MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R DeviceNet Master/Slave Module
User's Manual (Startup)

-RJ71DN91

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.

1

[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.

● For the operating status of each node after a communication failure, refer to manuals relevant to the network. 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.

[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.

- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple nodes. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.

- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.

- If a communications error occurs on a DeviceNet network, faulty nodes will behave as (1) and (2) below. Utilizing communications states of slave nodes, create an interlock circuit on sequential programs and provide safety mechanism externally so that the system will operate safely.
  - (1) The master node (RJ71DN91) holds input data which had been received from slave nodes before the error occurred.
  - (2) Whether output signals of a slave node are turned off or held is determined by the slave node's specifications or the parameters set at the master node. When the RJ71DN91 is used as a slave node, it holds data that have been input from the master node before the communication error.

[Design Precautions]

⚠CAUTION

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

4

[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 screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

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

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 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. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact. 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 mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
- 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. 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 undefined. The values need to be set in the buffer memory and written to the flash ROM 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) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;

i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and

ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

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

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

("Prohibited Application")

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

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.

- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.

- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

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

RJ71DN91

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

To ensure that Mitsubishi Electric programmable controllers maintain EMC and Low Voltage Directives 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
 • Safety Guidelines (This manual is included with the base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

Additional measures

No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Startup) [SH-081765ENG] (this manual)	Specifications, procedures before operation, system configuration, wiring, and communication examples of the DeviceNet master/slave module	Print book
		e-Manual PDF
MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application) [SH-081767ENG]	Functions, parameter settings, dedicated instructions, programming, troubleshooting, I/O signals, and buffer memory of the DeviceNet master/slave module	Print book
		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

This manual does not include information on the module function blocks.

For details, refer to the Function Block Reference for the module used.

> **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

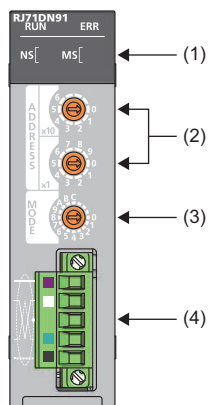Unless otherwise specified, this manual uses the following terms.

Term	Description
Buffer memory	Memory in an intelligent function module for storing data such as setting values and monitored values. When integrated into the CPU module, this memory refers to a memory for storing data such as setting values and monitored values of the Ethernet function, and data used for data communication of the multiple CPU system function.
Connection type	Communication methods that are used for I/O communications between the master node and slave nodes. When the RJ71DN91 is used as a master node, one of the following connection types can be selected for each slave node. • Polling • Bit strobe • Change of state • Cyclic When the RJ71DN91 is used as a slave node, I/O communications are performed by the polling method.
CPU module	A generic term for the MELSEC iQ-R series CPU modules
Device	A device (X, Y, M, D, or others) in a CPU module
Engineering tool	Another term for the software package for the MELSEC programmable controllers
Flash ROM	Internal memory of the RJ71DN91, in which parameters can be saved. Parameters saved in the flash ROM are read automatically to the buffer memory when the system is powered off and on or the CPU module is reset. (When module parameters are not set or "Basic parameter setting" of the module parameter is set to "Program" on GX Works3)
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.
Intelligent function module	A module that has functions other than input and output, such as an A/D converter module and D/A converter module
Label	A label that represents a device in a given character string
Master node	A device that communicates I/O data with slave nodes set in the parameters for master function
Master/slave node	A device that operates as a master node and slave node at the same time
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.
Parameter for master function	A parameter for setting information, such as a connection type and the number of I/O points, to perform I/O communications with each slave node when the RJ71DN91 is used as a master node
Parameter for slave function	Parameters that change the number of I/O points of a slave node when the RJ71DN91 is used as a slave node
RAS	The abbreviation for Reliability, Availability, and Serviceability. This term refers to the overall usability of automated equipment.
Remote head module	The abbreviation for the RJ72GF15-T2 CC-Link IE Field Network remote head module
Reserved node	A node reserved for future use. This node is not actually connected, but counted as a connected node.
Slave node	A device that communicates I/O data with the master node

1 PART NAMES

This section describes the names of each part of the RJ71DN91.

No.	Name		Description
(1)	RUN LED	Green	On: Normal operation Off: Error (📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application))
	ERR LED[1]	Red	On, flashing: Error (📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)) Off: Normal operation
	MS LED[1]	Green	On: Communication is available. Flashing: Parameter error Off: (When the red MS LED is also turned off) Power to the module is not being supplied.
		Red	On: Hardware failure (📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)) Flashing: Error (Hardware failures and parameter errors are excluded.) Off: (When the green MS LED is also turned off) Power to the module is not being supplied.
	NS LED	Green	On: Communication in progress Flashing: Waiting for communication (waiting for I/O communication request from the CPU module, or waiting for communication start of the target module) Off: (When the red NS LED is turned on or flashing) Communication error. (When the red NS LED is turned off) Initialization is not completed or power to the network is not being supplied.
		Red	On: The node address is out of range or the same as that of another node, or a bus off error (communication line error) has occurred. Flashing: (While the master function is used,) a node that does not respond exists. Off: (When the green NS LED is turned on or flashing) Normal operation. (When the green NS LED is turned off) Initialization is not completed or power to the network is not being supplied.
(2)	Node address setting switches		Sets the node address of the module. (Factory default: 0) • The node address must be unique. • When the module is used as both a master and slave node, the same node address is applied to the master and slave functions. • Since lower addresses have priority over higher addresses, set a lower address to a master node. Do not change the node address during module operation since it is recognized when the CPU module is reset or powered off and on. Doing so causes an error. Setting range: 0 to 63 (If any number other than 0 to 63 is set, an error occurs.)
(3)	Mode switch		Sets the operation mode of the module. ☞ Page 16 Mode switch
(4)	Terminal block for transmission cable		Connects DeviceNet cables.

*1 The above describes what the LED indicates when the mode switch is set to 0 to 8.
For the LED indications in the mode 9 (hardware test) and the mode A to C (communication test), refer to the following.
📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)

Mode switch

Sets the operation mode of the module.

Setting	Operation mode	Description	Communication speed
0	Master function	Operates as a master node.	125kbaud (factory default)
1			250kbaud
2			500kbaud
3	Slave function	Operates as a slave node.	125kbaud
4			250kbaud
5			500kbaud
6	Master function + slave function[1]	Operates as a master and slave node.	125kbaud
7			250kbaud
8			500kbaud
9	Hardware test	Performs the ROM check, RAM check, and self-loopback test.	—
A	Communication test	Performs the transmit/receive test.	125kbaud
B			250kbaud
C			500kbaud
D to F	Use prohibited	—	—

[1] Note the following when setting the mode switch to Master function + slave function.
· When only the slave function is used, do not set master function parameters or an error of the master function may occur.
· When only the master function is used, set the number of I/O points to zero for the slave function since the slave function parameters are set to 8 bytes by default.

Precautions

Do not change the mode during module operation since it is recognized when the CPU module is reset or powered off and on. Doing so causes an error.

2 SPECIFICATIONS

2.1 Performance Specifications

The following table lists the performance specifications of the RJ71DN91.

Item				Description
Master function	Node type			DeviceNet master (Group2 Only client)
	Node address			0 to 63
	Number of connections	Message connection		63
		I/O connection		63 (polling, bit strobe, change of state, cyclic)
	Communication data size	I/O communication	Transmit	Max. 4096 points (512 bytes), max. 256 bytes per node
			Receive	Max. 4096 points (512 bytes), max. 256 bytes per node
		Message communication	Transmit	Max. 240 bytes
			Receive	Max. 240 bytes
Slave function	Node type			DeviceNet slaves (Group2 server)
	Node address			0 to 63
	Number of connections	I/O connection		1 (polling)
	Communication data size	I/O communication	Transmit	Max. 1024 points (128 bytes)
			Receive	Max. 1024 points (128 bytes)
Communication speed				Selectable from 125kbaud, 250kbaud, and 500kbaud
Maximum cable length				☞ Page 17 Maximum cable length
Current consumption required on the network				5mA
Number of write accesses to a flash ROM				Max. 100000 times
Number of occupied I/O points				32
Internal current consumption (5VDC)				0.30A
External dimensions	Height			106mm (Base unit mounting side: 98mm)
	Width			27.8mm
	Depth			118.5mm
Weight				0.15kg

Maximum cable length

The maximum cable length complies with THE CIP NETWORKS LIBRARY Volume 3 DeviceNet Adaptation of CIP Edition 1.14.

Communication speed	Maximum trunk line distance			Drop line length	
	Thick cables	Thin cables	Combination of thick and thin cables	Maximum	Total
125kbaud	500m	100m	Thick cable length +5 × Thin cable length ≤ 500m	6m	156m
250kbaud	250m		Thick cable length +2.5 × Thin cable length ≤ 250m		78m
500kbaud	100m		Thick cable length + Thin cable length ≤ 100m		39m

MEMO

3 FUNCTION LIST

The following table lists the functions of the RJ71DN91. For details on the functions, refer to the following.

📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)

Data communications

Function		Description
Master function	I/O communication	A function for I/O data communications with each slave node (up to 63 nodes) using the buffer memory of the RJ71DN91
	Message communication	A function for reading/writing attribute data of slave nodes using the buffer memory of the RJ71DN91
Slave function	I/O communication	A function for I/O data communications with the master node using the buffer memory of the RJ71DN91
Data consistency function	Dedicated instruction	Maintains I/O data consistency using dedicated instructions.
	Refresh	Maintains I/O data consistency by refreshing.
Auto configuration		Detects slave nodes on the network and automatically creates parameters for the master function.

RAS

Function	Description
Hardware test	Checks if the module operates normally. The ROM check, RAM check, and self-loopback test is performed.
Communication test	Performs the transmit test and receive test with the RJ71DN91 connected to another DeviceNet device using a DeviceNet cable.

MEMO

3 FUNCTION LIST

4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Network construction

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

• Node address and operation mode setting (☞ Page 15 PART NAMES)

• Wiring (☞ Page 28 WIRING)

• Parameter settings (📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application))

2. Programming

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

☞Page 37 COMMUNICATION EXAMPLE

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MEMO

5 SYSTEM CONFIGURATION

5.1 DeviceNet Configuration

Single-master configuration

The number of modules (master node, slave node, master/slave node) connectable to a DeviceNet network is 64 in total.
The RJ71DN91 can be used as a master node, slave node, or master/slave node.
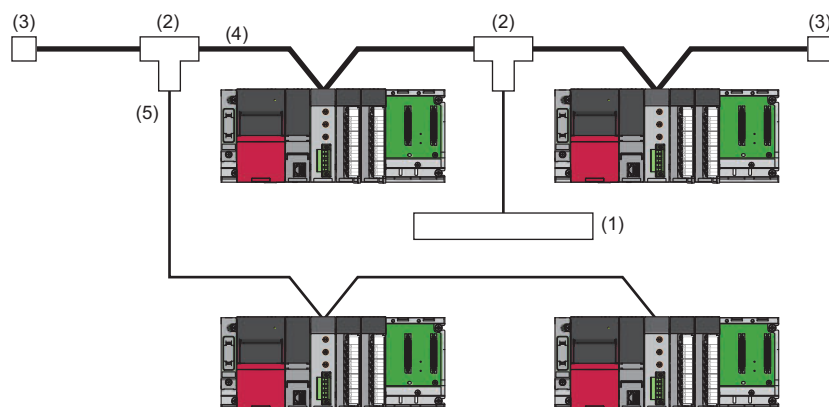
(1) Power supply for network
(2) Tap
(3) Terminating resistor
(4) Trunk line
(5) Drop line

Multi-master configuration

When the RJ71DN91 is used, multiple systems which have a master node and multiple slave nodes can be configured on one network.

The following figure shows a multi-master configuration which has three systems with a master and slave nodes.

❶ A master node (node address 10) and a slave node (node address 1)

❷ A master node (node address 5) and slave nodes (node addresses 2, 3, 4, and 6)

❸ A master node (node address 6) and slave nodes (node addresses 7, 8, and 9)

M: Master node, S: Slave node, No.: Node address
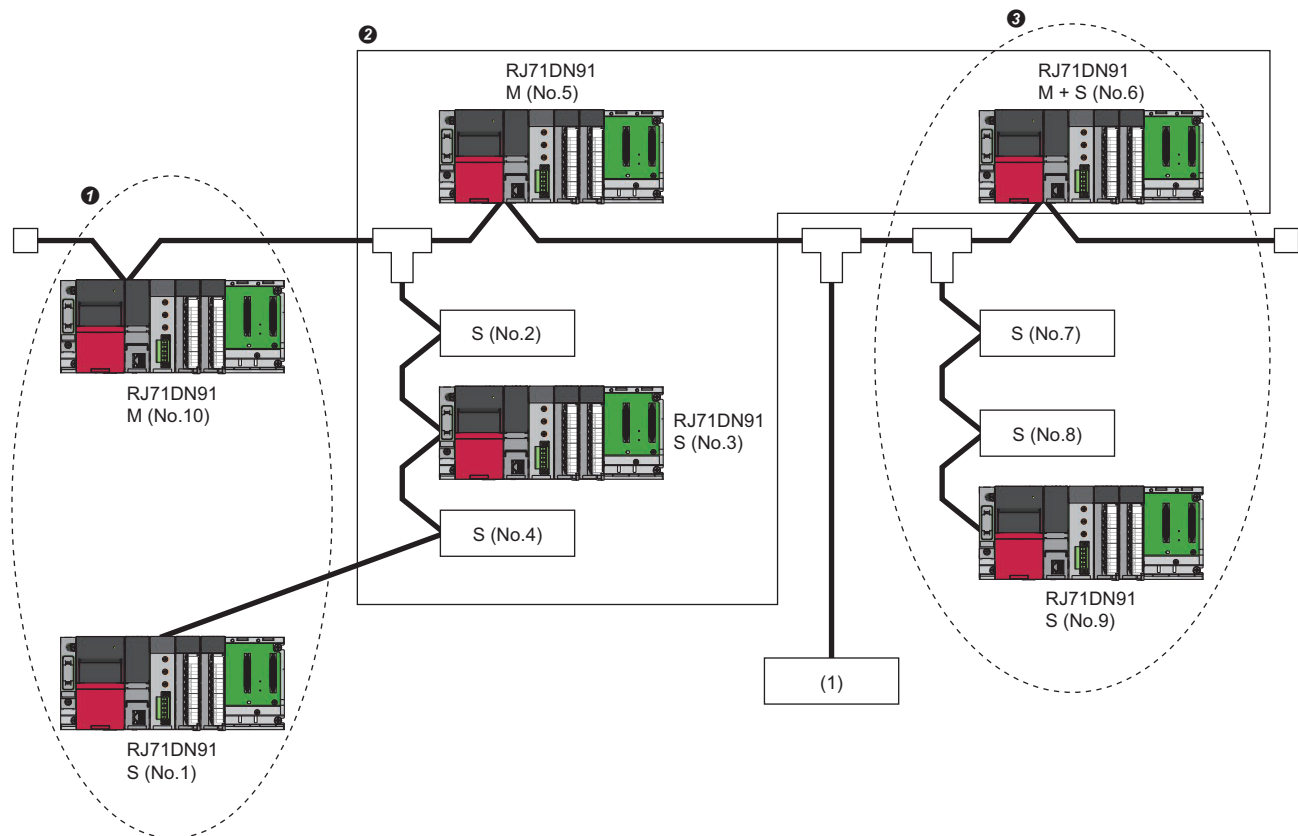
(1) Power supply for network

- I/O communications can be performed between RJ71DN91 modules. (Example: I/O communications can be performed between the node addresses 5 and 6.)
- The master function and slave function can be executed at the same time with one RJ71DN91 module. (Node address 6)
- A slave node can perform I/O communications only with one master node. (Example: I/O communications cannot be performed between the node addresses 5 and 7.)
- I/O communications cannot be performed between slave nodes. (Example: I/O communications cannot be performed between the node addresses 3 and 9.)

Precautions

A communication error may occur in a multi-master configuration because I/O communications are performed with high frequency in this type of configuration.

When a communication error occurs, set a constant scan for all the master nodes and decrease the frequency of communications.

Ex.

Set the total of the link scan time of each master node for "Constant Scan" in "Master Function Parameters" of "Basic Setting" of all the master nodes.

For how to calculate the link scan time, refer to the following.

📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)

DeviceNet cable, tap, and terminating resistor

DeviceNet cables consist of a trunk line and drop lines.

Connect each node to the trunk line directly or to a drop line connected to the trunk line via a tap. Nodes can be connected in any order regardless of the node address.

Connect terminating resistors at the ends of the trunk line.

Power supply for network and power supply tap

In addition to the power supplies for operating the nodes, connect a power supply for network to supply the communication circuit with power.

Connect a power supply tap to the trunk line and install a power supply for network.

Point

To avoid noise influence, keep a sufficient distance between the DeviceNet cable and the power cable or the signal wire of I/O modules.

5

5.2 Usable CPU Modules

The following table shows whether the RJ71DN91 can be used with a CPU module or remote head module.

The CPU modules and remote head modules are indicated by using the following symbols.

- Rn: RnCPU
- RnEN: RnENCPU
- RnP(P): Process CPU (process mode)
- RnP(R): Process CPU (redundant mode)
- RnMT: Motion CPU

- RnNC: NCCPU
- RnC: C Controller module
- RnSF: Safety CPU
- Rem: Remote head module
- Rem(R): Remote head module (redundant system)

○: Available, ×: Not available

Model	Rn	RnEN	RnP (P)	RnP (R)	RnMT	RnNC	RnC	RnSF	Rem	Rem (R)
RJ71DN91	○*3	○*3	○*2	×	×	×	○*2	○*1*2	×	×

*1 The RJ71DN91 does not support DeviceNet Safety. It can be used as a normal DeviceNet master/slave module.

*2 "Target" cannot be set for "Master function transmit data", "Master function receive data", "Slave function transmit data", and "Slave function receive data" in "Refresh Setting" on GX Works3. If it is set, a parameter error occurs and the error code 2220H is displayed in the module diagnostics.

*3 The RnCPU of the firmware version "28" and later, and the RnENCPU of the firmware version "17" and later are usable. The restrictions of *2 are applied to the CPU module of an earlier firmware version.

> **Point**
>
> The number of mountable modules for the RJ71DN91 depends on the specifications of the CPU modules to be mounted. (There are no restrictions specific to the RJ71DN91.)
>
> For the number of mountable modules for the RJ71DN91, refer to the following.
>
> 📖 MELSEC iQ-R Module Configuration Manual

Multiple CPU system

The RJ71DN91 can be used in a multiple CPU system. For details on the multiple CPU system, refer to the following.

📖 MELSEC iQ-R Module Configuration Manual

5.3   Supported Software Package

GX Works3 is required to set the RJ71DN91.

Software	Supported version
GX Works3	Version 1.035M or later
CW-Configurator	Version 1.006G will be supported. (Version 1.005F can be used when parameters are set using a program)

RJ71DN91 profile

To use the RJ71DN91 with GX Works3, register the profile in GX Works3.

Execute "Setup_0x0000_r_6863_v□□□.exe" (□□□: version) stored in the "TOOL" folder in the installation DVD-ROM (Disc1) of GX Works3 to register the profile.

Ex.
When the DVD drive is D, the profile is stored in "D:\TOOL\MELSOFT Library".

Helps for module dedicated instructions and FBs of the RJ71DN91

To view helps for module dedicated instructions and FBs of the RJ71DN91 on GX Works3, download e-Manual files (.ema) of the following manuals onto e-Manual Viewer

📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)

📖 MELSEC iQ-R DeviceNet Master/Slave Module Function Block Reference

■Downloading procedure

Follow the procedure described below on e-Manual Viewer.

🖱 [Download]⇨[Download New Manuals]

6 WIRING

This chapter describes the wiring for the RJ71DN91.

6.1 Terminal Block

Terminal block type

The following table shows a terminal block used for the RJ71DN91.

Name	Model	Contact
Terminal block for transmission cable	MSTB2, 5/5-STF-5, 08AU-M	PHOENIX CONTACT GmbH & Co. KG

Tightening torque

Tighten the screws on the terminal block within the following tightening torque range.

Screw position	Tightening torque range
Terminal block mounting screw (M2.5 screw)	0.2 to 0.3N·m
Wiring fixing screw (M3 screw)	0.50 to 0.60N·m

To tighten the screws, use a flathead screwdriver whose tip size is 0.6×3.5mm.

When removing the terminal block for transmission cable, check that the terminal block mounting screws at the ends have loosened (the screws have been removed from the socket) and pull out the terminal block for transmission cable.

If it is forcibly pulled out with the terminal block mounting screws not loosened, the device may be damaged.

To tighten the terminal block for transmission cable, check that there are no disconnected wires or untwisted wires that may cause a short circuit before mounting the terminal block, and then tighten the terminal block mounting screws at the ends securely.

Signal names of the terminal block

The following table lists the signal names of the terminal block.

The following figure shows the DeviceNet connectors of the RJ71DN91. Each connector has a colored label corresponding to a cable color.

Connect DeviceNet cables to corresponding connectors according to the colors of the cables and labels.
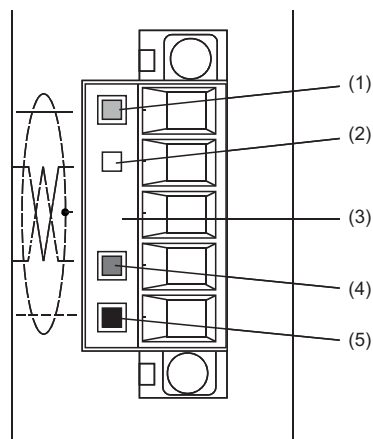
Terminal number	Name	Application	Cable color
(1)	V+	Power cable (positive side)	Red
(2)	CAN_H	Communication data (high side)	White
(3)	Shield	Drain wire	—
(4)	CAN_L	Communication data (low side)	Blue
(5)	V-	Power cable (negative side)	Black

6.2   Wiring Methods

This section describes the wiring to the terminal block for transmission cable of the RJ71DN91.

Wiring to the terminal block for transmission cable

■Connecting a cable

Loosen the wiring fixing screw and insert a cable to the wire insertion opening, and tighten the wiring fixing screw with an appropriate torque. After tightening the screw, lightly pull the cable and check that the cable is securely clamped.

Precautions

Tighten a wiring fixing screw within the specified torque range. (☞ Page 28 Tightening torque)

■Disconnecting a cable

Loosen the wiring fixing screw of the cable to be disconnected and unplug the cable.

6
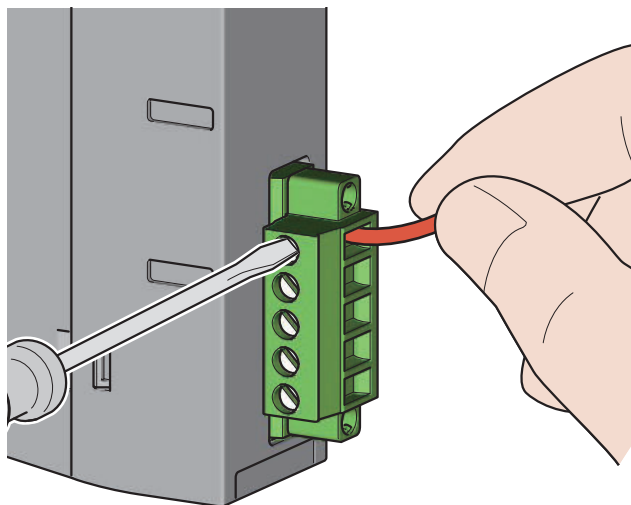
Grounding

Perform single-point grounding for the DeviceNet network. It must be performed near the center of the network. Connect the shield (drain wire) of the cable to the FG of the power supply for network, and ground the FG with a ground resistance of 100 ohms or less.

When multiple power supplies for network are used on the network, ground only the power supply located near the center of the network and do not ground the other power supplies. When multiple power supplies for network are used, use power supply taps.
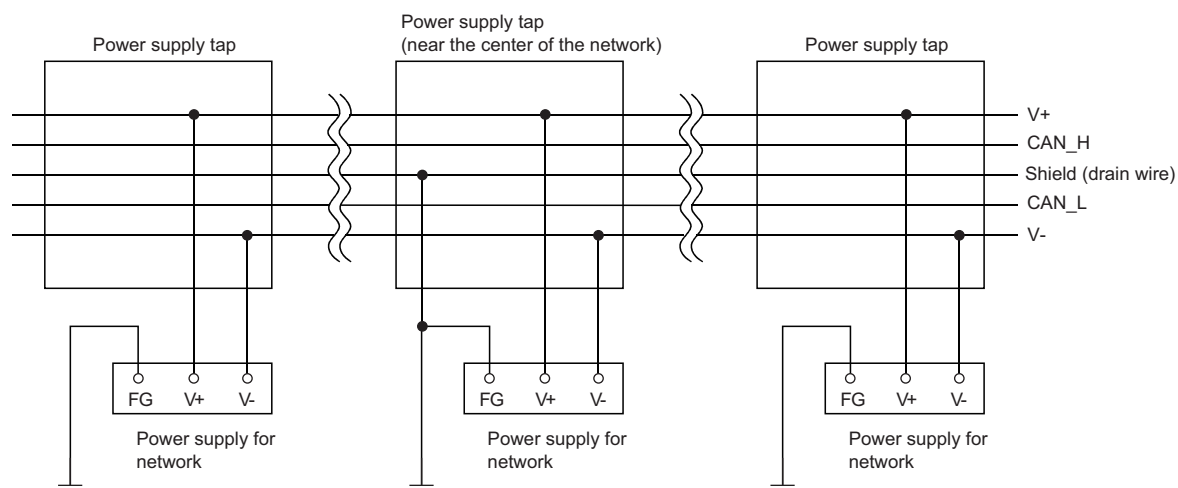
6.3 Precautions on Supplying Power for Network

This section describes the precautions on supplying power for network.

Arrangement of a power supply for network

Arrange a power supply for network following the procedure as described below.

1. Add the current consumptions of the nodes required on the network.

2. Measure the overall network length.

3. Check the maximum current capacity corresponding to the network length and cable type used, referring to the following table.

☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes

4. When the total current value calculated in Step 1 is smaller than the current value calculated in Step 3, any of the arrangements described in the following can be used.

☞ Page 33 How to arrange the power supply for network and calculate the current capacity

5. When the total current value calculated in Step 1 is greater than the current value calculated in the Step 3, arrange the power supply for network near the center of the network and check that power can be supplied to all the nodes, referring to the following.

☞ Page 33 How to arrange the power supply for network and calculate the current capacity

6. When power cannot be supplied to all the nodes as a result of check in Step 5, increase the number of power supplies for network.

Maximum current capacity that can be supplied to the master or slave nodes

The following table lists the maximum current capacity that can be supplied to the master or slave nodes for each DeviceNet cable network length.

Cable	Network length (m)	Maximum current (A)
Thick cable	0	8.00
	25	8.00
	50	5.42
	100	2.93
	150	2.01
	200	1.53
	250	1.23
	300	1.03
	350	0.89
	400	0.78
	450	0.69
	500	0.63
Thin cable	0	3.00
	10	3.00
	20	3.00
	30	2.06
	40	1.57
	50	1.26
	60	1.06
	70	0.91
	80	0.80
	90	0.71
	100	0.64

Use a power supply for network whose current capacity is greater than the total current consumption required.

When the current capacity is insufficient, multiple power supplies can be used.

When multiple power supplies are used, use power supply taps.

How to arrange the power supply for network and calculate the current capacity

The following describes how to arrange the power supply for network and calculate the current capacity.

When the power supply for network is connected at an end

The following figure shows the arrangement of when the power supply for network is connected at an end of the network whose overall length is 200m using a thick cable, and the current capacity calculation is shown below.

M: Master node, S: Slave node
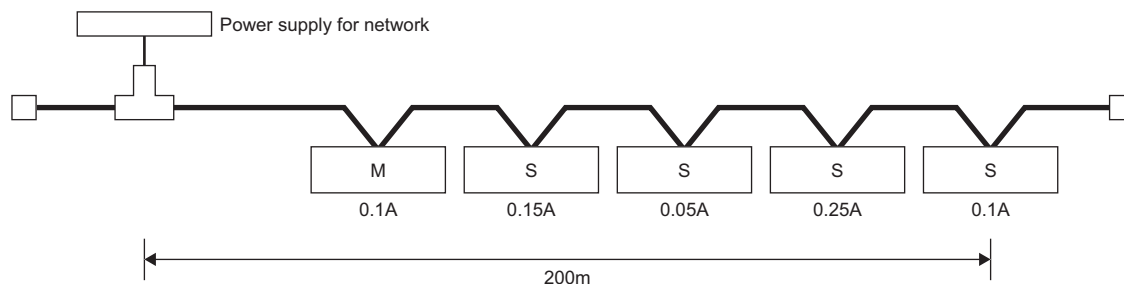
Overall power supply distance = 200m

Total current capacity = 0.1A + 0.15A + 0.05A + 0.25A + 0.1A = 0.65A

Maximum current which can flow through the thick cable of 200m = 1.53A (☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes)
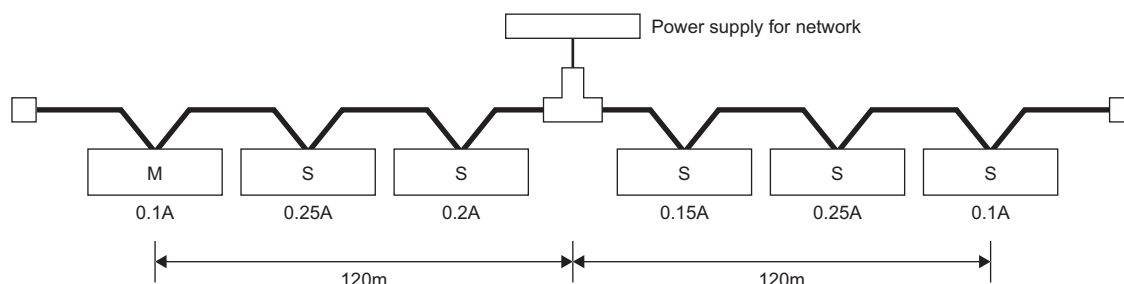
Thus, power can be supplied to all the nodes in this configuration.

When the power supply for network is connected at the center

The following figure shows the arrangement of when the power supply for network is connected at the center of the network using a thick cable, and the current capacity calculation is shown below.

The power supply in this configuration can supply current twice as much as the power supply for network connected at an end does.

M: Master node, S: Slave node

Overall power supply distance on the left side = Overall power supply distance on the right side = 120m

Total current capacity on the left side = 0.1A + 0.25A + 0.2A = 0.55A

Total current capacity on the right side = 0.15A + 0.25A + 0.15A = 0.55A

Maximum current which can flow through the thick cable of 120m = Approximately 2.56A (☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes)
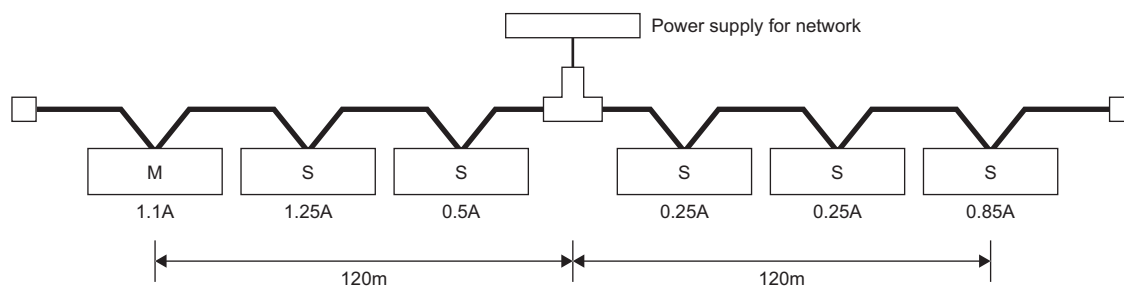
(The maximum current is calculated using the linear approximation between 100 to 150m.)

Thus, power can be supplied to all the nodes in this configuration.

When the current capacity of power for network is insufficient

When the power supply for network is connected to the following network using a thick cable

M: Master node, S: Slave node

Overall power supply distance on the left side = Overall power supply distance on the right side = 120m

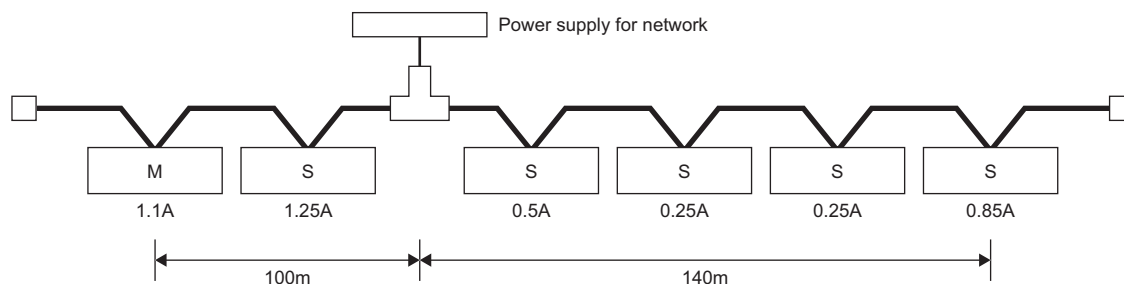Total current capacity on the left side = 1.1A + 1.25A + 0.5A = 2.85A

Total current capacity on the right side = 0.25A + 0.25A + 0.85A = 1.35A

Maximum current which can flow through the thick cable of 120m = Approximately 2.56A (☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes)

(The maximum current is calculated using the linear approximation between 100 to 150m.)

Thus, current capacity on the left side is insufficient in this configuration.

In such a case, move the power supply for network in the direction where the current capacity is insufficient. (Move it toward the left in the figure above.)

Overall power supply distance on the left side = 100m

Overall power supply distance on the right side = 140m

Total current capacity on the left side = 1.1A + 1.25A = 2.35A

Total current capacity on the right side = 0.5A + 0.25A + 0.25A + 0.85A = 1.85A

Maximum current which can flow through the thick cable of 100m = Approximately 2.93A

Maximum current which can flow through the thick cable of 140m = Approximately 2.19A

☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes

(The maximum current is calculated using the linear approximation between 100 to 150m.)

As a result of moving the power supply for network in the direction where the current capacity is insufficient, power can be supplied to all the nodes.

When both of a trunk line and drop line is used in a configuration

The following figure shows the arrangement of when the power supply for network is connected to a trunk line of thick cable of 200m and to a drop line of a thin cable of 6m, and the current capacity calculation is shown below.

M: Master node, S: Slave node
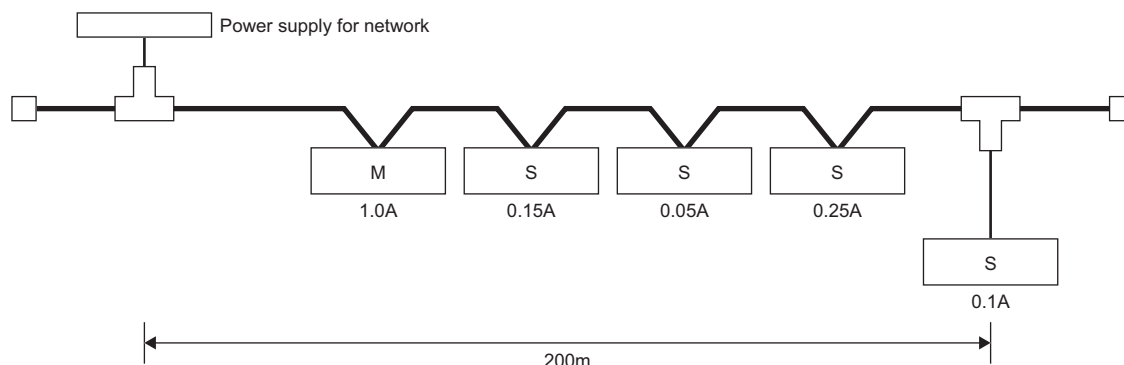
Overall length of the thick cables that supply power = 200m

Overall length of the drop line that supplies power = 6m

Total current capacity = 0.5A + 0.15A + 0.05A + 0.25A + 0.1A = 1.05A

Maximum current which can flow through the thick cable of 200m = 1.53A (☞ Page 31 Maximum current capacity that can be supplied to the master or slave nodes)

Maximum current which can flow through the drop line of 6m = 0.75A (☞ Page 35 Maximum current capacity for each cable length of a drop line)

Total current of devices connected to the drop line = 0.1A

Thus, power can be supplied to all the nodes in this configuration.

■Maximum current capacity for each cable length of a drop line

The following table lists the maximum current capacity for each cable length of a drop line.

Drop line length (m)	Maximum current (A)
0.30	3.00
0.90	3.00
1.50	3.00
2.25	2.00
3.00	1.50
4.50	1.00
6.00	0.75

6.4 Wiring Products

This section describes the devices used for DeviceNet.

DeviceNet devices

Prepare DeviceNet cables, power supplies for network, power supply taps, and taps by users.

For details on the devices required for the network configuration of DeviceNet, refer to the following.

 • ODVA (Open DeviceNet Vendor Association, Inc.)
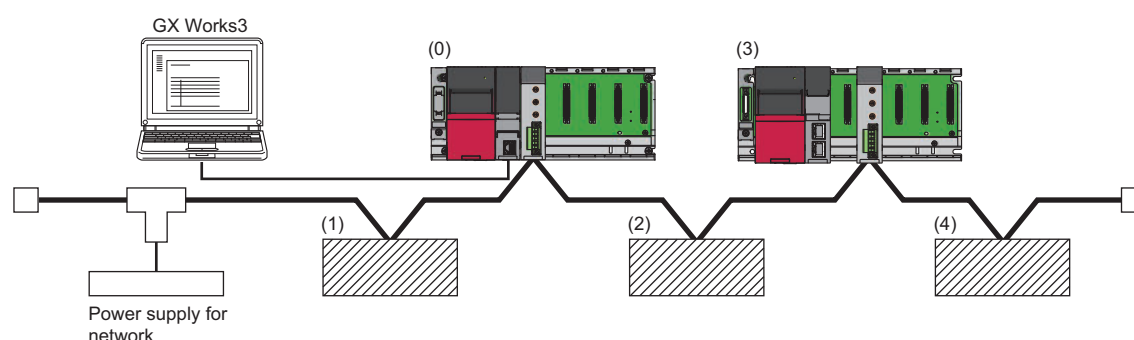
www.odva.org

7 COMMUNICATION EXAMPLE

This chapter describes an example of programming and start-up using the master function and slave function of the RJ71DN91.

7.1 Communications Between the Master Node and Slave Nodes

Communications are performed between the master node and slave nodes using the master function and slave function of the RJ71DN91.

System configuration

This section describes an example of communications between a master node and slave nodes using the following system configuration.

No./Node	Configuration	Remarks
(0) RJ71DN91 master node (Node address 0)	• Power supply module: R61P • CPU module: R04CPU • DeviceNet master/slave module: RJ71DN91 (Start I/O number: 0000H)	• Receive data: X100 to X16F • Transmit data: Y100 to Y14F • Communication speed: 125kbaud (Mode 0)
(1) Slave node (Node address 1, polling)	DRT1-ID08 manufactured by OMRON Corporation	• CompoBus/D (8-point input) • Communication speed: 125kbaud
(2) Slave node (Node address 2, polling)	DRT1-OD08 manufactured by OMRON Corporation	• CompoBus/D (8-point output) • Communication speed: 125kbaud
(3) RJ71DN91 slave node (Node address 4, polling)	• Power supply module: R61P • CPU module: R04CPU • DeviceNet master/slave module: RJ71DN91 (Start I/O number: 0020H)	• Number of receive bytes in the slave function (number of input points): 8 bytes • Number of transmit bytes in the slave function (number of output points): 8 bytes • Communication speed: 125kbaud (Mode 3)
(4) Slave node (Node address 3, bit strobe)	1794ADN + IB16 (Flex I/O DeviceNet Adapter + 16-point input) manufactured by Rockwell Automation, Inc.	The 1794ADN has input data of 2 bytes. The IB16 has input data of 2 bytes and output data of 2 bytes.

Setting node addresses and communication speeds

Set the node address and communication speed of the RJ71DN91 using the following switches.
• Node address setting: Node address setting switch
• Communication speed setting: Mode switch
For details on each switch, refer to the following.
☞ Page 15 PART NAMES
For the node address setting and communication speed setting for slave nodes other than the RJ71DN91, refer to the following.
📖 Manual for each slave node

Communications

The following figure shows the relationship between the CPU module, the buffer memory of the RJ71DN91 master node, and slave nodes.

Each number in the figure, from No.1 to No.4, represents a node address.
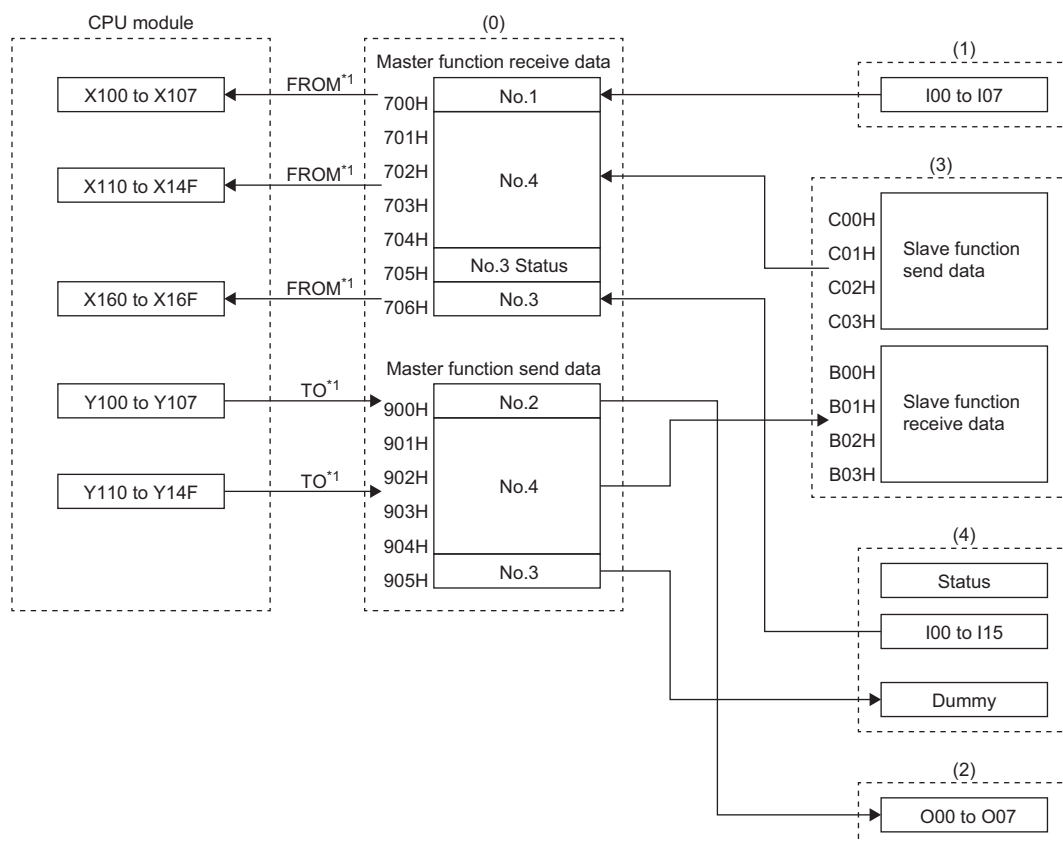
(0) RJ71DN91 master node (Node address 0)

(1) Slave node (Node address 1, polling): DRT1-ID08

(2) Slave node (Node address 2, polling): DRT1-OD08

(3) RJ71DN91 slave node (Node address 4, polling)

(4) Slave node (Node address 3, bit strobe): 1794ADN + IB16

*1 The following methods are available for data transfer between the CPU module and the master node RJ71DN91.
　　· Setting the refresh parameter (☞ Page 39 Settings of the RJ71DN91 master node)
　　· Transferring data using a program (📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application))

■Device assignment for the RJ71DN91 master node

The following shows how devices of the CPU module correspond to the buffer memory areas of the RJ71DN91 master node (Node address 0).

Start I/O number: 0000H

| CPU module	RJ71DN91 master node (Node address 0)	
Device	Description	Buffer memory
X100 to X107	Input (receive) data from the node address 1	'Master function receive data' (Un\G1792) (700H)
X110 to X14F	Input (receive) data from the node address 4	'Master function receive data' (Un\G1793 to Un\G1796) (701H to 704H)
X160 to X16F	Input (receive) data from the node address 3	'Master function receive data' (Un\G1798) (706H)
Y100 to Y107	Output (transmit) data to the node address 2	'Master function transmit data' (Un\G2304) (900H)
Y110 to Y14F	Output (transmit) data to the node address 4	'Master function transmit data' (Un\G2305 to Un\G2308) (901H to 904H)

Settings of the RJ71DN91 master node

Connect the engineering tool to the CPU module and set the parameters.
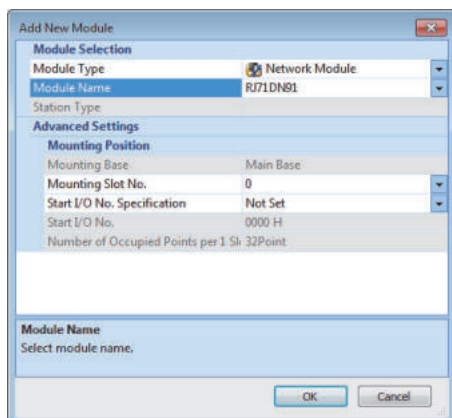
1. Set the CPU module as follows.

👈 [Project] ⇨ [New]
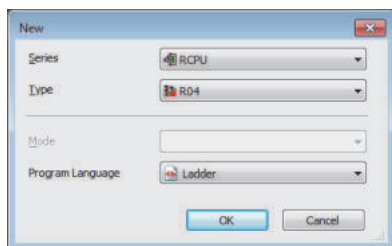
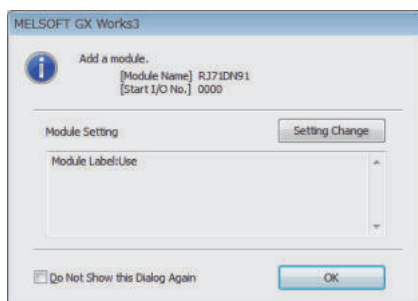*2.* Click the [OK] button to add the module labels of the CPU module.
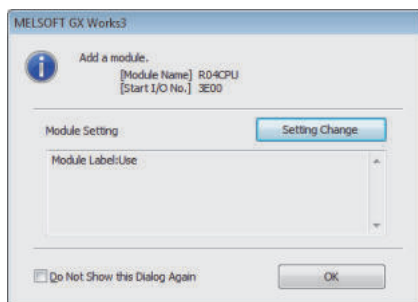
3. Set the RJ71DN91 as follows.

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

4. Click the [OK] button to add the module labels of the RJ71DN91.

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

👆 [Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71DN91] ⇨ [Module Parameter] ⇨ [Basic Setting]

Setting Item

Item	Setting Value
⊟ **Parameter Setting Method**	**Set how to set the parameters.**
Basic Parameter Setting	Parameter editor
⊟ **Master Function Parameters**	**Set the parameters for master function.**
Constant Scan	0 ms
Setting Method of Slave Nodes	Parameter editor
⊟ **Slave Node Information (1st)**	
Node Address	1
Message Group	Node that does not support UCMM. (Supports group 2 server only)
Connection Type	Polling
Input Byte Size	1
Output Byte Size	0
Input Word Size	0
Output Word Size	0
Input Dword Size	0
Output Dword Size	0
Expected Packet Rate	0
Watchdog Timeout Action	Default
Production Inhibit Time	0
⊟ **Slave Node Information (2nd)**	
Node Address	2
Message Group	Node that does not support UCMM. (Supports group 2 server only)
Connection Type	Polling
Input Byte Size	0
Output Byte Size	1
Input Word Size	0
Output Word Size	0
Input Dword Size	0
Output Dword Size	0
Expected Packet Rate	0
Watchdog Timeout Action	Default
Production Inhibit Time	0
⊟ **Slave Node Information (3rd)**	
Node Address	4
Message Group	Node that supports UCMM, and uses either message group 3, 2 or 1
Connection Type	Polling
Input Byte Size	8
Output Byte Size	8
Input Word Size	0
Output Word Size	0
Input Dword Size	0
Output Dword Size	0
Expected Packet Rate	501
Watchdog Timeout Action	Auto delete
Production Inhibit Time	21
⊟ **Slave Node Information (4th)**	
Node Address	3
Message Group	Node that supports UCMM, and uses either message group 3, 2 or 1
Connection Type	Bit strobe
Input Byte Size	4
Output Byte Size	2
Input Word Size	0
Output Word Size	0
Input Dword Size	0
Output Dword Size	0
Expected Packet Rate	0
Watchdog Timeout Action	Default
Production Inhibit Time	0
⊞ Slave Node Information (5th)	
⊞ Slave Node Information (6th)	
⊞ Slave Node Information (7th)	
⊞ Slave Node ...	
⊞ Slave Node Inform...	
⊞ **Slave Node Information (61st)**	
⊞ **Slave Node Information (62nd)**	
⊞ **Slave Node Information (63rd)**	
⊞ **Slave Function Parameters**	**Set the parameters for slave function.**
⊟ **Master/Slave Function Common Parameters**	**Set the common parameters for master/slave function.**
Auto Communication Start Setting	Start
Data Consistency Setting	Refresh is enabled
Operation setting for Bus Off error	No reset

6. Set the items in "Refresh Setting" as follows.

☞ [Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71DN91] ⇨ [Module Parameter] ⇨ [Refresh Setting]

Setting Item	
Target	Device ▼

Number of transfers to intelligent function module
Number of transfers to CPU

Item	Setting Value
⊟ *Transfer to Intelligent Module*	**Transfer the specified device data to the buffer memory.**
Master function transmit data	Y100
Slave function transmit data	
⊟ **Transfer to CPU**	**Transfer the buffer memory data to the specified device.**
Master communication status	
Error information for master function	
Bus error counter	
Bus off counter	
Configuration status of nodes	
Communication status of nodes	M96
Communication error status of nodes	
Error status of nodes	
Communication error information for own master function	
Communication error information for own slave function	
Communication error information for other slave nodes	
Master I/O address	
Present link scan time	
Minimum link scan time	
Maximum link scan time	
Slave function communication status	
Error information for slave function	
Master function receive data	X100
Slave function receive data	
⊟ **Refresh Timing**	**Set refresh timing.**
Refresh Timing	At the Execution Time of END Instruction
Refresh Group [n](n: 1-64)	1
⊟ **Refresh Timing (I/O)**	**Specify the timing which transfers the I/O device data.**
Refresh Timing	Based on Refresh Timing (Buffer Memory)

7. Write the set parameters to the CPU module. Then reset or power off and on the CPU module.

☞ [Online] ⇨ [Write to PLC]

> **Point**
>
> Default values are used for parameters that are not shown above. For the parameters, refer to the following.
> 📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)

7

Settings of the RJ71DN91 slave node

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

1. Set the CPU module as follows.

🖱 [Project] ⇨ [New]
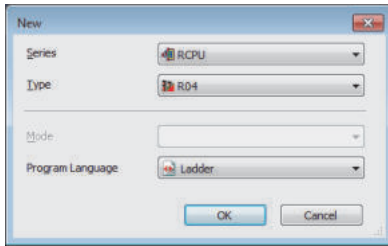
2. Click the [OK] button to add the module labels of the CPU module.
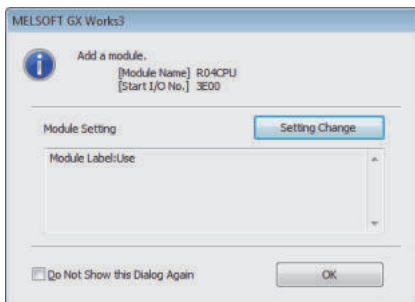
3. Set the RJ71DN91 slave node as follows.

🖱 [Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]
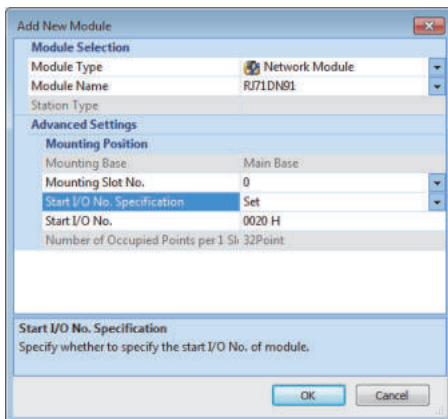
4. Click the [OK] button to add the module labels of the RJ71DN91 slave node.
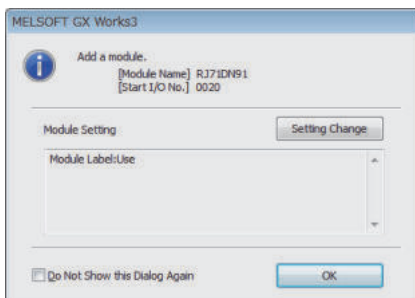
5. Set the items in "Basic Setting" as follows.

👆 [Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71DN91] ⇨ [Module Parameter] ⇨ [Basic Setting]

Item	Setting Value
⊟ **Parameter Setting Method**	**Set how to set the parameters.**
┈┈┈ Basic Parameter Setting	Parameter editor
⊞ **Master Function Parameters**	**Set the parameters for master function.**
⊟ *Slave Function Parameters*	**Set the parameters for slave function.**
┈┈┈ Slave Function Input Size	8 byte
┈┈┈ Slave Function Output Size	8 byte
⊟ **Master/Slave Function Common Parameters**	**Set the common parameters for master/slave function.**
┈┈┈ Auto Communication Start Setting	Start
┈┈┈ Data Consistency Setting	Disable
┈┈┈ Operation setting for Bus Off error	No reset

Basic Setting
- Parameter Setting Method
- Master Function Parameters
- Slave Function Parameters
- Master/Slave Function Common Parameters
- Applied Setting
- Refresh Setting

6. Set the items in "Refresh Setting" as follows.

👆 [Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71DN91] ⇨ [Module Parameter] ⇨ [Refresh Setting]

Setting Item

Target	Device		Number of transfers to intelligent function module
			Number of transfers to CPU

Item	Setting Value
⊟ *Transfer to Intelligent Module*	**Transfer the specified device data to the buffer memory.**
┈┈┈ Master function transmit data	
┈┈┈ Slave function transmit data	Y200
⊟ **Transfer to CPU**	**Transfer the buffer memory data to the specified device.**
┈┈┈ Master communication status	
┈┈┈ Error information for master function	
┈┈┈ Bus error counter	
┈┈┈ Bus off counter	
┈┈┈ Configuration status of nodes	
┈┈┈ Communication status of nodes	
┈┈┈ Communication error status of nodes	
┈┈┈ Error status of nodes	
┈┈┈ Communication error information for own master function	
┈┈┈ Communication error information for own slave function	
┈┈┈ Communication error information for other slave nodes	
┈┈┈ Master I/O address	
┈┈┈ Present link scan time	
┈┈┈ Minimum link scan time	
┈┈┈ Maximum link scan time	
┈┈┈ Slave function communication status	
┈┈┈ Error information for slave function	
┈┈┈ Master function receive data	
┈┈┈ Slave function receive data	X200
⊟ **Refresh Timing**	**Set refresh timing.**
┈┈┈ Refresh Timing	At the Execution Time of END Instruction
┈┈┈ Refresh Group [n](n: 1-64)	1
⊟ **Refresh Timing (I/O)**	**Specify the timing which transfers the I/O device data.**
┈┈┈ Refresh Timing	Based on Refresh Timing (Buffer Memory)

7. Write the set parameters to the CPU module. Then reset or power off and on the CPU module.

👆 [Online] ⇨ [Write to PLC]

Point 📌

Default values are used for parameters that are not shown above. For the parameters, refer to the following.
📖 MELSEC iQ-R DeviceNet Master/Slave Module User's Manual (Application)


7

Checking the system status

Check whether I/O communications are performed normally between the RJ71DN91 master node and each slave node.

When the LEDs are in the following status, I/O communications are performed normally.

• RJ71DN91 master node, RJ71DN91 slave node
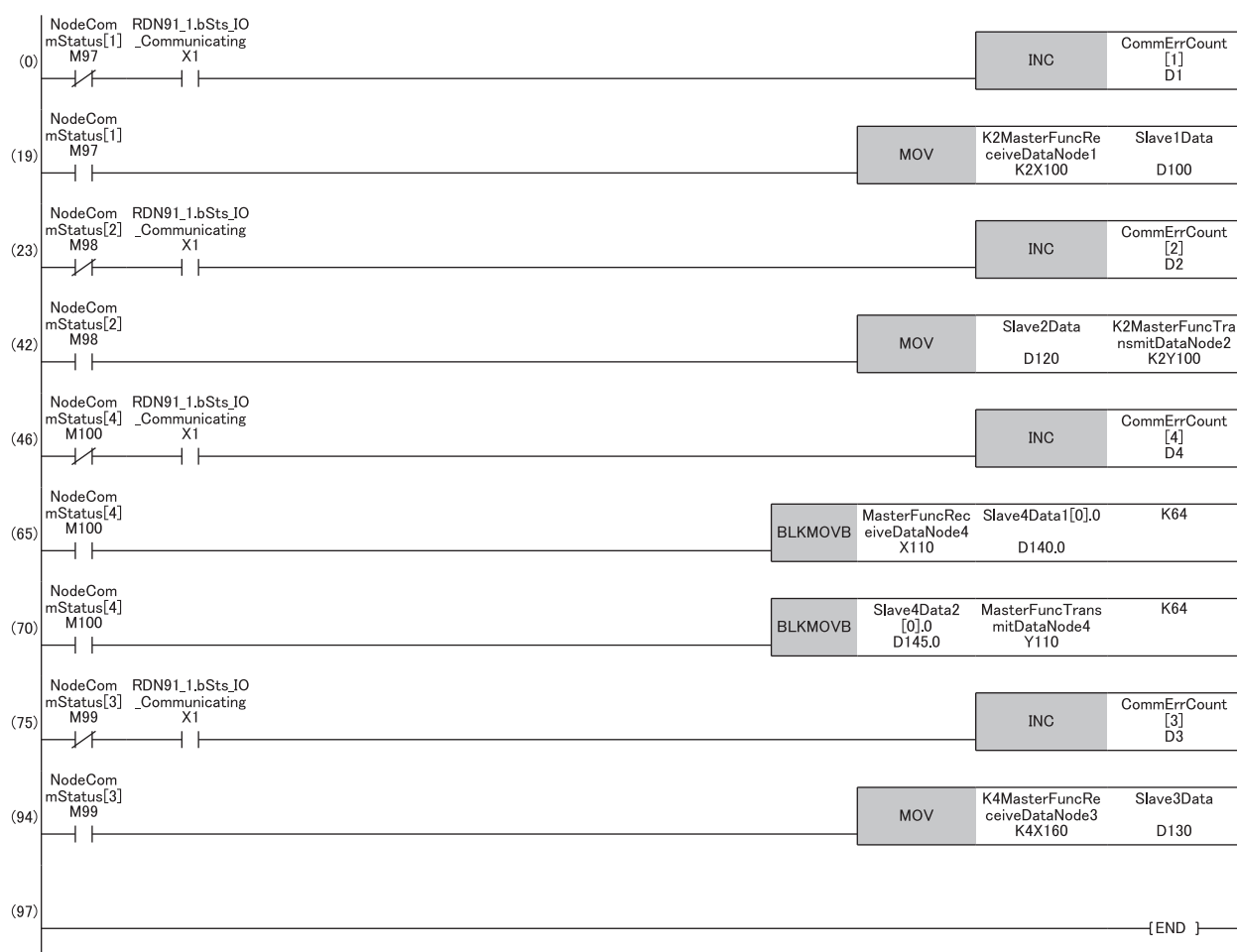
LED	Status
RUN	On (green)
ERR	Off
MS	On (green) and off (red)
NS	On (green) and off (red)

• For the LED status of slave nodes other than the RJ71DN91, refer to the manual for each slave node.

Program example for the master node

I/O communication with slave nodes

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_IO_Communicating	I/O communications being performed	X1
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class		Assign (Device/Label)
CommErrCount	Word [Signed](0..63)	...	VAR_GLOBAL	▼	D0
Slave1Data	Word [Signed]	...	VAR_GLOBAL	▼	D100
Slave2Data	Word [Signed]	...	VAR_GLOBAL	▼	D120
Slave4Data1	Word [Signed](0..3)	...	VAR_GLOBAL	▼	D140
Slave4Data2	Word [Signed](0..3)	...	VAR_GLOBAL	▼	D145
Slave3Data	Word [Signed]	...	VAR_GLOBAL	▼	D130
NodeCommStatus	Bit(0..63)	...	VAR_GLOBAL	▼	M96
MasterFuncReceiveDataNode1	Bit(0..7)	...	VAR_GLOBAL	▼	X100
MasterFuncReceiveDataNode4	Bit(0..63)	...	VAR_GLOBAL	▼	X110
MasterFuncReceiveDataNode3	Bit(0..15)	...	VAR_GLOBAL	▼	X160
MasterFuncTransmitDataNode2	Bit(0..7)	...	VAR_GLOBAL	▼	Y100
MasterFuncTransmitDataNode4	Bit(0..63)	...	VAR_GLOBAL	▼	Y110

(0) When the communication status with the slave node (Node address 1) is OFF, count the communication error.
(19) When the communication status with the slave node (Node address 1) is ON, read the receive data from the master function receive data area.
(23) When the communication status with the slave node (Node address 2) is OFF, count the communication error.
(42) When the communication status with the slave node (Node address 2) is ON, write the transmit data to the master function transmit data area.
(46) When the communication status with the slave node (Node address 4) is OFF, count the communication error.
(65) When the communication status with the slave node (Node address 4) is ON, read the receive data from the master function receive data area.
(70) When the communication status with the slave node (Node address 4) is ON, write the transmit data to the master function transmit data area.
(75) When the communication status with the slave node (Node address 3) is OFF, count the communication error.
(94) When the communication status with the slave node (Node address 3) is ON, read the receive data from the master function receive data area.

7

Message communication

■Reading attribute data

The following provides a program example of reading attribute data from the RJ71DN91 slave node (node address 3).

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_Message_Communication_Completion	Message communication completion	X02
	RDN91_1.bSet_Message_Communication_Request	Message communication request	Y12
	RDN91_1.uBFM_Monitor_Direct.uMaster_Function_Communication_Status_D	Master function communication status	U0\G432
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[0]	Message communication command	U0\G272
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[1]	Message communication command	U0\G273
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[2]	Message communication command	U0\G274
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[3]	Message communication command	U0\G275
	RDN91_1.uBFM_Monitor_Direct.uMessage_Communication_Result_D[0]	Message communication result	U0\G288
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Data_D[0]	Message communication data	U0\G304
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
ReadAttribute	Bit	...	VAR_GLOBAL ▼	M0
ReadAttributeExec	Bit	...	VAR_GLOBAL ▼	M10
MessageResult	Word [Signed](0..4)	...	VAR_GLOBAL ▼	D10
MessageErrCount	Word [Signed]	...	VAR_GLOBAL ▼	D200
MessageData	Word [Unsigned]/Bit String [16-bit](0..8)	...	VAR_GLOBAL ▼	D20
CommStatus	Word [Signed]	...	VAR_GLOBAL ▼	D100

(57)

ReadAttribute M0	RDN91_1.bSts_Message_Communication_Completion X2	RDN91_1.bSet_Message_Communication_Request Y12

BMOVP | RDN91_1.uBFM_Monitor_Direct. uMessage_Communication_Result_D[0] U0\G288 | MessageResult D10 | K5

<> | K0 | MessageResult[1] D11 | INC | MessageErrCount D200

= | K0 | MessageResult[1] D11 | SFRP | MessageResult[4] D14 | K8

DECP | MessageResult[4] D14

/P | MessageResult[4] D14 | K2 | MessageResult[4] D14

INCP | MessageResult[4] D14

BMOVP | RDN91_1.uBFM_Control_Direct. uMessage_Communication_Data_D[0] U0\G304 | MessageData D20 | MessageResult[4] D14

RST | RDN91_1.bSet_Message_Communication_Request Y12

RST | ReadAttribute M0

(99)

[END]

(0) Read the upper byte from the 'Master function communication status' (U0\G432).

When the upper byte is C0H or 40H, the attribute reading execution flag is turned on.

In 'Message communication command' (U0\G272 to U0\G275), set the command number = 0101H, the node address for the slave node = 3, the class ID = 1, the instance ID = 1, and the attribute ID = 7(ProductName).

'Message communication request' (Y12) is turned on and the attribute reading execution flag is turned off.

(57) Read 'Message communication result' (U0\G288).

When an error occurs, count the communication error.

When the reading completion flag of the message communication result is turned on, acquire and calculate the read data length of the message communication data.

Read 'Message communication data' (U0\G304).

'Message communication request' (Y12) and the attribute reading command are turned off.
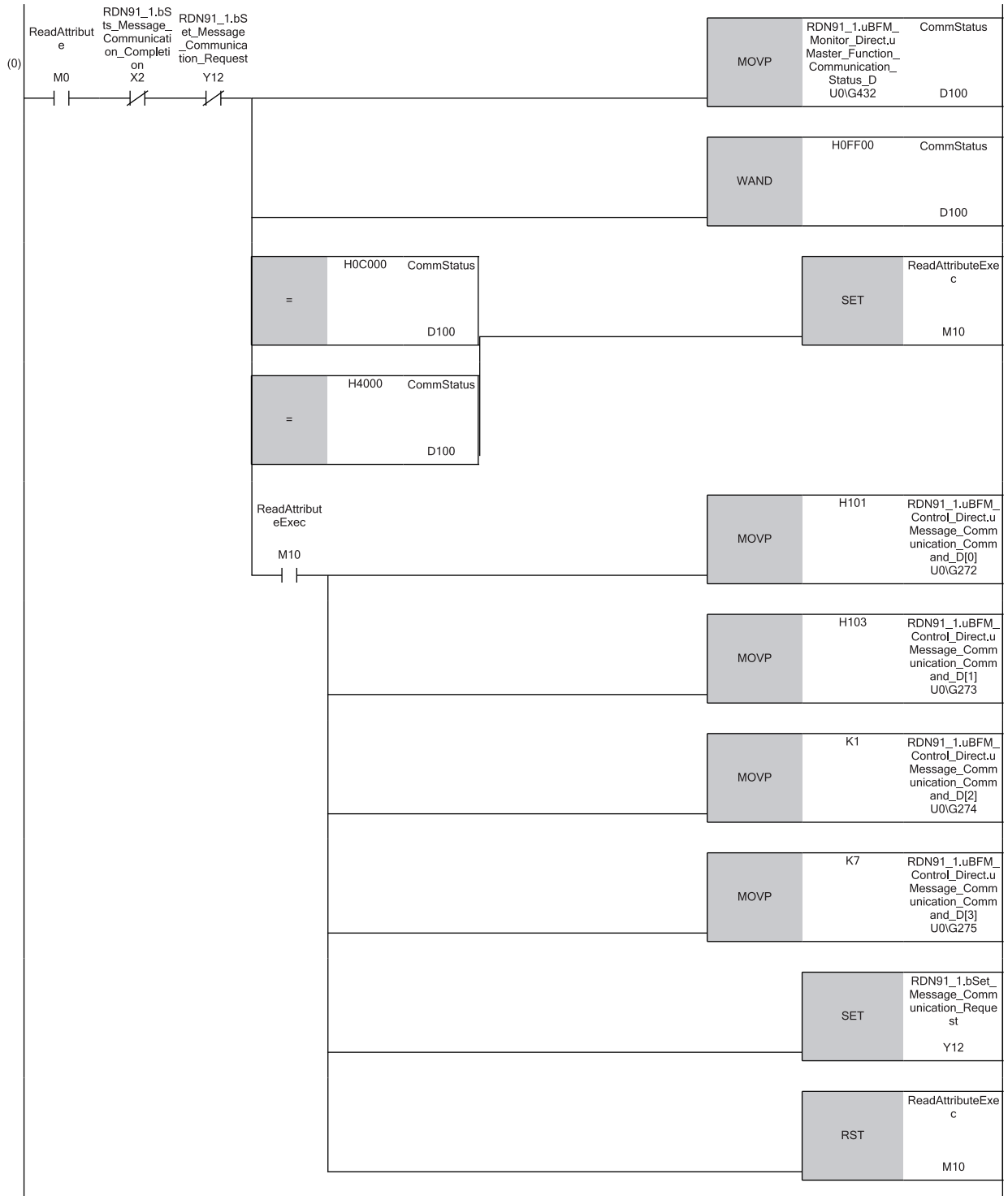
■Writing attribute data

The following provides a program example of writing attribute data to the RJ71DN91 slave node (node address 3).

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_Message_Communication_Completion	Message communication completion	X02
	RDN91_1.bSet_Message_Communication_Request	Message communication request	Y12
	RDN91_1.uBFM_Monitor_Direct.uMaster_Function_Communication_Status_D	Master function communication status	U0\G432
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[0]	Message communication command	U0\G272
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[1]	Message communication command	U0\G273
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[2]	Message communication command	U0\G274
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Command_D[3]	Message communication command	U0\G275
	RDN91_1.uBFM_Monitor_Direct.uMessage_Communication_Result_D[0]	Message communication result	U0\G288
	RDN91_1.uBFM_Control_Direct.uMessage_Communication_Data_D[0]	Message communication data	U0\G304
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign
WriteAttribute	Bit	...	VAR_GLOBAL	M21
WriteAttributeExec	Bit	...	VAR_GLOBAL	M20
CommStatus	Word [Signed]	...	VAR_GLOBAL	D200
MessageWriteData	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D30
MessageWriteResult	Word [Signed](0..4)	...	VAR_GLOBAL	D310
MessageWriteErrCount	Word [Signed]	...	VAR_GLOBAL	D400

```
WriteAttribut                                                   H102   RDN91_1.uBF
  eExec                                                                M_Control_Dir
                                              ┌─────────┬──────┐       ect.uMessage
                                              │         │      │       _Communicati
   M20                                        │  MOVP   │      │       on_Command
───┤ ├────────────────────────────────────────┤         │      │         _D[0]
             │                                └─────────┴──────┘       U0\G272
             │
             │                                                   H303   RDN91_1.uBF
             │                                ┌─────────┬──────┐       M_Control_Dir
             │                                │         │      │       ect.uMessage
             │                                │  MOVP   │      │       _Communicati
             ├────────────────────────────────┤         │      │       on_Command
             │                                └─────────┴──────┘         _D[1]
             │                                                         U0\G273
             │
             │                                                    K1    RDN91_1.uBF
             │                                ┌─────────┬──────┐       M_Control_Dir
             │                                │         │      │       ect.uMessage
             │                                │  MOVP   │      │       _Communicati
             ├────────────────────────────────┤         │      │       on_Command
             │                                └─────────┴──────┘         _D[2]
             │                                                         U0\G274
             │
             │                                                   H103   RDN91_1.uBF
             │                                ┌─────────┬──────┐       M_Control_Dir
             │                                │         │      │       ect.uMessage
             │                                │  MOVP   │      │       _Communicati
             ├────────────────────────────────┤         │      │       on_Command
             │                                └─────────┴──────┘         _D[3]
             │                                                         U0\G275
             │
             │                                ┌─────────┬──────┐       RDN91_1.bSe
             │                                │         │      │       t_Message_C
             │                                │   SET   │      │       ommunication
             ├────────────────────────────────┤         │      │       _Request
             │                                └─────────┴──────┘
             │                                                         Y12
             │
             │                                ┌─────────┬──────┐       WriteAttribute
             │                                │         │      │       Exec
             │                                │   RST   │      │
             └────────────────────────────────┤         │      │
                                              └─────────┴──────┘
                                                                       M20
```
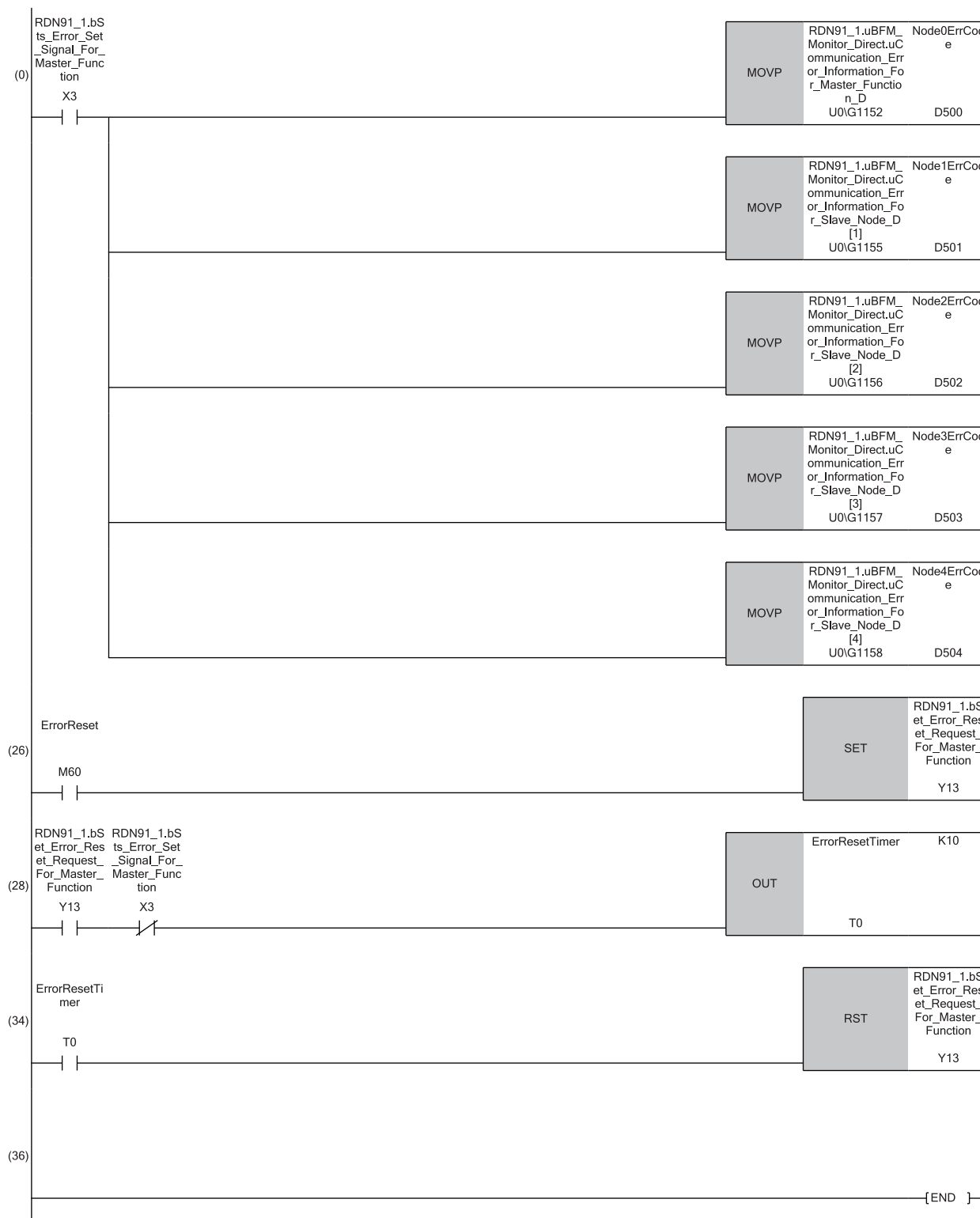
(0) Store attribute data in 'Message communication data' (U0\G304).

Read the upper byte from the 'Master function communication status' (U0\G432).

When the upper byte is C0H or 40H, the attribute writing execution flag is turned on.

In 'Message communication command' (U0\G272 to U0\G275), set the command number = 0102H, the node address for the slave node = 3, the class ID = 3, the instance ID = 1, the attribute ID = 3, and the data length = 1.

The message communication request is turned on and the attribute writing execution flag is turned off.

(65) Read 'Message communication result' (U0\G288).

When an error occurs, count the communication error.

When the message communication is completed, 'Message communication request' (Y12) and the attribute writing command are turned off.

Acquiring error information

The following provides a program example of obtaining communication error codes.

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_Error_Set_Signal_For_Master_Function	Error set signal for the master function	X03
	RDN91_1.bSet_Error_Reset_Request_For_Master_Function	Error reset request for the master function	Y13
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Master_Function_D	Master function communication error information	U0\G1152
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Slave_Node_D[1]	Other slave communication error information (Node address 1)	U0\G1155
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Slave_Node_D[2]	Other slave communication error information (Node address 2)	U0\G1156
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Slave_Node_D[3]	Other slave communication error information (Node address 3)	U0\G1157
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Slave_Node_D[4]	Other slave communication error information (Node address 4)	U0\G1158
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
Node0ErrCode	Word [Signed]	...	VAR_GLOBAL	D500
Node1ErrCode	Word [Signed]	...	VAR_GLOBAL	D501
Node2ErrCode	Word [Signed]	...	VAR_GLOBAL	D502
Node3ErrCode	Word [Signed]	...	VAR_GLOBAL	D503
Node4ErrCode	Word [Signed]	...	VAR_GLOBAL	D504
ErrorReset	Bit	...	VAR_GLOBAL	M60
ErrorResetTimer	Bit	...	VAR_GLOBAL	T0

```
        RDN91_1.bS                                          RDN91_1.uBFM_   Node0ErrCod
        ts_Error_Set                                        Monitor_Direct.uC   e
        _Signal_For_                                        ommunication_Err
        Master_Func                              MOVP       or_Information_Fo
        tion                                                r_Master_Functio
  (0)   X3                                                  n_D
        ┤ ├────────┬───────────────────────────────────    U0\G1152        D500

                   │                                        RDN91_1.uBFM_   Node1ErrCod
                   │                                        Monitor_Direct.uC   e
                   │                                        ommunication_Err
                   │                             MOVP       or_Information_Fo
                   │                                        r_Slave_Node_D
                   │                                        [1]
                   ├───────────────────────────────────    U0\G1155        D501

                   │                                        RDN91_1.uBFM_   Node2ErrCod
                   │                                        Monitor_Direct.uC   e
                   │                                        ommunication_Err
                   │                             MOVP       or_Information_Fo
                   │                                        r_Slave_Node_D
                   │                                        [2]
                   ├───────────────────────────────────    U0\G1156        D502

                   │                                        RDN91_1.uBFM_   Node3ErrCod
                   │                                        Monitor_Direct.uC   e
                   │                                        ommunication_Err
                   │                             MOVP       or_Information_Fo
                   │                                        r_Slave_Node_D
                   │                                        [3]
                   ├───────────────────────────────────    U0\G1157        D503

                   │                                        RDN91_1.uBFM_   Node4ErrCod
                   │                                        Monitor_Direct.uC   e
                   │                                        ommunication_Err
                   │                             MOVP       or_Information_Fo
                   │                                        r_Slave_Node_D
                   │                                        [4]
                   └───────────────────────────────────    U0\G1158        D504

        ErrorReset                                          RDN91_1.bS
                                                            et_Error_Res
                                                            et_Request_
                                             SET            For_Master_
                                                            Function
  (26)  M60
        ┤ ├────────────────────────────────────────────    Y13

        RDN91_1.bS   RDN91_1.bS                             ErrorResetTimer    K10
        et_Error_Res  ts_Error_Set
        et_Request_  _Signal_For_
        For_Master_  Master_Func                  OUT
        Function     tion
  (28)  Y13          X3
        ┤ ├──────────┤/├────────────────────────────────   T0

        ErrorResetTi                                        RDN91_1.bS
        mer                                                 et_Error_Res
                                                            et_Request_
                                             RST            For_Master_
                                                            Function
  (34)  T0
        ┤ ├────────────────────────────────────────────    Y13

  (36)
        ──────────────────────────────────────────────────────────[END]
```
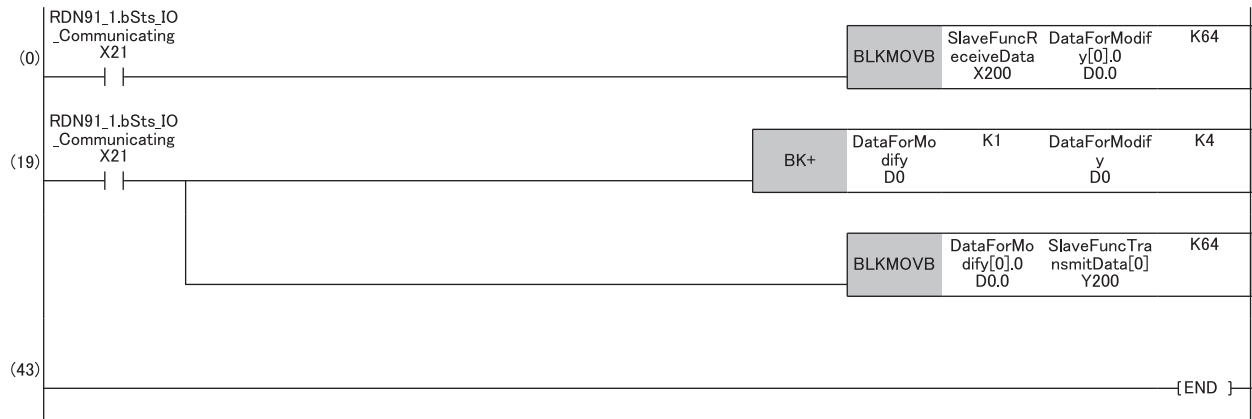
(0) Read the communication error code (own node: node address 0) from 'Master function communication error information' (U0\G1152).

Read the communication error code (other node: node addresses 1 to 4) from 'Other slave communication error information' (U0\G1155 to U0\G1158).

(26) The error reset command turns on 'Master function error reset request' (Y13).

(28) Wait for the error reset timer to be turned on.

(34) 'Master function error reset request' (Y13) is turned off.

Program example for slave nodes

I/O communication with the master node

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_IO_Communicating	I/O communications being performed	X21
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
DataForModify	Word [Signed](0..3)	...	VAR_GLOBAL	D0
SlaveFuncReceiveData	Bit(0..63)	...	VAR_GLOBAL	X200
SlaveFuncTransmitData	Bit(0..63)	...	VAR_GLOBAL	Y200

(0) Acquire the receive data from the slave function receive data area.

(19) Increment the receive data to be transmit data.

Write the transmit data to the slave function transmit data area.

Acquiring error information

The following provides a program example of obtaining communication error codes.

Classification	Label name	Description	Device
Module label	RDN91_1.bSts_Error_Set_Signal_For_Slave_Function	Error set signal for the slave function	X28
	RDN91_1.bSet_Error_Reset_Request_For_Slave_Function	Error reset request for the slave function	Y38
	RDN91_1.uBFM_Monitor_Direct.uCommunication_Error_Information_For_Slave_Function_D	Slave function communication error information	U2\G1153
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class		Assign (Device/Label)
SlaveErrInfo	Word [Signed]	...	VAR_GLOBAL	▼	D500
SlaveErrCounter	Word [Signed]	...	VAR_GLOBAL	▼	D400
ErrReset	Bit	...	VAR_GLOBAL	▼	M51
ErrResetTimer	Bit	...	VAR_GLOBAL	▼	T0

(0) Read the communication error code from 'Slave function communication error information' (U2\G1153).

When an error has occurred, count the communication error.

(9) The error reset command turns on 'Slave function error reset request' (Y38).
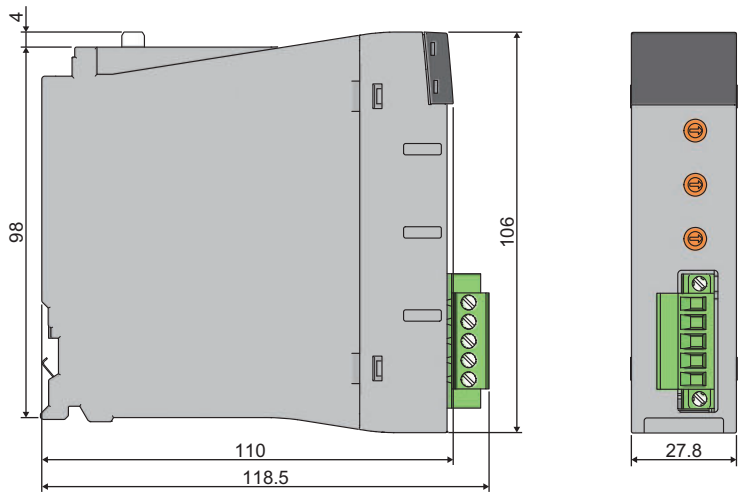
(11) Wait for the error to be reset.

(17) 'Slave function error reset request' (Y38) is turned off.

APPENDIX

Appendix 1 External Dimensions

This chapter describes the external dimensions of the RJ71DN91.

(Unit: mm)

MEMO

A

INDEX

MEMO

I

REVISIONS

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:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

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