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IB-66607-B

MITSUBISHI

Q2A(S1)/Q3A/Q4ACPU User's Manual (Hardware)

Mitsubishi General-Purpose Programmable Controller

User's Manual (Hardware)

Thank you for purchasing the Mitsubishi general-purpose programmable controller MELSEC-QnA series.

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

QnA MELSEC

MODEL	QNACPU-U(H/W)-E
MODEL CODE	13J820

IB-66607-B(9809)MEE

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual.
Also pay careful attention to safety and handle the module properly. These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PC system safety precautions.
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 properly.
⚠ CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

- Install a safety circuit external to the PC that keeps the entire system safe even when there are problems with the external power supply or the PC module. Otherwise, trouble could result from erroneous output or erroneous operation.
  (1) Outside the PC, 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 PC detects the following problems, it will stop calculation and turn off all output.
  The power supply module has over current protection equipment and over voltage protection equipment.
  · The PC CPUs self-diagnostic functions, such as the watchdog timer error, detect problems. In addition, all output will be turned on when there are problems that the PC CPU cannot detect, such as in the I/O controller. Build a fail safe circuit exterior to the PC that will make sure the equipment operates safely at such times. See Section 4.2 of this user's manual for example fail safe circuits.
  See this user's manual for example fail safe circuits.
  (3) Output could be left on or off when there is trouble in the outputs module relay or transistor. So build an external monitoring circuit that will monitor any single outputs that could cause serious trouble.
- Build a circuit that turns on the external power supply when the PC 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, the communication problem station will enter the following condition.
  (1) For the data link data, the data prior to the communication error will be held.
  (2) The MELSECNET (II,/B,/10) remote I/O station will turn all output off.
  (3) The MELSECNET/MINI-S3 remote I/O station will hold the output or turn all output off depending on the E.C. remote setting.
  Refer to the data link manuals regarding the method for setting the communication problem station and the operation status when there are communication problem.
  Build an interlock circuit into the PC program that will make sure the system operates safely by using the communication state information. Not doing so could result in erroneous output or erroneous operation.
- When configuring a system, do not leave any slots vacant on the base. Should there be any vacant slots, always use a blank cover (AG60) or dummy module (AG62).When the extension base A52B, A55B or A58B is used, attach the dustproof cover supplied with the product to the module installed in slot 0.If the cover is not attached, the module's internal parts may be dispersed when a short-circuit test is performed or overcurrent/overvoltage is accidentally applied to the external I/O area.

⚠ 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 100mm (3.94inch) 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→ON. Take measures such as replacing the module with one having sufficient rated current.
- When reading file registers R that are outside the range using MOV instructions, etc., the file register data will become FFFFH, so using this as is will cause an operation error. Please design the sequencer program so that file registers outside the range are not used. For details reading instructions, refer to the Programming Manual.

[INSTALLATION PRECAUTIONS]

⚠ DANGER

- Use the PC in an environment that meets the general specifications contained in this manual. Using this PC 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.
- Install so that the pegs on the bottom of the module fit securely into the base unit peg holes, and use the specified torque to tighten the module's fixing screws. Not installing the module correctly could result in erroneous operation, damage, or pieces of the product falling.
- Tightening the screws too far may cause damage to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- When installing more cables, be sure that the base unit and the module connectors are installed correctly. After installation, check them for looseness. Poor connections could cause an input or output failure.
- Correctly connect the memory card installation connector to the memory card. After installation, be sure that the connection is not loose. A poor connection could cause an operation failure.
- Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.

[WIRING PRECAUTIONS]

⚠ DANGER

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

[WIRING PRECAUTIONS]

⚠ CAUTION
• Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation. • When wiring in the PC, 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. • Do not connect multiple power supply modules in parallel. Doing so could cause overheating, fire or damage to the power supply module. If the terminal screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or module. • 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 damage 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. • External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. For information regarding the crimping and pressure welding tools, see the I/O module's user's manual. Imperfect connections could result in short circuit, fires, or erroneous operation.

[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 tightening the terminal screws. Not doing so could result in electric shock. If the screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or modules.
- Tightening the screws too far may 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 the module.
- Do not disassemble or modify the modules. Doing so could cause trouble, erroneous operation, injury, or fire.
- Switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause failure or malfunction of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

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

REVISIONS

*The manual number is given on the bottom right of the front cover.

Print Date	*Manual Number	Revision
Jun., 1996	IB(NA) 66607-A	First edition
Sep., 1998	IB(NA) 66607-B	Correction Safety precautions, 4.5.2 Addition Specifications, Performance specifications, EMC standards, Low-Voltage instruction

CONTENTS

This manual describes the operating precautions, input/output connections, and error codes related to Q2ACPU , Q2ACPU-S1, Q3ACPU, and Q4ACPU (hereafter, all are referred to simply as "QnACPU") operations.

About Manuals .

Other manuals related to QnACPU operation (shown below) are also available if necessary.

Detailed manuals

Manual Name	Manual No.
Q2A(S1)/Q3A/Q4ACPU User's Manual Discusses QnACPU performance, functions, and operation, and contains the specifications for the power supply, memory card, and base unit. (optional)	IB-66608
Q2A(S1)/Q3A/Q4ACPU, Q2AS(H)CPU(S1) User's Manual Corresponding Additional Explanation The functions and the instructions added for the version B functions of QnACPU and Q2AS(H) CPU are explained. (optional)	IB-66821

Related manuals

Manual Name	Manual No.
QnACPU Guidebook This manual is designed for first-time users of the QnACPU. It explains the procedures for all operations from program creation, to program writing to the CPU, and program debugging. It also explains how to use the QnACPU special features.	IB-66606
QnACPU Programming Manual (Fundamentals) Thei manual explains the programming procedures required for program creation. It also explains the device names, parameters, and program types. (optional)	IB-66614
QnACPU Programming Manual (Common Instructions) This manual explains how to use the sequence instructions, basic instructions, and application instructions. (optional)	IB-66615
QnACPU Programming Manual (Special Function Module) This manual explains the dedicated instructions used with special function modules at the Q2ACPU(S1), Q3ACPU, and Q4ACPU. (optional)	IB-66616
QnACPU Programming Manual (AD57 Instructions) This manual explains the dedicated instructions used to operate the AD57(S1) CRT controller module at the Q2ACPU(S1), Q3ACPU, and Q4ACPU. (optional)	IB-66617
QnACPU Programming Manual (PID Control Instructions) This manual explains the dedicated instructions used to execute PID control at the Q2ACPU(S1), Q3ACPU, and Q4ACPU. (optional)	IB-66618

Manual Name	Manual No.
QnACPU Programming module (SFC) This manual explains the SW0IVD-SAP3 system configuration, performance specifications, functions, programming, debugging, and error codes. (optional)	IB-66619
Building-Block Type Input/Output Module User's Manual This manual gives the specifications for building- block type I/O modules. (optional)	IB-66140

1.1 SPECIFICATIONS

Table 1.1 General specification

Item	Specifications					
Ambient operating temperature	0 to 50 °C					
Ambient storage temperature	−20 to 75 °C					
Ambient operating humidity	10 to 90 % RH, No-condensing					
Ambient storage humidity	10 to 90 % RH, No-condensing					
Vibration resistance	Conforming to JIS B 6501, IEC 1131-2		Frequency	Acceleration	Amplitude	No. of sweeps
		Under intermittent vibration	10 to 57Hz	——	0.075mm (0.003in.)	10 times each in X, Y, Z directions (for 80min.)
			57 to 150Hz	9.8m/s^2(1 G)	——	
		Under continuous vibration	10 to 57Hz	——	00.35mm (0.001in.)	
			57 to 150Hz	4.9m/s^2(1 G)	——	
Shock resistance	Conforming to JIS B 3501, IEC 1131-2 (147 m/s^2 {15G}, 3 times in each of 3 directions X Y Z)					
Operating ambience	No corrosive gases					
Operating elevation	2000m (6562ft.) max.					
Installation location	Control panel					
Over voltage category *1	II max.					
Pollution level *2	2 max.					

*1 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V

*2 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

2.1 QnACPU Module Performance Specifications

This section gives the Performance specifications of the QnACPU.

Table 2.1 Performance Specifications

Item			Model Name				Remark
			Q2ACPU	Q2ACPU-S1	Q3ACPU	Q4ACPU	
Control system			Repeated operation (using stored program)				
I/O control method			Refresh mode				Direct input using device names possible
Programming language			Language dedicated to sequence control				
			Relay symbol language, logic symbolic language, MELSAP-3 (SFC)				
Processing speed (sequence instruction) (μs/step)		LD	0.2		0.15	0.075	
		MOV	0.6		0.45	0.225	
Number of instructions	Sequence instructions		39				
	Basic instructions		230				
	Application instructions		321				
	Dedicated instructions		171				
Constant scan (ms)(program started at fixed time intervals)			5 to 2000 (can be set in 5 ms units)				Set by parameter
Memory capacity			Capacity of the installed memory card (max. 2036 k bytes)				
Program capacity	Number of steps (steps)		Max. 28 k	Max. 60 k	Max. 92 k	Max. 124 k	
	Number of files (files)		28	60	92	124	
Number of I/O device points			8192 (X/Y0 to 1FFF)				Number of points that can be used in programs
Number of I/O points			512 (X/Y0 to 1FF)	1024 (X/Y0 to 3FF)	2048 (X/Y0 to 7FF)	4096 (X/Y0 to FFF)	Number of points actually accessible with I/O modules

Table 2.1 Performance Specifications (Continued)

Item	Model Name				Remark
	Q2ACPU	Q2ACPU-S1	Q3ACPU	Q4ACPU	
Clock function	Year, month, date, hour, minute, second, day of week (automatic recognition of leap years) Accuracy −2.3 to +4.4 s (TYP +1.8 s)/d at 0 °C Accuracy −1.1 to +4.4 s (TYP +2.2 s)/d at 25°C Accuracy −9.6 to +2.7 s (TYP -2.4 s)/d at 55 °C				
Allowable momentary power interruption time	Depends on the power supply module				
Internal current consumption for 5 VDC (A)	0.3 (0.4)	0.3 (0.4)	0.3 (0.4)	0.6 (0.9)	The numerical value in parentheses represents a function version "B" or later unit.
Weight kg (lb)	0.8 (1.76)	0.8 (1.76)	0.8 (1.76)	0.8 (1.76)	
External dimensions mm (inch)	250 (9.84) × 79.5 (3.13) × 121 (4.76)				

REMARK

Please check the ratings label of the CPU unit for the function version "B"

<QnACPU>

Manufacturing date — Function Version

3.1 Requirements for Compliance to EMC Directive (89/336/EEC)

The EMC Directive (89/336/EEC) become mandatory within Europe from January 1st 1996. The EMC directive in essence defines the amount of electromagnetic output a product is allowed to produce and how susceptible that product is to electromagnetic interference. Any manufacturer or importer of electrical/electronic apparatus must before releasing or selling products within Europe after that date have a CE mark attached to their goods. Testing to comply with the directive is done by use of agreed European standards which define limits for radiated and mains conducted electromagnetic emissions from equipment, levels of immunity to radiated emissions, ability for equipment to cope with transient voltage surges and electro-static discharges.
When installed in the specified manner this unit will be compliant with the relevant standards EN50081-2 and prEN50082-2 as applicable in the EMC directive. Failure to comply with these instructions could lead to impaired EMC performance of the equipment and as such Mitsubishi Electric Corporation can accept no liability for such actions.

3.1.1 EMC standards

When the PC is installed following the directions given in this manual its EMC performance is compliant to the following standards and levels as required by the EMC directive.

Specifications	Test item	Test Description	Standard Values
EN50081-2: 1995	EN55011 Radiated noise	Measure the emission released by the product.	30M-230MHz QP : 30dBμ V/m (30m measurement) *1 230M-1000MHz QP : 37dBμ V/m (30 m measurement)
	EN55011 Conduction noise	Measure the emission released by the product to the power line.	150K-500kHzQP: 79dB, Mean : 66dB *1 500K-30MHz QP : 73dB, Mean: 60dB
prEN50082-2 1991	IEC801-2 Static electricity immunity *2	Immunity test by applying static electricity to the module enclosure.	4kV contact discharge 8kV air discharge
	IEC801-3 Radiated electromagnetic field *2	Immunity test by applying eradiated electric field to the product.	10V/m, 27-500MHz
	IEC801-4 First transient burst noise	Immunity test by applying burst noise to the power line and signal cable.	2kV

Specifications	Test Item	Test Description	Standard Values
EN50082-2 1995	EN61000-4-2 Static electricity immunity *2	Immunity test by applying static electricity to the module enclosure.	4kV contact discharge 8kV air discharge
	EN61000-4-4 First transient burst noise	Immunity test by applying burst noise to the power line and signal cable., 2kV	2kV
	ENV50140 Radiated electromagnetic field AM modulation *2	Immunity test by applying aradiated electric field to the product.	10V/m, 80-1000M Hz, 80% AM modulation @ 1kHz
	ENV50204 Radiated electromagnetic field Pulse modulation *2	Immunity test by applying aradiated electric field to the product.	10V/m, 900MHz, 200Hz pulse modulation, 50% duty
	ENV50141 Conduction noise	Immunity test by inducting an electromagnetic field in the power line signal cable.	10Vrms, 0.15-80 Hz, 80% modulation @1kHz

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

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

3.1.2 Installation instructions for EMC

3.1.2.1 Control cabinet

When constructing a control cabinet where the PC system will be installed, the following instructions must be followed.

(1) Use a conductive control cabinet.

(2) 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.

(3) 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.

(4) Earth the control cabinet with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies. (22mm^2 wire or thicker is recommended.)

(5) Holes made in the control cabinet must be 10cm (3.94in.) diameter or less. If the holes are 10cm (3.94in.) or larger, radio frequency noise may be emitted.

(6) Connect the door of cabinet to the main body with flat braided wires at as many points as possible so that a low impedance can be ensured even at high frequencies.

3.1.2.2 Connection of power and ground wires

Ground and power supply wires for the PC system must be connected as described below.

(1) 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 30cm (11.18in.) or shorter.) The LG and FG terminals function is to pass the noise generated in the PC 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.

Note) A long conductor will become a more efficient antenna at high frequency.

(2) 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) Except for A61PEU and A62PEU, short between FG and LG terminals by a short jumper wire.

3.1.2.3 Cables

The cables led from the control cabinet contain a high frequency noise element and outside the control panel these cables act as antennae and radiate noise. The cables connected to input/output modules or special modules which leave the control panel should always be shielded cables.
Mounting of a ferrite core on the cables is not required (excluding some models) but if a ferrite core is mounted, the noise radiated through the cable can be suppressed further.
Use of a shielded cable is also effective for increasing the noise immunity level. The PC system's input/output and special function module provide a noise immunity level of equivalent to that stated in IEC801-4 2kV when a shielded cable is used. If a shielded cable is not used or if the shield earthing treatment is not suitable even when used (See Section 3.1.2.4), the noise immunity level is less than 2kV.

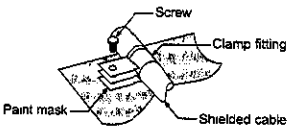
Note) prEN50082-2 specifies the noise resistance level based on the signal wire application.
Signals involved in process control: 2kV
Signals not involved in process control: 1kV

The meaning of "involved in process control" is not defined in prEN50082-2. However, when the purposes of the EMC Directive are considered, the signals that could cause personal injury or risks in the facility if a malfunction occurs should be defined as "signals involved in process control" Thus, it is assumed that a high noise immunity level is required.

3.1.2.4 Shield earthing

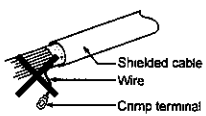
When the shield of the shielded cable is earthed to the cabinet body, please ensure that the shield contact with the body is over a large surface area. If the cabinet body is painted it will be necessary to remove paint from the contact area. All fastenings must be metallic and the shield and earthing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

(a) Peel the cable insulation off and expose the shield section.



(b) Sandwich the exposed shield section with the and earth to the control cabinet over a wide area.

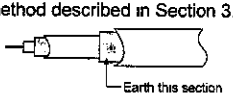
Note) The method of earthing by soldering a wire onto the shield section of the shielded cable as shown below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



3.1.2.5 MELSECNET/II module

The following requirements apply to AJ71AR21, AJ71QBR11, AnNCPUR21, AnACPUR21.

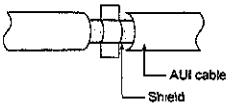
(1) Always use a triaxial cable for the module. The radiated noise in the band of 30MHz or higher can be suppressed by using a triax cable. Earth the outer shield by the method described in Section 3.1.2.4.



(2) Always mount a ferrite core onto the triaxial cable. Mount the ferrite core near the control cabinet outlet of each cable. Use of the TDK ZCAT3035 ferrite core is recommended.

3.1.2.6 Ethernet module

(1) Always earth the AUI cable connected to the AJ71QE71-B5. The AUI is a shielded cable so remove the outer insulation and connect to earth the exposed shield section using as wide a surface area as possible in the manner shown below.



(2) Always use a triaxial cable for the coaxial cable connected to the AJ71QE71-B2. The earthing precautions are the same as Section 3.1.2.5.

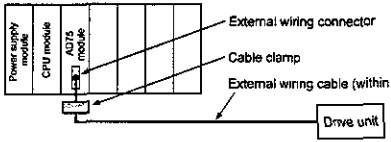
(3) For AJ71QE71-B2/B5, always mount a ferrite core in addition to items (1) and (2) above. Use of the TDK ZCAT3035 ferrite core is recommended.

3.1.2.7 Positioning modules

(1) When wiring with a 2m (6.6ft.) 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 AD75 external wiring connector.)

Wire the external wiring cable to the drive unit and external device with the shortest distance.

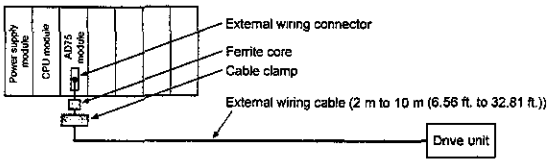
Install the drive unit in the same panel.



(2) When wiring with cable that exceeds 2m (6.6ft.), but is 10m (32.8ft.) or less Ground the shield section of the external wiring cable with the cable clamp. (Ground the shield at the closest location to the AD75 external wiring connector.)

Install a ferrite core.

Wire the external wiring cable to the drive unit and external device with the shortest distance.



(3) Ferrite core and cable clamp types and required quantities

(a) Cable clamp
Type AD75CK (Mitsubishi Electric)

(b) Ferrite core
Type ZCAT3035-1330 (TDK ferrite core)

(c) Required quantity

Cable length	Prepared part	Required Qty		
		1 axis	2 axes	3 axes
Within 2m (6.6 t.)	AD75CK	1	1	1
2m (6.6ft.) to 10m (32.8ft.)	AD75CK	1	1	1
	ZCAT3035-1330	1	2	3

3.1.2.8 I/O and other communication cables

Always earth the shield section of the I/O signal cables and other communication cables (RS-232-C, RS-422, etc.) in the same manner as described in Section 3.1.2.4 if the cables go outside of the control cabinet.

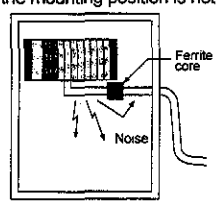
3.1.2.9 Power supply module

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

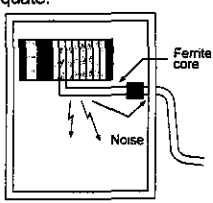
Model	Precautions
A61P A62P A63P	Always mount one of the filters listed in Section 3.1.2.10 to the incoming power supply lines.
A61PEU A62PEU	None

3.1.2.10 Ferrite core

A ferrite core is effective for reducing noise in the band of 30MHz to 100MHz. Mounting of a ferrite core is not necessary except for some particular models described in Section 3.1.2.5 and 3.1.2.6. However if further attenution of noise is necessary, mounting of a ferrite core on cables which radiate noise is recommended. When a ferrite core is mounted, mount the ferrite core just before the point where the cable goes outside of the cabinet. The ferrite will not be effective if the mounting position is not adequate.



(a) When there is a distance from the cable exit hole, the noise will jump over the ferrite, thus the effect will be halved.



(b) When mounted by the cable exit hole, the noise will not jump over the ferrite.

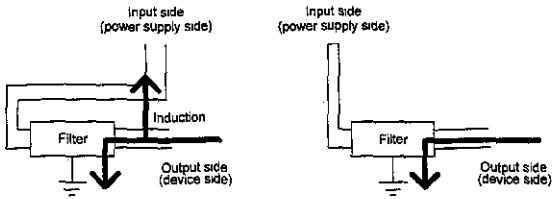
3.1.2.11 Noise filter (power supply line filter)

The noise filter (power supply line filter) is a device effective to reduce conducted noise. Except for some particular models described in Section 3.1.2.8, installation of a noise filter onto the power supply lines is not necessary. However conducted noise can be reduced if it is installed. (The noise filter is generally effective for reducing conducted noise in the band of 10MHz or less.) Usage of the following filters is recommended.

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

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 bundled, the output side noise will be induced into the input side wires from which the noise was filtered.



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

(b) Separate and lay the input and output wires.

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

3.2 Requirements for compliance with the Low Voltage Directive (73/23/EEC) and (93/68/EEC)

The Low Voltage Directive is mandatory within Europe, effective 1st January 1997
The Low Voltage Directive requires each device which operates with power supply ranging from 50VAC to 1000V and 75VDC to 1500V to satisfy necessary safety items.
In the Sections from 3.2.1 to 3.2.8, cautions on installation and wiring of the MELSEC-QnA series PC to conform to the Low Voltage Directive requires are described.
We have put the maximum effort to develop this material based on the requirements and standards of the Directive that we have collected. However, compatibility of the devices which are fabricated according to the contents of this manual to the above Directive 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-QnA

The standard applied for MELSEC-QnA is EN61010-1 safety of devices used in measurement rooms, control rooms, or laboratories.
For the modules which operate with the rated voltage of 50VAC/75VDC or above, we have developed new models that conform to the above standard.
For the modules which operate with the rated voltage under 50VAC/75VDC, the conventional models can be used, because they are out of the the Low Voltage Directive application range.

3.2.2 Precautions when using the MELSEC-QnA series PC

Module selection

(1) Power module
For a power module with rated input voltage of 100/200VAC, select a model in which the internal part between the first order and second order is intensively insulated, because it generates hazardous voltage (voltage of 42.4V or more at the peak) area.
For a power module with 24VDC rated input, a conventional model can be used.

(2) I/O module
For I/O module with rated input voltage of 100/200VAC, select a model in which the internal area between the first order and second order is intensively insulated, because it has hazardous voltage area.
For I/O module with 24VDC rated input, a conventional model can be used.

(3) CPU module, memory cassette, base unit
Conventional models can be used for these modules, because they only have a 5VDC circuit inside.

(4) Special module
Conventional models can be used for the special modules including analog module, network module, and positioning module, because the rated voltage is 24VDC or less.

(5) Display device
Use an A870GOT CE compatible model.

3.2.3 Power supply

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

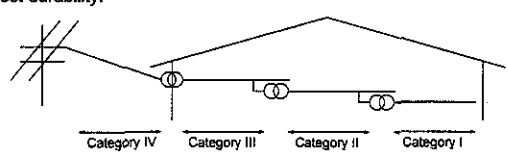


Figure 1. Installation Category

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 cabinet

Because the PC is open type equipment (a device designed to be stored within another module), be sure to use it only when installed in a control cabinet.

(1) Electrical shock prevention
In order to such as the operators from electric shocks, the control box must have the following functions
(a) The control cabinet must be equipped with a lock so that only skilled or qualified personnel.

(b) The control cabinet must be fitted with advice which automatically stops the power supply when the cabinet is opened.

(2) Dustproof and waterproof features
The control cabinet also provides protection from dust, water and ether substances. Insufficient ingression protection may lower the insulation withstand voltage, resulting in insulation destruction. The insulation in our PC is designed to cope with the pollution level 2, so use in an environment with pollustion level 2 or better.

Pollution level 1	An environment where the air is dry and conductive dust does not exist.
Pollution level 2	An environment where conductive dust does not usually exist, but occasional temporary conductivity occurs due to the accumulated dust. Generally, this is the level for inside the control box equivalent to IP54 in a control room or on the floor of a typical factory.
Pollution level 3	An environment where conductive dust 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 PC can realize the pollution level 2 when stored in a control cabinet equivalent to IP54.

3.2.5 Module installation

(1) Installing modules contiguously
In QnA series PCs, the left side of each I/O module is left open. When installing an I/O module to the base, do not make any open slots between any two modules. If there is an open slot on the left side of a module with 100/200VAC rating, the printed board which contains the hazardous voltage circuit becomes bare. When it is unavoidable to leave an open slot, be sure to install the blank module (AG60).
When using the A5□B expansion base with no power supply, attach the cover packaged with the expansion base to the side of the leftmost module.

3.2.6 Grounding

There are two kinds of grounding terminals as shown below. Both terminals must be grounded.
Be sure to ground the protective grounding for the safety reasons.

Protective grounding ⏚	Maintains the safety of the PC and improves the noise resistance.
Functional grounding ⏚	Improves the noise resistance.

3.2.7 External wiring

(1) 24VDC external power supply
For special modules that require a 24VDC I/O module or external power supply, select a model which complies with the Low Voltage Directive's requirements for isolation between the primary and secondary circuits.

(2) External devices
When a device with a hazardous voltage circuit is externally connected to the PC, select a model which complies with the Low Voltage Directive's requirements for isolation between the primary and secondary circuits.

(3) Insulation requirements
Dielectric withstand voltages are shown in Table 2.

Table2 Intensive Insulation Withstand Voltage (Installation Category II, source IEC664)

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

4.1 Installing modules

4.1.1 Precautions for handling of modules

This section describes the precautions that must be taken when handling the CPU, I/O modules, special function modules, power supply module, base units, etc.

(1) Module enclosure, memory cassette, 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 plastic casing.

(3) During wiring, take care to ensure that wiring off cuts, etc. do not get inside the case.
If anything does get inside the case, remove it.

(4) Tighten the module mounting (unnecessary in normal operating condition) and terminal block screws as indicated below.

Screw	Tightening Torque N cm (kgf · cm) [lb inch]
Module mounting screws (M4 screw) (optional)	78 to 118 (8 to 12) [6.9 to 10.4]
Terminal block screws	98 to 137 (10 to 14) [8.7 to 12.1]

(5) To install a module, push it firmly into the base unit so that the latch engages properly. To remove a module, press the latch to disengage it from the base unit, then pull the module out (for details, refer to the relevant PC CPU User's Manual).

4.1.2 Installation environment

The CPU system should not be installed under the following environmental conditions:

(1) Places where ambient temperature is outside of 0 to 55°C range.

(2) Places where ambient humidity is outside of 10 to 90%RH range.

(3) Places where dewing (condensation) occurs due to sudden temperature changes.

(4) Places where corrosive or inflammable gas exists.

(5) Places where a large amount of dust, iron powder and other conductive powder, oil mist, salt or organic solvent exists.

(6) places exposed to direct sunlight.

(7) Places where a strong electric or magnetic field exists.

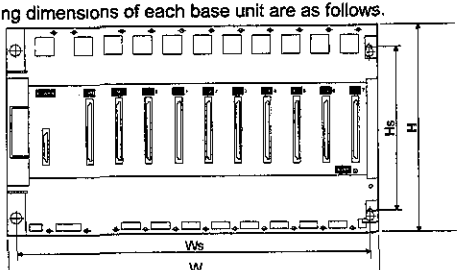
(8) Places where mechanical vibrations or impacts are transmitted directly to the module body.

4.1.3 Precautions relating to the installation of the unit.

The following precautions must be observed when installing a PC to an operation panel or other bases considering fully the operability, maintainability, and resistance to the environment.

(1) Mounting dimension

Mounting dimensions of each base unit are as follows.

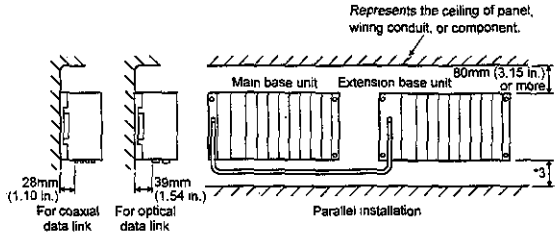


	A32B	A32B-S1	A35B	A38B A38HB	A62B	A65B	A68B	A52B	A55B	A58B
W	247 (9.72)	268 (10.55)	382 (15.03)	480 (18.9)	238 (9.37)	352 (13.86)	466 (18.35)	183 (7.2)	297 (11.69)	411 (16.18)
Ws	227 (8.93)	248 (9.76)	362 (14.25)	460 (18.11)	218 (8.58)	332 (13.07)	446 (17.6)	163 (6.42)	277 (10.9)	391 (15.4)
H	250 (9.84)									
Hs	200 (7.87)									

Dimensions: mm (inch)

(2) Unit mounting position

To ensure proper ventilation and make module replacement easy, provide a clearance of 80 mm (3.15 in.) or more between the top of the unit and any surrounding structure or equipment.



(3) A wiring conduit should be provided if required.

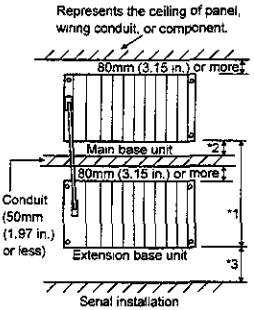
If its clearance above or below the programmable controller is less than indicated in the figure above, observe the following points:

(a) If the wiring conduit is installed above the programmable controller, its height must be no greater than 50 mm (1.97 in.) to ensure good ventilation.

In addition, there should be adequate space between the programmable controller and the wiring conduit to allow module latches to be pressed.

It will not be possible to replace modules if their latches cannot be pressed.

(b) If the wiring conduit is installed below the programmable controller, it should be installed so as to allow connection of the optical fiber cable or coaxial cable, taking the minimum bending radius of the cable into consideration.



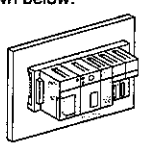
*1: These dimensions vary depending on the length of the extension cable as follows:
AC06B cable ····· 450mm (17.71 in.) or less
AC12B cable ····· 1050mm (41.34 in.) or less
AC30B cable ····· 2850mm (112.20 in.) or less

*2: When a link module is
not used ····· 50mm (1.97 in.) or more
When using ϕ4.5mm optical fiber cable, or coaxial cable ····· 100mm (3.94 in.) or more
When using ϕ8.5mm optical fiber cable ····· 130mm (5.12 in.) or more

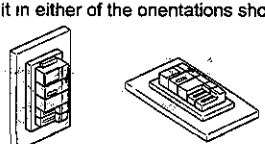
*3: When a link module is
not used ····· 50mm (1.97 in.) or more
When using ϕ4.5mm optical fiber cable, or coaxial cable ····· 100mm (3.94 in.) or more
When using ϕ8.5mm optical fiber cable ····· 130mm (5.12 in.) or more

(4) Unit mounting orientation

(a) Since the PC generates heat, mount it in a well-ventilated location and in the orientation shown below.



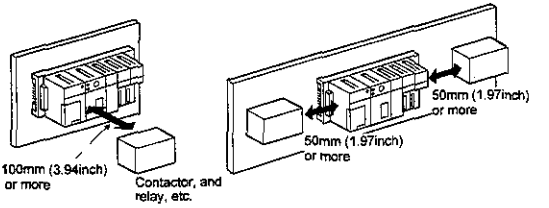
(b) Do not mount it in either of the orientations shown below.



(4) Mount base unit on a flat surface.
If the mounting surface is uneven, this may strain the printed circuit boards and cause malfunctions.

(5) Avoid mounting the 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 PC and devices that generate noise or heat (contactors and relays).
- •Required clearance in front of 100mm or more (3.94inch)
- •Required clearance on the right and left of ·· 50mm or more (1.97inch)



4.2 Fail-safe circuit

When the programmable controller is switched ON/OFF, the outputs may temporarily be incorrect due to the delay time and difference between the start-up time of the programmable controller's power supply and that of the external power supply for process control (especially if it is DC).

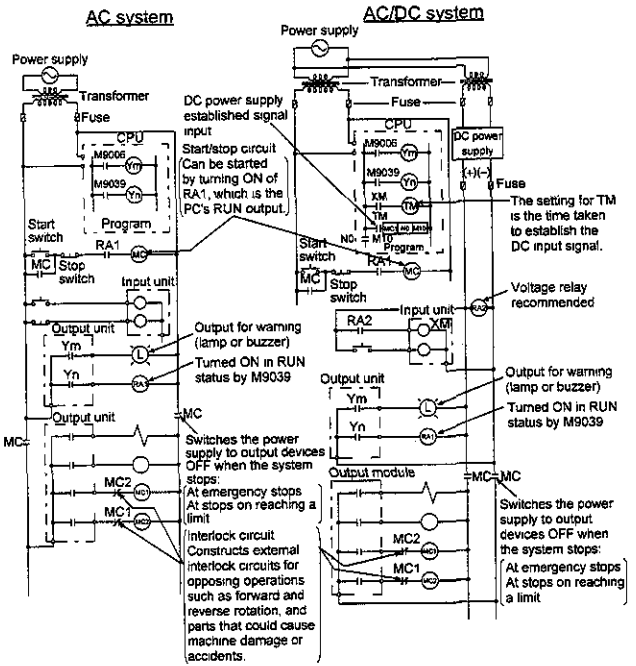
For example, if the power to the PC is turned ON after turning ON the external power supply used for the process control with the DC output module, the DC output module may make an erroneous output for an instant.

There is a possibility of abnormal operation if the external power supply is abnormal or a programmable controller fault occurs.

To prevent the abnormal operation of the whole system, machine breakdown, and accidents, build a fail-safe circuit (emergency stop, protective circuit, interlocking circuit, etc.) outside the PC.

An example system design circuit is shown on the following page.

(1) System design circuit example



The procedures used to switch on the power supply are indicated below.

AC system

[1] Switch the power supply ON.
[2] Set the CPU to RUN.
[3] Switch the start switch ON.
[4] The output devices are driven in accordance with program when the magnetic contactor (MC) comes ON.

AC/DC system

[1] Switch the power supply ON.
[2] Set the CPU to RUN.
[3] Switch RA2 ON when the DC power supply starts.
[4] Switch the timer (TM) ON when the DC power supply reaches working voltage. (The set value for TM must be the time it takes for 100% establishment of the DC power after RA2 is switched ON. Make this set value 0.5 seconds.)
[5] Switch the start switch ON.
[6] The output devices are driven in accordance with the program when the magnetic contactor (MC) comes ON. (If a voltage relay is used at RA2, no timer (TM) is necessary in the program.)

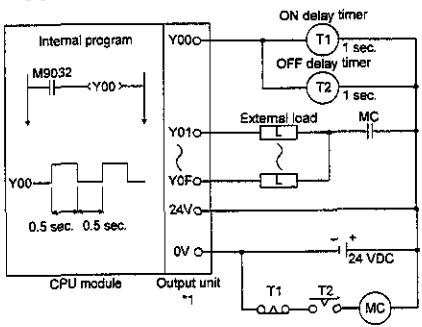
(2) Fail-safe measures to cover the possibility of PC failure

Problems with a CPU memory can be detected by the self diagnosis function. However, problems with I/O control area may not be detected by the CPU.

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 PCs are manufactured under strict quality control, they may cause failure or abnormal operations due to unspecified reasons. To prevent abnormal operations of whole system, machine breakdown, and accidents, build a fail-safe circuit outside the PC.

The following gives an example of a fail-safe circuit



*1 Since Y00 alternates between ON and OFF at 0.5 second intervals, use a contactless output module (in the above example this is a transistor).

4.3 Power supply connection

4.3.1 Performance Specifications for Power Supply Modules

Power Supply Module Specifications

Item		Specifications							
		A61P	A61PEU	A62P	A62PEU	A63P	A65P	A66P	A67P
Base unit loading position		Power supply module loading slot						I/O module loading slot	Power supply module loading slot
Input voltage		100-120 VAC +10% -15% (85 to 132 VAC)				24 VDC +30% -35% (15.6 to 31.2 VDC)	100-120 VAC +10% -15% (85 to132 VAC)		110 VDC (85 to 140 VDC)
		200-240 VAC +10 % -15 % (170 to 264 VAC)					200-240 VAC +10 % -15 % (170 to 264 VAC)		
Input frequency		50/60 Hz ±5 %				—	50/60 Hz ±5 %		—
Input voltage distortion factor.		Within 5% (See Section 4.4)							
Max. input apparent power		110 VA				65 W	110 VA	95 VA	65 W
Inrush current		20 A, within 8 ms				100 A, within 1 ms	20 A, within 8 ms		
Rated output current	5 VDC	8 A		5 A		8 A	2 A	—	8 A
	24 VDC	—		0.8 A		—	1.5 A	1.2 A	—
*1 Overcurrent protection	5 VDC	8.8 A or higher		5.5 A or higher		8.5 A or higher	2.2 A or higher	—	8.5 A or higher
	24 VDC	—		1.2 A or higher		—	2.3 A or higher	1.7 A or higher	—
*2 Overvoltage protection	5 VDC	5.5 to 6.5 V		5.5 to 6.5 V		5.5 to 6.5 V	5.5 to 6.5 V	—	5.5 to 6.5 V
	24 VDC	—							
Efficiency		65 % or higher							
Power indicator		Power LED display							
Terminal screw size		M4 × 0.7 × 6						M3 × 0.5 × 6	M4 × 0.7 × 6
Applicable wire size		0.75 to 2 mm^2							
Applicable solderless terminal		Same as *a	RAV 1.25-4 RAV2-4	Same as *a	RAV 1.25-4 RAV2-4	V1.25-4, V1.25-YS4A, V2-S4, V2-YS4A*a		V1.25-3, V1.25-YS3A V2-S3, V2-YS3A	V1.25-4, V1.25-YS4A, V2-S4, V2-YS4A

Item		Specifications							
		A61P	A61PEU	A62P	A62PEU	A63P	A65P	A66P	A67P
Applicable tightening torque: N · cm [kgf · cm] (lb · in)		118 [12] (10)						69 [7] (6)	118 [12] (10)
External dimensions mm (inch)		250 × 55× 121 (9.8× 2.1× 4.7)						250 × 37.5× 121 (9.8× 1.5× 4.7)	250 × 55× 121 (9.8× 2.1× 4.7)
Weight kg (lb)		0.98 (2.16)	0.8 (1.76)	0.94 (2.07)	0.9 (1.98)	0.8 (1.76)	0.94 (2.07)	0.75 (1.65)	0.8 (1.76)
*3 Allowable momentary power interruption time		Less than 20ms				Less than 1ms	Less than 20ms	——	Less than 20ms (at 100 VDC)
*4 Noise durability		Noise voltage 1500 V.P.P				Noise voltage 500 V.P.P	Noise voltage 1500 V.P.P		Noise voltage 500 V.P.P
Withstanding voltage		Same as *b	——	Same as *b	□□	1500 VAC for 1 minute between all AC external terminals together and ground 500 VAC for 1 minute between all DC external terminals together and ground *b			
Insulation resistance		Same as *c	——	Same as *c	□□	10 MW or higher, measured with a 500 VDC insulation resistance tester *c			
Insulation withstand voltage	Between primary and 5 VDC	——	2830 VAC	□□	2830 VAC	——			
	Between primary and 24 VDC	——	□□	——	2830 VAC	——			

REMARK

The A66P module has the number of occupied slots shown below.1 slot

POINTS

*1 Overcurrent protection

(a) The overcurrent protection device shuts off the 5VDC, 24VDC ladder and stops the system if the current flowing in the ladder exceeds the specified value.
When this device is activated, the power supply module LED is switched off or dimly lit.

(b) If this happens, eliminate the cause of the overcurrent — for example insufficient current capacity or short ladder — then start up the system.
When the current has returned to normal, the system undergoes an initial start.

*2 Overvoltage protection

The overvoltage protection device shuts off the 5VDC ladder and stops the system if an excessive voltage in the range 5.5 to 6.5V is applied to this ladder.
When this device is activated, the power supply module LED is switched off. If this happens, switch the input power OFF, then back ON to restart the system.
If the system is not booted and the LED remains off, the power supply module must be changed.

*3 Allowable momentary power interruption time

The PC CPU allowable momentary power interruption time varies according to the type of power supply module.
In the case of the A63P module, the allowable momentary power interruption time is defined as from when the 24VDC stabilized primary supply is cut off until the 24VDC voltage drops to the defined voltage (15.6VDC).

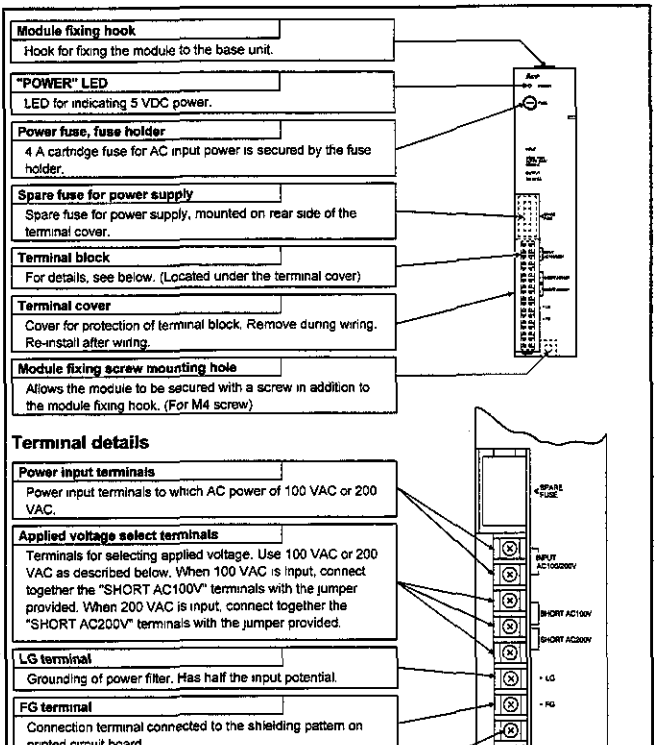
*4 Noise durability

Apply the specified noise voltage with a noise simulator with a noise width of 1μs and a noise frequency of 25 to 60Hz.

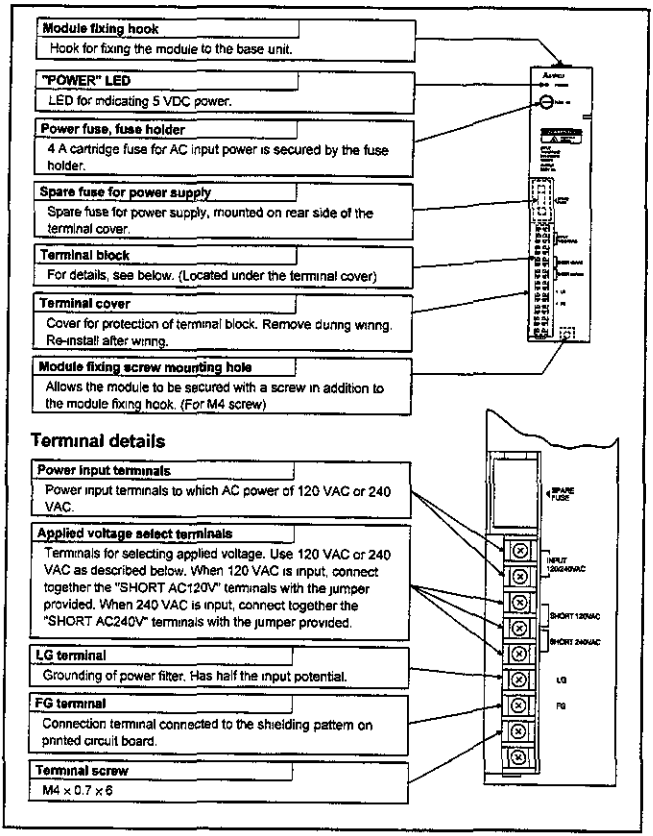
4.3.2 Part identification and setting of Power Supply Module

The names and descriptions of each of the parts of the power supply modules are given below.

(1) Names and description of parts of the A61P module



(2) Names and description of parts of the A61PEU module



(3) Names and description of parts of the A62P and A65P modules

Module fixing hook
Hook for fixing the module to the base unit.

"POWER" LED
LED for indicating 5 VDC power.

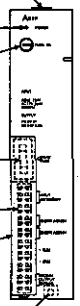
Power fuse, fuse holder
4 A cartridge fuse for AC input power is secured by the fuse holder.

Spare fuse for power supply
Spare fuse for power supply, mounted on rear side of the terminal cover.

Terminal block
For details, see below. (Located under the terminal cover)

Terminal cover
Cover for protection of terminal block. Remove during wiring. Re-install after wiring.

Module fixing screw mounting hole
Allows the module to be secured with a screw in addition to the module fixing hook. (For M4 screw)



Terminal details

Power input terminals
Power input terminals to which AC power of 100 VAC or 200 VAC.

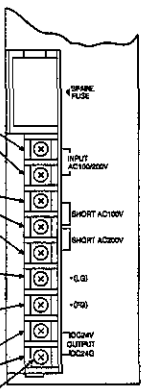
Applied voltage select terminals
Terminals for selecting applied voltage. Use 100 VAC or 200 VAC as described below. When 100 VAC is input, connect together the "SHORT AC100V" terminals with the jumper provided. When 200 VAC is input, connect together the "SHORT AC200V" terminals with the jumper provided.

LG terminal
Grounding of power filter. Has half the input potential.

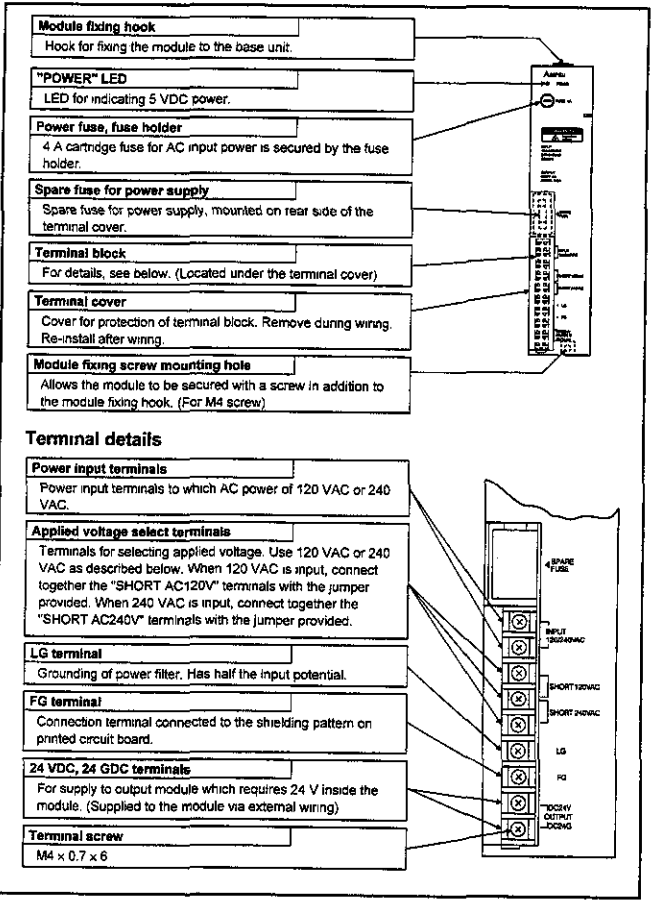
FG terminal
Connection terminal connected to the shielding pattern on printed circuit board.

24 VDC, 24 GDC terminals
For supply to output module which requires 24 V inside the module. (Supplied to the module via external wiring)

Terminal screw
M4 × 0.7 × 6



(4) Names and description of parts of the A62PEU modules



(5) Names and description of parts of the A63P and A67P modules

Module fixing hook
Hook for fixing the module to the base unit.

"POWER" LED
LED for indicating 5 VDC power.

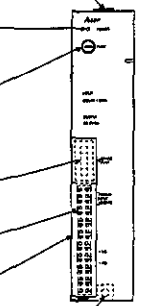
Power fuse, fuse holder
Cartridge fuse for DC input power is fixed by the fuse holder.
The rating for the fuses are as follows.
A63P: 6.3 A (SM6.3 A)
A67P: 4 A (GTH4)

Spare fuse for power supply
Spare fuse for power supply, mounted on rear side of the terminal cover.

Terminal block
For details, see below. (Located under the terminal cover)

Terminal cover
Cover for protection of terminal block. Remove during wiring. Re-install after wiring.

Module fixing screw mounting hole
Allows the module to be secured with a screw in addition to the module fixing hook. (For M4 screw)



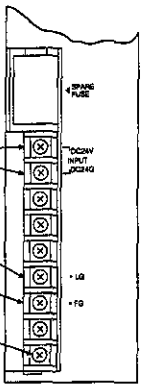
Terminal details

Power input terminals
Power input terminals for A63P: 24 VDC, A67P: 100 VDC.
The power fuse will be blown if the 24 VDC connection is made with the wrong polarity.

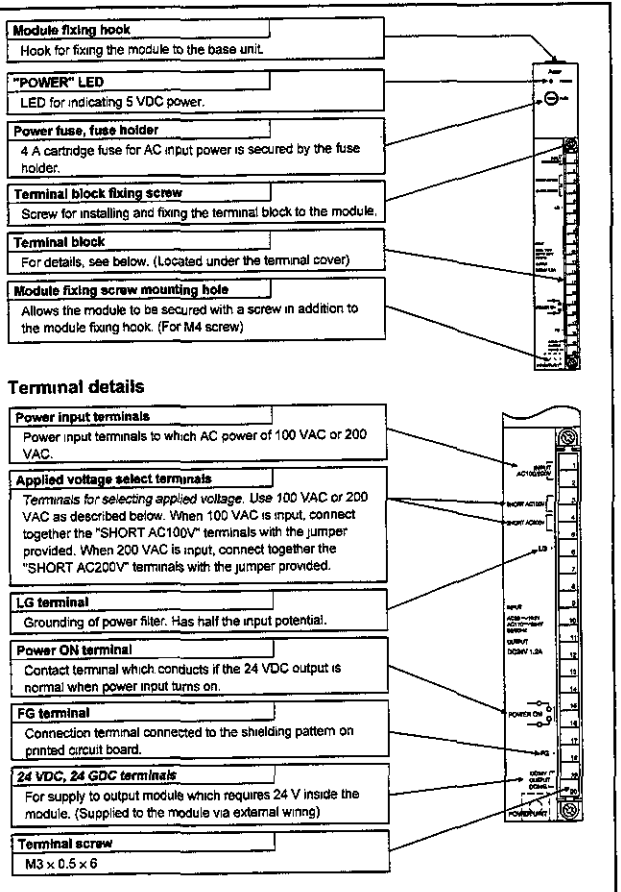
LG terminal
Grounding of power filter.

FG terminal
Connection terminal connected to the shielding pattern on printed circuit board.

Terminal screw
M4 × 0.7 × 6

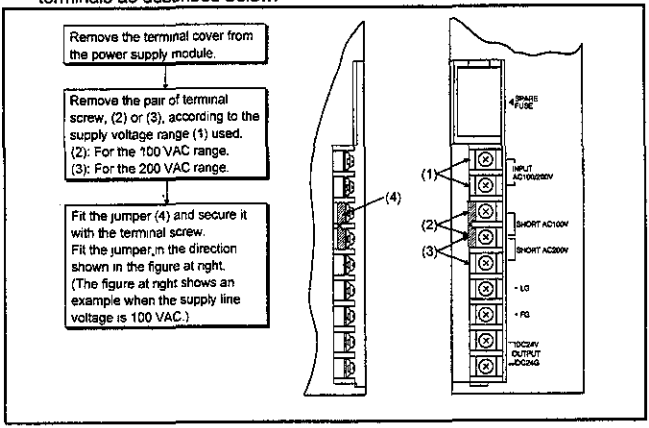


(6) Names and description of parts of the A66P module



(7) Setting

For A61P(EU), A62P(EU), A65P or A66P, the input voltage range, 100V or 200V, must be specified by placing a jumper (supplied) across two terminals as described below:



POINT

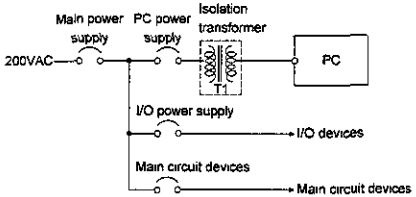
If the setting differs from the supply line voltage, the following occurs: do not mis-set.

	Supply Line Voltage	
	100VAC	200VAC
Setting to 100VAC (jumper fitted as indicated at (2))	—	The power supply module is damaged. (The CPU is not damaged.)
Setting to 200VAC (jumper fitted as indicated at (3))	No error occurs in the module. However, the CPU does not operate.	—
No setting (jumper not fitted)	No error occurs in the module. However, the CPU does not operate.	

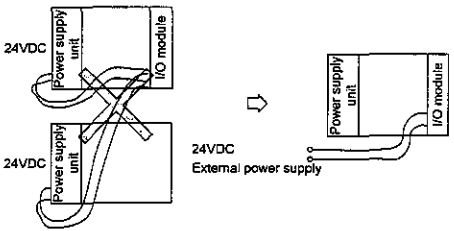
4.3.3 Power Supply Connection

Observe the following precautions for power supply wiring.

(1) Provide separate wiring systems for the PC power, I/O devices, and operating devices as shown below.
If the wiring is influenced by excessive noise, connect an isolation transformer.



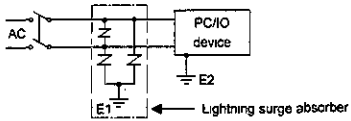
(2) Do not supply 24VDC power from more than one power supply modules in parallel to one I/O module. If they are connected in parallel, the power supply modules may fail.



(3) 100VAC, 200VAC, and 24VDC wires should be twisted as tightly as possible, and connect the modules at the shortest distance between them. To minimize voltage drop, use thick wires (MAX. 2mm^2) where possible.

(4) Do not bind 100VAC and 24VDC wires together with main circuit (high tension and large current) wires or I/O signal wires nor place them near each other. Provide 100mm (3.94 inch) clearance between the wires if possible.

(5) As a measure against surges caused by lightning, insert a lightning surge absorber as shown below.

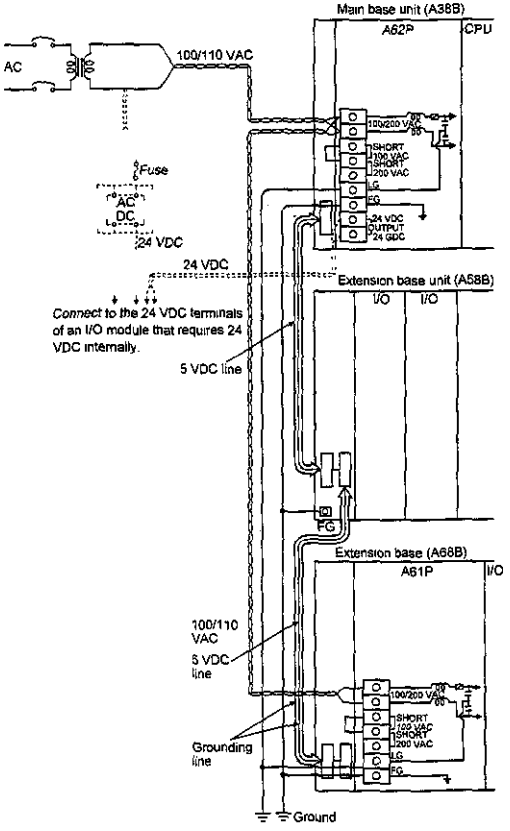


POINTS

(1) Provide separate grounding for the lightning surge absorber (E1) and the PC (E2).

(2) Select a lightning surge absorber whose maximum allowable circuit voltage is higher than the circuit voltage at the maximum power supply voltage.

(6) The following is an example of wiring of power supply and grounding wires to main base unit and extension base units.



POINTS

(1) Use thick wires (MAX. $2mm^2$) where possible for the 100/200VAC and 24VDC power supply, and twist the wires from connected terminals. When a solderless terminal is used, use a solderless terminal with an insulation sleeve to prevent short-circuit if the terminal screw becomes loose.

(2) When the LG and FG terminals are connected, they must be grounded. If they are not grounded, the operations will be easily influenced by noise. Be aware not to touch the LG terminal since it has potential of half the input voltage.

4.4 Precaution when Connecting the Uninterruptive Power Supply (UPS)

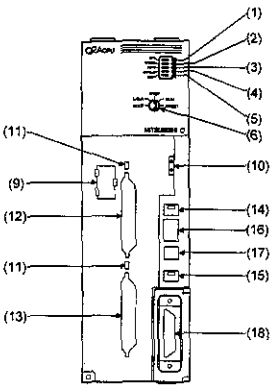
Be sure of the following items when connecting the QnACPU system to the uninterruptive power supply (abbreviated as UPS hereafter)
Use a UPS which employs the constant inverter power supply method with 5% or less voltage fluctuation.
Do not use a UPS with the constant commercial power supply method.

4.5 Nomenclature and Settings

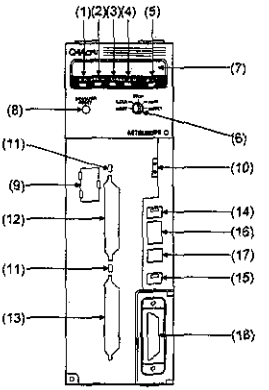
4.5.1 Nomenclature and settings

The programmable controller nomenclature and settings are explained in this section.

(1) Q2AQPU, Q2ACPU-S1



(2) Q3ACPU, Q4ACPU



Appearance with front cover open

No.	Name	Function
(1)	RUN LED	Indicates the CPU operating Status. Lamp ON :When key switch is set to RUN or STEP RUN, and operation is in prorress. Lamp OFF :When key switch is set to STOP PAUSE or STEP, RUN and operation is stopped. Or, when an error that stops operation has been detected. Lamp flashing :When writing to program occured while stopped, followed by STOP → RUN switching (key switch). A CPU RUN status is not in effect at this time. In order to re-establish the CPU RUN status, turn the key switch to RUN → STOP → RUN, or execute a reset using the key switch. (In the case of models Q3ACPU and Q4ACPU, a "PRG.CHECK!!" message is displayed.)
(2)	ERROR LED	Lamp ON :When a self-diagnosis error (excluding battery error) which does not stop operation has been detected. (When a "continue operation at error detection" parameter setting has been designated.) Lamp OFF :Normal Lamp Lamp flashing :When an error that stops operation has been detected.

No.	Name	Function
(3)	USER LED	ON :An error has been detected by the CHK instruction, or an annunciator (F) has come ON. (With Q3ACPU or Q4ACPU, a message or the comment for the annunciator is displayed on the LED indicator.) OFF :Normal Lamp flashing :Flashing when latch clear is performed. (With Q3ACPU or Q4ACPU, the message "L. CLR RDY" is displayed on the LED indicator.)
(4)	BAT.ALARM LED	*Lamp ON* :*When a battery error is activated by a low voltage condition at the CPU and memory card battery.* Lamp OFF :Normal
(5)	*BOOT LED*	Lamp ON :When boot operation is completed. Lamp OFF :When boot operation is not being executed.
(6)	*RUN/STOP key* switch	RUN/STOP :Sequence program operation EXECUTE/STOP L.CLR :Sets all data in the latch area (designated by parameter) to *"OFF" or "0". Also clears sampling trace and status latch* registrations. RESET :Executes a hardware reset for operation error, and to initialize operation, etc.
(7)	LED display (Q3A and Q4ACPU only)	16-character display Display content includes comments for self-diagnosis errors, comments for LED display instructions, clock data for SET SM212, and annunciator F-No. *comments for SET F,etc.*
(8)	Display RESET switch (Q3A and Q4ACPU only)	Clears the LED display content, displays the next data (when next data exists).
(9)	Battery (A6BAT)	Battery for internal memory and power failure backup.
(10)	Battery connector pin	For battery's lead wire connection. (To prevent wasted battery power consumption, the lead wire is disconnected from the connector when shipped from the factory.)
(11)	Memory card EJECT button	Ejects the memory card from the CPU.
(12)	*Memory card "A"* installation connector	Connectors for installing memory cards in the CPU.
(13)	Memory card "B" installation connector	
(14)	Memory card "A" *in/out (with built in* LED) 	This switch setting determines whether or not the memory card can be inserted and ejected while power is ON. Factory set to OFF ON :Insertion/ejection prohibited (LED is ON) OFF :Insertion/ejection permitted (LED is OFF)
(15)	Memory card "B" in/out switch (with built in LED) 	

<table>
<tr><th>No.</th><th>Name</th><th>Function</th></tr>
<tr><td rowspan="2">(16)</td><td>Ejects the memory card from the CPU
 
</td><td>Designates settings required for CPU operation. All switches are factory set to OFF
SW1 :Boot setting. Designates the memory used for operation.
ON :Boot operation
OFF :Internal RAM operation
SW2 to SW4 : Parameter area. These switches designate the memory where parameters are stored.
<table><tr><th></th><th>Internal RAM</th><th colspan="2">Memory card A</th><th colspan="2">Memory card B</th></tr><tr><th></th><th></th><th>RAM</th><th>ROM</th><th>RAM</th><th>ROM</th></tr><tr><td>SW2</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>SW3</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td></tr><tr><td>SW4</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>SW5 :System protect. Prevents all CPU writing and control operations.
ON :System protect ON
OFF :System protect OFF</td></tr>
<tr><td>(17)</td><td>System setting switch 2
 
</td><td>Designates settings required for CPU operation. All switches are factory set to OFF
SW1: For future expansion. Not used at present
SW2 Peripheral protocol. Designates the types of peripheral devices connected to the CPU peripheral interface.
(Set to ON if another ACPU station is to be accessed from a peripheral device. The ON or OFF setting becomes valid immediately upon switching.)
ON ACPU peripheral device 1: For future expansion. Not used at present
OFF QnACPU peripheral device</td></tr>
<tr><td>(18)</td><td>RS-422 connector</td><td>Connector for connection with peripheral devices.</td></tr>
</table>

4.5.2 Switch settings and corresponding LED displays

(1) Program writing when CPU is stopped.
To execute program writing when the CPU is stopped, follow the key switch setting procedure shown below.

(a) Set key switch to STOP
RUN LED :OFF
Q3ACPU, Q4ACPU display :OFF
·· CPU STOP status → program write

(b) Set key switch to RUN.
RUN LED :Flashing
Q3ACPU, Q4ACPU display :"PRG.CHECK!" message is displayed
CPU STOP status

(c) Set key switch to STOP, then back to RUN.
RUN LED :ON
Q3ACPU, Q4ACPU display :OFF
CPU STOP status

POINT

If the key switch is set to RUN immediately after program writing occurs with the CPU stopped, the CPU RUN status will not be established. To establish a CPU RUN status after program writing, execute a key switch reset, then set the key switch to RUN.

(2) Latch CLEAR operation
To execute a "Latch CLEAR", follow the key switch setting procedure shown below.

(a) Turn the key switch to "L.CLP" 3 times.
USR LED Flashing
Q3ACPU, Q4ACPU display "L.CLR RDY" is displayed
Ready for latch clear execution

(b) Turn the key switch to "L.CLR" 1 more time.
USR LED ON for 2 seconds
Q3ACPU, Q4ACPU display "L.CLR OK" displayed for 2 seconds
Latch CLEAR completed

POINTS

- The devices where the "Latch CLEAR" occurs can be designated by the "Latch CLEAR" enabled/disabled settings for each device made in device setting in the parameter mode.
- In addition to the key switch method, a remote "Latch CLEAR" can also be executed from a GPP function peripheral device. (Refer to the Q2A (S1)/Q3A/Q4ACPU User's Manual).

(3) Removing a memory card while power is ON

To remove the memory card while the power is ON, set the "memory card in/out" switch as shown below. Removing a memory card while power is ON:

(a) Switch ON (build-in LED ON)

···· Memory card insertion/ejection prohibited

(b) Switch OFF (build-in LED OFF)

···· Memory card insertion/ejection enabled → remove the memory card

POINTS

- The built-in LED at the "memory card in/out" switch may not go OFF if a CPU system function (sampling trace, status latch, etc.) is in progress, or if the memory card is being used by the program. In such cases, stop the system function or the program, then remove the memory card after checking that the switch's built-in LED has turned OFF
- Do not turn the "memory card in/out" switch ON after removing the memory card. An error will occur if the switch is turned ON at this time.

(4) Inserting a memory card while power is ON

To insert the memory card while the power is ON, set the "memory card in/out" switch as shown below.

(a) Insert the memory card.

(b) Turn the "memory card in/out" switch ON (built-in LED ON)

·· Memory card insertion/ejection prohibited

POINTS

- After inserting the memory card, turn the "memory card in/out" switch ON. The memory card cannot be used until the switch is turned ON.
- After the memory card is inserted, the scan time will be extended by a maximum of 10 ms for the necessary "remounting" processing.

MEMO

This section presents the specifications and wiring drawings for each of the A series I/O modules.

5.1 Input Modules

5.1.1 Input module specifications

Model	Input Type	Number of Points/ Module	Rated Input Voltage	Input Current	Operating Voltage		Maximum Simultaneous ON Input Point (Percentage Simultaneous ON)
					ON Voltage	OFF Voltage	
AX10	AC input	16 points	100VAC	10mA	80VAC or higher	40VAC or lower	100%
AX11		32 points					60%
AX20		16 points	200VAC		160VAC or higher	70VAC or lower	100%
AX21		32 points					60%
AX40	DC input (sink type)	16 points	12/24 VDC	4/10mA	9.5VDC or higher	6VDC or lower	100%
AX41		32 points					60%
AX42 *1		64 points		3/7mA			60% *3
AX50		16 points	48VDC	4mA	34VDC or higher	10VDC or lower	100%
AX50-S1	DC input (sink/source type)						
AX60	DC input (sink type)		100/110/ 125VDC	2mA	80VDC or higher	20VDC or lower	
AX60-S1	DC input (sink/source type)						
AX70	Sensor input (sink/source type)		5VDC (SW ON)	3.5mA (TYP) 5.5mA (MAX)	3.5VDC or higher	1.1VDC or lower	
			12VDC (SW OFF)	2mA (TYP) 3mA (MAX)	5VDC or higher	2VDC or lower	
			24VDC (SW OFF)	4.5mA (TYP) 6mA (MAX)			

Input Response Time		External Connections	Common Terminal Arrangement	Internal Current Consumption	Number of Occupied I/O Points
OFF to ON	ON to OFF				
15msec or less	25msec or less	20 terminal block connector	16 points/ common	0.055A	16 points
		38 terminal block connector	32 points/ common	0.11A	32 points
		20 terminal block connector	16 points/ common	0.055A	16 points
		38 terminal block connector	32 points/ common	0.11A	32 points
10msec or less	10msec or less	20 terminal block connector	8 points/ common	0.055A	16 points
		38 terminal block connector		0.11A	32 points
		40-pin connector × 2	32 points/ common	0.12A	64 point
10msec or less	20msec or less	20 terminal block connector	8 points/ common	0.055A	16 points
1.5msec or less	3msec or less				

(To next page)

(From front page)

Model	Input Type	Number of Points/ Module	Rated Input Voltage	Input Current	Operating Voltage		Maximum Simultaneous ON Input Point (Percentage Simultaneous ON)
					ON Voltage	OFF Voltage	
AX71	Sensor input (sink/source type)	32 points	5VDC (SW ON)	3.5mA (TYP) 5.5mA (MAX)	3.5VDC or higher	1.1VDC or lower	100%
			12VDC (SW OFF)	2mA (TYP) 3mA (MAX)	5VDC or higher	2VDC or lower	
			24VDC (SW OFF)	4.5mA (TYP) 6mA (MAX)			
AX80	DC input (source type)	16 points	12/24 VDC	4/10mA	9.5VDC or higher	6VDC or lower	
AX80E							
AX81		32 points	48/60 VDC	3/4mA	31VDC or higher	10VDC or lower	60%
AX81-S2							
AX81B	DC input (sink/source type)	32 points	24VDC	7mA	At normal input: 21VDC or higher	At normal input: 6VDC or lower	
					When disconnection detected: 1VDC or higher	When disconnection detected: 6VDC or lower	
AX82 *1	DC input (source type)	64 points	12/24 VDC	3/7mA	9.5VDC or higher	6VDC or lower	
AX31	AC/DC input	32 points	12/24 VAC 12/24 VDC	8.5/4mA	7VAC/ VDC or higher	2.5VAC/ VDC or lower	100%

Input Response Time		External Connections	Common Terminal Arrangement	Internal Current Consumption	Number of Occupied I/O Points
OFF to ON	ON to OFF				
1.5msec or less	3msec or less	38 terminal block connector	8points/ common	0.11A	32 points
10msec or less	10msec or less	20 terminal block connector		0.055A	16 points
[TYP] 5.5msec	6.0msec				
[High-speed mode] 0.5msec or less	1.0msec or less				
10msec or less	10msec or less	38 terminal block connector		0.11A	32 points
20msec or less	20msec or less				
10msec or less	10msec or less	38 terminal block connector	8 points/ common	0.125A	64 points
10msec or less	10msec or less	37-pin D subconnector x 2	32 points/ common	0.12A	64 points
25msec or less	20msec or less	38 terminal block connector		0.11A	32 points
20msec or less					

The following specifications apply to all modules:

Isolation method Photocoupler
Input indication LEDs

*1 The ON/OFF status of the first or latter half is indicated by the LEDs in accordance with the setting of the selector switch on the front panel of the module:

FH setting: First half (X00 to X1F), LH setting: Latter half (X20 to X3F)

*2 It is possible to select high speed or low speed for the upper eight points only using the DIP switch:

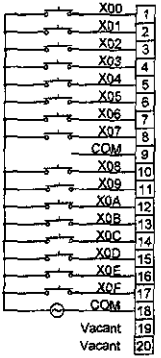
HIGH setting: high-speed, LOW setting: low-speed

*3: The number of simultaneous input points is 40% (13 inputs/common) simultaneously ON when the unit is used adjacent to the power supply module.

5.1.2 Input module connections

(1)

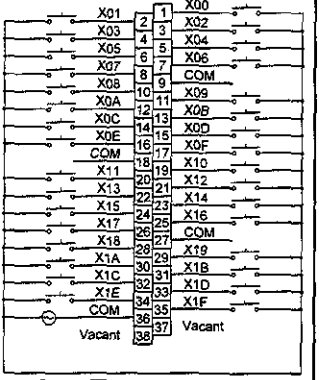
Model	Rated Input Voltage
AX10	100-120 VAC
AX20	200-240 VAC



* 9 and 18 are connected internally.

(2)

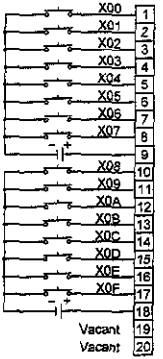
Model	Rated Input Voltage
AX11	100-120 VAC
AX21	200-240 VAC



* 9 and 18 , and 27 and 36 are connected internally.

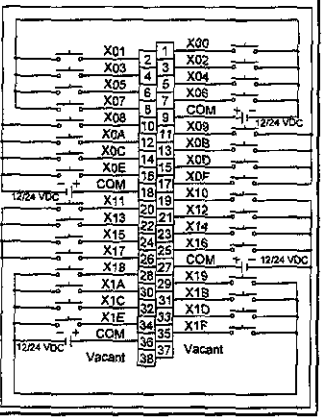
(3)

Model	Rated Input Voltage
AX40	12/24 VDC
AX50	48 VDC



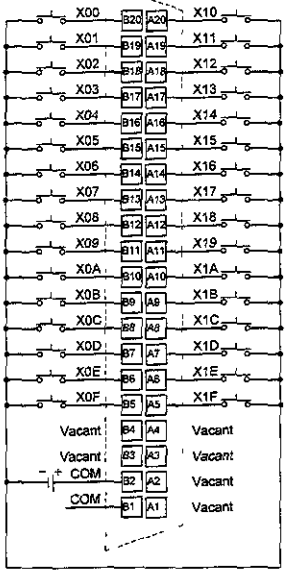
(4)

Model	Rated Input Voltage
AX41	12/24 VDC



(5)

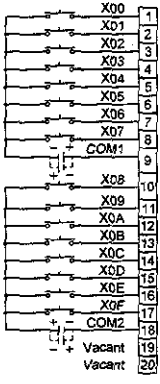
Model	Rated Input Voltage
AX42	12/24 VDC



* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard X00 to X1F as X20 to X3F).
B1 and B2 are connected internally.

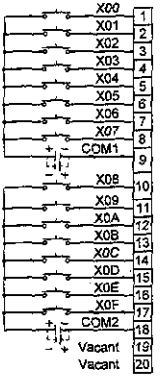
(6)

Model	Rated Input Voltage
AX50-S1	48 VDC



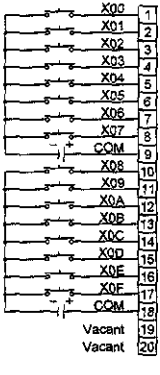
(8)

Model	Rated Input Voltage
AX60-S1	100/110/125 VAC



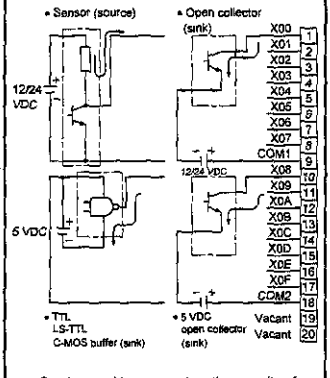
(7)

Model	Rated Input Voltage
AX60	100/110/125 VDC



(9)

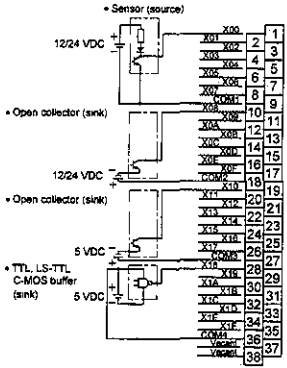
Model	Rated Input Voltage
AX70	5/12/24 VDC



• *Can be used in any combination* in units of 8 points per common.
When using the COMS source type, only *CMOSs with* a 5 VDC rating as shown above can be used (e.g. HCMOS).

(10)

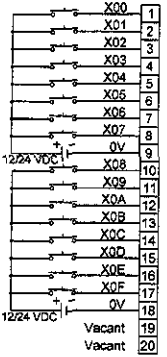
Model	Rated Input Voltage
AX71	5/12/24 VDC



• Can be used in any combination in units of 8 points per common.
When using the COMS source type, only CMOSs with a 5 VDC rating as shown above can be used (e.g. HCMOS).

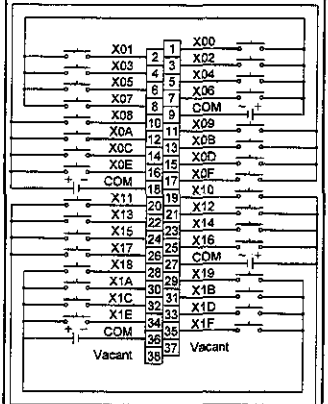
(11)

Model	Rated Input Voltage
AX80	12/24 VDC
AX80E	



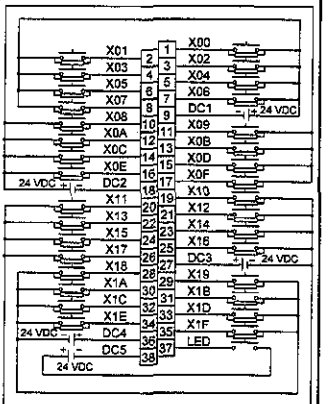
(12)

Model	Rated Input Voltage
AX81	12/24 VDC
AX81-S2	48/60 VDC



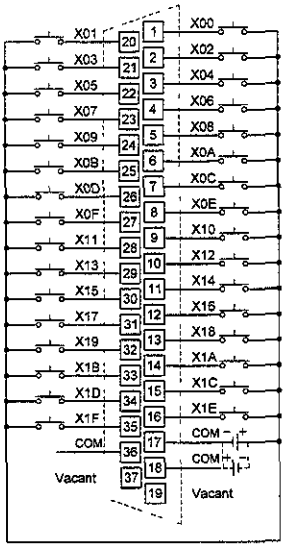
(13)

Model	Rated Input Voltage
AX81B	24 VDC



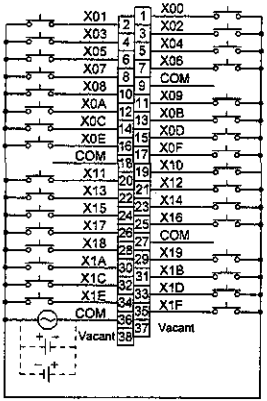
(14)

Model	Rated Input Voltage
AX82	12/24 VDC



* The figure above indicates F (the first half 35 points).
The connections for L (the latter half 32 points) are the same as for F (regard X00 to X1F as X20 to X3F).
17 , 18 , and 36 are connected internally.

	Model	Rated Input Voltage
(15)	AX31	12/24 VAC 12/24 VDC



* 9 and 18 and 27 and 36 are connected internally.

5.2 Output Modules

5.2.1 Output module specifications

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Input Response Time	
				Per Point	Per Common	OFF to ON	ON to OFF
AY10	Contact output	16 points	240VAC 24VAC	2A	8A	10msec or less	12msec or less
AY10A	Contact output (All points independent)				16A/all points		
AY11	Contact output				8A		
AY11A	Contact output (All points independent)				16A/all points		
AY11E	Contact output				8A		
AY13							
AY13E		32 points			5A		
AY22	Triac output	16 points	100 to 200 VAC	0.6A	3.3A	1msec or less	0.5Hz + 1msec or less
AY23		32 points			2.4A *4 (1.05A)		
AY40	Transistor output (sink type)	16 points	12/24VDC	0.1A	0.8A	2msec or less	2msec or less (resistive load)
AY40A	Transistor output (all points independent sink type)			0.3A	—		
AY40P	Transistor output (sink type)			0.1A	0.8A		
AY41		32 points		0.1A	1.6A		
AY41P					1A		

External Connections	Common Terminal Arrangement	Surge Suppression	Fuse Rating	Error Display	External Power Supply (TYP 24VDC) Current	Internal Current Consumption	Number of Occupied I/O Points
20 terminal block connector	8 points/ common	None	None	None	0.15A	0.115A	16 points
38 terminal block connector	No common (all points independent)						
20 terminal block connector	8 points/ common	Varistor					
38 terminal block connector	No common (all points independent)						
20 terminal block connector	8 points/ common		8A			0.23A	32 points
38 terminal block connector		None	None				
			8A		0.29A		
20 terminal block connector		CR absorber varistor	7A *6	Display *10	—	0.305A	16 points
38 terminal block connector		Absorber	3.2A *6	None		0.59A	32 points
20 terminal block connector		Clamp diode	None		0.008A	0.115A	16 points
38 terminal block connector	No common (all points independent)	Surge absorbing diode			—	0.19A	
20 terminal block connector	8 points/ common	Clamp diode			0.015A	0.115A	
38 terminal block connector	16 points/ common				0.02A	0.23A	32 points
					0.03A		

(To next page)

(From front page)

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Input Response Time	
				Per Point	Per Common	OFF to ON	ON to OFF
AY42 *1	Transistor output (sink type)	64 points	12/24VDC	0.1A	2A *4 (1.6A)	2msec or less	2msec or less (resistive load)
AY42-S3 *1				0.1A *5	2A		
AY42-S4 *1				0.1A	1.92A		
AY50		16 points		0.5A	2A		
AY51		32 points			2A *4 (3.3A)		
AY51-S1				0.3A	2A		
AY60		16 points	24VDC (12/48V) *2	2A	5A		
AY60E	Transistor output (source type)			12/24 VDC 2A 48VDC 0.8A	3A		
AY60EP			12/24VDC	12VDC 2A	9.6A	0.5msec or less	1.5msec or less
				24VDC 0.8A	3.8A		
AY60S	Transistor output (sink type)		24/48VDC (12V) *3	2A	6.4A	1msec or less	3msec or less (resistive load)
AY70	Transistor output (for TTL, CMOS) (sink type)	16 points	5/12VDC	0.016A	0.128A	1msec or less	1msec or less
AY71		32 points		0.016A	0.256A		
AY72 *1		64 points		0.016A	0.512A		
AY80	Transistor output (source type)	16 points	12/24VDC	0.5A	2A	2msec or less	2msec or less (resistive load)
AY80EP				0.8A	3.84A	0.5msec or less	1.5msec or less

External Connections	Common Terminal Arrangement	Surge Suppression	Fuse Rating	Error Display	External Power Supply (TYP 24VDC) Current	Internal Current Consumption	Number of Occupied I/O Points
40-pin connector × 2	32 points/ common	Cramp diode	None	None	0.04A	0.23A	32 points
			1.6A *7	Display *11		0.29mA	64 points
		Photo coupler Built-in Zener diode	None	None	—	0.5A	
20 terminal block connector	8 points/ common	Varistor	2A *6	Display *10	0.065A	0.115A	16 points
38 terminal block connector	16 points/ common		None	None	0.05A	0.023A	32 points
		Transistor Built-in Zener diode	1A *8	Display *10	0.1A	0.31A	
20 terminal block connector	8 points/ common	Varistor	3.2A *9	Display	0.065A	0.115A	16 points
		Surge absorbing diode	5A *9		0.065A		
			None	None	0.11A		
		Varistor	5A *9		0.003A	0.075A	
		None	None		*12 0.055A	0.1A	16 points
38 terminal block connector	16 points/ common				*12 0.1A	0.2A	32 points
40-pin connector × 2	32 points/ common				*12 0.3A	0.3A	64 points
20 terminal block connector	8 points/ common	Varistor	2A *6	Display *10	0.06A	0.115A	16 points
		Surge absorbing diode	None	None	0.11A		

(To next page)

(From front page)

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Input Response Time	
				Per Point	Per Common	OFF to ON	ON to OFF
AY81	Transistor output (source type)	32 points	12/24VDC	0.5A	4A	2msec of less	2msec of less (resistive load)
AY81EP				12VDC 0.8A	7.68A	0.5msec or less	1.5msec or less
				24VDC 0.4A	3.84A		
*1 AY82EP		64 points		12VDC 0.1A	1.92A		
				24VDC 0.04A	0.758A		

External Connections	Common Terminal Arrangement	Surge Suppression	Fuse Rating	Error Display	External Power Supply (TYP 24VDC) Current	Internal Current Consumption	Number of Occupied I/O Points
38 terminal block connector	16 points/ common	Varistor	None	None	0.05A	0.23A	32 points
		Surge absorbing diode			0.22A		
40-pin connector x 2	32 points/ common				0.05A	0.29A	64 points

The following specifications apply to all modules:

Isolation method	Photocoupler
Input indication	LEDs

*1 The ON/OFF status of the first or latter half is indicated by the LEDs in accordance with the setting of the selector switch on the front panel of the module:
FH setting: First half (X00 to X1F), LH setting: Latter half (X20 to X3F)

*2 When 12/48 VDC is used as the load power supply, a separate 24 VDC power supply must be used as an external power supply.

*3 When 12 VDC is used as the load power supply, a separate 24/48 VDC power supply must be used as an external power supply.

*4 When the module is installed adjacent to the power supply module, the value indicated in parentheses applies.

*5 The maximum load current differs depending on the number of simultaneously ON points.

*6 Fast-melting fuse (one per common)

*7 Normal fuse (two per common)

*8 Fast-melting fuse (two per 8-per-common unit)

*9 Fast-melting fuse (two per common)

*10 LED comes on when a fuse blows or the external power supply is turned off.

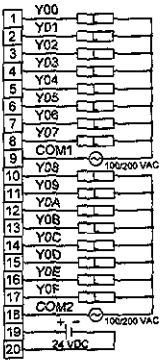
*11 Since this is a built-in fuse directly fixed to the module, replace the entire module if it blows.

*12: TYP 12 VDC

5.2.2 Output module connections

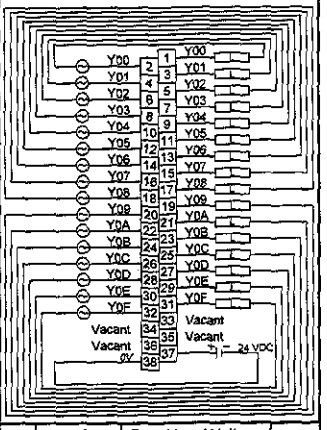
(1)

Model	Rated Input Voltage
AY10	24 VDC
AY11	240 VAC
AY11E	



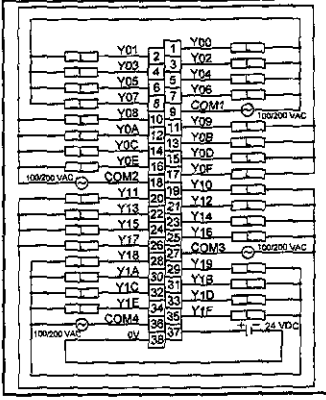
(2)

Model	Rated Input Voltage
AY10A	24 VDC/240 VAC
AY11A	



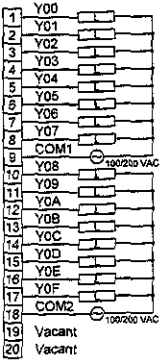
(3)

Model	Rated Input Voltage
AY13	12 VDC/240 VAC
AY13E	



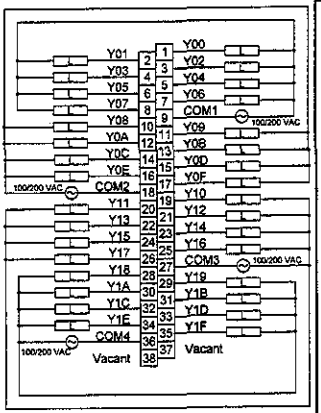
(4)

Model	Rated Input Voltage
AY22	100/240 VAC



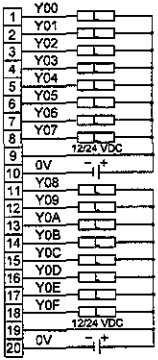
(5)

Model	Rated Input Voltage
AY23	100/240 VAC



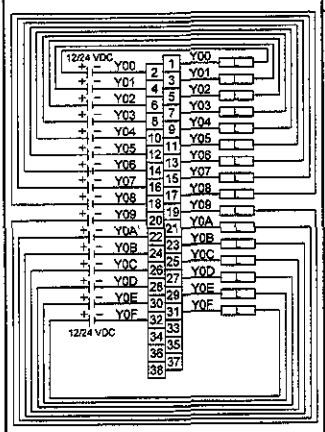
(6)

Model	Rated Input Voltage
AY40	12/24 VDC
AY40P	
AY50	



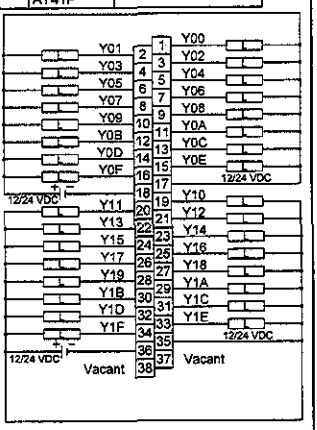
(7)

Model	Rated Input Voltage
AY40A	12/24 VDC



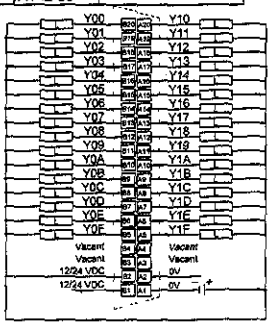
(8)

Model	Rated Input Voltage
AY41	12/24 VDC
AY41P	



(9)

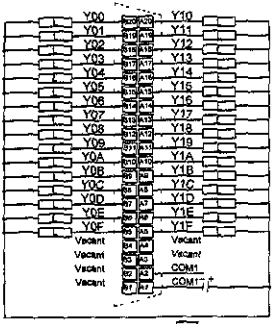
Model	Rated Input Voltage
AY42 AY42-S3	12/24 VDC



* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard Y00 to Y1F as Y20 to Y3F).
B1 and B2 and A1 and A2 are connected internally.

(10)

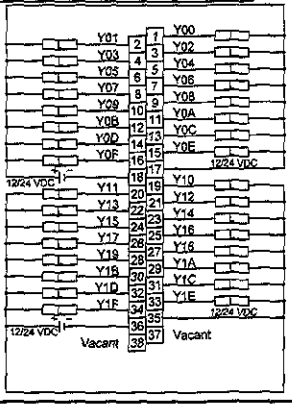
Model	Rated Input Voltage
AY42-S4	12/24 VDC



* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard Y00 to Y1F as Y20 to Y3F).
Regard COM1 as COM2.
B1 and B2 , and A1 and A2 are connected internally.

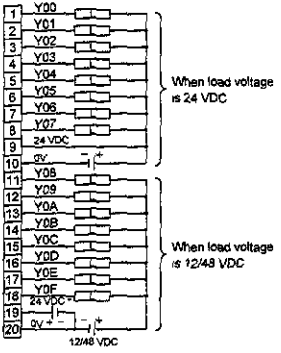
(11)

Model	Rated Input Voltage
AY51 AY51-S1	12/24 VDC



(12)

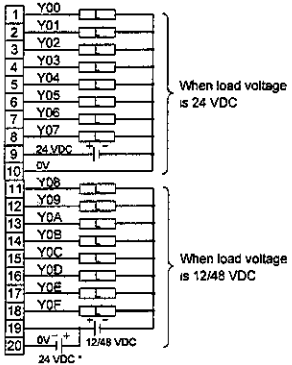
Model	Rated Input Voltage
AY60	24 (12/48) VDC



* When 12/48 VDC is used as the load power supply, a separate 24 VDC power supply must be used as an external power supply.

(13)

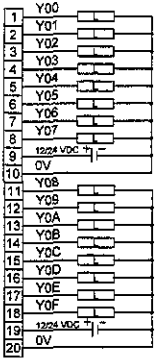
Model	Rated Input Voltage
AY60E	24 (12/48) VDC



- When 12/48 VDC is used as the load power supply, a separate 24 VDC power supply must be used as an external power supply.

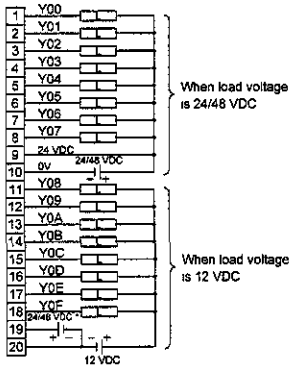
(14)

Model	Rated Input Voltage
AY60EP	12/24 VDC



(15)

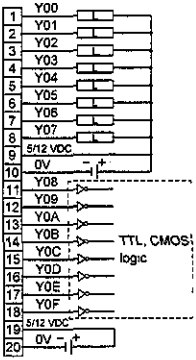
Model	Rated Input Voltage
AY60S	24/48 (12) VDC



- When 12 VDC is used as the load power supply, a separate 24/48 VDC power supply must be used as an external power supply.

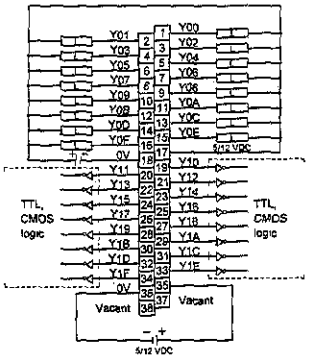
(16)

Model	Rated Input Voltage
AY70	5/12 VDC



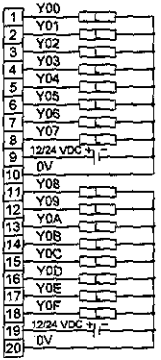
(17)

Model	Rated Input Voltage
AY71	5/12 VDC



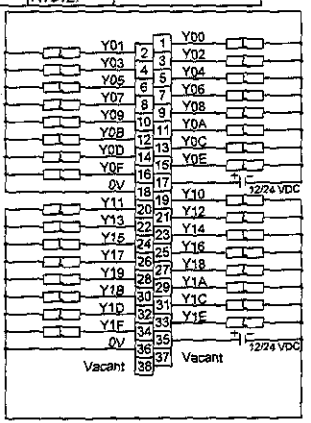
(18)

Model	Rated Input Voltage
AY80 AY80EP	12/24 VDC



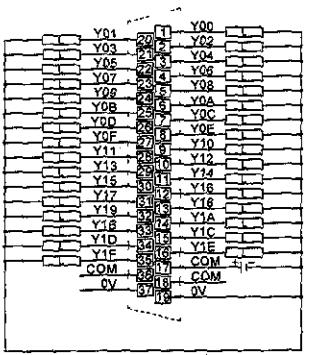
(19)

Model	Rated Input Voltage
AY81 AY81EP	12/24 VDC



(20)

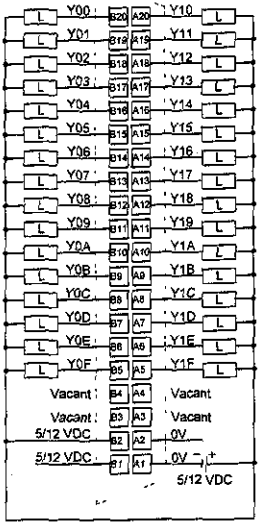
Model	Rated Input Voltage
AY82EP	12/24 VDC



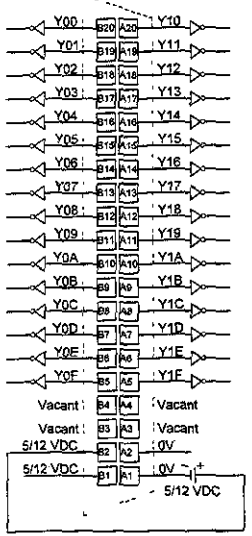
* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard Y00 to Y1F as Y20 to Y3F).
17 and 18 and 36 , and 19 and 37 are connected internally.

(21)	Model	Rated Input Voltage
	AY72	5/12 VDC

Load connection



TTL, CMOS logic



* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard Y00 to Y1F as Y20 to Y3F).
B1 and B2, and A1 and A2 are connected internally.

5.3 Input/Output Combined Modules

5.3.1 Input/output combined module specifications

Model	Input Type	Number of Points/ Module	Isolation Method	Rated Input Voltage	Input Current	Operating Voltage	
						ON Voltage	OFF Voltage
A42XY	Dynamic scan	64 points *1	Photocoupler insulation	12/24VDC		7VDC or higher	3VDC or lower
AH42	DC input (sink type)	32 points			3/7mA	9.5VDC or higher	6VDC or lower

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Input Response Time	
				Per Point	Per Common	OFF to ON	ON to OFF
A42XY	Dynamic scan	64 points	12/24VDC	50mA	—	16msec or less	16msec or less
AH42	Transistor output (sink type)	32 points		0.1A	1A	2msec or less	2msec or less

Maximum Simultaneous ON Input Point (Percentage Simultaneous ON)	Input Response Time		Input Display	External Connections	Common Terminal Arrangement
	OFF to ON	ON to OFF			
60%	16msec or less	16msec or less	LED display	16-pin connector	—
	10msec or less	10msec or less		40-pin connector × 2	30 points/ common

External Connections	Common Terminal Arrangement	Surge Suppression	Fuse Ratting	Error Display	External Power Supply (TYP 24VDC) Current	Internal Current Consumption	Number of Occupied I/O Points
32-pin connector	—	None	None	None	0.18A	0.11A	64 points *1
40-pin connector × 2	32 points/ common	Clamp diode			0.04A	0.245A	64 points *2

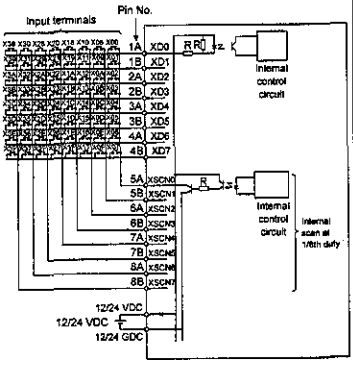
*1 The same numbers are allocated to both input and output points. The number of occupied I/O points is 64.

*2 The first half 32 points are allocated to input and the latter half 32 points are allocated to output. Thus, the number of occupied I/O points is 64. When I/O allocation is carried out at a peripheral device, both modules should be set as 64-point output modules.

5.3.2 Input/output combined module connections

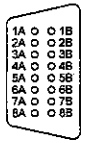
(1)	Model	Rated Input Voltage	Rated Load Voltage
	A42XY	12/24 VDC	12/24 VDC

Input side



* If there will be cases wher two or more switches are pressed simultaneously, install a diode at each switch (see right)

Pin Arrangement

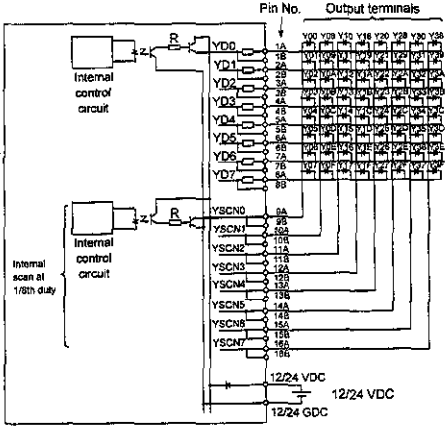


Seen from front face of the module

Pin No.	Signal Name	Pin No.	Signal Name
1A	XD0	1B	XD1
2A	XD2	2B	XD3
3A	XD4	3B	XD5
4A	XD6	4B	XD7
5A	XSCN0	5B	XSCN1
6A	XSCN2	6B	XSCN3
7A	XSCN4	7B	XSCN5
8A	XSCN6	8B	XSCN7

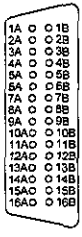
(1)	Model	Rated Input Voltage	Rated Load Voltage
	A42XY	12/24 VDC	12/24 VDC

Output side



* The power supply voltage (12/24 VDC) is applied in the LED's reverse direction.
If the peak inverse voltage insufficient, connect protective diodes in series with each of the LEDs. (see right)

Pin Arrangement

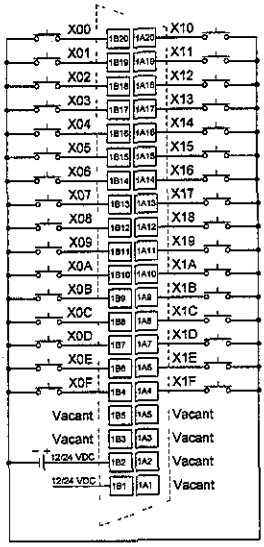


Seen from front face of the module

Pin No.	Signal Name	Pin No.	Signal Name
1A	YD0	1B	YD1
2A	YD1	2B	YD2
3A	YD2	3B	YD3
4A	YD3	4B	YD4
5A	YD4	5B	YD5
6A	YD5	6B	YD6
7A	YD6	7B	YD7
8A	YD7	8B	YD8
9A	YSCN0	9B	YSCN0
10A	YSCN1	10B	YSCN1
11A	YSCN2	11B	YSCN2
12A	YSCN3	12B	YSCN3
13A	YSCN4	13B	YSCN4
14A	YSCN5	14B	YSCN5
15A	YSCN6	15B	YSCN6
16A	YSCN7	16B	YSCN7

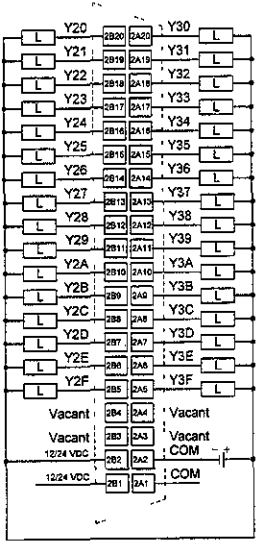
(2)

Model	Rated Input Voltage	Rated Load Voltage
AH42	12/24 VDC	12/24 VDC



X (Input side)

* 1B1 and 1B2 are connected internally.



Y (Output side)

* 2B1 and 2B2 , and 2A1 and 2A2 are connected internally.

6. ERROR CODE

When a programmable controller error occurs at power ON, when switched to the RUN status, or during the RUN status, the self-diagnosis function displays the error content (by LED indicator, or message display),and stores the error information at a special replay (SM) and specail register (SD).
QnACPU errors and corrective actions are described in this chapter.

6.1 Error Code Readout Procedure

When an error occurs, the error code or error message, etc., can be read out at GPPQ. For details regarding the GPPQ operation procedure, refer to the SW0IVD-GPPQ Operating manual (Online).

POINT

The QnACPU's built-in RAM memory is referred to as the "built-in memory" in this manual.
(On the SW0IVD-GPPQ display screen, it is referred to as the "built-in RAM".)

6.2 Error Code List

Error code/message descriptions, causes, and corrective actions are shown below.

Error Code List

Error Code (SD0)*1	Error Message	Common Information (SD5-12)*1	Individual Information (SD13-20)*1	LED Status		CPU Status	Diagnosis Timing
				RUN	ERROR		
1000	MAIN CPU DOWN	——	——	OFF	Flashing	STOP	constant
1010	END NOT EXECUTE	——	——	OFF	Flashing	STOP	At end instruction
1011							
1012							
1101	RAM ERROR	——	——	OFF	Flashing	STOP	At power ON & reset
1102							
1103							
1104							
1200	OPE. CIRCUIT ERR.	——	——	OFF	Flashing	STOP	At power ON & reset
1201							
1202							
1300	FUSE BRAKE OFF	——	——	OFF/ON	Flashing/ON	Stop/ continue *2	At END instruction
1310	I/O INT ERROR	Module No.	——	OFF	Flashing	STOP	At interruption

*1 Values shown in parentheses indicate the special register numbers where the error information is stored.

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

	Error Description & Cause	Corrective Action
	Main CPU run-away or failure (1) Malfunction caused by noise, etc. (2) Hardware fault.	(1) Take noise-prevention measures. (2) Reset, then re-establish the RUN condition. If the same error occurs again, the problem is probably a CPU hardware fault. In this case, contact your service representative for assistance.
	The END instruction is ignored, with the entire program being executed. (1) The END instruction is being read as another instruction due to noise, etc. (2) The END instruction has been changed to another instruction by some unknown cause.	(1) Take noise-prevention measures. (2) Execute a reset, then re-establish the RUN condition. If the same error occurs again, the problem is probably a CPU hardware fault. In this case, contact your service representative for assistance.
	Fault at built-in RAM for CPU sequence program storage.	At the ploblem is a CPU hardware fault, contact your service representative for assistance.
	Fault at CPU's internal work area RAM.	
	Fault at CPU's internal device memory.	
	Fault at CPU's internal address RAM.	
	Fault at CPU's internal calculation circuit for index qualifications.	
	Fault at CPU's internal hardware (logic).	
	Fault at CPU's internal calculation circuit for sequence processing.	
	A fuse is blown at one of the output modules.	(1) Check the blown-fuse LED indicators for the output modules, and replace the blown fuse. (2) Read out the error common information to the peripheral device, then replace the fuse at the output module corresponding to that information (module No.). Or, monitor the SD1300-SD1331 special registers at the peripheral device, and replace the fuse at the output module where a bit setting of "1" is shown.
	An interruption occurs even though no interrupt module is installed.	There is a hardware fault at one of the modules. Contact your service representative for assistance.

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
				RUN	ERROR		
1401	SP.UNIT DOWN	Module No.	Program error location	OFF	Flashing	STOP	At power ON & reset
1402							At FROM/TO instructions
1411	CONTROL-BUS ERR	Module No.	Program error location	OFF	Flashing	STOP	At power & reset
1421							FROM/TO instructions
1500	AC DOWN	——		ON	OFF	Continue	Constant
1600	BATTERY ERROR	Drive name	——	ON	OFF	Continue	Constant
1601				BAT. ALM LED ON		Continue	Constant
1602							
2000	UNIT VERIFY ERROR.	Module No.	——	OFF/ON	Flashing/ON	Stop/ continue *2	At end instruction
2100	SP. UNIT LAY ERROR.	Module No.	——	OFF	Flashing	STOP	At power ON & reset
2101							
2102							
2103							
2104							

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

Error Description & Cause	Corrective Action
Where parameter I/O allocations are designated, there is no reply from the special function module when the initial communication occurs. When the error occurs, the first input/output No. of the special function module indicated by the common information is stored.	There is a hardware fault at the accessed special function modules. Contact your service representative for assistance.
The special function module was accessed at the execution of the FROM/TO instruction, but there was no reply. When the error occurs, the program error location indicated by the individual information is stored.	
Where parameter I/O allocations are designated, the special function module cannot be accessed at the initial communication. When the error occurs, the first input/output No. of the special function module indicated by the common information is stored.	There is a fault at the special function module, the CPU or the base unit. Contact your service representative for assistance.
Execution of the FROM/TO instruction is prevented by a control bus error with the special function module. When the error occurs, the program error location indicated by the individual information is stored.	
A momentary power supply interruption occurred.	Check the power supply.
(1) Voltage at the CPU battery fell below the prescribed level. (2) A CPU battery lead connector is not installed.	(1) Replace the battery. (2) Install a lead connector at systems where a built-in RAM or a memory backup function is used
Voltage at the memory card1 battery fell below the prescribed level.	Replace the battery.
Voltage at the memory card2 battery fell below the prescribed level.	
Input/output module information discrepancy occurred at power ON. • The active input/output module (including the special function module) is either loose or disconnected.	Read out the error common information to the peripheral device then check/replace the module corresponding to that information (module No.). Or, monitor the SD1400 to SD1431 special registers at the peripheral device and replace the module where a bit setting of 1 is shown.
An input/output module position has been allocated to a special function module (or vice-versa) in the parameter I/O allocations.	Correct the parameter I/O allocation setting.
The number of special function modules (excluding AI61) which can designate an interrupt START at the CPU exceeds 13 modules.	Install 12 or fewer special function modules which can designate an interrupt START.
The number of installed computer link modules (excludes A (1S) J71QC24), etc. exceeds 7 modules.	Install 6 or fewer computer link modules (excludes A (1S) J71QC24), etc.
More than one AI61 interrupt modules is installed.	Install only one AI61 modules.
A discrepancy exists between the module allocations designated by the MELSECNET/MINI auto-refresh parameter, and the names of modules which are actually linked.	Re-designate the module allocations designated by the MELSECNET/MINI auto-refresh setting conform with the names of modules which are actually linked.

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
2105	SP. UNIT LAY ERR	Module No.	——	OFF	Flashing	STOP	At ON & reset
2106							
2107							
2108							
2110	SP. UNIT ERROR	Module No.	Program error location	OFF/ON	Flashing/ON	STOP/ *2 continue	At execution of FROM/TO instruction
2111							
2112							
2113		FFFH (fixed)					
2200	MISSING PARA	Drive name	——	OFF	Flashing	STOP	At power ON & reset

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

Error Description & Cause	Corrective Action
The number of registered I/O allocations for special function modules which can use dedicated instructions exceeds the maximum limit. (The number, as calculated below exceeds 1344). (AD59 number installed × 5) (AD57(S1)/AD58 number installed × 8) (AJ71C24(S3/S6/S8) number installed × 10) (AJ71UC24 number installed × 10) (AJ71C21(S1) number installed × 29) (AJ71T32-S3/ AJ71PT32(S3) number installed × 125)* (AJ71QC24(R2,R4) number installed × 29) (AJ71D1(2)-R4 number installed × 18) + (AD75 number installed × 12) Total >1344	Reduce the number of installed special function modules. *When the expansion mode is used.
(1) 5 or more AJ71QLP21 & AJ71QBR11 modules are installed. (2) 3 or more AJ71AP21/R21 & AJ71AT21B modules are installed. (3) The total number of installed AJ71QLP21, AJ71QBR11, AJ71AP21/R21, and AJ71AT21B modules exceeds 5. (4) Identical network Nos. or identical station Nos. exist at the MELSECNET/10 network system. (5) 2 or more master or load stations exist simultaneously at the MELSECNET(II) or MELSECNET/B data link system.	(1) Install 4 or fewer modules. (2) Install 2 or fewer modules. (3) Reduce the total number of modules to 4 or less. (4) Check the network Nos. and station Nos. (5) Check the station Nos.
The first X/Y in the parameter I/O allocation settings duplicates the first X/Y of another module.	Set the parameter I/O allocation settings so that they conform with the actual special function module installation conditions.
An AJ71LP21 or AJ71BR11 network module has been installed for the AnUCPU.	Replace with AJ71QLP21 or AJ71QBR11 network modules.
No special network module existed when a FROM/TO instruction was executed.	Read out the error individual information and check/correct the FROM/TO instruction corresponding to that information (program error location).
No network module existed when a link device [J [ ]\ ]] was designated.	
No special function module existed when a special function module dedicated instruction was executed. Or, no applicable special function module existed at that time.	Read out the error individual information and check/correct the special function module dedicated instruction corresponding to that information (program error location).
No simulation special module data was designated in the simulation data.	Read out the error individual information and designate the special function module's simulation data corresponding to that information (program error location).
No parameter file exists at the drive designated by the parameter enabled drive switch. (DIP switch)	Check/correct the parameter enabled drive switch setting. Designate a BOOT file for the drive designated by the parameter enabled drive switch. Check/correct the BOOT file data.

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
2210	BOOT ERROR	Drive name	——	OFF	Flashing	STOP	At power ON & reset
2300	ICM. OPE. ERROR	Drive name	——	OFF/ON	Flashing/ON	Stop/ continue *2	At memory card insertion /removal
2301							
2302							
2400	FILE SET ERROR	File name	Parameter No.	OFF	Flashing	STOP	At power ON & reset
2401							
2410	FILE OPE. ERROR	File name	Program error location	OFF/ON	Flashing/ON	Stop/ continue *2	At instruction execution
2411							
2412							
2413							
2500	CAN'T EXE. PRG.	File name	——	OFF	Flashing	STOP	At power ON & reset
2501							
2502							
2503							
2504							

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

Error Description & Cause	Corrective Action
Although the BOOT switch (DIP switch) is ON, there is no file (or the file data is incorrect) at the drive file specified by the parameter enabled drive switch.	Check/correct the parameter enabled drive switch setting. Designate a BOOT file for the drive designated by the parameter enabled drive switch. Check/correct the BOOT file data.
(1) A memory card was removed without turning the memory card in/out switch OFF (2) The card insert switch is turned ON although a memory card is not actually installed.	(1) Remove the memory card after turning the memory card in/out switch OFF. (2) Turn on the card insert switch after inserting a memory card.
(1) Memory card is not formatted. (2) Memory card format is incorrect.	(1) Format the memory card. (2) Re-format the memory card.
A memory card which cannot be used at the QnACPU was inserted.	Check the memory card.
The file specified at the "PC file setting" parameter item does not exist.	Read out the error individual information to a peripheral device, and check/ correct the drive name and file name corresponding to that information (parameter No.). Create the specified file.
Creation of a file designated in the failure history of the PC RAS setting parameter, etc., is impossible.	Read out the error individual information to a peripheral device, and check/ correct the drive name and file name corresponding to that information (parameter No.). Create the memory card's remaining memory area.
The file designated by the sequence program does not exist.	Read out the error individual information to a peripheral device, and check/ correct the program corresponding to that information (program error location). Create the specified file.
An off-limits file (comment file, etc.) was designated by the sequence program.	Read out the error individual information to a peripheral device, and check/ correct the program corresponding to that information (program error location).
An off-limits SFC program file was designated by the sequence program.	Read out the error individual information to a peripheral device, and check/ correct the program corresponding to that information (program error location).
No data could be written to a file designated by the sequence program.	Read out the error individual information to a peripheral device, and check/ correct the program corresponding to that information (program error location). Check to see if a " write-prohibit" status is in effect at the designated file.
A program file exists with device outside the device allocation range designated by the device setting in the parameters.	Read out the error common information to a peripheral device, and check/ correct the device allocations for the program file corresponding to that information (file name), and the device allocations in the parameter device setting.
Multiple program files is incompatible with the QnACPU. Or the file content is not a sequence program.	Change the program setting parameter to PRESENT. Or, delete unnecessary programs.
The program files exist even though NONE is designated at the program setting parameter.	Change that the program file type is "***.QPG" Check that the file content is a sequence program.
No program files exist.	Check the program configuration.
2 or more normal and control SFC programs were executed.	Check the parameter and program configuration.

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
3000	PARAMETER ERROR	File name	Parameter No.	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switching
3001							
3003							
3004							
3100	LINK PARA. ERROR	File name	Parameter No.	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switch
3101							
3102							
3200	SFC PARA. ERROR	File name	Parameter No.	OFF	Flashing	STOP	At STOP → RUN switching
3201							
3202							
3203							
4000	INSTRCT CODE ERR.	Program error location	——	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switching
4001							
4002							
4003							
4004							
4010	MISSING END INS.	Program error location	——	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switching
4020	CAN'T SET (P)	Program error location	——	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switching
4021							
4030	CAN'T SET (J)	Program error location	——	OFF	Flashing	STOP	At power ON, reset, and STOP → RUN switching

Error Description & Cause	Corrective Action
Settings for the following parameter items are outside the permissible range for CPU use: timer setting, RUN-PAUSE contact, common pointer No., general data processing, number of vacant slot points, system interrupt setting.	(1) Read out the error detailed information to a peripheral device, and check/ correct the parameter item corresponding to that information (parameter No.) (2) If the error occurs again after the parameter has been corrected, there is probably a fault at the CPU's built-in memory, or at the memory card. Contact your service representative for assistance.
Parameter data has been destroyed.	
The number of devices designated at the device settings in the parameters is outside the permissible range for CPU use.	
The parameter file is incompatible with the QnAPU. Or, the file does not contain parameter data.	Check that the parameter file type is "*** QPA". Check that the file contains parameter data.
Although the QnACPU is the control or master station, no network parameter data has been written to it.	(1) Correct, then write the network parameters. (2) If the error occurs again after corrections are made, the problem is probably caused by a hardware fault. Contact your service representative for assistance.
The refresh parameter data is incorrect.	
An error occurred when the network parameters were checked at a network module.	
Parameter data is incorrect.	Correct, then write the parameter data.
SFC block attribute information is incorrect.	
The number of step relays designated by the parameter setting are fewer than the number used by the program.	
The SFC program execution type designated by the parameter setting is other than "scan"	
The program contains an instruction code which cannot be decoded by the CPU.	Read out the error common information to a peripheral device, and check/ correct the error step corresponding to that information (program error location).
The program contains an SFC program dedicated instruction even though it is not an SFC program.	
The instruction name of the expansion instruction designated by the program is incorrect.	
The number of devices of the expansion instruction designated by the program is incorrect.	
An unusable device has been designated at the expansion instruction designated by the program.	
The program contains no END (FEND) instruction.	Read out the error common information to a peripheral device, and check/ correct the file corresponding to that information (program error location).
The total number of pointers used in the program files exceeds the maximum allowable number designated by the parameter setting.	Read out the error common information to a peripheral device, and check/ correct the error step corresponding to that information (program error location).
Duplicate common pointer Nos. exist in the files.	
Duplicate allocation pointer Nos. exist in the files.	

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
4100							
4101	OPERATION ERROR	Program error location	——	OFF/ON	Flashing/ON	Stop/ continue *2	At instruction execution
4102							
4103							
4200							
4201	FOR NEXT ERROR	Program error location	——	OFF	Flashing	STOP	At instruction execution
4202							
4203							
4210							
4211	CAN'T EXECUTE (P)	Program error location	——	OFF	Flashing	STOP	At instruction execution
4212							
4213							
4220							
4221	CAN'T EXECUTE (I)	Program error location	——	OFF	Flashing	STOP	At instruction execution
4223							
4230							
4231	INST. FORMAT ERR.	Program error location	——	OFF	Flashing	STOP	At instruction execution
4235							
4300	EXTEN-DINST	Location	——	OFF/ON	Flashing/ON	Stop/ continue *2	At instruction execution
4301							

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

Error Description & Cause	Corrective Action
An instruction contains data which cannot be processed.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
The instruction data exceeds the allowable number of data for instruction processing. Or, the storage data or constants at the device specified by the instruction exceeds the usable range.	
In correct network No. or station No. designated by a network dedicated instruction.	
Configuration of PID dedicated instruction is incorrect.	
A FOR instruction was executed without a NEXT instruction. Or, the number of NEXT instruction is fewer than the number of FOR instructions.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
A NEXT instruction was executed when there was no FOR instruction. Or, the number of NEXT instruction is greater than the number of FOR instructions.	
Reduce the nesting count to 16 or less.	The nesting count exceeded 16 nestings.
A BREAK instruction was executed when there was no FOR instruction.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
A CALL instruction was executed without a destination pointer.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
The executed sub-routine program contained no RET instruction.	
An RET instruction exists before the FEND instruction at the main program.	
The nesting count exceeded 16 nestings.	Reduce the nesting count to 16 or less.
An interruption input occurred without a corresponding interruption pointer.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
The executed interruption program contained no IRET instruction.	
An IRET instruction exists before the FEND instruction at the main program.	
The number of CHK and CHKEND instructions do not match.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
The number of IX and IXEND instructions do not match.	
The CHK instruction's check conditions are incorrect. Or, CHK instruction was executed in a low-speed program.	
An incorrect MELSECNET/MINI-S3 master module control instruction was designated.	
An incorrect AD57/AD58 control instruction was designated.	

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
4400	SFCP CODE ERROR	Program error	——	OFF	Flashing	STOP	At STOP → RUN switching
4410	CAN'T SET (BL)	Program error location	——	OFF	Flashing	STOP	At STOP → RUN switching
4411							
4420	CAN'T SET (S)	Program error location	——	OFF	Flashing	STOP	At STOP → RUN switching
4421							
4422							
4500	SFCP FORMAT ERR.	Program error location	——	OFF	Flashing	STOP	At STOP → RUN switching
4501							
4502							
4503							
4504							
4600	SFCP OPE. ERROR	Program error location	——	OFF/ON	Flashing/ON	Stop/ continue *2	At instruction execution
4601							
4602							
4610	SFCP. EXE. ERROR	Program error location	——	ON	ON	Continue	At STOP → RUN switching
4611							
4620	BLOCK EXE. ERROR	Program error location	——	OFF	Flashing	STOP	At instruction execution
4621							
4630	STEP EXE. ERROR		——	OFF	Flashing	STOP	At instruction execution
4631							
4632							
4633							

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

	Error Description & Cause	Corrective Action
	The SFC program contains no SFCP and SFCPEND instructions.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
	The block NO. designated by the SFC program exceeds the maximum setting value.	
	Duplicate block Nos. are designated at the SFC program.	
	The number of step Nos. designated at the SFC program exceeds 255.	
	The total number of steps at all SFC programs exceeds the maximum setting value.	Reduce the total number of steps to fewer than the maximum value.
	Duplicate step Nos. are designated in the SFC program.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
	The number of BLOCK and BEND instructions at the SFC program do not match.	
	The STEP" to TRAN" to TSET to SEND instruction configuration of the SFC program is incorrect.	
	There is no STEP!" instruction in an SFC program block.	
	The step designated by the SFC program's TSET instruction does not exist.	
	The step designated by the SFC program's TAND instruction does not exist.	
	The SFC program contains data which cannot be processed.	
	The device range which can be designated by the SFC program has been exceeded.	
	An block control END instruction preceded a START instruction at the SFC program.	
	Active step information was incorrect when an SFC program resumptive start occurred.	Set the program for an automatic initial start.
	The key-switch was reset during a RUN status when "continue" was designated at the SFC program.	
	The SFC program designated a block start for a block which has already been started.	Read out the error common information to a peripheral device, and check/correct the error step corresponding to that information (program error location).
	The SFC program designated a block start for a block which does not exist.	
	The SFC program designated a step start for a step which has already been started.	
	The SFC program designated a step start for a step which does not exist.	
	The number of simultaneously active block steps which can be designated at the SFC program has been exceeded.	
	The total number of simultaneously active steps which can be designated has been exceeded.	

Error Code List (Continued)

Error Code (SD0)	Error Message	Common Information (SD5-12)	Individual Information (SD13-20)	LED Status		CPU Status	Diagnosis Timing
5000	WDT ERROR	Time period (setting value)	Time period (setting value)	OFF	Flashing	STOP	Continue
5001							
5010	PRG. TIME OVER	Time period (setting value)	Time period (setting value)	ON	ON	Continue	Continue
5011							
9000	*****3	Program error location	Annunciator No.	ON	OFF	Continue	At instruction execution
				USER LED ON			
9010	<CHK> ERR****-****4	Program error location	Failure No.	ON	OFF	Continue	At instruction execution
				USER LED ON			

*2 The CPU status when an error occurs can be designated by parameter setting.
(LED operation changes accordingly)

*3 "****" is the detected annunciator number.

*4 "***" is the detected contact and coil numbers.

Error Description & Cause	Corrective Action
The scan time at an initial execution type program exceeded the initial execution monitor period designated by the PC RAS parameter setting.	Read out the error individual information, and reduce the scan time in accordance with the information (time period).
The program scan time exceeded the WDT value designated by the PC RAS parameter setting.	
The low-speed execution type program run time that is set in the parameter PC RAS setting goes over the margin time of constant scan.	Review and change the constant scan time and low-speed execution type program run time set for parameters to secure sufficient length of margin time of constant scan.
The low-speed scan time exceeded the low-speed execution monitor period designated by the PC RAS parameter setting.	Read out the error individual information, and reduce the scan time in accordance with the information (time period).
Annunciator F switched ON.	Read out the error individual information, and check the program corresponding to that information (annunciator No.).
An error was detected at the CHK instruction.	Read out the error individual information, and check the program corresponding to that information (failure No.).

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MITSUBISHI ELECTRIC CORPORATION

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