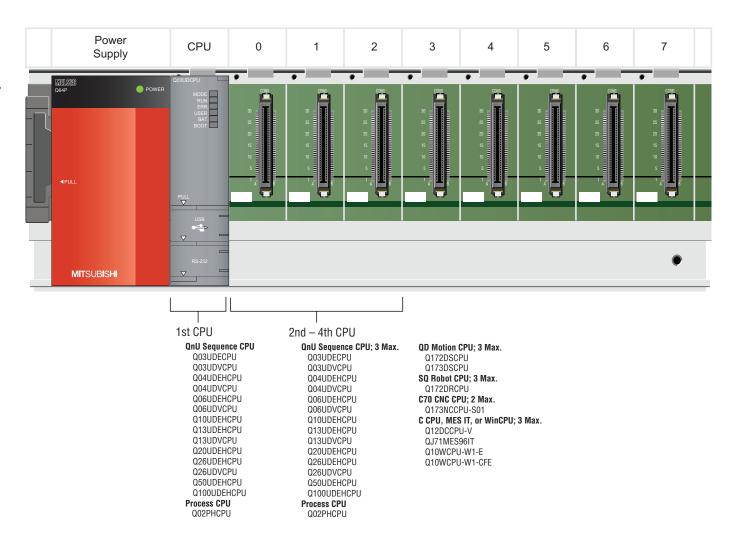# Modular CPUs

The Q Series unifies all of the Mitsubishi Electric automation disciplines into a one-of-a-kind modular Programmable Automation Controller (PAC). Based on the multi-CPU architecture of the renowned Q Series Automation Platform, the ultra high-speed dual-bus back plane allows the Q Series to be the only PAC to integrate individual Sequence, Motion, CNC, and Robot control onto a single rack. It is ideal for multi-discipline systems, requiring at least one sequence CPU. Users can expand their configuration with existing Q Series I/O and intelligent modules, providing customized flexibility without the cost of new development or double-stock.

Q Series CPU Configuration
High Speed Base Units: Q35DB, Q38DB or Q312DB

1st CPU

QnU Sequence CPU
Q03UDECPU
Q03UDVCPU
Q04UDEHCPU
Q04UDVCPU
Q06UDEHCPU
Q06UDVCPU
Q10UDEHCPU
Q13UDEHCPU
Q13UDVCPU
Q20UDEHCPU
Q26UDEHCPU
Q26UDVCPU
Q50UDEHCPU
Q100UDEHCPU

Process CPU
Q02PHCPU

2nd – 4th CPU

QnU Sequence CPU; 3 Max.
Q03UDECPU
Q03UDVCPU
Q04UDEHCPU
Q04UDVCPU
Q06UDEHCPU
Q06UDVCPU
Q10UDEHCPU
Q13UDEHCPU
Q13UDVCPU
Q20UDEHCPU
Q26UDEHCPU
Q26UDVCPU
Q50UDEHCPU
Q100UDEHCPU

Process CPU
Q02PHCPU

QD Motion CPU; 3 Max.
Q172DSCPU
Q173DSCPU

SQ Robot CPU; 3 Max.
Q172DRCPU

C70 CNC CPU; 2 Max.
Q173NCCPU-S01

C CPU, MES IT, or WinCPU; 3 Max.
Q12DCCPU-V
QJ71MES96IT
Q10WCPU-W1-E
Q10WCPU-W1-CFE

Q Series Sequence CPUs

Q Series CPUs bring high-end sequence control to the Mitsubishi PAC lineup. These CPUs are most effective when used in conjunction with other Q Series CPUs such as Motion, Robot, CNC, PC and C Language controllers. However, they can also be used in Q Series configurations to increase performance and functionality.

Model Number	Built-In Ethernet	Q03UDECPU	Q04UDEHCPU	Q06UDEHCPU	Q10UDEHCPU	Q13UDEHCPU	Q20UDEHCPU	Q26UDEHCPU	Q50UDEHCPU	Q100UDEHCPU
Stocked Item		S	S	S	-	S	-	S	-	-
Certification		UL • cUL • CE								
Processing Speed (Sequence Instruction)	LD X0	20ns	9.5ns							
	MOV D0 D1	40ns	19ns							
Program Capacity (*1, *2)		30k steps	40k steps	60k steps	100k steps	130k steps	200k steps	260k steps	500k steps	1000k steps
Memory Capacity (*1)	Program Memory (Drive 0)	120 kB	160 kB	240 kB	400 kB	520 kB	800 kB	1040 kB	2000 kB	4000 kB
	Standard RAM (Drive 3)	192 kB	256 kB	768 kB	1024 kB		1280 kB		1536 kB	1792 kB
	Standard ROM (Drive 4)	1024 kB			2048 kB		4096 kB		8192 kB	16384 kB
Max. No of Files Stored	Program Memory	124			252 (CPU module can only execute up to 124 programs, though more may be stored)					
	Standard RAM	4 files								
	Standard ROM	256							512	
Memory Card Interface		Yes								
Max. I/O Device Points		8192 points (X/Y0 to 1FFF)								
Max. Physical I/O Points		4096 points (X/Y0 to FFF)								
No. of Device Points		Set in PLC parameters								
File Registers		Available								
Specs. of Built-In Ethernet Port CPU Module (*3)	Data Transmission Speed	100/10Mbps								
	Communication Mode	Full-duplex / Half duplex								
	Ethernet Functions	Program upload/download, remote monitor/maintenance, HMI connection, FTP server, SNTP								
	Max. Distance Between Hub and Node	100m (328.08 feet)								
	Max. No. of Connectable Nodes — 10BASE-T	Cascade connection: Four stages maximum								
	Max. No. of Connectable Nodes — 100BASE-TX	Cascade connection: Two stages maximum								
	Number of Connections (*4)	16 for MELSOFT connection and MC protocol, 1 for FTP								
Communication Ports		USB (Mini-B), RS-232 / Ethernet							USB (Mini-B), Ethernet	
5VDC Internal Current Consumption		0.33A (*5)	0.39A (*6)						0.50A	
Base Unit Slots Occupied		1								
Weight (kg)		0.22							0.24	

Notes:
1. The unit of the file size stored in the memory area varies depending on the CPU module. For more details, refer to the QCPU User's Manual (Function Explanation, Program Fundamentals)
2. The maximum number of executable sequence steps is shown. (Program capacity) - (File header size (default: 34 steps)). For details, refer to the QCPU User's Manual (Function Explanation, Program Fundamentals).
3. Applies to QnU CPUs with built-in Ethernet ports only.
4. Indicates the total number of TCP/IP and UDP/IP protocols.
5. The current value consumption of the built-in Ethernet part version is 0.46A
6. The current consumption of the built-in Ethernet port version is 0.46A.

Model Number	Built-In Ethernet	Q03UDVCPU	Q04UDVCPU	Q06UDVCPU	Q13UDVCPU	Q26UDVCPU
Stocked Item		S	-	S	-	S
Certification		UL • cUL • CE				
Processing Speed (Sequence Instruction)	LD X0	1.9ns				
	MOV D0 D1	3.9ns				
Program Capacity (*1, *2, *3)		30k steps	40k steps	60K steps	130k steps	260k steps
Memory Capacity (*1)	Program Memory (Drive 0)	120 kB	160 kB	240 kB	520 kB	1040 kB
	Memory Card RAM (Drive 1)	-				
	Memory Card SD (Drive 2)	Depends on the SD memory card (SD or SDHC type) used. (Max. 32GB)				
	Standard RAM (Drive 3) Without Extended SRAM Cassette	192 kB	256 kB	768 kB	1024 kB	1280 kB
	Standard RAM (Drive 3) With Extended SRAM Cassette	Capacities of the memory in the module and extended SRAM cassette. (The maximum capacity of an extended SRAM casette is 8MB)				
	Standard ROM (Drive 4)	1025.5 kB			2051 kB	4102 kB
	CPU Shared Memory	32 kB				
Max. Number of Files Stored	Program Memory	124 (*4)			252 (*4)	
	Memory Card SD	Root directory: 512 files (maximum); Subdirectory: 65534 files (maximum)				
	Memory Card SDHC	Root directory: 65535 files (maximum); Subdirectory: 65534 files (maximum)				
	Standard RAM With or Without an Extended SRAM Cassette	323				
	Standard ROM	256				
Max. I/O Device Points		8192 points (X/Y0 to 1FFF)				
Max. Physical I/O Points		4096 points (X/Y0 to FFF)				
Specs. of Built-In Ethernet Port CPU Module (*4)	Data Transmission Speed	100/10Mbps				
	Communication Mode	Full-duplex/Half-duplex				
	Max. Distance Between Hub and Node	100m				
	Max. No. of Connectable Nodes — 10BASE-T	Cascade connection: Up to four bases (*5)				
	100BASE-TX	Cascade connection: Up to two bases (*5)				
	Number of Connections (*6)	16 for a total of socket communication, MELSOFT connection, and MC protocol, and 1 for FTP				
5VDC Internal Current Consumption		0.58A (only CPU module), 0.6A (with an extended SRAM cassette)				
Base Unit Slots Occupied		1				
Weight (kg)		20				

Notes:
1. The maximum number of executable sequence steps is obtained by the following formula.
2. Program size – file header size (default: 34 steps)
3. When the QnUD(H)CPU or QnUDE(H)CPU is replaced with the QnUDVCPU, the number of steps in the program may change (increase or decrease)
4. Data in the CPU shard memory cannot be latched. Data in the CPU shared memory is cleared when the programmable controller is powered on or the CPU module is reset.
5. This is the number of connectable modes when a repeater hub is used. For the number of connectable nodes when a switching hub is used, contact the manufacturer of the switching hub used.
6. The number is a total of TCP/IP and UDP/IP.

Q Series Motion CPUs
Please refer to the Motion Controller section in this Guide

Q Series CNC CPUs
Please refer to the CNC section in this Guide

Q Series Robot CPUs
Please refer to the Robot section in this Guide

PC Controller (WinCPU)

The Q Series combines several key automation disciplines including the ability to integrate an industrial PC and its environment on this hardware platform. WinCPU is design to compress your hardware architecture and manage your automation system while taking full advantage of benefits of a PC. This flexible solution is ideal for a wide range of applications including many nontraditional machine designs. Users can leverage all the benefits of each discipline and merge them into a seamless control system that far exceeds any control expectation.

Model Number		Q10WCPU-W1-E	Q10WCPU-W1-CFE
Stocked Item		S	S
Certification		UL • cUL • CE	
Number of Slots Occupied		2 slots	
CPU		Intel® Atom™ Processor N450 1.66GHz	
Chipset		Intel® ICH8M	
Memory	L1 Cache	Instruction 32KB + Data 24KB	
	L2 Cache	512KB	
	Main Memory	1GB (3.3V 200-pin DDR2 SO-DIMM DDR667Socket x 1)	
Video	Controller	N450 built-in	
	Video RAM	Main memory shared	
	CRT I/F	Analog-RGB 15-pin HD-SUB connector	
	Resolution	1,400 x 1,050 @60Hz (16 million colors)	
Serial I/F		RS-232C-compliant: 1ch (9-pin D-SUB connector) baudrate: 50 - 115200bps	
LAN	I/F	1000BASE-T/100BASE-TX/10BASE-TRJ-45 connector x 2	
	Controller	Intel 82574L	
CF Card Slot		CF CARD Type I (Only for the memory card of IDE connection) Indication: access LED (green) x 1 (*1, *2)	
CF Card		-	4GB CF Card included
Built-in SSD (*3)		Built-in flash drive 4GB	
USB I/F		USB2.0-compliant 5ch (front 3ch, bottom 2ch) Transfer rate: 480Mbps Supply power: +5V each channel 0.5A max. (*4)	
Watch Dog Timer		2ch Time-up period: system WDT 20msec - 2sec, user WDT 10msec - 10sec	
General I/O		Terminal block [1, 2] Input for shutdown (current drive input) Terminal block [3] Output to notify shutdown completion (open collector output) Terminal block [4] Output to nofity the start of watch dog timer (open collector output)	
RTC/CMOS		Lithium battery backup life: 10 years or more (when no power input, at 25°C) The real-time clock is accurate within ±3 minutes (at 25°C) per month	
Indication		RDY (green), B.RUN (green), ERR. (red), USER (red), BAT. (orange), EXIT (green), CF/SSD (green)	
Control		Reset PUSH switch, DIP switch 4-pole, DIP switch 6-pole, 3-position toggle switch	
Supported OS		Windows® Embedded Standard 2009	
5VDC Internal Current Consumption		3.0A (Max.) (This does not include the current consumption by any peripheral devices (such as the CF Card and USB device))	
Dimensions (W X D x H) [mm]		55.2 x 115.0 x 98.0 (Excluding protrusions)	
Weight (g)		440	450 (Including CF card, Fittings and screws to fix a CF card)

Notes:
1. When power is on, you can not push in / pull out a CF card. Memory card is supported but other purposes are not supported.
2. Access LED shows the access of both a CF card and built-in SSD.
3. Built-in SSD is used as OS space. SSD has rewritable life (1 million times). For details, refer to the User's Guide: "Built-in SSD" of "Chapter 5 Each Component Function"
4. Current capacity shows the maximum value the connector supports. But the actual value is limited because the total current cannot exceed the capacity of the power supply module. Therefore the actual available value may be less than 0.5A.

C Language CPU

The C Language CPU can be added to Q Series configuration and allows experienced C programmers to create custom control programs using VxWorks (sold separately). This product is only meant for the advanced user. The Q12DCCPU-V is the hardware base for the MES Interface IT e-F@ctory solution, and is included within the QJ71MES96IT Model Number. It is also the hardware base for Q Series Ethernet/IP scanner, EIP4CCPU.

Model Number		Q12DCCPU-V
Stocked Item		S
Certification		UL • cUL • CE
Endian Format (Memory Layout)		Little endian
User File Capacity (For Storage)	Standard RAM	3Mb
	CompactFlash Card	Up to 8 GB
Work RAM (for OS, Driver, User Program Execution)		128 MB
Battery Backed-up RAM		128 kB
Software	Operating System	VxWorks Version 6.4 (For the PC environment, refer to C Controller Module User's Manual)
	Programming Language	C language (C/C++)
Ethernet 10BASE-T/ 100BASE-TX	Number of Channels	2 channels (same specification for CH1 and CH2)
	Interface	10BASE-T/100BASE-TX (C Controller module differentiates 10BASE-T and 100BASE-TX according to the target device)
	Number of Cascaded Stages	Up to 4 (10BASE-T)/Up to 2 (100BASE-TX)
	Maximum Segment Length (Distance Between Hub and Node)	100m (328.08 feet)
	Supported Function	Auto negotiation function (automatically recognizes 10BASE-T or 100BASE-TX); Auto-MDIX function (automatically recognizes straight or crossing cable)
RS-232	Transmission Speed	9600, 14400, 19200, 28800, 38400, 57600, 115200 bps
	Transmission Distance	Up to 15m (49.21 feet)
	Recommended Cable	7/0.127_P HRV-SV outside diameter: 8.5mm (0.33 inches) or larger (Oki Electric Cable Company, Limited Specify the number of pairs in_)
	Connector Applicable to External Wiring	Round connector (10-pin)
USB	Transmission Speed	12Mbps (Full Speed Mode: FS)
	Connector	Mini-B
	Other Electric Characteristics	USB 2.0
CompactFlash Card	Supply Power Voltage	3.3V ±5%
	Supply Power Capacity	Up to 150mA
	Card Size	TYPE I card TYPE II card is not allowed. I/O cards, such as a modem card are not allowed
	Number of Card Slots	1
Number of I/O Points (Number of Points Accessible to Actual I/O Modules)		4096 points (X/Y 0 to FFF)
5 VDC Internal Current Consumption		0.93A
Weight (kg)		0.24
Base Unit Slots Occupied		1

Process and Redundant CPUs
Q Series Process Control CPUs

These CPUs include a wide variety of process control functions optimized to the task of controlling large scale, complex continuous processes where downtime is not an option. This allows a Q Series system to fully address the needs of users outside of the scope of traditional discrete control applications.

Model Number		Q02PHCPU	Q06PHCPU	Q12PHCPU	Q25PHCPU
Stocked Item		S	S	S	-
Programming Language	Sequence Control Dedicated Language	Relay symbol language, logic symbolic language, MELSAP3 (SFC), MELSAP-L, Function block and structured text (ST)			
	Process Control Language	FBD for process control (PX Developer is required for programming by FBD)			
Processing Speed (Sequence Instruction)	LD X0	34ns			
	MOV D0 D1	102ns			
Program Capacity (*1, *2)		28k steps	60 kB	124k steps	252k steps
Memory Capacity Item	Program Memory (Drive 0)	112 kB	240 kB	496 kB	1008 kB
	Standard RAM (Drive 3)	128 kB	256 kB (CPU shared memory is not latched)		
	Standard ROM (Drive 4)	112 kB	240 kB	496 kB	1008 kB
	CPU Shared Memory	8 kB			
Maximum No. of Stored Files	Program Memory	28	60	124	252 (*3)
	Standard RAM	3 (Extended by the upgraded functions of the CPU module)			
	Standard ROM	28	60	124	252
Memory Card Interface		Yes			
Max. I/O Device Points		8192 points (X/Y0 to 1 FFF)			
Max. Physical I/O Points		4096 points (X/Y0 to FFF)			
Communication Ports		USB (Type-B), RS-232			
5VDC Internal Current Consumption		0.64A			
Weight (kg)		0.20			
Base Unit Slots Occupied		1			

Notes:
1. The unit of the file size stored in the memory area varies depending on the CPU module. For details, refer to the QCPU User's Manual (Function Explanation, Program Fundamentals)
2. The maximum number of executable sequence steps is as shown. (Program capacity) - (File header size (default 34 steps)). Refer to the QCPU User's Manual (Function Explanation, Program Fundamentals)
3. The CPU module can only execute up to 124 programs.

Q Series Redundant CPUs

These CPUs take the process control capabilities of the Q Series process CPUs and add full hot-backup capability by using dual redundant CPUs. Use this system in applications where downtime cannot be tolerated for reasons of safety, equipment damage, financial loss, interruption of service, or regulatory compliance.

Model Number		Q12PRHCPU	Q25PRHCPU
Stocked Item		S	-
Certification		UL • cUL • CE	
Programming Language	Sequence Control Dedicated Language	Relay symbol language, logic symbolic language, MELSAP3 (SFC), MELSAP-L, function block and structured text (ST)	
	Process Control Language	FBD for process control (Programming by PX Developer)	
Processing Speed (Sequence Instruction)	LD X0	34ns	
	MOV D0 D1	102ns	
Processing Speed (Redundant Function)	Tracking Execution Time (Increased Scan Time)	Device memory 48k words: 10ms; Device memory 100k words: 15ms; QnPRHCPU User's Manual (Redundant System)	
Program Size		124 steps	252 steps
Program Memory (Drive 0)		496 kB	1008 kB
Memory Size	Standard RAM (Drive 3)	Size of the installed memory card (2MB max.)	
	Standard ROM (Drive 4)	496 kB	1008 kB
Max. Number of Files Stored	Program Memory	124	252
	Standard ROM	124	252
Max. I/O Device Points (*1)		8192 points (X/Y0 to 1FFF)	
Max. Physical I/O Points (*2)		4096 points (X/Y0 to FFF)	
Max. CPUs Mounted		1 (multiple-CPU configuration is not available)	
Max. Extension Base		0 (All non-redundant modules are mounted on the remote I/O station (the maximum number of modules that can be mounted on a remote station is 64))	
Max. Remote I/O Points		8192 points (up to 2048 points per station)	
Program Capacity	Number of Steps	124 ksteps	252 ksteps
	Number of Programs	124	252 (*3)
Functions Compatible With Redundant System		Redundant configuration of the entire system, including the CPU, the power supply, and the base unit. Hot standby system for the control and standby systems online module change both backup and separate mode available. Large-capacity data tracking: Large-capacity device data transfer (100 kwords) from the control system to the standby system. Network system compatible with redundant system: Switchover in case of MELSECNET/H or Ethernet module malfunction or network wire disconnection.	
Loop Control Specs.	Control Cycle	10 ms -/control loop (Can be set for each loop)	
	Number of Control Loops	No limit (*4)	
	Main Functions	2-degree-of-freedom PID control, cascade control, automatic tuning function, feed forward control	
RAS	Online Module Replacement	The I/O, analog, temperature input, temperature control, and pulse input modules can be replaced (on a remote I/O station)	
	Output In Case Of Error Stop	Clear or output retention can be designated for each module	
Communication Ports		USB (Type-B), RS-232	
Modules Mountable On Main Base Unit		Network modules for the Q Series can be mounted (Ethernet, MELSECNET/H, and CC-Link only)	
Programming Software		GX Developer, PX Developer	
5VDC Internal Current Consumption		0.89	
Weight (kg)		0.30	
Base Unit Slots Occupied		2	

Notes:
1. Total number of the I/O points on the main base unit, which are directly controlled from the CPU module, and the I/O points controlled as remote I/O by the remote I/O network.
2. The number of I/O points on the main base unit, which are directly controlled from the CPU module.
3. The max. number of files that can be executed is 124. Two SFC/MELSAP-Ls are available, one of which is a program execution control SFC.
4. The number of control loops is restricted by the combination of the device memory capacity (128 kwords/loop used) and the control cycle.

Q Redundant CPU Parts

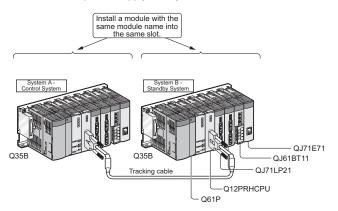| Product Name	Model	Overview	Stock Item
Redundant CPU Module	Q12PRHCPU	Max. I/O device points: 8192 (physical I/O points: 4096), program capacity: 124 ksteps	S
	Q25PRHCPU	Max. I/O device points: 8192 (physical I/O points: 4096), program capacity: 252 ksteps	-
Tracking Cable	QC10TR	1m cable for tracking	S
	QC30TR	3m cable for tracking	-
Base Unit For Redundant Power Supply Systems	Q38RB	Q Series I/O mounting main base: Number of power supply slots: 2, number of CPU slots: 1, number of I/O slots: 8	S
	Q68RB	Q Series I/O mounting extension base: Number of power supply slots: 2, number of I/O slots: 8	-
	Q65WRB	Q Series I/O mounting extension base: Dual Q Bus Inputs, Number of power supply slots: 2, number of I/O slots: 5	S
Power Supply Module For Redundant Power Supply Systems	Q64RPN	100 to 240 VAC input, 5 VDC, 8.5 A output	-

Communication and Networking Module Version Information for Compatibility With Redundant Systems

Product Name	Model Number	Overview	Version	Stock Item
MELSECNET/H Master Module	QJ71LP21-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) control / normal / master stations	Function version "D" or later	S
	QJ71LP21S-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) control / normal / master stations, equipped with an external power supply		-
	QJ71LP21GE	For MELSECNET/H dual optical loop interface module (compatible with GI) control / normal / master stations		-
	QJ71BR11	For MELSECNET/H coaxial single bus interface module control / normal / master stations		S
MELSECNET/H Remote I/O Module	QJ72LP25-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) remote I/O stations (*1)		S
	QJ72LP25GE	For MELSECNET/H dual optical loop interface module (compatible with GI) remote I/O stations		-
	QJ72BR15	For MELSECNET/H coaxial single bus interface module remote I/O stations		S
Ethernet Interface Module	QJ71E71-100	Ethernet interface module (100BASE-TX/10BASE-T)		S
MELSECNET / H Board For Personal Computers	Q81BD-J71LP21-25	For dual optical loop interface board (compatible with SI and QSI) control / normal stations (*1)		-
	Q80BD-J71LP21G	For dual optical loop interface board (compatible with GI) control / normal stations (*1)		-
	Q80BD-J71BR11	For coaxial single bus interface board control / normal stations (*1)		S
CC-Link IE Control	QJ71GP21-SX	For CC-Link IE Control, dual-loop fiber control stations		S
	QJ71GP21S-SX	For CC-Link IE Control, dual-loop fiber with redundant power control stations		-

Note 1: The boards must be used in combination with the attached driver package SW0DNC-MNETH-B[90K] or later version.

Sample Configurations

Non-redundant power supply configuration

Install a module with the same module name into the same slot.

System A - Control System

System B - Standby System

Q35B   Q35B

Tracking cable

QJ71E71
QJ61BT11
QJ71LP21
Q12PRHCPU
Q61P

Redundant power supply configuration

Make Redundant Power supply module redundant

Make Redundant Power supply module redundant

System A Control System

System B Standby System

Q38RB   Q38RB

Tracking cable

Q63RP/Q64RP
(Two modules mounted on Q38RB)

Q63RP/Q64RPN
(Two modules mounted on Q38RB)