

MELSEC System Q

Programmable Logic Controllers

User's Manual

**Basic Model QCPU
(Q Mode)
Q00JCPU, Q00CPU,
Q01CPU**

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly.


These SAFETY PRECAUTIONS classify the safety precautions into two categories: "DANGER" and "CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on circumstances, procedures indicated by  CAUTION may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

DANGER

- Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC module. Otherwise, trouble could result from erroneous output or erroneous operation.

- (1) Outside the PLC, construct mechanical damage preventing interlock circuits such as emergency stop, protective circuits, positioning upper and lower limits switches and interlocking forward/reverse operations.
- (2) When the PLC detects the following problems, it will stop calculation and turn off all output in the case of (a). In the case of (b), it will stop calculation and hold or turn off all output according to the parameter setting.

(a) The power supply module has over current protection equipment and over voltage protection equipment.

(b) The PLC CPUs self-diagnostic functions, such as the watchdog timer error, detect problems.

In addition, all output will be turned on when there are problems that the PLC CPU cannot detect, such as in the I/O controller. Build a fail safe circuit exterior to the PLC that will make sure the equipment operates safely at such times. See section 9.1 of this manual for example fail safe circuits.

- (3) Output could be left on or off when there is trouble in the outputs module relay or transistor. So build an external monitoring circuit that will monitor any single outputs that could cause serious trouble.

[DESIGN PRECAUTIONS]

DANGER

- When overcurrent which exceeds the rating or caused by short-circuited load flows in the output module for a long time, it may cause smoke or fire. To prevent this, configure an external safety circuit, such as fuse.
- Build a circuit that turns on the external power supply when the PLC main module power is turned on. If the external power supply is turned on first, it could result in erroneous output or erroneous operation.
- When there are communication problems with the data link, refer to the corresponding data link manual for the operating status of each station. Not doing so could result in erroneous output or erroneous operation.
- When connecting a peripheral device to the CPU module or connecting a personal computer or the like to the intelligent function module to exercise control (data change) on the running PLC, configure up an interlock circuit in the sequence program to ensure that the whole system will always operate safely.
Also before exercising other control (program change, operating status change (status control)) on the running PLC, read the manual carefully and fully confirm safety.
Especially for the above control on the remote PLC from an external device, an immediate action may not be taken for PLC trouble due to a data communication fault.
In addition to configuring up the interlock circuit in the sequence program, corrective and other actions to be taken as a system for the occurrence of a data communication fault should be predetermined between the external device and PLC CPU.

CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.
- When controlling items like lamp load, heater or solenoid valve using an output module, large current (approximately ten times greater than that present in normal circumstances) may flow when the output is turned OFF to ON.
Take measures such as replacing the module with one having sufficient rated current.

[INSTALLATION PRECAUTIONS]

CAUTION

- Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.
- Hold down the module loading lever at the module bottom, and securely insert the module fixing hook into the fixing hole in the base unit.
Incorrect loading of the module can cause a malfunction, failure or drop.
When using the PLC in the environment of much vibration, tighten the module with a screw. Tighten the screw in the specified torque range. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.
- When installing extension cables, be sure that the connectors of base unit are installed correctly. After installation, check them for looseness. Poor connections could cause an input or output failure.
- Completely turn off the external power supply before loading or unloading the module. Not doing so could result in electric shock or damage to the product.
- Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.

[WIRING PRECAUTIONS]

DANGER

- Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product.
- When turning on the power supply or operating the module after installation or wiring work, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

[WIRING PRECAUTIONS]

CAUTION

- Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.
- When wiring in the PLC, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.
- External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fires, or erroneous operation.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation. Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.
- The module has an ingress prevention label on its top to prevent foreign matter, such as wire offcuts, from entering the module during wiring.
Do not peel this label during wiring.
Before starting system operation, be sure to peel this label because of heat dissipation.

[STARTUP AND MAINTENANCE PRECAUTIONS]

DANGER

- Do not touch the terminals while power is on.
Doing so could cause shock or erroneous operation.
- Correctly connect the battery.
Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery.
Mishandling of battery can cause overheating or cracks which could result in injury and fires.
- Switch all phases of the external power supply off when cleaning the module or retightening the terminal or module mounting screws. Not doing so could result in electric shock.
Undertightening of terminal screws can cause a short circuit or malfunction. Overtightening of screws can cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.

[STARTUP AND MAINTENANCE PRECAUTIONS]

DANGER

- The online operations conducted for the CPU module being operated, connecting the peripheral device (especially, when changing data or operation status), shall be conducted after the manual has been carefully read and a sufficient check of safety has been conducted.
Operation mistakes could cause damage or problems with of the module.
- Do not disassemble or modify the modules.
Doing so could cause trouble, erroneous operation, injury, or fire.
- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm (9.85 inch) away from the PLC.
Not doing so can cause a malfunction.
- Switch all phases of the external power supply off before mounting or removing the module.
If you do not switch off the external power supply, it will cause failure or malfunction of the module.
- Do not drop or add an impact to the battery to be mounted in the module.
Otherwise the battery will be broken, possibly causing internal leakage of electrolyte.
Do not use but dispose of the battery if it has fallen or an impact is given to it.

[DISPOSAL PRECAUTIONS]

CAUTION

- When disposing of this product, treat it as industrial waste.

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-Q Series of General Purpose Programmable Controllers. Please read this manual carefully so that equipment is used to its optimum.

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About Manuals

The following manuals are related to this product.

Referring to this list, please request the necessary manuals.

Related Manuals

Manual Name	Manual Number (Model Code)
Basic model QCPU (Q Mode) User's Manual (Function Explanation, Program Fundamentals) This manual explains the functions, programming methods, devices and so on necessary to create programs with the Basic model QCPU. (Optional)	SH-080188 (13JR44)
QCPU (Q Mode)/QnACPU Programming Manual (Common Instructions) This manual describes how to use the sequence instructions, basic instructions and application instructions. (Optional)	SH-080039 (13JF58)
Q Corresponding MELSEC Communication Protocol Reference Manual This manual explains how the external devices read and write PLC CPU data through communication with the MC protocol using the serial communication module/Ethernet module. (Optional)	SH-080008 (13JF89)

How to Use This Manual

This manual is prepared for users to understand the hardware specifications of the modules such as CPU modules, power supply modules, base units and similar, maintenance and inspections of the system, and troubleshooting required when you use MELSEC-Q series PLCs.

The manual is classified roughly into three sections as shown below.

- 1) Chapters 1 and 2 Describe the outline of the CPU module and the system configuration.
The basics of the system configuration of CPU module are described.
- 2) Chapters 3 to 7 Describe the general specifications indicating the operating environments of the CPU module, power supply module, base units, and the performance specifications of these modules.
- 3) Chapters 8 to 10 Describe the overall maintenance such as the installation of the CPU module, daily inspections, and troubleshooting.

REMARK

This manual does not explain the functions of the CPU module.
For these functions, refer to the manual shown below.

- Basic model QCPU (Q Mode) User's Manual (Function Explanation, Program Fundamentals)

About the Generic Terms and Abbreviations

In this manual, the following general names and abbreviations are used for explanation of basic model QCPU unless otherwise specified.

Generic Term/Abbreviation	Description
Basic model QCPU CPU	General name for Q00JCPU, Q00CPU and Q01CPU modules.
Q Series	Abbreviation for Mitsubishi MELSEC-Q Series PLC.
GX Developer	Product name of GPP function software package SW□D5C-GPPW-E(-EV) compatible with Q Series Abbreviation for GX Developer of Version 7 or later.
Q3□B	General name for Q33B, Q35B, Q38B, Q312B type main base unit with Q00CPU, Q01CPU, Q Series power supply module, input/output module and intelligent function module attachable.
Q3□SB	General name for Q32SB, Q33SB, and Q35SB slim type main base units to which the following modules can be installed: Q00CPU, Q01CPU, slim type power supply module, input/output module, intelligent function module
Q6□B	General name for Q63B, Q65B, Q68B and Q612B type extension base unit with Q Series power supply module, input/output module and intelligent function module attachable.
Q5□B	General name for Q52B and Q55B type extension base unit with Q series input/output module and intelligent function module attachable.
Main base unit	General name for Q33B, Q35B, Q38B, and Q312B type main base unit to which the following modules can be installed: Q00CPU, Q01CPU, Q-series power supply module, input/output module, intelligent function module, and Q00JCPU (base unit).
Slim type main base unit	General name for Q32SB, Q33SB, and Q35SB slim type main base unit to which the following modules can be installed: Q00CPU, Q01CPU, slim type power supply module, input/output module and intelligent function module
Extension base unit	General name for Q5□B and Q6□B.
Base unit	General name for main base unit, slim type main base unit, and extension base unit
Extension cable	General name for QC05B, QC06B, QC12B, QC30B, QC50B, QC100B type extension cable.
Power supply module	General name for Q61P-A1, Q61P-A2, Q62P, Q63P and Q64P types power supply module.
Slim type power supply module	General name for Q61SP slim type power supply module
Battery	General name for battery for Q6BAT type CPU module.

1 OVERVIEW

This manual describes the hardware specification and handling method of the basic model QCPU.

It also describes the specifications of the power supply modules, base units, extension cables and battery.

Refer to the following functions for details on power supply modules, base units, extension cables, battery specifications and other information.

Basic Model QCPU (Q mode) User's Manual (Hardware Design, Maintenance and Inspections)

(1) Q00JCPU

- The Q00JCPU is a CPU module consisting of a CPU module, a power supply module and a main base unit (five slots).
- This CPU allows connection of up to two extension base units to accept up to 16 input/output and intelligent function modules.
- The number of input/output points controllable by the main and extension base units is 256.

(2) Q00CPU, Q01CPU

- Q00CPU and Q01CPU are stand alone CPU units that are installed in the main base unit or slim type main base unit.
- Up to four stages of extension base units can be connected and maximum 24 pieces of the input/output modules, intelligent function modules and other modules can be installed.
However, the slim type main base unit are not compatible with extension base unit.
- The main base unit, slim type main base unit or extension base unit can control up to 1024 input/output points.

The following table indicates differences between the Basic model QCPU.

Item		Q00JCPU	Q00CPU	Q01CPU
CPU module		CPU module, Power supply module, Main base unit (5 slots) Integrated type	Stand-alone CPU module	
Main base unit	Main base unit	Unnecessary	Necessary (Q33B, Q35B, Q38B, Q312B)	
	Slim type main base unit	Unnecessary	Necessary (Q32SB, Q33SB, Q35SB)	
Extension base unit		Connectable (Q52B, Q55B, Q63B, Q65B, Q68B, Q612B)		
Number of extension stages		Up to 2 stages	Up to 4 stages	
Number of input/output modules to be installed		16 modules	24 modules	
Power supply module				
Main base unit		Unnecessary	Necessary (Q61P-A1, Q61P-A2, Q62P, Q63P, Q64P)	
Slim type main base unit		Unnecessary	Necessary (Q61SP)	
Extension base unit	Q52B, Q55B	Unnecessary		
	Q63B, Q65B, Q68B, Q612B	Necessary (Q61P-A1, Q61P-A2, Q62P, Q63P, Q64P)		
Extension cable		QC05B, QC06B, QC12B, QC30B, QC50B, QC100B		
Memory card interface		No		
External interface	RS-232	Yes (transmission rate: 9.6kbps, 19.2kbps, 38.4kbps, 57.6kbps, 115.2kbps)		
	USB	No		
Processing speed (Sequence instruction)	LD X0	0.20μs	0.16μs	0.10μs
	MOV D0 D1	0.70μs	0.56μs	0.35μs
Program capacity*		8k steps (32 kbyte)	8k steps (32 kbyte)	14k steps (56 kbyte)
Memory capacity	Program memory	58 kbyte	94 kbyte	
	Standard RAM	—	64 kbyte	
	Standard ROM	58 kbyte	94 kbyte	
Device memory capacity		The number of device points can be changed within the range of 16.4 kbyte		
Number of input/output devices points (Remote I/O is contained.)		2048 points		
Number of input/output points		256 points	1024 points	
File register		No	Yes (32k points fixed)	
Serial communication function		No	Yes (using the RS-232 interface of the CPU module)	

*: 1 step of the program capacity is 4 bytes.

1.1 Features

(1) Many controllable input/output points

As the number of input/output points accessible to the input/output modules loaded on the base units, the following number of input/output points is supported.

Q00JCPU: 256 points (X/Y0 to FF)

Q00CPU, Q01CPU: 1024 points (X/Y0 to 3FF)

Up to 2048 points (X/Y0 to 7FF) are supported as the number of input/output device points usable for refreshing the remote input/output of CC-Link and the link inputs and outputs (LX, LY) of MELSECNET/H.

(2) Lineup according to program capacity

The optimum CPU module for the program capacity to be used can be selected.

Q00JCPU, Q00CPU : 8k steps

Q01CPU : 14k steps

(3) Fast processing

The LD instruction processing speeds are the following values.

Q00JCPU : 0.20μs

Q00CPU : 0.16μs

Q01CPU : 0.10μs

In addition, the high-speed system bus of the MELSEC-Q series base unit speeds up access to an intelligent function module and the link refresh of a network.

MELSECNET/H link refresh processing : 2.2ms/2k words *1

*1 This speed only applies when the SB/SW is not used with the Q01CPU and the MELSECNET/H network module is used as the main base unit.

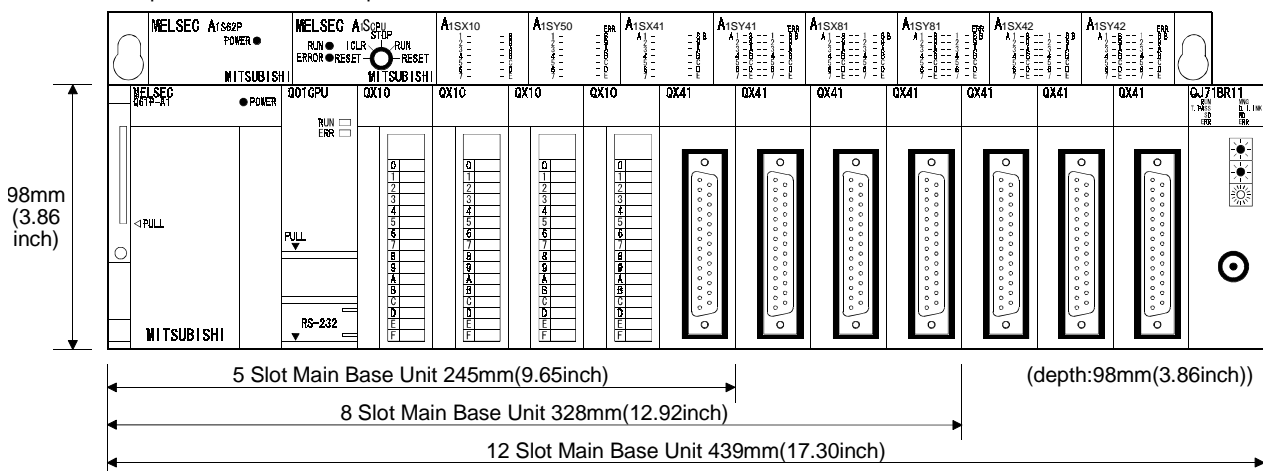
(4) Increase in debugging efficiency through high-speed communication with GX Developer

The RS-232 interface of the Basic model QCPU enables program write/read or monitor at a maximum of 115.2kbps.

(5) Saved space by a reduction in size

The installation area of the Basic model QCPU is about 60% of that of the AnS series.

Comparison of installation space



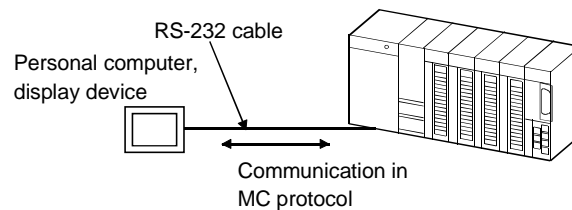
- (6) Connection of up to four/two extension base units
- The Q00JCPU can connect up to two extension base units (three base units including the main) and accepts up to 16 modules.
 - The Q00CPU, Q01CPU can connect up to four extension base units (five base units including the main) and accepts up to 24 modules.
 - The overall distance of the extension cables is up to 13.2m to ensure high degree of extension base unit arrangement.

POINT

- When bus-connecting the GOT, the number of extension base units connected decreases by one since the GOT uses one stage of the above base units.
- No extension base unit can be connected if the slim type main base unit (Q3□SB) is used.

(7) Serial communication function for communication with personal computer or display device

With the RS-232 interface of the Q00CPU or Q01CPU connected with a personal computer, display device or the like, the MELSEC communication protocol (hereafter referred to as the MC protocol) can be used to make communication.



The serial communication function only allows communication in the MC protocol (QnA-compatible 3C frame (format 4), QnA-compatible 4C frame (format 4, 5)).

The serial communication function does not allow communication in the nonprocedure protocol or bidirectional protocol.

Refer to the following manual for the MC protocol.

- Q Corresponding MELSEC Communication Protocol Reference Manual

(8) Built-in standard ROM

The flash ROM for storing parameters and sequential program is installed as a standard feature for easier protection of important program.

(9) Easy operation of CC-Link system

The I/O signals for up to 32 remote I/O stations can be controlled without parameters when one master module of the CC-Link system is used.

The remote I/O stations can be controlled in a similar manner to controlling the input/output modules installed on the base unit.

(10) Blocking an invalid access using the file password

Program can be prevented from being altered through invalid access by presetting the access level (reading prohibited, writing prohibited) in the file password.

2 SYSTEM CONFIGURATION

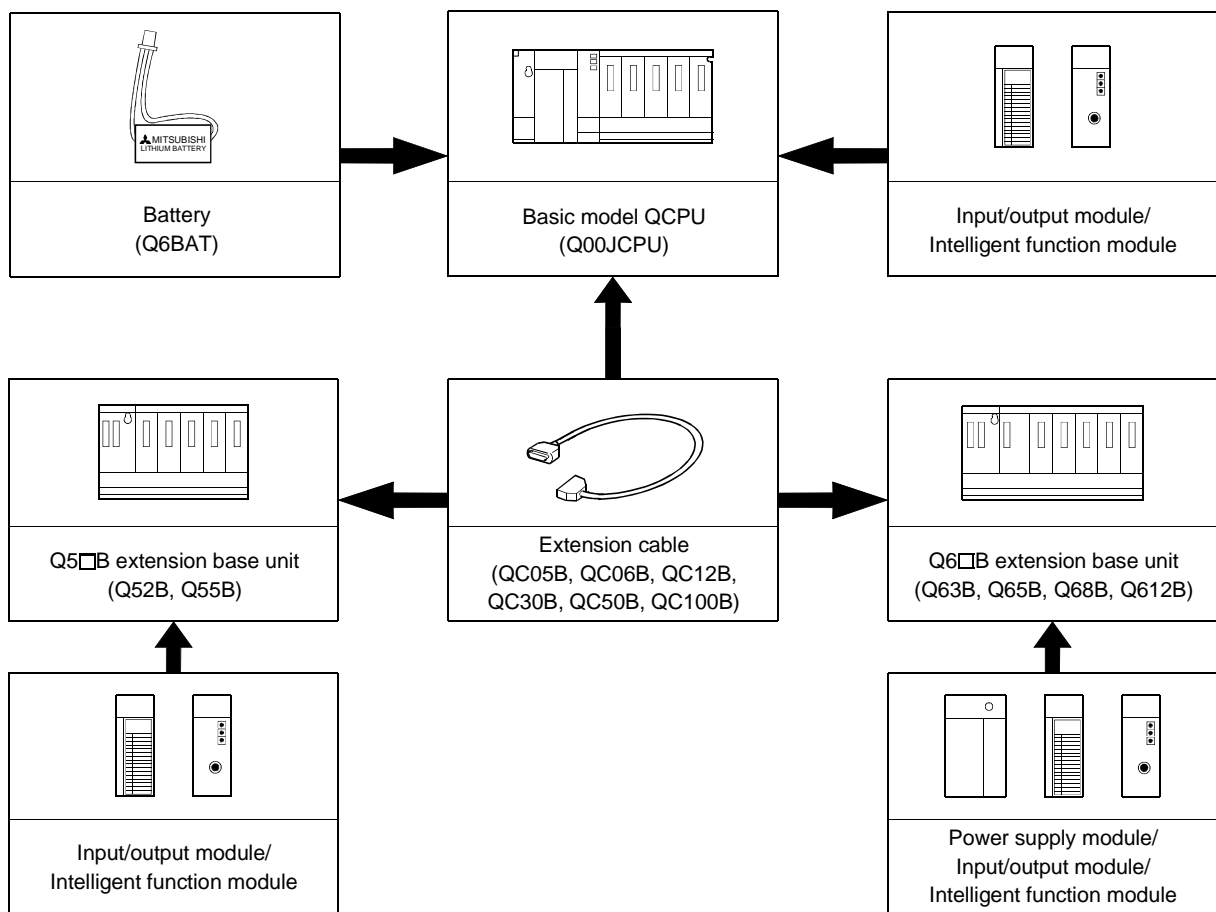
This section describes the system configuration of the Basic model QCPU, cautions on use of the system, and configured equipment.

2.1 System Configuration

2.1.1 Q00JCPU

This section explains the equipment configuration of a Q00JCPU system and the outline of the system configuration.

(1) Equipment configuration



(2) Outline of system configuration

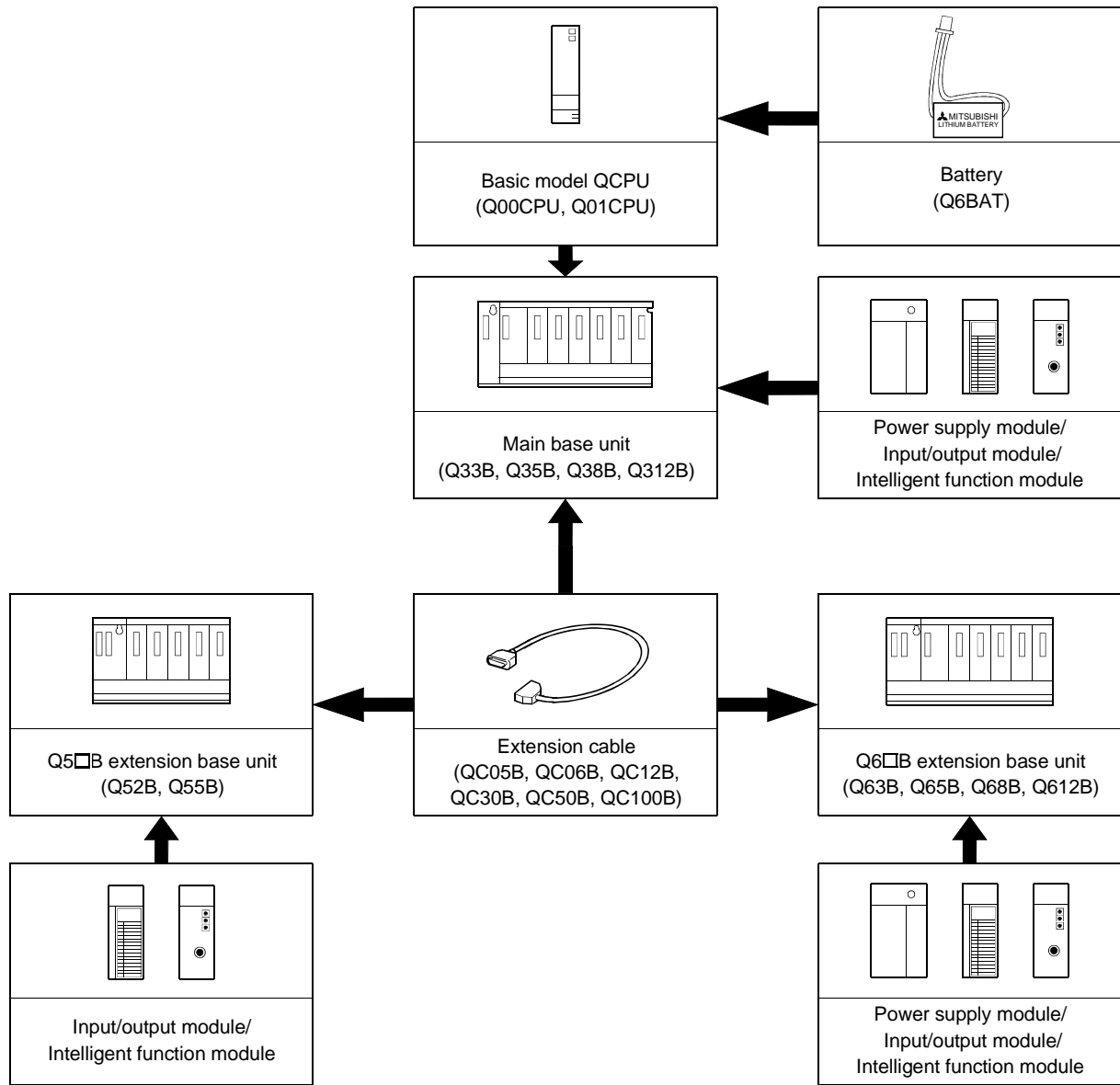
<p>System configuration</p>	<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>(a) System including extension base units</p> </div> <div style="width: 45%;"> <p>(b) System including extension base unit and GOT</p> </div> </div> <p style="text-align: center;">Loading will cause error Extension cable connector</p> <p style="text-align: center;">*Both of the above systems assume that each slot of the main and extension base units is loaded with a 16-point module.</p>
<p>Maximum number of Extension Stages</p>	<p style="text-align: center;">Two Extension Stages</p>
<p>Maximum number of input/output modules to be installed</p>	<p style="text-align: center;">16 modules</p>
<p>Maximum number of input/output points</p>	<p style="text-align: center;">256</p>
<p>Main base unit</p>	<p style="text-align: center;">Unnecessary</p>
<p>Extension base unit</p>	<p style="text-align: center;">Q52B, Q55B, Q63B, Q65B, Q68B, Q612B</p>
<p>Extension cable</p>	<p style="text-align: center;">QC05B, QC06B, QC12B, QC30B, QC50B, QC100B</p>
<p>Notes</p>	<ol style="list-style-type: none"> (1) Do not use an extension cable longer than an overall extension length of 13.2m(43.31ft.). (2) When using an extension cable, do not bind it together with the main circuit (high voltage and heavy current) line or do not lay down them closely to each other. (3) When setting the No. of the expansion stages, set it in the ascending order so that the same No. is not set simultaneously by two extension base units. (4) The QA1S6□B/QA65B cannot be connected as an extension base unit. (5) Connect the extension cable from OUT of the extension cable connector of the base unit to IN of the extension base unit on the next stage. (6) If 17 or more modules are installed, an error will occur. (7) When bus-connected, the GOT occupies one extension stage and one slot. (8) The Q00JCPU processes the GOT as a 16-point intelligent function module. Hence, connection of one GOT decreases the number of controllable points on base units by 16 points. (9) The bus extension connector box (A9GT-QCNB) cannot be connected to the Q00JCPU. It should be connected to the extension base unit.

2.1.2 Q00CPU, Q01CPU

This section explains the equipment configuration of a Q00CPU, Q01CPU system and the outline of the system configuration.

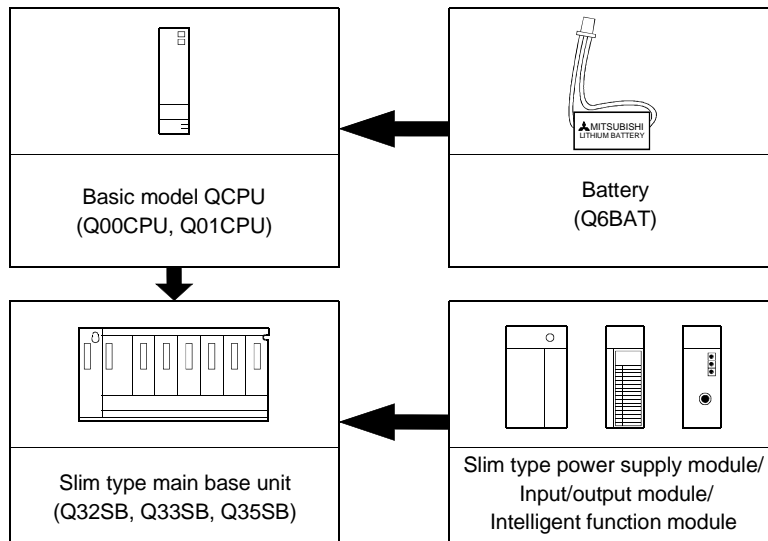
(1) Equipment configuration

(a) When the main base unit (Q3□B) is used



POINT
 Q61SP is not used for the power supply module.
 Use Q61P-A1, Q61P-A2, Q62P or Q64P for the power supply module.

(b) When the slim type main base unit (Q3□SB) is used



POINT

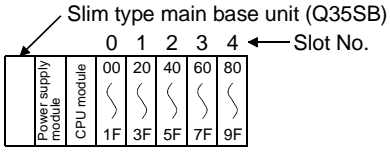
- (1) Q61P-A1, Q61P-A2, Q62P, or Q64P cannot be used for the power supply module. Use Q61SP for the power supply module.
- (2) The slim type main base unit does not have the extension cable connector. Therefore, the extension base or GOT can not be connected.

(2) Outline of system configuration

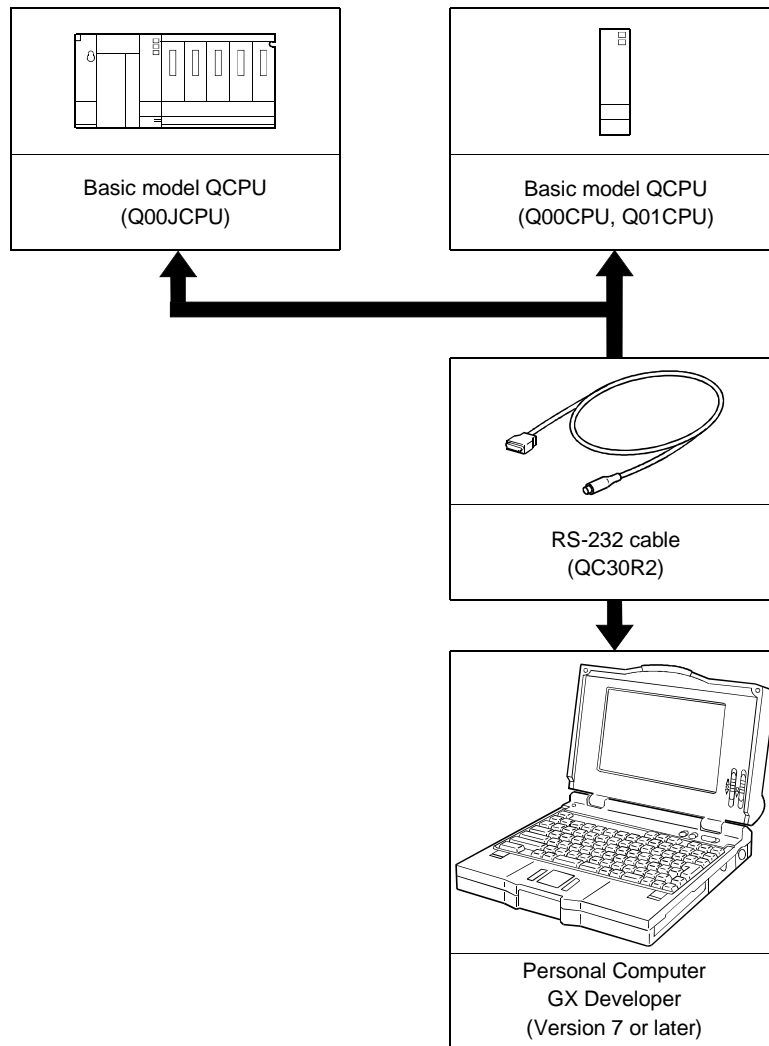
(a) When the main base unit (Q3□B) is used

<p>System configuration</p>	<p style="text-align: center;">Main base unit (Q312B)</p> <p style="text-align: right;">← Slot No.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Power supply module</td> <td>00</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td> </tr> <tr> <td>CPU module</td> <td>1F</td><td>3F</td><td>5F</td><td>7F</td><td>9F</td><td>BF</td><td>DF</td><td>FF</td><td>11F</td><td>13F</td><td>15F</td><td>17F</td> </tr> </table> <p style="text-align: center;">Extension base unit (Q68B)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Power supply module</td> <td>180</td><td>1A0</td><td>1C0</td><td>1E0</td><td>200</td><td>220</td><td>240</td><td>260</td> </tr> <tr> <td></td> <td>19F</td><td>1BF</td><td>1DF</td><td>1FF</td><td>21F</td><td>23F</td><td>25F</td><td>27F</td> </tr> </table> <p style="text-align: center;">Extension base unit (Q65B)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Power supply module</td> <td>280</td><td>2A0</td><td>2C0</td><td>2E0</td> </tr> <tr> <td></td> <td>29F</td><td>2BF</td><td>2CF</td><td>2FF</td> </tr> <tr> <td></td> <td></td><td></td><td>Inhibited</td><td></td> </tr> </table> <p style="text-align: center;">Loading will cause error</p> <p style="text-align: center;">*The above system assumes that each slot is loading with a 32-point module.</p>	Power supply module	00	01	02	03	04	05	06	07	08	09	10	11	CPU module	1F	3F	5F	7F	9F	BF	DF	FF	11F	13F	15F	17F	Power supply module	180	1A0	1C0	1E0	200	220	240	260		19F	1BF	1DF	1FF	21F	23F	25F	27F	Power supply module	280	2A0	2C0	2E0		29F	2BF	2CF	2FF				Inhibited	
Power supply module	00	01	02	03	04	05	06	07	08	09	10	11																																																
CPU module	1F	3F	5F	7F	9F	BF	DF	FF	11F	13F	15F	17F																																																
Power supply module	180	1A0	1C0	1E0	200	220	240	260																																																				
	19F	1BF	1DF	1FF	21F	23F	25F	27F																																																				
Power supply module	280	2A0	2C0	2E0																																																								
	29F	2BF	2CF	2FF																																																								
			Inhibited																																																									
<p>Maximum number of Extension Stages</p>	<p style="text-align: center;">Four Extension Stages</p>																																																											
<p>Maximum number of input/output modules to be installed</p>	<p style="text-align: center;">24 modules</p>																																																											
<p>Maximum number of input/output points</p>	<p style="text-align: center;">1024</p>																																																											
<p>Main base unit</p>	<p style="text-align: center;">Q33B, Q35B, Q38B, Q312B</p>																																																											
<p>Extension base unit</p>	<p style="text-align: center;">Q52B, Q55B, Q63B, Q65B, Q68B, Q612B</p>																																																											
<p>Extension cable</p>	<p style="text-align: center;">QC05B, QC06B, QC12B, QC30B, QC50B, QC100B</p>																																																											
<p>Notes</p>	<ol style="list-style-type: none"> (1) Do not use an extension cable longer than an overall extension length of 13.2m(43.31ft.). (2) When using an extension cable, do not bind it together with the main circuit (high voltage and heavy current) line or do not lay down them closely to each other. (3) When setting the No. of the expansion stages, set it in the ascending order so that the same No. is not set simultaneously by two extension base units. (4) The QA1S6□B/QA65B cannot be connected as an extension base unit. (5) Connect the extension cable from OUT of the extension cable connector of the base unit to IN of the extension base unit on the next stage. (6) If 25 or more modules are installed, an error will occur. (7) When bus-connected, the GOT occupies one extension stage and one slot. (8) The Q00CPU, Q01CPU processes the GOT as a 16-point intelligent function module. Hence, connection of one GOT decreases the number of controllable points on base units by 16 points. (9) Q61SP cannot be used for the power supply module. Use Q61P-A1, Q61P-A2, Q62P, or Q64P for the power supply module. 																																																											

(b) When the slim type main base unit (Q3□SB) is used

System configuration	 <p style="text-align: center;">*The above system assumes that each slot is loading with a 32-point module.</p>
Maximum number of Extension Stages	Not extendable
Maximum number of input/output modules to be installed	5 modules
Maximum number of input/output points	1024
Slim type main base unit model	Q32SB, Q33SB, Q35SB
Extension base unit	Not connectable
Extension cable	Not connectable
Notes	<p>(1) Q61P-A1, Q61P-A2, Q62P or Q64P cannot be used for the power supply module. Use Q61SP for the power supply module.</p> <p>(2) The slim type main base unit has no extension cable connector. Therefore, extension base unit or GOT can not be connected.</p>

2.1.3 Configuration of GX Developer



2.2 Precautions for Operation

This section describes hardware and software packages compatible with Basic model QCPU.

(1) Hardware

(a) The number of modules to be installed and functions are limited depending on the type of the modules.

Applicable Module	Type	Limit of number of modules to be installed
Q Series MELSECNET/H network module	QJ71LP21, QJ71BR11, QJ71LP21-25, QJ71LP21G, QJ71LP21GE	One module only
Q series Ethernet interface module	QJ71E71, QJ71E71-B2, QJ71E71-100	One module only
Q series CC-Link system master local module	QJ61BT11	Up to 2 modules function version B or later
Interrupt module	QI60	One module only *1

*1 : Only one piece of QI60 having no interrupt pointer setting can be used.

(b) A graphic operation terminal can be used only for the GOT900 series and F900 series (Basic OS matching Q-mode and communication driver must be installed).

The GOT800 series, A77GOT, and A64GOT cannot be used.

(c) A DeviceNet Master-Slave module (QJ71DN91) with function version is B or later can be used.

(d) A FL-net module (QJ71FL71, QJ71FL71-B2) with function version is B or later can be used.

(2) Software package

GX Developer and GX Configurator of the versions or later in the following table are usable with the Basic model QCPU.

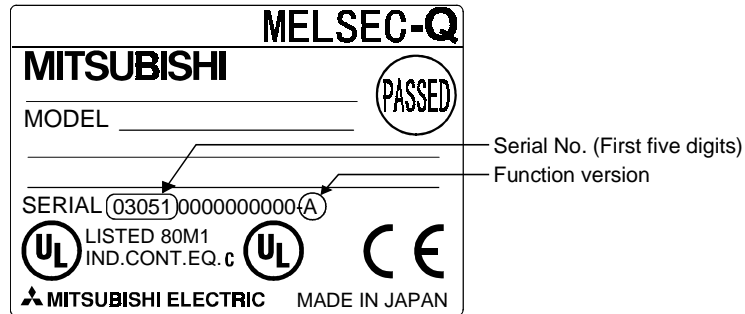
Product Name	Type	Version
GX Developer	SW7D5C-GPPW-E	Ver. 7
GX Simulator	SW6D5C-LLT-E	Ver. 6
GX Configurator-AD	SW0D5C-QADU-E	Ver. 1.10L
GX Configurator-DA	SW0D5C-QDAU-E	Ver. 1.10L
GX Configurator-SC	SW0D5C-QSCU-E	Ver. 1.10L
GX Configurator-CT	SW0D5C-QCTU-E	Ver. 1.10L
GX Configurator-TC	SW0D5C-QTCU-E	Ver. 1.10L
GX Configurator-FL	SW0D5C-QFLU-E	Ver. 1.10L
GX Configurator-DN	SW0D5C-QDNU-E	Ver. 1.10L
GX Configurator-QP	SW2D5C-QD75P-E	Ver. 2.10L
GX Configurator-PT	SW1D5C-QPTU-E	Ver. 1.10L
GX Configurator-TI	SW1D5C-QTIU-E	Ver. 1.10L
GX Configurator-AS	SW1D5C-QASU-E	Ver. 1.13P

2.3 Confirming the Function Version

The Basic model QCPU function version can be confirmed on the rating nameplate and GX Developer's system monitor.

(1) Confirming the function version on the rating nameplate

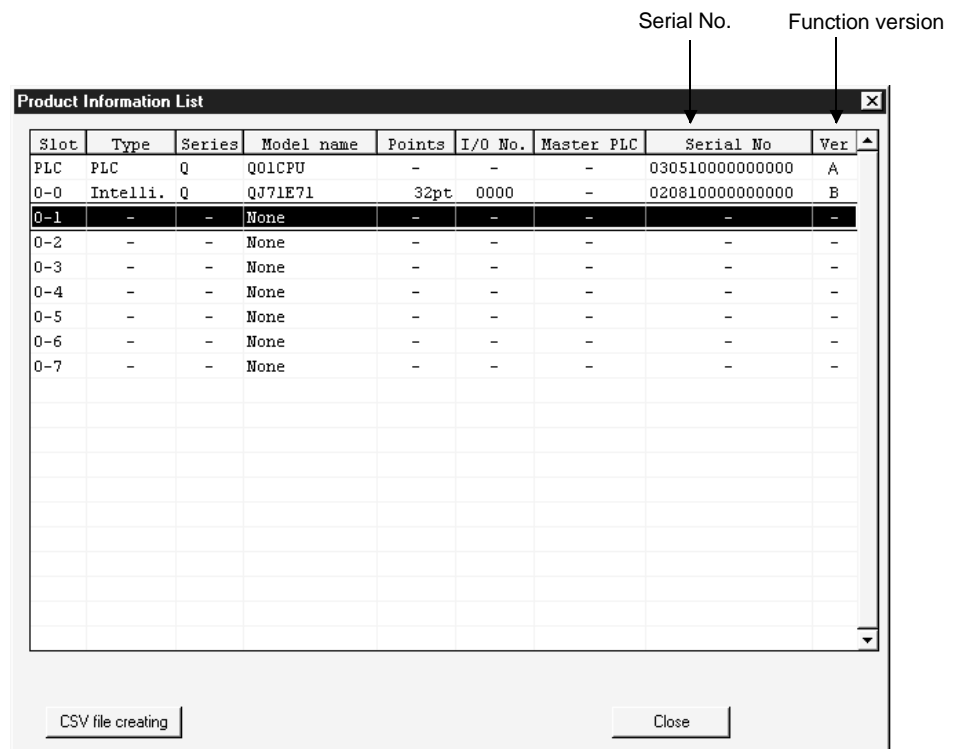
The function version is indicated on the rating nameplate.



(2) Confirming the function version on the system monitor (product information list)

The product information list in the system monitor of GX Developer allows you to confirm the function version of the Basic model QCPU.

The product information list of the system monitor also allows you to confirm the function versions of the intelligent function modules.



3 GENERAL SPECIFICATIONS

Performance specification of QCPU module is as follows:

Item	Specifications					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-25 to 75°C					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity	5 to 95%RH, non-condensing					
Vibration resistance	Conforming to JIS B 3502, IEC 61131-2	Under intermittent vibration	Frequency	Acceleration	Amplitude	Sweep count 10 times each in X, Y, Z directions (for 80 min.)
			10 to 57Hz	—	0.075mm (0.003in.)	
		Under continuous vibration	57 to 150Hz	9.8m/s ²	—	
			10 to 57Hz	—	0.035mm (0.001in.)	
57 to 150Hz	4.9m/s ²	—				
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147 m/s ² , 3 times in each of 3 directions X, Y, Z)					
Operating ambience	No corrosive gases					
Operating altitude	2000m (6562ft.) max.					
Installation location	Inside control panel					
Overvoltage category *1	II max.					
Pollution degree *2	2 max.					

*1 : This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities.

The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

*2 : This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.

Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

*3 : Do not use or store the PLC under pressure higher than the atmospheric pressure of altitude 0m.

Doing so can cause a malfunction.

When using the PLC under pressure, please contact your sales representative.

4 HARDWARE SPECIFICATION OF THE CPU MODULE

4.1 Performance Specification

The table below shows the performance specifications of the Basic model QCPU.

Performance Specifications

Item		Model			Remark
		Q00JCPU	Q00CPU	Q01CPU	
Control method		Repetitive operation of stored program			—
I/O control method		Refresh mode			Direct input/output is possible by direct input/output specification (DX□, DY□)
Programming language (Sequence control dedicated language)		Relay symbol language, logic symbolic language			The SFC function is not applicable.
Processing speed (Sequence instruction)	LD X0	0.20μs	0.16μs	0.10μs	—
	MOV D0 D1	0.70μs	0.56μs	0.35μs	—
Total number of instructions		249 (excluding intelligent function module dedicated instructions)			—
Constant scan (Function for setting the scan timer to fixed settings)		1 to 2000 ms (configurable in increments of 1 ms)			Set parameter values to specify
Program capacity *1 *2		8k steps (32 kbyte)	8k steps (32 kbyte)	14k steps (56 kbyte)	—
Memory capacity	Program memory (Drive 0)	58 kbyte	94 kbyte	94 kbyte	—
	Standard RAM (Drive 3)	0	64kbyte	64kbyte	—
	Standard ROM (Drive 4)	58 kbyte	94 kbyte	94 kbyte	—
Number of stored programs	Program memory	1	1	1	—
	Standard ROM	1	1	1	—
Number of stored file registers	Standard RAM	—	1	1	—
Standard RAM number of writings		Max. 100000 times			—
Number of I/O devices points		2048 points (X/Y0 to 7FF)			Number of devices usable on program
Number of I/O points		256 points (X/Y0 to FF)	1024 points (X/Y0 to 3FF)		Number of points accessible to input/output modules

*1: "1 step" in program capacity equals 4 bytes.

*2: The maximum number of steps that can be executed can be obtained as follows:
(Program capacity) - (File header size (Default: 34 steps))

Performance Specifications (continued)

Item		Model			Remark
		Q00JCPU	Q00CPU	Q01CPU	
Number of device points	Internal relay [M]	Default 8192 points (M0 to 8191)			Number of use points is set with parameters.
	Latch relay [L]	Default 2048 points (L0 to 2047)			
	Link relay [B]	Default 2048 points (B0 to 7FF)			
	Timer [T]	Default 512 points (T0 to 511) (for low / high speed timer) Select between low / high speed timer by instructions. The measurement unit of the low / high speed timer is set with parameters. (Low speed timer : 1 to 1000ms, 1ms/unit , default 100ms) (High speed timer : 0.1 to 100ms, 0.1ms/unit , default 10ms)			
	Retentive timer [ST]	Default 0 point (for low / high speed retentive timer) Switchover between the low / high speed retentive timer is set by instructions. The measurement unit of the low speed retentive timer and high speed retentive timer is set with parameters. (Low speed retentive timer : 1 to 1000ms, 1ms/unit , default 100ms) (High speed retentive timer : 0.1 to 100ms, 0.1ms/unit , default 10ms)			
	Counter [C]	<ul style="list-style-type: none"> • Normal counter default 512 points (C0 to 511) • Interrupt counter maximum 128 points (default 0 point, set with parameters) 			
	Data register [D]	Default 11136 points (D0 to 11135)			
	Link register [W]	Default 2048 points (W0 to 7FF)			
	Annunciator [F]	Default 1024 points (F0 to 1023)			
	Edge relay [V]	Default 1024 points (V0 to 1023)			
File Register	[R]	None	32768 points (R0 to 32767)/block		—
	[ZR]	None	32768 points (ZR0 to 32767)		

Performance Specifications (continued)

Item	Model			Remark		
	Q00JCPU	Q00CPU	Q01CPU			
Number of device points	Special link relay [SB]	1024 points (SB0 to 3FF)			The number of device points is fixed.	
	Special link register [SW]	1024 points (SW0 to 3FF)				
	Step relay [S] *3	2048 points (S0 to 2047)				
	Index register [Z]	10 points (Z0 to 9)				
	Pointer [P]	300 points (P0 to 299)				
	Interrupt pointer [I]	128 points (I0 to 127) The specified intervals of the system interrupt pointers I28 to I31 can be set with parameters.(0.5 to 1000ms, 0.5 ms/unit) Default I28 : 100ms I29 : 40ms I30 : 20ms I31 : 10ms				
	Special relay [SM]	1024 points (SM0 to 1023)				
	Special register [SD]	1024 points (SD0 to 1023)				
	Function input [FX]	16 points (FX0 to F)				The number of device points is fixed.
	Function output [FY]	16 points (FY0 to F)				
Function register[FD]	5 points (FD0 to 4)					
Link direct device	Device for direct access to link device. MELSECNET/H use only. Specified form at : J□□\X□□, J□□\Y□□, J□□\W□□, J□□\B□□, J□□\SW□□, J□□\SB□□			—		
Intelligent function module device	Device for direct access to the buffer memory of the intelligent function module. Specified form at : U□□G□□			—		
Latch (power failure compensation) range	L0 to 2047 (default) (Latch range can be set for B, F, V, T, ST, C, D, and W.)			Set parameter values to specify		
Remote RUN/PAUSE contact	RUN and PAUSE contacts can be set from among X0 to 7FF, respectively.					
Clock function	Year, month, day, hour, minute, second, day of the week (leap year automatic distinction) Accuracy -3.2 to +5.27s (TYP. +1.98s) /d at 0°C Accuracy -2.57 to +5.27s(TYP. +2.22s)/d at 25°C Accuracy -11.68 to +3.65s(TYP. -2.64s)/d at 55°C			—		
Allowable momentary stop time	Max. 20ms (Min. 100VAC)	Varies according to the type of power supply module.		—		
5VDC internal current consumption	0.22A *4	0.25A	0.27A	—		
External dimensions	H	98mm (3.86in.)	98mm (3.86in.)	—		
	W	245mm (9.65in.)*5	27.4mm (1.08in.)	—		
	D	97mm (3.82in.)	89.3mm (3.52in.)	—		
Weight	0.66kg *5	0.13kg	0.13kg	—		

*3: The "step relay" is a device for the SFC function.

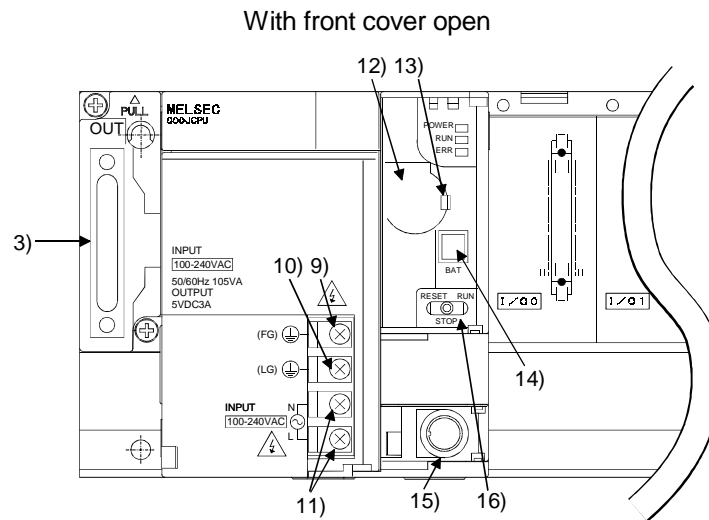
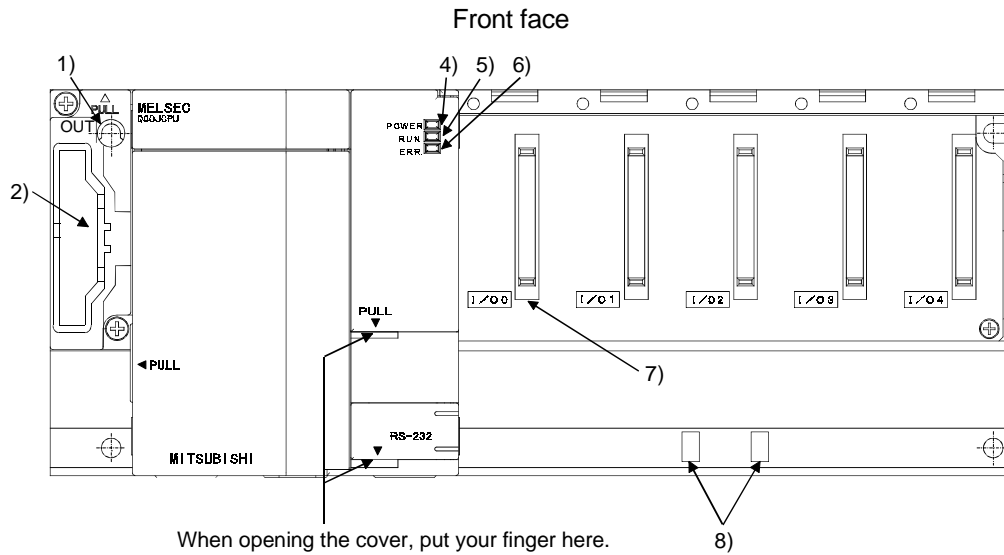
This cannot be used as the SFC function is not applicable to the Basic model QCPU.

*4: This value includes the CPU module and base unit.

*5: This value includes the CPU module, base unit, and power supply module.

4.2 Part Names

4.2.1 Q00JCPU

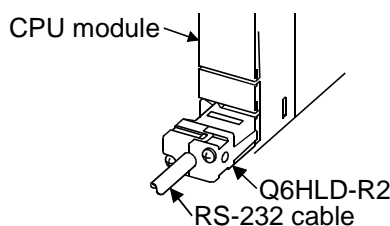


No.	Name	Application
1)	Base mounting hole	Pear-shaped hole for mounting the unit to a panel such as a control box. (For M4 screw)
2)	Cover	Protective cover for extension cable connector. Remove this cover when connecting an extension base unit.
3)	Extension cable connector	Connector for transfer of signals to/from the extension base unit. Connect an extension cable.
4)	POWER LED	LED for indicating 5VDC power. Lit when 5VDC is output normally.

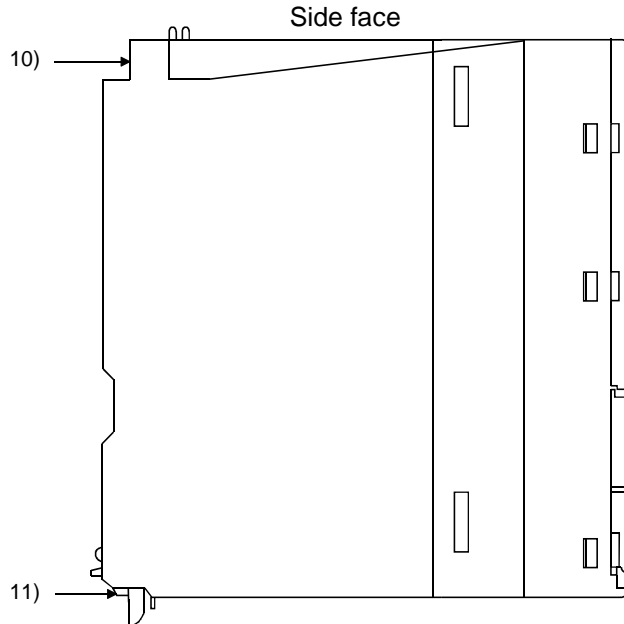
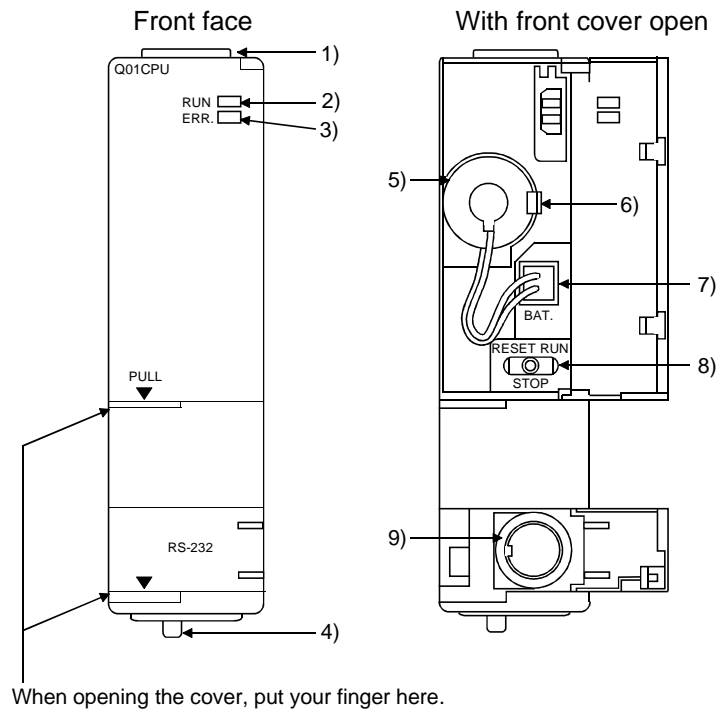
No.	Name	Application
5)	RUN LED	<p>Indicates the operating status of the CPU module.</p> <p>ON :During operation in "RUN" mode.</p> <p>OFF :During a stop in "STOP" mode or when the error whose occurrence stops operation is detected.</p> <p>Flicker :When parameters/program is written during STOP and the RUN/STOP/RESET switch is moved from "STOP" to "RUN".</p> <p>To turn ON the RUN LED after writing the program, carry out the following steps.</p> <ul style="list-style-type: none"> • Move the RUN/STOP/RESET switch from "RUN" to "STOP" to "RUN". • Perform reset with the RUN/STOP/RESET switch. • Power ON the PLC again. <p>To turn ON the RUN LED after writing the parameters, carry out the following steps.</p> <ul style="list-style-type: none"> • Perform reset with the RUN/STOP/RESET switch. • Power ON the PLC again. <p>(If the RUN/STOP/RESET switch is moved from "STOP" to "RUN" to "STOP" to "RUN" after changing the parameter values, the new values are not reflected on the parameters related to the intelligent function module, such as the network parameters.)</p>
6)	ERR. LED	<p>ON :When the self-diagnostic error that will not stop operation is detected.</p> <ul style="list-style-type: none"> • When continuation of operation at error detection is set in the parameter. • When the annunciator (F) is turned ON by the SET/OUT instruction. <p>OFF :Normal</p> <p>Flicker :When the error whose occurrence stops operation is detected.</p> <p>When reset operation is performed with the RUN/STOP/RESET switch.</p>
7)	Module connector	<p>Connector used for loading an input/output or intelligent function module.</p> <p>To the connector of the spare space where no module is loaded, fit the accessory connector cover or the blank cover module (QG60) to prevent dust from entering.</p>
8)	DIN rail adaptor mounting holes	Holes for mounting a DIN rail adaptor.
9)	FG terminal	Ground terminal connected with the shield pattern of the printed circuit board.
10)	LG terminal	Power filter ground having a half potential of the input voltage.
11)	Power input terminals	Power input terminals for connection of a 100VAC to 200VAC power supply.
12)	Battery	Backup battery for use of the program memory, standard RAM and power failure compensation function.
13)	Battery fixing hook	Hook for holding the battery.
14)	Battery connector pin	For connection of the battery lead wires. (When shipped from the factory, the lead wires are disconnected from the connector to prevent the battery from consuming.)
15)	RS-232 connector *1	<p>Connector for RS-232 connection</p> <p>Can be connected by the RS-232 connection cable (QC30R2).</p>
16)	RUN/STOP/RESET switch	<p>RUN :Executes sequence program operation.</p> <p>STOP :Stops sequence program operation.</p> <p>RESET :Performs hardware reset, operation error reset, operation initialization or like.</p> <p>(Refer to Section 4.4 for details of reset operation.)</p>

*1 : When a cable is to be connected to the RS-232 connector at all times, clamp the cable to prevent a loose connection, moving, or disconnection by pulling due to carelessness.

Q6HLD-R2 type RS-232 Connector Disconnection Prevention Holder is available as a clamp for RS-232 connector.



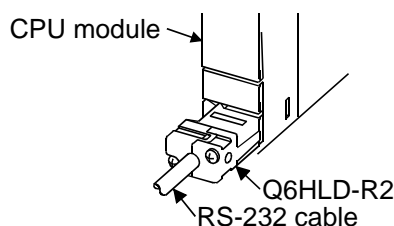
4.2.2 Q00CPU, Q01CPU



No.	Name	Application
1)	Module fixing hook	Hook used to fix the module to the base unit. (Single-motion installation)
2)	RUN LED	Indicates the operating status of the CPU module. ON :During operation in "RUN" mode. OFF :During a stop in "STOP" mode or when the error whose occurrence stops operation is detected. Flicker :When parameters/program is written during STOP and the RUN/STOP/RESET switch is moved from "STOP" to "RUN". To turn ON the RUN LED after writing the program, carry out the following steps. • Move the RUN/STOP/RESET switch from "RUN" to "STOP" to "RUN". • Perform reset with the RUN/STOP/RESET switch. • Power ON the PLC again. To turn ON the RUN LED after writing the parameters, carry out the following steps. • Perform reset with the RUN/STOP/RESET switch. • Power ON the PLC again. (If the RUN/STOP/RESET switch is moved from "STOP" to "RUN" to "STOP" to "RUN" after changing the parameter values, the new values are not reflected on the parameters related to the intelligent function module, such as the network parameters.)
3)	ERR. LED	ON :When the self-diagnostic error that will not stop operation is detected. • When continuation of operation at error detection is set in the parameter. • When the annunciator (F) is turned ON by the SET/OUT instruction. OFF :Normal Flicker :When the error whose occurrence stops operation is detected. When reset operation is performed with the RUN/STOP/RESET switch.
4)	Module loading lever	Used to load the module to the base unit.
5)	Battery	Backup battery for use of the program memory, standard RAM and power failure compensation function.
6)	Battery fixing hook	Hook for holding the battery.
7)	Battery connector pin	For connection of the battery lead wires. (When shipped from the factory, the lead wires are disconnected from the connector to prevent the battery from consuming.)
8)	RUN/STOP/RESET switch	RUN :Executes sequence program operation. STOP :Stops sequence program operation. RESET :Performs hardware reset, operation error reset, operation initialization or like. (Refer to Section 4.4 for details of reset operation.)
9)	RS-232 connector *1	Connector for RS-232 connection Can be connected by the RS-232 connection cable (QC30R2).
10)	Module fixing screw hole	Hole for the screw used to fix to the base unit. (M3×12 screw)
11)	Module fixing hook	Hook used to fix to the base unit.

*1 : When a cable is to be connected to the RS-232 connector at all times, clamp the cable to prevent a loose connection, moving, or disconnection by pulling due to carelessness.

Q6HLD-R2 type RS-232 Connector Disconnection Prevention Holder is available as a clamp for RS-232 connector.



4.3 Switch Operation After Program Write

Program write to the CPU module may be performed either during STOP or during RUN.

(1) When you wrote a program during STOP of the CPU module

When you wrote a program during STOP of the CPU module, operate the switch in the following procedure.

- 1) RUN/STOP/RESET switch: STOP
RUN LED: OFF CPU module STOP status to Program write
- 2) RUN/STOP/RESET switch: Perform reset. (Refer to Section 4.5.3)
- 3) RUN/STOP/RESET switch: STOP to RUN
RUN LED: ON CPU module RUN status

(2) When you wrote a program during RUN

When you wrote a program during RUN of the CPU module, you need not operate the switch.

POINT
<p>(1) The CPU module will not go into the RUN status if you move the RUN/STOP/RESET switch to RUN immediately after writing a program in the STOP status of the CPU module. After writing a program, perform reset operation with the RUN/STOP/RESET switch, then move the RUN/STOP/RESET switch to RUN to set the CPU module into the RUN status. (Refer to Section 4.5.3 for reset operation.)</p> <p>(2) To place the CPU module in the RUN status without resetting, move the RUN/STOP/RESET switch from STOP to RUN to STOP to RUN. After the second motion of STOP to RUN, the CPU module goes into the RUN status.</p> <p>(3) The program written by online program correction during boot operation is written to the program memory After making online program correction, also write the program to the standard ROM of the boot source memory. If the program is not written in the standard ROM, the old program will be executed at the next boot operation. For details of boot operation, refer to the Basic Model QCPU (Q Mode) User's Manual (Function Explanation, Program Fundamentals.)</p>

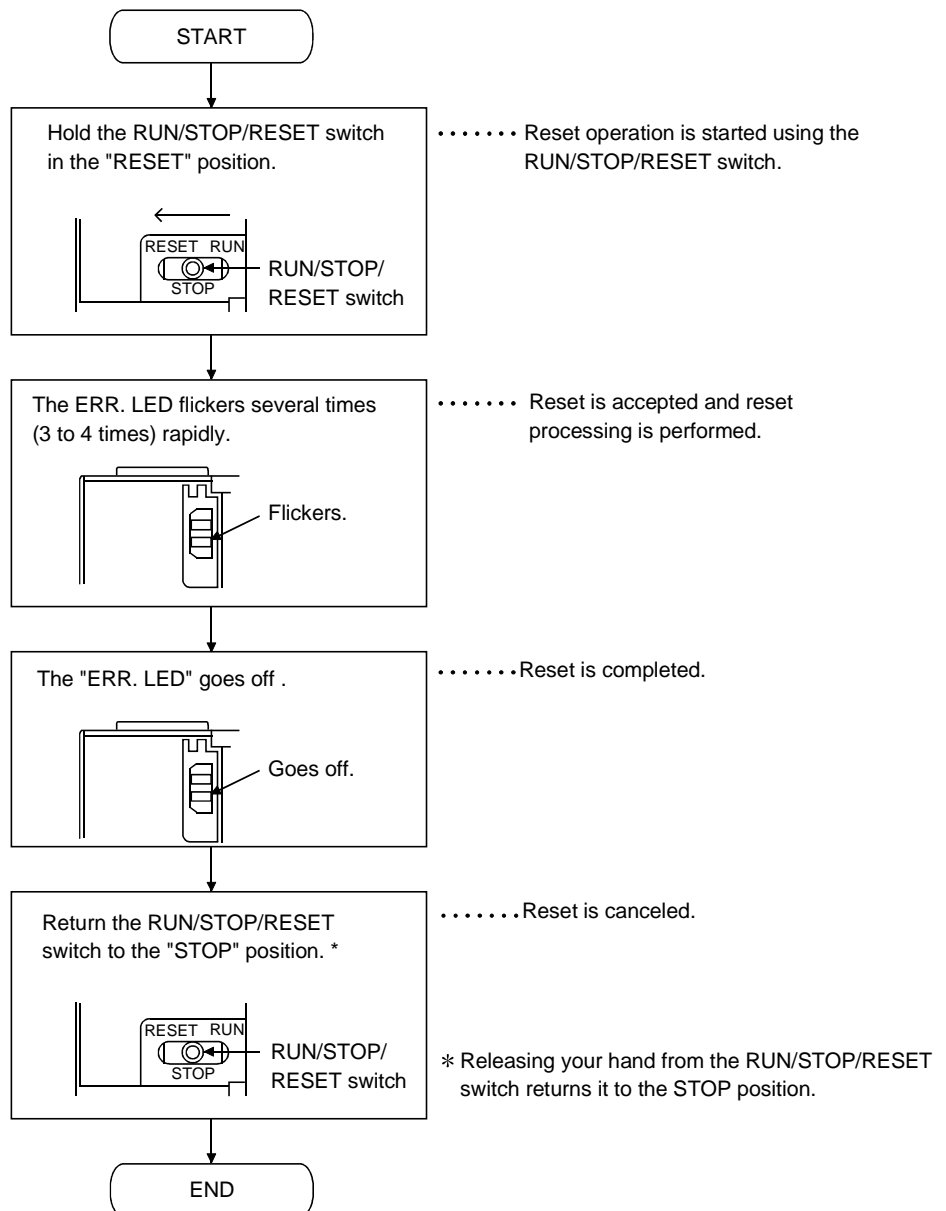
4.4 Reset Operation

For the Basic model QCPU, the RUN/STOP/RESET switch of the CPU module is used to switch between the "RUN status" and "STOP status" and to perform "RESET operation".

When using the RUN/STOP/RESET switch to reset the CPU module, moving the RUN/STOP/RESET switch to the reset position will not reset it immediately.

POINT
<p>Hold the RUN/STOP/RESET switch in the RESET position until reset processing is complete (the flickering ERR. LED goes off).</p> <p>If you release your hand from the RUN/STOP/RESET switch during reset processing (during rapid flickering of ERR. LED), the switch will return to the STOP position and reset processing cannot be completed.</p>

Perform reset operation with the RUN/STOP/RESET switch in the following procedure.



4.5 Latch Clear Operation

To execute latch clear, perform remote latch clear operation using GX Developer.
Latch clear cannot be executed by operating the switches of the CPU module.

POINT
(1) The invalid range of latch clear can be set device-by-device by making device setting in the parameter mode.
(2) For remote latch clear operation using GX Developer, refer to the operating manual of GX Developer used.

5 POWER SUPPLY MODULE

5.1 Specification

5.1.1 Power supply module specifications

This section gives the specifications of the power supply modules.

Item	Performance Specifications			
	Q61P-A1	Q61P-A2	Q62P	Q63P
Base loading position	Power supply module loading slot			
Applicable base unit	Q3□B, Q6□B			
Input power supply	100 to 120VAC +10% -15% (85V to 132VAC)	200 to 240VAC +10% -15% (170 to 264VAC)	100 to 240VAC +10% -15% (85V to 264VAC)	24VDC +30% -35% (15.6 to 31.2VDC)
Input frequency	50/60Hz ±5%			—
Input voltage distortion factor	Within 5% (Refer to Section 5.1.3)			
Max. input apparent power	105VA			45W
Inrush current	20A within 8ms			100A within 1ms
Rated output current	5VDC	6A	3A	6A
	24VDC	—	0.6A	—
External output voltage	—		24VDC ±10%	—
Overcurrent protection * 1	5VDC	6.6A or more	3.3A or more	6.6A or more
	24VDC	—	0.66A or more	—
Overvoltage protection * 2	5VDC	5.5 to 6.5V		
	24VDC	—		
Efficiency	70% or more		65% or more	70% or more
Permissible instantaneous power failure time * 3	Within 20ms			Within 10ms (at 24VDC input)
Dielectric withstand voltage	Across inputs/LG and outputs/FG 2830VAC rms/3 cycles (2000 m (6562 ft.))			500VAC across primary and 5VDC
Insulation resistance	Across inputs and outputs (LG and FG separated), across inputs and LG/FG, across outputs and FG/LG 10MΩ or more by insulation resistance tester			10MΩ or more by insulation resistance tester
Noise immunity	<ul style="list-style-type: none"> By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency Noise voltage IEC61000-4-4, 2kV 			By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency
Operation indication	LED indication (lit at 5VDC output)			
Fuse	Built-in (Unchangeable by user)			
Contact output section	Application	ERR contact (contact switched off (opened: normally closed contact) at an error stop of CPU module), for CPU module operating status output		
	Rated switching voltage/current	24VDC, 0.5A		
	Minimum switching load	5VDC, 1mA		
	Response time	OFF to ON: 10ms max. ON to OFF: 12ms max.		
	Life	Mechanical : More than 2 million times Electrical : More than 100 thousand times at rated switching voltage/current		
	Surge suppressor	No		
Fuse	No			
Terminal screw size	M3.5 × 7			
Applicable wire size	0.75 to 2mm ²			
Applicable crimping terminal	RAV1.25 to 3.5, RAV2 to 3.5			
Applicable tightening torque	66 to 89N•cm			
External dimensions	H	98mm (3.86in.)		
	W	55.2mm (2.17in.)		
	D	90mm (3.55in.)		
Weight	0.31kg		0.39kg	0.33kg

Item		Performance Specifications	
		Q64P	
Base loading position		Power supply module loading slot	
Applicable base unit		Q3□B, Q6□B	
Input power supply		100 to 120VAC/200 to 240VAC +10% -15% (85V to 132VAC/170 to 264VAC)	
Input frequency		50/60Hz ±5%	
Input voltage distortion factor		Within 5% (See. section 5.1.3)	
Max. input apparent power		160VA	
Inrush current		20A within 8ms	
Rated output current	5VDC	8.5A	
	24VDC	—	
Overcurrent protection*1	5VDC	9.9A or more	
	24VDC	—	
Overvoltage protection*2	5VDC	5.5 to 6.5V	
	24VDC	—	
Efficiency		70% or more	
Permissible instantaneous power failure time*3		Within 20ms	
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2830VAC rms/3 cycles (2000 m (6562 ft.))	
Insulation resistance		Across inputs and outputs (LG and FG separated), across inputs and LG/FG, across outputs and FG/LG 10M Ω or more by insulation resistance tester	
Noise immunity		<ul style="list-style-type: none"> • By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency • Noise voltage IEC61000-4-4, 2kV 	
Operation indication		LED indication (lit at 5VDC output)	
Fuse		Built-in (Unchangeable by user)	
Contact output section	Application	ERR contact (contact switched off (opened: normally closed contact) at an error stop of CPU module), for CPU module operating status output	
	Rated switching voltage/current	24VDC, 0.5A	
	Minimum switching load	5VDC, 1mA	
	Response time	OFF to ON: 10ms max. ON to OFF: 12ms max.	
	Life	Mechanical : More than 2 million times Electrical : More than 100 thousand times at rated switching voltage/current	
	Surge suppressor	No	
	Fuse	No	
Terminal screw size		M3.5 x 7	
Applicable wire size		0.75 to 2mm ²	
Applicable crimping terminal		RAV1.25 to 3.5, RAV2 to 3.5	
Applicable tightening torque		66 to 89N•cm	
External dimensions	H	98mm (3.86in.)	
	W	55.2mm (2.17in.)	
	D	115mm (4.35in.)	
Weight		0.40kg	

Item		Performance Specifications	
		Q61SP	
Base loading position		Slim type power supply module installation slot	
Applicable base unit		Q3□SB	
Input power supply		100 to 240VAC +10% -15% (AC85V to 264V)	
Input frequency		50/60Hz ±5%	
Input voltage distortion factor		Within 5% (See. section 4.3.1)	
Max. input apparent power		40VA	
Inrush current		20A within 8ms	
Rated output current	5VDC	2A	
	24VDC	—	
Overcurrent protection*1	5VDC	2.2A or more	
	24VDC	—	
Overvoltage protection*2	5VDC	5.5 to 6.5V	
	24VDC	—	
Efficiency		70% or more	
Permissible instantaneous power failure time*3		Within 20ms	
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2830VAC rms/3 cycles (2000 m (6562 ft.))	
Insulation resistance		Across inputs and outputs (LG and FG separated), across inputs and LG/FG, across outputs and FG/LG 10M Ω or more by insulation resistance tester	
Noise immunity		<ul style="list-style-type: none"> • By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency • Noise voltage IEC61000-4-4, 2kV 	
Operation indication		LED indication (lit at 5VDC output)	
Fuse		Built-in (Unchangeable by user)	
Contact output section	Application	ERR contact (contact switched off (opened: normally closed contact) at an error stop of CPU module), for CPU module operating status output	
	Rated switching voltage/current	24VDC, 0.5A	
	Minimum switching load	5VDC, 1mA	
	Response time	OFF to ON: 10ms max. ON to OFF: 12ms max.	
	Life	Mechanical : More than 2 million times Electrical : More than 100 thousand times at rated switching voltage/current	
	Surge suppressor	No	
	Fuse	No	
Terminal screw size		M3.5 x 7	
Applicable wire size		0.75 to 2mm ²	
Applicable crimping terminal		RAV1.25 to 3.5, RAV2 to 3.5	
Applicable tightening torque		66 to 89N•cm	
External dimensions	H	98mm (3.86in.)	
	W	27.4mm (1.08in.)	
	D	104mm (4.10in.)	
Weight		0.18kg	

Q00JCPU (Power Supply Section) Performance Specification List

Item		Performance Specifications
		Q00JCPU (power supply section)
Input power supply		100 to 240 VAC +10% -15% (AC85V to 264V)
Input frequency		50/60Hz ±5%
Input voltage distortion factor		Within 5% (Refer to Section 5.1.3)
Max. input apparent power		105VA
Inrush current		40A within 8ms
Rated output current	DC5V	3A
Overcurrent protection*1	DC5V	3.3A or more
Overvoltage protection*2	DC5V	5.5 to 6.5V
Efficiency		65% or more
Permissible instantaneous power failure time*3		Within 20ms (100VAC or more)
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2830VAC rms/3 cycles (altitude 2,000 m (6,562 ft.))
Insulation resistance		Across inputs and outputs (LG and FG separated), across inputs and LG/FG, across outputs and FG/LG 10MΩ or more by 500VDC insulation resistance tester
Noise immunity		<ul style="list-style-type: none"> • By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency • Noise voltage IEC61000-4-4, 2kV
Operation indication		LED indication (lit at 5VDC output, POWER LED on the CPU module)
Fuse		Built-in (Unchangeable by user)
Contact output section		None
Terminal screw size		M3.5×7
Applicable wire size		0.75 to 2mm ²
Applicable crimping terminal		RAV1.25 to 3.5, RAV2 to 3.5
Applicable tightening torque		66 to 89N•cm
External dimensions		Refer to Section 4.1
Weight		

POINTS***1 : Overcurrent protection**

The overcurrent protection device shuts off the 5 V, 24 VDC circuit and stops the system if the current flowing in the circuit exceeds the specified value. The LED of the power supply module is off or on (lit dimly) upon a voltage drop.

If this device is activated, switch the input power supply off and eliminate the cause such as insufficient current capacity or short. Then, a few minutes later, switch it on to restart the system.

The initial start for the system takes place when the current value becomes normal.

***2 : Overvoltage protection**

The overvoltage protection device shuts off the 5 VDC circuit and stops the system if a voltage of 5.5 to 6.5 VDC is applied to the circuit. When this device is activated, the power supply module LED is switched OFF. If this happens, switch the input power OFF, then a few minutes later ON. This causes the initial start for the system to take place. The power supply module must be changed if the system is not booted and the LED remains OFF.

3 : Permissible instantaneous power failure time*(1) For AC input power supply**

- An instantaneous power failure lasting less than 20ms will cause AC down to be detected, but operation will continue.
- An instantaneous power failure lasting more than 20ms may cause the operation to continue or initial start to take place depending on the power supply load.

Furthermore, by using the same AC power supply for the AC input module and the power supply module, it is possible to prevent the sensor, to which the AC input module is connected, from turning OFF when it is ON when the power is turned OFF.

However, if only the AC input module is connected to the AC line, which is connected to the power supply detection of the AC down for the power supply module may be delayed by the capacitor in the AC input module. Thus, connect a load of approx. 30mA per QX10 unit to the AC line.

(2) For DC input power supply

- An instantaneous power failure lasting less than 10ms (*4) will cause 24VDC down to be detected, but operation will continue.
- An instantaneous power failure lasting more than 10ms (*4) may cause the operation to continue or initial start to take place depending on the power supply load.

(*4: This is for a 24VDC input. This is 10ms or less for 24VDC or less.)

5.1.2 Selecting the power supply module

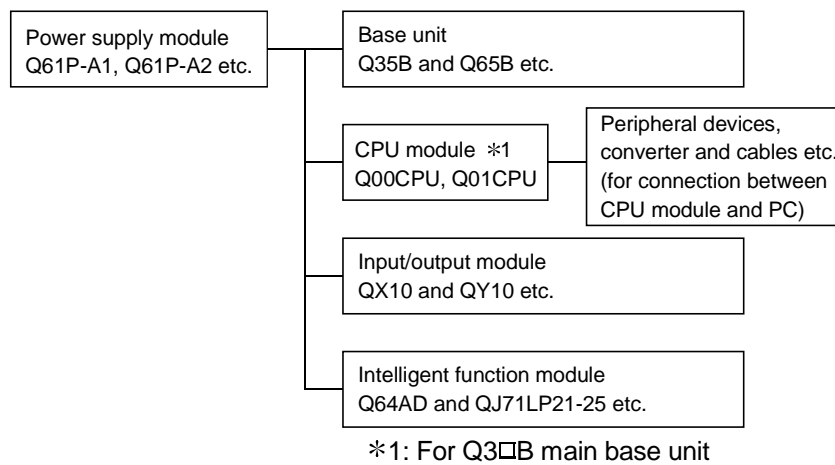
The power module is selected according to the total of current consumption of the base units, input/output modules, and intelligent function module supplied by its power supply module.

For the internal current consumption of 5 VDC of the base unit, see Chapter 6.

For the internal current consumption of 5 VDC of the input/output modules, and intelligent function module, see the User's Manuals of their respective modules.

For the devices prepared by a user, see the manual for the respective device.

(1) When Q3□B or Q6□B base unit is used



(a) Selection of power supply module for use of Q52B or Q55B extension base unit

Using the Q52B or Q55B supplies 5VDC power from the power supply module of the main base unit through the extension cable.

Therefore, note the following when using the Q52B or Q55B.

- 1) The power supply module to be loaded on the main base unit should be selected to cover also the 5VDC used on the Q52B or Q55B.

For example, either of the following power supply modules must be mounted on the main the base unit, when the current consumption on the main base unit is 3A and that on the Q52B or Q55B is 1A.

5VDC Rated output current	Type
6A	Q61P-A1, Q61P-A2, Q63P
8.5A	Q64P

- 2) Since 5VDC is supplied to the Q52B or Q55B through the extension cable, a voltage drop occurs at the extension cable.

You must select the power supply module and extension cable length to ensure that the "IN" connector voltage of the Q52B or Q55B is 4.75V or more.

For details of a voltage drop, refer to Section 6.6.

(b) Ideas for reducing voltage drops

The following methods are effective to reduce voltage drops at the extension cables.

1) Changing the module loading positions

Load large current consumption modules on the main base unit.

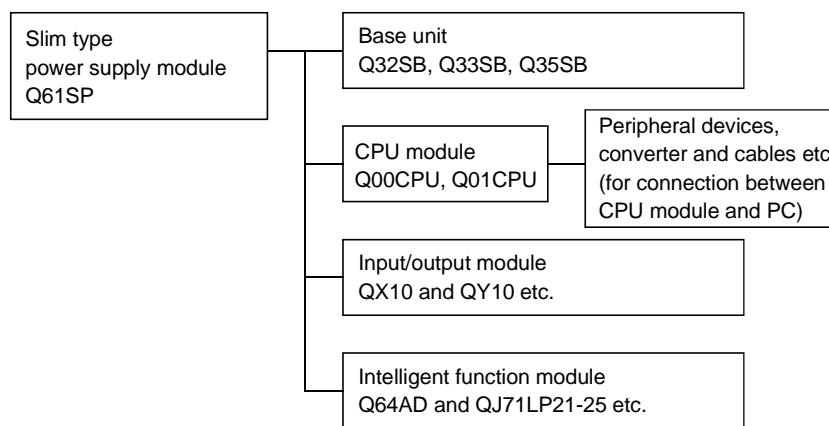
Load small current consumption modules on the extension base unit.

2) Using short extension cables

The shorter the extension cable is, the smaller the resistance and voltage drops are.

Use the shortest possible extension cables.

(2) When Q3□SB base unit is used



(a) To use the slim type main base unit and slim type power supply module, take care of the capacity of the 5 VDC power supply.

- 1) The capacity of the 5 VDC power supply of the power supply module (Q61SP) installed to the slim type main base unit is 2A. Choose modules so that the total capacity will not exceed 2A.

5VDC Rated output current	Type
2.0A	Q61SP

5.1.3 Precaution when connecting the uninterruptive power supply

Be sure of the following terms when connecting the Basic model QCPU system to the uninterruptive power supply (abbreviated as UPS hereafter):

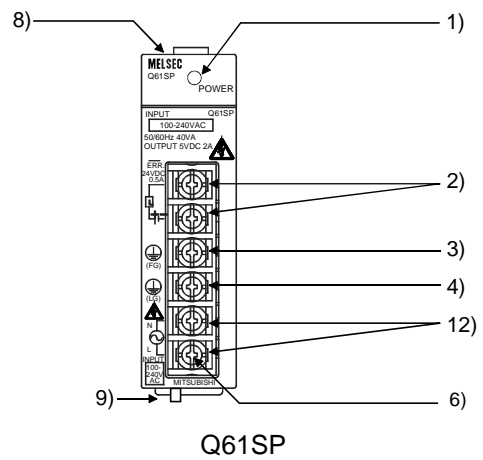
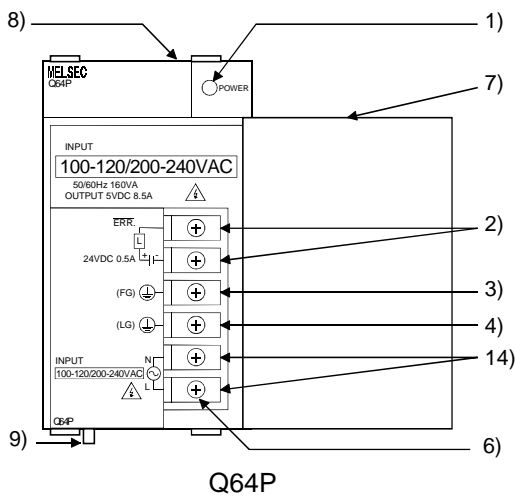
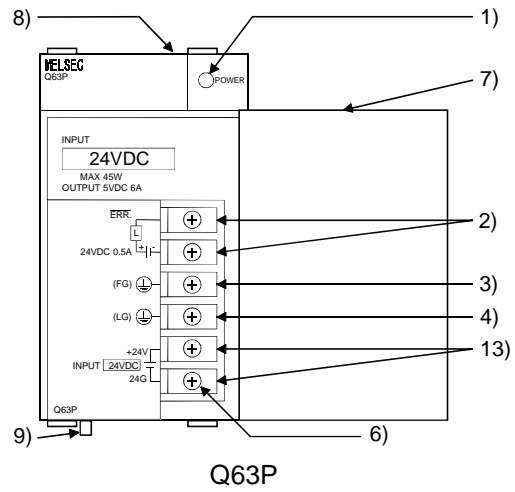
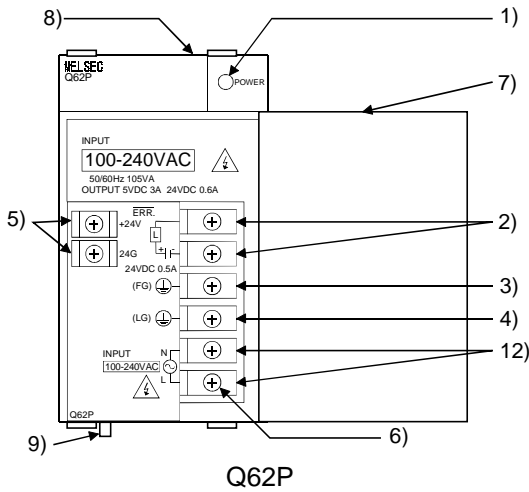
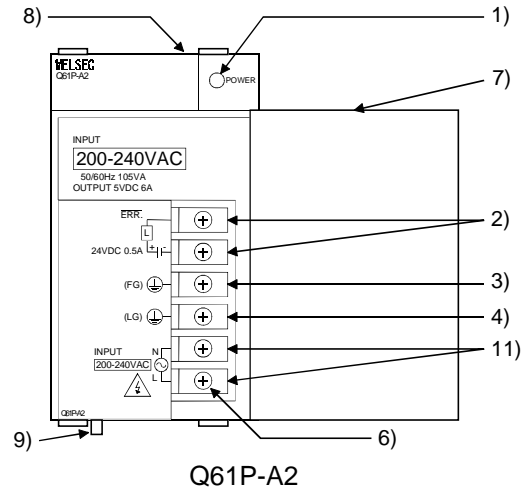
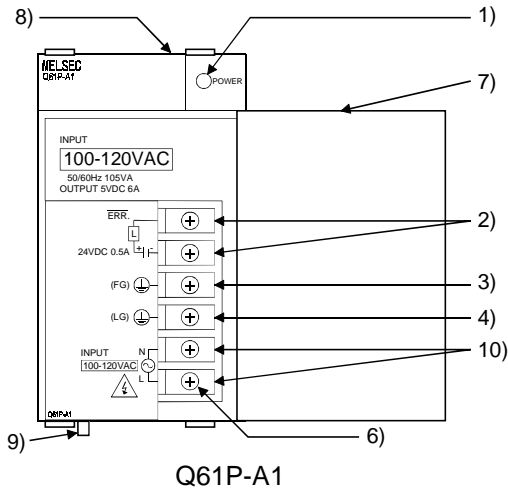
Use a UPS which employs the constant inverter power supply method with 5 % or less voltage fluctuation.

Do not use a UPS with the constant commercial power supply method.

5.2 Part Names and Settings

The part names of each power module are described below.

(1) Q61P-A1, Q61P-A2, Q62P, Q63P, Q64P, Q61SP



No.	Name	Application
1)	POWER LED	5VDC power indicator LED
2)	ERR terminals	Turned OFF (opened) when a stop error occurs in the CPU module. Normally off when loaded in an extension base unit.
3)	FG terminal	Ground terminal connected to the shield pattern of the printed circuit board.
4)	LG terminal	Grounding for the power supply filter. In case of AC input (Q61P-A1, Q61P-A2, Q62P, Q64P, and Q61SP), it has a half potential of the input voltage.
5)	+24V, 24G terminal	Used to supply 24VDC power to inside the output module (using external wiring).
6)	Terminal screw	M3.5 x 7
7)	Terminal cover	Protective cover of the terminal block
8)	Module fixing screw	Used to fix the module to the base unit. M3 x 12 screw (user-prepared) (Tightening torque : 36 to 48N•cm)
9)	Module loading lever	Used to load the module into the base unit.
10)	Power input terminals	Used to connect a 100VAC power supply.
11)	Power input terminals	Used to connect a 200VAC power supply.
12)	Power input terminals	Used to connect a 100VAC to 200VAC power supply.
13)	Power input terminals	Used to connect a 24VDC power supply.
14)	Power input terminals	Used to connect a 100VAC/200VAC power supply.

POINTS													
<p>(1) The Q61P-A1 is dedicated for inputting a voltage of 100 VAC. Do not input a voltage of 200 VAC into it or trouble may occur on the Q61P-A1.</p> <table border="1"> <thead> <tr> <th rowspan="2">Power module type</th> <th colspan="2">Supply power voltage</th> </tr> <tr> <th>100VAC</th> <th>200VAC</th> </tr> </thead> <tbody> <tr> <td>Q61P-A1</td> <td>Operates normally.</td> <td>Power module causes trouble.</td> </tr> <tr> <td>Q61P-A2</td> <td>Power module does not cause trouble. CPU module cannot be operated.</td> <td>Operates normally.</td> </tr> </tbody> </table>			Power module type	Supply power voltage		100VAC	200VAC	Q61P-A1	Operates normally.	Power module causes trouble.	Q61P-A2	Power module does not cause trouble. CPU module cannot be operated.	Operates normally.
Power module type	Supply power voltage												
	100VAC	200VAC											
Q61P-A1	Operates normally.	Power module causes trouble.											
Q61P-A2	Power module does not cause trouble. CPU module cannot be operated.	Operates normally.											
<p>(2) Q64P automatically switches the input range 100VAC/200VAC. Therefore, it is not compatible with the intermediate voltage (133VAC to 169VAC). The CPU module may not work normally if the above intermediate voltage is applied.</p>													
<p>(3) Ensure that the earth terminals LG and FG are grounded.</p>													

6 BASE UNIT AND EXTENSION CABLE

This section describes the specifications of the extension cables for the base units (main, slim type and extension base unit) used in the PLC system and the specification standards of the extension base unit.

6.1 Base Unit Specification Table

(1) Main base unit specifications

Item \ Type	Q33B	Q35B	Q38B	Q312B
Number of I/O modules installed	3	5	8	12
Extension possibilities	Extendable			
Applicable module	Q series modules			
5 VDC internal current consumption	0.105A	0.110A	0.114A	0.121A
Mounting hole size	M4 screw hole or ϕ 4.5 hole (for M4 screw)			
External dimensions	H	98mm (3.86in.)		
	W	189mm (7.43in.)	245mm (9.65in.)	328mm (12.92in.)
	D	44.1mm (1.74in.)		
Weight	0.21kg	0.25kg	0.35kg	0.45kg
Attachment	Mounting screw M4 \times 14 4 pieces (DIN rail mounting adapter to be sold separately)			
DIN rail mounting Adapter type	Q6DIN3	Q6DIN2	Q6DIN1	

6

(2) Slim type main base unit specification

Item \ Type	Q32SB	Q33SB	Q35SB
Number of I/O modules installed	2	3	5
Extension possibilities	Not extendable		
Applicable module	Q series modules		
5 VDC internal current consumption	0.086A	0.086A	0.091A
Mounting hole size	M4 screw hole or ϕ 4.5 hole (for M4 screw)		
External dimensions	H	98mm (3.86in.)	
	W	114mm (4.49in.)	197.5mm (7.78in.)
	D	18.5mm (1.74in.)	
Weight	0.12kg	0.15kg	0.21kg
Attachment	Mounting screw M4 \times 12 4 pieces (DIN rail mounting adapter to be sold separately)		
DIN rail mounting Adapter type	Q6DIN3		

(3) Extension base unit specification (Type not requiring power supply module)

Item \ Type		Q52B	Q55B
Number of I/O modules installed		2	5
Extension possibilities		Extendable	
Applicable module		Q series modules	
5 VDC internal current consumption		0.080A	0.100A
Mounting hole size		M4 screw hole or ϕ 4.5 hole (for M4 screw)	
External dimensions	H	98mm (3.86in.)	
	W	106mm (4.17in.)	189mm (7.43in.)
	D	44.1mm (1.74in.)	
Weight		0.14kg	0.23kg
Attachment		Mounting screw M4 \times 12 4 pieces (DIN rail mounting adapter to be sold separately)	
DIN rail mounting Adapter type		Q6DIN3	

(4) Extension base unit specifications (Power supply loaded type)

Item \ Type		Q63B	Q65B	Q68B	Q612B
Number of I/O modules installed		3	5	8	12
Extension possibilities		Extendable			
Applicable module		Q series modules			
5 VDC internal current consumption		0.105A	0.110A	0.114A	0.121A
Mounting hole size		M4 screw hole or ϕ 4.5 hole (for M4 screw)			
External dimensions	H	189mm (7.43in.)	245mm (9.65in.)	328mm (12.92in.)	439mm (17.30in.)
	W	98mm (3.86in.)			
	D	44.1mm (1.74in.)			
Weight		0.23kg	0.25kg	0.35kg	0.45kg
Attachment		Mounting screw M4 \times 14 4 pieces (DIN rail mounting adapter sold separately)			
DIN rail mounting Adapter type		Q6DIN3	Q6DIN2	Q6DIN1	

6.2 Extension Cable Specification Table

The list below shows the specifications of the extension cables which can be used for the Basic model QCPU system.

Item \ Type	QC05B	QC06B	QC12B	QC30B	QC50B	QC100B
Cable length	0.45m (1.48ft.)	0.6m (1.97ft.)	1.2m (3.94ft.)	3.0m (9.84ft.)	5.0m (16.40ft.)	10.0m (32.81ft.)
Application	Connection across the main base unit and extension base unit or across the extension base units.					
Weight	0.15kg	0.16kg	0.22kg	0.40kg	0.60kg	1.11kg

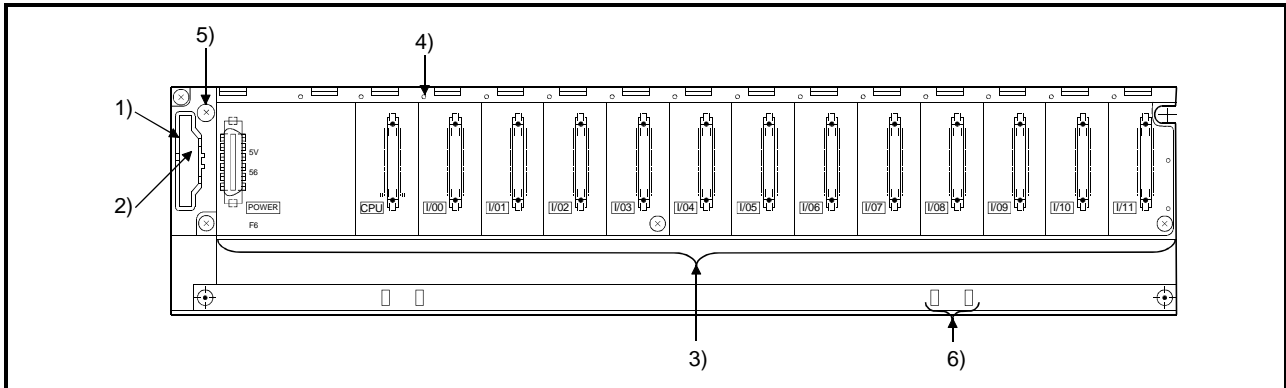
POINT

When the extension cables are used in combination, limit the overall length of the combined cable to 13.2 m(43.31 ft.).

6.3 Parts Names of Base Unit

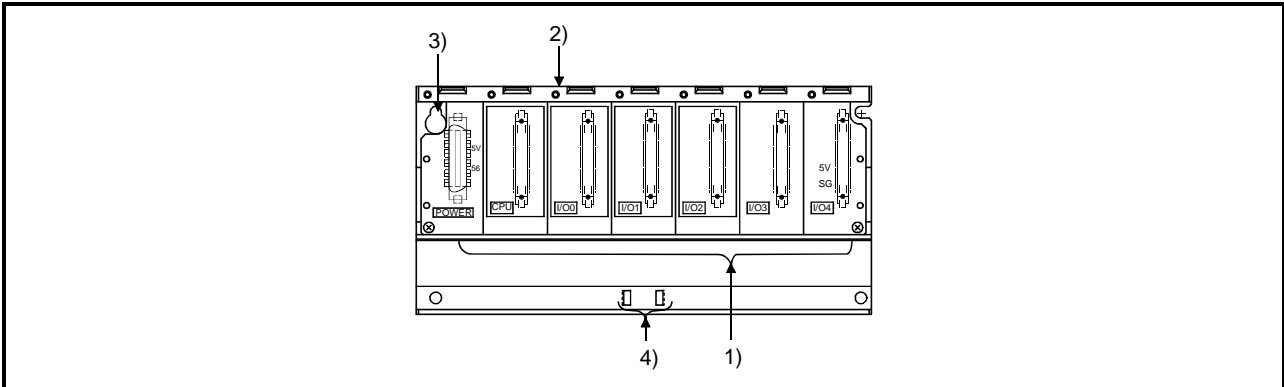
The parts names of the base unit are described below.

(1) Main base unit(Q33B, Q35B, Q38B, Q312B)



No.	Name	Application
1)	Extension cable connector	Connector for sending and receiving signals from the extension base unit, to which the extension cables are connected.
2)	Base cover	Protective cover of extension cable connector. Before an extension cable is connected, the area of the base cover surrounded by the groove under the word "OUT" on the base cover must be removed with a tool such as nippers.
3)	Module connector	Connector for installing the power supply module, CPU module, input/output modules, and intelligent function module. To the connectors located in the spare space where these modules are not installed, attach the supplied connector cover or the blank cover module (QG60) to prevent entry of dirt.
4)	Module fixing screw hole	Screw hole for fixing the module to the base unit. Screw size:M3 × 12
5)	Base mounting hole	Hole for mounting this base unit onto the panel of the control panel (for M4 screw)
6)	DIN rail adapter mounting hole	Hole for mounting DIN rail adapter

(2) Slim type main base unit(Q32SB, Q33SB, Q35SB)



No.	Name	Application
1)	Module connector	Connector for installing the power supply module, CPU module, input/output modules, and intelligent function module. To the connectors located in the spare space where these modules are not installed, attach the supplied connector cover or the blank cover module (QG60) to prevent entry of dirt.
2)	Module fixing screw hole	Screw hole for fixing the module to the base unit. Screw size:M3 × 12
3)	Base mounting hole	Hole for mounting this base unit onto the panel of the control panel (for M4 screw)
4)	DIN rail adapter mounting hole	Hole for mounting DIN rail adapter

(3) Extension base unit(Q52B, Q55B, Q65B, Q68B, Q612B)

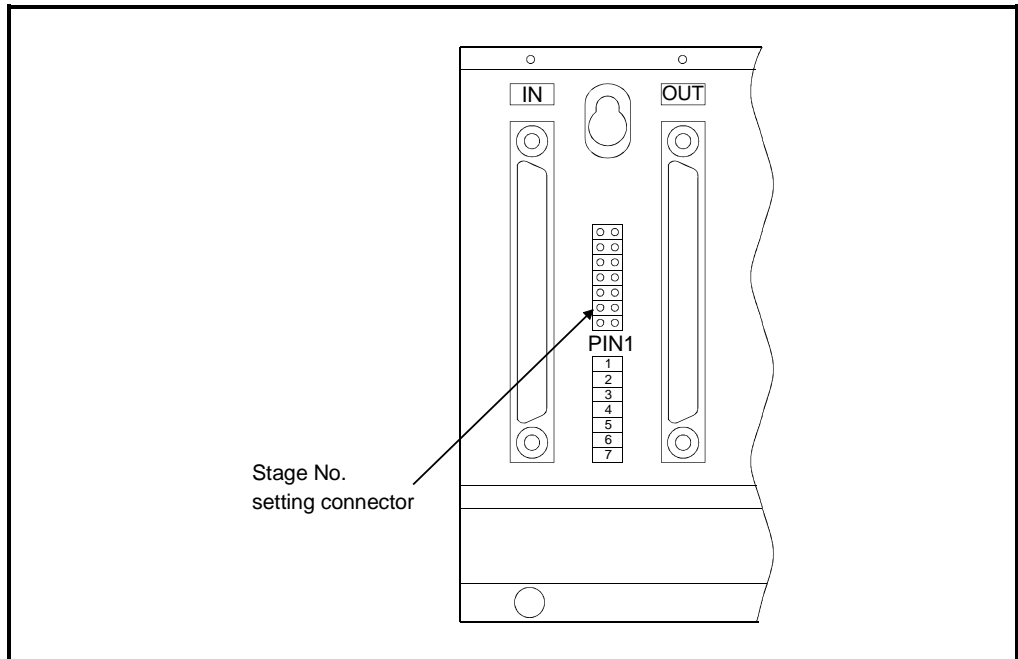
Q52B, Q55B

Q63B, Q65B, Q68B, Q612B

No.	Name	Application
1)	Extension cable connector	Connectors for sending and receiving signals from the main base unit or the other extension base units, to which the extension cables are connected. Do not remove the supplied connector cover.
2)	Base cover	Protective cover of extension cable connector.
3)	No. of stages setting connector	Connector for setting the number of stages of the extension base unit. For setting method, see Section 6.4.
4)	Module connector	Connectors for installing the power supply module, input/output modules, and intelligent function module. To those connectors located in the spare space where these modules are not installed, apply the supplied connector cover or the blank cover module (QG60) to prevent entry of dirt.
5)	Module fixing screw hole	Screw hole for fixing the module to the base unit. Screw size: M3 × 12
6)	Base mounting hole	Hole for mounting this base unit on the panel of the control panel. (For M4 screw)
7)	DIN rail adapter mounting hole	DIN rail adapter mounting hole.

6.4 Setting the Extension Base Unit

The number of stages setting method of each extension base unit to be used when extension base units are installed is described below.



Setting of Stage Number for Extension Base Units

	Setting of Number of Extension Stages						
	1st stage	2nd stage	3rd stage	4th stage	5th stage	6th stage	7th stage
Setting of stages No. setting connector							
Q00JCPU	Setting enabled		Setting disabled*		Setting disabled*		
Q00CPU Q01CPU	Setting enabled				Setting disabled*		

*: SP UNIT ERR. occurs when setting.

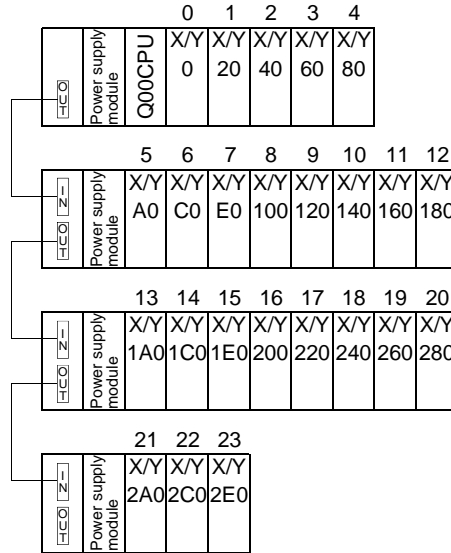
POINT

To set the No. of stages setting connector, set a number from 1 to 2/4 according to the number of extension stages.

Do not set the same stage number at two or more positions or do not fail to set a number. A miss-input or miss-output may occur.

6.5 Input/Output Allocations

Input/output numbers are assigned automatically from the system loading status. Though a five-slot base in the AnS series occupies eight slots, a five-slot base designed for the Basic model QCPU occupies only five slots.



* In this system, 32-point modules are loaded on slots 0 to 23.

For the input/output assignment setting method, refer to the GX Developer Operating Manual.

Refer to the following manual for details of input/output number assignment.

- Basic Model QCPU (Q Mode) User's Manual (Function Explanation, Program Fundamentals)

6.6 Guideline for Use of Extension Base Units (Q5□B)

Since the Q5□B is supplied with 5VDC from the power supply module on the main base unit, a voltage drop occurs at extension cables.

Improper input/output may be provided if the specified voltage (4.75VDC or higher) is not supplied to the "IN" connector of the Q5□B.

When using the Q5□B, make sure that the "IN" connector of the Q5□B is supplied with 4.75VDC or higher.

And it is recommend to connect it with the shortest possible extension cable right after connecting the main base unit, so as to minimize the effects of voltage drop.

(1) When only the Q5□B is connected to the extension base unit

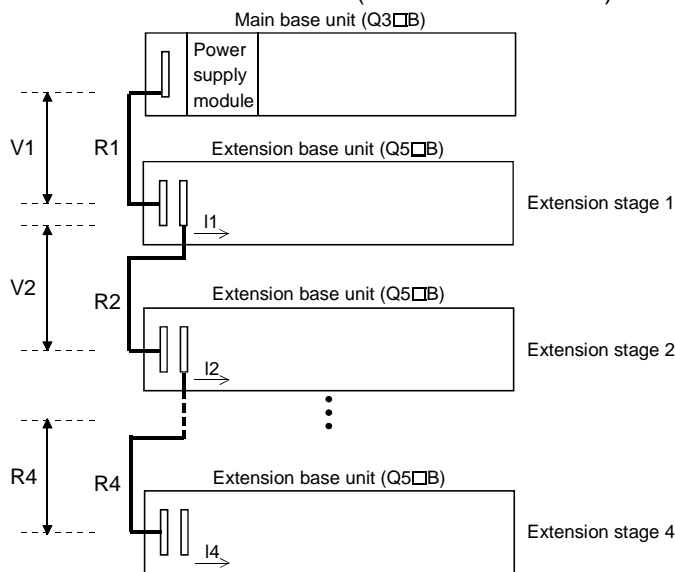
(a) Selection condition

4.75VDC or higher should be supplied to the "IN" connector of the Q5□B in the final extension stage.

(b) How to calculate voltage to "IN" connector

The 5VDC output voltage of the power supply module on the main base unit is set to at least 4.90VDC.

Therefore, the Q5□B can be used if the voltage drop is 0.15V or lower ($4.9V - 4.75V = 0.15V$).



Extension Cable Type	Extension Cable Conductor Resistance (Ω)
QC05B	0.044
QC06B	0.051
QC12B	0.082
QC30B	0.172
QC50B	0.273
QC100B	0.530

Symbol	Description
V1	Voltage drop at the extension cable between the main base unit and extension base unit
Vn	Voltage drop at the extension cable between the extension base unit (extension stage n-1) and extension base unit (extension stage n) *1
R1	Cable resistance between the main base unit and extension base unit
Rn	Cable resistance between the extension base unit (extension stage n-1) and extension base unit (extension stage n) *1
I1 to I4	5VDC current consumption among extension stage 1 to 4 *2

*1: n = 2 to 4 (n = 2 only for Q00J CPU)

*2: Sum total of current consumed by Q5□B and currents consumed by the input/output, intelligent function modules loaded on the Q5□B.

The symbols including "I" (I1 to I4) vary with the modules loaded on the extension base unit. For details of the symbol, refer to the user's manuals of the module used.

List for Calculating Voltage Drops Occurring at Extension Cables in System Consisting of Extensions 1 to 4

Q5□B Loading Position	Voltage Drop at Extension Cable on Corresponding Extension Unit				Sum Total of Voltage Drops to "IN" Connector of Q5□B (V)
	V1	V2	V3	V4	
Extension stage 1	$R1 \cdot I1$	—	—	—	$V=V1$
Extension stage 2	$R1(I1+I2)$	$R2 \cdot I2$	—	—	$V=V1+V2$
Extension stage 3	$R1(I1+I2+I3)$	$R2(I2+I3)$	$R3 \cdot I3$	—	$V=V1+V2+V3$
Extension stage 4	$R1(I1+I2+I3+I4)$	$R2(I2+I3+I4)$	$R3(I3+I4)$	$R4 \cdot I4$	$V=V1+V2+V3+V4$

The voltage supplied to "IN" connector of the Q5□B in the final extension reaches 4.75 VDC or higher on the condition that the sum total of voltage drop to "IN" connector of Q5□B (V) is 0.15V or lower.

(2) When the Q6□B is connected between the Q3□B and the Q5□B
 (a) Selection condition

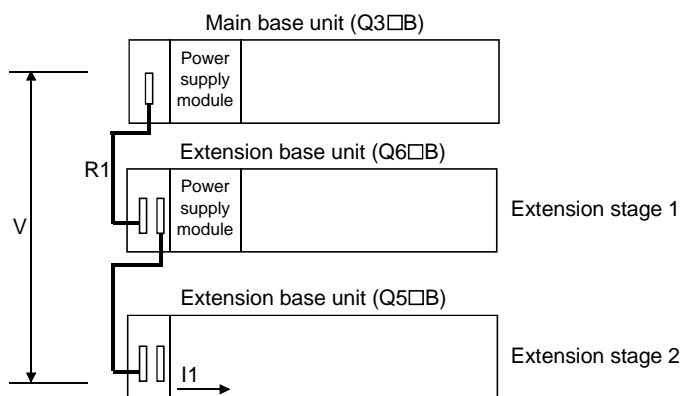
4.75VDC or higher should be supplied to the "IN" connector of the Q5□B in the final extension.

(b) How to calculate voltage to "IN" connector

The 5VDC output voltage of the power supply module on the main base unit is set to at least 4.90VDC.

Therefore, the Q5□B can be used if the voltage drop is 0.15V or lower ($4.9V - 4.75V = 0.15V$).

[When the Q5□B is connected to Extension stage 2.]



Extension Cable Type	Extension Cable Conductor Resistance (Ω)
QC05B	0.044
QC06B	0.051
QC12B	0.082
QC30B	0.172
QC50B	0.273
QC100B	0.530

Symbol	Description
V	Voltage drop at the extension cable between the main base unit and extension base unit (Q5□B)
I1	5VDC current consumption when the Q5□B is used as Extension n+1, n = 1 to 3, n: Extension No. of Q6□B connected (Sum total of current consumed by Q5□B and currents consumed by the input/output, intelligent function modules loaded on the Q5□B.)
Rn	Extension cable resistance between the main base unit (or the extension base unit (Q6□B)) and the extension base unit (Q6□B)
Rn+1	Extension cable resistance between the extension base unit (Q6□B) and extension base unit (Q5□B)

List for Calculating Voltage Drops Occurring at Extension Cables when connecting Q6□B between Q3□B and Q5□B

Position of extension base unit		Voltage drop caused by extension cable from the main base unit to the Q5□B IN connector (V)
Q6□B	Q5□B	
Extension stage 1	Extension stage 2	$V=(R1+R2)I1$
Extension stage 1, Extension stage 2	Extension stage 3	$V=(R1+R2+R3)I1$
Extension stage 1 to 3	Extension stage 4	$V=(R1+R2+R3+R4)I1$

The voltage supplied to the "IN" connector of the Q5□B reaches 4.75VDC or higher on the condition that the voltage drop (V) at the extension cable between the main base unit and Q5□B is 0.15VDC or lower.

(3) When the GOT is bus-connected

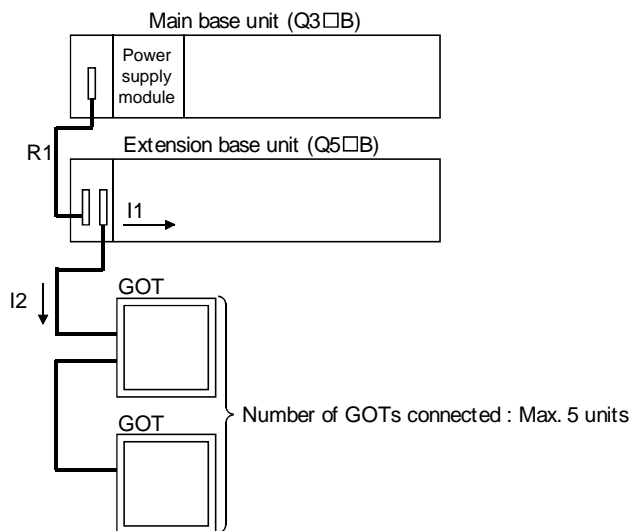
(a) Selection condition

4.75VDC or higher should be supplied to the "IN" connector of the Q5□B.

(b) How to calculate voltage to "IN" connector

The 5VDC output voltage of the power supply module on the main base unit is set to at least 4.90VDC.

Therefore, the Q5□B can be used if the voltage drop is 0.15V or lower ($4.9V - 4.75V = 0.15V$).



Extension Cable Type	Extension Cable Conductor Resistance (Ω)
QC05B	0.044
QC06B	0.051
QC12B	0.082
QC30B	0.172
QC50B	0.273
QC100B	0.530

Symbol	Description
V	Voltage drop at the extension cable between the main base unit and extension base unit (Q5□B)
I1	5VDC current consumption when the Q5□B is used as Extension n+1, n = 1 to 2, n: Extension No. of the Q6□B connected (Sum total of current consumed by Q5□B and currents consumed by input/output, intelligent function modules loaded on the Q5□B)
I2	5VDC current consumption of the GOT (current consumption per GOT is 254mA) • $I2 = 254 \times c$ (c: Number of GOTs connected (c: 1 to 5))
Rn	Extension cable resistance between the main base unit (or the extension base unit (Q6□B)) and the extension base unit (Q6□B)
Rn+1	Extension cable resistance between the extension base unit (Q6□B) and extension base unit (Q5□B)

POINT

When connecting GOT by extension cable that is 13.2 m (43.31ft) or longer, the bus extension connector box A9GT-QCNB is required. (A9GT-QCNB cannot be connected to the Q00JCPU main base unit. Connect A9GT-QCNB to the extension base unit.)

Since the A9GT-QCNB is supplied with 5VDC from the power supply module loaded on the main base unit, 29mA must be added to "I2" as the current consumption of the A9GT-QCNB.

For details of the GOT-bus connection, refer to the GOT-A900 Series User's Manual (Connection).

7 BATTERY

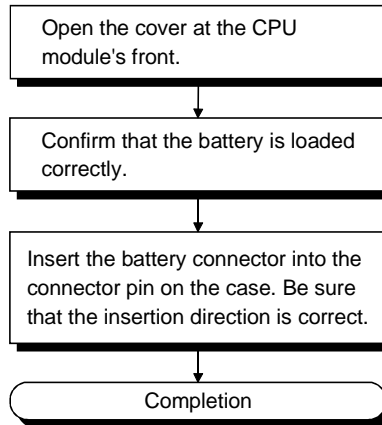
This section describes the specifications and handling of the memory card and battery which can be used on the Basic model QCPU.

7.1 Battery Specifications

Item \ Type	Q6BAT
Classification	Manganese dioxide lithium primary battery
Initial voltage	3.0V
Nominal current	1800mAh
Storage life	10 years (room temperature)
Total power interrupt time	Refer to Section 10.3.1.
Application	Latch of the program memory, standard RAM and latch device

7.2 Installation of Battery

- (1) The battery for the CPU module is shipped with its connector disconnected.
Connect the connector as follows.



Refer to Section 10.3 for the battery life and replacement method.

8 EMC AND LOW-VOLTAGE DIRECTIVES

For the products sold in European countries, the conformance to the EMC Directive, which is one of the European Directives, has been a legal obligation since 1996. Also, conformance to the Low Voltage Directive, another European Directives, has been a legal obligation since 1997.

Manufacturers who recognize their products must conform to the EMC and Low Voltage Directives required to declare that their products conform to these Directives and put a "CE mark" on their products.

8.1 Requirements for conformance to the EMC Directive

The EMC Directive specifies that products placed on the market must "be so constructed that they do not cause excessive electromagnetic interference (emissions) and are not unduly affected by electromagnetic interference (immunity)".

The applicable products are requested to meet these requirements. The sections 8.1.1 through 8.1.5 summarize the precautions on conformance to the EMC Directive of the machinery constructed using the MELSEC-Q series PLCs.

The details of these precautions has been prepared based on the requirements and the applicable standards control. However, we will not assure that the overall machinery manufactured according to these details conforms to the above-mentioned directives. The method of conformance to the EMC Directive and the judgment on whether or not the machinery conforms to the EMC Directive must be determined finally by the manufacturer.

8.1.1 Standards applicable to the EMC Directive

The standards applicable to the EMC Directive are listed below.

Specification	Test item	Test details	Standard value
EN50081-2 : 1995	EN55011 Radiated noise * 2	Electromagnetic emissions from the product are measured.	30 M-230 MHz QP : 30 dB μ V/m (30 m in measurement range) * 1 230 M-1000 MHz QP : 37 dB μ V/m (30 m in measurement range)
	EN55011 Conducted noise	Electromagnetic emissions from the product to the power line is measured.	150 k-500 kHz QP : 79 dB, Mean : 66 dB * 1 500 k-30 MHz QP : 73 dB, Mean : 60 dB
EN61131-2 : 1996	EN61000-4-2 Electrostatic immunity * 2	Immunity test in which static electricity is applied to the cabinet of the equipment.	15 k V Aerial discharge
	EN61000-4-4 Fast transient burst noise * 2	Immunity test in which burst noise is applied to the power line and signal lines.	Power line : 2 kV Digital input/output (24 V or higher) : 1 kV (Digital input/output (24 V or less)) > 250 V (Analog input/output, signal lines) > 250 V
	EN61000-4-3 Radiated field AM modulation * 2	Immunity test in which field is irradiated to the product.	10 V/m, 26-1000 MHz, 80%AM modulation@1 kHz
	EN61000-4-12 Damped oscillatory wave immunity	Immunity test in which a damped oscillatory wave is superimposed on the power line.	Power line : 1 kV Digital input/output (24 V or higher) : 1 kV

(* 1) QP : Quasi-peak value, Mean : Average value

(* 2) The PLC is an open type device (device installed to another device) and must be installed in a conductive control panel.
The tests for the corresponding items were performed while the PLC was installed inside a control panel.

8.1.2 Installation instructions for the EMC Directive

The PLC is open equipment and must be installed within a control cabinet for use. This not only ensures safety but also ensures effective shielding of PLC-generated electromagnetic noise.

(1) Control cabinet

- (a) Use a conductive control cabinet.
- (b) When attaching the control cabinet's top plate or base plate, mask painting and weld so that good surface contact can be made between the cabinet and plate.
- (c) To ensure good electrical contact with the control cabinet, mask the paint on the installation bolts of the inner plate in the control cabinet so that contact between surfaces can be ensured over the widest possible area.
- (d) Earth the control cabinet with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies.
- (e) Holes made in the control cabinet must be 10 cm (3.94 in.) diameter or less. If the holes are 10 cm (3.94 in.) or larger, radio frequency noise may be emitted.

In addition, because radio waves leak through a clearance between the control panel door and the main unit, reduce the clearance as much as practicable.

The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

Our tests have been carried out on a panel having the damping characteristics of 37 dB max. and 30 dB mean (measured by 3 m method with 30 to 300 MHz).

(2) Connection of power and earth wires

Earthing and power supply wires for the PLC system must be connected as described below.

- (a) Provide an earthing point near the power supply module. Earth the power supply's LG and FG terminals (LG : Line Ground, FG : Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30 cm (11.18 in.) or shorter.) The LG and FG terminals function is to pass the noise generated in the PLC system to the ground, so an impedance that is as low as possible must be ensured. As the wires are used to relieve the noise, the wire itself carries a large noise content and thus short wiring means that the wire is prevented from acting as an antenna.
- (b) The earth wire led from the earthing point must be twisted with the power supply wires. By twisting with the earthing wire, noise flowing from the power supply wires can be relieved to the earthing. However, if a filter is installed on the power supply wires, the wires and the earthing wire may not need to be twisted.

8.1.3 Cables

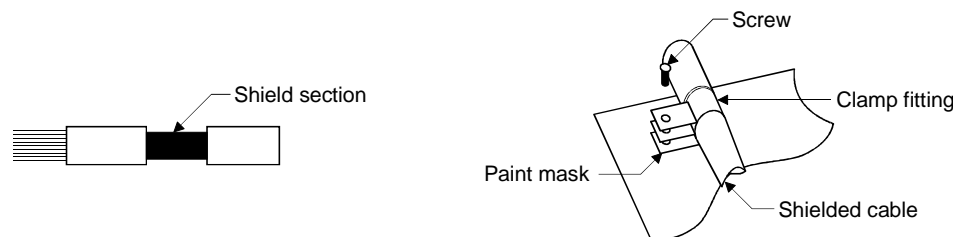
The cables extracted from the control panel contain a high frequency noise component. On the outside of the control panel, therefore, they serve as antennas to emit noise. To prevent noise emission, use shielded cable for the cables which are connected to the input/output modules and intelligent function modules and may be extracted to the outside of the control panel.

The use of a shielded cable also increases noise resistance. The signal lines connected to the PLC input/output modules and intelligent function modules use shielded cables to assure noise resistance under the conditions where the shield is earthed. If a shielded cable is not used or not earthed correctly, the noise resistance will not meet the specified requirements.

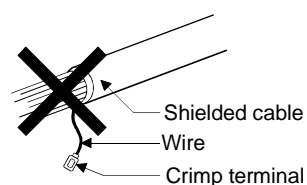
When the shield of a shielded cable is earthed to the cabinet body, please ensure that the shield contact with the body is over a large surface area. If the cabinet body is painted it will be necessary to remove paint from the contact area. All fastenings must be metallic and the shield and earthing contact must be made over the largest available surface area. If the contact surfaces are too uneven for optimal contact to be made either use washers to correct for surface inconsistencies or use an abrasive to level the surfaces. The following diagrams show examples of how to provide good surface contact of shield earthing by use of a cable clamp.

(1) Earthing of shielded of shield cable

- (a) Earth the shield of the shielded cable as near the module as possible taking care so that the earthed cables are not induced electromagnetically by the cable to be earthed.
- (b) Take an appropriate measures so that the shield section of the shielded cable from which the outer cover was partly removed for exposure is earthed to the control panel on an increased contact surface. A clamp may also be used as shown in the figure below. In this case, however, apply a cover to the painted inner wall surface of the control panel which comes in contact with the clamp.

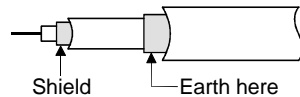


Note) The method of earthing by soldering a wire onto the shield section of the shielded cable as shown below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



(2) MELSECNET/H module

Always use a double-shielded coaxial cable (MITSUBISHI CABLE : 5C-2V-CCY) for the coaxial cables MELSECNET/H module. Radiated noise in the range of 30MHz or higher can be suppressed by use of the double-shielded coaxial cables. Earth the double-shielded coaxial cable by connecting its outer shield to the ground.



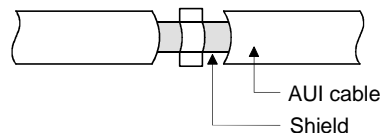
Refer to (1) for the earthing of the shield.

(3) Ethernet module, Web server module

Precautions for using AUI cables, twisted pair cables and coaxial cables are described below.

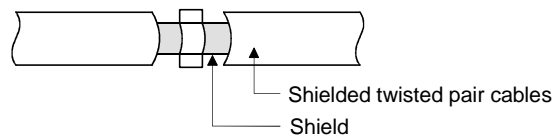
(a) Always earth the AUI cables connected to the 10BASE5 connectors.

Because the AUI cable is of the shielded type, strip part of the outer cover and earth the exposed shield section to the ground on the widest contact surface as shown below.



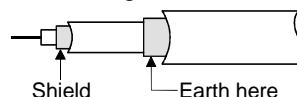
Refer to (1) for the earthing of the shield.

(b) Use a shielded twisted pair cable to connect to the 10BASE-T/100BASE-TX connector. Remove a part of the sheath from the shielded twisted pair cable and earth the exposed shield at an area as wide as possible as shown in the figure below.



Refer to (1) for the earthing of the shield.

(c) Always use double-shielded coaxial cables as the coaxial cables connected to the 10BASE2 connectors. Earth the double-shielded coaxial cable by connecting its outer shield to the ground.



Refer to (1) for the earthing of the shield.

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(4) Input/output signal lines and other communication cables

For the input/output signal lines and other communication cables lines (RS-232, RS-422, CC-Link, etc.), if extracted to the outside of the control panel, also ensure to earth the shield section of these lines and cables in the same manner as in item (1) above.

8.1.4 Power supply module, Q00JCPU power supply section

Always ground the LG and FG terminals after short-circuiting them.

8.1.5 Others

(1) Ferrite core

A ferrite core has the effect of reducing radiated noise in the 30 M Hz to 100 M Hz band.

It is not required to fit ferrite cores to cables, but it is recommended to fit ferrite cores if shield cables pulled out of the enclosure do not provide sufficient shielding effects.

It should be noted that the ferrite cores should be fitted to the cables in the position immediately before they are pulled out of the enclosure. If the fitting position is improper, the ferrite will not produce any effect.

In the CC-Link system, however, ferrite cores cannot be fitted to cables.

(2) Noise filter (power supply line filter)

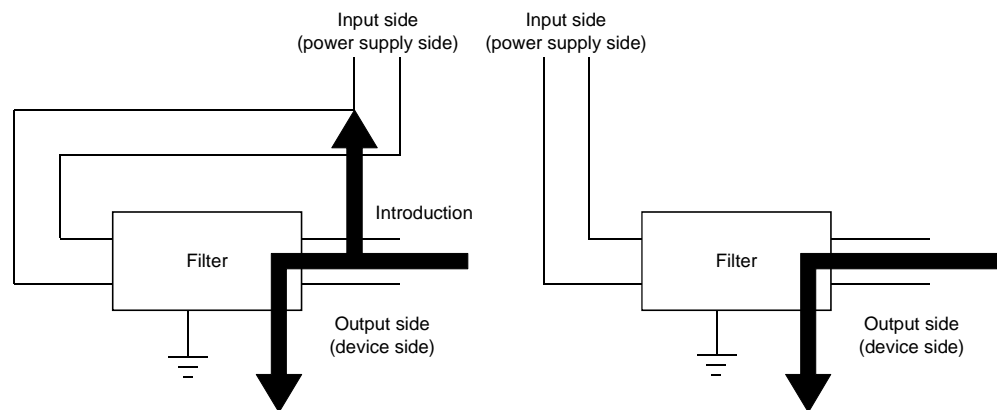
A noise filter is a component which has an effect on conducted noise.

It is not required to fit the noise filter to the power supply line, but fitting it can further suppress noise.

(The noise filter has the effect of reducing conducted noise of 10 MHz or less.)

The precautions required when installing a noise filter are described below.

- (a) Do not bundle the wires on the input side and output side of the noise filter. When bundled, the output side noise will be induced into the input side wires from which the noise was filtered.



1) The noise will be included when the input and output wires are bundled.

2) Separate and lay the input and output wires.

- (b) Earth the noise filter earthing terminal to the control cabinet with the shortest wire possible (approx. 10 cm (3.94 in.)).

Reference

Noise Filter Model Name	FN343-3/01	FN660-6/06	ZHC2203-11
Manufacturer	SCHAFFNER	SCHAFFNER	TDK
Rated current	3 A	6 A	3 A
Rated voltage	250 V		

8.2 Requirement to Conform to the Low-Voltage Directive

The low-voltage directive requires each device that operates with the power supply ranging from 50V to 1000VAC and 75V to 1500VDC to satisfy the safety requirements. In Sections 8.2.1 to 8.2.6, cautions on installation and wiring of the MELSEC-Q series PLC to conform to the low-voltage directive are described.

We have put the maximum effort to develop this material based on the requirements and standards of the regulation that we have collected. However, compatibility of the devices which are fabricated according to the contents of this manual to the above regulation is not guaranteed. Each manufacturer who fabricates such device should make the final judgement about the application method of the low-voltage directive and the product compatibility.

8.2.1 Standard applied for MELSEC-Q series PLC

The standard applied for MELSEC-Q series PLC is EN61010-1 safety of devices used in measurement rooms, control rooms, or laboratories.

The MELSEC-Q series PLC modules which operate at the rated voltage of 50VAC/75VDC or above are also developed to conform to the above standard. The modules which operate at the rated voltage of less than 50VAC/75VDC are out of the low-voltage directive application range.

8.2.2 MELSEC-Q series PLC selection

(1) Power module

There are dangerous voltages (voltages higher than 42.4V peak) inside the power supply modules of the 100/200VAC rated input voltages. Therefore, the CE mark-compliant models are enhanced in insulation internally between the primary and secondary.

(2) Input/output module

There are dangerous voltages (voltages higher than 42.4V peak) inside the input/output modules of the 100/200VAC rated input voltages. Therefore, the CE mark-compliant models are enhanced in insulation internally between the primary and secondary.

The input/output modules of 24VDC or less rating are out of the low-voltage directive application range.

(3) CPU module, base unit

Using 5VDC circuits inside, the above modules are out of the low-voltage directive application range.

(4) Intelligent function modules

The intelligent function modules such as the analog, network and positioning modules are 24VDC or less in rated voltage and are therefore out of the low-voltage directive application range.

(5) Display device

Use the display conforming to the EU directive.

8.2.3 Power supply

The insulation specification of the power module was designed assuming installation category II. Be sure to use the installation category II power supply to the PLC. The installation category indicates the durability level against surge voltage generated by a thunderbolt. Category I has the lowest durability; category IV has the highest durability.

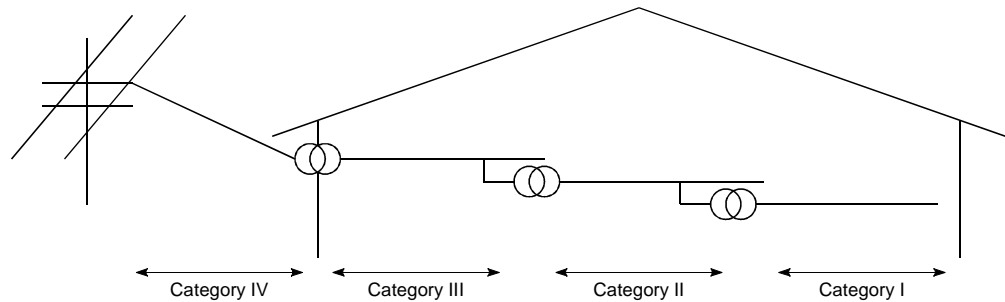


Figure 8.1: Installation Category

Category II indicates a power supply whose voltage has been reduced by two or more levels of isolating transformers from the public power distribution.

8.2.4 Control box

Because the PLC is an open device (a device designed to be stored within another module), be sure to use it after storing in the control box.

(1) Electrical shock prevention

In order to prevent persons who are not familiar with the electric facility such as the operators from electric shocks, the control box must have the following functions :

- (a) The control box must be equipped with a lock so that only the personnel who has studied about the electric facility and have enough knowledge can open it.
- (b) The control box must have a structure which automatically stops the power supply when the box is opened.

(2) Dustproof and waterproof features

The control box also has the dustproof and waterproof functions. Insufficient dustproof and waterproof features lower the insulation withstand voltage, resulting in insulation destruction. The insulation in our PLC is designed to cope with the pollution level 2, so use in an environment with pollution level 2 or below.

Pollution level 1 : An environment where the air is dry and conductive dust does not exist.

Pollution level 2 : An environment where conductive dust does not usually exist, but occasional temporary conductivity occurs due to the accumulated dust. Generally, this is the level for inside the control box equivalent to IP54 in a control room or on the floor of a typical factory.


Pollution level 3 : An environment where conductive dust exists and conductivity may be generated due to the accumulated dust. An environment for a typical factory floor.


Pollution level 4 : Continuous conductivity may occur due to rain, snow, etc. An outdoor environment.

As shown above, the PLC can realize the pollution level 2 when stored in a control box equivalent to IP54.

8.2.5 Grounding

There are the following two different grounding terminals.
Use either grounding terminal in an earthed status.

Protective grounding  : Maintains the safety of the PLC and improves the noise resistance.

Functional grounding  : Improves the noise resistance.

8.2.6 External wiring

(1) 24 VDC external power supply

For the MELSEC-Q series 24VDC input/output modules and the intelligent function modules which require external supply power, use a model whose 24 VDC circuit is intensively insulated from the hazardous voltage circuit.

(2) External devices

When a device with a hazardous voltage circuit is externally connected to the PLC, use a model whose circuit section of the interface to the PLC is intensively insulated from the hazardous voltage circuit.

(3) Intensive insulation

Intensive insulation refers to the insulation with the dielectric withstand voltage shown in Table 8.1.

Table 8.1 : Intensive Insulation Withstand Voltage
(Installation Category II, source : IEC664)

Rated voltage of hazardous voltage area	Surge withstand voltage (1.2/50 μ s)
150 VAC or below	2500 V
300 VAC or below	4000 V

9 LOADING AND INSTALLATION

In order to increase the reliability of the system and exploit the maximum performance of its functions, this section describes the methods and precautions for the mounting and installation of the system.

9.1 General Safety Requirements



DANGER

- Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC module. Otherwise, trouble could result from erroneous output or erroneous operation.
 - (1) Outside the PLC, construct mechanical damage preventing interlock circuits such as emergency stop, protective circuits, positioning upper and lower limits switches and interlocking forward/reverse operations.
 - (2) When the PLC detects the following problems, it will stop calculation and turn off all output in the case of (a). In the case of (b), it will stop calculation and hold or turn off all output according to the parameter setting.
 - (a) The power supply module has over current protection equipment and over voltage protection equipment.
 - (b) The PLC CPUs self-diagnostic functions, such as the watchdog timer error, detect problems.In addition, all output will be turned on when there are problems that the PLC CPU cannot detect, such as in the input/output controller. Build a fail safe circuit exterior to the PLC that will make sure the equipment operates safely at such times. For fail safe circuit examples, refer to "LOADING AND INSTALLATION" in this manual.
 - (3) Output could be left on or off when there is trouble in the outputs module relay or transistor. So build an external monitoring circuit that will monitor any single outputs that could cause serious trouble.
- When overcurrent which exceeds the rating or caused by short-circuited load flows in the output module for a long time, it may cause smoke or fire. To prevent this, configure an external safety circuit, such as fuse.
- Build a circuit that turns on the external power supply when the PLC main module power is turned on. If the external power supply is turned on first, it could result in erroneous output or erroneous operation.
- When there are communication problems with the data link, refer to the corresponding data link manual for the operating status of each station. Not doing so could result in erroneous output or erroneous operation. Nperating status of each station. Not doing so could result in erroneous output or erroneous operation.

**DANGER**

- When connecting a peripheral device to the CPU module or connecting a personal computer or the like to the special function module to exercise control (data change) on the running PLC, configure up an interlock circuit in the sequence program to ensure that the whole system will always operate safely.

Also before exercising other control (program change, operating status change (status control)) on the running PLC, read the manual carefully and fully confirm safety.

Especially for the above control on the remote PLC from an external device, an immediate action may not be taken for PLC trouble due to a data communication fault.

In addition to configuring up the interlock circuit in the sequence program, corrective and other actions to be taken as a system for the occurrence of a data communication fault should be predetermined between the external device and PLC CPU.

**CAUTION**

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.
- When controlling items like lamp load, heater or solenoid valve using an output module, large current (approximately ten times greater than that present in normal circumstances) may flow when the output is turned OFF to ON. Take measures such as replacing the module with one having sufficient rated current.

When the PLC power supply is switched ON-OFF, proper process output may not be provided temporarily due to differences in delay time and starting time between the PLC power supply and processing external power supply (especially DC).

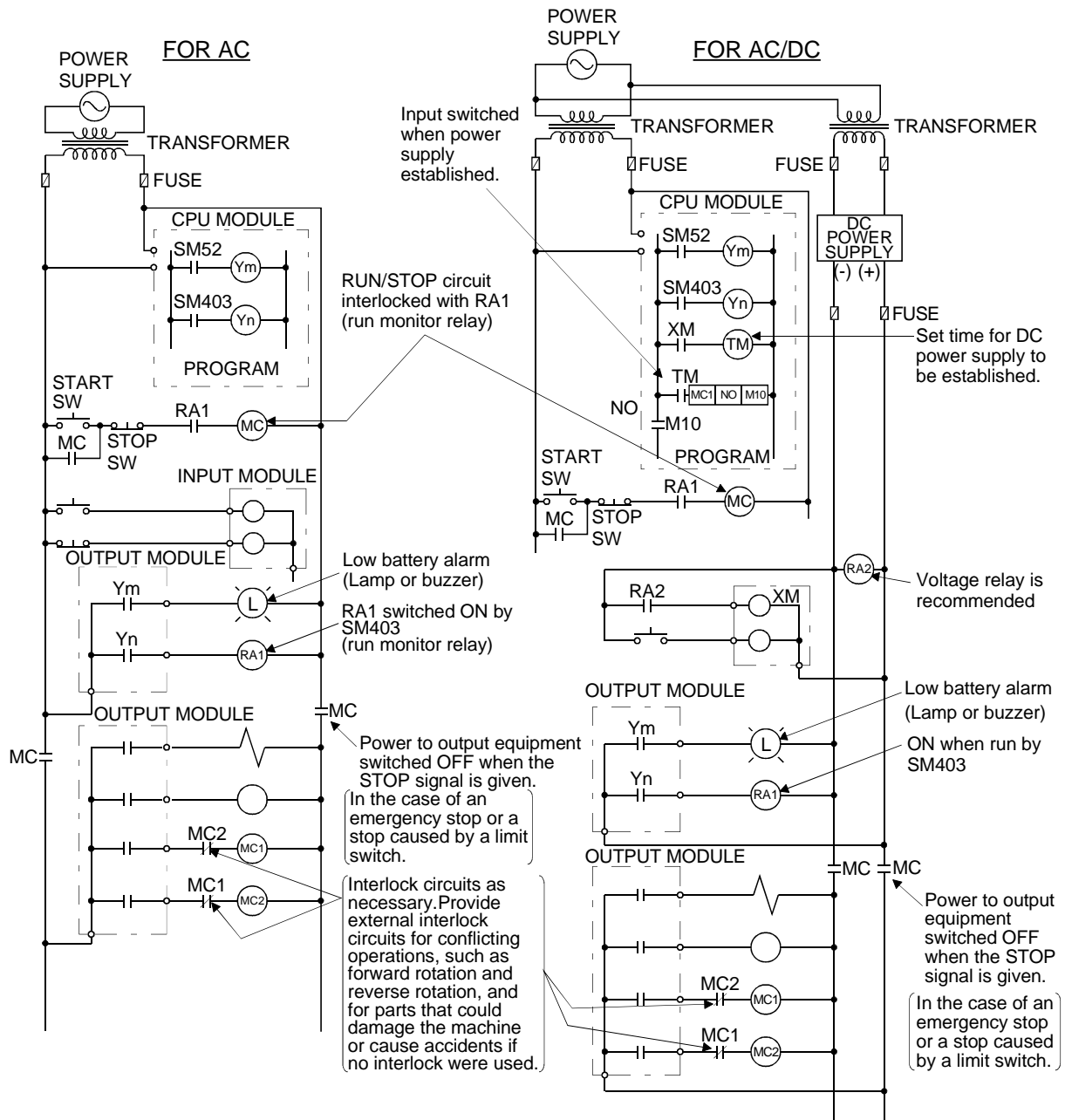
For example, if the processing external supply power is switched on in a DC output module and the PLC power supply is then switched on, the DC output module may provide false output instantaneously at power-on of the PLC. Therefore, it is necessary to make up a circuit which can switch on the PLC power supply first.

Also, an abnormal operation may be performed if an external power supply fault or PLC failure takes place.

To prevent any of these abnormal operations from leading to the abnormal operation of the whole system and in a fail-safe viewpoint, areas which can result in machine breakdown and accidents due to abnormal operations (e.g. emergency stop, protective and interlock circuits) should be constructed outside the PLC.

The following page gives examples of system designing in the above viewpoint.

(1) System design circuit example (when not using \overline{ERR} contact of power supply module, Q00JCPU)



The power-ON procedure is as follows:

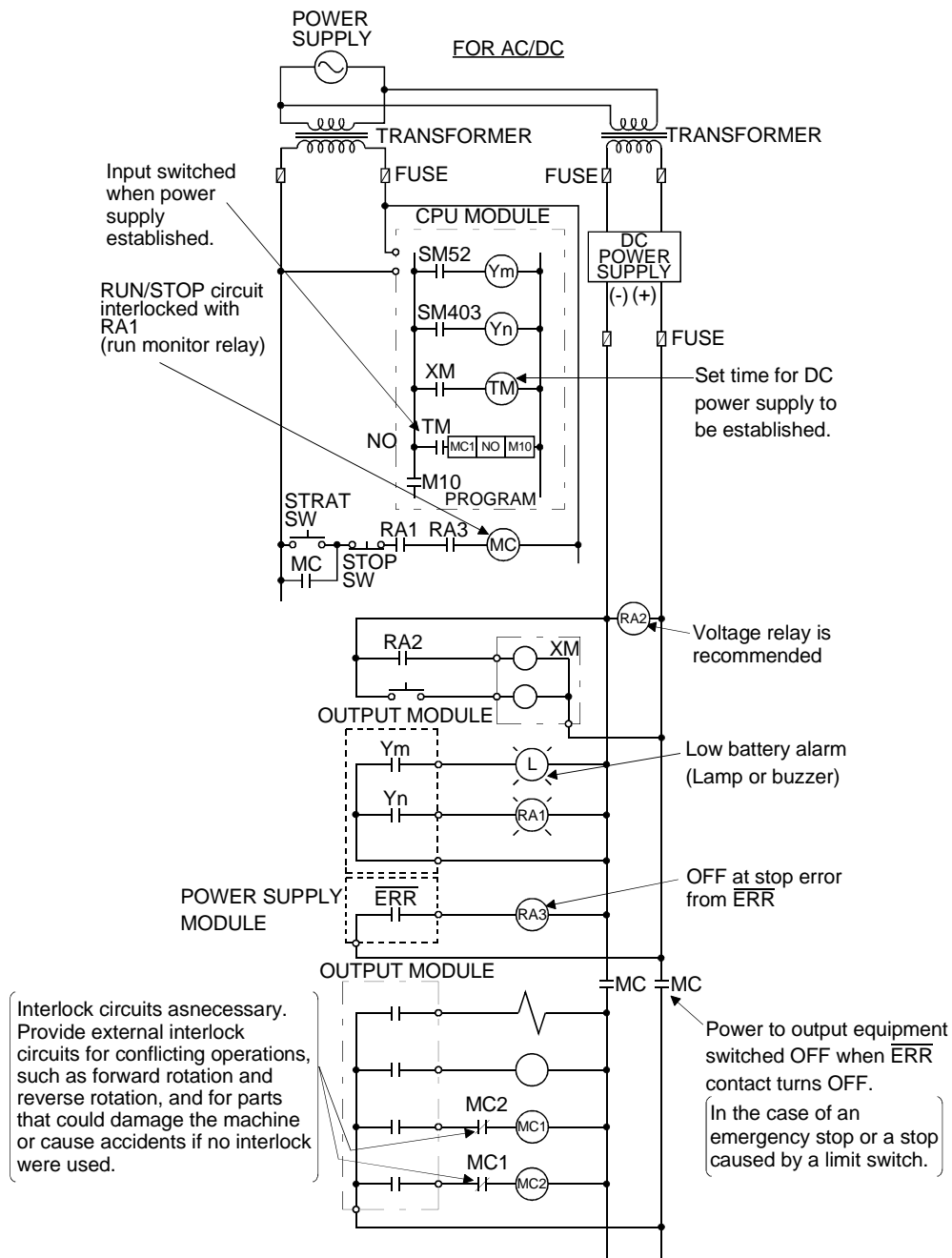
For AC

- 1) Switch power ON.
- 2) Set CPU to RUN.
- 3) Turn ON the start switch.
- 4) When the magnetic contactor (MC) comes on, the output equipment is powered and may be driven by the program.

For AC/DC

- 1) Switch power ON.
- 2) Set CPU to RUN.
- 3) When DC power is established, RA2 goes ON.
- 4) Timer (TM) times out after the DC power reaches 100%. (The TM set value should be the period of time from when RA2 goes ON to the establishment of 100% DC voltage. Set this value to approximately 0.5 seconds.)
- 5) Turn ON the start switch.
- 6) When the magnetic contactor (MC) comes on, the output equipment is powered and may be driven by the program. (If a voltage relay is used at RA2, no timer (TM) is required in the program.)

(2) System design circuit example (when using \overline{ERR} contact of power supply module)



The power-ON procedure is as follows:

For AC/DC

- 1) Switch power ON.
- 2) Set CPU to RUN.
- 3) When DC power is established, RA2 goes ON.
- 4) Timer (TM) times out after the DC power reaches 100%. (The TM set value should be the period of time from when RA2 goes ON to the establishment of 100% DC voltage. Set this value to approximately 0.5s.)
- 5) Turn ON the start switch.
- 6) When the magnetic contactor (MC) comes on, the output equipment is powered and may be driven by the program. (If a voltage relay is used at RA2, no timer (TM) is required in the program.)

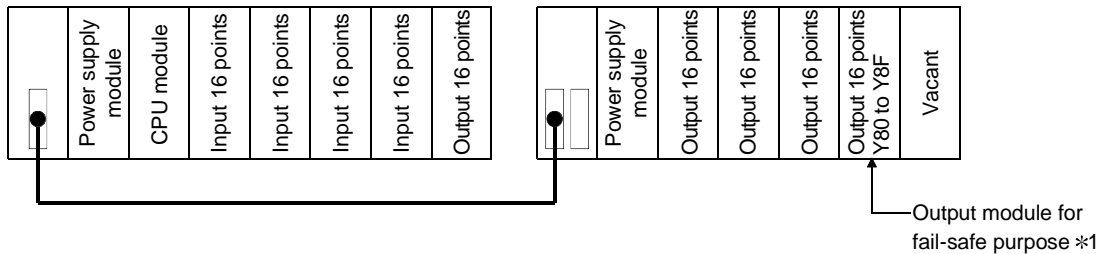
(3) Fail-safe measures against failure of the PLC

Failure of a CPU module or memory can be detected by the self diagnosis function. However, failure of input/output control area may not be detected by the CPU module.

In such cases, all input/output points turn ON or OFF depending on a condition of problem, and normal operating conditions and operating safety cannot sometimes be maintained.

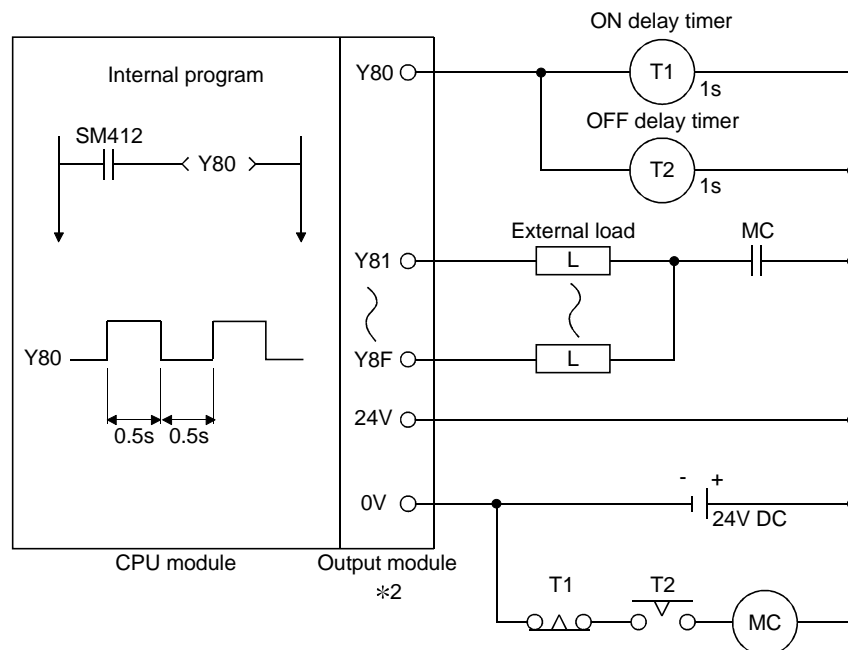
Though Mitsubishi PLCs are manufactured under strict quality control, they may cause failure or abnormal operations due to unspecific reasons. To prevent the abnormal operation of the whole system, machine breakdown, and accidents, fail-safe circuitry against failure of the PLC must be constructed outside the PLC. Examples of a system and its fail-safe circuitry are described below:

<System example>



*1: The output module for fail-safe purpose should be loaded in the last slot of the system. (Y80 to Y8F in the above system.)

<Fail-safe circuit example>



*2: Y80 repeats turning ON and then OFF at 0.5s intervals. Use a no-contact output module (transistor in the example shown above).

9.2 Calculating Heat Generation by PLC

The ambient temperature inside the board storing the PLC must be suppressed to a PLC usable ambient temperature of 55°C.

For the design of radiation from the storing board, it is necessary to know the average power consumption (heating value) of the devices and instruments stored in the board. Here the method of obtaining the average power consumption of the PLC system is described.

From the power consumption, calculate a rise in ambient temperature inside the board.

How to calculate average power consumption

The power consuming parts of the PLC are roughly classified into six blocks as shown below.

(1) Power consumption of power supply module

The power conversion efficiency of the power supply module is approx. 70 %, i.e., 30 % of the output power is consumed by heating. As a result, 3/7 of the output power becomes the power consumption.

Therefore the calculation formula is as follows.

$$W_{pw} = \frac{3}{7} \times (I_{5V} \times 5) \text{ (W)}$$

I_{5V} : Current consumption of logic 5 VDC circuit of each module

(2) Power consumption of a total of 5 VDC logic section of each module

The power consumption of the 5 VDC output circuit section of the power module is the power consumption of each module (including the current consumption of the base unit).

$$W_{5V} = I_{5V} \times 5 \text{ (W)}$$

(3) A total of 24 VDC average power consumption of the output module (power consumption for simultaneous ON points)

The average power of the external 24 VDC power is the total power consumption of each module.

$$W_{24V} = I_{24V} \times 24 \text{ (W)}$$

(4) Average power consumption due to voltage drop in the output section of the output module (Power consumption for simultaneous ON points)

$$W_{OUT} = I_{OUT} \times V_{drop} \times \text{Number of outputs} \times \text{Simultaneous ON rate (W)}$$

I_{OUT} : Output current (Current in actual use) (A)

V_{drop} : Voltage drop in each output module (V)

(5) Average power consumption of the input section of the input module (Power consumption for simultaneous ON points)

$$W_{IN} = I_{IN} \times E \times \text{Number of input points} \times \text{Simultaneous ON rate (W)}$$

I_{IN} : Input current (Effective value for AC) (A)

E : Input voltage (Voltage in actual use) (V)

(6) Power consumption of the power supply section of the intelligent function module

$$W_s = I_{5V} \times 5 + I_{24V} \times 24 + I_{100V} \times 100 \text{ (W)}$$

The total of the power consumption values calculated for each block becomes the power consumption of the overall sequencer system.

$$W = W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_s \text{ (W)}$$

From this overall power consumption (W), calculate the heating value and a rise in ambient temperature inside the board.

The outline of the calculation formula for a rise in ambient temperature inside the board is shown below.

$$T = \frac{W}{UA} \text{ (}^\circ\text{C)}$$

W : Power consumption of overall sequencer system (value obtained above)

A : Surface area inside the board

U : When the ambient temperature inside the board is uniformed by a fan..... 6
 When air inside the board is not circulated..... 4

POINT
<p>When a rise in ambient temperature inside the board exceeds the specified limit, it is recommended that you install a heat exchanger in the board to lower the ambient temperature inside the board.</p> <p>If a normal ventilating fan is used, dust will be sucked into the PLC together with the external air.</p> <p>It may affect the performance of the PLC.</p>

(7) Example of calculation of average power consumption

(a) System configuration

Q61P-A1	Q00CPU	QX40	QX40	QY10	QJ71LP21-25	Vacant	Q35B
---------	--------	------	------	------	-------------	--------	------

(b) 5 VDC current consumption of each module

- Q00CPU : 0.25 (A)
- QX40 : 0.05 (A)
- QY10 : 0.43 (A)
- QJ71LP21-25 : 0.55 (A)
- Q35B : 0.074 (A)

(c) Power consumption of power supply module

$$W_{PW} = 3/7 \times (0.25 + 0.05 + 0.05 + 0.43 + 0.55 + 0.074) \times 5 = 3.01 \text{ (W)}$$

(d) Power consumption of a total of 5 VDC logic section of each module

$$W_{5V} = (0.25 + 0.05 + 0.05 + 0.43 + 0.55 + 0.074) \times 5 = 7.02 \text{ (W)}$$

(e) A total of 24 VDC average power consumption of the output module

$$W_{24V} = 0 \text{ (W)}$$

- (f) Average power consumption due to voltage drop in the output section of the output module

$$W_{OUT} = 0 \text{ (W)}$$

- (g) Average power consumption of the input section of the input module

$$W_{IN} = 0.004 \times 24 \times 32 \times 1 = 3.07 \text{ (W)}$$

- (h) Power consumption of the power supply section of the intelligent function module


$$W_S = 0 \text{ (W)}$$

- (i) Power consumption of overall system.

$$W = 2.94 + 6.87 + 0 + 0 + 3.07 + 0 = 13.10 \text{ (W)}$$

9.3 Module Installation

9.3.1 Precaution on installation

	<p>CAUTION</p> <ul style="list-style-type: none"> ● Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product. ● Hold down the module loading lever at the module bottom, and securely insert the module fixing hook into the fixing hole in the base unit. Incorrect loading of the module can cause a malfunction, failure or drop. When using the PLC in the environment of much vibration, tighten the module with a screw. Tighten the screw in the specified torque range. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module. ● When installing more cables, be sure that the base unit and the module connectors are installed correctly. After installation, check them for looseness. Poor connections could cause an input or output failure. ● Completely turn off the external power supply before loading or unloading the module. Not doing so could result in electric shock or damage to the product. ● Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.
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This section gives instructions for handling the CPU module, input/output, intelligent function and power supply modules, base units and so on.

- (1) Module enclosure, terminal block connectors and pin connectors are made of resin; do not drop them or subject them to strong impact.
- (2) Do not remove modules' printed circuit boards from the enclosure in order to avoid changes in operation.
- (3) Tighten the module fixing screws and terminal block screws within the tightening torque range specified below.

Location of Screw	Tightening Torque Range
Module fixing screw (M3 × 12 screw)	36 to 48 N•cm
I/O module terminal block screw (M3 screw)	42 to 58 N•cm
I/O module terminal block fixing screw (M3.5 screw)	66 to 89 N•cm
Power module terminal screw (M3.5 screw)	66 to 89 N•cm

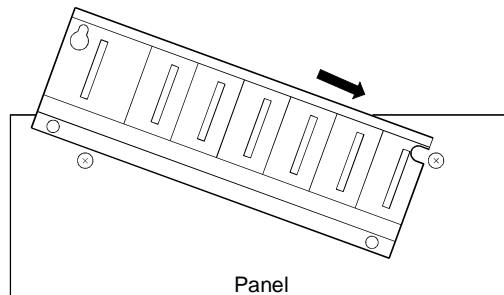
- (4) Make sure to install the power supply module on the main base unit and extension base unit. Even if the power supply module is not installed, when the input/output modules and intelligent function module installed on the base units are of light load type, the modules may be operated. In this case, because a voltage becomes unstable, we cannot guarantee the operation.
- (5) When an extension cable is used, do not bind the cable together with the main circuit (high voltage, heavy current) line or lay them close to each other.

(6) Install the main base unit, Q00JCPU (by screwing) in the following procedure.

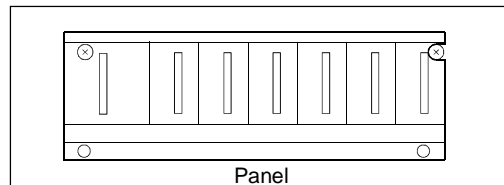
1) Fit the two base unit top mounting screws into the enclosure.



2) Place the right-hand side notch of the base unit onto the right-hand side screw.



3) Place the left-hand side pear-shaped hole onto the left-hand side screw.



4) Fit the mounting screws into the mounting screw holes in the base unit bottom and retighten the four mounting screws.

Note1 : Install the main base unit, Q00JCPU to a panel, with no module loaded in the right-end slot.

Remove the base unit after unloading the module from the right-end slot.

Note2 : The mounting screws that come with the slim type main base unit differ from those coming with other types of the base unit. To order mounting screws for the slim type main base unit, specify "cross recessed head blind screw M4 × 12 (black)."

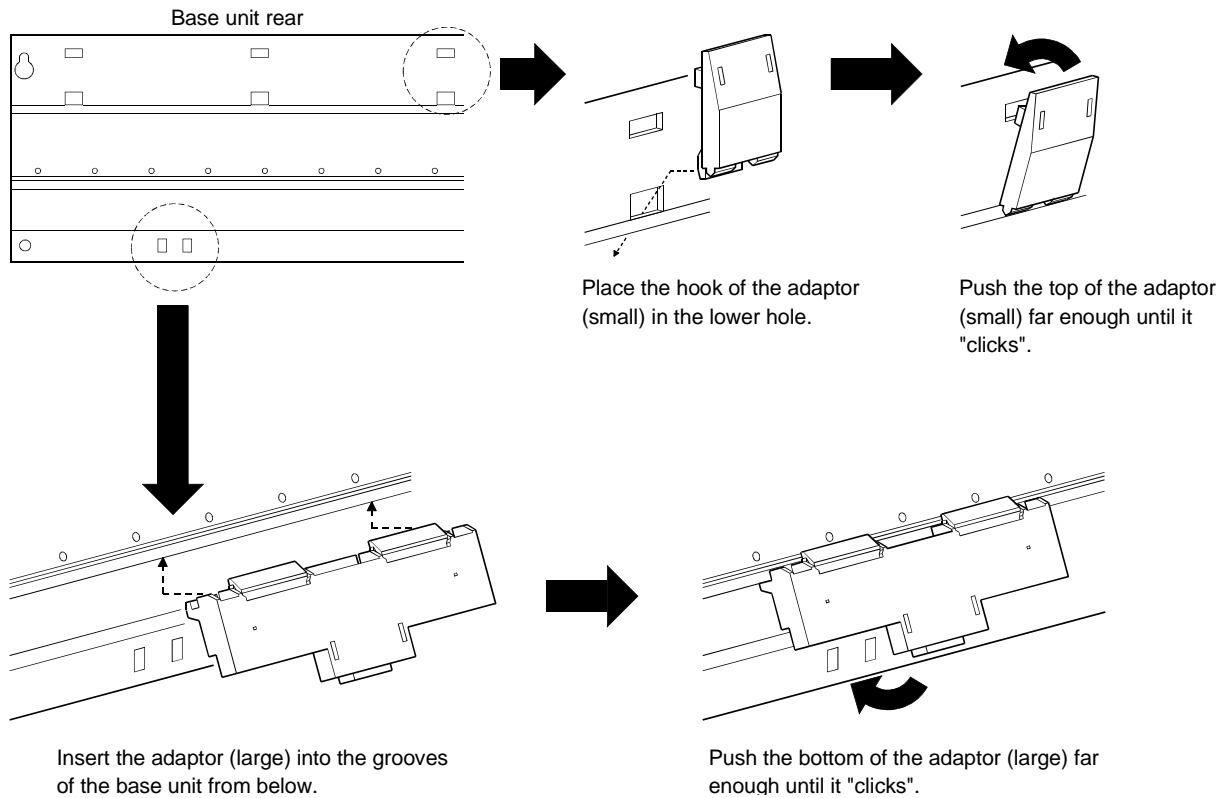
(7) Note the following points when mounting a DIN rail.
 Mounting a DIN rail needs special adapters (optional), which are to be user-prepared.

(a) Applicable adapter types

For Q38B, Q312B, Q68B, Q612B	: Q6DIN1
For Q35B, Q65B, Q00JCPU	: Q6DIN2
For Q33B, Q52B, Q55B, Q63B, Q32SB, Q33SB, Q35SB	: Q6DIN3

(b) Adapter installation method

The way to install the adapter for mounting a DIN rail to the base unit is given below.

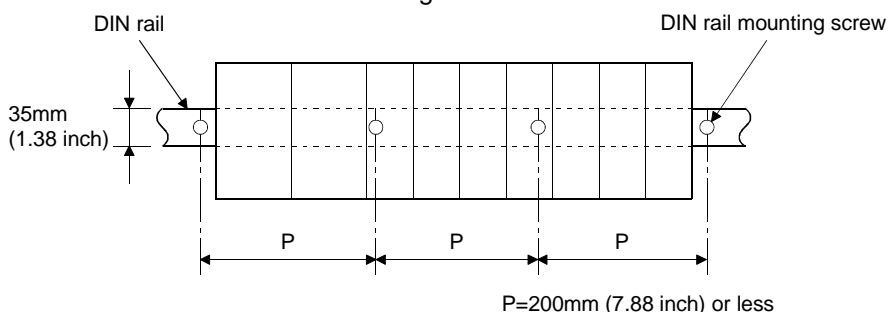


(c) Applicable DIN rail types (JIS C 2812)

- TH35-7.5Fe
- TH35-7.5Al
- TH35-15Fe

(d) DIN rail mounting screw intervals

When using a TH35-7.5Fe or TH35-7.5Al DIN rail, rail mounting screws should be tightened at a pitch of 200 mm (7.88 inch) or less in order to ensure that the rail has sufficient strength.



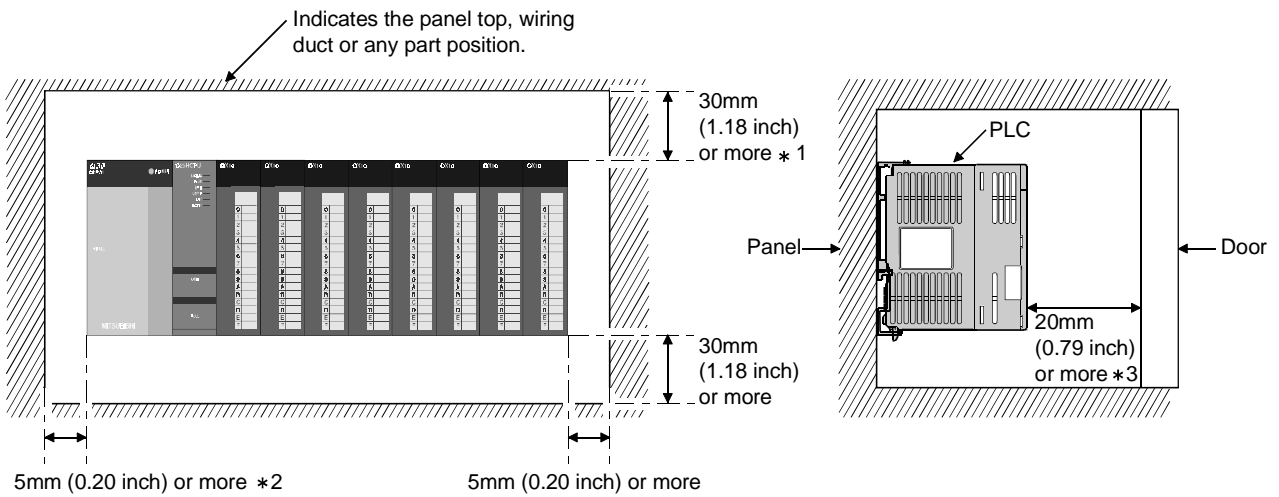
9.3.2 Instructions for mounting the base unit

When mounting the PLC to an enclosure or the like, fully consider its operability, maintainability and environmental resistance.

(1) Module mounting position

For enhanced ventilation and ease of module replacement, leave the following clearances between the module top/bottom and structure/parts.

(a) In case of main base unit or extension base unit



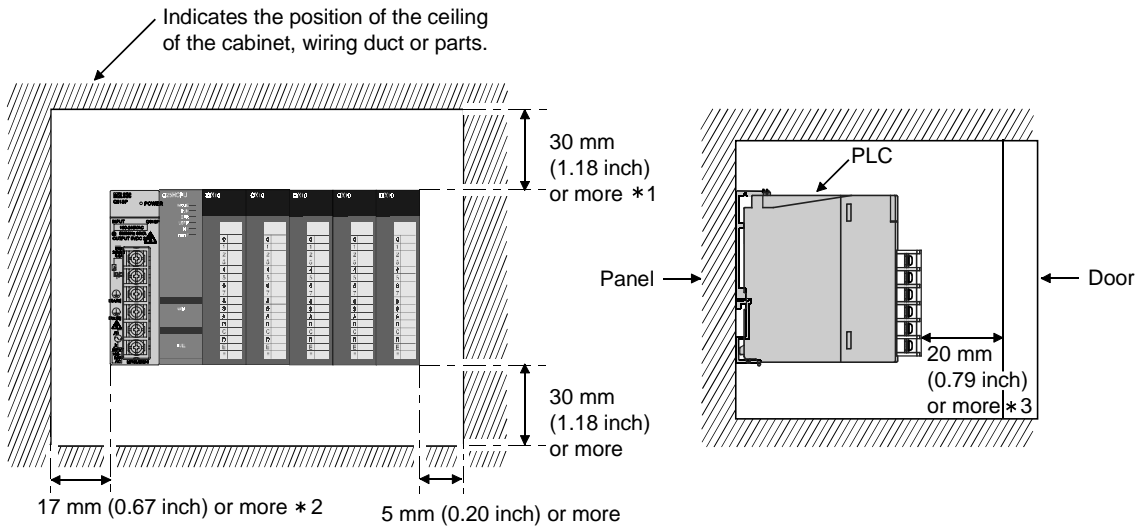
*1 : For wiring duct (50mm (1.97 inch) or less height).

40mm (1.58 inch) or more for other cases.

*2 : 5mm (0.20 inch) or more when the adjacent module is removed and the extension cable is connected.

*3 : 80mm (3.15 inch) or more for the connector type.

(b) In case of slim type main base unit



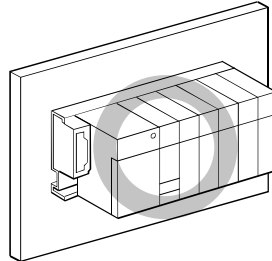
*1 : For wiring duct with 50mm (1.97inch) or less height.
 40 mm (1.58 inch) or more for other cases.

*2 : The cable of the power supply module of the slim type main base unit protrudes out of the left end of the module. Install the module while reserving 17 mm or more wiring space. If the cable sheath is susceptible to damage caused by a structural object or part on the left side of the module, take a protective measure with spiral tube or a similar insulator.

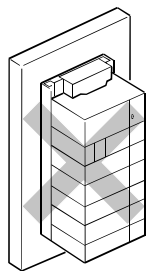
*3 : 80mm (3.15inch) or more for the connector type.

(2) Module mounting orientation

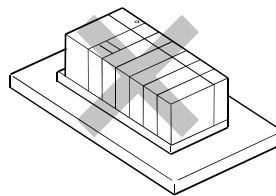
(a) Since the PLC generates heat, it should be mounted on a well ventilated location in the orientation shown below.



(b) Do not mount it in either of the orientations shown below.



Vertical



Flat

(3) Installation surface

Mount the base unit on a flat surface. If the mounting surface is not even, this may strain the printed circuit boards and cause malfunctions.

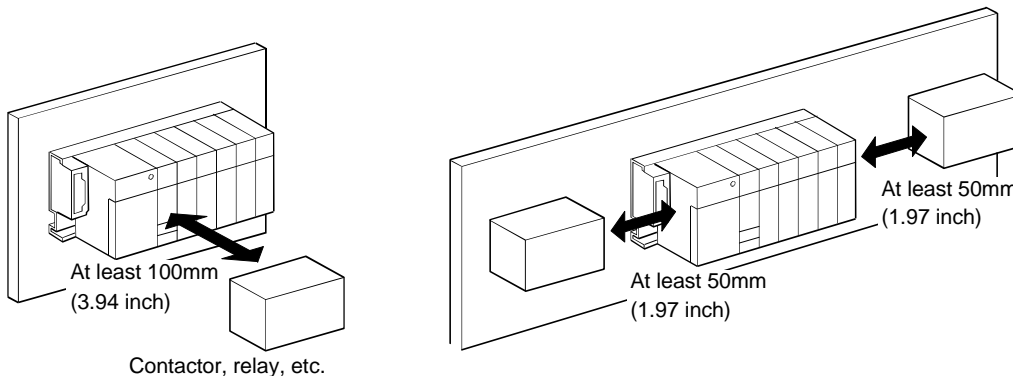
(4) Installation of unit in an area where the other devices are installed

Avoid mounting base unit in proximity to vibration sources such as large magnetic contractors and no-fuse circuit breakers; mount these on a separate panel or at a distance.

(5) Distances from the other devices

In order to avoid the effects of radiated noise and heat, provide the clearances indicated below between the PLC and devices that generate noise or heat (contactors and relays).

- Required clearance in front of PLC : at least 100 mm (3.94 inch)
- Required clearance on the right and left of PLC : at least 50 mm (1.97 inch)



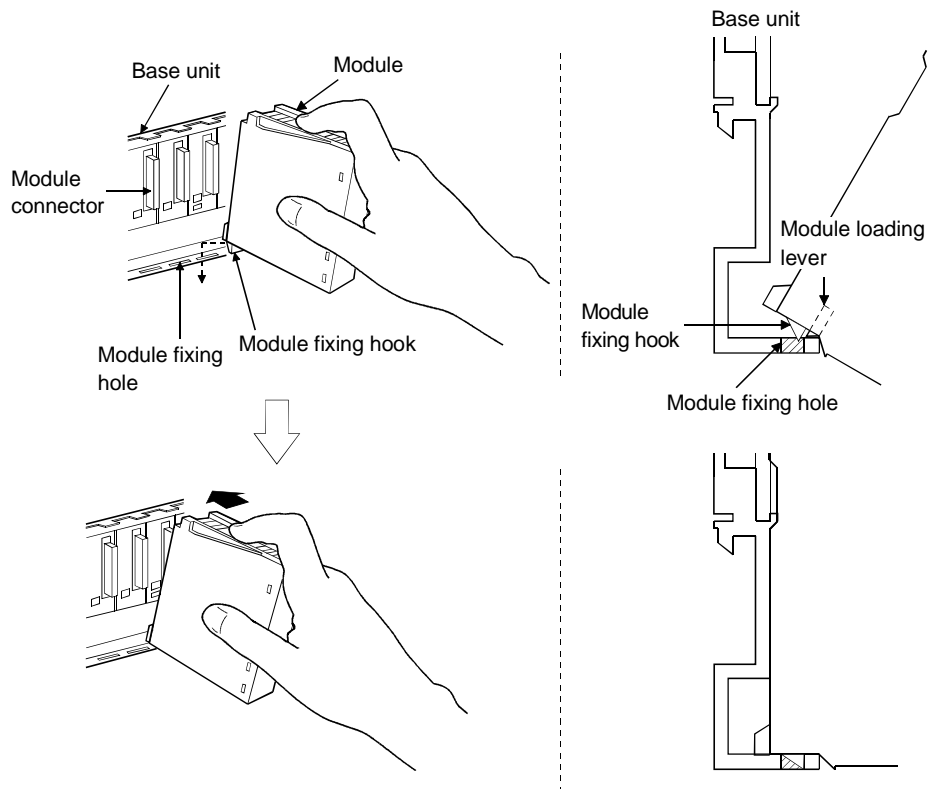
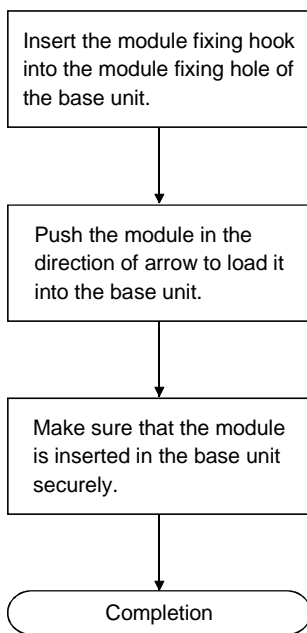
9.3.3 Installation and removal of the module

This section explains how to install and remove a power supply, CPU, input/output, intelligent function or another module to and from the base unit.

(1) Installation and removal of the module from the base unit

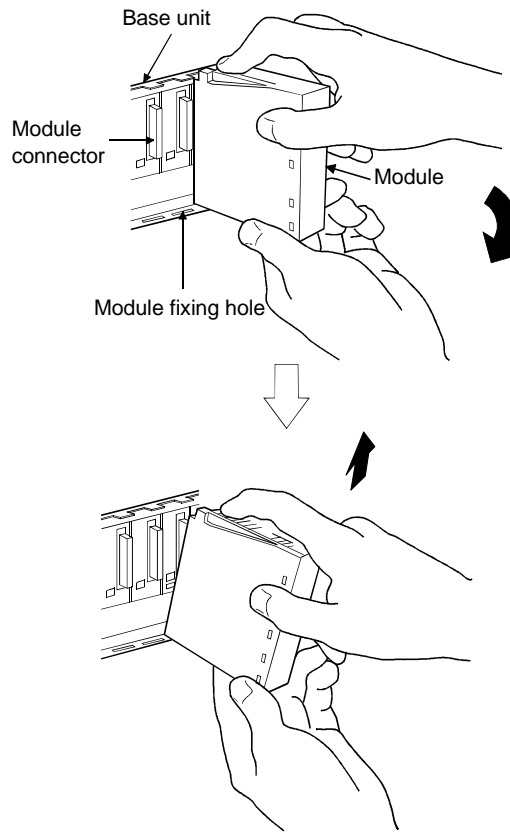
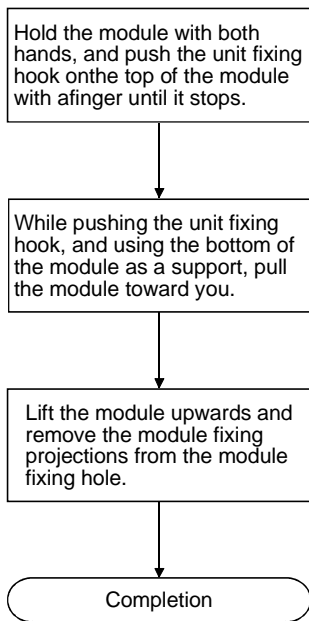
The installation and removal of the module from the base unit are described below.

(a) Installation of the module on the base unit



POINTS
(1) Always insert the module fixing hook of the module into the module fixing hole. Forcing the hook into the hole will damage the module connector and module.
(2) When using the PLC in a place where there is large vibration or impact, screw the CPU module to the base unit. Module fixing screw : M3 × 12 (user-prepared)

(b) Removal from the base unit



POINT
<p>When the module fixing screw is used, always remove the module by removing the module fixing screw and then taking the module fixing hook off the module fixing hole of the base unit.</p> <p>Forcibly removing the module will damage the module.</p>

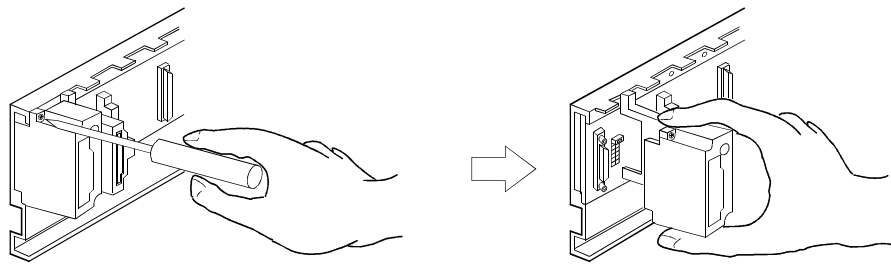
9.4 Setting the Stage Number of the Extension Base Unit

When using two or more extension base units, their stage numbers must be set with their "No. of stage setting connectors". Extension 1 need not be set since the extension stage number is factory-set to 1.

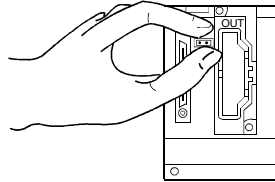
Make this setting in the following procedure.

- (1) The No. of stages setting connector of the extension base unit is located under the IN side base cover. (Refer to Section 6.4 for the setting of the No. of stages setting connector.)

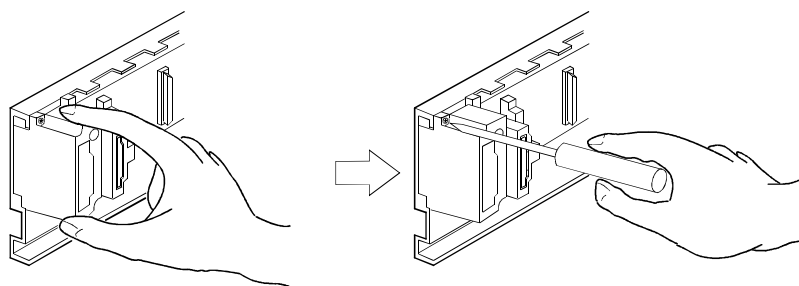
First, loosen the upper and lower screws in the IN side base cover and remove the base cover from the extension base unit.



- (2) Insert the connector pin in the required extension stages number location of the connector (PIN1) existing between the IN and OUT sides of the extension cable connector.



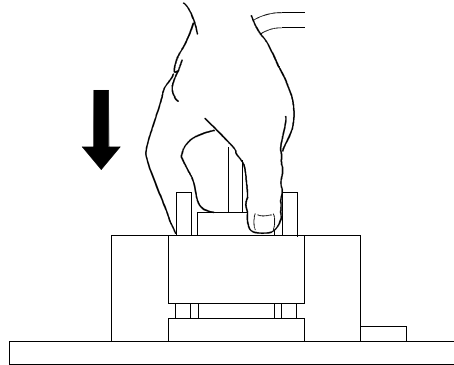
- (3) Install the base cover to the extension base unit and tighten the base cover screw. (Tightening torque: 36 to 48N • cm)



9.5 Connection and Disconnection of the Extension Cable

(1) Instructions for handling an extension cable

- Do not stamp an extension cable.
- An extension cable must be connected to the base unit when the base cover has been installed.
(After you have set the extension stage number to the extension base unit, reinstall and screw the base cover.)
- When running an extension cable, the minimum bending radius of the cable should be 55mm (2.17 inch) or more.
If it is less than 55mm (2.17 inch), a malfunction may occur due to characteristic deterioration, open cable or the like.
- When connecting or disconnecting an extension cable, do not hold the ferrite cores mounted at both ends of the cable.
Hold the connector part of the cable for connection or disconnection.



Holding the ferrite core may cause the cable to open within the connector. Also, if the ferrite core is shifted, the characteristic will change. When handling the cable, take care not to shift the ferrite core positions.

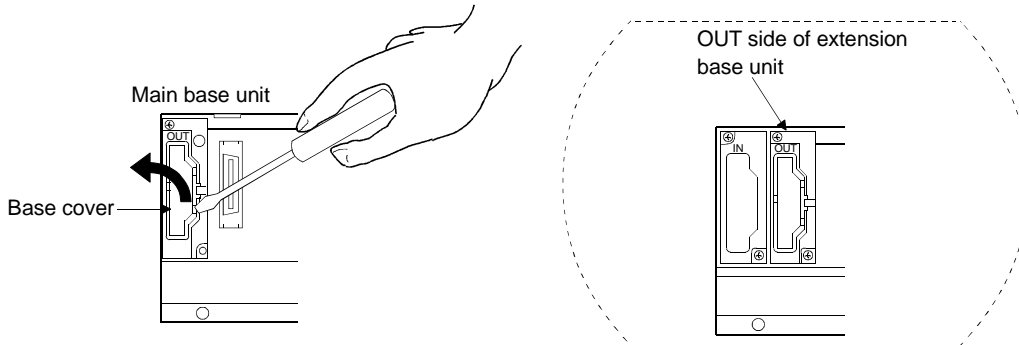
(2) Connection of extension cable

POINT

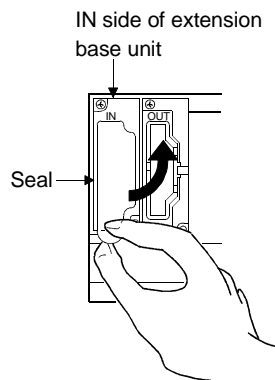
When connecting an extension base unit to the main base unit with an extension cable, always plug the OUT side connector of the main base unit and the IN side connector of the extension base unit with an extension cable. The system will not operate properly if the extension cable is connected in the form of IN to IN, OUT to OUT or IN to OUT.

When connecting two or more extension base units, plug the OUT side connector of the first extension base unit and the IN side connector of the second extension base unit with an extension cable.

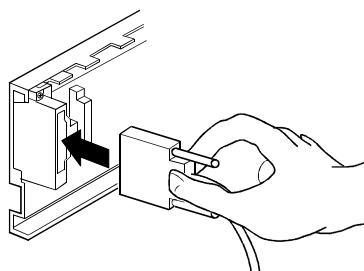
- (a) To connect an extension cable to the main base unit, remove the portion under the OUT characters on the base cover with a tool such as a flat-blade screwdriver (5.5 × 75, 6 × 100).
 This also applies to a case where an extension cable is connected to the OUT side connector of the extension base unit.
 For the Q00JCPU, remove the cover by hand.



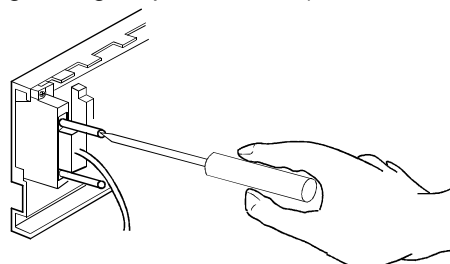
- (b) To connect the extension cable to the next extension base unit, remove the seal applied under the IN characters on the base cover.



- (c) When plugging the extension cable to any base unit, hold the connector part of the extension cable.



- (d) After fitting the extension cable, always tighten the extension cable connector fixing screws.
 (Tightening torque: 20N • cm)



(3) Disconnection of extension cable

When unplugging the extension cable, hold and pull the connector part of the extension cable after making sure that the fixing screws have been removed completely.

9.6 Wiring

9.6.1 The precautions on the wiring

⚠ DANGER

- Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product.
- When turning on the power supply or operating the module after installation or wiring work, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

⚠ CAUTION

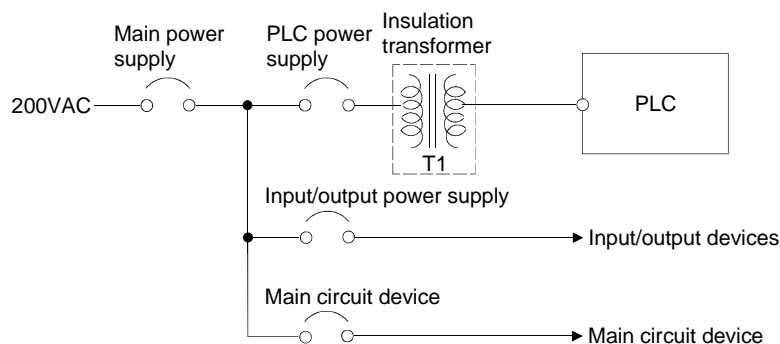
- Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.
- When wiring in the PLC, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.
- External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fires, or erroneous operation.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation. Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.
- The module has an ingress prevention label on its top to prevent foreign matter, such as wire offcuts, from entering the module during wiring.
Do not peel this label during wiring.
Before starting system operation, be sure to peel this label because of heat dissipation.

The precautions on the connection of the power cables are described below.

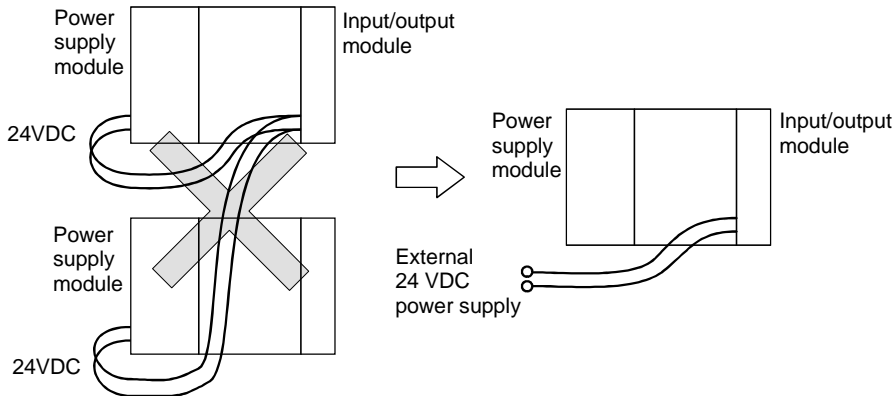
(1) Power supply wiring

(a) Separate the PLC's power supply line from the lines for input/output devices and power devices as shown below.

When there is much noise, connect an insulation transformer.



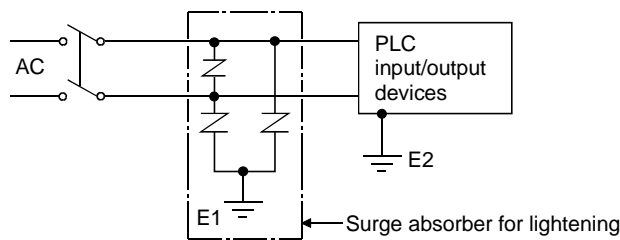
(b) Do not connect 24 VDC outputs of multiple power supply modules in parallel to a single input/output module. The power supply modules will be broken if cables are connected in parallel.



(c) 100VAC, 200VAC and 24VDC wires should be twisted as dense as possible. Connect the modules with the shortest distance. Also, to reduce the voltage drop to the minimum, use the thickest wires possible (maximum 2mm²).

(d) Do not bundle the 100VAC and 24VDC wires with, or run them close to, the main circuit (high voltage, large current) and input/output signal lines. Reserve a distance of at least 100 mm (3.94inch) from adjacent wires.

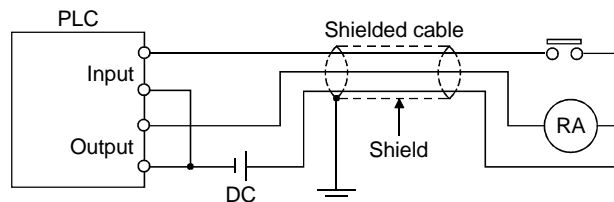
(e) As a countermeasure to power surge due to lightning, connect a surge absorber for lightning as shown below.



POINT
(1) Separate the ground of the surge absorber for lightning (E1) from that of the PLC (E2).
(2) Select a surge absorber for lightning whose power supply voltage does not exceed the maximum allowable circuit voltage even at the time of maximum power supply voltage elevation.

(2) Wiring of input/output equipment

- (a) Insulation-sleeved crimping terminals cannot be used with the terminal block. It is recommended to cover the wire connections of the crimping terminals with mark or insulation tubes.
- (b) The wires used for connection to the terminal block should be 0.3 to 0.75mm² in core and 2.8mm (0.11 inch) max. in outside diameter.
- (c) Run the input and output lines away from each other.
- (d) When the wiring cannot be run away from the main circuit and power lines, use a batch-shielded cable and ground it on the PLC side. In some cases, ground it in the opposite side.

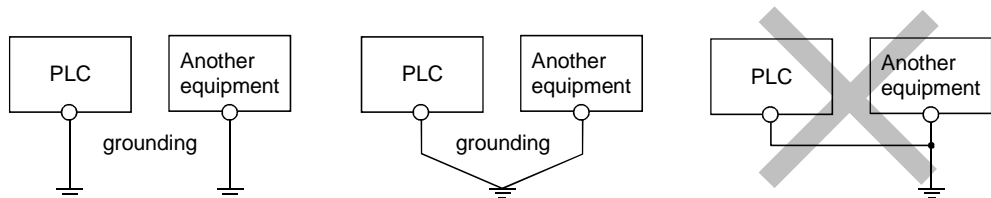


- (e) Where wiring runs through piping, ground the piping without fail.
- (f) Run the 24VDC input line away from the 100VAC and 200VAC lines.
- (g) Wiring of 200m (686.67 feet) or longer distance will give rise to leakage currents due to the line capacity, resulting in a fault. Refer to Section 11.5 for details.

(3) Grounding

To ground the cable, follow the steps (a) to (c) shown below.

- (a) Use the dedicated grounding as far as possible.
- (b) When a dedicated grounding cannot be performed, use (2) Common Grounding shown below.

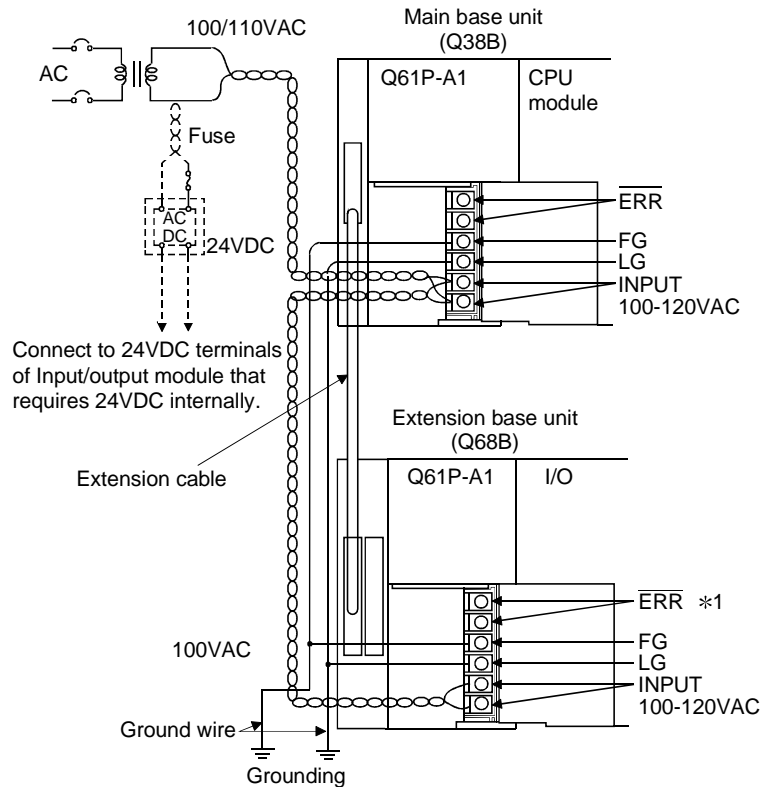


(1) Independent grounding.....Best (2) Common grounding.....Good (3) Joint grounding.....Not allowed

- (c) For grounding a cable, use the cable of 2 mm² or more. Position the ground-contact point as closely to the sequencer as possible, and reduce the length of the grounding cable as much as possible.

9.6.2 Connecting to the power supply module

The following diagram shows the wiring example of power lines, grounding lines, etc. to the main and extension base units.



POINTS

- (1) Use the thickest possible (max. 2 mm² (14 AWG)) wires for the 100/200 VAC and 24 VDC power cables. Be sure to twist these wires starting at the connection terminals. To prevent a short-circuit should any screws loosen, use solderless terminals with insulation sleeves.
- (2) When the LG terminals and FG terminals are connected, be sure to ground the wires. Do not connect the LG terminals and FG terminals to anything other than ground. If LG terminals and FG terminals are connected without grounding the wires, the PLC may be susceptible to noise. In addition, since the LG terminals have potential, the operator may receive an electric shock when touching metal parts.
- (3) *1 An error cannot be output from the $\overline{\text{ERR}}$ terminal of the power supply module loaded on the extension base unit. To output an error, use the $\overline{\text{ERR}}$ terminal of the power supply module loaded on the main base unit.

10 MAINTENANCE AND INSPECTION

**DANGER**

- Do not touch the terminals while power is on. Doing so could cause shock.
- Correctly connect the battery. Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery. Mishandling of a battery can cause overheating or cracks which could result in injury and fires.
- Turn the power off when cleaning the module or tightening the terminal screws or module mounting screws. Conducting these operations when the power is on could result in electric shock. Loose terminal screws may cause short circuits or malfunctions. Failure to mount the module properly will result in short circuit, malfunction or in the module falling.

**CAUTION**

- In order to ensure safe operation, read the manual carefully to acquaint yourself with procedures for program change, forced outputs, RUN, STOP, and PAUSE operations, etc., while operation is in progress. Operation mistakes could cause damage to the equipment and other problems.
- Never try to disassemble or modify module. It may cause product failure, malfunction, fire or cause injury.
- When using any radio communication device such as a cellular phone or a PHS phone, keep them away from the controller at least 25 cm (9.85 inch) or it may cause a malfunction.
- Turn the power off when installing or removing the modules. Trying to install or remove the module while the power is on could damage the module or result in erroneous operation.

In order that you can use the PLC in normal and optimal condition at all times, this section describes those items that must be maintained or inspected daily or at regular intervals.

10.1 Daily Inspection

The items that must be inspected daily are listed below.

Daily inspection

Item	Inspection Item	Inspection	Judgment Criteria	Remedy	
1	Installation of base unit	Check that fixing screws are not loose and the cover is not dislocated.	The screws and cover must be installed securely.	Further tighten the screws.	
2	Installation of input/output module	Check that the module is not dislocated and the unit fixing hook is engaged securely.	The unit fixing hook must be engaged and installed securely.	Securely engaged the unit fixing hook.	
3	Connection	Proximity of solderless terminals to each other	Terminal screws must not be loose.	Further tighten terminal screws.	
		Connectors of extension cable	The connectors of extension cables must be positioned at proper intervals.	Correct the intervals.	
		Check for lightening.	The connector must not be loose.	Further tighten connector fixing screws.	
4	Module indication lamp	Power supply [POWER] LED*1	Check that it is lit.	The lamp must be lit. (Abnormal if the lamp goes off.)	Follow Section 11.2.
		CPU [RUN] LED	Check that the lamp lights up in RUN state.	The lamp must be lit. (Abnormal if the lamp goes off.)	
		CPU [ERR.] LED	Check that the lamp goes off.	The lamp must go off. Abnormal if the lamp lights up or flashes.	
		Input LED	Check that the lamp lights up and goes off.	The lamp must be lit when the input power is turned ON. The lamp must be extinguished when the input power is turned OFF. (Abnormal if the lamp does not light up or goes off as indicated above.)	
		Output LED	Check that the lamp lights up and goes off.	The lamp lights up when the output power is turned ON. The lamp must be extinguished when the output power is turned OFF. (Abnormal if the lamp does not light up or goes off as indicated above.)	

*1 For the Q00JCPU, check the POWER LED of the CPU section.

10.2 Periodic Inspection

The items that must be inspected one or two times every 6 months to 1 year are listed below.

When the equipment is moved or modified, or layout of the wiring is changed, also perform this inspection.

Periodic Inspection

Item	Inspection Item	Inspection	Judgment Criteria	Remedy
1	Ambient environment	Measure with a thermometer and a hygrometer. Measure corrosive gas.	0 to 55 °C	When the sequencer is used in the board, the ambient temperature in the board becomes the ambient temperature.
	Ambient humidity		5 to 95 %RH	
	Atmosphere		Corrosive gas must not be present.	
2	Power voltage	Measure a voltage across the terminals of 100/200VAC and 24VDC.	85 to 132VAC 170 to 264VAC 15.6 to 31.2VDC	Change the power supply.
3	Installation	Move the module to check for looseness and rattling. Check visually.	The module must be installed fixedly. Dirt and foreign matter must not be present.	Further tighten screws. If the CPU module, input/output module, or power supply module is loose, fix it with screws.
	Adhesion of dirt and foreign matter			Remove and clean.
4	Connection	Try to further tighten screws with a screwdriver.	Screws must not be loose.	Further tighten.
	Proximity of solderless terminals to each other	Check visually.	Solderless terminals must be positioned at proper intervals.	Correct.
	Looseness of connectors	Check visually.	Connectors must not be loose.	Further tighten connector fixing screws.
5	Battery	check on the monitor mode of the GX Developer that SM51 or SM52 is turned OFF.	(Preventive maintenance)	Even if the lowering of a battery capacity is not shown, replace the battery with a new one if a specified service life of the battery is exceeded.

10.3 Battery Replacement

When the voltage of the program and power interrupt hold-on function backup battery is lowered, the special relays SM51 and SM52 are energized. Even if these special relays are energized, the contents of the program and power interrupt hold-on function are not erased immediately. If the energization of these relays is recognized, however, these contents may be deleted unintentionally. While a total of the power interrupt hold-on time after the SM51 is energized is within a specified time, replace the battery with a new one.

POINTS
The SM51 is used to give an alarm when the capacity of the battery is lowered. Even after it is energized, the data is held for a specified time. For safety, however, replace the battery with a new one as early as possible. The SM52 is energized when the battery causes a complete discharge error. Immediately after the relay has been energized, replace the battery with a new one.

Whichever voltage of the battery of the CPU module is lowered, the SM51 and SM52 are energized. To identify the specific battery of the memory of which voltage is lowered, check the contents of the special registers SD51 and SD52. When the voltage of the battery of each memory is lowered, the bit corresponding to each of SD51 and SD52 memories is turned on.

Bit No. of SD51 and SD52	Object
Bit 0	CPU module

POINTS													
The relation between the backups of the memories preformed by the batteries which are installed on the CPU module is described below.													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Power supply of the power supply module</th> <th style="width: 33%;">Battery of CPU Main Module</th> <th style="width: 33%;">Memory of CPU Main Module</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">ON</td> <td style="text-align: center;">Installed</td> <td style="text-align: center;">○</td> </tr> <tr> <td style="text-align: center;">Not installed</td> <td style="text-align: center;">○</td> </tr> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">OFF</td> <td style="text-align: center;">Installed</td> <td style="text-align: center;">○</td> </tr> <tr> <td style="text-align: center;">Not installed</td> <td style="text-align: center;">×</td> </tr> </tbody> </table>	Power supply of the power supply module	Battery of CPU Main Module	Memory of CPU Main Module	ON	Installed	○	Not installed	○	OFF	Installed	○	Not installed	×
Power supply of the power supply module	Battery of CPU Main Module	Memory of CPU Main Module											
ON	Installed	○											
	Not installed	○											
OFF	Installed	○											
	Not installed	×											
○ : Backup enable × : Backup unable													

The standard service life and replacement procedures of the battery is described on the next page.

10.3.1 Battery service life

(1) CPU module battery service life

The service life of the battery depends on the CPU module.

The battery service life is shown below.

Battery service life Type of CPU module	Battery service life (Total power interrupt time) [h]		
	Guaranteed value(MIN)	Value in actual use(TYP)	After SM51 is energized
Q00JCPU	26000	51000	710
Q00CPU	26000	51000	710
Q01CPU	5100	15000	420

* The actual value in use means the averaged value, and the guaranteed value means the minimum value.

The service life of the Q6BAT is 10 years when it is not connected to the CPU module or when it is connected to the CPU module and energized at all times.

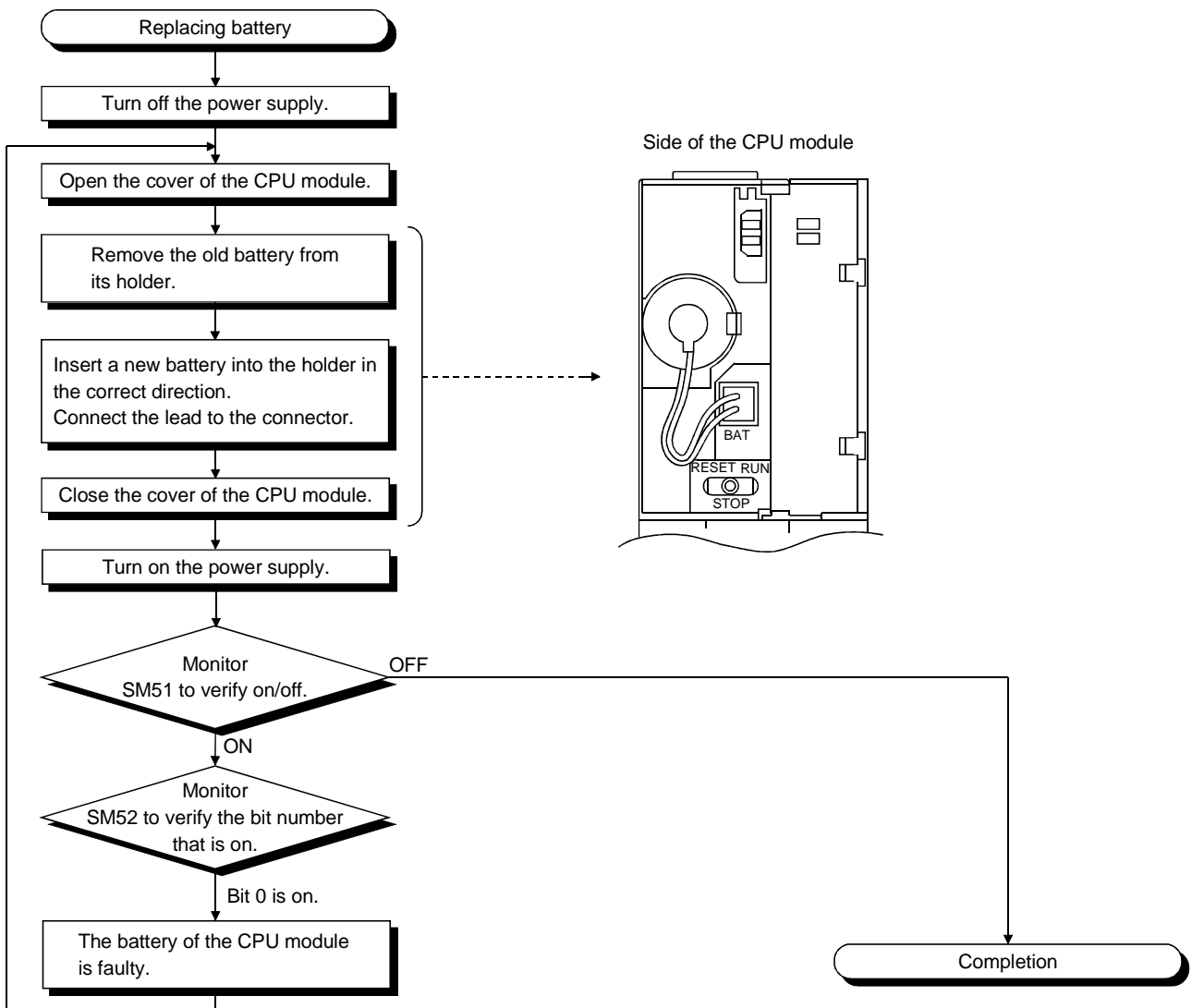
If a total of power interrupt time exceeds the guaranteed value specified above and the SM51 is turned on, replace the battery with a new one immediately.

10.3.2 Battery replacement procedure

(1) CPU module battery replacement procedure

When the CPU module battery has been exhausted, replace the battery with a new one in accordance with the procedure shown below. Before dismantling the battery, turn ON the power supply for 10 minutes or longer. Even when the battery is dismantled, the memories are backed up by the capacitor for a while. However, if the replacement time exceeds the guaranteed value specified in the table below, the contents stored in the memories may be erased. To prevent this trouble, replace the battery speedily.

Backup time by capacitor
Backup time by capacitor[min]
3



11 TROUBLESHOOTING

This section describes the various types of trouble that occur when the system is operated, and causes and remedies of these troubles.

11.1 Troubleshooting Basics

In order to increase the reliability of the system, not only highly reliable devices are used but also the speedy startup of the system after the occurrence of trouble becomes an important factor.

To start up the system speedily, the cause of the trouble must be located and eliminated correctly.

The basic three points that must be followed in the troubleshooting are as follows.

(1) Visual inspection

Visually check the following.

- 1) Movement of sequencer (stopped condition, operating condition)
- 2) Power supply on/off
- 3) State of input/output devices
- 4) Power supply module, CPU module, input/output module, intelligent function module, installation condition of extension cable
- 5) State of wiring (input/output cables, cables)
- 6) Display states of various types of indicators (POWER LED, RUN LED, ERR. LED, INPUT/OUTPUT LED)
- 7) States of setting of various types of set switches (Setting of No. of stages setting connector of extension base unit, power interrupt hold-on state)

After confirming items 1) to 7), connect the GX Developer, and check the operating conditions of the PLC and the contents of the program.

(2) Check of trouble

Check to see how the operating condition of the PLC varies while the PLC is operated as follows.

- 1) Set the RUN/STOP/RESET switch to STOP. (Refer to Section 4.4 for reset operation.)
- 2) Reset the trouble with the RUN/STOP/RESET switch.
- 3) Turn ON and OFF the power supply.

(3) Reduction in area

Estimate the troubled part in accordance with items (1) and (2) above.

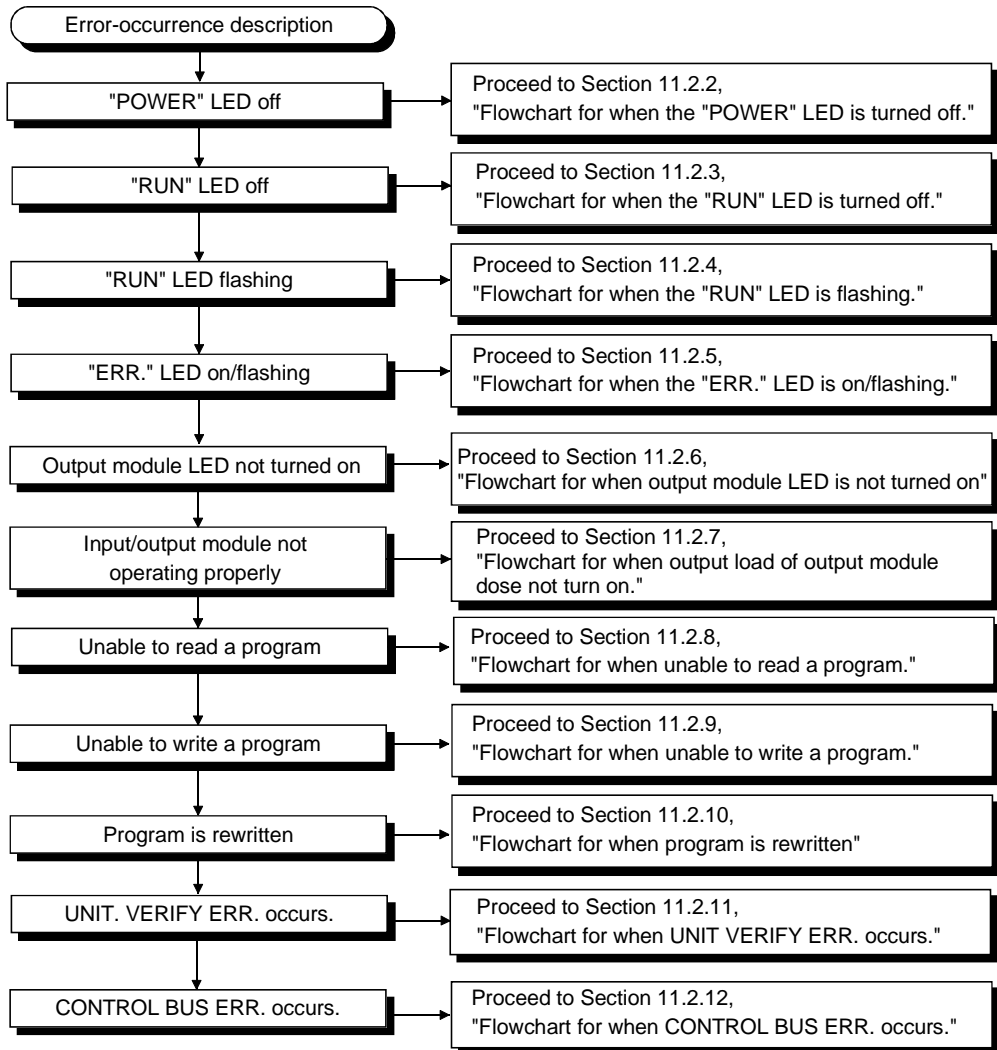
- 1) PLC or external devices
- 2) Input/output module or others
- 3) Sequence program

11.2 Troubleshooting

The trouble investigating methods, contents of troubles for the error codes, and remedies of the troubles are described below.

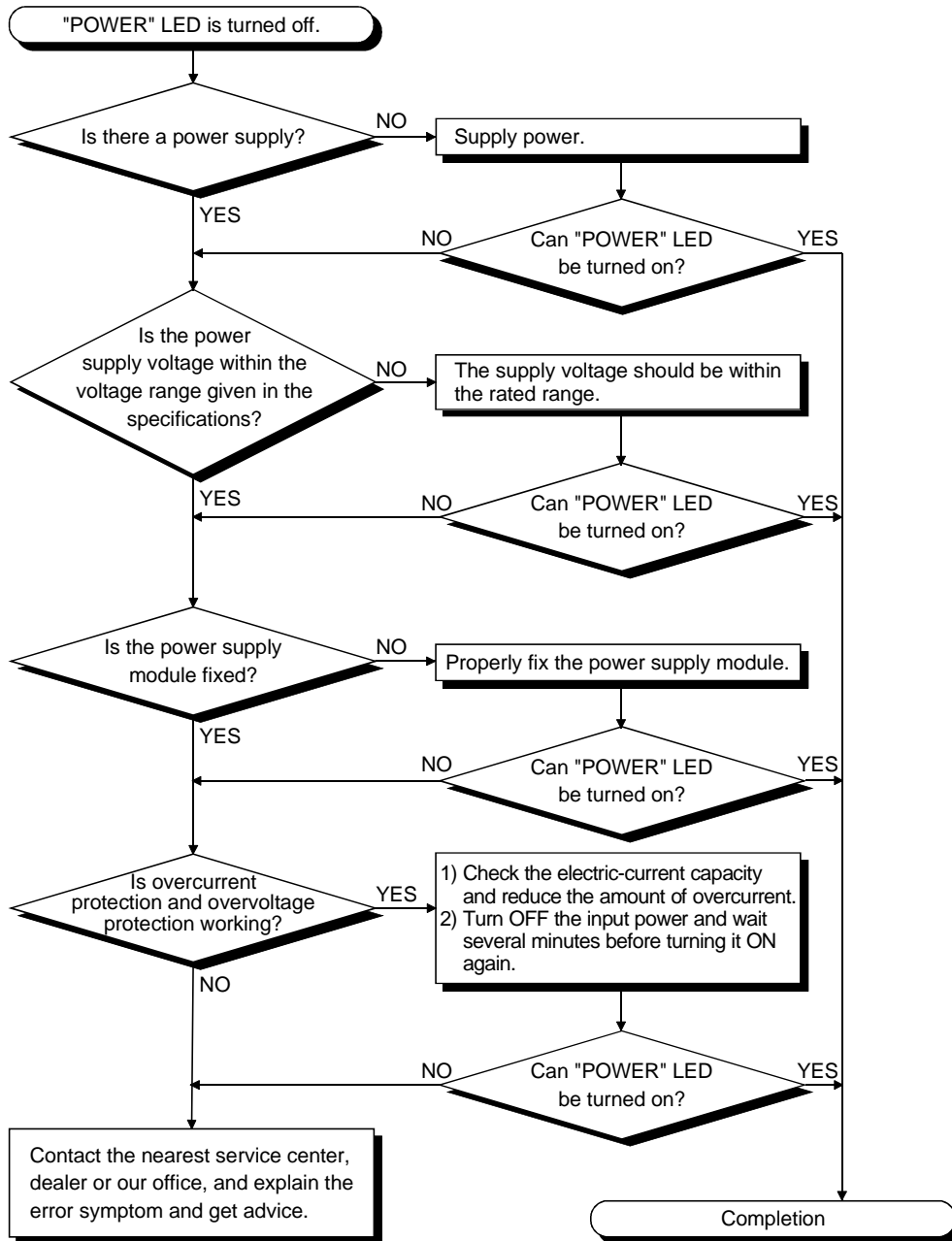
11.2.1 Troubleshooting flowchart

The following shows the contents of the troubles classified into a variety of groups according to the types of events.



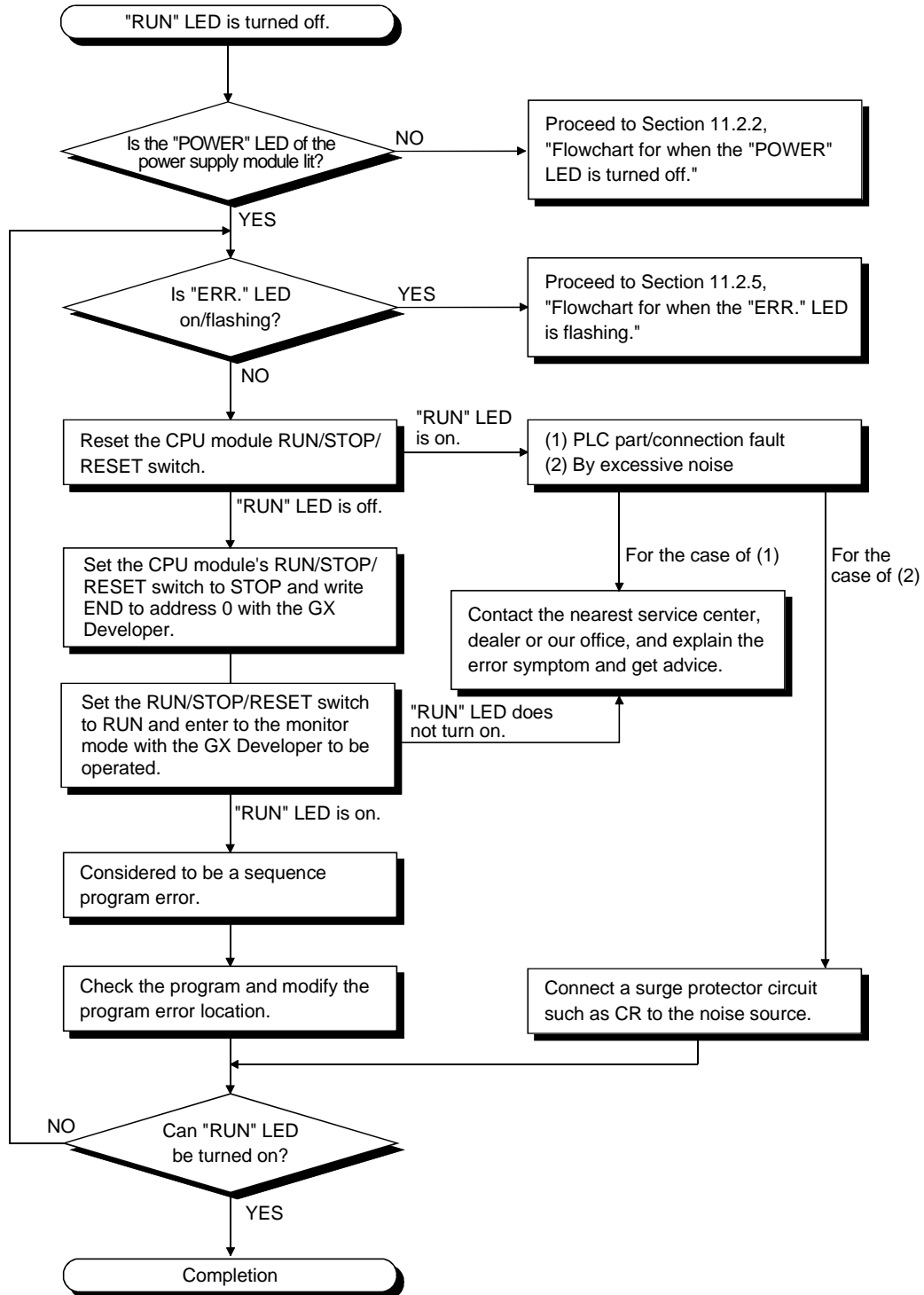
11.2.2 Flowchart for when the "POWER" LED is turned off

The following shows the flowchart to be followed when the "POWER" LED of the power supply module goes off when the PLC power supply is turned on or during the operation.



11.2.3 Flowchart for when the "RUN" LED is turned off

The following shows the flowchart to be followed when the "RUN" LED of the CPU module goes off during the PLC operation.

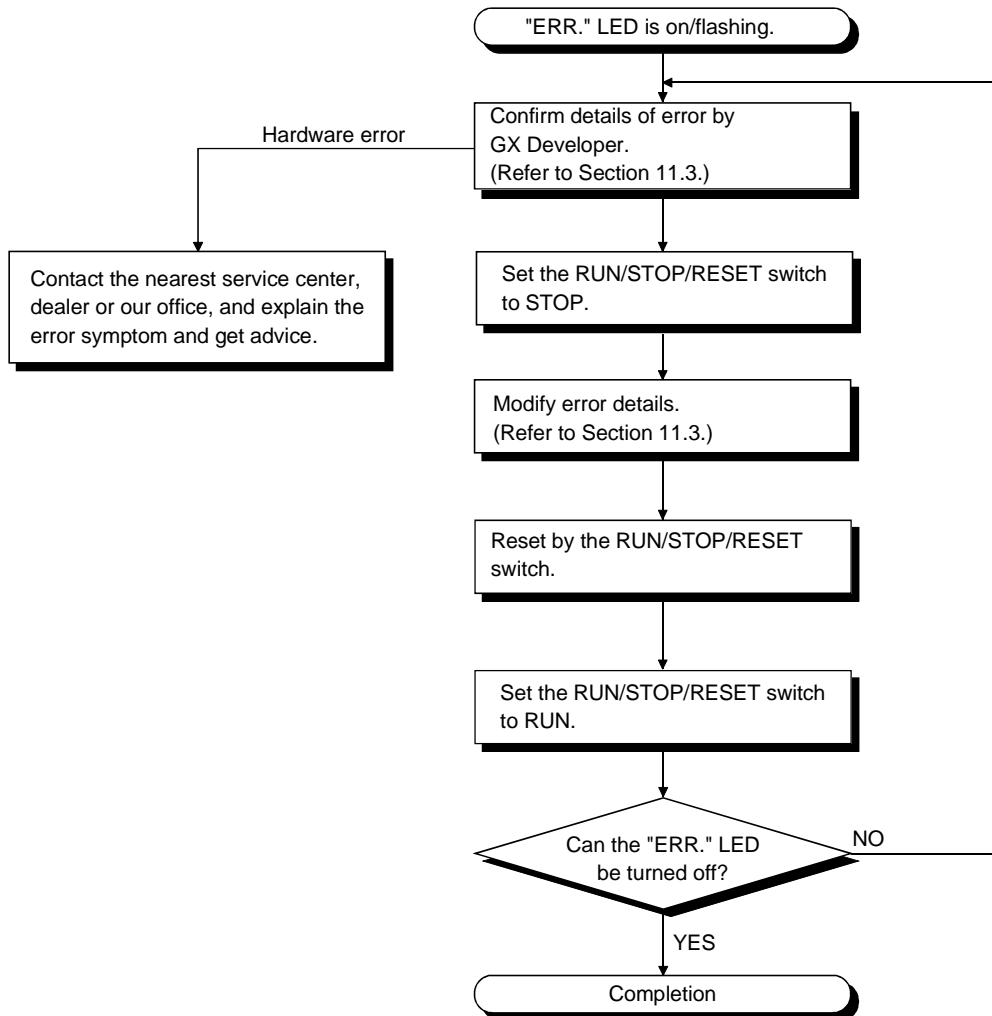


11.2.4 When the "RUN" LED is flashing

If the "RUN" LED flashes, follow the steps below.
The Basic model QCPU flashes the "RUN" LED when the RUN/STOP/RESET switch is set from STOP to RUN after the program or parameter is written in the Basic model QCPU during the stoppage.
Though this is not the trouble with the CPU module, the operation of the CPU module is stopped.
To bring the CPU module into RUN state, reset the CPU module with the RUN/STOP/RESET or set the RUN/STOP/RESET switch again from STOP to RUN.
The "RUN" LED lights up.

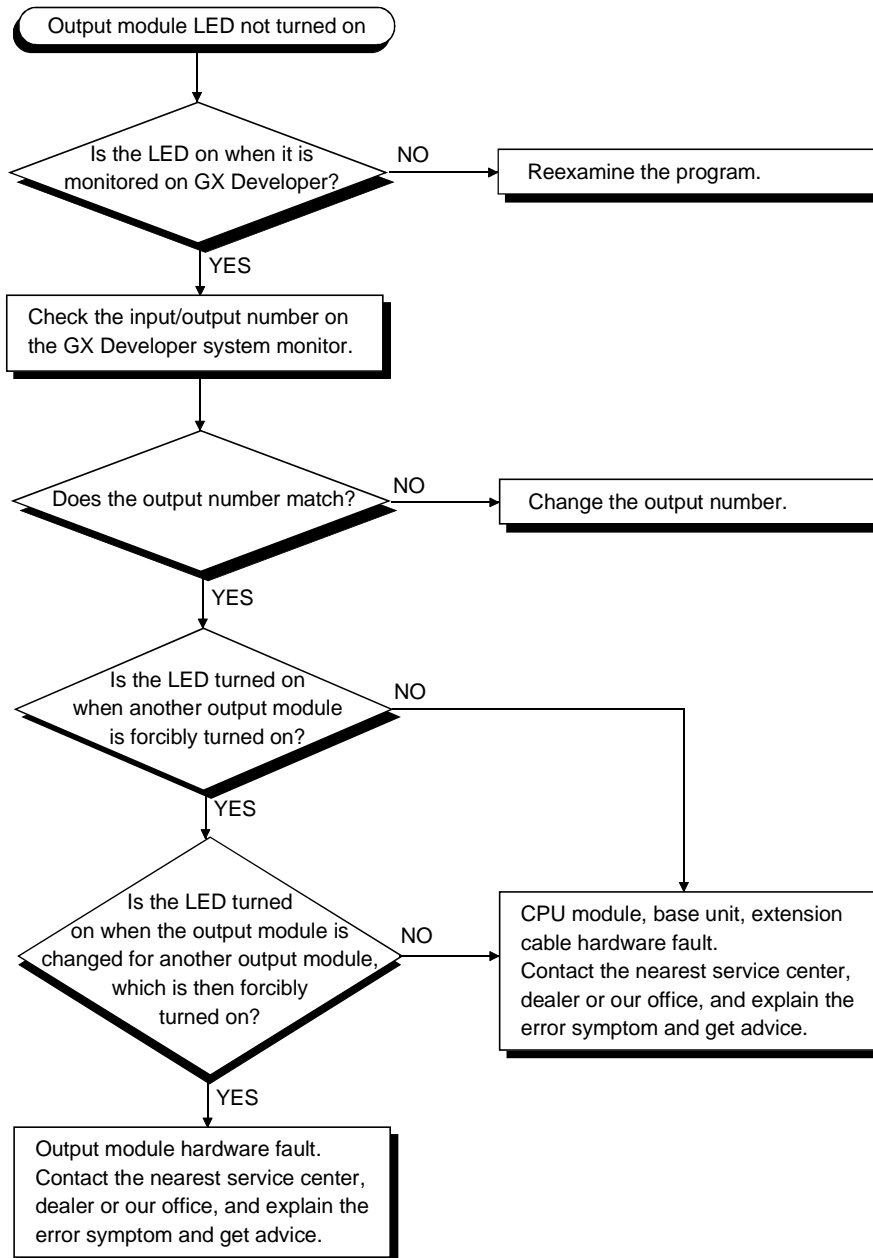
11.2.5 Flowchart for when the "ERR." LED is on/flashing

The following shows the flowchart to be followed when the "ERR." LED of the CPU module lights up/flashes during the operation when the PLC power supply is turned on or the operation is started.



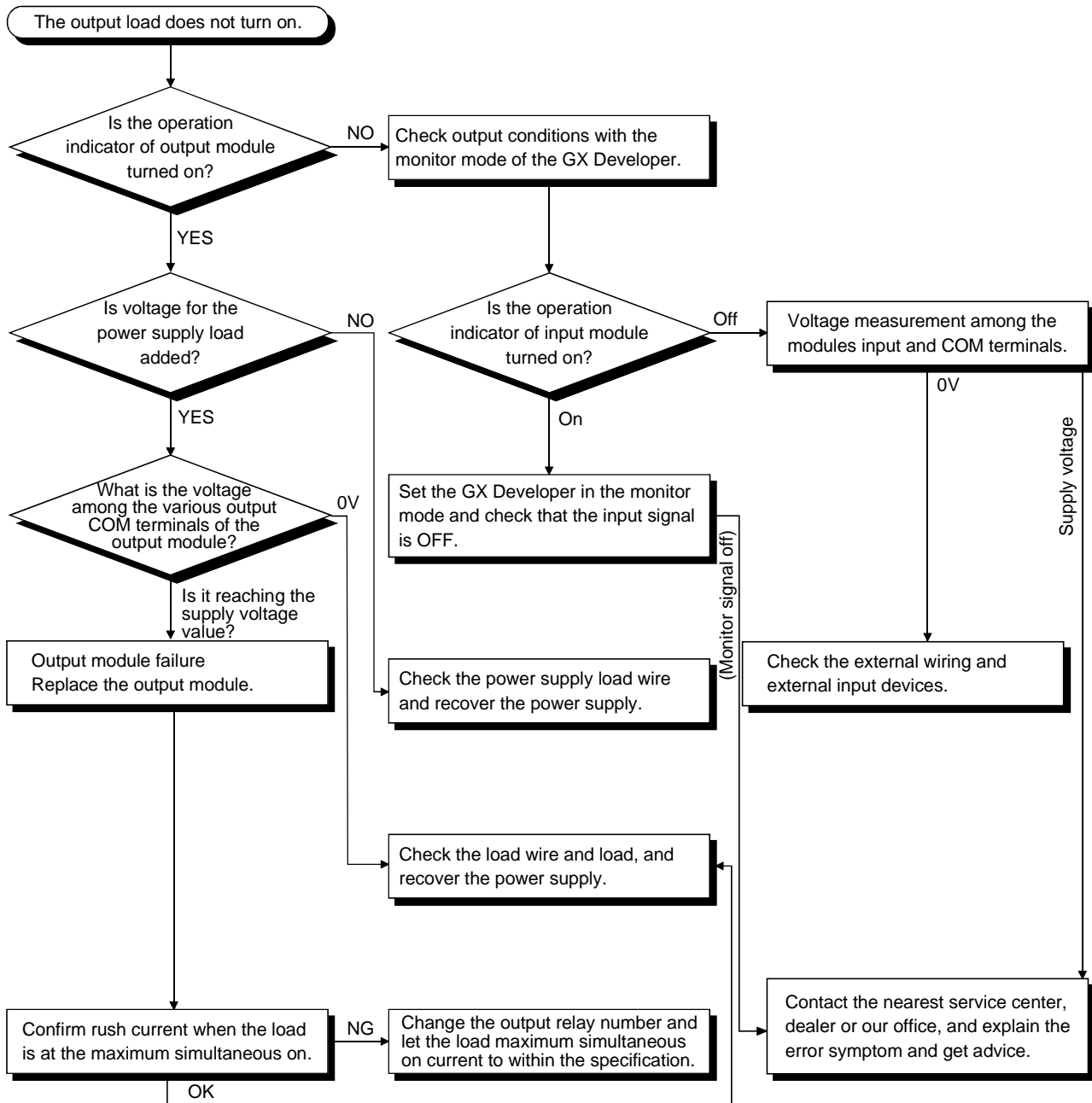
11.2.6 Flowchart for when output module LED is not turned on

The following shows the flowchart to be followed when the output module LED is not turned on during PLC operation.



11.2.7 Flowchart for when output load of output module does not turn on

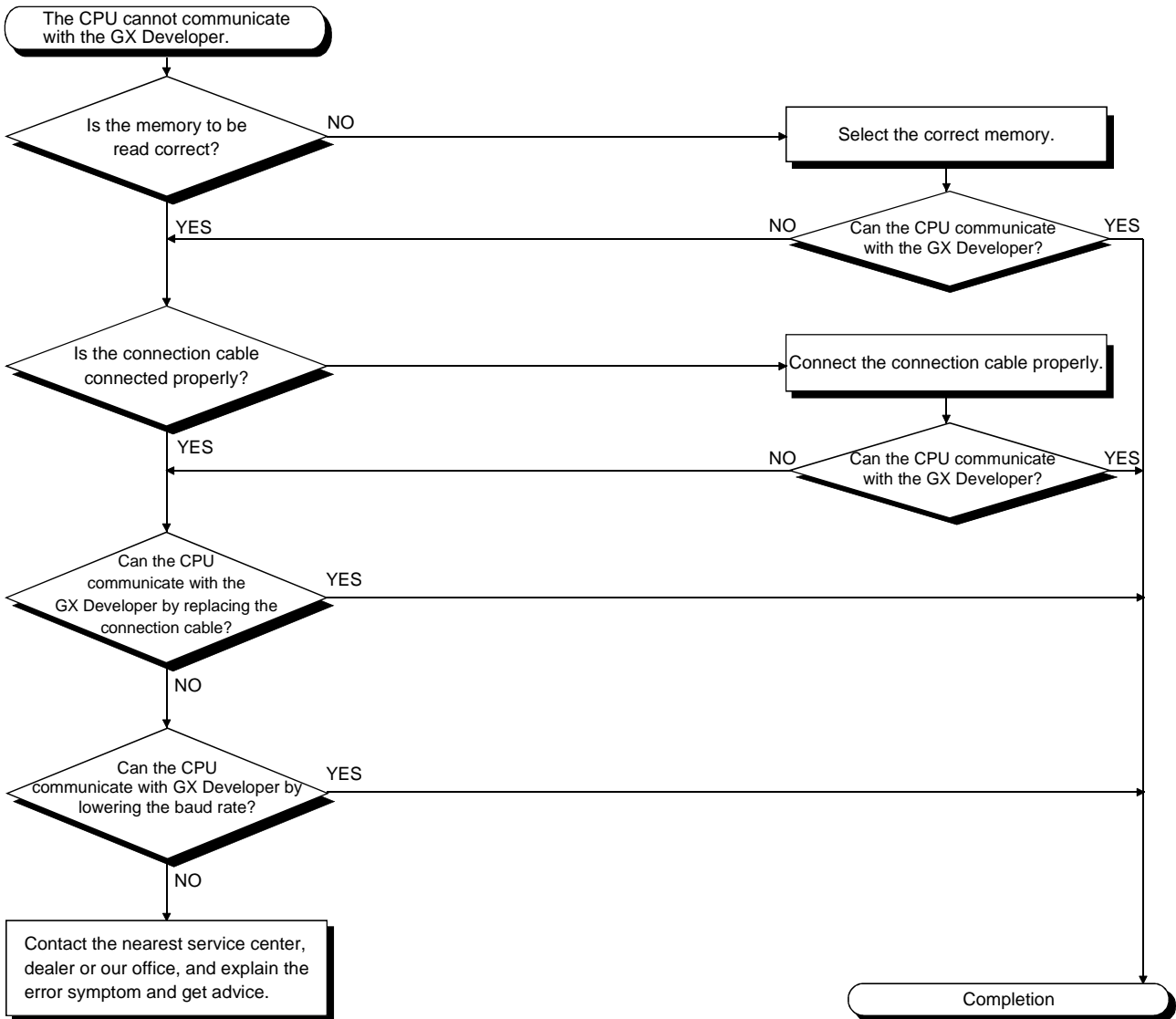
The following shows the flowchart that must be followed when the output load of the output module is not turned on during PLC operation.



POINT
 For the trouble that the input signal to the input module is not turned off, troubleshoot referring to Section 11.5 Examples of Troubles with Input/output Modules.

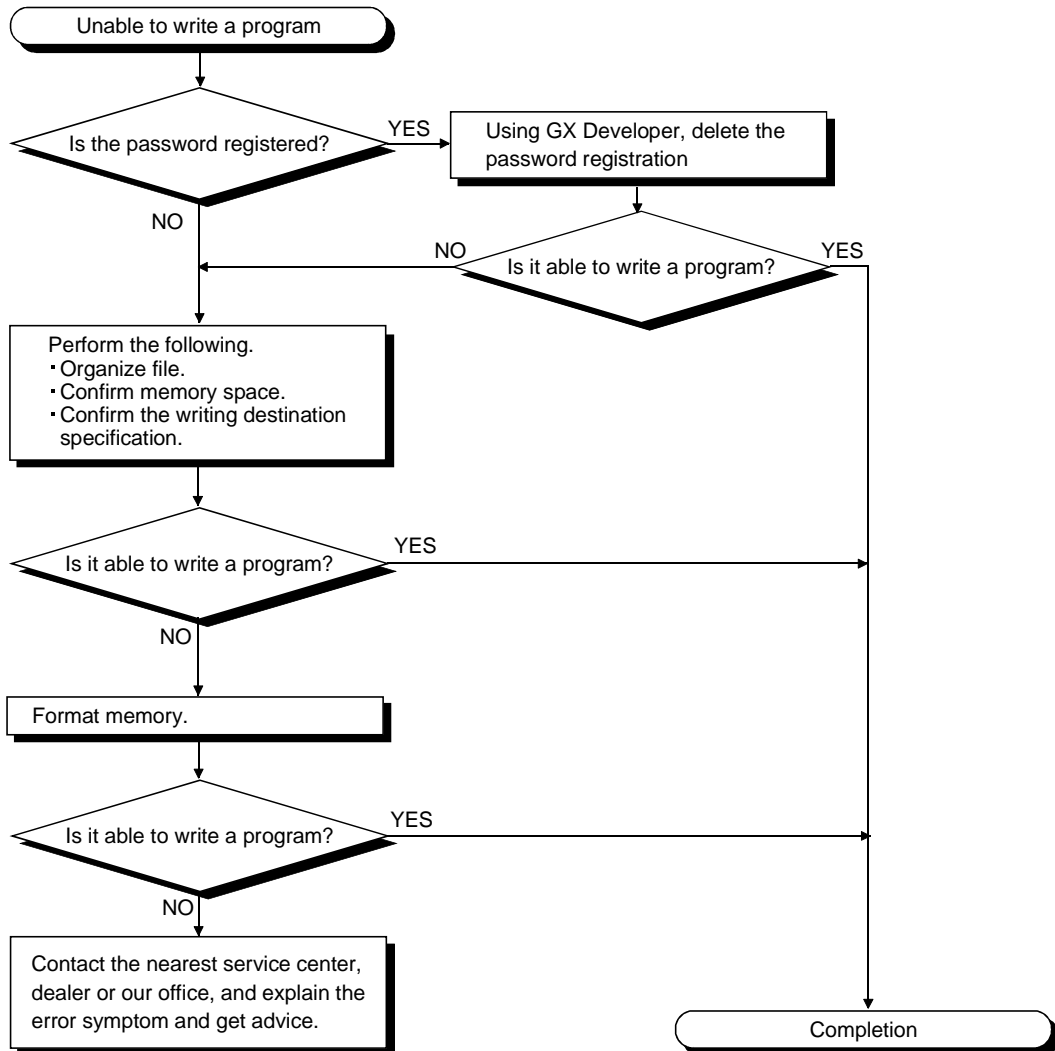
11.2.8 Flowchart for when unable to read a program

The following shows the flowchart that must be followed when the PLC cannot communicate with the GX Developer while the PLC power supply is turned on.



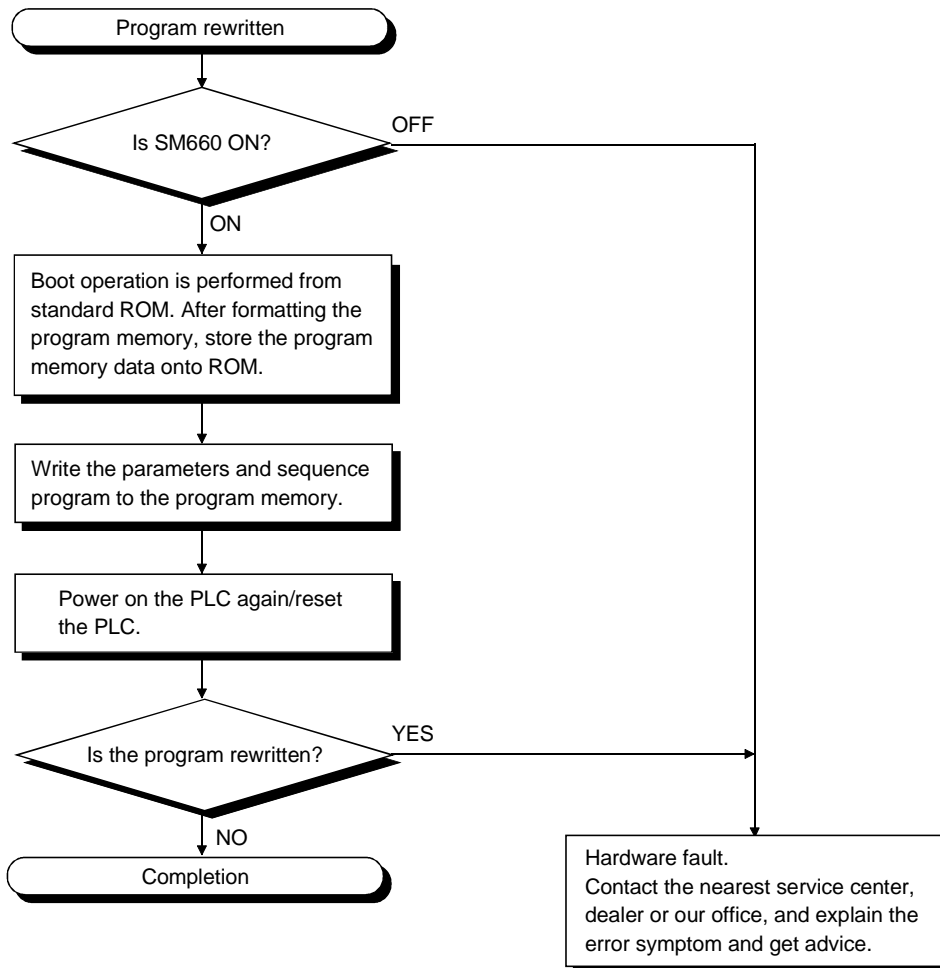
11.2.9 Flowchart for when unable to write a program

The following shows the flowchart that must be followed when programs cannot be written in the CPU module.



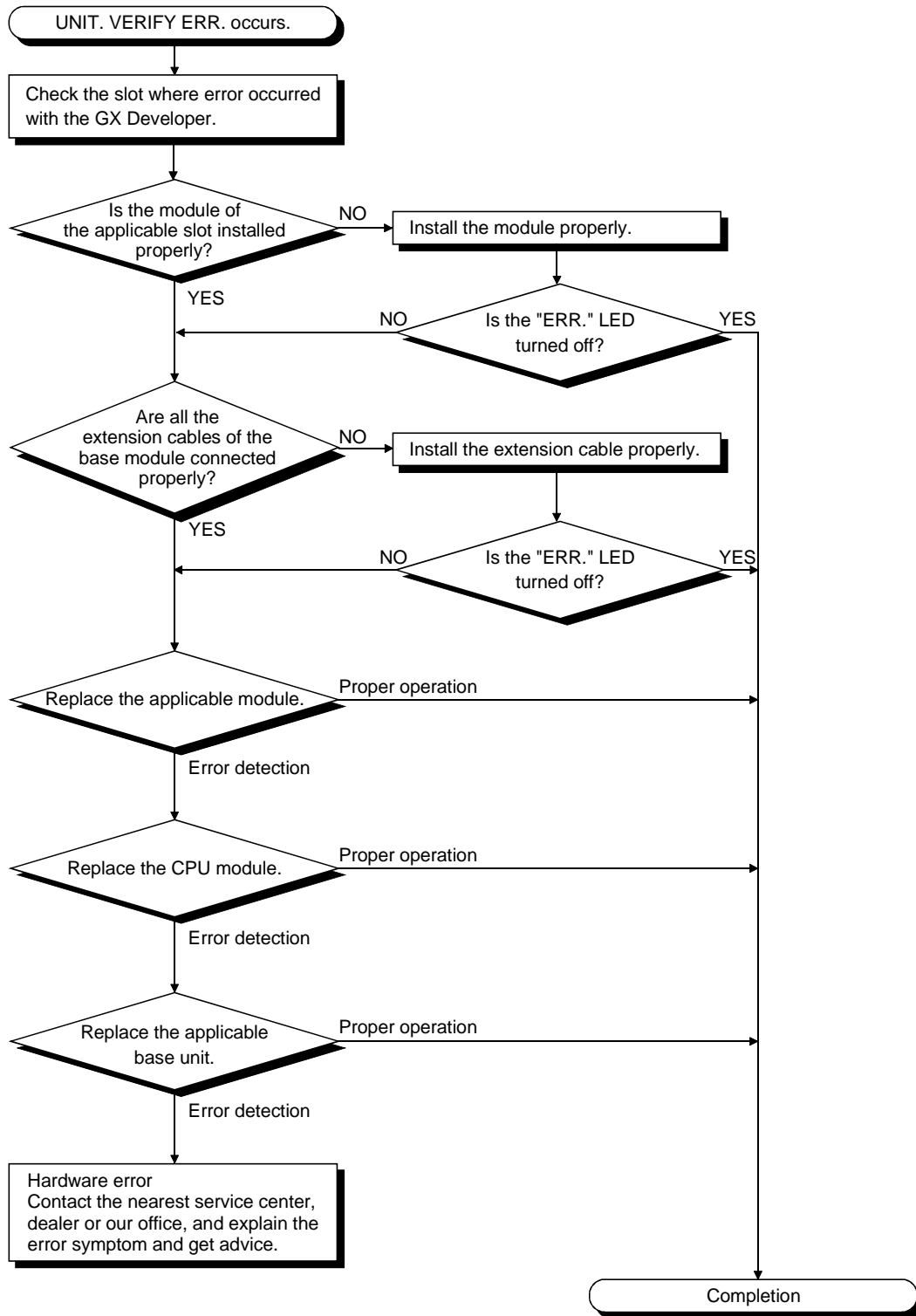
11.2.10 Flowchart for when program is rewritten

The following shows the flowchart to be followed when a program is rewritten when the PLC is powered on or reset.



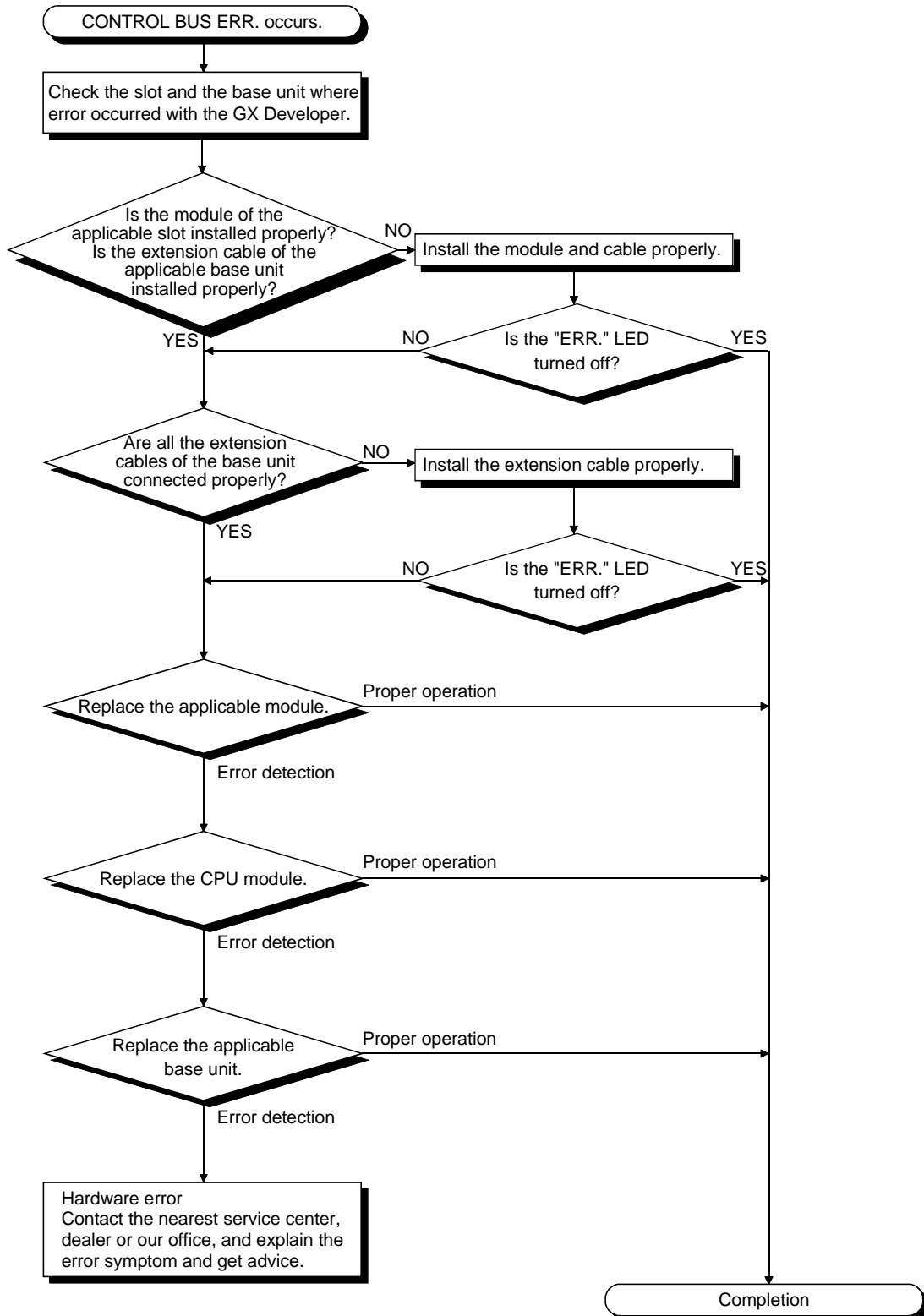
11.2.11 Flowchart for when UNIT VERIFY ERR. occurs

The following shows the flowchart to be followed when the UNIT VERIFY ERR. occurs while the PLC power supply is turned on or during the operation.



11.2.12 Flowchart for when CONTROL BUS ERR. occurs

The following shows the flowchart that must be followed when the CONTROL BUS ERR. occurs while the PLC power supply is turned on or during the operation. This flow chart can be confirmed only when a specific slot/base unit can be detected by the error code.



11.3 Error Code List

When the sequencer power supply is turned on and the stopped CPU module runs or trouble occurs during the running, the Basic model QCPU displays an error (by LED) using the self-diagnosis function, and stores the error information in the special relay SM and special register SD.

REMARK

For the error code (4000H to 4FFFH) developed upon a request for general data processing from the GX Developer, intelligent function unit or network system, refer to Appendix 1.

11.3.1 Procedure for reading error codes

If an error occurs, the error code and error message can be read using GX Developer Version 7 (SW7D5C-GPPW-E) or later.

Use the following procedure to read error codes with GX Developer.

- 1) Start the the GX Developer.
- 2) Connect the Basic model CPU module to the personal computer.
- 3) Select [Online] - [Read from PLC] Menu by the the GX Developer, and also read the project from the Basic model QCPU.
- 4) Select the [Diagnostics] - [PLC diagnostics] Menu.
- 5) Click the "Error Jump" button in the PLC diagnostics dialog box to display the error code and error message.
- 6) Select the [Help] - [PLC error] Menu, and confirm the content of the applicable error code.

For details of the the GX Developer operating method, refer to the applicable the GX Developer Operating Manual.

11.3.2 Error code list

The following information deals with error codes and the meanings, causes, and corrective measures of error messages.

Error Code (SD0) * 1	Error Messages	Common Information (SD5 to 15) * 1	Individual Information (SD16 to 26) * 1	LED Status		Operating States of CPU	Diagnostic Timing
				RUN	ERROR		
1000	MAIN CPU DOWN	—	—	Off	Flicker	Stop	Always
1009							
1010	END NOT EXECUTE	—	—	Off	Flicker	Stop	When an END instruction is executed.
1011							
1012							
1101	RAM ERROR	—	—	Off	Flicker	Stop	At power ON/At reset
1102							
1103							
1104							
1200	OPE. CIRCUIT ERR.	—	—	Off	Flicker	Stop	At power ON/At reset
1201							
1202							
1300	FUSE BREAK OFF	Unit/module No.	—	Off/ON	Flicker/On	Stop/Continue * 2	When an END instruction is executed.
1310	I/O INT ERROR	—	—	Off	Flicker	Stop	During interrupt
1401	SP. UNIT DOWN	Unit/module No.	—	Off	Flicker	Stop/Continue * 3	At power ON/At reset/ When intelligent function module is accessed.
1402			Program error location				When an intelligent function module access instruction is executed.
1403			—				When an END instruction is executed.
1411	CONTROL-BUS ERR.	Unit/module No.	—	Off	Flicker	Stop	At power ON/At reset
1412			Program error location				During execution of FROM/TO instruction set.
1413		—	Always				
1414		—	When an END instruction is executed.				
1415		Base No.					
1500	AC DOWN	—	—	On	On	Continue	Always
1600	BATTERY ERROR	Drive Name	—	ON	Off	Continue	Always
2000	UNIT VERIFY ERR.	Unit/module No.	—	Off/On	Flicker/On	Stop/Continue * 2	When an END instruction is executed.

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.

* 2 The CPU module operation status when an error occurs can be set at the parameters. (LED display will change accordingly.)

* 3 Stop/continue operation is selectable for each module by setting parameters.

Error Code (SD0) * 1	Error Contents and Cause	Corrective Action
1000	Run mode suspended or failure of main CPU module (1) Malfunctioning due to noise or other reasons (2) Hardware fault	(1) Measure noise level. (2) Reset the CPU module and establish the RUN status again. If the same error is displayed again, this suggests a CPU module hardware error. Contact your nearest Mitsubishi representative.
1009	Failure of the power supply module, CPU module, main base unit, extension base unit or extension cable is detected.	
1010	Entire program was executed without the execution of an END instruction.	(1) Measure noise level. (2) Reset the CPU module and establish the RUN status again. If the same error is displayed again, this suggests a CPU module hardware error. Contact your nearest Mitsubishi representative.
1011	(1) When the END instruction is executed it is read as another instruction code, e.g. due to noise. (2) The END instruction has been changed to another instruction code somehow.	
1012		
1101	Error in program memory where CPU sequence program is stored.	This suggests a CPU hardware error. Contact your nearest Mitsubishi representative.
1102	Error in RAM used as CPU work area.	
1103	Internal CPU device error.	
1104	RAM address error in CPU.	
1200	The circuit that performs CPU internal index qualification is not operating properly.	This suggests a CPU hardware error. Contact your nearest Mitsubishi representative.
1201	Internal CPU hardware (logic) does not operate normally.	
1202	The circuit that executes sequence processing in the CPU does not operate properly.	
1300	There is an output module with a blown fuse.	(1) Check ERR LED of the output modules and replace the module whose LED is lit. (2) The module with a blown fuse can also be checked with a peripheral device. Monitor special registers SD130 to SD137 and check if there is a bit "1," which corresponds to the module with a blown fuse.
1310	An interruption has occurred although there is no interrupt module.	One of the individual modules is experiencing hardware problems, so check the modules. Contact your nearest Mitsubishi representative and explain the problem with the defective module.
1401	<ul style="list-style-type: none"> There was no response from the intelligent function module during initial communications stage. The buffer memory size of the intelligent function module is wrong. 	The CPU module is experiencing hardware problems. Contact your nearest Mitsubishi representative.
1402	The intelligent function module was accessed in the program, but there was no response.	This suggests a CPU hardware error. Contact your nearest Mitsubishi representative.
1403	<ul style="list-style-type: none"> There was no response from the intelligent function module when the END instruction is executed. An error is detected at the intelligent function module. 	The intelligent function module that was being accessed is experiencing hardware problems. Contact your nearest Mitsubishi representative.
1411	When performing a parameter I/O allocation a intelligent function module could not be accessed during initial communications. On error occurring, the head I/O number of the corresponding special function module is stored in the common information.	A intelligent function module, the CPU module, or the base unit is experiencing problems. Contact your nearest Mitsubishi representative.
1412	The FROM/TO instruction set could not be executed, due to a control pulse error with a intelligent function module. On error occurring, the program error location is stored.	
1413	<ul style="list-style-type: none"> An error is detected on the system bus. Wait-length time-out, arbitration time-out. 	An intelligent function module, the CPU module, or the base unit is experiencing problems. Contact your nearest Mitsubishi representative.
1414	An error is detected on the system bus.	An intelligent function module, the CPU module, or the base unit is experiencing problems. Contact your nearest Mitsubishi representative.
1415	Fault of the main or extension base unit was detected.	An intelligent function module, CPU module or the base unit is experiencing problems. Contact your nearest Mitsubishi representative.
1500	A momentary power supply interruption of the power supply occurred. The power supply went off.	Check the power supply.
1600	<ul style="list-style-type: none"> (1) Voltage in the CPU module battery has dropped below stipulated level. (2) The lead connector of the CPU module battery is not connected. 	<ul style="list-style-type: none"> (1) Change the battery. (2) If the battery is for program memory or for the back-up power function, install a lead connector.
2000	<ul style="list-style-type: none"> Input/output module information power ON is changed. Input/output module (or intelligent function module) is not installed properly or installed on the base unit. 	Read the error common information at the peripheral device, and check and/or change the module that corresponds to the numerical value (module number) there. Alternatively, monitor the special registers SD150 to SD157 at a peripheral device, and change the fuse at the output module whose bit has a value of "1".

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.

Error Code List (Continued)

Error Code (SD0) * 1	Error Messages	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		Operating States of CPU	Diagnostic Timing
				RUN	ERROR		
2100	SP. UNIT LAY ERR.	Unit/module No.	—	Off	Flicker	Stop	At power ON/At reset
2103							
2106							
2107							
2110	SP. UNIT ERROR	Unit/module No.	Program error location	Off/On	Flicker/On	Stop/Continue * 2	When instruction executed.
2111							
2112	SP. UNIT ERROR	Unit/module No.	Program error location	Off/On	Flicker/On	Stop/Continue * 2	When instruction executed/ STOP → RUN
2120							
2122							
2124	SP. UNIT LAY ERR.	—	—	Off	Flicker	Stop	At power ON/At reset
2125							
2200	MISSING PARA.	Drive Name	—	Off	Flicker	Stop	At power ON/At reset
2400	FILE SET ERROR	File name	Parameter number	Off	Flicker	Stop	At power ON/At reset
2401							
2500	CANT EXE. PRG.	File name	—	Off	Flicker	Stop	At power ON/At reset
2501							
2502							
2503							
3000	PARAMETER ERROR	File name	Parameter number	Off	Flicker	Stop	At power ON/Reset/ STOP → RUN
3001							
3003							
3004							

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.
 * 2 The CPU module operation status when an error occurs can be set at the parameters. (LED display will change accordingly.)

Error Code (SD0) * 1	Error Contents and Cause	Corrective Action
2100	(1) In the parameter I/O allocation settings, an Intel (intelligent function module) was allocated to a location reserved for an I/O module or vice versa. (2) In the parameter I/O allocation settings, a module other than CPU (or nothing) was allocated to a location reserved for a CPU module or vice versa. (3) A general-purpose switch was set to the module with no general-purpose switches.	(1) Reset the parameter I/O allocation setting to conform to the actual status of the intelligent function module and the CPU module. (2) Reset the general-purpose switch settings.
2103	Two or more QI60 interrupt modules have been installed.	Install only 1 QI60 module.
2106	(1) Two or more MELSECNET/H modules were installed. (2) Two or more Q series Ethernet modules were installed. (3) Three or more Q series CC-Link modules were installed. (4) The same network number or same station number exists in the MELSECNET/H network system.	(1) Reduce the modules to one or less. (2) Reduce the modules to one or less. (3) Reduce the modules to two or less. (4) Check the network number and station number.
2107	The head X/Y set in the parameter I/O allocation settings is also the head X/Y for another module.	Reset the parameter I/O allocation setting to conform with the actual status of the special function modules.
2110	(1) The location designated by the FROM/TO instruction set is not a intelligent function module. (2) The intelligent function module being accessed is faulty.	(1) Read error individual information, then check and edit the FROM/TO instruction set that corresponds to the numerical value there (Program error location). (2) The intelligent function module that is being accessed has a hardware error. Consult the nearest service center, agent or our branch office and describe the symptom.
2111	The location designated by a link direct device (J□□) is not a network module.	
2112	(1) The location designated by a intelligent function module dedicated instruction is not a intelligent function module. (2) Alternatively, it is not the relevant intelligent function module.	Read error individual information, then check and edit the intelligent function module dedicated instruction that corresponds to the numerical value there (program error location).
2120	QA□B or QA1S□B was used as the base unit.	Use Q□B as the base unit.
2122	QA1S□B is installed to the main base unit.	Install Q□B as the main base unit.
2124	(1) A module is installed at 25th or higher slot (17th or higher slot for Q00J) (2) A module is installed at the slot later than the number of slots specified with base allocation setting. (3) A module is installed at the I/O points later than the actual I/O points. (4) A module was installed across the boundary of the actual I/O points. (5) 5 or more extension bases were added. (3 bases for Q00J)	(1) Remove the module installed at the 25th slot or later. (14th slot or later for Q00J) (2) Remove the module installed at the slot later than the number of slots specified in the base allocation setting. (3) Remove the module installed at the I/O points later than the actual I/O points. (4) Change the last module for the module whose occupying points do not exceed the actual I/O points. (5) Remove 5 or more extension base units. (3 bases for Q00J)
2125	(1) An unrecognisable module has been installed. (2) There was no response from the intelligent function module.	(1) Install a usable module. (2) The intelligent function module is experiencing hardware problems. Contact your nearest Mitsubishi representative.
2200	There is no parameter file at the program memory.	Check and correct the setting of the parameter enabled drive switch. Put a parameter file in the drive designated by the parameter enabled drive switch.
2400	The file designated at the PLC file settings in the parameters cannot be found.	Read the error individual information at the peripheral device, check to be sure that the parameter drive name and file name correspond to the numerical values there (parameter number), and correct. Create the designated file.
2401	The file designated at the parameter PLC RAS settings fault history area has not been created.	Read the error individual information at the peripheral device, check to be sure that the parameter drive name and file name correspond to the numerical values there (parameter number), and correct. Check the space remaining in the memory card.
2500	There is a program file that uses a device exceeds the device allocation range designated by the parameter device settings.	Read the error common information at the peripheral device, check to be sure that the parameter device allocation setting and the program file device allocation correspond to the numerical values there (file name), and correct if necessary.
2501	There are multiple program files although "none" has been set at the parameter program settings.	Edit the parameter program setting to "yes". Alternatively, delete unneeded programs.
2502	The program file is incorrect. Alternatively, the file contents are not those of a sequence program.	Check whether the program version is * * * .QPG, and check the file contents to be sure they are for a sequence program.
2503	There are no program files at all.	Check program configuration. Check parameters and program configuration.
3000	The parameter settings for timer time limit setting, the RUN-PAUSE contact, the common pointer number, the general data processing, number of vacant slots, or system interrupt settings are outside the range that can be used by the CPU module.	(1) Read the error detailed information at the peripheral device, check the parameter items corresponding to the numerical values (parameter numbers) there, and correct when necessary. (2) If the error is still generated following the correction of the parameter settings, it is likely that there is a memory error, either in the internal CPU module RAM. Contact your nearest Mitsubishi representative.
3001	Parameter contents have been destroyed.	
3003	The number of devices set at the parameter device settings exceeds the possible CPU module range.	(1) Read the error detailed information at the peripheral device, check the parameter items corresponding to the numerical values (parameter numbers) there, and correct when necessary. (2) If the error is still generated following the correction of the parameter settings, it is likely that there is a memory error, either in the internal CPU module RAM. Contact your nearest Mitsubishi representative.
3004	The parameter file is incorrect. Alternatively, the contents of the file are not parameters.	Check whether the parameter file version is * * * .QPA, and check the file contents to be sure they are parameters.

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.

Error Code List (Continued)

Error Code (SD0) * 1	Error Messages	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		Operating States of CPU	Diagnostic Timing
				RUN	ERROR		
3100	LINK PARA. ERROR	File name	Parameter number	Off	Flicker	Stop	At power ON/Reset/ STOP → RUN
3101							
3102							
3103							
3104							
3105							
3106							
3107							
3300	SP. PARA. ERROR	File name	Parameter number	Off	Flicker	Stop	At power ON/Reset/ STOP → RUN
3301							
3302							
4000	INSTRCT CODE ERR.	Program error location	—	Off	Flicker	Stop	At power ON/Reset/ STOP → RUN
4002							
4003							
4004							
4010	MISSING END INS.	Program error location	—	Off	Flicker	Stop	At power ON/Reset/ STOP → RUN
4021	CAN'T SET (P)						
4030	CAN'T SET (I)						
4100	OPERATION ERROR	Program error location	—	Off/On	Flicker/On	Stop/ continue * 2	When instruction is executed
4101							
4102							
4108							

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.
 * 2 The CPU operation status when an error occurs can be set at the parameters. (LED display will change accordingly.)

Error Code (SD0) * 1	Error Contents and Cause	Corrective Action
3100	(1) The number of actually installed modules is different from that designated in the number of modules setting parameter of MELSECNET/H. (2) The head I/O number of actually installed modules is different from that designated in the network parameter of MELSECNET/H. (3) Some data in the parameter cannot be handled. (4) The station type of MELSECNET/H has been changed while the power is on. (RESET → RUN is required to change the station type.)	(1) Check the network parameters and the installation state. If inconsistency is found, arrange consistency between network parameters and the installation state. If network parameters are changed, write the new network parameters to the CPU module. (2) Check the number of extension stages of the extension base unit. (3) Check the state of connection of the extension base unit and connector. If the display unit is connected to the main base unit or extension base unit, check the state of connection. (4) If the error persists after the above items (1) through (3) are checked, the hardware is faulty. Contact your nearest Mitsubishi representative and explain the symptom.
3101	The network No. specified by a parameter is different from that of the actually mounted network. The head I/O No. specified by a parameter is different from that of the actually mounted I/O unit. The network class specified by a parameter is different from that of the actually mounted network. The network refresh parameter of the MELSECNET/H is out of the specified area.	(1) Check the network parameters and the installation state. If inconsistency is found, arrange consistency between network parameters and the installation state. If network parameters are changed, write the new network parameters to the CPU module. (2) Check the number of extension stages of the extension base unit. (3) Check the state of connection of the extension base unit and connector. If the display unit is connected to the main base unit or extension base unit, check the state of connection. (4) If the error persists after the above items (1) through (3) are checked, the hardware is faulty. Contact your nearest Mitsubishi representative and explain the symptom.
3102	An error was discovered when the network parameter check was made at the network module.	(1) Write after correcting network parameters. (2) If the error persists after corrections have been made, contact your nearest Mitsubishi representative.
3103	• Though the number of Ethernet modules are set to one or more in the parameter, the actually mounted number of module is zero. • The head I/O number for the Ethernet module set parameters is different from that of the actually mounted I/O module.	(1) Write after correcting network parameters. (2) If the error persists after corrections have been made, contact your nearest Mitsubishi representative.
3104	Ethernet and MELSECNET/H use the same network number. Network number, station number and group number set by the parameter is out of range. I/O number is out of range. Ethernet-specific parameter setting is not normal. The parameter peculiar to Ethernet is not normal.	(1) Write after correcting network parameters. (2) If the error persists after corrections have been made, contact your nearest Mitsubishi representative.
3105	(1) Though the number of CC-Link modules set by the parameters is one or more, the actually mounted number of module is zero. (2) The head I/O number for the common parameters is different from that of the actually mounted I/O module. (3) The station class for the CC-Link unit quantity set parameters is different from that of the actually mounted station.	(1) Write after correcting network parameters. (2) If the error persists after corrections have been made, contact your nearest Mitsubishi representative.
3106	The network refresh parameter for CC-Link is out of range.	Check the parameter setting.
3107	The contents of the CC-Link parameter are incorrect.	Check the parameter setting.
3300	The first I/O number in the intelligent function module parameter set on GX Configurator differs from the actual I/O number.	Check the parameter setting.
3301	The refresh range of the intelligent function module exceeded the file register capacity. The intelligent function module's refresh parameter setting is outside the available range.	Check the parameter setting.
3302	The intelligent function module's parameter are abnormal.	Check the parameter setting.
4000	The program contains an instruction code that cannot be decoded . An unusable instruction is included in the program.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4002	The extension instruction designated by the program has an incorrect instruction name.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4003	The extension instruction designated by the program has an incorrect number of devices.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4004	The extension instruction designated by the program designates a device which cannot be used.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4010	There is no END (FEND) instruction in the program.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4021	The common pointers used by individual files are overlapping.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4030	The allocation pointers numbers used by individual files overlap overlapping.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4100	Data which cannot be dealt with by the instruction is included.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4101	The designated device numbers for data processed by the instruction exceed the usable range. Alternatively, the storage data or constants for the devices designated by the instruction exceed the usable range.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4102	The network number and station number designated by a dedicated network instruction are not correct. The link direct device (J ₁ W ₁) is not set correctly.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4108	The CC-Link parameter is not set when the CC-Link instruction is executed.	Set the numbers of execution to the CC-Link instruction to 64 or less. Execute the CC-Link instruction after setting the CC-Link parameter.

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.

Error Code List (Continued)

Error Code (SD0) * 1	Error Messages	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		Operating States of CPU	Diagnostic Timing
				RUN	ERROR		
4200	FOR NEXT ERROR	Program error location	—	Off	Flicker	Stop	When instruction is executed
4201							
4202							
4203							
4210	CANT EXECUTE (P)	Program error location	—	Off	Flicker	Stop	When instruction is executed
4211							
4212							
4213							
4220	CANT EXECUTE (I)	Program error location	—	Off	Flicker	Stop	When instruction is executed
4221							
4222							
4223							
4231	INST. FORMAT ERR.	Program error location	—	Off	Flicker	Stop	When instruction is executed
5001	WDT ERROR	Time (value set)	Time (value actually measured)	Off	Flicker	Stop	Always
5010	PRG. TIME OVER	Time (value set)	Time (value actually measured)	On	On	Continue	Always
9000	F*** * 3	Program error location	Annunciator number	On	Off	Continue	When instruction is executed

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.
 * 3 *** indicates detected annunciator number.

Error Code (SD0) * 1	Error Contents and Cause	Corrective Action
4200	No NEXT instruction was executed following the execution of a FOR instruction. Alternatively, there are fewer NEXT instructions than FOR instructions.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4201	A NEXT instruction was executed although no FOR instruction has been executed. Alternatively, there are more NEXT instructions than FOR instructions.	
4202	More than 16 nesting levels are programmed.	Keep nesting levels at 16 or under.
4203	A BREAK instruction was executed although no FOR instruction has been executed prior to that.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4210	The CALL instruction is executed, but there is no subroutine at the specified pointer.	
4211	There was no RET instruction in the executed sub-routine program.	
4212	The RET instruction was before the FEND instruction in the main program.	
4213	More than 16 nesting levels have been inserted.	
4220	Interrupt input was generated, but no corresponding interrupt pointer was found.	Read the common error information at a peripheral device, check error step corresponding to its numerical value (program error location), and correct the problem.
4221	There was no IRET instruction in the executed interrupt program.	
4223	The IRET instruction was before the FEND instruction in the main program.	
4231	The number of IX and IXEND instructions is not equal.	Read the error individual information at a peripheral device, check the numerical value (time) there, and shorten scan time if necessary.
5001	Program scan time goes over the WDT value set in the parameter PC RAS settings.	
5010	The scan time of the program exceeded the constant scan setting time specified in the PC RAS setting parameter.	
9000	Annunciator F went ON	Read the error individual information at a peripheral device, and check the program corresponding to the numerical value (annunciator number).

* 1 Characters in parentheses () indicate the special register numbers where individual information is being stored.

11.4 Canceling of Errors

The Basic model QCPU can perform the cancel operation for errors only when the errors allow the CPU module to continue its operation.

To cancel the errors, follow the steps shown below.

- 1) Eliminate the cause of the error.
- 2) Store the error code to be canceled in the special register SD50.
- 3) Energize the special relay SM50 (OFF → ON).
- 4) The error to be canceled is canceled.

After the CPU module is reset by the canceling of the error, the special relays, special registers, and LEDs associated with the error are returned to the states under which the error occurred.

If the same error occurs again after the cancellation of the error, it will be registered again in the error history.

When multiple enunciators(F) detected are canceled, the first one with No. F only is canceled.

POINT
(1) When the error is canceled with the error code to be canceled stored in the SD50, the lower one digit of the code is neglected. (Example) If error codes 2100 and 2101 occur, and error code 2100 to cancel error code 2101. If error codes 2100 and 2111 occur, error code 2111 is not canceled even if error code 2100 is canceled.
(2) Errors developed due to trouble in other than the CPU module are not canceled even if the special relay (SM50) and special register (SD50) are used to cancel the error. (Example) The cause of "SP. UNIT DOWN" error cannot be removed even by using the special relay (SM50) and special register (SD50), because the error is developed on the Q bus. Refer to the error code list in Section 11.3.2 to remove the cause of the error.

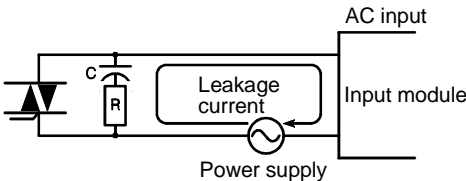
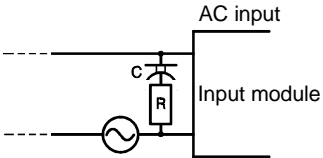
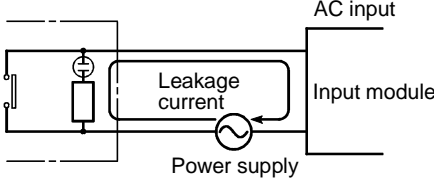
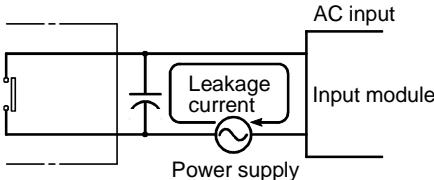
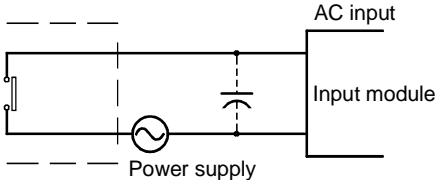
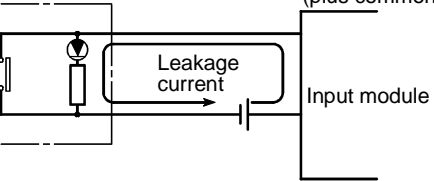
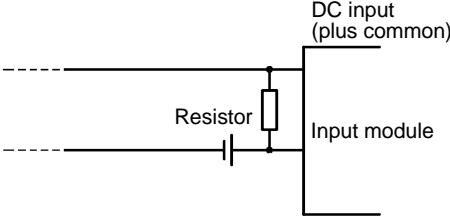
11.5 Input/Output Module Troubleshooting

This chapter explains possible problems with input/output circuits and their corrective actions.

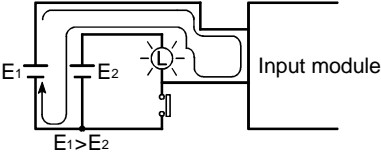
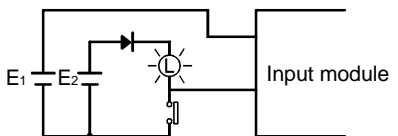
11.5.1 Input circuit troubleshooting

This section describes possible problems with input circuits and their corrective actions.

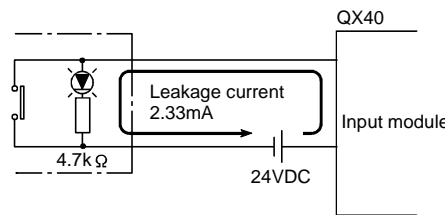
Input Circuit Problems and Corrective Actions

	Condition	Cause	Corrective Action
Example 1	Input signal does not turn OFF.	<ul style="list-style-type: none"> Leakage current of input switch (e.g. drive by non-contact switch). 	<ul style="list-style-type: none"> Connect an appropriate resistor which will make the voltage across the terminals of the input module lower than the OFF voltage value.  <p>It is recommended to use 0.1 to $47\mu\text{F} + 47$ to 120Ω ($1/2\text{W}$) for the CR constant.</p>
Example 2	Input signal does not turn OFF.	<ul style="list-style-type: none"> Drive by a limit switch with neon lamp. 	<ul style="list-style-type: none"> Same as Example 1. Or make up another independent display circuit.
Example 3	Input signal does not turn OFF.	<ul style="list-style-type: none"> Leakage current due to line capacity of wiring cable. (Line capacity C of twisted pair wire is approx. 100 pF/m). 	<ul style="list-style-type: none"> Same as Example 1. However, leakage current is not generated when the power supply is located in the input equipment side as shown below. 
Example 4	Input signal does not turn OFF.	<ul style="list-style-type: none"> Drive by switch with LED indicator. 	<ul style="list-style-type: none"> Connect a resistor which will make the voltage between the input module terminal and common lower than the OFF voltage, as shown below.  <p>* A calculation example of a value for a connected resistor is given on the following page.</p>

Input Circuit Problems and Corrective Actions (Continued)

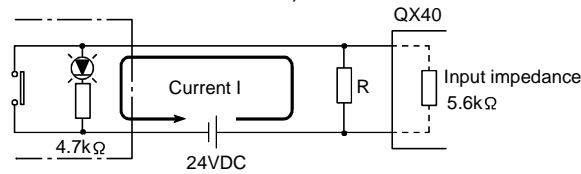
	Condition	Cause	Corrective Action
Example 5	Input signal does not turn OFF.	<ul style="list-style-type: none"> Sneak path due to the use of two power supplies. 	<ul style="list-style-type: none"> Use only one power supply. Connect a sneak path prevention diode. (Figure below) 
Example 6	False input due to noise	Depending on response time setting, noise is imported as input.	<p>Change response time setting. Example : 1ms → 5ms (Setting of a shorter response time may produce a higher effect on periodic excessive noise.) If no effects are produced by the above, take basic actions to prevent excessive noise from entering, e.g. avoid bundling the power and I/O cables, and suppress noise by adding surge absorbers to such noise sources as relays and conductors used with the same power supply.)</p>

<Calculation example of Example 4>



If a switch with an LED display is connected to QX40 and a current of 2.33 mA is leaked.

- Voltage V_{TB} across the terminal and common base is:
 $V_{TB} = 2.33[mA] \times 5.6[k\Omega] = 13[V]$ (Ignore the voltage drop caused by the LED.)
 Because the condition for the OFF voltage ($\leq 11[V]$) is not satisfied, the input does not turn off. To correct this, connect a resistor as shown below.

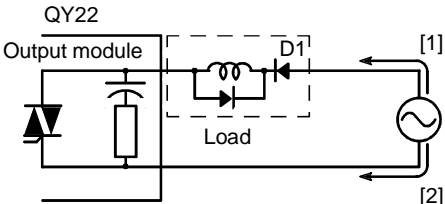
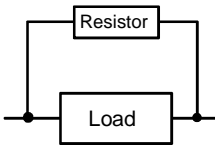
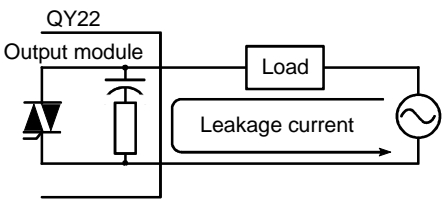
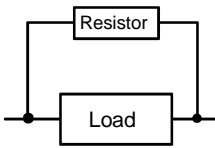


- Calculation of current for resistor R
 The voltage of QX40 across the terminals must be reduced to 11 [V] or less.
 The required current
 $(24-11[V]) \div 4.7[k\Omega] = 2.77[mA]$
 Therefore resistor R of flowing current I of 2.77 [mA] or more must be connected.
- Calculation of resistance of connected resistor R
 $11[V] \div R > 2.77[mA] - \frac{11[V]}{5.6[k\Omega]}$
 $11[V] \div R > 2.77-1.96[mA]$
 $11[V] \div 0.81[mA] > R$
 $13.6[k\Omega] > R$
 Resistance of the connected resistor R is obtained in the above equations.
 Suppose that the resistance R is 12 [kW].
 The power capacity W of the resistor during activation of the switch is:
 $W = (\text{Applied voltage})^2 / R$
 $W = (28.8[V])^2 / 12[k\Omega] = 0.069[W]$
- Because the resistance is selected so that the power capacity is three to five times the actual power consumption, a third to a half [W] should be selected.
 In this case, a resistor of 12 [kΩ] and a third to a half [W] should be connected across the terminal and COM.

11.5.2 Output circuit troubleshooting

This section describes possible problems with output circuits and their corrective actions.

Output Circuit Problems and Corrective Actions

	Condition	Cause	Corrective Action
Example 1	<p>When the output is OFF, excessive voltage is applied to the load.</p>	<ul style="list-style-type: none"> • Load is half-wave rectified inside (in some cases, this is true of a solenoid).  <ul style="list-style-type: none"> • When the polarity of the power supply is as shown in [1], C is charged. When the polarity is as shown in [2], the voltage charged in C plus the line voltage are applied across D1. Max. voltage is approx. 2.2E. (If a resistor is used in this way, it does not pose a problem to the output element. But it may cause the diode, which is built into the load, to deteriorate, resulting in a fire, etc.) 	<ul style="list-style-type: none"> • Connect a resistor several tens to hundreds of kΩ across the load. 
Example 2	<p>The load does not turn OFF (triac output).</p>	<ul style="list-style-type: none"> • Leakage current due to built-in noise suppression. 	<ul style="list-style-type: none"> • Connect C and R across the load. (When the wiring distance from the output card to the load is long, there may be a leakage current due to the line capacity.) 

11.6 Special Relay List

Special relays, SM, are internal relays whose applications are fixed in the PLC. For this reason, they cannot be used by sequence programs in the same way as the normal internal relays. However, they can be turned ON or OFF as needed in order to control the CPU module and remote I/O modules.

The headings in the table that follows have the following meanings.

Item	Function of Item
Number	• Indicates the number of the special relay.
Name	• Indicates the name of the special relay.
Meaning	• Indicates the nature of the special relay.
Explanation	• Contains detailed information about the nature of the special relay.
Set by (When set)	<ul style="list-style-type: none"> • Indicates whether the relay is set by the system or user, and, if it is set by the system, when setting is performed. <Set by> <ul style="list-style-type: none"> S : Set by system U : Set by user (in sequence program or test operation at a peripheral device) S/U : Set by both system and user <When set> <ul style="list-style-type: none"> Indicated only if setting is done by system. Each END : Set during each END processing Initial : Set only during initial processing (when power supply is turned ON, or when going from STOP to RUN) Status change : Set only when there is a change in status Error : Set when error is generated Instruction execution : Set when instruction is executed Request : Set only when there is a user request (through SM, etc.)

For details on the following items, refer to the following manual:

- Networks → • For Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network)

Special Relay List

(1) Diagnostic Information

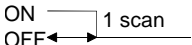
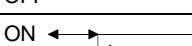
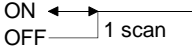






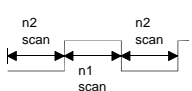
Number	Name	Meaning	Explanation	Set by (When Set)
SM0	Diagnostic errors	OFF: No error ON : Error	<ul style="list-style-type: none"> • ON if diagnosis results show error occurrence (Includes when an annunciator is ON, and when an error is detected with CHK instruction) • Stays ON subsequently even if normal operations restored 	S (Error)
SM1	Self-diagnosis error	OFF: No self-diagnosis errors ON : Self-diagnosis	<ul style="list-style-type: none"> • Comes ON when an error occurs as a result of self-diagnosis. (Does not include when an annunciator is ON.) • Stays ON subsequently even if normal operations restored 	S (Error)
SM5	Error common information	OFF: No error common information ON : Error common information	<ul style="list-style-type: none"> • When SM0 is ON, ON if there is error common information 	S (Error)
SM16	Error individual information	OFF: No error common information ON : Error common information	<ul style="list-style-type: none"> • When SM0 is ON, ON if there is error individual information 	S (Error)
SM50	Error reset	OFF → ON : Error reset	<ul style="list-style-type: none"> • Conducts error reset operation 	U
SM51	Battery low latch	OFF: Normal ON : Battery low	<ul style="list-style-type: none"> • ON if battery voltage at CPU module drops below rated value. Stays ON subsequently even after normal operation is restored 	S (Error)
SM52	Battery low	OFF: Normal ON : Battery low	<ul style="list-style-type: none"> • Same as SM51, but goes OFF subsequently when battery voltage returns to normal. 	S (Error)
SM53	AC/DC DOWN detection	OFF: AC/DC DOWN not detected ON : AC/DC DOWN detected	<ul style="list-style-type: none"> • Comes ON if a momentary power interruption of less than 20ms occurred during use of the AC power supply module, and reset by turning the power OFF, then ON. • Comes ON if a momentary power interruption of less than 10ms occurred during use of the DC power supply module, and reset by turning power OFF, then ON. 	S (Error)
SM56	Operation Errors	OFF: Normal ON : Operation error	<ul style="list-style-type: none"> • ON when operation error is generated • Stays ON subsequently even if normal operations restored 	S (Error)
SM60	Blown fuse detection	OFF: Normal ON : Module with blown fuse	<ul style="list-style-type: none"> • Comes ON even if there is only one output module with a blown fuse, and remains ON even after return to normal • Blown fuse status is checked even for remote I/O station output modules. 	S (Error)
SM61	I/O module verification error	OFF: Normal ON : Error	<ul style="list-style-type: none"> • Comes ON if there is a discrepancy between the actual I/O modules and the registered information when the power is turned on 	S (Error)
SM62	Annunciator detection	OFF: Not detected ON : Detected	<ul style="list-style-type: none"> • Goes ON if even one annunciator F goes ON. 	S (Instruction execution)
SM100	Serial communication function using flag	OFF: Serial communication function is not used. ON : Serial communication function is used.	<ul style="list-style-type: none"> • Stores whether the serial communication function in the serial communication setting parameter is used or not. 	S (Power-on or reset)
SM101	Communication protocol status flag	OFF: GX Developer ON : MC protocol communication device	<ul style="list-style-type: none"> • Stores whether the device that is communicating via the RS-232 interface is GX Developer or MC protocol communication device. 	S (RS-232 communication)
SM110	Protocol error	OFF: Normal ON : Abnormal	<ul style="list-style-type: none"> • Turns ON when an abnormal protocol was used to make communication in the serial communication function. • Remains ON if the protocol is restored to normal thereafter. 	S (Error)
SM111	Communication status	OFF: Normal ON : Abnormal	<ul style="list-style-type: none"> • Turns ON when the mode used to make communication was different from the setting in the serial communication function. • Remains ON if the mode is restored to normal thereafter. 	S (Error)
SM112	Error information clear	ON : Cleared	<ul style="list-style-type: none"> • Turns ON when the error codes stored in SM110, SM111, SD110 and SD111 are cleared. (Activated when turned from OFF to ON) 	U
SM113	Overrun error	OFF: Normal ON : Abnormal	<ul style="list-style-type: none"> • Turns ON when an overrun error occurred in the serial communication error. 	S (Error)
SM114	Parity error	OFF: Normal ON : Abnormal	<ul style="list-style-type: none"> • Turns ON when a parity error occurred in the serial communication error. 	S (Error)
SM115	Framing error	OFF: Normal ON : Abnormal	<ul style="list-style-type: none"> • Turns ON when a framing error occurred in the serial communication error. 	S (Error)

Special Relay List

(2) System information

Number	Name	Meaning	Explanation	Set by (When Set)
SM203	STOP contact	STOP status	• Goes ON at STOP status	S (Status change)
SM204	PAUSE contact	PAUSE status	• Goes ON at PAUSE status	S (Status change)
SM206	PAUSE enable coil	OFF : PAUSE disabled ON : PAUSE enabled	• PAUSE status is entered if this relay is ON when the remote PAUSE contact goes ON	U
SM211	Clock data error	OFF : No error ON : Error	• ON when error is generated in clock data (SD210 through SD213) value, and OFF if no error is detected.	S (Request)
SM213	Clock data read request	OFF : Ignored ON : Read request	• When this relay is ON, clock data is read to SD210 through SD213 as BCD values.	U
SM315	Communication reserved time delay enable/disable flag	OFF : Without delay ON : With delay	<ul style="list-style-type: none"> This flag is enabled when the time reserved for communication processing is set in SD315. Turns ON to delay the END processing by the time set in SD315 if there is no communication processing. (The scan time increases by the period set in SD315.) Turns OFF to perform the END processing without a delay of the time set in SD315 when there is no communication processing. (Defaults to OFF) 	U

(3) System clocks/counters

Number	Name	Meaning	Explanation	Set by (When Set)
SM400	Always ON	ON _____ OFF _____	• Normally is ON	S (Every END processing)
SM401	Always OFF	ON _____ OFF _____	• Normally is OFF	S (Every END processing)
SM402	ON for 1 scan only after RUN	ON  OFF 	<ul style="list-style-type: none"> After RUN, ON for 1 scan only. This connection can be used for scan execution type programs only. 	S (Every END processing)
SM403	After RUN, OFF for 1 scan only	ON  OFF 	<ul style="list-style-type: none"> After RUN, OFF for 1 scan only. This connection can be used for scan execution type programs only. 	S (Every END processing)
SM410	0.1 second clock		<ul style="list-style-type: none"> Repeatedly changes between ON and OFF at each designated time interval. When power supply is turned OFF, or reset is performed, goes from OFF to start. * Note that the ON-OFF status changes when the designated time has elapsed during the execution of the program. 	S (Status change)
SM411	0.2 second clock			
SM412	1 second clock			
SM413	2 second clock			
SM414	2n second clock		• Goes between ON and OFF in accordance with the number of seconds designated by SD414.	S (Status change)
SM420	User timing clock No.0		<ul style="list-style-type: none"> Relay repeats ON/OFF switching at fixed scan intervals. When power supply is turned ON, or reset is performed, goes from OFF to start. The ON/OFF intervals are set with the DUTY instruction. 	S (Every END processing)
SM421	User timing clock No.1			
SM422	User timing clock No.2			
SM423	User timing clock No.3			
SM424	User timing clock No.4			

Special Relay List

(4) Memory cards

Number	Name	Meaning	Explanation	Set by (When Set)
SM620	Memory card B usable flags	OFF: Unusable ON : Use enabled	• Always ON	S (Initial)
SM621	Memory card B protect flag	OFF: No protect ON : Protect	• Always ON	S (Initial)
SM622	Drive 3 flag	OFF: No drive 3 ON : Drive 3 present	• Always ON	S (Initial)
SM623	Drive 4 flag	OFF: No drive 4 ON : Drive 4 present	• Always ON	S (Initial)
SM640	File register use	OFF: File register not in use ON : File register in use	• Goes ON when file register is in use (Q00CPU, Q01CPU only)	S (Status change)
SM660	Boot operation	OFF: Program memory execution ON : Boot operation in progress	• Goes ON while boot operation is in process	S (Status change)

(5) Instruction-Related Special Relays

Number	Name	Meaning	Explanation	Set by (When Set)
SM700	Carry flag	OFF: Carry OFF ON : Carry ON	• Carry flag used in application instruction	S (Instruction execution)
SM702	Search method	OFF: Search next ON : 2-part search	• Designates method to be used by search instruction. • Data must be arranged for 2-part search.	U
SM703	Sort order	OFF: Ascending order ON : Descending order	• The sort instruction is used to designate whether data should be sorted in ascending order or in descending order.	U
SM704	Block comparison	OFF: Non-match found ON : All match	• Goes ON when all data conditions have been met for the BKCOMP instruction.	S (Instruction execution)
SM715	EI flag	0 : During DI 1 : During EI	• ON when EI instruction is being executed.	S (Instruction execution)
SM722	BIN/DBIN instruction error disabling flag	OFF: Error detection performed ON : Error detection not performed	• Turned ON when "OPERATION ERROR" is suppressed for BIN or DBIN instruction.	U
SM775	Selection of link refresh processing during COM instruction execution	OFF: Performs link refresh ON : No link refresh performed	• Select whether or not to perform link refresh processing in cases where only general data processing will be conducted during the execution of the COM instruction.	U

11.7 Special Register List

The special registers, SD, are internal registers with fixed applications in the PLC.

For this reason, it is not possible to use these registers in sequence programs in the same way that normal registers are used.

However, data can be written as needed in order to control the CPU module.

Data stored in the special registers are stored as BIN values if no special designation has been made to it.

The headings in the table that follows have the following meanings.

Item	Function of Item
Number	• Indicates special register number
Name	• Indicates name of special register
Meaning	• Indicates contents of special register
Explanation	• Discusses contents of special register in more detail
Set by (When set)	<ul style="list-style-type: none"> • Indicates whether the relay is set by the system or user, and, if it is set by the system, when setting is performed. <Set by> <ul style="list-style-type: none"> S : Set by system U : Set by user (sequence program or test operation from GX Developer or the like) S/U : Set by both system and user <When set> <ul style="list-style-type: none"> Indicated only for registers set by system Each END : Set during each END processing Initial : Set only during initial processing (when power supply is turned ON, or when going from STOP to RUN) Status change : Set only when there is a change in status Error : Set when error occurs Instruction execution : Set when instruction is executed Request : Set only when there is a user request (through SM, etc.)

For details on the following items, see these manuals:

- Networks → • For Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network)

Special Register List

(1) Diagnostic Information

Number	Name	Meaning	Explanation	Set by (When set)				
SD0	Diagnostic errors	Diagnosis error code	<ul style="list-style-type: none"> Error codes for errors found by diagnosis are stored as BIN data. Contents identical to latest fault history information. 	S (Error)				
SD1	Clock time for diagnosis error occurrence	Clock time for diagnosis error occurrence	<ul style="list-style-type: none"> Year (last two digits) and month that SD0 data was updated is stored as BCD 2-digit code. (Example) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">B15 to B8</td> <td style="text-align: center;">B7 to B0</td> <td style="text-align: center;">Year (0 to 99)</td> <td style="text-align: center;">Month (1 to 12)</td> </tr> </table> : October, 1995 H9510 	B15 to B8	B7 to B0	Year (0 to 99)	Month (1 to 12)	S (Error)
B15 to B8			B7 to B0	Year (0 to 99)	Month (1 to 12)			
SD2			<ul style="list-style-type: none"> The day and hour that SD0 was updated is stored as BCD 2-digit code. (Example) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">B15 to B8</td> <td style="text-align: center;">B7 to B0</td> <td style="text-align: center;">Day (1 to 31)</td> <td style="text-align: center;">Hour (0 to 23)</td> </tr> </table> : 10 a.m. on 25th H2510 	B15 to B8	B7 to B0	Day (1 to 31)	Hour (0 to 23)	
B15 to B8	B7 to B0	Day (1 to 31)	Hour (0 to 23)					
SD3	<ul style="list-style-type: none"> The minute and second that SD0 data was updated is stored as BCD 2-digit code. (Example) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">B15 to B8</td> <td style="text-align: center;">B7 to B0</td> <td style="text-align: center;">Minutes (0 to 59)</td> <td style="text-align: center;">Seconds (0 to 59)</td> </tr> </table> : 35 min. 48 sec. (past the hour) H3548 	B15 to B8	B7 to B0	Minutes (0 to 59)	Seconds (0 to 59)			
B15 to B8	B7 to B0	Minutes (0 to 59)	Seconds (0 to 59)					
SD4	Error information categories	Error information category code	<ul style="list-style-type: none"> Category codes which help indicate what type of information is being stored in the common information areas (SD5 through SD15) and the individual information areas (SD16 through SD26) are stored here. <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">B15 to B8</td> <td style="text-align: center;">B7 to B0</td> <td style="text-align: center;">Individual information category codes</td> <td style="text-align: center;">Common information category codes</td> </tr> </table> The common information category codes store the following codes: 0 : No error 1 : Unit/module No./ PLC No./Base No. 2 : File name/Drive name 3 : Time (value set) 4 : Program error location The individual information category codes store the following codes: 0 : No error 1 : (Open) 2 : File name/Drive name 3 : Time (value actually measured) 4 : Program error location 5 : Parameter number 6 : Annunciator number 	B15 to B8	B7 to B0	Individual information category codes	Common information category codes	S (Error)
B15 to B8	B7 to B0	Individual information category codes	Common information category codes					

Special Register List (Continued)

Number	Name	Meaning	Explanation	Set by (When set)																																																																							
SD5	Error common information Error common information	Error common information Error common information	<ul style="list-style-type: none"> Common information corresponding to the error codes (SD0) is stored here. The following four types of information are stored here: <ol style="list-style-type: none"> Slot No. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD5</td> <td>Slot No./Base No.</td> </tr> <tr> <td>SD6</td> <td>I/O No.</td> </tr> <tr> <td>SD7</td> <td rowspan="8">(Vacant)</td> </tr> <tr> <td>SD8</td> </tr> <tr> <td>SD9</td> </tr> <tr> <td>SD10</td> </tr> <tr> <td>SD11</td> </tr> <tr> <td>SD12</td> </tr> <tr> <td>SD13</td> </tr> <tr> <td>SD14</td> </tr> <tr> <td>SD15</td> </tr> </tbody> </table> File name/Drive name <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD5</td> <td>Drive</td> </tr> <tr> <td>SD6</td> <td rowspan="8">File name (ASCII code: 8 characters)</td> </tr> <tr> <td>SD7</td> </tr> <tr> <td>SD8</td> </tr> <tr> <td>SD9</td> </tr> <tr> <td>SD10</td> <td>Extension*1 2EH(.)</td> </tr> <tr> <td>SD11</td> <td>(ASCII code: 3 characters)</td> </tr> <tr> <td>SD12</td> <td rowspan="3">(Vacant)</td> </tr> <tr> <td>SD13</td> </tr> <tr> <td>SD14</td> </tr> <tr> <td>SD15</td> </tr> </tbody> </table> Time (value set) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD5</td> <td>Time : 1 μs units (0 to 999 μs)</td> </tr> <tr> <td>SD6</td> <td>Time : 1 ms units (0 to 65535 ms)</td> </tr> <tr> <td>SD7</td> <td rowspan="8">(Vacant)</td> </tr> <tr> <td>SD8</td> </tr> <tr> <td>SD9</td> </tr> <tr> <td>SD10</td> </tr> <tr> <td>SD11</td> </tr> <tr> <td>SD12</td> </tr> <tr> <td>SD13</td> </tr> <tr> <td>SD14</td> </tr> <tr> <td>SD15</td> </tr> </tbody> </table> Program error location <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD5</td> <td rowspan="4">File name (ASCII code: 8 characters)</td> </tr> <tr> <td>SD6</td> </tr> <tr> <td>SD7</td> </tr> <tr> <td>SD8</td> </tr> <tr> <td>SD9</td> <td>Extension*1 2EH(.)</td> </tr> <tr> <td>SD10</td> <td>(ASCII code: 3 characters)</td> </tr> <tr> <td>SD11</td> <td>Pattern*2</td> </tr> <tr> <td>SD12</td> <td>Block No.</td> </tr> <tr> <td>SD13</td> <td>Step No./transition No.</td> </tr> <tr> <td>SD14</td> <td>Sequence step No. (L)</td> </tr> <tr> <td>SD15</td> <td>Sequence step No. (H)</td> </tr> </tbody> </table> 	Number	Meaning	SD5	Slot No./Base No.	SD6	I/O No.	SD7	(Vacant)	SD8	SD9	SD10	SD11	SD12	SD13	SD14	SD15	Number	Meaning	SD5	Drive	SD6	File name (ASCII code: 8 characters)	SD7	SD8	SD9	SD10	Extension*1 2EH(.)	SD11	(ASCII code: 3 characters)	SD12	(Vacant)	SD13	SD14	SD15	Number	Meaning	SD5	Time : 1 μs units (0 to 999 μs)	SD6	Time : 1 ms units (0 to 65535 ms)	SD7	(Vacant)	SD8	SD9	SD10	SD11	SD12	SD13	SD14	SD15	Number	Meaning	SD5	File name (ASCII code: 8 characters)	SD6	SD7	SD8	SD9	Extension*1 2EH(.)	SD10	(ASCII code: 3 characters)	SD11	Pattern*2	SD12	Block No.	SD13	Step No./transition No.	SD14	Sequence step No. (L)	SD15	Sequence step No. (H)	S (Error)
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REMARK

*1: Extensions are shown below.

SD10 Higher8 bits	SD11		Extension name	File type
	Lower8 bits	Higher8 bits		
51H	50H	41H	QPA	Parameters
51H	50H	47H	QPG	Sequence program
51H	43H	44H	QCD	Device comment
51H	44H	52H	QDR	File register

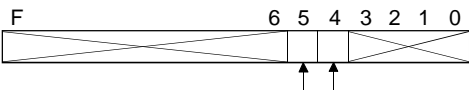
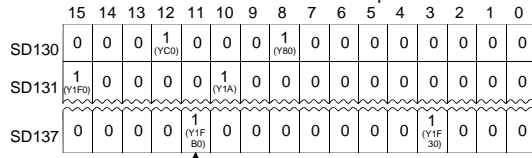
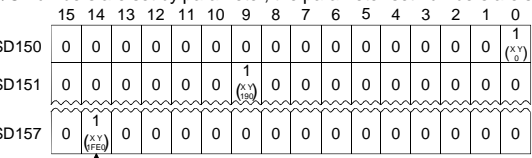
Special Register List (Continued)

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SD16			<ul style="list-style-type: none"> Individual information corresponding to error codes (SD0) is stored here. There are the following six different types of stored information. <p>① File name/Drive name</p> <p>(Example)</p> <table border="1"> <thead> <tr> <th>Number</th> <th>Meaning</th> <th>File name=</th> </tr> </thead> <tbody> <tr> <td>SD16</td> <td>Drive</td> <td>MAIN.QPG</td> </tr> <tr> <td>SD17</td> <td></td> <td>B15 to B8 B7 to B0</td> </tr> <tr> <td>SD18</td> <td>File name</td> <td>41H(A) 4DH(M)</td> </tr> <tr> <td>SD19</td> <td>(ASCII code: 8 characters)</td> <td>4EH(N) 49H(I)</td> </tr> <tr> <td>SD20</td> <td></td> <td>20H(SP) 20H(SP)</td> </tr> <tr> <td>SD21</td> <td>Extension</td> <td>2EH(.)</td> </tr> <tr> <td>SD22</td> <td>(ASCII code: 3 characters)</td> <td>51H(Q) 2EH(.)</td> </tr> <tr> <td>SD24</td> <td>(Vacant)</td> <td>47H(G) 50H(P)</td> </tr> <tr> <td>SD25</td> <td></td> <td></td> </tr> <tr> <td>SD26</td> <td></td> <td></td> </tr> </tbody> </table> <p>② Time (value actually measured)</p> <table border="1"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD16</td> <td>Time : 1 μs units (0 to 999 μs)</td> </tr> <tr> <td>SD17</td> <td>Time : 1 ms units (0 to 65535 ms)</td> </tr> <tr> <td>SD18</td> <td></td> </tr> <tr> <td>SD19</td> <td></td> </tr> <tr> <td>SD20</td> <td></td> </tr> <tr> <td>SD21</td> <td></td> </tr> <tr> <td>SD22</td> <td>(Vacant)</td> </tr> <tr> <td>SD23</td> <td></td> </tr> <tr> <td>SD24</td> <td></td> </tr> <tr> <td>SD25</td> <td></td> </tr> <tr> <td>SD26</td> <td></td> </tr> </tbody> </table> <p>③ Program error location</p> <table border="1"> <thead> <tr> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD16</td> <td>File name</td> </tr> <tr> <td>SD17</td> <td>(ASCII code: 8 characters)</td> </tr> <tr> <td>SD18</td> <td></td> </tr> <tr> <td>SD19</td> <td></td> </tr> <tr> <td>SD20</td> <td>Extension</td> </tr> <tr> <td>SD21</td> <td>2EH(.)</td> </tr> <tr> <td>SD22</td> <td>(ASCII code: 3 characters)</td> </tr> <tr> <td>SD23</td> <td>Pattern*2</td> </tr> <tr> <td>SD24</td> <td>Block No.</td> </tr> <tr> <td>SD25</td> <td>Step No./transition No.</td> </tr> <tr> <td>SD26</td> <td>Sequence step No. (L) Sequence step No. (H)</td> </tr> </tbody> </table> <p>* 2 The pattern data is 0 fixed.</p> <p>④ Parameter number ⑤ Annunciator number ⑥ Intelligent function module parameter error</p> <table border="1"> <thead> <tr> <th>Number</th> <th>Meaning</th> <th>Number</th> <th>Meaning</th> <th>Number</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SD16</td> <td>Parameter No.*3</td> <td>SD16</td> <td>No.</td> <td>SD16</td> <td>Parameter No. *3</td> </tr> <tr> <td>SD17</td> <td></td> <td>SD17</td> <td></td> <td>SD17</td> <td>Error code for intelligent function module</td> </tr> <tr> <td>SD18</td> <td></td> <td>SD18</td> <td></td> <td>SD18</td> <td></td> </tr> <tr> <td>SD19</td> <td></td> <td>SD19</td> <td></td> <td>SD19</td> <td></td> </tr> <tr> <td>SD20</td> <td></td> <td>SD20</td> <td></td> <td>SD20</td> <td></td> </tr> <tr> <td>SD21</td> <td>(Vacant)</td> <td>SD21</td> <td>(Vacant)</td> <td>SD21</td> <td></td> </tr> <tr> <td>SD22</td> <td></td> <td>SD22</td> <td></td> <td>SD22</td> <td>(Vacant)</td> </tr> <tr> <td>SD23</td> <td></td> <td>SD23</td> <td></td> <td>SD23</td> <td></td> </tr> <tr> <td>SD24</td> <td></td> <td>SD24</td> <td></td> <td>SD24</td> <td></td> </tr> <tr> <td>SD25</td> <td></td> <td>SD25</td> <td></td> <td>SD25</td> <td></td> </tr> <tr> <td>SD26</td> <td></td> <td>SD26</td> <td></td> <td>SD26</td> <td></td> </tr> </tbody> </table> <p>* 3 For details of the parameter numbers, refer to the user's manual of the CPU module used.</p>	Number	Meaning	File name=	SD16	Drive	MAIN.QPG	SD17		B15 to B8 B7 to B0	SD18	File name	41H(A) 4DH(M)	SD19	(ASCII code: 8 characters)	4EH(N) 49H(I)	SD20		20H(SP) 20H(SP)	SD21	Extension	2EH(.)	SD22	(ASCII code: 3 characters)	51H(Q) 2EH(.)	SD24	(Vacant)	47H(G) 50H(P)	SD25			SD26			Number	Meaning	SD16	Time : 1 μs units (0 to 999 μs)	SD17	Time : 1 ms units (0 to 65535 ms)	SD18		SD19		SD20		SD21		SD22	(Vacant)	SD23		SD24		SD25		SD26		Number	Meaning	SD16	File name	SD17	(ASCII code: 8 characters)	SD18		SD19		SD20	Extension	SD21	2EH(.)	SD22	(ASCII code: 3 characters)	SD23	Pattern*2	SD24	Block No.	SD25	Step No./transition No.	SD26	Sequence step No. (L) Sequence step No. (H)	Number	Meaning	Number	Meaning	Number	Meaning	SD16	Parameter No.*3	SD16	No.	SD16	Parameter No. *3	SD17		SD17		SD17	Error code for intelligent function module	SD18		SD18		SD18		SD19		SD19		SD19		SD20		SD20		SD20		SD21	(Vacant)	SD21	(Vacant)	SD21		SD22		SD22		SD22	(Vacant)	SD23		SD23		SD23		SD24		SD24		SD24		SD25		SD25		SD25		SD26		SD26		SD26		S (Error)
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SD50	Error reset	Error code that performs error reset	• Stores error code that performs error reset	U																																																																																																																																																																																																																																																															
SD51	Battery low latch	Bit pattern indicating where battery voltage drop occurred	<ul style="list-style-type: none"> • All corresponding bits go ON when battery voltage drops. • Subsequently, these remain ON even after battery voltage has been returned to normal. 	S (Error)																																																																																																																																																																																																																																																															
SD52	Battery low	Bit pattern indicating where battery voltage drop occurred	<ul style="list-style-type: none"> • Same configuration as SD51 above • Subsequently, goes OFF when battery voltage is restored to normal. 	S (Error)																																																																																																																																																																																																																																																															
SD53	AC/DC DOWN detection	Number of times for AC/DC DOWN	• Every time the input voltage falls to or below 85% (AC power)/65% (DC power) of the rating during calculation of the CPU module, the value is incremented by one and stored in BIN.	S (Error)																																																																																																																																																																																																																																																															
SD60	Blown fuse number	Number of module with blown fuse	• Value stored here is the lowest station I/O number of the module with the blown fuse.	S (Error)																																																																																																																																																																																																																																																															
SD61	I/O module verification error number	I/O module verification error module number	• The lowest I/O number of the module where the I/O module verification number took place.	S (Error)																																																																																																																																																																																																																																																															
SD62	Annunciator number	Annunciator number	• The first annunciator number to be detected is stored here.	S (Instruction execution)																																																																																																																																																																																																																																																															
SD63	Number of annunciators	Number of annunciators	• Stores the number of annunciators searched.	S (Instruction execution)																																																																																																																																																																																																																																																															
SD64	Table of detected annunciator numbers	Annunciator detection number	<p>When F goes ON due to OUT F or SET F, the F numbers which go progressively ON from SD64 through SD79 are registered.</p> <p>F numbers turned OFF by RST F are deleted from SD64 to SD79, and are shifted to the data register following the data register where the deleted F numbers had been stored.</p> <p>After 16 annunciators have been detected, detection of the 17th will not be stored from SD64 through SD79.</p> <p>SET SET SET RST SET SET SET SET SET SET SET F50 F25 F99 F25 F15 F70 F65 F38 F110F151F210RSTF50</p> <table border="1"> <tr> <td>SD62</td> <td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td> <td>... (Number detected)</td> </tr> <tr> <td>SD63</td> <td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>8</td> <td>... (Number of annunciators detected)</td> </tr> <tr> <td>SD64</td> <td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td> <td rowspan="14">} (Number detected)</td> </tr> <tr> <td>SD65</td> <td>0</td><td>0</td><td>25</td><td>25</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>15</td> </tr> <tr> <td>SD66</td> <td>0</td><td>0</td><td>0</td><td>99</td><td>0</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>70</td> </tr> <tr> <td>SD67</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>65</td> </tr> <tr> <td>SD68</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>65</td><td>65</td><td>65</td><td>65</td><td>65</td><td>38</td> </tr> <tr> <td>SD69</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>38</td><td>38</td><td>38</td><td>38</td><td>110</td> </tr> <tr> <td>SD70</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>110</td><td>110</td><td>110</td><td>151</td> </tr> <tr> <td>SD71</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>151</td><td>151</td><td>210</td> </tr> <tr> <td>SD72</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>210</td><td>0</td> </tr> <tr> <td>SD73</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD74</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD75</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD76</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD77</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD78</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>SD79</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> </table>	SD62	0	50	50	50	50	50	50	50	50	50	50	50	99	... (Number detected)	SD63	0	1	2	3	2	3	4	5	6	7	8	9	8	... (Number of annunciators detected)	SD64	0	50	50	50	50	50	50	50	50	50	50	50	99	} (Number detected)	SD65	0	0	25	25	99	99	99	99	99	99	99	99	15	SD66	0	0	0	99	0	15	15	15	15	15	15	15	70	SD67	0	0	0	0	0	0	70	70	70	70	70	70	65	SD68	0	0	0	0	0	0	0	65	65	65	65	65	38	SD69	0	0	0	0	0	0	0	0	38	38	38	38	110	SD70	0	0	0	0	0	0	0	0	0	110	110	110	151	SD71	0	0	0	0	0	0	0	0	0	0	151	151	210	SD72	0	0	0	0	0	0	0	0	0	0	0	210	0	SD73	0	0	0	0	0	0	0	0	0	0	0	0	0	SD74	0	0	0	0	0	0	0	0	0	0	0	0	0	SD75	0	0	0	0	0	0	0	0	0	0	0	0	0	SD76	0	0	0	0	0	0	0	0	0	0	0	0	0	SD77	0	0	0	0	0	0	0	0	0	0	0	0	0	SD78	0	0	0	0	0	0	0	0	0	0	0	0	0	SD79	0	0	0	0	0	0	0	0	0	0	0	0	0	S (Instruction execution)
SD62			0	50	50	50	50	50	50	50	50	50	50	50	99	... (Number detected)																																																																																																																																																																																																																																																			
SD63			0	1	2	3	2	3	4	5	6	7	8	9	8	... (Number of annunciators detected)																																																																																																																																																																																																																																																			
SD64			0	50	50	50	50	50	50	50	50	50	50	50	99	} (Number detected)																																																																																																																																																																																																																																																			
SD65			0	0	25	25	99	99	99	99	99	99	99	99	15																																																																																																																																																																																																																																																				
SD66			0	0	0	99	0	15	15	15	15	15	15	15	70																																																																																																																																																																																																																																																				
SD67			0	0	0	0	0	0	70	70	70	70	70	70	65																																																																																																																																																																																																																																																				
SD68			0	0	0	0	0	0	0	65	65	65	65	65	38																																																																																																																																																																																																																																																				
SD69			0	0	0	0	0	0	0	0	38	38	38	38	110																																																																																																																																																																																																																																																				
SD70			0	0	0	0	0	0	0	0	0	110	110	110	151																																																																																																																																																																																																																																																				
SD71			0	0	0	0	0	0	0	0	0	0	151	151	210																																																																																																																																																																																																																																																				
SD72			0	0	0	0	0	0	0	0	0	0	0	210	0																																																																																																																																																																																																																																																				
SD73			0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																				
SD74			0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																				
SD75	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																						
SD76	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																						
SD77	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																						
SD78	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																						
SD79	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																						

Special Register List (Continued)

Number	Name	Meaning	Explanation	Set by (When set)
SD100	Transmission speed storage area	Stores the transmission speed specified in the serial communication setting.	K96: 9.6kbps, K192: 19.2kbps, K384: 38.4kbps, K576: 57.6kbps, K1152: 115.2kbps	S (Power-on or reset)
SD101	Communication setting storage area	Stores the communication setting specified in the serial communication setting.	 <p>Online program correction setting 0: Disabled 1: Enabled</p> <p>Sumcheck yes/no 0: No 1: Yes</p>	S (Power-on or reset)
SD102	Message waiting time storage area	Stores the message waiting time specified in the serial communication setting.	0: No waiting time 1 to F: Waiting time (unit: 10ms) Defaults to 0.	S (Power-on or reset)
SD110	Data sending result storage area	Stores the data sending result when the serial communication function is used.	Stores the error code at the time of data sending using the serial communication function.	S (Error)
SD111	Data receiving result storage area	Stores the data receiving result when the serial communication function is used.	Stores the error code at the time of data receiving.	S (Error)
SD130	Fuse blown module	Bit pattern in units of 16 points, indicating the modules whose fuses have blown 0: No blown fuse 1: Blown fuse present	<ul style="list-style-type: none"> The numbers of output modules whose fuses have blown are input as a bit pattern (in units of 16 points). (If the module numbers are set by parameter, the parameter-set numbers are stored.) Also detects blown fuse condition at remote station output modules  <p>Indicates a blown fuse</p>	S (Error)
SD131				
SD132				
SD133				
SD134				
SD135				
SD136				
SD137				
SD150	I/O module verification error	Bit pattern, in units of 16 points, indicating the modules with verification errors. 0: No I/O verification errors 1: I/O verification error present	<ul style="list-style-type: none"> When the power is turned on, the module numbers of the I/O modules whose information differs from the registered I/O module information are set in this register (in units of 16 points). (If the I/O numbers are set by parameter, the parameter-set numbers are stored.)  <p>Indicates an I/O module verification error</p>	S (Error)
SD151				
SD152				
SD153				
SD154				
SD155				
SD156				
SD157				

Special Register List

(2) System information

Number	Name	Meaning	Explanation	Set by (When set)																		
SD200	Status of switch	Status of CPU switch	<ul style="list-style-type: none"> The CPU module switch status is stored in the following format: <table border="1"> <tr> <td>①: CPU switch status</td> <td>0: RUN</td> </tr> <tr> <td></td> <td>1: STOP</td> </tr> <tr> <td>②: Memory card switch</td> <td>Always OFF</td> </tr> </table>	①: CPU switch status	0: RUN		1: STOP	②: Memory card switch	Always OFF	S (Every END processing)												
①: CPU switch status	0: RUN																					
	1: STOP																					
②: Memory card switch	Always OFF																					
SD201	LED status	Status of CPU-LED	<ul style="list-style-type: none"> The following bit patterns are used to store the statuses of the LEDs on the CPU module: 0 indicates OFF, 1 ON, and 2 flicker. <table border="1"> <tr> <td>①: RUN</td> </tr> <tr> <td>②: ERROR</td> </tr> </table>	①: RUN	②: ERROR	S (Status change)																
①: RUN																						
②: ERROR																						
SD203	Operating status of CPU	Operating status of CPU	<ul style="list-style-type: none"> The CPU module operating status is stored as indicated in the following figure: <table border="1"> <tr> <td>①: Operating status of CPU</td> <td>0:RUN</td> </tr> <tr> <td></td> <td>1:Vacant</td> </tr> <tr> <td></td> <td>2:STOP</td> </tr> <tr> <td></td> <td>3:PAUSE</td> </tr> <tr> <td>②: STOP/PAUSE cause</td> <td>0:Switch</td> </tr> <tr> <td></td> <td>1:Remote contact</td> </tr> <tr> <td></td> <td>2:GX Developer/Serial Communication Module from some other remote source</td> </tr> <tr> <td></td> <td>3:Internal program instruction</td> </tr> <tr> <td>Note: Priority is earliest first</td> <td>4:Errors</td> </tr> </table>	①: Operating status of CPU	0:RUN		1:Vacant		2:STOP		3:PAUSE	②: STOP/PAUSE cause	0:Switch		1:Remote contact		2:GX Developer/Serial Communication Module from some other remote source		3:Internal program instruction	Note: Priority is earliest first	4:Errors	S (Every END processing)
①: Operating status of CPU	0:RUN																					
	1:Vacant																					
	2:STOP																					
	3:PAUSE																					
②: STOP/PAUSE cause	0:Switch																					
	1:Remote contact																					
	2:GX Developer/Serial Communication Module from some other remote source																					
	3:Internal program instruction																					
Note: Priority is earliest first	4:Errors																					
SD210	Clock data	Clock data (year, month)	<ul style="list-style-type: none"> The year (last two digits) and month are stored as BCD code at SD210 as shown below: <p>Example : July, 1993 H9307</p>																			
SD211	Clock data	Clock data (day, hour)	<ul style="list-style-type: none"> The day and hour are stored as BCD code at SD211 as shown below: <p>Example : 31st, 10 a.m. H3110</p>	S/U (Request)																		
SD212	Clock data	Clock data (minute, second)	<ul style="list-style-type: none"> The minutes and seconds (after the hour) are stored as BCD code at SD212 as shown below: <p>Example : 35 min., 48 sec. (after the hour) H3548</p>																			
SD213	Clock data	Clock data (Higher digits of year, day of week)	<ul style="list-style-type: none"> Stores the year (two digits) and the day of the week in SD213 in the BCD code format as shown below: <p>Example : Friday H0005</p> <table border="1"> <thead> <tr> <th>Day of week</th> </tr> </thead> <tbody> <tr><td>0</td><td>Sunday</td></tr> <tr><td>1</td><td>Monday</td></tr> <tr><td>2</td><td>Tuesday</td></tr> <tr><td>3</td><td>Wednesday</td></tr> <tr><td>4</td><td>Thursday</td></tr> <tr><td>5</td><td>Friday</td></tr> <tr><td>6</td><td>Saturday</td></tr> </tbody> </table>	Day of week	0	Sunday	1	Monday	2	Tuesday	3	Wednesday	4	Thursday	5	Friday	6	Saturday	S/U (Request)			
Day of week																						
0	Sunday																					
1	Monday																					
2	Tuesday																					
3	Wednesday																					
4	Thursday																					
5	Friday																					
6	Saturday																					

Special Register List (Continued)

Number	Name	Meaning	Explanation	Set by (When set)																																																						
SD220	LED display data	Display indicator data	<ul style="list-style-type: none"> Stores the message (16 characters of ASCII data) at error occurrence (including annunciator ON). <table border="1" style="margin-left: 40px;"> <tr> <td style="text-align: center;">B15</td> <td style="text-align: center;">to</td> <td style="text-align: center;">B8</td> <td style="text-align: center;">B7</td> <td style="text-align: center;">to</td> <td style="text-align: center;">B0</td> </tr> <tr> <td>SD220</td> <td></td> <td>15th character from the right</td> <td></td> <td></td> <td>16th character from the right</td> </tr> <tr> <td>SD221</td> <td></td> <td>13th character from the right</td> <td></td> <td></td> <td>14th character from the right</td> </tr> <tr> <td>SD222</td> <td></td> <td>11th character from the right</td> <td></td> <td></td> <td>12th character from the right</td> </tr> <tr> <td>SD223</td> <td></td> <td>9th character from the right</td> <td></td> <td></td> <td>10th character from the right</td> </tr> <tr> <td>SD224</td> <td></td> <td>7th character from the right</td> <td></td> <td></td> <td>8th character from the right</td> </tr> <tr> <td>SD225</td> <td></td> <td>5th character from the right</td> <td></td> <td></td> <td>6th character from the right</td> </tr> <tr> <td>SD226</td> <td></td> <td>3rd character from the right</td> <td></td> <td></td> <td>4th character from the right</td> </tr> <tr> <td>SD227</td> <td></td> <td></td> <td></td> <td></td> <td>2nd character from the right</td> </tr> </table> <p>The display device data at PRG CHK is not stored.</p>	B15	to	B8	B7	to	B0	SD220		15th character from the right			16th character from the right	SD221		13th character from the right			14th character from the right	SD222		11th character from the right			12th character from the right	SD223		9th character from the right			10th character from the right	SD224		7th character from the right			8th character from the right	SD225		5th character from the right			6th character from the right	SD226		3rd character from the right			4th character from the right	SD227					2nd character from the right	S (When changed)
B15				to	B8	B7	to	B0																																																		
SD220					15th character from the right			16th character from the right																																																		
SD221					13th character from the right			14th character from the right																																																		
SD222					11th character from the right			12th character from the right																																																		
SD223					9th character from the right			10th character from the right																																																		
SD224					7th character from the right			8th character from the right																																																		
SD225					5th character from the right			6th character from the right																																																		
SD226		3rd character from the right			4th character from the right																																																					
SD227					2nd character from the right																																																					
SD240	Base mode	0: Automatic mode 1: Detail mode	• Stores the base mode.	S (Initial)																																																						
SD241	No. of expansion bases	0: Basic only 1 to 4: No. of expansion bases	• Stores the maximum number of the expansion bases unit being installed.	S (Initial)																																																						
SD242	A/Q base differentiation	Base type differentiation 0: None 1: Q * * B is installed	<table border="1" style="margin-left: 40px;"> <tr> <td style="text-align: center;">B4</td> <td style="text-align: center;">B2</td> <td style="text-align: center;">B1</td> <td style="text-align: center;">B0</td> </tr> <tr> <td style="text-align: center;">Fixed to 0</td> <td style="text-align: center;">to</td> <td style="text-align: center;">to</td> <td style="text-align: center;">to</td> </tr> </table> <ul style="list-style-type: none"> → Main base unit → 1st expansion base → 2nd expansion base → 4th expansion base <p>When no expansion base is installed, the value is fixed to 0.</p>	B4	B2	B1	B0	Fixed to 0	to	to	to	S (Initial)																																														
B4	B2	B1	B0																																																							
Fixed to 0	to	to	to																																																							
SD243	No. of base slots	No. of base slots	<table border="1" style="margin-left: 40px;"> <tr> <td style="text-align: center;">B15</td> <td style="text-align: center;">B12</td> <td style="text-align: center;">B11</td> <td style="text-align: center;">B8</td> <td style="text-align: center;">B7</td> <td style="text-align: center;">B4</td> <td style="text-align: center;">B3</td> <td style="text-align: center;">B0</td> </tr> <tr> <td>SD243</td> <td>Expansion 3</td> <td>Expansion 2</td> <td>Expansion 1</td> <td colspan="2">Main</td> <td></td> <td></td> </tr> <tr> <td>SD244</td> <td colspan="4">Fixed to 0</td> <td colspan="3">Expansion 4</td> </tr> </table>	B15	B12	B11	B8	B7	B4	B3	B0	SD243	Expansion 3	Expansion 2	Expansion 1	Main				SD244	Fixed to 0				Expansion 4			S (Initial)																														
B15			B12	B11	B8	B7	B4	B3	B0																																																	
SD243	Expansion 3	Expansion 2	Expansion 1	Main																																																						
SD244	Fixed to 0				Expansion 4																																																					
SD244			• As shown above, each area stores the number of slots being installed.																																																							
SD250	Loaded maximum I/O	Loaded maximum I/O No.	• When SM250 goes from OFF to ON, the upper 2 digits of the final I/O number plus 1 of the modules loaded are stored as BIN values.	S (Initial)																																																						
SD254	MELSECNET/H information	Number of modules installed	• Indicates the number of modules installed on MELSECNET/H.	S (Initial)																																																						
SD255		I/O No.	• MELSECNET/H I/O number of first module installed																																																							
SD256		Network No.	• MELSECNET/H network number of first module installed																																																							
SD257		Group number	• MELSECNET/H group number of first module installed																																																							
SD258		Station No.	• MELSECNET/H station number of first module installed																																																							
SD290	Device allocation (Same as parameter contents)	Number of points allocated for X	• Stores the number of points currently set for X devices	S (Initial)																																																						
SD291		Number of points allocated for Y	• Stores the number of points currently set for Y devices																																																							
SD292		Number of points allocated for M	• Stores the number of points currently set for M devices																																																							
SD293		Number of points allocated for L	• Stores the number of points currently set for L devices																																																							
SD294		Number of points allocated for B	• Stores the number of points currently set for B devices																																																							
SD295		Number of points allocated for F	• Stores the number of points currently set for F devices																																																							
SD296		Number of points allocated for SB	• Stores the number of points currently set for SB devices																																																							
SD297		Number of points allocated for V	• Stores the number of points currently set for V devices																																																							
SD298		Number of points allocated for S	• Stores the number of points currently set for S devices																																																							

Special Register List (Continued)

Number	Name	Meaning	Explanation	Set by (When set)
SD299	Device allocation (Same as parameter contents)	Number of points allocated for T	• Stores the number of points currently set for T device	S (Initial)
SD300		Number of points allocated for ST	• Stores the number of points currently set for ST devices	
SD301		Number of points allocated for C	• Stores the number of points currently set for C devices	
SD302		Number of points allocated for D	• Stores the number of points currently set for D devices	S (Initial)
SD303		Number of points allocated for W	• Stores the number of points currently set for W devices	
SD304		Number of points allocated for SW	• Stores the number of points currently set for SW devices	
SD315	Time reserved for communication processing	Time reserved for communication processing	Reserves the designated time for communication processing with GX Developer or other units. The greater the value is designated, the shorter the response time for communication with other devices (GX Developer, serial communication units) becomes. Setting range: 1 to 100 ms If the designated value is out of the range above, it is assumed to no setting. The scan time becomes longer by the designated time.	END processing
SD340	Ethernet information	No. of modules installed	• Indicates the number of modules installed on Ethernet.	S (Initial)
SD341		I/O No.	• Indicates the I/O No. of the installed Ethernet.	
SD342		Network No.	• Indicates the network No. of the installed Ethernet.	
SD343		Group No.	• Indicates the group No. of the installed Ethernet.	
SD344		Station No.	• Indicates the station No. of the installed Ethernet.	

(3) System clocks/counters

Number	Name	Meaning	Explanation	Set by (When set)
SD412	1 second counter	Number of counts in 1-second units	• Following programmable controller CPU module RUN, 1 is added each second • Count repeats from 0 to 32767 to -32768 to 0	S (Status change)
SD414	2n second clock setting	2n second clock units	• Stores value n of 2n second clock (Default is 30) • Setting can be made between 1 and 32767	U
SD420	Scan counter	Number of counts in each scan	• Incremented by 1 for each scan execution after the CPU module is set to RUN. • Count repeats from 0 to 32767 to -32768 to 0	S (Every END processing)

(4) Scan information

Number	Name	Meaning	Explanation	Set by (When set)
SD520	Current scan time	Current scan time (ms unit)	<ul style="list-style-type: none"> Current scan time is stored into SD520, SD521. (Measurement is made in 100μs increments.) SD520: Place of ms is stored (storage range: 0 to 65535) SD521: Place of μs is stored (storage range: 0 to 900) (Example) Current scan time 23.6ms is stored as indicated below. SD520 = 23 SD521 = 600	S (Every END processing)
SD521		Current scan time (μ s unit)		S (Every END processing)
SD524	Minimum scan time	Minimum scan time (ms unit)	<ul style="list-style-type: none"> Minimum value of scan time is stored into SD524, SD525. (Measurement is made in 100μs increments.) SD524: Place of ms is stored (storage range: 0 to 65535) SD525: Place of μs is stored (storage range: 0 to 900) 	S (Every END processing)
SD525		Minimum scan time (μ s unit)		S (Every END processing)
SD526	Maximum scan time	Maximum scan time (ms unit)	<ul style="list-style-type: none"> Maximum value of scan time is stored into SD526, SD527. (Measurement is made in 100μs increments.) SD526: Place of ms is stored (storage range: 0 to 65535) SD527: Place of μs is stored (storage range: 0 to 900) 	S (Every END processing)
SD527		Maximum scan time (μ s unit)		
SD540	END processing time	END processing time (ms unit)	<ul style="list-style-type: none"> Time from scan program end until next scan start is stored into SD540, SD541. (Measurement is made in 100μs increments.) SD540: Place of ms is stored (storage range: 0 to 65535) SD541: Place of μs is stored (storage range: 0 to 900) 	S (Every END processing)
SD541		END processing time (μ s unit)		
SD542	Constant scan wait time	Constant scan wait time (ms unit)	<ul style="list-style-type: none"> Waiting time at the time of constant scan setting is stored into SD542, SD543. (Measurement is made in 100μs increments.) SD542: Place of ms is stored (storage range: 0 to 65535) SD543: Place of μs is stored (storage range: 0 to 900) 	S (First END processing)
SD543		Constant scan wait time (μ s unit)		
SD548	Scan program execution time	Scan program execution time (ms unit)	<ul style="list-style-type: none"> Execution time of scan program during one scan is stored into SD548, SD549. (Measurement is made in 100μs increments.) SD548: Place of ms is stored (storage range: 0 to 65535) SD549: Place of μs is stored (storage range: 0 to 900) Stored every scan. 	S (Every END processing)
SD549		Scan program execution time (μ s unit)		

(5) Memory card

Number	Name	Meaning	Explanation	Set by (When set)																					
SD620	Memory card B models	Memory card B models	<ul style="list-style-type: none"> Indicates memory card B models installed 	S (Initial)																					
SD622	Drive 3 (Standard RAM) capacity	Drive 3 capacity	<ul style="list-style-type: none"> Drive 3 capacity is stored in 1kbyte units. 	S (Initial)																					
SD623	Drive 4 (Standard ROM) capacity	Drive 4 capacity	<ul style="list-style-type: none"> Drive 4 capacity is stored in 1kbyte units. 	S (Initial)																					
SD624	Drive 3 use conditions	Drive 3 use conditions	<ul style="list-style-type: none"> Drive 3 use conditions are stored in bit pattern. 	S (Status change)																					
SD640	File register drive	Drive number	<ul style="list-style-type: none"> Stores drive number being used by file register 	S (Status change) * 1																					
SD641	File register file name	File register file name	<ul style="list-style-type: none"> Stores file register file name (MAIN, QDR) selected at parameters as ASCII code. <table border="1"> <thead> <tr> <th></th> <th>B15 to B8</th> <th>B7 to B0</th> </tr> </thead> <tbody> <tr> <td>SD641</td> <td>Second character</td> <td>First character</td> </tr> <tr> <td>SD642</td> <td>Fourth character</td> <td>Third character</td> </tr> <tr> <td>SD643</td> <td>Sixth character</td> <td>Fifth character</td> </tr> <tr> <td>SD644</td> <td>Eighth character</td> <td>Seventh character</td> </tr> <tr> <td>SD645</td> <td>First character of extension</td> <td>2E#(.)</td> </tr> <tr> <td>SD646</td> <td>Third character of extension</td> <td>Second character of extension</td> </tr> </tbody> </table>		B15 to B8	B7 to B0	SD641	Second character	First character	SD642	Fourth character	Third character	SD643	Sixth character	Fifth character	SD644	Eighth character	Seventh character	SD645	First character of extension	2E#(.)	SD646	Third character of extension	Second character of extension	S (Status change) * 1
			B15 to B8	B7 to B0																					
SD641			Second character	First character																					
SD642			Fourth character	Third character																					
SD643			Sixth character	Fifth character																					
SD644			Eighth character	Seventh character																					
SD645	First character of extension	2E#(.)																							
SD646	Third character of extension	Second character of extension																							
SD647	File register capacity	File register capacity	<ul style="list-style-type: none"> Stores the data capacity of the currently selected file register in 1 k word units. 	S (Status change) * 1																					
SD648	File register block number	File register block number	<ul style="list-style-type: none"> Stores the currently selected file register block number. 	S (Status change) * 1																					

* 1: The data is set when the CPU is stopped and then RUN or the RSET instruction is executed after parameter execution.

(6) Instruction-Related Registers

Number	Name	Meaning	Explanation	Set by (When set)																				
SD715	IMASK instruction mask pattern	Mask pattern	<ul style="list-style-type: none"> Patterns masked by use of the IMASK instruction are stored in the following manner: <table border="1"> <thead> <tr> <th></th> <th>B15</th> <th>B1</th> <th>B0</th> </tr> </thead> <tbody> <tr> <td>SD715</td> <td>I15 to I1</td> <td>I1</td> <td>I0</td> </tr> <tr> <td>SD716</td> <td>I31 to I17</td> <td>I17</td> <td>I16</td> </tr> <tr> <td>SD717</td> <td>I47 to I33</td> <td>I33</td> <td>I32</td> </tr> </tbody> </table>		B15	B1	B0	SD715	I15 to I1	I1	I0	SD716	I31 to I17	I17	I16	SD717	I47 to I33	I33	I32	S (During execution)				
			B15	B1	B0																			
SD715			I15 to I1	I1	I0																			
SD716	I31 to I17	I17	I16																					
SD717	I47 to I33	I33	I32																					
SD718	Accumulator	Accumulator	<ul style="list-style-type: none"> For use as replacement for accumulators used in A-series programs. 	S/U																				
SD719																								
SD781 TO SD785	Mask pattern of IMASK instruction	Mask pattern	<ul style="list-style-type: none"> Stores the mask patterns masked by the IMASK instruction as follows: <table border="1"> <thead> <tr> <th></th> <th>B15</th> <th>B1</th> <th>B0</th> </tr> </thead> <tbody> <tr> <td>SD781</td> <td>I63 to I49</td> <td>I49</td> <td>I48</td> </tr> <tr> <td>SD782</td> <td>I79 to I65</td> <td>I65</td> <td>I64</td> </tr> <tr> <td></td> <td colspan="3">to</td> </tr> <tr> <td>SD785</td> <td>I127 to I113</td> <td>I113</td> <td>I112</td> </tr> </tbody> </table>		B15	B1	B0	SD781	I63 to I49	I49	I48	SD782	I79 to I65	I65	I64		to			SD785	I127 to I113	I113	I112	S (During execution)
	B15	B1	B0																					
SD781	I63 to I49	I49	I48																					
SD782	I79 to I65	I65	I64																					
	to																							
SD785	I127 to I113	I113	I112																					

APPENDICES

APPENDIX 1 Error Code Return to Origin During General Data Processing

The CPU module returns an error code to the general data processing request origin when an error occurs and there is a general data processing request from the peripheral equipment, intelligent function module, or network system.

POINT
<p>This error code is not an error that is detected by the CPU module self-diagnostic function, so it is not stored in the special relay (SD0).</p> <p>When the request origin is GX Developer, a message or an error code is displayed.</p> <p>When the request origin is an intelligent function module or network system, an error is returned to the process that was requested.</p>

APPENDIX 1.1 Error code overall explanation

These error codes differ depending on the error No. of the location the error was detected. The following table shows the relationship between the error detection location and the error code.

Error detection location	Error Code (hexadecimal)	Error description reference destination
CPU module	4000H to 4FFFH	Refer to Appendix 1.2.
Intelligent function module	7000H to 7FFFH	User's manuals of intelligent function module
Network system	F000H to FFFFH	Q Corresponding MELSECNET/H Network System Reference Manual

APPENDIX 1.2 Description of the errors of the error codes (4000H to 4FFFH)

The following table indicates the definitions and corrective actions of the error codes (4000H to 4FFFH) detected by the CPU module.

Error code (hexadecimal)	Error item	Error description	Countermeasure
4000H	CPU related error	Sum check error	Check the connection status of the connection cable with the CPU module.
4001H		Remote request that is not handled was executed.	Check the requested remote operation.
4002H		Command for which a global request cannot be performed was executed.	Check the requested command.
4003H		The volume of data handled according to the specified request is too large.	Reduce the volume of data to that which can be processed at the specified request.
4005H		The password cannot be deleted.	Delete the set password.
4006H		The CPU module is not BUSY (The buffer is not vacant).	After the free time has passed, reexecute the request.
4008H		CPU mode error	The CPU module is running to the request contents cannot be executed.
4011H	The CPU module is not in the STEP-RUN status so the request contents cannot be executed.		Execute after setting the CPU module to STEP-RUN status.

Error code (hexadecimal)	Error item	Error description	Countermeasure
4021H	CPU file related error	The specified drive memory does not exist or there is an error.	Check the specified drive memory status.
4022H		The file with the specified file name or file No. does not exist.	Check the specified file name and file No.
4023H		The file name and file No. of the specified file do not match.	Delete the file and then recreate the file.
4024H		The specified file cannot be handled by a user.	Do not access the specified file.
4025H		The specified file is processing the request from a different location.	Forcefully execute the request forcibly. Or reexecute the request after the processing from the other location has ended.
4026H		The keyword specification set in the corresponding drive memory is required.	Access by specifying the keyword set in the corresponding drive memory.
4027H		The specified range exceeds the file range.	Check the specified range and access within that range.
4028H		The same file already exists.	Forcefully execute the request forcibly. Or reexecute after changing the file name.
4029H		The specified file capacity cannot be obtained.	Revise the specified file contents. Or reexecute after cleaning up and reorganizing the specified drive memory.
402BH		The request contents cannot be executed in the specified drive memory.	Do not execute a request for a specified drive memory in which an error has occurred.
402CH		Currently the request contents cannot be executed.	Reexecute after the free wait time has passed.
4030H		CPU device specified error	The specified device name cannot be handled.
4031H	The specified device No. is outside the range.		Check the specified device No.
4032H	There is a mistake in the specified device qualification.		Check the specified device qualification method.
4033H	Writing cannot be done because the specified device is for system use.		Do not write the data in the specified device, and do not turn on or off.
4040H	Intelligent function module specification error	The request contents cannot be executed in the specified intelligent function module.	Do not conduct a request for a specified intelligent function module in which an error has occurred.
4041H		The access range exceeds the buffer memory range of the specified intelligent function module.	Check the header address and access number of points and access using a range that exists in the intelligent function module.
4042H		The specified intelligent function module cannot be accessed.	Check that the specified intelligent function module is operating normally.
4043H		The intelligent function module does not exist in the specified position.	Check the header input/output No. of the specified intelligent function module.
4044H		A control bus error has occurred.	Check that there is no error in the intelligent function module or in the hardware of another module.
4045H		The setting required to conduct simulation has not been made.	Conduct a simulation setting.
4046H		The device header or number of points in the simulation is not in 16point unit.	Check the device header No.or number of points and correct them to 16 point units.

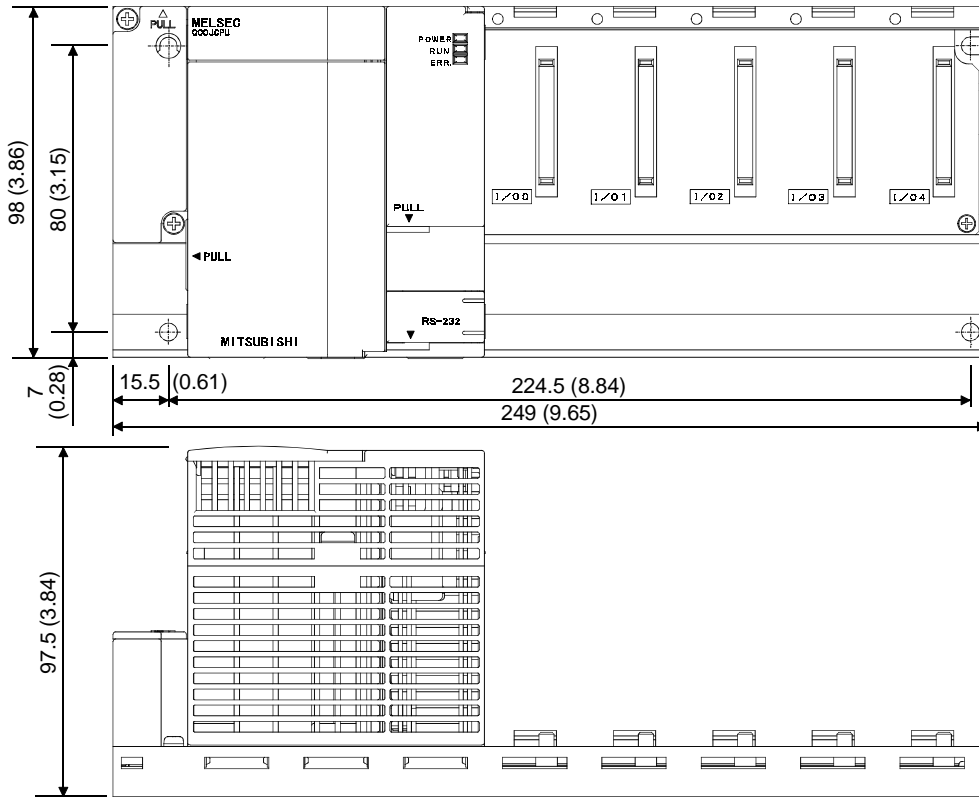
Error code (hexadecimal)	Error item	Error description	Countermeasure	
4051 _H	Protect error	The specified device memory cannot be accessed.	Check the following and make it countermeasures. • Is the memory one that can be used? • Is the specified drive memory correctly installed?	
4052 _H		The specified file attribute is read only so the data cannot be written.	Do not write data in the specified file. Or change the file attribute.	
4053 _H		An error occurred when writing data to the specified drive memory.	Check the specified drive memory. Or reexecute write after changing the corresponding drive memory.	
4054 _H		An error occurred when deleting the data in the specified drive memory.	Check the specified drive memory. Or re-erase after replacing the corresponding drive memory.	
4060 _H	Online registration error	The monitor condition registration CPU module system area is already being used by another piece of equipment.	Reexecute monitor after the monitor by the other equipment has completed. Or increase the system area of the program memory using the format with option.	
4061 _H		Communication failed.	Execute a re-communication.	
4062 _H		The monitor detail condition is already being used and monitored by another piece of equipment.	Do not conduct monitor detail conditions from the specified equipment. Or reexecute monitoring after deleting the monitor detail conditions of the other equipment.	
4063 _H		The number of the file lock registrations exceeds 16.	Reduce the number of registrations to 16 or less.	
4064 _H		There is a problem with the specified contents.	Check the specified contents.	
4065 _H		The device allocation information differs from the parameter.	Check the parameter. Or check the data.	
4066 _H		A keyword that differs from the keyword set in the specified driver memory has been specified.	Check the specified keyword.	
4067 _H		The specified monitor file cannot be obtained.	Conduct monitor after obtaining the monitor file.	
4068 _H		Registration/deletion cannot be conducted because the specified command is being executed.	Reexecute the command after the request from the other equipment has been completed.	
4069 _H		The conditions have already been reached by the device match.	Check the monitor conditions. Or reconduct monitor registration and execute monitor.	
406A _H		A drive other than Nos. 1 to 3 has been specified.	Check the specified drive and specify the correct drive.	
4070 _H		Circuit inquiry	Program before correction and the registration program differ.	Check the registration program and make the programs match.
4080 _H		Other errors	Data error	Check the requested data contents.
4081 _H			The sort subject cannot be detected.	Check the data to be searched.
4082 _H	The specified command is executing and therefore cannot be executed.		Reexecute the command after the request from the other equipment is completed.	
4083 _H	Trying to execute a program that is not registered in the parameter.		Register the program to be executed in the parameter.	

Error code (hexadecimal)	Error item	Error description	Countermeasure
4084 _H	Other errors	The specified pointer P, I cannot be detected.	Check the data to be searched.
4085 _H		Pointer P, I cannot be specified because the program is not specified in the parameter.	Specify pointer P, I after registering the program to be executed in the parameter.
4086 _H		Pointer P, I has already been added.	Check the pointer No. to be added and make correction.
4087 _H		Trying to specify too many pointers.	Check the specified pointer and make a correction.
4088 _H		The specified step No. was not in the instruction header.	Check the specified step No. and make a correction.
4089 _H		An END instruction was inserted/deleted while the CPU module was running.	Conduct Insert/removal after the CPU module has stopped.
408A _H		The file capacity was exceeded by the write during Run.	Write the program after the CPU module has stopped.
408B _H		The remote request cannot be executed.	Reexecute after the CPU module is in a status where the mode request can be executed.
41D0 _H	File-related errors	The route directory has no free space.	Increase the free space of the specified drive. Optimize the specified drive to increase continuous free areas.
41D1 _H		The file pointer is insufficient.	Specify the correct file pointer.
41D5 _H		The file of the same name exists.	Change the file name.
41DF _H		The disk is write-protected.	Cancel the write protection of the disk and execute again.
41E0 _H		The drive does not respond.	Check for the specified drive. If it exists, check its status.
41E1 _H		The address or sector is not found.	Check if the target is a ROM drive or not.
41E4 _H		The file cannot be accessed properly.	Execute again after resetting the CPU module.
41E8 _H		The drive format information is illegal.	Format the target drive.
41E9 _H		At the time of file access, time-out occurred during waiting for access.	Execute again after some time.
41EB _H		The path name is too long.	Check the length of the path name.
41ECH		The disk is logically broken.	Change the specified drive.
41ED _H		An attempt to make a file continuous failed. (There are enough free file areas, which cannot be taken continuously.)	Optimize the specified drive to increase continuous free areas.
41F2 _H		The specified drive is ROM.	Check the specified drive. (Format it for RAM.)
41FB _H		The same starting source has already opened the specified file.	Check if it is being processed by another application.
41FCH		An attempt was made to erase the mounted drive.	Execute again after dismounting the drive.
41FD _H		The flash ROM is not formatted.	Erase the specified drive.
41FE _H	The IC memory card is not inserted.	Insert or reinsert the IC memory card.	
41FF _H	The IC memory card type differs.	Check the IC memory card type.	
4A00 _H	Link related error	(1) The specified station could not be accessed because a routing parameter was not set in the related station. (2) Though routing via the multiple CPU system is attempted, the control CPU of the network module that relays the data is not active.	(1) Set the routing parameter for accessing the specified station in the related station. (2) Try after a while. Or check if the system relaying the data is active, then start communication.
4A01 _H		The network with the No. set in the routing parameter does not exist.	Check the routing parameter set in the related station and make a correction.
4A02 _H		Cannot access the specified station.	Check if an error has occurred in the network module and if the module is offline.
4B00 _H	Object related error	An error occurred in the access destination or in a relay station.	Check if an error has occurred in the specified access destination or in a relay station to the access station and if so take countermeasures.

APPENDIX 2 External Dimensions

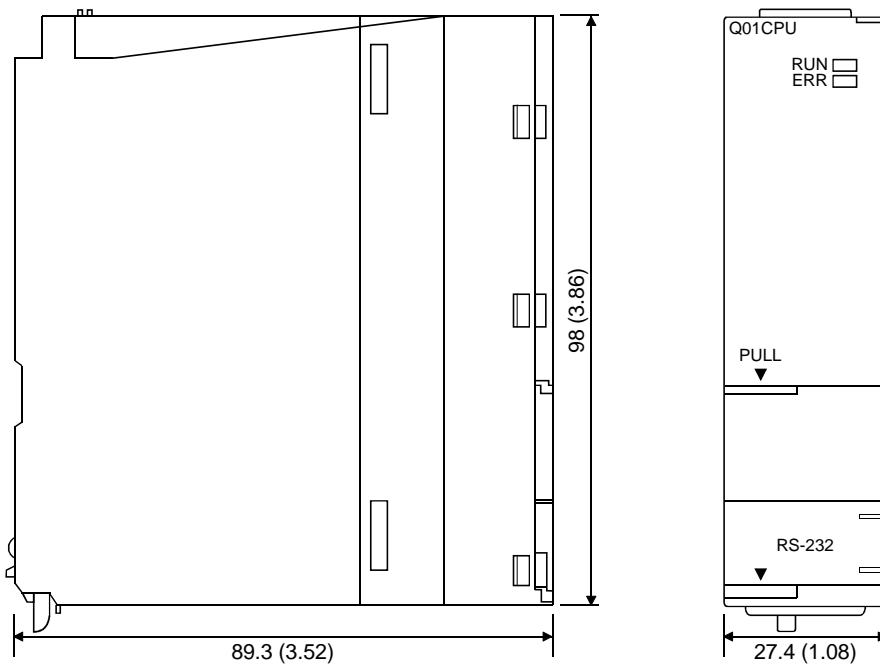
APPENDIX 2.1 CPU module

(1) Q00JCPU



Unit: mm (inch)

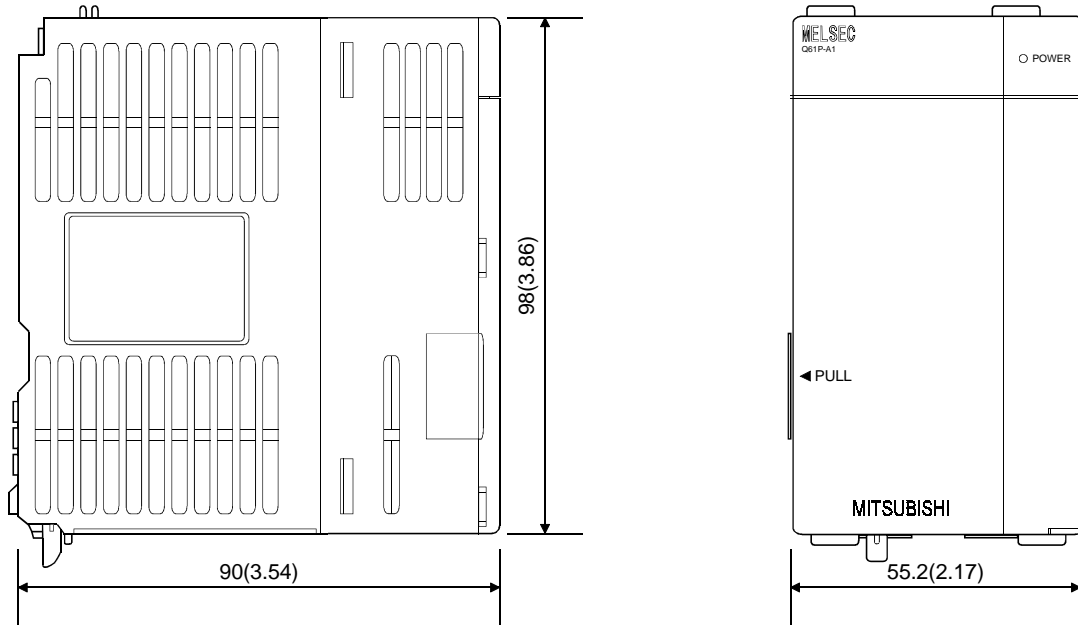
(2) Q00CPU, Q01CPU



Unit: mm (inch)

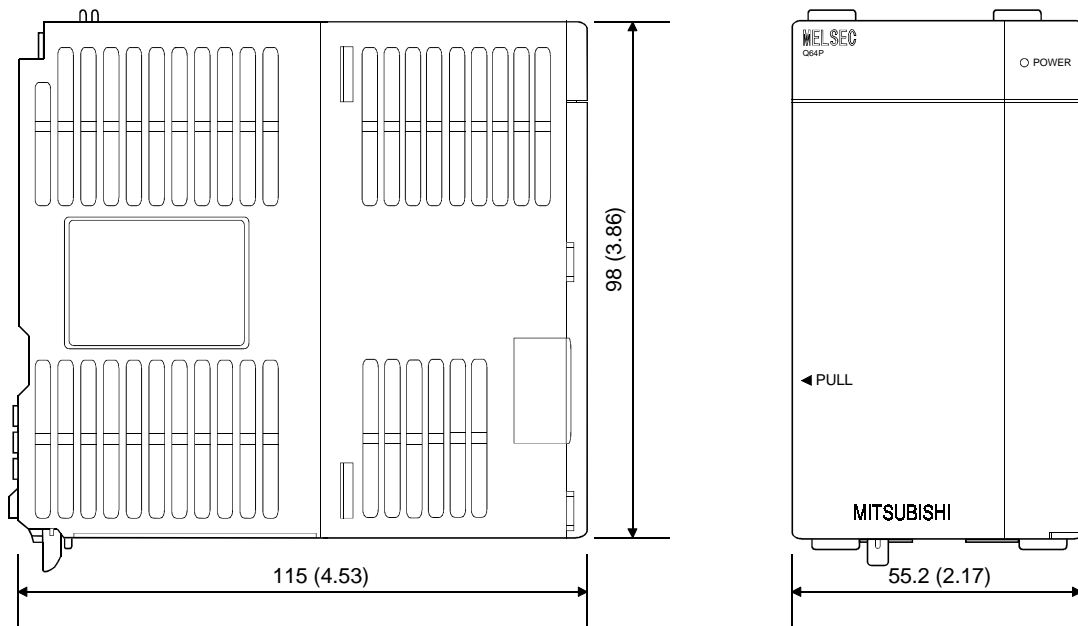
APPENDIX 2.2 Power supply module

(1) Power Supply Module (Q61P-A1, Q61P-A2, Q62P, Q63P)



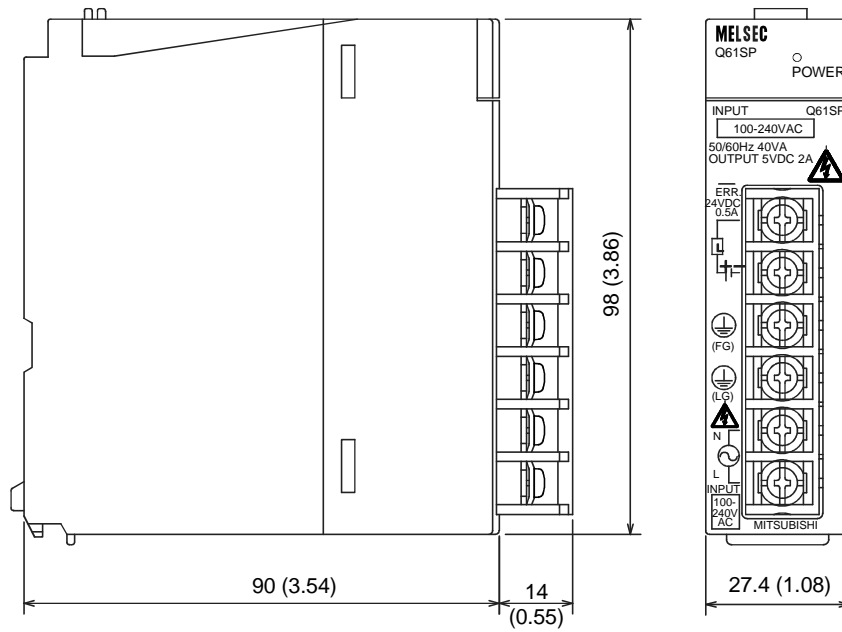
Unit: mm (inch)

(2) Power Supply Module (Q64P)



Unit: mm (inch)

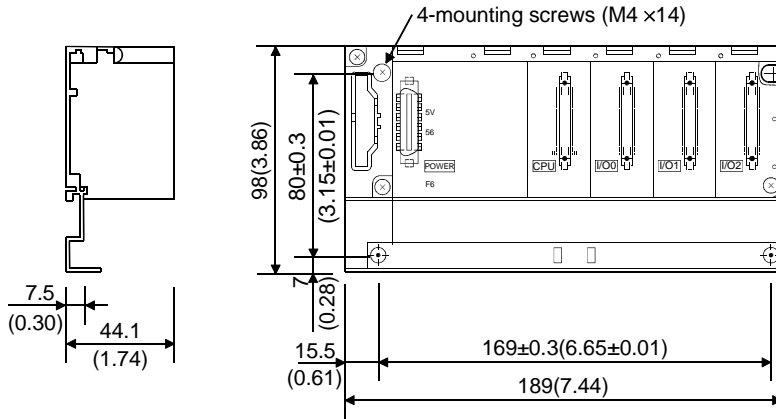
(3) Power Supply Module (Q61SP)



Unit: mm (inch)

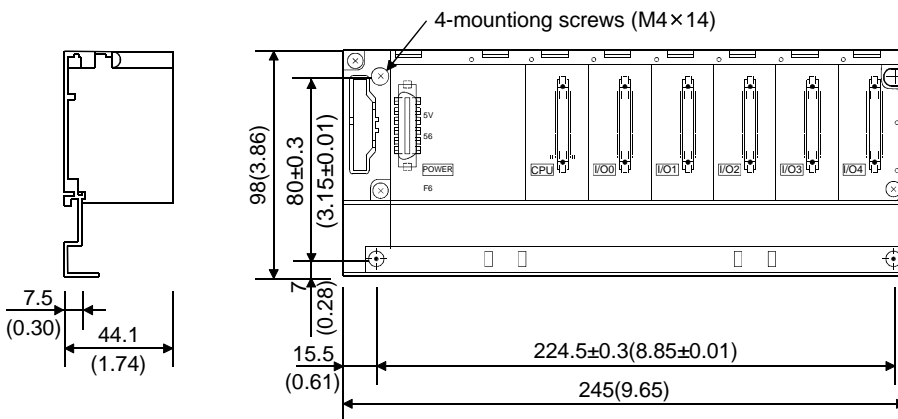
APPENDIX 2.3 Main base unit

(1) Main Base Unit (Q33B)



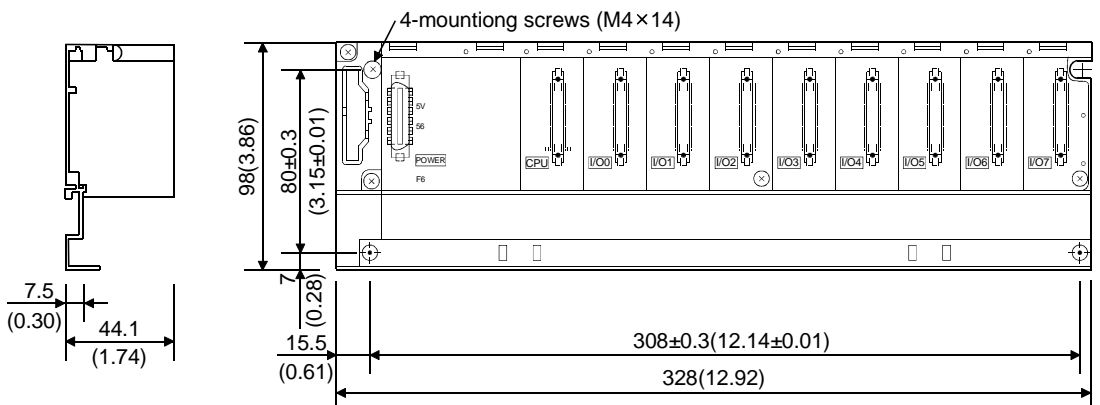
Unit: mm (inch)

(2) Main Base Unit (Q35B)



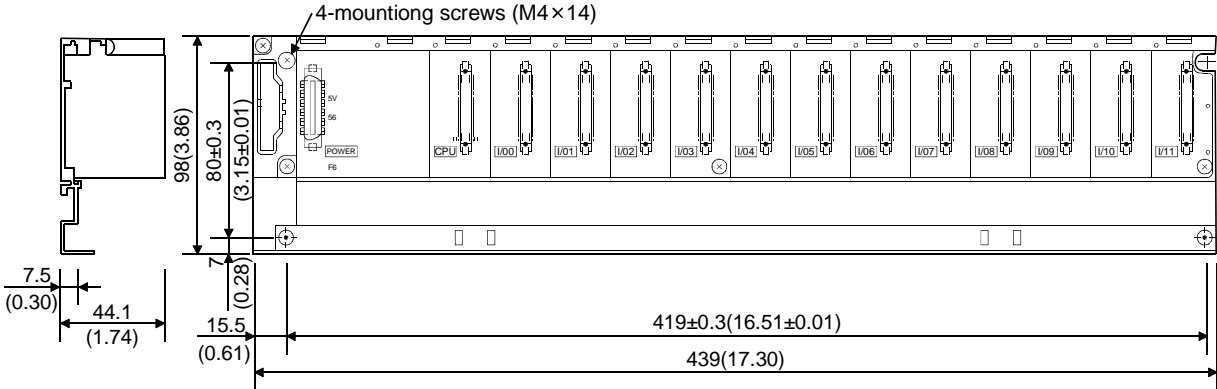
Unit: mm (inch)

(3) Main Base Unit (Q38B)



Unit: mm (inch)

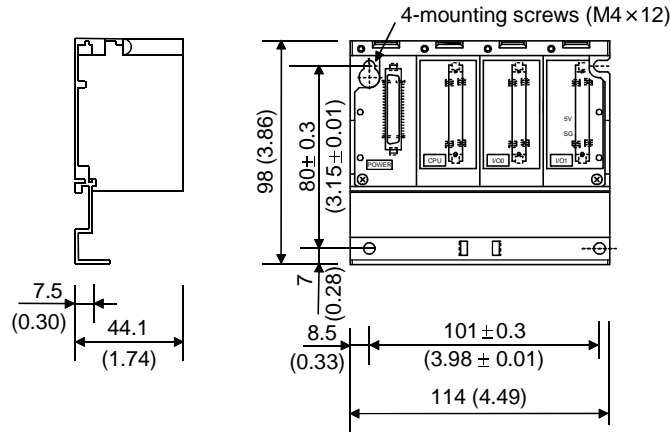
(4) Main Base Unit (Q312B)



Unit: mm (inch)

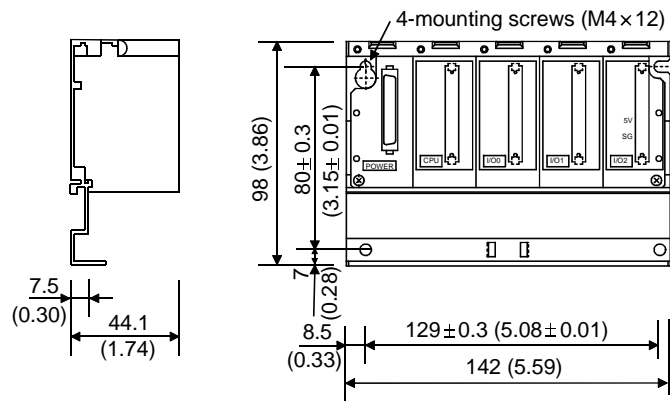
APPENDIX 2.4 Slim type main base unit

(1) Main Base Unit (Q32SB)



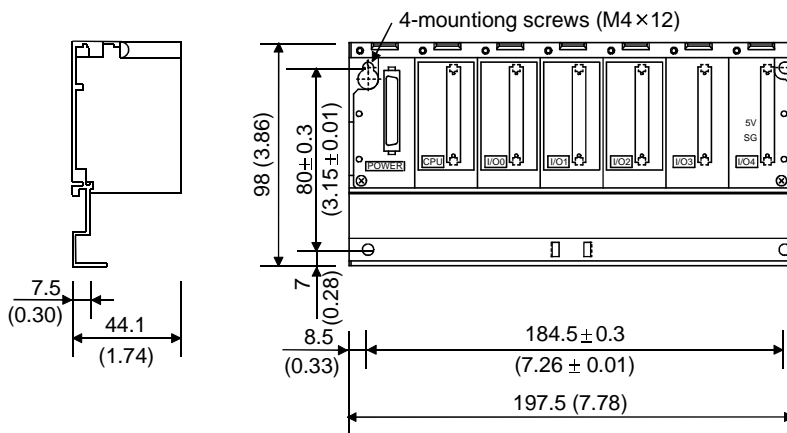
Unit: mm (inch)

(2) Main Base Unit (Q33SB)



Unit: mm (inch)

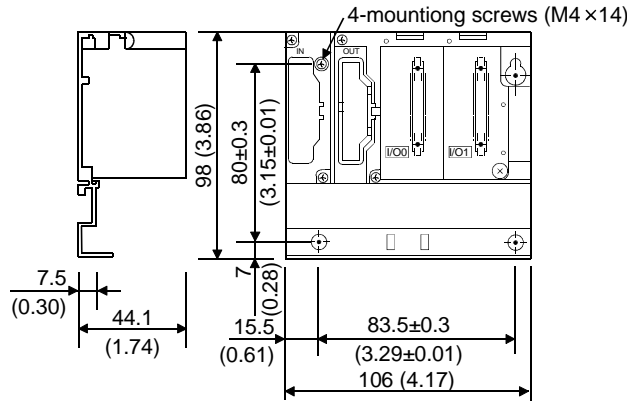
(3) Main Base Unit (Q35SB)



Unit: mm (inch)

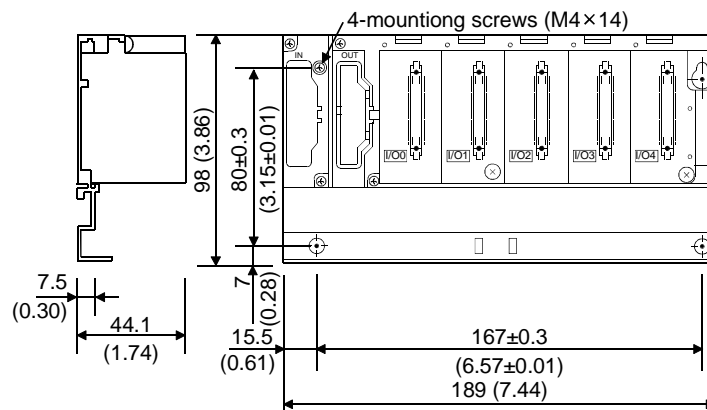
APPENDIX 2.5 Extension base unit

(1) Extension Base Unit (Q52B)



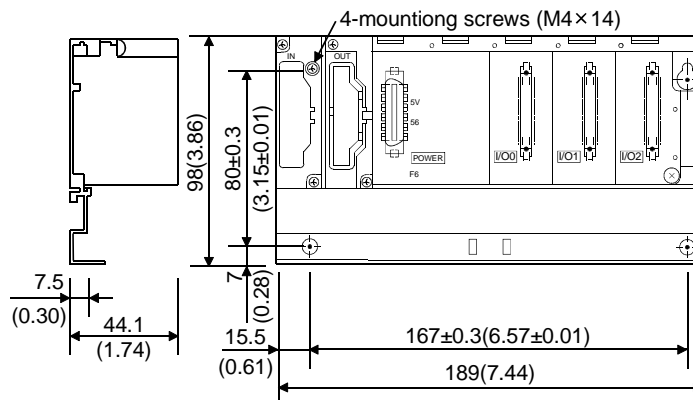
Unit: mm (inch)

(2) Extension Base Unit (Q55B)



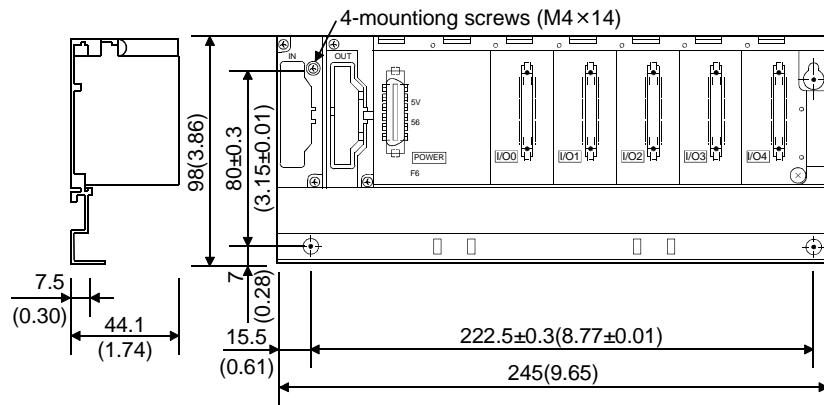
Unit: mm (inch)

(3) Extension Base Unit (Q63B)



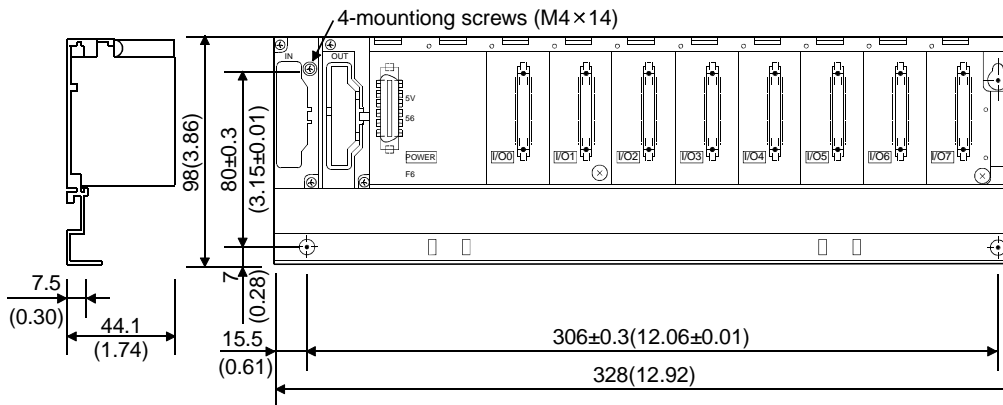
Unit: mm (inch)

(4) Extension Base Unit (Q65B)



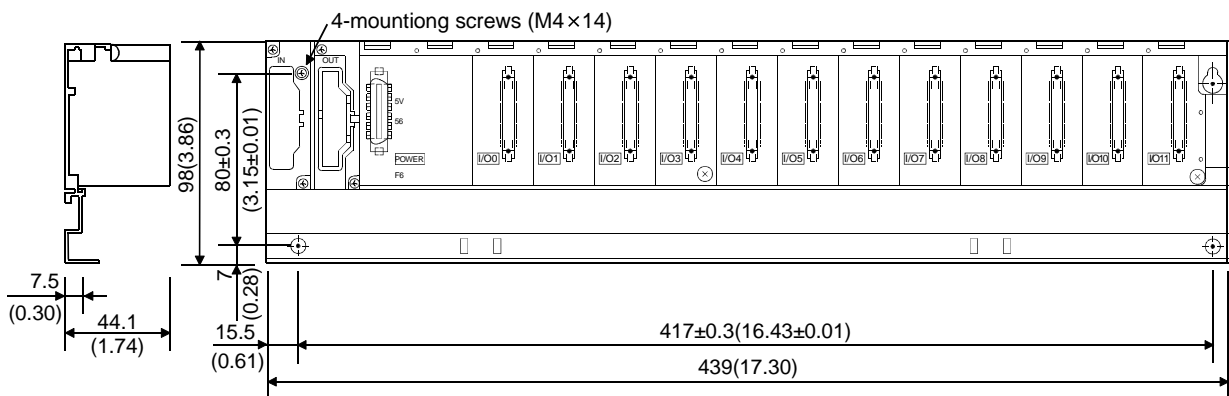
Unit: mm (inch)

(5) Extension Base Unit (Q68B)



Unit: mm (inch)

(6) Extension Base Unit (Q612B)



Unit: mm (inch)

MEMO

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WARRANTY

Please confirm the following product warranty details before starting use.

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 dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

- (1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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