter”. If "Open by Program" is selected, an execution of 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.

[Security Precautions]

⚠WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[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 (IB-0800525). 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 may cause malfunction, failure, or drop of the module.
- To mount a module with no module fixing hook, place the concave part(s) located at the bottom onto the guide(s) of the base unit, push in the module, and fix it with screw(s).
  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 component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
  For the specified torque range, refer to the MELSEC iQ-R Module Configuration Manual.
- 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 or a battery-less option 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.
- Beware that the module could be very hot while power is on and immediately after power-off.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, battery-less option 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 a blank cover module (RG60) to each empty slot before powering on the system for operation. Failure to do so may result in electric shock. Also, attach an extension connector protective cover*1 to each unused extension cable connector as necessary. Directly touching any conductive parts of the connectors while power is on may result in electric shock.
  *1 For details, please consult your local Mitsubishi Electric representative.

[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. Doing so may result in malfunction due to noise. Keep a distance of 100 mm or more between those cables.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables. In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks.
  Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
- 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.
- When a protective film is attached to the top of the module, remove it before system operation. If not, inadequate heat dissipation of the module may cause a fire, failure, or malfunction.
- 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 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 25 cm 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.

[Startup and Maintenance Precautions]

⚠CAUTION

- After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant).
  Exceeding the limit may cause malfunction
  - Mounting/removing the module to/from the base unit
  - Inserting/removing the extended SRAM cassette or battery-less option cassette to/from the CPU module
  - Mounting/removing the terminal block to/from the module
  - Connecting/disconnecting the extension cable to/from the base unit
- 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 or a battery-less option 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. Wearing a grounded antistatic wrist strap is recommended. Failure to discharge the static electricity may cause the module to fail or malfunction.
- After unpacking, eliminate static electricity from the module to prevent electrostatic discharge from affecting the module. If an electrostatically charged module comes in contact with a grounded metal object, a sudden electrostatic discharge of the module may cause failure.
  For details on how to eliminate static electricity from the module, refer to the following.
  Antistatic Precautions Before Using MELSEC iQ-R Series Products (FA-A-0368)
- Use a clean and dry cloth to wipe off dirt on the module.
- Before testing the operation, set a low speed value for the speed limit parameter so that the operation can be stopped immediately upon occurrence of a hazardous condition.
- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
- When using the absolute position system function, on starting up, and when the module or absolute position motor has been replaced, always perform a home position return.
- Before starting the operation, confirm the brake function.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- After maintenance and inspections are completed, confirm that the position detection of the absolute position detection function is correct.
- Lock the control panel and prevent access to those who are not certified to handle or install electric equipment.

[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.
- 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 and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.
- Note that when the reference axis speed is specified for interpolation operation, the speed of the partner axis (2nd, 3rd, or 4th axis) may exceed the speed limit value.
- Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.

[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.

REVISIONS

Print Date	Manual No.	Revision
Sep., 2025	L(NA)03212ENG-A	First edition

INTRODUCTION

Please read this manual carefully so that equipment is used to its optimum.

CONTENTS

MEMO

1. OVERVIEW OF MIGRATION FROM Q17nDCPU(-S1) TO RnMTCPU

1.1 Benefits of Migration

Migrating from the existing system using Q172DCPU/Q173DCPU/Q172DCPU-S1/ Q173DCPU-S1 (hereinafter called Q17nDCPU(-S1)) Motion controllers to a new system using MELSEC iQ-R series Motion controllers R32MTCPU/R16MTCPU (hereinafter called RnMTCPU), with the highly compatible Q173DCPU(-S1)/Q172DCPU(-S1), is recommended. We also recommend migrating servo amplifiers to the MR-J5-B at the same time.
Migrating not only allows the system to run for longer periods, but also has the following advantages.

(1) High-speed operation and high functionality of the Motion controller
The Motion controller RnMTCPU achieves the operation cycle of 0.222 ms/2 axes, enabling a dramatically fast operation.
The controller also achieves further advanced motion control with a wide variety of motion control functions.
→ Increased productivity from higher speeds and functionality of the Motion controller operation cycle.

(2) High-speed communication by SSCNET III/H
Speeding up and improving noise tolerance of servo system network communications (SSCNET III/H) are achieved by optical communication. Also, communication speeds have been increased threefold compared to SSCNET III to 150 Mbps both ways.
A long-distance cable of 100 m can also be used, removing the need to replace the connection cable from SSCNET III.
→ Increased speeds over the entire facility

(3) Servo amplifier MR-J5-B and servo motor
The latest MR-J5-B achieves high performance operation with a variety of functions including quick tuning, one-touch tuning, and advanced vibration suppression control II in addition to predictive maintenance such as disconnection detection, servo motor incorrect wiring detection, and encoder communication diagnosis. The product lineup includes multi-axis servo amplifiers that contribute to energy saving and space saving.
The HK series compatible rotary servo motor enables 3.5 kHz speed frequency response and a 26-bit high resolution encoder (67108864 pulse/rev). In addition, single connector/one-touch lock/single cable type is available for use, contributing to reduced wiring of a machine.
→ Increase of applications, improved performance, energy saving, downsizing, and reduced wiring of drive systems.

(4) Lower maintenance cost
After 5 years of usage, the products will need maintenance, such as replacement of the whole circuit board due to the life of components including electrolytic capacitors and memories.
MELSEC iQ-R series Motion controller RnMTCPU has a built-in non-volatile memory, and most recent MELSERVO-J5 series compatible servo motor HK series are equipped with a batteryless absolute position encoder as standard, removing the need for replacing batteries or managing battery storage, reducing maintenance costs.
→ Increased equipment longevity

1.2 Device list for migration

The main target models and operating system software for replacement described in this section are as follows.
If you are using special operating system software or application-specific operating system software, contact your local sales office.

(1) Table of system component

When replacing the existing controller with RnMTCPU, be sure to use MELSEC iQ-R series compatible system components.

Product name		Before migration from Q17nDCPU(-S1)		After migration to RnMTCPU
Main base unit		Q3□DB		R3□B
Power supply module		Q6□P		R6□P
Extension base unit		Q6□B		R6□B
Extension cable		QC□B		RC□B
CPU module No.1	PLC CPU module	QnUD(E)(H)(V)CPU		RnCPU
	C Controller module	Q06CCPU-V Q12DCCPU-V		R12CCPU-V
		Q24DHCCPU-□ Q26DHCCPU-□		–
Motion CPU module		Q172DCPU		R16MTCPU (Note-1)
		Q173DCPU		R32MTCPU (Note-2)
		Q172DCPU-S1		R16MTCPU (Note-1)
		Q173DCPU-S1		R32MTCPU (Note-2)
Battery holder unit		Q170HBATC (Order if necessary)		Unnecessary
Battery		Q6BAT		Unnecessary
Input module	AC input	QX10(-TS)		RX10
		QX28		RX28
	DC input (Positive common)	QX40(-S1)(-TS) QX41(-S1) QX42(-S1)		RX40C7(-TS) (Note-3) RX41C4 (Note-3) RX42C4 (Note-3)
		QX41-S2		RX41C6HS (Note-3)
	DC input (Negative common)	QX80(-TS) QX81 QX82(-S1)		RX40C7(-TS) (Note-3) RX41C4 (Note-3) RX42C4 (Note-3)
		QX81-S2		RX41C6HS (Note-3)
	DC input (Positive common/ negative common shared)	QX70 QX71 QX72		–
	DC high-speed input (Positive common)	QX40H		RX40PC6H
		QX70H		RX61C6HS (Note-3)
	DC high-speed input (Negative common)	QX80H		RX40NC6H
		QX90H		RX61C6HS (Note-3)
	DC/AC input	QX50		–

[Continued]

Product name		Before migration from Q17nDCPU(-S1)		After migration to RnMTCPU
Output module	Relay output	QY10(-TS) QY18A		RY10R2(-TS) RY18R2A
	Triac output	QY22		RY20S6
	Transistor output (Sink type)	QY40P(-TS) QY41P QX42P QY50		RY40NT5P(-TS) RY41NT5P RY42NT2P RY40NT2P
		QY70		–
		QY71		RY41NT5H
	Transistor output (Source type)	QY80(-TS) QY81P QY82P		RY40PT5P(-TS) RY41PT1P RY42PT1P
	Transistor high-speed output (Sink type)	QY41H		RY41NT2H
	Transistor output (Independent)	QY68A		–
Input/output composite module	DC input/transistor output	QH42P		RH42C4NT2P
		QX41Y41P QX48Y57		–
Interrupt module		QI60		RX40C7 (Note-3)
Analog input module	Voltage/current input	Q64AD(H)		R60AD(H)4
	Voltage input	Q68ADV		R60ADV8
	Current input	Q68ADI		R60ADI8
Channel isolated analog input module	Voltage/current input	Q64AD-GH		–
		Q64ADH		R60AD8-G
	Current input	Q62AD-DGH		–
		Q66AD-DG		–
Analog output module	Voltage/current output	Q62DA(N) Q64DA(N)		R60DA4
		Q64DAH		R60DAH4
	Voltage output	Q68DAV(N)		R60DAV8
	Current output	Q68DAI(N)		R60DAI8
Channel isolated analog output module	Voltage/current output	Q62DA-FG		–
		Q66DA-G		R60DA8-G
Analogue input/output module		Q64AD2DA		–
Servo external signals interface module		Q172DLX		RX41C4
Synchronous encoder interface module		Q172DEX		Unnecessary (via MR-J5-□B) (Note-4)
Manual pulse generator interface module		Q173DPX		RD62D2(Differential input, 2CH) RD62P2(DC input, 2CH) RD62P2E

[Continued]

<table>
<tr><th>Product name</th><th colspan="2">Before migration from Q17nDCPU(-S1)</th><th></th><th>After migration to RnMTCPU</th></tr>
<tr><td>Safety signal module</td><td colspan="2">Q173DSXY (Note-5)</td><td rowspan="8"></td><td>–</td></tr>
<tr><td>Cable for forced stop input</td><td>Q170DEMICBL☐M</td><td rowspan="2">Either is necessary</td><td rowspan="2">Unnecessary</td></tr>
<tr><td>Connector for forced stop input cable</td><td>Q170DEMICON</td></tr>
<tr><td rowspan="2">Serial absolute synchronous encoder</td><td colspan="2">Q171ENC-W8</td><td rowspan="3">HK-KT series rotary servo motor (Note-4)</td></tr>
<tr><td colspan="2">Q170ENC</td></tr>
<tr><td>Serial absolute synchronous encoder</td><td colspan="2">Q170ENCCBL☐M (Q171ENC-W8/Q170ENC)</td></tr>
<tr><td>Manual pulse generator</td><td colspan="2">MR-HDP01</td><td>← (Same as Q17nDCPU(-S1)) (Note-6)</td></tr>
<tr><td>Optical data transmission device (Note-7)</td><td colspan="2">EWF-0EA-N
EWF-0EB-N</td><td>–</td></tr>
<tr><td>SSCNETIII cable (Note-8)</td><td colspan="2">MR-J3BUS☐M
MR-J3BUS☐M-A
MR-J3BUS☐M-B</td><td>← (Same as Q17nDCPU(-S1))</td></tr>
</table>

(Note-1): The number of control axes is increased from 8 to 16.

(Note-2): If the number of axes used in the system with Q173DCPU(-S1) is 16 or less, R16MTCPU can be also selected.

(Note-3): Positive common/negative common shared

(Note-4): By connecting the HK-KT series rotary servo motor to MR-J5-☐B, it can be used as a synchronous encoder. Select the encoder cable by referring to "Motor cables/connector sets" and "Encoder cable" in "Rotary Servo Motor User's Manual (For MR-J5)". Also, when using a servo amplifier without CN2L, an MR-J4FCCBL03M branch cable is required.

(Note-5): Q17nDCPU-S1 only

(Note-6): The existing MR-HDP01 can be used continuously with RnMTCPU.
Mitsubishi Electric has confirmed the operation of the following manual pulse generator.
Contact the manufacturer for details.

Product name	Model name	Description	Manufacturer
Manual type rotary encoder	UFO-M2-0025-2Z1-B00E	Number of pulses per revolution: 25 pulse/rev (100 pulse/rev after magnification by 4)	Nemicon Corporation

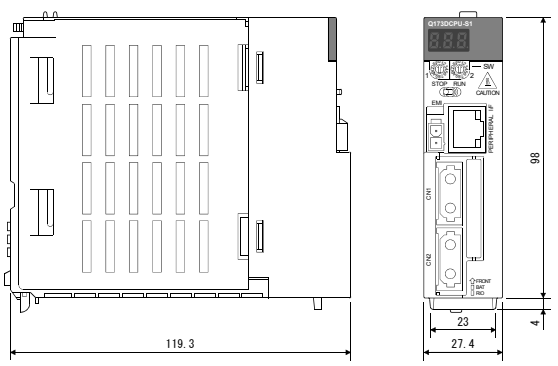
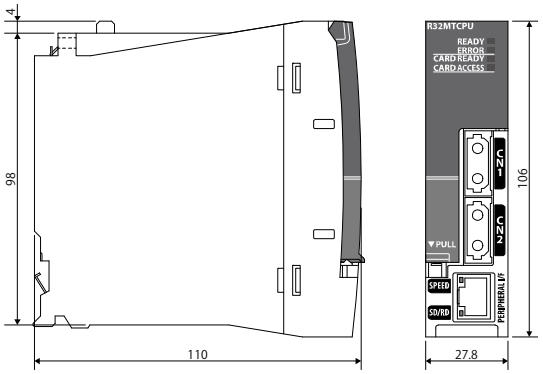
(Note-7): The optical data transmission device EWF-0EA-N/EWF-0EB-N does not support SSCNET III/H. When using this device, replace the servo amplifier with MR-J4-B and use the SSCNET III compatible mode.

(Note-8): For a long distance cable over 50 m or an ultra-long bending life cable, contact Mitsubishi Electric System & Service Co., Ltd.

(2) Points and cautions for system components replacement

- The RnMTCPU only controls MELSEC iQ-R series modules. It cannot control MELSEC-Q series modules.
- The RnMTCPU does not have an EMI terminal. When the existing model executes forced stop by using the EMI terminal, input the forced stop signal to an input module, and assign the device of the input module for forced stop in the forced stop input settings ([Motion CPU Common Parameter] → [Basic Setting]).
- RnMTCPU is battery-less.
- Select a power supply unit after estimating the current consumption of the system. The current consumption can be estimated on the "FA Integrated Selection Tool" on the Mitsubishi Electric FA global website.

(3) Exterior dimensions and mass

	Q17nDCPU(-S1)	RnMTCPU
Exterior dimensions [mm]		
	98.0[H] × 27.4[W] × 119.3[D]	106.0[H] × 27.8[W] × 110.0[D]
Current consumption DC5V[A]	1.25 to 1.30	1.20
Mass [kg]	0.33	0.28

(4) Operating system software

For the Q17nDCPU(-S1), the operating system software (OS) was prepared according to the purpose, but since the RnMTCPU has integrated the operating system software (OS), only SW10DNC-RMTFW is available.

Before migration from Q17nDCPU(-S1)				After migration to RnMTCPU	
Motion CPU model	OS Type	Operation system software model		Motion CPU model	Operation system software model
Q172DCPU(-S1)	SV13	SW8DNC-SV13QB	→	R32MTCPU R16MTCPU	SW10DNC-RMTFW (installed before shipment (Note-1))
Q173DCPU(-S1)		SW8DNC-SV13QD			
Q172DCPU(-S1)	SV22	SW8DNC-SV22QA			
Q173DCPU(-S1)		SW8DNC-SV22QC			
Q172DCPU(-S1)	SV43	SW8DNC-SV43QA			SW10DNC-RMTFW-Y001
Q173DCPU(-S1)		SW8DNC-SV43QC			

(Note-1): MR-J5-□B is supported with F/W Ver.24 or later.

(5) Servo amplifiers/Rotary servo motors

Refer to the User's Manual of each servo motor for the encoder cables that support to each servo motor.

Before migration from Q17nDCPU(-S1)		After migration to RnMTCPU	
Servo amplifier		Servo amplifier	
MR-J3-B	MR-J3-☐B MR-J3W-☐B MR-J3-☐BS MR-J3-☐B-RJ006	MR-J5-B	MR-J5-☐B MR-J5-☐B-RJ MR-J5W2-☐B MR-J5W3-☐B
MR-J4-B (J3 compatible mode)	MR-J4-☐B MR-J4-☐B-RJ MR-J4W2-☐B MR-J4W3-☐B	MR-J5-B	MR-J5-☐B MR-J5-☐B-RJ MR-J5W2-☐B MR-J5W3-☐B

Before migration from Q17nDCPU(-S1)			After migration to RnMTCPU		
Rotary servo motor			Rotary servo motor		
MR-J3-B	Ultra-low inertia	HF-MP☐	MR-J5-B	Ultra-low inertia	HK-MT☐
		HC-RP☐			HK-RT☐
	Low inertia	HF-KP☐		Low inertia	HK-KT☐
		HC-LP☐			
		HF-JP☐			
		HA-LP☐			
	Medium inertia	HF-SP☐		Medium inertia	HK-ST☐
	Flat type	HC-UP☐		Flat type	HK-ST☐
MR-J4-B (J3 compatible mode)	Ultra-compact size	HG-AK☐	MR-J5-B	Ultra-compact size	–
	Ultra-low inertia	HG-MR☐		Ultra-low inertia	HK-MT☐
		HG-RR☐			HK-RT☐
	Low inertia	HG-KR☐		Low inertia	HK-KT☐
		HG-JR☐ 2 kW or smaller			
		HG-JR☐ 3.5 kW or larger		Medium inertia	HK-ST☐
	Medium inertia	HG-SR☐			
	Flat type	HG-UR☐		Flat type	HK-ST☐

(6) Servo amplifiers/Linear servo motors

Before migration from Q17nDCPU(-S1)				After migration to RnMTCPU		
Servo amplifier		Linear servo motor		Servo amplifier		Linear servo motor
MR-J3-B	MR-J3-□B-RJ004	LM-H2□ LM-F□ LM-K2□ LM-U2□	→	MR-J5-B	MR-J5-□B MR-J5-□B-RJ MR-J5W2-□B MR-J5W3-□B	LM-H3□ LM-F□ LM-K2□ LM-U2□
MR-J4-B (J3 compatible mode)	MR-J4-□B MR-J4-□B-RJ MR-J4W2-□B MR-J4W3-□B	LM-H3□ LM-F□ LM-K2□ LM-U2□			MR-J5-□B MR-J5-□B-RJ MR-J5W2-□B MR-J5W3-□B	LM-H3□ LM-F□ LM-K2□ LM-U2□

(7) Servo amplifiers/Direct drive motors

A battery or a battery case, as well as an absolute position storage unit (MR-BTAS01) is required to configure an absolute position detection system by using a direct drive motor.

Before migration from Q17nDCPU(-S1)				After migration to RnMTCPU		
Servo amplifier		Direct drive motor		Servo amplifier		Direct drive motor
MR-J3-B	MR-J3-□B-RJ080W	TM-RFM□	→	MR-J5-B	MR-J5-□B MR-J5-□B-RJ MR-J5W2-□B MR-J5W3-□B	TM-RFM□ TM-RG2M□ TM-RU2M□
MR-J4-B (J3 compatible mode)	MR-J4-□B MR-J4-□B-RJ MR-J4W2-□B MR-J4W3-□B	TM-RFM□			MR-J5-□B MR-J5-□B-RJ MR-J5W2-□B MR-J5W3-□B	TM-RFM□ TM-RG2M□ TM-RU2M□

(8) Servo system network

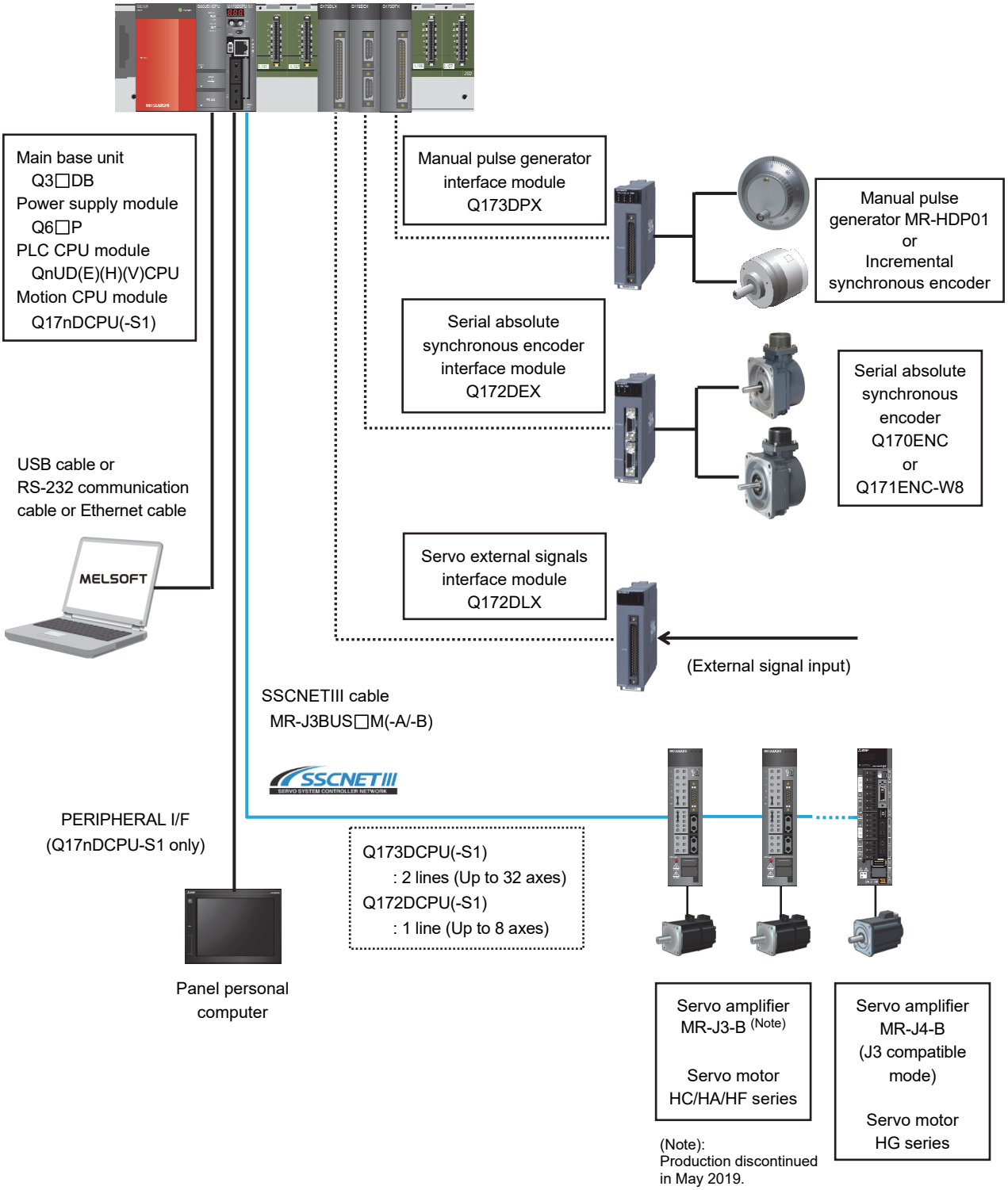
Item		SSCNETIII		SSCNETIII/H
Communications medium		Optical fiber cable		← (same as SSCNETIII)
Communications speed		50 Mbps		150 Mbps
Communications cycle	Send	0.44 ms/0.88 ms		0.222 ms/0.444 ms/0.888 ms
	Receive	0.44 ms/0.88 ms		0.222 ms/0.444 ms/0.888 ms
Number of control axes		Up to 16 axes/line		← (same as SSCNETIII)
Transmission distance		[Standard cord for inside panel] Up to 3 m between stations, Maximum overall distance: 48 m (3 m × 16 axes) [Standard cable for outside panel] Up to 20 m between stations, Maximum overall distance: 320 m (20 m × 16 axes)		[Standard code for inside panel and standard cable for outside panel] Up to 20 m between stations, Maximum overall distance: 320 m (20 m × 16 axes)
		[Long distance cable] Up to 50 m between stations Maximum overall distance: 800 m (50 m × 16 axes)		[Long distance cable] Up to 100 m between stations Maximum overall distance: 1600 m (100 m × 16 axes)

(9) Engineering environment (required)

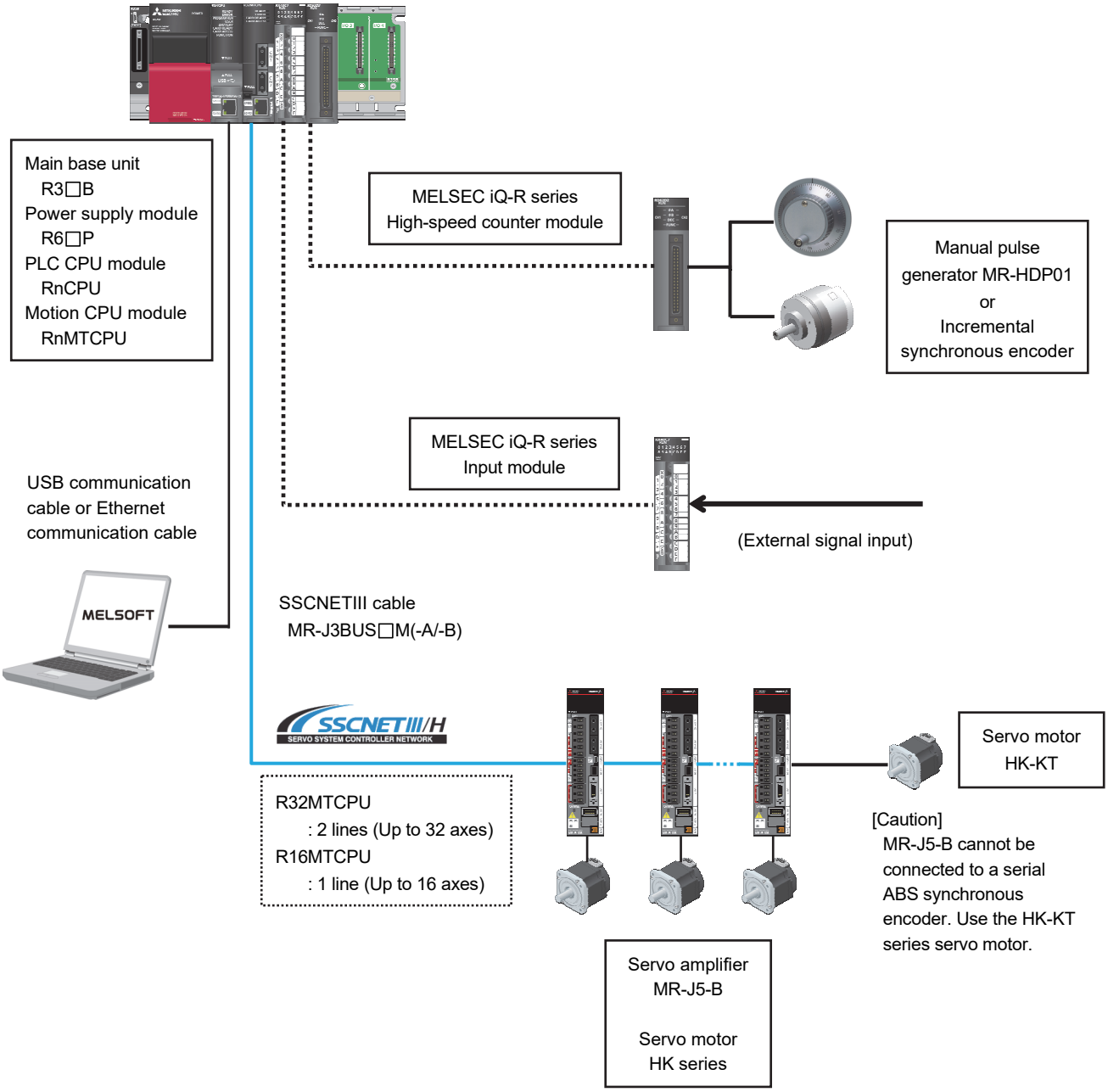
Product name	Model	Version
MELSOFT MT Works2	SW1DND-MTW2-E	Ver.1.175H or later
MELSOFT GX Works3	SW1DND-GXW3-E	Ver.1.000A or later
MELSOFT MR Configurator2	SW1DNC-MRC2-E	Ver.1.130L or later

1.3 System Configuration

1.3.1 Example of system configuration using Q17nDCPU(-S1) before migration

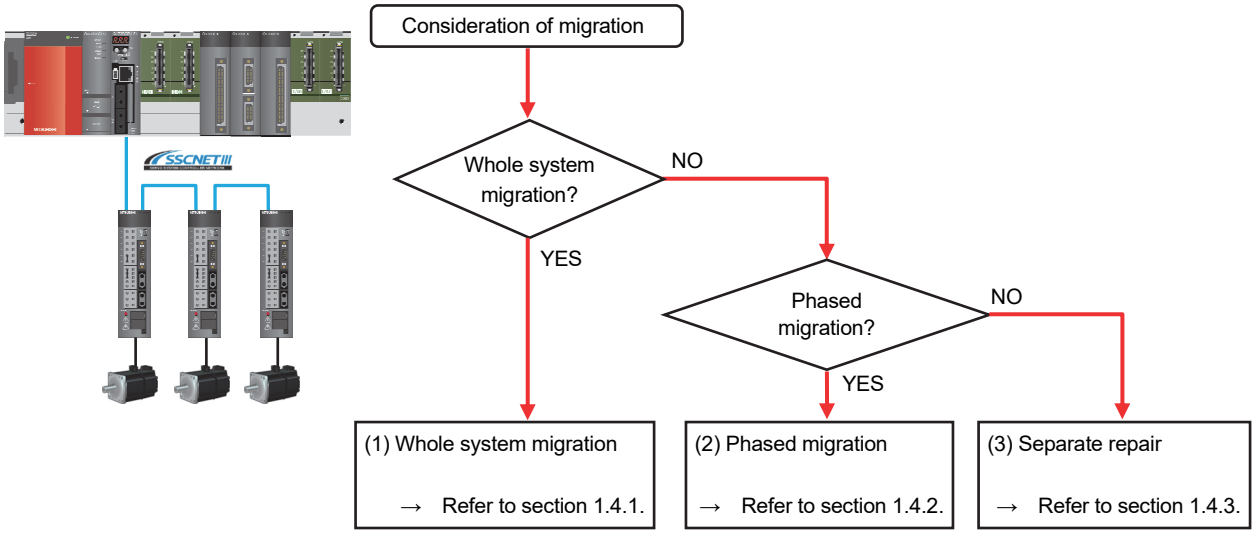


1.3.2 Example of system configuration using RnMTCPU after migration



1.4 Case Study on Migration

The following describes a standard case study of migrating the existing system using Q17nDCPU(-S1) and MR-J3-B.



(1) Whole system migration (recommended)

The controller, servo amplifiers, servo motors, and servo system network are replaced simultaneously. Although a large-scale installation is required, the whole system migration allows the system to operate for longer periods. (Refer to section 1.4.1.)

(2) Phased migration (When the whole system migration is difficult due to the installation period and cost.)

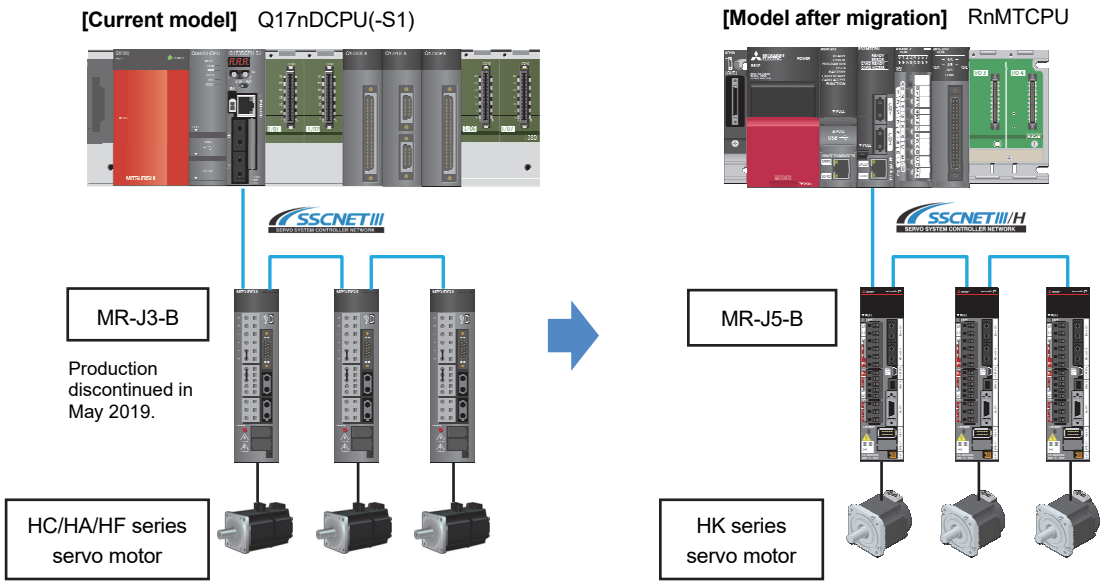
The controller is replaced with RnMTCPU in the first phase, then in the next phase, the MR-J3-B servo amplifiers are gradually replaced with MR-J4-B, and then in the final phase, the servo amplifiers are replaced with MR-J5-B.
(Refer to section 1.4.2.)

(3) Separate repair

This is a replacement method for when the controller, the servo amplifier, or the servo motor malfunctions. (Refer to section 1.4.3.)

1.4.1 Whole system migration (recommended)

The following shows the example of system when the whole system migration takes place.



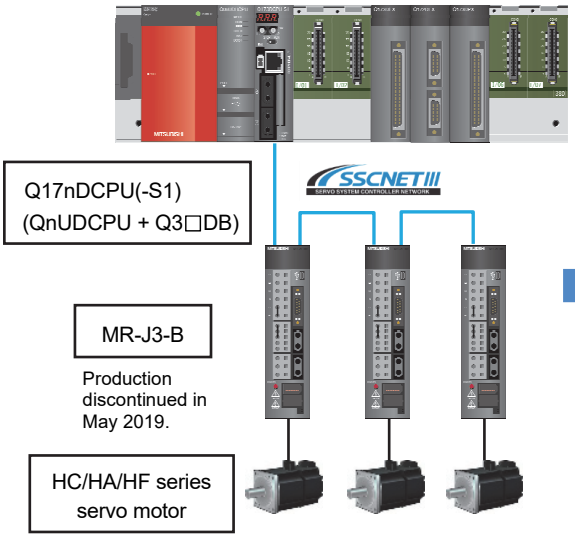
[Changes in the system]

Product name	Model before migration		Model after migration
Main base unit	Q3□DB		R3□B
Power supply module	Q6□P		R6□P
PLC CPU module	QnUD(E)(H)(V)CPU		RnCPU
Motion CPU module	Q17nDCPU(-S1)		RnMTCPU
Motion modules	Q172DLX		RX41C4
	Q172DEX		Not required (via MR-J5-□B)
	Q173DPX		RD62D2/RD62P2/RD62P2E
Servo amplifier	MR-J3-B/MR-J4-B		MR-J5-B
Servo motor	HC/HA/HF series (MR-J3-B) HG series (MR-J4-B)		HK series

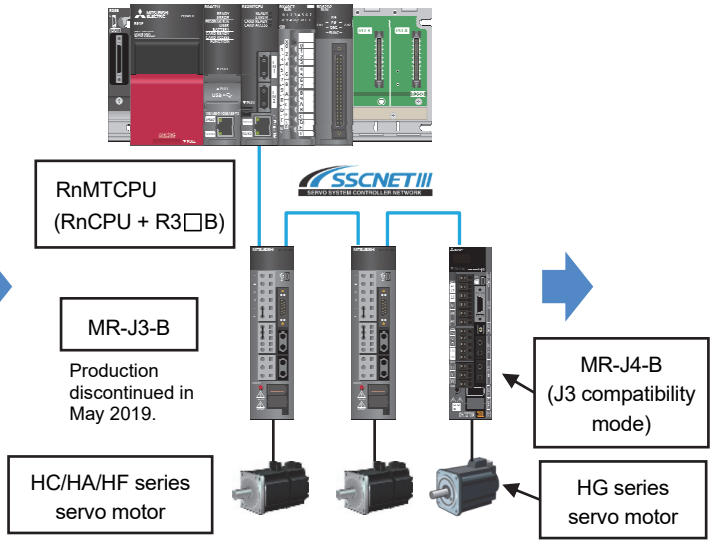
1.4.2 Phased migration

The following shows the procedure for the phased migration in which the controller is replaced with RnMTCPU in the first phase, and then the MR-J3-B servo amplifiers are gradually replaced with MR-J4-B/MR-J5-B in the following phases.

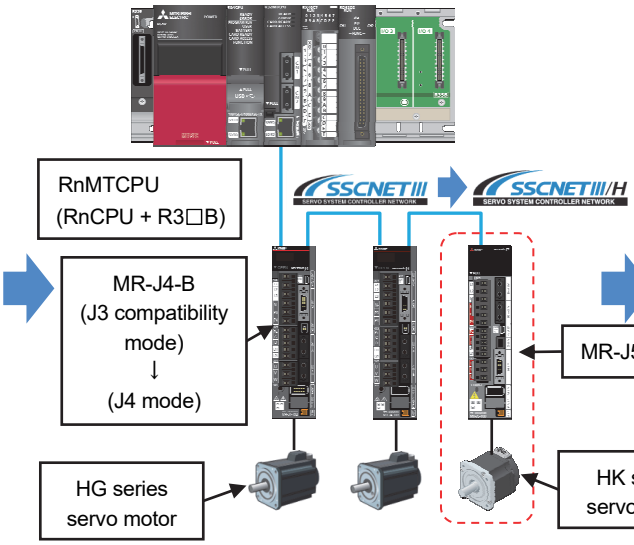
[Current model]



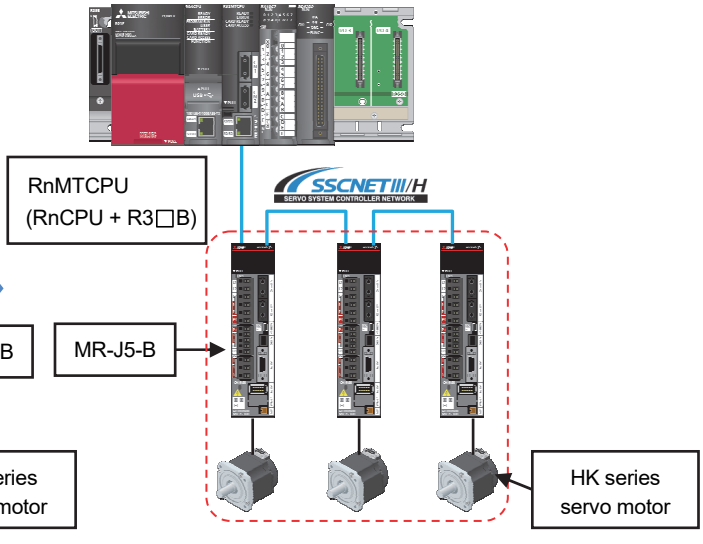
[Replacement - Phase 1]
Replacement of the controller, servo amplifier + servo motor replacement for only one axis



[Replacement - Phase 2]
Servo amplifier and servo motor replacement for other axis, and servo system network replacement



[Replacement - Phase 3]
Servo amplifier and servo motor replacement for all axes



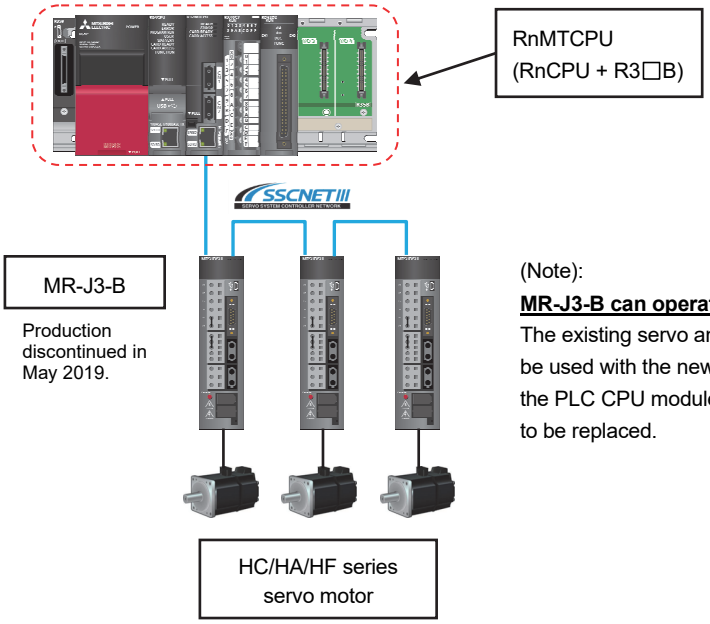
(Note): When replacing all the servo amplifiers with MR-J4-B or MR-J5-B, the operation mode of MR-J4-B can be switched from "J3 compatibility mode" to "J4 mode".
The servo system network is also changed from SSCNETIII to SSCNETIII/H.

(Note): For details of the J3 compatibility mode, refer to the "Transition from MELSERVO-J3/J3W Series to J4 Series Handbook".

1.4.3 Separate repair

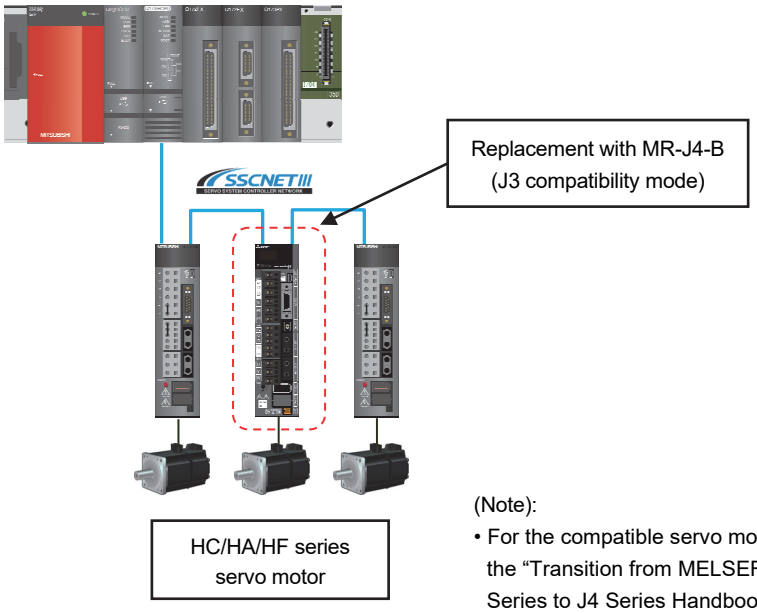
The following shows the procedure for the separate repair.

(1) When the controller has malfunctioned.
Replace only the controller.



(Note):
MR-J3-B can operate with the replaced controller
The existing servo amplifiers and servo motors can be used with the new controller, however, note that the PLC CPU module and the main base unit needs to be replaced.

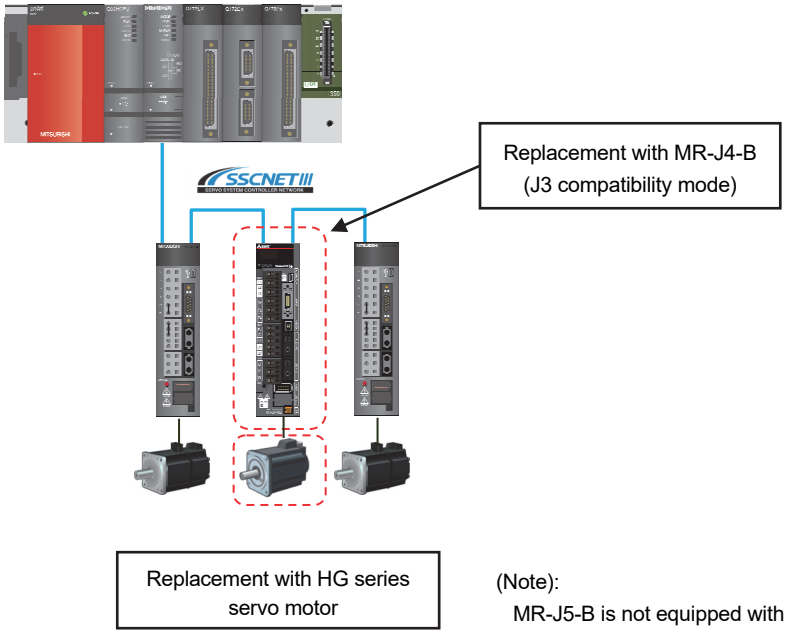
(2) When the MR-J3-B servo amplifier has malfunctioned.
Replace only the servo amplifier.



(Note):
- For the compatible servo motors, refer to the “Transition from MELSERVO-J3/J3W Series to J4 Series Handbook”.
- MR-J5-B is not equipped with J3 compatibility mode, and thus cannot be mixed with MR-J3-B.

(3) When the HC/HA/HF servo motor has malfunctioned

Simultaneously replace the servo amplifier and the malfunctioned servo motor.



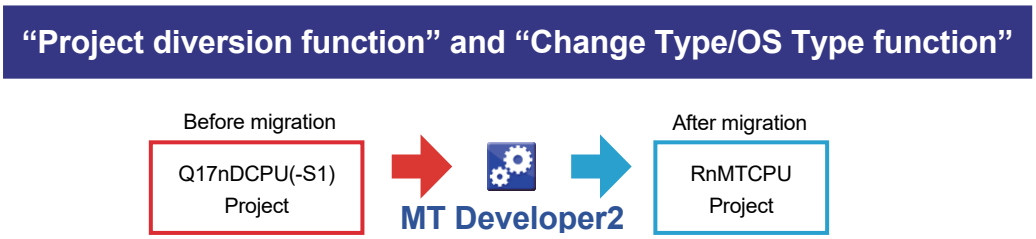
(Note):
MR-J5-B is not equipped with J3 compatibility mode, and thus cannot be mixed with MR-J3-B.

1.5 Project Diversion

The following functions can convert the projects of Q17nDCPU(-S1) into those of RnMTCPU. For the procedure details of project conversion, refer to section “2.3.3 Project diversion procedures by engineering environment”.

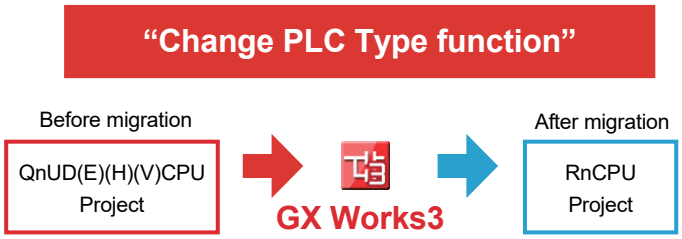
(1) Motion CPU project

“Project diversion function” and “Change type/OS type function” of MELSOFT MT Developer2



(2) PLC CPU project

“Change PLC type function” of MELSOFT GX Works3



1.6 Introduction of R64MTCPU

When replacing, the MELSEC iQ-R series Motion controller R64MTCPU with the maximum of 64 control axes is also available. Up to 192 axes can be synchronized by the use of three R64MTCPUs, enabling control of a large-scale system.

	R64MTCPU	R32MTCPU	R16MTCPU
Maximum number of control axes	64 axes (Note-1)	32 axes	16 axes
Servo system network	SSCNETIII/H, SSCNETIII		
Number of SSCNETIII/H lines	2 lines (Note-2)		1 line (Note-2)
Maximum distance between stations [m]	100 (SSCNETIII/H), 50 (SSCNETIII)		
Maximum overall cable distance [m]	3200 (SSCNETIII/H) 800 (SSCNETIII)	1600 (SSCNETIII/H) 800 (SSCNETIII)	
Maximum number of connected optical hub units	32 (16 per line)		16
Operation cycle [ms]	0.222 to 7.111		
Program language	Motion SFC, Dedicated instruction		

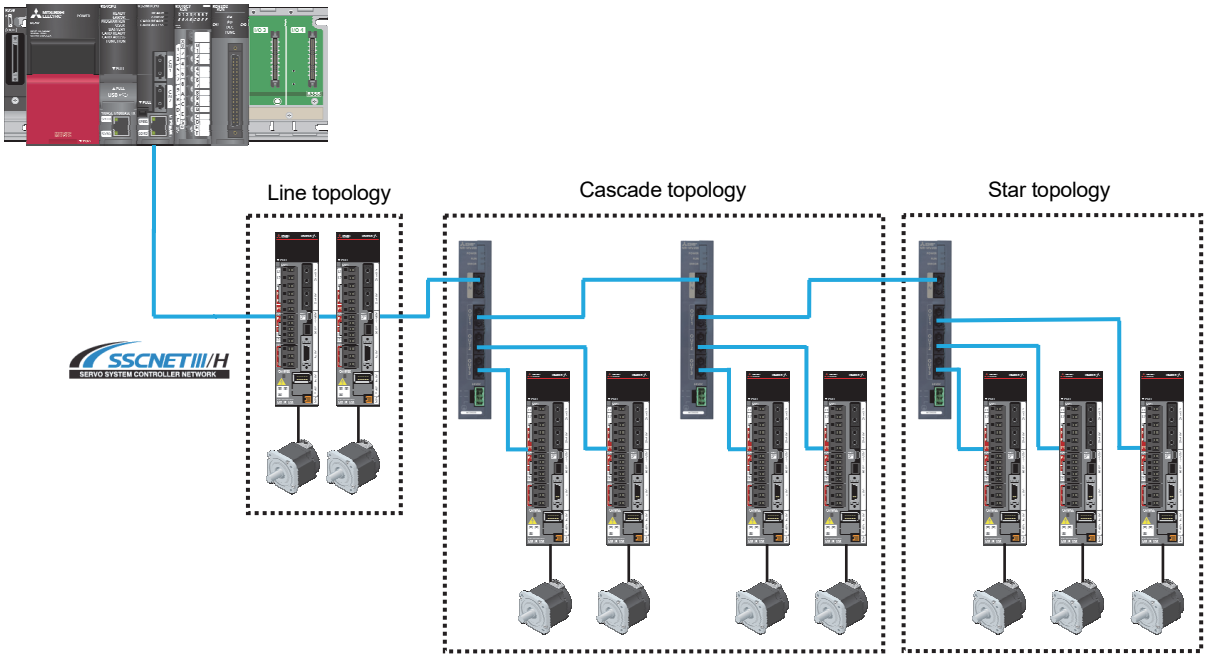
(Note-1): When SSCNETIII is used, the maximum number of control axes is 32 (16 axes per line).

(Note-2): SSCNETIII/H and SSCNETIII cannot be mixed on the same line.

1.7 Introduction of optical hub unit

The SSCNETIII/H compatible optical hub unit MR-MV200 can branch a single SSCNETIII/H network line in three separate directions (three outputs per one input).
By using MR-MV200, other servo amplifiers can be used even when a specific servo amplifier is turned OFF.

A connection example when using the MR-MV200 and the specifications are shown below.



Item	Description
Input voltage [V]	21.6 to 26.4 VDC (24 VDC ± 10 %)
Input current [A]	0.2
Consumption current [W]	4.8
Mass [kg]	0.2
Mounting method	Directly mounted to the control panel or with DIN rail
Cable length [m]	Up to 100
Number of optical hub units	Up to 16 units/line
Number of servo amplifiers (Note-1, 2)	Up to 16 axes/line
Exterior dimensions [mm]	168 (H) x 30 (W) x 100 (D)

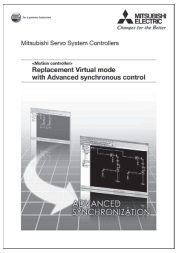
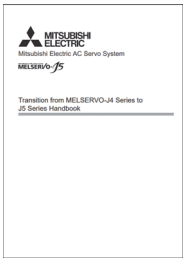
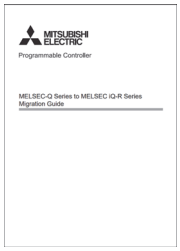
(Note-1): MR-J5-B/MR-J4-B occupies one axis, MR-J5W2-B/MR-J4W2-B occupies two axes, and MR-J5W3-B/MR-J4W3-B occupies three axes.

(Note-2): The number of connectable servo amplifiers on a single network line cannot be increased.

1.8 Relevant Documents

Refer to the following relevant documents for the replacement.

1.8.1 Relevant catalogs

Servo System Controllers MELSEC iQ-R/MELSEC iQ-F Series  L(NA)03100	AC Servo System MELSERVO-J5  L(NA)03179ENG
Replacement of Virtual mode with Advanced synchronous control  L(NA)03123	Transition from MELSERVO-J4 Series to J5 Series Handbook  L(NA)03201ENG
Transition from MELSERVO-J3/J3W Series to J4 Series Handbook  L(NA)03127	MELSEC-Q Series to MELSEC iQ-R Series Migration Guide  L(NA)08510ENG

1.8.2 Relevant manuals

(1) Motion controller

Manual title	Manual No.
MELSEC iQ-R Motion Controller User's Manual	IB-0300235
MELSEC iQ-R Motion Controller Programming Manual (Common)	IB-0300237
MELSEC iQ-R Motion Controller Programming Manual (Program Design)	IB-0300239
MELSEC iQ-R Motion Controller Programming Manual (Positioning Control)	IB-0300241
MELSEC iQ-R Motion Controller Programming Manual (Advanced Synchronous Control)	IB-0300243
MELSEC iQ-R Motion Controller Programming Manual (Machine Control)	IB-0300309
MELSEC iQ-R Motion Controller Programming Manual (G-code Control)	IB-0300371

(2) Servo amplifier/servo motor

Manual title	Manual No.
MR-J5-B/MR-J5W-B User's Manual (Parameters)	IB-0300581ENG
MR-J5 User's Manual (Troubleshooting)	SH-030312ENG
MR-J5 Safety Instructions and Precautions for AC Servos	IB-0300391E
MR-J4-_B_(-RJ) SERVO AMPLIFIER INSTRUCTION MANUAL	SH-030106ENG
MR-J4 Servo amplifier Instructions and Cautions for Safe Use of AC Servos	IB-0300175E
MELSERVO-J4 Servo amplifier INSTRUCTION MANUAL TROUBLE SHOOTING	SH-030109ENG
MR-J4W2-_B/MR-J4W3-_B/MR-J4W2-0303B6 SERVO AMPLIFIER INSTRUCTION MANUAL	SH-030105ENG
Rotary Servo Motor User's Manual (For MR-J5)	SH-030314ENG

2. DETAILS OF MIGRATION FROM Q17nDCPU(-S1) TO RnMTCPU

2.1 Differences Between Q17nDCPU(-S1) and RnMTCPU

(1) Performance and specifications

Items \ Models		Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
Number of control axes		Up to 32	Up to 8	Up to 32	Up to 16	−
Operation cycle (default)	SV13	0.44ms/ 1 to 6 axes 0.88ms/ 7 to 18 axes 1.77ms/19 to 32 axes	0.44ms/ 1 to 6 axes 0.88ms/ 7 to 8 axes	0.222ms/ 1 to 2 axes 0.444ms/ 3 to 8 axes 0.888ms/ 9 to 20 axes 1.777ms/21 to 32 axes		If the operation cycle is set as default (automatic), the operation cycle will be changed. Set a fixed operation cycle where necessary because the change in the operation cycle may change program execution timing. (Refer to section 2.1(8).)
	SV22	0.44ms / 1 to 4 axes 0.88ms/ 5 to 12 axes 1.77ms/13 to 28 axes 3.55ms/29 to 32 axes	0.44ms/ 1 to 4 axes 0.88ms/ 5 to 8 axes			
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)		−
Control methods		PTP (Point to Point) control, Speed control, Speed/position switching control, Fixed-pitch feed, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous control (SV22 virtual mode switching method)		PTP (Point to Point) control, Speed control, Speed/position switching control, Fixed-pitch feed, Continuous trajectory control, Position follow-up control, Speed control with fixed position stop, High-speed oscillation control, Speed-torque control, Tightening & press-fit control, Advanced synchronous control		The term "constant-speed control" has been changed to "continuous trajectory control". However, the program is divertible as it is. If "Speed-switching control" is used, replace it with "Continuous trajectory control". (Refer to section 2.1(7).)
Motion dedicated PLC instruction	M(P).□	−		M(P).DDRD, M(P).DDWR, M(P).SFCS, M(P).SVST, M(P).CHGT, M(P).CHGV, M(P).CHGVS, M(P).CHGA, M(P).CHGAS, M(P).GINT, M(P).SVSTD, M(P).MCNST, M(P).BITWR		The D(P) instructions are executed at CPU communication cycle, while M(P) instructions are executed immediately. Refer to “MELSEC iQ-R Motion Controller Programming Manual (Program Design)”.
	D(P).□	D(P).DDRD, D(P).DDWR, D(P).SFCS, D(P).SVST, D(P).CHGT, D(P).CHGV, D(P).CHGA, D(P).GINT		D(P).DDRD, D(P).DDWR, D(P).SFCS, D(P).SVST, D(P).CHGT, D(P).CHGV, D(P).CHGVS, D(P).CHGA, D(P).CHGAS, D(P).GINT, D(P).SVSTD, D(P).MCNST, D(P).BITWR		Revise programs which use CHGT instructions because the unit of the torque limit value is different. (Refer to section 2.1(6) and 2.1(12).)

(Continued)

Items \ Models	Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
Program language	Motion SFC, Dedicated instruction, Mechanical support language (SV22) (Note-2)		Motion SFC, Dedicated instruction		For replacement of a mechanical system program (mechanical support language), refer to "Replacement of virtual mode with advanced synchronous control".
Servo external signal	Q172LX signal, External input signals of servo amplifier (FLS/RLS/DOG)		Bit device (When “Inter-module synchronization” is valid, “High accuracy” setting of actual input signal is possible), External input signals of servo amplifier (FLS/RLS/DOG)		When the servo external signals interface module is used, review the settings. (Refer to section 2.1(9).)
Cancel signal of servo program	Available		Available (Note-3)		–
Limit switch output function	Up to 32 points		Up to 64 points		When diverting from the virtual mode switching method, some data are not diverted.
Limit output data	Output enable/disable bit, Forced output bit		Forced OFF bit, Forced ON bit		The setting of “Output enable/ disable bit” and “Forced output bit” in Q17nDCPU(-S1) are respectively diverted as “Forced OFF bit” and “Forced ON bit” in RnMTCPU. The program can be diverted as it is.
Number of I/O points	Total 256 points (I/O module + Intelligent function module)		Total 4096 points (I/O module + Intelligent function module)		When the existing program uses PX/PY, revise the program so that the PX/PY devices are replaced with the X/Y devices assigned in the system setting. (Refer to section 2.1(10).)
Devices: Input (X)	8192 points		12288 points (Real input 4096 points)		
Devices: Output (Y)	8192 points		12288 points (Real input 4096 points)		
Devices: Real I/O (PX/PY)	256 points		PX/PY are integrated into X/Y device		
Devices: Internal relays (M)	12288 points		12288 points (default)		• The point assignment can be flexibly changed among devices within the total of 128k words. • Motion registers (#) are not latched as default in RnMTCPU. Review the latch setting as needed.
Devices: Link relays (B)	8192 points		8192 points (default)		
Devices: Annunciators (F)	2048 points		2048 points (default)		
Devices: Data registers (D)	8192 points		20480 points (default)		

(Continued)

Items \ Models		Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
Devices	Link registers (W)	8192 points		8192 points (default)		• The point assignment can be flexibly changed among devices within the total of 128k words. • Motion registers (#) are not latched as default in RnMTCPU. Review the latch setting as needed.
	Motion registers (#)	12288 points		12288 points (default)		
	Free-running timer (FT)	1 point (888μs)		SD718, SD719 (Replace 888μs free-running timer)		–
	Special relays (SM)	2256 points		4096 points		
	Special registers (SD)	2256 points		4096 points		
	Multiple CPU area devices (Fixed scan communication area)	Multiple CPU high speed transmission area U3E□\G10000 to up to 14336 points/1CPU		CPU buffer memory (fixed scan communication area) U3E□\HG0 to up to 12288 points/1 CPU		Replace the Multiple CPU high speed transmission area (from U3E \G10000) in Q17nDCPU(-S1) with the CPU buffer memory (Fixed scan communication area (from U3E \HG0)) in RnMTCPU. (Refer to section 2.1(11).)
	Multiple CPU area devices	CPU shared memory U3E□\G0 to 4096 points		CPU buffer memory U3E□\G0 to 2097152 points (PLC CPU: 524288 points)		If MULTW /MULTR instructions are used for writing/reading of data to/from the shared memory, review the program. (Refer to section 2.1(3).)
Word device bit specification		Bit specification is possible in Multiple CPU area device only. (U3E□\G.0 to F)		Bit specification is possible in all word devices.		–
Automatic refresh	Memory	Multiple CPU high speed transmission area of the Multiple CPU shared memory		CPU buffer memory, CPU buffer memory (Fixed scan communication area)		–
	Automatic refresh setting	32 latch settings (Refresh END)		END: 32 latch ranges [Multiple CPU area device] I45 executing: 32 latch ranges [Multiple CPU area devices (Fixed scan communication area]		–
	Multiple CPU high speed refresh function	128 settings [Refresh timing]: PLC CPU: Refresh END, Motion CPU: Operation cycle				When the refresh (I45 executing) is used, refresh synchronized with the fixed scan communication is also possible in PLC CPU.

(Continued)

Items \ Models	Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
Cancelling errors of Multiple CPU	M2039 OFF		SM50 ON • All errors can be cancelled. • After cancelling errors, SM50 turns OFF automatically.		–
Self-diagnostic errors	When a Motion CPU-specific error occurs, 10000 to 10999 are stored in diagnostic errors (SD0) (the stored value varies depending on the error.) At this time, the self-diagnostic error flag (SM1) and diagnostic error flag (SM0) also turn ON.		All errors are assigned to the self-diagnostic error codes. When an error occurs, an error code is set in SD0, and then SM0 and SM1 turn ON.		
Motion SFC error detection flag (M2039)	Provided (M2039 turns ON for all the errors occurred in the Motion CPU module.)		None (Integrated into the self-diagnostic errors)		
Battery error check of Motion CPU	Provided (Anytime valid)		None (Battery-less)		
Error setting when a servo warning occurs	Outputs an error (Anytime)		Outputs an error		
Peripheral I/F	USB/RS-232/Ethernet (Note-4) (via PLC CPU) / PERIPHERAL I/F (Motion CPU)		USB/Ethernet (via PLC CPU) / PERIPHERAL I/F (Motion CPU)		Use a compatible I/F to communicate with peripheral devices. If RS-232C communication is used, replace it with USB communication. In that case, replace the existing cable with the A-mini B USB cable as well.
Forced stop input	• Use the devices (X/M) specified in the forced stop setting in system setting. • Use the EMI connector of the Motion CPU.		Use the devices (optional bit devices) specified in the forced stop setting in system setting.		If the EMI terminal is used for the forced stop/release, access to the device via the input module.
High-speed input request signal	Q172DLX(DOG/CHANGE)/ Q172DEX(TREN)/Q173DPX(TREN)		Optional bit device/ servo amplifier input		Change the signal input to the input module or DI input of servo amplifier.
Mark detection function	Not available		Up to 64 settings		–
RUN/STOP	RUN/STOP switch, Remote RUN/STOP, M2000 ON/OFF directly, M3072 ON/OFF directly, D704 ON/OFF directly		RUN/STOP switch, Remote RUN/STOP, RUN contact		If M2000, M3072, or D704 is directly operated in the program to switch the RUN/STOP status, revise the program. (Refer to section 2.1(4).)
Output mode setting of STOP to RUN	No option (Comparable to “Clear the output (Y)”)		Output the output (Y) status before STOP/ Clear the output (Y)		The default setting is “Output the output (Y) status before STOP”. Change the setting if necessary.

(Continued)

Items \ Models		Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
ROM operation		• ROM writing is executed in “Mode operated by RAM”/“Mode operated by ROM”. • ROM writing can be executed for the data of MT Developer□.		Always operate with standard ROM data (write data of MT Developer2 to the standard ROM/transmit data of MT Developer2 from the SD memory card to the standard ROM using the file transmission at boot.)		–
LED display		7-segment LED		READY, ERROR, CARD READY, CARD ACCESS with Dot matrix LED		More information can be indicated on the LED display, enabling to conduct troubleshooting more easily. (Refer to "MELSEC iQ-R Motion Controller User's Manual".)
Rotary switch		2 (Normal mode, mode operated by ROM, installation mode, SRAM clear, Ethernet IP address display mode)		1 (Normal mode, Installation Mode, built-in memory clear, Ethernet information display mode)		–
Latch range setting	Latch (1)	1 setting for each device (M, B, F, D, W devices)		Up to 32 settings (M, B, F, D, W, # devices)		# devices are latched as default in Q17nDCPU(-S1), however, not in RnMTCPU. Review the latch settings as needed.
	Latch (2)					
Latch clear	Latch (1)	It is possible to clear with latch clear (1) and latch clear (1)(2) of remote latch clear.		• Clearing the MT Developer2 Motion CPU memory. • Cleaning built-in memory with Motion CPU rotary switch "C".		
	Latch (2)	It is possible to clear with lath clear (1)(2) of remote latch clear.		• Cleaning built-in memory with Motion CPU rotary switch "C".		
All clear function		Execute in installation mode		• The standard ROM and the latch range are cleared with the rotary switch for all clear. • The standard ROM is cleared by formatting the Motion CPU.		–
Servo system network		SSCNETIII		SSCNETIII/H or SSCNETIII		–
System setting/ SSCNET configuration		Q173DCPU(-S1): 2 lines (Up to 16 axes/line)		R32MTCPU: 2 lines (Up to 16 axes/line)		Set the servo amplifier’s rotary switch and connection according to the SSCNET configuration.
		Q172DCPU(-S1): 1 line (Up to 8 axes/line)		R16MTCPU: 1 line (Up to 16 axes/line)		
Amplifier-less operation function		Setting required for “EMI valid/EMI invalid” (At the amplifier-less operation start)		No setting required for “EMI valid/EMI invalid” (At the amplifier-less operation start)		The setting “EMI valid/EMI invalid” at the amplifier-less operation start has become unnecessary. Revise the program.

(Continued)

Items \ Models	Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
MC protocol communication (PHERIPHERAL I/F)	Provided		None		Use the Ethernet port of PLC CPU for the communication. Set the CPU No. of the Motion CPU for the SLMP/MC protocol request destination module I/O No.
Acceleration/ deceleration time	1 to 65535 ms (1 word)		1 to 8388608 ms (2 words) 1 to 65535 ms (Note-5) (1 word)		Change the setting. (Refer to section 2.1(5))
Torque limit value	1 [%] unit		0.1 [%] unit		Revise the program. (Refer to section 2.1(6))
Motor speed (#8066+4n, #8067+4n)	0.1 r/min unit (0.1 mm/s for linear servo motors)		0.01 r/min unit (0.01 mm/s for linear servo motors)		Revise the program.
Operation control program: Motion dedicated instructions	CHGV CHGT		CHGV, CHGVS CHGT CHGP		If CHGT instruction is used, revise the program. (Refer to section 2.1(6) and 2.1(12).)
Operation control program: Others instructions	EI, DI, NOP, BMOV, FMOV MULTW, MULTR TO, FROM TIME		EI, DI, NOP, BMOV, FMOV – TO, FROM, RTO, RFROM TIME		If MULTR/MULTW instruction is used, revise the program. (Refer to section 2.1(3).)
Operation control program: Vision system dedicated instruction (Note-6)	MVOPEN, MVLOAD, MVTRG MVPST, MVIN, MVOUT MVFIN, MVCLOSE, MVCOM		MVOPEN, MVLOAD, MVTRG MVPST, MVIN, MVOUT MVFIN, MVCLOSE, MVCOM		–
Operation control program: Y/N transition	Provided		Provided		The description method of the program has been changed. Revise the program. (Refer to section 2.1(13).)
Digital oscilloscope function	• Word 4CH, Bit 8CH • Real-time display • Sampling points: Up to 8192		• Word 16CH, Bit 16CH • Real-time display • Sampling points: Up to 133120 • Offline sampling • Saving sampling results to SD memory card.		Sampling can be performed without a personal computer by turning ON the sampling settings RUN request device (SM860) after files in which trigger condition, etc. are set are stored to the ROM area or SD memory card.
Security function	Protection by password		• Protection by password (32 characters) • Software security key (Common specification among MELSEC iQ-R series)		The setting method has been changed. (Refer to “MELSEC iQ-R Motion Controller Programming Manual (Common)”.)

(Continued)

Items \ Models	Q173DCPU(-S1)	Q172DCPU(-S1)	R32MTCPU (Note-1)	R16MTCPU (Note-1)	Points for migration
Operating system software installation method	• MT Developer2 • MT Developer		• MT Developer2 • SD memory card		The installation files have been consolidated into one, making management of the files easier. Supported installation using an SD memory card. (Refer to "MELSEC iQ-R Motion Controller Programming Manual (COMMON)".)
Safety observation function (Note-6)	• Safety signal comparison, • Shut-off function (STO, SS1), • Standstill monitoring (SOS, SS2), • Speed monitoring function (SLS), • Safe break control (SBC), • Safe speed monitor (SSM)		None		Use the safety CPU module (R□SFCPU-SET) and the safety input/output. (The safety sub-functions and the safety levels differ depending on the combination of servo motor and servo amplifier or drive unit, as well as the firmware version of the servo amplifier.)
Servo system recorder function	None		Provided		The result file for data collected by the servo system recorder is stored in the SD memory card or the standard ROM. The default setting of the servo system recorder result file storage destination is the SD memory card. (Refer to "MELSEC iQ-R Motion Controller Programming Manual (COMMON)".)

(Note-1): There are restrictions in the function that can be used by the version of the operating system software and engineering software. Functions without restrictions can be used from the first version. (Refer to "MELSEC iQ-R Motion Controller User`s Manual for details.)

(Note-2): SV22 virtual mode only

(Note-3): Compatible with operating system software version 20 or later

(Note-4): QnUDE(H)CPU/QnUDVCPU only

(Note-5): Be sure to use this function in combination: with MT Works2 version "1.185T" or later and operating system software version "26" or later.

(Note-6): Q17nDCPU-S1 only

(2) Error codes system

MELSEC iQ-R series error codes are expressed with 4 hexadecimal digits (integer without 16-bit sign). There are errors detected with each module's self-diagnostic function, and common errors detected when communicating between modules.
The error detection type and error code ranges are shown below.

Error detection type	Error code range	Description
Detection with each module's self-diagnostic function	H0001 to H3FFF	These are errors such as module self-diagnostic errors that are different for each module.
Detection when communicating between modules	H4000 to H4FFF	CPU module error
	H7000 to H7FFF	Serial communication module error
	HB000 to HBFFF	CC-Link module error
	HC000 to HCFBF	Ethernet module error
	HD000 to HDFFF	CC-Link IE field network module error
	HE000 to HEFFF	CC-Link IE controller network module error
	HF000 to HFFFF	MELSECNET/H network module, MELSECNET/10 network module error

Errors detected at the RnMTCPU are divided into warnings and errors. The categories and error code range of errors detected at the RnMTCPU are shown below.

Category		Error code	Description	Remarks
Warning		H0800 to H0FFF	Warnings which do not stop servo programs	• Equivalent to some of the Q17nDCPU(-S1) minor errors
Error	Minor	H1000 to H1FFF	Errors which stop servo programs The CPU continues to operate (in RUN status).	• Equivalent to some of the minor errors of Q17nDCPU(-S1), and the major errors
	Minor (SFC)	H3100 to H3BFF	Motion SFC execution errors The CPU continues to operate (in RUN status).	• Equivalent to Motion SFC errors of Q17nDCPU(-S1).
	Moderate	H2000 to H30FF	Errors that put the CPU operation status to “During stop error”.	• If the system parameter is set to “All station stop by stop error of CPU No.1 to 4”, all CPUs of the whole system will be in stop status with the specified CPU stop error. • Equivalent to system setting errors of Q17nDCPU(-S1).
	Major	H3C00 to H3FFF		• If the system parameter is set to “All station stop by stop error of CPU No.1 to 4”, all CPUs of the whole system will be in stop status with the specified CPU stop error. • Equivalent to some of the self-diagnostic errors of Q17nDCPU(-S1).

Refer to "MELSEC iQ-R Motion Controller User`s Manual (COMMON)" for details of the operations at error detection.

When the RnMTCPU detects an error, the error is displayed on the Motion CPU LED display, and the error code is stored in the relevant device. Use the relevant device in which the error code is stored in the program to enable a machine control interlock.
The following shows the methods for checking and cancelling errors.

(a) Check methods when an error occurs

1) LED display
   - The ERROR LED is ON (or flickers).
   - The dot matrix LED displays ""AL" (flickers 3 times) → "Error code" (4 digits shown 2 at a time)".

2) Special relays/special register

   [Special relays]
   - Latest self-diagnostics error (SM0)
   - Latest self-diagnostics error (SM1)
   - Warning detection (SM4)
   - Detailed information 1: flag in use (SM80)
   - Detailed information 2: flag in use (SM112)

   [Special registers]
   - Latest self-diagnostics error code (SD0)
   - Clock time for latest self-diagnostic error occurrence (SD1 to SD7)
   - Self-diagnostic error code (SD10 to SD25)
   - Detailed information 1 information category (SD80)
   - Detailed information 1 (SD81 to SD111)
   - Detailed information 2 information category (SD112)
   - Detailed information 2 (SD113 to SD143)

3) GX Works3 module diagnostics (error information list)
4) MT Developer2 Motion CPU error batch monitor (Motion error history)
5) Axis status signals, and axis monitor devices (Error details detected for each axis)
6) Check the operation and error details with the "event history" file saved in the Motion CPU standard ROM, or SD memory card.

(b) Cancelling errors

Among the RnMTCPU errors, continue errors (minor errors, or continue mode moderate errors) and warnings can be cancelled.

Use the following method to cancel errors after eliminating the cause.

• Cancel with GX Works3 "Module diagnostics"

• Cancel with MT Developer2 "Motion Monitor"

• Cancel with "Error reset (SM50)" (Note-1)

Error type	Information required to cancel error
System common errors	• Self-diagnostic error information (SD0 to SD7, SD10 to SD25) • Diagnosis error detection (SM0, SM1) • Warning detection (SM4) • Detailed information 1 (SD80 to SD111) • Detailed information 2 (SD112 to SD143) • Detailed information 1: flag in use (SM80) • Detailed information 2: flag in use (SM112) • AC/DC DOWN counter (SD53) • AC/DC DOWN detected (SM53) • I/O module verify error module number (SD61)
Positioning/synchronous control output axis errors/warnings (Note-1)	• Warning code • Error code • Error detection signal
Servo alarms/warnings (Note-1)	• Servo error code • Servo error detection signal
Synchronous control input axis errors/warnings (Note-1)	• Command generation axis warning code • Command generation axis error code • Command generation axis error detection signal • Synchronous encoder axis warning No. • Synchronous encoder axis error No. • Synchronous encoder axis error detection signal

(Note-1): Clears errors for all axes at the same time.

Refer to “Appendix 1 Error Codes of MELSEC iQ-R Motion Controller Programming Manual (Common)” for details.

(3) Data read/write operation to the CPU shared memory

(a) MULTW/MULTR instructions

MULTW/MULTR instructions need to be used when Q17nDCPU(-S1) accesses the CPU shared memory. Meanwhile, “CPU buffer memory access device (from U3E□\G0)” is available for RnMTCPU to access the memory, and therefore the MULTW/MULTR instructions have been eliminated in RnMTCPU.
If those instructions are used before migration, replace them with TO/FROM instruction, BMOV instruction, or CPU buffer memory access device to directly access the memory.

The following shows program examples for revision.

Ex. 1) The program which writes two words from D0 to the CPU shared memory (from HA00) of self-CPU (CPU No.2)

Q17nDCPU(-S1)		RnMTCPU (One of the following three)
MULTW HA00, D0, K2, M0	→	TO H3E10, HA00, D0, K2
		BMOV U3E1\G2560, D0, K2
		U3E1\G2560L = D0L

Ex. 2) The program which reads two words from the shared memory (HC00) of CPU No.1 to #0

Q17nDCPU(-S1)		RnMTCPU (One of the following three)
MULTR #0, H3E0, HC00, K2	→	FROM #0, H3E00, HC00, K2
		BMOV #0, U3E0\G3072, K2
		#0L = U3E0\G3072L

[Point]
Make sure to review the Motion SFC program since the MT Developer2 does not automatically convert Motion SFC programs at project diversion.
An error occurs at the program conversion and write operation cannot be performed.

(b) Access to other modules (MULTR/FROM/TO instructions)

If the specified I/O number cannot be found (the specified module does not exist) when Q17nDCPU(-S1) accesses other modules with MULTR instructions or FROM/TO instructions, a Motion SFC error will be outputted, however, the operation will continue.
With RnMTCPU, whether to stop or continue the program execution can be selected with parameter.
([R series common parameter] - [CPU parameter] - [RAS setting] - [CPU module operation setting at error detected] - [Module I/O No. specification incorrect])
The default setting of the parameter is “Stop”.
In order to make the setting equivalent to that of Q17nDCPU(-S1) (program execution does not stop) when the specified I/O number is invalid, change the parameter to “Continue”.

(4) Switching of RUN/STOP status

The RUN/STOP status of Q17nDCPU(-S1) is switched by directly operating M2000 (or M3072, D704) in the program. However, the RUN/STOP status of RnMTCPU cannot be switched by the same method.

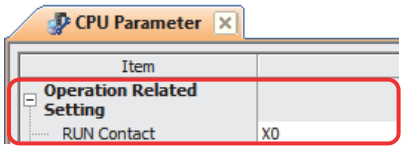
Therefore, if M2000 is used to change the status, the program is required to be changed so that a RUN contact for remote operation is used to switch the RUN/STOP status.

The following shows the procedure and point for the program revision.

[For Q17nDCPU(-S1)]

Procedure	Contents
1) Direct operation of M2000 (or M3072, D704) in the program	Changes CPU operation status.

[For RnMTCPU]

Procedure	Contents
1) Set a RUN contact in the [CPU Parameter] settings of MT Developer2.	Set a X device for RUN contact (X0 to X2FFF). 
2) Change the X device status.	CPU operation status can be changed by changing the status of the X-device set in 1). • RUN contact is OFF: CPU module is in RUN status. • RUN contact is ON: CPU module is in STOP status. During this operation, the RUN/STOP switch on product must be in RUN status position.

[Points]

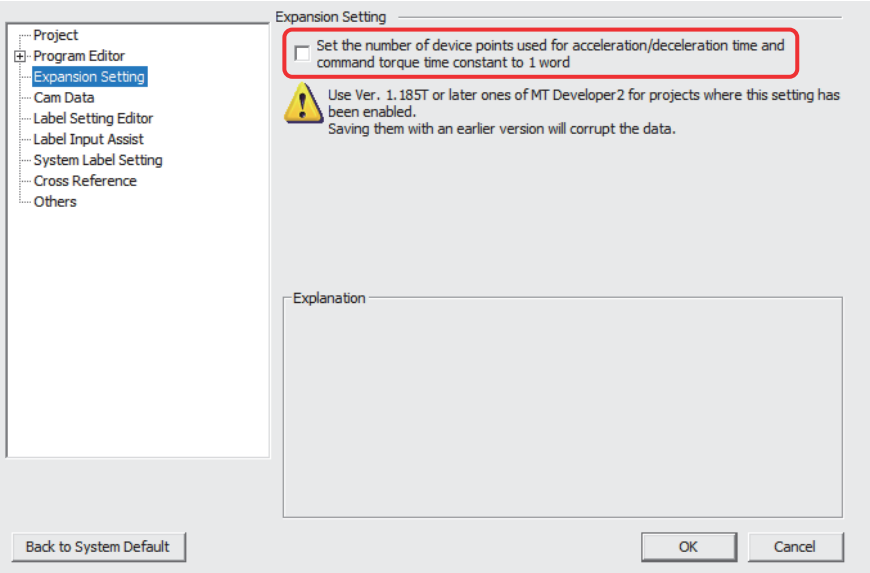
- M3072 and D704 have become unusable in RnMTCPU. They cannot be used as a status device.
- Note that RUN contact ON is for STOP status and the RUN contact OFF is for RUN status.

(5) Acceleration/deceleration time settings

The setting range of the acceleration/deceleration time is expanded from 1 word to 2 words in RnMTCPU. The number of words used must be changed to 1 word setting, if the program is used as it is.

The number of words used is set in the MT Developer2 options screen by selecting “Expansion Setting”, and inserting a check for “Set the number of device points used for acceleration/deceleration time and command torque time constant to 1 word”.

- No check: 2 words setting
- With check: 1 word setting



[Checking the number of words used]

The number of words used be checked with the following monitor device.

Monitor item	Storage details	Monitor value	Refresh cycle	Device No.
Words used information	Stores information of the number of words used set with the acceleration/deceleration time and command torque time constant 1 word setting function.	0: 2 words setting 1: 1 word setting	At power ON	SD750

[Points]

- When changing the number of words used setting, rewrite the Motion control parameter (axis setting parameter, parameter block and synchronous control parameter) and servo program, and turn ON the Multiple CPU system power supply again. When changing the Motion CPU from STOP to RUN without turning ON the Multiple CPU system power supply again, a moderate error (error code: 30E6H) occurs.
- Used in combination with MT Works2 version “1.185T” or later and operating system software version "26" or later for the acceleration/deceleration time and command torque time constant 1 word setting function.

(6) Torque limit value settings

All torque limit value is set by 0.1 [%] unit in RnMTCPU.

Refer to the following table for the program revision.

Function	Item	Unit		Points for migration
		Q17nDCPU(-S1)	RnMTCPU	
Motion control parameter (Parameter block)	Torque limit value	1 [%]	0.1 [%]	The unit is automatically converted to 0.1 [%] at project diversion.
Axis setting parameter (Home position return data) (Note):Only when the stopper method is executed.	Torque limit value at creep speed			The unit is automatically converted to 0.1 [%] at project diversion. However, when the unit is indirectly designated, the unit is not automatically converted and a program revision is required.
Servo program	Torque limit value (common)			The unit is not automatically converted regardless of direct or indirect designation. A program revision is required.
	Torque limit value (parameter block)			
Data register (Monitor device)	Torque limit value (D14+20n)			Since the values stored in this monitor device will be changed following the unit change, a revision is needed for programs which use “D14+20n”.
Motion SFC instruction	Torque limit value change request (CHGT)			Since the instruction method has been changed, a program revision is required.(Note-1)
Motion dedicated PLC instruction	Torque limit value change request instruction from the PLC CPU to the Motion CPU (D(P).CHGT)			

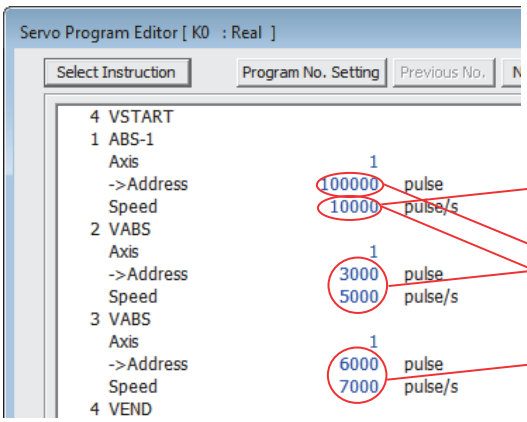
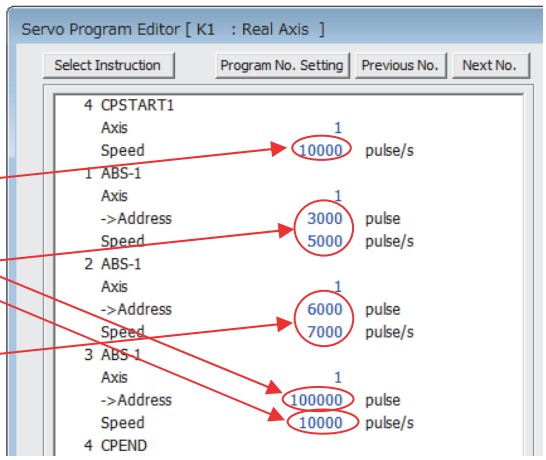
(Note-1): CHGT and D(P).CHGT instructions are used to set a separate torque limit value for positive/negative direction in RnMTCPU. However, the same torque limit value will be applied to positive/negative direction if the torque limit value is set by a different method.

(7) Speed switching control

The speed switching control is not available with RnMTCPU.

When the speed switching control is used, replace it with continuous trajectory control (name changed from constant-speed control).

The following shows the replacement points when changing the speed switching control to the continuous trajectory control.

[Speed switching control of Q17nDCPU(-S1)]	[Continuous trajectory control of RnMTCPU]
	

[Point]

The speed switching control program begins with the end point address/movement amount. The speed is described as needed for each speed switching point.

The continuous trajectory control program describes the address/movement amount and the speed for each point.

(8) Operation cycle

The operation cycle settings of Q17nDCPU(-S1) can be imported to RnMTCPU when the projects of Q17nDCPU(-S1) are diverted to RnMTCPU in MT Developer2.
(Refer to section 2.3.3(2) for details of project diversion.)
However, if the operation cycle is set as default (automatic), the operation cycle will be changed. Set an operation cycle where necessary by following the table below because the change in the operation cycle may change program execution timing.

[Control axes and operation cycle at default]

<table>
<tr><th colspan="2">Item \ Model</th><th>Q173DCPU(-S1)</th><th>Q172DCPU(-S1)</th><th>R32MTCPU</th><th>R16MTCPU</th></tr>
<tr><td colspan="2">Number of control axes</td><td>Up to 32</td><td>Up to 8</td><td>Up to 32</td><td>Up to 16</td></tr>
<tr><td rowspan="2">Operation cycle (default)</td><td>SV13</td><td>0.44 ms/ 1 to 6 axes
0.88 ms/ 7 to 18 axes
1.77 ms/19 to 32 axes</td><td>0.44 ms/ 1 to 6 axes
0.88 ms/ 7 to 8 axes</td><td colspan="2" rowspan="2">0.222 ms/ 1 to 2 axes
0.444 ms/ 3 to 8 axes
0.888 ms/ 9 to 20 axes
1.777 ms/21 to 32 axes</td></tr>
<tr><td>SV22</td><td>0.44 ms/ 1 to 4 axes
0.88 ms/ 5 to 12 axes
1.77 ms/13 to 28 axes
3.55 ms/29 to 32 axes</td><td>0.44 ms/ 1 to 4 axes
0.88 ms/ 5 to 8 axes</td></tr>
</table>

[Settable operation cycle]

Q17nDCPU(-S1)	RnMTCPU
0.44 ms	0.222 ms
0.88 ms	0.444 ms
1.77 ms	0.888 ms
3.55 ms	1.777 ms
7.11 ms	3.555 ms
14.2 ms(Note-1)	7.111 ms

(Note-1): Operation cycle of 14.2ms is not settable for RnMTCPU.
If the operation cycle of 14.2ms is set in the Q17nDCPU(-S1) project, the value is changed to the "default value (automatic)" at project diversion. Review the setting as needed.

(9) External signals interface module

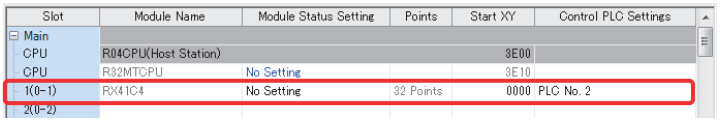
The setting of the external signals interface module needs to be reviewed in GX Works3 since the system setting is read from GX Works3.
(Refer to section 2.3.3(1) for details of project diversion.)

[Parameter setting methods]

RnMTCPU uses the common input module with PLC CPU. The following shows the example in which the signal of RX41C4 input module is set in the external signal parameter for each axis.

With GX Works3, the module to be used is set.

With MT Developer2, the external signal parameter for each axis is set.

Setting item	Setting details
1) GX Works3 [system parameter] settings	Set RX41C4 input module on the [System parameter] screen. (Refer to "MELSEC iQ-R Module Configuration Manual SH-081262ENG" for details.) 
2) MT Developer2 [Axis setting parameter] settings	Set the external signal parameters (FLS, RLS, STOP, DOG) of the target axes as shown below on the [Axis setting parameter] screen. [Signal type]→2: Bit device [Device]→X0 (X device number of the input module set in 1)) 

[Point]

When the MELSEC-Q series external signals interface module is replaced with the MELSEC iQ-R series input module, the detection accuracy depends on the operation cycle.

In order to detect signals at high accuracy, set the inter-module synchronization function to "Synchronize", and set the device of high speed input request signal. And, change the accuracy of high-speed input request signals to "1: High-accuracy" before use.

Refer to "MELSEC iQ-R Motion Controller Programming Manual (Common)" for how to set the inter-module synchronization function.

(10) Input device (X)

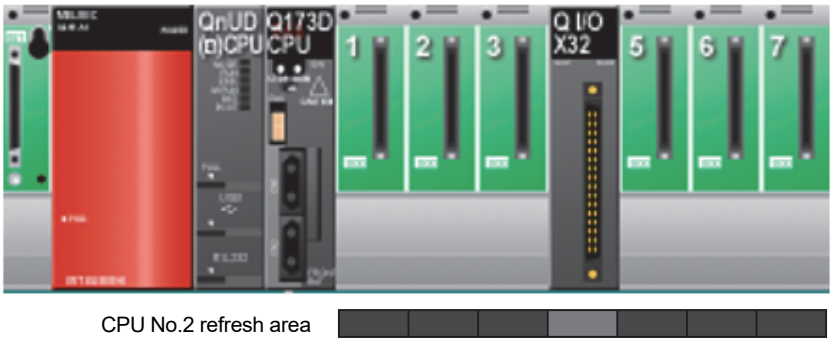
With the Q17nDCPU(-S1), the input devices (X) other than actual I/O devices (PX) assigned in the system settings can be used in the same way as internal relay (M). These X devices can be flexibly set/reset in the program.
In the RnMTCPU system, however, depending on the system configuration, some input devices (X) may not be set/reset. The following shows the cases where a revision is required.

The system image below shows a general example of refresh area for input devices of a self CPU.

: Fixed to 0 at refresh
: Fixed to 0 at refresh
(I/O reading from outside the group enabled)/ Refresh (I/O reading from outside the group disabled)
: Input refresh
: No refresh (SET/RESET possible)

[Q17nDCPU(-S1)]

	Power supply	CPU	I/O0	I/O1	I/O2	I/O3	I/O4	I/O5	I/O6	I/O7
Start I/O No.	-	U3E0	U31E	0000	0020	0030	0040	0060	0080	00A0
Points	-	-	-	32 points	16 points	16 points	32 points	32 points	32 points	16 points

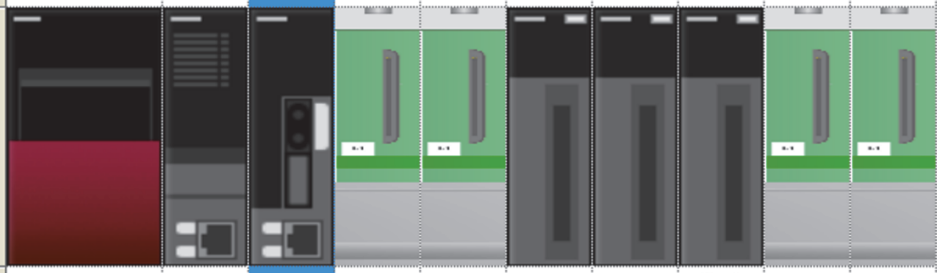


CPU No.2 refresh area

X devices other than X40 to X5F assigned as the actual inputs can be set/reset in the program.

[RnMTCPU]

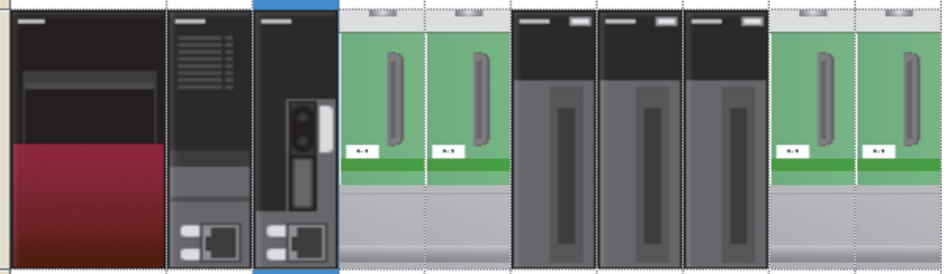
Ex.) When the self CPU controls 1 or more modules, or “I/O reading from outside the group” is valid.

	Power Supply	CPU	I/O0	I/O1	I/O2	I/O3	I/O4	I/O5	I/O6	I/O7
Start I/O No.	-	3E00	3E10	0000	0010	0020	0040	0060	0080	00A0
Points	-	-	-	16 Point	16 Point	32 Point	32 Point	32 Point	32 Point	16 Point
Module Name	R61P	R04CPU	R32MTCPU	-	-	RX41C4	RX41C4	RX41C4	-	-
Error Status	-	-	-	-	-	-	-	-	-	-
Module Configuration										
Control CPU	-	-	-	-	-	No. 1	No. 2	No. 1	-	-

CPU No.2 refresh area 

The X devices ranging from I/O No. 0 to actual I/O No. (regardless of control CPU) cannot be set/reset in the program. (In the system above, the X00 to X7F is the device area where the set/reset cannot be performed.)
If the current Q17nDCPU(-S1) program uses X00 to X3F, and X60 to X7F as an internal relay in the program, replace them with devices of X80 or later.

<Information>
When no module is controlled by the self CPU and “I/O reading from outside the group” is invalid, all the X devices of No.2 CPU can be set/reset in the program.

	Power Supply	CPU	I/O0	I/O1	I/O2	I/O3	I/O4	I/O5	I/O6	I/O7
Start I/O No.	-	3E00	3E10	0000	0010	0020	0040	0060	0080	00A0
Points	-	-	-	16 Point	16 Point	32 Point	32 Point	32 Point	32 Point	16 Point
Module Name	R61P	R04CPU	R32MTCPU	-	-	RX41C4	RX41C4	RX41C4	-	-
Error Status	-	-	-	-	-	-	-	-	-	-
Module Configuration										
Control CPU	-	-	-	-	-	No. 1	No. 1	No. 1	-	-

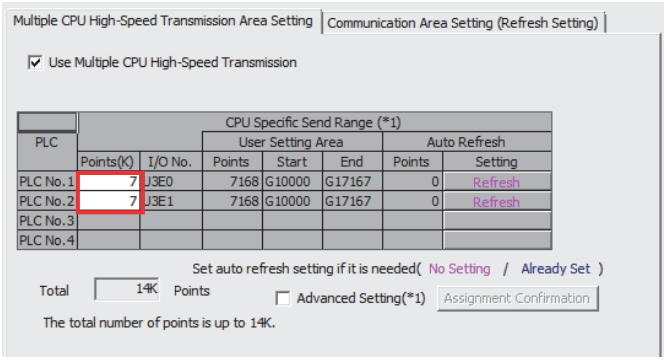
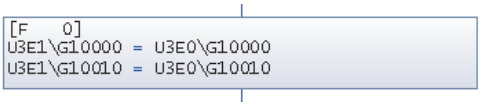
CPU No.2 refresh area 

(11) CPU buffer memory (fixed scan communication area)

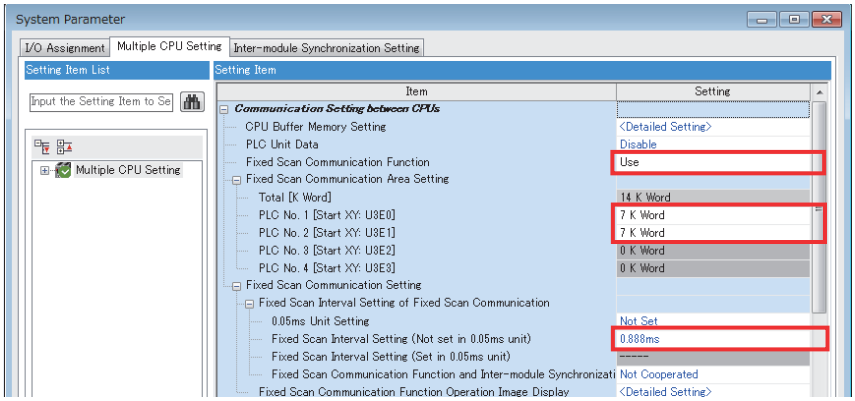
"Multiple CPU high speed transmission area" (from U3E□\G10000) in the existing system has been changed to the "CPU buffer memory (fixed scan communication area)" (from U3E□\HG0) in the MELSEC iQ-R series. Therefore, it is required to change the devices for the transmission area to those for the CPU buffer memory and set the CPU fixed scan communication in the system parameters.

When starting the CPU fixed scan communication, execute the EI instruction in a PLC CPU, and with an interrupt enabled, execute the Multiple CPU synchronous interrupt program (I45).

[Q17nDCPU(-S1)]

Procedure		Description
1)	Set "Multiple CPU high speed transmission area".	• Make the same setting for the Motion CPU and the PLC CPU. 
2)	Programming	• Create a program by using the devices for multiple CPU high-speed transmission area (from "U3E\G10000"). 

[RnMTCPU]

Procedure		Description
1)	Set “Fixed Scan Communication Setting”.	• Set the system parameter in GX Works3, and read that data by MT Works2. • The following shows the details of the system parameter settings. [Fixed Scan Communication Function]: Use [Fixed Scan Communication Area Setting] : The same area as Q17nDCPU(-S1) or more [Fixed Scan Interval Setting] : 0.888ms (to make the data refresh timing equivalent to that of Q17nDCPU(-S1).) <Setting example in GX Works3> 
2)	Programming	• Create a program by using the devices for CPU buffer memory (from “U3E\HG0”). • When Q17nDCPU(-S1) projects are diverted, the devices are not automatically replaced for the new system. Replace the devices manually, and if needed, use the replace device batch function, etc. of MT Developer2. 

(12) Torque limit value change request, Torque limit value change request instruction from PLC CPU to Motion CPU

In RnMTCPU, the setting method of CHGT/D(P).CHGT instructions have been changed to the instructions equivalent to CHGT2/D(P).CHGT2 of Q17nDCPU(-S1), and CHGT2/D(P).CHGT2 instructions have been eliminated. Following the change, a program revision is required.

The following shows the points and revision example.

Ex.) A program which changes Axis 1 torque limit value by 10.0[%]

Q17nDCPU(-S1)		RnMTCPU
CHGT (K1, K10)		CHGT(K1, K100, K100)
D(P).CHGT H3E1 “J1” K10		D(P).CHGT H3E1 “J1” K100 K100

[Points]

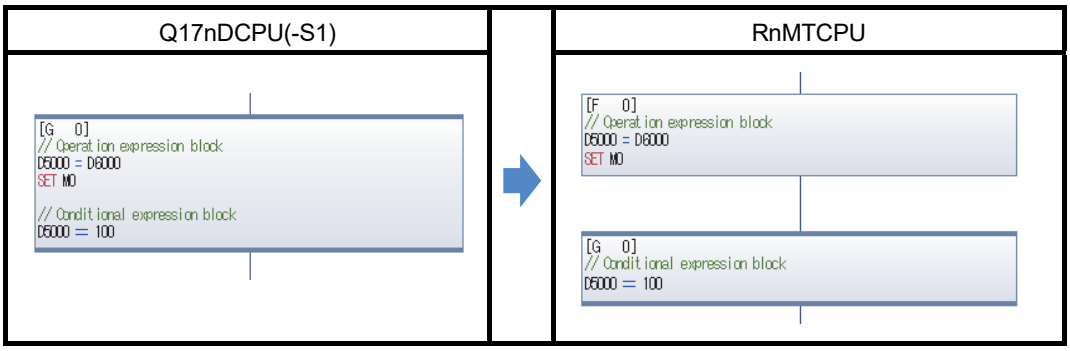
- The CHGT instruction of Q17nDCPU(-S1) sets the same value for both positive and negative directions, however, the CHGT instruction of RnMTCPU changes the value individually for positive and negative directions. Therefore, separate value for each direction is required in RnMTCPU program.
- The torque limit value unit differs between Q17nDSCPU and RnMTCPU (Q17nDCPU(-S1): 1%, RnMTCPU: 0.1%). Be sure to multiply the value tenfold.
- The changes above are not automatically reflected by MT Developer2 or GX Works3 at project diversion. If the program is converted by MT Developer2 without revision, an error will occur at project diversion and write operation cannot be performed. If converted by GX Works3 without revision, the instruction will be changed to SM4095 (coil).

(13) Motion SFC program (Y/N transition)

For Q17nDCPU(-S1), conditional/operation expressions can be described together in "Shift Y/N transition" or "WAIT Y/N transition"(conditional expression must be the last block), however, for RnMTCPU, only conditional expression can be described in the transition program.

If operation expression and conditional expression are described together in “Shift Y/N transition" or "WAIT Y/N transition", the program needs to be revised. The following shows a program revision example。

Ex.) “WAIT Y/N” transition



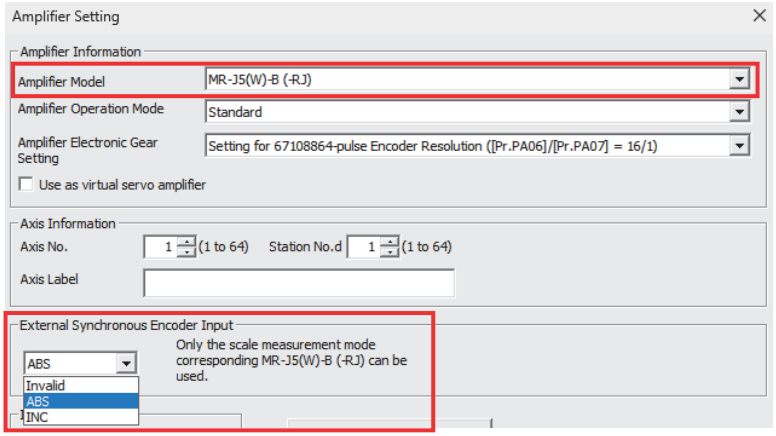
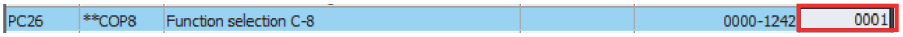
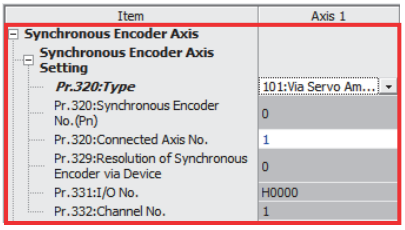
[Points]

- If operation expression and conditional expression are described together in “Shift Y/N transition" or "WAIT Y/N transition", revise the program so that the operation expression is described in an operation control step, and the conditional expression is in WAIT Y/N transition.
- Make sure to review the Motion SFC program since MT Developer2 does not automatically convert the changes above at project diversion. (An error will occur at project diversion and write operation cannot be executed.)

(14) Synchronous encoder interface module

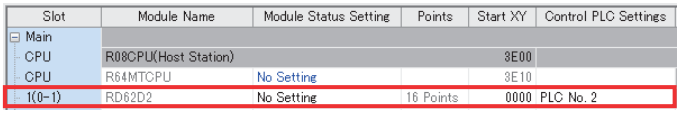
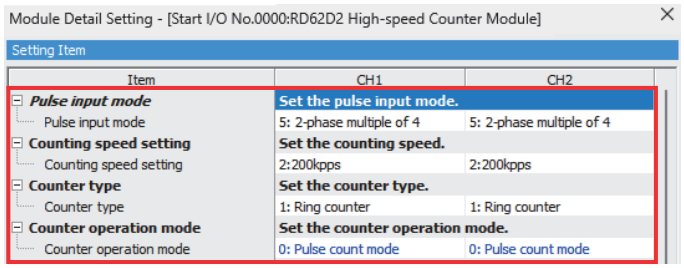
RnMTCPU uses a synchronous encoder via a servo amplifier (MR-J5-□B).

The following shows a setting example which uses a synchronous encoder via MR-J5-□B.

Setting procedure		Setting details
1)	[Servo Network] settings of MT Developer2	Set the servo amplifer and the synchronous encoder on [Amplifier Setting].  [Amplifier Model]: MR-J5(W)-B(-RJ) [External Synchronous Encoder Input]: ABS
2)	[Servo Parameter] settings of MT Developer2	Set ”1: Four-wire type” in “Function selection C-8 (PC26) (Load-side encoder communication method)”. 
3)	[Synchronous Encoder Axis Parameter] settings of MT Developer2	Set the following items for the target axes on [Synchronous Encoder Axis parameter] screen. [Type] → 101: Via Servo Amplifier [Connected Axis No.] → The axis No. set in 1). [Servo Network] settings. 

(15) Manual pulse generator interface module

RnMTCPU uses a common high-speed counter module with the PLC CPU.
The following shows a setting example when using RD62D2.
The high-speed counter module is set with GX Works3 and the external signals for each axis are set with MT Developer2.

Setting item		Setting details
1)	[System Parameter] settings of GX Works3	Set the RD62D2 high-speed counter module in system paremter setting. Refer to section 4.1 for setting details. 
2)	[Module Detail Setting] settings of MT Developer2	Set the following items on [Module Detail Setting] screen. [Pulse input mode] → 2-phase multiple of 4 [Counting speed setting] → Select the maximum input pulse frequency (value after multiplied by 4) [Counter type] → 1: Ring counter [Counter operatoin mode] → Pulse count mode 

2.2 Comparison of Devices

2.2.1 Motion registers

(1) Motion registers (Monitor devices)

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU(Note-1)		
#8000 to #8019		Axis 1 monitor device	
#8020 to #8039		Axis 2 monitor device	
#8040 to #8059		Axis 3 monitor device	
#8060 to #8079		Axis 4 monitor device	
#8080 to #8099		Axis 5 monitor device	
#8100 to #8119		Axis 6 monitor device	
#8120 to #8139		Axis 7 monitor device	
#8140 to #8159		Axis 8 monitor device	
#8160 to #8179		Axis 9 monitor device	
#8180 to #8199		Axis 10 monitor device	
#8200 to #8219		Axis 11 monitor device	
#8220 to #8239		Axis 12 monitor device	
#8240 to #8259		Axis 13 monitor device	
#8260 to #8279		Axis 14 monitor device	
#8280 to #8299		Axis 15 monitor device	
#8300 to #8319		Axis 16 monitor device	
#8320 to #8339		Axis 17 monitor device	
#8340 to #8359		Axis 18 monitor device	
#8360 to #8379		Axis 19 monitor device	
#8380 to #8399		Axis 20 monitor device	
#8400 to #8419		Axis 21 monitor device	
#8420 to #8439		Axis 22 monitor device	
#8440 to #8459		Axis 23 monitor device	
#8460 to #8479		Axis 24 monitor device	
#8480 to #8499		Axis 25 monitor device	
#8500 to #8519		Axis 26 monitor device	
#8520 to #8539		Axis 27 monitor device	
#8540 to #8559		Axis 28 monitor device	
#8560 to #8579		Axis 29 monitor device	
#8580 to #8599		Axis 30 monitor device	
#8600 to #8619		Axis 31 monitor device	
#8620 to #8639		Axis 32 monitor device	

(Note-1): Description in Q series Motion compatible device assignment

(2) Each axis monitor devices

Device No.(Note-1)		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU(Note-2)		
#8000+20n		Servo amplifier type	
#8001+20n		Motor current value [0.1 %]	
#8002+20n #8003+20n		Motor speed	The setting unit differs between Q17nDCPU(-S1) and RnMTCPU. Review the program as needed. • Q17nDCPU(-S1): [0.1r/min] • RnMTCPU: [0.01 r/min]
#8004+20n #8005+20n		Command speed	
#8006+20n #8007+20n		Home position return re-travel value	
#8008+20n		Servo amplifier display servo error code	
−	#8009+20n	Parameter error No.	
−	#8010+20n	Servo status 1	
−	#8011+20n	Servo status 2	
−	#8012+20n	Servo status 3	
−	#8013+20n	Unusable	
−	#8014+20n	Servo status 5	
−	#8015+20n	Unusable	
−	#8016+20n	Servo amplifier vendor ID	New device in RnMTCPU
−	#8017+20n	Unusable	
−	#8018+20n	Servo status 7	
−	#8019+20n	Unusable	

(Note-1): “n” indicates the corresponding axis No. (Axis No.1 to 32: n=0 to 31).
(Note-2): Description in Q series Motion compatible device assignment

(3) Motion registers (Motion error history)

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
#8640 to #8735	SD10 to SD25	Motion SFC error history device	Motion error history is checked with the MT Developer2 Motion CPU error batch monitor.

(4) Motion error history

Device No.(Note-1)		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
#8640+12n	−	Error Motion SFC program No.	Motion error history is checked with the Motion CPU error batch monitor of MT Developer2.
#8641+12n	−	Error type	
#8642+12n	−	Error program No.	
#8643+12n	−	Error block No./Motion SFC list/Line No./Axis No.	
#8644+12n	SD10 to SD25	Error code	
#8645+12n	−	Error occurrence time (Year/month)	
#8646+12n	−	Error occurrence time (Day/hour)	
#8647+12n	−	Error occurrence time (Minute/second)	
#8648+12n	−	Error setting data information	
#8649+12n	−	Unusable	
#8650+12n #8651+12n	−	Error setting data	

(Note-1): "n" in the device No. indicates the numerical value (n=0 to 7) which correspond to motion error history.

(5) Motion register (Product information list device) list

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
#8736 to #8743	SD740 to SD747	Operating system software version	
#8744 to #8751		Motion CPU module serial number	

2.2.2 Special relays

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
SM51	−	Battery low latch	Not required since the Motion CPU is battery-less.
SM52	−	Battery low	
SM53		AC/DC DOWN detection	
SM58	−	Battery low warning latch	
SM59	−	Battery low warning	
SM60	−	Fuse blown detection	There is no replacement device.
M2039, M2041 M2045, M2047	SM1	Self-diagnostic error	The error flag is integrated in the self-diagnostic errors (SM0, SM1). (Refer to section 2.1(2).)
	SM0	Diagnostic error	
SM211	−	Clock data error	Operated on the No.1 CPU clock data.
SM801	SM213	Clock data read request	
SM400		Always ON	
SM401		Always OFF	
−	SM50	Diagnostic error reset	When resetting diagnostic error information in M2039, errors are reset by SM50.
SM512		Motion CPU WDT error	The error cause is stored in SD512.
SM500		PCPU READY complete	
SM501		Test mode ON	
SM502		External forced stop input	
SM513	−	Manual pulse generator axis setting error	The error flag is integrated in the self-diagnostic errors (SM0, SM1). (Refer to section 2.1(2).)
SM510	−	TEST mode request error	There is no replacement device.
SM516	−	Servo program setting error	
SM528	−	No.1 CPU MULTR complete	MULTR instructions are deleted since RnMTCPU can use CPU buffer memory access device to access the memory. (Refer to section 2.1(3).)
SM529	−	No.2 CPU MULTR complete	
SM530	−	No.3 CPU MULTR complete	
SM531	−	No.4 CPU MULTR complete	
SM240		No.1 CPU resetting	
SM241		No.2 CPU resetting	
SM242		No.3 CPU resetting	
SM243		No.4 CPU resetting	
SM244	SM230	No.1 CPU error	
SM245	SM231	No.2 CPU error	
SM246	SM232	No.3 CPU error	
SM247	SM233	No.4 CPU error	
SM220	SM220	CPU No.1 READY complete	
SM221	SM221	CPU No.2 READY complete	
SM222	SM222	CPU No.3 READY complete	
SM223	SM223	CPU No.4 READY complete	
SM503	SM760	Digital oscilloscope executing	
SM506	SM506	External forced stop input ON latch	
SM508	SM508	Amplifier-less operation status flag	
SM526	SM360	Over heat warning latch	
SM527	SM361	Over heat warning	

2.2.3 Special registers

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
SD60	−	Fuse blown No.	There is no replacement device.
SD53		AC/DC DOWN counter No.	
SD0		Latest self-diagnostic error code	Error codes for errors found by diagnosis are stored as hexadecimal notation data.
SD1	SD1	Clock time for diagnostic error occurrence (Year (four digits))	The clock time information that SD0 data was updated is stored as BIN code.
	SD2	Clock time for diagnostic error occurrence (Month)	
SD2	SD3	Clock time for diagnostic error occurrence (Day)	
	SD4	Clock time for diagnostic error occurrence (Hour)	
SD3	SD5	Clock time for diagnostic error occurrence (Minute)	
	SD6	Clock time for diagnostic error occurrence (Second)	
SD4	SD80	Detailed information 1 information category	
	SD112	Detailed information 2 information category	
SD5 to SD15	SD81 to SD111	Detailed information 1	
SD16 to SD26	SD113 to SD143	Detailed information 2	
SD203		Operating status of CPU	
SD520		Scan time	
SD521		Maximum scan time	
SD210	SD210	Clock data (Year (four digits))	The clock data is stored as BIN code.
	SD211	Clock data (Month)	
SD211	SD212	Clock data (Day)	
	SD213	Clock data (Hour)	
SD212	SD214	Clock data (Minute)	
	SD215	Clock data (Second)	
SD213	SD216	Clock data (Day of week)	
SD395	SD229	Multiple CPU No.	
SD510	−	Test mode request error information	These error code storage devices are integrated in “Latest self diagnostics error (SD0)”.
SD511	−		
SD512		Motion CPU WDT error cause	
SD513	−	Manual pulse generator axis setting error	These error code storage devices are integrated in “Latest self diagnostics error (SD0)”.
SD514	−		
SD515	−		
SD522		Motion operation cycle	
SD516	−	Error program No.	These error code storage devices are integrated in “Latest self diagnostics error (SD0)”.
SD517	−	Error item information	
SD502		Servo amplifier loading information	
SD503			

(Continued)

Device No.		Name	Remarks
Q17nDCPU(-S1)	RnMTCPU		
SD504	−	Real mode/virtual mode switching error information	These error code storage devices are integrated in “Latest self diagnostics error (SD0)”.
SD505	−		
SD506	−		
SD523		Operation cycle of the Motion CPU setting	
SD200		State of switch	
SD700	SD700	Device assignment	
SD701	SD701		
SD702	−		There is no replacement device.
SD703	−		
SD704	−		
FT	SD718, SD719	888μs free-running timer	The free-running timer (FT) is integrated in the special register (SD718, SD719). Read SD718 device in 2 word unit.
SD720, SD721		444μs free-running timer	

2.2.4 Other devices

Items		Q17nDCPU(-S1)	RnMTCPU (Note-1)
Internal relays/ data registers	M2400 to M3039	Device area of 9 axes or more is usable as user devices in Q172DCPU(-S1).	Device area of 17 axes or more in R16MTCPU and device area of 33 axes or more in R32MTCPU is usable as user devices.
	M3200 to M3839		
	D0 to D639		
	D640 to D703		
PLC READY flag		M2000/M3072	M2000
Motion SFC error history clear request flag		M2035/M3080	"MT Developer2 Motion CPU error batch monitor" clears the error history.
Speed switching point specified flag		M2040/M3073	M2040
All axes servo ON command		M2042/M3074	M2042
Real/virtual mode switching request		M2043/M3075	M12000+n (Note-2)
Real/virtual mode switching status		M2044	M10880+n (Note-2)
Out-of-sync warning		M2046	– (Not compatible with virtual mode) (Note-2)
JOG operation simultaneous start command		M2048/M3076	M2048
Manual pulse generator 1 enable flag		M2051/M3077	M2051
Manual pulse generator 2 enable flag		M2052/M3078	M2052
Manual pulse generator 3 enable flag		M2053/M3079	M2053
Synchronous encoder current value changing flag		M2101 to M2112	– (Not compatible with virtual mode) (Note-2)
Clutch status (Main shaft side)		Optional device (M2160+2n is also settable)	M10560+10n
Clutch status (Auxiliary input side)		Optional device (M2161+2n is also settable)	M10562+10n
Minor error code		D6+20n	– (Both minor and major errors have been Integrated in D7+20n)
PLC ready flag request		D704	M2000
Speed switching point specified flag request		D705	M2040
All axes servo ON command request		D706	M2042
Real/virtual mode switching request		D707	M12000+n (Note-2)
JOG operation simultaneous start command request		D708	M2048
Manual pulse generator 1 enable flag request		D755	M2051
Manual pulse generator 2 enable flag request		D756	M2052
Manual pulse generator 3 enable flag request		D757	M2053
Home position return re-travel value		D9+20n (Data shortened to 1 word)	D9+20n (Data shortened to 1 word)
		#8006+20n, #8007+20n (Referring at monitoring)	#8006+20n, #8007+20n
Real mode axis information register		SD500, SD501	– ("M10880+n" is used to distinguish the axis status (in synchronization or in real mode) (Note-2))

(Continued)

Items		Q17nDCPU(-S1)	RnMTCPU (Note-1)
Limit switch output data	Output device	X0 to X1FFF	X0 to X2FFF
		Y0 to Y1FFF	Y0 to Y2FFF
		M0 to M8191	M0 to M49151
		B0 to B1FFF	B0 to B1FFF
		U□\G10000 to U□\G(10000+p-1).F (Note-3), (Note-5)	U□\G0 to U□\G268435455.F (Note-5)
	Watch data	D0 to D8191	D0 to D57343
		W0 to W1FFF	W0 to W1FFF
		#0 to #9215	#0 to #12287
		U□\G10000 to U□\G(10000+p-1) (Note-3), (Note-5)	U□\G0 to U□\G268435455 (Note-5)
	ON section setting	D0 to D8191	D0 to D57343
		W0 to W1FFF	W0 to W1FFF
		#0 to #9215	#0 to #12287
		Constant (Hn/Kn) (Note-4)	Constant (Hn/Kn) (Note-4)
		U□\G10000 to U□\G(10000+p-1) (Note-3), (Note-5)	U□\G0 to U□\G268435455 (Note-5)
	Output enable/disable bit, Forced output bit	X0 to X1FFF	X0 to X2FFF
		Y0 to Y1FFF	Y0 to Y2FFF
		M0 to M8191	M0 to M49151
		B0 to B1FFF	B0 to B1FFF
		F0 to F2047	F0 to F2047
		SM0 to SM1999	SM0 to SM4095
		U□\G10000 to U□\G(10000+p-1).F (Note-3), (Note-5)	U□\G0 to U□\G268435455.F (Note-5)

(Note): “n” indicates the corresponding axis No. (Axis No.1 to 32: n=0 to 31).

(Note-1): Description in Q series Motion compatible device assignment.

(Note-2): The synchronous control function is replaced with the advanced synchronous control function. Refer to the “Replacement Virtual mode with Advanced synchronous control” fo details.

(Note-3): "p" indicates user setting area points of Multiple CPU high speed transmission area in each CPU. Refer to section 2.1(1).

(Note-4): The setting range varies depending on the setting unit.

(Note-5): □ = CPU No. (CPU No.0, CPU No.1, CPU No.2, CPU No.3)

2.3 Project Diversion

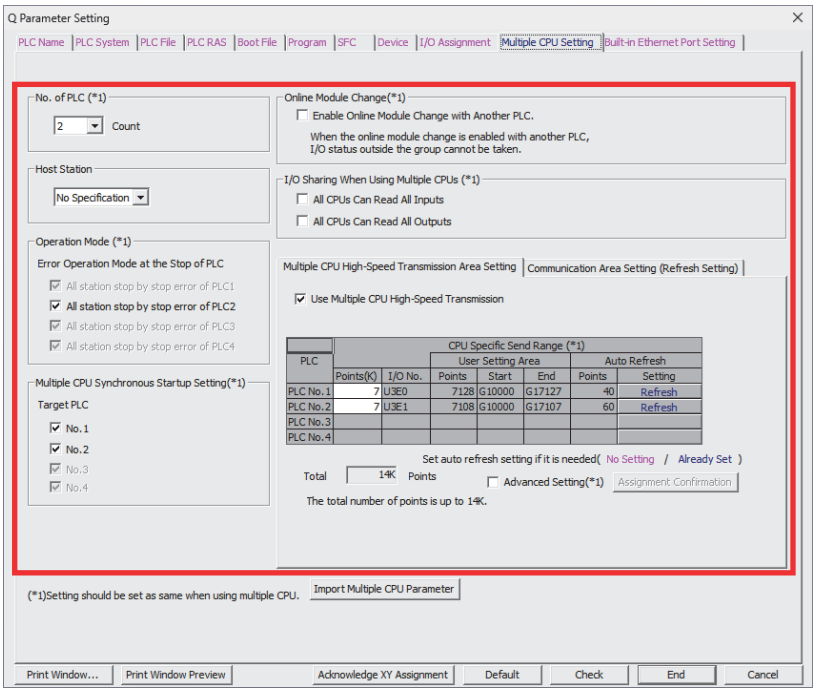
2.3.1 Module control with RnMTCPU

(1) Multiple CPU setting

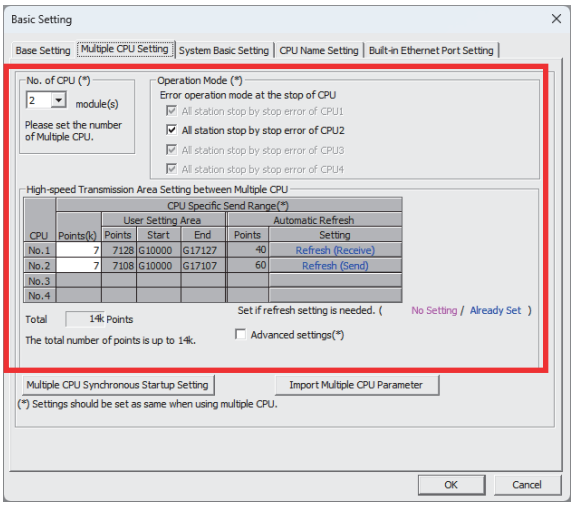
Multiple CPU settings for QnUD(E)(H)(V)CPU and Q17nDCPU(-S1), which are set in GX Works2 and MT Developer2, must be matched. However, the multiple CPU setting for RnCPU and RnMTCPU is set in GX Works3 first, and the setting can be read by MT Developer2 afterwards.

(a) Multiple CPU setting of QnUD(E)(H)(V)CPU and Q17nDCPU(-S1)

[GX Works2]

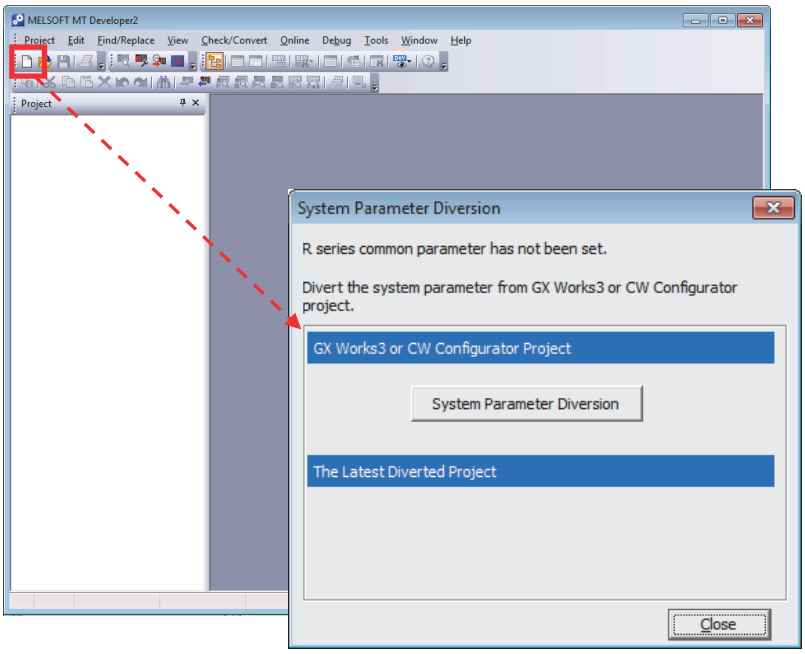


[MT Developer2]



(b) Multiple CPU setting of RnCPU and RnMTCPU

[MT Developer2]



(2) System parameter settings

The system configuration and the common parameters of Q17nDCPU(-S1) projects cannot be directly diverted to RnMTCPU. They must be set in GX Works3 first, and then the set parameters can be read by MT Developer2.

(a) GX Works3 settings

Set the following system parameters at GX Works3

- Module configuration
- System parameter (I/O assignment setting, Multiple CPU setting, Synchronization setting)
- Set the Motion CPU as the module control CPU in "Control PLC Settings" in [I/O Assignment Setting] screen.

(b) MT Developer2 settings

Read the parameters set in GX Works3 using MT Developer2 [System Parameter Diversion].

After diversion, the following R series common parameters can be set.

- Module parameters for modules for which a Motion CPU has been set as the control CPU
- Multiple CPU refresh settings
- Module parameters of Motion CPU

2.3.2 List of divertible/not divertible data (SV13/SV22)

Q17nDCPU(-S1) data name	Divertible/not divertible	Remarks
System settings		
Basic settings		
Base setting	△	(Note-1)
Multiple CPU setting	△	(Note-1), (Note-2)
System basic setting	○	
CPU name setting	○	
Built-in Ethernet port setting	△	
SSCNET setting	△	(Note-3)
System configuration	△	(Note-1)
SSCNET configuration	○	(Note-4)
High-speed read data	×	
Optional data monitor setting	○	
Safety observation function parameter	×	
Vision system parameter	○	
Servo data settings		
Servo data	○	(Note-5)
Servo parameter	○	(Note-6)
Parameter block	○	
Limit output data	△	
Motion SFC programs		
Motion SFC parameter	○	
Motion SFC program	○	(Note-7)
Servo programs		
K mode allocation	○	SV22 only
Servo program	○	
Mechanical system program	○	SV22 only (Note-8)
Cam data	○	SV22 only (Note-8)
Label/structure	○	
Device memory	△	
Device comment	○	
Backup data	×	
Communication setting	×	

○: Divertible, △: Partially divertible, ×: Not divertible

(Note-1): MT Developer2 reads parameters set in MELSOFT GX Works3.
Therefore, the existing data which have been set in MT Developer2 for Q17nDCPU(-S1) cannot be diverted.

(Note-2): When the system parameters have been set already, only the auto refresh settings for Q17nDCPU(-S1) can be diverted ([R Series Common Parameter] - [Multiple CPU Setting] - [Refresh (145 executing) Setting])

(Note-3): Select SSCNETIII/H at SSCNET setting.

(Note-4): If SSCNETIII/H is selected, the servo amplifiers are replaced with MR-J4-B.

(Note-5): Review the fixed parameters according to the resolution per servo motor revolution.
(Number of pulses per revolution and movement amount per revolution)

(Note-6): Refer to “MT Developer2 Help” for conversion rules for servo parameters.

(Note-7): When Motion registers or special devices are used in the program, they need to be reviewed.

(Note-8): Refer to section 2.3.4 for replacement of mechanical system programs and cam data.

2.3.3 Project diversion procedures by engineering environment

The following shows the project diversion procedures for PLC CPU and Motion CPU.
The contents of this manual are based on the specifications of the engineering environment (MELSOFT GX Works3 Ver.1.101F, MELSOFT MT Works2 Ver.1.187V).
Update to the latest version when replacing.

(1) Procedures for PLC CPU projects diversion by GX Works3

GX Works3 can read projects created in GX Works2.
If the PLC CPU is other than the following models, the programmable controller type needs to be changed to universal models.

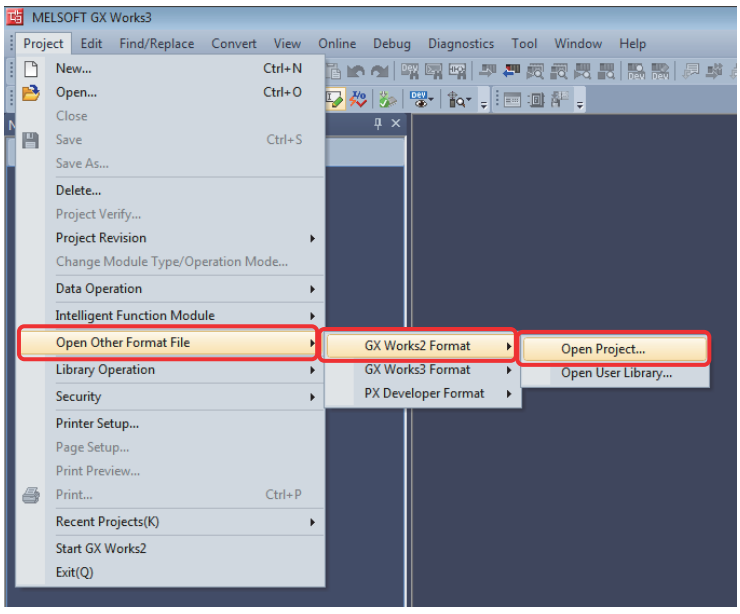
- Universal model QCPU
- High-speed universal model QCPU
- Universal model process CPU

Refer to “GX Works2 Version 1 Operating Manual (Common)” for restrictions on the programmable controller type changes.
In addition, refer to the following Technical Bulletins for details of the programmable controller type changes.
(Note): Contact your local sales office for details.

- Method of replacing Basic model QCPU with Universal model QCPU (FA-A-0054)
- Method of replacing High Performance model QCPU with Universal model QCPU (FA-A-0001)
- Method of replacing High Performance model QCPU with Universal model QCPU (Introduction) (FA-A-0209)

[Procedures when projects in which universal model QCPU is set is diverted to GX Works3]
Refer to “GX Works3 Operating Manual” for details of replacing GX Works2 projects as those for GX Works3.

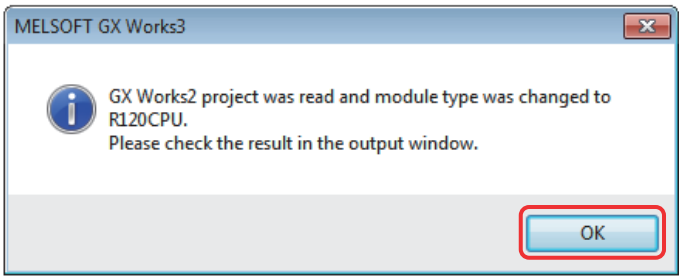
1) Start GX Works3. Select [Open Other Format File] - [GX Works2 Format] - [Open Project…] from “Project” menu.



2) Select the project to be diverted on the “Open GX Works2 Format Project” screen, and click “OK”.

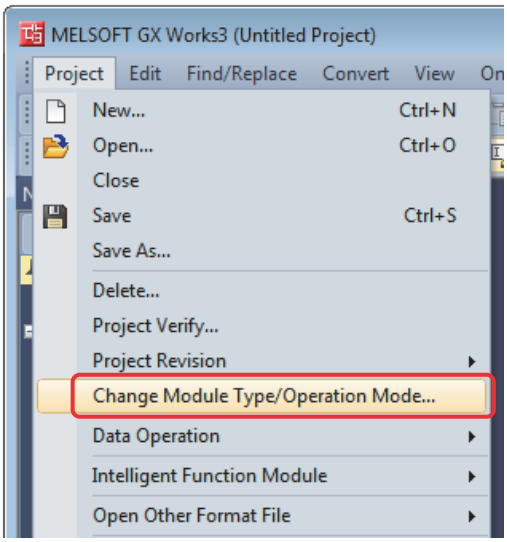
3) Check the following precaution at project diversion, and click “OK”.
[Precaution]
When GX Works2 projects are read by GX Works3, the MELSEC-Q series PLC CPUs are automatically changed to R120CPU.

4) After GX Works2 project is read, click “OK”.
(Make sure to check the model change result in the output window.)

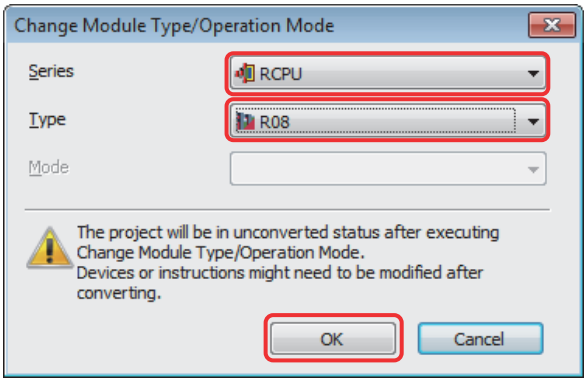


When the PLC CPU is replaced with other than R120CPU, execute the following 5) to 7).

5) Select “Change Module Type/Operation Mode…” in “Project” menu to open “Change Module Type/Operation Mode” screen.



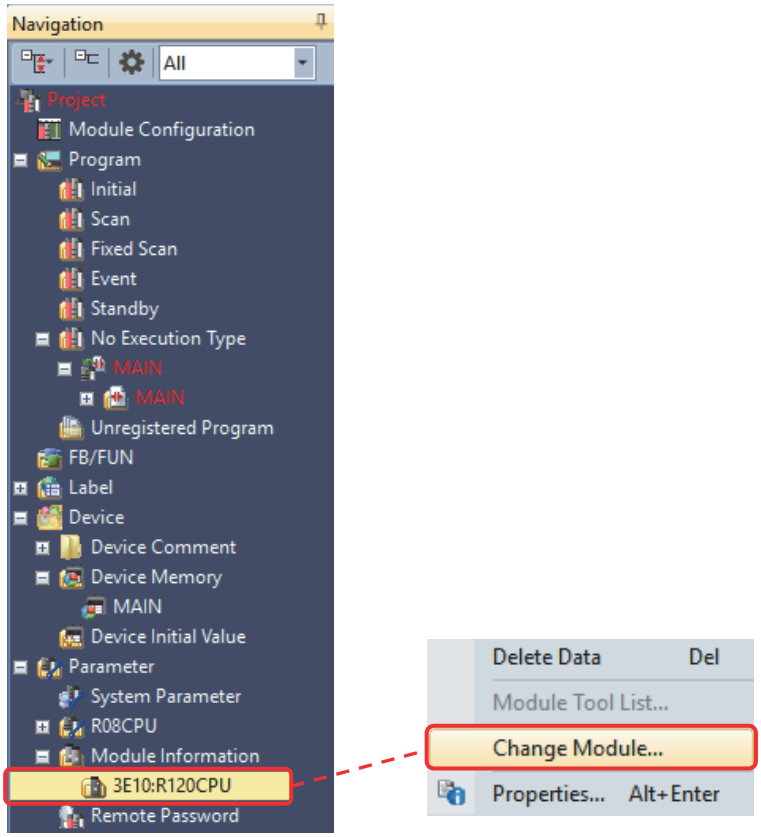
6) Select RCPU for “Series” and the replaced PLC CPU model for “Type” (the setting example below: R08CPU). Click “OK”.



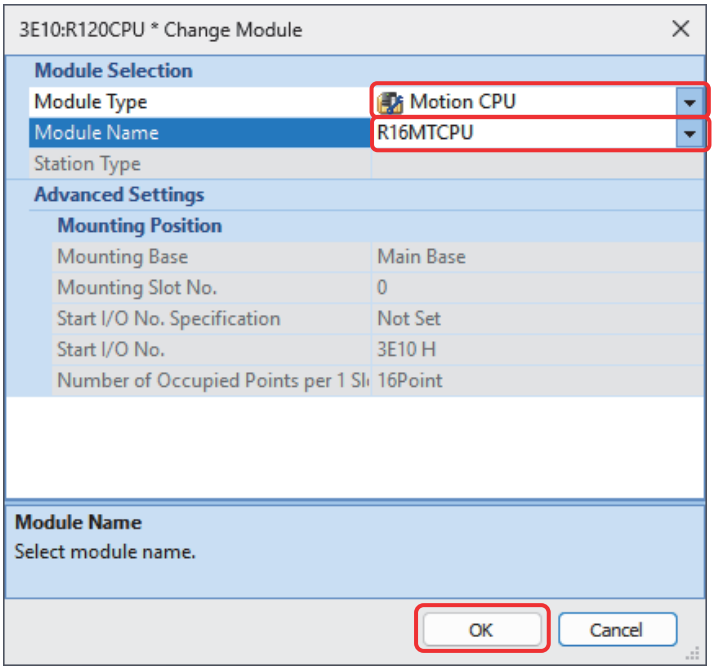
7) Click “OK” after confirming the precautions at model change.
The model change result is indicated in the “output window” of GX Works3.

The Motion CPU set for the multiple CPU system is also automatically converted to R120CPU.
The procedure for changing R120CPU to RnMTCPU is described in the following 8) and later.

8) Right-click “3E10:R120CPU” in the navigation tree and select “Change Module”.



9) On the “Change Module” screen, select Motion CPU for [Module Type], the replaced Motion CPU model for [Module Name] (the setting example below: R16MTCPU). Click [OK].



10) Click “OK” after confirming the precautions at model change.

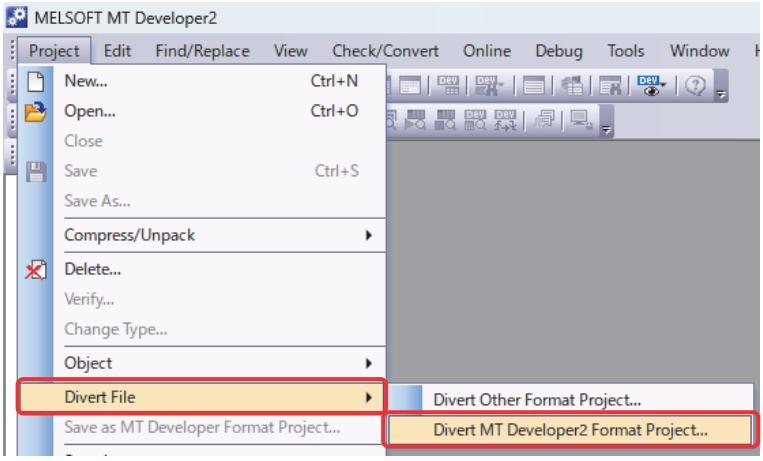
The diversion is complete.
Though a model change has been executed, the project conversion has not finished yet.
Make sure to execute [Rebuilt All] before writing to PLC CPU.

(Note): [Multiple CPU high speed transmission area setting] - [Refresh Setting] and [Communication Area Setting (Refresh Setting)] of GX Works2 is diverted to the [Refresh (I45 executing) Setting] and [Refresh (END) Setting] of GX Works3 respectively. (Refer to section 2.3.5.)

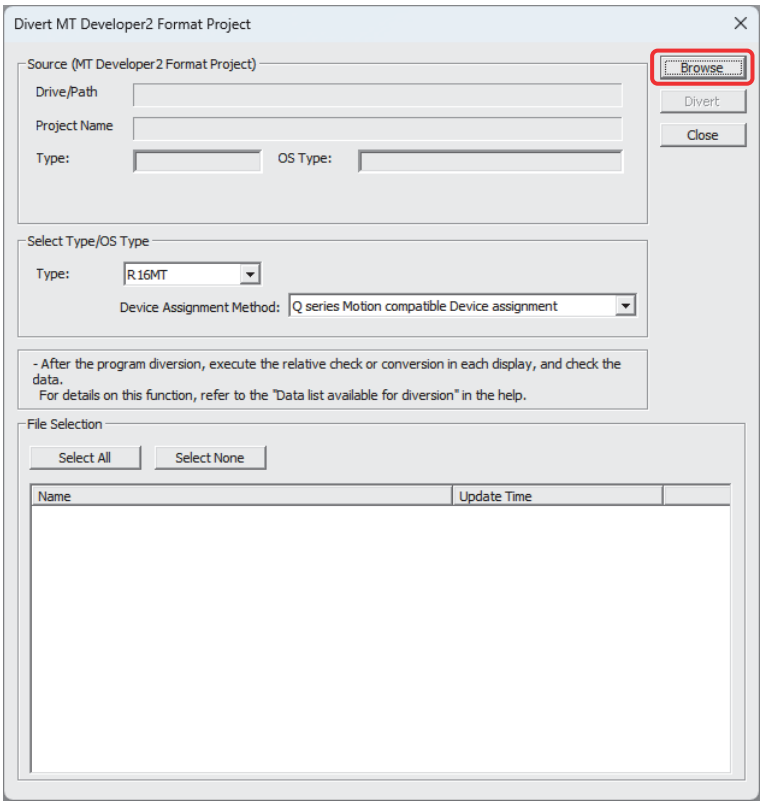
(2) Procedures for Motion CPU projects diversion by MT Developer2

If latch settings and CPU refresh settings (I45 executing) in R series common parameters are diverted, divert the system parameters before the Motion projects diversion.
(Refer to (3) in this section)

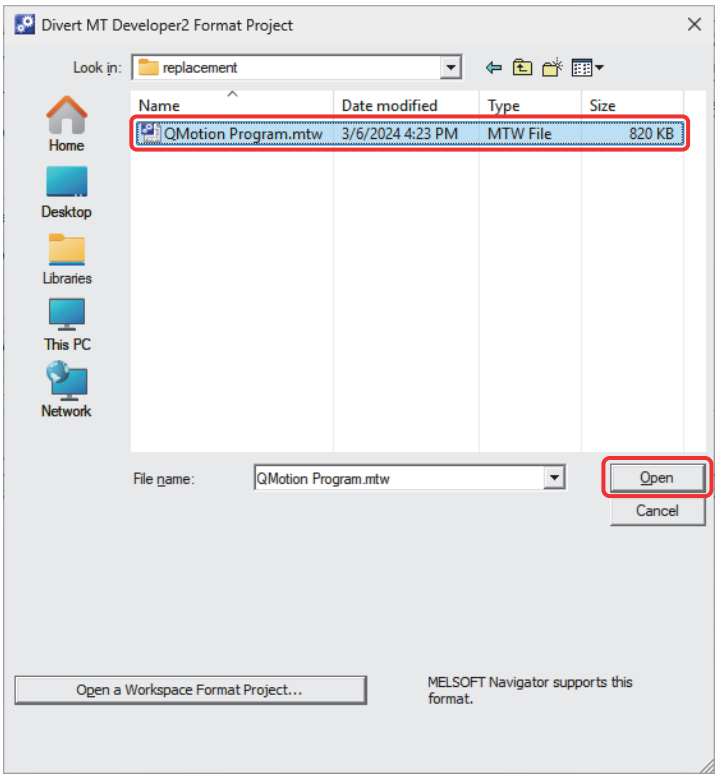
1) Start MT Developer2. Select [Divert file] - [Divert MT Developer2 Format Project…] from “Project” menu.



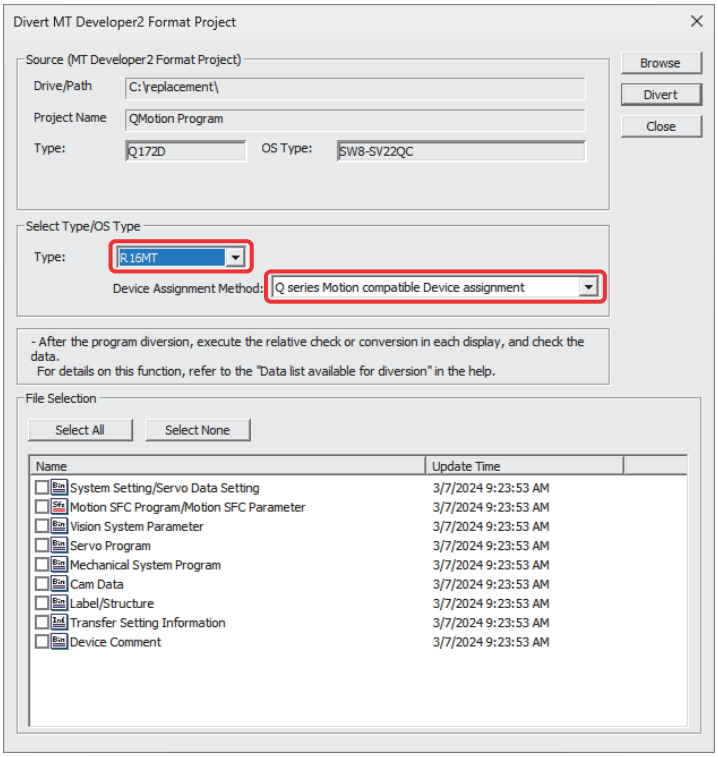
2) Click “Browse” on the “Divert MT Developer2 Format Project” screen.



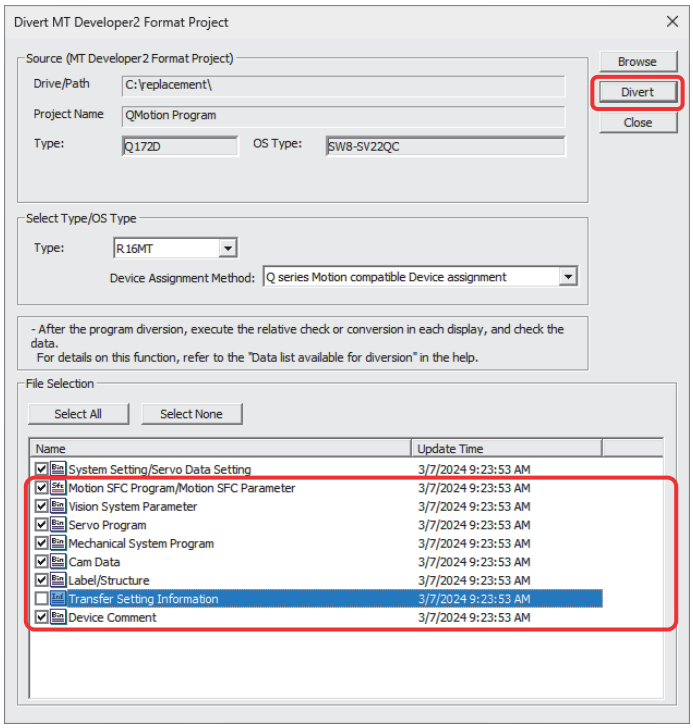
3) Select the project to be diverted on the file selection window. Click [Open] to update the selected project (MT Developer2 Format Project).



4) Select the replaced model for [Select Type/OS Type] (the setting example below: R16MTCPU). After the “Device Assignment Method” appears and becomes selectable, select “Q series Motion compatible Device assignment”.

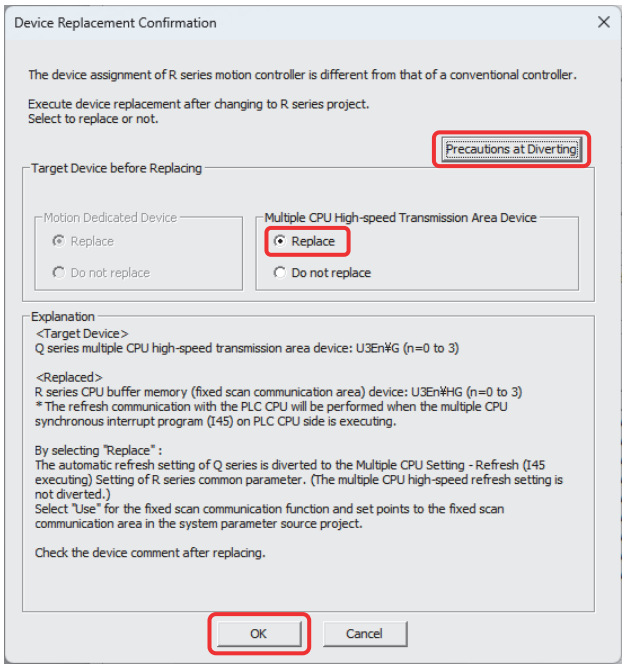


5) Check the box of the data to be diverted in the “File Selection”. Click “Divert”.
When projects for Q17nDCPU(-S1) are diverted as those for RnMTCPU, remove the check of the “Transfer Setting Information” box since the “Transfer Setting Information” cannot be diverted.

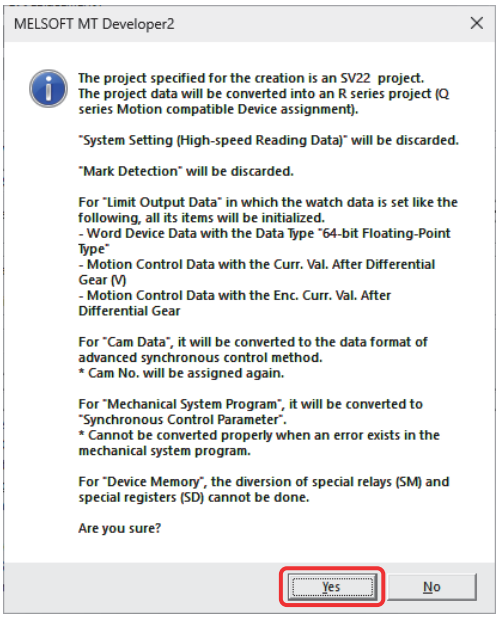


(Note): If "Transfer Setting Information" is not unchecked, an error message will be displayed.

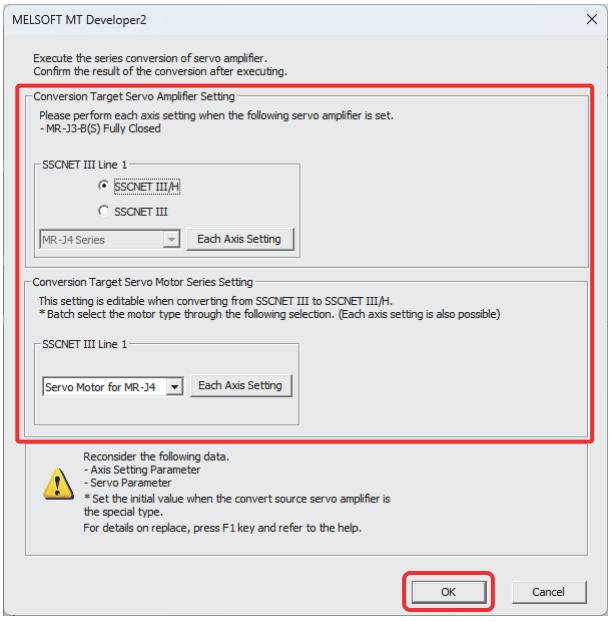
6) Make sure to check the “precautions at Diverting” in the Device Replacement Confirmation. After that, select “Replace” of [Multiple CPU High-speed Transmission Area Device”, and click “OK”.



7) Confirm the precautions at conversion. Click “Yes”.

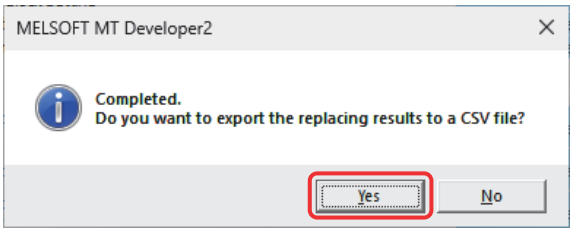


8) Execute the series conversion of the servo amplifier and servo motor.
Select “SSCNETIII/H” in the “Conversion Target Servo Amplifier Setting” and select “Servo Motor of MR-J4” in the Conversion Target Servo Amplifier Setting”, and click [OK].

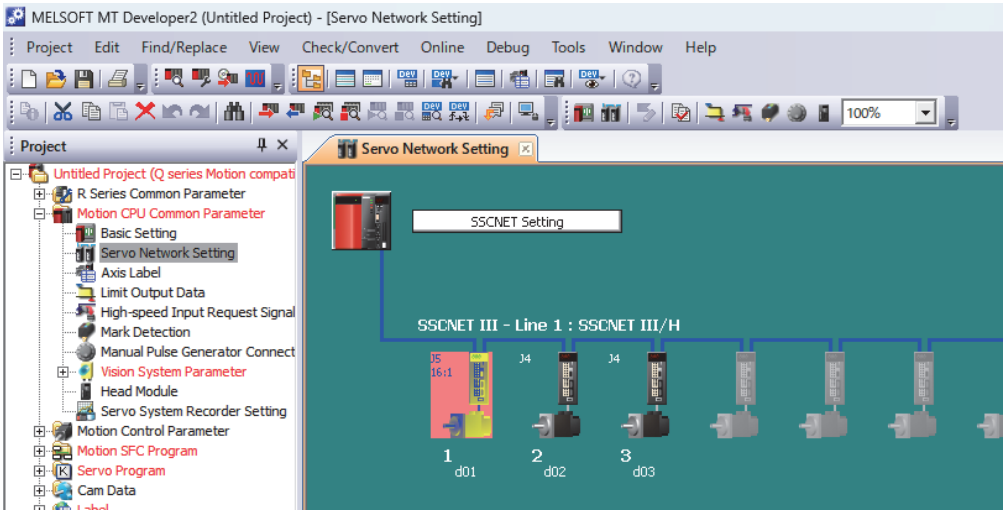


(Note): When servo parameters settings are changed from “MR-J3 series” to “MR-J4 series”, the parameter conversion is carried out based on conversion rules.
Refer to “MT Developer2 Help [Appendix] - [Servo parameter conversion]” for the conversion rules.

9) When the project diversion completion message appears, click [OK].
Confirm the [Replacement result] in the exported CSV file.



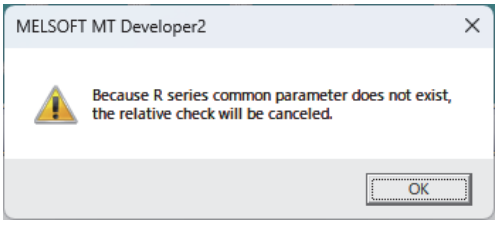
10) When using a MELSERVO-J5 series servo amplifier, change the servo amplifier set to each axis from the project window in "Servo Network Setting".
Refer to “Transition from MELSERVO-J4 Series to J5 Series Handbook” for details.



The diversion is completed.

If the operation cycle is set as default (automatic), the operation cycle will be changed. Set a fixed operation cycle where necessary because the change in the operation cycle may change the program execution timing. (Refer to section 2.1(8).)
Though the project has been diverted, conversion of Motion SFC programs and servo programs has not finished yet. Make sure to execute [Project Batch Check/Conversion] before writing to the Motion controller.

If the error message window below appears while “Project Batch Check/Conversion” is being executed, the system parameters need to be set.
Refer to “(3) Procedures for system parameter diversion by MT Developer2” in this section for system parameter setting procedures.

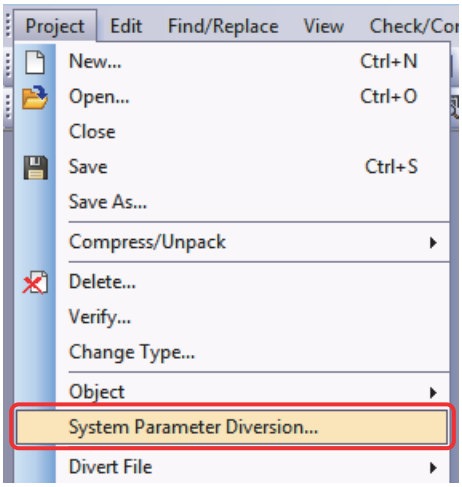


(3) Procedures for system parameter diversion by MT Developer2

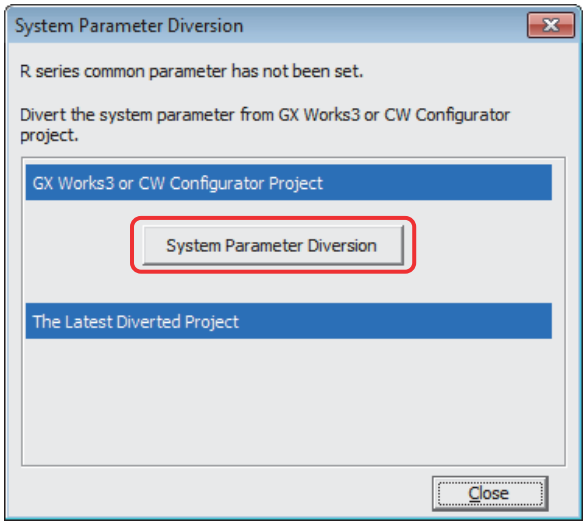
GX Works3 system parameters need to be diverted to R series common parameter settings (comparable to the basic settings of Q series).

The following is the diversion procedure.

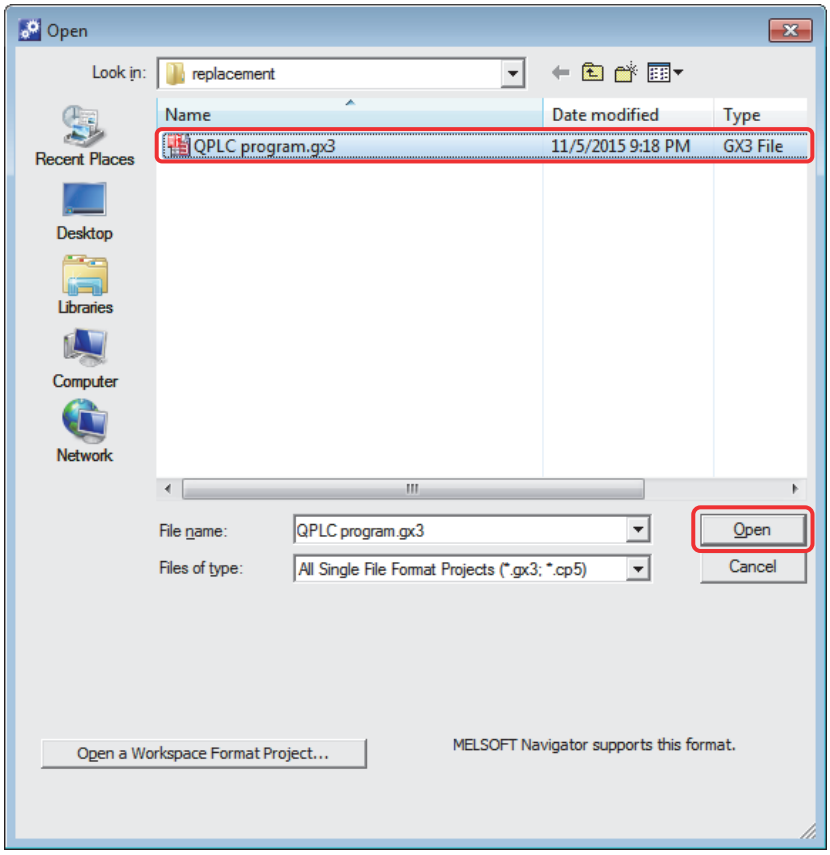
1) Start MT Developer2. Select “System Parameter Diversion” from “Project” menu to open the “System Parameter Diversion” screen.



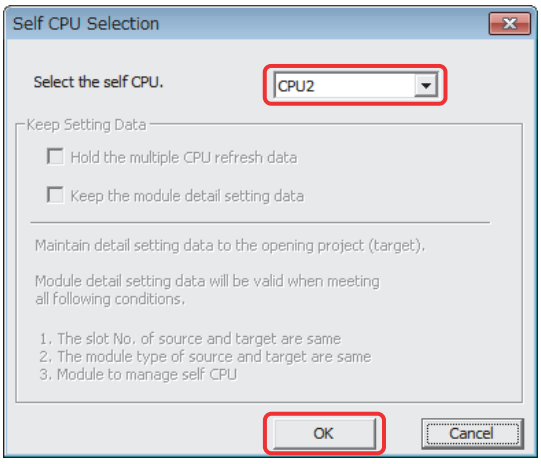
2) Click “System Parameter Diversion”.



3) Select the project to be diverted (The GX Works3 projects created in (1)), and click “Open”.



4) Select the self CPU No. on the “Self CPU selection” screen, and click “OK”.



The diversion is completed.

(4) Batch replacement of devices numbers by MT Developer2

(a) Motion register

The Motion register is expanded and the device assignment is changed when Q17nDCPU(-S1) is replaced with RnMTCPU. When the Motion register “#8000 to #8751” are used in Q17nDCPU(-S1), replace them by referring to “2.3.1 Motion registers”.

(b) Special device

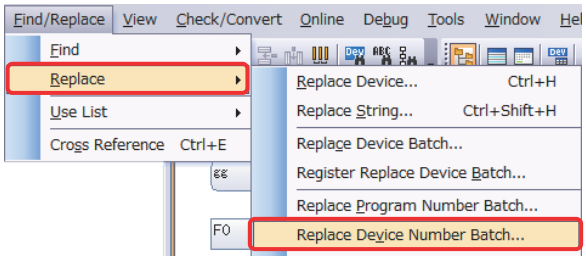
When special devices (SM0 to SM801, SD0 to SD721) are used, replace them by referring to “2.2.2 Special relays” and “2.2.3 Special registers” in this document.

(c) Other devices other than the above

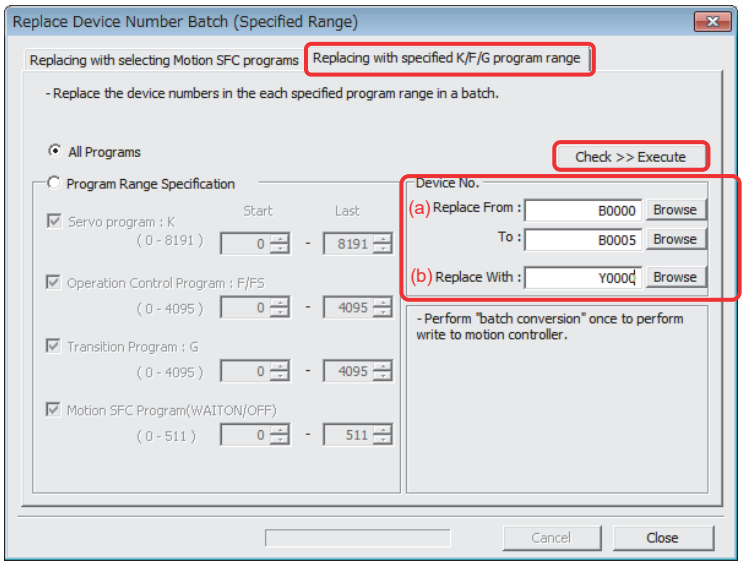
Replace them by referring to “2.2.4 Other devices” in this document.

The following shows the procedure for the batch replacement of the device numbers.

1) Start MT Developer2, and select [Replace Device Number Batch…] from “Find/Replace” menu.



2) Select “Replacing with specified K/F/G program range” tab. Enter the device numbers in [(a) Replace From:] [To:], and [(b) Replace With:]. Click [Check >> Execute].



(a) Specify the start/end device before replacement.

(b) Specify the start device after replacement.

2.3.4 Replacement of mechanical system program with advanced synchronization control

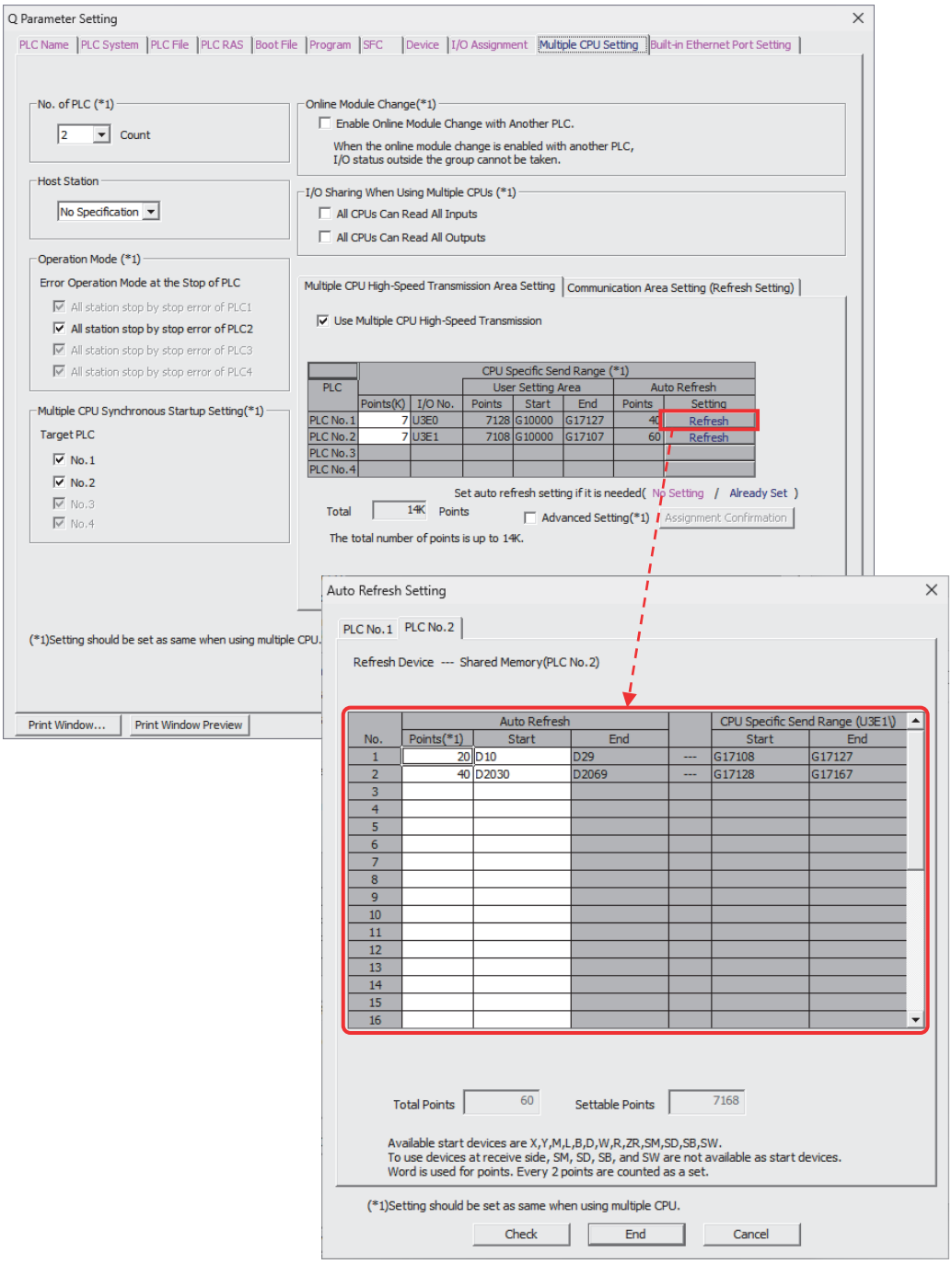
The synchronous control function is replaced with the advanced synchronous control function.

Refer to "Replacement of virtual mode with advanced synchronous control" for the replacement of the synchronous control function. However, at the time of replacement, be sure to take into account the device assignment difference between MELSEC-Q series and MELSEC iQ-R series (replace the Q-series device assignment for Q173DCPU(-S1)/Q172DCPU(-S1) with those for RnMTCPU (Q series Motion compatible device assignment)).

2.3.5 Auto refresh settings in MELSOFT GX Works3

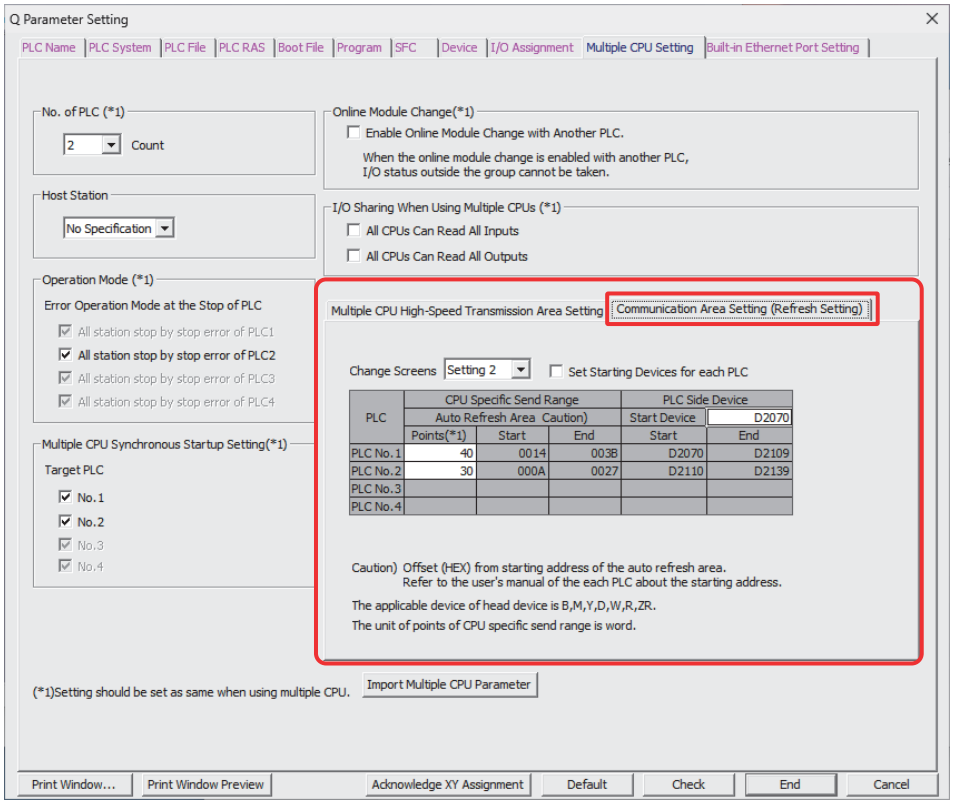
[Multiple CPU high speed transmission area setting] - [Refresh Setting] and [Communication Area Setting (Refresh Setting)] of GX Works2 is diverted to the [Refresh (I45 executing) Setting] and [Refresh (END) Setting] of GX Works3 respectively.

(1) Confirming the “Multiple CPU High Speed Transmission Area Setting” of GX Works2
Select [Parameter] - [PLC Parameter] in the navigation tree to open the “Q Parameter Setting” screen. Select [Multiple CPU Setting] tab and confirm the details of “Multiple CPU High Speed Transmission Area Setting] - [Refresh Setting)”.



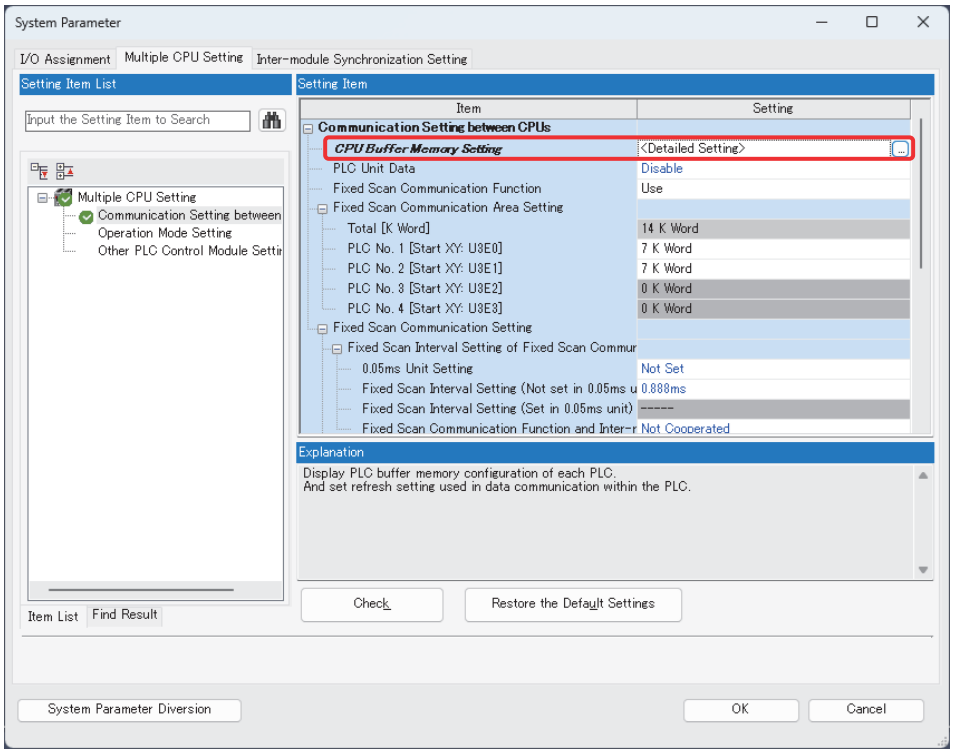
(2) Confirming the “Communication Area Setting (Refresh Setting)” of GX Works2

Select “Communication Area Setting (Refresh Setting)” from [Multiple CPU Setting] tab of "Q Parameter Setting" screen and confirm them.

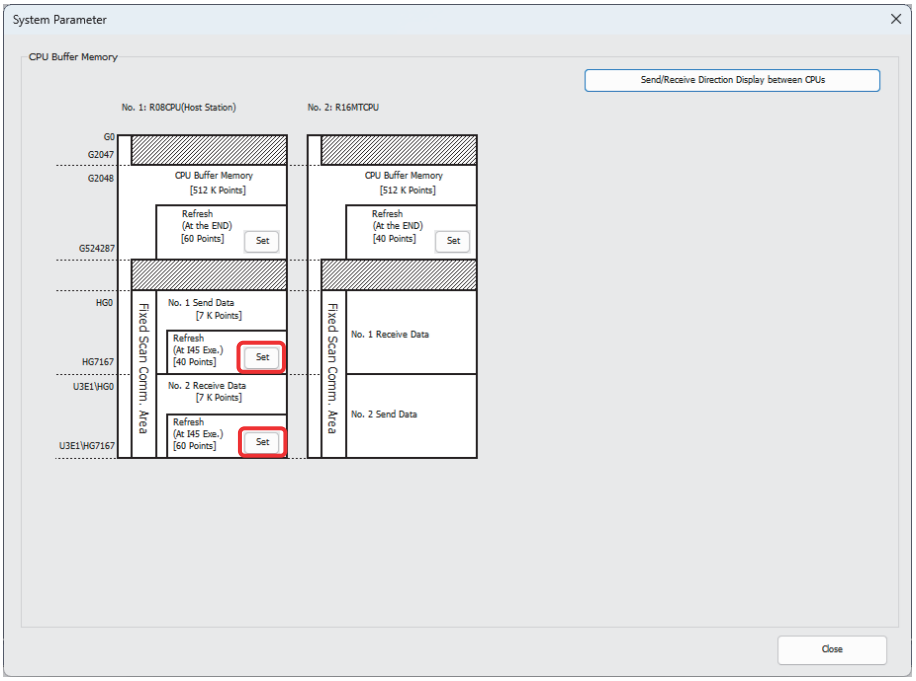


(3) Confirming “Refresh (I45 execution/END)” of GX Works3

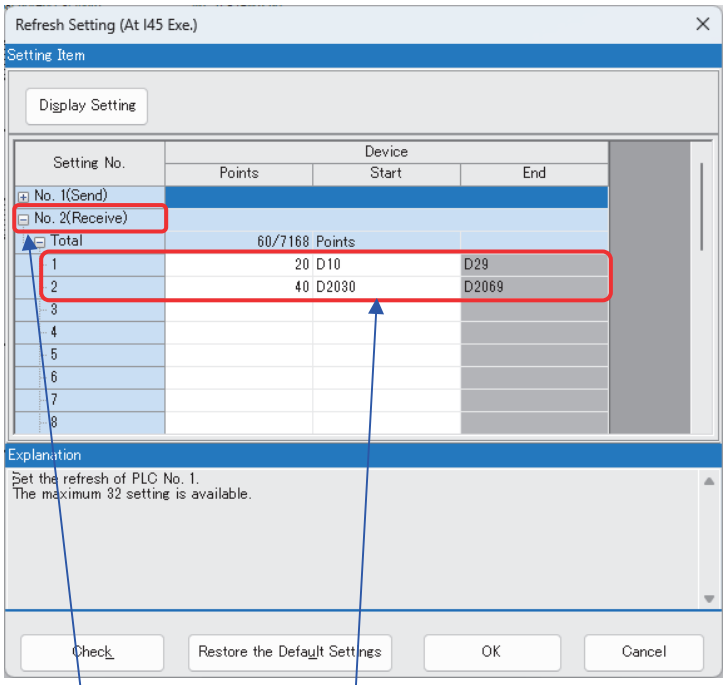
1) Select [Parameter] - [System parameter] in the navigation tree to open “System Parameter” screen. Click on “CPU Buffer Memory Setting: <Detailed Setting>” in [Multiple CPU Setting] tab.

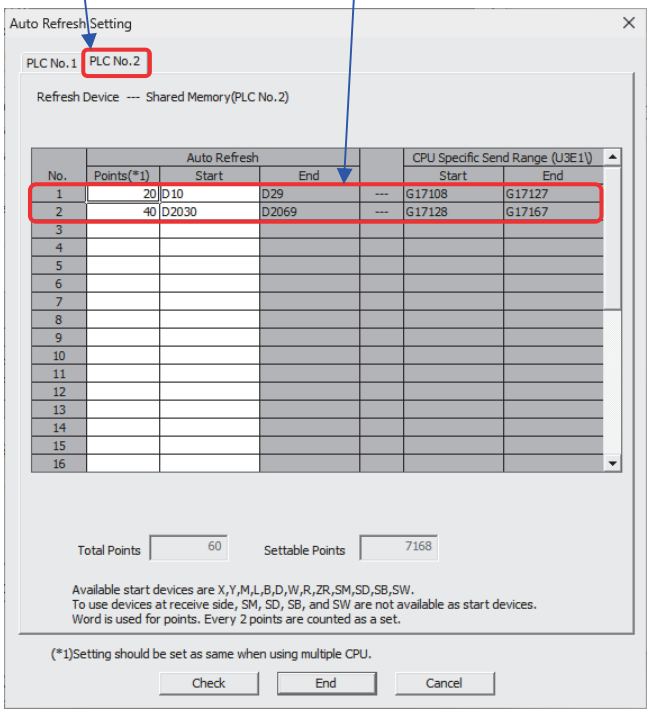


2) The screen below appears. Click a “Set” button of either CPU No.1 Send Data or No.2 Receive Data in [Refresh (At the I45 execution)].

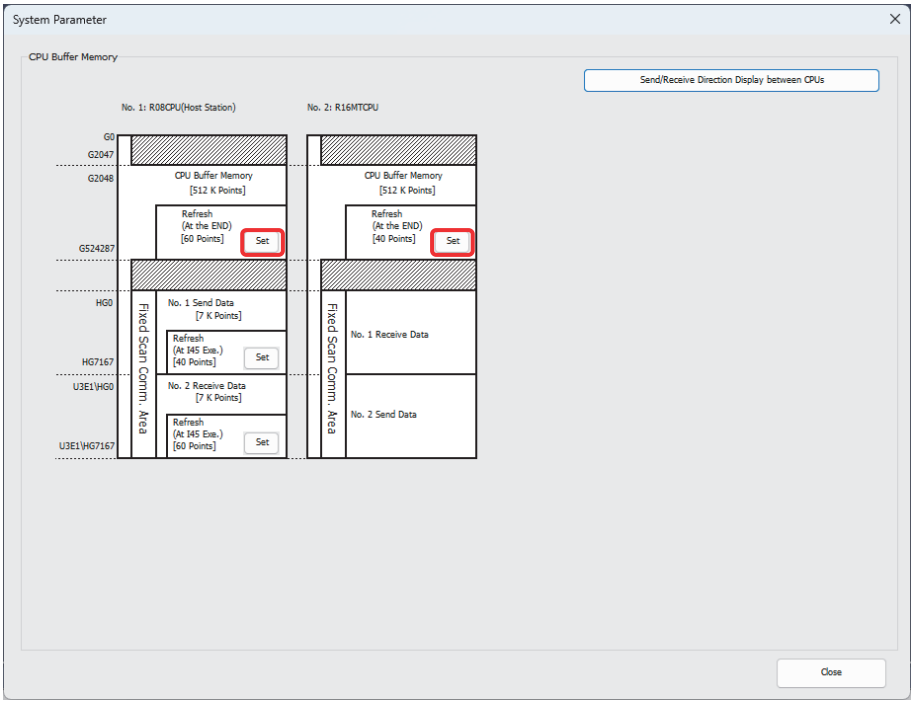


3) The "Refresh (I45 execution) setting" in GX Works3 diverts the "Automatic refresh setting" in GX Works2.

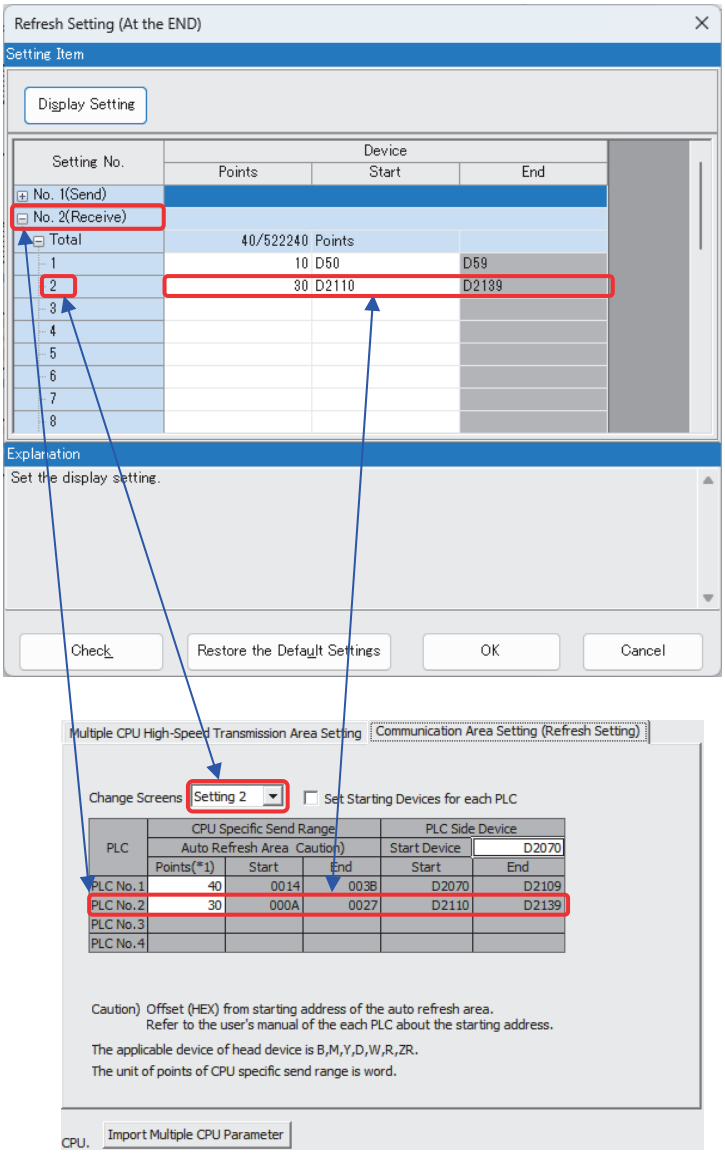




4) The screen below appears. Click a “Set” button of either CPU No.1 or No.2 in [Refresh (At the END)].



5) The "Refresh (I45 execution) setting" in GX Works3 diverts the "Automatic refresh setting" in GX Works2.



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 to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) 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.

6. Precautions for Choosing the Products

(1) For the use of our servo system controller, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the servo system controller, and a backup or fail-safe function should operate on an external system to the servo system controller when any failure or malfunction occurs.

(2) Our servo system controller is designed and manufactured as general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.

In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.

We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

L(NA)03212ENG-A(2509)MEE

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN