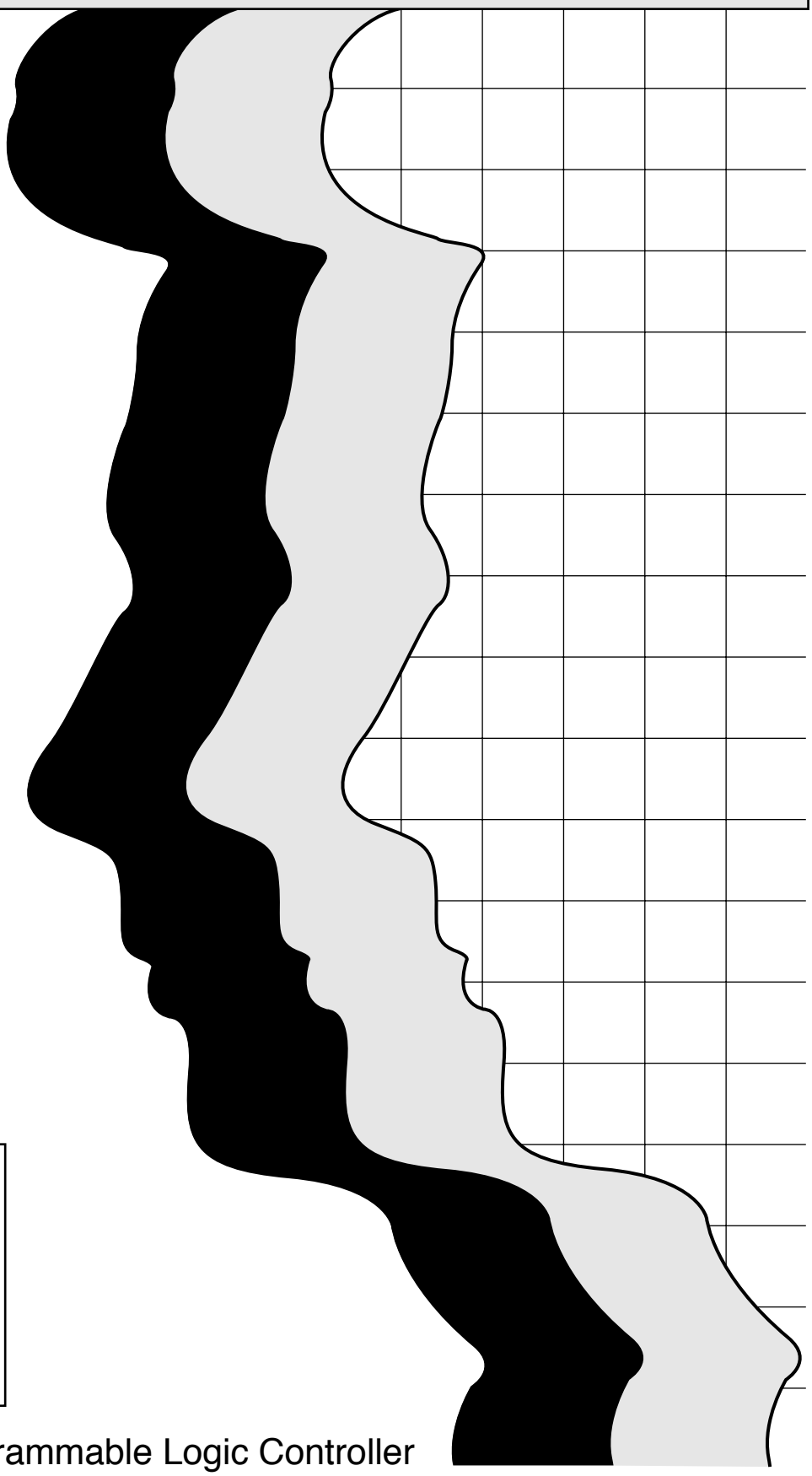
MITSUBISHI

Type A1SJH(S8)/A1SH/A2SHCPU (S1)

User's Manual



MELSEC

Mitsubishi Programmable Logic Controller

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results. In any case, it is important to follow the directions for usage.

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

[DESIGN PRECAUTIONS]

⚠ DANGER

● Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC module. Otherwise, trouble could result from erroneous output or erroneous operation.

(1) Outside the PLC, construct mechanical damage preventing interlock circuits such as emergency stop, protective circuits, positioning upper and lower limits switches and interlocking forward/reverse operations.

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

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

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

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

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

[DESIGN PRECAUTIONS]

⚠ DANGER

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

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

- When a data link results in a communication error, the faulty station changes in operating status depending on the used data link type.
  (1) For the data link data, the data prior to the communication error will be held.
  (2) The MELSECNET (II,/B,/10) remote I/O station will turn all output off.
  (3) The MELSECNET/MINI-S3 remote I/O station will hold the output or turn all output off depending on the E.C. remote setting.
  Refer to the data link manuals regarding the method for setting the communication problem station and the operation status when there are communication problem.

- When connecting a peripheral device to the CPU module or connecting a personal computer or the like to the intelligent function module to exercise control (data change) on the running PLC, configure up an interlock circuit in the sequence program to ensure that the whole system will always operate safely.
  Also before exercising other control (program change, operating status change (status control)) on the running PLC, read the manual carefully and fully confirm safety.
  Especially for the above control on the remote PLC from an external device, an immediate action may not be taken for PLC trouble due to a data communication fault.
  In addition to configuring up the interlock circuit in the sequence program, corrective and other actions to be taken as a system for the occurrence of a data communication fault should be predetermined between the external device and PLC CPU.

- When configuring a system, do not leave any slots vacant on the base. Should there be any vacant slots, always use a blank cover (A1SG60) or dummy module (A1SG62).
  When the extension base A1S52B, A1S55B or A1S58B is used, attach the dustproof cover supplied with the product to the module installed in slot 0.
  If the cover is not attached, the module's internal parts may be dispersed when a short-circuit test is performed or overcurrent/overvoltage is accidentally applied to the external I/O area.

[DESIGN PRECAUTIONS]

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.

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

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.

- Hold down the module loading lever at the module bottom, and securely insert the module fixing latch into the fixing hole in the base unit.
  Incorrect loading of the module can cause a malfunction, failure or drop.
  When using the PLC in the environment of much vibration, tighten the module with a screw. Tighten the screw in the specified torque range. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.

- When installing extension cables, be sure that the connectors of base unit are installed correctly. After installation, check them for looseness. Poor connections could cause an input or output failure.

- Correctly connect the memory cassette installation connector to the memory cassette. After installation, be sure that the connection is not loose. A poor connection could cause an operation failure.

- Completely turn off the external power supply before loading or unloading the module. Not doing so could result in electric shock or damage to the product.

- Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.

[WIRING PRECAUTIONS]

⚠ DANGER

- Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product.

- When turning on the power supply or operating the module after installation or wiring work, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

⚠ CAUTION

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

- When wiring in the PLC, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.

- Do not connect multiple power supply modules in parallel.
  Doing so could cause overheating, fire or damage to the power supply module.

- External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fires, or erroneous operation.

- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation. Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.

- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.

- The module has an ingress prevention label on its top to prevent foreign matter, such as wire offcuts, from entering the module during wiring.
  Do not peel this label during wiring.
  Before starting system operation, be sure to peel this label because of heat dissipation.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ DANGER

- Do not touch the terminals while power is on.
  Doing so could cause shock or erroneous operation.

- Correctly connect the battery.
  Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery.
  Mishandling of battery can cause overheating or cracks which could result in injury and fires.

- Switch all phases of the external power supply off when cleaning the module or retightening the terminal or module mounting screws. Not doing so could result in electric shock.
  Undertightening of terminal screws can cause a short circuit or malfunction. Overtightening of screws can cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.

⚠ DANGER

- The online operations conducted for the CPU module being operated, connecting the peripheral device (especially, when changing data or operation status), shall be conducted after the manual has been carefully read and a sufficient check of safety has been conducted.
  Operation mistakes could cause damage or problems with of the module.

- Do not disassemble or modify the modules.
  Doing so could cause trouble, erroneous operation, injury, or fire.

- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm (9.85 inch) away from the PLC.
  Not doing so can cause a malfunction.

- Switch all phases of the external power supply off before mounting or removing the module.
  If you do not switch off the external power supply, it will cause failure or malfunction of the module.

- Do not drop or give an impact to the battery installed in the module.
  Otherwise the battery will be broken, possibly causing internal leakage of electrolyte.
  Do not use but dispose of the battery if it has fallen or an impact is given to it.

- Always make sure to touch the grounded metal to discharge the electricity charged in the electricity charged in the body, etc., before touching the module.
  Failure to do say cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

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

[TRANSPORTATION PRECAUTIONS]

⚠ CAUTION
● When transporting lithium batteries, make sure to treat them based on the transport regulations. (Refer to Appendix 5 for details of the controlled models.)

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
May., 1997	IB (NA) 66779-A	First edition
Nov., 1997	IB (NA) 66779-B	Correction Contents, Related manuals, Section 1.1, Section 2.1.1, 2.1.2, Section 2.2, 2.3, Chapter 3, Section 4.1.6, Section 5.1, 5.2, Section 6.1.2, Section 8.7.1, 8.7.2, Section 9.1.3, Section 11.3.1, Appendix 1, 1.1, Appendix 3.1, 3.2, Appendix 5.
Apr., 1998	IB (NA) 66779-C	Correction SAFETY PRECAUTIONS, Contents, Section 1.1, Section 2.2, 2.3, Section 4.1, 4.1.7, 4.1.8, 4.1.9, 4.4.3, Section 6.1.3, Section 7.1.4, Section 8.7.1, Section 9.2.1, 9.2.2, Section 11.3.1, Appendix 1, 1.1, Appendix 3.1, 3.2, 3.3.3.
Aug., 1998	IB (NA) 66779-D	Correction Section 2.2.1, 2.3, Section 4.1, Section 9.1.2.7, 9.1.2.9 Section 11.2.4 Appendix 2.2, 3.3.5
Nov., 1998	IB (NA) 66779-E	Addition of module A1SJHCPU-S8
Dec., 2002	IB (NA) 66779-F	Equivalent to the Japanese version F Correction SAFETY PRECAUTIONS, Section 1.1, 1.2, Section 2.1.1, 2.1.2, 2.2.1, 2.2.2, 2.3, Chapter 3, Section 4.1.1, 4.1.7, Section 5.1, 5.2, Section 6.1.3, Section 7.1.1, Section 9.1.4, Chapter 10, Section 11.1.3, Appendix 2.1, 2.2, Appendix 4
Dec., 2003	IB (NA) 66779-G	Addition of module A1SY42P Correction Section 2.2.1, 2.3, Section 7.1.1, 7.1.4, 7.2.1, Section 8.4.1, 8.8, Section 9.1.4, Section 11.3.1, Appendix 2.1 Addition Appendix 5

Japanese Manual Version SH (NA) 3635-G

INTRODUCTION

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

Contents

About This Manual

The following table lists manuals regarding this product.

Related Manuals

Manual Name	Manual No (Model Code)
ACPU Programming Manual (Fundamentals) Describes programming methods necessary for creating programs,, device names parameters,, program types,, memory area configuration,, and so on (Sold separately)	IB-66249 (13J740)
ACPU Programming Manual (Common Instructions) Describes how to use the sequence instruction,, basic instructions, applied instructions and microcomputer programs. (Sold separately)	IB-66250 (13J741)
AnSHCPU/AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (Dedicated Instructions) Describes instructions that have been expanded for AnSHCPU. (Sold separately)	IB-66251 (13J742)
AnS Module type I/O User's Manual Describes the specification of the compact building block type I/O module. (Sold separately)	IB-66541 (13JE81)

MEMO

1. OVERVIEW

1.1 Overview

This user's manual describes the functions, specification, and handling of the A1SJHCPU general purpose PLC (abbreviated as A1SJHCPU from here on), A1SJHCPU-S8 general purpose PLC (abbreviated as A1SJHCPU-S8), A1SHCPU general purpose PLC (abbreviated as A1SHCPU), A2SHCPU general purpose PLC (abbreviated as A2SHCPU), and A2SHCPU-S1 general purpose PLC (abbreviated as A2SHCPU-S1).

A1SHCPU, A1SJHCPU and A1SJHCPU-S8 are grouped as A1SHCPU, unless there is necessity to identify each model.

Also, A1SHCPU, A2SHCPU and A2SHCPU-S1 are grouped as AnSHCPU, unless there is necessity to identify each model.

The AnSHCPU is a compact-type building block PLC. The model is one third the size of the conventional building block type PLC, and allows easy operation in spite of its small size.

AnSHCPUs are miniature building block programmable controllers, which have been downsized to occupy one third of the volume of conventional building block type programmable controllers, and are designed to be easy to use in spite of their small size.

Sequence programs that have been created for the existing A0J2CPU, A0J2HCPU and A[ ]NCPU models can be used by changing the CPU module type specification for the program. Moreover, since modules for use with A[ ]NCPU can be used by installing them on an extension base unit for A[ ]NCPU use, it is possible to extend the functions of an AnSCPU.

The AnSCPU has functions equivalent to those of the A2NCPU and we urge you to make the best use of these functions in order to use the equipment efficiently.

This user's manual refers to peripheral devices by using the following abbreviations.

A7PHP, A7HGP, A6GPP, A6PHP, and IBM PC/AT
(started up with SW3IVD-GPPA, MELSEC MEDOC, MELSEC MEDOC plus)
.....Abbreviated as "GPP function".
A7PUS, A8PUE .....Abbreviated as "PU".

1.2 Features

(1) High-speed operation processing speed

Compared to the conventional A1SCPU, the A1SHCPU is three times and A2SHCPU (-S1) is four times faster in the operation processing speed, respectively.

Item	A1SHCPU	A2SHCPU(-S1)	A1SCPU
Operation processing speed *1	0.33 μs	0.25 μs	1 μs

*1 I/O processing : Refresh and LD instruction

(2) Addition of new dedicated instructions

The CC-Link dedicated instructions (8 instructions) have been added, making the operation even easier.

(3) Increased number of I/O device points

The actual number of I/O points is the same as the AnS series, but each CPU has 2048 points (X/Y0 to 7FF) of I/O devices.
The added I/O device can be used as the MELSECNET (/B), MELSECNET/MINI-S3, or CC-Link.

(4) Increased file register R capacity

The capacity is now max. 8192 points (R0 to 8191), which doubled the AnS series' 4096 points (R0 to 4095).

(5) Increased memory capacity (Increased number of comment points)

The A1SHCPU has 64 k bytes, which doubled the A1SCPU's 32 k bytes.
This increased the number of comment points stored in the CPU module 3648 in comparison to the 1600 points in A1SCPU.

(6) Full compatibility with A1S(S1)/A2SCPU(S1)

Because there is full compatibility of the functions and instructions with A1S(S1)/A2SCPU(S1), all software packages can be used.
In addition, power supply module, base unit, and I/O modules can be used.

(7) Compact size

The outside dimensions of the AnSHCPU system with one power supply module, one CPU, and eight 16-point I/O modules for use with AnS mounted to the main base unit are:
430 mm (16.9 in.) (W); 130 mm (5.12 in.) (H); and 110 mm (4.33 in.) (D).

(8) Max. 8 k/14 k steps of program

An AnSCPU allows the creation of a program of up to 8 k (A1SCPU(S1)/ A1SCPUC24-R2)/ 14 k (A2SCPU(S1)) steps containing up to 26 sequence instructions, 131 basic instructions, 106 application instructions, and 8 CC-Link dedicated instructions.

In addition, microcomputer programs and utility programs created by the user can be used.

(9) SFC language compatible

An AnSCPU contains a microcomputer program area, so it can use an SFC program by using the software on an IBM personal computer.

(10) Two extension connectors, on the right and left sides.
(A1SJHCPU(S8) on the right side only)

In order to facilitate wiring wherever the extension base unit is installed, extension connectors are provided at both left and right sides of the AnSHCPU and extension cables that suit the requirements imposed by different mounting locations are available.

(11) Use either screws or DIN rail for panel installations

The AnS base unit is provided both with screw holes and, on its rear face, the fixture for mounting it to a DIN rail.

(12) Easy-to-see terminal block symbol sheet

- A terminal block symbol sheet is attached to the front of AnS I/O modules.

It is possible to write I/O device numbers, connector numbers, etc. on one side of the sheet.

- Terminal symbols for 16 I/O signals can be written on the other side.

(13) A[ ]N, A[ ]A-series I/O module and special function module compatible

By connecting an A[ ]N, A[ ]A-series extension base unit, A[ ]N, A[ ]A I/O modules or special function modules can be used.

(14) Same programming environment as other MELSEC-A CPU modules

A sequence program can be created using the peripheral device currently used for other MELSEC-A CPU modules.

For details on the applicable peripheral devices, see Section 2.2 "Cautions on System Configuration".

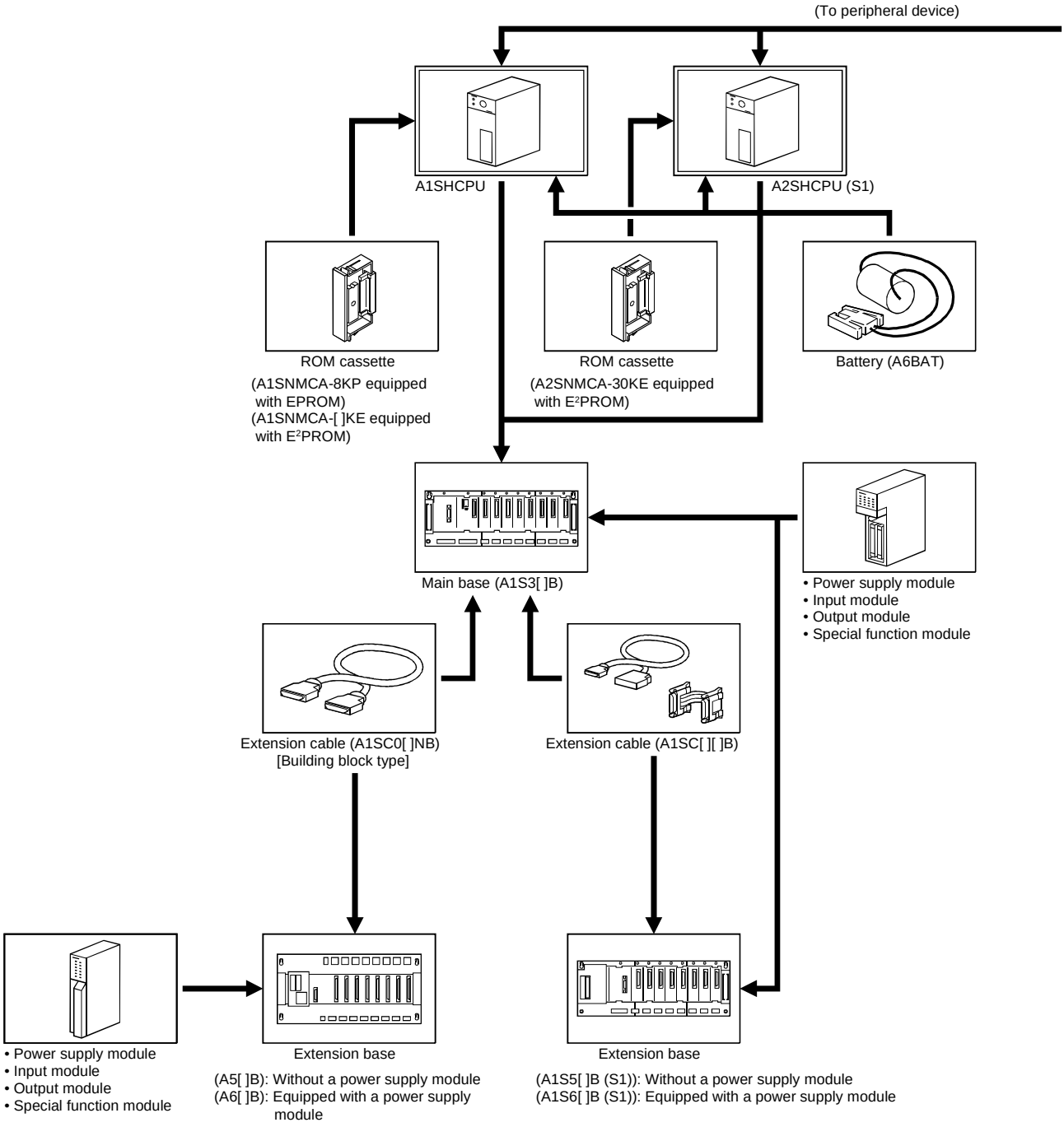
2. SYSTEM CONFIGURATION

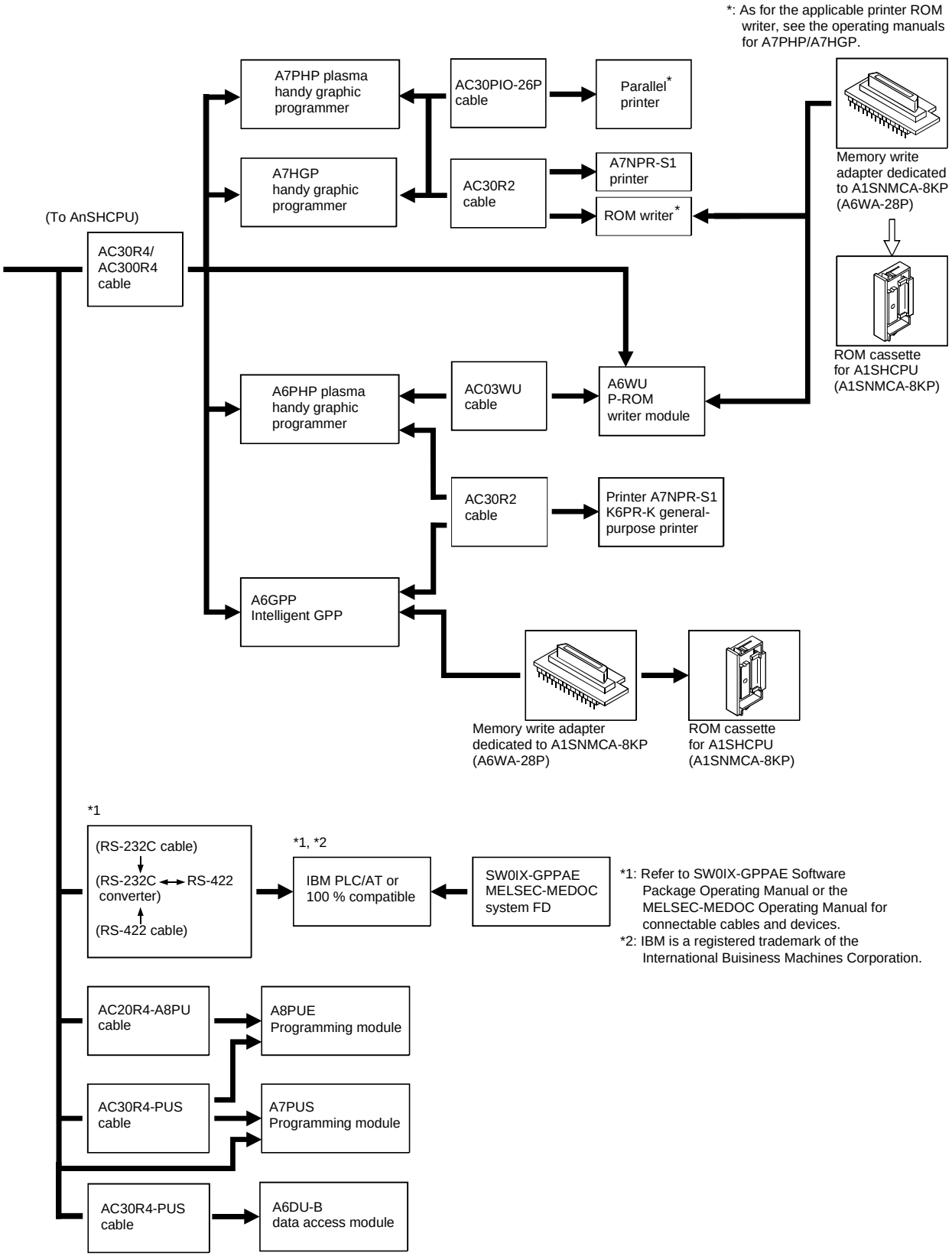
This chapter describes the applicable system configurations, cautions on configuring a system, and component devices of the AnSHCPU.

2.1 Overall Configuration

2.1.1 Total configuration of AnSHCPU

The figure below shows a system configuration when the AnSHCPU is used independently.



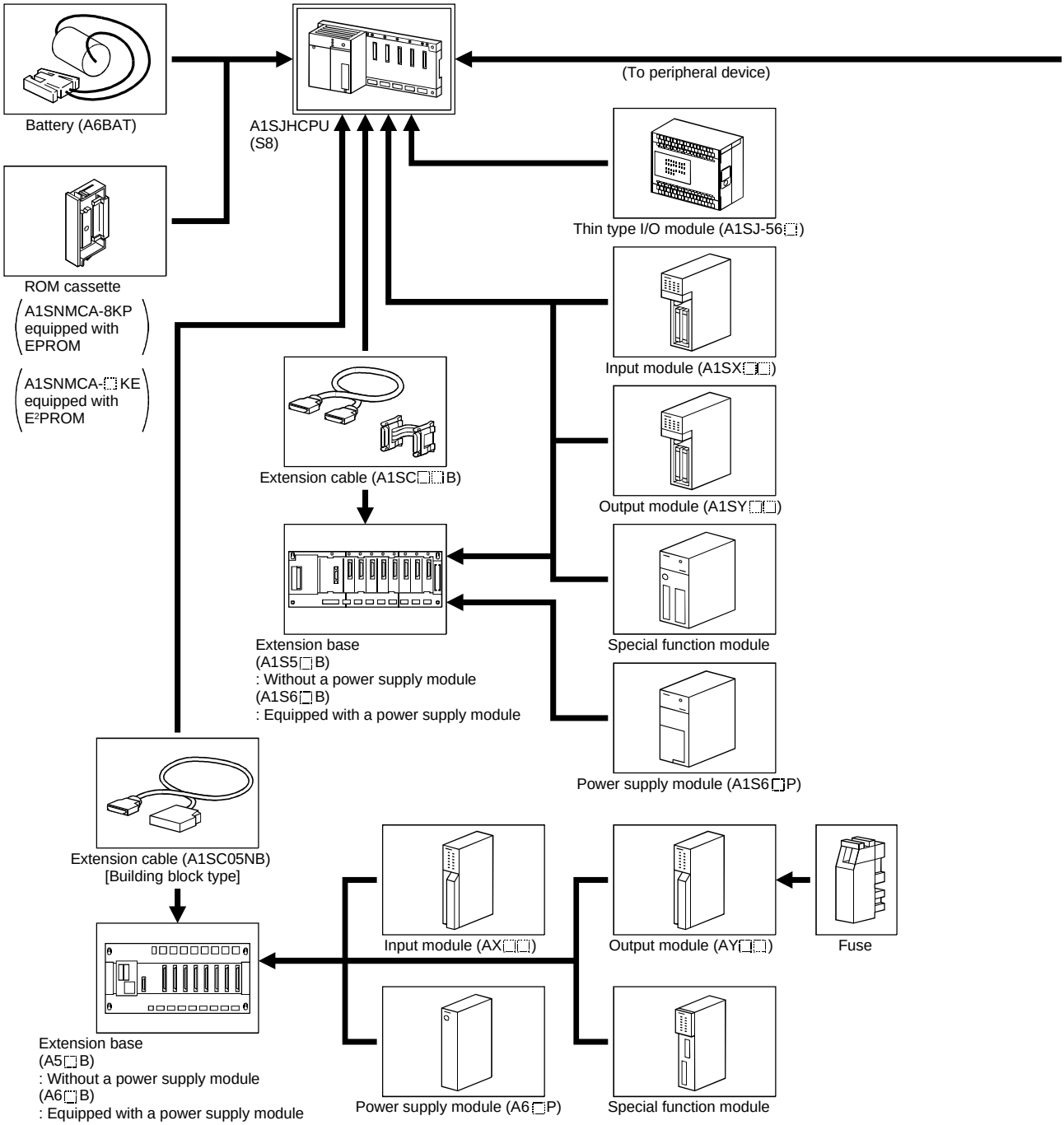


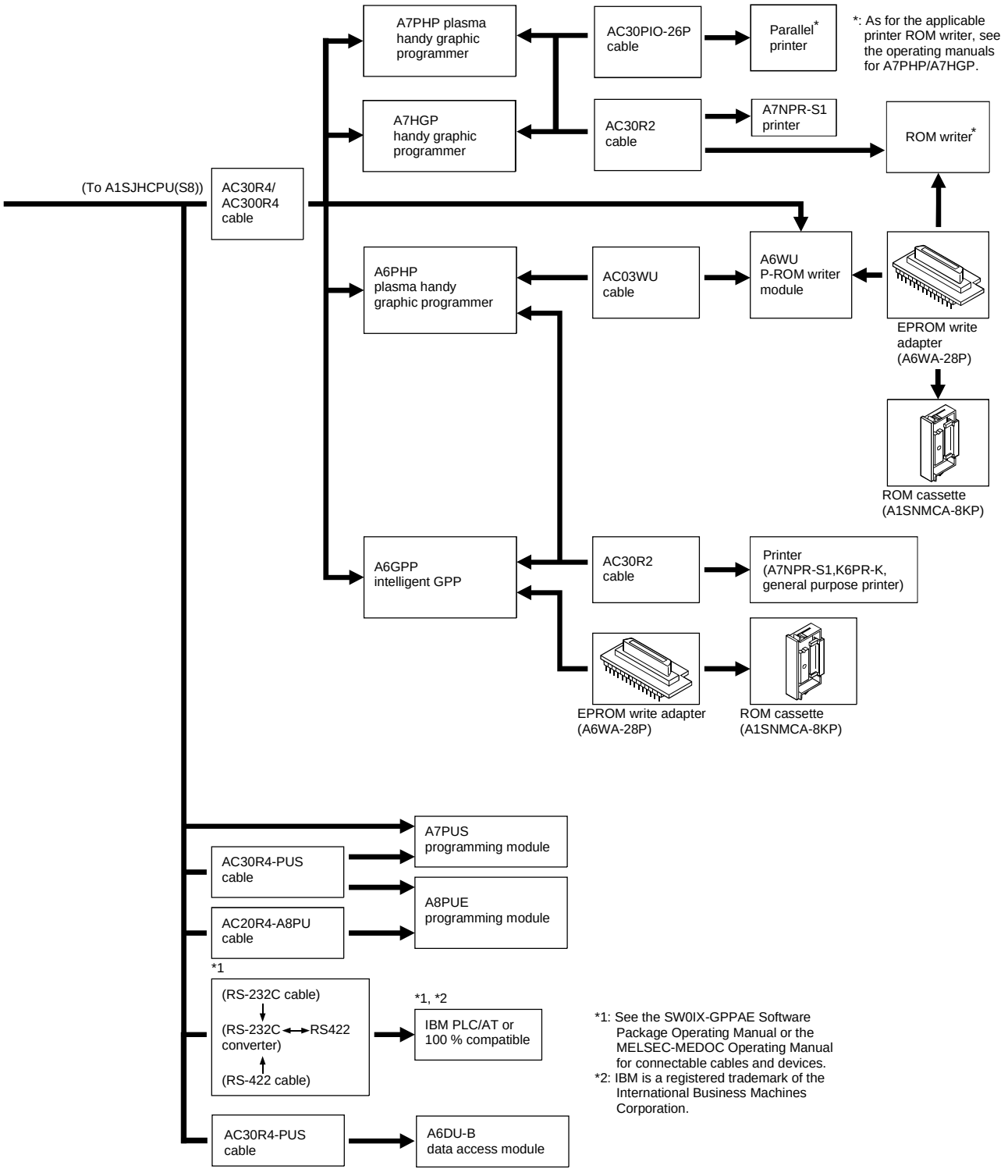
POINT

For applicable printers, cables, and ROM writers, see the operating manual for each peripheral device used.

2.1.2 Total configuration of A1SJHCPU(S8)

The figure below shows a system configuration and peripheral device configuration when the A1SJHCPU(S8) is used independently.




A7PHP plasma handy graphic programmer
AC30PIO-26P cable
Parallel* printer
*: As for the applicable printer ROM writer, see the operating manuals for A7PHP/A7HGP.
A7HGP handy graphic programmer
AC30R2 cable
A7NPR-S1 printer
ROM writer*
(To A1SJHCPU(S8))
AC30R4/ AC300R4 cable
A6PHP plasma handy graphic programmer
AC03WU cable
A6WU P-ROM writer module
EPROM write adapter (A6WA-28P)
ROM cassette (A1SNMCA-8KP)
A6GPP intelligent GPP
AC30R2 cable
Printer (A7NPR-S1,K6PR-K, general purpose printer)
EPROM write adapter (A6WA-28P)
ROM cassette (A1SNMCA-8KP)
A7PUS programming module
AC30R4-PUS cable
A8PUE programming module
AC20R4-A8PU cable
*1
(RS-232C cable)
(RS-232C ↔ RS422 converter)
(RS-422 cable)
*1, *2
IBM PLC/AT or 100 % compatible
AC30R4-PUS cable
A6DU-B data access module
*1: See the SW0IX-GPPAE Software Package Operating Manual or the MELSEC-MEDOC Operating Manual for connectable cables and devices.
*2: IBM is a registered trademark of the International Business Machines Corporation.

2.2 Cautions on Configuring a System

This section describes the hardware and software that can be used with the AnSHCPU.

2.2.1 Hardware

(1) I/O module

An A[ ]N or A[ ]A building-block type I/O module can be used by loading it to the A5[ ]B/A6[ ]B extension base.

(2) Special function module

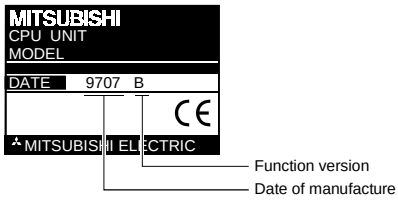
(a) An A[ ]N or A[ ]A special function module can be used by loading it to the A5[ ]B/A6[ ]B extension base.

(b) Limits are imposed on the number of the following special function modules that can be loaded.

AD51H-S3 AJ71UC24 AJ71E71N-B5T AJ71C23-S3 AJ61BT11 (Only when in the intelligent mode)	AJ71C22-S1 AJ71E71N-B2 AD22-S1	Up to 2
A1SD51S A1SJ61BT11(Only when in the intelligent mode) A1SJ71UC24-R2(PRF/R4) A1SJ71E71N-B2	A1SD21-S1 A1SJ71E71N-B5T	
A985GOT (Only when the bus connection is used.) A975GOT (Only when the bus connection is used.) A970GOT (Only when the bus connection is used.) A960GOT (Only when the bus connection is used.) A956WGOT (Only when the bus connection is used.) A956GOT (Only when the bus connection is used.) A951GOT		
AI61(S1)		Only 1
A1SI61		
AJ71AP21(S3) AJ71AT21B AJ71BR11	AJ71AR21 AJ71LP21(G) AJ71LR21	Only 1
A1SJ71AT21B A1SJ71AP21(S3) A1SJ71LP21	A1SJ71AR21 A1SJ71BR11 A1SJ71LR21	
AJ71PT32-S3 (Only when in the extension mode.) AJ71T32-S3 (Only when in the extension mode.) A1SJ71PT32-S3 (Only when in the extension mode.) A1SJ71T32-S3 (Only when in the extension mode.)		Only one module can be installed.

POINT

When the dedicated instruction for the CC-Link is used, use the master module with ("9707 B" or later), shown right, inscribed in the DATE column of the rated plate.

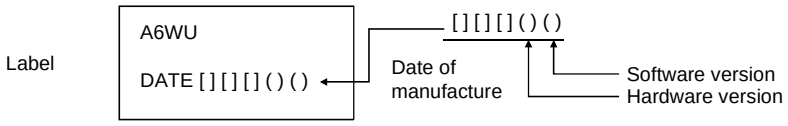


(3) Peripheral device

(a) Points to note when using an A6WU P-ROM writer

1) When using an A1SHCPU

Use an A6WU P-RPM writer module whose software version is "E" or later.



(b) The A6WU P-ROM writer module cannot be installed directly on the AnSHCPU (add-on installation impossible).
Only handheld connection using cables is possible.

(c) Among the programming modules (A7PUS and A8PUE), only the A7PUS can be added on.
The other models (A8PUE) are available only as the handheld installation type which requires cables.

(4) EPROM memory cassette ROM partition

Partitioning the EPROM memory cassette with an A6GPP (SW4GP-GPPA)/A6WU requires a memory write adapter (optional). The valid combinations of memory cassette and memory write adapter are as follows :

CPU model	Memory cassette model		Memory write adapter model
	model	capacity	
A1SHCPU	A1SNMCA-8KP	32k bytes	A6WA-28P
A1SJHCPU(S8), A1SHCPU	A1SMCA-8KP, A1SNMCA-8KP	32k bytes	A6WA-28P

(5) Program write during operation with E^2PROM

(a) When an operation is executed using an E^2PROM, writing is not possible in the RUN status. If writing is attempted in this status, the following messages will be sent to the peripheral devices :

- When the SW3GP-GPPA is used : "PLC COMMUNICATIONS ERROR : ERROR CODE = 19" is displayed.
- When SW0RX-GPPA is used : "PLC COMMUNICATIONS ERROR : ERROR CODE = 19" is displayed.
- When the A7PUS is used : "PLC NOT RESPOND" is displayed.

(b) Programs cannot be written from peripheral devices which are connected to the computer link module or other stations of the MELSECNET.

Write programs from peripheral devices connected to the AnSHCPU's RS-422.

(c) When writing a program to the A1SNMCA-2KE, set the parameter for main sequence program capacity to 2 k steps or less.

Programs written with a main sequence program capacity setting of 3 k steps or over cannot work properly.

Checking between the AnSHCPU and a peripheral device will result in a mismatch.

2.2.2 Software packages

(1) Specifying the system startup software package and startup model

(a) For AnSHCPU, startup with the PLC model "A3."

(b) Perform the PLC type setting as shown below when using conventional peripheral devices.

Peripheral device	Software package	CPU type			Remarks
		A1SJH(S8)/ A1SH	A2SH	A2SH-S1	
IBM PC/AT	SW[ ]IVD-GPPA *	A3 *	A3	A3	
	MELSEC MEDOC				
	MELSEC MEDOC plus				
	GX Developer	A1SJH/A1SH	A2SH	A2SH1	
A6PHP	SW3GP-GPPAEE	A3 *	A3	A3	EPROM write not possible.
	SW4GP-GPPAEE				*
A6GPP	SW3-GPPAEE				EPROM write not possible.
	SW3GP-GPPAEE				
	SW4GP-GPPAEE				*

* Selected model names differ as shown below, depending on the version of the software package:

Type / Model name	For ROM writing			For programming	
	Select "A0J2H"	Select "A1S"	Select "A1SH"	Select "A3"	Select "A1SH"
SW4GP-GPPA	Q or earlier	R or later		All versions	
SW3RXV-GPPA		30D or earlier	40E or later	30D or earlier	40E or later
SW3NX-GPPA		60G or earlier	70H or later	60G or earlier	70H or later
SW3IVD-GPPA		60G or earlier	70H or later	60G or earlier	70H or later

POINT

(1) Take note that old software packages other than the SW3-GPPA, SW3-HGPA, SW3GP-GPPA and SW4GP-GPPA cannot be used for system startup software packages when the A6GPP/A6PHP is used.

(2) Take caution when using a software version that selects "A0J2H" or "A1S" for ROM writing, since the file register area of 8k points is reduced to 4k points.
To measure this, use a software package for which A1SJH/A1SH can be selected.

(2) Utility package

(a) The applicable utility packages are listed below.

- SW0GHP-UTLPC-FN1
- SW0GHP-UTLP-FD1
- SW1GP-AD57P
- SW0GHP-UTLPC-FN0
- SW0-AD57P
- SW0GHP-UTLPC-PID

[1] Select "A3CPU" when an SW0GHP-UTLPC-FN1 or SW0GHP-UTLP-FD1 is started up.

[2] If both an SW1GP-AD57P and another utility package are used in combination, specify "AD57P-COM" as the file name.

(b) The inapplicable utility package model is listed below.

- SW0-SAPA(MELSAP)

2.3 System Equipment

The following table shows the list of modules and devices which can be used for an AnS system.

(1) AnSCPU dedicated modules

Item	Model	Description		Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
					5 V DC	24 V DC		
CPU module	A1SJHCPU	Number of I/O points : 256, memory capacity : 64 k bytes, Number of I/O slots : 5		—	0.30	—	RAM memory embedded	UL/cUL
	A1SJHCPU-S8	Number of I/O points : 256, memory capacity : 64k bytes, Number of I/O slots : 8						
	A1SHCPU	Number of I/O points : 256, memory capacity : 64 k bytes						
	A2SHCPU	Number of I/O points : 512, memory capacity : 64 k bytes		—	0.40		RAM memory embedded	
	A2SHCPU-S1	Number of I/O points : 1024, memory capacity : 192 k bytes						
Power supply module	A1S61PN	5 V DC, 5 A	Input 100/200 V AC	—	—	—	Loaded to the slot for main base or extension base power supply.	
	A1S62PN	5 V DC, 3 A/24 V DC 0.6A						
	A1S63P	5 V DC, 5 A	Input 24 V DC	—	—	—		
Input module	A1SX10	16-point 100 to 120 V AC input module		16 [16 inputs]	0.05	—		UL/cUL
	ASX10EU	16-point 100 to 120 V AC input module		16 [16 inputs]	0.05	—		
	A1SX20	16-point 200 to 240 V AC input module		16 [16 inputs]	0.05	—		
	A1SX20EU	16-point 200 to 240 V AC input module		16 [16 inputs]	0.05	—		
	A1SX30	16-point 12/24 V DC, 12/24 V AC input module		16 [16 inputs]	0.05	—		
	A1SX40	16-point 12/24 VDC input module		16 [16 inputs]	0.05	—		
	A1SX40-S1	16-point 24 V DC input module		16 [16 inputs]	0.05	—		
	A1SX40-S2	16-point 24 V DC input module		16 [16 inputs]	0.05	—		UL/cUL
	A1SX41	32-point 12/24 V DC input module		32 [32 inputs]	0.08	—		
	A1SX41-S1	32-point 24 V DC input module		32 [32 inputs]	0.12	—		
	A1SX41-S2	32-point 24 V DC input module		32 [32 inputs]	0.08	—		
	A1SX42	64-point 12/24 V DC input module		64 [64 inputs]	0.09	—		
	A1SX42-S1	64-point 24 V DC input module		64 [64 inputs]	0.16	—		
	A1SX42-S2	64-point 24 V DC input module		64 [64 inputs]	0.09	—		
	A1SX71	32-point 5/12/24V DC input module		32 [32 inputs]	0.075	—		UL/cUL
	A1SX80	16-point 12/24 V DC sink/source input module		16 [16 inputs]	0.05	—		
	A1SX80-S1	16-point 24 V DC sink/source input module		16 [16 inputs]	0.05	—		
	A1SX80-S2	16-point 24 V DC input module		16 [16 inputs]	0.05	—		
	A1SX81	32-point 12/24 V DC sink/source input module		32 [32 inputs]	0.08	—		
	A1SX81-S2	32-point 24 V DC input module		32 [32 inputs]	0.08	—		
	A1SX82-S1	64-point 24 V DC sink/source input module		64 [64 inputs]	0.16	—		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5/12/24 V DC modules.

Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Output module	A1SY10	16-point relay contact output module (2 A)	16 [16 outputs]	0.12	0.09		UL/cUL
	A1SY10EU	16-point relay contact output module (2 A)	16 [16 outputs]	0.12	0.09		
	A1SY14EU	16-point relay contact output module (2 A)	16 [16 outputs]	0.12	0.1		
	A1SY18A	8-point relay contact output module (2 A) All points independent	16 [16 outputs]	0.24	0.075		
	A1SY18AEU	8-point relay contact output module (2 A) All points independent	16 [16 outputs]	0.24	0.075		
	A1SY22	16-point triac output module (0.6 A)	16 [16 outputs]	0.27	(200 V AC) 0.002		
	A1SY28A	8-point triac output module (1 A) All points independent	16 [16 outputs]	0.13	—		
	A1SY28AEU	8-point triac output module (0.6 A)	16 [16 outputs]	0.27	—		
	A1SY40	16-point 12/24 V DC transistor output module (0.1 A) sink type	16 [16 outputs]	0.27	0.008		
	A1SY41	32-point 12/24 V DC transistor output module (0.1 A) sink type	32 [32 outputs]	0.50	0.008		
	A1SY42	64-point 12/24 V DC transistor output module (0.1 A) sink type	64 [64 outputs]	0.93	0.008		
	A1SY42P	64-point 12/24 V DC transistor output module (0.1 A) sink type	64 [64 outputs]	0.17	0.014		
	A1SY50	16-point 12/24 V DC transistor output module (0.5 A) sink type	16 [16 outputs]	0.12	0.06		
	A1SY60	16-point 24 V DC transistor output module (2 A) sink type	16 [16 outputs]	0.12	0.015		
	A1SY60E	16-point 5/12/24 V DC transistor output module (2 A) source type	16 [16 outputs]	0.20	0.01		
	A1SY68A	8-point 5/12/24/48 V DC transistor output module (2 A) sink/source type All points independent	16 [16 outputs]	0.11	—		
	A1SY71	32-point 5/12 V DC transistor output module (0.016 A) sink type	32 [32 outputs]	0.40	0.15		
	A1SY80	16-point 12/24 V DC transistor output module (0.8 A) source type	16 [16 outputs]	0.12	0.02		
	A1SY81	32-point 12/24 V DC transistor output module (0.1 A) source type	32 [32 outputs]	0.50	0.008		
	A1SY82	64-point 12/24 V DC transistor output module (0.1 A) source type	64 [64 outputs]	0.93	0.008		
Input/ output combi-nation module	A1SH42	32-point 12/24 V DC input module 32-output 12/24 V DC transistor output module (0.1 A) sink type	32 [32 outputs]	0.50	0.008		
	A1SH42-S1	32-point 24 V DC input module 32-output 24 V DC transistor output module (0.1 A) sink type	32 [32 outputs]	0.50	0.008		
	A1SX 48Y18	8-point 12/24 V DC input module 8-point 12/24 V DC relay contact output module (2 A)	16 [16 outputs]	0.085	0.045		
	A1SX 48Y58	8-point 24 V DC input module 8-point 12/24 V DC transistor output module (0.5 A)	16 [16 outputs]	0.06	0.06		
	A1SJ-56DR	32-point 24 V DC input module 24-point 200 to 240 V AC relay contact output module (2 A)	128 points	0.22	0.14	Install to A1SJHCPU. (Not installable to the extension base.)	
	A1SJ-56DT	32-point 24 V DC input module 24-point 24 V DC transistor output module (0.5 A)	64 points + Vacant 16 points × 4	0.22	0.06		
Dynamic input module	A1S42X	16-, 32-, 48- and 64-point 12/24 V DC dynamic input module	Number of set points (Inputs [ ])	0.08	—		
Dynamic output module	A1S42Y	16-, 32-, 48-, and 64-point 12/24 V DC dynamic output module	Number of set points (Outputs [ ])	0.10	0.008		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5/12/24 V DC modules

Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Blank cover	A1SG60	Keeps unused slots free from dust	16 [empty]	—	—		
Dummy module	A1SG62	16-, 32-, 48-, and 64-input selectable module	Number of set points ([ ] inputs)	—	—		
Pulse catch module	A1SP60	Pulse input module with short ON time (Pulse : min. 0.5 msec) 16-point inputs	16 [16 outputs]	0.055	—		
Analog timer module	A1ST60	For changing timer set values(0.1 to 1.0 sec, 1 to 10 sec, 10 to 60 sec, 60 to 600 sec) by potensiometer. Analog timer 8 points	16 [16 outputs]	0.055	—		
Interrupt module	A1SI61	For specifying execution of an interrupt program. Interrupt module (Interrupt input points : 16)	32 [Special 32-point]	0.057	—		
High-speed counter module	A1SD61	32-bit signed binary 50 KBPS, 1 channel	32 [Special 32-point]	0.35	—		
	A1SD62	24-bit signed binary, 2 channels 100kPPS, DC input Transistor output (sink type)	32 [Special 32-point]	0.1	—		
	A1SD62E	24-bit signed binary, 2 channels 100kPPS, DC input Transistor output (source type)		0.1			
	A1SD62D	24-bit signed binary, 2 channels 200kPPS, difference input Transistor output (sink type)	32 [Special 32-point]	0.25	—		
	A1SD62D-S1	24-bit signed binary, 2 channels 200kPPS, difference input Transistor output (sink type)		0.27			
A-D converter module	A1S64AD	4 to 20 mA / 0 to 10 V Analog 4 channels	32 [Special 32-point]	0.4	—		UL/cUL
	A1S68AD	4 to 20 mA / 0 to 10 V Analog input : 8 channels	32 [Special 32-point]	0.4	—		
Analog I/O module	A1S63ADA	Analog input : 2 channel Simple loop Analog output : 1 channel Control possible	32 [Special 32-point]	0.8	—		
	A1S66ADA	Analog input : 4 channels I/O signal system Analog output : 2 channels	32 [Special 32-point]	0.21	0.16		
Tempera-ture-digital converter module	A1S62RD3	For connecting a Pt100 (3-wire type) Temperature input : 2 channels	32 [Special 32-point]	0.49	—		
	A1S62RD4	For connecting a Pt100 (4-wire type) Temperature input : 2 channels	32 [Special 32-point]	0.39	—		
	A1S68TD	For connecting a thermocouple Temperature input: 8 channels	32 [Special 32-point]	0.32	—		
D-A converter module	A1S62DA	4 to 20 mA / 0 to 10 V Analog output : 2 channels	32 [Special 32-point]	0.8	—		
	AIS68DAV	-10 to 10 V input Analog output: 8 channels	32 [Special 32-point]	0.65	—		
	AIS68DAI	4 to 20 mA input Analog output: 8 channels	32 [Special 32-point]	0.85	—		
Computer link module	A1SJ71UC24 -R2	Computer link functions RS-232C : 1 channel	32 [Special 32-point]	0.1	—		
	A1SJ71UC24 -PRF	Computer link and printer functions RS-232C : 1 channel	32 [Special 32-point]	0.1	—		
	A1SJ71UC24 -R4	Computer link and multidrop link functions RS-422/485 : 1 channel	32 [Special 32-point]	0.1	—		
Data trans-mission interface module	A1SJ71 CMO-S3	Computer link function (dedicated-protocol no-procedure mode) Internal modem, number of line connection: 1	32 [special 32-point]	0.26	—		
Intelligent communi-cation module	A1SD51S	Interpreter BASIC, Compile BASIC RS-232C : 2 channels RS-422/485 : 1 channel	32 [Special 32-point]	0.4	—		UL/cUL

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5-12-24 V DC modules.

Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Memory card interface module	A1SD59J-S2	Memory card interface module	32 [Special 32-point]	0.05	—	Current consumption is when A1SD59J-MIF is connected.	UL/cUL
Ethernet interface module	A1SJ71E71N-B2	10 base 2 (Cheapernet)	32 [Special 32-point]	0.64	—		
	A1SJ71E71N-B5T	10 base 5 (Ethernet), 10 base T	32 [Special 32-point]	0.42	—		
Position-ing module	A1SD70	For 1-axis position control, speed control, speed position control. Analog voltage output (0 to ± 10 V)	32 [Special 32-point]	0.3	—		
	A1SD71-S2	For position control, for speed control, for speed position control. Pulse train output, 2 axes (independent/simultaneous 2-axis control, direct interpolation)	48 [Special 48-point]	0.8	—		
	A1SD71-S7	Allows alteration of the output speed setting of a manual pulse generator for position control. Pulse train output, 2 axes (independent/simultaneous 2-axis control, direct interpolation)	48 [Special 48-point]	0.8	—		
	A1SD75P1-S3	Used for positioning control Pulse output, 1 axis	32 [Special 32-point]	0.7	—		
	A1SD75P2-S3	Used for positioning control Pulse output, 2 axes (independent, dual-axis simultaneous, linear interpolation, circular interpolation)	32 [Special 32-point]	0.7	—		
	A1SD75P3-S3	Used for positioning control Pulse output, 3 axes (independent, triple-axis simultaneous, dual-axis linear interpolation, dual-axis circular interpolation)	32 [Special 32-point]	0.7 *	—	* When differential driver is connected : 0.78	
	A1SD75M1	Used for positioning control Digital output. For MR-H-B/MR-J-B/MR-J2-B. 1 axis, SSCNET	32 [Special 32-point]	0.7	—		
	A1SD75M2	Used for positioning control Digital output. For MR-H-B/MR-J-B/MR-J2-B. 2 axes, SSCNET (independent, dual-axis simultaneous, linear interpolation, circular interpolation)	32 [Special 32-point]	0.7	—		UL/cUL
	A1SD75M3	Used for positioning control Digital output. For MR-H-B/MR-J-B/MR-J2-B. 3 axes, SSCNET (independent, triple-axis simultaneous, dual-axis linear interpolation, dual-axis circular interpolation)	32 [Special 32-point]	0.7	—		
Position detection module	A1S62LS	Absolute position detection module	32 [Special 32-point]	0.55	—		
PLC easier monitoring module	A1SS91	PLC easier monitoring module	32 [Special 32-point]	0.08	—		
ID interface module	A1SD35ID1	ID interface module Reader/writer connection : 1	32 [Special 32-point]	0.25	0.17		
	A1SD35ID2	ID interface module Reader/writer connection : 2	32 [Special 32-point]	0.25	0.33		
Paging module	A1SD21-S1	Number of entries for calling control trigger device 2000 : maximum word number of 40 (Half-character) 1120 : maximum word number of 80 (Half-character) Number of entries for receiver number: 1000	32 [Special 32-point]	0.14	—		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5-12-24 V DC modules.

Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Temperature adjustment module	A1S62TCTT-S2	Transistor output, thermocouple input 2 channels/module PID control : ON/OFF pulse	32 [Special 32-point]	0.19	—		UL/cUL
	A1S62TCTTBW-S2	Transistor output, thermocouple input 2 channels/module PID control : ON/OFF pulse, heater wire breakage detection function		0.28	—		
	A1S62TCRT-S2	Transistor output, platinum temperature-measuring resistor input 2 channels/module PID control : ON/OFF pulse	32 [Special 32-point]	0.19	—		
	A1S62TCRTBW-S2	Transistor output, platinum temperature-measuring resistor input 2 channels/module PID control : ON/OFF pulse, heater wire breakage detection function		0.28	—		
	A1S64TCTT-S1	Transistor output, thermocouple input 4 channels/module PID control : ON/OFF pulse or 2-position control	32 [Special 32-point]	0.33	—		
	A1S64TCTTBW-S1	Transistor output, thermocouple input 4 channels/module PID control : ON/OFF pulse or 2-position control Heater wire breakage detection function		0.42	—		
	A1S64TCRT-S1	Transistor output, thermocouple input 4 channels/module PID control : ON/OFF pulse or 2-position control	32 [Special 32-point]	0.33	—		
	A1S64TCRTBW-S1	Transistor output, thermocouple input 4 channels/module PID control : ON/FOO pulse or 2-position control Heater wire breakage detection function		0.42	—		
MELSECNET (II) data link module	A1SJ71AP21	For master or local station of MELSECNET (II) optical data link	32 [Special 32-point]	0.33	—		
	A1SJ71AP21-S3	For master or local station of MELSECNET (II) data link module system (GI type optical fiber cable)	32 [Special 32-point]	0.33	—		
	A1SJ71AR21	For master or local station of MELSECNET (II) coaxial data link	32 [Special 32-point]	0.8	—		
MELSECNET/B data link module	A1SJ71AT21B	For master or local station of MELSECNET/B data link system	32 [Special 32-point]	0.66	—		
	A1SJ72T25B	For remote I/O station of MELSECNET/B data link system	—	0.3	—		
MELSECNET/10 data link module	A1SJ71LP21	For control station, master station, and local station of the MELSECNET/10 data link module system (For SI type optical fiber cable, double loop)	32 [Special 32-point]	0.65	—		
	A1SJ71BR11	For control station, master station, and local station of the MELSECNET/10 data link module system (For coaxial cable, single bus)	32 [Special 32-point]	0.80	—		
	A1SJ71LR21	For control station, master station, and local station of the MELSECNET/10 data link module system (For coaxial cable, double loop)	32 [Special 32-point]	1.14	—		
CC-Link system master-local module	A1SJ61BT11	For the master station of the C.C-Link data link system (Dedicatedly for shielded twisted pair cable)	32 [32 outputs]	0.40	—		

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Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
JEMANET (OPCN-1) Interface module	A1SJ71J92-S3	JEMANET(OPCN-1)Master module	32 [Special 32-point]	0.40	—		
	A1SJ71J95	JEMANET(OPCN-1)slave module	32 [Special 32-point]	0.40	—		
MELSECNET/MINI-S3 master module	A1SJ71PT32-S3	Used to control up to 64 MELSECNET/MINI-S3 master stations, and a total of 512 remote I/O points and remote terminals.	Exclusive I/O mode: 32 [Special 32-point] Expansion mode: 48 [Special 48-point]	0.35	—		UL/cUL
	A1SJ71T32-S3	MELSECNET/MINI-S3 master station Remote I/O and remote terminal controls are performed for a total of 512 I/O points with maximum of 64 stations. (Dedicatedly for twisted pair cable)	I/O dedicated mode 32 [Special 32-point] Expansion mode: 48 [Special 48-point]	0.30	—		
MELSECNET-I/O LINK master module	A1SJ51T64	MELSECNET-I/O LINK master station. Performs I/O LINK remote I/O module control for a total of 128 I/O points with maximum of 16 stations.	64 [64 outputs]	0.115	0.09		
B/NET interface module	A1SJ71 B62-S3	Used for controlling the B/NET transmission terminal. Up to 63 stations can be controlled per module.	32 [Special 32-point]	0.08	—		
S-LINK system master module	A1SJ71SL92N	Used for controlling S-LINK devices. Control I/O points: Max. 128 points	32 [Special 32-point]	0.2	—		
DeviceNet interface module	A1SJ71DN91	Master module for DeviceNet I/O total 4096 points	32 [Special 32-point]	0.24	—		
PROFIBUS interface module	A1SJPB92D	Master module for PROFIBUS-DP Data transferred Usually service: 32 bytes Extended service: 244 bytes	32 [Special 32-point]	0.56	—		
PROFIBUS-DP slave module	A1SJPB93D	Slave module for PROFIBUS-DP I/O data total 192 words	32 [Special 32-point]	0.36	—		
AS-I interface module	A1SJ71AS92	Master module for AS-I I/O total 496 points	32 [Special 32-point]	0.15	—		
Simulation module	A6SIM-X64Y64	I/O simulation module used by connecting to the basic base. Desktop debugging is possible without installing the I/O module to the base unit. Use the AnS series extension cable between the AnS series basic base and A6SIM-X64Y64.	64 [64 inputs] 64 [64 outputs]	TYP. 0.3 (all points on)	—		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5-12-24 V DC modules.

Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Graphic operation terminal	A985GOT	Large-size graphic operation terminal 256 colors, TFT color, 800 × 600 dots, high intensity	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A975GOT	Large-size graphic operation terminal 256 colors, TFT color, 640 × 480 dots, high intensity	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A970GOT	Large-size graphic operation terminal 16 colors, TFT color, 640 × 480 dots, high intensity/16 colors, TFT color, 640 × 480 dots, wide viewing angle/8 colors, STN color, 640 × 480 dots/2 colors, STN monochrome, 640 × 480 dots	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A960GOT	Large-size graphic operation terminal 2 colors, EL, 640 × 400 dots	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A956GOT	Medium-size graphic operation terminal 8 colors, STN color, 320 × 240 dots/STN monochrome, 320 × 240 dots/256 colors, TFT color, 320 × 240 dots	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A956WGOT	Medium-size graphic operation terminal 256 colors, TFT color, 480 × 234 dots	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A953GOT	Medium-size graphic operation terminal 8 colors, STN color, 320 × 240 dots/STN monochrome, 320 × 240 dots/256 colors, TFT color, 320 × 240 dots	—	—	—	For RS-232C connected	
	A951GOT	Medium-size graphic operation terminal 8 colors, STN color, 320 × 240 dots/STN monochrome, 320 × 240 dots/256 colors, TFT color, 320 × 240 dots	32 [Special 32-point] ✻	0.22 ✻	—	✻ When bus-connected	
	A950GOT	Medium-size graphic operation terminal 8 colors, STN color, 320 × 240 dots/STN monochrome, 320 × 240 dots/256 colors, TFT color, 320 × 240 dots	—	—	—	For RS-422 connected	

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Item	Model	Description	Number of inputs/outputs [I/O allocation module type]	Current consumption		Remarks	* Approved standard
				5 V DC	24 V DC		
Main base unit	A1S32B	Up to two I/O modules can be loaded.	—	—	—	Equipped with two extension connectors: one is on the right; the other on the left side	UL/cUL
	A1S33B	Up to three I/O modules can be loaded.					
	A1S35B	Up to five I/O modules can be loaded.					
	A1S38B	Up to eight I/O modules can be loaded.					
Extension base unit	A1S52B(S1)	Up to two I/O modules can be loaded.	—	—	—	Power supply module cannot be loaded (power is supplied from the main base unit).	
	A1S55B(S1)	Up to five I/O modules can be loaded.					
	A1S58B(S1)	Up to eight I/O modules can be loaded.					
	A1S65B(S1)	Up to five I/O modules can be loaded.	—	—	—	Needs a power supply module.	
	A1S68B(S1)	Up to eight I/O modules can be loaded.					
Extension cable	A1SC01B	0.055 m (0.18 ft.) long flat cable	—	—	—	For extension on the right side	
	A1SC03B	0.33 m (1.08 ft.) long	—	—	—	Extension base unit connection cable	
	A1SC07B	0.7 m (2.30 ft.) long					
	A1SC12B	1.2 m (3.94 ft.) long					
	A1SC30B	3 m (9.84 ft.) long					
	A1SC60B	6 m (19.69 ft.) long					
	A1SC05NB	0.45 m (1.48 ft.) long	—	—	—	A[ ]N, A[ ]A extension base cable	
	A1SC07NB	0.7 m (2.30 ft.) long					
	A1SC30NB	4.3 m (14.11 ft.) long	—	—	—		
	A1SC50NB	5 m (16.41 ft.) long	—	—	—		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5-12-24 V DC modules.

Item		Model	Description	Applicable model	* Approved standard
Memory cassette	EPROM	A1SNMCA-8KP	8 k steps, equipped with EPROM (directly)	For A1SJH/A1SHCPU : A6WA-28P required	UL/cUL
	E^2PROM	A1SNMCA-2KE	2 k steps, equipped with E^2PROM (directly)	For A1SJH/A1SHCPU Writing/reading directly from the peripheral device is possible	
		A1SNMCA-8KE	8 k steps, equipped with E^2PROM (directly)		
		A2SNMCA-30KE	30 k steps, equipped with E^2PROM (directly)	For A2SHCPU Writing/reading directly from the peripheral device is possible	
Memory write adapter		A6WA-28P	Used for memory cassette connector/EPROM 28-pin	Used to partition ROM in A1SNMCA-8KP	
Battery		A6BAT	IC-RAM battery backup	Mounted in A1SJH/A1SHCPU/A2SHCPU body	
Connector/terminal block conversion module		A6TBXY36	For sink type input module and sink type output module (standard type)	A1SX41(S1/S2), A1SX42(S1/S2), A1SY41, A1SY42, A1SY42P, A1SH42(S1), A1SY82	
		A6TBXY54	For sink type input module and sink type output module (2-wire type)		
		A6TBX70	For sink type input module (3-wire type)	A1SX41(S1/S2), A1SX42(S1/S2), A1SH42(S1)	
		A6TBX36-E	For source type input module (standard type)	A1SX81(S2), A1SX71, A1SX82-S1	
		A6TBY36-E	For source type output module (standard type)	A1SY81, A1SY82	
		A6TBX54-E	For source type input module (2-wire type)	A1SX81(S2), A1SX71, A1SX82-S1	
		A6TBY54-E	For source type output module (2-wire type)	A1SY81, A1SY82	
		A6TBX70-E	For source type input module (3-wire type)	A1SX81(S2), A1SX71, A1SX82-S1	
Cable for connector/terminal block conversion module		AC05TB	0.5 m (1.64 ft.) for source module	A6TBXY36, A6TBXY54, A6TBX70	
		AC10TB	1 m (3.28 ft.) for source module		
		AC20TB	2 m (6.56 ft.) for source module		
		AC30TB	3 m (9.84 ft.) for source module		
		AC50TB	5 m (16.4 ft.) for source module		
		AC80TB	8 m (26.24 ft.) for sink module		
		AC100TB	10 m (32.8 ft.) for sink module		
		AC05TB-E	0.5 m (1.64 ft.) for source module	A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, A6TBX70-E	
		AC10TB-E	1 m (3.28 ft.) for source module		
		AC20TB-E	2 m (6.56 ft.) for source module		
		AC30TB-E	3 m (9.84 ft.) for source module		
		AC50TB-E	5 m (16.4 ft.) for source module		
Relay terminal module		A6TE2-16SRN	For sink type output module	A1SY41, A1SY42, A1SY42P, A1SH42(S1)	
Cable for connecting relay terminal module		AC06TE	0.6 m (1.97 ft.) long	A6TE2-16SRN	
		AC10TE	1 m (3.28 ft.) long		
		AC30TE	3 m (9.84 ft.) long		
		AC50TE	5 m (16.4 ft.) long		
		AC100TE	10 m (32.8 ft.) long		
AnS I/O module and special module terminal block cover		A1STEC-S	Slim-type terminal block cover for the AnS I/O module and special module (terminal block connector type)	All terminal block connector type modules	
Insulation displacement terminal block adapter		A1S-TA32	Insulation displacement terminal block adapter for 32 points 0.5mm^2 (AWG20)	A1SX41(S1/S2), A1SX71, A1SY41, A1SY71	
		A1S-TA32-3	Insulation displacement terminal block adapter for 32 points 0.3mm^2 (AWG22)		
		A1S-TA32-7	Insulation displacement terminal block adapter for 32 points 0.75mm^2 (AWG18)		
Terminal block adapter		A1S-TB32	For 32 points, conversion into Europe type terminal block	A1SX41(S1/S2), A1SX71, A1SY41, A1SY71	
40-pin connector		A6CON1	Soldered joint type, straight out	Sink type (40p FCN)	
		A6CON2	Solderless attachment type, straight out		
		A6CON3	Pressed joint type, flat cable		
		A6CON4	Soldered joint type, straight/diagonal out		
37-pin D-sub connector		A6CON1E	Soldered joint type, straight out	S ource type (37p D-sub)	UL/cUL
		A6CON2E	Solderless attachment type, straight out		
		A6CON3E	Pressed joint type, flat cable		

* : Class 2 power supply recognized by the UL/cUL Standard is required for 5-12-24 V DC modules.

REMARK

I/O cables with connectors for I/O modules with 40-pin connector specifications (A1SX41, A1SX42, A1SY41, A1SY42, etc.) or 37-pin D-sub connector specifications (A1SX81, A1SY81, A1SY81EP) are available.
Consult your nearest Mitsubishi representative for I/O cables with connectors.

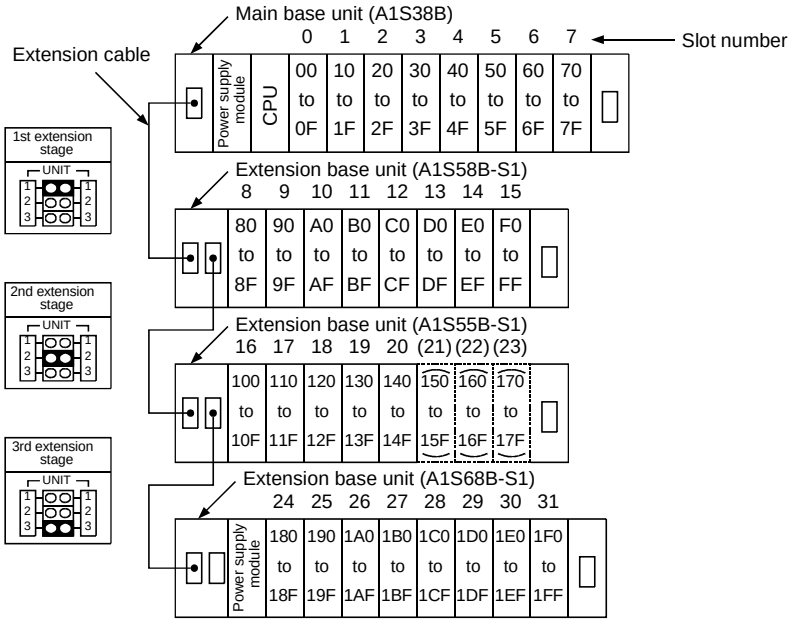
(2) Peripheral devices

Item	Module	Remarks	
Plasma handy Graphic programmer	A6PHP-SET	• Main body of A6PHP • SW[ ]GP-GPPAEE : A-series GPP function system disk • SW[ ]GP-GPPKEE : K-series GPP function system disk • SW0-GPPU : User disk (2DD) • AC30R4 : RS-422 cable (3 m (9.84 ft) long)	
Intelligent GPP	A6GPP-SET	• Main body of A6GPP • SW[ ]GP-HGPAEE : A-series GPP function system disk • SW[ ]GP-HGPKEE : K-series GPP function system disk • SW0-GPPU : User disk (2DD) • AC30R4 : RS-422 cable (3 m (9.84 ft) long)	
Composite video cable	AC10MD	• Connects A6GPP and monitor display. (1 m (3.28 ft) long)	
RS-422 cable	AC30R4	3 m (9.84 ft) long	Used for storing user program (3.5 in., formatted)
	AC300R4	30 m (98.4 ft) long	
User disk	SW0-GPPU	2DD	Connects CPU and A6GPP/A6PHP.
	SW0S-USER	2HD	
Cleaning disk	SW0-FDC	Applicable to A6GPP/A6PHP	Used for cleaning disk drive.
Printer	K6PR-K A7NPR-S1	• For printing out program circuit diagrams and various lists.	
RS232C cable	AC30R2	Connection cable for between A6GPP/A6PHP and printer (K6PR-K, A7NPR-S1, and a general-purpose printer with RS-232C interface) 3m (9.84 ft.) long	
Printer paper	K6PR-Y K7PR-Y	Printer paper for K6PR(S1) and K6PR-K. 9-inch paper. 2000 sheets per unit. Printer paper for A7PR and A7NPR. 11-inch paper. 2000 sheets per unit.	
Inked ribbon for K6PR(K)	K6PR-R	Replacement inked ribbon for K6PR-K.	
Inked ribbon for A7NPR-S1	A7NPR-R	Replacement inked ribbon for A7NPR-S1.	
Programming module	A7PUS	Read/write of the program is performed by connecting to the CPU main module with a RS-422 cable (AC30R4-PUS). (5VDC 0.4A)	
	A8PUE	Read/write of the program is performed by connecting to the CPU main module with a RS-422 cable (AC30R4-PUS, AC20R4-A8PU). (5VDC 0.4A)	
RS-422 cable	AC30R4-PUS	Connection cable for between the CPU main module and A7PUS, A8PUE. 3m (9.84 ft.) long	
	AC20R4-A8PU	Connection cable for between the CPU main module and A8PUE. 2m (6.56 ft.) long	
P-ROM write module	A6WU	Used to write the program in the CPU/A6PHP main module to a ROM, or to read out the program in the ROM for the CPU main module. Connect to the CPU/A6PHP with an AC30R4/AC03WU cable.	
Data access module	A6DU-B	Used for monitoring the CPU devices, changing the setting values/ current values, and displaying the operation status. (5VDC 0.23A) Connect to the CPU with an AC30R4-PUS cable.	
RS-422 cable	AC30R4 AC300R4	Connection cable for between the CPU main module and A6WU. 3m/30m (9.84 ft./98.43 ft.) long.	
	AC03WU	Connection cable for between the A6PHP main module and A6WU. 0.3m (0.98 ft.) long.	

2.4 General Description of System Configuration

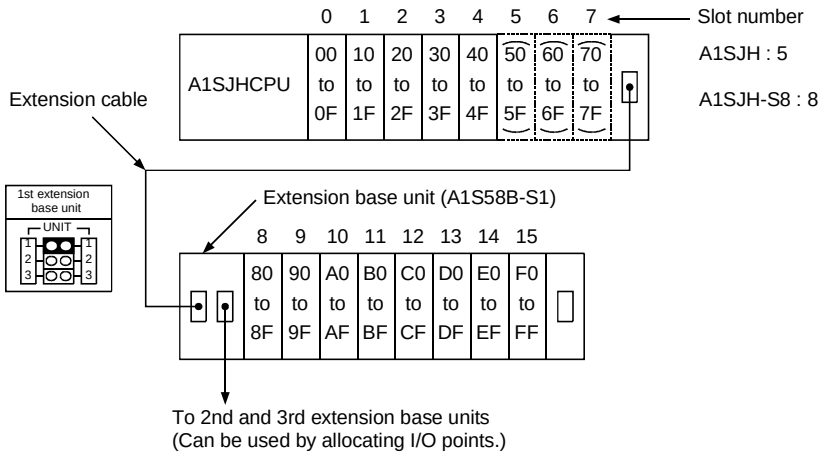
2.4.1 Outline of AnSHCPU configuration

The following gives the system configuration, number of inputs/outputs, I/O number allocation, etc. when the AnSHCPU is used as an independent system.

System configuration	
Maximum number of extension stages	Three
Maximum number of input/output points	A1SHCPU : 256 points, A2SHCPU : 512 points, A2SHCPU-S1 : 1024 points
Main base units	A1S32B, A1S33B, A1S35B, A1S38B
Extension base units	A1S52B(S1), A1S55B(S1), A1S58B(S1), A1S65B(S1), A1S68B(S1), A52B, A55B, A58B, A62B, A65B, A68B
Extension cables	A1SC01B (for installation on the right side), A1SC03B, A1SC07B, A1SC12B, A1SC30B, A1SC60B, AC06B, AC12B, AC30B, A1SC05NB, A1SC07NB, A1SC30NB, A1SC50NB
Notes	(1) Only the 1st extension base unit can be used when extension base units of types other than the AnS S1 are equipped. (The S1 type and other types must not be used together.) (2) To use the AnS S1 type extension base unit with an A[ ]N or A[ ]A type, the latter must be equipped with the last extension base unit. (The A[ ]N or A[ ]A extension base unit cannot be connected to the AnS S1 type.) (3) When an A1S52B (S1), A1S55B (S1), A1S58B (S1), A52B, A55B, or A58B is used, a voltage of 5 V DC is supplied from the power supply module. See Section 7.1.3, and consider the application. (4) The extension cable should be used for distances of up to 6 m (19.68 ft.). (5) The extension cable must not be bundled with or laid near the main circuit (high voltage, high current) lines.
I/O number allocation	(1) Allocate I/O numbers to the extension base units in order of extension base unit number, not in extension cable connection order. (2) I/O numbers are allocated on the assumption that both the main base unit and the extension base units have eight slots. Sixteen input/output points will be allocated to each slot indicated by dotted lines in the above system configuration figure. (3) Allocate 16 input/output points to empty slots. (4) If the setting of an extension base unit has been omitted, make the allocation on the assumption that each of the eight slots of the relevant base unit occupies 16 input/output points. (5) Items (2) to (4) can be changed by performing "I/O allocation". For details, see the ACPU Programming Manual (Fundamentals).

2.4.2 Outline of A1SJHCPU(S8) configuration

This section describes the system configuration, numbers of I/O points, I/O allocations, etc., for a stand-alone A1SJHCPU(S8) system.

System configuration	 *In this example, a 16-point module is installed at each slot.
Maximum number of extension stages	Three
Maximum number of input/output points	256
Extension base units	A1S52B(S1), A1S55B(S1), A1S58B(S1), A1S65B(S1), A1S68B(S1), A52B, A55B, A58B, A62B, A65B, A68B
Extension cables	A1SC01B (for installation on the right side), A1SC03B, A1SC07B, A1SC12B, A1SC30B, A1SC60B, AC06B, AC12B, AC30B, A1SC05NB, A1SC07NB, A1SC30NB, A1SC50NB
Notes	(1) If using a type of extension base unit for A1S use other than the S1 type,, only one extension base unit can be installed. (Combined use of S1 type extension base units and extension base units other than the S1 type is not possible.) (2) When using one or more S1 type extension base units for A1S use in combination with one or more extension base units for A[ ]N or A[ ]A use, the final extension base unit must be one for A[ ]N or A[ ]A use. (An S1 type extension base for A1S use can not be connected from an extension base for A[ ]N or A[ ]A use.) (3) Extension base units A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B are supplied with a 5 V DC power supply from the power supply module on the main base unit; see Section 7.1.3 to determine whether or not these extension base units can be used. (4) The total length of extension cable used must not exceed 6 m (19.68 ft.).
I/O number allocation	(1) I/O numbers are allocated in the order of the numbers set in extension base number setting, regardless of the order of connection of extension cables. (2) When allocating I/O points, all main bases and extension bases are regarded as having 8 slots of I/O points. Accordingly, 16 points per slot are allocated to the part of the system configuration drawing indicated using dotted lines. (3) 16 points are allocated to vacant slots. (4) If extension base number setting has not been performed at one or more modules, I/O points are allocated by regarding each slot in the total number of slots involved-obtained by multiplying the number of extension bases for which setting was skipped by 8 slots-as occupying 16 points per slot. (5) The allocations in (2) to (4) above can be changed by performing "I/O allocation". When using two or three extension base units, perform "I/O allocation" to allocate 0 points to vacant slots of the A1SJCPU and some slots of the first extension base unit, and allocate I/O points to the second and third extension base units. (The total number of I/O points for the A1SJCPU and 1st, 2nd, and 3rd extension base units is 256.) For details on "I/O allocation", see the ACPU Programming Manual(Fundamentals).

3. SPECIFICATIONS

Table 3.1 General specification

Item	Specifications					
Ambient operating temperature	0 to 50 °C					
Ambient storage temperature	-20 to 75 °C					
Ambient operating humidity	10 to 90 % RH, No-condensing					
Ambient storage humidity	10 to 90 % RH, No-condensing					
Vibration resistance	Conforming to JIS B 3502, IEC 61131-2		Frequency	Acceleration	Amplitude	No. of sweeps
		Under intermittent vibration	10 to 57 Hz	—	0.075 mm (0.003 in.)	10 times each in X, Y, Z directions (for 80 min.)
			57 to 150 Hz	9.8 m/s^2	—	
		Under continuous vibration	10 to 57 Hz	—	00.35 mm (0.001 in.)	
			57 to 150 Hz	4.9 m/s^2	—	
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147 m/s^2, 3 times in each of 3 directions X Y Z)					
Operating ambience	No corrosive gases					
Operating elevation *3	2000 m (6562 ft.) max.					
Installation location	Control panel					
Over voltage category *1	II max.					
Pollution level *2	2 max.					

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

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

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

4. AnSHCPU MODULE

4.1 Performance Specifications

The memory capacities of AnSHCPU modules, performances of devices, etc., are presented below.

Table 4.1 Performance specifications

Item \ Type		A1SJHCPU	A1SJHCPU-S8	A1SHCPU	A2SHCPU(S1)
Control system		Repeated operation (using stored program)			
I/O control method		Refresh mode/Direct mode selectable			
Programming language		Language dedicated to sequence control. Relay symbol type and logic symbolic language, MELSAP-II(SFC)			
Number of instructions (types)		Sequence instructions : 26			
		Basic instructions : 131			
		Application instructions : 106			
		CC-Link dedicated instructions : 8			
Processing speed (sequence instruction) (μ sec/step)		Direct : 1.0 to 2.3 Refresh : 1.0			
I/O points		2048 *1			
Actual I/O number of point		256		256	A2SH : 512, A2SH-S1 : 1024
Watchdog timer (WDT) (msec)		10 to 2000			
Memory capacity *2 (built-in RAM)		64 k bytes			A2SH : 64 k bytes, A2SH-S1 : 192 k bytes
Program capacity	Main sequence	Max. 8 k steps			A2SH : Max. 14 k steps, A2SH-S1 : Max. 30 k steps
	Sub sequence	Unavailable			
Internal relay (M) (points)		100 (M0 to 999)		The number of M + L + S = 2048 (set in parameters)	
Latch relay (L) (points)		1048 (L1000 to 2047)			
Number of step relays (S) (points)		0 (Defaults to no value)			
Link relay (B) (points)		1024 (B0 to 3FF)			
Timer (T)		256 points 100 msec timer : Setting time 0.1 to 3276.7 sec (T0 to 199) 10 msec timer : Setting timer 0.01 to 327.67 sec (T200 to 255) 100 msec : Depending on setting Retentive timer : (Setting time 0.1 to 3276.7 sec)			Set in parameters
Counter (C)		256 points Normal counter : Setting range 1 to 32767 (C0 to 255) Interrupt program counter : Setting range 1 to 32767 → Counter to be used in interrupt program			Set in parameters
Data register (D) (points)		1024 (D0 to D1023)			
Link register (W) (points)		1024 (W0 to W3FF)			
Annunciator (F) (points)		256 (F0 to F255)			
File register (R) (points)		Max. 8192 (R0 to R8191)			
Accumulator (A) (points)		2 (A0, A1)			

Table 4.1 Performance specifications (Continued)

Item \ Type	A1SJHCPU	A1SJHCPU-S8	A1SHCPU	A2SHCPU(S1)
Index register (V, Z) (points)	2 (V, Z)			
Pointer (P) (points)	256 (P0 to P255)			
Interrupt pointer (I) (points)	32 (I0 to I31)			
Special relay (M) (points)	256 (M9000 to M9255)			
Special register (D) (points)	256 (D9000 to D9255)			
Comment (points) (Specify in batches of 64 points)	Max. 3648			
Self-diagnostic functions	Watchdog error monitor, Memory error detection, CPU error detection, I/O error detection, Battery error detection, etc.			
Operation mode at the time of error	STOP/CONTINUE			
STOP → RUN output mode	Output data at time of STOP restored/data output after operation execution			
Clock function	Year, month, day, hour, minute, second (Automatically recognises leap years.) Accuracy -3.1 to +5.3 s (TYP. +1.7 s)/d at 0 °C -1.6 to +5.3 s (TYP. +2.4 s)/d at 25 °C -9.6 to +3.6 s (TYP. -2.1 s)/d at 55 °C			
Allowable momentary power interruption time	20 msec (1 ms or less for the A1563P only. 100 V AC or more for the A1SJHCPU.)			
Current consumption (5 V DC)	0.3 A		0.3 A	0.4 A
Weight [kg (lb.)]	1.00 (2.20)	1.06 (2.33)	0.33 (0.73)	0.33 (0.73)
Standard	UL/cUL			

*1 The I/O device after the actual input points can be used as MELSECNET(/B), MELSECNET/MINI, or C.C-Link.

*2 The maximum total memory that can be used for parameters, T/C set values, program capacity, file registers, number of comments, sampling trace, and status latch is 32 k/64 k bytes. The memory capacity is fixed. No expansion memory is available. Section 4.1.7 shows how to calculate the memory capacity.

4.1.1 Outline of AnSHCPU operation processing

This section explains the operation processing which takes place from the time the AnSHCPU power is switched ON until the sequence program is executed. AnSHCPU processing is generally divided into the following four types:

(1) Initial processing

This is the pre-processing for executing sequence operations. Initial processing is executed once at power up or after key reset.

(a) Resetting the I/O module.

(b) Initialization of the data memory's unset latch area (bit devices turned OFF, word devices set to 0).

(c) I/O module addresses are automatically assigned in accordance with the I/O module type and where the module is installed on a base unit.

(d) Automatic diagnostic check of parameter settings and operation circuits is executed (see Section 4.1.6).

(e) If the AnSHCPU is used in the master station of an MELSECNET(II) MELSECNET/B, data link operation begins after setting the link parameter data in the data link module.

(2) I/O module refresh processing

If the refresh mode for both input and output is set with the I/O control switch, the I/O module is refreshed (see Section 4.1.5).

(3) Sequence program operation processing

The sequence program written in the AnSHCPU is executed from step 0 to the END instruction.

(4) END processing

When sequence program processing reaches the END instruction, the sequence program is returned to step 0.

(a) Self-diagnosis checks for blown fuses, I/O module verification, low battery voltage, etc., are executed (see Section 4.1.6).

(b) T/C present values are updated and contacts are turned ON/OFF. (The ACPU Programming Manual (Fundmentals) gives details.)

(c) Data read or write from/to computer link modules (A1SJ71UC24-R2, etc.)

(d) Link refresh processing is executed when the link refresh request is given from the MELSECNET data link.

Note that the AnSHCPU can enable and disable execution of link refresh by turning M9053 ON/OFF and by issuing DI/EI instructions.

(e) When sampling trace is performed for every scan (after an END instruction is executed), the status of the set device is stored in the sampling trace area.

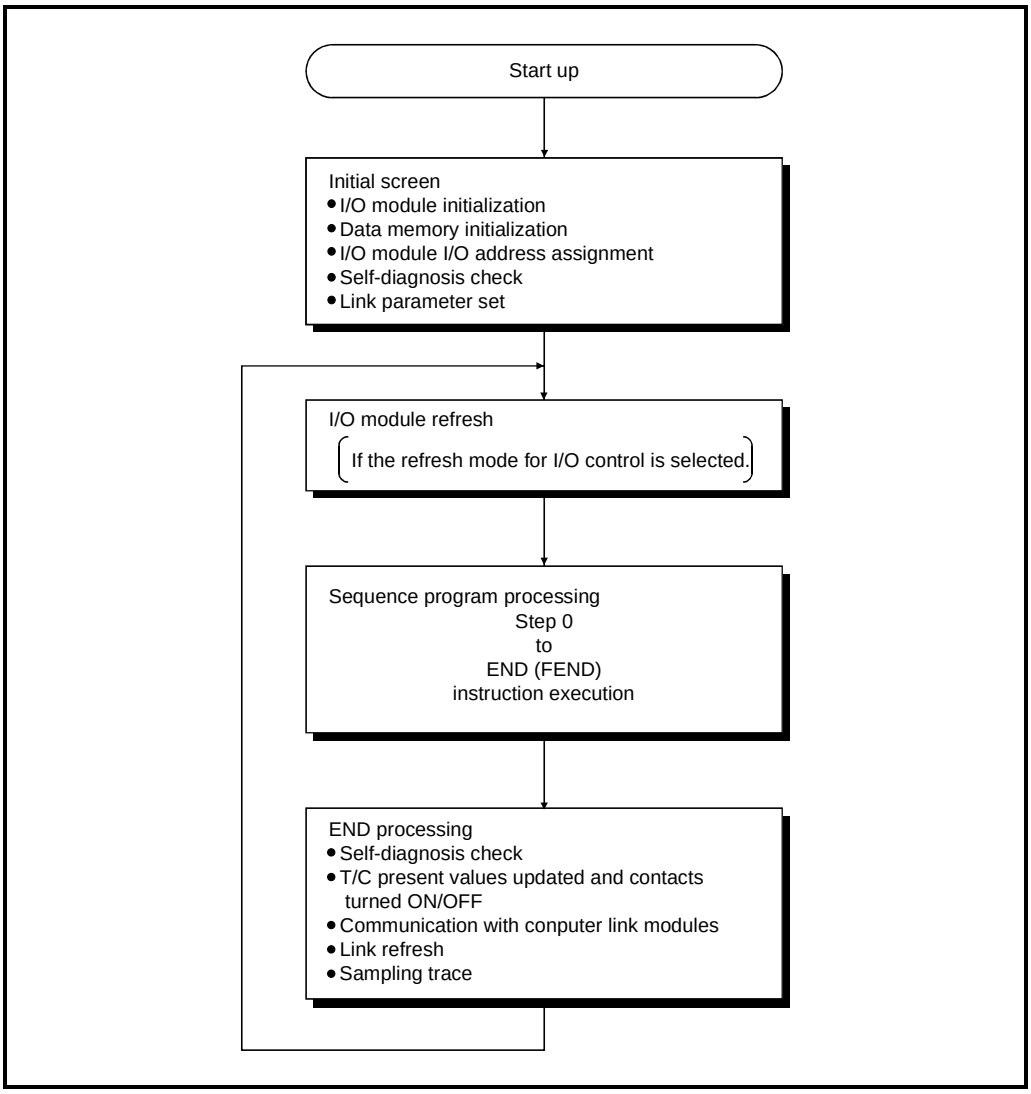


Fig.4.1 AnSHCPU operation processing

POINT

If a FROM or TO instruction is executed to the special function module frequently with short scanning intervals, the special function module may not be processed normally.

When you execute a FROM or TO instruction to the special function module, adjust the processing time and conversion time using the timer, constant scan and other measures of the special function module.

4.1.2 Operation processing in the RUN, STOP, PAUSE status

The PLC CPU can be operated in the RUN, STOP and PAUSE status as described below.

(1) RUN operation

RUN indicates repeated operations of the sequence program from step 0 to the END (FEND) instruction.

When a CPU changes its status to the RUN mode, the CPU restores all output data which was saved when the CPU was stopped, in accordance with the STOP → RUN mode set in the parameters.

The PLC CPU needs initialization time before starting a sequence program operation. It requires two to three seconds after a power ON or reset, and one to three seconds after the mode is changed from STOP to RUN.

(2) STOP operation

STOP indicates stopping of sequence program operation by executing a STOP instruction or by using the remote STOP function (see Section 4.2.3).

When the CPU is set to STOP, the output status is saved and all outputs are switched OFF. Data other than the outputs (Y) is retained.

(3) PAUSE operation

PAUSE indicates stopping of sequence program operation with the output and data memory status retained.

(4) PLC CPU operation processing upon the RUN/STOP key switch operation

PLC CPU operation processing / RUN/STOP key switch operation	Operation processing of sequence program	External output	Data memory (Y,M,L,S,T,C,D)	Remarks
RUN → STOP	Executes up to an END instruction and then stops.	OS saves the output status and turns all output points OFF.	Holds the status just before the STOP status.	
STOP → RUN	Starts operation.	Depends on the parameter output mode when the key switch is changed from STOP to RUN.	Executes operation from the status just before the STOP status.	

POINT

AnSHCPU executes the following operations at any time in the RUN, STOP or PAUSE mode :

- Refresh processing of the I/O module when the refresh mode is set.
- Data communications with computer link modules.
- Link refresh processing.

Therefore, the following operations are possible even when the AnSHCPU is in the STOP or PAUSE status :

- Monitoring I/O status and testing using a peripheral device.
- Read/write with computer link modules.
- Communications with other stations in the MELSECNET data link system.

4.1.3 Operation processing when a momentary power interruption occurs

When voltage supplied to the power supply module is below the specified range, the AnSHCPU detects a momentary power interruption.

When the AnSHCPU detects a momentary power interruption, the following operations are executed :

(1) Momentary power interruption within 20 msec

(a) Program processing is stopped and the output is retained.

(b) Program processing is resumed when the power is restored.

(c) The watchdog timer (WDT) continues counting even while the operation is stopped.
For example, if a momentary power interruption of 20 msec occurs when the scan time is 190 msec, a watchdog timer error (200 msec) occurs.

(2) Momentary power interruption over 20 msec

The AnSHCPU is reset and returns to the initial start status. The necessary operations are the same as when the CPU power is turned ON or when the CPU is reset.

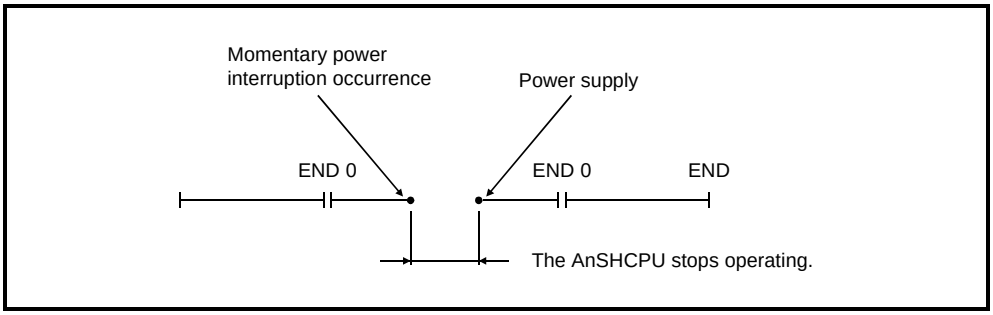


Fig. 4.2 Operation processing when a momentary power interruption occurs

4.1.4 Self-diagnosis

The self-diagnosis function allows the AnSHCPU to detect its own errors.

Self-diagnosis is carried out when the PLC power supply is turned ON and if an error occurs while the PLC is in the RUN status. If the AnSHCPU detects an error, it displays an error message and stops to prevent faulty PLC operation.

The operation of the AnSHCPU when an error is detected by the self-diagnosis function can be selected as either stop mode or continuous mode by making a parameter setting. In the stop mode, PLC operation is stopped when the error is detected; in the continuous mode, PLC operation is continued.

When an error occurs, the error occurrence and the error content are stored in a special relay (M) and special register (D). In the continuous mode, in particular, the program should read the details of the error and take appropriate action to prevent faulty PLC and machine operations.

Operation stops and all outputs (Y) are immediately turned OFF after the self-diagnosis function detects an error which stops PLC operation.

If the self-diagnosis function detects an error during which PLC operation continues, the part of the program where the error was detected is skipped and the rest of the program is executed.

If an I/O module verify error is detected, the operation is continued with the I/O addresses at the time the error occurred.

Explanations of the errors detected by the self-diagnosis function are given in Table 4.2.

REMARK

(1) In Table 4.2, in the I/O error, I/O module verify, fuse blown, special function module error, and operation check error diagnoses, the CPU module status can be selected as either stop or run; and the RUN LED status as either flashing or ON by using peripheral devices.

(2) The LED Display Message column in Table 4.2 lists messages displayed by the peripheral devices' PLC diagnosis.

Table 4.2 Self-diagnosis

Diagnosis	Diagnosis timing	CPU module status	"RUN" LED status	LED display message
Memory error Instruction code check	When the corresponding instruction is executed	Stop	Flashing	INSTRUCT. CODE ERR.
Parameter setting check	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			PARAMETER ERROR
No END instruction	When M9056 or M9057 is switched ON When switched from STOP/PAUSE to RUN			MISSING END INS.
Instruction execution disable	When CJ, SCJ, JMP, CALL(P), FOR and NEXT instruction is executed When switched from STOP/PAUSE to RUN			CAN'T EXECUTE (P)
Format (CHK instruction) check	When switched from STOP/PAUSE to RUN			CHK FORMAT ERR.
Instruction execution disable	When an interrupt occurs When switched from STOP/PAUSE to RUN			CAN'T EXECUTE (I)
CPU error RAM check	When power is switched ON or a reset is executed When M9084 is switched ON during STOP	Stop	Flashing	RAM ERROR
Operation circuit check	When power is switched ON or a reset is executed			OPE. CIRCUIT ERR.
Watchdog error check	When an END instruction is executed			WDT ERROR
END instruction not executed	When program processing reaches the end of the program			END NOT EXECUTE
Endless loop execution	At any time			WDT ERROR
I/O error I/O module verify	When an END instruction is executed (Not checked when M9084 is ON)	Stop / Run	Flashing / ON	UNIT VERIFY ERR.
Fuse blown	When an END instruction is executed (Not checked when M9084 is ON)			FUSE BREAK OFF.
Special function module error Control bus check	When a FROM, TO instruction is executed	Stop	Flashing	CONTROL-BUS ERR.
Special function module error	When a FROM, TO instruction is executed			SP. UNIT DOWN
Link module error	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			LINK UNIT ERROR
I/O interruption error	When an interruption occurs			I/O INT. ERROR
Special function module assignment	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			SP. UNIT LAY. ERR.
Special function module error	When a FROM, TO instruction is executed	Stop / Run	Flashing / ON	SP. UNIT ERROR
Link parameter error	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN	Run	ON	LINK PARA. ERROR
Battery error Battery low	At any time (not checked When M9084 is ON)	Run	ON	BATTERY ERROR
Operation check error	When the corresponding instruction is executed	Stop / Run	Flashing / ON	OPERATION ERROR

4.1.5 List of devices

A device is any contact, coil, or timer used in PLC program operations.

AnSHCPU devices and their range of use are shown below. The items marked "*" can be used and set for range change by setting the parameters.

Set parameters which are appropriate for the system configuration and its program. Section 4.1.6 gives details about parameter settings.

Table 4.3 Devices

Device		Application range (Number of points)		Explanation
X	Input	A1SJHCPU/A1SHCPU : X/Y00 to X/YFF (X, Y total 256 points) A2SHCPU : X/Y000 to X/Y1FF (X, Y total 512 points) A2SHCPU-S1 : X/Y0 to X/Y3FF (X, Y total 1024 points)		Provides a command or data from an external device, (e.g. pushbutton, select switch, limit switch, digital switch) to the PLC.
Y	Output			Provides the program control result to an external device, e.g. solenoid, magnetic switch, signal light, digital display.
X	Input	X/Y000 to X/Y7FF (X, Y total 2048 points)		• Possible to use in a program after the I/O points usage range per each A1SJHCPU, A1SHCPU, A2SHCPU (described above) to a maximum of 8192 points (external output is not allowed). • Objective is to allocate for automatic I/O refresh of MELSECNET/MINI-S3, for remote I/O of MELSECNET/10, for remote I/O of MELSECNET(B), or for CC-Link.
Y	Output			
M	Special relay	M9000 to M9255 (256 points)		Predefined internal relay for special purposes.
M	Internal relay *	M0 to M999 (1000 points)	Number of M + L + S = 2048	Internal relay in the PLC which cannot be directly output.
L	Latch relay*	L1000 to L2047 (1048 points)		Internal relay in the PLC which cannot be directly output. Backed up during power failure.
S	Step relay*	Can be used by setting a parameter (0)		Used in the same manner as an internal relay (M) e.g., as a relay indicating the stage number of a step-by step process operation program.
B	Link relay	B0 to B3FF (1024 points)		Internal relay for MELSECNET which cannot be output. May be used as an internal relay if not assigned for data link use.
F	Annunciator	F0 to F255 (256 points)		Used to detect a fault. When switched ON during RUN by a fault detection program, it stores a corresponding number in a special register D.
T	100 msec timer*	T0 to T199 (200 points)		Forward timers are available in 100 msec, 10 msec and 100 msec retentive types.
T	10 msec timer*	T200 to T255 (56 points)		
T	100 msec retentive timer*	Can be used by setting a parameter (0 points)		
C	Counter*	C0 to C255 (256 points)		Forward counters are available in normal and interrupt types.
C	Interrupt counter*	Can be used by setting a parameter (0 points)		
D	Data register	D0 to D1023 (1024 points)		Memory for storing values.
D	Special register	D9000 to D9255 (256 points)		Predefined data memory for special purposes.
W	Link register	W0 to W3FF (1024 points)		Data register for MELSECNET. May be used as a data register if not assigned for MELSECNET use.
R	File register*	Can be used by setting a parameter (0 points)		Extends the data register utilizing the user memory area.
A	Accumulator	A0, A1 (2 points)		Data register for storing the operation results of basic and application instructions.
Z	Index register	Z (1 point)		Used to index device numbers (X, Y, M, L, B, F, T, C, D, W, R, K, H, P).
V	Index register	V (1 point)		
N	Nesting	N0 to N7 (8 levels)		Indicates the nesting of master controls.

Table 4.3 Devices (Continued)

Device		Application range (Number of points)	Explanation
P	Pointer	P0 to P255 (256 points)	Indicates the destination of branch instructions (CJ, SCJ, CALL, JMP).
I	Pointer for interruption	I0 to I31 (32 points)	Indicates an interrupt program corresponding to the interrupt source.
K	Decimal constant	K-32768 to 32767 (16-bit instruction) K-2147483648 to 2147483647 (32-bit instruction)	Used to specify the timer/counter set value, pointer number, interrupt pointer number, the number of bit device digits, and basic and application instruction values.
H	Hexadecimal constant	H0 to FFFF (16-bit instruction) H0 to FFFFFFFF (32-bit instruction)	Used to specify the basic and application instruction values.

REMARK

The step relay (S) may be used in the same manner as the internal relay (M). The step relay is useful when writing a program which has two functions or applications, i.e., the step relay can be used specifically in accordance with the function or application, independently of the internal relay.

4.1.6 List of parameter setting ranges

The parameters specify various PLC functions, device ranges and user memory assignments of the AnSHCPU.

As shown in Table 4.4, the parameters have default settings so the user does not have to set all the parameter items. If any parameter item needs to be modified, please refer to the table for the allowed setting range.

The operating manuals for each peripheral device give details on parameter settings.

Table 4.4 Parameter setting ranges

Item \ Setting		Default value	Setting range	Valid peripheral devices	
				PU	GPP
Main sequence program area	A1SJHCPU(S8) A1SHCPU	6 k steps	1 to 8 k steps (in units of 1 k steps)	○	○
	A2SHCPU(S1)		1 to 14 k steps (in units of 1 k steps)	○	○
File register capacity		None	1 to 4 k points (in units of 1 k points)	○	○
Comment capacity	A1SJHCPU(S8) A1SHCPU	None	0 to 3648 points (in units of 64 points)	—	○
	A2SHCPU(S1)		0 to 3648 points (in units of 64 points)		
Status latch	Memory capacity	None	0/8 to 16 k bytes	—	○
	Data memory		Absent/present		
	File register		Absent/present (2 to 8 k bytes)		
Sampling trace	Memory capacity	None	0/8 k bytes	—	○
	Device setting		Device number		
	Execution condition		Per scan		
			Per time		
	Sampling count		0 to 1024 times (in units of 129 times)		
Microcomputer program capacity	A1SJHCPU A1SHCPU	None	0 to 14 k bytes (in units of 2 k bytes)	—	○
	A2SHCPU (S1)		0 to 26 k bytes (in units of 2 k bytes)		
Setting of latch (power interruption compensation) range	Link relay (B)	Only for L1000 to L2047. None for others	B0 to B3FF (in units of 1 point)	○	○
	Timer (T)		T0 to T255 (in units of 1 point)		
	Counter (C)		C0 to C255 (in units of 1 point)		
	Data register (D)		D0 to D1023 (in units of 1 point)		
	Link register (W)		W0 to W3FF (in units of 1 point)		
Setting of link range	Number of link stations	None	1 to 64	—	○
	Input (X) A1SJHCPU(S8) A1SHCPU		X0 to FF (in units of 16 points)		

Table 4.4 Parameter setting ranges (Continued)

Item \ Setting			Default value	Setting range	Valid peripheral devices	
					PU	GPP
Setting of link range	Input (X)	A2SHCPU	None	X0 to 1FF (in units of 16 points)	—	○
		A2SHCPU-S1		X0 to 3FF (in units of 16 points)		
	Output (Y)	A1SJHCPU(S8) A1SHCPU		Y0 to FF (in units of 16 points)		
		A2SHCPU		Y0 to 1FF (in units of 16 points)		
		A2SHCPU-S1		Y0 to 3FF (in units of 16 points)		
	Link relay (B)			B0 to B3FF (in units of 16 points)		
	Link register (W)			W0 to W3FF (in units of 1 point)		
I/O assignment			None	X/Y0 to X/Y1FF (in units of 16 points)	—	○
Setting of internal relay (M), latch relay (L), and step relay (S) setting			M0 to M999 L1000 to L2047 None for S	M/L/S 0 to 2047 (M, L, S are serial numbers)	○	○
Watchdog timer setting			200 msec	10 msec to 2000 msec (in units of 10 msec)	○	○
Setting of timer			100 msec : T0 to T199 10 msec : T200 to T255	256 points of 100 msec, 10 msec, and integrating timers (in units of 8 points). Timers have serial numbers.	○	○
Setting of counter			No interrupt counter	256 points (in units of 8 points) for counters and interrupt counters. Must be consecutive numbers.	—	○
Setting of remote RUN/PAUSE contact *		A1SJHCPU(S8) A1SHCPU	None	X0 to XFF	—	○
		A2SHCPU		X0 to X1FF		
		A2SHCPU-S1		X0 to X3FF		
Operation mode at the time of error	Fuse blown		Continuation	Stop/continuation	—	○
	I/O verify error		Stop			
	Operation error		Continuation			
	Special function module check error		Stop			
STOP → RUN display mode			Operation status prior to re-output of STOP	Output before STOP or after operation execution	—	○
Print title entry			None	Up to 128 characters	—	○
Keyword entry			None	Max. 6 digits in hexadecimal (0 to 9, A to F)	○	○

* It is not possible to set a PAUSE contact alone.

4.1.7 Memory capacity settings (main programs, file registers, comments, etc.)

The A1SHCPU, A2SHCPU(S1) provides 64 k (192 k) bytes of user memory area (RAM).
Data for parameters, T/C set values, main programs, sampling trace, status latch, file registers, and comments can be stored in the user memory area.

(1) Calculating memory capacity

The user memory can be divided into several memory blocks in accordance with the parameter settings.

Table 4.5 Parameter settings and memory capacity

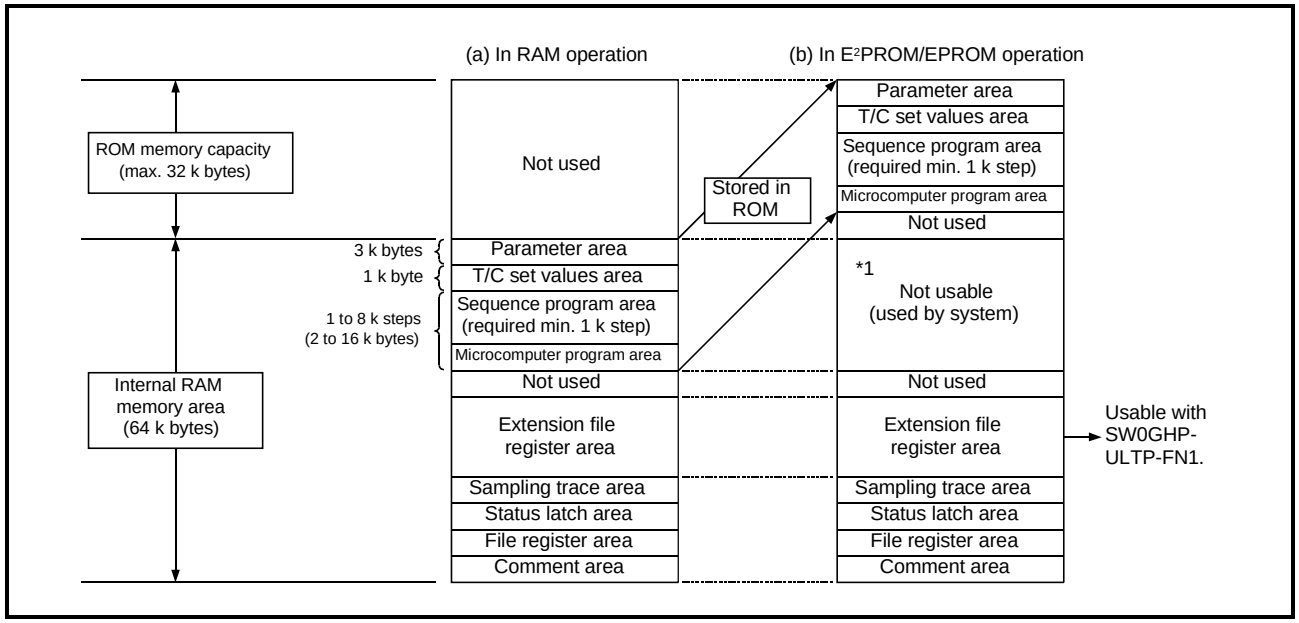
Item		Setting module	Memory capacity	Storage onto ROM	Remark
Main program	Parameter, T/C set values	—	4 k bytes (fixed)	Possible	Occupies 4 k bytes for parameters and T/C set values
	Sequence program	1 k steps	(Main sequence program capacity) × 2 k bytes		
	Microcomputer program	2 k bytes	(Main micro computer program capacity) ×1 k byte		
Sampling trace		Not available/ available	0/8 k bytes	Impossible	
Status latch	Data memory	Not available/ available	0/8 k bytes		The memory capacity for the file register status latch is determined by the number of file register points set using parameters.
	File registers	Not available/ available	(File registers' memory capacity) 1 k byte		
File registers		1 k points	(File registers' number of points) × 2 k bytes		
Comments		64 points	$\left(\frac{\text{Number of comments}}{64} + 1\right)$ k byte		1 k byte is occupied by the system when setting comment capacity.

(2) Storage priority in user memory

The data set in the parameters is stored in the following sequence.

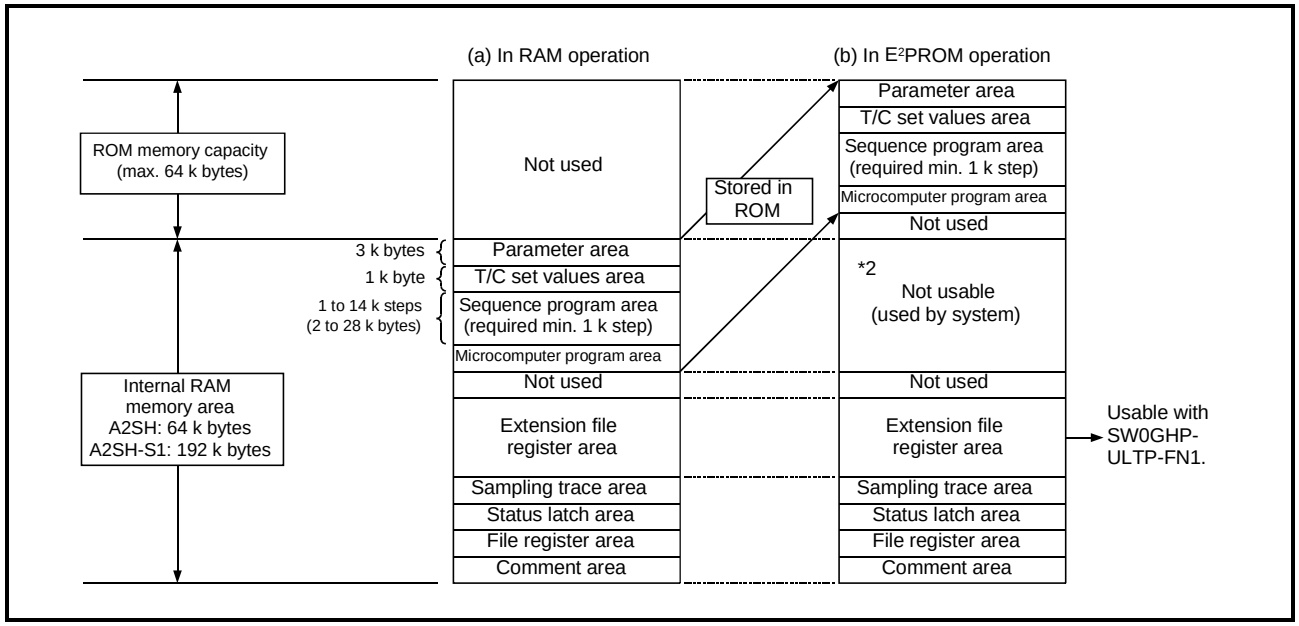
(a) When the A1SJHCPU(S8)/A1SHCPU is used

Even if the main program is stored in an E^2PROM/EPROM, the capacities of the sampling trace, status latch, file register, and comment areas cannot be increased, because the system uses the internal RAM area (area indicated by *1 in the following figure) as in RAM operation.



(b) When the A2SHCPU(S1) is used

Even if the main program is stored in an E^2PROM, the area cannot be used for the extension file register, because the system uses the internal RAM area (area indicated by *2 in the following figure) as in RAM operation.



4.2 Functions

The following table describes the functions of the AnSHCPU.

Table 4.6 List of functions

Function	Description	Section reference
Constant scan	• Executes the sequence program at the predetermined intervals independently of the scan time. • Setting allowed from 10 to 2000 msec.	4.2.1
Latch (power interruption compensation)	• Retains device data while the PLC is switched OFF or reset or a momentary power interruption of 20 msec or longer occurs. • L, B, T, C, D and W can be latched.	4.2.2
Remote RUN/STOP	• Allows remote RUN/STOP control from an external device (e.g. peripheral, external input, computer) with the RUN/STOP switch in the RUN position.	4.2.3
PAUSE	• Stops operation with the output (Y) status retained. • Pause function may be switched ON by using either of the following : Remote PAUSE contact Peripheral device	4.2.4
Status latch	• Stores all device data in the status latch area in the AnS when the status latch condition is switched ON. • The stored data can be monitored by a peripheral device.	4.2.5
Sampling trace	• Samples the specified device operating status at predetermined intervals and stores the sampling result in the sampling trace area in the AnS. • The stored data can be monitored by a peripheral device.	4.2.6
Offline switch	• Allows the device (Y, M, L, S, F, B) used with the OUT instruction to be disconnected from the sequence program processing.	4.2.7
Priority setting ERROR LED	• Sets the ON/OFF status of the ERROR LED in the event of an error.	4.2.8
Clock *1	• Executes clock operation in the CPU module. • Clock data includes the year, month, day, hour, minute, second, and day of the week. • Clock data can be read from special registers D9025 to D9028.	4.2.9

*1 The year only contains the last two digits of the year. Therefore, when the clock data is read from the PLC CPU and used in the sequence control, the year data may have to be fixed using a sequence program depending on the usage.

Year 1999 → "99"

Year 2000 → "00"

When comparison is made only with the last two digits of the year read, the year 2000 and consecutive years are considered older than the year 1999.

REMARK

The AnSHCPU cannot do "step operation", "PAUSE using RUN/STOP key switch", or "I/O module replacement at online".

4.3 Handling precautions

This section gives handling instructions from unpacking to installation of the AnSHCPU, I/O module, extension base unit, etc.

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fire, malfunction, and damage to or deterioration of the product.
- Securely insert and install the module fixing projection on the module bottom into the fixing hole of the base module, before tightening the module fixing screws up to the specified torque. Unless the module is properly installed and screwed on, it may cause a malfunction, failure, or fall.
- Tighten the screws in the specified torque range.
  Tightening the screws insufficiently may cause the module to fall, short-circuit, or malfunction.
  Tightening the screws too much may cause the module to fall, short-circuit, or malfunction due to damage to the screws or the module.
- Push the memory cassette onto the fixing connector to install it securely. Check that floating does not occur after its installation. Poor contact could result in a malfunction.
- Do not directly touch conductive parts or electronic parts of the module. Doing so may cause a malfunction and failure of the module.

(1) Since the case, terminal block connector, and pin connector of this PLC are made of plastic, do not drop them or subject them to mechanical shock.

(2) Do not remove the printed circuit board of any module from its case. Removal may cause board damage.

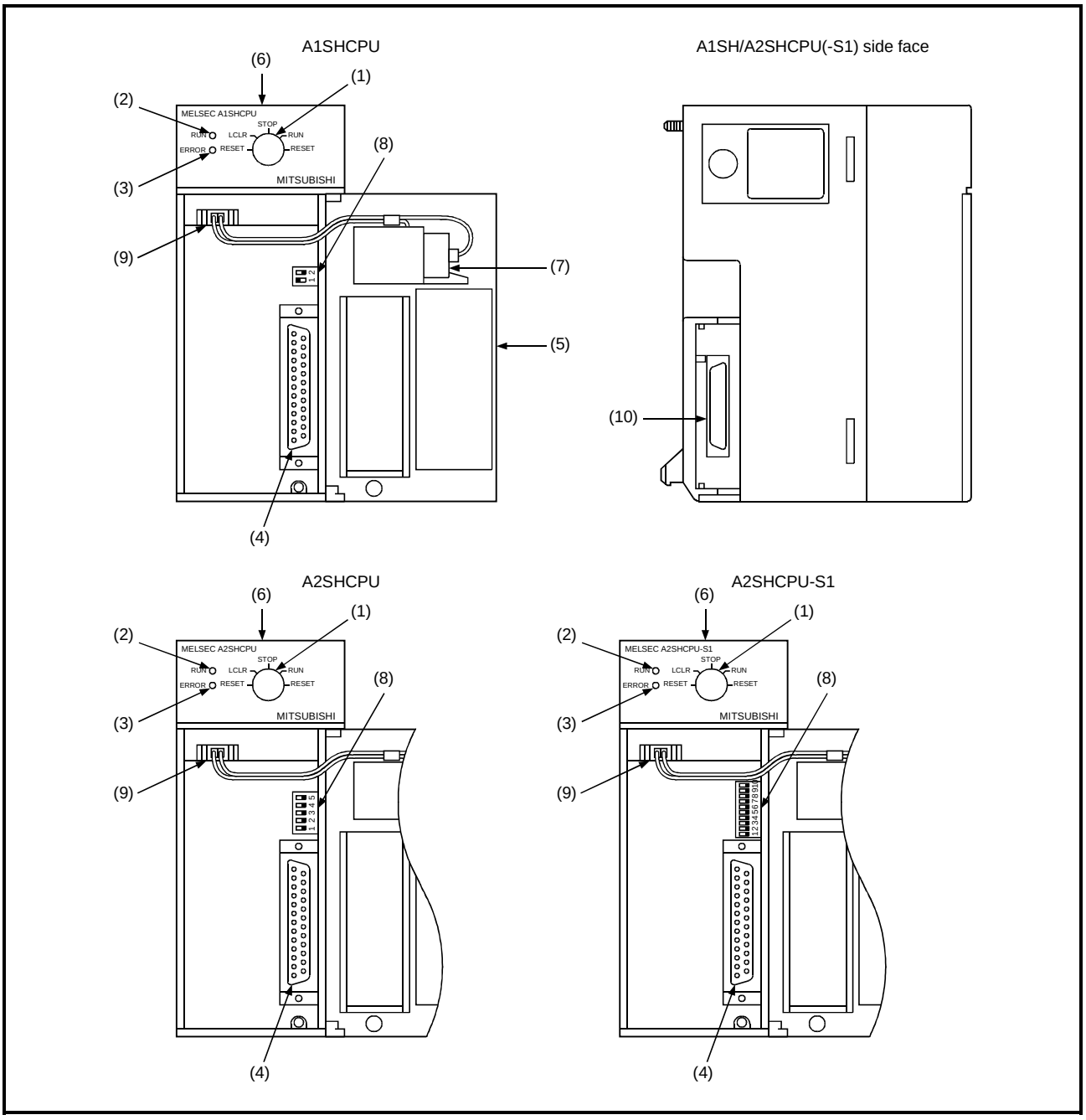
(3) When wiring, take care to prevent entry of wire offcuts into the module. If any conductive debris enters the module, make sure that it is removed.

(4) Tighten the module mounting screws and terminal screws as indicated below.

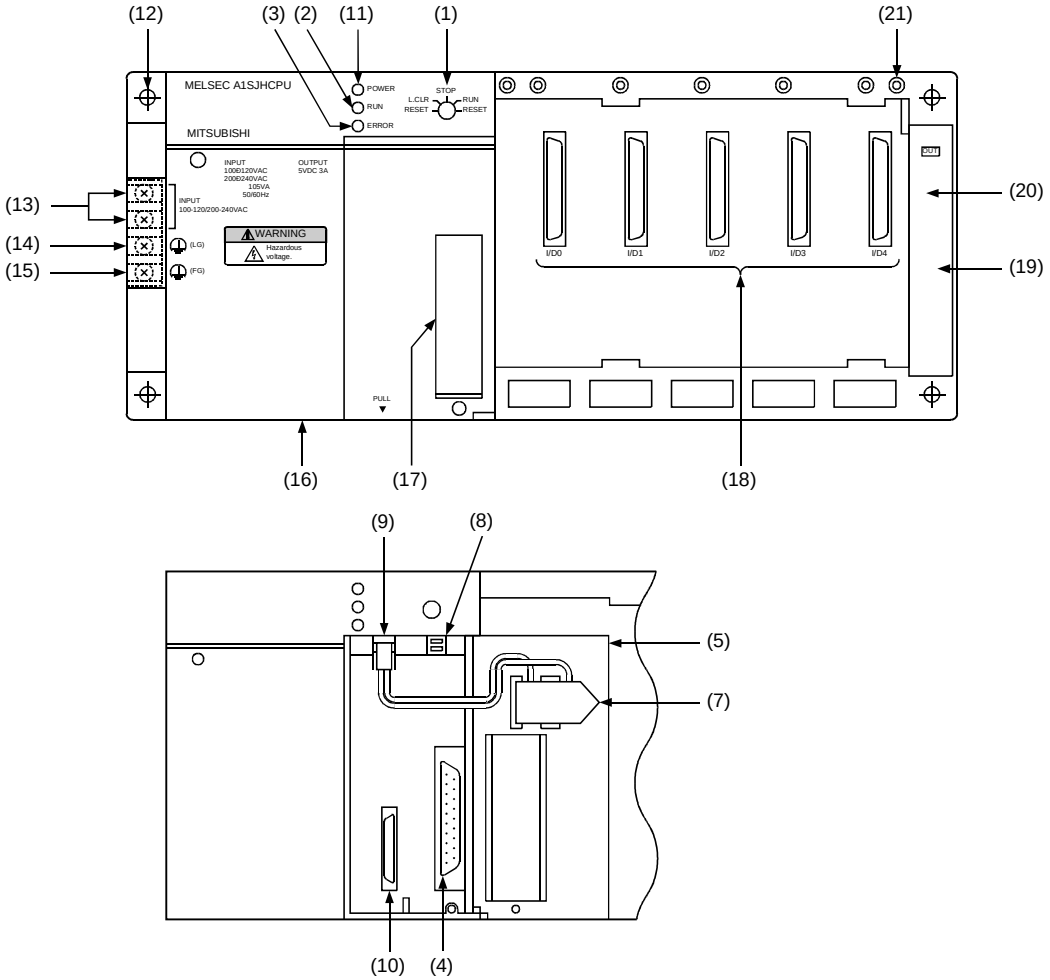
Screw	Tightening torque range N · cm
Module mounting screw (M4 screw)	78 to 118
I/O module terminal block terminal screw (M3.5 screw)	59 to 88

4.4 Part Identification and Setting

4.4.1 Part identification of AnSHCPU, A1SJHCPU (S8)



A1SJHCPU(S8)



No.	Name	Function
(1)	RUN/STOP key switch	• RUN/STOP : To start/stop running a sequence program. • RESET : To reset the hardware. To reset an error occurring during operation to initialize operation. • LATCH CLEAR (L.CLR) : To clear (turn OFF, or clear to "0") the data in the latch range and non-latch range which are set by parameter. For the latch clear operation procedure, see Section 4.4.4
(2)	"RUN" LED	• ON : Indicates that a sequence program operation is being executed with the RUN key switch set to the RUN position. [The LED remains lit if an error (Section 11.3), which permits sequence operation to continue, occurs.] • OFF : The RUN LED goes out in the following cases : • When the RUN key switch is in the STOP position. • When the remote STOP signal is input. • When the remote PAUSE signal is input. • Flashing : The RUN LED flashes in the following cases : • When an error which causes sequence operation to stop is detected by the self-diagnosis function. • When the latch clear operation is executed.
(3)	"ERROR" LED	• ON : Indicates that the self-diagnosis function has detected an error. [When the detected error is set to "not lit" in the ERROR LED indication priority setting.] • OFF : Indicates that no error has occurred or that a malfunction has been detected by the [CHK] instruction. • Flashing : An annunciator (F) is turned ON by the sequence program.

No.	Name	Function
(4)	RS-422 connector	• Used to connect a peripheral device to write/read, monitor, or test a program using a peripheral device. • Close with the cover when not connected to a peripheral device.

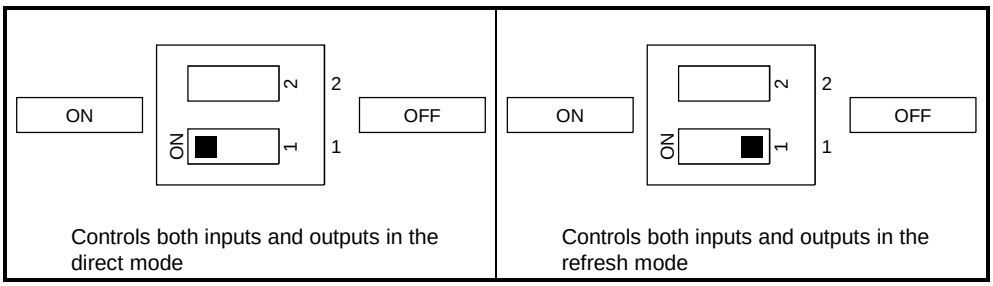
(5)	Cover	• Protects AnSHCPU printed circuit board, memory cassette, RS-422 connector, battery, etc.
		• Execute the following operations with the cover open.
		  • Memory cassette connection/disconnection
		  • Setting a dip switch
		  • Connection to battery connector
		  • For mounting the module to the base unit battery replacement

(6)	Module fixing screws	• For mounting the module to the base unit
(7)	Battery	• For retaining data such as programs, device latch ranges, file registers, etc. (See Section 7.2 for battery replacement.)
(8)	DIP switch	• Used for switching the I/O control method and for setting the memory protect function. (See Sections 4.4.2 and 4.4.3)
(9)	Battery connector	• For connection to the battery
(10)	Memory cassette installing connector	• For installing the memory cassette
(11)	"POWER" LED	• 5 V DC power display LED
(12)	Base installation hole	• Hole to install the base unit to a panel such as a control board. (M5 screw)
(13)	Power supply input terminals	• Connect the 100 V AC or 200 V AC power for the power input terminal.
(14)	LG terminals	• Power filter grounding terminal. Has half the voltage level of the input voltage.
(15)	FG terminals	• Grounding terminal connected to the shielding pattern on the print board.
(16)	DIN rail	• DIN rail installation hook (2)
(17)	RS-422 connector cover	• RS-422 connector cover
(18)	Module connector	• Connector to install the I/O module or special module. For the connector not for module installation, install supplied connector cover, or blank cover (A1SG60) to prevent dust entry. Number of I/O slots A1SJHCPU : 5 A1SJHCPU-S8 : 8
(19)	Extension cable connector	• Connect the extension cable with the signal send/receive connector with the extension base unit.
(20)	Base cover	• Extension connector protective cover. To extend, the area surrounded by the groove below the OUT sign on the base cover must be removed using tools such as a nipper.
(21)	Module fixing screws	• Screws to fix the module to the base. (M4 × 12 screws)

4.4.2 I/O control switch setting

The I/O control system uses either the direct mode or the refresh mode. Use the DIP switch (SW1) to switch the I/O control mode.

On shipment from the factory, the direct mode is set for both inputs and outputs (SW1 : ON).



Controls both inputs and outputs in the direct mode

Controls both inputs and outputs in the refresh mode

POINT

Make sure that the power is OFF be to reswitching the I/O control mode.

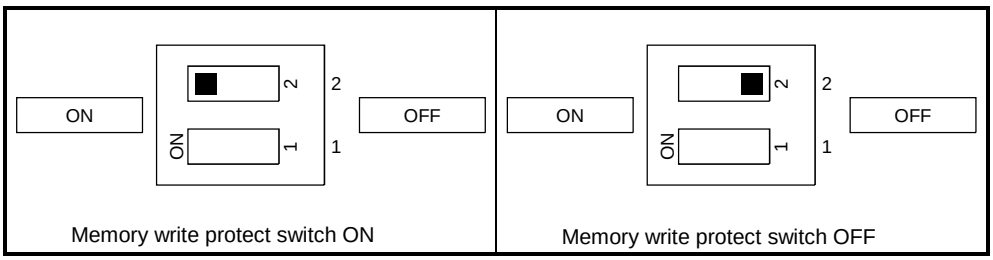
4.4.3 Memory write protect switch setting

The memory write protect switch is designed to protect data in the RAM memory from being overwritten due to incorrect operation or malfunction of a peripheral device.
It is used to prevent overwriting or deletion of created programs.
To modify data in RAM memory, the memory write protect switch must be turned OFF.
The memory write protect switch is set to OFF (SW2 : OFF) before shipment from the factory.

(1) When the A1SJHCPU(S8)/A1SHCPU is used

With the A1SJHCPU(S8)/A1SHCPU, ON/OFF of memory write protection is set using a DIP switch (SW-2). The first 32 Kbytes in the user memory area of 64 Kbytes are fixed.
When operating using an E^2PROM, the setting of the memory write protect switch is effective with respect to the E^2PROM if a memory cassette is installed.
Programs cannot be written to the internal RAM using peripheral devices while operating the E^2PROM.

By selecting the ON position on this switch, the parameters, the program and a part of extension file register will be write-protected in the memory. (See Section 4.1.9.)



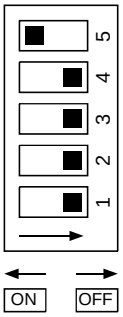
Memory write protect switch ON

Memory write protect switch OFF

(2) When the A2SHCPU(S1) is used

The memory write protect range can be changed by changing the settings of the memory write protect DIP switches. For details, see Fig. 4.16. The SW2 may be in the ON or OFF position.

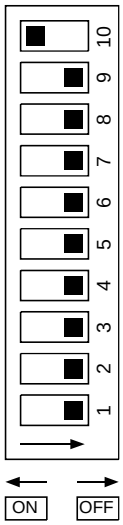
A2SHCPU



Switch No.	Application
5	I/O select switch setting ON : Direct method OFF : Refresh method
	Memory write protect setting (RAM and E^2PROM) ON : With memory write protection *1 OFF : Without memory write protection
	Memory write protection range
4	48 to 64 k bytes
3	32 to 48 k bytes
2	16 to 32 k bytes
1	0 to 16 k bytes

*1 When installing the memory cassette, the setting becomes invalid to RAM only.

A2SHCPU-S1



Switch No.	Application
10	I/O select switch setting ON : Direct method OFF : Refresh method
	Memory write protect setting (RAM and E^2PROM) ON : With memory write protection *1 OFF : Without memory write protection
	Memory write protection range
9	144 to 192 k bytes
8	112 to 144 k bytes
7	96 to 112 k bytes
6	80 to 96 k bytes
5	64 to 80 k bytes
4	48 to 64 k bytes
3	32 to 48 k bytes
2	16 to 32 k bytes
1	0 to 16 k bytes

*1 When installing the memory cassette, the setting becomes invalid to RAM only.

Fig. 4.16 Memory write protect DIP switch settings

POINT

(1) Set the memory write protect range according to the address (step number) of each memory area (sequence program, comment, sampling trace, status latch, file register).

(2) Do not use the memory write protect function when executing a sampling trace or status latch since it will make it impossible to store the data in the memory.

4.4.4 Clearing latched data

Follow the procedure described below to clear latched data using the RUN/STOP key switch. The latch clear operation also clears unlatched device data.

(1) Turn the RUN/STOP key switch from the "STOP" position to the "L.CLR" position several times to make the "RUN" LED flash quickly (ON for approximately 0.2 seconds and OFF for approximately 0.2 seconds). The quickly flashing "RUN" LED indicates that the preparation for the latch clear operation is completed.

(2) Turn the RUN/STOP key switch from the "STOP" position to the "L.CLR" position again while the "RUN" LED is flashing. The latched data will be cleared, and the "RUN" LED will go OFF.
To cancel the latch clear operation, turn the RUN/STOP key switch to the "RUN" position to make the AnSCPU start processing, or to the "RESET" position to reset the AnSCPU.

REMARK

Latched data can be cleared using the GPP function.
The A6GPP, for example, performs latch clear using "DEVICE MEMORYALL CLEAR" of the test functions of the PLC mode.
See the GPP Operating Manual for details.

5. POWER SUPPLY MODULE

5.1 Specifications

(1) Table 5.1 shows the specifications of the power supply modules.

Table 5.1 Power supply modules specifications

Item		Performance specifications		
		A1S61PN	A1S62PN	A1S63P
Base installation location		Power supply module installation slot		
Input power supply		100 to 240VAC $^{+10\%}_{-15\%}$ (85 to 264VAC)		24VDC $^{+30\%}_{-35\%}$ (15.6 to 31.2VDC)
Input frequency		50/60Hz±5%		———
Input voltage distortion factor		Within 5% (See Section 8.8)		
Maximum input apparent power		105VA		41W
Inrush current		20A 8ms or less		81A 1ms or less
Output current rating	5VDC	5A	3A	5A
	24VDC ±10%	———	0.6A	———
Overcurrent protection *1	5VDC	5.5A or above	3.3A or above	5.5A or above
	24VDC	———	0.66A or above	———
Overvoltage protection *2	5VDC	5.5 to 6.5V		
	24VDC	———		
Efficiency		65% or above		
Allowable momentary power failure time *3		20ms or less		1ms or less
Dielectric withstand voltage	Between primary and 5 V DC	Between input: batch LG and output: batch FG, 2,830VAC rms/3 cycle (altitude 2,000m (6562 ft)		500VAC
	Between primary and 24 V DC			———
Insulation resistance		Between input: batch LG and output: batch FG 500VAC (10MΩ or above by insulation resistance tester)		10MΩ or above by insulation resistance tester
Noise durability		(1) By noise simulator with noise voltage of 1,500Vp-p, noise width of 1μs, and noise frequency of 25 to 60Hz. (2) Noise voltage IEC801-4, 2kV		By noise simulator with noise voltage of 500Vp-p, noise width of 1μs, and noise frequency of 25 to 60Hz.
Operation display		LED display (ON for 5VDC output)		
Terminal screw size		M3.5 × 7		
Applicable wire size		0.75 to 2mm^2 (AWG 18 to 14)		
Applicable crimp-style terminal		RAV1.25-3.5, RAV2-3.5		
Applicable tightening torque		59 to 88N·cm		
External dimensions (mm (inch))		130 (5.12) × 55 (2.17) × 93.6 (3.69)		
Weight (kg)		0.60		0.50

*1 Since a varistor is installed between AC and LG, do not apply a voltage of 400 volts or more between AC and LG.

(2) Performance specifications for the A1SJHCPU(S8) built-in power supply.

Table 5.2 Performance specifications for the A1SJHCPU(S8) built -in power supply

Item \ Type	A1SJHCPU(S8)
Input power supply	100-120 V AC $^{+10\ \%}_{-15\ \%}$ (85 to 132 V AC) 500-240 V AC $^{+10\ \%}_{-15\ \%}$ (170 to 264 V AC)
Input frequency	50/60 Hz ± 3 Hz
Input voltage distortion factor	Within 5 % (See Section 8.8)
Input maximum apparent power	100 V A
Rush current	20 A 8 msec or less
Rated output	5 V DC 3 A
Overcurrent protection *1	3.3 A or over
Overvoltage protection *2	Not provided
Efficiency	65 % or over
Power supply indication	POWER LED indicator
Terminal screw size	M3.5 × 8
Applicable solderless terminal	0.3 to 2 mm^2
Applicable solderless terminal	RAV 1.25-3.5, RAV 2-3.5
Allowable momentary power failure *3	20 msec or less (100 V AC or over)

POINT

*1 : Overcurrent protection

The overcurrent protection device shuts off the 5V, 24 V DC circuit and stops the system if the current flowing in the circuit exceeds the specified value.
When this device is activated, the power supply module LED is switched OFF or dimly lit. In this case, remove any cause of overcurrent and start up the system.

*2 : Overvoltage protection

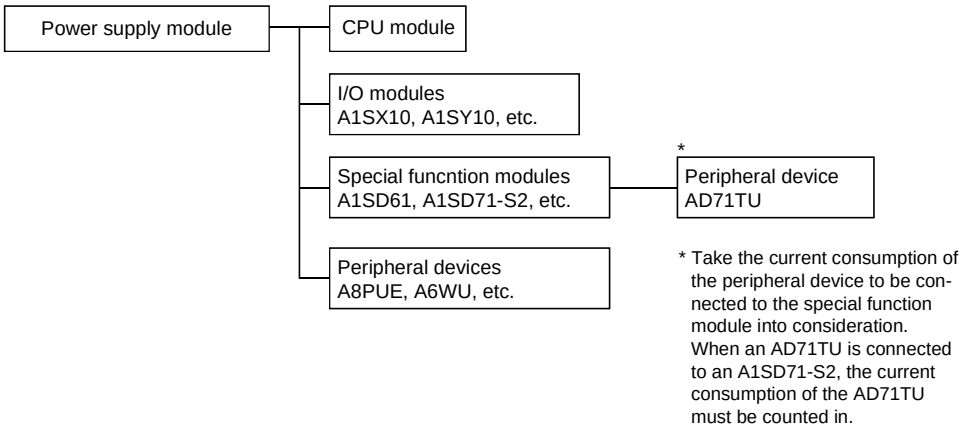
The overvoltage protection device shuts off the 5 V DC circuit and stops the system if 5.5 to 6.5 V voltage is applied to the circuit.
When this device is activated, the power supply module LED is switched OFF. In this case, switch OFF, then ON the input power to restart the system.
The power supply module must be changed if the system is not booted and the LED remains OFF.

*3 : Allowable momentary power failure time

This value indicates the momentary power failure time allowed for the PLC CPU and varies according to the power supply module used with the PLC CPU module.
The allowable momentary power failure time for a system in which an A1S63P is used is defined that it starts when the primary power supply of the 24 V DC stabilized power supply of the A1S63P is turned OFF and lasts until the 24 V DC becomes less than the specified voltage (15.6 V DC)

5.1.1 Selection of the power supply module

Select the power supply module according to the total current consumption of I/O modules, special function modules and peripheral devices supplied by the power supply module. When an A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used, the power is supplied from the power supply module of the main base unit. This point should also be taken into consideration.
See Section 2.3 for details of the 5 V DC current consumptions of I/O modules, special function modules, and peripheral devices.



(1) Power supply module when an extension base A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used.

When an extension base A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used, the 5 V DC is supplied from the power supply module of the main base unit through the extension cable. Note the following points regarding the use of an extension base from among A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B and A58B :

(a) Select a power supply module for the main base unit whose 5 V DC capacity can cover the 5 V DC current consumption of the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B.

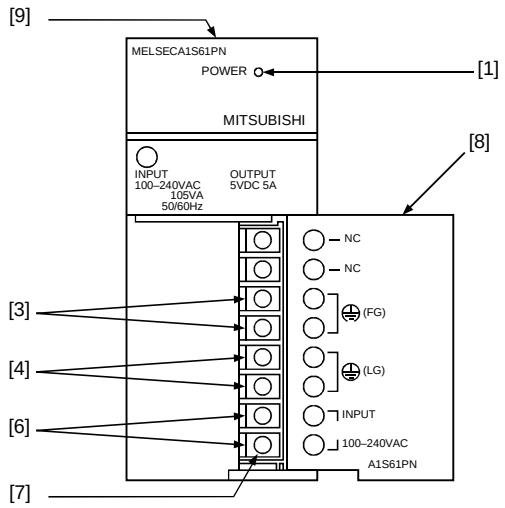
[Example]

When the 5 V DC current consumption by the main base unit is 3 A and that by the A1S55B(S1) is 1 A, the power supply module installed at the main base unit must be A61P (5 V DC, 5 A).

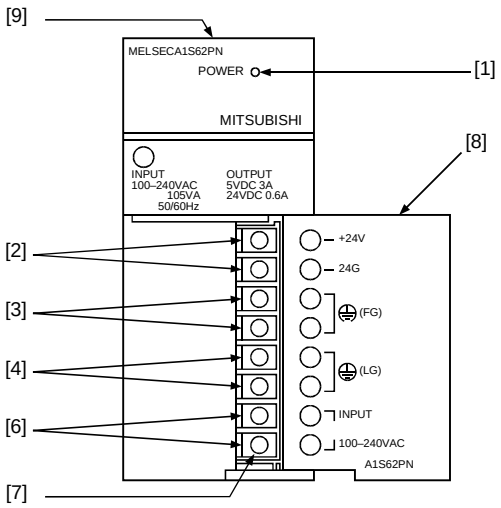
(b) Since the power is supplied to the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B through the extension cable, some voltage drop occurs in the cable. It is necessary to select a power supply module and length of cable which can provide 4.75 V DC or more at the receiving end.
For details of voltage drop and other information, see Section 6.1.3 "Application standards for extension base units".

5.2 Part Identification and Setting

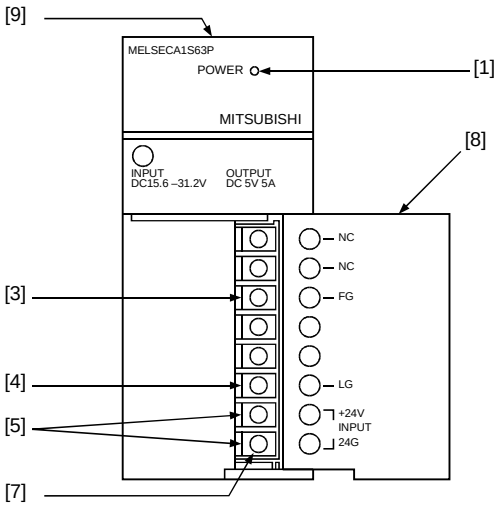
The following gives the names and description of the parts of the power supply modules :



(1) A1S61PN



(2) A1S62PN



(3) A1S63P

No.	Name	Description
[1]	POWER LED	The indicator LED for the 5 V DC power.
[2]	24 V and 24 G terminals	Used to supply 24 V DC to inside the output module (using external wiring).
[3]	FG terminal	The grounding terminal connected to the shield pattern of the printed circuit board.

No.	Name	Description
[4]	LG terminal	Grounding for the power supply filter. The potential of A1S61P or A1S62P terminal is 1/2 of the input voltage.
[5]	Power supply input terminals	Used to connect a 24 V DC power supply.
[6]	Power supply input terminals	Used to connect 100 V AC to 200 V AC power supply.
[7]	Terminal screw	M3.5 × 7
[8]	Terminal cover	The protective cover of the terminal block.
[9]	Module fixing screw	Used to fix the module to the base unit. (M4 screw, tightening torque : 59 to 88 N·cm

POINT

(1) Do not cable to the unused terminals such as FG and LG on the terminal block (terminals whose name is not printed on the terminal cover).

(2) Be sure to ground the terminal ⏚ LG to the protective ground conductor with class D (class-3) grounding or above.

6. BASE UNIT AND EXTENSION CABLE

6.1 Specifications

This section describes the specifications for the base units (main base units, extension base units) that can be used in the system, and the application standards for extension base units.

6.1.1 Specifications of base units

(1) Specifications of main base units

Table 6.1 Main base unit specifications

Item \ Model	A1S32B	A1S33B	A1S35B	A1S38B
Number of I/O modules	2 can be loaded	3 can be loaded	5 can be loaded	8 can be loaded
Extension connection	Enabled			
Installation hole size	ø6-mm (0.24 in.) slot (for M5 screw)			
External dimensions [mm(in.)]	220 × 130 × 28 (8.66 × 5.12 × 1.10)	255 × 130 × 28 (10.04 × 5.12 × 1.10)	325 × 130 × 28 (12.80 × 5.12 × 1.10)	430 × 130 × 28 (16.93 × 5.12 × 1.10)
Weight [kg]	0.52	0.65	0.75	0.97
Accessory	Four mounting screws (M5 × 25)			

(2) Specifications of extension base units

Table 6.2 Extension base unit specifications

Item \ Model	A1S65B(S1)	A1S68B(S1)	A1S52B(S1)	A1S55B(S1)	A1S58B(S1)
Number of I/O modules	5 can be loaded	8 can be loaded	2 can be loaded	5 can be loaded	8 can be loaded
Power supply module loading	Required		Not required		
Installation hole size	ø6-mm (0.24 in.) slot (for M5 screw)				
Terminal screw size	—	—	M4 × 6 (FG terminal)		
Applicable wire size	—	—	0.75 to 2 mm^2		
Applicable solderless terminal size	—	—	(V)1.25-4, (V)1.25-YS4, (V)2-YS4A (Applicable tightening torque: 98 to 137 N·cm)		
External dimensions mm(in.)	315 × 130 × 28 (12.40 × 5.12 × 1.10)	420 × 130 × 28 (16.54 × 5.12 × 1.10)	135 × 130 × 28 (5.31 × 5.12 × 1.10)	260 × 130 × 28 (10.24 × 5.12 × 1.10)	365 × 130 × 28 (14.37 × 5.12 × 1.10)
Weight [kg]	0.71	0.95	0.38	0.61	0.87
Accessory	Four mounting screws (M5 × 25)		*1 One dustproof cover (for I/O module) Four mounting screws (M5 × 25)		

*1: For the installation of the dustproof cover, see Section 8.6.

POINT

When using one of the base units A1S52B(S1), A1S55B(S1) or A1S58B(S1), which do not require a supply module, see Section 5.1.1 "Selection of the power supply module" and Section 6.1.3.

6.1.2 Specifications of extension cables

Table 6.3 shows the specifications of the extension cables which can be used for the AnSHCPU system.

Table 6.3 Extension cable specifications

Item \ Model	A1SC01B	A1SC03B	A1SC07B	A1SC12B	A1SC30B	A1SC60B	A1SC05NB	A1SC07NB	A1SC30NB	A1SC50NB
Cable length [m (ft.)]	0.055 (0.18)	0.33 (1.08)	0.7 (2.3)	1.2 (3.94)	3.0 (9.84)	6.0 (19.68)	0.45 (1.48)	0.7 (2.3)	3.0 (9.84)	5.0 (16.14)
Resistance of 5 V DC supply line (Ω at 55 °C)	0.02	0.02	0.04	0.06	0.12	0.18	0.04	0.05	0.12	0.18
Application	Connection between main base unit and A1S5[ ]B (S1)/A1S6[ ]B (S1)						Connection between main base unit and A5[ ]B/A6[ ]B		Connection between main base unit and A5[ ]B/A6[ ]B	
Weight [kg]	0.025	0.01	0.14	0.20	0.40	0.65	0.20	0.22	0.4	0.56

6.1.3 Application standards for extension base units (A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B)

When an extension base unit of one of the models A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, or A58B is used, make sure a voltage of 4.75 V or higher is supplied to the receiving end (at the module installed in the last slot of the extension base unit).

With the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, and A58B extension base units, 5 V DC is supplied from the power supply module of the main base unit via an extension cable. Therefore, some voltage drop occurs in the extension cable and the specified voltage may not be supplied to the receiving end, resulting in incorrect operation.

If the voltage at the receiving end is less than 4.75 V, use an extension base unit of one of the models A1S65B(S1), A1S68B(S1), A62B, A65B, or A68B, equipped with a power supply module.

(1) Selection conditions

The voltage received by the module installed in the last slot of an A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, or A58B extension base unit must be 4.75 V or higher.

Since the output voltage of the power supply module is set at 5.1 V or higher, the voltage drop must be 0.35 V or less.

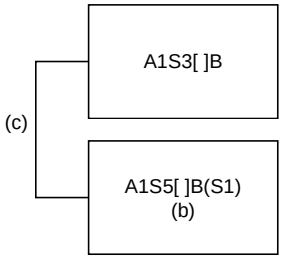
(2) Factors of voltage drop

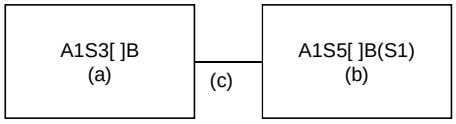
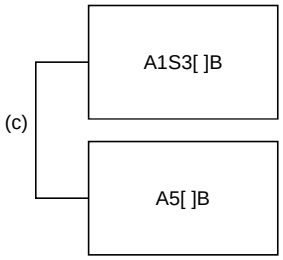
Voltage drop may involve the following factors (a), (b), and (c) depending on the connecting method and type of extension base units.

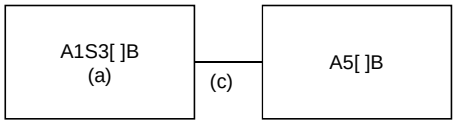
(a) Voltage drop of a main base unit

(b) Voltage drop of an extension base unit

(c) Voltage drop in an extension cable

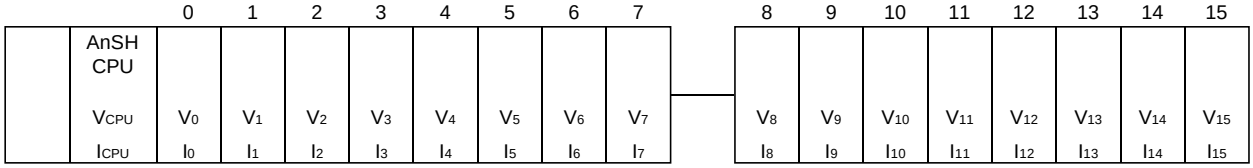
<table>
<tr><th></th><th>Extension cable connected to the left side of main base unit (serial)</th><th>Extension cable connected to the right side of main base unit (parallel)</th></tr>
<tr><td>A1S52B(S1), A1S55B(S1), or A1S58B(S1) extension base unit is used</td><td> 

Voltage drop of the main base unit can be ignored.</td><td> 
</td></tr>
<tr><td>A52B, A55B or A58B extension base unit is used</td><td> 

Voltage drop of the main and extension base units can be ignored.</td><td> 

Voltage drop of the extension base units can be ignored.</td></tr>
</table>

(3) Calculation of the receiving-end voltage



V_{CPU}, V_0 to V_7 : Voltage drop of each slot of a main base unit
I_{CPU}, I_0 to I_7 : Current consumption of each slot of a main base unit
V_8 to V_{15} : Voltage drop of each slot of an extension base unit
I_8 to I_{15} : Current consumption of each slot of an extension base unit

(a) Calculation of voltage drop of a main base unit (A1S32B, A1S33B, A1S35B, A1S38B)

Each slot of a main base unit has a resistance of 0.007 Ω.
Calculate the voltage drop of each slot, to obtain the total voltage drop of a main base unit.

Current consumption of CPU module

- A1SJHCPU(S8), A1SHCPU : 0.3(A)
- A2SHCPU(S1) : 0.4(A)

1) Voltage drop of a CPU module : V_{CPU}

$V_{CPU} = 0.007 \times (I_{cpu} + I_0 + I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

2) Voltage drop of slot 0 : V_0

$V_0 = 0.007 \times (I_0 + I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

3) Voltage drop of slot 1 : V_1

$V_1 = 0.007 \times (I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

4) Voltage drop of slot 2 : V_2

$V_2 = 0.007 \times (I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

5) Voltage drop of slot 3 : V_3

$V_3 = 0.007 \times (I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

6) Voltage drop of slot 4 : V_4

$V_4 = 0.007 \times (I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

7) Voltage drop of slot 5 : V_5

$V_5 = 0.007 \times (I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

8) Voltage drop of slot 6 : V_6

$V_6 = 0.007 \times (I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

9) Voltage drop of slot 7 : V_7

$V_7 = 0.007 \times (I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

10) Total voltage drop of a main base unit : V_K

$V_K = V_{CPU} + V_0 + V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7)$

(b) Calculation of voltage drop of an extension base unit (A1S52B(S1), A1S55B(S1), A1S58B(S1))

Each slot of an extension base unit has a resistance of 0.006 Ω. Calculate the voltage drop of each slot, to obtain the total voltage drop of an extension base unit.

1) Voltage drop of slot 8 : V_8

$V_8 = 0.006 \times (I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

2) Voltage drop of slot 9 : V_9

$V_9 = 0.006 \times (I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

3) Voltage drop of slot 10 : V_{10}

$V_{10} = 0.006 \times (I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

4) Voltage drop of slot 11 : V_{11}

$V_{11} = 0.006 \times (I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

5) Voltage drop of slot 12 : V_{12}

$V_{12} = 0.006 \times (I_{12} + I_{13} + I_{14} + I_{15})$

6) Voltage drop of slot 13 : V_{13}

$V_{13} = 0.006 \times (I_{13} + I_{14} + I_{15})$

7) Voltage drop of slot 14 : V_{14}

$V_{14} = 0.006 \times (I_{14} + I_{15})$

8) Voltage drop of slot 15 : V_{15}

$V_{15} = 0.006 \times I_{15}$

9) Total voltage drop of an extension base unit : V_Z

$V_Z = V_8 + V_9 + V_{10} + V_{11} + V_{12} + V_{13} + V_{14} + V_{15}$

(c) Calculation of voltage drop in extension cables

[1] Total current consumption of an extension base unit : I_Z

$I_Z = I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15}$

[2] Voltage drop in an extension cable : V_C

V_C = (Resistance of an extension cable) $\times$ I_Z

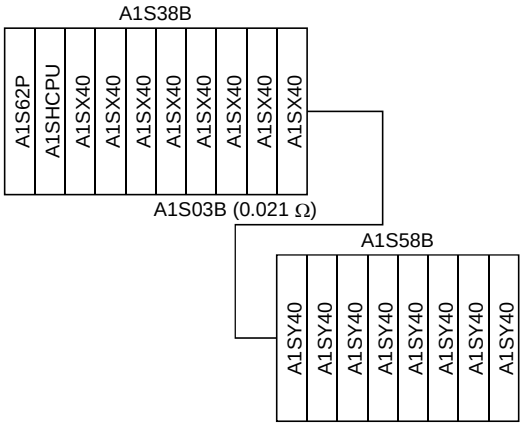
Resistance of extension cables

A1SC01B ····· 0.02 Ω	A1SC30B ····· 0.121 Ω
A1SC03B ····· 0.021 Ω	A1SC60B ····· 0.182 Ω
A1SC07B ····· 0.036 Ω	A1SC05NB ··· 0.037 Ω
A1SC12B ····· 0.055 Ω	A1SC07NB ··· 0.045 Ω
	A1SC30NB ··· 0.12 Ω
	A1SC50NB ··· 0.18 Ω

(d) Voltage at the receiving end

(5.1 (V) - VK - VZ - VC) $\geq$ 4.75 (V)

(4) Examples



(a) Calculation of voltage drop of the main base unit

$Vk = 0.007 \times \{0.32 + 0.05 \times (9 + 8 + 7 + 6 + 5 + 4 + 3 + 2) + (0.27 \times 8) \times 9\} = 0.15372$

(b) Calculation of voltage drop of the extension base unit

$Vz = 0.006 \times 0.27 \times (8 + 7 + 6 + 5 + 4 + 3 + 2 + 1) = 0.05832$

(c) Calculation of voltage drop in the extension cable

$Vc = 0.021 \times (0.27 \times 8) = 0.04536$

(d) Voltage at the receiving end

5.1 - 0.15372 - 0.05832 - 0.04536 = 4.8426 (V)

Since the voltage at the receiving end is more than 4.75 V, the system can be put into operation.

(5) Minimizing the voltage drop

Try the following measures to minimize the voltage drop :

(a) Change the positions of modules.

Install the modules of the main base unit from slot 0 in descending order of current consumption. Install modules with small current consumption in the extension base units.

(b) Connect the base units in series.

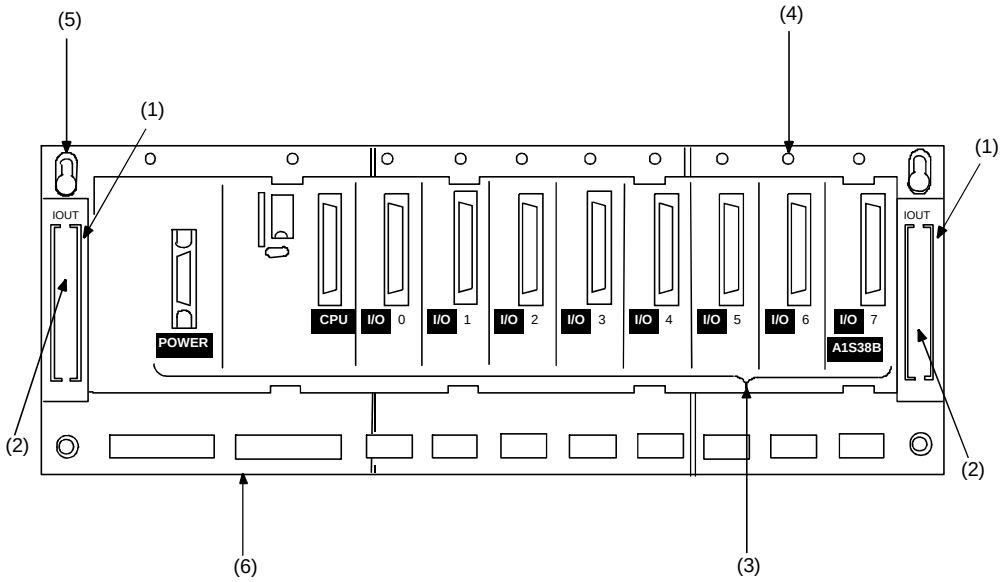
By connecting the base units in series (connecting an extension cable to the left side of a main base unit, see Section 8.4.2), the voltage drop of the main base unit can be minimized. But when a long extension cable is used for this connection, the extension cable may cause a larger voltage drop than that of the main base unit. In such case, calculate the voltage drop as described in (3).

(c) Use a short extension cable.

The shorter the extension cable, the lower and the smaller its voltage drops. Use extension cables that are as short as possible.

6.2 Parts Identification and Setting

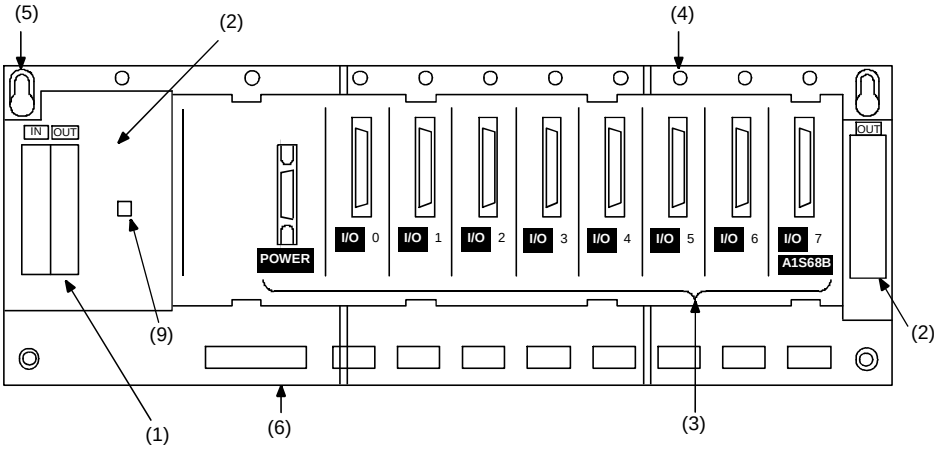
(1) Main base unit (A1S32B, A1S33B, A1S35B, A1S38B)



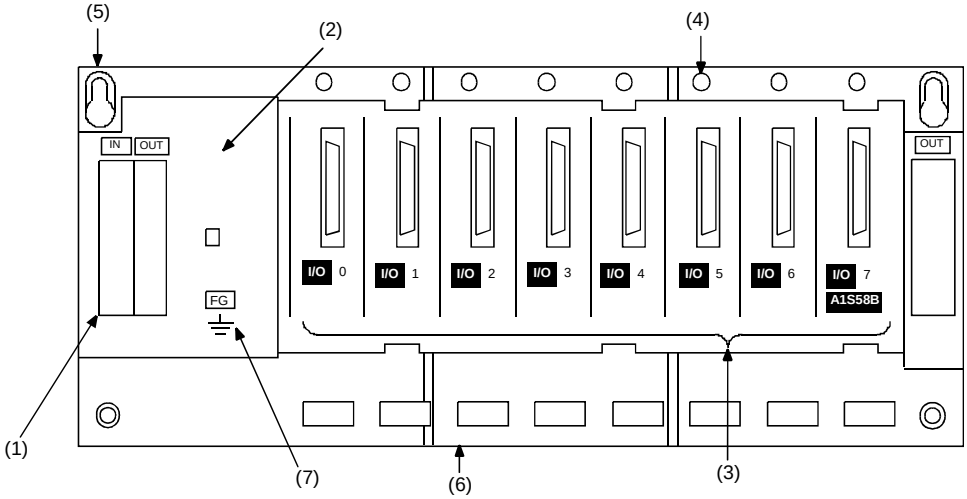
No.	Name	Application
(1)	Connector for extension cable	Connector for sending and receiving signals to and from the extension base unit.
(2)	Base cover	Cover to protect the connector for the extension cable. When connecting an extension cable, remove the appropriate base cover located below the word "OUT" with nippers or a similar tool.
(3)	Module connectors	Connectors where the power supply module, CPU module, I/O module, special function modules are loaded. Fit the connector cover or blank cover (A1SG60) to vacant connectors, in order to protect the module from dust.
(4)	Module fixing screw	Screw to fix a module to the base unit. Screw size : M4 × 12 screw
(5)	Guide hole for base installation	Slot for mounting this base unit to the panel of control box, etc. (For M5 screw)
(6)	DIN rail hook	Hook to install on a DIN rail. A1S32B, A1S33B·····1 A1S35B, A1S38B·····2

(2) Main base modules (A1S52B(S1), A1S55B(S1), A1S58B(S1), A1S65B(S1), A1S68B(S1))

A1S65B (S1), A1S68B (S1)



A1S52B (S1), A1S55B (S1), A1S58B (S1)



No.	Name	Purpose
(1)	Extension cable connector	Used to connect an extension cable to a main base module. Remove the connector cover attached to the module and connect the extension cable.
(2)	Base cover	Extension cable connector protective cover.
(3)	Module connector	Used to load a power supply module, I/O or special function module. Put a supplied cover or blank cover (A1SG60) on any unused connector to protect it from dust.
(4)	Module fixing screw	Used to secure a module to the base module. Screw size : M4 × 12
(5)	Base mounting hole	Used to mount the base module to a control panel. (for M5 screw)
(6)	DIN rail hook	Used to install on a DIN rail. A1S52B(S1), A1S55B(S1) : One hook A1S65B(S1), A1S68B(S1), A1S58B(S1) : Two hooks
(7)	FG terminal	Grounding terminal connected to the shield pattern on the PLC board.

6.3 Installing and Removal on/from a DIN Rail

Both main base units and extension base units are equipped with hooks for mounting on a DIN rail.

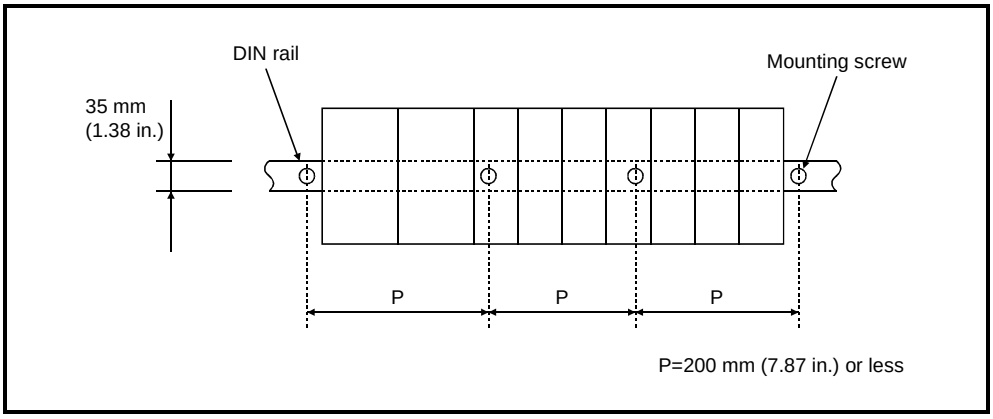
The method for mounting them on a DIN rail is explained below :

(1) Applicable DIN rails (JIS-C2B12)

TH35-7.5 Fe
TH35-7.5 Al
TH35-15 Fe

(2) Mounting screw interval

When a TH35-7.5 Fe or TH35-7.5 Al rail is mounted, fix it with screws spaced no more than 200 mm (7.87 in.) apart.



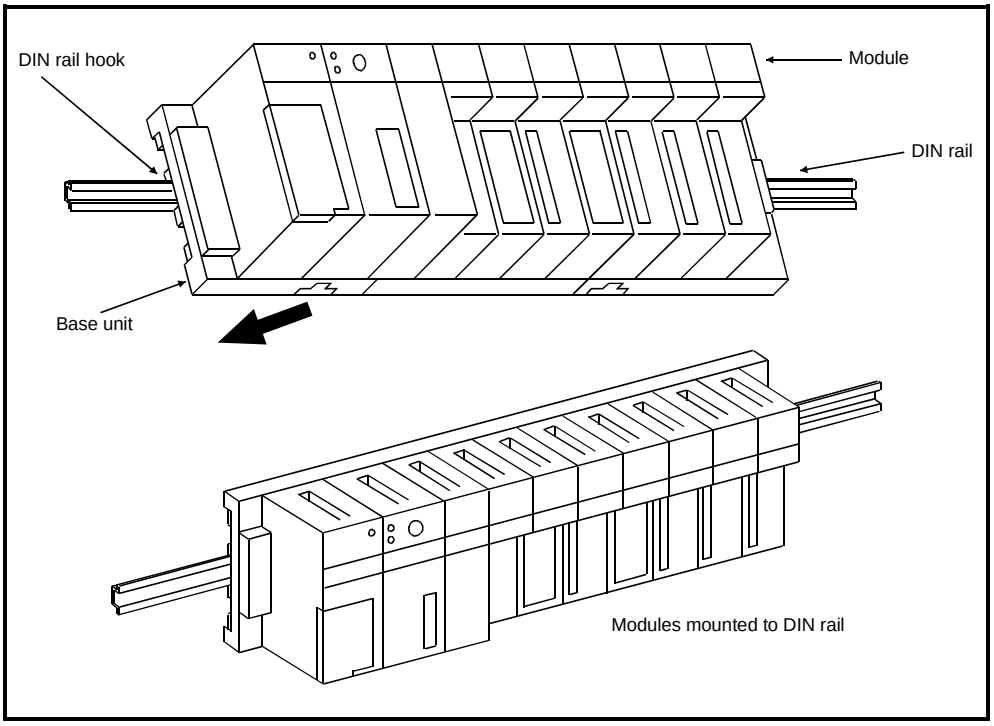
(3) Mounting/removing on/from a DIN rail

(a) Mounting procedure

Mount a base unit on a DIN rail as follows :

1) Engage the hook of the base unit with the rail from above rail.

2) Push the base unit onto the rail and fix it in position.

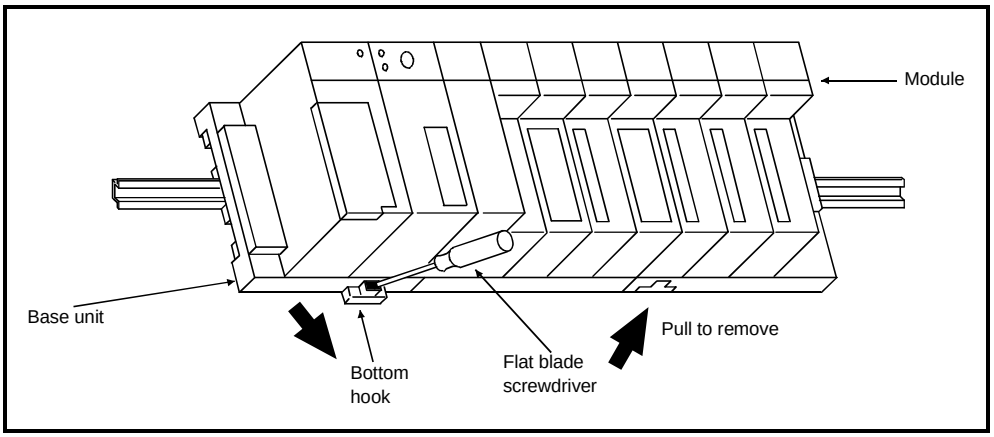


(b) Removing procedure

Remove a base unit from the DIN rail as follows :

1) Pull down the bottom hook of the base unit using a flat blade screwdriver.

2) Pull the base unit away from the rail while pulling down the bottom hook.



7. MEMORY CASSETTE AND BATTERY

7.1 Memory Cassette

This section describes the specifications, handling instructions and installation of the memory ICs used in the AnSHCPU.

7.1.1 Specifications

Table 7.1 and 7.2 show the specifications of the ROMs.

Table 7.1 Memory specifications (A1SJHCPU(S8)/A1SHCPU)

Item \ Model	A1SNMCA-2KE *1	A1SNMCA-8KE	A1SNMCA-8KP
Memory specifications	E^2PROM		EPROM
Memory capacity	8 k bytes (max. 2 k steps)	32 k bytes (max. 8 k steps)	32 k bytes (max. 8 k steps)
E^2PROM service life for writing	10000 times	100000 times	—
Outside dimension [mm (in.)]	15 × 69.6 × 40.5 (0.59 × 2.75 × 1.59)		
Weight [kg]	0.03		

Table 7.2 Memory specifications (A2SHCPU)

Item \ Model	A2SNMCA-30KE
Memory specifications	E^2PROM
Memory capacity	64 k bytes A2SHCPU : (max. 14 k steps) A2SHCPU-S1 : (max. 30 k steps)
E^2PROM service life for writing	100000 times
Outside dimension [mm (in.)]	15 × 69.6 × 40.5 (0.59 × 2.75 × 1.59)
Weight [kg]	0.03

POINT

*1: When writing a program to the A1SNMCA-2KE,set the parameter for main sequence program capacity to 2k steps or less.
Programs written with a main sequence program capacity setting of 3k steps or over cannot work properly.
Checking between the AnSHCPU and a peripheral device will result in a mismatch.

7.1.2 Handling precautions

(1) Handle memory cassettes and pin connectors with care since their plastic bodies cannot resist strong impacts.

(2) Do not remove the printed circuit board from its enclosure.

(3) Take care not to let chips of wires and other foreign material enter the memory cassette.

(4) When installing a memory cassette in an AnSHCPU module, push it in so that the connectors engage securely.

(5) Never place a memory cassette on metal, which may allow current flow, or on an object which is charged with static electricity, such as wood, plastic, vinyl, fiber, cable or paper.

(6) Do not touch or bend the leads of memory chips.

(7) Do not touch the connectors of a memory cassette. This could cause insecure contact.

POINT

(1) Always turn OFF the power to an AnSHCPU module when installing or removing a memory cassette. If a memory cassette is installed or removed with the power to the CPU ON, the data contents of the memory may be destroyed while the AnSCPU power is live.

(2) If the power is turned ON when the memory cassette is installed, the program in the built-in RAM memory of the CPU module is overwritten by that of the memory cassette.
If the program in the RAM memory needs to be saved, install the memory cassette after making a backup of the program by using a programming device.

7.1.3 Installing and removing a memory cassette

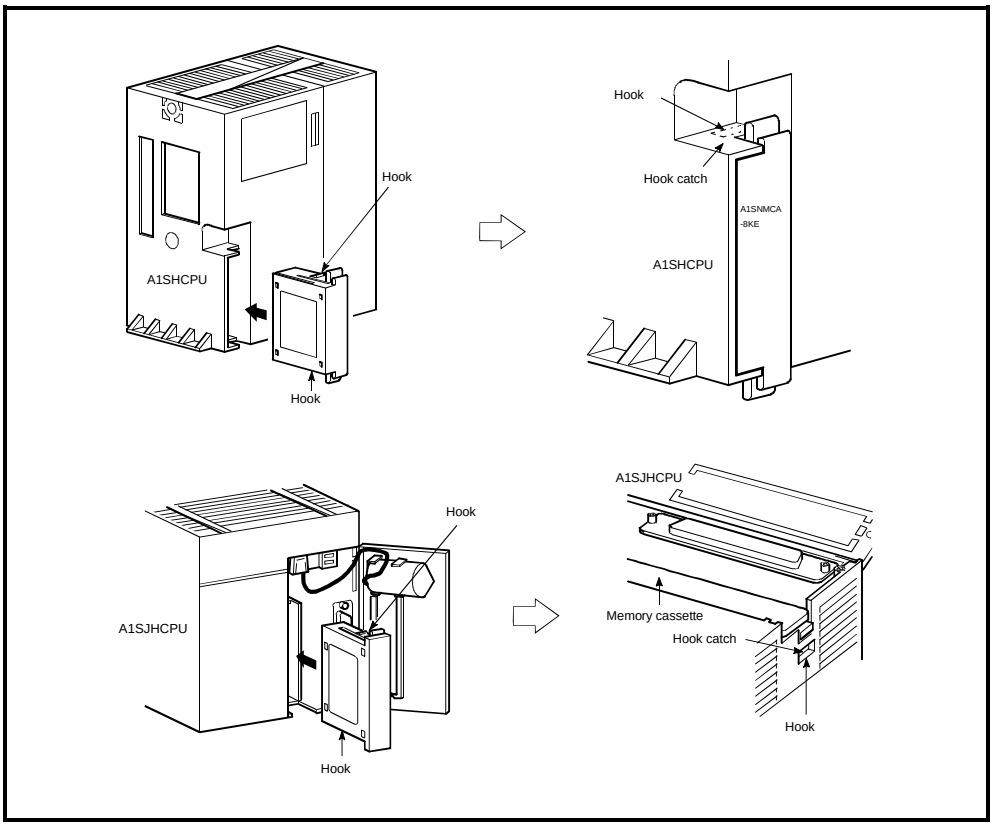
⚠ DANGER
• Push the memory cassette onto the fixing connector to install it securely. Check that floating does not occur after its installation. Poor contact could result in a malfunction.

The installation/removal method of the memory cassette is common in all AnSHCPU models, but the installation position is unique to each model.

Memory cassette installation position: A1SHCPU/A2SHCPU(-S1) ----- Left side

A1SJHCPU(S8) --- Front

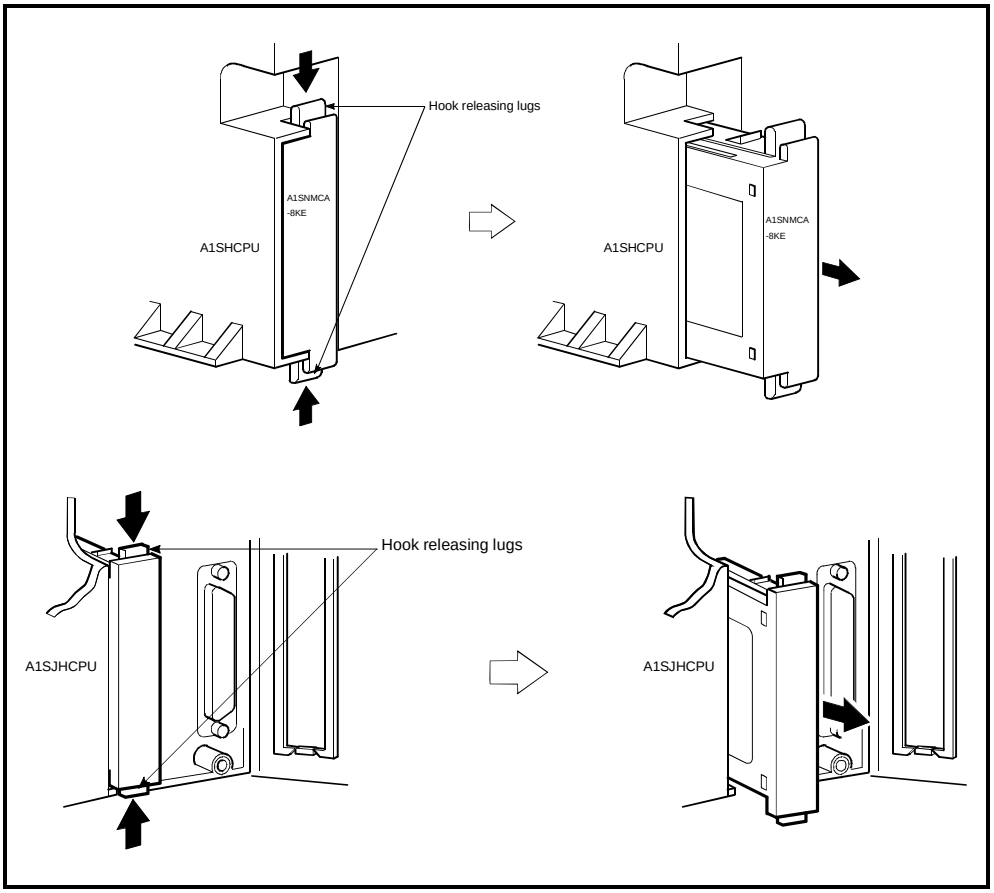
(1) Installing a memory cassette



(a) Hold the memory cassette vertically so that its model name is right side up and its connector faces the AnSHCPU module. Insert the memory cassette all the way in the AnSHCPU module so that the hooks of the memory cassette are completely engaged (they will click).

(b) Make sure the hooks are completely engaged.

(2) Removing a memory cassette



(a) Pull out the memory cassette while pushing the hook releasing lugs that are provided at the top and the bottom of the memory cassette.

7.1.4 Writing a sequence program to a memory cassette

A sequence program can be written to, or erased from, an A1SMCA-8KP or A1SNMCA-8KP using a ROM writer/eraser.

If a memory cassette is installed in the ROM socket of an A6GPP or A6WU, use either of the following memory write adapters.

CPU model	Memory cassette model	Memory write adapter
A1SHCPU	A1SNMCA-8KP	A6WA-28P
A1SJHCPU(S8)/A1SHCPU	A1SMCA-8KP, A1SNMCA-8KP	A6WA-28P

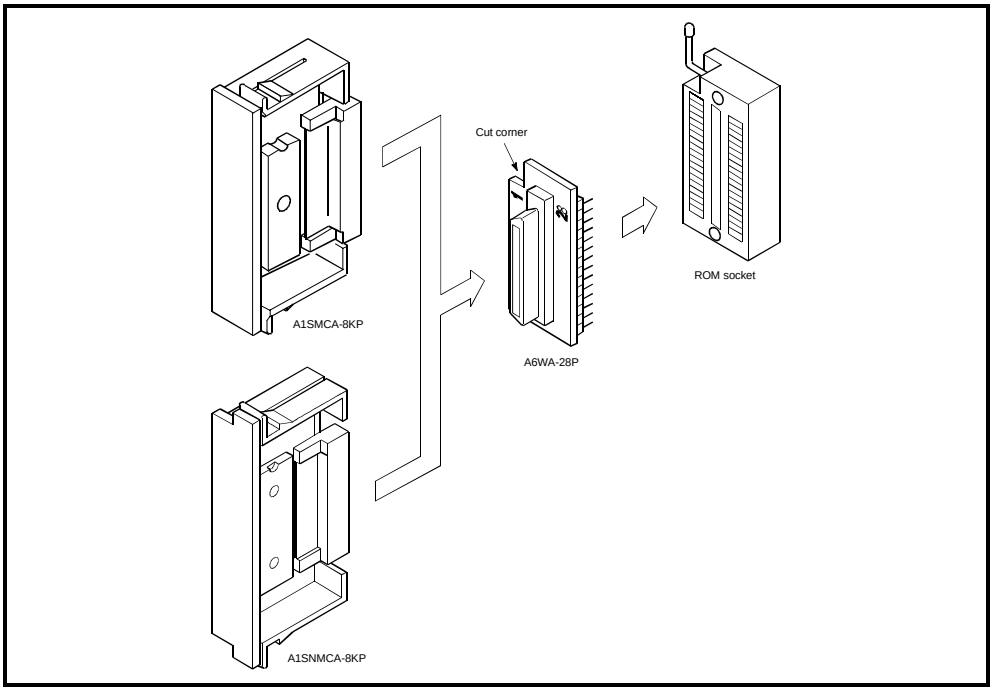
POINT

(1) It is necessary to change the start-up model name when using SW□GP-GPPA to initialize the ROM of the A1SHCPU/A1SJHCPU.
Set "A0J2H" for Version Q or earlier, or "A1S" for Version R or later.
In addition, select "27256" for the ROM setting type.

(2) Take caution when a software version that selects "A0J2H" or "A1S" is used to initialize the ROM, since the file register area of 8k points will be reduced to 4k points.
As a countermeasure, use a software package for which A1SJH/A1SH can be selected.

(1) Mount a memory cassette to the memory write adapter. Couple the connectors correctly.

(2) Mount the memory write adapter coupled with the memory cassette to the ROM socket of an A6GPP or A6WU in the correct orientation. The pin on the cut corner side of the memory write adapter is pin No.1.

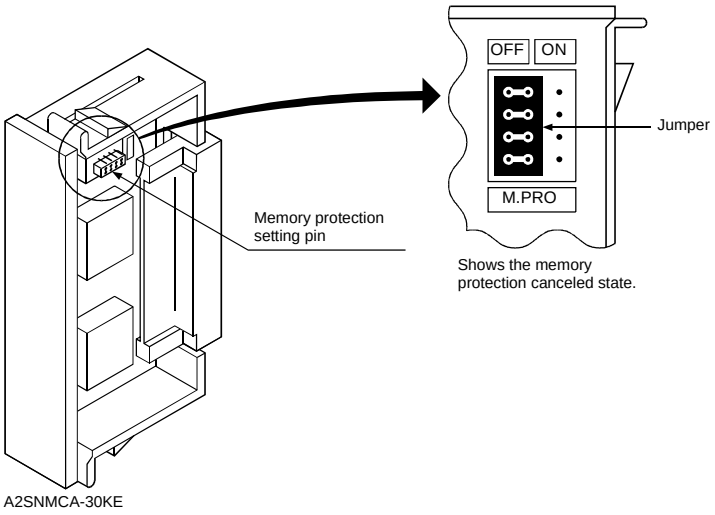


7.1.5 Memory write-protect setting for an A2SNMCA-30KE

When an A2SNMCA-30KE is installed on an A2SHCPU, misuse of peripheral devices can cause the E^2PROM memory to be over-written. In order to prevent this from occurring, the A2SNMCA-30KE has been provided with a memory write-protect setting.

When the memory write-protect setting pin is in the ON position, all 64 k bytes of the user memory area will be protected.

The memory write-protect setting pin must be moved to the OFF position in order to allow the contents of the ROM memory to be corrected.
The pin is set to the OFF position before shipment from the factory.
See Section 4.1.9 regarding memory area allocation.



7.2 Battery

⚠ DANGER

- Connect the battery correctly. Do not perform charging, disassembly, heating, throwing into fire, short-circuit, soldering and so on.
  Handling the battery incorrectly may cause injuries or a fire due to overheating, blowout, ignition and so on.

This section describes the specifications, handling instructions, and installation procedure for the battery.

7.2.1 Specifications

Table 7.3 shows specifications of the battery used to retain the data stored in memory when a power interruption occurs.

Table 7.3 Battery specifications

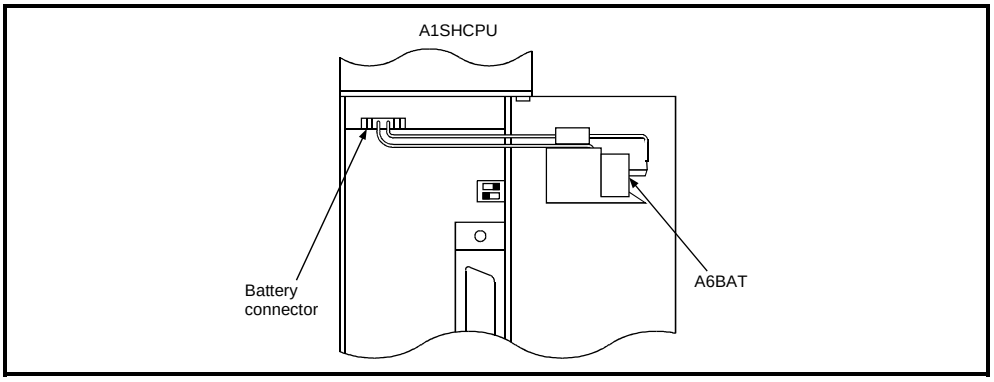
Item \ Model	A6BAT
Classification	Thiony chloride lithium battery
Normal voltage	3.6 V DC
Guaranteed life	5 years
Application	For IC-RAM memory backup and power interruption compensation function
External dimensions [mm (in.)]	ϕ16 (0.63) × 30 (1.18)

7.2.2 Installation of the battery

The battery lead connector is disconnected from the battery connector on the AnSHCPU board to prevent discharge during transportation and storage.

Before starting the AnSHCPU, plug the battery connector into the battery connector on the AnSHCPU board.

- To use a sequence program stored in the user program area in the AnSHCPU if a power interruption occurs.
- To retain the data if a power interruption occurs.



8. LOADING AND INSTALLATION

This chapter describes the procedure for loading and installation and gives relevant precautions to ensure that the system performs with high reliability and that its functions are used to best effect.

8.1 Consideration for Safety

When the power to the system is turned ON or OFF, the process output may not perform normally at times due to the difference between the delay time and the rise time of the power supply of the PLC CPU main module and the external power supply (especially DC). Also, if there is an error in the external power supply, the output process may malfunction.

For example, if the power supply to the PLC is switched on after switching on the external power supply for the sequence program operation at a DC output module, the DC output module may temporarily output erroneous signals when the power to the PLC is switched on. A circuit that allows the power to the PLC to be switched on first must therefore be provided.

In addition, if there is an abnormality in the external power supply or trouble in the PLC, this could cause malfunction.

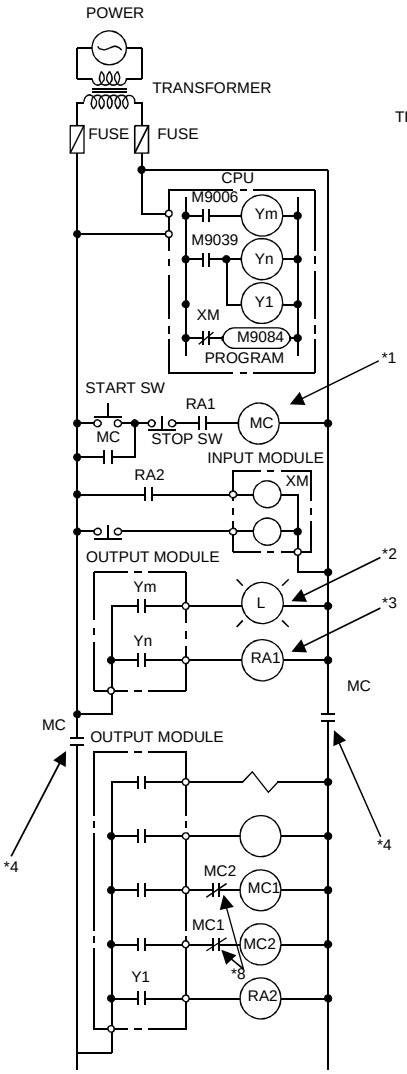
To (a) prevent erroneous operation of the entire system, and (b) ensure safety, prepare circuits (such as an emergency stop circuit, protection circuit, and interlock circuit) that prevent machine damage and/or accidents due to erroneous operation of peripheral devices. An example system design circuit based on this concept is shown on the following page.

⚠ DANGER

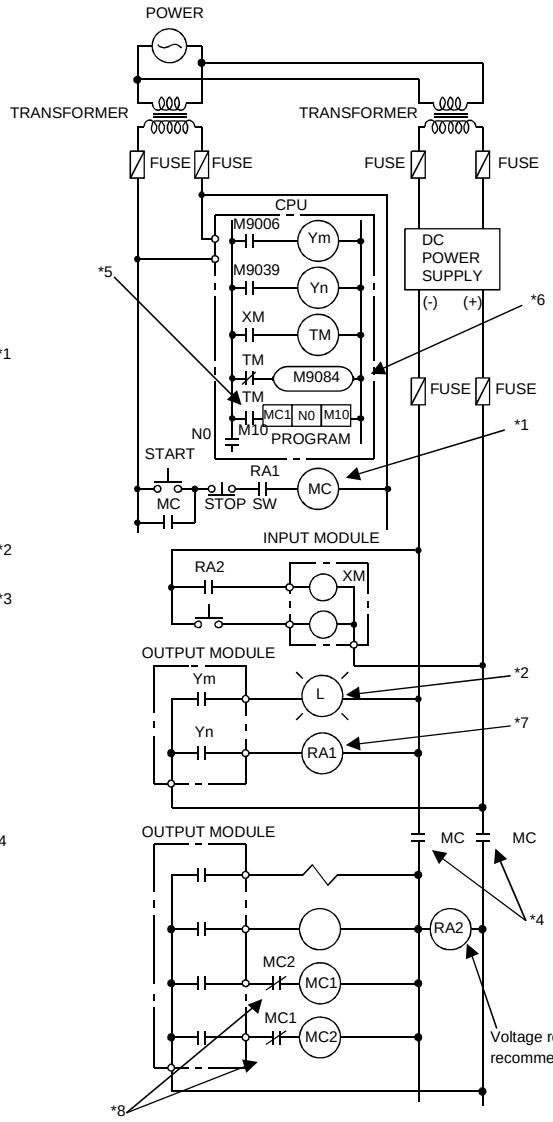
- Safety circuitry must be so designed and constructed externally that an entire system stays in safe in case of a external power supply failure and/or PLC failure. In particular, the following safety circuitry are required to constructed outside of the PLC.
  (1) Emergency stop circuit, protection circuit, interlocking circuit for contrary operations such as forward and reverse movement , and hardware stroke limit circuit for positioning controls must be constructed externally.
  (2) In case of hardware failure which PLC CPU cannot detect occurs, all or some output signals could be turned on without program instructions. An external safety circuitry must be so constructed that safety of equipment or machine can be protected from such case. Please refer to Sub-clause 4.3.2 for details.
  (3) In some cases, relays or transistors used in output modules stay always ON or OFF as failure symptoms. If such failure could cause serious damage on persons or properties, those safety critical output signals must be externally monitored.
- If the power to the PLC is turned ON after turning ON the external power supply used for the process control with the DC output module, the DC output module may make an erroneous output for an instant. Take the following procedures for power up of the equipment, in order to prevent such erroneous input and output to/from the PLC.

(1) System design circuit example

ALL AC



Mixed AC and DC



*1 : RUN/STOP circuit interlocked with RA1 (run monitor relay)

*2 : Low battery alarm

*3 : RA1 switched ON by M9039 (run monitor relay)

*4 : Power to output equipment switched OFF when the STOP signal is given.

*5 : Input switched when power supply established.

*6 : Set time for DC power supply to be established.

*7 : ON when run by M9039

*8 : Interlock circuits as necessary.

The power-ON procedure is as follows :

For AC

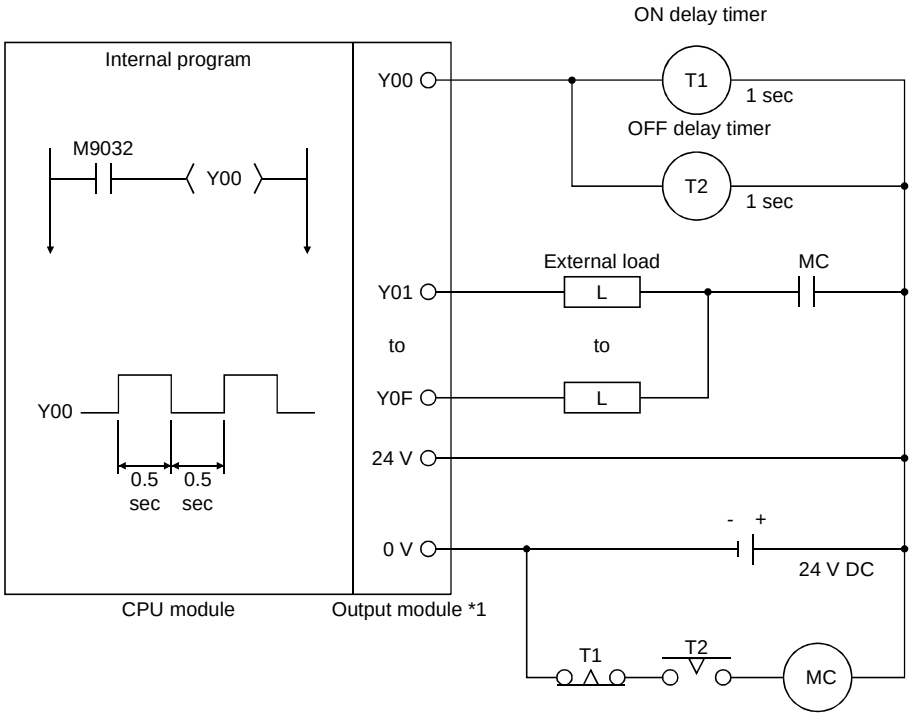
1) Switch ON the power.
2) Set the CPU module to RUN.
3) Turn ON the start switch.
4) When the magnetic contactor (MC) comes in, the output equipment is powered and may be driven by the program.

For AC/DC

1) Switch ON the power.
2) Set the CPU module to RUN.
3) Turn ON the start switch.
4) When DC power is established, RA2 comes ON.
5) Timer (TM) times out after the DC power reaches 100 %. (The TM set value should be the period of time from when RA2 comes ON to the establishment of 100 % DC voltage. Set this value to approximately 0.5 seconds.)
6) When the magnetic contactor (MC) comes in, the output equipment is powered and may be driven by the program. (If a voltage relay is used at RA2, no timer (TM) is required in the program.)

(2) Fail-safe measures against PLC failures

Problems with the CPU or memory can be detected by the self-diagnosis function. However, problems with the I/O control area may not be detected by the CPU.
If such a problem arises, all I/O points turn ON or OFF depending on the nature of the problem, and it may not be possible to maintain normal operating conditions and operating safety.
Although Mitsubishi PLCs are manufactured under strict quality control, they may fail or operate abnormally due to unspecifiable reasons. To prevent the abnormal operation of the whole system, machine breakdown, and accidents, build a fail-safe circuit outside the PLC.
The following is an example of a fail-safe circuit.



*1 : Y00 repeats turning ON and then OFF at 0.5 second intervals. Use a no-contact output module (transistor in the example shown above).

8.2 Installation Environment

Never install the AnSHCPU system in the following environments :

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

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

(3) Locations where dew condensation takes place due to sudden temperature changes.

(4) Locations where there are corrosive and/or combustible gasses.

(5) Locations where there is a high level of conductive powder (such as dust and iron filings, oil mist, salt, and organic solvents).

(6) Locations exposed to the direct rays of the sun.

(7) Locations where strong power and magnetic fields are generated.

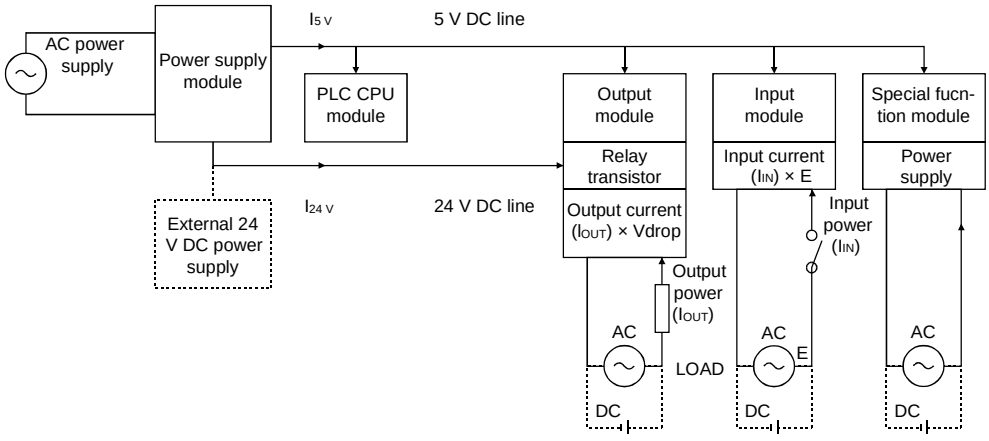
(8) Locations where vibration and shock are directly transmitted to the main module.

8.3 Calculation of Heat Generated by the Programmable Controller System

The operating ambient temperature of the PLC must be kept below 55 °C. In order to plan a heat dissipating design for the panel that houses the equipment, the average power consumption (heat generation) of the devices and equipment housed in the panel must be known. Therefore, the method for determining the average power consumption of an AnSHCPU system is described here. Calculate the temperature rise inside the panel from the power consumption.

Average power consumption

Power is consumed by the following PLC areas :



(1) Power consumption of a power supply module

Approximately 70 % of the power supply module current is converted into power and 30 % of that 70 % is dissipated as heat, i.e., 3/7 of the output power is actually used.

$$Wpw = \frac{3}{7} \{(I_{5V} \times 5) + (I_{24V} \times 24)\} (W)$$

Where, I_{5V} = V DC logic circuit current consumption of each module.
I_{24V} = current consumption of the output modules (with an average number of points switched ON) ...(Not for 24 V DC input power supply modules)

(2) Total 5 V DC power consumption

5 V DC is supplied to each module via the base plate, which powers the logic circuitry.

$W_{5V} = I_{5V} \times 5 (W)$

(3) Total 24 V DC output module power consumption (with an average number of points switched ON)

24 V DC is supplied to drive output devices.

$W_{24V} = I_{24V} \times 24 (W)$

(4) Power consumption of output circuits (with an average number of points switched ON)

$W_{OUT} = I_{OUT} \times Vdrop \times$ average number of outputs on at one time (W)

Where, I_{OUT} = output current (actual operating current) (A)
Vdrop = voltage dropped across each output load (V)

(5) Power consumption of input circuits (with an average number of points switched ON)

$W_{IN} = I_{IN} \times E \times$ average number of inputs on at one time (W)

Where, I_{IN} = input current (effective value for AC) (A)
E = input voltage (actual operating voltage) (V)

(6) Power consumption of the special function module power supply is expressed as :

$$Ws = I_{5V} \times 5 + I_{24V} \times 24 + I_{100V} \times 100 \text{ (W)}$$

The sum of the above values is the power consumption of the entire PLC system.

$$W = W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_S \text{ (W)}$$

Further calculations are necessary to work out the power dissipated by the other equipment in the panel.

Generally, the temperature rise in the panel is expressed as :

$$T = \frac{W}{UA} \text{ (°C)}$$

Where, W = power consumption of the entire PLC system (obtained as shown above)

A = panel inside surface area (m^2)

U = 6 (if the panel temperature is controlled by a fan, etc.)
4 (if the panel air is not circulated)

POINT

If the temperature rise inside the panel exceeds the stipulated range, you are recommended to install a heat exchanger in the panel to lower the temperature.
If an ordinary ventilation fan is used, dust will be sucked in along with the air from outside the panel and this may affect the performance of the PLC.

8.4 Module Mounting

This section gives the mounting instructions for the main base unit and extension base units.

8.4.1 Mounting instructions

The instructions for mounting the PLC to a panel, etc. are presented below :

(1) To improve ventilation and facilitate the replacement of the module, provide 30 mm (1.18 in.) or more of clearance around the PLC.

However, when an extension base unit of one of models A52B, A55B, A58B, A62B, A65B, and A68B is used, allow a clearance of 80 mm (3.15 in.) or more between the top face of the module and the surface of a structure or component.

(2) Do not mount the base unit vertically or horizontally since this will obstruct ventilation.

(3) Ensure that the base unit mounting surface is uniform to prevent strain. If excessive force is applied to the printed circuit boards, this will result in incorrect operation. Therefore, mount the base unit on a flat surface.

(4) Avoid mounting the base unit close to vibration sources, such as large magnetic contactors and no-fuse breakers, install the base unit in another panel or distance the base unit from the vibration source.

(5) Provide a wiring duct as necessary.

However, if the dimensions from the top and bottom of the PLC are less than those shown in Fig. 8.1, note the following points :

(a) When the duct is located above the PLC, the height of the duct should be 50 mm (1.97 in.) or less to allow for sufficient ventilation.

Between the duct and the top of the PLC, provide a sufficient distance to allow the cable to be removed by opening the cable connector fixing the lever.

If the lever at the top of the module cannot be opened, it will not be possible to replace the module.

(b) If a duct is built under the PLC, provide a clearance between the bottom surface of the PLC and the surface of the duct so that the input power cable (100/200 V AC) of the power supply module and the I/O cables and the cable for 12/24 V DC of I/O modules are not affected or bent.

(6) If an equipment which generates noise or heat is positioned in front of the PLC (i.e, mounted on the back side of a panel door), allow a clearance of 100 mm (3.94 in.) or more between the PLC and the equipment.

Also allow a clearance of 50 mm (1.97 in.) or more between the right/left side of a base unit and this equipment.

(7) It is recommendable to fix the base module to the control panel directly using screws, as this method ensures higher resistance to vibration than when using a DIN rail.

8.4.2 Installation

This section explains how to mount main and extension base units.

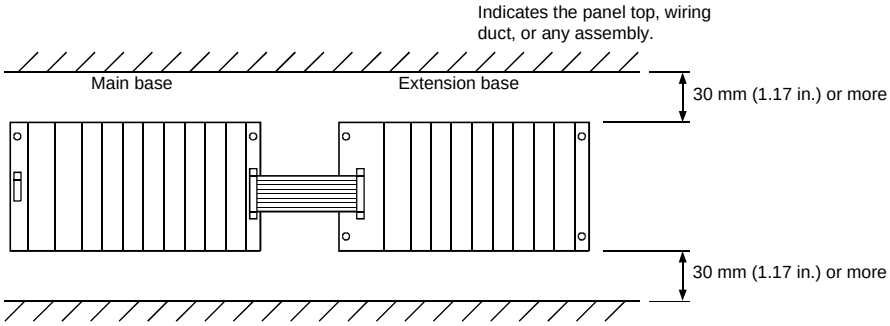


Fig. 8.1 Parallel mounting

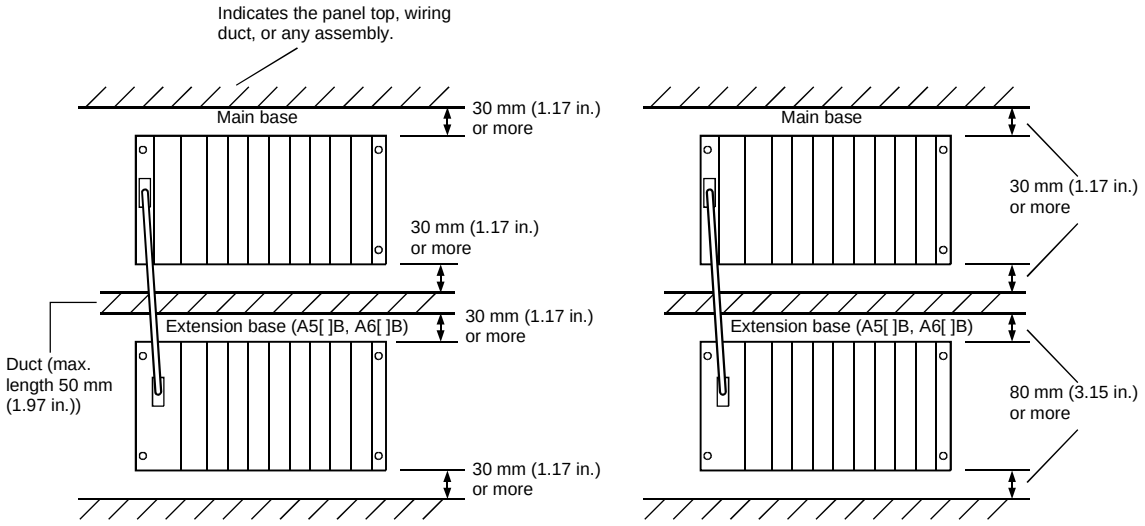


Fig. 8.2 Serial mounting

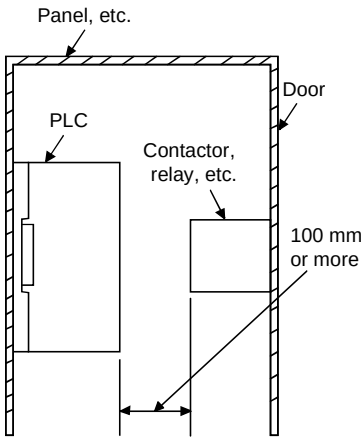


Fig. 8.3 Minimum front clearance with panel door

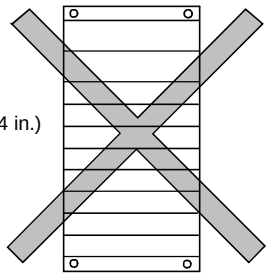


Fig. 8.4 Vertical mounting (not allowed)

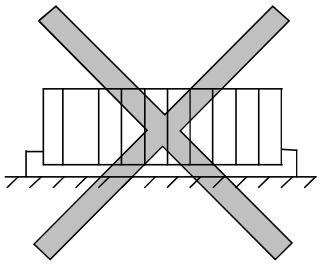


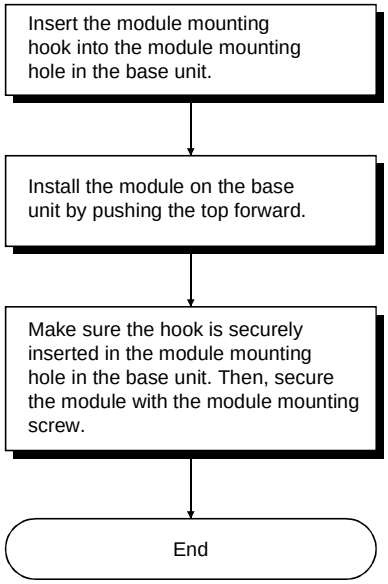
Fig. 8.5 horizontal mounting (not allowed)

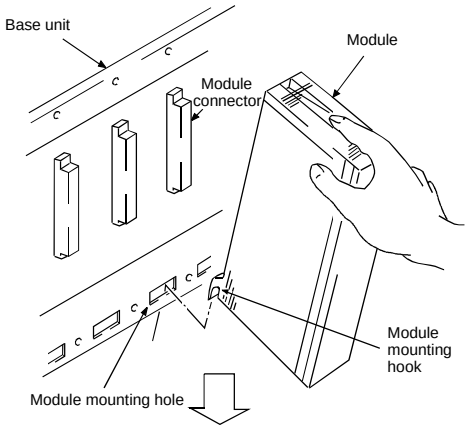
8.5 Installation and Removal of Module

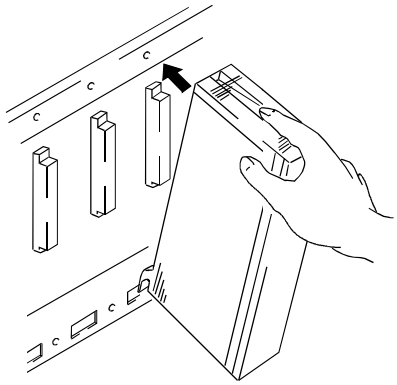
This section explains the mounting and removal of the I/O module and special function module, etc., to and from the base module.

(1) Module mounting

The module mounting procedure is as follows.



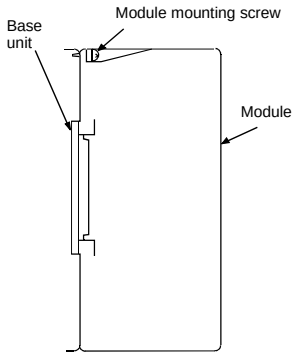




POINT

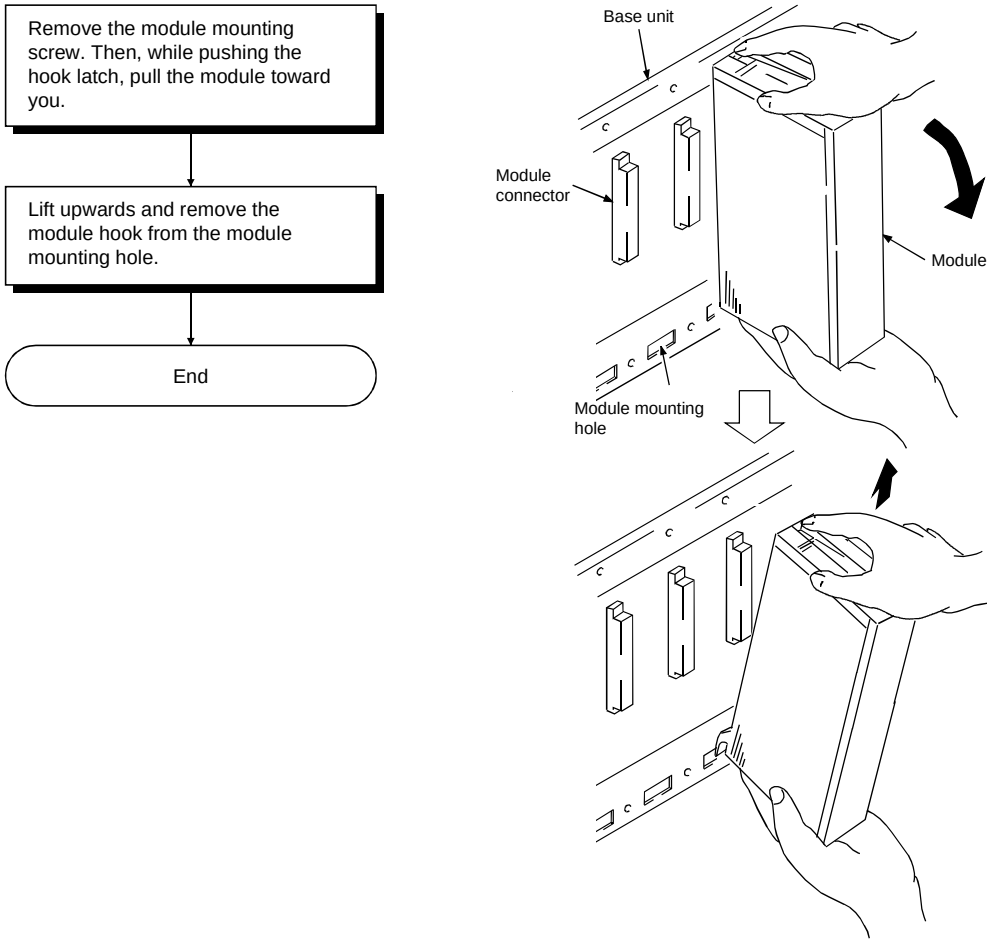
(1) When securing the module, be sure to insert the module mounting hook into the module mounting hole. If the module is forcibly secured without insertion, the module's connector or the module itself may be damaged.

(2) Always turn the power supply OFF before mounting or removing any module.



(2) Module removal

The module removal procedure is as follows.



POINT

(1) When removing the module, be sure to remove the module mounting screw first and then remove the module mounting hook from the module mounting hole. If the module is forcibly removed, the screw or module mounting hook will be damaged.

(2) Always turn the power supply OFF before mounting or removal.

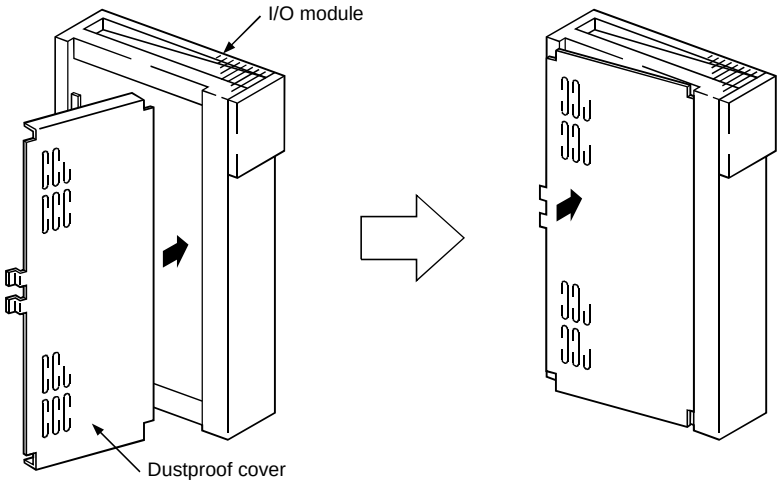
8.6 Installing and Removing the Dustproof Cover

⚠ DANGER

- When configuring the system, do not leave any vacant slots on the base.
  Should there be any vacant slots, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62).
  When the extension base A1S52B, A1S55B, or A1S58B is used, be sure to install the provided dustproof cover to the module installed in slot 0 without fail.
  If a short-circuit test is performed, or overcurrent or overvoltage is accidentally applied to the external I/O area, the internal parts of the module may be scattered.

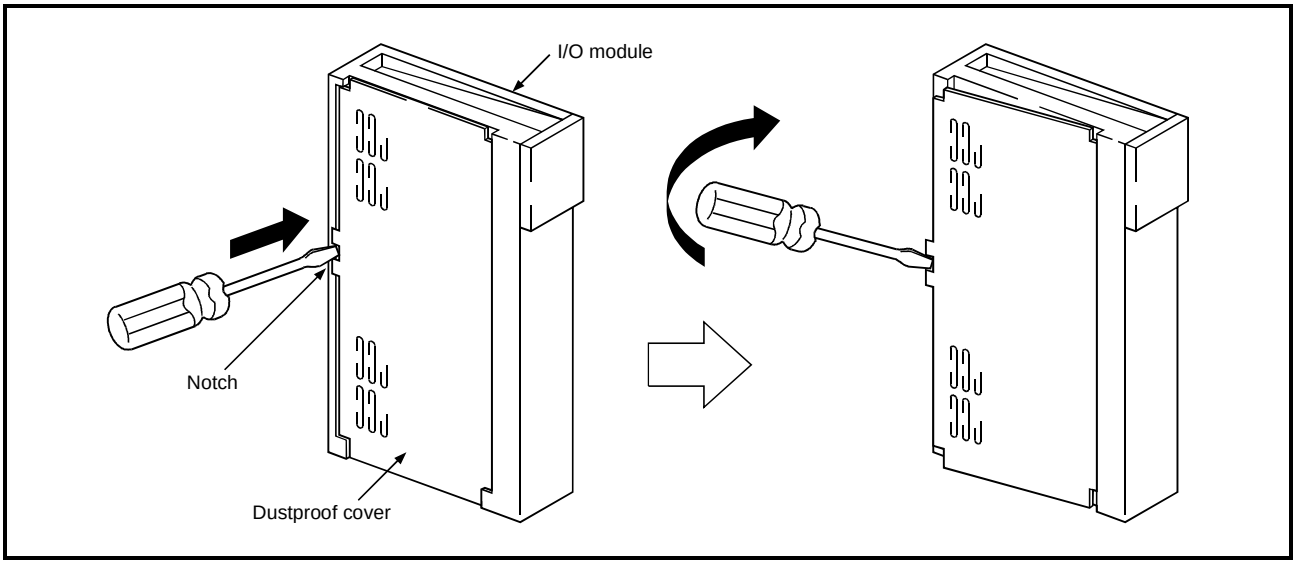
When an A1S52B(S1), A1S55B(S1), or A1S58B(S1) is used, it is necessary to mount the dustproof cover, which is supplied with the base, to the I/O module loaded at the left end to prevent foreign matter from entering the I/O module. If the dustproof cover is not mounted, foreign matter will enter the I/O module, resulting in malfunction. The following explains the installation and removal of the dustproof cover.

(1) Installation



To fit the dustproof cover to the I/O module, first insert it at the terminal side and then press it against the I/O module as shown in the figure.

(2) Removal



Fit the tip of a flat blade screwdriver into the notch on the left side of the dustproof cover. While keeping the screwdriver tip in the notch, gently move the screwdriver to the left (as shown above) until the cover snaps open.

8.7 Wiring

This section gives the wiring instructions for the system.

8.7.1 Wiring instructions

⚠ DANGER

- Before biginning any installation or wiring work, make sure all phases of the power supply have been obstructed from the outside. Failure to completely shut off the power supply phases may cause electric shock and/or damage to the module.
- When turning on the power or operating the module after installation or wiring work, be sure the module's terminal covers are correctly attached. Failure to attach the terminal covers may result in electric shock.

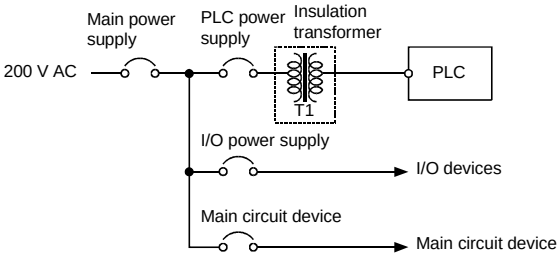
⚠ CAUTION

- Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.
- When wiring the PLC, check the rated voltage and terminal layout of the wiring, and make sure the wiring is done correctly. Connecting a power supply that differs from the rated voltage or wiring it incorrectly may coups fire or breakdowns.
- Do not connect the outputs of two or more power supply modules in parallel. The power supply module may overheat and cause a fire or failure.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it may result in short circuits, fire or malfunction.
  If the terminal screws are tightened too much, it may damage the screws and the module result in short circuits, malfunction or cause the module to fall out.
- Be careful not to let foreign matter such as filings or wire chips gear inside the module. These can cause fire, breakdowns and malfunction.
- Perform correct pressure-welding, crimp-contact or soldering for connectors for the outside using the specified tools. See the User's Manual of the corresponding I/O module for tools required to perform pressure-welding and crimp-contact.
  Incorrect connection may cause short circuits, fire, or malfunction.
- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 in.) or more from each other. Failure to do so may result in nose that would cause malfunction.

Precautions when wiring power supply cable are described.

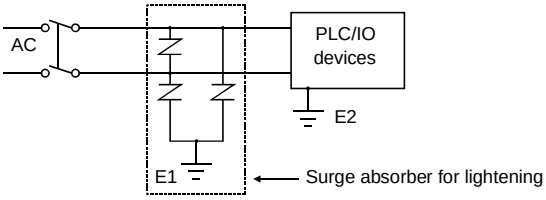
(1) Wiring power supply

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



(b) 100 V AC, 200 V AC and 24 V DC wires should be twisted as dense as possible. Connect the modules with the shortest distance.
Also, to reduce the voltage drop to the minimum, use the thickest wires possible (maximum 2 mm^2).

(c) As a countermeasure to power surge due to lightening, connect a surge absorber for lightening as shown below.



POINT

(1) Separate the ground of the surge absorber for lightening (E_1) from that of the PLC (E_2).

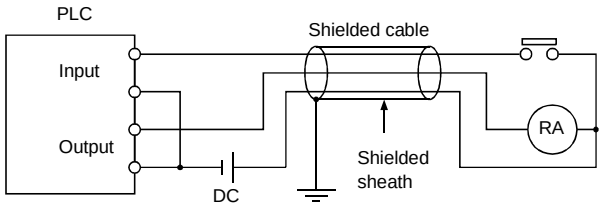
(2) Select a surge absorber for lightening whose power supply voltage does no exceed the maximum allowable circuit voltage even at the time of maximum power supply voltage elevation.

(2) Wiring of I/O equipment

(a) The applicable size of wire for connection to the terminal block connector is 0.75 (18) to 1.25 mm^2 (14 AWG). However, it is recommended to use wires of 0.75 mm^2 (18 AWG) for convenience.

(b) Separate the input and output lines.

(c) If the I/O signal wires cannot be separated from the main circuit wires and power wires, ground at the PLC side with batch-shielded cables. Under some conditions, it may be preferable to ground at the other side.



(d) If wiring has been done with piping, ground the piping.

(e) Separate the 24 V DC I/O cables from the 100 V AC and 200 V AC cables.

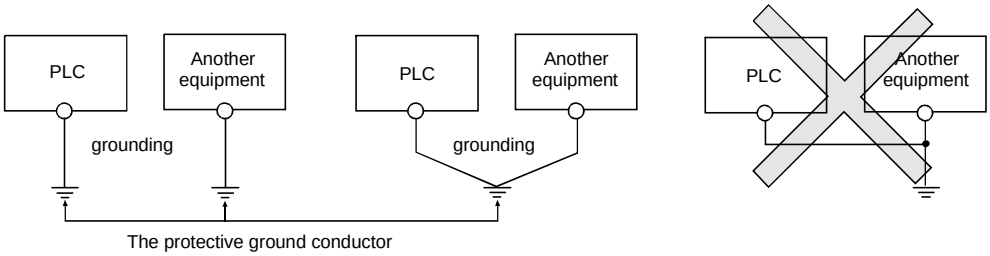
(f) If wiring over 200 m (0.12 mile) or longer distances, problems can be caused by leakage currents due to line capacity. Take corrective action as described in Section 11.4.

(2) 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 (grounding resistance 100 Ω or less).

(b) If independent grounding is impossible, use the joint grounding method as shown in the figure below (2).

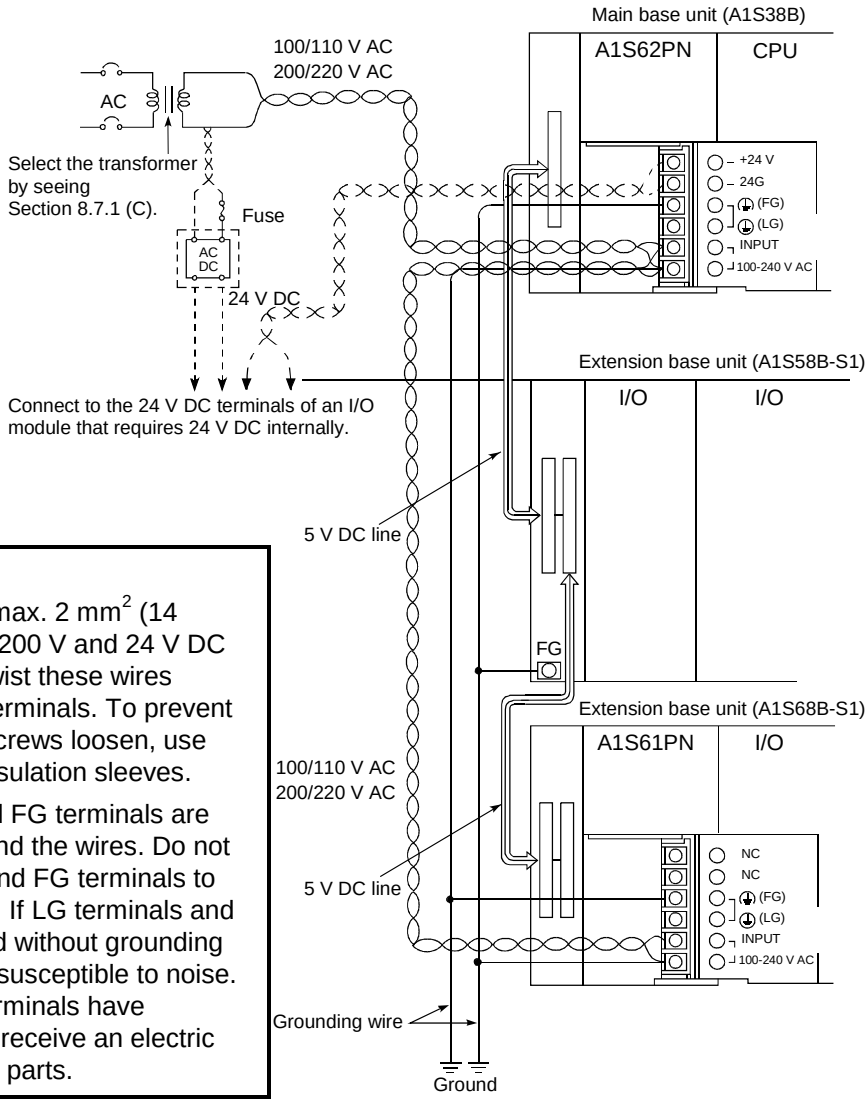


(1) Independent grounding…Best (2) Joint grounding…..Good (3) Joint grounding…..Not allowed

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

8.7.2 Wiring to module terminals

This section explains the wiring of power lines and grounding lines to the main and extension bases .



POINT

(1) Use the thickest possible (max. 2 mm^2 (14 AWG)) wires for the 100 V/200 V and 24 V DC power cables. Be sure to twist these wires starting at the connection terminals. To prevent a short-circuit should any screws loosen, use solderless terminals with insulation sleeves.

(2) When the LG terminals and FG terminals are connected, be sure to ground the wires. Do not connect the LG terminals and FG terminals to anything other than ground. If LG terminals and FG terminals are connected without grounding the wires, the PLC may be susceptible to noise. In addition, since the LG terminals have potential, the operator may receive an electric shock when touching metal parts.

8.8 Precaution when Connecting the Uninterruptive Power Supply (UPS)

Be sure of the following items when connecting the AnSHCPU system to the uninterruptive power supply (abbreviated as UPS hereafter) :

Use the online UPS with a voltage distortion of 5% or less or line-interactive UPS.

For standby UPS, select the Mitsubishi FREQUPS-F series UPS (serial No. P or later) such as FW-F10-03K/0.5K.

Do not use the stand UPS other than above.

9. EMC DIRECTIVE AND LOW-VOLTAGE INSTRUCTION

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

The EMC Directive (89/336/EEC) will become mandatory within Europe from January 1st 1996. The EMC directive in essence defines the amount of electromagnetic output a product is allowed to produce and how susceptible that product is to electromagnetic interference. Any manufacturer or importer of electrical/electronic apparatus must before releasing or selling products within Europe after that date have either a CE mark attached to their goods. Testing to comply with the directive is done by use of agreed European standards which define limits for radiated and mains conducted electromagnetic emissions from equipment, levels of immunity to radiated emissions, ability for equipment to cope with transient voltage surges and electro-static discharges.

When installed in the specified manner this unit will be compliant with the relevant standards EN50081-2 and prEN50082-2 as applicable in the EMC directive. Failure to comply with these instructions could lead to impaired EMC performance of the equipment and as such Mitsubishi Electric Corporation can accept no liability for such actions.

9.1.1 EMC standards

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

Specifications	Test Item	Test Description	Standard Values
EN50081-2 : 1995	EN55011 Radiated noise	Measure the electric wave released by the product.	30 M-230 M Hz QP : 30 dBμ V/m (30 m measurement) *1 230 M-1000 M Hz QP : 37 dBμ V/m (30 m measurement)
	EN55011 Conduction noise	Measure the noise released by the product to the power line.	150 K-500k Hz QP: 79 dB, Mean : 66 dB *1 500 K-30M Hz QP : 73 dB, Mean: 60 dB
prEN50082-2 : 1991	IEC801-2 Static electricity immunity *2	Immunity test by applying static electricity to the module enclosure.	4 k V contact discharge 8 k V air discharge
	IEC801-3 Radiated electromagnetic field *2	Immunity test by radiating an electric field to the product.	10 V/m, 27-500 M Hz
	IEC801-4 First transient burst noise	Immunity test by applying burst noise to the power line and signal cable.	2 k V
EN50082-2 : 1995	EN61000-4-2 Static electricity immunity *2	Immunity test by applying static electricity to the module enclosure.	4 k V contact discharge 8 k V air discharge
	EN61000-4-4 First transient burst noise	Immunity test by applying burst noise to the power line and signal cable., 2 k V	2 k V
	ENV50140 Radiated electromagnetic field AM modulation *2	Immunity test by radiating an electric field to the product.	10 V/m, 80-1000 M Hz, 80 % AM modulation@1 k Hz
	ENV50204 Radiated electromagnetic field Pulse modulation *2	Immunity test by radiating an electric field to the product.	10 V/m, 900 M Hz, 200 Hz pulse modulation, 50 % duty
	ENV50141 Conduction noise	Immunity test by inducting electromagnetic field to the power line signal cable.	10 Vrms, 0.15-80 M Hz, 80 % modulation@1 k Hz

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

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

9.1.2 Installation inside the control cabinet

Since the PLC is an open type device (device incorporated into another device), it must be installed in the control cabinet. This has a good effect of not only for assuring safety but also for shielding noise emitted from the PLC, by means of the control cabinet.

(1) Control cabinet

(a) Use a conductive control cabinet.

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

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

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

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

(2) Connection of power and earth wires

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

(a) Provide an earthing point near the power supply module. Earth the power supply's LG and FG terminals (LG : Line Ground, FG : Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30 cm (11.18 in.) or shorter.) The LG and FG terminals function is to pass the noise generated in the PLC system to the ground, so an impedance that is as low as possible must be ensured. As the wires are used to relieve the noise, the wire itself carries a large noise content and thus short wiring means that the wire is prevented from acting as an antenna.

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

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

9.1.3 Cables

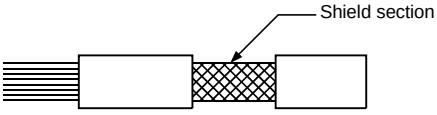
The cables led from the control cabinet contain a high frequency noise element and outside the control panel these cables act as antennae and radiate noise. The cables connected to input/output modules or special modules which leave the control panel must always be shielded cables.
Mounting of a ferrite core on the cables is not required (excluding some models) but if a ferrite core is mounted, the noise radiated through the cable can be suppressed further.
Use of a shielded cable is also effective for increasing the noise immunity level. The PLC system's input/output and special function module provide a noise immunity level of equivalent to that stated in IEC801-4 : 2 k V when a shielded cable is used. If a shielded cable is not used or if the shield earthing treatment is not suitable even when used (See Section 3.1.6), the noise immunity level is less than 2 k V.

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

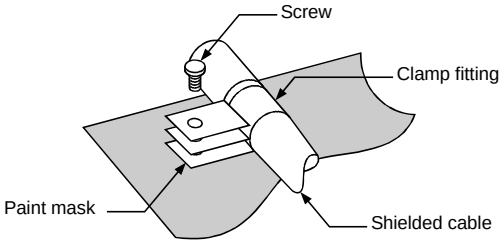
The meaning of "involved in process control" is not defined in prEN50082-2. However, when the purposes of the EMC Directive are considered, the signals that could cause personal injury or risks in the facility if a malfunction occurs should be defined as "signals involved in process control". Thus, it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

(1) Shield earthing

When a shield of the shielded cable is earthed to the cabinet body, please ensure that the shield contact with the body is over a large surface area. If the cabinet body is painted it will be necessary to remove paint from the contact area. All fastenings must be metallic and the shield and earthing contact must be made over the largest available surface area. If the contact surfaces are too uneven for optimal contact to be made either use washers to correct for surface inconsistencies or use an abrasive to level the surfaces. The following diagrams show examples of how to provide good surface contact of shield earthing by use of a cable clamp.

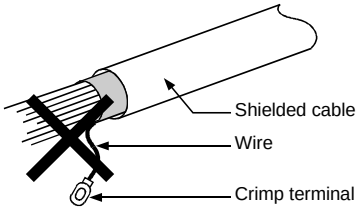


(a) Peal the cable insulation off and expose the shield section.



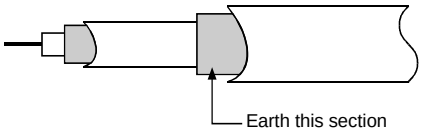
(b) Sandwich the exposed shield section with the and earth to the control cabinet over a wide area.

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



(2) MELSECNET/II, MELSECNET/10 module

(a) The following requirements apply to A1SJ71AR21, A1SJ71BR11, AnNCPUR21, AnACPUR21.
Always use a triaxial cable for the module. The radiated noise in the band of 30 M Hz or higher can be suppressed by using a triax cable. Earth the outer shield by the method described in (1).

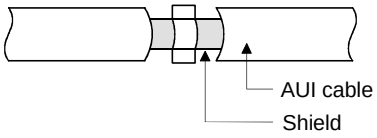


(b) Always mount a ferrite core onto the triaxial cable. Mount the ferrite core near the control cabinet outlet of each cable. Use of the TDK ZCAT3035 ferrite core is recommended.

(3) Ethernet module, Web server module

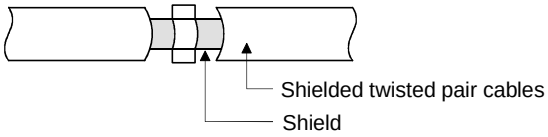
Precautions for using AUI cables, twisted pair cables and coaxial cables are described below.

(a) Always earth the AUI cables connected to the 10BASE5 connectors. Because the AUI cable is of the shielded type, strip part of the outer cover and earth the exposed shield section to the ground on the widest contact surface as shown below.



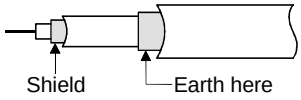
Refer to (1) for the earthing of the shield.

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



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

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



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

Ethernet is the registered trademark of XEROX Corporation in the US.

(4) I/O and other communication cables

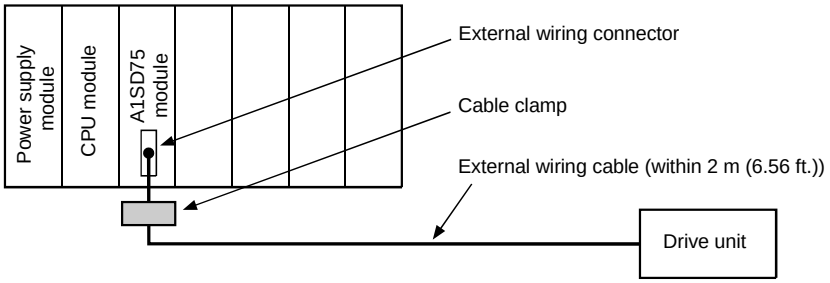
Always earth the shield section of the I/O signal cables and other communication cables (RS-232-C, RS-422, etc.) in the same manner as described in (1) if the cables go outside of the control cabinet.

(5) Positioning Modules

(a) When wiring with a 2 m (6.6 ft.) or less cable
Ground the shield section of the external wiring cable with the cable clamp.
(Ground the shield at the closest location to the A1SD75 external wiring connector.)

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

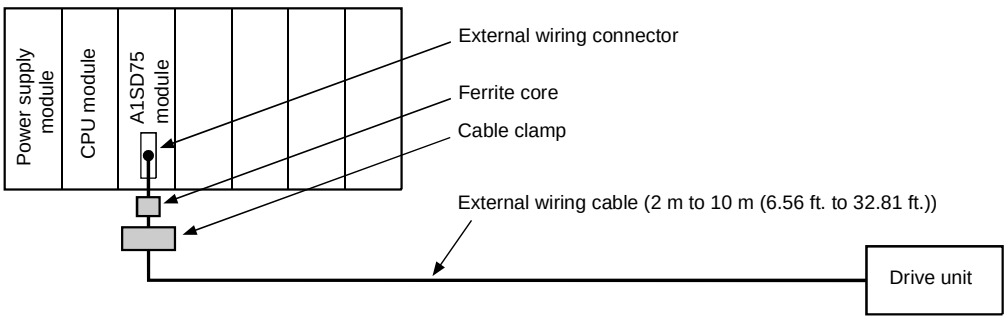
Install the drive unit in the same panel.



(b) When wiring with cable that exceeds 2 m (6.6 ft.), but is 10 m (32.8 ft.) or less
Ground the shield section of the external wiring cable with the cable clamp.
(Ground the shield at the closest location to the A1SD75 external wiring connector.)

Install a ferrite core.

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



(c) Ferrite core and cable clamp types and required quantities
- Cable clamp
  Type : AD75CK (Mitsubishi Electric)
- Ferrite core
  Type : ZCAT3035-1330 (TDK ferrite core)
- Required quantity

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

9.1.4 Power supply module

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

Model	Precautions
A1S63P *1	Use a CE-compliant 24VDC internal power supply.
A1S61PN A1S62PN	Make sure to short and ground the LG and FG terminals. *2
A1SJHCPU A1SJHCPU-S8	Make sure to short and ground the LG and FG terminals.

*1 If a sufficient filter circuitry is built into a 24 V DC external power supply module, the noise generated by A1S63P will be absorbed by that filter circuit, so a line filter may not be required.

Filtering circuitry of version F or later of A1S63P is improved so that a external line filter is not required.

*2 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.

9.1.5 Ferrite core

A ferrite core has the effect of reducing radiated noise in the 30MHz to 100MHz band.
It is not required to fit ferrite cores to cables, but it is recommended to fit ferrite cores if shield cables pulled out of the enclosure do not provide sufficient shielding effects.
It should be noted that the ferrite cores should be fitted to the cables in the position immediately before they are pulled out of the enclosure. If the fitting position is improper, the ferrite will not produce any effect.
In the CC-Link system, however, ferrite cores cannot be fitted to cables.

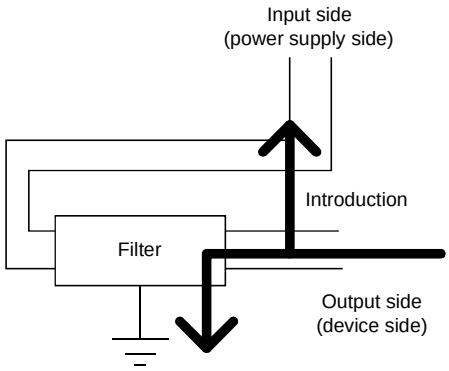
9.1.6 Noise filter (power supply line filter)

The noise filter (power supply line filter) is a device effective to reduce conducted noise. Except some particular models described in Section 3.1.3 (5), installation of a noise filter onto the power supply lines is not necessary. However conducted noise can be reduced if it is installed. (The noise filter is generally effective for reducing conducted noise in the band of 10 M Hz or less.) Usage of the following filters is recommended.

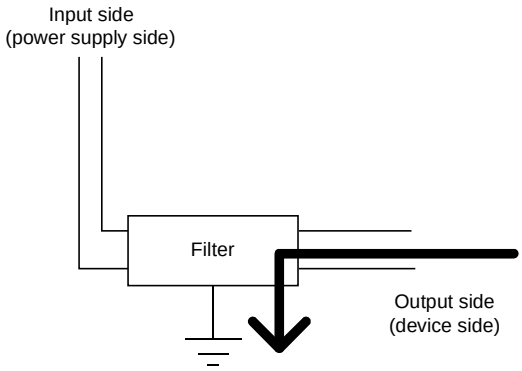
Model name	FN343-3/01	FN660-6/06	ZHC2203-11
Manufacturer	SCHAFFNER	SCHAFFNER	TDK
Rated current	3 A	6 A	3 A
Rated voltage	250 V		

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

(1) Do not bundle the wires on the input side and output side of the noise filter. When bundled, the output side noise will be induced into the input side wires from which the noise was filtered.



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



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

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

9.2 Requirement to Conform to the Low-Voltage Instruction

The low-voltage instruction, one of the European Instructions, is now regulated.

The low-voltage instruction require each device which operates with power supply ranging from 50 V AC to 1000 V and 75 V DC to 1500 V to satisfy necessary safety items.

In the Sections from 3.2.1 to 3.2.8, cautions on installation and wiring of the MELSEC-AnS series PLC to conform to the low-voltage instruction regulation are described.

We have put the maximum effort to develop this material based on the requirements and standards of the regulation that we have collected. However, compatibility of the devices which are fabricated according to the contents of this manual to the above regulation is not guaranteed. Each manufacturer who fabricates such device should make the final judgement about the application method of the low-voltage instruction and the product compatibility.

9.2.1 Standard applied for AnS series

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

For the modules which operate with the rated voltage of 50 V AC/75 V DC or above, we have developed new models that conform to the above standard.

For the modules which operate with the rated voltage under 50 V AC/75 V DC, the conventional models can be used, because they are out of the low-voltage instruction application range.

9.2.2 Precautions when using the AnS series

Module selection

(1) Power module

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

For a power module with 24 V DC rated input, a conventional model can be used.

(2) I/O module

For I/O module with rated input voltage of 100/200 V AC, select a model in which the internal area between the first order and second order is intensively insulated, because it has hazardous voltage area.

For I/O module with 24 V DC rated input, a conventional model can be used.

(3) CPU module, memory cassette, base unit

Conventional models can be used for these modules, because they only have a 5 V DC circuit inside.

(4) Special module

Conventional models can be used for the special modules including analog module, network module, and positioning module, because the rated voltage is 24 V DC or smaller.

(5) Display device

Use an A900 series GOT CE compatible model.

9.2.3 Power supply

The insulation specification of the power module was designed assuming installation category II. Be sure to use the installation category II power supply to the PLC.

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

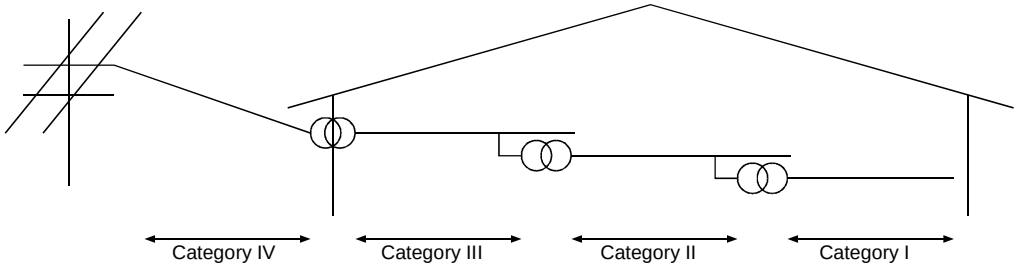


Figure 1. : Installation Category

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

9.2.4 Control box

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

(1) Electrical shock prevention

In order to prevent persons who are not familiar with the electric facility such as the operators from electric shocks, the control box must have the following functions :

(a) The control box must be equipped with a lock so that only the personnel who has studied about the electric facility and have enough knowledge can open it.

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

(2) Dustproof and waterproof features

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

Pollution level 1 :	An environment where the air is dry and conductive dust does not exist.
Pollution level 2 :	An environment where conductive dust does not usually exist, but occasional temporary conductivity occurs due to the accumulated dust. Generally, this is the level for inside the control box equivalent to IP54 in a control room or on the floor of a typical factory.
Pollution level 3 :	An environment where conductive dust exits and conductivity may be generated due to the accumulated dust. An environment for a typical factory floor.
Pollution level 4 :	Continuous conductivity may occur due to rain, snow, etc. An outdoor environment.

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

9.2.5 Module installation

(1) Installing modules contiguously

In AnS series PLCs, the left side of each I/O module is left open. When installing an I/O module to the base, do not make any open slots between any two modules. If there is an open slot on the left side of a module with 100/200 V AC rating, the printed board which contains the hazardous voltage circuit becomes bare. When it is unavoidable to make an open slot, be sure to install the blank module (A1SG60).

When using the A1S5□B expansion base with no power supply, attach the cover packaged with the expansion base to the side of the leftmost module.

9.2.6 Grounding

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

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

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

Functional grounding ⏚ : Improves the noise resistance.

9.2.7 External wiring

(1) 24 V DC external power supply

For special modules that require a 24 V DC I/O module or external power supply, use a model whose 24 V DC circuit is intensively insulated from the hazardous voltage circuit.

(2) External devices

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

(3) Intensive insulation

Intensive insulation refers to the insulation with the dielectric withstand voltage shown in Table 2.

Table 2 : Intensive Insulation Withstand Voltage (Installation Category II, source : IEC664)

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

10. MAINTENANCE AND INSPECTION

⚠ DANGER

- Do not touch a terminal while power is supplied.
  Doing so may result in electric shock or a malfunction.
- Connect the battery correctly. Do not perform charging, disassembly, heating, throwing into fire, short-circuit, soldering and so on.
  Handling the battery incorrectly may cause injuries or a fire due to overheating, blowout, ignition and so on.
- Be sure to shut down all phases of the external power supply before cleaning the module or retightening terminal screws.
  Unless all phases are shut down, electric shock may occur.
  Tightening the screws insufficiently may cause the module to fall, short-circuit, or malfunction.
  Tightening the screws too much may cause the module to fall, short-circuit, or malfunction due to damage to the screws or the module.

⚠ CAUTION

- Read the manuals carefully and confirm safety before performing online operation (in particular, changing a program, performing forced output, or changing the operation status) while connecting a peripheral device to the running CPU module.
  Erroneous operations may cause damage to the machine or an accident.
- Do not disassemble or modify the module.
  Doing so may cause a failure, malfunction, injury, or fire.
- Be sure to shut down all phases of the external power supply before installing or removing the module.
  Otherwise it may cause a failure or malfunction of the module.
- When using a cellular phone or PHS, keep it 25cm or more away from the PLC.

This chapter describes items to be checked in daily and periodic maintenance and inspection in order to maintain the programmable controller in the normal and optimum condition.

10.1 Daily Inspection

Table 10.1 shows the inspection and items which are to be checked daily.

Table 10.1 Daily inspection

No.	Check item		Check point	Judgement	Corrective action
1	Base unit mounting conditions		Check for loose mounting screws and cover	The base unit should be securely mounted.	Retighten screws.
2	Mounting conditions of I/O module, etc.		Check if the module is disengaged and if the hook is securely engaged.	The hook should be securely engaged and the module should be positively mounted.	Securely engage the hook.
3	Connecting conditions		Check for loose terminal screws.	Screws should not be loose.	Retighten terminal screws
			Check distance between Solderless terminals.	The proper clearance should be provided between Solderless terminals	Correct.
			Check connectors of extension cable.	Connections should no be loose.	Retighten connector mounting screws.
4	CPU module indicator lamps	"POWER" LED	Check that the LED is ON.	ON (OFF indicates an error.)	See Section 11.2.2
		"RUN" LED	Check that the LED is ON during RUN.	ON (OFF or flashing indicates an error.)	See Sections 11.2.3 and 11.2.4
		"ERROR" LED	Check that the LED is ON when an error occurred.	OFF (ON when an error occurred.)	See Sections 11.2.5 and 11.2.6
		Input LED	Check that the LED turns ON and OFF.	ON when input is ON. OFF when input is OFF. (Display, other than above, indicates an error.)	See Sections 11.2.7
		Output LED	Check that the LED turns ON and OFF.	On when output is ON. OFF when output is OFF. (Display, other than above, indicates an error.)	See Sections 11.2.7

10.2 Periodic Inspection

This section explains the inspection items which are to be checked every six months to one year. This inspection should also be performed when the equipment is moved or modified or the wiring is changed.

Table 10.2 Periodic inspection

No.	Check item		Check point	Judgement	Corrective action
1	Ambient environment	Ambient temperature	Measure whit thermometer and hygrometer. Measure corrosive gas.	0 to 55 °C	When PLC is used inside a panel, the temperature in the panel is the ambient temperature.
		Ambient humidity		10 to 90 % RH	
		Ambience		There should be no corrosive gases.	
2	Line voltage check.		Measure voltage across 100/200 V AC terminal.	85 to 132 V AC	Change supply power.
				170 to 264 V AC	
3	Mounting conditions	Looseness, play	Move the module.	The module should be mounted securely and positively.	Retighten screws.
		Ingress of dust or foreign material	Visual check.	There should be no dust or foreign material in the vicinity of the PLC.	Remove and clean.
4	Connecting conditions	Loose terminal screws	Retighten.	Connectors should not be loose.	Retighten.
		Distances between Solderless terminals.	Visual check.	The proper clearance should be provided between Solderless terminals.	Correct.
		Loose connector	Visual check.	Connectors should not be loose.	Retighten connector mounting screws.
5	Battery		Check battery status by mounting special auxiliary relays M9006 and M9007.	Preventive maintenance	If battery capacity reduction is not indicated, change the battery when specified service life is exceeded.

10.3 Replacement of Battery

M9006 or M9007 turns ON when the voltage of the battery for program backup and power interruption compensation falls.

Even if this special relay turns ON, the contents of the program and the power interruption compensation function are not lost immediately.

However, if the ON state is overlooked, the PLC data contents may be lost.

Special auxiliary relays M9006 and M9007 are switched ON to indicate that the battery has reached the life time (minimum) indicated in Table 10.3 and it must be replaced if continued use of the power interruption RAM and /or data backup is required.

The following sections give the battery service life and the battery changing procedure.

10.3.1 Service life of battery

Table 10.3 shows the service life of the battery.

Table 10.3 Battery life

Battery life / CPU model	Battery life (Total power interruption time) [Hr]		
	Guaranteed value (MIN)	Actual service value (TYP)	After M9006 or M9007 is turned ON
A1SJHCPU(S8) A1SHCPU A2SHCPU	4000	20000	100
A2SHCPU-S1	2200	12000	56

* The actual service value indicates a typical life time and the guaranteed value indicates the minimum life time.

Preventive maintenance is as follows :

(1) Even if the total power interruption time is less than the guaranteed value in the above table, change the battery after four to five years.

(2) When the total power interruption time has exceeded the guaranteed value in the table above and M9006 has turned ON, change the battery.

10.3.2 Battery replacement procedure

When the service life of the battery has expired, replace the battery using the following procedure :

Even if the battery is removed, the memory is backed up by a capacitor for some time.

However, if the replacement time exceeds the guaranteed value shown in the following table, the contents of the memory may be lost. Therefore, replace the battery as quickly as possible.

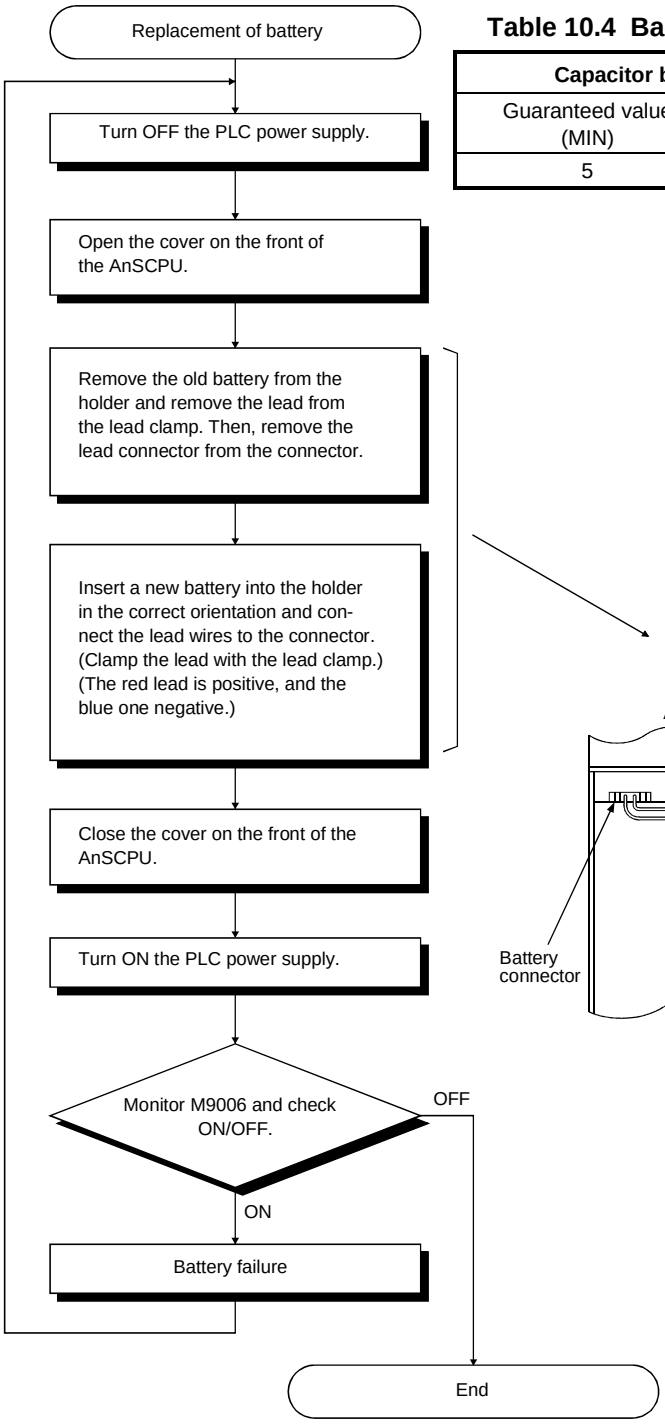


Table 10.4 Backup time by capacitor

Capacitor backup time (Minutes)	
Guaranteed value (MIN)	Actually applied value (TYP)
5	15

11. TROUBLESHOOTING

This chapter describes various procedures for troubleshooting, and corrective action.

11.1 Basic Troubleshooting

System reliability depends not only on reliable equipment but also on short down-times in the event of faults.

The three basic points to be kept in mind in troubleshooting are :

(1) Visual checks

Check the following points

(a) Machine motion (in the stopped and operating status)

(b) Power ON or OFF

(c) Status of I/O equipment

(d) Condition of wiring (I/O wires, cables)

(e) Display status of various indicators (such as the POWER LED, RUN LED, ERROR LED, and I/O LED)

(f) Status of various setting switches (such as extension base and power interruption compensation)

After checking (a) to (f), connect the peripheral equipment and check the running status of the PLC CPU and the program contents.

(2) Trouble check

Observe any changes in the error condition when performing the following operations :

(a) Set the RUN/STOP keyswitch to the STOP position.

(b) Reset using the RUN/STOP keyswitch.

(c) Turn the power ON and OFF.

(3) Narrow down the possible causes of the trouble :

Deduce where the fault lies, i.e :

(a) Inside or outside the PLC CPU.

(b) In the I/O module or another module.

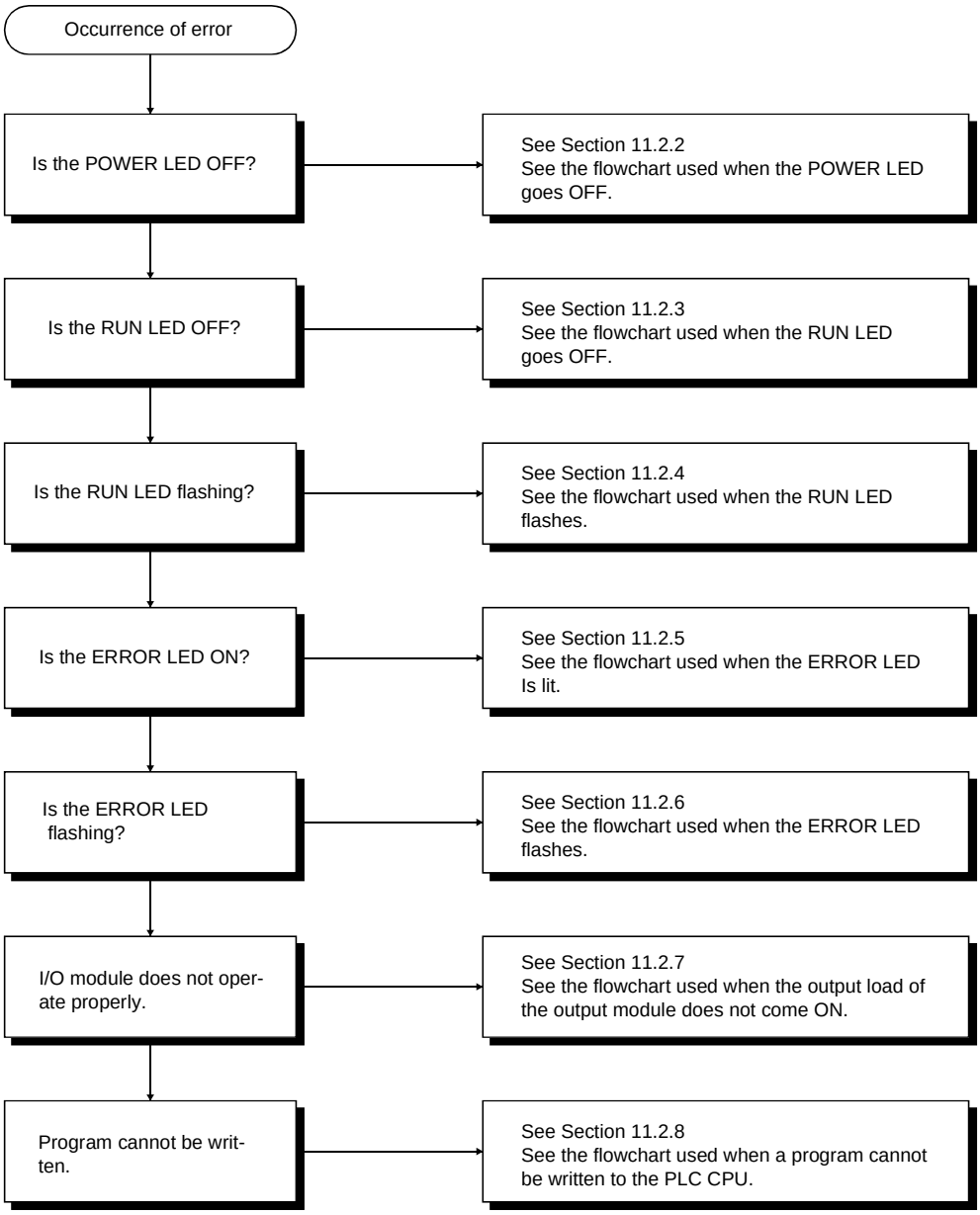
(c) In the sequence program.

11.2 Troubleshooting

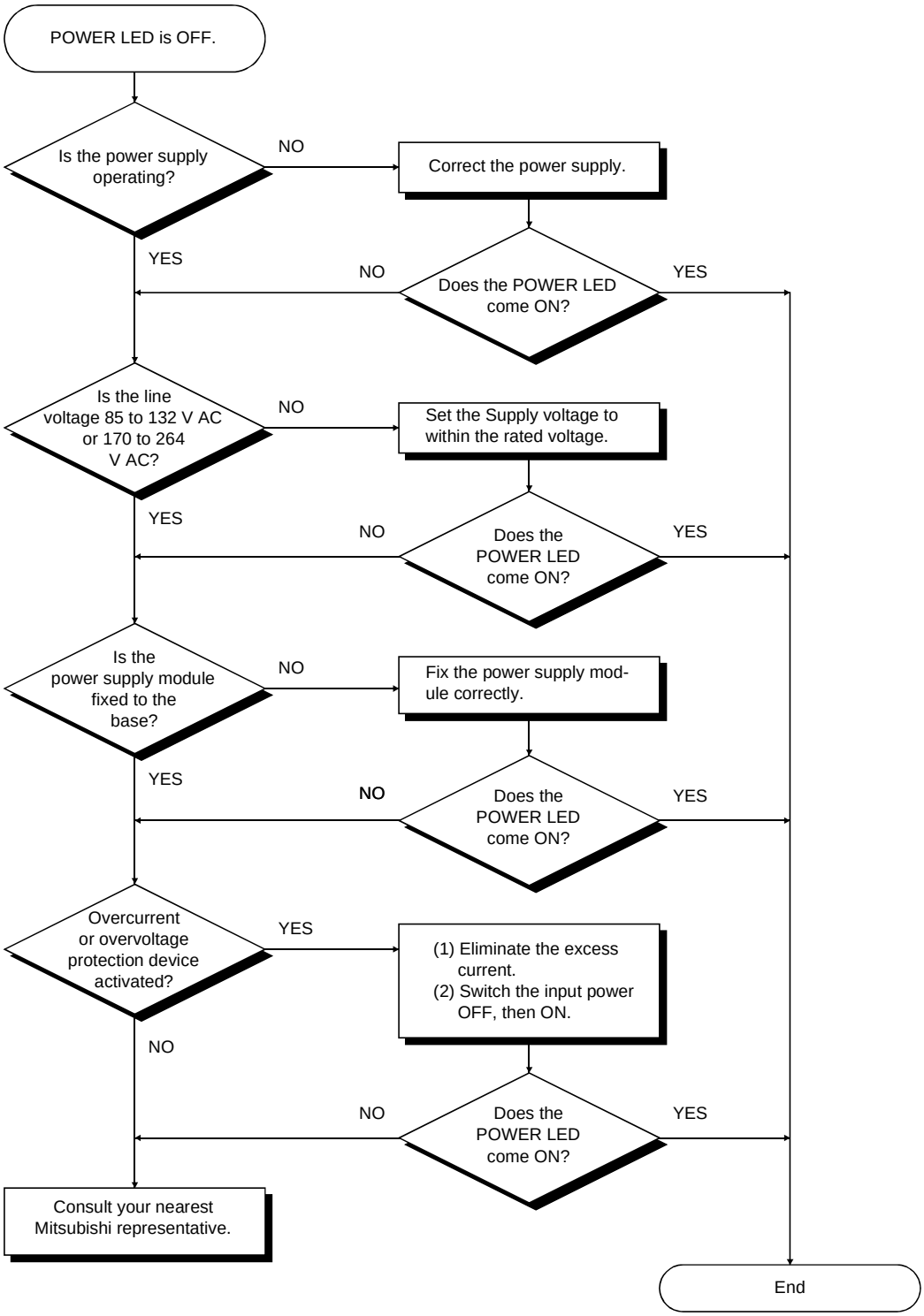
This section explains the procedure for determining the cause of problems, errors, and corrective action to be taken in response to error codes.

11.2.1 Troubleshooting flowcharts

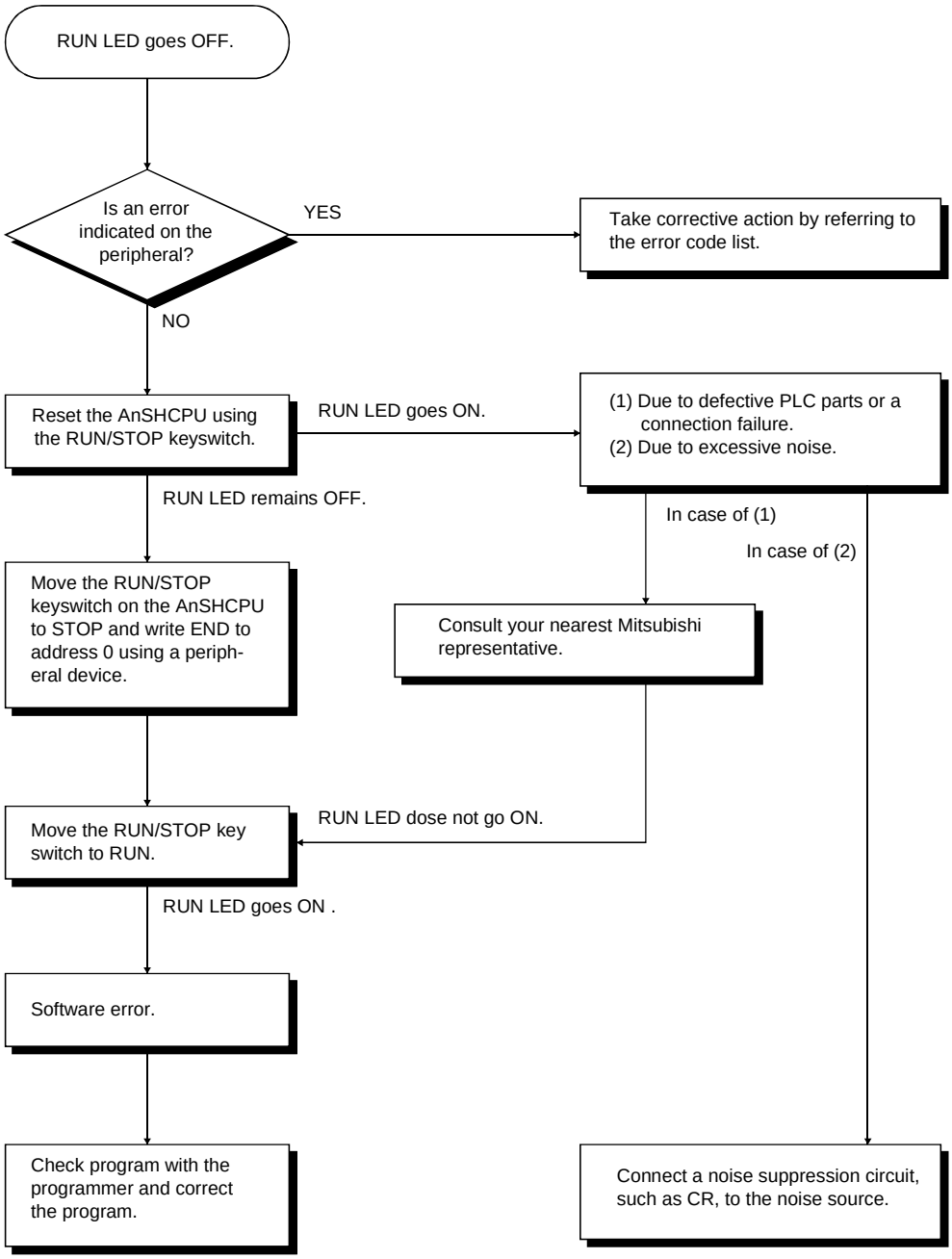
The procedures for troubleshooting are given in the following flowcharts :



11.2.2 Flowchart used when the POWER LED goes OFF

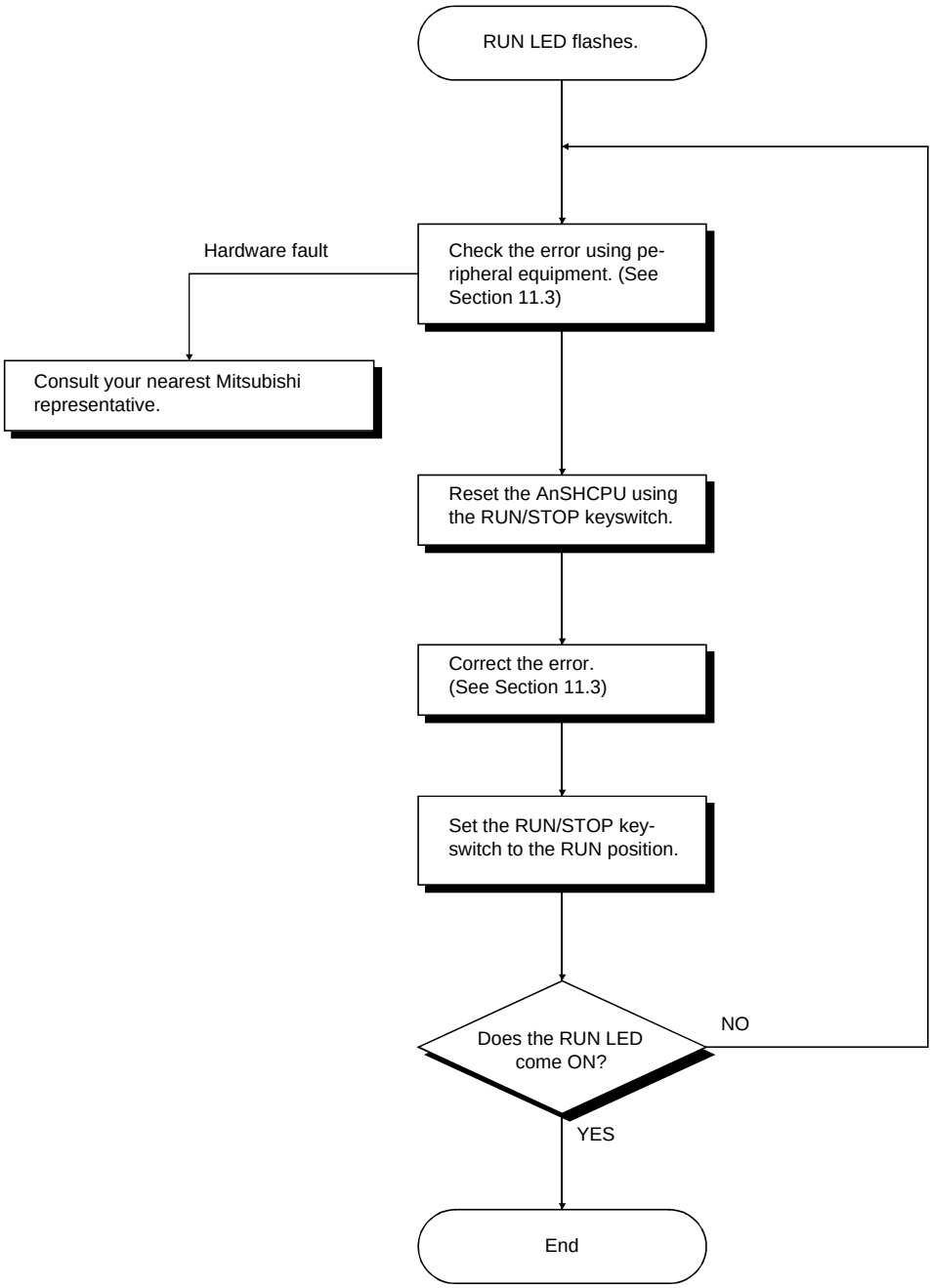


11.2.3 Flowchart used when the RUN LED goes OFF



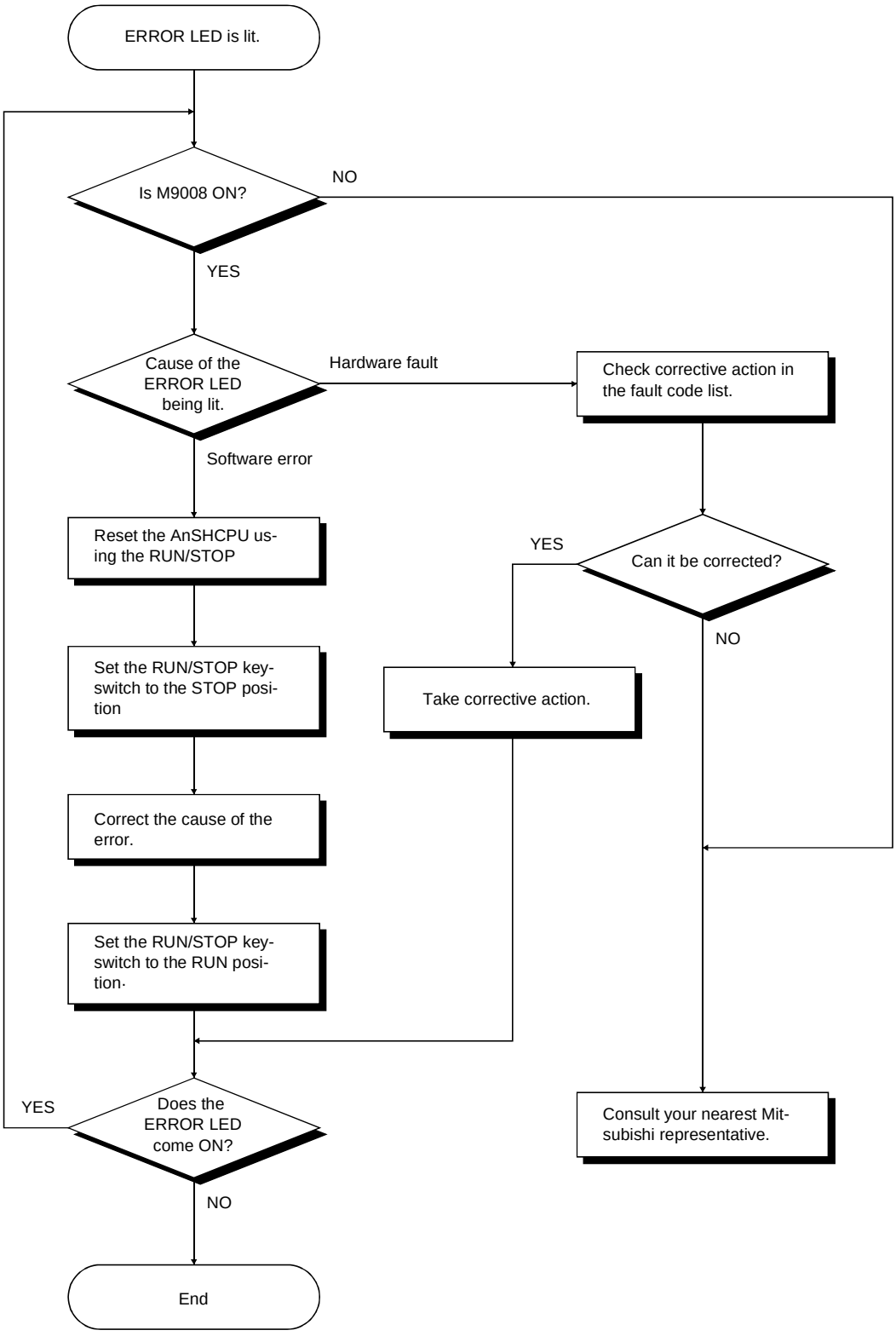
11.2.4 Flowchart used when the RUN LED flashes

The following shows the corrective measures to take if the RUN LED flashes when the power is switched ON, when operation is started, or during operation.



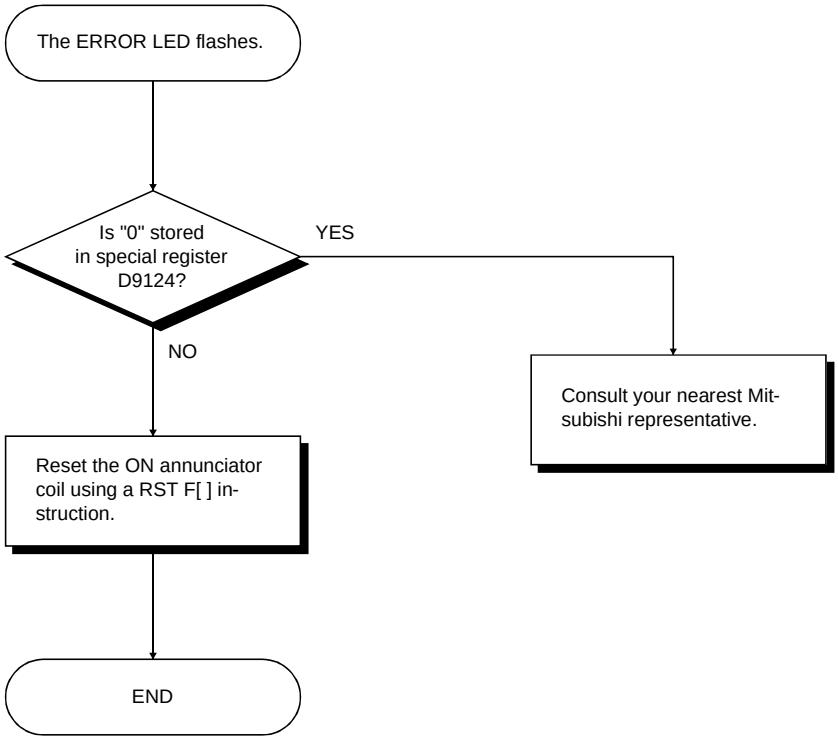
11.2.5 Flowchart used when the ERROR LED is lit

The following shows the corrective measures when the ERROR LED is lit in the RUN status.

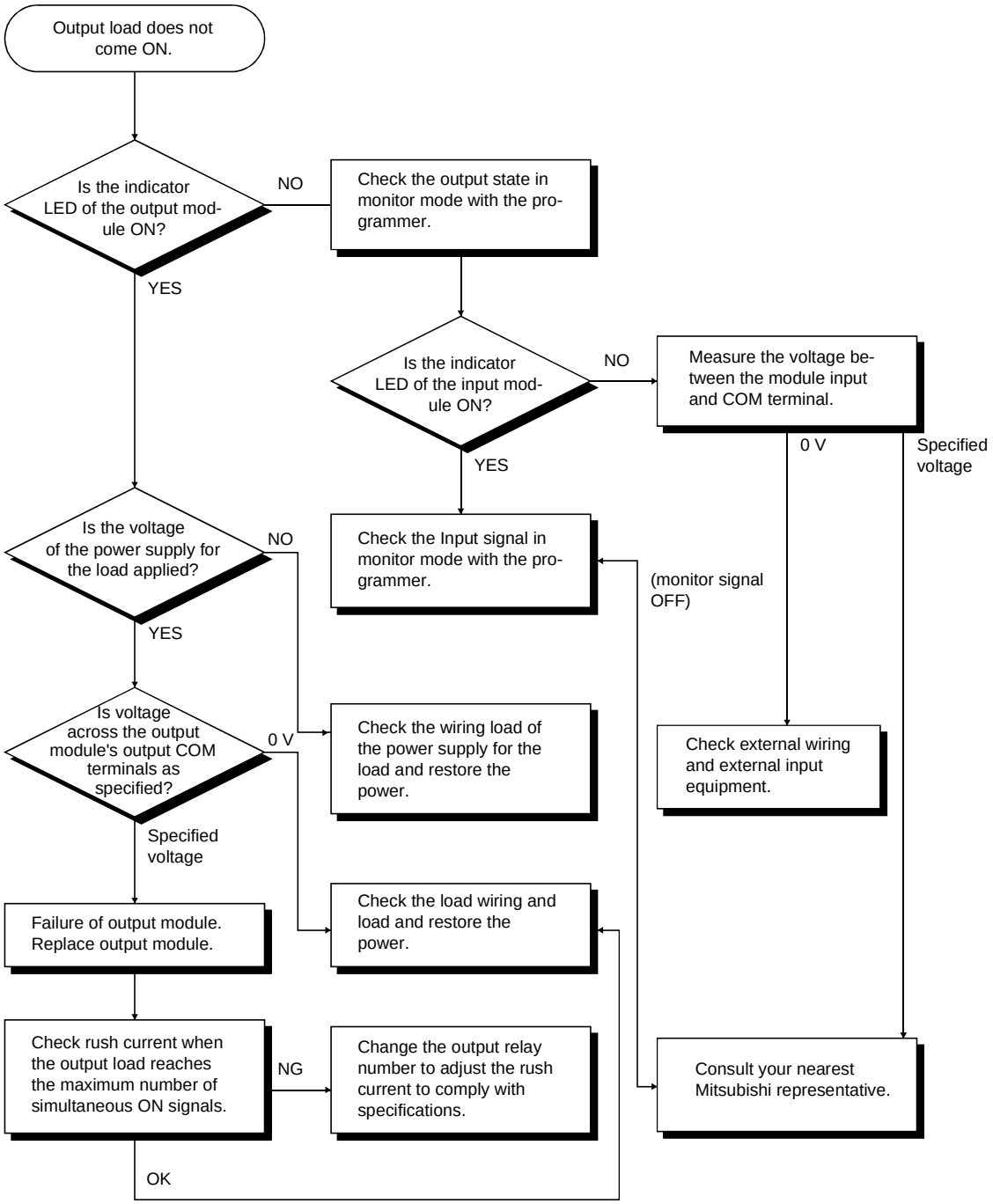


11.2.6 Flowchart used when the ERROR LED flashes

The following shows the corrective measures when the ERROR LED flashes.



11.2.7 Flowchart used when the output load of the output module does not come ON

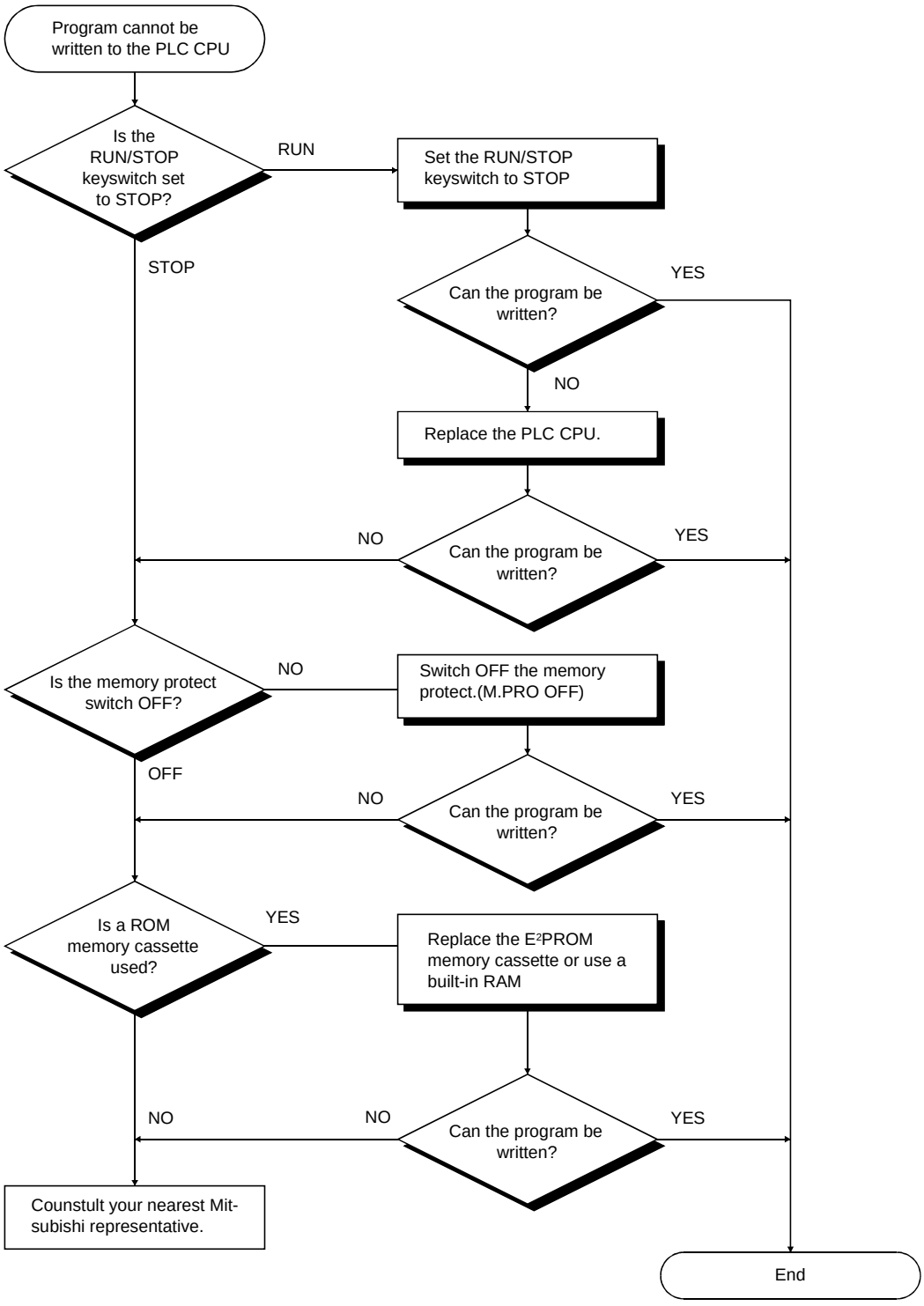


POINT

If the input or load signals are not switched OFF, see Section 11.4 I/O Connection Troubleshooting and take corrective measures.

11.2.8 Flowchart used when a program cannot be written to the PLC CPU

The following shows the corrective measures when a program cannot be written to the PLC CPU.



11.3 Error Code List

If an error occurs in the RUN mode, an error display or error code (including a step number) is stored in the special register by the self-diagnosis function. The error code reading procedure and the causes of and corrective actions for errors are shown in Table 11.1.

11.3.1 Error codes

The followings are the explanation about the descriptions and the causes of the error messages, error codes and the detailed error codes, and their corrective actions.

The detailed error codes are stored in D9092 only when using the dedicated instruction for CC-Link.

Table 11.1 Error codes

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"INSTRCT. CODE ERR"	10	—	Stop	Instruction code, which cannot be decoded by CPU module, is included in the program. (1) Memory cassette including instruction code, which cannot be decoded, has been loaded. (2) Since the memory contents have changed for some reason, instruction code, which cannot be decoded, has been included.	(1) Read the error step by use of peripheral equipment and correct the program at that step. (2) In the case of memory cassette, rewrite the contents or replace the cassette with a memory cassette which stores correct contents.
		101		Instruction code, which cannot be decoded by CPU module, is included in the program. (1) Memory cassette including instruction code, which cannot be decoded, has been loaded. (2) Since the memory contents have changed for some reason, instruction code, which cannot be decoded, has been included.	(1) Read the error step by use of peripheral equipment and correct the program at that step. (2) In the case of memory cassette, rewrite the contents or replace the cassette with a memory cassette which stores correct contents.
		103		Device specified by a dedicated instruction for CC-Link is not correct.	Read the error step using a peripheral device and correct the program of the step.
		104		A dedicated instruction for CC-Link has incorrect program structure.	
		105		A dedicated instruction for CC-Link has incorrect command name.	
"PARAMETER ERROR"	11	—	Stop	The contents of parameters of CPU memory have changed due to noise or the improper loading of memory.	(1) Load the memory cassette correctly. (2) Read the parameter contents of CPU memory, check and correct the contents, and write them to CPU again.
"MISSING END INS."	12	—	Stop	There is no END (FEND) instruction in the program.	Write END instruction at the end of program.

Table 11.1 Error codes (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"CAN'T EXECUTE(P)"	13	—	Stop	(1) There is no jump destination or multiple destinations specified by the CJ, SCJ, CALL, CALLP, or JMP instruction. (2) Although there is no CALL instruction, the RET instruction exists in the program and has been executed. (3) The CJ, SCJ, CALL, CALLP, or JMP instruction has been executed with its jump destination located below the END instruction. (4) The number of the FOR instructions is different from that of the NEXT instructions. (5) A JMP instruction is given within a FOR to NEXT loop causing the processing to exit the loop. (6) Processing exited subroutine by the JMP instruction before execution of the RET instruction. (7) Processing jumped into a step in a FOR to NEXT loop or into a subroutine by the JMP instruction.	Read the error step by use of peripheral equipment and correct the program at that step. (Insert a jump destination or reduce multiple destinations to one.)
"CHK FORMAT ERR"	14	—	Stop	(1) Instructions (including NOP) except LD X□, LDI X□, AND X□ and ANI X□ are included in the CHK instruction circuit block. (2) Multiple CHK instructions are given. (3) The number of contact points in the CHK instruction circuit block exceeds 150. (4) There is no CJ P□ circuit block before the CHK instruction circuit block. (5) The device number of D1 of the CHK D1 D2 instruction is different from that of the contact point before the CJ P□ instruction. (6) Pointer P254 is not given to the head of the CHK instruction circuit block. P254 CHK D1 D2	(1) Check the program in the CHK instruction circuit block according to item (1) to (7) in the left column. Correct problem using the peripheral equipment and perform operation again. (2) This error code is only effective when the input/output control method is a direct method.

Table 11.1 Error codes (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"CAN'T EXECUTE (I)"	15	—	Stop	(1) Although the interrupt module is used, there is no number of interrupt pointer I, which corresponds to that module, in the program or there are multiple numbers. (2) No IRET instruction has been entered in the interrupt program. (3) There is IRET instruction in other than the interrupt program.	(1) Check for the presence of interrupt program which corresponds to the interrupt unit, create the interrupt program, and reduce the same numbers of I. (2) Check if there is IRET instruction in the interrupt program and enter the IRET instruction. (3) Check if there is IRET instruction in other than the interrupt program and delete the IRET instruction.
"ROM ERR"	17	—	Stop	Parameters and/or sequence programs are not correctly written to the mounted memory cassette.	(1) Correctly write parameters and/or sequence programs to the memory cassette. (2) Remove the memory cassettes that contain no parameters or sequence programs.
				Parameters stored in the memory cassette have exceeded the limit of available program capacity. Ex.) Default parameters (program capacity: 6k steps) are written to A1NMCA-2KE.	(1) Adjust the program capacity for parameters to the memory cassette used. (2) Use the memory cassette of which memory capacity is larger than the program capacity for parameters.
"RAM ERROR"	20	—	Stop	The CPU has checked if write and read operations can be performed properly to the data memory area of CPU, and as a result, either or both has not been performed.	Since this CPU hardware error, consult Mitsubishi representative.
"OPE. CIRCUIT ERR"	21	—	Stop	The operation circuit, which performs the sequence processing in the CPU, does not operate properly.	
"WDT ERROR"	22	—	Stop	Scan time exceeds watch dog error monitor time. (1) Scan time of user program has been exceeded for some conditions. (2) Scan time has lengthened due to instantaneous power failure which occurred during scan.	(1) Calculate and check the scan time of user program and reduce the scan time using the CJ instruction or the like. (2) Monitor the content of special register D9005 by use of peripheral equipment. When the content is other than 0, line voltage is insufficient. When the content is other than 0, the power voltage is unstable.
"END NOT EXECUTE"	24	—	Stop	(1) When the END instruction was to be executed, the instruction was read as other instruction code due to noise or the like. (2) The END instruction has changed to another instruction code for some reason.	Reset and run the CPU module again. If the same error is displayed again, it is the CPU hardware error, consult Mitsubishi representative.
"WDT ERROR"	25	—	Stop	The CJ instruction or the like causes a loop in execution of the sequence program to disable execution of the END instruction.	Check the program for an endless loop and correct.

Table 11.1 Error codes (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"UNIT VERIFY ERR."	31	—	Stop or Continue (set by parameter)	I/O module data are different from those at power-on. (1) The I/O module (including the special function module) is incorrectly loaded or has been removed, or a different unit has been loaded.	(1) The bit in special registers D9116 to D9123 corresponding to the module causing the verification error is “1.” Use a peripheral device to monitor the registers to locate the “1” bit, and check or replace the corresponding module. (2) To accept the current module arrangement, operate the RUN/STOP key switch to reset.
"FUSE BREAK OFF"	32	—	Stop or Continue (set by parameter)	(1) The fuse is blown in some output modules. (2) The external power supply for the output load is turned off or it is disconnected.	(1) Check the ERR LED of the output module. Replace the module with the lit LED. (2) Among special registers D9100 to D9107, the bit corresponding to the unit of fuse break is "1" Replace the fuse of a corresponding module. Monitor and check it. (3) Check ON/OFF of the external power supply for the output load.
"CONTROL-BUS ERR."	40	—	Stop	The FROM and TO instructions cannot be executed. (1) Error of control bus with special function module.	The hardware of the special function module, CPU module or base unit is faulty. Replace the faulty module and check the faulty module. Consult Mitsubishi representative.
"SP. UNIT DOWN"	41	—	Stop	There is no reply from the special function module during execution of the FROM or TO instruction. (1) The special function module being accessed is faulty.	The hardware of the special function module being accessed is faulty. Consult Mitsubishi representative.
"I/O INT. ERROR"	43	—	Stop	Interrupt occurs though no interrupt module is installed.	The hardware of a module is faulty. Replace the module and check the faulty module. Consult Mitsubishi representative.

Table 11.1 Error codes (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"SP. UNIT LAY. ERROR."	44	—	Stop	(1) Three or more computer link modules are installed for a single CPU module. (2) Two or more MELSECNET (II), MELSECNET /B or MELSECNET /10 data link modules are installed. (3) Two or more interrupt modules are installed. (4) A special function module is installed to a slot assigned to the I/O module with parameter setup of the peripheral device, or vice versa. (5) The I/O module or special function module is installed outside the following I/O number ranges, or GOT is connected to the bus. A1SH, A1SJHCPU: X0 to XFF A2SHCPU(S1): X0 to X1FF	(1) Reduce the number of computer link modules to within two. (2) Reduce the number of MELSECNET (II), MELSECNET /B and MELSECNET /10 data link modules to one. (3) Reduce the number of interrupt modules to one. (4) Using the peripheral device, correct the parameter I/O assignment according to the actual state of installation of the special function modules. (5) Examine the I/O number and remove the modules and GOT installed outside the range specified on the left.
"SP. UNIT ERROR"	46	—	Stop or Continue (set by parameter)	(1) Access (execution of FROM or TO instruction) has been made to a location where no special function module is installed.	(1) Use the peripheral device to read and correct the FROM and/or TO instruction at the error step.
		462		(1) There is inconsistency in the module name between the special instruction for CC-Link and I/O assignment of the parameter. (2) The location designated by the special instruction for CC-Link is not the master module.	(1) Correct the module name of I/O assignment of the parameter to that of the special instruction for CC-Link. (2) Use the peripheral device to check and correct the special instruction for CC-Link at the error step.
"LINK PARA. ERROR"	47	—	Stop or Continue (set by parameter)	(1) There is inconsistency for some reason between the data, which is written by the peripheral device in the parameter area of the link under link range designation using parameter setup, and the link parameter data read by the CPU module. (2) The total number of stations is set at “0.”	(1) Write parameters and check again. (2) If the error persists, there is a fault in hardware. Consult Mitsubishi representative.

Table 11.1 Error codes (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU States	Error and Cause	Corrective Action
"OPERATION ERROR"	50	—	Stop or Continue (set by parameter)	(1) The result of BCD conversion exceeds the rated range ("9999" or "99999999"). (2) There is a setting exceeding the rated device range, disabling execution of calculation. (3) The file register is used on the program without designation of the capacity of the file register.	Use the peripheral device to read and correct the error step in the program. (Check the setting range of the device, BCD conversion value and so on.)
		503		The data stored by the designated device or a constant exceeds the allowable range.	Use the peripheral device to read and correct the error step in the program.
		504		The setting quantity of handled data exceeds the allowable range.	
		509		The number of special instructions for CC-Link executed in each scan exceeds 64.	Reduce the special instructions for CC-Link executed in each scan to within 64.
				A special instruction for CC-Link is executed to a CC-Link module to which no parameter is defined.	Define parameters.
"BATTERY ERROR"	70	—	Continue	(1) The battery voltage is low. (2) The battery lead connector is not connected.	(1) Replace the battery. (2) Connect the lead connector to use the built-in RAM memory or power failure compensation function.

11.4 I/O Connection Troubleshooting

This section explains possible problems with I/O circuits.

11.4.1 Input circuit troubleshooting

This section describes possible problems with input circuits, and corrective action.

Table 11.2 Input circuit problems and corrective action

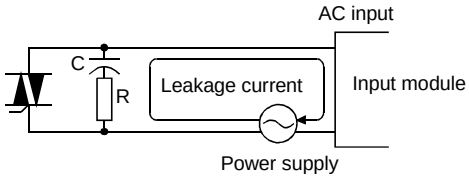
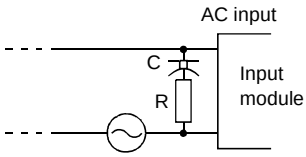
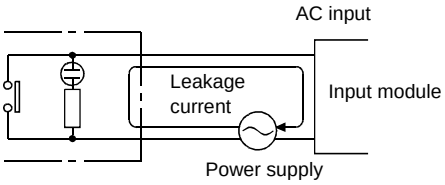
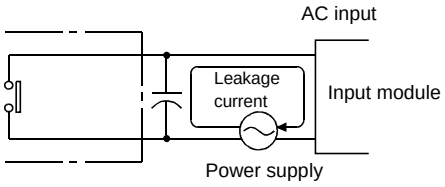
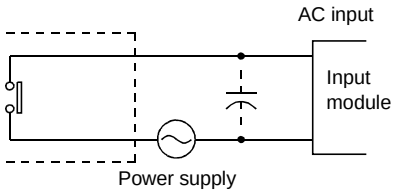
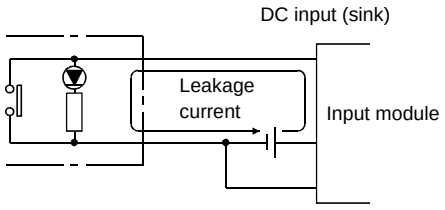
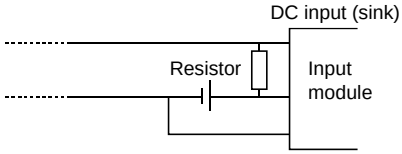
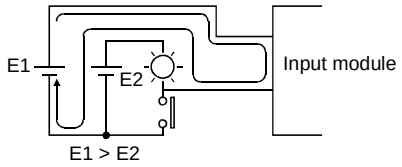
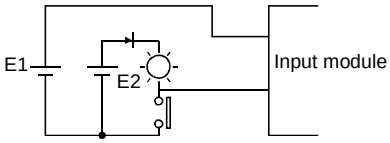
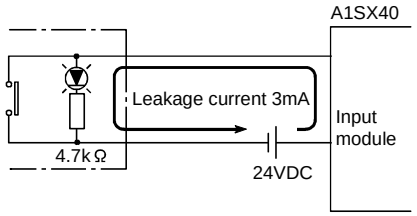
	Condition	Cause	Corrective action
Example 1	Input signal does not turn OFF	Leakage current of input switch (e.g. drive by non-contact switch). 	• Connect an appropriate resistor which will make the voltage across the terminals of the input module lower than the OFF voltage value.  It is recommended to use 0.1 to 0.47 μF + 47 to 120 Ω (1/2 W) for the CR constant.
Example 2	Input signal does not turn OFF	Drive by a limit switch with neon lamp. 	• Same as Example 1. • Or make up another independent display circuit.
Example 3	Input signal does not turn OFF	Leakage current due to line capacity of wiring cable. (Line capacity C of twisted pair wire is approx. 100 PF/m). 	• Same as Example 1. • However, leakage current is not generated when the power supply is located in the input equipment side as shown below. 
Example 4	Input signal does not turn OFF	Drive by switch with LED indicator. 	• Connect a register which will make the voltage between the input module terminal and common higher than the OFF voltage, as shown below.  * An example calculation of a value for a connected resistor is given on the following page.

Table 11.2 Input circuit problems and corrective action

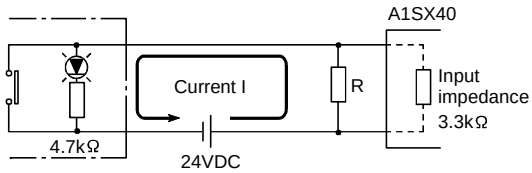
	Condition	Cause	Corrective action
Example 5	Input signal does not turn OFF	• Sneak path due to the use of two power supplies. 	• Use only one power supply. • Connect a sneak path prevention diode. (Figure below) 

<Example 4s Calculation Example>



If a switch with an LED display is connected to A1SX40 and a leak current of 3 mA is observed

- Voltage V_{TB} across the terminal and common base is:
  V_{TB} = 3 [mA] × 3.3 [kΩ] = 9.9 [V] (Ignore the voltage drop caused by the LED.)
  Because the condition for the OFF voltage (≤ 4 [V]) is not satisfied, the input does not turn off. To correct this, connect a resistor as shown below.



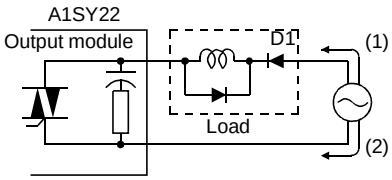
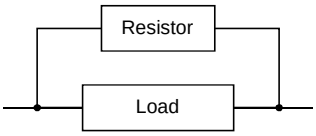
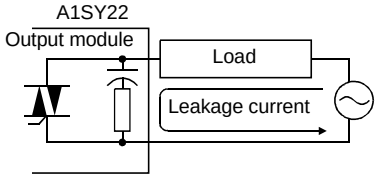
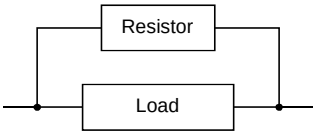
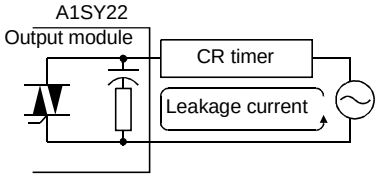
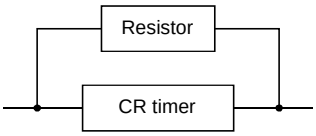
- Calculation of resistance of connected resistor R
  The voltage of A1SX40 across the terminals must be reduced to within 4 [V]. The current for reducing the voltage across the terminals to within 4 [V] is:
  (24 − 4 [V] ÷ 4.7 [kΩ] = 4.26 mA)
  Therefore resistor R for flowing current I of 4.26 [mA] must be connected.

- Resistance of the connected resistor R is obtained in the following equations.
  4 [V] ÷ R > 4.26 − 1.21 [mA] ← 4 [V] ÷ Input impedance 3.3 [kΩ]
  4 [V] ÷ 3.05 [mA] > R
  1.31 [kΩ] > R
  Suppose that the resistance R is 1.2 [kΩ].
  The power capacity W of the resistor when the switch turned on is:
  W = (Applied voltage)^2/R
  W = (26.4 [V])^2/ 1.2 [kΩ] = 0.58 [W]

- Because the resistance is selected so that the power capacity is three to five times the actual power consumption, 2 to 3 [W] should be selected.
  From the above, the resistor to be connected across the terminal in question and COM is 1.2 [kΩ] 2 to 3 [W].

11.4.2 Output circuit failures and corrective action

Table 11.3 Output circuit failures and corrective action

	Condition	Cause	Corrective action
Example 1	When the output is OFF, excessive voltage is applied to the load.	• Load is half-wave rectified inside (in some cases, this is true of a solenoid).  When the polarity of the power supply is as shown in [1], C is charged. When the polarity is as shown in [2], the voltage charged in C plus the line voltage are applied across D1. Max. voltage is approx. 2.2E.	• Connect a resistor of 10 to 99 k Ω. across the load. (If a resistor is used in this way, it does not pose a problem to the output element. But it may cause the diode, which is built into the load, to deteriorate, resulting in a fire, etc.) 
Example 2	The load does not turn OFF (triac output)	• Leakage current due to built-in noise suppression 	• Connect C and R across the load. (When the wiring distance from the output card to the load is long, there may be a leakage current due to the line capacity.) 
Example 3	When the load is a CR type timer, time constant fluctuates (triac output).		• Drive the relay using a contact and drive the CR type timer using the same contact. (Some timers have half-wave rectified internal circuits. Therefore, take the precautions indicated in the Example1.)  Calculate the CR constant depending on the load.

APPENDICES

Appendix 1 Instructions

Instructions used with the AnSHCPU are listed below.
See the following programming manuals for details of the instructions.

• ACPU Programming Manual (Fundamentals)	(IB-66249)
• ACPU Programming Manual (Common Instructions)	(IB-66250)
• AnSHCPU/AnACPU/AnUCPU/QCPU-A (A mode) Programming Manual (Dedicated Instructions)	(IB-66251)

(1) Sequence instructions

(a) Contact instruction

Contact	LD, LDI, AND, ANI, OR, ORI

(b) Connection instruction

Connection	ANB, ORB, MPS, MRD, MPP

(c) Output instruction

Output	OUT, SET, RST, PLS, PLF, CHK

(d) Shift instruction

Shift	SFT, SFTP

(e) Master control instruction

Master control	MC, MCR

(f) Termination instruction

Program end	FEND, END

(g) Other instructions

Stop	STOP
No operation	NOP
Page feed (page feed operation of printer output)	NOPLF

(2) Basic instructions

(a) Comparison instructions

=	16 bits	LD=, AND=, OR=
	32 bits	LDD=, ANDD=, ORD=
< >	16 bits	LD<>, AND<>, OR<>
	32 bits	LDD<>, ANDD<>, ORD<>
>	16 bits	LD>, AND>, OR>
	32 bits	LDD>, ANDD>, ORD>
<=	16 bits	LD<=, AND<=, OR<=
	32 bits	LDD<=, ANDD<=, ORD<=
<	16 bits	LD<, AND<, OR<
	32 bits	LDD<, ANDD<, ORD<
>=	16 bits	LD>=, AND>=, OR>=
	32 bits	LDD>=, ANDD>=, ORD>=

(b) BIN arithmetic operation instructions

+ Addition	16 bits	Two types each for + and +P
	32 bits	Two types each for D+ and D+P
- Subtraction	16 bits	Two types each for - and -P
	32 bits	Two types each for D- and D-P
* Multiplication	16 bits	*, *P
	32 bits	D*, D*P
/ Division	16 bits	/, /P
	32 bits	D/, D/P
+1 Addition	16 bits	INC, INCP
	32 bits	DINC, DINCP
-1 Subtraction	16 bits	DEC, DECP
	32 bits	DDEC, DDECP

(c) BCD arithmetic operation instructions

+ Addition	BCD 4 digits	Two types each for B+ and B+P
	BCD 8 digits	Two types each for DB+ and DB+P
- Subtraction	BCD 4 digits	Two types each for B- and B-P
	BCD 8 digits	Two types each for DB- and DB-P
* Multiplication	BCD 4 digits	B*, B*P
	BCD 8 digits	DB*, DB*P
/ Division	BCD 4 digits	B/, B/P
	BCD 8 digits	DB/, DB/P

(d) BCD - BIN conversion instructions

BIN → BCD	16 bits	BCD, BCDP
	32 bits	DBCD, DBCDP
BCD → BIN	16 bits	BIN, BINP
	32 bits	DBIN, DBINP

(e) Data transfer instructions

Transfer	16 bits	MOV, MOVP
	32 bits	DMOV, DMOVP
Change	16 bits	XCH, XCHP
	32 bits	DXCH, DXCHP
Undefined transfer	16 bits	CML, CMLP
	32 bits	DCML, DCMLP
Block transfer	16 bits	BMOV, BMOVP
Repeat data block transfer	16 bits	FMOV, FMOVP

(f) Program branch instructions

Jump	CJ, SCJ, JMP
Subroutine call	CALL, CALLP, RET
Interrupt program enable/disable	EI, DI, IRET
Microcomputer program call	SUB

(g) Refresh instructions

Link refresh	COM
Link refresh enable/disable	EI, DI
Partial refresh	SEG

(3) Application instructions

(a) Logical operation instructions

Logical product	16 bits	Two types each for WAND and WANDP
	32 bits	DAND, DANDP
Logical product	16 bits	Two types each for WOR and WORP
	32 bits	DOR, DORP
Exclusive logical sum	16 bits	Two types each for WXOR and WXORP
	32 bits	DXOR, DXORP
NOT exclusive logical sum	16 bits	Two types each for WXNR and WXNRP
	32 bits	DXNR, DXNRP
2's complement (reversed sign)	16 bits	NEG, NEGP

(b) Rotation instructions

Right ward rotation	16 bits	ROR, RORP, RCR, RCRP
	32 bits	DROR, DRORP, DRCR, DRCRP
Left ward rotation	16 bits	ROL, ROLP, RCL, RCLP
	32 bits	DROL, DROLP, DRCL, DRCLP

(c) Shift instructions

Right ward shift	16 bits	SFR, SFRP, BSFR, BSFRP
	Per device	DSFR, DSFRP
Left ward shift	16 bits	SFL, SFLP, BSFL, BSFLP
	Per device	DSFL, DSFLP

(d) Data processing instructions

Data search	16 bits	SER, SERP
Bit check	16 bits	SUM, SUMP
	32 bits	DSUM, DSUMP
Decode	2.MDSU/n. MDNM/ bits	DECO, DECOP
	16 bits	SEG
Encode	2.MDSU/n. MDNM/ bits	ENCO, ENCOP
Bit set	16 bits	BSET, BSETP
Bit reset	16 bits	BRST, BRSTP
Dissociation	16 bits	DIS, DISP
Association	16 bits	UNI, UNIP

(e) FIFO instructions

Write	16 bits	FIFW, FIFWP
Read	16 bits	FIFR, FIFRP

(f) ASCII instructions

ASCII conversion	ASC
ASCII print	Two types each for PR and PRC

(g) Buffer memory access instructions

Data read	1 word	FROM, FROMP
	2 words	DFRO, DFROP
Data write	1 word	TO, TOP
	2 words	DTO, DTOP

(h) FOR NEXT instruction

Repetition	FOR, NEXT

(i) Data link module instruction

Data read	1 word	LRDP, RFRP
Data write	1 word	LWTP, RTOP

(j) Display instruction

Display reset	LEDR

(k) Other instructions

WDT reset		WDT, WDTP
Fault check		CHK
Status latch		SLT, SLTR
Sampling trace		STRA, STRAR
Carry flag set/reset	1 bit	STC, CLC
Timing clock	1 bit	DUTY

(4) CC-Link dedicated instructions

Link parameter setting	RLPA
Refresh parameter setting	RRPA
Read master station buffer memory	RIFR
Write to master station buffer memory	RITO
Read buffer memory of intelligent remote station	RIRD
Write to buffer memory of intelligent remote station	RIWT
Write to buffer memory of intelligent remote station (with handshaking)	RISEND
Read buffer memory of intelligent remote station (with handshaking)	RIRCV

Appendix 1.1 Caution when Performing a Write while Running Dedicated Instruction

Description of write performed when running.	For LEDA	For LEDB
Normal configuration is written when running.	After write, the previous contact turns on and the instruction is executed.	After write, the instruction is executed when the previous contact is turned from OFF to ON.
LEDA/LEDB was added by mistake.	Error 104 occurs (incorrect configuration).	If the previous contact stays after write, the instruction is not executed, so no process is performed. When the previous contact is turned from OFF to ON, error 104 results.
LEDA/LEDB was deleted by mistake.	The LEDC/SUB/LEDR is processed as a regular instruction.	Same as stated on left.
LEDC/SUB was added by mistake.	Error 104 occurs (incorrect configuration).	If the previous contact stays after write, the instruction is not executed, so no process is performed. When the previous contact is turned from OFF to ON, error 104 results.
LEDC/SUB was deleted by mistake.	Error 104 occurs (incorrect configuration).	If the previous contact stays after write, the instruction is not executed, so no process is performed. When the previous contact is turned from OFF to ON, error 104 results.
LEDR was added by mistake.	The latter LEDR is processed as a regular instruction.	The latter LEDR is processed as a regular instruction.
LEDR was deleted by mistake.	Error 104 occurs if LEDR does not exist directly after the deleted LEDR.	Error 104 occurs if LEDR does not exist directly after the deleted LEDR. If LEDR exists, all instructions in between are not executed.

REMARK

Detailed error code 104 indicates "the program configuration of the CC-Link dedicated instruction is incorrect." (See Section 11.3.1.)

Appendix 2 Special Relay, Special Register List

Appendix 2.1 Special Relay List

(1) Special relay list

Special relays are internal relays whose uses are determined inside the PLC. Therefore, they cannot be turned ON/OFF as coils is a program. (Except for *1 and *2 in the table)

Table 2.1 Special relay list

Number	Name	Description	Details	Applicable CPU	
∗1 M9000	Fuse blown	OFF: Normal ON: Fuse blown unit	• Turned on when there is one or more output units of which fuse has been blown or external power supply has been turned off (only for small type). Remains on if normal status is restored. Output modules of remote I/O stations are also checked fore fuse condition.	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
∗2 M9002	I/O unit verify error	OFF: Normal ON: Error	• Turned on if the status of I/O module is different from entered status when power is turned on. Remains on if normal status is restored. I/O module verification is done also to remote I/O station modules. (Reset is enabled only when special registers D9116 to D9123 are reset.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
M9004	MINI link master module error	OFF: Normal ON: Error	• Turned on when the MINI (S3) link error is detected on even one of the MINI (S3) link modules being loaded. Remains on if normal status is restored.	—	Dedicated to AnA, A2AS, AnU and QCPU-A (A Mode).
∗1 M9005	AC DOWN detection	OFF: AC power good ON: AC power DOWN	• Turned on when an momentary power failure of 20 msec or less occurred. Reset when POWER switch is moved from OFF to ON position.	○	Usable with all types of CPUs.
M9006	Battery low	OFF: Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Turned off when battery voltage becomes normal.	○	Usable with all types of CPUs.
∗1 M9007	Battery low latch	OFF: Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Remains on if battery voltage becomes normal	○	Usable with all types of CPUs.
∗1 M9008	Self-diagnostic error	OFF: No error ON: Error	• Turned on when error is found as a result of self-diagnosis.	○	Usable with all types of CPUs.
M9009	Annunciator detection	OFF: No detection ON: Detected	• Turned on when OUT F of SET F instruction is executed. Switched off when D9124 data is zeroed.	○	Usable with all types of CPUs.
M9010	Operation error flag	OFF: No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Turned off when error is eliminated.	△	Unusable with A3H, A3M, AnA, A2AS, A3A board, AnU and QCPU-A (A Mode).
∗1 M9011	Operation error flag	OFF: No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Remains on if normal status is restored.	○	Usable with all types of CPUs.
M9012	Carry flag	OFF: Carry off ON: Carry on	• Carry flag used in application instruction.	○	Usable with all types of CPUs.

Table 2.1 Special relay list (Continue)

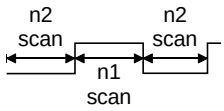
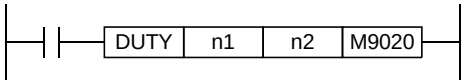
Number	Name	Description	Details	Applicable CPU	
M9016	Data memory clear flag	OFF: No processing ON: Output clear	• Clears the data memory including the latch range (other than special relays and special registers) in remote run mode from computer, etc. when M9016 is on.	○	Usable with all types of CPUs.
M9017	Data memory clear flag	OFF: No processing ON: Output clear	• Clears the unlatched data memory (other than special relays and special registers) in remote run mode from computer, etc. when M9017 is on.	○	Usable with all types of CPUs.
∗2 M9018	Data link monitor switching	OFF: F link ON: R link	• Specifies the lines to be monitored for link monitoring.	—	Dedicated to A3V.
M9020	User timing clock No. 0		• Relay that repeats on/off at intervals of predetermined scan. • When power is turned on or reset is per-formed, the clock starts with off. • Set the intervals of on/off by DUTY instruction. 	○	Usable with all types of CPUs.
M9021	User timing clock No. 1				
M9022	User timing clock No. 2				
M9023	User timing clock No. 3				
M9024	User timing clock No. 4				
∗2 M9025	Clock data set request	OFF: No processing ON: Set requested	• Writes clock data from D9025-D9028 to the clock element after the END instruction is executed during the scan in which M9025 has changed from off to on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9026	Clock data error	OFF: No error ON: Error	• Switched on by clock data (D9025 to D9028) error and switched off without an error.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9027	Clock data display	OFF: No processing ON: Display	• Clock data such as month, day, hour, minute and minute are indicated on the CPU front LED display.	△	Usable with A3N, A3A, A3U, A4U, A73 and A3N board.
∗2 M9028	Clock data read request	OFF: No processing ON: Read request	• Reads clock data to D9025-D9028 in BCD when M9028 is on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
∗2 M9029	Data communication request batch process	OFF: No batch process ON: Batch process	• Turn M9029 on in the sequence program to process all data communication requests, which have been received in the entire scan, during END process of the scan. • The data communication request batch process can be turned on or off during operation. • OFF in default state (Each data communication request is processed at the END process in the order of reception.)	△	Usable with AnU and A2US(H).

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9030	0.1 second clock	0.05 seconds / 0.05 seconds	• 0.1 second, 0.2 second, 1 second, 2 second, and 1 minute clocks are generated. • Not turned on and off per scan but turned on and off even during scan if corresponding time has elapsed. • Starts with off when power is turned on or reset is performed.	△	Unusable with A3V.
M9031	0.2 second clock	0.1 seconds / 0.1 seconds			
M9032	1 second clock	0.5 seconds / 0.5 seconds			
M9033	2 second clock	1 second / 1 second			
M9034	1 minute clock	30 seconds / 30 seconds			
M9036	Normally ON	ON / OFF	• Used as dummy contacts of initialization and application instruction in sequence program. • M9036 and M9037 are turned on and off without regard to position of key switch on CPU front. M9038 and M9039 are under the same condition as RUN status except when the key switch is at STOP position, and turned off and on. Switched off if the key switch is in STOP position. M9038 is on for one scan only and M9039 is off for one scan only if the key switch is not in STOP position.	○	Usable with all types of CPU
M9037	Normally OFF	ON / OFF			
M9038	On only for 1 scan after run	ON / OFF, 1 scan			
M9039	RUN flag (off only for 1 scan after run)	ON / OFF, 1 scan			
M9040	PAUSE enable coil	OFF: PAUSE disabled ON: PAUSE enabled	• When RUN key switch is at PAUSE position or remote pause contact has turned on and if M9040 is on, PAUSE mode is set and M9041 is turned on.	○	Usable with all types of CPU
M9041	PAUSE status contact	OFF: Not during pause ON: During pause			
M9042	Stop status contact	OFF: Not during stop ON: During stop	• Switched on when the RUN key switch is in STOP position.	○	Usable with all types of CPU
M9043	Sampling trace completion	OFF: During sampling trace ON: Sampling trace completion	• Turned on upon completion of sampling trace performed the number of times preset by parameter after [STRA] instruction is executed. Reset when [STRAR] instruction is executed.	△	Unusable with A1 and A1N.
M9044	Sampling trace	OFF → ON: [STRA] Same as execution ON → OFF: [STRAR] Same as execution	• Turning on/off M9044 can execute [STRA] / [STRAR] instruction. (M9044 is forcibly turned on/off by a peripheral device.) When switched from OFF to ON: [STRA] instruction When switched from ON to OFF: [STRAR] instruction The value stored in D9044 is used as the condition for the sampling trace. At scanning, at time → Time (10 msec unit)	△	Unusable with A1 and A1N.
M9045	Watchdog timer (WDT) reset	OFF: WDT not reset ON: WDT reset	• Turn on M9045 to reset the WDT upon execution of a [ZCOM] instruction or data communication request batch process. (Use this function for scan times exceeding 200 ms.)	△	Unusable with A1 and A1N.

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9046	Sampling trace	OFF: Except during trace ON: During trace	• Switched on during sampling trace.	△	Unusable with A1 and A1N.
M9047	Sampling trace preparation	OFF: Sampling trace stop ON: Sampling trace start	• Turn on M9047 to execute sampling trace. Sampling trace is interrupted if M9047 is turned off.	△	Unusable with A1 and A1N.
∗2 M9048	RUN LED flicker flag	ON: Flickers at annunciator on. OFF: No flicker at annunciator on.	• Sets whether the RUN LED flickers or not when the annunciator relay F□ is turned on when the A0J2H is used.	—	Usable with A0J2H.
M9048	Memory card battery voltage detection	OFF: Low voltage is not detected. ON: Low voltage is detected.	• Turned ON when the drop in the battery voltage for the memory card is detected. (Automatically turned OFF when the voltage recovers to normal.)	—	Dedicated to QCPU-A (A Mode)
M9049	Switching the number of output characters	OFF: Up to NUL code are output. ON: 16 characters are output.	• When M9049 is off, up to NUL (00_H) code are output. • When M9049 is on, ASCII codes of 16 characters are output.	△	Unusable with An, A3V, A2C and A52G
∗2 M9050	Operation result storage memory change contact (for CHG instruction)	OFF: Not changed ON: Changed	• Switched on to exchange the operation result storage memory data and the save area data.	—	Dedicated to A3
M9051	CHG instruction execution disable	OFF: Enable ON: Disable	• Switched on to disable the CHG instruction. • Switched on when program transfer is requested and automatically switched off when transfer is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A3U, A4U, A73 and A3N board
∗2 M9052	SEG instruction switching	OFF: 7SEG display ON: Partial refresh	• Switched on to execute the SEG instruction as a partial refresh instruction. Switched off to execute the SEG instruction as a 7SEG display instruction.	△	Unusable with An, A3H, A3M, A3V, AnA, AnU, A3V and A3A board
∗2 M9053	EI / DI instruction switching	OFF: Sequence interrupt control ON: Link interrupt control	• Switched on to execute the link refresh enable, disable (EI, DI) instructions.	△	Unusable with An, A3V and A3N board
M9054	STEP RUN flag	OFF: Other than step run ON: During step run	• Switched on when the RUN key switch is in STEP RUN position.	△	Unusable with An, AnS, AnSH, A1FX, A2C, A0J2H, and A52G
M9055	Status latch complete flag	OFF: Not complete ON: Complete	• Turned on when status latch is completed. Turned off by reset instruction.	△	Unusable with A1 and A1N.
M9056	Main program P, I set request	OFF: Other than P, I set request ON: P, I set request	• Provides P, I set request after transfer of the other program (for example subprogram when main program is being run) is complete during run. Automatically switched off when P, I setting is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A73, A3U, A4U and A3N board
M9057	Subprogram 1 P, I set request	OFF: Except during P, I set request ON: During P, I set request			
M9060	Subprogram 2 P, I set request			—	Dedicated to A4U
M9061	Subprogram 3 P, I set request				

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9060	Remote terminal error	OFF: Normal ON: Error	• Turned on when one of remote terminal modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all re-mote terminal modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G
M9061	Communication error	OFF: Normal ON: Error	• Turned on when communication with a remote terminal module or an I/O module is faulty. • Communication error occurs due to the following reasons. • Initial data error • Cable breakage • Power off for remote terminal modules or I/O modules • Turned off when communication is restored to normal with automatic online return enabled • Remains on when communication is suspended at error detection with automatic online return disabled.	—	Usable with A2C and A52G
M9065	Divided transfer status	OFF: Other than divided processing ON: Divided processing	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing, and turned off at completion of divided processing.	—	Usable with AnA, and AnU.
∗2 M9066	Transfer processing switching	OFF: Batch transfer ON: Divided transfer	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing.	—	Usable with AnA, and AnU.
M9067	I/O module error detection	OFF: Normal ON: Error	• Turned on when one of I/O modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all I/O modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G.
M9068	Test mode	OFF: Automatic online return enabled Automatic online return disabled Communication suspended at online error ON: Line check	• Turned on when line check with I/O modules and remote terminal modules is performed. • Turned off when communication with I/O modules and remote terminal modules is per-formed.	—	Usable with A2C and A52G.
M9069	Output at line error	OFF: All outputs are turned off. ON: Outputs are retained.	• Sets whether all outputs are turned off or retained at communication error. OFF: .....All outputs are turned off at communication error. ON: .....Outputs before communication error are retained.	—	Usable with A2C and A52G.

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
∗2 M9070	Time required for search of A8UPU/A8PUJ	OFF: Reading time reduction OFF ON: Reading time reduction ON	• Turn on to reduce the search time of A8UPU/A8PUJ. (In this case, the scan time of the CPU module extends by 10%.)	△	Usable with AnU and A2US(H).
∗1 M9073	WDT error flag	OFF: No WDT error ON: WDT error	• Turns on when WDT error is detected by the self-check of the PCPU.	—	Dedicated to A73.
M9073	Clock data set request	OFF: No processing ON: Set request is made	• The clock data registered in D9073 to D9076 is written to the clock device after the execution of the END instruction of the scan in which the state of M9073 changes from OFF to ON.	—	Dedicated to A2CCPUC24 (-PRF)
M9073	Setting of writing to flash ROM	OFF: Disables writing to ROM ON: Enables writing to ROM	• Turned on to enable writing to the flash ROM. (DIP switch 3 should be set to ON.)	—	Dedicated to QCPU-A (A Mode)
M9074	PCPU ready complete flag	OFF: PCPU ready incomplete ON: PCPU ready complete	• Set if the motor is not running when it is checked at PC ready (M2000) on. Turned off when M2000 is turned off.	—	Dedicated to A73.
M9074	Clock data error	OFF: No error ON: Error occurred	• This goes ON when a clock data (D9073 to D9076) error occurs. This remains OFF when there is no error.	—	Dedicated to A2CCPUC24 (-PRF)
M9074	Request for writing to flash ROM	OFF → ON: Starts writing to ROM	• When turned from OFF to ON, writing to the standard ROM is started.	—	Dedicated to QCPU-A (A Mode)
M9075	Test mode flag	OFF: Other than test mode ON: Test mode	• Turned ON when a test mode request is made from a peripheral device. Reset when test mode is finished.	—	Dedicated to A73.
M9075	Successful completion of writing to standard ROM	OFF: Failed writing to ROM ON: Successfully completed writing to ROM	• Turned on when writing to the standard ROM is successfully completed. (This status is stored in D9075.)	—	Dedicated to QCPU-A (A Mode)
M9076	External emergency stop input flag	OFF: External emergency stop input is on. ON: External emergency stop input is off.	• Turned off when the external emergency stop input connected to the EMG terminal of A70SF is turned on. Turned on when the external emergency stop input is turned off.	—	Dedicated to A73.
M9076	Clock data read request	OFF: No procesing ON: Read request is made	• When M9076 is ON, clock data is read out to D9073 to D9076 in BCD values.	—	Dedicated to A2CCPUC24 (-PRF)
M9076	Status of writing to standard ROM	OFF: Writing to ROM disabled ON: Writing to ROM enabled	• Turns ON when writing to standard ROM is enabled. (Turns ON when DIP switch and M9073 are ON.)	—	Dedicated to QCPU-A (A Mode)
M9077	Manual pulse generator axis setting error flag	OFF: All axes normal ON: Error axis detected	• Turned on when there is an error in the contents of manual pulse generator axis setting. Turned off if all axes are normal when the manual pulse generator enable flag is turned on.	—	Dedicated to A73.

Table 2.1 Special relay list (Continue)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>M9077</td><td>Sequence accumulation time measurement</td><td>OFF: Time not elapsed
ON: Time elapsed</td><td>• Compares the setting value at D9077 with the time elapsed from the start of measurement (accumulation time) at every scan. Then, performs the following operations:
Setting value > Accumulation time:
Turns M9077 ON and clears the accumulation time.
Setting value < Accumulation time:
Turns M9077 from ON to OFF and clears the accumulation time. When M9077 is already OFF, clears the accumulation time.
∗ When 1 to 255 is designated at D9077, M9077 is turned ON at the first scan.
∗ When the value other than 1 to 255 is designated at D9077, the value in D9077 is reset to 0 and M9077 is always turned OFF.</td><td>—</td><td>Dedicated to QCPU-A (A Mode)</td></tr>
<tr><td>M9078</td><td>Test mode request error flag</td><td>OFF: No error
ON: Error</td><td>• Turned on when test mode is not available though a test mode request was made from a peripheral device. Turned off if test mode becomes available by making another test mode request.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9079</td><td>Servo program setting error flag</td><td>OFF: No data error
ON: Data error</td><td>• Turned on when the positioning data of the servo program designated by the DSFRP instruction has an error.
Turned off when the data has no error after the DSFRP instruction is executed again.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9080</td><td>BUSY flag for execution of CC-Link dedicated instruction</td><td>OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0</td><td>Turned ON/OFF according to the number of remaining instructions (RIRD/RIWT/RISEND/RIRCV) being executable simultaneously at one scan.
OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0
By assigning M9080 as execution condition, the number of instructions above executed simultaneously at one scan can be limited to 10 or less.
∗4: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr>
<tr><td>A2UCPU(S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr>
<tr><td>A2USCPU(S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH, QCPU-A (A Mode) ∗4</td></tr>
</table>

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9081	Registration area busy signal for communication request	OFF: Communication request to remote terminal modules enabled ON: Communication request to remote terminal modules disabled	• Indication of communication enable/disable to remote terminal modules connected to the MINI (S3) link module, A2C or A52G.	—	Usable with AnA, AnA, AnU, A2AS, QCPU-A (A Mode) A2C and A52G.
M9082	Final station number disagreement	OFF: Final station number agreement ON: Final station number disagreement	• Turned on when the final station number of the remote terminal modules and remote I/O modules connected to the A2C or A52G disagrees with the total number of stations set in the initial setting. • Turned off when the final station number agrees with the total number of stations at STOP → RUN	—	Dedicated to A2C and A52G.
∗2 M9084	Error check	OFF: Checks enabled ON: Checks disabled	• Specify whether the following errors are to be checked or not after the END instruction is executed (to set END instruction processing time): • Fuse blown • I/O unit verify error • Battery error	△	Unusable with An, A2C and A3V.
M9086	BASIC program RUN flag	OFF: A3M-BASIC stop ON: A3M-BASIC run	• Turned on when the A3M-BASIC is in RUN state, and turned off when it is in STOP state.	—	Dedicated to A3M
M9087	BASIC program PAUSE flag	OFF: A3M-BASIC RUN enable ON: A3M-BASIC disable	• Specifies enable/disable of A3M-BASIC execution when the A3MCPU is in PAUSE state. OFF: A3M-BASIC is executed. ON: A3M-BASIC is not executed.	—	Dedicated to A3M.
M9090	Power supply problem status on the PC side	OFF: Normal ON: Power off	• Turns on if the power to the PC side is shut off when the external power supply is connected to the CPU board. It stays on even after the status becomes normal.	—	Dedicated to A2USH board
∗1 M9091	Operation error detail flag	OFF: No error ON: Error	• Turned on when an operation error detail factor is stored at D9091, and remains ON after normal state is restored.	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
∗ M9091	Microcomputer subroutine call error flag	OFF: No error ON: Error	• Turned on when an error occurred at execution of the microcomputer program package, and remains ON after normal state is restored.	—	Unusable with AnA, A2AS, AnU and QCPU-A (A Mode).
M9092	External power supply problem status	OFF: Normal ON: Power off	• Turns on when the external power being supplied to the CPU board is shut off. It stays on even after the status becomes normal.	—	Dedicated to A2USH board
M9092	Duplex power supply overheat error	OFF: Normal ON: Overheat	• Turned on when overheat of a duplex power supply module is detected.	—	Dedicated to A3V.
M9093	Duplex power supply error	OFF: Normal ON: Failure or AC power supply down	• Turned on when a duplex power supply module caused failure or the AC power supply is cut down.	—	Dedicated to A3V.
∗2 ∗3 M9094	I/O change flag	OFF: Changed ON: Not changed	• After the head address of the required I/O module is set to D9094, switching M9094 on allows the I/O module to be changed in online mode. (One module is only allowed to be changed by one setting.) • To be switched on in the program or peripheral device test mode to change the module during CPU RUN. To be switched on in peripheral device test mode to change the module during CPU STOP. • RUN/STOP mode must not be changed until I/O module change is complete.	—	Usable with An, AnN, AnA, AnU.

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9095	Duplex operation verify error	OFF: Normal ON: Duplex operation verify error	• During duplex operation of the operating CPU with a stand-by CPU, verification is performed by the both to each other. Turned on when a verify error occurred.	—	Dedicated to A3V.
M9096	A3VCPU A selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU A mounted next to the A3VTU.	—	Dedicated to A3V.
M9097	A3VCPU B selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU B mounted next to the A3VCPU A.	—	Dedicated to A3V.
M9098	A3VCPU C selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU C mounted next to the A3VCPU B.	—	Dedicated to A3V.
M9099	A3VTU selfcheck error	OFF: No error ON: Error	• Turned on when a self-check error occurred on the A3VTU.	—	Dedicated to A3V.
M9100	SFC program registration	OFF: No SFC program ON: SFC program registered	• Turned on if the SFC program is registered, and turned off if it is not.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
∗2 M9101	SFC program start/stop	OFF: SFC program stop ON: SFC program start	• Should be turned on by the program if the SFC program is to be started. If turned off, operation output of the execution step is turned off and the SFC program is stopped.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
∗2 M9102	SFC program starting status	OFF: Initial start ON: Continuous start	• Selects the starting step when the SFC program is restarted using M9101. ON: Started with the step of the block being executed when the program stopped. OFF: All execution conditions when the SFC program stopped are cleared, and the program is started with the initial step of block 0. • Once turned on, the program is latched in the system and remains on even if the power is turned off. Should be turned off by the sequence program when turning on the power, or when starting with the initial step of block 0.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
∗2 M9103	Consecutive step transfer enable/disable	OFF: Consecutive step transfer disable ON: Consecutive step transfer enable	• Selects consecutive or step-by-step transfer of steps of which transfer conditions are established when all of the transfer conditions of consecutive steps are established. ON: Consecutive transfer is executed. OFF: One step per one scan is transferred.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9104	Consecutive transfer prevention flag	OFF: Transfer complete ON: Transfer incomplete	• Turned on when consecutive transfer is not executed with consecutive transfer enabled. Turned off when transfer of one step is completed. Consecutive transfer of a step can be prevented by writing an AND condition to corresponding M9104.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

∗: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9108 ∗2	Step transfer monitoring timer start (corresponds to D9108)	OFF: Monitoring timer reset ON: Monitoring timer reset start	• Turned on when the step transfer monitoring timer is started. Turned off when the monitoring timer is reset.	—	Usable with AnN∗, AnA∗, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9109 ∗2	Step transfer monitoring timer start (corresponds to D9109)				
M9110 ∗2	Step transfer monitoring timer start (corresponds to D9110)				
M9111 ∗2	Step transfer monitoring timer start (corresponds to D9111)				
M9112 ∗2	Step transfer monitoring timer start (corresponds to D9112)				
M9113 ∗2	Step transfer monitoring timer start (corresponds to D9113)				
M9114 ∗2	Step transfer monitoring timer start (corresponds to D9114)				

∗: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.1 Special relay list (Continue)

Number	Name	Description	Details	Applicable CPU	
M9180	Active step sampling trace complete flag	OFF: Trace start ON: Trace complete	• Turned on when sampling trace of all specified blocks is completed. Turned off when sampling trace is started.	—	Usable with AnN＊, AnA＊, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9181	Active step sampling trace execution flag	OFF: Trace not executed. ON: Trace being executed.	• Turned on when sampling trace is being executed. Turned off when sampling trace is completed or suspended.	—	Usable with AnN＊, AnA＊, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
＊2 M9182	Active step sampling trace enable	OFF: Trace disable/suspend ON: Trace enable	• Selects sampling trace execution enable/disable. ON: Sampling trace execution is enabled. OFF: Sampling trace execution is disabled. If turned off during sampling trace execution, trace is suspended.	—	Usable with AnN＊, AnA＊, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
＊2 M9196	Operation output at block stop	OFF: Coil output off ON: Coil output on	• Selects the operation output when block stop is executed. ON: Retains the ON/OFF status of the coil being used by using operation output of the step being executed at block stop. OFF: All coil outputs are turned off. (Operation output by the SET instruction is retained regardless of the ON/OFF status of M9196.)	—	Usable with AnN＊, AnA＊, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9197 M9198	Fuse blow, I/O verify error display switching	M9197 / M9198 / I/O numbers to be displayed: OFF / OFF / X/Y0 to 7F0 ON / OFF / X/Y800 to FF0 OFF / ON / X/Y1000 to 17F0 ON / ON / X/Y1800 to 1FF0	• Switches I/O numbers in the fuse blow module storage registers (D9100 to D9107) and I/O module verify error storage registers (D9116 to D9123) according to the combination of ON/OFF of the M9197 and M9198.	—	Usable with AnU, A2AS and QCPU-A (A Mode)
M9199	Data recovery of online sampling trace / status latch	OFF: Data recovery OFF ON: Data recovery ON	• When sampling trace / status latch is executed, the setting data stored in the CPU module is recovered to enable restart. • Turn on M9199 to execute again. (There is no need to write data with the peripheral device.)	—	Usable with AnU, A2AS and QCPU-A (A Mode)

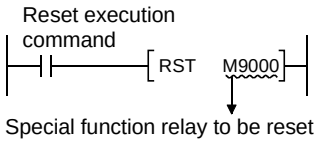
＊: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

POINTS

(1) Contents of the M special relays are all cleared by power off, latch clear or reset with the reset key switch. When the RUN key switch is set in the STOP position, the contents are retained.

(2) The above relays with numbers marked ∗1 remain "on" if normal status is restored. Therefore, to turn them "off", use the following method:

(a) Method by use program
Insert the circuit shown at right into the user program and turn on the reset execution command contact to clear the special relay M.



(b) Use the test function of the peripheral device to reset forcibly.
For the operation procedure, refer to the manuals for peripheral devices.

(c) By moving the RESET key switch on the CPU front to the RESET position, the special relays are turned off.

(3) Special relays marked ∗2 above are switched on/off in the sequence program.

(4) Special relays marked ∗3 above are switched on/off in test mode of the peripheral equipment.

(5) Turn OFF the following special relays after resetting the related special resisters. Unless the related special registers are reset, the special relays will be turned ON again even if they are turned reset.

Special Relay	Related Special Resister
M9000	D9100 to D9107
M9001	D9116 to D9123

Appendix 2.2 Special Registers D

The special registers are data registers used for specific purposes. Therefore, do not write data to the special registers in the program (except the ones with numbers marked *2 in the table).

Table 2.2 Special registers list

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9000</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• When fuse blown modules are detected, the lowest number of detected units is stored in hexadecimal. (Example: When fuses of Y50 to 6F output modules have blown, "50" is stored in hexadecimal) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9100 to D9107 are reset to 0.)
• Fuse blow check is executed also to the output modules of remote I/O stations.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>D9001</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• Stores the module numbers corresponding to setting switch numbers or base slot numbers when fuse blow occurred.
<table>
<tr><th colspan="2">I/O Module for A0J2</th><th colspan="2">Extension Base Unit</th></tr>
<tr><th>Setting Switch</th><th>Stored Data</th><th>Base Unit Slot No.</th><th>Stored Data</th></tr>
<tr><td>0</td><td>1</td><td>0</td><td>5</td></tr>
<tr><td>1</td><td>2</td><td>1</td><td>6</td></tr>
<tr><td>2</td><td>3</td><td>2</td><td>7</td></tr>
<tr><td>3</td><td>4</td><td>3</td><td>8</td></tr>
<tr><td>4</td><td>5</td><td></td><td></td></tr>
<tr><td>5</td><td>6</td><td></td><td></td></tr>
<tr><td>6</td><td>7</td><td></td><td></td></tr>
<tr><td>7</td><td>8</td><td></td><td></td></tr>
</table>
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
<tr><td rowspan="2">D9002</td><td rowspan="2">I/O module verify error</td><td rowspan="2">I/O module verify error unit number</td><td>• If I/O modules, of which data are different from data entered, are detected when the power is turned on, the first I/O number of the lowest number unit among the detected units is stored in hexadecimal. (Storing method is the same as that of D9000.) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9116 to D9123 are reset to 0.)
• I/O module verify check is executed also to the modules of remote I/O terminals.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>• If an I/O module, of which data is different from data entered, is detected when the power in turned on, the I/O number corresponding to the setting switch No. or base unit No. is stored.
(Storing method is the same as that of D9001).
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
</table>

Table 2.2 Special registers list (Continue)

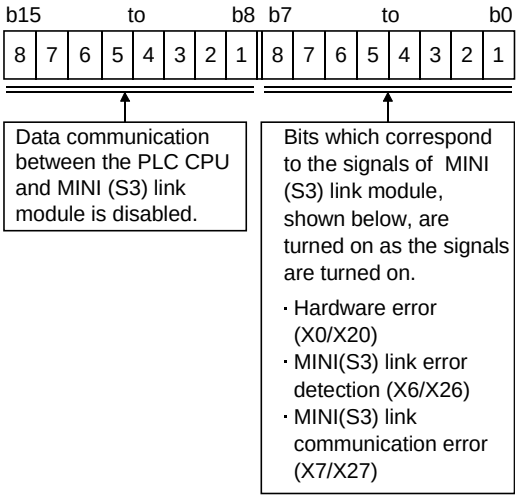
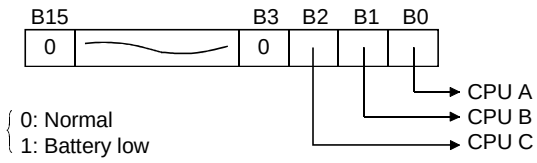
Number	Name	Description	Details	Applicable CPU	
D9003	SUM instruction detection bits	The number of bits detected by SUM instruction detection.	• The number of bits detected by execution of the SUM instruction are stored. in BIN code and updated every execution thereafter.	—	Dedicated to A0J2H.
∗1 D9004	MINI link master module error	Error detection status	• Error status of the MINI (S3) link detected on loaded MINI (S3) link module is stored. 	—	Usable with AnA, A2AS, AnA board and AnU.
∗1 D9005	AC DOWN counter	AC DOWN count	• 1 is added each time input voltage becomes 85% or less of rating while the CPU unit is performing operation, and the value is stored in BIN code.	○	Usable with all types of CPUs.
D9006	Battery low	Indicates the CPU module of which battery voltage is low.	• Bits which correspond to CPU of which battery is low are turned on in D9006, as shown below. 	—	Dedicated to A3V.
∗1 D9008	Shelf-diagnostic error	Self-diagnostic error number	• When error is found as a result of self-diagnosis, error number is stored in BIN code.	○	Usable with all types of CPUs.
D9009	Annunciator detection	F number at which external failure has occurred	• When one of F0 to 255 is turned on by OUT F or SET F, the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by RST F or LEDR instruction. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	△	Unusable with A3, A3N, A3A, A73 and A3N board.
			• When one of F0 to 255 is turned on by OUT F or SET F, the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by executing RST F or LEDR instruction or moving INDICATOR RESET switch on CPU front to ON position. If another F number has been detected, the clearing of D9009 causes the nest number to be stored in D9009.	—	Usable with A3, A3N, A3A, A73 and A3N board.

Table 2.2 Special registers list (Continue)

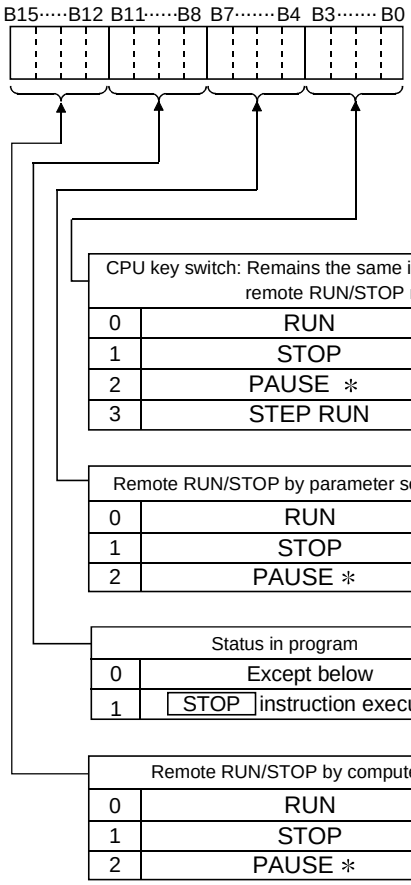
Number	Name	Description	Details	Applicable CPU	
D9010	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Thereafter, each time operation error occurs, the contents of D9010 are renewed.	△	Unusable with A3H and A3M.
∗1 D9011	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Since storage into D9011 is made when M9011 changes from off to on, the contents of D9010 cannot be renewed unless M9011 is cleared by user program.	○	Usable with all types of CPUs.
D9014	I/O control mode	I/O control mode number	• The I/O control mode set is returned in any of the following numbers: 0. Both input and output in direct mode 1. Input in refresh mode, output in direct mode 3. Both input and output in refresh mode	△	Unusable with An, A3H and A3M.
D9015	CPU operating states	Operating states of CPU	• The operation states of CPU as shown below are stored in D9015.  ∗ When the CPU is in RUN mode and M9040 is off, the CPU remains in RUN mode if changed to PAUSE mode.	○	Usable with all types of CPUs.

Table 2.2 Special registers list (Continue)

Number	Name	Description	Details	Applicable CPU	
D9016	ROM/RAM setting	0: ROM 1: RAM 2: E^2PROM	• Indicates the setting of memory select chip. One value of 0 to 2 is stored in BIN code.	—	Usable with A1 and A1N.
	Program number	0: Main program (ROM) 1: Main program (RAM) 2: Subprogram (RAM)	• Indicates which sequence program is run presently. One value of 0 to 2 is stored in BIN code. ("2" is not stored when AnS, AnSH, A1FX, A0J2H, A2C, A2, A2N, A2A, A2AS and A2U is used.)	△	Unusable with A1 and A1N
		0: Main program (ROM) 1: Main program (RAM) 2: Subprogram 1 (RAM) 3: Subprogram 2 (RAM) 4: Subprogram 3 (RAM) 5: Subprogram 1 (ROM) 6: Subprogram 2 (ROM) 7: Subprogram 3 (ROM) 8: Main program (E^2PROM) 9: Subprogram 1 (E^2PROM) A: Subprogram 2 (E^2PROM) B: Subprogram 3 (E^2PROM)	• Indicates which sequence program is run presently. One value of 0 to B is stored in BIN code.	—	Dedicated to AnU.
D9017	Scan time	Minimum scan time (per 10 ms)	• If scan time is smaller than the content of D9017, the value is newly stored at each END. Namely, the minimum value of scan time is stored into D9017 in BIN code.	○	Usable with all types of CPUs.
D9018	Scan time	Scan time (per 10 ms)	• Scan time is stored in BIN code at each END and always rewritten.	○	Usable with all types of CPUs.
D9019	Scan time	Maximum scan time (per 10 ms)	• If scan time is larger than the content of D9019, the value is newly stored at each END. Namely, the maximum value of scan time is stored into D9019 in BIN code.	○	Usable with all types of CPUs.
*2 D9020	Constant scan	Constant scan time (Set by user in 10 ms increments)	• Sets the interval between consecutive user program starts in multiples of 10 ms. 0: No setting 1 to 200: Set. Program is executed at intervals of (set value) × 10 ms.	△	Unusable with An.
D9021	Scan time	Scan time (1 ms unit)	• Scan time is stored and updated in BIN code after every END.	—	Usable with AnA, A2AS, AnU, AnA board and QCPU-A (A Mode).
D9022	1 second counter	Counts 1 every second.	• When the PC CPU starts running, it starts counting 1 every second. • It starts counting up from 0 to 32767, then down to -32768 and then again up to 0. Counting repeats this routine.	—	

Table 2.2 Special registers list (Continue)

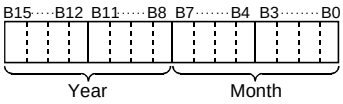
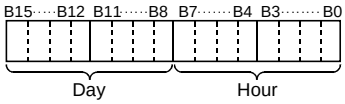
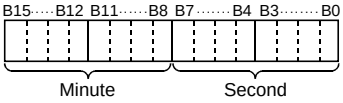
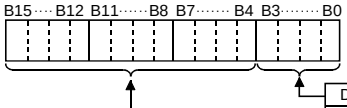
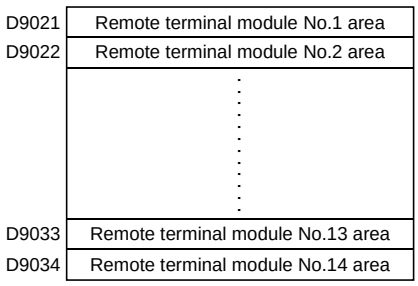
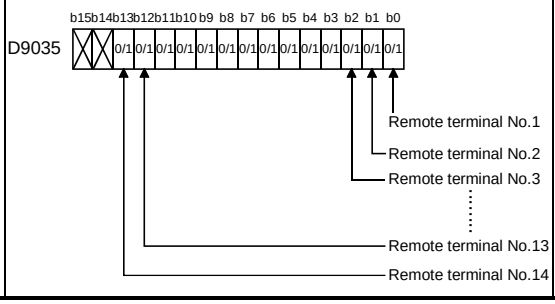
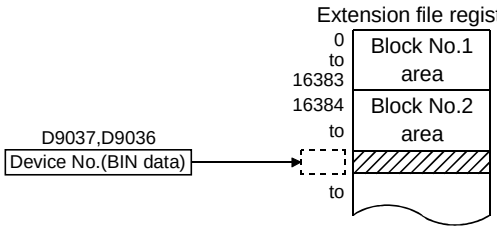
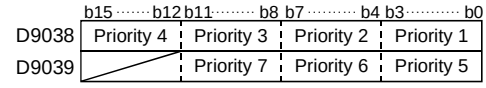
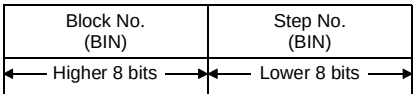
Number	Name	Description	Details	Applicable CPU	
∗2 D9025	Clock data	Clock data (Year, month)	• Stores the year (2 lower digits) and month in BCD.  Example: 1987,July H8707	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
∗2 D9026	Clock data	Clock data (Day, hour)	• Stores the day and hour in BCD.  Example: 31th,10 o'clock H3110	△	
∗2 D9027	Clock data	Clock data (Minute, second)	• Stores the Minute and second in BCD.  Example: 35 minutes, 48 seconds H3548	△	
∗2 D9028	Clock data	Clock data (, day of the week)	• Stores the day of the week in BCD.  Example: Friday H0005 Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
D9021 D9022 D9023 D9024 D9025 D9026 D9027 D9028 D9029 D9030 D9031 D9032 D9033 D9034	Remote terminal parameter setting	1 to 61	• Sets the head station number of remote terminal modules connected to A2C and A52G. Setting is not necessarily in the order of station numbers. A2CCPUC24: 1 to 57 Other CPUs: 1 to 61 • Data configuration 	—	Usable with A2C and A52G.
D9035	Attribute of remote terminal module	0: MINI standard protocol 1: No protocol	• Sets attribute of each remote terminal module connected to A2C and A52G with 0 or 1 at each bit. 0: Conforms to the MINI standard protocol or remote terminal unit. 1: No-protocol mode of AJ35PTF-R2 • Data configuration 		

Table 2.2 Special registers list (Continue)

Number	Name	Description	Details	Applicable CPU	
D9035	Extension file register	Use block No.	• Stores the block No. of the extension file register being used in BCD code.	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
D9036	Total number of stations	1 to 64	• Sets the total number of stations (1 to 64) of I/O modules and remote terminal modules which are connected to an A2C or A52G.	—	Usable with A2C and A52G.
D9036 D9037	For designation extension file register device numbers	The devise number used for getting direct access to each device for extension file register	• Designate the device number for the extension file register for direct read and write in 2 words at D9036 and D9037 in BIN data. Use consecutive numbers beginning with R0 of block No. 1 to designate device numbers. 	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
D9038 D9039	LED indication priority	Priority 1 to 4 Priority 5 to 7	• Sets priority of ERROR LEDs which illuminate (or flicker) to indicate errors with error code numbers. • Configuration of the priority setting areas is as shown below.  • For details, refer to the applicable CPUs User's Manual and the ACPU (Fundamentals) Programming manual.	—	Usable with A2C, AnS, AnSH, A1FX, A0J2H, A52G AnA, A2AS, AnU and QCPU-A (A Mode).
D9044	Sampling trace	Step or time during sampling trace	• The value stored in D9044 is used as the condition of the sampling trace when M9044 is turned on or off with the peripheral device to start sampling trace STRA or STRAR. At scanning.....0 At time .....Time (10 ms unit) Stores the value in BIN code for D9044.	△	Usable with A1 and A1N
D9049	SFC program execution work area	Expansion file register block number to be used as the work area for the execution of a SFC program.	• Stores the block number of the expansion file register which is used as the work area for the execution of a SFC program in a binary value. • Stores "0" if an empty area of 16K bytes or smaller, which cannot be expansion file register No. 1, is used or if M9100 is OFF.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
D9050	SFC program error code	Code number of error occurred in the SFC program	• Stores code numbers of errors occurred in the SFC program in BIN code. 0: No error 80: SFC program parameter error 81: SFC code error 82: Number of steps of simultaneous execution exceeded 83: Block start error 84: SFC program operation error		
D9051	Error block	Block number in which an error occurred.	• Stores the block number in which an error occurred in the SFC program in BIN code. In the case of error 83 the starting block number is stored.	—	

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-ll Programming Manual.

Table 2.2 Special registers list (Continue)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9052</td><td>Error step</td><td>Step number in which an error occurred.</td><td>• Stores the step number in which error 84 occurred in the SFC program in BIN code.
Stores "0" when errors 80, 81 and 82 occurred.
Stored the block starting step number when error 83 occurred.</td><td>—</td><td rowspan="3">Usable with AnN＊, AnA＊, AnU, A2S, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.</td></tr>
<tr><td>D9053</td><td>Error transfer</td><td>Transfer condition number in which an error occurred.</td><td>• Stores the transfer condition number in which error 84 occurred in the SFC program in BIN code.
Stored "0" when errors 80, 81, 82 and 83 occurred.</td><td>—</td></tr>
<tr><td>D9054</td><td>Error sequence step</td><td>Sequence step number in which an error occurred.</td><td>• Stores the sequence step number of transfer condition and operation output in which error 84 occurred in the SFC program in BIN code.</td><td>—</td></tr>
<tr><td>D9055</td><td>Status latch execution step number</td><td>Status latch execution step number</td><td>• Stores the step number when status latch is executed.
• Stores the step number in a binary value if status latch is executed in a main sequence program.
• Stores the block number and the step number if status latch is executed in a SFC program.
 
</td><td>—</td><td>Usable with AnA, A2AS, AnA bpard, AnU and QCPU-A (A Mode).</td></tr>
<tr><td>D9060</td><td>Software version</td><td>Software version of internal system</td><td>Stores the software version of the CPU module's internal system in ASCII codes.
Example: Stores "41H" for version A.
Note) The software version of the internal system may be different from the version marked on the housing.
＊5: This function is available with the CPU of the following S/W versions or later.
<table><tr><th>CPU Type Name</th><th>Software Version</th></tr><tr><td>A2ACPU (P21/R21), A2ACPU-S1 (P21/R21)</td><td>S/W version W (Manufactured in July, 1998)</td></tr><tr><td>A3ACPU (P21/R21)</td><td>S/W version X (Manufactured in July, 1998)</td></tr><tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version H (Manufactured in July, 1998)</td></tr><tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td><td>S/W version H (Manufactured in May, 1998)</td></tr><tr><td>A2USCPU (S1)</td><td>S/W version Y (Manufactured in July, 1998)</td></tr><tr><td>A2USHCPU-S1</td><td>S/W version E (Manufactured in July, 1998)</td></tr></table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH. ＊5</td></tr>
</table>

＊: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-ll Programming Manual.

Table 2.2 Special registers list (Continue)

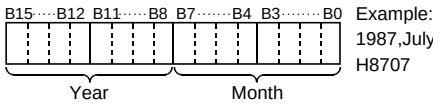
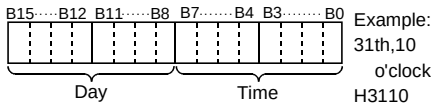
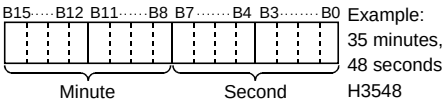
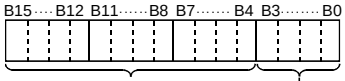
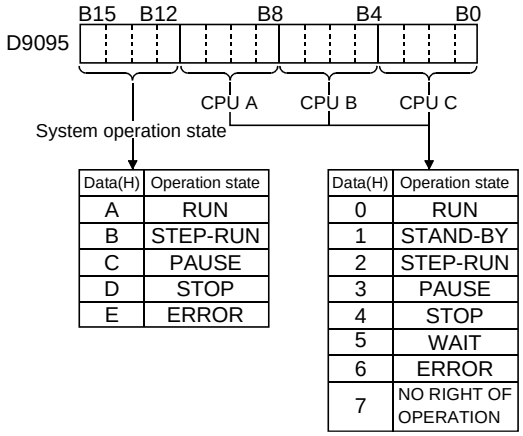
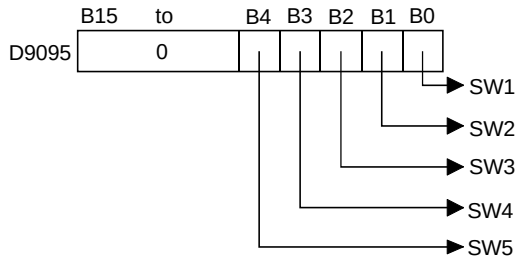
Number	Name	Description	Details	Applicable CPU	
D9061	Communication error code	0: Normal 1: Initial data error 2: Line error	• Stores error code when M9061 is turned on (communication with I/O modules or remote terminal modules fails). • 1.....Total number of stations of I/O modules or remote terminal modules or number of retries is not normal. Initial program contains an error. • 2.....Cable breakage or power supply of I/O modules or remote terminal modules is turned off.	—	Usable with A2C and A52G.
D9068	Abnormal base module	Stores the bit pattern of the abnormal base module	Stores the bit pattern of the base module in abnormal condition. When basic base module is abnormal: Bit 0 turns ON. When 1st expansion base module is abnormal: Bit 1 turns ON. When 2nd expansion base module is abnormal: Bit 2 turns ON. ⋮ When 7th expansion base module is abnormal: Bit 7 turns ON.	—	Dedicated to QCPU-A (A Mode)
D9072	PC communication check	Data check by AJ71C24	• In the loopback test mode of individual AJ71C24, the AJ71C24 automatically executes data write/read and communication check.	○	Usable with all types of CPUs.
D9073	Clock data	Clock data (year, month)	• Two digits showing the year (XX of 19XX) and month are stored to D9073 in BCD codes, as shown below. 	—	Dedicated to A2CCPUC24 (-PRF)
D9074	Clock data	Clock data (day, time)	• Two digits showing the day and time are stored to D9074 in BCD codes, as shown below. 		
D9075	Clock data	Clock data (minute, second)	• Two digits showing the minute and second are stored to D9075 in BCD codes, as shown below. 		Dedicated to A2CCPUC24 (-PRF)
D9075	Result of writing to standard ROM	Stores the status of writing to the standard ROM	Stores the status of writing to the standard ROM. 0: Writing enabled F1H: During RAM operation F2H: Writing to standard ROM disabled F3H: Failed to erase F4H: Failed to write FEH: Checking erasing FFH: During writing	—	Dedicated to QCPU-A (A Mode)
D9076	Clock data	Clock data (day of the week)	• Two day of the week is stored to D9076 in BCD codes, as shown below.  These digits are always set to 0. Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	—	Dedicated to A2CCPUC24 (-PRF)

Table 2.2 Special registers list (Continue)

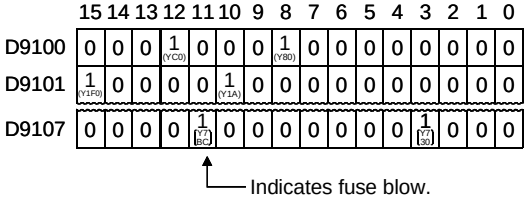
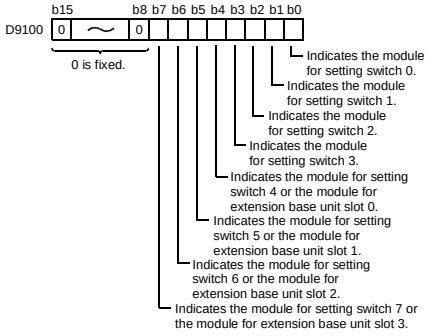
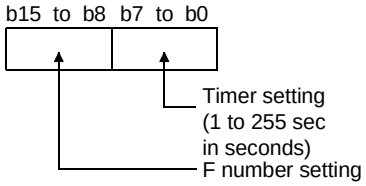
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9076</td><td>Status of writing to standard ROM</td><td>Stores the status of writing (enabled/disabled) to the standard ROM</td><td>Stores the status of writing (enabled/disabled) to the standard ROM.
Statuses of DIP switch 3 and M9073
0: SW3 is OFF, M9073 is OFF/ON
1: SW3 is ON, M9073 is OFF
2: SW3 is ON, M9073 is ON</td><td>—</td><td>Dedicated to QCPU-A (A Mode)</td></tr>
<tr><td>D9077</td><td>Sequence accumulation time measurement</td><td>Accumulation time setting</td><td>• Stores the accumulation time used by M9077.
Setting range: 1 to 255ms (Default: 5ms)
∗ When the value other than 1 to 255 ms is designated, the value in D9077 is reset to 0.</td><td>—</td><td>Dedicated to QCPU-A (A Mode)</td></tr>
<tr><td>D9080</td><td>Number of executable CC-Link dedicated instructions</td><td>Stores the number of remaining CC-Link dedicated instructions being executable</td><td>Stores the number of remaining instructions (RIRD/RIWT/RISEND/RIRCV) being executable simultaneously at one scan.
(With QCUP-A or AnUCPU)
Number of remaining instructions being executable = 10 – Number of instructions executed simultaneously
(With AnSHCPU)
Number of remaining instructions being executable = 64 – Number of instructions executed simultaneously
∗6: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr>
<tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr>
<tr><td>A2USCPU (S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, QCPU-A (A Mode) or AnSH ∗6</td></tr>
<tr><td>D9081</td><td>Number of vacant registration areas for communication requests</td><td>0 to 32</td><td>• Stores the number of vacant registration areas for communication requests executed to remote terminal modules connected to MINI (S3) link module, A2C and A52G.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode), AnU, A2C and A52G.</td></tr>
<tr><td>D9082</td><td>Final connected station number</td><td>Final connected station number</td><td>• Stores the final station number of remote I/O modules and remote terminal modules connected to A2C and A52G.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9085</td><td>Time check time</td><td>1 s to 65535 s</td><td>• Sets the time check time of the data link instructions (ZNRD, ZNWR) for the MELSECNET/10.
• Setting range: 1 s to 65535 s (1 to 65535)
• Setting unit: 1 s
• Default value: 10 s (If 0 has been set, default 10 s is applied)</td><td>—</td><td>Usable with AnU and A2AS, QCPU-A (A Mode)</td></tr>
<tr><td>D9090</td><td>Microcomputer subroutine input data area head device number</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode) and AnU.</td></tr>
<tr><td rowspan="2">D9091</td><td>Instruction error</td><td>Instruction error detail number</td><td>• Stores the detail code of cause of an instruction error.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
<tr><td>Microcomputer subroutine call error code</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
</table>

Table 2.2 Special registers list (Continue)

Number	Name	Description	Details	Applicable CPU	
D9091	SFC program detail error number	Detail error number of the error which occurred in a SFC program	• Stores the detail error number of the error occurred in a SFC program in a binary value.	—	Usable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.
＊2 ＊3 D9094	Changed I/O module head address	Changed I/O module head address	• Stores upper 2 digits of the head I/O address of I/O modules to be loaded or unloaded during online mode in BIN code. Example) Input module X2F0 → H2F	—	Unusable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.
D9095	Operation state of the A3VTS system and A3VCPU	Stores operation with 4 hexadecimal digits.	• Monitors operation state of the A3VTS system and the A3VCPU.  Data(H) / Operation state: A RUN; B STEP-RUN; C PAUSE; D STOP; E ERROR Data(H) / Operation state: 0 RUN; 1 STAND-BY; 2 STEP-RUN; 3 PAUSE; 4 STOP; 5 WAIT; 6 ERROR; 7 NO RIGHT OF OPERATION	—	Dedicated to A3V.
	Dip switch information	Dip switch information	• Dip switch information of CPU module is stored as follows. 0:ON 1:OFF 	—	Usable wtih QCPU-A (A mode) only.
D9096	A3VCPU A Self-check error	Self-check error code	• Error code of self-check error on CPU A is stored in BIN code. • Cleared when D9008 of CPU A is cleared.	—	Dedicated to A3V.
D9097	A3VCPU B Self-check error	Self-check error code	• Error code of self-check error on CPU B is stored in BIN code. • Cleared when D9008 of CPU B is cleared.	—	Dedicated to A3V.
D9098	A3VCPU C Self-check error	Self-check error code	• Error code of self-check error on CPU C is stored in BIN code. • Cleared when D9008 of CPU C is cleared.	—	Dedicated to A3V.
D9099	A3VTU Self-check error	Self-check error code	• Error code of self-check error on A3VTU is stored in BIN code.	—	Dedicated to A3V.

＊: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-ll Programming Manual.

Table 2.2 Special registers list (Continue)

Number	Name	Description	Details	Applicable CPU	
∗1 D9100 ∗1 D9101 ∗1 D9102 ∗1 D9103 ∗1 D9104 ∗1 D9105 ∗1 D9106 ∗1 D9107	Fuse blown module	Bit pattern in units of 16 points of fuse blow modules	• Output module numbers (in units of 16 points), of which fuses have blown, are entered in bit pattern. (Preset output unit numbers when parameter setting has been performed.)  • Fuse blow check is executed also to the output module of remote I/O station. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
∗1 D9100	Fuse blow module	Fuse blow module bit pattern	• Stores the output module number of the fuses have blown in the bit pattern. 	—	Dedicated to A0J2H.
∗2 D9108 ∗2 D9109 ∗2 D9110 ∗2 D9111 ∗2 D9112 ∗2 D9113 ∗2 D9114	Step transfer monitoring timer setting	Timer setting value and the F number at time out	• Sets value for the step transfer monitoring timer and the number of F which turns on when the monitoring timer timed out.  (By turning on any of M9108 to M9114, the monitoring timer starts. If the transfer condition following a step which corresponds to the timer is not established within set time, set annunciator (F) is tuned on.	—	Usable with AnN, AnA, AnU, A2AS, AnA board, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

∗: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-ll Programming Manual.

Table 2.2 Special registers list (Continue)

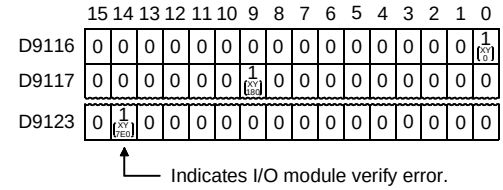
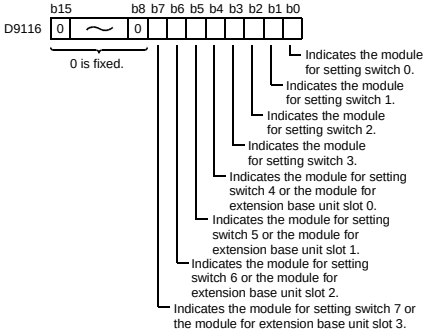
Number	Name	Description	Details	Applicable CPU	
∗1 D9116 ∗1 D9117 ∗1 D9118 ∗1 D9119 ∗1 D9120 ∗1 D9121 ∗1 D9122 ∗1 D9123	I/O module verify error	Bit pattern in units of 16 points of verify error units	• When I/O modules, of which data are different from those entered at power-on, have been detected, the I/O unit numbers (in units of 16 points) are entered in bit pattern. (Preset I/O unit numbers when parameter setting has been performed.)  • I/O module verify check is executed also to remote I/O station modules. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
∗1 D9116	I/O module verification error	Bit pattern of verification error module	• When an I/O module different from the I/O module data registered during power-on is detected, this register indicates the bit pattern of the I/O module number. 	—	Dedicated to A0J2H.
D9124	Annunciator detection quantity	Annunciator detection quantity	• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by SET F 1 is added to the contents of D9124. When RST F or LEDR instruction is executed, 1 is subtracted from the contents of D9124. (If the INDICATOR RESET switch is provided to the CPU, pressing the switch can execute the same processing.) • Quantity, which has been turned on by SET F is stored into D9124 in BIN code. The quantity turned on with SET F is stored up to “8.”	○	Usable with all types of CPUs.

Table 2.2 Special registers list (Continue)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9125
D9126
D9127
D9128
D9129
D9130
D9131
D9132</td><td>Annunciator detection number</td><td>Annunciator detection number</td><td>• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by SET F, F number, which has turned on, is entered into D9125 to D9132 in due order in BIN code.
• F number, which has been turned off by RST F, is erased from D9125 to D9132, and the contents of data registers succeeding the data register, where the erased F number was stored, are shifted to the preceding data registers.
• By executing LEDR instruction, the contents of D9125 to D9132 are shifted upward by one. (With a CPU equipped with an INDICATOR RESET switch, the same process occurs when the switch is pressed.
• When there are 8 annunciator detections, the 9th one is not stored into D9125 to 9132 even if detected.
SET F50 SET F25 SET F99 RST F25 SET F15 SET F70 SET F65 SET F38 SET F110 SET F151 SET F210 LEDR
D9009 0 50 50 50 50 50 50 50 50 50 50 50 99
D9124 0 1 2 3 2 3 4 5 6 7 8 8 8
D9125 0 50 50 50 50 50 50 50 50 50 50 50 99
D9126 0 0 25 25 99 99 99 99 99 99 99 99 15
D9127 0 0 0 99 0 15 15 15 15 15 15 15 70
D9128 0 0 0 0 0 0 70 70 70 70 70 70 65
D9129 0 0 0 0 0 0 0 65 65 65 65 65 38
D9130 0 0 0 0 0 0 0 0 38 38 38 38 110
D9131 0 0 0 0 0 0 0 0 0 110 110 110 151
D9132 0 0 0 0 0 0 0 0 0 0 151 151 210</td><td>○</td><td>Usable with all types of CPUs</td></tr>
<tr><td>D9133
D9134
D9135
D9136
D9137
D9138
D9139
D9140</td><td>Remote terminal card information</td><td>00: No I/O module or remote terminal module or initial communication impossible
01: Input module or remote terminal module
10: Output module</td><td>• Stores information of I/O modules and remote terminal modules connected to the A2C and A52G corresponding to station number.
• Information of I/O modules and remote terminal modules is for input, output and remote terminal module identification and expressed as 2-bit data.
00: No I/O module or remote terminal module or initial communication is impossible.
01: Input module or remote terminal module
10: Output module
• Data configuration
b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
D9133 Station 8 Station 7 Station 6 Station 5 Station 4 Station 3 Station 2 Station 1
Station 16 Station 15 Station 14 Station 13 Station 12 Station 11 Station 10 Station 9
Station Station Station Station Station Station Station Station
Station 56 Station 55 Station 54 Station 53 Station 52 Station 51 Station 50 Station 49
D9140 Station 64 Station 63 Station 62 Station 61 Station 60 Station 59 Station 58 Station 57</td><td></td><td>Usable with A2C and A52G</td></tr>
</table>

Table 2.2 Special registers list (Continue)

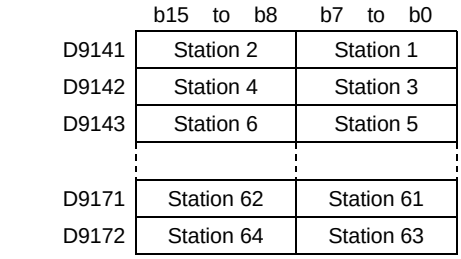
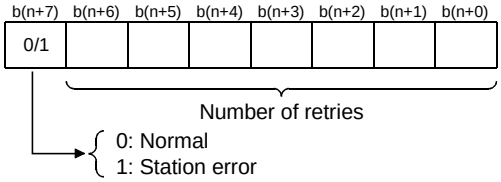
Number	Name	Description	Details	Applicable CPU	
D9141	Number of times of retry execution	Number of retries	• Stores the number of retries executed to I/O modules or remote terminal modules which caused communication error. (Retry processing is executed the number of times set at D9174.) • Data becomes 0 when communication is restored to normal. • Station number setting of I/O modules and remote terminal modules is as shown below.  • Retry counter uses 8 bits for one station.  * "n" is determined by station number of I/O module or remote terminal module. Odd number stations: b0 to b7 (n = 0) Even number stations: b8 to b15 (n = 8)	—	Usable with A2C and A52G.
D9142					
D9143					
D9144					
D9145					
D9146					
D9147					
D9148					
D9149					
D9150					
D9151					
D9152					
D9153					
D9154					
D9155					
D9156					
D9157					
D9158					
D9159					
D9160					
D9161					
D9162					
D9163					
D9164					
D9165					
D9166					
D9167					
D9168					
D9169					
D9170					
D9171					
D9172					

Table 2.2 Special registers list (Continue)

Number	Name	Description	Details			Applicable CPU	
D9173	Mode setting	0: Automatic online return enabled 1: Automatic online return disabled 2: Transmission stop at online error 3: Line check	Mode setting			—	Usable with A2C and A52G.
			0	Automatic online return enabled	• When an I/O module or a remote terminal module caused communication error, the station is placed offline. • Communication with normal stations is continued. • The station recovering from a communication error automatically resumes communication.		
			1	Automatic online return disabled	• When an I/O module or a remote terminal module caused communication error, the station is placed offline. • Communication with normal stations is continued. • Though a faulty station returned to normal, communication is not restored unless the station module is restarted.		
			2	Transmission stop at online error	• When an I/O module or a remote terminal module caused communication error, communication with all stations is stopped. • Though a faulty station returned to normal, communication is not restored unless the station module is restarted.		
			3	Line check	• Checks hardware and connecting cables of I/O modules and remote terminal modules.		
D9174	Setting of the number of retries	Number of retries	• Sets the number of retries executed to I/O modules and remote terminal modules which caused communication error. • Set for 5 times at power on. • Set range: 0 to 32 • If communication with an I/O module or a remote terminal module is not restored to normal after set number of retries, such module is regarded as a faulty station.			—	Usable with A2C and A52G.
D9175	Line error retry counter	Number of retries	• Stores the number of retries executed at line error (time out). • Data becomes 0 when line is restored to normal and communication with I/O modules and remote terminal modules is resumed.			—	Usable with A2C and A52G.

Table 2.2 Special registers list (Continue)

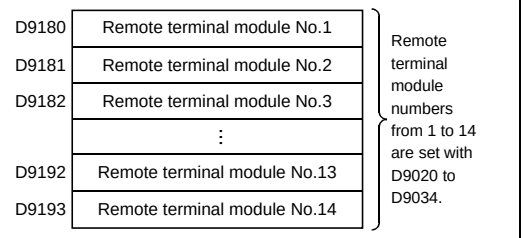
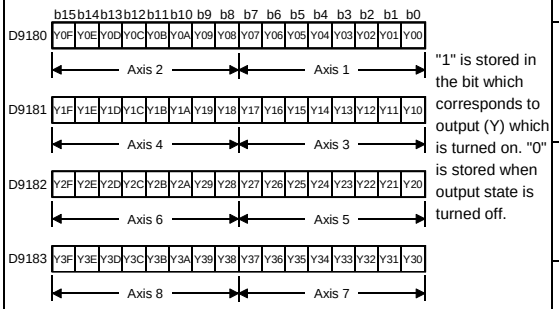
Number	Name	Description	Details	Applicable CPU	
D9180 D9181 D9182 D9183 D9184 D9185 D9186 D9187 D9188 D9189 D9190 D9191 D9192 D9193	Remote terminal module error number		• Stores error code of a faulty remote terminal module when M9060 is turned on. • The error code storage areas for each remote terminal module are as shown below.  • Error code is cleared in the following cases. • When the RUN key switch is moved from STOP to RUN. (D9180 to D9183 are all cleared.) • When Yn4 of each remote terminal is set from OFF to ON.	—	Usable with A2C and A52G.
D9180	Limit switch output state torage areas for axes 1 and 2	Bit pattern of limit switch function output state	• Stores output state of limit switch function. 	—	Dedicated to A73.
D9181	Limit switch output state storage areas for axes 3 and 4			—	Dedicated to A73.
D9182	Limit switch output state storage areas for axes 5 and 6			—	Dedicated to A73.
D9183	Limit switch output state storage areas for axes 7 and 8			—	Dedicated to A73.
D9184	Cause of PCPU error	PCPU error code	• Stores error codes occurred at the PCPU in BIN code. 0: Normal 1: A73CPU hardware error 2: PCPU error 10: A70AF error 11: A70AF error 12: A70MDF error 13: AY42 error	—	Dedicated to A73.
D9185	Servo amplifier connection data	Bit pattern of servo amplifier connection state	• Servo amplifier connection state is checked and the result is stored in the bit which corresponds to each axis number. Connection state is continuously checked. Axes which changed from disconnected state to connected state are regarded as connected. But, axes which changed from connected state to disconnected state are still regarded as connected. 	—	Dedicated to A73.

Table 2.2 Special registers list (Continue)

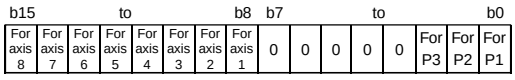
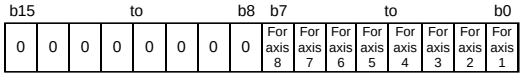
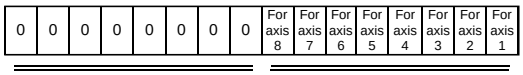
Number	Name	Description	Details	Applicable CPU	
D9187	Manual pulse generator axis setting error	Manual pulse generator axis setting error code	• Stores error code when the manual pulse generator axis setting error flag (M9077) is turned on in the bit each corresponds to each axis number.  "1" is stored in the bit which corresponds to the axis number which caused 1 pulse input magnification setting error. 0: Normal 1: Input magnification is out of the range from 1 to 100. (Not used) "1" is stored in the bit which corresponds to the manual pulse generator number which caused manual pulse generator axis setting error. 0: Normal 1: Axis setting is out of the range from 1 to 8.	—	Dedicated to A73.
D9188	Starting axis number at test mode request error	Starting axis number	• Stores axis number in the bit which corresponds to the axis which was running when a test mode request was given and test mode request error occurred.  (Not used) "1" is stored when running. "0" is stored when not running.	—	Dedicated to A73.
D9189	Error program number	Error program number	• Stores error servo program number (0 to 4095) when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9190	Data setting error	Data setting error number	• Stores error code which corresponds to the error setting item when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9191	Servo amplifier type	Bit pattern of the axis connected to a general-purpose servo amplifier	• Stores type of connected servo amplifier in the bit which corresponds to each axis number. 0: MR-SB/MR-SD/MR-SB-K is connected or not connected. 1: General-purpose servo amplifier is connected.  All 0 Type of servo amplifier set at each axis is stored with "0" or "1".	—	Dedicated to A73.

Table 2.2 Special registers list (Continue)

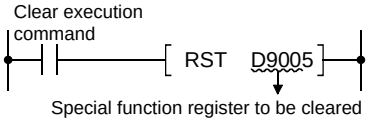
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9196
D9197
D9198
D9199</td><td>Faulty station detection</td><td>Bit pattern of the faulty station</td><td>• Bit which corresponds to faulty I/O module or remote terminal module is set (1).
(Bit which corresponds to a faulty station is set when normal communication cannot be restored after executing the number of retries set at D9174.)
• If automatic online return is enabled, bit which corresponds to a faulty station is reset (0) when the station is restored to normal.
• Data configuration
<table>
<tr><th>Address</th><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>b11</th><th>b10</th><th>b9</th><th>b8</th><th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr>
<tr><td>D9196</td><td>Stasion 16</td><td>Stasion 15</td><td>Stasion 14</td><td>Stasion 13</td><td>Stasion 12</td><td>Stasion 11</td><td>Stasion 10</td><td>Stasion 9</td><td>Stasion 8</td><td>Stasion 7</td><td>Stasion 6</td><td>Stasion 5</td><td>Stasion 4</td><td>Stasion 3</td><td>Stasion 2</td><td>Stasion 1</td></tr>
<tr><td>D9197</td><td>Stasion 32</td><td>Stasion 31</td><td>Stasion 30</td><td>Stasion 29</td><td>Stasion 28</td><td>Stasion 27</td><td>Stasion 26</td><td>Stasion 25</td><td>Stasion 24</td><td>Stasion 23</td><td>Stasion 22</td><td>Stasion 21</td><td>Stasion 20</td><td>Stasion 19</td><td>Stasion 18</td><td>Stasion 17</td></tr>
<tr><td>D9198</td><td>Stasion 48</td><td>Stasion 47</td><td>Stasion 46</td><td>Stasion 45</td><td>Stasion 44</td><td>Stasion 43</td><td>Stasion 42</td><td>Stasion 41</td><td>Stasion 40</td><td>Stasion 39</td><td>Stasion 38</td><td>Stasion 37</td><td>Stasion 36</td><td>Stasion 35</td><td>Stasion 34</td><td>Stasion 33</td></tr>
<tr><td>D9199</td><td>Stasion 64</td><td>Stasion 63</td><td>Stasion 62</td><td>Stasion 61</td><td>Stasion 60</td><td>Stasion 59</td><td>Stasion 58</td><td>Stasion 57</td><td>Stasion 56</td><td>Stasion 55</td><td>Stasion 54</td><td>Stasion 53</td><td>Stasion 52</td><td>Stasion 51</td><td>Stasion 50</td><td>Stasion 49</td></tr>
</table>
1: Error
0: Normal</td><td colspan="2">—</td><td>Usable with A2C and A52G.</td></tr>
</table>

POINTS

(1) Special registers are cleared when the PC is switched off or the RESET switch is set to LATCH CLEAR or RESET. Data remains unchanged when the RUN key switch is set to STOP.

(2) The above special registers marked ∗1 above are latched and their data will remain unchanged after normal status is restored. For this reason, use one of the following methods to clear the registers.

(a) Method by user program
Insert the circuit shown at right into the program and turn on the clear execution command contact to clear the contents of register.



(b) Method by peripheral equipment
Set the register to "0" by changing the present value by the test function of peripheral equipment or set to "0" by forced reset. For the operation procedure, refer to the Instruction Manual for peripheral equipment.

(c) By moving the RESET key switch at the CPU front to the RESET position, the special register is set to "0".

(3) Data is written to special registers marked ∗2 above in the sequence program.

(4) Data is written to special registers marked ∗3 above in test mode of the peripheral equipment.

Appendix 3 Precautions when Switching from AnSCPU to AnSHCPU

Appendix 3.1 Dissimilarities between A1SHCPU and A1SCPU

The dissimilarities between the A1SHCPU and A1SCPU are as follows :

	Item	A1SHCPU	A1SCPU
1	CPU processing speed *1	0.33 μs	1 μs
2	I/O points	2048 points *2	256 points
3	File register capacity (R)	Max. 8192 points (R0 to 8191)	Max. 4096 points (R0 to 4095)
4	Memory capacity	64 k bytes	32 k bytes
5	Comment points	Max. 3648 points	Max. 1600 points *3
6	CC-Link dedicated instruction	8	None
7	Startup model	A3	A1S
8	Memory write protect range	First half, 32 k bytes	First half, 20 k bytes
9	Microcomputer program	There are some restrictions.	There is no restrictions.
10	Conventional memory cassette A1SMCA-2KE/8KE/8KP	×	○
	New-type memory cassette A1SMCA-2KE/8KE/8KP	○	○
11	Clock precision	Year, month, day, hour, minute, day of week (Automatic leap year calculation)	
		Precision -3.1 to +5.3 s(TYP. +1.7 s)/d at 0 °C -1.6 to +5.3 s(TYP. +2.4 s)/d at 25 °C -9.6 to +3.6 s(TYP. -2.1 s)/d at 55 °C	Precision -2.3 to +4.4 s(TYP. +1.8 s)/d at 0 °C -1.1 to +4.4 s(TYP. +2.2 s)/d at 25 °C -9.6 to +2.7 s(TYP. -2.4 s)/d at 55 °C

*1 : I/O processing: during refresh and LD instruction execution

*2 : Actual I/O points are the same as the AnS series, but this model has 2048 points of I/O device for each CPU (X/Y0 to 7FF). The added I/O device can be used for MELSECNET (/B), MELSECNET/MINI, or CC-Link.

*3 : The comment points for comments that can be stored in the CPU module is 1600 points, while up to 3648 points of comment can be created using the GPP function.

Appendix 3.2 Dissimilarities between A2SHCPU(-S1) and A2SCPU

The dissimilarities between the A2SHCPU(-S1) and A2SCPU are as follows :

	Item	A2SHCPU(-S1)	A2SCPU
1	CPU processing speed *1	0.25 μs	1 μs
2	I/O points	2048 points *2	512 points
3	File register capacity (R)	Max. 8192 points (R0 to 8191)	Max. 4096 points (R0 to 4095)
4	CC-Link dedicated instruction	8	None
5	Startup model	A3	A2
6	Microcomputer program	There are some restrictions.	There is no restrictions.
7	Conventional memory cassette A2SMCA-14KE/14KP	×	○
	New-type memory cassette A2SNMCA-30KE	○	○
8	Clock precision	Year, month, day, hour, minute, day of week (Automatic leap year calculation)	
		Precision -3.1 to +5.3 s(TYP. +1.7 s)/d at 0 °C -1.6 to +5.3 s(TYP. +2.4 s)/d at 25 °C -9.6 to +3.6 s(TYP. -2.1 s)/d at 55 °C	Precision -2.3 to +4.4 s(TYP. +1.8 s)/d at 0 °C -1.1 to +4.4 s(TYP. +2.2 s)/d at 25 °C -9.6 to +2.7 s(TYP. -2.4 s)/d at 55 °C

*1 : I/O processing : during refresh and LD instruction execution

*2 : Actual I/O points are the same as the AnS series, but this model has 2048 points of I/O device for each CPU (X/Y0 to 7FF). The added I/O device can be used for MELSECNET (/B), MELSECNET/MINI, or CC-Link.

Appendix 3.3 Precautions when Switching the Model

Appendix 3.3.1 PLC type setting

The PLC type becomes "A3" to enable the use of 2048 input device points X/Y, file register R8192 points and LEAD/LEDB instructions.

Appendix 3.3.2 The precaution when performing the ROM cutoff

When performing the ROM cutoff of A1SJHCPU and A1SHCPU with SW4GP-GPPA, the startup model must be changed as following.

	Startup model
Before software version Q	A0J2H
Aafter software version R	A1S

Appendix 3.3.3 The precaution when utilizing the sequence program

Please follow the procedures below for applying the parameter and program created for AnSCPU to AnSHCPU:

1. Select the 'Read File' from the initial setting menu after starting up the GPP function software.

2. Read the parameter and program files created for AnSCPU from the floppy or hard disk, and then write those parameter and program into a peripheral device. (Such file reading is required for performing the procedure described in 3.)

3. Using the item PLC type change in the initial setting menu, change the CPU type name to A3 which is the one specified for AnSHCPU. (Perform the procedure as given in 4, since the parameter is reset to the default setting.)

4. In the file maintenance menu, read the parameter and program created for AnSCPU from the floppy or hard disk into peripheral devices. (Ignore the error message 'Unmatched PLC Type' even if such a message may be given.)

The above procedures allow the parameter and program for AnSCPU to be used for AnSHCPU, without any change or modification.

Appendix 3.3.4 System confirmation by high-speed instruction processing

Confirm effects on the user system by the instruction processing speed and the reduction of the scan time.

Appendix 3.3.5 Handling conventional memory cassettes

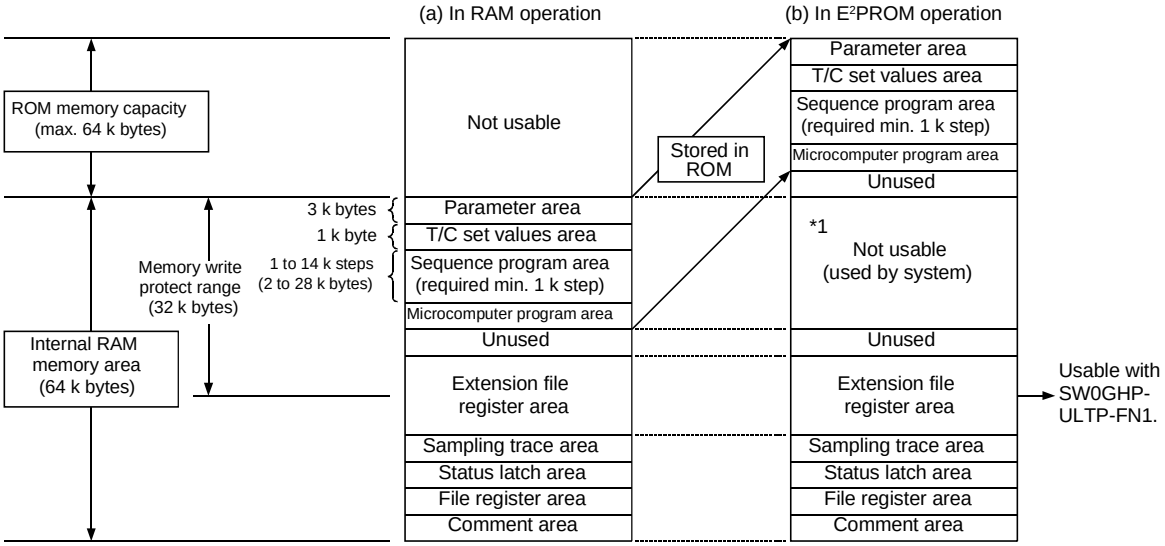
Conventional memory cassettes A1SMCA-2KE/8KE/8KP (for A1SCPU) and A2SMCA-14KE (for A2SCPU) cannot be used for A1SHCPU and A2SHCPU(S1). (Used only for A1SJHCPU(S8))

The new type memory cassettes A1SNMCA-2KE/8KE/8KP (for A1SJHCPU(S8)/A1SHCPU) and A2SNMCA-30KE (for A2SHCPU(S1)) should be used.

Appendix 3.3.6 Switching from the A2SMCA-14KP (when A2SCPU + A2SMCA-14KP has been used)

When A2SHCPU + A2SNMCA-30KE was switched, *1 area cannot be used as the extension file register.

When *1 area has been used as the extension file register, the system of A2ASCPU(-S1) + A2SMCA-14KP should be used.



Appendix 3.3.7 Restrictions in microcomputer programs

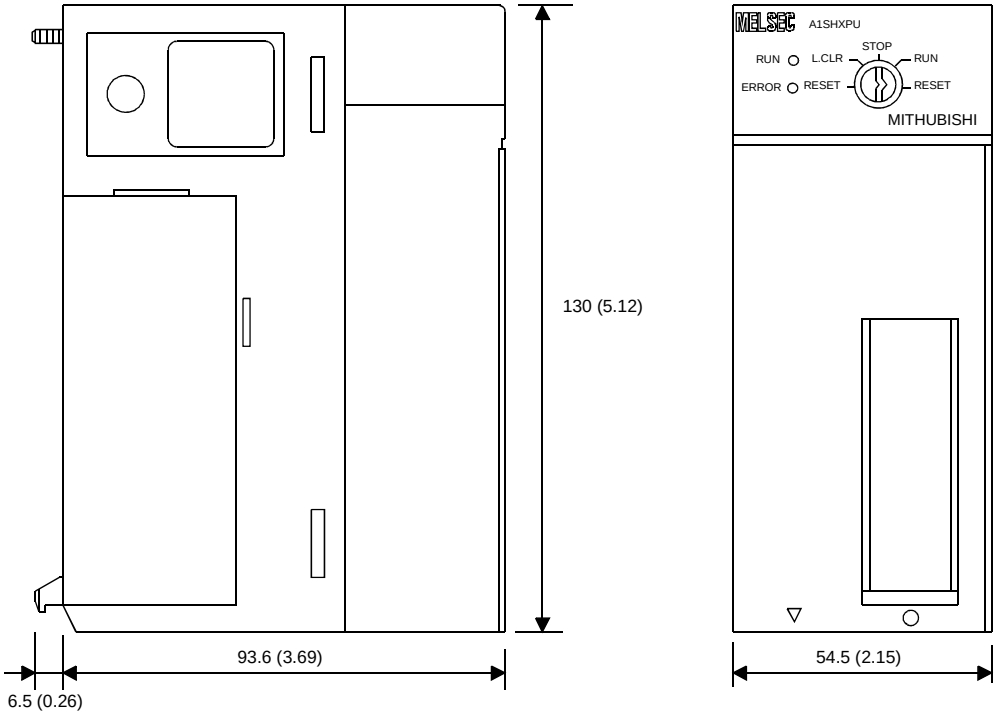
When a customer used the microcomputer mode, the following changes are made in the microcomputer instructions.

Change points by switching to AnSHCPU from AnSCPU	Corrective action method
When REP LODSW and REP LODSB instructions are used AnSCPUThe ..... contents of a memory shown by the S1 register for the number of times specified in CX register,, are transfered to the register of AL (8 bits operation) or AX (16 bits operation). Aafter the instructions have been executed, the CX register value becomes 0. AnSHCPU..... The contents of a memory shown only once by the S1 register regardless of the value of the CX register,, are transfered to the register of AL (8 bits operation) or AX (16 bits operation). After the instructions have been executed, the CX register value does not change.	The following example for the program should be revered. Program example STD MOV CX.3 **REP LODSB** → **A : LODSB Loop A** STD MOV CX.3

Appendix 4 Outside Dimensions

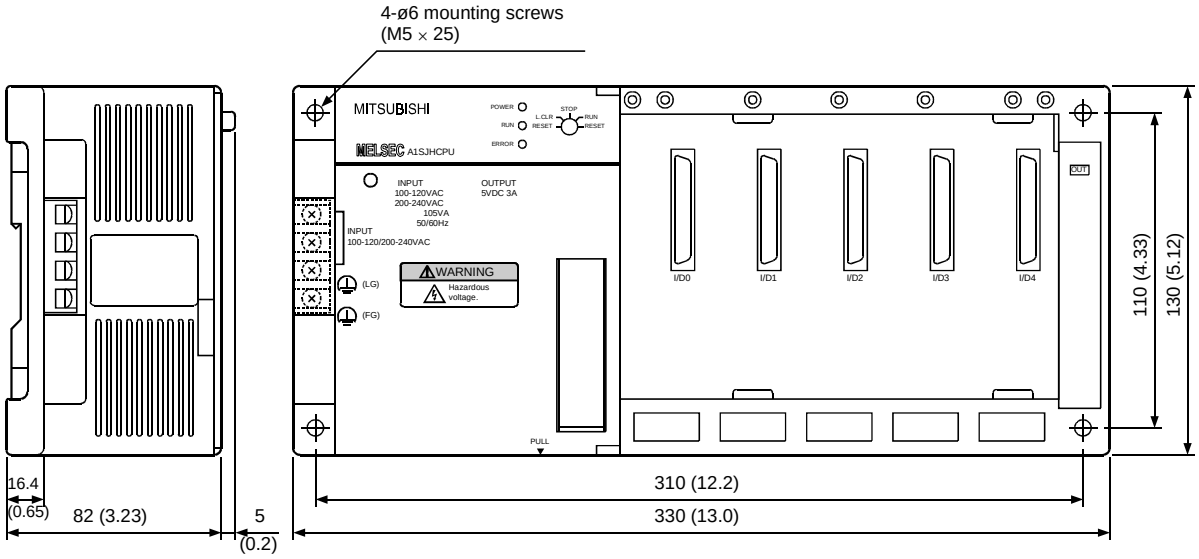
Appendix 4.1 CPU Module

Appendix 4.1.1 A1SHCPU/A2SHCPU(S1) module



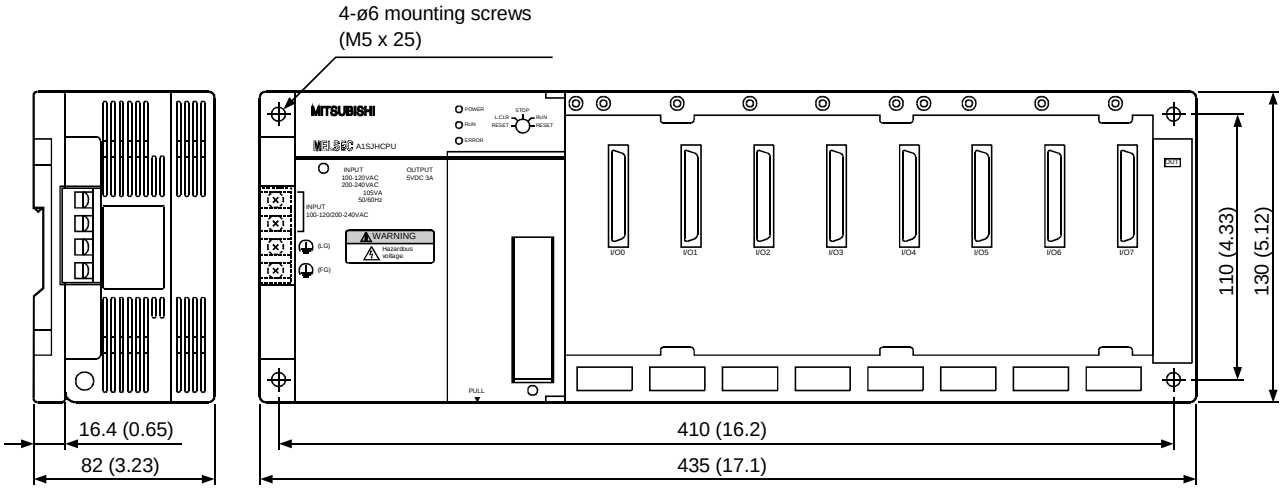
Unit : mm (in.)

Appendix 4.1.2 A1SJHCPU module



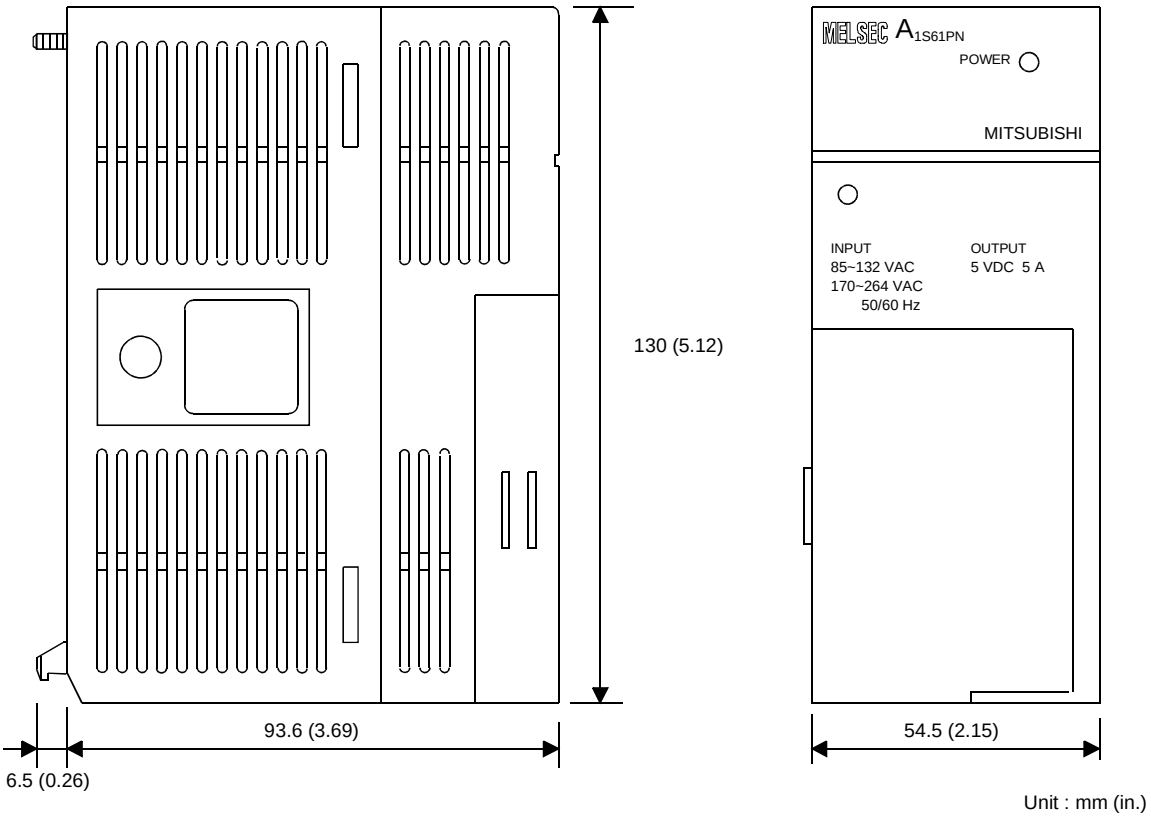
Unit : mm (in.)

Appendix 4.1.3 A1SJHCPU-S8 module



Unit: mm (in)

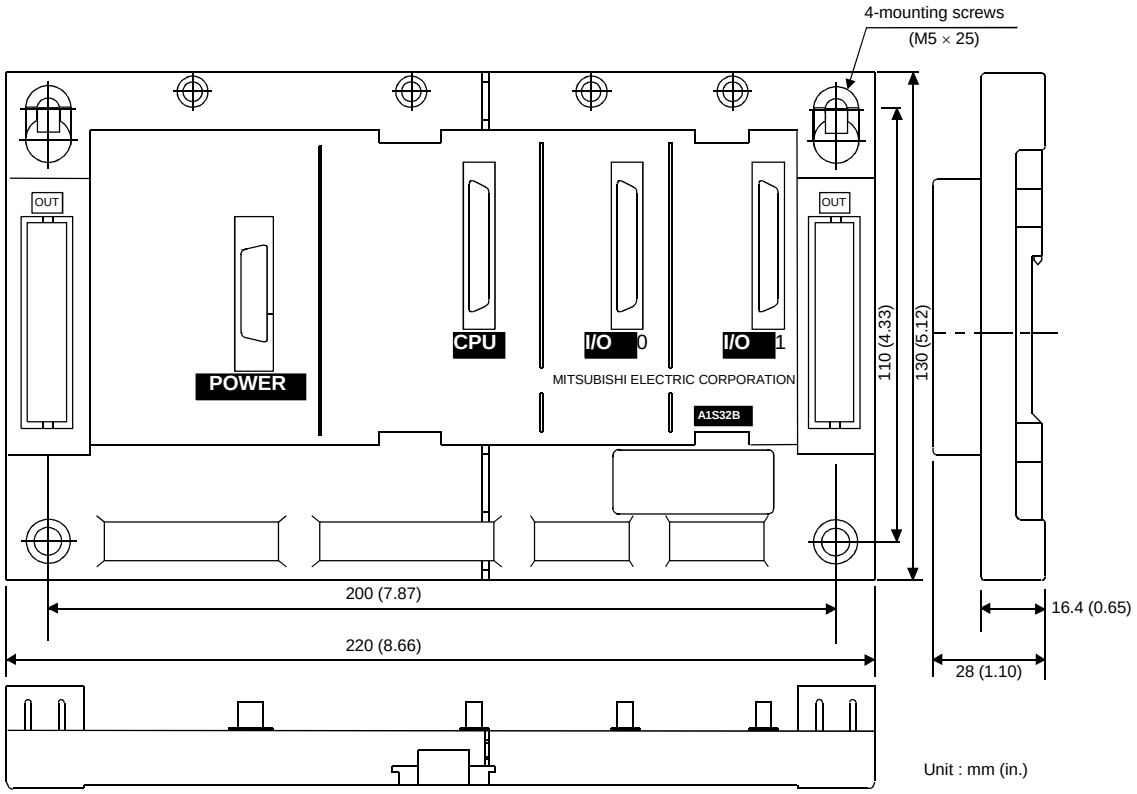
Appendix 4.2 A1S61PN/A1S62PN/A1S63P Power Supply Module



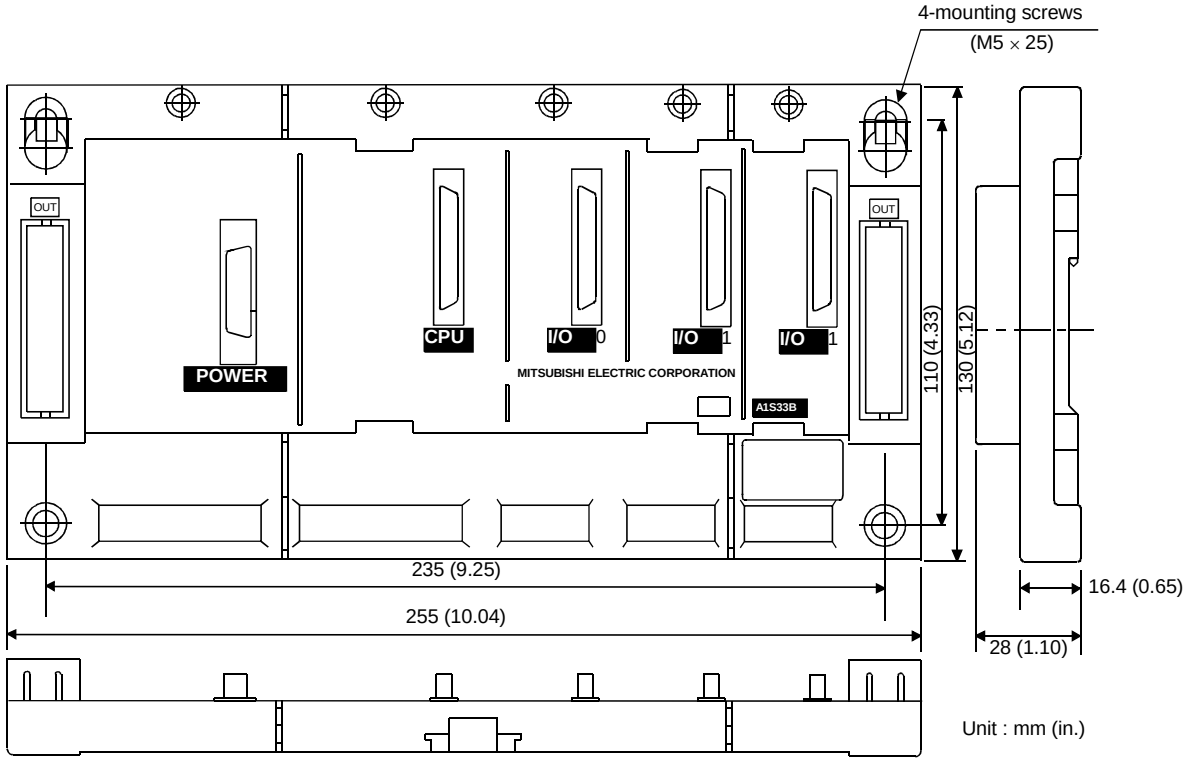
Unit : mm (in.)

Appendix 4.3 Main Base Units

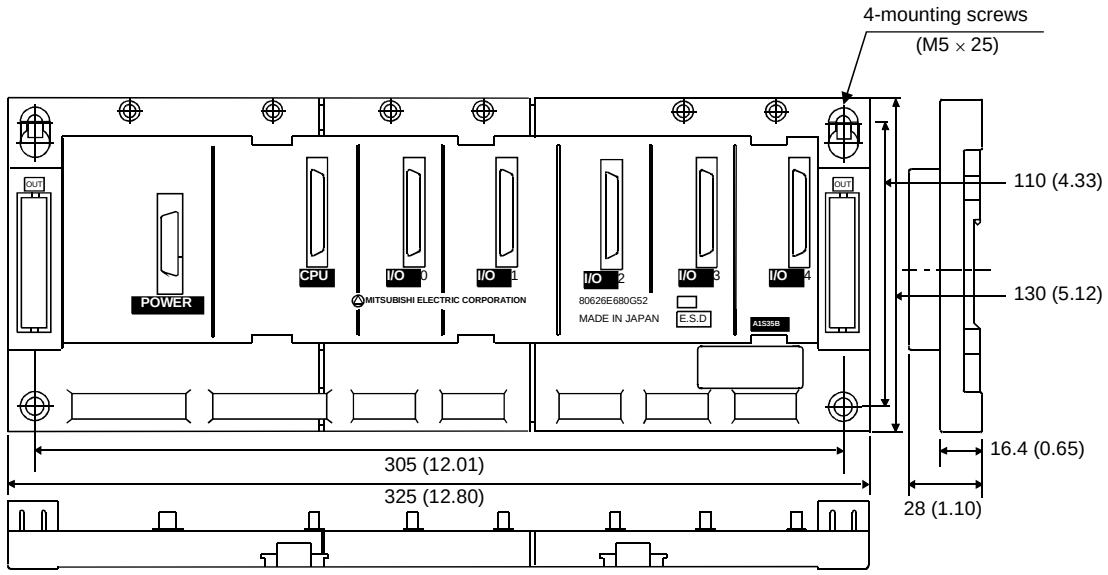
Appendix 4.3.1 A1S32B main base unit



Appendix 4.3.2 A1S33B main base unit

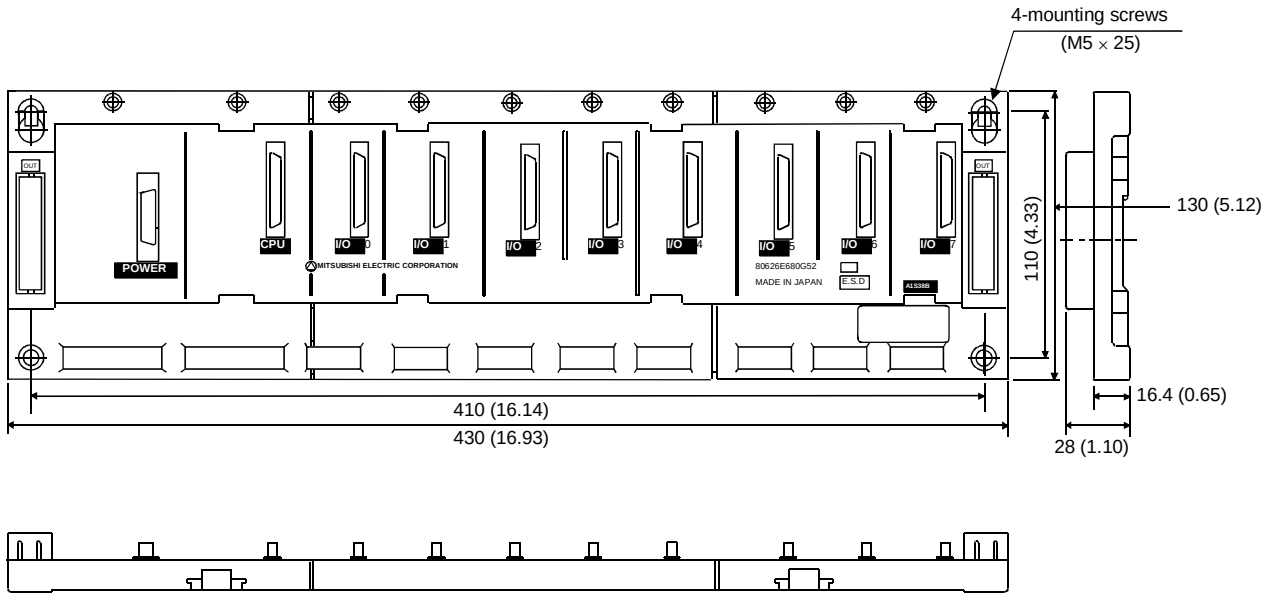


Appendix 4.3.3 A1S35B main base unit



Unit : mm (in.)

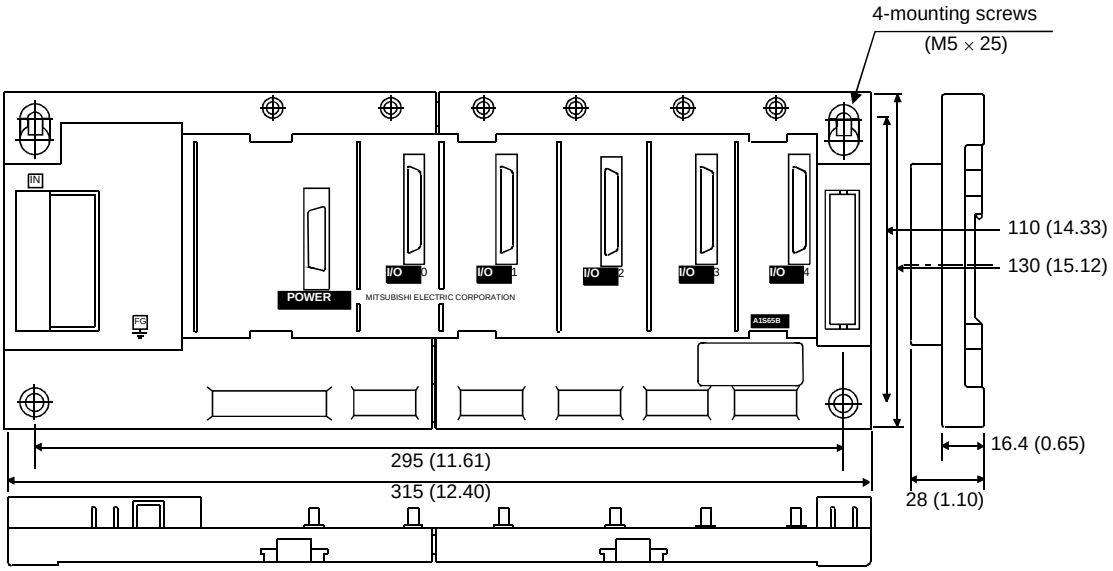
Appendix 4.3.4 A1S38B main base unit



Unit : mm (in.)

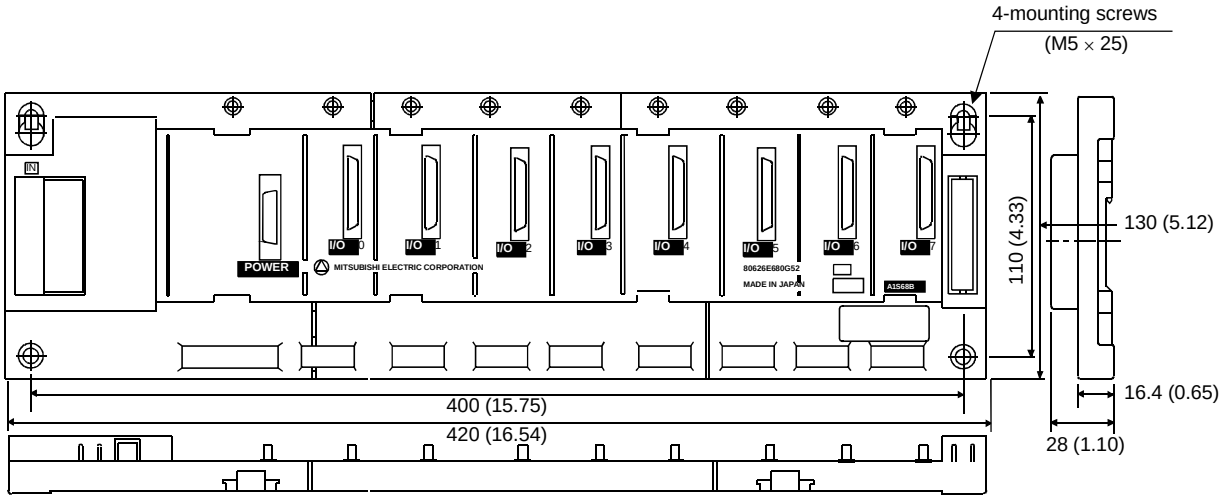
Appendix 4.4 Extension Base Units

Appendix 4.4.1 A1S65B extension base unit



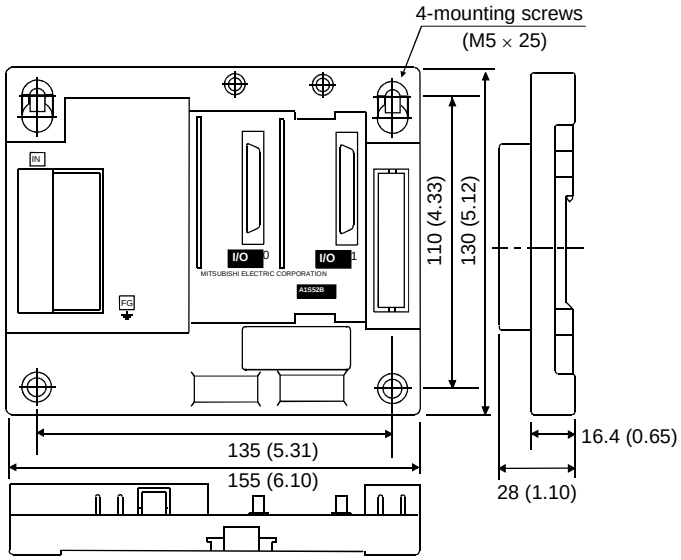
Unit : mm (in.)

Appendix 4.4.2 A1S68B extension base unit



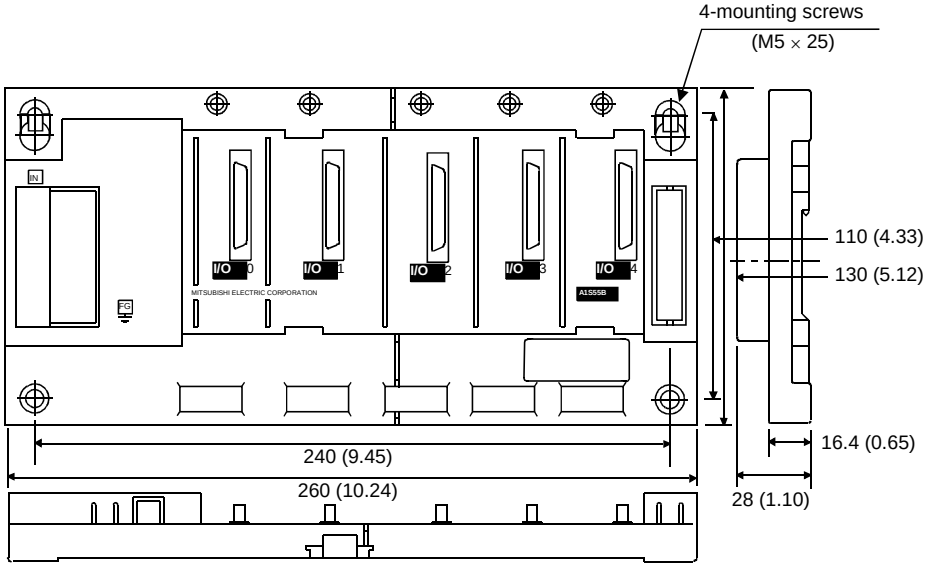
Unit : mm (in.)

Appendix 4.4.3 A1S52B extension base unit



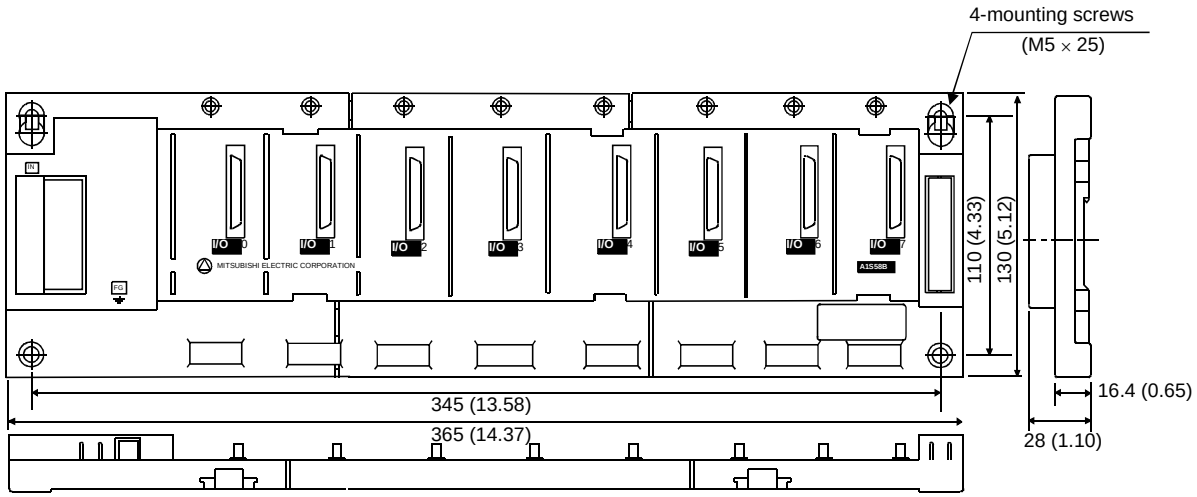
Unit : mm (in.)

Appendix 4.4.4 A1S55B extension base unit



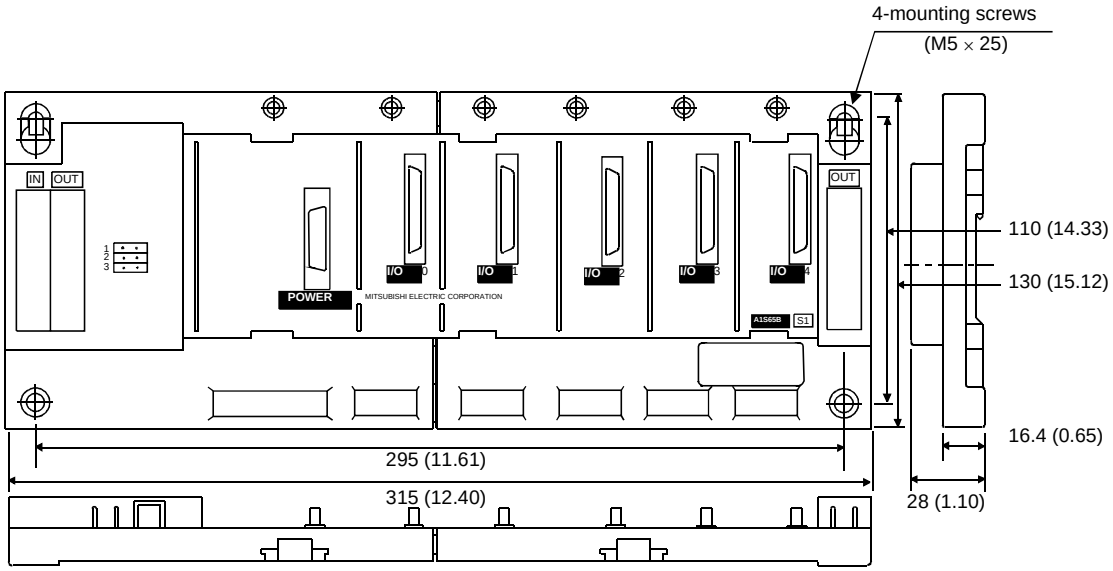
Unit : mm (in.)

Appendix 4.4.5 A1S58B extension base unit



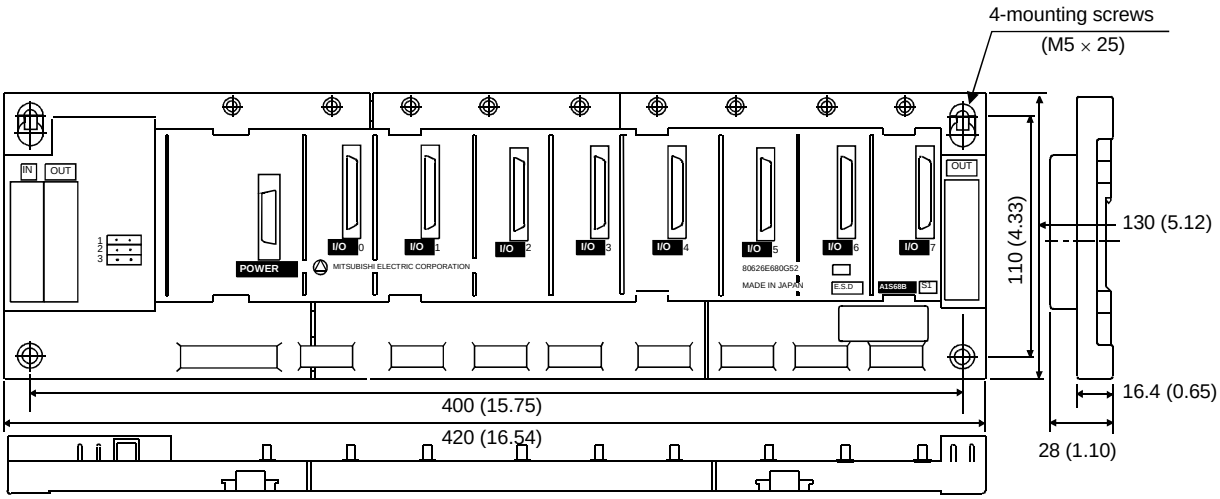
Unit : mm (in.)

Appendix 4.4.6 A1S65B-S1 extension base unit



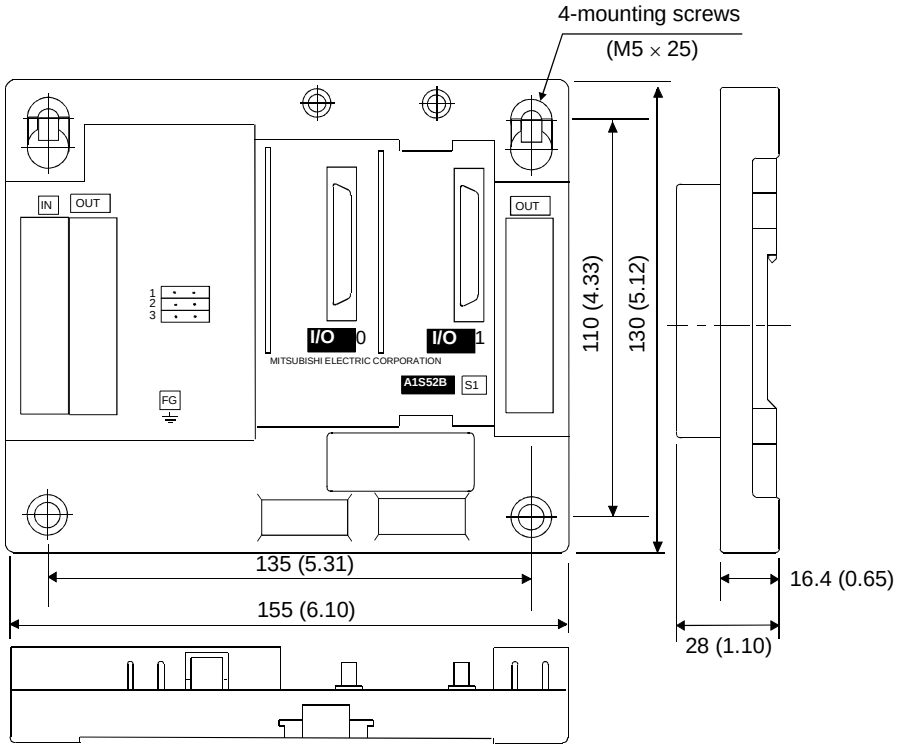
Unit : mm (in.)

Appendix 4.4.7 A1S68B-S1 extension base unit



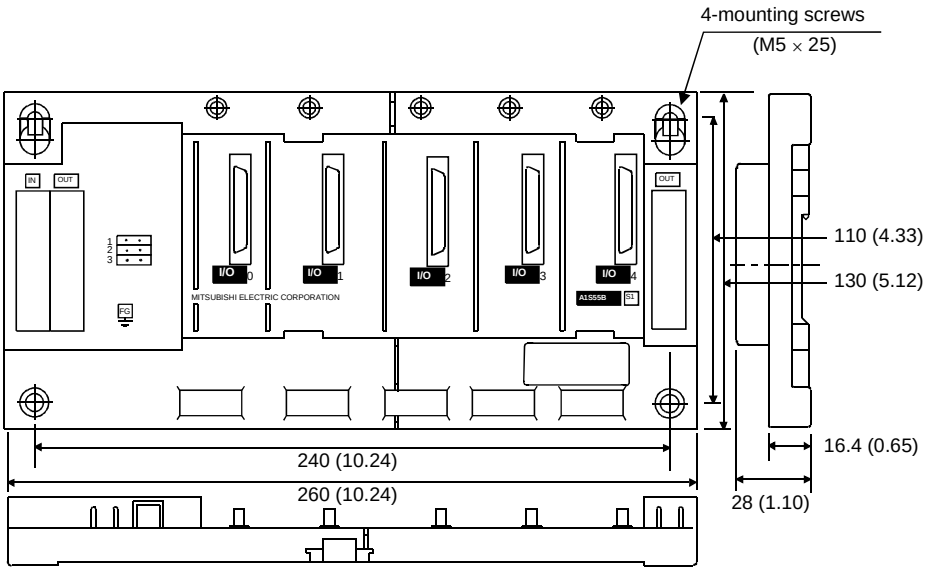
Unit : mm (in.)

Appendix 4.4.8 A1S52B-S1 extension base unit



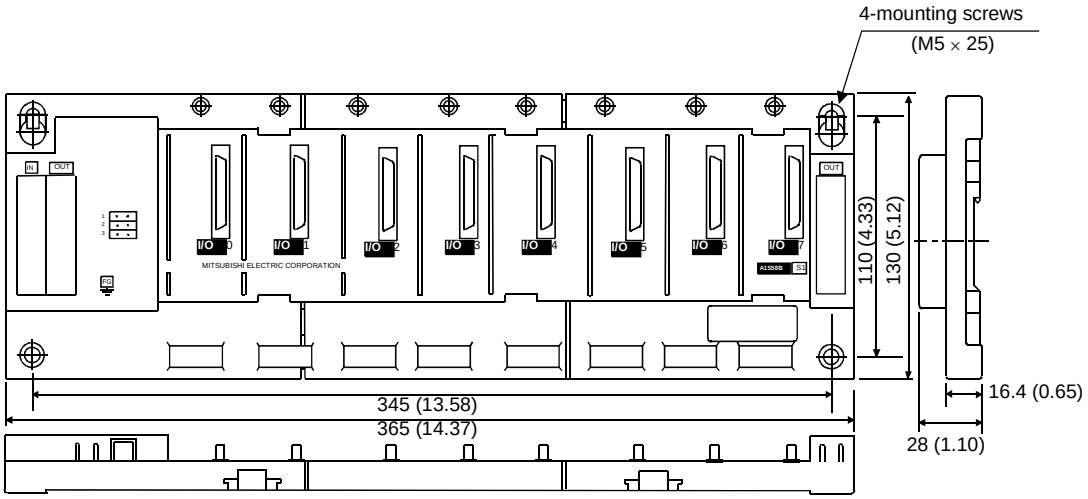
Unit : mm (in.)

Appendix 4.4.9 A1S55B-S1 extension base unit



Unit : mm (in.)

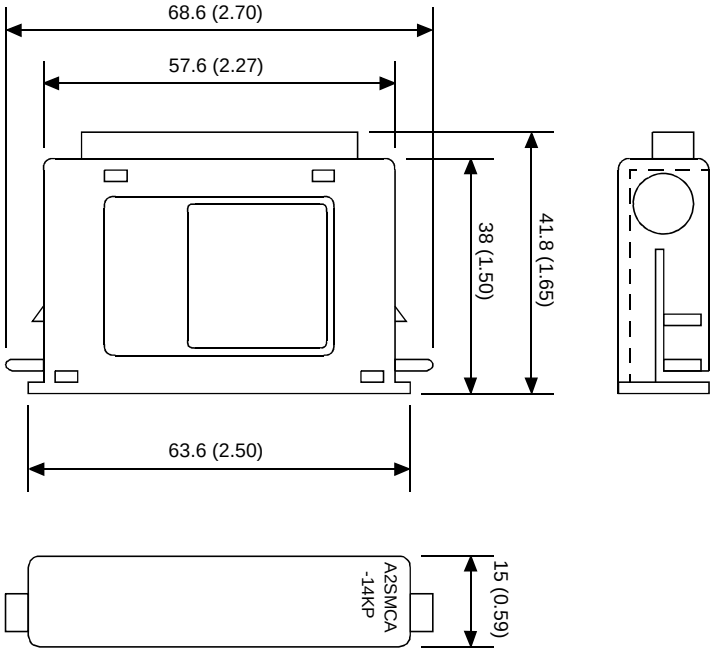
Appendix 4.4.10 A1S58B-S1 extension base unit



Unit : mm (in.)

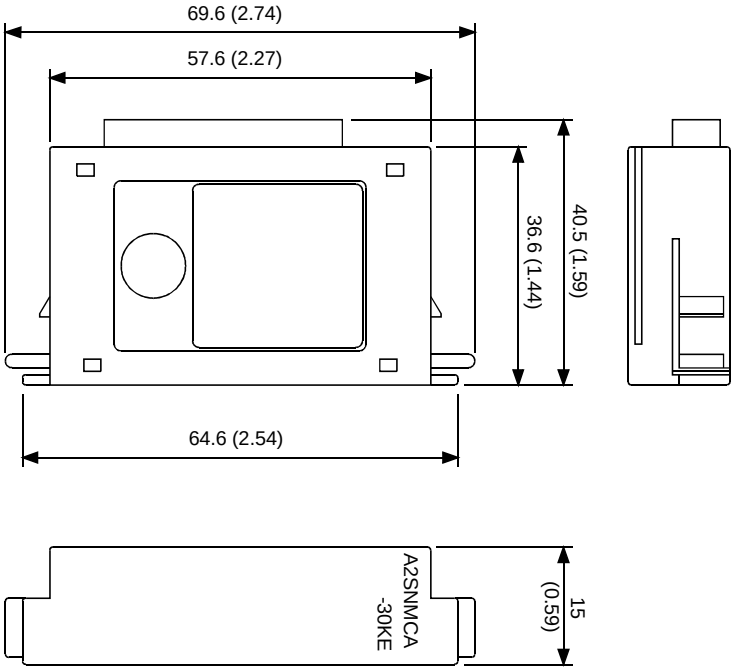
Appendix 4.5 Memory Cassette

Appendix 4.5.1 AnSMCA-[ ] memory cassette



Unit : mm (in.)

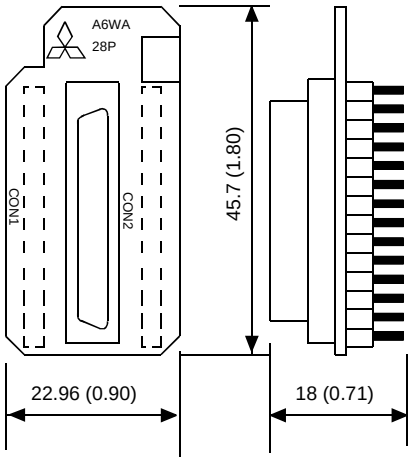
Appendix 4.5.2 AnSNMCA-[ ] memory cassette



Unit : mm (in.)

Appendix 4.6 Memory Write Adapter

Appendix 4.6.1 A6WA-28P memory write adapter



Unit : mm (in.)

Appendix 5 Transportation Precautions

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

Appendix 5.1 Controlled models

The battery for A1SJHCPU (S8), A1SHCPU and A2SHCPU (S1) is classified as follows:

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

Appendix 5.2 Transport guidelines

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

WARRANTY

Please confirm the following product warranty details before starting use.

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 dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 to not be the responsibility of Mitsubishi or 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by failures in Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

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 logic 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 logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic 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 each Japan Railways company or the Department of Defense shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required fin terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

Type A1SJH(S8)/A1SH/A2SHCPU (S1)

User's Manual

MODEL	ANSHCPU-U-E
MODEL CODE	13JL22
IB(NA)-66779-G(0312)MEE	

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : 1-8-12, OFFICE TOWER Z 14F HARUMI CHUO-KU 104-6212,JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN