MITSUBISHI

Type AnN/AnA/AnUCPU

Mitsubishi Programmable Controller

User's Manual

(Hardware)

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

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

MODEL	ANN/A/UCPU-U(HW)E
MODEL Code	13JE82
IB(NA)-66542-I(0810)MEE	

● SAFETY PRECAUTIONS ●

(Be sure to read these instructions before use.)

Before using the product, read this and relevant manuals carefully and handle the product correctly with full attention to safety.
In this manual, ● SAFETY PRECAUTIONS ●are classified into 2 levels: "DANGER" and "CAUTION".

⚠**DANGER**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠**CAUTION**	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury and/or property damage.

Under some circumstances, failure to observe the ⚠**CAUTION** level instructions may also lead to serious results.
Be sure to observe the instructions of both levels to ensure the safety.
Please keep this manual in a safe place for future reference and also pass this manual on to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER
● Create a safety circuit outside the PLC to ensure the whole system will operate safely even if an external power failure or a PLC failure occurs. Otherwise, incorrect output or malfunction may cause an accident. (1) For an emergency stop circuit, protection circuit and interlock circuit that is designed for incompatible actions such as forward/reverse rotation or for damage prevention such as the upper/lower limit setting in positioning, any of them must be created outside the PLC.

[DESIGN PRECAUTIONS]

⚠ DANGER

(2) When the PLC detects the following error conditions, it stops the operation and turn off all the outputs.
- The overcurrent protection device or overvoltage protection device of the power supply module is activated.
- The PLC CPU detects an error such as a watchdog timer error by the self-diagnostics function.

In the case of an error of a part such as an I/O control part that cannot be detected by the PLC CPU, all the outputs may turn on. In order to make all machines operate safely in such a case, set up a fail-safe circuit or a specific mechanism outside the PLC.
Refer to "LOADING AND INSTALLATION" in this manual for example fail safe circuits.

(3) Depending on the failure of the output module's relay or transistor, the output status may remain ON or OFF incorrectly. For output signals that may lead to a serious accident, create an external monitoring circuit.
- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the output module for a long time, it may cause a fire and smoke. Provide an external safety device such as a fuse.
- Design a circuit so that the external power will be supplied after power-up of the PLC.
  Activating the external power supply prior to the PLC may result in an accident due to incorrect output or malfunction.
- For the operation status of each station at a communication error in data link, refer to the respective data link manual.
  The communication error may result in an accident due to incorrect output or malfunction.

[DESIGN PRECAUTIONS]

⚠ DANGER

- When controlling a running PLC (data modification) by connecting a peripheral device to the CPU module or a PC to a special function module, create an interlock circuit on sequence programs so that the whole system functions safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the manual carefully and ensure the safety.
  In these controls, especially the one from an external device to a PLC in a remote location, some PLC side problem may not be resolved immediately due to failure of data communications.
  To prevent this, create an interlock circuit on sequence programs and establish corrective procedures for communication failure between the external device and the PLC CPU.
- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (AG60) or a dummy module (AG62) for it.
  When using the extension base unit, A52B, A55B or A58B, attach the included dustproof cover to the module in slot 0.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to external I/O section.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
  Keep a distance of 100mm (3.94inch) or more between them.
  Failure to do so may cause malfunctions due to noise.
- When an output module is used to control the lamp load, heater, solenoid valve, etc., a large current (ten times larger than the normal one) may flow at the time that the output status changes from OFF to ON. Take some preventive measures such as replacing the output module with the one of a suitable current rating.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION
● Use the PLC under the environment specified in the user's manual. Otherwise, it may cause electric shocks, fires, malfunctions, product deterioration or damage. ● 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. ● Connect the extension cable to the connector of the base unit or module. Check the cable for incomplete connection after connecting it. Poor electrical contact may cause incorrect inputs and/or outputs. ● 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. ● Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module. Failure to do so may damage the module. ● Do not directly touch the conductive part or electronic components of the module. Doing so may cause malfunctions or a failure of the module.

[WIRING PRECAUTIONS]

DANGER

- Be sure to shut off all phases of the external power supply used by the system before wiring.
  Failure to do so may result in an electric shock or damage of the product.
- Before energizing and operating the system after wiring, be sure to attach the terminal cover supplied with the product.
  Failure to do so may cause an electric shock.

CAUTION

- Always ground the FG and LG terminals to the protective ground conductor.
  Failure to do so may cause an electric shock or malfunctions.
- Wire the module correctly after confirming the rated voltage and terminal layout.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.
- Do not connect multiple power supply modules to one module in parallel.
  The power supply modules may be heated, resulting in a fire or failure.
- Press, crimp or properly solder the connector for external connection with the specified tool.
  Incomplete connection may cause a short circuit, fire or malfunctions.
- Tighten terminal screws within the specified torque range. If the screw is too loose, it may cause a short circuit, fire or malfunctions.
  If too tight, it may damage the screw and/or the module, resulting in a short circuit or malfunctions.
- Carefully prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.
- Install our PLC in a control panel for use.
  Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.
  Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.
  (For the wiring methods, refer to Type A1N/A2N(S1)/A3NCPU User's Manual.)

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ DANGER

- Do not touch any terminal during power distribution.
  Doing so may cause an electric shock.
- Properly connect batteries. Do not charge, disassemble, heat or throw them into the fire and do not make them short-circuited and soldered. Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws or module mounting screws.
  Failure to do so may result in an electric shock.
  If they are too loose, it may cause a short circuit or malfunctions.
  If too tight, it may cause damage to the screws and/or module, resulting in an accidental drop of the module, short circuit or malfunctions.

⚠ CAUTION

- When performing online operations (especially, program modification, forced output or operating status change) by connecting a peripheral device to the running CPU module, read the manual carefully and ensure the safety.
  Incorrect operation will cause mechanical damage or accidents.
- Do not disassemble or modify each of modules.
  Doing so may cause failure, malfunctions, personal injuries and/or a fire.
- When using a wireless communication device such as a mobile phone, keep a distance of 25cm (9.84inch) or more from the PLC in all directions.
  Failure to do so may cause malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may result in failure or malfunctions of the module.
- Do not drop or apply any impact to the battery.
  Doing so may damage the battery, resulting in electrolyte spillage inside the battery.
  If any impact has been applied, discard the battery and never use it.
- Before handling modules, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION
● When disposing of the product, treat it as an industrial waste. When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the battery directive in EU member states, refer to the user's manual for the CPU module used.)

[TRANSPORTATION PRECAUTIONS]

⚠ CAUTION
● When transporting lithium batteries, make sure to treat them based on the transportation regulations. (Refer to Chapter 7 for details of the relevant models.)

REVISIONS

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

Print Date	*Manual Number	Revision
Mar., 1995	IB(NA) 66542-A	First edition
Jan., 1996	IB(NA) 66542-B	
Sep., 1998	IB(NA) 66542-C	Correction SAFETY PRECAUTIONS, 4.5.2 Addition SPECIFICATIONS, PERFORMANCE SPECIFICATIONS, EMC STANDARDS, LOW-VOLTAGE INSTRUCTION Deletion I/O MODULE SPECIFICATIONS AND CONNECTIONS
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Jul., 2005	IB(NA) 66542-F	Addition USER PRECAUTION Partial corrections SAFETY PRECAUTIONS, Chapter 3, Section 3.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.2, 3.2.1, 3.2.2, 3.2.5, 3.2.7, 4.1.1, 4.1.3, 4.2, 4.3.1, 4.3.2, 4.3.3, 4.4, 4.5
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Oct., 2008	IB(NA) 66542-I	Partial corrections SAFETY PRECAUTIONS, Section 4.3.3, Section 1.1

Japanese Manual Version IB(NA)68438-M

CONTENTS

About Manuals

The manuals related to these CPUs are listed below.
Refer to the following manuals when necessary.

Detailed manuals

Manual Name	Manual Number (Type code)
A1N/A2N(S1)/A3NCPU User's Manual This manual describes the performance, functions, handling, etc., of the A1NCPU, A2NCPU(S1), and A3NCPU, and the specifications and handling for the memory cassette, power supply module, and base unit.	IB-66543 (13JE83)
A2A/A3ACPU User's Manual This manual describes the performance, functions, handling, etc., of the A2ACPU(S1) and A3ACPU, and the specifications and handling of the memory cassette, power supply module, and base unit.	IB-66544 (13JE84)
A2U(S1)/A3U/A4UCPU User's Manual This manual describes the performance, functions, handling, and so forth of A2UCPU(S1), A3UCPU, A4UCPU, and the specifications and handling of the memory cassette, power supply module, and base unit.	IB-66436 (13JE25)

Detailed manuals

Manual Name	Manual Number (Type code)
ACPU/QCPU-A(A mode) 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/QCPU-A(A mode) Programming Manual (Common Instructions) This manual describes how to use the sequence instructions, basic instructions, application instructions and micro-computer programs.	IB-66250 (13J741)
AnSHCPU/AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (Dedicated Instructions) This manual describes the instructions that are expanded for dedicated use with the A2ACPU(S1), A3ACPU, A2UCPU(S1), A3UCPU, and A4UCPU.	IB-66251 (13J742)
AnACPU/AnUCPU Programming Manual (AD57 Control Instructions) This manual describes sequence program instructions used to control the AD57(S1)/AD58 CRT/LCD controllers with the A2ACPU(S1), A3ACPU, A2UCPU(S1), A3UCPU, and A4UCPU.	IB-66257 (13J743)
AnACPU/AnUCPU Programming Manual (PID Control Instructions) This manual describes sequence program instructions used to execute PID control with the A2ACPU(S1), A3ACPU, A2UCPU(S1), A3UCPU, and A4UCPU.	IB-66258 (13J744)
Building Block I/O Module User's Manual This manual describes the specifications of the building block I/O module.	IB-66140 (13J643)

USER PRECAUTIONS

Precautions when using the A series

For a new CPU module, which has never used before, the memory of memory cassette and the device data of CPU module are undefined.
Make sure to clear the memory (PC memory all clear) in the memory cassette by peripheral devices and operate latch clear by reset key switches.

Precautions for battery

(1) Operation after a battery is unmounted and a PLC is stored
When the operation is resumed after a battery is unmounted and a PLC is stored, the memory of the memory cassette and the contents of device data may be undefined.
For this reason, make sure to clear the memory (PC memory all clear) in the memory cassette by peripheral devices and operate latch clear by the reset key switch of the CPU module before starting the operation again.
After operating the clear and latch clear of the memory of the memory cassette, write the memory contents backed-up before storing the PLC to the CPU module.

(2) Operation when a PLC has been stored exceeding its battery's guaranteed life
When the operation is resumed after a PLC has been stored exceeding its battery's guaranteed life, the memory of the memory cassette and the contents of device data may be undefined.
For this reason, make sure to clear the memory (PC memory all clear) in the memory cassette by peripheral devices and operate latch clear by the reset key switch of the CPU module before starting the operation again.
After operating the clear and latch clear of the memory of the memory cassette, write the memory contents backed-up before storing the PLC to the CPU module.

POINT
Make sure to back-up each memory content before storing the PLC.

*: Refer to the following manuals for details of clearing the memory of the memory cassette (PLC memory all clear) by peripheral devices.
- GX Developer Operating Manual
- A6GPP/A6PHP Operating Manual
- SW□SRX/SW□NX/SW□IVD-GPPA Operating Manual

Refer to Section 4.5 for the latch clear operation by the reset key switch of a CPU module.

1.1 SPECIFICATIONS

Table 1.1 General specification

Item	Specifications					
Ambient operating temperature	0 to 55 °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 3502, IEC 61131-2		Frequency	Acceleration	Amplitude	No. of sweeps
		Under intermittent vibration	10 to 57Hz	——	0.075mm (0.003in.)	10 times each in X, Y, Z directions
			57 to 150Hz	9.8m/s^2	——	
		Under continuous vibration	10 to 57Hz	——	0.035mm (0.001in.)	——
			57 to 150Hz	4.9m/s^2	——	
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147 m/s^2, 3 times in each of 3 directions X Y Z)					
Operating ambience	No corrosive gases					
Operating elevation *3	2000m (6562ft.) max.					
Installation location	Control panel					
Over voltage category *1	II max.					
Pollution level *2	2 max.					
Equipment category	Class I					

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

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

*3: Do not use or store the PC in the environment when the pressure is higher than the atmospheric pressure at sea level. Otherwise, malfunction may result. To use the PC in high-pressure environment, contact your nearest Mitsubishi representative.

2.1 CPU Module Performance Specifications

2.1.1 AnNCPU Module Performance Specifications

Table 2.1 shows the memory capacities of the CPU modules and the performance of their devices.

Table 2.1 Performance Specifications

Item		Performance			
		A1NCPU	A2NCPU	A2NCPU-S1	A3NCPU
Control system		Stored program, repeated operation			
I/O control mode		Refresh / direct mode selectable			
Programming language		Language dedicated to sequence control. (Combined use of relay symbol type, logic symbolic language and MELSAP-II(SFC)*1)			
Processing speed (Sequence instruction)		Direct mode : 1.0 to 2.3 μs/step Refresh mode : 1.0 μs/step			
I/O points		256 points (X/Y0 to FF)	512 points (X/Y0 to 1FF)	1024 points (X/Y0 to 3FF)	2048 points (X/Y0 to 7FF)
Watch dog timer (WDT)		10 to 2000ms			
Memory capacity		Max. 16k bytes	Capacity of installed memory cassette Max.448k bytes		
Program capacity	Main sequence program	Max. 6k steps	Max.14k steps		Max. 30k steps
	Sub-sequence program	Absent			Max. 30k steps

*1 The SFC language cannot be used with an A1NCPU.

Table 2.1 Performance Specifications (Continued)

Item	Performance			
	A1NCPU	A2NCPU	A2NCPU-S1	A3NCPU
Self-diagnosis	Watchdog error supervision Memory error detection, CPU error detection, I/O error detection, battery error detection, etc.			
Operation mode at error occurrence	Stop or continue selectable			
Output mode a switching at STOP → RUN	Selection of re-output of operation state before STOP (default)/output after operation execution			
Starting method at RUN	Initial start (Automatic restart when "RUN" switch is moved to ON position at power-on, at power restoration after power failure)			
Clock function	Year, month, day, hour, second, and day of the week (automatic leap year recognition) Accuracy: -3.9 to + 0.8s (TYP. -1.1s) /d at 0°C -1.8 to + 1.0s (TYP. -0.2s) /d at 25°C -8.5 to + 0.7s (TYP. -4.0s) /d at 55°C			
Latch (power failure compensation) range	Defaults to L1000 to 2047 (Latch range can be set for L, B, T, C, D and W relays.)			
Remote RUN/Pause contact	X0 to FF	X0 to 1FF	X0 to 3FF	X0 to 7FF
	One RUN contact and one PAUSE contact can be set. It is not possible			
Allowable momentary power failure time	20 ms	Depends on used power supply module		
5 VDC internal power consumption	A1NCPU :0.53 A A1NCPUP21(S3) :1.23 A A1NCPUR21 :1.63 A	A2NCPU :0.73 A A2NCPUP21(S3) :1.38 A A2NCPUR21 :1.78 A	A2NCPU-S1 :0.73 A A2NCPUP21-S1 (S4) :1.38 A A2NCPUR21-S1 :1.78 A	A3NCPU :0.90 A A3NCPUP21(S3) :1.55 A A3NCPUR21 :1.95 A
Weight	A1NCPU:1.45 kg A1NCPUP21(S3) :1.75 kg A1NCPUR21 :1.75 kg	A2NCPU:0.62 kg A2NCPUP21(S3) :0.92 kg A2NCPUR21 :0.92 kg	A2NCPU-S1 :0.62 kg A2NCPUP21-S1 (S4) :0.92 kg A2NCPUR21-S1 :0.92 kg	A3NCPU:0.65 kg A3NCPUP21(S3) :0.95 kg A3NCPUR21 :0.95 kg
External dimensions	250(H) × 135(W) ×121(D) (9.84 × 5.31 ×4.76) mm (inch)	250(H) × 79.5(W) ×121(D) (9.84 × 3.13 ×4.76) mm (inch)		

2.1.2 AnACPU Module performance specifications

Table 2.2 shows the performance specifications of the AnACPU module. Since the valid range for setting each device differs, use caution when a previous system FD, peripheral devices or an AnACPU compatible system FD are used.

Table 2.2 CPU Module Performance Specifications

Item		Performance			Remarks
		A2ACPU	A2ACPU-S1	A3ACPU	
Control system		Stored program, repeated operation			
I/O control method		Refresh method			Instructions to enable partial direct I/O are available.
Programming language		Language dedicated to sequence control			
		Combined use of relay symbol type, logic symbolic language and MELSAP-II(SFC)			
Processing speed (Sequence instruction)		A2A (S1) : 0.2 to 0.4 μs/step A3A : 0.15 to 0.3 μs/ step			
Constant scan (program start at specified intervals)		Can be set between 10 ms and 190 ms in 10 ms increments			Set in special register D9020.
Memory capacity and memory type	Memory capacity	Max. 448k bytes		Max. 768k bytes	Refer to Section 7 for details on memory cassette. Battery back up.
	Memory type (Memory cassette type)	A3NMCA-0 to A3NMCA-56		A3NMCA-0 to A3NMCA-56 *A3AMCA-96	

POINT

* Memory cassette A3AMCA-96 is compatible with CPUs of the following versions and later versions.

- A3ACPU Version BM
- A3ACPUP21 Version BL
- A3ACPUR21 Version AL

Example)

B M

B: Hardware version
M: Software version

Table 2.2 CPU Module Performance Specifications (continued)

Item		Performance			Remarks
		A2ACPU	A2ACPU-S1	A3ACPU	
Main sequence program capacity		6k steps			Set in parameters.
		(Can be set to max. 14k steps		(Can be set to max. 30k steps)	
Sub-sequence program capacity		Absent		0 to 30k steps can be set.	Set in parameters.
I/O points		512 points	1024 points	2048 points	The number of points which can be used for accessibility to actual I/O modules.
STOP → RUN output mode		Selection of re-output of operation state before STOP (default)/output after operation execution			Set in parameters.
Self-diagnostic functions		Watchdog error timer (watchdog timer 200 ms fixed) Memory error detection, CPU error detection, I/O error detection, battery error detection, etc.			
Starting method at RUN		Automatic restart when "RUN" switch is moved to ON position (initial start)			
Allowable momentary power failure time		Depends on used power supply module			
Latch (power failure compensation) range		Using parameter setting, M, L, and S relays 0 to 8191, can be set in latch relay as L0 to L8191 (defaults to L1000 to L2047)			Set range in parameters.
Remote RUN/PAUSE contact		RUN/PAUSE contact point can be set by the parameter settings for A2A, A2A-S1, and A3 within the following range. A2A: X0 to X1FF, A2A-S1: X0 to X3FF, and A3A: X0 to X7FF.			
Operation mode at the time of error		I/O, special function module error: Stop, Operation error: continue			Can be changed to operation error stop.
Clock function		Year, month, day, hour, minute, second, day of the week (leap year is automatically identified.) Accuracy -2.3 to + 4.4s (TYP. +1.8s) /d at 0°C -1.1 to + 4.4s (TYP. +2.2s) /d at 25°C -9.6 to + 2.7s (TYP. -2.4s) /d at 55°C			
Other functions	Step RUN	• Execution per instruction • Execution per circuit ladder block • Execution according to loop count and step interval specification • Execution according to loop count and break point specification • Execution according to device status			
	Interrupt processing	Interrupt program can be run in response to a signal from an interrupt unit or by a constant-cycle interrupt signal.			
	Data link	Data link system incorporating local PCs and/or remote I/O can be constructed.			

Table 2.2 CPU Module Performance Specifications (continued)

Item	Performance			Remarks
	A2ACPU	A2ACPU-S1	A3ACPU	
Current consumption	A2ACPU : 0.4 A A2ACPUP21(S3) : 1.0 A A2ACPUR21 : 1.4 A	A2ACPU-S1 : 0.4 A A2ACPUP21-S1 (S4) : 1.0 A A2ACPUR21-S1 : 1.4 A	A3ACPU : 0.6 A A3ACPUP21(S3) : 1.0 A A3ACPUR21 : 1.6 A	Differs according to memory cassette.
Weight	A2ACPU : 0.7 kg A2ACPUP21(S3) : 0.9 kg A2ACPUR21 : 0.9 kg	A2ACPU-S1 : 0.7 kg A2ACPUP21-S1 (S4) : 0.9 kg A2ACPUR21-S1 : 0.9 kg	A3ACPU : 0.7 kg A3ACPUP21(S3) : 0.9 kg A3ACPUR21 : 1.0 kg	
External dimensions	250(H) × 79.5(W) × 121(D) (9.84 × 3.13 × 4.76) mm (inch)			

2.1.3 AnUCPU Module Performance Specifications

This section explains the performance specifications and devices of the AnUCPU.

Table 2.3 Performance Specifications

Item		Performance				Remarks
		A2UCPU	A2UCPU-S1	A3UCPU	A4UCPU	
Control system		Stored program, repeated operation				
I/O control method		Refresh method				Instructions to enable partial direct I/O are available.
Programming language		Language dedicated to sequence control				
		Combined use of relay symbol type, logic symbolic language and MELSAP-II (SFC)				
Processing speed (Sequence instruction)		0.2 μs/step		0.15 μs/step		
Constant scan (program start at specified intervals)		Can be set between 10 ms and 190 ms in 10 ms increments				Set in special register D9020.
Memory capacity		Capacity of installed memory cassette (Max. 448 kbytes)		Capacity of installed memory cassette (Max. 1024 kbytes)		
Program capacity	Main sequence program	Max. 14k steps		Max. 30k steps		Set in parameters.
	Sub-sequence program	Absent		Max. 30k steps	Max. 30k steps × 3	
I/O device points		8192 points (X/Y0 to 1FFF)				The number of points usable in the program
I/O points		512 points (X/Y0 to 1FF)	1024 points (X/Y0 to 3FF)	2048 points (X/Y0 to 7FF)	4096 points (X/Y0 to FFF)	The number of points which can be used for accessibility to actual I/O modules

Table 2.3 Performance Specifications (continued)

Item	Performance				Remarks
	A2UCPU	A2UCPU-S1	A3UCPU	A4UCPU	
Output mode switching at STOP → RUN	Selection of re-output of operation state before STOP (default)/output after operation execution				Set in parameters.
Self-diagnostic functions	Watchdog timer (watchdog timer 200 msec fixed) Memory error detection, CPU error detection, I/O error detection, battery error detection, etc.				
Operation mode at error occurrence	Stop or continue selectable				Set in parameters.
Starting method at RUN	Initial start (Automatic restart when "RUN" switch is moved to ON position at power-on, at power restoration after power failure)				
Latch (power failure compensation) range	Defaults to L1000 to L2047 (Latch range can be set for L, B, T, C, D and W relays.)				Set range in parameters.
Remote RUN/PAUSE contact	One RUN contact and one PAUSE contact can be set within the range from X0 to X1FFF				Set in parameters.
Step RUN	Can execute or stop sequence program operation.				
Interrupt processing	Interrupt program can be run in response to a signal from an interrupt unit or by a constant-cycle interrupt signal.				
Data link	MELSECNET/10, MELSECNET (II)				
Allowable momentary power failure time	Depends on used power supply module				
5 VDC internal power consumption	0.4 A	0.4 A	0.5 A	0.5 A	
Weight	0.5 kg	0.5 kg	0.6 kg	0.6 kg	
External dimensions	250(H) × 79.5(W) × 121(D) (9.84 × 3.13 × 4.76) mm (inch)				

CAUTION

When the existing system software package and peripheral devices are used, the applicable device range is limited.

The products sold in the European countries have been required by law to comply with the EMC Directives and Low Voltage Directives of the EU Directives since 1996 and 1997, respectively.
The manufacturers must confirm by self-declaration that their products meet the requirements of these directives, and put the CE mark on the products.

3.1 Requirements for Compliance with EMC Directives

The EMC Directives specifies emission and immunity criteria and requires the products to meet both of them, i.e., not to emit excessive electromagnetic interference (emission): to be immune to electromagnetic interference outside (immunity).
Guidelines for complying the machinery including MELSEC-A series PLC with the EMC Directives are provided in Section 3.1.1 to 3.1.6 below.
The guidelines are created based on the requirements of the regulations and relevant standards, however, they do not guarantee that the machinery constructed according to them will not comply with the Directives.
Therefore, the manufacturer of the machinery must finally determine how to make it comply with the EMC Directives: if it is actually compliant with the EMC Directives.

3.1.1 EMC standards

When the PLC 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
EN61000-6-4 (2001)	EN55011 *2 Radiated noise	Measure the emission released by the product.	30M-230 M Hz QP: 30dBμ V/m (30m measurement) *1 230M-1000MHz QP: 37dBμ V/m (30m measurement) *1
	EN55011 *2 Conduction noise	Measure the emission released by the product to the power line.	150k-500kHz QP: 79dB, Mean: 66dB*1 500k-30MHz QP: 73dB, Mean: 60dB *1
EN61131-2/A12 (2000)	EN61000-4-2 *2 Static electricity immunity	Immunity test by applying static electricity to the module enclosure.	4kV contact discharge 8kV air discharge
	EN61000-4-4 *2 First transient burst noise	Immunity test by applying burst noise to the power line and signal line.	2kV Power line 1kv Signal line
	EN61000-4-12 *2 Damped oscillatory wave	Immunity test in which a damped oscillatory wave is superimposed on the power line.	1kv
	EN61000-4-3 *2 Radiated electromagnetic field	Immunity test by applying a radiated electric field to the product.	10V/m, 26-1000MHz
EN61000-6-2 (2001)	EN61000-4-6 *2 Conduction noise	Immunity test by inducting an electromagnetic field in the power line signal line.	10 V/ms, 0.15-80MHZ, 80% AM modulation@1kHz

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

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

3.1.2 Installation instructions for EMC Directive

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

* : Also, each network remote station needs to be installed inside the control panel. However, the waterproof type remote station can be installed outside the control panel.

(1) Control cabinet

(a) Use a conductive control cabinet.

(b) When attaching the control cabinet's top plate or base plate, mask painting and weld so that good surface contact can be made between the cabinet and plate.

(c) To ensure good electrical contact with the control cabinet, mask the paint on the installation bolts of the inner plate in the control cabinet so that contact between surfaces can be ensured over the widest possible area.

(d) Earth the control cabinet with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies.

(e) Holes made in the control cabinet must be 10 cm (3.94 in.) diameter or less. If the holes are 10 cm (3.94 in.) or larger, radio frequency noise may be emitted.
In addition, because radio waves leak through a clearance between the control panel door and the main unit, reduce the clearance as much as practicable.
The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.
Our tests have been carried out on a panel having the damping characteristics of 37 dB max. and 30 dB mean (measured by 3 m method with 30 to 300 MHz).

(2) Connection of power and earth wires

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

(a) Provide an earthing point near the power supply module. Earth the power supply's LG and FG terminals (LG: Line Ground, FG: Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30 cm (11.81 in.) or shorter.) The LG and FG terminals function is to pass the noise generated in the PLC system to the ground, so an impedance that is as low as possible must be ensured. In addition, make sure to wire the ground cable short as the wires are used to relieve the noise, the wire itself carries large noise content and thus short wiring means that the wire is prevented from acting as an antenna.

(b) The earth wire led from the earthing point must be twisted with the power supply wires. By twisting with the earthing wire, noise flowing from the power supply wires can be relieved to the earthing. However, if a filter is installed on the power supply wires, the wires and the earthing wire may not need to be twisted.

3.1.3 Cables

The cables pulled out of the control panel contain a high frequency noise component. On the outside of the control panel, therefore, they serve as antennas to emit noise.

Ensure to use shielded cables for the cables, which are connected to the I/O modules, special modules and those pulled out to outside of the control panel. Mounting ferrite core is not required except some types of CPU however, noise emanated via the cable can be restrained using it.

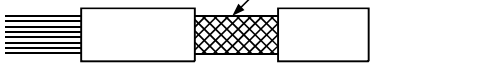
The use of a shielded cable also increases noise resistance. The signal lines (including common line) connected to the PLC input/output modules and intelligent modules use shielded cables to assure noise resistance, as a condition, standardized on EN61131-2/A12(2000).

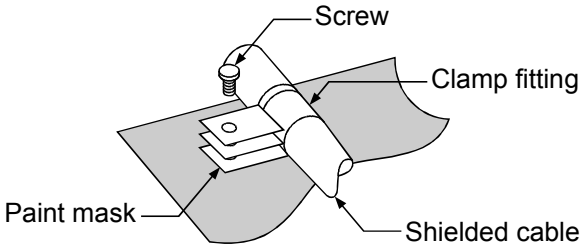
If a shielded cable is not used or not earthed correctly, the noise resistance will be less than the rated value

(1) Earthing of shielded of cables

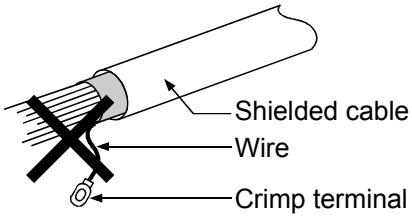
(a) Earth the shield of the shielded cable as near the unit as possible taking care so that the earthed cables are not induced electromagnetically by the cable to be earthed.

(b) Take appropriate measures so that the shield section of the shielded cable from which the outer cover was partly removed for exposure is earthed to the control panel on an increased contact surface. A clamp may also be used as shown in the figure below. In this case, however, apply a cover to the painted inner wall surface of the control panel which comes in contact with the clamp.



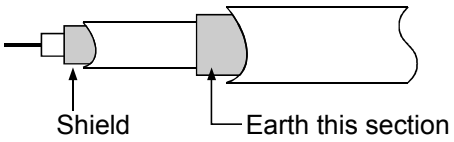


Note) The method of earthing by soldering a wire onto the shield section of the shielded cable as shown below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



(2) MELSECNET (II) and MELSECNET/10 units

(a) Use a double-shielded coaxial cable for the MELSECNET unit which uses coaxial cables. Noise in the range of 30 MHz or higher in radiation noise can be suppressed by the use of double-shielded coaxial cables (Mitsubishi Cable: 5C-2V-CCY). Earth the outer shield to the ground. The precautions on shielding to be followed are the same as those stated in item (1) above.

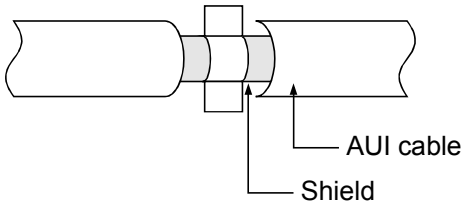


(b) Ensure to attach a ferrite core to the double-shielded coaxial cable connected to the MELSECNET unit. In addition, position the ferrite core on each cable near the outlet of the control panel. TDK-make ZCAT3035 ferrite core is recommended.

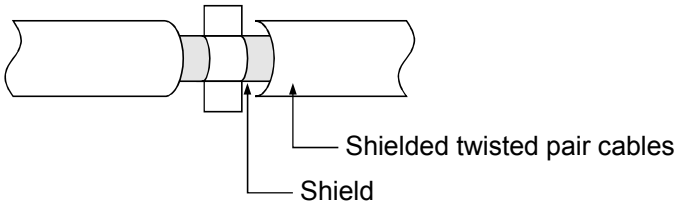
(3) Ethernet module

Precautions to be followed when AUI cables and coaxial cables are used are described below.

(a) Ensure to earth also the AUI cables connected to the 10BASE5 connectors of the A1SJ71QE71-B5. Because the AUI cable is of the shielded type, as shown in the figure below, partly remove the outer cover of it, and earth the exposed shield section to the ground on the widest contact surface.



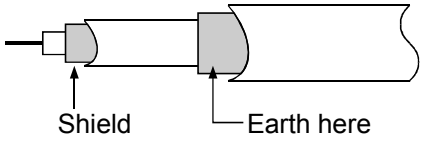
(b) Use shielded twisted pair cables as the twisted pair cables*1 connected to the 10BASE-T connectors. For the shielded twisted pair cables, strip part of the outer cover and earth the exposed shield section to the ground on the widest contact surface as shown below.



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

*1: Make sure to install a ferrite core for the cable.
As a ferrite core, ZCAT2035 manufactured by TDK is recommended.

(c) Always use double-shielded coaxial cables as the coaxial cables*2 connected to the 10BASE2 connectors. Earth the double-shielded coaxial cable by connecting its outer shield to the ground.



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

*2: Make sure to install a ferrite core for the cable.
As a ferrite core, ZCAT2035 manufactured by TDK is recommended.

Ethernet is the registered trademark of XEROX, Co.,LTD

(4) I/O and other communication cables

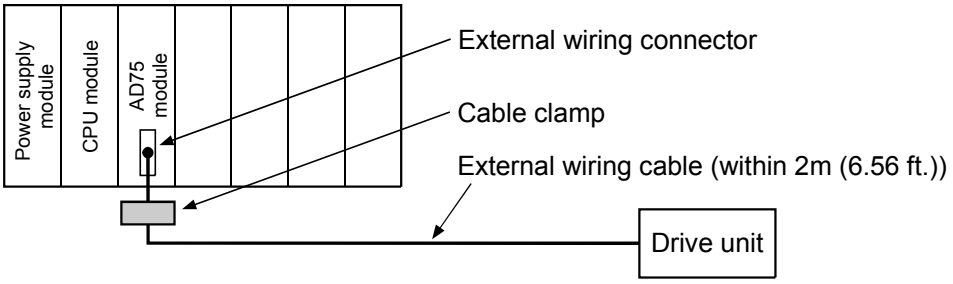
For the I/O signal lines (including common line) and other communication cables (RS-232, RS-422, etc), if extracted to the outside of the control panel, also ensure to earth the shield section of these lines and cables in the same manner as in item (1) above.

(5) Positioning Modules

Precautions to be followed when the machinery conforming to the EMC Directive is configured using the AD75P□-S3 are described below.

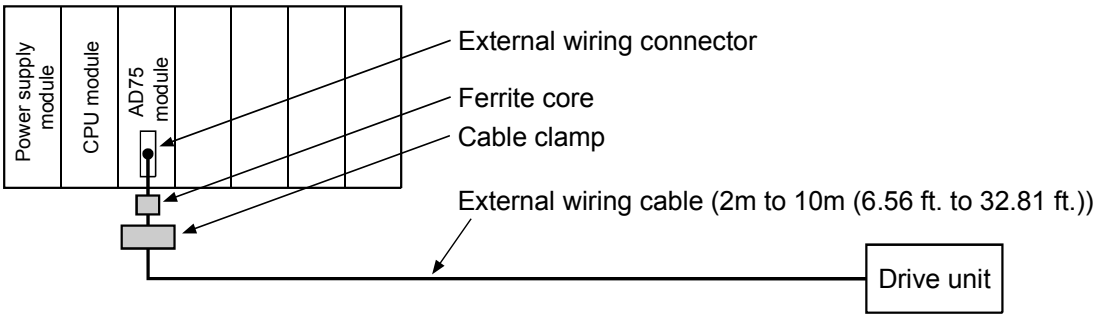
(a) When wiring with a 2 m (6.56 ft.) or less cable

- Ground the shield section of the external wiring cable with the cable clamp.
  (Ground the shield at the closest location to the AD75 external wiring connector.)
- Wire the external wiring cable to the drive unit and external device with the shortest practicable length of cable.
- Install the drive unit in the same panel.



(b) When wiring with cable that exceeds 2 m (6.56 ft.), but is 10 m (32.81 ft.) or less

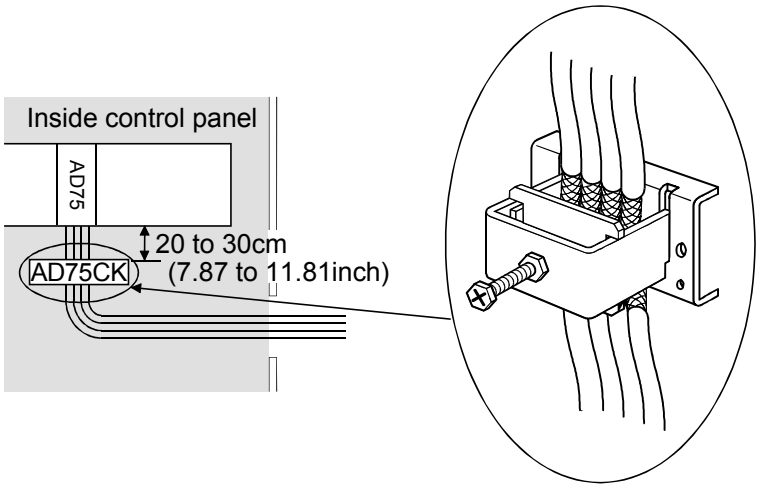
- Ground the shield section of the external wiring cable with the cable clamp.
  (Ground the shield at the closest location to the AD75 external wiring connector.)
- Install a ferrite core.
- Wire the external wiring cable to the drive unit and external device with the shortest practicable length of cable.



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

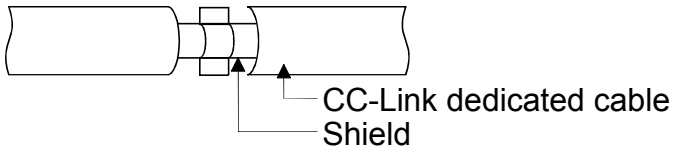
- Cable clamp
  Type : AD75CK (Mitsubishi Electric)
- Ferrite core
  Type : ZCAT3035-1330 (TDK ferrite core)
- Required quantity

Cable length	Prepared part	Required Qty		
		1 axis	2 axes	3 axes
Within 2 m (6.56 ft.)	AD75CK	1	1	1
2 m (6.56 ft.) to 10m (32.81 ft.)	AD75CK	1	1	1
	ZCAT3035-1330	1	2	3



(6) CC-Link Module

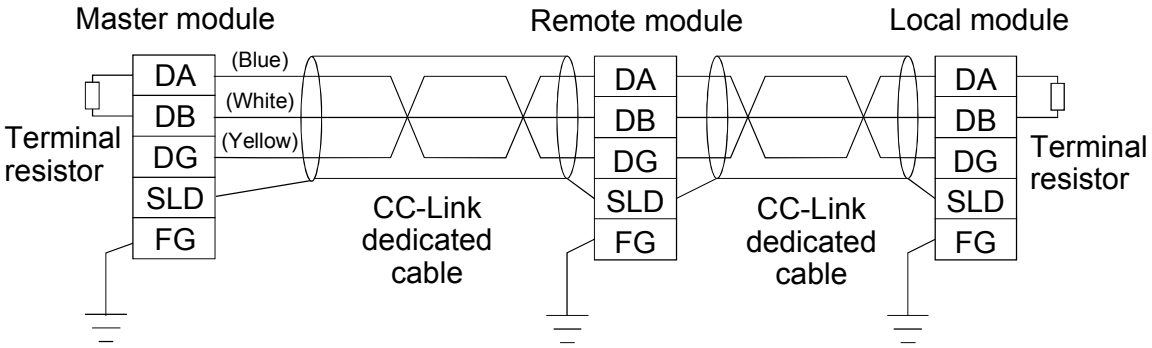
(a) Be sure to ground the cable shield that is connected to the CC-Link module close to the exit of control panel or to any of the CC-Link stations within 30 cm (11.81 in.) from the module or stations.
The CC-Link dedicated cable is a shielded cable. As shown in the illustration below, remove a portion of the outer covering and ground as large a surface area of the exposed shield part as possible.



(b) Always use the specified CC-Link dedicated cable.

(c) The CC-Link module, the CC-Link stations and the FG line inside the control panel should be connected at the FG terminal as shown in the diagram below.

[Simplified diagram]



(d) Power line connecting to the external power supply terminal (compliant with I/O power port of CE standard) should be 30m (98.43 ft.) or less. Power line connecting to module power supply terminal (compliant with main power port of CE standard) should be 10m (32.81 ft.) or less.

(e) A power line connecting to the analog input of the following modules should be 30cm or less.
- AJ65BT-64RD3
- AJ65BT-64RD4
- AJ65BT-68TD

3.1.4 Power supply module

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

Model name	Precautions
A61P, A61PN, A62P	N/A
A63P	Use a CE-compliant 24VDC power supply in the control panel.
A61PEU, A62PEU, A1NCPU (Power supply part)	Make sure to short and ground the LG and FG terminals.

3.1.5 Ferrite core

Use of ferrite cores is effective in reducing the conduction noise in the band of about 10 MHz and radiated noise in 30 to 100 MHz band.

It is recommended to attach ferrite cores when the shield of the shielded cable coming out of control panel does not work effectively, or when emission of the conduction noise from the power line has to be suppressed.*1 The ferrite cores used in our tests are TDK's ZCAT3035.

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

＊1:To response with CE(EN61131-2/A12), make sure to mount 2 or more ferrite cores onto the power supply line. The mounting position should be as near the power supply module as possible.

- Ferrite core
  Type: ZCAT2235-1030A (TDK ferrite core)

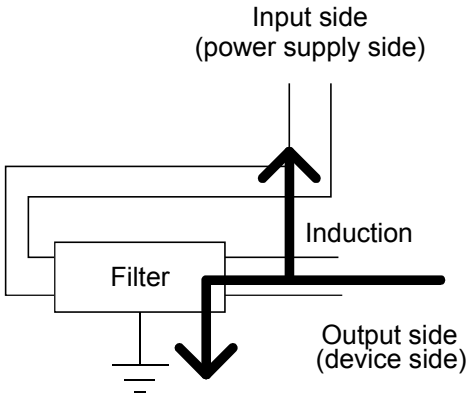
3.1.6 Noise filter (power supply line filter)

A noise filter is a component which has an effect on conducted noise. With the exception of some models, it is not required to fit the noise filter to the power supply line, but fitting it can further suppress noise. (The noise filter has the effect of reducing conducted noise of 10 M Hz or less.) Use any of the following noise filters (double π type filters) or equivalent.

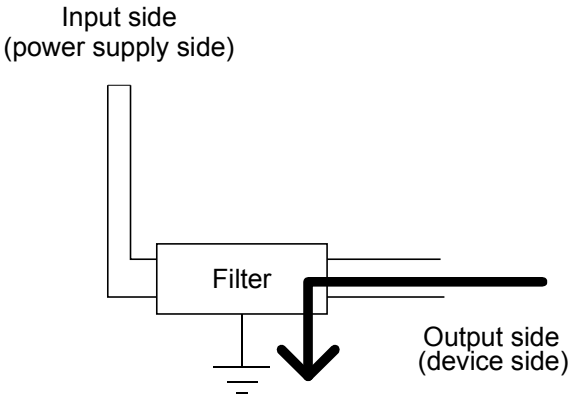
Model name	FN343-3/01	FN660-6/06	ZHC2203-11
Manufacturer	SCHAFFNER	SCHAFFNER	TDK
Rated current	3 A	6 A	3 A
Rated voltage	250 V		

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. 10 cm (3.94 in.)).

3.2 Requirements for Compliance with Low Voltage Directives

The Low Voltage Directives apply to the electrical equipment operating from 50 to 1000VAC or 75 to 1500VDC; the manufacturer must ensure the adequate safety of the equipment.
Guidelines for installation and wiring of MELSEC-A series PLC are provided in Section 3.2.1 to 3.2.7 for the purpose of compliance with the EMC Directives.
The guidelines are created based on the requirements of the regulations and relevant standards, however, they do not guarantee that the machinery constructed according to them will comply with the Directives.
Therefore, the manufacturer of the machinery must finally determine how to make it comply with the EMC Directives: if it is actually compliant with the EMC Directives.

3.2.1 Standard applied for MELSEC-A series PLC

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

For the modules which operate with the rated voltage of 50 VAC/75 VDC or above, we have developed new models that conform to the above standard.
For the modules which operate with the rated voltage under 50 VAC/75 VDC, the conventional models can be used, because they are out of the low voltage directive application range.

3.2.2 Precautions when using the MELSEC-A series PLC

Module selection

(1) Power module
For a power module with rated input voltage of 100/200 VAC, 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 42.4 V or more at the peak) area.
For a power module with 24 VDC rated input, a conventional model can be used.

(2) I/O module
For I/O module with rated input voltage of 100/200 VAC, 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 24 VDC 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 5 VDC circuit inside.

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

(5) Display device
Use the CE-marked product.

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 PLC.
The installation category indicates the durability level against surge voltage generated by a thunderbolt. Category I has the lowest durability; category IV has the highest durability.

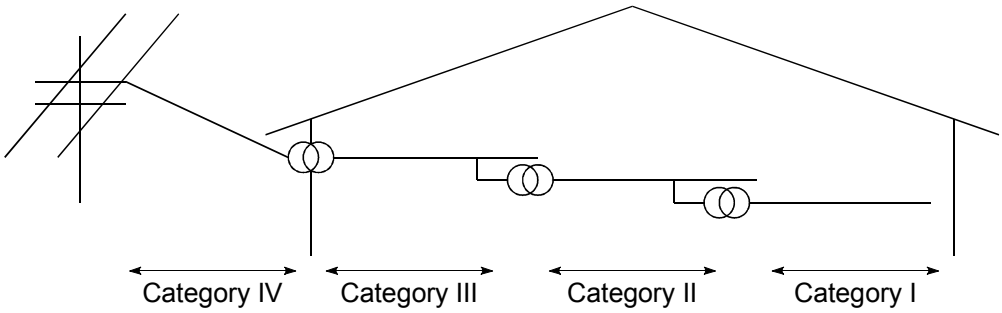


Figure 1: Installation Category

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

3.2.4 Control panel

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

(1) Electrical shock prevention
In order to prevent persons who are not familiar with the electric facility such as the operators from electric shocks, the control panel must have the following functions:
(a) The control panel must be equipped with a lock so that only the personnel who has studied about the electric facility and have enough knowledge can open it.
(b) The control panel must have a structure which automatically stops the power supply when the box is opened.
(c) For electric shock protection, use IP20 or greater control panel.

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

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

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

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

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

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

3.2.5 Module installation

(1) Installing modules contiguously

In Q2AS series PLCs, 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 100/200 VAC rating, the printed board which contains the hazardous voltage circuit becomes bare. When it is unavoidable to make an open slot, be sure to install the blank module (AG60).

3.2.6 Grounding

There are two kinds of grounding terminals as shown below. Either grounding terminal must be used grounded.

Be sure to ground the protective grounding for the safety reasons.

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

Functional grounding  : Improves the noise resistance.

3.2.7 External wiring

(1) Module power supply and external power supply

For the remote module which requires 24VDC as module power supply, the 5/12/24/48VDC I/O module, and the special function module which requires the external power supply, use the 5/12/24/48VDC circuit which is doubly insulated from the hazardous voltage circuit or use the power supply whose insulation is reinforced.

(2) External devices

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

(3) Intensive insulation

Intensive insulation refers to the insulation with the dielectric withstand voltage shown in Table 1.

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

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

4.1 Installing Modules

4.1.1 Notes on handling the module

This section explains some notes on handling the CPU module, I/O module, special function module, power supply module, and base unit.

(1) Do not drop or allow any impact to the modules case, memory card, terminal block cover, or pin connector.

(2) Do not remove modules' printed circuit boards from the plastic casing.

(3) Use caution to prevent foreign matter, such as wire chips, falling into the module during wiring. If foreign matter enters the module, remove it.

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

Screw	Tightening Torque N·cm
Module mounting screws (M4 screw) (optional)	78 to 118
Terminal block screws	98 to 137

(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) A location in which the ambient temperature falls outside the range of 0 to 55 degrees Celsius.

(2) A location in which the ambient humidity falls outside the range of 10 to 90%RH.

(3) A location in which condensation may occur due to drastic changes in temperature.

(4) A location in which corrosive gas or flammable gas exists.

(5) A location in which the system is easily exposed to conductive powder, such as dust and iron filings, oil mist, salt, or organic solvent.

(6) A location exposed to direct sunlight.

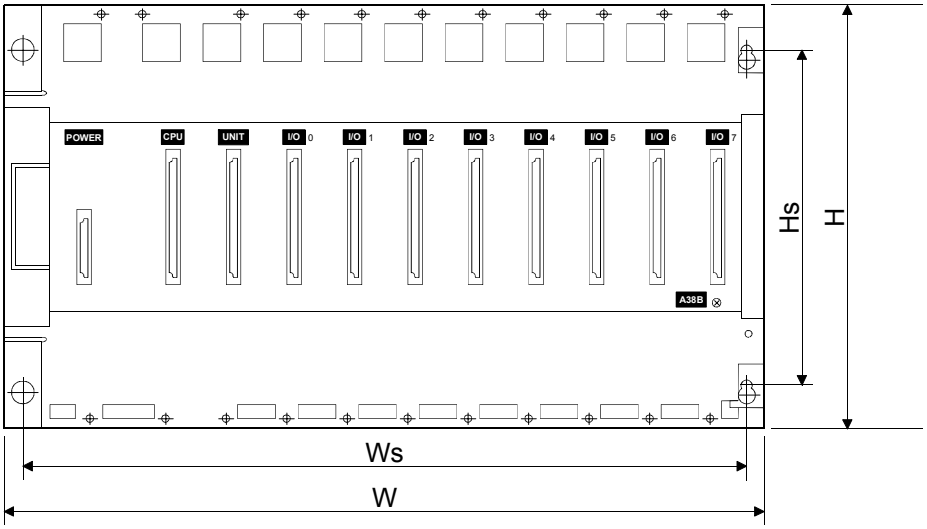
(7) A location in which strong electrical or magnetic fields are generated.

(8) A location in which the module is exposed to direct vibration or impact.

4.1.3 Notes on installing the base unit

Take ease of operation, ease of maintenance, and environmental durability into consideration when you are installing the PLC on the panel.

(1) Mounting dimension
Mounting dimensions of each base unit are as follows.

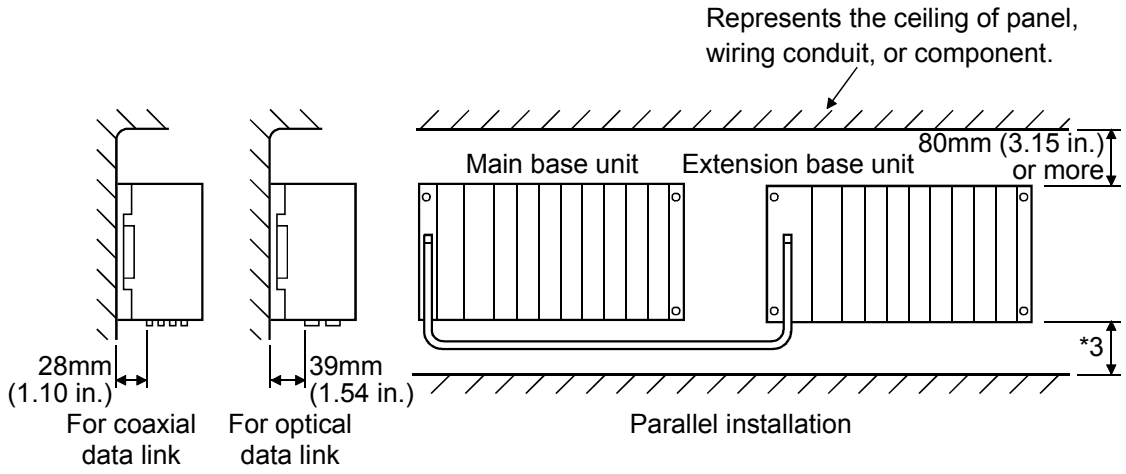


	A32B	A32B-S1	A35B	A38B	A62B	A65B	A68B	A52B	A55B	A58B
W	247 (9.72)	268 (10.55)	382 (15.03)	480 (18.9)	238 (9.37)	352 (13.86)	466 (18.35)	183 (7.2)	297 (11.69)	411 (16.18)
Ws	227 (8.93)	248 (9.76)	362 (14.25)	460 (18.11)	218 (8.58)	332 (13.07)	446 (17.6)	163 (6.42)	277 (10.9)	391 (15.4)
H	250 (9.84)		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

Dimensions: mm (inch)

(2) Module installation position

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



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

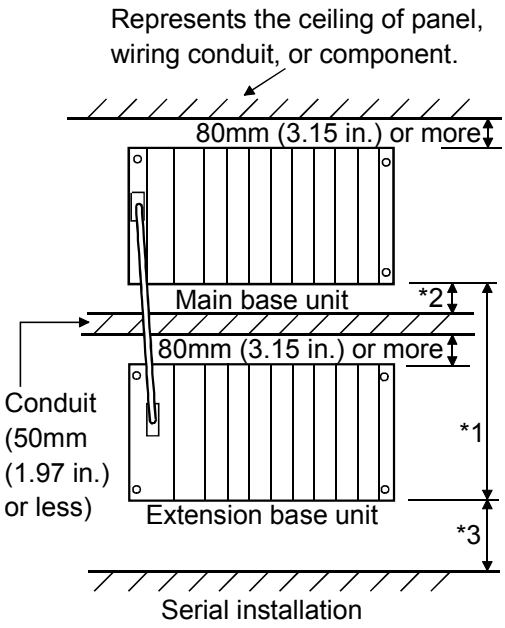
If its clearance above or below the programmable controller is less than indicated in the figure above, observe the following points:

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

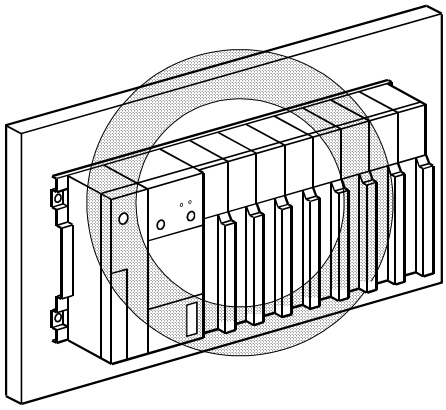
(b) If the wiring conduit is installed below the programmable controller, it should be installed so as to allow connection of the optical fiber cable or coaxial cable, taking the minimum bending radius of the cable into consideration.



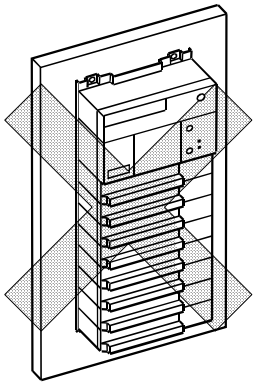
*1 : These dimensions vary depending on the length of the extension cable as follows:
AC06B cable..... 450mm (17.71in.) or less
AC12B cable..... 1050mm (41.34in.) or less
AC30B cable..... 2850mm (112.20in.) or less
*2 : When a link module is not used..... 50mm (1.97in.) or more
When using ϕ4.5mm optical fiber cable, or coaxial cable..... 100mm (3.94in.) or more
When using ϕ8.5mm optical fiber cable ..... 130mm (5.12in.) or more
*3 : When a link module is not used..... 50mm (1.97in.) or more
When using ϕ4.5mm optical fiber cable, or coaxial cable ..... 100mm (3.94in.) or more
When using ϕ8.5mm optical fiber cable ..... 130mm (5.12in.) or more

(4) Module installation direction

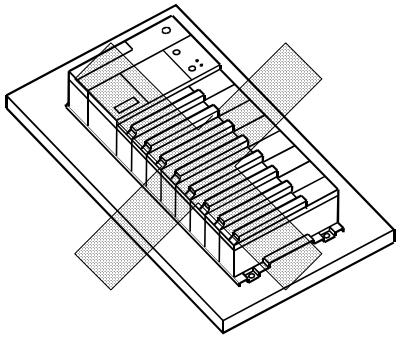
(a) Use the PLC in the following position for better ventilation and heat dissipation:



(b) Do not use the PLC in the following positions:



Vertical position



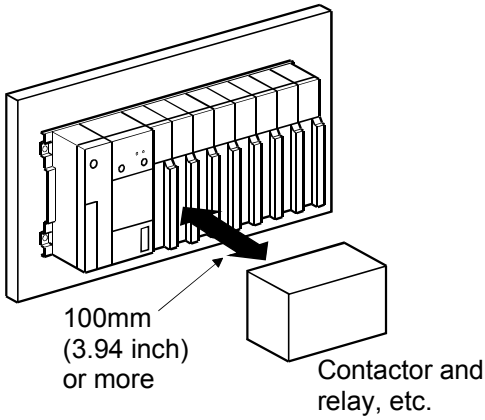
Horizontal position

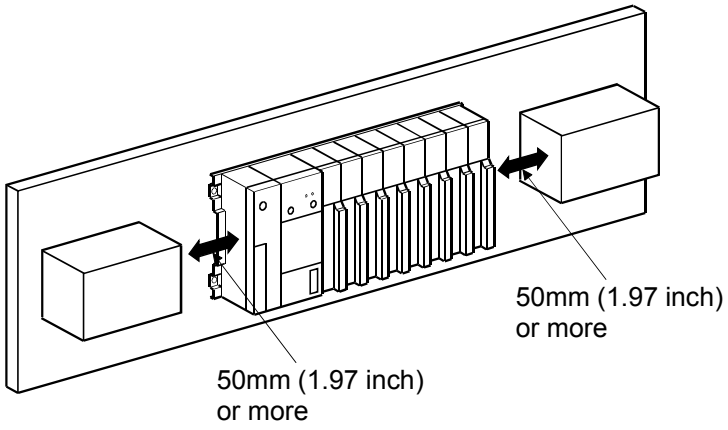
(5) Install the base unit on a level surface.
If the surface is not level, force may be applied to the printed wiring board, causing a malfunction.

(6) Install the unit far from any source of vibration, such as a large magnetic contactor and a no-fuse breaker on the same panel, or install it on a separate panel.

(7) Keep the following distance between the PLC and other devices (such as a contactor and a relay) in order to avoid the influence of radiated noise and heat:

- a device installed in front of the PLC ..... 100mm (3.94 inch) or more
- a device installed on the right or left of the PLC ..... 50mm (1.97 inch) or more





4.2 Fail-Safe Circuit Concept

When the PLC is powered ON and then OFF, improper outputs may be generated temporarily depending on the delay time and start-up time differences between the PLC power supply and the external power supply for the control target (especially, DC).

For example, if the external power supply for the control target is powered ON and then the PLC is powered ON, the DC output module may generate incorrect outputs temporarily upon the PLC power-ON. Therefore, it is required to build the circuit that energizes the PLC by priority.

The external power failure or PLC failure may lead to the system error.
In order to eliminate the possibility of the system error and ensure fail-safe operation, build the following circuit outside the PLC: emergency circuit, protection circuit and interlock circuit, as they could cause machine damages and accidents due to the abovementioned failures.

An example of system design, which is based on fail-safe concept, is provided on the next page.

DANGER

- Create a safety circuit outside the PLC to ensure the whole system will operate safely even if an external power failure or a PLC failure occurs.
  Otherwise, incorrect output or malfunction may cause an accident.
  (1) For an emergency stop circuit, protection circuit and interlock circuit that is designed for incompatible actions such as forward/reverse rotation or for damage prevention such as the upper/lower limit setting in positioning, any of them must be created outside the PLC.
  (2) When the PLC detects the following error conditions, it stops the operation and turn off all the outputs.
  - The overcurrent protection device or overvoltage protection device of the power supply module is activated.
  - The PLC CPU detects an error such as a watchdog timer error by the self-diagnostics function.

  In the case of an error of a part such as an I/O control part that cannot be detected by the PLC CPU, all the outputs may turn on. In order to make all machines operate safely in such a case, set up a fail-safe circuit or a specific mechanism outside the PLC.
  (3) Depending on the failure of the output module's relay or transistor, the output status may remain ON or OFF incorrectly. For output signals that may lead to a serious accident, create an external monitoring circuit.
- Design a circuit so that the external power will be supplied after power-up of the PLC.
  Activating the external power supply prior to the PLC may result in an accident due to incorrect output or malfunction.
- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the output module for a long time, it may cause a fire and smoke. Provide an external safety device such as a fuse.
- For the operation status of each station at a communication error in data link, refer to the respective data link manual.
  The communication error may result in an accident due to incorrect output or malfunction.

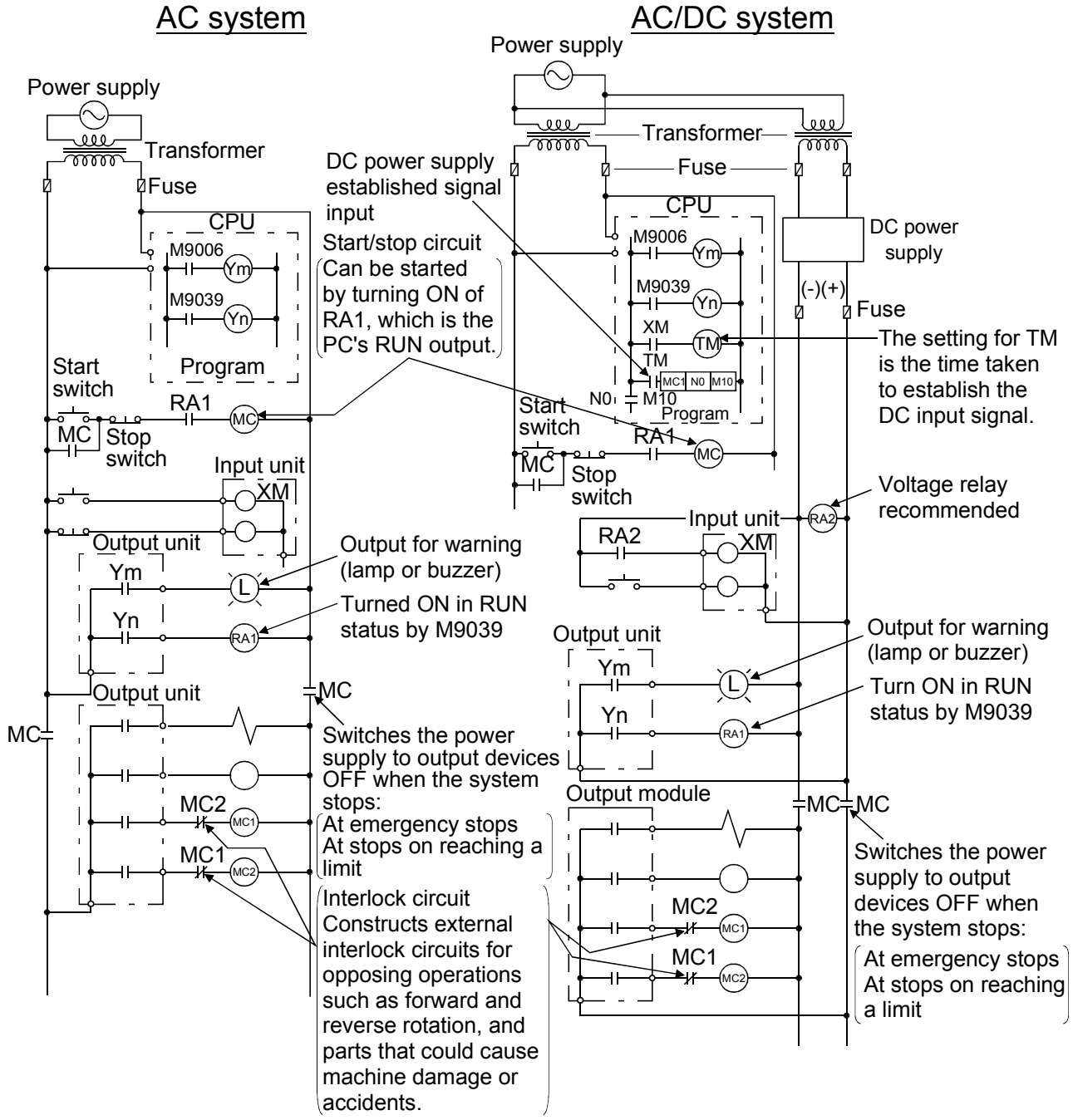
DANGER

- When controlling a running PLC (data modification) by connecting a peripheral device to the CPU module or a PC to a special function module, create an interlock circuit on sequence programs so that the whole system functions safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the manual carefully and ensure the safety.
  In these controls, especially the one from an external device to a PLC in a remote location, some PLC side problem may not be resolved immediately due to failure of data communications.
  To prevent this, create an interlock circuit on sequence programs and establish corrective procedures for communication failure between the external device and the PLC CPU.
- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (AG60) or a dummy module (AG62) for it.
  When using the extension base unit, A52B, A55B or A58B, attach the included dustproof cover to the module in slot 0. Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to external I/O section.

CAUTION

- Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
  Keep a distance of 100mm (3.9inch) or more between them. Failure to do so may cause malfunctions due to noise.
- When an output module is used to control the lamp load, heater, solenoid valve, etc., a large current (ten times larger than the normal one) may flow at the time that the output status changes from OFF to ON. Take some preventive measures such as replacing the module with the one of a suitable current rating.

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

AC/DC system

[1] Switch the power supply ON.
[2] Set the CPU module 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 accord-ance 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 PLC failure

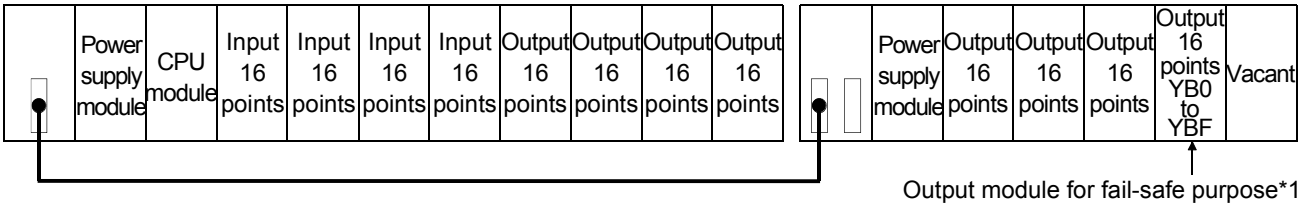
Problems with a CPU module and memory can be detected by the self diagnostics function. However, problems with I/O control area may not be detected by the CPU module.

In such cases, all I/O points turn ON or OFF depending on the problem, and normal operation and safety cannot be maintained.

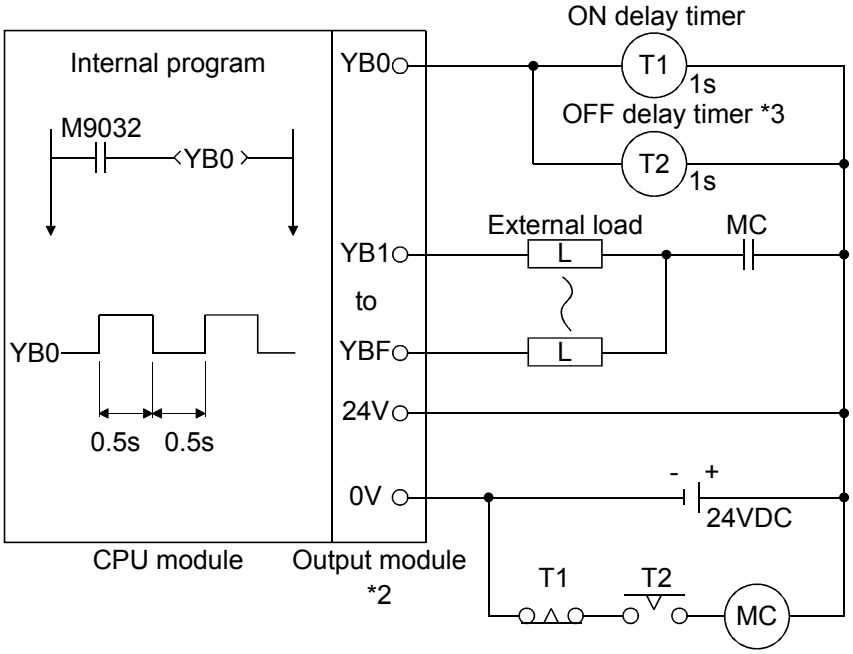
Though Mitsubishi PLCs are manufactured under strict quality control, they may fail or malfunction due to unspecified reasons. To prevent the whole system failure, machine breakdown, and accidents, build a fail-safe circuit outside the PLC.

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

<System example>



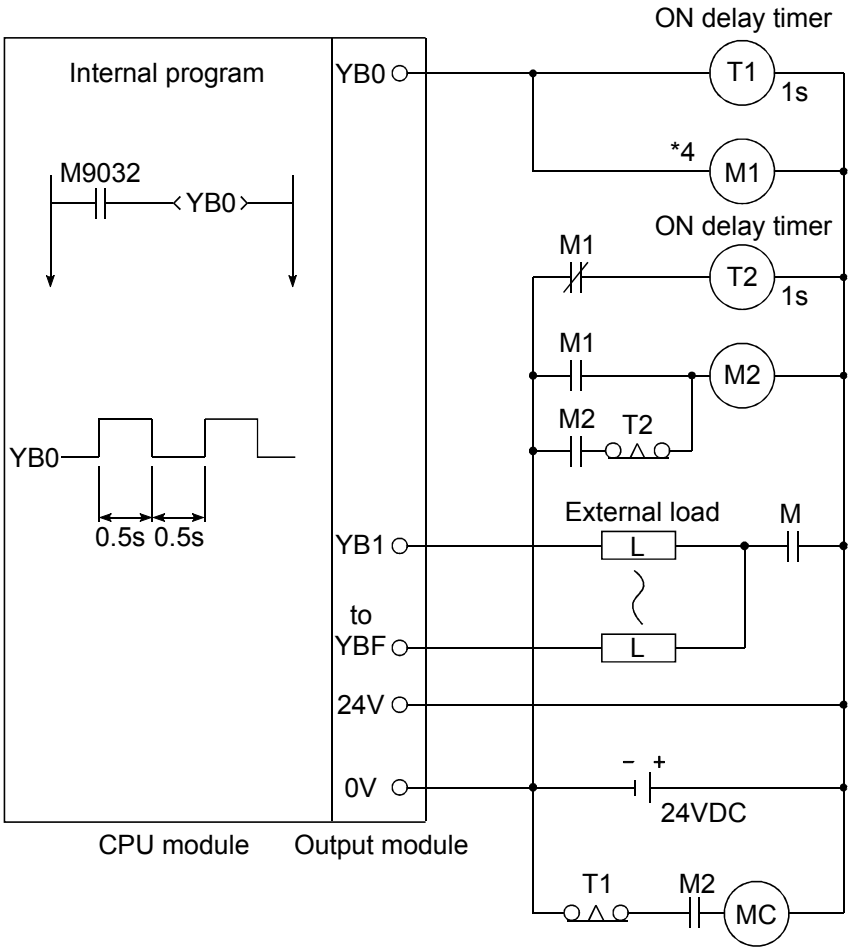
*1: The output module for fail-safe purpose should be mounted on the last slot of the system. (YB0 to YBF in the above system.)



*2: Since YB0 turns ON and OFF alternatively at 0.5 second intervals, use a contactless output module (a transistor is used in the above example).

*3: If an OFF delay timer (especially a miniature timer) is not available, use ON delay timers to make a fail-safe circuit as shown below.

A fail-safe circuit built with ON delay timers



*4: Use a solid state relay for the M1 relay.

4.3 Power Supply Connection

4.3.1 Performance Specification for Power Supply Modules

(1) Normal power supply module

Table 4.1 Power Supply Module Specifications

Item		Specifications						
		A61P	**A61PN**	**A62P**	**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 to 120 VAC +10% -15% (85 to 132 VAC)			24VDC +30% -35% (15.6 to 31.2 VDC)	100 to 120 VAC +10% -15% (85 to132 VAC)		110 VDC (85 to 140 VDC)
		200 to 240 VAC +10 % -15 % (170 to 264 VAC)				200 to 240 VAC +10 % -15 % (170 to 264 VAC)		
Input frequency		50/60 Hz ±5 %			—	50/60 Hz ±5 %		—
Input voltage distortion factor.		Within 5% (Refer to Section 4.4)			—	Within 5% (Refer to Section 4.4)		—
Max. input apparent power		160 VA		155 VA	65 W	110 VA	95 VA	65 W
Inrush current		20 A, within 8 ms*4			100 A, within 1 ms	20 A, within 8 ms*4		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						
Withstanding voltage		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						
Noise durability		Noise voltage 1500 Vp-p Noise width 1μs, Noise frequency 25 to 60 Hz (noise simulator condition)			Noise voltage 500 Vp-p Noise width 1 s, Noise frequency 25 to 60 Hz (noise simulator condition)	Noise voltage 1500 Vp-p Noise width 1 s, Noise frequency 25 to 60 Hz (noise simulator condition)		Noise voltage 500 Vp-p Noise width 1 s, Noise frequency 25 to 60 Hz (noise simulator condition)
Insulation resistance		10 MΩ or higher, measured with a 500 VDC insulation resistance tester						

Table 4.1 Power Supply Module Specifications

Item	Specifications						
	A61P	**A61PN**	**A62P**	**A63P**	**A65P**	**A66P**	**A67P**
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	R1.25-4, R2-4, RAV1.25-4, RAV2-4					R1.25-3, R2-3, RAV1.25-3, RAV2-3	R1.25-4, R2-4, RAV1.25-4, RAV2-4
Applicable tightening torque:	78 to 118 N · cm					39 to 59 N · cm	78 to 118 N · cm
External dimensions	250 (H) × 55 (W)× 121 (D) (9.8× 2.1× 4.7) mm (inch)					250 (H) × 37.5 (W) × 121 (D) (9.8× 1.5× 4.7) mm (inch)	250 (H) × 55 (W) × 121 (D) (9.8× 2.1× 4.7) mm (inch)
Weight	0.98 kg	0.75 kg	0.94 kg	0.8 kg	0.94 kg	0.75 kg	0.8 kg
Allowable momentary power interruption time *3	Less than 20ms			Less than 1ms	Less than 20ms	——	Less than 20ms (at 100 VDC)

REMARK

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

(2) Power supply module for CE marking

Table 4.2 Power Supply Module Specifications

Item		Specifications	
		A61PEU	A62PEU
Base unit loading position		Power supply module loading slot	
Input voltage		100 to 120 / 200 to 240 VAC +10% -15% (85 to 264 VAC)	
Input frequency		50/60 Hz ±5 %	
Input voltage distortion factor.		Within 5% (See Section 4.4)	
Max. input apparent power		130 VA	155 VA
Inrush current		20 A, within 8 ms	
Rated output current	5 VDC	8 A	5 A
	24 VDC	—	0.8 A
Overcurrent protection *1	5 VDC	8.8 A or higher	5.5 A or higher
	24 VDC	—	1.2 A or higher
Overvoltage protection *2	5 VDC	5.5 to 6.5 V	—
	24 VDC	—	
Efficiency		65 % or higher	
Withstanding voltage		2830 VAC	
Noise durability		Noise voltage IEC801-4; 2kV, 1500 Vp-p Noise width 1 s, Noise frequency 25 to 60 Hz (noise simulator condition)	
Insulation resistance		10 MΩ or higher, measured with a 500 VDC insulation resistance tester	
Power indicator		Power LED display	
Terminal screw size		M4 × 0.7 × 6	
Applicable wire size		0.75 to 2 mm^2	
Applicable solderless terminal		RAV1.25-4, RAV2-4	
Applicable tightening torque		78 to 118 N · cm	
External dimensions		250 (H) × 55 (W)× 121 (D) (9.8× 2.1× 4.7) mm (inch)	
Weight		0.8 kg	0.9 kg
Allowable momentary power interruption time *3		Less than 20ms	

POINTS

*1: Overcurrent protection

The overcurrent protection device shuts off the 5VDC and/or 24VDC circuit(s) and stops the system if the current exceeding the specified value flows in the circuit(s).

As this results in voltage drop, the power supply module LED turns OFF or is dimly lit.

After that, eliminate the causes of overcurrent, e.g., insufficient current capacity and short circuit, and then start the system.

When the current has reached the normal value, the initial start up of the system will be performed.

*2: Overvoltage protection

The overvoltage protection shuts off the 5VDC circuit and stops the system if the overvoltage of 5.5 to 6.5V is applied to the circuit.

This results in the power supply module LED turning OFF.

When restarting the system, power OFF and ON the input power supply, and the initial start up of the system will be performed.

If the system is not booted and the LED remains off, this means that the power supply module has to be replaced.

*3: Allowable momentary power failure period

The PLC CPU allowable momentary power failure period varies with the power supply module used.

In case of the A1S63P power supply module, the allowable momentary power failure period is defined as the time from when the primary side of the stabilized power supply for supplying 24VDC to the A1S63P is turned OFF until when the voltage (secondary side) has dropped from 24VDC to the specified value (15.6VDC) or less.

*4: Inrush current

If the power supply module is re-powered ON right after powered OFF (within 5seconds), the inrush current exceeding the specified value (2ms or less) may be generated. Therefore, make sure to re-power ON the module 5seconds after power off.

When selecting a fuse or breaker for external circuit, consider the above point as well as meltdown and detection characteristics.

4.3.2 Part names and settings 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, A61PN and A61PEU module

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

"POWER" LED
LED for indicating 5 VDC power.

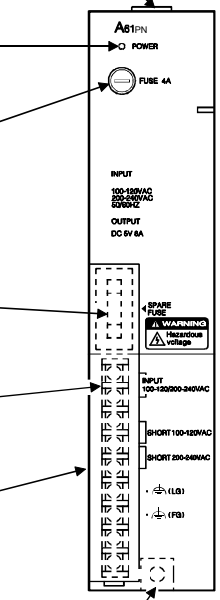
Power fuse, fuse holder
4 A cartridge fuse for AC input power is secured by the fuse holder.

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



Terminal details

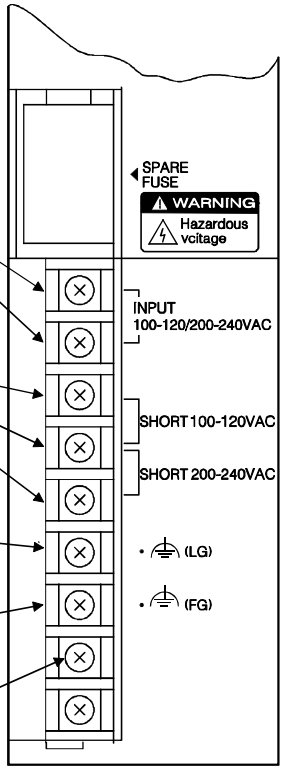
Power input terminals
Power input terminals to which AC power of 100 VAC or 200 VAC.

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.

Terminal screw
M4 × 0.7 × 6



(2) Names and description of parts of the A62P, A62PEU 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

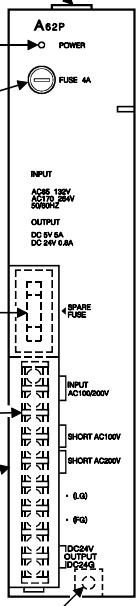
For details, see below. (Located under the terminal cover)

Terminal cover

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

Module mounting 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

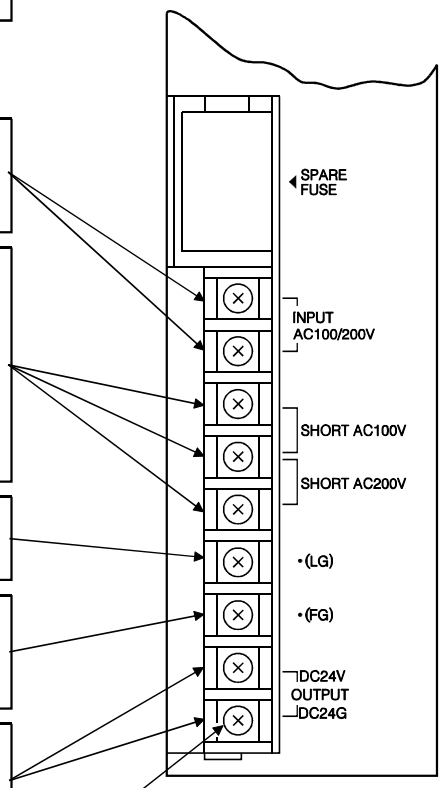
Connection terminal connected to the shielding pattern on printed circuit board.

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



(3) 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 or FGTA 250V 6A)
A67P: 4 A (GTH4 or FGTA 250V 4A)

Spare fuse for power supply

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

Terminal block

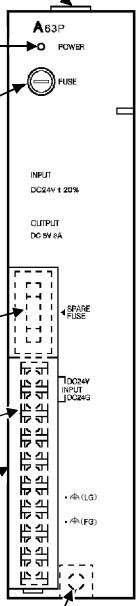
For details, see below. (Located under the terminal cover)

Terminal cover

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

Module mounting 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

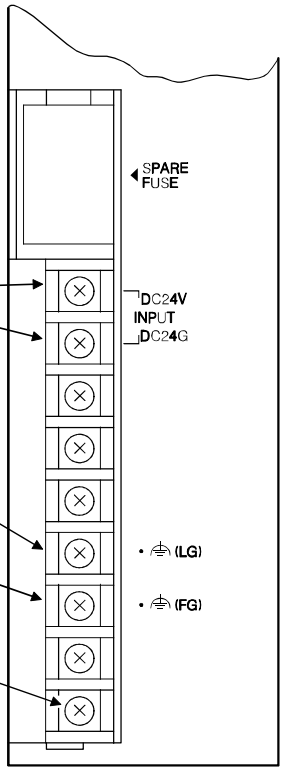
Grounding of power filter.

FG terminal

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

Terminal screw

M4 × 0.7 × 6



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

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.

Terminal block mouniting screw

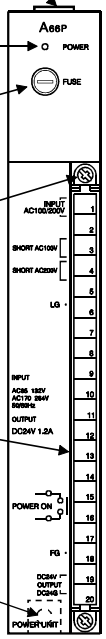
Screw for installing and fixing the terminal block to the module.

Terminal block

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

Module mouniting 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.

Power ON terminal

Contact terminal which conducts if the 24 VDC output is normal when power input turns on.

FG terminal

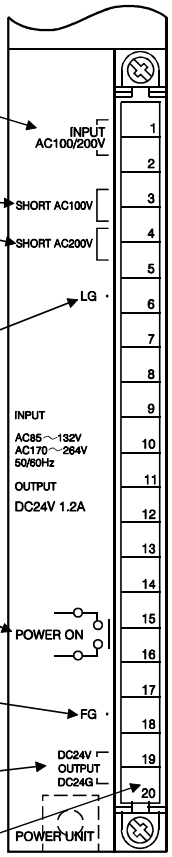
Connection terminal connected to the shielding pattern on printed circuit board.

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

M3 × 0.5 × 6



(5) Setting

For A61P, A61PN, A61PEU, A62P, A62PEU, A65P or A66P, the input voltage range, 100V or 200V, must be specified by placing a jumper (supplied) across two terminals as described below:

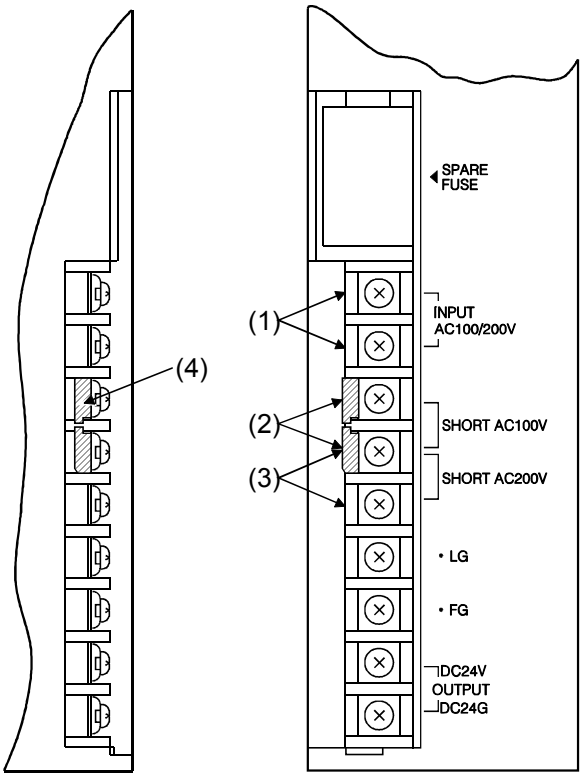
Remove the terminal cover from the power supply module.

↓

Remove the pair of terminal screw, (2) or (3), according to the supply voltage range (1) used.
(2): For the 100 VAC range.
(3): For the 200 VAC range.

↓

Fit the jumper (4) and secure it with the terminal screw.
Fit the jumper in the direction shown in the figure at right.
(The figure at right shows an example when the supply line voltage is 100 VAC.)



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 module is not damaged.)
Setting to 200VAC (jumper fitted as indicated at (3))	No error occurs in the module. However, the CPU module does not operate.	—
No setting (jumper not fitted)	No error occurs in the module. However, the CPU module does not operate.	

4.3.3 Wiring instructions

Instructions for wiring the power supply cable and I/O cable.

DANGER

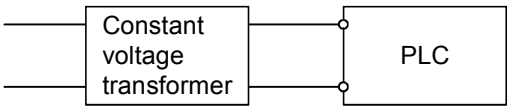
- Be sure to shut off all phases of the external power supply used by the system before wiring.
  Failure to do so may result in an electric shock or damage of the product.
- Before energizing and operating the system after wiring, be sure to attach the terminal cover supplied with the product.
  Failure to do so may cause an electric shock.

CAUTION

- Always ground the FG and LG terminals to the protective ground conductor.
  Failure to do so may cause an electric shock or malfunctions.
- Wire the module correctly after confirming the rated voltage and terminal layout.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.
- Do not connect multiple power supply modules to one module in parallel. The power supply modules may be heated, resulting in a fire or failure.
- Press, crimp or properly solder the connector for external connection with the specified tool.
  Incomplete connection may cause a short circuit, fire or malfunctions.
- Tighten terminal screws within the specified torque range. If the screw is too loose, it may cause a short circuit, fire or malfunctions.
  If too tight, it may damage the screw and/or the module, resulting in a short circuit or malfunctions.
- Carefully prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.
- Install our PLC in a control panel for use.
  Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.
  Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.
  (For the wiring methods, refer to Type A1N/A2N(S1)/A3NCPU User's Manual.)

(1) Power Supply Connection

(a) When voltage fluctuations are larger than the specified value, connect a constant-voltage transformer.



(b) Use a power supply which generates minimal noise between wires and between the PLC and ground. If excessive noise is generated, connect an insulating transformer.

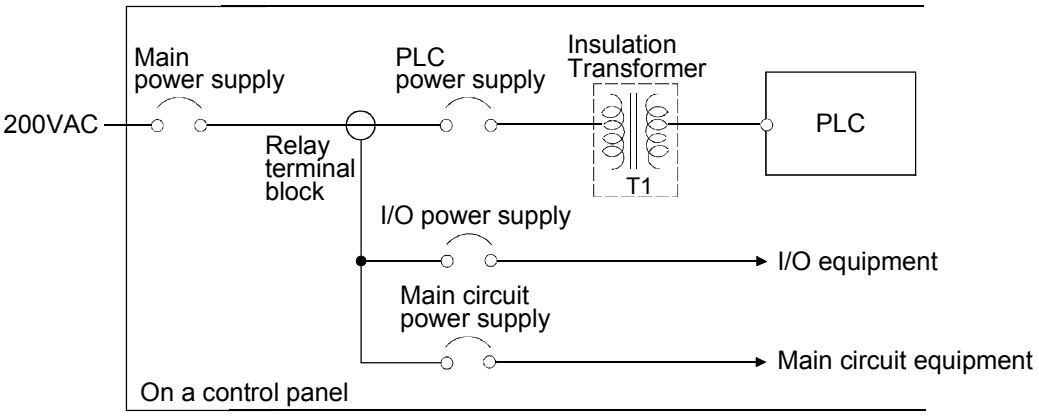
(c) When a power transformer or insulating transformer is employed to reduce the voltage from 200 VAC to 100 VAC, use one with a capacity greater than those indicated in the following table.

Power Supply Module	Transformer Capacity
A61P, A61P	160VA × n
A62P	155VA × n
A65P	110VA × n
A66P	95VA × n

n: Stands for the number of power supply modules.

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

(e) Taking rated current or inrush current into consideration when wiring the power supply, be sure to connect a breaker or an external fuse that have proper blown and detection.
When using a single PLC, a 10A breaker or an external fuse are recommended for wiring protection.

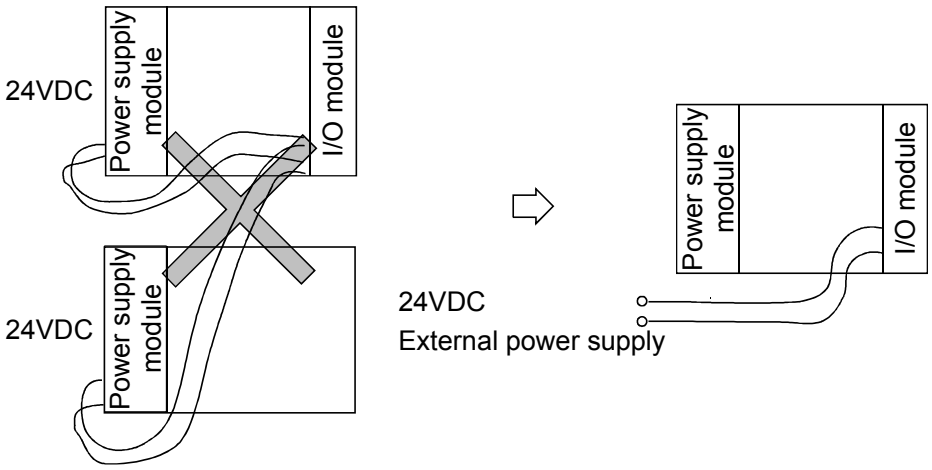


(f) Note on using the 24 VDC output of the A62P, A65P and A66P power supply module.

⚠ CAUTION

- Do not connect multiple power supply modules to one module in parallel. The power supply modules may be heated, resulting in a fire or failure.

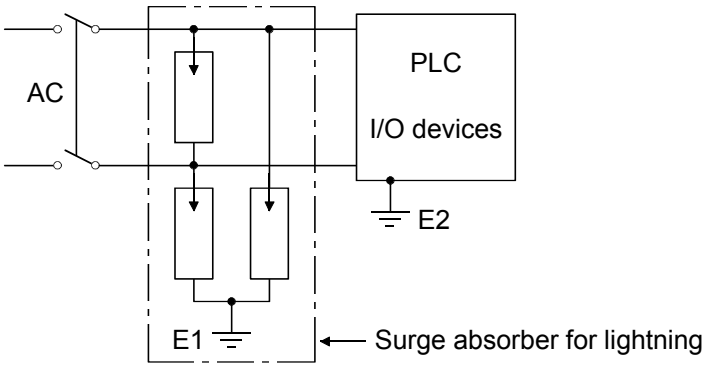
If the 24 VDC output capacity is insufficient for one power supply module, supply 24 VDC from the external 24 VDC power supply as shown below:



(g) 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.

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

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



POINT

(1) Provide separate grounding for the lightning surge absorber (E1) and the PLC (E2).
(2) Select a lightning surge absorber whose maximum allowable circuit voltage is higher than the circuit voltage at the maximum power supply voltage.

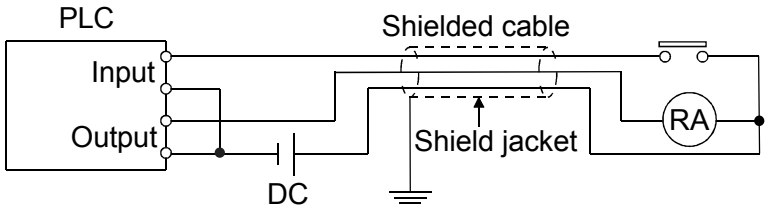
(2) Wiring to I/O device

(a) The solderless terminal with insulation sleeve is inapplicable to a terminal block.
It is advisable to cover the wire connection part of a terminal with a mark tube or insulation tube.

(b) Install wiring to a terminal block using the cable of core diameter 0.3 to 0.75mm^2, and outside diameter 2.8mm or less.

(c) Run the I/O line and output line away from each other.

(d) When the main circuit line and power line cannot be separated, use a shielding cable and ground it on the PLC side.
However, ground it on the opposite side in some cases.



(e) When cables are run through pipes, securely ground the pipes.

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

(g) The cabling of 200m (656.2ft.) or longer distance may produce leakage current depending on the capacity between lines and result in an accident.

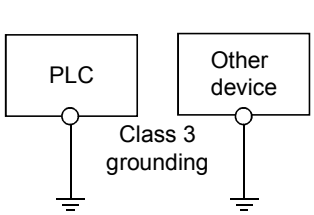
(h) As a countermeasure against the power surge due to lightning, separate the AC wiring and DC wiring and connect a surge absorber for lightning as shown in (i) of item (1).
Failure to do so increases the risk of I/O device failure due to lightning.

(3) Grounding

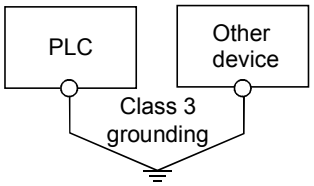
⚠ CAUTION ● Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.

(a) Carry out the independent grounding if possible. (Grounding resistance 100Ω or less.)

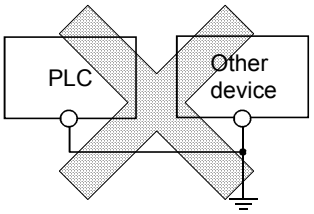
(b) If the independent grounding is impossible, carry out the shared grounding (2) as shown below.



(1) Independent grounding.....Best



(2) Shared grounding.....Good



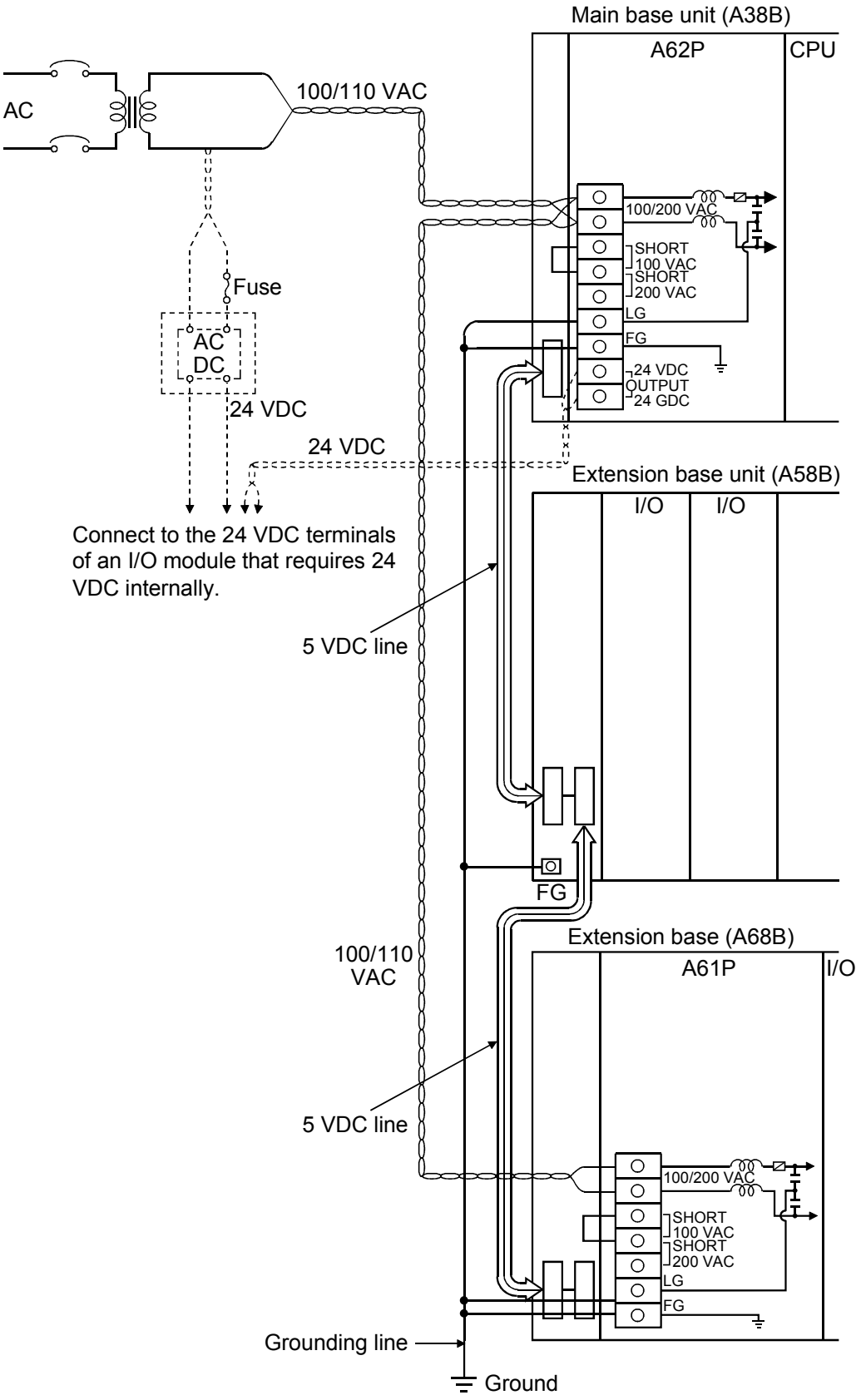
(3) Common grounding.....Not allowed

(c) Use the cable of 2mm^2 or more for grounding.
Set the grounding point closer to the PLC to make the grounding cable short as possible.

(d) If a malfunction occurs due to earthling, separate either LG or FG of the base module, the device combination, or all the connection from the earthling.

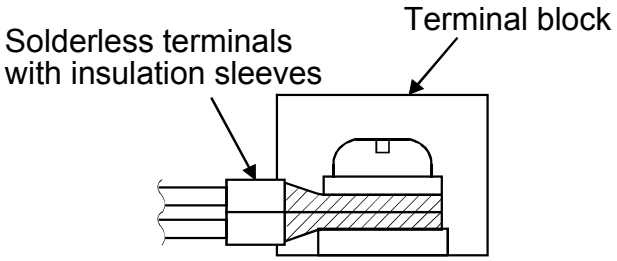
4.3.4 Wiring to module terminals

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



POINT

(1) Use the thickest possible (max. 2 mm^2 (14 AWG)) wires for the 100/200 VAC and 24 VDC power cables. Be sure to twist these wires starting at the connection terminals. For wiring a terminal block, be sure to use a solderless terminal. To prevent short-circuit due to loosening screws, use the solderless terminals with insulation sleeves of 0.8 mm (0.03 inch) or less thick. The number of the solderless terminals to be connected for one terminal block are limited to 2.



(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.

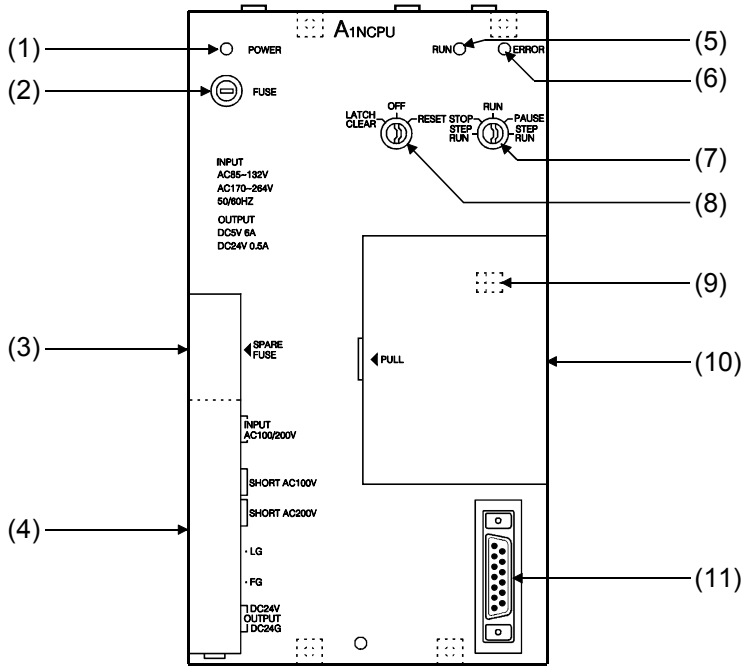
4.4 Precaution when Connecting the Uninterruptive Power Supply (UPS)

Be sure of the following terms when connecting the PLC system to the uninterruptive power supply (abbreviated as UPS hereafter):
As for UPS, use the online power system or online interactive system with a voltage distortion rate of 5% or less.
For the UPS of the commercial online power system, use Mitsubishi Electric's F Series UPS (serial number P or later) (Ex.: FW-F10-0.3K/0.5K).
Do not use any UPS of the commercial online power system other than the F series mentioned above.

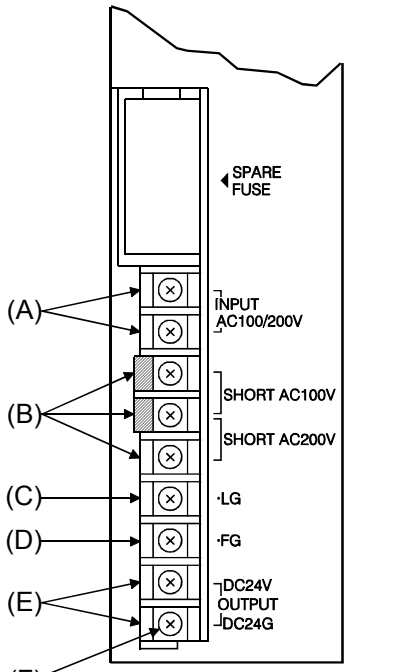
4.5 Part names and settings

This section gives the names of each part of the CPU module.

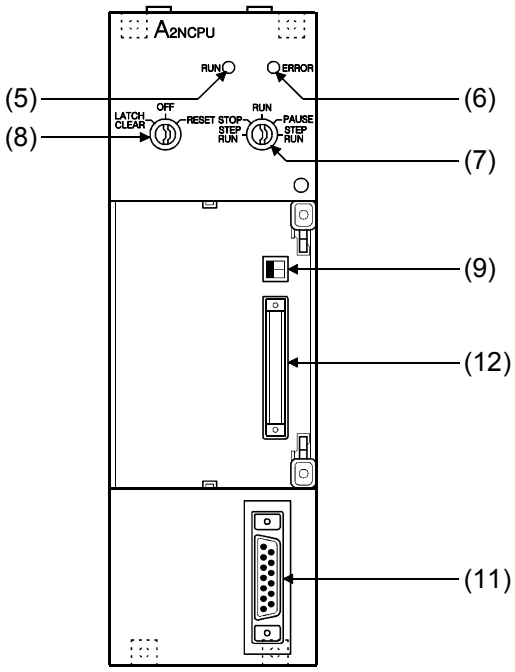
4.5.1 Part names of AnNCPU, AnACPU, and AnUCPU



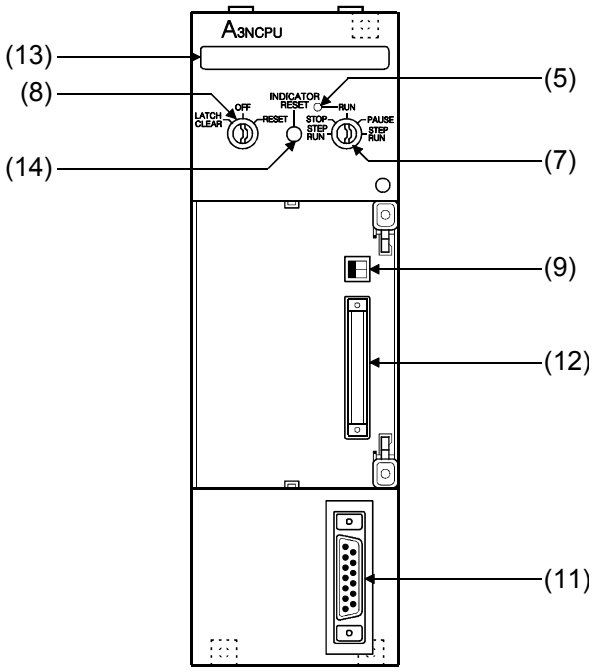
A1NCPU



Detail of A1NCPU terminals



A2NCPU(S1)
A2ACPU(S1)
A2UCPU(S1)



A3NCPU
A3ACPU
A3U, A4UCPU

(1) "POWER" LED

The "POWER" LED lights when the AC power is switched on and the 5/24 VDC output is normal.

(2) Fuse holder

Holder for the fuse that protects the AC side

(3) Spare fuse box

A spare fuse for the power supply is stored on the rear face of the cover

(4) Power terminal block

(A) Power input terminal
The power input terminal used to connect the 100VAC or 200VAC power supply.

(B) Operating voltage switching terminal
It is possible to use either a 100VAC or 200VAC power supply. When 100VAC is used, short-circuit the "SHORT 100VAC" terminals with the shorting strip supplied. When 200VAC is used, short-circuit the "SHORT 200VAC" terminals.

(C) LG terminal
Used to ground power filter.
Has potential half the input voltage.

(D) FG terminal
The grounding terminal connected to the shielding pattern on the printed wiring board.

(E) 24VDC, 24GDC terminals
Used to supply 24V to output modules that require an internal 24V source (supplied to modules through external wiring).

(F) Terminal screws
M4 x 0.7 x 6

POINT

Discrepancies between the voltage setting and the actual power supply voltage will have the following consequences:

	Power Supply Voltage	
	100VAC	**200VAC**
Set to 100VAC (shorting strip connected at (2))	—	The power supply module is destroyed (no abnormality in the CPU)
Set to 200VAC (shorting strip connected at (3))	There is no abnormality in the module. However, the CPU does not operate.	—
No setting (shorting strip not used)	There is no abnormality in the module. However, the CPU does not operate.	

(5) "RUN" LED

The "RUN" LED indicates the operating condition of the CPU.

ON : When the key switch is turned to RUN or STEP RUN and the sequence program is being executed.

OFF : When the key switch is turned to STOP, PAUSE or STEP RUN and the sequence program is not being executed.

Flashing : When an error has been detected by the self-diagnosis function (operation will continue if the error detected has been specified in the parameter settings). When the key switch is set to the LATCH CLEAR position, the LED flashes rapidly for about two seconds.

(6) "ERROR" LED

ON : Indicates that a WDT or internal fault check error has occurred due to a hardware fault.

OFF : Indicates that the annunciator (F) has been switched ON by the sequence program.

(7) RUN/STOP key switch

RUN/STOP : Used to start/stop sequence program execution.

PAUSE : Sequence program operation stops with the output statuses immediately before the PAUSE condition was established retained.

STEP RUN : The sequence program is run step by step or scan by scan.

(8) RESET key switch

RESET : Hardware reset. Used to reset the CPU after an operation error and to initialize operation.

LATCH CLEAR : Sets all data in the latch area defined in the parameter settings to "OFF" or "0" (valid only when the RUN/STOP key switch is turned to STOP).

Latch Clearing Method

(1) Turn the RUN/STOP switch from STOP to L.CLR several times.

(2) Clear by means of a program.

(9) I/O control switch (AnNCPU only)

This switch is used to set the Direct/Refresh mode.

Switch Setting	Input (X)	Output (Y)	D9014
 (Factory setting)	Direct mode	Direct mode	0
	Refresh mode	Direct mode	1
	Refresh mode	Refresh mode	3

POINTS

(1) Perform switch setting while the power is switched OFF.

(2) After the switches have been set, the CPU checks the status of the switches at power on or at reset. Note that if the direct mode is set for input and the refresh mode for output, the CPU will execute processing in the refresh mode for both input and output.

(3) Since a binary code corresponding to the I/O control mode is stored in special register D9014, the mode can be monitored using a peripheral device.

(10) Memory card area

This is the section where the memory card is installed and the memory protect setting is made. It is provided with a cover.

(11) RS-422 connector

The connector for peripheral device connection.
Fitted with a cover when not in use.

(12) Memory cassette loading connector

Used to connect the memory cassette to the CPU.

(13) LED Display

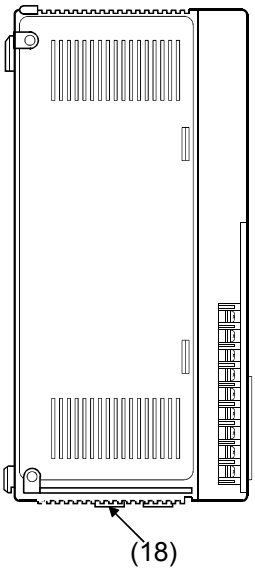
Capable of displaying up to 16 alphanumeric characters. Displays self diagnosis error comments, and the F number comments of annunciators in accordance with OUT F and SET F

(14) LED display reset switch

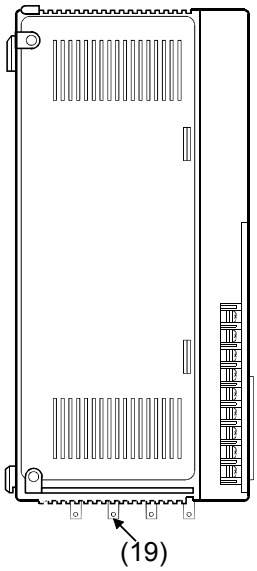
Used to clear the LED display and display the next display data if there is any.

4.5.2 Part identification of AnNCPUP21/R21, AnACPUP21/R21

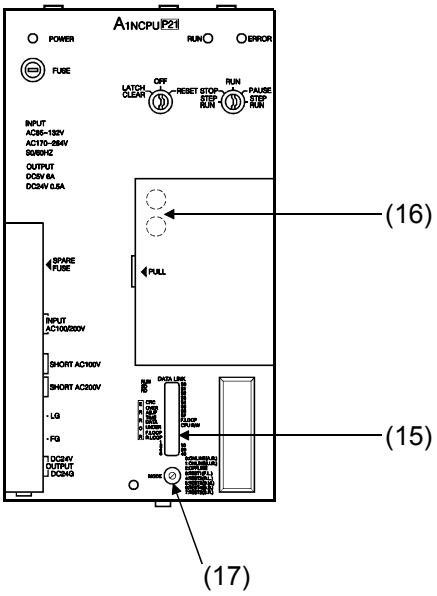
This section gives the names of those parts of the AnNCPUP21/R21 and AnACPUP21/R21 that relate to the data link function. For the names of other parts, such as the RUN/STOP key switch, refer to Section 4.5.1.

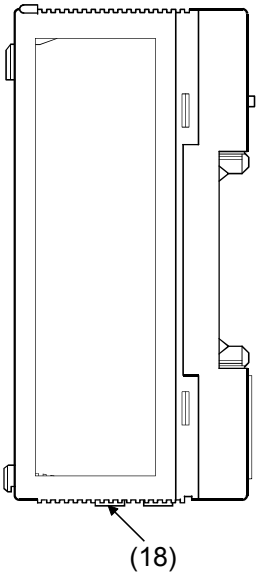


A1NCPUP21(-S3)

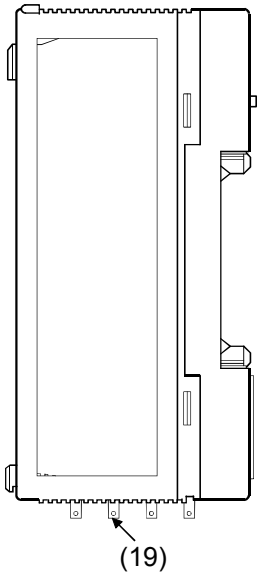


A1NCPUR21

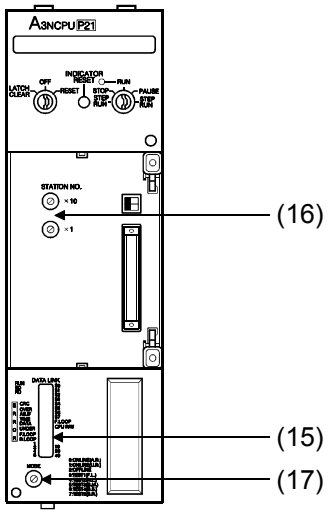




A2NCPU(S1)P21(-S4)
A3NCPUP21(-S3)
A2ACPU(S1)P21(-S4)
A3ACPUP21(-S3)



A2NCPU(S1)R21
A3NCPUR21
A2ACPU(S1)R21
A3ACPUR21



(15) LEDs for indicating operation status and errors

LED Name	Description	LED Name	Description
RUN	Comes ON when the data link is normal.	S0	Not used (These LEDs flash during execution of data link. This is not an abnormal condition)
SD	Remains ON while data is sent.	S1	
RD	Remains ON while data is received.	S2	
	Not used (always OFF)	S3	
CRC	Comes ON when a code check error occurs.	S4	
OVER	Comes ON when a data entry delay error occurs.	S5	
		S6	
AB. IF	Comes ON when data is all "1".	S7	
TIME	Comes ON when a time-out occurs.	F.LOOP	Comes ON when the forward loop serves as the data receiving line, or goes OFF when the reverse loop is used for it.
DATA	Comes ON when a receive data error occurs.		
UNDER	Comes ON when a send data error occurs.	CPU R/W	Comes ON during communications with the PC CPU.
F. LOOP	Comes ON when a forward loop receive data error occurs.		Not used (always OFF)
R.. LOOP	Comes ON when a reverse loop receive data error occurs.		Not used (always OFF)
		10	Indicate the figures at the ten's digit of the station numbers in BCD codes.
1	Indicate the figures at the one's digit of the station numbers in BCD.	20	
2		40	
4			Not used (always OFF)
8			

(16) Station number setting switches

- Station numbers from 00 to 64 can be set.
- The "X10" switch is to set the ten's digit of a station number.
- The "X1" switch is to set the one's digit of a station number.
- To use a station as the master station, set "00".
- To use a station as a local station, set between "01" and "64".

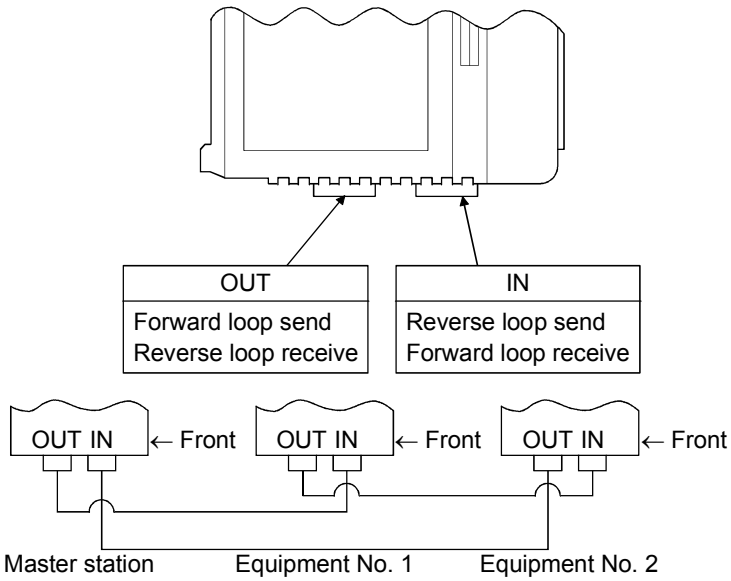
(17) Mode select switch

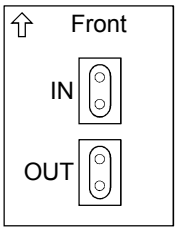
By switching mode, the following functions are available:

Setting Number	Name	Description
0	Online	Automatic return is set during normal operation.
1	Online	Automatic return is not set during normal operation.
2	Online	The host station is disconnected.
3	Forward loop test mode	Used to perform a line check on the optical fiber cables or coaxial cables in the forward loop (for normal data link) throughout the entire data link system.
4	Reverse loop test mode	Used to perform a line check on the optical fiber cables or coaxial cables in the reverse loop (for loopback when an error occurs) throughout the entire data link system.
5	Station-to-station test mode (master station)	Used to check the line between two stations. The line is checked with the station with the smaller station number set as the master station and the other station set as a slave station.
6	Station-to-station test mode (slave station)	
7	Self-loopback test mode	Used to check the hardware, including the send/receive circuits of the communications system, of one data link module in isolation.
8 to F	—	Unusable

(18) Connectors for connecting opeical fiber cables

Connect the cables as illustrated below:

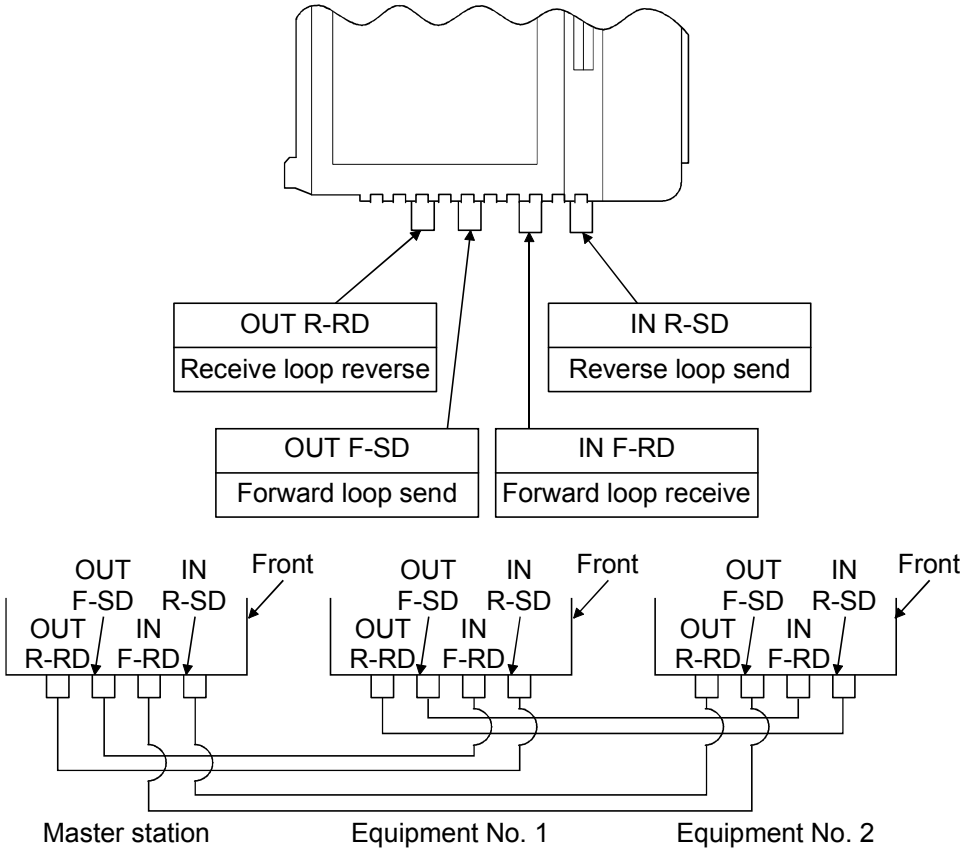


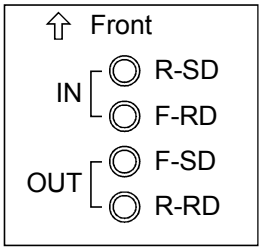


IN : To be connected to the OUT connector of the previous station.
OUT: To be connected to the IN connector of the next station.

(19) Connectors for connecting coaxial cables

Connect the cables as illustrated below:





IN R-SD : To be connected to the OUT R-RD connector of the previous station.
IN F-RD : To be connected to the OUT F-SD connector of the previous station.
OUT F-SD : To be connected to the IN F-RD connector of the next station.
OUT R-RD: To be connected to the IN R-SD connector of the next station.

5. I/O MODULE SPECIFICATIONS AND CONNECTIONS

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	100V to 120VAC	10mA	80VAC or higher	40VAC or lower	100%	
AX11		32 points					60%	
AX11EU				12mA	79VAC or higher			
AX20		16 points	200V to 240VAC	10mA	160VAC or higher	70VAC or lower	100%	
AX21		32 points					60%	
AX21EU				12mA				
AX40	DC input (sink type)	16 points	12/24 VDC	4/10mA	9.5VDC or higher	6VDC or lower	100%	
AX41		32 points					60%	
AX41-S1								
AX42 *1		64 points		3/7mA			60% *3	
AX42-S1 *1	DC input							
AX50	DC input (sink type)	16 points	48VDC	4mA	34VDC or higher	10VDC or lower	100%	
AX50-S1	DC input (sink/source							
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				
	15ms or less	25ms or less	20 terminal block connector	16 points/ common	0.055A	16 points
			38 terminal block connector	32 points/ common	0.11A	32 points
					0.15A	
			20 terminal block connector	16 points/ common	0.055A	16 points
			38 terminal block connector	32 points/ common	0.11A	32 points
					0.15A	
	10ms or less	10ms or less	20 terminal block connector	8 points/ common	0.055A	16 points
			38 terminal block connector		0.11A	32 points
	0.1ms or less	0.2ms or less		32 points/ common		
	10ms or less	10ms or less	40-pin connector × 2	32 points/ common	0.12A	64 point
	0.5ms or less	0.5ms or less				32 points
	10ms or less	10ms or less	20 terminal block connector	8 points/ common	0.055A	16 points
	10ms or less	20ms or less				
	1.5ms or less	3ms 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					60%	
AX81-S1	DC input			2.5/5mA	5.6VDC or higher	2.4VDC or lower		
AX81-S2	DC input (source type)		48/60 VDC	3/4mA	31VDC or higher	10VDC or lower		
AX81-S3	DC input		12/24 VDC	4/10mA	9.5VDC or higher	6VDC or lower		
AX81B	DC input (sink/source type)	32 points	24VDC	7mA	At normal input			
					21VDC or higher	6VDC or lower		
					When disconnection detected			
					1VDC or higher	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	8.5/4mA	7VAC/ VDC or higher	2.5VAC /VDC or lower	100%	
			12/24 VDC					

	Input Response Time		External Connections	Common Terminal Arrangement	Internal Current Consumption	Number of Occupied I/O Points
	OFF to ON	ON to OFF				
	1.5ms or less	3ms or less	38 terminal block connector	8points/ common	0.11A	32 points
	10ms or less	10ms or less	20 terminal block connector		0.055A	16 points
	[TYP] 5.5ms | 6.0ms [High-speed mode] 0.5ms or less | 1.0ms or less					
	10ms or less	10ms or less	38 terminal block connector		0.11A	32 points
					0.105A	
	20ms or less	20ms or less			0.11A	
	0.1ms or less	0.2ms or less				
	10ms or less	10ms or less	38 terminal block connector	8 points/ common	0.125A	64 points
	10ms or less	10ms or less	37-pin D subconnector × 2	32 points/ common	0.12A	64 points
	25ms or less	20ms or less	38 terminal block connector		0.11A	32 points
	20ms 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:

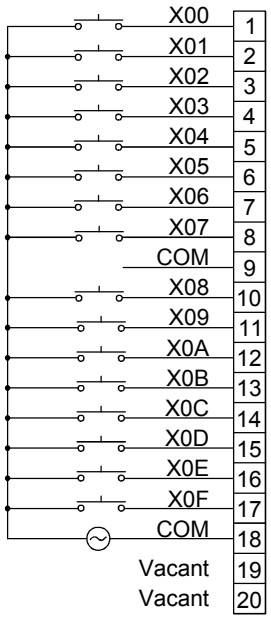
HIGH setting: high-speed, LOW setting: low-speed

*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)

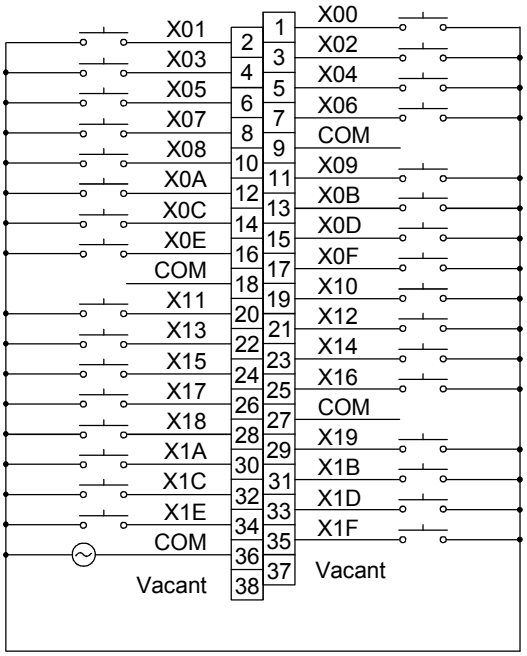
Model	Rated Input Voltage
AX10	100-120 VAC
AX20	200-240 VAC



* 9 and 18 are connected internally.

(2)

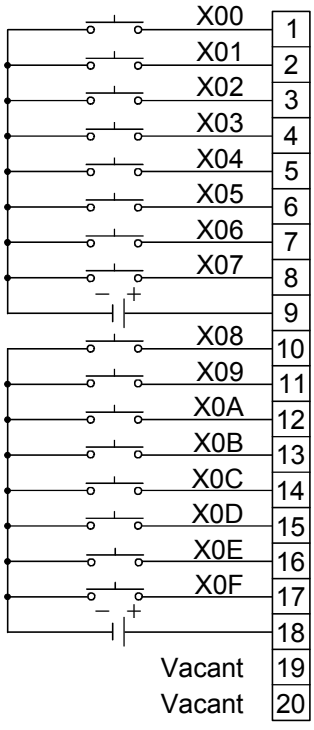
Model	Rated Input Voltage
AX11	100-120 VAC
AX11EU	
AX21	200-240 VAC
AX21EU	



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

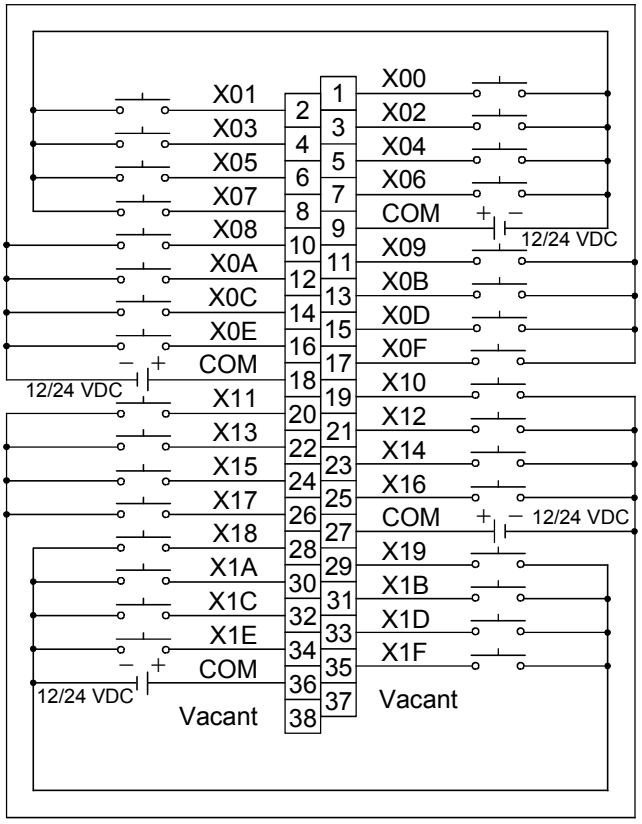
(3)

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

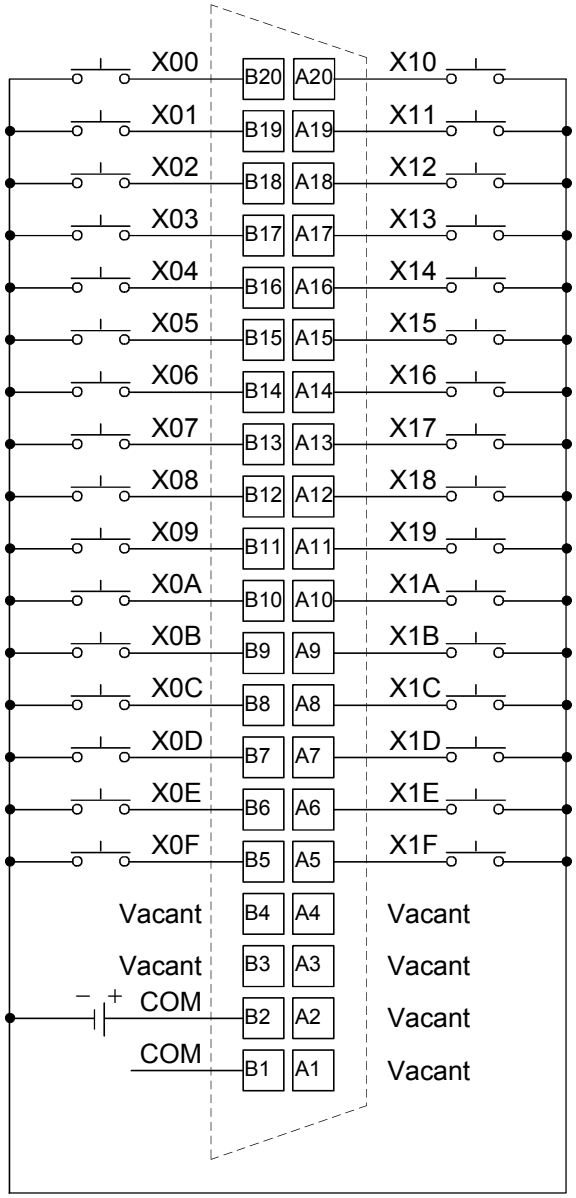


(4)

Model	Rated Input Voltage
AX41	12/24 VDC
AX41-S1	



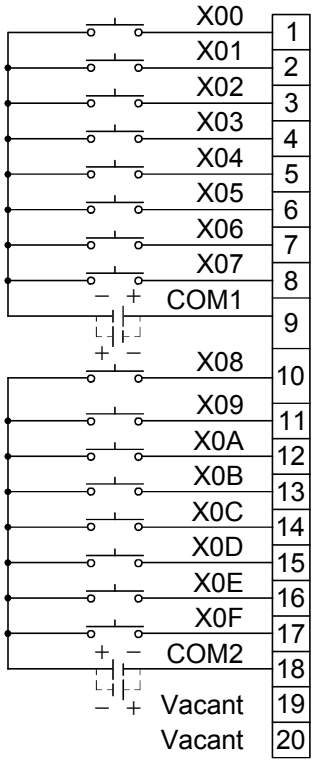
	Model	Rated Input Voltage
(5)	AX42	12/24 VDC
	AX42-S1	



* 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.

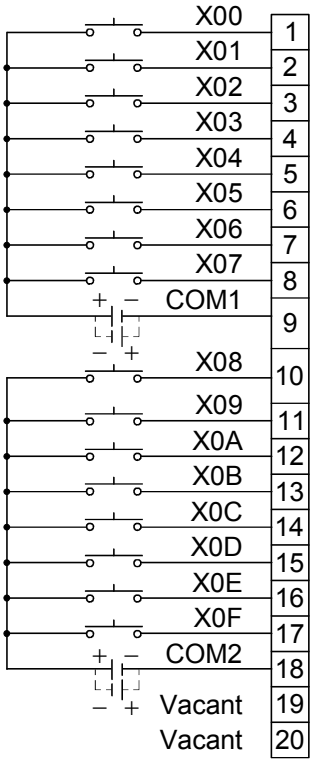
(6)

Model	Rated Input Voltage
AX50-S1	48 VDC



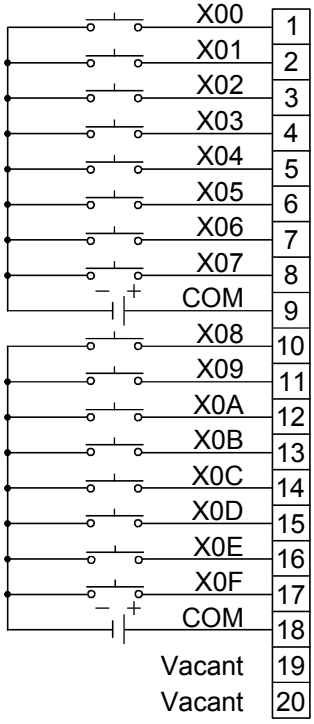
(8)

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



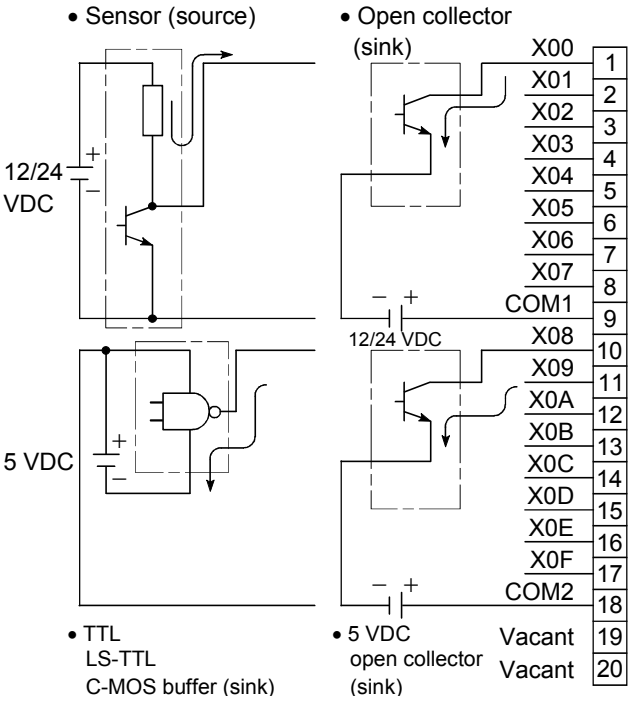
(7)

Model	Rated Input Voltage
AX60	100/110/125 VDC



(9)

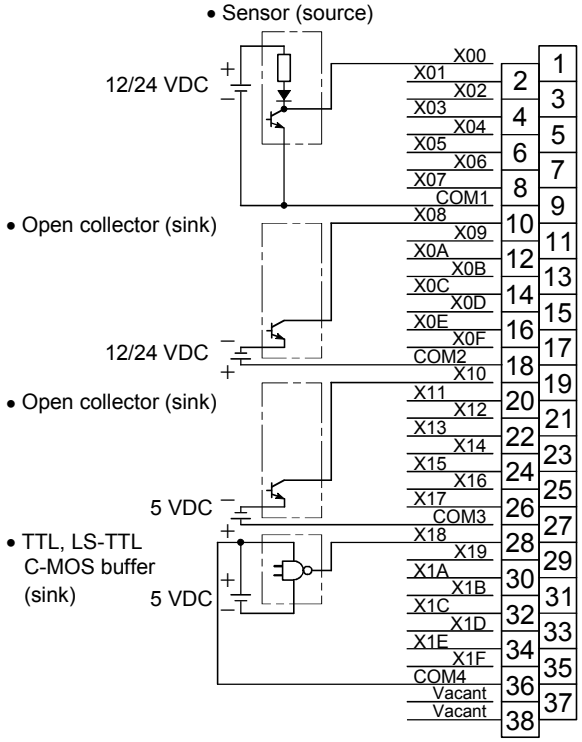
Model	Rated Input Voltage
AX70	5/12/24 VDC



- 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)

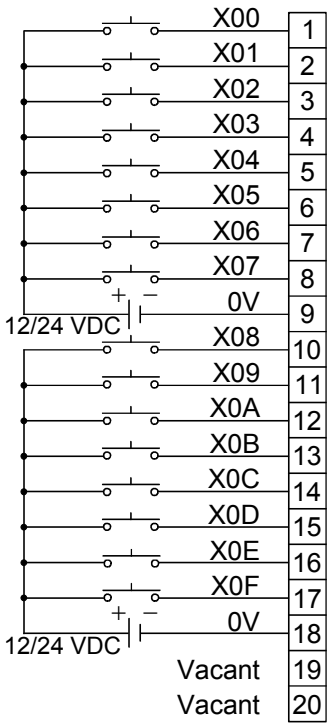
Model	Rated Input Voltage
AX71	5/12/24 VDC



- 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).

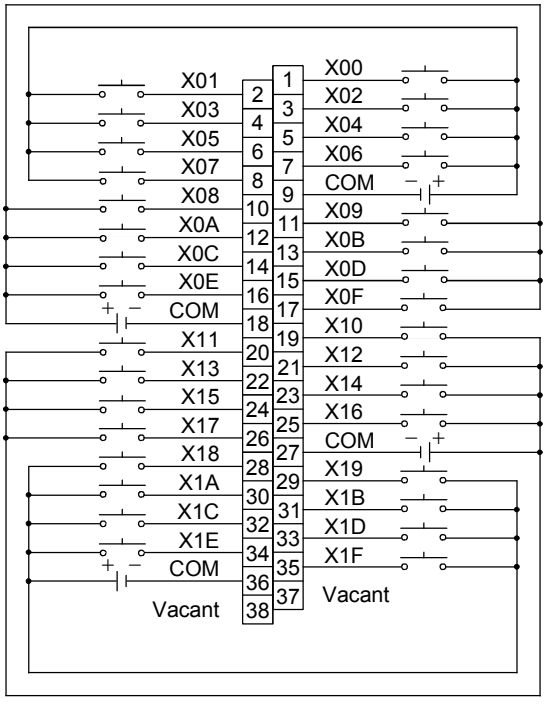
(11)

Model	Rated Input Voltage
AX80	12/24 VDC
AX80E	



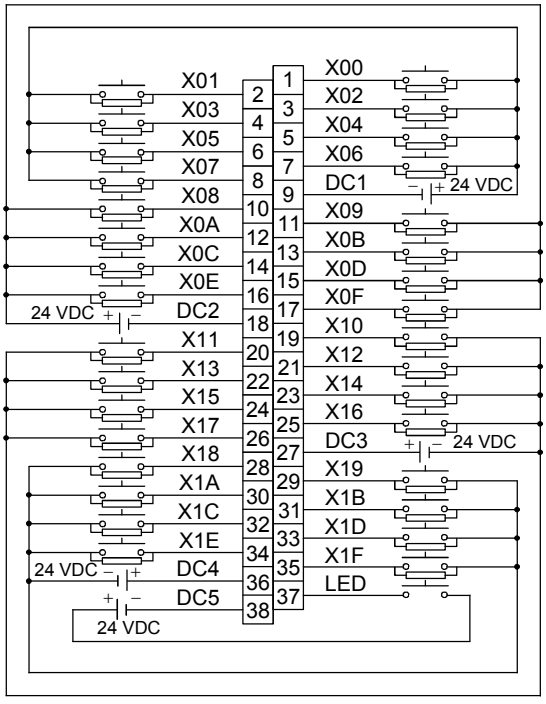
(12)

Model	Rated Input Voltage
AX81	12/24 VDC
AX81-S1	
AX81-S2	48/60 VDC
AX81-S3	12/24 VDC

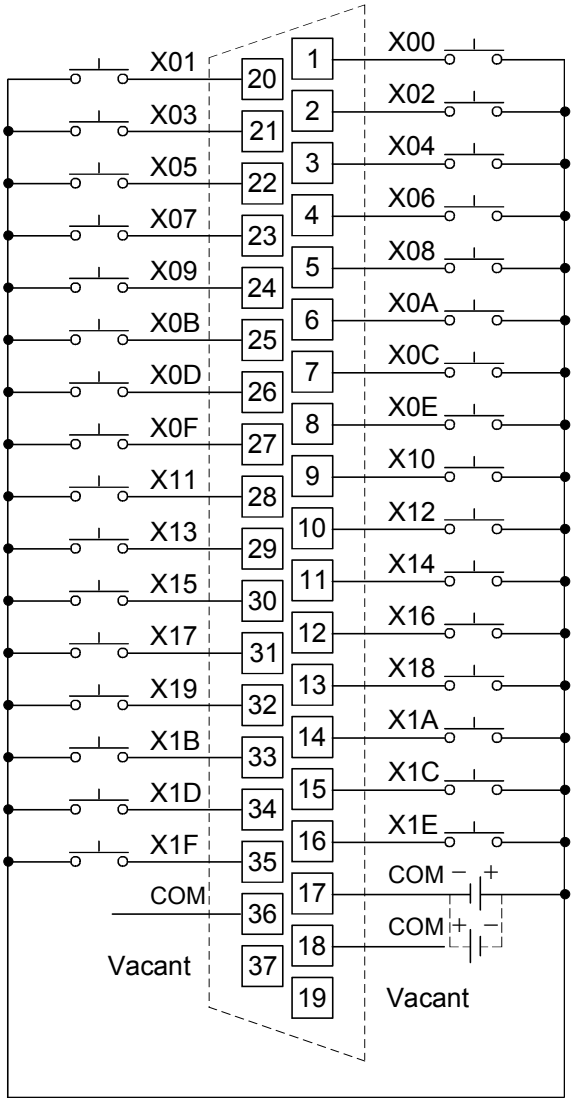


(13)

Model	Rated Input Voltage
AX81B	24 VDC

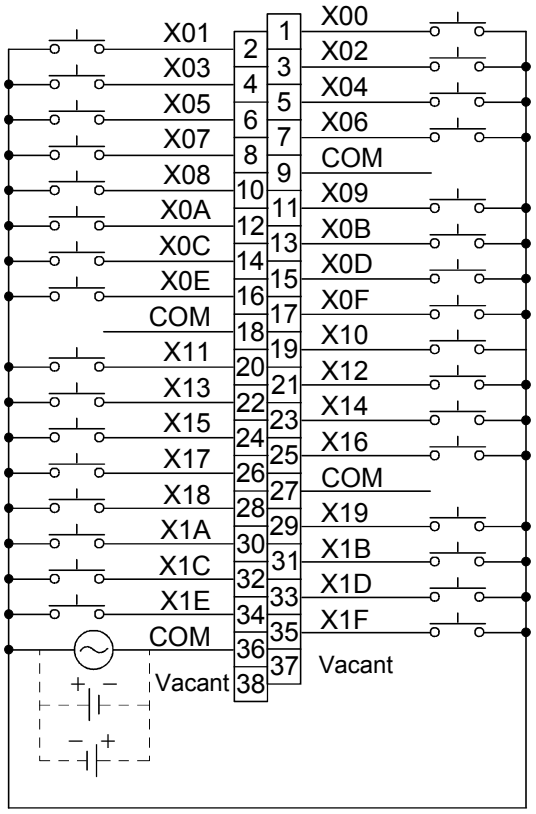


(14)	Model	Rated Input Voltage
	AX82	12/24 VDC



* 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

<table>
<tr><th rowspan="2">Model</th><th rowspan="2">Output Type</th><th rowspan="2">No. of Points/ Module</th><th rowspan="2">Rated Load Voltage</th><th colspan="2">Max. Load Current</th><th colspan="2">Output Response Time</th><th rowspan="2"></th></tr>
<tr><th>Per Point</th><th>Per Common</th><th>OFF to ON</th><th>ON to OFF</th></tr>
<tr><td>AY10</td><td>Contact output</td><td rowspan="10">16 points</td><td rowspan="4">240VAC
24VDC</td><td rowspan="14">2A</td><td>8A</td><td rowspan="14">10ms or less</td><td rowspan="14">12ms or less</td><td rowspan="14"></td></tr>
<tr><td>AY10A</td><td>Contact output
(All points independent)</td><td>16A/all points</td></tr>
<tr><td>AY11</td><td>Contact output</td><td>8A</td></tr>
<tr><td>AY11A</td><td rowspan="2">Contact output
(All points independent)</td><td rowspan="2">16A/all points</td></tr>
<tr><td>AY11AEU</td><td>24VDC
24VAC</td></tr>
<tr><td>AY11E</td><td rowspan="6">Contact output</td><td>240VAC
24VAC</td><td rowspan="2">8A</td></tr>
<tr><td>AY11EEU</td><td>24VDC
24VAC</td></tr>
<tr><td>AY13</td><td rowspan="4">32 points</td><td>240VAC
24VAC</td><td rowspan="3">5A</td></tr>
<tr><td>AY13EEU</td><td>24VDC
24VAC</td></tr>
<tr><td>AY13E</td><td>240VAC
24VAC</td></tr>
<tr><td>AY15EU</td><td>24 points</td><td>24VDC
240VAC</td><td>8A</td></tr>
<tr><td>AY20EU</td><td rowspan="3">Triac output</td><td rowspan="2">16 points</td><td rowspan="3">100 to 200 VAC</td><td>0.6A</td><td>1.9A</td><td rowspan="3">1ms or less</td><td rowspan="3">0.5Hz
+
1ms or less</td><td rowspan="3"></td></tr>
<tr><td>AY22</td><td>2A</td><td>3.3A</td></tr>
<tr><td>AY23</td><td>32 points</td><td>0.6A</td><td>2.4A *4
(1.05A)</td></tr>
<tr><td>AY40</td><td>Transistor output
(sink type)</td><td rowspan="3">16 points</td><td rowspan="3">12/24VDC</td><td>0.1A</td><td>0.8A</td><td rowspan="3">2ms or less</td><td rowspan="3">2ms or less
(resistive load)</td><td rowspan="3"></td></tr>
<tr><td>AY40A</td><td>Transistor output
(all points independent sink type)</td><td>0.3A</td><td>—</td></tr>
<tr><td>AY40P</td><td>Transistor output
(sink type)</td><td>0.1A</td><td>0.8A</td></tr>
</table>

	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				
	38 terminal block connector		None	None		0.29A	0.23A	32 points
				8A				
				None		0.22A	0.15A	
		4 points/ common	CR absorber	3.2A	Display *10	—	0.40A	16 points
	20 terminal block connector	8 points/ common	CR absorber varistor	7A *6			0.305A	
	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	Cramp diode			0.015A	0.115A	

(To next page)

(From front page)

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Output Response Time	
				Per Point	Per Common	OFF to ON	ON to OFF
AY41	Transistor output (sink type)	32 points	12/24VDC	0.1A	1.6A	2ms or less	2ms or less (resistive load)
AY41P					1A		
AY42 *1		64 points			2A *4 (1.6A)		
AY42-S1						0.1ms or less	0.3ms or less (resistive load)
AY42-S2			5/12/24 VDC			2ms or less	2ms or less (resistive load)
AY42-S3 *1			12/24VDC	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	0.5ms or less	1.5ms or less
				24VDC 0.8A	3.8A		
AY60S	Transistor output (sink type)		24/48VDC (12V) *3	2A	6.4A	1ms or less	3ms or less (resistive load)
AY70	Transistor output (for TTL. COMOS) (sink type)	16 points	5/12VDC	0.016A	0.128A	1ms or less	1ms or less
AY71		32 points		0.016A	0.256A		

	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	Cramp diode	None	None	0.02A	0.23A	32 points
						0.03A		
	40-pin connector × 2	32 points/ common				0.04A	0.29A	64 points
							0.34A	
							0.29A	
				1.6A *7	Display *11		0.29A	
			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

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(From front page)

Model	Output Type	No. of Points/ Module	Rated Load Voltage	Max. Load Current		Output Response Time		
				Per Point	Per Common	OFF to ON	ON to OFF	
AY72 *1	Transistor output (for TTL. COMOS) (sink type)	64 points	5/12VDC	0.016A	0.512A	1ms or less	1ms or less	
AY80	Transistor output (source type)	16 points	12/24VDC	0.5A	2A	2mc of less	2ms of less (resistive load)	
AY80EP				0.8A	3.84A	0.5ms or less	1.5ms or less	
AY81		32 points		0.5A	4A	2ms of less	2ms of less (resistive load)	
AY81EP				12VDC 0.8A	7.68A	0.5ms or less	1.5ms 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
	40-pin connector × 2	32 points/ common	None	None	None	*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		
	38 terminal block connector	16 points/ common	Varistor	None	None	0.05A	0.23A	32 points
			Surge absorbing diode			0.22A		
	40-pin connector × 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 (Y00 to Y1F), LH setting: Latter half (Y20 to Y3F)

*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.

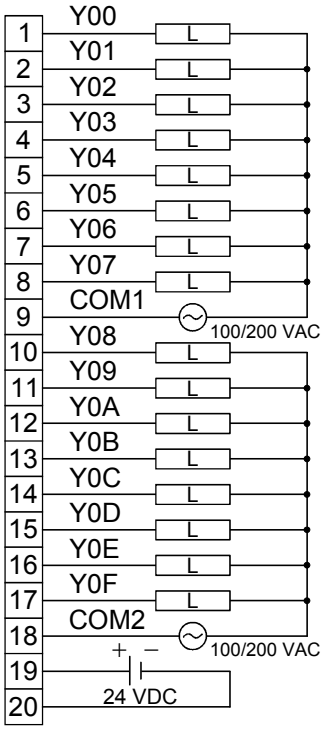
*11 : Since this is a built-in fuse directly fixed to the module, replace the entire module if it blows.

*12 : TYP. 12 VDC

5.2.2 Output module connections

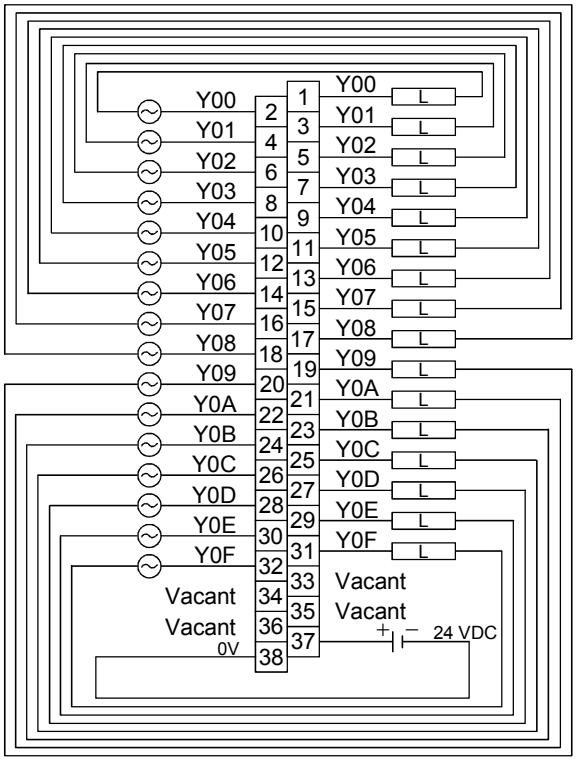
(1)

Model	Rated Input Voltage
AY10	24 VDC/240 VAC
AY11	
AY11E	
AY11EEU	



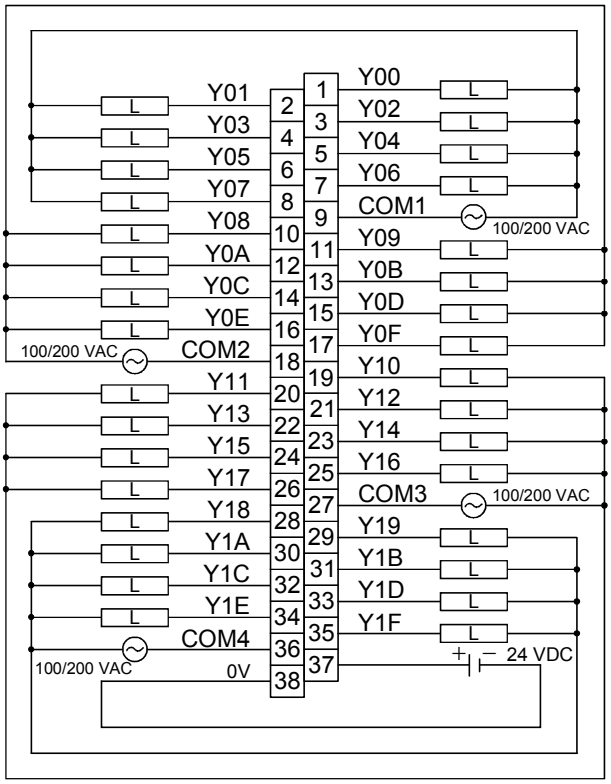
(2)

Model	Rated Input Voltage
AY10A	24 VDC/240 VAC
AY11A	
AY11AEU	



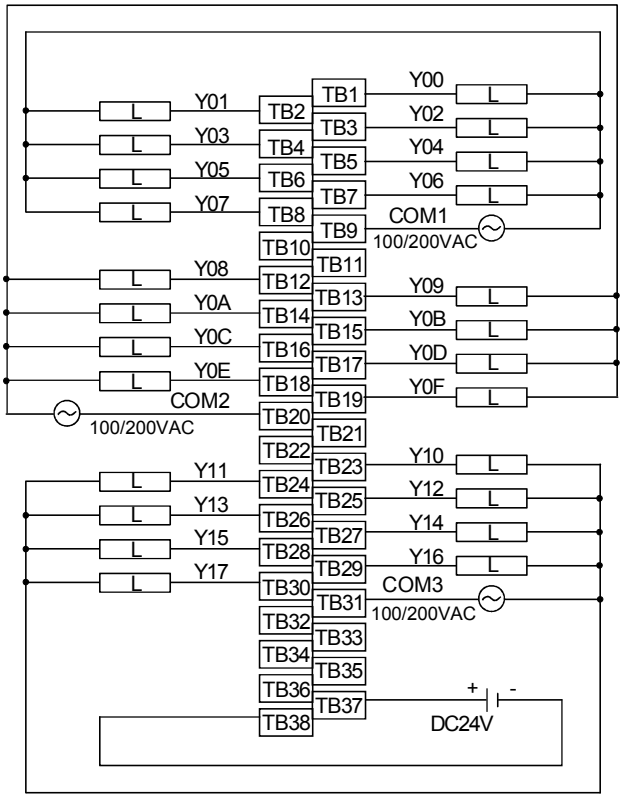
(3)

Model	Rated Input Voltage
AY13	12 VDC/240 VAC
AY13E	
AY13EU	



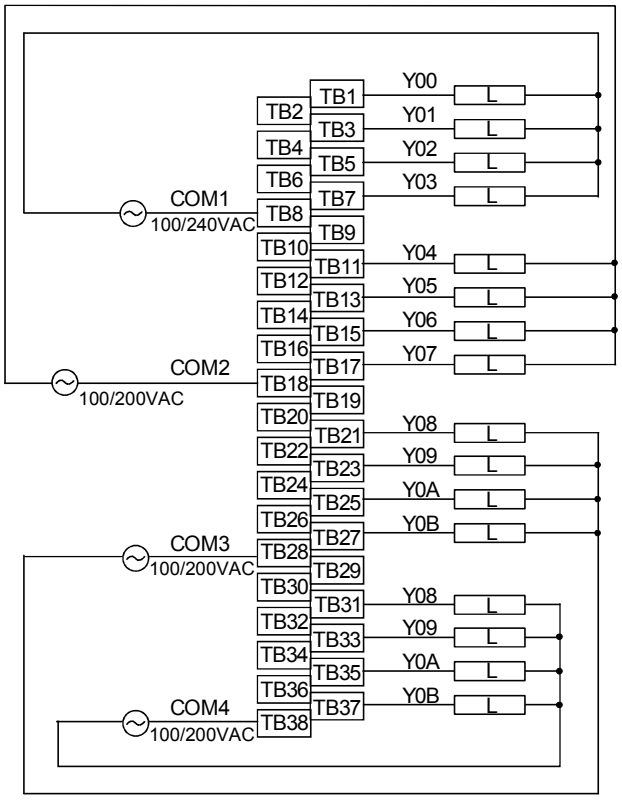
(4)

Model	Rated Input Voltage
AY15EU	24VDC/240 VAC



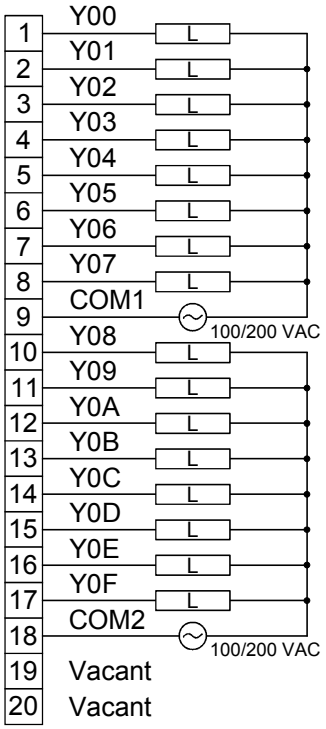
(5)

Model	Rated Input Voltage
AY20EU	100/200 VAC



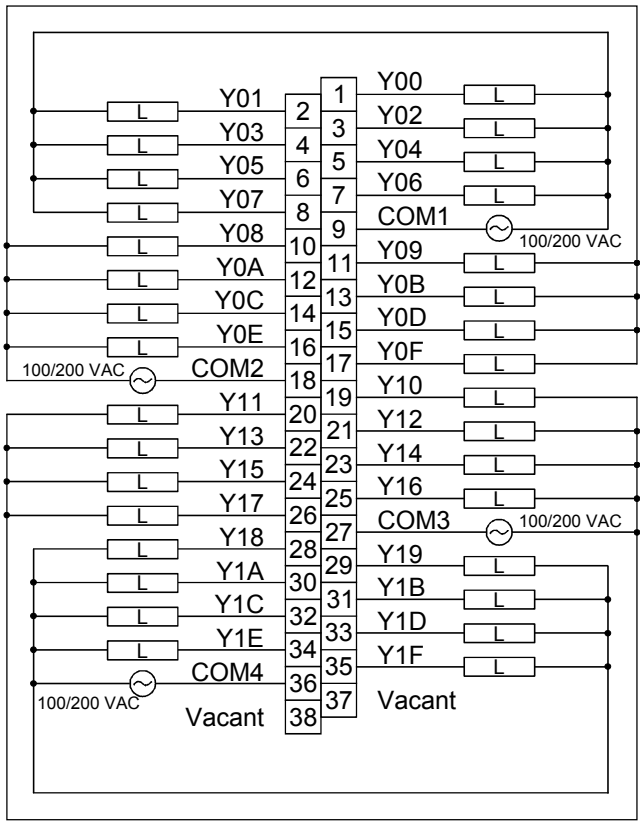
(6)

Model	Rated Input Voltage
AY22	24 VDC/240 VAC



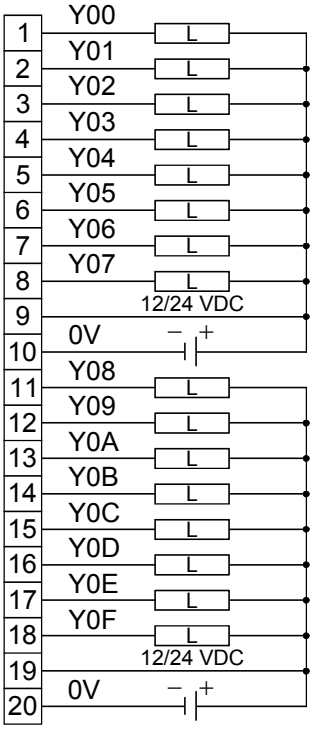
(7)

Model	Rated Input Voltage
AY23	100/240 VAC



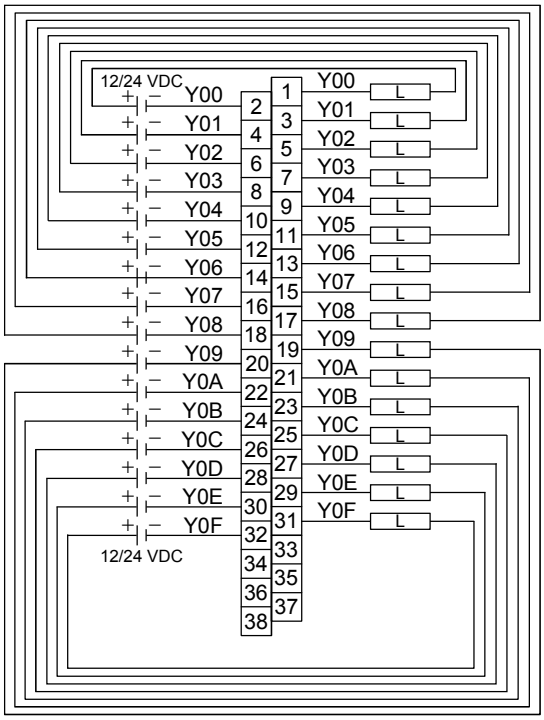
(8)

Model	Rated Input Voltage
AY40	12/240 VDC
AY40P	
AY50	



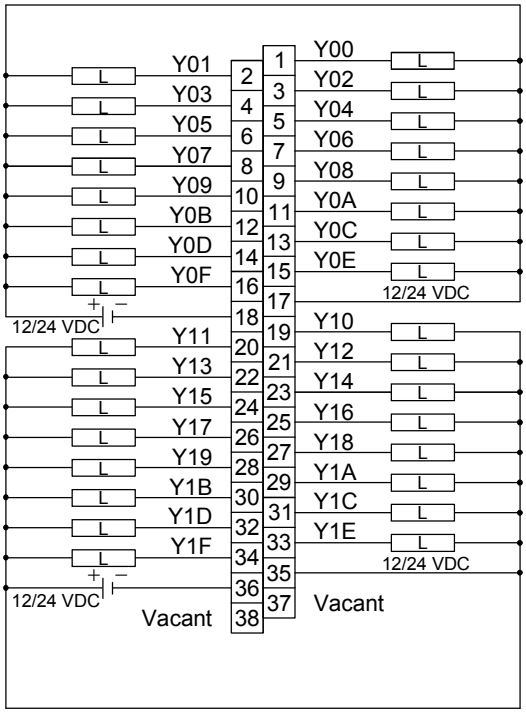
(9)

Model	Rated Input Voltage
AY40A	12/24 VDC



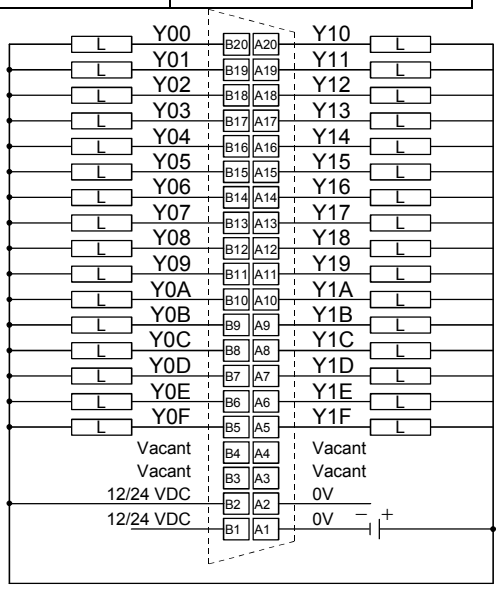
(10)

Model	Rated Input Voltage
AY41	12/24 VDC
AY41P	



(11)

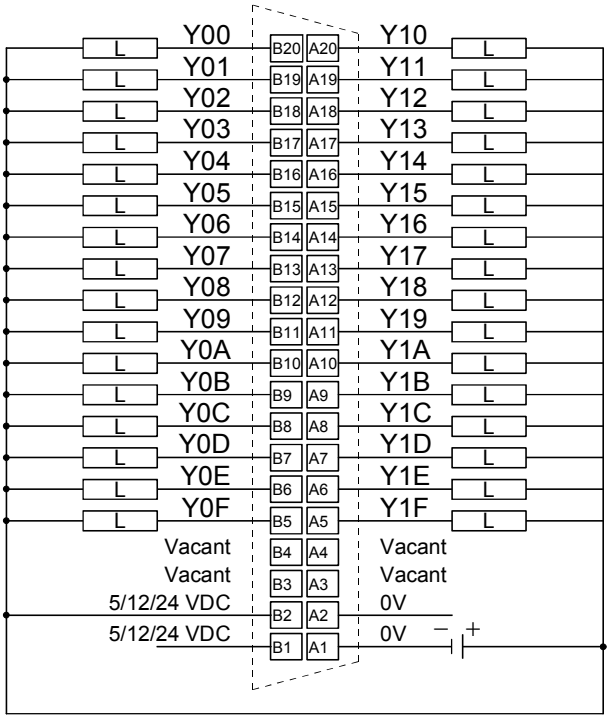
Model	Rated Input Voltage
AY42	12/24 VDC
AY42-S3	



* 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.

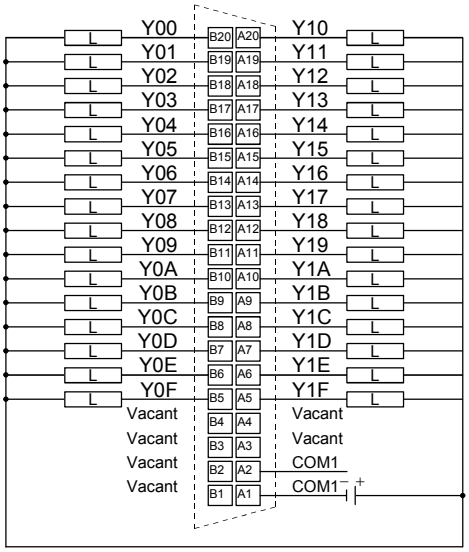
(12)

Model	Rated Input Voltage
AY42-S2	5/12/24 VDC



(13)

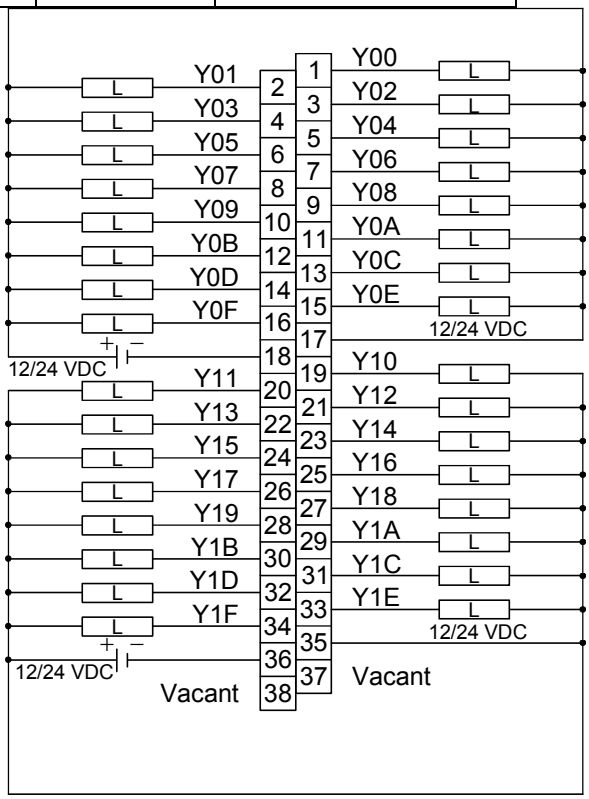
Model	Rated Input Voltage
AY42-S4	12/24 VDC



* 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.

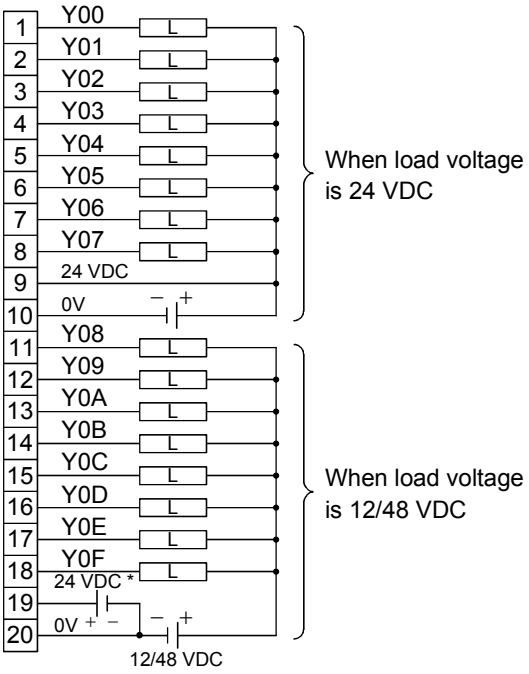
(14)

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



(15)

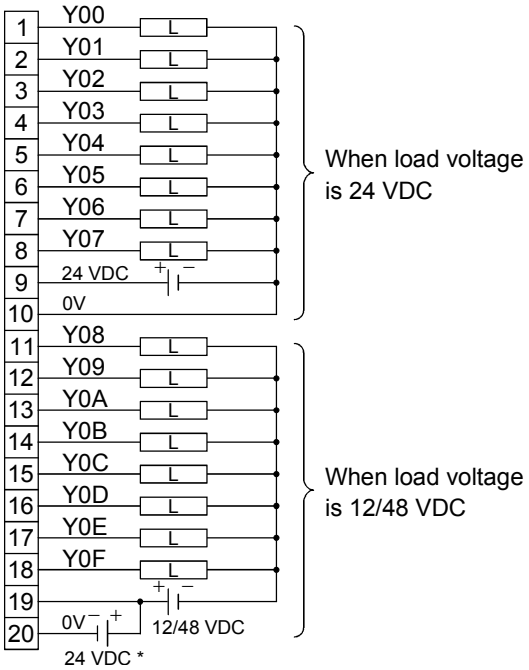
Model	Rated Input Voltage
AY60	24 (2/48) VDC



- 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.

(16)

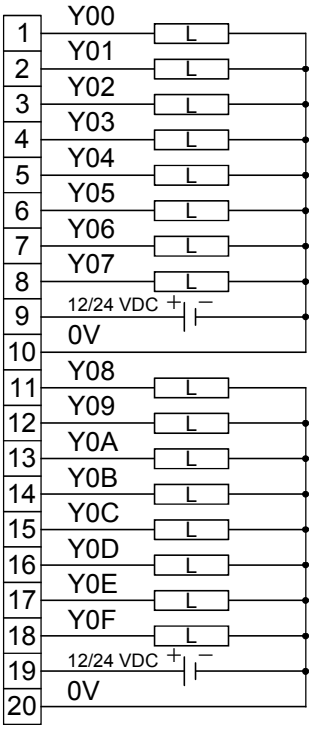
Model	Rated Input Voltage
AY60E	24 (12/48) VDC



- 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.

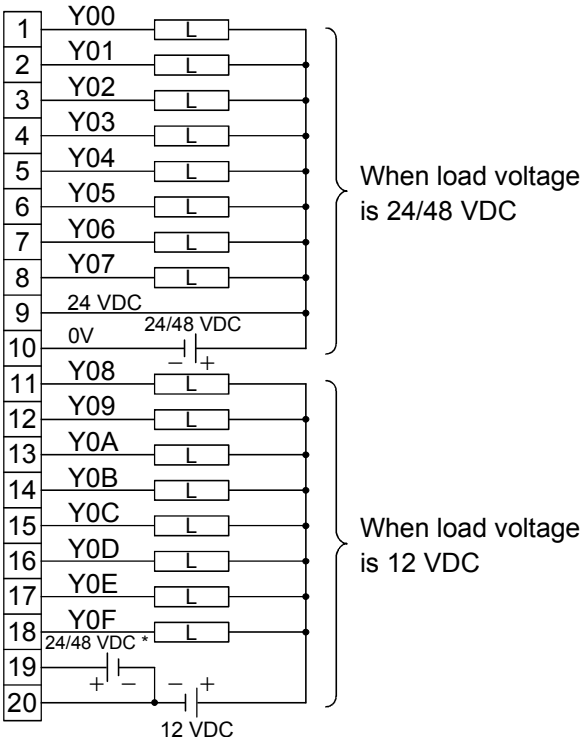
(17)

Model	Rated Input Voltage
AY60EP	12/24 VDC



(18)

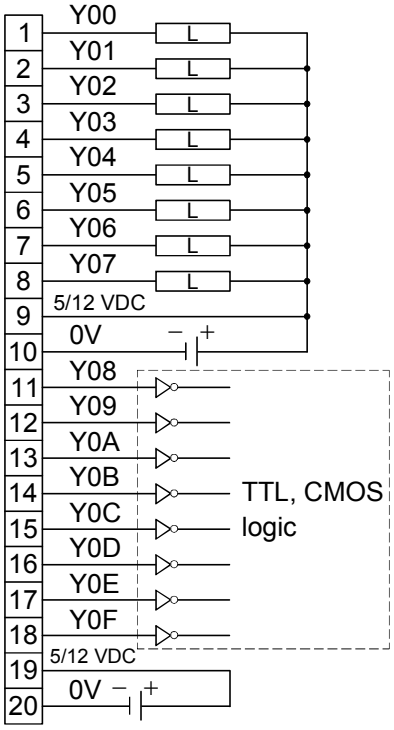
Model	Rated Input Voltage
AY60S	24/48 (12) VDC



- 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.

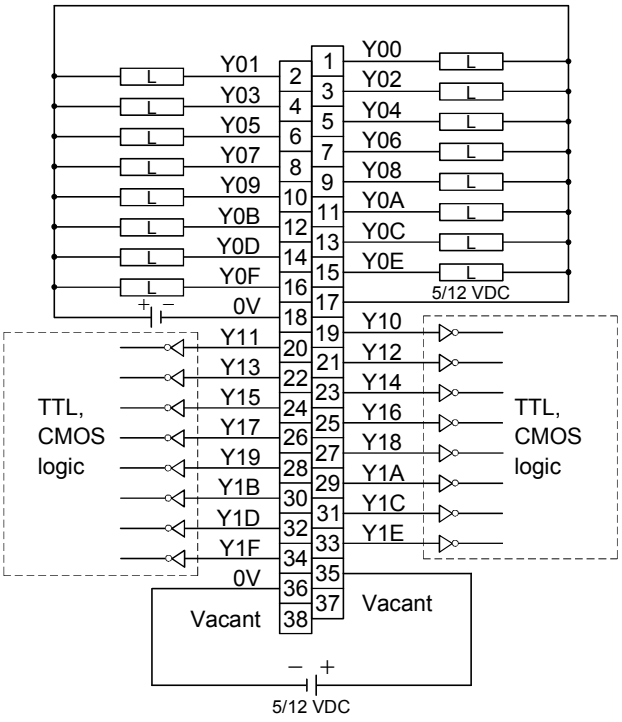
(19)

Model	Rated Input Voltage
AY70	5/12 VDC



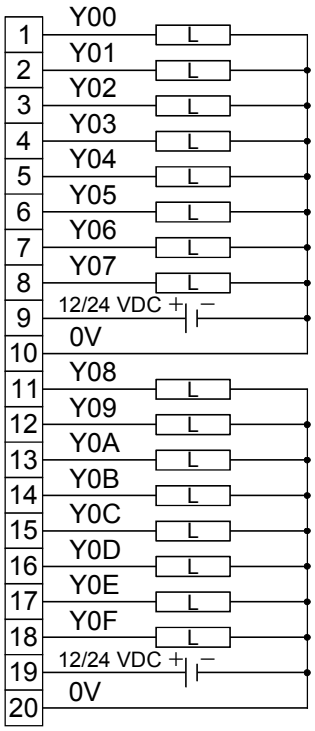
(20)

Model	Rated Input Voltage
AY71	5/12 VDC



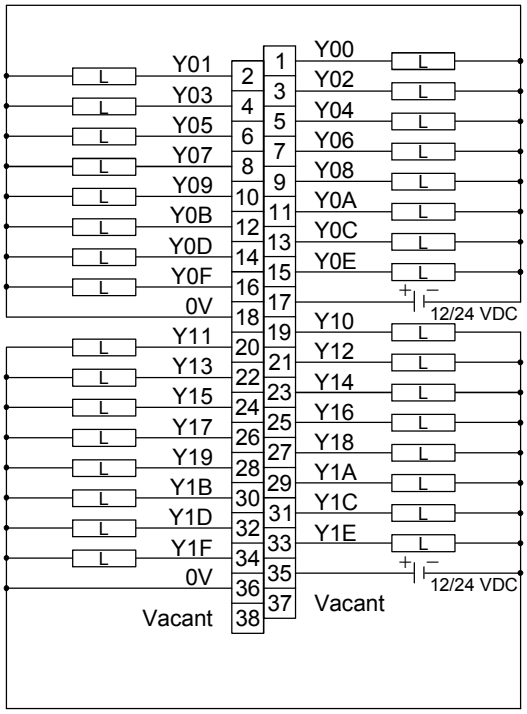
(21)

Model	Rated Input Voltage
AY80	12/24 VDC
AY80EP	



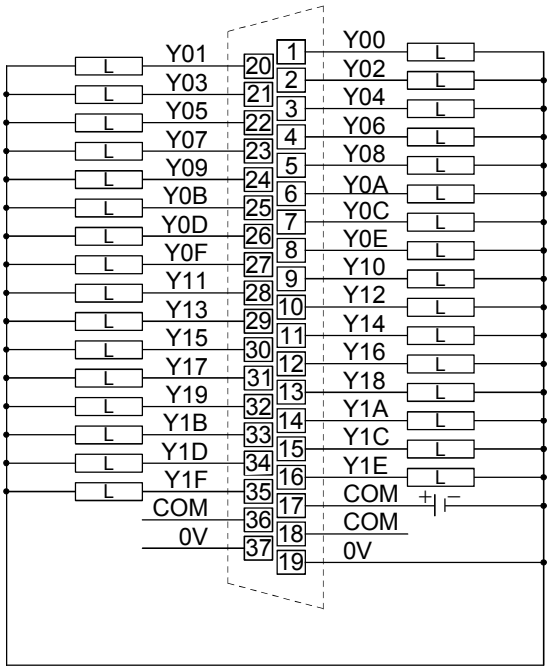
(22)

Model	Rated Input Voltage
AY81	12/24 VDC
AY81EP	



(23)

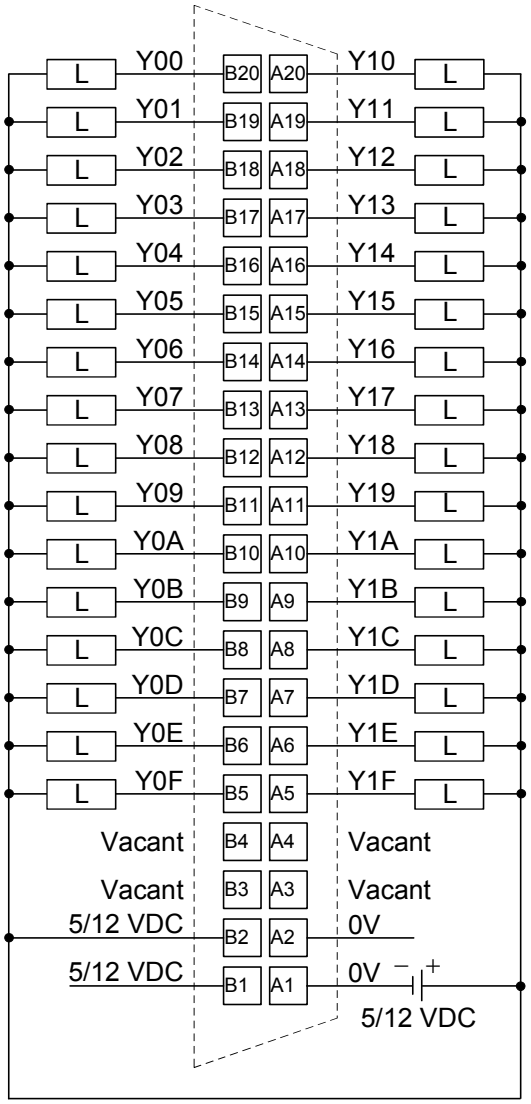
Model	Rated Input Voltage
AY82EP	12/24 VDC



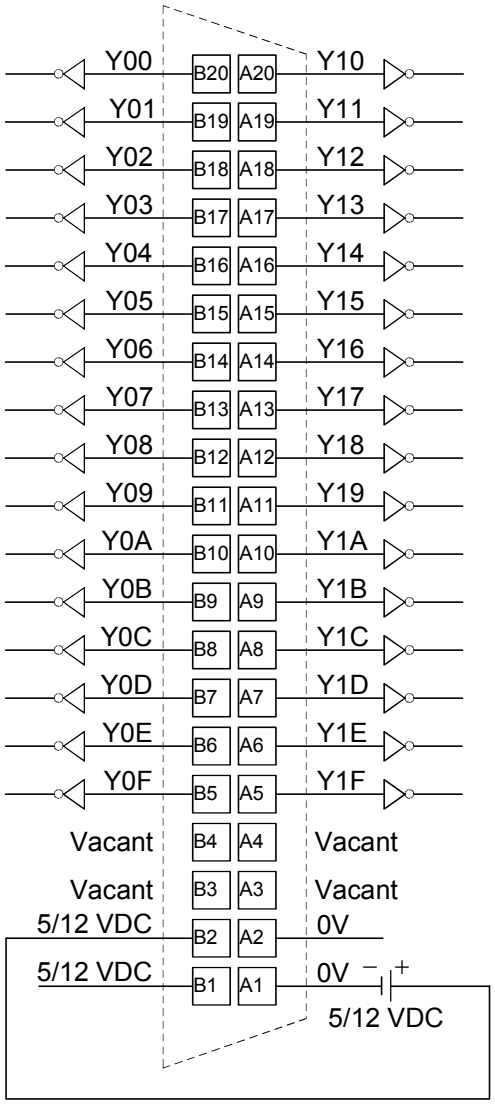
* The figure above indicates F (the first half 32 points).
The connections for L (the latter half 32 points) are the same as for F (regard Y00 to Y1F as Y20 to Y3F).
17 and 18 and 36 , and 19 and 37 are connected internally.

(24)	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.

MEMO

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	—	16ms or less	16ms or less	
AH42	Transistor output (sink type)	32 points		0.1A	1A	2ms or less	2ms 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%	16ms or less	16ms or less	LED display	16-pin connector	—
		10ms or less	10ms 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

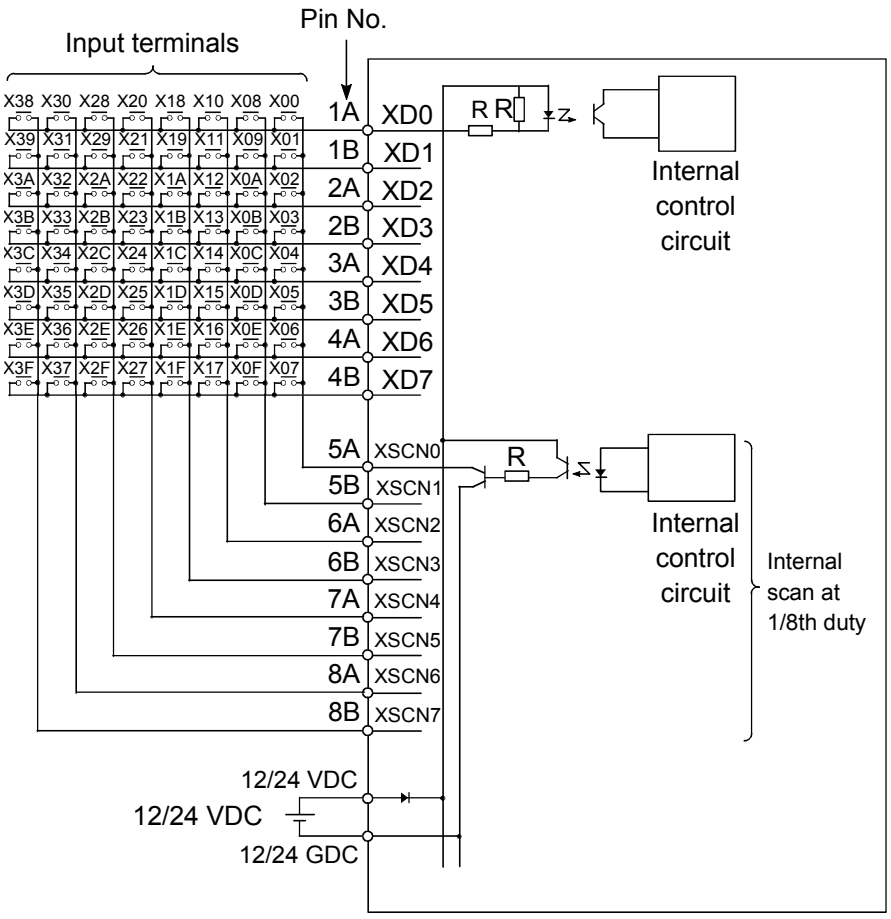
*1 : The same numbers are allocated to both input and output points. The number of occupied I/O points is 64.

*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.

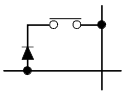
5.3.2 Input/output combined module connections

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

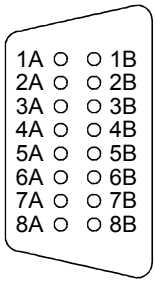
Input side



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



Pin Arrangement

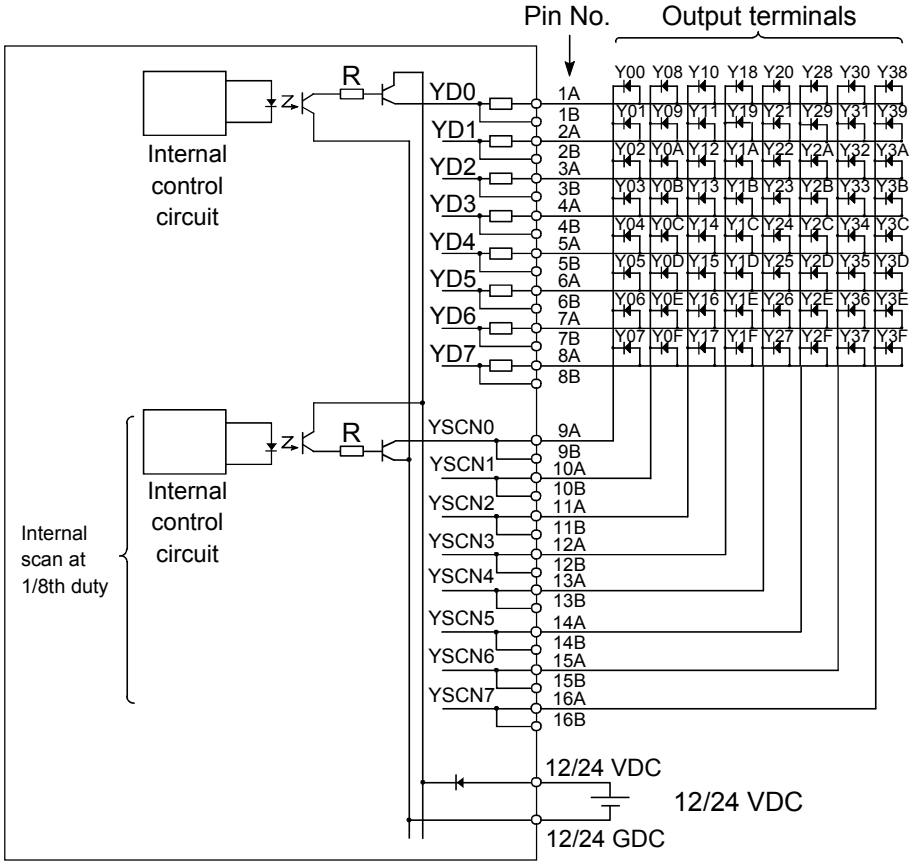


Seen from front face of the module

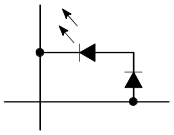
Pin No.	Signal Name	Pin No.	Signal Name
1A	XD0	1B	XD1
2A	XD2	2B	XD3
3A	XD4	3B	XD5
4A	XD6	4B	XD7
5A	XSCN0	5B	XSCN1
6A	XSCN2	6B	XSCN3
7A	XSCN4	7B	XSCN5
8A	XSCN6	8B	XSCN7

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

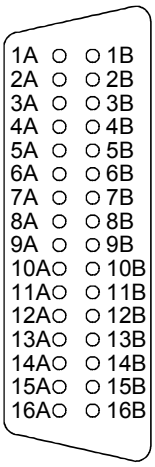
Output side



* 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

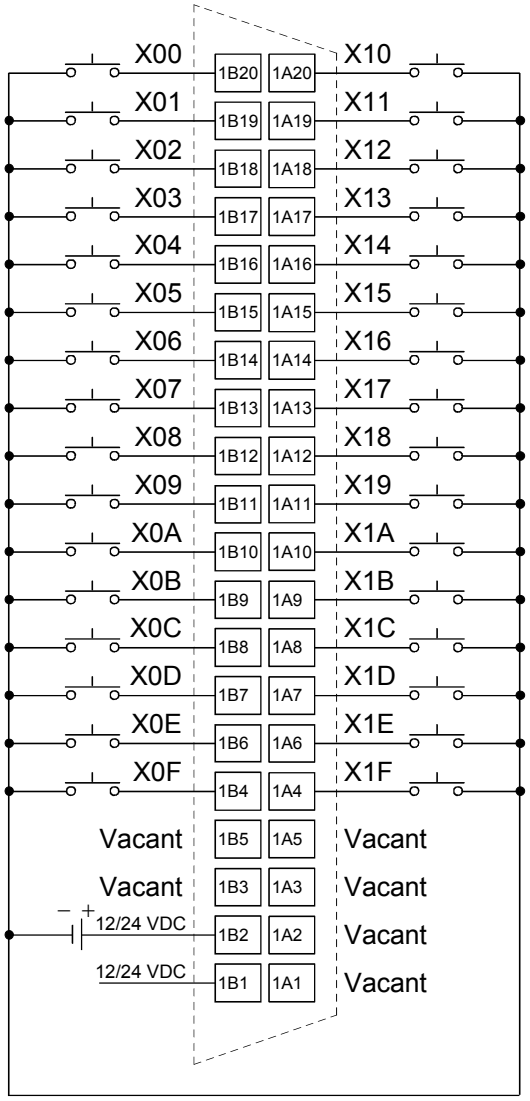


Seen from front face of the module

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

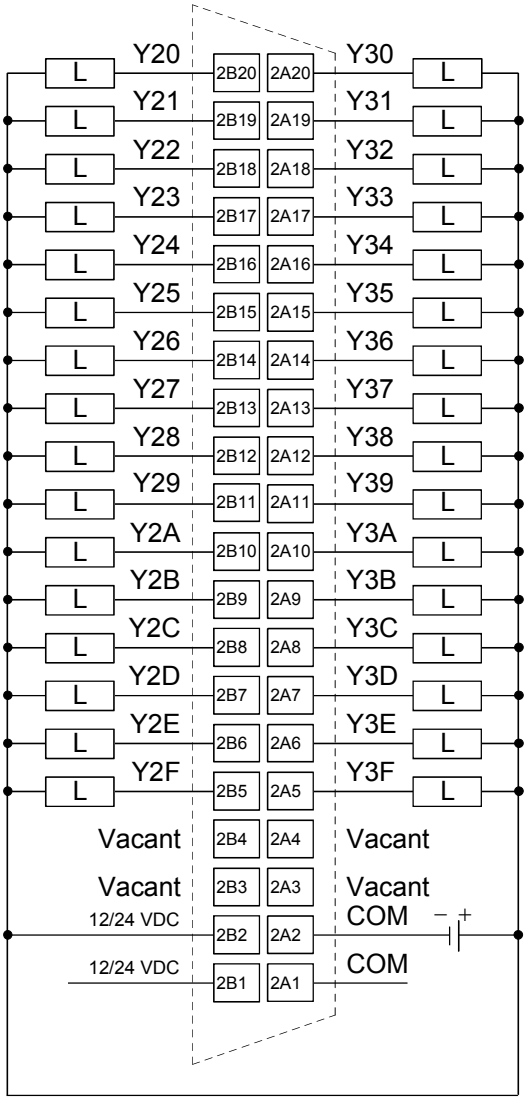
(2)

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.

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.

Section 6.1 Error Code List for AnNCPU (Table 6.1)
Section 6.2 Error Code List for AnACPU (Table 6.2)
Section 6.3 Error Code List for AnUCPU (Table 6.3)
Errors should be cleared by taking appropriate action.

6.1 Error Code List for AnNCPU

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

Table 6.1 Error Code List

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"INSTRCT. CODE ERR" (Checked at the execution of instruction)	10	Stop	Instruction code, which cannot be decoded by CPU, is included in the program. (1)EP-ROM or memory cassette, which cannot be decoded, has been loaded. (2)Since the memory contents have changed for some reason, instruction code, which cannot be decoded, has been included.	(1)Read the error step by use of a peripheral equipment and correct the program at that step. (2)In the case of EP-ROM or memory cassette, rewrite the contents or replace with an EP-ROM or memory cassette which stores correct contents.
"PARAME-TER ERROR" (Checked at power-on, STOP → RUN, and PAUSE → RUN)	11	Stop	(1)Capacity larger than the memory capacity of CPU module has been set with the peripheral equipment and then write to CPU module has been performed. (2)The contents of parameters of CPU memory have changed due to noise or the improper loading of memory. (3)RAM is not loaded to the A1 or A1NCPU.	(1)Check the memory capacity of CPU with the memory capacity set by peripheral equipment and re-set incorrect area. (2)Check the loading of CPU memory and load it correctly. Read the parameter contents of CPU memory, check and correct the contents, and write them to CPU again. (3)Install the RAM and write parameter contents from a peripheral device.

Table 6.1 Error Code List (Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"MISSING END INS." (Checked at STOP → RUN)	12	Stop	(1)There is no END (FEND) instruction in the program. (2)When subprogram has been set by the parameter, there is no END instruction in the subprogram.	Write END instruction at the end of program.
"CAN'T EXECUTE(P)" (Checked at the execution of instruction)	13	Stop	(1)There is no jump destination or multiple destinations specified by the CJ, SCJ, CALL, CALLP, or JMP instruction. (2)There is a CHG instruction and no setting of subprogram. (3)Although there is no CALL instruction, the RET instruction exists in the program and has been executed. (4)The CJ, SCJ, CALL, CALLP, or JMP instruction has been executed with its jump destination located below the END instruction. (5)The number of the FOR instructions is different from that of the NEXT instructions. (6)A JMP instruction is given within a FOR to NEXT loop causing the processing to exit the loop. (7)Processing exited subroutine by the JMP instruction before execution of the RET instruction. (8)Processing jumped into a step in a FOR to NEXT loop or into a subroutine by the JMP instruction. (9)The STOP instruction is given in an interrupt program, a subroutine program or in a FOR to NEXT loop.	Read the error step by use of peripheral equipment and correct the program at that step. (Insert a jump destination or reduce multiple destinations to one.)

Table 6.1 Error Code List (Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/ PAUSE → RUN)	14	Stop	(1)Instructions (including NOP) except LD X□, LDI X□, AND X□ and ANI X□ are included in the CHK instruction circuit block. (2)Multiple CHK instructions are given. (3)The number of contact points in the CHK instruction circuit block exceeds 150. (4)There is no CJ P□ circuit block before the CHK instruction circuit block. (5)The device number of D1 of the CHK D1 D2 instruction is different from that of the contact point before the CJ P□ instruction. (6)Pointer P254 is not given to the head of the CHK instruction circuit block. P254 CHK D1 D2	Check the program in the CHK instruction circuit block according to items (1) to (6) in the left column. Correct problem using the peripheral and perform operation again.
"CAN'T EXECUTE (I)" (Checked at the occurrence of interruption)	15	Stop	(1)Although the interrupt module is used, there is no number of interrupt pointer I, which corresponds to that module, in the program or there are multiple numbers. (2)No IRET instruction has been entered in the interrupt program. (3)There is IRET instruction in other than the interrupt program.	(1)Check for the presence of interrupt program which corresponds to the interrupt unit, create the interrupt program, and reduce the same numbers of I. (2)Check if there is IRET instruction in the interrupt program and enter the IRET instruction. (3)Check if there is IRET instruction in other than the interrupt program and delete the IRET instruction.
"CASSETTE ERROR" (Checked at power-on) An, AnN only	16	Stop	The memory cassette is not loaded.	Turn off the power, insert the memory cassette and turn on the power again.

Table 6.1 Error Code List (Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"ROM ERR"	17	Stop	Parameters and/or sequence programs are not correctly written to the mounted memory cassette.	(1)Correctly write parameters and/or sequence programs to the memory cassette. (2)Remove the memory cassettes that contain no parameters or sequence programs.
			Parameters stored in the memory cassette have exceeded the limit of available program capacity. Ex.)Default parameters (program capacity: 6k steps) are written to A1NMCA-2KE.	(1)Adjust the program capacity for parameters to the memory cassette used. (2)Use the memory cassette of which memory capacity is larger than the program capacity for parameters.
"RAM ERROR" (Checked at power-on)	20	Stop	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 CPU hardware error, consult Mitsubishi representative.
"OPE. CIRCUIT ERR" (Checked at power-on)	21	Stop	The operation circuit, which performs the sequence processing in the CPU, does not operate properly.	
"WDT ERROR" (Checked at the execution of END processing)	22	Stop	Scan time exceeds watch dog error monitor time. (1)Scan time of user program has been exceeded for some conditions. (2)Scan time has lengthened due to instantaneous power failure which occurred during scan.	(1)Calculate and check the scan time of user program and reduce the scan time using the CJ instruction or the like. (2)Monitor the content of special register D9005 by use of peripheral equipment. When the content is other than 0, line voltage is insufficient. When the content is other than 0, the power voltage is unstable.
"SUB-CPU ERROR" (Checked continuously)	23 (During run) 26 (At power-on)	Stop	Sub-CPU is out of control or defective.	Since this CPU hardware error, consult Mitsubishi representative.

Table 6.1 Error Code List (Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"END NOT EXECUTE" (Checked at the execution of END instruction)	24	Stop	(1)When the END instruction was to be executed, the instruction was read as other instruction code due to noise or the like. (2)The END instruction has changed to another instruction code for some reason.	Perform reset and run. If the same error is displayed again, it is the CPU hardware error, consult Mitsubishi representative.
"WDT ERROR" (Checked continuously)	25	Stop	The CPU is executing an endless loop.	Since the program is in an endless lop due to the JMP and CJ instructions, check the program.
"MAIN CPU DOWN" (Checked continuously)	26	Stop	Main-CPU is out of control or defective. (Sub-CPU checked it.)	Since this is a CPU hardware error, consult Mitsubishi representative.
"UNIT VERIFY ERR. " (Checked continuously)	31	Stop or Continue (set by parameter)	I/O module data are different from those at power-on. The I/O module (including the special function module) is incorrectly loaded or has been removed, or a different unit has been loaded.	(1)Among special registers D9116 to D9123, the bit corresponding to the module of verify error is "1". Therefore, use peripheral equipment to monitor the registers and check for the module with “1” and make replacement. (2)When the present unit arrangement is OK, perform reset with the reset switch.
"FUSE BREAK OFF" (Checked continuously)	32	Stop or Continue (set by parameter)	(1)A fuse is blown in an output modul. (2)The external output supply for output load is not turned off or not connected.	(1)Check the fuse blown indicator LED of output module and change the fuse of module of which LED is on. (2)Among special registers D9100 to D9107, the bit corresponding to the unit of fuse break is "1" Replace the fuse of a corresponding module. Monitor and check it. (3)Check if the external power supply for output load is turned on or off.

Table 6.1 Error Code List(Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"CONTROL-BUS ERR. " (Checked at the execution of FROM and TO instructions)	40	Stop	The FROM and TO instructions can-not be executed. Error of control bus with special function module.	Since this is a hardware error of a special function module, CPU module, or base unit, replace the module and check the defective module, consult Mitsubishi representative.
"SP. UNIT DOWN" (Checked at the execution of FROM and TO instructions.)	41	Stop	When the FROM or TO instruction is executed, access has been made to the special function module but the answer is not given. The accessed special function module is defective.	Since this is an accessed special function module error, consult Mitsubishi representative.
"LINK UNIT ERROR"	42	Stop	The data link module is loaded in the master station.	Remove the data link module from the master station. After correction, reset and start from the initialization.
"I/O INT. ERROR"	43	Stop	Although the interrupt module is not loaded, interruption has occurred.	Since this is a hardware error of a specific module, replace the module and check the defective module, consult Mitsubishi representative.
"SP. UNIT LAY. ERROR."	44	Stop	(1)Three or more computer link units are loaded with respect to one CPU module. (A1SCPU24-R2 is also counted as one unit.) (2)Two or more data link modules are loaded. (3)Two or more interrupt units are loaded. (4)A special function module is assigned in place of an I/O module, or vice versa, at I/O assignment of parameters on peripheral devices. (5)The input/output modules or special function modules are loaded at the input/output numbers exceeding the number of input/output points, or GOT is connected via bus line.	(1)Reduce the computer link modules to two or less. (2)Reduce the data link modules to one or less. (3)Reduce the interrupt module to one. (4)Re-set the I/O assignment of parameter setting by use of peripheral devices according to the actually loaded special function module. (5)Review the input/output numbers, and remove the modules at the input/output numbers beyond the number of input/output points or GOT.

Table 6.1 Error Code List (Continue)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"SP. UNIT ERROR" (Checked at the execution of FROM and TO instructions)	46	Stop or Continue (set by parameter)	Access (execution of FROM to TO instruction) has been made to a location where there is not special function unit.	Read the error step by use of peripheral equipment, and check and correct the content of FROM or TO instruction at that step.
"LINK PARA. ERROR"	47	Continue	(1)If a data link CPU is used to set a master station (station number "00") : The contents written to the parameter area of link by setting the link range in the parameter setting of peripheral devices are different from the link parameter contents for some reason. Or, link parameters are not written. (2)The setting of the total number of slave stations is 0.	(1)Write parameters again and make check. (2)Check setting of station numbers. (3)When the error is displayed again, it is hardware error. Therefore, consult Mitsubishi representative.
"OPERATION ERROR" (Checked during execution of instruction)	50	Continue	(1)The result of BCD conversion has exceeded the specified range (9999 or 99999999). (2)Operation impossible because specified device range has been exceeded. (3)File registers used in program without capacity setting. (4)Operation error occurred during execution of the RTOP, RFRP, LWTP or LRDP instruction.	Read the error step using peripheral devices and check the program at the error step, and correct it. (Check the specified device range, BCD conversion, or the like.)
"MAIN CPU DOWN" (Interrupt fault) AnNCPU only	60	Stop	(1) INT instruction processed in microcomputer program area. (2)CPU malfunction due to noise. (3)Hardware error of CPU module.	(1)Because the INT instruction cannot be used in the microcomputer program, remove it. (2)Take measures against noises. (3)Consult Mitsubishi representative.
"BATTERY ERROR" (Checked at power-on)	70	Continue	(1)The battery voltage has dropped to below the specified value. (2)The lead connector of the battery is not connected.	(1)Replace battery. (2)Connect the lead connector if RAM memory or power failure compensation function is used.

6.2 Error Code List for AnACPU

The causes and corrective actions for error code, error message and detailed error with AnACPU are shown below.

Table 6.2 Error Code List

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"INSTRCT CODE ERR" (Checked when STOP → RUN or at execution of instruction.)	10	101	STOP	Instruction codes which the CPU cannot decode are included in the program.	(1)Read the error step using a peripheral device and correct the program of the step. (2)Check the ROM if it contains instruction codes which cannot be decoded. If it does, replace it with a correct ROM.
		102		Index qualification is specified for a 32-bit constant.	Read the error step using a peripheral device and correct the program of the step.
		103		Device specified by a dedicated instruction is not correct.	
		104		An dedicated instruction has incorrect program structure.	
		105		An dedicated instruction has incorrect command name.	
		106		Index qualification using Z or V is included in the program between LEDA/B IX and LEDA/B IXEND.	

Table 6.2 Error Code List

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"INSTRCT CODE ERR" (Checked when STOP → RUN or at execution of instruction.)	10	107	STOP	(1)Index qualification is specified for the device numbers and set values in the OUT instruction of timers and counters. (2)Index qualification is specified at the label number of the pointer (P) provided to the head of destination of the CJ, SCJ, CALL, CALLP, JMP, LEDA/B, FCALL and LEDA/B, BREAK instructions or at the label number of the interrupt pointer (I) provided to the head of an interrupt program.	Read the error step using a peripheral device and correct the program of the step.
		108		Errors other than 101 to 107 mentioned above.	

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"PARAM-ETER ERROR" (Checked at power on and at STOP/ PAUSE → RUN.)	11	111	STOP	Capacity settings of the main and sub programs, microcomputer program, file register comments, status latch, sampl-ing trace and extension file registers are not within the usable range of the CPU.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory.
		112		Total of the set capacity of the main and sub programs, file register comments, status latch, sampling trace and extension file registers exceeds capacity of the memory cassette.	
		113		Latch range set by parameters or setting of M, L or S is incorrect.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory
		114		Sum check error	
		115		Either of settings of the remote RUN/ PAUSE contact point by parameters, operation mode at occurrence of error, annunciator indication mode, or STOP → RUN indication mode is incorrect.	
		116		The MNET-MINI automatic refresh setting by parameters is incorrect.	
		117		Timer setting by parameters is incorrect.	
		118		Counter setting by parameters is incorrect.	
"MISS-ING END INS" (Checked at STOP → RUN.)	12	121	STOP	The END (FEND) instruction is not given in the main program.	Write the END instruction at the end of the main program.
		122		The END (FEND) instruction is not given in the sub program if the sub program is set by parameters.	Write the END instruction at the end of the sub program.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CAN'T EXE-CUTE (P)" (Checked at execu-tion of instruction.)	13	131	STOP	The same device number is used at two or more steps for the pointers (P) and interrupt pointers (I) used as labels to be specified at the head of jump destination.	Eliminate the same pointer numbers provided at the head of jump destination.
		132		Label of the pointer (P) specified in the CJ, SCJ, CALL, CALLP, JMP, LEDA/BFCALL or LEDA/BBREAK instruction is not provided before the END instruction.	Read the error step using a peripheral device, check contents and insert a jump destination pointer (P).
		133		(1)The RET instruction was included in the program and executed though the CALL instruction was not given. (2)The NEXT LEDA/BBREAK instructions were included in the program and executed though the FOR instruction was not given. (3)Nesting level of the CALL, CALLP and FOR instructions is 6 levels or deeper, and the 6th level was executed. (4)There is no RET or NEXT instruction at execution of the CALL or FOR instruc-tion.	(1)Read the error step using a peripheral device, check contents and cor-rect program of the step. (2)Reduce the number of nesting levels of the CALL, CALLP and FOR instructions to 5 or less.
		134		The CHG instruction was included in the program and executed though no sub program was provided.	Read the error step using a peripheral device and delete the CHG instruction circuit block.
		135		(1) LEDA/BIX and LEDA/BIXEND instructions are not paired. (2)There are 33 or more sets of LEDA/BIX and LEDA/BIXEND instruc-tions.	(1)Read the error step using a peripheral device, check contents and cor-rect program of the step. (2)Reduce the number of sets of LEDA/BIX and LEDA/BIXEND instruc-tions to 32 or less.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/ PAUSE → RUN.)	14	141	STOP	Instructions (including NOP) other than LDX, LDIX, ANDX and ANIX are included in the CHK instruction circuit block.	Check the program of the CHK instruction and correct it referring to contents of detailed error codes.
		142		Multiple CHK instructions are given.	
		143		The number of contact points in the CHK instruction circuit block exceeds 150.	
		144		The LEDA CHK instructions are not paired with the LEDA CHKEND instructions, or 2 or more pairs of them are given.	
		145		Format of the block shown below, which is provided before the CHK instruction circuit block, is not as specified. P254 CJ P	
		146		Device number of D1 in the CHK D1 D2 instruction is different from that of the contact point before the CJ P instruction.	
		147		Index qualification is used in the check pattern circuit.	

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/ PAUSE → RUN.)	14	148	STOP	(1)Multiple check pattern circuits of the LEDA CHK - LEDA CHKEND instructions are given. (2)There are 7 or more check condition circuits in the LEDA CHK - LEDA CHKEND instructions. (3)The check condition circuits in the LEDA CHK - LEDA CHKEND instructions are written without using X and Y contact instructions or compare instructions. (4)The check pattern circuits of the LEDA CHK - LEDA CHKEND Å@instructions are written with 257 or more steps.	Check the program of the CHK instruction and correct it referring to contents of detailed error codes.
"CAN'T EXE-CUTE (I)" (Checked at occurrence of interrupt.)	15	151	STOP	The IRET instruction was given outside of the interrupt program and was executed.	Read the error step using a peripheral device and delete the IRET instruction.
		152		There is no IRET instruction in the interrupt program.	Check the interrupt program if the IRET instruction is given in it. Write the IRET instruction if it is not given.
		153		Though an interrupt module is used, no interrupt pointer (I) which corresponds to the module is given in the program. Upon occurrence of error, the problem pointer (I) number is stored at D9011.	Monitor special register D9011 using a peripheral device, and check if the interrupt program that corresponds to the stored data is provided or if two or more interrupt pointers (I) of the same number are given. Make necessary corrections.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CAS-SETTE ERROR"	16	—	STOP	Memory cassette is not loaded.	Turn off the PC power and load the memory cassette.
"RAM ERROR" (Checked at power on.)	20	201	STOP	The sequence program storage RAM in the CPU module caused an error.	Since this is CPU hardware error, consult Mitsubishi representative.
		202		The work area RAM in the CPU module caused an error.	
		203		The device memory in the CPU module caused an error.	
		204		The address RAM in the CPU module caused an error.	
"OPE CIRCUIT ERROR" (Check during execution of END process)	21	211	STOP	The operation circuit for index qualification in the CPU does not work correctly.	
		212		Hardware (logic) in the CPU does not operate correctly.	
		213		The operation circuit for sequential processing in the CPU does not operate correctly.	
		214		The operation circuit for indexing in the END process check of the CPU does not function correctly.	
		215		Hardware inside the CPU does not function in the END process check of the CPU.	
"WDT ERROR" (Checked at execution of END processing.)	22	—	STOP	Scan time is longer than the WDT time. (1)Scan time of the user's program has been extended due to certain conditions. 2) Scan time has been extended due to momentary power failure occurred during scanning.	(1)Calculate and check the scan time of user program and reduce the scan time using the CJ instruction or the like. (2)Monitor contents of special register D9005 using a peripheral device. If the contents are other than 0, power supply voltage may not be stable. Check power supply and reduce variation in voltage.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"END NOT EXECUTE" (Checked at execution of the END instruction.)	24	241	STOP	Whole program of specified program capacity was executed without executing the END instructions. (1)When the END instruction was to be executed, the instruction was read as other instruction code due to noise. (2)The END instruction changed to other instruction code due to unknown cause.	(1)Reset and run the CPU again. If the same error recurs, Since this is CPU hardware error, consult Mitsubishi representative.
"MAIN CPU DOWN"	26	—	STOP	The main CPU is malfunctioning or faulty.	Since this is CPU hardware error, consult Mitsubishi representative
"UNIT VERIFY ERR" (Checked continuously.)	31	—	Stop or Continue (set by parameter)	Current I/O module information is different from that recognized when the power was turned on. (1)The I/O module (including special function modules) connection became loose or the module was disconnected during operation, or wrong module was connected.	Read detailed error code using a peripheral device and check or replace the module which corresponds to the data (I/O head number). Or, monitor special registers D9116 to D9123 using a peripheral device and check or replace the modules if corresponding data bit is "1".
"FUSE BREAK OFF" (Checked continuously.)	32	—	Stop or Continue (set by parameter)	There is an output module of which fuse is blown.	(1)Check the FUSE BLOWN indicator LED on the output module and replace the fuse. (2)Read detailed error code using a peripheral device and replace the fuse of the output module which corresponds to the data (I/O head number). Or, monitor special registers D9100 to D9107 using a peripheral device and replace the fuse of the output module of which corresponding data bit is "1".

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CONTROL -BUS ERR"	40	401	STOP	Due to the error of the control bus which connects to special function modules, the FROM/TO instruction cannot be executed.	Since it is a hardware error of special function module, CPU module or base module, replace and check defective module(s). Consult Mitsubishi representative for defective modules.
		402		If parameter I/O assignment is being executed, special function modules are not accessible at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9011.	
"SP.UNIT DOWN"	41	411	STOP	Though an access was made to a special function module at execution of the FROM/TO instruction, no response is received.	Since it is hardware error of the special function module to which an access was made, consult Mitsubishi representative.
		412		If parameter I/O assignment is being executed, no response is received from a special function module at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9011.	
"LINK UNIT ERROR"	42	—	STOP	(1)Either data link module is loaded to the master station. (2)There are 2 link modules which are set to the master station (station 0).	(1)Remove data link module from the master station. (2)Reduce the number of master stations to 1. Reduce the link modules to 1 when the 3-tier system is not used.
"I/O INT. ERROR"	43	—	STOP	Though the interrupt module is not loaded, an interrupt occurred.	Since it is hardware error of a module, replace and check a defective module. For defective modules, consult Mitsubishi representative.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"SP.UNIT LAY.ERR."	44	441	STOP	A special function module is assigned as an I/O module, or vice versa, in the I/O assignment using parameters from the peripheral device.	Execute I/O assignment again using parameters from the peripheral device according to the loading status of special function modules.
		442		There are 9 or more special function modules (except the interrupt module) which can execute interruption to the CPU module loaded.	Reduce the special function modules (except the interrupt module) which can execute interrupt start to 8 or less.
		443		There are 2 or more data link modules loaded.	Reduce the data link modules to 1 or less.
		444		There are 7 or more modules such as a computer link module loaded to one CPU module.	Reduce the computer link modules to 6 or less.
		445		There are 2 or more interrupt modules loaded.	Reduce the interrupt modules to 1 or less.
		446		Modules assigned by parameters for MNT/MINI automatic refresh from the peripheral device do not conform with the types of station modules actually linked.	Perform again module assignment for MNT/MINI automatic refresh with parameters according to actually linked station modules.
		447		The number of modules of I/O assignment registration (number of loaded modules) per one CPU module for the special function modules which can use dedicated instructions is larger than the specified limit. (Total of the number of computers shown below is larger than 1344.) (AD59 × 5) (AD57(S1)/AD58 × 8) (AJ71C24(S3/S6/S8) × 10) (AJ7IUC24 × 10) (AJ71C21(S1) (S2) × 29) + ((AJ71PT32(S3) in extension mode × 125) Total > 1344	Reduce the number of loaded special function modules.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"SP.UNIT ERROR" (Checked at execution of the FROM/TO instruction or the dedicated instructions for special function modules.)	46	461	Stop or Continue (set by parameter)	Module specified by the FROM / TO instruction is not a special function module.	Read the error step using a peripheral device and check and correct contents of the FROM / TO instruction of the step.
		462		Module specified by the dedicated instruction for special function module is not a special function module or not a corresponding special function module.	Read the error step using a peripheral device and check and correct contents of the dedicated instruction for special function modules of the step.
"LINK PARA. ERROR"	47	—	Continue	(1)Data written to the parameter areas of the link of which range was set by parameters using a peripheral device does not conform with the data of link parameters read by the CPU. Or, link parameters are not written. (2)Total number of local stations is set at 0.	(1)Write in parameters again and check. (2)Check setting of station numbers. (3)If the same error indication is given again, it is hardware failure. Consult Mitsubishi representative.
"OPERATION ERROR" (Checked at execution of instruction.)	50	501	Stop or Continue (set by parameter)	(1)When file registers (R) are used, operation is executed outside of specified ranges of device numbers and block numbers of file registers (R). (2)File registers are used in the program without setting capacity of file registers.	Read the error step using a peripheral device and check and correct program of the step.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"OPERATION ERROR" (Checked at execution of instruction.)	50	502	Stop or Continue (set by parameter)	Combination of the devices specified by instruction is incorrect.	Read the error step using a peripheral device and check and correct program of the step.
		503		Stored data or constant of specified device is not in the usable range.	
		504		Set number of data to be handled is out of the usable range.	
		505		(1)Station number specified by the LEDA/BLRDP LEDA/BLWTP, LRDP, LWTP instructions is not a local station. (2)Head I/O number specified by the LEDA/BRFRP LEDA/BRTOP, RFRP, RTOP instructions is not of a remote station.	
		506		Head I/O number specified by the LEDA/BRFRP LEDA/BRTOP, RFRP, RTOP instructions is not of a special function module.	
		507		(1)When the AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed to either of them. (2)When an AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed in divided mode to another AD57(S1) or AD58.	Read the error step using a peripheral device and provide interlock with special relay M9066 or modify program structure so that, when the AD57(S1) or AD58 is executing instructions in divided processing mode, other instructions may not be executed to either of them or to another AD57(S1) or AD58 in divided mode.

Table 6.2 Error Code List (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"OPERATION ERROR" (Checked at execution of instruction.)	50	509	STOP	(1)An instruction which cannot be executed by remote terminal modules connected to the MNET/ MINI-S3 was executed to the modules. (2)When the PRC instruction was executed to a remote terminal, the communication request registration areas overflowed. (3)The PIDCONT instruction was executed without executing the PIDINIT instruction. The PID57 instruction was executed without executing the PIDINIT or PIDCONT instruction.	(1)Read the error step using a peripheral device and correct the program, meeting loaded conditions of remote terminal modules. (2)Provide interlock using M9081 (communication request registration areas BUSY signal) or D9081 (number of vacant areas in the communication request registration areas) when the PRC instruction is executed to a remote terminal. (3)Execute the PIDCONT instruction after execution of the PIDINIT instruction. Execute the PID57 instruction after execution of the PIDINIT and PIDCONT instructions.
"MAIN CPU DOWN"	60	—	STOP	(1)The CPU malfunctioned due to noise. (2)Hardware failure.	(1)Take proper countermeasures for noise. (2)Hardware failure.
		602		(1)Failure in the power module, CPU module, main base unit or expansion cable is detected.	(1)Replace the power module, CPU module, main base unit or expansion cable.
"BATTERY ERROR" (Checked at power on.)	70	—	Continue	(1)Battery voltage has lowered below specified level. (2)Battery lead connector is not connected.	(1)Replace battery. (2)If a RAM memory or power failure compensation function is used, connect the lead connector.

6.3Error Code List for AnUCPU

The causes and corrective actions for error code, error message and detailed error with AnUCPU are shown below.

*1 denotes those error codes that occur only with the AnUCPU.
*2 denotes those error codes that occur only with the A4UCPU.

Table 6.3 Error Code List for AnUCPU

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"INSTRCT CODE ERR" (Checked when STOP → RUN or at execution of instruction.)	10	101	STOP	Instruction codes which the CPU cannot decode are included in the program.	(1)Read the error step using a peripheral device and correct the program of the step. (2)Check the ROM if it contains instruction codes which cannot be decoded. If it does, replace it with a correct ROM.
		102		Index qualification is specified for a 32-bit constant.	Read the error step using a peripheral device and correct the program of the step.
		103		Device specified by a dedicated instruction is not correct.	
		104		An dedicated instruction has incorrect program structure.	
		105		An dedicated instruction has incorrect command name.	
		106		Index qualification using Z or V is included in the program between LEDA IX and LEDA IXEND .	

Table 6.3 Error Code List for AnUCPU

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"INSTRCT CODE ERR" (Checked when STOP → RUN or at execution of instruction.)	10	107	STOP	(1)Index qualification is specified for the device numbers and set values in the OUT instruction of timers and counters. (2)Index qualification is specified at the label number of the pointer (P) provided to the head of destination of the CJ, SCJ, CALL, CALLP, JMP, LEDA/B, FCALL and LEDA/B, BREAK instructions or at the label number of the interrupt pointer (I) provided to the head of an interrupt program.	Read the error step using a peripheral device and correct the program of the step.
		108		Errors other than 101 to 107 mentioned above.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"PARAMETER ERROR" (Checked at power on and at STOP/ PAUSE → RUN.)	11	111	STOP	Capacity settings of the main and sub programs, microcomputer program, file register comments, status latch, sampl-ing trace and extension file registers are not within the usable range of the CPU.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory.
		112		Total of the set capacity of the main and sub programs, file register comments, status latch, sampling trace and extension file registers exceeds capacity of the memory cassette.	
		113		Latch range set by parameters or setting of M, L or S is incorrect.	Read parameters in the CPU memory, check the contents, make necessary corrections and write them again to the memory
		114		Sum check error	
		115		Either of settings of the remote RUN/ PAUSE contact point by parameters, operation mode at occurrence of error, annunciator indication mode, or STOP → RUN indication mode is incorrect.	
		116		The MNET-MINI automatic refresh setting by parameters is incorrect.	
		117		Timer setting by parameters is incorrect.	
		118		Counter setting by parameters is incorrect.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"MISSING END INS" (Checked at STOP → RUN.)	12	121	STOP	The END END (FEND) instruction is not given in the main program.	Write the END instruction at the end of the main program.
		122		The END (FEND) instruction is not given in the sub program if the sub program is set by parameters.	Write the END instruction at the end of the sub program.
		123		(1)When subprogram 2 is set by a parameter, there is no END (FEND) instruction in subprogram 2. (2)When subprogram 2 is set by a parameter, subprogram 2 has not been written from a peripheral device.	
		124		(1)When subprogram 3 is set by a parameter, there is no END (FEND) instruction in subprogram 3. (2)When subprogram 3 is set by a parameter, subprogram 2 has not been written from a peripheral device.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CAN'T EXECUTE (P)" (Checked at execution of instruction.)	13	131	STOP	The same device number is used at two or more steps for the pointers (P) and interrupt pointers (I) used as labels to be specified at the head of jump destination.	Eliminate the same pointer numbers provided at the head of jump destination.
		132		Label of the pointer (P) specified in the the CJ, SCJ, CALL, CALLP, JMP, LEDA/BFCALL or LEDA/BBREAK instruction is not provided before the END instruction.	Read the error step using a peripheral device, check contents and insert a jump destination pointer (P).
		133		(1)The RET instruction was included in the program and executed though the CALL instruction was not given. (2)The NEXT LEDA/BBREAK instructions were included in the program and executed though the FOR instruction was not given. (3)Nesting level of the CALL, CALLP and FOR instructions is 6 levels or deeper, and the 6th level was executed. (4)There is no RET or NEXT instruction at execution of the CALL or FOR instruction.	(1)Read the error step using a peripheral device, check contents and correct program of the step. (2)Reduce the number of nesting levels of the CALL, CALLP and FOR instructions to 5 or less.
		134		The CHG instruction was included in the program and executed though no sub program was provided.	Read the error step using a peripheral device and delete the CHG instruction circuit block.
		135		(1) LEDAIX and LEDAIXEND instructions are not paired. (2)There are 33 or more sets of LEDAIX and LEDAIXEND instructions.	(1)Read the error step using a peripheral device, check contents and correct program of the step. (2)Reduce the number of sets of LEDAIX and LEDAIXEND instructions to 32 or less.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/ PAUSE → RUN.)	14	141	STOP	Instructions (including NOP) other than LDX, LDIX, ANDX and ANIX are included in the CHK instruction circuit block.	Check the program of the CHK instruction and correct it referring to contents of detailed error codes.
		142		Multiple CHK instructions are given.	
		143		The number of contact points in the CHK instruction circuit block exceeds 150.	
		144		The LEDA CHK instructions are not paired with the LEDA CHKEND instructions, or 2 or more pairs of them are given.	
		145		Format of the block shown below, which is provided before the CHK instruction circuit block, is not as specified. P254 CJ P□	
		146		Device number of D1 in the CHK D1 D2 instruction is different from that of the contact point before the CJ P□ instruction.	
		147		Index qualification is used in the check pattern circuit.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CHK FORMAT ERR" (Checked at STOP/ PAUSE → RUN.)	14	148	STOP	(1)Multiple check pattern circuits of the LEDA CHK - LEDA CHKEND instructions are given. (2)There are 7 or more check condition circuits in the LEDA CHK - LEDA CHKEND instructions. (3)The check condition circuits in the LEDA CHK - LEDA CHKEND instructions are written without using X and Y contact instructions or compare instructions. (4)The check pattern circuits of the LEDA CHK - LEDA CHKEND instructions are written with 257 or more steps.	Check the program of the CHK instruction and correct it referring to contents of detailed error codes.
"CAN'T EXECUTE (I)" (Checked at occurrence of interrupt.)	15	151	STOP	The IRET instruction was given outside of the interrupt program and was executed.	Read the error step using a peripheral device and delete the IRET instruction.
		152		There is no IRET instruction in the interrupt program.	Check the interrupt program if the IRET instruction is given in it. Write the IRET instruction if it is not given.
		153		Though an interrupt module is used, no interrupt pointer (I) which corresponds to the module is given in the program. Upon occurrence of error, the problem pointer (I) number is stored at D9011.	Monitor special register D9011 using a peripheral device, and check if the interrupt program that corresponds to the stored data is provided or if two or more interrupt pointers (I) of the same number are given. Make necessary corrections.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CASSETTE ERROR"	16	—	STOP	Memory cassette is not loaded.	Turn off the PC power and load the memory cassette.
"RAM ERROR" (Checked at power on.)	20	201	STOP	The sequence program storage RAM in the CPU module caused an error.	Since this is CPU hardware error, consult Mitsubishi representative.
		202		The work area RAM in the CPU module caused an error.	
		203		The device memory in the CPU module caused an error.	
		204		The address RAM in the CPU module caused an error.	
"OPE CIRCUIT ERROR" (Checked at power on.)	21	211	STOP	The operation circuit for index qualification in the CPU does not work correctly.	Since this is CPU hardware error, consult Mitsubishi representative.
		212		Hardware (logic) in the CPU does not operate correctly.	
		213		The operation circuit for sequential processing in the CPU does not operate correctly.	
"OPE. CIRCUIT ERR." (Checked at execution of the END instruction)		214		In the END processing check, the operation circuit for index qualification in the CPU does not work correctly.	
		215		In the END processing check, the hardware in the CPU does not operate correctly.	
"WDT ERROR" (Checked at execution of END processing.)	22	—	STOP	Scan time is longer than the WDT time. (1)Scan time of the user's program has been extended due to certain conditions. (2)Scan time has been extended due to momentary power failure occurred during scanning.	(1)Calculate and check the scan time of user program and reduce the scan time using the CJ instruction or the like. (2)Monitor contents of special register D9005 using a peripheral device. If the contents are other than 0, power supply voltage may not be stable. Check power supply and reduce variation in voltage.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"END NOT EXECUTE" (Checked at execution of the END instruction.)	24	241	STOP	Whole program of specified program capacity was executed without executing the END instructions. (1)When the END instruction was to be executed, the instruction was read as other instruction code due to noise. (2)The END instruction changed to other instruction code due to unknown cause.	(1)Reset and run the CPU again. If the same error recurs, Since this is CPU hardware error, consult Mitsubishi representative.
"MAIN CPU DOWN"	26	—	STOP	The main CPU is malfunctioning or faulty.	Since this is CPU hardware error, consult Mitsubishi representative
"UNIT VERIFY ERR" (Checked continuously.)	31	—	Stop or Continue (set by parameter)	Current I/O module information is different from that recognized when the power was turned on. (1)The I/O module (including special function modules) connection became loose or the module was disconnected during operation, or wrong module was connected.	Read detailed error code using a peripheral device and check or replace the module which corresponds to the data (I/O head number). Or, monitor special registers D9116 to D9123 using a peripheral device and check or replace the modules if corresponding data bit is "1".
"FUSE BREAK OFF" (Checked continuously.)	32	—	Stop or Continue (set by parameter)	(1)There is an output module of which fuse is blown. (2)The external power supply for output load is turned OFF or is not connected.	(1)Check the FUSE BLOWN indicator LED on the output module and replace the fuse. (2)Read detailed error code using a peripheral device and replace the fuse of the output module which corresponds to the data (I/O head number). Or, monitor special registers D9100 to D9107 using a peripheral device and replace the fuse of the output module of which corresponding data bit is "1". (3)Check the ON/OFF status of the external power supply for output load.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"CONTRO L-BUS ERR"	40	401	STOP	Due to the error of the control bus which connects to special function modules, the FROM/TO instruction cannot be executed.	Since it is a hardware error of special function module, CPU module or base module, replace and check defective module(s). Consult Mitsubishi representative for defective modules.
		402		If parameter I/O assignment is being executed, special function modules are not accessible at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9011.	
"SP.UNIT DOWN"	41	411	STOP	Though an access was made to a special function module at execution of the FROM/TO instruction no response is received.	Since it is hardware error of the special function module to which an access was made, consult Mitsubishi representative.
		412		If parameter I/O assignment is being executed, no response is received from a special function module at initial communication. At error occurrence, the head I/O number (upper 2 digits of 3 digits) of the special function module that caused error is stored at D9011.	
"LINK UNIT ERROR"	42	—	STOP	(1)Either data link module is loaded to the master station. (2)There are 2 link modules which are set to the master station (station 0).	(1)Remove data link module from the master station. (2)Reduce the number of master stations to 1. Reduce the link modules to 1 when the 3-tier system is not used.
"I/O INT. ERROR"	43	—	STOP	Though the interrupt module is not loaded, an interrupt occurred.	Since it is hardware error of a module, replace and check a defective module. For defective modules, consult Mitsubishi representative.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"SP.UNIT LAY.ERR."	44	441	STOP	A special function module is assigned as an I/O module, or vice versa, in the I/O assignment using parameters from the peripheral device.	Execute I/O assignment again using parameters from the peripheral device according to the loading status of special function modules.
		442		There are 9 or more special function modules (except the interrupt module) which can execute interruption to the CPU module loaded.	Reduce the special function modules (except the interrupt module) which can execute interrupt start to 8 or less.
		443		There are 2 or more data link modules loaded.	Reduce the data link modules to 1 or less.
		444		There are 7 or more modules such as a computer link module loaded to one CPU module.	Reduce the computer link modules to 6 or less.
		445		There are 2 or more interrupt modules loaded.	Reduce the interrupt modules to 1 or less.
		446		Modules assigned by parameters for MNT/MINI automatic refresh from the peripheral device do not conform with the types of station modules actually linked.	Perform again module assignment for MNT/MINI automatic refresh with parameters according to actually linked station modules.
		447		The number of modules of I/O assignment registration (number of loaded modules) per one CPU module for the special function modules which can use dedicated instructions is larger than the specified limit. (Total of the number of computers shown below is larger than 1344.) (AD59 × 5) (AD57(S1)/AD58 × 8) (AJ71C24(S3/S6/S8) × 10) (AJ7IUC24 × 10) (AJ71C21(S1) (S2) × 29) + ((AJ71PT32(S3) in extension mode × 125) Total > 1344	Reduce the number of loaded special function modules.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	Corrective Action
"SP.UNIT LAY.ERR."	44	448*	STOP	(1)Five or more network modules have been installed. (2)A total of five or more of network modules and data link modules have been installed.	Make the total of the installed network modules and data link modules four or less.
"SP.UNIT ERROR" (Checked at execution of the FROM/TO instruction or the dedicated instructions for special function modules.)	46	461	Stop or Continue (set by para-meter)	Module specified by the FROM/TO instruction is not a special function module.	Read the error step using a peripheral device and check and correct contents of the FROM/TO instruction of the step.
		462		(1)Module specified by the dedicated instruction for special function module is not a special function module or not a corresponding special function module. (2)A command was issued to a CC-Link module with function version under B. (3)A CC-Link dedicated command was issued to a CC-Link module for which the network parameters have not been set.	(1)Read the error step using a peripheral device and check and correct contents of the dedicated instruction for special function modules of the step. (2)Replace with a CC-Link module having function version B and above. (3)Set the parameters.
"LINK PARA. ERROR"	47	0	Continue	[When using MELSECNET/(II)] (1)When the link range at a data link CPU which is also a master station (station number = 00) is set by parameter setting at a peripheral device, for some reason the data written to the link parameter area differs from the link parameter data read by the CPU. Alternatively, no link parameters have been written. (2)The total number of slave stations is set at 0. (3)The head I/O number of the network parameters is incorrect.	(1)Write the parameters again and check. (2)Check the station number settings. (3)Check the head I/O number of the network parameters. (4)Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"LINK PARA. ERROR"	47	470*	Continue	[When using MELSECNET/10] (1)The contents of the network refresh parameters written from a peripheral device differ from the actual system at the base unit. (2)The network refresh parameters have not been written. (3)The head I/O number of the network parameters is incorrect.	Write the network refresh parameters again and check.
		471*		[When using MELSECNET/10] (1)The transfer source device range and transfer destination device range specified for the inter-network transfer parameters are in the same network. (2)The specified range of transfer source devices or transfer destination devices for the inter-network transfer parameters spans two or more networks. (3)The specified range of transfer source devices or transfer destination devices for the inter-network transfer parameters is not used by the network.	Write the network parameters again and check.
		472*		[When using MELSECNET/10] The contents of the routing parameters written from a peripheral device differ from the actual network system.	Write the routing parameters again and check.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"LINK PARA. ERROR"	47	473*	Continue	[When using MELSECNET/10] (1)The contents of the network parameters for the first link unit, written from a peripheral device, differ from the actual network system. (2)The link parameters for the first link unit have not been written. (3)The setting for the total number of stations is 0.	(1)Write the parameters again and check. (2)Check the station number settings. (3)Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		474*		[When using MELSECNET/10] (1)The contents of the network parameters for the second link unit, written from a peripheral device, differ from the actual network system. (2)The link parameters for the second link unit have not been written. (3)The setting for the total number of stations is 0.	(1)Write the parameters again and check. (2)Check the station number settings. (3)Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		475*		[When using MELSECNET/10] (1)The contents of the network parameters for the third link unit, written from a peripheral device, differ from the actual network system. (2)The link parameters for the third link unit have not been written. (3)The setting for the total number of stations is 0.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"LINK PARA. ERROR	47	476*	Continue	[When using MELSECNET/10] (1)The contents of the network parameters for the fourth link unit, written from a peripheral device, differ from the actual network system. (2)The link parameters for the fourth link unit have not been written. (3)The setting for the total number of stations is 0.	(1)Write the parameters again and check. (2)Check the station number settings. (3)Persistent error occurrence may indicate a hardware fault. Consult your nearest Mitsubishi representative, explaining the nature of the problem.
		477		A ink parameter error was detected by the CC-Link module.	(1)Write the parameters in again and check. (2)If the error appears again, there is a problem with the hardware. Consult your nearest System Service, sales office or branch office.
"OPERATION ERROR" (Checked at execution of instruction.)	50	501	Stop or Continue (set by para-meter)	(1)When file registers (R) are used, operation is executed outside of specified ranges of device numbers and block numbers of file registers (R). (2)File registers are used in the program without setting capacity of file registers.	Read the error step using a peripheral device and check and correct program of the step.
		502		Combination of the devices specified by instruction is incorrect.	
		503		Stored data or constant of specified device is not in the usable range.	
		504		Set number of data to be handled is out of the usable range.	

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"OPERATION ERROR" (Checked at execution of instruction.)	50	505	Stop or Continue (set by parameter)	(1)Station number specified by the LEDA/BLRDP LEDA/BLWTP, LRDP, LWTP instructions is not a local station. (2)Head I/O number specified by the LEDA/BRFRP LEDA/BRTOP, RFRP, RTOP instructions is not of a remote station.	Read the error step using a peripheral device and check and correct program of the step.
		506		Head I/O number specified by the LEDA/BRFRP LEDA/BRTOP, RFRP, RTOP instructions is not of a special function module.	
		507		(1)When the AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed to either of them. (2)When an AD57(S1) or AD58 was executing instructions in divided processing mode, other instructions were executed in divided mode to another AD57(S1) or AD58.	Read the error step using a peripheral device and provide interlock with special relay M9066 or modify program structure so that, when the AD57(S1) or AD58 is executing instructions in divided processing mode, other instructions may not be executed to either of them or to another AD57(S1) or AD58 in divided mode.
		508		A CC-Link dedicated command was issued to three or more CC-Link modules.	The CC-Link dedicated command can be issued only to two or less CC-Link modules.

Table 6.3 Error Code List for AnUCPU (Continue)

Error Massage	Error Code (D9008)	Detailed Error Code (D9091)	CPU States	Error and Cause	
"OPERATION ERROR" (Checked at execution of instruction.)	50	509	STOP	(1)An instruction which cannot be executed by remote terminal modules connected to the MNET/MINI-S3 was executed to the modules. (2)Though there are 32 entries of FROM or TO instructions registered with a PRC instruction in the mailbox memory area waiting for execution), another PRC instruction is executed to cause an overflow in the mail box (memory area waiting for execution). (3)The PIDCONT instruction was executed without executing the PIDINIT instruction. The PID57 instruction was executed without executing the PIDINIT or PIDCONT instruction. The program presently executed was specified by the ZCHG instruction. (4)The number of CC-Link dedicated command executed in one scan exceeded 10.	(1)Read the error step using a peripheral device and correct the program, meeting loaded conditions of remote terminal modules. (2)Use special register D9081 (number of empty entries in mailbox) or special relay M9081 (BUSY signal of mail box) to suppress registration or execution of the PRC instruction. (3)Correct the program specified by the ZCHG instruction to other. (4)Set the number of CC-Link dedicated commands executed in one scan to 10 or less.
"MAIN CPU DOWN"	60	—	STOP	(1)The CPU malfunctioned due to noise. (2)Hardware failure.	(1)Take proper countermeasures for noise. (2)Since this is hardware error, consult Mitsubishi representative.
		602		(1)Failure in the power module, CPU module, main base unit or expansion cable is detected.	(1)Replace the power module, CPU module, main base unit or expansion cable.
"BATTERY ERROR" (Checked at power on.)	70	—	Continue	(1)Battery voltage has lowered below specified level. (2)Battery lead connector is not connected.	(1)Replace battery. (2)If a RAM memory or power failure compensation function is used, connect the lead connector.

6.4 Canceling of Errors

Q series CPU module can perform the cancel operation for errors only when the errors allow the CPU module to continue its operation.
To cancel the errors, follow the steps shown below.

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

After the CPU module is reset by the canceling of the error, the special relays, special registers, and LEDs associated with the error are returned to the status under which the error occurred.
If the same error occurs again after the cancellation of the error, it will be registered again in the error history.

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

Refer to the following manual for details of error canceling.
→ QCPU User's Manual (Function Explanation, Program Fundamentals

POINT

(1) When the error is canceled with the error code to be canceled stored in the SD50, the lower one digit of the code is neglected.
(Example)
If error codes 2100 and 2101 occur, and error code 2100 to cancel error code 2101.
If error codes 2100 and 2111 occur, error code 2111 is not canceled even if error code 2100 is canceled.

(2) Errors developed due to trouble in other than the CPU module are not canceled even if the special relay (SM50) and special register (SD50) are used to cancel the error.
(Example)
Since "SP. UNIT DOWN" is the error that occurred in the base unit (including the extension cable), intelligent function module, etc. the error cause cannot be removed even if the error is canceled by the special relay (SM50) and special register (SD50).
Refer to the error code list and remove the error cause.

7. TRANSPORTATION PRECAUTIONS

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

7.1 Controlled Models

The battery for AnNCPU, AnACPU and AnUCPU is classified as follows:

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

7.2 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.

MEMO

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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