

Programmable Controller

MELSEC iQ-R
series

MELSEC iQ-R PROFINET IO Device Module User's Manual (Application)

-RJ71PN93

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.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
 - (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
 - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
 - Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
 - (3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.
 - (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- Configure a circuit so that the external power supply is turned off first and then the programmable controller. If the programmable controller is turned off first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to manuals for the network used. For the manuals, please consult your local Mitsubishi representative. Incorrect output or malfunction due to a communication failure may result in an accident.
- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents. When a Safety CPU is used, data cannot be modified while the Safety CPU is in SAFETY MODE.

[Design Precautions]

WARNING

- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used. For areas used for safety communications, they are protected from being written by users, and thus safety communications failure caused by data writing does not occur.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Incorrect output or malfunction due to a communication failure may result in an accident. When safety communications are used, an interlock by the safety station interlock function protects the system from an incorrect output or malfunction.
- If data exchanges of a PROFINET IO device module are disabled, the module sends input data (0) to a PROFINET IO controller module. The PROFINET IO device module holds output data (at the time when the data exchanges stopped) received from the PROFINET IO controller module in 'IO data receive area' (Un\G0 to Un\G511) of the buffer memory. Configure an interlock circuit (with 'IO data exchanging' (X1) and 'IO data receive error' (X2)) in the program to ensure that the entire system will always operate safely even if communications fail.

[Security Precautions]

WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

WARNING

- 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 electric shock or cause the module to fail or malfunction.

[Installation Precautions]

CAUTION

- 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 electric shock or cause the module to fail or malfunction.
- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- To mount a module with no module fixing hook, place the concave part(s) located at the bottom onto the guide(s) of the base unit, push in the module, and fix it with screw(s). Incorrect interconnection may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction. For the specified torque range, refer to the MELSEC iQ-R Module Configuration Manual.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
- When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette or a battery-less option cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, battery-less option cassette, or connector. 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 installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach a blank cover module (RG60) to each empty slot and an included extension connector protective cover to the unused extension cable connector before powering on the system 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 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal 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 fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to noise. Keep a distance of 100mm or more between those cables.
- Place the cables in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables.
In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks.
Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- 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.
- 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 wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, 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 screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- 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 mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, 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).
Exceeding the limit may cause malfunction.
 - Mounting/removing the module to/from the base unit
 - Inserting/removing the extended SRAM cassette or battery-less option cassette to/from the CPU module
 - Mounting/removing the terminal block to/from the module
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette or a battery-less option cassette. Doing so may cause malfunction or failure of the module.
- 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.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- 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.

[Operating Precautions]

CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so can cause malfunction or failure of the module.

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;

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

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers.

This manual describes the functions, parameter settings, and troubleshooting of the relevant products listed below.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.

When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

Please make sure that the end users read this manual.

Relevant product

RJ71PN93

MEMO

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R PROFINET IO Device Module User's Manual (Application) [SH-082366ENG] (this manual)	Functions, parameter settings, troubleshooting, I/O signals, and buffer memory of the PROFINET IO device module	Print book e-Manual PDF
MELSEC iQ-R Module Configuration Manual [SH-081262ENG]	The combination of the MELSEC iQ-R series modules, common information on the installation/wiring in the system, and specifications of the power supply module, base unit, SD memory card, and battery	Print book e-Manual PDF
MELSEC iQ-R PROFINET IO Device Module User's Manual (Startup) [SH-082364ENG]	Specifications, procedures before operation, system configuration, wiring, and communication examples of the PROFINET IO device module	Print book e-Manual PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Buffer memory	Memory in an intelligent function module to store data such as setting values and monitor values. For CPU modules, it refers to memory to store data such as setting values and monitor values of the Ethernet function, or data used for data communication of the multiple CPU system function.
Device	A memory of a CPU module to store data. Devices such as X, Y, M, D, and others are provided depending on the intended use.
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance
Global label	A label that is valid for all the program data when multiple program data are created in the project. There are two types of global label: a module specific label (module label), which is generated automatically by GX Works3, and an optional label, which can be created for any specified device.
GSDML file	A file based on XML for PROFINET. The file contains information required for PROFINET configuration, such as an IO device attribute, module types, setting data of modules, and error messages.
Intelligent function module	A module that has functions other than an input or output, such as an A/D converter module and D/A converter module
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.
Multiple CPU system	A system where two to four CPU modules separately control I/O modules and intelligent function modules

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term/abbreviation	Description
CPU module	An abbreviation for the MELSEC iQ-R series CPU module
IO controller	An abbreviation for the PROFINET IO controller
IO device	An abbreviation for the PROFINET IO device
Module	A generic term for a virtual component of an IO device
MRC	An abbreviation for the Media Redundancy Client. A device that operates according to the ring topology settings of the MRM among PROFINET IO devices with two or more ports.
MRM	An abbreviation for the Media Redundancy Manager A device that can manage the ring topology among PROFINET IO devices with two or more ports.
MRP	An abbreviation for the Media Redundancy Protocol
PROFINET configuration tool	A generic term for the configuration tool used for PROFINET configuration with the IO controller
Remote head module	An abbreviation for the RJ72GF15-T2 CC-Link IE Field Network remote head module

1 FUNCTIONS

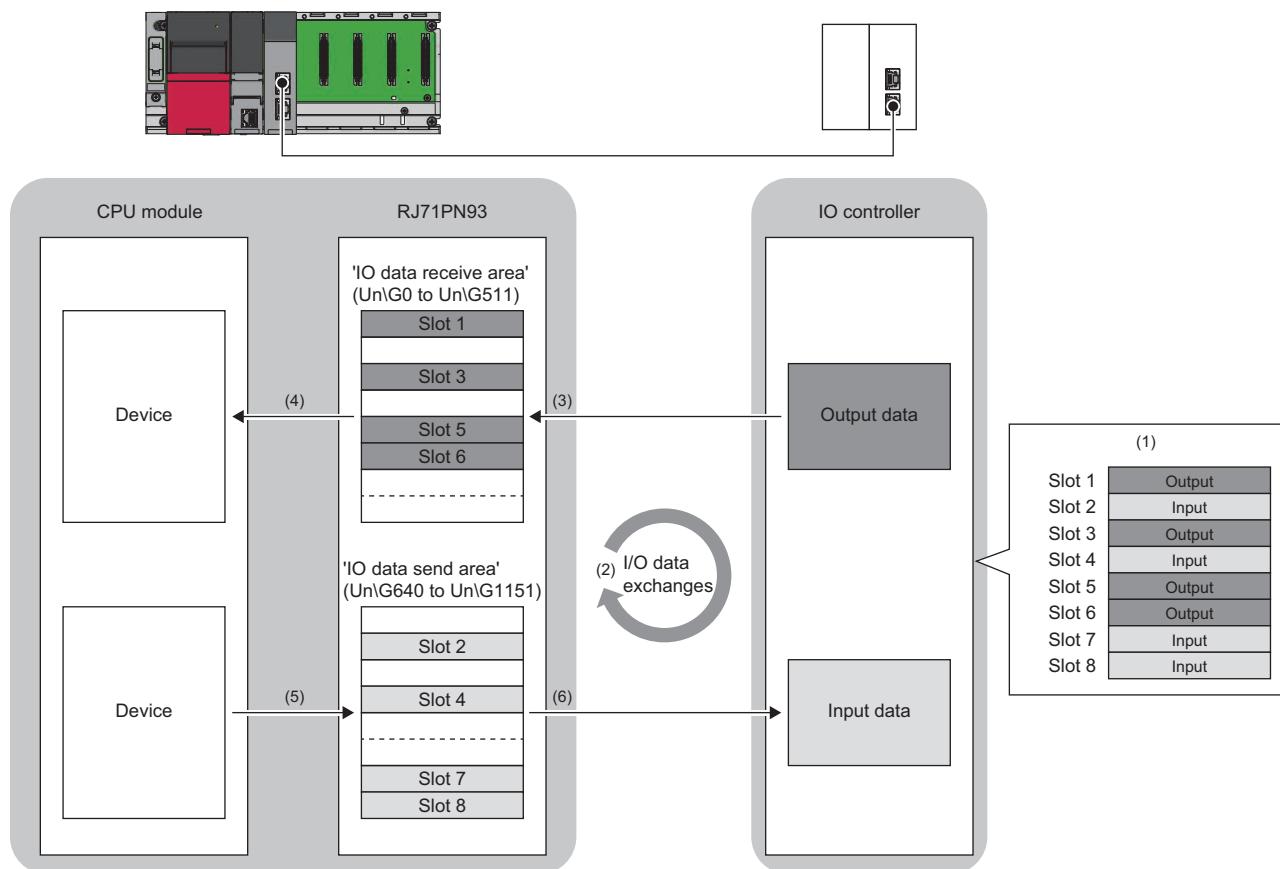
1.1 Data Exchange

This function exchanges data between the RJ71PN93 and the IO controller at a specified cycle.

The RJ71PN93 can send/receive data to/from the IO controller.

I/O data flow

The RJ71PN93 exchanges data with the IO controller using the following buffer memory areas: 'IO data receive area' (Un\G0 to Un\G511) for received data, and 'IO data send area' (Un\G640 to Un\G1151) for data to send.



(1) Set the RJ71PN93 module configuration using PROFINET configuration tool. (☞ Page 17 Module configuration)

(2) The modules communicate with each other at communication cycles specified by the IO controller.

(3) The RJ71PN93 stores data received from the IO controller in its buffer memory.

(4) The RJ71PN93 uses refresh or the FROM instruction to read data to the CPU module.

(5) The CPU module uses refresh or the TO instruction to write data to the RJ71PN93.

(6) The RJ71PN93 sends data stored in its buffer memory to the IO controller.

■Data transfer between the RJ71PN93 and the CPU module

The FROM/TO instructions using a program, or the refresh is used to transfer data between the buffer memory of the RJ71PN93 and the device on the CPU module.

For details on the FROM/TO instructions, refer to the following.

☞ MELSEC iQ-R Programming Manual (CPU Module Instructions, Standard Functions/Function Blocks)

For details on the refresh, refer to the following.

☞ Page 28 Refresh Setting

Setting method

Module settings

■I/O controller settings

Import the GSDML file of the RJ71PN93 and set the parameters using PROFINET configuration tool.

For details, refer to the manual of the IO controller or PROFINET configuration tool used.

■RJ71PN93 settings

Use the engineering tool to configure the following parameters:

- Various Operations Settings
- Own Node Setting

For details, refer to the following.

☞ Page 26 Basic Setting

Module configuration

Input/output data to be sent/received in I/O data exchanges are configured by combination of multiple modules.

■Module

Modules and slots are managed in a one-to-one relationship.

The following shows the data sizes, data format, and input/output specification of the module.

1 Word Input

(1) (2) (3)

No.	Item	Description
(1)	Data size	1, 2, 4, 8, 16, 32, 64 (unit: word)
(2)	Data format	Word
(3)	Input/output specification	<ul style="list-style-type: none">• Input• Output

■Module configuration setting conditions

- Number of slots: 1 to 8
- The total I/O data size: 512 words maximum (The total size of input data size (512 words maximum) and output data size (512 words maximum))

Precautions

The total I/O data size indicates the sum total of the total input data size and the total output data size. The sum total shall not exceed 512 words.

Module management

The modules to be set in slot 1 to slot 8 can be selected according to the system configuration.

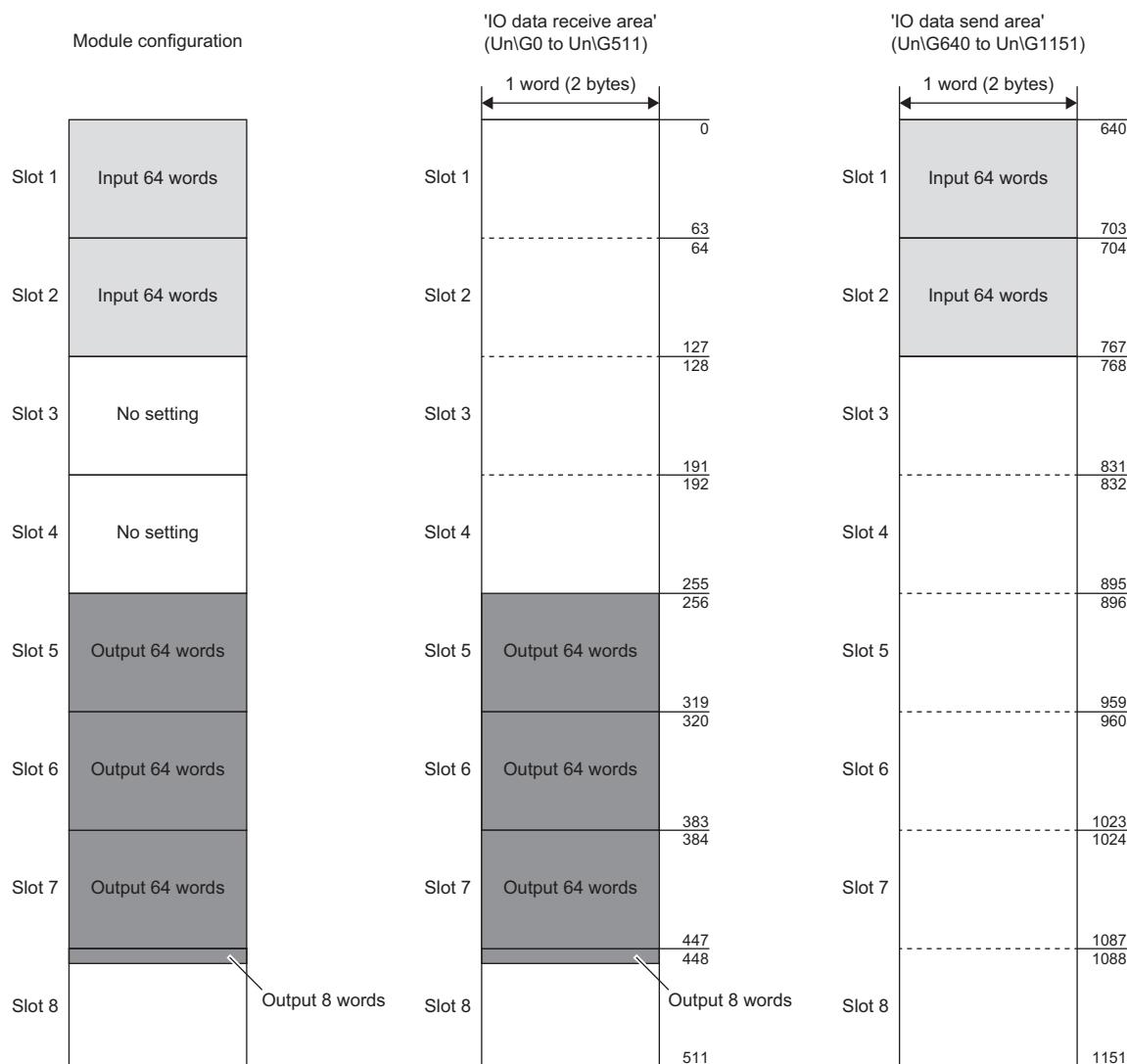
This section describes the management methods of the modules to be set.

Management with blocks

The following shows the module management method when 200 words of input data is managed as one block, and 100 words of output data as one block.

The "—" in the table indicates that no modules are set.

Slot	Module
1	64 Word Input
2	64 Word Input
3	—
4	—
5	64 Word Output
6	64 Word Output
7	64 Word Output
8	8 Word Output



Point

• When applicable data size for the module does not exist, set a larger data size than the actual data size. For example, if output data of 100 words is managed in slot 5 and 6, slot 6 requires 36 words. (100 words = 64 words (slot 5) + 36 words (slot 6)) However, because there is no data size option of 36 Word Output, set 64 Word Output, which is a data size option larger than 36 words, in slot 6.

- Set input modules continuously according to the size of input data to be received. Likewise, set output modules continuously according to the size of output data to be sent.
- Modules can be managed as if no modules are set to the slots.

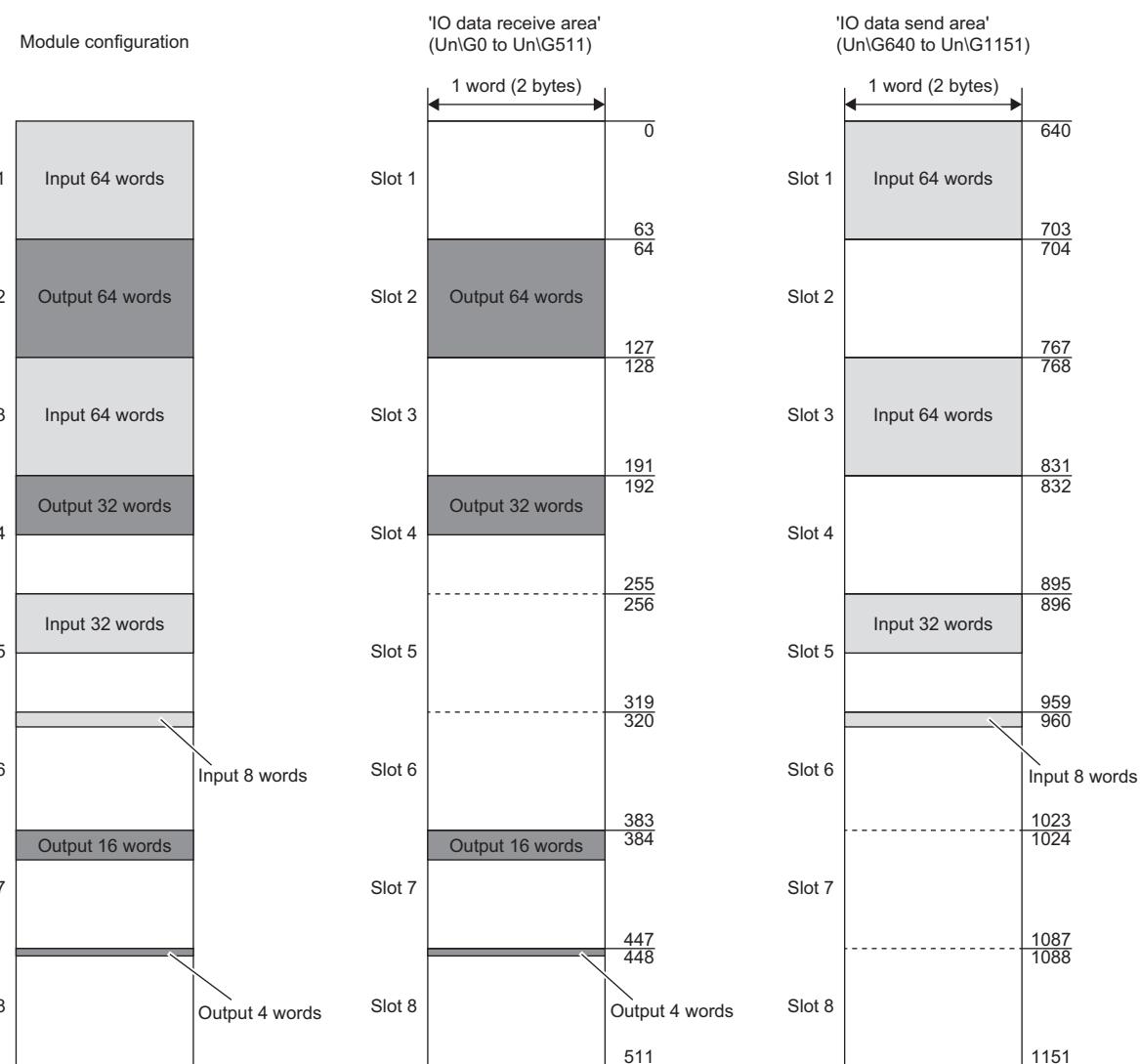
For example, if slots 1 to 4 are set for input data and slots 5 to 8 are set for output data, the modules can be managed as if some slots where no modules are set exist (slot 3 and 4 in figure above).

Management with slots

The following shows the module management method when I/O data is managed with slots.

This method is helpful when slots are set by purpose or application such as the control signal management and device status notification.

Slot	Module
1	64 Word Input
2	64 Word Output
3	64 Word Input
4	32 Word Output
5	32 Word Input
6	8 Word Input
7	16 Word Output
8	4 Word Output



Point

- Setting modules with slots according to the data applications can manage I/O data without affecting data areas of other applications (other slots) even if the data is increased.
- When applicable data size for the module does not exist, set a larger data size than the actual data size. For example, if input data of 36 words is set, there is no data size option of 36 Word Input, set 64 Word Input, which is a data size option larger than 36 words.

Precautions

- If any part of the own node information (IP address, subnet mask, default gateway, and device name) is changed by a device other than the IO controller during data exchanging, the communications with the IO controller would be disconnected.
- The following table shows the relationship between the CPU module status and send/receive data on the RJ71PN93.

Direction of data	CPU module status on the IO device side	Data to be sent from an IO device to the IO controller	Data to be received from the IO controller to an IO device	'IO data receive error' (X2) ^{*1}	Value in 'IO data send area' (Un\G640 to Un\G1151)	Value in 'IO data receive area' (Un\G0 to Un\G511)
Sending (IO device → IO controller)	Other than stop error	The value in 'IO data send area' (Y0 is on.)	—	Off	The value written by the user with a sequence program	—
		0 (Y0 is off.)			The value at the time of occurrence of an error ^{*2}	
	Stop error	The value in 'IO data send area' (Y0 is on.)	Receive data from the IO controller	—	Receive data from the IO controller	—
		0 (Y0 is off.)				
Receiving (IO controller → IO device)	No dependence on CPU module status	—	Receive data from the IO controller	—	Receive data from the IO controller	—

*1 For details, refer to the following.

☞ Page 46 IO data receive error (X2)

*2 The value of buffer memory is not changed because the CPU module stops.

1.2 Data Consistency Function

In I/O data exchanges, this function prevents the state of data inconsistency between the buffer memory of the RJ71PN93 and the device of the CPU module.

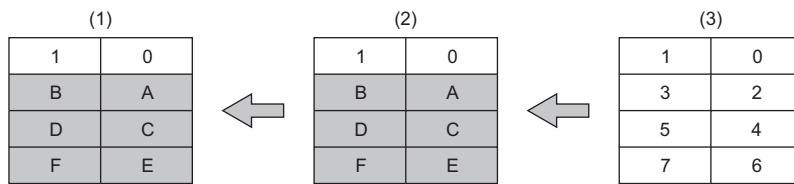
Data inconsistency is an issue where a set of two-word size (32 bits) data is separated into two sets of one-word (16 bits) data (one is new and the other is old) at the timing of refresh of I/O data exchanges.

Assurance of receive data consistency

■When the data consistency function is not used

When data is sent from the receive data area of the buffer memory to the device of the CPU module, data in the device of the CPU module and data on PROFINET may be inconsistent.

 : Receive data (new)
 : Receive data (previous)

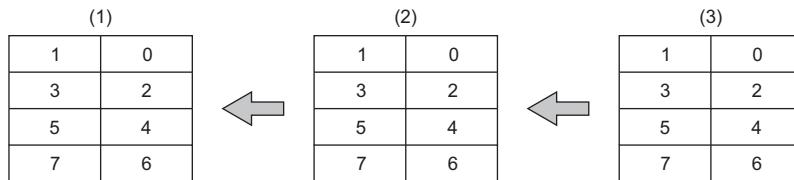


(1) Device of the CPU module
(2) Buffer memory ('IO data receive area' (Un\G0 to Un\G511)) of the RJ71PN93
(3) Data on PROFINET

■When the data consistency function is used

When data is sent from the receive data area of the buffer memory to the device of the CPU module, all data in the device of the CPU module will be updated.

 : Receive data (new)



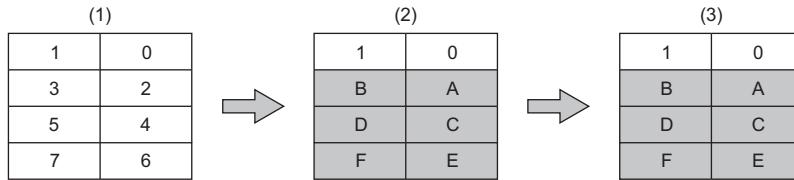
(1) Device of the CPU module
(2) Buffer memory ('IO data receive area' (Un\G0 to Un\G511)) of the RJ71PN93
(3) Data on PROFINET

Assurance of send data consistency

■When the data consistency function is not used

When data is sent from the device of the CPU module to the send data area of the buffer memory, data in the device of the CPU module and data on PROFINET may be inconsistent.

: Send data (new)
 : Send data (previous)

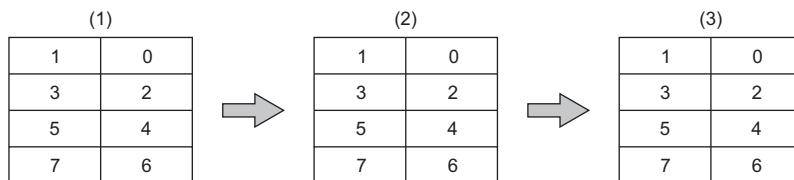


(1) Device of the CPU module
(2) Buffer memory ('IO data send area' (Un\G640 to Un\G1151)) of the RJ71PN93
(3) Data on PROFINET

■When the data consistency function is used

When data is sent from the device of the CPU module to the send data area of the buffer memory, all data in the device of the CPU module on PROFINET will be updated.

: Send data (new)



(1) Device of the CPU module
(2) Buffer memory ('IO data send area' (Un\G640 to Un\G1151)) of the RJ71PN93
(3) Data on PROFINET

Setting method

Using the engineering tool, set "Data Consistency Setting" to "Enable" to enable data transfer by performing refresh. For details, refer to the following.

☞ Page 27 Data Consistency Setting

☞ Page 28 Refresh Setting

Point

The refresh setting is configured with slots. However, when the data consistency function is used, all refresh ranges can be assured as a single unit.

Restriction

The data consistency function is enabled only when data transfer between the buffer memory of the RJ71PN93 and the device of the CPU module is performed by refresh and "Data Consistency Setting" is set to "Enable".

When data transfer is not performed by refresh, the data consistency function is disabled even if "Data Consistency Setting" is set to "Enable". In this case, the data in the buffer memory ('IO data receive area' (Un\G0 to Un\G511) of the RJ71PN93 is not updated, and the data in 'IO data send area' (Un\G640 to Un\G1151) is not sent.

Precautions

- When the data consistency function is used, the transmission delay time becomes longer because the function requires the time to wait for transferring data or reading/writing data from/to the CPU module.
- For whether data that the IO controller receives/sends from/to an IO device is assured, refer to manual of the IO controller used.

2 PARAMETER SETTINGS

This chapter describes the parameter settings required for communications between the RJ71PN93 and the IO controller.

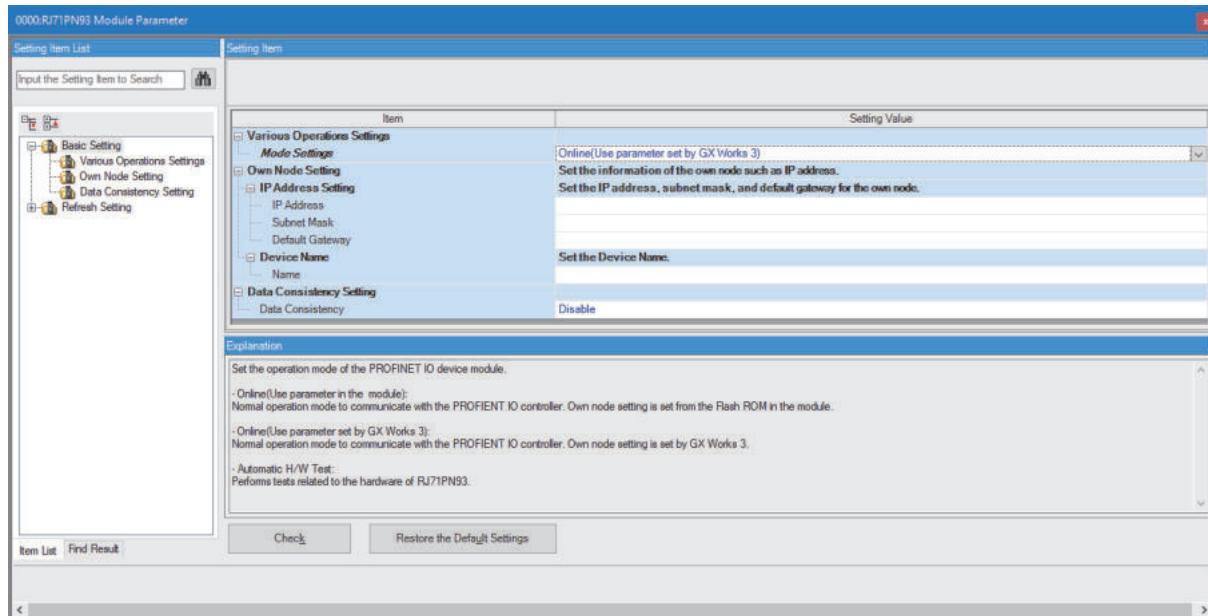
2.1 Setting Parameters

2

1. Add the RJ71PN93 in the engineering tool.
 [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Right-click ⇒ [Add New Module]
2. The basic settings and refresh settings are included in the module parameters. Select the settings from the tree on the following window and configure them.
 [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN93]
3. Write the module parameters to the CPU module using the engineering tool.
 [Online] ⇒ [Write to PLC]
4. The settings are reflected by resetting the CPU module or powering off and on the system.

2.2 Basic Setting

Set the operation mode, IP address, and other items of the RJ71PN93.



Various Operations Settings

Set the operation mode of the RJ71PN93.

Item	Description	Setting range
Mode Settings	<p>Set the operation mode of the RJ71PN93.</p> <p>■Online (Use parameter in the module) The RJ71PN93 operates with the own node settings saved in the RJ71PN93 at startup. If the own node settings are not saved, the default settings are used.*1</p> <p>■Online (Use parameter set by GX Works3) The RJ71PN93 operates with the own node settings set by the engineering tool at startup. If the own node settings, different from the settings saved in the module, are set using the engineering tool, this mode saves the settings in the engineering tool at startup.</p> <p>■Automatic H/W Test A test is carried out whether to check the ROM, RAM, or 2-port RAM of the RJ71PN93 has an error.</p> <p>For the automatic hardware test, refer to the following.</p> <p> Page 34 Automatic Hardware Test</p>	<ul style="list-style-type: none">• Online (Use parameter in the module)• Online (Use parameter set by GX Works3)• Automatic H/W Test <p>(Default: Online (Use parameter set by GX Works3))</p>

*1 The default own settings are as follows.

IP address: 0.0.0.0, subnet mask: 0.0.0.0, default gateway: 0.0.0.0, device name: blank

Precautions

When the RJ71PN93 in which "Online (Use parameter in the module)" is set is replaced with new one, rewrite the own node information to the RJ71PN93 after replacing the module. (When the CPU module is replaced, the RJ71PN93 does not require to rewrite the own node information.)

Own Node Setting

Set the IP address and name of the RJ71PN93.

Item	Description		Setting range
IP Address Setting	IP Address	Set the IP address of the RJ71PN93. Set the external devices which exchange data with the own node so that they have the same class and subnet address. Set any one of A, B, or C class of the IP address.	• Blank ^{*1} • 0.0.0.1 to 126.255.255.254, 128.0.0.1 to 223.255.255.254 ^{*5} (Default: Blank)
	Subnet Mask	Set the subnet mask of the own node. Define how many upper bits of the IP address are used to identify the network. For example, if the upper 24 bits are assigned to the subnet mask, set 255.255.255.0.	• Blank ^{*2} • 128.0.0.0 to 255.255.255.252 ^{*5} (Default: Blank)
	Default Gateway	Set the IP address of the relay device (default gateway) to access devices on other networks through the own node network. Set the subnet address of the default gateway to be the same as that of the own station.	• Blank ^{*3} • 0.0.0.1 to 126.255.255.254, 128.0.0.1 to 223.255.255.254 ^{*5} (Default: Blank)
Device Name	Name	Set the name of the RJ71PN93. Device name is used for the DCP protocol to identify the name on PROFINET.	• Blank ^{*4} • Between 1 to 240 one-byte alphanumeric characters ^{*6*7} (Default: Blank)

*1 When the parameter is written without the IP address setting (empty), the module operates with the following setting.
192.168.3.4

*2 When the parameter is written without the subnet mask setting (empty), the module operates with the following setting.
255.255.255.0

*3 When the parameter is written without the default gateway setting (empty), the module operates with no setting.

*4 When the parameter is written without the device name setting (empty), the module operates with the following setting.
rj71pn93

*5 Set the IP address which is the same value as that of the network part of the default gateway.

*6 Set the unique device name to each IO device when multiple IO devices are connected.

*7 Characters from a to z, numbers from 0 to 9, "." (dot), and "-" (hyphen) can be used. "-" cannot be used at the beginning and end of the name.

The name can be separated by ". ". The number of characters in each separated part is within 1 to 63.

Data Consistency Setting

Set the data consistency function of the RJ71PN93.

Item	Description	Setting range
Data Consistency	Enable/disable the data consistency function. • Disable: Disable the data consistency function of refresh. • Enable: Enable the data consistency function of refresh. To enable this item, set the refresh target using "Refresh Setting". If not set, the data consistency function is not available. ( Page 28 Refresh Setting)	• Disable • Enable (Default: Disable)

2.3 Refresh Setting

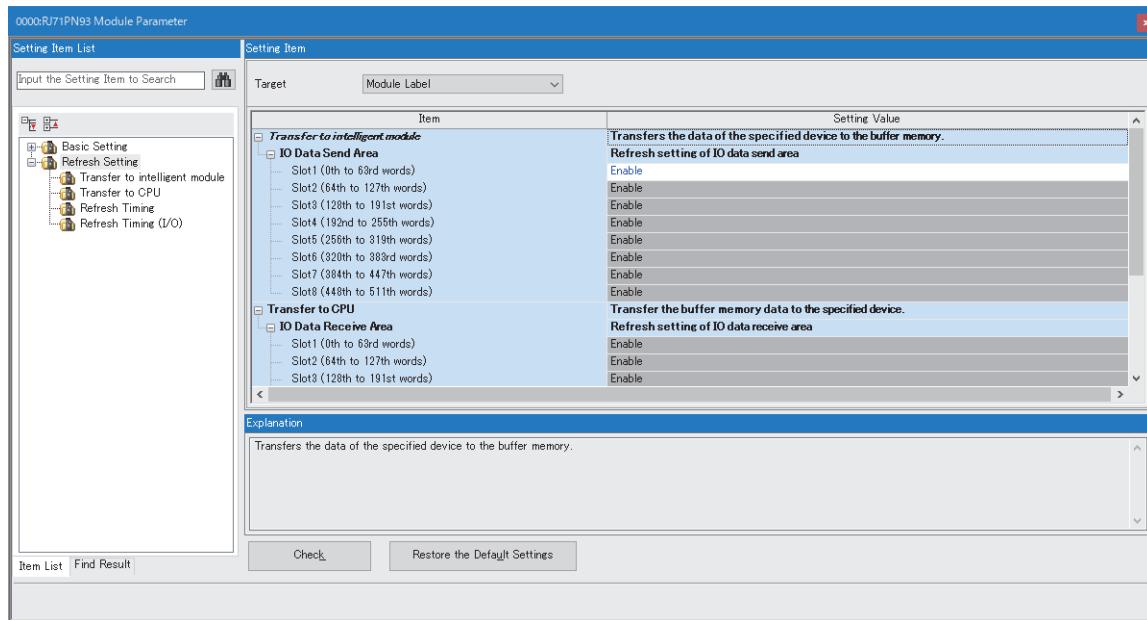
Setting method

The refresh automatically transfers data between the buffer memory areas related to the I/O data exchange of the RJ71PN93 and the devices of the CPU module.

Configuring the refresh settings eliminates the necessity of read and write processes by the program.

1. Open the module parameter window.

 [Navigation window] \Rightarrow [Parameter] \Rightarrow [Module Information] \Rightarrow [RJ71PN93] \Rightarrow [Refresh Setting]



2. Click "Target" and set the refresh target.

- When "Target" is set to "Module Label"

Enable or disable "Slot1 (0th to 63rd words)" to enable or disable the refresh.

- When "Target" is set to "Refresh Data Register (RD)"

To automatically set the transfer destinations of all items, set "Start Device Name" to the start device.

- When "Target" is set to "Device"^{*1*2}

Double-click a relevant item and enter the refresh target device.

*1 X, Y, M, L, B, D, R, W, ZR, or RD can be specified for a device. Set the device number in increments of 16 points when X, Y, M, L, or B is specified.

*2 Note that the device range does not overlap with other buffer memory areas.

3. Click "Refresh Timing" and set the refresh timing.

Set "Refresh Timing" to "At the Execution Time of END Instruction" or "At the Execution Time of Specified Program".

When it is set to "At the Execution Time of Specified Program", double-click "Refresh Group [n](n: 1-64)" and set the refresh group numbers to 1 to 64.



When the refresh is enabled, the refresh target values will be valid at the timing set in the engineering tool. At the time, buffer memory areas are overwritten with the refresh target values. To change the refreshed values in the buffer memory, create a program to change the values in the refresh target module label or device.

3 TROUBLESHOOTING

This chapter describes troubleshooting for the RJ71PN93.

3.1 Checking with LED

This section describes troubleshooting using the LEDs.

Error status can be determined by the status of the RUN LED and the ERR LED.

3

RUN LED	ERR LED	Error status	Description
Off	On, flashing	Major error	An error such as hardware failure or memory failure. The module stops operating.
On	Flashing	Moderate error	An error, such as parameter error, which affects module operation. The module stops operating.
On	On	Minor error	An error with which the module continues operating.

When the RUN LED turns off

When the RUN LED turns off after powering on the RJ71PN93, check the following.

Check item	Action
Is the RJ71PN93 mounted correctly?	Securely mount the RJ71PN93 on the base unit.
Is the module other than the RJ71PN93 set to the mounting slot of the RJ71PN93 on the programmable controller setting (system parameter)?	Change the setting or the mounting slot, so that the programmable controller setting matches with the mounting slot of the RJ71PN93.

If the above action does not solve the problem, perform the automatic hardware test to check the RJ71PN93 for failure. (☞ Page 34 Automatic Hardware Test)

When the ERR LED turns on or is flashing

When the ERR LED turns on or is flashing, check the following.

Check item	Action
Has an error occurred in the module diagnostics?	Take the actions displayed on the window. (☞ Page 31 Checking the Module Status)

If the above action does not solve the problem, perform the automatic hardware test to check the RJ71PN93 for failure. (☞ Page 34 Automatic Hardware Test)



The ERR LED on the RJ71PN93 does not go off automatically even when the error cause is eliminated.

For minor errors on the module, eliminate the error cause, and click the [Clear Error] button in "Module Diagnostics".

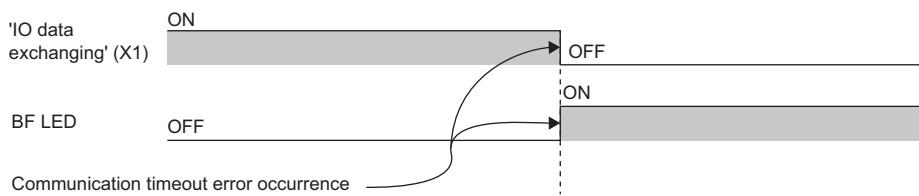
For moderate or major errors on the module, reset the CPU module or power off and on the system.

When the BF LED turns on

When the BF LED on the RJ71PN93 turns on, check the following.

Check item	Action
Are I/O data exchanges stopping?	Start I/O data exchanges from the IO controller.
Is the network in the overloaded conditions?	If the broadcast storm occurs, eliminate the error cause. Check that the wiring is correct. Check that the ring topology configurations are correct on the IO controller side.
Does the device name of the RJ71PN93 overlap with that of other IO devices?	Change the device name of the RJ71PN93 to the unique one.
Has a communication timeout error occurred in the RJ71PN93? (Check the current error or "Event History" in the "Module Diagnostics" window.) ^{*1}	If a communication timeout error has occurred, take actions referring to the following. Page 41 When communication timeout error occurs

*1 The following shows display status of 'IO data exchanging' (X1) and the BF LED when a communication timeout error occurs.



3.2 Checking the Module Status

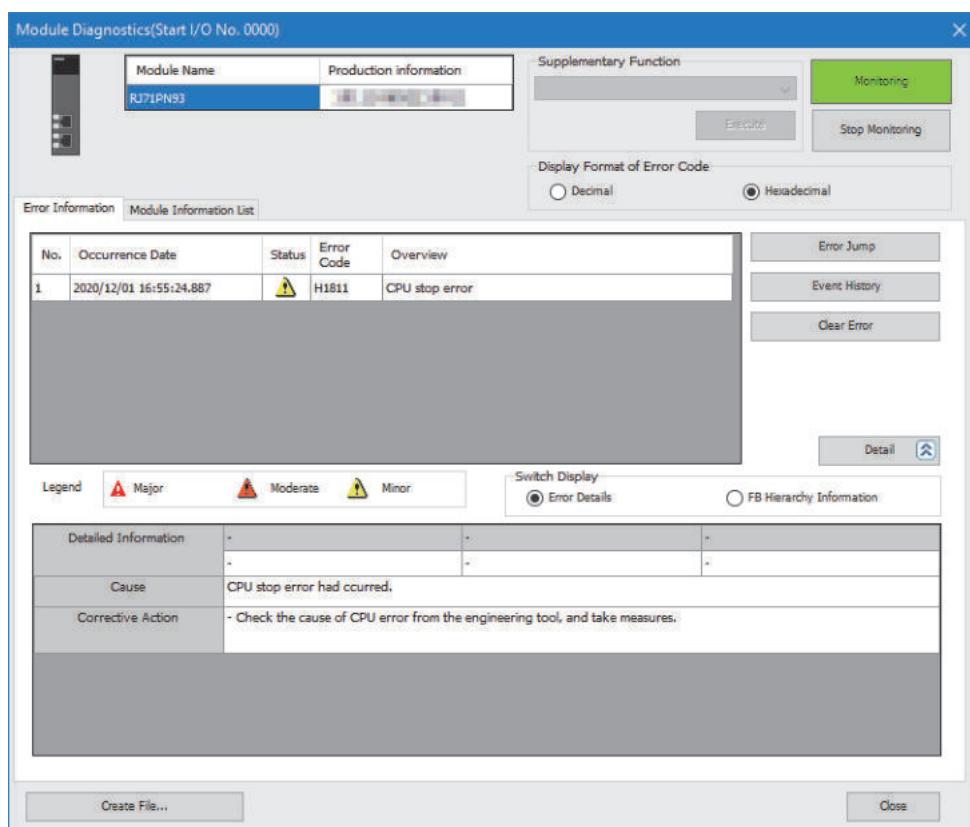
Checking from the "Module Diagnostics" window

The following functions can be used in the "Module Diagnostics" window of the RJ71PN93.

Function	Application
Error Information	Displays the details of the errors currently occurring. Click the [Event History] button to check the history of errors that have occurred on the RJ71PN93, errors detected for each module, and operations that have been executed.
Module Information List	Displays various status information of the RJ71PN93.

Error information

Check the details of the error currently occurring and action to eliminate the error.



Item	Description
Status	Major: An error such as hardware failure or memory failure. The module stops operating. Moderate: An error, such as a parameter error, which affects module operation. The module stops operating. Minor: An error with which the module continues operating.
Error Code	Page 42 List of Error Codes
[Error Jump] button	Cannot be used on the RJ71PN93.
[Event History] button	Click the [Event History] button to check the history of errors that have occurred on the network, errors detected for each module, and operations that have been executed. Page 43 Event List
[Clear Error] button	Page 32 Clear Error
Detailed information	Displays detailed information about each error (maximum of 3 pieces).
Cause	Displays the detailed error causes.
Corrective Action	Displays the actions to eliminate the error causes.

■Clear Error

Click the [Clear Error] button in the "Error Information" tab on the "Module Diagnostics" window to execute this function. This clears all the continuation errors of the RJ71PN93.

The following table lists errors and whether they can be cleared.

○: Can be cleared, ×: Cannot be cleared

Mode setting	Error name	Level	Whether it can be cleared
Online	Continuation error	Minor error	○
	Stop error	Moderate error	×
		Major error	×
Other than online	—		×

The following table shows the indications after the error notifications/indications are cleared by the "Clear Error" operation.

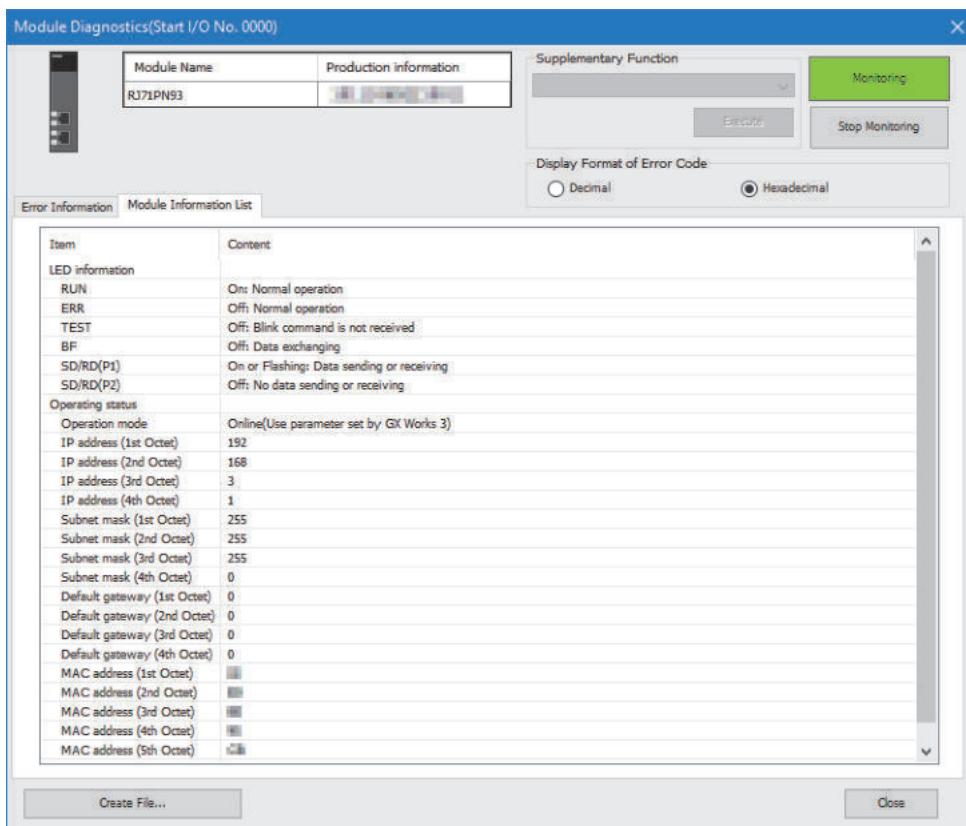
Clear target		Status after error clear
Module	ERR LED	Off
	'Module error' (X3)	Off
	'Module error information' (Un)G1752	0
GX Works3	Error status on the system monitor window	No error
	Error codes on the system monitor window	No error code
	Error information on the "Module Diagnostics" window	No error information

Precautions

- Errors are not cleared while a stop error exists.
- Errors may occur and be detected again if the error causes are not eliminated or another error occurs after clearing.
- 'IO data receive error' (X2) and BF LED are not cleared.

Module Information List

Switch to the [Module Information List] tab to check various status information of the RJ71PN93.



3

Item	Description	
LED information	Displays the LED status of the RJ71PN93.	
Operating status ^{*1}	Operation mode	Displays the operation mode set for the selected module.
	IP address (1st Octet)	Displays the IP address set for the selected module.
	IP address (2nd Octet)	
	IP address (3rd Octet)	
	IP address (4th Octet)	
	Subnet mask (1st Octet)	Displays the subnet mask set for the selected module.
	Subnet mask (2nd Octet)	
	Subnet mask (3rd Octet)	
	Subnet mask (4th Octet)	
	Default gateway (1st Octet)	Displays the default gateway set for the selected module.
	Default gateway (2nd Octet)	
	Default gateway (3rd Octet)	
	Default gateway (4th Octet)	
	MAC address (1st Octet)	Displays the MAC address set for the selected module.
	MAC address (2nd Octet)	
	MAC address (3rd Octet)	
	MAC address (4th Octet)	
	MAC address (5th Octet)	
	MAC address (6th Octet)	

*1 When the automatic hardware test in operation mode is performed, 0 is displayed for the status other than "Operation Mode".

3.3 Automatic Hardware Test

A test is carried out whether to check the ROM, RAM, or 2-port RAM of the RJ71PN93 has an error.

Operating procedure

1. Check the following and power on the programmable controller.
 - Check if the RJ71PN93 is securely mounted on the base unit.
 - Check if the input power supply voltage is appropriate for the power supply module.
 - Check if the CPU module is in STOP state.
2. Set the mode setting of the RJ71PN93 to the automatic hardware test using the engineering tool.
☞ [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN93] ⇒ [Basic Setting] ⇒ [Various Operations Settings] ⇒ [Mode Settings] ⇒ Select "Automatic H/W Test".
3. Use the engineering tool to disable all the refresh settings of the RJ71PN93. (When the settings have been changed at the default settings, change the settings to the default.)
☞ [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN93] ⇒ [Refresh Setting]
4. Write the set parameters to the CPU module, and reset the CPU module or power off and on the system.
☞ [Online] ⇒ [Write to PLC]
5. The automatic hardware test is automatically performed.

How to check

The status of the automatic hardware test can be checked with the LED indication and buffer memory of the RJ71PN93.

■Checking with the LED indication

Status	RUN LED status	ERR LED status
During automatic hardware test	Flashing	Off
Automatic hardware test completion	Completed successfully	Off
	Completed with an error ^{*1}	On

*1 To check 'Running offline test number' (Un\G2083) allows the items which were testing at completed with an error can be checked.

☞ Page 53 Running offline test number (Un\G2083)

How to handle an error when the test is completed with the error

Check that the refresh settings of the RJ71PN93 are disabled.

If the result is still error completion after retrying the operation, the hardware failure of the RJ71PN93 may have been occurred. In such a case, please consult your local Mitsubishi representative.

3.4 Troubleshooting by Symptom

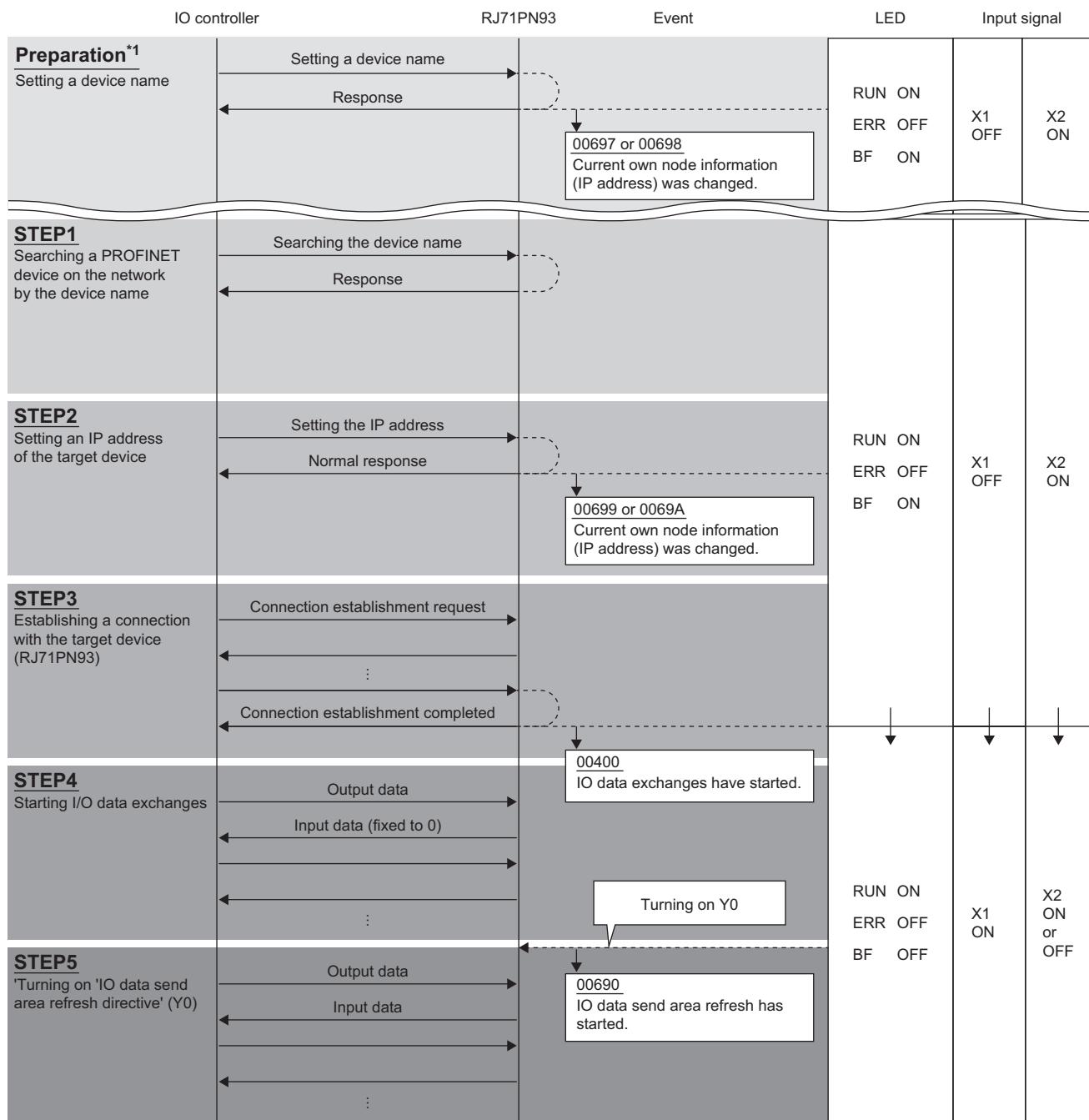
When the RJ71PN93 is communicated with the IO controller, I/O data exchanges are performed after taking the preparation and STEP 1 to STEP 5 as below.

If the RJ71PN93 cannot be communicated with the IO controller, check the symptom occurring each STEP and take the relevant action.



If an error has occurred in the RJ71PN93, identify the error cause using the engineering tool. (☞ Page 31
Checking the Module Status)

3



*1 When operation mode is set to "Online (Use parameter in the module)", set the device name only once in preparation. The setting is not required every communication establishment.

When operation mode is set to "Online (Use parameter set by GX Works3)", the preparation is not required.

Communications with the IO controller fail

■A device name cannot be set. (Preparation)

Check the following when operation mode is used in "Online (Use parameter in the module)" and a device name cannot be set via a network.

Cause	Check item	Action
Power-off	Is the RJ71PN93 powered on?	Power on the programmable controller.
Network overload	Is the network in the overloaded conditions?	If the broadcast storm occurs, eliminate the error cause. Check that the wiring is correct. Check that the ring topology configurations are correct on the IO controller.
Communication path	Is the Ethernet cable wired correctly?	Wire the Ethernet cable correctly. (参见 MELSEC iQ-R PROFINET IO Device Module User's Manual (Startup))
	Is the Ethernet cable disconnected or short circuit?	Replace the damaged Ethernet cable with a normal one.
	Is a device unsupporting a ring topology (MRP) connected?	Replace the device with a device supporting a ring topology (MRP) or configure the system with another network topology.
	If a ring topology is configured, has the device to be operated as the MRM been configured with the ring topology?	Configure a ring topology with the device to be operated as the MRM. (The RJ71PN93 operates as an MRC.)
Mode setting	Is operation mode set to online?	Set the operation mode to online. Once the device name registration request is accepted via a network even if "Online (Use parameter set by GX Works3)" is set, the device name of the current own node information is overwritten. Note that once the programmable controller is restarted, the device name set in the engineering tool is enabled again.
IO controller settings	Are the IO controller settings (PROFINET configuration tool) correct?	Refer to the manual of the IO controller or PROFINET configuration tool used.
Failure of the IO controller	Is the modules on the IO controller side operating normally when a device name is set via the IO controller?	Refer to the manual of the IO controller used.
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

■The RJ71PN93 cannot be searched on a network. (STEP 1)

When the communications are started, the IO controller firstly searches the device name of the RJ71PN93 on the network.

Check the following if the device name cannot be searched properly.

Cause	Check item	Action
Power-off	Is the RJ71PN93 powered on?	Power on the programmable controller.
Network overload	Is the network in the overloaded conditions?	If the broadcast storm occurs, eliminate the error cause. Check that the wiring is correct. Check that the ring topology configurations are correct on the IO controller.
Communication path	Is the Ethernet cable wired correctly?	Wire the Ethernet cable correctly. (参照 MELSEC iQ-R PROFINET IO Device Module User's Manual (Startup))
	Is the Ethernet cable disconnected or short circuit?	Replace the damaged Ethernet cable with a normal one.
	Is a device unsupporting a ring topology (MRP) connected?	Replace the device with a device supporting a ring topology (MRP) or configure the system with another network topology.
	If a ring topology is configured, has the device to be operated as the MRM been configured with the ring topology?	Configure a ring topology with the device to be operated as the MRM. (The RJ71PN93 operates as an MRC.)
Mode setting	Is operation mode set to online?	Set the operation mode to online.
A device name mismatch	Has the device name registered to the RJ71PN93?	<p>■When Online (Use parameter set by GX Works3) is used Set a device name using the engineering tool, and write the project to the CPU module.</p> <p>■When Online (Use parameter in the module) is used Using the PROFINET configuration tool, register a device name to the RJ71PN93 via the network. To register the device name, enable the Permanent setting. (If a device name is written to the CPU module with the Permanent setting disabled, the device name is cleared after the power of the programmable controller is reset.) Or, change the operation mode while "Online (Use parameter set by GX Works3)" is used, and set the device name using the engineering tool.</p>
	Does the device name of the IO controller settings match with that of the RJ71PN93?	<p>Check if the device name matches with that of the IO controller settings by checking the device name of the RJ71PN93 with 'Current Own Node Setting' (Un(G1360 to Un(G1485)). If these device names are mismatched, correct the settings to match the device names between the IO controller and the RJ71PN93. Once the device name registration request is accepted via a network even if "Online (Use parameter set by GX Works3)" is set for operation mode, the device name of the current own node information is overwritten. Note that once the programmable controller is restarted, the device name set in the engineering tool is enabled again.</p>
Device name overlapped	Does the PROFINET device having the same device name as that of the RJ71PN93 exist on the network?	Check if other PROFINET devices that have the same device name exist by searching the device name on the network where Ethernet cable of the RJ71PN93 is disconnected. If the device names are overlapped, change them to the unique one.
IO controller settings	Are the programs and parameters of the IO controller correct?	Refer to the manual of the IO controller used.
Failure of the IO controller	Does the IO controller operate properly?	Refer to the manual of the IO controller used.
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

■No IP address of the RJ71PN93 can be set. (STEP 2)

When the IO controller identifies the existence of the target device (RJ71PN93) on the network by searching the device name, the IO controller sets the registered IP address to the target device (RJ71PN93). Check the following when IP address setting is not available.

Cause	Check item	Action
IO controller settings	Is the IP address setting method of the RJ71PN93 set on the IO controller used as DHCP?	Correct the IO controller settings and set the Address Assignment setting to DCP or LOCAL. Setting names may vary depending on the IO controller used. In addition, if LOCAL is set, this STEP (IP address setting) may be skipped according to the IO controller specifications.
	Are the programs and parameters of the IO controller correct?	Refer to the manual of the IO controller used.
Failure of the IO controller	Does the IO controller operate properly?	Refer to the manual of the IO controller used.
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

Precautions

If the IP address set on the IO controller has already set to the target device (RJ71PN93), this STEP (IP address setting) may be skipped.

■Connection establishment fails. (STEP 3)

The IO controller requests the connection establishment using an UDP-based communication frame. In the connection establishment processing, the parameter information including module configuration of each slot set on the IO controller is notified to the target device (RJ71PN93), and I/O data exchanges start if the parameters are correct.

If the connection establishment fails, check the following.

Cause	Check item	Action
IP address mismatch	Do the IP address and subnet mask of the module match with those of the target device (RJ71PN93) on the IO controller?	Check if the IP address and subnet mask are matched with those of the IO controller by checking data in 'Current Own Node Setting' (Un\G1360 to Un\G1485) or data in the module diagnostics window of the engineering tool. If they are unmatched, correct the IO controller settings or the RJ71PN93 settings to match their IP addresses and subnet masks.
IP address overlapped	Does the PROFINET device having the same IP address as that of the RJ71PN93 exist on the network?	Check if other Ethernet devices that use the same IP address by executing a PING test from the personal computer on the network where Ethernet cable of the RJ71PN93 is disconnected. If their IP addresses are overlapped, change them to the unique one.
During a connection establishment	Has the RJ71PN93 already been connected to another IO controller?	Check if the status is in the data exchanging by checking the status of 'IO data exchanging' (X1). If the status is in the data exchanging, correct the settings to communicate the RJ71PN93 with only one IO controller as the communication destination.
Invalid GSDML	Is the GSDML file used for PROFINET configuration tool on the IO controller correct?	Check if the GSDML file of the RJ71PN93 is used for the parameter settings by checking the IO controller settings. If the GSDML file of a different device is used, set the parameters using the GSDML file of the RJ71PN93 again. The RJ71PN93 operates according to the parameter information including module configuration of each slot notified by the IO controller. Therefore, even if the incorrect GSDML file of the RJ71PN93 is selected, a parameter error does not occur.
IO controller settings	Are the programs and parameters of the IO controller correct?	Refer to the manual of the IO controller used.
	Is Conformance Class of IO controller A or B?	Check the IO controller used.
Failure of the IO controller	Does the IO controller operate properly?	Refer to the manual of the IO controller used.
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

Sent or received data does not have an intended value or values.**■The I/O data exchanges have not been started. (STEP 4)**

Send data of the RJ71PN93 is fixed to 0 after the connection is established. Turn on 'IO data send area refresh directive' (Y0) to send data other than 0.

When the I/O data exchanges have not been started, check the following.

Cause	Check item	Action
Y0	Is 'IO data send area refresh directive' (Y0) turned on?	Turn on 'IO data send area refresh directive' (Y0) and set the value other than 0 to the following. ■When the refresh settings are disabled 'IO data send area' (Un\G640 to Un\G1151) ■When the refresh settings are enabled Transfer source device specified in the refresh settings
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

■The intended data cannot be sent/received. (STEP 5)

Check the following when the intended data cannot be sent/received even though the I/O data exchanges are performed after turning on 'IO data send area refresh directive' (Y0).

Cause	Check item	Action
Incorrect refresh settings	Is the corresponding slot where data is set used for input module (for sending)?	<p>Check if the data size of the corresponding slot is set other than 0 by checking data in 'IO data send area data size' (Un\G1296 to Un\G1303). If the data size of the corresponding slot is 0, the slot is unused or is used for the output module (for receiving).</p> <p>In 'IO data send area data size' (Un\G1296 to Un\G1303), set data to the sending area of the slot whose data size is other than 0, and check if the data can be received on the IO controller.</p>
	Is the corresponding slot where data is read used for output module (for receiving)?	<p>Check if the data size of the corresponding slot is set other than 0 by checking data in 'IO data receive area data size' (Un\G1280 to Un\G1287). If the data size of the corresponding slot is 0, the slot is unused or is used for the input module (for sending).</p> <p>In 'IO data receive area data size' (Un\G1280 to Un\G1287), read data in the receiving area of the slot whose data size is other than 0, and check if the data sent from the IO controller is stored.</p>
	Are the target device and buffer memory address to send data correct?	<p>Correct the device and address to set data.</p> <p>■When the refresh settings are disabled</p> <p>Set data to the corresponding slot area in 'IO data send area' (Un\G640 to Un\G1151).</p> <p>■When the refresh settings are enabled</p> <p>Set data to the device specified in the refresh settings or the corresponding slot area of the label.</p>
	Are the target device and buffer memory address to receive data correct?	<p>Correct the device and address to read data.</p> <p>■When the refresh settings are disabled</p> <p>Read data from the corresponding slot area in 'IO data receive area' (Un\G0 to Un\G511).</p> <p>■When the refresh settings are enabled</p> <p>Read data from the device specified in the refresh settings or the corresponding slot area of the label.</p>
	Is the data size specified in the refresh settings matched with that of I/O data exchanges specified in the IO controller?	Check if the data size of the I/O data exchanges set in the IO controller and data size that is being processed in the IO device program or data size in the refresh setting are correct.
Incorrect data consistency setting	Are the refresh settings enabled when "Data Consistency Setting" is set to "Enable"?	<ul style="list-style-type: none"> Enable the refresh settings when "Data Consistency Setting" is set to "Enable". Check if the device of the CPU module is specified in "IO Data Send Area" and "IO Data Receive Area" of "Refresh Setting". ( Page 28 Refresh Setting)
	Is the data consistency setting enabled when data with two or more are used?	Set "Data Consistency Setting" to "Enable" when I/O data with two words or more consistency are assured.
Invalid data of the IO controller	Have any errors occurred in the IO controller?	Refer to the manual of the IO controller used.
Byte order	Does the IO controller use the big-endian byte order?	<p>If the big-endian byte order is used, swap the byte order of sending data or receiving data in units of one word in a ladder program.</p> <p>For the program example which swaps the byte order, refer to the following.</p> <p> MELSEC iQ-R PROFINET IO Device Module User's Manual (Startup)</p> <p>Since the RJ71PN93 uses the little-endian byte order for send/receive data, the byte order of the send/receive data is inverted at communications with the IO controller which uses big-endian byte order.</p>
IO controller settings	Are the programs and parameters of the IO controller correct?	Refer to the manual of the IO controller used.
Failure of the IO controller	Does the IO controller operate properly?	Refer to the manual of the IO controller used.
CPU module stop error	Has an error occurred in the CPU module?	<p>Take the actions displayed on the window.</p> <p>If the stop error occurs in the CPU module, 'IO data send area refresh directive' (Y0) is turned off and the RJ71PN93 sends 0.</p>
Major/moderate error	Has an error occurred in the module?	Take the actions displayed on the window.

Communications with IO controller are unstable

When communications with the IO controller are unstable, check the following items.

Check item	Action
Is the Ethernet cable connected correctly?	Connect the Ethernet cable again.
Is the Ethernet cable wired correctly?	Wire the Ethernet cable correctly. ( MELSEC iQ-R PROFINET IO Device Module User's Manual (Startup))
Is the Ethernet cable used normal?	<p>Check if the normal Ethernet cable is used.</p> <ul style="list-style-type: none"> Check if the length between nodes is within the range of the specification. Check if the Ethernet cable is disconnected or short circuit.
Does the IO controller operate properly?	Check the status of the IO controller.
Has the automatic hardware test completed with an error?	If an error is found in the result of the automatic hardware test, please consult your local Mitsubishi representative.
Is the network in the overloaded conditions?	Reduce the communication load by setting the communication cycle longer or other methods on the IO controller side.
Is the device name or IP address (including subnet mask and default gateway) set to the RJ71PN93 via a network?	<p>Do not set the device name or IP address during communications with the IO controller. Once the RJ71PN93 accepts these setting requests, the communications are temporarily stopped to update the setting information in the module.</p> <p>(Even if the setting values are the same values as the current ones, the setting information is updated.)</p>

Others

■When communication timeout error occurs

When a communication timeout error occurs, check the following items.

Check item	Action
Does the IO controller operate properly?	Refer to the manual of the IO controller used and check the error information.
Is the watchdog timer setting too short?	Refer to the manual of the IO controller used and set the module watchdog timer appropriately.
Are communications with IO controller unstable?	<p>Check the following.</p> <p> Page 41 Communications with IO controller are unstable</p>

■Operation of the RJ71PN93 is unstable or does not work.

When operation of the RJ71PN93 is unstable or does not work, check the following.

Check item	Action
Has the automatic hardware test completed with an error?  Page 34 Automatic Hardware Test	If an error is found in the result of the automatic hardware test, please consult your local Mitsubishi representative.

3.5 List of Error Codes

This section lists the error codes, error definitions and causes, and actions for the errors that occur in processing for data communication between the IO controller and the RJ71PN93 or are caused by processing requests from the CPU module on the own node.

Error codes are classified into major error, moderate error, and minor error, and can be checked in the [Error Information] tab of the "Module Diagnostics" window of the RJ71PN93. ( Page 31 Error information)

Error code	Error definition and cause	Action	Detailed information
1080H	The number of writes to the flash ROM has exceeded 100000.	Replace the module with the new one.	—
1811H	A stop error has been detected in the CPU module.	Check the error details of the CPU module by executing the module diagnostics of the engineering tool, and take actions.	—
18D1H	The module has been in the overloaded conditions.	Check if the line is in the overloaded conditions, and eliminate the error cause.	—
2220H	An incorrect content has been detected in the module parameters.	Check the module parameters. If the same error occurs again even after the above action is taken, the module may have a hardware failure. Please consult your local Mitsubishi representative.	—
3C00H	A hardware failure has been detected.	<ul style="list-style-type: none">Take measures to reduce noise.Reset the CPU module, and run it again. If the same error occurs again even after the above action is taken, the module may have a hardware failure. Please consult your local Mitsubishi representative.	—
3C01H	A hardware failure has been detected.	<ul style="list-style-type: none">Take measures to reduce noise.Reset the CPU module, and run it again. If the same error occurs again even after the above action is taken, the module may have a hardware failure. Please consult your local Mitsubishi representative.	—
3C02H	A hardware failure has been detected.	<ul style="list-style-type: none">Take measures to reduce noise.Reset the CPU module, and run it again. If the same error occurs again even after the above action is taken, the module may have a hardware failure. Please consult your local Mitsubishi representative.	—
3C03H	A hardware failure has been detected.	<ul style="list-style-type: none">Take measures to reduce noise.Reset the CPU module, and run it again. If the same error occurs again even after the above action is taken, the module may have a hardware failure. Please consult your local Mitsubishi representative.	—

3.6 Event List

This section lists the events which occur in the RJ71PN93.

System

Event code	Overview	Cause
00400	IO data exchanges started	I/O data exchanges with the IO controller have started.
00690	IO data send area refresh started	Sending data in the IO data send area to the IO controller has started.
00697	Current own node information ("Device Name") (Disable permanent option)	The current own node information (device name) has been changed via a network. The own node information is not saved in the module.
00698	Current own node information ("Device Name") (Enable permanent option)	The current own node information (device name) has been changed via a network. The own node information is saved in the module.
00699	Current own node information ("IP Address") (Disable permanent option)	The current own node information (IP address) has been changed via a network. The own node information is not saved in the module.
0069A	Current own node information ("IP Address") (Enable permanent option)	The current own node information (IP address) has been changed via a network. The own node information is saved in the module.
00C00	IO data exchanges stopped	I/O data exchanges with the IO controller have stopped.
00E82	IO data send area refresh stopped	Sending data in the IO data send area to the IO controller has stopped.

Operation

Event code	Overview	Cause
26000	Error clear	The error was cleared with the engineering tool.

APPENDICES

Appendix 1 Module Label

This section describes how to use a module label to configure the I/O signals and buffer memory of the RJ71PN93.

Module label format

The name of the module label is defined in the following formats.

"Instance name" "_Module number". "Label name"

"Instance name" "_Module number". "Label name" _D

Ex.

RPN93_1. bSts_ModuleREADY

■Instance name

The instance name of the RJ71PN93 is as follows.

Module model name	Instance name
RJ71PN93	RPN93

■Module number

A module number is a number starting from one that is assigned to identify modules with the same instance name.

■Label name

A label name of a module of its own

■_D

This symbol indicates that the module label is for direct access. Without this symbol, the label is for refresh. Refresh and direct access are different as shown in the table below.

Type	Description	Access timing
Refresh	Values read/written from/to a module label are applied simultaneously to the module at the time of refresh. This can reduce the execution time of the program.	At the time of refresh
Direct access	Values read/written from/to a module label are applied immediately to the module. The execution time of the program increases compared to that of refresh, but responsiveness improved.	At the time of reading/writing from/to the module label

Appendix 2 I/O Signals

This section describes I/O signals for the CPU module. The I/O signal assignment of when the start I/O number of the RJ71PN93 is "0" is listed below.

List of I/O signals

The following table lists the I/O signals. The device X is an input signal from the RJ71PN93 to the CPU module. The device Y is an output signal from the CPU module to the RJ71PN93.

Input signals

Device No.	Signal name
X0	Module watchdog timer error
X1	IO data exchanging
X2	IO data receive error
X3	Module error
X4 to X1C	Use prohibited
X1D	Module READY
X1E to X1F	Use prohibited

Output signals

Device No.	Signal name
Y0	IO data send area refresh directive
Y1 to Y1F	Use prohibited



Do not turn on "Use prohibited" signals of I/O signals for the CPU module. Doing so may cause the programmable controller system to malfunction.

A

Details of input signals

Module watchdog timer error (X0)

This signal turns on when a module watchdog timer error occurs.

- On: A watchdog timer error has occurred.
- Off: No watchdog timer error has occurred.

'Module watchdog timer error' (X0) turns on and off by resetting the CPU module or powering off and on the system.

If the signal turns on again, the RJ71PN93 may have a hardware failure. In such a case, please consult your local Mitsubishi representative.



'Module watchdog timer error' (X0) turns on when the RJ71PN93 suddenly stops.

IO data exchanging (X1)

This signal turns on when I/O data exchanges start or when I/O data exchanges perform normally.^{*1}

The signal is used as an interlock for the program.

- On: I/O data exchanging
- Off: I/O data exchanges stopped

When 'IO data exchanging' (X1) turns on, the values stored in the 'IO data receive area data size' (Un\G1280 to Un\G1287) and the values in 'IO data send area data size' (Un\G1296 to Un\G1303) of the buffer memory areas are updated.

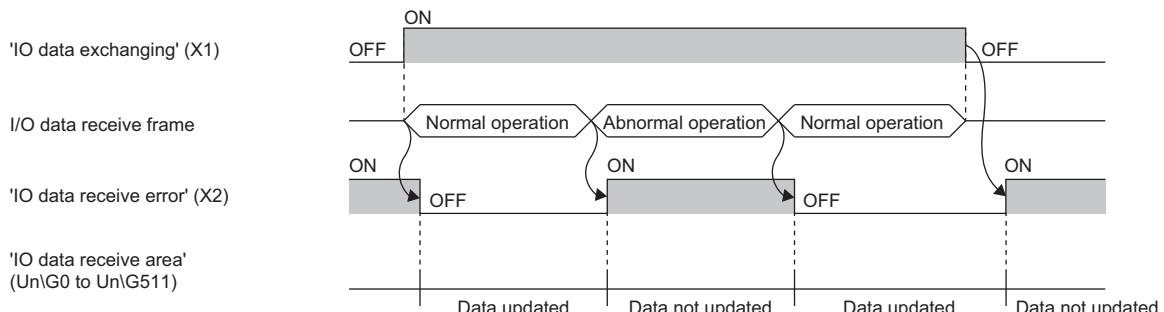
*1 At the start of I/O data exchanges, 'IO data exchanging' (X1) turns on, then the BF LED is turned off.

IO data receive error (X2)

This signal turns on when the I/O data receive frame is invalid from the IO controller or when I/O data exchanges stopped.

- On: I/O data receive frame is invalid or I/O data exchanges stopped
- Off: I/O data receive frame is normal

When 'IO data receive error' (X2) turns on, the last normal data received is held in 'IO data receive area' (Un\G0 to Un\G511) of the buffer memory areas.



Module error (X3)

This signal turns on when a module error occurs.

- On: A module error has occurred.
- Off: No module error has occurred.

Module READY (X1D)

This signal turns on when the CPU module is reset or powered off and on or when the RJ71PN93 is ready.

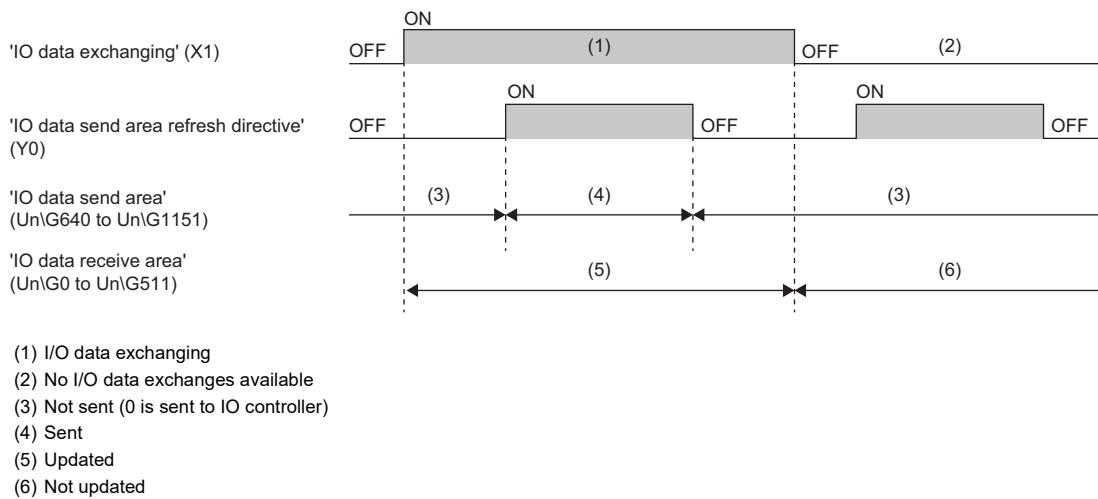
It also turns off when a watchdog timer error or a hardware failure occurs.

- On: Module ready
- Off: The module is in preparation, a watchdog timer error has occurred, or a hardware failure has occurred.

Details of output signals

IO data send area refresh directive (Y0)

- Turning on this signal (Y0) starts sending data in 'IO data send area' (Un\G640 to Un\G1151) to the I/O controller while 'IO data exchanging' (X1) is on. (0 is sent to the IO controller until turning on this signal (Y0)).
- Turning on and off this signal (Y0) stops sending data in the 'IO data send area' (Un\G640 to Un\G1151) to the I/O controller. (0 is sent to the I/O controller while data exchanges are stopped and the refresh in 'IO data receive area' (Un\G0 to Un\G511) is continued.
- If this signal (Y0) turns on while 'IO data exchanging' (X1) is off, the data in 'IO data send area' (Un\G640 to Un\G1151) is not sent.



Appendix 3 Buffer Memory

The buffer memory is used to exchange data between the RJ71PN93 and the CPU module, or between the RJ71PN93 and an IO controller. Buffer memory values are defaulted when the CPU module is reset or the system is powered off and on.

List of buffer memory addresses

Address (decimal)	Address (hexadecimal)	Name	Initial value	Read, write	
0 to 63	0H to 3FH	IO data receive area	Slot 1	0	Read
64 to 127	40H to 7FH		Slot 2	0	Read
128 to 191	80H to BFH		Slot 3	0	Read
192 to 255	C0H to FFH		Slot 4	0	Read
256 to 319	100H to 13FH		Slot 5	0	Read
320 to 383	140H to 17FH		Slot 6	0	Read
384 to 447	180H to 1BFH		Slot 7	0	Read
448 to 511	1C0H to 1FFH		Slot 8	0	Read
512 to 639	200H to 27FH	System area			
640 to 703	280H to 2BFH	IO data send area	Slot 1	0	Read, write
704 to 767	2C0H to 2FFH		Slot 2	0	Read, write
768 to 831	300H to 33FH		Slot 3	0	Read, write
832 to 895	340H to 37FH		Slot 4	0	Read, write
896 to 959	380H to 3BFH		Slot 5	0	Read, write
960 to 1023	3C0H to 3FFH		Slot 6	0	Read, write
1024 to 1087	400H to 43FH		Slot 7	0	Read, write
1088 to 1151	440H to 47FH		Slot 8	0	Read, write
1152 to 1279	480H to 4FFH	System area			
1280	500H	IO data receive area data size	Slot 1	0	Read
1281	501H		Slot 2	0	Read
1282	502H		Slot 3	0	Read
1283	503H		Slot 4	0	Read
1284	504H		Slot 5	0	Read
1285	505H		Slot 6	0	Read
1286	506H		Slot 7	0	Read
1287	507H		Slot 8	0	Read
1288 to 1295	508H to 50FH	System area			
1296	510H	IO data send area data size	Slot 1	0	Read
1297	511H		Slot 2	0	Read
1298	512H		Slot 3	0	Read
1299	513H		Slot 4	0	Read
1300	514H		Slot 5	0	Read
1301	515H		Slot 6	0	Read
1302	516H		Slot 7	0	Read
1303	517H		Slot 8	0	Read
1304 to 1359	518H to 54FH	System area			
1360 to 1361	550H to 551H	Current Own Node Setting	IP address	0	Read
1362 to 1363	552H to 553H		Subnet mask	0	Read
1364 to 1365	554H to 555H		Default gateway	0	Read
1366 to 1485	556H to 5CDH		Device name	0	Read
1486 to 1487	5CEH to 5CFH	System area			
1488 to 1489	5D0H to 5D1H	Own Node Setting (Set by network)	IP address	0	Read
1490 to 1491	5D2H to 5D3H		Subnet mask	0	Read
1492 to 1493	5D4H to 5D5H		Default gateway	0	Read
1494 to 1613	5D6H to 64DH		Device name	0	Read

A

Address (decimal)	Address (hexadecimal)	Name	Initial value	Read, write	
1614 to 1615	64EH to 64FH	System area			
1616 to 1617	650H to 551H	Own Node Setting (Set by GX Works3)	IP address	0	Read
1618 to 1619	652H to 653H		Subnet mask	0	Read
1620 to 1621	654H to 655H		Default gateway	0	Read
1622 to 1741	656H to 6CDH		Device name	0	Read
1742 to 1743	6CEH to 6CFH	System area			
1744	6D0H	Data consistency setting	0	Read	
1745 to 1751	6D1H to 6D7H	System area			
1752	6D8H	Module error information	0	Read	
1753 to 2079	6D9H to 81FH	System area			
2080	820H	Operation mode	0	Read	
2081	821H	Offline test status	0	Read	
2082	822H	System area			
2083	823H	Running offline test number	0	Read	
2084 to 65536	824H to 10000H	System area			



Do not write data to "System area". Doing so may cause malfunction of the programmable controller system.

Details of buffer memory addresses

This section describes the buffer memory areas of the RJ71PN93.

IO data send/receive area

■IO data receive area (Un\G0 to Un\G511)

In I/O data exchanges, this area stores data output from the IO controller by each slot.

For details, refer to the following.

☞ Page 16 Data Exchange

■IO data send area (Un\G640 to Un\G1151)

In I/O data exchanges, this area stores data input to the IO controller by each slot.

For details, refer to the following.

☞ Page 16 Data Exchange

IO data send/receive area data size

■IO data receive area data size (Un\G1280 to Un\G1287)

This area stores data size (word) in IO data receive area that is set to parameters in the IO controller by each slot.

For details, refer to the following.

☞ Page 16 Data Exchange

■IO data send area data size (Un\G1296 to Un\G1303)

This area stores data size (word) in IO data send area that is set to parameters in the IO controller by each slot.

For details, refer to the following.

☞ Page 16 Data Exchange

A

Own node setting

■Current Own Node Setting (Un\G1360 to Un\G1485)

This area stores the values of current own node information.

- IP address: 2 words
- Subnet mask: 2 words
- Default gateway: 2 words
- Device name: 120 words

The IP address, subnet mask, and default gateway are stored as follows.

Item	Upper byte	Lower byte
1st word	3rd octet	4th octet
2nd word	1st octet	2nd octet

The value to be stored in this area at startup is determined by mode settings.

Mode setting	Current own node information at startup
Online (Use parameter in the module)	The own node information saved in the module is stored.
Online (Use parameter set by GX Works3)	The own node information set by the engineering tool is stored.
Automatic hardware test	The initial value is stored.

Point

Own node information of the RJ71PN93 may be changed via a network. In such a case, the changed information is applied to this area.

The changes of the own node information via a network occurs in the following cases:

- When establishing communications by the IO controller
- When executing the own node information change instruction to the RJ71PN93 using PROFINET configuration tool

■Own Node Setting (Set by network) (Un\G1488 to Un\G1613)

This area stores the value of own node information that is saved in a module via a network.

However, if the own node information is not saved in the module, the initial value is stored. If the connection with the IO controller is also disconnected, the own node information during the connection is held.

For details on the value of the own node information to be stored, refer to the following.

☞ Page 52 Current Own Node Setting (Un\G1360 to Un\G1485)

Precautions

When the module is started up after the settings that are different from those saved in the module are set by GX Works3 and "Mode Setting" is set to "Online (Use parameter set by GX Works3)", the module saves the settings set by GX Works3.

Therefore, this area saves the setting values by GX Works3.

■Own Node Setting (Set by GX Works3) (Un\G1616 to Un\G1741)

This area stores the value of own node information set by the engineering tool at start-up.

For details on the value of own node information to be stored, refer to the following.

☞ Page 52 Current Own Node Setting (Un\G1360 to Un\G1485)

Data consistency setting

■Data consistency setting (Un\G1744)

This area stores the value of data consistency setting by the engineering tool.

- 0: Enable data consistency
- 1: Disable data consistency

Module error information

■Module error information (Un\G1752)

This area stores an error code occurring in the RJ71PN93.

For the error code to be stored, refer to the following.

 Page 42 List of Error Codes

The following table lists the update conditions and the descriptions of this area.

Condition	Description
An error occurred.	An error code is stored. When more than one error occurs, the error code with the highest priority is stored. When more than one error with the same highest priority occurs, the error code of the most recent error is stored.
The error is cleared.	An error in this area is cleared by performing the following. • Click the [Clear Error] button on the "Module Diagnostics" window of the engineering tool.

When data in this area is updated, the module error information is notified of the CPU module.

Operation mode

■Operation mode (Un\G2080)

This area stores mode setting information set to the RJ71PN93.

- 0: Online (Use parameter in the module)
- 1: Online (Use parameter set by GX Works3)
- 2: Automatic H/W Test

0 is stored as the initial value in active.

A

Offline test

■Offline test status (Un\G2081)

This area stores the execution status of the offline test.

- 0: The offline test has not been executed yet.
- 1: The offline test is in progress.
- 2: The offline test is completed successfully.
- 3: The offline test is completed with an error.

■Running offline test number (Un\G2083)

This area stores the execution status of the offline test.

- 1: ROM test
- 2: RAM test
- 3: 2-port RAM test

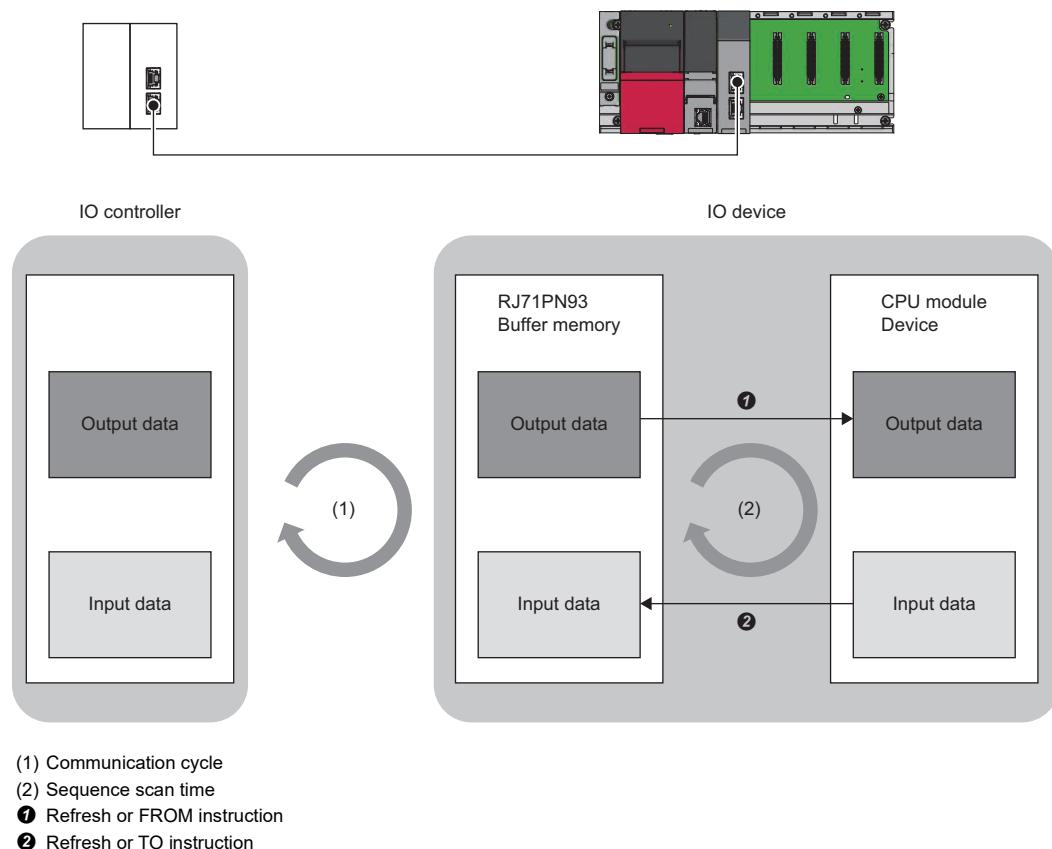
Appendix 4 Processing Time

Transmission delay time of I/O data exchanges

This section describes the transmission delay time of I/O data exchange.

Transmission delay time is the time needed for transmitting I/O data between the CPU module with which the RJ71PN93 is mounted and the IO controller network during I/O data exchanges.

Communication direction	Description
IO controller → RJ71PN93	The time between output data sent from the IO controller and data storage in the CPU module device with which the RJ71PN93 is mounted.
RJ71PN93 → IO controller	The time between data storage in the CPU module device with which the RJ71PN93 is mounted and data received from the IO controller.



Transmission delay time of output data received

■Calculation formula

Calculation value	When data consistency setting is disabled	When data consistency setting is enabled
Normal value [ms]	$T_{scan} \times 0.5 + T_{unit} + T_{cycle} \times 0.5$	$T_{scan} \times 1.5 + T_{unit} + T_{cycle} \times 0.5$
Maximum value [ms]	$T_{scan} + T_{unit} + T_{cycle}$	$T_{scan} \times 2 + T_{unit} + T_{cycle}$

■Symbols in the above formulas

Symbol	Item	Description
T _{scan}	Sequence scan time	MELSEC iQ-R CPU Module User's Manual (Application)
T _{unit}	Module processing time (1.5ms)	The time to transfer data received from receive buffer to 'IO data receive area' (Un\G0 to Un\G511).
T _{cycle}	Communication cycle set on the IO controller	Manual of the IO controller or PROFINET configuration tool used

Transmission delay time of sending input data

■Calculation formula

Calculation value	When data consistency setting is enabled	
	T _{scan} >T _{cycle}	T _{scan} <T _{cycle}
Normal value [ms]	$T_{scan} \times 1.5 + T_{unit} + T_{cycle} \times 0.5$	$T_{scan} \times 0.5 + T_{unit} + T_{cycle}$
Maximum value [ms]	$T_{scan} \times 2 + T_{unit} + T_{cycle}$	$T_{scan} + T_{unit} + T_{cycle} \times 2$

■Symbols in the above formulas

Symbol	Item	Description
T _{scan}	Sequence scan time	MELSEC iQ-R CPU Module User's Manual (Application)
T _{unit}	Module processing time (1.5ms)	The time to transfer send data from 'IO data send area' (Un\G640 to Un\G1151) to send buffer.
T _{cycle}	Communication cycle set on the IO controller	Manual of the IO controller or PROFINET configuration tool used

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REVISIONS

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

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MODEL: RJ71PN93-U-OU-E

MODEL CODE: 13JX4E

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

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