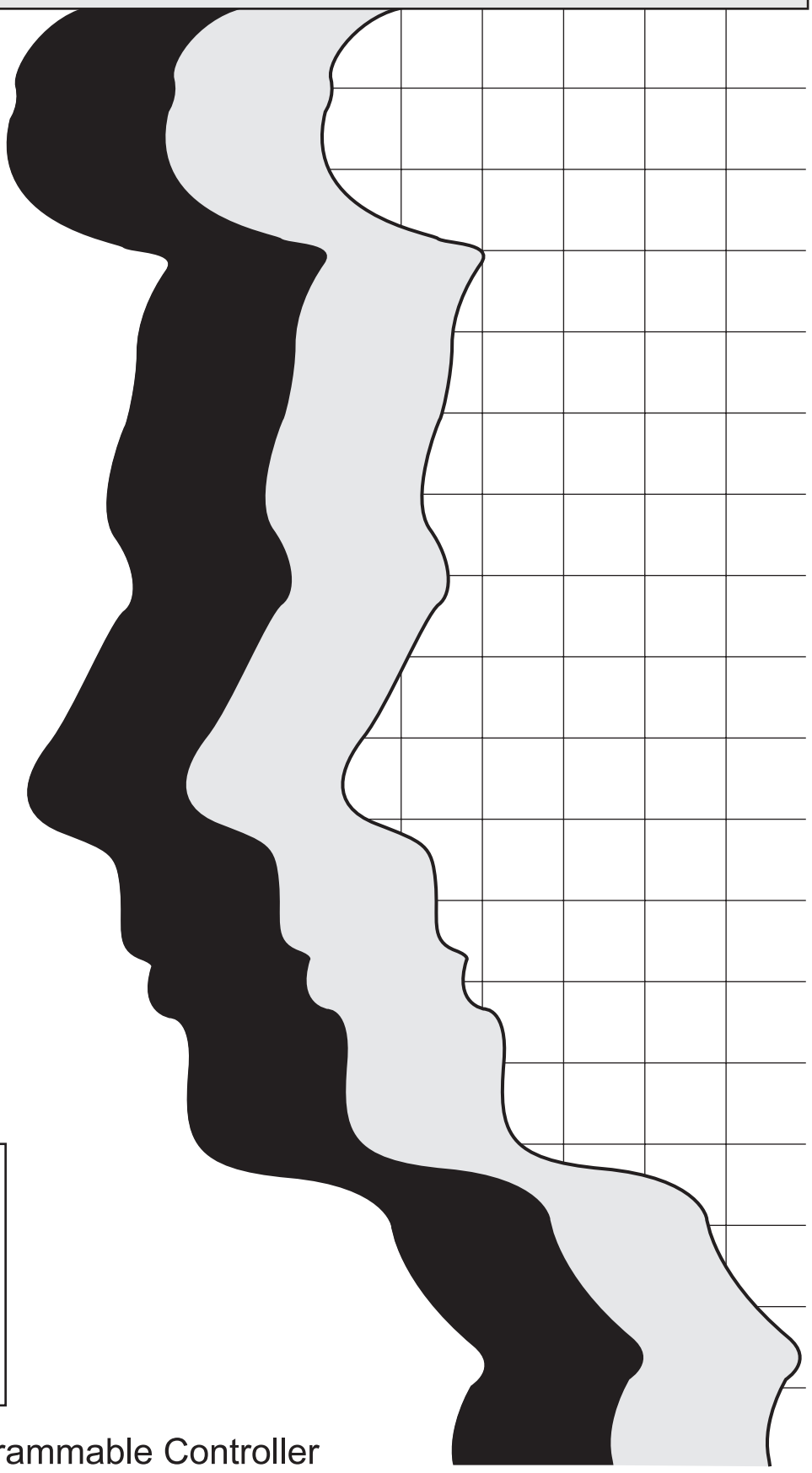
MITSUBISHI

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

User's Manual



A

MELSEC

Mitsubishi Programmable Controller

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

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

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

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

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[DESIGN PRECAUTIONS]

⚠ WARNING

● Create a safety circuit outside the programmable controller to ensure the whole system will operate safely even if an external power failure or a programmable controller failure occurs.
Otherwise, incorrect output or malfunction may cause an accident.

(1) For an emergency stop circuit, protection circuit and interlock circuit that is designed for incompatible actions such as forward/reverse rotation or for damage prevention such as the upper/lower limit setting in positioning, any of them must be created outside the programmable controller.
Install the emergency stop switch outsid the controlpanel so that workers can operate it easily.

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

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

(3) Depending on the failure of the output module's relay or transistor, the output status may remain ON or OFF incorrectly.
For output signals that may lead to a serious accident, create an external monitoring circuit.

[DESIGN PRECAUTIONS]

⚠WARNING

- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the output module for a long time, it may cause a fire and smoke. Provide an external safety device such as a fuse.
- Design a circuit so that the external power will be supplied after power-up of the programmable controller.
  Activating the external power supply prior to the programmable controller may result in an accident due to incorrect output or malfunction.
- For the operation status of each station at a communication error in data link, refer to the respective data link manual.
  The communication error may result in an accident due to incorrect output or malfunction.
- When controlling a running programmable controller (data modification) by connecting a peripheral device to the CPU module or a PC to a special function module, create an interlock circuit on sequence programs so that the whole system functions safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the manual carefully and ensure the safety.
  In these controls, especially the one from an external device to a programmable controller in a remote location, some programmable controller side problem may not be resolved immediately due to failure of data communications.
  To prevent this, create an interlock circuit on sequence programs and establish corrective procedures for communication failure between the external device and the programmable controller CPU.
- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  When using the extension base unit, A1S52B(S1), A1S55B(S1) or A1S58B(S1), attach the included dustproof cover to the module in slot 0.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
  Keep a distance of 100mm (3.94inch) or more between them.
  Failure to do so may cause malfunctions due to noise.
- When an output module is used to control the lamp load, heater, solenoid valve, etc., a large current (ten times larger than the normal one) may flow at the time that the output status changes from OFF to ON. Take some preventive measures such as replacing the output module with the one of a suitable current rating.
- Time from when the CPU module is powered on or is reset to when it enters in RUN status depends on the system configuration, parameter settings, and program size.
  Design the program so that the entire system will always operate safely, regardless of the time.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the programmable controller under the environment specified in the user's manual.
  Otherwise, it may cause electric shocks, fires, malfunctions, product deterioration or damage.

- Insert the module fixing projection into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

- Connect the extension cable to the connector of the base unit or module.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause incorrect inputs and/or outputs.

- Insert the memory cassette and fully press it to the memory cassette connector.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause malfunctions.

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.

- Do not directly touch the conductive part or electronic components of the module.
  Doing so may cause malfunctions or a failure of the module.

[WIRING PRECAUTIONS]

⚠ WARNING

- Be sure to shut off all phases of the external power supply used by the system before wiring.
  Failure to do so may result in an electric shock or damage of the product.

- Before energizing and operating the system after wiring, be sure to attach the terminal cover supplied with the product.
  Failure to do so may cause an electric shock.

⚠ CAUTION

- Ground the FG and LG terminals correctly.
  Failure to do so may cause an electric shock or malfunctions.

- Wire the module correctly after confirming the rated voltage and terminal layout.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.

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

- Press, crimp or properly solder the connector for external connection with the specified tool.
  Incomplete connection may cause a short circuit, fire or malfunctions.

- Tighten terminal screws within the specified torque range.
  If the screw is too loose, it may cause a short circuit, fire or malfunctions.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

- Carefully prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.

- Install our programmable controller in a control panel for use.
  Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.
  Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.
  (For the wiring methods, refer to Section 8.7.)

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ WARNING

- Do not touch any terminal during power distribution.
  Doing so may cause an electric shock.

- Correctly connect the battery connector.
  Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
  Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.

- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws or module mounting screws.
  Failure to do so may result in an electric shock.
  If they are too loose, it may cause a short circuit or malfunctions.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

⚠ CAUTION

- When performing online operations (especially, program modification, forced output or operating status change) by connecting a peripheral device to the running CPU module, read the manual carefully and ensure the safety.
  Incorrect operation will cause mechanical damage or accidents.

- Do not disassemble or modify each of modules.
  Doing so may cause failure, malfunctions, personal injuries and/or a fire.

- When using a wireless communication device such as a mobile phone, keep a distance of 25cm (9.84inch) or more from the programmable controller in all directions.
  Failure to do so may cause malfunctions.

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may result in failure or malfunctions of the module.

- Do not drop or apply any impact to the battery.
  Doing so may damage the battery, resulting in electrolyte spillage inside the battery.
  If any impact has been applied, discard the battery and never use it.

- Do not mount/remove the module onto/from base unit more than 50 times (IEC61131-2-compliant), after the first use of the product.

- Before handling modules, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION
● When disposing of the product, treat it as an industrial waste. When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the battery directive in EU member states, refer to Appendix 6.)

[TRANSPORTATION PRECAUTIONS]

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

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

Revision

*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
Oct., 2006	IB(NA)-66779-H	Correction SAFETY PRECAUTIONS, Section 2.2.1, 2.3, Chapter 3, Section 4.1, 4.1.2, 4.1.3, 4.1.4, 4.1.7, 4.2, 4.3, 4.4.1, 4.4.3, 4.4.4, Section 5.1, 5.2, Section 6.1.2, 6.1.3, 6.2, Section 7.1.1, 7.1.3, Section 8.1, 8.3, 8.4.1, 8.4.2, 8.5, 8.7.1, 8.7.2, 8.8, Chapter 9, Section 9.1.3, 9.2.6, Chapter 10, Section 10.2, 10.3.2, Section 11.2.8, 11.3.2, 11.4.1, 11.4.2, Appendix 2.1, 2.2, Appendix 4.5.1, WARRANTY Addition USER PRECAUTONS, Section 7.2.2, Section 11.2.9, 11.3.1

Print Date	*Manual Number	Revision
May, 2007	IB(NA)-66779-I	Correction Section 2.3, 8.7.1, 8.7.2, 9.1.3, 9.2.7, 10.3.1, 11.4.2 Addition Section 9.1.7
Jul., 2007	IB(NA)-66779-J	Correction Section 6.2, Appendix 4.4.1, Appendix 4.4.3, Appendix 4.4.4, Appendix 4.4.5, Appendix 4.4.8, Appendix 4.4.9, Appendix 4.4.10
Sep., 2008	IB(NA)-66779-K	Correction SAFETY PRECAUTIONS, Chapter 1, Section 2.2.2, 2.3, 2.4, Chapter 3, Section 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.3, 4.4, 5.1, 8.1, 8.2, 8.3, 8.4.1, 8.4.2, 8.7.1, 8.7.2, 8.8, 9.1, 9.1.1, 9.1.2, 9.1.3, 9.2, 9.2.1, 9.2.2, 9.2.3, 9.2.4, 9.2.5, 9.2.6, 9.2.7, Chapter 10, Section 10.3.1, 10.3.2, 11.1, 11.2.3, 11.3, 11.4.1, 11.2.8, Appendix 1, Appendix2.2 Addition Appendix 6, Appendix 6.1, Appendix 6.2
Sep., 2009	IB(NA)-66779-L	Correction Chapter 3, Section 7.2.3, Chapter 9, Section 10.3.1, 10.3.2, 11.4.1
Mar., 2010	IB(NA)-66779-M	Correction SAFETY PRECAUTIONS, Chapter 1, Section 1.1, 2.2.1, 2.3, 2.4, 7.1.1, 7.2, 8.1, 8.6, 8.7.1, Chapter 10, Section 10.3, Appendix 2.1 Addition CONDITIONS OF USE FOR THE PRODUCT
Jan., 2011	IB(NA)-66779-N	Correction Chapter 3, Section 4.1.4, Chapter 9, Section 9.1, 9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.1.5, 9.1.6, 9.1.7, Appendix 2 Addition Section 9.1.8

Japanese Manual Version SH-3635-O

Introduction

Thank you for purchasing the Mitsubishi programmable logic controller MELSEC-A Series.
Prior to use, please read this manual thoroughly to fully understand the functions.
Please hand in a copy of this manual to the end user.

Table of Contents

About This Manual

The following manuals are related to this product.

Related manuals

Manual Name	Manual No. (Model Code)
ACPU/QCPU-A (A mode) 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/QCPU-A (A mode) 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)

USER PRECAUTIONS

Precautions when using the AnS series

For a new CPU module, which has never used before, the contents of built-in RAM and device data are undefined.
Make sure to clear the built-in RAM memory (PLC memory all clear) in the CPU module by peripheral devices and operate latch clear by RUN/STOP key switches.

Precautions for battery

(1) The operation after a battery is unmounted and the programmable controller is stored.
When reoperating after a battery is uncounted and the programmable controller is stored, the contents of built-in RAM and device data may be undefined.
For this reason, make sure to clear the built-in RAM memory (PLC memory all clear) in the CPU module by peripheral devices and operate latch clear by RUN/STOP key switches before start the operation again.*
After the built-in RAM clear and latch clear of the CPU module, write the backed-up memory contents to the CPU module before saving.

(2) The operation after excess of a battery life
If a battery exceeded its guaranteed life is stored and reoperated, the contents of built-in RAM and device data may be undefined.
For this reason, make sure to clear the built-in RAM memory (PLC memory all clear) in the CPU module by peripheral devices and operate latch clear by RUN/STOP key switches before start the operation again.*
After the built-in RAM clear and latch clear of the CPU module, write the backed-up memory contents to the CPU module before saving.

POINT
Make sure to back up each memory contents before storing the programmable controller.

* Refer to the following manuals for details of built-in RAM clear (PLC memory all clear) by peripheral devices.
- GX Developer Operating Manual
- A6GPP/A6PHP Operating Manual
- SW□IVD-GPPA Operating Manual

Refer to Section 4.5 for latch clear operation by RUN/STOP key switch of the CPU module.

1 OVERVIEW

This user's manual describes the functions, specification, and handling of the A1SJHCPU general purpose programmable controller (abbreviated as A1SJHCPU from here on), A1SJHCPU-S8 general purpose programmable controller (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 and A1SJHCPU are grouped as A1S(J)HCPU, unless there is necessity to identify each model.

Also, A1S(J)HCPU, A2SHCPU and A2SHCPU-S1 are grouped as AnSHCPU, unless there is necessity to identify each model.

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

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

A6GPP, A6PHP, PC/AT (started up with SW □ IVD-GPPA)
..... Abbreviated as "GPP function".
A7PUS, A8PUE ..... Abbreviated as "PU".

1.1 Features

(1) High-speed operation processing speed
Compared to the conventional A1SCPU, the A1S(J)HCPU is three times and A2SHCPU (S1) is four times faster in the operation processing speed, respectively.

Item	A1S(J)HCPU	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 X/Y7FF) 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 R8191), which doubled the AnS series' 4096 points (R0 to R4095).

(5) Increased memory capacity (Increased number of comment points)
The A1S(J)HCPU 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 points 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 appearance 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: 430mm (16.9in.) (W); 130mm (5.12in.) (H); and 110mm (4.33in.) (D).

(8) Max. 8 k/14 k steps of program
An A1S(J)HCPU allows the creation of a sequence program up to 8k steps, an A2SHCPU(S1) allows up to 14k steps.
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 an SFC program can be used.

(10) Two extension connectors, on the right and left sides. (A1SHCPU,A2SHCPU(S1))
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.
* A1SJHCPU(S8) on the right side only

(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. AnSHCPU writes 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, refer to Section 2.2 "Precautions when Configuring the System".

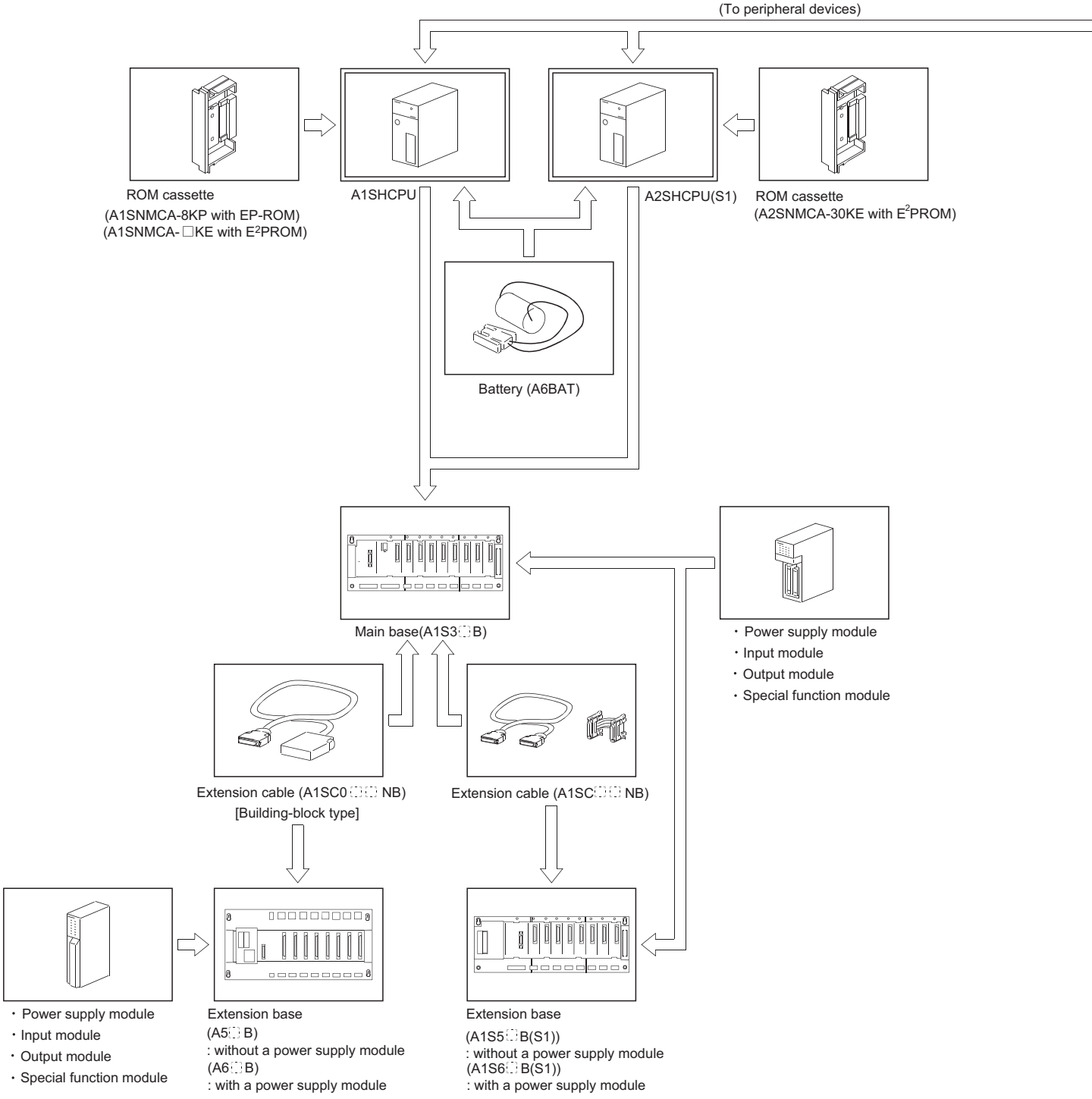
2 SYSTEM CONFIGURATION

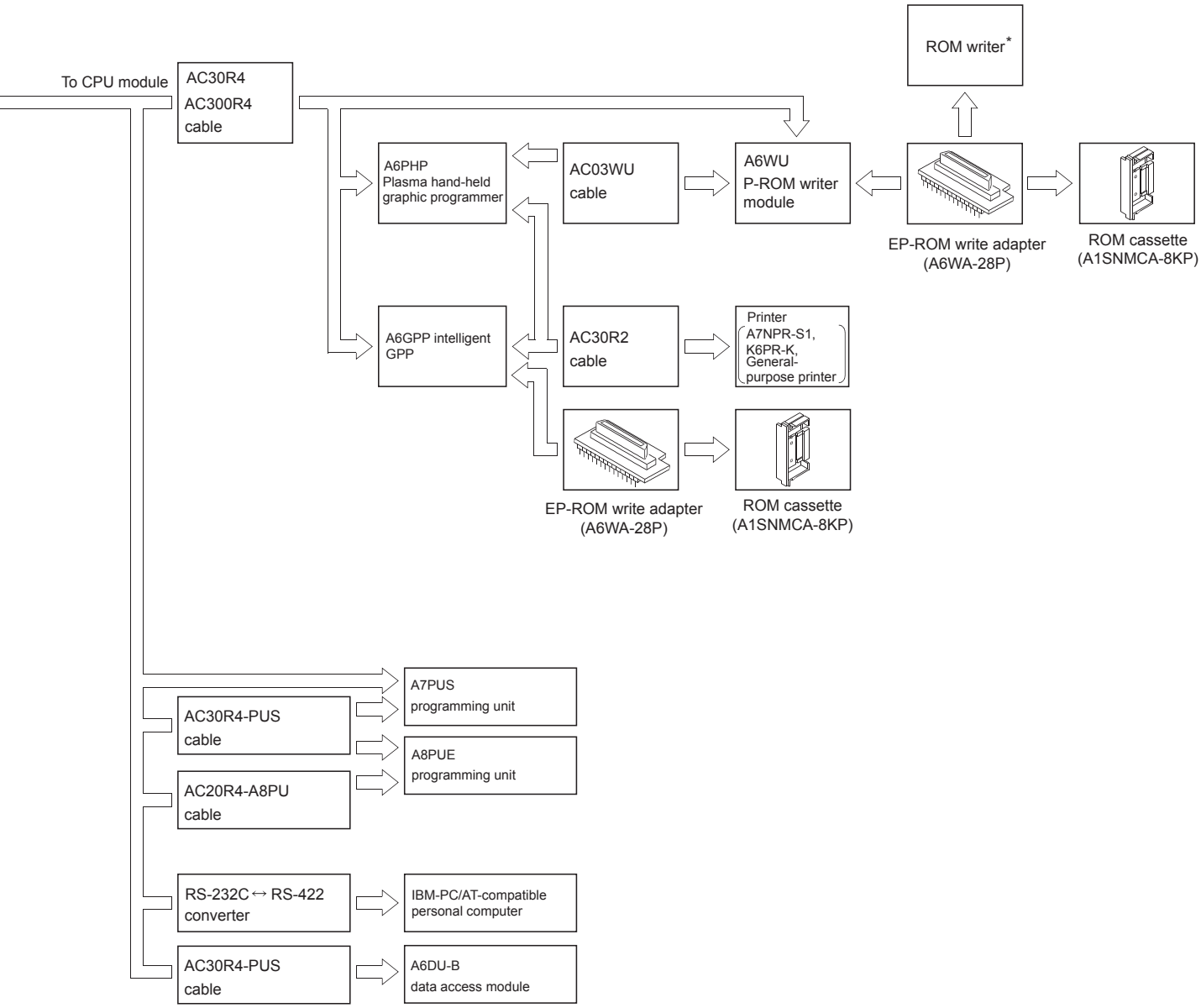
This chapter describes the applicable system configurations, cautions on configuring a system, and component devices of the AnSHCPU.

2.1 Overall Configuration

2.1.1 Overall configuration of AnSHCPU

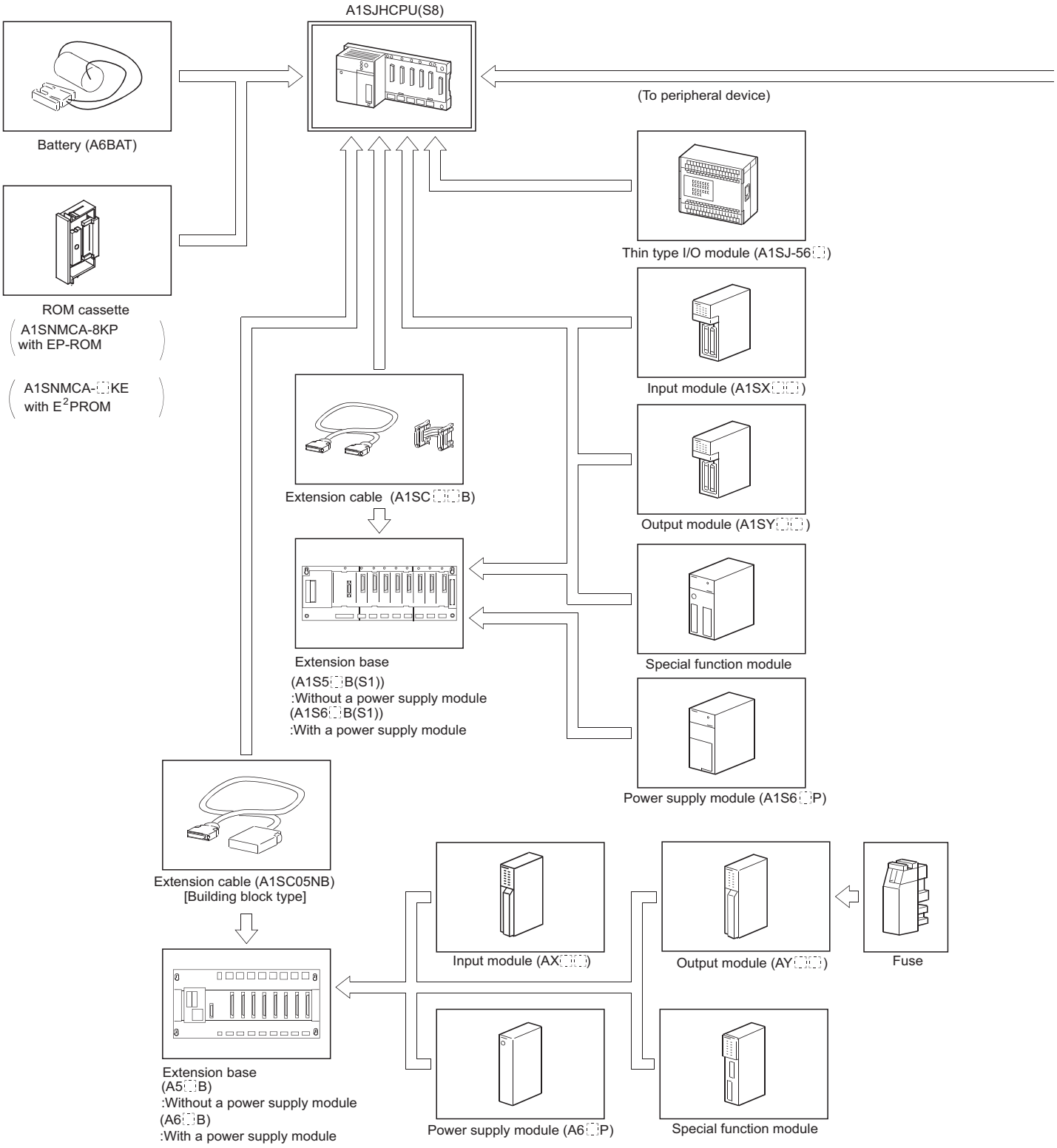
The following figure shows configurations of an AnSHCPU stand-alone system and a peripheral device.

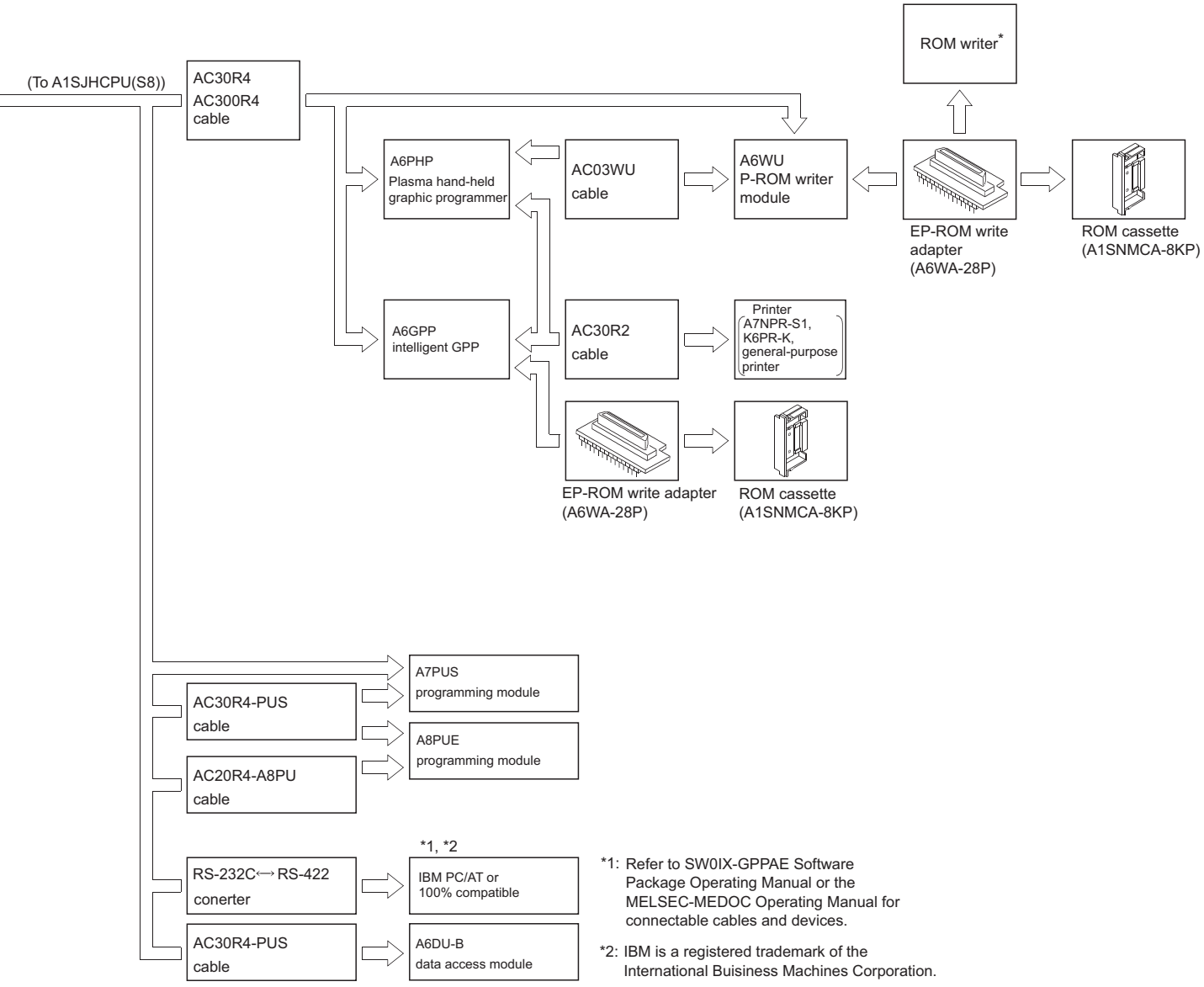



ROM writer*
To CPU module
AC30R4
AC300R4
cable
A6PHP
Plasma hand-held
graphic programmer
AC03WU
cable
A6WU
P-ROM writer
module
EP-ROM write adapter
(A6WA-28P)
ROM cassette
(A1SNMCA-8KP)
A6GPP intelligent
GPP
AC30R2
cable
Printer
A7NPR-S1,
K6PR-K,
General-
purpose printer
EP-ROM write adapter
(A6WA-28P)
ROM cassette
(A1SNMCA-8KP)
A7PUS
programming unit
AC30R4-PUS
cable
A8PUE
programming unit
AC20R4-A8PU
cable
RS-232C ↔ RS-422
converter
IBM-PC/AT-compatible
personal computer
AC30R4-PUS
cable
A6DU-B
data access module

2.1.2 Overall configuration of A1SJHCPU(S8)

The following figure shows configurations of a A1SJHCPU(S8) stand-alone system and peripheral device.





*1: Refer to 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 Buisiness Machines Corporation.

2.2 Precautions when Configuring the System

The hardware and software packages which can be used for the CPU module are described.

2.2.1 Hardware

(1) I/O module
All the building-block-type I/O modules for A□N and A□A can be used by installing them to the extension base module of A5□B/A6□B.

(2) Special function module

(a) Special function modules for A□N and A□A can be used by installing them in the extension base of A5□B/A6□B.

(b) Installation count of the following modules are limited of the special function modules.

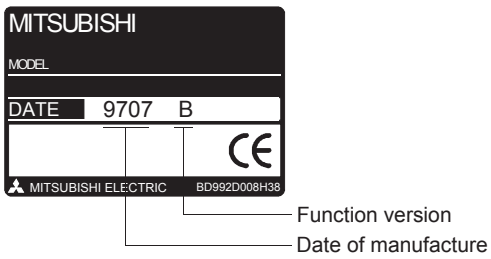
AD51H-S3 AJ71C22-S1 AJ71UC24 AJ71E71N-B2 AJ71E71N-B5 AJ71E71N-T AJ71C23-S3 AD22-S1 AJ61BT11 (Only when the intelligent mode is used.)	Up to 2 modules in total can be installed.
GOT-A900 Series (Only when the bus connection is used.)*1 GOT1000 Series (Only when the bus connection is used.)*1	
A1SJ71UC24-R2(PRF/R4) A1SJ71E71N-B2 A1SJ71E71N-B5T A1SD51S A1SD21-S1 A1SJ61BT11 (Only when the intelligent mode is used.)	
AI61(S1)	Only one module can be installed.
A1SI61	
AJ71AP21(S3) AJ71AR21 AJ71AT21B	Only one module can be installed.
A1SJ71AP21(S3) A1SJ71AR21 A1SJ71AT21B	
AJ71LP21(G/GE) AJ71BR11 AJ71LR21	
A1SJ71LP21(GE) A1SJ71BR11 A1SJ71LR21	
AJ71PT32-S3 (Only when the extension mode is used.) AJ71T32-S3 (Only when the extension mode is used.)	Only one module can be installed.
A1SJ71PT32-S3 (Only when the extension mode is used.) A1SJ71T32-S3 (Only when the extension mode is used.)	

*1 Refer to the following manual for the GOT model names.

- GOT-A900 Series User's Manual (GT Work2 Version2/GT Designer2 Version2 Compatible Connection System Manual)
- GOT1000 Series Connection Manual

POINT

When the dedicated instruction for the CC-Link is used, use the master module marked "9707 B" or later in the DATE column of the rated plate.

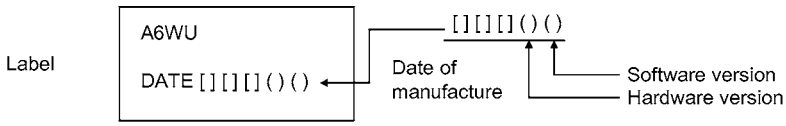


(3) Peripheral device

(a) Precautions when using an A6WU P-ROM writer

1) When using an A1S(J)HCPU

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



(b) The A6WU P-ROM writer module cannot be installed with add-on system, which is installed directly in the AnSHCPU.
Only hand-held system, which is installed using cables, is possible.

(c) Among the programming modules (A7PUS and A8PUE), only the A7PUS can be installed with add-on system.
Other models (A8PUE) can be installed with hand-held system, which is connected with cables.

(4) EP-ROM memory cassette ROM partition
Partitioning the EP-ROM memory cassette with an A6GPP (SW4GP-GPPA)/A6WU requires a memory write adapter (optional).
The following shows the valid combinations of memory cassette and memory write adapter:

CPU Model	Memory Cassette		Memory Write Adapter Model
	Model	Capacity	
A1SHCPU	A1SNMCA-8KP	32k bytes	A6WA-28P
A1SJHCPU(S8)	A1SNMCA-8KP	32k bytes	

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

(a) When an operation is executed using an E^2PROM, write during RUN is not possible. If write during RUN is executed, the following messages are displayed on the peripheral devices:

- For SW3GP-GPPA: "PLC COMMUNICATIONS ERROR : ERROR CODE = 19"
- For SW0RX-GPPA: "PLC COMMUNICATIONS ERROR :ERROR CODE = 19"
- For A7PUS: "PLC NOT RESPOND"

(b) The writing of the program cannot be executed from the computer link module or from a peripheral device connected to other stations on the MELSECNET. Write programs from peripheral devices connected to the AnSHCPU's RS-422.

2.2.2 Software package

(1) GPP function software packages and model name setting at the start-up
  (a) For AnSHCPU start-up, use the PLC model "A3".
  (b) Perform the PLC type setting as shown below when using conventional peripheral devices.

Peripheral Device	Software Package for System Start-up	Programmable controller CPU Model for Set-up			Remark
		A1SJH /A1SH	A2SH	A2SH-S1	
IBM PC/AT	SW□IVD-GPPA*	A3*	A3	A3	
	MELSEC MEDOC				
	MELSEC MEDOC plus				
	GX Developer	A1SJH/ A1SH	A2SH	A2SH-S1	
A6PHP	SW3GP-GPPA	A3*	A3	A3	Writing on the ROM is not allowed.
	SW4GP-GPPA				
A6GPP	SW3-GPPA SW3GP-GPPA			A3	Writing on the ROM is not allowed.
	SW4GP-GPPA				

*Select the model names according to the software package versions as shown below:

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) Old software packages other than SW3-GPPA, SW3GP-GPPA, and SW4GP-GPPA cannot be used as the software package for system start-up for A6GPP/A6PHP.
(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 following shows the applicable utility packages:

- SW0GHP-UTLPC-FN1
- SW0GHP-UTLPC-PID
- SW0GHP-UTLP-FD1
- SW0GHP-UTLPC-FN0
- SW0C-UTLP-FN0
- SW1GP-AD57P
- SW0-AD57P

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

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

(b) The following shows the inapplicable utility package model:

- SW0-SAPA(MELSAP)

2.3 System Equipment

The following shows the system equipment (modules and peripheral devices) that can be used in an AnS system.

(1) AnS series modules

Product Name	Model Name	Description		Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
					5VDC(A)	24VDC(A)	
CPU module	A1SJHCPU	Number of I/O points: 256, memory capacity: 64k bytes, Number of I/O slots: 5		–	0.30	–	Built-in RAM memory
	A1SJHCPU (S8)	Number of I/O points: 256, memory capacity: 64k bytes, Number of I/O slots: 8		–	0.30	–	
	A1SHCPU	Number of I/O points: 256, memory capacity: 64k bytes,		–	0.30	–	
	A2SHCPU	Number of I/O points: 512, memory capacity: 256k bytes		–	0.40	–	
	A2SHCPU-S1	Number of I/O points: 1024, memory capacity: 192k bytes		–	0.40	–	
Power supply module	A1S61PN	5VDC, 5A	100/200VAC input	–	–	–	Installed in the power supply slot of the main base and extension base.
	A1S62PN	5VDC, 3A/24VDC, 0.6A					
	A1S63P	5VDC, 5A	24VDC input				

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Input module	A1SX10	16-point 100 to 120 VAC input module	16 [16 input points]	0.05	–	
	A1SX10EU	16-point 100 to 120VAC input module	16 [16 input points]	0.05	–	
	A1SX20	16-point 200 to 240VAC input module	16 [16 input points]	0.05	–	
	A1SX20EU	16-point 200 to 240VAC input module	16 [16 input points]	0.05	–	
	A1SX30	16-point 12/24VDC, 12/24VAC input module	16 [16 input points]	0.05	–	
	A1SX40	16-point 12/24VDC input module	16 [16 input points]	0.05	–	
	A1SX40-S1	16-point 24VDC input module	16 [16 input points]	0.05	–	
	A1SX40-S2	16-point 24VDC input module	16 [16 input points]	0.05	–	
	A1SX41	32-point 12/24VDC input module	32 [32 input points]	0.08	–	
	A1SX41-S1	32-point 24VDC input module	32 [32 input points]	0.12	–	
	A1SX41-S2	32-point 24VDC input module	32 [32 input points]	0.08	–	
	A1SX42	64-point 12/24VDC input module	64 [64 input points]	0.09	–	
	A1SX42-S1	64-point 24VDC input module	64 [64 input points]	0.16	–	
	A1SX42-S2	64-point 24VDC input module	64 [64 input points]	0.09	–	
	A1SX71	32-point 5/12/24VDC input module	32 [32 input points]	0.075	–	
	A1SX80	16-point 12/24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX80-S1	16-point 24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX80-S2	16-point 24VDC sink/source input module	16 [16 input points]	0.05	–	
	A1SX81	32-point 12/24VDC sink/source input module	16 [16 input points]	0.08	–	
	A1SX81-S2	32-point 24VDC sink/source input module	32 [32 input points]	0.08	–	
	A1SX82-S1	64-point 24VDC sink/source input module	32 [32 input points]	0.16	–	

*1:0.08A is shown on the rating plate of the module.

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Output module	A1SY10	16-point relay contact output module (2A)	16 [16 output points]	0.12	0.09	
	A1SY10EU	16-point relay contact output module (2A)	16 [16 output points]	0.12	0.10	
	A1SY14EU	12-point relay contact output module (2A)	16 [16 output points]	0.12	0.10	
	A1SY18A	8-point relay contact output module (2A) for independent contacts	16 [16 output points]	0.24	0.075	
	A1SY18AEU	8-point relay contact output module (2A) for independent contacts	16 [16 output points]	0.24	0.075	
	A1SY22	16-point triac output module (0.6A)	16 [16 output points]	0.27	(200VAC) 0.002	
	A1SY28A	8-point triac output module (1A) All points independent	16 [16 output points]	0.13	–	
	A1SY40	16-point 12/24VDC transistor output module (0.1A) sink type	16 [16 output points]	0.27	0.008	
	A1SY40P	16-point 12/24VDC transistor output module (0.1A) sink type	16 [16 output points]	0.079*2	0.011	
	A1SY41	32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SY41P	32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.141*3	0.012	
	A1SY42	64-point 12/24VDC transistor output module (0.1A) sink type	64 [64 output points]	0.93	0.008	
	A1SY50	16-point 12/24VDC transistor output module (0.5A) sink type	16 [16 output points]	0.12	0.06	
	A1SY60	16-point 24VDC transistor output module (2A) sink type	16 [16 output points]	0.12	0.015	
	A1SY60E	16-point 12/24VDC transistor output module (2A) source type	16 [16 output points]	0.20	0.01	
	A1SY68A	8-point 5/12/24/48VDC transistor output module (2A) sink/source type All points independent	16 [16 output points]	0.11	–	
	A1SY71	32-point 5/12VDC transistor output module (0.016A) sink type	32 [32 output points]	0.40	0.15	
	A1SY80	16-point 12/24VDC transistor output module (0.8A) source type	16 [16 output points]	0.12	0.02	
	A1SY81	32-point 12/24VDC transistor output module (0.1A) source type	32 [32 output points]	0.50	0.008	
	A1SY82	64-point 12/24VDC transistor output module (0.1A) source type	64 [64 output points]	0.93	0.008	

*2:0.08A is shown on the rating plate of the module.
*3:0.15A is shown on the rating plate of the module.

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
I/O combined module	A1SH42	32-point 12/24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SH42P	32-point 12/24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.13	0.012	
	A1SH42-S1	32-point 24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.50	0.008	
	A1SH42P-S1	32-point 24VDC input module 32-point 12/24VDC transistor output module (0.1A) sink type	32 [32 output points]	0.13	0.012	
	A1SX48Y18	8-point 24VDC input module 8-point relay contact output module (2A)	16 [16 output points]	0.085*4	0.045	
	A1SX48Y58	8-point 24VDC input module 8-point 12/24VDC transistor output module (0.5A)	16 [16 output points]	0.06	0.06	
Dynamic input module	A1S42X	16/32/48/64 points 12/24VDC dynamic input module	Specified number of points [Input Specified number of points]	0.08	–	
Dynamic output module	A1S42Y	16/32/48/64 points 12/24VDC dynamic output module	Specified number of points [Output Specified number of points]	0.18	0.055	

*4:0.09A is shown on the rating plate of the module.

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Blank cover	A1SG60	Dust-proof cover for unused slot	16 [Empty]	–	–	
Dummy module	A1SG62	16-point, 32-point, 48-point, 64-point selectable module	Specified number of points [Input Specified number of points]	–	–	
Pulse catch module	A1SP60	Short ON-time pulse input module (pulse with a minimum of 0.5ms) 16 input points	16 [16 output points]	0.055*5	–	
Analog timer module	A1ST60	A module whose timer setting value can be changed for different volumes (0.1 to 1.0s1 to 10s10 to 60s60 to 600s) Analog timer 8 points	16 [16 output points]	0.055*5	–	
Interrupt module	A1SI61	Interrupt module for specifying the interrupt program (16-point interrupt input)	32 [32 special points]	0.057*5	–	
High-speed counter module	A1SD61	32-bit signed binary 50kPPS, 1 channel	32 [32 special points]	0.35	–	
	A1SD62	24-bit signed binary, 2 channel 100kPPS, DC input, transistor output (sink type)	32 [32 special points]	0.1	–	
	A1SD62D	24-bit signed binary, 2 channel 200kPPS, difference input, transistor output (sink type)	32 [32 special points]	0.25	–	
	A1SD62D-S1	24-bit signed binary, 2 channel 200kPPS, difference input, transistor output (sink type)	32 [32 special points]	0.27	–	
	A1SD62E	24-bit signed binary, 2 channel 100kPPS, DC input, transistor output (source type)	32 [32 special points]	0.1	–	
A/D converter module	A1S64AD	4 to 20mA/0 to 10V 4 analog channels	32 [32 special points]	0.4	–	
	A1S68AD	4 to 20mA/0 to 10V 8 analog channels	32 [32 special points]	0.4	–	
D/A converter module	A1S62DA	4 to 20mA/0 to 10V 2 analog output channels	32 [32 special points]	0.8	–	
	A1S68DAV	-10 to 10V input 8 analog output channels	32 [32 special points]	0.65	–	
	A1S68DAI	4 to 20mA input 8 analog output channels	32 [32 special points]	0.85	–	
Analog I/O module	A1S63ADA	Analog input, 2 channels, simple loop control is allowed 1 analog output channels	32 [32 special points]	0.8	–	
	A1S66ADA	Analog input, 4 channels, simple loop control is allowed 2 analog output channels	64 [64 special points]	0.21	0.16	

*5:0.06A is shown on the rating plate of the module.

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Temperature/ digital converter module	A1S62RD3	For connecting to Pt100 (3-wire) Temperature input, 2 channels	32 [32 special points]	0.49	–	
	A1S62RD4	For connecting to Pt100 (4-wire) Temperature input, 2 channels	32 [32 special points]	0.39	–	
	A1S68TD	Thermocouple input, 8 channels	32 [32 special points]	0.32	–	
Temperature control module	A1S62TCTT-S2	Transistor output, thermocouple input 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.19	–	
	A1S62TCTT BW-S2	Transistor output, thermocouple input 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.28	–	
	A1S62TCRT-S2	Transistor output, platinum RTD (Resistance Temperature Detector) input 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.19	–	
	A1S62TCRT BW-S2	Transistor output, platinum RTD input 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.28	–	
	A1S64TCTT-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control	32 [32 special points]	0.33	–	
	A1S64TCTT BW-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control Heater wire breakage detection function	32 [32 special points]	0.42	–	
	A1S64TCRT-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control	32 [32 special points]	0.33	–	
	A1S64TCRT BW-S1	Transistor output, thermocouple input 4 channels/module PID control: ON/OFF pulse or 2 positioning control Heater wire breakage detection function	32 [32 special points]	0.42	–	
	A1S64TCTRT	Transistor output, thermocouple input, or platinum RTD input [For standard control] 4 channels/module PID control: ON/OFF pulse or 2 positioning control [For heating-cooling control] 2 channels/module PID control: ON/OFF pulse	32 [32 special points]	0.33 (0.19)*	–	*:When the temperature conversion function of unused channelsare not used in the heating-cooing controll

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Temperature control module	A1S64TCTRTBW	Transistor output, thermocouple input, or platinum RTD input [For standard control] 4channels/module PID control: ON/OFF pulse or 2 positioning control [For heating-cooling control] 2 channels/module PID control: ON/OFF pulse, wire breakage detection function	32 [32 special points]	0.39 (0.25)*	–	*:When the temperature conversion function of unused channelsare not used in the heating-cooing controll
Temperature regulating module	A1S64TCTRT	Transistor output, thermocouple/platinum temperature-mesuring resistor input. 4 channels/modules PID control: ON/OFF pulse or 2 positioning control	32 [32 special points]	0.33	–	
	A1S64TCTRTBW	Transistor output, thermocouple/platinum temperature-mesuring resistor input. 4 channels/modules PID control: ON/OFF pulse or 2 positioning control Heater break detection function	32 [32 special points]	0.39	–	
Computer link module	A1SJ71UC24-R2	Computer link function RS-232C, 1 channel	32 [32 special points]	0.1	–	
	A1SJ71UC24-PRF	Computer link function, printer function RS-232C, 1 channel	32 [32 special points]	0.1	–	
	A1SJ71UC24-R4	Computer link function, multidrop link function RS-422/RS-485, 1 channel	32 [32 special points]	0.1	–	
Ethernet interface module	A1SJ71E71N3-T	10 Base-T	32 [32 special points]	0.69	–	
	A1SJ71E71N-T	10 Base-T	32 [32 special points]	0.56	–	
	A1SJ71E71N-B2	10 Base 2 (for Cheapernet)	32 [32 special points]	0.66	–	
	A1SJ71E71N-B5	10 Base 5 (for Ethernet)	32 [32 special points]	0.57	–	
Intelligent communication module	A1SD51S	BASIC (interpreter/compiler) RS-232C, 2 channels RS-422/RS-485, 1 channel	32 [32 special points]	0.4	–	

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Positioning module	A1SD70	1 axis positioning control, speed control, analog voltage output for speed-positioning control 0 to ±10V)	48 (First half: 16 empty points; Second half: 32 special points)	0.3	–	
	A1SD75P1-S3	For positioning control, pulse output, 1 axis	32 [32 special points]	0.7	–	
	A1SD75P2-S3	For positioning control, pulse output, 2 axes (2-axis simultaneous, linear interpolation, circular interpolation)	32 [32 special points]	0.7	–	
	A1SD75P3-S3	For positioning control, pulse output, 3 axes (Independent, 3-axis simultaneous, linear interpolation, circular interpolation)	32 [32 special points]	0.7 *	–	* When different driver is connected: 0.78A
	A1SD75M1	For positioning control, digital output, for MR-H-B/ MR-J-B/MR-J2-B, 1-axis SSCNET	32 [32 special points]	0.7	–	
	A1SD75M2	For positioning control, digital output, for MR-H-B/ MR-J-B/MR-J2-B, 2-axis SSCNET (independent, 2-axis simultaneous, linear interpolation, circular interpolation)	32 [32 special points]	0.7	–	
	A1SD75M3	For positioning control, digital output, for MR-H-B/ MR-J-B/MR-J2-B, 3-axis SSCNET (independent, 3-axis simultaneous, 2-axis linear interpolation, 2-axis circular interpolation)	32 [32 special points]	0.7	–	
ID interface module	A1SD35ID1	ID interface module One reader/writer modules can be connected.	32 [32 special points]	0.25	0.17	
	A1SD35ID2	ID interface module Two reader/writer modules can be connected.	32 [32 special points]	0.25	0.33	
MELSECNET(II) data link module	A1SJ71AP21	For the master and local stations of MELSECNET(II) data link system (for the optical fiber cable)	32 [32 special points]	0.33	–	
	A1SJ71AP21-S3	For the master and local stations of MELSECNET(II) data link (for the GI-type optical fiber cable)	32 [32 special points]	0.33	–	
	A1SJ71AR21	For the master and local stations of MELSECNET(II) data link system (for the coaxial cable)	32 [32 special points]	0.8	–	
MELSECNET/B data link module	A1SJ71AT21B	For the master and local stations of MELSECNET/ B data link system	32 [32 special points]	0.66	–	
	A1SJ72T25B *1	For the remote I/O station of MELSECNET/B data link system	–	0.3	–	
B/NET interface module	A1SJ71B62-S3	Master module for B/NET	32 [32 special points]	0.08	–	

*1:Models to be discontinued

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
MELSECNET/ 10 data link module	A1SJ71LP21	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the coaxial cable dual loop)	32 [32 special points]	0.65	–	
	A1SJ71LP21 GE	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the GI-type optical fiber cable dual loop)	32 [32 special points]	0.65	–	
	A1SJ71BR11	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the single bus coaxial cable)	32 [32 special points]	0.80	–	
	A1SJ71LR21	For the control, master, and normal stations of the MELSECNET/10 data link module system (For the coaxial cable dual loop)	32 [32 special points]	1.14	–	
CC-Link system master module	A1SJ61BT11	For the master and local stations of the CC-Link data link system (For the twisted pair shield cable only)	32 [32 special points]	0.40	–	
MELSECNET/ MINI-S3 master module	A1SJ71PT32 -S3	For MELSECNET/MINI-S3 master stations (max. 64 stations). Performs remote I/O and remote terminal control of a total of 512 I/O points.	I/O mode [32 special points]	0.35	–	
			Expanded mode 48 [48 special points]			
MELSECNET-I/O LINK master module	A1SJ51T64	MELSECNET-I/O LINK master station.Controls I/O LINK remote I/O module of a maximum of 16 stations and a total of 128 I/O points.	64 [64 special points]	0.115	0.09	
S-LINK interface module	A1SJ71SL92 N	Master module for S-LINK I/O total 128 points	32 [32 special points]	0.20	–	
AS-I interface module	A1SJ71AS92	Master module for AS-I I/O total 496 points	32 [32 special points]	0.15	–	
Positioning detection module	A1S62LS	Absolute positioning detection module	32 [32 special points]	0.55	–	

*6:0.06A is shown on the rating plate of the module.

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Programmable controller easier monitoring module	A1SS91	Programmable controller easier monitoring module	16 [16 special points]	0.08	–	
Memory card interface module	A1SD59J-S2	Memory card interface module	32 [32 special points]	0.05	–	The current consumption describes in connecting A1SD59J-MIF.
Simulation module	A6SIM-X64Y64	An I/O simulation unit used connected to the base module.Debugging can be executed without connecting the I/O module to the base module.Use an expansion cable of the AnS series between the main base of the AnS series and the A6SIM-X64Y64.	64 [64 input points] 64 [64 output points]	TYP. 0.3 (When all points ON)	–	
PROFIBUS interface module	A1SJ71PB92D	PROFIBUS-DP master module	32 [32 special points]	0.56	–	
	A1SJ71PB96F	PROFIBUS-FMS interface module	32 [32 special points]	0.56	–	
Device Net interface module	A1SJ71DN91	Device net master module	32 [32 special points]	0.24	–	
MODBUS interface module	A1SJ71UC24-R2-S2	RS-232Ctype MODBUS interface module	32 [32 special points]	0.1	–	
	A1SJ71UC24-R4-S2	RS-422/485type MODBUS interface module	32 [32 special points]	0.1	–	

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Graphic operation terminal	A985GOT	Large-size graphic operation terminal 256 colors, TFT color, 800×600 dots, high intensity	32 [32 special points]*	0.22 *	–	*When bus connected
	A975GOT	Large-size graphic operation terminal 256 colors, TFT color, 640×480 dots, high intensity				
	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				
	A960GOT	Large-size graphic operation terminal 2 colors, EL, 640×400 dots				
	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				
	A956WGOT	Medium-size graphic operation terminal 256 colors, TFT color 480×234 dots				
	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 only
	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 [32 special points]*	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 only
	GT1565-VTBA	Large-size graphic operation terminal 8.4" 256/65536 colors, TFT color, 640×480 dots (When installing a multi color display board, 65536 colors can be displayed.)	32 [32 special points]*	0.12	–	*When bus connected
	GT1575-VTBA	Large-size graphic operation terminal 10.4" 256/65536 colors, TFT color, 640×480 dots (When installing a multi color display board, 65536 colors can be displayed.)				
Main base unit	A1S32B	2 I/O modules can be installed.	–	–	–	Extension connector on the right and left side each.
	A1S33B	3 I/O modules can be installed.				
	A1S35B	5 I/O modules can be installed.				
	A1S38B	8 I/O modules can be installed.				

Product Name	Model Name	Description	Number of occupied points (points) [I/O Assignment Module Type]	Current Consumption		Remark
				5VDC(A)	24VDC(A)	
Extension base unit	A1S52B	2 I/O modules can be installed.	–	–	–	The power supply module cannot be installed. (Power is supplied from the main base unit.)
	A1S52B-S1					
	A1S55B	5 I/O modules can be installed.				
	A1S55B-S1					
	A1S58B	8 I/O modules can be installed.	–	–	–	
	A1S58B-S1					
	A1S65B	5 I/O modules can be installed.	–	–	–	The power supply module is required.
	A1S65B-S1					
	A1S68B	8 I/O modules can be installed.				
	A1S68B-S1					
Extension cable	A1SC01B	55mm (2.17inch) long flat cable	–	–	–	For extension towards right
	A1SC03B	330mm (13inch) long	–	–	–	Connection cable for the extension base unit.
	A1SCO7B	700mm (27.56inch) long				
	A1SC12B	1200mm (47.24inch) long				
	A1SC30B	3000mm (118.11inch) long				
	A1SC60B	6000mm (236.22inch) long				
	A1SC05NB	450mm (17.72inch) long	–	–	–	Cable for the A□N, A□A extension base unit
	A1SCO7NB	700mm (27.56inch) long				
	A1SC30NB	3000mm (118.11inch) long				
	A1SC50NB	5000mm (196.86inch) long				

Product Name		Model Name	Description	Applicable Model
Memory cassette	EP-ROM	A1SNMCA-8KP	8k steps, equipped with EP-ROM(directly)	For A1S(J)HCPU: A6WA-28P required
	E^2PROM	A1SNMCA-2KE	2k steps, equipped with E^2PROM (directly)	Write/read directly from the peripheral device for A1S(J)HCPU is possible.
		A1SNMCA-8KE	8k steps, equipped with E^2PROM (directly)	
		A2SNMCA-30KE	With 30k-step E^2PROM (directly)	Direct writing to and reading from a peripheral device is feasible.
Memory write adapter		A6WA-28P	Used for memory cassette connector/EP-ROM 28-pin adapter	Used for ROM writing in A1SNMCA-8KP
Battery		A6BAT	IC-RAM memory backup	Installed in the A1SJHCPU(S8), A1SHCPU, A2SHCPU(S1) main unit
Connector/terminal block converter unit		A6TBXY36	For the sink-type input module and sink-type output module. (standard type)	A1SX41(S1/S2), A1SX42(S1/S2), A1SY41, A1SY41P, A1SY42, A1SY82, A1SH42(S1), A1SH42P(S1)
		A6TBXY54	For the sink-type input module and sink-type output module. (2-wire type)	
		A6TBX70	For the sink-type input module (3-wire type)	A1SX41(S1/S2),A1SX42(S1/S2),A1SH42(S1), A1SH42P(S1)
		A6TBX36-E	For the source-type input module (standard type)	A1SX71, A1SX82-S1, A1SX81(S2)
		A6TBY36-E	For the source-type output module (standard type)	A1SY81, A1SY82
		A6TBX54-E	For the source-type input module (2-wire type)	A1SX71, A1SX82-S1, A1SX81(S2)
		A6TBY54-E	For the source-type output module (2-wire type)	A1SY81, A1SY82
		A6TBX70-E	For the source-type input module (3-wire type)	A1SX71, A1SX82-S1, A1SX81(S2)
Cable for connector/terminal block converter unit		AC05TB	0.5m (1.64ft.) for the sink module	A6TBXY36 A6TBXY54 A6TBX70
		AC10TB	1m (3.28ft.) for the sink module	
		AC20TB	2m (6.56ft.) for the sink module	
		AC30TB	3m (9.84ft.) for the sink module	
		AC50TB	5m (16.40ft.) for the sink module	
		AC80TB	8m (26.24ft.) for the sink module	
		AC100TB	10m (32.81ft.) for the sink module	
		AC05TB-E	0.5m (1.64ft.) for the source module	A6TBX36-E A6TBY36-E A6TBX54-E A6TBY54-E A6TBX70-E
		AC10TB-E	1m (3.28ft.) for the source module	
		AC20TB-E	2m (6.56ft.) for the source module	
		AC30TB-E	3m (9.84ft.) for the source module	
		AC50TB-E	5m (16.40ft.) for the source module	
Relay terminal unit		A6TE2-16SRN	For the sink-type output module	A1SY41, A1SY41P, A1SY42, A1SH42(S1), A1SH42P(S1)

Product Name	Model Name	Description	Applicable Model
Cable for connecting the relay terminal unit	AC06TE	0.6m (1.97ft.) long	A6TE2-16SRN
	AC10TE	1m (3.28ft.) long	
	AC30TE	3m (9.84ft.) long	
	AC50TE	5m (16.40ft.) long	
	AC100TE	10m (32.81ft.) long	
Terminal block cover for the A1S I/O module and the special module	A1STEC-S	Slim-type terminal block cover for the A1S I/O module and the special module (terminal block connector type).	All terminal block connector type modules
IDC terminal block adapter	A1S-TA32	IDC terminal block adapter for 32 points 0.5mm^2 (AWG20)	A1SX41(S1/S2), A1SX71, A1SY41, A1SY71
	A1S-TA32-3	IDC terminal block adapter for 32 points 0.3mm^2 (AWG22)	
	A1S-TA32-7	IDC 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, A1SY41P, A1SY71
40-pin connector	A6CON1	Soldering-type, straight out	Sink type (40p FCN)
	A6CON2	Crimp type, straight out	
	A6CON3	Insulation-displacement type, flat cable	
	A6CON4	Soldering-type, straight/diagonal out	
3-pin D-sub connector	A6CON1E	Soldering-type, straight out	Source type (37p D-sub)
	A6CON2E	Crimp type, straight out	
	A6CON3E	Insulation-displacement type, flat cable	

REMARK

Toa Electric Industrial CO., LTD. provides I/O cables with connectors, which can connect to 40-pin connector (A1SX41, A1SX42, A1SY41, A1SY41P, A1SY42, A1SY42P, etc.) or 37-pin D-sub connector (A1SX81, A1SY81) of I/O modules.

Contact:
TOA ELECTRIC INDUSTRIAL CO., LTD.

(2) Peripheral device

Product Name	Model Name	Remark	
Plasma hand-held graphic programmer	A6PHP-SET	• A6PHP main unit • SW □ GP-GPPA..... GPP function start-up floppy disk for the A series • SW □ GP-GPPK..... GPP function start-up floppy disk for the K series • SW0-GPPU..... User floppy disk (2DD) • AC30R4..... RS-422 cable 3m (9.84 ft.)-long	
Intelligent GPP	A6GPP-SET	• A6GPP main unit • SW □ GP-GPPA..... GPP function start-up floppy disk for the A series. • SW □ GP-GPPK..... GPP function start-up floppy disk for the K series. • SW0-GPPU..... User floppy disk (2DD). • AC30R4..... RS-422 cable 3m (9.84 ft.)-long	
Composite video cable	AC10MD	• Connection cable for the monitor display of the A6GPP screen: 1m (3.28 ft.) long	
RS-422 cable	AC30R4	3m (9.84ft.) long	Connection cable for between the CPU main module and A6GPP/A6PHP
	AC300R4	30m (98.43ft.) long	
User floppy disk	SW0S-USER	2HD-type	Floppy disk for storing user programs (3.5-inch, pre-formatted)
Floppy disk for cleaning	SW0-FDC	For A6GPP/A6PHP	Floppy disk for cleaning the floppy disk drive.
Optional keyboard for A6PHP	A6KB-SET-H	• A6KB keyboard • AC03R4H..... Connection cable between A6KB and A6PHP: 0.3m (0.98 ft.) long • A6KB-C..... Key sheet for the GPP mode of A6KB	
Optional keyboard for A6GPP	A6KB-SET	• A6KB keyboard • AC03R4L..... Connection cable between A6KB and A6GPP: 0.3m (0.98 ft.) long • A6KB-C..... Key sheet for the GPP mode of A6KB.	

Product Name	Model Name	Remark
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 (9.84ft.) long
Printer paper	K6PR-Y K7PR-Y	Printer paper for K6PR(S1) and K6PR-K, 9-inch paper, Unit: 2000 sheets Printer paper for A7PR and A7NPR, 11-inch paper, Unit: 2000 sheets
Inked ribbon for K6PR(K)	K6PR-R	Replacement inked ribbon for K6PR-K.
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 or 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 (9.84ft.) long
	AC20R4-A8PU	Connection cable for between the CPU main module and A8PUE 2m (6.56ft.) long
Data access module	A6DU-B	• Used for monitoring the devices of the CPU module, changing the setting values/ current values, and displaying the operation status. (5VDC 0.23A) • Connect to the CPU mopdule with an AC30R4-PUS cable.
Modem interface module	A6TEL	• An interface module which connects the CPU module and the modem. Using a telephone line, the communication is performed between a remote peripheral device and the CPU module. (5VDC 0.2A) • Connect to the CPU mopdule with an AC30R4-PUS cable.
RS-422 cable	AC30R4 AC300R4	Connection cable for between the CPU main unit and A6WU: 3m/30m (9.84 ft./ 98.43 ft.) long
	AC03WU	Connection cable for between the A6PHP main unit and A6WU: 0.3m (0.98ft.) long

2.4 System Configuration Overview

There are four system configuration types as follows:

(1) Stand-alone system ..... A system that connects with a main base unit, or with a main base unit and an extension base unit using extension cable

(2) Data link system ..... A system that controls multiple programmable controllers and remote I/O modules

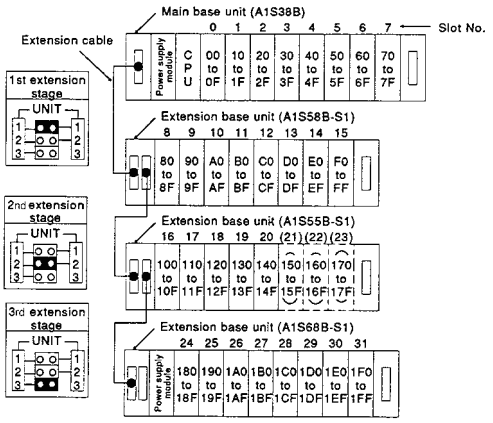
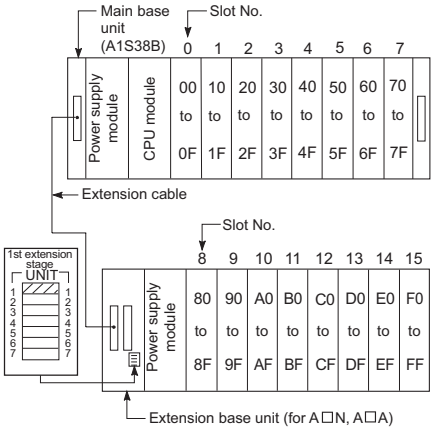
(3) Computer link system ..... A system that communicates between the CPU module and the computer (personal computer, etc.) by using an A1SJ71UC24 computer link module

(4) Composite system ..... A system that has a combination of a data link system and a computer link system

The details of the system configuration, number of I/O points, I/O number assignment, etc., of a stand-alone system are listed on the following page.

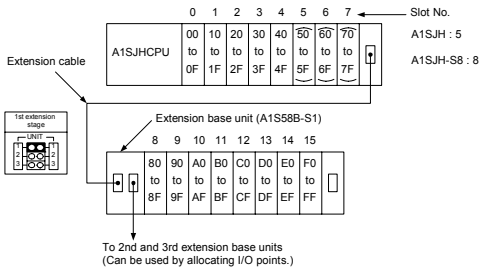
(a) A1SJHCPU, A1SHCPU, A2SHCPU system

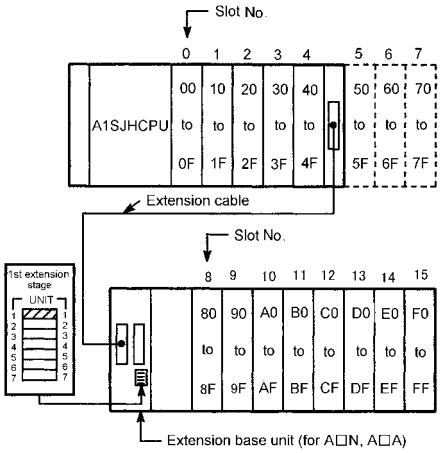
The following example shows the A1SHCPU system configuration, number of I/O points, I/O assignment of a stand-alone system.

<table>
<tr><td>System Configuration</td><td>[When the AnS extension base is used]
The following shows an example that the 16-point module is installed to each slot.
 
</td><td colspan="2">[When the A□N, A□A extension base is used]
The following shows an example that the 16-point module is installed to each slot.
 
</td></tr>
<tr><td>Maximum number of extension stages</td><td>3rd extension stage</td><td colspan="2">1st extension stage</td></tr>
<tr><td>Maximum number of I/O modules</td><td colspan="3">16 modules</td></tr>
<tr><td>Maximum number of I/O points</td><td colspan="3">A1SJHCPU, A1SHCPU: 256 points, A2SHCPU: 512 points</td></tr>
<tr><td>Main base unit model name</td><td colspan="3">A1S32B, A1S33B, A1S35B, A1S38B</td></tr>
<tr><td>Extension base unit model name</td><td>A1S65B(S1), A1S68B(S1), A1S52B(S1), A1S55B(S1), A1S58B(S1)</td><td colspan="2">A62B, A65B, A68B, A52B, A55B, A58B</td></tr>
<tr><td>Extension cable model name</td><td>A1SC03B, A1SC07B, A1SC12B, A1SC30B, A1SC01B (right-side installation), A1SC60B</td><td colspan="2">A1SC05NB, A1SC07NB, A1SC30NB, A1SC50NB</td></tr>
<tr><td>Precautions</td><td colspan="3">(1) Only one A□N, A□A extension base can be used.(The second extension module cannot be used.)
(2) When the extension base A1S52B(S1), A1S55B(S1), A58B(S1) or A52B, A55B, A58B are used, the 5VDC power is supplied from the power supply module of the main base unit. Before use, refer to Section 6.1.3 and examine if it can be used.
(3) Limit the length of extension cable to 6m (236inch) or shorter.
(4) When using the extension cable, do not install it with the main circuit cables, which has high voltage, large current, or install them close together.</td></tr>
</table>

I/O number assignment (When I/O assignment is not performed)	(1) Assign I/O numbers to the main base unit first, then to the extension base unit. (2) Assign I/O numbers as if both main base unit and extension base unit have 8 slots each. When the A1S32B/A1S33B/A1S35B for 2/3/5 slots are used as the main base unit, add 6/5/3 slots (96 points/80 points/48 points) and assign the extension base unit I/O numbers. (3) 16 points are assigned to an empty slot. (4) When an extension base unit for A□N or A□A is used, be sure to set to a single extension level. If it is set to the number of skipped stages, 16 points/slot are assigned to all of skipped stages×8 slots, and thus it does not work. (5) Items (2) to (3) can be changed by the I/O assignment.(Refer to the ACPU/QCPU-A (A Mode) Programming Manual (Fundamentals).)

(b) A1SJHCPU(S8) system

<table>
<tr><td>System Configuration</td><td>[When the AnS extension base is used]
The following shows an example that the 16-point module is installed to each slot.
 

*In this example, a 16-point module is installed to each slot.</td><td colspan="2">[When the A□N, A□A extension base is used]
The following shows an example that the 16-point module is installed to each slot.
 
</td></tr>
<tr><td>Maximum number of extension stages</td><td>3rd extension stage</td><td>1st extension stage</td></tr>
<tr><td>Maximum number of I/O modules</td><td colspan="2">16 modules</td></tr>
<tr><td>Maximum number of I/O points</td><td colspan="2">256 points</td></tr>
<tr><td>Main base unit model name</td><td colspan="2">A1S32B, A1S33B, A1S35B, A1S38B</td></tr>
<tr><td>Extension base unit model name</td><td>A1S65B(S1), A1S68B(S1), A1S52B(S1), A1S55B(S1), A1S58B(S1)</td><td>A62B, A65B, A68B, A52B, A55B, A58B</td></tr>
<tr><td>Extension cable model name</td><td>A1SC03B, A1SC07B, A1SC12B, A1SC30B, A1SC01B (right-side installation), A1SC60B</td><td>A1SC05NB, A1SC07NB, A1SC30NB, A1SC50NB</td></tr>
<tr><td>Precautions</td><td colspan="2">(1) Only one A□N, A□A extension base can be used.(The second extension module cannot be used.)
(2) When the extension base A1S52B(S1), A1S55B(S1), A58B(S1) or A52B, A55B, A58B are used, the 5VDC power is supplied from the power supply module of the main base unit. Before use, refer to Section 6.1.3 and examine if it can be used.
(3) Limit the length of extension cable to 6m (236inch) or shorter.
(4) When using the extension cable, do not install it with the main circuit cables, which has high voltage, large current, or install them close together.</td></tr>
</table>

I/O number assignment (When I/O assignment is not performed)	(1) Assign I/O numbers to the A1SJHCPU first, then to the extension base unit. (2) Assign I/O numbers as if both the A1SJHCPU and the extension base unit have 8 slots each.A1SJHCPU has 0 to 4 slots, and 5 to 7 are empty slots.Thus, the empty slots occupies 16 points×3=48 points. (3) 16 points are assigned to an empty slot. (4) When an extension base unit for A□N or A□A is used, be sure to set to a single extension level. If it is set to the number of skipped stages, 16 points/slot are assigned to all of skipped stages×8 slots, and thus it does not work. (5) Items (2) to (3) can be changed by the I/O assignment.(Refer to the ACPU/QCPU-A (A Mode) Programming Manual (Fundamentals) for details.)

3 SPECIFICATIONS

The general specification common to various modules is shown.

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-20 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance*4</td><td rowspan="5">Conforming to JIS B 3502, IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 9Hz</td><td>－</td><td>3.5mm (0.138in)</td><td rowspan="2">10 times each in X, Y, Z directions.</td></tr>
<tr><td>9 to 150Hz</td><td>9.8m/s^2</td><td>－</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 9Hz</td><td>－</td><td>1.7mm (0.068in)</td><td rowspan="2">－</td></tr>
<tr><td>9 to 150Hz</td><td>4.9m/s^2</td><td>－</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforming to JIS B 3502, IEC 61131-2 (147m/s^2 , 3 times in each of 3 directions XYZ)</td></tr>
<tr><td>Operation ambiance</td><td colspan="6">No corrosive gasses</td></tr>
<tr><td>Operating elevation*3</td><td colspan="6">2000m (6562ft.) or less</td></tr>
<tr><td>Installation location</td><td colspan="6">Control panel</td></tr>
<tr><td>Over voltage category*1</td><td colspan="6">II max.</td></tr>
<tr><td>Pollution degree*2</td><td colspan="6">2 max.</td></tr>
<tr><td>Equipment category</td><td colspan="6">Class I</td></tr>
</table>

*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 programmable controller in the environment when the pressure is higher than the atmospheric pressure at sea level.
Otherwise, malfunction may result.
To use the programmable controller in high-pressure environment, please contact your local Mitsubishi representative.

*4 When an A series extension base unit (A52B, A55B, A58B, A62B, A65B, A68B) is used in the system, the following specifications apply.

	Frequency	Acceleration	Amplitude	Sweep count
Under intermittent vibration	10 to 57Hz	–	0.075mm (0.003in.)	10 times each in X, Y, Z directions
	57 to 150Hz	9.8m/s^2	–	
Under continuous vibration	10 to 57Hz	–	0.035mm (0.001in.)	–
	57 to 150Hz	4.9m/s^2	–	

4 CPU MODULE

4.1 Performance Specifications

Performance specifications of CPU modules are shown below.

Performance specifications

Item		Model			Remark
		A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)	
Control method		Sequence program control method			
I/O control mode		Refresh mode/Direct mode selectable			
Programming language		Language dedicated to sequence control			
		Relay symbol language, logic symbol language, MELSAP-II (SFC)			
Processing speed (sequence instruction)		Refresh: 0.33 μs/step Direct: 2.1 μs/step		Refresh: 0.25 μs/step Direct: 1.9 μs/step	
Constant scanning (Program start-up with a specified interval)		Can be set between 10ms and 2000ms in 10ms units.			Set in special register D9020.
Memory capacity*1		A1SJHCPU(S8), A1SHCPU, A2SHCPU: 64k byte (built-in RAM) A2SHCPU-S1: 192k byte (built-in RAM)			
Program capacity (steps)	Main sequence program	Max. 8k steps		A2SHCPU: Max. 14k steps A2SHCPU-S1: Max. 30k steps	Set in parameters.
	Subsequence program	None			
Number of I/O device points*2		2048 points (X/Y0 to X/Y7FF)			The number of points usable in the program
Number of I/O points		256 points (X/Y0 to X/YFF)		512 points (X/Y0 to X/Y1FF)	The number of points which can be used for access to actual I/O modules

*1 Each memory capacity for the programmable controllers is the sum total of the parameters, T/C setting values, program capacities, file registers, comment points, sampling traces and status latches.The memory capacities are unchanged.The extension memories cannot be approved.
For the calculation method of memory capacity, refer to Section 4.2.2.

*2 I/O devices of the actual number of I/O points or later can be used as the MELSECNET/B, MELSECNET/MINI or CC-Link.

Performance specifications (Continued)

Item		Model			Remark
		A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)	
Device points	Internal relay [M]	1000 points (M0 to M999)			The range can be changed by parameters.
	Latch relay [L]	1048 points (L1000 to L2047)		Total 2048 shared by M, L, S	
	Step relay [S]	0 point (None for the initial status)			
	Link relay [B]	1024 points (B0 to B3FF)			
	Timer [T]	256 points •100ms timer (T0 to T199) ..... Setting time: 0.1 to 3276.7s •10ms timer (T200 to T255) ..... Setting time: 0.01 to 327.67s •100ms retentive timer (none for initial) .... Setting time: 0.1 to 3276.7s			The range and number of points for use set by parameters (Refer to Section 4.2.1.)
	Counter [C]	256 points •Normal counter (C0 to C255)..... Setting range: 1 to 32767 times •Interrupt counter (none for default)... Can be use by setting the parameters.			The range and number of points for use set by parameters (Refer to Section 4.2.1.)
	Data register [D]	1024 points (D0 to D1023)			
	Link register [W]	1024 points (W0 to W3FF)			
	Annunciator [F]	256 points (F0 to F255)			Fault finding device
	File register [R]	8192 points (R0 to R8191)			Points set by parameters
	Accumulator [A]	2 points (A0, A1)			
	Index register [V, Z]	2 points (V, Z)			
	Pointer [P]	256 points (P0 to P255)			
	Interrupt pointer [I]	32 points (I0 to I31)			
	Special relay [M]	256 points (M9000 to M9255)			
	Special register [D]	256 points (D9000 to D9255)			

Performance specifications (Continued)

Item	Model			Remark
	A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)	
Comment	Max. 3648 points (Set by the unit of 64 points)			Set in parameters.
Switch output mode from STOP to RUN	Select "Set the output status at STOP to RUN. (Default)" or "Output after operation exectution."			Set in parameters.
Self-diagnostics function	Watchdog error supervision (watchdog timer: set within 10ms to 200ms) Error detection in the memory, CPU, I/O, battery, etc.			Refer to Section 4.1.4 for details.
Operation mode when there is an error	Select STOP or continue			Set in parameters. (Refer to Section 4.2.1)
Start-up method at RUN	Initial start (upon power supply on/power restoration after power failure, automatic restart by turning the RUN switch of the CPU or ON.)			
Latch (power failure compensation) range	L1000 to L2047 (Default) (Possible to setup latch ranges for L, B, T, C, D, W)			Range set by parameters.
Remote RUN/PAUSE contacts	Possible to set one contact point for each of RUN/PAUSE from X0 to X1FF.			Set in parameters.
Print title regisration	YES (128 characters)			Set in parameters.
Keyword registration	YES			Set in parameters.
I/O assignment	Possible to register number of occupied I/O points and module model names.			
Step operation	None			
Interrupt processing	Possible to operate an interrupt program by the interrupt module or constant period interrupt signal.			
Data link	MELSECNET, MELSECNET/B			
Clock function	Year, month, day, hour, minute, second, day of the week (automatic detection of the leap year) Accuracy ▪ -3.1 to +5.3s (TYP.+1.7s)/d at 0℃ ▪ -1.6 to +5.3s (TYP.+2.4s)/d at 25℃ ▪ -9.6 to +3.6s (TYP.-2.1s)/d at 55℃			
Allowable momentary power failure period	Depending on the power supply modules			Refer to Section 5.1.
5VDC internal current consumption	0.3A		0.4A	
Weight	A1SJHCPU:1.00kg A1SJHCPU-S8:1.06kg	0.33kg		
External dimensions	A1SJHCPU: 130mm (5.12inch)×330mm (13 inch)×82mm (3.23inch) A1SJHCPU-S8: 130mm (5.12inch)×435mm (17.1inch)×82mm (3.23inch)	130mm (5.12inch)×54.5mm (2.15inch)×93.6mm (3.69inch)		

4.1.1 Overview of operation processing

The following shows an overview of processing which begins with a CPU module power-on to execute the sequence program.
CPU modules processing may be categorized roughly into the following four kinds:

(1) Initial processing
This is a preprocess to execute sequence operations, and is performed only once upon power-on or reset.
(a) Resets the I/O module and initialize it.
(b) Initializes the range of data memory for which latch is not set up (sets the bit device to OFF and the word device to 0).
(c) Allocates I/O address of the I/O module automatically based on the I/O module number or the position of installation on the extension base module.
(d) Executes the self-diagnostics check for the parameter setting and the operation circuit. (Refer to Section 4.1.4.)
(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) Refresh processing of I/O module
Executes the refresh processing of I/O module.
(Refer to the ACPU/QCPU-A (A mode) Programming Manual (Fundamentals).)

(3) Operation processing of a sequence program
Executes the sequence program from step 0 to the END instruction written in the programmable controller CPU.

(4) END processing
This is a post-process that finishes one cycle of operation processing of the sequence program and returns the execution of the sequence program to the step 0.
(a) Executes self-diagnostics checks, such as a fuse blown, an I/O module verify, and a low battery.
(Refer to Section 4.1.4.)
(b) Updates the current value of the timer, sets the contact ON/OFF, updates the current value of the counter and sets the contact to ON.
(Refer to the ACPU/QCPU-A (A mode) Programming Manual (Fundamentals).)
(c) Executes the data exchange between the programmable controller CPU and a computer link module (e.g. A1SJ71UC24-R2) when there is a data read or write request from the computer link module.

(d) Executes the refresh processing when there is a refresh request from the network module or link module.
Note that the AnSHCPU can enable and disable execution of link refresh by turning ON/OFF M9053 and by issuing DI/EI instructions.

(e) When the trace point setting of sampling trace is set for each scan (after END instruction execution), stores the device status for which it is setup into the sampling trace area.

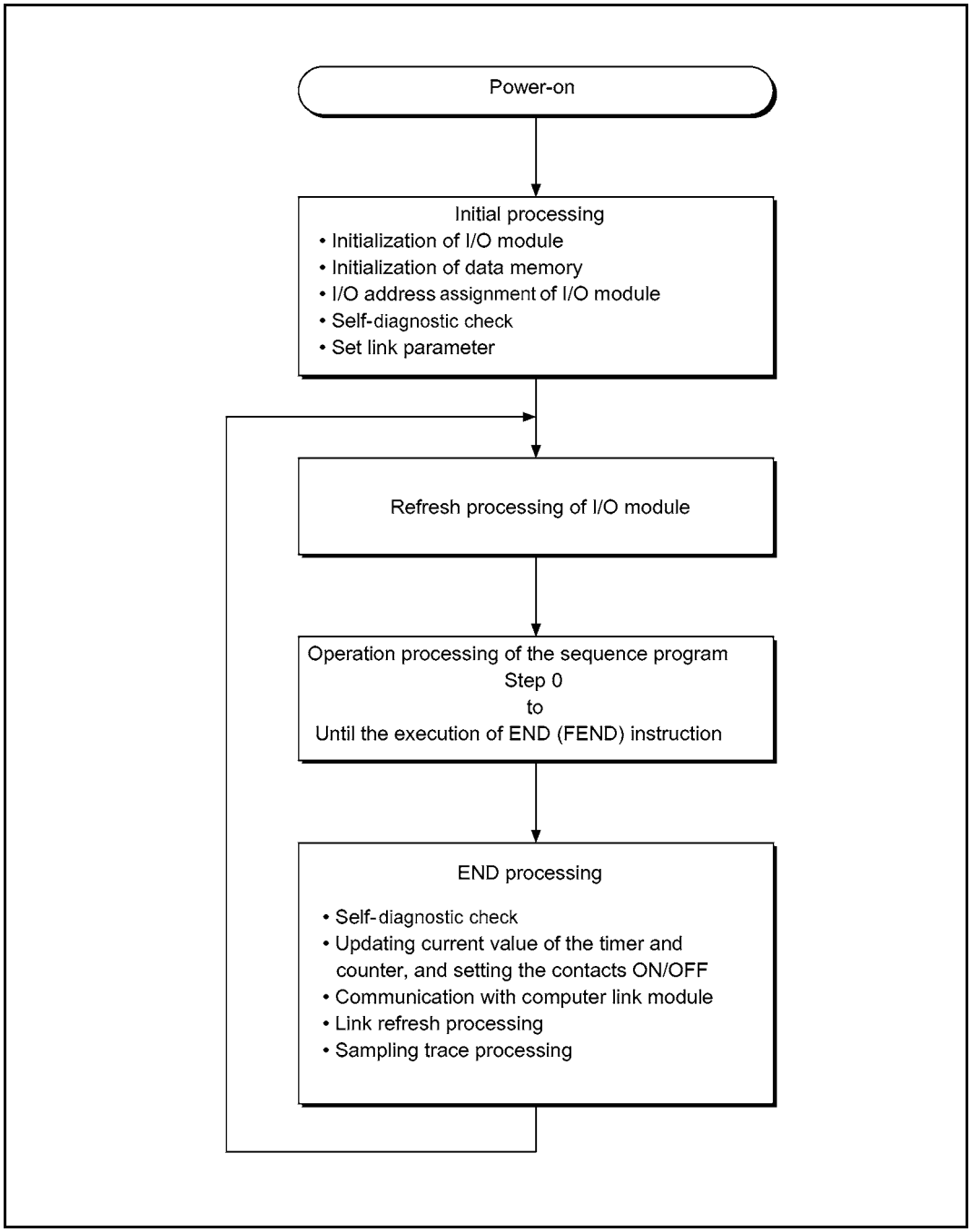


Fig. 4.1 CPU module operation processing

POINT

When executing the FROM/TO instruction for the special function module frequently in short scan time, it may cause an operation error in the target special function module.
When executing the FROM/TO instruction, match the processing time and conversion time for the special function module using timer or constant scan function.

4.1.2 Operation processing of RUN, STOP and PAUSE

The programmable controller CPU can be operated in the RUN, STOP and PAUSE as described below.
Operation processing of programmable controller CPU in each operation status is explained.

(1) Operation processing in RUN
  (a) RUN status means that the sequence program operation is repeated as step 0 → END (FEND) instruction → 0.

  (b) When entering the RUN status, outputs the stored output status at STOP because of setting the output mode as STOP → RUN in the parameters.

  (c) Processing time from switching STOP → RUN to the start of the sequence program operation is usually one to three seconds, although it may vary depending on the system configuration.

(2) Operation processing in STOP
  (a) STOP status means that the sequence program operation is canceled due to the RUN/STOP key switch, STOP instruction, or the remote STOP. (Refer to Section 4.3.)

  (b) When entering the STOP status, stores the output status and sets all output points to OFF. Data memories except for output (Y) are retained.

(3) Operation processing in PAUSE
  (a) PAUSE status means that the sequence program operation is canceled retaining output and data memories. (Refer to Section 4.3.)

(4) Programmable controller CPU operation processing when RUN/STOP key switch is operated

RUN/STOP Key Switch Operation	Programmable controller CPU Operation Processing				Remark
	Operation Processing of Sequence Program	External Output	Data Memory		
			M, L, S, T, C, D	Y	
RUN → STOP	Executes up to the END instruction, then stops.	OS stores the output status, and sets all the output points to OFF.	Retains the condition immediately prior to entering the STOP status.	OS stores the output status, and sets all the output points to OFF.	
STOP → RUN	Starts.	Determines according to the output mode upon STOP → RUN in the parameters.	Starts operations from the status immediately before STOP.	Determines according to the output mode upon STOP → RUN in the parameters.	

POINT

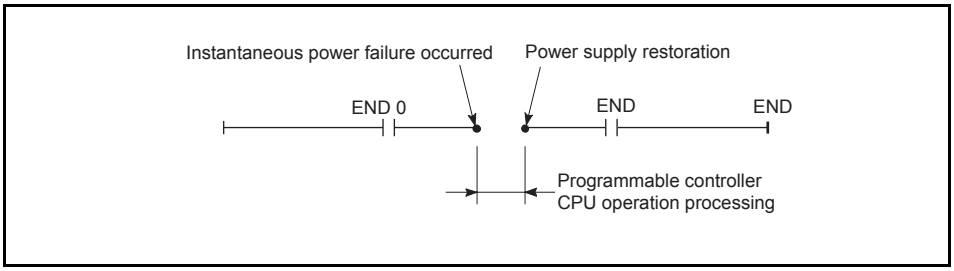
1. In any statuses of RUN, STOP or PAUSE, programmable controller CPU performs the following:
   - Refresh processing of I/O module
   - Data communication with computer link module
   - Link refresh processing

   Thus, even in STOP or PAUSE, monitoring or testing I/O with peripheral devices, read/write with a computer link module, and communication with other stations by MELSECNET are possible.

4.1.3 Operation processing upon instantaneous power failure

The programmable controller CPU detects a momentary power failure when input power voltage supplied to the power supply module becomes lower than the specified range. When the programmable controller CPU detects an instantaneous power failure, the following operation processing is performed.

(1) When an instantaneous power failure shorter than allowable momentary power failure period occurred:
   (a) When an instantaneous power failure occurred, the operation processing is interrupted while the output status is retained.
   (b) When the instantaneous power failure is reset, the operation processing will be continued.
   (c) When an instantaneous power failure occurred and the operation was interrupted, measurement of the watchdog timer (WDT) continues. For instance, in the case that WDT is 200ms and the scan time is 190ms, if an instantaneous power failure of 15ms occurs, it causes the watchdog timer error.



Operation processing upon instantaneous power failure

(2) When an instantaneous power failure longer than the allowable momentary power failure period occurred:
   The programmable controller CPU performs the initial start.
   The operation processing is the same as power-on or reset operation with the reset switch.

4.1.4 Self-diagnostics function

Self-diagnosis is a function that a CPU module diagnoses itself for the presence of any abnormalities.

(1) While turning on the programmable controller power or when an error occurred in the PLC RUN, the error is detected and displayed, and the operation is stopped by the self-diagnostics function, which the CPU module performs, to prevent programmable controller malfunctions and give preventive maintenance.

(2) The CPU module stores the error occurred last to a special register D9008 as an error code.

(3) The following shows contents of the error information. (The error which occurred last):
   (a) The time and date of error occurrences..... Year, month, day, hour, minute, second (Clock data)
   (b) Error Code..... The content of the special register D9008
   (c) Detailed error code.....The content of the special register D9092
   (d) Error step and error module installation address.....The content of the special register D9010, D9000, D9002

(4) When detecting an error by self-diagnosis, AnSHCPU takes action in the following modes:
   • Mode wherein the programmable controller operation is stopped
   • Mode wherein the programmable controller operation is continued
   In addition, some errors can be skipped or stopped by setting parameters.
   (a) When an operation stop error is detected by the self-diagnosis, the AnSHCPU stops the operation at error detection, and sets the all outputs(Y) to OFF.
   (b) When an error of operation continued is detected, the only part of the program with the error is not executed while the other part is executed.
   Also, in the case of module verify error, the operation is continued using the I/O address prior to the error.
   Since error occurrence and error contents are stored in the special relay (M) and special register (D) at error detection, use in the program for preventing any malfunctions of the programmable controller or mechanical system especially in mode wherein the programmable controller operation is continued.

   The next page shows error descriptions detected by the self-diagnosis.

REMARK

(1) As to the LED indication, the order of priority of the LED indication can be changed if CPU module is in the operation mode. (Error codes are stored in the special register.)

(2) When the special relay M9084 is ON, checking on fuse blown, I/O verification and the battery are not performed. (Error codes are not stored in the special register.)

(3) The "Error indication of peripheral device" in the table of self-diagnostics functions are messages that is indicated by the PLC diagnosis of peripheral devices.

Self-diagnostics list

Diagnostic Item		Diagnostic Timing	CPU Module Status	Status of "RUN" LED	Error Message	Error Code (D9008)
Memory error	Instruction code check	Upon execution of each instruction	Stop	Flickering	INSTRCT CODE ERR.	10
	Parameter setting check	▪ When power is ON or RESET ▪ When switching from (STOP, PAUSE) to (RUN)			PARAMETER ERROR	11
	No END instruction	▪ When M9056 or M9057 is ON ▪ When switching from (STOP, PAUSE) to (RUN)			MISSING END INS	12
	Unable to execute instruction	▪ CJ SCJ JMP CALL(P) FOR to NEXT ▪ Upon execution of each instruction ▪ When switching from (STOP, PAUSE) to (RUN)			CAN'T EXECUTE(P)	13
	Format (CHK instruction) check	▪ When switching from (STOP, PAUSE) to (RUN)			CHK FORMAT ERR.	14
	Unable to execute instruction	▪ When interruption occurrs ▪ When switching from (STOP, PAUSE) to (RUN)			CAN'T EXECUTE(I)	15
CPU error	RAM check	▪ When power is ON or RESET ▪ When M9084 is ON during STOP ▪ When switching ON or resetting	STOP	Flickering	RAM ERROR	20
	Operation circuit check	▪ When power is ON or RESET			OPE.CIRCUIT ERR.	21
	Watchdog error supervision	▪ Upon execution of END instruction			WDT ERROR	22
	END instruction not executed	▪ Upon execution of END instruction			END NOT EXECUTE	24
	Main CPU check	Always			MAIN CPU DOWN	26
I/O error	Module verify error *1 (Default: stop)	Upon execution of END instruction (However, not checked when M9084 is ON.)	STOP/RUN	Flickering/ ON	UNIT VERIFY ERR.	31
	Fuse blown *1 (Default: stop)	Upon execution of END instruction (However, not checked when M9084 is ON.)			FUSE BREAK OFF	32
Special function module error	Control bus check	Upon execution of FROM, TO instruction	STOP	Flickering	CONTROL-BUS ERR.	40
	Special function module error	Upon execution of FROM, TO instruction			SP.UNIT DOWN	41
	Link module error	▪ When power is ON or RESET ▪ When switching from (STOP, PAUSE) to (RUN)			LINK UNIT ERROR	42
	I/O interrupt error	When interruption occurs			I/O INT.ERROR	43
	Special function module assignment error	▪ When power is ON or RESET ▪ When switching from (STOP, PAUSE) to (RUN)			SP.UNIT LAY.ERR.	44
	Special module access error *1 (Default: stop)	Upon execution of FROM, TO instruction	STOP/RUN	Flickering/ ON	SP.UNIT ERROR	46
	Link parameter error	▪ When power is ON or RESET ▪ When switching from (STOP, PAUSE) to (RUN)	RUN	ON	LINK PARA.ERROR	47
Battery	Low battery	Always (However, not checked when M9084 is ON.)	RUN	ON	BATTERY ERROR	70
Operation error *1 (Default: stop)		Upon execution of each instruction	STOP/RUN	Flickering/ ON	OPERATION ERROR*2 [<CHK> ERROR□ □ □]	50

*1 Can be changed by the parameter settings of a peripheral device.
*2 Indicated as a three-digit trouble code only for errors with the CHK instruction.

4.1.5 Device list

Device means a general name for such as a contact, coil and timer used on the program operations in a programmable controller.
The following shows usage ranges and device names of the programmable controller.
For "*" in the devices below, they can be used by setting the parameters on each peripheral device. Also, they can be changed the usage ranges assignment.
Set the parameters depending on the usage system and contents of the programs.
For the detailed setting for parameters, refer to Section 4.2.1 "List of parameter setting range".)

Device list

Device		Usage Range (points)			Description of Device
		A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)	
X	Input	X/Y0 to X/YFF (256 points)	X/Y0 to X/YFF (256 points)	A2SHCPU: X/Y0 to X/Y1FF (512 points) A2SHCPU-S1: X/Y0 to X/Y3FF (1024 points)	Used for the supply programmable controller commands and data from the external devices such as push buttons, select switches, limit switches and digital switches.
Y	Output				Used for the output control results of the program to the external devices such as solenoids, magnetic switches, signal lights and digital display device.
X	Input	X/Y0 to X/Y7FF (2048 points)			• Possible to use in a program from the I/O points usage range for each PLC (described above) up to 2048 points.(External output is not allowed.)
Y	Output				• Allocates for remote I/O of MELSECNET(B) and for auto refresh of CC-Link.
M	Special relay	M9000 to M9255 (256 points)			An auxiliary relay that is used in a programmable controller set in advance for a special application.
	*Internal relay	M/L/S0 to M/L/S2047 (2048 points) 2048 points as a total of M, L, S			An auxiliary relay in a programmable controller that cannot output directly to external devices.
L	*Latch relay				An auxiliary relay in a programmable controller that cannot output directly to the external devices. Has the power failure compensation function.
S	*Step relay				Used in the same manner as the internal relay (M). Used as a relays to indicate the stage number of process stepping program, etc.
R	Link relay	B0 to B3FF (1024 points)			An internal relay for data link. Cannot output to external devices.The range not set by the link parameters can be used as a substitute for a data register.
F	Annunciator	F0 to F255 (256 points)			For error detection. A fault finding program is created in advance, and if it becomes ON during RUN, the number is stored in a special register D.
T	*100ms timer	T0 to T255 (256 points)			Up-timing-timer. There are three kinds: 100ms timer, 10ms timer and 100ms retentive timers.
	*10ms timer				
	*100ms retentive timer				
C	*Counter	C0 to C255 (256 points) (Interrupt counter can be used by setting parameters.)			Up-timing There are two kinds: up-timing counter used in programmable controller programs, interrupt counter used in counting the number of interrupts.
	*Interrupt counter				
D	Data register	D0 to D1023 (1024 points)			Memory that stores data inside the programmable controller.
	Special register	D9000 to D9255 (256 points)			Data memory set up in advance for the special application
W	Link register	W0 to W3FF (1024 points)			Register for a data link The range not set by the link parameters can be used as a substitute for a data register.

Device list (Continued)

Device		Usage Range (points)			Description of Device
		A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)	
R	*File register	R0 to R8191 (8192 points)			For the data register expansion. User memory area is used for this.
A	Accumulator	A0, A1 (2 points)			Data register that stores a operation result of basic and application instructions.
Z V	Index register	V, Z (2 points)			Used for qualification of devices (X, Y, M, L, B, F, T, C, D, W, R, K, H, P)
N	Nesting	N0 to N7 (8 levels)			Indicates nesting structure of a master control.
P	Pointer	P0 to P255 (256 points)			Indicates destination of the branch instructions (CJ, SCJ, CALL, JMP).
I	Interrupt pointer	I0 to I31 (32 points)			When an interruption factor is generated, indicates the destination of the interrupt program corresponding to the interruption factor.
K	Decimal constant	K-32768 to K32767 (16-bit instruction) K-2147483648 to K2147483647 (32-bit instruction)			Used to set timer/counter, pointer number, interrupt pointer number, bit device digits, and values for basic and application instructions.
H	Hexadecimal	H0 to HFFFF (16-bit instruction) H0 to HFFFFFFFF (32-bit instruction)			Used to the set values for basic and application instructions.

REMARK

The step relay in the above list can be used in the same manner as the internal relay (M). For the program creation with two kinds of functions in one program, it is usable to divide the step relay (S) and internal relay (M) into a category of such as a function and usage in using.

4.2 Parameter Setting Ranges

Parameter contents in the CPU modules and parameter setting ranges are explained below.

4.2.1 List of parameter setting range

Parameters are used for allocating the user memory area inside the CPU module, setting various functions and device ranges.
A parameter is usually stored in the first 3k bytes of the user memory area.
Even though a default value can be used, parameter value can be changed to a value suitable for a particular application within a setting range by the peripheral devices.

List of parameter setting range

Item		Default Value	Setting Range		
			A1SJHCPU(S8)	A1SHCPU	A2SHCPU(S1)
Main sequence program capacity		6k steps	1 to 8k steps (1k step = in 2k-byte units)	1 to 8k steps (1k step = in 2k-byte units)	1 to 14k steps (1k step = in 2k-byte units)
Microcomputer program capacity		–	0 to 14k bytes (in units of 2k bytes)	0 to 14 bytes (in units of 2k bytes)	0 to 26k bytes (in units of 2k bytes)
File register capacity		–	0 to 8k points (1k point = in 2k-byte units)		
Comment capacity		–	0 to 3648 points (64 points unit = in 1k byte units) [When comment capacity is set up, 1k byte is added to the memory area.]		
Expanded comment capacity		–	0 to 3968 points (64 points unit = in 1k byte units)		
Status latch	Memory capacity	–	0/8 to 16k bytes		
	Data memory		No/Yes		
	File register		No/Yes (2 to 8k bytes)		
Sampling trace	Memory capacity	–	0/8k byte(s)		
	Device setting		Device No.		
	Executing condition		For each scan		
			For each period		
	Number of sampling times		0 to 1024 times (in units of 129 times)		
Latch range setting (power failure compensation)	Link relay (B)	• Latch: only 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)		
Settings for internal relay (M), latch relay (L), step relay (S)		M0 to M999 L1000 to L2047 None for S	M/L/S0 to M/L/S2047 (where M, L, S are serial numbers)		

List of parameter setting range (Continued)

<table>
<tr><th colspan="2" rowspan="2">Item</th><th rowspan="2">Default Value</th><th colspan="3">Setting Range</th></tr>
<tr><th>A1SJHCPU(S8)</th><th>A1SHCPU</th><th>A2SHCPU(S1)</th></tr>
<tr><td colspan="2">Watchdog timer setting</td><td>200ms</td><td colspan="3">10ms to 2000ms (in units of 10ms)</td></tr>
<tr><td>Timer settings</td><td>T0 to T255</td><td>T0 to T199 (100ms)
T200 to T255(10ms)</td><td colspan="3">• 256 points by 100ms, 10ms, and retentive timers (in 8-point units)
• Timers are serial numbers.</td></tr>
<tr><td>System interrupt setting</td><td>Interrupt counter start No.</td><td>–</td><td colspan="3">• Sets the interrupt counter start Nos. (in units of 8 points).</td></tr>
<tr><td colspan="2">I/O number assignment</td><td>–</td><td colspan="3">0 to 64 points (in 16-point units) ..... Input module/output module
Special function module/empty slot
• Module model name registration is possible.</td></tr>
<tr><td colspan="2">Remote RUN/PAUSE contact setting</td><td>–</td><td colspan="3">• X0 to X7FF
• RUN/PAUSE ..... 1 point (Setting only PAUSE contact is not allowed.)</td></tr>
<tr><td rowspan="4">Operating mode when there is an error</td><td>Fuse blown</td><td>Continue</td><td colspan="3" rowspan="4">Stop/Continue</td></tr>
<tr><td>I/O verify error</td><td>Stop</td></tr>
<tr><td>Operation error</td><td>Continue</td></tr>
<tr><td>Special function module check error</td><td>Stop</td></tr>
<tr><td colspan="2">Data communication request batch processing</td><td>None</td><td colspan="3">Yes/No</td></tr>
<tr><td colspan="2">Output mode at STOP to RUN</td><td>Ouput data at the time of STOP restored</td><td colspan="3">Output before STOP/after operation</td></tr>
<tr><td colspan="2">Print title entry</td><td>–</td><td colspan="3">• 128 characters</td></tr>
<tr><td colspan="2">Keyword registration</td><td>–</td><td colspan="3">• Up to 6 characters in hexadecimal (0 to 9, A to F)</td></tr>
<tr><td rowspan="4">Link range settings for MELSECNET</td><td>Number of link stations</td><td rowspan="4">–</td><td colspan="3">• 0 to 64 station(s)</td></tr>
<tr><td>I/O (X/Y)</td><td>X/Y0 to X/YFF
(in 16-point units)</td><td>X/Y0 to X/YFF
(in 16-point units)</td><td>X/Y0 to X/Y1FF
(in 16-point units)</td></tr>
<tr><td>Link relay (B)</td><td colspan="3">• B0 to B3FF (in units of 16 points)</td></tr>
<tr><td>Link register (W)</td><td colspan="3">• W0 to W3FF (in units of 1 point)</td></tr>
</table>

4.2.2 Memory capacity setting (for main program, file register, comment, etc.)

64k bytes user memory (built-in RAM) has fitted with the CPU module as standard equipment.
Parameters, T/C set value, main program, sampling trace, status latch, file register, and comment data are stored in the user memory.

(1) Calculation of memory capacity
Determine the data types to be stored and the memory capacity with parameters before using the user memory.
Calculate the memory capacity according to Table 4.1.

Table 4.1 Memory capacity

Item		Setting Unit	Memory Capacity	Change into ROM	Remark
Parameter, T/C set value		–	4 k bytes (fixed)	Usable	The parameter and T/C set value occupy 4k bytes.
Main program	Sequence program	1k step	(Main sequence program capacity)× 2k bytes		–
	Microcomputer program	2k bytes	(Main microcomputer program)k byte		–
Sampling trace		No/Yes	0/8k byte(s)	Not usable	
Status latch	Data memory	No/Yes	0/8k byte(s)		Memory capacity of status latch in the file register is determined by the file register points set in the parameter.
	File register	No/Yes	(Number of file register points)× 2k bytes		
File register		1k point	(Number of file register points) × 2k bytes		–
Comment		64 points	((Number of comments)/64+1)k bytes		When the comment capacity is set, the system occupies 1k byte.

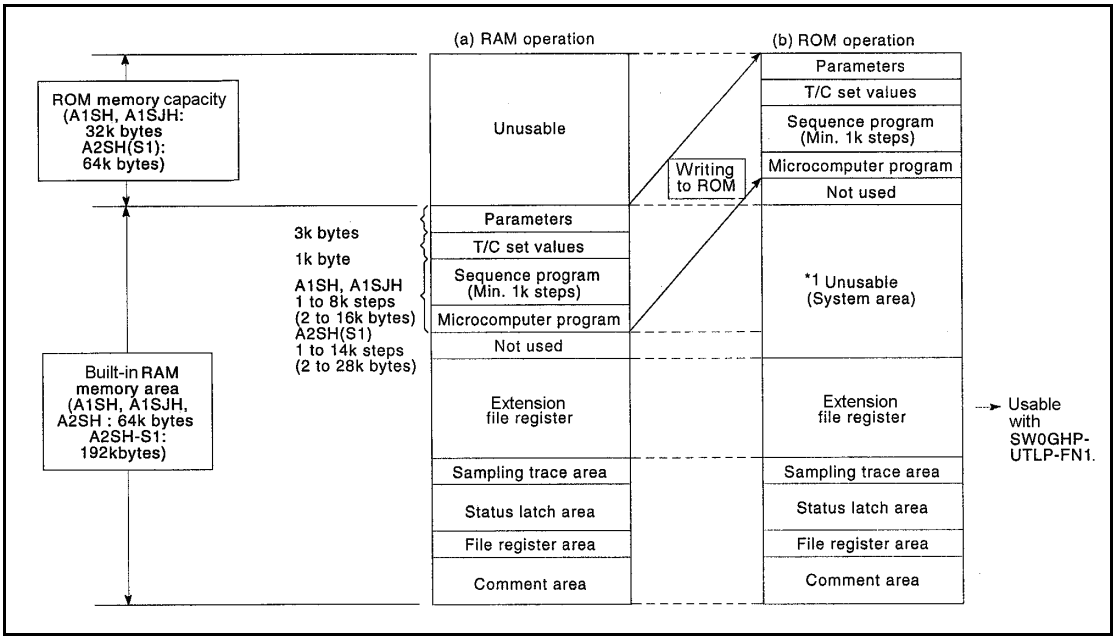
(2) Storing order in the user memory

Each data set by the parameters are stored in the order shown below:

Execute the memory protect after confirming that the write area during execution of the sequence program such as a file register is not in the memory protect range.

(a) When the main program data is written to ROM

Even if the main program is written to ROM, it cannot be used for other use. Which is because the same built-in RAM area (the area in the fig.*1) is used in the system as the case that RAM is running .



4.3 Function List

Various functions of the CPU modules are explained below.

Function (application)	Description	Overview of Setting and Operation
Constant scan •Program execution at constant intervals •Simplified positioning	• Makes the processing time for a single scan in the sequence program constant. • Set the processing time within the range of 10ms to 2000ms by 10ms.	• Write to the special register D9020 by the sequence program.
Latch (power failure compensation) Continuous control by data retention on power failure	• When the power supply failure of 20ms or the longer/CPU reset/power supply off occurs, data contents of the devices for which latches have been set up in advance are retained. • Latch-enabled devices: L, B, T, C, D, W • Latched data are stored in the CPU main module and backed up by the batteries of the CPU main module.	• Latch device and latch range are specified by setting of the peripheral device parameters.
Remote RUN/STOP When performing RUN/ STOP control from outside the programmable controller	• When a programmable controller CPU is in RUN (the RUN/ STOP key switch is set to RUN), performs the programmable controller's STOP/RUN from outside the programmable controller (external input, peripheral devices, computer) with a remote control.	• When performed with the external input (X), the parameter is set with a peripheral device. • When performed by a peripheral device, perform in the programmable controller test operation. • When performed via the computer link module, perform using the dedicated commands.
PAUSE •When stopping the operation of CPU while retaining the output (Y) •When performing RUN/ PAUSE control from outside the programmable controller	• Stops the operation processing of a programmable controller CPU while retaining the ON/OFF of all the outputs (Y). (When the operation is stopped by STOP, all the outputs (Y) are set to OFF.) • When a programmable controller CPU is in RUN (the RUN/ STOP key switch is set to RUN), performs the programmable controller's STOP/RUN from outside the programmable controller CPU (external input, peripheral devices, computer) with a remote control.	• Performed by the peripheral device in the programmable controller test operation. • When performed with the external input (X), perform the parameter setting with the peripheral device, set the special relay M9040 to ON with the sequence program, then perform.
Status latch Carries out operation check and failure factor check on each device when debugging or a failure condition is met.	• With respect to the devices to which status latches are set up, when the status latch conditions are met, the data contents of the devices are stored in status latch area in the CPU main module. • The criteria for the satisfied condition can be selected from when the SLT instruction is executed by the sequence program or when the device value matches the set condition.	• Set-up devices of status latch is performed by parameter setting of peripheral devices. • Using the peripheral devices, monitor the status latch data.

(To the next page)

(Continued)

Function (application)	Description	Overview of Setting and Operation
Sampling trace [Performs chronological checking to the operation status of setup devices when debugging or an abnormal operation is detected.]	• With respect to a device for which the sampling trace is set up, the operatinon condition of the device is sampled for the number of times specified per scan or per hour, and the results are stored in the sampling trace of the CPU main module. • Sampling trace is performed by the STRA instruction in the sequence program.	• Set-up of the memory capacity for sampling trace is performed by the parameter setting of peripheral devices. • Set the device which executes sampling trace, trace point, and number of times using the peripheral devices. • Using the peripheral devices, monitor the result of the sampling trace.
Clock [Program control by clock data/external display of clock data]	• Executes the operation of the clock built into the CPU module. • Clock data: year, month, day , hour, minute, second, day of the week • When the clock data read request (M9028) is ON, the clock data are read out and stored in D9025 to D9028 by the clock element after the END processing of the sequence operation. • The clock elements are backed up with the batteries in the CPU main module.	• Sets data for D9025 to D9028 by a peripheral device, turns M9025 ON, then writes the data to the clock element. • Writes to the clock element by the sequence program. (Dedicated instructions can be used.)
Offline switch	• Allows the device (Y, M, L, S, F, B) used with the OUT instruction to be disconnected from the operation processing of the sequence program.	• Use the test function fitted with the peripheral devices for set-up.
Priority order of LED indication [Changing priority order of display/canceling display]	• For ERROR LED indication except for operation stop, changing the order of display/canceling the display are executed.	• Writes data as to whether to change the order/cancel the display to D9038 or D9039 by the sequence program.
Self-diagnostics function [•An abnormal behavior of the CPU module •Preventive maintenance]	• When an error that matches one of the self-diagnostics items is generated at the CPU module power on or during RUN, it prevents malfunctions by stopping the CPU module operation and indicating the error. • Stores the error codes corresponding to the self-diagnostics item.	• There are some self-diagnostics items with which the operation can be continued or stopped by the setting of peripheral device parameters. • Reads out the error codes with the peripheral device and performs troubleshooting. (Refer to Section 4.1.4)

4.4 Handling Precautions

Precautions when handling the CPU module from unpacking to installation are described below.

⚠ CAUTION

- Use the programmable controller under the environment specified in the user's manual.
  Otherwise, it may cause electric shocks, fires, malfunctions, product deterioration or damage.
- Insert the module fixing projection into the fixing hole in the base unit and then tighten the module screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctiuons, a failure or a drop of the module.
  If too tight, it may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.
- Connect the extension cable to the connector of the base unit or module.
  Check the cable for incomplete connection after connecting it.
  Poor electrical contact may cause incorrect inputs and/or outputs.
- Insert the memory cassette and fully press it to the memory cassette connector.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.
- Do not directly touch the conductive part or electronic components of the module.
  Doing so may cause malfunctions or a failure of the module.

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

(2) Do not remove the module printed wiring board from the case. Otherwise, a malfunction may occur.

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

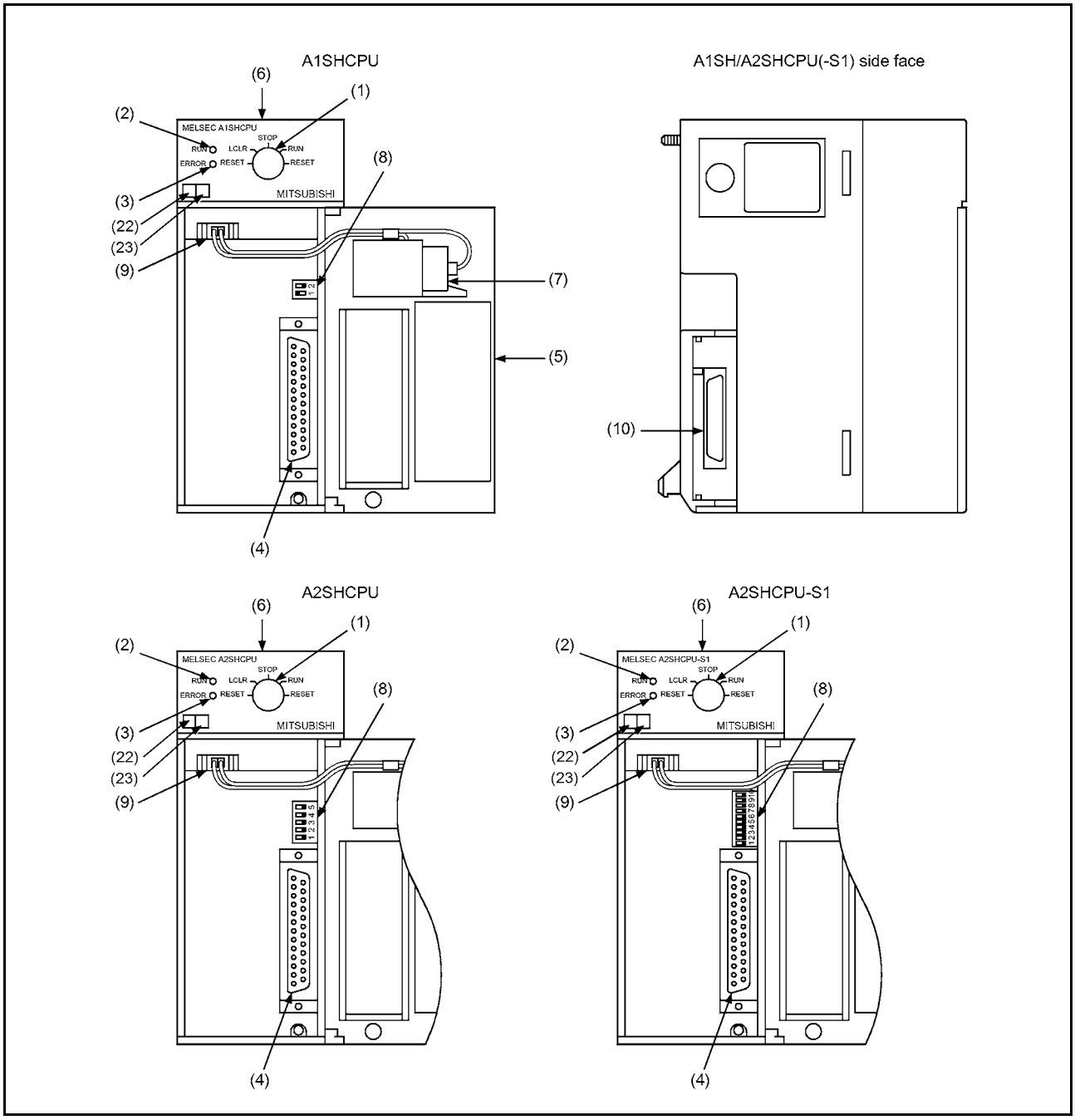
(4) Tighten the module mounting screws and terminal block screws within the tightening torque range specified shown the table below.

Screw position	Tightening torque range
Module mounting screw (M4 screw)	78 to 118N・cm
I/O module (M3.5 screw)	59 to 88N・cm
Power supply module terminal screws (M3.5 screw)	59 to 88N・cm

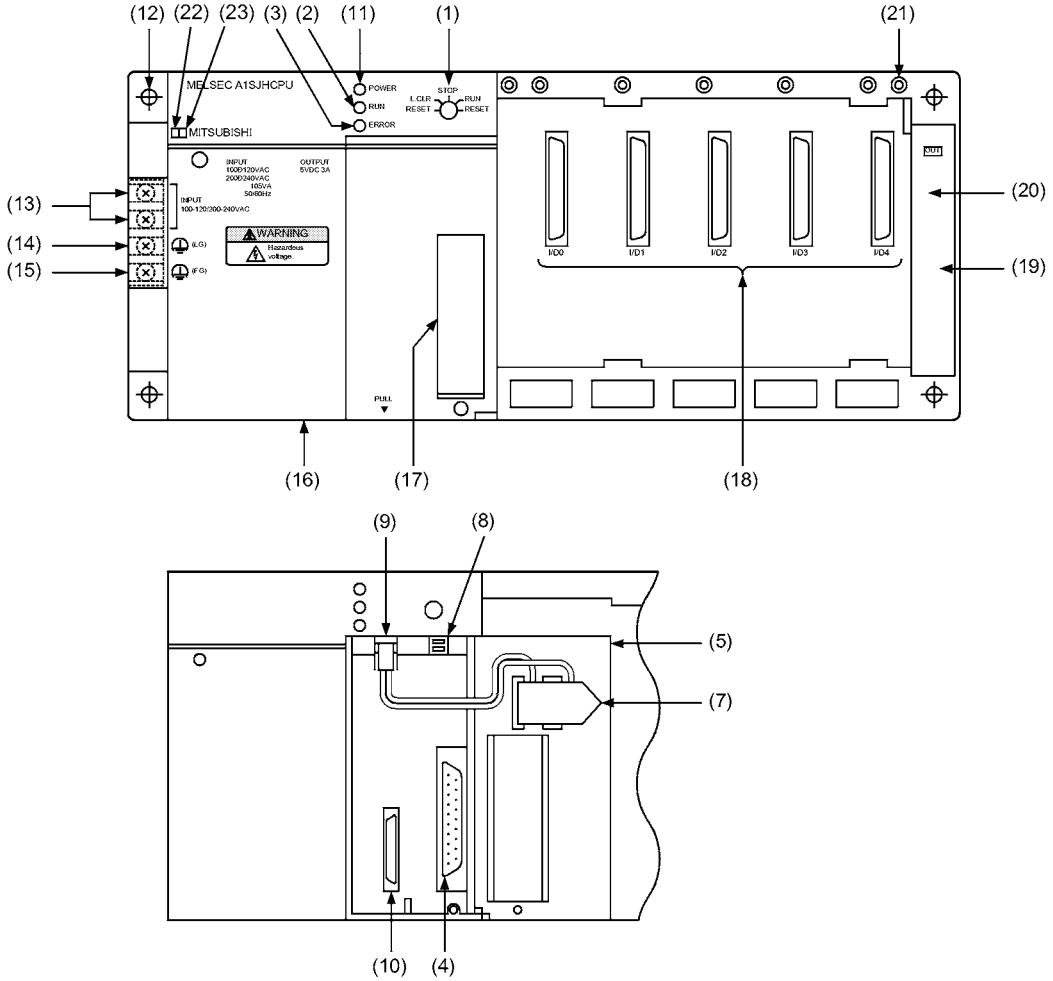
4.5 Part Names

The following shows parts names of the AnSHCPU and the switch setting for using the AnSHCPU.

4.5.1 Parts names of the A1SHCPU, A2SHCPU(S1), A1SJHCPU (S8)



A1SJHCPU(S8)



No.	Name	Description
(1)	RUN→STOP key switch	• RUN/STOP: Used to start/stop sequence program operation. • RESET: Resets the hardware. Performs the reset and initialization of the operation at the operation error occurrence. • L.CLR (LATCH CLEAR): Clears the data in the latch area (to OFF or 0) set by parameters. (With LATCH CLEAR, data in area other than the latch area is also cleared.) For the operation method of the latch clear, refer to Section 4.5.3.

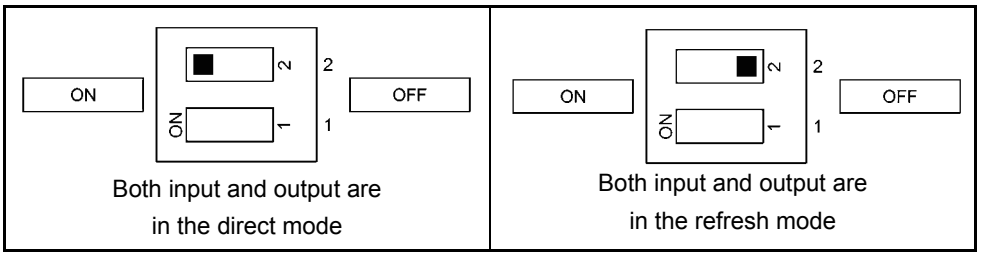
No.	Name	Description
(2)	"RUN" LED	• ON: RUN/STOP key switch is in the "RUN" position, and the sequence program operation is being executed. (In case of an error which does not stop the operation of sequence program occurs (refer to Section 11.3), the LED remains on.) • OFF: The "RUN" LED turns off in the following cases: • The RUN/STOP key switch is set to "STOP". • Remote STOP is being performed. • Remote PAUSE is being performed. • Flashing: The "RUN" LED flashes in the following cases: • An error which causes operation of the sequence program to stop has been detected by self-diagnostics. • During latch clear operation
(3)	"ERROR" LED	• ON: An error has been detected by self-diagnostics. (When an error which has been set to LED OFF in the priority order setting of the LED indication is detected, the LED remains OFF.) • OFF: When failure of the system or target device is detected in normal or by the CHK instruction. • Flashing: Annunciator (F) is turned on in the sequence program.
(4)	RS-422 connector	• Connector to write/read, monitor and test the main program with peripheral device. • Cover it with a lid when no peripheral device is to be connected.
(5)	Cover	• Protective cover for printed-circuit board of CPU module, memory cassette, RS-422 connector, battery, etc. • Open the cover to perform the following operations: ▪ Installation and removal of the memory cassette (only for A1SJHCPU) ▪ Setting DIP switches ▪ Connecting the battery to the connector ▪ Battery replacement
(6)	Module mounting screw	• Used to fix a module to the base unit.
(7)	Battery	• For the retention of data for program, latch range devices and file registers(for installation and removal of battery, refer to Section 7.2)
(8)	Dip switch	• Used to switch the I/O control mode or set memory protect to Enable/Disable. (Refer to Section 4.5.2, Section 4.5.3 for details of the setting.)
(9)	Battery connector	• For the connection with the connector on the battery side.
(10)	Memory cassette installing connector	• Connector to install a memory cassette. (It automatically enters into ROM operation when a memory cassette is installed.)
(11)	"POWER" LED	• LED for the 5VDC power indicator.
(12)	Base installation hole	• A hole used to install the base unit to a control panel.(M5 screw)

No.	Name	Description
(13)	Power input terminal	• Used to connect the 100VAC or 200VAC power supply using the power input terminal.
(14)	LG terminal	• Power filter grounding terminal, having the potential half of the input voltage.
(15)	FG terminal	• The ground terminal connected to the shielding pattern of the printed-circuit board.
(16)	DIN rail	• Hook for DIN rail installation. (2pcs)
(17)	RS-422 connector cover	• Connector cover for the RS-422
(18)	Module connector	• Connector to install a I/O module or a special module. To prevent dust from entering, attach the supplied connector cover or a blank cover (A1SG60) to the connector with no module installed. Number of I/O slots A1SJHCPU:5 A1SJHCPU-S8:8
(19)	Extension cable connector	• A connector used to connect an extension cable, by which signals can be transferred to/from an extension base unit.
(20)	Base cover	• Protective cover for extension connector. To extend, the area surrounded by the groove below the OUT sign on the base cover has to be removed using a tool such as a nipper.
(21)	Module fixing screw	• A screw to fix the module to the base. (M4 × 12 screws)
(22)	Hardware version	• Hardware version seal of CPU module
(23)	Software version	• Software version seal of CPU module

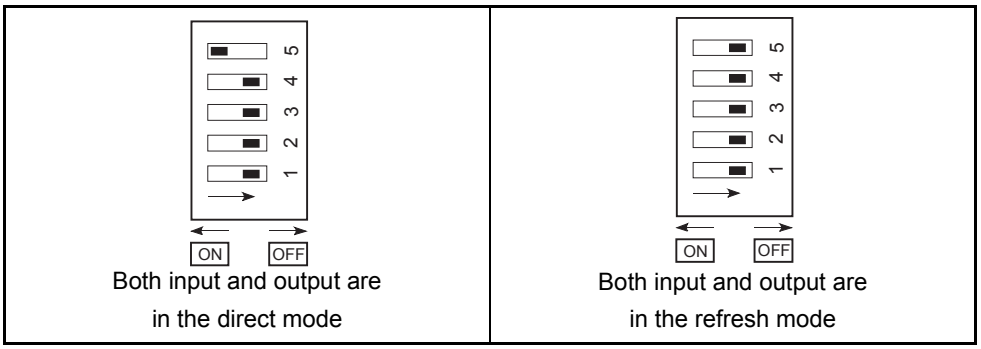
4.5.2 Setting of I/O control mode switching switch

There are a direct mode and a refresh mode in I/O control mode.

(1) When using the A1SJHCPU(S8) or the A1SHCPU
Use the DIP switch (SW1) to switch the I/O control mode.
Upon shipment, the direct mode (SW1 : ON) is set for both input and output.



(2) When using the A2SHCPU
Use the DIP switch (SW5) to switch the I/O control mode.
Upon shipment, the direct mode (SW5 : ON) is set for both input and output.

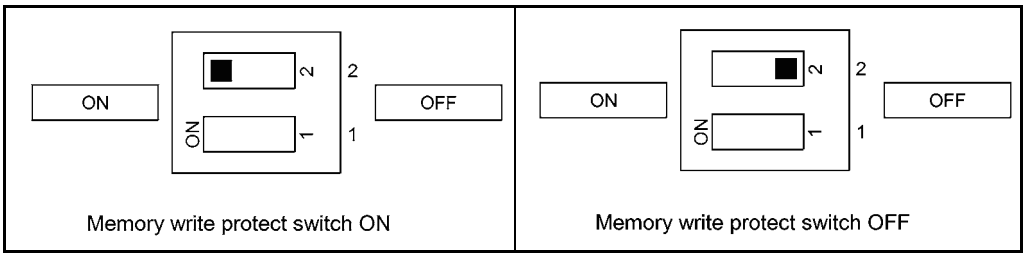


POINT
Make sure that the power supply is OFF before setting the I/O control switching switch.

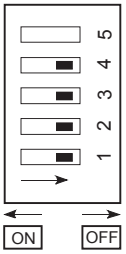
4.5.3 Settings for memory write protect switch

Memory write protect switch is to prevent a program from overwriting and deleting by an operation from the peripheral device.
It is used to prevent overwriting and deletion of a program after the program is created.
To modify the ROM memory, cancel the memory write protect (OFF).
The memory write protect is set to OFF as factory default.

(1) When using the A1SJHCPU(S8) or the A1SHCPU
With the A1SJHCPU(S8)/A1SHCPU, ON/OFF setting of memory write protect is set using the 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 to the E^2PROM if a memory cassette is installed.
Furthermore, pograms cannot be written to the built-in RAM using peripheral devices while operating the E^2PROM.
By selecting the ON position on this switch, the parameters, program and a part of extension file register is write-protected in the memory. (Refer to Section 4.2.2.)



(2) When using the A2SHCPU
The memory write protect range can be changed by setting the DIP switches for memory write protect.

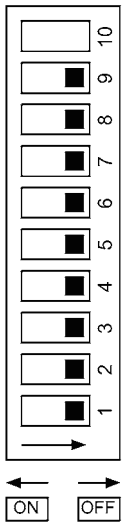


Range of Memory Protection (k bytes)	Setting Switch
0 to 16	1:ON
16 to 32	2:ON
32 to 48	3:ON
48 to 64	4:ON

(3) When the A2SHCPU-S1

The memory write protect range can be changed by changing the settings of the memory write protect DIP switches.

A2SHCPU-S1



Range of Memory Protection (k bytes)	Setting Switch
0 to 16	1:ON
16 to 32	2:ON
32 to 48	3:ON
48 to 64	4:ON
64 to 80	5:ON
80 to 96	6:ON
96 to 112	7:ON
112 to 144	8:ON
144 to 192	9:ON

POINT

(1) When the memory protect is used, refer to the address (step number) of each memory area (sequence program, comment, sampling trace, status latch and file register) to set protection. (Refer to Section 4.2.2)

(2) When sampling trace or status latch is executed, do not apply the memory protect to the data storage area.
If the protection is applied, the execution results cannot be stored in the memory.

REMARK

When E^2PROM is used, memory protect is possible with the memory protect setting pins on the main unit of the A2SNMCA-30KE. Refer to Section 7.1.5.

4.5.4 Latch clear operation

When performing latch clear by the RUN/STOP key switch, follow the procedures below. When the latch clear is performed, the device data in the non-latched range is also cleared.

(1) Switch the RUN/STOP key switch a few times (three or four times) from "STOP" to "L.CLR", and then "RUN" LED turns flicker at high speed (about 0.2s ON, 0.2s OFF). If the "RUN" LED turns flicker at high speed, a latch clear is ready.

(2) After the "RUN"LED flickers at high speed, switch the RUN/STOP key switch from "STOP" to "L.CLR" again, and then the latch clear is all prepared and "RUN" LED turns off.
In the case of cancelling the latch clear operation halfway, switch the RUN/STOP key switch to "RUN" to lead the CPU module to RUN status, or switch to "RESET" to lead it to reset status.

REMARK

The latch clear can also be performed by the operation of GPP function.
For instance, latch clear by A6GPP can be performed by "Device memory all clear" of the PLC mode test function.
For the operation method, refer to the operating manual for GPP functions.

5 POWER SUPPLY MODULE

5.1 Specifications

Specifications of power supply modules are shown below.

Table 5.1 Power supply module specifications

Item		Performance Specifications		
		A1S61PN	A1S62PN	A1S63P
Slot position		Power supply module 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		Within 5% (See Section 8.8)		–
Max. input apparent power		105VA		41W
Inrush current		20A, 8ms or less*4		81A, 1ms or less
Rated output current	5VDC	5A	3A	5A
	24VDC	–	0.6A	–
Overcurrent protection*1	5VDC	5.5A or higher	3.3A or higher	5.5A or higher
	24VDC	–	0.66A or higher	–
Overvoltage protection*2	5VDC	5.5 to 6.5V		
	24VDC	–		
Efficiency		65% or higher		
Allowable momentary power failure period*3		20ms or less		10ms or less (24VDC or higher)
Dielectric withstand voltage	Between primary and 5VDC	AC across input/LG and output/FG, 2,830VAC rms/3 cycles (elevation 2,000m (6562 ft))		500VAC
	Between primary and 24VDC			–
Insulation resistance		AC across input/LG and output/FG 10MΩ or higher, measures with a 500VDC insulation resistance tester		
Noise durability		• Noise voltage 1,500 Vp-p, Nioise width 1μs, Noise frequency 25 to 60Hz (noise simulator condition) • Noise voltage IEC801-4, 2kV		Noise voltage 500Vp-p, Noise width 1μs, Noise frequency 25 to 60 Hz (noise simulator condition)
Operation indication		LED indication (ON for 5VCDC output)		
Fuse		Built in (User cannot change.)		
Terminal screw size		M3.5× 7		
Applicable wire size		0.75 to 2mm^2		
Applicable solderless terminal		RAV1.25 to 3.5, RAV2 to 3.5		
Applicable tightening torque		59 to 88N・cm		

Item	Performance Specifications		
	A1S61PN	A1S62PN	A1S63P
External dimensions	130mm(5.12inch)×55mm(2.17inch)×93.6mm(3.69inch)		
Weight	0.60kg	0.60kg	0.50kg

Table5.2 Performance specifications for the A1SJHCPU(S8) built -in power supply

Item		Model
		A1SJHCPU(S8)
Input power supply		100 to 120VAC $^{+10\%}_{-15\%}$ (85 to 132VAC) 200 to 240VAC $^{+10\%}_{-15\%}$ (170 to 264VAC)
Input frequency		50/60Hz±3Hz
Input voltage distortion		Within 5% (See Section 8.8)
Max. input apparent power		100VA
Inrush current		20A, 8ms or less*4
Rated output		5VDC, 3A
Overcurrent protection*1		3.3A or higher
Overvoltage protection*2		None
Efficiency		65% or higher
Power indicator		POWER LED indicator
Terminal screw size		M3.5× 8
Applicable wire size		0.3 to 2mm^2
Applicable solderless terminal		RAV1.25 to 3.5, RAV2 to 3.5
Allowable momentary power failure period*3		20ms or less (100VAC or more)
Dielectric withstand voltage	Between primary and 5VDC	AC across input/LG and output/FG, 2,830VAC rms/3 cycles (elevation 2,000m (6562 ft))
	Between primary and 24VDC	
Insulation resistance		AC across input/LG and output/FG 10MΩ or higher, measures with a 500VDC insulation resistance tester
Noise durability		• Noise voltage 1,500 Vp-p, Nioise width 1μs, Noise frequency 25 to 60Hz (noise simulator condition) • Noise voltage IEC801-4, 2kV

POINT

*1 Overcurrent protection

The overcurrent proctection device shuts off the 5VDC and/or 24VDC circuit(s) and stops the system if the current exceeding the specified value flows in the circuit(s).
As this results in voltage drop, the power supply module LED turns OFF or is dimly ON.
After that, eliminate the causes of overcurrent, e.g., insufficient current capacity and short-circuit, and then start the system.
When the current value has reached the normal value, the initial start up of the system will be performed.

*2 Overvoltage protection

The overvoltage protection shuts off the 5VDC circuit and stops the system if the overvoltage of 5.5 to 6.5V is applied to the circuit.
The power supply module LED turns OFF.
When restarting the system, power OFF and ON the input power supply, and the initial start up of the system will be performed.If the system is not booted and the LED remains off, this means that the power supply module has to be replaced.

*3 Allowable momentary power failure period

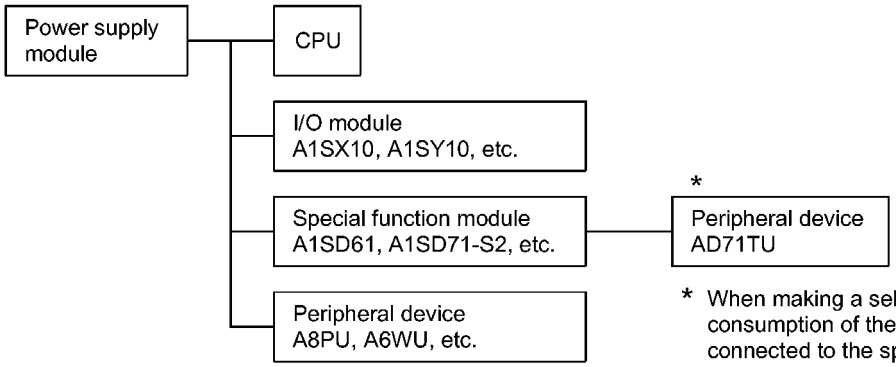
The programmable controller CPU allowable momentary power failure period varies with the power supply module used.
In case of the A1S63P power supply module, the allowable momentary power failure period is defined as the time from when the primary side of the stabilized power supply for supplying 24VDC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

*4 Inrush current

If power is reapplied immediately after power OFF (within 5 seconds), an inrush current exceeding the specified value may flow (for 2ms or less).
Therefore, make sure to re-power ON the module 5seconds after power off.
When selecting a fuse or breaker for an external circuit, consider the above as well as meltdown and detection characteristics.

5.1.1 Power supply module selection

Power supply module is selected based on to the total current consumption of the I/O module, special function module and peripheral devices to which power is supplied by the subject power supply module. When extension base unit A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B is used, take into consideration that the power to the module is supplied by the power supply module of the main base.
For 5VDC current consumption of I/O modules, special function modules and peripheral devices, refer to Section 2.3.



(1) Power supply module selection when extension base unit A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B is used
When extension base unit A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B is used, 5VDC power supply is supplied from the power supply module of the main base unit via extension cable. Thus, when one of these units is used, be careful with the following:

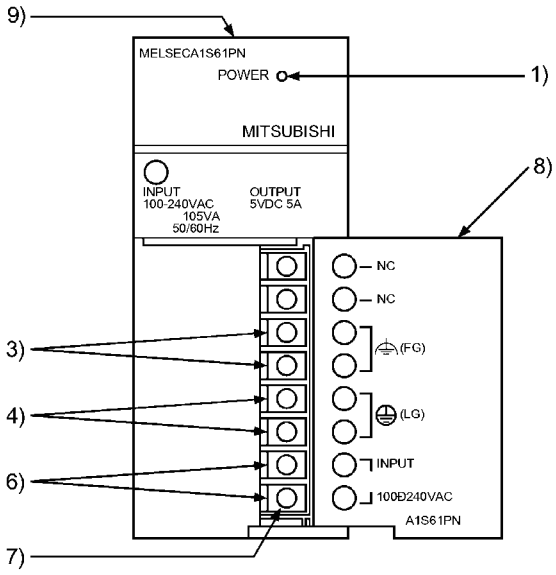
(a) Select a 5VDC power supply module of the main base unit with sufficient capacity to supply 5VDC current consumed by A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B.
Example) If 5VDC current consumption on the main base unit is 3A and 5VDC current consumption on the A1S55B is 1A, then, the power supply module installed to the main base unit must be A1S61P(5VDC 5A).

(b) Since the power to A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B is supplied via extension cable, a voltage drop occurs through the cable. It is necessary to select a power supply module and cable with proper length so that 4.75VDC or more is available at the receiving port. For the details of voltage drop, refer to Section 6.1.3, the applicable standards of extension base units.

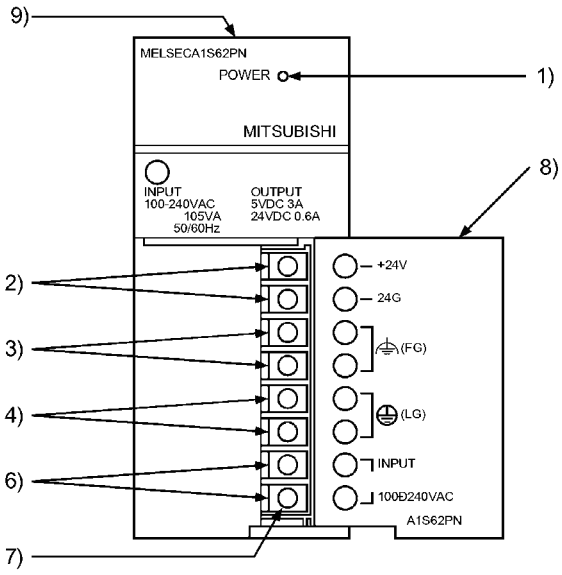
5.2 Part Names

Part names of the power supply modules are shown here.

(1) A1S61PN

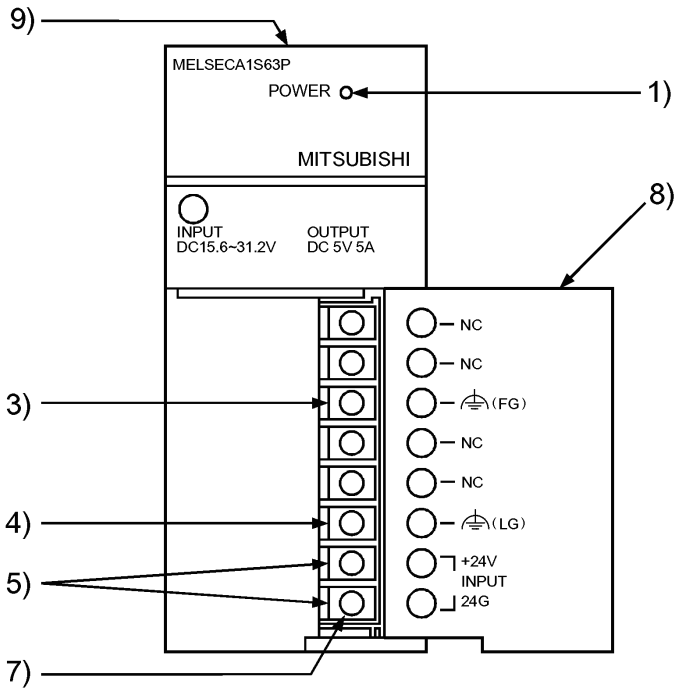


(2) A1S62PN



No.	Name	Description
1)	POWER LED	LED for the 5VDC power indicator.
2)	24VDC, 24GDC terminal	Used to supply 24VDC power supply to inside the output module (using external wiring).
3)	FG terminal	The ground terminal connected to the shielding pattern of the printed-circuit board.
4)	LG terminal	Grounding for the power supply filter. The potential of A1S61PN or A1S62PN terminal is 1/2 of the input voltage.

(3) A1S63P



No.	Name	Description
5)	Power input terminal	Used to connect a 24VDC power supply.
6)	Power input terminal	Used to connect 100VAC to 240VAC power supply.
7)	Terminal screw	M3.5×7
8)	Terminal cover	A protective cover for the terminal block.
9)	Module mounting screw	Used to fix a module to the base unit. (M4 screw; tightening torque: 59 to 88N ▪ 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) The protective ground terminal LG must be grounded.

6 BASE UNIT AND EXTENSION CABLE

6.1 Specifications

This section explains the specifications of the base units (the main and extension base units) and extension cables available for the systems, and the applicable standards for use of the extension base units.

6.1.1 Base unit specifications

(1) Main base unit specifications

Table 6.1 Main base unit specifications

Item	A1S32B	A1S33B	A1S35B	A1S38B
I/O module installing range	2 modules can be installed.	3 modules can be installed.	5 modules can be installed.	8 modules can be installed.
Extension possibility	Extendable			
Installation hole size	ϕ 6 bell-shaped holes (for M5 screws)			
External dimensions	220mm (8.66inch)×130mm (5.12inch)×28mm (1.10inch)	255mm (10.03inch)×130mm (5.12inch)×28mm (1.10inch)	325mm (12.80inch)×130mm (5.12inch)×28mm (1.10inch)	430mm (16.92inch)×130mm (5.12inch)×28mm (1.10inch)
Weight	0.52kg	0.65kg	0.75kg	0.97kg
Accessory	Installation screws: M5×25, 4 pcs.			

(2) Extension base unit specifications

Table 6.2 Extension base unit specifications

Item	A1S65B	A1S65B-S1	A1S68B	A1S68B-S1	A1S52B	A1S52B-S1	A1S55B	A1S55B-S1	A1S58B	A1S58B-S1
I/O module installing range	5 modules can be installed.		8 modules can be installed.		2 modules can be installed.		5 modules can be installed.		8 modules can be installed.	
Power supply module installing requirement	Power supply module required				Power supply module not required					
Installation hole size	ϕ 6 bell-shaped holes (for M5 screws)									
Terminal screw size	–		–		M4×6 (FG terminal)					
Applicable wire size	–		–		0.75 to 2mm^2					
Applicable solderless terminal	–		–		(V) 1.25-4 (V) 1.25-YS4(V)2-YS4A (Applicable tightening torque98 to 137N . cm)					
External dimensions	315mm (12.40inch)×130mm (5.12inch)×28mm (1.10inch)		420mm (16.54inch)×130mm (5.12inch)×28mm (1.10inch)		155mm (6.10inch)×130mm (5.12inch)×28mm (1.10inch)		260mm (10.24inch)×130mm (5.12inch)×28mm (1.10inch)		365mm (14.37inch)×130mm (5.12inch)×28mm (1.10inch)	
Weight	0.71kg		0.95kg		0.38kg		0.61kg		0.87kg	
Accessory	Installation screws: M5×25, 4 pcs.				*1 Dustproof cover (for I/O module): 1 pc. Installation screws: M5×25, 4 pcs.					

*1 1 For the attachment of the dustproof cover, refer to Section 8.6.

POINT

For the usage of the base units which do not require power supply module A1S52B(S1), A1S55B(S1), and A1S58B(S1), refer to the power supply module selection in Section 5.1.1 and the applicable standards of extension base units in Section 6.1.3 .

6.1.2 Extension cable specifications

The specifications of the extension cables applicable to PLC systems are shown in Table 6.3.

Table 6.3 Extension cable specifications

Item	A1SC01B	A1SC03B	A1SC07B	A1SC12B	A1SC30B	A1SC60B	A1SC05NB	A1SC07NB	A1SC30NB	A1SC50NB
Cable length	0.055m (0.18ft.)	0.33m (1.08ft.)	0.7m (2.30ft.)	1.2m (3.94ft.)	3.0m (9.84ft.)	6.0m (19.69ft.)	0.45m (1.48ft.)	0.7m (2.30ft.)	3.0m (9.86ft.)	5.0m (16.43ft.)
Resistive value of 5VDC supply line (at 55℃)	0.02Ω	0.02Ω	0.04Ω	0.06Ω	0.12Ω	0.18Ω	0.04Ω	0.05Ω	0.12Ω	0.18Ω
Application	Connection between a main base and A1S5□B(S1)/A1S6□B(S1)						Connection between a main base and A5□B/A6□B			
Weight	0.025kg	0.10kg	0.14kg	0.20kg	0.40kg	0.65kg	0.20kg	0.22kg	0.40kg	0.56kg

When using the extension cable, do not bundle it with the main circuit cables together, which has high voltage, large current, or install them close to each other.

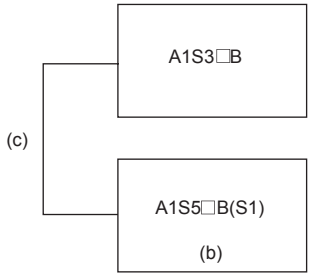
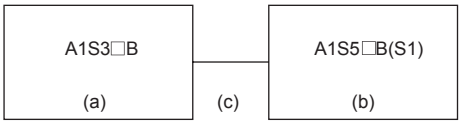
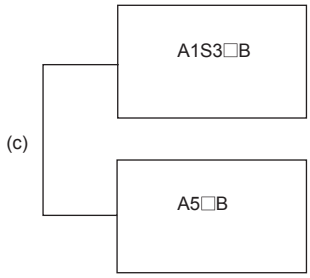
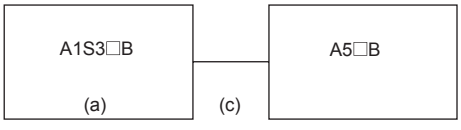
6.1.3 Application standards of extension base units (A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B)

When using the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B extension base unit, make sure that the voltage of the receiving port (the module installed in the last slot of the extension base unit) is 4.75V or more.
Since the power supply module on the main base unit supplies 5VDC to the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B extension base unit, a voltage drop occurs through the base unit and extension cable. If the specified voltage is not supplied at the receiving port, incorrect input or output may result.
If the voltage at the receiving port is less than 4.75V, replace the extension base unit with the A1S65B(S1), A1S68B(S1), A62B, A65B or A68B that has a power supply.

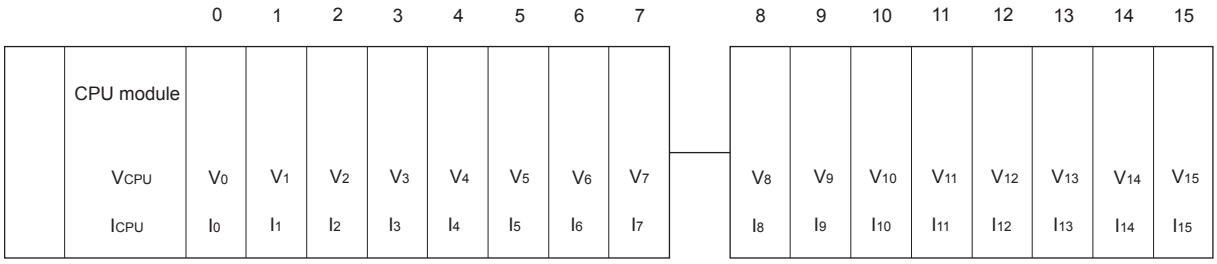
(1) Selection condition
Receiving voltage of the module installed in the last slot of the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B extension base unit is 4.75V or more.
The output voltage of the power supply module is set to 5.1V or more. Thus, a voltage drop of 0.35V or less allows use of the module.

(2) Elements of voltage drop
There are the following elements of voltage drop, (a) to (c), depending on the connection method and type of the extension base unit.

(a) Voltage drop in the main base unit
(b) Voltage drop in the extension base unit
(c) Voltage drop in the extension cable

Extension Base Unit Used	Extension Cable is Connected to the Left Side of the Main Base Unit (in Series).	Extension Cable is Connected to the Right Side of the Main Base Unit (Parallel Installation).
A1S52B(S1), A1S55B(S1) or A1S58B(S1) extension base unit is used.	 The voltage drop in the main base unit can be ignored.	
A52B, A55B or A58B extension base unit is used.	 The voltage drop in the main base unit and extension base unit can be ignored.	 The voltage drop in the extension base unit can be ignored.

(3) Receiving voltage calculation method



V_{CPU}, V_0 to V_7:Voltage drop at each slot of the main base unit

I_{CPU}, I_0 to I_7 :Current consumption at each slot of the main base unit

V_8 to V_{15} :Voltage drop at each slot of the extension base unit

I_8 to I_{15} :Current consumption at each slot of the extension base unit

(a) Calculation of voltage drops with the main base unit (A1S32B, A1S33B, A1S35B, A1S38B) Resistive value with the main base unit is 0.007Ω per slot.Sum up the voltage drops of each slot.

Current consumption of the CPU module

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

1) Voltage drop at the 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 at 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 at 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 at 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 at 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 at 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 at 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 at 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 at 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 at the 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) Voltage drop calculation on the extension base unit (A1S52B(S1), A1S55B(S1), A1S58B(S1))

The resistive value on the extension base unit is 0.006Ω per slot.

Calculate the voltage drop of each slot and obtain the total voltage drop.

1) Voltage drop at 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 at 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 at slot 10: V_{10}
   $V_{10}=0.006\times(I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$
4) Voltage drop at slot 11: V_{11}
   $V_{11}=0.006\times(I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$
5) Voltage drop at slot 12: V_{12}
   $V_{12}=0.006\times(I_{12} + I_{13} + I_{14} + I_{15})$
6) Voltage drop at slot 13: V_{13}
   $V_{13}=0.006\times(I_{13} + I_{14} + I_{15})$
7) Voltage drop at slot 14: V_{14}
   $V_{14}=0.006\times(I_{14} + I_{15})$
8) Voltage drop at slot 15: V_{15}
   $V_{15}=0.006\times I_{15}$
9) Total voltage drop at the 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 through the extension cable

[1] Total current consumption of the 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 of the extension cable: V_c
   V_c=(Resistive value of the extension cable) × I_z

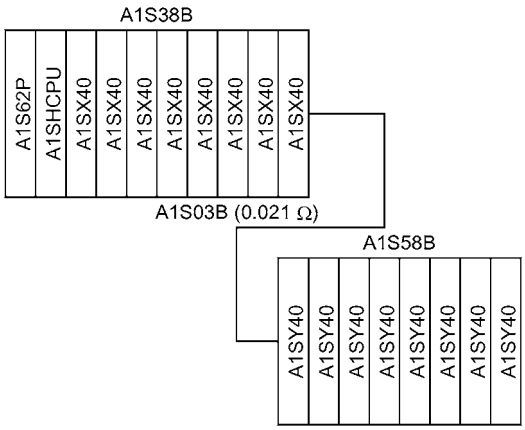
Resistive value of extension cable

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

(d) Verification of the receiving port voltage

$(5.1(V)-V_K-V_Z-V_C) \geqq 4.75(V)$

(4) Calculation examples



(a) Calculation of voltage drop on the main base unit
$V_K = 0.007 \times \{0.3 + 0.05 \times (9 + 8 + 7 + 6 + 5 + 4 + 3 + 2) + (0.27 \times 8) \times 9\} = 0.15358$

(b) Calculation of voltage drop on the extension base unit
$V_Z = 0.006 \times 0.27 \times (8+7+6+5+4+3+2+1) = 0.05832$

(c) Voltage drop on the extension cable
$V_C = 0.021 \times (0.27 \times 8) = 0.04536$

(d) Verification of the receiving port voltage
5.1-0.15358-0.05832-0.04536=4.84274(V)
Since the receiving port voltage is more than 4.75V, the above system is usable.

(5) To reduce the voltage drop
The following methods are effective to reduce the voltage drop.

(a) Change the installing position of the module
Install the modules with high current consumption in order starting from slot 0 of the main base unit.
Install modules with low current consumption to the extension base unit.

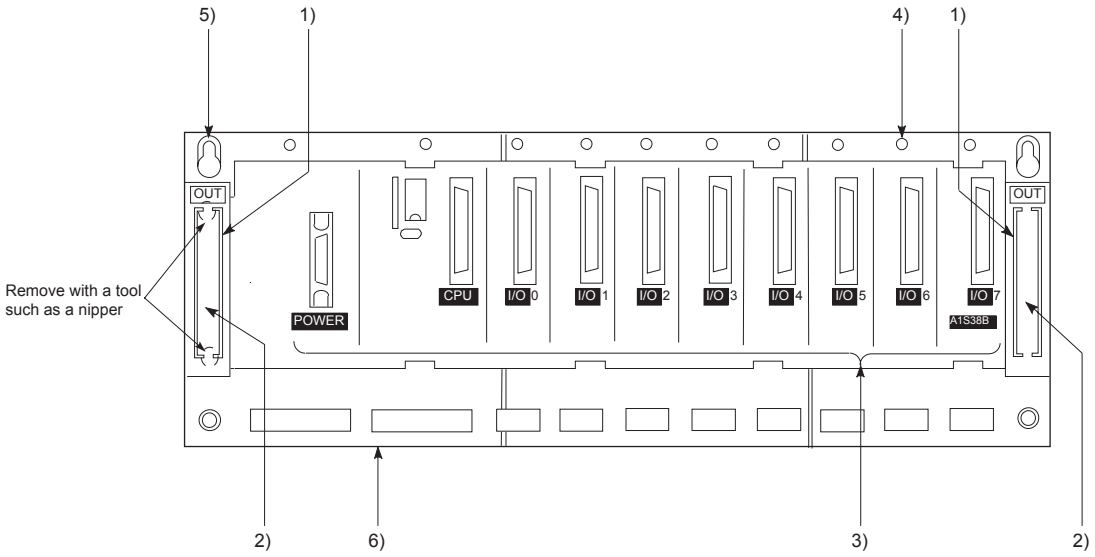
(b) Connect the base units in series
By connecting base units in series (connecting the extension cable to the left side of the main base unit. Refer to this section (2), the voltage drop on the main base unit can be ignored.
If the extension cable is long, however, the voltage drop through the cable may be larger than that on the main base unit. Therefore, calculate the voltage drop according to (3).

(c) Use a shorter extension cable
The shorter the extension cable is, the smaller the resistive value and the voltage drop become.
Use the extension cable as short as possible.

6.2 Part Names

Part names of the base unit are shown here.

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

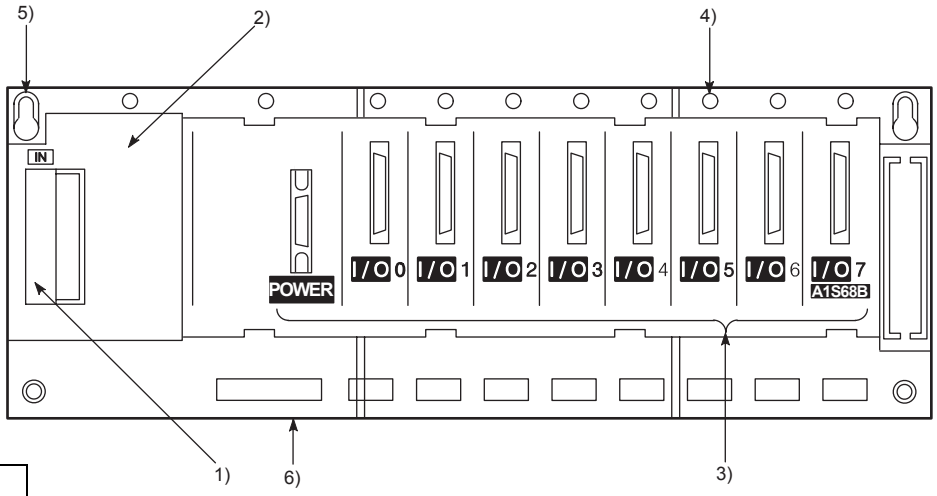


No.	Name	Description
1)	Extension cable connector	A connector used to connect an extension cable, by which signals can be transferred to/from an extension base unit.
2)	Base cover	A protective cover for the extension cable connector. When connecting extension cables, remove the area (refer to the part in the above figure) with a tool such as a nipper.
3)	Module connector	Connectors used to install the power supply module, CPU module, I/O modules and/or special function modules. To prevent dust from entering, install the supplied connector cover or a blank cover (A1SG60) to any open connector.
4)	Module mounting screw hole	Screw mounting hole to fix the module to the base. Screw size: for M4 screw
5)	Base installation hole	A bell-shaped hole used to install the base unit to a control panel. (For M5 screw)
6)	Hook for DIN rail	Hook for DIN rail installation. A1S32B, A1S33B ..... 1 pc A1S35B, A1S38B 2pcs

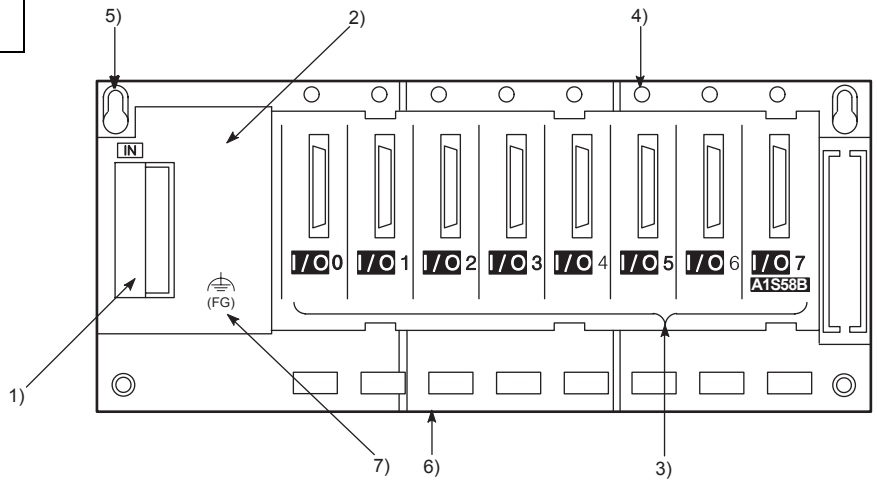
IMPORTANT
Only one extension base unit can be connected to the main base unit. Connecting 2 extension base units to the main base unit through 2 extension connectors may cause incorrect input or output.

(2) Extension base unit (A1S52B, A1S55B, A1S58B, A1S52B-S1, A1S55B-S1, A1S58B-S1, A1S65B, A1S68B, A1S65B-S1, A1S68B-S1)

A1S65B-S1, A1S68B-S1



A1S52B-S1, A1S55B-S1, A1S58B-S1



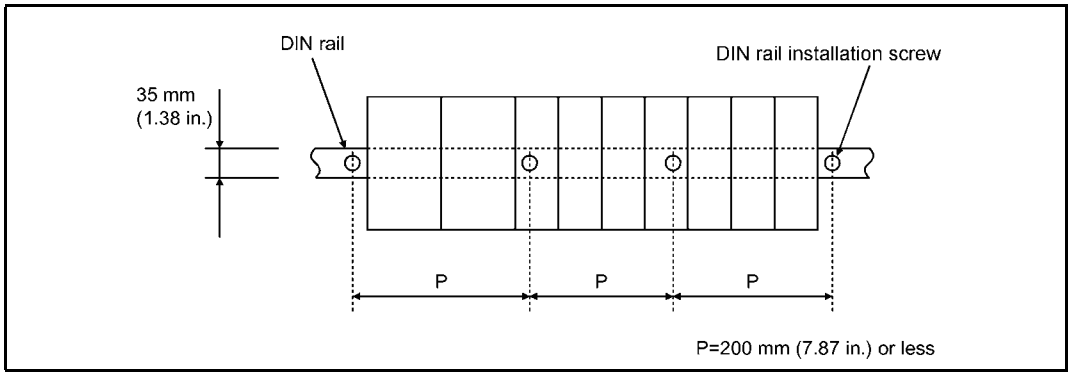
No.	Name	Description
1)	Extension cable connector	A connector used to connect an extension cable, by which signals can be transferred to/from an main base unit. Before connecting the extension cable, remove the supplied connector cover.
2)	Base cover	A protective cover for the extension cable connector.
3)	Module connector	Connectors used to install the power supply module, I/O modules and/or special function modules. To prevent dust from entering, install the supplied connector cover or a blank cover (A1SG60) to any open connector.
4)	Module mounting screw hole	Screw mounting hole to fix the module to the base. Screw size: for M4 screw
5)	Base installation hole	A bell-shaped hole used to install the base unit to a control panel. (For M5 screw)
6)	Hook for DIN rail	Hook for DIN rail installation. A1S52B, A1S55B, A1S52B-S1, A1S55B-S1.....1 pc A1S65B, A1S68B, A1S58B, A1S65B-S1, A1S68B-S1, A1S58B-S1.....2 pcs
7)	FG terminal	The ground terminal connected to the shielding pattern of the printed-circuit board.

6.3 Installation and Removal of DIN Rail

Each of the main and extension base units is supplied with a DIN rail hook as standard. The following explains how to install the DIN rail.

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

(2) DIN rail installation screw pitch
When using the TH35-7.5Fe or TH35-7.5Al type DIN rail, tighten the rail-installation screws by a pitch of 200mm or less to ensure the strength.



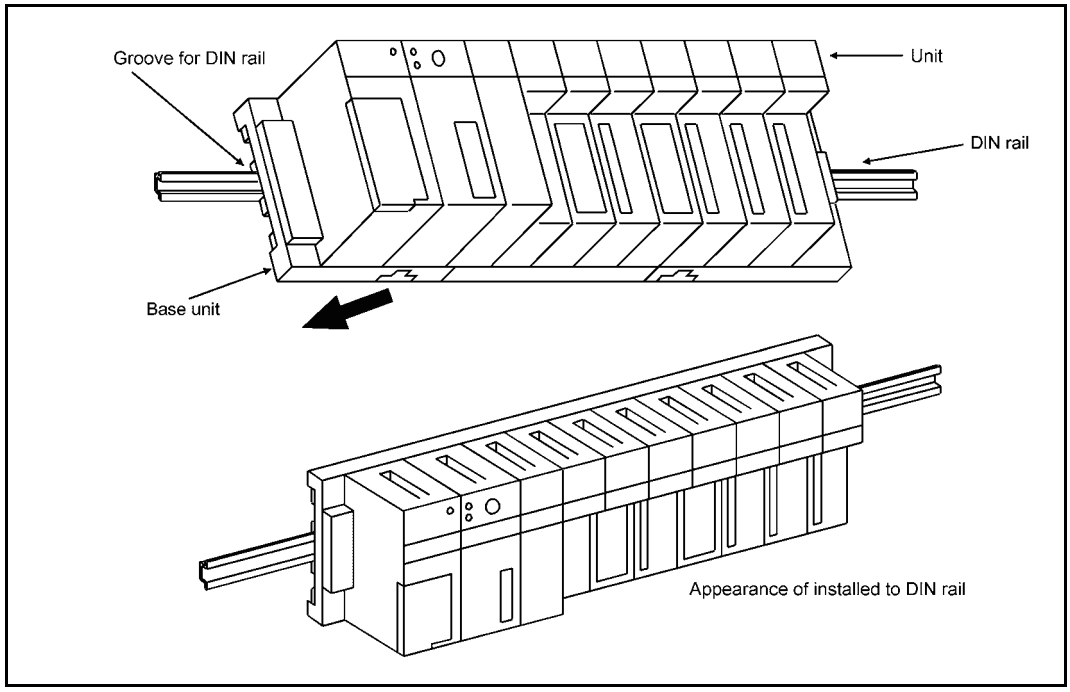
(3) Installing to and removing from the DIN rail

(a) Installing the unit to the DIN rail

The base unit is installed to the DIN rail as follows:

[1] Engage the upper side groove on the base unit with the upper part of the DIN rail.

[2] Press the base unit to the DIN rail to fix them.

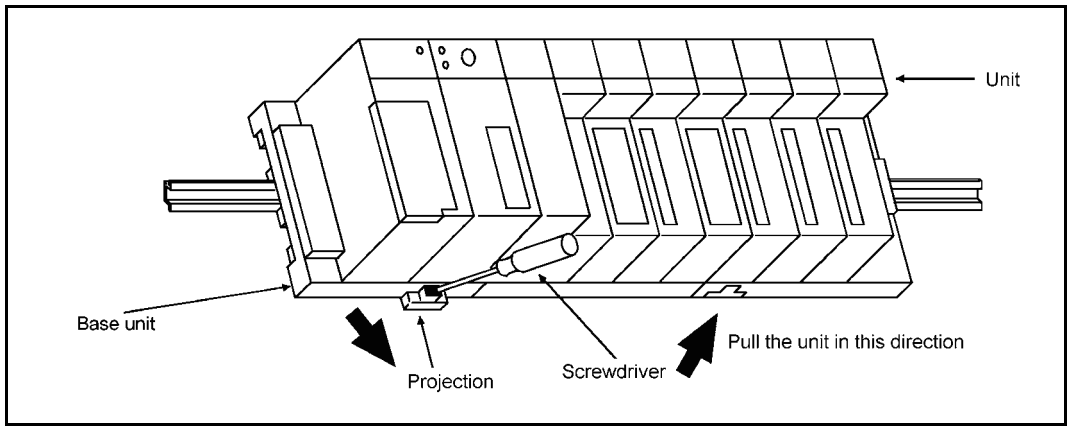


(b) Removing the unit from the DIN rail

The base unit is removed from the DIN rail as follows:

[1] Pull out the projection on the bottom of the base unit with the flat-head screwdriver (6 × 100).

[2] With the projection pulled out, pull the base unit to remove it from the DIN rail.



7 MEMORY CASSETTE AND BATTERY

7.1 Memory Cassette

This section explains the specifications of the memory cassette, the handling precautions and the installation and removal procedures.

7.1.1 Specifications

The specifications of the memory cassette are shown in Table 7.1 and Table 7.2.

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

Item	Model Name		
	A1SNMCA-2KE*	A1SNMCA-8KE	A1SNMCA-8KP
Memory specification	E^2PROM		EP-ROM
Memory capacity	8k bytes (Max. 2k steps)	32k bytes (Max. 8k steps)	32k bytes (Max. 8k steps)
Maximum number of writes for E^2PROM	10,000 times	100,000 times	–
External dimensions	15mm (0.59inch) × 69.6mm (2.74inch) × 40.5mm (1.59inch)		
Weight	0.03kg		

Table 7.2 Memory cassette specifications (A2SHCPU(S1))

Item	Model Name
	A2SNMCA-30KE
Memory specification	E^2PROM
Memory capacity	64k bytes A2SHCPU : (Max. 14 k steps) A2SHCPU-S1 : (Max. 30 k steps)
Maximum number of writes for E^2PROM	100,000 times
External dimensions	15mm (0.59inch) × 69.6mm (2.74inch) × 40.5mm (1.59inch)
Weight	0.03kg

POINT

* When writing a program to the A1SNMCA-2KE, set the parameter for main sequence program capacity to 2k steps or less.
If the program is written with setting the main sequence program capacity to 3k steps or more, it cannot properly work.
Comparing between the A1S(J)HCPU and a peripheral device will result in a mismatch.

7.1.2 Handling precautions

This section explains the specifications of the memory cassette, the handling precautions and the installation and removal procedures.

(1) Since the memory cassette and pin connector are made of resin, do not drop them or apply heavy impact to them.

(2) Do not remove the printed-circuit board of memory cassette from the case. Doing so could give damage to the module.

(3) Carefully prevent foreign matter such as wire chips from entering the inside of the memory cassette.
If it does get inside the module, remove it immediately.

(4) When installing the memory cassette into the CPU module, fully press it to the connector.

(5) Do not place the memory cassette on a metal object where current is or can be leaked, or materials like wood, plastic, vinyl, fibers, electric wires or paper where static electricity is charged.

(6) Do not touch the lead of the memory. This may damage the memory.

(7) Do not touch the CPU connector of the memory cassette. Doing so may cause poor contact.

POINT
(1) Before installing the memory cassette to or removing it from the CPU module, make sure that the power is OFF. Installing or removing the memory cassette with power ON destroys its memory. (2) Install the memory cassette and turn on the power supply of CPU module. RAM memory built-in CPU module (parameter, T/C setting value, main program) is overwritten. If the RAM memory is needed, back up the data using a peripheral device before installing the memory cassette.

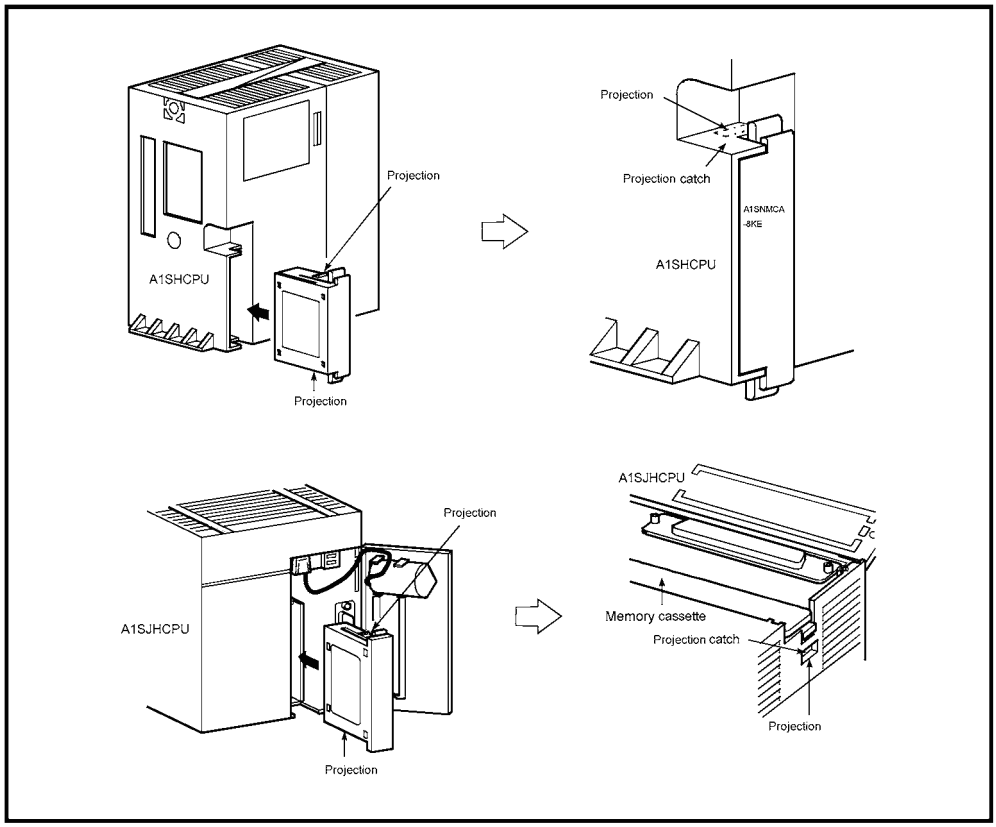
7.1.3 Installation and removal of memory cassette

⚠ CAUTION	● Insert the memory cassette and fully press it into the memory cassette connector. Check for incomplete connection after installing it. Poor electrical contact may cause malfunctions.

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

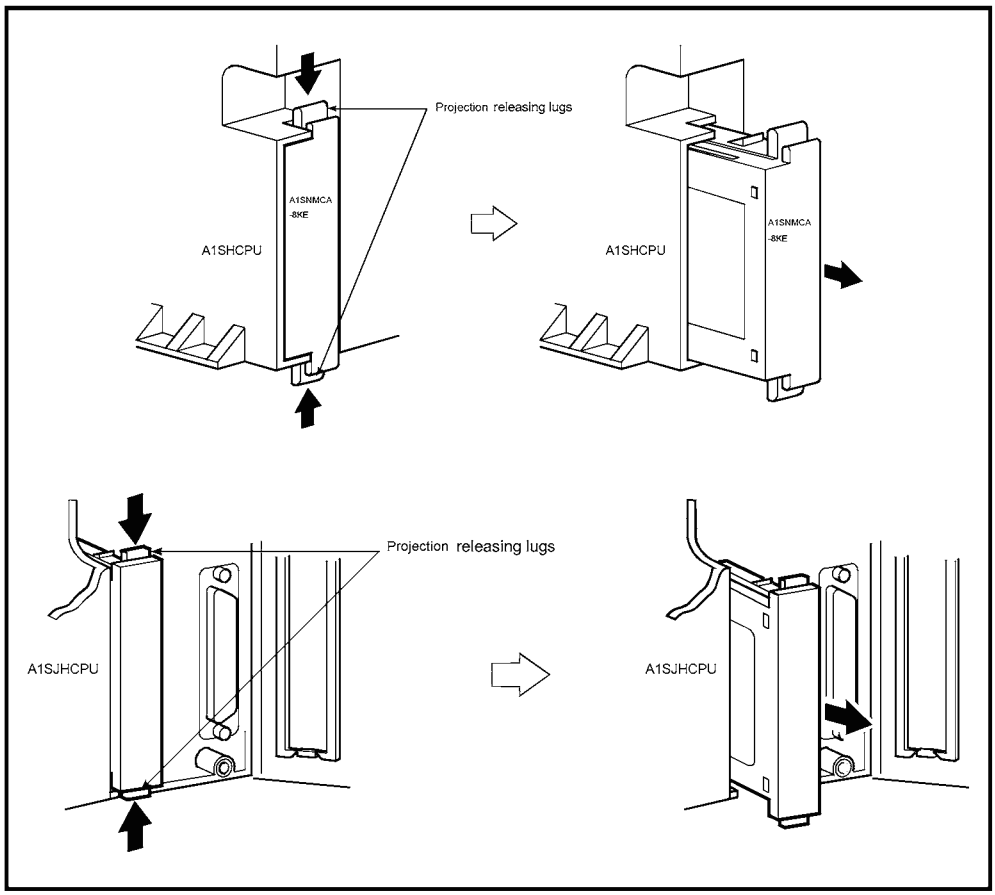
(1) Installation of the memory cassette



(a) Facing the model name side of the memory cassette to the operator with the model name shown on the top, insert it into the applied part of CPU module until a click is heard (a tab is engaged).

(b) Check that the hooks on the top and bottom of the memory cassette are engaged with the catches of the CPU module.
(If the memory cassette is not installed correctly, the front cover of the CPU module will not be closed.)

(2) Removal of the memory cassette



(a) While pressing the top and bottom projections for hook disengagement with fingers, pull the memory cassette.

7.1.4 Writing a sequence program to a memory cassette

A sequence program can be written to, or erased from, the A1SMCA-8KP or the A1SNMCA-8KP using a ROM writer/eraser.
If a memory cassette is installed in the ROM socket of the A6GPP or the A6WU, use either of the following memory write adapters.

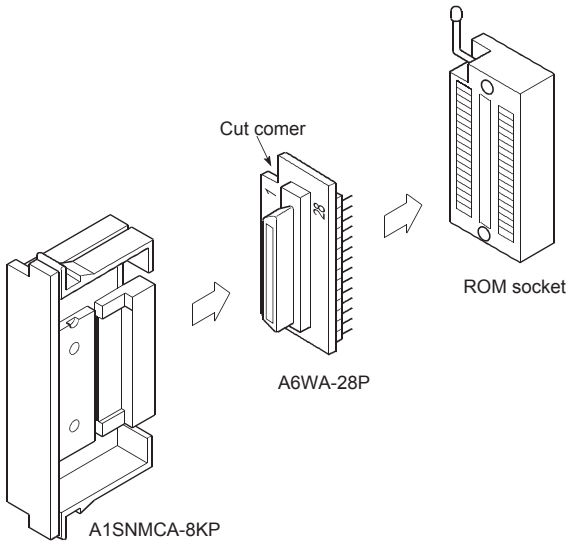
CPU Model Name	Memory Cassette Model Name	Memory Write Adapter Model Name
A1SHCPU	A1SNMCA-8KP	A6WA-28P
A1SJHCPU(S8)	A1SNMCA-8KP	

POINT
(1) When writing to the ROM for the A1SHCPU or the A1SJHCPU(S8) with the SWGP-GPPA, the startup model has to be changed.. 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 the software version that selects "A0J2H" or "A1S" is used to write the ROM, since the file register area of 8k points is reduced to 4k points. As a countermeasure, use the software package for which the A1SJH/A1SH can be selected.

The following explains how to use a memory write adapter.

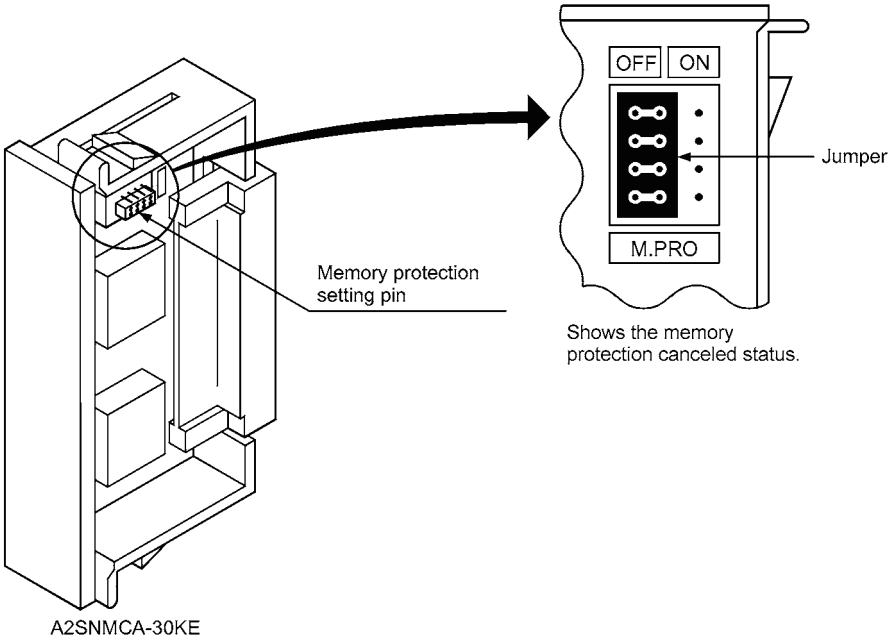
(1) Mount a memory cassette to the memory write adapter.
Couple the connectors correctly.

(2) Mount the memory write adapter coupled with the memory cassette to the ROM socket of the A6GPP or the 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 protection setting of A2SNMCA-30KE

When the A2SNMCA-30KE is installed in the CPU module, memory protection can be set up to the A2SNMCA-30KE to prevent the E^2PROM memory from being modified by erroneous operation of peripheral equipment.
Setting the memory protection setting pin to ON allows the user memory area of 64k bytes to be protected all at once.
To modify the ROM memory, disable the memory protection (OFF).
The memory protection setting pin is set to OFF as factory default.
For memory area assignment, refer to Section 4.5.2.



7.2 Battery

This section explains the specifications, handling precautions and installation procedures of the battery.

> ⚠ WARNING
> ● Correctly connect the battery connector.
> Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
> Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.

7.2.1 Specifications

The specifications of the battery used for power failure compensation are shown in Table 7.2.

Table7.2 Battery specifications

Item	A6BAT
Classification	Thionyl chloride lithium battery
Initial voltage	3.6VDC
Battery life when stored	5 years
Lithium content	0.48g
Application	IC-RAM memory backup and power failure compensation
External dimensions	ϕ16mm (0.63inch)×30mm (1.18inch)

For the battery directive in EU member states, refer to Appendix 6.

7.2.2 Handling precautions

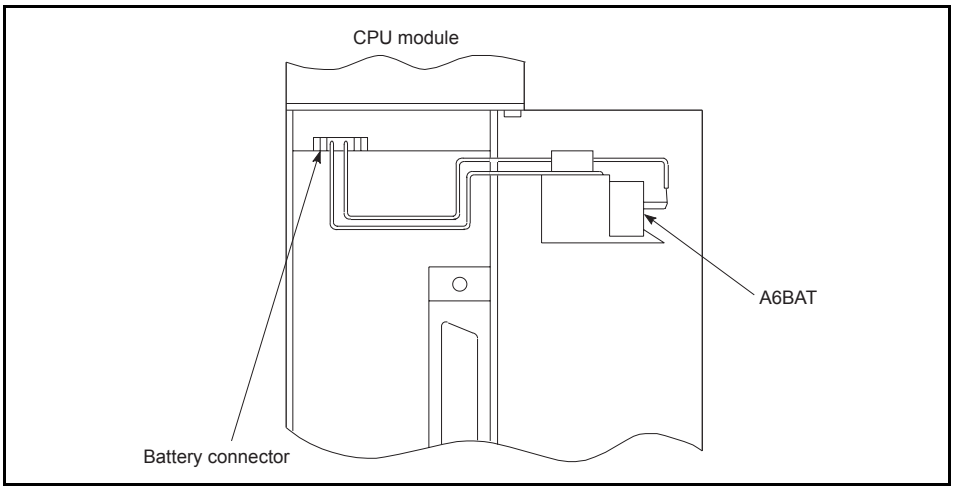
This section explains the specifications, handling precautions and installation procedures of the battery.

(1) Do not short it.
(2) Do not disassemble it.
(3) Do not put it in a fire.
(4) Do not heat it.
(5) Do not solder to the electrodes.

7.2.3 Battery installation

The battery connector is removed to prevent battery consumption during distribution and storage.
Connect the lead connector of the battery to the battery connector on the CPU module print broad before using CPU module for the following objectives:

- Using the sequence program, file registers or comments in the user program area in the CPU module
- Using the power failure compensation function



POINT
Firmly push the connector all the way.

8 LOADING AND INSTALLATION

To increase the system reliability and fully utilize the functions, procedures and cautions concerning loading and installation are described below.

8.1 Fail-Safe Circuit Concept

When the programmable controller is powered ON and then OFF, improper outputs may be generated temporarily depending on the delay time and start-up time differences between the programmable controller power supply and the external power supply for the control target (especially, DC).
For example, if the external power supply for the control target is powered ON and then the programmable controller is powered ON, the DC output module may generate incorrect outputs temporarily upon the programmable controller power-ON. Therefore, it is required to build the circuit that energizes the programmable controller by priority.
The external power failure or programmable controller failure may lead to the system error. In order to eliminate the possibility of the system error and ensure fail-safe operation, build the following circuit outside the programmable controller: emergency stop circuit, protection circuit and interlock circuit, as they could cause machine damages and accidents due to the abovementioned failures.
An example of system design, which is based on fail-safe concept, is provided on the next page.

⚠ WARNING

- Create a safety circuit outside the programmable controller to ensure the whole system will operate safely even if an external power failure or a programmable controller failure occurs.
  Otherwise, incorrect output or malfunction may cause an accident.
  (1) For an emergency stop circuit, protection circuit and interlock circuit that is designed for incompatible actions such as forward/reverse rotation or for damage prevention such as the upper/lower limit setting in positioning, any of them must be created outside the programmable controller.
  Install the emergency stop switch outsid the controlpanel so that workers can operate it easily.
  (2) When the programmable controller detects the following error conditions, it stops the operation and turn off all the outputs.
  - The overcurrent protection device or overvoltage protection device of the power supply module is activated.
  - The programmable controller CPU detects an error such as a watchdog timer error by the self-diagnostics function.
  In the case of an error of a part such as an I/O control part that cannot be detected by the programmable controller CPU, all the outputs may turn on. In order to make all machines operate safely in such a case, set up a fail-safe circuit or a specific mechanism outside the programmable controller.
  (3) Depending on the failure of the output module's relay or transistor, the output status may remain ON or OFF incorrectly. For output signals that may lead to a serious accident, create an external monitoring circuit.
- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the output module for a long time, it may cause a fire and smoke. Provide an external safety device such as a fuse.

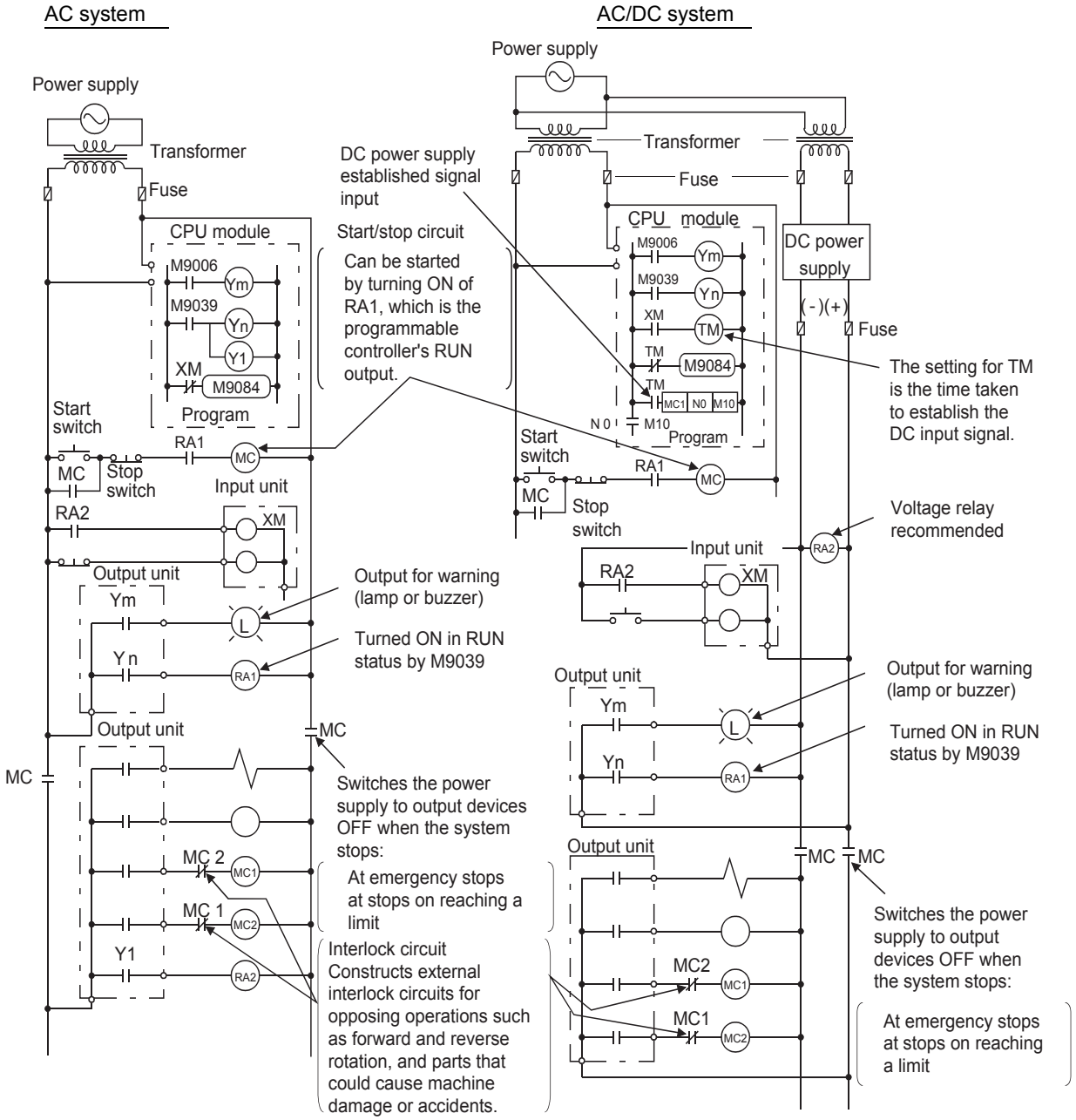
⚠ WARNING

- Design a circuit so that the external power will be supplied after power-up of the programmable controller.
  Activating the external power supply prior to the programmable controller may result in an accident due to incorrect output or malfunction.
- For the operation status of each station at a communication error in data link, refer to the respective data link manual.
  The communication error may result in an accident due to incorrect output or malfunctions.
- When controlling a running programmable controller (data modification) by connecting a peripheral device to the CPU module or a PC to a special function module, create an interlock circuit on sequence programs so that the whole system functions safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the manual carefully and ensure the safety.
  In these controls, especially the one from an external device to a programmable controller in a remote location, some programmable controller side problem may not be resolved immediately due to failure of data communications.
  To prevent this, create an interlock circuit on sequence programs and establish corrective procedures for communication failure between the external device and the programmable controller CPU.
- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  When using the extension base unit, A1S52B(S1), A1S55B(S1), A1S58B(S1), attach the included dustproof cover to the module in slot 0.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to external I/O section.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
  Keep a distance of 100mm (3.9inch) or more between them.
  Failure to do so may cause malfunctions due to noise.
- When an output module is used to control the lamp load, heater, solenoid valve, etc., a large current (ten times larger than the normal one) may flow at the time that the output status changes from OFF to ON. Take some preventive measures such as replacing the output module with the one of a suitable current rating.
- Time from when the CPU module is powered on or is reset to when it enters in RUN status depends on the system configuration, parameter settings, and program size.
  Design the program so that the entire system will always operate safely, regardless of the time.

(1) System design circuit example



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

AC system

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

AC/DC system

1) Switch the power supply ON.
2) Set the CPU module to RUN.
3) Switch RA2 ON when the DC power supply starts.
4) Set the timer (TM) to "ON" upon 100% establishment of DC power supply.
   (Set value for TM shall be the period from RA2 turned "ON" to 100% establishment of DC power supply. Make this set value 0.5 seconds.)
5) Switch the start switch ON.
6) The output equipments are driven in accordance with the program when the magnetic contactor (MC) comes ON.
   (When a voltage relay is used for RA2, the timer in the program (TM) is not necessary.)

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

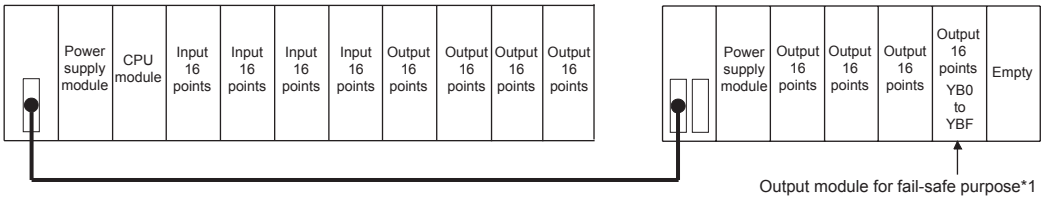
Problems with a CPU module and memory can be detected by the self diagnostics function. However, problems with I/O control area may not be detected by the CPU module.

In such cases, there is a possibility of setting all points to ON or OFF, or a situation may develop where normal operations and safety of the controlled subject cannot be assured, depending on the condition of the failure.

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

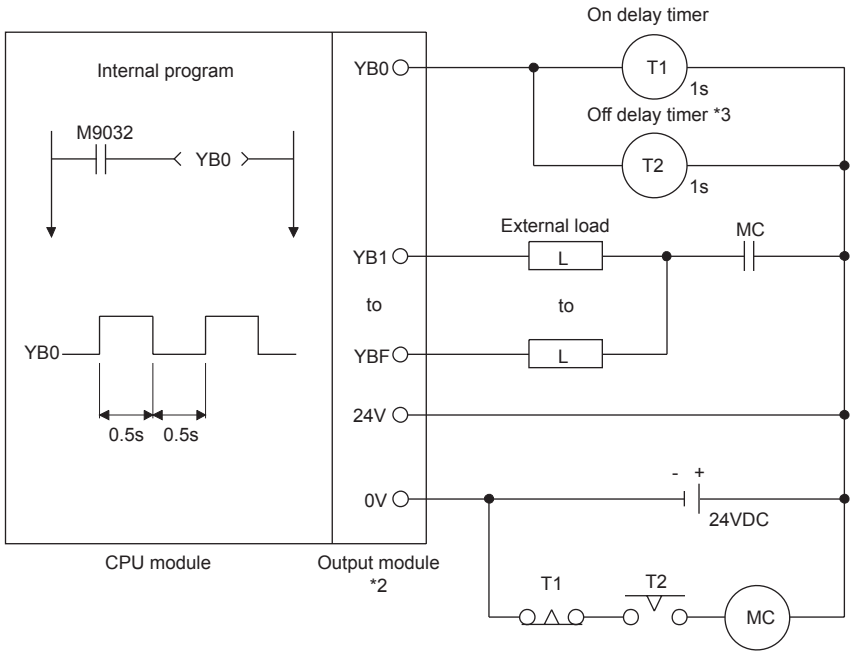
Examples of a system and its fail-safe circuitry are described below:

＜System example＞



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

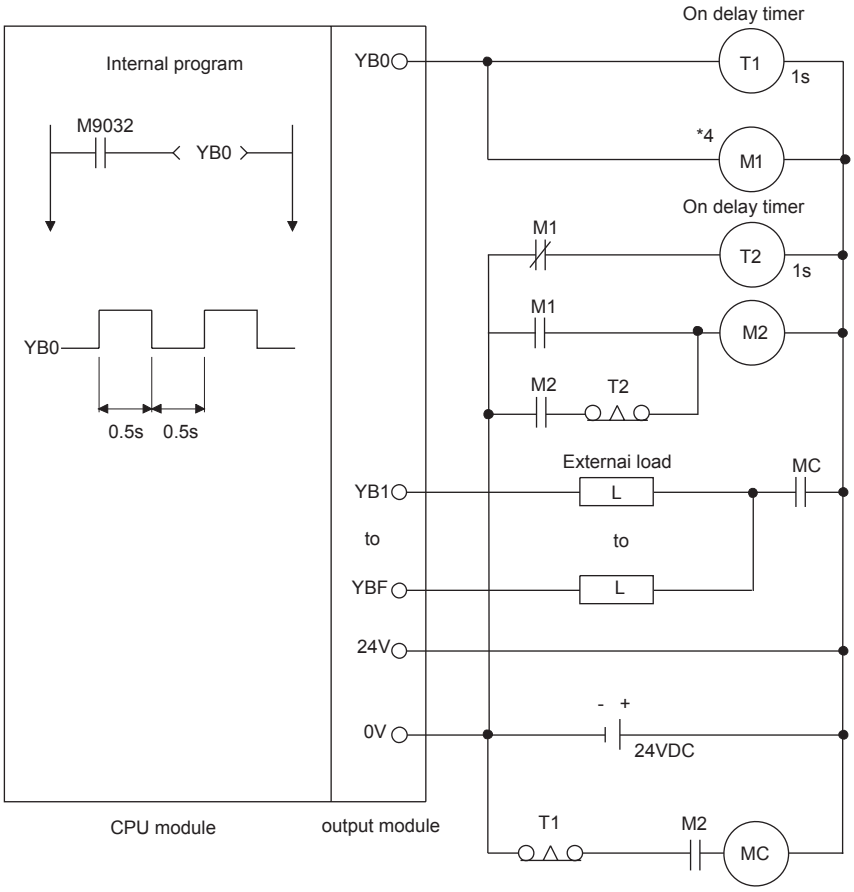
＜Example fail safe circuits＞



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

*3 If an off delay timer (especially miniature timer) is not available, construct the failsafe circuit using an on delay timer shown on the next page.

When constructing a fail safe circuit using on delay timers only



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

8.2 Installation Environment

Avoid the following environment when you install the programmable controller system:

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

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

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

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

(5) A location in which a lot of conductive powdery substance such as dust and iron filing, oil mist, salt, or organic solvent exists.

(6) A location exposed to direct sunlight.

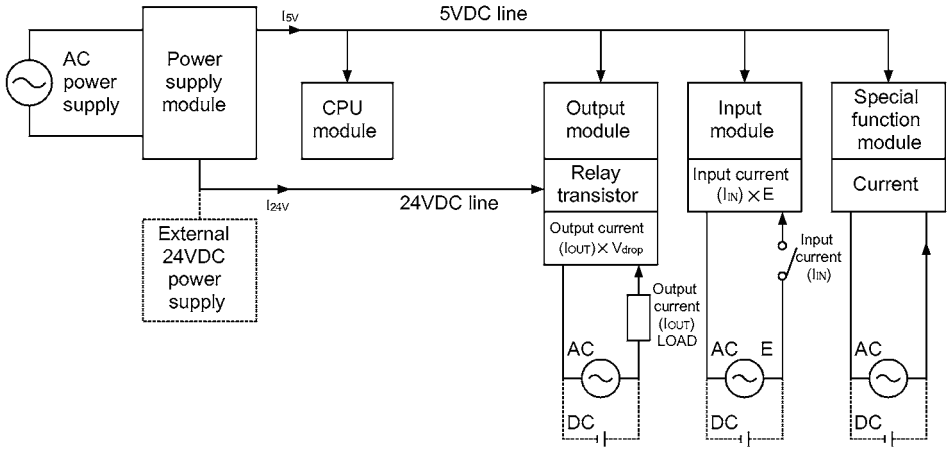
(7) A location in which strong electric fields or magnetic fields form.

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

8.3 Calculation Method of Heat Amount Generated by the PLC

It is necessary to keep the temperature of the panel which stores the PLC to the operating ambient temperature of the PLC, which is 55℃, or below. For heat dissipation design of the panel, it is necessary to know the average power consumption (heat generation) of the devices and machinery stored inside. In this section, a method to obtain the average power consumption of the PLC system is explained. Calculate the temperature rise inside the panel from the power consumption.

(Calculation method of average power consumption)
The power consuming parts of the PLC may be roughly classified into the blocks as shown below:



(1) Power consumption by power supply module
The power conversion efficiency of the power supply module is about 70%, and 30% is consumed as heat generated, thus, 3/7 of the output power is the power consumption. Therefore, the calculation formula is:

$$Wpw=\frac{3}{7}\{(I_{5V}\times 5) + (I_{15V}\times 15) + (I_{24V}\times 24)\}(W)$$

I_{5V} : Current consumption of 5VDC logic circuit of each module
I_{15V}: Current consumption of 15VDC external power supply part of special function module
I_{24V}: Average current consumption of 24VDC power supply for internal consumption of the output module
(Current consumption equivalent to the points simultaneously ON)
Not applicable to a system where 24VDC is supplied externally and a power supply module which does not have a 24VDC output is used.

(2) Total power consumption of each module at 5VDC logic part
Power of the 5VDC output circuit of the power supply module is the power consumption of each module.

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

(3) Total 24VDC average power consumption of the output module (power consumption equivalent to the points simultaneously ON)
Average power of the 24VDC output circuit of the power supply module is the total power consumption of each module.

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

(4) Total 24VDC average power consumption of the output module
(power consumption equivalent to the points simultaneously ON)

$W_{OUT}=I_{OUT}\times V_{drop}\times$ Output points $\times$ Simultaneous ON ratio (W)

I_{OUT} : Output current (current actually used) (A)
V_{drop} : Voltage drop of each output module (V)

(5) Average power consumption of the input modules at the input part (power consumption equivalent to the points simultaneously ON)

$W_{IN}=I_{IN}\times E\times$ Input points $\times$ Simultaneous ON (W)

I_{IN} : Input current (effective value in the case of AC) (A)
E : Input voltage (voltage for actual usage) (V)

(6) Power consumption of the external power supply part of the special function module

$W_S=I_{+15V}\times 15 + I_{-15V}\times 15 + I_{24V}\times 24$(W)

The total of the power consumption calculated for each block as above is the power consumption of the programmable controller system as a whole.

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

Calculate the amount of heat generation and temperature rise inside the panel from the total power consumption (W).
Simplified calculation formula to obtain temperature rise inside panel is shown next:

$$T=\frac{W}{U}[^{\circ}C]$$

W: Power consumption of the programmable controller system as a whole (the value obtained above)
A: Inside surface area of the panel [m^2]
U: When inside temperature of the panel is kept constant by a fan, etc.....6
When the air inside the panel is not circulated 4

POINT
When the temperature rise inside the panel exceeds the specified range, it is recommended to lower the temperature inside the panel by installing a heat exchanger to the panel. If a conventional ventilation fan is used, it sucks dust along with the outside air, which may affect the programmable controller, so care must be taken.

8.4 Installing the Base Units

Precautions concerning installation of the main base unit and extension base unit are described next.

8.4.1 Precautions when installing programmable controller

Precautions concerning the installation of programmable controller to the panel, etc. are explained below.

(1) To improve the ventilation and to facilitate the exchange of the module, provide at least 30mm (1.18inch) of distance between the top part of the module and any structure or part.
However, when A52B, A55B, A58B, A62B, A65B or A68B extension base unit is used, provide at least 80mm (3.15inch) of distance between the top of the unit and any structural part.

(2) Do not install vertically or horizontally, because of concerns with ventilation.

(3) If there are any protrusions, dents or distortion on the installation surface of the base unit, an excessive force is applied to the printed-circuit board and causes problems, so, install to a flat surface.

(4) Avoid sharing the same panel with any source of vibration such as a large-sized magnetic contactor or no-fuse breaker, and install to a separate panel or away from such devices.

(5) Provide wiring ducts as necessary.
However, when the clearance of the top and bottom of the programmable controller are smaller than those shown in figure 8.1, pay attention to the following:
   (a) When installing to the top of programmable controller, to improve the ventilation, keep the height of the duct to 50mm (1.97inch) or below.
   In addition, the distance from the top of the programmable controller should be sufficient for tightening and loosening works for the mounting screws on the top of the module.
   The module cannot be replaced if the screws on the top of the module cannot be loosened or tightened.
   (b) When installing to the bottom part of the programmable controller, provide a sufficient space so that the 100/200VAC input line of the power supply module, I/O wires of I/O modules and 12/24VDC lines are not affected.

(6) If any device is installed in front of the programmable controller (i.e. installed in the back of the door), position it to secure at least 100mm (3.94inch) of distance to avoid the effects of radiated noise and heat.
Also, keep at least 50mm (1.97inch) distance from the base unit to any device placed on right or left or the unit.

(7) When installing the base unit to DIN rail in an environment with large vibration, use a vibration-proofing bracket (A1S-PLT-D). Mounting the vibration-proofing bracket (A1S-PLT-D) enhances the resistance to vibration.
However, the A1SJHCPU-S8 cannot use a vibration-proofing bracket(A1S-PLT-D).
Depending on the environment to set up the base unit, it is also recommended to fix the base unit to the control panel directly.

8.4.2 Installation

Installation location of the main base unit and the extension base unit is shown below.

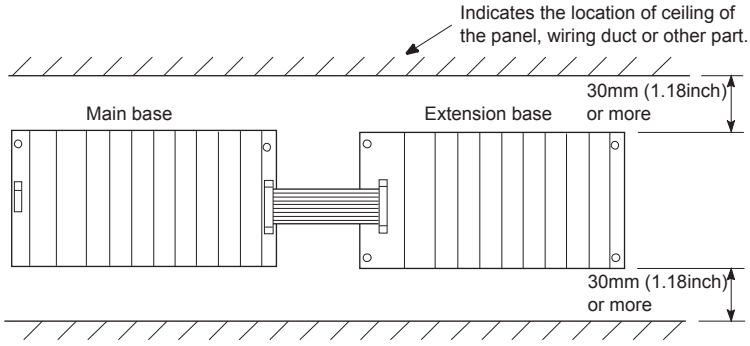


Figure8.1 Parallel installation

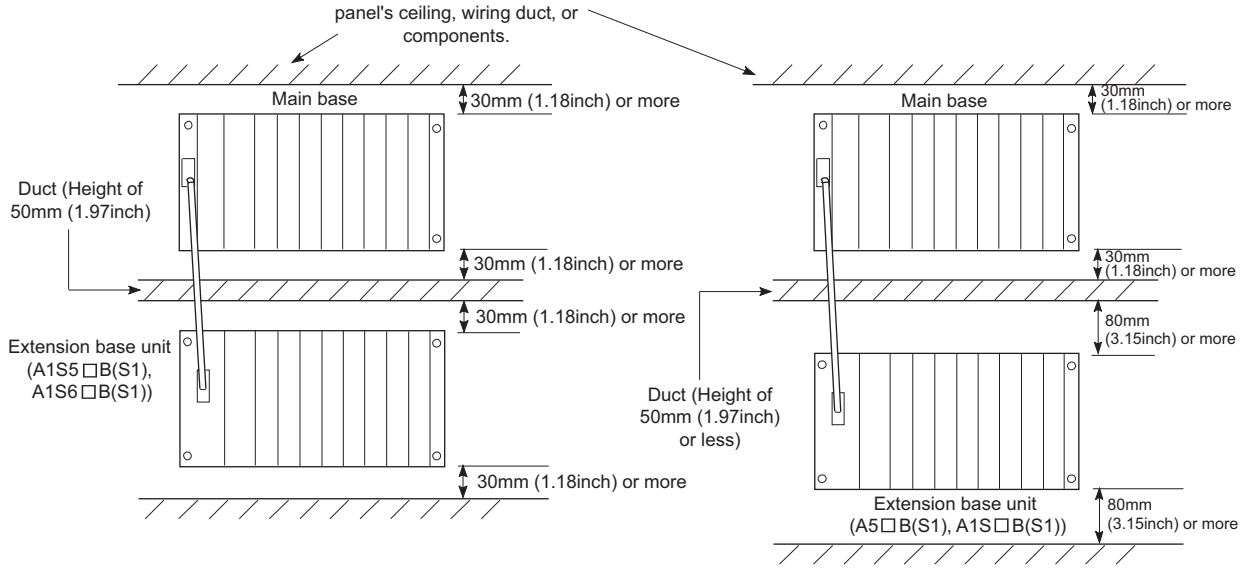


Figure8.2 Series installation

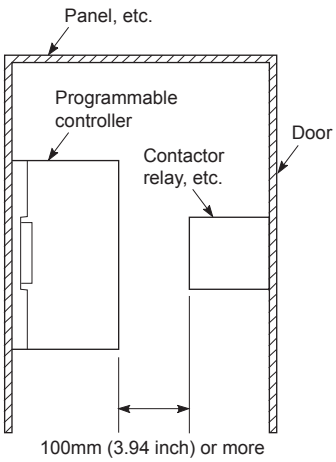


Figure8.3 Distance between the front face of the programmable controller and other devices

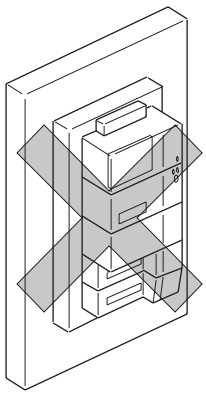


Figure8.4 Vertical installation (not allowed)

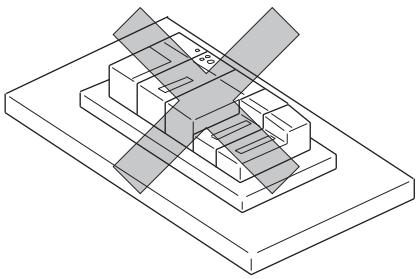


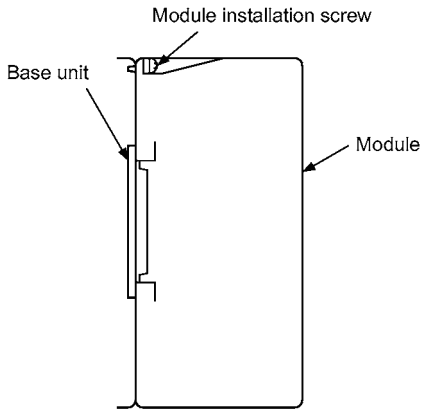
Figure8.5 Horizontal installation (not allowed)

8.5 Installation and Removal of the Base Units

How to install and remove the power supply module, CPU module, I/O module and special function module, etc. to/from the base unit are explained.

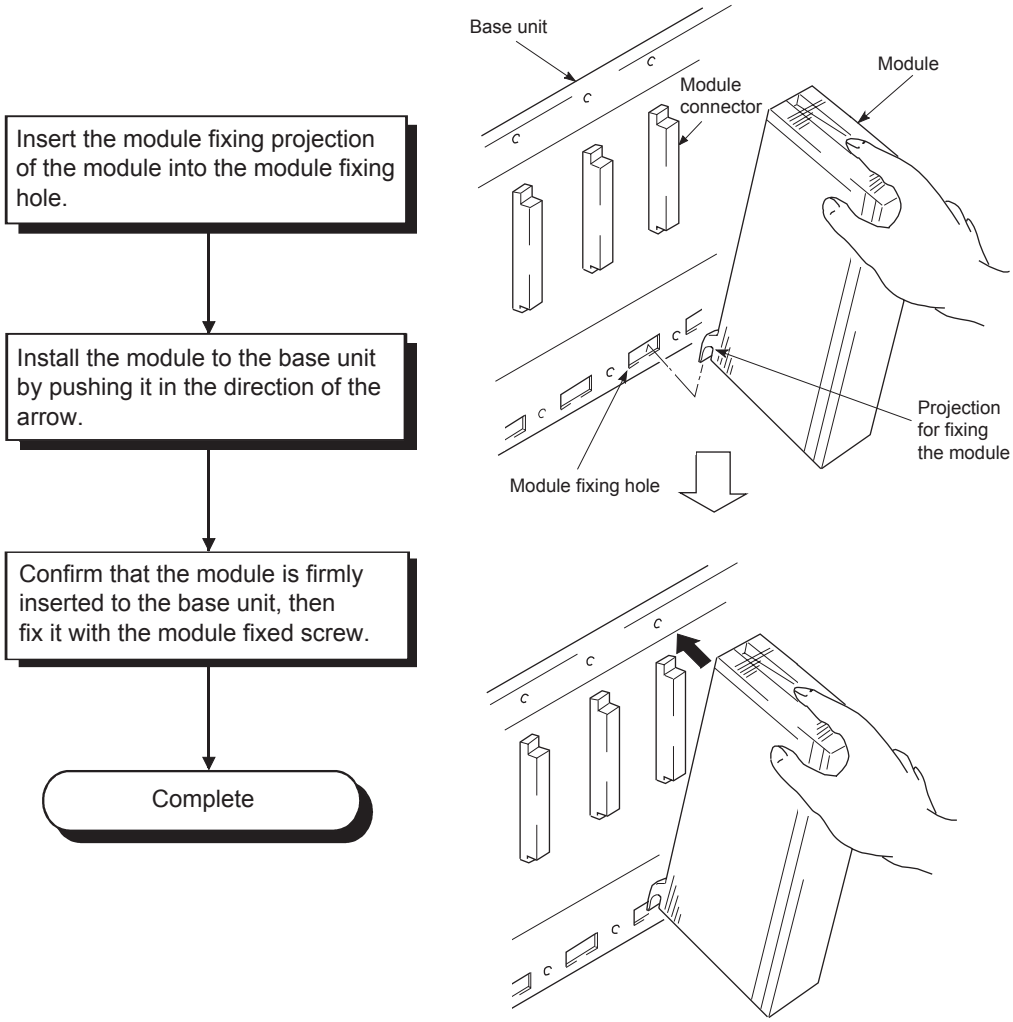
⚠ CAUTION

- Insert the module fixing projection into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  If too tight, it may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Filure to do so may damage the module.
- Do not directly touch the conductive part or electronic components of the module.
  Doing so may cause malfunctions or a failure of the module.



(1) Module installation

Installation procedure of the module is explained.



(2) Removal of the module

Removal procedure of the module is explained.

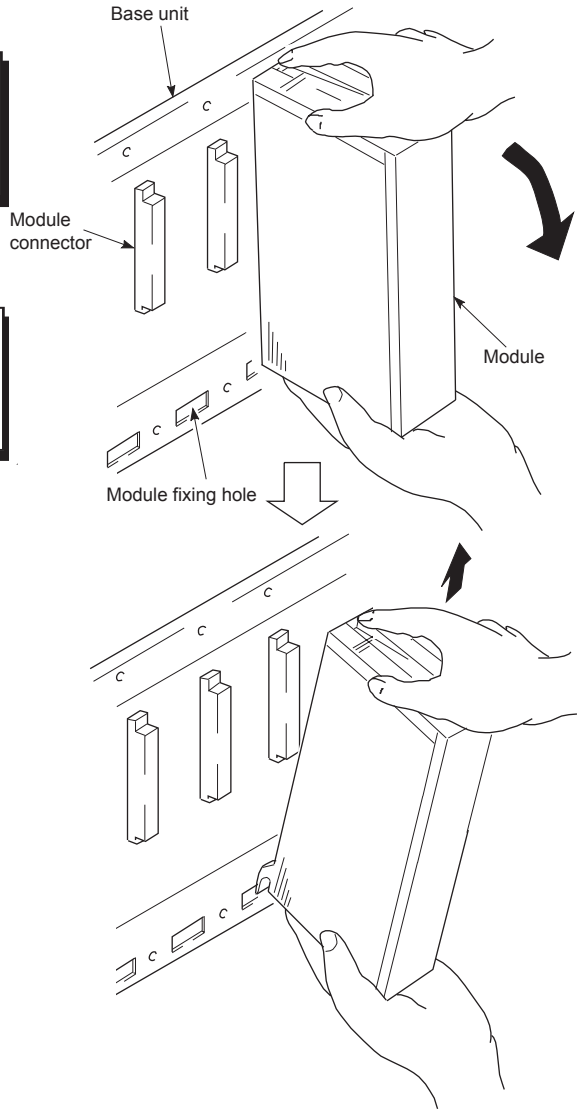
Remove the module installation screw, then pull out the top of the module while using the bottom of the module as the fulcrum.

↓

While lifting the module upward, disengage the module fixing projection from the module fixing hole.

↓

Complete



POINT
To remove the module, the module mounting screw must be removed first, then disengage the module fixing projection from the module fixing hole. If the module is forcibly removed the module fixing projection will be damaged.

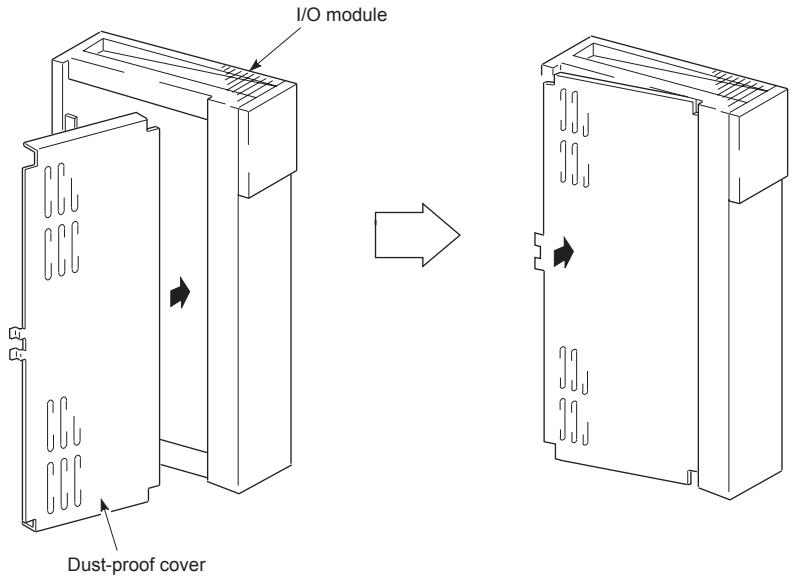
8.6 Installation and Removal of the Dustproof Cover

⚠ WARNING

- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  When using the extension base unit, A1S52B(S1), A1S55B(S1), A1S58B(S1), attach the included dustproof cover to the module in slot 0.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

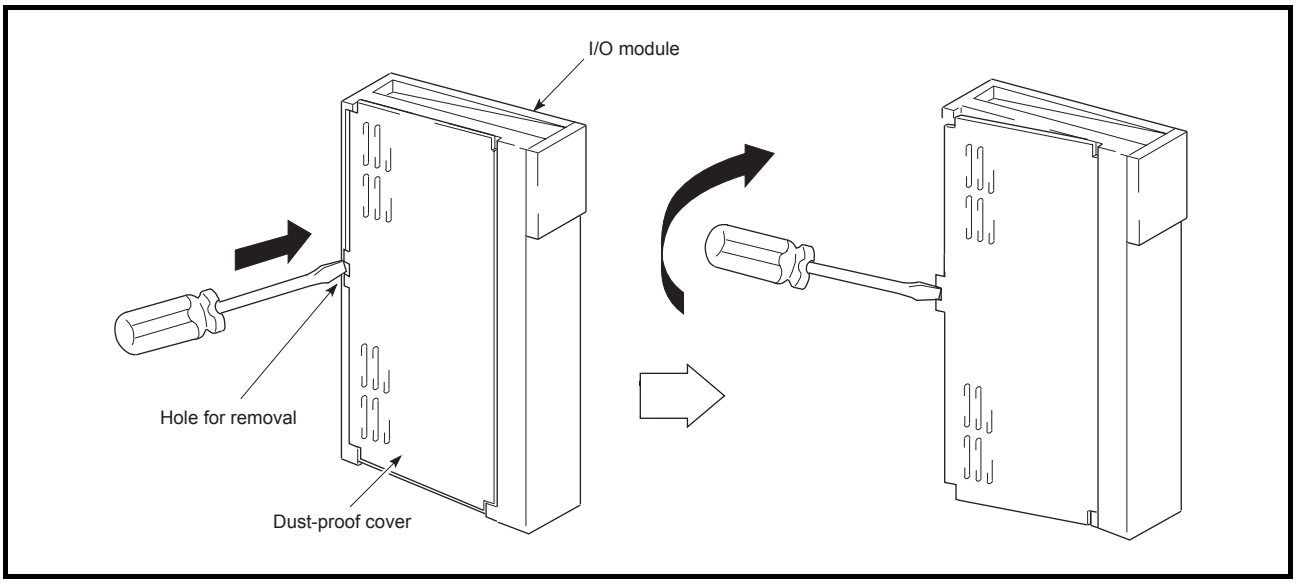
When A1S52B(S1), A1S55B(S1), A1S58B(S1) is used, it is necessary to install the dustproof cover, which is supplied with base to the I/O module to be installed to the left end in order to prevent intrusion of foreign material into the I/O module. Intrusion of foreign matter into the I/O module may cause breakdowns. Procedures for installing and removing the dustproof cover are described below.

(1) Installation



To insert the dustproof cover to the I/O module, insert the cover to the connector or terminal side first as shown in the figure, then push the cover to the I/O module side.

(2) Removal



To remove the dustproof cover from the I/O module, insert the tip of a flat-tip screwdriver into the removal hole as shown in the figure, then move the screwdriver towards the rear of the module to separate the clip from the removal hole and remove the cover.

8.7 Wiring

8.7.1 Wiring instructions

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

⚠ WARNING

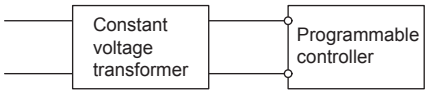
- Be sure to shut off all the phases of the external power supply used by the system before wiring.
  Failure to do so may result in an electric shock or damage of the product.
- Before energizing and operating the system after wiring, be sure to attach the terminal cover supplied with the product.
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

⚠ CAUTION

- Always ground the FG and LG terminals to the protective ground connector.
  Failure to do so may cause an electric shock or malfunctions.
- Wire the module correctly after confirming the rated voltage and terminal layout.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.
- Do not connect multiple power supply modules to one module in parallel.
  The power supply modules may be heated, resulting in a fire or failure.
- Press, crimp or properly solder the connector for external connection with the specified tool.
  Incomplete connection may cause a short circuit, fire or malfunctions.
- Tighten terminal screws within the specified torque range.
  If the screw is too loose, it may cause a short circuit, fire or malfunctions.
  If too tight, it may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.
- Carefully prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.
- Install our programmable controller in a control panel for use.
  Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.
  Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.
  (For the wiring methods, refer to Section 8.7.)

(1) Wiring power supply

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



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

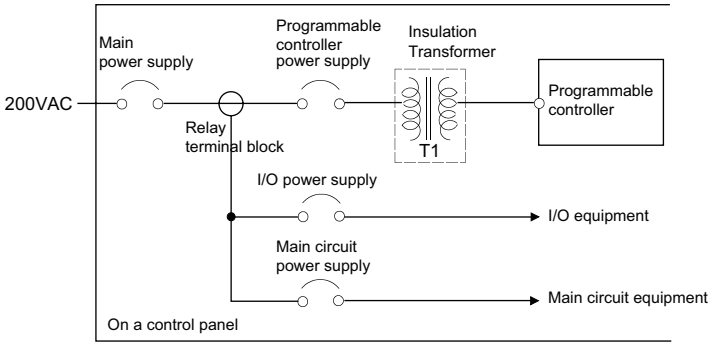
(c) When a power supply transformer or isolating transformer is employed to reduce the voltage from 200VAC to 100VAC, use one with a capacity greater than those indicated in the following table.

Power Supply Module	Transformer Capacity
A1S61PN	110VA× n
A1S62PN	110VA× n

n: Stands for the number of power supply modules.

(d) Separate the programmable controller's power supply line from the lines for I/O equipments and power equipments as shown below.
When there is much noise, connect an isolating transformer.

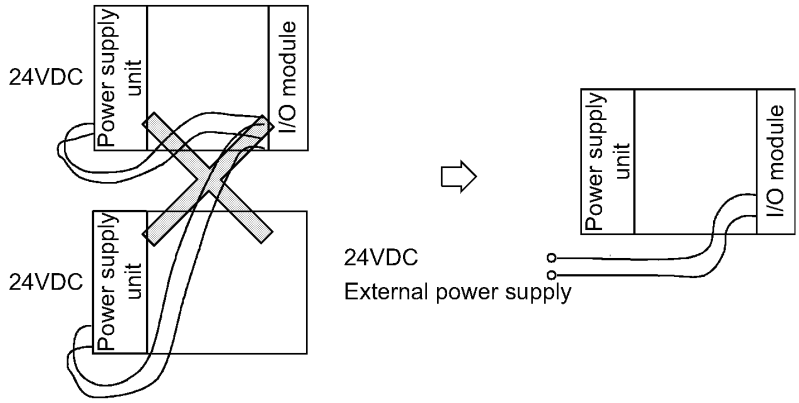
(e) Taking rated current or inrush current into consideration when wiring the power supply, be sure to connect a breaker or an external fuse that have proper blown and detection.
When using a single programmable controller, a 10A breaker or an external fuse are recommended for wiring protection.



(f) Note on using the 24VDC output of the A1S62PN power supply module.

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

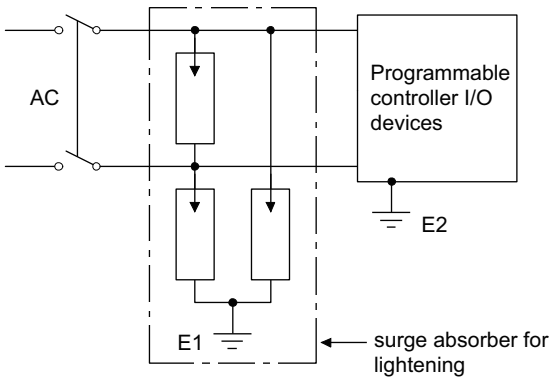
If the 24VDC output capacity is insufficient for one power supply module, supply 24VDC from the external 24VDC power supply as shown below:



(g) 100VAC, 200VAC and 24VDC wires should be twisted as dense as possible. Connect the modules with a shortest distance.
Also, to reduce the voltage drop to the minimum, use thickest wires possible (maximum 2mm^2 (0.0031in.^{2})).

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

(i) As measures against surge due to lightening, connect a surge absorber for lightening as shown below.



POINT

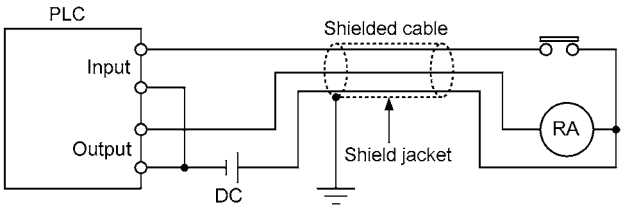
(1) Separate the ground of the surge absorber for lightening (E1) from that of the programmable controller (E2).
(2) Select a surge absorber for lightening whose power supply voltage does not exceed the maximum allowable circuit voltage even when line voltage is maximum.

(2) Wiring I/O equipments

⚠ CAUTION

● Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
Keep a distance of 100mm (3.9inch) or more between them.
Failure to do so may cause malfunctions due to noise.

(a) The applicable wire size for a terminal block connector is 0.75 to 2mm^2 . It is recommended to use wire of 0.75mm^2 for easy use.
(b) Run the input line and output line away from each other.
(c) Run the I/O signal line (including common line) away from the main circuit line with high voltage or large current by more than 100mm (3.94inch).
(d) When the main circuit line and power line cannot be separated, use a batch shielding cable and ground it on the programmable controller side.
However, ground it on the opposite side in some cases.

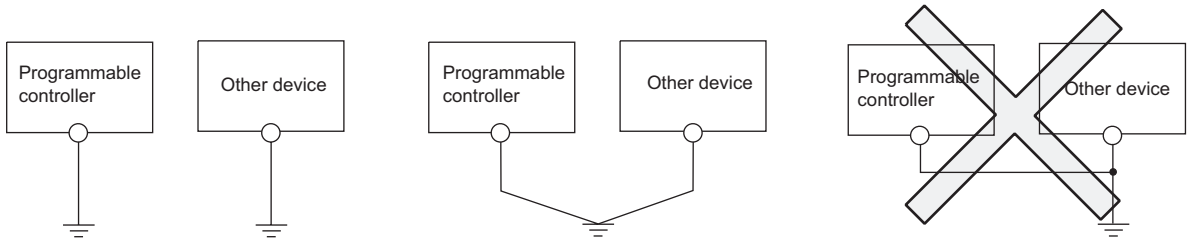


(e) When cables are run through pipes, securely ground the pipes.
(f) Separate the 24VDC I/O wires from the 100VAC and 200VAC lines.
(g) With a long distance wiring of 200m (656.2ft.) or longer, leak current due to line capacity may cause troubles.
(h) As a measure against surge due to lightning, separate the AC wiring and DC wiring and connect a surge absorber for lightning as shown in (i) of item (1).
Failure to do so increases the risk of I/O equipment failure due to lightning.

(3) Grounding

CAUTION	● Always ground the FG and LG terminals to the protective ground connector. Failure to do so may cause an electric shock or malfunctions.

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

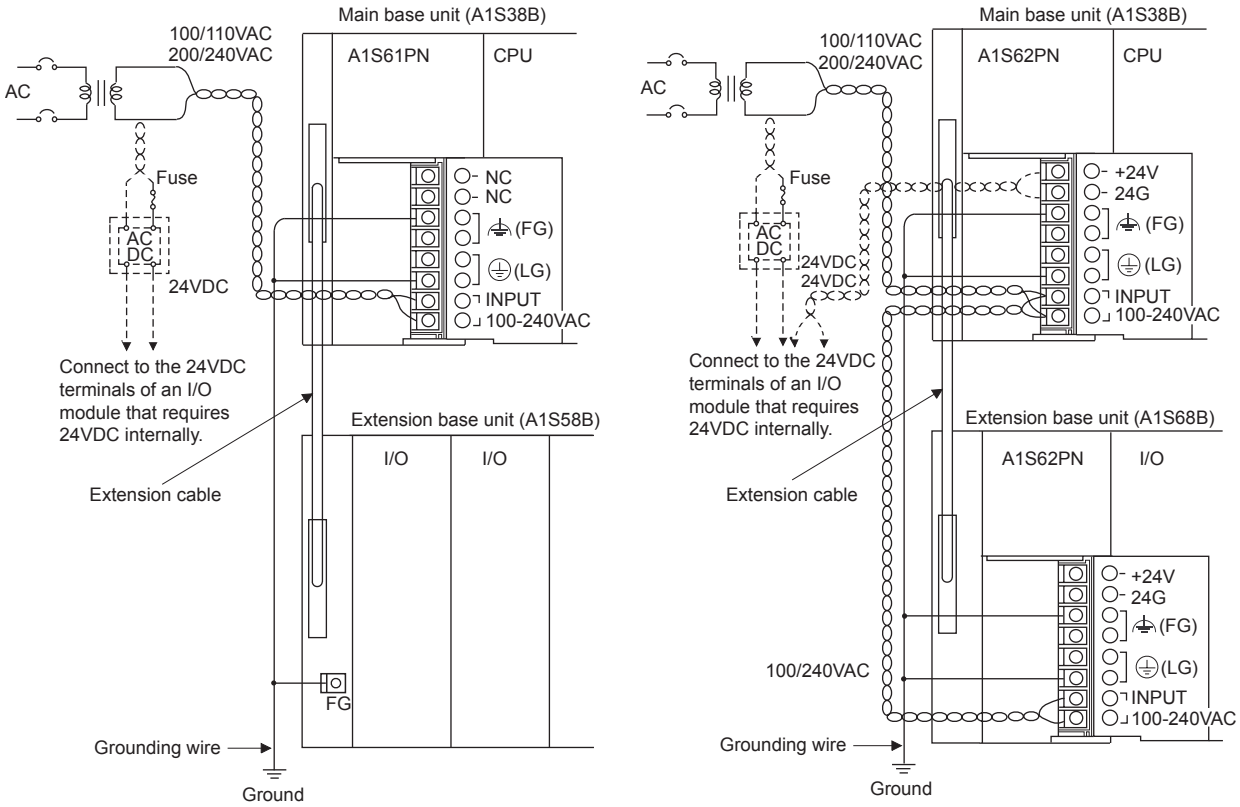


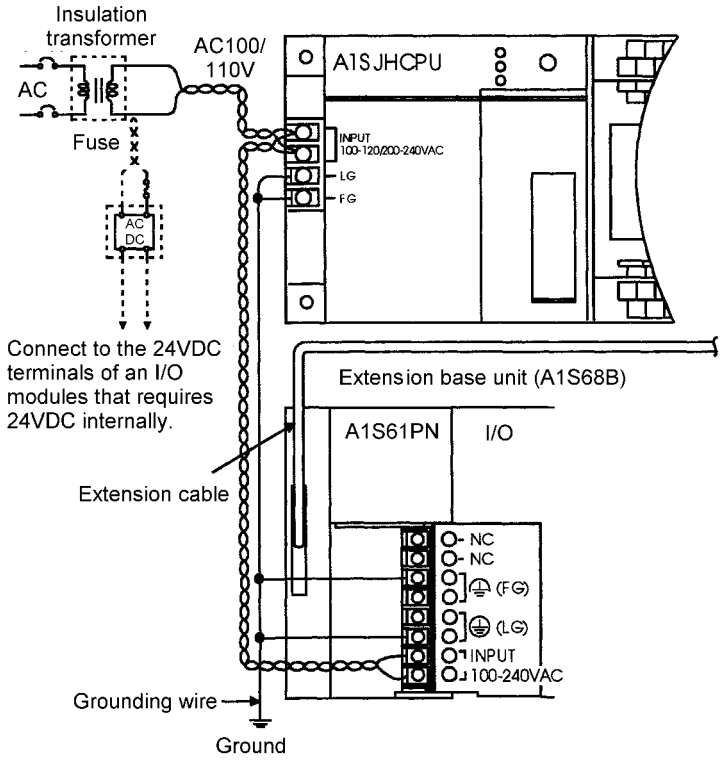
(1) Independent grounding ..... Best (2) Shared grounding ..... Good (3) Common grounding ..... Not allowed

(c) Use the cable of 2mm^2 (0.0031in.^{2}) or more for grounding.
Set the grounding point closer to the programmable controller to make the grounding cable short as possible.
(d) If a malfunction occurs due to grounding, separate either LG or FG of the base unit, the device combination, or all the connection from the grounding.

8.7.2 Wiring to module terminals

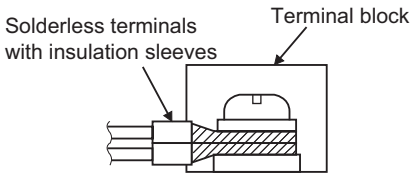
This section explains the wiring of power cables and ground wires to the main and extension bases.





POINT

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



(2) Be sure to ground the LG and FG terminals.Failure to do so may cause the programmable controller to be susceptible to noise. Note that LG terminals include the potential as half as that of input voltage; you might get an electric shock when you touch them.

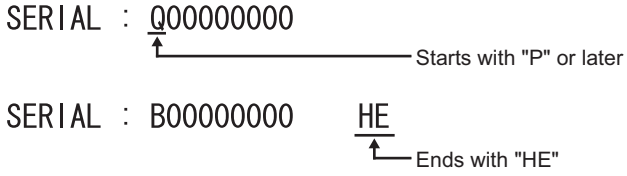
(3) A1S61PN and A1S62PN do not need to be switched as the are 100 to 240VAC wide-range.

8.8 Precautions when Connecting the Uninterruptible Power Supply (UPS)

Connect the programmable controller system to the uninterruptible power supply (UPS), while paying attention to the followings.

When connecting an uninterruptible power supply (UPS) to the programmable controller system, use an online UPS or line-interactive UPS with a voltage distortion rate of 5% or less. When connecting a standby UPS, use a Mitsubishi FREQUPS FW-F series UPS (hereinafter FW-F series UPS)*1. (Example: FW-F10-0.3K/0.5K)
Do not use any standby UPS other than the FW-F series UPS.

*1 The FW-F series UPS whose serial number starts with the letter "P" or later, or ends with the letters "HE" is applicable.



9 EMC AND LOW VOLTAGE DIRECTIVES

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

(1) Authorized representative in Europe
Authorized representative in Europe is shown below
Name: Mitsubishi Electric Europe BV
Address: Gothaer Strasse 8, 40880 Ratingen, Germany

9.1 Requirements for Compliance with EMC Directives

The EMC Directives specifies emission and immunity criteria and requires the products to meet both of them, i.e., not to emit excessive electromagnetic interference (emission): to be immune to electromagnetic interference outside (immunity). Guidelines for complying the machinery including MELSEC-AnS series programmable controller with the EMC Directives are provided in Section 9.1.1 to Section 9.1.8 below.
The guidelines are created based on the requirements of the regulations and relevant standards, however, they do not guarantee that the machinery constructed according to them will not comply with the Directives. Therefore, the manufacturer of the machinery must finally determine how to make it comply with the EMC Directives: if it is actually compliant with the EMC Directives.

9.1.1 EMC Directive related standards

(1) Regulations regarding emission

Standard	Test item	Test description	Value specified in standard
EN61131-2:2007	CISPR16-2-3 Radiated emission *2	Radio waves from the product are measured.	• 30M-230MHz QP: 40dBμV/m (10m in measurement range) *1 • 230M-1000MHz QP: 47dBμV/m (10m in measurement range)
	CISPR16-2-1, CISPR16-1-2 Conducted emission *2	Noise from the product to the power line is measured.	• 150k-500kHz QP: 79dB, Mean: 66dB *1 • 500k-30MHz QP: 73dB, Mean: 60dB

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

*2 Programmable controllers are open-type devices (devices designed to be housed inside other equipment) and must be installed inside a conductive control panel. The corresponding tests were conducted with the programmable controller installed inside a control panel.

(2) Regulations regarding immunity

Standard	Test item	Test description	Value specified in standard
EN61131-2:2007	EN61000-4-2 Electrostatic discharge immunity *1	Immunity test in which electrostatic is applied to the cabinet of the equipment.	• 8kV Air discharge • 4kV Contact discharge
	EN61000-4-3 Radiated, radio-frequency, electromagnetic field immunity *1	Immunity test in which electric fields are irradiated to the product.	80% AM modulation@1kHz • 80M-1000MHz: 10V/m • 1.4G-2.0GHz: 3V/m • 2.0G-2.7GHz: 1V/m
	EN61000-4-4 Electrical fast transient/burst immunity *1	Immunity test in which burst noise is applied to the power line and signal line.	• AC/DC main power, I/O power, AC I/O (unshielded): 2kV • DC I/O, analog, communication: 1kV
	EN61000-4-5 Surge immunity *1	Immunity test in which lightning surge is applied to the power line and signal line.	• AC power line, AC I/O power, AC I/O (unshielded): 2kV CM, 1kV DM • DC power line, DC I/O power: 0.5kV CM, DM • DC I/O, AC I/O (shielded),analog, communication: 1kV CM
	EN61000-4-6 Immunity to conducted disturbances, induced by radio-frequency fields *1	Immunity test in which high frequency noise is applied to the power line and signal line.	0.15M-80MHz, 80% AM modulation@1kHz, 10Vrms
	EN61000-4-8 Power-frequency magnetic field immunity *1	Immunity test in which the product is installed in inductive magnetic field.	50Hz/60Hz, 30A/m
	EN61000-4-11 Voltage dips and interruption immunity *1	Immunity test in which power supply voltage is momentarily interrupted.	• Apply at 0%, 0.5 cycles and zero-cross point • 0%, 250/300 cycles (50/60Hz) • 40%, 10/12 cycles (50/60Hz) • 70%, 25/30 cycles (50/60Hz)

*1 Programmable controllers are open-type devices (devices designed to be housed inside other equipment) and must be installed inside a conductive control panel. The corresponding tests were conducted with the programmable controller installed inside a control panel.

9.1.2 Installation instructions for EMC directive

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

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

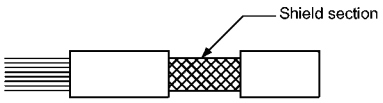
(1) Control panel
  (a) Use a conductive control panel.
  (b) When attaching the control panel's top plate or base plate, mask painting and weld so that good surface contact can be made between the panel and the bolt.
  (c) To ensure good electrical contact with the control panel, mask the paint on the installation bolts of the inner plate in the control panel so that contact between surfaces can be ensured over the widest possible area.
  (d) Earth the control panel with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies.
  (e) Holes made in the control panel must be 10cm (3.94inch) diameter or less. If the holes are 10cm (3.94inch) or larger, radio wave may be emitted.
  (f) Lock the control panel so that only those who are trained and have acquired enough knowledge of electric facilities can open the control panel.

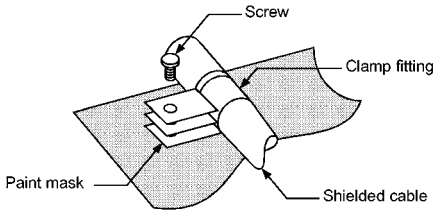
(2) Connection of power cable and ground wires
  Earthing and power supply cable for the programmable controller system must be connected as described below.
  (a) Provide a grounding point near the power supply module. Earth the power supply's LG and FG terminals (LG : Line Ground, FG : Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30cm (11.18inch) or shorter.) The LG and FG terminals function is to pass the noise generated in the programmable controller system to the ground, so an impedance that is as low as possible must be ensured.
  In addition, make sure to wire the ground cable short as the wires are used to relieve the noise, the wire itself carries large noise content and thus short wiring means that the wire is prevented from acting as an antenna.
  (b) The ground wire led from the grounding point must be twisted with the power cables. By twisting with the ground wire, noise flowing from the power cables can be relieved to the earthing. However, if a filter is installed on the power cables, the wires and the ground wire may not need to be twisted.

9.1.3 Cables

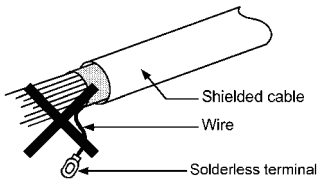
The cables extracted from the control panel contain a high frequency noise component. On the outside of the control panel, therefore, they serve as antennas to emit noise. To prevent noise emission, use shielded cables for the cables which are connected to the I/O modules and intelligent function modules and may be extracted to the outside of the control panel.
The use of a shielded cable also increases noise resistance.
The signal lines (including common line) of the programmable controller, which are connected to I/O modules, intelligent function modules and/or extension cables, have noise durability in the condition of grounding their shields by using the shielded cables. If a shielded cable is not used or not grounded correctly, the noise resistance will not meet the specified requirements.

(1) Earthing of shielded cables
   (a) Earth the shield of the shielded cable as near the control panel as possible taking care so that the earthed cables are not induced electromagnetically by the cable to be earthed.
   (b) Take appropriate measures so that the shield section of the shielded cable from which the outer sheath cover was partly removed for exposure is earthed to the control panel on an increased contact surface. A clamp may also be used as shown in the figure below. In this case, however, apply a cover to the painted inner wall surface of the control panel which comes in contact with the clamp.



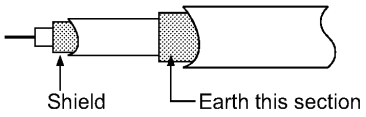


Note) The method of earthing by soldering a wire onto the shield section of the shielded cable as shown below is not recommended. The high frequency impedance will increase and the shield will be ineffective.



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

(a) Use a double-shielded coaxial cable for the MELSECNET module which uses coaxial cables such as A1SJ71AR21, A1SJ71LR21 and A1SJ71BR11. Noise in the range of 30 MHz or higher in radiation noise can be suppressed by the use of double-shielded coaxial cables (manufactured by MITSUBISHI CABLE INDUSTRIES, LTD: 5C-2V-CCY). Earth the outer shield to the ground.



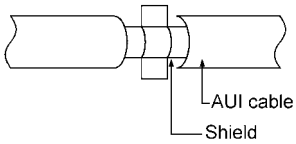
Refer to (1) for the earthing of the shield.

(b) Make sure to attach a ferrite core to the double-shielded coaxial cable connected to the MELSECNET module. In addition, position the ferrite core on each cable near the outlet of the control panel. The ferrite core manufactured by TDK Corporation, ZCAT3035-1330, is recommended.

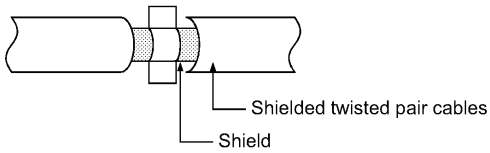
(3) Ethernet module

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

(a) Always earth the AUI cables[*1] 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.



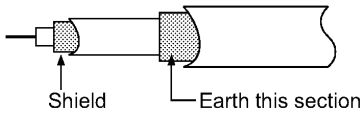
(b) Use shielded twisted pair cables as the twisted pair cables[*1] connected to the 10BASE-T connectors. For the shielded twisted pair cables, strip part of the outer cover and earth the exposed shield section to the ground on the widest contact surface as shown below.



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

*1 Make sure to install a ferrite core for the cable.
The ferrite core manufactured by TDK Corporation, ZCAT2032-0930, is recommended.

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



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

*2 Make sure to install a ferrite core for the cable.
The ferrite core manufactured by TDK Corporation, ZCAT3035-1330, is recommended.

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

(4) I/O and other communication cables

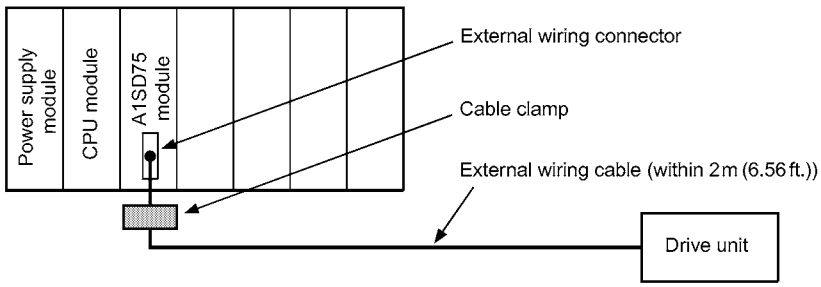
For the I/O signal lines (including common line) and other communication cables (RS-232, RS-422, etc), if extracted to the outside of the control panel, also ensure to earth the shield section of these lines and cables in the same manner as in item (1) above.

(5) Positioning Modules

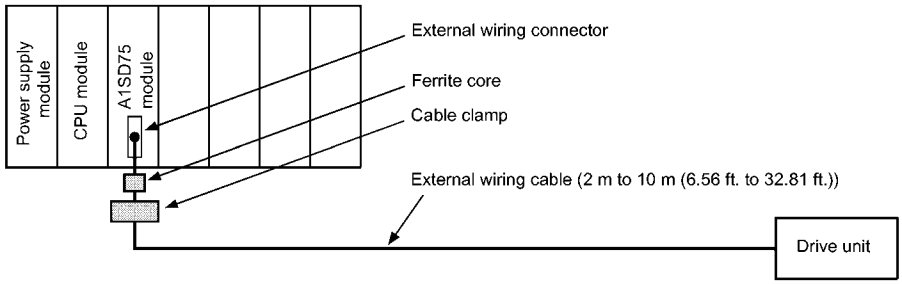
Precautions to be followed when the machinery conforming to the EMC Directive is configured using the A1SD75P□-S3 are described below.

(a) When wiring with a 2m (6.56ft.) 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 minimum distance of cable.
- Install the drive unit in the same panel.



(b) When wiring with cable that exceeds 2m (6.56ft.), but is 10m (32.81ft.) 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 minimum distance of cable.



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

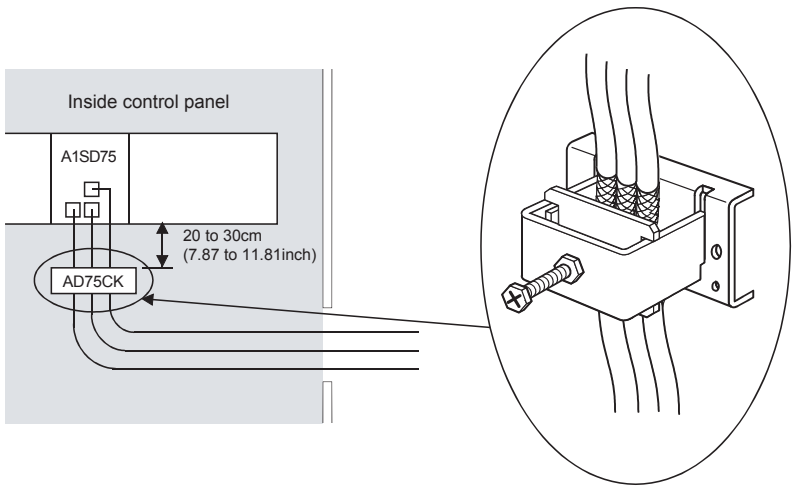
  Type : AD75CK (manufactured by Mitsubishi Electric Corporation)
- Ferrite core

  Type : ZCAT3035-1330 (manufactured by TDK Corporation)

  Contact: TDK Corporation
- Required quantity

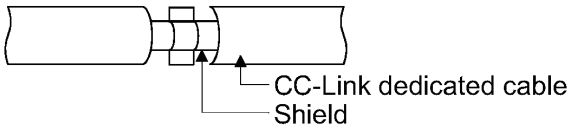
Cable length	Prepared part	Required Qty		
		1 axis	2 axes	3 axes
Within 2m (6.56ft.)	AD75CK	1	1	1
2m (6.56ft.) to 10m (32.81ft.)	AD75CK	1	1	1
	ZCAT3035-1330	1	2	3

(d) Cable clamp mounting position



(6) CC-Link Module

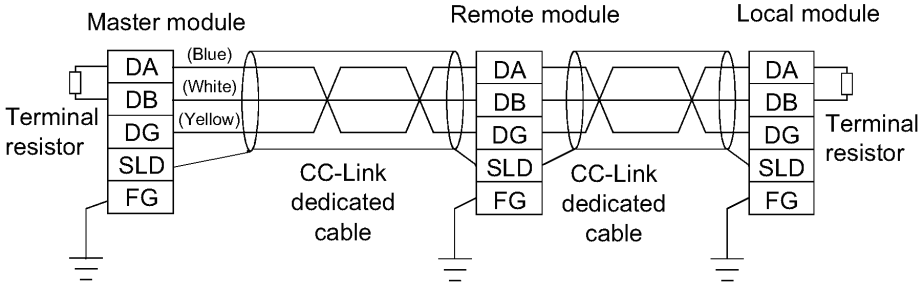
(a) Be sure to ground the cable shield that is connected to the CC-Link module close to the exit of control panel or to any of the CC-Link stations within 30cm (11.81inch) from the module or stations.
The CC-Link dedicated cable is a shielded cable. As shown in the illustration below, remove a portion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



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

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

[Simplified diagram]

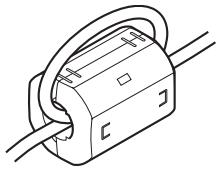


(d) Each power line connecting to the external power supply terminal or module power supply terminal must be 30m (98.43 ft) or less.

(e) Install a noise filter to the external power supply. Use a noise filter with an attenuation characteristic equivalent to that of the MA1206 (TDK-Lambda Corporation). Note that a noise filter is not required when the module is used in Zone A defined in EN61131-2.

(f) Keep the length of signal cables connected to the analog input terminals of the following modules to 30m or less.
Wire cables connected to the external power supply and module power supply terminal in the control panel where the module is installed.
- AJ65BT-64RD3
- AJ65BT-64RD4
- AJ65BT-68TD

(g) For the cable connected to the power supply terminal of the AJ65SBT-RPS or AJ65BT-68TD, attach a ferrite core with an attenuation characteristic equivalent to that of the ZCAT3035-1330 from TDK Corporation. Twist the cable around the ferrite core by one as shown below.



(7) CC-Link/LT module
To supply the CL2DA2-B and CL2AD4-B with 24VDC power using the CL1PAD1, keep the length of the power cable from the CL1PAD1 to the 24VDC power supply to 30m or less.

(8) Measures against static electricity
When using an insulation displacement connector without connector cover, a connected cable for the connector is thin in applicable wire size and coating. Therefore, note that the module may cause an electric discharge failure.
As measures against the failure, using pressure-displacement type connector whose applicable wire size is thick or soldering type connector is recommended.

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
A1S61PN, A1S62PN	Make sure to short the LG and FG terminals with a cable of 6 to 7cm and ground the cable.
A1S63P *1	Use the 24VDC panel power supply equipment conforming to the EU Directive.
A1SJHCPU(S8)	Make sure to short and ground the LG and FG terminals.*2

*1 Filter attachment to the power cable is not required for the A1S63 product with the version (F) and later. However, use the 24VDC panel power equipment that conforms to the CE.

*2 Make sure to attach two ferrite cores to the power line.
Attach them as close to the power supply module as possible.
Use a ferrite core whose damping characteristic is equivalent to that of the RFC-H13 produced by KITAGAWA INDUSTREIS CO., LTD.

9.1.5 Ferrite core

Use of ferrite cores is effective in reducing the conduction noise in the band of about 10MHz and radiated noise in 30 to 100MHz band.
It is recommended to attach ferrite cores when the shield of the shielded cable coming out of the control panel does not work effectively, or when emission of the conduction noise from the power supply line has to be suppressed.
We tested using ferrite cores from TDK Corporation, ZCAT3035-1330 and ZCAT2032-0930, and RFC-H13 from KITAGAWA INDUSTREIS CO., LTD.
Make sure to attach a ferrite core to a cable at the position closest to the outlet of control panel as possible. If attached at an improper position, the ferrite core will not work effectively.

- Ferrite core

Type : ZCAT3035-1330, ZCAT2032-0930
Contact : TDK Corporation
Type : RFC-H13
Contact : KITAGAWA INDUSTREIS CO., LTD

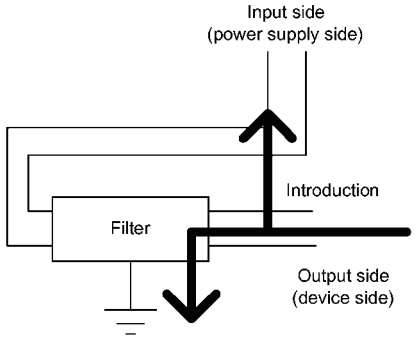
9.1.6 Noise filter (power supply line filter)

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

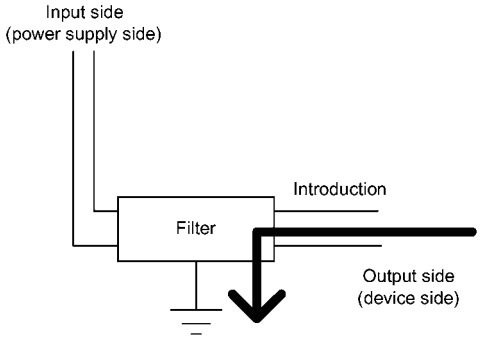
Model name	FN343-3/01	FN660-6/06	ZHC2203-11
Manufacturer	SCHAFFNER	SCHAFFNER	TDK
Rated current	3A	6A	3A
Rated voltage	250V		

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

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



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



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

(2) Earth the noise filter ground terminal to the control panel with the shortest wire possible (approx. 10cm (3.94inch)).

9.1.7 Power line for external power supply terminal

Use a CE-marked AC/DC power supply for an external power supply of the modules, and the power cable length needs to be less than 30m (98.43 ft.).*1

*1 The power cable length for the A1SJ71E71N-B5 needs to be less than 3m (9.84 ft.).

Install noise filters to external supply power terminals of the I/O module and the modules below.
Use noise filters whose damping characteristic is equivalent to that of the MA1206 produced by TDK Lambda Corporation.

- Analog-digital converter module
- Digital-analog converter module
- Analog I/O module
- Temperature input module
- Temperature control module
- Pulse input module
- High-speed counter module
- Positioning module

9.1.8 Installation environment of the CC-Link/LT module and the AS-i module

(1) CC-Link/LT module

Use the module under the environment of Zone A[*1].
For the categories of the following products, refer to the manual came with each product.

- CL1Y4-R1B1
- CL1Y4-R1B2
- CL1XY4-DR1B2
- CL1XY8-DR1B2
- CL1PSU-2A

(2) AS-i module

Use the module under the environment of Zone A[*1].

*1 Zone defines categories according to industrial environment, specified in the EMC and Low Voltage Directives, EN61131-2.
Zone C: Factory mains (isolated from public mains by dedicated transformer)
Zone B: Dedicated power distribution, secondary surge protection (rated voltage:300V or less)
Zone A: Local power distribution, protected from dedicated power distribution by AC/DC converter and insulation transformer (rated voltage: 120V or less)

9.2 Requirements for Compliance with Low Voltage Directives

The Low Voltage Directives apply to the electrical equipment operating from 50 to 1000VAC or 75 to 1500VDC; the manufacturer must ensure the adequate safety of the equipment.
Guidelines for installation and wiring of MELSEC-AnS series programmable controller are provided in 9.2.1 to Section 9.2.7 for the purpose of compliance with the EMC Directives. The guidelines are created based on the requirements of the regulations and relevant standards, however, they do not guarantee that the machinery constructed according to them will comply with the Directives. Therefore, the manufacturer of the machinery must finally determine how to make it comply with the EMC Directives: if it is actually compliant with the EMC Directives.

9.2.1 Standard applied for MELSEC-AnS series programmable controller

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

9.2.2 Precautions when using the MELSEC-AnS series programmable controller

Module selection

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

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

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

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

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

9.2.3 Power supply

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

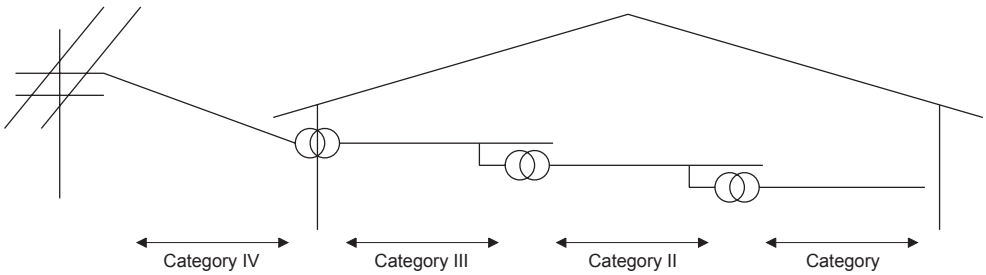


Figure9.1: Installation Category

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 panel

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

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

(1) Shock protection

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

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

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

(c) For electric shock protection, use IP20 or greater control panel.

(2) Dustproof and waterproof features

The control panel also has the dustproof and waterproof functions. Insufficient dustproof and waterproof features lower the insulation withstand voltage, resulting in insulation destruction. The insulation in our programmable controller 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 panel equivalent to IP54 in a control room or on the floor of a typical factory.

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

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

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

9.2.5 Module installation

(1) Installing modules contiguously
In AnS series programmable controllers, the left side of each I/O module is left open. When installing an I/O module to the base, do not make any empty slots between any two modules. If there is an empty slot on the left side of a module with 100/200VAC rating, the circuit board which contains the hazardous voltage circuit becomes bare. When it is unavoidable to make an empty slot, be sure to install the blank module (A1SG60).
When using the A1S5□B(S1) extension base with no power supply, attach the cover packaged with the extension base to the side of the leftmost module.

9.2.6 Grounding

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

Protective grounding ⏚ : Maintains the safety of the programmable controller and improves the noise resistance.
Functional grounding : Improves the noise resistance.

9.2.7 External wiring

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

(2) External devices
When a device with a hazardous voltage circuit is externally connected to the programmable controller, use a model whose circuit section of the interface to the programmable controller is intensively insulated from the hazardous voltage circuit.

(3) Intensive insulation
Intensive insulation refers to the insulation with the dielectric withstand voltage shown in the following table.

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

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

10 MAINTENANCE AND INSPECTION

⚠ WARNING

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

⚠ CAUTION

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

In order to use the programmable controller always in good condition, conducting daily and periodical maintenance/inspection on the following items are strongly recommended.

10.1 Daily Inspection

Dairy inspection items recommended are shown in Table 10.1.

Table 10.1 Dairy inspection

Item	Check item		Content of inspection	Judgement	Action
1	Installation condition of the base unit		Confirm if mounting screws are not loose or cover is not detached.	It is installed securely.	Retighten the screw.
2	Installation condition of the I/O modules		Confirm if the module mounting screw is firmly tightened.	The module mounting screws are firmly tightened.	Tighten the module mounting screw firmly.
3	Connection conditions		Loosening of terminal screw	No loosening.	Retighten the terminal screw.
			Proximity of solderless terminals	There is an appropriate distance.	Correct the distance.
			Connector areas of extension cable	No loosening at connectors.	Retighten the connector fixing screw.
4	LEDs on the main module	POWER LED	Confirm it is ON.	The LED is ON. (Faulty if it is OFF.)	Per Section 11.2.2.
		"RUN" LED	Confirm it is ON in the "RUN" state.	The LED is ON. (Faulty if it is OFF or flickering.)	Section 11.2.3 Per Section 11.2.4.
		"ERROR" LED	Confirm it is ON at error occurrence.	The LED is OFF. (ON when error has occurred.)	Section 11.2.5 Per Section 11.2.6.
		Input LED	Confirm if it correctly turns on and off.	The LED is ON when input is ON, and OFF when input is OFF. (Faulty other than the above.)	Per Section 11.4.1.
		Output LED	Confirm if it correctly turns on and off.	The LED is ON when output is ON, and OFF when output is OFF. (Faulty other than the above.)	Per Section 11.4.2.

10.2 Periodic Inspection

Inspection on items shown below should be conducted once or twice every six months to a year. Conduct the inspection when the equipment is moved or modified, or wiring is changed.

Table 10.2 Periodic inspection

Item	Check item		Content of inspection	Judgement	Action
1	Ambient environment	Ambient temperature	Measure with temperature and humidity gauge. Measure presence of corrosive gasses.	0 to 55℃	When used in a panel, temperature inside the panel is the ambient temperature.
		Ambient humidity		10 to 90%RH	
		Atmosphere		There is no corrosive gas present.	
2	Line voltage check		Measure voltage between 100/200VAC terminals.	85 to 264VAC	Change the power supply.
3	Installation condition	Loosening, backlash	Test by moving the module.	Must be installed solidly.	Retighten the screw.
		Adhesion of dirt or foreign matters	Visual inspection	No adhesion.	Remove and clean.
4	Connection conditions	Loosening of terminal screw	Retighten with a screwdriver.	No loosening.	Retighten.
		Proximity of solderless terminals	Visual inspection	There is an appropriate distance.	Correct the distance.
		Loosening of connector	Visual inspection	No loosening.	Retighten the connector fixing screw.
5	Battery		Confirm M9006 or M9007 is OFF with a peripheral device in the monitoring mode.	(Preventive maintenance)	Even when there is no low-battery display, replace if specified life is exceeded.

10.3 Battery Replacement

> ⚠ WARNING
> ● Correctly connect the battery connector.
> Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
> Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.

M9006 or M9007 is turned ON when voltage of the battery for backing up programs and power failure compensation function drops. Even though programs and contents of power failure compensation function are not erased immediately when these special relays become ON, the contents could be erased if the ON-status of the special relay fails to be recognized.
Replace the battery while the total period of power failure is less than shown in Table 10.3 from when the M9006 or M9007 is turned ON.
Yardstick for battery life and the specifics of replacement are explained below.

10.3.1 Battery life

(1) The battery life is shown in Table 10.3 when using a software version CPU module.
For software version check, refer to Section 4.5.1.
There is no difference of battery life in the A2SHCPU depending on versions.
- A1SJHCPU: Hardware version R or later
- A1SJHCPU-S8: Hardware version H or later
- A1SHCPU: Hardware version H or later

Table10.3 Battery life

CPU Module Model Name	Current-carrying Hour Rate*1	Battery Life*5			
		Guaranteed Value*2	Actual Value (TYP)*3		After Turning ON M9006 or M9007 (Power failure compensation time after alarm occurrence*4)
			Ambient Temperature 40℃	Ambient Temperature 25℃	
A1SJHCPU(S8)	0%	4,000 hr 0.4 years	24,500hr 2.8 years	27,000hr 3.1 years	100hr 4 days
	30%	5,700 hr 0.6 years	35,000hr 4.0 years	38,500hr 4.4 years	100hr 4 days
	50%	8,000hr 0.9 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days
	100%	43,800hr 5 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days

Table10.3 Battery life

CPU Module Model Name	Current-carrying Hour Rate*1	Battery Life*5			
		Guaranteed Value*2	Actual Value (TYP)*3		After Turning ON M9006 or M9007 (Power failure compensation time after alarm occurrence*4)
			Ambient Temperature 40℃	Ambient Temperature 25℃	
A1SHCPU	0%	4,000 hr 0.4 years	24,500hr 2.8 years	27,000hr 3.1 years	100hr 4 days
	30%	5,700 hr 0.6 years	35,000hr 4.0 years	38,500hr 4.4 years	100hr 4 days
	50%	8,000hr 0.9 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days
	100%	43,800hr 5 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days
A2SHCPU(S1)	0%	4,000 hr 0.4 years	24,500hr 2.8 years	27,000hr 3.1 years	100hr 4 days
	30%	5,700 hr 0.6 years	35,000hr 4.0 years	38,500hr 4.4 years	100hr 4 days
	50%	8,000hr 0.9 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days
	100%	43,800hr 5 years	43,800hr 5 years	43,800hr 5 years	100hr 4 days

*1 The power time ratio indicates the percentage of power-on time per day (24 hours).
(The power-on time ratio is 50% when the total power-on time is 12 hours and the total power-off time is 12 hours.)

*2 The guaranteed value represents a battery life at 70℃, which is calculated based on characteristic values of manufacturer-supplied memories (SRAM) and on the assumption of storage within the ambient temperature range of -20 to 75℃ (operating ambient temperature of 0 to 55℃).

*3 The actual service value (reference value) represents a battery life that is calculated based on the values measured at storage ambient temperature of 40℃ and 25℃. This value is intended for reference only, as it varies with characteristics of the memory.

*4 The guaranteed time after power-off is 10 minutes when:
- The battery connector is disconnected,
- The battery lead wire is broken.

*5 The battery duration (maximum life) is 5 years (43,800 hours).

(2) The battery life is shown in Table 10.4 when using a software version CPU module. For software version check, refer to Section 4.5.1.
- A1SJHCPU: Hardware version Q or earlier
- A1SJHCPU-S8 Hardware version G or earlier
- A1SHCPU: Hardware version G or earlier

Table 10.4 Battery life when using earlier version CPU.

CPU Module Model Name	Current-carrying Hour Rate*1	Battery Life*5			
		Guaranteed Value*2	Actual Value (TYP)*3		After Turning ON M9006 or M9007 (Power failure compensation time after alarm occurrence*4)
			Ambient Temperature 40℃	Ambient Temperature 25℃	
A1SJHCPU(S8)	0%	4,000 hr 0.4 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	30%	5,700 hr 0.6 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	50%	8,000hr 0.9 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	100%	43,800hr 5 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
A1SHCPU	0%	4,000 hr 0.4 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	30%	5,700 hr 0.6 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	50%	8,000hr 0.9 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days
	100%	43,800hr 5 years	43,800hr 5 years	43,800hr 5 years	100hr 4.2 days

*1 The power time ratio indicates the percentage of power-on time per day (24 hours). (The power-on time ratio is 50% when the total power-on time is 12 hours and the total power-off time is 12 hours.)

*2 The guaranteed value represents a battery life at 70℃, which is calculated based on characteristic values of manufacturer-supplied memories (SRAM) and on the assumption of storage within the ambient temperature range of -20 to 75℃ (operating ambient temperature of 0 to 55℃).

*3 The actual service value (reference value) represents a battery life that is calculated based on the values measured at storage ambient temperature of 40℃ and 25℃. This value is intended for reference only, as it varies with characteristics of the memory.

*4 The guaranteed time after power-off is 10 minutes when:
- The battery connector is disconnected,
- The battery lead wire is broken.

*5 The battery duration (maximum life) is 5 years (43,800 hours).

Yardsticks for preventive maintenance are as follows:

[1] Replace a battery in 4 or 5 years even when the battery has been used less than the guaranteed time shown in the table above.

[2] Replace a battery when the battery has been used exceeding the guaranteed time and M9006 is on.

POINT

(1) Use the battery within the time shown by the guaranteed value of the battery life.

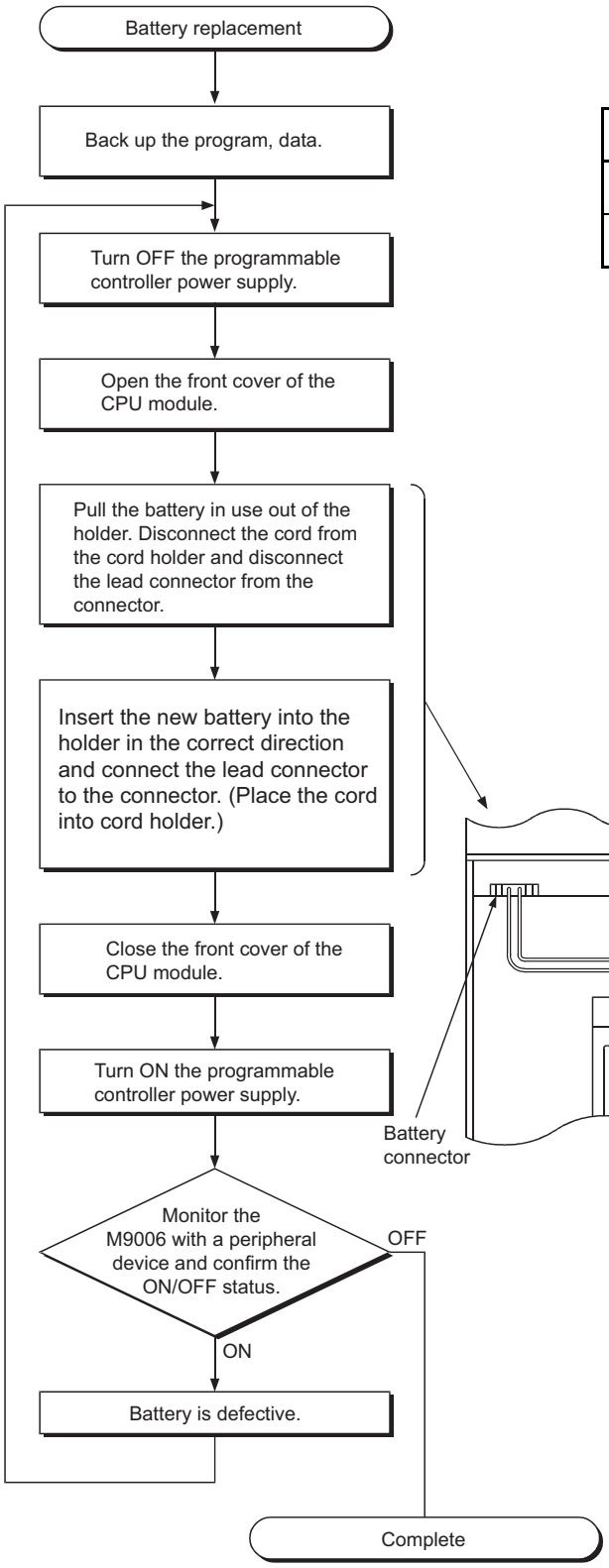
(2) If the battery may be used exceeding the guaranteed time, perform ROM operation to protect data in case that the battery will be exhausted during power-off of the programmable controller. Or, after M9006 turns on, back up data within the backup power time.

(3) When the battery (A6BAT) is not connected to the CPU module, its service life is five years.

(4) When the battery-low special relay M9006 turns on, immediately change the battery.
Even if an alarm has not yet occurred, it is recommended to replace the battery periodically according to the operating condition.

10.3.2 Battery replacement procedure

Replace the battery according to the following procedure when life of the battery is over.Even when the battery is removed memory is backed up by the capacitor for a while. However, if replacement takes longer than the guaranteed value shown in Table 10.5, the content of the memory may be erased, so replace the battery quickly.



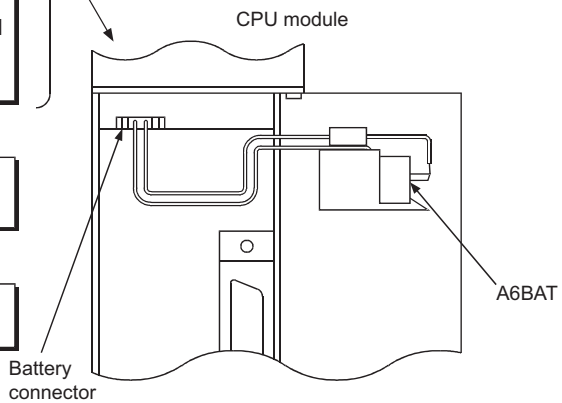
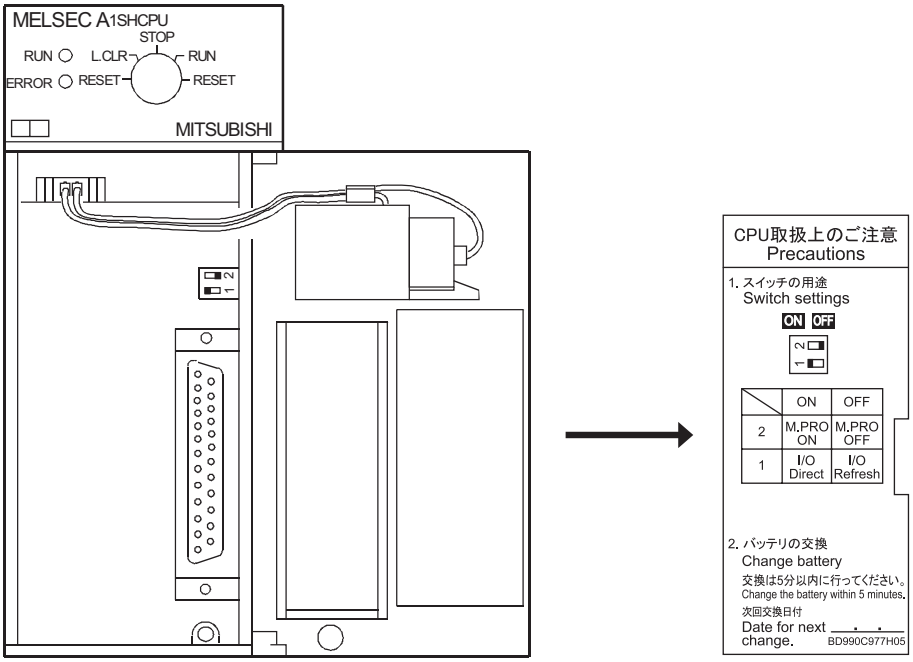


Table 10.5 Period backed up by the capacitor

Period backed up by the capacitor [min]	
Guaranteed value (MIN)	Actual value (TYP)
5	15

POINT

After replacing a battery, write the date for next battery replacement on the sticker on the back side of the front cover.
Write the proper date by checking the battery life. (Refer to Section 10.3.1)



11 TROUBLESHOOTING

The description, cause determination, and corrective actions of each error which may occur during system usage are described.

11.1 Fundamentals of Troubleshooting

Besides using obviously highly-reliable devices to increase system reliability, it is an important point to quickly start up the system again when an error occurs.
In order to quickly start up the system, find the cause of the problem and resolve it. There are the following three basic points to be aware of when performing troubleshooting.

(1) Visual confirmation
Confirm the following points:
(a) Machine operation (stop status and operation status)
(b) Power supply ON/OFF
(c) I/O equipment status
(d) Wiring status (I/O wires and cable)
(e) Display status of each display indicator (POWER LED, RUN LED, ERROR LED, I/O LED, etc.)
(f) Status of each setting switch (extension base, power failure compensation, etc.)

After confirming (a) to (f), connect a peripheral device and observe the operation status of the programmable controller and program contents.

(2) Error confirmation
Observe how the error changes by performing the following operations:
(a) Set the RUN/STOP key switch to "STOP."
(b) Reset using the RUN/STOP key switch.
(c) Turn ON/OFF the power supply.

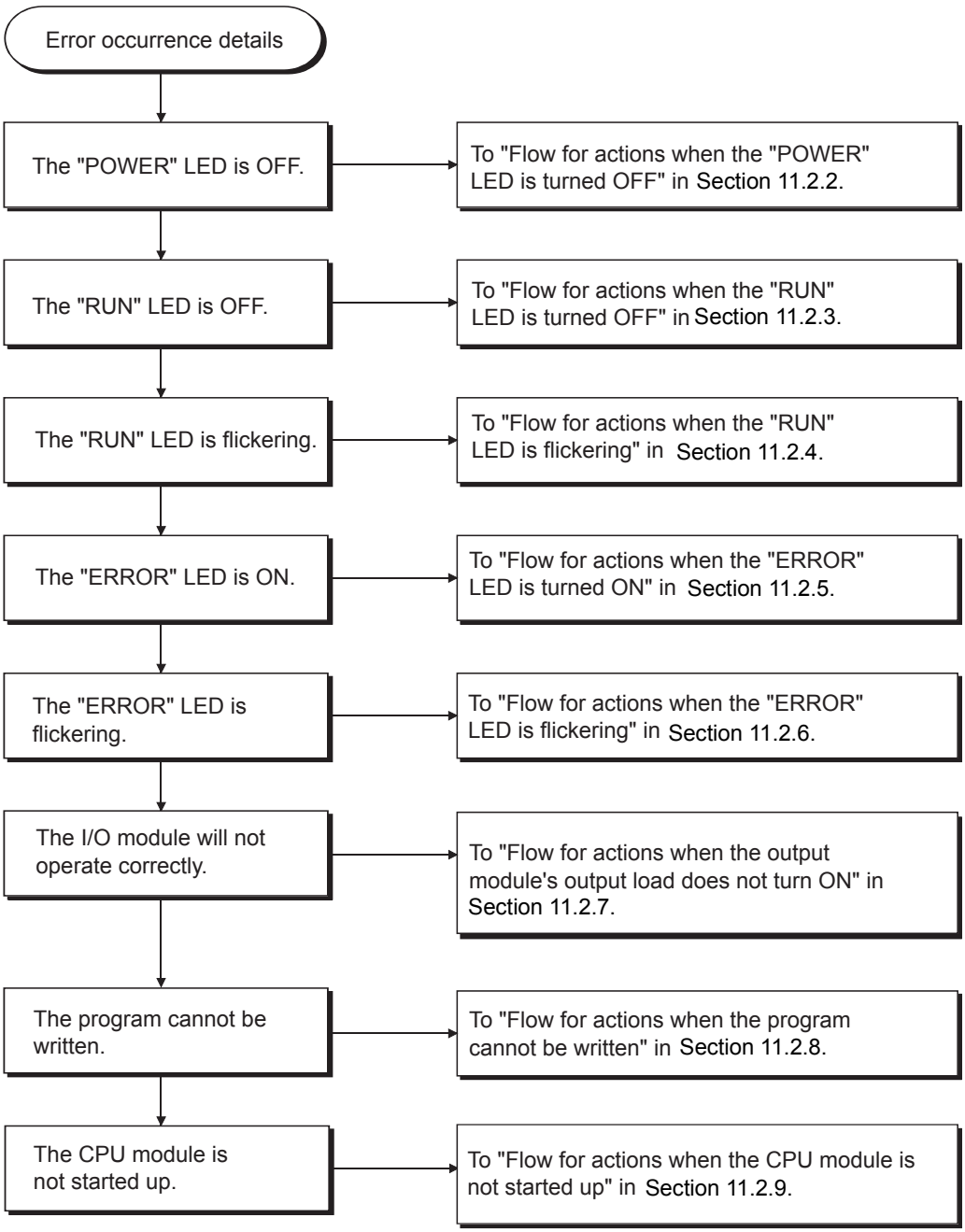
(3) Narrow down the range
By performing the (1) and (2) above, assume the faulty area in the following:
(a) Programmable controller or external?
(b) I/O module or others?
(c) Sequence program?

11.2 Troubleshooting

The error definition determination method, error definition corresponding to the error code, and corrective actions are described.

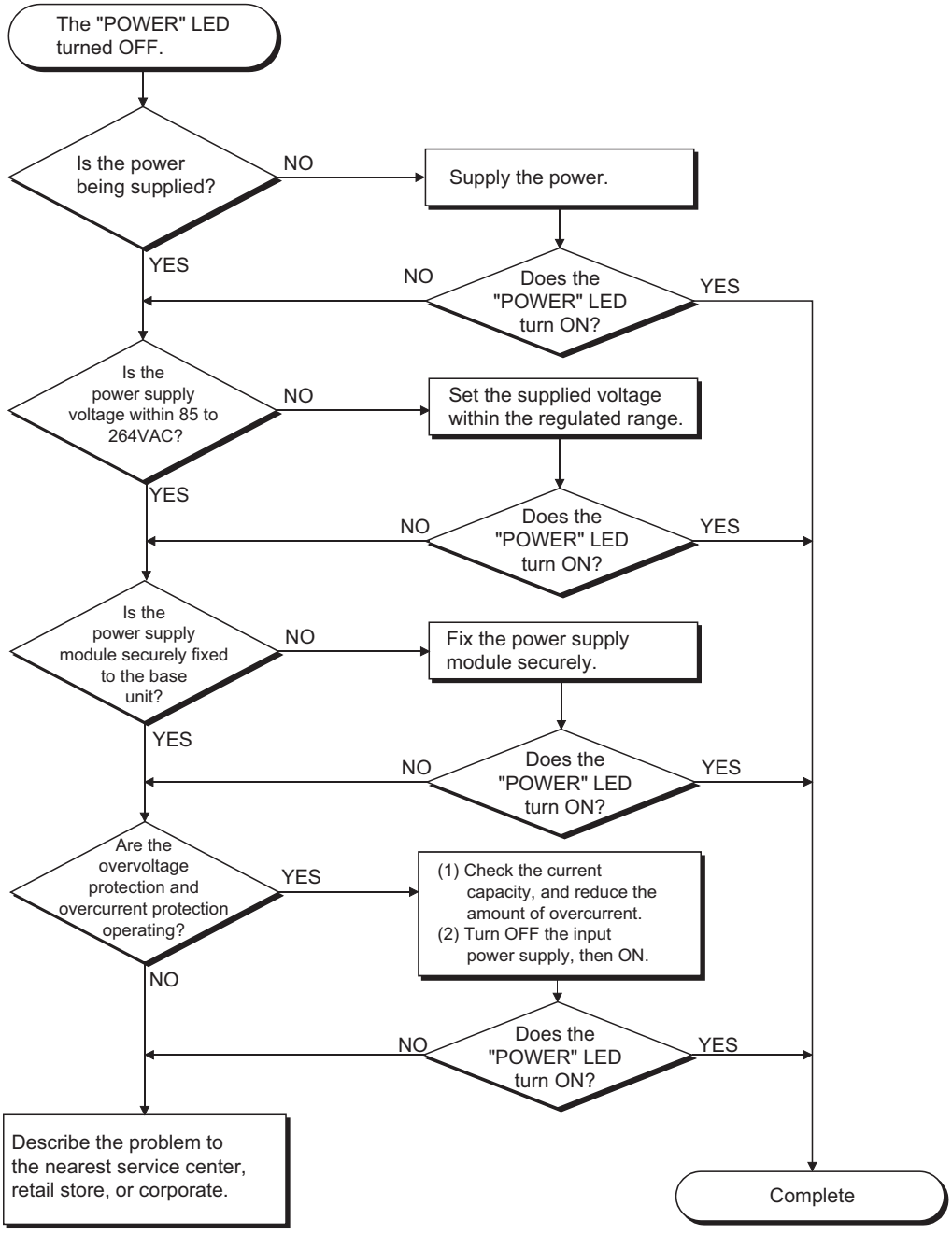
11.2.1 Troubleshooting procedure

The error definitions are described by events.



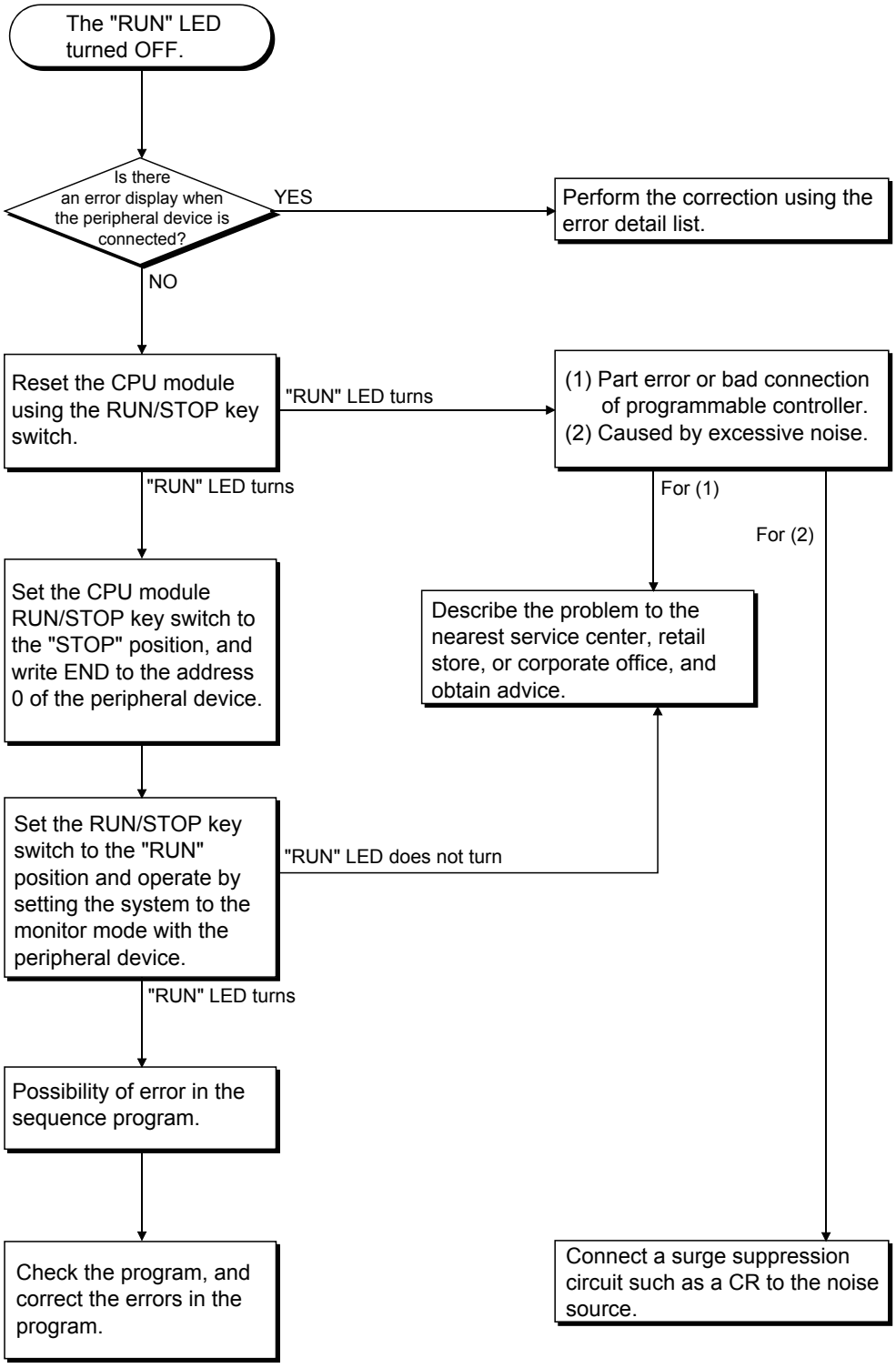
11.2.2 Flow for actions when the "POWER" LED is turned OFF

The corrective action when the "POWER" LED turns OFF when the power supply is turned ON or during operation is described.



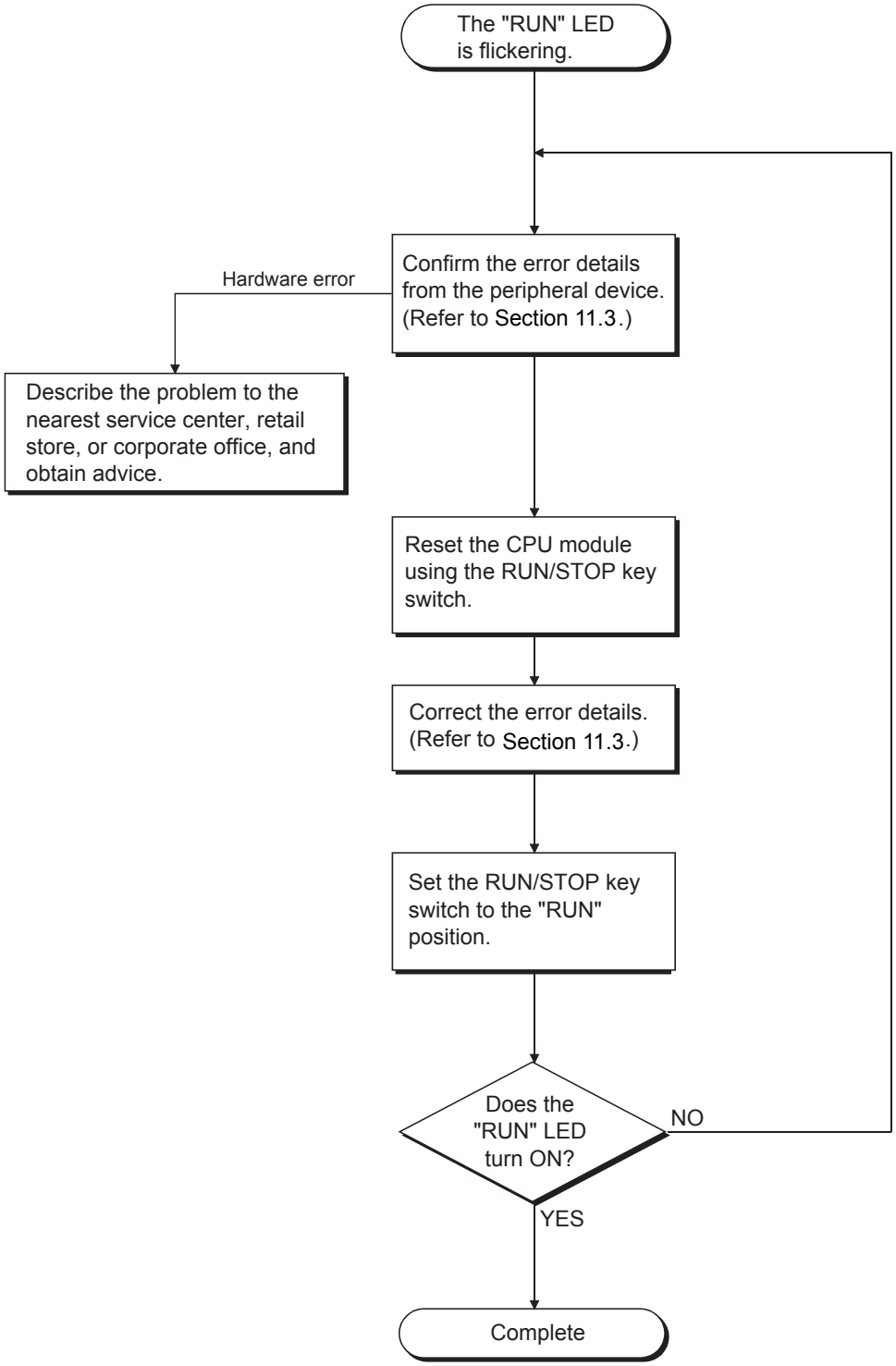
11.2.3 Flow for actions when the "RUN" LED is turned OFF

The corrective action when the "RUN" LED turns OFF during operation is described.



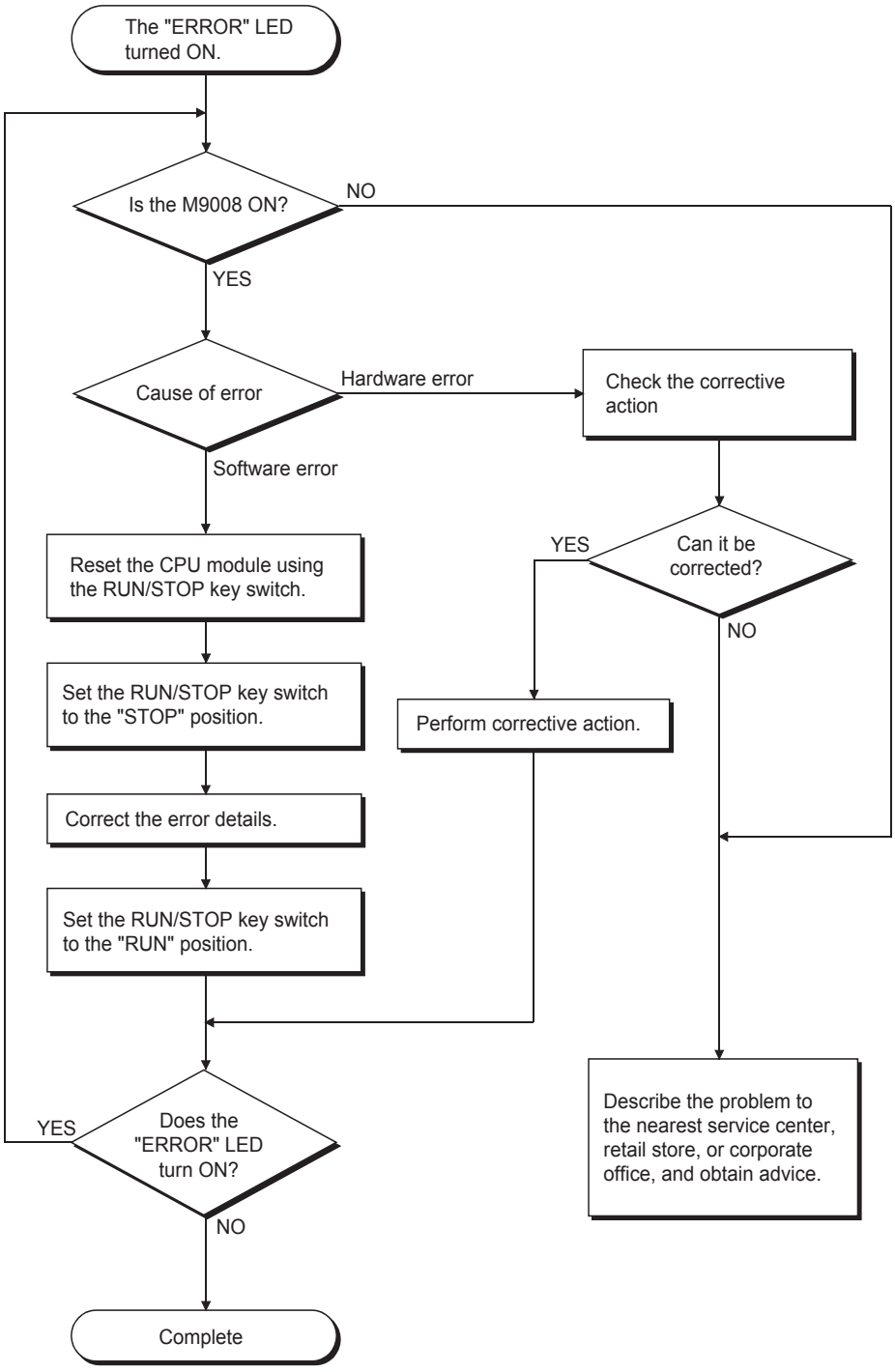
11.2.4 Flow for actions when the "RUN" LED is flickering

The corrective action when the "RUN" LED is flickering when turning on the power supply, starting operation, or during operation is described.



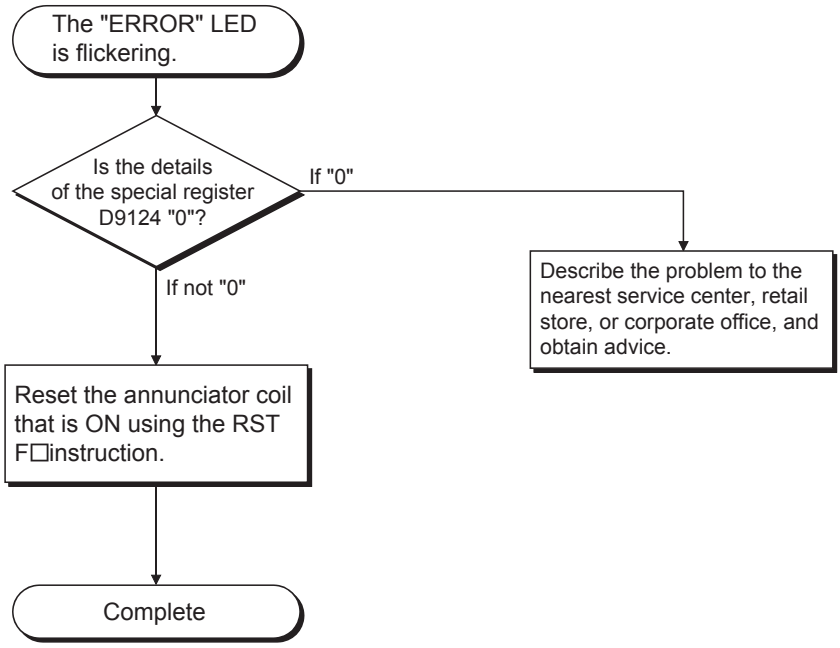
11.2.5 Flow for actions when the "ERROR" LED is turned ON

The flow when the "ERROR" LED turns ON during operation is described.



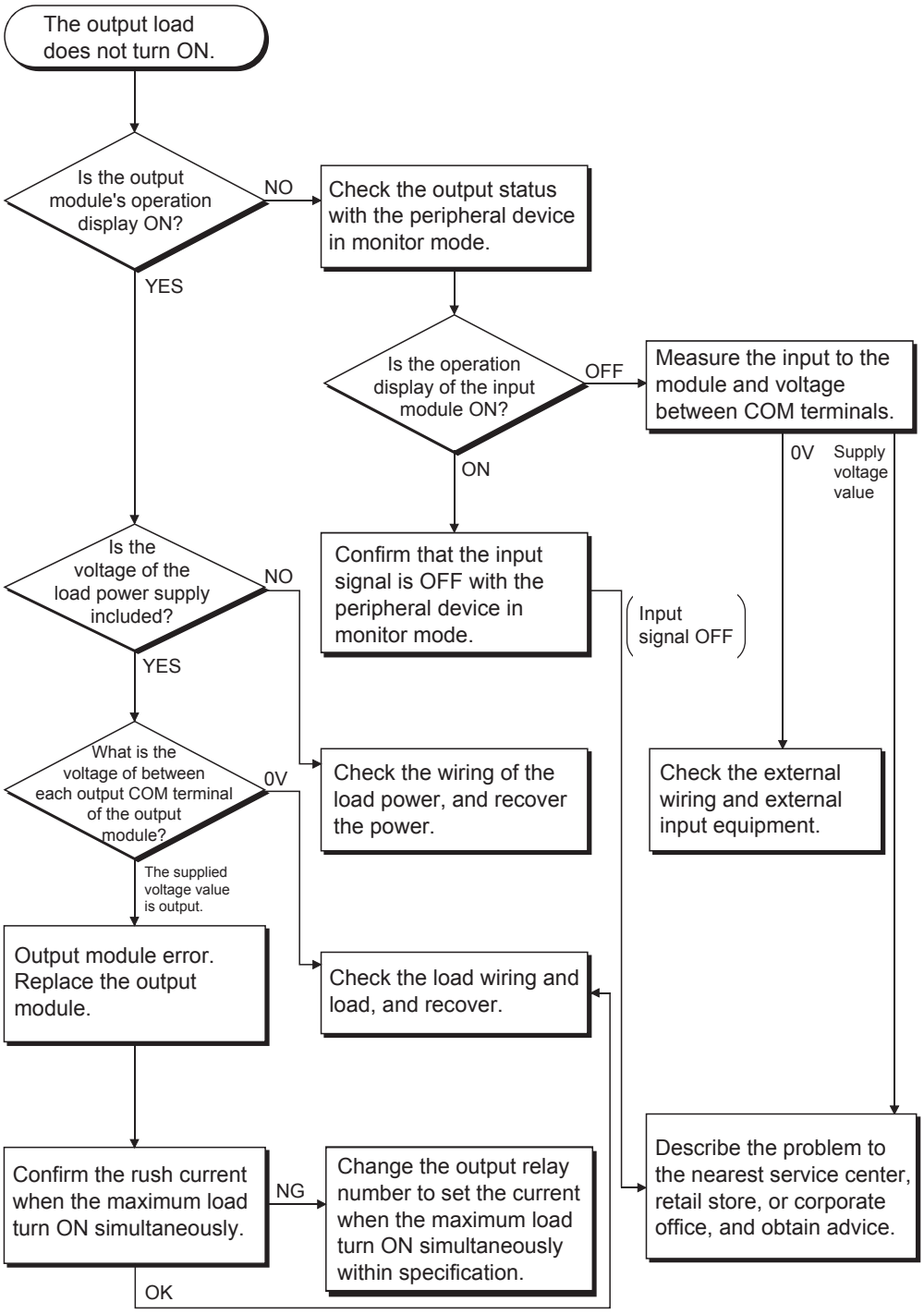
11.2.6 Flow for actions when the "ERROR" LED is flickering

The flow when the "ERROR" LED turns ON during operation is described.



11.2.7 Flow for actions when the output module's output load does not turn ON

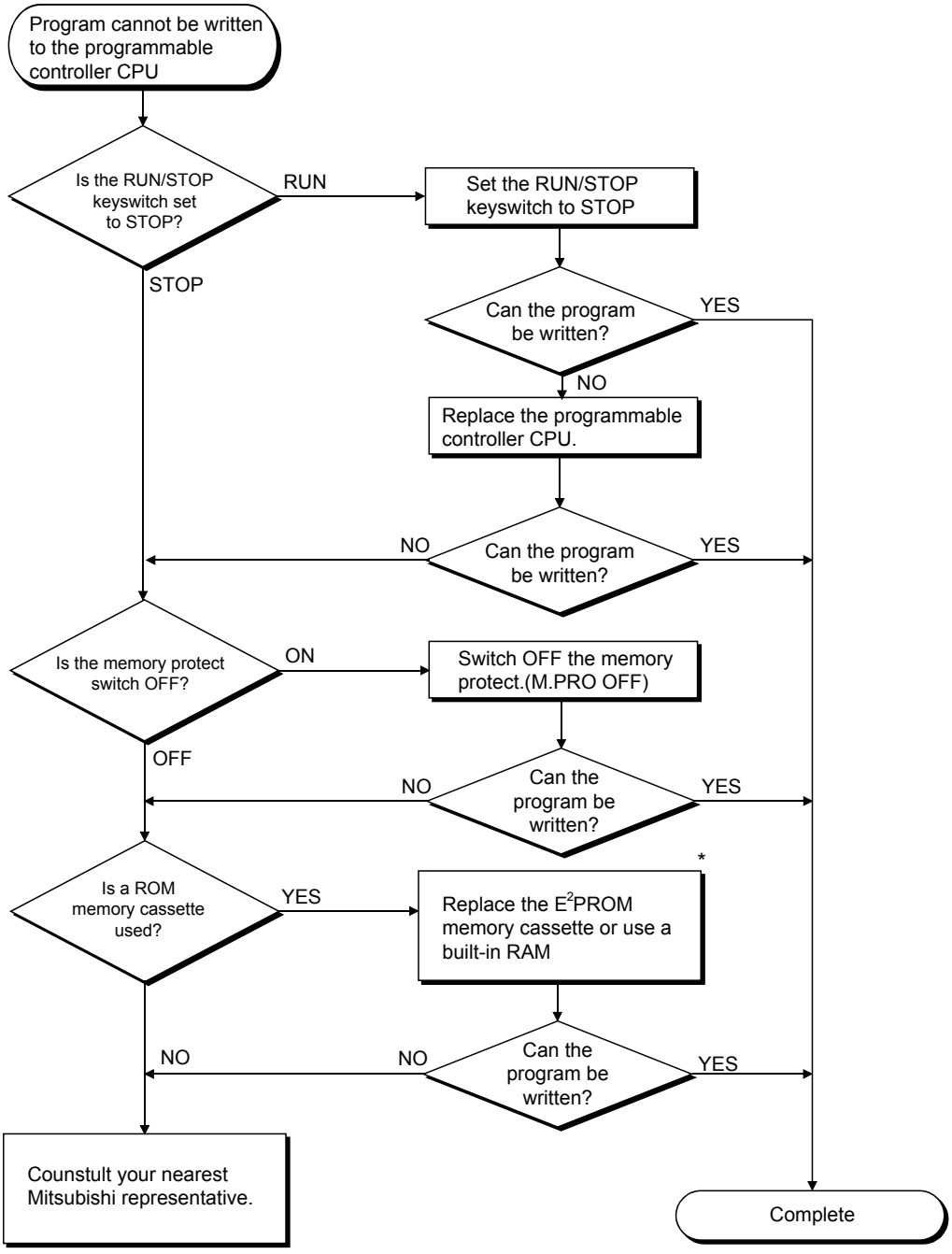
The corrective action when the output load of the output module does not turn ON during operation is described.



POINT
For problems when the input signal does not turn off and load does not turn off, perform troubleshooting by referring to the fault examples for the I/O module in Section 11.4.

11.2.8 Flow for actions when the program cannot be written

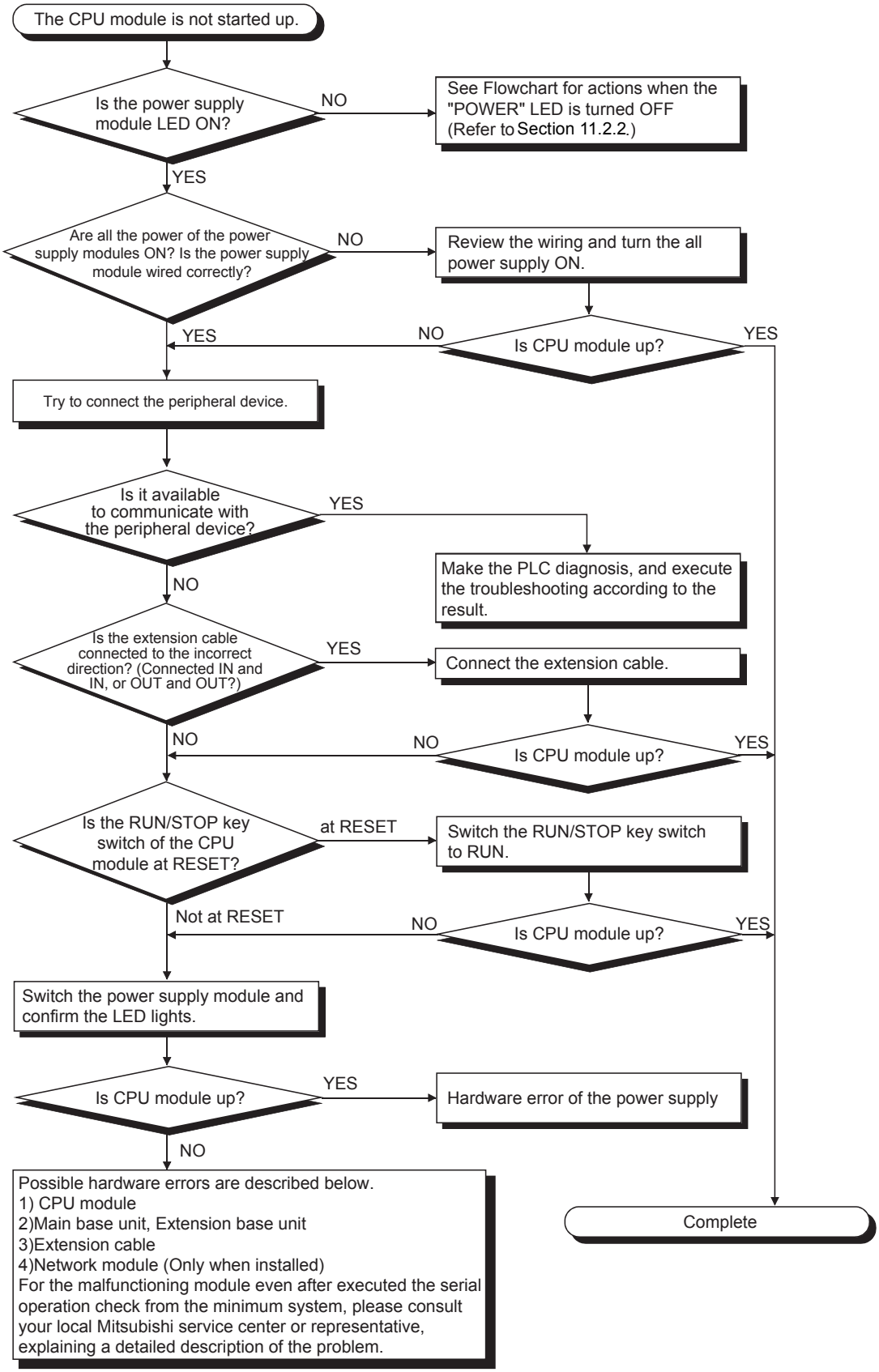
The flowchart when the program and other data cannot be written to the CPU module is described.



* When using the E^2PROM memory cassette, confirm that the memory protect setting pin is at "OFF" on the A2SNMCA-30KE modules.

11.2.9 Flow for actions when the CPU module is not started up

The flow when the CPU module is not started up is described.



11.3 Error Code List

When an error occurs while the programmable controller is running or during RUN, error is displayed, or error code, detailed error code and error step are stored to special registers, D9008, D9091 and D9010, respectively, by the self-diagnostics function. Error definitions and corrective actions are shown below.

11.3.1 Procedure to read an error code

When an error occurs, the error code can be read with a peripheral device.
Refer to the Operating Manuals of the peripheral device for operation method.

11.3.2 AnSHCPU error code list

Table 11.1 shows the error messages, description and cause of error and corrective actions for A1SJH(S8), A1SH and A2SH(S1). Detailed error codes are stored in D9092 only when a dedicated instruction for CC-Link is used.

Table 11.1 AnSHCPU Error Code List

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU module status	Error and Cause	Corrective Action
"INSTRCT. CODE ERR" (Checked at STOP → RUN.)	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" (Checked at power-on or STOP/PAUSE → RUN.)	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 with a peripheral device, check and correct the contents, and write them to CPU again.
"MISSING END INS." (Checked at STOP → RUN.)	12	—	Stop	There is no END (FEND) instruction in the program.	Write END instruction at the end of program.

Table 11.1 AnSHCPU Error Code List (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU module status	Error and Cause	Corrective Action
"CAN'T EXECUTE(P)" (Checked at instruction execution.)	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.	(1) Read the error step by use of the peripheral device and correct the program at that step. (Insert a jump destination or reduce multiple destinations to one.)
"CHK FORMAT ERR" (Checked at STOP/PAUSE → RUN.)	14	—	Stop	(1) Instructions (including NOP) except LD X□, LDI X□, AND X□ and ANI X□ are included in the CHK instruction ladder block. (2) Multiple CHK instructions are given. (3) The number of contact points in the CHK instruction ladder block exceeds 150. (4) The device number of X in the CHK instruction circuit block exceeds X7FE. (5) There is no ⊣CJ P□⊢ ladder block before the CHK instruction ladder block. (6) The device number of D1 of the CHK D1 D2 instruction is different from that of the contact point before the CJ P□ instruction. (7) 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 ladder block according to item (1) to (7) in the left column. Correct problem using the peripheral device and perform operation again. (2) This error code is only effective when the input/output control method is a direct method.
"CAN'T EXECUTE (I)" (Checked at interrupt occurrence.)	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.

Table 11.1 AnSHCPU Error Code List (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU module status	Error and Cause	Corrective Action
"ROM ERR" (Checked at power-on.)	17	—	Stop	Parameters and/or sequence programs are not correctly written to the mounted memory cassette.	(1) Correctly write parameters and/or sequence programs to the memory cassette. (2) Remove the memory cassettes that contain no parameters or sequence programs.
				Parameters stored in the memory cassette have exceeded the limit of available program capacity. Ex.) Default parameters (program capacity: 6k steps) are written to A1NMCA-2KE.	(1) Adjust the program capacity for parameters to the memory cassette used. (2) Use the memory cassette of which memory capacity is larger than the program capacity for parameters.
"RAM ERROR" (Checked at power-on.)	20	—	Stop	The CPU has checked if write and read operations can be performed properly to the data memory area of CPU, and as a result, either or both has not been performed.	Since this is CPU hardware error, consult Mitsubishi representative.
"OPE. CIRCUIT ERR" (Checked at power-on.)	21	—	Stop	The operation circuit, which performs the sequence processing in the CPU, does not operate properly.	
"WDT ERROR" (Checked at END instruction.)	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 increased 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" (Checked at END processing.)	24	—	Stop	(1) AnSHCPU has read other instruction code due to noise at the END instruction execution. (2) The END instruction has changed to another instruction code for some reason.	Reset and run the CPU module again. If the same error persists 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.
"UNIT VERIFY ERR."	31	—	Stop (Continue)	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.

Table 11.1 AnSHCPU Error Code List (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU module status	Error and Cause	Corrective Action
"FUSE BREAK OFF"	32	—	Continue (Stop)	(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) Checking fuse blown module can be made with the peripheral device. Among special registers D9100 to D9107, the bit corresponding to the unit of fuse break "1". 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 are faulty. Consult Mitsubishi representative.
"SP. UNIT DOWN"	41	—	Stop	There is no reply from the special function module during the FROM or TO instructions execution. (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.
"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" (Checked at FROM/TO instructions or a special function module dedicated instruction.)	46	—	Stop (Continue)	(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.

Table 11.1 AnSHCPU Error Code List (Continue)

Error Message	Error Code (D9008)	Detailed Error Code (D9092)	CPU module status	Error and Cause	Corrective Action
"LINK PARA. ERROR"	47	—	Stop (Continue)	(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.
"OPERATION ERROR" (Checked at instruction execution.)	50	—	Continue (Stop)	(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.
"MAIN CPU DOWN"	60	—	Stop	(1) The CPU malfunctioned due to noise. (2) Hardware failure.	(1) Take proper countermeasures for noise. (2) Consult Mitsubishi representative.
"BATTERY ERROR" (Always checked.)	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 Fault Examples with I/O Modules

Examples of faults concerning I/O circuits and the corrective actions are explained.

11.4.1 Faults with the input circuit and the corrective actions

Examples of faults concerning input circuits and the corrective actions are explained.

Table 11.2 Faults with the input circuit and the corrective actions

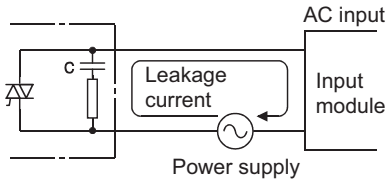
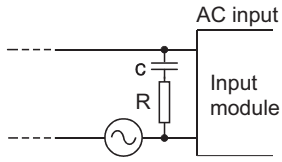
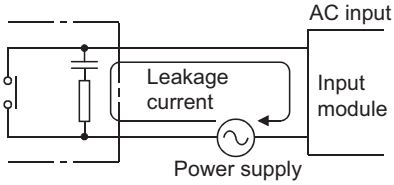
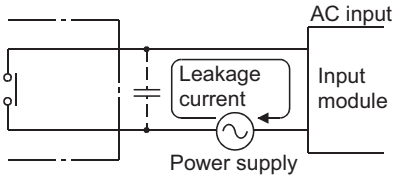
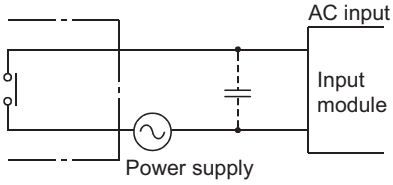
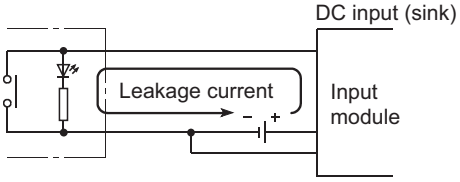
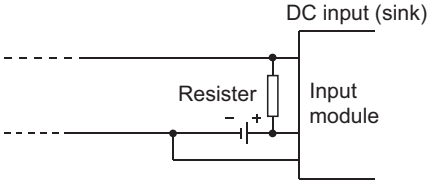
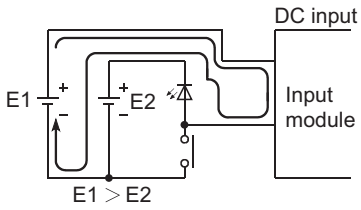
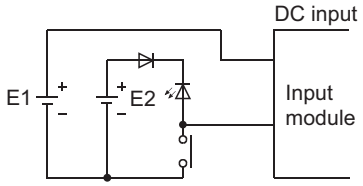
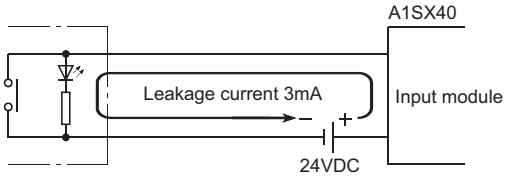
	Situation	Cause	Countermeasure
Example 1	Input signal does not turn OFF.	• Leak current from input switch (driven by a contactless switch, etc.) 	• Connect an appropriate resistor so that voltage between the terminals of the input module is lower than the OFF voltage.  For CR constant, 0.1 to 0.47μF+47 to 120Ω (1/2W) is recommended.
Example 2	Input signal does not turn OFF.	• Driven by a limit switch with a neon lamp 	• Same as the example 1. • Or, provide a totally independent display circuit separately.
Example 3	Input signal does not turn OFF.	• Line capacity C of the leak current twisted pair cable due to line capacity of the wiring cable is about 100PF/m. 	• Same as the example 1. • However, it does not occur when power supply is on the side of input device as shown below. 
Example 4	Input signal does not turn OFF.	• Driven by a switch with LED indication 	• Connect an appropriate resistor so that voltage between the terminal of the input module and the common is lower than the OFF voltage as shown below.  * An example of calculation of resistance to be connected is provided on the following page.

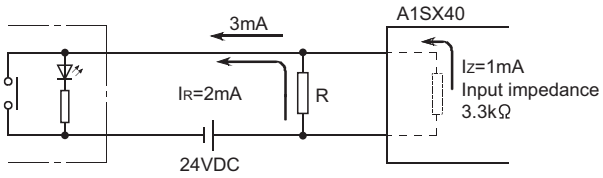
Table 11.2 Faults with the input circuit and the corrective actions (Continued)

	Situation	Cause	Countermeasure
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 diode to prevent the sneak path (figure below). 

<Sample calculation for Example 4>
When a switch with LED indicator, giving leaking current of 3mA at maximum when 24VDC power is supplied to the A1SX40



(1) 1mA or less OFF current of the A1SX40 is not satisfied. Hence, connect a resistor as shown below.



(2) Calculate the resistance value R as shown below.
To satisfy 1mA or less OFF current of the A1SX40, connect a resistor which flows 2mA or more.
$I_R : I_Z = Z(\text{Input impedance}) : R$

$$R < \frac{I_Z}{I_R} \times Z(\text{Input impedance}) = \frac{1.0}{2.0} \times 3.3 = 1.65[k\Omega]$$

Supposing that the resistance R is 1.5kΩ, the power capacity W of resistor R is:
$W = (\text{Input voltage})^2/R = 26.4^2/1500 = 0.465$ [W]

(3) Connect a resistor of 1.5(kΩ) and 2 to 3(W) to a terminal which may cause an error, since the power capacity of a resistor is selected so that it will be 3 to 5 times greater than the actual power consumption.

(4) Also, OFF voltage when resistor R is connected will be as follows.

$$\frac{1}{\frac{1}{1.5[k\Omega]} + \frac{1}{3.3[k\Omega]}} \times 3[mA] = 3.09[V]$$

• This satisfies 4V or less OFF voltage of A1SX40.

11.4.2 Faults in the output circuit

Faults concerning output circuits and the corrective actions are explained.

Table 11.3 Faults with the output circuit and the corrective actions

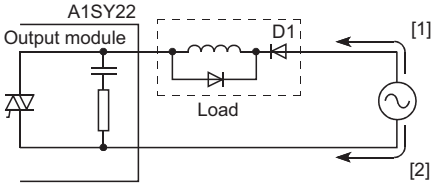
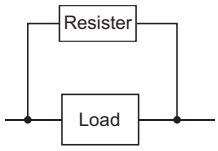
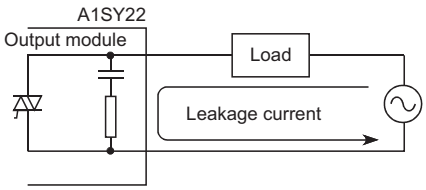
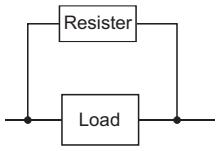
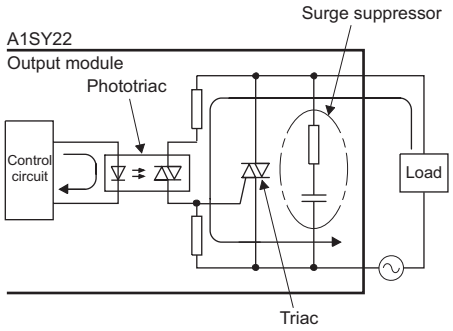
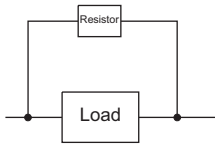
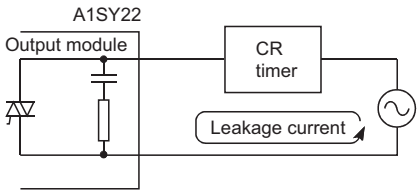
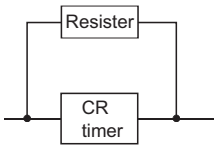
	Situation	Cause	Countermeasure
Example 1	An excessive voltage is applied to the load when output is off.	• When the load is subjected to half wave rectification inside (Solenoids have these types.)  • When the polarity of the power supply is [1], C is charged, and when the polarity is [2], the voltage charged in C + voltage of the power supply are applied to the both ends of D1. The maximum value of the voltage is about 2.2E.	• Connect a resistor with several tens to several hundreds of kΩ to the both ends of the load. (With this kind of usage, there is no problem with the output element, but the diode built-in to the load may deteriorate and burn-out.) 
Example 2	Load does not turn OFF. (Triac output)	• Leak current caused by built-in noise supressor 	• Connect a resistor to the both ends of the load. (When the wiring distance from the output card to the load is long, be aware of the risk of a leak current due to line capacity.) 

Table 11.3 Faults with the output circuit and the corrective actions (Continued)

<table>
<tr><th></th><th>Situation</th><th>Cause</th><th>Countermeasure</th></tr>
<tr><td>Example 3</td><td>The load is not turned OFF. (Triac output)</td><td>• The load current is lower than the minimum load current.
 

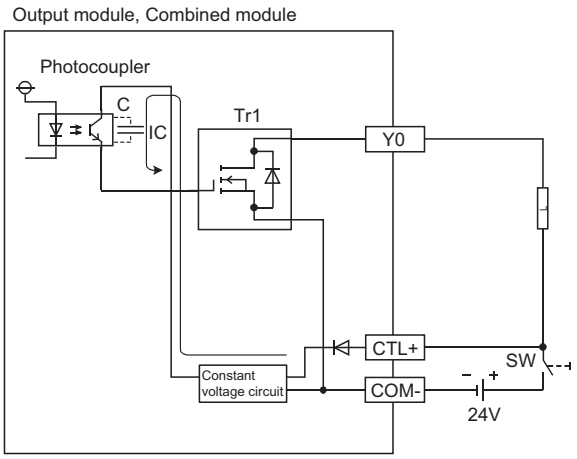
• When the load current is lower than the minimum load current of the output module, the triac does not operate since the load current flows into a phototriac as shown below. When an inductive load is connected, the load may not be turned OFF since surge at the time of OFF is applied to the phototriac.</td><td>• Connect a resistor to both ends of a load so that the load current is higher than the minimum load current.
 
</td></tr>
<tr><td>Example 4</td><td>When load is CR type timer, the time limit fluctuates. (Triac output)</td><td> 
</td><td>• Start the relay first, then start the CR-type timer at the contact.
(In some timers, internal circuit may be half wave rectification type, so the caution as to the example 1 is necessary here.)
 

Calculate the constant of the resistance based on the load.</td></tr>
</table>

Table 11.3 Faults with the output circuit and the corrective actions (Continued)

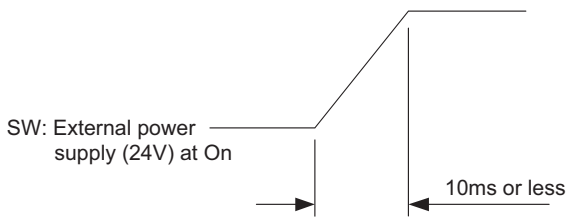
<table>
<tr><th></th><th>Situation</th><th>Cause</th><th>Countermeasure</th></tr>
<tr><td>Example 5</td><td>When the external power supply turns on, the load turns on for a moment.</td><td>
Erroneous output due to the stray capacitance (C) between collector and emitter of hotocoupler.

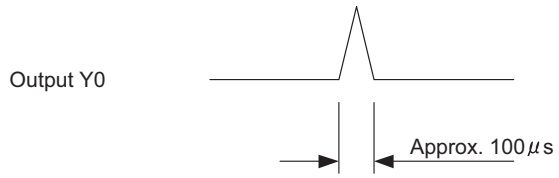
(There is no erroneous output at normal road.
An erroneous output may occur at high sensitivity load
(such as solid state relay).)



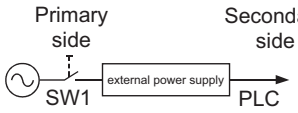
If the external power supply is turned on precipitously, Ic current flows due to the stray capacitance (C) between collector and emitter of hotocoupler.

Ic current flows to the next stage of transister Tr1 gate and Y0 output turns on by 100 μs

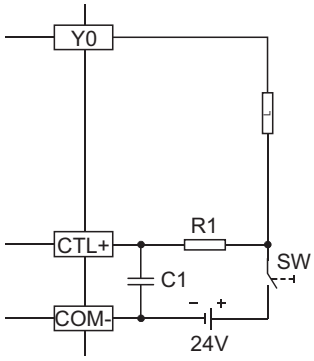




</td><td>
When the external power turns ON/OFF, check that the external power supply rising edge must be 10ms or more, and switch the SW1 to the primary side of external power supply.



When switching to the secondary side of the external power supply is required, the external power supply rising edge connected a condenser must be slow, and measured 10ms or more.



R1: Several tens of ohms
Power capacity ≧
(external power supply current*1)^2
× resistance value × (3 to 5)*2

C1: Several hundreds of microfarads 50V

*1 Refer to consumption current of the external power supply for modules used in this manual.

*2 Select the power capacity of resistance to be 3 to 5 times lager than the actual power consumption.

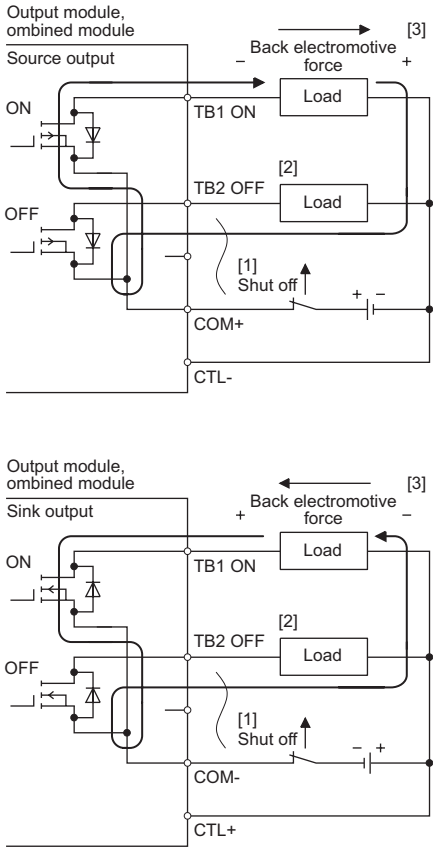
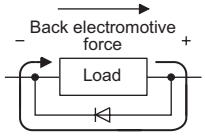
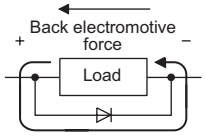
(Example)

R1=40 Ω , C1=300 μF

Use the below expression to calculated a time constant

C1 × R1=300 × 10^{-6} × 40
=12 × 10^{-3}s
=12ms
</td></tr>
</table>

Table 11.3 Faults with the output circuit and the corrective actions (Continued)

	Situation	Cause	Countermeasure
Example 6	The load which was turned OFF is turned ON for a moment at power-off. (Transistor output)	The load [2] which was turned OFF may be turned ON due to back electromotive force at the time of power-off [1] if an inductive load is used.  	To prevent the generation of the back electromotive force, connect diode in parallel with load where the back electromotive force has been generated. Source output [3]  Sink output [3] 

APPENDICES

Appendix 1 Instruction List

The instruction list to be used with a programmable controller is shown.
Refer to the following Programming Manuals for the details of the instructions.

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

(1) Sequence instructions

(a) Contact instruction

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

(b) Association command

Association	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) End instruction

Program end	FEND, END

(g) Other instructions

Stop	STOP
No operation	NOP
Page break (Page break operation for printer output)	NOPLF

(2) Basic instructions

(a) Comparison instructions

=	16 bit	LD=, AND=, OR=
	32 bit	LDD=, ANDD=, ORD=
< >	16 bit	LD<>, AND<>, OR<>
	32 bit	LDD<>, ANDD<>, ORD<>
>	16 bit	LD>, AND>, OR>
	32 bit	LDD>, ANDD>, ORD>
≦	16 bit	LD<=, AND<=, OR<=
	32 bit	LDD<=, ANDD<=, ORD<=
<	16 bit	LD<, AND<, OR<
	32 bit	LDD<, ANDD<, ORD<
≧	16 bit	LD>=, AND>=, OR>=
	32 bit	LDD>=, ANDD>=, ORD>=

(b) BIN arithmetic operation instructions

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

(c) BCD arithmetic operation instructions

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

(d) BCD-BIN conversion instructions

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

(e) Data transfer instructions

Transfer	16 bit	MOV, MOVP
	32 bit	DMOV, DMOVP
Exchange	16 bit	XCH, XCHP
	32 bit	DXCH, DXCHP
Negation transfer	16 bit	CML, CMLP
	32 bit	DCML, DCMLP
Batch transfer	16 bit	BMOV, BMOVP
Same data batch transfer	16 bit	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 bit	Two types each for WAND, WANDP
	32 bit	DAND, DANDP
Logical sum	16 bit	Two types each for WOR, WORP
	32 bit	DOR, DORP
Exclusive logical sum	16 bit	Two types each for WXOR, WXORP
	32 bit	DXOR, DXORP
Not exclusive logical sum	16 bit	Two types each for WXNR, WXNRP
	32 bit	DXNR, DXNRP
Complements of 2 (sign highlights)	16 bit	NEG, NEGP

(b) Rotation instructions

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

(c) Shift instruction

Right shift	16 bit	SFR, SFRP, BSFR, BSFRP
	Device unit	DSFR, DSFRP
Left shift	16 bit	SFL, SFLP, BSFL, BSFLP
	Device unit	DSFL, DSFLP

(d) Data processing instructions

Data search	16 bit	SER, SERP
Bit check	16 bit	SUM, SUMP
	32 bit	DSUM, DSUMP
Decode	2^n-bit	DECO, DECOP
	16 bit	SEG
Encode	2^n-bit	ENCO, ENCOP
Bit set	16 bit	BSET, BSETP
Bit reset	16 bit	BRST, BRSTP
Separation	16 bit	DIS, DISP
Association	16 bit	UNI, UNIP

(e) FIFO instructions

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

(f) ASCII instructions

ASCII conversion	ASC
ASCII print	PR (two types), PRC

(g) Buffer memory access instructions

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

(h) FOR to NEXT instruction

Repeat	FOR, NEXT

(i) Display instructions

Display reset	LEDR

(j) Data link module instructions

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

(k) Other instructions

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

(4) Dedicated instructions

(a) CC-Link dedicated instructions

Network parameter setting	RLPA
Automatic refresh parameter setting	RRPA
Read from the auto refresh buffer memory of the intelligent device station	RIFR
Write to the auto refresh buffer memory of the intelligent device station	RITO
Read from the buffer memory of the intelligent device station	RIRD
Write to the buffer memory of the intelligent device station	RIWT
Write to the buffer memory of the intelligent device station (with handshake)	RISEND
Read from the buffer memory of the intelligent device station (with handshake)	RIRCV

Appendix 1.1 Precautions for write during RUN of a dedicated instruction

Contents of Write during RUN	For LEDA	For LEDB
Write normal configuration during RUN	After writing, the instruction is executed with the previous contact ON.	After writing, the instruction is executed when the previous contact is turned from OFF to ON.
LEDA/LEDB was added by mistake.	Detailed error code, 104 is reported.	If the previous contact remains ON after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from OFF to ON.
LEDA/LEDB was deleted by mistake.	LEDC/SUB/LEDR is handled as a normal instruction.	
LEDC/SUB was added by mistake.	Detailed error code, 104 is reported.	If the previous contact remains ON after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from OFF to ON.
LEDC/SUB was deleted by mistake.	Detailed error code, 104 is reported.	If the previous contact remains ON after writing, no execution causes no processing and detailed error code 104 is reported when the previous contact is turned from OFF to ON.
LEDR was added by mistake.	LEDR in the back is handled as a normal instruction.	LEDR in the back is handled as a normal instruction.
LEDR was deleted by mistake.	If no LEDR exists immediately after the deleted LEDR, detailed error code 104 is reported.	If no LEDR exists immediately after the deleted LEDR, detailed error code 104 is reported. When the LEDR exists, all instructions found between them are not executed.

REMARK

The detailed error code 104 means that "the configuration of the program using dedicated CC-Link instructions is not correct." (Refer to Section 11.3.2)

Appendix 2 LISTS OF SPECIAL RELAYS AND SPECIAL REGISTERS

Appendix 2.1 List of Special Relays

The special relays are the internal relays that have specific applications in the sequencer. Therefore, do not turn the special register ON/OFF on the program. (Except for the ones marked by *1 or *2 in the table.)

Table App2.1 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 ms 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 App2.1 Special Relay List (Continue)

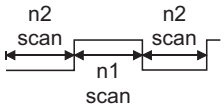
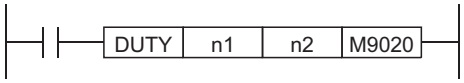
Number	Name	Description	Details	Applicable CPU	
M9016	Data memory clear flag	OFF: No processing ON: Output clear	• Clears the data memory including the latch range (other than special relays and special registers) in remote run mode from computer, etc. when M9016 is on.	○	Usable with all types of CPUs.
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 App2.1 Special Relay List (Continue)

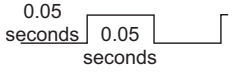
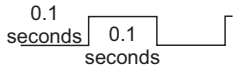
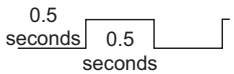
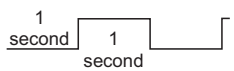
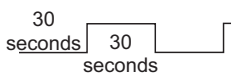
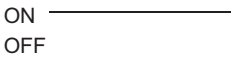
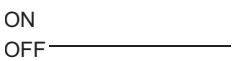
Number	Name	Description	Details	Applicable CPU	
M9030	0.1 second clock		• 0.1 second, 0.2 second, 1 second, 2 second, and 1 minute clocks are generated. • Not turned on and off per scan but turned on and off even during scan if corresponding time has elapsed. • Starts with off when power is turned on or reset is performed.	△	Unusable with A3V.
M9031	0.2 second clock				
M9032	1 second clock				
M9033	2 second clock				
M9034	1 minute clock				
M9036	Normally ON		• 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				
M9038	On only for 1 scan after run				
M9039	RUN flag (off only for 1 scan after run)				
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 ms unit)	△	Unusable with A1, A1N, AnA, AnU and QCPU-A (A Mode)
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 App2.1 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: Flashes at annunciator on. OFF: No flicker at annunciator on.	• Sets whether the RUN LED flashes 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 App2.1 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 App2.1 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 built-in 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 built-in ROM	OFF: Failed writing to ROM ON: Successfully completed writing to ROM	• Turned on when writing to the built-in 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 processing 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 built-in ROM	OFF: Writing to ROM disabled ON: Writing to ROM enabled	• Turns ON when writing to built-in 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 App2.1 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>A1S(J)HCPU, 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 App2.1 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).
*1 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.

Table App2.1 Special Relay List (Continue)

Number	Name	Description	Details	Applicable CPU	
*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.
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.

*: 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 App2.1 Special Relay List (Continue)

Number	Name	Description	Details	Applicable CPU	
M9103 *2	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.
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 App2.1 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.
M9182 *2	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.
M9196 *2	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)

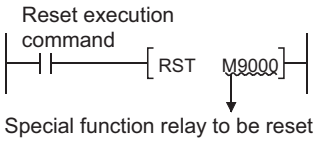
*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

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/STOP 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. (Except for the AnU, A2US(H), and QCPU-A (A mode).)

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

Appendix 2.2 Special Registers

Special registers are data registers of which applications have been determined inside the PC. Therefore, do not write data to the special registers in the program (except the ones with numbers marked 2 in the table).

Table App2.2 Special Register 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 an I/O module whose data is different from the entered data when the power is turned on is detected, the head I/O number of the detected module is stored in hexadecimal. When the situation is detected in multiple modules, the lowest number among the module will be stored. (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 App2.2 Special Register List (Continue)

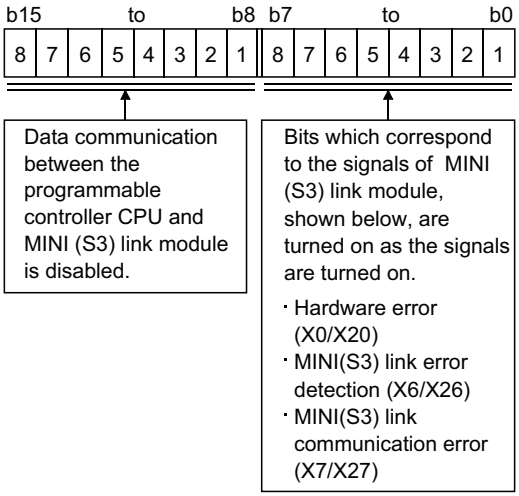
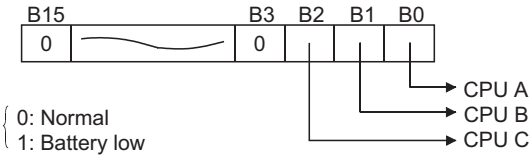
Number	Name	Description	Details	Applicable CPU	
D9003	SUM instruction detection bits	The number of bits detected by SUM instruction detection.	• The number of bits detected by execution of the SUM instruction are stored. in BIN code and updated every execution thereafter.	—	Dedicated to A0J2H.
*1 D9004	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 App2.2 Special Register List (Continue)

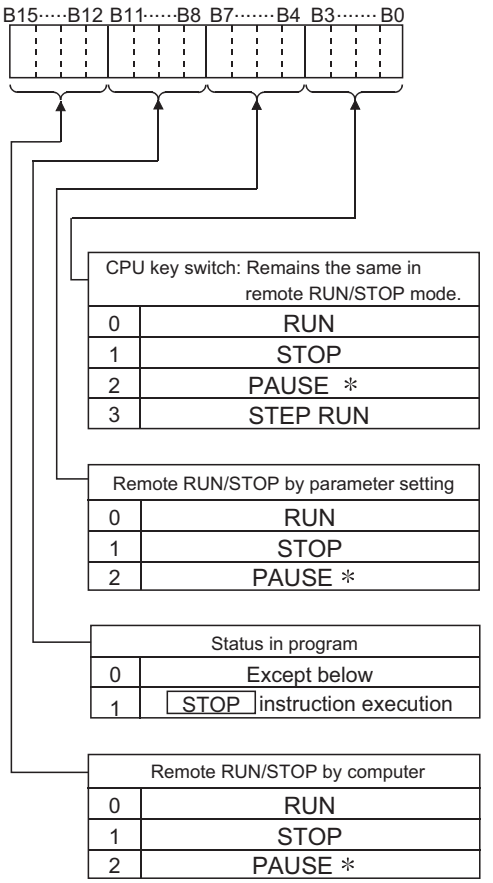
Number	Name	Description	Details	Applicable CPU	
D9010	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Thereafter, each time operation error occurs, the contents of D9010 are renewed.	△	Unusable with A3H and A3M.
D9011 *1	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 App2.2 Special Register 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.
D9020 *2	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 App2.2 Special Register List (Continue)

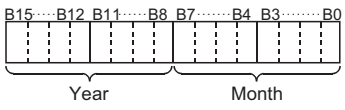
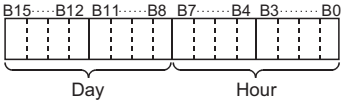
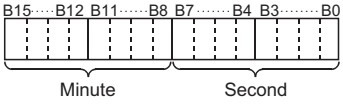
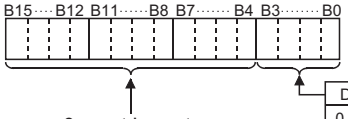
Number	Name	Description	Details	Applicable CPU	
*2 D9025	Clock data	Clock data (Year, month)	• Stores the year (2 lower digits) and month in BCD.  Example: 1987,July H8707	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
*2 D9026	Clock data	Clock data (Day, hour)	• Stores the day and hour in BCD.  Example: 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.

Table App2.2 Special Register List (Continue)

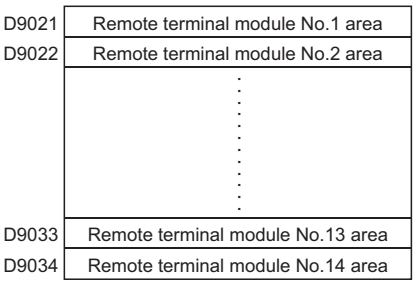
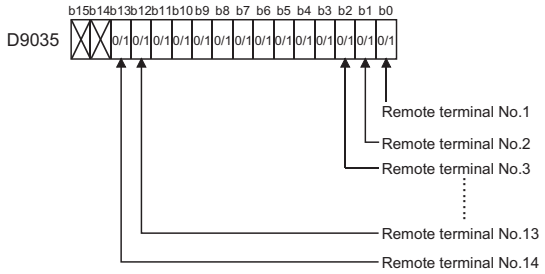
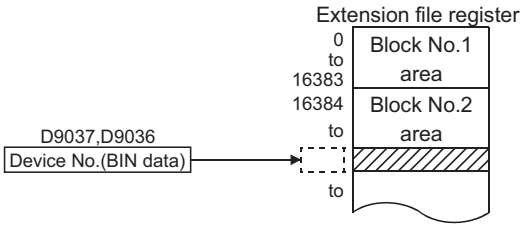
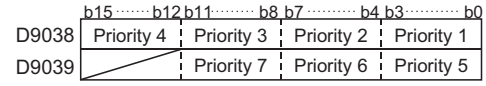
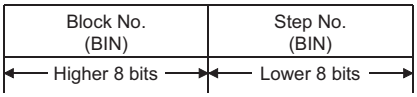
Number	Name	Description	Details	Applicable CPU	
D9021 D9022 D9023 D9024 D9025 D9026 D9027 D9028 D9029 D9030 D9031 D9032 D9033 D9034	Remote terminal parameter setting	1 to 61	• Sets the head station number of remote terminal modules connected to A2C and A52G. Setting is not necessarily in the order of 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 		
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.

Table App2.2 Special Register List (Continue)

Number	Name	Description	Details	Applicable CPU	
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-II Programming Manual.

Table App2.2 Special Register 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 board, 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>A1S(J)HCPU, 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>
<tr><td>D9061</td><td>Communication error code</td><td>0: Normal
1: Initial data error
2: Line error</td><td>• 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.</td><td>—</td><td>Usable with A2C and A52G.</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-II Programming Manual.

Table App2.2 Special Register List (Continue)

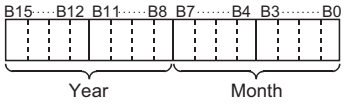
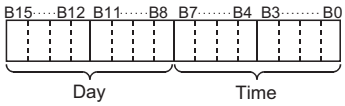
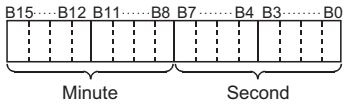
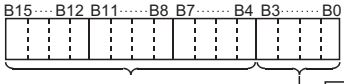
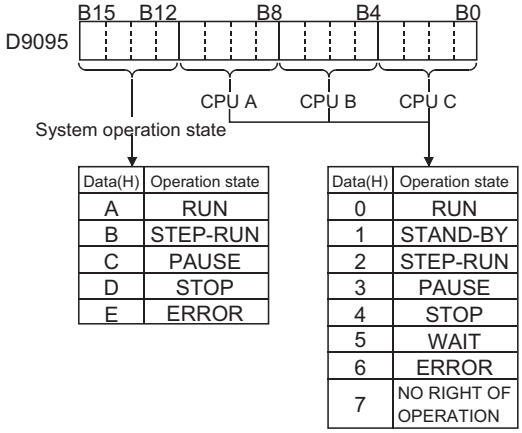
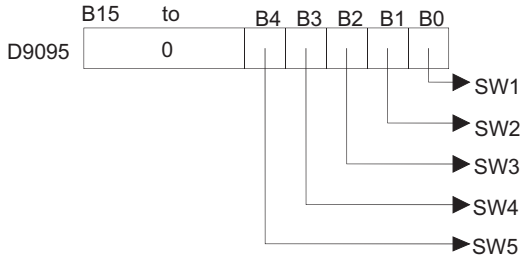
Number	Name	Description	Details	Applicable CPU	
D9068	Abnormal base module	Stores the bit pattern of the abnormal base module	Stores the bit pattern of the base module in abnormal condition. When basic base module is abnormal: Bit 0 turns ON. When 1st expansion base module is abnormal: Bit 1 turns ON. 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.  Example: 1987,July H8707	—	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.  Example: 31th,10 o'clock H3110		
D9075	Clock data	Clock data (minute, second)	• Two digits showing the minute and second are stored to D9075 in BCD codes, as shown below.  Example: 35 minutes, 48 seconds H3548		Dedicated to A2CCPUC24 (-PRF)
D9075	Result of writing to built-in ROM	Stores the status of writing to the built-in ROM	Stores the status of writing to the built-in ROM. 0: Writing enabled F1H: During RAM operation F2H: Writing to built-in 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)
D9076	Status of writing to built-in ROM	Stores the status of writing (enabled/disabled) to the built-in ROM	Stores the status of writing (enabled/disabled) to the built-in 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	—	Dedicated to QCPU-A (A Mode)

Table App2.2 Special Register List (Continue)

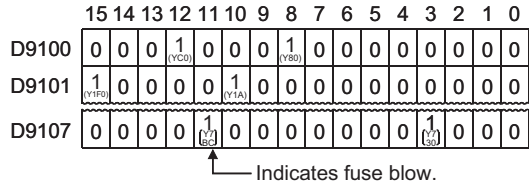
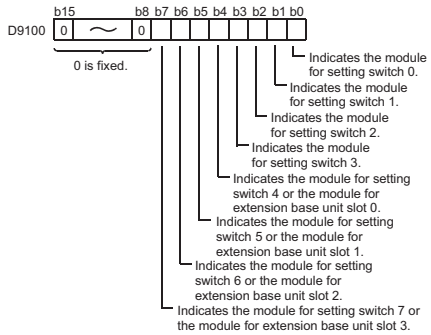
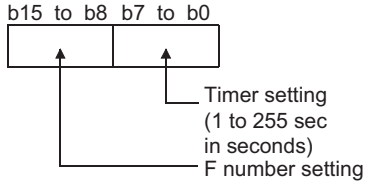
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9077</td><td>Sequence accumulation time measurement</td><td>Accumulation time setting</td><td>• Stores the accumulation time used by M9077.
Setting range: 1 to 255ms (Default: 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>A1S(J)HCPU, 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 App2.2 Special Register 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 AnN*, AnA*, AnU, A2US(H), A2C, AOJ2H, QCPU-A (A Mode), AnS, AnSH, A1FX.
*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 AnN, A3V, AnA, A73, 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 with 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-II Programming Manual.

Table App2.2 Special Register 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.)  Turns on all the bits corresponding to the output module number (in units of 16 points) in output points occupied by the modules on modules with more than 16 output points. (Example) On a module with 64 points attached to slot 0, b3 to b0 turn on when a fuse blow is detected. • 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.) (For the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off M9000 (fuse blown). (For the CPU other than the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off D9100 to D9107 (fuse blown).	○	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 App2.2 Special Register List (Continue)

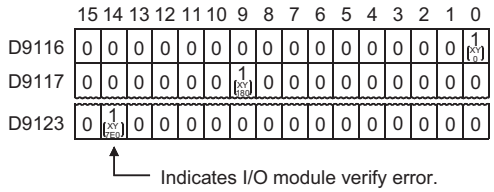
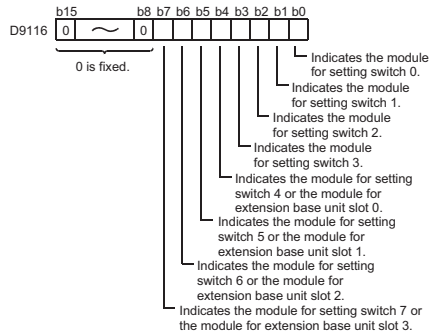
Number	Name	Description	Details	Applicable CPU	
*1 D9116 *1 D9117 *1 D9118 *1 D9119 *1 D9120 *1 D9121 *1 D9122 *1 D9123	I/O module verify error	Bit pattern in units of 16 points of verify error units	• When I/O modules, of which data are different from those entered at power-on, have been detected, the 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.)  Turns on all the bits corresponding to the I/O module number (in units of 16 points) in input/output points occupied by the modules on modules with more than 16 input/output points. (Example) On a module with 64 points attached to slot 0, b3 to b0 turn on when an error is detected. • 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 App2.2 Special Register 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 App2.2 Special Register List (Continue)

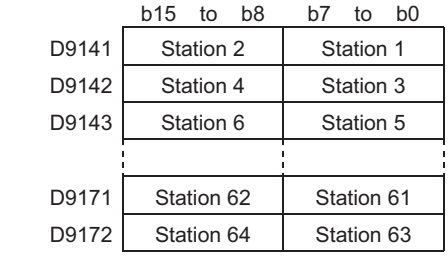
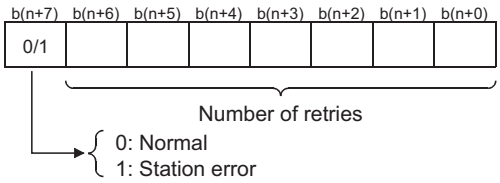
Number	Name	Description	Details	Applicable CPU	
D9141 D9142 D9143 D9144 D9145 D9146 D9147 D9148 D9149 D9150 D9151 D9152 D9153 D9154 D9155 D9156 D9157 D9158 D9159 D9160 D9161 D9162 D9163 D9164 D9165 D9166 D9167 D9168 D9169 D9170 D9171 D9172	Number of times of retry execution	Number of retries	• Stores 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.

Table App2.2 Special Register List (Continue)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th colspan="3">Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td rowspan="5">D9173</td><td rowspan="5">Mode setting</td><td rowspan="5">0: Automatic online return enabled
1: Automatic online return disabled
2: Transmission stop at online error
3: Line check</td><td colspan="3">Mode setting</td><td rowspan="5">—</td><td rowspan="5">Usable with A2C and A52G.</td></tr>
<tr><td>0</td><td>Auto-matic online return enabled</td><td>• 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.</td></tr>
<tr><td>1</td><td>Auto-matic online return disabled</td><td>• 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.</td></tr>
<tr><td>2</td><td>Trans-mission stop at online error</td><td>• 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.</td></tr>
<tr><td>3</td><td>Line check</td><td>• Checks hardware and connecting cables of I/O modules and remote terminal modules.</td></tr>
<tr><td>D9174</td><td>Setting of the number of retries</td><td>Number of retries</td><td colspan="3">• 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.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9175</td><td>Line error retry counter</td><td>Number of retries</td><td colspan="3">• 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.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9180
D9181
D9182
D9183
D9184
D9185
D9186
D9187
D9188
D9189
D9190
D9191
D9192
D9193</td><td>Remote terminal module error number</td><td>Remote terminal number</td><td colspan="3">• 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.
D9180 Remote terminal module No.1
D9181 Remote terminal module No.2
D9182 Remote terminal module No.3
⋮
D9192 Remote terminal module No.13
D9193 Remote terminal module No.14
Remote terminal module numbers from 1 to 14 are set with D9020 to D9034.
• 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.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

Table App2.2 Special Register List (Continue)

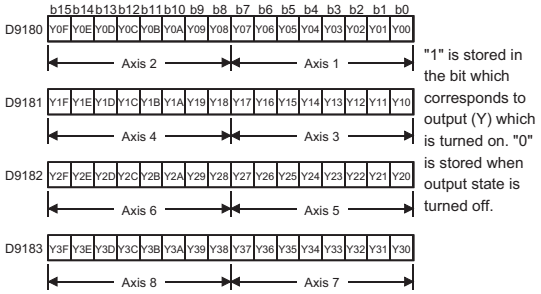
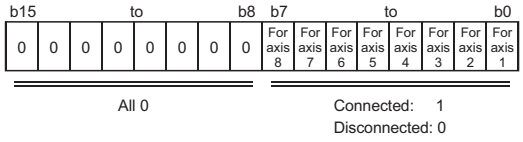
Number	Name	Description	Details		
D9180	Limit switch output state storage areas for axes 1 and 2	Bit pattern of limit switch function output state	• Stores output state of limit switch function.  "1" is stored in the bit which corresponds to output (Y) which is turned on. "0" is stored when output state is turned off.	—	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 App2.2 Special Register List (Continue)

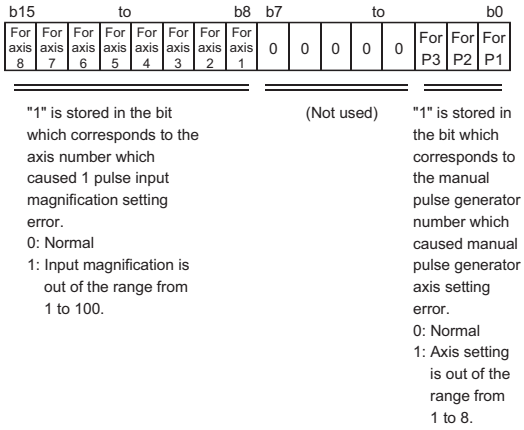
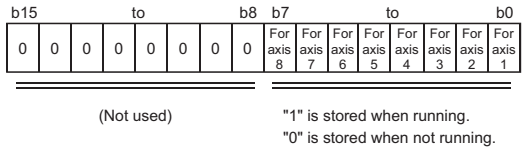
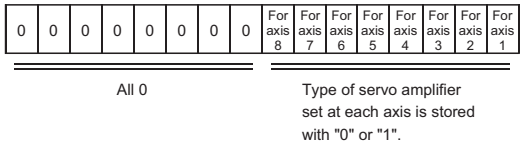
Number	Name	Description	Details		
D9187	Manual pulse generator axis setting error	Manual pulse generator axis setting error code	• Stores error code when the manual pulse generator axis setting error flag (M9077) is turned on in the bit each corresponds to each axis number. 	—	Dedicated to A73.
D9188	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. 	—	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. 	—	Dedicated to A73.

Table App2.2 Special Register List (Continue)

Number	Name	Description	Details		
D9196 D9197 D9198 D9199	Faulty station detection	Bit pattern of the faulty station	• 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	—	Usable with A2C and A52G.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D9196	Stasion 16	Stasion 15	Stasion 14	Stasion 13	Stasion 12	Stasion 11	Stasion 10	Stasion 9	Stasion 8	Stasion 7	Stasion 6	Stasion 5	Stasion 4	Stasion 3	Stasion 2	Stasion 1
D9197	Stasion 32	Stasion 31	Stasion 30	Stasion 29	Stasion 28	Stasion 27	Stasion 26	Stasion 25	Stasion 24	Stasion 23	Stasion 22	Stasion 21	Stasion 20	Stasion 19	Stasion 18	Stasion 17
D9198	Stasion 48	Stasion 47	Stasion 46	Stasion 45	Stasion 44	Stasion 43	Stasion 42	Stasion 41	Stasion 40	Stasion 39	Stasion 38	Stasion 37	Stasion 36	Stasion 35	Stasion 34	Stasion 33
D9199	Stasion 64	Stasion 63	Stasion 62	Stasion 61	Stasion 60	Stasion 59	Stasion 58	Stasion 57	Stasion 56	Stasion 55	Stasion 54	Stasion 53	Stasion 52	Stasion 51	Stasion 50	Stasion 49

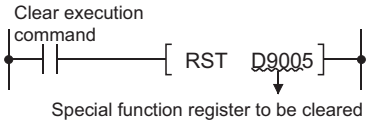
1: Error
0: Normal

POINT

(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/STOP 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 Replacing AnSCPU with AnSHCPU

Appendix 3.1 Differences between A1SHCPU and A1SCPU

The differences between the A1SHCPU and A1SCPU are as follows:

	Item	A1SHCPU	A1SCPU
1	Operation processing speed *1	0.33 μs	1 μs
2	Number of 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	64k bytes	32k bytes
5	Comment points	MAX.3648 points	MAX.1600 points*3
6	CC-Link dedicated instructions	8	Not provided
7	Startup model	A3	A1S
8	Memory write protection range	First 32k bytes	First 20k bytes
9	Microcomputer program	There are some restrictions.	There are no restrictions.
10	Conventional memory cassette A1SMCA-2KE/8KE/8KP	×	○
	New-type memory cassette A1SNMCA-2KE/8KE/8KP	○	○
11	Clock precision	Year, month, day, hour, minute, day of the week (automatic detection of the leap year)	
		Precision -3.1 to +5.3s(TYP.+1.7s)/d at 0℃ -1.6 to +5.3s(TYP.+2.4s)/d at 25℃ -9.6 to +3.6s(TYP.-2.1s)/d at 55℃	Precision -2.3 to +4.4s(TYP.+1.8s)/d at 0℃ -1.1 to +4.4s(TYP.+2.2s)/d at 25℃ -9.6 to +2.7s(TYP.-2.4s)/d at 55℃

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

*2 The number of the actual I/O points is the same as the AnS series, but this model has 2048 points of I/O device for each CPU (X/Y0 to X/Y7FF). The added I/O devices 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 Differences between A2SHCPU(S1) and A2SCPU

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

	Item	A2SHCPU(S1)	A2SCPU
1	Operation processing speed*1	0.25 μs	1 μs
2	Number of 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 instructions	8	Not provided
5	Startup model	A3	A2
6	Microcomputer program	There are some restrictions.	There are no restrictions.
7	Conventional memory cassette A2SMCA-14KE/14KP	×	○
	New-type memory cassette A2SNMCA-30KP	○	○
8	Clock precision	Year, month, day, hour, minute, day of the week (automatic detection of the leap year)	
		Precision -3.1 to +5.3s(TYP.+1.7s)/d at 0℃ -1.6 to +5.3s(TYP.+2.4s)/d at 25℃ -9.6 to +3.6s(TYP.-2.1s)/d at 55℃	Precision -2.3 to +4.4s(TYP.+1.8s)/d at 0℃ -1.1 to +4.4s(TYP.+2.2s)/d at 25℃ -1.1 to +4.4s(TYP.+2.2s)/d at 25℃

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

*2 The number of the actual I/O points is the same as the AnS series, but this model has 2048 points of I/O device for each CPU (X/Y0 to X/Y7FF).The added I/O devices can be used for MELSECNET (/B), MELSECNET/MINI, or CC-Link.

Appendix 3.3 Replacement precautions

Appendix 3.3.1 PLC type setting

The PLC type must be set to "A3" to enable the use of 2048 I/O device (X/Y) points, 8192 file register (R) points, and LEAD/LEDB instructions.

Appendix 3.3.2 Precautions when performing ROM partition

When performing ROM partition for A1SJHCPU(S8) or A1SHCPU with the SW4GP-GPPA, the startup model must be changed as follows.

	Startup Model
Software version Q or earlier	A0J2H
Software version R or later	A1S

Appendix 3.3.3 Precautions when utilizing sequence programs

When applying parameters and programs created for AnSCPU to AnSHCPU, follow the procedures below.

(1) Select "Read File" from the initial setting menu after starting up the GPP function software package.

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

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

(4) Select the file maintenance menu to read the parameters and programs created for AnSCPU from the floppy or hard disk into the peripheral device.
(Ignore the error message 'Unmatched PLC Type' even if such a message appers.)

The above procedures allow parameters and programs for AnSCPU to be used for AnSHCPU without any change or modification.

Appendix 3.3.4 Checking the influence of the increased instruction processing speed on the system

Confirm the influences of the increased instruction processing speed and reduced scan time on the user system.

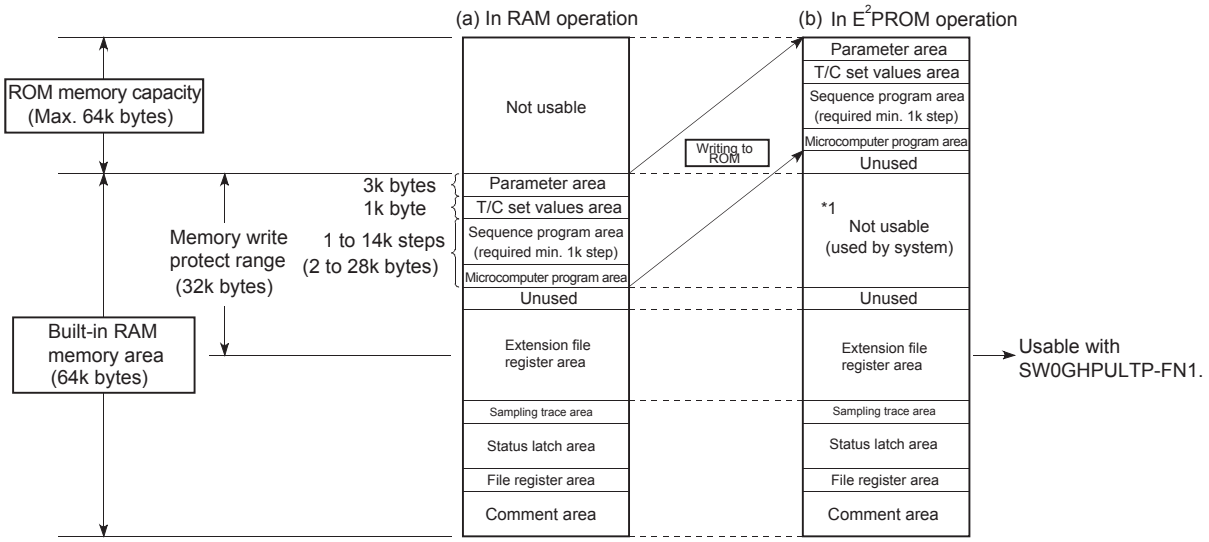
Appendix 3.3.5 Handling conventional memory cassettes

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 Replacing the A2SMCA-14KP (when A2SCPU + A2SMCA-14KP has been used)

When replacing the above with A2SHCPU + A2SNMCA-30KE, the area *1 cannot be used for the extension file register.

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



Appendix 3.3.7 Restrictions on microcomputer programs

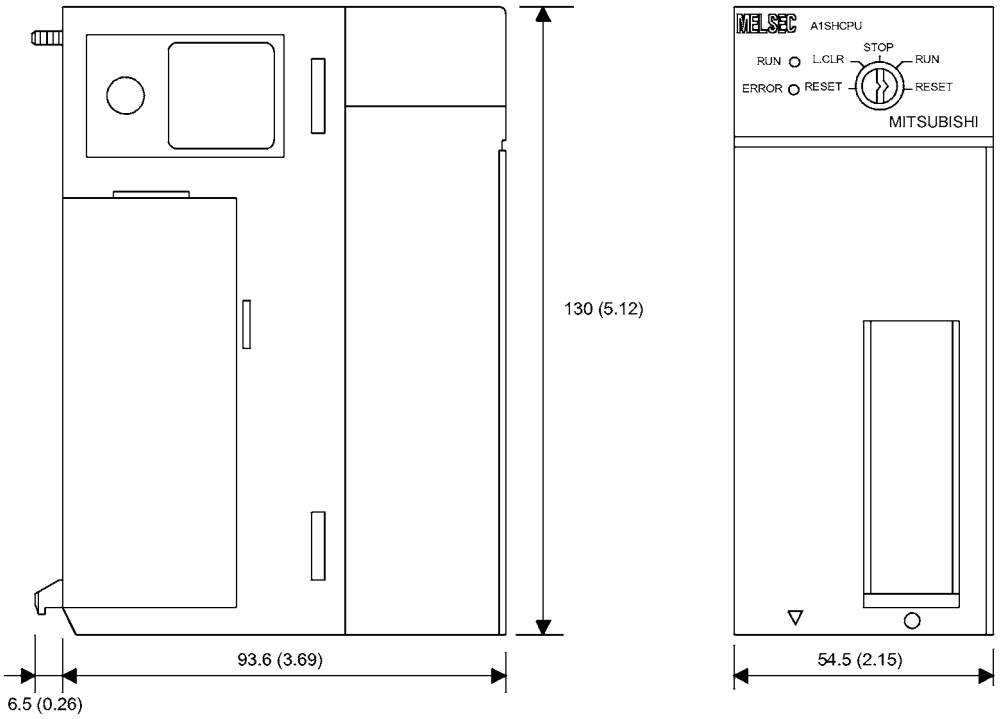
When using the microcomputer mode, the following changes are made in the microcomputer instructions.

Changes by Replacing AnSCPU with AnSHCPU	Corrective Action
When REP LODSW and REP LODSB instructions are used	Refer to the following program example.
AnSCPU ..... The contents of the memory specified by the SI register are transfered to the register of AL (8-bit operation) or AX (16-bit operation) for the number of times specified in the CX register. After the instructions are executed, the CX register value becomes 0.	Program example
AnSHCPU.... The contents of the memory specified by the SI register are transfered to the register of AL (8-bit operation) or AX (16-bit operation) only once regardless of the value of the CX register. After the instructions are executed, the CX register value does not change.	STD STD MOV CX.3 MOV CX.3 REP LODSB → A: LODSB Loop A

Appendix 4 External Dimensions

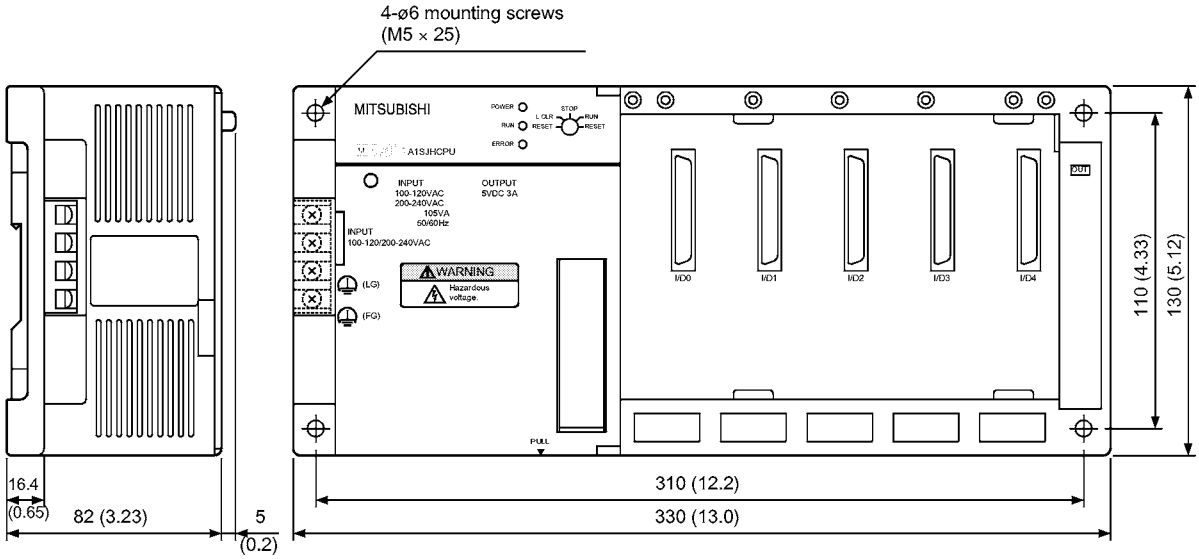
Appendix 4.1 CPU module

Appendix 4.1.1 A1SHCPU, A2SHCPU(S1) module



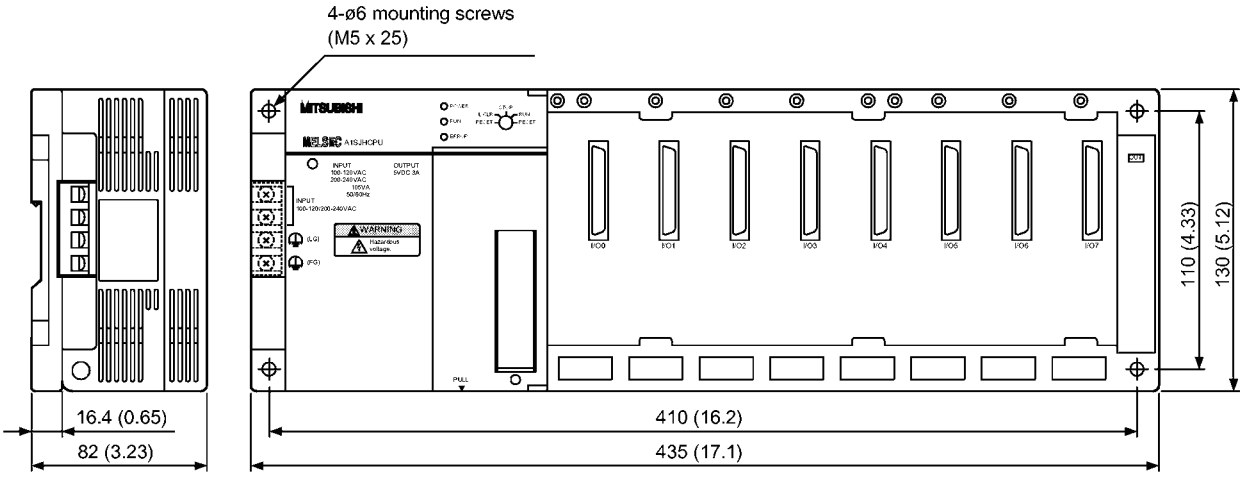
Unit : mm (inch)

Appendix 4.1.2 A1SJHCPU module



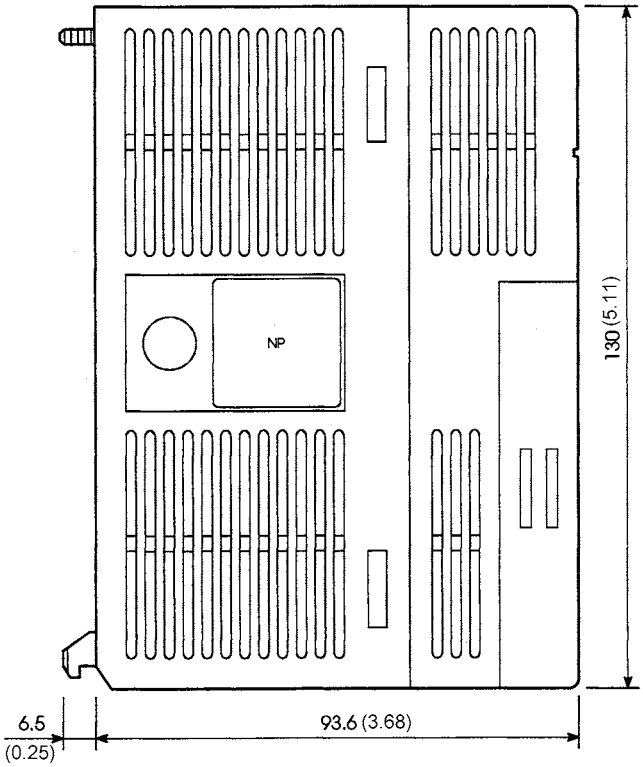
Unit : mm (inch)

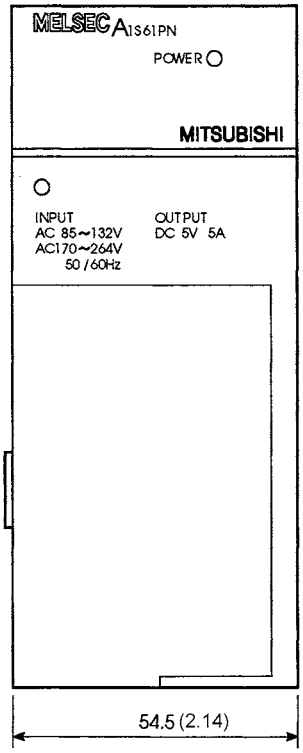
Appendix 4.1.3 A1SJHCPU-S8 module



Unit : mm (inch)

Appendix 4.2 A1S61PN, A1S62PN and A1S63P power supply modules

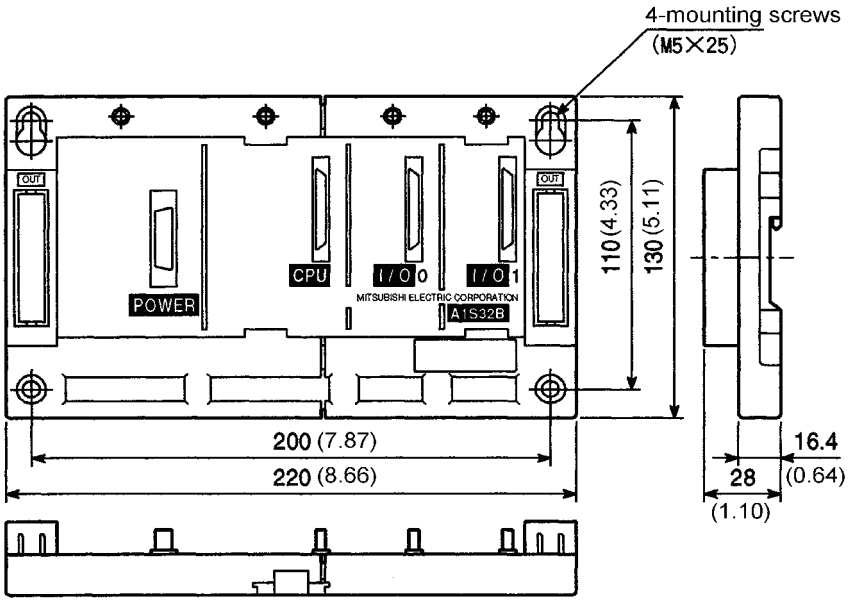




Unit : mm (inch)

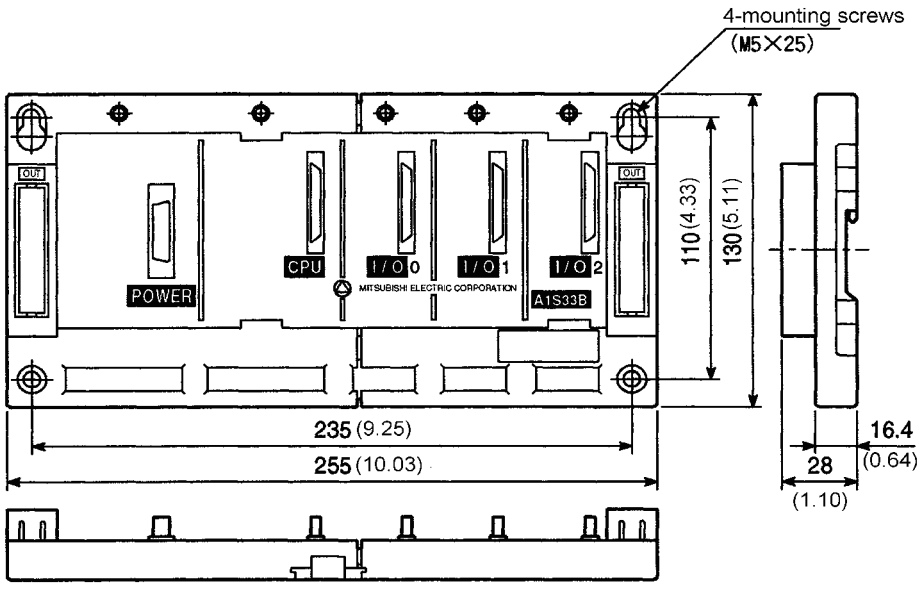
Appendix 4.3 Main base unit

Appendix 4.3.1 A1S32B main base unit



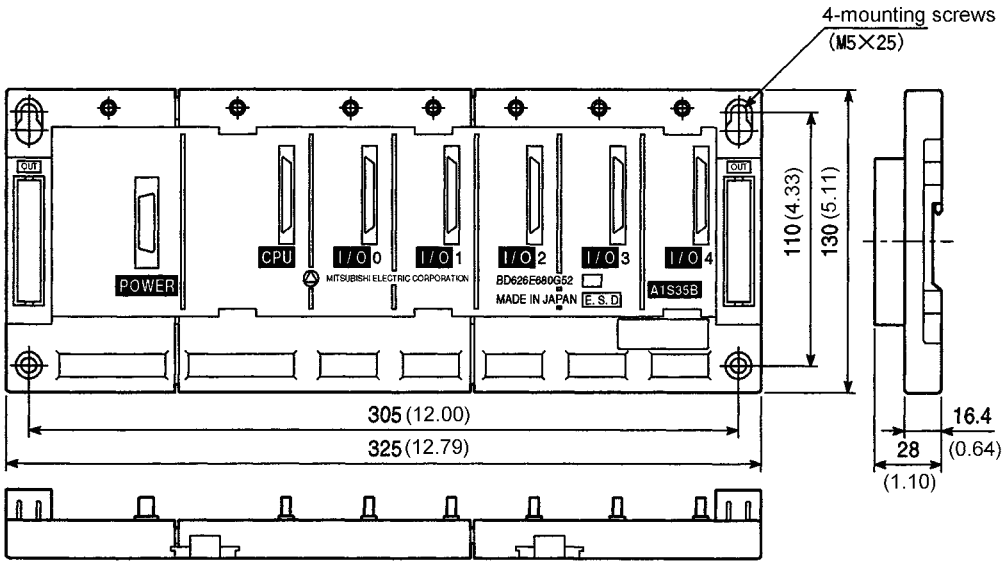
Unit : mm (inch)

Appendix 4.3.2 A1S33B main base unit



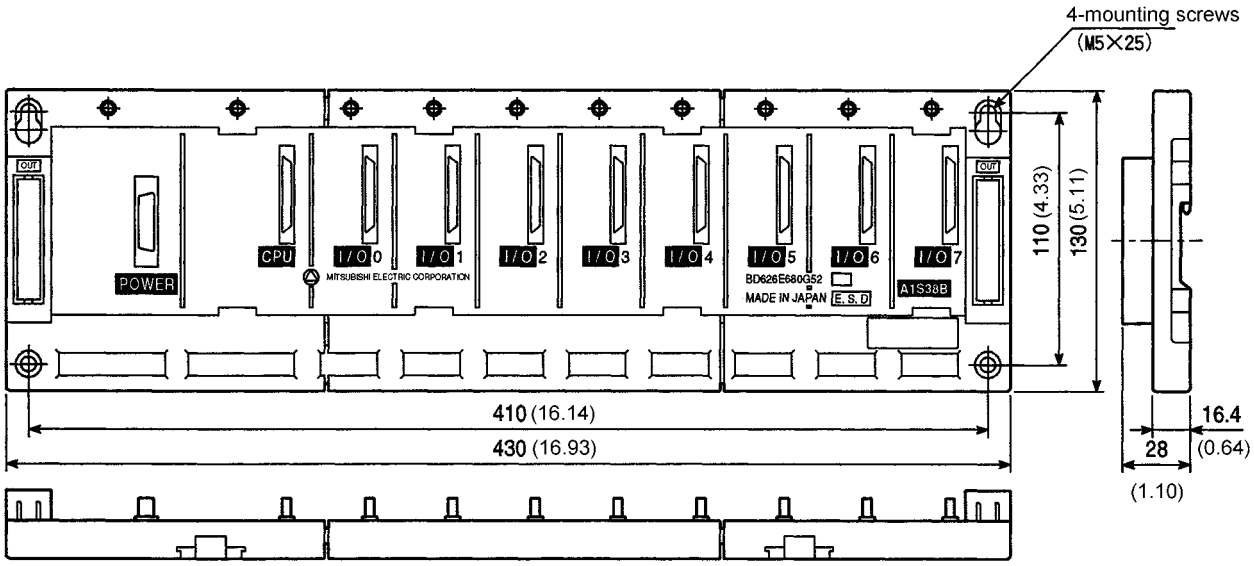
Unit : mm (inch)

Appendix 4.3.3 A1S35B main base unit



Unit : mm (inch)

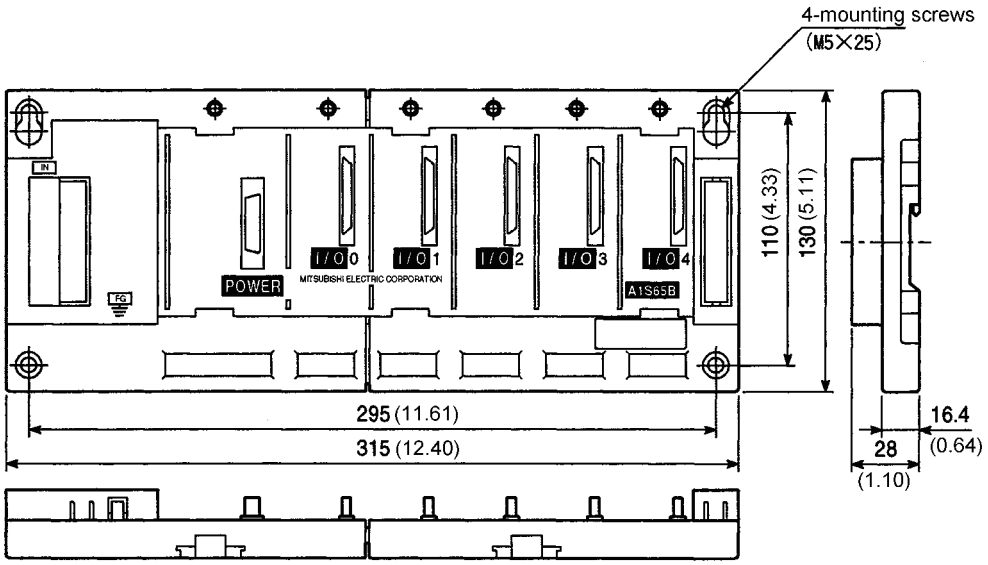
Appendix 4.3.4 A1S38B main base unit



Unit : mm (inch)

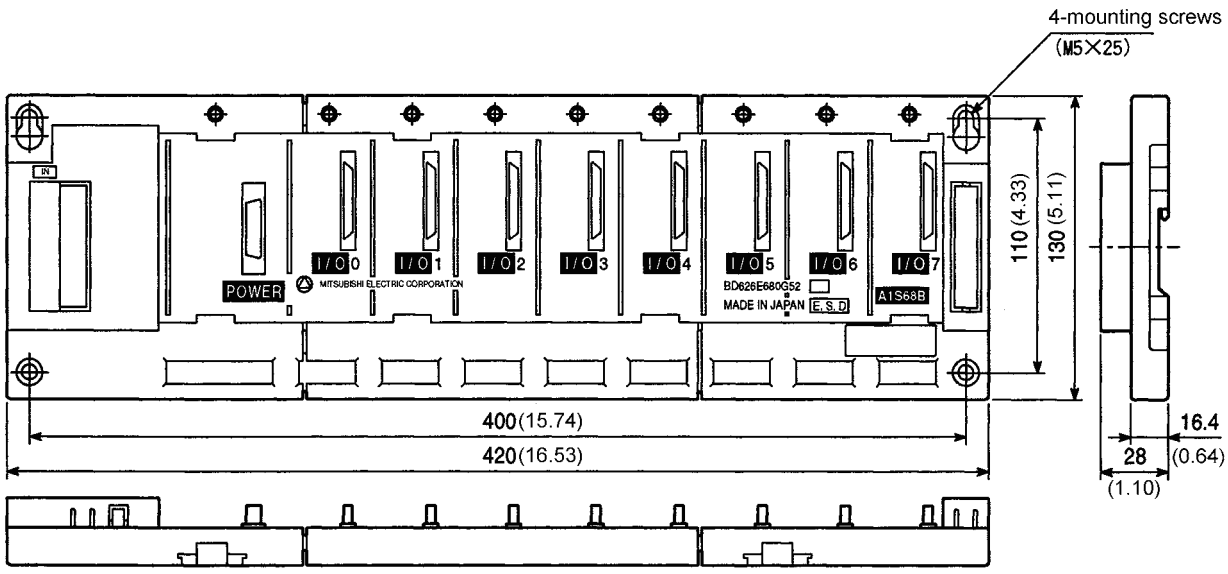
Appendix 4.4 Extension base unit

Appendix 4.4.1 A1S65B extension base unit



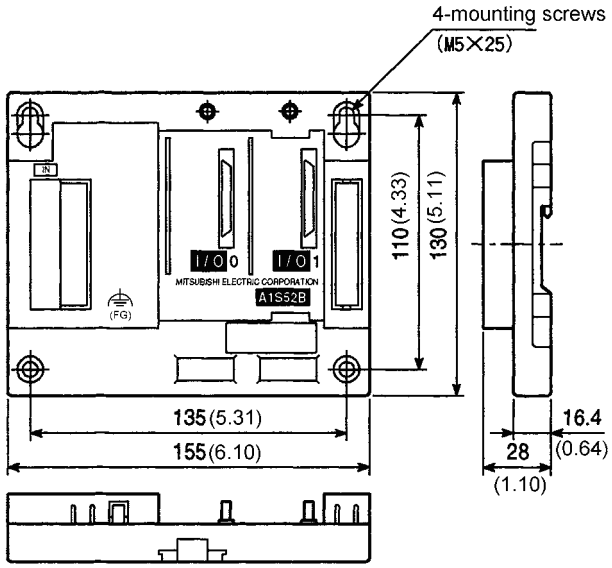
Unit : mm (inch)

Appendix 4.4.2 A1S68B extension base unit



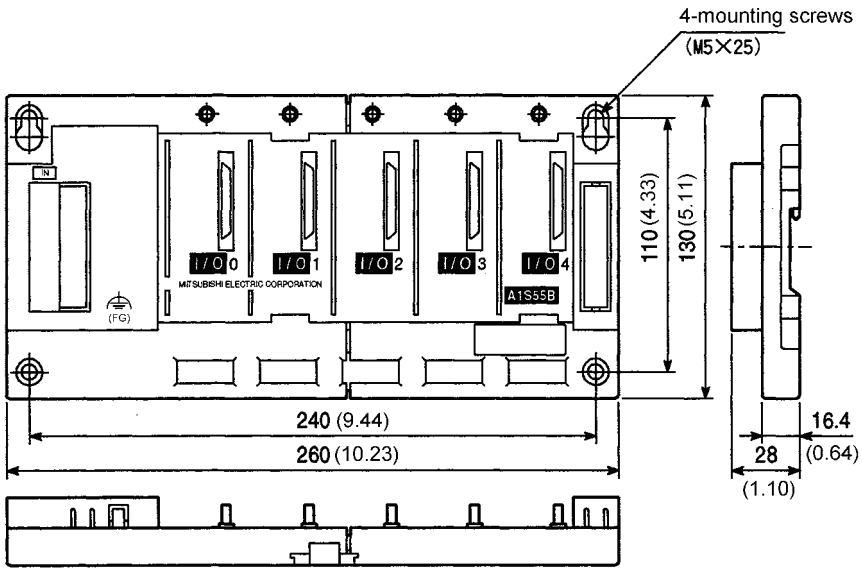
Unit : mm (inch)

Appendix 4.4.3 A1S52B extension base unit



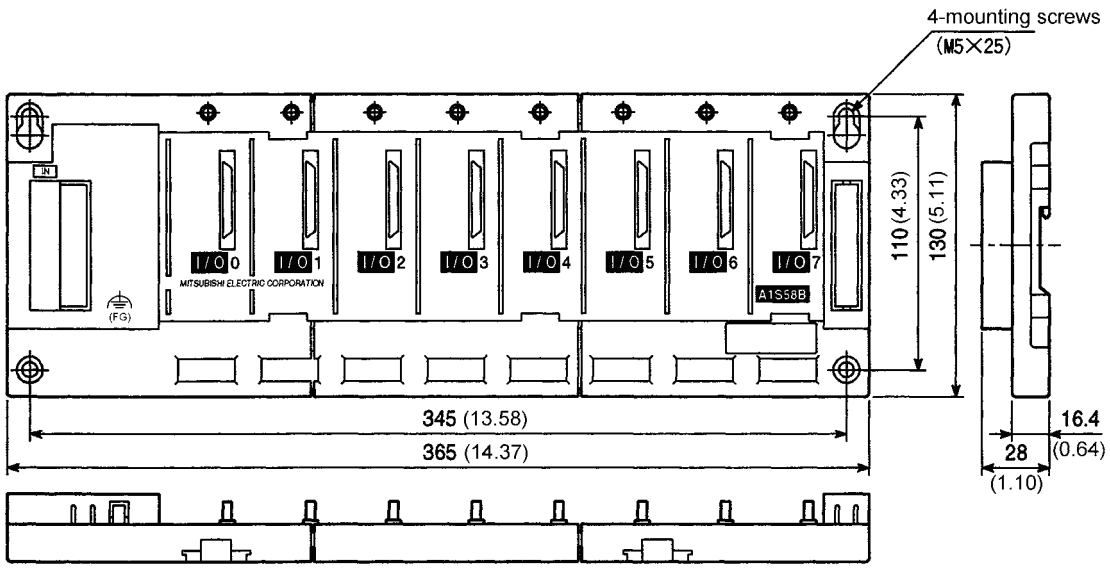
Unit : mm (inch)

Appendix 4.4.4 A1S55B extension base unit



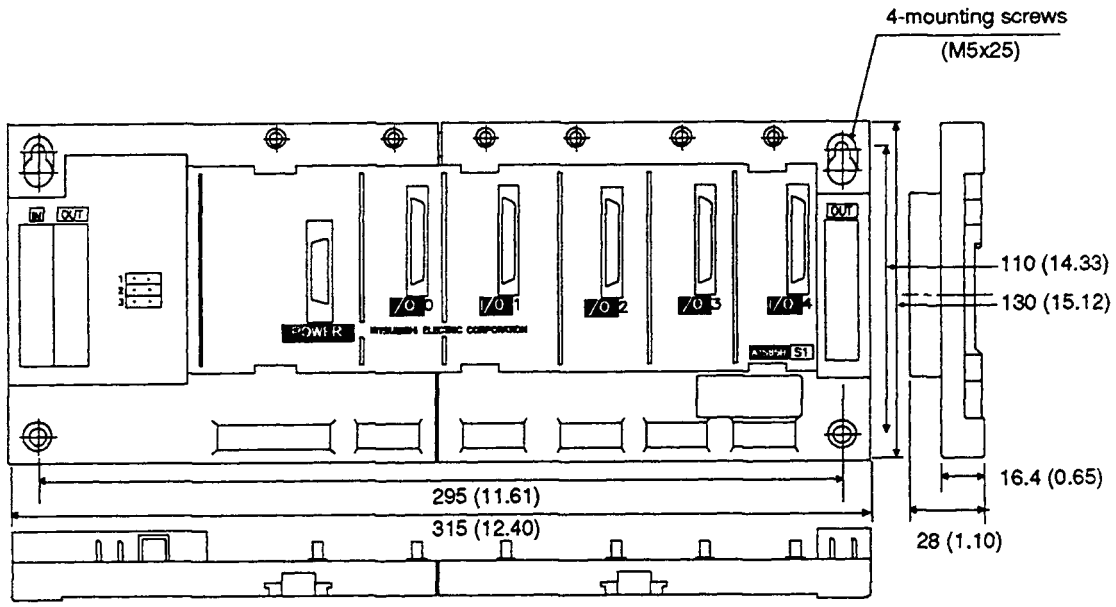
Unit : mm (inch)

Appendix 4.4.5 A1S58B extension base unit



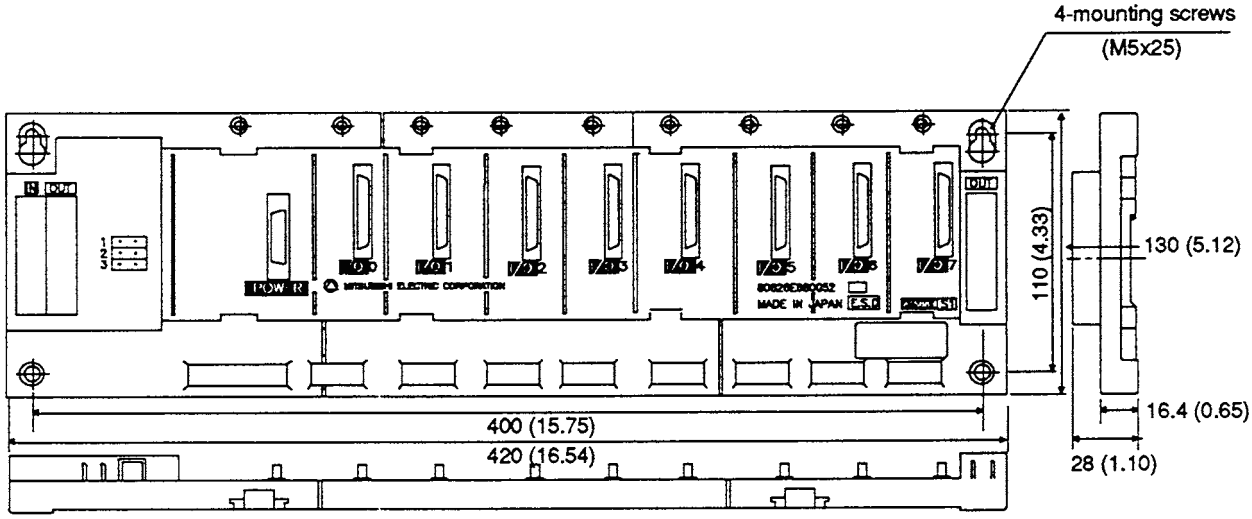
Unit : mm (inch)

Appendix 4.4.6 A1S65B-S1 extension base unit



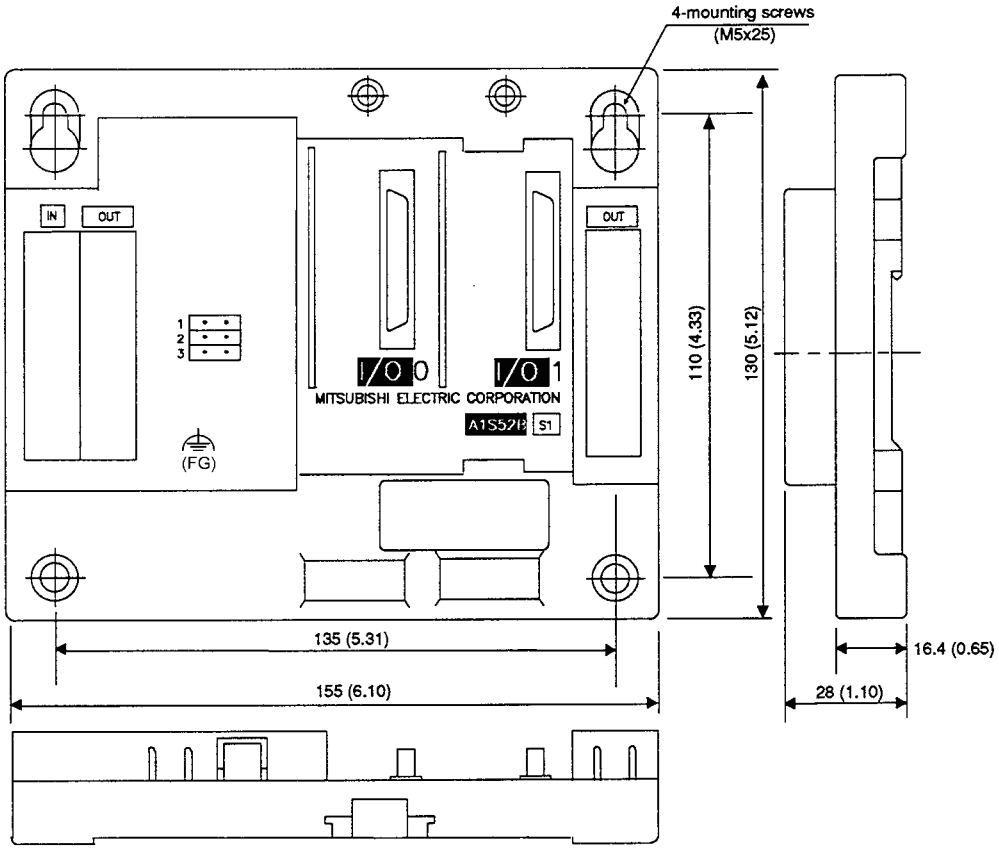
Unit : mm (inch)

Appendix 4.4.7 A1S68B-S1 extension base unit



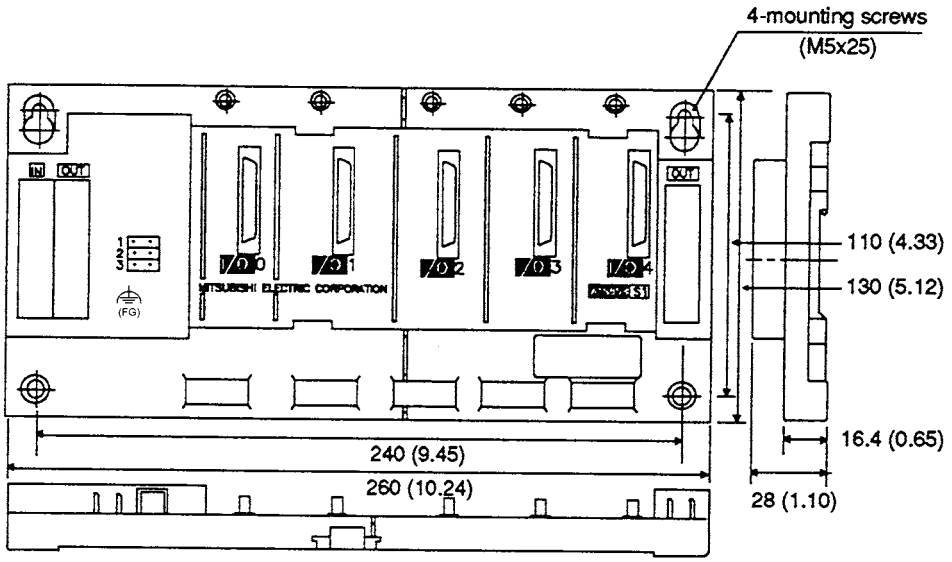
Unit : mm (inch)

Appendix 4.4.8 A1S52B-S1 extension base unit



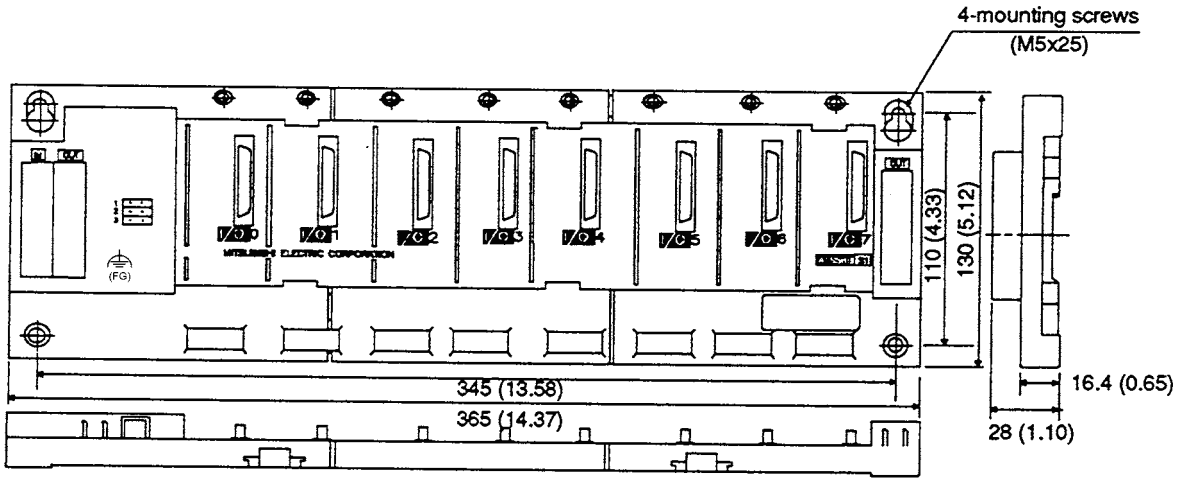
Unit : mm (inch)

Appendix 4.4.9 A1S55B-S1 extension base unit



Unit : mm (inch)

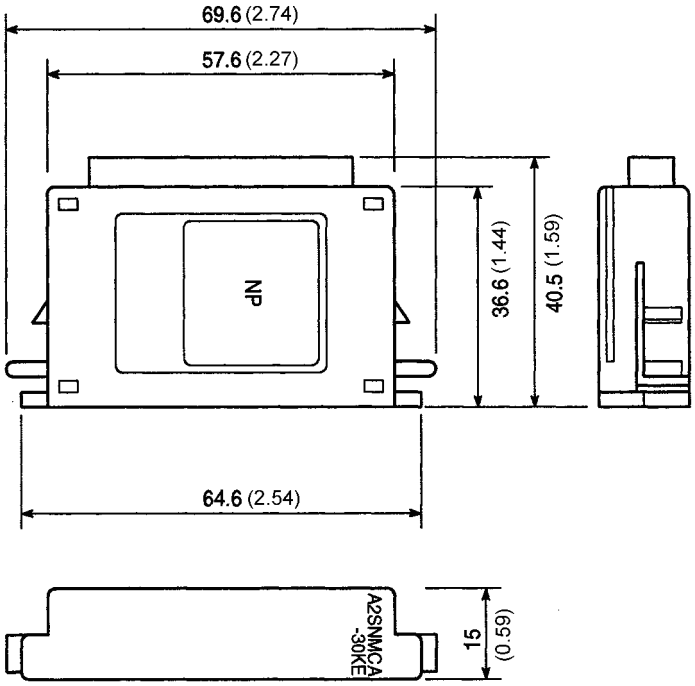
Appendix 4.4.10A1S58B-S1 extension base unit



Unit : mm (inch)

Appendix 4.5 Memory cassette

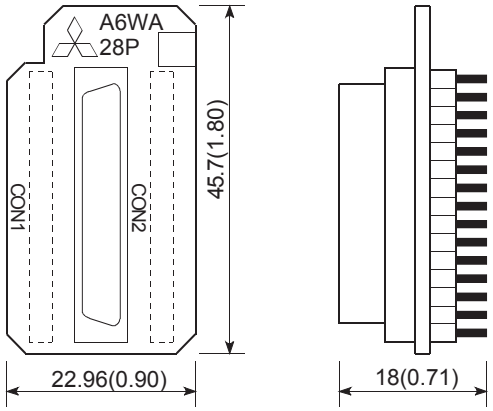
Appendix 4.5.1 AnSNMCA-[ ] memory cassette



Unit : mm (inch)

Appendix 4.6 Memory write adapter

Appendix 4.6.1 A6WA-28P memory write adapter



Unit : mm (inch)

Appendix5 Transportation Precautions

When transporting lithium batteries, make sure to handle them based on the transportation regulations.

Appendix5.1 Relevant models

The batteries used for CPU modules are classified as follows:

Product Name	Model Name	Description	Handling Category
A series battery	A6BAT	Lithium battery	Non-dangerous goods

Appendix5.2 Transportation Guidelines

Products are packed properly in compliance with the transportation regulations prior to shipment. When repacking any of the unpacked products to transport it to another location, make sure to observe the IATA Dangerous Goods Regulations, IMDG Code and other local transportation regulations.

For details, please consult your transportation company.

Appendix6 Handling of Batteries and Devices with Built-in Batteries in EU Countries

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

Appendix6.1 Disposal precautions

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

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

Symbol mark

Note: This symbol mark is for EU countries only.
The symbol mark is specified in the EU directive 2006/66/EC Article 20
A gInformation for end usersAh and Annex II.

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

Appendix6.2 Exportation precautions

In accordance with the enforcement of the new EU Battery Directive (2006/66/EC), the following must be required when marketing or exporting batteries and/or devices with builtin batteries to EU coutries.

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

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

(2) Explaining the symbol mark in the manuals
To export devices incorporating Mitsubishi programmable controller to EU countries on September 26, 2008 or later, provide the latest manuals that include the explanation of the symbol mark.
If no Mitsubishi manuals or any old manuals without the explanation of the symbol mark are provided, separately attach an explanatory note regarding the symbol mark to each manual of the devices.

POINT

The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive.

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MEMO

WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.
[Gratis Warranty Term]
The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.
[Gratis Warranty Range]

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

2. Onerous repair term after discontinuation of production

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

3. Overseas service

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

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

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

5. Changes in product specifications

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

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

User's Manual

MODEL	ANSHCPU-U-E
MODEL CODE	13JL22
IB(NA)-66779-N(1101)MEE	

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