



Programmable Controller

MELSEC iQ-R
series

MELSEC iQ-R PROFINET IO Controller Module User's Manual (Startup)

-RJ71PN92



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 MELSEC iQ-R Module Configuration Manual.

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.
 - For the operating status of each IO device after a communication failure, refer to the MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application). Incorrect output or malfunction due to a communication failure may result in an accident.
 - Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail in multiple IO devices. Failure to do so may result in an accident due to an incorrect output or malfunction.
-

[Design Precautions]

CAUTION

- 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 electromagnetic interference. Keep a distance of 100mm or more between those cables.
 - During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
 - After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
 - Do not power off the programmable controller or reset the CPU module while the settings are being written. 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 also may cause malfunction or failure of the module.
 - When changing the operating status of the CPU module from external devices (such as the remote RUN/STOP functions), select "Do Not Open by Program" for "Opening Method" of "Module Parameter". If "Open by Program" is selected, an execution of the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.
-

[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

- 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.
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[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 Precautions]

CAUTION

- 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.
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[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 procedures, system configuration, and wiring of the relevant product 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

RJ71PN92

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

To ensure that Mitsubishi Electric programmable controllers maintain the EMC and Low Voltage Directives or other regulations when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- MELSEC iQ-R Module Configuration Manual (SH-081262ENG)
- Safety Guidelines (IB-0800525)

Certification marks on the side of the programmable controller indicate compliance with the relevant regulations.

Additional measures

To ensure that this product maintains the EMC and Low Voltage Directives or other regulations, please refer to the following.

- Page 27 Maintaining EMC Directive in this manual

MEMO

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R PROFINET IO Controller Module User's Manual (Startup) [SH-081679ENG] (this manual)	Specifications, procedures before operation, system configuration, wiring, and communication examples of the PROFINET IO controller 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 Controller Module User's Manual (Application) [SH-081680ENG]	Functions, parameter settings, operation methods of GX Configurator-PN, programming, troubleshooting, I/O signals, and buffer memory of the PROFINET IO controller module	Print book e-Manual PDF
MELSEC iQ-R PROFINET IO Controller Module Function Block Reference [BCN-P5999-0740]	Specifications of the MELSEC iQ-R series PROFINET IO controller module FBs	e-Manual PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF

This manual does not include detailed information on the following:

- General specifications
- Installation

For details, refer to the following.

 MELSEC iQ-R Module Configuration Manual

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
Acyclic communications	Acyclic data communications. Data are read/written from/to an IO device at the desired timing.
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.
Cycle time	Time required for one cycle of data exchange between the RJ71PN92 and each IO device
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.
Disconnection	A process of stopping communications if a communication error occurs
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.
GX Configurator-PN	A tool to set network configuration for PROFINET
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	A component that is a part of an IO device. The module can be easily added or replaced.
PROFINET	An industrial Ethernet protocol offered by PROFIBUS & PROFINET International

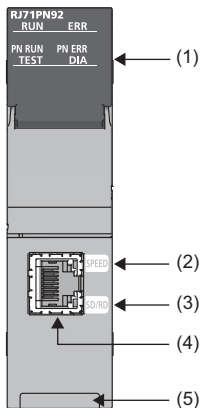
GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
Ethernet device	A generic term for devices, such as personal computers, that support IP (Internet Protocol) communications
IO device	An abbreviation for the PROFINET IO device
RAS	An abbreviation for Reliability, Availability, and Serviceability. This term refers to the overall usability of automated equipment.

1 PART NAMES

This section describes the names of each part of the RJ71PN92.



No.	Name	Description
(1)	RUN LED	Indicates the operating status. On: Normal operation Flashing: Initial processing Off: Error (MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application))
	ERR LED	Indicates the error status of the module. On, flashing: Error (MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application)) Off: Normal operation
	PN RUN LED	Indicates the communication status of PROFINET. On: Data communications being performed Off: Data communications stopped
	PN ERR LED	Indicates the communication error status of PROFINET. On: Communication error (MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application)) Flashing: One or more IO devices are not connected or an error has occurred in one or more IO devices. (MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application)) Off: Normal operation
	TEST LED	Indicates the receive status of the Blink command.*1 Flashing: Blink command received from an external device Off: Blink command not received
	DIA LED	Indicates the alarm status of the connected IO devices. On: Alarm issued Off: No alarm
(2)	SPEED LED	Indicates the link status of PROFINET. On (orange): Link-up (1Gbps) On (green): Link-up (100Mbps) Off: Link-down or link-up (10Mbps)
(3)	SD/RD LED	Indicates the data sending/receiving status. On: Data being sent or received Off: Data not sent nor received
(4)	Ethernet port	A connector for PROFINET. Connect an Ethernet cable. For wiring methods and wiring precautions, refer to the following. Page 27 WIRING
(5)	Production information marking	Shows the production information (16 digits) of the module.

*1 The Blink command remotely flashes the LED on the connected IO device. This command shows the physical location of the IO device selected on GX Configurator-PN. (MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application))

2 SPECIFICATIONS

2.1 Performance Specifications

The following table lists the performance specifications of the RJ71PN92.

Item		Description
Data exchange	Maximum input data length per network	4096 words
	Maximum output data length per network	4096 words
	Maximum input data length per IO device	1437 bytes
	Maximum output data length per IO device	1437 bytes
	Cycle time	512ms maximum 1ms minimum* ¹
Service interface	Maximum transmission capacity per request	4116 bytes
Maximum number of connectable IO devices		128
Transmission specifications	Data transmission speed* ²	1Gbps/100Mbps/10Mbps
	Communication mode	Full-duplex
	Interface	RJ45 connector (Auto-negotiation, AUTO MDI/MDI-X)
	Transmission method	Base band
	Maximum segment length	100m (length between hub and node)* ³
	Number of cascade connections	Consult the manufacturer of the switching hub used.
	IP version	IPv4
	Communication processing performance	Maximum 8000 packets (frames)/second* ⁴
Number of occupied I/O points		32
Internal current consumption (5VDC)		1.09A
External dimensions	Height	106mm (Base unit mounting side: 98mm)
	Width	27.8mm
	Depth	110mm
Weight		0.24kg

*1 The cycle time depends on the number of IO devices and the input/output data length.

*2 Data communications at 100Mbps is recommended.

*3 For maximum segment length (length between hubs), consult the manufacturer of the hub used.

*4 An error occurs if the communication setting over 8000 packets (frames)/second is set in GX Configurator-PN.

3 FUNCTION LIST

The following tables list the functions of the RJ71PN92. For details on the functions, refer to the following.

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

Data communications

Function	Description
Data exchange function	Performs data exchange between the RJ71PN92 and IO devices in a specified period.
Data consistency function	Assures consistency of data that is input or output in data exchange in units of an IO device.
Service interface function	Detects a network, detects an IO device, reads Record data in non-connection type Acyclic communications, writes Record data in connection type Acyclic communications, reads Record data in connection type Acyclic communications, issues an alarm request, issues an alarm ACK, acquires IO device information, and acquires an alarm log, at a timing different from the timing of data exchange.
Communication stop at CPU STOP	Stops communications with an IO device if the CPU module is in the STOP state.

RAS

Function	Description
Alarm acquisition function	Enables the RJ71PN92 to acquire alarms generated in IO devices.

Diagnostics


Function	Description
Automatic hardware test	Performs a test related to hardware, such as a ROM/RAM/Ethernet port of the RJ71PN92.

4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Mounting the module to the base unit

The RJ71PN92 has no module fixing hooks. For how to mount and remove a module without module fixing hooks to/from the base unit, refer to the following.

 MELSEC iQ-R Module Configuration Manual

2. Network construction

Configure the system and set the parameters which are required for start-up.

- Wiring ( Page 27 WIRING)
- Parameter setting ( MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application))

3. Network diagnostics

Check that communications are performed normally.

With normal communications, the status of LEDs and buffer memory areas are as follows.

- RUN LED: On
- ERR LED: Off
- PN RUN: On
- PN ERR: Off
- Corresponding bit of each IO device in 'IO device communication status' (Un\G17153 to Un\G17160): On
- Corresponding bit of each IO device in 'IO device error' (Un\G17161 to Un\G17168): Off

4. Programming

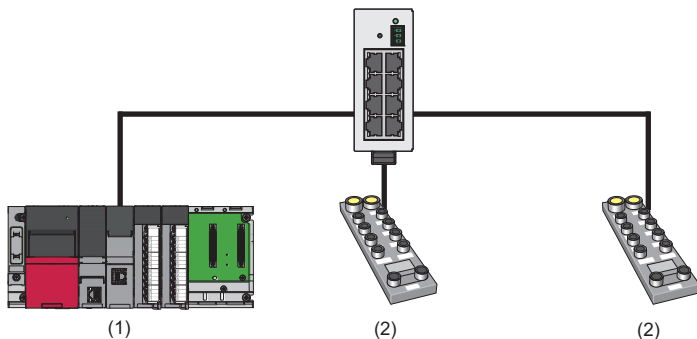
Create a program. For details, refer to the following.

 Page 29 COMMUNICATION EXAMPLE

5 SYSTEM CONFIGURATION

5.1 PROFINET Configuration

PROFINET consists of an RJ71PN92 (1) and IO devices (2).



Point

In PROFINET, other PROFINET IO controllers or external devices that perform TCP/IP communications can be used with the devices above on the same network.

5.2 Applicable CPU Modules

The following table shows the availability of the RJ71PN92 when each CPU module or remote head module is used.

The CPU modules and remote head modules are indicated by symbols as follows.

- Rn: RnCPU
- RnEN: RnENCPU
- RnP(P): Process CPU (process mode)
- RnP(R)(M): Process CPU (redundant mode) (main base unit)
- RnP(R)(E): Process CPU (redundant mode) (extension base unit in the redundant system with redundant extension base unit)
- RnMT: Motion CPU
- RnNC: NCCPU
- RnRT: Robot CPU
- RnC: C Controller module
- RnPSF: SIL2 Process CPU
- RnSF: Safety CPU
- Rem: Remote head module
- Rem(R): Remote head module (redundant system)

○: Available, ×: Not available

Model	Rn	RnEN	RnP(P)	RnP(R)(M)	RnP(R)(E)	RnMT	RnNC	RnRT	RnC	RnPSF	RnSF	Rem	Rem(R)
RJ71PN92	○ ^{*1}	○	○	×	×	×	○ ^{*2}	×	×	×	○ ^{*3}	×	×


*1 Use GX Configurator-PN with version 2.02C or later when the module is used with the R00CPU, R01CPU, or R02CPU.

*2 The RJ71PN92 can be mounted to the same base unit on which the NCCPU is mounted. However, only the NCCPU with version A4 or later can perform as the Control CPU when it is mounted together with the RJ71PN92, because the RJ71PN92 is not compatible with the NCCPU with version earlier than A4.

*3 The RJ71PN92 does not support PROFIsafe communications. Only standard PROFINET communications are available even when the RJ71PN92 is mounted together with the Safety CPU.


The RJ71PN92 does not support a safety program.

Point

- The number of mountable RJ71PN92s depends on the specifications of the CPU module used. (For the RJ71PN92 itself, there is no restrictions on the mountable number.) For the number of mountable RJ71PN92s for each type of CPU module to be connected together, refer to the following.
 MELSEC iQ-R Module Configuration Manual
- An error is not detected for the following cases: the RJ71PN92s are incompatible with the CPU module or the remote head module that is mounted together; the number of mounted RJ71PN92s exceeds its limit.

Multiple CPU system

The RJ71PN92 supports the multiple CPU system. For details on the multiple CPU system, refer to the following.

 MELSEC iQ-R Module Configuration Manual

5.3 Available Software Packages

GX Works3 and GX Configurator-PN are required for configuring the settings of the RJ71PN92.

Software	Supported version
GX Works3	Version 1.032J or later
GX Configurator-PN	Version 2.00A or later

Profile of the RJ71PN92

The profile is data stored the information (such as a model name) of connected devices.

Profile of the RJ71PN92 are automatically registered in GX Works3 during the installation of GX Configurator-PN.

Restriction

If GX Works3 is installed on the condition that GX Configurator-PN is already installed, the RJ71PN92 cannot be added in GX Works3.

Install each software in order of GX Works3 → GX Configurator-PN.

6 WIRING

This chapter describes the wiring for PROFINET.

6.1 Wiring Methods

This section describes connection and disconnection of the Ethernet cable.

Connecting the cable

1. Push the Ethernet cable connector into the RJ71PN92 until it clicks. Pay attention to the connector's direction.
2. Lightly pull it to check that it is securely connected.
3. Check that the SPEED LED of the port connected with an Ethernet cable is on.* 1

*1 The time between the cable connection and the SPEED LED turning on may vary. The SPEED LED usually turns on in a few seconds. Note, however, that the time may be extended further if the link-up processing is repeated depending on the status of the device on the line. Check whether the cables are connected properly if the SPEED LED does not turn on. In addition, when the communication speed is 10Mbps, the SPEED LED does not turn on. Perform network diagnostics to check whether the cables are connected properly. (📖 MELSEC iQ-R PROFINET IO Controller Module User's Manual (Application))

Disconnecting the cable

1. Press the latch down and unplug the Ethernet cable.

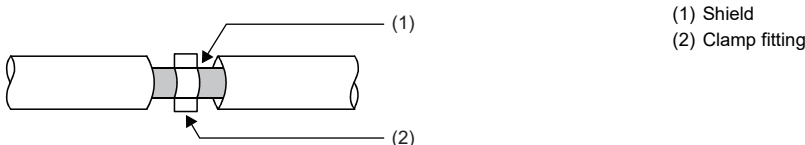
Precautions

- Place the Ethernet cable in a duct or clamp it. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or the cable or malfunction due to poor contact.
- Do not touch the core of the cable-side or module-side connector, and protect it from dirt or dust. If oil from your hand, dirt or dust is attached to the core, this can increase transmission loss, causing a problem in communications.
- Check that the Ethernet cable is not disconnected or not shorted and there is no problem with the connector connection.
- Do not use Ethernet cables with broken latches. Doing so may cause the cables to unplug or malfunction.
- Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling the cable connected to the module may result in damage to the module or the cable or malfunction due to poor contact.
- The maximum segment length of the Ethernet cable is 100m. However, the length may be shorter depending on the environment where the cable is used. For details, contact the cable manufacturer.
- The bending radius of the Ethernet cable is limited. For details, check the specifications of the Ethernet cable to be used.

Maintaining EMC Directive

To ensure that this product maintains EMC Directive, take the following measure.

- Use a shielded twisted pair cable to connect the 10BASE-T/100BASE-TX/1000BASE-T connector. Strip a part of the jacket of the shielded twisted pair cable as shown below and ground the exposed shield with the contact surface as large as possible.



6.2 Wiring Products

This section describes the devices used for PROFINET.

PROFINET devices

Ethernet cables must be prepared by users. For details on Ethernet cables, refer to the following.

- PI: www.profibus.com

Point

A communication error may occur due to high-frequency noise from devices other than a programmable controller in a given connection environment. The following describes countermeasures to be taken on the RJ71PN92 side to avoid high-frequency noise influence.

[Wiring]

- Do not install cables together with the main circuit lines or power cables.
 - Place cables in a duct.
-

Hubs

Use hubs that support the transmission speed of communication when using hub in PROFINET.

When the industrial managed switch (NZ2MHG-T8F2) is used, use the industrial managed switch (NZ2MHG-T8F2) with the production information (first six digits) of 7104AV or later.

7 COMMUNICATION EXAMPLE

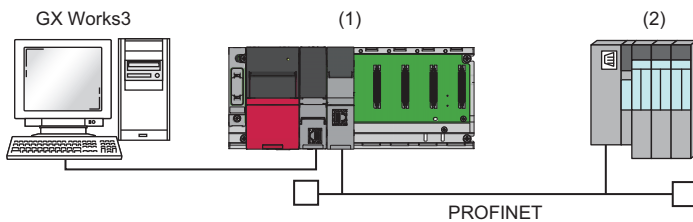
7.1 Communication Example of the RJ71PN92 and an IO Device

This section provides an example for data exchange between the RJ71PN92 and an IO device.

System configuration example

The following system configuration is used to explain data exchange between the RJ71PN92 and an IO device.

System configuration



(1) Programmable controller system

- Power supply module: R61P
- CPU module: R04CPU
- PROFINET IO controller module: RJ71PN92 (start I/O number: 0000H to 001FH)

(2) IO device: ET 200S (IM151-3 PN V2.0)*¹

- Power module: PM-E 24VDC
- I/O module: 4DI 24VDC
- I/O module: 2DO 24VDC/0.5A HF

*1 The device is manufactured by Siemens AG.

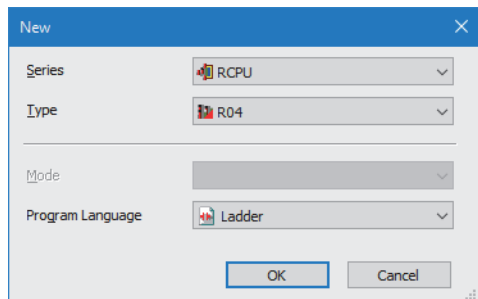
Setting parameters

Connect the engineering tool to the CPU module and set the parameters.

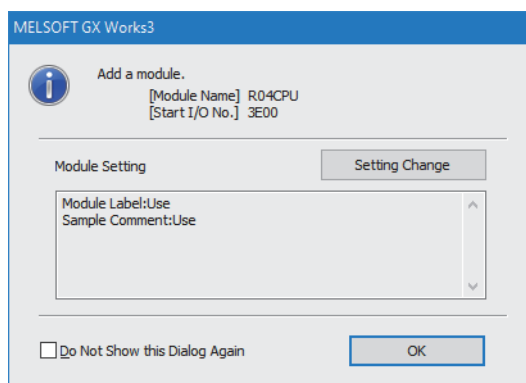
Setting module parameters

1. Set the CPU module as follows.

[Project] ⇒ [New]

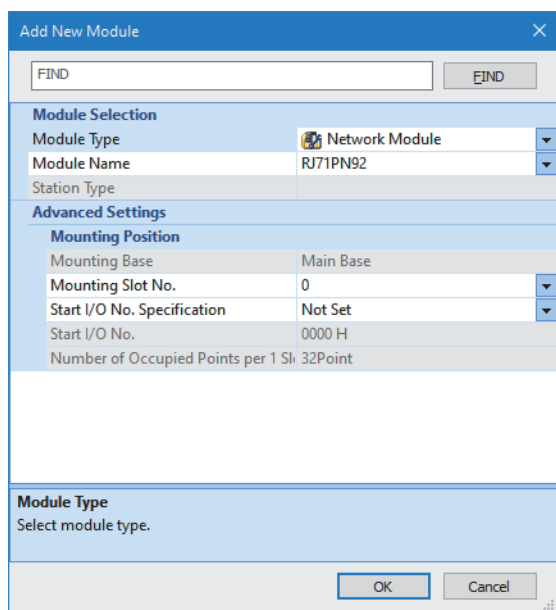


2. Click the [Setting Change] button and set "Use Module Label" to "Yes".



3. Set the RJ71PN92 as follows.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Right-click ⇒ [Add New Module]



4. Set the items in "Basic Setting" as follows.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN92] ⇒ [Module Parameter] ⇒ [Basic Setting]

Setting Item	
Item	
Various Operations Settings	
Mode Settings	Online
Own Node Setting	Set the information of the own node such as IP address.
IP Address Setting	Set the IP address, subnet mask, and default gateway for the own node.
IP Address	192.168.3.3
Subnet Mask	255.255.255.0
Default Gateway	
Controller Name	Set the Controller Name.
Name	rj71pn92

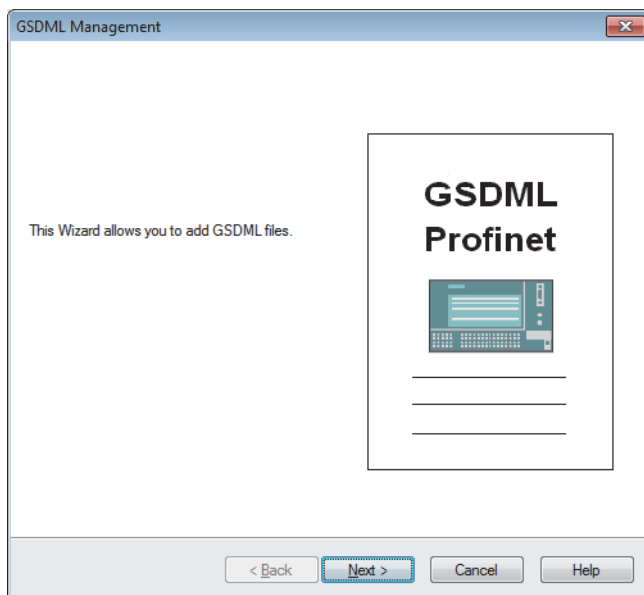
PROFINET module setting

1. Start GX Configurator-PN from the engineering tool.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN92] ⇒ [PROFINET Module Setting]

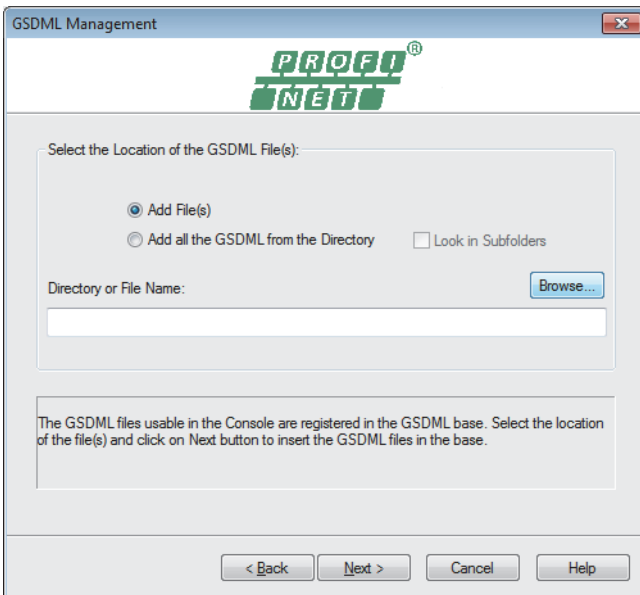
2. Open the "GSDML Management" window to add a GSDML file of the IO device to "Device Library".

[Library] ⇒ [Add]

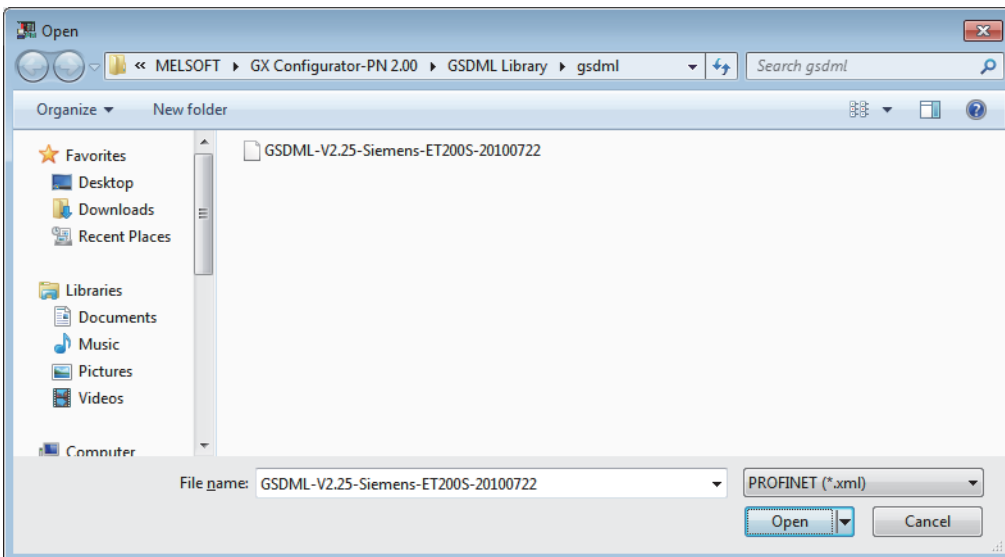


3. Click the [Next] button in the "GSDML Management" window.

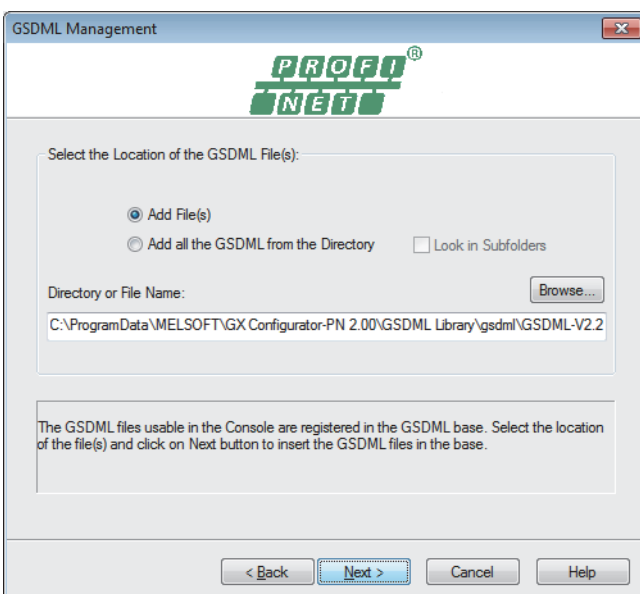
4. Click the [Browse] button.



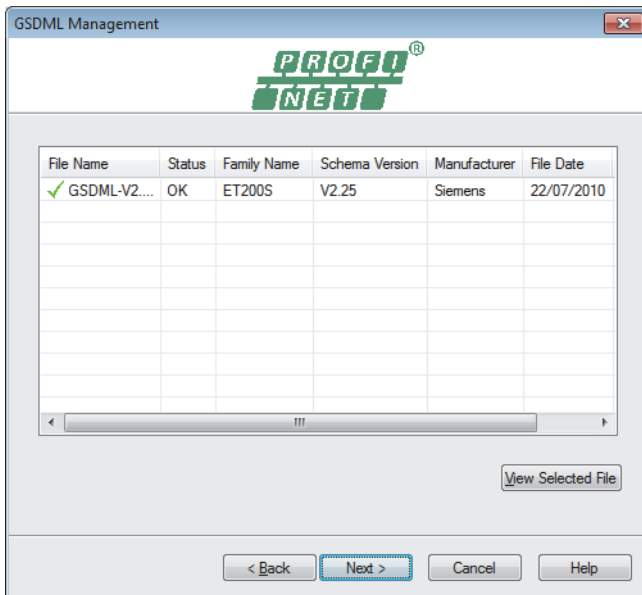
5. Select the GSDML file and click the [Open] button.



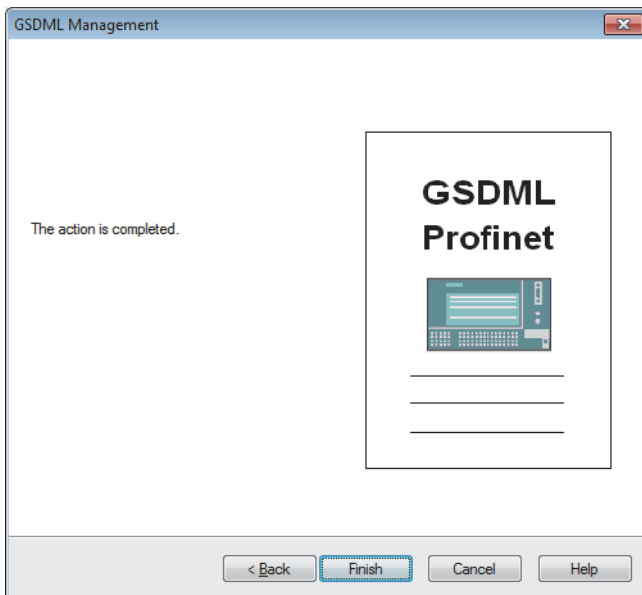
6. Click the [Next] button.



7. The result of the GSDML file addition to "Device Library" is displayed. Click the [Next] button.



8. Click the [Finish] button to exit the GSDML Management wizard.

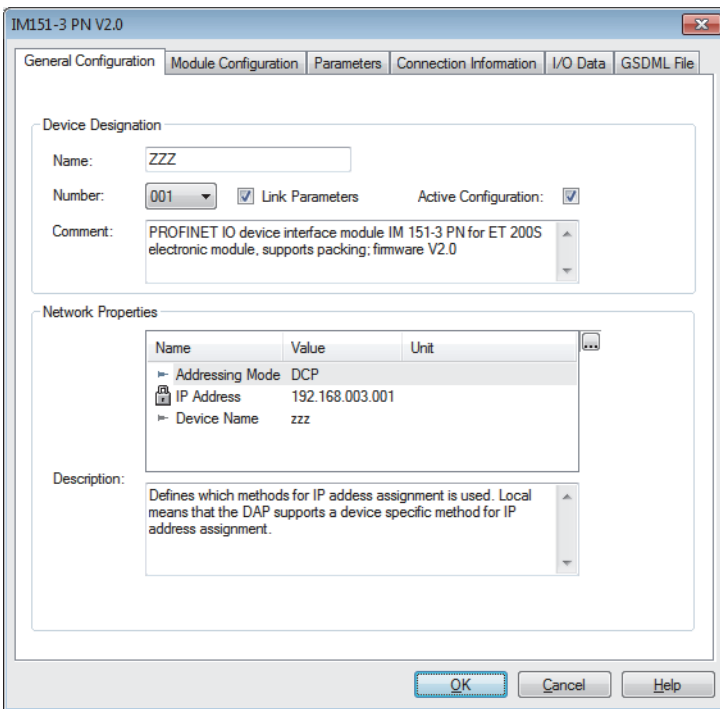


9. Select IM151-3 PN V2.0 in "Device Library" to add it in the network configuration setting.

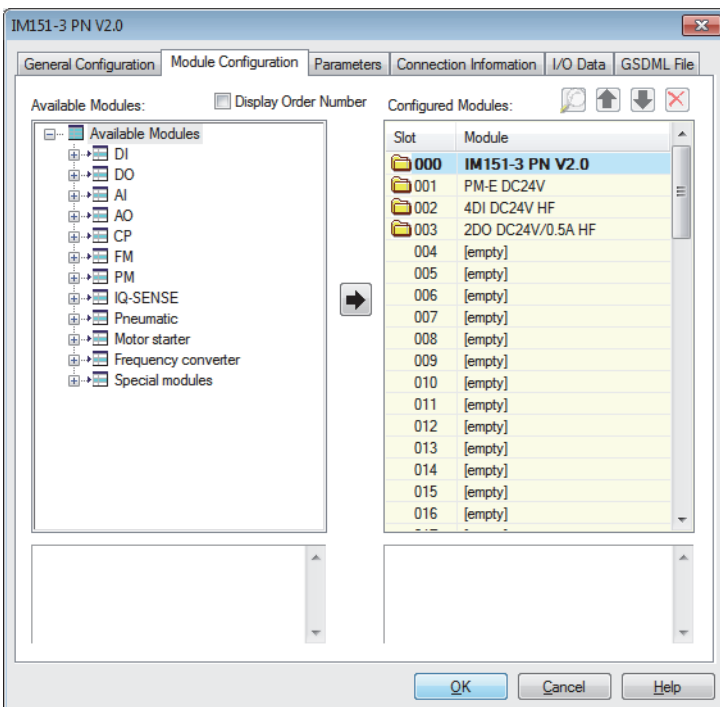
☞ Select IM151-3 PN V2.0 in "Device Library". ⇒ [Library] ⇒ [Insert in Configuration]

10. Set the parameters of IO device in the IO device setting window. (The IO device setting window pops up when IM151-3 PN V2.0 is added in the network configuration setting from "Device Library".)

- [General Configuration] tab



- [Module Configuration] tab



11. Save the set project of GX Configurator-PN.

[File] ⇒ [Save]

12. Exit GX Configurator-PN.

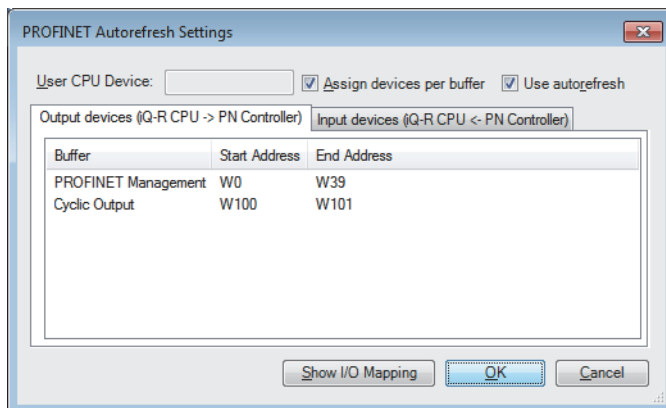
[File] ⇒ [Exit]

Refresh settings

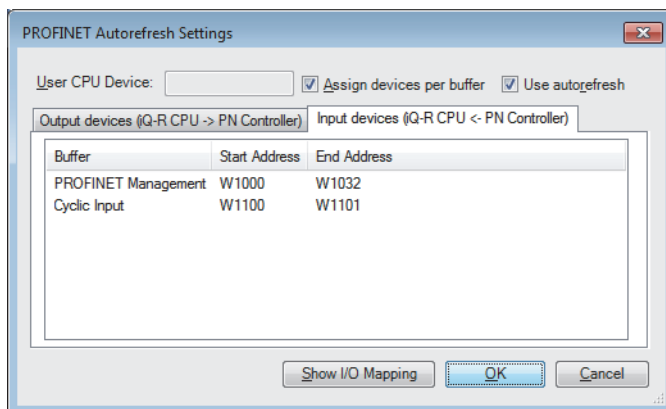
1. Set items for refresh as follows.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN92] ⇒ Right-click ⇒ [Autorefresh Settings]

- Output devices (iQ-R CPU → PN Controller) tab



- Input devices (iQ-R CPU ← PN Controller) tab



2. Click the [OK] button to complete the settings.

Updating global labels and structures

1. Update global labels and structures related to the RJ71PN92.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ [RJ71PN92] ⇒ Right-click ⇒ [Update PROFINET Label]

2. Convert or rebuild programs.

[Convert] ⇒ [Convert] or [Rebuild All]

3. Write the set parameters to the CPU module and the RJ71PN92. Then reset the CPU module or power off and on the system.

[Online] ⇒ [Write to PLC]

Point

In this example, default values are used for parameters that are not shown above. For the parameters, refer to the following.


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

Checking the network status

Check whether the RJ71PN92 and IO device communicate with each other normally.

Communications are performed normally if the status of LEDs and corresponding bits of each IO device in buffer memory areas are as follows after the program execution.

For the program, refer to the following.

 Page 37 Program example for data exchange

- LEDs of the RJ71PN92

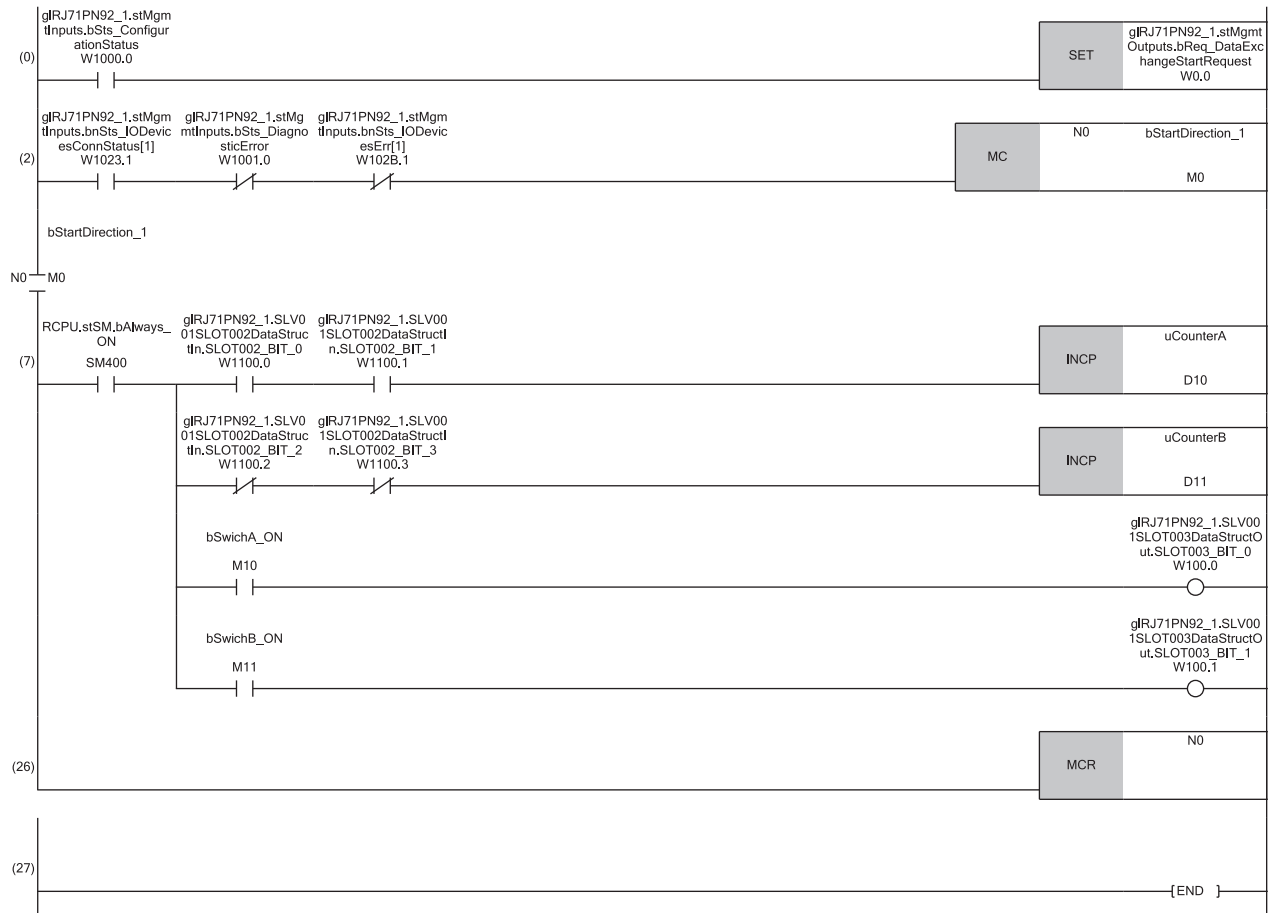
LED	Status
RUN	On
ERR	Off
PN RUN	On
PN ERR	Off

- Corresponding bits of each IO device in buffer memory areas

Name	Status
'IO device communication status' (Un\G17153 to Un\G17160)	On
'IO device error' (Un\G17161 to Un\G17168)	Off

Program example for data exchange

Classification	Label name	Description	Device																								
Module label	RCPU.stSM.bAlways_ON	Always on	SM400																								
Global label that was updated in the RJ71PN92	gIRJ71PN92_1.stMgmtOutputs.bReq_DataExchangeStartRequest	Data exchange start request	W0.0																								
	gIRJ71PN92_1.SLV001SLOT003DataStructOut.SLOT003_BIT_0	Output data to IO device 1	W100.0																								
	gIRJ71PN92_1.SLV001SLOT003DataStructOut.SLOT003_BIT_1		W100.1																								
	gIRJ71PN92_1.stMgmtInputs.bSts_ConfigurationStatus	Parameter setting status	W1000.0																								
	gIRJ71PN92_1.stMgmtInputs.bSts_DiagnosticError	Module error	W1001.0																								
	gIRJ71PN92_1.stMgmtInputs.bnSts_IODevicesConnStatus[1]	IO device communication status	W1023.1																								
	gIRJ71PN92_1.stMgmtInputs.bnSts_IODevicesErr[1]	IO device error	W102B.1																								
	gIRJ71PN92_1.SLV001SLOT002DataStructIn.SLOT002_BIT_0	Input data to IO device 1	W1100.0																								
	gIRJ71PN92_1.SLV001SLOT002DataStructIn.SLOT002_BIT_1		W1100.1																								
	gIRJ71PN92_1.SLV001SLOT002DataStructIn.SLOT002_BIT_2		W1100.2																								
gIRJ71PN92_1.SLV001SLOT002DataStructIn.SLOT002_BIT_3	W1100.3																										
Label to be defined	Define global labels as shown below:																										
	<table border="1"> <thead> <tr> <th>Label Name</th> <th>Data Type</th> <th>Class</th> <th>Assign (Device/Label)</th> </tr> </thead> <tbody> <tr> <td>bStartDirection_1</td> <td>Bit</td> <td>VAR_GLOBAL</td> <td>M0</td> </tr> <tr> <td>bSwichA_ON</td> <td>Bit</td> <td>VAR_GLOBAL</td> <td>M10</td> </tr> <tr> <td>bSwichB_ON</td> <td>Bit</td> <td>VAR_GLOBAL</td> <td>M11</td> </tr> <tr> <td>uCounterA</td> <td>Word [Signed]</td> <td>VAR_GLOBAL</td> <td>D10</td> </tr> <tr> <td>uCounterB</td> <td>Word [Signed]</td> <td>VAR_GLOBAL</td> <td>D11</td> </tr> </tbody> </table>			Label Name	Data Type	Class	Assign (Device/Label)	bStartDirection_1	Bit	VAR_GLOBAL	M0	bSwichA_ON	Bit	VAR_GLOBAL	M10	bSwichB_ON	Bit	VAR_GLOBAL	M11	uCounterA	Word [Signed]	VAR_GLOBAL	D10	uCounterB	Word [Signed]	VAR_GLOBAL	D11
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bStartDirection_1	Bit	VAR_GLOBAL	M0																								
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bSwichB_ON	Bit	VAR_GLOBAL	M11																								
uCounterA	Word [Signed]	VAR_GLOBAL	D10																								
uCounterB	Word [Signed]	VAR_GLOBAL	D11																								

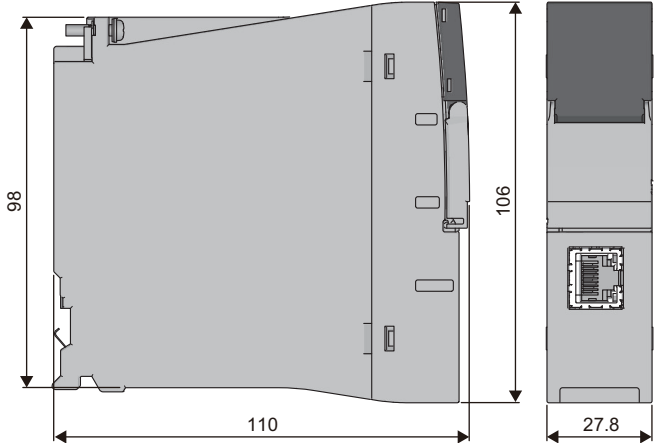


(7) Program to process I/O data to IO device 1

APPENDIX

Appendix 1 External Dimensions

This section describes the external dimensions of the RJ71PN92.



(Unit: mm)

MEMO

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REVISIONS

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

Revision date	*Manual number	Description
May 2017	SH(NA)-081679ENG-A	First edition
September 2018	SH(NA)-081679ENG-B	■Added or modified parts SAFETY PRECAUTIONS, Section 5.2, 6.2, 7.1
May 2021	SH(NA)-081679ENG-C	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Section 5.2
September 2021	SH(NA)-081679ENG-D	■Added function Communication stop at CPU STOP ■Added or modified parts COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, Chapter 3

Japanese manual number: SH-081677-D

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WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

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

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

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

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

2. Onerous repair term after discontinuation of production

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

3. Overseas service

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

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

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

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- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
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SH(NA)-081679ENG-D(2109)MEE

MODEL: RJ71PN92-U-IN-E

MODEL CODE: 13JX59

MITSUBISHI ELECTRIC CORPORATION

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