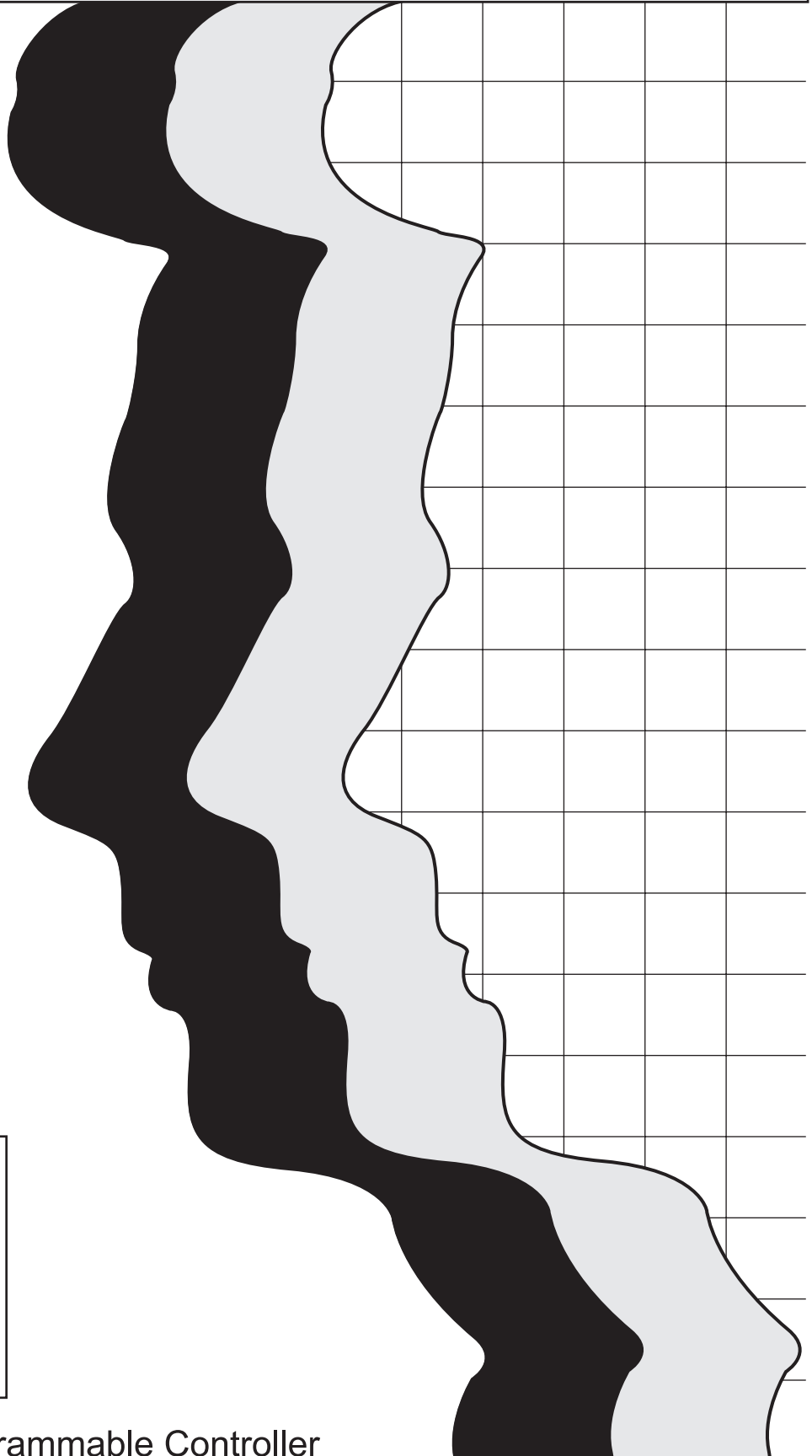


# MITSUBISHI

## Type A1FXCPU Module

### User's Manual (Setup)



Mitsubishi Programmable Controller



# ● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".




**DANGER**

**Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.**



**CAUTION**

**Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.**

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

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

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

## [Designing Instructions]

### **WARNING**

- Provide safety circuits outside the PLC to ensure that the system operates safely if an external power fault or PLC failure occurs.

Not doing so may cause misoutput or misoperation.

(1) Configure up circuits, e.g. an emergency stop circuit, a protective circuit, interlock circuits for forward/reverse rotation and other opposite operations, and interlock circuits for machine damage prevention such as upper and lower positioning limits, outside the PLC.

Refer to section 4.2 of this manual for example an interlock circuits.

(2) When the PLC detects either of the following faulty conditions, it stops operation and switches off all outputs.

- The overcurrent or overvoltage protector of the power supply module is activated.
- The self-diagnostic function of the PLC CPU detects a fault such as a watchdog timer error.

Faults undetectable by the PLC CPU, e.g. a fault at the I/O control section may cause all outputs to switch on. Build a fail safe circuit exterior to the PLC that will make sure the equipment operates safely at such times.

Refer to section 4.2 of this manual for example fail safe circuits.

(3) The output current of the service power supply for sensor differs according to the model and whether there are extension blocks or not. If overload occurs, the voltage drops automatically, PLC inputs become inoperative, and all outputs switch off. The external circuit and mechanism should be designed to ensure that the machine operates safely at such a time.

(4) Some failures of relays, transistors and other devices of the output module may cause outputs to turn on or off. An external monitoring circuit should be provided to monitor output signals which may lead to a serious accident.

## [Designing Instructions]

### **WARNING**

- If a current higher than the rating or an overcurrent due to a load short-circuit, etc. kept on flowing for a long time in the outputs, fuming or combustion may occur. To prevent this, provide an external safety circuit such as a fuse.
- Configure up a circuit so that the external supply power is switched on after the power of the PLC is switched on.  
If the external supply power is switched on first, an accident may occur due to misoutput or misoperation.
- When a communication fault occurs in inter-PLC link, the faulty station retains the data prior to the occurrence of the communication fault.  
Using communication status data, make up an interlock circuit in the sequence program to ensure that the system operates safely.  
Not doing so may cause an accident due to misoutput or misoperation.  
For an interlock circuit example, how to check a faulty station, and operating status at communication fault occurrence, refer to the A1FXCPU User's Manual (Function description).

### **CAUTION**

- Do not bundle control or communication cables with the main circuit, power or other lines or lay them near these lines. As a guideline, separate the cables at least 100mm (3.94 inch).  
A failure to do so can cause misoperation due to noise.
- When controlling items like lamp load, heater or solenoid valve using an output module, large current (approximately ten times greater than that present in normal circumstances) may flow when the output is turned OFF to ON.  
Take measures such as replacing the module with one having sufficient rated current.

## [Installation Precautions]

### **CAUTION**

- Use the PLC in an environment that conforms to the general specifications given in this manual.  
Not doing so can cause an electric shock, fire, misoperation or product damage or deterioration.
- Completely turn off the external power supply before loading or unloading the module. Not doing so could result in electric shock or damage to the product.
- Do not touch the conductive areas and electronic parts of the module directly.  
Doing so can cause the module to misoperate or fail.

## [Wiring Precautions]

### DANGER

- Before starting mounting, wiring or other work, always switch power off externally in all phases. Not doing so may cause an electric shock or product damage.
- When switching power on or starting operation after mounting, wiring or other work, always fit the supplied terminal cover to the product. Not doing so can cause an electric shock.

### CAUTION

- Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.
- Wire the module correctly after confirming the rated voltage and terminal arrangement of the product.  
A fire or failure can occur if the power supply connected is different from the rating or wiring is incorrect.
- Do not connect the A1FXCPU and extension module service power supply outputs in parallel. Doing so can cause the power supply module to overheat, leading to a fire or failure.
- Do not supply external power to the +24V/24G terminals of the A1FXCPU and the  terminal of the extension module.  
Also, do not wire the empty terminal (NC) of the A1FXCPU and the empty terminal  of the extension module externally. Doing so may cause product damage.
- Tighten the terminal screws to the specified torque.  
Undertightening can cause a short circuit, fire or misoperation.  
Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module. They can cause a fire, failure or misoperation.
- 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.

## [Starting and Maintenance Precautions]

### DANGER

- Do not touch the terminals while power is on.  
This can cause an electric shock or misoperation.
- Connect the battery correctly. Do not recharge, disassemble, heat, short or solder the battery or throw it into fire.  
Improper handling of the battery may result in injury or fire due to heating, burst, combustion, etc.
- Before starting cleaning or terminal screw retightening, always switch power off externally in all phases.  
Not doing so can cause an electric shock.  
Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module.

### CAUTION

- Before starting online operation with the peripheral connected to the running CPU module (especially program modification, forced output, operating status change), carefully read the manual and fully ensure safety.  
Not doing so can cause machine damage or accident due to operational mistakes.
- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm (9.85 inch) away from the PLC. Not doing so can cause a malfunction.
- Do not disassemble or modify each module.  
This can cause a failure, misoperation, injury or fire.
- Completely turn off the external power supply before loading or unloading the module. Not doing so could result in electric shock or damage to the product.
- Do not drop or give an impact to the battery installed in the module.  
Otherwise the battery will be broken, possibly causing internal leakage of electrolyte. Do not use but dispose of the battery if it has fallen or an impact is given to it.
- Always make sure to touch the grounded metal to discharge the electricity charged in the electricity charged in the body, etc., before touching the module.  
Failure to do so can cause a failure or malfunctions of the module.

## [Disposal Precautions]

### CAUTION

- When disposing of this product, treat it as 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 Appendix 4.)

## [Transportation Precautions]

### CAUTION

- When transporting lithium batteries, make sure to treat them based on the transport regulations.  
(Refer to section Appendix 3 of this manual for details of the controlled models.)

## Revisions

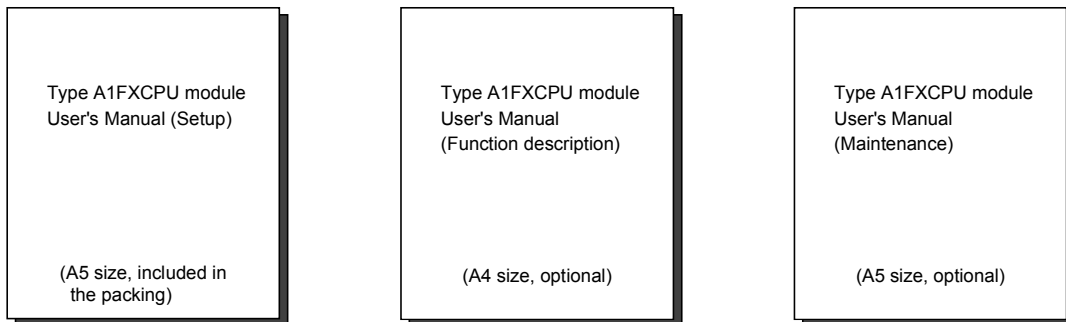
\*The manual number is noted at the lower left of the back cover.

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Feb., 1998	IB(NA)-66839-A	First printing
Feb., 1998	IB(NA)-66839-B	<p><b>Correction</b></p> <p>CONTENTS, Section 2.1.1, 2.2.2, 2.4.1, 2.4.2, 2.5.2, 2.6.2, 2.7, 2.8, 3.1, 3.2, 4.1, 4.2, 7.1, 7.3, Appendix 1, Appendix 2.1</p>
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Jul., 2007	IB(NA)-66839-D	<p><b>Partial correction</b></p> <p>Section 2.8, 5.2.4</p>
Oct., 2008	IB(NA)-66839-E	<p><b>Partial correction</b></p> <p>SAFETY PRECAUTIONS, Section 6.3.1, Appendix 1</p> <p><b>Addition</b></p> <p>Appendix 4, Appendix 4.1, Appendix 4.2</p>

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

## [Manual Makeup]

There are three different manuals related to the A1FXCPU. setup, function description and maintenance manuals.



### 1) A1FXCPU user's manual (Setup)

This manual provides procedures from product and accessory checkup to installation and wiring to be followed after you have purchased the A1FXCPU and unpacked the package.

The setup manual describes the following items.

- A1FXCPU performances (CPU section, power supply section, built-in functions)
- Names of parts
- Settings of parts (hardware settings)
- I/O number assignment
- EMC Directive, Low Voltage Directive
- Installation of A1FXCPU
- External wiring
- Outline dimension drawings

### 2) A1FXCPU user's manual (Function description)

This manual includes the explanation, data setting and programming of the built-in functions added to the A1FXCPU, I/O number assignment needed for I/O control, methods of communication with special modules/special blocks, error codes and other information.

The function description manual describes the following items.

- System configuration
- Performances of A1FXCPU(CPU section, power supply section, built-in functions)
- Built-in functions of A1FXCPU(simple inter-PLC link, simple positioning, high-speed counter, external interrupt)
- I/O number assignment
- Communication with special modules/special blocks
- Error codes
- Special relays, special registers
- Outline dimension drawings

### 3) A1FXCPU user's manual (Maintenance)

This manual explains the inspection of a system using the A1FXCPU and troubleshooting at error occurrence.

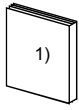
The Maintenance manual describes the following items.

- Names of parts
- Settings of parts
- Maintenance and inspection
- Troubleshooting
- Special relays, special registers

Refer to ACPUCPU/QCPU-A (A mode) programming manuals for the instructions needed for devices and programming of the A1FXCPU, and to GX Developer operating manuals for peripheral operation to be performed for programming.



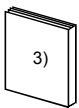
[A1FXCPU Manuals]



Type A1FXCPU CPU module user's manual (Setup)  
(A5 size, included in the packing)

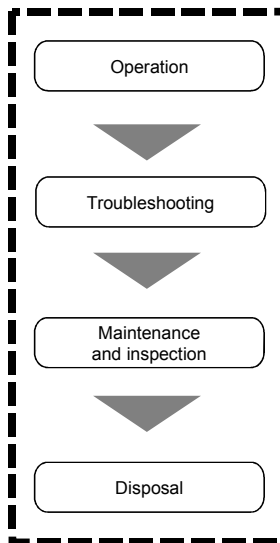
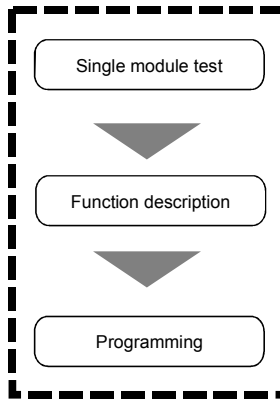
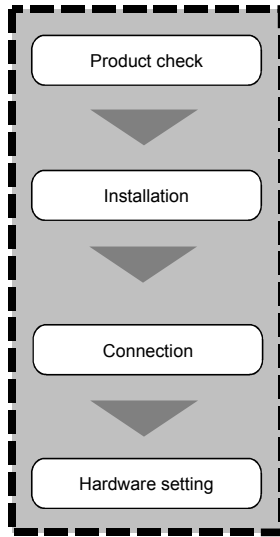


Type A1FXCPU CPU module user's manual (Function description)  
(A4 size, optional)



Type A1FXCPU CPU module user's manual (Maintenance)  
(A5 size, optional)

[Operation Sequence in Time Series]



[Relevant Manuals]

ACPU/QCPU-A (A mode) programming manuals (Fundamentals, Common instructions)

GX Developer operating manuals

## About This Manuals

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

### **Related Manuals**

<b>Manual Name</b>	<b>Manual No. (Model Code)</b>
Type A1FXCPU module user's manual (Maintenance) Provides maintenance/inspection and troubleshooting procedures of the module for use of the A1FXCPU. (Option)	SH-4003 (13JL58)
Type A1FXCPU module user's manual (Function description) Includes the system configuration, performance specifications, functions, handling, I/O number assignment and error codes of the A1FXCPU. (Option)	SH-4002 (13JL59)
ACPU/QCPU-A (A mode) Programming Manual (Fundamentals) Offers programming methods, device names, parameters, program types, memory area makeup, etc. needed to write programs. (Option)	IB-66249 (13J740)
ACPU/QCPU-A (A mode) Programming Manual (Common Instruction) Gives how to use sequence, basic and application instructions and microcomputer programs. (Option)	IB-66250 (13J741)
Type MELSAP-II Programming Manual Provides specifications, functions, instructions, programming methods, etc. needed when the MELSAP-II is used for programming with SFC programs. (Option)	IB-66361 (13JF40)

#### **POINT**

For the FX series, refer to the manual you use.

## Introduction

Thank you for the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers.  
Please read this manual carefully so that equipment is used to its optimum.  
A copy of this manual should be forwarded to the end user.

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## 1. INTRODUCTION

This user's manual provides information on the specifications, installation and wiring of the A1FXCPU general-purpose programmable controller (hereafter referred to as the "A1FXCPU").

The A1FXCPU is a CPU module upgraded in built-in functions to control the FX series extension modules, extension blocks, special extension modules and special extension blocks with the A series instructions.

### 1.1 Features

The A1FXCPU module has the following features:

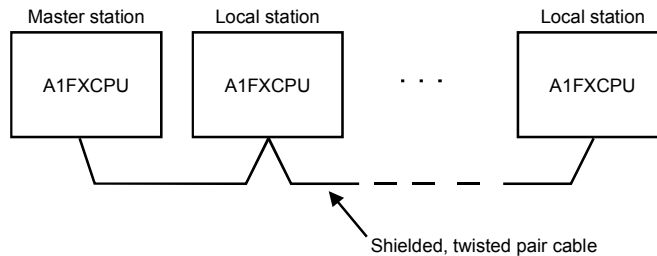
- (1) CPU module having a power supply and CPU in one body  
The A1FXCPU contains the power supply, CPU and program memories (RAM, E<sup>2</sup>PROM).
- (2) Special functions incorporated in the CPU module  
The CPU modules incorporates the simple inter-PLC link function, simple positioning function, high-speed counter function and interrupt input function in addition to the AnSHCPU functions.
- (3) A series instructions available  
The A series peripheral can be used to perform programming with the A series instructions.
- (4) FX series extension modules, extension blocks and special extension equipment available  
The FX<sub>2N</sub> and FX<sub>0N</sub> series extension modules, extension blocks and special extension equipment can be used to configure up a compact system.
- (5) Data link with the FX<sub>2N</sub> and FX<sub>0N</sub> series  
The simple inter-PLC link function allows bit data and word data to be communicated with the FX<sub>2N</sub> and FX<sub>0N</sub> series.
- (6) CE Mark compliant product  
The A1FXCPU complies with the CE Mark.  
For full information, refer to Chapter 5.

## 1.2 Functions Built in the A1FXCPU

The A1FXCPU has the following built-in functions.

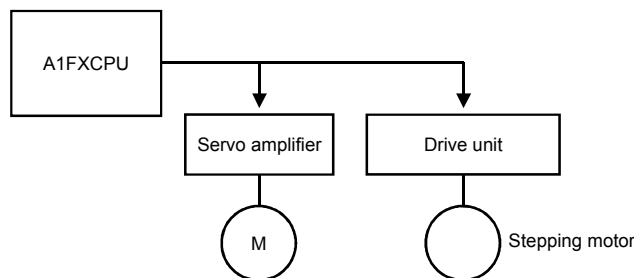
### (1) Simple inter-PLC link function

Up to eight A1FXCPU, FX<sub>2N</sub> and FX<sub>0N</sub> can be connected by shielded, twisted pair cables to communicate bit and word data.



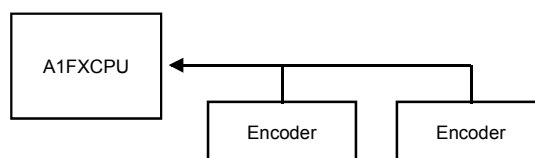
### (2) Simple positioning function

One servo amplifier and one stepping motor driver may be connected to the A1FXCPU to do simple positioning with max.60kpps pulses output.



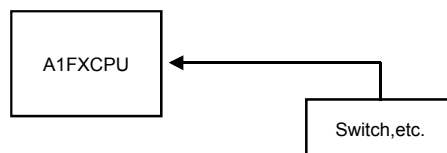
### (3) High-speed counter function

Two encoders may be connected to the A1FXCPU to count max.60kpps pulses input. When the set value matches the count value, interrupt programs (I12, I13) can be run.



### (4) Interrupt input function

By entering signals into the interrupt input terminals, interrupt programs (I0 to I5) can be run by the A1FXCPU.



## 1.3 Instructions for Use of the A1FXCPU

When using the A1FXCPU, follow these instructions.

(1) Instructions for adding the FX series

The FX series may be increased up to 224 points.

Use the supplied extension cable to connect the extension module.

Use the extension cable contained in the extension block to connect the extension block.

Use the conversion cable (FX<sub>2N</sub>-CNV-1/F) to connect the FX<sub>1</sub> or FX<sub>2</sub> series special extension module/special extension block.

(2) Battery connection

The batter connector is disconnected before shipment to prevent the battery from being consumed during distribution and storage.

When using the A1FXCPU, connect the lead connector of the battery to the battery connector of the A1FXCPU circuit board.

For more information, refer to Section 6.3.2 in this manual.

(3) Switching between RAM and E<sup>2</sup>PROM

To switch between RAM and E<sup>2</sup>PROM built in the A1FXCPU, use the DIP switch.

For details, refer to Section 3.2 of this manual.

(4) Assignment of I/O numbers

I/O number assignment of the A1FXCPU is different from that of the A series.

For details, refer to Chapter 4 of this manual.

(5) Type setting at startup of the peripheral

For the A1FXCPU, start up the peripheral with the PLC type "A2".

(6) FX series peripheral unavailable

For the A1FXCPU, the A series peripheral is used to perform programming with the A series instructions, and therefore, the FX series peripheral cannot be used.

## 1.4 Packing List

After unpacking, confirm that there are the following products.

Product	Quantity
A1FXCPU module	1
32-pin connector	1
Battery (A6BAT)	1
Terminal resistor (110Ω 1/2W)	1
I/O number label	1
Link station number label	1



### 2. PERFORMANCE

#### 2.1 Performance of the CPU Section

This section provides the CPU section performance of the A1FXCPU.

##### 2.1.1 CPU section performance list

Table 2.1 gives the CPU section performance list of the A1FXCPU.

Table 2.1 Performance List

Item	Performance	
Control method	Repeated operation (using stored program)	
I/O control method	Refresh system	
Program language	Language dedicated to sequence control Relay symbol words, logic symbolic words, MELSAP(II)	
Number of instructions (types)	Sequence instruction :26 Basic instruction :131 Application instruction :93	
Processing speed (sequence instruction, $\mu$ s/step)	0.25	
Number of I/O points (points)	224 (X/Y20 to FF)	
Watchdog timer (ms)	10 to 2000	
Memory capacity (k bytes)	Built-in RAM :64 Built-in E <sup>2</sup> PROM :32 (E <sup>2</sup> PROM service life for writing: 100000 times)	
Program capacity (k steps)	Main sequence :Max.14 Sub sequence :None	
Internal relay (M) (points)	1000(M0 to 999)	A total of 2048 points of M and L are commonly used. } Set in parameters
Latch relay (L) (points)	1048(L1000 to 2047)	
Step relay (S) (points)	0	Must not be set.
Link relay (B) (points)	1024(B0 to 3FF)	
Timer (T) (points)	256 100ms timer: Set time 0.1 to 3276.7s (T0 to 199) 10ms timer: Set time 0.01 to 327.67s (T200 to 255) 100ms retentive timer: Set time 0.1 to 3276.7s	} Set in parameters
Counter (C) (points)	256 Normal counter: Setting range 1 to 32767 (C0 to 255) Interrupt program counter: Setting range 1 to 32767 (Counter used in interrupt program)	} Set in parameters
Data register (D) (points)	1024(D0 to 1023)	

## 2. PERFORMANCE

MELSEC-A

Table 2.1 Performance List (Continued)

Item	Performance
Link register (W) (points)	1024(W0 to 3FF)
Annunciator (F) (points)	256(F0 to 255)
File register (R) (points)	Max. 4096 (R0 to 4095)
Accumulator (A) (points)	2(A0,A1)
Index register (V, Z) (points)	2(V,Z)
Pointer (P) (points)	256(P0 to 255)
Interrupt pointer (I) (points)	11(I0 to I5, I12, I13, I29 to I31)
Special relay (M) (points)	256(M9000 to 9255)
Special register (D) (points)	256(D9000 to 9255)
Number of comment points (in increments of 64 points)	Max. 3648
Self-diagnostic function	Watchdog timer error, memory error, CPU error, I/O error, battery error detection, etc.
Operation mode at error occurrence	Stop or continue selected
Output mode switching at the time of STOP to RUN	Before-STOP operation status re-output or output after operation execution is selected.
Clock function	Year, month, day, hour, minute, second, day of the week (automatic judgment of leap year) Accuracy -3.2 to +5.3s(TYP. +2.1s)/d at 0°C -3.4 to +5.3s(TYP. +2.1s)/d at 25°C -13.4 to +3.6s(TYP. -3.2s)/d at 55°C
Permissible instantaneous power failure period (ms)	10
Outline dimensions (mm){inch}	130(5.12)(W)×90(3.55)(H)×87(3.43)(D)
Weight (kg)(lb)	0.56(1.24)

## 2. PERFORMANCE

### 2.2 Performance of the Power Supply Section

This section provides the power supply section performance of the A1FXCPU.

#### 2.2.1 Power Supply Section Performance List

Table 2.2 gives the power supply section performance list of the A1FXCPU.

Table 2.2 Performance List

Item	Performance
Input voltage	100-240VAC +10% -15%(85-264VAC)
Input frequency	50/60Hz ±3Hz
Input apparent power	100VA
Inrush current	50A 5ms at input of 240VAC <sup>*4</sup>
Rated output <sup>*1</sup>	5VDC 1.2A/24VDC 0.41A [max] (for CPU, I/O) 24VDC 0.43A[MAX] (for external service power supply) <sup>*2 *3</sup>
Overcurrent protection	5VDC 1.5A or more/24VDC 0.65A or more (total for insulation and non-insulation) <sup>*5</sup>
Overvoltage protection	5.5 to 6.5VDC <sup>*6</sup>
Efficiency	65% or more
Power indication	POWER LED indication
Terminal screw size	M3×8
Applicable wire size	0.3 to 2mm <sup>2</sup>
Applicable solderless terminal	· RAV1.25-3 R1.25-3 (in conformance with JIS-C2805) [Applicable wire size: 0.3 to 1.25mm <sup>2</sup> ] · V2-MS3, RAP2-3S RAP-3SL [Applicable wire size:1.25 to 2mm <sup>2</sup> ]
Permissible instantaneous power failure period	Within 10ms <sup>*7</sup>

\*1:For details, refer to Section 2.2.2 “Number of extension points and 24VDC service power supply capacity” and Section 2.2.3 “Number of special extension modules and blocks and 5VDC power supply capacity”

\*2:For external service power supply : 0.3A  
For built-in functions : 0.13A } Total 0.43A

\*3:24VDC can be used up to a total of 0.6A for the cpu, I/O and external service power supply.

\*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.

\*5: 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.

\*6: 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.

\*7: 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.

**REMARK**

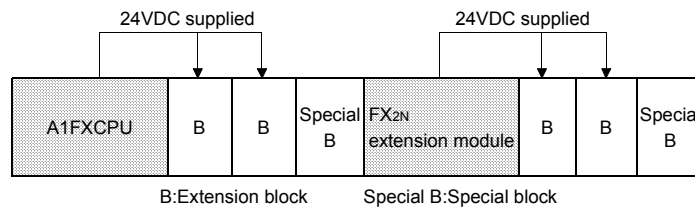
For the power supply specifications of the extension module, refer to Section 8.7.

### 2.2.2 Number of extension points and 24VDC service power supply capacity

The A1FXCPU and extension module supply 24VDC power to extension blocks. Therefore, the number of extension block points connected must be within the range in which the A1FXCPU and extension module can supply power. Since 0.13A out of insulated 24VDC is used for the built-in functions, the 24VDC external service power supply capacity is max. 0.3A (0.43A - 0.13A = 0.3A)

#### (1) Power supplying range

The A1FXCPU or extension module can supply 24VDC service power in the following range.



The A1FXCPU or extension module supplies 24VDC current to extension blocks in the extension module connected next. The extension block designed for input requires external wiring. Special blocks are supplied with 5VDC power.

#### (2) 24VDC capacity calculation

The capacity of the 24VDC service power supply depends on the model.

#### <24VDC service power supply capacity>

Model	Power Supply Capacity	Remarks
A1FXCPU	300mA	Power supplied to extension blocks
FX2N-32E	250mA	
FX2N-48E	460mA	

Extension blocks designed for input and output differ in current consumption. Current consumption less than the total capacity indicates that extension blocks can be connected.

Remaining power may be used for sensors, output loads, etc.

$$\left( \begin{array}{l} \text{Total service power} \\ \text{supply capacity} \\ 300\text{mA or }250\text{mA} \\ \text{or }460\text{mA} \end{array} \right) - \left( \begin{array}{l} \text{Extension block for} \\ \text{FX}_{2N}/\text{FX}_{0N} \text{ input} \\ 8 \text{ points} \\ 50\text{mA} \end{array} \times \begin{array}{l} \text{Number of} \\ \text{blocks} \\ \text{connected} \end{array} \right) - \left( \begin{array}{l} \text{Extension block for} \\ \text{FX}_{2N}/\text{FX}_{0N} \text{ output} \\ 8 \text{ points, }75\text{mA for} \\ 24 \text{ or more points} \end{array} \times \begin{array}{l} \text{Number of} \\ \text{blocks} \\ \text{connected} \end{array} \right)$$

≥0(remaining power for sensors and loads)  
 If the result is less than 0, the capacity is short.  
 Use an extension module midway.

Connection example A1FXCPU,FX<sub>0N</sub>-8EX,FX<sub>2N</sub>-16EX,FX<sub>0N</sub>-8EYR

$$300\text{mA} - 50\text{mA} \times 1 - 50\text{mA} \times 1 - 0\text{mA} \times 1 = 150\text{mA} \geq 0 (\text{may be added})$$

↑ Remaining 24VDC service power  
 ↑ Because of less than 24 output points

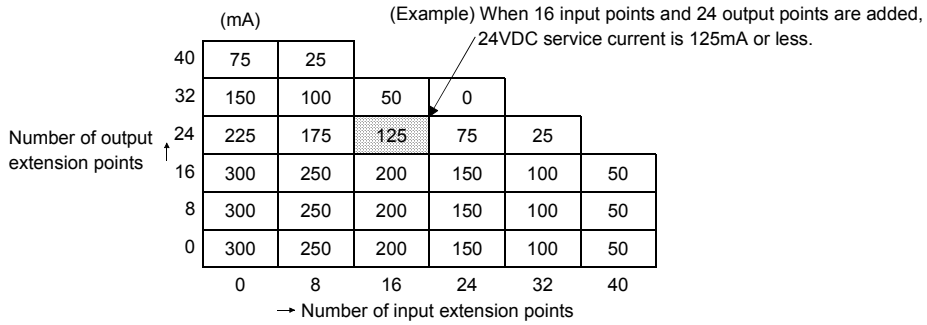
### (3) Quick calculation table

The following tables represent capacity formulas with specific values.

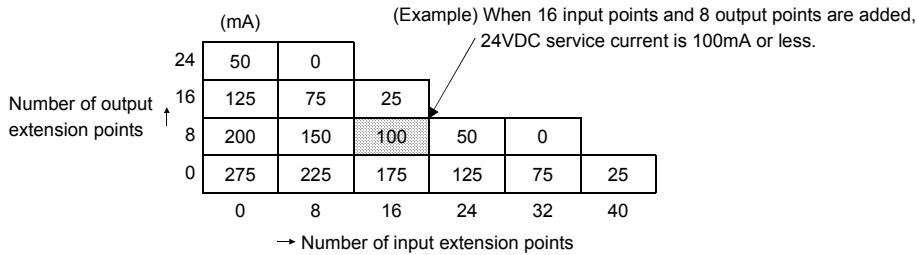
They can be used to determine whether extension blocks may be connected or not and to find the remaining 24VDC service power.

#### A1FXCPU

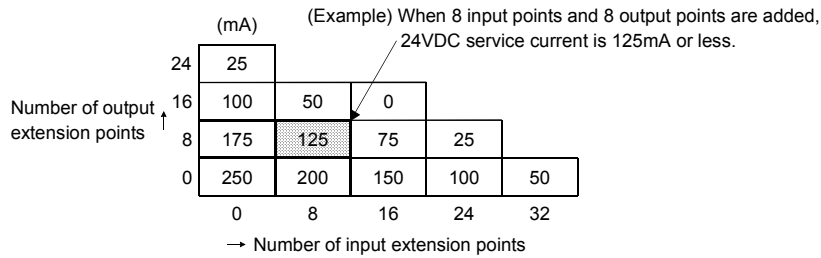
When the FX<sub>0N</sub>-3A is not used.



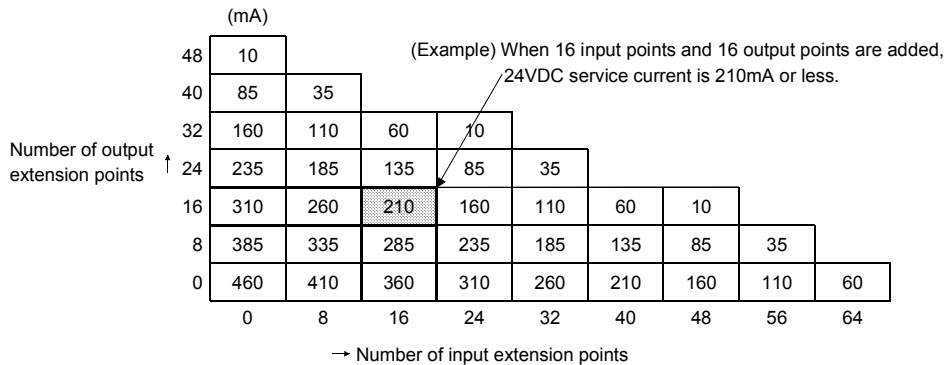
When the FX<sub>0N</sub>-3A is used (up to 2 FX<sub>0N</sub>-3A's may be connected).



#### When FX<sub>2N</sub>-32E is used



#### When FX<sub>2N</sub>-48E is used



2.2.3 Number of special extension modules and blocks and 5VDC power supply capacity

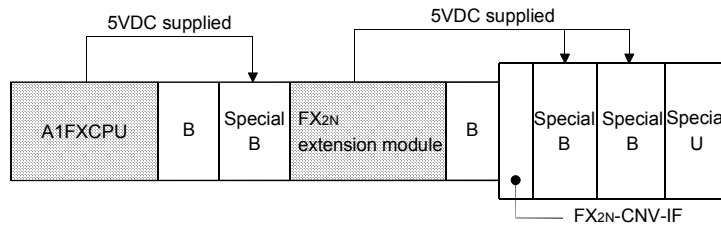
When special modules and special blocks are used, the number of modules and blocks connected and 5VDC current consumption must be taken into consideration.

(1) Number of modules and blocks connected

Up to eight special modules/special blocks may be connected to the A1FXCPU.

(2) Power supply range.

Special blocks are supplied with 5VDC in the following range.



B:Extension block Special B:Special block Special U:Special module

The A1FXCPU or extension module supplies 5VDC power to the special blocks in the extension module connected next. (The special module does not include a power supply.) As 5VDC power is supplied through the extension cable, external wiring is not necessary.

(3) 5VDC capacity calculation

The 5VDC power supply of each module is as follows. Refer to the following table for the current consumption of each special block.

<5VDC power supply capacity>

Model	Power Supply Capacity	Remarks
A1FXCPU	300mA	The 5VDC current to the CPU and the equipment connected to the programming connector has already been subtracted.
FX <sub>2N</sub> extension module	690mA	

5VDC Total capacity 300mA or 690mA	-	Special block 5VDC Current consumption Refer to Table 2.3	≥ 0	If the result is less than 0, the capacity is short. Use an extension module midway.
--	---	--	-----	---

Up to two FX<sub>0N</sub>-3A's may be connected to the A1FXCPU or FX<sub>2N</sub>-32E, or up to three FX<sub>0N</sub>-3A's to the FX<sub>2N</sub>-48E. If more blocks are connected, use the extension module(FX<sub>2N</sub>-32E,FX<sub>2N</sub>-48E) midway.

Connection example A1FXCPU, FX<sub>0N</sub>-3A 2, FX-IHC ×1, FX-10GM ×1

$$300\text{mA} - (30 \times 2)\text{mA} - 70\text{mA} - 0\text{mA}(\text{power supply built-in:unnecessary}) = 170\text{mA} \geq 0 \text{ (connectable)}$$

**Table2.3 Special extension equipment list**

Model	Type	Name	Current Consumption (5VDC)
Special block	FX <sub>0N</sub> -3A	2-channel analog input, 1-channel analog output	30mA
	FX <sub>0N</sub> -16NT	For M-NET/MINI (twisted wire)	20mA
	FX <sub>2N</sub> -4AD	4-channel analog input	30mA
	FX <sub>2N</sub> -4DA	4-channel analog output	30mA
	FX <sub>2N</sub> -4AD-PT	4-channel temperature sensor input (PT-100)	30mA
	FX <sub>2N</sub> -4AD-TC	4-channel temperature sensor input (thermocouple)	30mA
	FX <sub>2N</sub> -1HC	50kHz 2-phase high-speed counter	90mA
	FX <sub>2N</sub> -1PG	100kpps pulse output block	55mA
	FX <sub>2N</sub> -232IF	RS232C communication interface	40mA
	FX-16NP *	For M-NET/MINI (optical fiber)	80mA
	FX-16NT *	For M-NET/MINI (twisted wire)	80mA
	FX-16NP-S3 *	For M-NET/MINI-S3 (optical fiber)	80mA
	FX-16NT-S3 *	For M-NET/MINI-S3 (twisted wire)	80mA
	FX-2DA *	2-channel analog output	30mA
	FX-4DA *	4-channel analog output	30mA
	FX-4AD *	4-channel analog input	30mA
	FX-2AD-PT *	2-channel temperature sensor input (PT-100)	30mA
	FX-4AD-TC *	4-channel temperature sensor input (thermocouple)	40mA
	FX-1HC *	50kHz 2-phase high-speed counter	70mA
	FX-1PG *	100kpps pulse output block	55mA
FX-1DIF *	ID interface	130mA	
Special module	FX-1GM *	Positioning pulse output module (1 axis)	Self-supply
	FX-10GM *	Positioning pulse output module (1 axis)	Self-supply
	FX-20GM *	Positioning pulse output module (2 axes)	Self-supply

\*The FX2N-CNV-IF conversion adaptor is required for use of special modules and special blocks.



### 2.3 Performance of Simple Inter-PLC Link

This section provides the simple inter-PLC link performance of the A1FXCPU.

#### 2.3.1 Simple inter-PLC link performance list

Table 2.4 gives the simple inter-PLC link performance list of the A1FXCPU.

**Table 2.4 Performance List**

Item		Performance
Interface		Conformance with RS-485
Communication method		Half duplex communication system
Synchronous method		Asynchronous system
Transmission speed		38400bps
Total transmission distance		Max. 500m(1639.3feet)
Number of stations		8 stations
Data	Bit data	0 or 32 or 64 bits/station
	Word data	4 or 8 words/station
Data communication method		N:N
Link scan time		Max. 200ms

## 2. PERFORMANCE

### 2.3.2 Interface specifications

Table 2.5 gives the RS-485 interface specification list of the A1FXCPU.

**Table 2.5 Specification List**

Signal Abbreviation	Signal Direction Module ↔ Module	Description
SDA/RDA	↔	Send/receive data
SDB/RDB	↔	Send/receive data
SG	↔	Signal ground

Wiring method		
<p>The diagram illustrates the RS-485 wiring method. It shows three modules: a Master station on the left and two Local stations on the right. Each module has five terminals: SDA/RDA, SDB/RDB, SG, SLD, and FG. The SDA/RDA and SDB/RDB terminals are connected to the twisted pair cables. Terminal resistors (R) are connected to the SDA/RDA and SDB/RDB terminals. The SG terminal is connected to the signal ground. The SLD and FG terminals are connected to the shield wire of the twisted pair cable, which is then grounded. The diagram shows that both ends of the shield wire of the twisted pair cable are connected to the ground (ground conductor with class D (class-3)) via "SLD" and "FG" of each module. SLD and FG are connected inside the module.</p>		

POINT
<p>Connect both ends of the shield wire of the twisted pair cable to the ground (ground conductor with class D (class-3)) via "SLD" and "FG" of each module. SLD and FG are connected inside the module.</p>

### 2.3.3 Specifications of the Twisted Pair Cable

Table 2.6 indicates the specifications of the cable that may be used in simple inter-PLC link of the A1FXCPU.

**Table 2.6 Twisted Pair Cable Specifications**

<b>Item</b>	<b>Specifications</b>
Cable type	Shielded twisted pair cable
Number of pairs	2 pairs or more
Conductor resistance (20°C)	88.0Ω/km or less
Capacitance (1kHz)	Average 60nF/km or less
Characteristic impedance (100kHz)	110±10Ω

### 2.4 Performance of Simple Positioning

This section provides the simple positioning performance of the A1FXCPU.

#### 2.4.1 Simple positioning performance list

Table 2.7 gives the simple positioning performance list of the A1FXCPU.

**Table 2.7 Performance List**

Item	Performance
Number of axes controlled	2 axes
Number of positioning data	1/axis
Control unit	pulse
Positioning system	Position control
Acceleration/deceleration processing	Automatic trapezoidal acceleration/deceleration
Acceleration/deceleration time	1 to 32767 (ms)
Output pulse range	0 to 16777215(pulse)
Output pulse speed	1 to 60000pps
Starting bias speed	1 to 60000pps
Error indication*1	Special relay
Positioning data storage destination	Special register

\*1:For details, refer to the Function Description Manual.

## 2. PERFORMANCE

### 2.4.2 Interface specifications

Table 2.8 gives the simple positioning interface specification list of the A1FXCPU.

**Table 2.8 Specification List**

Item	Specifications
Number of output points	4 points (positioning pulse output 2 axes×2 points, Y10 to 13)
Output form	Transistor (open collector) output
Rated load voltage	5-15/24VDC
Operating load voltage range	4.75 to 16.5VDC (at 5-15VDC)/21.6 to 26.4VDC (at 24VDC)
Max. load current/inrush current	50mA/point, 200mA 10ms or less (at 25°C)
Min. load current	2mA (when it is less than 2mA, a dummy resistor should be added.)
Max. voltage drop at ON	0.5VDC or less
Leakage current at OFF	0.1mA or less
Common method	2 points-1 common (Y10 COM and Y12 COM, and Y11 COM and Y13 COM are connected internally)

External wiring			
Terminal Number	Signal Name	Terminal Number	Signal Name
B16	YDC5	A16	XDC5
B15	YDC24	A15	XDC24
B14	Y13	A14	Y12
B13	Y13 COM	A13	Y12 COM
B12	Y11	A12	Y10
B11	Y11 COM	A11	Y10 COM
B10	—	A10	—
B9	—	A9	—
B8	—	A8	—
B7	—	A7	—
B6	—	A6	—
B5	—	A5	—
B4	—	A4	—
B3	—	A3	—
B2	—	A2	—
B1	—	A1	—

—: Indicates the terminal which is not used with this function.

POINT
Connect the power supply to YDC5 at 5-15VDC or to YDC24 at 24VDC.

## 2. PERFORMANCE

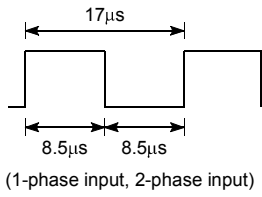
### 2.5 Performance of the High-Speed Counter

This section provides the high-speed counter performance of the A1FXCPU.

#### 2.5.1 High-speed counter performance list

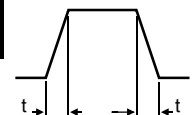
Table 2.9 gives the high-speed counter performance list of the A1FXCPU.

**Table 2.9 Performance List**

Item		Specifications	
Counting speed selection setting		1 phase/2 phase: 60kpps/1 phase: 10kpps, 2 phase: 7kpps	
Number of channels		2 channels	
Count input	Phase	1-phase input, 2-phase input	
	Count input signal	CH.1 $\phi A$ : XA, $\phi B$ : XC CH.2 $\phi A$ : XB, $\phi B$ : XD	
Pulse input mode		1-phase input multiplied by 1, 1-phase input multiplied by 2 2-phase input multiplied by 1, 2-phase input multiplied by 2, 2-phase input multiplied by 4	
Counter	Counting speed (max.)	1-phase input	60kpps
		2-phase input	60kpps
	Counting range		0 to 16777215
	Type		UP/DOWN preset counter + ring counter function
	Min. count pulse width (duty ratio 50%)		
Comparison output	Comparison range	0 to 16777215	
	Comparison result	Set value < count value (M9147/M9167) Set value = count value (M9148/M9168) Set value > count value (M9149/M9169)	
External input	Preset	CH.1 : X8 CH.2 : X9	
	Disable/latch trigger	CH.1 : X6 CH.2 : X7	
Interrupt output	Coincidence output	CH.1 : I12 CH.2 : I13	

#### Countalbe Counting Speed

Counting Speed Selection Setting	60k		10k	
	1-phase input	2-phase input	1-phase input	2-phase input
Rise/fall time $t=2.5\ \mu\text{s}$ or less	60kpps	60kpps	10kpps	7kpps
$t=25\ \mu\text{s}$ or less	10kpps	10kpps	1kpps	700kpps
$t=500\ \mu\text{s}$ or less	—	—	500kpps	250kpps



## 2. PERFORMANCE

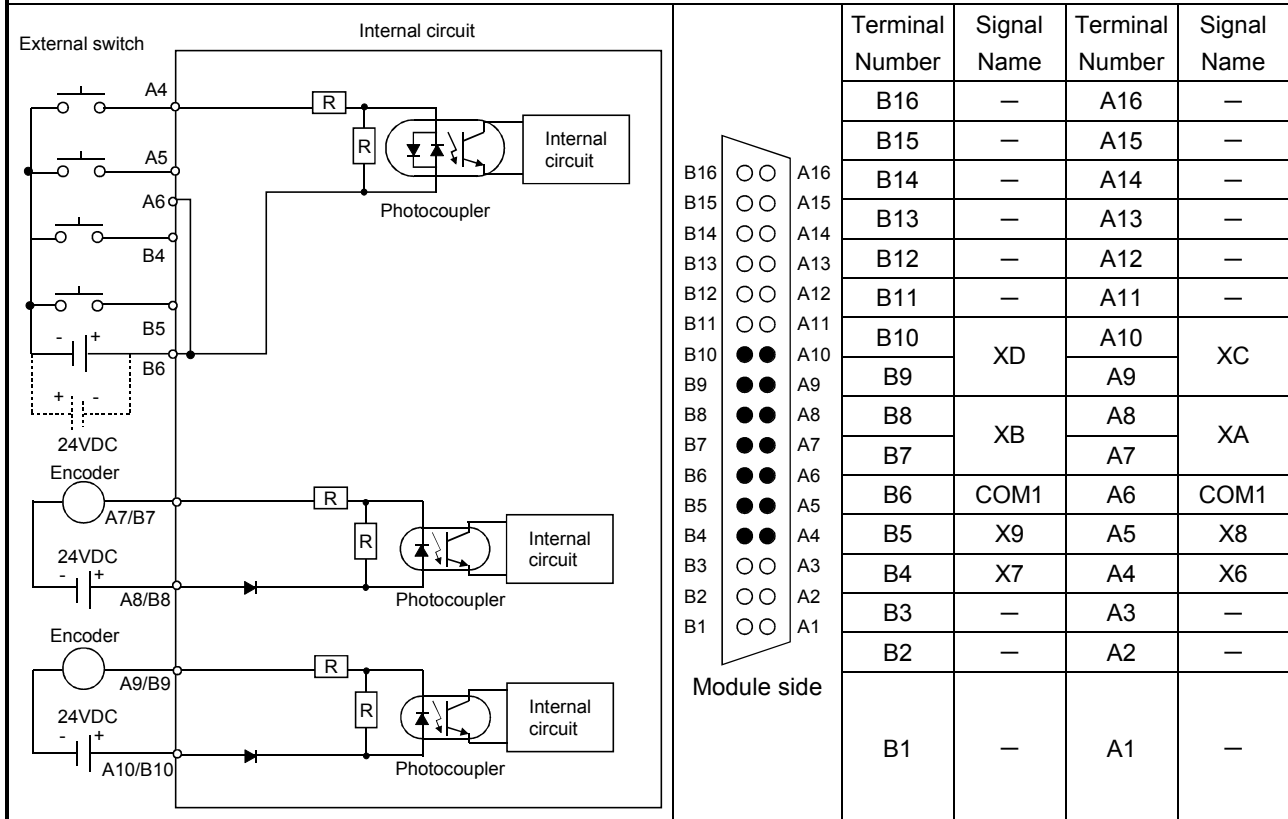
### 2.5.2 Interface specifications

Table 2.10 gives the high-speed counter function interface specification list of the A1FXCPU.

Table 2.10 Specification List

Item	Specifications	
	External input	Counter input
Number of input points	4 points (X6 to 9)	4 points (XA to D)
Built-in function	Preset 2 channels × 1 point Disable/latch trigger 2 channels × 1 point	Counter input 2 channels × 2 points
Isolation method	Photocoupler isolation	
Rated input voltage	24VDC	24VDC
Rated input current	5mA	8mA
Operating voltage range	21.6 to 26.4VDC (ripple ratio within 5%)	
Max. number of simultaneous input points	100% simultaneous ON	
ON voltage/ON current	18V/3.5mA or more	19V/5.5mA or more
OFF voltage/OFF current	3V/0.7mA or less	3V/0.25mA or less
Input resistance	4.7kΩ	2.7kΩ
Response time	OFF→ON	0.5ms or less
	ON→OFF	0.5ms or less
Common method	10 points-1 common (2 terminals) (Common to X0 to 9)	All points with independent commons

#### External wiring



—: Indicates the terminal which is not used with this function.

### 2.6 Performance of the Interrupt Function

This section provides the external interrupt function performance of the A1FXCPU.

#### 2.6.1 Interrupt function performance list

Table 2.11 gives the external interrupt function performance list of the A1FXCPU.

**Table 2.11 Performance List**

Item	Performance
Number of interrupt points	6 points
Interrupt factor	· X0 to X5: External inputs (you can select interrupt execution on leading/trailing edge for each point.) IO : X0, I1 : X1, I2 : X2, I3 : X3, I4 : X4, I5 : X5





## 2. PERFORMANCE

### 2.7 Terminal Arrangement of the Built-in function Connector

Table 2.13 gives the Built-in function connector terminal arrangement list of the A1FXCPU.

**Table 2.13 Terminal Arrangement List**

Built-in function Connector Arrangement (Front View)					
Terminal Number	Signal Name	Application	Terminal Number	Signal Name	Application
A1	X0	Interrupt input I0	B1	X1	Interrupt input I1
A2	X2	Interrupt input I2	B2	X3	Interrupt input I3
A3	X4	Interrupt input I4	B3	X5	Interrupt input I5
A4	X6	CH1 counter data disable/latch trigger input	B4	X7	CH2 counter data disable/latch trigger input
A5	X8	CH1 counter preset input	B5	X9	CH2 counter preset input
A6	COM1	Common for input signal X0 to 9	B6	COM1	Common for input signal X0 to 9
A7	XA	CH1 A-phase pulse input (high-speed counter)	B7	XB	CH2 A-phase pulse input (high-speed counter)
A8			B8		
A9	XC	CH1 B-phase pulse input (high-speed counter)	B9	XD	CH2 B-phase pulse input (high-speed counter)
A10			B10		
A11	Y10 COM	X axis CW/PULSE output (connected to Y12 COM internally)	B11	Y11 COM	Y axis CW/PULSE output (connected to Y13 COM internally)
A12	Y10	X axis CW/PULSE output	B12	Y11	Y axis CW/PULSE output
A13	Y12COM	X axis CCW/SIGN output (connected to Y10 COM internally)	B13	Y13 COM	Y axis CCW/SIGN output (connected to Y11 COM internally)
A14	Y12	X axis CCW/SIGN output	B14	Y13	Y axis CCW/SIGN output
A15	XDC24	External supply for Y10, 12 (X axis)(at 24VDC), 24VDC input	B15	YDC24	External supply for Y11, 13 (Y axis)(at 24VDC), 24VDC input
A16	XDC5	External supply for Y10, 12 (X axis)(at 5-15VDC), 5-15VDC input	B16	YDC5	External supply for Y11, 13 (Y axis)(at 5-15VDC), 5-15VDC input

<b>POINT</b>
The applicable wire size is 0.3mm <sup>2</sup>

## 2. PERFORMANCE

### 2.8 Performance Specifications of the Terminal Block

Table 2.14 provides the terminal block performance specification list of the A1FXCPU.

**Table 2.14 Performance List**

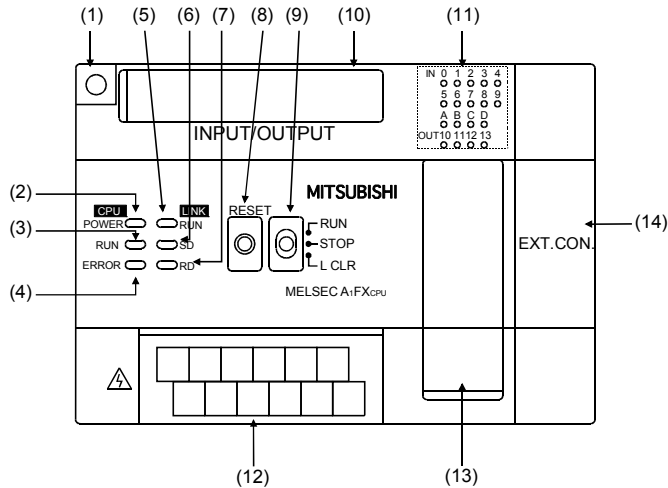
Terminal Block Front View		
Terminal Number	Signal Name	Application
1	L	AC power input
2	LG	Line ground. Protective ground conductor with class D (class-3).
3	N	AC power input
4	NC	Must not be used
5	NC	
6	SDA/RDA	Simple PLC link
7	SDB/RDB	
8	SG	
9	+24V	24VDC output for external service power supply
10	SLD	Simple PLC link
11	24G	24VDC ground for external service power supply
12	FG	Grounding terminal. ground conductor with class D (class-3)

POINT
(1) Tighten the terminal screws within the following tightening torque. Terminal block screw (M3 screw) 39 to 59N·cm
(2) Tighten the terminal block mounting screws within the following tightening torque. Terminal block screw (M4 screw) 78 to 1189N·cm
(3) The applicable wire sizes are 0.3 to 2mm <sup>2</sup>

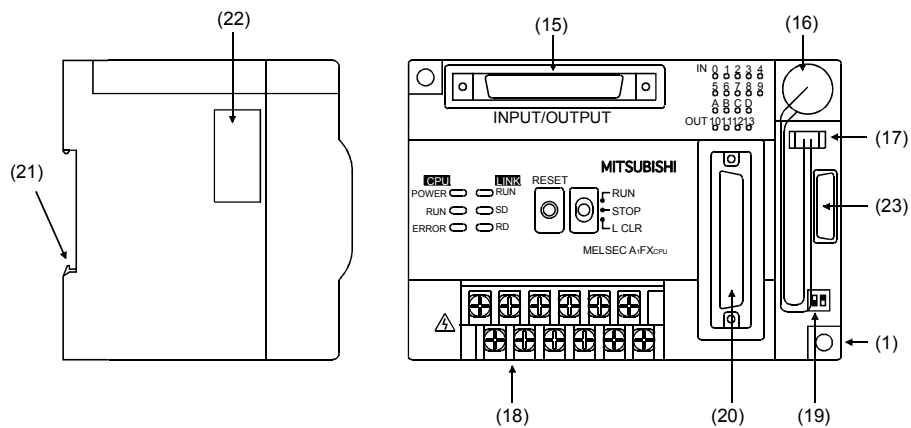
## 3. NAMES OF PARTS AND THEIR SETTINGS

### 3.1 Names of Parts

Front view



Left side view and the front view without cover



No.	Name	Application
1	Mounting hole (For M4 screw)	Pear-shaped hole used to mount this module to a panel such as a control box.
2	"POWER" LED	· 5VDC power indicator LED
3	"RUN" LED	<ul style="list-style-type: none"> <li>· On: Indicates that the RUN/STOP switch is in the "RUN" position and sequence program operation is being executed. (Remains on if an error defined to continue sequence program operation occurs.)</li> <li>· Off: Turns off when: <ul style="list-style-type: none"> <li>· 100 to 240VAC is not supplied to the A1FXCPU;</li> <li>· The RUN/STOP switch is in the "STOP" position'</li> <li>· Remote STOP is performed; or</li> <li>· Remote PAUSE is performed.</li> </ul> </li> <li>· Flicker: Flickers when: <ul style="list-style-type: none"> <li>· The self-diagnostic function detected an error defined to stop sequence program operation; or</li> <li>· Latch clear operation is performed.</li> </ul> </li> </ul>

### 3. NAMES OF PARTS AND THEIR SETTINGS

MELSEC-A

No.	Name	Application
4	"ERROR" LED	<ul style="list-style-type: none"> <li>· On: Indicates that the self-diagnostic function detected an error. (Remains off when the error detected is the one preset to be turned off in the LED indication priority setting.)</li> <li>· Off: Indicates a normal status or that a failure was detected with the CHK instruction.</li> <li>· Flicker: Indicates that the annunciator (F) was switched on in the sequence program.</li> </ul>
5	"LINK RUN" LED	<ul style="list-style-type: none"> <li>· On: Indicates normal operation of simple inter-PLC link.</li> <li>· Off: Indicates a simple inter-PLC link fault.</li> </ul>
6	"SD" LED	<ul style="list-style-type: none"> <li>· Flicker: Indicates that data is being sent to the other station in simple inter-PLC link.</li> <li>· Off: Indicates that data is not yet sent to the other station in simple inter-PLC link.</li> </ul>
7	"RD" LED	<ul style="list-style-type: none"> <li>· Flicker: Indicates that data is being received from the other station in simple inter-PLC link.</li> <li>· Off: Indicates that data is not yet received from the other station in simple inter-PLC link.</li> </ul>
8	RESET switch	<ul style="list-style-type: none"> <li>· RESET: Hardware reset. Used to make a reset at occurrence of an operation fault and initialize operation.</li> </ul>
9	RUN/STOP switch	<ul style="list-style-type: none"> <li>· RUN/STOP: Used to execute/stop sequence program operation.</li> <li>· LATCH CLEAR (L. CLR): Used to clear (OFF or 0) latch clear data set in parameters. (LATCH CLEAR also clears data other than the latch clear data.)</li> </ul>
10	Built-in function connector cover	Cover for protection of the built-in function connector When the connector is not used, put this cover on.
11	Indicator LEDs	I/O indicator LED
12	Terminal block cover	Cover for protection of the terminal block. Put this cover on except when making connections.
13	Peripheral connector cover	Connector cover for connection of a peripheral. When a peripheral is not used, put this cover on.
14	Protective cover	<p>Cover for protection of the battery, connector, etc. of the A1FXCPU. Open the protective cover to perform the following operations:</p> <ul style="list-style-type: none"> <li>· DIP switch setting</li> <li>· Connection to the battery connector</li> <li>· Battery replacement</li> <li>· Connection/disconnection to/from the extension block connector</li> </ul> <p>When the above operations are not performed, put this cover on.</p>
15	Built-in function connector	Connector for the high-speed counter, positioning output and external interrupt input.
16	Battery	Used to back up program, latch range device, file register and other data.
17	Battery connector	For connection of the battery side connector.
18	Terminal block	Terminal block for AC power input, service power output and simple inter-PLC link.
19	DIP switches	Used to set memory protect and select between RAM and E <sup>2</sup> PROM.
20	Peripheral connector (D sub-25 pins)	Connector used to perform main program write/read, monitoring and test using a peripheral.
21	DIN rail catch	Catch for mounting this module to a DIN rail.
22	Cover	Do not open this cover.
23	Extension block connector	Connector for connection of the FX <sub>0N</sub> and FX <sub>2N</sub> series extension modules, extension blocks, special extension modules and special extension blocks.

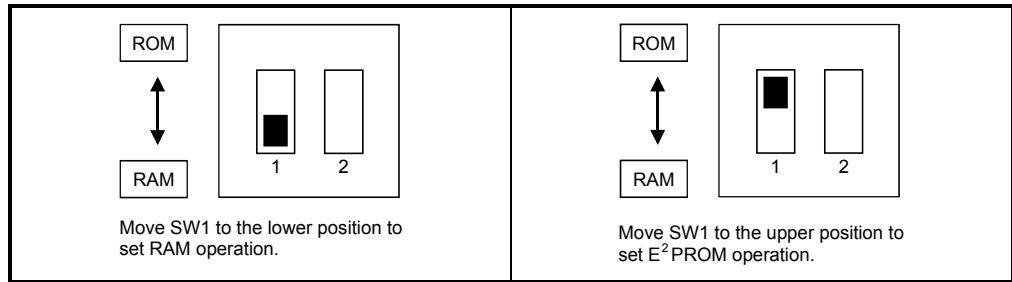
### 3. NAMES OF PARTS AND THEIR SETTINGS

#### 3.2 Settings

The A1FXCPU settings include RAM/E<sup>2</sup>PROM operation and write protect settings.

##### 3.2.1 RAM/E<sup>2</sup>PROM operation setting

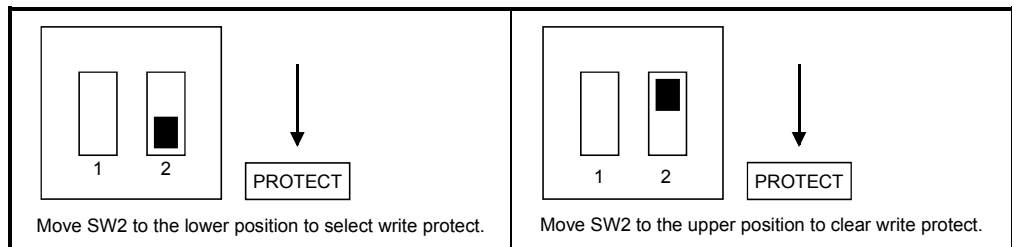
The memory operation system includes RAM and E<sup>2</sup>PROM modes. Use the DIP switch (SW1) to select the memory operation system. SW1 is factory-set in the RAM operation (lower) position.



<b>POINT</b>
Before choosing the E <sup>2</sup> PROM mode, read the contents of RAM with a peripheral.

##### 3.2.2 Write protect switch setting

The write protect switch is used to prevent RAM and E<sup>2</sup>PROM data from being rewritten by operation performed from a peripheral. Use this switch to prevent a program created from being rewritten or deleted, for example. When this function is used, RAM is write-protected in the RAM operation mode and E<sup>2</sup>PROM write-protected in the E<sup>2</sup>PROM operation mode. Before making corrections to the RAM memory contents, clear write protect (move the switch to the upper position). Use the DIP switch (SW2) to select or clear write protect. SW2 is factory-set in the write protect clear (upper) position.



### 4. I/O NUMBER ASSIGNMENT

This chapter describes I/O number assignment made to transfer data between the A1FXCPU and extension modules/extension blocks.

#### 4.1 What Are I/O Numbers?

"Inputs (X)" are used to import data from the extension modules/extension blocks to the A1FXCPU, and "outputs (Y)" are used to output data from the A1FXCPU to the extension modules/extension blocks.

I/O numbers are addresses of the inputs/outputs built in the A1FXCPU and the extension modules/extension blocks.

The number of input/output points that may be controlled by the A1FXCPU is 224.

However, one special extension module or special extension block occupies 8 points. Hence, when special extension modules/special extension blocks are used, the number of points available for extension modules/extension blocks is found by:

$224 \text{ points} - 8 \times (\text{number of special extension modules/special extension blocks})$

· In the A1FXCPU, 14 input points and 4 output points are occupied for the built-in function. (X0 to XD and Y10 to Y13 are occupied.)

Therefore, extension modules/extension blocks use X/Y20 to X/YFF.

## 4.2 I/O Number Assignment

When switched on or reset with the RUN/STOP switch, the A1FXCPU makes the following I/O number assignment.

When writing a sequence program, specify the I/O numbers assigned in accordance with the following items.

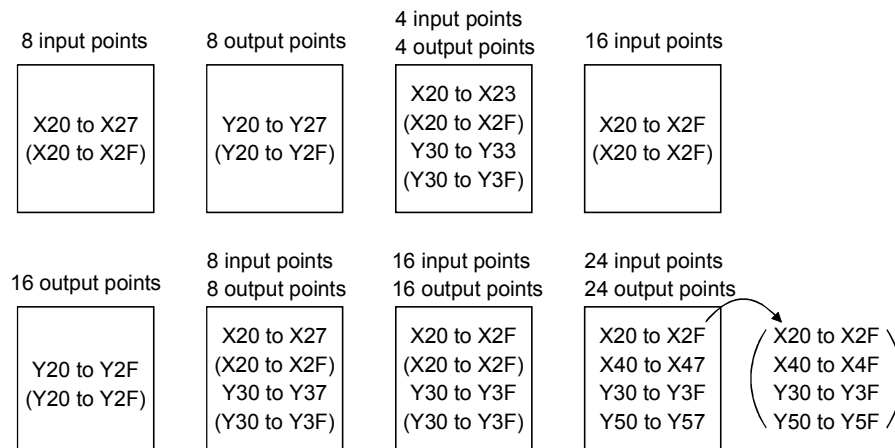
- (1) I/O number assignment
  - (a) I/O numbers are assigned to the extension module/extension block connected on the right-hand side of the A1FXCPU, starting with X/Y20.  
Numbers X □ □ □ are assigned to the inputs of extension modules/extension blocks and Y □ □ □ to their outputs.
  - (b) I/O numbers are assigned in hexadecimal.
  - (c) Inputs/outputs start at X/Yn0.

The I/O numbers of each module are indicated below:

Number of I/O Points of Extension Module/Extension Block	I/O Numbers
8 input points	Xn0 to Xn7 (Xn8 to XnF must not be used)
8 output points	Yn0 to Yn7 (Yn8 to YnF are handled as internal relays)*1
4 input points, 4 output points	Xn0 to Xn3 (Xn4 to XnF must not be used) Y[n+1]0 to Y[n+1]3 (Y[n+1]4 to Y[n+1]F are handled as internal relays)*1
16 input points	Xn0 to XnF
16 output points	Yn0 to YnF
8 input points, 8 output points	Xn0 to Xn7 (Xn8 to XnF must not be used) Y[n+1]0 to Y[n+1]7 (Y[n+1]8 to Y[n+1]F are handled as internal relays)*1
16 input points, 16 output points	Xn0 to XnF, Y[n+1]0 to Y[n+1]7
24 input points, 24 output points	Xn0 to XnF, Y[n+1]0 to Y[n+1]F, X[n+2]0 to X[n+2]7, Y[n+3]0 to Y[n+3]7

\*1: Can be switched on/off in the sequence program but cannot be provided to the outside.

For example, I/O numbers are as follows when an extension module/extension block is connected on the right-hand side of the A1FXCPU. I/O numbers in parentheses are occupied by each extension module/extension block.

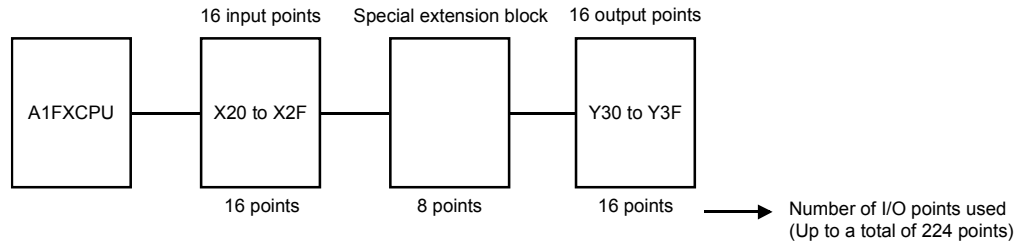




# 4. I/O NUMBER ASSIGNMENT

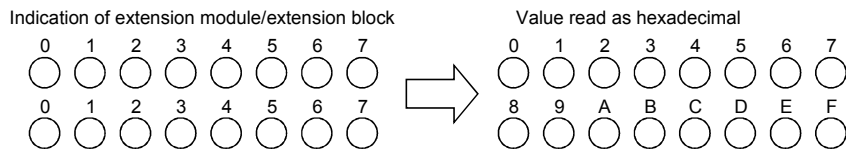
(d) One special extension module/special extension block occupies 8 points but does not use I/O numbers.

Hence, when special extension modules/special extension blocks are used, skip them over when setting the I/O numbers.

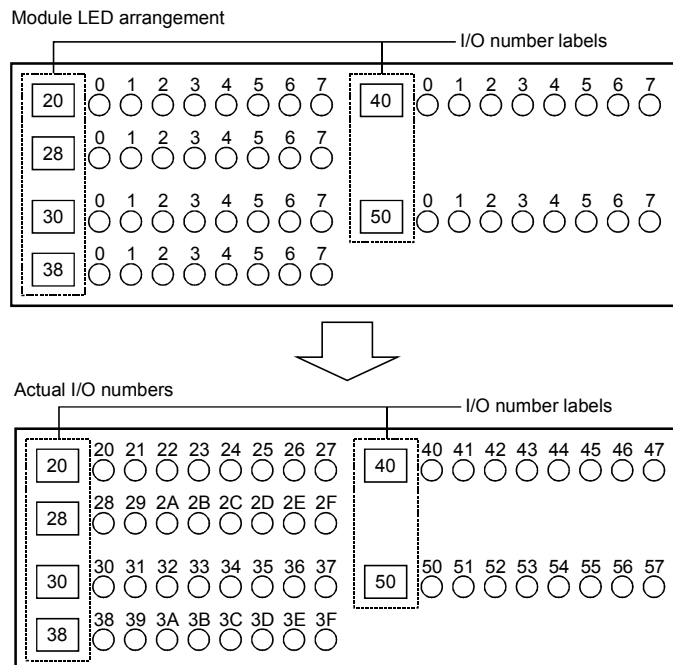


### REMARKS

The LED indication of the extension module/extension block is in octal.  
 When using the A1FXCPU to control the extension module/extension block, read the octal of the LED indication as hexadecimal.



When a 48-point extension module (input 24-point, output 24-point) is connected next to the A1FXCPU



### 5. EMC DIRECTIVE, LOW VOLTAGE DIRECTIVE

This chapter provides information on the A1FXCPU only. For the FX series products such as extension modules/extension blocks, refer to the FX series manual.

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.

#### 5.1 Requirement for Compliance with the EMC Directive

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 5.1.1 to 5.1.5 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.

## 5. EMC DIRECTIVE, LOW VOLTAGE DIRECTIVE

MELSEC-A

### 5.1.1 EMC Directive

The following table lists standards related to the EMC Directive:

Specifications	Test Item	Test	Standard Values
EN50081-2: 1995	EN55011 Radiation noise	Measure waves emitted by a product.	30M-230MHz QP: 30dB $\mu$ V/m (measured 30m away) <sup>*1</sup> 230M-1000MHz QP: 37dB $\mu$ V/m (measured 30m away) <sup>*1</sup>
	EN55011 Conduction noise	Measure noise released by a product to power line.	150k-500kHz QP: 79dB, Mean: 66dB <sup>*1</sup> 500k-30MHz QP: 73dB, Mean: 60dB
	IEC801-2 <sup>*2</sup> Static electricity immunity	Immunity test made by applying static electricity to an equipment enclosure.	4kV: contact discharge 8kV: air discharge
	IEC801-3 Radiation field <sup>*2</sup>	Immunity test made by applying electric field to a product.	10V/m, 27-500MHz
	IEC801-4 First transient burst noise	Immunity test made by applying burst noise to power and signal lines.	2kV
prEN50082-2: 1991	EN61000-4-2 <sup>*2</sup> Static electricity immunity	Immunity test made by applying static electricity to an equipment enclosure.	4kV: contact discharge 8kV: air discharge
	EN61000-4-4 First transient burst noise	Immunity test made by applying burst noise to power and signal lines.	2kV
EN50082-2: 1995	ENV50140 Radiation field AM modulation <sup>*2</sup>	Immunity test made by applying electric field to a product.	10V/m, 80-1000MHz, 80% modulation@1kHz
	ENV50204 Radiation field Pulse modulation	Immunity test made by applying electric field to a product.	10V/m, 900MHz Pulse modulation 200Hz, 50% duty
	ENV50141 Conduction noise	Immunity test made by inducing electromagnetic field into power and signal lines.	10Vrms, 0.15-80MHz, 80% modulation@1kHz

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

\*2: The PLC is open equipment (equipment incorporated into other apparatus) and must be installed in a conductive control box. For the relevant test items, the tests were performed with the PLC installed in a control box.

### 5.1.2 Installation in control box

The PLC is open equipment (equipment incorporated into other apparatus) and must be installed in a conductive control box. This not only ensures safety but also has a great effect on the shielding of PLC-generated noise with the control box.

#### (1) Control box

- (a) The control box should be conductive.
- (b) When fixing the top and bottom plates, etc. of the control box with bolts, mask the paint to permit surface contact.
- (c) To reserve electrical contact with the control box, mask the paint on the bolts used for mounting the inner plates to the control box so that conductivity may be reserved on the widest possible surface.
- (d) To reserve low impedance at high frequencies, connect the control box to the ground with thick ground wires.
- (e) The hole of the control box should be 10cm max. in diameter. If it is more than 10cm, electric waves may leak.

#### (2) Routing the power and ground wires

Route the ground and power wires of the PLC as described below:

- (a) Provide a control box grounding point near the built-in power supply Section of the A1FXCPU module and connect the LG and FG (LG: line ground, FG: frame ground) terminals of the power supply module to the ground with the thickest and shortest possible wires (about 30cm or less long) to that point. Since the LG and FG terminals are designed to draw noise generated inside the PLC to the ground, the lowest possible impedance must be reserved. 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 ground wires drawn from the grounding point should be twisted with the power wires. Doing so can release noise from the power wires to a larger ground. However, when a noise filter is fitted to the power wires, this twisting may not be needed.

## 5.1.3 Cables

Cables drawn from the control box include high-frequency noise components and act as antennas outside the control box to radiate noise. Cables connected to the I/O and special modules and drawn to outside the control box must be shielded cables. With the exception of some models, cables are not required to be fitted with ferrite cores. However, fitting of ferrite cores can further suppress noise radiated via cables. Use of shielded cables are also effective to increase noise immunity.

The signal lines of the PLC I/O and special modules reserve the noise immunity of 2kV in IEC801-4/EN61000-4-4 under the conditions of using shielded cables. If you do not use shielded cables or if you use them but do not ground their shields properly, noise immunity is less than 2kV.

Note: EN50082-2 sets forth noise immunity according to the signal line application.

Signals related to process control : 2kV

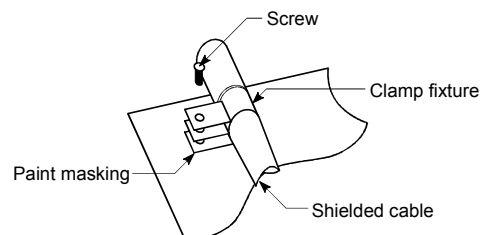
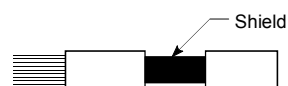
Signals not related to process control : 1kV

EN50082-2 does not define the meaning of "related to process control". However, given the spirit of the EMC Directive, we understand signal lines which may endanger people or equipment due to a malfunction should be defined as "signals related to process control" and require high noise immunity.

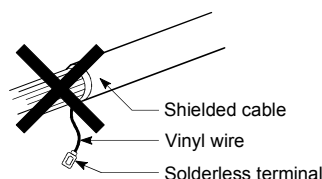
### (1) Shield grounding

(a) Ground a shield at a point near the outlet of a cable from a control box. If the grounding point is away from the outlet position, the cable after the grounding point will cause electromagnetic induction again, generating high-frequency noise.

(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: If a vinyl wire is soldered to the shield of the shielded cable and the end of that wire is grounded, this grounding method will increase high-frequency impedance and eliminate the effect of the shield.



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

For I/O signal lines and other communication cables (RS-232C, RS-422, etc.) drawn to outside the control box, their shields must also be grounded as described in (1).

5.1.4 Ferrite core

A ferrite core has an effect on noise reduction in the 30MHz to 100MHz bandwidth of radiation noise. With the exception of some models, ferrite cores are not required to be fitted to cables. However, if the shields of shielded cables drawn to outside the control box do not produce sufficient effects, it is recommended to fit ferrite cores. The ferrite cores we used in our tests are TDK's ZCAT3035.\*

Ferrite cores should be fitted immediately before cables are drawn to outside the control box. If ferrite cores are not fitted in proper position, they will lose their effects.

\*: To ensure the compliance with CE (EN6111-21/A11), make sure to short the LG and FG terminals using a wire of 6 to 7cm.

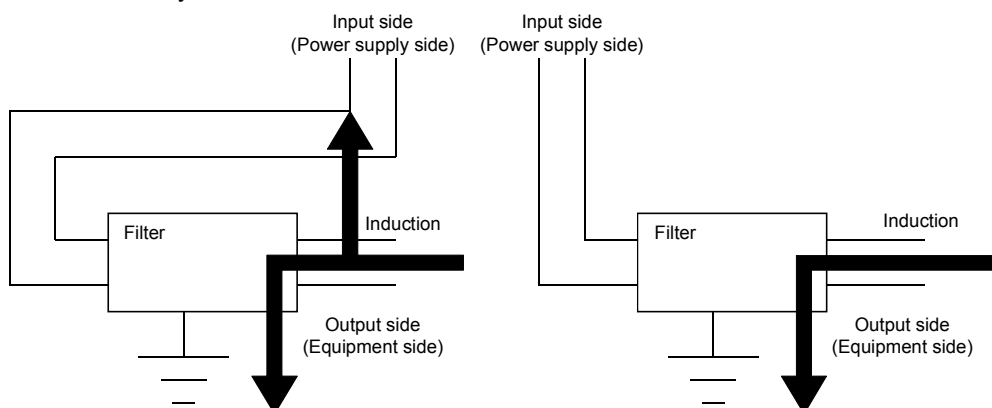
5.1.5 Noise filter (Power line filter)

A noise filter has an effect on conduction noise. With the exception of some models, a noise filter is not required to be fitted to the power line, but fitting it can further suppress noise. (A noise filter is effective on noise reduction in the 10MHz or less bandwidth of conduction noise.) Use any of the following noise filters (double π type filters) or equivalent:

Type	FN343-3/01	FN660-6-06	ZHC2203-11
Maker	SCHAFFNER	SCHAFFNER	TDK
Rated current	3A	6A	3A
Rated voltage	250V		

The instructions below should be followed when fitting a noise filter.

(1) Do not bundle the input and output side wirings of the noise filter. Doing so will induce output side noise into the input side wiring whose noise has been removed by the filter.



(a) Noise will be induced if input and output wirings are bundled

(b) Route input wiring away from output wiring.

(2) Connect the ground terminal of the noise filter to the control box in the shortest possible distance (about 10cm).

### 5.2 Requirement for Compliance with the Low Voltage Directive

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 5.2.1 to 5.2.5 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.

#### 5.2.1 Standard applied to the MELSEC-A

Standard applied to the MELSEC-A: EN61010-1 "Safety of equipment used in measurement, control and laboratories"

#### 5.2.2 Supply power

The built-in power supply section of the A1FXCPU is insulated on the assumption of installation category II. Supply power to the PLC should be in installation category II. The installation category is the level of immunity to a surge voltage that will occur due to lightning; category I is the lowest in immunity and IV the highest.

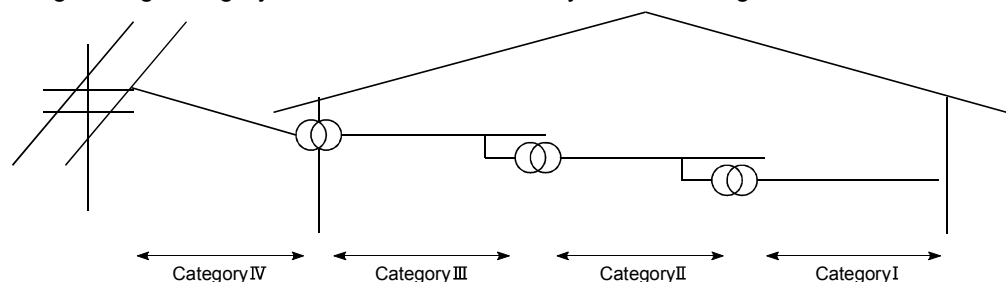


Fig. 1: Installation Categories

Category II indicates power dropped in voltage by two or more transformers from a public electricity grid

### 5.2.3 Control box

The PLC is open equipment (equipment incorporated into other apparatus) and must be installed in a conductive control box.

#### (1) Electric shock protection

The following actions must be taken for a control box to protect persons who do not have enough knowledge of electrical equipment, such as operators, from the risk of electric shock:

- (a) Lock the control box so that only the person trained to have enough knowledge of electrical equipment can open the control box.
- (b) The control box is designed to shut off power automatically when it is opened.

#### (2) Dustproof, waterproof

The control box has dustproof and waterproof purposes. Insufficient dustproofness and waterproofness will reduce dielectric strength, causing dielectric breakdown more easily. Since our PLCs are insulated on the assumption of contamination level 2, use them in the environment of contamination level 2 or less.

Contamination level 1 : Dry environment where conductive dust is not produced.

Contamination level 2 : Environment where conductive dust is not produced generally but temporary conduction may sometimes take place due to accumulated dust. Generally, for example, environment in a control chamber inside a plant or within a control box corresponding to IP54 on a plant floor.


Contamination level 3 : Environment where conductive dust may be produced and a conductive state occur due to accumulated dust, e.g. general plant floor.

Contamination level 4 : Environment where a continuous conductive state may occur due to rain, snow or the like, e.g. outdoors.

If the PLC is incorporated in a control box equivalent to IP54 as described above, contamination level 2 can be achieved.

### 5.2.4 Grounding

The A1FXCPU has the following grounding terminal and must be used in a grounded condition.

Name	Terminal Symbol	Description
Function ground		The function ground terminal is designed to improve noise resistance.



### 5.2.5 External wiring

(1) 24VDC external supply power

A 24VDC I/O module or a special module requiring external supply power should be the one whose 24VDC circuit is enhanced-insulated from a hazardous voltage circuit.

(2) Externally connected equipment

External equipment which is connected to the PLC and has a hazardous voltage circuit inside should be the one whose interface circuit is enhanced-insulated from the hazardous voltage circuit.

(3) Enhanced insulation

Enhanced insulation indicates the insulation that has the following dielectric withstand voltage.

Enhanced Dielectric Strength (Installation category II, cited from IEC664)

Rated Voltage of Hazardous Voltage Section	Surge Voltage Resistance
150VAC or less	2500V
300VAC or less	4000V

### 6. LOADING AND INSTALLATION

This chapter provides loading and installation methods and instructions to be followed to increase system reliability and ensure optimum functions.



#### **WARNING**

- Use the PLC in an environment that conforms to the general specifications given in the manual.  
Not doing so can cause an electric shock, fire, misoperation or product damage or deterioration.
- Securely fix the module using the DIN rail or mounting screws and securely tighten the mounting screws within the specified torque range.  
Undertightening can cause a drop.  
Overtightening can cause a drop due to damaged screws or module.
- Plug each cable connector into the corresponding socket securely.  
Incomplete plugging can cause mis-output due to a contact fault.
- Do not touch the conductive areas and electronic parts of the module directly.  
Doing so can cause the module to misoperate or fail.
- Before starting mounting, wiring or other work, always switch power off externally in all phases.  
Not doing so may cause an electric shock or product damage.
- When switching power on or starting operation after mounting, wiring or other work, always fit the supplied terminal cover to the product.  
Not doing so can cause an electric shock.



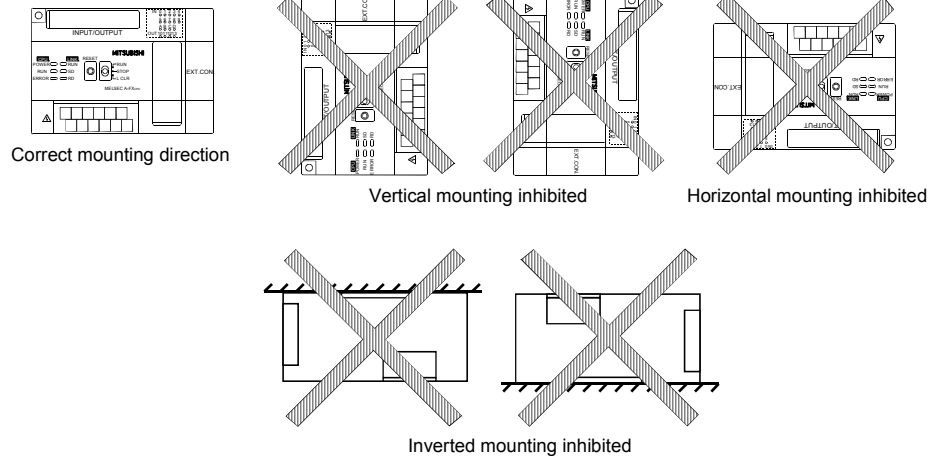
#### **CAUTION**

- Always connect the FG and LG terminals to the ground using class D (class-3) or higher grounding exclusively designed for the PLC.  
Not doing so may cause an electric shock or misoperation.
- Wire the PLC correctly after confirming the rated voltage and terminal arrangement of the product.  
A fire or failure can occur if the power supply connected is different from the rating or wiring is incorrect.
- Do not connect the A1FXCPU and extension module outputs in parallel.  
Doing so can cause the power supply module to overheat, leading to a fire or failure.
- Do not supply external power to the +24V/24G terminals of the A1FXCPU and the  terminal of the extension module.  
Also, do not wire the empty terminal (NC) of the A1FXCPU and the empty terminal  of the extension module externally.  
Doing so may cause product damage.
- Tighten the terminal screws to the specified torque.  
Undertightening can cause a short circuit, fire or misoperation.  
Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module.  
They can cause a fire, failure or misoperation.

### 6.1 Mounting Instructions

When mounting the A1FXCPU to a control box or the like, follow the instructions given below:

- (1) The PLC must not be mounted on its side or horizontally as below to ensure proper ventilation.



- (2) Ensure that the surface on which the module is to be mounted is flat to prevent possible flexing of the printed circuit boards.

- (3) Do not mount the PLC close to sources of vibration like large magnetic contactors or no-fuse breakers.

- (4) Use wiring conduits where appropriate.

For installations with conduit running closer to the PLC than the clearance distances of less than 30mm or less, note the following:

- (a) When used above the PLC, the conduit should be less than 50mm deep to allow proper ventilation and clearance for the I/O lines of the A1FXCPU and extension modules/extension blocks.

- (b) When used below the PLC, the conduit should allow clearance for the 100 to 200VAC input line of the power supply and the I/O and 24VDC lines of the extension modules/extension blocks

- (5) To avoid the influence of radiation noise and heat, any equipment installed in front of the PLC (equipment installed on the back of the panel door) should be at least 100mm away from the PLC.

Also, any equipment installed on either side of the module should be at least 50mm away from the module.

## 6.2 Mounting the A1FXCPU

This section provides how to mount and dismount the A1FXCPU.

### 6.2.1 Mounting/dismounting the A1FXCPU to/from a panel surface

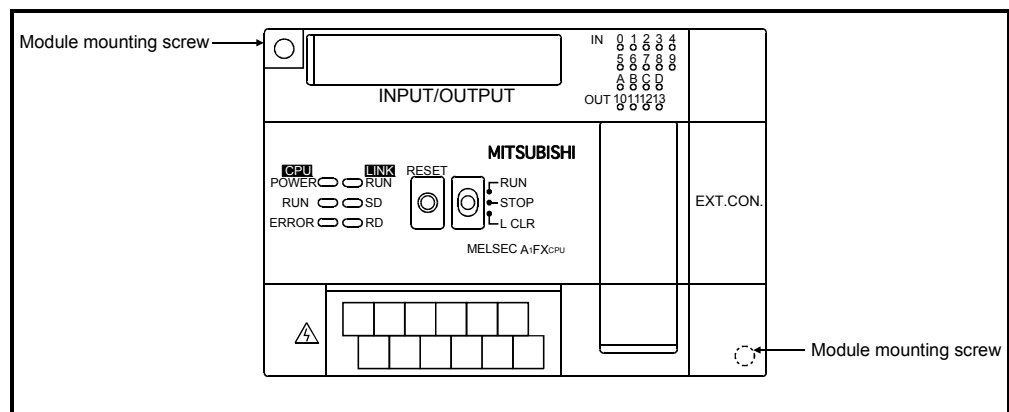
Mount the module to a panel surface horizontally as shown below by tightening the module mounting screws at top left and bottom right of the module.

When dismounting the module, loosen the module mounting screws to dismount it.

For the positions of the module mounting screw holes, refer to Appendix 2.1

The module mounting screw size is as follows:

M4 × 0.7mm × 16mm or longer screw···(Tightening torque range: 78 to 118N · cm)



### 6.2.2 Mounting the DIN rail

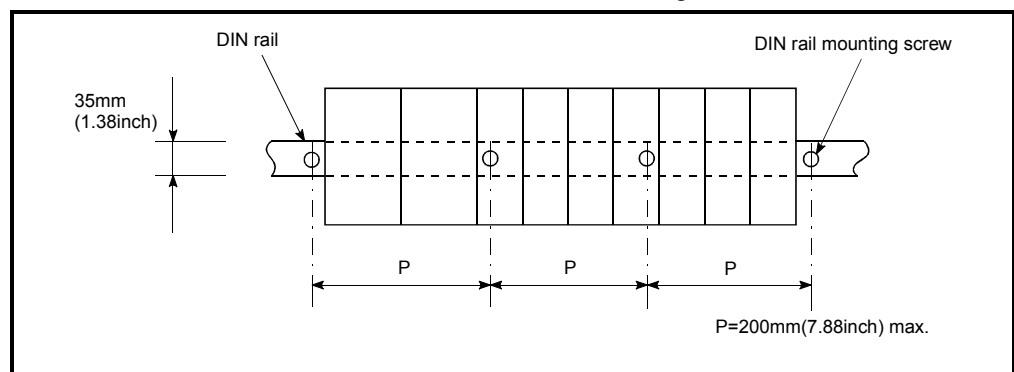
The A1FXCPU is equipped with the DIN rail catch as standard.

The way of mounting the DIN rail is described below:

- (1) Applicable DIN rail type (JIS C 2812)  
TH35-7.5Fe, TH35-7.5Al, TH35-15Fe

- (2) DIN rail mounting screw intervals

When using the DIN rail of TH35-7.5Fe or TH35-7.5Al, tighten the rail mounting screws at intervals of 200mm or less to reserve strength.



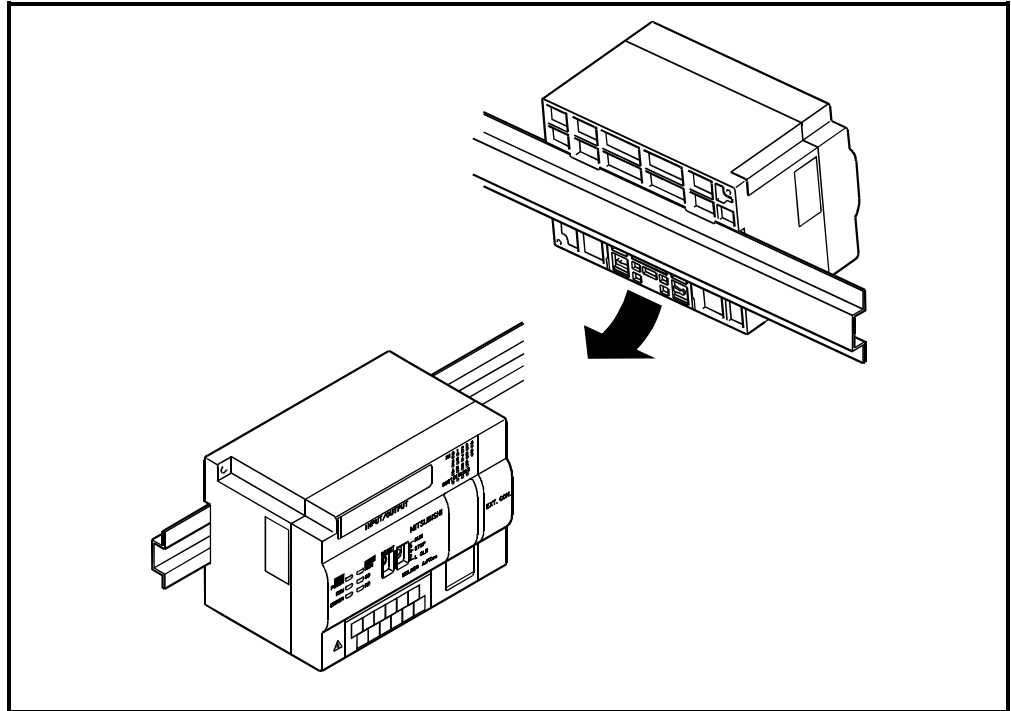
### 6.2.3 Mounting/dismounting the A1FXCPU to/from the DIN rail

#### (1) Mounting the A1FXCPU to the DIN rail

Mount the A1FXCPU to the DIN rail in the following procedure.

(a) Fit the top of the DIN rail groove in the A1FXCPU into the top of the DIN rail.

(b) Press the A1FXCPU against the DIN rail to fix it.

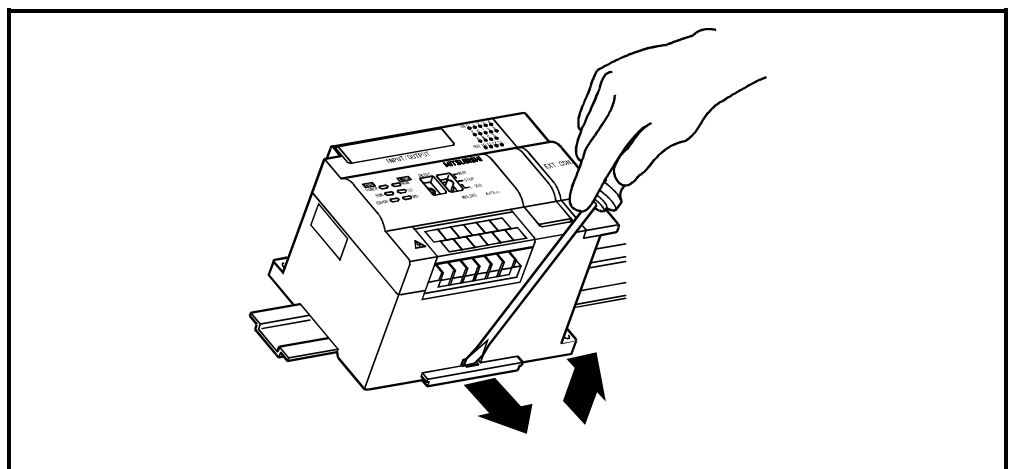


#### (2) Dismounting the A1FXCPU from the DIN rail

Dismount the A1FXCPU from the DIN rail in the following procedure:


(a) Using a flat-blade screwdriver (6 × 100), draw down the catch at the bottom of the A1FXCPU.

(b) With the catch drawn down, pull the A1FXCPU toward you to remove it from the DIN rail.



**6.3 Battery**

This section gives the specifications, handling instructions and fitting method of the battery.

 **WARNING**

- Connect the battery correctly. Do not recharge, disassemble, heat, short or solder the battery or throw it into fire.

Improper handling of the battery may result in injury or fire due to heating, burst, combustion, etc.

**6.3.1 Battery specifications**

Table 6.3 indicates the specifications of the battery used for the power failure backup function.

**Table 6.3 Battery Specifications**

Item \ Type	A6BAT
Classification	Thionyl chloride lithium battery
Nominal voltage	3.6VDC
Battery guarantee period	5 years
Life	Guaranteed time (minimum value): 4000 hours Actual operation time (average value): 20000 hours · If the total power failure time is less than the guaranteed value, change the battery in 4 to 5 years.
Application	For IC-RAM memory backup and power failure backup function
Outline dimensions	φ16 × 30

**REMARKS**

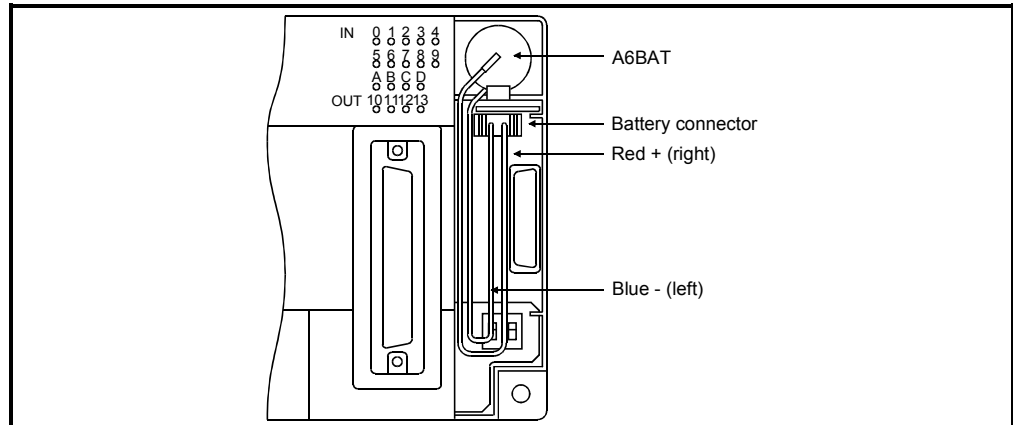
For the battery directive in EU member states, refer to Appendix 4.

### 6.3.2 Battery loading

The battery connector is disconnected before shipment to prevent the battery from being consumed during distribution and storage.

When using the A1FXCPU as described below, plug the lead connector of the battery into the battery connector of the A1FXCPU circuit board.

- The sequence program, file registers and comments in the user program area of the A1FXCPU are used.
- The power failure backup function is used.



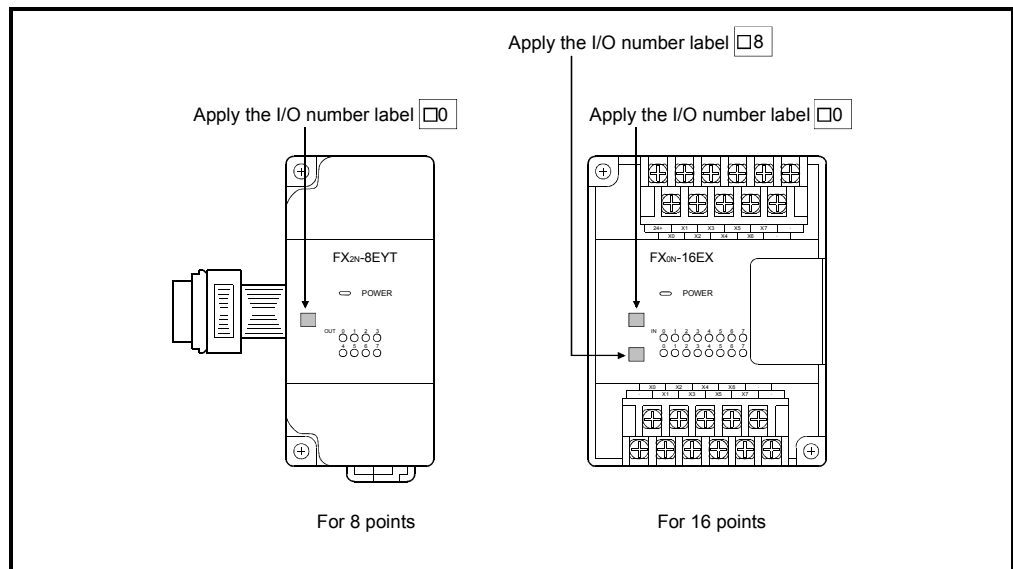
## 6. LOADING AND INSTALLATION

### 6.4 How to Use the Labels Supplied with the Product

This section explains the I/O number and ink station number labels supplied with the A1FXCPU and how to use them.

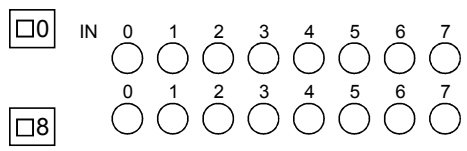
#### 6.4.1 How to use the I/O number labels

Use the I/O number labels as follows:



#### REMARKS

When inputs or outputs are assigned in increments of 16 points, apply the I/O number label □0 to the position of the first 8 points of the I/O numbers and □8 to the position of the second 8 points.



For example, when the I/O numbers are 20 to 2F, apply the label "20" to the position of 20 to 27 and the label "28" to the position of 28 to 2F.

For I/O number assignment, refer to Chapter 4.

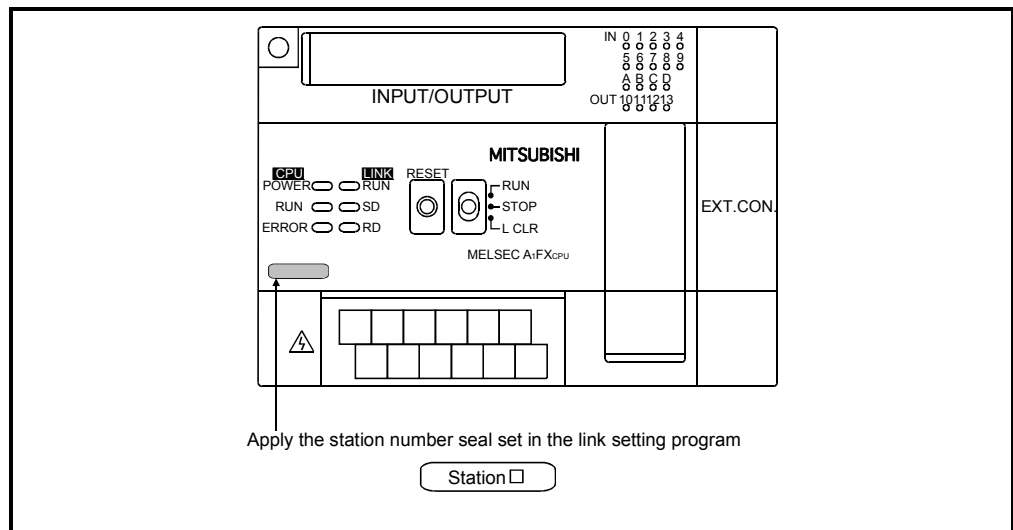


## 6. LOADING AND INSTALLATION

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### 6.4.2 How to use the link station number labels

Use the link station number labels as follows:



### 6.5 Failsafe Circuit

When a PLC power supply is switched on or off, some controlled outputs may not temporarily operate normally due to differences in delay time or rise time between the PLC power supply and external power supply for control target (especially DC).

For example, if the PLC power supply is switched on after the external power supply for control target is switched on in the DC output module, the DC output module may provide erroneous output instantaneously. Therefore, the circuitry must be designed to switch on the PLC power supply first.

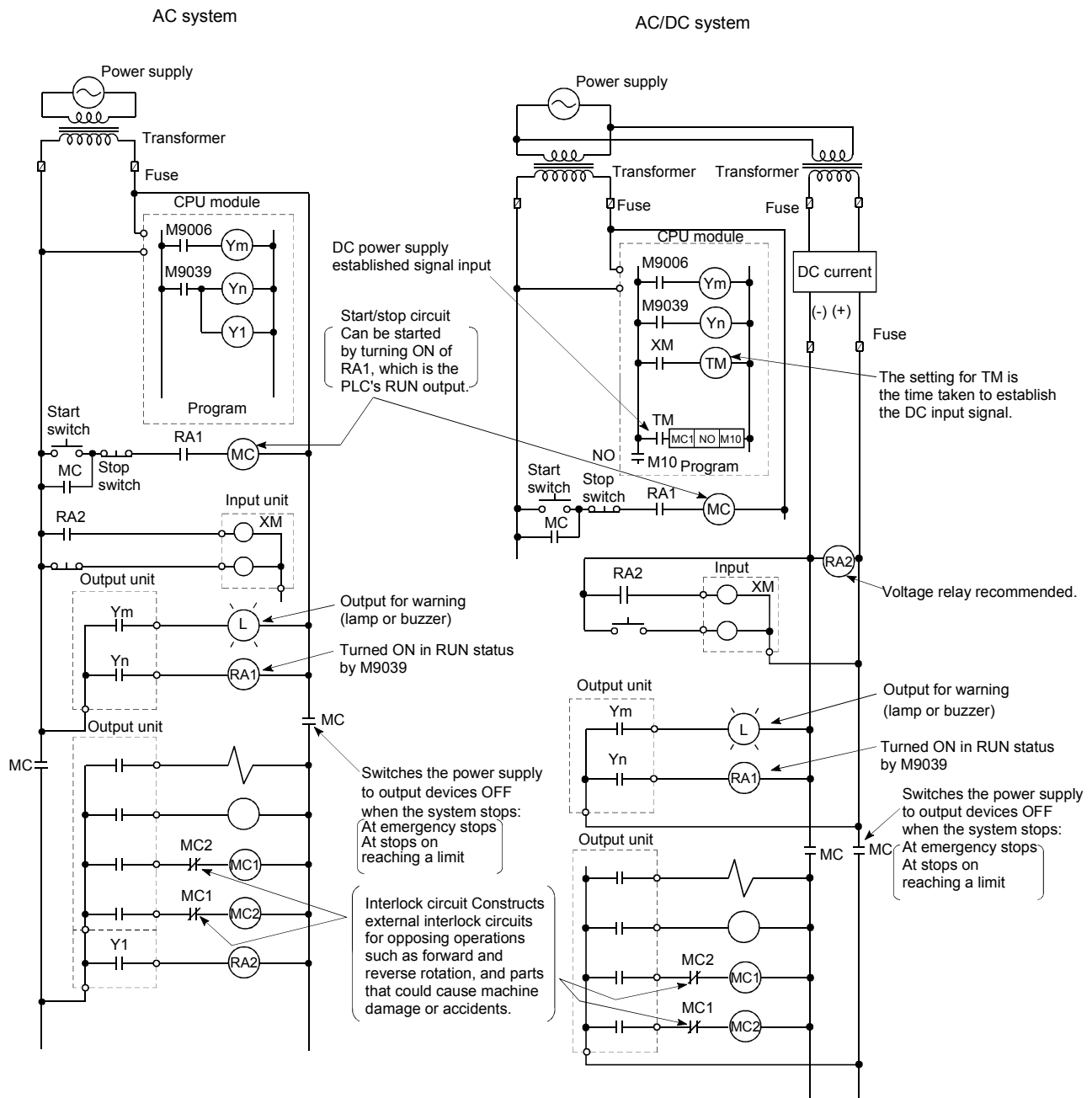
Also when an external power supply fault or PLC failure occurs, the PLC may operate improperly.

To ensure safety and to prevent such faulty operation from leading to a whole system fault, circuits (such as emergency stop, protective, interlock and other circuits) which may lead to machine damage or accidents due to faulty operation should be made up in the outside of the PLC.

The following circuit will overcome any problems which may arise in extreme circumstances due to this phenomenon.

<b>POINT</b>	
	The A1FXCPU and extension module power supplies should be switched on or off at the same time.

## (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 program when the magnetic contactor (MC) turns ON.

### AC/DC system

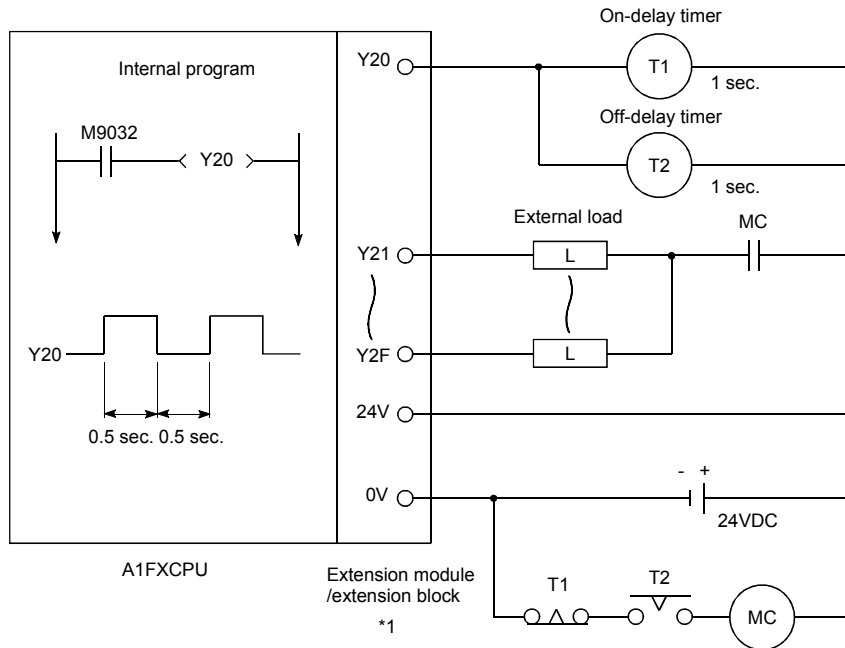
- [1] Switch the power supply ON.
- [2] Set the CPU module to RUN.
- [3] Switch RA2 ON when the DC power supply starts.
- [4] Switch the timer (TM) ON when the DC power supply reaches working voltage. (The set value for TM must be the time it takes for 100% establishment of the DC power after RA2 is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

(2) Failsafe technique for a PLC failure

The PLC CPU module and memory failures are detected by the self-diagnostic function, but a failure may not be detected by the CPU module if there is a fault in the I/O control or other sections. In such a case, all points may turn on or off, or the controlled system may not operate properly or safely at the worst.

In addition to our highest possible quality designed in the product, we ask the user to configure up an external failsafe circuit to prevent machine damage or accident if the PLC has failed for some reason.

A failsafe circuit example is given below.



\*1: As Y20 alternates on and off at intervals of 0.5 seconds, use a no-contact extension module/extension block (transistors in the above example).

### 6.6 Installation Environment



#### **CAUTION**

- Use the PLC in an environment which conforms to the general specifications given in the manual. Not doing so can cause an electric shock, fire, misoperation or product damage or deterioration can occur.

When installing the A1FXCPU system, avoid:

- (1) Ambient temperature outside the range 0 to 55°C
- (2) Ambient humidity outside the following range:  
10 to 90%RH when the A1FXCPU is used independently; or  
35 to 85%RH when the A1FXCPU is used with the FX series
- (3) Condensation due to sudden temperature changes
- (4) Corrosive or combustible gasses
- (5) Dust, conductive powder (e.g. metal filings), oil mist, salt and organic solvent
- (6) Direct sunlight
- (7) Strong power and magnetic fields
- (8) Vibration and impact

### 6.7 Precautions for Connecting to Uninterruptible Power Supply (UPS)

When connecting to an uninterruptible power supply (abbreviated as UPS here after), pay attention to the followings.

- Always use the on-line UPS system which voltage distortion is 5% or less.
- Do not use the off-line UPS system.

### 7. EXTERNAL WIRING

This chapter gives instructions for wiring the power, I/O and other lines.



#### **DANGER**

- Plug each cable connector into the corresponding socket securely. Incomplete plugging can cause mis-output due to a contact fault.
- Do not touch the conductive areas and electronic parts of the module directly. Doing so can cause the module to misoperate or fail.
- Before starting mounting, wiring or other work, always switch power off externally in all phases. Not doing so may cause an electric shock or product damage.
- When switching power on or starting operation after mounting, wiring or other work, always fit the supplied terminal cover to the product. Not doing so can cause an electric shock.



#### **CAUTION**

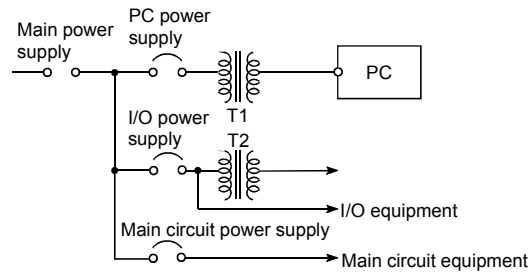
- Be sure to ground the FG terminals and LG terminals to the protective ground conductor with class D (class-3). Not doing so could result in electric shock or erroneous operation.
- Wire the module correctly after confirming the rated voltage and terminal arrangement of the product. A fire or failure can occur if the power supply connected is different from the rating or wiring is incorrect.
- Do not connect the A1FXCPU and extension module outputs in parallel. Doing so can cause the power supply module to overheat, leading to a fire or failure.
- Do not supply external power to the +24V/24G terminals of the A1FXCPU and the  terminal of the extension module. Also, do not wire the empty terminal (NC) of the A1FXCPU and the empty terminal  of the extension module externally. Doing so may cause product damage.
- Tighten the terminal screws to the specified torque. Undertightening can cause a short circuit, fire or misoperation. Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module. They can cause a fire, failure or misoperation.

## 7.1 Power Supply Wiring

### (1) Power supply wiring

(a) Wire the PLC, I/O equipment and power equipment in separate lines as shown below.

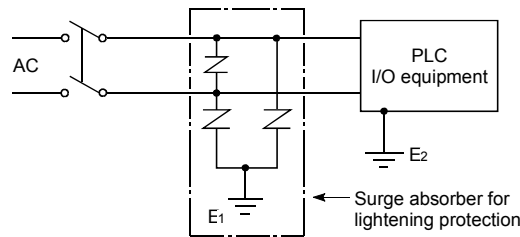
If excessive noise is generated, use isolating transformers.



(b) 100VAC, 200VAC and 24VDC supply cables should be twisted as tightly as possible and of the shortest possible length.

Use the largest possible gauge (max. 2mm<sup>2</sup>) for the above cables to minimize any voltage drop.

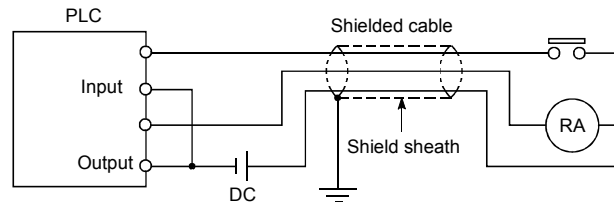
(c) As a measure against any potential large surges (e.g. due to lightening), use a surge absorber as shown below.



POINT
(1) Ground the surge absorber (E <sub>1</sub> ) and the PLC (E <sub>2</sub> ) separately.
(2) When selecting a surge absorber, make due allowance for increases in the power supply voltage.

(2) I/O equipment wiring

- (a) The terminal blocks are designed for use with 0.3 to 1.25mm<sup>2</sup> gauge wires, and connectors are designed for use with 0.3mm<sup>2</sup> gauge wires.
- (b) Route the input and output lines separately.
- (c) When the I/O signal wires cannot be separated from the main circuit wiring and/or the power wiring, use twisted pair shielded cable grounded at one end only, preferably at the PLC end.

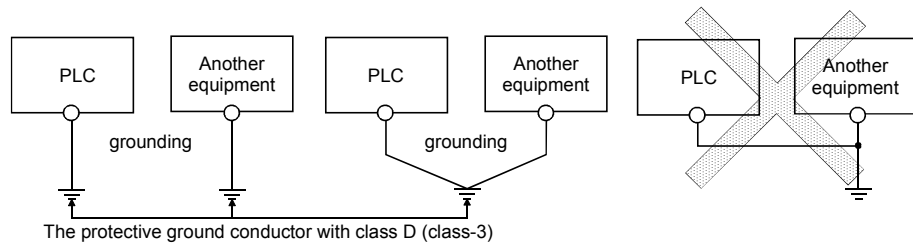


- (d) Where wiring runs through metal piping, ground the piping.
- (e) Run the 24VDC input cable separately from 100VAC and 200VAC cables.
- (f) Wiring over 200m(655.74feet) or further may give rise to leakage currents due to the line capacitance. This may be corrected as discussed in Section 3.4 "Extension Module/Extension Block Trouble Examples" in the Maintenance Manual.
- (g) When the module is used as a high-speed counter or interrupt module, wire the cables carefully so that it is not affected by noise.

(3) Grounding

Grounding must be done in conformance with (a) to (d) below

- (a) Ground the PLC as independently as possible. Be sure to ground to the protective ground conductor with class D (class-3)(grounding resistance 100Ω or less).
- (b) If independent grounding is impossible, use the joint grounding method as shown in the figure below(2).



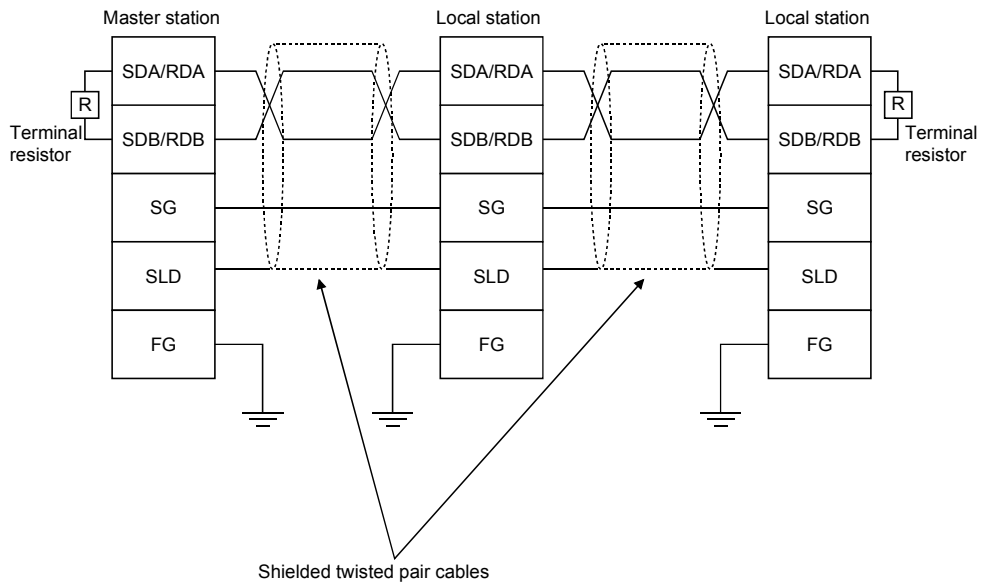
(1) Independent grounding.....Best      (2) Joint grounding.....Good      (3) Joint grounding.....Not allowed

- (c) Use a wire with a cross-sectional area of at least 2mm<sup>2</sup> for grounding. Make the grounding point as close to the PLC as possible so that the grounding wire is not too long.



## 7.2 Wiring for Simple Inter-PLC Link

The following diagram shows how to wire the A1FXCPU for simple inter-PLC link.



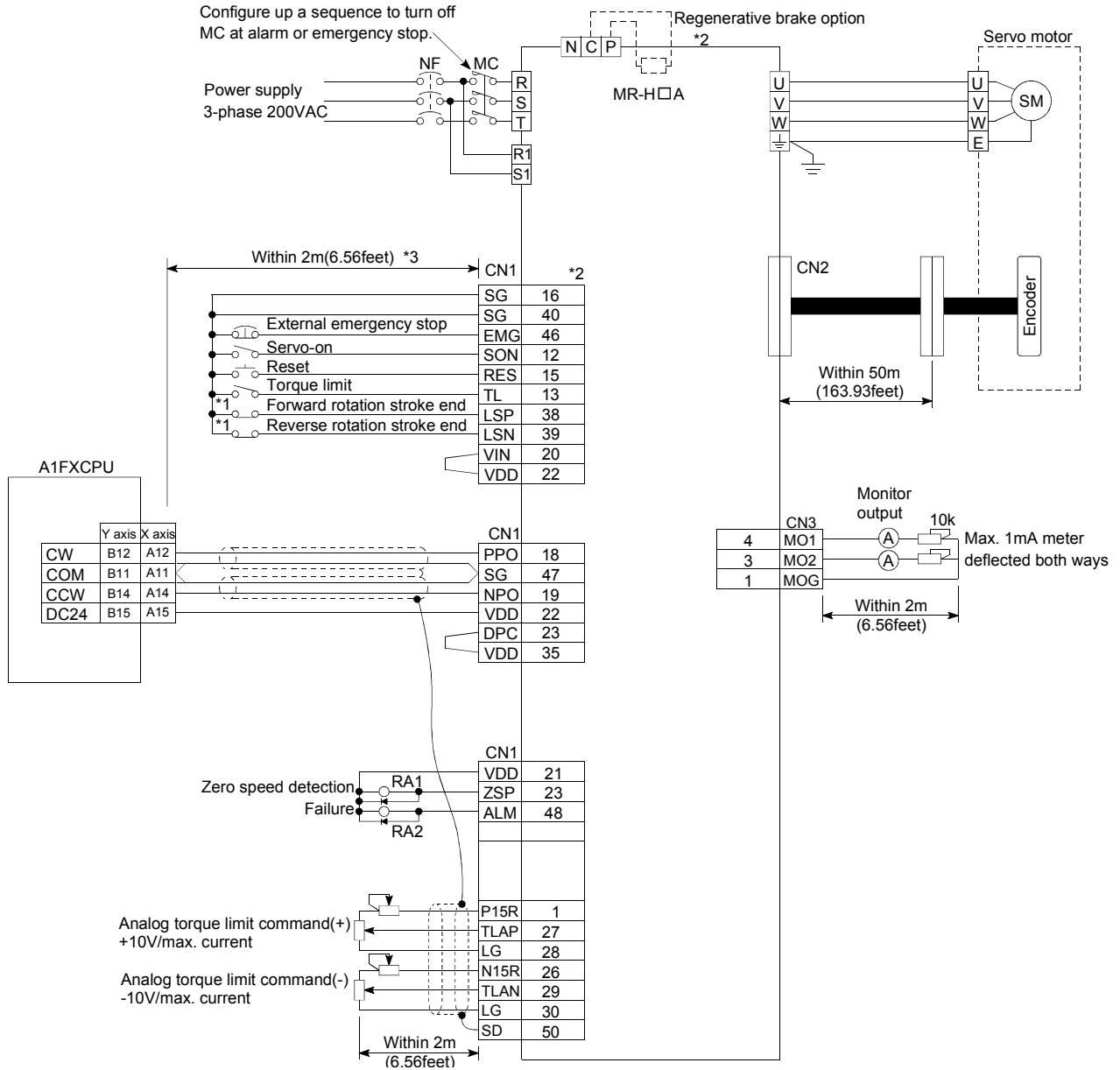
<b>POINT</b>	
For the specifications of the twisted pair cables, refer to Section 2.3.3.	

# 7. EXTERNAL WIRING

## 7.3 Wiring for Simple Positioning

The following diagrams show connection examples of the A1FXCPU for simple positioning.

### 7.3.1 Example of connection with the MR-H□A

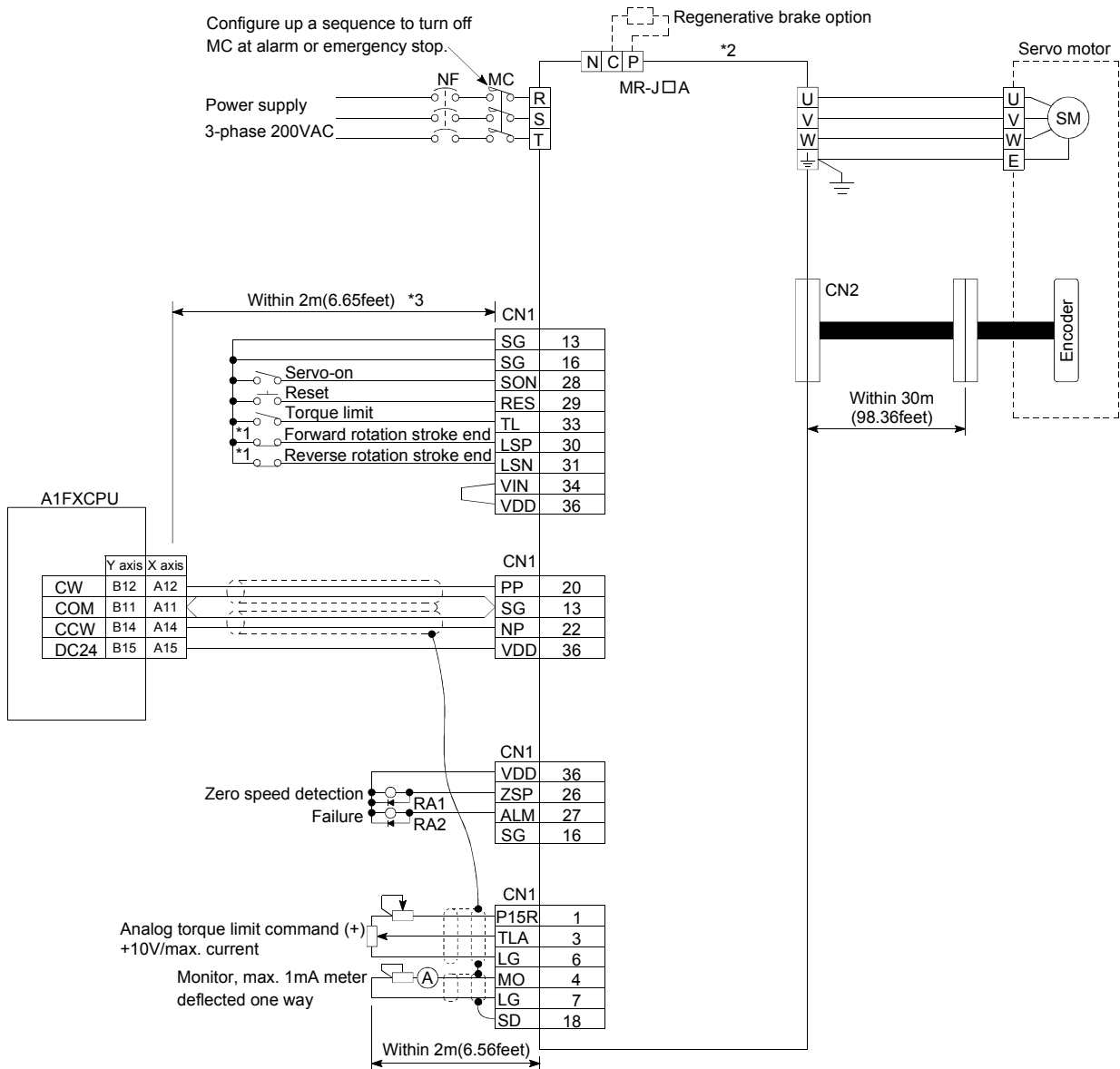


**REMARKS**

- \*1 Limit switch for servo (stop).
- \*2 For connection details, refer to the Specifications and Installation Guide of the MR-H servo amplifier.
- \*3 Indicates a distance between A1FXCPU and amplifier.

# 7. EXTERNAL WIRING

## 7.3.2 Example of connection with the MR-J□A

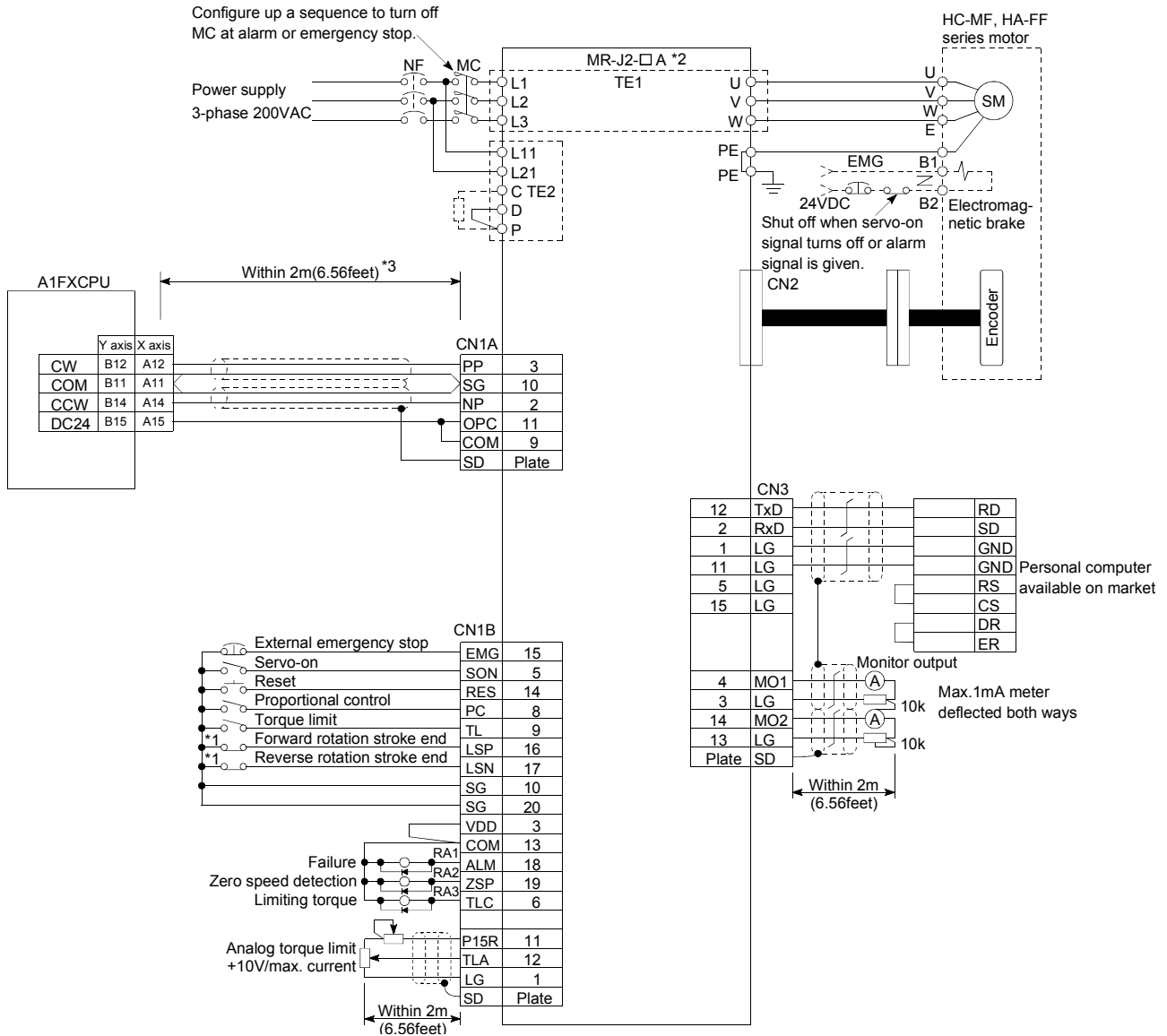


**REMARKS**

- \*1 Limit switch for servo (stop).
- \*2 For connection details, refer to the Specifications and Installation Guide of the MR-J servo amplifier.
- \*3 Indicates a distance between A1FXCPU and amplifier.

# 7. EXTERNAL WIRING

## 7.3.3 Example of connection with the MR-J2□A

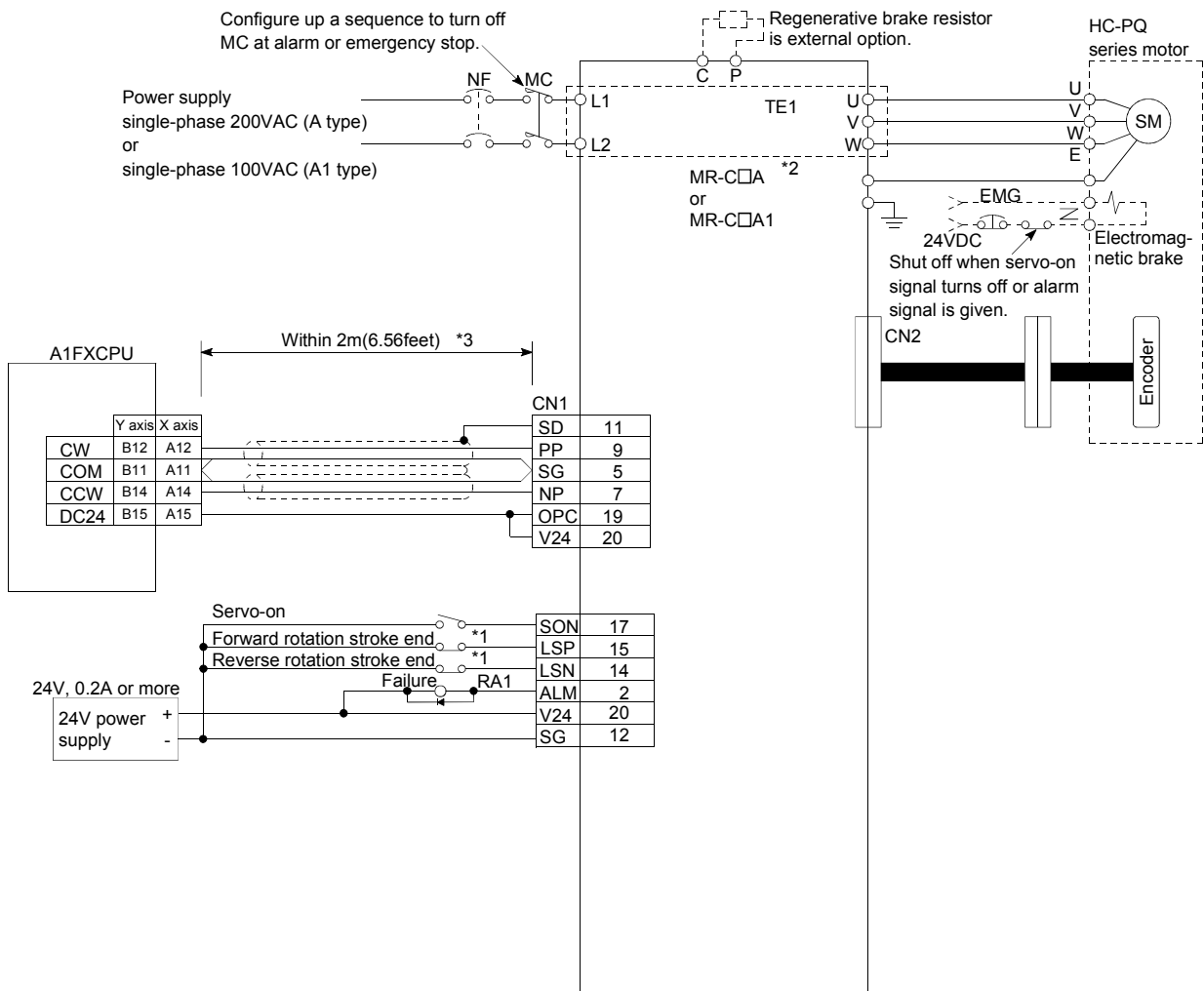


### REMARKS

- \*1 Limit switch for servo (stop).
- \*2 For connection details, refer to the Specifications and Installation Guide of the MR-J2 servo amplifier.
- \*3 Indicates a distance between A1FXCPU and amplifier.

# 7. EXTERNAL WIRING

## 7.3.4 Example of connection with the MR-C□A

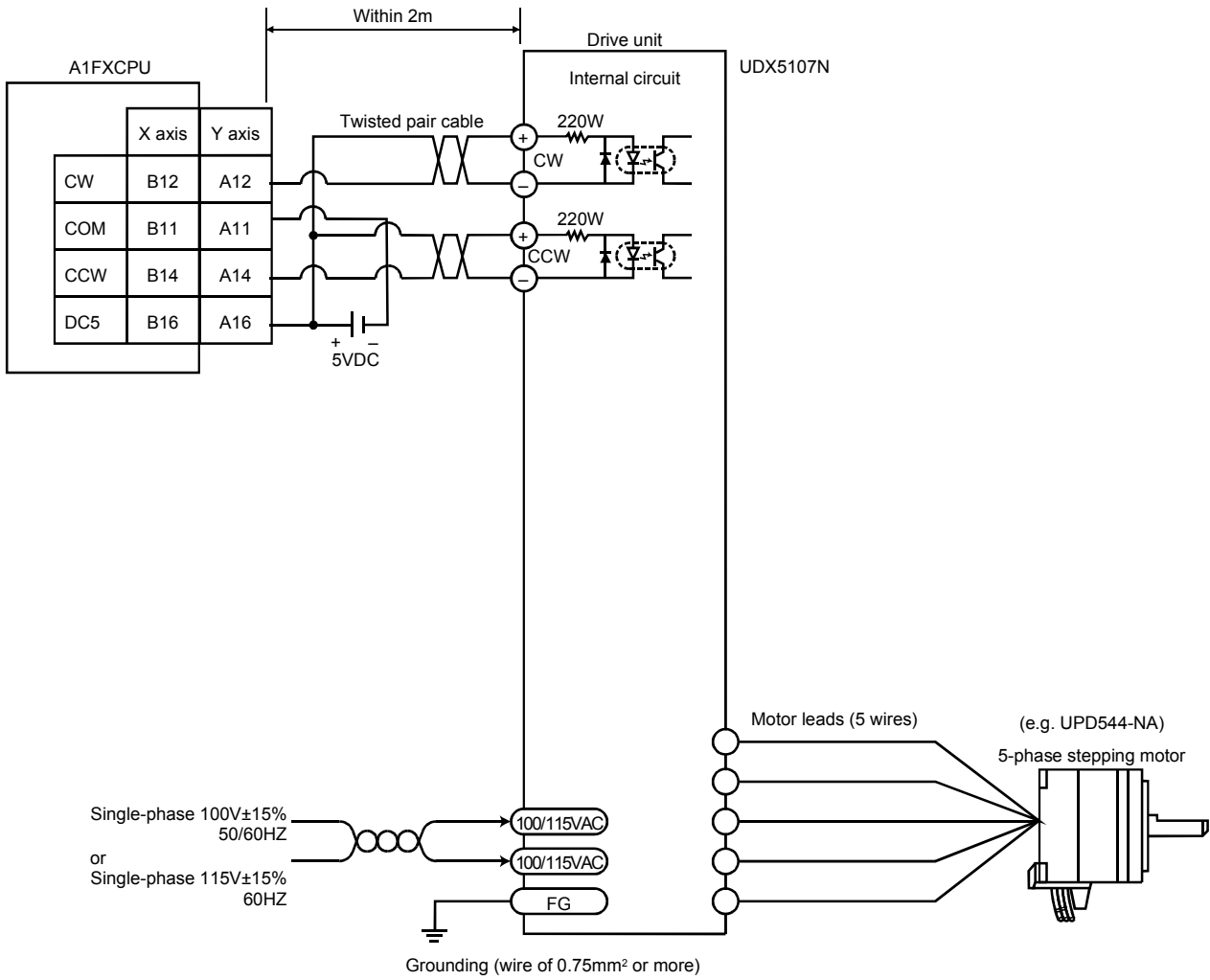


**REMARKS**

- \*1 Limit switch for servo (stop).
- \*2 For connection details, refer to the Specifications and Installation Guide of the MR-C servo amplifier.
- \*3 Indicates a distance between A1FXCPU and amplifier.

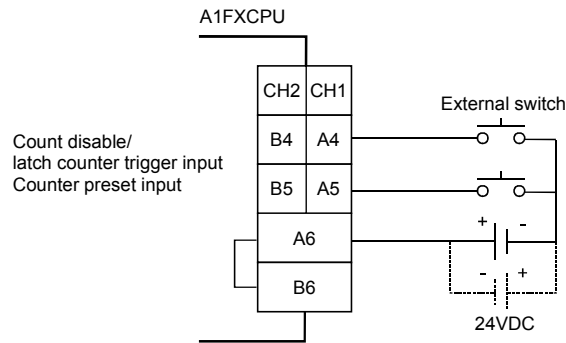
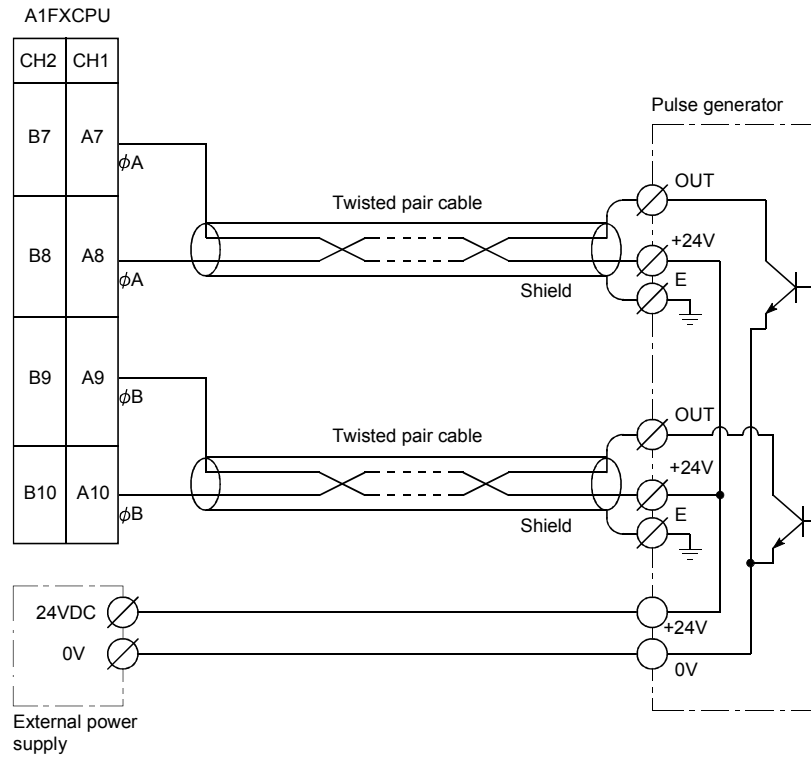
# 7. EXTERNAL WIRING

## 7.3.5 Example of connection with stepping motor driver



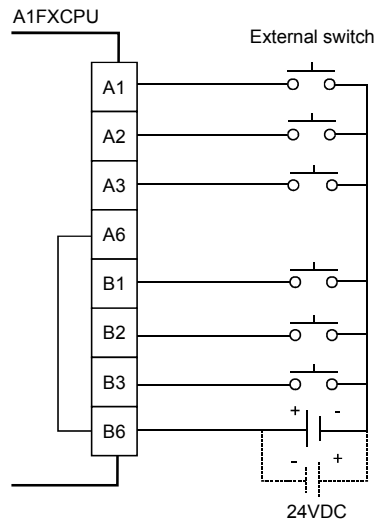
## 7.4 Wiring for High-Speed Counter Function

The following diagram shows how to wire the A1FXCPU for the high-speed function.



## 7.5 Wiring for Interrupt Input Function

The following diagram shows how to wire the A1FXCPU for the interrupt input function.





## 8. SPECIFICATIONS AND WIRING OF THE I/O BLOCKS

This chapter explains the specifications and external wiring of the I/O blocks.

**WARNING**

- Plug each cable connector into the corresponding socket securely. Incomplete plugging can cause mis-output due to a contact fault.
- Do not touch the conductive areas and electronic parts of the module directly. Doing so can cause the module to misoperate or fail.
- Before starting mounting, wiring or other work, always switch power off externally in all phases.  
Not doing so may cause an electric shock or product damage.
- When switching power on or starting operation after mounting, wiring or other work, always fit the supplied terminal cover to the product.  
Not doing so can cause an electric shock.

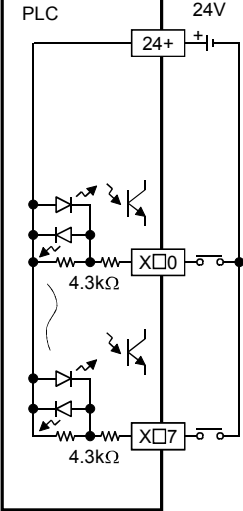
**CAUTION**

- Be sure to ground the FG terminals and LG terminals to the protective ground conductor with class D (class-3).  
Not doing so could result in electric shock or erroneous operation.
- Wire the module correctly after confirming the rated voltage and terminal arrangement of the product.  
A fire or failure can occur if the power supply connected is different from the rating or wiring is incorrect.
- Do not connect the A1FXCPU and extension module outputs in parallel.  
Doing so can cause the power supply module to overheat, leading to a fire or failure.
- Do not supply external power to the +24V/24G terminals of the A1FXCPU and the 24+ terminal of the extension module.  
Also, do not wire the empty terminal (NC) of the A1FXCPU and the empty terminal ▪ of the extension module externally.  
Doing so may cause product damage.
- Tighten the terminal screws to the specified torque.  
Undertightening can cause a short circuit, fire or misoperation.  
Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module.  
They can cause a fire, failure or misoperation.

# 8. SPECIFICATIONS AND WIRING OF THE I/O BLOCKS

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## 8.1 Input Specifications

Item	DC Input
Model	Extension block (for FX <sub>0N</sub> , FX <sub>2N</sub> ) Extension module (for FX <sub>2N</sub> )
Input circuit structure	
Input signal voltage	24VDC±10%
Input signal current	5mA/24VDC
Input ON current	3.5mA or more
Input OFF current	1.5mA or more
Input response time	Approx. 10ms
Input signal form	Contact input or NPN open collector transistor
Circuit isolation	Photocopler isolation
Input operation indication	LED is lit to indicate that input is on.

## 8.2 Handling of DC Input Signals (AC Power Supply Type)

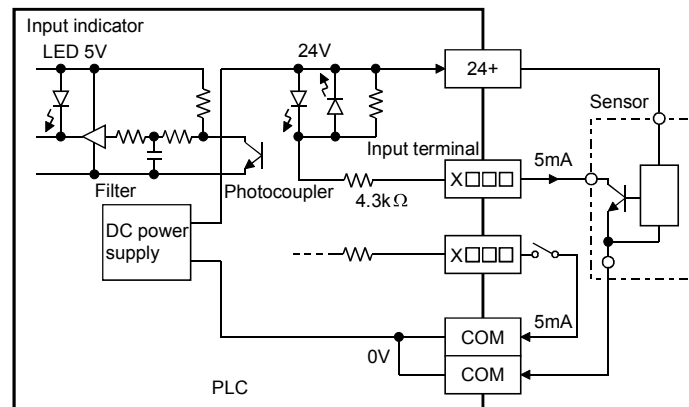
### (1) DC input circuit

#### (a) Input terminals

When the input terminal and [COM] terminal are connected by the no-voltage contact or NPN open collector transistor, the input switches on.

At this time, the input indicator LED is lit.

The input [COM] terminals are connected inside the PLC.



#### (b) Input circuits

The primary and secondary input circuits are isolated by photocouplers and the secondary circuit has a C-R filter to prevent a malfunction if input contact chattering occurs or noise enters from the input lines.

For this reason, there is an approx. 10ms response delay for ON to OFF or OFF to ON of the input in the PLC.

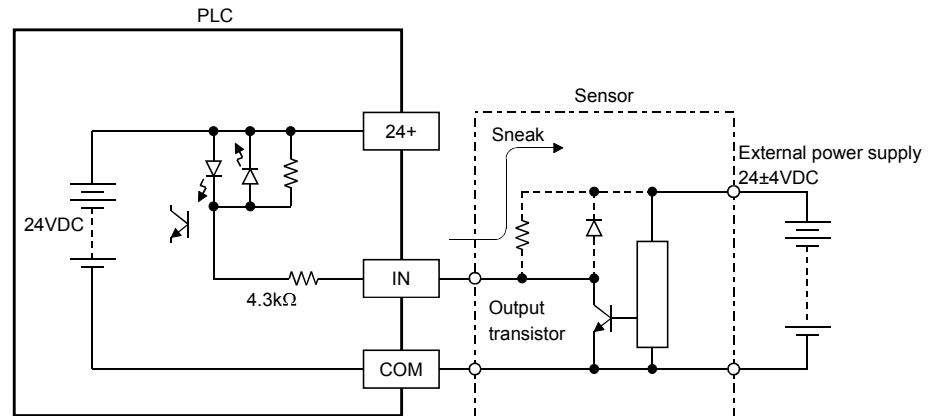
#### (c) Input sensitivity

The input current of this PLC is 24VDC 5mA. However, it should be 3.5mA or more to switch on the input reliably and 1.5mA or less to switch it off reliably. For this reason, the instructions in Sections 8.3 and 8.4 must be followed when there are series diodes or resistors in the input contacts (not switched on completely) or there are parallel resistors or leakage currents in the input contacts (not switched off completely).

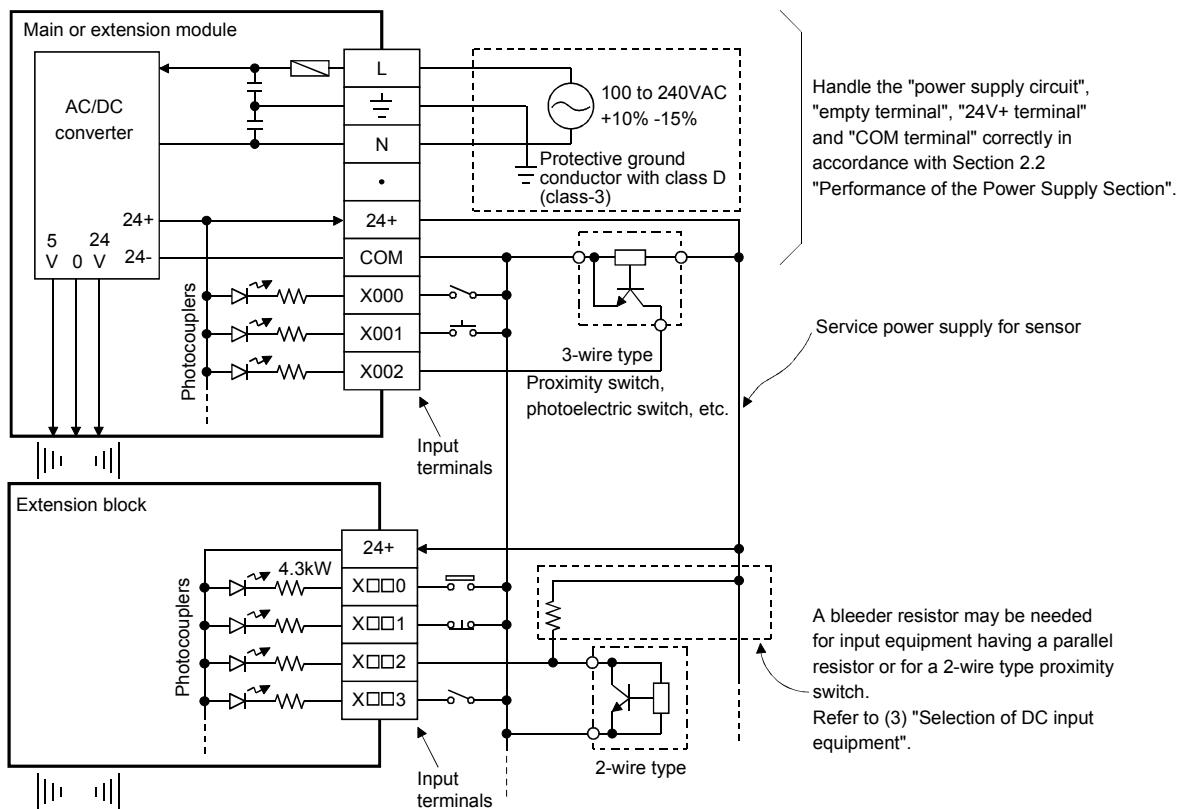
# 8. SPECIFICATIONS AND WIRING OF THE I/O BLOCKS

(d) External circuit for sensor

The input current of this PLC is supplied from the 24VDC power supply in the PLC. Therefore, when the sensor such as a photoelectric switch is driven by an external power supply, the voltage of this external power supply should be  $24V \pm 4VDC$  and the output transistor of the sensor should be the NPN open collector type. However, when the output transistor has sufficient voltage resistance and there are no diode and resistor in the sensor as indicated in the dotted line (open collector), the external power supply voltage may be different.



(2) Input connection example



### (3) Selection of DC input equipment

The input current of this extension module/extension block is 24VDC (internally supplied) 5mA (5mA for X010 or later). Use small input equipment which suits this very weak current.

<Example> OMRON make

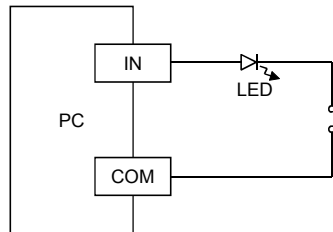
- Micro switch : Type Z, Type V, Type D2RV
- Operation switch : Type A3P
- Proximity switch : Type TL, Type E2M
- Photoelectric switch : Type E3S, Type E3N

Use of a switch for large current may cause a contact fault.

#### (a) Input equipment having a series diode

The voltage drop of a series diode should be approx. 4V max.

Consequently, two or less reed switches with series LEDs should be used in series.



#### (b) Input equipment having a parallel resistor/2-wire type proximity switch

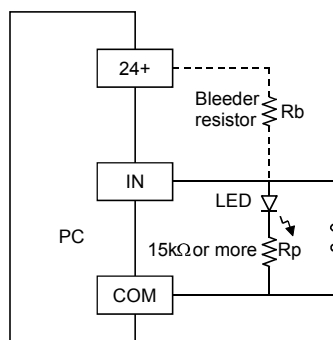
The parallel resistor  $R_p$  should be  $15k\Omega$ .

If it is less than the above value, a bleeder resistor  $R_b$  satisfying the following formula should be connected between the [24+] and [IN] terminals:

$$R_b \leq \frac{4R_p}{15-R_p} \text{ (k}\Omega\text{)}$$

When the 2-wire type proximity switch is off, the leakage current  $I_1$  should be  $1.5mA$  max. If it is more than the above value, a bleeder resistor  $R_b$  satisfying the following formula should be connected similarly:

$$R_b \leq \frac{6}{11-1.5} \text{ (k}\Omega\text{)}$$



## 8. SPECIFICATIONS AND WIRING OF THE I/O BLOCKS

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### 8.3 Output Specifications

Item		Relay Output	Triac Output	Transistor Output
Model		FX <sub>2</sub> N Extension module Extension block	FX <sub>2</sub> N Extension block	FX <sub>2</sub> N Extension module Extension block
Output circuit structure				
External power supply		250VAC, 30VDC or less	85 to 242VAC	5 to 30VDC
Circuit isolation		Mechanical isolation	Photothyristor isolation	Photocoupler isolation
Operation indication		LED is lit when relay coil is energized	LED is lit when photothyristor is driven	LED is lit when photocoupler is driven
Max. load	Resistive load	2A/point 8A/4 points-1 common 8A/8 points-1 common	0.3A/point, 0.8A/4 points	0.5A/point, 0.8A/4 points
	Inductive load	80VA	15VA/100VAC 30VA/200VAC(50VA/100VAC C 100VA/200VAC)	12W/24VDC
	Lamp load	100W	30W [100W]	1.5W/24VDC
Open-circuit leakage current		—	1mA/100VAC 2mA/200VAC	0.1mA/30VDC
Min. load		5VDC 2mA, reference value	0.4VA/100VAC 1.6VA/200VAC	—
Response time	OFF→ON	Approx. 10ms	1ms max.	0.2ms max.
	ON→OFF	Approx. 10ms	10ms max.	0.2ms max.

### 8.4 Handling of the Relay Output Circuit

#### 8.4.1 Relay output circuit

(1) Output terminals

The relay output type is a 4-, 8- or 16-point/1-common output type and the common terminals are numbered [COM1] to [COM9].

Different common blocks (1 point increments for the separated common type) can drive loads in different circuit voltage systems (for example, 200VAC, 100VAC, 24VDC).

(2) Circuit isolation

The PLC internal circuit and external load circuit are electrically isolated between the coils and contacts of the output relays. The common blocks are also separated each other.

(3) Operation indication

When the coil of the output relay is energized, the LED is lit and the output contact switches on.

(4) Response time

Response time from when the coil of the output relay is energized or deenergized to when the output contact switches on or off is approx. 10ms.

(5) Output current

At the circuit voltage of 250VAC or less, a purely resistive load of 2A/point, an inductive load of 80VA or less (100VAC or 200VAC), or a lamp load of 100W or less (100VAC or 200VAC) can be driven.

Refer to Table 8.4.1 for the contact life at switching of an inductive load. When a DC inductive load is switched by the output contact, a commutating diode should be connected in parallel with this load and the current voltage 30VDC or less.

(6) Open-circuit leakage current

As there are no leakage currents when the output contact turns off, a neon bulb or the like can be driven.

(7) Relay output contact life

The standard life of the contact for an inductive AC load such as a contactor or electromagnetic valve is 500,000,000 times at 35VA. Table 8.4.1 indicates the guidelines for relay lives in accordance with our life tests.

Testing condition: 1 second ON/1 second OFF

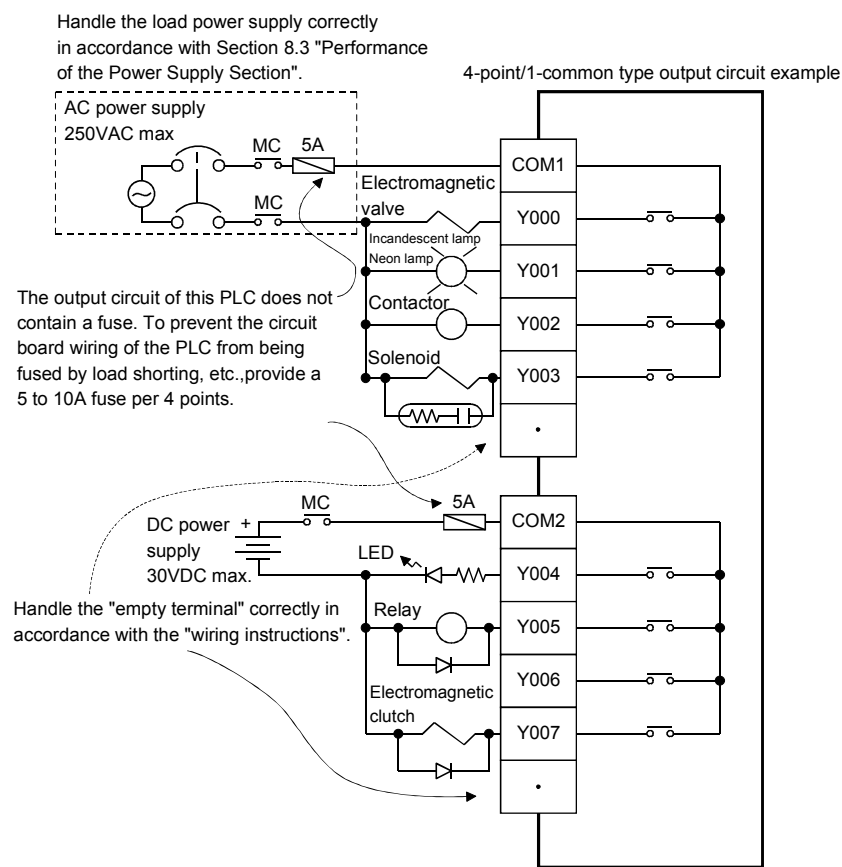
## 8. SPECIFICATIONS AND WIRING OF THE I/O BLOCKS

MELSEC-A

Load Capacity		Contact Life	Applied Load Example (Our Electromagnetic Switch)
35VA	0.35A/100VAC	3 million times	S-K10 to S-K150, S-N10 to S-N35
	0.17A/200VAC		
80VA	0.8A/100VAC	1 million times	S-K180 to S-K400
	0.4A/200VAC		
120VA	1.2A/100VAC	0.2 million times	S-K600, S-K800
	0.6A/200VAC		

Note that if inrush overcurrent is shut off under the above condition, the relay contact life will be remarkably reduced.

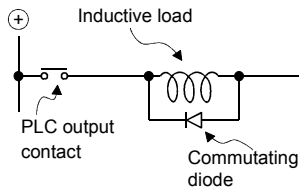
### 8.4.2 Output connection example





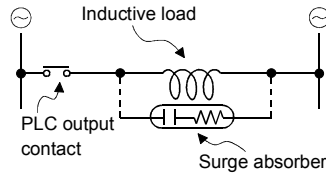
## 8.4.3 Output circuit structure

DC load



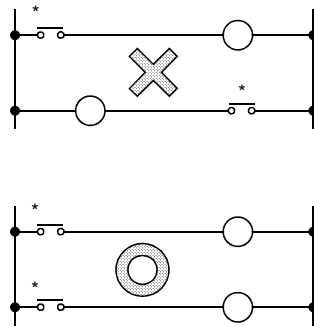
Connect a commutating diode in parallel with the DC inductive load. Without this diode, the contact life will be reduced remarkably. The commutating diode selected should be the one whose inverse dielectric withstand voltage is 5 to 10 times greater than the load voltage and whose forward current is equal to or higher than the load current.

AC load



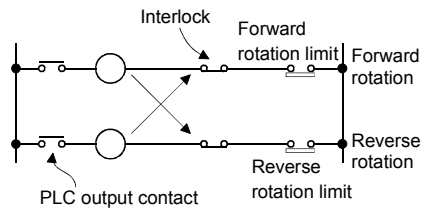
Noise reduces if a surge absorber is provided in parallel with the AC inductive load.

Use in the same phase



It is recommended to use the output contacts (\*) of the PLC in the same phase.

Interlock



Forward rotation Reverse rotation  
Forward rotation limit Reverse rotation limit  
Loads such as forward and reverse rotation contactors, which will cause hazardous conditions if they are switched on at the same time, must be interlocked in the program in the PLC and also be interlocked outside the PLC.

### 8.5 Handling of the Triac Output Circuit

#### 8.5.1 Triac output circuit

(1) Output terminals

The triac output type is a 4- or 8-points/1-common type.

Different common blocks (1 point increments for the separated common type) can drive loads in different circuit voltage systems (for example, 100VAC, 200VAC).

(2) Circuit isolation

The PLC internal circuit and output devices (triacs) are isolated by photothyristors. The common blocks are also separated each other.

(3) Operation indication

When the photothyristor is driven, the LED is lit and the output triac switches on.

(4) Response time

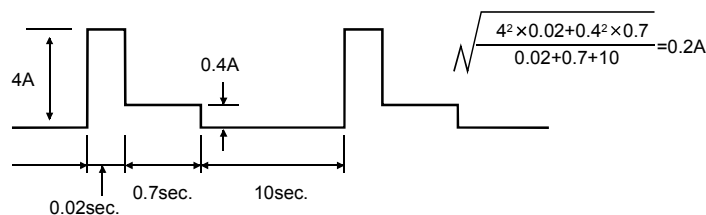
The time from when the photothyristor is driven (or shut off) to when the output triac switches on is 1ms max., and the time from when the photothyristor is shut off to when the triac switches off is 10ms max.

(5) Output current

0.3A current can flow per output point. However, the current used should be 0.8A per 4 points (0.2A per point on average) to limit temperature rise.

When switching a load of large inrush current on/off frequently, mean square current should be 0.2A max.

<Example>



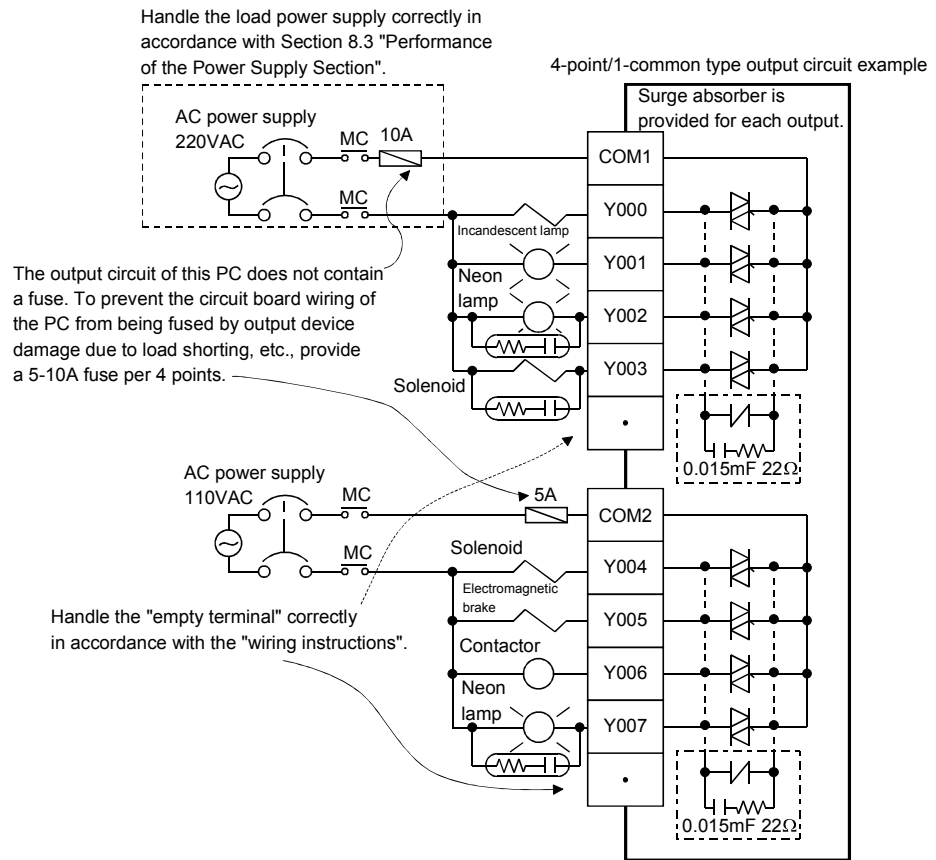
(6) Open-circuit leakage current

C-R absorbers for turn-off are connected in parallel with the triac output terminals of this PLC. Hence, leakage current of 1mA/100VAC or 2mA/200VAC flows when the circuit opens.

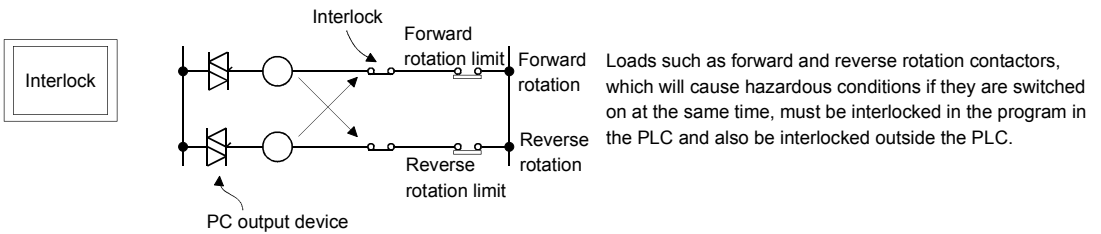
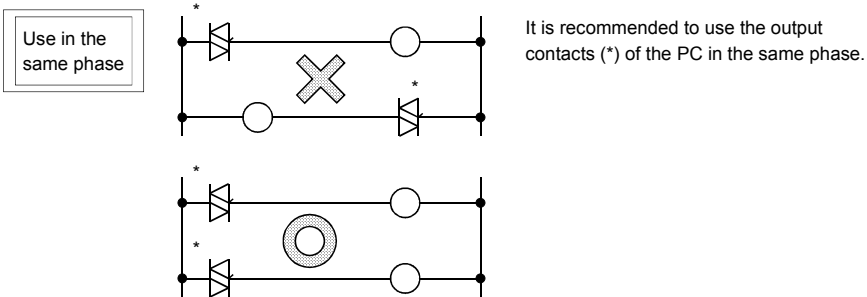
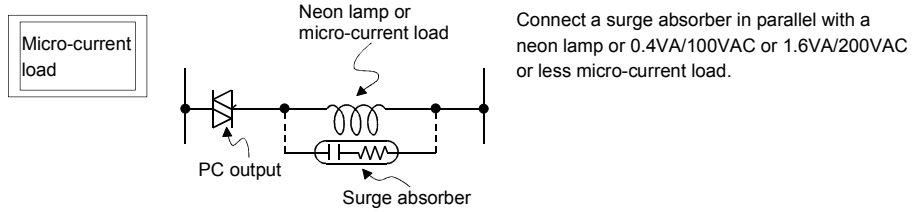
Thus, as the triac output type has open-circuit leakage current unlike the relay output type, note that the operation of a small relay or micro-current load low in rated operating current may be held even if the triac output turns off.

Therefore, loads should be at least 0.4VA/100VAC or 1.6VA/20VAC and surge absorbers given on the next page should be connected in parallel with any loads and neon lamps lower than these values.

## 8.5.2 Output connection example



## 8.5.3 Output circuit structure

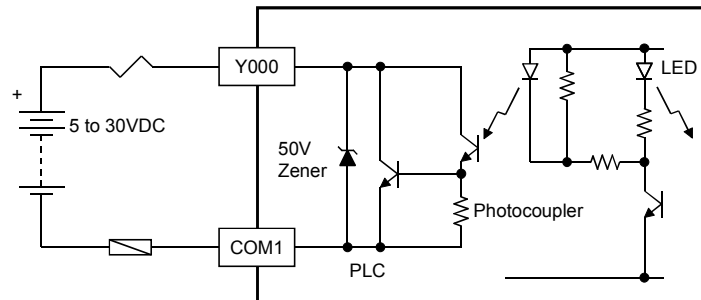


## 8.6 Handling of the Transistor Output Circuit

### 8.6.1 Transistor output circuit

(1) Output terminals

The transistor output type is a 4-, 8- or 16-points/1-common output type. Use a 5 to 30VDC smoothing power supply as a load driving power supply.



(2) Circuit isolation

The PLC internal circuit and output transistors are optically isolated by photocouplers. The common blocks are also separated each other.

(3) Operation indication

When the photocoupler is driven, the LED is lit and the output transistor switches on.

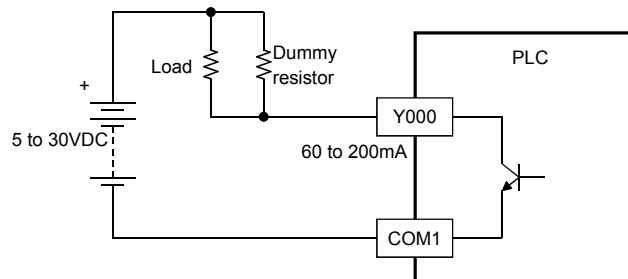
(4) Response time

The time from when the photocoupler is driven (or shut off) by the PLC to when the transistor switches on (or off) is 0.2ms max.

Note that the OFF time of the transistor is longer under lighter load.

For example, the response time is 0.5ms under a 24VDC 60mA load.

When a high response level is needed under light load, provide a dummy resistor to increase current.



(5) Output current

0.5A current can flow per output point.

However, the current used should be 0.8A per 4 points (0.2A per point on average) to limit temperature rise.

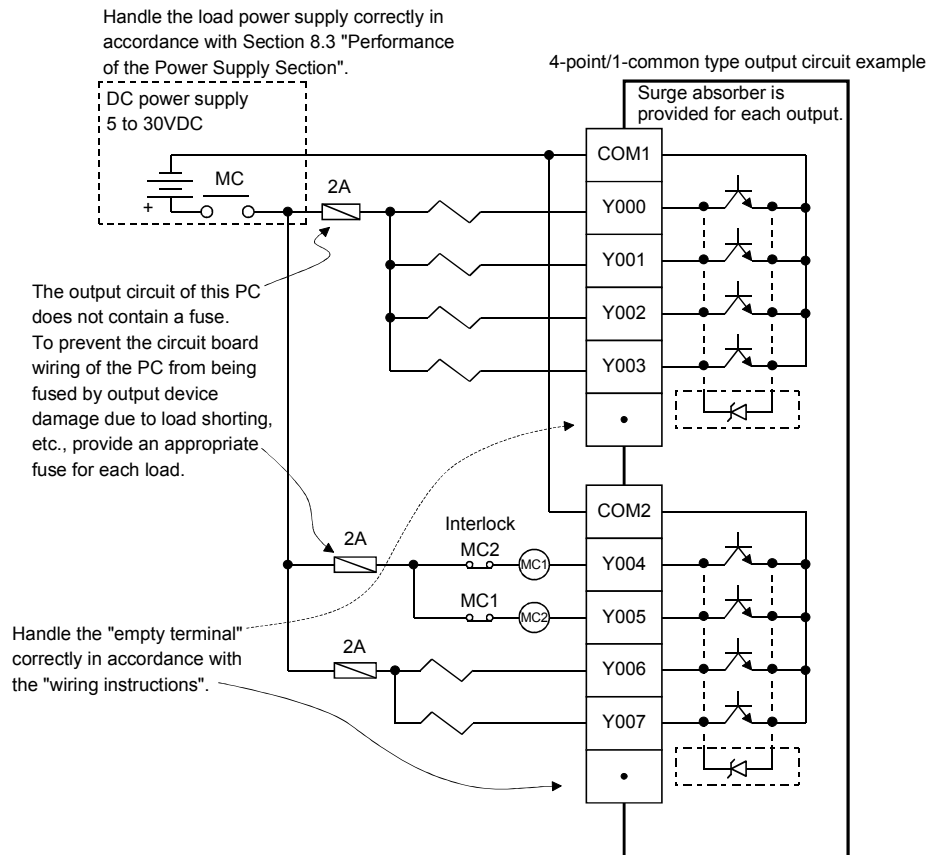
The ON voltage of the output transistor is approx. 1.5V.

Therefore, when driving a semiconductor device, etc., note the input voltage characteristic of the device used.

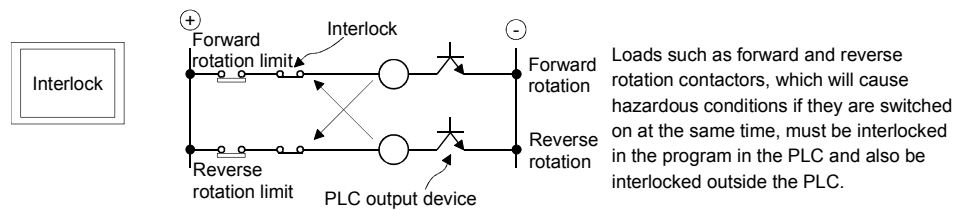
(6) Open-circuit leakage current

0.1mA max.

## 8.6.2 Output connection example



## 8.6.3 Output circuit structure



## 8.7 Power Supply Specifications of the Extension Module

Table 8.9 lists the power supply specifications of the extension module.

**Table 8.4 Power Supply Specification List of the Extension Module**

Item		Specifications	
Type		FX2N-32E	FX2N-48E
Rated voltage		100-240VAC	
Permissible voltage range		85-264VAC	
Input frequency		50/60Hz ±3Hz	
Input apparent power		100VA	
Permissible instantaneous power failure time		Within 10ms	
Power fuse		250V 3.15A(3A) 5φ × 20mm	250V 5A 5φ × 20mm
Power consumption (VA)		35	45
Inrush current		Max. 40A 5ms/100VAC Max. 60A 5ms/200VAC	
Sensor power supply	Without extension block	24VDC 250mA max.	24VDC 460mA max.
	With extension block	Refer to Sections 2.2.2 and 2.2.3.	

**APPENDIX**

**Appendix 1 General Specifications**

Table 1.1 lists the general specifications of the A1FXCPU used independently, and Table 1.2 lists those of the A1FXCPU used with the FX series.

**Table 1.1 General Specifications (of the A1FXCPU Used Independently)**

Item	Specifications					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-20 to 75°C					
Operating ambient humidity	10 to 90%RH, non-condensing					
Storage ambient humidity	10 to 90%RH, non-condensing					
Vibration resistance	Conforms to JIS B 3502 and IEC 1131-2	In case of intermittent vibration	Frequency	Acceleration	Amplitude	Sweep Count
			10 to 57Hz	—	0.075mm	10 times in each of X, Y and Z directions
		In case of continuous vibration	57 to 150Hz	9.8m/s <sup>2</sup>	—	
			10 to 57Hz	—	0.035mm	—
Shock resistance	Conforms to JIS B 3502 and IEC 1131-2 (147m/s <sup>2</sup> , 3 times in each of X, Y and Z directions)					
Operating atmosphere	No corrosive gas					
Operating altitude	2000m(6557.38feet) max.					
Installation site	Inside control box					
Overvoltage category*1	II or less					
Contamination level*2	2 or less					
Noise durability	By noise simulator of 1,500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency.					
Dielectric withstand voltage	1,500VAC for 1 minute across AC external terminals and ground 500VAC for 1 minute across DC external terminals and ground.					
Insulation resistance	10MΩ or larger for 1 minute by 500VDC insulation resistance tester across AC external terminals and ground					
Grounding	Protective ground conductor with class D (class-3)					

\*1: Indicates the element in the distribution system between the public electricity grid and the mechanical equipment inside the premises that the relevant device is assumed to be connected to.

CategoryII applies to devices such as those that draw their power supply from fixed installations.

The surge voltage withstand capability of devices with ratings up to 300V is 2,500V.

\*2: This index gives a measure of the incidence of conductive materials in the environment in which the device is used.

A contamination level of 2 indicates an environment in which there is only contamination by non-conducting materials, but due to occasional condensation, conductivity may occur.



The specifications in the following table apply when the A1FXCPU is used with the FX series.

However, when the A1FXCPU is mounted on an enclosure, the vibration resistance should be as in the A1FXCPU range (Table 1.1).

When the A1FXCPU is mounted on the DIN rail, the vibration resistance should be as in the FX series range (Table 1.2).

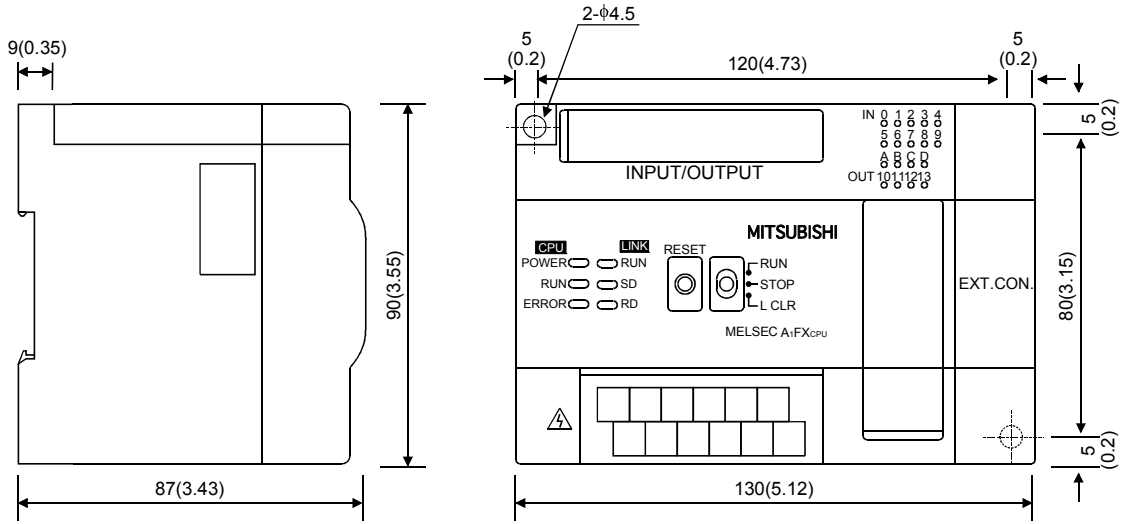
**Table 1.2 General Specifications (of the A1FXCPU Used with the FX Series)**

Item	Specifications	
Ambient temperature	0 to 55°C…Operating, -20 to 70°C … Storage	
Relative humidity	35 to 85%RH (non-condensing) … Operating	
Vibration resistance	Conforms to JIS C 0911. 10 to 55Hz, 0.5mm (max. 2G) <sup>*1</sup> , in each of three axial directions for 2 hours	
Shock resistance	Conforms to JIS C 0912. 10G, 3 times in each of three axial directions.	
Noise durability	By noise simulator of 1,000Vp-p noise voltage, 1μs noise width and 30 to 100Hz noise frequency.	
Dielectric withstand voltage	1,500VAC for 1 minute	Across all terminals and ground
Insulation resistance	5MΩ or larger by 500VDC insulation resistance tester	
Grounding	Protective ground conductor with class D (class-3) (no joint grounding with power control system)	
Operating atmosphere	No corrosive and combustible gases and little conductive dirt and dust	

\*1: 0.5G when mounted to DIN rail

Appendix 2 Outline Dimension Drawings

Appendix 2.1 A1FXCPU module



Unit:mm(inch)

**Appendix 3 Transportation Precautions**

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

**Appendix 3.1 Controlled Models**

The batteries for the A1FXCPU are classified as follows:

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

**Appendix 3.2 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.

#### Appendix 4 Handling of Batteries and Devices with Built-in Batteries in EU Member States

This section describes the precautions for disposing of waste batteries in EU member states and exporting batteries and/or devices with built-in batteries to EU member states.

##### Appendix 4.1 Disposal precautions

In EU member states, there is a separate collection system for waste batteries. Dispose of batteries properly at the local community waste collection/recycling center.

The following symbol is printed on the batteries and packaging of batteries and devices with built-in batteries used for Mitsubishi programmable controllers.



Note: This symbol is for EU member states only.

The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20 "Information for end-users" and Annex II.

The symbol indicates that batteries need to be disposed of separately from other wastes.

**Appendix 4.2 Exportation precautions**

The new EU Battery Directive (2006/66/EC) requires the following when marketing or exporting batteries and/or devices with built-in batteries to EU member states.

- To print the symbol on batteries, devices, or their packaging
- To explain the symbol in the manuals of the products

(1) Labelling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states on September 26, 2008 or later, print the symbol shown on the previous page on the batteries, devices, or their packaging.

(2) Explaining the symbol in the manuals

To export devices incorporating Mitsubishi programmable controller to EU member states on September 26, 2008 or later, provide the latest manuals that include the explanation of the symbol.

If no Mitsubishi manuals or any old manuals without the explanation of the symbol are provided, separately attach an explanatory note regarding the symbol to each manual of the devices.

<b>POINT</b>	
	The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive (2006/66/EC).

# WARRANTY

Please confirm the following product warranty details before using this product.

## 1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

### [Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

### [Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
  1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
  2. Failure caused by unapproved modifications, etc., to the product by the user.
  3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
  4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
  5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
  6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
  7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

## 2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

## 3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

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

## 6. Product application

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

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.



# Type A1FXCPU Module

## User's Manual (Setup)

MODEL	A1FXCPU-U-E-SETUP
MODEL CODE	13JL57
IB(NA)-66839-E(0810)MEE	

 **MITSUBISHI ELECTRIC CORPORATION**

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN  
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.