

Method of replacing Process CPU with Universal model Process CPU

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■Relevant Models

Q04UDPVCPU, Q06UDPVCPU, Q13UDPVCPU, Q26UDPVCPU

Thank you for your continued support of Mitsubishi Electric programmable controllers, MELSEC-Q series.

This bulletin describes the method of replacing Process CPU with Universal model Process CPU.

Note that the reference manuals or the references described in this bulletin provide information as of September 2018.

1 Terms


This bulletin uses the following terms unless otherwise specified.

Generic term	Description
Process CPU	A generic term for the Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU
Universal model Process CPU	A generic term for the Q04UDPVCPU, Q06UDPVCPU, Q13UDPVCPU, and Q26UDPVCPU

2 Precautions for replacement

System configuration			
Item	Precautions	Replacement method	Reference
RS-232 port	There is no RS-232 port.	Use a USB port or an Ethernet port. To communicate with an RS-232 interface, use the QJ71C24N (-R2) in the system.	—
USB port	Applicable USB cables are different. <ul style="list-style-type: none"> • Process CPU: A-B type • Universal model Process CPU: A-miniB type 	Use USB cables of A-miniB type. Or, use USB conversion adapters of B-miniB type.*1	—
Applicable products and software	<ul style="list-style-type: none"> • A programming tool that was available for the Process CPU can no longer be used or needs to be upgraded. (The use of GX Developer is not supported in the system after replacement.) • Some GOTs and intelligent function modules that were available for the Process CPU can no longer be used or need to be upgraded. 	<ul style="list-style-type: none"> • Upgrade the version of the programming tool to the one compatible with the Universal model Process CPU. • Replace the GOT and intelligent function modules to those compatible with the Universal model Process CPU. 	Page 8 Applicable products and software
Multiple CPU system	Scan time is shortened in the Universal model Process CPU because operations are performed at higher speed. When used in a multiple CPU system, the Universal model Process CPU accesses to other modules frequently. As a result, the processing time in other CPU modules may increase.	Check the processing timings of other CPU modules and adjust the access frequency of the Universal model Process CPU using timers or the constant scan function.	QCPU User's Manual (Multiple CPU System)
MELSECNET/H	Simple dual-structured network function is not supported.	—	Section 7.7 in the Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network)
Multiple remote I/O network	Multiple remote I/O network is not supported.	—	—

*1 For the list of cables and converters for connection with peripheral devices (recommended product), refer to the following.

 List of cables and converters for connection with peripheral devices (recommended product) (FA-A-0036)

Program			
Item	Precautions	Replacement method	Reference
Language and instruction	Some instructions are not supported.	Replace the instructions not supported in the Universal model QCPU as described in Appendix 5.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).	Appendix 5.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Floating-point operation	The Universal model QCPU performs program operations of floating-point data in single precision.	Instructions for floating-point double-precision operations are added for the Universal model Process CPU. When floating-point double-precision operations are required, replace the instructions as described in Appendix 5.4.1 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).*1	Appendix 4.4, Appendix 5.4.1, and Appendix 5.4.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	When using the floating-point data comparison instructions, LDE□, ANDE□, ORE□, LDED□, ANDED□, and ORED□, if the comparison source data are -0, nonnumeric, unnormalized number, or ±∞, "OPERATION ERROR" (error code: 4101) is detected. (□ indicates one of the following; =, <>, <=, >=, <, >.)	When the floating-point data comparison instructions are used, modify the program as described in Appendix 5.4.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).*1	
	The operation results may slightly differ between the Process CPU and the Universal model Process CPU.	Ensure that it does not cause any problems in the system.	—

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Item	Precautions	Replacement method	Reference
Device range check at an index modification	When a device number exceeds a setting range due to index modification, "OPERATION ERROR" (error code: 4101) is detected.	Deselect the "Check Device Range at Indexing" checkbox in the PLC RAS tab of the PLC parameter dialog box so that checking is not performed.	Appendix 5.4.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)* ¹
Program execution type	Low-speed execution type programs are not supported.	Use scan execution type programs or fixed scan execution type programs.	Section 2.10 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	A program execution type cannot be changed by remote operation. For the Universal model Process CPU whose serial number (first five digits) is "18112" or later, however, a program execution type can be changed by remote operation.	Use instructions for switching program execution types, such as PSTOP, POFF, and PSCAN.	
Latch setting	If latch ranges of internal user devices are specified, the processing time is added in proportion to the device points set to be latched.	The latch function of the Universal model Process CPU is enhanced as shown in the following (1) to (4). (1) Large-capacity file register (R, ZR) (2) Writing/reading device data to the standard ROM (SP.DEVST and S(P).DEVLD instructions) (3) Latch range specification of internal devices (4) "Time Setting" specification in the latch interval setting parameter Change the latch method to the one described above according to the application.	Section 3.3, Section 3.3 (5) (b), and Appendix 5.4.4 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)* ¹
Interrupt program	Interrupt counter is not supported.	Check the number of executions for interrupt programs on the Interrupt program monitor list screen.	Section 3.13.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	The interrupt pointers (I32 to I40) due to an error are not supported.	—	Section 4.11 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
SCJ instruction	When the SCJ instruction is used in the Universal model QCPU, the AND SM400 (or NOP instruction) needs to be inserted immediately before the SCJ instruction.	Insert the AND SM400 (or NOP instruction) immediately before the SCJ instruction when the SCJ instruction is used.	Section 6.5 in the MELSEC-Q/L Programming Manual (Common Instruction)
ZPUSH instruction	The number of index registers is increased to 20 for the Universal model QCPU. The area for saving the data in the index register with the ZPUSH instruction is increased as well.	Increase the save areas used for the ZPUSH instruction as needed.	Section 7.19 in the MELSEC-Q/L Programming Manual (Common Instruction)
File usability setting for each program	The following file usability setting for each program is not available. • File register • Initial device value • Comment	When file usability is set, modify the program as described in Appendix 5.4.5 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)* ¹	Section 2.10 and Appendix 5.4.5 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
I/O refresh setting for each program	I/O refresh setting for each program is not available.	Use the RFS instruction if I/O refresh setting for each program is required.	• Section 2.10 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals) • MELSEC-Q/L Programming Manual (Common Instruction)
SM/SD	Usage of a part of the special relay and special register is different.	Replace the corresponding special relay and special register as described in Appendix 5.5 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).	Appendix 5.5 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	A series-compatible special relay and special register are not supported. (SM1000 to SM1255/SD1000 to SD1255)	By using a programming tool, A series-compatible special relay and special register can be replaced with the Universal model Process CPU-compatible special relay and special register. Note, however, that the ones which are not compatible with the Universal model Process CPU are replaced with SM1255 and SD1255. Modify programs as needed.	QCPU User's Manual (Hardware Design, Maintenance and Inspection)

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Item	Precautions	Replacement method	Reference
Processing time	Scan time and each processing time are different.	Modify programs as needed, checking the processing timing.	—
Number of steps	The number of basic steps differs in some instructions.	—	—
	The number of steps increases by one when: <ul style="list-style-type: none"> • Index modification is performed. • A leading or trailing edge instruction is used. • Bit devices are used as word data by specifying digits using K1, K2, K3, K5, K6, or K7, or by specifying a device number of other than multiples of 16. 	If index modifications mentioned on the left are frequently used in the program, the program size may exceed the storage capacity of the replaced CPU module. After the program controller type is changed, check the program size using the confirm memory size function. If the program size exceeds the storage capacity, take the following actions or change the CPU module to that with larger program memory. <ul style="list-style-type: none"> • Move parameters and device comments to the standard ROM. • Reduce the reserved area for online change. • Use the file register, extended data register, and extended link register within 64K words because the number of steps decreases by one when used in that way. 	Section 3.8 in the MELSEC-Q/L Programming Manual (Common Instruction)

*1 "High Performance model QCPU" in the reference manual shall be replaced with "Process CPU".

Parameter size

Item	Precautions	Replacement method	Reference
Parameter size	The parameter size increases because the built-in Ethernet port setting parameters are added.	<ul style="list-style-type: none"> • Delete unnecessary files and free some space. • Move the parameter file to another memory area. 	—

Drives and files

Item	Precautions	Replacement method	Reference
Boot file setting	Files in the standard ROM cannot be booted to the program memory.	Since the Universal model Process CPU holds the data in the program memory even when the battery voltage drops, the boot file setting is not necessary. Move files with the boot setting (from the standard ROM to the program memory) to the program memory.	Section 2.11 and Appendix 5.4.6 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	Booting operation is different.	For replacement method when the parameter-valid drive and the boot files setting are set in the Process CPU, refer to Appendix 5.4.6 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals). ^{*1}	
	A memory card (SRAM card, ATA card, or Flash card) cannot be specified as a transfer source.	Specify an SD memory card as a transfer source.	
Automatic all data write from memory card to standard ROM	The setting method of this function is different.	<ul style="list-style-type: none"> • In the Boot file tab of the PLC parameter dialog box, select "standard ROM" for the transfer destination. Note, however, that the transfer destination of program is fixed to "program memory". (Setting by DIP switches is not necessary.) • The data in the program cache memory is transferred to the program memory (flash ROM), so the data in the program memory can be used in the normal operation. (Automatic backup function) 	Section 2.11 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Device comment	A device comment file cannot be stored in an SRAM card.	Store the file in the standard RAM.	—
	A device comment file cannot be stored in an ATA card nor Flash card.	Store the file in an SD memory card.	—

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Item	Precautions	Replacement method	Reference
Initial device value	An initial device value file cannot be stored in an SRAM card.	Store the file in the standard RAM or standard ROM.	Section 3.25 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	An initial device value file cannot be stored in an ATA card nor Flash card.	Store the file in an SD memory card.	
Local device	A local device file cannot be stored in an SRAM card.	<ul style="list-style-type: none"> Store the file in the standard RAM. If the size of the local device file exceeds the standard RAM capacity, consider the use of an extended SRAM cassette. 	Section 6.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
File register	A file register file cannot be stored in an SRAM card.	<ul style="list-style-type: none"> Store the file in the standard RAM. If the size of the file register file exceeds the standard RAM capacity, consider the use of an extended SRAM cassette. 	Section 4.7.1 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	A file register file cannot be stored in a Flash card. (Sequence programs can only read file register data in a Flash card.)	Use the initial device value file in an SD memory card or the FREAD/FWRITE instructions.	<ul style="list-style-type: none"> Section 3.25 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals) MELSEC-Q/L Programming Manual (Common Instruction)
Sampling trace	A sampling trace file cannot be stored in an SRAM card.	<ul style="list-style-type: none"> Store the file in the standard RAM. If the size of the sampling trace file exceeds the standard RAM capacity, consider the use of an extended SRAM cassette. 	Section 3.14 (2) in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)

*1 "High Performance model QCPU" in the reference manual shall be replaced with "Process CPU".

External communication

Item	Precautions	Replacement method	Reference
Module service interval time read	The module service interval time cannot be read.	—	Section 3.24.1 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
MC protocol	<p>The following commands cannot specify monitoring conditions.</p> <ul style="list-style-type: none"> Randomly reading data in units of word (Command: 0403) Device memory monitoring (Command: 0801) <p>The applicable frame types are as follows:</p> <ul style="list-style-type: none"> QnA-compatible 3C/4C frame QnA-compatible 3E frame 4E frame 	—	MELSEC Communication Protocol Reference Manual

Functions

Item	Precautions	Replacement method	Reference
Security function	The security function, which limits accesses to the files in the CPU module, has been enhanced from the password registration function to the file password 32 function.	Use the file password 32 function instead of the password registration function.	Section 3.19 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Error history	Error history data cannot be stored in the memory card.	The Universal model Process CPU can store history data by the number of storable history data in a memory card (100) to the system memory.	Section 3.18 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
LED indication priority setting	LED indication priority cannot be set. Only LED indication setting at error occurrence is supported.	—	Section 3.20.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Online module change function	Online module change function is not supported.	—	—

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Debugging

Item	Precautions	Replacement method	Reference
Scan time measurement	Time required for executing a part of the program cannot be measured using the scan time measurement function.*1	Calculate the time using instruction processing time described in the manual.	<ul style="list-style-type: none"> • Section 3.13.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals) • Appendix 1 in the MELSEC-Q/L Programming Manual (Common Instruction)

*1 Scan time of each program can be checked on the Program monitor list screen.

Switch on the front of the CPU module

Item	Precautions	Replacement method	Reference
RUN/STOP/RESET switch	The operation method with the RUN/STOP/RESET switch is modified.	The RUN/STOP/RESET switch of the Universal model Process CPU can be used for the reset operation of the CPU module and switching between the STOP status and RUN status.	Section 6.1.3 in the QCPU User's Manual (Hardware Design, Maintenance and Inspection)
RESET/L.CLR switch	Latch data cannot be cleared by the switch.	Perform the following operations to clear latch data. <ul style="list-style-type: none"> • Remote latch clear using a programming tool 	Section 3.6.4 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
System protection	The system protect cannot be set by the switch.	Data in the files can be protected by setting a password for each file. Password for each file can be registered with a programming tool.	Section 3.19 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Parameter-valid drive	The parameter-valid drive setting is not necessary.	The Universal model Process CPU automatically determines the parameter-valid drive. Change the setting as described in Appendix 5.4.6 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals) when the parameter-valid drive is set to other than the program memory in the Universal model Process CPU.*1	Section 2.1.2 and Appendix 5.4.6 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)

*1 "High Performance model QCPU" in the reference manual shall be replaced with "Process CPU".

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SFC

Item	Precautions	Replacement method	Reference
Step transition monitoring timer	The step transition monitoring timer is not supported.	Change the program as described in Appendix 3 in the reference manual mentioned on the right.	Section 4.6 and Appendix 3 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC operation mode setting	The periodic execution block setting is not supported.	Change the program as described in Appendix 3 in the reference manual mentioned on the right.	Section 4.7 and Appendix 3 in the MELSEC-Q/L/QnA Programming Manual (SFC)
	An operation mode at transition to active step (double step START) cannot be selected. (Fixed to "TRANSFER".)	—	Section 4.7 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC program for program execution management	SFC programs for program execution management are not supported.	—	Section 5.3 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC control instruction	Some SFC control instructions are not supported.	For unusable instructions and replacement method, refer to Appendix 5.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).	<ul style="list-style-type: none"> • Appendix 5.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals) • Section 4.4 in the MELSEC-Q/L/QnA Programming Manual (SFC)
Method of SFC program change	SFC program files cannot be written to the running CPU module. (Programs in SFC Figure can be changed online.)	<ul style="list-style-type: none"> • Write program data to the CPU module after changing the Universal model Process CPU status to STOP. • An inactive block in an SFC program can be changed by online change of inactive block. 	Section 6.6 in the MELSEC-Q/L/QnA Programming Manual (SFC)

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3 Applicable products and software

3.1 Products need to be replaced for the compatibility with the Universal model Process CPU

The following tables show products need to be replaced for the compatibility with the Universal model Process CPU. (As for products not listed in the table below, replacement is not required.)

Communication module

Product	Model	Serial number (first five digits) of the product compatible with the Universal model Process CPU*2
Web server module*1	• QJ71WS96	"14122" or later
MES interface module	• QJ71MES96	"14122" or later
High speed data logger module	• QD81DL96	"14122" or later

*1 The Universal model Process CPU does not operate normally when the Web server module on which GX RemoteService-I is installed is used.

*2 The Universal model Process CPU does not operate normally when the products not compatible with the Universal model Process CPU are used.

PC interface board

Product	Model	Dedicated software package version compatible with the Universal model Process CPU*1
CC-Link IE Field Network interface board	• Q81BD-J71GF11-T2	1.12N or later
CC-Link IE Controller Network interface board	• Q81BD-J71GP21-SX • Q81BD-J71GP21S-SX • Q80BD-J71GP21-SX • Q80BD-J71GP21S-SX	1.15R or later
MELSECNET/H interface board	SI/QSI/H-PCF optical cable	• Q80BD-J71LP21-25 • Q80BD-J71LP21S-25 • Q81BD-J71LP21-25
	GI optical cable	• Q80BD-J71LP21G
	Coaxial cable	• Q80BD-J71BR11
CC-Link System master/local interface board	• Q80BD-J61BT11N • Q81BD-J61BT11	1.12N or later

*1 No restrictions on the board itself.

GOT

Product	Model	GT Works3 OS version compatible with the Universal model Process CPU*1
GOT1000	• GT16□-□ • GT15□-□ • GT14□-□ • GT11□-□ • GT10□-□	1.73B or later

*1 No restrictions on GOT itself.

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Network module

Product	Model	Module version compatible with the Universal model Process CPU
MELSECNET/H module	<ul style="list-style-type: none"> • QJ71LP21-25 • QJ71LP21S-25 • QJ71LP21G • QJ71BR11 	Some restrictions depending on use conditions.*1

- *1 The serial number (first five digits) of the MELSECNET/H module must be "10042" or later if all conditions 1) to 4) described below are satisfied.
- A multiple CPU system including the Universal model Process CPU is configured.
 - A programming tool or GOT is connected to an Ethernet port of the Universal model Process CPU.
 - A programming tool or GOT accesses the CPU module on another station via the MELSECNET/H module controlled by another CPU.
 - The access target on another station is MELSEC-A/QnA series CPU module.

3.2 CPU module that can configure a multiple CPU system with the Universal model Process CPU

The following table shows the CPU module that can configure a multiple CPU system with the Universal model Process CPU.

Module	Model	Applicable version	Restrictions
Motion CPU	<ul style="list-style-type: none"> • Q172DCPU • Q173DCPU • Q172DCPU-S1 • Q173DCPU-S1 • Q172DSCPU • Q173DSCPU 	No restrictions	Use only multiple CPU high-speed main base unit (Q3□DB) as a main base unit.
PC CPU module	• PPC-CPU852 (MS)	Not supported	—
C Controller module	<ul style="list-style-type: none"> • Q06CCPU-V • Q06CCPU-V-B • Q12DCCPU-V 	Not supported	—
	• Q24DHCCPU-V	Serial number (first five digits) "15051" or later	—
	• Q24DHCCPU-LS	No restrictions	—
High Performance model QCPU	<ul style="list-style-type: none"> • Q02CPU • Q02HCPU • Q06HCPU • Q12HCPU • Q25HCPU 	Function version B or later	—
Process CPU	<ul style="list-style-type: none"> • Q02PHCPU • Q06PHCPU • Q12PHCPU • Q25PHCPU 	No restrictions	—
Universal model QCPU	<ul style="list-style-type: none"> • Q03UD(E)CPU • Q03UDVCPU • Q04UD(E)HCPU • Q04UDVCPU • Q04UDPVCPU • Q06UD(E)HCPU • Q06UDVCPU • Q06UDPVCPU • Q10UD(E)HCPU • Q13UD(E)HCPU • Q13UDVCPU • Q13UDPVCPU • Q20UD(E)HCPU • Q26UD(E)HCPU • Q26UDVCPU • Q26UDPVCPU • Q50UDEHCPU • Q100UDEHCPU 	No restrictions	—

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3.3 Products not compatible with the Universal model Process CPU

The following table shows the products not compatible with the Universal model Process CPU.

Product	Model
GOT	GOT900 series
Programming module	EPU01
Hand-held graphic programmer	EHGP10
PocketLadder	EPGP2Q□□-CE

REVISIONS

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