

Programmable Controller

**MELSEC iQ-R**  
series

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

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-RJ71GB91



# SAFETY PRECAUTIONS

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(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".

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 <b>WARNING</b>	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 <b>CAUTION</b>	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

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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]

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### **WARNING**

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- 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.
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## [Design Precautions]

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### **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.
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## [Design Precautions]

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### **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.
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## [Security Precautions]

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### **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.
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## [Installation Precautions]

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### **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]

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### **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.
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## [Wiring Precautions]

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### **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.
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## [Wiring Precautions]

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### CAUTION

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

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### **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]

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### **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
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## [Startup and Maintenance Precautions]

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### 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.
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## [Operating Precautions]

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### 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.
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## [Disposal Precautions]

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### **CAUTION**

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

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### **CAUTION**

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- 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.
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# CONDITIONS OF USE FOR THE PRODUCT

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- (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

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

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

Please make sure that the end users read this manual.

### Relevant product

RJ71GB91

# CONTENTS

SAFETY PRECAUTIONS .....	1
CONDITIONS OF USE FOR THE PRODUCT .....	10
INTRODUCTION .....	10
RELEVANT MANUALS .....	13
TERMS .....	14
GENERIC TERMS AND ABBREVIATIONS .....	14
<b>CHAPTER 1 FUNCTIONS</b> .....	<b>15</b>
<b>1.1 Master Mode</b> .....	<b>16</b>
Interface message transmission .....	17
Data transmission .....	29
Data reception .....	34
<b>1.2 Slave Mode</b> .....	<b>39</b>
Interface message reception .....	39
Service request .....	44
Data transmission .....	45
Data reception .....	49
<b>1.3 Event History Function</b> .....	<b>52</b>
<b>1.4 Interrupt Function</b> .....	<b>53</b>
<b>CHAPTER 2 PARAMETER SETTINGS</b> .....	<b>54</b>
<b>2.1 Basic Settings</b> .....	<b>54</b>
<b>2.2 Application Settings</b> .....	<b>55</b>
<b>2.3 Interrupt Settings</b> .....	<b>56</b>
<b>2.4 Refresh Settings</b> .....	<b>57</b>
Refresh processing time .....	58
<b>CHAPTER 3 TROUBLESHOOTING</b> .....	<b>59</b>
<b>3.1 Troubleshooting with the LEDs</b> .....	<b>59</b>
<b>3.2 Checking the State of the Module</b> .....	<b>60</b>
<b>3.3 Troubleshooting by Symptom</b> .....	<b>62</b>
When the RUN LED does not turn on .....	62
When the ERR LED turns on .....	62
When communications fail .....	62
<b>3.4 List of Error Codes</b> .....	<b>63</b>
<b>APPENDICES</b> .....	<b>66</b>
<b>Appendix 1 Module Label</b> .....	<b>66</b>
<b>Appendix 2 I/O Signals</b> .....	<b>67</b>
List of I/O signals .....	67
Details of input signals .....	69
Details of output signals .....	77
<b>Appendix 3 Buffer Memory</b> .....	<b>78</b>
List of buffer memory areas .....	78
Details of buffer memory areas .....	82

**INDEX**

**92**

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REVISIONS .....	.94
WARRANTY .....	.95
TRADEMARKS .....	.96

# RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R GP-IB Interface Module User's Manual (Application) [SH-082380ENG] (this manual)	Functions, parameter settings, troubleshooting, I/O signals, and buffer memory 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 (Startup) [SH-082378ENG]	System configuration, specifications, procedures before operation, wiring, and communication examples 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

## 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 messages, and the commands communicated using multiple signal lines are called a multiline messages.
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 FUNCTIONS

This chapter describes the functions of the GP-IB interface module and the setting procedures for those functions. For details on the I/O signals and the buffer memory, refer to the following.

☞ Page 67 I/O Signals

☞ Page 78 Buffer Memory

## Point

Numerical values corresponding to device numbers come in □ of the error codes described in this chapter. For details on the numerical values, refer to the following.

☞ Page 63 List of Error Codes

## Operation modes

The GP-IB interface module has following operation modes. Select an appropriate mode using the engineering tool.

- Master mode: The GP-IB interface module operates as the controller in this mode. (☞ Page 16 Master Mode)
- Slave mode: The GP-IB interface module operates as one of devices connected to and controlled by the controller in this mode. (☞ Page 39 Slave Mode)

# 1.1 Master Mode

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The GP-IB interface module in this mode operates as the controller.

To GP-IB devices connected to the controller, numbers of 1 to 14 to manage the devices are given, which are used to specify communication destination devices by a program.

For instance, specifying the device 1 and requesting GP-IB communications by programs make the GP-IB interface module start communications with a device address (0 to 30) set in 'Device 1 communications setting' (Un\G16).

## Ex.

The GP-IB interface module starts communications with the device 1 having the device address 5, by setting the buffer memory areas as shown below, specifying the device 1 and requesting GP-IB communications by programs.

- 'Device 1 communications setting' (Un\G16): Device address 5
- 'Device 2 communications setting' (Un\G24): Device address 1

# Interface message transmission

The GP-IB interface module in master mode sends interface messages to GP-IB devices connected.

## Types of interface messages

The following table lists interface messages to be sent from the interface module.

Type of interface message	'Interface message number' (Un\G200)	'Interface message destination' (Un\G201)	Transmission processing of the GP-IB interface module	
			Destination	Processing
Interface clear	1	—	All devices	Sends the IFC signal.
Device clear	2	0	All devices	Sends the DCL command.
		Destination device(s) specified	Specified device(s)	Specifies the destination device(s) as listener(s), and then sends the SDC command.
Device trigger	3	0	No device specified	Sends the GET command. (Only the device(s) that are already specified as listener(s) receive the GET command.)
		Destination device(s) specified	Specified device(s)	Specifies the destination device(s) as listener(s), and then sends the GET command.
Remote setting	4	0	No device specified	Turns on the REN signal (sets devices to the remote). (The setting takes effect only when device(s) have been specified as listener(s) after the turning on.)
		Destination device(s) specified	Specified device(s)	Turns on the REN signal (sets devices to the remote), and then specifies the destination device(s) as listener(s).
Local setting	5	0	All devices	Turns off the REN signal (sets devices to the local).
		Destination device(s) specified	Specified device(s)	Specifies the destination device(s) as listener(s), and then sends the GTL command.
Local lockout setting	6	—	All devices	Sends the LLO command.
Serial poll	7	0	All devices	Executes the serial poll to the devices one by one, from the device with the smallest number.
		Destination device(s) specified	Specified device(s)	
Parallel poll	8	—	No device specified <sup>*1</sup>	Sends the ATN signal and EOI signal.
Parallel poll configure	9	0	—	The setting error occurs.
		Destination device(s) specified	Specified device(s)	Sends the PPC command.


\*1 Although the ATN signal and EOI signal are sent to all devices, only the devices compatible with the parallel poll to which signal lines are already assigned at the response bit respond to the signals.

## Parameter setting values check and timeout monitoring

The following table shows whether the parameter-setting-value-range check or timeout monitoring is to be performed or not by each interface message.

Type of interface message	Whether the parameter setting values check is to be performed				Whether the timeout monitoring is to be performed
	Number of connected devices	Destination specification	Timeout monitoring time	Device address	
Interface clear	—	—	—	—	—
Device clear	—	—	○	—	○
	○	○	○	○	○
Device trigger	—	—	○	—	○
	○	○	○	○	○
Remote setting	—	—	—	—	—
	○	○	○	○	○
Local setting	—	—	—	—	—
	○	○	○	○	○
Local lockout setting	—	—	○	—	○
Serial poll	○	—	○	○	○*1
	○	○	○	○	○*1
Parallel poll	—	—	—	—	—
Parallel poll configure	—*2				
	○	○	○	○	○

\*1 For the timing when the timeout monitoring is performed and the timing when a timeout error occurs, refer to the following.

 Page 25 When a device does not respond to the serial poll

\*2 If 0 is set in 'Interface message destination' (Un\G201), an error occurs, and thus neither the parameter setting values check nor the timeout monitoring is performed.

## Transmission procedure

1. Set the number of interface message to be sent for 'Interface message number' (Un\G200).

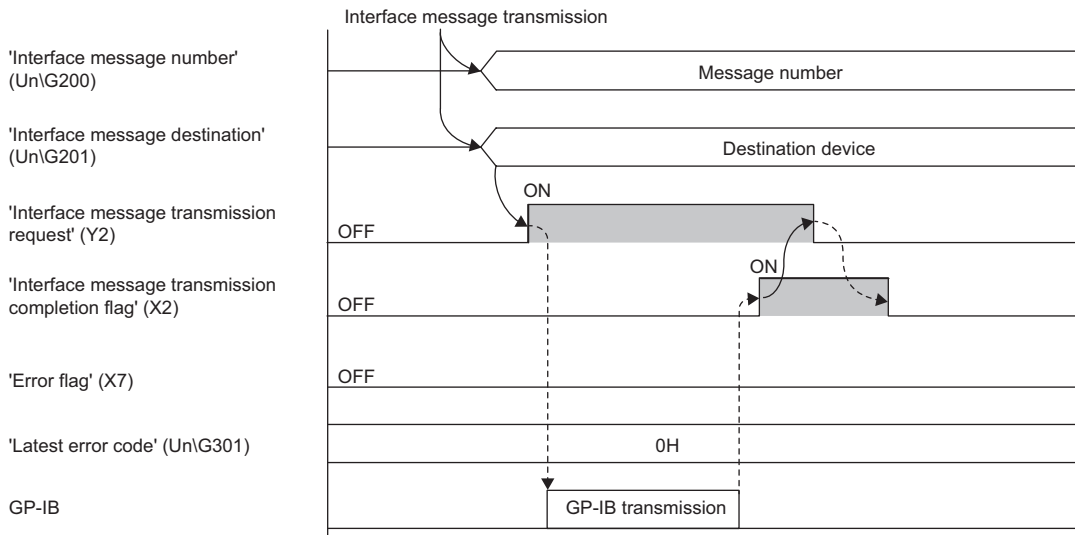
2. Specify destination devices in 'Interface message destination' (Un\G201).

Note that depending on the types of interface messages, the message is sent to all devices regardless of the setting of 'Interface message destination' (Un\G201). For the types of interface messages, refer to the following.

☞ Page 17 Interface message transmission

3. Turn on 'Interface message transmission request' (Y2).

4. When 'Interface message transmission completion flag' (X2) turns on, turn off 'Interface message transmission request' (Y2).



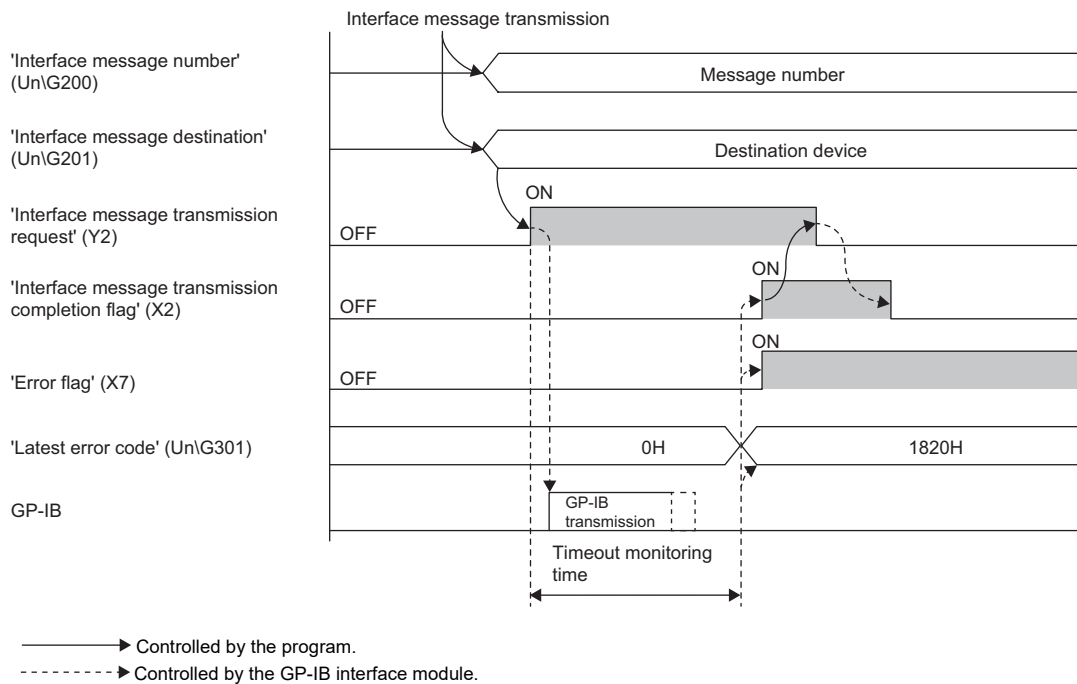
—————▶ Controlled by the program.  
 - - - - -▶ Controlled by the GP-IB interface module.

### Point

When setting an address for a destination device to send an interface message, set an address different from the own device. If 'Interface message transmission request' (Y2) is turned on while the addresses overlap, an interface message destination device □ address overlap error (error code: 187□H) occurs and the interface message will not be sent.

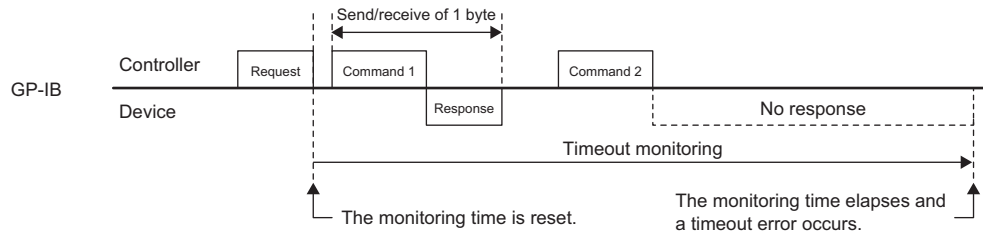
## ■When an error occurs during transmission

If an error, such as a timeout, occurs after 'Interface message transmission request' (Y2) is turned on, 'Interface message transmission completion flag' (X2) and 'Error flag' (X7) turn on.



## ■Timeout monitoring

For interface message transmission using multiple signal lines, if the transmission is not complete until the time set in 'Timeout monitoring time' (Un\G4) elapses after turning on of 'Interface message transmission request' (Y2), an interface message transmission timeout (error code: 1820H) occurs.



## Precautions

When multiple devices are specified in 'Interface message destination' (Un\G201) but some of them are not connected to the controller, an interface message transmission timeout (error code: 1820H) does not occur. This is because a handshake is established when one device is both specified and connected.

### Ex.

If an interface message is sent while the devices 1 to 3 are specified as destination devices but only the devices 1 and 3 are connected, a timeout does not occur despite the device 2 not connected. This is because a handshake is established for the devices 1 and 3.

## ■When interface message transmission is attempted before the error is cleared

Turning on 'Interface message transmission request' (Y2) is ignored if it is done while 'Error flag' (X7) is on. In such a case, the interface message is not sent and 'Interface message transmission completion flag' (X2) does not turn on.

If 'Error flag' (X7) is on when you send an interface message, turn off 'Error flag' (X7) by using 'Error clear request' (Y7), and then turn on 'Interface message transmission request' (Y2).

## Interface clear

This interface message initializes the GP-IB communications interface function of all connected devices.

The GP-IB interface module sends the IFC signal by turning on 'Interface message transmission request' (Y2) using the program.

The interface clear does not initialize device functions that are specific to each device, such as measurement range setting, though. Transmission of the device clear initializes device functions.

## Device clear

This interface message initializes device functions specific to each device.

The GP-IB interface module performs the following operation according to a setting of 'Interface message destination' (Un\G201), by turning on 'Interface message transmission request' (Y2) using the program.

'Interface message destination' (Un\G201)	Transmission processing
0	Sends the DCL command. The command is received by all connected devices that support the device clear function.
Destination device(s) are specified.	Specifies the destination device(s) as listener(s), and then sends the SDC command.

After the command transmission, if a destination device does not send back the command reception until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

## Device trigger

This interface message synchronizes the start timing of a function across multiple devices.

It is useful for a case such as simultaneously starting measurement across multiple pulse counters.

The GP-IB interface module performs the following operation according to a setting of 'Interface message destination' (Un\G201), by turning on 'Interface message transmission request' (Y2) using the program.

'Interface message destination' (Un\G201)	Transmission processing
0	Sends the GET command.
Destination device(s) are specified.	Specifies the destination device(s) as listener(s), and then sends the GET command.

After the command transmission, if a destination device does not send back the command reception until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

## Remote setting

Device mode can be selected between the remote status and the local status. Devices in the remote status are operated by the GP-IB interface module while devices in local status are operated by the front panels of devices. The interface message of remote setting sets devices to the remote status.

The GP-IB interface module performs the following operation according to a setting of 'Interface message destination' (Un\G201), by turning on 'Interface message transmission request' (Y2) using the program.

'Interface message destination' (Un\G201)	Transmission processing
0	Turns on the REN signal (sets devices to the remote).
Destination device(s) are specified.	Turns on the REN signal (sets devices to the remote), and then specifies the destination device(s) as listener(s).

After the transmission of command where destination device(s) are specified, if a destination device does not send back the command reception until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

## Local setting

This interface message sets devices to the local status.

The GP-IB interface module performs the following operation according to a setting of 'Interface message destination' (Un\G201), by turning on 'Interface message transmission request' (Y2) using the program.

'Interface message destination' (Un\G201)	Transmission processing
0	Turns off the REN signal (sets devices to the local).
Destination device(s) are specified.	Specifies the destination device(s) as listener(s), and then sends the GTL command.

After the transmission of command where destination device(s) are specified, if a destination device does not send back the command reception until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

## Local lockout setting

This interface message prohibits any operation using front panels of connected devices.

The GP-IB interface module sends the LLO command by turning on 'Interface message transmission request' (Y2) using the program. The LLO command is received by all connected devices that support the local lockout function.

After the command transmission, if a destination device does not send back the command reception until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

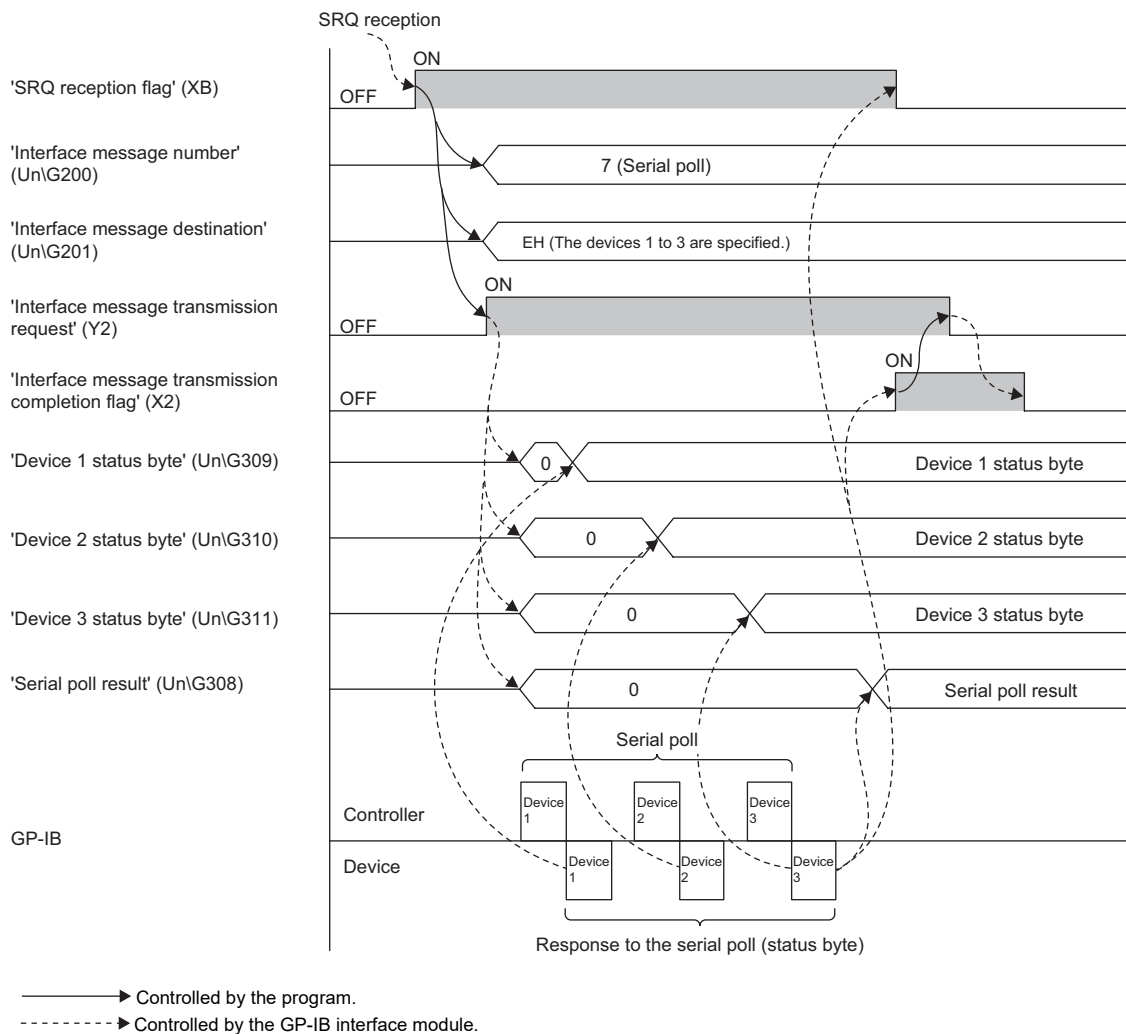


## Serial poll

This interface message identifies a device that has sent the SRQ and inquires about the service request sent by the device. The GP-IB interface module executes the serial poll to the devices specified in 'Interface message destination' (Un\G201), one by one from the device with the smallest number by turning on 'Interface message transmission request' (Y2) using the program.

### Serial poll procedure

1. Set 7 (Serial poll) for 'Interface message number' (Un\G200).
2. Specify target devices of the serial poll in 'Interface message destination' (Un\G201).  
When 0 is set for this buffer memory area, the serial poll is executed to all connected devices.
3. Turn on 'Interface message transmission request' (Y2).  
Values stored in 'Device 1 status byte' (Un\G309) to 'Device 14 status byte' (Un\G322) and 'Serial poll result' (Un\G308) are cleared to 0. And then the serial poll starts from the device with the smallest number.
4. The status bytes are stored in the buffer memory areas, one by one from the device for which the serial poll has been completed.
5. When the serial poll has been completed for all specified devices, 'Interface message transmission completion flag' (X2) turns on. Turn off 'Interface message transmission request' (Y2) after confirming the X2 signal has turned on.

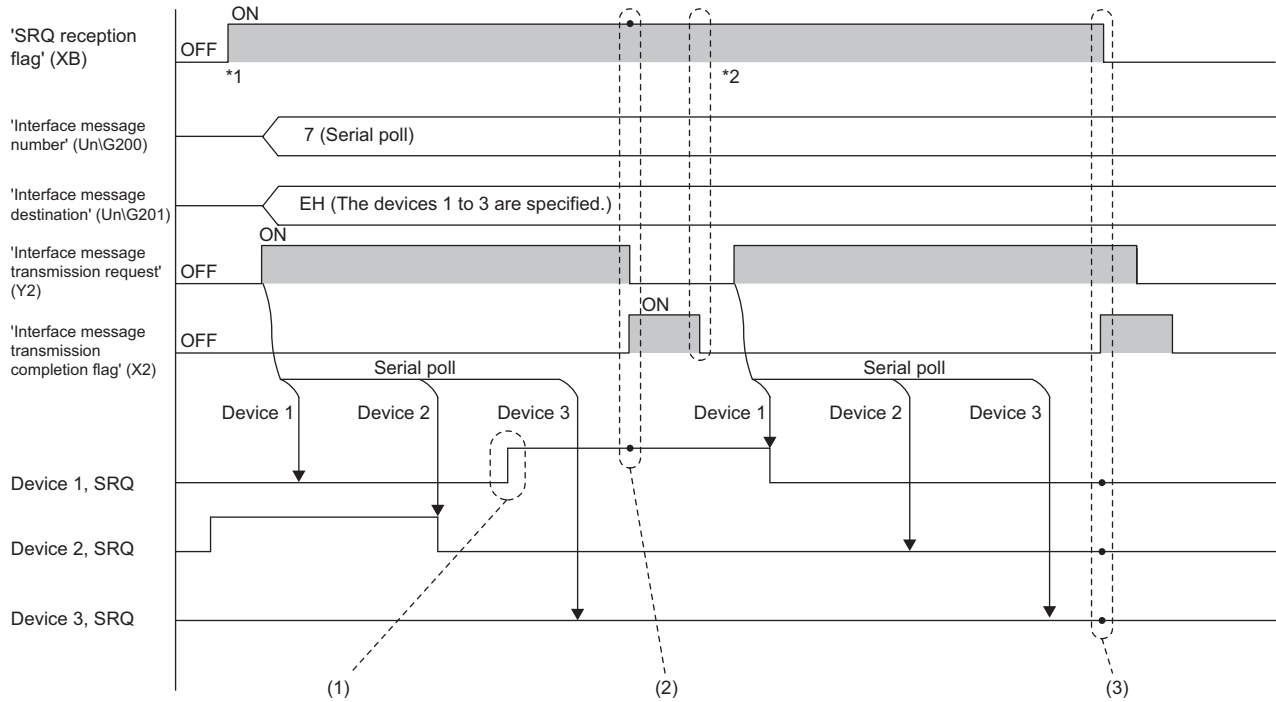


## ■When another SRQ is sent during serial poll

The serial poll is executed to the devices sequentially when multiple devices are specified as its targets.

During the execution, if another SRQ is sent from a device where the serial poll is already complete, 'SRQ reception flag' (XB) does not turn off even when the serial poll has been completed for all the devices specified.

Check the status bytes that have been stored and execute the serial poll again.



(1) The SRQ turns on after the serial poll completion of device 1.

(2) 'SRQ reception flag' (XB) does not turn off because the SRQ of device 1 is on.

(3) 'SRQ reception flag' (XB) turns off after the SRQs of all devices turn off.

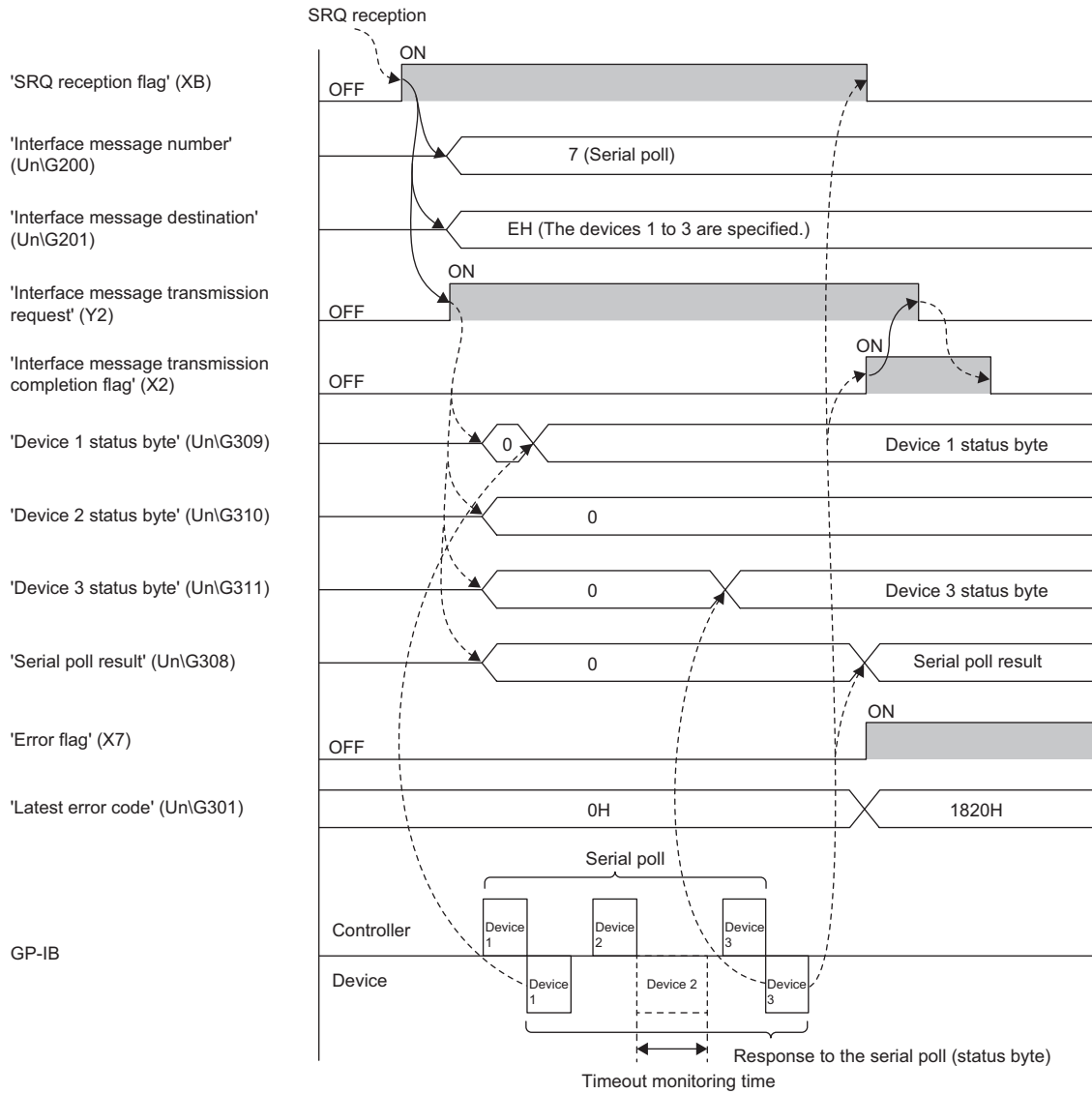
\*1 When an interrupt by the SRQ reception is set and 'SRQ reception flag' (XB) has turned on, the GP-IB interface module notifies the CPU module that an interrupt factor has occurred.

\*2 When an interrupt by the SRQ reception is set, any of the SRQs is on, and 'Interface message transmission completion flag' (X2) has turned off, the GP-IB interface module notifies the CPU module that an interrupt factor has occurred and the interrupt program starts.

### ■When a device does not respond to the serial poll

During transmission of the serial poll command to the target devices, if one of these devices does not respond to the command until the time set in 'Timeout monitoring time' (Un\G4) elapses, the processing of serial poll for that device stops and moves on to the next device.

In such a case, an interface message transmission timeout (error code: 1820H) occurs when the serial poll has been completed for all the devices specified.



—————> Controlled by the program.  
 - - - - -> Controlled by the GP-IB interface module.

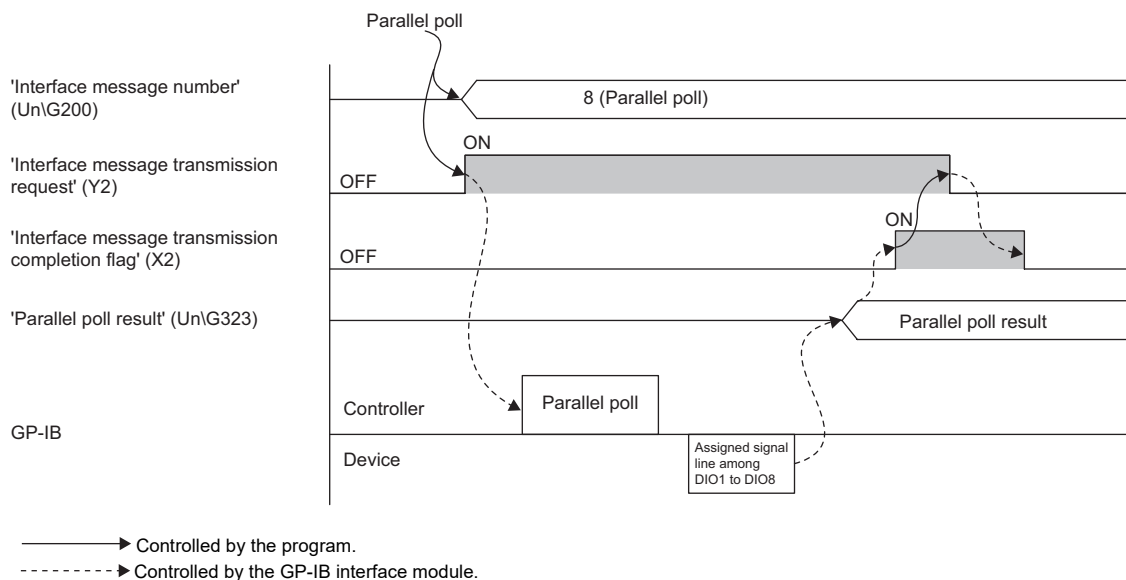
## Parallel poll

This interface message inquires about a state of each device.

At parallel poll execution, each device responds using one of eight signal lines (DIO1 to DIO8) that is assigned to it.

### Parallel poll procedure

1. Set 8 (Parallel poll) for 'Interface message number' (Un\G200) and turn on 'Interface message transmission request' (Y2).
2. The parallel poll results are stored in 'Parallel poll result' (Un\G323).



## Parallel poll configure

This interface message assigns a signal line (DIO1 to DIO8) to respond to the parallel poll and sets a response polarity (positive or negative) to each device.

If a device does not respond to the parallel poll configure until the time set in 'Timeout monitoring time' (Un\G4) elapses, an interface message transmission timeout (error code: 1820H) occurs.

### Assignment of signal lines with which devices respond

Assign signal lines to each device by setting any of DIO1 to DIO8 for 'Parallel poll response bit' (Un\G19, Un\G27, Un\G35, Un\G43, Un\G51, Un\G59, Un\G67, Un\G75, Un\G83, Un\G91, Un\G99, Un\G107, Un\G115, Un\G123).

For a device that does not need to respond to the parallel poll, set 0. If a value other than 0 to 8 is set for these buffer memory areas, a device □ parallel poll response bit setting range error (error code: 185□H) occurs.

### ■Response polarity

Set a response polarity to each device by setting 0 or 1 for 'Parallel poll response mode' (Un\G20, Un\G28, Un\G36, Un\G44, Un\G52, Un\G60, Un\G68, Un\G76, Un\G84, Un\G92, Un\G100, Un\G108, Un\G116, Un\G124).

If a value other than 0 and 1 is set for these buffer memory areas, a device □ parallel poll response mode setting range error (error code: 186□H) occurs.

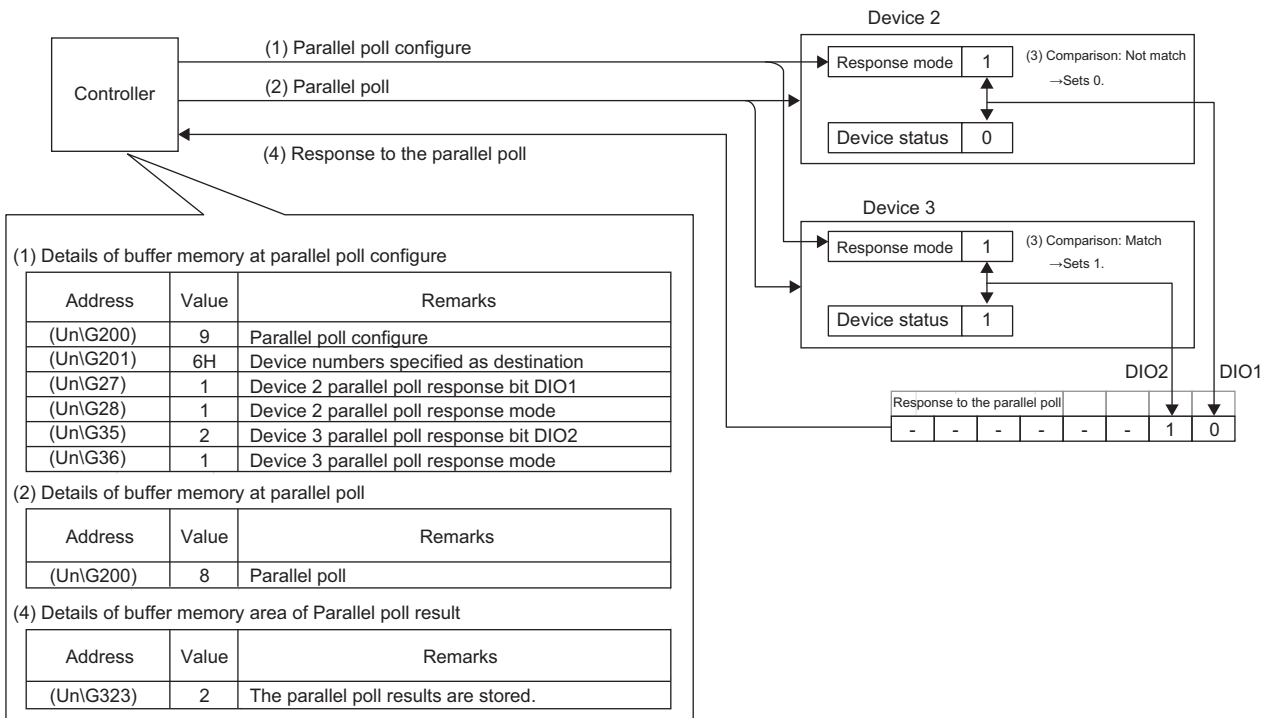
At reception of the parallel poll, each device compares values (0 or 1) between Device status and Parallel poll response mode. The device sets 1 when the values match or sets 0 when they do not match as a response.

**Ex.**

Assume here that a device status of 0 indicates normal device operation, and 1 indicates the device in error state.

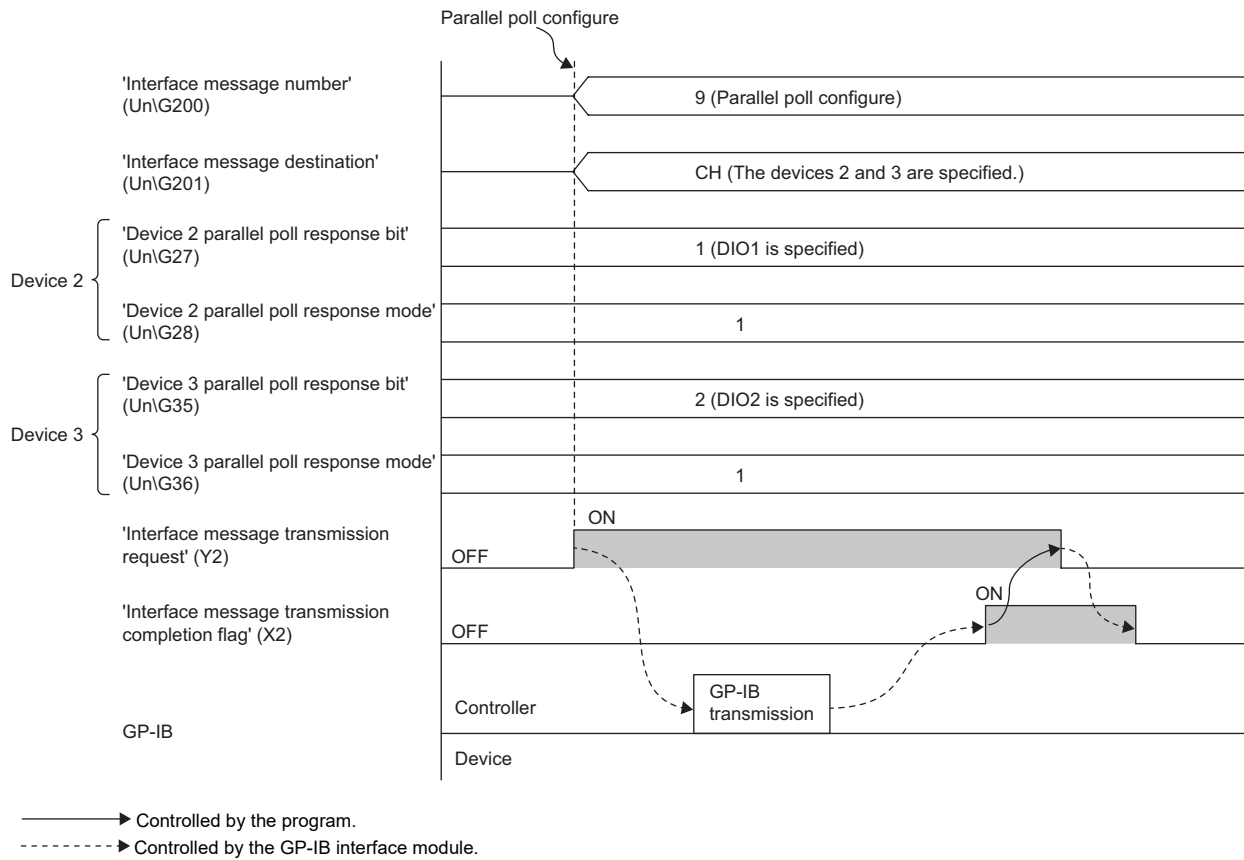
When 1 is set for Parallel poll response mode at the parallel poll configure, 1 is stored in a bit corresponding to a device in error state at the parallel poll execution.

The controller can detect devices with errors by this method.



## Parallel poll configure procedure

1. Set 9 (Parallel poll configure) for 'Interface message number' (Un\G200).
2. Specify destination devices in 'Interface message destination' (Un\G201).
3. Turn on 'Interface message transmission request' (Y2).



### Point

When changing a value set in 'Parallel poll response bit' (Un\G19, Un\G27, Un\G35, Un\G43, Un\G51, Un\G59, Un\G67, Un\G75, Un\G83, Un\G91, Un\G99, Un\G107, Un\G115, Un\G123) or 'Parallel poll response mode' (Un\G20, Un\G28, Un\G36, Un\G44, Un\G52, Un\G60, Un\G68, Un\G76, Un\G84, Un\G92, Un\G100, Un\G108, Un\G116, Un\G124), do it before the step 3.

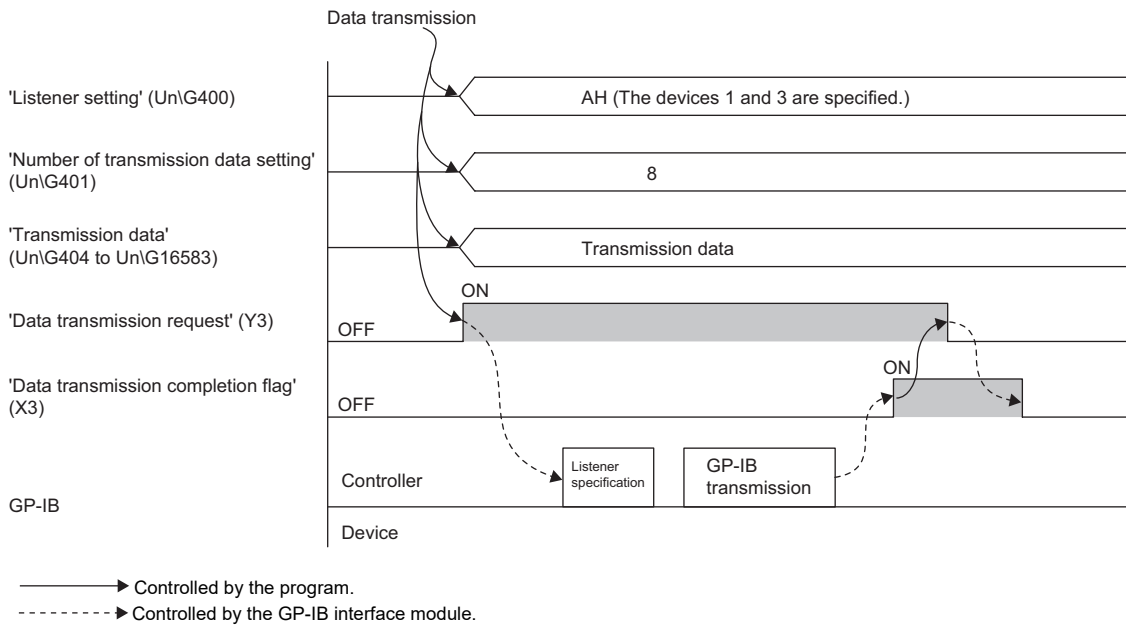
# Data transmission

The GP-IB interface module (talker) sends device dependent messages to a device specified as a listener. When multiple devices are specified as listeners, the module can send data to them at the same time.



## Transmission procedure

1. Specify devices that receive data (listeners) in 'Listener setting' (Un\G400).
2. Set the number of data to be sent for 'Number of transmission data setting' (Un\G401).
3. Transfer the data to be sent to 'Transmission data' (Un\G404 to Un\G16583).
4. Turn on 'Data transmission request' (Y3).



## ■Specifying listeners

Set 1 to bits corresponding to device numbers (1 to 14) to be used as listeners in 'Listener setting' (Un\G400). For instance, to specify the device 1 and device 3 as listeners, set AH (set 1 only for bit 1 and bit 3) in 'Listener setting' (Un\G400).

When n, which is a number set in 'Number of connected devices' (Un\G15), is 13 or smaller, select listeners between device 1 and device n. If a device (n+1) or larger number is specified as a listener, a listener device setting error at transmission (error code: 1812H) occurs.

When setting an address of a listener device, set an address different from the own device address. If the listener device and the own device have the same address, a listener device □ address overlap error at transmission (error code: 188□H) occurs.

## ■Specifying the number of transmission data

Specify the number of data to be sent in units of bytes.

When 0 is set, either of following operations is performed according to a value set in End of transmission (end code) of listener devices.

- When the end code is set (a set value is other than FFFFH): only the end code is sent before the transmission is complete.
- When the end code is not set (a set value is FFFFH): the transmission is complete without sending any data.

## ■Transferring the transmission data

Prepare data for transmission by referring to manuals of the listener devices. Data contents can be decided freely.

Transfer the data so that the first byte and the second byte data are stored in the lower byte and the upper byte of 'Transmission data' (Un\G404) respectively. For data of third byte or later, arrange them in the same way, in order of lower byte and upper byte.



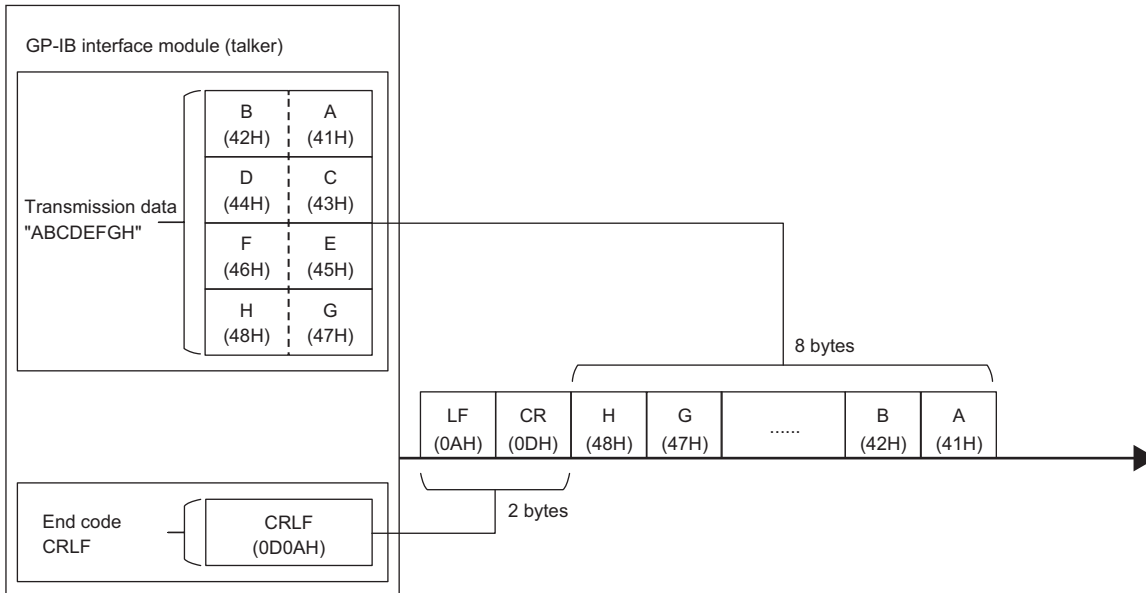
## End of transmission

The way how the transmission ends differs depending on following settings on the listener side: 'End of transmission (end code)' (Un\G17, Un\G25, Un\G33, Un\G41, Un\G49, Un\G57, Un\G65, Un\G73, Un\G81, Un\G89, Un\G97, Un\G105, Un\G113, Un\G121), 'End of transmission (EOI output)' (Un\G18, Un\G26, Un\G34, Un\G42, Un\G50, Un\G58, Un\G66, Un\G74, Un\G82, Un\G90, Un\G98, Un\G106, Un\G114, Un\G122).

### ■When the end code is set (a set value is other than FFFFH)

The end code set in 'End of transmission (end code)' (Un\G17, Un\G25, Un\G33, Un\G41, Un\G49, Un\G57, Un\G65, Un\G73, Un\G81, Un\G89, Un\G97, Un\G105, Un\G113, Un\G121) is automatically sent after all data stored in 'Transmission data' (Un\G404 to Un\G16583) have been sent.

When setting 'Number of transmission data setting' (Un\G401), exclude the number of bytes of the end code.



## Precautions

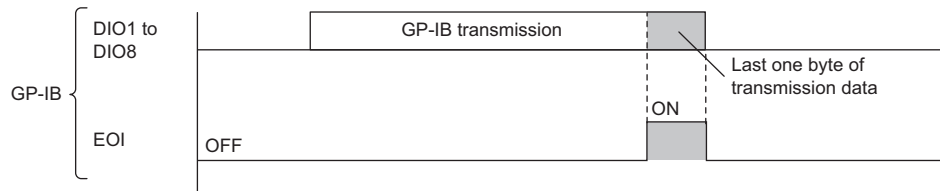
When sending data to multiple devices at the same time, set the same value for 'End of transmission (end code)' (Un\G17, Un\G25, Un\G33, Un\G41, Un\G49, Un\G57, Un\G65, Un\G73, Un\G81, Un\G89, Un\G97, Un\G105, Un\G113, Un\G121) of all the listeners. If the set values are not the same, an end of transmission setting mismatch (error code: 1817H) occurs.

### ■When the EOI signal is set to be output (a set value is 0)

When 0 (Output) is set for 'End of transmission (EOI output)' (Un\G18, Un\G26, Un\G34, Un\G42, Un\G50, Un\G58, Un\G66, Un\G74, Un\G82, Un\G90, Un\G98, Un\G106, Un\G114, Un\G122) on the listener side, the EOI signal is output at the same timing the last byte of 'Transmission data' (Un\G404 to Un\G16583) is sent.

When the end code is set as well, the EOI signal is output at the same timing the last byte of the end code is sent.

The EOI signal is not output when 0 is set for 'Number of transmission data setting' (Un\G401), even though 0 is set for 'End of transmission (EOI output)'.

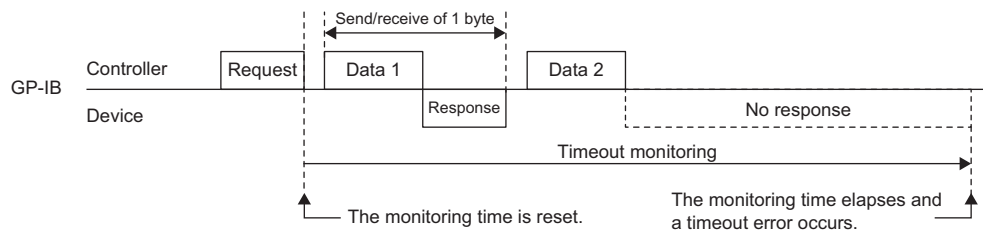


### Precautions

When sending data to multiple devices at the same time, if 0 (Output) is set for 'End of transmission (EOI output)' (Un\G18, Un\G26, Un\G34, Un\G42, Un\G50, Un\G58, Un\G66, Un\G74, Un\G82, Un\G90, Un\G98, Un\G106, Un\G114, Un\G122) of any of the devices, the EOI signal is output. When you do not want to output the signal, set 1 (Do not output) for all the listener devices.

### Timeout monitoring

If the transmission is not complete until the time set in 'Timeout monitoring time' (Un\G4) elapses after turning on of 'Data transmission request' (Y3), a data transmission timeout (error code: 1821H) occurs.



### Precautions

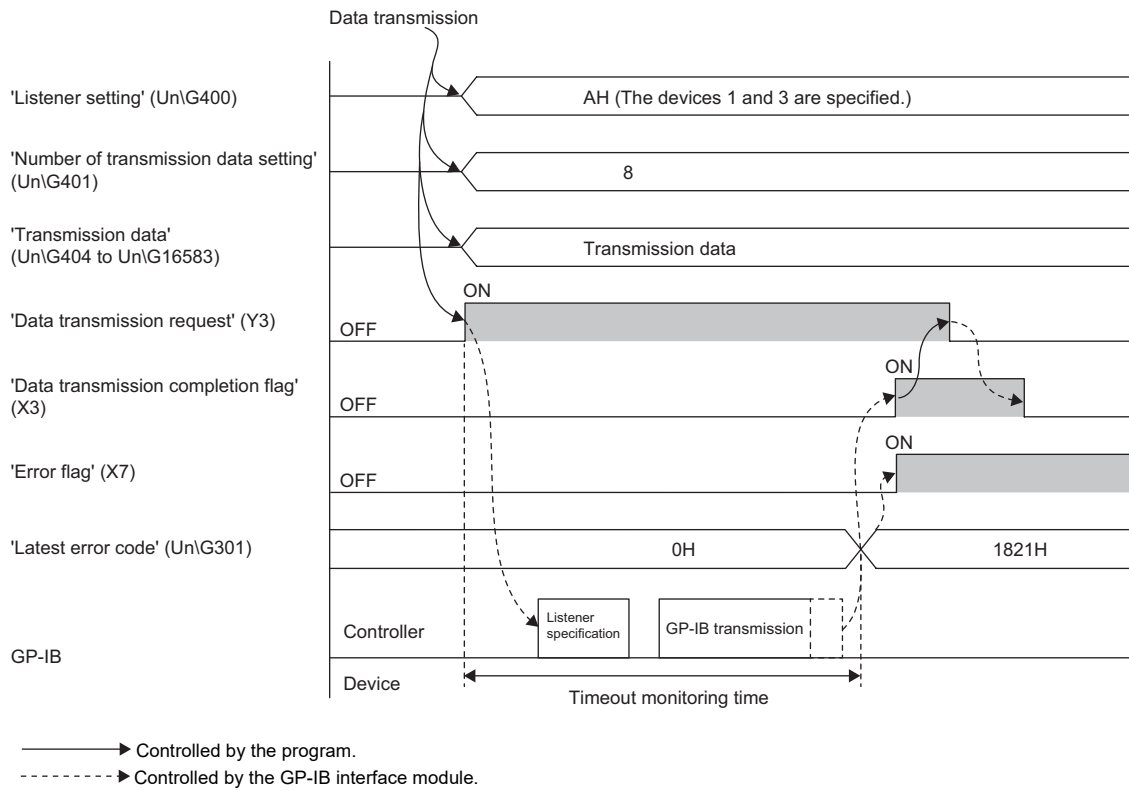
When multiple devices are specified in 'Listener setting' (Un\G400) but some of them are not connected, a data transmission timeout (error code: 1821H) does not occur. This is because a handshake is established when one device is both specified and connected.

#### Ex.

If a device dependent message is sent while the devices 1 to 3 are specified as listeners but only the devices 1 and 3 are connected, a timeout does not occur despite the device 2 not connected. This is because a handshake is established for the devices 1 and 3.

## When an error occurs during transmission

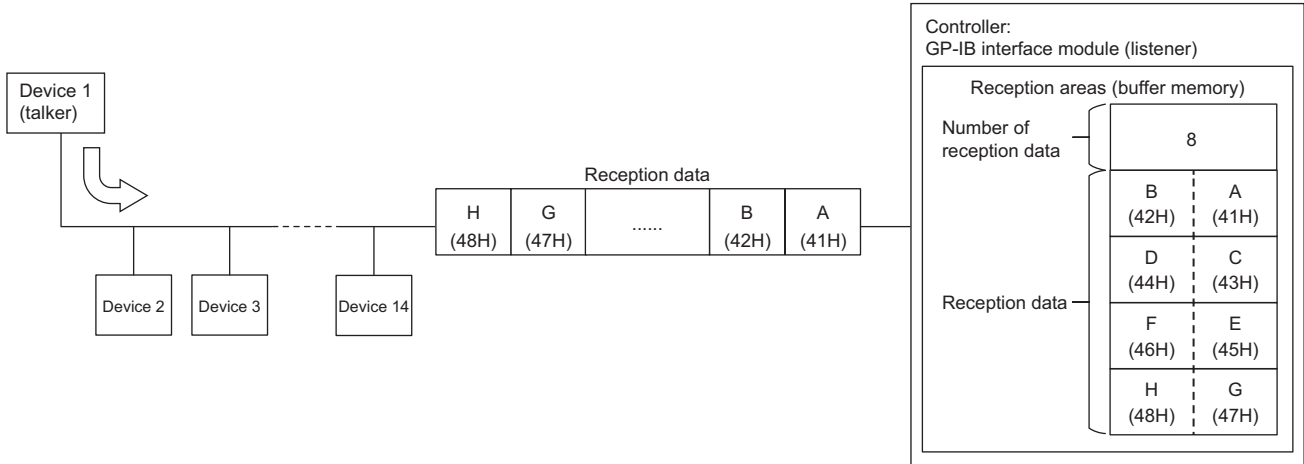
The following is the operation when an error, such as a timeout, occurs after 'Data transmission request' (Y3) is turned on.



# Data reception

One device is selected among devices 1 to 14 and is specified as the talker. The GP-IB interface module (listener) receives device dependent messages sent from the talker.

When some devices are selected among devices 1 to 14 (except the talker) and are specified as listeners, these devices also can receive the data from the talker.

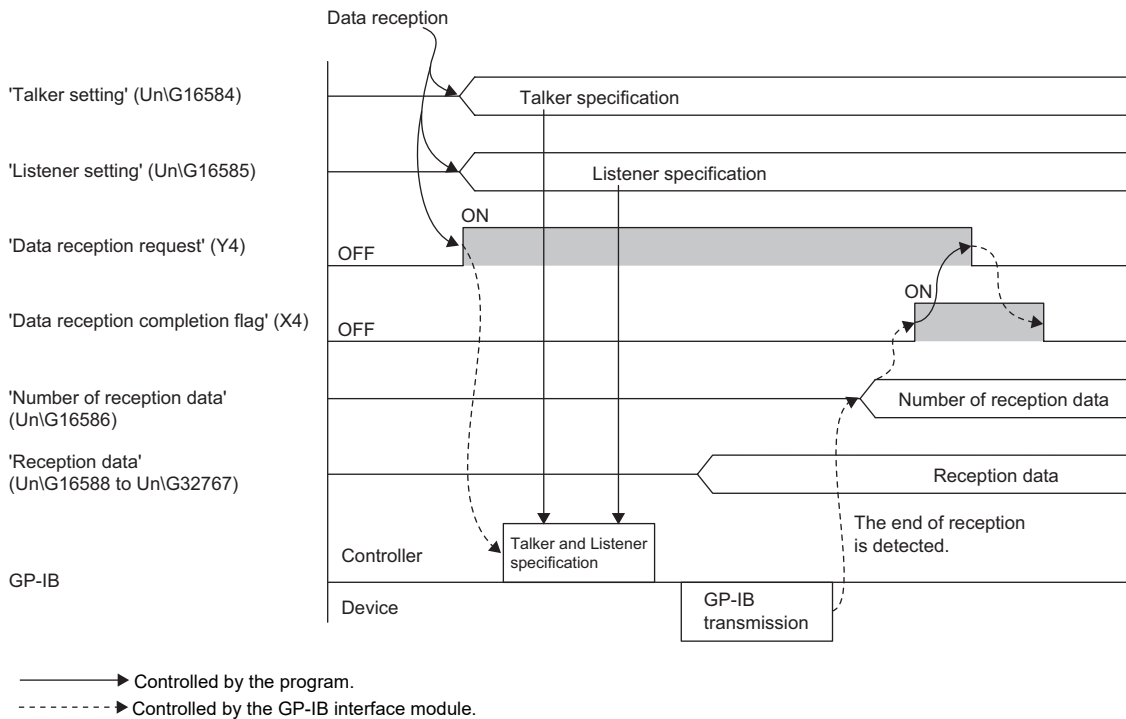


## Reception procedure

1. Specify the device that sends data (talker) in 'Talker setting' (Un\G16584).
2. Specify devices that receive data (listeners) in 'Listener setting' (Un\G16585).
3. Turn on 'Data reception request' (Y4).
4. When 'Data reception completion flag' (X4) turns on, turn off 'Data reception request' (Y4).
5. Obtain the data stored in 'Number of reception data' (Un\G16586).
6. Convert the number obtained at step 5 from a byte to a word.

The number of data (word) = The number stored in 'Number of reception data' (Un\G16586)/2 (value after the decimal point is rounded up.)

7. Transfer the data stored in 'Reception data' (Un\G16588 to Un\G32767) to the CPU module, only for the amount calculated at step 6.



## ■Specifying the talker

Set 1 to a bit corresponding to a device number (1 to 14) to be used as the talker in Talker setting' (Un\G16584).

Specify the talker by observing the following.

- Set only one device as the talker.
- When n, which is a number set in 'Number of connected devices' (Un\G15), is 13 or smaller, select the talker between device 1 and device n.

## Precautions

If the talker is specified without observing the above, a talker device setting error at reception (error code: 1813H) occurs. When setting an address of the talker device, set an address different from the own device address. If the talker device and the own device have the same address, a talker device □ address overlap error at reception (error code: 189□H) occurs.

## ■Specifying listeners

Set 'Listener setting' (Un\G16585) as follows according to what receives the data.

- When only the GP-IB interface module receives the data, set 0.
- When devices apart from the GP-IB interface module also receive the data, set 1 to bits corresponding to device numbers (1 to 14) to be used as listeners. For instance, to specify the device 1 and device 3 as listeners, set AH (set 1 only for bit 1 and bit 3).

## Precautions

When setting 'Listener setting' (Un\G16585), avoid both of the following. Failure to do so causes a listener device setting error at reception (error code: 1814H).

- Specify a device (n+1) or larger number as a listener when n, which is a number set in 'Number of connected devices' (Un\G15), is 13 or smaller.
- Specify a device that is already set as the talker as a listener.

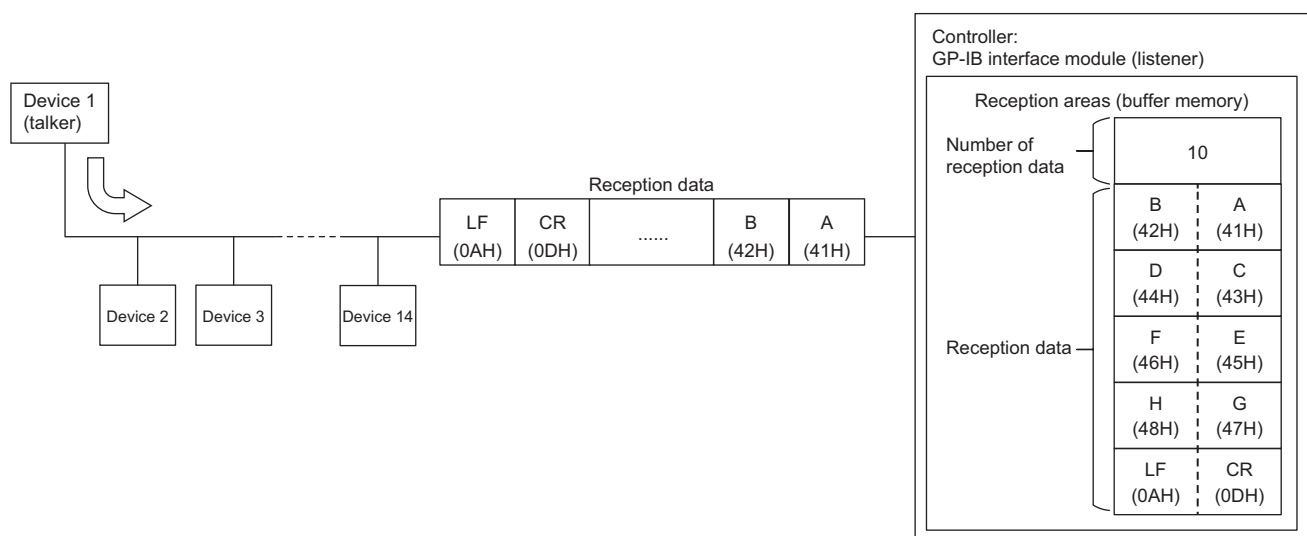
In addition, when setting an address of a listener, set an address different from the talker address. If the listener and the talker have the same address, a listener device □ address overlap error at reception (error code: 18A□H) occurs.

## ■Number of reception data, Reception data

The number of bytes of received data is stored in 'Number of reception data' (Un\G16586).

When the end code is set in 'End of reception (end code)' (Un\G2), not only the received data but also the end code are stored in 'Reception data' (Un\G16588 to Un\G32767). The data number of end code is included in 'Number of reception data' (Un\G16586).

The first byte of received data is stored in the lower byte, and the second is stored in the upper byte of 'Reception data' (Un\G16588). Received data of third byte or later are stored in the same way, in order of lower byte and upper byte.



## Conditions to end reception

The following can be set as conditions to end the GP-IB interface module data reception. When multiple conditions are set, the data reception ends at the timing any of the conditions is met.

- Number of received data: When a value other than 0 is set for 'End of reception (number of data)' (Un\G1), the reception ends at the timing data of a set number of bytes have been received.
- End code: When a value other than FFFFH is set for 'End of reception (end code)' (Un\G2), the reception ends at the timing the end code has been received.
- EOI signal detection: When 0 (Detect) is set for 'End of reception (EOI detection)' (Un\G3), the reception ends at the timing the EOI signal has been received.

### Precautions

- When amount of received data exceeds 32360 bytes, a receive buffer overflow (error code: 1823H) occurs.
- If any of the conditions to end reception is not set, a receive buffer overflow (error code: 1823H) or a data reception timeout (error code: 1822H) occurs. A data reception timeout (error code: 1822H) occurs when the time set in 'Timeout monitoring time' (Un\G4) elapses.

## Timeout monitoring

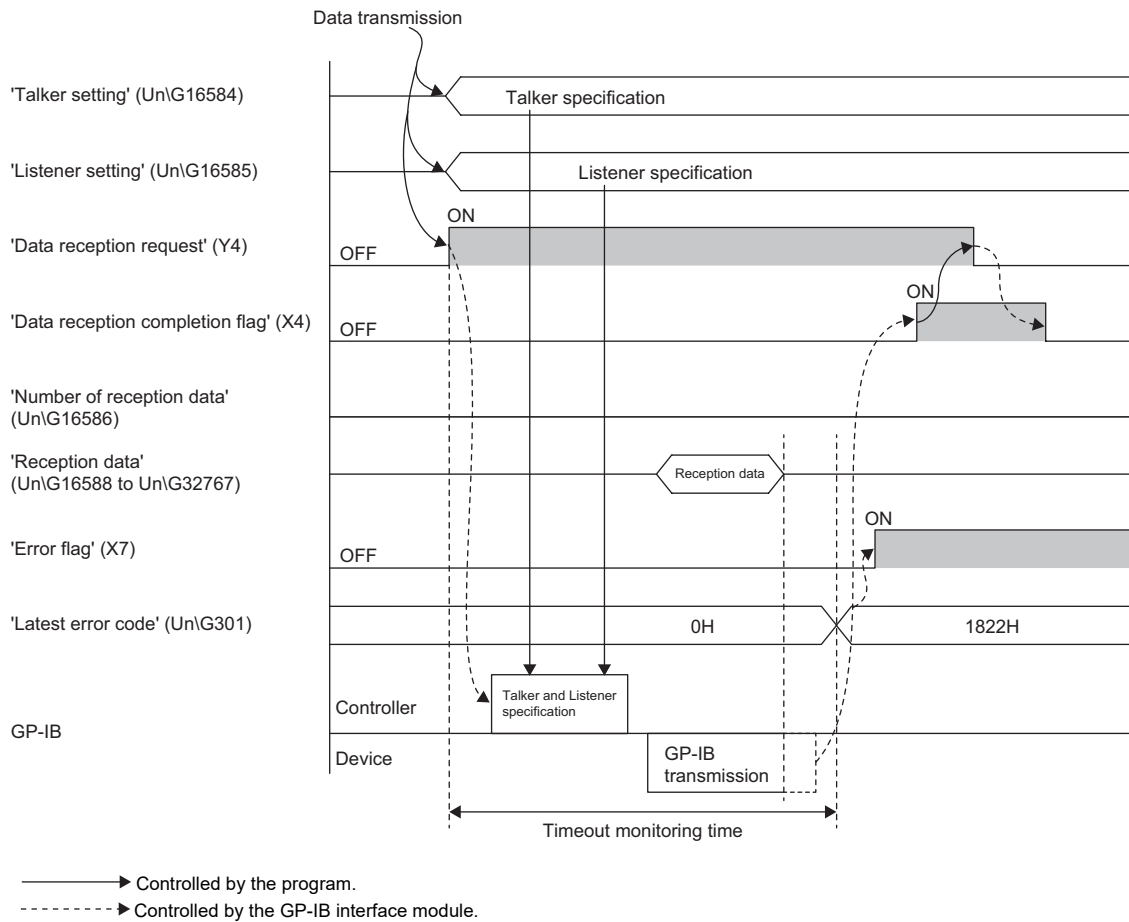
If the data reception is not complete until the time set in 'Timeout monitoring time' (Un\G4) elapses after turning on of 'Data reception request' (Y4), a data reception timeout (error code: 1822H) occurs.

### Precautions

Even though a device not connected is specified in 'Listener setting' (Un\G16585), a data reception timeout (error code: 1822H) does not occur because a handshake is established between the talker and the GP-IB interface module (listener).

## When an error occurs during reception

The following is the operation when an error, such as a timeout, occurs after 'Data reception request' (Y4) is turned on.





# 1.2 Slave Mode

The GP-IB interface module in this mode operates as one of devices that are connected to the controller.

## Interface message reception

For details on interface messages that are sent from the controller, refer to the following.

☞ Page 17 Interface message transmission

### Interface clear

Upon receipt of the IFC signal, the GP-IB communications interface function of the GP-IB interface module is initialized and the following occur.

- 'IFC reception flag' (XE) turns on. This signal is turned off by turning on 'IFC reception processing completion' (YE).
- The talker and listener statuses are cancelled and the module and devices become idle.

### Device clear

This interface message initializes device functions specific to each device.

Upon receipt of the message, the GP-IB interface module turns on 'DCL command reception flag' (XD) and notifies the program of the reception of device clear (DCL command or SDC command). The device clear does not initialize the GP-IB interface module itself, such as input signals except 'DCL command reception flag' (XD) and buffer memory areas.

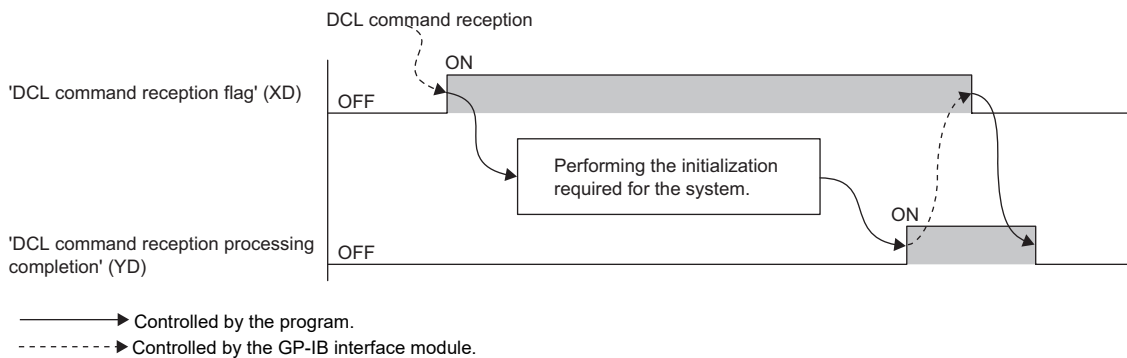
When 'DCL command reception flag' (XD) turns on, perform the initialization required for the system using the program.

When an interrupt program is set to start by the device clear reception, the GP-IB interface module requests the CPU module to start the interrupt program. For details on the interrupt function, refer to the following.

☞ Page 53 Interrupt Function

### ■ Processing at device clear reception

1. When 'DCL command reception flag' (XD) turns on, perform the initialization using the program. A process of initialization can be decided freely. Perform the process required for the system.
2. Turn on 'DCL command reception processing completion' (YD).
3. When 'DCL command reception flag' (XD) turns off, turn off 'DCL command reception processing completion' (YD).



## Device trigger

This interface message is sent to each device from the controller, to start device functions.

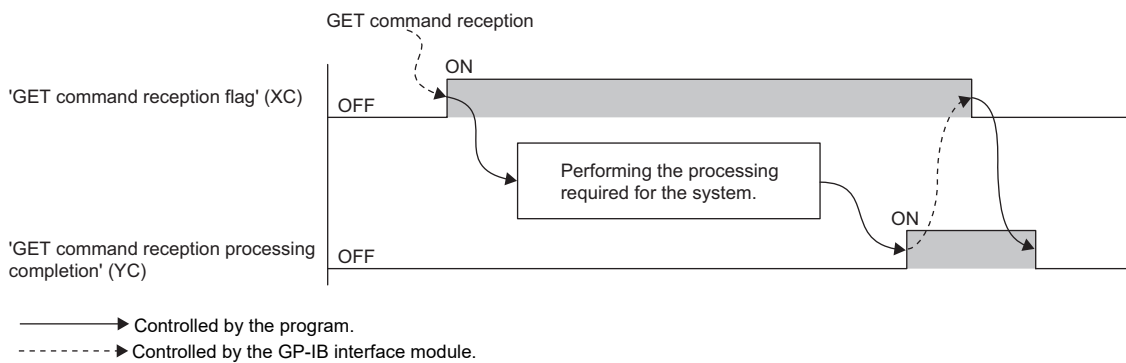
Upon receipt of the message, the GP-IB interface module notifies the program of the reception of device trigger (GET command) by turning on 'GET command reception flag' (XC).

When an interrupt program is set to start by the device trigger reception, the GP-IB interface module requests the CPU module to start the interrupt program. For details on the interrupt function, refer to the following.

☞ Page 53 Interrupt Function

### ■ Processing at device trigger reception

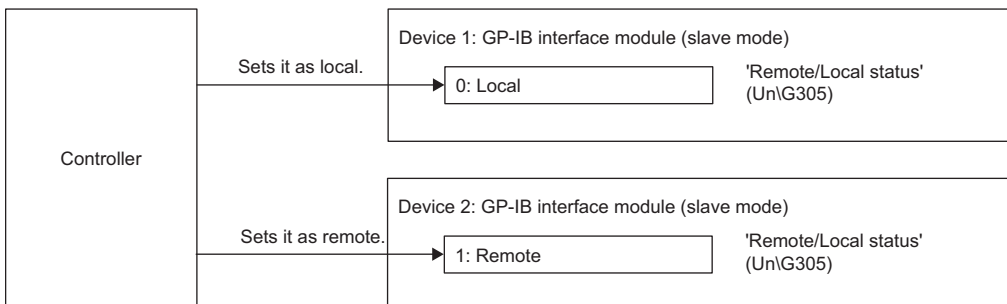
1. When 'GET command reception flag' (XC) turns on, execute the process of device trigger target using the program. The process can be decided freely. Perform the process required for the system.
2. Turn on 'GET command reception processing completion' (YC).
3. When 'GET command reception flag' (XC) turns off, turn off 'GET command reception processing completion' (YC).



## Remote setting/Local setting

These interface messages are sent to each device from the controller to switch the device mode between the remote and the local.

The GP-IB interface module stores its mode that is instructed by the interface messages in 'Remote/Local status' (Un\G305).



### ■ Operations of the GP-IB interface module that is set as the local

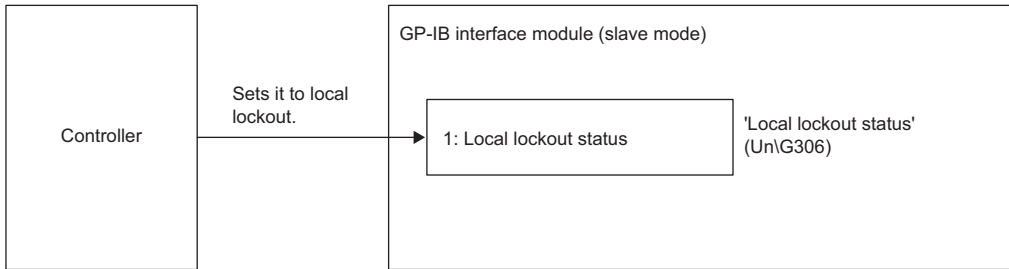
The module stores 0 (Local) in 'Remote/Local status' (Un\G305) when set as the local. The local status module performs processes of responding to requests by Y signals as well as reception processes of data from the controller and other devices, in the same way as the remote status module. To make the local status module operations suitable for system specifications, such as not issuing requests and not referring to received data, create programs.

## Local lockout setting

This interface message prohibits any operation using front panels of devices.

Upon receipt of this message from the controller, the GP-IB interface module stores its mode that is instructed by the message in 'Local lockout status' (Un\G306). Refer to this buffer memory area using a program if needed.

The local lockout status can be canceled only by turning off the REN signal.



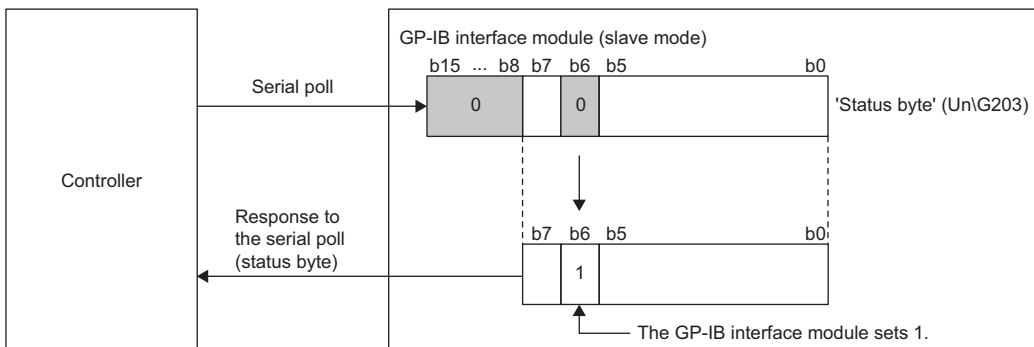
## Serial poll

The controller uses this interface message to identify a device that has sent the SRQ and inquire about the service request sent by the device.

Upon receipt of this message from the controller, the GP-IB interface module sends back data as follows.

- When the GP-IB interface module has sent the SRQ, it sets 1 to the bit 6 of 'Status byte' (Un\G203) and sends it back.
- When the GP-IB interface module has not sent the SRQ, it sets 0 to the bit 6 of 'Status byte' (Un\G203) and sends it back.

### ■When the GP-IB interface module has sent the SRQ



The bits 0 to 5 and bit 7 of 'Status byte' can be used as a means by which the module notifies the controller of its state because any desired information can be set to these bits.

### Ex.

When 'Status byte' (Un\G203) is used to inform the upper hierarchy of a current work process (Charging material, Processing, Inspection, or Taking out products)

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0								(7)	Fixed to 0	(6)	(5)	(4)	(3)	(2)	(1)

- (1) User definition 1: Charging material
- (2) User definition 2: Processing
- (3) User definition 3: Inspection
- (4) User definition 4: Taking out products
- (5) User definition 5: No definition
- (6) User definition 6: No definition
- (7) User definition 7: Error

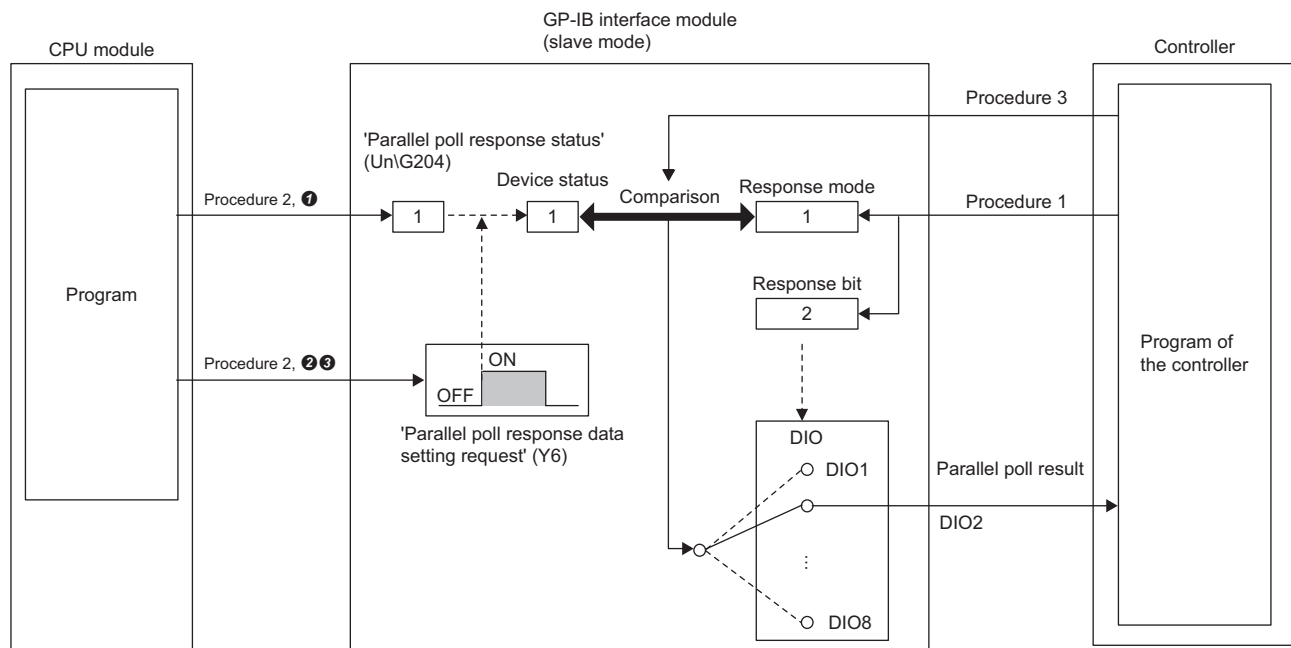
When you have changed the setting of 'Status byte' (Un\G203), send the SRQ using 'Service request' (Y5) to request the controller to perform the serial poll. The setting takes effect when 'Service request' (Y5) has been turned on. And thus, when the module has received the serial poll from the controller without 'Service request' (Y5) tuned on, the module sends back the previous setting.

## Parallel poll

This interface message is sent to each device from the controller, to inquire about a state of each device.

Upon receipt of the message, the GP-IB interface module sends back data to the controller, according to the settings shown below.

Setting item	Setting value	Initial value	How to set a value
Response bit	<ul style="list-style-type: none"> <li>DIO1 to DIO8</li> <li>Do not respond</li> </ul>	Do not respond	Set a value using the program of controller.
Response mode	<ul style="list-style-type: none"> <li>0</li> <li>1</li> </ul>	0	
Device status	<ul style="list-style-type: none"> <li>0</li> <li>1</li> </ul>	0	Set 0 or 1 using the program of the CPU module.



### ■ Procedure

**1.** Set a response bit and a response mode to the GP-IB interface module from the controller.

For the settings of a response bit and a response mode, refer to the following.

☞ Page 43 Parallel poll configure

**2.** Set a device status to the GP-IB interface module from the CPU module at any desired timing.

① Set 0 or 1 for 'Parallel poll response status' (Un\G204).

② Turn on 'Parallel poll response data setting request' (Y6).

③ When 'Parallel poll response data setting completion flag' (X6) turns on, turn off 'Parallel poll response data setting request' (Y6).

**3.** Execute the parallel poll at any desired timing.

The GP-IB interface module sends back the parallel poll result using an assigned signal line (DIO1 to DIO8).

The following table lists parallel poll results (combinations of device status and response mode).

Device status	Parallel poll result	
	Response mode: 0	Response mode: 1
0	1	0
1	0	1

## Parallel poll configure

This interface message sent from the controller is used to set a response bit and a response mode to the GP-IB interface module. A response bit and a response mode determine device operations at the parallel poll. Set them using the PPC command and the PPE command before the parallel poll execution.

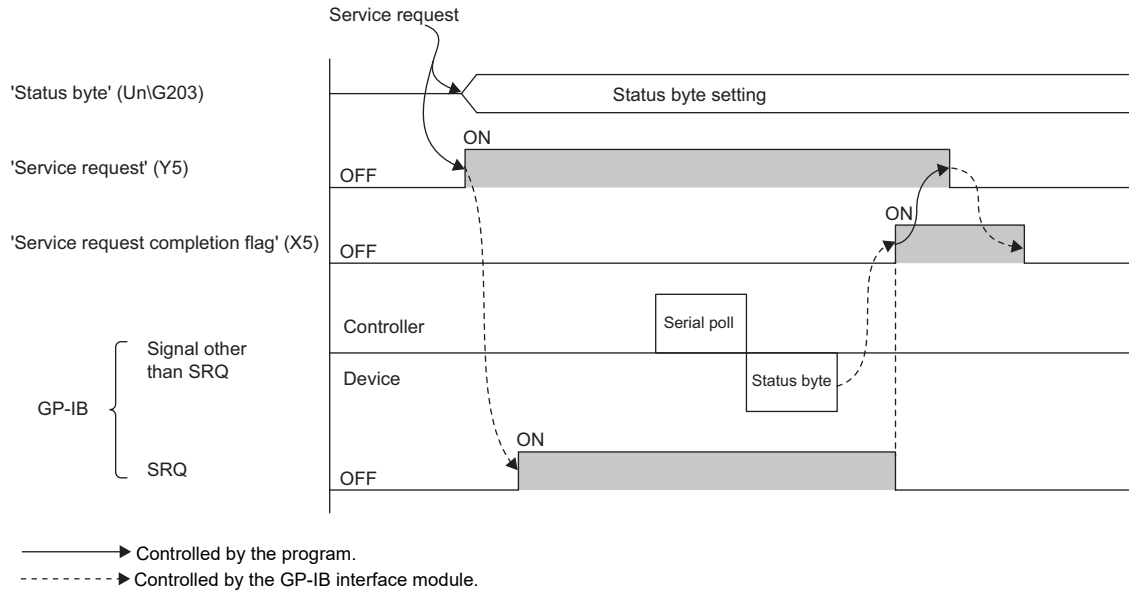
- Response bit: Sets which signal line (DIO1 to DIO8) is to be used to respond to the parallel poll.
- Response mode: Sets polarity (positive or negative) to be used to respond to the parallel poll.

When you want the module not to respond to the parallel poll, send the PPU command or the PPC command and the PPD command combined to the GP-IB interface module.

# Service request

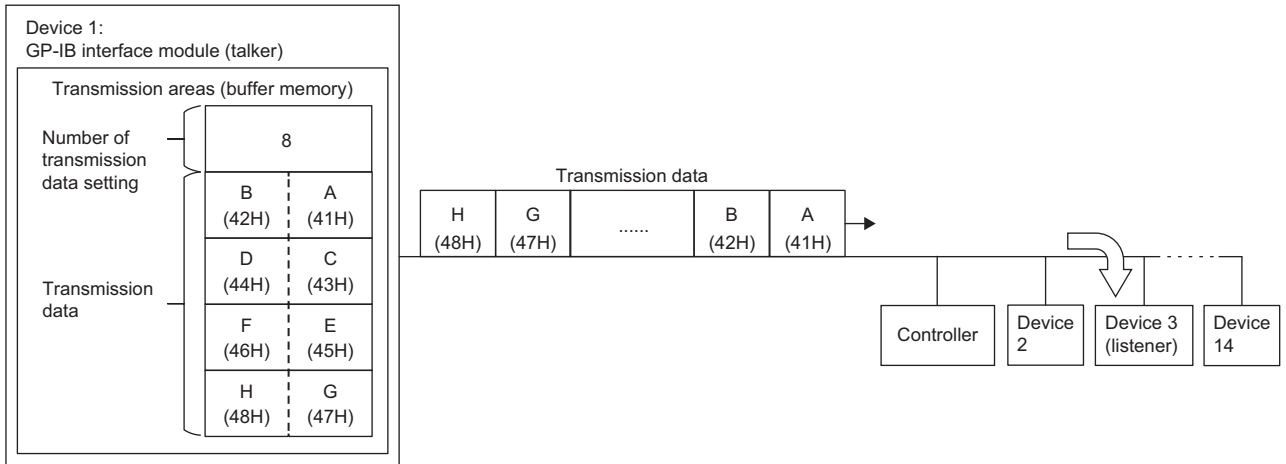
The service request requests the controller to perform the serial poll, by notifying the controller of errors or status changes of the connected devices or sending a request of data transmission.

Among the user definitions 1 to 7 of 'Status byte' (Un\G203), turn on a bit corresponding to an event that has occurred, and then turn on 'Service request' (Y5). The GP-IB interface module sends the SRQ to the controller and requests it to perform a serial poll by this turning on of 'Service request' (Y5).



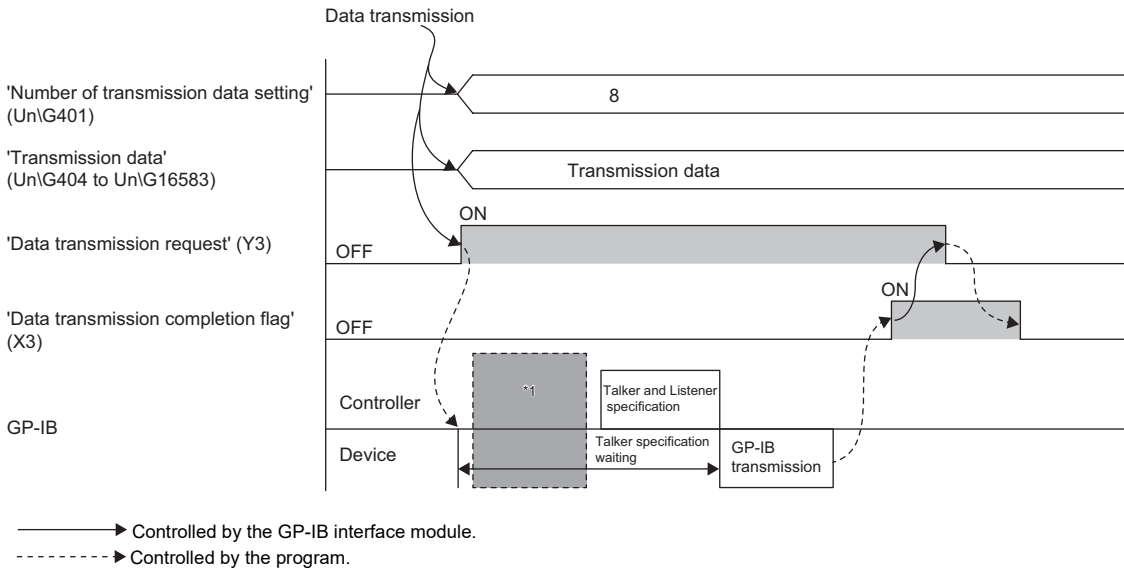
# Data transmission

This function sends device dependent messages to other connected devices (including the controller).  
The GP-IB interface module starts data transmission when it has been specified as the talker by the controller.  
A device that receives the data (listener) is specified by the controller.



## Transmission procedure

1. Set the number of data to be sent for 'Number of transmission data setting' (Un\G401).
2. Transfer the data to be sent to 'Transmission data' (Un\G404 to Un\G16583).
3. Turn on 'Data transmission request' (Y3).



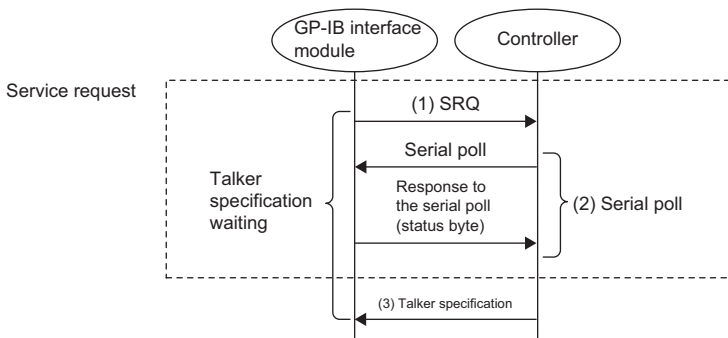
\*1 The service request is performed. For details, refer to the following.

☞ Page 44 Service request

The GP-IB interface module does not start GP-IB communications until the controller has specified it as the talker.

Since the controller does not know that the GP-IB interface module has data to be sent, the following steps must be taken before GP-IB communications.

- (1) At the turning on of 'Service request' (Y5), the GP-IB interface module sends the SRQ to the controller and requests the serial poll.
- (2) Upon receipt of the SRQ, the controller sends the serial poll to each device including the GP-IB interface module and receives the status byte.
- (3) Upon receipt of the status byte, the controller specifies the GP-IB interface module as the talker.



### ■Specifying the number of transmission data

Specify the number of data to be sent in units of bytes.

### ■Transferring the transmission data

Prepare data for transmission by referring to manuals of the destination devices. Data contents can be decided freely.

Transfer the data so that the first byte and the second byte data are stored in the lower byte and the upper byte of 'Transmission data' (Un\G404) respectively. For data of third byte or later, arrange them in the same way, in order of lower byte and upper byte.



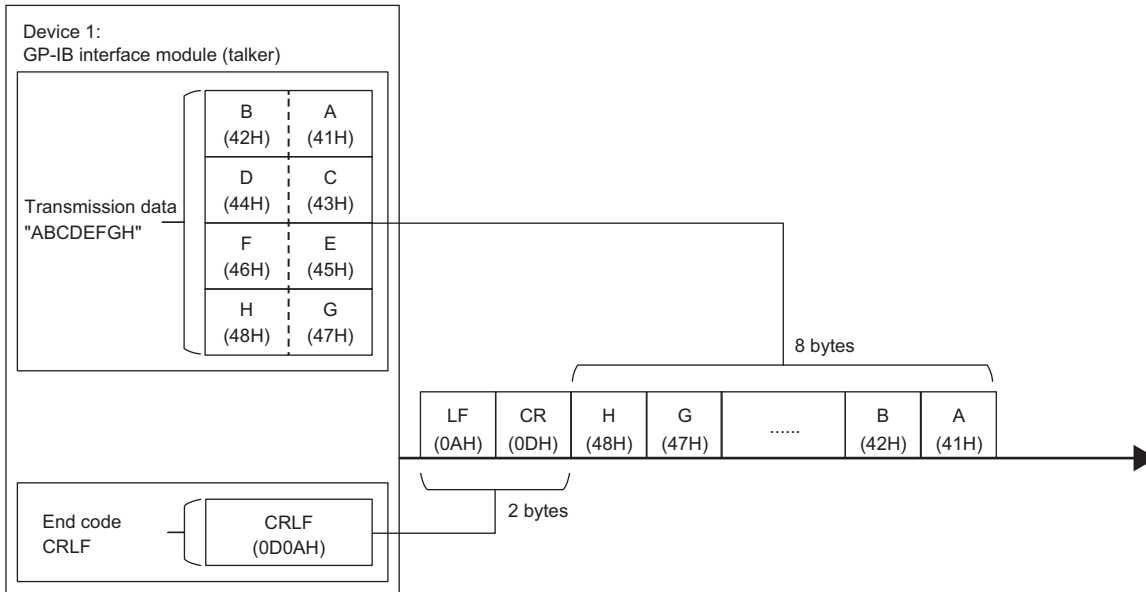
## End of transmission

The way how the transmission ends differs depending on 'End of transmission (end code)' (Un\G5) and 'End of transmission (EOI output)' (Un\G6).

### ■When the end code is set (a set value is other than FFFFH)

The end code set in 'End of transmission (end code)' (Un\G5) is automatically sent after all data stored in 'Transmission data' (Un\G404 to Un\G16583) have been sent.

When setting 'Number of transmission data setting' (Un\G401), exclude the number of bytes of the end code.



### ■When the EOI signal is set to be output (a set value is 0)

When 0 (Output) is set for 'End of transmission (EOI output)' (Un\G6), the EOI signal is output at the same timing the last byte of 'Transmission data' (Un\G404 to Un\G16583) is sent.

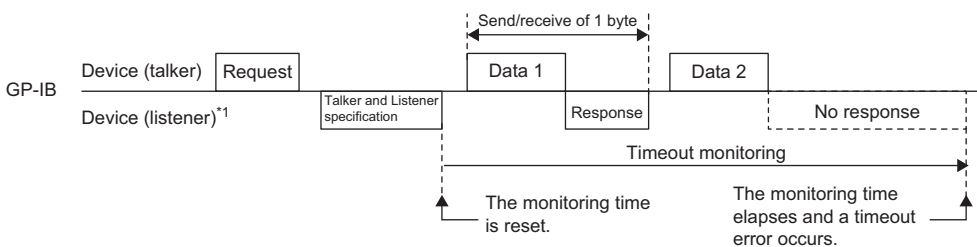
When the end code is set as well, the EOI signal is output at the same timing the last byte of the end code is sent.

The EOI signal is not output when 0 is set for 'Number of transmission data setting' (Un\G401), even though 0 is set for 'End of transmission (EOI output)'.

## Timeout monitoring

The timeout monitoring starts when 'Data transmission request' (Y3) is on and the GP-IB interface module is specified as the talker by the controller.

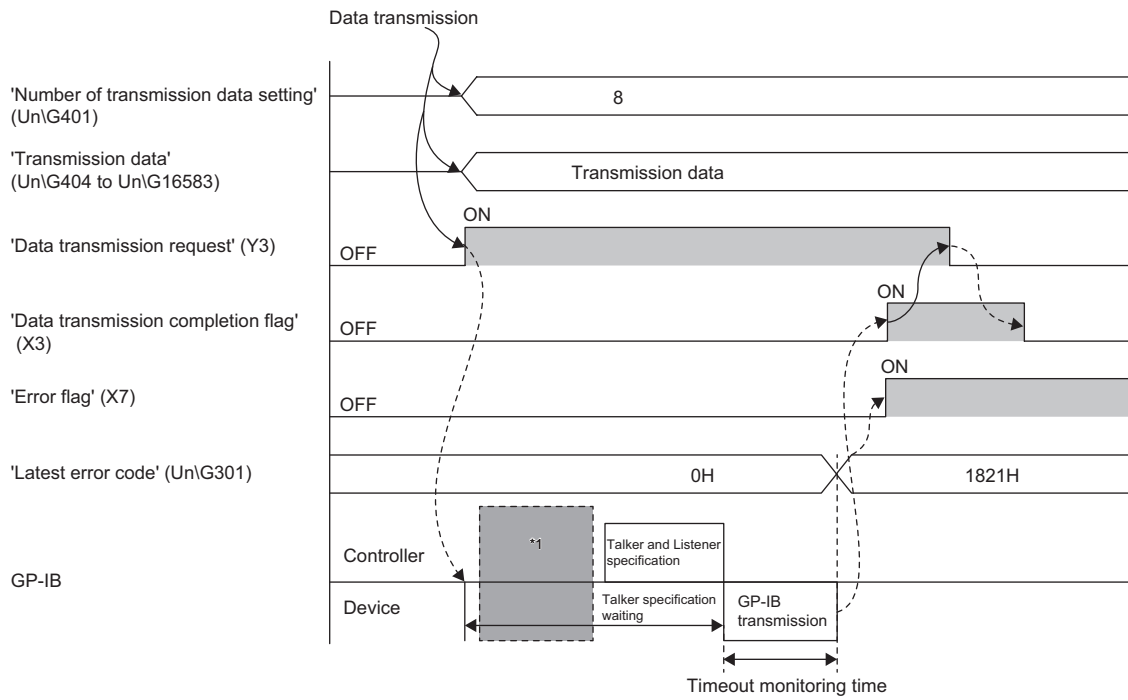
If the data transmission is not complete until the time set in 'Timeout monitoring time' (Un\G4) elapses, a data transmission timeout (error code: 1821H) occurs.



\*1 Assume that the controller is the listener.

## When an error occurs during transmission

The following is the operation when an error, such as a timeout, occurs after 'Data transmission request' (Y3) is turned on.



—————> Controlled by the program.

- - - - -> Controlled by the GP-IB interface module.

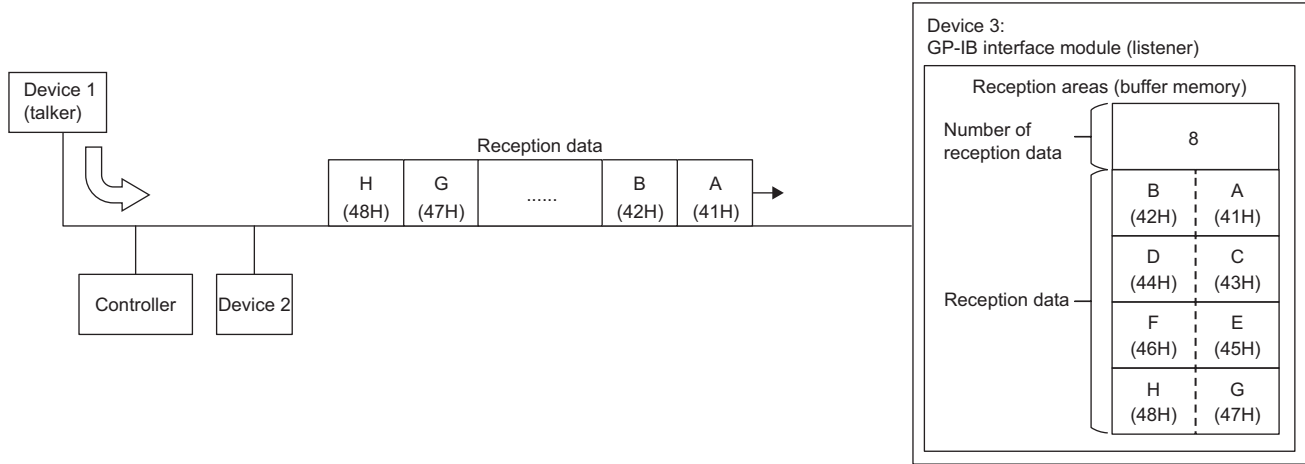
\*1 The service request is performed. For details, refer to the following.

☞ Page 44 Service request

# Data reception

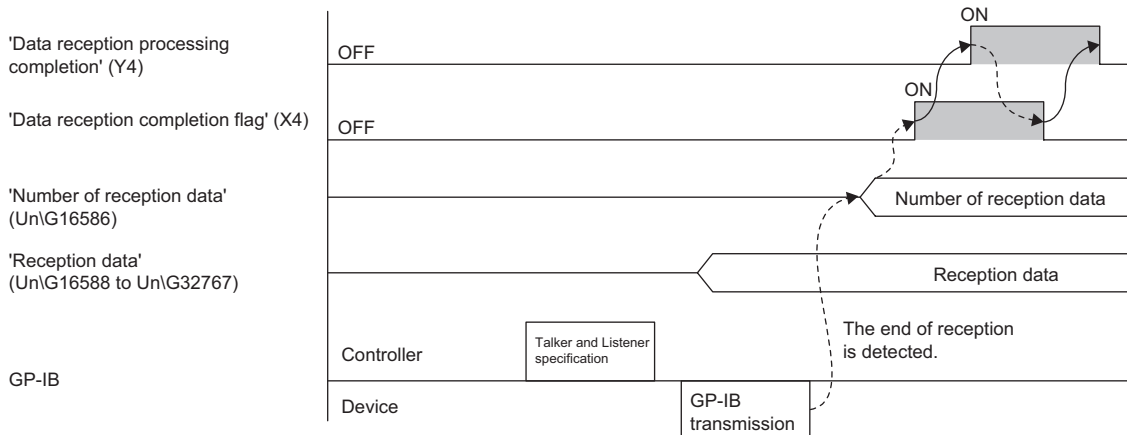
The GP-IB interface module receives device dependent messages from the talker when it is specified as a listener by the controller.

The received data are sequentially stored in 'Reception data' (Un\G16588 to Un\G32767). When the condition is met and the reception end is detected, the number of received data is stored in 'Number of reception data' (Un\G16586) and 'Data reception flag' (X4) turns on.



## Reading out the received data

1. Obtain the data stored in 'Number of reception data' (Un\G16586) after 'Data reception flag' (X4) turns on.
  2. Convert the number obtained at step 1 from a byte to a word.  
 The number of data (word) = The number stored in 'Number of reception data' (Un\G16586)/2 (value after the decimal point is rounded up.)
  3. Transfer the data stored in 'Reception data' (Un\G16588 to Un\G32767) to the CPU module, only for the amount calculated at step 2.
  4. Turn off 'Data reception flag' (X4) by turning on 'Data reception processing completion' (Y4).
- Data reception processing is not performed while 'Data reception flag' (X4) is on (the state before step 4), and thus a timeout occurs on the data transmission side. To prevent this, after the completion of reading out of the received data with a program, turn off 'Data reception flag' (X4) by turning on 'Data reception processing completion' (Y4).



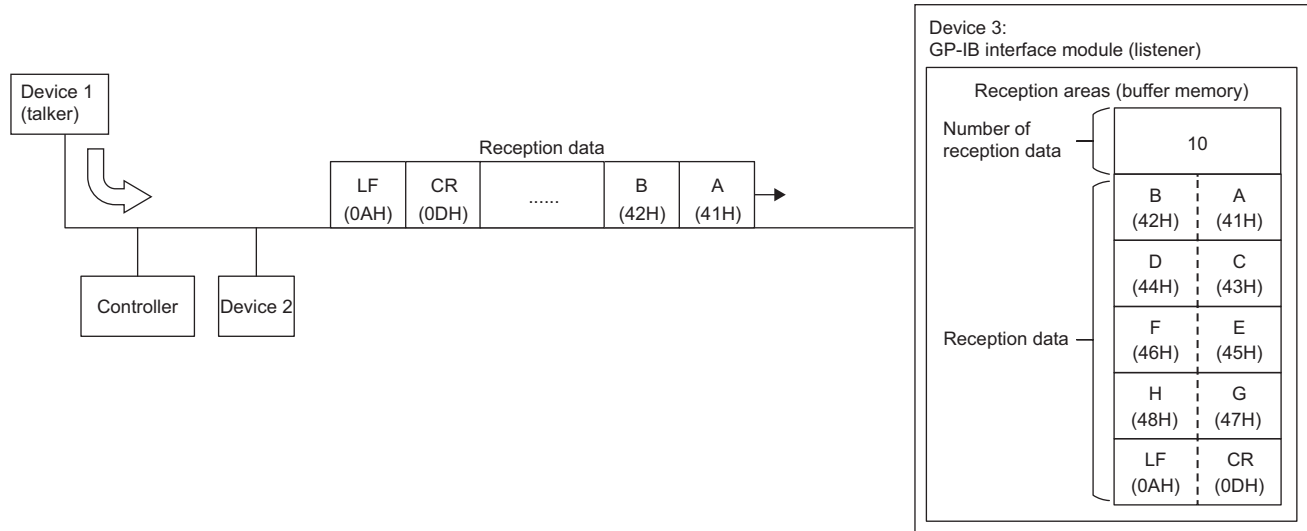
—————> Controlled by the program.  
 - - - - -> Controlled by the GP-IB interface module.

## ■Number of reception data, Reception data

The number of bytes of data in 'Reception data' (Un\G16588 to Un\G32767) is stored in 'Number of reception data' (Un\G16586).

When the end code is set in 'End of reception (end code)' (Un\G2), not only the received data but also the end code is stored in 'Reception data' (Un\G16588 to Un\G32767). The data number of end code is included in 'Number of reception data' (Un\G16586).

The first byte of received data is stored in the lower byte, and the second is stored in the upper byte of 'Reception data' (Un\G16588). Received data of third byte or later are stored in the same way, in order of lower byte and upper byte.



## Conditions to end reception

The following can be set as conditions to end the GP-IB interface module data reception. When multiple conditions are set, the data reception ends at the timing any of the conditions is met.

- Number of received data: When a value other than 0 is set for 'End of reception (number of data)' (Un\G1), the reception ends at the timing data of a set number of bytes have been received.
- End code: When a value other than FFFFH is set for 'End of reception (end code)' (Un\G2), the reception ends at the timing the end code has been received.
- EOI signal detection: When 0 (Detect) is set for 'End of reception (EOI detection)' (Un\G3), the reception ends at the timing the EOI signal has been received.

### Precautions

- When amount of received data exceeds 32360 bytes, a receive buffer overflow (error code: 1823H) occurs.
- If any of the conditions to end reception is not set, a receive buffer overflow (error code: 1823H) or a data reception timeout (error code: 1822H) occurs. A data reception timeout (error code: 1822H) occurs when the time set in 'Timeout monitoring time' (Un\G4) elapses.
- 'Data reception flag' (X4) does not turn on when any of the following errors occurs: timeout monitoring time setting range error (error code: 1801H), end of reception (EOI detection) setting range error (error code: 1805H), end of reception (number of data) setting range error (error code: 1815H), data reception timeout (error code: 1822H), receive buffer overflow (error code: 1823H).

## Timeout monitoring

If the data reception is not complete until the time set in 'Timeout monitoring time' (Un\G4) elapses after the GP-IB interface module has been specified as a listener, a data reception timeout (error code: 1822H) occurs.

### Precautions

When 'Data reception flag' (X4) is on, the GP-IB interface module does not perform data reception even after specified as a listener, and thus a data reception timeout (error code: 1822H) does not occur.

# 1.3 Event History Function

This function collects errors or operations that have occurred or have been performed in the GP-IB interface module as event information.


The CPU module stores these event information in its data memory or an SD memory card.

The event information can be displayed on an engineering tool in a time series to check them easily.

Event type	Classification	Description
System	Error	An error detected by the self diagnostics in each module
	Warning	A warning (alarm) detected in each module
	Information	Operation detected in the system that is normal and not classified as Error or Warning, or operation performed automatically by the system
Security	Warning	Operation that is judged as an unauthorized access to each module
	Information	Operation that cannot be judged as success of unlocking passwords or an unauthorized access but is close to
Operation	Warning	Deleting (data clear) operation that has been executed to each module. This operation is not judged as Error by the self diagnostics but may affect the module performance.
	Information	Operation performed by users that changes the system operation or configuration.

## Setting procedure

Set the event history function from the event history setting window of the engineering tool. For details, refer to the following.

 MELSEC iQ-R CPU Module User's Manual (Application)

## Displaying event history

Access the menu window of the engineering tool. For details on the operating procedure and how to view the contents, refer to the following.

 GX Works3 Operating Manual

## List of event history data

The following table shows the event that would occur in the GP-IB interface module and is classified into the event type of Operation.

Code	Classification	Name	Description	Additional information
20100	Information	Error clear	An error clear request has been issued.	—

# 1.4 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. This enables the module to promptly respond to a request from a connected device.

The following table shows triggers (interrupt factors) that execute interrupt programs.

Interrupt factors that can be set in master mode	Interrupt factors that can be set in slave mode
<ul style="list-style-type: none"> <li>• Service request (SRQ) reception</li> <li>• Data reception completion</li> <li>• Error</li> </ul>	<ul style="list-style-type: none"> <li>• Device clear (DCL command) reception</li> <li>• Trigger (GET command) reception</li> <li>• Data reception</li> <li>• Error</li> </ul>


An interrupt pointer corresponding to each interrupt factor can be set in the interrupt setting of module parameter.

## Operation

When an interrupt condition is met, an interrupt request is sent to the CPU module and an interrupt program is executed.

## Setting procedure

To use the interrupt function, set "Condition target setting" and "Interrupt pointer" using the engineering tool.

 [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Module model name ⇒ [Interrupt setting]

The details on setting items are shown below.

Item	Description
Condition target setting	Select a factor to be detected to start an interrupt program.
Interrupt pointer	Specify the number of an interrupt pointer that is started at the detection of an interrupt factor.


### ■Condition target setting

For details on interrupt factors, refer to the following.

 Page 85 Condition target setting [n]


### ■Interrupt pointer

For details on interrupt pointers, refer to the following.

 MELSEC iQ-R CPU Module User's Manual (Application)

## Precautions

- When "Condition target setting" is "Disable", an interrupt request is not sent to the CPU module.
- When multiple interrupt factors occur simultaneously, interrupt programs are executed in order of priority of the interrupt pointers. For the priority of the interrupt pointers, refer to the following.

 MELSEC iQ-R CPU Module User's Manual (Application)

- If the processing of system is interrupted for a long time due to the execution of interrupt program, time set in system watchdog timer elapses before the completion. If an error has occurred in the CPU module, check and review the parameter setting and program of the CPU module.

# 2 PARAMETER SETTINGS

Set the parameters of GP-IB interface module.

Setting parameters here eliminates the need to program them.

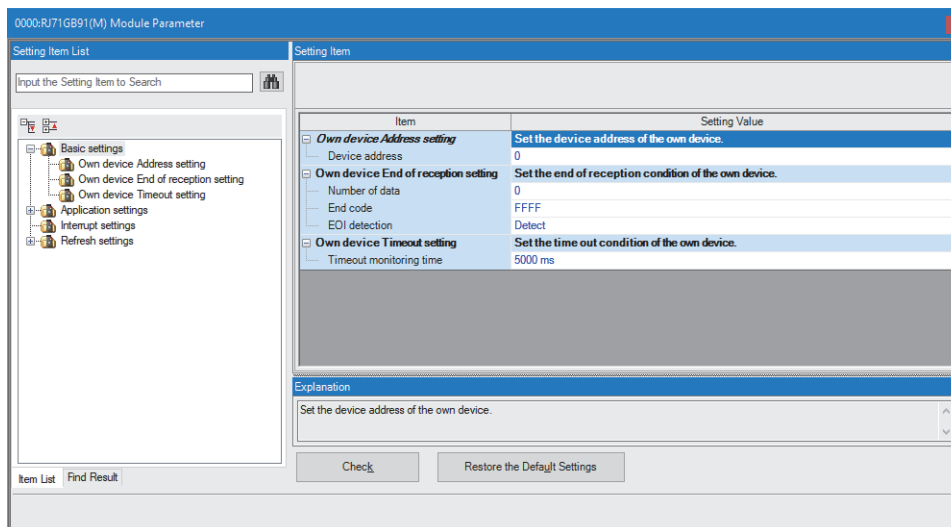
## 2.1 Basic Settings

### Setting procedure

Open "Basic settings" of the engineering tool.

1. Start Module Parameter.

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



2. Click the item to be changed and enter the setting value.

- Item where a value is selected from the drop-down list

Click the [▼] button of the item to be set, and from the drop-down list that appears, select the value.

- Item where a value is entered into the text box

Double-click the item to be set and enter the numeric value.



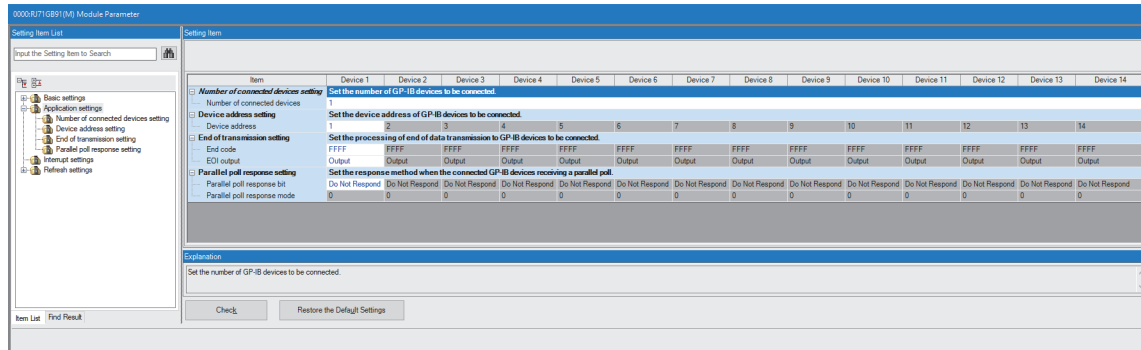
# 2.2 Application Settings

## Setting procedure

Open "Application settings" of the engineering tool.

1. Start Module Parameter.

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



2. Click the item to be changed and enter the setting value.

- Item where a value is selected from the drop-down list

Click the [▼] button of the item to be set, and from the drop-down list that appears, select the value.

- Item where a value is entered into the text box

Double-click the item to be set and enter the numeric value.

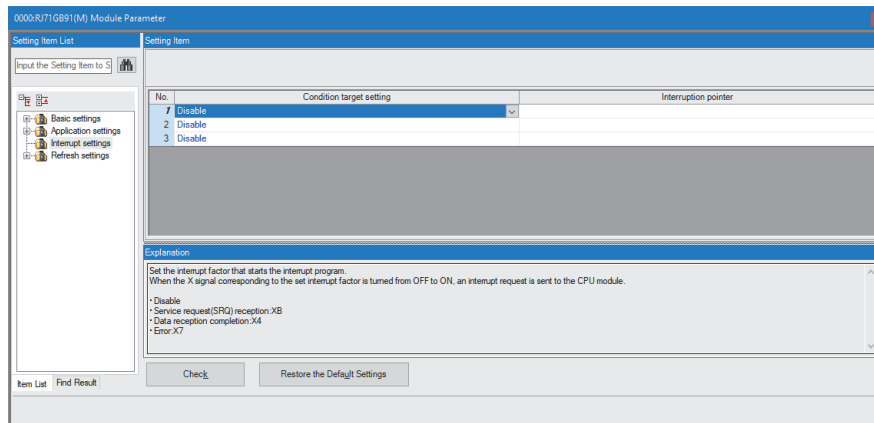
## 2.3 Interrupt Settings

### Setting procedure

Open "Interrupt settings" of the engineering tool.

#### 1. Start Module Parameter.

[Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Module model name ⇒ [Interrupt settings]



#### 2. Click the item of interrupt setting number (master mode: No.1 to No.3, slave mode: No.1 to No.4) to be changed and enter the setting value.

- Item where a value is selected from the drop-down list

Click the [▼] button of the item to be set, and from the drop-down list that appears, select the value.

- Item where a value is entered into the text box


Double-click the item to be set and enter the numeric value.

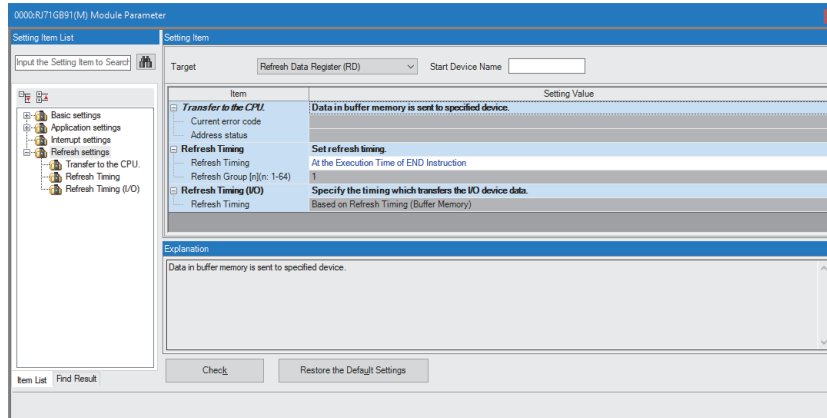
## 2.4 Refresh Settings

### Setting procedure

Set the buffer memory areas of the GP-IB interface module to be refreshed.  
The refresh settings eliminate the need to read data by a program.

#### 1. Start Module Parameter.

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



#### 2. Click "Target" and set the refresh destination.

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

The transfer destinations of all items are automatically set by setting the start device for "Start Device Name".

- When "Target" is "Device"

Double-click the item to be set and enter the refresh destination device.

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

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


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



The module label cannot be selected as "Target" for the GP-IB interface module.

## Refresh processing time

A refresh processing time [ $\mu\text{s}$ ] is a constituent of the scan time of the CPU module. For details on the scan time, refer to the following.

 MELSEC iQ-R CPU Module User's Manual (Application)

The refresh processing time [ $\mu\text{s}$ ] shown below is a time taken for refresh.

- Refresh processing time [ $\mu\text{s}$ ] = Refresh read time (time for transferring refresh data to the CPU module)

The refresh read time varies depending on the settings of "Target".


### When "Target" is "Refresh Data Register (RD)"

The following table shows the refresh read time when an RnCPU module is used.

Model	Classification	When the refresh is set
RJ71GB91 (master mode)	Refresh read time	12.64 $\mu\text{s}$
RJ71GB91 (slave mode)	Refresh read time	13.72 $\mu\text{s}$

### When "Target" is "Device"

Calculate the refresh read time according to the number of items that are set to be refreshed and the number of their transfer data (in units of word). For the calculation method, refer to the following.

 MELSEC iQ-R CPU Module User's Manual (Application)

# 3 TROUBLESHOOTING

This chapter describes errors that may occur while the GP-IB interface module is used and their troubleshooting.

## 3.1 Troubleshooting with the LEDs

Check the state of the LEDs to narrow down the possible causes of the trouble. This step is the first diagnostics before using the engineering tool.

A state of the GP-IB interface module can be checked with the RUN LED and ERR LED. The following table shows correspondences between these LEDs and states of the GP-IB interface module.

Name	Description
RUN LED	Indicates the operating status of the GP-IB interface module. On: Normal operation Off: 5V power supply interrupted, watchdog timer error occurred
ERR LED	Indicates the error status of the GP-IB interface module.*1 On: Error occurred Off: Normal operation

\*1 For details, refer to the following.

 Page 63 List of Error Codes


## 3.2 Checking the State of the Module

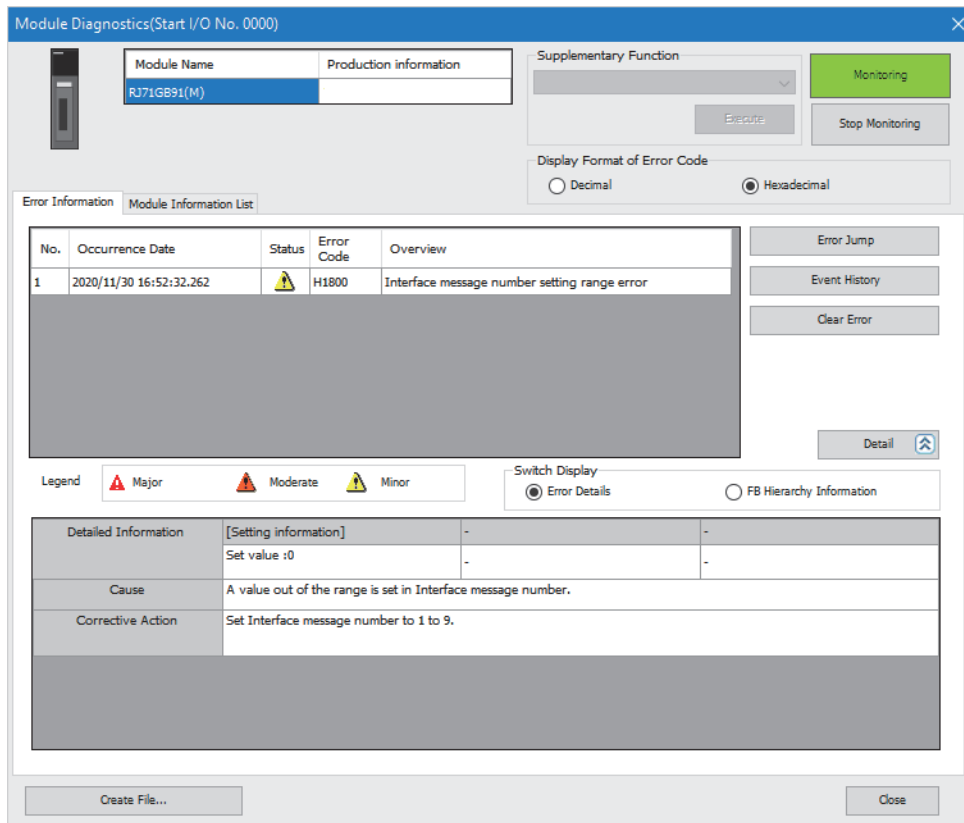
The following functions can be used on the "Module Diagnostics" window of the GP-IB interface module.

Function	Description
Error Information	Indicates the errors that have occurred. Click the [Event History] button to check not only the errors that occurred in the GP-IB interface module, but also the errors detected by each module and the operation history.
Module Information List	Indicates status information of various items of the GP-IB interface module.

### Error Information

Check the details and actions for the errors that have occurred.

 [Diagnostics] ⇒ [System Monitor] ⇒ Right-click the module to be checked. ⇒ "Module Diagnostics"



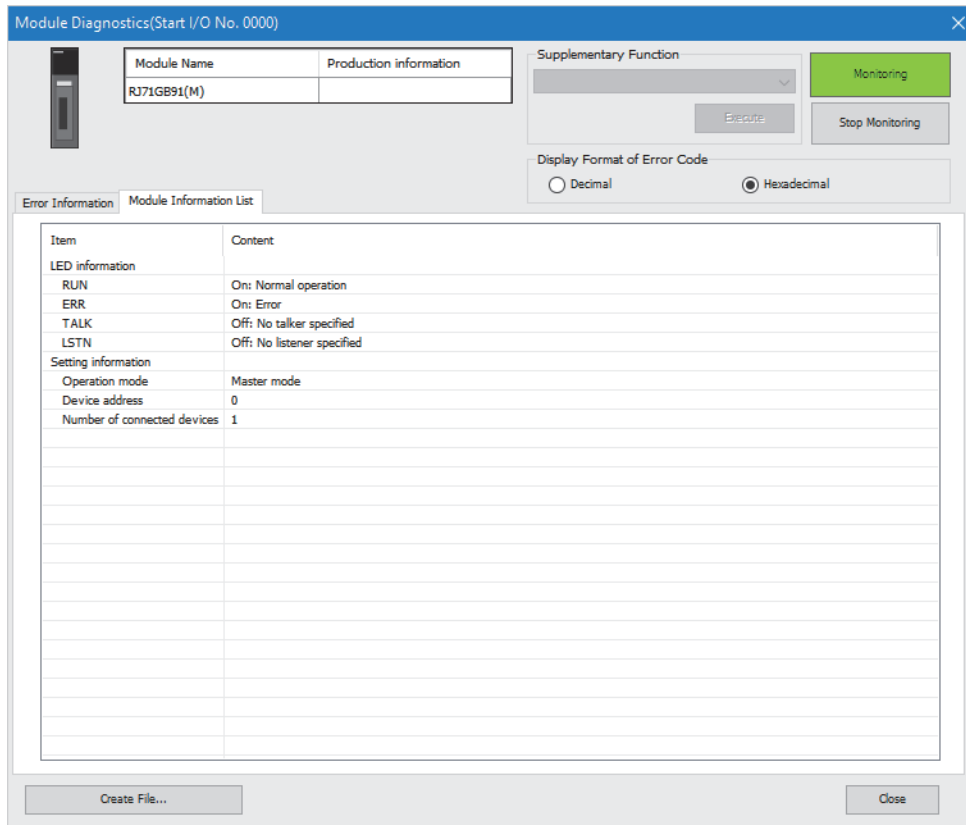
Item	Description
Detailed Information	Indicates the set value that caused the error.
Cause	Indicates detailed information about the error cause.
Corrective Action	Indicates the actions for the error.

### Precautions

Execution of "Clear Error" may fail if it is done during GP-IB communications. In such a case, execute it again after the end of GP-IB communications.

## Module Information List

Switch the tab to the "Module Information List" tab and check status information of each item of the GP-IB interface module.



3


Item	Description
LED information	Indicates the LED status of the GP-IB interface module.
Setting information	Indicates the settings of the GP-IB interface module.

## 3.3 Troubleshooting by Symptom


### When the RUN LED does not turn on

Check item	Action
Check whether the power is supplied.	Check that the supply voltage of the power supply module is within the rated range.
Check whether the capacity of the power supply module is enough.	Calculate the current consumption of mounted modules, such as the CPU module, I/O modules, and intelligent function modules, to check that the power capacity is enough.
Check whether the module is mounted properly.	Check the mounting state of the module.
Cases other than the above	Reset the CPU module, and check that the RUN LED turns on. If the RUN LED still remains off, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.

### When the ERR LED turns on

Check item	Action
Check whether any error has occurred.	Check 'Latest error code' (Un\G301) and take actions described in the list of error codes.  Page 63 List of Error Codes

### When communications fail

Check item	Action
Check whether the address settings of the GP-IB interface module are correct.	<ul style="list-style-type: none"> <li>• Check that the GP-IB address LED indicates the set address.</li> <li>• For master mode: Perform both of the following and check that set device addresses are correct: [Basic settings] ⇒ [Own device Address setting] ⇒ [Device address]; [Application settings] ⇒ [Device address setting] ⇒ [Device address].</li> <li>• For slave mode: Perform the following and check that a set device address is correct: [Basic settings] ⇒ [Own device Address setting] ⇒ [Device address].</li> </ul>
Check whether an address different from the other devices is set.	Check that all devices connected on the same busbar have separate addresses.
Check whether the communications parameters match those of other devices.	Check that conditions to end transmission/reception (number of data, EOI signal, end code) match between the talker and the listeners.
Check whether the cable is connected.	Check that the GP-IB cable is connected. When it is connected, check that the connector is engaged properly. If the communications failure persists, the possible cause is a failure of the cable, and thus replace the cable with new one.
Check whether cable disconnection has occurred.	
Check whether any measures have been taken to reduce noise.	Refer to the precautions on wiring described in the following manual and take measures to reduce noise.  MELSEC iQ-R GP-IB Interface Module User's Manual (Startup)
Check whether the power is on.	Check that all devices used for the communications are powered on.
Check whether there are two or more controllers connected on the same busbar.	Only one device can serve as the controller on one busbar. The system may not work properly if multiple devices are set to serve as the controller and connected to one busbar.
Check whether 'Error flag' (X7) is on.	Check that 'Error flag' (X7) is off. When 'Error flag' (X7) is on, the following occurs. <ul style="list-style-type: none"> <li>• For master mode: The interface message transmission request, data transmission request, or data reception request is ignored.</li> <li>• For slave mode: The data transmission request is ignored.</li> </ul>
Check whether 'Data reception flag' (X4) is on. (for slave mode)	Data reception processing is not performed while 'Data reception flag' (X4) is on, and thus a timeout occurs on the data transmission side. To prevent this, after the completion of reading out of the received data, turn off 'Data reception flag' (X4) by turning on 'Data reception processing completion' (Y4).



## 3.4 List of Error Codes

The GP-IB interface module stores the error code into 'Latest error code' (Un\G301) of the buffer memory if an error occurs during operation. In addition, 'Error flag' (X7) turns on. The error code in 'Latest error code' (Un\G301) is cleared and 'Error flag' (X7) is turned off by turning on 'Error clear request' (Y7).

Error codes of the GP-IB interface module are classified into minor errors and moderate errors.

- Minor error: An error caused by the setting error of programs and parameters. Each function operates normally after the error cause is eliminated. (1000H to 1FFFH)
- Moderate error: An error related to the connection with the remote head module (2000H), an error with which GP-IB communications do not continue, such as hardware failures (3000H to 3FFFH)

○: Applicable, —: Not applicable. □: This symbol indicates the number of the device where an error has occurred. A numerical value of 1 to E corresponds to Device 1 to 14.

(1: Device 1, 2: Device 2, 3: Device 3, 4: Device 4, 5: Device 5, 6: Device 6, 7: Device 7, 8: Device 8, 9: Device 9, A: Device 10, B: Device 11, C: Device 12, D: Device 13, E: Device 14)

Error code	Error name	Description and cause	Action	Operation mode	
				Master mode	Slave mode
0000H	—	There is no error.	—	○	○
1800H	Interface message number setting range error	A value out of the range is set in Interface message number.	Set Interface message number to 1 to 9.	○	—
1801H	Timeout monitoring time setting range error	A value out of the range is set in Timeout monitoring time.	Set Timeout monitoring time to 10 to 32767.	○	○
1803H	Own device end of transmission (EOI output) setting range error	A value out of the range is set in End of transmission (EOI output) of the own device communications setting.	Set End of transmission (EOI output) to 0 (Output) or 1 (Do not output).	—	○
1805H	End of reception (EOI detection) setting range error	A value out of the range is set in End of reception (EOI detection).	Set End of reception (EOI detection) to 0 (Detect) or 1 (Do not detect).	○	○
1807H	Number of connected devices setting range error	A value out of the range is set in Number of connected devices.	Set Number of connected devices to 1 to 14.	○	—
1811H	Interface message destination device setting error	<ul style="list-style-type: none"> <li>• The interface message transmission request has been issued while Number of connected devices is set to 13 or smaller but the device number is set to a larger number than the set number of connected devices.</li> <li>• The interface message transmission request has been issued while Interface message number is set to 9 (Parallel poll configure) but Interface message destination is set to 0000H (state of the destination not specified).</li> </ul>	<ul style="list-style-type: none"> <li>• When setting Number of connected devices to 13 or smaller, set the device number of interface message destination to the set number of connected devices or smaller.</li> <li>• When executing the parallel poll configure, specify one or more destination device(s).</li> </ul>	○	—
1812H	Listener device setting error at transmission	<p>The data transmission request has been issued while Listener setting of transmission areas is either of following conditions.</p> <ul style="list-style-type: none"> <li>• No listener device is specified (all bits are 0).</li> <li>• Although Number of connected devices is set to 13 or smaller, the device number is set to a larger number than the set number of connected devices.</li> </ul>	<ul style="list-style-type: none"> <li>• Set a bit corresponding to the listener device to be used to 1.</li> <li>• When setting Number of connected devices to 13 or smaller, set the listener device number to the set number of connected devices or smaller.</li> </ul>	○	—

Error code	Error name	Description and cause	Action	Operation mode	
				Master mode	Slave mode
1813H	Talker device setting error at reception	The data reception request has been issued while Talker setting of reception areas is any of following conditions. <ul style="list-style-type: none"> <li>No talker device is specified (all bits are 0).</li> <li>Multiple talker devices are specified.</li> <li>Although Number of connected devices is set to 13 or smaller, the device number is set to a larger number than the set number of connected devices.</li> </ul>	<ul style="list-style-type: none"> <li>Set a bit corresponding to the talker device to be used to 1.</li> <li>Specify one talker device only.</li> <li>When setting Number of connected devices to 13 or smaller, set the talker device number to the set number of connected devices or smaller.</li> </ul>	○	—
1814H	Listener device setting error at reception	The data reception request has been issued while Number of connected devices is set to 13 or smaller but the device number larger than the set number of connected devices is set in Listener setting of reception areas.	When setting Number of connected devices to 13 or smaller, set the listener device number if necessary, to the set number of connected devices or smaller.	○	—
1815H	End of reception (number of data) setting range error	A value out of the range is set in End of reception (number of data).	Set End of reception (number of data) to 0 to 32360.	○	○
1816H	Number of transmission data setting range error	A value out of the range is set in Number of transmission data setting.	Set Number of transmission data setting to 0 to 32360.	○	○
1817H	End of transmission setting mismatch	Data have been sent while specified devices have separate values set in End of transmission (end code).	When sending data to multiple devices at the same time, set End of transmission (end code) to a same value for all listener devices where the end code is to be set.	○	—
1818H	Listener device setting overlap error at reception	A device already set as a talker device has been specified as a listener device.	Do not specify a talker device as a listener device.	○	—
1820H	Interface message transmission timeout	A timeout has occurred at interface message transmission.	<ul style="list-style-type: none"> <li>Check whether interface message destinations are correct.</li> <li>Check the device addresses of the destinations.</li> <li>Check whether disconnection has occurred on cables connecting to destination devices.</li> <li>Review and correct the timeout monitoring time.</li> </ul>	○	—
1821H	Data transmission timeout	A timeout has occurred at data transmission.	<ul style="list-style-type: none"> <li>Check whether the listener setting is correct.</li> <li>Check the device addresses of the listeners.</li> <li>Check whether GP-IB cable disconnection has occurred.</li> <li>Review and correct the timeout monitoring time.</li> </ul>	○	—
			<ul style="list-style-type: none"> <li>Check the device addresses of the listeners.</li> <li>Check whether GP-IB cable disconnection has occurred.</li> <li>Review and correct the timeout monitoring time.</li> </ul>	—	○
1822H	Data reception timeout	A timeout has occurred at data reception.	<ul style="list-style-type: none"> <li>Check whether the talker setting and the listener setting are correct.</li> <li>Check the device addresses of the talker and the listeners.</li> <li>Check whether GP-IB cable disconnection has occurred.</li> <li>Review and correct the timeout monitoring time.</li> </ul>	○	—
			<ul style="list-style-type: none"> <li>Check the device addresses of the listeners.</li> <li>Check whether GP-IB cable disconnection has occurred.</li> <li>Review and correct the timeout monitoring time.</li> </ul>	—	○

Error code	Error name	Description and cause	Action	Operation mode	
				Master mode	Slave mode
1823H	Receive buffer overflow	Amount of received data has exceeded 32360 bytes.	<ul style="list-style-type: none"> <li>• Check whether the end of reception setting (end code) matches the specifications of the talker device.</li> <li>• Check whether the end of reception setting (EOI detection) matches the specifications of the talker device.</li> <li>• Check whether there is no setting error on the talker device.</li> </ul>	○	○
1824H	IFC forced termination error	The device received the IFC signal, and thus data transmission or data reception was forced to end.	Check why the program at master mode device sent the IFC signal.	—	○
183□H	Device □ end of transmission (EOI output) setting range error	A value out of the range is set in End of transmission (EOI output) of the device □ communications setting.	Set End of transmission (EOI output) to 0 (Output) or 1 (Do not output).	○	—
184□H	Device □ address setting range error	A value out of the range is set in Device address of the device □ communications setting.	Set Device address to 0 to 30.	○	—
185□H	Device □ parallel poll response bit setting range error	A value out of the range is set in Parallel poll response bit of the device □ communications setting.	Set Parallel poll response bit to 0 (Do not respond) or 1 to 8 (DIO1 to DIO8).	○	—
186□H	Device □ parallel poll response mode setting range error	A value out of the range is set in Parallel poll response mode of the device □ communications setting.	Set Parallel poll response mode to 0 or 1.	○	—
187□H	Interface message destination device □ address overlap error	The value set in Device address of the specified interface message destination □ is the same as own device address.	Set Device address of the interface message destination □ to an address different from the own device.	○	—
188□H	Listener device □ address overlap error at transmission	The value set in Device address of the specified listener □ is the same as own device address.	Set Device address of the listener □ to an address different from the own device.	○	—
189□H	Talker device □ address overlap error at reception	The value set in Device address of the specified talker □ is the same as own device address.	Set Device address of the talker □ to an address different from the own device.	○	—
18A□H	Listener device □ address overlap error at reception	At reception, the value set in Device address of the specified listener □ is the same as talker address.	Set Device address of the listener □ to an address different from the talker device.	○	—
2000H	Remote head module connection error	The system has been powered on while the interface module is mounted with the remote head module.	This interface module cannot be used on the intelligent device station together with the remote head module. Use the interface module together with the programmable controller CPU.	○	○
3001H	Hardware failure	A hardware failure has occurred in the module.	Power off and on the module. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.	○	○

# APPENDICES

## Appendix 1 Module Label

The functions of the GP-IB interface module can be set by using module labels.

### Module label structure

The module label names have the following structures.

- "Instance name"\_"Module number"."Label name"
- "Instance name"\_"Module number"."Label name"\_D
- "Instance name"\_"Module number"."Data item"."Label name"\_D
- "Instance name"\_"Module number"."Data item[□]". "Label name"\_D

#### Point

□ indicates a device number.

#### Ex.

GB91\_M\_1.uSet\_ConnectionDeviceNumber\_D

#### ■ Instance name

The following are instance names of the GP-IB interface module.

- Master mode: "GB91\_M"
- Slave mode: "GB91\_S"

#### ■ Module number

This is a number starting from 1. The module number is added to a module label name to identify modules that have the same instance name.

#### ■ Data item

- stOwnDevice: Own device communications setting
- stnDevice[□]: Device □ communications setting
- stDataTransmission: Data transmission
- stDataReception: Data reception

#### Point

□ indicates a device number.

#### ■ Label name

This is a label identifier unique to a module.

#### ■ \_D

This string indicates that the module label is for the direct access. A module label without the string is for refresh processing.

# Appendix 2 I/O Signals

## List of I/O signals

The following tables list the I/O signals of the GP-IB interface module.

For details on the I/O signals, refer to the following.

☞ Page 69 Details of input signals

☞ Page 77 Details of output signals



The I/O numbers (X/Y) described below are for when the start I/O number of the GP-IB interface module is set to 0.

### Master mode

#### ■ Input signals

Signal direction	GP-IB interface module → CPU module
Device number	Signal name
X0	Module READY
X1	Use prohibited
X2	Interface message transmission completion flag
X3	Data transmission completion flag
X4	Data reception completion flag
X5	Use prohibited
X6	Use prohibited
X7	Error flag
X8	Use prohibited
X9	Use prohibited
XA	Use prohibited
XB	SRQ reception flag
XC	Use prohibited
XD	Use prohibited
XE	Use prohibited
XF	Use prohibited

#### ■ Output signals

Signal direction	CPU module → GP-IB interface module
Device number	Signal name
Y0	Use prohibited
Y1	Use prohibited
Y2	Interface message transmission request
Y3	Data transmission request
Y4	Data reception request
Y5	Use prohibited
Y6	Use prohibited
Y7	Error clear request
Y8	Use prohibited
Y9	Use prohibited
YA	Use prohibited
YB	Use prohibited
YC	Use prohibited
YD	Use prohibited
YE	Use prohibited
YF	Use prohibited

## Slave mode

### ■Input signals

Signal direction	GP-IB interface module → CPU module
Device number	Signal name
X0	Module READY
X1	Use prohibited
X2	Use prohibited
X3	Data transmission completion flag
X4	Data reception flag
X5	Service request completion flag
X6	Parallel poll response data setting completion flag
X7	Error flag
X8	Use prohibited
X9	Use prohibited
XA	Use prohibited
XB	Use prohibited
XC	GET command reception flag
XD	DCL command reception flag
XE	IFC reception flag
XF	Use prohibited

### ■Output signals

Signal direction	CPU module → GP-IB interface module
Device number	Signal name
Y0	Use prohibited
Y1	Use prohibited
Y2	Use prohibited
Y3	Data transmission request
Y4	Data reception processing completion
Y5	Service request
Y6	Parallel poll response data setting request
Y7	Error clear request
Y8	Use prohibited
Y9	Use prohibited
YA	Use prohibited
YB	Use prohibited
YC	GET command reception processing completion
YD	DCL command reception processing completion
YE	IFC reception processing completion
YF	Use prohibited

## Details of input signals

This section describes the details of the input signals of the GP-IB interface module which are assigned to the CPU module. The I/O numbers (X/Y) described here are for when the start I/O number of the GP-IB interface module is set to 0.

### Module READY

This signal is common to both master mode and slave mode.

'Module READY' turns on when the GP-IB interface module has started up properly after the power-on or the reset of the CPU module.

The signal turns off when a watchdog timer error occurs.

#### ■Device number

The device number of this input signal is shown below.

Signal name	Device number
Module READY	X0

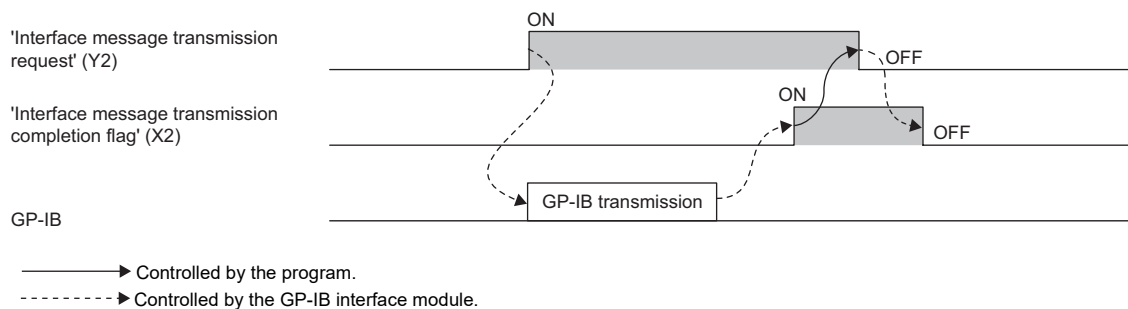
### Interface message transmission completion flag

This signal is for master mode.

Use 'Interface message transmission completion flag' as an interlock condition to turn on or off 'Interface message transmission request' (Y2).

'Interface message transmission completion flag' (X2) turns on when transmission is complete after turning on of 'Interface message transmission request' (Y2).

When 'Interface message transmission request' (Y2) is turned off, 'Interface message transmission completion flag' (X2) turns off.



#### ■Device number

The device number of this input signal is shown below.

Signal name	Device number
Interface message transmission completion flag	X2

A

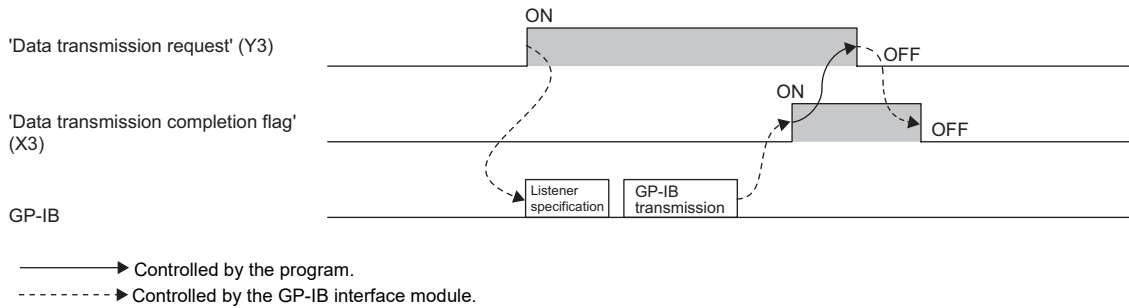
## Data transmission completion flag

Use 'Data transmission completion flag' as an interlock condition to turn on or off 'Data transmission request' (Y3).

### ■Operation in master mode

'Data transmission completion flag' (X3) turns on when transmission is complete after turning on of 'Data transmission request' (Y3).

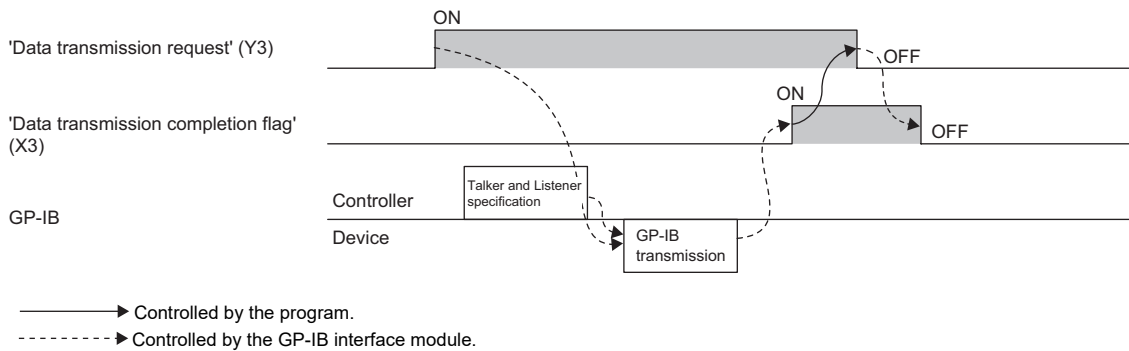
When 'Data transmission request' (Y3) is turned off, 'Data transmission completion flag' (X3) turns off.



### ■Operation in slave mode

'Data transmission completion flag' (X3) turns on when transmission is complete after turning on of 'Data transmission request' (Y3) and the own device being specified as the talker.

When 'Data transmission request' (Y3) is turned off, 'Data transmission completion flag' (X3) turns off.



### ■Device number

The device number of this input signal is shown below.

Signal name	Device number
Data transmission completion flag	X3



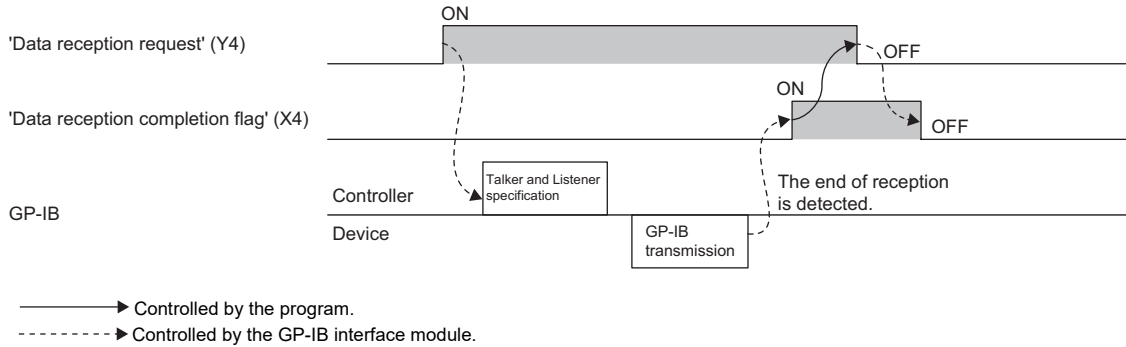
## Data reception completion flag

This signal is for master mode.

Use 'Data reception completion flag' as an interlock condition to turn on or off 'Data reception request' (Y4).

'Data reception completion flag' (X4) turns on when the end of data reception has been detected after turning on of 'Data reception request' (Y4) and specifying the talker and listeners.

When 'Data reception request' (Y4) is turned off, 'Data reception completion flag' (X4) turns off.



### Device number

The device number of this input signal is shown below.

Signal name	Device number
Data reception completion flag	X4

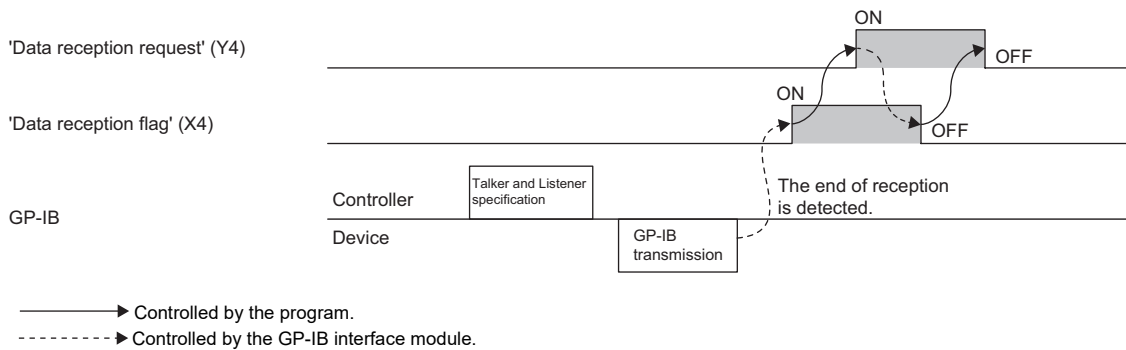
## Data reception flag

This signal is for slave mode.

Use 'Data reception flag' as an interlock condition to turn on or off 'Data reception processing completion' (Y4).

'Data reception flag' (X4) turns on when the end of data reception has been detected after the own device being specified as a listener.

When 'Data reception processing completion' (Y4) is turned on, 'Data reception flag' (X4) turns off.



### Device number

The device number of this input signal is shown below.

Signal name	Device number
Data reception flag	X4

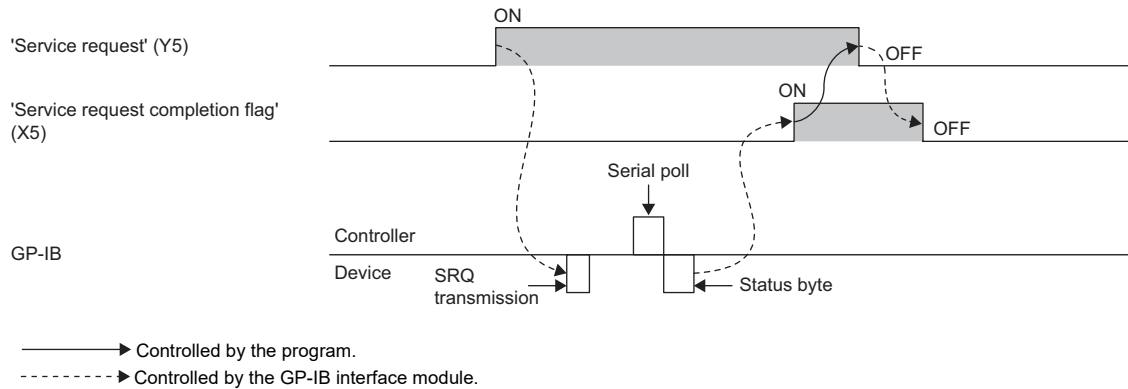
## Service request completion flag

This signal is for slave mode.

Use 'Service request completion flag' as an interlock condition to turn on or off 'Service request' (Y5).

'Service request completion flag' (X5) turns on when the device has received the serial poll from the controller and has sent back 'Status byte' (Un\G203) to the controller after turning on of 'Service request' (Y5).

When 'Service request' (Y5) is turned off, 'Service request completion flag' (X5) turns off.



### Device number

The device number of this input signal is shown below.

Signal name	Device number
Service request completion flag	X5

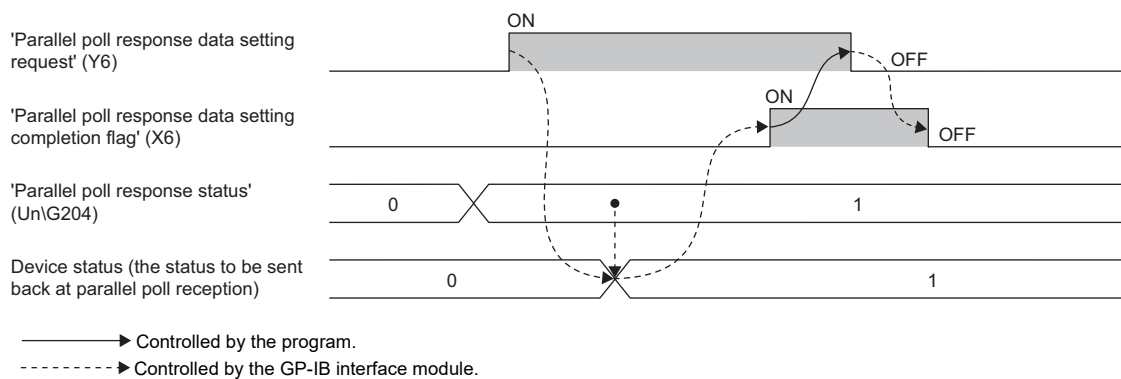
## Parallel poll response data setting completion flag

This signal is for slave mode.

Use 'Parallel poll response data setting completion flag' as an interlock condition to turn on or off 'Parallel poll response data setting request' (Y6).

'Parallel poll response data setting completion flag' (X6) turns on when the setting of status to be sent back to the controller at parallel poll reception is complete after turning on of 'Parallel poll response data setting request' (Y6).

When 'Parallel poll response data setting request' (Y6) is turned off, 'Parallel poll response data setting completion flag' (X6) turns off.



### Device number

The device number of this input signal is shown below.

Signal name	Device number
Parallel poll response data setting completion flag	X6

## Error flag

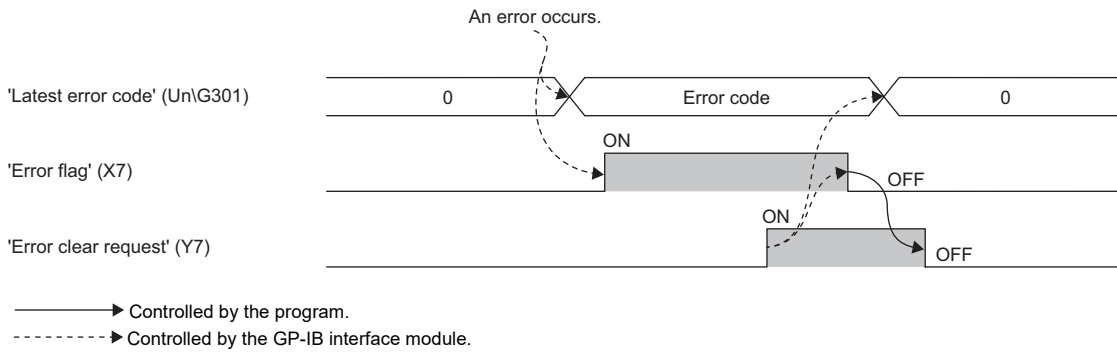
This signal is common to both master mode and slave mode.

Use 'Error flag' as an interlock condition to turn on or off 'Error clear request' (Y7).

'Error flag' (X7) turns on and the following are performed when an error occurs.

- The error code is stored in 'Latest error code' (Un\G301).
- The ERR LED turns on.

Turning on 'Error clear request' (Y7) clears 'Latest error code' (Un\G301) and turns off 'Error flag' (X7). The ERR LED turns off as well.



### Device number

The device number of this input signal is shown below.

Signal name	Device number
Error flag	X7

## SRQ reception flag

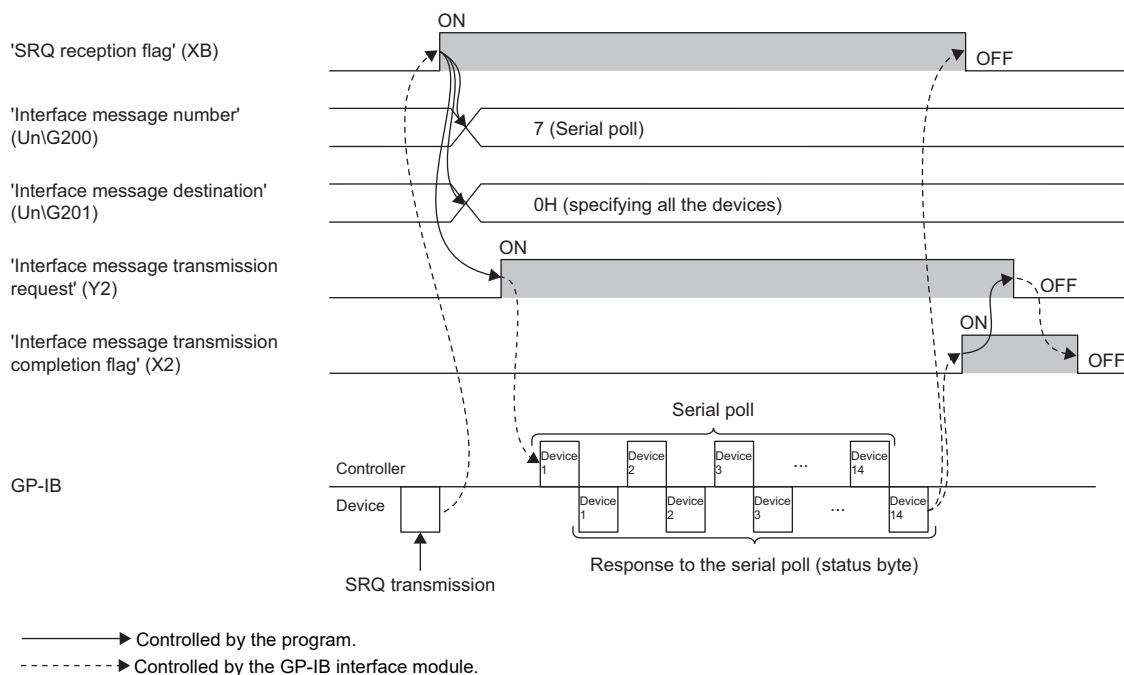
This signal is for master mode.

'SRQ reception flag' (XB) turns on when the controller receives the SRQ from a connected device.

'SRQ reception flag' (XB) turns off when a series of following operations are complete: set 7 (Serial poll) for 'Interface message number' (Un\G200); turn on 'Interface message transmission request' (Y2); the serial poll is executed to all connected devices that are specified in 'Interface message destination' (Un\G201).

Note that during the serial poll execution, if another SRQ is sent from a device where the serial poll is already complete, 'SRQ reception flag' (XB) does not turn off at completion of the serial poll. For details, refer to the following.

☞ Page 24 When another SRQ is sent during serial poll



### ■ Device number

The device number of this input signal is shown below.

Signal name	Device number
SRQ reception flag	XB

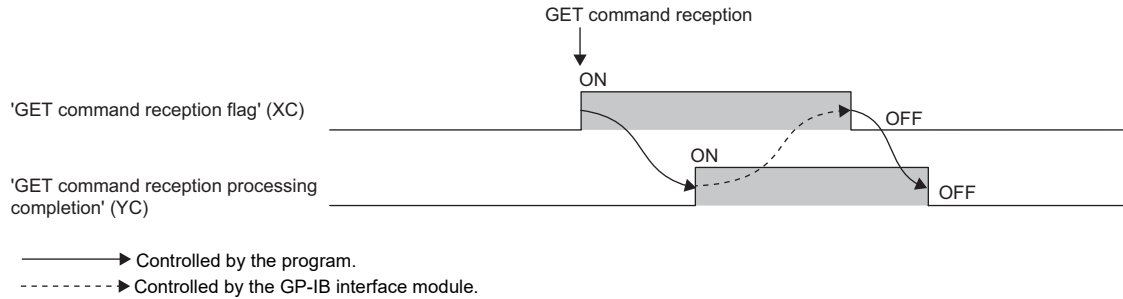
## GET command reception flag

This signal is for slave mode.

Use 'GET command reception flag' as an interlock condition to turn on or off 'GET command reception processing completion' (YC).

'GET command reception flag' (XC) turns on when the GP-IB interface module receives the GET command from the controller.

When 'GET command reception processing completion' (YC) is turned on, 'GET command reception flag' (XC) turns off.



### ■ Device number

The device number of this input signal is shown below.

Signal name	Device number
GET command reception flag	XC

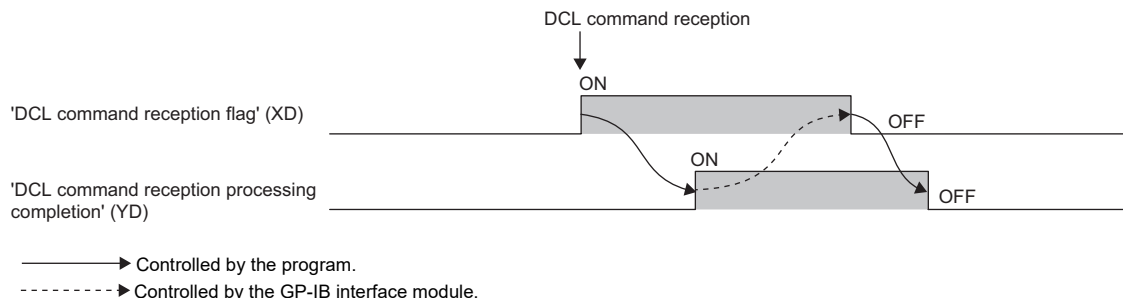
## DCL command reception flag

This signal is for slave mode.

Use 'DCL command reception flag' as an interlock condition to turn on or off 'DCL command reception processing completion' (YD).

'DCL command reception flag' (XD) turns on when the GP-IB interface module receives the DCL command or SDC command from the controller.

When 'DCL command reception processing completion' (YD) is turned on, 'DCL command reception flag' (XD) turns off.



### ■Device number

The device number of this input signal is shown below.

Signal name	Device number
DCL command reception flag	XD

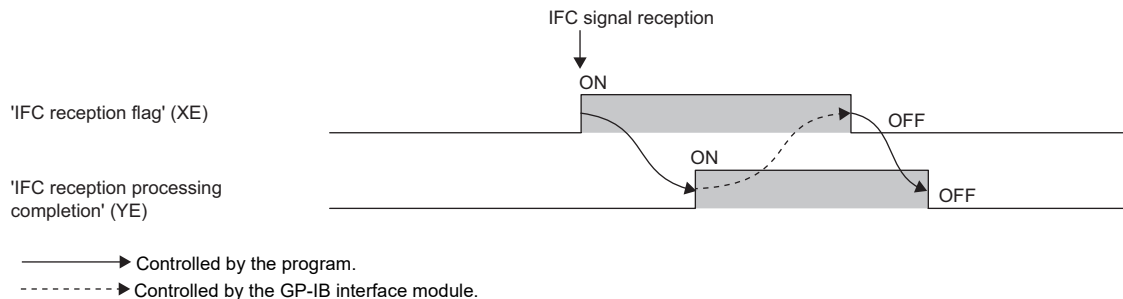
## IFC reception flag

This signal is for slave mode.

Use 'IFC reception flag' as an interlock condition to turn on or off 'IFC reception processing completion' (YE).

'IFC reception flag' (XE) turns on when the GP-IB interface module receives the IFC signal from the controller.

When 'IFC reception processing completion' (YE) is turned on, 'IFC reception flag' (XE) turns off.



### ■Device number

The device number of this input signal is shown below.

Signal name	Device number
IFC reception flag	XE

## Details of output signals

For details on the output signals of the GP-IB interface module which are assigned to the CPU module, refer to the following list.

Device number	Signal name	Operation mode	Reference
Y2	Interface message transmission request	Master mode	Page 69 Interface message transmission completion flag
Y3	Data transmission request	Master mode, slave mode	Page 70 Data transmission completion flag
Y4	Data reception request	Master mode	Page 71 Data reception completion flag
	Data reception processing completion	Slave mode	Page 71 Data reception flag
Y5	Service request	Slave mode	Page 72 Service request completion flag
Y6	Parallel poll response data setting request	Slave mode	Page 72 Parallel poll response data setting completion flag
Y7	Error clear request	Master mode, slave mode	Page 73 Error flag
YC	GET command reception processing completion	Slave mode	Page 75 GET command reception flag
YD	DCL command reception processing completion	Slave mode	Page 76 DCL command reception flag
YE	IFC reception processing completion	Slave mode	Page 76 IFC reception flag

# Appendix 3 Buffer Memory

## List of buffer memory areas

This section shows the list of buffer memory areas of the GP-IB interface module. For details on each area, refer to the following.

☞ Page 82 Details of buffer memory areas

For the buffer memory areas, default values are set at the power-on or the reset of CPU module.

The areas are classified into the following data types.

Data type	Description	
Setting data	Description	Set this data according to the connected devices and application purposes of the system.
	Read/write attribute	Data can be read and written from/to this area.
	Setting method	Set this data using an engineering tool or a program.
	Setting timing	A change of the value for this data takes effect when the relevant function starts next time.
Control data	Description	Use this data to control the GP-IB interface module.
	Read/write attribute	Data can be read and written from/to this area.
	Setting method	Set this data using an engineering tool or a program.
	Setting timing	A change of the value for this data takes effect when the relevant function starts next time.
Monitor data	Description	Use this data to check the status of the GP-IB interface module.
	Read/write attribute	Reading data is only allowed. Writing data is not allowed.
	Setting method	—
	Setting timing	—

### Precautions

- Do not write data to system areas and monitor data areas of the buffer memory. Doing so can cause the malfunction of the module.
- Do not write data to buffer memory areas during interface message transmission ('Interface message transmission request' (Y2) is on), data transmission ('Data transmission request' (Y3) is on), or data reception ('Data reception request' (Y4) is on). Doing so can cause transmission of unintended data.



○: Available, ×: Not available, —: Use prohibited

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh	Operation mode		
						Master mode	Slave mode	
0	0H	Own device communication setting	System area	—	—	—	—	
1	1H		End of reception (number of data)	0	Setting	×	○	○
2	2H		End of reception (end code)	FFFFH (Not specified)		×	○	○
3	3H		End of reception (EOI detection)	0: Detect		×	○	○
4	4H		Timeout monitoring time	5000ms		×	○	○
5	5H		End of transmission (end code)	FFFFH (Do not add)		×	×	○
6	6H		End of transmission (EOI output)	0: Output		×	×	○
7 to 14	7H to EH	System area	—	—		—	—	—
15	FH	Number of connected devices	1	Setting	×	○	×	
16	10H	Device 1 communication setting	Device address		1	×	○	×
17	11H		End of transmission (end code)		FFFFH (Do not add)	×	○	×
18	12H		End of transmission (EOI output)		0: Output	×	○	×
19	13H		Parallel poll response bit		0: Do not respond	×	○	×
20	14H		Parallel poll response mode		0	×	○	×
21 to 23	15H to 17H		System area		—	—	—	—
24	18H	Device 2 communication setting	Device address	2	Setting	×	○	×
25	19H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
26	1AH		End of transmission (EOI output)	0: Output		×	○	×
27	1BH		Parallel poll response bit	0: Do not respond		×	○	×
28	1CH		Parallel poll response mode	0		×	○	×
29 to 31	1DH to 1FH	System area	—	—	—	—	—	
32	20H	Device 3 communication setting	Device address	3	Setting	×	○	×
33	21H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
34	22H		End of transmission (EOI output)	0: Output		×	○	×
35	23H		Parallel poll response bit	0: Do not respond		×	○	×
36	24H		Parallel poll response mode	0		×	○	×
37 to 39	25H to 27H	System area	—	—	—	—	—	
40	28H	Device 4 communication setting	Device address	4	Setting	×	○	×
41	29H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
42	2AH		End of transmission (EOI output)	0: Output		×	○	×
43	2BH		Parallel poll response bit	0: Do not respond		×	○	×
44	2CH		Parallel poll response mode	0		×	○	×
45 to 47	2DH to 2FH	System area	—	—	—	—	—	
48	30H	Device 5 communication setting	Device address	5	Setting	×	○	×
49	31H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
50	32H		End of transmission (EOI output)	0: Output		×	○	×
51	33H		Parallel poll response bit	0: Do not respond		×	○	×
52	34H		Parallel poll response mode	0		×	○	×
53 to 55	35H to 37H	System area	—	—	—	—	—	
56	38H	Device 6 communication setting	Device address	6	Setting	×	○	×
57	39H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
58	3AH		End of transmission (EOI output)	0: Output		×	○	×
59	3BH		Parallel poll response bit	0: Do not respond		×	○	×
60	3CH		Parallel poll response mode	0		×	○	×
61 to 63	3DH to 3FH	System area	—	—	—	—	—	



Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh	Operation mode		
						Master mode	Slave mode	
64	40H	Device 7 communication s setting	Device address	7	Setting	×	○	×
65	41H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
66	42H		End of transmission (EOI output)	0: Output		×	○	×
67	43H		Parallel poll response bit	0: Do not respond		×	○	×
68	44H		Parallel poll response mode	0		×	○	×
69 to 71	45H to 47H		System area	—	—	—	—	
72	48H	Device 8 communication s setting	Device address	8	Setting	×	○	×
73	49H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
74	4AH		End of transmission (EOI output)	0: Output		×	○	×
75	4BH		Parallel poll response bit	0: Do not respond		×	○	×
76	4CH		Parallel poll response mode	0		×	○	×
77 to 79	4DH to 4FH		System area	—	—	—	—	
80	50H	Device 9 communication s setting	Device address	9	Setting	×	○	×
81	51H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
82	52H		End of transmission (EOI output)	0: Output		×	○	×
83	53H		Parallel poll response bit	0: Do not respond		×	○	×
84	54H		Parallel poll response mode	0		×	○	×
85 to 87	55H to 57H		System area	—	—	—	—	
88	58H	Device 10 communication s setting	Device address	10	Setting	×	○	×
89	59H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
90	5AH		End of transmission (EOI output)	0: Output		×	○	×
91	5BH		Parallel poll response bit	0: Do not respond		×	○	×
92	5CH		Parallel poll response mode	0		×	○	×
93 to 95	5DH to 5FH		System area	—	—	—	—	
96	60H	Device 11 communication s setting	Device address	11	Setting	×	○	×
97	61H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
98	62H		End of transmission (EOI output)	0: Output		×	○	×
99	63H		Parallel poll response bit	0: Do not respond		×	○	×
100	64H		Parallel poll response mode	0		×	○	×
101 to 103	65H to 67H		System area	—	—	—	—	
104	68H	Device 12 communication s setting	Device address	12	Setting	×	○	×
105	69H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
106	6AH		End of transmission (EOI output)	0: Output		×	○	×
107	6BH		Parallel poll response bit	0: Do not respond		×	○	×
108	6CH		Parallel poll response mode	0		×	○	×
109 to 111	6DH to 6FH		System area	—	—	—	—	
112	70H	Device 13 communication s setting	Device address	13	Setting	×	○	×
113	71H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
114	72H		End of transmission (EOI output)	0: Output		×	○	×
115	73H		Parallel poll response bit	0: Do not respond		×	○	×
116	74H		Parallel poll response mode	0		×	○	×
117 to 119	75H to 77H		System area	—	—	—	—	
120	78H	Device 14 communication s setting	Device address	14	Setting	×	○	×
121	79H		End of transmission (end code)	FFFFH (Do not add)		×	○	×
122	7AH		End of transmission (EOI output)	0: Output		×	○	×
123	7BH		Parallel poll response bit	0: Do not respond		×	○	×
124	7CH		Parallel poll response mode	0		×	○	×
125 to 127	7DH to 7FH		System area	—	—	—	—	
128 to 179	80H to B3H	System area	—	—	—	—	—	
180	B4H	Condition target setting [1] <sup>*1</sup>	0	Setting	×	○	○	
181	B5H	Condition target setting [2] <sup>*1</sup>	0	Setting	×	○	○	

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh	Operation mode		
						Master mode	Slave mode	
182	B6H	Condition target setting [3] <sup>*1</sup>	0	Setting	×	○	○	
183	B7H	Condition target setting [4] <sup>*1</sup>	0	Setting	×	×	○	
184 to 199	B8H to C7H	System area	—	—	—	—	—	
200	C8H	Interface message number	0	Control	×	○	×	
201	C9H	Interface message destination	0	Control	×	○	×	
202	CAH	System area	—	—	—	—	—	
203	CBH	Status byte	0	Control	×	×	○	
204	CCH	Parallel poll response status	0	Control	×	×	○	
205 to 299	CDH to 12BH	System area	—	—	—	—	—	
300	12CH	Device address	0	Monitor	×	○	○	
301	12DH	Latest error code	0	Monitor	○	○	○	
302	12EH	System area	—	—	—	—	—	
303	12FH	Address status	0	Monitor	○	○	○	
304	130H	Operation mode	0	Monitor	×	○	○	
305	131H	Remote/Local status	0	Monitor	○	×	○	
306	132H	Local lockout status	0	Monitor	○	×	○	
307	133H	Bus status	0	Monitor	×	○	○	
308	134H	Serial poll result	0	Monitor	×	○	×	
309	135H	Device 1 status byte	0	Monitor	×	○	×	
310	136H	Device 2 status byte	0	Monitor	×	○	×	
311	137H	Device 3 status byte	0	Monitor	×	○	×	
312	138H	Device 4 status byte	0	Monitor	×	○	×	
313	139H	Device 5 status byte	0	Monitor	×	○	×	
314	13AH	Device 6 status byte	0	Monitor	×	○	×	
315	13BH	Device 7 status byte	0	Monitor	×	○	×	
316	13CH	Device 8 status byte	0	Monitor	×	○	×	
317	13DH	Device 9 status byte	0	Monitor	×	○	×	
318	13EH	Device 10 status byte	0	Monitor	×	○	×	
319	13FH	Device 11 status byte	0	Monitor	×	○	×	
320	140H	Device 12 status byte	0	Monitor	×	○	×	
321	141H	Device 13 status byte	0	Monitor	×	○	×	
322	142H	Device 14 status byte	0	Monitor	×	○	×	
323	143H	Parallel poll result	0	Monitor	×	○	×	
324	144H	Number of connected devices monitor	1	Monitor	×	○	×	
325 to 399	145H to 18FH	System area	—	—	—	—	—	
400	190H	Transmission area	Listener setting	0	Control	×	○	×
401	191H		Number of transmission data setting	0	Control	×	○	○
402, 403	192H, 193H		System area	—	—	—	—	—
404 to 16583	194H to 40C7H		Transmission data (32360 bytes)	0	Control	×	○	○
16584	40C8H	Reception area	Talker setting	0	Control	×	○	×
16585	40C9H		Listener setting	0	Control	×	○	×
16586	40CAH		Number of reception data	0	Monitor	×	○	○
16587	40CBH		System area	—	—	—	—	—
16588 to 32767	40CCH to 7FFFH		Reception data (32360 bytes)	0	Monitor	×	○	○
32768 to 114687	8000H to 1BFFFH	System area	—	—	—	—	—	

\*1 Only the data that is set by using the module parameter is valid. The setting cannot be changed by using the program.



# Details of buffer memory areas

This section describes the details of buffer memory areas of the GP-IB interface module.

## Own device communications setting

Set necessary information for GP-IB communications in these areas.

### ■End of reception (number of data)

When detecting the end of data reception by using amount of received data, set the number of data in this area.

Buffer memory address	Setting range
1	0 to 32360



- When not using amount of received data for the detection, set 0 in this area.
- If a value out of the range is set, an end of reception (number of data) setting range error (error code: 1815H) occurs.

### ■End of reception (end code)

When detecting the end of data reception by using a character code, set the code in this area.

Buffer memory address	Setting range
2	0H to FFH, D0AH, FFFFH



- When not using the end code for the detection, set FFFFH.
- When using CRLF (2 bytes) for the detection, set D0AH.
- When using the end code (1 byte) for the detection, set a value of 0H to FFH.
- For a value other than FFFFH and D0AH, characters set in the upper byte are ignored and characters set in the lower byte are regarded as an end code. (Example: For a value of 1234H, the end code is 34H.)

### ■End of reception (EOI detection)

Set whether to detect the end of data reception by using the EOI signal in this area.

Buffer memory address	Setting range
3	<ul style="list-style-type: none"><li>• 0: Detect</li><li>• 1: Do not detect</li></ul>



If a value out of the range is set, an end of reception (EOI detection) setting range error (error code: 1805H) occurs.

### ■Timeout monitoring time

When sending an interface message or sending/receiving data, set a time period used to determine a timeout error in this area.

Buffer memory address	Setting range
4	10 to 32767ms



If a value out of the range is set, a timeout monitoring time setting range error (error code: 1801H) occurs.

## ■End of transmission (end code)

Use this area only in slave mode.

Set a character code (end code) that is added to transmission data at the end of transmission.

Buffer memory address	Setting range
5	0H to FFH, D0AH, FFFFH

### Point

- When not adding the end code, set FFFFH.
- When adding CRLF (2 bytes), set D0AH.
- When adding the end code (1 byte), set a value of 0H to FFH.
- For a value other than FFFFH and D0AH, characters set in the upper byte are ignored and characters set in the lower byte are regarded as an end code. (Example: For a value of 1234H, the end code is 34H.)

## ■End of transmission (EOI output)

Use this area only in slave mode.

Set whether to output the EOI signal at the end of data transmission in this area.

Buffer memory address	Setting range
6	<ul style="list-style-type: none"><li>• 0: Output</li><li>• 1: Do not output</li></ul>

### Point

If a value out of the range is set, an own device end of transmission (EOI output) setting range error (error code: 1803H) occurs.

## Number of connected devices

Use this area only in master mode.

Set the number of GP-IB devices to be connected in this area.

Buffer memory address	Setting range
15	1 to 14

### Point

If a value out of the range is set, a number of connected devices setting range error (error code: 1807H) occurs.

A

## Device 1 communications setting

Use these areas only in master mode.

Set necessary information to communicate with the first connected GP-IB device here.

Setting items of Device 1 communications setting are the same as those of Device 2 to 14 communications setting. Set these areas in a sequential order without skipping any device number.

### ■Device address

Set an address of device 1.

Buffer memory address	Setting range
16	0 to 30

#### Point

- The numbers of 1 to 14 are set to the devices 1 to 14 as initial values of device addresses.
- If a value out of the range is set, a device □ address setting range error (error code: 184□H) occurs.

### ■End of transmission (end code)

Set a character code (end code) that is added to transmission data at the end of transmission.

Buffer memory address	Setting range
17	0H to FFH, D0AH, FFFFH

#### Point

- When not adding the end code, set FFFFH.
- When adding CRLF (2 bytes), set D0AH.
- When adding the end code (1 byte), set a value of 0H to FFH.
- For a value other than FFFFH and D0AH, characters set in the upper byte are ignored and characters set in the lower byte are regarded as an end code. (Example: For a value of 1234H, the end code is 34H.)

### ■End of transmission (EOI output)

Set whether to output the EOI signal at the end of data transmission in this area.

Buffer memory address	Setting range
18	<ul style="list-style-type: none"><li>• 0: Output</li><li>• 1: Do not output</li></ul>

#### Point

If a value out of the range is set, a device □ end of transmission (EOI output) setting range error (error code: 183□H) occurs.

### ■Parallel poll response bit

Set which signal line (DIO1 to DIO8) is to be used to respond to the parallel poll. For a device that does not need to respond to the parallel poll, set 0.

Buffer memory address	Setting range
19	<ul style="list-style-type: none"><li>• 0: Do not respond</li><li>• 1: DIO1</li><li>• 2: DIO2</li><li>• 3: DIO3</li><li>• 4: DIO4</li><li>• 5: DIO5</li><li>• 6: DIO6</li><li>• 7: DIO7</li><li>• 8: DIO8</li></ul>

#### Point

If a value out of the range is set, a device □ parallel poll response bit setting range error (error code: 185□H) occurs.

## Parallel poll response mode

Set which polarity is to be used to respond to the parallel poll.

Buffer memory address	Setting range
20	0 or 1

### Point

If a value out of the range is set, a device □ parallel poll response mode setting range error (error code: 186□H) occurs.

## Condition target setting [n]

Set an interrupt factor with which the interrupt program starts, by using the engineering tool.

A value set by the engineering tool becomes valid by powering off and on or resetting the CPU module, and stored in this area.

### Condition target setting [1 to 3] (master mode)

An interrupt request is sent to the CPU module when the X signal corresponding to a set interrupt factor has turned on.

Buffer memory address	Setting range
180 to 182	<ul style="list-style-type: none"><li>• 0: Disable</li><li>• 1: Service request (SRQ) reception</li><li>• 2: Data reception completion</li><li>• 3: Error</li></ul>

### Condition target setting [1 to 4] (slave mode)

An interrupt request is sent to the CPU module when the X signal corresponding to a set interrupt factor has turned on.

Buffer memory address	Setting range
180 to 183	<ul style="list-style-type: none"><li>• 0: Disable</li><li>• 1: Device clear (DCL command) reception</li><li>• 2: Trigger (GET command) reception</li><li>• 3: Data reception</li><li>• 4: Error</li></ul>

A

## Interface message number

Use this area only in master mode.

Specify an interface message to be sent.

Buffer memory address	Setting range
200	<ul style="list-style-type: none"><li>• 1: Interface clear</li><li>• 2: Device clear</li><li>• 3: Device trigger</li><li>• 4: Remote setting</li><li>• 5: Local setting</li><li>• 6: Local lockout setting</li><li>• 7: Serial poll</li><li>• 8: Parallel poll</li><li>• 9: Parallel poll configure</li></ul>

### Point

If a value out of the range is set, an interface message number setting range error (error code: 1800H) occurs.

## Interface message destination

Use this area only in master mode.

When sending the following interface messages, specify destination devices in this area.

- 2: Device clear
- 3: Device trigger
- 4: Remote setting
- 5: Local setting
- 7: Serial poll
- 9: Parallel poll configure

Note that the following interface messages are sent to all devices regardless of the setting of this area. (The devices that respond to the parallel poll are those to which the signal lines (DIO1 to DIO8) are assigned in advance.)

- 1: Interface clear
- 6: Local lockout setting
- 8: Parallel poll

Buffer memory address	Setting range
201	0H to 7FFE H

The bit areas are assigned as shown below. Note that D□ represents Device □. For instance, D14 represents Device 14.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	Fixed to 0

0: Do not send  
1: Send



When 0H is set in Interface message destination, the following operation is performed according to the setting of Interface message number.

- For 2: Device clear, the message is sent to all devices.
- For 3: Device trigger, the GET command is sent without listener specification.
- For 4: Remote setting, the REN signal is turned on without listener specification.
- For 5: Local setting, the message is sent to all devices.
- For 7: Serial poll, the message is sent to all devices.
- For 9: Parallel poll configure, an interface message destination device setting error (error code: 1811H) occurs.

For details, refer to the following.

Page 17 Interface message transmission



## Status byte

Use this area only in slave mode.

Set a status byte that is sent back to the controller at the reception of serial poll.

Buffer memory address	Setting range
203	0H to BFH

The bit areas are assigned as shown below.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0								(7)	Fixed to 0	(6)	(5)	(4)	(3)	(2)	(1)

- (1) User definition 1
- (2) User definition 2
- (3) User definition 3
- (4) User definition 4
- (5) User definition 5
- (6) User definition 6
- (7) User definition 7

### Point

When you want to change a value of User definition 1 to 7 and send it to the controller, turn on 'Service request' (Y5) after the change of value. When the module (device) receives the serial poll from the controller while 'Service request' (Y5) is on, the module (device) sends back the data where 1 is added to the bit 6 of this setting.

## Parallel poll response status

Use this area only in slave mode.

Set a value that is sent back to the controller at the reception of parallel poll.

Buffer memory address	Setting range
204	0 or 1


### Point

For this setting, only a value of the bit 0 is valid because 0 or 1 is sent back as a response to the parallel poll.

## Device address

The address of GP-IB interface module is stored in this area.

Set the device address by using the engineering tool.

 [Navigation window] ⇒ [Parameter] ⇒ [Module Information] ⇒ Module model name ⇒ [Basic settings] ⇒ [Own device Address setting] ⇒ [Device address]

Buffer memory address	Monitored value
300	0 to 30

## Latest error code

Among errors that have occurred in the GP-IB interface module, a code of the latest error is stored in this area.

For details, refer to the following.

 Page 63 List of Error Codes

Buffer memory address	Monitored value
301	—

## Address status

The status of GP-IB interface module is stored in this area.

Buffer memory address	Monitored value
303	<ul style="list-style-type: none"><li>• 0: Idle</li><li>• 1: Talker</li><li>• 2: Listener</li></ul>

## Operation mode

The operation mode of GP-IB interface module is stored in this area.

Buffer memory address	Monitored value
304	<ul style="list-style-type: none"><li>• 0: Master mode</li><li>• 1: Slave mode</li></ul>

## Remote/Local status

Use this area only in slave mode.

Whether the GP-IB interface module is in remote status or in local status is stored in this area.

Buffer memory address	Monitored value
305	<ul style="list-style-type: none"><li>• 0: Local</li><li>• 1: Remote</li></ul>

## Local lockout status

Use this area only in slave mode.

Whether the GP-IB interface module is in local lockout status or not is stored in this area.

Buffer memory address	Monitored value
306	<ul style="list-style-type: none"><li>• 0: Normal</li><li>• 1: Local lockout</li></ul>

## Bus status

The status of each signal is stored in this area.

Buffer memory address	Monitored value
307	0H to FFH

The bit areas are assigned as shown below.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0								ATN line	DAV line	NDAC line	NRFD line	EOI line	SRQ line	IFC line	REN line

0: OFF

1: ON

## Serial poll result

Use this area only in master mode.

At the completion of serial poll, 1 is stored in a bit corresponding to the device from which the controller has received the status byte.

At the start of serial poll, this area is cleared to 0.

Buffer memory address	Monitored value
308	0H to 7FEH

The bit areas are assigned as shown below. Note that D□ represents Device □. For instance, D14 represents Device 14.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	Fixed to 0

0: Reception not completed

1: Reception completed

## Device 1 to 14 status byte

Use this area only in master mode.

The status byte of each device obtained by using the serial poll is stored in this area. This area is used when the controller has received the SRQ, to inquire which device has sent the SRQ and what request the device has.

At the start of serial poll, this area is cleared to 0.

Buffer memory address	Monitored value
309 to 322	0H to FFH

The bit areas are assigned as shown below.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0								(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)

(1) User definition 1

(2) User definition 2

(3) User definition 3

(4) User definition 4

(5) User definition 5

(6) User definition 6

(7) Service request (0: No request, 1: Request sent)

(8) User definition 7

## Parallel poll result

Use this area only in master mode.

The parallel poll results collected from each device are stored in this area.

Buffer memory address	Monitored value
323	0H to FFH

The bit areas are assigned as shown below.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0								(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)

(1) DIO1 response data

(2) DIO2 response data

(3) DIO3 response data

(4) DIO4 response data

(5) DIO5 response data

(6) DIO6 response data

(7) DIO7 response data

(8) DIO8 response data

## Number of connected devices monitor

Use this area only in master mode.

The number of GP-IB devices set in 'Number of connected devices' is stored in this area.

Buffer memory address	Monitored value
324	1 to 14

## Transmission area

Set necessary information here to send device dependent messages from the GP-IB interface module.

### ■Listener setting

Use this area only in master mode.

Specify devices that receive data (listeners) by setting 1 to bits corresponding to the devices.

Buffer memory address	Setting range
400	0H to 7FFEH

The bit areas are assigned as shown below. Note that D□ represents Device □. For instance, D14 represents Device 14.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	Fixed to 0

0: Do not receive  
1: Receive



If Data transmission request is turned on while no listener device is specified (all bits are 0), a listener device setting error at transmission (error code: 1812H) occurs.

### ■Number of transmission data setting

Specify the number of data to be sent in units of bytes. (Exclude the number of bytes of end code.)

Buffer memory address	Setting range
401	0 to 32360



If a value out of the range is set, a number of transmission data setting range error (error code: 1816H) occurs.

### ■Transmission data

Write the data to be sent in this area. Do not include the end code in the transmission data.

Buffer memory address	Setting range
404 to 16583	—

## Reception area

- In master mode: Used for the following: specify a device except for the own device as the talker; specify devices including the own device as listeners; receive data.
- In slave mode: Used to receive data from the controller or another device when the module is specified as a listener by the controller.

### ■Talker setting

Use this area only in master mode.

Specify the device that sends data (talker) by setting 1 to a bit corresponding to the device.

Buffer memory address	Setting range
16584	0H to 7FFE H

The bit areas are assigned as shown below. Note that D□ represents Device □. For instance, D14 represents Device 14.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	Fixed to 0

0: Do not send

1: Send



If Data reception request is turned on while no talker device is specified (all bits are 0) or multiple talkers are specified, a talker device setting error at reception (error code: 1813H) occurs.

### ■Listener setting

Use this area only in master mode.

Specify devices that receive data (listeners) by setting 1 to bits corresponding to the devices.

The own device receives data regardless of this setting.

Buffer memory address	Setting range
16585	0H to 7FFE H

The bit areas are assigned as shown below. Note that D□ represents Device □. For instance, D14 represents Device 14.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to 0	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	Fixed to 0

0: Do not receive

1: Receive

### ■Number of reception data

When the data reception is complete successfully, the number of received data is stored in units of bytes in this area. The number of reception data includes the number of bytes of end code.

Buffer memory address	Monitored value
16586	0 to 32360



The value 0 in this area indicates no data has been received.

### ■Reception data

Data that have been received are stored in this area. The end code is stored here as well, as the reception data.

Received data are stored here even when data reception is complete with an error.

Buffer memory address	Monitored value
16588 to 32767	—

# INDEX

---

## A

---

Application settings . . . . . 55

## B

---

Basic settings . . . . . 54

## D

---

Data reception completion flag . . . . . 71  
Data reception flag . . . . . 71  
Data transmission completion flag . . . . . 70  
DCL command reception flag . . . . . 76

## E

---

End of reception (end code) . . . . . 82  
End of reception (EOI detection) . . . . . 82  
End of reception (number of data) . . . . . 82  
End of transmission (end code) . . . . . 83  
End of transmission (EOI output) . . . . . 83  
Error flag . . . . . 73

## G

---

GET command reception flag . . . . . 75

## I

---

IFC reception flag . . . . . 76  
Input signals . . . . . 67,68  
Interface message transmission completion flag . . . . . 69  
Interrupt settings . . . . . 56

## M

---

Module READY . . . . . 69

## N

---

Number of connected devices . . . . . 83

## O

---

Output signals . . . . . 67,68

## P

---

Parallel poll response data setting completion flag  
. . . . . 72

## R

---

Refresh processing time . . . . . 58  
Refresh settings . . . . . 57

## S

---

Service request completion flag . . . . . 72  
SRQ reception flag . . . . . 74

## T

---

Timeout monitoring time . . . . . 82

# MEMO

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# REVISIONS

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

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# WARRANTY

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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.
- (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.

## **5. Changes in product specifications**

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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