MITSUBISHI

QCPU(Q mode) CPU Module

User's Manual

(Hardware)

Q00JCPU Q02CPU Q12PHCPU
Q00CPU Q02HCPU Q25PHCPU
Q01CPU Q06HCPU
Q12HCPU
Q25HCPU

Thank you for buying the Mitsubishi programmable logic controller MELSEC-Q Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MELSEC-Q
Mitsubishi Programmable Logic Controller

MODEL	QCPU(Q)-U(H/W)-E
MODEL CODE	13JL96
IB(NA)-0800061-J(0209)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using)

When using Mitsubishi equipment, thoroughly read this manual and the related manuals introduced in this manual. Also pay careful attention to safety and handle the module correctly.
These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

⚠DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out correctly.
⚠CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out correctly.

Depending on circumstances, procedures indicated by **⚠CAUTION** may also cause serious accidents.
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.
  Note that the AnS series module will turn off the output in either of cases (a) and (b).
  (a) The power supply module has over currentprotection equipment and over voltage protection equipment.
  (b) The CPU module self-diagnosis functions, such as the watch dog timer error, detect problems.
  In addition, all outputs will be turned on when there are problems that the CPU module cannot detect, such as in the I/O controller. Build a fail-safe circuit or provide a mechanism exterior to the PLC that will make sure the equipment operates safely at such times. For a fail-safe circuit example, see "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.

[DESIGN PRECAUTIONS]

⚠DANGER

- 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 CPU module.

⚠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 mounting lever at the module bottom, and securely insert the module fixing latch into the fixing hole in the base unit. Incorrect mounting 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. ● Securely mount the memory card into the memory card mounting connector. After mounting, check for lifting. Lifting can cause a malfunction due to a contact fault. ● Completely turn off the external power supply before mounting or removing the module. Not doing so could result in electric shock or damage to the product. Note that online module change can be made when the QnPHCPU is used. Note that there are restrictions on the modules that can be changed online and each module has a predetermined changing procedure. For details, refer to the section of online module change in the Process CPU User's Manual (Hardware Design,Maintenance and Inspection). ● 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.

⚠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.

⚠CAUTION
● 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. ● 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. Note that online module change can be made when the QnPHCPU is used. Note that there are restrictions on the modules that can be changed online and each module has a predetermined changing procedure. For details, refer to the section of online module change in the Process CPU User's Manual (Hardware Design,Maintenance and Inspection). ● Be sure not make a strong impact on the battery to be mounted into the module by dropping or similar careless action. This could break the battery, causing an internal battery liquid leakage. Do not use the battery which has been exposed to a strong impact, and dispose of it.

[DISPOSAL PRECAUTIONS]

⚠CAUTION
● When disposing of this product, treat it as industrial waste.

Revisions

* The manual number is described at the lower right of the front cover.

Print Date	*Manual Number	Revision
Nov.,1999	IB(NA)-0800061-A	First printing
May.,2000	IB(NA)-0800061-B	Q33B, Q63B, QX70, QX71, QX72, QY18A, QY22, QH42P and QX48Y57 added.
Sep.,2000	IB(NA)-0800061-C	QX28, QX40-S1, QI60 and Q63P added. Addition Section1.2, 4.5.5 Correction Section2.2, 6.1
Nov.,2000	IB(NA)-0800061-D	QY70 and QY71 added. Correction Section5.4.1
Jan.,2001	IB(NA)-0800061-E	Q62P, QY68A added. Correction Section4.1.2
May.,2001	IB(NA)-0800061-F	Q00JCPU, Q00CPU, Q01CPU, Q52B and Q55B added. Partial addition Chapter 1, Table 4.2, Section 4.5, Section 4.5 changed to be Section 4.6.
Sep.,2001	IB(NA)-0800061-G	Q64P added. Partial addition Section 1.1, 3.1.5, 4.1.2, 4.1.4, 4.1.5, 4.3.1, 4.5.3, 4.6.4, 5.2.1
Mar.,2002	IB(NA)-0800061-H	Q12PHCPU, Q25PHCPU added Correction Section 1.2, 2.2, 2.3, 4.3.1, 4.5.1, 4.6.1, 5.3.1, 5.3.2, 6.1
Jul.,2002	IB(NA)-0800061-I	QX41-S1, QX42-S1 added
Sep.,2002	IB(NA)-0800061-J	Completely reviewed and revised. Q32SB, Q33SB, Q35SB, Q61SP added

Japanese Manual Version IB (NA) -0800027-L

CONTENTS

About the Manuals

The following product manuals are available. Please use this table as a reference to request the appropriate manual as necessary.

Basic Model QCPU (Q00JCPU, Q00CPU, Q01CPU)

Detailed Manual

Manual name	Manual No. (Model code)
Basic Model QCPU (Q Mode) User's Manual (Hardware Design, Maintenance and Inspection) This manual provides the specifications of the CPU modules, power supply modules, base units, extension cables and others. (Sold separately)	SH-080187 (13JR43)
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 (Q mode). (Sold separately)	SH-080188 (13JR44)

Relevant Manual

Manual name	Manual No. (Model code)
QCPU (Q Mode)/QnACPU Programming Manual (Common Instructions) This manual explains how to use the sequence instructions, basic instructions, application instructions and similar instructions. (Sold separately)	SH-080039 (13JF58)
Building Block I/O Module User's Manual This manual provides the specifications and external wiring of I/O modules. (Sold separately)	SH-080042 (13JL99)

High Performance Model QCPU
(Q02 (H) CPU, Q06HCPU, Q12HCPU, Q25HCPU)

Detailed Manual

Manual name	Manual No. (Model code)
High Performance Model QCPU (Q Mode) User's Manual (Hardware Design, Maintenance and Inspection) This manual provides the specifications of the CPU modules, power supply modules, base units, extension cables, memory cards and others. (Sold separately)	SH-080037 (13JL97)
High Performance 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 High Performance model QCPU (Q mode). (Sold separately)	SH-080038 (13JL98)

Relevant Manual

Manual name	Manual No. (Model code)
QCPU (Q Mode)/QnACPU Programming Manual (Common Instructions) This manual explains how to use the sequence instructions, basic instructions, application instructions and similar instructions. (Sold separately)	SH-080039 (13JF58)
QCPU (Q Mode)/QnACPU Programming Manual (PID Control) This manual explains the dedicated instructions used to exercise PID control. (Sold separately)	SH-080040 (13JF59)
QCPU (Q Mode)/QnACPU Programming Manual (SFC) This manual explains the system configuration, performance specifications, functions, programming, debugging, error codes and others of MELSAP3. (Sold separately)	SH-080041 (13JF60)
QCPU (Q Mode)/QnACPU Programming Manual (MELSAP-L) This manual explains the programming methods, specifications, functions, and so on that are necessary to create the MELSAP-L type SFC programs. (Sold separately)	SH-080076 (13JF61)
Building Block I/O Module User's Manual This manual provides the specifications and external wiring of I/O modules. (Sold separately)	SH-080042 (13JL99)

Process CPU (Q12PHCPU, Q25PHCPU)

Detailed Manual

Manual name	Manual No. (Model code)
Process CPU User's Manual (Hardware Design, Maintenance and Inspection) This manual provides the specifications of the CPU modules, power supply modules, base units, extension cables, memory cards and others. (Sold separately)	SH-080314E (13JR55)
Process CPU User's Manual (Function Explanation, Program Fundamentals) This manual explains the functions, programming methods, devices and so on necessary to create programs with the Process CPU (Sold separately)	SH-080315E (13JR56)

Relevant Manual

Manual name	Manual No. (Model code)
QCPU (Q Mode)/QnACPU Programming Manual (Common Instructions) This manual explains how to use the sequence instructions, basic instructions and application instructions. (Sold separately)	SH-080039 (13JF58)
QnPHCPU Programming Manual (Process Control Instructions) This manual explains the programming procedures, device names, and other items necessary to implement PID control using process control instructions. (Sold separately)	SH-080316E (13JF67)
QCPU (Q Mode)/QnACPU Programming Manual (SFC) This manual explains the system configuration, performance specifications, functions, programming, debugging, error codes and others of MELSAP3. (Sold separately)	SH-080041 (13JF60)
QCPU (Q Mode)/QnACPU Programming Manual (MELSAP-L) This manual explains the programming methods, specifications, functions, and so on that are necessary to create the MELSAP-L type SFC programs. (Sold separately)	SH-080076 (13JF61)
Building Block I/O Module User's Manual This manual prividesthe specifications and external wiring of I/O modules. (Sold separately)	SH-080042 (13JL99)

1. Overview

This manual provides the performance specifications, loading and installation, and part names and settings of the MELSEC-Q series CPU modules, the specifications and connection of the I/O modules, and how to read error codes.
The CPU type is abbreviated to the QCPU when description is common to the MELSEC-Q series CPU modules.
The usable extension base units and the number of extension bases vary with the CPU module used.
The following table indicates the CPU module types described in this manual and differences between them.

CPU Module Type	Main Base	Extension Base			Number of Extension Bases	Number of mountable Modules
		Q5□B	Q6□B	QA1S□B		
Q00JCPU	Unnecessary	Usable	Usable	Unusable	2	16
Q00CPU	Necessary	Usable *1	Usable *1	Unusable	4	24
Q01CPU						
Q02 (H) CPU	Necessary	Usable *1	Usable *1	Usable *1	7	64
Q06HCPU						
Q12HCPU						
Q25HCPU						
Q12PHCPU	Necessary *2	Usable	Usable	Unusable	7	64
Q25PHCPU						

*1: Extension base unit cannot be connected when the slim type main base unit (Q32SB, Q33SB, Q35SB) is used.
*2: Q12PHCPU and Q25PHCPU are not compatible with the slim type main base unit (Q32SB, Q33SB, Q35SB).

1.1 Included Parts

The following tables list the parts included with the corresponding modules.

(1) CPU module

(a) Q00JCPU

Product Name	Type	Quantity
CPU module	Q00JCPU	1
Battery	Q6BAT	1
Base unit mounting screw	M4×14 screw	4
This manual	——	1

(b) Other than Q00JCPU

Product Name	Type	Quantity
CPU module	Q00CPU	1
	Q01CPU	
	Q02CPU	
	Q02HCPU	
	Q06HCPU	
	Q12HCPU	
	Q25HCPU	
	Q12PHCPU	
	Q25PHCPU	
Battery	Q6BAT	1

(2) Main base unit for Q series modules

Product Name	Type	Quantity
Main base unit	Q33B	1
	Q35B	
	Q38B	
	Q312B	
Base unit mounting screw	M4×14 screw	4
This manual	——	1

(3) Slim type main base unit for Q series module

Product Name	Type	Quantity
Slim type main base unit	Q32SB	1
	Q33SB	
	Q35SB	
Base unit mounting screw	M4×12 screw	4
This manual	——	1

(4) Extension base unit for Q series modules

Product Name	Type	Quantity
Extension base unit	Q52B	1
	Q55B	
	Q63B	
	Q65B	
	Q68B	
	Q612B	
Base unit mounting screw	M4×14 screw	4

(5) Extension base unit for AnS series modules
(Only Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU or Q25HCPU is usable)

Product Name	Type	Quantity
Extension base unit	QA1S65B	1
	QA1S68B	
Base unit mounting screw	M5 screw	4

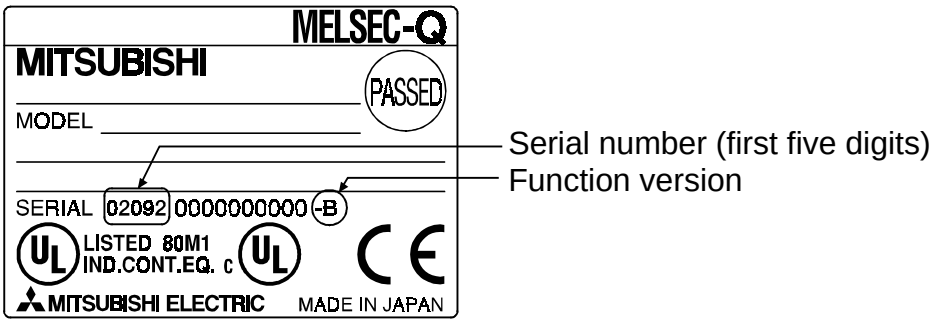
(6) Power supply module

Product Name	Type	Quantity
Power supply module	Q61P-A1	1
	Q61P-A2	
	Q62P	
	Q63P	
	Q64P	
	Q61SP	
	A1S61PN	
	A1S62PN	
	A1S63P	

1.2 Confirming the serial number and function version

The QCPU serial No. and function version can be confirmed on the rating nameplate and GX Developer's system monitor.

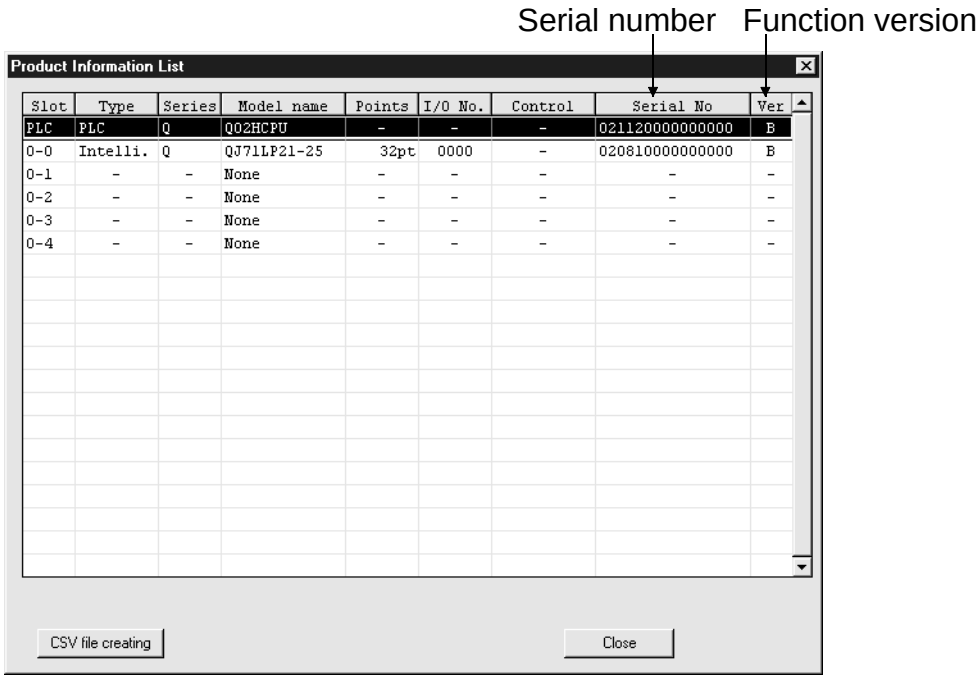
(1) Confirmation on the rating nameplate



(2) Confirmation on the system monitor

The QCPU serial No. and function version can be confirmed with Product Information List on the GX Developer's system monitor.*

The intelligent function module's serial No. and function version can also be confirmed.



* : The version of compatible GX Developer varies depending on the CPU module.

Type	Version of Compatible GX Developer
Q00JCPU Q00CPU Q01CPU	GX Developer Version 7 or later
Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	GX Developer Version 6 or later
Q12PHCPU Q25PHCPU	GX Developer Version 7.10L or later

2. Specifications

2.1 General Specifications

This section provides specifications common to various modules.

Table 2.1 General Specifications

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-25 to 75℃*3</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6">5 to 95%RH*4, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">5 to 95%RH*4, non-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Conforming to JIS B 3502, IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>10 to 57Hz</td><td>———</td><td>0.075mm (0.003inch)</td><td rowspan="4">10 times each in X, Y, Z directions (for 80 minch)</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s^2</td><td>———</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>10 to 57Hz</td><td>———</td><td>0.035mm (0.001inch)</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s^2</td><td>———</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforming to JIS B 3502, IEC 61131-2 (147 m/s^2, 3 times in each of 3 directions X, Y, Z)</td></tr>
<tr><td>Operating ambience</td><td colspan="6">No corrosive gases</td></tr>
<tr><td>Operating altitude</td><td colspan="6">2000m (6562ft.) max.</td></tr>
<tr><td>Installation position</td><td colspan="6">Inside control panel</td></tr>
<tr><td>Overvoltage category *1</td><td colspan="6">II max.</td></tr>
<tr><td>Pollution level *2</td><td colspan="6">2 max.</td></tr>
</table>

*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.
In the environment corresponding to “Pollution level 2”, basically only non-conductive pollution occurs, however temporary conductivity may occur due to the occasional condensing.

*3: The storage ambient temperature is -20 to 75℃ if the system includes the AnS series modules.

*4: The operating ambient humidity and storage ambient humidity are 10 to 90%RH if the system includes the AnS series modules.

*5: 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.

2.2 Performance Specifications of CPU Modules

This section provides the performance specifications of the CPU modules.

Table 2.2 Q00JCPU, Q00CPU, Q01CPU Performance Specifications

Item			Type			Remarks
			Q00JCPU	Q00CPU	Q01CPU	
Control method			Repeated operation using stored program			——
I/O control mode			Refresh mode			Direct I/O is available by direct I/O specification (DX□, DY□)
Programming language (Language dedicated to sequence control)			Relay symbol language, logic symbolic languagee			——
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 (except instructions dedicated to intelligent function module)			——
Constant scan (Function that uniforms scan time)			1 to 2000ms (can be specified in 1ms increments)			Parameter setting
Program capacity *1			8k steps	8k steps	14k steps	——
Memory capacity		Program memory (Drive 0)	58kbyte	94kbyte		——
		Standard RAM (Drive 3)	None	64kbyte		——
		Standard ROM (Drive 4)	58kbyte	94kbyte		——
Number of standard ROM write times			Max. 100 thousand times			——
Number of I/O device points			2048 points (X/Y0 to 7FF)			Number of points available in programs
Number of occupied I/O points			256 points (X/Y0 to FF)	1024 points (X/Y0 to 3FF)		Number of points accessible to actual I/O modules
Number of extension bases			2	4		——
Number of loadable modules			16	24		——
Clock function			Year, month, day, hour, minute, second, day of week (Automatic leap year judgment) Accuracy -3.2 to +5.27s (TYP. +1.98s)/d at 0℃ -2.57 to +5.27s (TYP. +2.22s)/d at 25℃ -11.68 to +3.65s (TYP. -2.64s)/d at 55℃			——
Allowable momentaly power failure period			Within 20ms (100VAC or more)	depending on power supply module		——
5VDC internal current consumption			0.22A *2	0.25A	0.27A	——
External dimensions		H	98mm (3.86inch)	98mm (3.86inch)		——
		W	245mm (9.65inch) *2	27.4mm (1.08inch)		——
		D	98mm (3.86inch)	89.3mm (3.52inch)		——
Weight			0.66kg *2	0.13kg		——

*1: The max. number of sequence steps that can be executed is found by the following expression.
(Program capacity) - (file header size (default: 34 steps))
Refer to the following manual for details of the program capacity and file.
• Basic Model QCPU (Q Mode) User's Manual
(Function Explanation, Program Fundamentals)

*2: These values include those of the CPU module, base unit and power supply module.

Table 2.3 Q02(H)CPU, Q06HCPU, Q12HCPU, Q25HCPU Performance Specifications

Item			Type					Remarks
			Q02 CPU	Q02H CPU	Q06H CPU	Q12H CPU	Q25H CPU	
Control method			Repeated operation using stored program					——
I/O control mode			Refresh mode					Direct I/O is available by direct I/O specification (DX□, DY□)
Programming language (Language dedicated to sequence control			Relay symbol language, logic symbolic language, MELSAP3 (SFC), MELSAP-L and function block					——
Processing speed (sequence instruction)		LD X0	0.079μs	0.034μs				——
		MOV D0 D1	0.237μs	0.102μs				——
Total number of instructions			360 (except instructions dedicated to intelligent function module)					——
Constant scan (Function that uniforms scan time)			0.5 to 2000 ms (can be specified in 0.5ms increments)					Parameter setting
Program capacity *2	Program memory (Drive 0)		28k step		60k step	124k step	252k step	——
Memory capacity	Memory card (RAM) (Drive 1)		Capacity of the memory card (max. 2Mbyte)					——
	Memory card (ROM) (Drive 2)		Capacity of the memory card loaded (Flash card: max. 4Mbyte, ATA card: max. 32Mbyte)					——
	Standard RAM (Drive 3)		64kbyte	128kbyte *5		256kbyte *3		——
	Standard ROM (Drive 4)		112 kbyte		240 kbyte	496 kbyte	1008 kbyte	——
	CPU shared memory*4		8kbyte					——
Max. number of files stored	Program memory		28		60	124	252 *1	——
	Memory card (RAM)		256					——
	Memory card (ROM)	Flash card	288					——
		ATA card	512					——
	Standard RAM		2					Only one file each for file register and local device
	Standard ROM		28		60	124	252	——
Number of standard ROM write times			Max. 100 thousand times					——

*1: The CPU module can execute 124 files. It cannot execute 125 or more files.

*2: The maximum number of sequence steps (for one program) for which the parameters are stored in another drive and executed with the CPU module can be calculated with the following expression.
(Program size) - (File header size (default : 34 steps))
Refer to the High Performance model QCPU (Q Mode) User's Manual (Function Explanation, Program Fundamentals) for details on the program size and file.

Item		Type					Remarks
		Q02 CPU	Q02H CPU	Q06H CPU	Q12H CPU	Q25H CPU	
Number of I/O device points		8192 points (X/Y0 to 1FFF)					Number of points available in programs
Number of occupied I/O points		4096 points (X/Y0 to FFF)					Number of points accessible to actual I/O modules
Number of extension bases		7					——
Number of mountable modules		64					——
Clock function		Year, month, day, hour, minute, second, day of week (Automatic leap year judgment) Accuracy -3.18 to +5.25s (TYP.+2.12s)/d at 0℃ -3.93 to +5.25s (TYP.+1.90s)/d at 25℃ -14.69 to +3.53s (TYP.-3.67s)/d at 55℃					——
Allowable momentary power failure period		Depends on power supply module.					——
5VDC internal current consumption		0.60A	0.64A				——
External dimensions	H	98mm (3.86inch)					——
	W	27.4mm (1.08inch)					——
	D	89.3mm (3.52inch)					——
Weight		0.20kg					——

*3: The memory capacity of the Q12HCPU or Q25HCPU whose serial No.'s first five digits are "02091" or earlier is 64kbyte. (See to section 1.2 for the way to check the serial No.)

*4: Memory added to the function version B.
The CPU shared memory is not latched.
The CPU shared memory is cleared when the PLC is powered on or the CPU module is reset.

*5: The memory capacity of the Q02HCPU or Q06HCPU whose serial No.'s first five digits are "04011" or earlier is 64kbyte. (See to Section 1.2 for the way to check the serial No.)

Table 2.4 Q12PHCPU, Q25PHCPU Performance Specifications

Item			Type		Remarks
			Q12PHCPU	Q25PHCPU	
Control method			Repeated operation using stored program		——
I/O control mode			Refresh mode		Direct I/O is available by direct I/O specification (DX□, DY□)
Programming language (Language dedicated to sequence control)			Relay symbol language, logic symbolic language, MELSAP3 (SFC), MELSAP-L, and function block		——
Processing speed (sequence instruction)		LD X0	0.034μs		——
		MOV D0 D1	0.102μs		——
Total number of instructions			415 (except instructions dedicated to intelligent function module)		——
Constant scan (Function that uniforms scan time)			0.5 to 2000 ms (can be specified in 0.5ms increments)		Parameter setting
Program capacity *2	Program memory (Drive 0)		124k step	252k step	——
Memory capacity	Memory card (RAM) (Drive 1)		Capacity of mounted memory card (max. 2Mbyte)		——
	Memory card (ROM) (Drive 2)		Capacity of mounted memory card (Flash card: max. 4Mbyte, ATA card: max. 32Mbyte)		——
	Standard RAM (Drive 3)		256kbyte		——
	Standard ROM (Drive 4)		496kbyte	1008kbyte	——
	CPU shared memory*3		8kbyte		——
Max. number of files stored	Program memory		124	252 *1	——
	Memory card (RAM)		256		——
	Memory card (ROM)	Flash card	288		——
		ATA card	512		——
	Standard RAM		2		Only one file each for file register and local device
	Standard ROM		124	252	——
Number of standard ROM write times			Max. 100 thousand times		——

*1: The CPU module can execute 124 files. It cannot execute 125 or more files.

*2: The maximum number of sequence steps (for one program) for which the parameters are stored in another drive and executed with the CPU module can be calculated with the following expression.
(Program size) - (File header size (default : 34 steps))
Refer to the Process CPU User's Manual (Function Explanation, Program Fundamentals) for details on the program size and file.

*3: The CPU shared memory is not latched.
The CPU shared memory is cleared when the PLC is powered on or the CPU module is reset.

Item		Type		Remarks
		Q12PHCPU	Q25PHCPU	
Number of I/O device points		8192 points (X/Y0 to 1FFF)		Number of points available in programs
Number of occupied I/O points		4096 points (X/Y0 to FFF)		Number of points accessible to actual I/O modules
Number of extension bases		7		——
Number of mountable modules		64		——
Clock function		Year, month, day, hour, minute, second, day of week (Automatic leap year judgment) Accuracy -3.18 to +5.25s (TYP.+2.12s)/d at 0℃ -3.93 to +5.25s (TYP.+1.90s)/d at 25℃ -14.69 to +3.53s (TYP.-3.67s)/d at 55℃		——
Allowable momentaly power failure period		Depends on power supply module.		——
5VDC internal current consumption		0.64A		——
External dimensions	H	98mm (3.86inch)		——
	W	27.4mm (1.08inch)		——
	D	89.3mm (3.52inch)		——
Weight		0.20kg		——

2.3 Power supply module specifications

This section provides the specifications of the power supply modules.

Table 2.5 Q61P-A1/A2, Q62P, Q63P Performance Specification List

Item			Performance Specifications			
			Q61P-A1	Q61P-A2	Q62P	Q63P
Base mounting position			Power supply module mounting slot			
Applicable base unit			Q3□B, Q6□B			
Input power supply			100 to 120VAC (-15%/+10%) (85V to 132VAC)	200 to 240VAC (-15%/+10%) (170 to 264VAC)	100 to 240VAC (-15%/+10%) (85V to 264VAC)	24VDC (-35%/+30%) (15.6 to 31.2VDC)
Input frequency			50/60Hz ±5%			——
Input voltage distortion factor			Within 5% (See section 4.3.1)			——
Max. input apparent power			105VA			——
Max. input power			——			45W
Inrush current			20A within 8ms			100A within 1ms
Rated output current		5VDC	6A		3A	6A
		24VDC	——		0.6A	——
External output voltage			——		24VDC (-10%/+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
Allowable momentary power failure period*3			Within 20ms			Within 10ms (at 24VDC input)
Dielectric withstand voltage			Across inputs/LG and outputs/FG 2,830VAC rms/3 cycles (2,000 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 durability			• By noise simulator of 1,500Vp-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 display			LED display (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		None			
	Fuse		None			
Terminal screw size			M3.5 × 7			
Applicable wire size			0.75 to 2mm^2			
Applicable solderless terminal			RAV1.25-3.5, RAV2-3.5			
Applicable tightening torque			66 to 89N•cm			
External dimensions		H	98mm (3.86inch)			
		W	55.2mm (2.17inch)			
		D	90mm (3.55inch)			
Weight			0.31kg		0.39kg	0.33kg

Table 2.6 Q64P Performance Specifications

Item		Performance Specifications
		Q64P
Base mounting position		Power supply module mounting slot
Applicable base unit		Q3□B, Q6□B
Input power supply		100 to 120VAC/200 to 240VAC (-15%/+10%) (85V to 132VAC/170 to 264VAC)
Input frequency		50/60Hz ±5%
Input voltage distortion factor		Within 5% (See section 4.3.1)
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
Allowable momentary power failure period*3		Within 20ms
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2,830VAC rms/3 cycles (2,000 m (6562 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 insulation resistance tester
Noise durability		• By noise simulator of 1,500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency • Noise voltage IEC61000-4-4, 2kV
Operation display		LED display (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	None
	Fuse	None
Terminal screw size		M3.5 × 7
Applicable wire size		0.75 to 2mm^2
Applicable solderless terminal		RAV1.25-3.5, RAV2-3.5
Applicable tightening torque		66 to 89N•cm
External dimensions	H	98mm (3.86inch)
	W	55.2mm (2.17inch)
	D	115mm (4.53inch)
Weight		0.40kg

Table 2.7 Q61SP Performance/Specifications

Item			Performance/Specifications
			Q61SP
Base mounting position			Slim type power supply module mounting slot
Applicable base unit			Q3□SB
Input power supply			100 to 240V AC +10% -15% (85 to 264V AC)
Input frequency			50/60Hz +-5%
Input voltage distortion rate			Within 5% (See section 4.3.1)
Maximum input apparent power			40VA
Inrush current			Within 20A for 8 sec.
Rated input current		5V DC	2.0A
		24V DC	-
Overcurrent protection *1		5V DC	2.2A or more
		24V DC	-
Overvoltage protection *2		5V DC	5.5 to 6.5V
		24V DC	-
Efficiency			70% or more
Allowable momentary power failure period			Within 20ms
Dielectric withstand voltage			Across inputs/LG and outputs/FG 2,830V AC crms/3 cycles (2,000m)
Insulation resistance *3			Across inputs and outputs (LG and FG are separated), across inputs and LG/FG, across outputs and FG/LG, 10MΩ or more by 500V DC insulation resistance tester
Noise durability			• By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60HZ noise frequency • Noise voltage IEC61000-4-4, 2kV
Operation display			LED display (lit at 5V DC output)
Fuse			Built-in (Unchangeable by user)
Contact output	Application		ERR contact (contact switched off (opened: B-contact) at error stop of CPU module) for CPU module operating status output
	Rated switching voltage, current		24V DC, 0.5A
	Minimum switching load		5V DC, 1mA
	Response time		OFF to ON: 10ms max. ON to OFF: 12ms max.
	Life		Mechanic: More than 2 million times Electrical: More than 100 thousand times at rated switching voltage, current
	Surge suppresser		None
	Fuse		None
Terminal screw size			M3.5×7
Applicable wire size			0.75 to 2mm^2
Applicable solderless terminal			RAV1.25-3.5, RAV2-3.5
Applicable tightening torque			66 to 89N•cm
External dimensions		H	98mm (3.86inch)
		W	55.2mm (2.17inch)
		D	104mm (4.09inch)
Weight			0.18kg

Table 2.8 Q00JCPU (Power Supply Section) Performance Specifications

Item		Performance Specifications
		Q00JCPU (power supply section)
Input power supply		100 to 240VAC (-15%/+10%) (85 to 264VAC)
Input frequency		50/60Hz ±5%
Input voltage distortion factor		Within 5% (See section 4.3.1)
Max. input apparent power		105VA
Inrush current		40A within 8ms
Rated output current	DC5V	3A
	DC24V	——
Overcurrent protection*1	DC5V	3.3A or more
	DC24V	——
Overvoltage protection*2	DC5V	5.5 to 6.5V
	DC24V	——
Efficiency		65% or more
Allowable instantaneous power failure time*3		Within 20ms (100VAC or more)
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2,830VAC 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 durability		• By noise simulator of 1,500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency • Noise voltage IEC61000-4-4, 2kV
Operation display		LED display (lit at 5VDC output)
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 solderless terminal		RAV1.25-3.5, RAV2-3.5
Applicable tightening torque		66 to 89N•cm
External dimensions		Refer to Table 2.2
Weight		

Table 2.9 A1S61PN, A1S62PN, A1S63P Performance Specifications

Item		Performance Specifications		
		A1S61PN	A1S62PN	A1S63P
Base mounting position		Power supply module mounting slot		
Applicable base unit		QA1S65B, QA1S68B		
Input power supply		100 to 240VAC (-15%/+10%) (85 to 264VAC)		24VDC (-35%/+30%) (15.6 to 31.2VDC)
Input frequency		50/60Hz ±5%		——
Input voltage distortion factor		Within 5% (See section 4.3.1)		
Max. input apparent power		105VA		——
Max. input power		——		41W
Inrush current		20A within 8ms		81A within 1ms
Rated output current	5VDC	5A	3A	5A
	24VDC	——	0.6A	——
External output voltage		——	24VDC (-10%/+10%)	——
Overcurrent protection*1	5VDC	5.5A or more	3.3A or more	5.5A or more
	24VDC	——	0.66A or more	——
Overvoltage protection*2	5VDC	5.5 to 6.5V		
	24VDC	——		
Efficiency		65% or more		
Allowable momentary power failure period*3		Within 20ms		Within 10ms (at 24VDC input)
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2,830VAC rms/3 cycles (2,000 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		5MΩ or more by insulation resistance tester
Noise durability		• By noise simulator of 1,500Vp-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 display		LED display (lit at 5VDC output)		
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 solderless terminal		RAV1.25-3.5, RAV2-3.5		
Applicable tightening torque		66 to 89N•cm		
External dimensions	H	130mm (5.12inch)		
	W	55mm (2.17inch)		
	D	93.6 (3.69inch)		
Weight		0.60kg		0.50kg

POINT

*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. 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 : Allowable momentary power failure period

(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 suppludetection 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.)

2.4 Specifications of Base Units

(1) Main base units

Item / Type		Q00JCPU	Q33B	Q35B	Q38B	Q312B
Number of mountable I/O modules		2	3	5	8	12
Applicable modules		Q series modules				
5VDC internal Current consumption		0.220A	0.105A	0.110A	0.114A	0.121A
Weight		0.66kg	0.21kg	0.25kg	0.35kg	0.45kg
External dimensions	H	98mm (3.86inch)				
	W	245mm (9.65inch)	189mm (7.44inch)	245mm (9.65inch)	328mm (12.92inch)	439mm (17.30inch)
	D	97mm (3.82inch)	44.1mm (1.74inch)			

(2) Slim type main base units

Item / Type		Q32SB	Q33SB	Q35SB
Number of mountable I/O modules		2	3	5
Applicable modules		Q series modules		
5VDC internal Current consumption		0.086A	0.086A	0.091A
Weight		0.12kg	0.15kg	0.21kg
External dimensions	H	98mm (3.86inch)		
	W	114mm (4.49inch)	142mm (5.59inch)	197.5mm (7.78inch)
	D	18.5mm (0.73inch)		

(3) Extension base units

Item / Type		Q52B	Q55B	Q63B	Q65B	Q68B	Q612B
Number of mountable I/O modules		2	5	3	5	8	12
Applicable modules		Q series modules					
5VDC internal Current consumption		0.080A	0.100A	0.105A	0.110A	0.114A	0.121A
Weight		0.14kg	0.23kg	0.23kg	0.25kg	0.35kg	0.45kg
External dimensions	H	98mm (3.86inch)					
	W	106mm (4.17inch)	189mm (7.44inch)	189mm (7.44inch)	245mm (9.65inch)	328mm (12.92inch)	439mm (17.30inch)
	D	44.1mm (1.74inch)					

Item / Type		QA1S65B	QA1S68B
Number of mountable I/O modules		5	8
Applicable modules		AnS series modules	
5VDC internal current consumption		0.117A	0.118A
Weight		0.75kg	1.00kg
External dimensions	H	130mm (5.12inch)	
	W	315mm (12.41inch)	420mm (16.55inch)
	D	51.2mm (2.02inch)	

3. EMC and Low Voltage Directive

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 Directive are required to declare that their products conform to these Directives and put a "CE mark" on their products.

3.1 Requirements for conformance to 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 3.1.1 through 3.1.6 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 control requirements and the applicable standards . 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 of the machinery.

3.1.1 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.	30M-230MHz QP : 30dB μV/m (30 m in measurement range) *1 230M-1000MHz QP : 37 dB μV/m (30 m in measurement range)
	EN55011 Conducted noise	Electromagnetic emissions from the product to the power line is measured.	150k-500kHz QP: 79 dB, Mean: 66 dB *1 500k-30MHz 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.	15kV 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: 2kV Digital I/O (24V or higher): 1kV (Digital I/O (24V or less)) > 250V (Analog I/O, signal lines) > 250V
	EN61000-4-3 Radiated field AM modulation *2	Immunity test in which field is irradiated to the product.	10V/m, 26-1000MHz, 80%AM modulation@1kHz
	EN61000-4-12 Damped oscillatory wave immunity	Immunity test in which a damped oscillatory wave is superimposed on the power line.	Power line: 1kV Digital I/O (24V or higher): 1kV

*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.

3.1.2 Installation instructions for 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 inch) diameter or less. If the holes are 10 cm (3.94 inch) 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 300MHz).

(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 inch) 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.

3.1.3 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 I/O units and intelligent function units and may be extracted to the outside of the control panel.

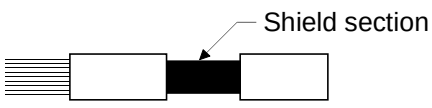
The use of a shielded cable also increases noise resistance. The signal lines connected to the PLC I/O units and intelligent function units use shielded cables to assure noise resistance under the conditions where the shield is earthed. If a shielded cable is not used or not earthed correctly, the noise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

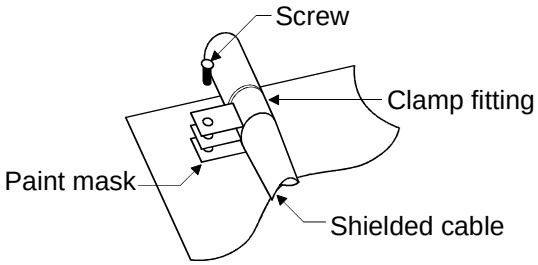
When the shield of a shielded cable is earthed to the cabinet body, please ensure that the shield contact with the body is over a large surface area. If the cabinet body is painted it will be necessary to remove paint from the contact area. All fastenings must be metallic and the shield and earthing 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

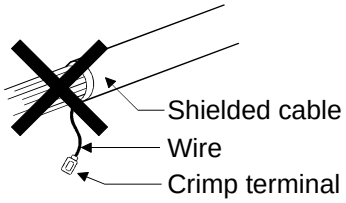
(a) Earth the shield of the shielded cable as near the unit as possible taking care so that the earthed cables are not induced electromagnetically by the cable to be earthed.

(b) Take 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.



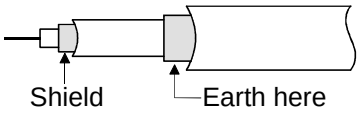


Note) The method of earthing by soldering a wire onto the shield section of the shielded cable as shown below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



(2) MELSECNET/H module

Always use a double-shielded coaxial cable (MITSUBISHI CABLE INDUSTRIES, LED.: 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.

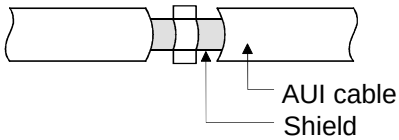


See to 1) for the earthing of the shield.

(3) Ethernet module, FL-net module, Web server module

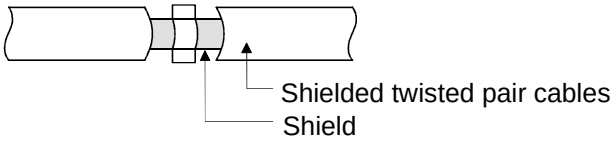
Precautions for using AUI cables, twisted pair cables and coaxial cables are described below.

(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.



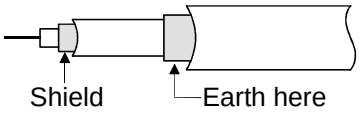
See to 1) for the earthing of the shield.

(b) Use shielded twisted pair cables as the twisted pair cables connected to the 10BASE-T/100BASE-TX connectors. For the shielded twisted pair cables, strip part of the outer cover and earth the exposed shield section to the ground on the widest contact surface as shown below.



See 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.



See to 1) for the earthing of the shield.

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(4) I/O signal lines and other communication cables

For the I/O signal lines and other communication 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.

3.1.4 Power supply module

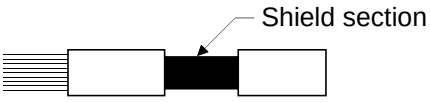
Always ground the LG and FG terminals after short-circuiting them.

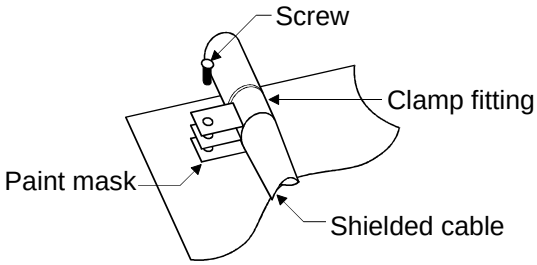
3.1.5 When using QA1S6□B type base unit

(1) Cable

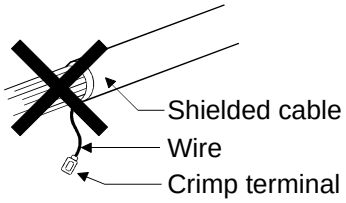
(a) Earthing of shielded cables

- Earth the shield of the shielded cable as near the unit as possible taking care so that the earthed cables are not induced electromagnetically by the cable to be earthed.
- Take appropriate measures so the shield that was partly removed for exposure is earthed to the control panel over a large contact surface area. 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.

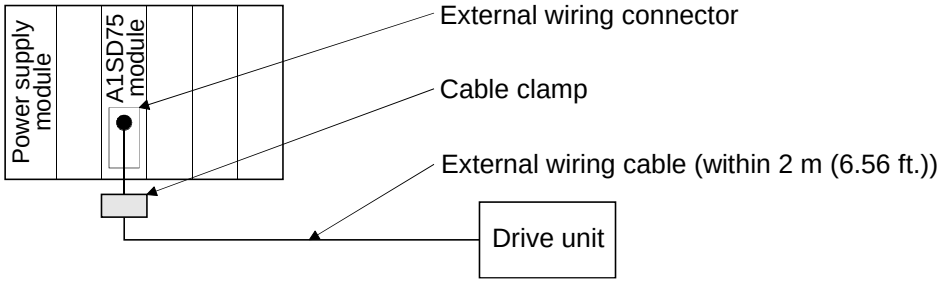


(b) Positioning modules

Precautions to be followed when the machinery conforming to the EMC Directive is configured using the A1SD75P1-S3/A1SD75P2-S3/ A1SD75P3-S3 (hereafter referred to as the A1SD75) are described below.

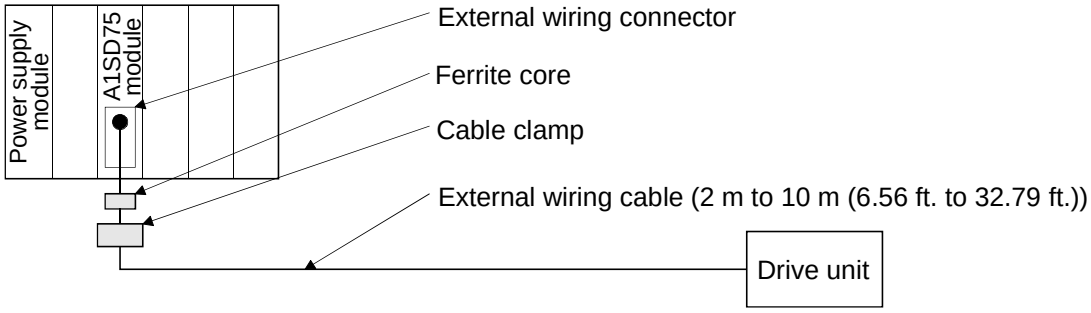
1) When wiring with a 2 m (6.56 ft.) or less cable

- Ground the shield section of the external wiring cable with the cable clamp. (Ground the shield at the closest location to the A1SD75 external wiring connector.)
- Wire the external wiring cable to the drive unit and external device with the shortest practicable length of cable.
- Install the drive unit in the same panel.



2) When wiring with cable that exceeds 2 m (6.56 ft.), but is 10 m (32.79 ft.) or less

- Ground the shield section of the external wiring cable with the cable clamp. (Ground the shield at the closest location to the A1SD75 external wiring connector.)
- Install a ferrite core.
- Wire the external wiring cable to the drive unit and external device with the shortest practicable length of cable.



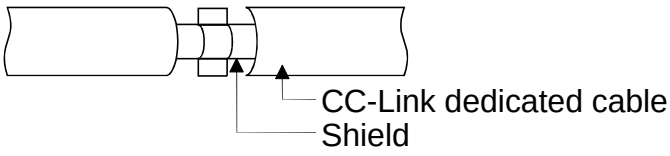
3) Ferrite core and cable clamp types and required quantities

- Cable clamp
  Type : AD75CK (Mitsubishi Electric)
- Ferrite core
  Type : ZCAT3035-1330 (TDK ferrite core)
- Required quantity

Cable length	Prepared part	Required Qty		
		1 axis	2 axis	3 axis
Within 2 m (6.56 ft.)	AD75CK	1	1	1
2 m (6.56 ft.) to 10m (32.79 ft.)	AD75CK	1	1	1
	ZCAT3035-1330	1	2	3

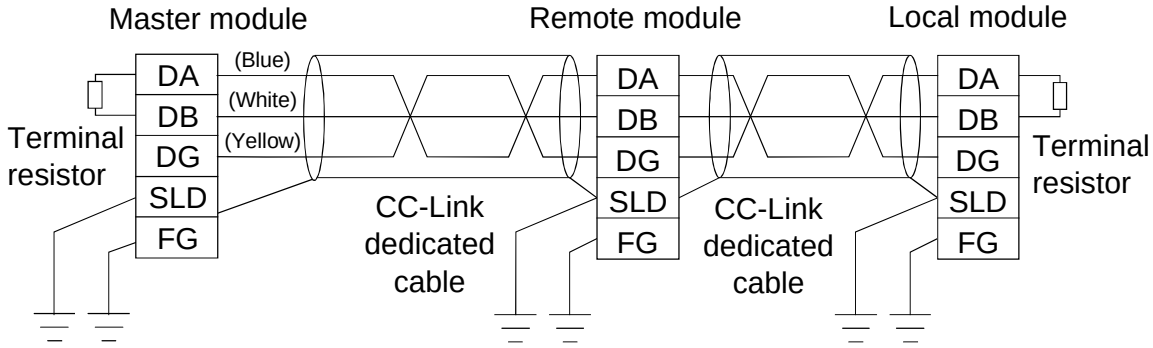
(c) CC-Link module

1) Be sure to ground the cable shield that is connected to the CC-Link module close to the exit of control panel or to any of the CC-Link stations within 30 cm (11.8 inch) from the module or stations.
The CC-Link dedicated cable is a shielded cable. As shown in the illustration below, remove a portion of the outer covering and ground as large a surface area of the exposed shield part as possible.



2) Always use the specified CC-Link dedicated cable.
3) Do not use a ferrite core for the CC-Link module or CC-Link stations.
4) The CC-Link module, the CC-Link stations and the FG line inside the control panel should be connected at both the FG terminal and the SLD terminal as shown in the diagram below.

[Simplified diagram]



(d) I/O signal lines and other communication cables
For the I/O signal lines 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.

(2) Power supply module
The precautions required for each power supply module are described below. Always observe the items noted as precautions.

Model	Precautions
A1S61P, A1S62P	Not usable
A1S63P*1	Use the 24VDC panel power equipment conforming to the CE Directives.
A1S61PEU, A1S62PEU, A1S61PN, A1S62PN	Always ground the LG and FG terminals after short-circuiting them.

*1: If sufficient filter circuitry is built into the 24 VDC external power supply module, the noise generated by A1S63P will be absorbed by that filter circuit, so a line filter may not be required.
Filtering circuitry of version F or later of A1S63P is improved so that a external line filter is not required.

3.1.6 Others

(1) Ferrite core

A ferrite core has the effect of reducing radiated noise in the 30MHz to 100MHz 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)

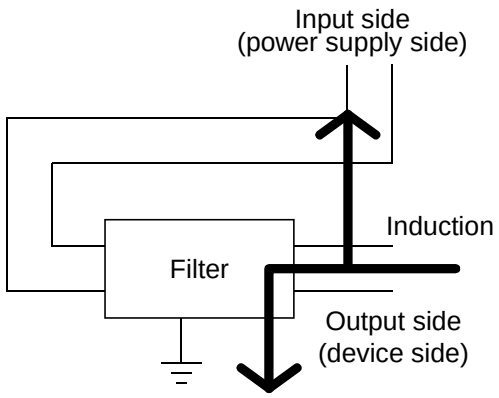
A noise filter is a component which has an effect on conducted noise.

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

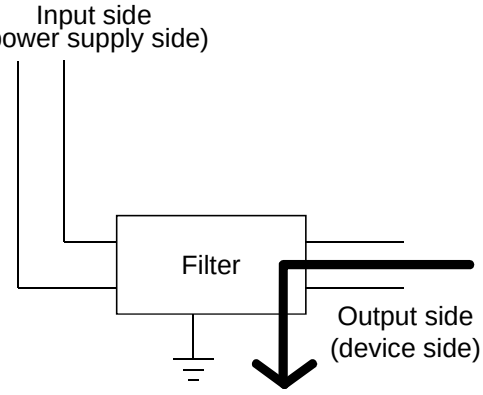
(The noise filter has the effect of reducing conducted noise of 10MHz or less.)

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

1) Do not bundle the wires on the input side and output side of the noise filter. When they are bundled, the output side noise will induct into the input side wires.



The noise will induct into input side when the input and output wires are bundled.



Separate the input and output wires.

2) Earth the noise filter earthing terminal to the control cabinet with the short wire as possible (less than approx. 10 cm (3.94 inch)).

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		

3.2 Requirement to Conform to the Low Voltage Directive

The Low Voltage Directive requires each device that operates with the power supply ranging from 50 to 1000VAC and 75 to 1500VDC to satisfy the safety requirements.
In Sections 3.2.1 to 3.2.6, 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.

3.2.1 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 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.

3.2.2 PLC selection

(1) Power supply module
There are dangerous voltages (voltages higher than 42.4V peak) inside the power supply modules of the 100/200VAC rated I/O voltages. Therefore, the CE marked models are enhanced in insulation internally between the primary and secondary.

(2) I/O module
There are dangerous voltages in the I/O modules of the 100/200VAC rated I/O voltages. Therefore, the CE marked models are enhanced in insulation internally between the primary and secondary.
The I/O modules of 24VDC or less rating are out of Low Voltage Directive application range.

(3) CPU module, memory card, base unit
Using 5VDC circuits inside, the above modules are out of the Low Voltage Directive application range.

(4) Intelligent function modules (special function modules)
The intelligent function modules (special 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 CE marked display device.

3.2.3 Power supply

The insulation specification of the power supply 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.

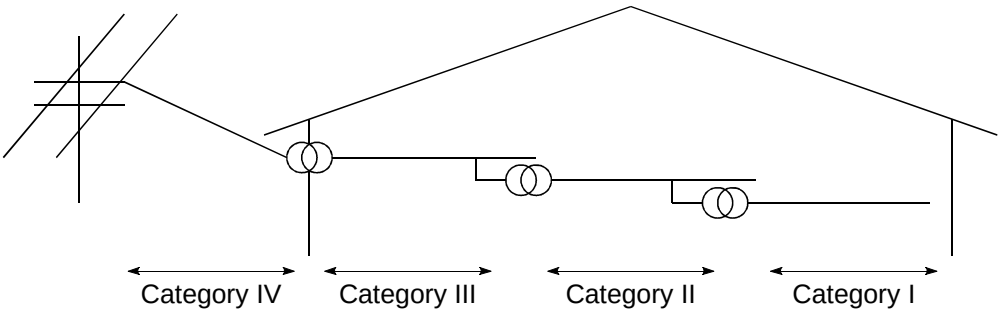


Figure 1. : Installation Category

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

3.2.4 Control panel

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 panel.

(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 panel must have the following functions :

(a) The control panel 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 panel must have a structure which automatically stops the power supply when the panel is opened.

(2) Dustproof and waterproof features

The control panel 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 pollustion 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 panel equivalent to IP54 in a control room or on the floor of a typical factory.

Pollution level 3: An environment where conductive dust exits 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 panel equivalent to IP54.

3.2.5 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.

3.2.6 External wiring

(1) 24 VDC external power supply

For the MELSEC-Q series 24VDC I/O modules and the intelligent function modules (special function modules) which require external supply power,

(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 1.

Table 1 :Intensive Insulation Withstand Voltage
(Installation Category II, source : IEC664)

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

4. Mounting and Installation

4.1 Module Installation

4.1.1 Handling instructions

⚠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 mounting lever at the module bottom, and securely insert the module fixing latch into the fixing hole in the base unit. Incorrect mounting 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.
- Securely mount the memory card by pushing it into the memory card mounting slot. Then, confirm that it has been securely mounted. Not doing so can cause a malfunction due to a contact fault.
- Completely turn off the external power supply before mounting or removing the module. Not doing so could result in electric shock or damage to the product.
  Note that online module change can be made when the QnPHCPU is used.
  Note that there are restrictions on the modules that can be changed online and each module has a predetermined changing procedure.
  For details, refer to the section of online module change in the Process CPU User's Manual (Hardware Design,Maintenance and Inspection).
- 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.

This section provides instructions for handling the CPU, I/O, intelligent function and power supply modules, base units and so on.

(1) Module enclosure, memory card, 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 mounting and fixing screws as specified below.

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 mounting screw (M3.5 screw)	66 to 89 N·cm
Power supply module terminal screw (M3.5 screw)	66 to 89 N·cm

(4) Make sure to install the power supply module on the extension base units Q6□B, QA1S6□B. Even if the power supply module is not installed, when the I/O modules and intelligent function module installed on the base units are of light load type, the modules may be operated. In the case, because a voltage becomes unstable, we cannot guarantee the operation.
(5) When using an extension cable, do not bundle it with nor run it close to the main circuit (high voltage, large current) cables.

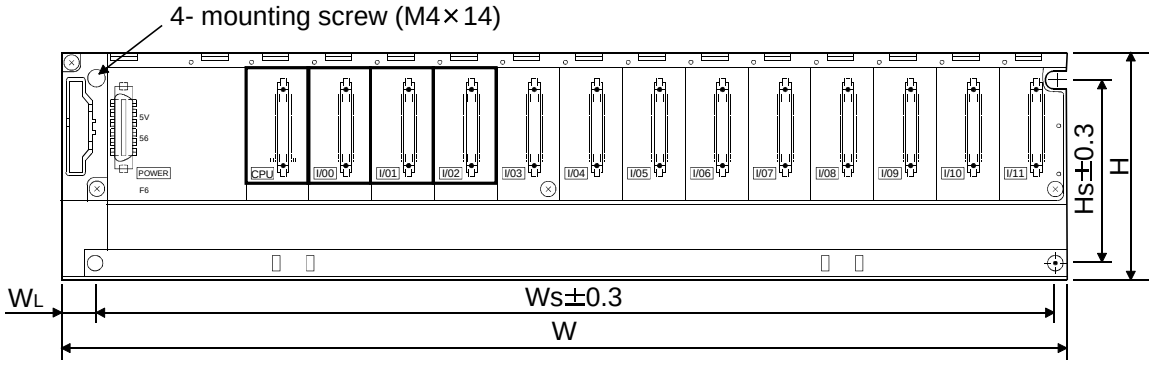
4.1.2 Instructions for mounting the base unit

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

(1) Mounting dimensions

Mounting dimensions of each base unit are as follows:

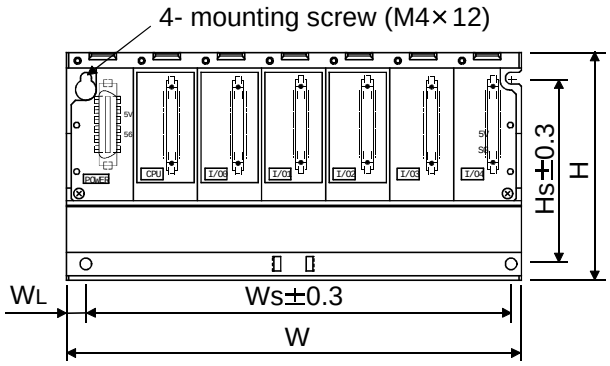
(a) Main base unit (Q3□B), extension base unit (Q5□B, Q6□B, QA1S6□B)



	Q00J CPU	Q33B	Q35B	Q38B	Q312B	Q52B	Q55B	Q63B	Q65B	Q68B	Q612B	QA1S 65B	QA1S 68B
W	245 (9.65)	189 (7.44)	245 (9.65)	328 (12.92)	439 (17.30)	106 (4.17)	189 (7.44)	189 (7.44)	245 (9.65)	328 (12.92)	439 (17.30)	315 (12.41)	420 (16.55)
Ws	224.5 (8.85)	169 (6.61)	224.5 (8.85)	308 (12.14)	419 (16.51)	83.5 (3.29)	167 (6.57)	167 (6.57)	222.5 (8.77)	306 (12.06)	417 (16.43)	295 (11.62)	400 (15.76)
WL	15.5 (0.61)											10 (0.39)	
H	98 (3.86)											130 (5.12)	
Hs	80 (3.15)											110 (4.33)	

Unit: mm (inch)

(b) Slim type main base unit (Q3□SB)



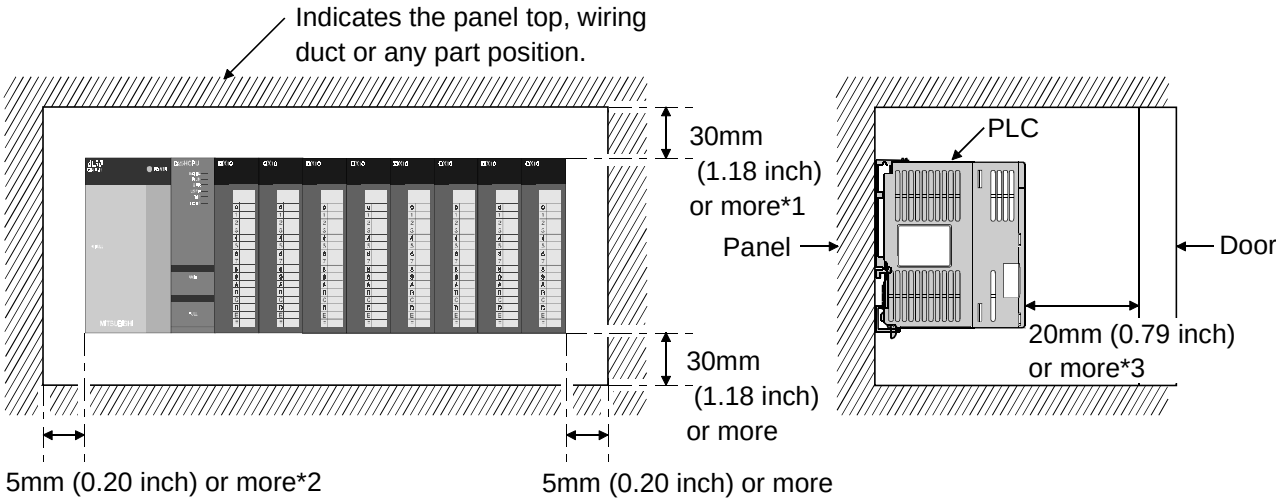
	Q32SB	Q33SB	Q35SB
W	114 (4.49)	142 (5.59)	197.5 (7.78)
Ws	101 (3.98)	129 (5.08)	184.5 (7.26)
WL	8.5 (0.33)		
H	98 (3.86)		
Hs	80 (3.15)		

Unit: mm (inch)

(2) Unit mounting position

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

(a) Main base unit (Q3□B), extension base unit (Q5□B, Q6□B, QA1S6□B)

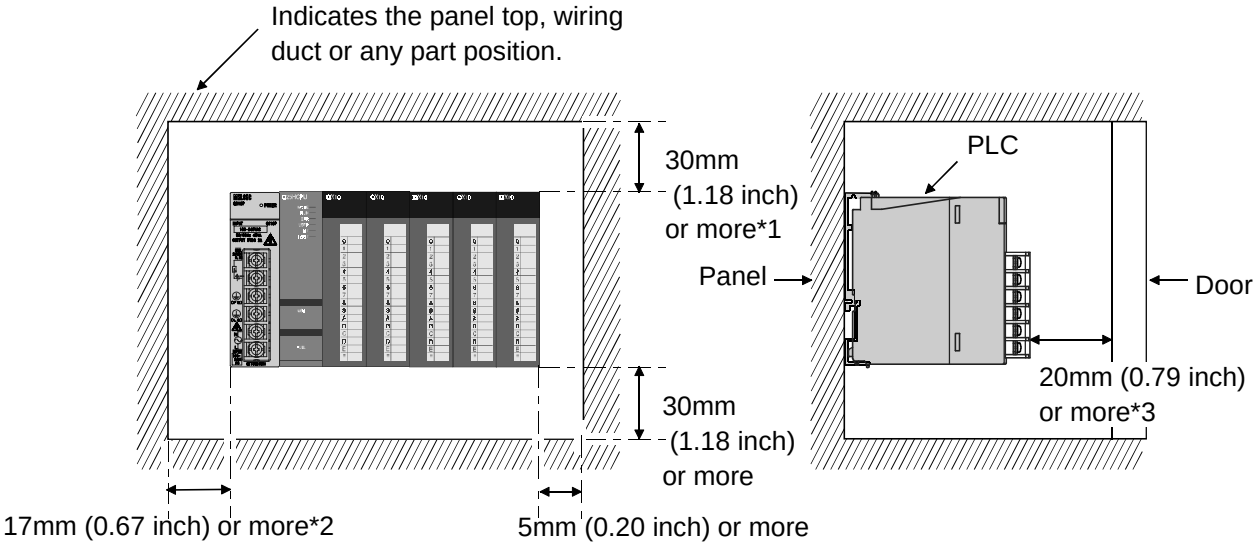


*1: For wiring duct (50mm (1.97 inch) or less height).
40mm (1.58 inch) or more for other cases.

*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) Slim type main base unit (Q3□SB)



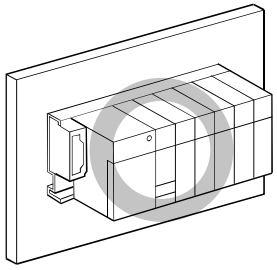
*1: For wiring duct (50mm or less) or other, 40mm or more.

*2: When wiring the slim type main base unit and power supply module, the cable will run off the left edge of the module. Separate the system and wall by 17mm or more to secure the installation space. If the materials, devices or parts on right side of the module may damage the cable coating, attach an insulating material such as spiral tube to it for protection.

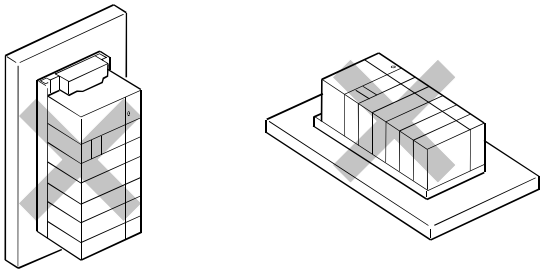
*3: For connector type, 80mm or more.

(3) Unit 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.



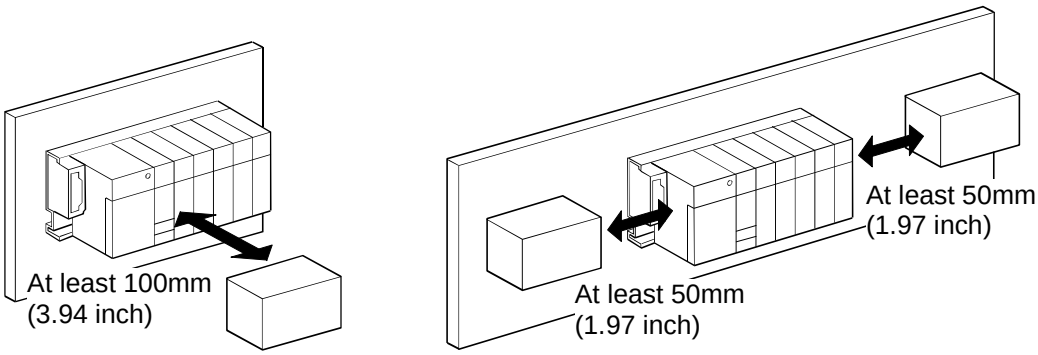
Vertical Flat

(4) 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.

(5) 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.

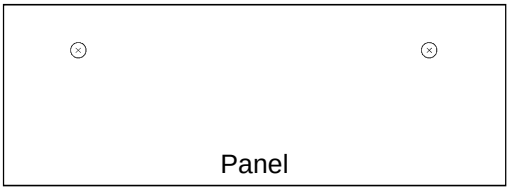
(6) In order to avoid the effects of radiated noise and heat, provide the clearances indicated below between the PLC and devices that generate noise or heat (contactors and relays).

- 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)

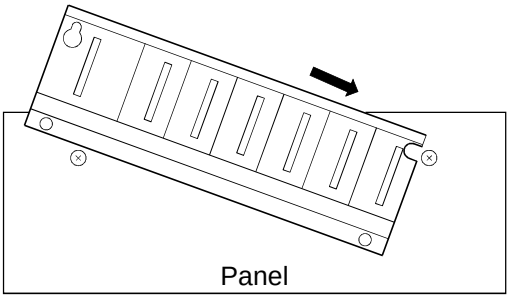


(7) Install the main base unit/Q00JCPU (by screwing) in the following procedure.

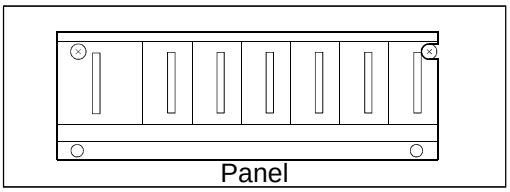
(a) Fit the two base unit top mounting screws into the enclosure.



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



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



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

Note1) : Install the main base unit to a panel, with no module mounted in the rightmost slot.
Remove the base unit after removing the module from the rightmost slot.

Note2): The mounting screws included with the slim type main base unit differ from those included with other main base units. Please specify “Cross-recessed binding head machine screw M4×12(black) when ordering the mounting screws for the slim type main base unit.

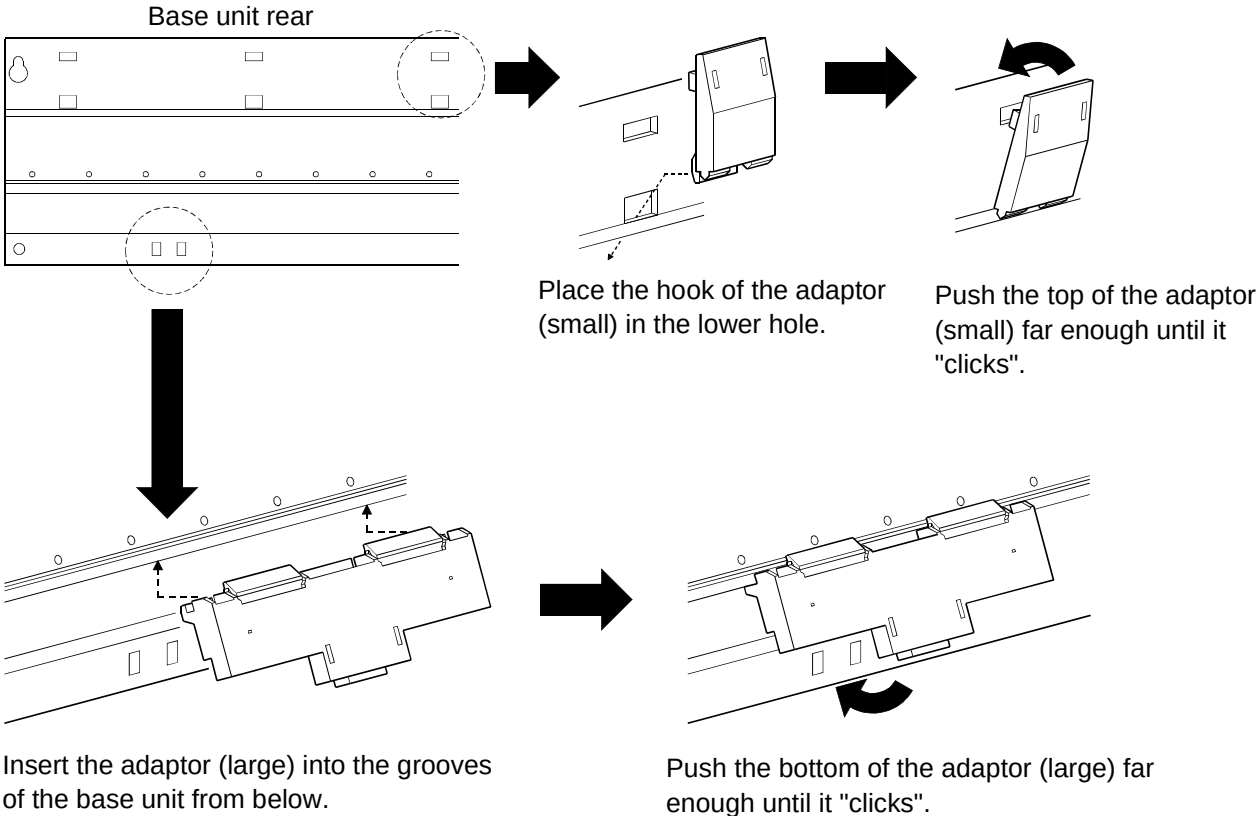
(8) Note the following points when mounting a DIN rail.
Mounting a DIN rail needs special adaptors (optional), which are to be user-prepared.

(a) Applicable adapter types

DIN rail adapter	Applicable main base unit
Q6DIN1	Q38B, Q312B, Q68B, Q612B
Q6DIN2	Q35B, Q65B, Q00JCPU
Q6DIN3	Q33B, Q52B, Q55B, Q63B, Q32SB, Q33SB, Q35SB

(b) Adaptor installation method

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

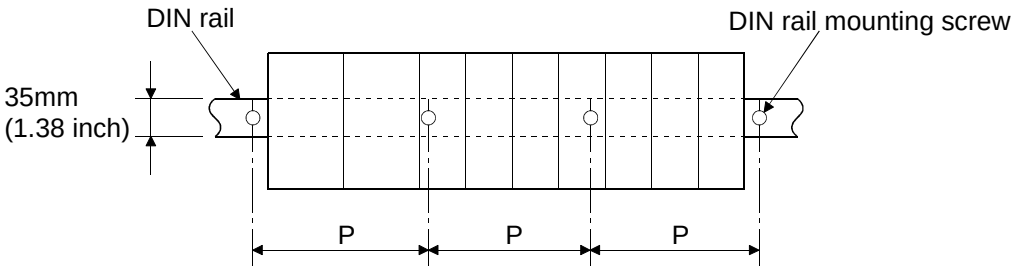


(c) Applicable DIN rail types (JIS C 2812)

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.

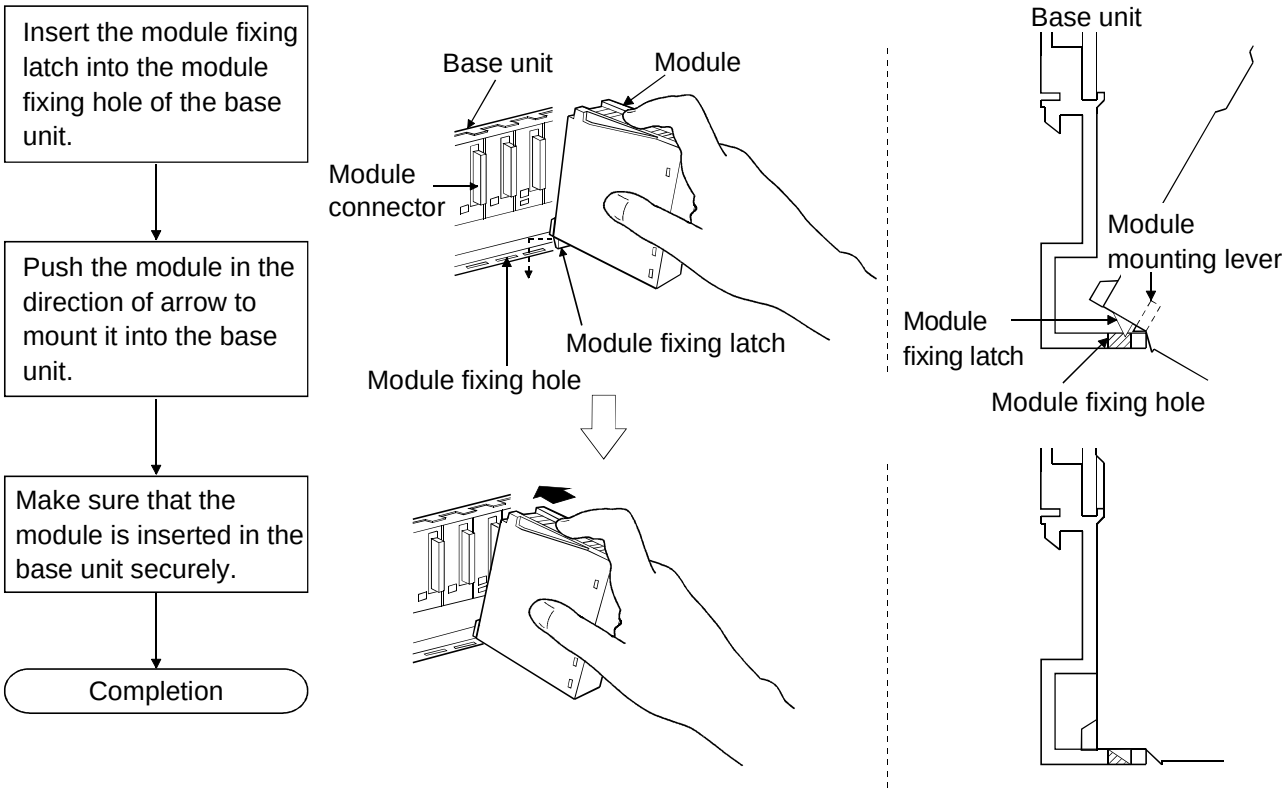


P=200mm (7.88 inch) or less

4.1.3 Mounting and removing of module

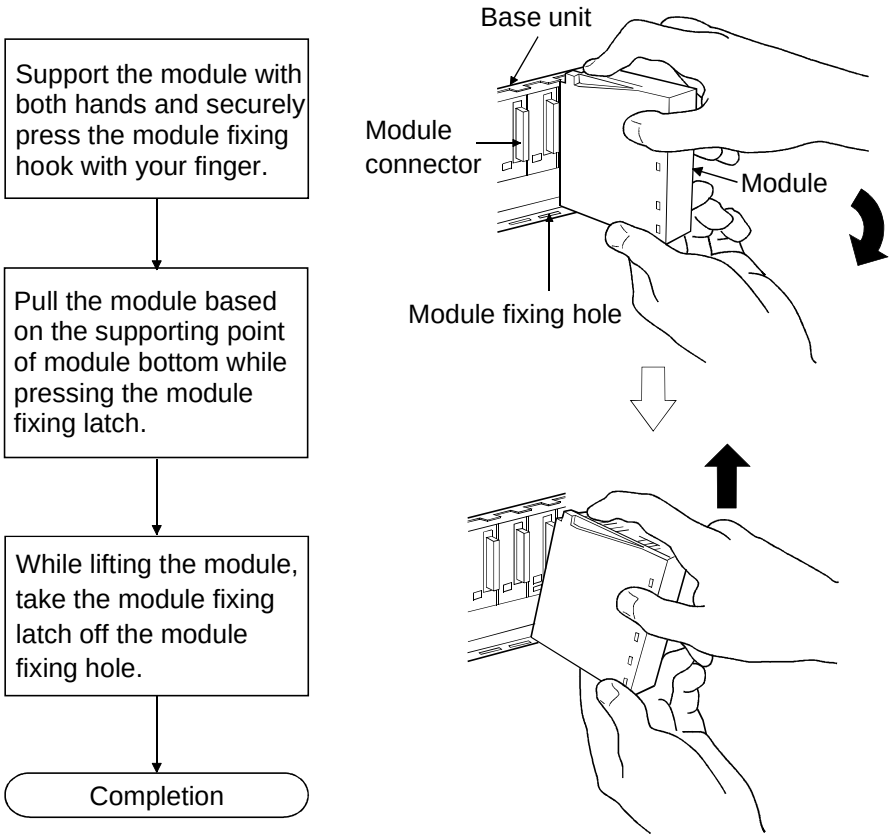
This section explains how to mount and remove a power supply, CPU, I/O, intelligent function or another module to and from the base unit.

(1) Mounting of module



POINT
(1) Always insert the module fixing latch 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)

(2) Removing of module

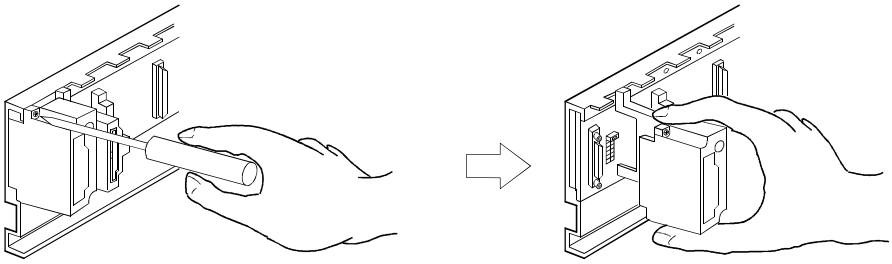


POINT
When the module fixing screw is used, always remove the module by removing the module fixing screw and then taking the module fixing latch off the module fixing hole of the base unit. Forcibly removing the module will damage the module.

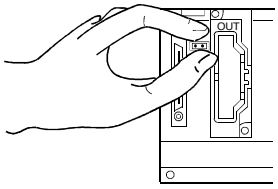
4.1.4 Setting the extension stage number of the extension base unit

When using two or more extension base units, their extension stage numbers must be set with the extension stage number 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.

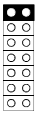
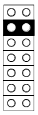
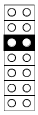
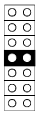
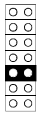
(1) The extension stage number setting connector of the extension base unit is located under the IN side base cover.
First, loosen the upper and lower screws in the IN side base cover and remove the base cover from the extension base unit.



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



Setting Extension Stage Number of Extension Base Units

	Extension Stage Number Setting						
	1st stage	2nd stage	3rd stage	4th stage	5th stage	6th stage	7th stage
Extension stage No. setting							
Q00JCPU	○	○	×	×	×	×	×
Q00CPU, Q01CPU	○	○	○	○	×	×	×
Q02 (H) CPU, Q06HCPU Q12HCPU, Q25HCPU	○	○	○	○	○	○	○
Q12PHCPU, Q25PHCPU	○	○	○	○	○	○	○

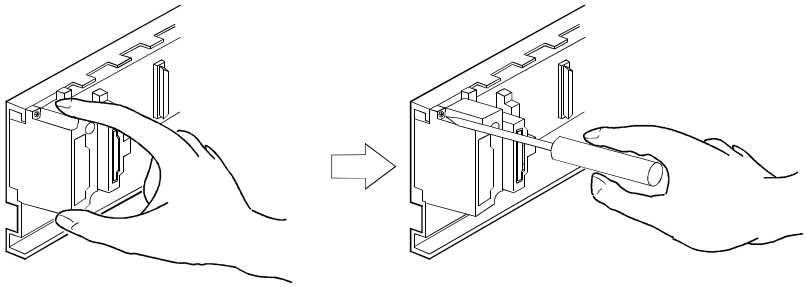
○ : Can be set × : Cannot be set

POINT

(1) Set the extension stage number setting connector to any of numbers 1 to 7 in ascending order.
If two or more modules have the same number or any module has no setting, for example, false input and output will occur.

(2) If there are Q5□B/Q6□B and QA1S6□B extension base units, first set the extension stage numbers of the Q5□B/Q6□B's. (The Q00J/Q00/Q01CPU or Q12PH/Q25PHCPU cannot use the QA1S6□B.)
Example: When there are a total of seven extension base units, four Q68B's and three QA1S68B's, set numbers 1 to 4 to the Q68B's and numbers 5 to 7 to the QA1S68B's.
For the extension base connection sequence, connect the Q5□B/Q6□B's, then connect the QA1S6□B's.

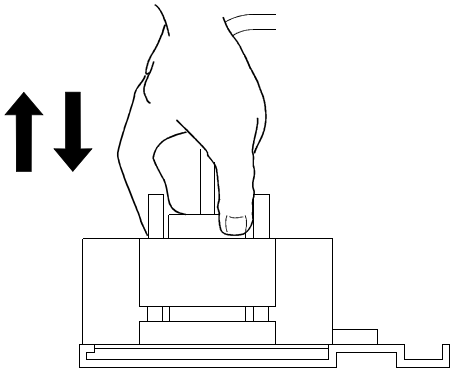
(3) Mount the base cover to the extension base unit and tighten the base cover screw.
(Tightening torque: 36 to 48N·cm)



4.1.5 Connecting and disconnecting 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 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.

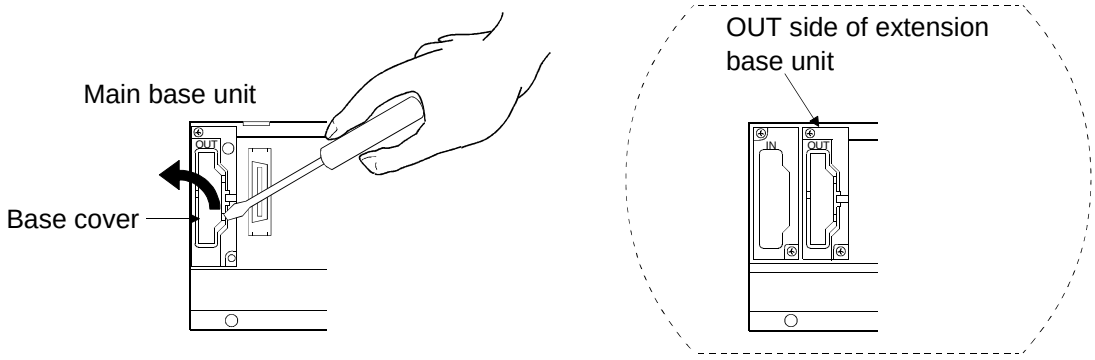


Holding the ferrite core may cause the cable to open within the connector. Also, if the ferrite core is shifted, the characteristic will change. When handling the cable, take care not to shift the ferrite core positions.

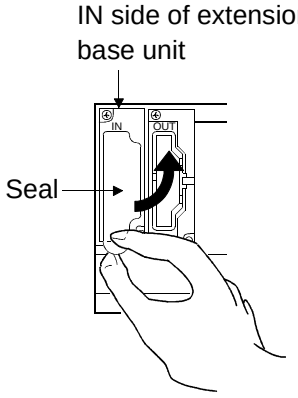
(2) Connecting of extension cable

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.

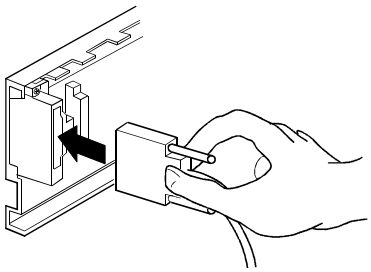
(a) To connect an extension cable to the main base unit, remove the portion under the OUT characters on the base cover with a tool such as a flat-blade screwdriver (5.5 × 75, 6 × 100). This also applies to a case where an extension cable is connected to the OUT side connector of the extension base unit.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



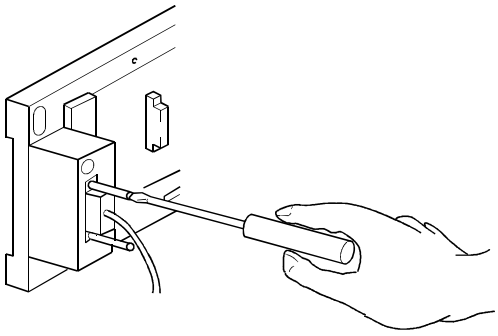
(b) To connect the extension cable to the next extension base unit, remove the seal applied under the IN characters on the base cover.



(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) Disconnecting 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.

4.2 General Safety Requirements

⚠DANGER

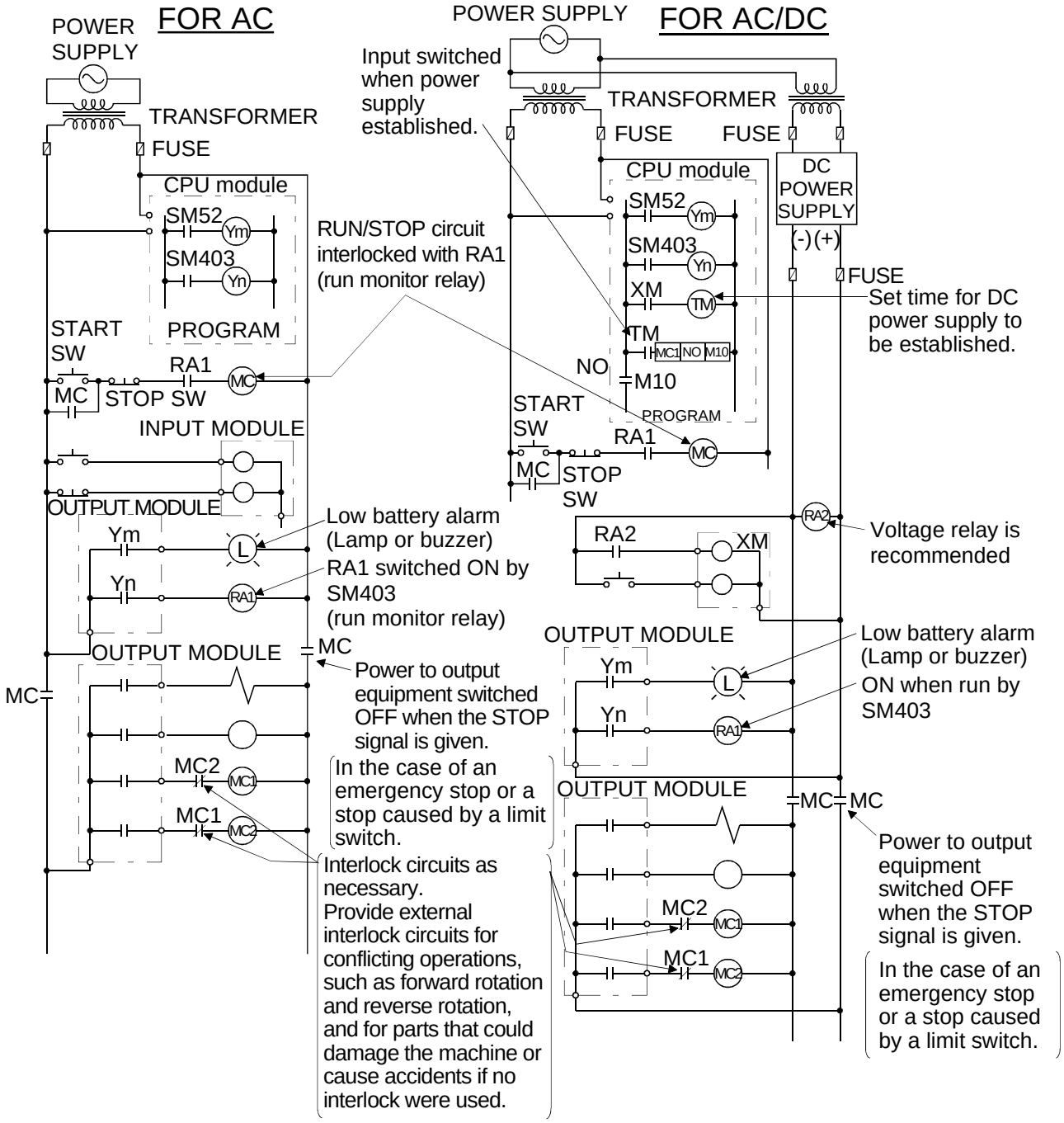
- Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC module. Otherwise, trouble could result from erroneous output or erroneous operation.
  (1) Outside the PLC, construct mechanical damage preventing interlock 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.
  Note that the AnS series module will turn off the output in either of cases (a) and (b).
    (a) The power supply module has over current protection equipment and over voltage protection equipment.
    (b) The CPU module self-diagnostic functions, such as the watch dog timer error, detect problems.
    In addition, all output will be turned on when there are problems that the CPU module 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.
  (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. operating 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 CPU module.

⚠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 to OFF, proper output of the control target may not be provided temporarily due to differences in delay time and starting time between the PLC power supply and the external power supply for control target (especially DC).
For example, if the external power supply for control target 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 that 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 $\overline{\text{ERR}}$ contact of power supply module/for Q00JCPU)



The power-ON procedure is as follows:

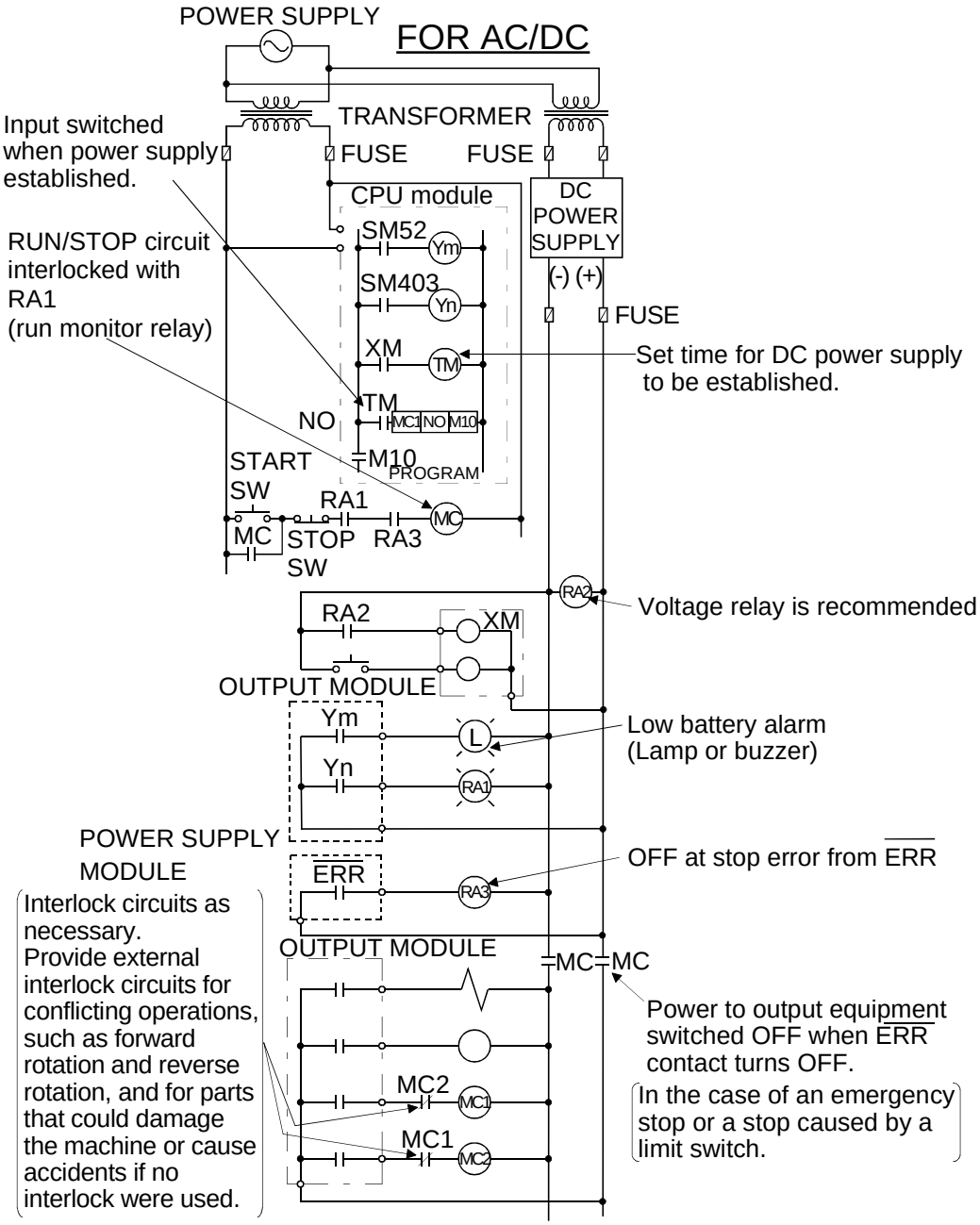
For AC

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 $\overline{\text{ERR}}$ 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 0.5 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.)

(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 I/O control area may not be detected by the CPU module.

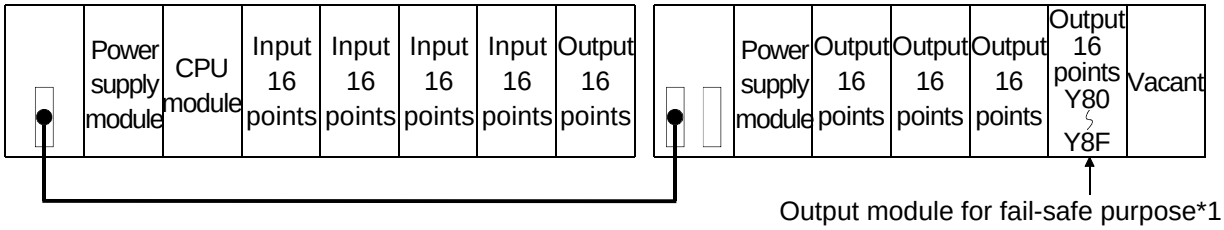
In such cases, all I/O points turn ON or OFF depending on a condition of problem, and normal operating conditions and operating safety cannot sometimes be maintained.

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.

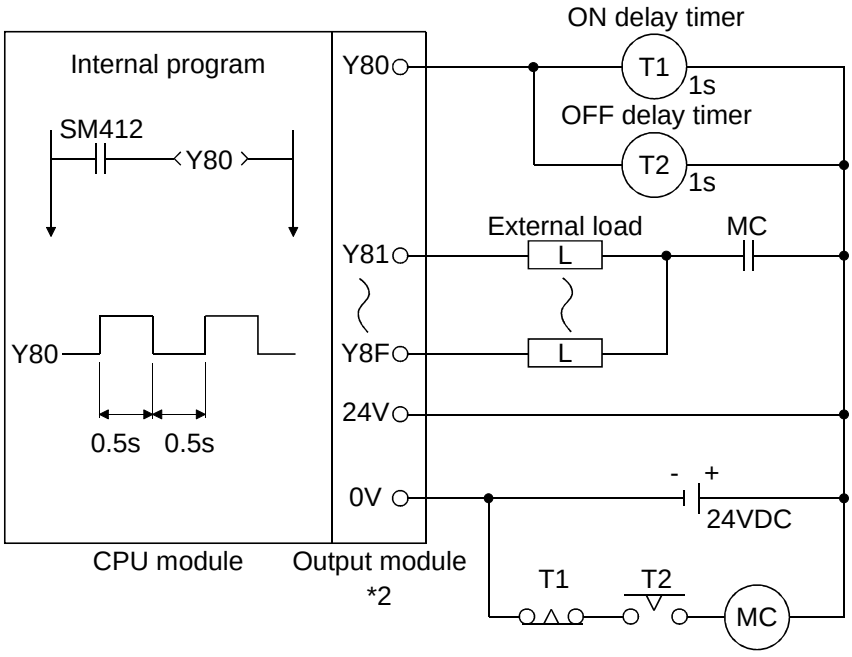
Examples of a system and its fail-safe circuitry are described below:

<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 0.5 second intervals.
Use a no-contact output module (transistor in the example shown above).

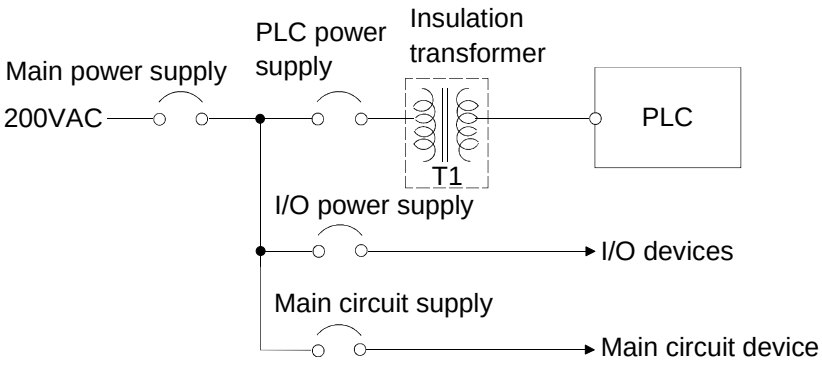
4.3 Power Supply Wiring

This section provides instructions for wiring the power supply.

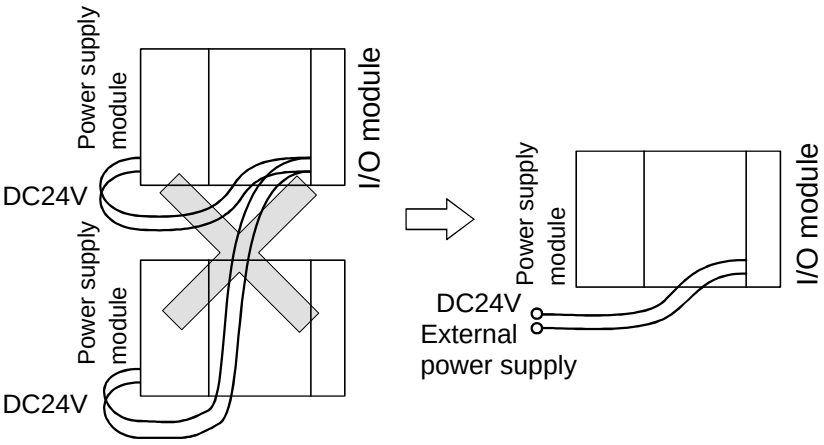
⚠DANGER	● Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product. ● When turning on the power supply or operating the module after installation or wiring work, be sure that the module's 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.

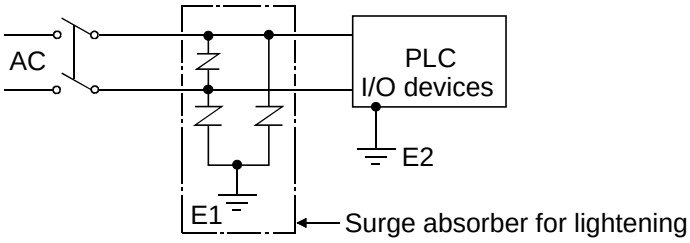
(1) Separate the PLC's power supply line from the lines for I/O devices and power devices as shown below.
When there is much noise, connect an insulation transformer.



(2) Do not connect the 24VDC outputs of two or more power supply modules in parallel and supply power to one I/O module.
Parallel connection will damage the power supply modules.

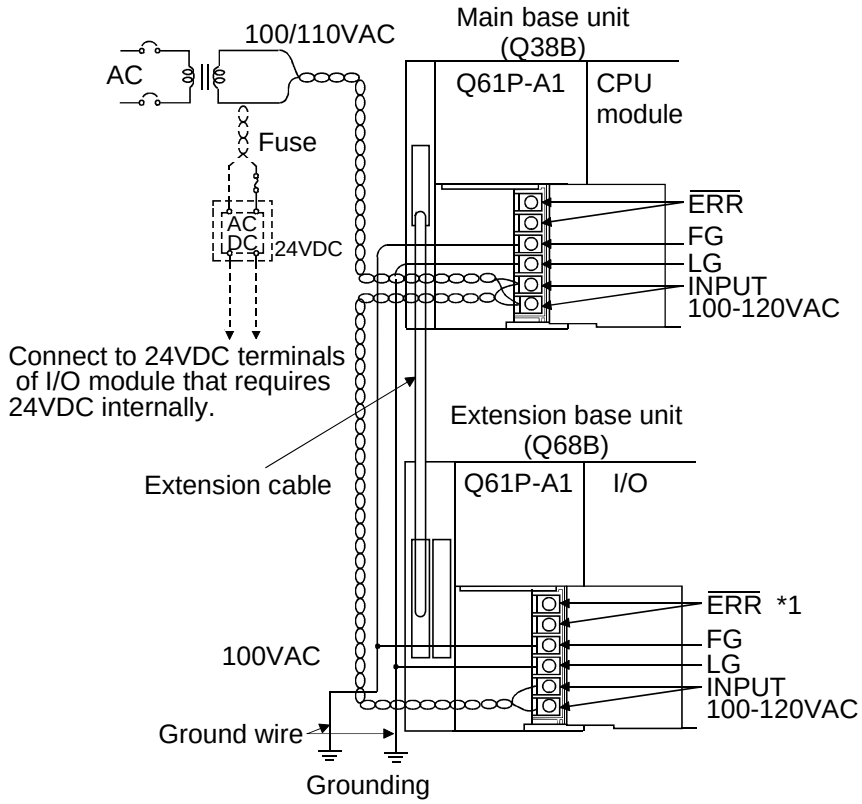


(3) 100VAC, 200VAC and 24VDC wires should be twisted as dense as possible. Connect the modules with the shortest distance.
Also, to reduce the voltage drop to the minimum, use the thickest wires possible (maximum 2mm^2).
(4) Do not bundle the 100VAC and 24VDC wires with, or run them close to, the main circuit (high voltage, large current) and I/O signal lines. If possible, run them more than 100mm (3.94 inch) away.
(5) As a countermeasure to power surge due to lightening, connect a surge absorber for lightening as shown below.



POINT
(1) Separate the ground of the surge absorber for lightening (E1) from that of the PLC (E2). (2) Select a surge absorber for lightening whose power supply voltage does no exceed the maximum allowable circuit voltage even at the time of maximum power supply voltage elevation.

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



POINT
(1) Use the thickest possible (max. 2 mm^2 (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 Error output through the ERR terminal of the power supply module on the extension base is not available. For error output, use the ERR terminal of the power supply module on the main base.

4.3.1 Precaution when connecting the uninterruptive power supply

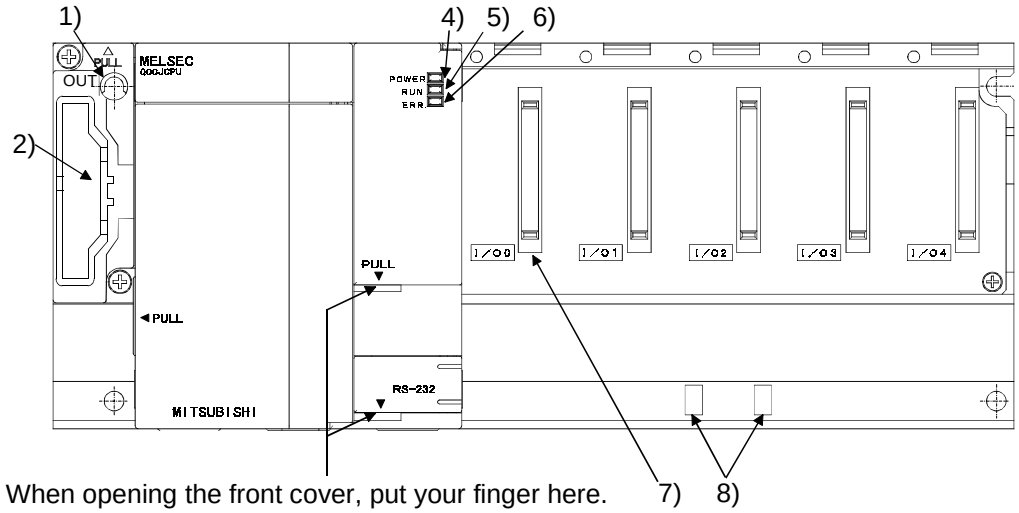
Be sure of the following terms when connecting the QCPU system to the uninterruptive power supply (abbreviated as UPS hereafter):
Use a UPS which employs the constant inverter power supply method with 5 % or less voltage fluctuation.
Do not use a UPS with the constant commercial power supply method.

4.4 Part Names and Settings of Q00J/Q00/Q01CPU

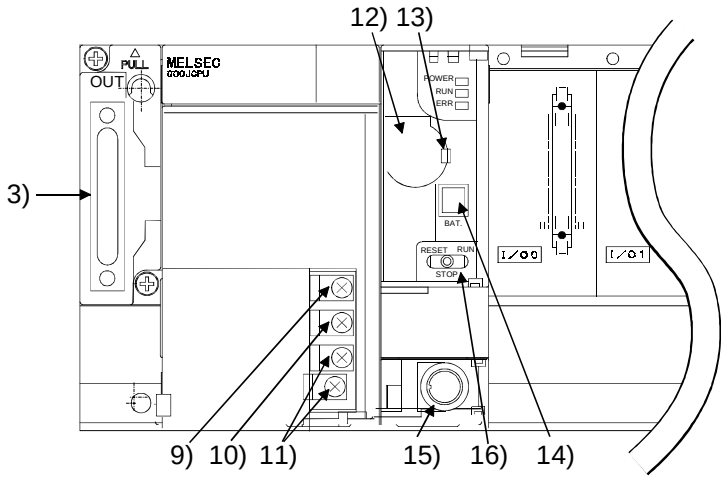
4.4.1 Part names and settings

(1) Q00JCPU

Front face



With front cover open

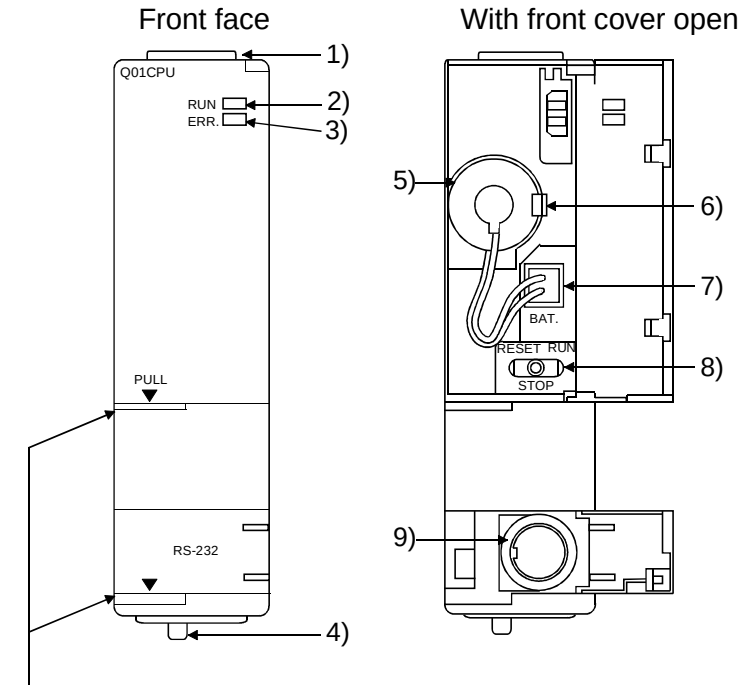


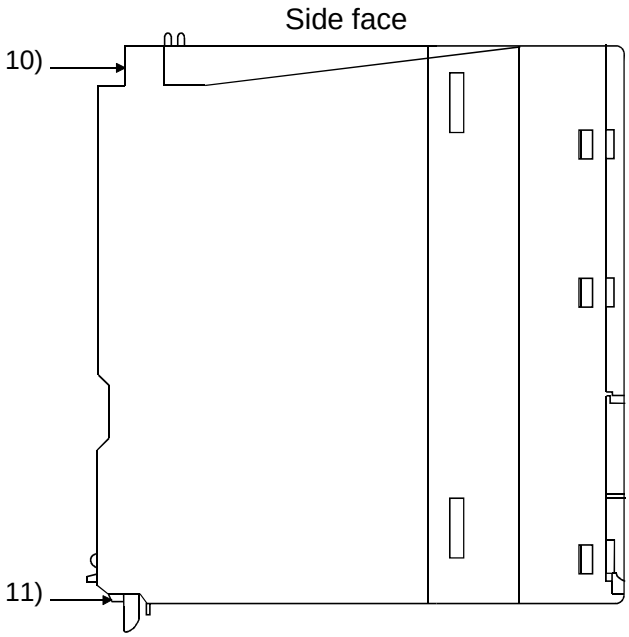
No.	Name	Application
1)	Base mounting hole	Pear-shaped hole for mounting the unit to a panel such as a control box. (For M4 screw)
2)	Cover	Protective cover for extension cable connector. Remove this cover when connecting an extension base.
3)	Extension cable connector	Connector for transfer of signals 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	Displays the operating status of the CPU module. ON :During operation in "RUN" mode. OFF :During a stop in "STOP" mode or when the errorwhose 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.)
6)	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.
7)	Module connector	Connector used for loading an I/O or intelligent function module. To the connector of the spare space where no module is mounted, fit the accessory connector cover or QG60 blank cover module to prevent dust from entering.
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-232C connector *1	Connector for connection of a peripheral device. Can be connected by the RS-232 connection cable (QC30R2).
16)	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 4.4.3 for details of reset operation.)

*1 : When normally connecting a cable to the RS-232 connector, clamp the cable to prevent it from coming off due to the dangling, moving or careless pulling of the cable.
Q6HLD-R2 type RS-232 Connector Disconnection Prevention Holder is available as a clamp for RS-232 connector.

(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	Displays the operating status of the CPU module. ON :During operation in "RUN" mode. OFF :During a stop in "STOP" mode or when the errorwhose 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 mount 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 4.5.3 for details of reset operation.)
9)	RS-232C connector *1	Connector for connection of a peripheral device. 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 latch	Latch used to fix to the base unit.

*1 : When normally connecting a cable to the RS-232 connector, clamp the cable to prevent it from coming off due to the dangling, moving or careless pulling of the cable.
Q6HLD-R2 type RS-232 Connector Disconnection Prevention Holder is available as a clamp for RS-232 connector.

4.4.2 Switch operation after writing program

Program can be written to the CPU module during STOP or RUN.

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

When you write 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 4.4.3)
3) RUN/STOP/RESET switch: STOP to RUN
   RUN LED: ON CPU module RUN status

(2) When you write a program during RUN

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

POINT

(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 4.4.3 for reset operation.)

(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.

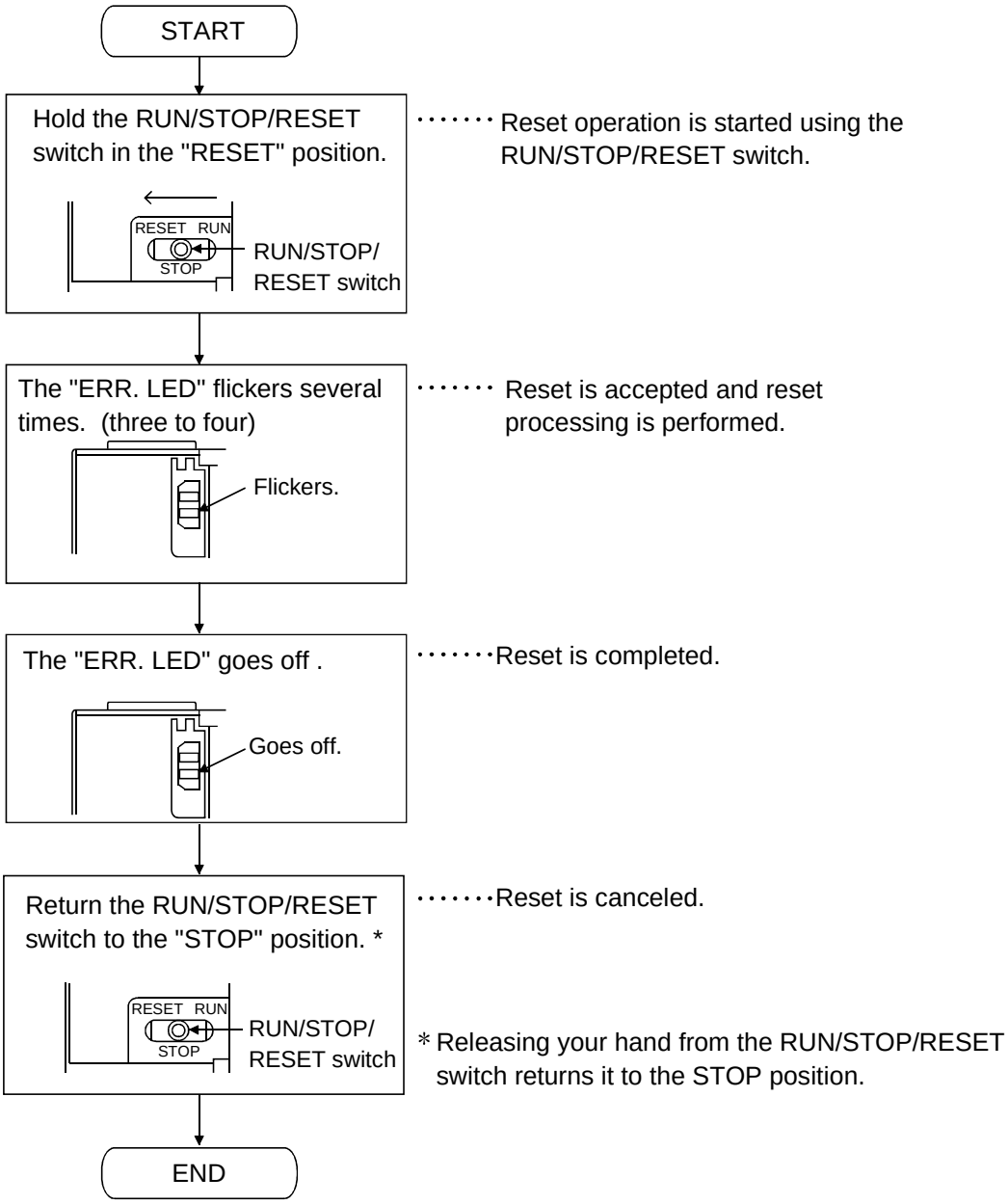
(3) The program written by online program correction during boot operation is written to the program memory
After making online program correction, also write the program to the standard ROM of the boot source memory. If you forget to write the program to the standard ROM, the old program will be executed 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).)

4.4.3 Reset operation

For the Q00J/Q00/Q01CPU, 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
Hold the RUN/STOP/RESET switch in the RESET position until reset processing is complete (the flickering ERR. LED goes off). If you release your hand from the RUN/STOP/RESET switch during reset processing (while the ERR. LED is flickering), the switch will return to the STOP position and reset processing cannot be completed.

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



4.4.4 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.

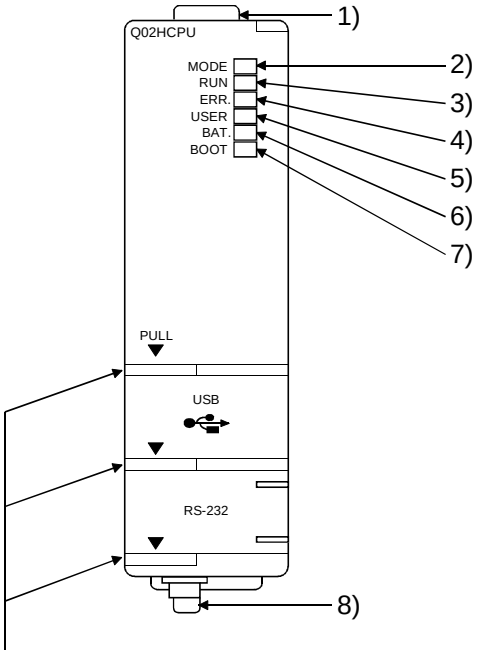
POINT
(1) The invalid range of latch clear can be set device-by-device by making device setting in the parameter mode. (2) For remote latch clear operation using GX Developer, refer to the operating manual of GX Developer.

4.5 Part Names and Settings of Q02 (H) /Q06H/Q12H/Q25H/Q12PH/Q25PHCPU

4.5.1 Part names and settings

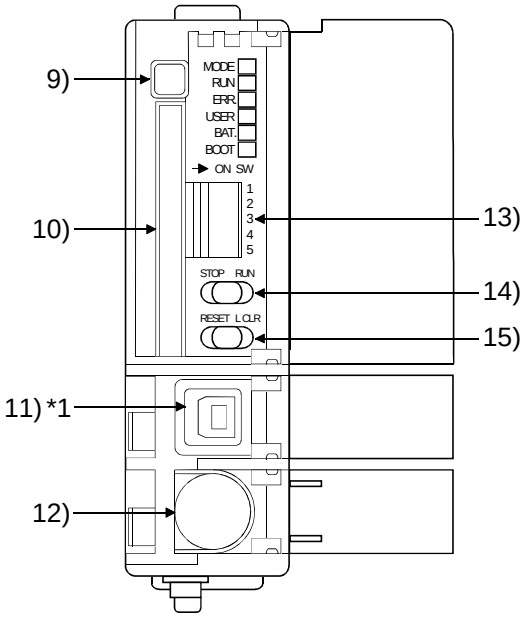
This section explains the names and settings of the module.

Front face

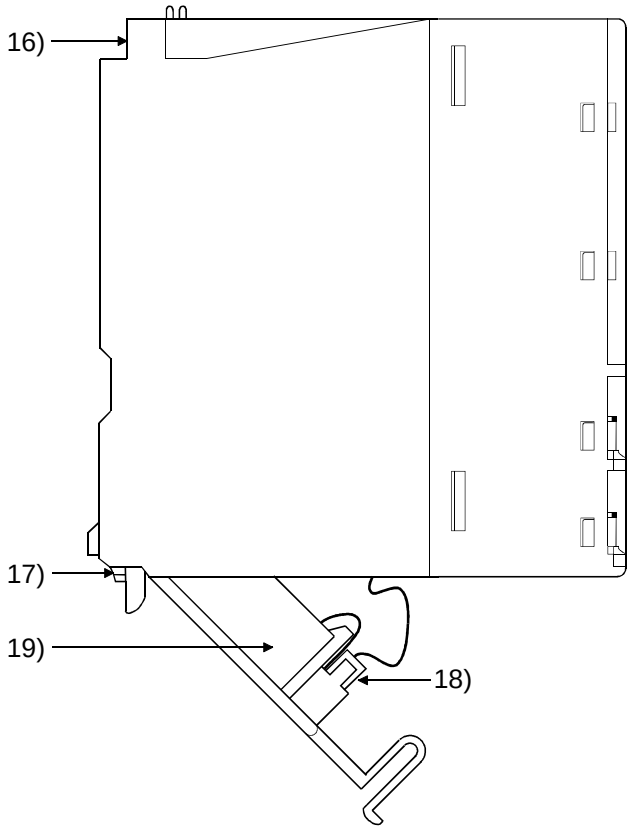


When opening the front cover, put your finger here.

With front cover open

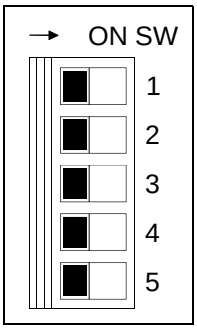


Side face



*1: Not provided for Q02CPU.

No.	Name	Application
1)	Module fixing hook	Hook used to fix the module to the base unit. (Single-motion installation)
2)	Mode LED	Displays the mode of the CPU module. ON (green) : Q mode ON (orange) : A mode Flicker (green) : Mandatory ON/OFF of external input/output registered
3)	RUN LED	Displays the operating status of the CPU module. ON : During operation in "RUN" mode. OFF : During a stop in "STOP" mode or detection of error whose occurrence stops operation. Flicker : When parameter/program is written at STOP and RUN/STOP switch is changed from "STOP" to "RUN". To turn ON the RUN LED after writing the program, carry out the following steps. • Set the RUN/STOP switch from "RUN" → "STOP" → "RUN". • Reset with the RESET/L.CLR switch. • Restart the PLC power. To turn ON the RUN LED after writing the parameters, carry out the following steps. • Reset with the RESET/L.CLR switch. • Restart the PLC power. (If the RUN/STOP switch is set from "RUN" → "STOP" → "RUN" after changing the parameters, the parameters related to the intelligent function module, such as the network parameters, will not be reflected.)
4)	ERR. LED	ON : Self-diagnostic error (except battery error) is detected and operation will not stop. (When operation continued at error detection is set in the parameter) OFF : Normal Flicker : Detection of error whose occurrence stops operation. When automatic writing to standard ROM is completed normally. (BOOT LED also flickers.)
5)	USER LED	ON : Error detected by CHK instruction or annunciator ON OFF : Normal Flicker : Execution of latch clear
6)	BAT. LED	ON : Battery error occurs due to reduction in battery voltages of CPU module and memory card. OFF : Normal
7)	BOOT LED	ON : Start of boot operation OFF : Non-execution of boot operation Flicker : When automatic writing to standard ROM is completed normally. (ERR. LED also flickers.)
8)	Module loading lever	Used to mount the module to the base unit.
9)	Memory card EJECT button	Used to eject the memory card from the CPU module.
10)	Memory card loading connector	Connector used to mount the memory card to the CPU module.

<table>
<tr><th>No.</th><th>Name</th><th>Application</th></tr>
<tr><td>11)</td><td>USB connector*2</td><td>Connector for connection with USB-compatible peripheral device
(Connector type B)
Can be connected by USB-dedicated cable.
Not available for Q02CPU.</td></tr>
<tr><td>12)</td><td>RS-232 connector*2</td><td>Connector for connection with a peripheral device.
Can be connected by RS-232 connection cable (QC30R2).</td></tr>
<tr><td rowspan="5">13)</td><td rowspan="5">DIP switches
  </td><td>Used to set the items for operation of the CPU module.
For system protection and parameter-valid drive functions, refer to the User's Manual (Function Explanation, Program Fundamentals) of the CPU module used.</td></tr>
<tr><td>SW1 : Used to set system protection. Batch-inhibits write and control directives to the CPU module. (Shipped in OFF position)
OFF : No protection
ON : Protection</td></tr>
<tr><td>SW2, SW3: Used to specify parameter-valid drive. (Both SW2 and SW3 are shipped in OFF position)
<table>
<tr><th>SW2</th><th>SW3</th><th>Parameter Drive</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Program memory (Drive 0)</td></tr>
<tr><td>ON</td><td>OFF</td><td>SRAM card (Drive 1)</td></tr>
<tr><td>OFF</td><td>ON</td><td>Flash card/ATA card (Drive 2)</td></tr>
<tr><td>ON</td><td>ON</td><td>Standard ROM (Drive 4)</td></tr>
</table>
Note: Parameters cannot be stored in standard RAM (Drive 3).</td></tr>
<tr><td>SW4: Must not be used. Normally OFF.
(Shipped in OFF position)</td></tr>
<tr><td>SW5: Must not be used. Normally OFF.
(Shipped in OFF position)</td></tr>
<tr><td>14)</td><td>RUN/STOP switch</td><td>RUN : Executes sequence program operation.
STOP: Stops sequence program operation.</td></tr>
<tr><td>15)</td><td>RESET/L.CLR switch</td><td>RESET: Used to perform hardware reset, operation fault rest, operation initialization, etc.
If this switch is left in the RESET position, the whole system will be reset and the system will not operate properly. After performing reset, always return this switch to the neutral position.
L.CLR : Used to turn "OFF" or "zero" all data in the parameter-set latch area.
Used to clear the sampling trace and status latch registration.</td></tr>
<tr><td>16)</td><td>Module fixing screw hole</td><td>Hole for the screw used to fix to the base unit. (M3 × 12 screw)</td></tr>
<tr><td>17)</td><td>Module fixing latch</td><td>Latch used to fix to the base unit.</td></tr>
<tr><td>18)</td><td>Battery connector pin</td><td>For connection of battery lead wires.
(When shipped from the factory, the lead wires are disconnected from the connector to prevent the battery from consuming.)</td></tr>
<tr><td>19)</td><td>Battery</td><td>Backup battery for use of program memory, standard RAM and power failure compensation function.</td></tr>
</table>

*2 : When normally connecting a cable to the USB connector or RS-232 connector, clamp the cable to prevent it from coming off due to the dangling, moving or carelessly pulling of the cable.
The Q6HLD-R2 type Connector Disconnection Prevention Holder is available as a clamp for RS232 connector.

4.5.2 Switch operation after writing program

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

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

(a) RUN/STOP switch: STOP

RUN LED : OFF ..... CPU module STOP status to Program write

(b) RESET/L.CLR switch: Move to RESET once and return to the original neutral position.

RUN/STOP switch : STOP to RUN

RUN LED : ON ..... CPU module RUN status

(2) When you write a program during RUN

When you write a program during RUN of the CPU module, do not operate the switch.

POINT
(1) The CPU module will not go into the RUN status if you move the RUN/STOP switch to RUN immediately after writing a program in the STOP status of the CPU module. After writing a program, perform rest with the RESET/L.CLR switch, then move the RUN/STOP switch to RUN to set the CPU module to the RUN status. (2) If you want to set the CPU module into the RUN status without resetting, move the RUN/STOP 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.

4.5.3 Latch clear operation

To perform latch clear, operate the RESET/L.CLR switch in the following procedure.

(a) RUN/STOP switch : STOP

(b) RESET/L.CLR switch : Move the switch to L.CLR several times until the USER LED flickers.

USER LED : Flicker ..... Ready for latch clear.

(c) RESET/L.CLR switch : Move the switch to L.CLR once more.

USER LED: OFF ..... Latch clear complete.

POINT
(1) Latch clear can be set to be valid or invalid device-by-device by making device setting in the parameter mode. (2) In addition to the way of using the RESET/L.CLR switch for latch clear, remote latch clear may be performed from GX Developer. For remote latch clear, refer to the User's Manual (Function Explanation, Program Fundamentals) of the CPU module used.

4.5.4 Mounting and removing memory card during power-on

(1) When removing the memory card while power is on

(a) Using the sequence program or testing of the GX Developer, turn on the special relay "SM609".

(b) Make sure that the special relays "SM604", "SM605" turned off by monitoring the GX Developer.

(c) Remove the memory card.

POINT
Note that if you do not follow the above procedure, the data within the memory card may be corrupted. If the CPU module operation at parameter error occurrence has been set to a stop, the CPU module stops operation due to the occurrence of "ICM. OPE. ERROR".

(2) When installing the memory card while power is on

(a) Mounting memory card

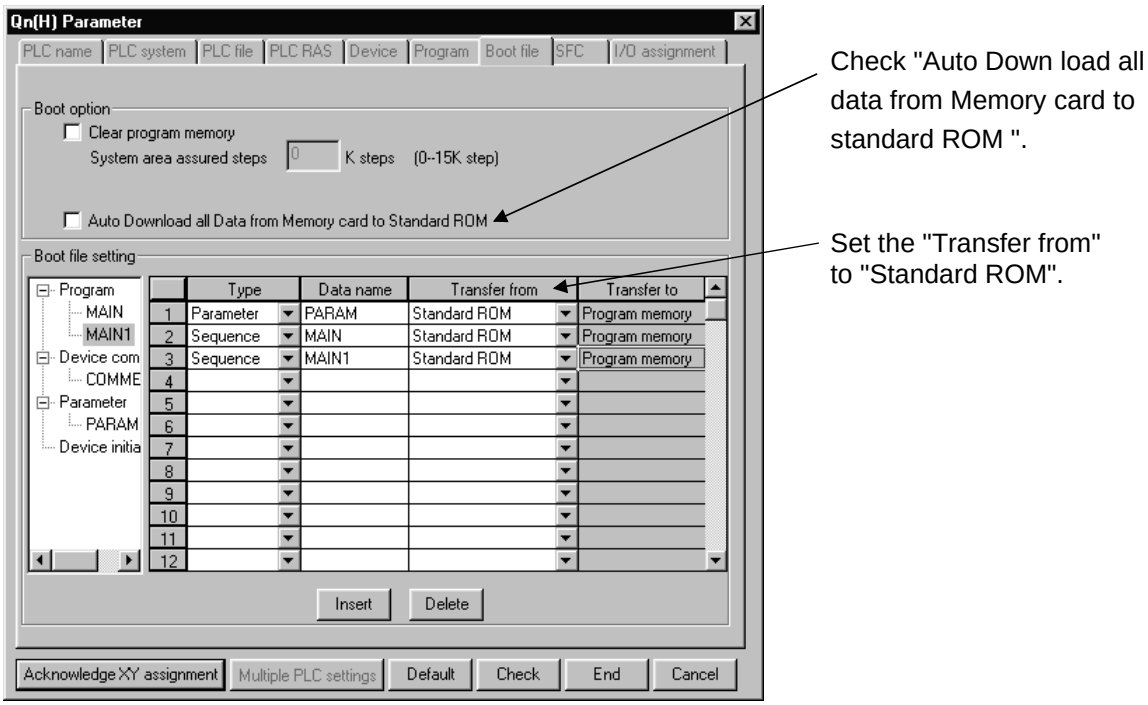
POINT
Note that after mounting the memory card, remounting processing is performed, increasing the scan time to a maximum of several 10 ms.

4.5.5 Executing automatic write to standard ROM.

Automatic write to the standard ROM is carried out with the following procedures.

(1) Operation with GX Developer (setting automatic write to standard ROM)

(a) Check the "Auto Download all Data from Memory card to standard ROM" item in the PLC parameter boot file setting.



(b) Store the set parameters and programs to be booted in the memory card.

(2) Operation with CPU module (automatic write to standard ROM)
(a) Turn the PLC power OFF.
(b) Mount the memory card containing the parameters and program to be booted into the CPU module.
(c) Set the parameter valid drive to the mounted memory card using the CPU module DIP switches.
- When SRAM card is mounted .....SW2: ON, SW3: OFF
- When Flash/ATA card is mounted .....SW2: OFF, SW3: ON

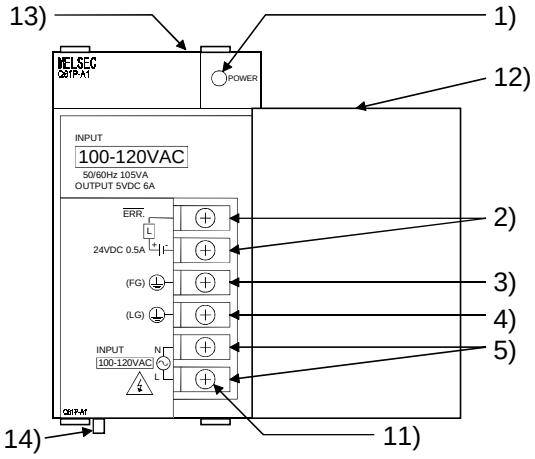
(d) Turn the PLC power ON.
Boot the file designated in the memory card into the program memory, and after booting is completed, write the contents of the program memory into the standard ROM.
(e) When automatic write to standard ROM is completed, the "BOOT LED" will flicker, and the CPU module will stop with an error.
(f) Turn the PLC power OFF.
(g) Remove the memory card, and set the parameter valid drive to the standard ROM with the CPU module DIP switches.
- Standard ROM .....SW2: ON, SW3: ON

(3) When the PLC power is turned ON, the data will be booted from the standard ROM to the program memory, and actual operation will be possible.

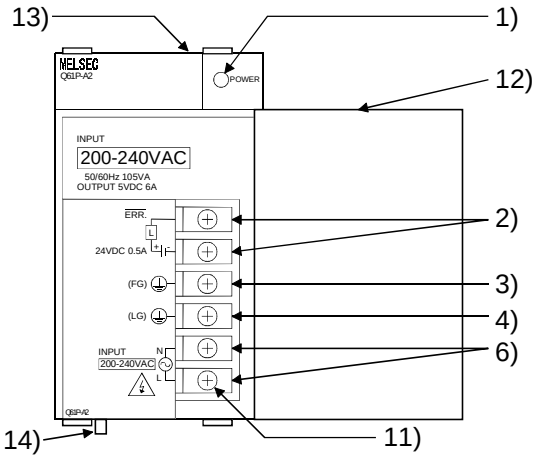
4.6 Part Names of Power Supply Modules

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

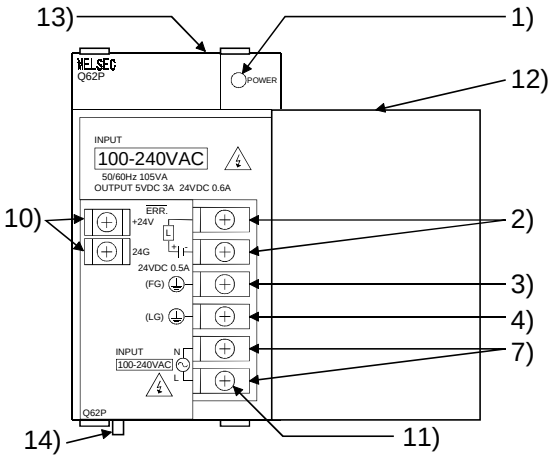
(See section 4.4.1 for part names of power supply of Q00JCPU.)



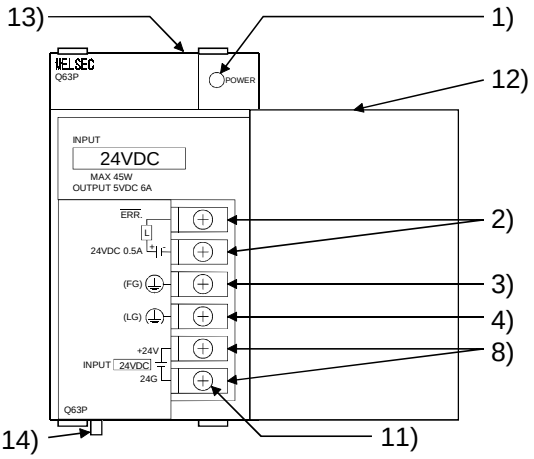
Q61P-A1



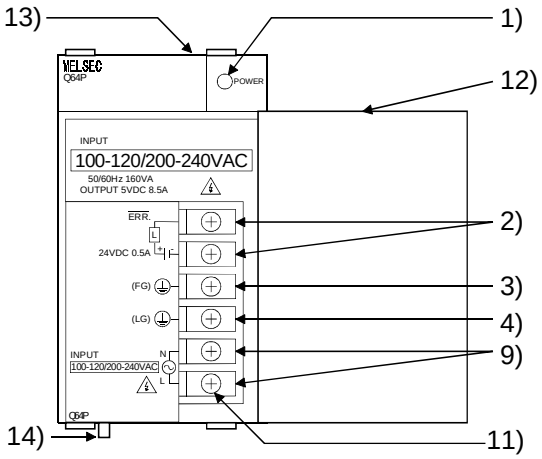
Q61P-A2



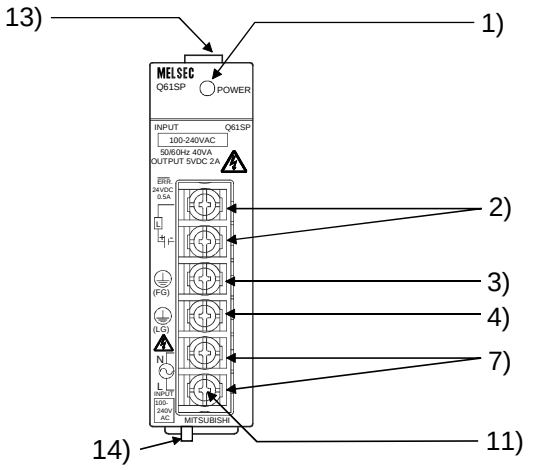
Q62P



Q63P



Q64P



Q61SP

No.	Name	Application
1)	POWER LED	5VDC power indicator LED
2)	$\overline{\text{ERR}}$ terminals	Turned OFF (opened) when a stop error occurs in the CPU module. Normally off when mounted 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. The potential of Q61P-A1, Q61P-A2, Q62P, Q64P and Q61SP terminal is 1/2 of the input voltage
5)	Power input terminals	Used to connect a 100VAC power supply.
6)	Power input terminals	Used to connect a 200VAC power supply.
7)	Power input terminals	Used to connect a 100VAC to 200VAC power supply.
8)	Power input terminals	Used to connect a 24VDC power supply.
9)	Power input terminals	Used to connect a 100VAC/200VAC power supply.
10)	+24V, 24G terminals	Used to supply 24VDC power to inside the output module (using external wiring).
11)	Terminal screw	M3.5 × 7
12)	Terminal cover	Protective cover of the terminal block
13)	Module fixing screw	Used to fix the module to the base unit. M3 × 12 screw (user-prepared) (Tightening torque : 36 to 48N·cm)
14)	Module loading lever	Used to mount the module into the base unit.

POINTS

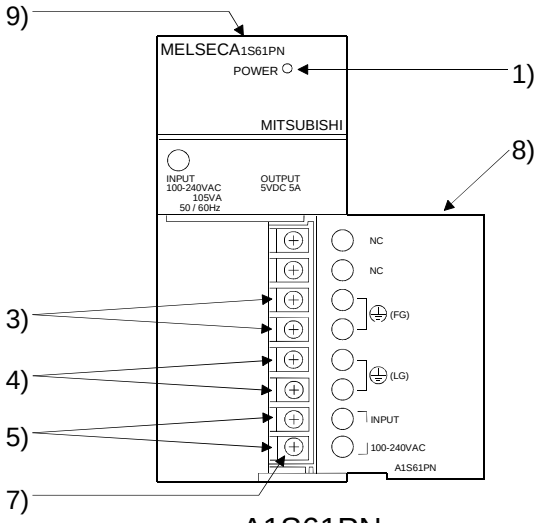
(1) The Q61P-A1 is dedicated for inputting a voltage of 100 VAC. Do not input a voltage of 200 VAC into it or trouble may occur on the Q61P-A1.

Power module type	Supply power voltage	
	100VAC	200VAC
Q61P-A1	Operates normally.	Power supply module causes trouble.
Q61P-A2	Power supply module does not cause trouble. CPU module cannot be operated.	Operates normally.

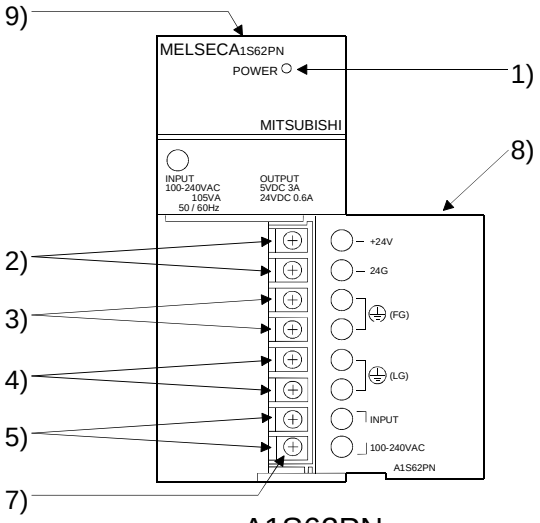
(2) Q64P automatically switches the input range 100VAC/200VAC.
Therefore, it is not compatible with the intermediate voltage (133VAC to 169VAC).
The CPU module may not work normally if the above intermediate voltage is applied.

(3) Ensure that the earth terminals LG and FG are grounded.

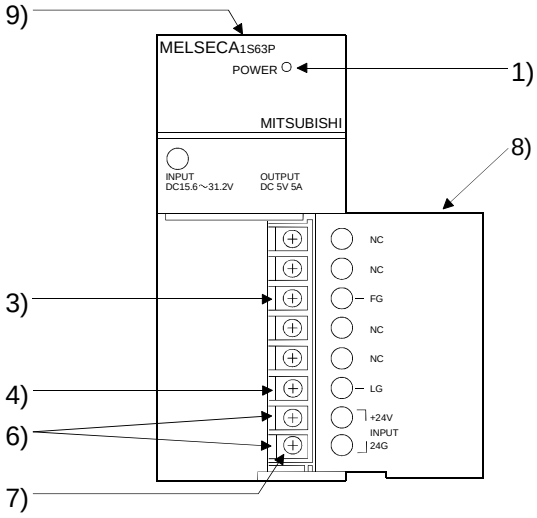
(2) A1S61PN, A1S62PN, A1S63P



A1S61PN



A1S62PN



A1S63P

No.	Name	Application
1)	POWER LED	5VDC power indicator LED
2)	+24V, 24G terminals	Used to supply 24VDC power to inside of the output module (using external wiring).
3)	FG terminals	Ground terminal connected to the shield pattern of the printed circuit board.
4)	LG terminals	Grounding for the power supply filter. The potential of A1S61PN or A1S62PN terminal is 1/2 of the input voltage.
5)	Power input terminals	Used to connect a 100VAC to 200VAC power supply.
6)	Power input terminals	Used to connect a 24VDC power supply.
7)	Terminal screw	Protective cover of the terminal block
8)	Terminal cover	Protective cover of the terminal block
9)	Module fixing screw	Used to fix the module to the base unit. (M4 screw, tightening torque : 59 to 88N·cm)

POINT
(1) Do not wire the terminal which is printed NC on the terminal block. (2) Be sure to ground the terminals LG and FG to the protective ground conductor.

5. Specifications and Connections of I/O Modules

⚠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.

This chapter provides the specifications and connection diagrams of the Q series I/O modules.

5.1 Input Modules
5.1.1 Specifications of input modules

Item \ Type		QX10	QX28
Input form		AC input	
Number of input points		16 points	8 points
Rated input voltage, frequency		100 to120V AC (+10%/-15%) 50/60Hz (±3Hz)	100 to 240V AC (+10%/-15%) 50/60Hz (±3Hz)
Rated input current		Approx. 8mA (100V AC, 60Hz) Approx. 7mA (100V AC, 50Hz)	Approx. 17mA (200V AC, 60Hz), Approx. 14mA (200V AC, 50Hz), Approx. 8mA (100V AC, 60Hz), Approx. 7mA (100V AC, 50Hz)
ON voltage/ON current		80V AC or more/5mA or more (50Hz, 60Hz)	
OFF voltage/OFF current		30V AC or less/1.7mA or less (50Hz, 60Hz)	
Number of simultaneously input points (Simultaneous ON ratio)		100% (110V AC) 60% (132V AC)	100% (240V AC) 87.5% (264V AC)
Response time	OFF to ON	15ms or less (100V AC, 60Hz)	10ms or less (100V AC, 60Hz)
	ON to OFF	20ms or less (100V AC, 60Hz)	
Writing method for common		16 points/common (Common terminal: TB17)	8 points/common (Common terminal: TB17)
Number of occupied I/O points		16 points/common (Common terminal:TB17)	
External connection		18-point terminal block (M3 x 6 screw)	
5 V DC internal current consumption		50mA (TYP. all points ON)	

For all modules, the following is applied. Isolation method: Photocoupler isolation
Input display: LED display

Item \ Type		QX40	QX40-S1
Input form		DC input (positive common type)	
Number of input points		16 points	
Rated input voltage		26V DC (+ 20%/-15%, ripple ratio within 5%)	
Rated input current		Approx. 4mA	Approx. 6mA
ON voltage/ON current		19V or more/3mA or more	19V or more/4mA or more
OFF voltage/OFF current		11V or less/1.7mA or less	
Number of simultaneous input points (Simultaneous ON ratio)		100%	
Response time	OFF to ON	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) Initial setting is 10ms.	*1
	ON to OFF		
Writing method for common		16 points/common (Common terminal:TB17)	
Number of occupied I/O points		16 points (I/O assignment is set as 16-point input module)	16 points (I/O assignment is set as 16-point high-speed input module)
External connection		18-point terminal block (M3 × 6 screw)	
5V DC internal current consumption		50mA (TYP. all points ON)	60mA (TYP. all points ON)

For all modules, the following is applied. Isolation method: Photocoupler isolation
Input display: LED display

*1: The response time of QX40-S1 is shown below. (Set with parameters of the CPU module. The initial setting is 0.2ms.)

Setting value		0.1	0.2	0.4	0.6	1
OFF→ON	TYP.	0.05ms	0.15ms	0.30ms	0.55ms	1.05ms
	MAX.	0.10ms	0.20ms	0.40ms	0.60ms	1.20ms
ON→OFF	TYP.	0.15ms	0.20ms	0.35ms	0.60ms	1.10ms
	MAX	0.20ms	0.30ms	0.50ms	0.70ms	1.30ms

Item \ Type		QX41	QX41-S1
Input form		DC input (positive common type)	
Number of input points		32 points	
Rated input voltage		24V DC (+ 20%/-15%, ripple ratio within 5%)	
Rated input current		Approx. 4mA	Approx. 6mA
ON voltage/ON current		19V or more/3mA or more	
OFF voltage/OFF current		11V or less/1.7mA or less	9.5V or less/1.5mA or less
Number of simultaneous input points (Simultaneous ON ratio)		60% (20 points/common)	
Response time	OFF to ON	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) Initial setting is 10ms.	*1
	ON to OFF		
Writing method for common		32 points/common (Common terminal:B01, B02)	
Number of occupied I/O points		32 points (I/O assignment is set as 32-point input module)	32 points (I/O assignment is set as 32-point high-speed input module)
External connection		40-pin connector	
5V DC internal current consumption		75mA (TYP. all points ON)	

For all modules, the following is applied. Isolation method: Photocoupler isolation
Input display: LED display

*1: The response time of QX41-S1 is shown below. (Set with parameters of the CPU module. The initial setting is 0.2ms.)

Setting value		0.1	0.2	0.4	0.6	1
OFF→ON	TYP.	0.05ms	0.15ms	0.30ms	0.55ms	1.05ms
	MAX.	0.12ms	0.20ms	0.40ms	0.60ms	1.20ms
ON→OFF	TYP.	0.15ms	0.20ms	0.35ms	0.60ms	1.10ms
	MAX.	0.20ms	0.30ms	0.50ms	0.70ms	1.30ms

Item \ Type		QX42	QX42-S1
Input form		DC input (positive common type)	
Number of input points		64 points	
Rated input voltage		24V DC (+ 20%/-15%, ripple ratio within 5%)	
Rated input current		Approx. 4mA	
ON voltage/ON current		19V or more/3mA or more	
OFF voltage/OFF current		11V or less/1.7mA or less	9.5V or less/1.5mA or less
Number of simultaneous input points (Simultaneous ON ratio)		50% (16 points/common)	
Response time	OFF to ON ON to OFF	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) Initial setting is 10ms.	*1
Writing method for common		32 points/common (Common terminal: 1B01, 1B02, 2B01, 2B02)	
Number of occupied I/O points		64 points (I/O assignment is set as 64-point input module)	64 points (I/O assignment is set as 64-point high-speed input module)
External connection		40-pin connector × 2	
5V DC internal current consumption		90mA (TYP. all points ON)	

For all modules, the following is applied. Isolation method: Photocoupler isolation
Input display: LED display

*1: The response time of QX42-S1 is shown below. (Set with parameters of the CPU module. The initial setting is 0.2ms.)

Setting value		0.1	0.2	0.4	0.6	1
OFF→ON	TYP.	0.05ms	0.15ms	0.30ms	0.55ms	1.05ms
	MAX.	0.12ms	0.20ms	0.40ms	0.60ms	1.20ms
ON→OFF	TYP.	0.15ms	0.20ms	0.35ms	0.60ms	1.10ms
	MAX.	0.20ms	0.30ms	0.50ms	0.70ms	1.30ms

Item \ Type	QX70		QX71		QX72	
Input form	DC input (positive/negative common type)					
Number of input points	16 points		32 points		64 points	
Rated input voltage	5VDC (-15%/ +20%, ripple ratio within 5%)	12VDC (-15%/ +20%, ripple ratio within 5%)	5VDC (-15%/ +20%, ripple ratio within 5%)	12VDC (-15%/ +20%, ripple ratio within 5%)	5VDC (-15%/ +20%, ripple ratio within 5%)	12VDC (-15%/ +20%, ripple ratio within 5%)
Rated input current	Approx. 1.2mA	Approx. 3.3mA	Approx. 1.2mA	Approx. 3.3mA	Approx. 1.2mA	Approx. 3.3mA
ON voltage/ON current	3.5V or more/1mA or more					
OFF voltage/OFF current	1V or less/0.1mA or less					
Number of simultaneous input points (Simultaneous ON ratio)	100%					
Response time: OFF to ON / ON to OFF	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) Initial setting is 10ms.					
Writing method for common	16 points/common (Common terminal:TB17)		32 points/common (Common terminal: B01, B02)		32 points/common (Common terminal: 1B01, 1B02, 2B01, 2B02)	
Number of occupied I/O points	16 points (I/O assignment is set as 16-point input module)		32 points (I/O assignment is set as 32-point input module)		64 points (I/O assignment is set as 64-point input module)	
External connection	18-point terminal block (M3 × 6 screw)		40-pin connector		40-pin connector × 2	
5V DC internal current consumption	55mA (TYP. all points ON)		70mA (TYP. all points ON)		85mA (TYP. all points ON)	

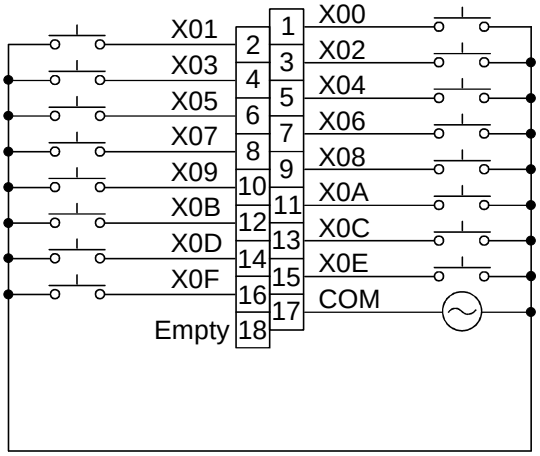
For all modules, the following is applied. Isolation method: Photocoupler isolation
Input display: LED display

Item \ Type	QX80	QX81
Input form	DC input (negative common type)	
Number of input points	16 points	32 points
Rated input voltage	24V DC (+ 20%/-15%, ripple ratio within 5%)	
Rated input current	Approx. 4mA	
ON voltage/ON current	19V or more/3mA or more	
OFF voltage/OFF current	11V or less/1.7mA or less	
Number of simultaneous input points (Simultaneous ON ratio)	100%	60% (20 points/common)
Response time: OFF to ON / ON to OFF	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) Initial setting is 10ms.	
Writing method for common	16 points/common (Common terminal:TB18)	32 points/common (Common terminal: 17,18, 36)
Number of occupied I/O points	16 points (I/O assignment is set as 16-point input module)	32 points (I/O assignment is set as 32-point input module)
External connection	18-point terminal block (M3 × 6 screw)	37-pin D sub-connector
5V DC internal current consumption	50mA (TYP. all points ON)	75 (TYP. all points ON)

5.1.2 Input module connection diagram

(1)

Type	Rated input voltage
QX10	100 to 200VAC

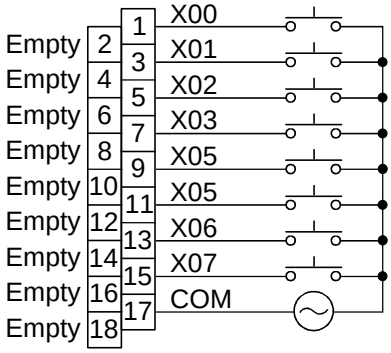


⚠DANGER

- Do not touch the terminals during energization. Doing so can cause an electric shock or malfunction.

(2)

Type	Rated input voltage
QX28	100 to 240VAC

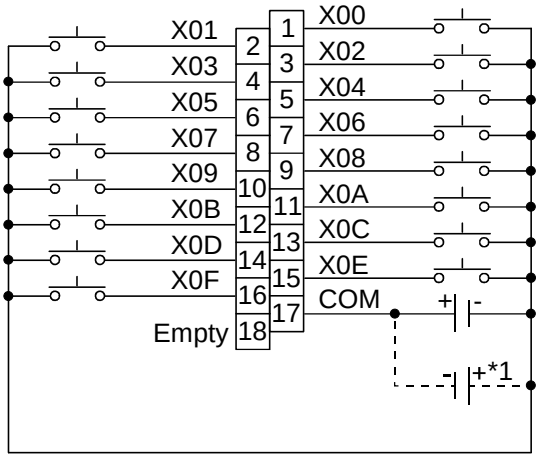


⚠DANGER

- Do not touch the terminals during energization. Doing so can cause an electric shock or malfunction.

(3)

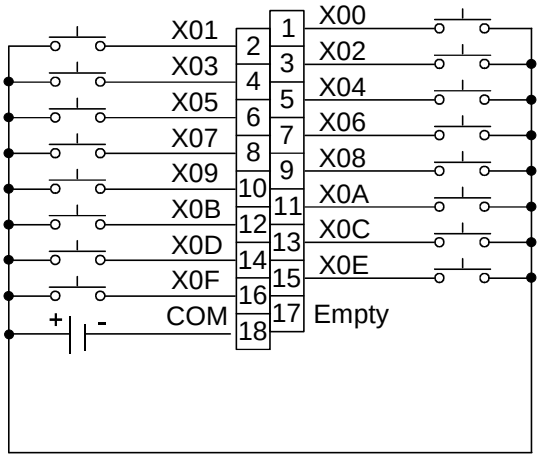
Type	Rated input voltage
QX40	24VDC
QX40-S1	
QX70	5/12VDC



*1: Negative and positive commons are both applicable to QX70.

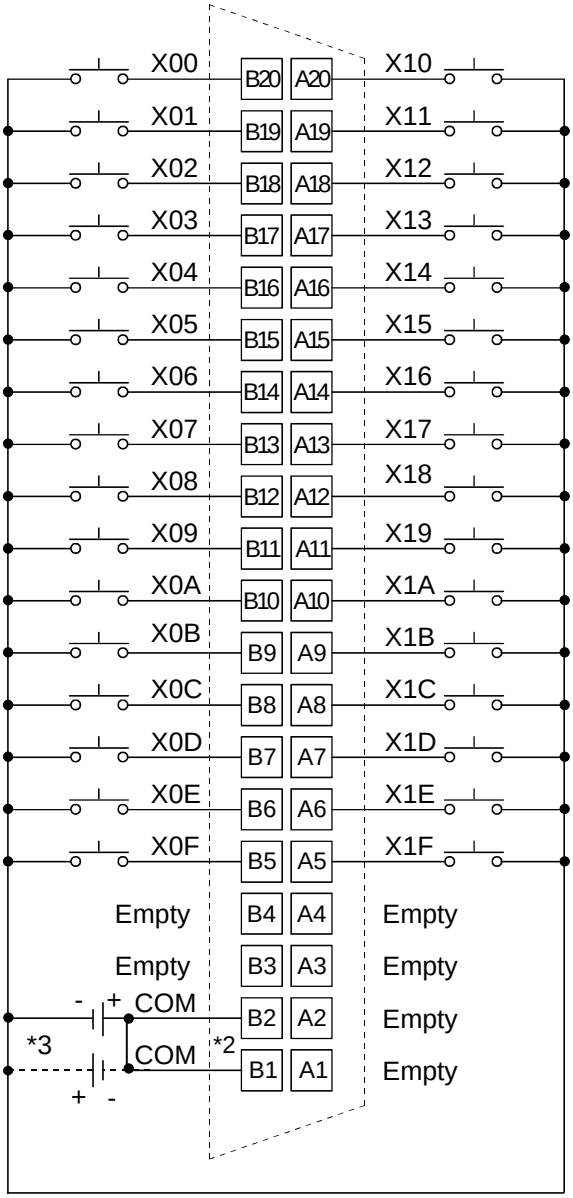
(4)

Type	Rated input voltage
QX80	24VDC



(5)

Type	Rated input voltage
QX41	24VDC
QX41-S1	
QX42 *1	
QX42-S1	
QX71	5/12VDC
QX72 *1	



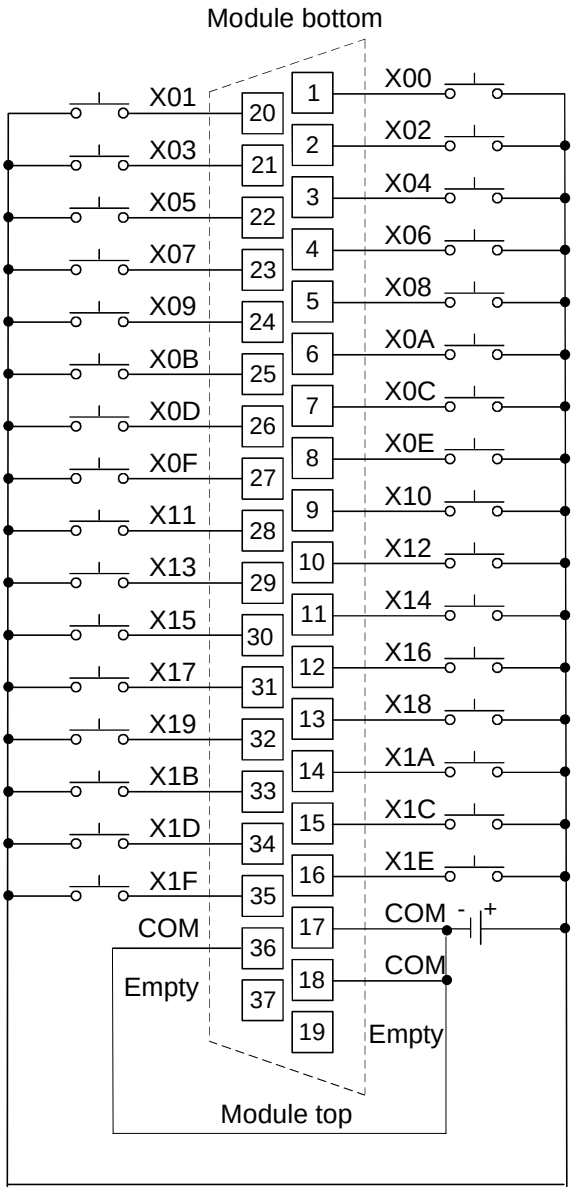
*1: For the QX42/QX42-S1/QX72, the above diagram shows the first half 32 points (F). The connections of the latter half 32 points (L) are the same as those of the first half 32 points (F).
Regard X00 to X1F as X20 to X3F.

*2: [B1] and [B2] are connected internally.

*3: Negative and positive commons are both applicable to QX71 and QX72.

(6)

Type	Rated input voltage
QX81	24VDC



*[17], [18] and [36] are connected internally.

5.2 Output Modules
5.2.1 Specifications of output modules

Item \ Type		QY10	QY18A
Output form		Contact output	
Number of output points		16 points	8 points
Rated switching voltage, current		24V DC, 2A (resistance load)/point; 240V AC, 2A (COSϕ = 1)/point; 8A/common	24V DC, 2A (resistance load)/point; 240V AC, 2A (COSϕ = 1)/point
Response time	OFF to ON	10ms or less	
	ON to OFF	12ms or less	
Surge suppressor		None	
Fuse		None	
Fuse blown display		None	
External power supply	Voltage	-	
	Current		
Writing method for common		16 points/common (Common terminal:TB17)	-
Number of occupied I/O points		16 points (I/O assignment is set as 16-point output module)	
Protective function		None	
External connection		18-point terminal block (M3 × 6 screw)	
5V DC internal current consumption		430mA (TYP. all points ON)	240mA (TYP. all points ON)

For QY10 and QY18A, the following is applied.
Isolation method: Relay isolation
Output display: LED display

Item \ Type		QY22	QY40P
Output form		TRIAC output	Transistor output (sink type)
Number of output points		16 points	
Rated load voltage		100 – 240V AC (+20%/-15%)	12/24V DC (+20%/-15%)
Max. load current		0.6A/point, 4.8A/common	0.1A/point, 1.6A/common
Response time	OFF to ON	1ms + 0.5Hz or less	1ms or less
	ON to OFF	1ms + 0.5Hz or less (rated load, resistance load)	1ms or less (rated load, resistance load)
Surge suppressor		CR absorber	Zener diode
Fuse		None	
Fuse blown display		None	
External power supply	Voltage	-	12/24V DC (+20%/-15%, ripple ratio within 5%)
	Current		10mA (at 24V DC, MAX all points ON)
Writing method for common		16 points/common (Common terminal:TB17)	16 points/common (Common terminal:TB18)
Number of occupied I/O points		16 points (I/O assignment is set as 16-point output module)	
Protective function		None	Provided
External connection		18-point terminal block (M3 screw × 6)	
5V DC internal current consumption		250mA (MAX. all points ON)	65mA (TYP. all points ON)

For QY22 and QY40P, the following is applied.
Isolation method: Photocoupler isolation
Output display: LED display

Item \ Type		QY41P	QY42P
Output form		Transistor output (sink type)	
Number of output points		32 points	64 points
Rated load voltage		12/24V DC (+20%/-15%)	
Max. load current		0.1A/point, 2A/common	
Response time	OFF to ON	1ms or less	
	ON to OFF	1ms or less (rated load, resistance load)	
Surge suppressor		Zener diode	
Fuse		None	
Fuse blown display		None	
External power supply	Voltage	12/24V DC (+20%/-15%, ripple ratio within 5%)	
	Current	20mA (at 24V DC)	10mA (at 24V DC)/common
Writing method for common		32 points/common (Common terminal:A01, A02)	1632 points/common (Common terminal:1A01, 1A02, 2A01, 2A02)
Number of occupied I/O points		32 points (I/O assignment is set as 32-point output module)	64 points (I/O assignment is set as 64-point output module)
Protective function		Provided	
External connection		40-pin connector	40-pin connector × 2
5V DC internal current consumption		105mA (TYP. all points ON)	150mA (TYP. all points ON)

For QY41P and QY42P, the following is applied.
Isolation method: Photocoupler isolation
Output display: LED display

Item \ Type		QY50	QY68A
Output form		Transistor output (sink type)	Transistor output (all points independent, sink/source type)
Number of output points		16 points	8 points
Rated load voltage		12/24V DC (+20%/-15%)	5/12/24V DC (+20%/-15%)
Max. load current		0.5A/point, 4A/common	2A/point, 8A/module
Response time	OFF to ON	1ms or less	3ms or less
	ON to OFF	1ms or less (rated load, resistance load)	10ms or less (resistance load)
Surge suppressor		Zener diode	
Fuse		6.7A (Not replaceable, blown fuse capacity: 50A)	None
Fuse blown display		Provided (LED display for fuse blown, signal output to CPU module)	None
External power supply	Voltage	12/24V DC (+20%/-15%, ripple ratio within 5%)	-
	Current	20mA (at 24V DC)	
Writing method for common		16 points/common (Common terminal:TB18)	All points independent
Number of occupied I/O points		16 points (I/O assignment is set as 16-point output module)	
Protective function		None	
External connection		18-point terminal block (M3 screw × 6)	
5V DC internal current consumption		80mA (TYP. all points ON)	110mA (TYP. all points ON)

For QY50 and QY68A, the following is applied.
Isolation method: Photocoupler isolation
Output display: LED display

Item \ Type		QY70	QY71
Output form		Transistor output (sink type)	
Number of output points		16 points	32 points
Rated load voltage		5/12V DC (+20%/-10%)	5/12V DC (+25%/-10%)
Max. load current		16mA/point, 256mA/common	16mA/point, 512mA/common
Response time	OFF to ON	0.5ms or less	
	ON to OFF	0.5ms or less (resistance load)	
Surge suppressor		None	
Fuse		1.6A (Not replaceable, blown fuse capacity: 50A)	
Fuse blown display		Provided (LED display for fuse blown, signal output to CPU module)	
External power supply	Voltage	5/12V DC (+20%/-10%, ripple ratio within 5%)	5/12V DC (+25%/-10%, ripple ratio within 5%)
	Current	90mA (at 24V DC, MAX all points ON)	170mA (at 24V DC)
Writing method for common		16 points/common (Common terminal:TB18)	32 points/common (Common terminal: A01, A02)
Number of occupied I/O points		16 points (I/O assignment is set as 16-point output module)	32 points (I/O assignment is set as 32-point output module)
Protective function		None	
External connection		18-point terminal block (M3 × 6 screw)	40-pin connector
5V DC internal current consumption		95mA (TYP. all points ON)	150mA (TYP. all points ON)

For QY70 and QY71, the following is applied.
Isolation method: Photocoupler isolation
Output display: LED display

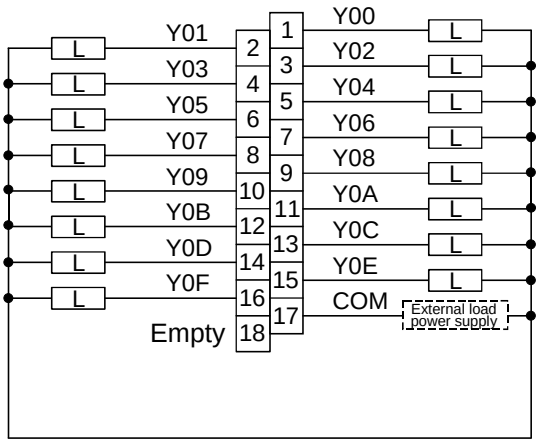
Item \ Type		QY80	QY81P
Output form		Transistor output (source type)	
Number of output points		16 points	32 points
Rated load voltage		12/24V DC (+20%/-15%)	
Max. load current		0.5A/point, 4A/common	0.1A/point, 2A/common
Response time	OFF to ON	1ms or less	
	ON to OFF	1ms or less (resistance load, resistance load)	
Surge suppressor		Zenor diode	
Fuse		6.7A (Not replaceable, blown fuse capacity: 50A)	None
Fuse blown display		Provided (LED display for fuse blown, signal output to CPU module)	None
External power supply	Voltage	12/24V DC (+20%/-15%, ripple ratio within 5%)	
	Current	20mA (at 24V DC)	40mA (at 24V DC)
Writing method for common		16 points/common (Common terminal:TB17)	32 points/common (Common terminal: 17,18, 36)
Number of occupied I/O points		16 points (I/O assignment is set as 16-point output module)	32 points (I/O assignment is set as 32-point output module)
Protective function		None	Provided
External connection		18-point terminal block (M3 × 6 screw)	37-pin D sub-connector
5V DC internal current consumption		80mA (TYP. all points ON)	95mA (TYP. all points ON)

For QY80 and QY81P, the following is applied.
Isolation method: Photocoupler isolation
Output display: LED display

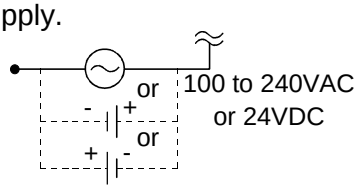
5.2.2 Output module connection diagram

(1)

Type	Rated load voltage
QY10	24VDC/240VAC



* The following diagram shows the external load power supply.

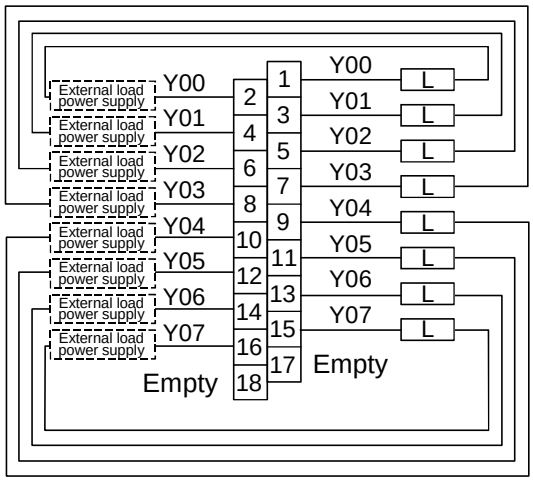


DANGER

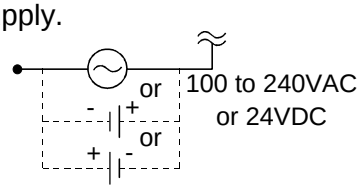
- Do not touch the terminals during energization. Doing so can cause an electric shock or malfunction.

(2)

Type	Rated load voltage
QY18A	24VDC/240VAC



* The following diagram shows the external load power supply.

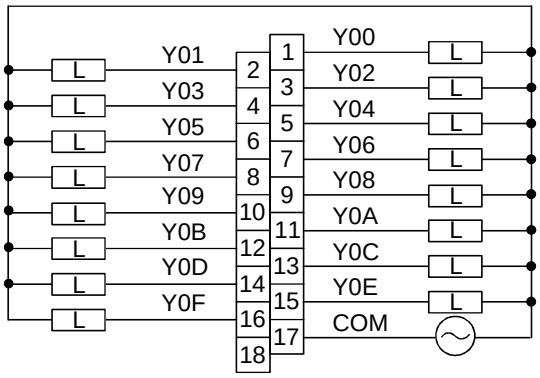


DANGER

- Do not touch the terminals during energization. Doing so can cause an electric shock or malfunction.

(3)

Type	Rated load voltage
QY22	100-240VAC

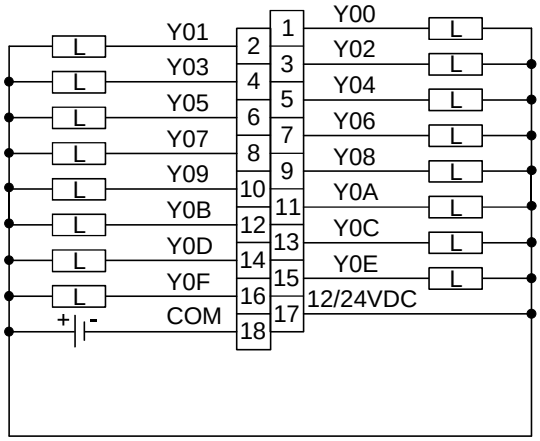


DANGER

- Do not touch the terminals during energization. Doing so can cause an electric shock or malfunction.

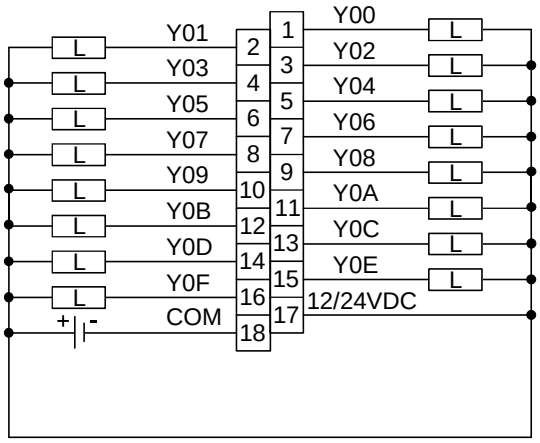
(4)

Type	Rated load voltage
QY40P	12/24VDC



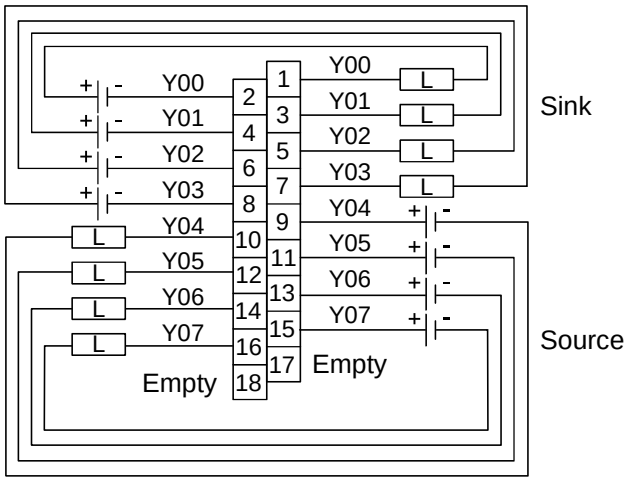
(5)

Type	Rated load voltage
QY50	12/24VDC



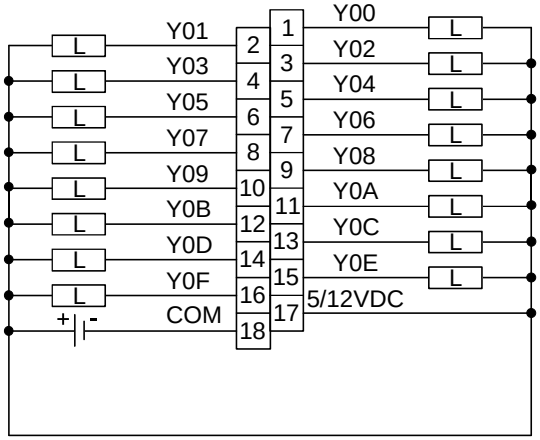
(6)

Type	Rated load voltage
QY68A	5/12/24VDC



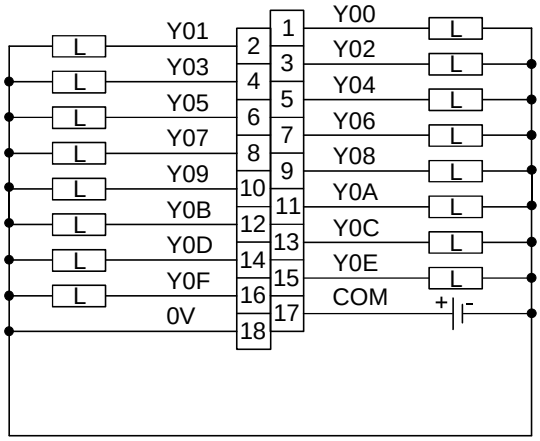
(7)

Type	Rated load voltage
QY70	5/12VDC



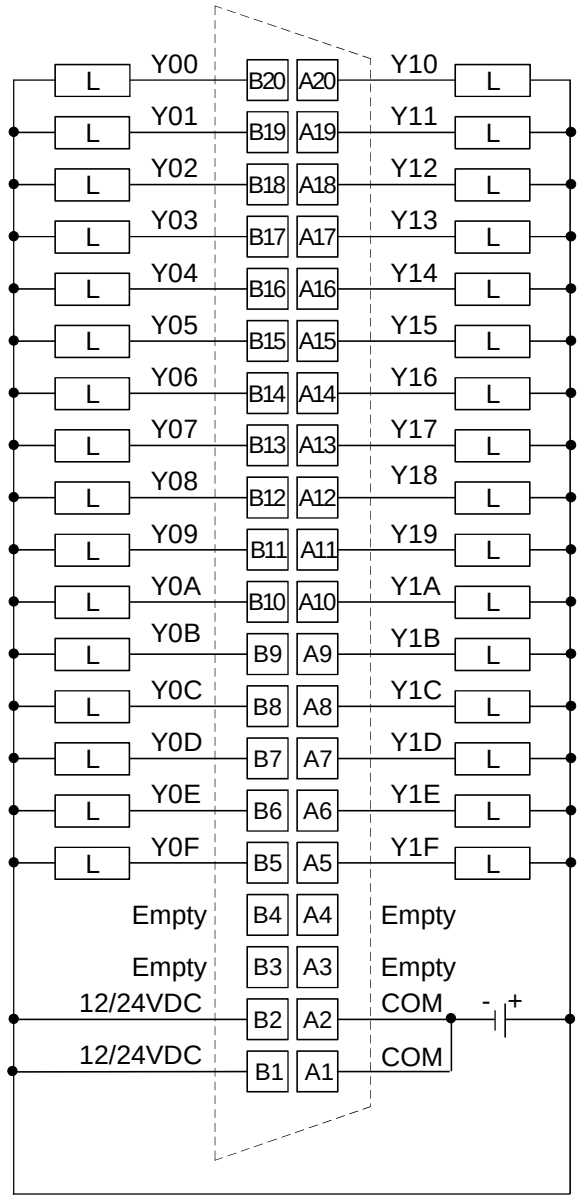
(8)

Type	Rated load voltage
QY80	12/24VDC



(9)

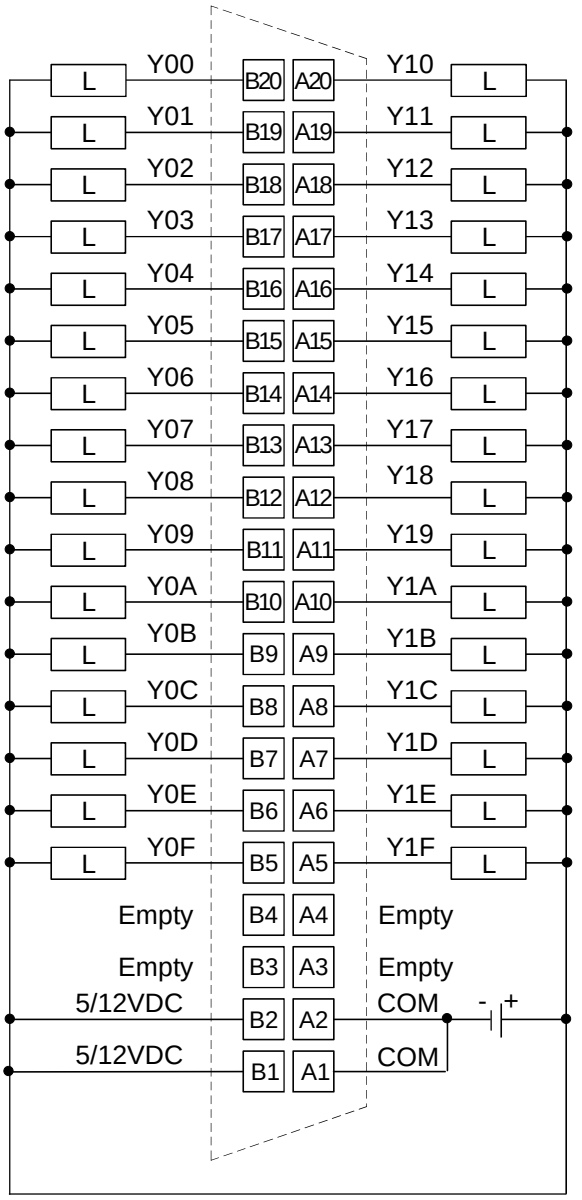
Type	Rated load voltage
QY41P	12/24VDC
QY42P	



* For QY42P, the above diagram shows the first half 32 points (F).
The connections of the latter half 32 points (L) are the same as those of the first half 32 points (F).
Regard Y00 to Y1F as Y20 to Y3F.
* B1 and B2, and A1 and A2 are internally connected.

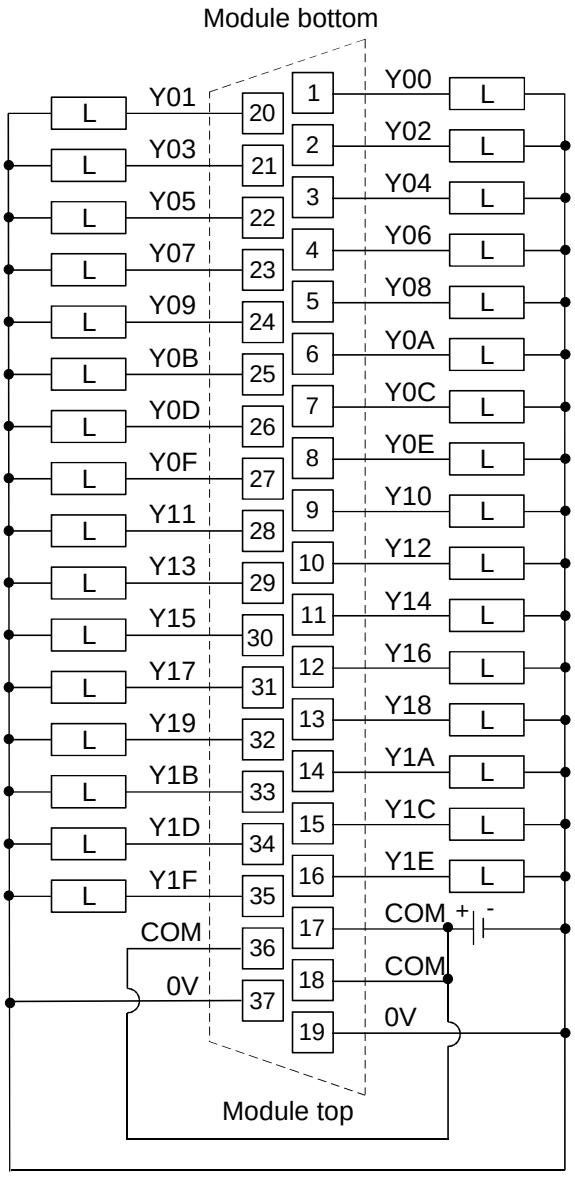
(10)

Type	Rated load voltage
QY71	5/12VDC



* B1 and B2, and A1 and A2 are internally connected.

(11)	Type	Rated load voltage
	QY81P	12/24VDC



*17, 18 and 36, and 19 and 37 are internally connected.

5.3 Input/output Composite Module

5.3.1 QH42P type input/output composite module

(1) Specifications

(a) Input section specifications

Item \ Type		DC Input (positive common)
Number of input points		32 points
Isolation method		Photocoupler isolation
Rated input voltage		24V DC (+20%/-15%, ripple ratio within 5%)
Rated input current		Approx. 4mA
ON voltage/ON current		19V DC or more/3mA or more
OFF voltage/OFF current		11V DC or less/1.7mA or less
Number of simultaneously input points (Simultaneous ON ratio)		100% (50 ℃) 75% (55 ℃)
Response time	OFF to ON	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) *1 Initial setting is 10ms.
	ON to OFF	
Writing method for common		32 points/common (Common terminal:1B01, 1B02)
Number of occupied I/O points		32 points (I/O assignment is set as 32-point I/O composite module.)
Operation display		32-point changeover indication with ON indication (LED) switch
External wire connection method		40-pin connector
5V DC internal current consumption		130mA (TYP. all points ON)

*1: The response time of the input section can be changed using the following GX developer.

CPU module	GX Developer
Q00JCPU, Q00CPU, Q01CPU	Version 7 or later
Q02 (H) CPU, Q06HCPU, Q12HCPU, Q25HCPU	Version 5 or later
Q12PHCPU, Q25PHCPU	Version 7.10L or later

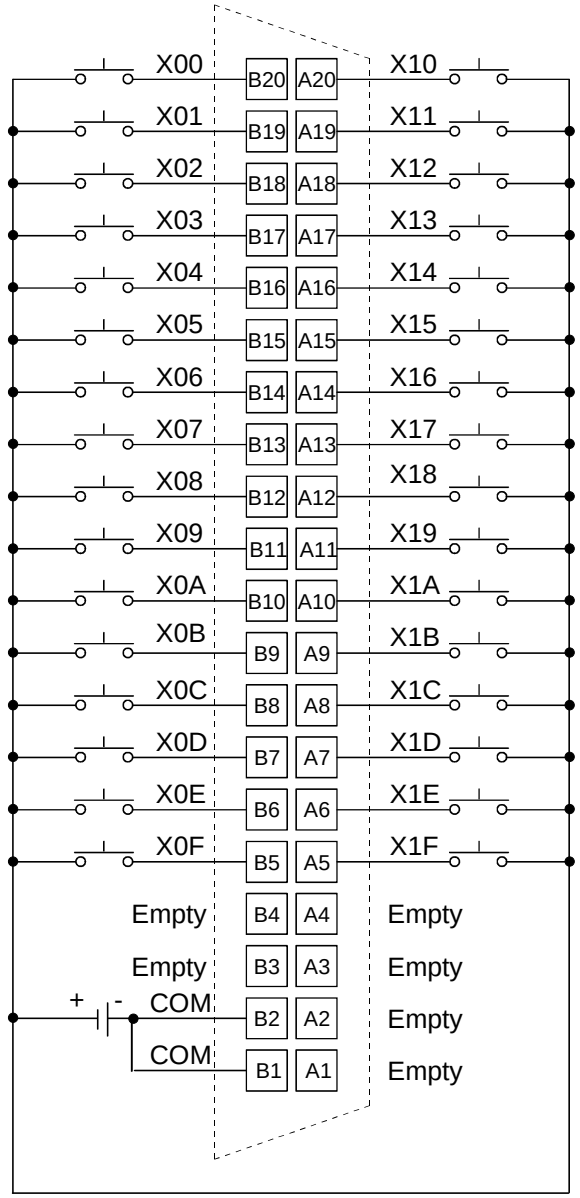
Notice that the set response time of the input section becomes valid when using the CPU module with the first 5 digits of the serial number, “01112” or later.
(To check the serial number, see Section 1.2.)

(b) Output section specifications

Item \ Type		Transistor output (sink type)
Number of output points		32 points
Isolation method		Photocoupler isolation
Rated load voltage		12/24V DC (+20%/-15%)
Max. load current		0.1A/point, 2A/common
Response Time	OFF to ON	1ms or less
	ON to OFF	1ms or less (rated load, resistance load)
Surge suppressor		Zenor diode
Fuse		None
Fuse blown display		None
External power supply	Voltage	12/24V DC (+20%/-15%, ripple ratio within 5%)
	Current	15mA (at 24V DC)/common (MAX. all points ON)
Writing method for common		32 points/common (Common terminal: 2A01, 2A02))
Protective function		Provided

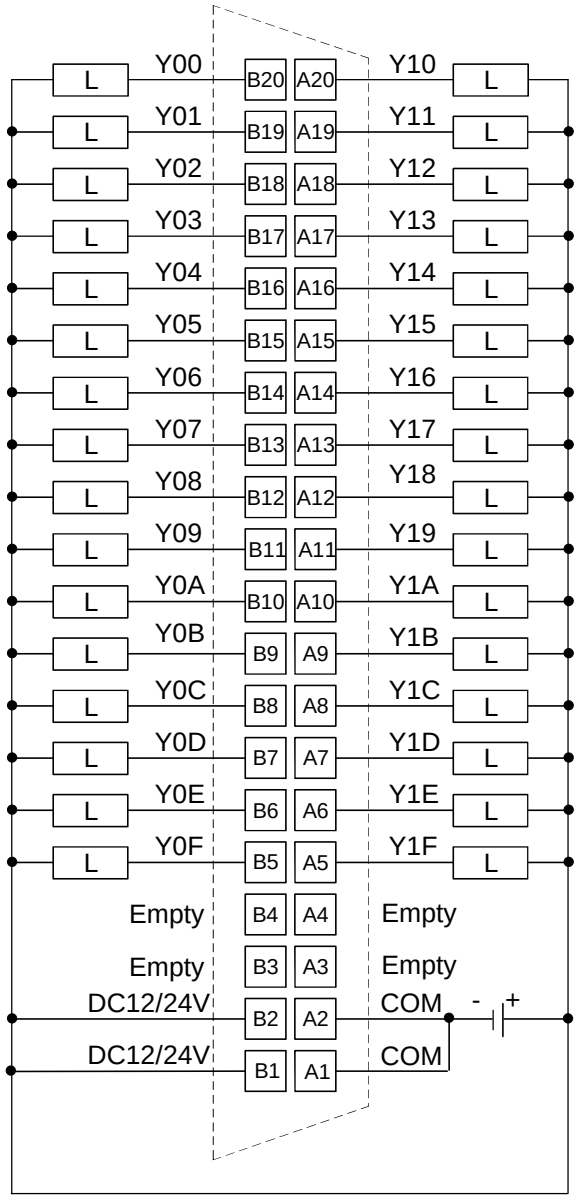
(2) Connection diagram

Type	Rated load voltage
QH42P (input section)	24VDC



*B1 and B2, and A1 and A2 are connected internally.

Type	Rated load voltage
QH42P (output section)	12/24VDC



*B1 and B2, and A1 and A2 are connected internally.

5.3.2 QX48Y57 type input/output composite module

(1) Specifications

(a) Input section specifications

Specification \ Type		DC input (positive common)
Number of input points		8 points
Isolation method		Photo coupler isolation
Rated input voltage		24VDC (-15%/+20%, ripple ratio within 5%)
Rated input current		Approx. 4mA
ON voltage/ON current		19VDC or more/3mA or more
OFF voltage/OFF current		11VDC or less/1.7mA or less
Number of simultaneously input points (Simultaneous ON ratio)		100%
Response time	OFF → ON	1ms/5ms/10ms/20ms/70ms or less (CPU module parameter setting) *1 Initial setting is 10ms
	ON → OFF	
Writing method for common		8 points/common (Common terminal:TB09)
Number of occupied input/output points		16 points (The I/O assignment is set as the 16-point input/output composite module)
Operation indication		ON indication (LED)
External wire connection method		18-point terminal block (M3 × 6 screw)
5VDC internal current consumption		80mA (TYP. all points ON)

*1: The response time of the input section can be changed with the following GX Developer.

CPU Module	GX Developer
Q00JCPU, Q00CPU, Q01CPU	Version 7 or later
Q02 (H) CPU, Q06HCPU, Q12HCPU, Q25HCPU	Version 5 or later
Q12PHCPU, Q25PHCPU	Version 7.10L or later

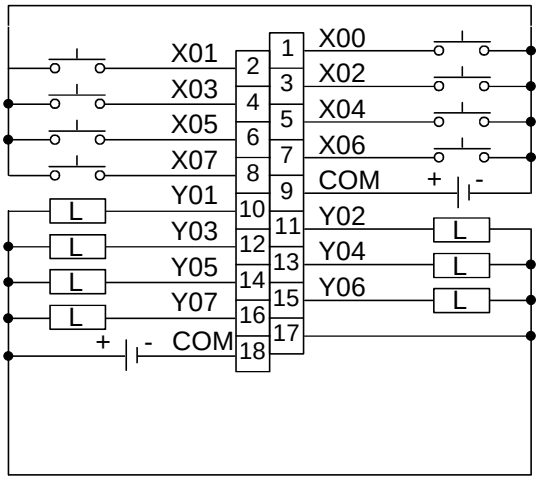
Notice that the set response time of the input section becomes valid when using the CPU module with the first 5 digits of the serial number, “01112” or later.
(To check the serial number, see Section 1.2.)

(b) Output section specifications

Specification \ Type		Transistor output (sink type)
Number of output points		7 points
Isolation method		Photo coupler isolation
Rated load voltage		12/24VDC (-15%/+20%)
Max. load current		0.5A/point, 2A/common
Response time	OFF → ON	0.1ms or less
	ON → OFF	1ms or less (rated load, resistance load)
Surge suppressor		Zener diode
Fuse		4A (not replaceable) (Fuse blowing capacity: 50A)
Fuse blow indication		Provided (When the fuse blows, it is indicated with the LED and a signal is output to the CPU.)
External supply power	Voltage	12/24VDC(+20%/-15%) (ripple ratio within 5%)
	Current	10mA (at 24VDC)
Writing method for common		7 points/common (Common terminal:1B18)
Protective function		None

(2) Connection diagram

Rated input voltage	Rated load voltage
24VDC	12/24VDC



5.4 Interrupt Module
5.4.1 QI60 type interrupt module

Item \ Type		QI60
Input form		DC input (positive common type)
Number of input points		16 points
Rated input voltage		24V DC (+20%/-15%, ripple ratio within 5%)
Rated input current		Approx. 6mA
ON voltage/ON current		19V DC or more/4.0mA or more
OFF voltage/OFF current		11V DC or less/1.7mA or less
Number of simultaneously input points (Simultaneous ON ratio)		100%
Response Time	OFF to ON	*2
	ON to OFF	
Writing method for common		16 points/common (Common terminal:TB17)
Number of occupied I/O points		16 points (I/O assignment is set as 16-point I/O composite module.)
External wire connection method		18-point terminal block (M3 × 6 screw)
5V DC internal current consumption		60mA (TYP. all points ON)

For QI60, the following is applied.
Isolation method: Photocoupler isolation
Iutput display: LED display

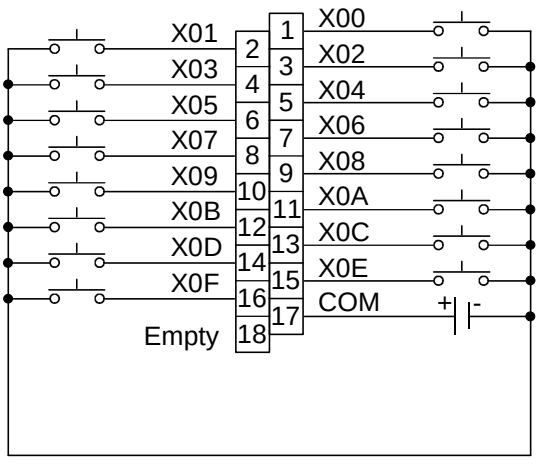
*1: The response time of QI60 can be changed according to the following.
When using other products, the response time will not changed. (Fixed at 0.2ms)

Product name	Description
CPU module	Product with first 5 digits of serial number, “02092” or later.
GX Developer	Version 6 or later

*2 The response time of QI60 is shown below. (Set with CPU module parameters. Initial setting is 0.2ms.)

Setting value		0.1	0.2	0.4	0.6	1
OFF→ON	TYP.	0.05ms	0.15ms	0.30ms	0.55ms	1.05ms
	MAX.	0.12ms	0.20ms	0.40ms	0.60ms	1.20ms
ON→OFF	TYP.	0.15ms	0.20ms	0.35ms	0.60ms	1.10ms
	MAX.	0.20ms	0.30ms	0.50ms	0.70ms	1.30ms

Type	Rated load voltage
QI60	24VDC



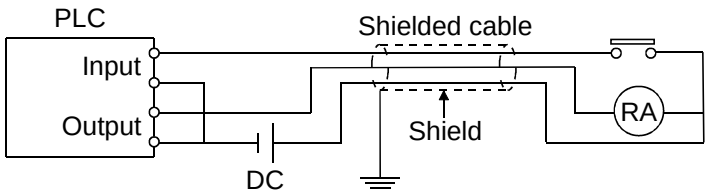
5.5 Wiring of I/O Equipment

(1) The wires used for connection to the terminal block should be 0.3 to 0.75mm^2 in core and 2.8mm (0.11 inch) max. in outside diameter.

(2) 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.

(3) Run the input and output lines away from each other.

(4) 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.



(5) Where wiring runs through piping, ground the piping without fail.

(6) Run the 24VDC input line away from the 100VAC and 200VAC lines.

(7) Wiring of 200m (686.67 ft.) or longer distance will give rise to leakage currents due to the line capacity, resulting in a fault.
Refer to the troubleshooting chapter of the I/O Module User's Manual.

6. Error Codes

If a fault occurs when the CPU module is switched from STOP to RUN or during running (while the PLC system is ON), the CPU module will output the error (LED indication) by the self-diagnosis function and store the error information in the special relay (SM) and special register (SD).

REMARK

For the error code (4000H to 4FFFH) of the errors occurred on GX Developer, intelligent function module or network system at request for general data processing, refer to the user's manual of the CPU module (Hardware Design, Maintenance and Inspection).

6.1 How to Read the Error Code

If an error occurs, read the error code, error message and so on using the following GX Developer.

CPU Module	GX Developer
Q00JCPU, Q00CPU, Q01CPU	Version 7 or later
Q02 (H) CPU, Q06HCPU, Q12HCPU, Q25HCPU	Version 5 or later
Q12PHCPU, Q25PHCPU	Version 7.10L or later

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

(1) Start GX Developer.
(2) Connect the PLC and peripheral device.
(3) On GX Developer, choose the [Online]-[Transfer setup] menu and specify the port and the CPU module from which the error code will be read.
(4) Choose [Diagnostics]-[PLC diagnostics] menu.
(5) Clicking the Current error button in the PLC diagnostics dialog box shows the error code and error message.
(6) Choose the [Help]-[PLC error] menu and confirm the definition of the corresponding error code.

For details of how to operate GX Developer, refer to the operating manual of your GX Developer.

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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