MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R GP-IB Interface Module User's Manual (Startup)

-RJ71GB91

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.

[Design Precautions]

⚠WARNING

- 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.
- 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 prohibited 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 prohibited 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.

[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 communication line, and the external device cannot execute the remote RUN.

[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.
- Beware that the module could be very hot while power is on and immediately after power-off.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, battery-less option cassette, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach a blank cover module (RG60) to each empty slot and an included extension connector protective cover to the unused extension cable connector before powering on the system for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to noise. Keep a distance of 100mm or more between those cables.
- Place the cables in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables.
  In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks.
  Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant).
  Exceeding the limit may cause malfunction.
  - Mounting/removing the module to/from the base unit
  - Inserting/removing the extended SRAM cassette or battery-less option cassette to/from the CPU module
  - Mounting/removing the terminal block to/from the module
  - Connecting/disconnecting the extension cable to/from the base unit

[Startup and Maintenance Precautions]

⚠CAUTION

- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette or a battery-less option cassette. Doing so may cause malfunction or failure of the module.
- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Wearing an anti-static wrist strap (grounded) is also recommended. Not discharging the static electricity may cause the module to fail or malfunction.
- Use a clean and dry cloth to wipe off dirt on the module.

[Operating Precautions]

⚠CAUTION

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

[Disposal Precautions]

⚠CAUTION

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

[Transportation Precautions]

⚠CAUTION

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

CONDITIONS OF USE FOR THE PRODUCT

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

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

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

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

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers. This manual describes the specifications, procedures before operation, wiring, and programming 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.

Point

Unless otherwise specified, this manual provides program examples in which the I/O numbers of X/Y0 to X/YF are assigned to the GP-IB interface module. Assign I/O numbers when applying the program examples to an actual system. For I/O number assignment, refer to the following.
MELSEC iQ-R Module Configuration Manual

Relevant product

RJ71GB91

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

To ensure that Mitsubishi 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

To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the following manuals.

- 📖 MELSEC iQ-R Module Configuration Manual
- 📖 Safety Guidelines (This manual is included with the base unit.)

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R GP-IB Interface Module User's Manual (Startup) [SH-082378ENG] (this manual)	Specifications, procedures before operation, system configuration, wiring, and communication examples of the GP-IB interface module	Print book
		e-Manual PDF
MELSEC iQ-R Module Configuration Manual [SH-081262ENG]	Combinations of MELSEC iQ-R series modules to be used, common information on installations/wiring for configuring systems, and specifications of the power supply module, base unit, SD memory card, and battery	Print book
		e-Manual PDF
MELSEC iQ-R GP-IB Interface Module User's Manual (Application) [SH-082380ENG]	Functions, parameter settings, troubleshooting, I/O signals, and buffer memory of the GP-IB interface module	Print book
		e-Manual PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF

This manual does not include detailed information on the following:

- General specifications
- Applicable combinations of CPU modules and the other modules, and the number of mountable modules
- 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
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. The global label has two types: 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.
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.

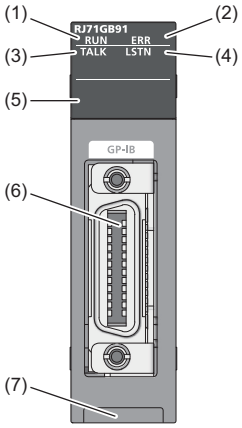
GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
Controller	A generic term for devices that have control of the GP-IB communications system. Only one device can serve as the controller in the system.
Device dependent message	A generic term for data relevant to device functions and specific to each device. The data are communicated as device dependent messages.
Device function	A generic term for functions specific to each device, such as a measurement function of voltage or frequency
GP-IB interface module	An abbreviation for the MELSEC iQ-R series GP-IB interface module
Interface message	A generic term for messages used by the controller to control the other devices. The messages sent using one signal line are called a uniline message, and the commands communicated using multiple signal lines are called a multiline message.
Listener	A generic term for devices that input signals and receive data in the GP-IB communications system
Talker	A generic term for devices that output signals and send data in the GP-IB communications system

1 PART NAMES

This chapter describes the part names of the GP-IB interface module.



No.	Name	Description
(1)	RUN LED	Indicates the operating status of the GP-IB interface module. On: Normal operation Off: 5V power supply interrupted, watchdog timer error occurred
(2)	ERR LED	Indicates the error status of the GP-IB interface module. On: Error occurred Off: Normal operation
(3)	TALK LED	Indicates whether the module operates as the talker. On: Specified as the talker Off: Not specified as the talker
(4)	LSTN LED	Indicates whether the module operates as a listener. On: Specified as a listener Off: Not specified as a listener
(5)	GP-IB address LED	Indicates the device address of the GP-IB interface module. (0 to 30)
(6)	GP-IB connector	Connects the GP-IB cable.
(7)	Production information marking	Shows the product information (16 digits) of the GP-IB interface module.

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2 SPECIFICATIONS

This chapter describes the performance specifications.

2.1 Performance Specifications

The following table lists the performance specifications of the GP-IB interface module.

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Item		Specifications
GP-IB interface		1 port
Transmission method		8 bits parallel transmission
Communication mode		Half-duplex
Interface		IEEE488.1 compliant
Handshake method		3-wire handshake
Network topology		Star topology, daisy chain topology
Cable length		2m or less per interface module (overall cable distance 20m) 4m maximum only for one to one connection
Number of connectable connectors		2 maximum (connected in piles)
Number of connectable devices		15 maximum (the GP-IB interface module included)
Device address settable		0 to 30 (Set addresses by the module parameter.)
Number of data that can be sent/ received at a time		• Send: 32360 bytes maximum • Receive: 32360 bytes maximum
End of data communications	Send	End code (CRLF or any code of 1 byte) or EOI output (according to the settings of module parameter)
	Receive	End code (CRLF or any code of 1 byte), EOI detection, or size of received data (according to the settings of module parameter)
Data transfer speed		The transfer speed of the slowest device among the connected devices 100K bytes maximum/s (for when one device is connected to one GP-IB interface module)
Number of occupied I/O points		16 points (I/O assignment: Intelligent 16 points)
Internal current consumption (5VDC)		0.28A
External dimensions	Height	106.0mm
	Width	27.8mm
	Depth	110.0mm
Weight		0.17kg

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3 FUNCTION LISTS

This chapter shows the function lists of the GP-IB interface module. For details on the functions, refer to the following.
📖 MELSEC iQ-R GP-IB Interface Module User's Manual (Application)

Item	Master mode	Slave mode
Interface message transmission	The GP-IB interface module sends interface messages to connected devices.	—
Interface message reception	—	The GP-IB interface module operates according to the interface message sent from the controller.
Service request	—	The GP-IB interface module sends the SRQ to notify the controller of the following: errors or status changes of the connected devices; necessity of data transmission from the controller. With the SRQ, the interface module requests the controller to perform the serial poll.
Data transmission	The GP-IB interface module (talker) sends data (device dependent messages) to a device specified as a listener.	When specified as the talker by the controller, the GP-IB interface module sends data (device dependent messages) to a device specified as a listener.
Data reception	The GP-IB interface module selects one connected device and specifies it as the talker, and receives data (device dependent messages) sent from the talker.	When specified as a listener by the controller, the GP-IB interface module receives data (device dependent messages) sent from the talker.
Event history function	This function collects errors or operations that have occurred or have been performed in the GP-IB interface module, and stores them in the CPU module as event information.	
Firmware update function	This function enables users to update the firmware versions of modules by using firmware update files. (For the firmware update file, please consult your local Mitsubishi representative.) For details on the function, refer to the following. 📖 MELSEC iQ-R Module Configuration Manual	
Interrupt function	This function executes interrupt programs of the CPU module when an interrupt factor, such as reception of data from a connected device and an error, has been detected.	

Precautions

When updating the firmware version, check that the output from the GP-IB interface module has stopped. Updating the firmware version without stopping the output may cause an unintended operation of the module, resulting in system failure.

GP-IB interface functions

The following table lists GP-IB interface functions used in master mode or in slave mode.

Function	Master mode		Slave mode	
SH (source handshake)	SH1	Available (transmission function)	SH1	Available (transmission function)
AH (acceptor handshake)	AH1	Available (reception function)	AH1	Available (reception function)
C (controller)	C1 C2 C3 C4 C25	• System controller • IFC transmission • REN transmission • Responding to the SRQ • Interface message transmission • Parallel poll • No delegation of authority of the controller	C0	Not available
T (talker)	T8	Available (the talker cancellation function by MLA command available, the talking only mode setting not available, the serial poll not available)	T6	Available (the talker cancellation function by MLA command available, the talking only mode setting not available, the serial poll available)
L (listener)	L4	Available (the listener cancellation function by MTA command available, the listening only mode setting not available)	L4	Available (the listener cancellation function by MTA command available, the listening only mode setting not available)
SR (service request)	SR0	Not available (the serial poll can be performed)	SR1	Available
RL (remote, local)	RL0	Not available	RL1	Available
PP (parallel poll)	PP0	Not available (the parallel poll can be performed)	PP1	The response function to the parallel poll available
DC (device clear)	DC0	Not available	DC1	Available
DT (device trigger)	DT0	Not available	DT1	Available

4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Mounting a module

Mount the GP-IB interface module in any desired configuration.

☞ Page 24 SYSTEM CONFIGURATION

2. Wiring

Wire the GP-IB interface module to external devices.

☞ Page 27 External Wiring

3. Adding a module

Add the GP-IB interface module to a module configuration by using the engineering tool. For details, refer to the following.

📖 GX Works3 Operating Manual

4. Parameter settings

Set up the parameters of the GP-IB interface module by using the engineering tool. For details, refer to the following.

📖 MELSEC iQ-R GP-IB Interface Module User's Manual (Application)

5. Programming

Create programs. For details, refer to the following.

☞ Page 28 COMMUNICATION EXAMPLES

MEMO

5 SYSTEM CONFIGURATION

For system configurations using the MELSEC iQ-R series modules, CPU modules that can be connected with the GP-IB interface module, and the number of mountable GP-IB interface modules, refer to the following.

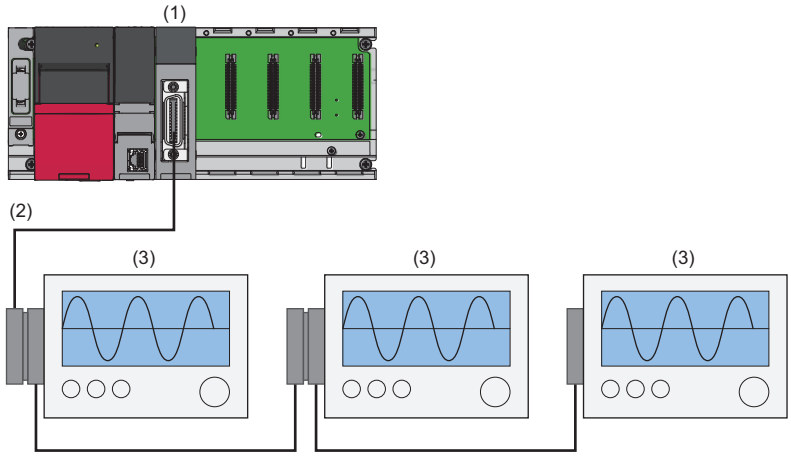
MELSEC iQ-R Module Configuration Manual

5.1 Network Topology

Use either of following network topologies when connecting the GP-IB interface module to GP-IB devices.

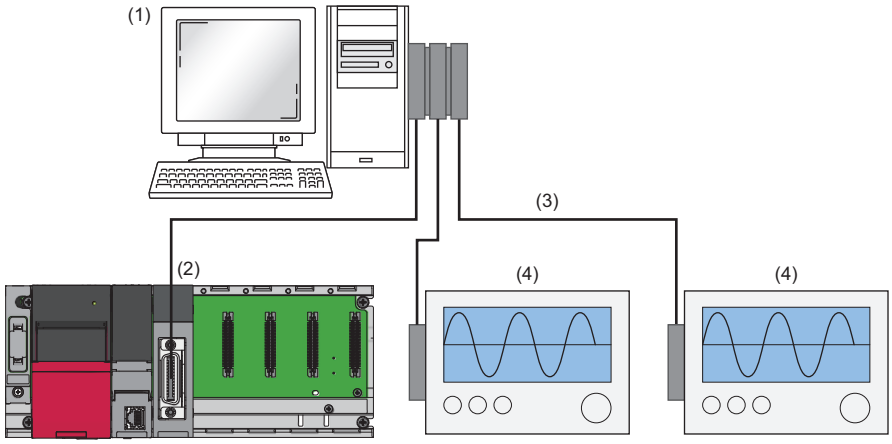
- Daisy chain topology
- Star topology

Daisy chain topology



(1) GP-IB interface module
(2) GP-IB cable
(3) GP-IB device

Star topology



(1) Controller
(2) GP-IB interface module
(3) GP-IB cable
(4) GP-IB device

Precautions

For precautions on the connections, refer to the following.

☞ Page 26 Precautions

5.2 Restrictions

When importing an electrical CAD file in AutomationML format with MELSOFT Navigator, use MELSOFT Navigator with the version 2.78G or later.

For details on MELSOFT Navigator, refer to the following.

📖 MELSOFT Navigator Version2 Help

6 WIRING

This chapter describes wiring of the GP-IB interface module.

6.1 Wiring Procedures

The following shows how to connect and remove the GP-IB cable.

Connection

1. Insert and connect the wired GP-IB cable horizontally to the slot of the GP-IB interface module.
2. Fix the cable with GP-IB connector screws (M3.5) at two locations.

Removal

Loosen the GP-IB connector screws (M3.5) and pull out the GP-IB cable horizontally from the GP-IB interface module.

Precautions

- Up to two GP-IB cables can be connected in cascade to the GP-IB connector of GP-IB interface module.
- Avoid a load applied between the GP-IB connector of GP-IB interface module and the GP-IB cable.
- After wiring, attach the included GP-IB connector cover to the module, and then power on the system for operation. Starting operation without the cover attached may result in electric shock.
- Tighten the GP-IB connector screws within the specified torque range.

Screw type	Tightening torque range
GP-IB connector screw (M3.5)	0.294 to 0.49N·m

Point

Depending on devices to be connected to the module or the installation environment, a communication error may occur. If the communication error has occurred, take the following measures to improve noise immunity.

- Use a GP-IB cable where both the cable and entire connector have the shield structure.
- Install GP-IB cables 20cm or more away from the power cables, and 10cm or more away from the I/O signal wires.
- When a device to be connected has a plug with the ground terminal, ground the terminal.
- Attach ferrite cores to the connector bases on the both ends of GP-IB cable. Use the ferrite core equivalent to ZCAT3035-1330 manufactured by TDK Corporation. Use the ferrite core with the cable threaded through it.
- Strip the jacket of GP-IB cable and expose the shield. Pinch the shield with an FG clamp, and ground and fix it. For grounding the clamp, refer to the following.

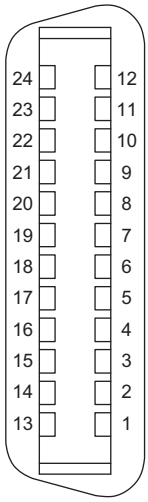
MELSEC iQ-R Module Configuration Manual

6.2 Wiring Product

For the wiring, use a GP-IB cable compliant with IEEE488.

6.3 External Wiring

The following shows the signal layout of the GP-IB connector.

Pin layout (viewed from the front of the module)	Pin number	Signal name	Pin number	Signal name
	1	DIO1	13	DIO5
	2	DIO2	14	DIO6
	3	DIO3	15	DIO7
	4	DIO4	16	DIO8
	5	EOI	17	REN
	6	DAV	18	GND
	7	NRFD	19	GND
	8	NDAC	20	GND
	9	IFC	21	GND
	10	SRQ	22	GND
	11	ATN	23	GND
	12	FG	24	Logic GND

7 COMMUNICATION EXAMPLES

This chapter describes the programming procedure and program examples of the GP-IB interface module.

7.1 Programming Procedure

Take the following steps to create programs for running the GP-IB interface module:

1. Set parameters.

☞ Page 30 Parameter settings

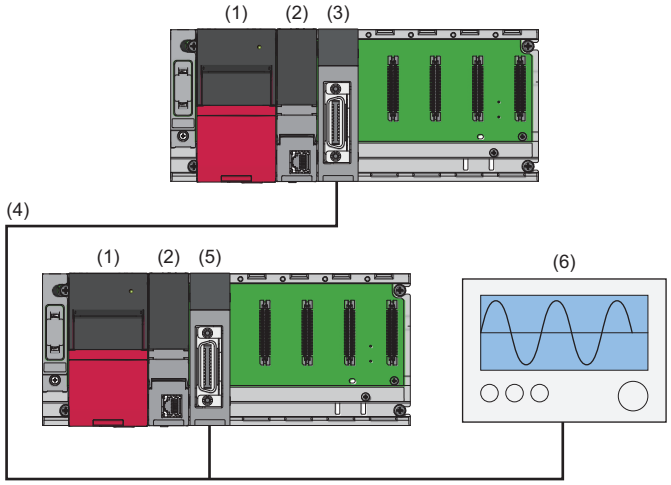
2. Create programs.

☞ Page 38 Program examples

7.2 Program Examples

System configuration

The following figure is an example of the system configuration.



(1) Power supply module (R61P)
(2) CPU module (R04CPU)
(3) GP-IB interface module (master mode) (RJ71GB91)
(4) GP-IB cable
(5) GP-IB interface module (slave mode) (RJ71GB91): Device 1 (device address 1)
(6) GP-IB device: Device 2 (device address 5)

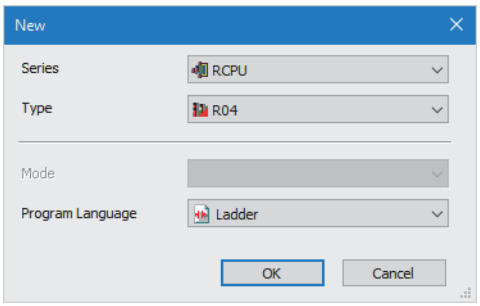
Parameter settings

Module settings of the GP-IB interface module (master mode)

Connect the engineering tool to the CPU module on master mode side and set parameters.

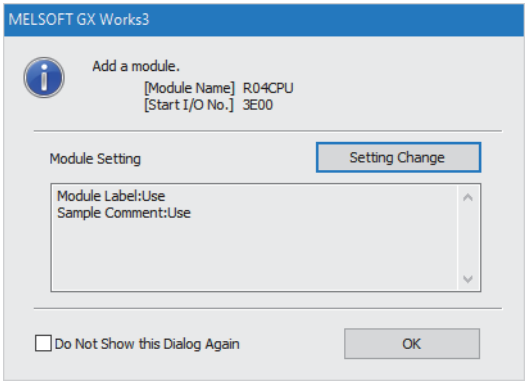
1. Create the project with the following settings.

[Project] ⇨ [New]



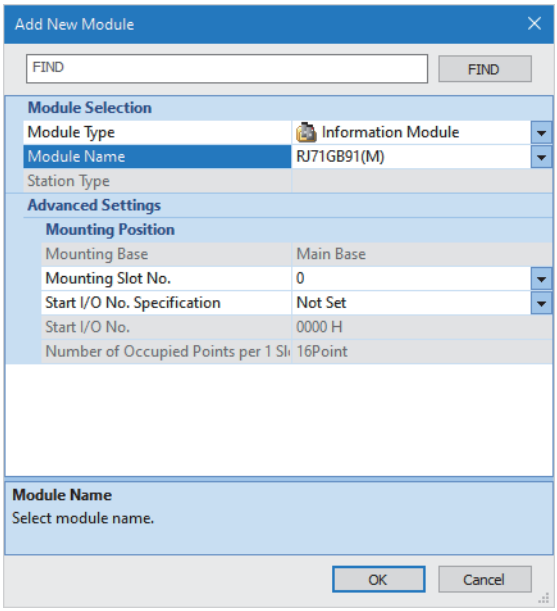
2. Click the [Setting Change] button and set the module to use the module labels.

3. Click the [OK] button in the following window to add the module labels of the CPU module.



4. Set the GP-IB interface module as follows.

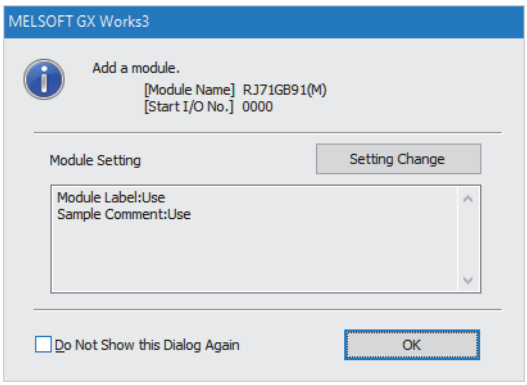
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]



Point

The GP-IB interface module is set to master mode by setting "Module Name" to "RJ71GB91(M)".

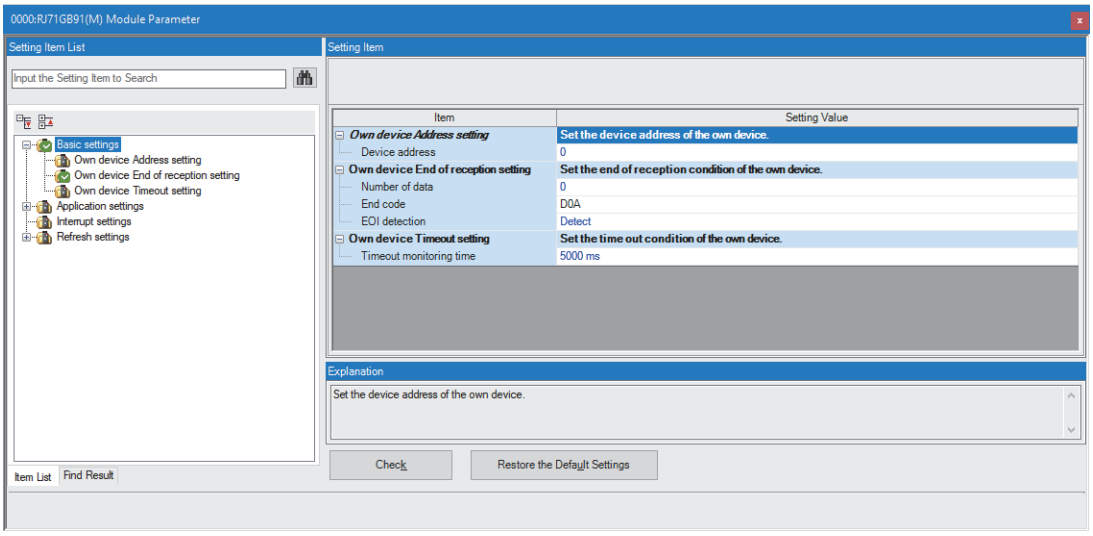
5. Set the window as follows to add the module labels of the GP-IB interface module.



Parameter settings of the GP-IB interface module (master mode)

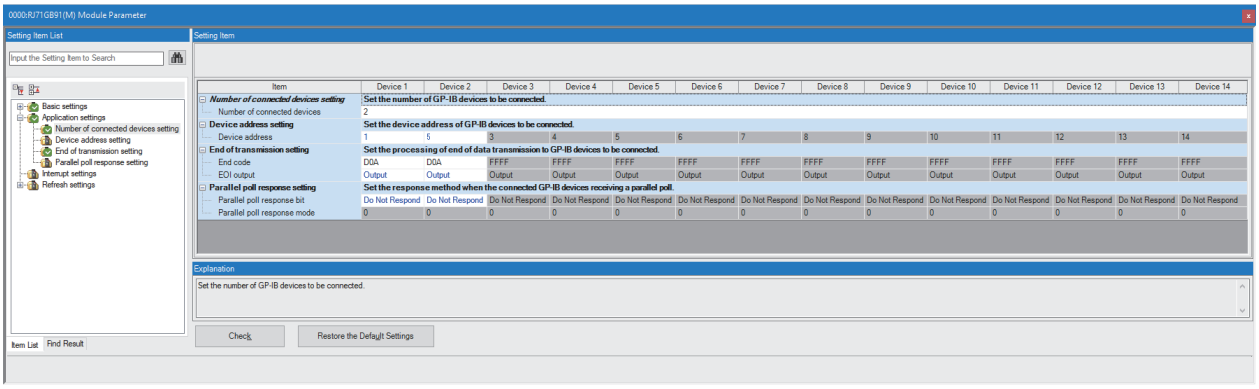
1. Set "Basic settings" of the module parameters of the GP-IB interface module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Basic settings]



2. Set "Application settings" of the module parameters of the GP-IB interface module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Application settings]



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

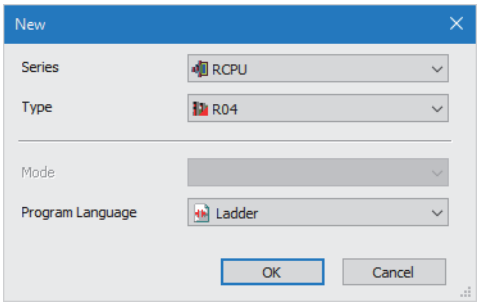
[Online] ⇨ [Write to PLC]

Module settings of the GP-IB interface module (slave mode)

Connect the engineering tool to the CPU module on slave mode side and set parameters.

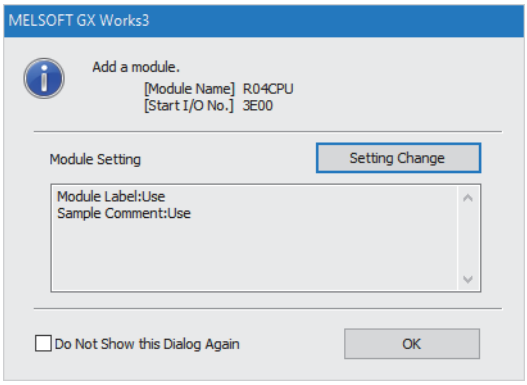
1. Create the project with the following settings.

[Project] ⇨ [New]



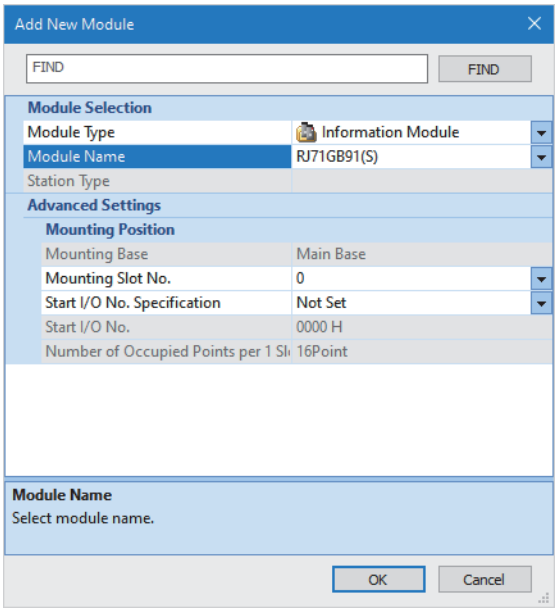
2. Click the [Setting Change] button and set the module to use the module labels.

3. Click the [OK] button in the following window to add the module labels of the CPU module.



4. Set the GP-IB interface module as follows.

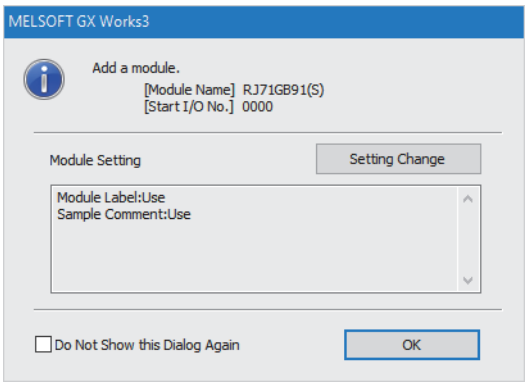
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]



Point

The GP-IB interface module is set to slave mode by setting "Module Name" to "RJ71GB91(S)".

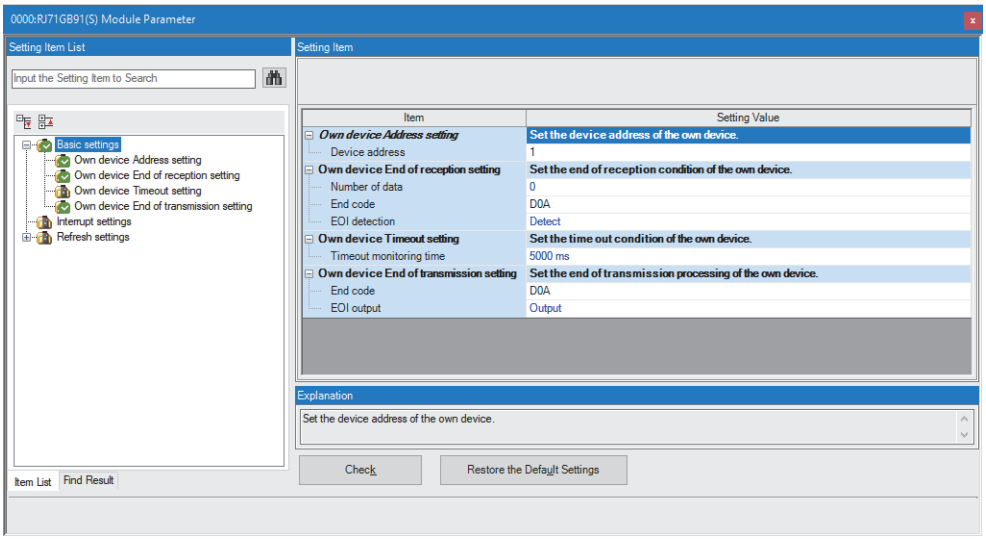
5. Set the window as follows to add the module labels of the GP-IB interface module.



Parameter settings of the GP-IB interface module (slave mode)

1. Set "Basic settings" of the module parameters of the GP-IB interface module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Basic settings]



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

[Online] ⇨ [Write to PLC]

Settings of GP-IB devices

For how to set GP-IB devices, refer to the manuals for the devices used.

Label settings

The engineering tool provides functions that support the creation of programs.

The following tables list the module labels and global labels used for the program examples in this section.

The settings of module labels do not need to be changed. For details on the global labels, refer to the following.

MELSEC iQ-R Programming Manual (Program Design)

Classification	Label name*1	Description	Device
Module labels (master mode)	GB91_M_x.bModuleReady	Module READY	X0
	GB91_M_x.bInterfaceMessageTransmissionCompletionFlag	Interface message transmission completion flag	X2
	GB91_M_x.bDataTransmissionCompletionFlag	Data transmission completion flag	X3
	GB91_M_x.bDataReceptionCompletionFlag	Data reception completion flag	X4
	GB91_M_x.bErrorFlag	Error flag	X7
	GB91_M_x.bSRQReceptionFlag	SRQ reception flag	XB
	GB91_M_x.bInterfaceMessageTransmissionRequest	Interface message transmission request	Y2
	GB91_M_x.bDataTransmissionRequest	Data transmission request	Y3
	GB91_M_x.bDataReceptionRequest	Data reception request	Y4
	GB91_M_x.bErrorClearRequest	Error clear request	Y7
Module labels (slave mode)	GB91_S_x.bModuleReady	Module READY	X0
	GB91_S_x.bDataTransmissionCompletionFlag	Data transmission completion flag	X3
	GB91_S_x.bDataReceptionFlag	Data reception flag	X4
	GB91_S_x.bServiceRequestCompletionFlag	Service request completion flag	X5
	GB91_S_x.bParallelPollResponseDataSettingCompletionFlag	Parallel poll response data setting completion flag	X6
	GB91_S_x.bErrorFlag	Error flag	X7
	GB91_S_x.bGETCommandReceptionFlag	GET command reception flag	XC
	GB91_S_x.bDCLCommandReceptionFlag	DCL command reception flag	XD
	GB91_S_x.bIFCReceptionFlag	IFC reception flag	XE
	GB91_S_x.bDataTransmissionRequest	Data transmission request	Y3
	GB91_S_x.bDataReceptionProcessingCompletion	Data reception processing completion	Y4
	GB91_S_x.bServiceRequest	Service request	Y5
	GB91_S_x.bParallelPollResponseDataSettingRequest	Parallel poll response data setting request	Y6
	GB91_S_x.bErrorClearRequest	Error clear request	Y7
	GB91_S_x.bGETCommandReceptionProcessingCompletion	GET command reception processing completion	YC
	GB91_S_x.bDCLCommandReceptionProcessingCompletion	DCL command reception processing completion	YD
	GB91_S_x.bIFCReceptionProcessingCompletion	IFC reception processing completion	YE

*1 Numerical values corresponding to device numbers (1 to 14) come in X.

Classification	Label name	Description	Device
Labels to be defined	Define global labels as shown below: • Master mode		

	Label Name	Data Type		Class	Assign
1	InterfaceClearCommand	Bit	...	VAR_GLOBAL	M0
2	TriggerCommand	Bit	...	VAR_GLOBAL	M1
3	DataTransmissionCommand_M	Bit	...	VAR_GLOBAL	M2
4	DataReceptionCommand	Bit	...	VAR_GLOBAL	M3
5	SerialPollCommand	Bit	...	VAR_GLOBAL	M4
6	ErrorClearCommand	Bit	...	VAR_GLOBAL	M5
7	InterfaceClearCompletion	Bit	...	VAR_GLOBAL	M100
8	TriggerRequestCompletion	Bit	...	VAR_GLOBAL	M101
9	DataTransmissionCompletion_M	Bit	...	VAR_GLOBAL	M102
10	DataReceptionCompletion	Bit	...	VAR_GLOBAL	M103
11	SerialPollCompletion	Bit	...	VAR_GLOBAL	M104
12	TmpInterfaceClearCommand	Bit	...	VAR_GLOBAL	M1000
13	TmpTriggerCommand	Bit	...	VAR_GLOBAL	M1001
14	TmpSerialPollCommand	Bit	...	VAR_GLOBAL	M1002
15	ErrorOccurrence	Bit	...	VAR_GLOBAL	F0
16	TriggerRequestError	Bit	...	VAR_GLOBAL	F1
17	DataTransmissionError_M	Bit	...	VAR_GLOBAL	F2
18	DataReceptionError_M	Bit	...	VAR_GLOBAL	F3
19	SerialPollError	Bit	...	VAR_GLOBAL	F4
20	ErrorCode_M	Word [Signed]	...	VAR_GLOBAL	D0
21	SerialPollResult	Word [Signed](0..14)	...	VAR_GLOBAL	D50
22	NumberOfReceivedDataTemporary_M	Word [Signed]	...	VAR_GLOBAL	D100
23	TransmitDataHead_M	Word [Signed]	...	VAR_GLOBAL	D1000
24	ReceivedDataHead_M	Word [Signed]	...	VAR_GLOBAL	D4000

• Slave mode

	Label Name	Data Type		Class	Assign
1	DataTransmissionCommand_S	Bit	...	VAR_GLOBAL	M10
2	DeviceError	Bit	...	VAR_GLOBAL	M11
3	DeviceClearProcessingCommand	Bit	...	VAR_GLOBAL	M40
4	DeviceClearProcessingCompletion	Bit	...	VAR_GLOBAL	M50
5	DeviceTriggerProcessingCommand	Bit	...	VAR_GLOBAL	M41
6	DeviceTriggerProcessingCompletion	Bit	...	VAR_GLOBAL	M51
7	DataTransmissionCompletion_S	Bit	...	VAR_GLOBAL	M202
8	DataTransmissionError_S	Bit	...	VAR_GLOBAL	F10
9	DataReceptionError_S	Bit	...	VAR_GLOBAL	F11
10	ErrorCode_S	Word [Signed]	...	VAR_GLOBAL	D10000
11	NumberOfReceivedDataTemporary_S	Word [Signed]	...	VAR_GLOBAL	D10100
12	TransmitDataHead_S	Word [Signed]	...	VAR_GLOBAL	D11000
13	ReceivedDataHead_S	Word [Signed]	...	VAR_GLOBAL	D14000

Program examples

Precautions

In the programs provided in this section, if the CPU module is changed to STOP while each request is not yet complete, a device used for the request or command, such as 'DataTransmissionCommand_S' (M10), may not be reset properly even after the CPU module is changed to RUN again. To prevent this, change the CPU module state to STOP while a device of request or command is off.

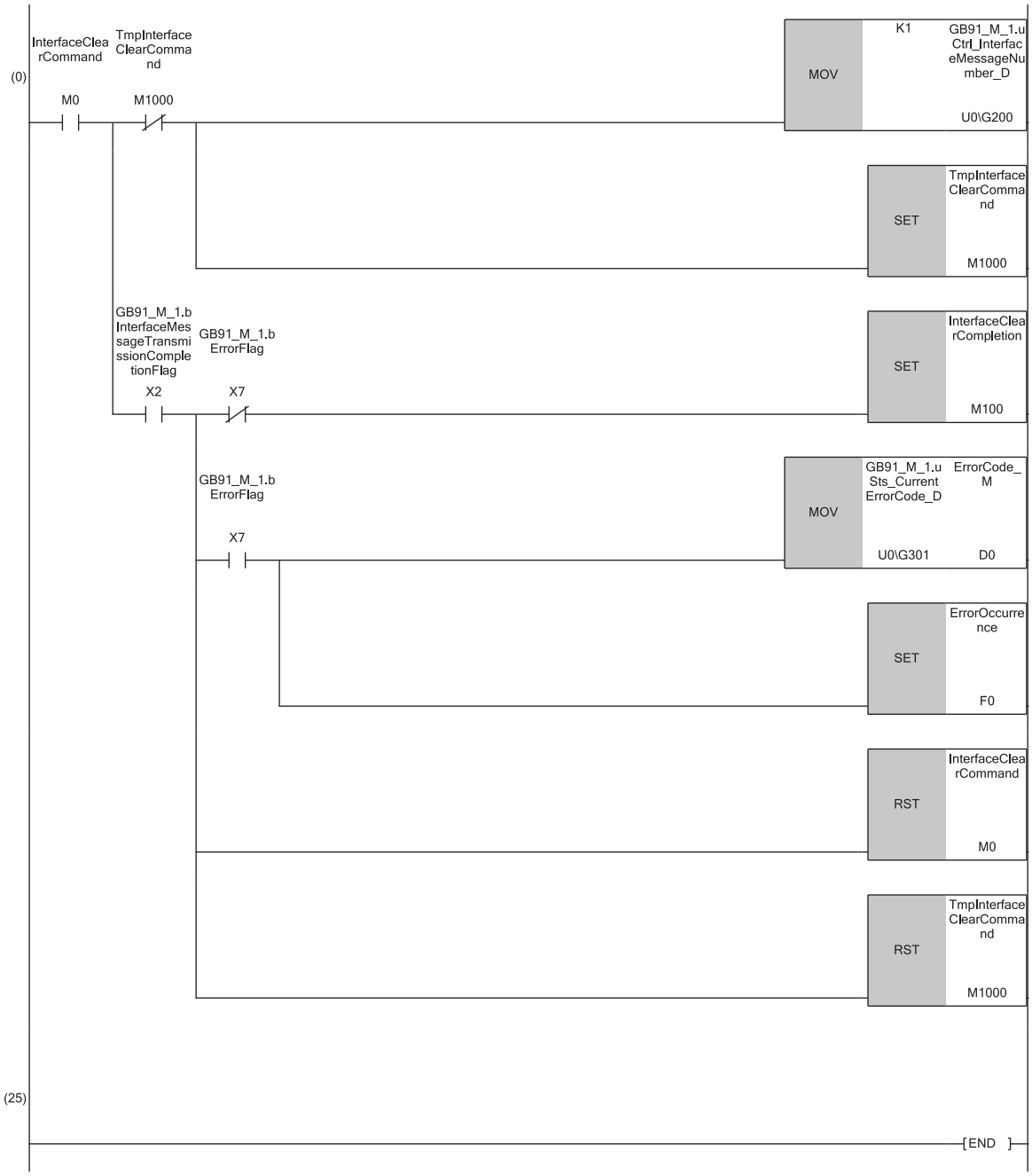
Program examples in master mode

■Interface message transmission (destination not specified)

The following example is a program for interface clear.

For the program of turning on 'Interface message transmission request' (Y2), refer to the following.

☞ Page 42 Program common to interface message transmission



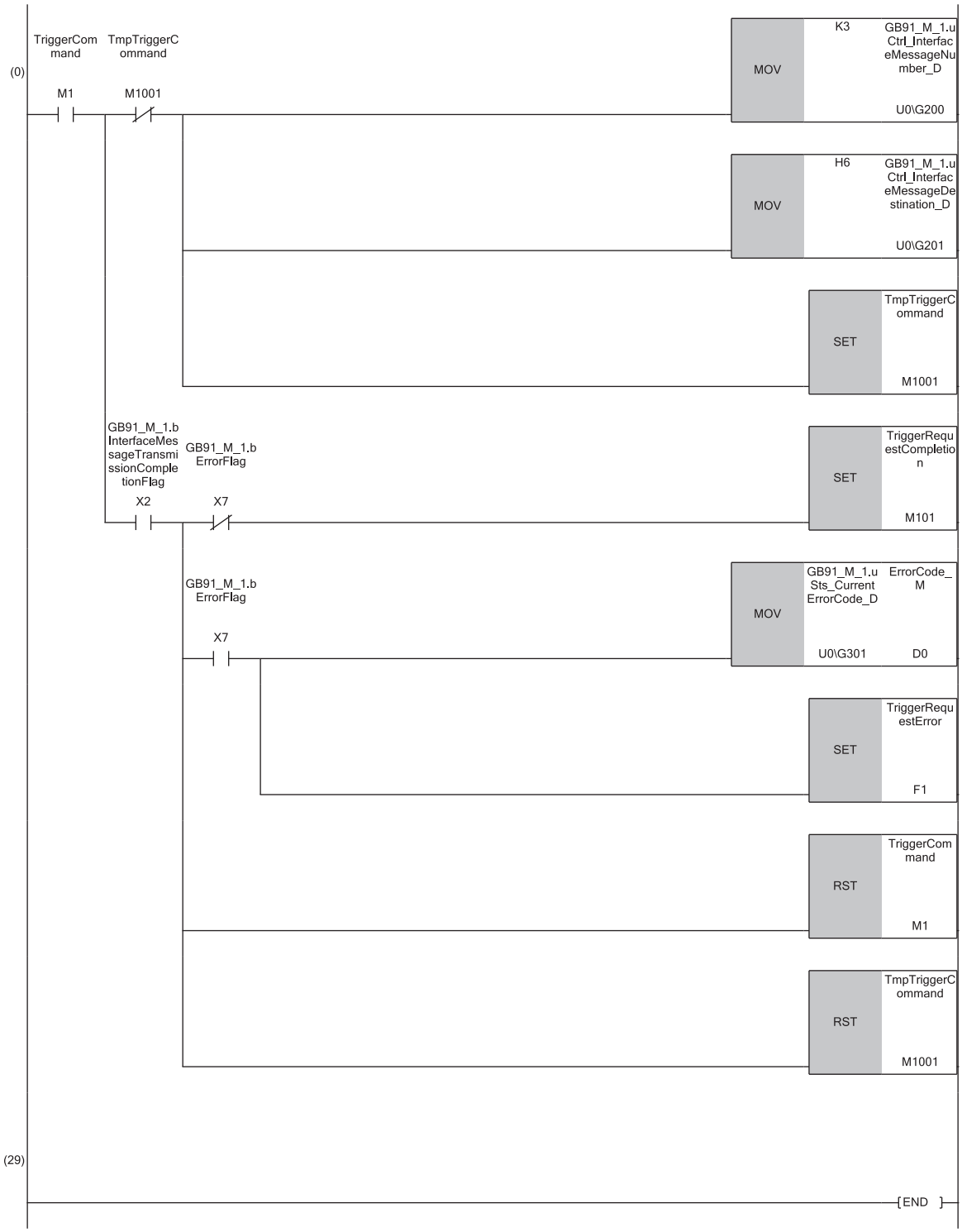
(0) The IFC signal is sent by turning on 'InterfaceClearCommand' (M0).

■Interface message transmission (destination specified)

The following example is a program for device trigger.

For the program of turning on 'Interface message transmission request' (Y2), refer to the following.

☞ Page 42 Program common to interface message transmission



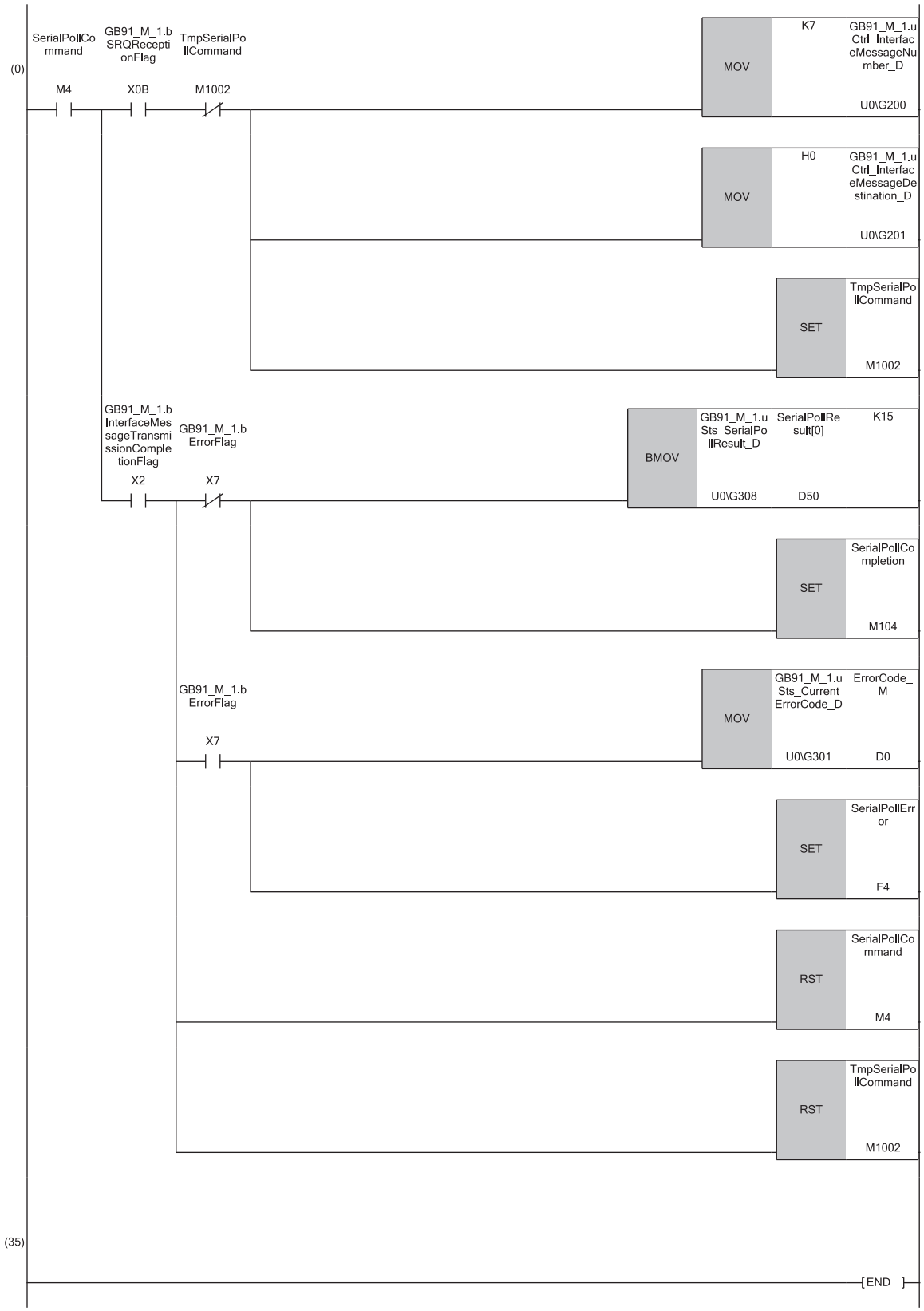
(0) The following operations are performed by turning on 'TriggerCommand' (M1): the GP-IB interface module (slave mode) and the GP-IB device are specified as the interface message destination; the GET command is sent.

■Processing at service request reception

The following example is a program for serial poll, which is performed at service request reception.

For the program of turning on 'Interface message transmission request' (Y2), refer to the following.

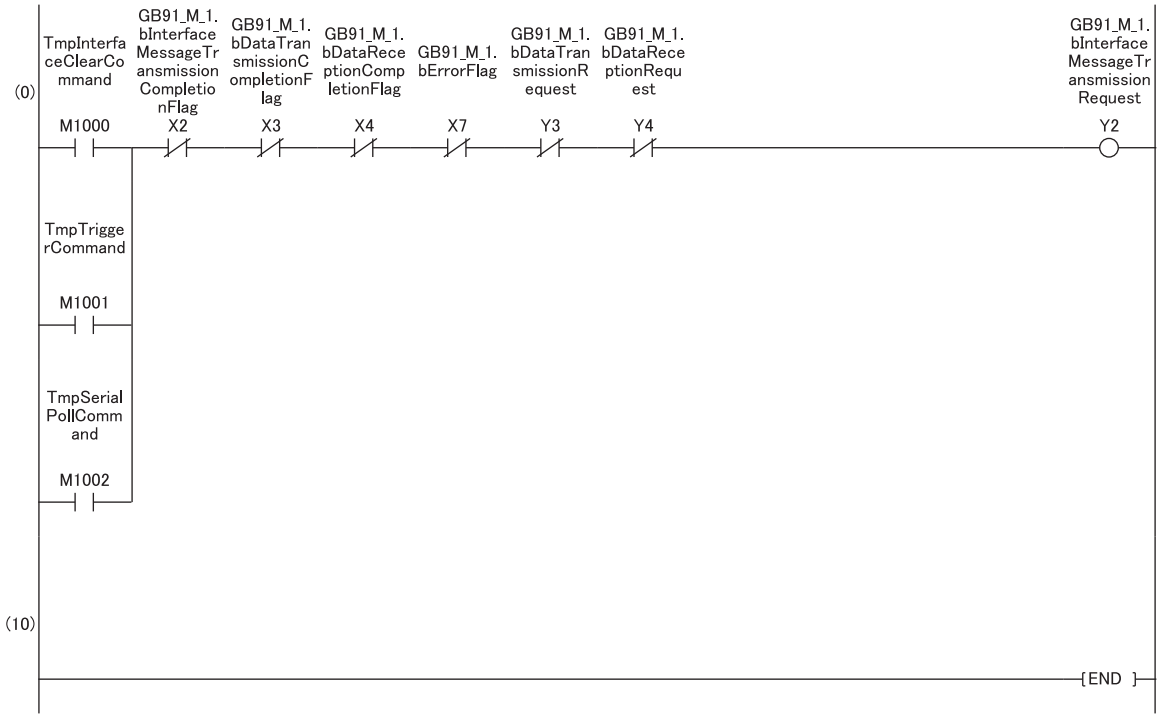
☞ Page 42 Program common to interface message transmission



(0) At service request reception, the following operations are performed by turning on 'SerialPollCommand' (M4): all devices are specified as the interface message destination; the serial poll is performed.

■Program common to interface message transmission

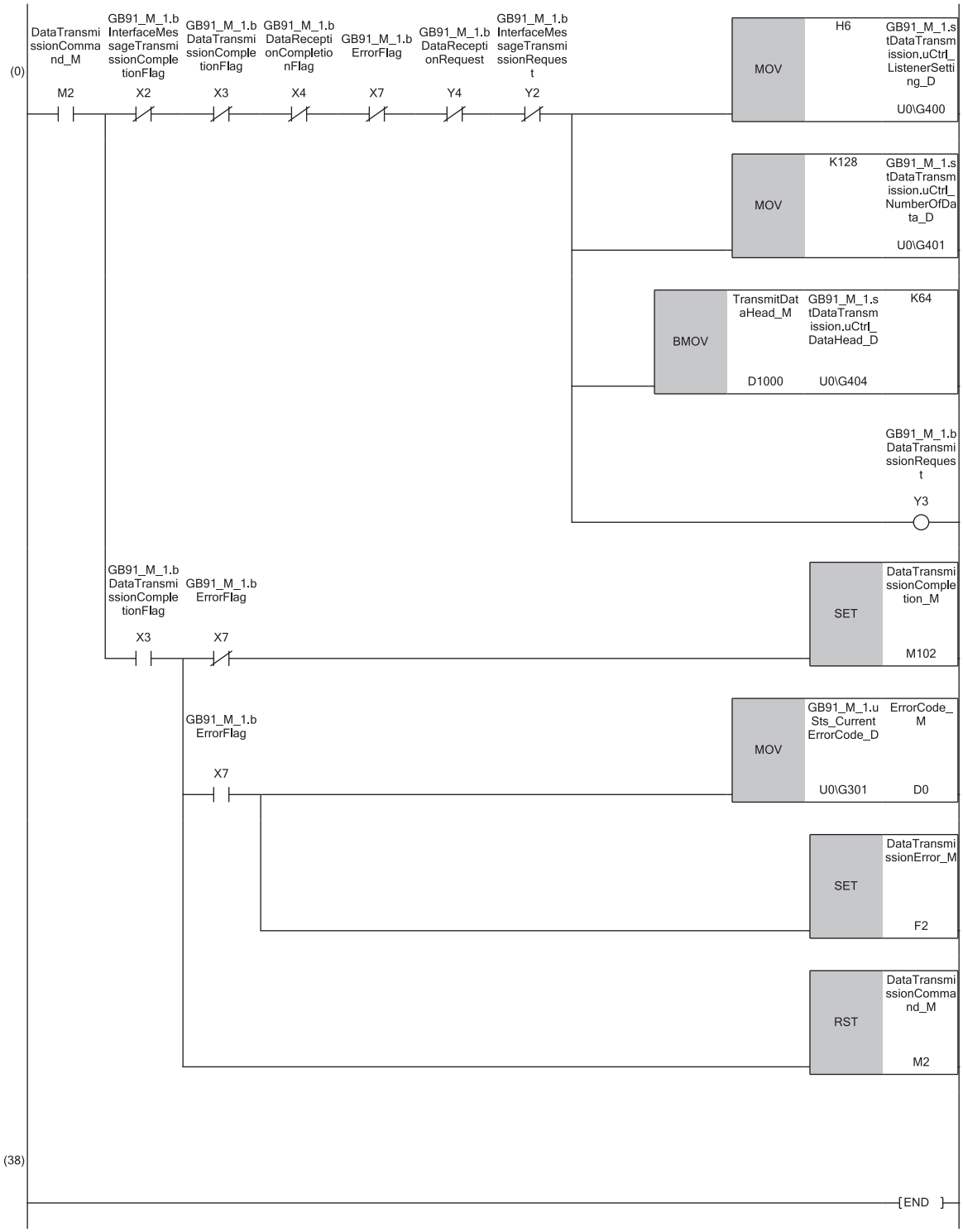
The following example is a part of program that is used for all types of interface message transmission.



(0) Turn on 'Interface message transmission request' when a relay of each interface message turns on.

■Data transmission

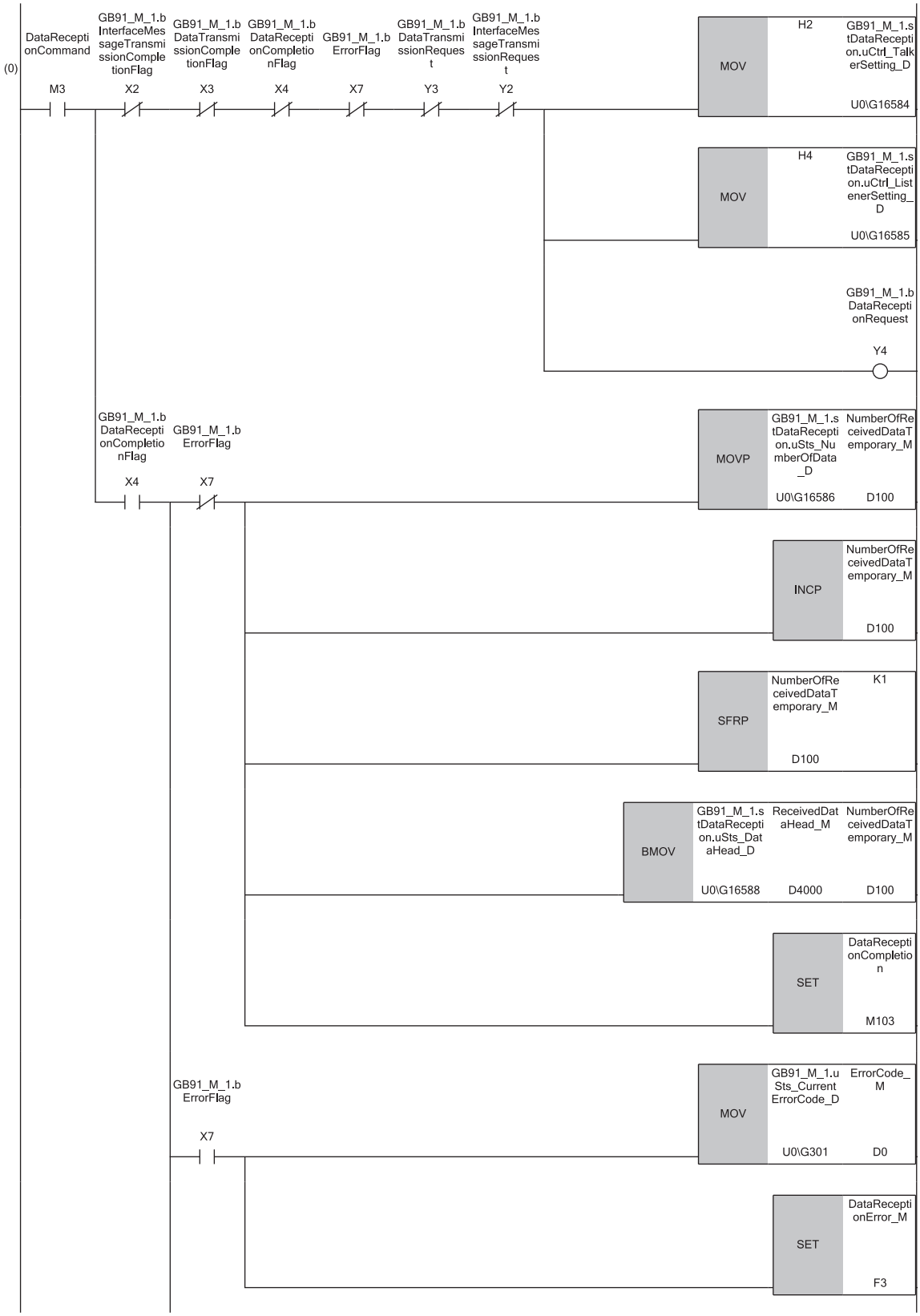
The following example is a program for data transmission.

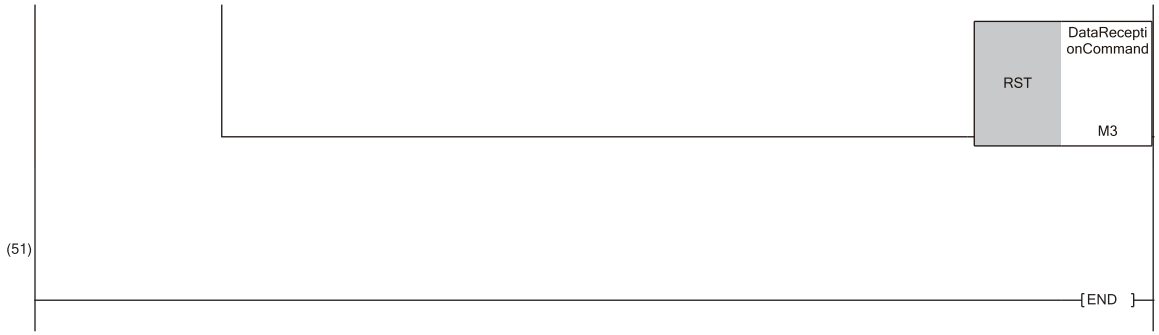


(0) Data of 128 bytes are sent to the GP-IB interface module (slave mode) and the GP-IB device by turning on 'DataTransmissionCommand_M' (M2).

■Data reception

The following example is a program for data reception.

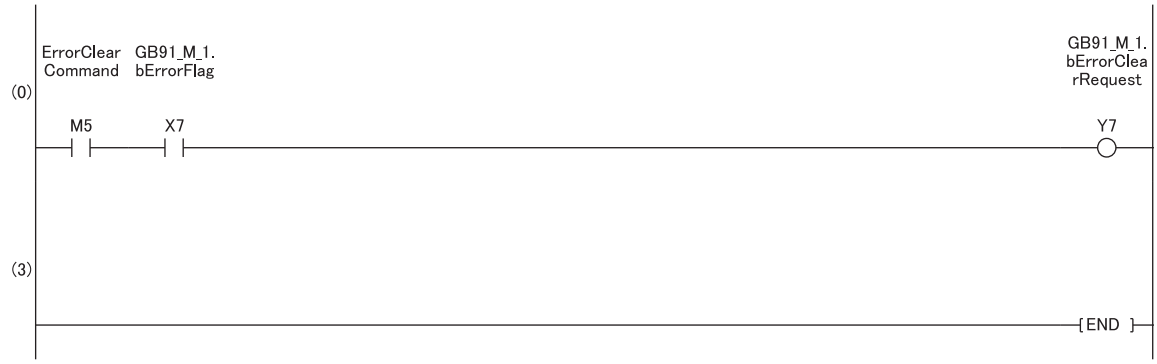




(0) The GP-IB interface module (master mode) and the GP-IB device receive data sent from the GP-IB interface module (slave mode) by turning on 'DataReceptionCommand' (M3).

■Error clear processing

The following example is a program for error clear processing.

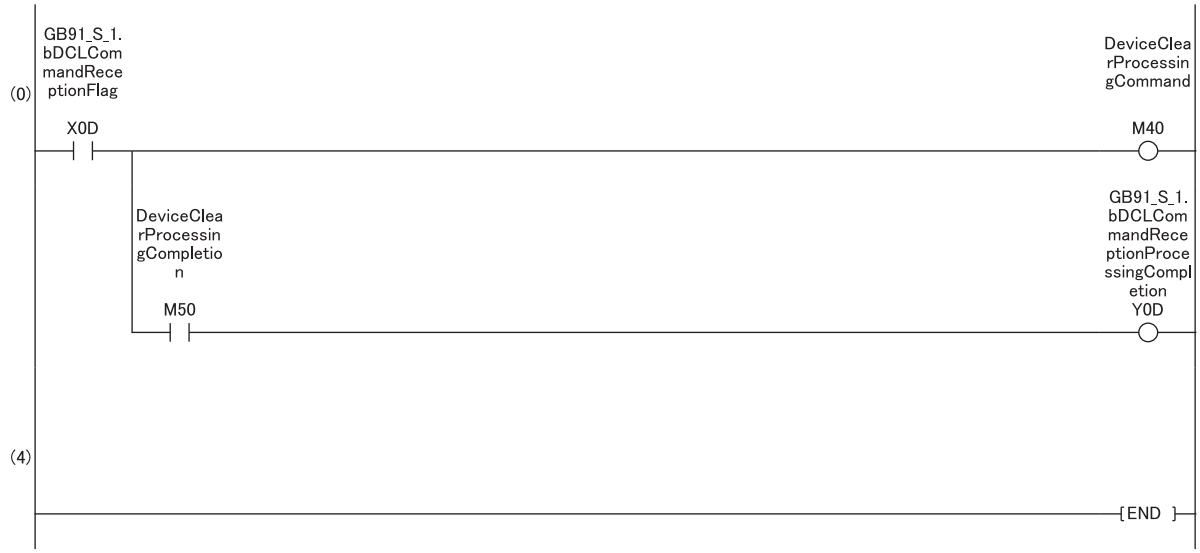


(0) When an error has occurred, the error is cleared by turning on 'ErrorClearCommand' (M5).

Program examples in slave mode

■Device clear

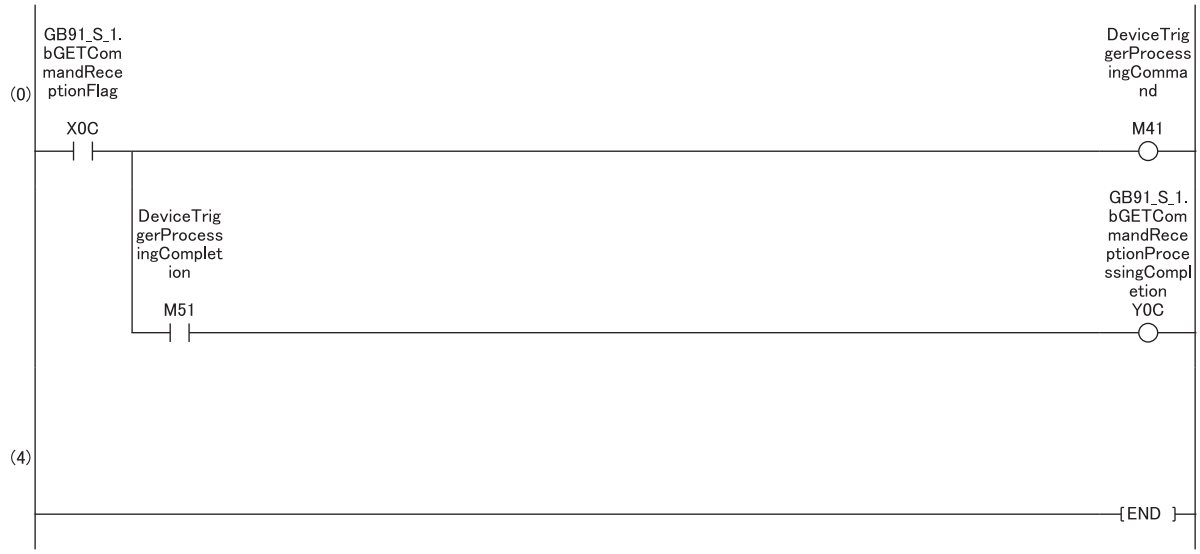
The following example is a program for device clear.



(0) Turn on 'DeviceClearProcessingCommand' (M40) when the DCL command or the SDC command sent from the controller has been received. The device clear is complete by performing the process required for the system and turning on 'DeviceClearProcessingCompletion' (M50).

■Device trigger

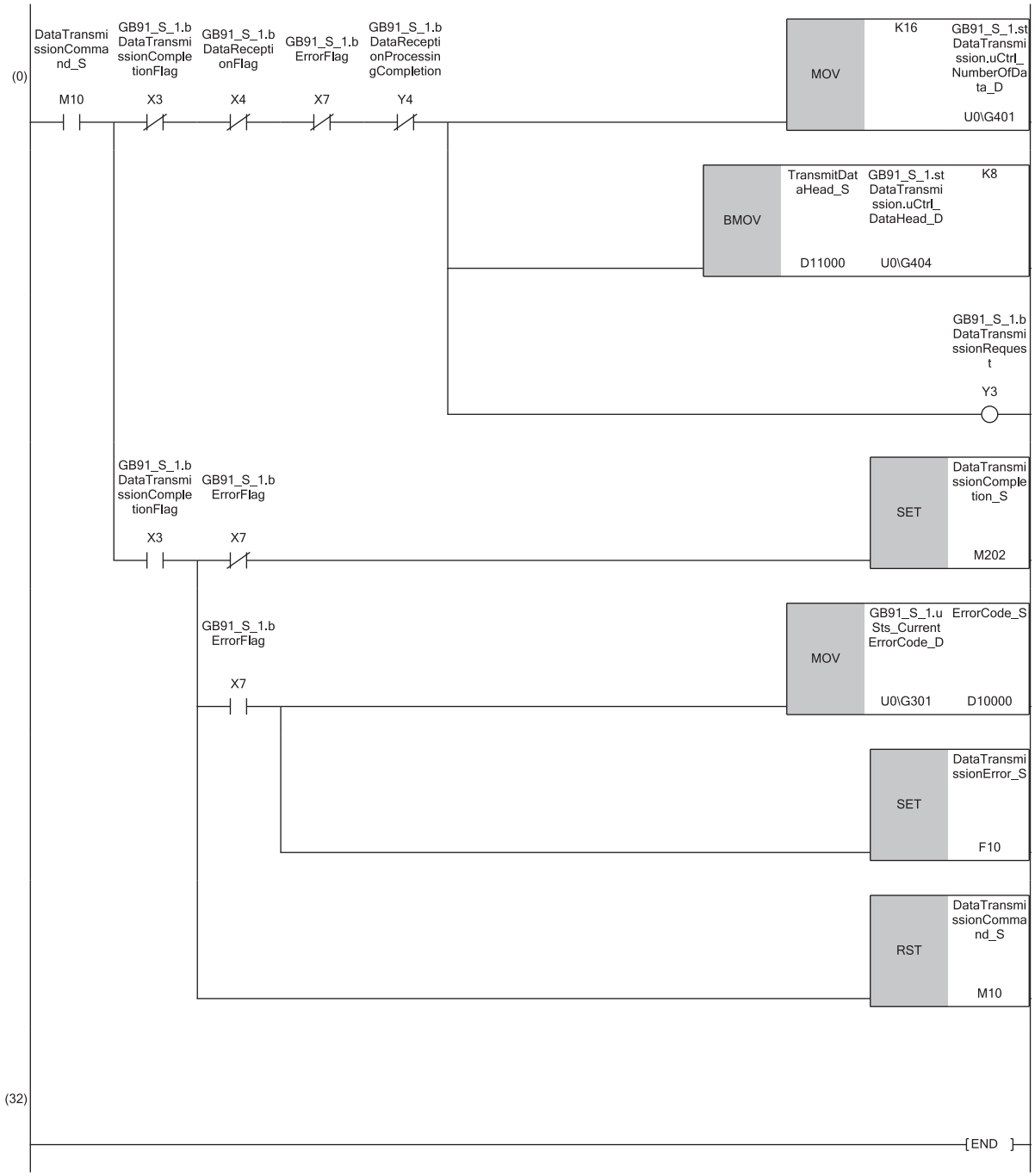
The following example is a program for device trigger.



(0) Turn on 'DeviceTriggerProcessingCommand' (M41) when the GET command sent from the controller has been received. The device trigger is complete by performing the process required for the system and turning on 'DeviceTriggerProcessingCompletion' (M51).

■Data transmission

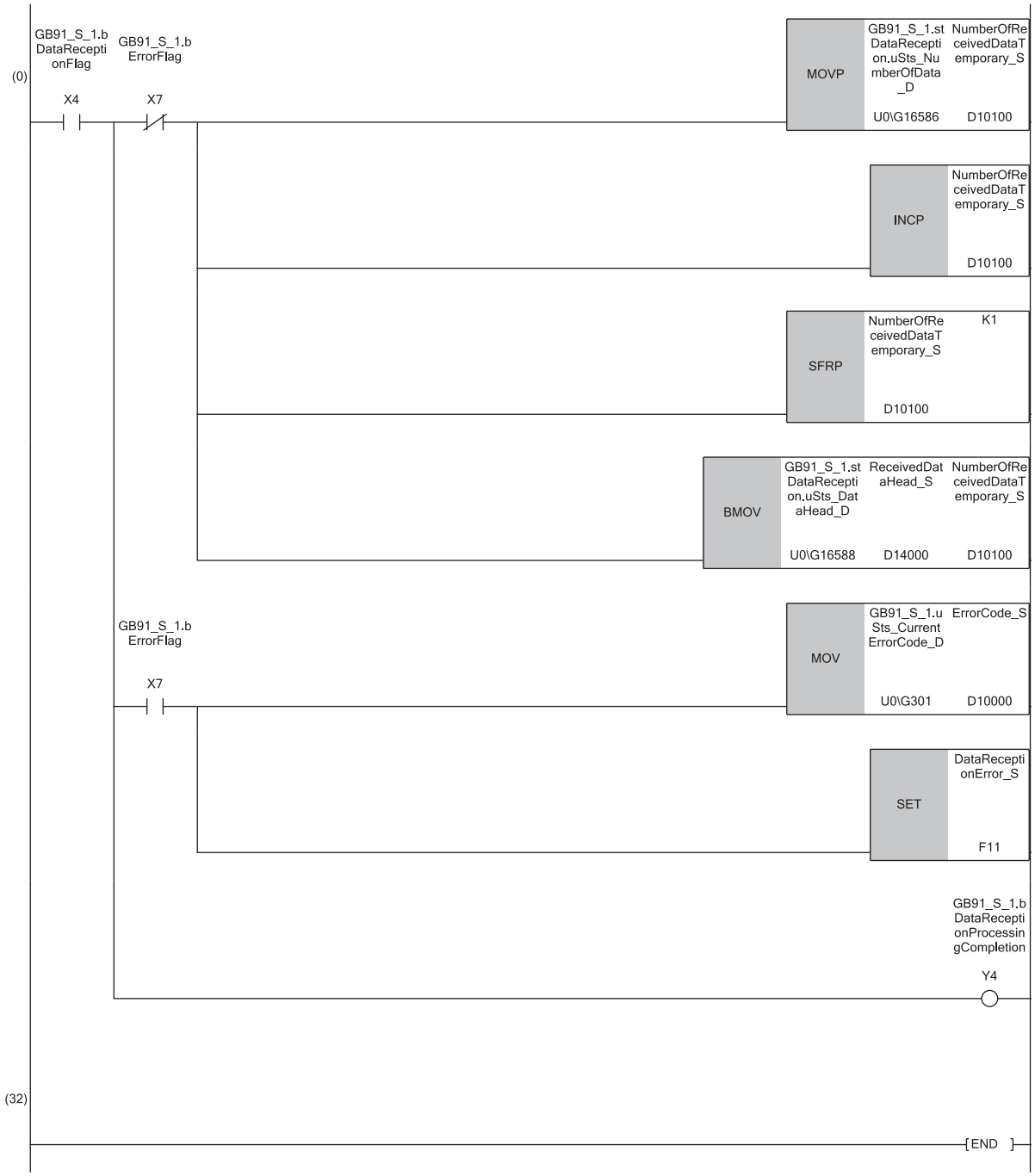
The following example is a program for data transmission.



(0) Data of 16 bytes are sent by turning on 'DataTransmissionCommand_S' (M10). Turn on 'DataTransmissionCompletion_S' (202) when data transmission is complete after the own device being specified as the talker by the controller.

■Data reception

The following example is a program for data reception.



(0) Received data are transferred to the area of 'ReceivedDataHead_S' (D14000) and later when the end of data reception has been detected after the own device being specified as a listener by the controller.

■Service request

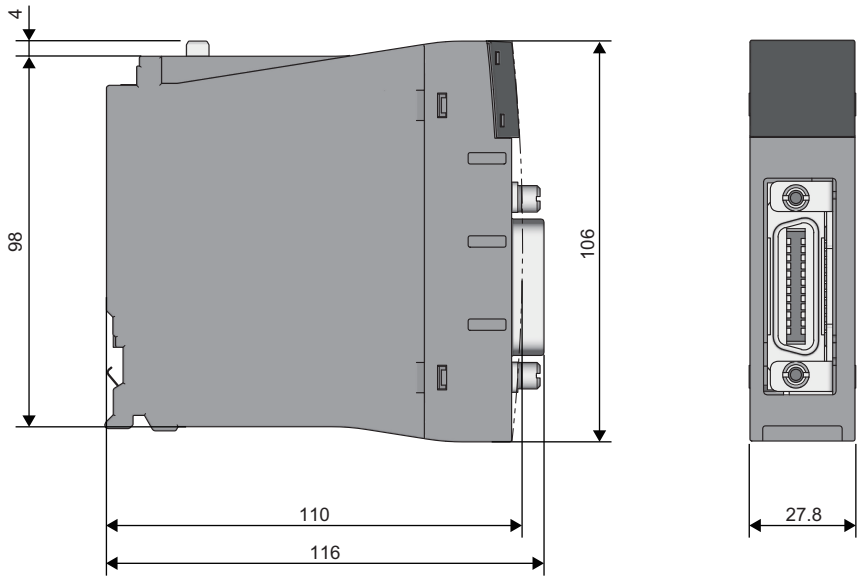
The following example is a program to notify the controller that a service request has been issued when an error occurs in the system (when 'DeviceError' (M11) turns on).

(0) The following operations are performed by turning on 'DeviceError' (M11): a status byte (H1), which is sent back to the controller at the reception of serial poll, is set; a service request is issued.

APPENDIX

Appendix 1 External Dimensions

This chapter shows the external dimensions of the GP-IB interface module.



(Unit: mm)

MEMO

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ERR LED 16

G

GP-IB address LED 16
GP-IB connector 16

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LSTN LED 16

R

RUN LED 16

T

TALK LED 16

MEMO

REVISIONS

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

Revision date	*Manual number	Description
January 2021	SH(NA)-082378ENG-A	First edition
May 2021	SH(NA)-082378ENG-B	■Added or modified part Section 5.2

Japanese manual number: SH-082377-B

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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.

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[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.
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6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
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(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

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SH(NA)-082378ENG-B(2105)MEE
MODEL: RJ71GB91-U-IN-E
MODEL CODE: 13JX4F

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