

# MITSUBISHI

## Type A0J2HCPU(P21/R21)

Mitsubishi General-Purpose Programmable  
Controller  
**User's Manual**  
(Hardware)

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

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



MODEL	A0J2HCPU-U-H/W-E
MODEL Code	13JL05
IB(NA)-66758-E(0308)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 ● 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]



- Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC module. Otherwise, trouble could result from erroneous output or erroneous operation.
  - (1) Outside the PLC, construct mechanical damage preventing interlock circuits such as emergency stop, protective circuits, positioning upper and lower limits switches and interlocking forward/reverse operations.

## [DESIGN PRECAUTIONS]



**(2) When the PLC detects the following problems, it will stop calculation and turn off all output in the case of (a). In the case of (b), it will stop calculation and hold or turn off all output according to the parameter setting.**

**Note that the AnS series module will turn off the output in either of cases (a) and (b).**

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

**(b) The PLC CPUs self-diagnosis functions, such as the watch dog timer error, detect problems.**

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

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

- **When overcurrent which exceeds the rating or caused by short-circuited load flows in the output module for a long time, it may cause smoke or fire. To prevent this, configure an external safety circuit, such as fuse.**

- **Build a circuit that turns on the external power supply when the PLC main module power is turned on. If the external power supply is turned on first, it could result in erroneous output or erroneous operation.**

- **When a data link results in a communication error, the faulty station changes in operating status depending on the used data link type.**

**(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.**

## [DESIGN PRECAUTIONS]

### DANGER

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

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

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

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

- When configuring a system, do not leave any slots vacant on the base. Should there be any vacant slots, always use a blank cover (A1SG60) or dummy module (A1SG62).

When the extension base A1S52B, A1S55B or A1S58B 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 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.

- When controlling items like lamp load, heater or solenoid valve using an output module, large current (approximately ten times greater than that present in normal circumstances) may flow when the output is turned OFF to ON.

Take measures such as replacing the module with one having sufficient rated current.

## [INSTALLATION PRECAUTIONS]

### CAUTION

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

## [WIRING PRECAUTIONS]

### DANGER

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

### CAUTION

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

## [STARTUP AND MAINTENANCE PRECAUTIONS]



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

## [STARTUP AND MAINTENANCE PRECAUTIONS]

### CAUTION

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

## [DISPOSAL PRECAUTIONS]

### CAUTION

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

## [TRANSPORTATION PRECAUTIONS]

### CAUTION

- When transporting lithium batteries, make sure to treat them based on the transport regulations. (Refer to Appendix 2 for details of the controlled models.)

## REVISIONS

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

<b>Print Date</b>	<b>*Manual Number</b>	<b>Revision</b>	
Oct., 1990	IB(NA) 66758-A	First edition	
Jun., 1994	IB(NA) 66758-B		
Mar., 1997	IB(NA) 66758-C		
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Addition			
Aug., 2003	IB(NA) 66758-E	<table border="1"><tr><td>Partial corrections</td></tr></table> SAFETY PRECAUTIONS	Partial corrections
Partial corrections			

Japanese Manual Version IB(NA)68462-E

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<b>1.SPECIFICATIONS</b> .....	<b>1</b>
1.1 SPECIFICATIONS.....	1
<b>2.PERFORMANCE SPECIFICATIONS</b> .....	<b>2</b>
2.1 A0J2HCPU Module Performance Specifications .....	2
<b>3.LOADING AND INSTALLATION</b> .....	<b>4</b>
3.1 Installing Modules.....	4
3.1.1 Precautions for handling of modules .....	4
3.1.2 Installation environment.....	4
3.1.3 Precautions relating to the installation of the module .....	5
3.2 Failsafe Circuits .....	8
3.3 Power Supply Module and Cable Specifications .....	11
3.3.1 Performance specification for power supply modules.....	11
3.3.2 Cable specifications.....	12
3.3.3 Power supply connection.....	14
3.3.4 Connection to module terminals.....	17
3.4 Precaution when Connecting the Uninterruptive Power Supply (UPS) .....	19
3.5 Part Identification and Setting of A0J2HCPU (P21/R21).....	20
3.6 Installing and Removing the Lever Holder .....	28
3.6.1 Procedure for installation.....	28
3.6.2 Procedure for removal.....	29
<b>4.INPUT/OUTPUT MODULE SPECIFICATIONS AND CONNECTIONS</b> .....	<b>30</b>
4.1 Explanation of I/O Module Model Names .....	30
4.2 Input Modules .....	30
4.2.1 Input module specifications.....	30
4.2.2 Connections for input modules.....	32
4.3 Output Modules .....	34
4.3.1 Output module specifications .....	34
4.3.2 Output module connections.....	36
4.4 Input/Output Modules .....	38
4.4.1 Input/Output module specification.....	38
4.4.2 Input/Output module connections (A0J2(E)-E28[...]) .....	42
4.4.3 Input/Output module connections (A0J2(E)-E56[...]) .....	44
<b>5.ERROR CODES</b> .....	<b>45</b>
5.1 Error Code List for A0J2HCPU .....	45
<b>APPENDICES</b> .....	<b>53</b>
Appendix1 CPU Startup Names .....	53
Appendix 2 Transportation Precautions .....	53
Appendix 2.1 Controlled Models.....	53
Appendix 2.2 Transport Guidelines .....	53

This manual describes the handling precautions, connections to I/O modules, and error codes, for the A0J2HCPU(P21/R21).

### About Manuals

The following manuals are also related to this product.  
Please order those you require.

#### **Detailed Manuals**

<b>Manual Title</b>	<b>Manual No. (Model Code)</b>
A0J2HCPU (P21/R21) User's Manual This manual describes the performance, functions, handling, etc., of the A0J2HCPU (P21/R21)	IB-66268 (13J788)

#### **Related Manuals**

<b>Manual Title</b>	<b>Manual No. (Model Code)</b>
ACPU Programming Manual (Fundamentals) This manual describes programming methods required to create programs, device names, parameters, types of program, configuration of the memory area, etc.	IB-66249 (13J740)
ACPU Programming Manual (Common Instructions) This manual describes how to use the sequence instructions, basic instructions, application instructions and micro-computer programs.	IB-66250 (13J741)
A0J2 (I/O unit) User's Manual This manual describes the specifications of each of the I/O modules, extension power supply modules, cables, etc., used with A0J2 general purpose programmable controllers.	IB-66068 (13J602)

# 1. SPECIFICATIONS

## 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	Under intermittent vibration	Frequency	Acceleration	Amplitude	No. of sweeps  10 times each in X, Y, Z directions (for 80min.)
			10 to 57Hz	-	0.075mm (0.003in.)	
		Under continuous vibration	57 to 150Hz	9.8 m/s <sup>2</sup> {1G}	-	
			10 to 57Hz	-	0.035mm (0.001in.)	
		57 to 150Hz	4.9 m/s <sup>2</sup> {1G}	-		
Shock resistance	Conforming to JIS B 3501, IEC 1131-2 (147m/s <sup>2</sup> {15G}, 3times in each of 3directions 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 300V is 2500V.

\*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. PERFORMANCE SPECIFICATIONS

### 2.1 A0J2HCPU Module Performance Specifications

- (1) This section describes the performance of the A0J2HCPU module, including memory capacity, devices, etc.

**Table 2.1 List of Performance**

Item		Type	A0J2H	A0J2H-DC24
Control system			Repeated operation (using stored program)	
I/O control method			Refresh mode/Direct mode selectable	
Programming language			Language dedicated to sequence control (Combined use of relay symbol type and logic symbolic language)	
Number of instructions	Sequence instruction		22	
	Basic instruction		131	
	Application instruction		109	
Processing speed (sequence instruction) ( $\mu$ sec/step)			Direct : 1.25 to 2.25 Refresh : 1.25	
I/O points			336 (Max. 480 points when using extension base units)	
Watch dog timer (WDT) (msec)			10 to 2000	
*1 Memory capacity			32k byte (RAM)	
Program capacity			Main sequence program + main microcomputer program = 8k steps max. Internal microcomputer program can be set to 7k steps (14k bytes) max. (subsequence program not available).	
Self-diagnostic functions			Watch dog error monitor (watch dog timer 200 ms), Memory error detection, CPU error detection, I/O error detection, battery error detection, etc.	
Operation mode at the time of error			STOP/CONTINUE	
STOP•RUN output mode			Output data at time of STOP restored/data output after operation execution	
Allowable momentary power interruption time (ms)			No greater than 20	-
*3 Allowable momentary drop time (ms)			-	No greater than 1
Current consumption (5 VDC)			A0J2HCPU : 0.4A A0J2HCPUP21 : 0.53A A0J2HCPUR21 : 0.86A	
Weight (kg) (lb)			A0J2HCPU : 0.75 (1.65) A0J2HCPUP21 : 1.16 (2.56) A0J2HCPUR21 : 1.16 (2.56)	0.65 (1.43)
External dimensions (mm) (inch)			A0J2HCPU : 250 (9.84) H $\times$ 112 (4.41) W $\times$ 41 (1.61) D A0J2HCPU (P21/R21) : 250 (9.84) H $\times$ 112 (4.41) W $\times$ 68 (2.68) D	250 (9.84) H $\times$ 112 (4.41) W $\times$ 41 (1.61) D

\*1 : The total memory used for parameters, T/C set values, program capacity, file registers, number of comments, sampling trace, and status latch is 32k bytes.

\*2 : Up to 1600 comments can be stored in the A0J2HCPU. In the GPP/PHP/HGP, 4032 comments points can be written.

\*3 : Indicates the allowable momentary drop time from lower limit input (power supply voltage: 15.6 V).

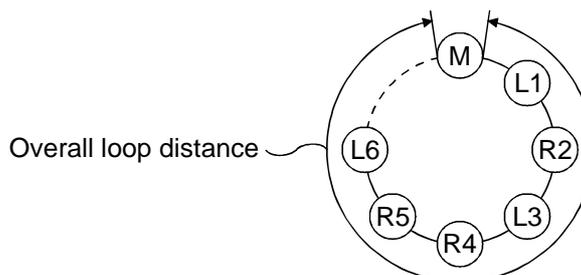
- (2) This section describes the performance specifications of optical and coaxial links when using A0J2HCPU (P21/R21) data link modules.

**Table 2.2 Data Link Performance Specification**

		Optical Data Link	Coaxial Data Link
		A0J2HCPUP21	A0J2HCPUR21
Maximum number of I/O points		336 (480 when extension base is used)	
Max. number of usable link points per station	Input (X)	512 points (64 bytes)	
	Output (Y)	512 points (64 bytes)	
Max. number of link points in 1 system	Link relay (B)	1024 (1/8 byte/ point, 128 bytes)	
	Link register (W)	1024 (2 bytes/ points, 2048 bytes)	
Max. number of link points in 1 station		$Y + B + W \leq 1024$ bytes	
Allowable momentary power failure time		Within 20 ms	
Communication speed		1.25 mbps	
communication method		Half duplex bit serial method	
Synchronous method		Frame synchronous method	
Transmission path method		Duplex loop method	
Overall loop distance *1		Max. 10 km (32810 ft) (1 km (3281 ft) station interval)	Max. 10 km (32810 ft) (500 m (1640.5 ft) station interval)
Number of connected stations		Max. 65 units/loop (1 master station, 64 local/remote I/O stations)	
Demodulation method		CMI method	
Transmission format		Conforms to HDLC (frame method)	
Error control system		Retry due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$ ) and time over	
RAS function		Loopback function due to error detection and cable breakage, diagnostic function such as host link line	
Connector		2-core optical connector plug (CA9003)	BNC-P-5, BNC-P-3-NI (DDK) equivalent
Cable used		SI-200/250	3C-2V, 5C-2V equivalent

**REMARK**

\*1 : The overall loop distance is the distance from the sending port of the master station to the receiving port of the master station via slave stations. Both optical and coaxial cables have a max. distance of 10 km (32810 ft).



- (3) If using an A0J2HCPU at a master station or local station in a MELSECNET/B data link system, mount the MELSECNET/B data link module (AJ71AT21B) on an extension base unit.

### 3. LOADING AND INSTALLATION

#### 3.1 Installing Modules

##### 3.1.1 Precautions for handling of modules

The precautions on handling the A0J2HCPU are listed below.

- (1) The case of the A0J2HCPU is made of resin : do not drop it or subject it to strong impact.
- (2) Do not remove the printed circuit board from the case. This could cause failure.
- (3) Make sure that no wire offcuts or other debris enters the module during wiring.  
If anything does enter the module, remove it.
- (4) Tighten the module mounting and terminal screws as specified below.

Screw	Tightening Torque Range N-cm {kgf-cm} (lb-inch)
Terminal block terminal screw for I/O module (M3 screw)	49 to 78 {5 to 8} (4.34 to 6.93)
Terminal block mounting screw for I/O module (M4 screw)	78 to 137 {8 to 14} (6.93 to 12.13)
Terminal block screw for power supply (M4 screw)	98 to 137 {10 to 14} (8.68 to 12.13)
Module mounting screw (M4 screw)	78 to 118 {8 to 12} (6.93 to 10.4)

##### 3.1.2 Installation environment

Avoid installing the A0J2HCPU at locations subject to the following environmental conditions.

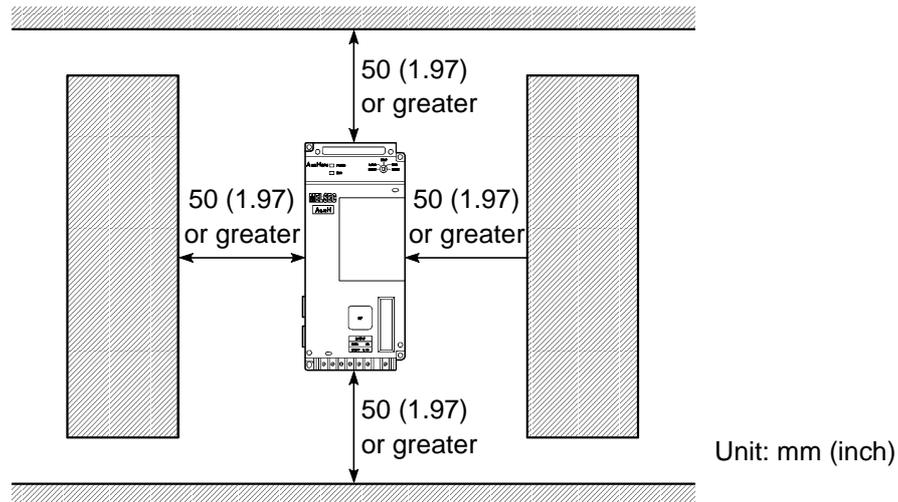
- (1) Ambient temperatures outside the range 0 to 55°C
- (2) Ambient humidity outside the range 10 to 90% RH
- (3) Abrupt temperature changes causing condensation
- (4) Corrosive or flammable gases
- (5) Excessive dust, conductive powders such as iron filings, oil mist, airborne salt, organic solvents
- (6) Exposure to direct sunlight
- (7) Strong electric or magnetic fields
- (8) Exposure to direct vibrations and shocks

### 3.1.3 Precautions relating to the installation of the module

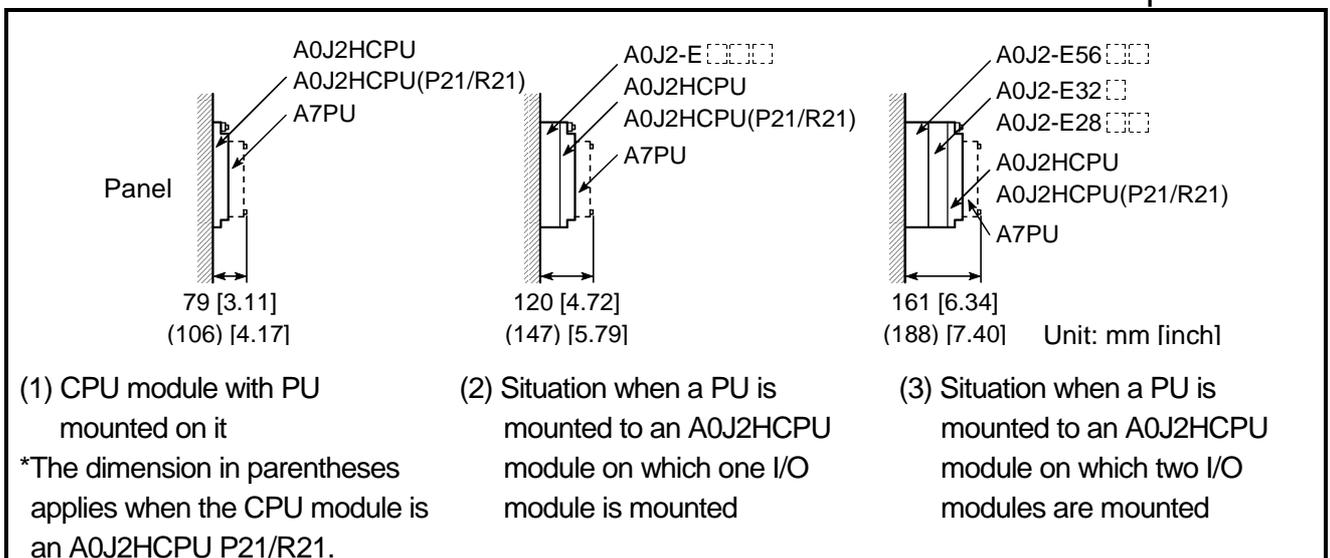
When installing the PC on an operation panel or other base, due consideration must be given to operability, maintainability, and resistance to environmental conditions.

#### (1) Installation site

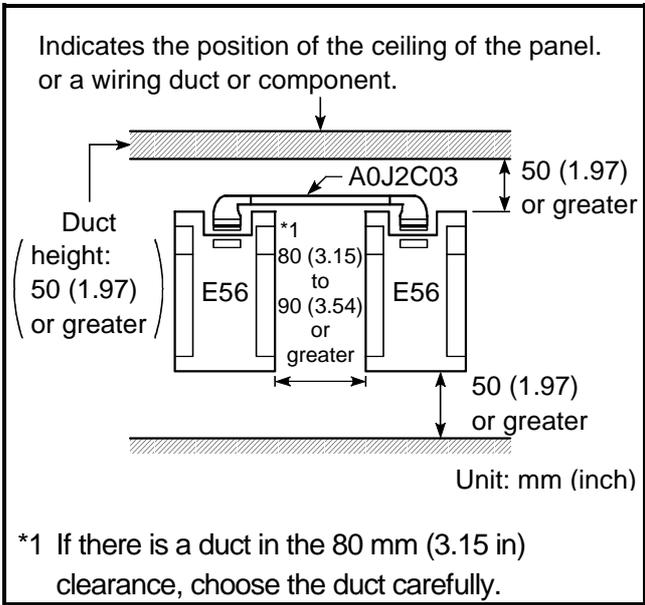
- (a) In order to allow good ventilation, and to ensure the module can be replaced easily, provide the following clearances between the module and structural elements or other equipment.



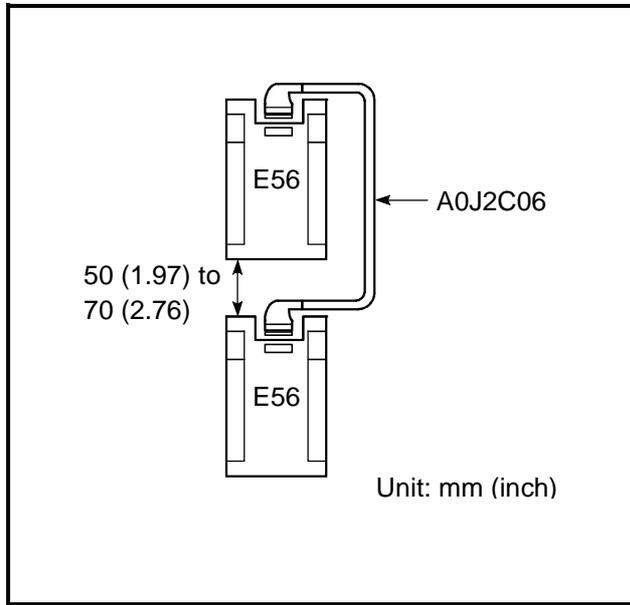
- (b) The dimensions of the A0J2HCPU module when a PU is mounted to it are shown in Figure 3.1. The dimensions when the module is mounted in side-to-side and top-to-bottom arrangements are shown in Figures 3.2 and 3.3.
- (c) The dimensions when an extension base unit is installed are shown in Figure 3.4. When an A0J2C10B extension cable is used, the extension base unit can also be installed on the door of the panel.



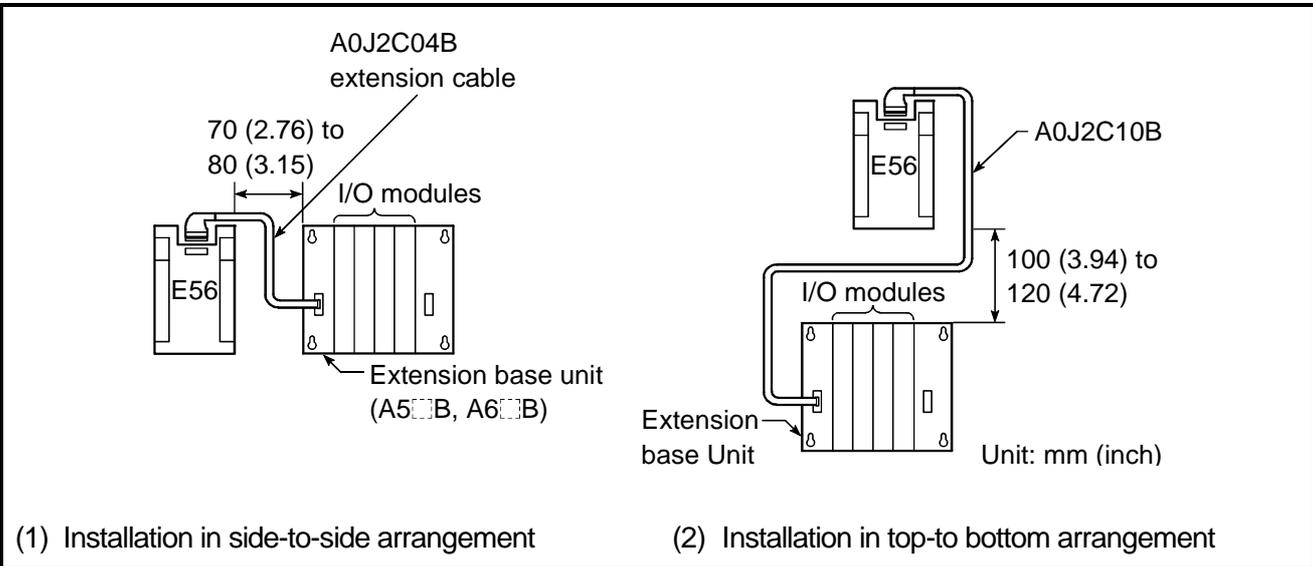
**Fig. 3.1 Dimensions for Module-to-Module Mounting**



**Fig3.2 Side-to-Side Installation**



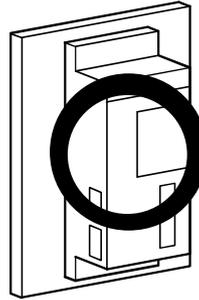
**Fig3.3 Top-to-Bottom Installation**



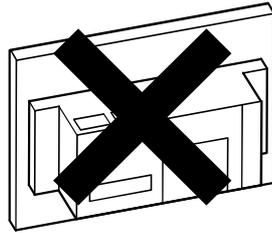
**Fig3.4 Installation of Extension Base Unit**

(2) Installing orientation

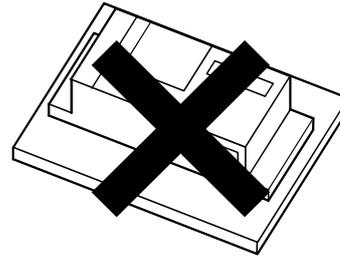
- (a) Since the PC generates heat it must be used in the orientation that permits good ventilation, shown below.



- (b) Do not install it in the orientations shown below.

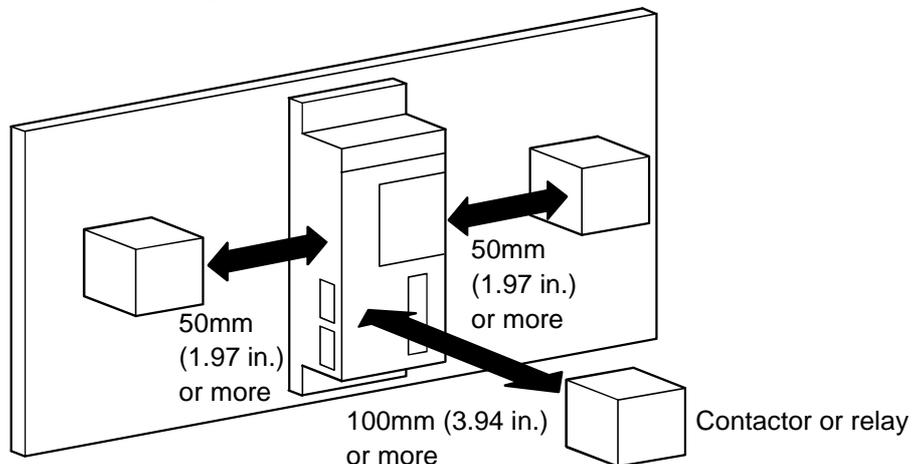


Vertical mount



Horizontal mount

- (3) The A0J2HCPU module must be mounted on a flat surface. An uneven mounting surface can cause undue stress to the PCBs, and could lead to malfunctions.
- (4) Mount the A0J2HCPU module on a separate panel from, or as far as possible from, vibration sources such as large electromagnetic contactors or non-fuse breakers.
- (5) In order to avoid the influence of radiated noise and heat, the programmable controller and other equipment (contactors, relays, etc.) should be separated by the distances shown below.
- For equipment mounted in front of the programmable controller.....100mm (3.94 in.) or more
  - For equipment mounted to the right and left of the programmable controller.....50mm (1.97 in.) or more



### **3.2 Failsafe Circuits**

When the programmable controller power is switched ON/OFF, abnormal processing outputs may occur temporarily due to a delay time between the controller's power supply and the external power supply (particularly DC power) for processing, and due to a start-up time difference.

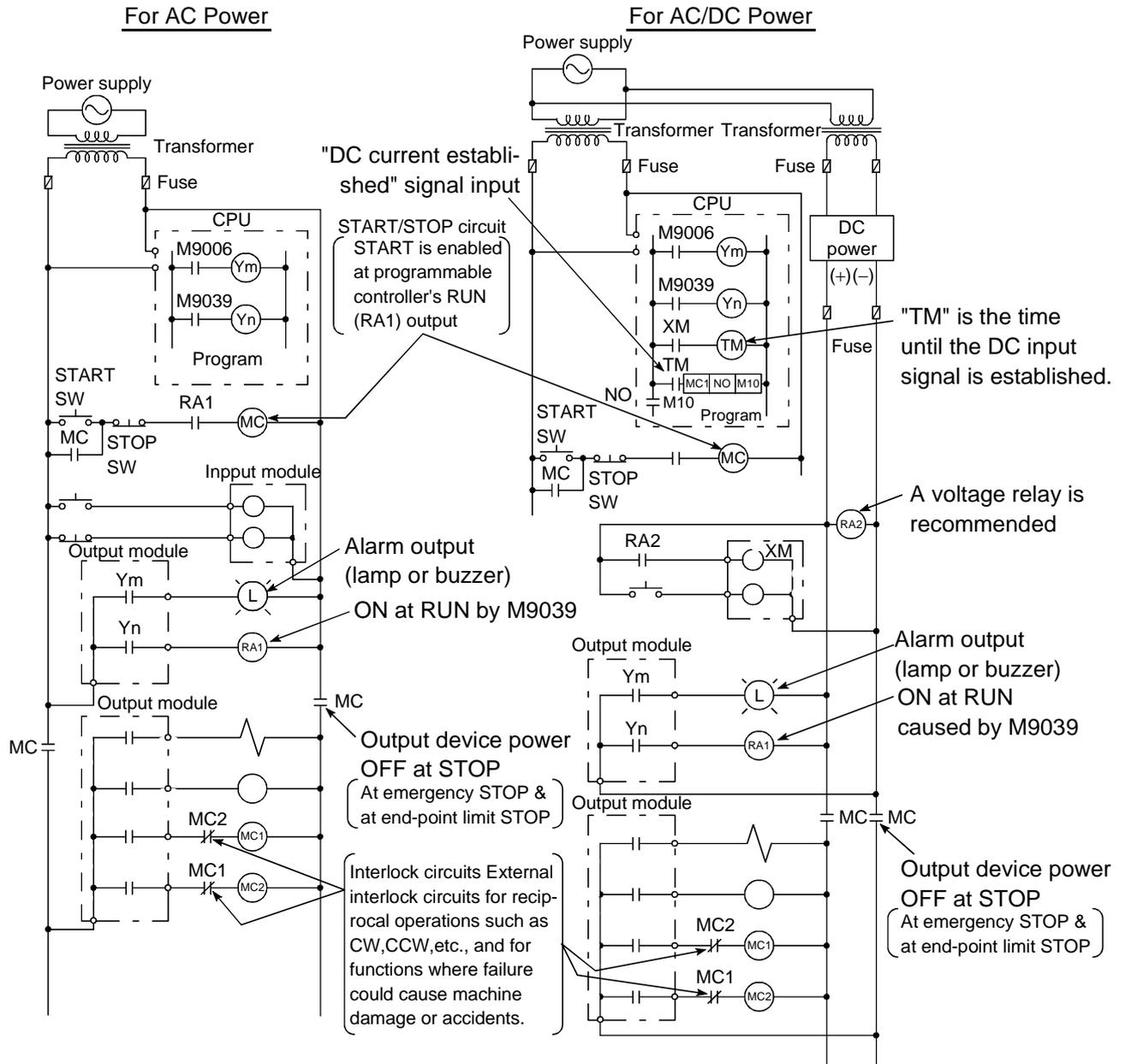
For example, a momentary erroneous output will occur from a DC output module if the programmable controller power is switched ON after the processing power (external power supply) is switched ON. To prevent this from occurring, a circuit must be provided which ensure that the programmable controller power is switched ON first.

External power supply errors, or programmable controller failures could cause erroneous operation which affects the entire system.

Failsafe circuits should therefore be provided external to the programmable controller for critical functions (emergency stop circuit, protector circuits, interlock circuits, etc.,) where a failure could cause machine damage or accidents.

An example of a circuit design which meets the above needs is shown on the following page.

# (1) Example of circuit design



The power start-up procedures are shown below.

## For AC Power

1. Switch the power ON.
2. Set the CPU to RUN.
3. Turn the START switch ON.
4. Output device driven by program when the electromagnetic contactor (MC) switches ON.

## For AC/DC Power

1. Switch the power ON.
2. Set the CPU to RUN.
3. RA2 switches ON when DC power is established.
4. TM (timer) switches ON when 100% DC power is established.  
(The "TM" setting is the time from the point when RA2 switches ON until the point when 100% DC power is established. This time should be designated as "0.5 s".)
5. Turn the START switch ON.
6. Output device drive is executed by program when the electromagnetic contactor (MC) switches ON.  
(A program timer (TM) is not require if a voltage relay is used at RA2.)

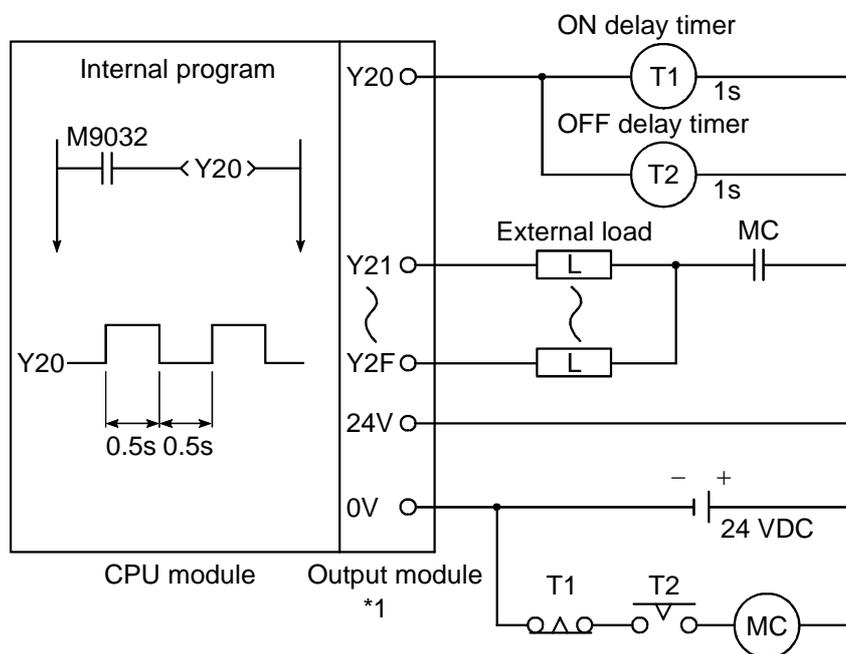
(2) Failsafe measures for PC failure

Although programmable controller CPU and memory failures are detected by a self-diagnosis function, there are cases where malfunctions at the input/output control area, etc., cannot be detected by the CPU.

Although the operation at such times depends in part on the nature of the malfunction, there may be cases where an all-points ON or all-points OFF condition occurs, making it impossible to ensure normal and safe execution of the operation being controlled.

Although the manufacturer of this product has complete confidence in its quality, an external failsafe circuit should nevertheless be provided to prevent machine damage and accidents in the event of a programmable controller failure.

An example failsafe circuit is presented below.



\*1 As "Y20" repeatedly switches ON and OFF at 0.5 second intervals, a non-contact output module ("transistor" in the above example) should be used.

### 3.3 Power Supply Module and Cable Specifications

#### 3.3.1 Performance specification for power supply modules

**Table 3.1 Performance Specification for Power Supply Modules**

Item		Type	Performance specification			
			A0J2H	A0J2PW	A0J2H-DC24	A0J2PW-DC24
Input/ Output	Input power		100-120 VAC <sup>+10%</sup> / <sub>-15%</sub> (85 to 132 VAC)	200-240 VAC <sup>+10%</sup> / <sub>-15%</sub> (170 to 264 VAC)	24 VDC <sup>+10%</sup> / <sub>-15%</sub> (15.6 to 31.2 VDC)	
	Input current		0.7 A or less/ 0.35 A or less	1.5 A or less/ 0.8 A or less	1.5 A (15.6 VDC) or less/1 A (24 VDC) or less	—
	Input frequency		50/60 HZ±5%	50/60 HZ±5%	—	
	Maximum input apparent power		56 VA or less	120 VA or less/ 150 VA or less	—	
	Input electric power		—	—	24 W or less	
	Inrush current		40 A, within 5 ms	40 A, within 5 ms	50 A (within 2 ms)	65 A TYP (within 2 ms)
	Efficiency		65% or more			
	Rated output current	5 VDC	2 A	2.3 A	2 A	2.5 A
		24 VDC	0.5 A	1.5 A	—	
	Overcurrent protection	5 VDC	2.4 A	2.6 A	2.4 A	2.7 A
24 VDC		0.6 A	1.95 A	—		
Power supply display		LED display provided				
Size (mm) (in)		A0J2HCPU : 250×112×41  (9.84×4.41×1.61) A0J2HCPUP21/ R21 : 250×112×68  (9.84×4.41×2.68)	250×112×41 (9.84×4.41×1.61)			
Weight (kg) (lb)		A0J2HCPU : 0.75 (1.65) A0J2HCPUP21/ R21 : 1.16 (2.25)	0.71 (1.56)	0.65 (1.43)	0.71 (1.56)	

#### POINTS

- (1) An extension power supply module is used when power capacity is insufficient with only the CPU module's built-in power supply.
- (2) One extension power supply module may be used for the A0J2HCPU.
- (3) Oscillation noise will occur when using the A0J2PW with a light load, but no error has occurred.
- (4) Overvoltage protection  
If 5.5 to 6.5 V of overvoltage is applied to the 5 VDC circuit, an overvoltage protection device breaks the circuit and stops the system. The LED display of the power supply module goes OFF. If the input power is turned ON after having gone OFF, the system restarts by initial start. If the LED display remains OFF without starting the system, the power supply module must be replaced.

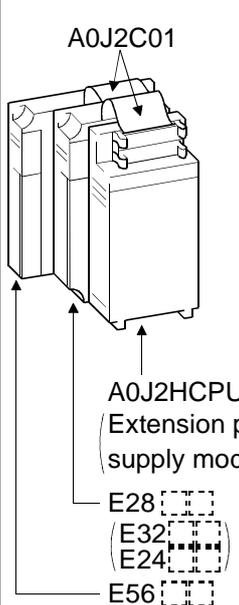
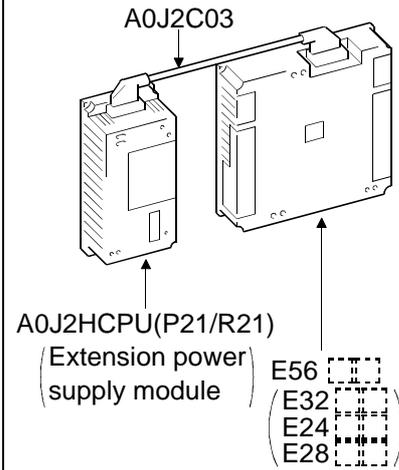
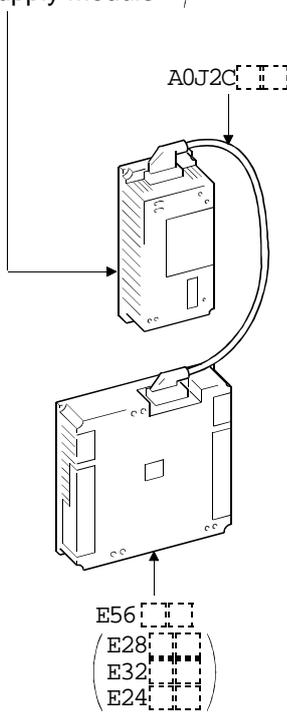
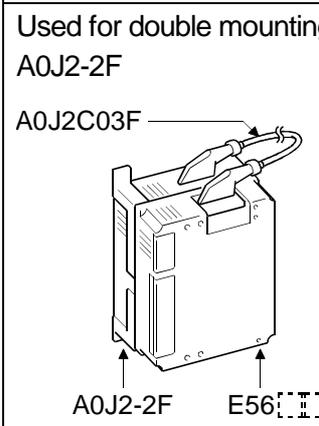
### 3.3.2 Cable specifications

This section describes specifications of the I/O and extension cables to be used for the A0J2HCPU system.

#### (1) I/O cable specifications

Table 3.2 shows specifications of the I/O cables to be used for the A0J2HCPU system. Select I/O cable according to module mounting method.

**Table 3.2 I/O Cable Specifications**

Type Item	A0J2C01	A0J2C03 (F)	A0J2C06	A0J2C10	A0J2C20
Cable length (mm) (in)	80 (3.15)	300 (11.81)	550 (21.65)	1000 (39.37)	2000 (78.74)
5 VDC supply line resistance ( $\Omega$ : at 55°C)	0.047	0.0617	0.0882	0.168	0.294
Application	<p>Used for module-to-module mounting</p> 	<p>Used for side-to-side installation</p> 	<p>Used for top-to bottom installation</p> <p>A0J2HCPU (Extension power supply module)</p> 		
		<p>Used for double mounting with A0J2-2F</p> 			
<p>Connection between A0J2HCPU module and A0J2 I/O module</p> <p>Connection between an extension power supply module and A0J2 I/O module</p> <p>Connection between A0J2 I/O modules</p>					
Weight (kg) (lb)	0.025 (0.01)	0.085 (0.003)	0.130 (0.005)	0.196 (0.43)	0.375 (0.83)

**POINTS**

- (a) When connecting the CPU module and I/O modules, the overall distance of the I/O cable must not be made longer than 6.6 m (21.65ft). If a length of I/O cable longer than this is used, erroneous outputs may be made to the output units.
- (b) When connecting the CPU module and I/O modules, the receiving end voltage at each I/O module must be 4.75 V or greater.  
For details on the method for calculating the receiving end voltage see Section 5.3.

(2) Extension cable specifications

This section describes specifications of the extension cable used for the A0J2HCPU system.

Table 3.3 Extension Cable Specification

	<b>A0J2C04B</b>	<b>A0J2C10B</b>
Cable length (mm) (in)	400 (15.75)	1000 (39.37)
5 VDC supply line resistance ( $\Omega$ : at 55°C)	0.0626	0.126
Application	Connection between A0J2 I/O module and A series extension base unit Connection between an extension power supply module and A series extension base unit	
Connecting method outline		
Weight (kg) (lb)	0.160 (0.006)	0.260 (0.01)

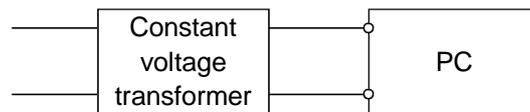
### 3.3.3 Power supply connection

The information on wiring that you should be aware of when using the system is given below.

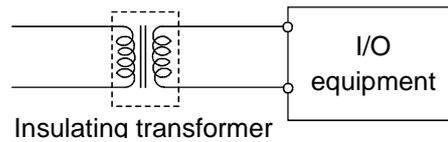
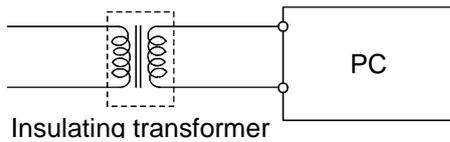
The following cautions must be observed when wiring the power line and input/output lines.

#### (1) Wiring of power source

- (a) If voltage variations are greater than the specification, connect a constant voltage transformer.



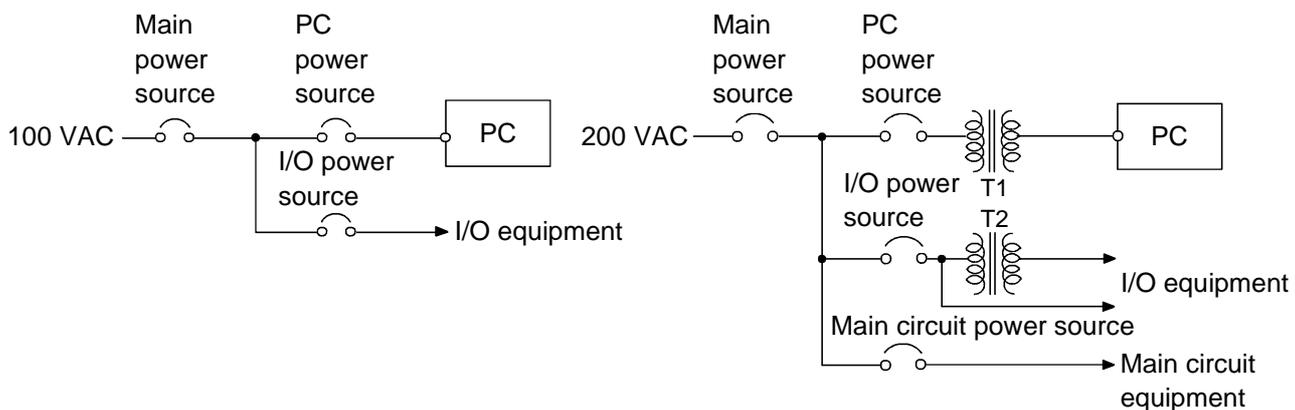
- (b) Use a power supply which generates minimal noise between wires and with respect to the ground. If there is excessive noise, connect an insulating transformer.



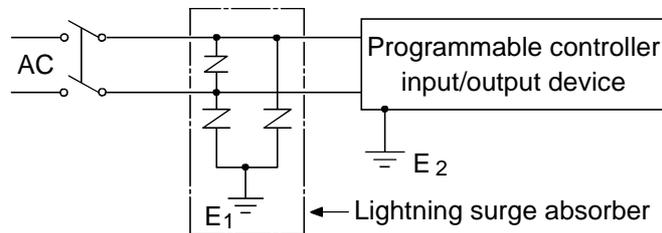
- (c) When a power transformer or insulating transformer is employed to reduce the voltage from 200 VAC to 100 VAC, use one with a capacity greater than that indicated in the following table.

Power Supply Module	Transformer Capacity
A0J2HCPU	56VA
A0J2-PW	120VA

- (d) When wiring, separate the PC power source from the power sources for I/O equipment and power equipment as shown below.



- (e) The 100 VAC, 200 VAC, 24 VDC cables should be twisted as tightly as possible, with the distance between the connected modules as short as possible.
- (f) A thick cable (max. 2 mm<sup>2</sup>) should be used for the 100 VAC, 200 VAC, 24 VDC cables to minimize voltage drop.
- (g) The 100 VAC and 24 VDC cables should not be bundled together with, or located near the main circuit (high voltage, large current) cable or the input/output signal lines. If possible these cables/lines should be separated by a distance of 100 mm (3.94 in) or more.
- (h) A lightning surge absorber should be connected as shown below as a measure against power surges caused by lightning.

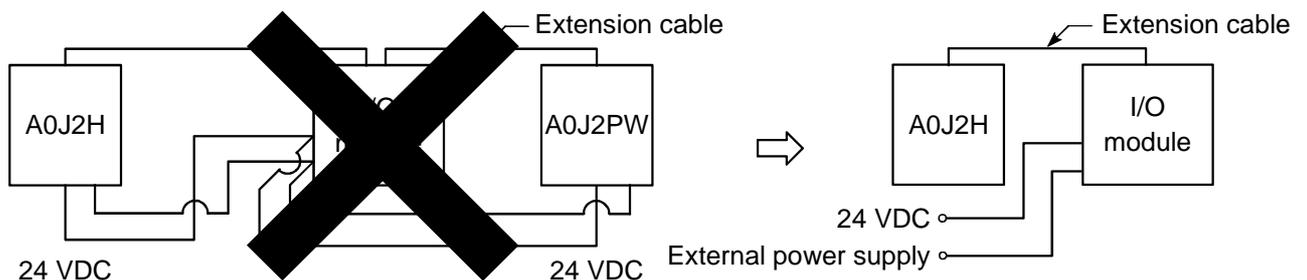


**POINTS**

- (1) The ground (E<sub>1</sub>) for the lightning surge absorber should be separate from the programmable controller ground (E<sub>2</sub>).
- (2) Select a lightning surge absorber which can accommodate the maximum power voltage rise.

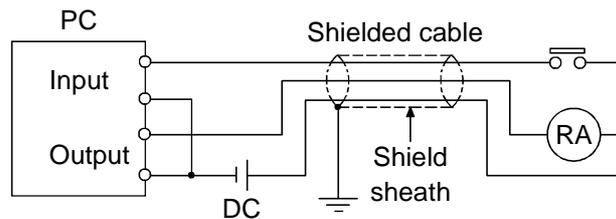
(2) Cautions on use of A0J2H and A0J2PW 24 VDC output

- (a) If the output capacity of the A0J2H/A0J2PW is insufficient, supply power from the external 24 VDC power supply.
- (b) Do not use one common I/O module for parallel connection of the A0J2H and A0J2PW 24 VDC output. Parallel connection will damage the A0J2H/A0J2PW internal power supplies.



### (3) Wiring of I/O equipment

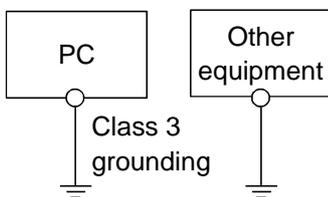
- (a) The applicable size of wire to the terminal block connector is 0.75 to 2 mm<sup>2</sup>. However, you are recommended to use wires of 0.75 mm<sup>2</sup> for convenience.
- (b) Run the input line and output line along separate routes.
- (c) I/O signal wires must be at least 100 mm (3.94 in.) away from high-voltage and large-current main circuit wires.
- (d) When the I/O signal wires cannot be separated from the main circuit wires and power wires, use shielded cable and, as a rule, ground the shielding at the PC side (under some conditions it may be preferable to ground at the other side).



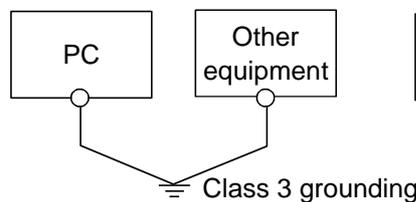
- (e) If the wiring is run through piping, ground the piping.
- (f) Separate the 24 VDC I/O cables from the 100 VAC and 200 VAC cables.
- (g) If wiring over a distance of 200 m (7.88 in.) or greater, trouble can be caused by leakage currents due to line capacity.

### (4) Grounding

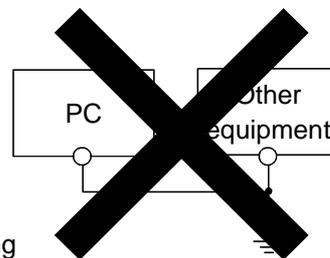
- (a) The A series PC has good noise resistance and can therefore be used without grounding except where there is excessive noise. When grounding is necessary, comply with (b) to (e) below.
- (b) Ground the PC as independently as possible. Class 3 grounding should be used (grounding resistance 100 Ω or less).
- (c) When independent grounding is impossible, use the common grounding method shown in figure (2) below.



(1) Independent grounding  
..... Best



(2) Common grounding  
..... Good



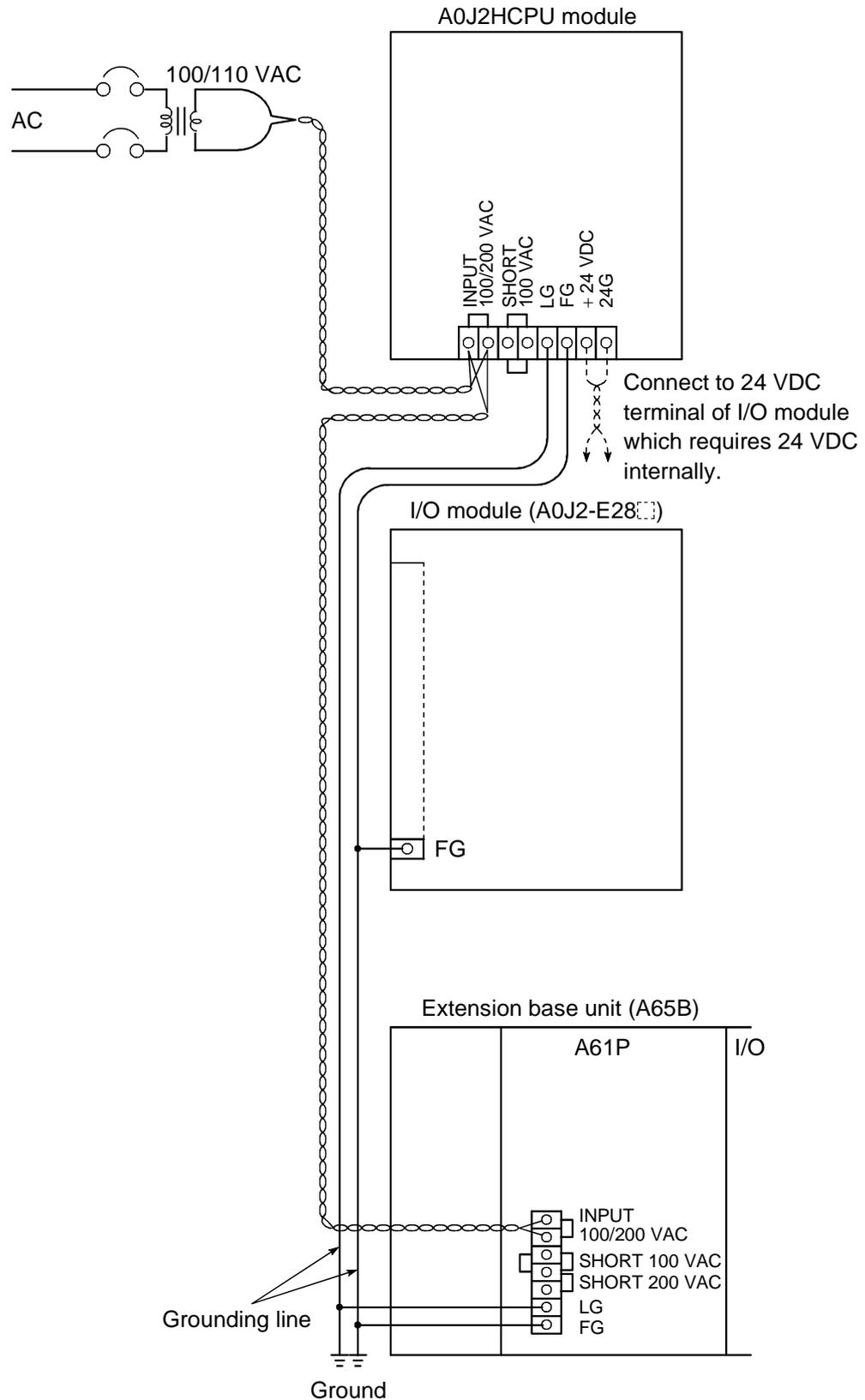
(3) Common grounding  
..... Not permitted

- (d) Use 2 mm<sup>2</sup> or thicker grounding wire. The grounding point should be as close as possible to the PC to minimize the length of the grounding cable.
- (e) Should incorrect operation occur due to grounding, disconnect one or both of the LG and FG terminals of the base unit from the ground.

### 3.3.4 Connection to module terminals

This section describes the wiring of power lines and grounding lines to CPU modules, I/O modules, and extension base units.

#### (1) A0J2HCPU



## POINTS

(1) The 100/200 VAC and 24 VDC cables should be as thick as possible (max. 2 mm<sup>2</sup>), and should be twisted from the connected terminal. In order to prevent shorting at the solderless terminals due to loose screws, use solderless terminals with insulation sleeves.

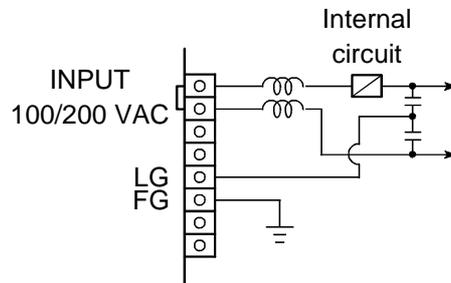
(2) If the LG and FG terminals are connected, be sure to ground the connection.

If no ground is provided, do not connect the LG and FG terminals.

Ungrounded connection of the LG and FG terminals will increase susceptibility to noise.

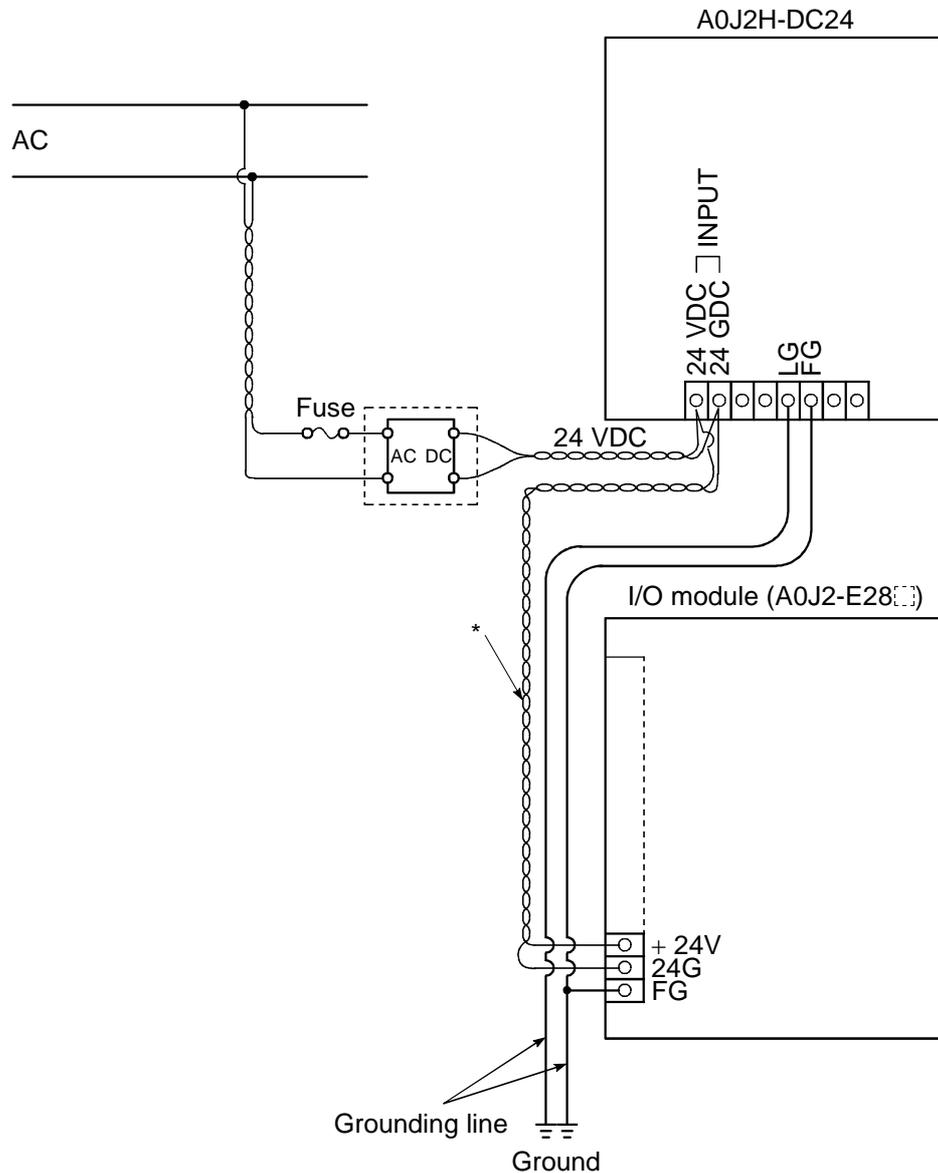
The LG terminal voltage is half that of the input voltage, and may cause an electrical shock if touched.

Internal circuit



(3) \*...The power supply used to supply 24 VDC to both the A0J2H-DC24 and the I/O module must satisfy the operating voltage ranges of the A0J2H-DC24 and the I/O module.

## (2) A0J2H-DC24



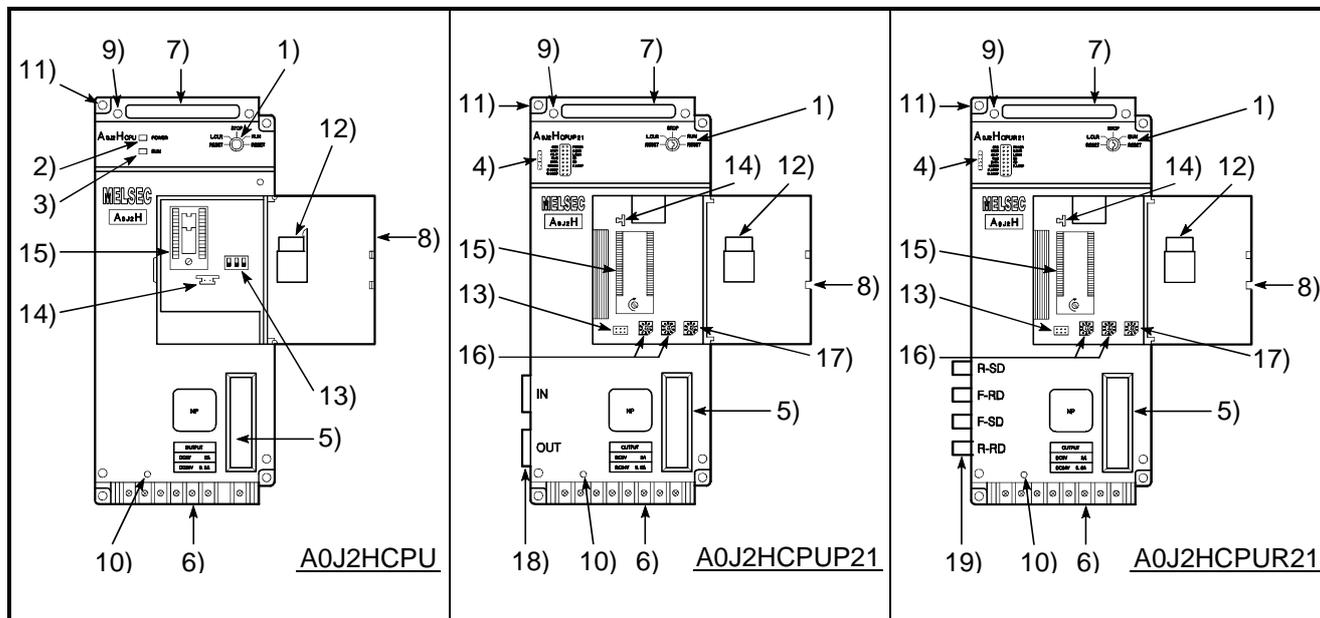
### 3.4 Precaution when Connecting the Uninterruptible Power Supply (UPS)

Be sure of the following items when connecting the ACPU system to the uninterruptible 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.

### 3.5 Part Identification and Setting of A0J2HCPU (P21/R21)



#### 1) RUN/STOP key switch

- **RUN/STOP :**  
Executes/stops sequence program operation.
- **RESET :**  
Resets the hardware Resets after occurrence of an operation error and initializes for sequence program operation.
- **LATCH CLEAR :**  
Clears (turns OFF or resets to "0") the data in the parameter set latch area.  
With the LATCH CLEAR operation, data other than that in the latch area is also cleared.

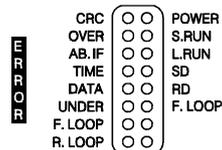
#### 2) "POWER"LED

- **Lit :**  
100/200 VAC is being supplied to the A0J2HCPU, and is being converted into 5 VDC normally inside the A0J2HCPU.
- **Not lit :**  
100/200 VAC is not being supplied to the A0J2HCPU. Conversion from 100/200 VAC to 5 VDC not possible.

### 3) "RUN" LED

- Lit :  
The RUN key switch is at the "RUN" position and sequence program operation is in progress.  
The LED remains lit if an error that does not stop sequence program operation occurs.
- Not lit :  
The "RUN" LED is not lit in the following cases:
  - When 100/200 VAC is not being supplied to the A0J2HCPU
  - When the RUN key switch is at the "STOP" position
  - When a remote SOTP is executed
  - When a remote PAUSE is executed
- Flashing :  
The "RUN" LED flashes in the following cases :
  - When an error that stops sequence program operation is detected in self-diagnosis  
.....0.5 s ON, 0.5 s OFF
  - When a latch clear operation is executed  
.....0.2 s ON, 0.2 s OFF
  - When an annunciator (F) is set (when M9048 is ON only)  
.....2 s ON, 0.5 s OFF

### 4) LEDs indicating operation details and errors



LED Name	Description	LED Name	Description
CRC	Lit at code error check.	POWER	Lit when power ON.
OVER	Lit on occurrence of data input delay error.	S.RUN	Lit during sequence program operation.
AB.IB	Lit when all data is "1".	L.RUN	Lit when data link is normal.
TIME	Lit on occurrence of time over error.	SD	Lit during data sending.
DATA	Lit on occurrence of receive data error.	RD	Lit during data reception.
UNDER	Lit on occurrence of send data error.	F.LOOP	Lit during forward loop communication. Lit when the data receive line is the forward loop and not lit when it is the reverse loop.
F.LOOP	Lit on occurrence of forward loop reception error.		
R.LOOP	Lit on occurrence of reverse loop reception error.		

The LEDs "CRC" to "R.LOOP" indicate the operation status of the MELSECNET data link system.

For details, refer to the MELSECNET (II)

Data Link System Reference Manual.

The "S.RUN" LED indicates the operation status of the sequence program.

- Lit :

The RUN key switch is in the "RUN" position and sequence program operation is in progress.

Remains lit even if an error that does not stop sequence program operation occurs.

- Not lit :

The "S.RUN" LED is not lit in the following situations :

- When 100/200 VAC is not being supplied to the A0J2HCPU (P21/R21).
- When the RUN key switch is at the "STOP" position.
- When a remote STOP is executed.
- When a remote PAUSE is executed.

- Flashing :

The "S.RUN" LED flashes in the following situations :

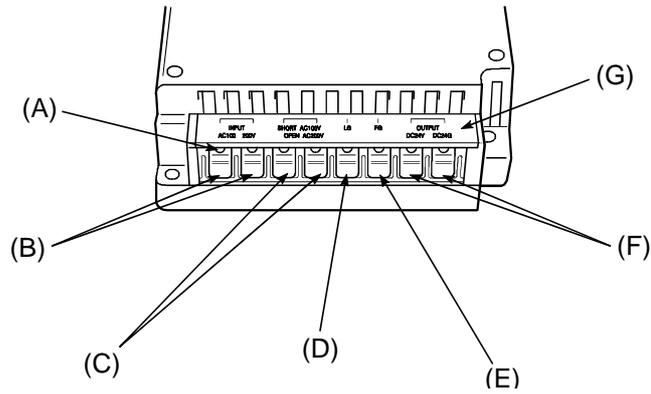
- When an error that stops sequence program operation is detected in self-diagnosis.  
.....0.5 s ON, 0.5 s OFF
- When a latch clear operation is executed  
.....0.2 s ON, 0.2 s OFF
- When an annunciator (F) is set (when M9048 is ON only)  
.....2 s ON, 0.5 s OFF

## 5) RS-422 connector

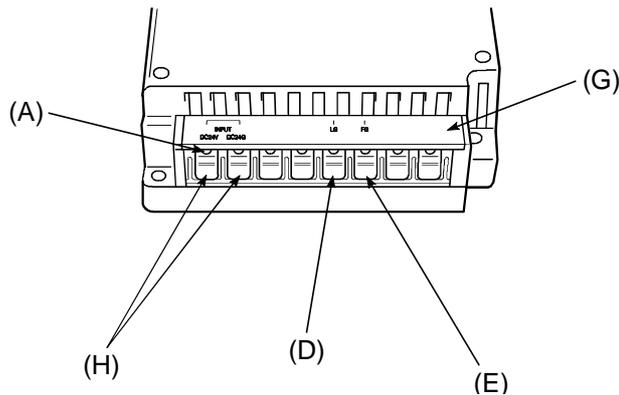
- Connector for writing/reading main programs, monitoring, and testing, using a peripheral device.
- The cover should be fitted to this connector if no peripheral device is connected.

## 6) Power supply terminal block

### A0J2HCPU(P21/R21)



### A0J2H-DC24

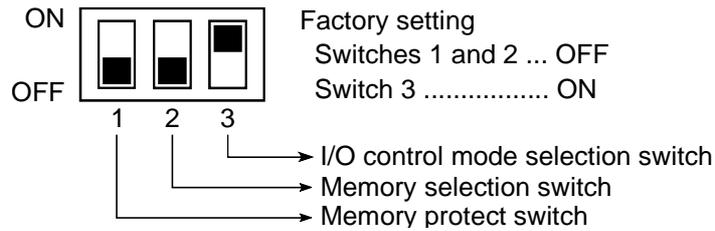


(A)	Terminal screw M4 × 0.7 × 8
(B)	Power input terminals Power supply terminals Connect 100 VAC or 200 VAC to these terminals.
(C)	Voltage selection terminals To receive 100 VAC : Short the terminals with the jumper. To receive 200 VAC : Leave the terminals open.
(D)	LG terminal Grounding terminal for power supply filter
(E)	FG terminal Terminal connected to shield pattern on PCB
(F)	24VDC • 24GDC Terminals to input 24 VDC or to supply internal power supply for relay and transistor output.
(G)	Terminal cover Remove the cover when connecting cables to the terminals ; set the cover in place after completing cable connection.
(H)	Power input terminals (A0J2H-DC24) These terminals are for input of the DC power supply.

- 7) I/O cable and extension cable connector
  - The connector for signal cables of I/O modules and extension base units. Connect the I/O cable (A0J2C0□□) or extension cable (AJ2C□□□B).
- 8) Cover
  - Protective cover for PCB, EP-ROM, and battery of A0J2HCPU (P21/R21)
  - Open the cover to do the followig :
    - Remove/install an EP-ROM
    - Set the memory (EP-ROM)
    - Connect a battery
    - Change the battery
- 9) Cover mounting screws
  - The screws used to fixed the cover
- 10) Peripheral device fixing screw
  - The screw to fix the peripheral device
- 11) Module mounting hole
  - The opening to mount the A0J2HCPU (P21/R21) module to a panel or to mount an I/O module vertically.
- 12) Battery
  - Used to retain data such as that of programs, devices in the latch range, and file registers.

### 13) DIP switch

Switches used to set memory protect state, ROM/RAM selection, and input/output control mode.



#### 1. Setting the memory protect switch

The memory protect range is the first 20k bytes of the 32k byte user memory area.

#### POINTS

- (1) Do not use the memory protect function when performing sampling trace or status latch. If the protect function is used, the data cannot be stored to memory.
- (2) Set the memory protect switch to the OFF position during ROM operation. If it is left ON a MEMORY PROTECT ERROR will occur.

#### 2. Setting the memory selection switch

For RAM operation, set switch 2 "OFF".

For ROM operation, set switch 2 "ON".

However, for ROM setting, switch 1 must be OFF.

#### 3. I/O control mode selection switch

When using the direct mode for both input and output, set switch 3 ON.

When using the refresh mode for both input and output, set switch 3 OFF.

### 14) Battery connector

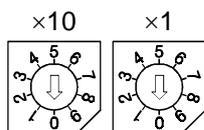
- Connects with the connector on the battery

### 15) Memory installation socket

- Socket install the EP-ROM

## 16) Station number setting switches

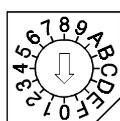
STATION No.



- Set the station number in the range of 01 to 64.
- "×10" switch :  
Sets tens digit of station number
- "×1" switch :  
Sets units digit of station number
- Set "00" when the station is used as the master station.
- Set "01" to "64" when the station is used as a local station.

## 17) Mode selection switch

MODE

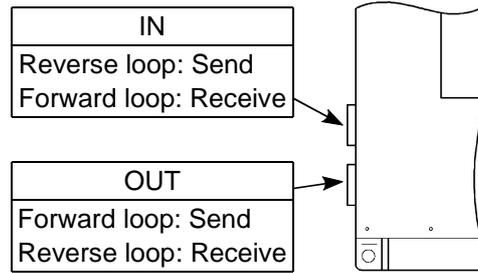


- The following functions are available according to the selected mode.

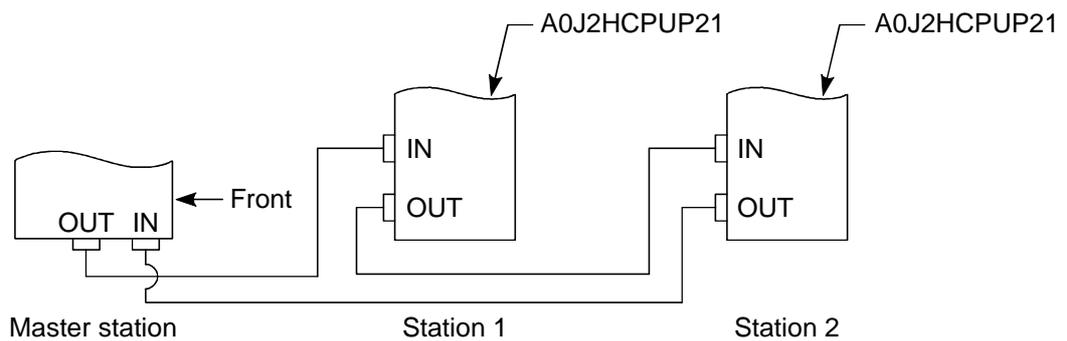
Setting Number	Mode Name	Description
0	Online	Automatic online return is available in normal operation.
1	Online	Automatic online return is not available in normal operation.
2	Offline	The host station is disconnected.
3	Forward loop test mode	The mode in which the fiber optic cable or coaxial cable lines are checked throughout the whole system in the forward direction (direction for normal link operation).
4	Reverse loop test mode	The mode in which the fiber optic cable or coaxial cable lines are checked throughout the whole system in the reverse direction (direction in which loopback is performed when there is a fault in the system).
5	Station-to-station test mode (master station)	Mode in which the line between two stations is checked. The check is performed with the station with the lower station number set as the master station and the one with the higher number as the slave station.
6	Station-to-station test mode (slave station)	
7	Self-loopback test mode	Mode in which the hardware of a link module in isolation is checked, including the transmission/reception circuits of the communication system.
8 to 9	—	Not used
A to C	—	Not used
D to F	—	Not used

## 18) Fiber-optic cable connector

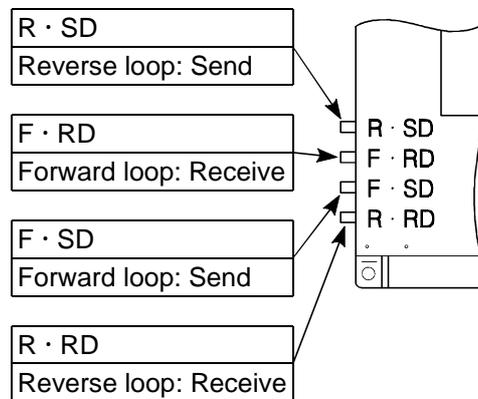
The connector is shown below.



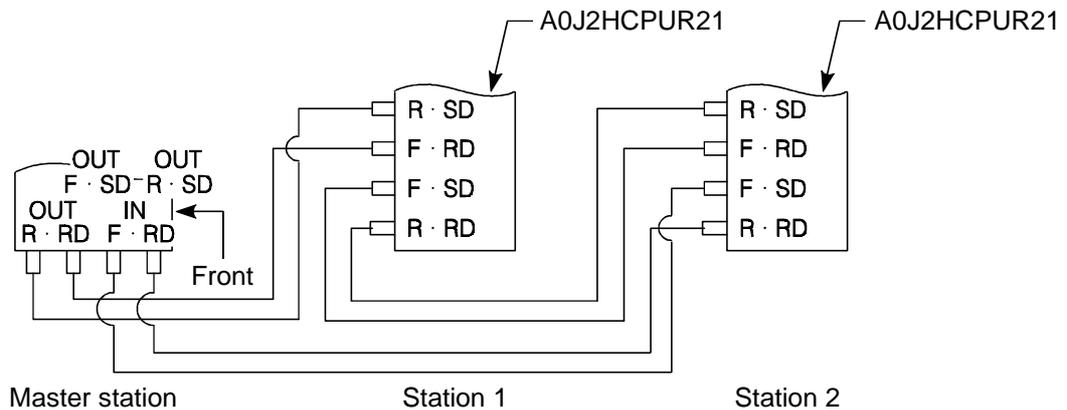
- Connect the fiber-optic cable connector and cables as shown below.



## 19) Coaxial cable connector



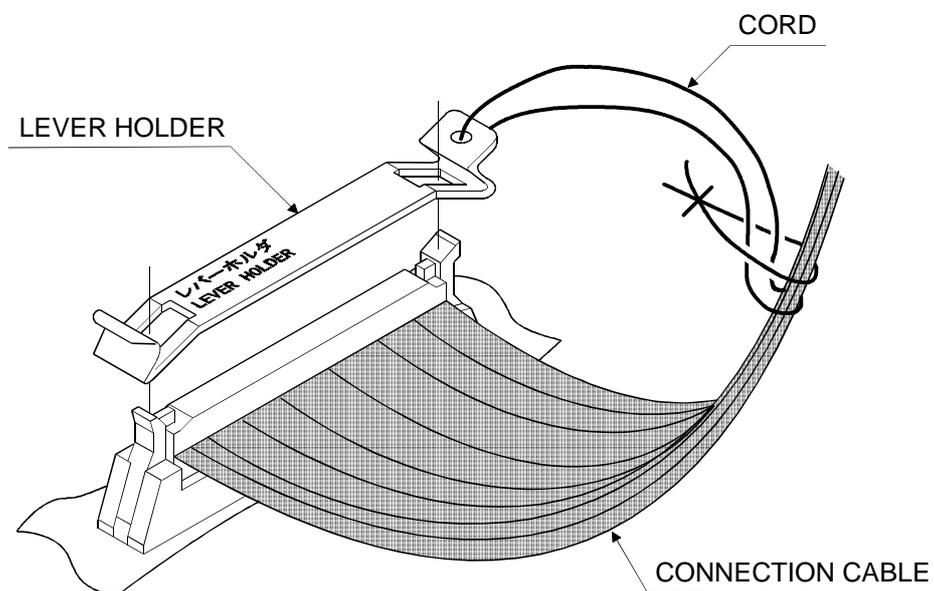
- Connect the coaxial cable connector and cables as shown below.



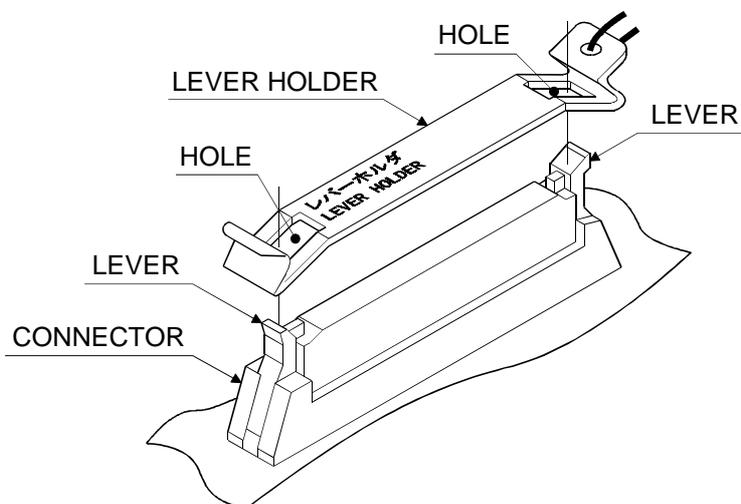
## 3.6 Installing and Removing the Lever Holder

### 3.6.1 Procedure for installation

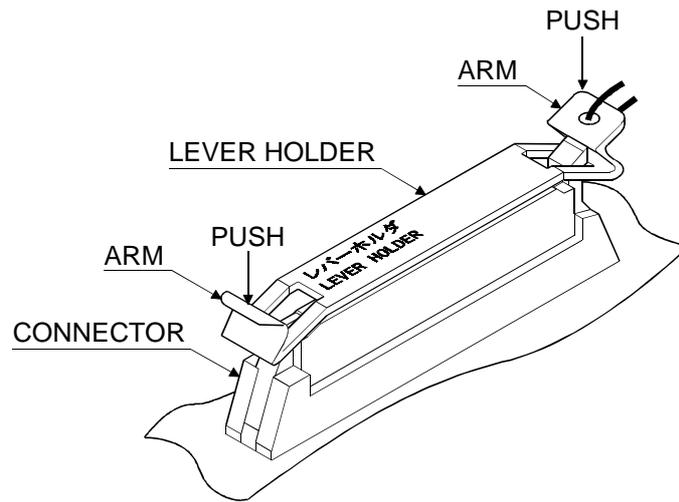
- (1) First, attach the cord on the lever holder to the connection cable.  
(This is to prevent loss and rinks.)



- (2) Place the both holes of the Lever Holder on top of connector levers and position the Lever Holder on connector.



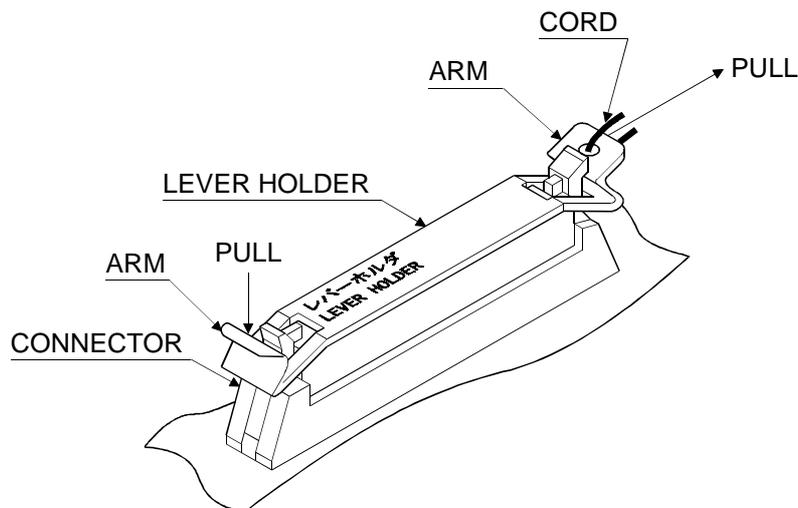
- (3) Using fingers, push arms of the Lever Holder to lower top of connector levers and lock connector levers.



- (4) Check to ensure that the Lever Holder is firmly attached the connector and locked connector levers.

### 3.6.2 Procedure for removal

Pull the cord of the Lever Holder, remove the Lever Holder from connector levers.



### CAUTION

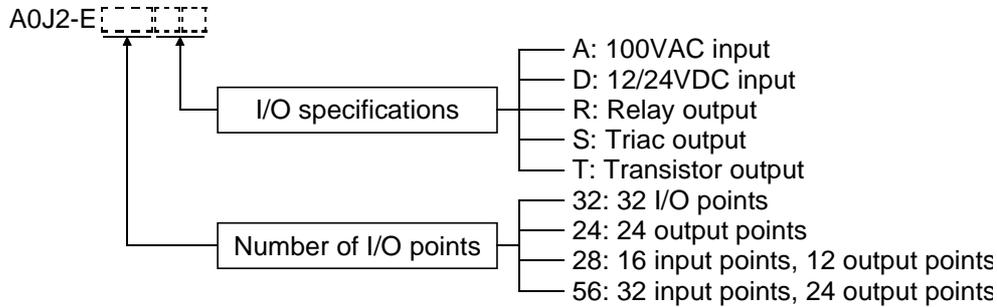
**When removing, if pulled out with force using only the cord, the lever holder will come out with force and may cause injuries.  
Always remove the lever holder with both hands, following the given procedure.**

## 4. INPUT/OUTPUT MODULE SPECIFICATIONS AND CONNECTIONS

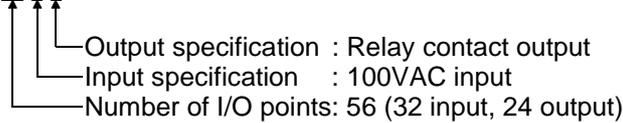
### 4.1 Explanation of I/O Module Model Names

This section explains the model names of I/O modules.

The final part of an I/O module model name indicates the I/O specifications.



(Example) A0J2-E56AR I/O module



### 4.2 Input Modules

This section describes the specifications of A series I/O modules and their connections.

#### 4.2.1 Input module specifications

Model Name	Input Type	Points per Module	Rated Input Voltage	Input Current	Operation Voltage		Max. Simultaneous Input Points (simultaneous ON percentage)
					ON Voltage	OFF Voltage	
A0J2-E32A	AC input	32	100/120 VAC	10mA	80 VAC or greater	40 VAC or greater	100%
A0J2-E32D	DC input (sink)		12/24 VDC	3/7mA	9.5 VDC or greater	6 VDC or greater	
A0J2E-E32D	DC input (source)						

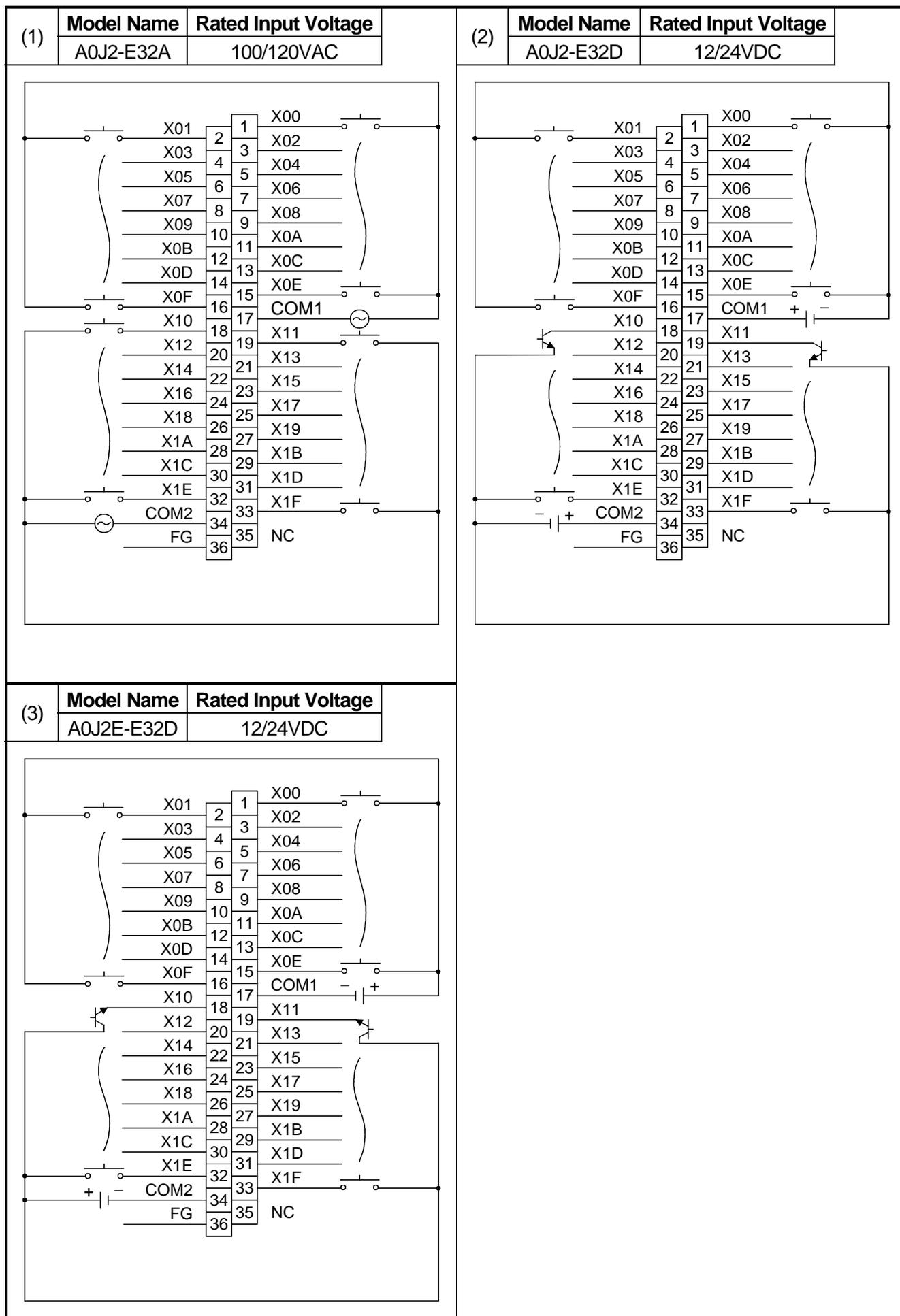
	Input Response Time		Connections	Common Connection	Internal Current Consumption	Number of Input/Output Points
	OFF→ON	ON→OFF				
	15ms max.	35ms max.	36 point terminal block connector	16 points per common	105mA	64
	10ms max.	10ms max.				
	5.5ms (0.5ms)*	6.0ms (1.0ms)				

All modules are insulated by photocoupler.

Input are indicated by LED.

\* ..... Upper 8 points high-speed mode.

## 4.2.2 Connections for input modules



# MEMO

## 4.3 Output Modules

### 4.3.1 Output module specifications

Model Name	Output Type	Points Per Module	Rated Load Voltage	Max. Load Current		Output Response Time		
				1Point	1Common	OFF→ON	ON→OFF	
A0J2-E24R	Relay contact output	24points	24VDC 240VAC	2A	5A	10ms max.	12ms max.	
A0J2-E24S	Triac output		100/ 240VAC	0.6A	2.4A	1ms max.	0.5Hz+ 1ms max.	
A0J2-E24T	Transistor output (Sink)		12/24 VDC	0.5A	4A	2ms max.	2ms max (resistance load)	
A0J2E-E24R	Relay contact output		24VDC 240VAC	2A	5A	10ms max.	12ms max.	
A0J2E-E24T	Transistor output (Source)		12/24 VDC	0.8A 0.6A	—	0.5ms max.	1.5ms max.	

	External Connection	Common Connection	Surge Suppressor	Fuse	Error Display	External Current Supply (TYP 24VDC)	Internal Current Consumption	Number of Input/Output Points
						Current		
	36 points terminal block connector	8 points per common	None	None	None	*3 0.23A	0.145A	64 points
			CR absorber	*1 3.2A	*2 Featured	-	0.4A	
			Varistor	None	None	0.023A	0.145A	
				8A	*2 Featured	*3 0.22A		
			Surge absorbing diode	*4 None	None	0.2A		

All modules are insulated by photocoupler.

Inputs are indicated by LED.

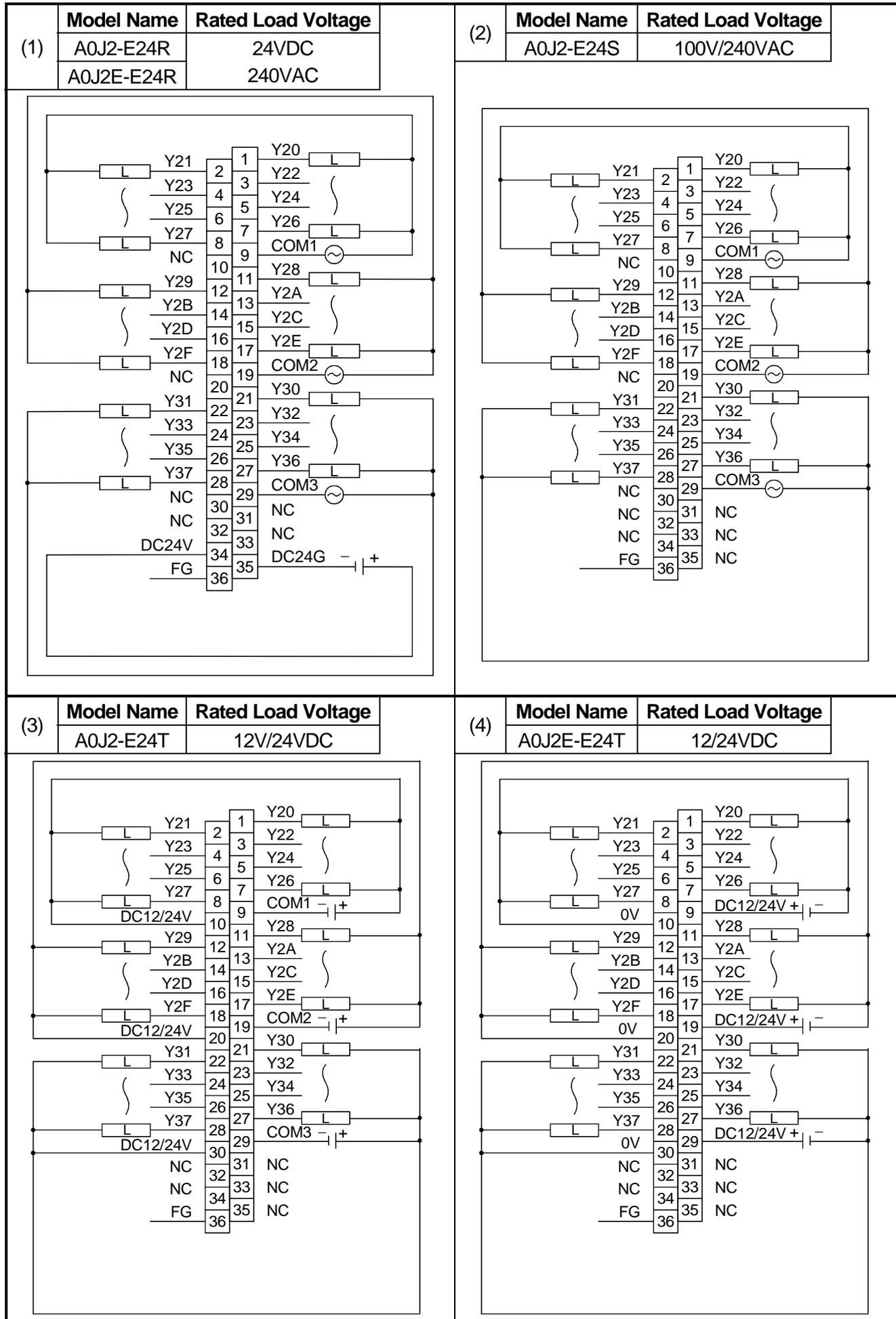
\*1 ..... Quick-blowing (one per common)

\*2 ..... LED lights and signal is output to the CPU when a fuse blows

\*3 ..... Power supply to drive relay coils

\*4 ..... Short circuit protection provided

### 4.3.2 Output module connections



# MEMO

## 4.4 Input/Output Modules

### 4.4.1 Input/Output module specification

#### Input Modules

Model Name	Input Type	Points Per Module	Insulation Method	Rated Input Voltage	Input Current		
A0J2-E28AR	AC input	16	By photo coupler	100/120VAC	10mA		
A0J2-E28AS							
A0J2-E28DR	DC input (sink type)			12/24VDC	3/7mA		
A0J2-E28DS					3/7mA		
A0J2-E28DT					3/7mA		
A0J2E-E28DR					DC input source type •	3/7mA	
A0J2E-E28DS	3/7mA						
A0J2E-E28DT	3/7mA						
A0J2-E56AR	AC input	32		By photo coupler	100/120VAC	10mA	
A0J2-E56AS							
A0J2-E56DR	DC input (sink type)				12/24VDC	3/7mA	
A0J2-E56DS						3/7mA	
A0J2-E56DT						3/7mA	
A0J2E-E56DR						DC input (source type)	3/7mA
A0J2E-E56DS	3/7mA						
A0J2E-E56DT	3/7mA						

	Operation Voltage		Max. Simultaneous Input Points (Simultaneous ON Percentage)	Input Response Time		Input Display	External Connection	Common Connection		
	ON Voltage	OFF Voltage		OFF → ON	ON → OFF					
	80VAC or greater	40VAC max.	100%	15ms max.	35ms max.	LED display	36 points terminal block connector	16 points per common		
				9.5VDC or greater	6VAC max.				10ms max.	10ms max.
	5.5ms (0.5ms) <sup>*1</sup>	6.0ms (1.0ms) <sup>*1</sup>								
	80VAC or greater	40VDC max.							15ms max.	35ms max.
									9.5VDC or greater	6VDC max.
	5.5ms (0.5ms) <sup>*1</sup>	6.0ms (1.0ms) <sup>*1</sup>								

\*1 ..... Upper 8 points high-speed mode.

## Output Modules

Model Name	Output type	Number of Points Per Module	Rated load Voltage	Max. load Current		Output Response Time		
				1point	1common	OFF→ON	ON→OFF	
A0J2-E28AR	Relay contact output	12	24VDC 240VAC	2A	5A	10ms max.	12ms max.	
A0J2-E28AS	Triac output		100/240 VAC	0.6A	2.4A	1ms max.	0.5Hz+ 1ms max.	
A0J2-E28DR	Relay contact output		24VDC 240VAC	2A	5A	10ms max.	12ms max.	
A0J2-E28DS	Triac output		100 to 240VAC	0.6A	2.4A	1ms max.	0.5Hz+ 1ms max.	
A0J2-E28DT	Transistor output (sink)		12/24VDC	0.5A	4A	2ms max.	2ms max. (resistance load)	
A0J2E-E28DR	Relay contact output		24VDC 240VAC	2A	5A	10ms max.	12ms max.	
A0J2E-E28DS	Triac output		100/240 VAC	0.6A 0.5A	-	1ms max.	0.5Hz+ 1ms max.	
A0J2E-E28DT	Transistor output (source)		12/24VDC	0.8A 0.7A	-	0.5ms max.	1.5ms max.	
A0J2-E56AR	Relay contact output		24	24VDC 240VAC	2A	5A	10ms max.	12ms max.
A0J2-E56AS	Triac output	100/240 VAC		0.6A	2.4A	1ms max.	0.5Hz+ 1ms max.	
A0J2-E56DR	Relay contact output	24VDC 240VAC		2A	5A	10ms max.	12ms max.	
A0J2-E56DS	Triac output	100/240 VAC		0.6A	2.4A	1ms max.	0.5Hz+ 1ms max.	
A0J2-E56DT	Transistor output (sink)	12/24VDC		0.5A	4A	2ms max.	2ms max. (resistance load)	
A0J2E-E56DR	Relay contact output	24VDC 240VAC		2A	5A	10ms max.	12ms max.	
A0J2E-E56DS	Triac output	100/240 VAC		0.6A 0.5A	-	1ms max.	0.5Hz+ 1ms max.	
A0J2E-E56DT	Transistor output (source)	12/24VDC		0.8A	-	0.5ms max.	1.5ms max.	

\*2.....Quick-blowing fuse (one per common)

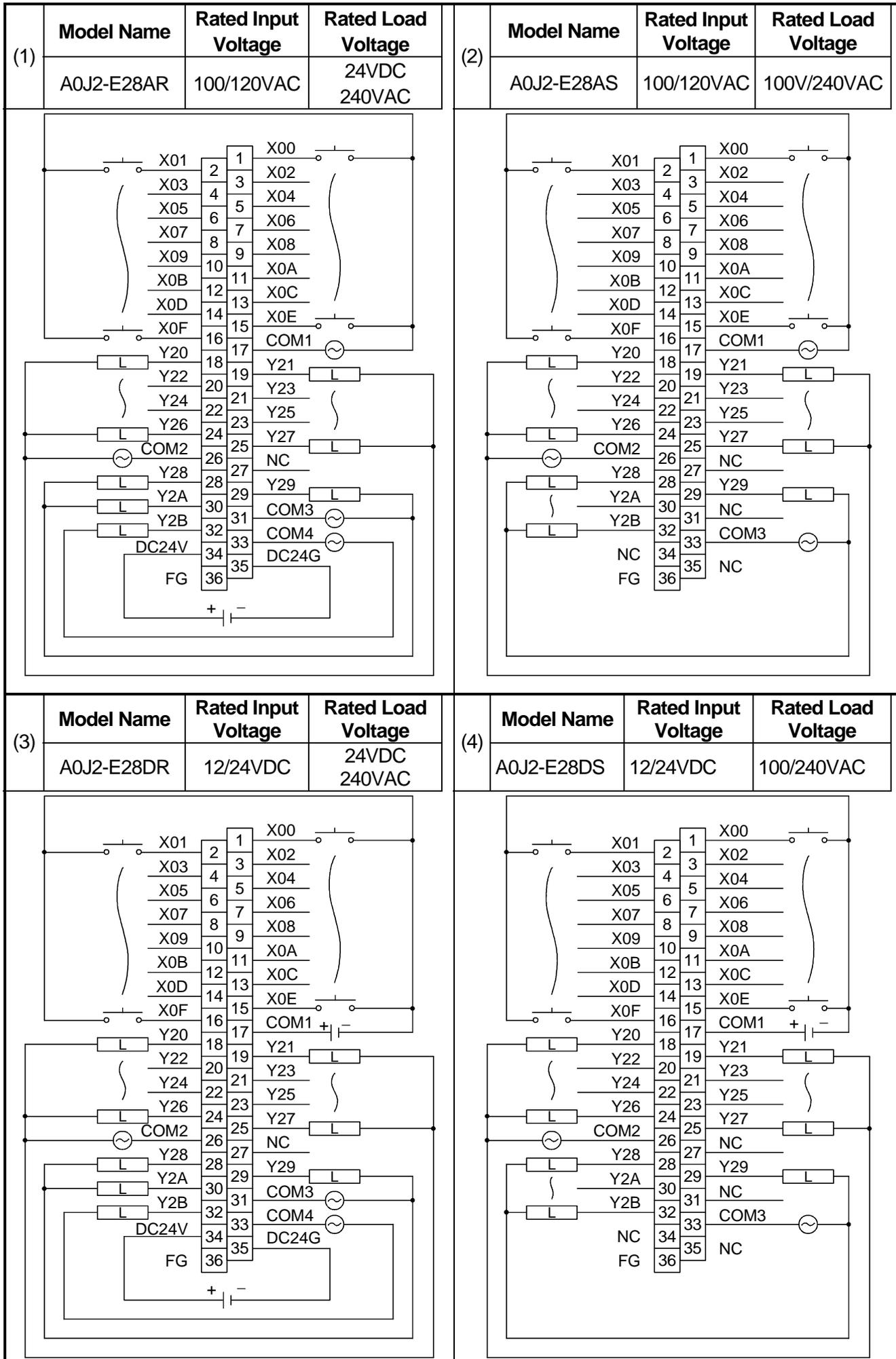
\*3.....LED lights and signal is output to the CPU when a fuse blows

	Common Connection	Surge Suppressor	Fuse	Error Display	External power Supply (TYPE 24VDC)	Internal Current Consumption	Number of Occupied Points
Current							
	8points per common 3points per common independent contacts	None	None	None	*5 0.125A	0.14A	64
	8points per common 4points per common	CR absorber	*2 3.2A	*3 Featured	+	0.26A	
	8points per common 3points per common independent contacts	None	None	None	*5 0.125A	0.13A	
	8 points per common 4 points per common	CR absorber	*2 3.2A	*3 Featured	-	0.26A	
		Varistor	None	None	0.023A	0.125A	
			8A	None	*5 0.11A	0.13A	
		CR absorber	*2 3.2A	*3 Featured	-	0.26A	
		Surge absorbing diode	*4 None	None	0.1A	0.125A	
	8 points per common	None	None	None	*5 0.23A	0.225A	
		CR absorber	*2 3.2A	*3 Featured	-	0.46A	
		None	None	None	*5 0.23A	0.23A	
		CR absorber	*2 3.2A	*3 Featured	-	0.46A	
		Varistor	None	None	0.023A	0.225A	
			8A	None	*5 0.22A	0.23A	
		CR absorber	*2 3.2A	*3 Features	-	0.46A	
	Surge absorbing diode	*4 None	None	0.2A	0.225A		

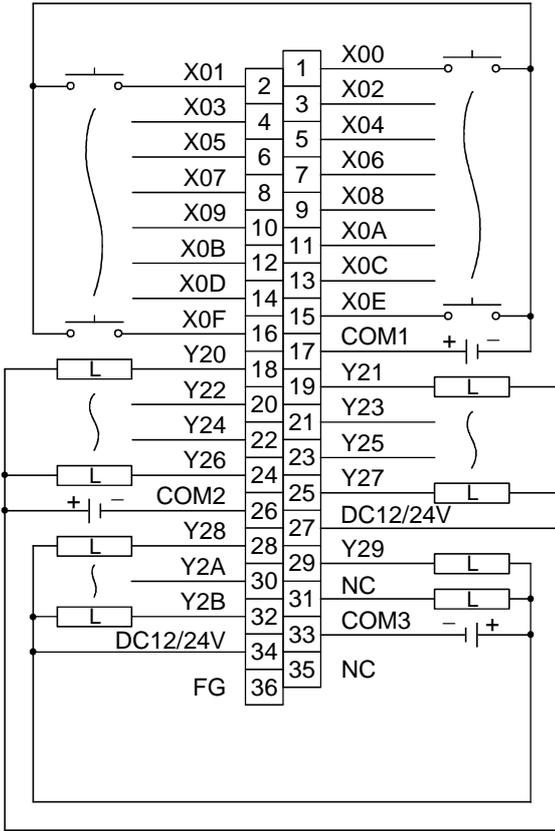
\*4 ..... Short circuit protection provided

\*5 ..... Power supply to drive relay coils

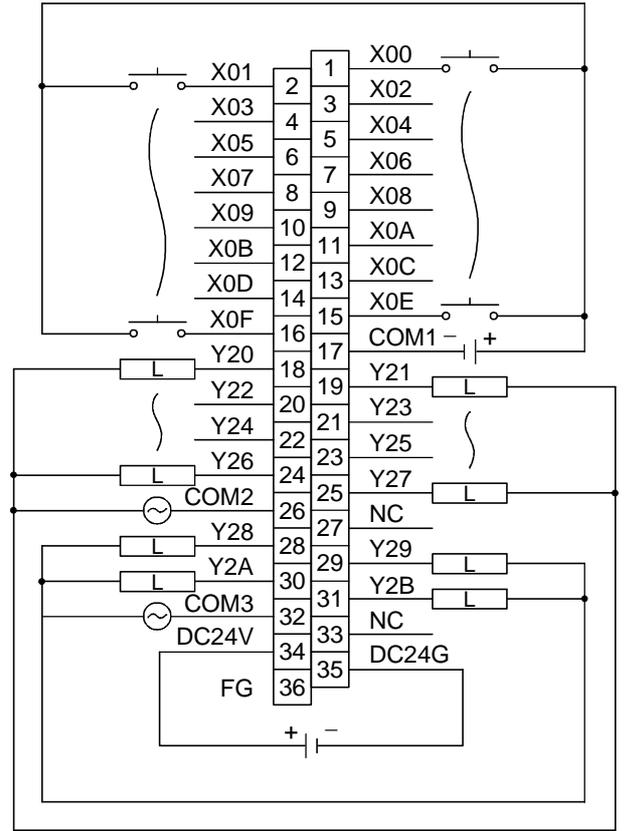
### 4.4.2 Input/Output module connections (A0J2(E)-E28[...])



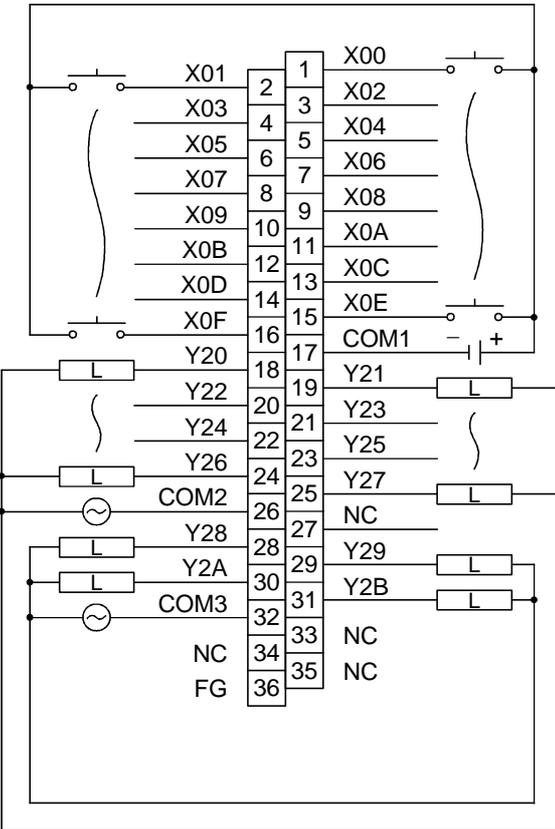
(5)	Model Name	Rated Input Voltage	Rated Load Voltage
	A0J2-E28DT	12/24VDC	12/24VDC



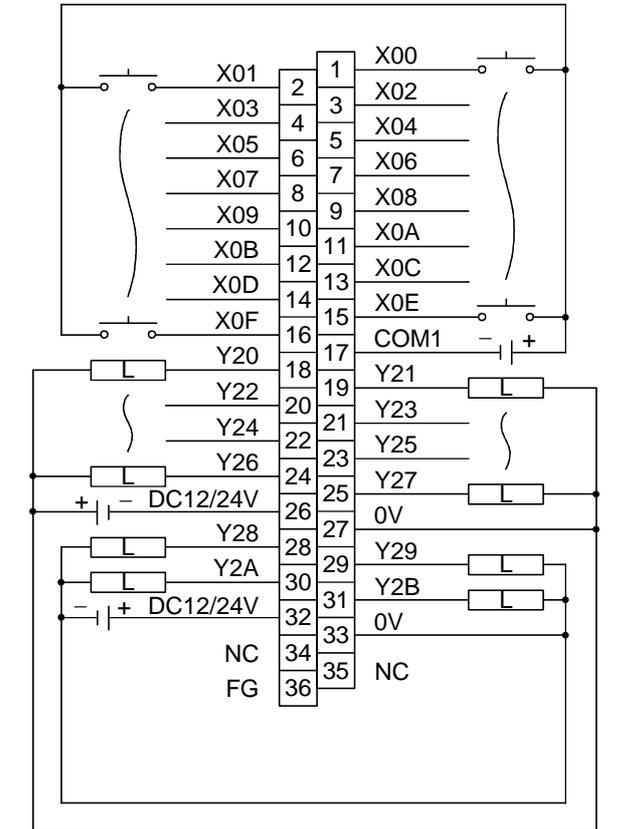
(6)	Model Name	Rated Input Voltage	Rated Load Voltage
	A0J2E-E28DR	12V/24VDC	24VDC 240VAC



(7)	Model Name	Rated Input Voltage	Rated Load Voltage
	A0J2E-E28DS	12/24VDC	100V/240VAC



(8)	Model Name	Rated Input Voltage	Rated Load Voltage
	A0J2E-E28DT	12/24VDC	12/24VDC



### 4.4.3 Input/Output module connections (A0J2(E)-E56[...])

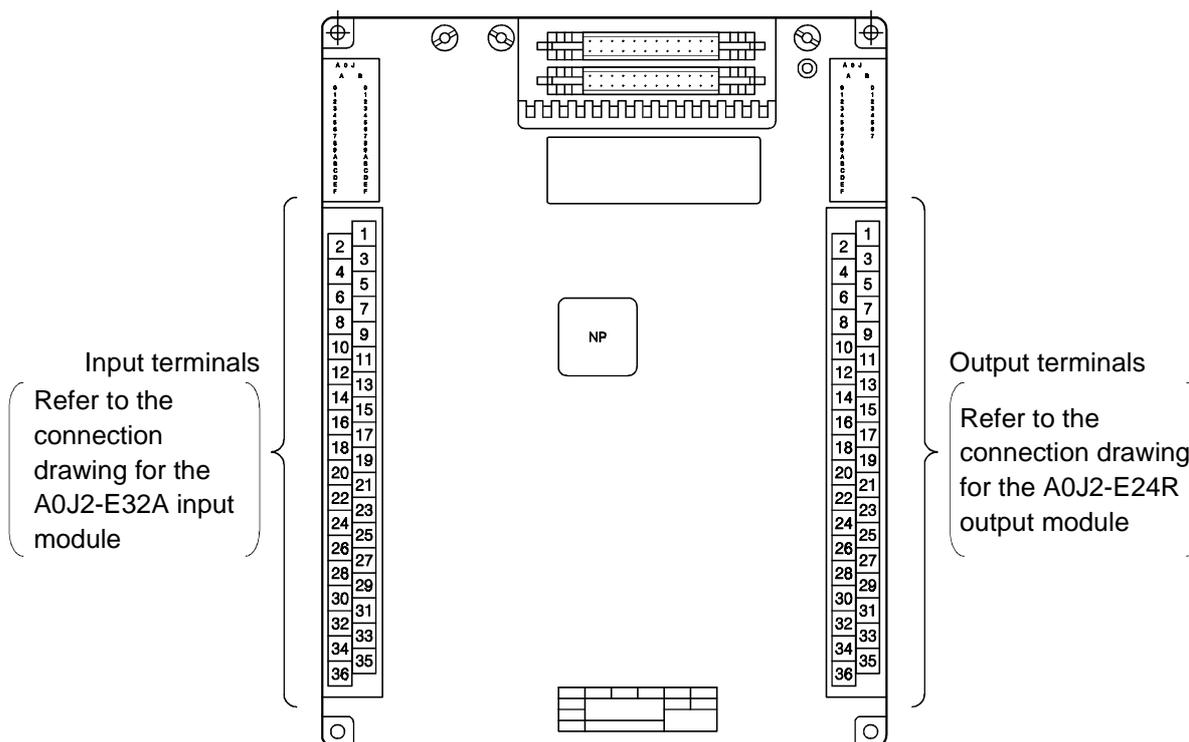
- An A0J2(E)-E56[...] is a combination of an input module (A0J2)(E)-E32[...] and an output module (A0J2(E)-E24[...]).

For details on connecting the A0J2(E)-E56[...] type I/O modules, refer to the details for the corresponding input modules and output modules.

The table below indicates the combinations of I/O modules.

Module Model Name	Input Module	Output Module
(1) A0J2-E56AR	A0J2-E32A	A0J2-E24R
(2) A0J2-E56AS		A0J2-E24S
(3) A0J2-E56DR (sink type)	A0J2-E32D	A0J2-E24R
(4) A0J2-E56DS (sink type)		A0J2-E24S
(5) A0J2-E56DT (sink type)		A0J2-E24T
(6) A0J2E-E56DR (source type)	A0J2E-E32D	A0J2E-E24R
(7) A0J2E-E56DS (source type)		A0J2E-E24S
(8) A0J2E-E56DT (source type)		A0J2E-E24T

(Example) For connection of the A0J2-E56AR input/output module, refer to the details for "A0J2-E32A" and "A0J2-E24R".



Front of module

## 5. ERROR CODES

If an error occurs in the RUN mode, an error display or error code (including a step number) is stored in the special register by the self-diagnostic function. The error code reading procedure and the causes of and corrective actions for errors are shown below.

Errors should be cleared by taking appropriate action.

### 5.1 Error Code List for A0J2HCPU

This section gives the error descriptions, possible causes, and corrective action for A0J2HCPU error codes and error messages.

**Table 5.1 Error Codes List**

<b>Error Message</b>	<b>Contents of Special Register D9008 (BIN value)</b>	<b>CPU State</b>	<b>Error and Cause</b>	<b>Corrective Action</b>
"INSTRCT CODE ERR."  (Checked during instruction execution)	10	STOP	An instruction code, which cannot be decoded by CPU, is included in the program. (1) ROM including invalid instruction code, has been loaded. (2) The occurrence of an error destroyed the memory contents, adding an instruction code that cannot be read to the memory.	(1) Read the error step by use of peripheral device and correct the program at that step. (2) In the case of ROM, rewrite the contents of the ROM, or change the ROM.
"PARAMETER ERROR"  (Checked at power on, reset, STOP to RUN, PAUSE to STEP-RUN)	11	STOP	The parameter contents of CPU memory are changed due to noise or incorrect loading of memory.	(1) Check the loading of the CPU memory and load it correctly. (2) Read the parameter contents of CPU memory, check and correct the contents, and write them to the memory again.

**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"MISSING END INS." (Checked at M9056 or M9057 on, STOP to RUN, PAUSE to STEP-RUN)</p>	12	STOP	<p>(1) There is no END (FEND) instruction in the program. (2) Although a subprogram is set in the parameters, the subprogram has no END instruction.</p>	<p>(1) Write END at the end of the program.</p>
<p>"CAN'T EXECUTE (P)"  (Checked at CJ, SCJ, JMP, CALL(P), FOR to NEXT execution, STOP to RUN, PAUSE to STEP-RUN)</p>	13	STOP	<p>(1) There is no jump destination or plural destinations specified by the CJ, SCJ, CALL, CALL(P), or JMP instruction. (2) Although there is a CHG instruction, there is no setting for a subprogram. (3) Although there is no CALL instruction, the RET instruction exists in the program and has been executed. (4) The CJ, SCJ, CALL, CALL(P), or JMP instruction has been executed with its jump destination located below the END instruction. (5) The number of FOR instructions does not match that of NEXT instruction. (6) The JMP instruction specified between FOR to NEXT has caused execution to deviate from between FOR to NEXT. (7) The JMP instruction has caused execution to deviate from the subroutine before the RET instruction is executed.</p>	<p>(1) Read the error step by use of a peripheral device and correct the program at that step. (Make corrections such as the insertion of jump destination or the changing of jump destinations to one.)</p>



**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"CANT EXECUTE (I)"</p> <p>(At interrupt occurrence Checked at STOP to RUN and PAUSE to STEP-RUN)</p>	15	STOP	<p>(1) Although the interrupt module is used, there is no number for interrupt pointer I, which corresponds to that module, in the program or several numbers of pointer I exist in the program.</p> <p>(2) No IRET instruction has been entered in the interrupt program.</p> <p>(3) There is an IRET instruction somewhere besides the interrupt program.</p>	<p>(1) Check for the presence of interrupt program which corresponds to the interrupt module and create an interrupt program or reduce the numbers of I to one.</p> <p>(2) Check if there is IRET instruction in the interrupt program and enter the IRET instruction.</p> <p>(3) Check if there is an IRET instruction somewhere besides the interrupt program and delete that IRET instruction.</p>
<p>"ROM ERROR"</p> <p>(Checked at power on and reset)</p>	17	STOP	<p>(1) Parameter and sequence programs are not correctly written to installed EP-ROM.</p> <p>(2) EP-ROM is destroyed.</p>	Write the program correctly to EP-ROM.
<p>"MEMORY PROTECT ERROR"</p> <p>(Checked at power on and reset)</p>	18	STOP	The MEMORY PROTECT switch is set in the ON position while operating the A0J2H system using ROM stored programs.	Set the MEMORY PROTECT switch in the OFF position.
<p>"RAM ERROR"</p> <p>(Checked at power on, reset, M9084 ON during STOP)</p>	20	STOP	(1) The CPU has checked if write and read operations can be performed properly to the data memory area of CPU, and as a result, either or both has not been performed.	Since this is a PC CPU hardware fault, consult your nearest Mitsubishi representative.
<p>"OPE. CIRCUIT ERR."</p> <p>(Checked at power on and reset)</p>	21	STOP	(1) The operation circuit, which performs the sequence processing in the CPU, does not operate properly.	

**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"WDT ERROR"</p> <p>(Checked at the execution of END instruction)</p>	22	STOP	<p>Scan time exceeds watchdog timer error supervising time.</p> <p>(1) Scan time of user program has become excessive.</p> <p>(2) Scan time has lengthened due to momentary power failure which occurred during scan.</p>	<p>(1) Calculate and check the scan time of user program and reduce the scan time by use of <b>CJ</b> instruction, etc.</p> <p>(2) Monitor the content of special register D9005 by use of peripheral device. When the content is other than 0, line voltage is insufficient. Therefore, check the power and eliminate the voltage fluctuation.</p>
<p>"END NOT EXECUTE "</p> <p>(Checked at the execution of END instruction)</p>	24	STOP	<p>(1) When the <b>END</b> instruction is executed, another instruction code has been read due to noise, etc.</p> <p>(2) The <b>END</b> instruction has changed to another instruction code for some reason.</p>	<p>(1) Perform reset and RUN. If the same error is displayed again, it is a CPU hardware fault. Therefore, consult your nearest Mitsubishi representative.</p>
<p>"WDT ERROR"</p> <p>(Checked continuously)</p>	25	STOP	<p>The <b>END</b> instruction cannot be executed with the sequence program by <b>CJ</b> instructions, etc looped.</p>	<p>Check for an infinite loop and correct the program.</p>
<p>"UNIT VERIFY ERR."</p> <p>(Checked at the execution of END instruction) (However, this is not checked when M9084 or M9094 is ON)</p>	31	STOP (RUN)	<p>I/O module data is different from that at power on.</p> <p>(1) The I/O module (including the special-function module) is (a) incorrectly disengaged or has been removed, or (b) a different module has been loaded.</p>	<p>(1) Among special registers D9116 to D9123, the bit corresponding to the module verify error is "1". Therefore, monitor the registers by use of a peripheral device and check and change for the module with "1".</p> <p>(2) When the fault has been corrected, reset the CPU.</p>

**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"FUSE BREAK OFF"</p> <p>(Checked at the execution of END instruction) (However, this is not checked when M9084 or M9094 is ON)</p>	32	RUN (STOP)	<p>There is an output module with a fuse blown.</p>	<p>(1) Check the fuse blown indicator LED of the output module and change the fuse in the module whose LED is on.</p> <p>(2) Checking the module for a fuse blown can also be done with a peripheral device. Among special registers D9100 to D9107, the bit corresponding to the module of verify error is "1". Therefore, check by monitoring the registers.</p>
<p>"CONTROL-BUS ERR."</p> <p>(Checked at the execution of FROM and TO instruction)</p>	40	STOP	<p>The FROM/TO instructions cannot be executed.</p> <p>(1) Error of control bus with special-function module.</p>	<p>(1) This is a special function module, CPU module or base unit hardware fault. Therefore, change the unit and check the defective module. Consult your nearest Mitsubishi representative about the defective module.</p>
<p>"SP.UNIT DOWN"</p> <p>(Checked at the execution of FROM and TO instruction)</p>	41	STOP	<p>When FROM/TO instructions is executed no response comes back from the special function module.</p> <p>(1) The accessed special function module is faulty.</p>	<p>This is a special function module, CPU module or base unit hardware fault. Therefore, change the unit and check the defective module. Consult your nearest Mitsubishi representative about the defective module.</p>
<p>"LINK UNIT ERROR"</p> <p>(Checked at power on, reset, STOP to RUN, PAUSE to STEP-RUN)</p>	42	Stop	<p>(1) Either AJ71(A)R22 or AJ71(A)P22 is installed at the master station.</p>	<p>(1) Remove either AJ71(A)R22 or AJ71(A)P22 from the master station. After this correction, reset and restart from the initial step.</p>

**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"I/O INT. ERROR"</p> <p>(At interrupt occurrence)</p>	43	STOP	Although the interrupt module is not installed, an interruption has occurred.	<p>(1) This is a certain module hardware fault. Therefore, change the module and check the defective module. Consult your nearest Mitsubishi representative about the defective module.</p>
<p>"SP.UNIT LAY. ERR."</p> <p>(Checked at power on, reset, STOP to RUN, PAUSE to STEP-RUN)</p>	44	STOP	<p>(1) Three or more computer link modules are installed into a single CPU module.</p> <p>(2) Two or more modules of AJ71(A)P22 or AJ71(A)R22 are installed.</p> <p>(3) Two or more interrupt modules are installed.</p> <p>(4) In the parameter setting of the peripheral device, while an I/O module is actually installed, a special-function module has been set in the I/O assignment, and vice versa.</p>	<p>(1) Reduce the computer link modules to two or less.</p> <p>(2) Install no more than one AJ71(A)P21 or AJ71(A)R21.</p> <p>(3) Use one interrupt module.</p> <p>(4) Reset the I/O assignment of parameter setting by use of peripheral device according to the actually loaded special function module.</p>
<p>"SP.UNIT ERROR"</p> <p>(Checked at the execution of FROM and TO instruction)</p>	46	STOP (RUN)	<p>(1) Access (execution of FROM/TO instruction) has been made to a location where there is no special function module.</p>	<p>(1) Read the error step by use of peripheral device, and check and correct the content of the FROM/TO instruction at that step by using a peripheral device.</p>

**Table 5.1 Error Codes List (Continued)**

Error Message	Contents of Special Register D9008 (BIN value)	CPU State	Error and Cause	Corrective Action
<p>"LINK PARA. ERROR"</p> <p>(Checked at power on, reset, STOP to RUN, PAUSE to STEP-RUN)</p>	47	RUN	<p>(1) Link parameters have not been written.</p> <p>(2) Link parameters have been erased/deleted.</p>	<p>(1) In the case of the master station, write the link parameters. In the case of a local station, set a station number in the range of 01 to 64.</p> <p>(2) Write the parameters again and check. If this message is displayed again, it is a hardware fault. Therefore, consult your nearest Mitsubishi representative.</p>
<p>"OPERATION ERROR"</p> <p>(Checked during instruction execution)</p>	50	RUN (STOP)	<p>(1) The result of BCD conversion has exceeded the specified range (9999 or 99999999).</p> <p>(2) A setting has been done which exceeds the specified device range and the operation cannot be done.</p> <p>(3) File registers are used in the program without performing the capacity setting of file registers.</p>	<p>(1) Use a peripheral device to read the error step and check and correct the program at that step. (Check device setting range, BCD conversion value, etc.)</p>
<p>"MAIN CPU DOWN"</p> <p>(Interrupt error)</p>	60	STOP	<p>(1) When an interrupt <input type="text" value="INT"/> instruction is used in a microcomputer program.</p> <p>(2) When the CPU malfunctions due to noise, etc.</p> <p>(3) CPU hardware fault.</p>	<p>(1) The <input type="text" value="INT"/> instruction cannot be used in a microcomputer program: take out the <input type="text" value="INT"/> instruction.</p> <p>(2) Take countermeasures against noise.</p> <p>(3) Change the CPU.</p>
<p>"BATTERY ERROR"</p> <p>(Checked continuously) (Not checked when M9084 is on)</p>	70	RUN	<p>(1) The battery voltage has reduced to less than the specified value.</p> <p>(2) The battery lead is disconnected.</p>	<p>(1) Change the battery.</p> <p>(2) When RAM or power failure compensation is used, connect the battery.</p>

**Appendix1 CPU Startup Names**

CPU	Startup Name	CPU Name to Be Selected If the CPU Name Given on the Left Is Not Found
A0J2HCPU (P21/R21)	A0J2H	A2

**Appendix 2 Transportation Precautions**

When transporting lithium batteries, make sure to treat them based on the transport regulations.

**Appendix 2.1 Controlled Models**

The battery for A0J2HCPU (P21/R21) is classified as follows:

Product Name	Model	Product supply status	Classification for transportation
A series battery	A6BAT	Lithium battery	Non-dangerous goods

**Appendix 2.2 Transport Guidelines**

Comply with IATA Dangerous Goods Regulations, IMDG code and the local transport regulations when transporting products after unpacking or repacking, while Mitsubishi ships products with packages to comply with the transport regulations.

Also, contact the transporters.



## Warranty

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

### ⚠ For safe use

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

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Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. AV. Paulista 1471, Conj. 308, Sao Paulo City, Sao Paulo State, Brazil Tel : +55-11-283-2423	China	Ryoden Automation Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : +86-21-6475-3228
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