MITSUBISHI ELECTRIC

Safety Programmable Controller

MELSEC QS series

QSCPU User's Manual (Hardware Design, Maintenance and Inspection)

-QS001CPU

●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.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

● When a safety programmable controller detects an error in an external power supply or a failure in programmable controller, it turns off all the outputs.
Create an external circuit to securely stop the power of hazard by turning off the outputs. Incorrect configuration may result in an accident.

● Create short current protection for a safety relay, and a protection circuit such as a fuse, and breaker, outside a safety programmable controller.

● When data/program change, or status control is performed from a personal computer to a running safety programmable controller, create an interlock circuit outside the sequence program and safety programmable controller to ensure that the whole system always operates safely.
For the operations to a safety programmable controller, pay full attention to safety by reading the relevant manuals carefully, and establishing the operating procedure.
Furthermore, for the online operations performed from a personal computer to a safety CPU module, the corrective actions against a communication error due to a cable connection fault, etc. should be predetermined as a system.

[Design Precautions]

⚠WARNING

- All output signals from a safety CPU module to the CC-Link Safety system master module are prohibited to use.
  These signals can be found in the CC-Link Safety System Master Module User's Manual.
  Do not turn ON or OFF these signals by sequence program, since turning ON/OFF these output signals of the programmable controller system may cause malfunctions and safety operation cannot be guaranteed.

- All output signals from a safety CPU module to the CC-Link IE Field Safety Network master/local module (with safety functions) are prohibited to use.
  These signals can be found in the MELSEC-QS CC-Link IE Field Safety Network Master/Local User's Manual.
  Do not turn ON or OFF these signals by sequence program, since turning ON/OFF these output signals of the programmable controller system may cause malfunctions and safety operation cannot be guaranteed.

- When a safety remote I/O module has detected a CC-Link Safety error, it turns off all the outputs. Note that the outputs in a sequence program are not automatically turned off.
  If a CC-Link Safety or CC-Link IE Field Network error has been detected, create a sequence program that turns off the outputs in the program.
  If the CC-Link Safety or CC-Link IE Field Network is restored with the outputs on, it may suddenly operate and result in an accident.

- To inhibit restart without manual operation after safety functions was performed and outputs were turned OFF, create an interlock program which uses a reset button for restart.

- To prevent an illegal operation and malfunction, do not connect a safety programmable controller to the Internet or to a wireless LAN.

[Design Precautions]

⚠CAUTION

- Do not install the wires of external devices or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them.
  Failure to do so may result in malfunction due to noise.

- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size.
  Design circuits so that the entire system will always operate safely, regardless of the time.

[Installation Precautions]

⚠CAUTION

- Use the safety programmable controller in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.

- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect interconnection may cause malfunction, failure, or drop of the module.
  Secure the module to the base unit with screws.
  Tighten the screws within the specified torque range.
  Undertightening can cause drop of the screw, short circuit, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may result in damage to the product.

- Do not directly touch any conductive part of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before wiring.
  Failure to do so may result in electric shock or damage to the product.

- After wiring, attach the included terminal cover to the module before turning it on for operation.
  Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 Ω or less.
  Failure to do so may result in electric shock or malfunction.

- Use a solderless terminal with insulation sleeve for wiring of a terminal block.
  Use up to two solderless terminals for a single terminal.

- Use applicable solderless terminals and tighten them within the specified torque range.
  If any spade solderless terminal is used, it may be disconnected when a terminal block screw comes loose, resulting in failure.

- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.

- Tighten the terminal block mounting screws, terminal screws, and module fixing screws within the specified torque range.
  Undertightening of the terminal block mounting screws or terminal screws can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
  Undertightening of the module fixing screws can cause drop of the module.
  Overtightening can damage the screw and/or module, resulting in drop.

- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.

- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

[Wiring Precautions]

⚠CAUTION

● Mitsubishi programmable controllers must be installed in control panels.
Connect the main power supply to the power supply module in the control panel through a relay terminal block.
Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock.
(For the wiring methods, refer to Section 10.3.)

[Startup and Maintenance Precautions]

⚠WARNING

● Do not touch any terminal while power is on.
Doing so will cause electric shock.

● Correctly connect the battery connector.
Do not charge, disassemble, heat, short-circuit, or solder the battery, or throw it into the fire.
Doing so will cause the battery to produce heat, explode, or ignite, resulting in injury and fire.

● Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal block mounting screws, terminal screws, or module fixing screws.
Failure to do so may result in electric shock.
Tighten these screws within the specified torque range.
Undertightening of the terminal block mounting screws or terminal screws can cause short circuit, fire, or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
Undertightening of the module fixing screws can cause drop of the module.
Overtightening can damage the screw and/or module, resulting in drop.

[Startup and Maintenance Precautions]

⚠CAUTION

- The online operations performed from a personal computer to a running safety programmable controller (Program change when a safety CPU module is RUN, device test, and operating status change such as RUN-STOP switching) have to be executed after the manual has been carefully read and the safety has been ensured.
  Following the operating procedure predetermined at designing, the operation has to be performed by an instructed person.
  When changing a program while a safety CPU module is RUN (Write during RUN), it may cause a program breakdown in some operating conditions.
  Fully understand the precautions described in the GX Developer's manual before use.

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.
  If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.

- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller.
  Failure to do so may cause malfunction.

- Shut off the external power supply (all phases) used in the system before wiring.
  Failure to do so may cause the module to fail or malfunction.

- After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant):
  • Mounting/removing the module to/from the base unit
  • Mounting/removing the terminal block to/from the module
  Exceeding the limit may cause malfunction.

- Do not drop or apply shock to the battery to be installed in the module.
  Doing so may damage the battery, causing the battery fluid to leak inside the battery.
  If the battery is dropped or any shock is applied to it, dispose of it without using.

- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
  When disposing of batteries, separate them from other wastes according to the local regulations.
  (For details of battery regulations in EU member states, refer to Appendix 4.)

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations.
  (For details of the regulated models, refer to Appendix 3.)

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508, ISO13849-1 from TUV Rheinland, this fact does not guarantee that Product will be free from any malfunction or failure. The user of this Product shall comply with any and all applicable safety standard, regulation or law and take appropriate safety measures for the system in which the Product is installed or used and shall take the second or third safety measures other than the Product. MELCO is not liable for damages that could have been prevented by compliance with any applicable safety standard, regulation or law.

(2) MELCO prohibits the use of Products with or in any application involving, and MELCO shall not be liable for a default, a liability for defect warranty, a quality assurance, negligence or other tort and a product liability in these applications.
 (a) power plants,
 (b) trains, railway systems, airplanes, airline operations, other transportation systems,
 (c) hospitals, medical care, dialysis and life support facilities or equipment,
 (d) amusement equipments,
 (e) incineration and fuel devices,
 (f) handling of nuclear or hazardous materials or chemicals,
 (g) mining and drilling,
 (h) and other applications where the level of risk to human life, health or property are elevated.

REVISIONS

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

Print Date	Manual Number	Revision
Sep., 2006	SH(NA)-080626ENG-A	First edition
May, 2007	SH(NA)-080626ENG-B	Correction Section 2.2, 4.1, 5.1, 6.1, 9.1.1, 9.1.3, 10.1, 10.3.1, 10.3.2, 12.2.1, 12.2.10 Addition Section 12.2.12
Apr., 2008	SH(NA)-080626ENG-C	Correction ABOUT MANUALS, GENERIC TERMS AND ABBREVIATIONS, Section 1.1, 2.1, 4.2, 4.3, 4.4, 5.1, 5.3, 6.2, 8.1, 9.1.3, 9.1.4, 9.2.1, 10.2.1, 10.2.3, 10.3.1, 10.3.2, 11.1, 11.2, 12.2.1, 12.2.3, 12.2.4, 12.2.5, 12.2.7, 12.2.8, 12.2.9, 12.2.12, 12.3.1, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8, 12.6, 12.7 Addition Section 2.1.1, Appendix 2
Sep., 2008	SH(NA)-080626ENG-D	Correction Section 10.2.1 Addition SAFETY PRECAUTIONS, Section 7.1, Appendix 4
Apr., 2009	SH(NA)-080626ENG-E	Change of a term "PLC" was changed to "programmable controller". Correction ABOUT MANUALS GENERIC TERMS AND ABBREVIATIONS Chapter 1, Section 2.1.1, Chapter 3, Chapter 9, Section 11.3.1, Section 11.3.2, Section 12.3.3, Section 12.3.6
Feb., 2010	SH(NA)-080626ENG-F	Correction SAFETY PRECAUTIONS, Section 2.1, 4.1, 7.1.1, 7.1.2, Chapter 11, Section 11.3.1, 12.3.3, Appendix 1.1, Appendix 1.3 Addition CONDITIONS OF USE FOR THE PRODUCT
Jul., 2010	SH(NA)-080626ENG-G	Correction SAFETY PRECAUTIONS, Section 1.1, 2.1, 2.1.1, 4.1, Chapter 9 Addition Section 9.3
May, 2011	SH(NA)-080626ENG-H	Correction SAFETY PRECAUTIONS, ABOUT MANUALS, GENERIC TERMS AND ABBREVIATIONS Section 1.1, 2.1, 2.1.1, 8.1, 9.1.3, 9.2.2, Chapter 10, Section 12.2.7, 12.3.1, 12.3.4, 12.3.5, 12.6, 12.7, Appendix 2
May, 2012	SH(NA)-080626ENG-I	Correction SAFETY PRECAUTIONS, Section 2.3, Chapter 3, Section 5.2, 5.3, 9.1.1, 9.2.1, 10.3.1, 12.6, Appendix 2

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

Print Date	Manual Number	Revision
Jun., 2013	SH(NA)-080626ENG-J	Correction Section 2.1.1, 5.3, 9.1.5 Deletion Section 9.2.5
Feb., 2015	SH(NA)-080626ENG-K	Correction Section 7.1.1
Aug., 2016	SH(NA)-080626ENG-L	Correction SAFETY PRECAUTIONS, ABOUT MANUALS, Section 4.1, 5.1, 6.1, Chapter 9, Section 9.1.2, 9.1.3, 9.1.5, Chapter 10, Section 10.2.1, 10.2.2, 10.3.2, Chapter 11, Section 11.3.1, Appendix 1.1, Appendix 1.2, Appendix 1.3
Dec., 2016	SH(NA)-080626ENG-M	Correction Section 1.1, 9.2.5
Dec., 2017	SH(NA)-080626ENG-N	Correction Section 7.1.1
Jan., 2019	SH(NA)-080626ENG-O	Correction Section 9.1.5

Japanese Manual Version SH-080607-N

INTRODUCTION

Thank you for choosing the Mitsubishi Electric MELSEC-QS series of Safety Programmable Controllers. Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the QS series programmable controller you have purchased, so as to ensure correct use.

CONTENTS

(Related manual).....QSCPU User's Manual (Function Explanation, Program Fundamentals)

CONTENTS

CHAPTER6 FUNCTIONS

APPENDICES

INDEX

ABOUT MANUALS

Introduction Manual

Read the following manual before designing and constructing a safety system.

Manual Name	Manual No. (Model Code)
Safety Application Guide Explains the overview, construction method, laying and wiring examples, and application programs of the safety-related system. (Sold separately)	SH-080613ENG (13JR90)

Related Manuals

The manual related to this product is shown below.
Please place an order as needed.

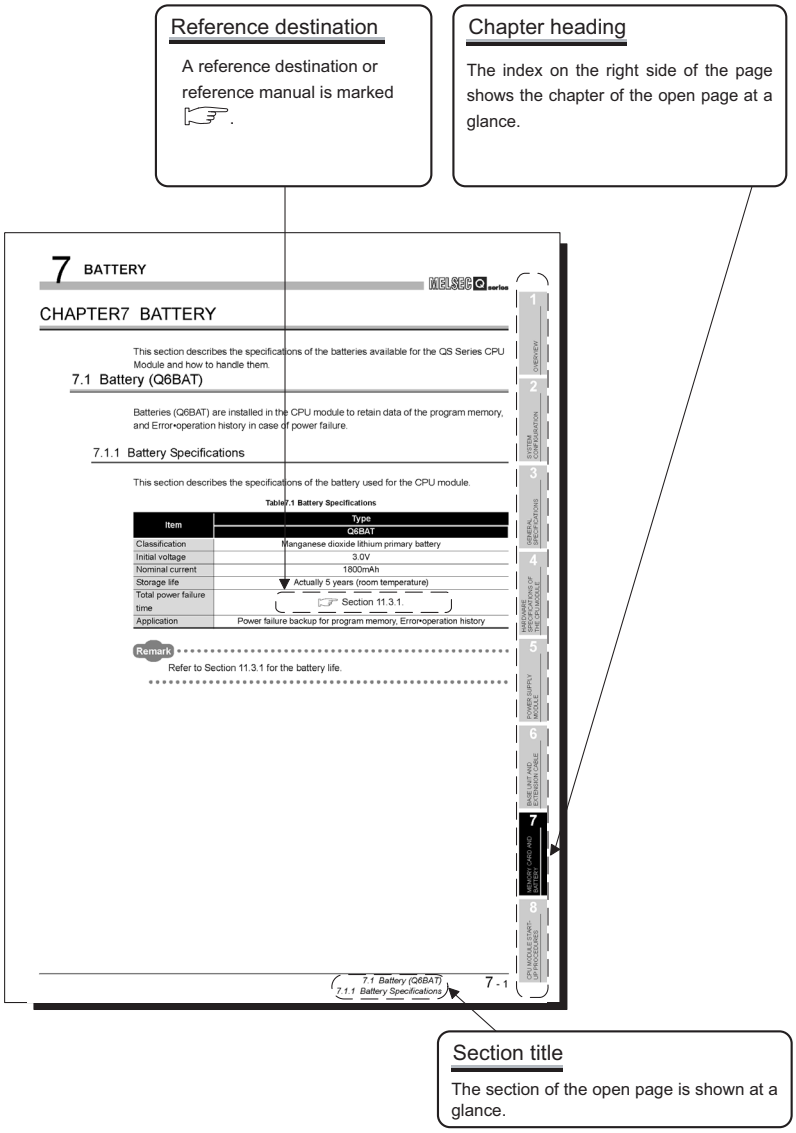
Manual Name	Manual No. (Model Code)
QSCPU User's Manual (Function Explanation, Program Fundamentals) Explains the functions, programming methods, devices and others that are necessary to create programs with the QSCPU. (Sold separately)	SH-080627ENG (13JR93)
QSCPU Programming Manual (Common Instructions) Explains how to use the sequence instructions, basic instructions, application instructions, and QSCPU dedicated instructions. (Sold separately)	SH-080628ENG (13JW01)
CC-Link Safety System Master Module User's Manual Explains the specifications, procedures and settings before operation, parameter settings, and troubleshooting of the QS0J61BT12 CC-Link Safety system master module. (Sold separately)	SH-080600ENG (13JR88)
CC-Link Safety System Remote I/O Module User's Manual Explains the specifications, procedures and settings before operation, parameter settings, and troubleshooting of the CC-Link Safety system remote I/O modules. (Sold separately)	SH-080612ENG (13JR89)
MELSEC-QS CC-Link IE Field Network Master/Local Module User's Manual Explains the specifications, procedures and settings before operation, parameter settings, and troubleshooting of a CC-Link IE Field Network master/local module (with safety functions). (Sold separately)	SH-080969ENG (13JZ53)
MELSEC-Q CC-Link IE Controller Network Reference Manual Explains the system configuration, performance specifications, functions, handling, wiring, and troubleshooting of CC-Link IE Controller Network. (Sold separately)	SH-080668ENG (13JV16)
Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network) Explains the specifications, procedures and settings before operation, parameter settings, programming, and troubleshooting of a MELSECNET/H network system for PLC to PLC network. (Sold separately)	SH-080049 (13JF92)
Q Corresponding Ethernet Interface Module User's Manual (Basic) Explains the specifications, procedures for data communication with external devices, line connection (open/close), fixed buffer communication, random access buffer communication, and troubleshooting of the Ethernet module. (Sold separately)	SH-080009 (13JL88)

Manual Name	Manual No. (Model Code)
MELSEC-Q/L Ethernet Interface Module User's Manual (Application) Explains the e-mail function, programmable controller CPU status monitoring function, communication function via CC-Link IE Controller Network, MELSECNET/H or MELSECNET/10, communication function using the data link instructions, file transfer function (FTP server) of the Ethernet module. (Sold separately)	SH-080010 (13JL89)
MELSEC Communication Protocol Reference Manual Explains the communication methods and control procedures using the MC protocol, which is used by external devices to read and write data of the programmable controller CPU via the serial communication module or Ethernet module. (Sold separately)	SH-080008 (13JF89)

Remark

Printed materials are separately available for single item purchase. Order the manual by quoting the manual number on the table above (Model code).

HOW THIS MANUAL IS ORGANIZED



In addition, this manual provides the following explanations.

POINT

Explains the matters to be especially noted, the functions and others related to the description on that page.

Remark

Provides the reference destination related to the description on that page and the convenient information.

HOW TO USE THIS MANUAL

This manual is prepared for users to understand the hardware specifications of those modules such as the CPU modules, power supply modules, and base units, maintenance and inspections of the system, and troubleshooting required when you use QS series programmable controllers.

The manual is classified roughly into three sections as shown below.

1) Chapters 1 and 2 — Describe the outline of the CPU module and the system configuration.
The basics of the system configuration of CPU module are described.

2) Chapters 3 to 7 — Describe the general specifications indicating the operating environments of the CPU module, power supply module, and base units, and the performance specifications of these modules.

3) Chapters 8 to 12 — Describe the overall maintenance such as the installation of the CPU module, daily inspections, and troubleshooting.

Remark

This manual does not explain the functions of the CPU module.
For these functions, refer to the manual shown below.
☞QSCPU User's Manual (Function Explanation, Program Fundamentals)

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations to explain the QS series CPU modules.

Generic Term/Abbreviation	Description
Safety programmable controller	Generic term for safety CPU module, safety power supply module, safety main base unit, CC-Link safety master module, CC-Link safety remote I/O module, and CC-Link IE Field Network master/local module (with safety functions).
Standard programmable controller	Generic term of each module for MELSEC-Q series, MELSEC-L series, MELSEC-QnA series, MELSEC-A series and MELSEC-FX series. (Used for distinction from safety programmable controller.)
QS series	Abbreviation for Mitsubishi Electric safety programmable controller MELSEC-QS series
QS001CPU	Abbreviation for the QS001CPU type safety CPU module
CPU module	Other name for the QS001CPU
GX Developer	General product name for the models SW8D5C-GPPW-E, SW8D5C-GPPW-EA, SW8D5C-GPPW-EV and SW8D5C-GPPW-EVA
QS034B	Abbreviation for the QS034B type safety main base unit
Base unit	Other name for the QS034B
QS061P	Abbreviation for the QS061P-A1 and QS061P-A2 type safety power supply modules
Power supply module	Other name for the QS061P
QS0J61BT12	Abbreviation for the QS0J61BT12 type CC-Link Safety system master module
CC-Link Safety	Abbreviation for the CC-Link Safety system
CC-Link Safety master module	Other name for the QS061BT12
QS0J65BTS2-8D	Abbreviation for the QS0J65BTS2-8D CC-Link Safety system remote I/O module
QS0J65BTS2-4T	Abbreviation for the QS0J65BTS2-4T CC-Link Safety system remote I/O module
QS0J65BTB2-12DT	Abbreviation for the QS0J65BTB2-12DT CC-Link Safety system remote I/O module
CC-Link Safety remote I/O module	Generic term for the QS0J65BTS2-8D, QS0J65BTS2-4T, and QS0J65BTB2-12DT
CC-Link IE Field Network master/ local module (with safety functions)	Abbreviation for the MELSEC-QS series CC-Link IE Field Network master/local module
CC-Link IE Controller Network module	Abbreviation for the QJ71GP21-SX and QJ71GP21S-SX CC-Link IE Controller Network module
MELSECNET/H	Abbreviation for the MELSECNET/H network system
MELSECNET/H module	Abbreviation for the QJ71LP21-25, QJ71LP21S-25, QJ71LP21G, QJ71BR11 MELSECNET/H network module
Ethernet	Abbreviation for the Ethernet network system
Ethernet module	Abbreviation for the QJ71E71-100, QJ71E71-B5, QJ71E71-B2 Ethernet interface module
Intelligent function module	Generic term for the CC-Link Safety master module, CC-Link IE Field Network master/ local module (with safety functions), CC-Link IE Controller Network module, MELSECNET/H module, and Ethernet module
Network module	Generic term for the CC-Link IE Field Network master/local module (with safety functions), CC-Link IE Controller Network module, MELSECNET/H module, and Ethernet module
Battery	Abbreviation for the Q6BAT type battery
Blank cover	Abbreviation for the QG60 type blank cover
GOT	Generic term for the Mitsubishi Electric Graphic Operation Terminal GOT-A*** series, GOT-F*** series and GOT1000 series

PRECAUTIONS FOR USE

Precautions for the first use of the QS series CPU module

When using a CPU module for the first time, the PLC memory needs to be initialized using GX Developer.
For details of PLC memory initialization, refer to the following manual.
☞ GX Developer Operating Manual (Safety Programmable Controller)

Precautions on battery

(1) When running the CPU module that has been stored without battery
When, in the TEST MODE, running the CPU module that has been stored with the battery removed, the memory needs to be formatted using GX Developer.
(☞ Section 11.4)

(2) When running the CPU module that has been stored with battery longer than the battery life
When, in the TEST MODE, running the CPU module that has been stored with the battery exceeding its life, the memory needs to be formatted using GX Developer.
(☞ Section 11.5)

CHAPTER1 OVERVIEW

This manual describes the hardware specifications and handling methods of the QS series CPU module, QS001CPU. The manual also describes the specifications of the power supply module, base, unit, and battery.

For the functions, programs, and devices of the QS series CPU module, refer to the following.

☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)

(1) List of QS Series CPU Module manuals

The QS series CPU module manuals are as shown below.
For details such as manual numbers, refer to "About Manuals" in this manual.

Table1.1 List of manuals of QS Series CPU module

Purpose	 QSCPU User's Manual (Hardware Design, Maintenance and inspection)	 QSCPU User's Manual (Function Explanation, Program Fundamentals)	 QSCPU Programming Manual (Common Instruction)
Confirmation of part names and specifications of the CPU module	Details	Outline	
Confirmation of connection methods for the power supply module and base unit	Details		
Construction of the CPU system (confirmation of start-up procedure and I/O number assignment)	Details		
Confirmation of the sequence program configuration and memory		Details	
Confirmation of the functions, parameters, and devices of the CPU module		Details	
Confirmation of the troubleshooting and error codes	Details		
Confirmation of usage of sequence instructions, basic instructions, application instructions, etc.			Details

1.1 Features

The QS series CPU module has the following new features:

(1) Safety programmable controller system can be constructed

The QS series CPU module has acquired certification of the highest safety level (SIL3 of IEC 61508, Category 4 of EN 654-1, and Category 4 performance level "e" of EN ISO 13849-1) applicable to programmable controllers.

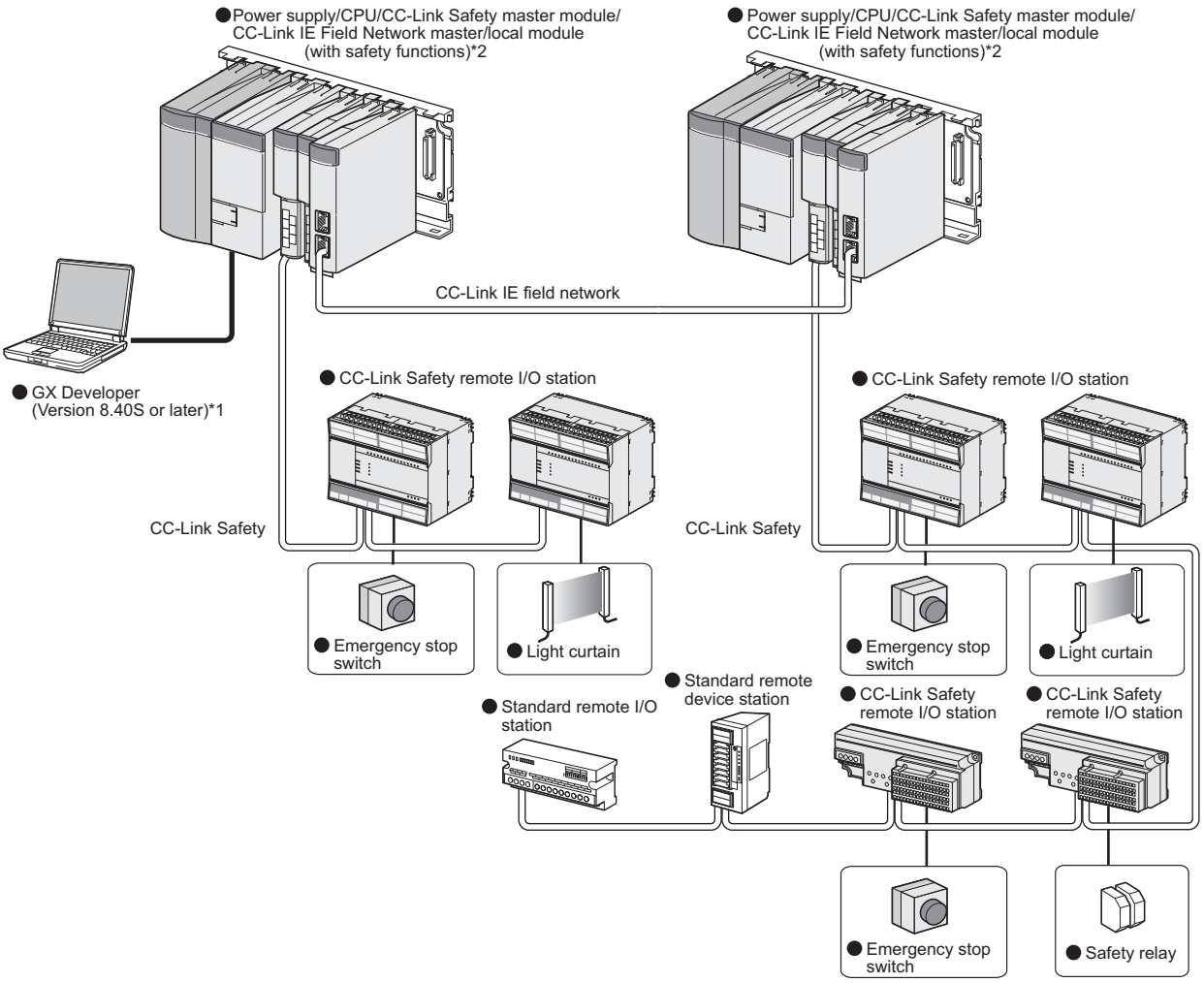


Figure 1.1 Safety programmable controller system

* 1 : The available functions vary depending on the versions. For details, refer to Appendix 2.
* 2 : For details of the CC-Link IE Field Network master/local module (with safety functions), refer to the following manual.

☞ MELSEC-QS CC-Link IE Field Network Master/Local Module User's Manual

(2) The safety CPU operation mode is equipped for safe system operation

The CPU module is equipped with two safety CPU operation modes. "SAFETY MODE" for safe system operation and "TEST MODE" for system construction and maintenance.

These two modes prevent the user's erroneous operations for safe system operation.

(a) SAFETY MODE

SAFETY MODE is a mode for safe system operation. This mode prohibits the write operation from a programming tool and the device test operation during the system operation.

(b) TEST MODE

TEST MODE is a mode for maintenance. This mode enables the write operation from a programming tool and the device test operation to debug or maintain the sequence program.

For the details of operations available in the SAFETY MODE and TEST MODE, refer to the following manual.

☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)

(3) Enriched operation history and error history

The CPU module can record up to 3000 logs of user operations performed on the CPU module, and errors occurred in the CPU module, CC-Link Safety, or CC-Link IE Field Network.

User operations and errors will be recorded as operation/error history data in chronological order.

Checking the operation/error history data helps users perform troubleshooting easier.

The contents recorded in the operation/error history are shown in Table1.2.

Table1.2 Recorded contents of operation/error history

Information	Contents	History Information per Entry
Operation history information	User's operations for the CPU module are stored as a history. (Operations which change the CPU module status are recorded.)	• Operation code • Operation message • Operation execution date • Result code • Operation attached information
Error history information	The following errors are stored as a history. • Error/failure detected by self-diagnostics • Hardware error • Error detected in CC-Link Safety • Error detected in the CC-Link IE Field Network	• Error code • Error message • Occurrence date • Error information category (common information/individual information) • Error information (common information/individual information)

(4) Enhanced RAS

(a) Enhanced memory diagnostics
The memory diagnostics equipped with the CPU module are enhanced.

(b) Redundant CPU
The CPU module has two CPUs (CPU A and CPU B). The operation results of CPU A/CPU B are compared, and output only when the results are matched so that incorrect outputs can be prevented. (When the compared results are mismatched, the system stops.)

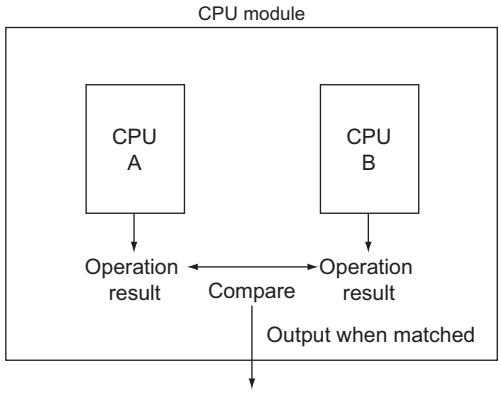


Figure 1.2 Redundant CPU

(c) Enhanced hardware diagnostics by hardware circuit
The diagnostic functions of the Table1.3 prevents incorrect outputs when a hardware error which cannot be detected by the OS occurs.

Table1.3 Hardware diagnostics function added to the QS series CPU module

Diagnostics	Diagnosis Contents
Overvoltage/ undervoltage detection	Overvoltage or undervoltage is detected for the power supply voltage provided from the power supply module to the CPU module.
Clock stop detection	The input clock stop to the CPU module internal circuit is detected.

(5) USB interface is equipped

The CPU module is equipped with the USB interface to communicate with a programming tool.

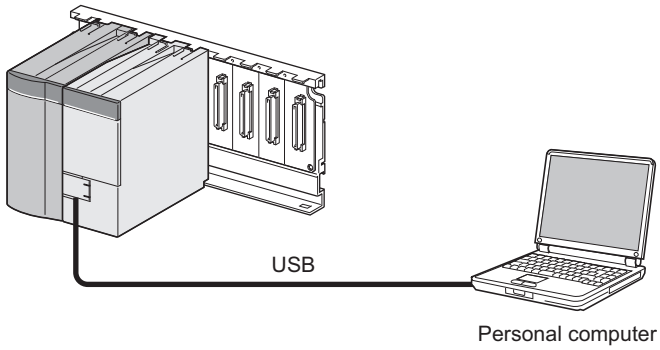


Figure 1.3 Connection to a personal computer using USB

(6) Connectable with personal computers and standard programmable controllers[*1]

The CPU module can read data from the MELSOFT products installed in the personal computer and also can communicate data between safety programmable controller and standard programmable controller using dedicated instructions via CC-Link IE Controller Network, MELSECNET/H, and/or Ethernet[*2].

Besides, the data of ladder monitor, device monitor, and operation/error history in the safety programmable controller can be read using GOT.

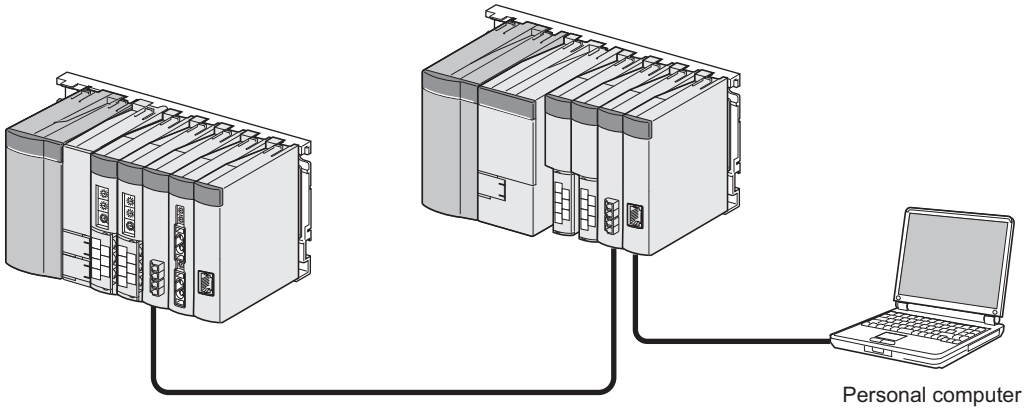


Figure 1.4 Connection with personal computer and standard programmable controller

* 1 : For an access range from GX Developer and a GOT to a safety CPU module, refer to the following manual.

☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)

* 2 : An access to the CPU module can be restricted by using the remote password function.

(7) Safety communication in the CC-Link IE Field Network

A CC-Link IE Field Network master/local module (with safety functions) enables safety communication between safety CPU modules. In addition, safety and standard communications can be used on the same network. These factors allow a safety programmable controller to be simply added to the existing CC-Link IE Field Network.

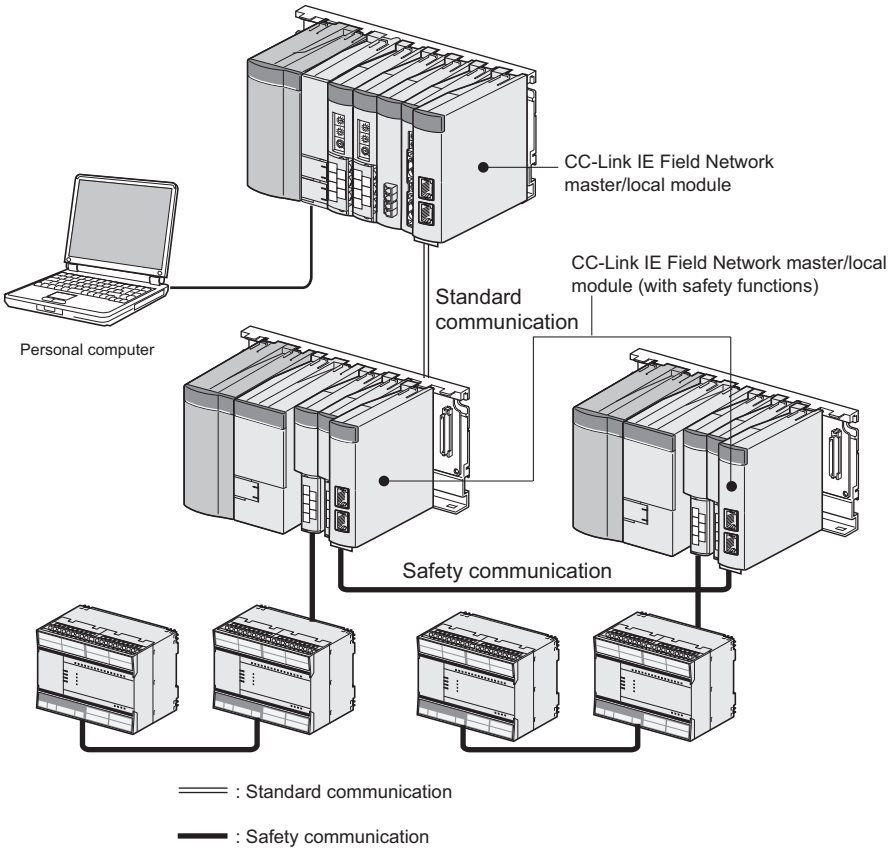


Figure 1.5 Safety communication using the CC-Link IE Field Network master/local module (with safety functions)

(8) Safety Standards

Use the product according to the following safety standards.

Table1.4 Safety Standards

Region	Safety Standards
International	IEC61508 Parts 1-7:1998-2000, ISO13849-1:2015, IEC61131-2:2007, IEC61000-6-2:2005, IEC61000-6-4:2006, IEC61784-3:2010, IEC60204-1:2009
Europe	EN ISO13849-1:2015, EN61131-2:2007, EN61000-6-2:2005, EN61000-6-4:2007
North America	UL508, NFPA79:2015

CHAPTER2 SYSTEM CONFIGURATION

This section describes the system configuration of the QS series CPU module cautions on use of the system, and configured equipment.

2.1 System Configuration

The following figure shows the system configuration of the safety programmable controller system when the QS series CPU module is used.

(1) System configuration when the CPU(QS001CPU) is used

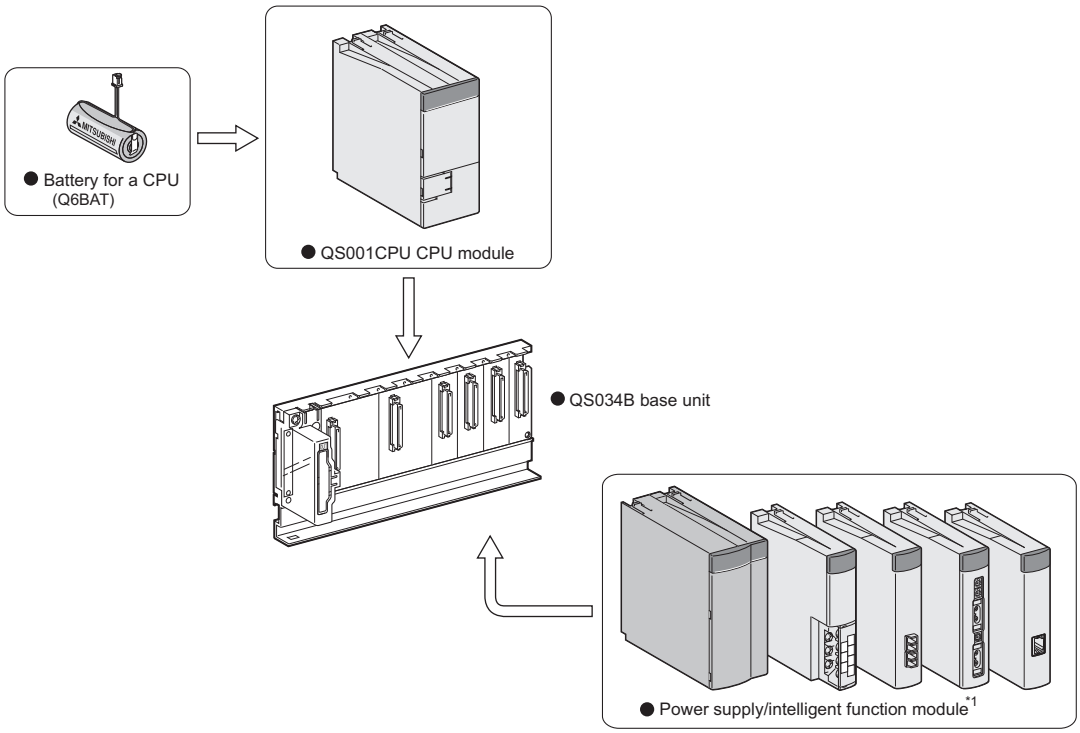


Figure 2.1 System configuration

* 1 : For mountable modules, refer to Section 2.1.1 "Precautions for system configuration".

(2) System configuration overview

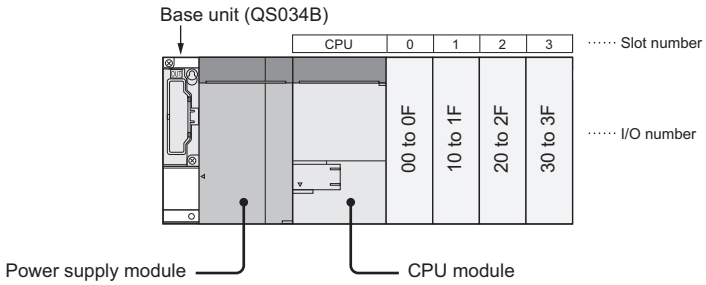


Figure 2.2 System configuration

Table2.1 Base unit and power supply module applicable to system configuration

Base unit model name	QS034B
Maximum number of mountable modules	4 modules
Power supply module model name	QS061P-A1, QS061P-A2

■ Precautions

- The extension base unit cannot be connected.
- The multiple CPU system cannot be configured.
- The modules which can be mounted on the I/O slot are the intelligent function module and blank cover only.
  If a module other than the ones mentioned above is mounted, "MODULE LAYOUT ERROR" (error code: 2125) is detected.
  Note, however, that a "MODULE LAYOUT ERROR" is not detected for the slot where "Empty" has been set in the I/O assignment setting of PLC parameter.
- Bus connection for the GOT is not available. For the GOT connection, refer to the following.
  ☞ GOT1000 Series Connection Manual (Mitsubishi Products)

Table2.2 Safety programmable controller products

Product Name	Model	Description
Safety main base unit	QS034B	A unit where a safety CPU module, safety power supply module, and CC-Link Safety system master module are mounted
	QS034B-K	An S-mark*1 certified safety main base unit
Safety power supply module	QS061P-A1	A module which is mounted on a safety main base unit and supplies 100VAC to the system
	QS061P-A2	A module which is mounted on a safety main base unit and supplies 200VAC to the system
	QS061P-A1-K	An S-mark*1 certified safety power supply module (100VAC)
	QS061P-A2-K	An S-mark*1 certified safety power supply module (200VAC)
Safety CPU module	QS001CPU	A module which is mounted on a safety main base unit and performs logic operations for safety control
	QS001CPU-K	An S-mark*1 certified safety CPU module
CC-Link Safety master module	QS0J61BT12	A module which is mounted on a safety main base unit and establishes connection to CC-Link Safety
	QS0J61BT12-K	An S-mark*1 certified CC-Link Safety master module
CC-Link IE Field Network master/local module (with safety functions)	QS0J71GF11-T2	A module which is mounted on a safety main base unit and establishes connection to CC-Link IE Field Network

* 1 : S-mark is a safety certification issued by Korea Occupational Safety and Health Agency (KOSHA).

2.1.1 Precautions for system configuration

(1) Modules mountable on the main base unit

Table2.3 lists the modules that can be mounted on the main base unit.
The number of mounted modules and functions are restricted depending on the module type.

Table2.3 Modules mountable on the main base unit

Module	Model	Number of modules mounted in one system	Remarks
CPU module	• QS001CPU	Only one	---
Power supply module	• QS061P-A1 • QS061P-A2	Only one (only one of the module models)	---
CC-Link Safety master module	• QS0J61BT12	Up to two	---
CC-Link IE Field Network master/local module (with safety functions)	• QS0J71GF11-T2	Only one	---
CC-Link IE Controller Network module	• QJ71GP21-SX • QJ71GP21S-SX	Only one (only one of the models among CC-Link IE Controller Network modules and MELSECNET/H modules)	• Serial number (first five digits): "10041" or later • Function version: D or later
MELSECNET/H module	• QJ71LP21-25 • QJ71LP21S-25 • QJ71LP21G • QJ71LP21GE • QJ71BR11		• Serial number (first five digits): "08102" or later • Function version: D or later
Ethernet module	• QJ71E71-B2 • QJ71E71-B5 • QJ71E71-100	Only one (only one of the module models)	---
Blank cover	• QG60	Up to four	---

(2) Module/Unit Replacement

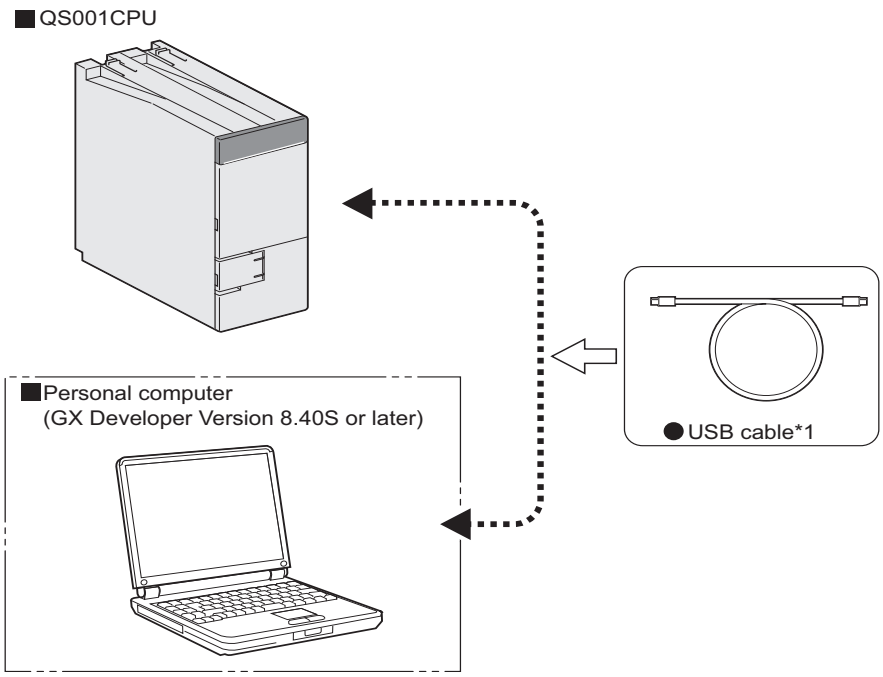
Replace the module or unit according to the following replacement cycle.

Table2.4 Module/Unit Replacement

Module/Unit	Replacement Cycle
Safety power supply module	5 years
Safety CPU module	10 years
Safety main base unit	10 years
CC-Link Safety master module	10 years
CC-Link IE Field Network master/local module (with safety functions)	10 years

2.2 Configuration of Peripheral Devices

This section describes the configuration of the peripheral devices usable in the safety programmable controller system.



* 1: For details of the USB cable, refer to "About the USB cable (QCPU (Q mode) compatible)" of the following manual.

☞ GX Developer Operating Manual

Figure 2.3 Configuration of peripheral devices

2.3 Checking Serial Number and Function Version

The serial number and function version of the CPU module can be checked on the rating plate or the System monitor window in GX Developer.

(1) Checking on the rating plate

The rating plate is located on the side of the CPU module.

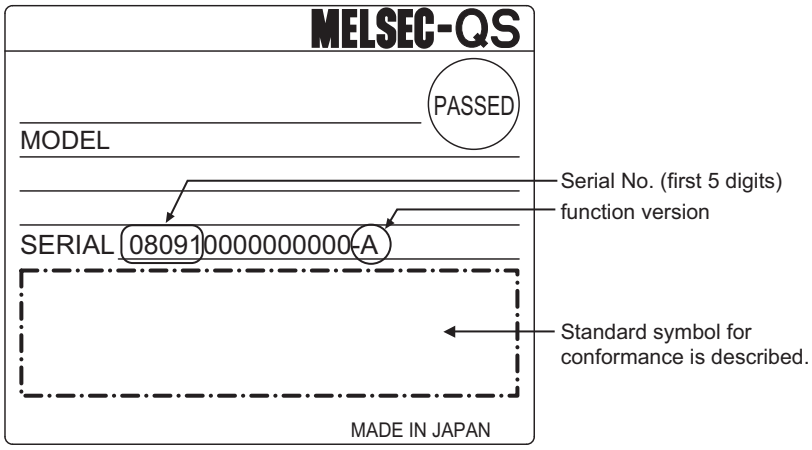


Figure 2.4 Rating plate

(2) Checking on the front of the module

The serial number on the rating plate is printed on the front (at the bottom) of the module.

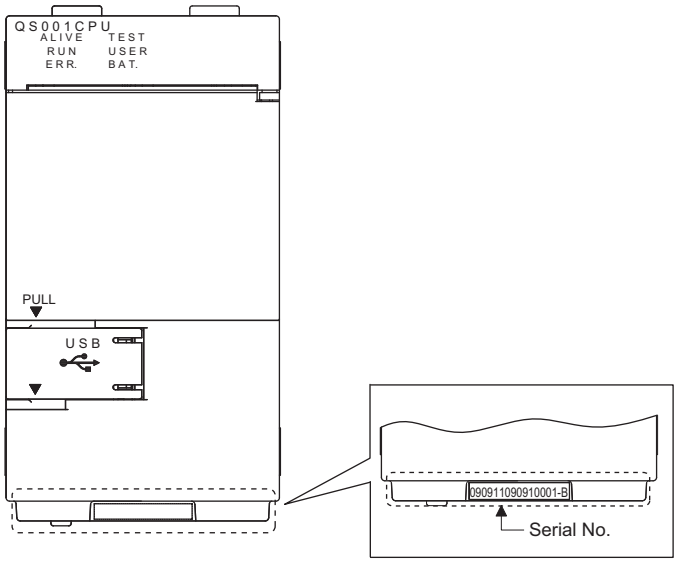


Figure 2.5 Display on the front of the module

(3) Checking on the System monitor window (Product Information List window)

To display the window for checking the serial number and function version, select [Diagnostics] → [System monitor] and click the Product Information List button in GX Developer.

On the window, the serial number and function version of intelligent function modules can also be checked.

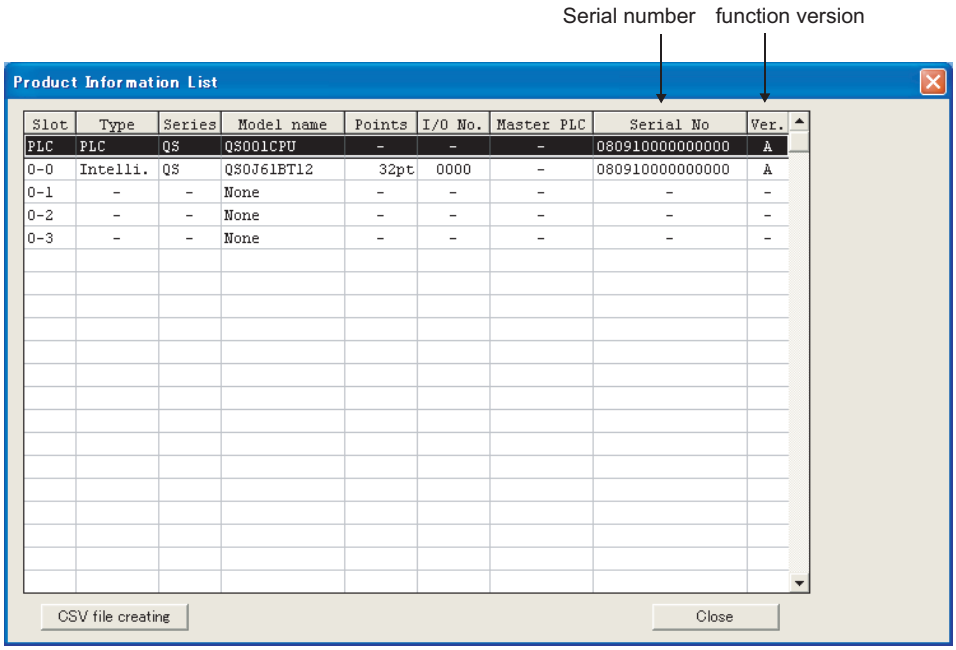


Figure 2.6 System monitor

POINT

The serial number displayed on the Product information list window of GX Developer may differ from that on the rating plate and on the front of the module.

- The serial number on the rating plate indicates the management information of the product.
- The serial number displayed on the Product Information List window indicates the functional information of the product.
  The functional information of the product is updated when a new function is added.

CHAPTER3 GENERAL SPECIFICATIONS

The performance specifications of QS series programmable controllers are shown in Table3.1.

Table3.1 General specifications

<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">-40 to 75℃</td></tr>
<tr><td>Operating ambient humidity
Storage ambient humidity</td><td colspan="6">5 to 95%RH, non-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Compliant with JIS B 3502 and IEC 61131-2</td><td></td><td>Frequency</td><td>Constant acceleration</td><td>Half amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 8.4Hz</td><td>----</td><td>3.5mm</td><td rowspan="2">10 times each in X, Y, Z directions</td></tr>
<tr><td>8.4 to 150Hz</td><td>9.8m/s^2</td><td>----</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 8.4Hz</td><td>----</td><td>1.75mm</td><td rowspan="2">----</td></tr>
<tr><td>8.4 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 and IEC 61131-2 (147 m/s^2, duration of action 11ms, 3 times each in 3 directions X, Y, Z by sine half-wave pulse)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="6">No corrosive gases</td></tr>
<tr><td>Operating altitude*3</td><td colspan="6">0 to 2000m</td></tr>
<tr><td>Installation location</td><td colspan="6">Inside a control panel</td></tr>
<tr><td>Overvoltage category *1</td><td colspan="6">II or less</td></tr>
<tr><td>Pollution degree *2</td><td colspan="6">2 or less</td></tr>
<tr><td>Equipment class</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 equipment with the rated voltage of up to 300V is 2500V.

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

*3 : Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

Memo

CHAPTER4 CPU MODULE

4.1 Performance Specifications

Table4.1 shows the performance specifications of the CPU module.

Table4.1 Performance Specifications

Item		QS001CPU	Remarks
Control method		Repetitive operation of stored program	----
I/O control mode		Refresh mode	----
Program language	Sequence control language	Relay symbol language, function block.	----
Processing speed (sequence instruction)	LD X0	0.10μs	----
	MOV D0 D1	0.35μs	----
Constant scan (Function for keeping regular scan time)		1 to 2000ms (in increments of 1ms)	Setting by parameters.
Program capacity *1		14K steps (56K bytes)	----
Memory capacity*1	Program memory (drive 0)	128K bytes	----
	Standard ROM (drive 4)	128K bytes	----
Max. number of files stored	Program memory	3*2	----
	Standard ROM	3*2	----
No. of times of writing data into the standard ROM		Max.100000 times	----
No. of I/O device points		6144 points(X/Y0 to 17FF)	No. of points usable on program
No. of I/O points		1024 points(X/Y0 to 3FF)	No. of points accessible to the actual I/O module

*1 : The maximum number of executable sequence steps is as shown below.(Program capacity) - (File header size (default: 34 steps))
For the details, refer to the manual below.

☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)

*2 : Each of parameter, sequence program, SFC program, and device comment files can be stored.

Table4.1 Performance Specifications (Continue)

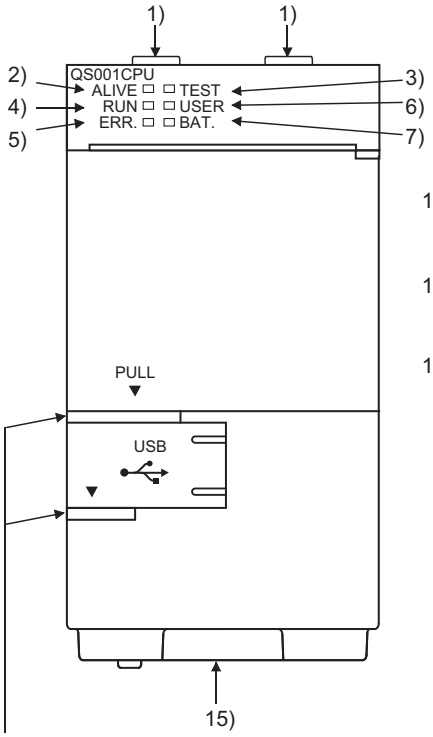
Item			QS001CPU	Remarks
No. of device points	Internal relay [M]		6144 points by default (M0-6143) (changeable)	The number of points can be changed within the setting range. (☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)
	Link relay [B]		2048 points by default (B0 to 7FF) (changeable)	
	Timer [T]		512 points by default (T0 to 511) (changeable) (Sharing of low- and high-speed timers)	
			The low- and high-speed timers are specified by the instructions. The measurement unit of the low- and high-speed timers is set up by parameters. (Low-speed timer: 1 to 1000ms, 1ms unit, 100ms by default) (High-speed timer: 0.1 to 100ms, 0.1ms unit, 10ms by default)	
	Retentive timer [ST]		0 point by default (sharing of the low- and high-speed retentive timers) (changeable) The low- and high-speed retentive timers are specified by the instructions. The measurement unit of the low- and high-speed retentive timers is set up by parameters. (Low-speed retentive timer: 1 to 1000ms, 1ms unit, 100ms by default) (High-speed retentive timer: 0.1 to 100ms, 0.1ms unit, 10ms by default)	
	Counter [C]		Normal counter: 512 points by default (C0 to 511) (changeable)	
	Data register [D]		6144 points by default (D0 to 6143) (changeable)	
	Link register [W]		2048 points by default (W0 to 7FF) (changeable)	
	Annunciator [F]		1024 points by default (F0 to 1023) (changeable)	
	Edge relay [V]		1024 points by default (V0 to 1023) (changeable)	
	Link special relay [SB]		1536 points (SB0 to 5FF)	The number of device points is fixed.
	Link special register [SW]		1536 points (SW0 to 5FF)	
	Special relay [SM]		5120 points (SM0 to 5119)	
	Special register [SD]		5120 points (SD0 to 5119)	
RUN/PAUSE contact			One contact can be set up in X0 to 17FF for each of RUN. No PAUSE contact.	Setting by parameters.
Timer function			Year, month, date, hour, minute, second and day-of-week (leap year automatically identified) Accuracy: -3.18 to +5.25s (TYP.+2.14s)/d at 0℃ Accuracy: -3.18 to +2.59s (TYP.+2.07s)/d at 25℃ Accuracy: -12.97 to +3.63s (TYP.-3.16s)/d at 55℃	----
Allowable instantaneous power failure period			Varies depending on the power supply module.	----
5VDC internal current consumption			0.58A*3	----
External dimensions		H	98mm	----
		W	55.2mm	----
		D	114mm	----
Weight			0.29kg	----
Protection of degree			IP2X	----

*3 : The value for the CPU module whose serial number (first four digits) is "1207" or earlier is 0.43A.
5VDC internal current consumption: 0.43A

Remark

For the general specifications, refer to CHAPTER 3.

4.2 Part Names



When opening the cover, put your finger here.

Figure 4.1 Front face

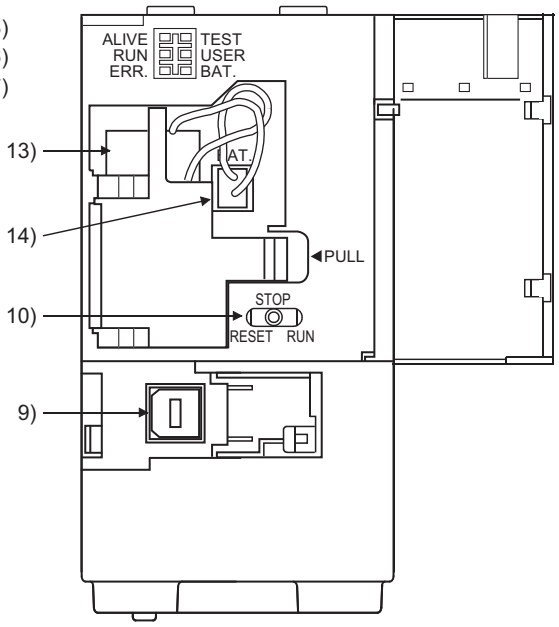


Figure 4.2 With front cover open

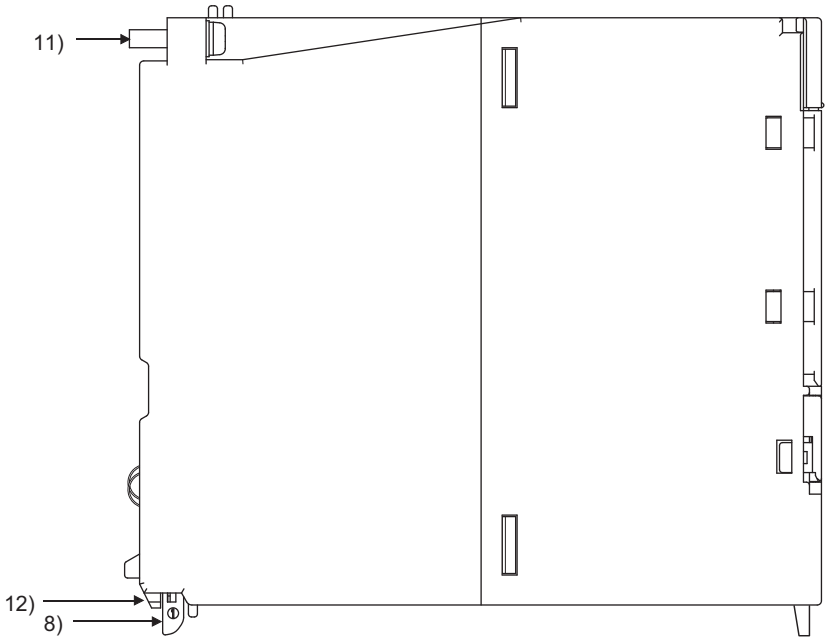


Figure 4.3 Side Face

Table4.2 Part Names

No.	Name	Application
1)	Module fixing hook	Hook used to fix the module to the base unit.
2)	"ALIVE" LED (Green)	On : Normal*1 Off : When the hardware watchdog timer error is detected ("ERR." LED is On.)
3)	"TEST" LED (Yellow)	Indicates the operating mode of the CPU module. On : TEST MODE *1 Flash : When TEST MODE is switched to SAFETY MODE The "TEST" LED turns off after reset. (Flash interval: On 200ms/Off 200ms) Off : SAFETY MODE
4)	"RUN" LED (Green)	Indicates the operating status of the CPU module. On : During operation in "RUN"*1 Off : During stop in "STOP" or when the error which stops the operation is detected Flash : When parameters/program is written during STOP and the RUN/STOP/RESET switch is moved from "STOP" to "RUN" (Flash interval: On 200ms/Off 200ms)
5)	"ERR." LED (Red)	On : When the self-diagnostics error that will not stop operation, other than a battery error, is detected *1 Off : Normal Flash : When the self-diagnostics error that will stop operation is detected (Flash interval: On 200ms/Off 200ms) When the reset operation is performed (Flash interval: On 60ms/Off 60ms)
6)	"USER" LED (Red)	On : When the annunciator (F) turns ON*1 Off : Normal
7)	"BAT." LED (Yellow)	On : When a battery error has occurred due to the CPU battery voltage drop *1 Off : Normal
8)	Module loading lever	Used to load the module to the safety base unit.
9)	USB connector*2	Connector used to connect to the USB compatible peripheral devices. (Connector type B) Can be connected by the USB dedicated cable.
10)	RUN/STOP/RESET switch*3	RUN : Executes sequence program operation. STOP : Stops sequence program operation. RESET : Performs hardware reset and operation initialization when an operation error occurs. (Section 4.4)
11)	Module fixing screw	Screw used to fix a module to the base unit. (M3 screw)
12)	Module fixing latch	Latch used to fix a module to the base unit.
13)	Battery	Backup battery for the power failure compensation function of program memory.
14)	Battery connector pin	For connection of the battery lead wires (When shipped from the factory, the lead wires are disconnected from the connector to prevent the battery from discharging.)
15)	Serial number display	Displays the serial number on the rating plate.

*1 : Turns On during the initial processing (self-diagnostics, etc.) right after the power-on or reset cancel.

*2 : When a cable is to be connected to the USB connector at all times, clamp the cable to prevent a loose connection, shifting, or disconnection by pulling due to carelessness.

*3 : Operate the RUN/STOP/RESET switch with your fingertips. Do not use any tool such as a screwdriver because the switch part might be damaged.

4.3 Switch Operation after Writing a Program

Programs can be written to the CPU module in either the STOP or RUN status.

(1) When writing a program with the CPU module set to "STOP"

(a) Set the RUN/STOP/RESET switch to STOP.
The "RUN" LED turns Off, and the module is placed in the STOP status.
Write a program from GX Developer to the CPU module in the STOP status.

(b) Reset with the RUN/STOP/RESET switch.
The CPU module is reset. (☞ Section 4.4)

(c) Set the RUN/STOP/RESET switch to RUN.
The "RUN" LED turns on, and the CPU module is placed in the RUN status.

(2) When writing a program during RUN
When writing a program during RUN, the operation for the RUN/STOP/RESET switch is not required.

POINT

1. The program modified online during boot operation is written to the program memory.
After making online program change, also write the program to the standard ROM of the boot source memory. If the program is not written in the standard ROM, the old program will be executed at the next boot operation.
For details of the boot operation, refer to the manual below.
☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)
2. To stop the CPU module, the remote operation of GX Developer can also be used.
In this case, the operation for the RUN/STOP/RESET switch is not required.
For details on the remote operation of GX Developer, refer to the following manual.
☞ GX Developer Version 8 Operating Manual

4.4 Reset Operation

For the CPU module, the RUN/STOP/RESET switch of the CPU module is used to switch between the "RUN status" and "STOP status" and to perform "RESET operation".
When using the RUN/STOP/RESET switch to reset the CPU module, moving the RUN/STOP/RESET switch to the reset position will not reset it immediately.

POINT

Hold the RUN/STOP/RESET switch in the RESET position until reset processing is complete (the flashing ERR. LED turns off).
If you release your hand from the RUN/STOP/RESET switch during reset processing (during rapid flashing of ERR. LED), the switch will return to the STOP position and reset processing cannot be completed.

Perform reset operation with the RUN/STOP/RESET switch as shown in Figure 4.4.

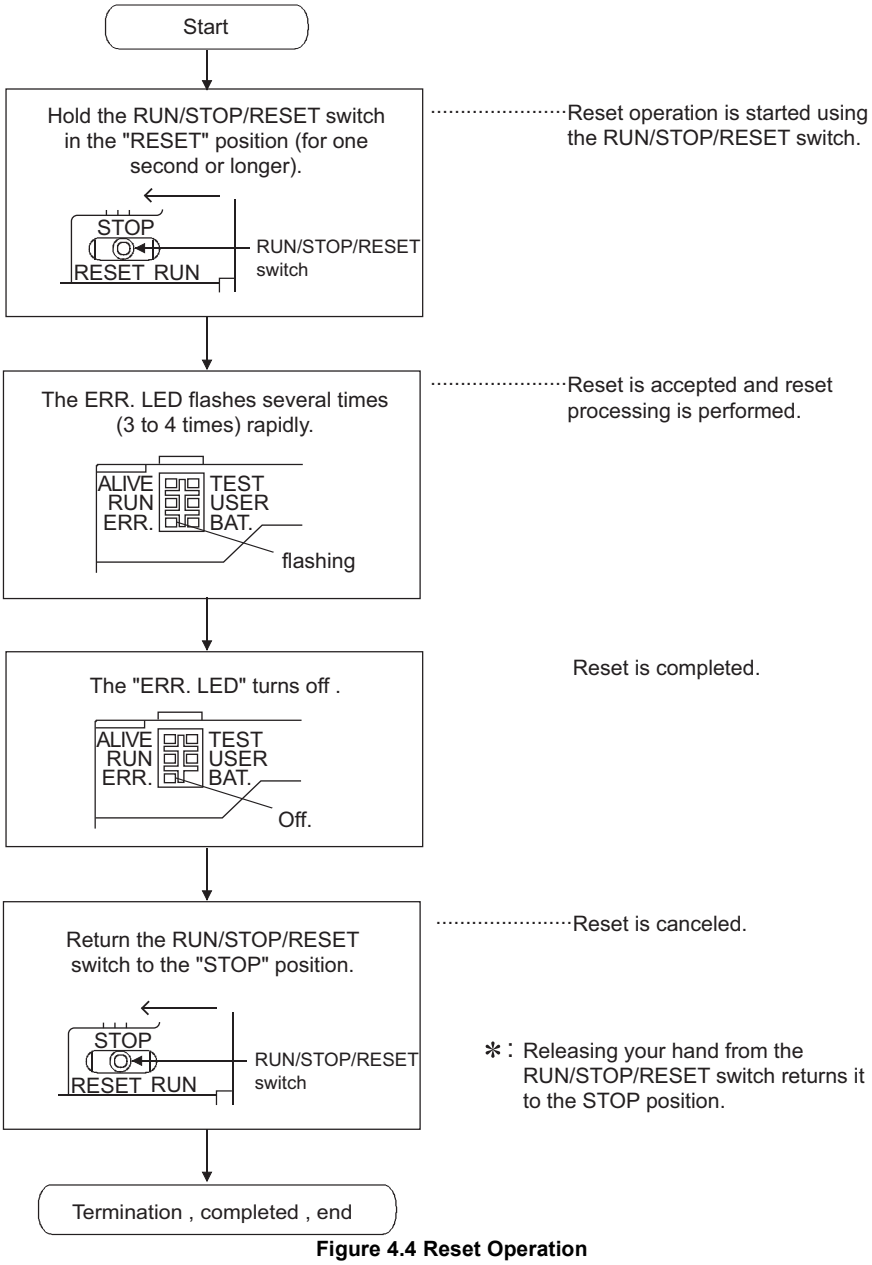


Figure 4.4 Reset Operation

POINT

Operate the RUN/STOP/RESET switch with your fingertips.
Do not use any tool such as a screwdriver because the switch part might be damaged.

CHAPTER5 POWER SUPPLY MODULE

This section describes the specifications of the power supply modules applicable for the programmable controller system and how to select the most suitable module.

5.1 Specifications

Table5.1 shows the specifications of the power supply modules.

Table5.1 Power supply module specifications

Item		Performance Specifications	
		QS061P-A1	QS061P-A2
Base loading position		QS series power supply module loading slot	
Applicable base unit		QS034B	
Input power supply		100 to 120VAC $^{+10\%}_{-15\%}$ (85 to 132VAC)	200 to 240VAC $^{+10\%}_{-15\%}$ (170 to 264VAC)
Input frequency		50/60Hz ±5%	
Input voltage distortion ratio		Within 5% (☞ Section 5.2)	
Max. input apparent power		125VA	
Inrush current		20A, 8ms or less*4	
Rated output current	5VDC	6A	
Overcurrent protection*1	5VDC	6.6A or more	
Overvoltage protection*2	5VDC	5.5 to 6.5V	
Efficiency		70% or more	
Allowable momentary power failure period*3		Within 20ms	
Withstand voltage		1780VAC rms/3 cycles (altitude 0 to 2000m) (Between the combined "line input/LG terminals" and the "FG terminal and output")	2830VAC rms/3 cycles (altitude 0 to 2000m) (Between the combined "line input/ LG terminals" and the "FG terminal and output")
Insulation resistance		10MΩ or higher by 500VDC insulation resistance tester (Between the combined "line input/LG terminals" and the "FG terminal and output", the line input and LG terminals, the output and FG terminals)	
Noise immunity		• Noise voltage 1500Vp-p, noise width 1μs, noise frequency 25 to 60Hz (noise simulator condition) • Noise voltage IEC61000-4-4: 2kV	
Operation indication		LED indication (Normal: On (green), Error: Off)	
Fuse		Built-in (Unchangeable by user)	

Table5.1 Power supply module specifications (Continue)

Item			Performance Specifications	
			QS061P-A1	QS061P-A2
Contact output part	Application		$\overline{\text{ERR.}}$ contact (☞ Section 5.3)	
	Rated switching voltage/current		24VDC, 0.5A	
	Min. switching load		5VDC, 1mA	
	Response time		OFF → ON: 10ms or less, ON → OFF: 12ms or less	
	Life		Mechanical : 20 million times or more Electrical : Rated switching voltage/current load: 100 thousand times or more	
	Surge suppressor		No	
	Fuse		No	
Terminal screw size			M3.5	
Applicable wire size			0.75 to 2mm^2	
Applicable solderless terminal			RAV1.25 to 3.5, RAV2 to 3.5 (0.8mm or less thick)	
Applicable tightening torque			0.66 to 0.89N•m	
External dimensions		H	98mm	
		W	55.2mm	
		D	115mm	
Weight			0.40kg	

POINT

*1: Overcurrent protection

The overcurrent protection function shuts off the 5 VDC circuit and stops the system if the current flowing in the circuit exceeds the specified value.

The LED of the power supply module is turned off or lights up in dim green when voltage is lowered. If this device is activated, switch the input power supply OFF and eliminate the cause such as insufficient current capacity or short. Then, a few minutes later, switch it ON to restart the system.

The initial start for the system takes place when the current value becomes normal.

*2: Overvoltage protection

The overvoltage protection function shuts off the 5 VDC circuit and stops the system if a voltage of 5.5 VDC or above is applied to the circuit.

When this device is activated, the power supply module LED is turned OFF.

For restart of the system, turn OFF the input power supply, and then turn ON in a few minutes. This allows the system to start up with initial start. If the system doesn't start up and a LED indication remains off, replacement of a power supply module is required.

*3: Allowable momentary power failure period

- An instantaneous power failure lasting less than 20ms will cause AC down to be detected, but operation will continue.
- An instantaneous power failure lasting in excess of 20ms may cause the operation to continue or initial start to take place depending on the power supply load.

*4: Inrush current

When power is switched on again immediately (within 5 seconds) after power-off, an inrush current of more than the specified value (2ms or less) may flow. Reapply power 5 or more seconds after power-off. When selecting a fuse and breaker in the external circuit, take account of the blowout, detection characteristics and above matters.

5.2 Precaution when connecting the uninterruptible power supply

Be sure of the following terms when connecting the QS Series CPU Module system to the uninterruptible power supply (abbreviated as UPS hereafter):

Use an online UPS (uninterruptible power supply) with power distortion factor of 5% or less or line-interactive UPS. For a standby system UPS, use Mitsubishi small-capacity UPS "FREQUPS FW-F series" (hereafter abbreviated as FW-F series).*1
(Example: FWF10-0.3K/0.5K)
Do not use any standby system UPS other than the FW-F series.

* 1: Use a FW-F series UPS with the serial number starts with P or later or ends with HE.

SERIAL : Q00000000
Starts with "P" or later

SERIAL : B00000000 HE
Ends with "HE"

5.3 Names of Parts and Settings

The names of the parts of each power supply module are described below.

■ QS061P-A1 (100 to 120VAC input, 5VDC 6A output)
■ QS061P-A2 (200 to 240VAC input, 5VDC 6A output)

<QS061P-A1>

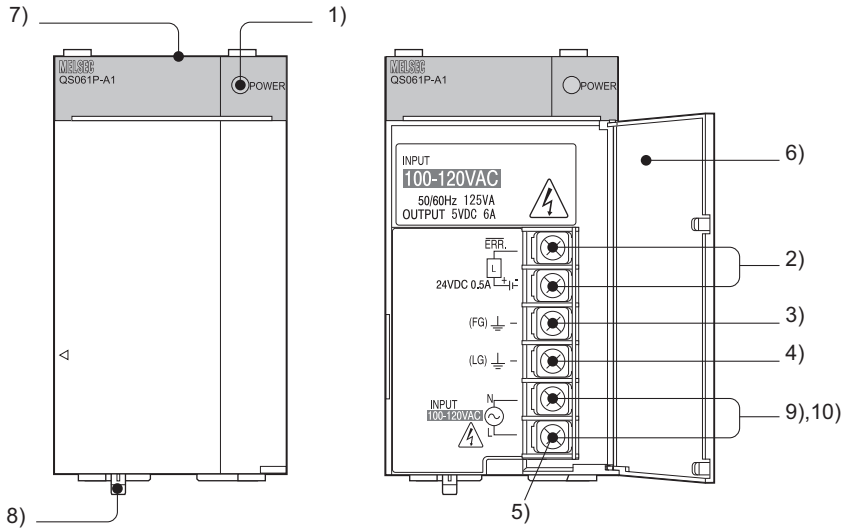


Figure 5.1 Power supply module

Table5.2 Part names

No.	Name	Application
1)	"POWER" LED	On (green) : Normal (5VDC output, instantaneous power failure within 20ms) Off : • AC power supply is ON, however, the power supply module is out of order. (5VDC error, overload, internal circuit failure, fuse blown) • AC power supply is not ON. • Power failure (including an instantaneous power failure of 20ms or more)
2)	$\overline{\text{ERR.}}$ terminal	• Turned ON when the whole system operates normally. • Turns OFF (opens) when the AC power is not input, a stop error (including a reset) occurs in the CPU module, or the fuse is blown.
3)	FG terminal	Ground terminal connected to the shielding pattern of the printed-circuit board.
4)	LG terminal	Grounding for the power filter. The potential of the QS061P-A1 and QS061P-A2 terminals are one-half of the input voltage.
5)	Terminal screw	M3.5 screw
6)	Terminal cover	Protective cover of the terminal block
7)	Module fixing screw	Used to fix the module to the base unit. M3 screw (Tightening torque range : 0.36 to 0.48N•m)
8)	Module loading lever	Used to load the module to the base unit.
9)	Power input terminal	Power input terminal for the QS061P-A1 and connected to a 100VAC power supply.
10)	Power input terminal	Power input terminal for the QS061P-A2 and connected to a 200VAC power supply.

POINT

1. The QS061P-A1 is dedicated for inputting a voltage of 100 VAC.
   Do not input a voltage of 200 VAC into it or trouble may occur on the QS061P-A1.

Table5.3 Precaution

Power module type	Supply power voltage	
	100VAC	200VAC
QS061P-A1	Operates normally.	Power supply module causes trouble.
QS061P-A2	Power supply module does not cause trouble. CPU module cannot be operated.	Operates normally.

2. Individually ground the LG and FG terminals with a ground resistance of 100Ω or less.
3. $\overline{\text{ERR.}}$ terminal cannot be used as a safety output.
   Connect the cable for $\overline{\text{ERR.}}$ contact of 30m or less in length in a control panel.

CHAPTER6 BASE UNIT

This section describes the specifications of the base units used in the programmable controller system.

6.1 Specification

The base unit is a unit to which the CPU module, power supply module and/or intelligent function module are installed.

Table6.1 Base unit specifications

Item		Type
		QS034B
Number of I/O modules installed		4
Possibility of extension		Disable
Applicable module		QS series modules
5 VDC internal current consumption		0.10A
Mounting hole size		M4 screw hole or ϕ4.5 hole (for M4 screw)
External dimensions	H	98mm
	W	245mm
	D	44.1mm
Weight		0.28kg
Attachment		Mounting screw M4×14 4 pieces (DIN rail adapter is sold separately.)
DIN rail adapter type		Q6DIN2

6.2 Part Names

The names of the parts of the base unit are described below.

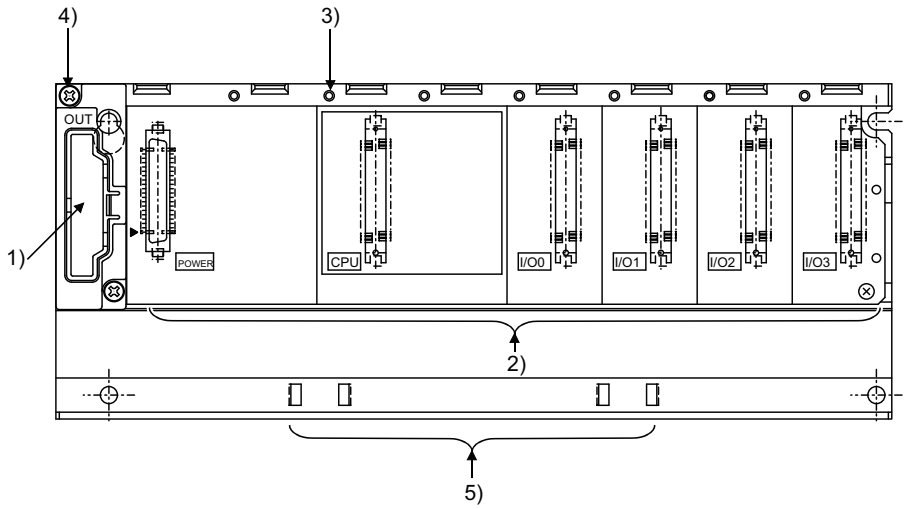


Figure 6.1 Base unit (QS034B)

Table6.2 Part Names

No.	Name	Application
1)	Base cover	Cover for protecting the printed-circuit board of the base unit
2)	Module connector	Connector for installing the QS series power supply module, CPU module and intelligent function module. For the reserved connector where no module is mounted, attach a supplied connector cover or a blank cover (QG60) to prevent entry of dust.
3)	Module fixing screw hole	Screw hole for fixing the module to the base unit. Screw size: M3×12
4)	Base mounting hole	Hole for mounting this base unit onto the panel of the control panel (for M4 screw)
5)	DIN rail adapter mounting hole	Hole for mounting DIN rail adapter

CHAPTER7 BATTERY

This section describes the specifications of the batteries available for the QS series CPU module and how to handle them.

7.1 Battery (Q6BAT)

Batteries (Q6BAT) are installed in the CPU module to retain data of the program memory and operation/error history in case of power failure.

7.1.1 Battery Specifications

This section describes the specifications of the battery used for the CPU module.

Table7.1 Battery Specifications

Item	Type
	Q6BAT
Classification	Manganese dioxide lithium primary battery
Initial voltage	3.0V
Nominal current	1800mAh
Battery life when stored	Actually 5 years (room temperature)
Battery life when used	☞ Section 11.3.1.
Lithium content	0.57g*1
Application	Power failure backup for program memory, operation/error history

* 1 The lithium content of batteries manufactured in July 2017 or earlier differs from this list. For details, refer to the following.

☞ Changes in battery parts (FA-A-0242)

Remark

1. Refer to Section 11.3.1 for the battery life.
2. For the battery directive in EU member states, refer to Appendix 4.

7.1.2 Installation of Battery

The battery for the CPU module is shipped with its connector disconnected. Connect the connector as follows.
Refer to Section 11.3 for the service life of the battery and how to replace the battery.

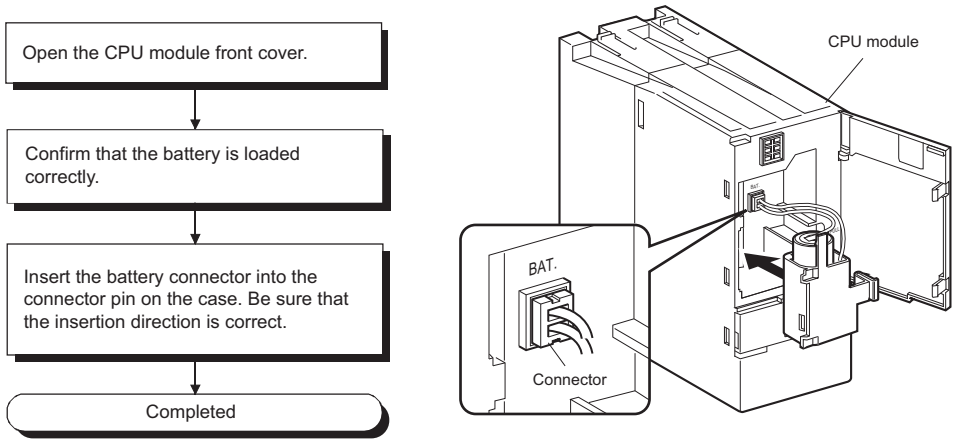


Figure 7.1 Q6BAT battery setting procedure

POINT

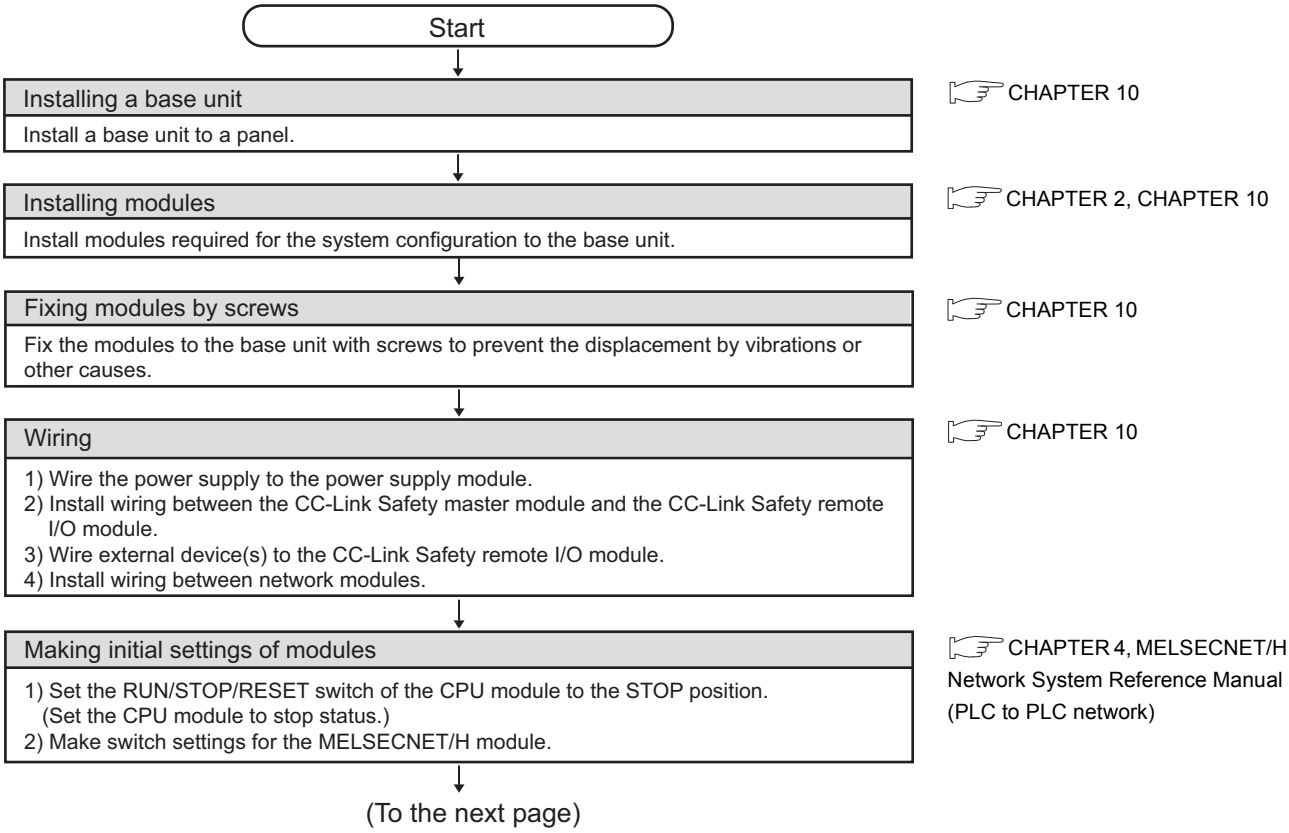
Firmly push the connector all the way.

CHAPTER8 CPU MODULE START-UP PROCEDURES

This chapter describes the procedure for starting up the CPU module.
It is assumed that programs and parameters have been created separately.

8.1 Procedure before Operating in SAFETY MODE

This section describes the procedure before operating the CPU module in SAFETY MODE.
The default operation mode of the CPU module is TEST MODE. Switch the mode to SAFETY MODE to operate the CPU module.



(Continued from the previous page)

Installing a battery

Install a battery to the CPU module.

☞ CHAPTER 7

Powering ON the power supply module

Confirm the following items of the safety programmable controller system, and then turn on the power supply.
- Wiring of the power supply
- Power supply voltage
- Operating status of the CPU module ··· Stop status (The RUN/STOP/RESET switch is in the STOP position.)

☞ CHAPTER 4, CHAPTER 5, CHAPTER 10

Confirming the CPU module LEDs

Confirm that the "ALIVE" LED and "TEST" LED of the CPU module are on.
(Confirm that the CPU module is in TEST MODE.)

☞ CHAPTER 4

Connecting a personal computer in which GX Developer is installed

1) Start up GX Developer on the personal computer in which GX Developer is installed.
2) Connect the personal computer with GX Developer installed, to the CPU module.

☞ GX Developer Version 8 Operating Manual (Safety Programmable Controller)

Initializing the PLC memory of the CPU module

Initialize the PLC memory of the CPU module with GX Developer.

☞ GX Developer Version 8 Operating Manual (Safety Programmable Controller)

Registering the CPU access password with the CPU module

Register the CPU access password with the CPU module by using GX Developer.

☞ GX Developer Version 8 Operating Manual (Safety Programmable Controller)

Setting clock data and clearing history data of the CPU module

When the safety CPU module is operated for the first time after purchase, take the following actions for the CPU module with GX Developer.
- Set the clock with "Clock setup".
- Clear the error history of the CPU module with "PLC diagnostics".

☞ GX Developer Version 8 Operating Manual, GX Developer Version 8 Operating Manual (Safety Programmable Controller)

(1)

Writing the parameters and programs to the CPU module

Write the parameters and user programs created by GX Developer to the CPU module.

☞ GX Developer Version 8 Operating Manual

Restarting the system

Turn off and then turn on the system power supply, or reset the CPU module.

☞ CHAPTER 4

Running the CPU module

Set the RUN/STOP/RESET switch of the CPU module to the RUN position.
Confirm that the "ALIVE" LED, "RUN" LED, and "TEST" LED of the CPU module are on.

☞ CHAPTER 4

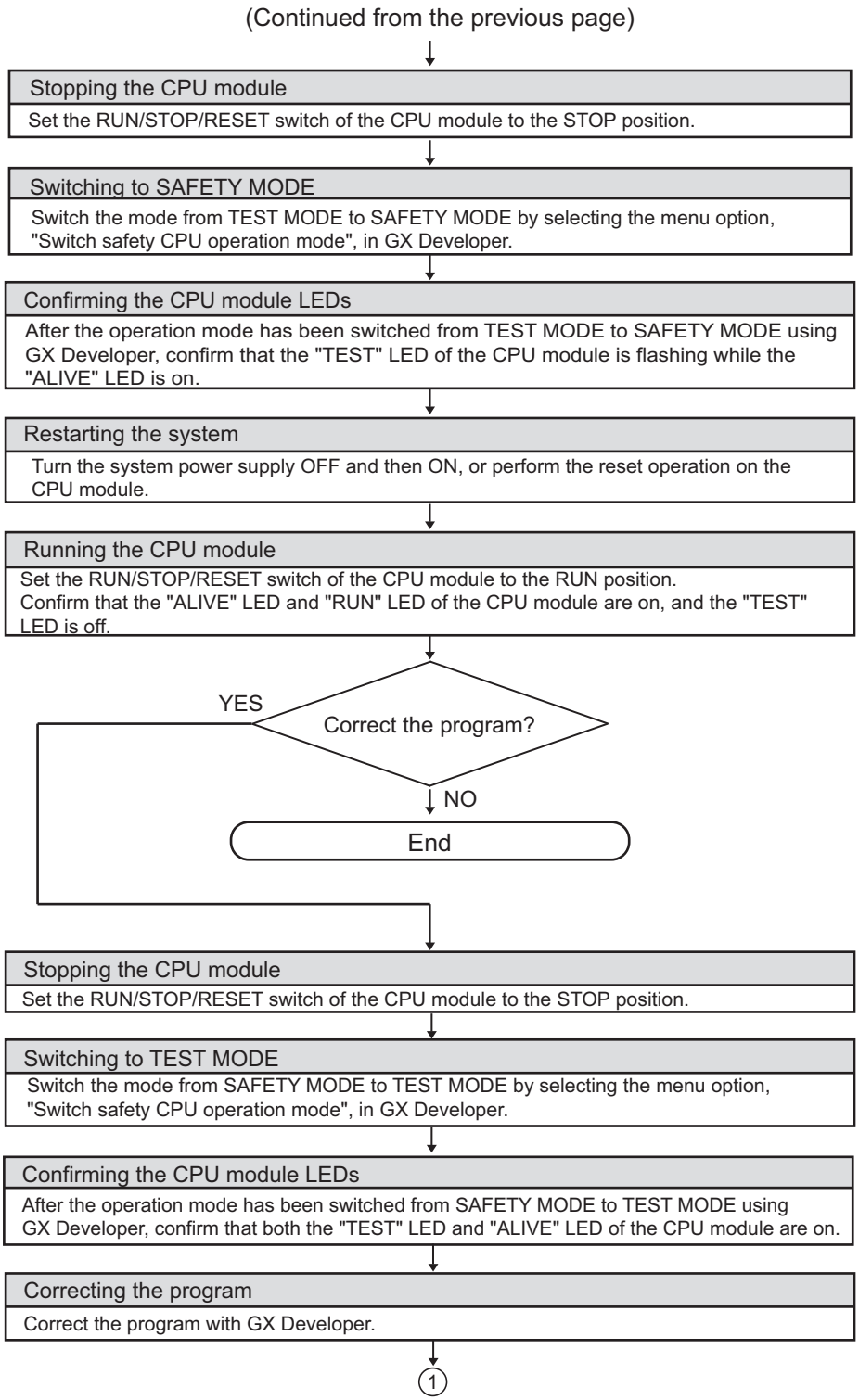
Checking the user program operation

Check the user program operation, cables, and inputs/outputs.
When the "ERR." LED of the CPU module is on or flashing, identify the error cause by the diagnostics*2 of GX Developer to eliminate the error cause.
When the error is related to the parameters or programs, correct them.

☞ CHAPTER 4

(To the next page)

* 2: The following types of diagnostics are available.
- PLC diagnostics
- Ethernet diagnostics
- CC IE Control diagnostics
- CC IE Field diagnostics
- MELSECNET diagnostics
- CC-Link / CC-Link/LT diagnostics
- System monitor



☞ CHAPTER 4

☞ GX Developer Version 8 Operating Manual (Safety Programmable Controller)

☞ CHAPTER 4

☞ CHAPTER 4

☞ CHAPTER 4

☞ CHAPTER 4

☞ GX Developer Version 8 Operating Manual (Safety Programmable Controller)

☞ CHAPTER 4

☞ GX Developer Version 8 Operating Manual

Memo

CHAPTER9 EMC, LOW VOLTAGE, AND MACHINERY DIRECTIVES

Compliance with the Machinery Directive, which is one of the EU directives, has been mandatory for the products sold within EU member states since 1995, as well as compliance with the EMC Directive since 1996 and compliance with the Low Voltage Directive since 1997.
The safety programmable controller is a CE-marked product. To prove the compliance, Mitsubishi has issued an EU Declaration of Conformity for each EMC, Low Voltage, and Machinery Directive, based on the safety approval obtained from the third-party certification organization, TÜV Rheinland.

(1) Authorized representative in Europe
Authorized representative in Europe is shown below.
Name : MITSUBISHI ELECTRIC EUROPE B.V.
Address: Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany

9.1 Requirements for Conformance to EMC Directive

The EMC Directive specifies that products placed on the market must "be so constructed that they do not cause excessive electromagnetic interference (emissions) and are not unduly affected by electromagnetic interference (immunity)".
The applicable products are requested to meet these requirements. The Section 9.1.1 through Section 9.1.5 summarize the precautions on conformance to the EMC Directive of the machinery constructed using the MELSEC-QS series programmable controllers.
The details of these precautions has been prepared based on the control requirements and the applicable standards control. However, we will not assure that the overall machinery manufactured according to these details conforms to the above-mentioned directives. The method of conformance to the EMC Directive and the judgment on whether or not the machinery conforms to the EMC Directive must be determined finally by the manufacturer of the machinery.

9.1.1 Standards relevant to the EMC Directive

(1) Emission related standards

Table9.1 Emission related standards

Standard	Test item	Test description	Value specified in standard
EN61131-2: 2007	CISPR16-2-3 Radiated emission*2	The electromagnetic wave which the product emits to the external space is measured.	• 30 to 230MHz, QP: 40dBμV/m (measured at 10m distance)*1 • 230 to 1000MHz, QP: 47dBμV/m (measured at 10m distance)
	CISPR16-2-1, CISPR16-1-2 Conducted emission*2	The noise level which the product emits to the power line is measured.	• 0.15 to 0.5MHz, QP: 79dB, Mean: 66dB *1 • 0.5 to 30MHz, QP: 73dB, Mean: 60dB

* 1 : QP: Quasi-Peak value, Mean: Average value
* 2 : Programmable controller is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel, applying the maximum applicable input voltage to the power supply module.

(2) Immunity related standards

Table9.2 Immunity related standards

Standard	Test item	Test description	Value specified in standard
EN61131-2: 2007	EN61000-4-2 Electrostatic discharge immunity*1	An electrostatic discharge is applied to the enclosure of the equipment.	• 8kV Air discharge • 4kV Contact discharge
	EN61000-4-3 Radiated, radio-frequency, electromagnetic field immunity*1	An electric field is radiated to the product.	80% AM modulation @1kHz • 80 to 1000MHz: 10Vm • 1.4 to 2.0GHz: 3Vm • 2.0 to 2.7GHz: 1Vm
	EN61000-4-4 Fast transient burst immunity*1	Burst noise is applied to power lines and signal lines.	• AC/DC power, I/O power, and AC I/O (unshielded) lines: 2kV • DC I/O, analog, and communication lines: 1kV
	EN61000-4-5 Surge immunity*1	Lightning surge is applied to power lines and signal lines.	• AC power, AC I/O power, and AC I/O (unshielded) lines: 2kV CM, 1kV DM • DC power and DC I/O power lines: 0.5kV CM, 0.5kV DM • DC I/O, AC I/O (shielded), analog*2, and communication lines: 1kV CM
	EN61000-4-6 Conducted RF immunity*1	High-frequency noise is applied to power lines and signal lines.	0.15 to 80MHz, 80% AM modulation @1kHz, 10Vrms
	EN61000-4-8 Power-frequency magnetic field immunity*1	The product is immersed in the magnetic field of an induction coil.	50/60Hz, 30A/m
	EN61000-4-11 Voltage dips and interruption immunity	Power voltage is momentarily interrupted.	• 0%, 0.5 period, starting at zero-crossing • 0%, 250/300 period (50/60Hz) • 40%, 10/12 period (50/60Hz) • 70%, 25/30 period (50/60Hz)

* 1 : Programmable controller is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel, applying the maximum applicable input voltage to the power supply module.
* 2 : The accuracy of an analog-digital converter module may temporarily vary within ±10%.

9.1.2 Installation in a control panel

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

* : Install CC-Link Safety remote stations within a control panel as well.

(1) Control panel

- Use a conductive control panel.
- 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 plate.
- 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.
- Earth the control panel with a thick wire so that a low impedance connection to ground can be ensured even at high frequencies.
- Holes made in the control panel must be 10 cm diameter or less. If the holes are 10 cm or larger, radio frequency noise may be emitted.
  In addition, because radio waves leak through a clearance between the control panel door and the main unit, reduce the clearance as much as practicable.
  The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

  Our tests have been carried out on a panel having the damping characteristics of 37 dB max. and 30 dB mean (measured by 3 m method with 30 to 300 MHz).

(2) Connection of power and earth wires

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

- Provide an earthing point near the power supply module. Earth the power supply's LG and FG terminals (LG : Line Ground, FG : Frame Ground) with the thickest and shortest wire possible. (The wire length must be 30 cm 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. As the wires are used to relieve the noise, the wire itself carries a large noise content and thus short wiring means that the wire is prevented from acting as an antenna.
- The earth wire led from the earthing point must be twisted with the power supply wires. By twisting with the earthing wire, noise flowing from the power supply wires can be relieved to the earthing. However, if a filter is installed on the power supply wires, the wires and the earthing wire may not need to be twisted.

9.1.3 Cables

The cables pulled out 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 when pulling out the cables which are connected to intelligent function module and CC-Link Safety remote I/O module and using them outside of the control panel.
The use of shielded cables also increases noise immunity.
For signal lines (including common line) of intelligent function module and CC-Link Safety remote I/O module, the noise immunity satisfies the standard value on the condition that the shielded cables are used for grounding.
If shielded cables are not used or not grounded correctly, the noise immunity does not meet the specified requirements.

(1) Shield grounding processing of shielded cables

- Provide a grounding point on the shielded cable as near the module as possible so that the wiring between the module and grounding point is not induced electromagnetically by the other parts of wiring on the cable.
- Take appropriate measures so that the exposed shield part of the shielded cable, where the cable jacket was partly removed, is grounded to the control panel on the widest contact surface.
  A clamp may also be used as shown in Figure 9.2.
  In this case, however, a mask painting is required for the inner wall of the control panel which comes into contact with the clamp.

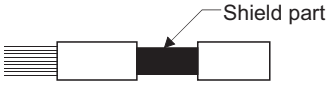


Figure 9.1 Part to be exposed

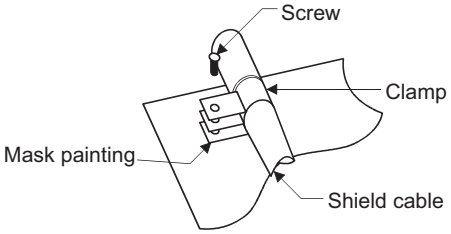


Figure 9.2 Shield grounding (Good example)

Note) If a wire is soldered onto the shield part of the shielded cable for grounding as shown below, the high-frequency impedance rises, resulting in a loss of shield effect.

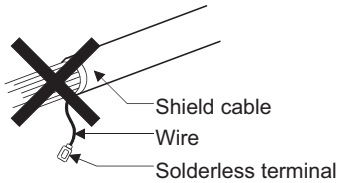


Figure 9.3 Shield grounding (Bad example)

(2) MELSECNET/H module

Be sure to use double-shielded coaxial cables (MITSUBISHI CABLE INDUSTRIES, LTD.: 5C-2V-CCY) for the coaxial cables of MELSECNET/H module. Radiated noise in the range of 30HMz or higher can be suppressed by using double-shielded coaxial cables. Ground the double-shielded coaxial cable by connecting its outer shield to the ground.

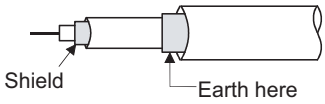


Figure 9.4 Double-shielded coaxial cable grounding

Refer to (1) for the shield grounding processing.

(3) Ethernet module

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

- Be sure to ground the AUI cables[*1] connected to the 10BASE5 connectors. Since the AUI cable is of the shielded type, ground the exposed shield section of the cable, where the cable jacket was partly removed as shown in Figure 9.5, on the widest contact surface.

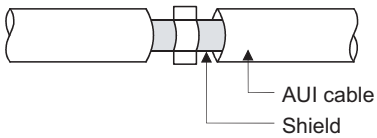


Figure 9.5 AUI cable grounding

Refer to (1) for the shield grounding processing.

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

- Use shielded twisted pair cables for the twisted pair cables connected to the 10BASE-T/100BASE-TX connectors. Ground the exposed shield section of the shielded twisted pair cable, where the cable jacket was partly removed as shown in Figure 9.6, on the widest contact surface.

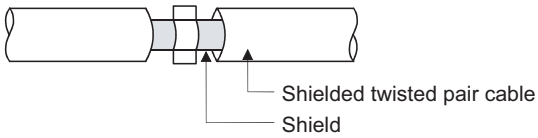


Figure 9.6 Shielded twisted pair cable grounding

Refer to (1) for the shield grounding processing.

- Be sure to use double-shielded coaxial cables for the coaxial cables*2 connected to the 10BASE2 connectors. Ground the double-shielded coaxial cable by connecting its outer shield to the ground

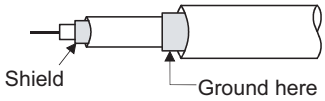


Figure 9.7 Double-shielded coaxial cable grounding

Refer to (1) for the shield grounding processing.

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

(4) CC-Link IE Field Network master/local module (with safety functions)

This section describes the precautions for using the CC-Link IE Field Network cable.

- Use the CC-Link IE Field Network cable (SCE5EW-S ☐ M).
- Because the CC-Link IE Field Network cable is a shielded type, strip part of the jacket as shown in Figure 9.8 and ground the exposed shield section to the ground as much as possible.

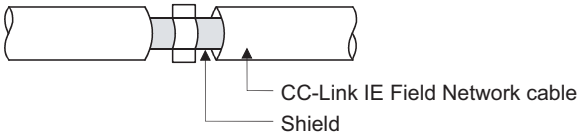


Figure 9.8 CC-Link IE Field Network cable grounding

Use shielded cables for the external wiring, and ground the shields of the external wiring cables to the control box with the AD75CK cable clamp (Mitsubishi).
(Ground the shield section 20 to 30cm away from the module.)

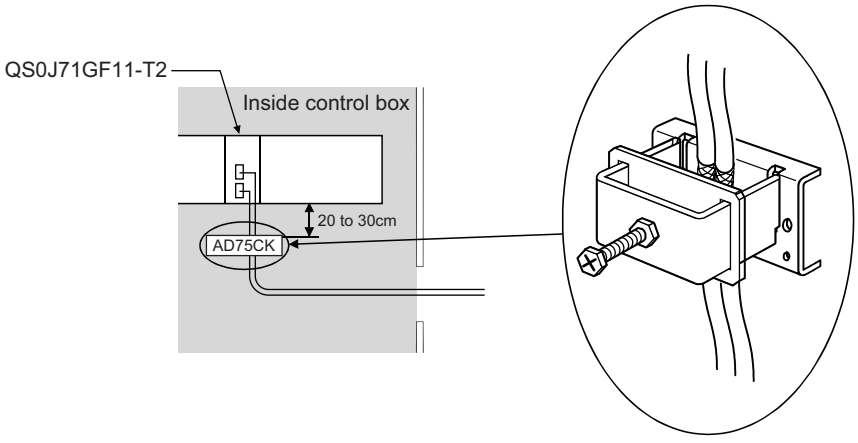


Figure 9.9 AD75CK cable clamp mounting position

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

If the I/O signal lines (including common line) and other communication cables (such as CC-Link Safety and CC-Link IE Field Network) are pulled out from the control panel, be sure to ground the shield sections of the cables as described in (1).

9.1.4 Power Supply Module

Always ground the LG and FG terminals after short-circuiting them.

9.1.5 Others

(1) Ferrite core

A ferrite core has the effect of reducing conduction noise in around 10MHz band and radiated noise in the 30MHz to 100MHz band.
It is recommended to fit ferrite cores if shielded cables pulled out of the panel do not provide sufficient shielding effects or if the emission of conduction noise from the power supply line has to be suppressed.
It is also recommended to fit a ferrite core to the USB cable which connects the CPU and the personal computer as measures against noise.
Regarding the number of winding to the ferrite core, the more the better. The two turns or more is recommended as the number of winding.

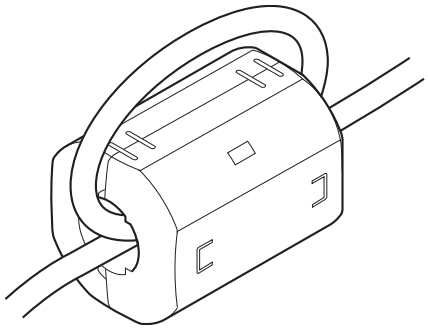


Figure 9.10 For number of winding is two turns or more

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

(2) Noise filter (power supply line filter)

A noise filter is a component which has an effect on conducted noise.
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 MHz or less.)

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

- 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.

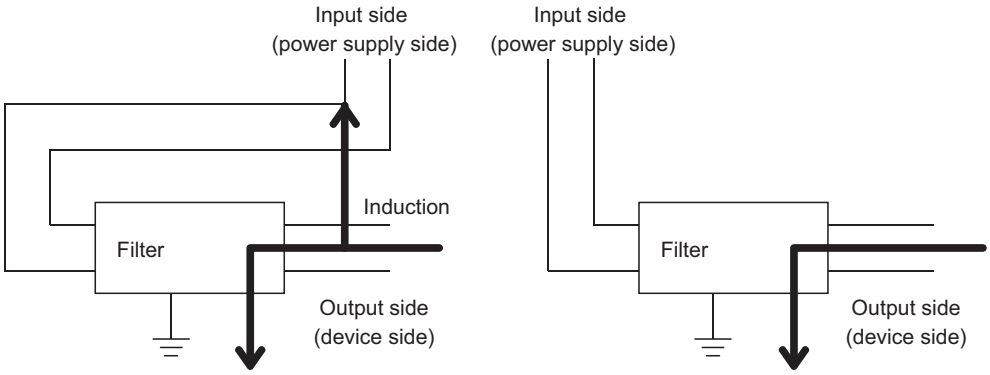


Figure 9.11 Precautions on noise filter

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

Remark

Table9.3 Noise filer specifications

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

(3) AC surge protective devices

AC surge protective device (SPD) is a device designed to protect electrical devices from lightning surges on the AC power line. An AC SPD is necessary if common mode surges exceeding the tolerance limit (±2kV) can occur in the installation environment.

Remark

Before using an AC SPD, check the specifications and precautions in the manual.

9.2 Requirement to Conform to the Low Voltage Directive

The Low Voltage Directive requires each device that operates with the power supply ranging from 50 to 1000VAC and 75 to 1500VDC to satisfy the safety requirements.
In Section 9.2.1 to Section 9.2.5, cautions on installation and wiring of the MELSEC-QS series programmable controller to conform to the Low Voltage Directive are described.
These descriptions are based on the requirements and standards of the regulation, however, it does not guarantee that the entire machinery manufactured based on the descriptions conforms to the above-mentioned directive. The method and judgment for the conformity to the low voltage directive must be left to the manufacturer's own discretion.

9.2.1 Standard applied for MELSEC-QS series programmable controller

The standard applied for MELSEC-QS series programmable controller is EN61131-2 safety of devices used in measurement rooms, control rooms, or laboratories.

The MELSEC-QS series programmable controller modules which operate at the rated voltage of 50VAC/75VDC or above are also developed to conform to the above standard. The modules which operate at the rated voltage of less than 50VAC/75VDC are out of the Low Voltage Directive application range.
For CE-marked products, please consult your local Mitsubishi representative.

9.2.2 MELSEC-QS series programmable controller selection

(1) Power supply module
There are dangerous voltages (voltages higher than 42.4V peak) inside the power supply modules of the 100/200VAC rated input voltages. Therefore, the CE marked models are enhanced in insulation internally between the primary and secondary.

(2) CPU module, base unit
Using 5VDC circuits inside, CPU modules and base units are out of the Low Voltage Directive application range.

(3) Intelligent function module
The intelligent function module is out of the scope of the Low Voltage Directive because the rated voltage is 24VDC or less.

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.

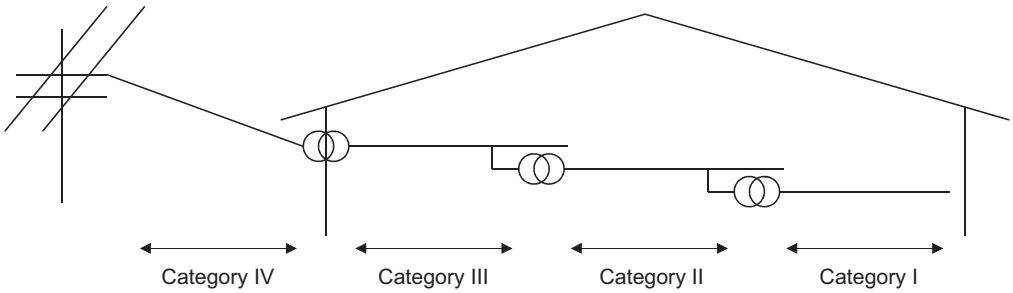


Figure 9.12 Installation category for power supply module

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 module), be sure to use it after storing in the control panel.*

* : Also, each network remote station needs to be installed inside the control panel.

(1) Electrical shock prevention

The control panel must be handled as shown below to protect a person who does not have adequate knowledge of electricity from an electric shock.

- Lock the control panel so that only those who are trained and have acquired enough knowledge of electric facilities can open the control panel.
- The control panel must have a structure which automatically stops the power supply when the box is opened.
- 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 pollution level 2 or below.

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

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

9.2.5 External wiring

(1) 24VDC external power supply

To connect to the CC-Link Safety remote I/O module, use the power supply that meets the following conditions:

- SELV (Safety Extra Low Voltage): Product with reinforced insulation from the hazardous potential part (48V or more)
- LVD applicable product
- Output voltage specifications: 24VDC (ripple ratio: 5% or less) (allowable voltage range: 19.2 to 28.8VDC)

(2) External devices

When a device with a hazardous voltage circuit is externally connected to the programmable controller, use the device whose interface circuit section to the programmable controller has the reinforced insulation against the hazardous voltage circuit.

(3) Reinforced insulation

The reinforced insulation covers the withstand voltages shown in Table9.4.

Table9.4 Reinforced 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

9.3 Requirements for compliance with the Machinery Directive

The Machinery Directive requires that machinery satisfy the three pillars of safety: mechanical safety, electrical safety, and worker safety.
This product complies with the Machinery Directive (2006/42/EC).
Before using this product, please read this manual, the relevant manuals, the manuals for standard programmable controller, and the safety standards carefully and pay full attention to safety to handle the product correctly.
The descriptions are based on the requirements of the Machinery Directive and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the Machinery Directive. The manufacture of the machinery must determine the testing method for compliance and declare conformity to the Machinery Directive.

CHAPTER10 LOADING AND INSTALLATION

In order to increase the reliability of the system and exploit the maximum performance of its functions, this section describes the methods and precautions for the mounting and installation of the system.

WARNING

- When a safety programmable controller detects an error in an external power supply or a failure in programmable controller, it turns off all the outputs.
  Create an external circuit to securely stop the power of hazard by turning off the outputs. Incorrect configuration may result in an accident.

- Create short current protection for a safety relay, and a protection circuit such as a fuse, and breaker, outside a safety programmable controller.

- When data/program change, or status control is performed from a personal computer to a running safety programmable controller, create an interlock circuit outside the sequence program and safety programmable controller to ensure that the whole system always operates safely.
  For the operations to a safety programmable controller, pay full attention to safety by reading the relevant manuals carefully, and establishing the operating procedure.
  Furthermore, for the online operations performed from a personal computer to a safety CPU module, the corrective actions of the whole system should be predetermined in case that a communication error occurs due to a cable connection fault, etc.

- All output signals from a safety CPU module to the CC-Link Safety master module are prohibited to use.
  These signals can be found in the CC-Link Safety System Master Module User's Manual.
  Do not turn ON or OFF these signals by sequence program, since turning ON/OFF these output signals of the programmable controller system may cause malfunctions and safety operation cannot be guaranteed.

- All output signals from a safety CPU module to the CC-Link IE Field Network master/local module (with safety functions) are prohibited to use.
  These signals can be found in the MELSEC-QS CC-Link IE Field Network Master/Local User's Manual.
  Do not turn ON or OFF these signals by sequence program, since turning ON/OFF these output signals of the programmable controller system may cause malfunctions and safety operation cannot be guaranteed.

WARNING

- When a safety remote I/O module has detected a CC-Link Safety error, it turns off all the outputs.
  Note that the outputs in a sequence program are not automatically turned off.
  If a CC-Link Safety or CC-Link IE Field Network error has been detected, create a sequence program that turns off the outputs in the program.
  If the CC-Link Safety or CC-Link IE Field Network is restored with the outputs on, it may suddenly operate and result in an accident.

- To inhibit restart without manual operation after safety functions was performed and outputs were turned OFF, create an interlock program which uses a reset button for restart.

CAUTION

- Do not install the wires of external devices or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them.
  Failure to do so may result in malfunction due to noise.

10.1 Calculating Heat Generation of programmable controller

The ambient temperature inside the panel storing the programmable controller must be suppressed to an ambient temperature of 55℃ or less, which is specified for the programmable controller.
For the design of a heat releasing panel, it is necessary to know the average power consumption (heating value) of the devices and instruments stored inside.
Here the method of obtaining the average power consumption of the programmable controller system is described.
From the power consumption, calculate a rise in ambient temperature inside the panel.

How to calculate average power consumption

The power consuming parts of the programmable controller are roughly classified into six blocks as shown below.

(1) Power consumption of power supply module

The power conversion efficiency of the power supply module is approx. 70 %, while 30 % of the output power is consumed as heat. As a result, 3/7 of the output power is the power consumption.
Therefore the calculation formula is as follows.

$$W_{PW} = \frac{3}{7} \times (I_{5V} \times 5)\ (W)$$

I_{5V}: Current consumption of logic 5 VDC circuit of each module

(2) Total power consumption for 5VDC logic circuits of all modules (including CPU module)

The power consumption of the 5 VDC output circuit section of the power supply module is the power consumption of each module (including the current consumption of the base unit).

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

The total of the power consumption values calculated for each block becomes the power consumption of the overall sequencer system.

$$W = W_{PW} + W_{5V}$$

From this overall power consumption (W), calculate the heating value and a rise in ambient temperature inside the panel.
The outline of the calculation formula for a rise in ambient temperature inside the panel is shown below.

$$T = \frac{W}{UA}\ (^{\circ}C)$$

W : Power consumption of overall sequencer system (value obtained above)
A : Surface area inside the panel
U : When the ambient temperature inside the panel is uniformed by a fan 6
When air inside the panel is not circulated 4

POINT

If the temperature inside the panel has exceeded the specified range, it is recommended to install a heat exchanger to the panel to lower the temperature. If a normal ventilating fan is used, dust will be sucked into the programmable controller together with the external air, and it may affect the performance of the programmable controller.

(3) Example of calculation of average power consumption

(a) System configuration

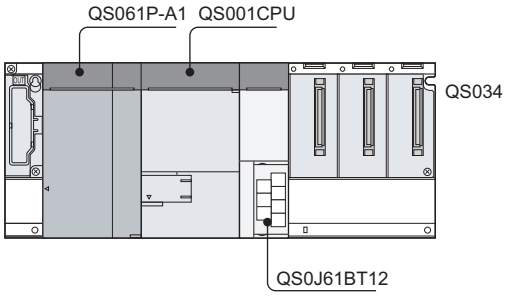


Figure 10.1 System configuration

(b) 5 VDC current consumption of each module
QS001CPU : 0.43(A)
QS0J61BT12 : 0.46(A)
QS034B : 0.10(A)

(c) Power consumption of power supply module
W_{PW} = 3/7×(0.43 + 0.46 + 0.10)×5 = 2.12(W)

(d) Total power consumption for 5 VDC logic circuits of all module
W_{5V} = (0.43 + 0.46 + 0.10)×5 = 4.95(W)

(e) Power consumption of overall system
W = 2.12 + 4.95 = 7.07(W)

10.2 Module Installation

10.2.1 Installation precautions

CAUTION

- Use the safety programmable controller in an environment that meets the general specifications in this manual.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.

- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect interconnection may cause malfunction, failure, or drop of the module.
  Secure the module to the base unit with screws.
  Tighten the screws within the specified torque range.
  Undertightening can cause drop of the screw, short circuit, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may result in damage to the product.

- Do not directly touch any conductive part of the module.
  Doing so can cause malfunction or failure of the module.

This section gives instructions for handling the CPU, and power supply modules, base unit and so on.

- Do not drop the module case and main module or subject them to strong impact.
- Do not remove modules' printed circuit boards from the enclosure in order to avoid failures in operation.
- Tighten the screws such as module fixing screws within the following ranges.

Table10.1 Tightening torque range

Location of Screw	Tightening Torque Range
Module fixing screw (M3×12 screw)*1	0.36 to 0.48N•m
Power supply module terminal screw (M3.5 screw)	0.66 to 0.89N•m

* 1 The module can be easily fixed onto the base unit using the hook at the top of the module. However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

- Be sure to install a power supply module in the power supply installation slot of QS034B.

Install a base unit (by screwing) in the following procedure.

1) Fit the two base unit top mounting screws into the panel.

Figure 10.2 Install a base unit

2) Place the right-hand side notch of the base unit onto the right-hand side screw.

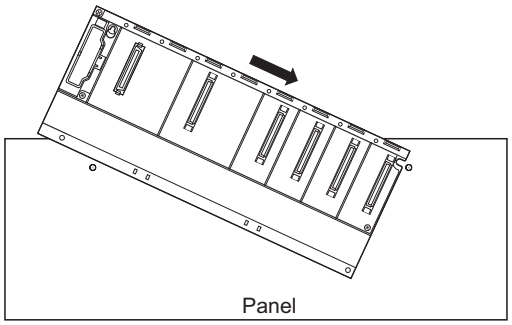


Figure 10.3 Install a base unit

3) Place the left-hand side pear-shaped hole onto the left-hand side screw.

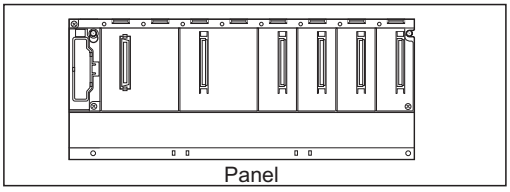


Figure 10.4 Install a base unit

4) Fit the mounting screws into the holes at the bottom of the base unit, and then retighten the 4 mounting screws.

Note1 : Install the base unit to a panel, with no module loaded in the right-end slot.
Remove the base unit after unloading the module from the right-end slot.

Note the following points when mounting a DIN rail.
Mounting a DIN rail needs special adapters (optional), which are to be prepared by the user.

(a) Applicable adapter types
For QS034B : Q6DIN2

Table10.2 Parts included with DIN rail adapters

DIN rail adapter	Quantity of included parts				
	Adapter(Large)	Adapter(small)	Mounting screw (M5×10)	Square washer	Stopper
Q6DIN2	2	3	2	2	2

(b) Adapter installation method
The following figure shows how to attach DIN rail adapters to the base unit.

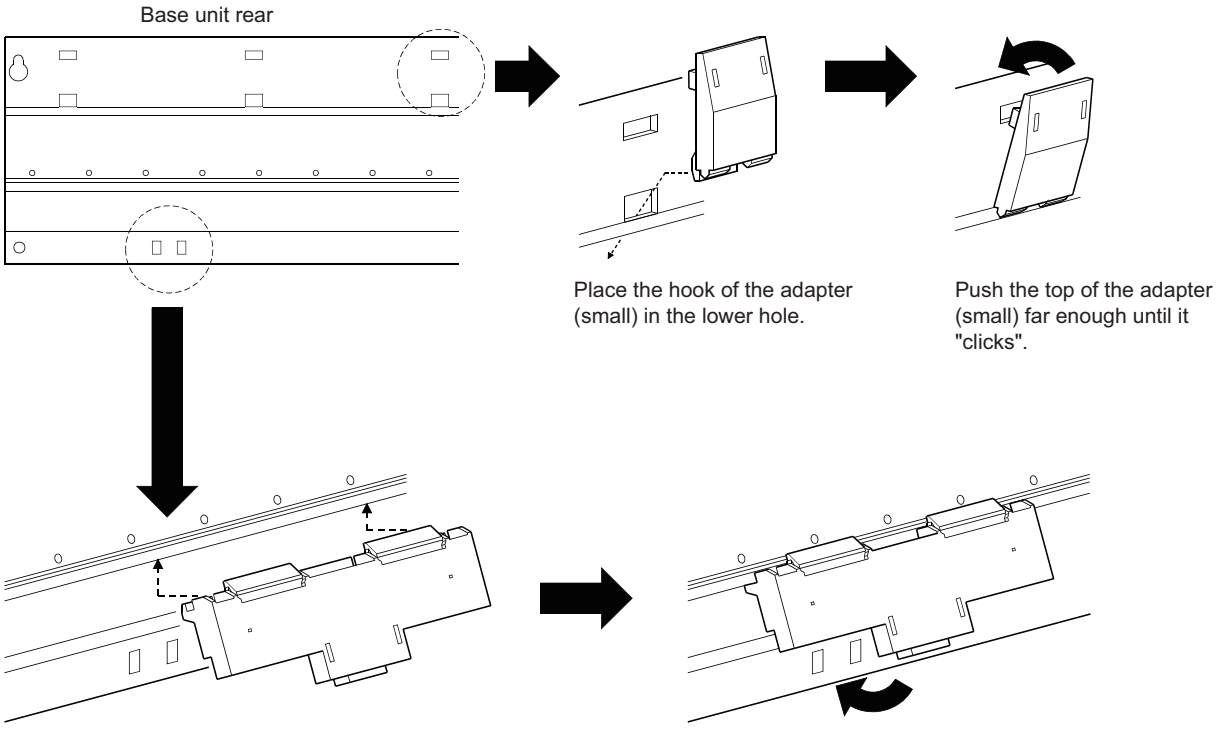


Figure 10.5 Adapter installation method

(c) Applicable DIN rail types (IEC 60715/JIS C 2812)
TH35-7.5Fe
TH35-7.5Al
TH35-15Fe

(d) DIN rail mounting screw intervals
When using either the TH35-7.5Fe or TH35-7.5Al DIN rail, tighten rail mounting screws with an interval of 200mm or less to ensure that the rail has sufficient strength.

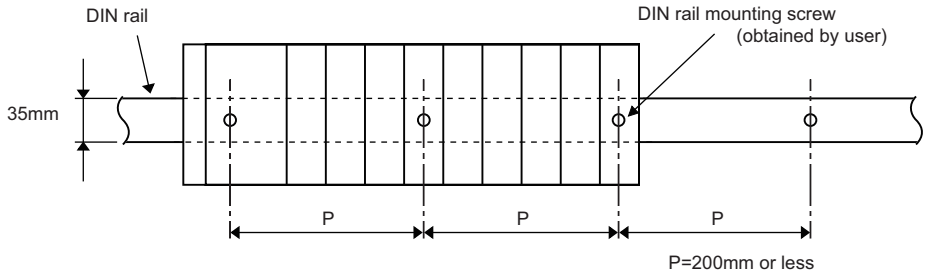


Figure 10.6 DIN rail mounting screw intervals

When installing the DIN rail in a large vibration and/or shock prone environment, tighten the mounting screws with an interval of 200mm or less by the following method shown below.

Screw the DIN rail in two places using the mounting screws and square washers included with the adapters in 'Position A' (bottom of base unit).

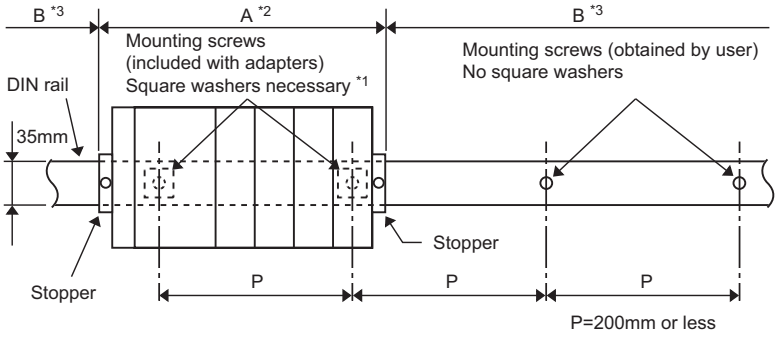


Figure 10.7 DIN rail mounting screw intervals

* 1

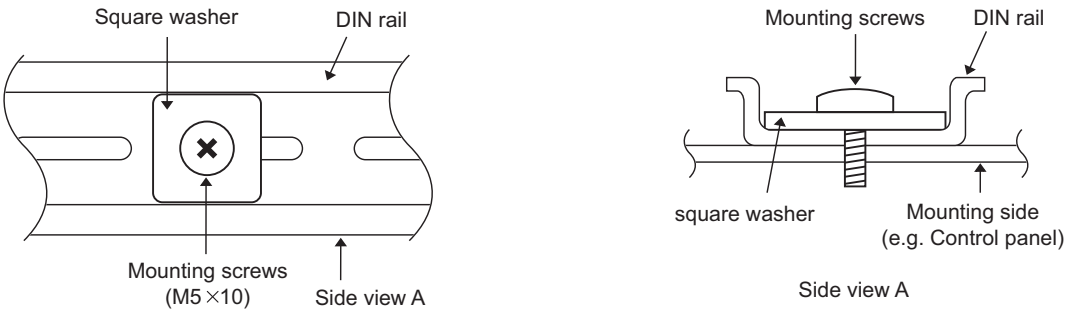


Figure 10.8 Square washer

* 2: Screw the DIN rail to a control panel using the mounting screws and square washers included with the adapters in 'Position A' (bottom of base unit).

* 3: Screw the DIN rail with mounting screws(obtained by user) in 'Position B' (Where the base unit is not installed). In this method the supplied mounting screws and square washers are not used.

POINT

(1) Use only one washer for each mounting screw. Use only the square washers supplied with the adapters.
If two or more washers are used together for one mounting screw, the screw may interfere with the base unit.

(2) Make sure to align the square washer sides with the DIN rail.

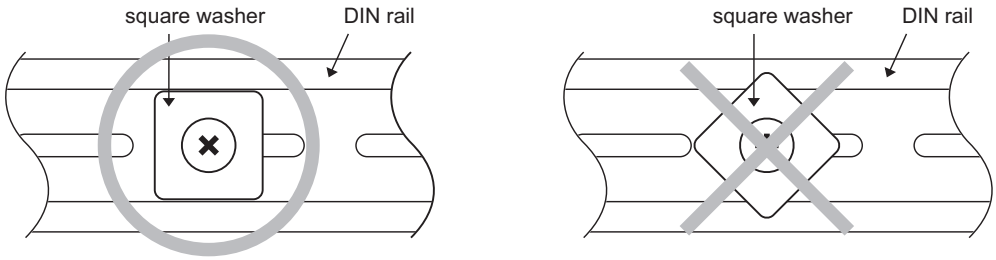


Figure 10.9 Precautions when mounting a square washer

(3) Use the DIN rail that is compatible with M5 size screws.

(e) Stopper mounting

When using the DIN rail in a large vibration and/or shock prone environment, install the base unit using the stoppers supplied with the DIN rail adapters indicated in (a).

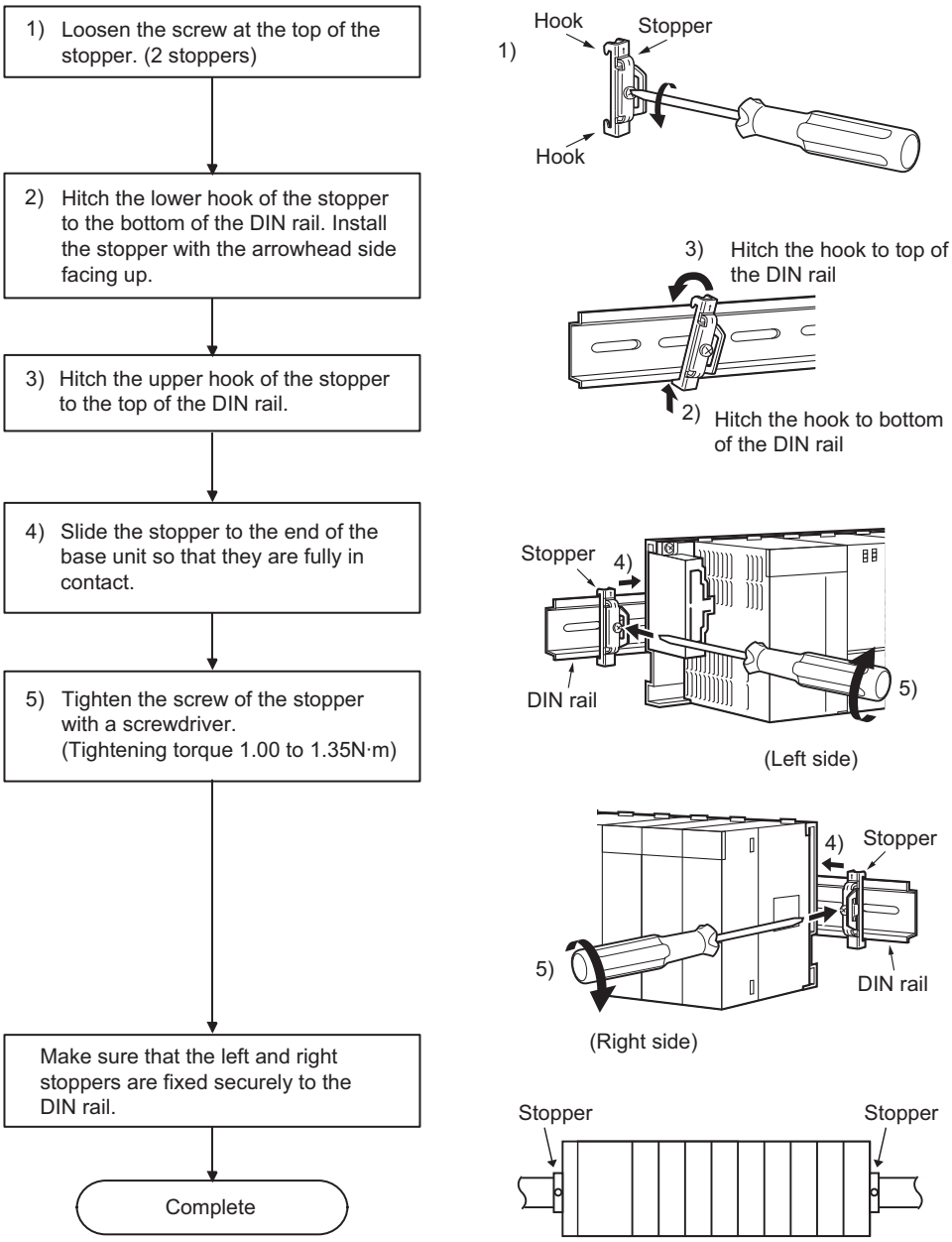


Figure 10.10 Fixture mounting procedure

POINT

When stoppers are used, the dimension of stoppers need to be considered in the unit installation dimensions. Refer to Section 6.1 for the base unit dimensions (W).

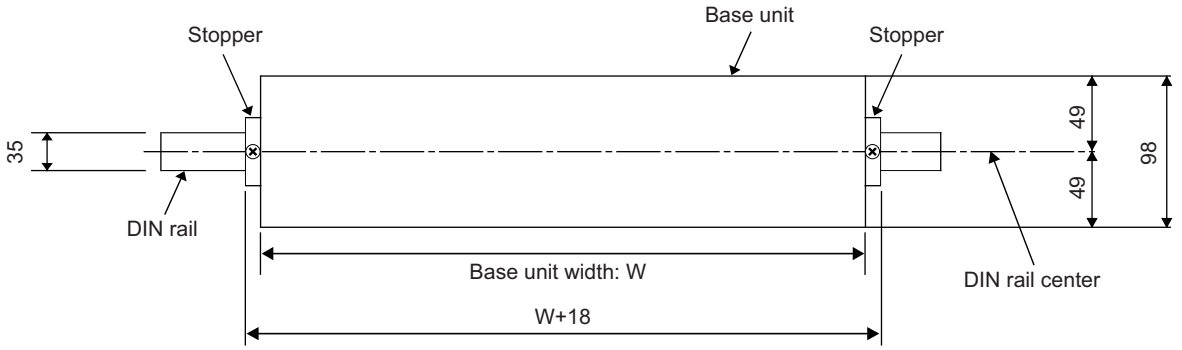


Figure 10.11 Base unit external dimensions (Front view)

(f) Dimensions when DIN rail is attached (Side view).

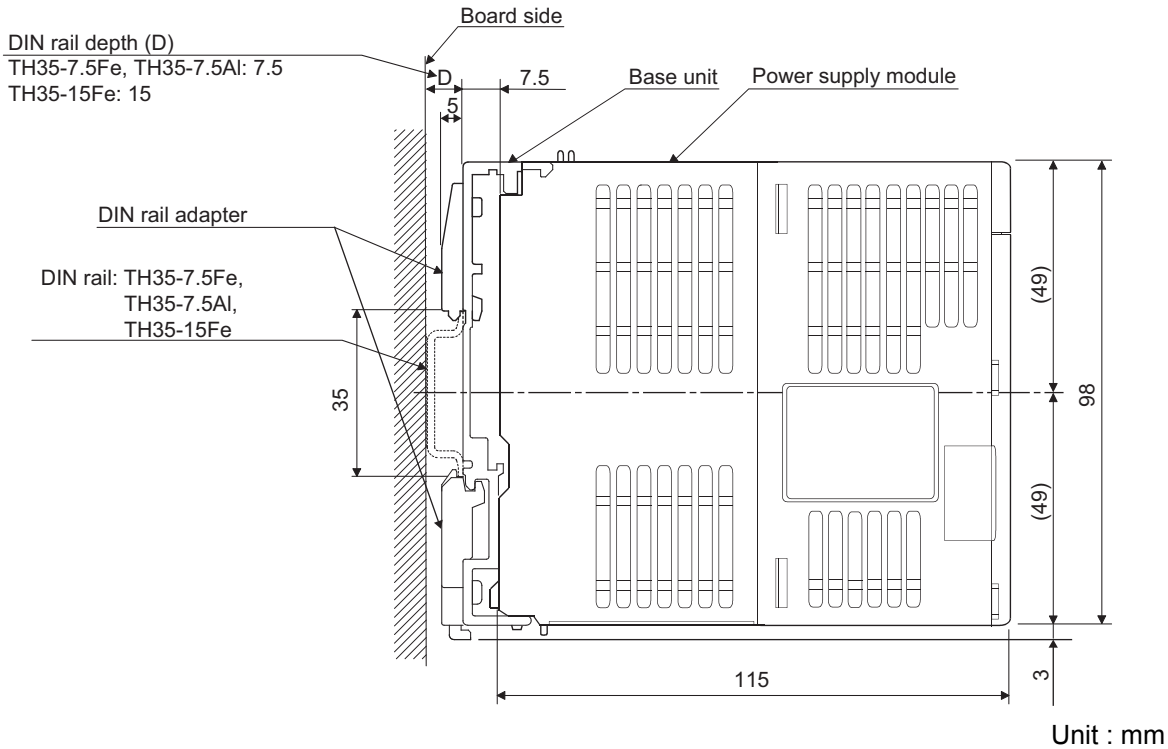


Figure 10.12 External dimensions (Side view)

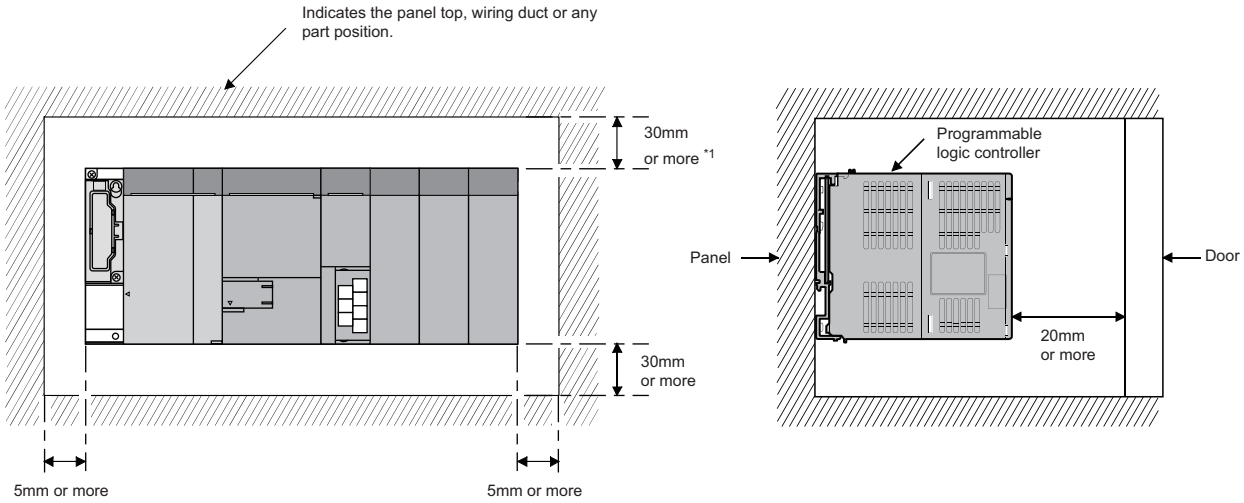
10.2.2 Instructions for mounting the base unit

When mounting the programmable controller to an enclosure or similar, fully consider its operability, maintainability and environmental resistance.

(1) Module mounting position

Keep the clearances shown in Figure 10.13 between the top/bottom faces of the module and other structures or parts to ensure good ventilation and facilitate module replacement.

(a) In case of base unit



* 1: For wiring duct with 50mm or less height. For other cases, 40mm or more.

Figure 10.13 Module mounting position

(2) Module mounting orientation

- Install the programmable controller in the orientation in Figure 10.14 to ensure good ventilation for heat release.

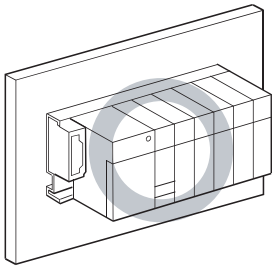


Figure 10.14 Orientation in which modules can be mounted

- Do not mount it in either of the orientations shown in Figure 10.15.

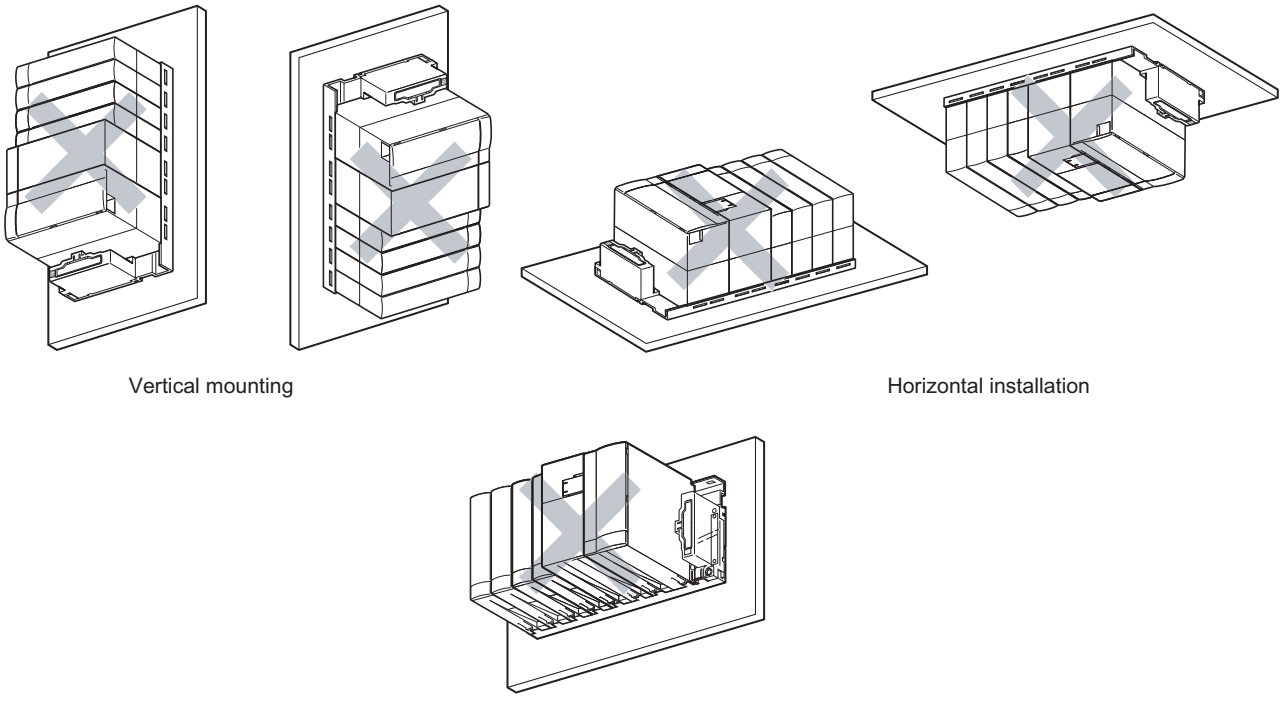


Figure 10.15 Orientation in which modules cannot be mounted

(3) Installation surface

Mount the base unit on a flat surface. If the mounting surface is not even, this may strain the printed circuit boards and cause malfunctions.

(4) Installation of unit in an area where the other devices are installed

Avoid mounting base unit in proximity to vibration sources such as large magnetic contractors and no-fuse circuit breakers; mount these on a separate panel or at a distance.

(5) Distances from the other devices

In order to avoid the effects of radiated noise and heat, provide the clearances indicated below between the programmable controller and devices that generate noise or heat (contactors and relays).

- Required clearance in front of programmable controller
  : at least 100 mm
- Required clearance on the right and left of programmable controller
  : at least 50 mm.

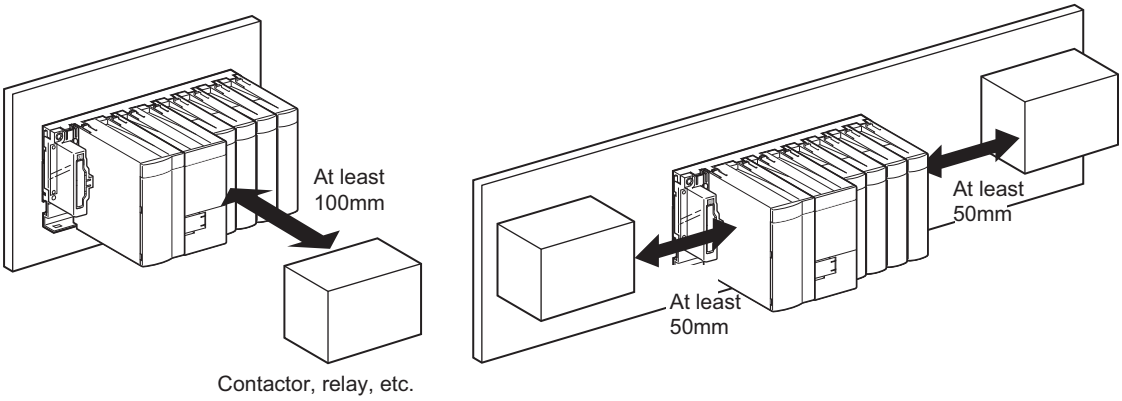


Figure 10.16 Distances from the other devices

10.2.3 Installation and removal of module

This section explains how to install and remove a power supply, CPU, intelligent function or another module to and from the base unit.

(1) Installation and removal of the module from the QS034B

(a) Installation of module on the QS034B

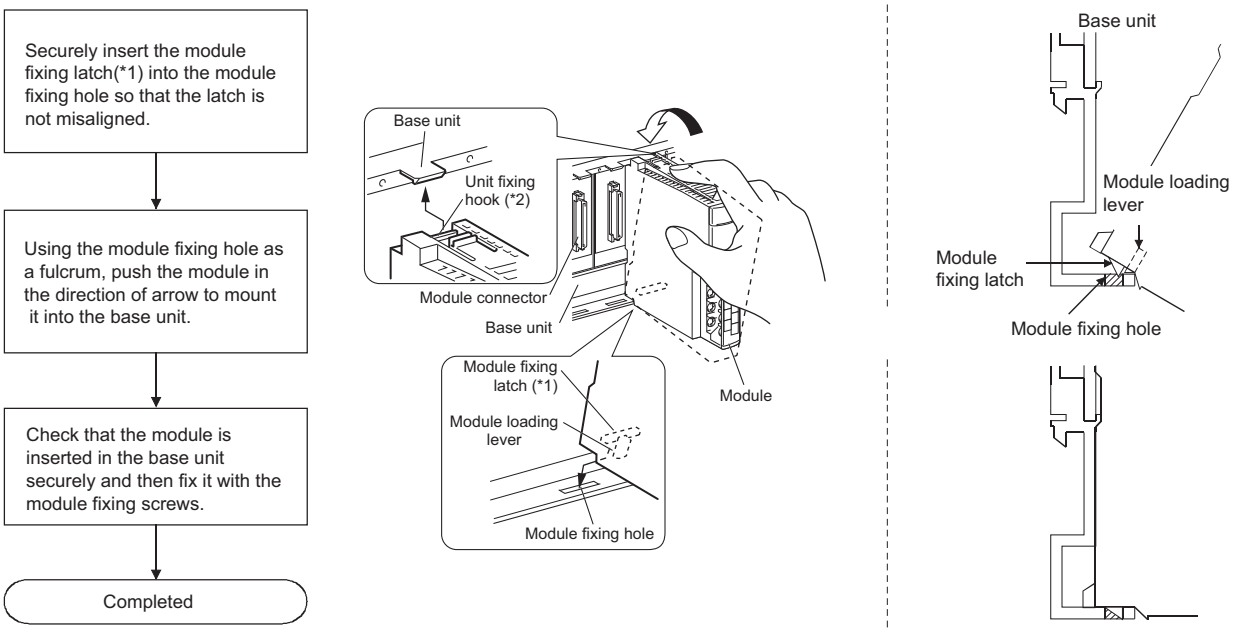


Figure 10.17 Module mounting procedure

* 1: The power supply module and CPU module has two module fixing latches. Insert the two module fixing latches on the right and left into the module fixing holes so that they are not misaligned.

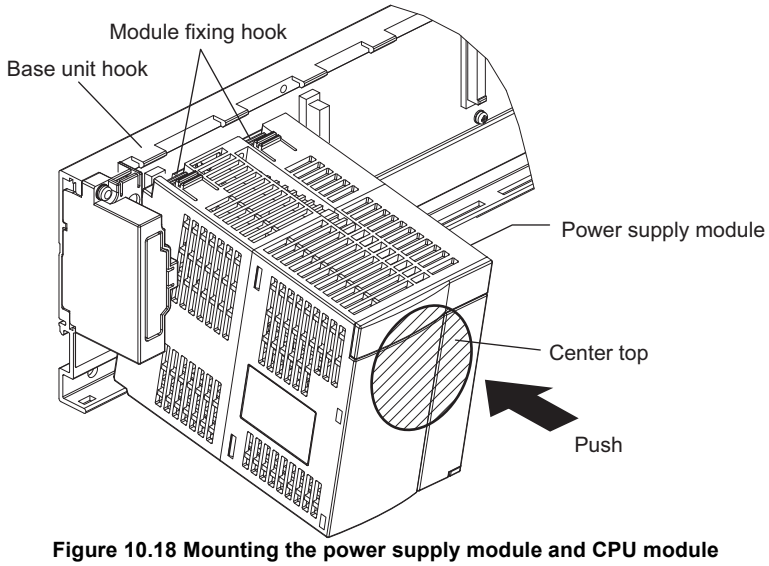


Figure 10.18 Mounting the power supply module and CPU module

* 2: The power supply module and CPU module has two module fixing hooks on its top. Push the center top of the power supply module and CPU module and mount the module so that the two module fixing hooks on the right and left are securely engaged with the base unit hooks.

POINT

1. When mounting the module, always insert the module fixing latch into the module fixing hole of the base unit.
   At that time, securely insert the module fixing latch so that it does not come off from the module fixing hole.
   If the module is forcibly mounted without the latch being inserted, the module connector and module will be damaged.
2. After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant):
   - Mounting/removing the module to/from the base unit
   - Mounting/removing the terminal block to/from the module

   Exceeding the limit may cause malfunction.

(b) Removal from the QS034B

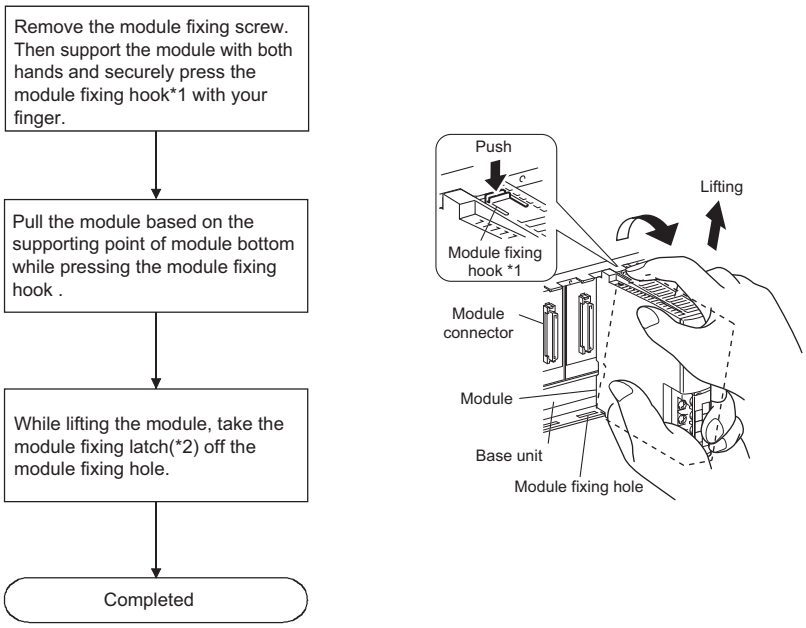


Figure 10.19 Module removal procedure

* 1: The power supply module and CPU module has two module fixing hooks on its top. Push the two module fixing hooks on the right and left of the module top simultaneously with your fingers until they stop.

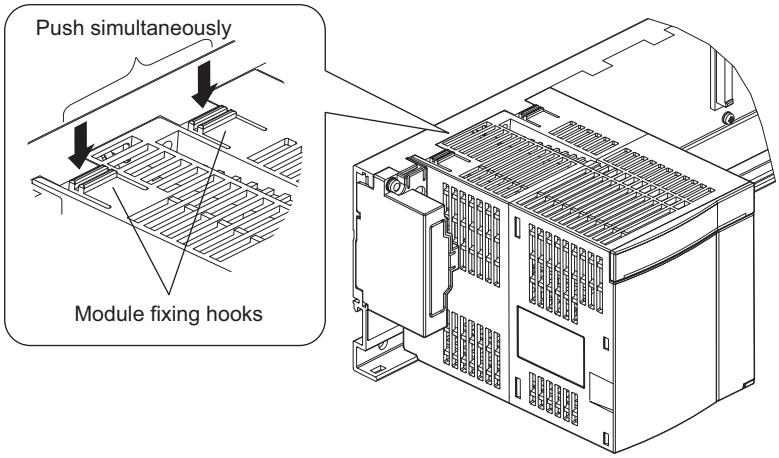


Figure 10.20 Power supply module and CPU module removal procedure

* 2: The power supply module and CPU module has two module fixing latches. Remove the two module fixing latches on the right and left of the module bottom from the module fixing holes.

POINT

When removing the module, always remove the module fixing screw(s) first, and then remove the module fixing projection(s) from the module fixing hole(s). Attempting to remove the module by force may damage the module fixing latch.

10.3 Wiring

10.3.1 Wiring precautions

⚠ WARNING	● Shut off the external power supply (all phases) used in the system before wiring. Failure to do so may result in electric shock or damage to the product.
	● After wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 Ω or less. Failure to do so may result in electric shock or malfunction.

- Use a solderless terminal with insulation sleeve for wiring of a terminal block.
  Use up to two solderless terminals for a single terminal.

- Use applicable solderless terminals and tighten them within the specified torque range.
  If any spade solderless terminal is used, it may be disconnected when a terminal block screw comes loose, resulting in failure.

- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.

- Tighten the terminal block mounting screws, terminal screws, and module fixing screws within the specified torque range.
  Undertightening of the terminal block mounting screws or terminal screws can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
  Undertightening of the module fixing screws can cause drop of the module.
  Overtightening can damage the screw and/or module, resulting in drop.

- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.

- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

- Mitsubishi programmable controllers must be installed in control panels.
  Connect the main power supply to the power supply module in the control panel through a relay terminal block.
  Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock.
  (For the wiring methods, refer to Section 10.3.)

The precautions on the connection of the power cables are described below.

(1) Power supply wiring

- Separate the programmable controller power supply line from the lines for I/O devices and power devices as shown below.
  When there is much noise, connect an insulation transformer.
- 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.

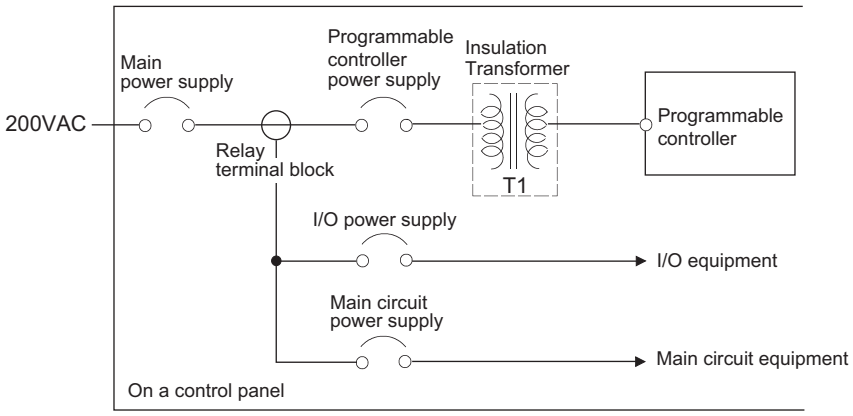


Figure 10.21 Power supply connection diagram

- 100VAC and 200VAC wires should be twisted as dense as possible.
  Connect the modules with the shortest distance.
  Also, to reduce the voltage drop to the minimum, use the thickest wires possible (maximum 2mm^2).
- Do not bundle the 100VAC and 200VAC wires with, or run them close to, the main circuit (high voltage, large current) and I/O signal lines (including common line).
  Reserve a distance of at least 100 mm from adjacent wires.
- Momentary power failure may be detected or the CPU module may be reset due to serge caused by lightning.
  As measures against serge caused by lightning, connect a surge absorber for lightning as shown in Figure 10.22.
  Using the surge absorber for lightning can reduce the influence of lightning.

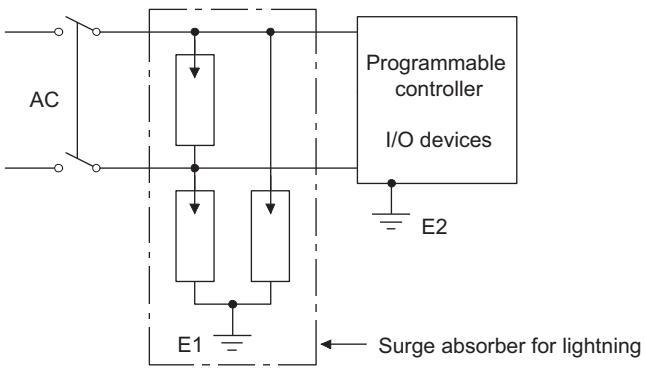


Figure 10.22 Connecting a lightning surge absorber

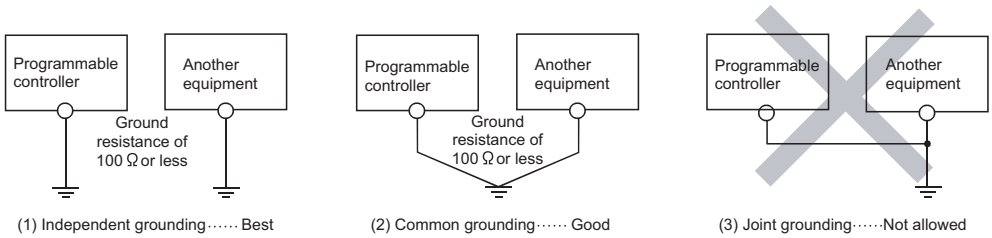
POINT

1. Separate the ground of the surge absorber for lightning (E1) from that of the programmable controller (E2).
2. Select a surge absorber for lightning whose power supply voltage does no exceed the maximum allowable circuit voltage even at the time of maximum power supply voltage elevation.

(2) Grounding

For grounding, perform the following:

- Use a dedicated grounding wire as far as possible. (Grounding resistance of 100Ω or less.)
- When a dedicated grounding cannot be performed, use (2) Common Grounding shown below.



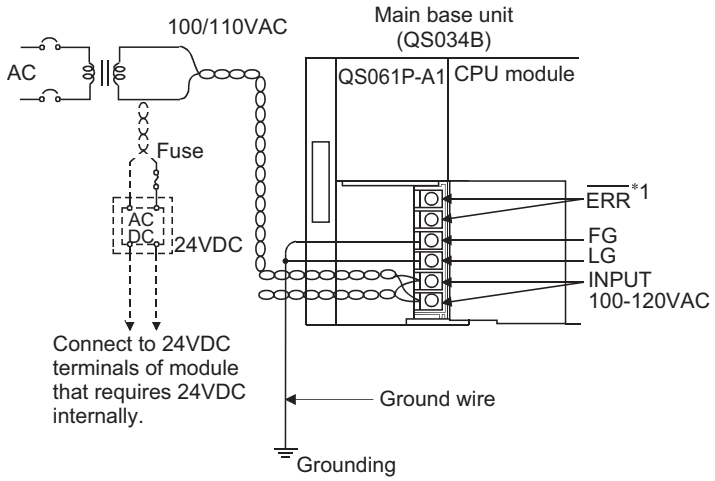
(1) Independent grounding····· Best (2) Common grounding····· Good (3) Joint grounding·····Not allowed

Figure 10.23 Grounding procedures

- For grounding a cable, use the cable of 2 mm^2 or more.
  Position the ground-contact point as closely to the sequencer as possible, and reduce the length of the grounding cable as much as possible.

10.3.2 Connecting to the power supply module

The following figure shows the wiring example of power lines, grounding lines, etc. to the unit.

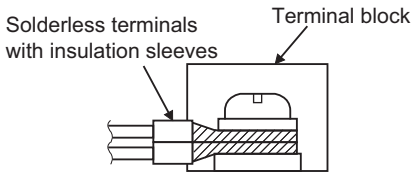


* 1: The $\overline{\text{ERR}}$. terminal turns ON/OFF as described below.
The terminal turns OFF (opens) when the AC power is not input, a CPU module stop error (including a reset) occurs, or the fuse of the power supply module is blown.

Figure 10.24 Wiring example

POINT

1. Use the thickest possible (max. 2 mm^2 (14 AWG)) wires for the 100/200 VAC 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 or less thick. The number of the solderless terminals to be connected for one terminal block are limited to 2.



2. The $\overline{\text{ERR}}$. terminal can not be used as a safety output. In addition, set the cable for $\overline{\text{ERR}}$. contact in the control panel and its length to 30m or less.

CHAPTER11 MAINTENANCE AND INSPECTION

WARNING

- Do not touch the terminals while power is on.
  Doing so could cause shock or erroneous operation.
- Correctly connect the battery.
  Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery.
  Mishandling of battery can cause overheating or cracks which could result in injury and fires.
- Turn off all phases of the external supply power used in the system when cleaning the module or retightening the terminal block mounting screws, terminal screws, or module fixing screws.
  Not doing so could result in electric shock.
  Tighten a terminal block mounting screw, terminal screw, and module fixing screw within the specified torque range.
  If the terminal block mounting screw or terminal 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 screw or module, a short circuit or malfunctions.
  If the module fixing screw is too loose, it may cause a drop of the screw or module.
  Overtightening the screw may cause a drop due to the damage of the screw or module.

CAUTION

- The online operations performed from a personal computer to a running safety programmable controller (Program change when a safety CPU is RUN, device test, and operating status change such as RUN-STOP switching) have to be executed after the manual has been carefully read and the safety has been ensured.
  Following the operating procedure predetermined at designing, the operation has to be performed by an instructed person.
  When changing a program while a safety CPU is RUN (Write during RUN), it may cause a program breakdown in some operating conditions.
  Fully understand the precautions described in the GX Developer's manual before use.
- Do not disassemble or modify the modules.
  Doing so could cause a failure, erroneous operation, injury, or fire.
  If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.
- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm away in all directions of the programmable controller.
  Not doing so can cause a malfunction.
- Completely turn off the externally supplied power used in the system before mounting or removing the module.
  Not doing so may result in a failure or malfunctions of the module.
- After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant):
  • Mounting/removing the module to/from the base unit
  • Mounting/removing the terminal block to/from the module
  Exceeding the limit may cause malfunction.
- Do not drop or give an impact to the battery mounted to the module.
  Doing so may damage the battery, causing the battery fluid to leak inside the battery.
  If the battery is dropped or given an impact, dispose of it without using.
- Before touching the module, always touch grounded metal, etc. to discharge static electricity from human body, etc.
  Not doing so may result in a failure or malfunctions of the module.

In order that you can use the programmable controller in normal and optimal condition at all times, this section describes those items that must be maintained or inspected daily or at regular intervals.

11.1 Daily Inspection

The items that must be inspected daily are listed in Table11.1.

Table11.1 Daily inspection

Item	Inspection Item		Inspection	Judgment Criteria	Remedy
1	Installation of base unit		Check that fixing screws are not loose and the cover is not dislocated.	The screws and cover must be installed securely	Retighten the screws.
2	Installation of power supply module and CPU module		Check that the module is not dislocated and the unit fixing hook is engaged securely.	The module fixing hook must be engaged and installed securely.	Securely engaged the unit fixing hook.
			Check that the module fixing screws are securely tightened.	The module fixing screws must be securely tightened.	Securely tighten the module fixing screws.
3	Connecting conditions		Check for loose terminal screws.	Screws should not be loose.	Retighten the terminal screws.
			Check for distance between solderless terminals.	The proper clearance should be provided between Solderless terminals.	Correct.
4	Module indication LED	Power supply module "POWER" LED	Check that the LED is On (green).	The LED must be On (green). (Abnormal if the LED is Off.)	Since the status other than indicated on the left is in the status other than normal operation*1, perform the troubleshooting referring to Section 12.2.
		CPU module "ALIVE" LED	Check that the LED is On (green).	The LED must be On (green). (Abnormal if the LED is Off.)	
		CPU module "RUN" LED	Check that the LED is On (green).	The LED must be On (green). (Abnormal if the LED is Off.)	
		CPU module "ERR." LED	Check that the LED is Off.	The LED must be Off. (Abnormal if the LED is On or flashing.)	
		CPU module "TEST" LED	Check that the LED is Off.	The LED must be Off. (Abnormal if the LED is On.)	
		CPU module "BAT." LED	Check that the LED is Off.	The LED must be Off. (Abnormal if the LED is On.)	

*1: Normal operation indicates the following conditions.
- Safety CPU operation mode is in the SAFETY MODE.
- The CPU operation status is in the RUN status.

11.2 Periodic Inspection

The items that must be inspected one or two times every 6 months to 1 year are listed below.
When the equipment is moved or modified, or layout of the wiring is changed, also perform this inspection.

Table11.2 Periodic Inspection

Item	Inspection Item		Inspection	Judgment Criteria	Remedy
1	Ambient environment	Ambient temperature	Measure with a thermometer and a hygrometer.	0 to 55℃	When the sequencer is used in the board, the ambient temperature in the board becomes the ambient temperature.
		Ambient humidity		5 to 95 %RH	
		Atmosphere	Measure corrosive gas.	Corrosive gas must not be present.	
2	Power voltage		Measure a voltage across the terminals of 100/ 200VAC.	85 to 132VAC	Change the power supply.
				170 to 264VAC	
3	Installation	Looseness and rattling of module fixing screws	Try to further tighten screws with a screwdriver.	The module must be installed fixedly.	Retighten the screws. If the CPU, or power supply module is loose, fix it with screws.
		Adhesion of dirt and foreign matter	Check visually.	Dirt and foreign matter must not be present.	Remove and clean.
4	Connection	Looseness of terminal screws	Try to further tighten screws with a screwdriver.	Screws must not be loose.	Retighten the terminal screws.
		Proximity of solderless terminals to each other	Check visually.	Solderless terminals must be positioned at proper intervals.	Correct.
		Looseness of connectors	Check visually.	Connectors must not be loose.	Retighten the connector fixing screws.
5	Battery		Check "BAT." LED on the front face of the CPU module.	The LED must be Off.	If the LED is On, replace the battery.
			Check the period after the purchase of the battery.	The period must be five years or less.	If the battery is used for more than 5 years, replace the battery.
			Check in the monitoring mode of GX Developer that SM51 or SM52 is turned OFF.	SM51 or SM52 must be OFF.	If SM51 or SM52 is ON, replace the battery.
6	Number of writes to standard ROM		Check the values of SD232 and SD233 in the monitoring mode of GX Developer.	The number of writes to the standard ROM must be 100,000 times or less.	If the number of writes to the standard ROM exceeds 100,000 times, replace the CPU module.
7	Clock		Check the current time at the clock setting of GX Developer.	There is no time lag between the time checked at the time setting of GX Developer and the actual time.	Change the time at the time setting of GX Developer.

11.3 Battery Life and Replacement Procedure

The battery installed in the safety CPU module is used for data retention of the program memory and operation/error history during the power failure. Special relays SM51 and SM52 turn on due to the decrease of battery voltage. Even if the special relays turn on, the program and operation/error data are not erased immediately.
After relay SM51 turns on, replace the battery quickly within the data retention time for power failure (3 minutes).

POINT

SM51 turns on when the battery voltage falls below the specified value, and remains ON even after the voltage is recovered to the normal value.
SM52 turns on when the battery voltage falls below the specified value, and turns OFF when the voltage is recovered to the normal value.
After SM51 and/or SM52 turns on, replace the battery quickly.

SM51 and SM52 turn on when the battery voltage of the CPU module is lowered.
The battery voltage drop can be checked with the contents of the special registers SD51 and SD52.

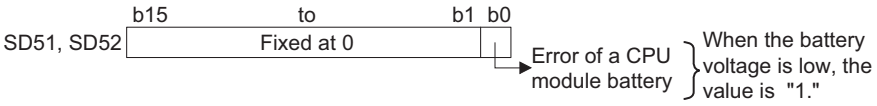


Figure 11.1 Bit pattern

For details of SD51 and SD52, refer to Section 12.7.

11.3.1 Battery lives of CPU modules

Table11.3 Battery lives

CPU Module Type	Power-on Time Ratio*1	Battery lives		
		Guaranteed value*2	Actual service value (Reference value)*3	After SM52 ON (Backup time after alarm*4)
QS001CPU	0%	26,000hr 2.96 years	43,800hr 5.00 years	710hr 30 days
	30%	37,142hr 4.23 years	43,800hr 5.00 years	710hr 30 days
	50%	43,800hr 5.00 years	43,800hr 5.00 years	710hr 30 days
	70%	43,800hr 5.00 years	43,800hr 5.00 years	710hr 30 days
	100%	43,800hr 5.00 years	43,800hr 5.00 years	710hr 30 days

* 1: The power-on time ratio indicates the ratio of programmable controller power-on time to one day (24 hours).
(When the total power-on time is 12 hours and the total power-off time is 12 hours, the power-on time ratio is 50%.)

* 2: The guaranteed value represents a battery life at 70℃ , which is calculated based on the characteristic values of manufacturer-supplied memories (SRAM) and on the assumption of storage within the ambient temperature range of -40 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℃ . This value is intended for reference only, as it varies with characteristics of the memory.

* 4: In the following status, the backup time after power OFF is 3 minutes.
•The battery connector is disconnected.
•The lead wire of the battery is broken.

POINT

1. Use the battery within the time shown by the guaranteed value of the battery life.
   If the battery may be used exceeding the time shown by the guaranteed battery life value, perform the following.
   - Back up programs and the operation/error history in advance after SM52 turns on (within backup time after alarm).
2. The life of Q6BAT is 5 years when not connected to a CPU module.
3. When the battery-low special relay SM52 turns on, immediately change the battery.
   If an alarm has not yet occurred, it is recommended to replace the battery periodically according to the conditions of use.

11.3.2 Replacement Procedure of the CPU Module Battery

Replace the battery by the following procedure when the Q6BAT battery of the CPU module comes to the end of its life. The battery replacement can be performed regardless of the SAFETY MODE or TEST MODE.
The programmable controller power must be on for 10 minutes or longer before dismounting the battery.
Data in the memory are backed up for a while by a capacitor even after the battery is removed. However, since data in the memory may be erased if the time for replacement exceeds the backup time shown in Table11.4, replace the battery quickly.

Table11.4 Backup time

Backup time
3 minutes

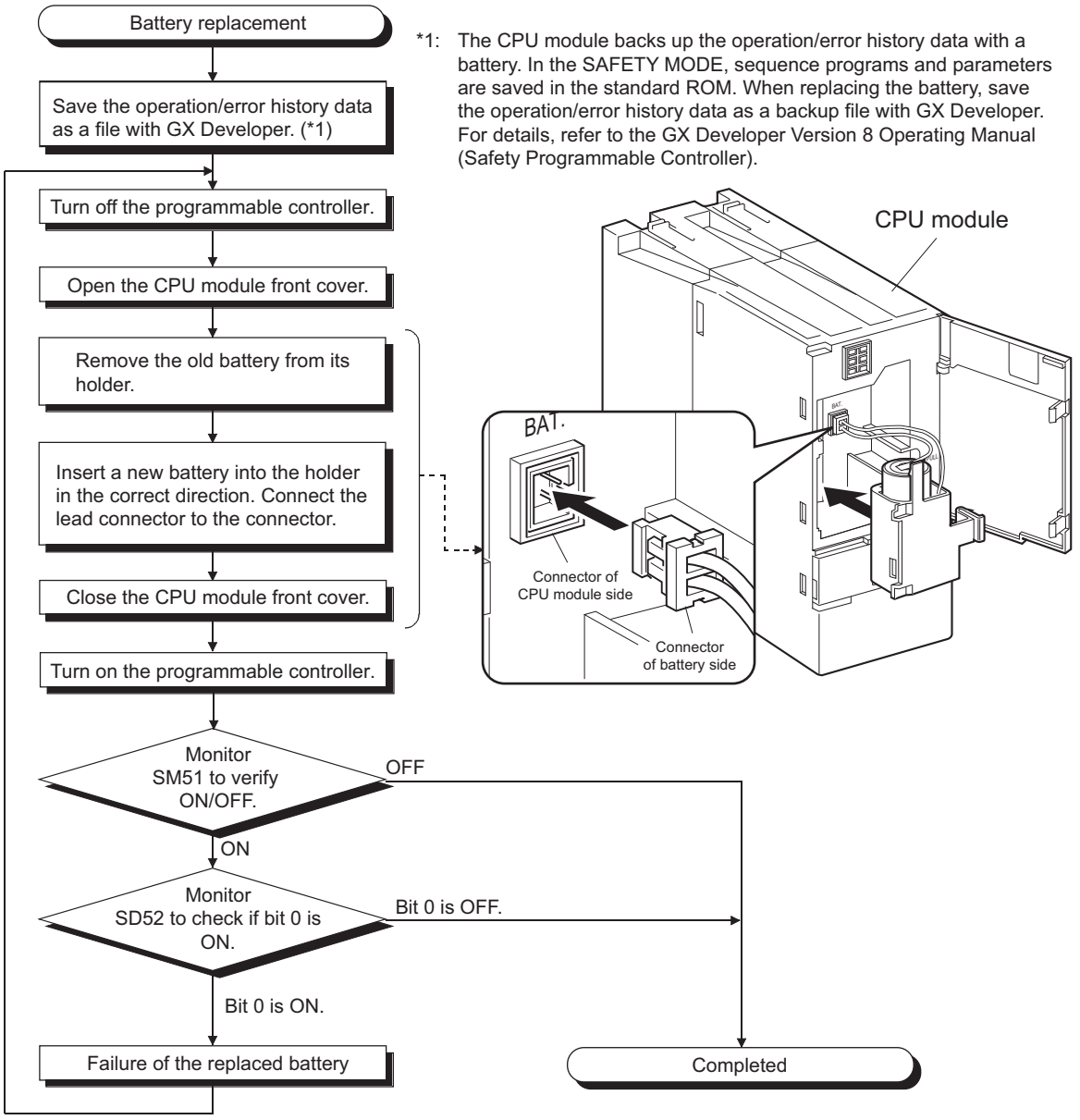


Figure 11.2 Replacement procedure for the Q6BAT battery

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. (☞ Section 11.3.1)

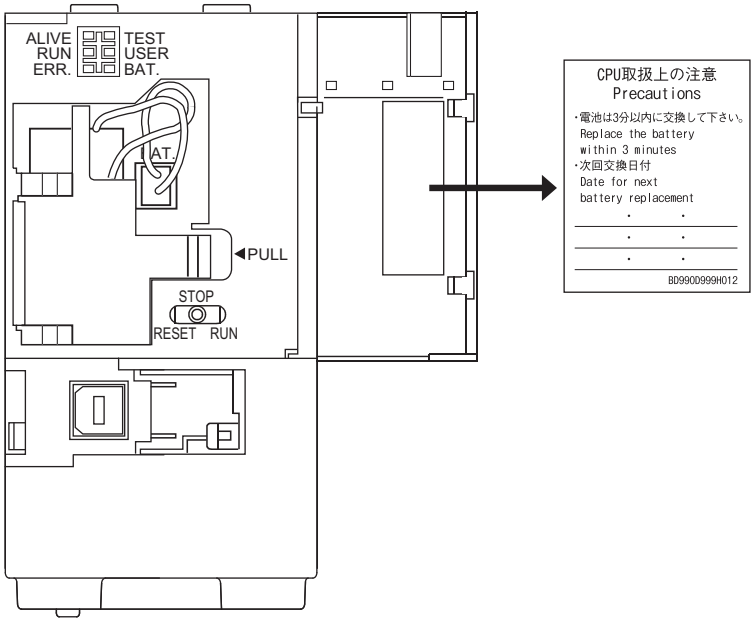


Figure 11.3 Back side of the front cover

11.4 When programmable controller Has been Stored without a Battery

When the programmable controller operation is to be resumed after being stored with the battery removed, the memories in the CPU module may be corrupted.
Hence, before resuming operation, always format the memories using GX Developer.
After formatting the memories, write the memory contents backed up prior to storage to each memory.

The relationships between battery and battery-backed memories are shown in Table11.5.

Table11.5 Relationships between the battery and battery-backed memories

Memory		Battery
		Q6BAT
CPU module	Program memory	○
	Standard ROM	---- (Battery backup not needed)

○ : Battery backed, × : Not battery backed

Format the battery-backed memories in Table11.5 using GX Developer before resuming operation.

For information about the memory formatting, refer to the manual below.
☞ GX Developer Operating Manual

POINT

1. Before storing the programmable controller, always back up the contents of each memory.
2. The operation/error history cannot be written to the memory from GX Developer.

11.5 When Battery Has Gone Flat during Storage of a programmable controller

When the programmable controller is to be used after being stored for some period of time and the battery has gone flat during storage, the memories in the CPU module may be corrupted.
Hence, before resuming operation, always format the memories using GX Developer.
After formatting the memories, write the memory contents backed up prior to storage to each memory.

The relationships between battery and battery-backed memories are shown in Table11.6.

Table11.6 Relationships between the battery and battery-backed memories

Memory		Battery
		Q6BAT
CPU module	Program memory	○
	Standard ROM	---- (Battery backup not needed)

○ : Battery backed, × : Not battery backed

Format the battery-backed memories in Table11.6 using GX Developer before resuming operation.

For information about the memory formatting, refer to the manual below.
☞ GX Developer Operating Manual

POINT

1. Before storing the programmable controller, always back up the contents of each memory.
2. The operation/error history cannot be written to the memory from GX Developer.

CHAPTER12 TROUBLESHOOTING

This section describes the various types of trouble that occur when the system is operated, and causes and remedies of these troubles.

12.1 Troubleshooting Basics

In order to increase the reliability of the system, not only highly reliable devices are used but also the speedy startup of the system after the occurrence of trouble becomes an important factor.
To start up the system speedily, the cause of the trouble must be located and eliminated correctly.
The basic three points that must be followed in the troubleshooting are as follows.

(1) Visual inspection
Visually check the following.

1) Movement of sequencer (stopped condition, operating condition)
2) Power supply on/off
3) Status of input/output devices
4) Installation condition of the power supply module, CPU module, intelligent function module to the base unit
5) Status of wiring (power cables, CC-Link dedicated cables)
6) Display status of various types of indicators ("POWER" LED, "RUN" LED, "ERR." LED)
7) Status of setting of various types of set switches

After checking 1) to 7), connect GX Developer and monitor the operating condition and program contents of the programmable controller.

(2) Check of trouble
Check to see how the operating condition of the programmable controller varies while the programmable controller is operated as follows.

1) Set the CPU module RUN/STOP/RESET switch to "STOP".
2) Reset the trouble with the CPU module RUN/STOP/RESET switch.
(☞ CHAPTER 4)
3) Turn ON and OFF the power supplied to the power supply module.

(3) Narrowing down the range of trouble occurrence causes.
Estimate the troubled part in accordance with items (1) and (2) above.

1) programmable controller or external devices
2) CPU module or others
3) Sequence program

12.2 Troubleshooting Flowchart

The trouble investigating methods and remedies of the troubles are described below.

12.2.1 Troubleshooting category flow

This section classifies the error by definition and describes them.

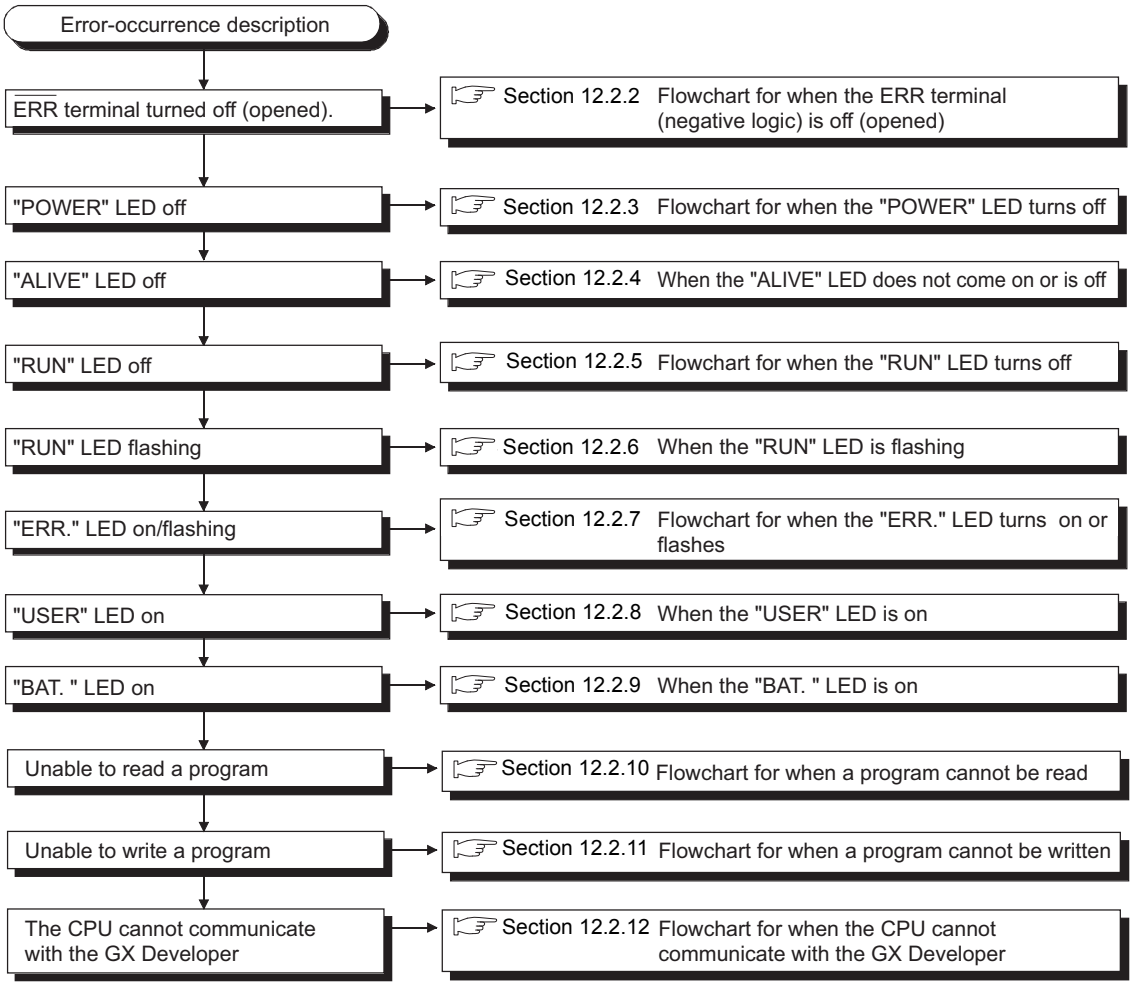
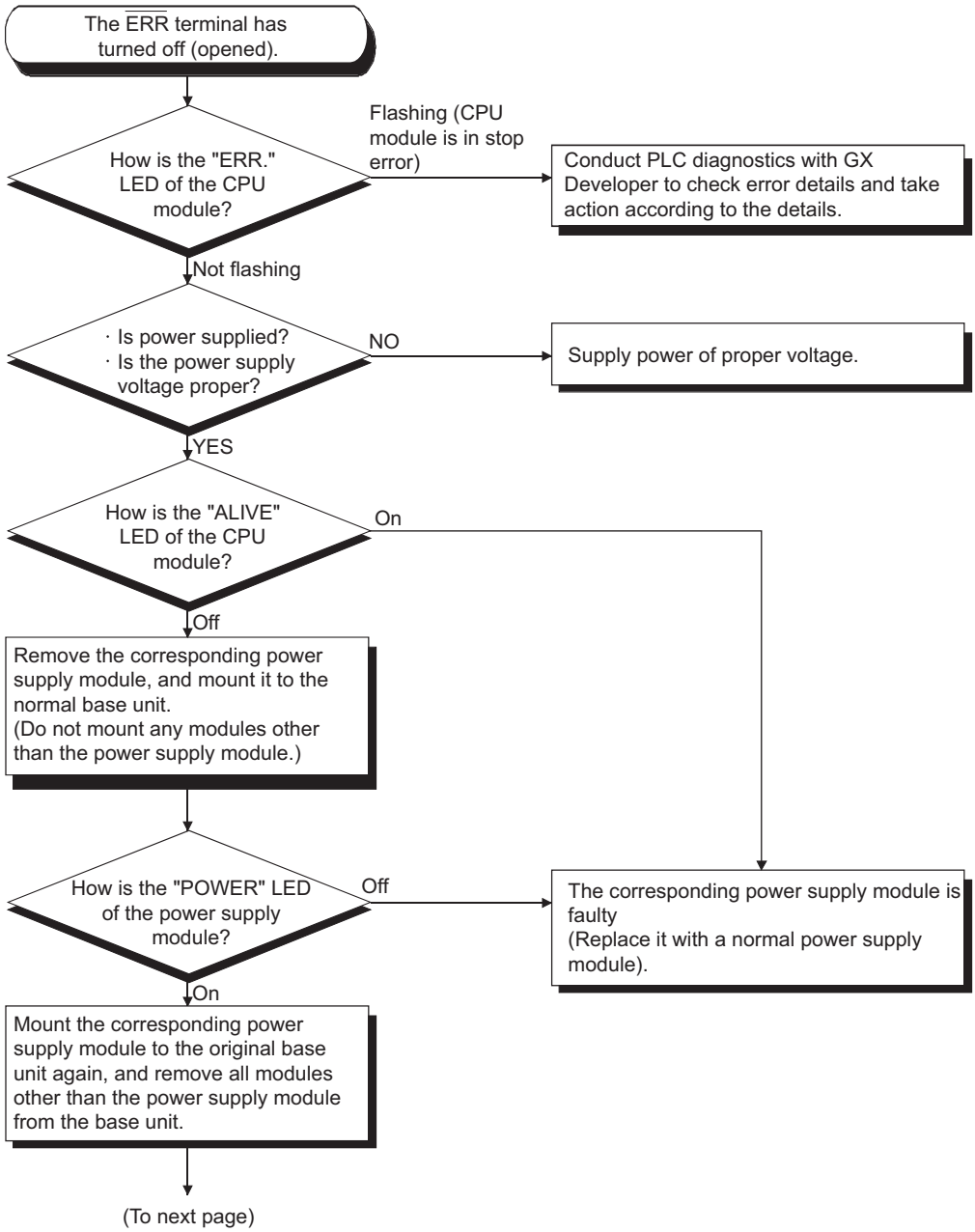


Figure 12.1 Troubleshooting flowchart

12.2.2 Flowchart for when the ERR terminal (negative logic) is off (opened)

The following shows the flowchart for when the "$\overline{\text{ERR}}$ terminal" is off (opened) at power-on or during operation of the programmable controller.



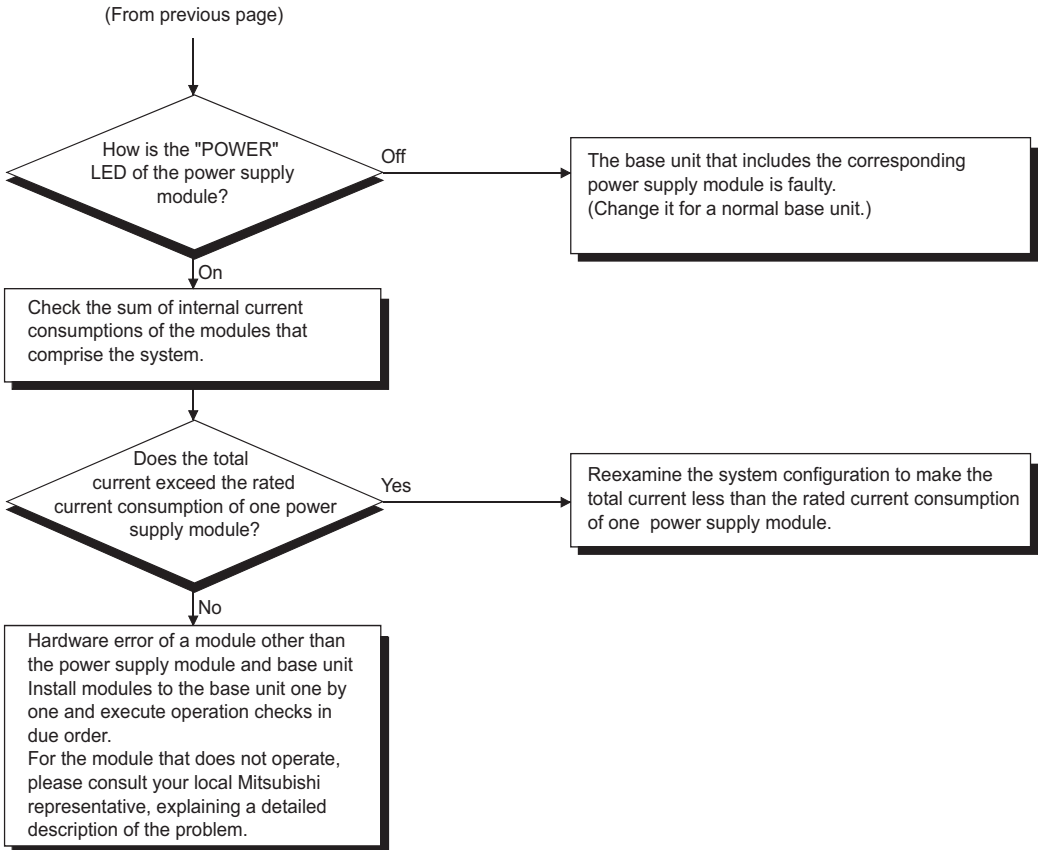


Figure 12.2 Flowchart for when the ERR terminal turns off

Errors that can be detected by the $\overline{\text{ERR}}$. terminal

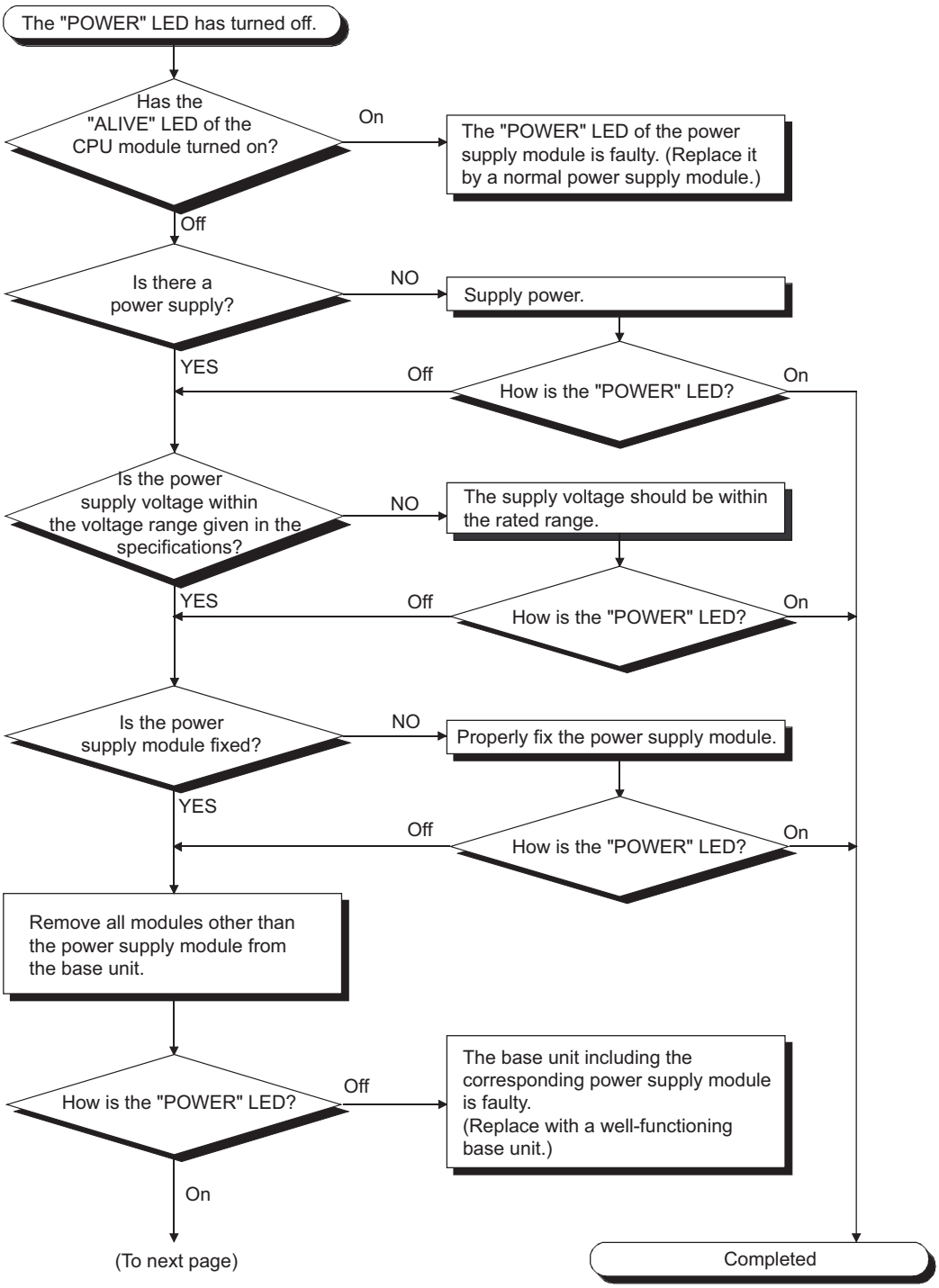
The following shows the errors that can be detected by the $\overline{\text{ERR}}$. terminal of the power supply module.

Table12.1 Errors that can be detected by the ERR terminal of a power supply module

Base unit	CPU module
	QS001CPU
Main base unit (QS034B)	AC power not input, power supply module fuse blown and CPU module stop error (including reset) can be detected.

12.2.3 Flowchart for when the "POWER" LED turns off

The following shows the flowchart for when the "POWER" LED of the power supply module turns off at of the programmable controller power-on or during operation.



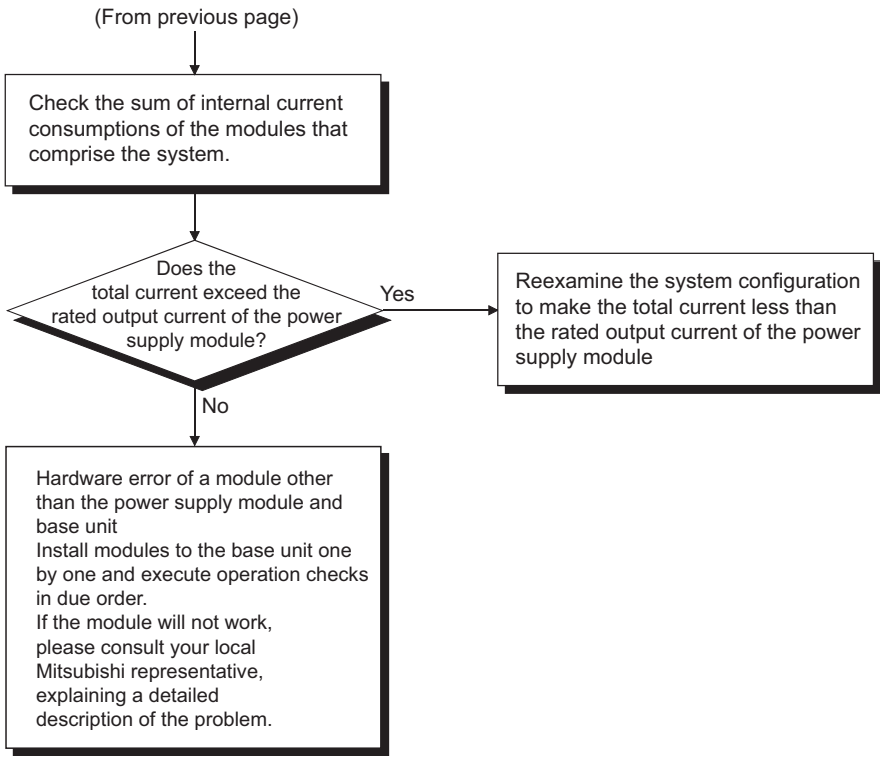
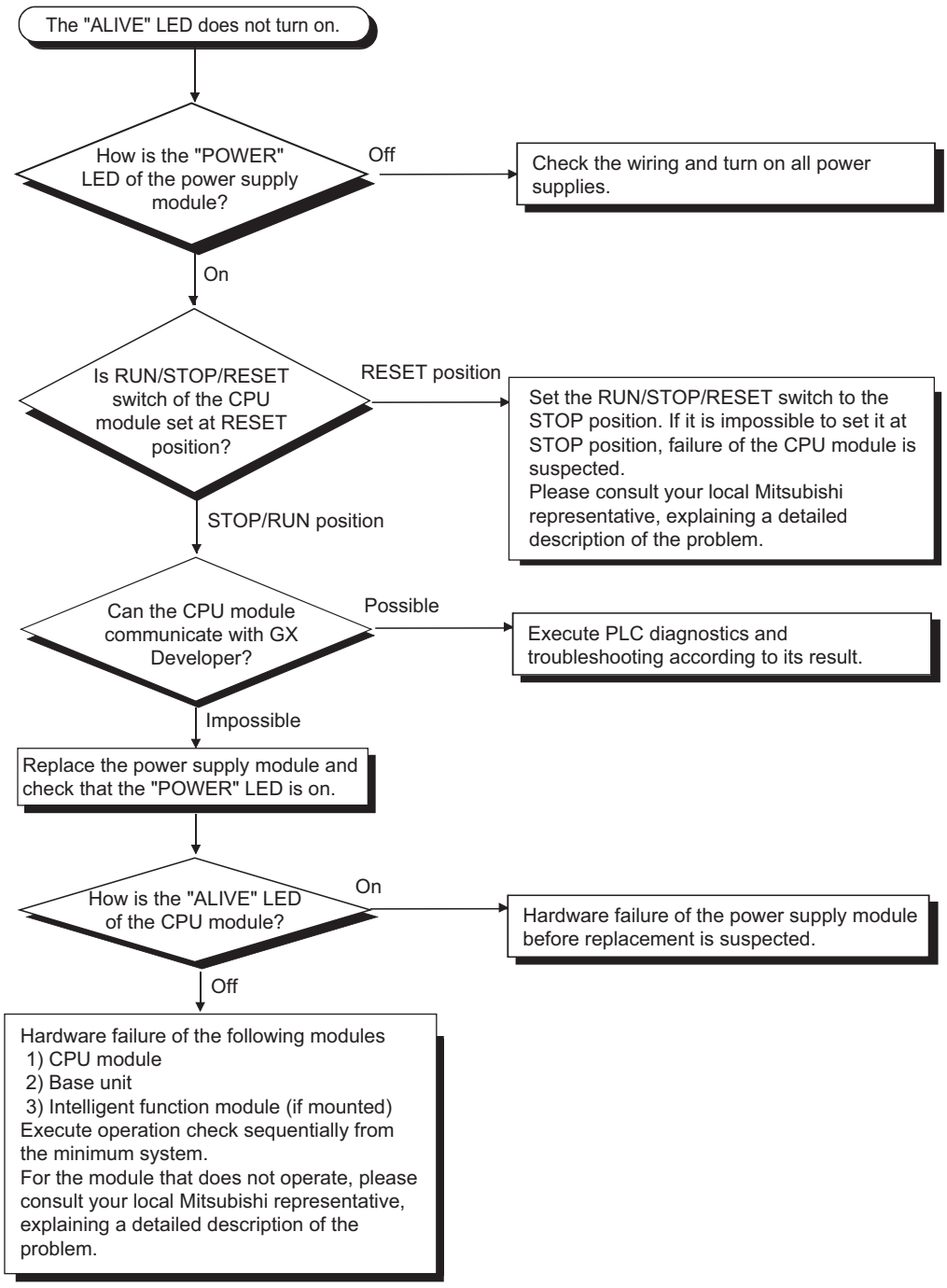


Figure 12.3 Flowchart for when the "POWER" LED is off

12.2.4 When the "ALIVE" LED does not turn on or turns off

This section describes the troubleshooting for when the "ALIVE" LED of the CPU module does not turn on at power-ON of the programmable controller or when the "ALIVE" LED turns off during operation.

(1) Flowchart for when the "ALIVE" LED of the CPU module does not turn on at power-ON of the programmable controller.



(2) When the "ALIVE" LED of the CPU module turns off during operation of the programmable controller

The "ALIVE" LED of the CPU module may turn off when

(a) the CPU module detects the hardware failure, or

(b) the power supply module, CPU module, or intelligent function module is mounted to/removed from the base unit while the power is ON. In this case, the CPU module detects a "POWER SUPPLY ERROR" (error code: 8080).

When the "ALIVE" LED turns off, the CPU module forcibly goes into the stop status.
In this case, the communications with GX Developer cannot be guaranteed. Turn on the power supply again or reset the CPU module with RUN/STOP/RESET switch.
If the problem is not improved after performing the operation above, please consult your local Mitsubishi representative, explaining a detailed description of the problem.

12.2.5 Flowchart for when the "RUN" LED turns off

The following shows the flowchart for when the "RUN" LED of the CPU module turns off during operation of the programmable controller.

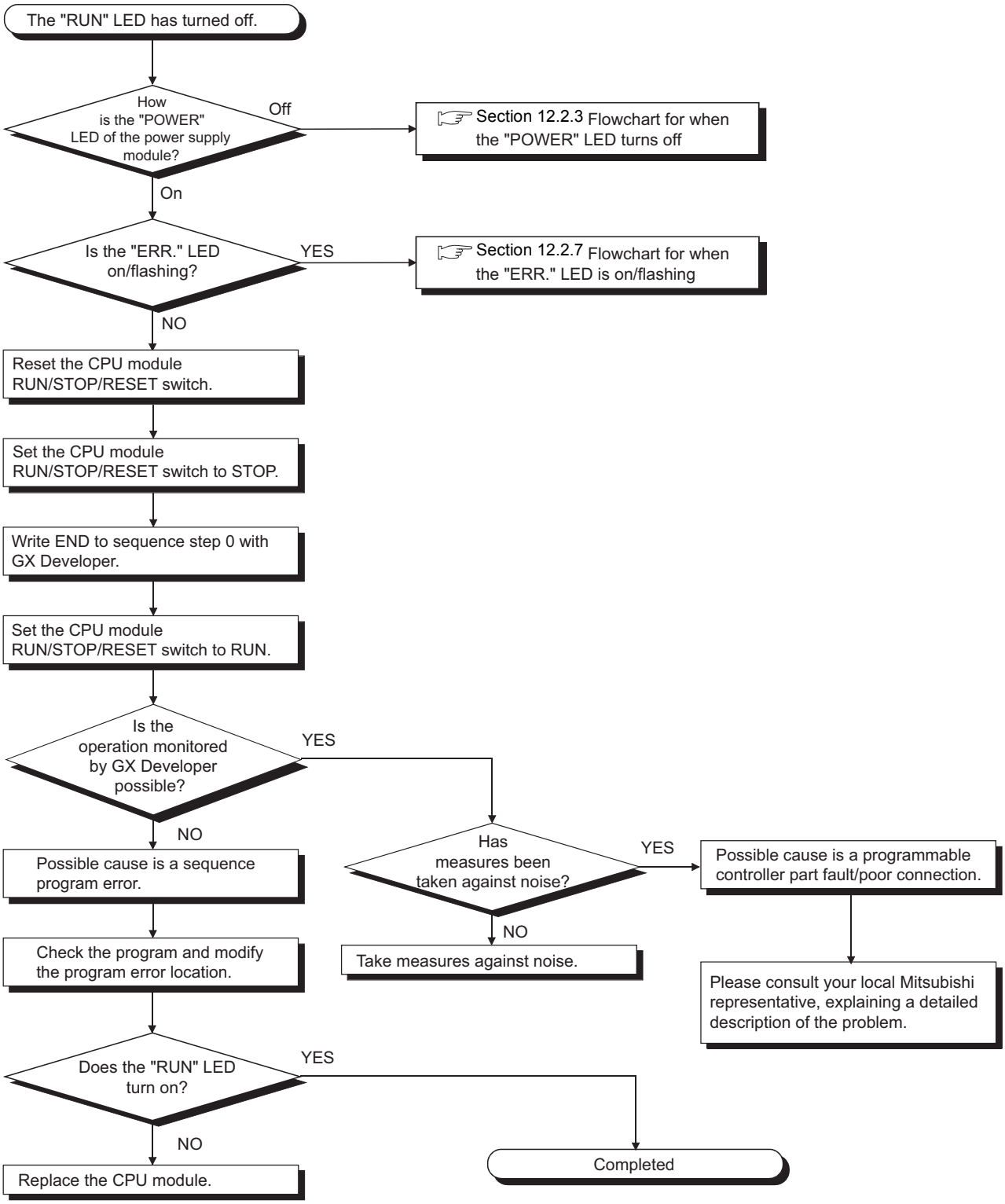


Figure 12.4 Flowchart for when the "RUN" LED turns off

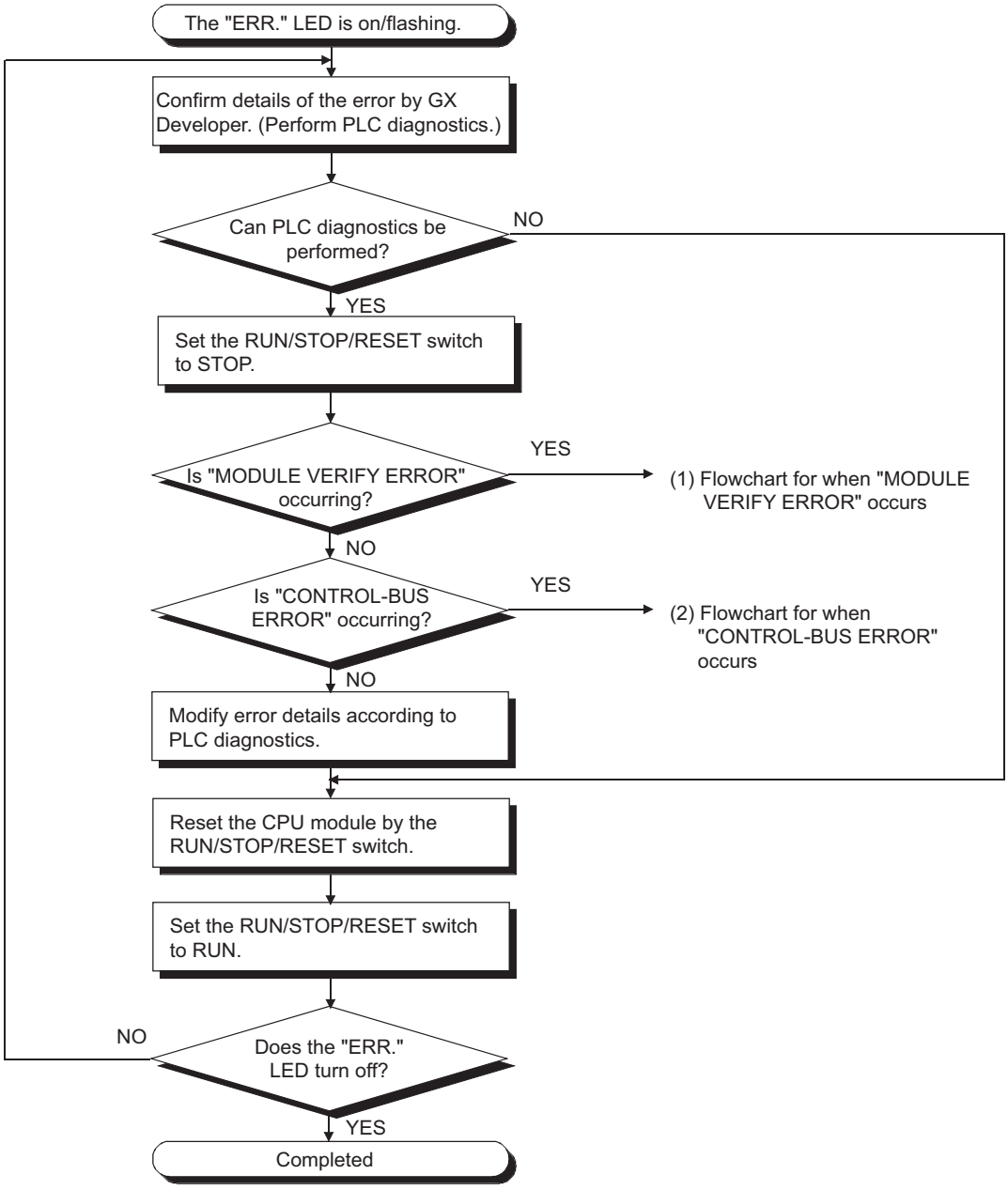
12.2.6 When the "RUN" LED flashes

If the "RUN" LED flashes, follow the steps below.

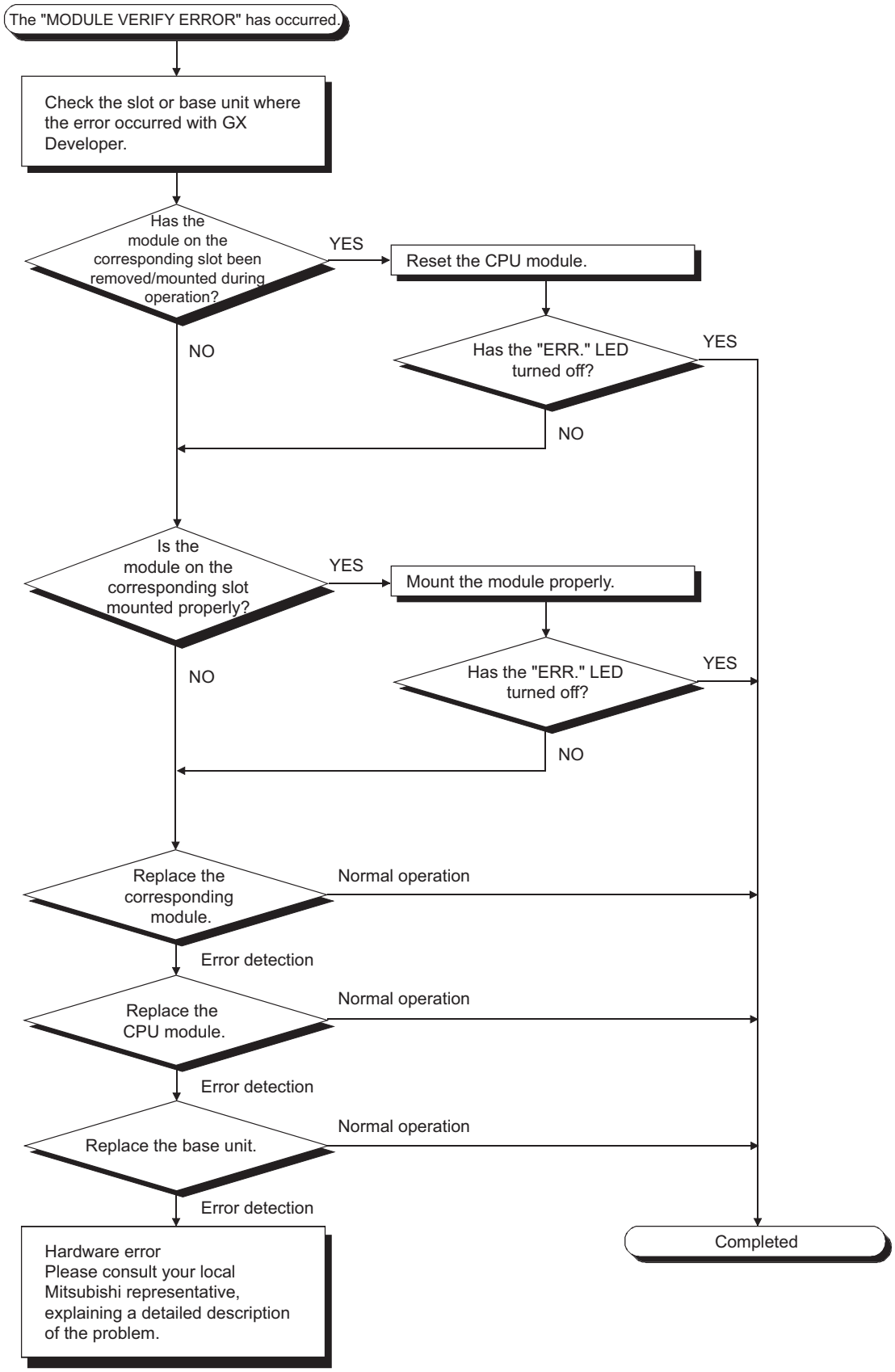
When the programs or parameters are written into the CPU module during STOP status and then the RUN/STOP/RESET switch is set from STOP to RUN, the "RUN" LED of the CPU module flashes.
Although this status does not mean the CPU module error, the CPU module stops the operation. To set the CPU module into RUN status, reset the CPU module using the RUN/STOP/RESET switch.
With this setting, the "RUN" LED turns on.
The "RUN" LED still flashes even when the RUN/STOP/RESET switch is set from RUN to STOP and then to RUN after flashing.

12.2.7 Flowchart for when the "ERR." LED turns on or flashes

The following shows the flowchart for when the "ERR." LED of the CPU module turns on or flashes at of the programmable controller power-on, at operation start or during operation.



(1) Flowchart for when "MODULE VERIFY ERROR" occurs



(2) Flowchart for when "CONTROL-BUS ERROR" occurs

This flowchart can be confirmed only when a specific slot/base unit can be detected by the error code.

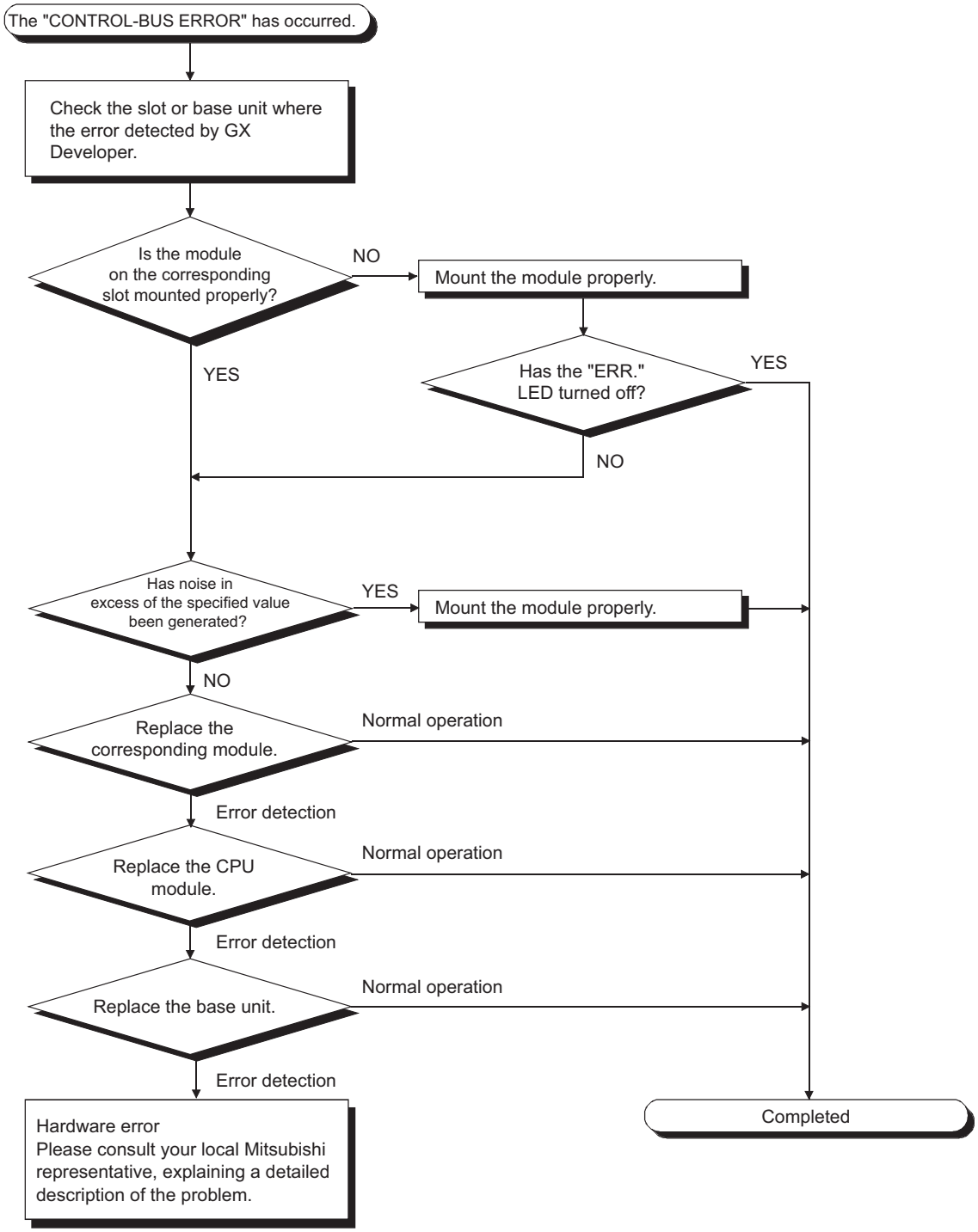


Figure 12.5 Flowchart for when the "ERR." LED is on/flashing

Remark

The following causes are possible when the "ERR." LED of the CPU module flashes at programmable controller power-on.

Table12.2 Error messages and causes

Error Message	Cause	Corrective Action
MODULE LAYOUT ERROR (Error code: 2125)	The multiple CPU system is configured.	Remove all CPU modules other than the safety CPU module from the base unit.
	Modules other than intelligent function modules are mounted on the base unit.	Remove all modules other than intelligent function modules from the base unit.
CC-LINK PARAMETER ERROR (Error code: 3105)	The CC-Link Safety master module mounted on the base unit is not set as a master station.	Set the CC-Link Safety master module as a master station.
NETWORK PARAMETER ERROR (Error code: 3100)	• The MELSECNET/H module mounted on the base unit is not set as a PLC to PLC network normal station. • The number of CC-Link IE Field Network master/local modules (with safety functions) actually mounted is different from that is set in Network parameter for CC-Link IE Field Network.	• Set the MELSECNET/H module as a PLC to PLC network normal station. • Mount or remove the CC-Link IE Field Network master/local modules (with safety functions) so that the number matches that is set in Network parameter.
NETWORK PARAMETER ERROR (Error code: 3103)	The number of Ethernet modules actually mounted is different from that is set in Network parameter for Ethernet.	Change either the number of modules or parameter setting so that they become the same.

12.2.8 When the "USER" LED turns on

If the "USER" LED turns on, follow the steps described below.

The "USER" LED turns on when an error is detected by the annunciator (F) turns on.
If the "USER" LED turns on, monitor the special relay SM62 and the special registers SD62 to SD79 in the monitor mode of GX Developer.

- When M62 has turned ON
  The annunciator (F) is ON.
  Using SD62 to SD79, check the error cause.

Eliminate the error cause after confirming it.

The "USER" LED can be turned off by:

- Making a reset with the RUN/STOP/RESET switch.
- Canceling Errors with the special relay and the special register (☞ Section 12.4)

12.2.9 When the "BAT." LED turns on

If the "BAT." LED turns on, follow the steps described below.

The "BAT." LED turns on when low battery capacity is detected in the Q6BAT installed to the CPU module.
Replace the battery with a new one according to Section 11.3.2.

12.2.10 Flowchart for when a program cannot be read

The following shows the flowchart for when a program cannot be read from the CPU module.

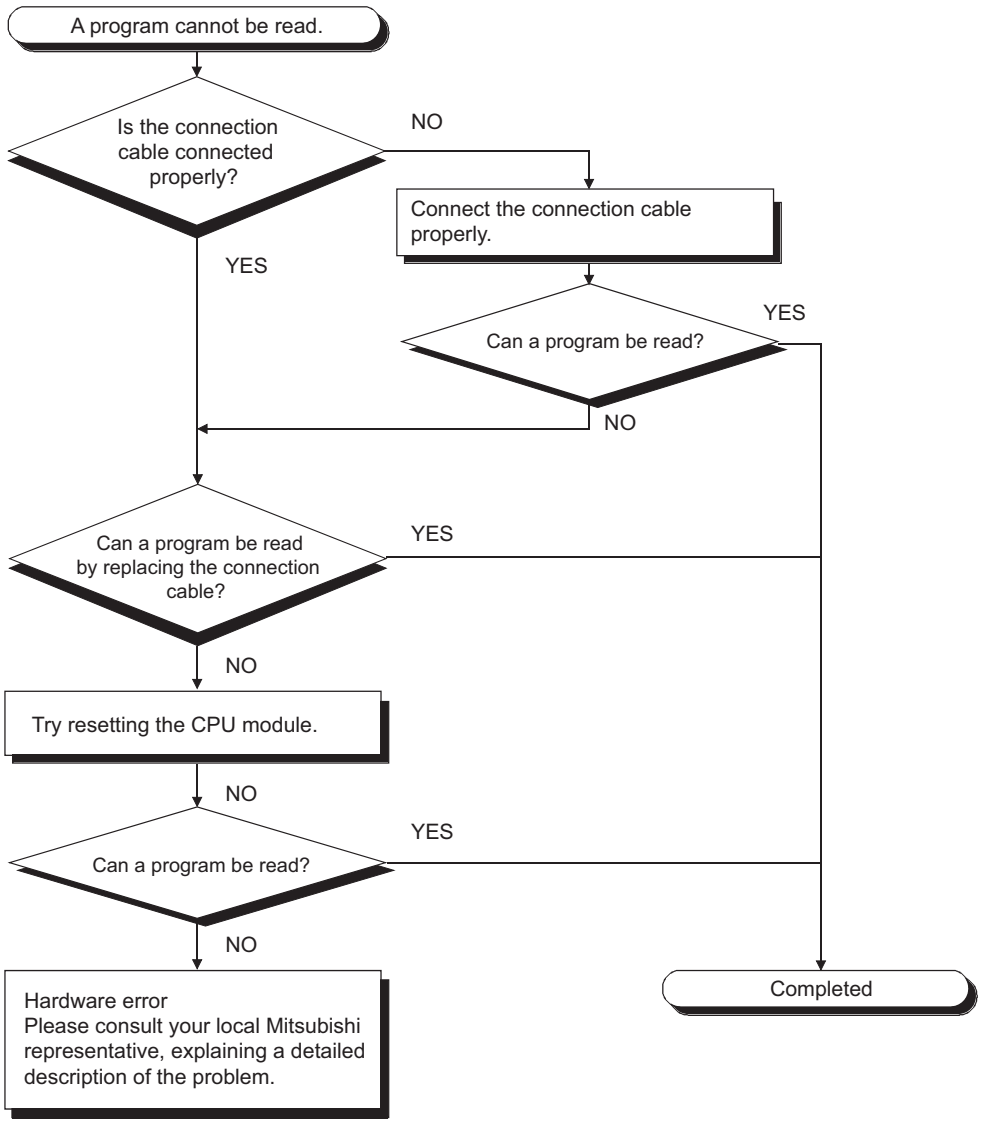
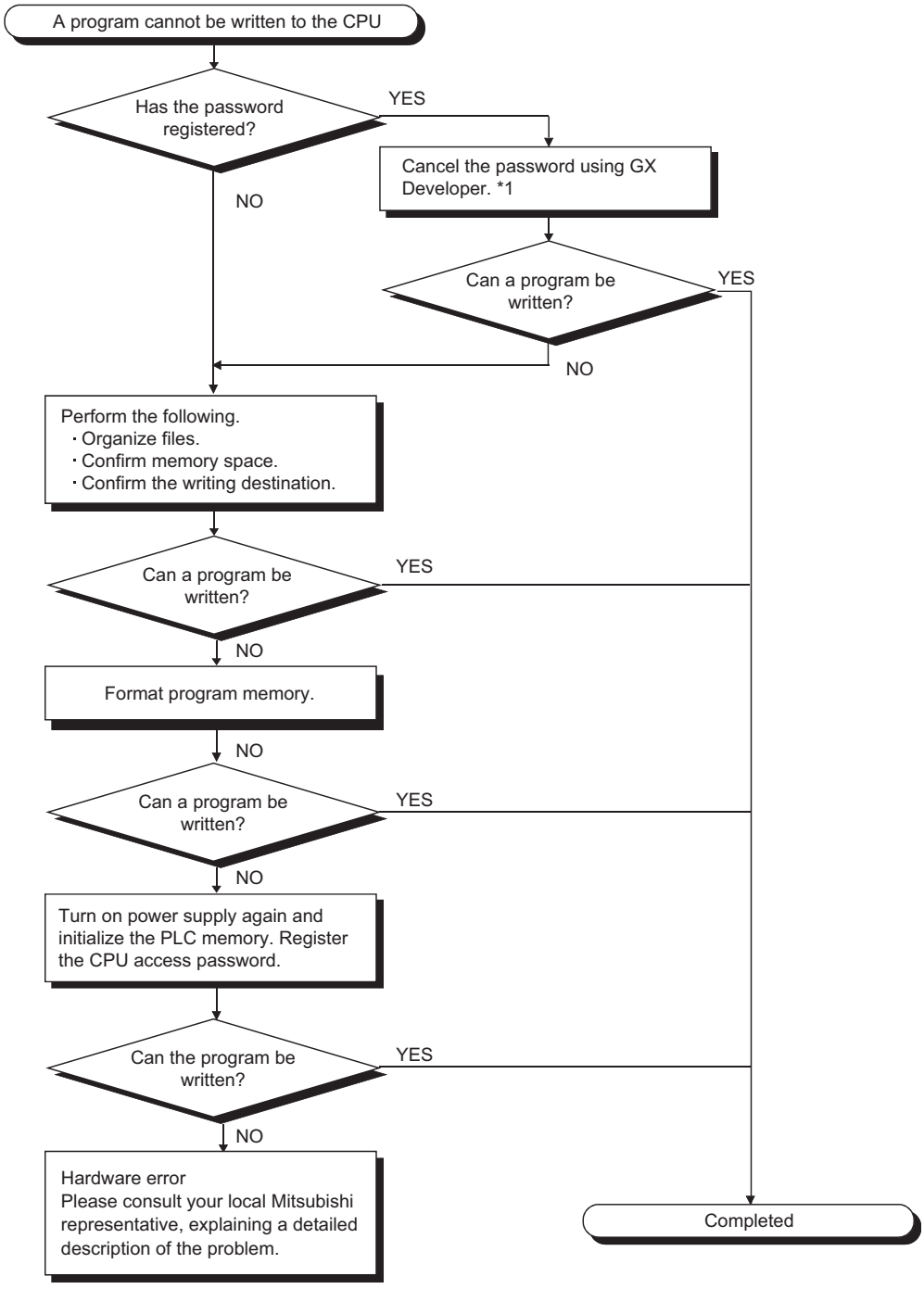


Figure 12.6 Flowchart for when a program cannot be read

12.2.11 Flowchart for when a program cannot be written

The following shows the flowchart for when programs cannot be written in the CPU module.



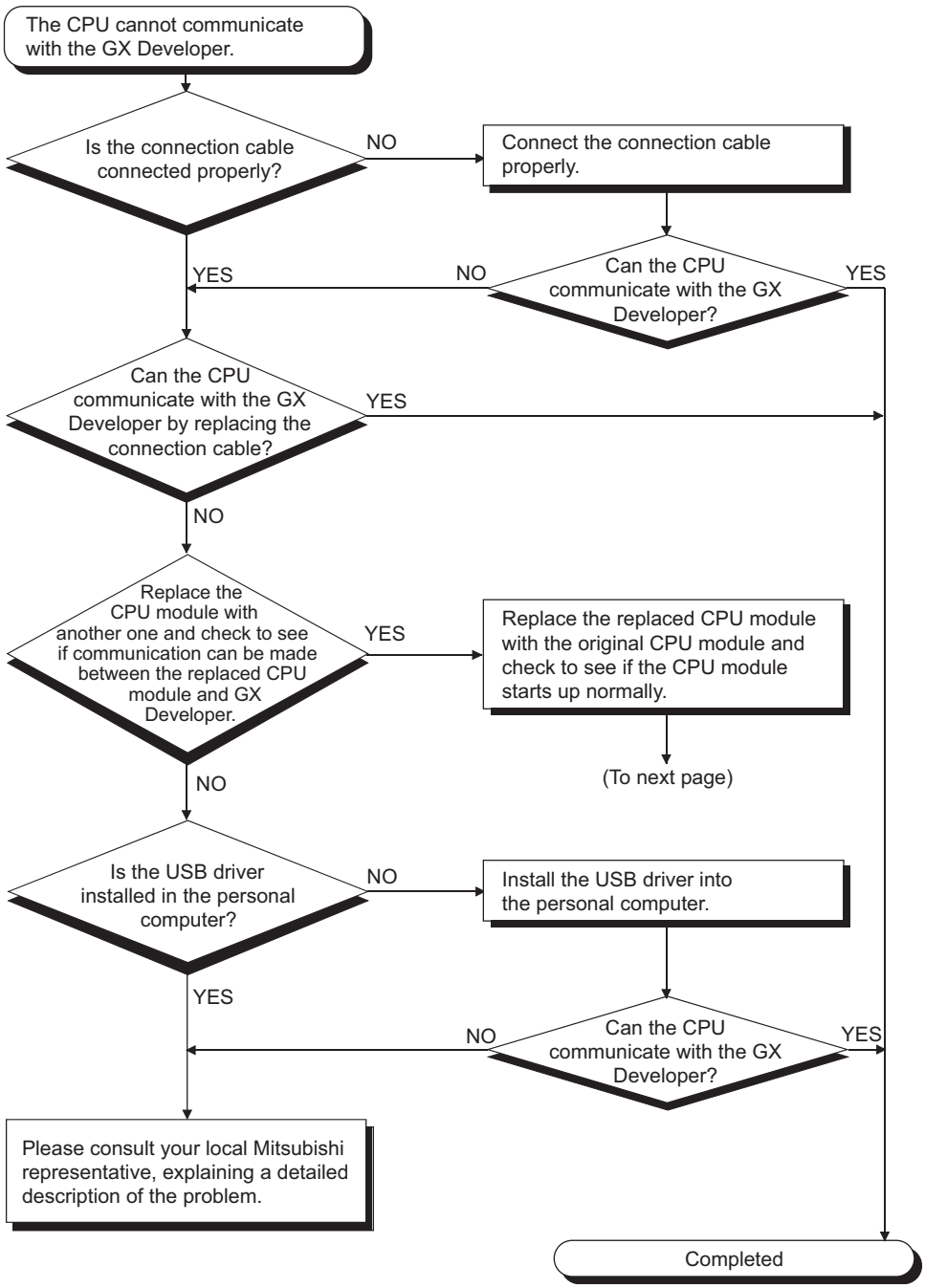
* 1: If the password registration cannot be canceled due to the loss of password, initialize the PLC memory with GX developer.
The PLC memory initialization initializes the memory of the CPU module (i.e. deletes all information in the CPU module) and resets the memory to the factory default.

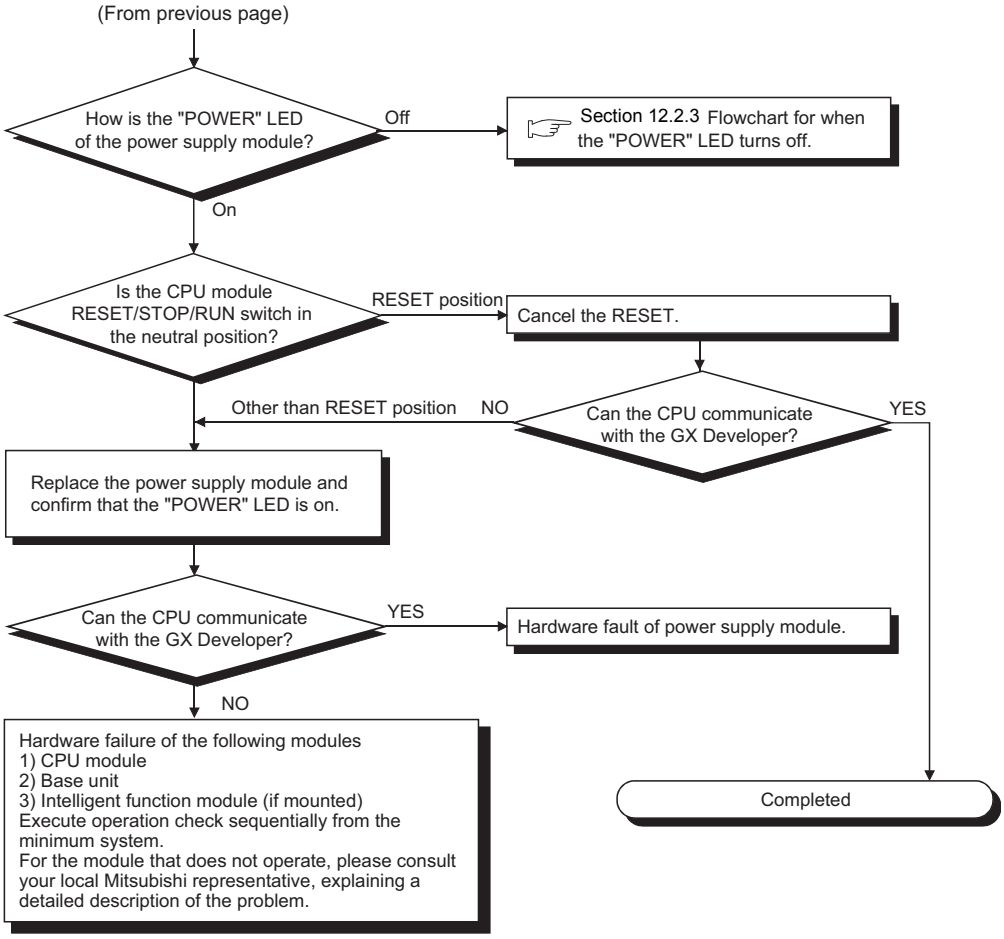
☞ GX Developer Operating Manual (Safety Programmable Controller)

Figure 12.7 Flowchart for when a program cannot be written

12.2.12 Flowchart for when the CPU cannot communicate with the GX Developer

The following shows the flowchart for when communication with peripheral device is disabled at connecting the CPU module with GX Developer.




(From previous page)
How is the "POWER" LED of the power supply module?
Off
Section 12.2.3 Flowchart for when the "POWER" LED turns off.
On
Is the CPU module RESET/STOP/RUN switch in the neutral position?
RESET position
Cancel the RESET.
Other than RESET position
NO
Can the CPU communicate with the GX Developer?
YES
Replace the power supply module and confirm that the "POWER" LED is on.
Can the CPU communicate with the GX Developer?
YES
Hardware fault of power supply module.
NO
Hardware failure of the following modules
1) CPU module
2) Base unit
3) Intelligent function module (if mounted)
Execute operation check sequentially from the minimum system.
For the module that does not operate, please consult your local Mitsubishi representative, explaining a detailed description of the problem.
Completed

12.3 Error Code List

If an error occurs under one of the following conditions, the QS series CPU module uses the self-diagnostic function to display error information (LED indication) and stores it in the special relay (SM) and special register (SD):
• the programmable controller is powered on
• the programmable controller is reset
• the programmable controller is switched from STOP to RUN
• the programmable controller is running

If an error occurs when a communication request is issued from GX Developer, intelligent function module or network system to the CPU module, the CPU module returns the error code (4000_H to $4FFF_H$) to the request source.
The following describes the description of errors which occur in the CPU module and the corrective actions for the errors.

(1) How to read the error code list

The following describes how to read Section 12.3.3 Error code list (1000 to 1999) to Section 12.3.8 Error code list (8000 to 9000).

(a) Error code, common information and individual information
Alphanumeric characters in the parentheses of the titles indicate the special register numbers where each information is stored.

(b) Compatible CPU
QS: Compatible with the QSCPU.

12.3.1 Error codes

Errors are detected by the self diagnostic function of the CPU module or detected during communication with the CPU module.
The relation between the error detection pattern, error detection location and error code is shown in the following table.

Table12.3 The relation between the error detection pattern, error detection location and error code

Error detection pattern	Error detection location	Error code	Reference
Detection by the self diagnostics function of CPU module	CPU module	1000 to 9000*1	Section 12.3.3 to 12.3.8
Detection at communication with CPU module	CPU module	4000H to 4FFFH	Section 12.5
	CC-Link Safety master module	B000H to BFFFH	CC-Link Safety System Master Module User's Manual
	Ethernet module	C000H to CFFFH	Ethernet Interface Module User's Manual
	CC-Link IE Field Network master/local module (with safety functions)	D000H to DFFFH	MELSEC-QS CC-Link IE Field Network Master/Local Module User's Manual
	CC-Link IE Controller Network module	E000H to EFFFH	MELSEC-Q CC-Link IE Controller Network Reference Manual
	MELSECNET/H module	F000H to FFFFH	MELSECNET/H Network System Reference Manual

* 1: CPU module error codes are classified into minor, moderate, major errors as shown below.
- •Minor error: Errors that may allow the CPU module to continue the operation, e.g., battery error. (Error code: 1300 to 9000)
- •Moderate error: Errors that may cause the CPU module to stop the operation, e.g., WDT error. (Error code: 1300 to 9000)
- •Major error: Errors that may cause the CPU module to stop the operation, e.g., RAM error. (Error code: 1000 to 1299)

"Errors that may allow the CPU module to continue the operation" and "Errors that may cause the CPU module to stop the operation" can be distinguished using "Operating Statuses of CPU" of Section 12.3.3 to 12.3.8 Error code list.

12.3.2 Reading an error code

If an error occurs, information such as the error code and error message for troubleshooting can be read using GX Developer.
To read error codes, follow the instructions described below.

1) Start GX Developer.
2) Connect the CPU module to the personal computer that started GX Developer.
3) On GX Developer, choose the [Online] → [Read from PLC] menu and read the project from the CPU module.
4) Choose the [Diagnostic] → [PLC diagnostic] menu.
5) Click the "Current error" button in the PLC diagnostic dialog box to display the error code and error message.
6) Choose the [Help] → [CPU error] menu and check details of the corresponding error code.

For details, refer to the following.
☞GX Developer Operating Manual

12.3.3 Error code list (1000 to 1999)

The following shows the error messages from the error code 1000 to 1999, the contents and causes of the errors, and the corrective actions for the errors.

Table12.4 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
1000	MAIN CPU DOWN	–	–	Off	On/ Flash	Stop	Always	
1001					On			
1002								
1003								
1004								
1006								
1009					Flash			
1010	END NOT EXECUTE	–	–	Off	Flash	Stop	When an END instruction executed.	
1030	MAIN CPU DOWN	–	Error information	Off	Flash	Stop	Always	
1031								

*1 BAT.ALM LED is displayed at BATTERY ERROR.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	1000 1001 1002 1003 1004 1006	Runaway or failure of the main CPU • Malfunctioning due to noise or other reason • Hardware fault	• Take noise reduction measures. • Reset the CPU module and RUN it again.If the same error is displayed again, this suggests a CPU module hardware fault.(Please consult your local Mitsubishi representative.)	QS
	1009	• The power supply module detected an incorrect power waveform. • A failure is detected on the power supply module, CPU module, or base unit.	• Correct the power waveform applied to the power supply module. • Reset the CPU module and RUN it again.If the same error is detected again, it is considered that the power supply module, CPU module, or base unit is failure. (Please consult your local Mitsubishi representative.)	
	1010	Entire program was executed without the execution of an END instruction. • When the END instruction is executed it is read as another instruction code, e.g. due to noise. • The END instruction has been changed to another instruction code somehow.	• Take noise reduction measures. • Reset the CPU module and RUN it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	1030 1031	Run mode suspended or failure of main CPU • Malfunctioning due to noise or other reason • Hardware fault	• Take noise reduction measures. • Reset the CPU module and RUN it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
1131 1132 1133 1136 1137 1141 1142 1143 1146	RAM ERROR	–	Error information	Off	Flash	Stop	At power-ON/ At reset Always	
1210	OPERATION CIRCUIT ERROR	–	Error information	Off	Flash	Stop	At power-ON/ At reset/When an END instruction executed	
1311	I/O INTERRUPT ERROR	–	–	Off	Flash	Stop	During interrupt	
1401	INTELLIGENT FUNCTION MODULE DOWN	Module No.	–	Off	Flash	Stop	At power ON/ At reset/When intelligent function module is accessed.	
1403	INTELLIGENT FUNCTION MODULE DOWN	Module No.	–	Off	Flash	Stop	When an END instruction executed.	
1404	INTELLIGENT FUNCTION MODULE DOWN	Module No.	–	Off	Flash	Stop	When an END instruction executed.	

*1 BAT.ALM LED is displayed at BATTERY ERROR.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	1131 1132 1133 1136 1137 1141 1142 1143 1146	A fault was detected in the internal memory of the CPU module.	Hardware error of the CPU module. (Please consult your local Mitsubishi representative.)	QS
	1210	The operation circuit for sequence processing in the CPU module does not operate normally.	Hardware error of the CPU module. (Please consult your local Mitsubishi representative.)	QS
	1311	An interrupt request from the module where interrupt pointer setting has not been made in the PLC parameter dialog box was detected.	Hardware error of either of the CPU module or base unit. (Please consult your local Mitsubishi representative.)	QS
	1401	• There was no response from the intelligent function module in the initial processing. • The size of the buffer memory of the intelligent function module is invalid.	Hardware error of the intelligent function module, CPU module or base unit is expecting a hardware fault. (Please consult your local Mitsubishi representative.)	QS
	1403	• The hardware test of the module installed in the slot indicated by module number has completed. • There was no response from the intelligent function module when the END instruction is executed. • An error is detected at the intelligent function module. • The intelligent function module being accessed is broken down.	• Confirm if the setting of hardware test of the module installed in the slot indicated by the module number has been set or not. • Hardware error of the access target intelligent function module. (Please consult your local Mitsubishi representative.)	QS
	1404	An intelligent function module response data error was detected.	Reset the CPU module and RUN it again. If the same error is displayed again, the intelligent function module, CPU module or base unit is faulty. (Please consult your local Mitsubishi representative.)	QS

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
1411	CONTROL-BUS ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	
1413	CONTROL-BUS ERROR	–	–	Off	Flash	Stop	Always	
1414	CONTROL-BUS ERROR	–	–	Off	Flash	Stop	When an END instruction executed.	
1415	CONTROL-BUS ERROR	Base No.	–	Off	Flash	Stop	When an END instruction executed.	
1500	AC/DC DOWN	–	–	On	Off	Continue	Always	
1600	BATTERY ERROR*1	Drive Name	–	On	Off	Continue	Always	
1610	EXCEED MAX FLASH ROM REWRIT. ERR.	–	–	On	On	Continue	When an END instruction executed.	

*1 BAT.ALM LED is displayed at BATTERY ERROR.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	1411	When performing a parameter I/O allocation the intelligent function module could not be accessed during initial communications. (On error occurring, the head I/O number of the corresponding intelligent function module is stored in the common information.)	Reset the CPU module and RUN it again. If the same error is displayed again, the intelligent function module, CPU module or base unit is faulty. (Please consult your local Mitsubishi representative.)	QS
	1413	An error was detected on the system bus.	The intelligent function module, CPU module or base unit is faulty. (Please consult your local Mitsubishi representative.)	QS
	1414	An error was detected on the system bus.	The intelligent function module, CPU module or base unit is faulty. (Please consult your local Mitsubishi representative.)	QS
	1415	Fault of the base unit was detected.	The intelligent function module, CPU module or base unit is faulty. (Please consult your local Mitsubishi representative.)	QS
	1500	• A momentary power supply interruption has occurred. • The power supply went off.	Check the power supply.	QS
	1600	• The battery voltage in the CPU module has dropped below stipulated level. • The lead connector of the CPU module battery is not connected. • The lead connector of the CPU module battery is not securely engaged.	• Change the battery. • Install a lead connector of the battery. • Check the lead connector of the CPU module for looseness. Firmly engage the connector if it is loose.	QS
	1610	The number of writing to the standard ROM exceeded one hundred thousand times. (Number of writing>100,000 times)	Replace the CPU modules.	QS

12.3.4 Error code list (2000 to 2999)

The following shows the error messages from the error code 2000 to 2999, the contents and causes of the errors, and the corrective actions for the errors.

Table12.5 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
2000	MODULE VERIFY ERROR	Module No.	–	Off	Flash	Stop	When an END instruction executed.	
2100	MODULE LAYOUT ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	
2106	MODULE LAYOUT ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	2000	• Intelligent function module information at power ON are changed. • During operation, Intelligent function module are not installed properly or installed on the base unit.	Read the common information of the error using the GX Developer, and check and/or change the module that corresponds to the numerical values (module number) there. Alternatively, monitor the special registers SD 150 to SD 153 at a GX Developer, and change the fuse at the output module whose bit has a value of "1".	QS
	2100	• In the parameter I/O allocation settings, an Inteli (intelligent function module) was allocated to a location reserved for an I/O module. • In the I/O assignment setting of the PLC parameter dialog box, the number of points assigned to the intelligent function module is less than the number of points of the mounted module.	Reset the parameter I/O allocation setting to conform to the actual status of the intelligent function module.	QS
	2106	• More than three CC-Link Safety master modules are mounted. • More than two CC-Link IE Controller Network modules are mounted. • More than two MELSECNET/H modules are mounted. • More than two Ethernet modules are mounted. • A module that the Safety CPU module cannot recognize has been mounted. • More than two CC-Link IE Field Network master/local modules (with safety functions) are mounted.	• Mount two or less CC-Link Safety master modules. • Mount either only one CC-Link IE Controller Network module or MESECNET/H module. • Mount only one Ethernet module. • Mount a module supported in the Safety CPU module. • Mount only one CC-Link IE Field Network master/local module (with safety functions).	QS

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
2107	MODULE LAYOUT ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	
2112	INTELLIGENT FUNCTION MODULE ERR.	Module No.	Program error location	Off	Flash	Stop	At an execution of instruction	
2124	MODULE LAYOUT ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	
2125	MODULE LAYOUT ERROR	Module No.	–	Off	Flash	Stop	At power ON/ At reset	
2200	MISSING PARAMETER	Drive No.	–	Off	Flash	Stop	At power ON/ At reset	
2210	BOOT ERROR	Drive No.	–	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	2107	The start X/Y set in the PLC parameter's I/O assignment settings is overlapped with the one for another module.	Make the PLC parameter's I/O assignment setting again so it is consistent with the actual status of the intelligent function module.	QS
	2112	• The module other than intelligent function module is specified by the intelligent function module dedicated instruction. Or, it is not the corresponding intelligent function module. • There is no network No. specified by the network dedicated instruction. Or the relay target network does not exit.	Read the individual information of the error using GX Developer, check and correct the intelligent function module dedicated instruction corresponding to its value (program error location).	QS
	2124	• A module is installed to the actual I/O points or greater. • A module is installed to the slot whose assigned I/O range includes the limit of actual I/O points.	• Remove the module installed to the actual I/O points or greater. • Reset the I/O assignment setting of the parameter so as not to exceed the actual I/O points.	QS
	2125	• A module that the safety CPU module cannot recognize has been mounted. • There was no response from the intelligent function module.	• Mount a module supported in the safety CPU module. • The intelligent function module is experiencing a hardware fault. (Please consult your local Mitsubishi representative.)	QS
	2200	There is no parameter file at the program memory.	Set the parameter file to the program memory.	QS
	2210	The contents of the boot file are incorrect.	Check the boot setting.	QS

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
2500	CAN'T EXECUTE PROGRAM	File name/ Drive No.	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
2501								
2502								
2503								

Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
2500	• There is a program file that uses a device that is out of the range set in the PLC parameter device setting.	Read the common information of the error using the GX Developer, check to be sure that the parameter device allocation setting and the program file device allocation correspond to the numerical values there (file name), and correct if necessary.	QS
2501	• More than two program files exist for one drive. • The program name differs from the program contents.	• Delete unnecessary program files. • Match the program name with the program contents.	QS
2502	The program file is incorrect. Alternatively, the file contents are not those of a sequence program.	Check whether the program version is ∗ ∗ ∗.QPG, and check the file contents to be sure they are for a sequence program.	QS
2503	There are no program files at all. (A drive No. is only displayed on the common information.)	• Check program configuration. • Check parameters and program configuration.	QS

12.3.5 Error code list (3000 to 3999)

The following shows the error messages from the error code 3000 to 3999, the contents and causes of the errors, and the corrective actions for the errors.

Table12.6 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
3000	PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3001								
3003	PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3004	PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3008	PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	When CC-Link Safety remote station return	
3100	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	3000	The PLC parameter settings for timer time limit setting, the RUN-PAUSE contact, and number of vacant slots is outside the range that can be used by the CPU module.	Read the detailed information of the error using the GX Developer, check the parameter items corresponding to those numerical values (parameter numbers), and correct when necessary.	QS
	3001	The parameter settings are corrupted.		
	3003	The number of devices set at the PLC parameter device settings exceeds the possible CPU module range.	Read the detailed information of the error using the GX Developer, check the parameter items corresponding to those numerical values (parameter numbers), and correct when necessary.	QS
	3004	The parameter file is incorrect. Alternatively, the contents of the file are not parameters.	Check whether the parameter file version is ＊＊＊.QPA, and check the file contents to be sure they are parameters.	QS
	3008	The system power is not restarted or the CPU module is not reset after writing the parameter to the CPU module. (When the remote I/O station returns while the system power is restarted or the CPU module is reset after writing the PLC parameter into CPU module, this error occurs.)	Restart the power or reset the CPU module.	QS
	3100	• The number of modules actually mounted is different from that is set in Network parameter for CC-Link IE Field Network. • The start I/O number of the module actually mounted is different from that is set in Network parameter for CC-Link IE Field Network. • Some data in the parameters are not supported.	• Check the setting in Network parameter and actual mounting status, and if they differ, correct either the setting or mounting status so that they become the same. If the parameter setting is corrected, write Network parameter to the CPU module. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.)	QS*3

*1 This applies when the serial number (first five digits) of the MELSECNET/H module is "08102" or later.
*2 This applies when the serial number (first five digits) of the CPU module is "10031" or earlier.
*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
3100	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	3100	• The number of modules actually mounted is different from that is set in Network parameter for CC-Link IE Controller Network. • The start I/O number of the module actually mounted is different from that is set in Network parameter for CCLink IE Controller Network. • Some data in the parameters are not supported. • The station type for a CC-Link IE Controller Network has been changed while the power is ON. (RESET → RUN is required to change the station type.)	• Check the setting in Network parameter and actual mounting status, and if they differ, correct either the setting or mounting status so that they become the same. If the parameter setting is corrected, write Network parameter to the CPU module. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.)	QS
		• The number of modules actually mounted is different from that is set in Network parameter for MELSECNET/H. • The start I/O number of the module . actually mounted is different from thatis set in Network parameter for MELSECNET/H. • Some data in the parameters are not supported. • The station type for a MELSECNET/H has been changed while the power is ON. (RESET → RUN is required to change the station type.) • The mode switches of MELSECNET/H module*1 are out of the setting range.	• Check the setting in Network parameter and actual mounting status, and if they differ, correct either the setting or mounting status so that they become the same. If the parameter setting is corrected, write Network parameter to the CPU module. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.) • Set the mode switches of MELSECNET/H module*1 within the setting range.	QS

*1 This applies when the serial number (first five digits) of the MELSECNET/H module is "08102" or later.
*2 This applies when the serial number (first five digits) of the CPU module is "10031" or earlier.
*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
3101	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3102	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3103	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	3101	The refresh parameter for CC-Link IE Controller Network is out of the setting range. • The refresh parameter for CC-Link IE Field Network is out of the setting range. • The refresh parameter for CC-Link IE Field Network is overlapped with the refresh parameter or the I/O assignment setting for other networks. • The start I/O number of the module actually mounted is different from that is set in Network parameter. • The refresh parameter for MELSECNET/H is out of the setting range.	Check the setting in Network parameter and actual mounting status, and if they differ, correct either the setting or mounting status so that they become the same. If the parameter setting is corrected, write Network parameter to the CPU module.	QS
	3102	• The network module detected an error in Network parameter. • The MELSECNET/H inherent parameter setting is incorrect.	• Correct the parameter setting and write Network parameter to the CPU. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.)	QS
	3103	• The number of modules actually mounted is different from that is set in Network parameter for Ethernet. • The start I/O number of the module actually mounted is different from that is set in Network parameter for Ethernet.	• Check the setting in Network parameter and actual mounting status, and if they differ, correct either the setting or mounting status so that they become the same. If the parameter setting is corrected, write Network parameter to the CPU module. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.)	QS

*1 This applies when the serial number (first five digits) of the MELSECNET/H module is "08102" or later.
*2 This applies when the serial number (first five digits) of the CPU module is "10031" or earlier.
*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
3104	NETWORK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3105	CC-LINK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3106	CC-LINK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	3104	• The same network number is used for Ethernet, CC-Link IE Controller Network, and MELSECNET/H. • The network number, station number, and/or group number set in Network parameter are out of the setting range. • The specified I/O number is outside the range of the used CPU module. • The Ethernet inherent parameter setting is incorrect.	• Correct the parameter setting and write Network parameter to the CPU module. • If an error occurs even after correction, a hardware failure is considered. (Please consult your local Mitsubishi representative.)	QS
	3105	• Though the number of CC-Link modules set in the network parameters is one or more, the number of actually mounted modules is zero. • The start I/O number in the common parameters is different from that of the actually mounted module. • The station type of the CC-Link module count setting parameters is different from that of the actually mounted station.	• Correct and write the network parameters. • If the error occurs after correction, it suggests a hardware fault. (Please consult your local Mitsubishi representative.)	QS
	3106	• The network refresh parameter for CC-Link is out of range. • Although the safety remote station set in the network parameter does not support the safety data monitoring time, it is set for the station. • The refresh parameter for CC-Link IE Field Network is overlapped with the refresh parameter or the I/O assignment setting for other networks.	• Check the [Model name] and [Module technical version] of the safety remote station settings, or delete the setting of the safety data monitoring time. • Correct and write the network parameters. • If the error occurs after correction, it suggests a hardware fault. (Please consult your local Mitsubishi representative.)	QS
		The safety data monitoring time has been set.	Delete the setting of the safety data monitoring time.	QS*2

*1 This applies when the serial number (first five digits) of the MELSECNET/H module is "08102" or later.
*2 This applies when the serial number (first five digits) of the CPU module is "10031" or earlier.
*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
3107	CC-LINK PARAMETER ERROR	File name/ Drive No.	Parameter number	Off	Flash	Stop	At power ON/ At reset	
3150	DUPLICAT.NET.NO.	File name/ Drive No.	Parameter number (A block No. of the switch setting is stored.)	Off	Flash	Stop	At power ON/ At reset	
3400	REMOTE PASSWORD ERROR	---	---	Off	Flash	Stop	At power ON/ At reset	
3401	REMOTE PASSWORD ERROR	---	---	Off	Flash	Stop	At power ON/ At reset	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	3107	The CC-Link parameter setting is incorrect.	• Correct and write the network parameters. • If the error occurs after correction, it suggests a hardware fault. (Please consult your local Mitsubishi representative.)	QS
	3150	The network No. set in Network parameter for CC-Link IE Field Network is overlapped with the one set for another network module.	Check the parameter setting.	QS*3
	3400	The start I/O number of the target module in Remote password is set to other than 0H to 3E0H.	Change the start I/O number of the target module to the number within 0H to 3E0H.	QS
	3401	Ethernet module of function version B or later is not mounted on the slot specified for the start I/O number of Remote password.	Mount the Ethernet module of function version B or later on the slot specified for the start I/O number of Remote password.	QS

12.3.6 Error code list (4000 to 4999)

The following shows the error messages from the error code 4000 to 4999, the contents and causes of the errors, and the corrective actions for the errors.

Table12.7 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
4000	INSTRUCTION CODE ERROR	Program error location	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
4002	INSTRUCTION CODE ERROR	Program error location	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
4003	INSTRUCTION CODE ERROR	Program error location	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
4004	INSTRUCTION CODE ERROR	Program error location	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
4010	MISSING END INSTRUCTION	Program error location	–	Off	Flash	Stop	At power ON/ At reset/ STOP→RUN	
4100	OPERATION ERROR	Program error location	–	Off/ On	Flash	Stop	When instruction executed.	
4101	OPERATION ERROR	Program error location	–	Off/ On	Flash	Stop	When instruction executed.	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	4000	• The program contains an instruction code that cannot be decoded. • An unusable instruction is included in the program. • An unusable safety FB is included in the program.	Read the common information of the error using a GX Developer, check error step corresponding to its numerical value (program error location), and correct the problem.	QS
	4002	• The name of dedicated instruction specified in the program is incorrect. • The dedicated instruction specified in the program cannot be executed by the specified module. • An unsupported instruction exists.		QS
	4003	The number of devices for the dedicated instruction specified in the program is incorrect.		
	4004	The device, which cannot be used by the dedicated instruction specified in the program, is specified.		
	4010	There is no END instruction in the program.		QS
	4100	The instruction cannot process the contained data.	Read the common information of the error using the GX Developer, check error step corresponding to its numerical value (program error location), and correct the problem.	QS
	4101	• The designated device number for data processed by the instruction exceeds the usable range. • Alternatively, the stored data or constants for the devices designated by the instruction exceeds the usable range.	Read the common information of the error using the GX Developer, check error step corresponding to its numerical value (program error location), and correct the problem.	QS

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
4102	OPERATION ERROR	Program error location	–	Off	Flash	Stop	At an execution of instruction	
4700	PROGRAM ABORT EXECUTED	Program error location	Aborted program information	Off	Flash	Stop	When executing the S.QSABORT instructions.	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	4102	• The network number and/or station number specified by the dedicated instruction are incorrect. • The module number, network number, and/or number of character strings specified by the dedicated instruction exceed the allowable range.	Read the common information of the error using the GX Developer, check error step corresponding to its numerical value (program error location), and correct the problem.	QS
	4700	The S.QSABORT instruction was executed, and the program was forcefully stopped.	Remove the cause before executing the S.QSABORT instruction.	QS

12.3.7 Error code list (5000 to 5999)

The following shows the error messages from the error code 5000 to 5999, the contents and causes of the errors, and the corrective actions for the errors.

Table12.8 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
5001	WDT ERROR	Time (value set)	Time (value actually measured)	Off	Flash	Stop	Always	
5010	PROGRAM SCAN TIME OVER	Time (value set)	Time (value actually measured)	On	On	Continue	Always	

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	5001	The program scan time exceeded the WDT value specified in the PLC RAS setting of the PLC parameter dialog box.	Read the individual information of the error with the GX Developer, check its value (time), and shorten the scan time.	QS
	5010	The program scan time exceeded the constant scan time specified in the PLC RAS setting of the PLC parameter dialog box.	Review the constant scan time in the PLC parameter so that the margin time of constant scan may be fully reserved.	QS

12.3.8 Error code list (8000 to 9000)

The following shows the error messages from the error code 8000 to 9000, the contents and causes of the errors, and the corrective actions for the errors.

Table12.9 Error code

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8000	INTERNAL REGISTER ERROR	–	Error information	Off	Flash	Stop	At power ON/ At reset/When an END instruction executed.	
8010	INTERNAL BUS ERROR	–	Error information	Off	Flash	Stop	At power ON/ At reset/When an END instruction executed.	
8020	CPU A & B CAN'T BE SYNCHRO-NIZED	–	Error information	Off	Flash	Stop	Always	
8021							When an END instruction executed.	
8031	INCORRECT FILE	–	Diagnostics file information	Off	Flash	Stop	At power ON/ At reset	
8032	INCORRECT FILE	–	Diagnostics file information	Off	Flash	Stop	When an END instruction executed.	
8050	SAFETY OUTPUT VERIFY ERROR	Module No./ Station No.	–	Off	Flash	Stop	When an END instruction executed.	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8000	Error is detected by the inside register diagnostics built in the CPU module.	This suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8010	Error is detected inside the bus of the CPU module.	This suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8020	Mismatch has occurred in the execution status of CPU A and CPU B.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8021	Mismatch of program execution times is detected between CPU A and CPU B.		
	8031	Error of a file stored in the program memory or the standard ROM is detected.	The file indicated by the individual information SD17~SD22 is written into the individual information SD16, and turn the CPU power is turned OFF→ON or reset→reset canceling.If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8032			
	8050	The verification of safety outputs between the CPU A and CPU B in a CPU module resulted in a mismatch.	• Check if the program for outputing safety outputs is correct. • Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8060	INCORRECT FIRMWARE	–	Error information	Off	Flash	Stop	At power ON/ At reset/When an END instruction executed.	
8070	INTERNAL CPU COMMUNI-CATION ERROR	–	Error information	Off	Flash	Stop	At power ON/ At reset	
8071								
8072								
8073							When an END instruction executed.	
8074								
8080	POWER SUPPLY ERROR	–	Error information	Off	Off/On	Stop	Always	
8090	VOLTAGE DIAGNOSIS ERROR	–	Error information	Off	Flash	Stop	When an END instruction executed.	
8100	TEST MODE TIME EXCEEDED	–	–	On	On	Continues	When an END instruction executed.	
8120	WDT CLOCK CHECK ERROR	–	–	Off	Flash	Stop	Always	
8300	CC-LINK REMOTE DETECTION ERROR	CC-Link Safety information	CC-Link Safety information	Off/On*1	Flash/ On*1	Stop/ Continues *1	Always	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8060	Error of system programs is detected.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8070	The initial communication between CPU A and CPU B was unsuccessful.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8071	CPU A and CPU B cannot send data to each other.		
	8072	CPU A and CPU B cannot receive data from each other.		
	8073	CPU A and CPU B cannot send data to each other.		
	8074	CPU A and CPU B cannot receive data from each other.		
	8080	Power supply voltage error has been detected in a CPU module.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8090	The error of line voltage monitoring circuit is detected.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8100	The continuous operation time on TEST MODE exceeds the TEST MODE continuous operation time set by the parameter.	Confirm that the safety CPU operation mode can be switched to the SAFETY MODE, and start operation after switching the TEST MODE to the SAFETY MODE.	QS
	8120	Clock stop of the WDT is detected.	• Take measure against noise. • Reset it and run it again. If the same error is displayed again, this suggests a CPU module hardware fault. (Please consult your local Mitsubishi representative.)	QS
	8300	Error information is received from CC-Link Safety remote station.	Confirm the error code of the relevant CC-Link Safety remote station. (Refer to the manual of the CC-Link Safety remote module for the confirmation.)	QS

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8310	CC-LINK PRODUCT INFO. MISMATCH	CC-Link Safety information	CC-Link Safety information	Off/On*1	Flash/ On*1	Stop/ Continues *1	Always	
8320	CC-LINK DATA RECEPTION TIMEOUT	CC-Link Safety information	CC-Link Safety information	Off/On*1	Flash/ On*1	Stop/ Continues *1	While initializing remote station	
8321							Always	
8322							When receiving remote station's error information	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8310	The installed product is different from the specified one by network parameter.	Check that [Model name], [Module technical version] or [Production information] of the CC-Link Safety remote station set in the network parameter matches the product information of the relevant CC-Link Safety remote station.(Refer to the manual of the CC-Link Safety remote module for the confirmation.)	QS
	8320	The response data cannot be received during the initial processing of CC-Link Safety remote station.	• Check that the following operations are not executed. (1)Switching the operation mode (2)Writing the program memory to ROM (3)Registration/change of the CPU access password (4)Initialization of PLC memory (If executed, this error may occur due to the increase of the interval between data communications of CC-Link Safety.) • When instantaneous power failure occurs to the supply power, change to the asynchronous mode or slow down the speed. • Execute the link test to check the soundness of transmission path. • Check the setting of transmission speed. • Check if the setting value of the Safety refresh monitoring time is appropriate. • Check if the setting value of the Safety data monitoring timer is appropriate.	QS
	8321	The response data cannot be received during the normal communication with CC-Link Safety remote station.		QS
	8322	The response data cannot be received during processing error information from CC-Link Safety remote station.		QS

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8330	CC-LINK RECEIVED DATA ERROR	CC-Link Safety information	CC-Link Safety information	Off/On*1	Flash/ On*1	Stop/ Continues *1	Always	
8331								
8332								
8333								
8334								
8400	CC IE ANOTHER MODULE DETECT ERR.	Error classification, error item, network No., station No.	CC-Link IE Field Network information	On	On	Continue	Always	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8330	The received command differs from the expected value.	• Check the cable status visually or by a line test. • Hardware error of the CC-Link Safety master module or the relevant CC-Link Safety remote module (Please consult your local Mitsubishi representative.)	QS
	8331	Lapse in separated receiving data has occurred.		QS
	8332	The link ID in receiving data is different from the expected value.	• Check if the link ID setting of the relevant remote station and the link ID that has been set in the network parameter are identical. • Hardware error of the CC-Link Safety master module or the relevant CC-Link Safety remote module (Please consult your local Mitsubishi representative.)	QS
	8333	The running No. in receiving data is different from the expected value.	• Check if the setting value of the Safety refresh monitoring time is appropriate. • Hardware error of the CC-Link Safety master module or the relevant CC-Link Safety remote module (Please consult your local Mitsubishi representative.)	QS
	8334	The CC-Link Safety master station cannot recognize the received data.	• Check the cable status visually or by a line test. • Hardware error of the CC-Link Safety master module or the relevant CC-Link Safety remote module (Please consult your local Mitsubishi representative.)	QS
	8400	Safety communication target station detection error (Error information is received from a safety communication target station on CC-Link IE Field Network.)	Check the error code of the communication target station on CC-Link IE Field Network.	QS*3

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8410	CC IE PRODUCT INFO. MISMATCH	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	When connection with safety stations established	
8420	CC IE DATA RECEPTION TIMEOUT	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	When connection established with safety stations	
8421							Always	
8422							When an error received from a safety station	
8423							Always	
8424								

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8410	Safety station product information mismatch ("Model name" or "Production information" of a safety station is incorrect.)	It may be malfunction due to noise. Check the soundness of transmission path by performing the CC-Link IE Field Network diagnostics. Check the distance between power lines and communication cables, and the installation status of each device as well.	QS*3
	8420	Safety monitoring timeout error (A timeout error occurred during safety communication.)	• Check that the following operations are not performed. 1) Switching the operation mode 2) Writing the program memory to ROM 3) Registration/change of the CPU access password 4) Initialization of PLC memory 5) Monitoring, diagnostics (If executed, this error may occur due to the increase of the interval between data communications of CC-Link IE Field.) • Set the larger value for the safety refresh monitoring time. Or set the smaller value for the transmission interval monitoring time. • It may be malfunction due to noise. Check the soundness of transmission path by performing the CC-Link IE Field Network diagnostics. Check the distance between power lines and communication cables, and the installation status of each device as well.	QS*3
	8421			
	8422			
	8423			
	8424			QS*3

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8425	CC IE DATA RECEPTION TIMEOUT	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	Always	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8425	Safety monitoring timeout error (A timeout error occurred during safety communication.)	• Check that the following operations are not performed. 1) Switching the operation mode 2) Writing the program memory to ROM 3) Registration/change of the CPU access password 4) Initialization of PLC memory 5) Monitoring, diagnostics (If executed, this error may occur due to the increase of the interval between data communications of CC-Link IE Field.) • Check that the transmission interval monitoring time for the target station is correctly set. • It may be malfunction due to noise. Check the soundness of transmission path by performing the CC-Link IE Field Network diagnostics. Check the distance between power lines and communication cables, and the installation status of each device as well.	QS*3

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

Error Code (SD0)	Error Message	Common Information (SD5 to 15)	Individual Information (SD16 to 26)	LED Status		CPU Operation Status	Diagnostic Timing	
				RUN	ERROR			
8426	CC IE DATA RECEPTION TIMEOUT	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	Always	
8430	CC IE RECEIVED DATA ERROR	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	Always	
8431								
8432								
8440	CC IE CONNECTION SETTING ERROR	Network No., station No.	CC-Link IE Field Network information	On	On	Continue	Always	
9000	F**** *2	Program error location	Annunciator number	On	Off	Continue	When instruction executed.	

*1 The operating status of a CPU module in case of an error can be set in the "Operation settings during remote station error" of "Parameter". The default is set to "Stop" (The LED indication changes according to the status).

*2 At occurrence of "F****", the “USER” LED turns on.

	Error Code (SD0)	Error Contents and Cause	Corrective Action	Corresponding CPU
	8426	Safety monitoring timeout error (A timeout error occurred during safety communication.)	• Check that the following operations are not performed. 1) Switching the operation mode 2) Writing the program memory to ROM 3) Registration/change of the CPU access password 4) Initialization of PLC memory 5) Monitoring, diagnostics (If executed, this error may occur due to the increase of the interval between data communications of CC-Link IE Field.) • Set the larger value for the safety refresh monitoring time. Or set the smaller value for the transmission interval monitoring time. • It may be malfunction due to noise. Check the soundness of transmission path by performing the CC-Link IE Field Network diagnostics. Check the distance between power lines and communication cables, and the installation status of each device as well.	QS*3
	8430 8431 8432	Safety station reception data error (Incorrect data is received.)	It may be malfunction due to noise. Check the soundness of transmission path by performing the CC-Link IE Field Network diagnostics. Check the distance between power lines and communication cables, and the installation status of each device as well.	QS*3
	8440	Safety connection setting error (Incorrect CID is received.)	Check that safety connection is correctly set for own station.	QS*3
	9000	Annunciator (F) was set ON (**** in the error message indicates the detected annunciator number.)	Read the individual information of the error using the GX Developer, and check the program corresponding to the numerical value (annunciator number).	QS

*3 This applies when the serial number (first five digits) of the CPU module is "13042" or later.

12.4 Clearing an error

An error can be cleared as far as the CPU module continues its operation regardless of the error.
The continuation error can be checked by the ON status of the corresponding bit of SD81 (Cause of error). Table12.9 lists the continuation errors and their causes corresponding to each bit of SD81.

Table12.9 Error factor/error code corresponding to bit number of SD81

Bit number of SD81/error factor corresponding to continuation error		Continuation error corresponding to bit number of SD81	
Bit number	**Error factor**	**Error code**	**Error message**
0	Instantaneous power failure	1500	AC/DC DOWN
1	Battery low	1600	BATTERY ERROR
2	Standard ROM write count excess	1610	EXCEED MAX FLASH ROM REWRIT.ERR.
3	Test mode continuous RUN tolerance timeout	8100	TEST MODE TIME EXCEEDED
4	Scan timeout	5010	PROGRAM SCAN TIME OVER
5	Annunciator ON	9000	F**** (**** indicates the annunciator number.)
6	Safety remote station detection error	8300	CC-LINK REMOTE DETECTION ERROR
	Safety communication target station detection error	8400	CC IE ANOTHER MODULE DETECT ERR
7	Safety remote station product information mismatch	8310	CC-LINK PRODUCT INFO. MISMATCH
	Safety station product information mismatch	8410	CC IE PRODUCT INFO. MISMATCH
8	Initial monitoring timeout error	8320	CC-LINK DATA RECEPTION TIMEOUT
	Safety monitoring timeout error	8321	
	Error monitoring timeout error	8322	
	Safety monitoring timeout error	8420 8421 8422 8423 8424 8425	CC IE DATA RECEPTION TIMEOUT
9	Safety remote station command error	8330	CC-LINK RECEIVED DATA ERROR
	Safety remote station data split error	8331	
	Safety remote station link ID error	8332	
	Safety remote station running number error	8333	
	Safety remote station reception data error	8334	
	Safety station reception data error	8430 8431 8432	CC IE RECEIVED DATA ERROR
	Safety connection setting error	8440	CC IE CONNECTION SETTING ERROR

To cancel the errors, follow the steps shown below.

1) Read the special register SD81 with GX Developer and confirm the cause of the continuation error that currently occurs in the CPU module.
2) Eliminate the cause of the error.
3) Store the error code to be canceled in the special register SD50.
4) Energize the special relay SM50 (OFF → ON).
5) Read the special register SD81 with GX Developer again and confirm that the bit corresponding to the canceled continuation error is turned OFF.
6) Turn the special relay SM50 OFF.

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

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

If the canceling of errors is performed when multiple continuation errors are occurring, the LED indication and error information of the CPU module operate as follows.

Error Canceling Status	LED Indication *1 ("ERR." LED, "BAT." LED, "USER" LED)	Error Information (SM0, SM1, SM5, SM16, SD0 to 26)
Before canceling errors	On	The error information of the continuation error that occurred last is stored.
↓		
The error which occurred last is cancelled. (The continuation error that is not canceled remains.)	On	Returned to the status without error.
Errors other than the continuation error that occurred last are cancelled. (The continuation error that is not canceled remains.)	On	No change (The error information that occurred last is retained.)
↓		
All the continuation errors are cancelled.	Off	No error

*1: 1) Error code: When 1600 (BATTERY ERROR) occurs, only "BAT." LED turns on.
Error code: When canceling the error code 1600, "BAT." LED turns off.
2) Error code: When 9000 (F****) occurs, only "USER" LED turns on.
Error code: When canceling the error code 9000, "USER" LED turns off.

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

POINT

1. When the error is canceled with the error code to be canceled stored in the SD50, the lower one digit of the code is neglected.
   (Example)
   If error codes 2100 and 2106 occur, and error code 2100 to cancel error code 2106.
   If error codes 2100 and 2125 occur, error code 2125 is not canceled even if error code 2100 is canceled.
2. Errors developed due to trouble in other than the CPU module are not canceled even if the special relay (SM50) and special register (SD50) are used to cancel the error.
   (Example)
   Since "INTELLIGENT FUNCTION MODULE DOWN" is the error that occurred in the base unit, intelligent function module, etc. the error cause cannot be removed even if the error is canceled by the special relay (SM50) and special register (SD50).
   Refer to the error code list and remove the error cause.

12.5 Error codes returned to request source during communication with CPU module

The CPU module returns an error code to GX Developer if an error occurs at a request of communication from GX Developer.

POINT

This error code is not an error that is detected by the CPU module self-diagnosis function, so it is not stored in the special relay (SD0).
When the request origin is a GX Developer, a message or an error code is displayed.

The error contents of the error codes (4000H to 4FFFH) detected by the CPU module and the messages displayed by the GX Developer are shown in Table12.10.

Table12.10 Error code

Error code (Hexadecimal)	Error item	Error details	Corrective action
4000H	Common error	Serial communication sum check error	• Connect the serial communication cable correctly. • Take noise reduction measures.
4001H		Unsupported request was executed.	Check the CPU module model name selected in the peripheral device.
4002H		Unsupported request was executed.	Check the CPU module model name selected in the peripheral device.
4003H		Command for which a global request cannot be performed was executed.	Perform the request again with a peripheral device.
4004H		Any operation for the CPU module is prohibited by the system protect function provided against the following events. • The system protect switch is ON. • The CPU module is starting.	• Set the system protect switch of the CPU module to OFF. • Perform operation again after the CPU module has completed starting.
4005H		The volume of data handled according to the specified request is too large.	Perform the request again with a peripheral device.
4006H		Serial communication could not be initialized.	Check the CPU module model name selected in the peripheral device.
4010H	CPU mode error	The CPU module is running to the request contents cannot be executed.	Execute after setting the CPU module to STOP status.
4013H		Since the CPU module is not in a STOP status, the request contents cannot be executed.	Execute after setting the CPU module to STOP status.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
4021H	CPU file related error	The specified drive memory does not exist or there is an error.	• Check the specified drive memory status. • After backing up the data in the CPU module, execute PLC memory format.
4022H		The file with the specified file name or file No. does not exist.	Check the specified file name and file No.
4023H		The file name and file No. of the specified file do not match.	Delete the file and then recreate the file.
4024H		The specified file cannot be handled by a user.	Do not access the specified file.
4025H		The specified file is processing the request from the other peripheral device.	Forcibly execute the request, or make the request again after the processing from the other peripheral device is completed.
4026H		The file password or drive keyword set to the target drive (memory) must be specified.	Make access after specifying the file password or drive keyword set to the target drive (memory).
4027H		The specified range exceeds the file range.	Check the specified range and access within that range.
4028H		The same file already exists.	Forcefully execute the request forcibly. Or reexecute after changing the file name.
4029H		The specified file capacity cannot be obtained.	Revise the specified file contents. Or reexecute after cleaning up and reorganizing the specified drive memory.
402AH		The specified file is abnormal.	After backing up the data in the CPU module, execute PLC memory format.
4030H	CPU device specified error	The specified device name cannot be handled.	Check the specified device name.
4031H		The specified device No. is outside the range.	• Check the specified device No. • Check the device assignment parameters of the CPU module.
4032H		There is a mistake in the specified device qualification.	Check the specified device qualification method.
4040H	Intelligent function module specification error	The request contents cannot be executed in the specified intelligent function module.	Check whether the specified module is the intelligent function module having the buffer memory.
4041H		The access range exceeds the buffer memory range of the specified intelligent function module.	Check the header address and access number of points and access using a range that exists in the intelligent function module.
4042H		The specified intelligent function module cannot be accessed.	• Check that the specified intelligent function module is operating normally. • Check the specified module for a hardware fault.
4043H		The intelligent function module does not exist in the specified position.	Check the I/O No. of the specified intelligent function module.
4052H	Protect error	The specified file attribute is read only so the data cannot be written.	Do not write data in the specified file. Or change the file attribute.
4054H		An error occurred when deleting the data in the specified drive memory.	Check the specified drive memory. Or re-erase after replacing the corresponding drive memory.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
4060H	Online registration error	The online debug function is being executed by the other peripheral device.	• Execute the function again after the operation of the other peripheral device has ended. • When the operation was suspended by the other peripheral device, execute the function again after executing it on the other peripheral device to normally complete the operation.
4061H		Communication of the online debug function was unsuccessful.	• Execute communication after the registering the online debug function (e.g. online program change/trace/ conditional monitor). • Execute again after checking the communication route such as the communication cable.
4063H		The registered number of locked files exceeded the maximum value.	Execute again after file access by the other peripheral device has ended.
4068H		Operation is disabled since the same operation is being executed from the other peripheral device.	Execute again after the operation from the other peripheral device is over.
406AH		The drive (memory) number that cannot be handled (other than 0 to 4) was specified.	Check the specified drive and specify the correct drive.
4070H	Circuit inquiry error	The program not yet corrected and the one corrected by online program change are different.	Execute read from PLC to make the program of the peripheral device the same as that of the CPU module, and then execute online program change again.
4080H	Other errors	Request data error	Check the request data specified in the MC protocol, etc.
4081H		The sort subject cannot be detected.	Check the data to be searched.
4082H		The specified command is executing and therefore cannot be executed.	Execute the command again after the request from the other peripheral device is completed.
4083H		An attempt was made to perform operation for the program not registered to the parameters.	Register the program to the parameters.
4089H		An attempt was made to insert/delete the END instruction by online program change.	• Check the specified program file contents. • Write the program after setting the CPU module to the STOP status.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
408AH	Other errors	The file capacity was exceeded by the write during Run.	• Check the capacity of the specified program file. • Write the program after setting the CPU module to the STOP status.
408BH		The remote request cannot be executed.	• Reexecute after the CPU module is in a status where the mode request can be executed. • For remote operation, set the parameter to "Enable remote reset".
408DH		The instruction code that cannot be handled exists.	• Check whether the model of the used CPU module is correct or not. • The sequence program where online program change was attempted includes the instruction that cannot be handled by the CPU module model name set in the project. Reexamine the sequence program and delete that instruction.
408EH		The write step is illegal.	• Write the program after setting the CPU module to the STOP status. • The starting position of online program change is not specified with the correct program step No. Check whether the used peripheral device supports the CPU module model name and CPU module version set in the project.
4103H		The instruction written during RUN is wrong or illegal.	Execute online program change again, or write the program after setting the CPU module to the STOP status.
4110H	CPU mode error	Since the CPU module is in a stop error status, it cannot execute the request.	Execute the request again after resetting the CPU module.
4121H	File-related errors	The specified drive (memory) or file does not exist.	Execute again after checking the specified drive (memory) or file.
4122H		The specified drive (memory) or file does not exist.	Execute again after checking the specified drive (memory) or file.
4123H		The specified drive (memory) is abnormal.	Execute PLC memory format to make the drive (memory) normal. In the case of the Flash ROM, check the data to be written to the Flash ROM, and write them to the Flash ROM.
4124H		The specified drive (memory) is abnormal.	Execute PLC memory format to make the drive (memory) normal. In the case of the Flash ROM, check the data to be written to the Flash ROM, and write them to the Flash ROM.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
4135H	File-related errors	The date/time data of the peripheral device (personal computer) is beyond the range.	Execute again after checking the clock setting of the peripheral device (personal computer).
4136H		The specified file already exists.	Execute again after checking the specified file name.
4139H		The specified file has exceeded the already existing file range.	Execute again after checking the size of the specified file.
413AH		The specified file has exceeded the already existing file size.	Execute again after checking the size of the specified file.
413FH		Writing the file to the specified drive is inhibited	Check the drive to be specified and write the file again.
4151H		An attempt was made to delete the file protected by the system.	Do not delete the target file as it cannot be deleted.
4160H	Online registration error	The registered number of forced inputs/ outputs exceeded the maximum value.	Deregister the unused forced inputs/outputs.
4165H		The multiple-block online change system file does not exist.	Execute again after securing the area that enables multiple-block online change at the time of PLC memory format.
41C1H	File-related error	The format information data of the specified drive (memory) is abnormal.	The file information data may be corrupted. After backing up the data in the CPU module, execute PLC memory format.
41C4H		Simultaneously accessible files exceeded the maximum.	Execute again after decreasing file operations.
41C5H		The specified file does not exist.	Execute again after checking the file.
41C7H		The specified file or drive (memory) does not exist.	Execute again after checking the file or drive (memory).
41C8H		The specified file has exceeded the already existing file range.	Execute again after checking the size of the specified file. If the error recurs after re-execution, the file information data may be corrupted. After backing up the data in the CPU module, execute PLC memory format.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
41CB$_H$	File-related errors	The file name is specified in a wrong method.	Execute again after checking the file name.
41CC$_H$		The specified file does not exist.	Execute again after checking the file.
41CD$_H$		Access to the file is inhibited by the system.	Do not access the specified file.
41CE$_H$		The specified file is write-disabled since its attribute is read-only.	The specified file is write-inhibited. Execute again after checking the attribute.
41CF$_H$		The specified drive (memory) capacity was exceeded.	Execute again after checking the drive (memory) capacity.
41D0$_H$		The specified drive (memory) has no free space.	Execute again after increasing the free space of the drive (memory).
41D1$_H$		The file name is specified in a wrong method.	Execute again after checking the file name. If the error recurs after re-execution, the file information data may be corrupted. After backing up the data in the CPU module, execute PLC memory format.
41D5$_H$		The file of the same name exists.	Forcibly execute the request, or execute after changing the file name.
41D8$_H$		The specified file is being accessed.	Execute again after a while.
41E1$_H$		Access to the flash ROM was unsuccessful.	• After backing up the data, execute write to PLC (Flash ROM).
41E9$_H$		The specified file is being accessed.	Execute again after some time.
41EC$_H$		The file system of the specified drive (memory) is logically corrupted.	The file information data may have been corrupted. After backing up the data in the CPU module, execute PLC memory format.
41ED$_H$		The specified drive (memory) does not have continuous free space. (The free space for file is sufficient but the continuous free space is insufficient.)	Execute again after deleting unnecessary files or executing PLC memory arrangement.
41F2$_H$		Operation cannot be performed since the specified drive (memory) is Flash ROM.	Execute again after checking the specified drive (memory). When performing operation for the Flash ROM, use write to PLC (Flash ROM).
41FA$_H$		Program was written beyond the area where the program can be executed.	Execute again after reducing either the already written program or newly written program.
41FB$_H$		Operation is being performed for the file already specified for the same peripheral device.	Execute again after the currently performed operation is completed.
41FC$_H$		An attempt was made to erase the drive (memory) being used.	The specified drive (memory) is being used and cannot be erased.
41FD$_H$		There are no data written to the Flash ROM.	Write a file by executing write to PLC (Flash ROM).

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
42A0H	CPU access password mismatch	The CPU access password is mismatched.	• Check whether the CPU access password is correct or not. • Register the CPU access password again.
42A1H	CPU access password is not registered with CPU module	The CPU access password is not registered with the CPU module.	Register the CPU password and execute the command.
42A2H	Exclusive control ID mismatch	The authentication of write operation or remote operation failed.	• Redo the write operation from the beginning. • Redo the remote operation from the beginning.
42A3H	Change mode specification error	The specification value of the safety CPU operation mode is out of range.	Check whether the mode other than the TEST MODE or SAFETY MODE is specified or not.
42A4H	Safety CPU operation mode change error	An attempt was made to switch the safety CPU operation mode to the TEST MODE in the TEST MODE. Or an attempt was made to switch the Safety CPU operation mode to the SAFETY MODE in the SAFETY MODE (including a wait-for-restart).	Check whether an attempt is made to switch the current safety CPU operation mode to the same mode or not.
42A5H	Command that cannot be executed in SAFETY MODE	The operation that cannot be executed in the SAFETY MODE has been performed.	Perform the operation after switching to the TEST MODE.
42A6H	Command that cannot be executed in the wait-for-restart status	The operation that cannot be executed in the wait-for-restart status has been performed.	Execute the operation after restarting the CPU module.
42A7H	Safety CPU operation mode switching disabled (from TEST MODE to SAFETY MODE)	The safety CPU operation CPU mode could not be switched from the TEST MODE to the SAFETY MODE.	Check that a stop error has not occurred in the CPU module, make the CPU module STOP and perform safety CPU operation mode switching.
42A9H	Communica-tion CRC error	The CRC error occurred during communications with the CPU module.	Execute the online operation again.
42AAH	During the write exclusive control	Cannot be executed during the write operation.	Start after the current online operation has been completed.
42ABH	Already started in the other starting source	The online operation is performed from the other starting source.	Start after the online operation performed from the other starting source has been completed.
42ACH	Write exclusive control is not performed	The write operation procedure is not correct.	Redo the write operation from the beginning.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
$42AD_H$	Already started in the same starting source	The online operation started before is in the continued status due to some reason (e.g. communication disturbance during execution, etc.). Start the online operation forcibly.	Redo the online operation from the beginning.
$42AE_H$	CRC read disabled	An attempt was made to read the CRC value to the file in which the CRC value is not stored.	• Execute PLC memory format. • Execute PLC memory initialization.
$42AF_H$	During history data update	The history file read cannot be started since the history data update is during execution in the CPU module.	Execute the read again after a while.
$42B0_H$	Communication error between CPUs	The communication between CPU A and CPU B failed. The CPU module may be faulty.	Restart the CPU module.
$42B1_H$	CPU access password cannot be written	Writing the CPU access password failed.	Write the CPU access password again. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.
$42B2_H$	ROM marking information cannot be written	A write error to flash ROM occurred while program memory data is written to ROM.	Write program memory data to ROM again. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.
$42B3_H$	Program memory data cannot be written to ROM	A write error to flash ROM occurred while program memory data is written to ROM.	Write program memory data to ROM again. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.
$42B4_H$	Command execution results mismatch	The results of executed functions are different between CPU A and CPU B.	Execute the function which became an error again. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.
$42B5_H$	Command that cannot be executed in the specified transfer target	The online operation that can be executed only without the transfer target specification is executed to CPU A or CPU B.	Execute the online operation again after switching the transfer target to "Not specified".
$42B6_H$	CPU access password damaged	The CPU access password stored in the CPU module is damaged.	Write the CPU access password again after PLC memory initialization. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.
$42B7_H$	Illegal user name	Characters other than ASCII characters are used for the user name.	Check whether the characters other than ASCII characters (20 to $7E_H$) are used for the login user name.
$42B8_H$	Program size mismatch	The program size stored in the program memory is different from that of the running program.	Restart the CPU module. If the same error occurs again, it is a CPU hardware failure. Please consult your local Mitsubishi representative.

Table12.10 Error code (Continue)

Error code (Hexadecimal)	Error item	Error details	Corrective action
$42B9_H$	General data frame error	The communication data whose format is not supported by the transfer target CPU has been sent.	Check whether the application compatible with the QS001CPU is used or not.
$4B00_H$	Target-related error	An error occurred in the access destination or relay station, or the specified transfer setup (request destination module I/O number) is illegal.	• Take corrective action after checking the error that occurred at the specified access destination or the relay station to the accessed station. • Check the transfer setup (request destination module I/O number or PLC number) in the request data of the peripheral device.
$4B02_H$		The request is not addressed to the CPU module.	Perform operation for the module that can execute the specified function.
$4B03_H$		The specified route is not supported by the specified CPU module version.	Check whether the specified route is supported or not.

12.6 Special Relay List

Special relays, SM, are internal relays whose applications are fixed in the programmable controller.
For this reason, they cannot be used by sequence programs in the same way as the normal internal relays.
However, they can be turned ON or OFF as needed in order to control the CPU module and remote I/O modules.
The heading descriptions in the following special relay lists are shown in Table12.11.

Table12.11 Descriptions of the special relay lists headings

Item	Function of Item
Number	• Indicates special register number
Name	• Indicates name of special register
Meaning	• Indicates contents of special register
Explanation	• Discusses contents of special register in more detail
Set by (When set)	• Indicates whether the relay is set by the system or user, and, if it is set by the system, when setting is performed. <Set by> S : Set by system U : Set by user (sequence programs or test operations from GX Developer) S/U : Set by both system and user <When set> Indicated only for registers set by system Every END : Set during every END processing Initial : Set only during initial processing (when power supply is turned ON, or when going from STOP to RUN) Status change : Set only when there is a change in status Error : Set when error occurs Instruction execution : Set when instruction is executed Request : Set only when there is a user request (through SM, etc.)

For details on the following items, refer to the following manuals:
• Networks → Manuals of each network module

POINT

In the program that achieves the safety function, only SM1000 to SM1299 can be used.
Special relay other than SM1000 to SM1299 cannot be used in the program that achieves the safety function.

(1) Diagnostic Information

Table12.12 Descriptions of the special relay headings

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM0	Diagnostic errors	OFF : No error ON : Error	• Turns ON when an error is detected by diagnostics (Includes when an annunciator is ON) • Remains ON if the condition is restored to normal thereafter.	S (Error)	QS
SM1	Self-diagnosis error	OFF : No self-diagnosis errors ON : Self-diagnosis	• Turns ON when an error is detected by self-diagnostics (Does not include when an annunciator is ON) • Remains ON if the condition is restored to normal thereafter.	S (Error)	
SM5	Error common information	OFF : No error common information ON : Error common information	• When SM0 is ON, ON if there is error common information	S (Error)	
SM16	Error individual information	OFF : No error individual information ON : Error individual information	• When SM0 is ON, ON if there is error individual information	S (Error)	
SM50	Error reset	OFF→ON: Error reset	• Conducts error reset operation	U	
SM51	Battery low latch	OFF : Normal ON : Battery low	• ON if battery voltage at CPU module or memory card drops below rated value. • Remains ON if the battery voltage returns to normal thereafter. • Synchronous with BAT. LED	S (Error)	
SM52	Battery low	OFF : Normal ON : Battery low	• Same as SM51, but goes OFF subsequently when battery voltage returns to normal.	S (Error)	
SM53	AC DOWN detection	OFF : AC DOWN not detected ON : AC DOWN detected	• Turns ON if an instantaneous power failure of within 20ms occurs during use of the AC power supply module. Reset when the power supply is switched OFF, then ON.	S (Error)	
SM56	Operation error	OFF : Normal ON : Operation error	• ON when operation error is generated • Remains ON if the condition is restored to normal thereafter.	S (Error)	
SM61	I/O module verify error	OFF : Normal ON : Error	• Turns ON if the I/O module differs from the status registered at power on. • Remains ON if the condition is restored to normal thereafter.	S (Error)	
SM62	Annunciator detection	OFF : Not detected ON : Detected	• Goes ON if even one annunciator F goes ON.	S (Instruction execution)	

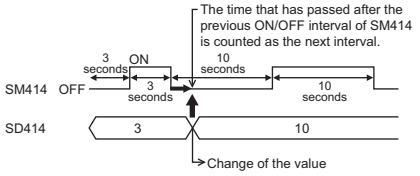
(2) System information

Table12.13 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM203	STOP contact	STOP status	• Turns ON when the CPU is in STOP status.	S (Status change)	QS
SM210	Clock data set request	OFF: Ignored ON: Set request	• Writes clock data stored in SD210 to SD213 to the CPU module after the END instruction of the scan where the relay changes OFF to ON has been executed.	U	
SM211	Clock data error	OFF: No error ON: Error	• Turns ON when an error is detected in the clock data (SD210 to SD213) and turns OFF if no error is detected.	S (Request)	
SM213	Clock data read request	OFF : Ignored ON : Read request	• Reads clock data to SD210 to SD213 in BCD value when the relay is ON.	U	
SM232	Number of writes to ROM	OFF : Within the number of writes ON : Over the number of writes	• Turns ON when the number of writes to ROM exceeds 100,000.	S (Error)	

(3) System clocks/counters

Table12.14 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM400	Always ON	ON OFF	• Normally is ON	S (Every END)	QS
SM401	Always OFF	ON OFF	• Normally is OFF	S (Every END)	
SM402	After RUN, ON for 1 scan only	ON OFF 1 scan	• After RUN, ON for 1 scan only.	S (Every END)	
SM403	After RUN, OFF for 1 scan only	ON OFF 1 scan	• After RUN, OFF for 1 scan only.	S (Every END)	
SM410	0.1 second clock	0.05s 0.05s	• Repeatedly changes between ON and OFF at each designated time interval. • When programmable controller power supply is turned ON or a CPU module reset is performed, goes from OFF to start.	S (Status change)	
SM411	0.2 second clock	0.1s 0.1s			
SM412	1 second clock	0.5s 0.5s			
SM413	2 second clock	1s 1s			
SM414	2n second clock	ns ns	• This relay alternates between ON and OFF at intervals of the time (unit: s) specified in SD414. (If the value of SD414 is changed, the time that has passed after the previous ON/OFF interval of SM414 is counted as the next interval, and the ON/OFF status is changed at the next interval that is newly specified.) Example: When the value of SD414 is changed from 3 to 10.  • When programmable controller power supply is turned ON or a CPU module reset is performed, goes from OFF to start.	S (Status change)	

(4) Safety CPU

Table12.15 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM560	TEST MODE flag	OFF : Other than TEST MODE ON : TEST MODE	• Turns ON when operating on the TEST MODE. • Turns OFF when operating on the other mode (SAFETY MODE, SAFETY MODE (wait-for-restart)).	S (Status change)	QS
SM561	Continuous RUN of tolerance time setting for the TEST MODE	OFF : Within the setting time ON : Over the setting time	• Turns ON when the continuous RUN of tolerance time set for the TEST MODE in the parameter is exceeded.	S (Error)	

(5) Boot operation

Table12.16 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM660	Boot operation	OFF : Program memory execution ON : During boot operation	(On the TEST MODE) • Turns ON during the boot operation from standard ROM. • Turns OFF when the boot operation from standard ROM is not run. (On the SAFETY MODE) • Always ON	S (Initial)	QS

(6) Instruction-Related Special Relays

Table12.17 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM722	BIN/DBIN instruction error disabling flag	OFF : Error detection performed ON : Error detection not performed	• Turned ON when "OPERATION ERROR" is suppressed for BIN or DBIN instruction.	U	QS

(7) CC-Link Safety

Table12.18 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM1004	Safety refresh communication status of each safety remote station (Safety master module 1)	OFF : Normal ON : Communication error	The safety station refresh communication status is stored. (The status of each station are stored in SD1004 to SD1007.)	S (Status change)	QS
SM1204	Safety refresh communication status of each safety remote station (Safety master module 2)	OFF : Normal ON : Communication error	The safety station refresh communication status is stored. (The status of each station are stored in SD1204 to SD1207.)	S (Status change)	

(8) CC-Link IE Field Network

Table12.19 Special relay

Number	Name	Meaning	Explanation	Set by (When Set)	Corresponding CPU
SM1400	Setting status of safety communication with master station	OFF : Not set ON : Set	The setting status of safety communication with the master station is stored.	S (Initial)	QS*1
SM1420	Safety refresh communication status of each safety station	OFF : Normal (excluding safety refresh communication with the master station) ON : Communication error	The safety refresh communication status with each safety station (excluding the master station) is stored. (The status of each safety station is stored in SD1420 to SD1427.)	S (Status change)	
SM1421	Safety refresh communication status of safety master station	OFF : Normal or safety communication with master station on CC-Link IE Field Network not set ON : Safety refresh communication error	The safety refresh communication status with the master station is stored. When safety communication with the master station is not set in parameter or own station is the master station, this bit turns OFF.		
SM1700	Safety master station interlock status	OFF : Not interlocked ON : Interlocked	When an error is detected and an interlock is activated, this bit turns ON.		
SM1720	Safety master station interlock release request	OFF : I/O interlock of safety station on CC-Link IE Field Network not released ON : I/O interlock of safety station on CC-Link IE Field Network released	The safety station interlock status is released by changing this bit from OFF to ON.	U	

* 1: This applies when the serial number (first five digits) of the CPU module is "13042" or later.

12.7 Special Register List

The special registers, SD, are internal registers with fixed applications in the programmable controller.
For this reason, it is not possible to use these registers in sequence programs in the same way that normal registers are used.
However, data can be written as needed in order to control the CPU modules and remote I/O modules.
Data stored in the special registers are stored as BIN values if no special designation has been made to the contrary.

The heading descriptions in the following special register lists are shown in Table12.20.

Table12.20 Descriptions of the special register list headings

Item	Function of Item
Number	• Indicates special register number
Name	• Indicates name of special register
Meaning	• Indicates contents of special register
Explanation	• Discusses contents of special register in more detail
Set by (When set)	• Indicates whether the relay is set by the system or user, and, if it is set by the system, when setting is performed. <Set by> S : Set by system U : Set by user (sequence programs or test operations from GX Developer) S/U : Set by both system and user <When set> Indicated only for registers set by system Every END : Set during every END processing Initial : Set only during initial processing (when power supply is turned ON, or when going from STOP to RUN) Status change : Set only when there is a change in status Error : Set when error occurs Instruction execution : Set when instruction is executed Request : Set only when there is a user request (through SM, etc.) Writing to ROM : Set when writing to ROM

For details on the following items, refer to the following manuals:
• Networks → Manuals of each network module

POINT

In the program that achieves the safety function, only SD1000 to SD1299 can be used.
Special register other than SD1000 to SD1299 cannot be used in the program that achieves the safety function.

(1) Diagnostic Information

Table12.20 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD0	Diagnostic errors	Diagnosis error code	• Error codes for errors detected by diagnostics are stored as BIN data. • Contents identical to latest error history information.	S (Error)	QS
SD1	Clock time for diagnosis error occurrence	Clock time for diagnosis error occurrence	• Stores the year (last two digits) and month when SD0 data was updated as BCD 2-digit code. b15 to b8 b7 to b0 Year (0 to 99) | Month (1 to 12) (Example) September, 2006 H0609	S (Error)	
SD2			• Stores the day and hour when SD0 data was updated as BCD 2-digit code. b15 to b8 b7 to b0 Day (1 to 31) | Hour (0 to 23) (Example) 10 a.m. on 25th H2510		
SD3			• Stores the minute and second when SD0 data was updated as BCD 2-digit code. b15 to b8 b7 to b0 Minutes (0 to 59) | Seconds (0 to 59) (Example) 35 min. 48 sec. H3548		
SD4	Error information categories	Error information category code	Category codes to identify what type of error information is stored in the common information (SD5 to SD15) or in the individual information (SD16 to SD26). b15 to b8 b7 to b0 Individual information category codes | Common information category codes • The common information category codes store the following codes: 0 : No error 1: Module No./Base No. 2: File name/Drive name 3: Time (value set) 4: Program error location 9: CC-Link Safety information 10: Module No./Station No. 11: CC-Link IE Field Network information • The individual information category codes store the following codes: 0: No error 2: File name/Drive name 3: Time (value actually measured) 4: Program error location 5: Parameter number 6: Annunciator (F) number 9: Error information 10: CC-Link Safety information 11: Program abort information 12: File diagnostics information 13: CC-Link IE Field Network information	S (Error)	

Table12.20 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD5
SD6
SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>Error common information</td><td>Error common information</td><td>• Common information corresponding to the error codes (SD0) is stored here.
• The following seven types of information are stored here:
1) Module No./Base No.
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD5</td><td>Slot No./Base No. *1</td></tr><tr><td>SD6</td><td>I/O No.*2</td></tr><tr><td>SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>(Empty)</td></tr></table>*1: The storing value "255" in SD5 (Slot No.) indicates that the slot number for a module specified by an instruction cannot be identified. When storing the base number to SD5, store 0 (main base unit).
*2: The storing value "FFFFH" in SD6 (I/O No.) indicates that the I/O number cannot be identified on the I/O assignment setting tab of PLC parameter due to overlapping of I/O numbers or that the I/O number cannot be identified from the network number specified by an instruction. In this case, the error location can be identified in SD5.
2) File name/Drive name
<table><tr><th>Number</th><th colspan="2">Meaning</th></tr><tr><td>SD5</td><td colspan="2">Drive</td></tr><tr><td>SD6
SD7
SD8
SD9</td><td colspan="2">File name
(ASCII code: 8 characters)</td></tr><tr><td>SD10</td><td>Extension *3</td><td>2EH(.)</td></tr><tr><td>SD11</td><td colspan="2">(ASCII code: 3 characters)</td></tr><tr><td>SD12
SD13
SD14
SD15</td><td colspan="2">(Empty)</td></tr></table>(Example) File name = MAIN.QPG
<table><tr><th>b15 to b8</th><th>b7 to b0</th></tr><tr><td>41H(A)</td><td>4DH(M)</td></tr><tr><td>4EH(N)</td><td>43H(I)</td></tr><tr><td>20H(SP)</td><td>20H(SP)</td></tr><tr><td>20H(SP)</td><td>20H(SP)</td></tr><tr><td>51H(Q)</td><td>2EH(.)</td></tr><tr><td>47H(G)</td><td>50H(P)</td></tr></table></td><td>S (Error)</td><td>QS</td></tr>
</table>

Remark

*3 : Extensions are shown in Table12.21.

Table12.21 Extension name

SDn	SDn+1		Extension name	File type
Higher 8 bits	Lower 8 bits	Higher 8 bits		
51H	50H	41H	QPA	Parameters
51H	50H	47H	QPG	Sequence program
51H	43H	44H	QCD	Device comment

Table12.20 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD5
SD6
SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>Error common information</td><td>Error common information</td><td>3) Time (value set)
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD5</td><td>Time : 1μs units (0 to 999μs)</td></tr><tr><td>SD6</td><td>Time : 1ms units (0 to 65535ms)</td></tr><tr><td>SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>(Empty)</td></tr></table>4) Program error location
<table><tr><th>Number</th><th colspan="2">Meaning</th></tr><tr><td>SD5
SD6
SD7
SD8</td><td colspan="2">File name
(ASCII code: 8 characters)</td></tr><tr><td>SD9</td><td>Extension ∗3</td><td>2EH(.)</td></tr><tr><td>SD10</td><td colspan="2">(ASCII code: 3 characters)</td></tr><tr><td>SD11</td><td colspan="2">(Empty)</td></tr><tr><td>SD12</td><td colspan="2">Block No.∗4</td></tr><tr><td>SD13</td><td colspan="2">Step No. ∗4</td></tr><tr><td>SD14</td><td colspan="2">Sequence step No. (L)</td></tr><tr><td>SD15</td><td colspan="2">Sequence step No. (H)</td></tr></table>*4: "0" is stored to the block number and the step number.
9) CC-Link Safety information
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD5</td><td>Error classification∗5</td></tr><tr><td>SD6</td><td>Error item∗5</td></tr><tr><td>SD7</td><td>Link ID</td></tr><tr><td>SD8</td><td>Station No.</td></tr><tr><td>SD9</td><td>System area 1</td></tr><tr><td>SD10</td><td>System area 2</td></tr><tr><td>SD11</td><td>System area 3</td></tr><tr><td>SD12</td><td>System area 4</td></tr><tr><td>SD13</td><td>System area 5</td></tr><tr><td>SD14</td><td>System area 6</td></tr><tr><td>SD15</td><td>System area 7</td></tr></table>*5: For details on the error classification and error item, refer to the manuals for the connected devices.
10) Module No./Station No.
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD5</td><td>Slot No.</td></tr><tr><td>SD6</td><td>I/O No.</td></tr><tr><td>SD7</td><td>Station No.</td></tr><tr><td>SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>(Empty)</td></tr></table>11) CC-Link IE Field Network information
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD5</td><td>Error classification∗6</td></tr><tr><td>SD6</td><td>Error item∗6</td></tr><tr><td>SD7</td><td>Network No.</td></tr><tr><td>SD8</td><td>Station No.</td></tr><tr><td>SD9</td><td>System area 1</td></tr><tr><td>SD10</td><td>System area 2</td></tr><tr><td>SD11</td><td>System area 3</td></tr><tr><td>SD12</td><td>System area 4</td></tr><tr><td>SD13</td><td>System area 5</td></tr><tr><td>SD14</td><td>System area 6</td></tr><tr><td>SD15</td><td>System area 7</td></tr></table>*6: For details on the error classification and error item, refer to the manuals for the connected devices.
If the QSCPU is connected, "350" is stored as the error classification and the error code of the transfer target is stored as the error item.</td><td>S (Error)</td><td>QS</td></tr>
</table>

Table12.20 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD16
SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>Error individual information</td><td>Error individual information</td><td>
• Individual information corresponding to error codes (SD0) is stored here.
• There are the following ten different types of information are stored.

2) File name/Drive name
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Drive</td></tr>
<tr><td>SD17
SD18
SD19
SD20</td><td>File name
(ASCII code: 8 characters)</td></tr>
<tr><td>SD21</td><td>Extension ∗3 2EH(.)</td></tr>
<tr><td>SD22</td><td>(ASCII code: 3 characters)</td></tr>
<tr><td>SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr>
</table>
(Example) File name = MAIN.QPG
<table>
<tr><th>b15 to b8</th><th>b7 to b0</th></tr>
<tr><td>41H(A)</td><td>4DH(M)</td></tr>
<tr><td>4EH(N)</td><td>43H(I)</td></tr>
<tr><td>20H(SP)</td><td>20H(SP)</td></tr>
<tr><td>20H(SP)</td><td>20H(SP)</td></tr>
<tr><td>51H(Q)</td><td>2EH(.)</td></tr>
<tr><td>47H(G)</td><td>50H(P)</td></tr>
</table>
3) Time (value Actually measured)
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Time : 1μs units (0 to 999μs)</td></tr>
<tr><td>SD17</td><td>Time : 1ms units (0 to 65535ms)</td></tr>
<tr><td>SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr>
</table>
4) Program error location
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16
SD17
SD18
SD19</td><td>File name
(ASCII code: 8 characters)</td></tr>
<tr><td>SD20</td><td>Extension ∗3 2EH(.)</td></tr>
<tr><td>SD21</td><td>(ASCII code: 3 characters)</td></tr>
<tr><td>SD22</td><td>(Empty)</td></tr>
<tr><td>SD23</td><td>Block No. ∗6</td></tr>
<tr><td>SD24</td><td>Step No. ∗6</td></tr>
<tr><td>SD25</td><td>Sequence step No. (L)</td></tr>
<tr><td>SD26</td><td>Sequence step No. (H)</td></tr>
</table>
*6: "0" is stored to the block number and the step number.
5) Parameter No.
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Parameter No.</td></tr>
<tr><td>SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr>
</table>
6) Annunciator number
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>No.</td></tr>
<tr><td>SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr>
</table>
9) Error information
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Error information 1</td></tr>
<tr><td>SD17</td><td>Error information 2</td></tr>
<tr><td>SD18</td><td>Error information 3</td></tr>
<tr><td>SD19</td><td>Error information 4</td></tr>
<tr><td>SD20</td><td>Error information 5</td></tr>
<tr><td>SD21</td><td>Error information 6</td></tr>
<tr><td>SD22</td><td>Error information 7</td></tr>
<tr><td>SD23</td><td>Error information 8</td></tr>
<tr><td>SD24</td><td>Error information 9</td></tr>
<tr><td>SD25</td><td>Error information 10</td></tr>
<tr><td>SD26</td><td>Error information 11</td></tr>
</table>
</td><td>S (Error)</td><td>QS</td></tr>
</table>

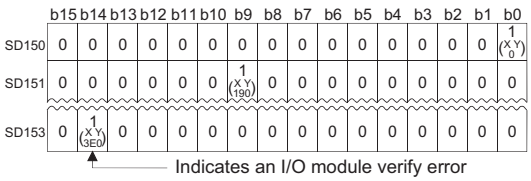
Table12.20 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD16
SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>Error individual information</td><td>Error individual information</td><td>10) CC-Link Safety information
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Number of items for individual information</td></tr>
<tr><td>SD17</td><td>individual information 1</td></tr>
<tr><td>SD18</td><td>individual information 2</td></tr>
<tr><td>SD19</td><td>individual information 3</td></tr>
<tr><td>SD20</td><td>individual information 4</td></tr>
<tr><td>SD21</td><td>individual information 5</td></tr>
<tr><td>SD22</td><td>individual information 6</td></tr>
<tr><td>SD23</td><td>individual information 7</td></tr>
<tr><td>SD24</td><td>individual information 8</td></tr>
<tr><td>SD25</td><td>individual information 9</td></tr>
<tr><td>SD26</td><td>individual information 10</td></tr>
</table>
11) Program abort information
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Abort code *5</td></tr>
<tr><td>SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr>
</table>
*5 : The specified abort code is stored by the S.QSABORT instruction.
12) File diagnostics information
<table>
<tr><th>Number</th><th colspan="2">Meaning</th></tr>
<tr><td>SD16</td><td>Error information</td><td>Drive No.</td></tr>
<tr><td>SD17
SD18
SD19
SD20</td><td colspan="2">File name
(ASCII code: 8 characters)</td></tr>
<tr><td>SD21</td><td>Extension *3</td><td>2EH(.)</td></tr>
<tr><td>SD22</td><td colspan="2">(ASCII code: 3 characters)</td></tr>
<tr><td>SD23
SD24</td><td colspan="2">Error information 2</td></tr>
<tr><td>SD25
SD26</td><td colspan="2">Error information 3</td></tr>
</table>
(Example) File name = MAIN.QPG
<table>
<tr><th colspan="2">b15 to b8 b7 to b0</th></tr>
<tr><td>41H(A)</td><td>4DH(M)</td></tr>
<tr><td>4EH(N)</td><td>43H(I)</td></tr>
<tr><td>20H(SP)</td><td>20H(SP)</td></tr>
<tr><td>20H(SP)</td><td>20H(SP)</td></tr>
<tr><td>51H(Q)</td><td>2EH(.)</td></tr>
<tr><td>47H(G)</td><td>50H(P)</td></tr>
</table>
13) CC-Link IE Field Network information
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Number of items for individual information</td></tr>
<tr><td>SD17</td><td>individual information 1</td></tr>
<tr><td>SD18</td><td>individual information 2</td></tr>
<tr><td>SD19</td><td>individual information 3</td></tr>
<tr><td>SD20</td><td>individual information 4</td></tr>
<tr><td>SD21</td><td>individual information 5</td></tr>
<tr><td>SD22</td><td>individual information 6</td></tr>
<tr><td>SD23</td><td>individual information 7</td></tr>
<tr><td>SD24</td><td>individual information 8</td></tr>
<tr><td>SD25</td><td>individual information 9</td></tr>
<tr><td>SD26</td><td>individual information 10</td></tr>
</table></td><td>S (Error)</td><td>QS</td></tr>
</table>

Table12.20 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD27	Diagnostics error CPU identifier	CPU identifier (CPU A/CPU B)	• The identifier of the CPU module that issued the diagnostics error (SD0 to SD26) is stored. 0001H : CPU A 0002H : CPU B	S (Error)	
SD50	Error reset	Error code to be cleared	• An error code to be cleared is stored.	U	
SD51	Battery low latch	Bit pattern indicating where battery voltage drop occurred	• All corresponding bits go 1(ON) when battery voltage drops. • Subsequently, these remain 1(ON) even after battery voltage has been returned to normal. b15 to b1 b0 0 CPU module battery error	S (Error)	
SD52	Battery low	Bit pattern indicating where battery voltage drop occurred	• Same configuration as SD51 above • Turns to 0 (OFF) when the battery voltage returns to normal thereafter.	S (Error)	
SD53	AC DOWN detection	Number of times for AC DOWN detection	• Every time the input voltage falls to or below 85% (AC power) of the rating during calculation of the CPU module, the value is incremented by 1 and stored in BIN code.	S (Error)	
SD61	I/O module verify error number	I/O module verify error module number	• The lowest I/O number of the module where the I/O module verification error took place.	S (Error)	
SD62	Annunciator number	Annunciator number	• The first annunciator number (F number) to be detected is stored here.	S (Instruction execution)	QS
SD63	Number of annunciators	Number of annunciators	• Stores the number of annunciators searched.	S (Instruction execution)	
SD64 SD65 SD66 SD67 SD68 SD69 SD70 SD71 SD72 SD73 SD74 SD75 SD76 SD77 SD78 SD79	Table of detected annunciator numbers	Annunciator detection number	• When F goes ON due to OUT F or SET F, the F numbers which go progressively ON from SD64 through SD79 are registered. • The F numbers turned OFF by RST F are deleted from SD64 - SD79, and the F numbers stored after the deleted F numbers are shifted to the preceding registers. After 16 annunciators have been detected, detection of the 17th will not be stored from SD64 through SD79. SET SET SET RST SET SET SET SET SET SET SET RST F50 F25 F99 F25 F15 F70 F65 F38 F110 F151 F210 F50 SD62 0 50 50 50 50 50 50 50 50 50 50 50 99 (Number detected) SD63 0 1 2 3 2 3 4 5 6 7 8 9 8 (Number of annunciators detected) SD64 0 50 50 50 50 50 50 50 50 50 50 50 99 SD65 0 0 25 25 99 99 99 99 99 99 99 99 15 SD66 0 0 0 99 0 15 15 15 15 15 15 15 70 SD67 0 0 0 0 0 0 70 70 70 70 70 70 65 SD68 0 0 0 0 0 0 0 65 65 65 65 65 38 SD69 0 0 0 0 0 0 0 0 38 38 38 38 110 SD70 0 0 0 0 0 0 0 0 0 110 110 110 151 SD71 0 0 0 0 0 0 0 0 0 0 151 151 210 SD72 0 0 0 0 0 0 0 0 0 0 0 210 0 SD73 0 0 0 0 0 0 0 0 0 0 0 0 0 SD74 0 0 0 0 0 0 0 0 0 0 0 0 0 SD75 0 0 0 0 0 0 0 0 0 0 0 0 0 SD76 0 0 0 0 0 0 0 0 0 0 0 0 0 SD77 0 0 0 0 0 0 0 0 0 0 0 0 0 SD78 0 0 0 0 0 0 0 0 0 0 0 0 0 SD79 0 0 0 0 0 0 0 0 0 0 0 0 0 (Number detected)	S (Instruction execution)	

Table12.20 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD81</td><td>Cause of error</td><td>Cause of error</td><td>• When a continuation error occurs, the corresponding bits are all set to ON.
• Canceling the error, starting up the safety programmable controller power or canceling the safety CPU module reset after eliminating the cause of the error makes the bits go OFF.
<table><tr><th>Bit No.</th><th>Name of the cause</th></tr><tr><td>0</td><td>Instantaneous power failure</td></tr><tr><td>1</td><td>Battery low</td></tr><tr><td>2</td><td>Standard ROM write count excess</td></tr><tr><td>3</td><td>TEST MODE continuous RUN tolerance timeout</td></tr><tr><td>4</td><td>Scan timeout</td></tr><tr><td>5</td><td>Annunciator ON</td></tr><tr><td>6</td><td>Safety remote station detection error
Safety communication target station detection error</td></tr><tr><td>7</td><td>Safety remote station product information mismatch
Safety station product information mismatch</td></tr><tr><td>8</td><td>Initial monitoring timeout error
Safety monitoring timeout error
Error monitoring timeout error</td></tr><tr><td>9</td><td>Safety remote station data split error
Safety remote command error
Safety remote station link ID error
Safety remote station running number error
Safety remote station reception data error
Safety station reception data error
Safety connection setting error</td></tr><tr><td>10 to 15</td><td>Empty (fixed to 0)</td></tr></table></td><td>S (Error)</td><td>QS</td></tr>
<tr><td>SD150
SD151
SD152
SD153</td><td>I/O module verify error</td><td>Bit pattern, in units of 16 points, indicating the modules with verify errors.
0: No I/O verify errors
1: I/O verify error present</td><td>• When an I/O module whose information is different from the one registered at power-on is detected, the corresponding I/O module number (in units of 16 points) is stored. (The I/O module number set in parameter is stored if it is set.)
 

If a module has more than 16 I/O points, the I/O module number (in units of 16 points) corresponds to the start 16 I/O points turns on.
(Example) When a module with 64 I/O points is mounted in slot 0, only b0 turns on when an error is detected.
• Not cleared even if the blown fuse is replaced with a new one. This flag is cleared by error resetting operation.</td><td>S (Error)</td><td>QS</td></tr>
</table>

(2) System information

Table12.22 Special register

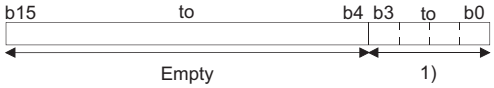
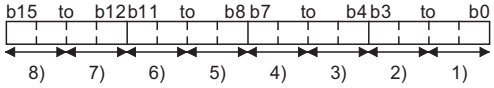
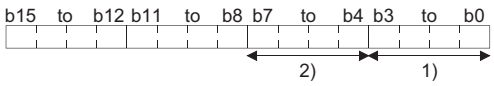
Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD200	Status of switch	Status of CPU switch	• The CPU switch status is stored in the following format.  1): CPU switch status 0: RUN 1: STOP 2: RESET	S (Every END)	QS
SD201	LED status	Status of CPU-LED	• The following bit patterns are used to store the statuses of the LEDs on the CPU module: • 0 is off, 1 is on, and 2 is flashing.  1): RUN 5): Empty 2): ERR. 6): Empty 3): USER 7): TEST 4): BAT. 8): Empty	S (Status change)	
SD203	Operating status of CPU	Operating status of CPU	• The CPU operating status is stored as indicated in the following figure:  1): Operating status of CPU 0: RUN 2: STOP 2): STOP cause 0: Instruction in remote operation program from RUN/STOP/RESET switch 1: Remote contact 2: Remote operation from GX Developer 4: Error 5: SAFETY MODE (wait-for-restart) 6: "Write to PLC" was executed. Note stores the above-mentioned factors from the smallest number in priority to the largest one. However, "4:error" is treated as the highest priority.	S (Every END)	

Table12.22 Special register

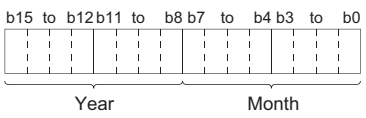
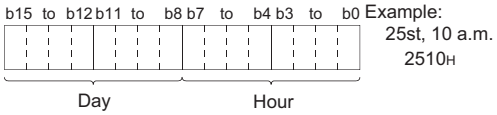
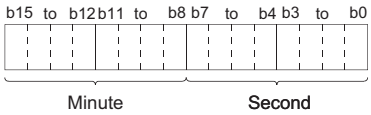
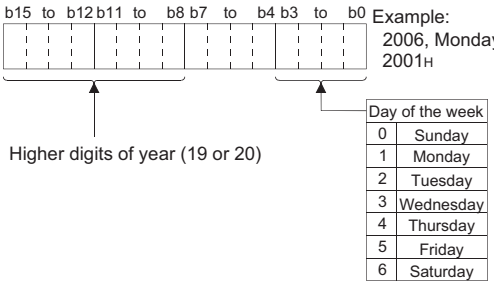
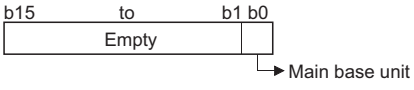
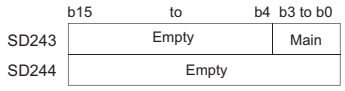
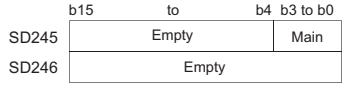
Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD210	Clock data	Clock data (year, month)	• The year (last two digits) and month are stored as BCD code at SD210 as shown below: 	S (Request)/U	QS
SD211	Clock data	Clock data (day, hour)	• The day and hour are stored as BCD code at SD211 as shown below: 		
SD212	Clock data	Clock data (minute, second)	• The minutes and seconds (after the hour) are stored as BCD code at SD212 as shown below: 		
SD213	Clock data	Clock data (later digits of year, day of week)	• Stores the year (two digits) and the day of the week in SD213 in the BCD code format as shown below. 		
SD232 SD233	ROM write count	ROM write count up to now	• Store the ROM write count up to now.	S (Writing to ROM)	
SD240	Base mode	0: Automatic mode	• Stores the base mode. (0 fixed)	S (Initial)	
SD241	Extension stage number	0: Main base only	• Stores the maximum number of the extension bases being installed. (0 fixed)	S (Initial)	

Table12.22 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD242	Installed Q base presence/ absence	Base type differentiation 0: Base not installed 1: QS**B is installed		S (Initial)	QS
SD243 SD244	No. of base slots (Operation status)	No. of base slots	 • As shown above, each area stores the number of slots being installed. (Number of set slots when parameter setting has been made)	S (Initial)	
SD245 SD246	No. of base slots (Mounting status)	No. of base slots	 • As shown above, each area stores the numbers of module-mounted slots of the base unit (actual number of slots of the installed base unit).	S (Initial)	
SD250	Loaded maximum I/O	Loaded maximum I/O No.	• The upper 2 digits of the final I/O number plus 1 of the modules loaded are stored as BIN values.	S (Initial)	
SD254	CC-Link IE Controller Network, MELSECNET /H information	Number of modules mounted	• Indicates the number of mounted CC-Link IE Controller Network or MELSECNET/H modules.	S (Initial)	
SD255		I/O number	• Indicates the I/O number of mounted CC-Link IE Controller Network or MELSECNET/H module.		
SD256		Network number	• Indicates the network number of mounted CC-Link IE Controller Network or MELSECNET/H module.		
SD257		Group number	• Indicates the group number of mounted CC-Link IE Controller Network or MELSECNET/H module.		
SD258		Station number	• Indicates the station number of mounted CC-Link IE Controller Network or MELSECNET/H module.		
SD290	Device assignment (Same as the parameter setting)	Number of points assigned for X	• Stores the number of points currently set for X devices	S (Initial)	
SD291		Number of points assigned for Y	• Stores the number of points currently set for Y devices		
SD292		Number of points assigned for M	• Stores the number of points currently set for M devices		
SD294		Number of points assigned for B	• Stores the number of points currently set for B devices		
SD295		Number of points assigned for F	• Stores the number of points currently set for F devices		
SD296		Number of points assigned for SB	• Stores the number of points currently set for SB devices		
SD297		Number of points assigned for V	• Stores the number of points currently set for V devices		
SD299		Number of points assigned for T	• Stores the number of points currently set for T devices		
SD300		Number of points assigned for ST	• Stores the number of points currently set for ST devices		
SD301		Number of points assigned for C	• Stores the number of points currently set for C devices		
SD302		Number of points assigned for D	• Stores the number of points currently set for D devices		
SD303		Number of points assigned for W	• Stores the number of points currently set for W devices		
SD304		Number of points assigned for SW	• Stores the number of points currently set for SW devices		

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD340	Ethernet information	Number of modules mounted	• Indicates the number of mounted Ethernet modules.	S (Initial)	QS
SD341		I/O number	• Indicates the I/O number of mounted Ethernet module.		
SD342		Network number	• Indicates the network number of mounted Ethernet module.		
SD343		Group number	• Indicates the group number of mounted Ethernet module.		
SD344		Station number	• Indicates the station number of mounted Ethernet module.		

(3) System clocks/counters

Table12.23 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD412	1 second counter	Number of counts in 1-second units	• Following programmable controller CPU module RUN, 1 is added each second • Count repeats from 0 to 32767 to -32768 to 0	S (Status change)	QS
SD414	2n second clock setting	2n second clock units	• Stores value n of 2n second clock (Default is 30) • Setting can be made between 1 to 32767	U	
SD420	Scan counter	Number of counts in each scan	• Incremented by 1 for each scan execution after the CPU module is set to RUN. • Count repeats from 0 to 32767 to -32768 to 0	S (Every END)	

(4) Scan information

Table12.24 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD520	Current scan time	Current scan time (in 1 ms units)	• The current scan time is stored into SD520 and SD521. (Measurement is made in 100 μs units.) SD520: Stores the value of ms. (Storage range: 0 to 6553) SD521: Stores the value of μs. (Storage range: 0 to 900) (Example) When the current scan time is 23.6ms, the following values are stored. SD520 = 23 SD521 = 600 • The accuracy of processing time of scantime is ±0.1ms.	S (Every END)	QS
SD521		Current scan time (in 100 μs units)			
SD524	Minimum scan time	Minimum scan time (in 1 ms units)	• Stores the minimum value of the scan time into SD524 and SD525. (Measurement is made in 100 μs units.) SD524: Stores the ms place. (Storage range: 0 to 6553) SD525: Stores the μs place. (Storage range: 0 to 900) • The accuracy of processing time of scantime is ±0.1ms.	S (Every END)	
SD525		Minimum scan time (in 100 μs units)			
SD526	Maximum scan time	Maximum scan time (in 1 ms units)	• Stores the maximum value of the scan time into SD526 and SD527. (Measurement is made in 100 μs units.) SD526: Stores the ms place. (Storage range: 0 to 6553) SD527: Stores the μs place. (Storage range: 0 to 900) • The accuracy of processing time of scantime is ±0.1ms.	S (Every END)	
SD527		Maximum scan time (in 100 μs units)			
SD540	END processing time	END processing time (in 1 ms units)	• Stores the time from when the scan program ends until the next scan starts into SD540 and SD541. (Measurement is made in 100 μs units.) SD540: Stores the ms place. (Storage range: 0 to 6553) SD541: Stores the μs place. (Storage range: 0 to 900) • The accuracy of END processing time is ±0.1ms.	S (Every END)	
SD541		END processing time (in 100 μs units)			
SD542	Constant scan wait time	Constant scan wait time (in 1 ms units)	• Stores the wait time for constant scan setting into SD542 and SD543. (Measurement is made in 100 μs units.) SD542: Stores the ms place. (Storage range: 0 to 6553) SD543: Stores the μs place. (Storage range: 0 to 900) • The accuracy of constant scan wait time is ±0.1ms.	S (Every END)	
SD543		Constant scan wait time (in 100 μs units)			
SD548	Scan program execution time	Scan program execution time (in 1 ms units)	• Stores the execution time of a scan program during one scan into SD548 and SD549. (Measurement is made in 100 μs units.) SD548: Stores the ms place. (Storage range: 0 to 6553) SD549: Stores the μs place. (Storage range: 0 to 900) • Stored every scan. • The accuracy of scan program execution time is ±0.1ms.	S (Every END)	
SD549		Scan program execution time (in 100 μs units)			

(5) Safety CPU

Table12.25 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD560	Safety CPU operation mode	Safety CPU operation mode	• Stores the safety CPU operation mode. b15 to b2 b1 b0 Empty 00 : SAFETY MODE 01 : TEST MODE 10 : SAFETY MODE (Wait-for-restart)	S (Status change)	QS
SD561 SD562	TEST MODE continuous RUN time	TEST MODE continuous RUN time (seconds)	• Stores the TEST MODE continuous RUN time. (Measured in seconds) (RUN time in TEST MODE. Start measurement when STOP & RUN (Time when operation is STOP is not included.)) • Stores the measurement valve with the range of 1 to 2147483647.	S (Every END)	

(6) Memory

Table12.26 Special register

Number	Name	Meaning	Explanation	Set by (When set)	Corresponding CPU
SD620	Memory type	Memory type	• Indicates the type of built-in memory. b15 to b8 b7 to b4 b3 to b0 0 0 Drive 4 (Standard ROM) Fixed at "3 (FLASH ROM)"	S (Initial)	QS
SD623	Drive 4 (ROM) capacity	Drive 4 capacity	• Drive 4 capacity is stored in 1K byte units.	S (Initial)	

(7) CC-Link Safety

Table12.27 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD1000 to SD1003</td><td>Safety remote station specification (CC-Link Safety master module 1)</td><td>0: No safety remote station specification
1: Safety remote station specification</td><td>• The specified status of safety remote station is stored.
• "0" is stored for the standard remote station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1000</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1001</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1002</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1003</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Initial)</td><td rowspan="4">QS</td></tr>
<tr><td>SD1004 to SD1007</td><td>Safety refresh communication status of each safety remote station (CC-Link Safety master module 1)</td><td>0: Normal communication, reserved station, unused station, standard remote station on CC-Link Safety
1: Safety station communication error</td><td>• The refresh communication status of safety remote station is stored.
• "0" is stored for the standard remote station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1004</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1005</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1006</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1007</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Status change)</td></tr>
<tr><td>SD1008 to SD1071</td><td>Safety station communication status (CC-Link Safety master module 1)</td><td>The status of communication with safety remote station is stored.</td><td>• The status of communication with each safety remote station is stored.
• SD1008: Station number 1 to SD1071: Station number 64 (0 fixed in the case of standard remote station, reserved station specified, or without connection)
0: At normal communication
10: At initial
20: During internal information access
30: Link error
8300: The safety communications - Safety remote station detection error
8310: The safety communications - Product information mismatch
8320: The safety communications - Initial monitor timeout
8321: The safety communications - Safety monitor timeout
8322: The safety communications - Error monitor timeout
8330: The safety communications - Command error
8331: The safety communications - Data split number error
8332: The safety communications - Link ID error
8333: The safety communications - Running number error
8334: The safety communications - Received data error</td><td>S (Status change)</td></tr>
<tr><td>SD1072 to SD1075</td><td>Safety station interlock status (CC-Link Safety master module 1)</td><td>0: Interlock is not executed
1: During interlock</td><td>Bit corresponding to the station number turns 1 when the master station goes to the interlock status after the error was detected at the master station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1072</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1073</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1074</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1075</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Status change)</td></tr>
</table>

Table12.26 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD1076 to SD1079</td><td>Safety station interlock cancel request (CC-Link Safety master module 1)</td><td>0: I/O interlock of safety station on CC-Link Safety not released
1: I/O interlock of safety station on CC-Link Safety released</td><td>Cancel the I/O interlock of safety station by changing the bit of register from 0 to 1.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1076</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1077</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1078</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1079</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>U (Request)</td><td rowspan="4">QS</td></tr>
<tr><td>SD1200 to SD1203</td><td>Safety remote station specification (CC-Link Safety master module 2)</td><td>0: No safety remote station specification
1: Safety remote station specification</td><td>• The specified status of safety remote station is stored.
• "0" is stored for the standard remote station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1200</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1201</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1202</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1203</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Initial)</td></tr>
<tr><td>SD1204 to SD1207</td><td>Safety refresh communication status of each safety remote station (CC-Link Safety master module 2)</td><td>0: Normal communication, reserved station, unused station, standard remote station on CC-Link Safety
1: Safety station communication error</td><td>• The refresh communication status of safety remote station is stored.
• "0" is stored for the standard remote station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1204</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1205</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1206</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1207</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Status change)</td></tr>
<tr><td>SD1208 to SD1271</td><td>Safety station communication status (CC-Link Safety master module 2)</td><td>The status of communication with safety station is stored.</td><td>• The status of communication with each safety remote station is stored.
• SD1208: Station number 1 to SD1271: Station number 64 (0 fixed in the case of standard remote station, reserved station specified, or without connection)
0: At normal communication
10: At initial
20: During internal information access
30: Link error
8300: The safety communications - Safety remote station detection error
8310: The safety communications - Product information mismatch
8320: The safety communications - Initial monitor timeout
8321: The safety communications - Safety monitor timeout
8322: The safety communications - Error monitor timeout
8330: The safety communications - Command error
8331: The safety communications - Data split number error
8332: The safety communications - Link ID error
8333: The safety communications - Running number error
8334: The safety communications - Received data error</td><td>S (Status change)</td></tr>
</table>

Table12.26 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD1272 to SD1275</td><td>Safety station interlock status (CC-Link Safety master module 2)</td><td>0: Interlock is not executed
1: During interlock</td><td>Bit corresponding to the station number turns 1 when the master station goes to the interlock status after the error was detected at the master station.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1272</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1273</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1274</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1275</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>S (Status change)</td><td rowspan="2">QS</td></tr>
<tr><td>SD1276 to SD1279</td><td>Safety station interlock cancel request (CC-Link Safety master module 2)</td><td>0: I/O interlock of safety station on CC-Link Safety not released
1: I/O interlock of safety station on CC-Link Safety released</td><td>Cancel the I/O interlock of safety station by changing the bit of register from 0 to 1.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b1</td><td>b0</td></tr><tr><td>SD1276</td><td>16</td><td>15</td><td>to</td><td>2</td><td>1</td></tr><tr><td>SD1277</td><td>32</td><td>31</td><td>to</td><td>18</td><td>17</td></tr><tr><td>SD1278</td><td>48</td><td>47</td><td>to</td><td>34</td><td>33</td></tr><tr><td>SD1279</td><td>64</td><td>63</td><td>to</td><td>50</td><td>49</td></tr></table>1 to 64 in the table indicate station numbers.</td><td>U (Request)</td></tr>
</table>

(8) CC-Link IE Field Network

Table12.27 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD1400 to SD1407</td><td>Setting status of safety communication with each station</td><td>0: Not set
1: Set</td><td>The safety communication setting status for each station is stored.
For standard stations, "0" is stored.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SD1400</td><td>16</td><td>15</td><td>to</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SD1401</td><td>32</td><td>31</td><td>to</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SD1402</td><td>48</td><td>47</td><td>to</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SD1403</td><td>64</td><td>63</td><td>to</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SD1404</td><td>80</td><td>79</td><td>to</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SD1405</td><td>96</td><td>95</td><td>to</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SD1406</td><td>112</td><td>111</td><td>to</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SD1407</td><td>-</td><td>-</td><td>to</td><td>-</td><td>-</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table>1 to 120 in the table indicate station numbers.
-: Fixed to "0"</td><td>S (Initial)</td><td>QS*1</td></tr>
<tr><td>SD1420 to SD1427</td><td>Safety refresh communication status of each safety station</td><td>0: Normal, Reserved station specified, unused station, standard station on CC-Link IE Field Network, or own station
1: Communication error of safety station on CC-Link IE Field Network</td><td>The communication status with each safety station is stored.
For standard stations, "0" is stored.
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SD1420</td><td>16</td><td>15</td><td>to</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SD1421</td><td>32</td><td>31</td><td>to</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SD1422</td><td>48</td><td>47</td><td>to</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SD1423</td><td>64</td><td>63</td><td>to</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SD1424</td><td>80</td><td>79</td><td>to</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SD1425</td><td>96</td><td>95</td><td>to</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SD1426</td><td>112</td><td>111</td><td>to</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SD1427</td><td>-</td><td>-</td><td>to</td><td>-</td><td>-</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table>1 to 120 in the table indicate station numbers.
-: Fixed to "0"</td><td>S (Status change)</td><td>QS*1</td></tr>
<tr><td>SD1440 to SD1560</td><td>Safety communication status of each safety station</td><td>Stores the communication status with each safety station.</td><td>• The communication status with each safety station is stored.
• SD1440: Station number 0 to SD1560: Station number 120
• (For reserved stations, unused stations, standard stations, or own station, "0" is stored.)
0: Safety refresh communication
10 to 15: Safety initial communication
30: Communication error or interlocked
8400: Safety communication target station detection error
8420, 8421, 8422, 8423, 8424, 8425: Safety monitoring timeout error
8430, 8431, 8432: Safety station reception data error
8440: Safety connection setting error</td><td>S (Status change)</td><td>QS*1</td></tr>
</table>

Table12.28 Special register

<table>
<tr><th>Number</th><th>Name</th><th>Meaning</th><th>Explanation</th><th>Set by (When set)</th><th>Corresponding CPU</th></tr>
<tr><td>SD1700 to SD1707</td><td>Safety station interlock status</td><td>0: Not interlocked
1: Interlocked</td><td>• When an error is detected and an interlock is activated, the bit corresponding to the error station turns to "1".
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SD1700</td><td>16</td><td>15</td><td>to</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SD1701</td><td>32</td><td>31</td><td>to</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SD1702</td><td>48</td><td>47</td><td>to</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SD1703</td><td>64</td><td>63</td><td>to</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SD1704</td><td>80</td><td>79</td><td>to</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SD1705</td><td>96</td><td>95</td><td>to</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SD1706</td><td>112</td><td>111</td><td>to</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SD1707</td><td>-</td><td>-</td><td>to</td><td>-</td><td>-</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table>1 to 120 in the table indicate station numbers.
-: Fixed to "0"</td><td>S (Status change)</td><td>QS*1</td></tr>
<tr><td>SD1720 to SD1727</td><td>Safety station interlock release request</td><td>0: I/O interlock of safety station on CC-Link IE Field Network not released
1: I/O interlock of safety station on CC-Link IE Field Network released</td><td>• The interlock status of a safety station is released when the corresponding bit in this register is changed from "0" to "1".
<table><tr><td></td><td>b15</td><td>b14</td><td>to</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SD1720</td><td>16</td><td>15</td><td>to</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SD1721</td><td>32</td><td>31</td><td>to</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SD1722</td><td>48</td><td>47</td><td>to</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SD1723</td><td>64</td><td>63</td><td>to</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SD1724</td><td>80</td><td>79</td><td>to</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SD1725</td><td>96</td><td>95</td><td>to</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SD1726</td><td>112</td><td>111</td><td>to</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SD1727</td><td>-</td><td>-</td><td>to</td><td>-</td><td>-</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table>1 to 120 in the table indicate station numbers.
-: Fixed to "0"</td><td>U (Request)</td><td>QS*1</td></tr>
</table>

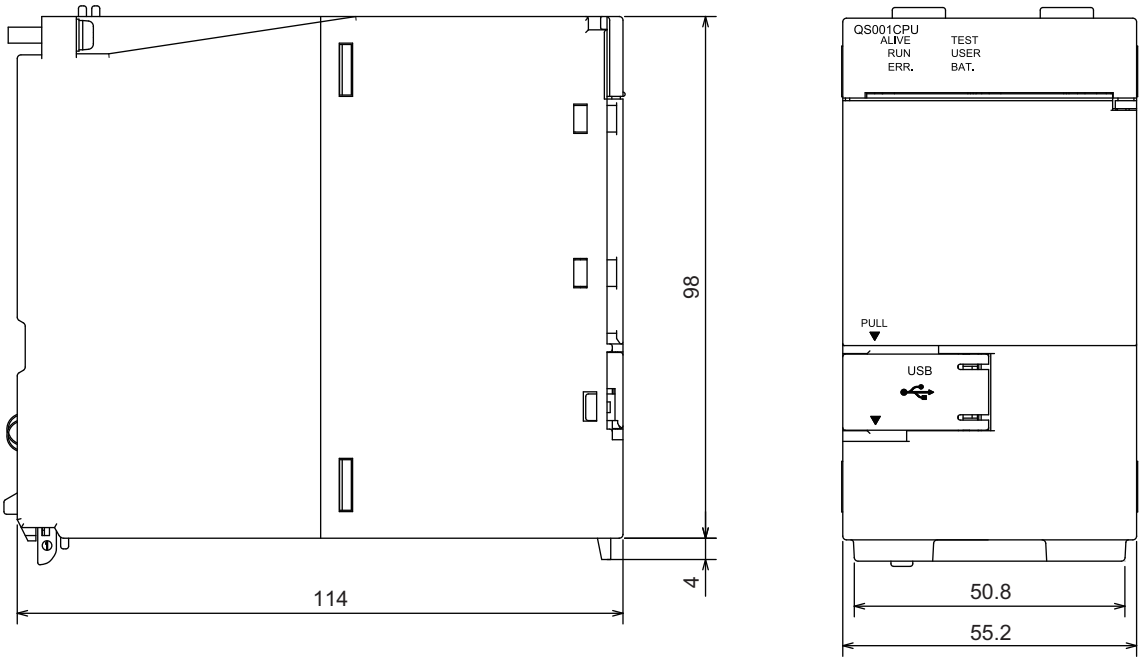
* 1: This applies when the serial number (first five digits) of the CPU module is "13042" or later.

APPENDICES

Appendix 1 External Dimensions

Appendix 1.1 CPU module

(1) QS001CPU

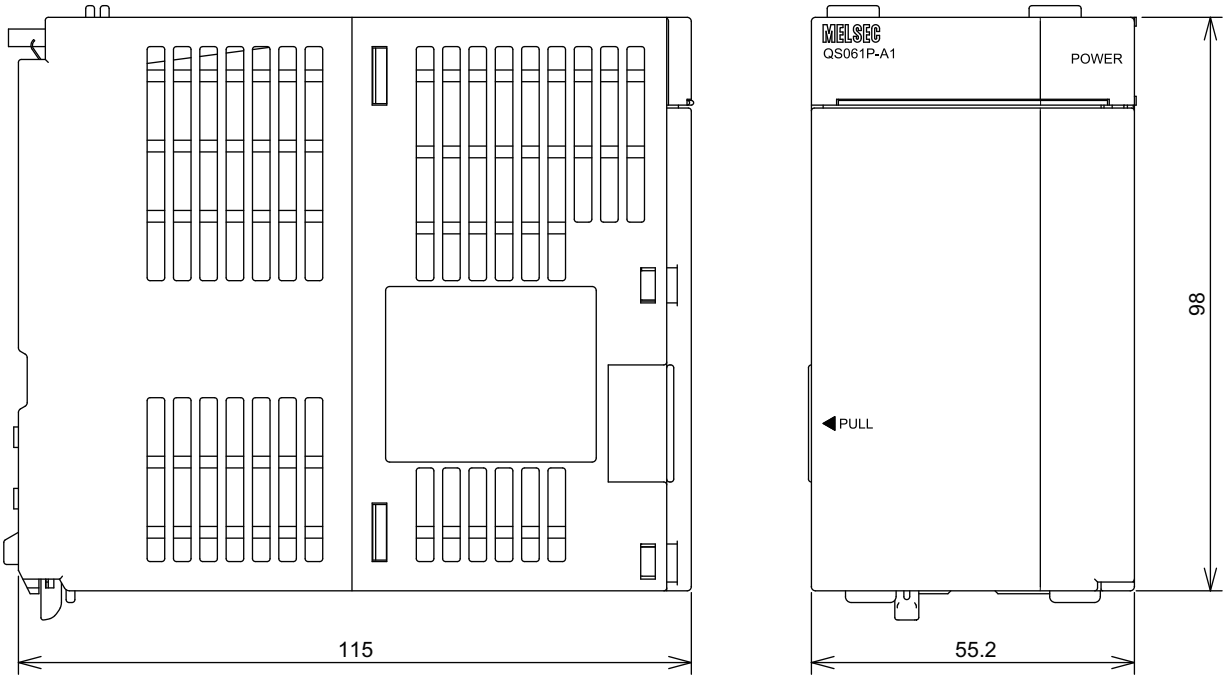


Unit : mm

Figure App.1 QS001CPU

Appendix 1.2 Power supply module

(1) QS061P-A1,QS061P-A2

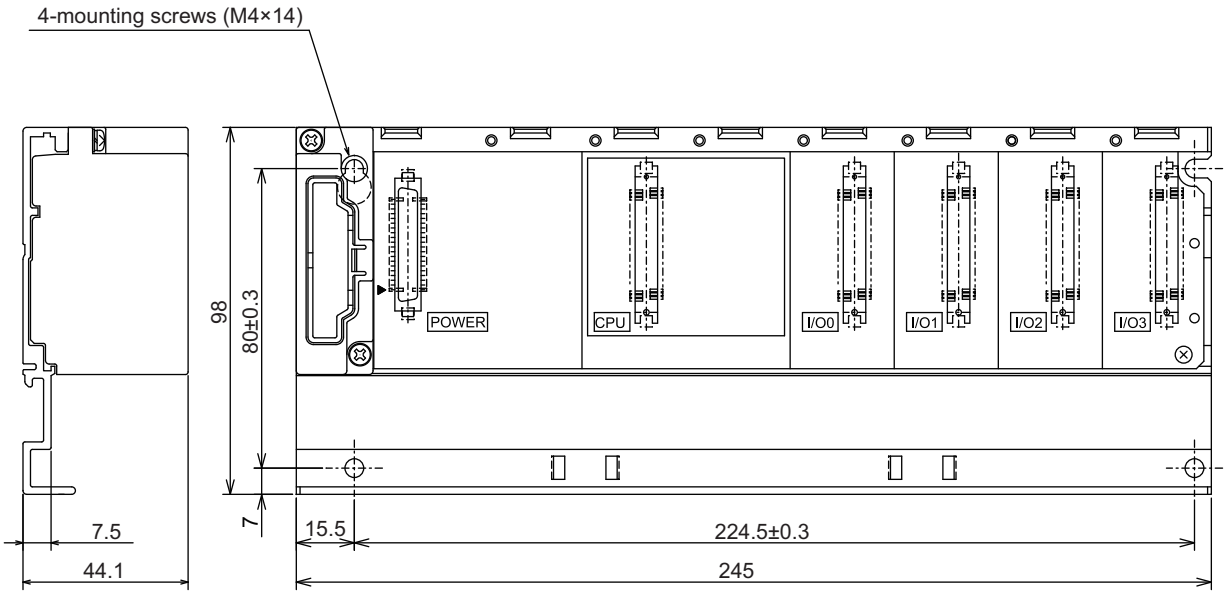


Unit : mm

Figure App.2 QS061P-A1,QS061P-A2

Appendix 1.3 Main base unit

(1) QS034B



Unit : mm

Figure App.3 QS034B

Appendix 2 Safety CPU Module Upgrade

(1) Additional functions and availability of the functions according to the version of GX Developer

TableApp.1 Additional functions and availability of the functions according to the version of GX Developer

New function	Compatible function version	Compatible serial No.	Compatible GX Developer
Response performance enhancement(☞CC-Link Safety System Master Module User's Manual)	A	10032 or later	Version 8.65T or later
CC-Link IE Controller Network compatibility (☞MELSEC-Q CC-Link IE Controller Network Reference Manual)			
MELSECNET/H transient transmission function (☞Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network))			
Ethernet (☞Q Corresponding Ethernet Interface Module User's Manual (Basic)), (☞MELSEC-Q/L Ethernet Interface Module User's Manual (Application))			
Dedicated instructions (☞QSCPU User's Manual (Function Explanation, Program Fundamentals)), (☞MELSEC-Q CC-Link IE Controller Network Reference Manual), (☞Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network)), (☞Q Corresponding Ethernet Interface Module User's Manual (Basic)), (☞MELSEC-Q/L Ethernet Interface Module User's Manual (Application))			
MC protocol(☞MELSEC Communication Protocol Reference Manual)			
Clock data change function using the special relay and special register (☞QSCPU User's Manual (Function Explanation, Program Fundamentals))			
Remote password setting function (☞QSCPU User's Manual (Function Explanation, Program Fundamentals))			
Safety FB Version2 (☞QSCPU Programming Manual (Safety FB))		11042 or later	Version 8.82L or later
CC-Link IE Field Network (☞MELSEC-QS CC-Link IE Field Network Master/Local Module User's Manual)		13042 or later	Version 8.98C or later
Access range expansion of the safety CPU module (☞QSCPU User's Manual (Function Explanation, Program Fundamentals))			

New function	Compatible function version	Compatible serial No.	Compatible GX Developer
Increasing of the number of refresh parameter settings for CC-Link IE Controller Network (☞MELSEC-Q CC-Link IE Controller Network Reference Manual)	A	14052 or later	Version 8.107M or later

Appendix 3 Precautions for Battery Transportation

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

(1) Controlled models

The batteries for the QS Series CPU module are classified as shown in TableApp.2

TableApp.2 Models subject to transportation regulations

Product name	Model	Product supply status	Classification for transportation
Q series battery	Q6BAT	Lithium battery	Dangerous goods

(2) Transport guidelines

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

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

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

Appendix 4.1 Disposal precautions

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

The symbol shown in Figure App.4 is printed on the batteries and packaging of batteries and devices with built-in batteries used for Mitsubishi Electric programmable controllers.

Figure App.4 Symbol

Note: This symbol is for EU member states only.
The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20 information for end-users and Annex II.

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

Appendix 4.2 Exportation precautions

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

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

(1) Labeling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states on September 26, 2008 or later, print the symbol shown in Figure App.4 on the batteries, devices, or their packaging.

(2) Explaining the symbol in the manuals

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

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

POINT

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

Memo

INDEX

WARRANTY

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

1. Limited Warranty and Product Support.

a. Mitsubishi Electric Company ("MELCO") warrants that for a period of eighteen (18) months after date of delivery from the point of manufacture or one year from date of Customer's purchase, whichever is less, Mitsubishi MELSEC Safety programmable logic controllers (the "Products") will be free from defects in material and workmanship.
b. At MELCO's option, for those Products MELCO determines are not as warranted, MELCO shall either repair or replace them or issue a credit or return the purchase price paid for them.
c. For this warranty to apply:
   (1) Customer shall give MELCO (i) notice of a warranty claim to MELCO and the authorized dealer or distributor from whom the Products were purchased, (ii) the notice shall describe in reasonable details the warranty problem, (iii) the notice shall be provided promptly and in no event later than thirty (30) days after the Customer knows or has reason to believe that Products are not as warranted, and (iv) in any event, the notice must given within the warranty period;
   (2) Customer shall cooperate with MELCO and MELCO's representatives in MELCO's investigation of the warranty claim, including preserving evidence of the claim and its causes, meaningfully responding to MELCO's questions and investigation of the problem, grant MELCO access to witnesses, personnel, documents, physical evidence and records concerning the warranty problem, and allow MELCO to examine and test the Products in question offsite or at the premises where they are installed or used; and
   (3) If MELCO requests, Customer shall remove Products it claims are defective and ship them to MELCO or MELCO's authorized representative for examination and, if found defective, for repair or replacement. The costs of removal, shipment to and from MELCO's designated examination point, and reinstallation of repaired or replaced Products shall be at Customer's expense.
   (4) If Customer requests and MELCO agrees to effect repairs onsite at any domestic or overseas location, the Customer will pay for the costs of sending repair personnel and shipping parts. MELCO is not responsible for any re-commissioning, maintenance, or testing on-site that involves repairs or replacing of the Products.
d. Repairs of Products located outside of Japan are accepted by MELCO's local authorized service facility centers ("FA Centers"). Terms and conditions on which each FA Center offers repair services for Products that are out of warranty or not covered by MELCO's limited warranty may vary.
e. Subject to availability of spare parts, MELCO will offer Product repair services for (7) years after each Product model or line is discontinued, at MELCO's or its FA Centers' rates and charges and standard terms in effect at the time of repair. MELCO usually produces and retains sufficient spare parts for repairs of its Products for a period of seven (7) years after production is discontinued.
f. MELCO generally announces discontinuation of Products through MELCO's Technical Bulletins. Products discontinued and repair parts for them may not be available after their production is discontinued.

2. Limits of Warranties.

a. MELCO does not warrant or guarantee the design, specify, manufacture, construction or installation of the materials, construction criteria, functionality, use, properties or other characteristics of the equipment, systems, or production lines into which the Products may be incorporated, including any safety, fail-safe and shut down systems using the Products.
b. MELCO is not responsible for determining the suitability of the Products for their intended purpose and use, including determining if the Products provide appropriate safety margins and redundancies for the applications, equipment or systems into which they are incorporated.
c. Customer acknowledges that qualified and experienced personnel are required to determine the suitability, application, design, construction and proper installation and integration of the Products. MELCO does not supply such personnel.
d. MELCO is not responsible for designing and conducting tests to determine that the Product functions appropriately and meets application standards and requirements as installed or incorporated into the end-user's equipment, production lines or systems.
e. MELCO does not warrant any Product:
   (1) repaired or altered by persons other than MELCO or its authorized engineers or FA Centers;
   (2) subjected to negligence, carelessness, accident, misuse, or damage;
   (3) improperly stored, handled, installed or maintained;
   (4) integrated or used in connection with improperly designed, incompatible or defective hardware or software;
   (5) that fails because consumable parts such as batteries, backlights, or fuses were not tested, serviced or replaced;
   (6) operated or used with equipment, production lines or systems that do not meet applicable and commensurate legal, safety and industry-accepted standards;
   (7) operated or used in abnormal applications;
   (8) installed, operated or used in contravention of instructions, precautions or warnings contained in MELCO's user, instruction and/or safety manuals, technical bulletins and guidelines for the Products;
   (9) used with obsolete technologies or technologies not fully tested and widely accepted and in use at the time of the Product's manufacture;
   (10) subjected to excessive heat or moisture, abnormal voltages, shock, excessive vibration, physical damage or other improper environment; or
   (11) damaged or malfunctioning due to Acts of God, fires, acts of vandals, criminals or terrorists, communication or power failures, or any other cause or failure that results from circumstances beyond MELCO's control.
f. All Product information and specifications contained on MELCO's website and in catalogs, manuals, or technical information materials provided by MELCO are subject to change without prior notice.

g. The Product information and statements contained on MELCO's website and in catalogs, manuals, technical bulletins or other materials provided by MELCO are provided as a guide for Customer's use. They do not constitute warranties and are not incorporated in the contract of sale for the Products.
h. These terms and conditions constitute the entire agreement between Customer and MELCO with respect to warranties, remedies and damages and supersede any other understandings, whether written or oral, between the parties. Customer expressly acknowledges that any representations or statements made by MELCO or others concerning the Products outside these terms are not part of the basis of the bargain between the parties and are not factored into the pricing of the Products.
i. THE WARRANTIES AND REMEDIES SET FORTH IN THESE TERMS ARE THE EXCLUSIVE AND ONLY WARRANTIES AND REMEDIES THAT APPLY TO THE PRODUCTS.
j. MELCO DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

3. Limits on Damages.

a. MELCO'S MAXIMUM CUMULATIVE LIABILITY BASED ON ANY CLAIMS FOR BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE, STRICT TORT LIABILITY OR OTHER THEORIES OF RECOVERY REGARDING THE SALE, REPAIR, REPLACEMENT, DELIVERY, PERFORMANCE, CONDITION, SUITABILITY, COMPLIANCE, OR OTHER ASPECTS OF THE PRODUCTS OR THEIR SALE, INSTALLATION OR USE SHALL BE LIMITED TO THE PRICE PAID FOR PRODUCTS NOT AS WARRANTED.
b. Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508 and ISO13849-1 from TUV Rheinland, this fact does not guarantee that Product will be free from any malfunction or failure. The user of this Product shall comply with any and all applicable safety standard, regulation or law and take appropriate safety measures for the system in which the Product is installed or used and shall take the second or third safety measures other than the Product. MELCO is not liable for damages that could have been prevented by compliance with any applicable safety standard, regulation or law.
c. MELCO prohibits the use of Products with or in any application involving power plants, trains, railway systems, airplanes, airline operations, other transportation systems, amusement equipments, hospitals, medical care, dialysis and life support facilities or equipment, incineration and fuel devices, handling of nuclear or hazardous materials or chemicals, mining and drilling, and other applications where the level of risk to human life, health or property are elevated.
d. MELCO SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, INDIRECT OR PUNITIVE DAMAGES, FOR LOSS OF PROFITS, SALES, OR REVENUE, FOR INCREASED LABOR OR OVERHEAD COSTS, FOR DOWNTIME OR LOSS OF PRODUCTION, FOR COST OVERRUNS, OR FOR ENVIRONMENTAL OR POLLUTION DAMAGES OR CLEAN-UP COSTS, WHETHER THE LOSS IS BASED ON CLAIMS FOR BREACH OF CONTRACT OR WARRANTY, VIOLATION OF STATUTE, NEGLIGENCE OR OTHER TORT, STRICT LIABILITY OR OTHERWISE.
e. In the event that any damages which are asserted against MELCO arising out of or relating to the Products or defects in them, consist of personal injury, wrongful death and/or physical property damages as well as damages of a pecuniary nature, the disclaimers and limitations contained in these terms shall apply to all three types of damages to the fullest extent permitted by law. If, however, the personal injury, wrongful death and/or physical property damages cannot be disclaimed or limited by law or public policy to the extent provided by these terms, then in any such event the disclaimer of and limitations on pecuniary or economic consequential and incidental damages shall nevertheless be enforceable to the fullest extent allowed by law.
f. In no event shall any cause of action arising out of breach of warranty or otherwise concerning the Products be brought by Customer more than one year after the cause of action accrues.
g. Each of the limitations on remedies and damages set forth in these terms is separate and independently enforceable, notwithstanding the unenforceability or failure of essential purpose of any warranty, undertaking, damage limitation, other provision of these terms or other terms comprising the contract of sale between Customer and MELCO.

4. Delivery/Force Majeure.

a. Any delivery date for the Products acknowledged by MELCO is an estimated and not a promised date. MELCO will make all reasonable efforts to meet the delivery schedule set forth in Customer's order or the purchase contract but shall not be liable for failure to do so.
b. Products stored at the request of Customer or because Customer refuses or delays shipment shall be at the risk and expense of Customer.
c. MELCO shall not be liable for any damage to or loss of the Products or any delay in or failure to deliver, service, repair or replace the Products arising from shortage of raw materials, failure of suppliers to make timely delivery, labor difficulties of any kind, earthquake, fire, windstorm, flood, theft, criminal or terrorist acts, war, embargoes, governmental acts or rulings, loss or damage or delays in carriage, acts of God, vandals or any other circumstances reasonably beyond MELCO's control.

5. Choice of Law/Jurisdiction.

These terms and any agreement or contract between Customer and MELCO shall be governed by the laws of the State of New York without regard to conflicts of laws. To the extent any action or dispute is not arbitrated, the parties consent to the exclusive jurisdiction and venue of the federal and state courts located in the Southern District of the State of New York. Any judgment there obtained may be enforced in any court of competent jurisdiction.

6. Arbitration.

Any controversy or claim arising out of, or relating to or in connection with the Products, their sale or use or these terms, shall be settled by arbitration conducted in accordance with the Center for Public Resources (CPR) Rules for Non-Administered Arbitration of International Disputes, by a sole arbitrator chosen from the CPR's panels of distinguished neutrals. Judgment upon the award rendered by the Arbitrator shall be final and binding and may be entered by any court having jurisdiction thereof. The place of the arbitration shall be New York City, New York. The language of the arbitration shall be English. The neutral organization designated to perform the functions specified in Rule 6 and Rules 7.7(b), 7.8 and 7.9 shall be the CPR.

SH(NA)-080626ENG-O

SH(NA)-080626ENG-O(1901)MEE
MODEL: QSCPU-U-HH-E
MODEL CODE: 13JR92

MITSUBISHI ELECTRIC CORPORATION

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