MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series

# MELSEC iQ-R Thermocouple Input Module/RTD Input Module Function Block Reference

# SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using the products described under "Relevant products", please read this manual and the relevant manuals carefully and pay full attention to safety to handle the products correctly.

The precautions given in this manual are concerned with the products only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual and MELSEC MX Controller (MX-R Model) User's Manual.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

| | |
|---|---|
| ⚠ **WARNING** | Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury. |
| ⚠ **CAUTION** | Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage. |

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

# CONDITIONS OF USE FOR THE PRODUCT

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

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

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

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

# INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers.
This manual describes the module function blocks for the relevant products listed below.
Before using the products, 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 products correctly.
Please make sure that the end users read this manual.

## Relevant products

- R60TD8-G
- R60RD8-G

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# RELEVANT MANUALS

The following manuals are relevant to this product.

| Manual name [manual number] | Description |
|---|---|
| MELSEC iQ-R Thermocouple Input Module/RTD Input Module Function Block Reference [BCN-P5999-0462] (this manual) | FBs of the channel isolated thermocouple input module and channel isolated RTD input module |
| MELSEC iQ-R Channel Isolated Thermocouple Input Module/ Channel Isolated RTD Input Module User's Manual (Startup) [SH-081493ENG] | System configuration, specifications, procedures before operation, wiring, and operation examples of the channel isolated thermocouple input module and channel isolated RTD input module |
| MELSEC iQ-R Channel Isolated Thermocouple Input Module/ Channel Isolated RTD Input Module User's Manual (Application) [SH-081495ENG] | Functions, parameter settings, I/O signals, buffer memory, and troubleshooting of the channel isolated thermocouple input module and channel isolated RTD input module |

# TERMS

Unless otherwise specified, this manual uses the following terms.

| Term | Description |
|---|---|
| Buffer memory | A memory in an intelligent function module, where data (such as setting values and monitoring values) are stored.<br>For CPU modules, it refers to memory to store data such as setting values and monitor values of the Ethernet function, or data used for data communication of the multiple CPU system function. |
| Engineering tool | A tool used for setting up programmable controllers, programming, debugging, and maintenance. |
| 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.<br>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 |
|---|---|
| CPU module | A generic term for the MELSEC iQ-R series CPU modules and MELSEC MX Controller MX-R Model |
| RTD input module | An abbreviation for the MELSEC iQ-R series channel isolated RTD input module |
| Temperature input module | A generic term for the thermocouple input module and RTD input module |
| Thermocouple input module | An abbreviation for the MELSEC iQ-R series channel isolated thermocouple input module |

# MEMO

# 1 OVERVIEW

The FBs described in this reference are the module FBs (for GX Works3) intended to be used for the MELSEC iQ-R series thermocouple input module and RTD input module.

## 1.1 FUNCTION BLOCK (FB) LIST

This section lists the module FBs described in this reference. Note that this reference does not describe the FB version information which is displayed such as "_00A" at the end of the FB name.

### Thermocouple input module FB

| Name | Description |
|---|---|
| M+R60TDG_RequestSetting | Enables the settings of each function. |
| M+R60TDG_OperateError | Monitors error codes and resets errors. |
| M+R60TDG_SetLoggingPARAM | Sets up the logging function of a specified channel. |
| M+R60TDG_SaveLogging | Saves the logging data of a specified channel into a file. |

### RTD input module FB

| Name | Description |
|---|---|
| M+R60RDG_RequestSetting | Enables the settings of each function. |
| M+R60RDG_OperateError | Monitors error codes and resets errors. |
| M+R60RDG_SetLoggingPARAM | Sets up the logging function of a specified channel. |
| M+R60RDG_SaveLogging | Saves the logging data of a specified channel into a file. |

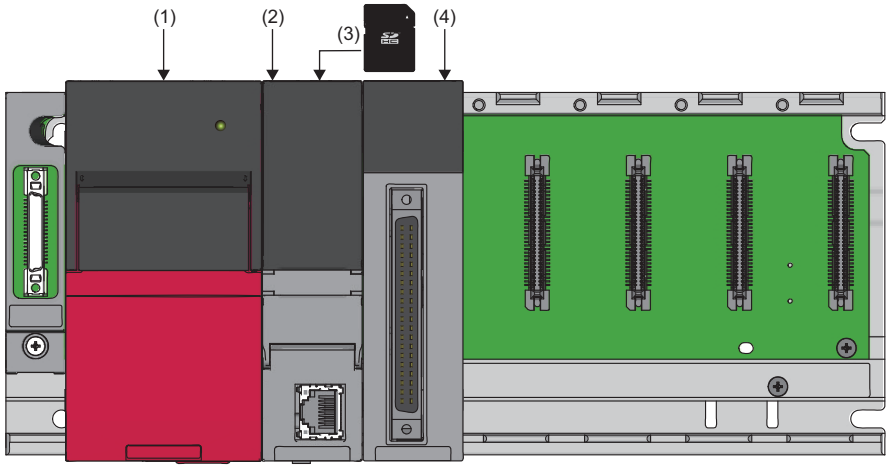
## 1.2 How to Obtain

Module FBs are installed at the same time as installing GX Works3; however, the module FBs in this reference may not be installed with some versions of GX Works3. It is recommended to install the latest version of GX Works3.

# 1.3 System Configuration



The following shows the system configuration for using the module FBs in this reference.




(1) Power supply module
(2) CPU module
(3) SD memory card*1
(4) Temperature input module

*1 SD memory cards are not required for the following FBs.

- M+Model_RequestSetting
- M+Model_OperateError
- M+Model_SetLoggingPARAM

For the specifications of modules to be used, refer to the user's manual for each module.

# 2 TEMPERATURE INPUT MODULE FB

## 2.1 M+Model_RequestSetting

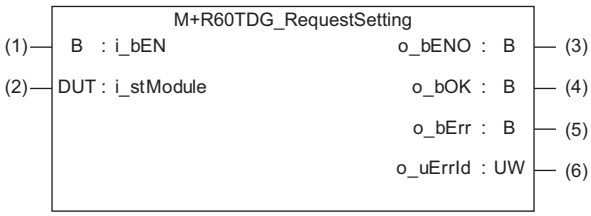
### Name

The module names of the FB are based on the module used and are as follows.

| Relevant module | Name |
|---|---|
| R60TD8-G | M+R60TDG_RequestSetting |
| R60RD8-G | M+R60RDG_RequestSetting |

### Overview

Enables the settings of each function.




### Labels to use

#### Input labels

| No. | Variable name | Name | Data type | Scope | Description |
|---|---|---|---|---|---|
| (1) | i_bEN | Execution command | Bit | On or off | On: The FB is activated.<br>Off: The FB is not activated. |
| (2) | i_stModule | Module label | Structure | The scope differs depending on the module label. | Specifies a module label of a temperature input module. |

#### Output labels

| No. | Variable name | Name | Data type | Default value | Description |
|---|---|---|---|---|---|
| (3) | o_bENO | Execution status | Bit | Off | On: The execution command is on.<br>Off: The execution command is off. |
| (4) | o_bOK | Normal completion | Bit | Off | The on state indicates that the operation to enable each setting is complete. |
| (5) | o_bErr | Error completion | Bit | Off | Always off |
| (6) | o_uErrId | Error code | Word [unsigned] | 0 | Always 0 |

# FB details



## Relevant devices

### ■Temperature input module

| Relevant module | Engineering tool |
|---|---|
| R60TD8-G, R60RD8-G | GX Works3 with version 1.007H or later |

### ■CPU module

- MELSEC iQ-R series*1
- MELSEC MX Controller MX-R Model

*1 For the MELSEC iQ-R series CPU modules, refer to the MELSEC iQ-R Module Configuration Manual.

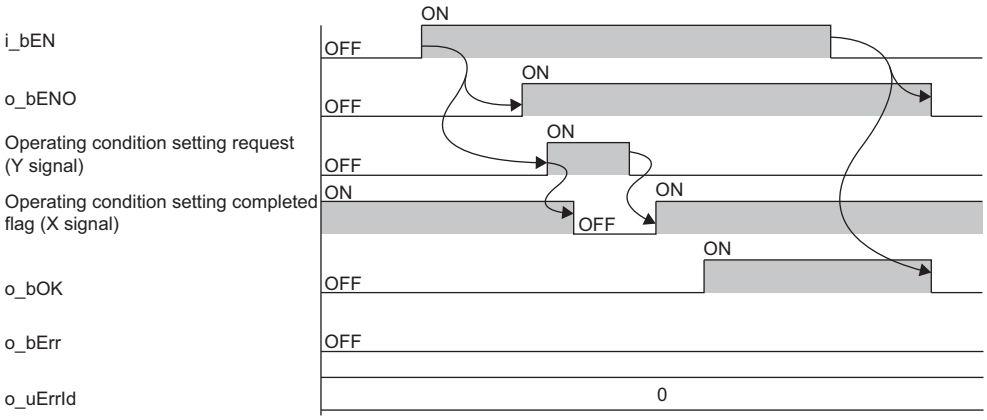
## Basic specifications

| Item | Description | |
|---|---|---|
| Language to use | Ladder diagram | |
| Number of basic steps (Only for the MELSEC iQ-R series) | 32 steps<br>The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| Label usage | MELSEC iQ-R series | • Label: 4 points (Word)<br>• Latch label: 0 points (Word) |
| | MELSEC MX Controller MX-R Model | • Label: 20 points (Word)<br>• Latch label: 0 points (Word) |
| | The usage of labels embedded in a program depends on the CPU module used, the devices specified as an argument, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| FB compilation method | Macro type | |
| FB operation | Pulse execution type (multiple scan execution type) | |

## Functional description

- Turning on i_bEN (execution command) allows the settings of all channels to be enabled. For what settings are enabled, refer to the MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Application).
- This FB continues its execution until the completion of the settings of each function after i_bEN (execution command) turns on.

## Timing chart of I/O signals



## Restrictions and precautions

- This FB does not include the error recovery processing. Prepare the error recovery processing separately to suit the user's system and the expected operation.
- The FB cannot be used in an interrupt program.
- As this FB is executed, the temperature conversion processing stops, and thereafter when o_bOK (normal completion) turns on, the conversion processing resumes.
- Putting a temperature input module into operation requires the module parameters of GX Works3 to be set up according to the connected devices and the system in use. For how to set up the module parameters, refer to the MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Application).

# Error code

| Error code | Description | Action |
|---|---|---|
| None | None | None |

# 2.2 M+Model_OperateError

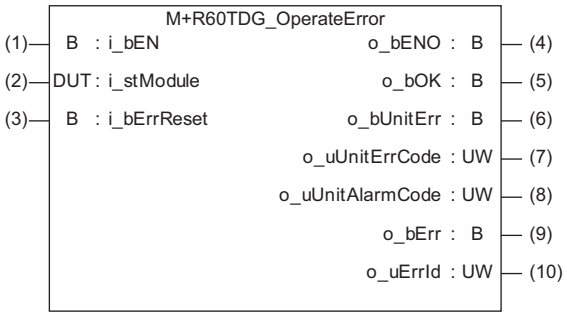
## Name

The module names of the FB are based on the module used and are as follows.

| Relevant module | Name |
|---|---|
| R60TD8-G | M+R60TDG_OperateError |
| R60RD8-G | M+R60RDG_OperateError |

## Overview

Monitors error codes and resets errors.




## Labels to use

### Input labels

| No. | Variable name | Name | Data type | Scope | Description |
|---|---|---|---|---|---|
| (1) | i_bEN | Execution command | Bit | On or off | On: The FB is activated.<br>Off: The FB is not activated. |
| (2) | i_stModule | Module label | Structure | The scope differs depending on the module label. | Specifies a module label of a temperature input module. |
| (3) | i_bErrReset | Error reset request | Bit | On or off | Turn on this label to reset the errors.<br>Turn off this label after the error reset. |

### Output labels

| No. | Variable name | Name | Data type | Default value | Description |
|---|---|---|---|---|---|
| (4) | o_bENO | Execution status | Bit | Off | On: The execution command is on.<br>Off: The execution command is off. |
| (5) | o_bOK | Normal completion | Bit | Off | The on state indicates that the error reset is complete. |
| (6) | o_bUnitErr | Module error flag | Bit | Off | The on state indicates that a module error has occurred. |
| (7) | o_uUnitErrCode | Module error code | Word [unsigned] | 0 | The error code of an error occurred is stored. |
| (8) | o_uUnitAlarmCode | Module alarm code | Word [unsigned] | 0 | The alarm code of an alarm occurred is stored. |
| (9) | o_bErr | Error completion | Bit | Off | Always off |
| (10) | o_uErrId | Error code | Word [unsigned] | 0 | Always 0 |

# FB details

## Relevant devices

### ■Temperature input module

| Relevant module | Engineering tool |
|---|---|
| R60TD8-G, R60RD8-G | GX Works3 with version 1.007H or later |

### ■CPU module

- MELSEC iQ-R series*1
- MELSEC MX Controller MX-R Model

*1 For the MELSEC iQ-R series CPU modules, refer to the MELSEC iQ-R Module Configuration Manual.

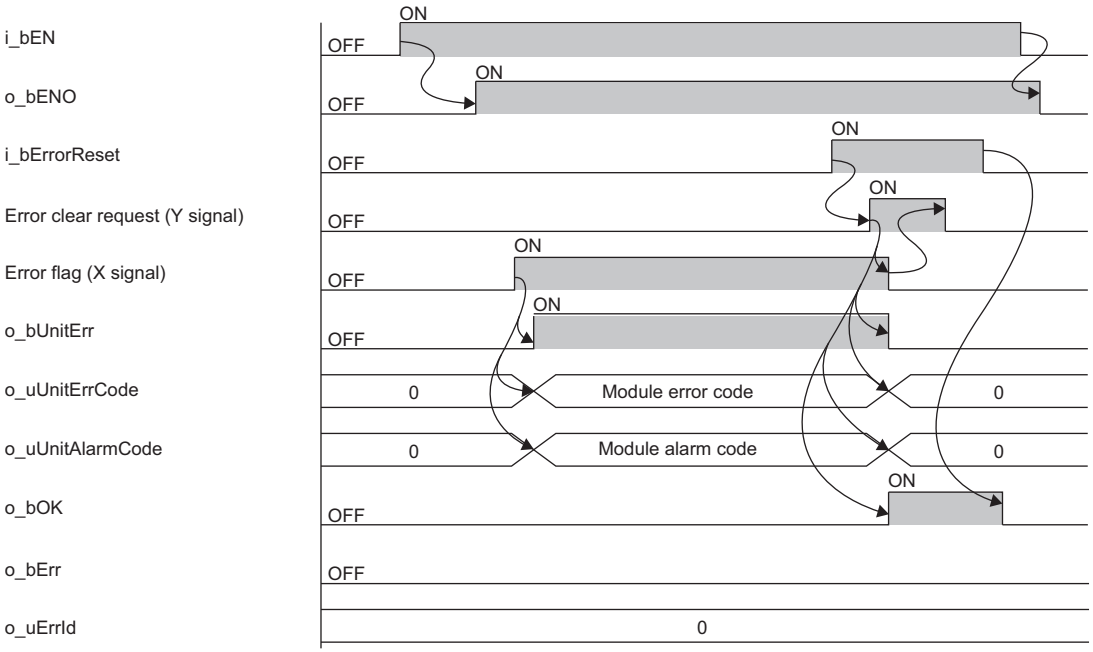
## Basic specifications

| Item | Description | |
|---|---|---|
| Language to use | Ladder diagram | |
| Number of basic steps (Only for the MELSEC iQ-R series) | 61 steps<br>The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| Label usage | MELSEC iQ-R series | • Label: 4 points (Word)<br>• Latch label: 0 points (Word) |
| | MELSEC MX Controller MX-R Model | • Label: 24 points (Word)<br>• Latch label: 0 points (Word) |
| | The usage of labels embedded in a program depends on the CPU module used, the devices specified as an argument, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| FB compilation method | Macro type | |
| FB operation | Arbitrary execution type | |

## Functional description

- As i_bEN (execution command) turns on, errors in the target module are monitored.
- After i_bEN (execution command) turns on, turning on i_bErrReset (error reset request) during an error allows the error to be reset.

## Timing chart of I/O signals




## Restrictions and precautions

- This FB does not include the error recovery processing. Prepare the error recovery processing separately to suit the user's system and the expected operation.
- The FB cannot be used in an interrupt program.
- Putting a temperature input module into operation requires the module parameters of GX Works3 to be set up according to the connected devices and the system in use. For how to set up the module parameters, refer to the MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Application).

# Error code

| Error code | Description | Action |
|---|---|---|
| None | None | None |

# 2.3 M+Model_SetLoggingPARAM

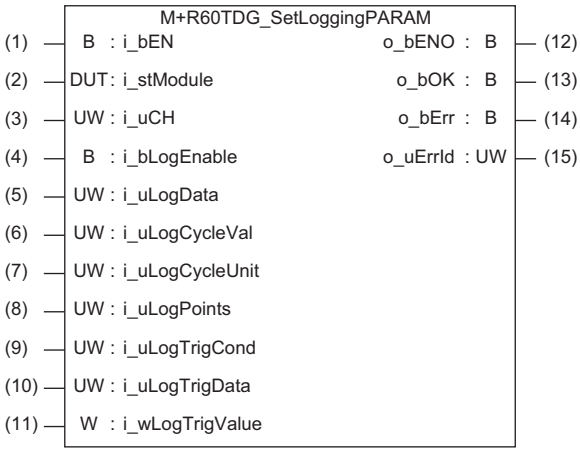
## Name

The module names of the FB are based on the module used and are as follows.

| Relevant module | Name |
|---|---|
| R60TD8-G | M+R60TDG_SetLoggingPARAM |
| R60RD8-G | M+R60RDG_SetLoggingPARAM |

## Overview

Sets up the logging function of a specified channel.




## Labels to use

### Input labels

| No. | Variable name | Name | Data type | Scope | Description |
|---|---|---|---|---|---|
| (1) | i_bEN | Execution command | Bit | On or off | On: The FB is activated.<br>Off: The FB is not activated. |
| (2) | i_stModule | Module label | Structure | The scope differs depending on the module label. | Specifies a module label of a temperature input module. |
| (3) | i_uCH | Target channel | Word [unsigned] | 1 to 8 | Specifies a channel number. |
| (4) | i_bLogEnable | Logging enable/ disable setting | Bit | On or off | On: Enables the logging function.<br>Off: Disables the logging function. |
| (5) | i_uLogData | Logging data setting | Word [unsigned] | 0: Measured temperature value<br>1: Scaling value | Sets the data to be logged. |
| (6) | i_uLogCycleVal | Logging cycle setting value | Word [unsigned] | When the logging cycle unit setting is 1<br>R60TD8-G: 30 to 32767<br>R60RD8-G: 10 to 32767<br>When the logging cycle unit setting is 2: 1 to 3600 | Sets the interval of cycles at which data is stored. |
| (7) | i_uLogCycleUnit | Logging cycle unit setting | Word [unsigned] | 1: ms<br>2: s | Specifies the unit of cycles at which data is stored. |
| (8) | i_uLogPoints | Post-trigger logging points | Word [unsigned] | 1 to 1000 | Specifies the number of data to be logged after a hold trigger occurs. |
| (9) | i_uLogTrigCond | Level trigger condition setting | Word [unsigned] | 0: Disable<br>1: Rise<br>2: Fall<br>3: Rise and fall | Sets the condition in which a level trigger is to be used.<br>Set 0 if using no lever trigger. |
| (10) | i_uLogTrigData | Trigger data | Word [unsigned] | 0 to 9999 | Specifies a buffer memory address to be monitored by level trigger. |
| (11) | i_wLogTrigValue | Trigger setting value | Word [signed] | -32768 to 32767 | Sets the level at which a level trigger is generated. |

## Output labels

| No. | Variable name | Name | Data type | Default value | Description |
|---|---|---|---|---|---|
| (12) | o_bENO | Execution status | Bit | Off | On: The execution command is on.<br>Off: The execution command is off. |
| (13) | o_bOK | Normal completion | Bit | Off | The on state indicates that the setting of the logging function parameters is completed. |
| (14) | o_bErr | Error completion | Bit | Off | The on state indicates that an error has occurred in the FB. |
| (15) | o_uErrId | Error code | Word [unsigned] | 0 | The error code of an error occurred in the FB is stored. |



# FB details

## Relevant devices

### ■Temperature input module

| Relevant module | Engineering tool |
|---|---|
| R60TD8-G, R60RD8-G | GX Works3 with version 1.007H or later |

### ■CPU module

- MELSEC iQ-R series*1
- MELSEC MX Controller MX-R Model

*1 For the MELSEC iQ-R series CPU modules, refer to the MELSEC iQ-R Module Configuration Manual.

## Basic specifications

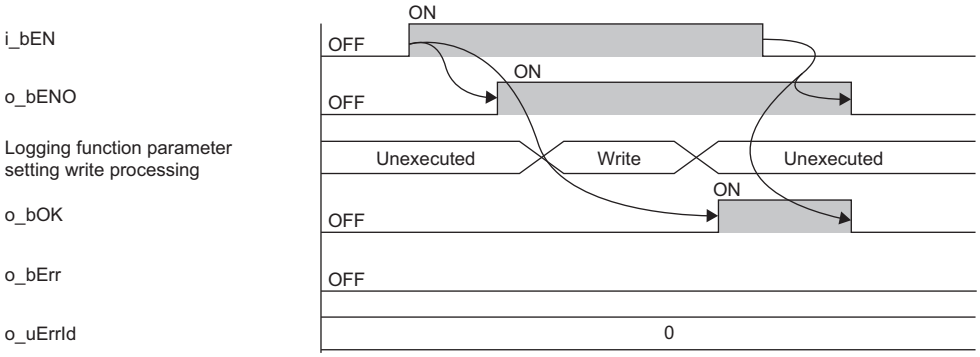
| Item | Description | |
|---|---|---|
| Language to use | Ladder diagram | |
| Number of basic steps (Only for the MELSEC iQ-R series) | 116 steps<br>The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| Label usage | MELSEC iQ-R series | • Label: 12 points (Word)<br>• Latch label: 0 points (Word) |
| | MELSEC MX Controller MX-R Model | • Label: 32 points (Word)<br>• Latch label: 0 points (Word) |
| | The usage of labels embedded in a program depends on the CPU module used, the devices specified as an argument, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| FB compilation method | Macro type | |
| FB operation | Pulse execution type (single scan execution type) | |

## Functional description

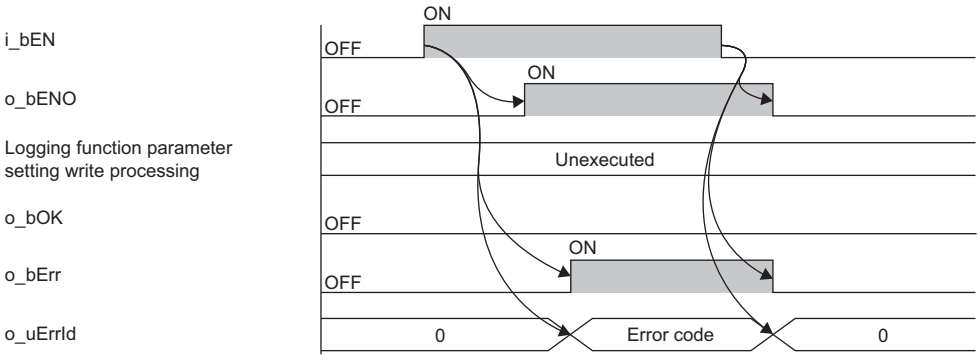
- Turning on i_bEN (execution command) allows the logging function of a specified channel to be set.
- This FB works for only one shot as i_bEN (execution command) turns on.
- The set values are enabled by turning on and off Operating condition setting request (Yn9) or executing the operating condition setting request FB (M+R60TDG_RequestSetting, M+R60RDG_RequestSetting).
- If the set value of the target channel is out of the range, o_bErr (error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (error code). For the error code, refer to the list of error codes.

## Timing chart of I/O signals

### ■Normal completion




### ■Error completion




## Restrictions and precautions

- This FB does not include the error recovery processing. Prepare the error recovery processing separately to suit the user's system and the expected operation.
- The FB cannot be used in an interrupt program.
- Using the FB in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, has a problem that i_bEN (execution command) can no longer be turned off and normal operation is not possible; Always use the FB in a program that is capable of turning off the execution command.
- To use more than one of this FB, care must be taken to avoid duplication of the target channel.
- The FB requires the configuration of the ladder for every input label.
- If the parameters are set by means of the configuration function of GX Works3, this FB is not required.
- Putting a temperature input module into operation requires the module parameters of GX Works3 to be set up according to the connected devices and the system in use. For how to set up the module parameters, refer to the MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Application).

# Error code

| Error code | Description | Action |
|---|---|---|
| 100H | The target channel is set out of the range. Set the target channel within 1 to 8. | Review and correct the setting and then execute the FB again. |

# 2.4 M+Model_SaveLogging

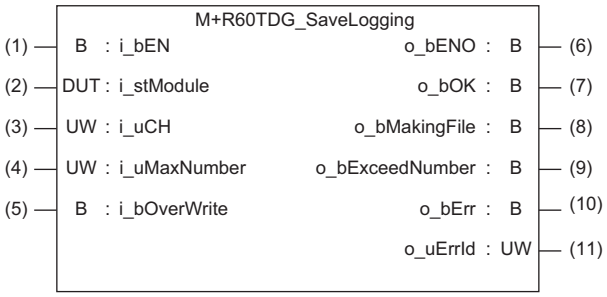
## Name

The module names of the FB are based on the module used and are as follows.

| Relevant module | Name |
|---|---|
| R60TD8-G | M+R60TDG_SaveLogging |
| R60RD8-G | M+R60RDG_SaveLogging |

## Overview

Saves the logging data of a specified channel into a file.




## Labels to use

### Input labels

| No. | Variable name | Name | Data type | Scope | Description |
|---|---|---|---|---|---|
| (1) | i_bEN | Execution command | Bit | On or off | On: The FB is activated.<br>Off: The FB is not activated. |
| (2) | i_stModule | Module label | Structure | The scope differs depending on the module label. | Specifies a module label of a temperature input module. |
| (3) | i_uCH | Target channel | Word [unsigned] | 1 to 8 | Specifies a channel number. |
| (4) | i_uMaxNumber | Maximum number of save files | Word [unsigned] | 1 to 999 | Specifies the maximum number of CSV files that this FB saves. |
| (5) | i_bOverWrite | Overwrite save command | Bit | On or off | Specifies whether or not to overwrite the CSV files having smaller consecutive numbers when the number of CSV files that this FB has saved reaches the maximum number of save files.<br>If the setting is off, the save processing of logging data stops. |

### Output labels

| No. | Variable name | Name | Data type | Default value | Description |
|---|---|---|---|---|---|
| (6) | o_bENO | Execution status | Bit | Off | On: The execution command is on.<br>Off: The execution command is off. |
| (7) | o_bOK | Normal completion | Bit | Off | The on state indicates that the file save is complete. This label turns off as logging resumes. |
| (8) | o_bMakingFile | Creating file | Bit | Off | The on state indicates that files are being created. |
| (9) | o_bExceedNumber | Maximum number reach flag | Bit | Off | The on state indicates that the number of CSV files that this FB has saved has reached the maximum number of save files. |
| (10) | o_bErr | Error completion | Bit | Off | The on state indicates that an error has occurred in the FB. |
| (11) | o_uErrId | Error code | Word [unsigned] | 0 | The error code of an error occurred in the FB is stored. |

# FB details

## Relevant devices

### ■Temperature input module

| Relevant module | Engineering tool |
|---|---|
| R60TD8-G, R60RD8-G | GX Works3 with version 1.007H or later |

### ■CPU module

- MELSEC iQ-R series*1
- MELSEC MX Controller MX-R Model

*1 For the MELSEC iQ-R series CPU modules, refer to the MELSEC iQ-R Module Configuration Manual.

## Basic specifications

| Item | Description | |
|---|---|---|
| Language to use | Ladder diagram | |
| Number of basic steps (Only for the MELSEC iQ-R series) | 1329 steps<br>The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| Label usage | MELSEC iQ-R series | • Label: 216 points (Word)<br>• Latch label: 0 points (Word) |
| | MELSEC MX Controller MX-R Model | • Label: 248 points (Word)<br>• Latch label: 0 points (Word) |
| | The usage of labels embedded in a program depends on the CPU module used, the devices specified as an argument, and the options setting of GX Works3. For the options setting of GX Works3, refer to the GX Works3 Operating Manual. | |
| FB compilation method | Macro type | |
| FB operation | Pulse execution type (multiple scan execution type) | |

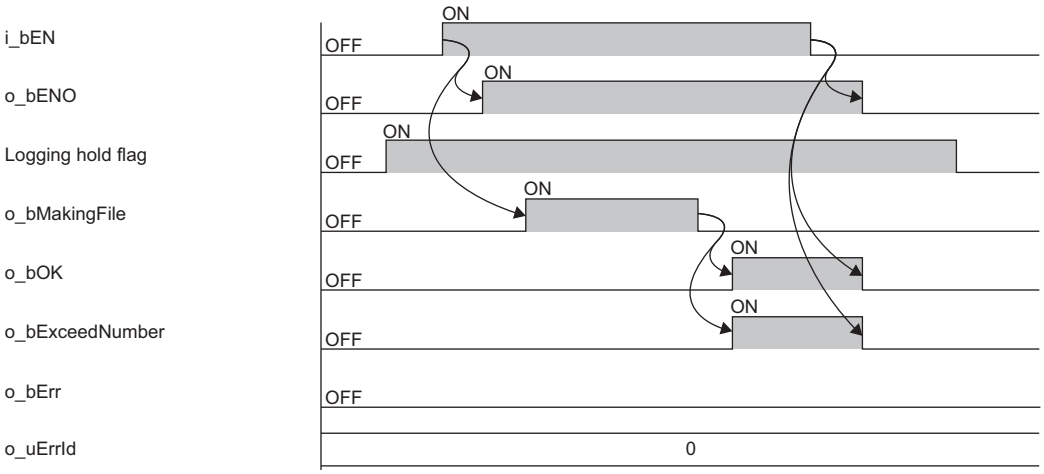
## Functional description

- As i_bEN (execution command) turns on and the logging hold flag turns on, the FB sorts the logging data, the number of which is equal to the number of logging points from the head pointer, in a chronological order, and saves the data along with the trigger generation information in the SD memory card inserted in the CPU module, in a CSV format.
- Provided that i_bEN (execution command) is on, this FB starts the save processing of logging data every time the logging hold flag turns on.
- It takes multiple scans to complete the save processing of logging data. Check o_bOK (normal completion) to see that the processing is complete.
- When this FB saves data in an SD memory card, the file name for a thermocouple input module is given as follows: "TD" + "Middle two digits of the four digits representing the start I/O number of the thermocouple input module" + "Target channel" + "Consecutive number" + ".CSV". The file name for a RTD input module is "RD" + "Middle two digits of the four digits representing the start I/O number of the RTD input module" + "Target channel" + "Consecutive number" + ".CSV". The maximum number of consecutive number varies with i_uMaxNumber (maximum number of save files). Turning off i_bEN (execution command) results in the consecutive number being reset, and thereafter a consecutive number is given from 1 again. Suppose that the start I/O number of the thermocouple input module is H0450, the target channel is 3, i_uMaxNumber (maximum number of save files) is 30, and the number of file creation by this FB is 6th. The file name is "TD453006.CSV".
- When this FB creates a CSV file in an SD memory card, a file of the same name, if already exists in the SD memory card, is replaced with the newly created file.
- If i_bOverWrite (overwrite save command) is on and the number of files that this FB has saved in an SD memory card exceeds i_uMaxNumber (maximum number of save files), the consecutive number returns back to 1 and the save processing of logging data continues.
- If i_bOverWrite (overwrite save command) is off and the number of files that this FB has saved in an SD memory card reaches i_uMaxNumber (maximum number of save files), the save processing of logging data stops.

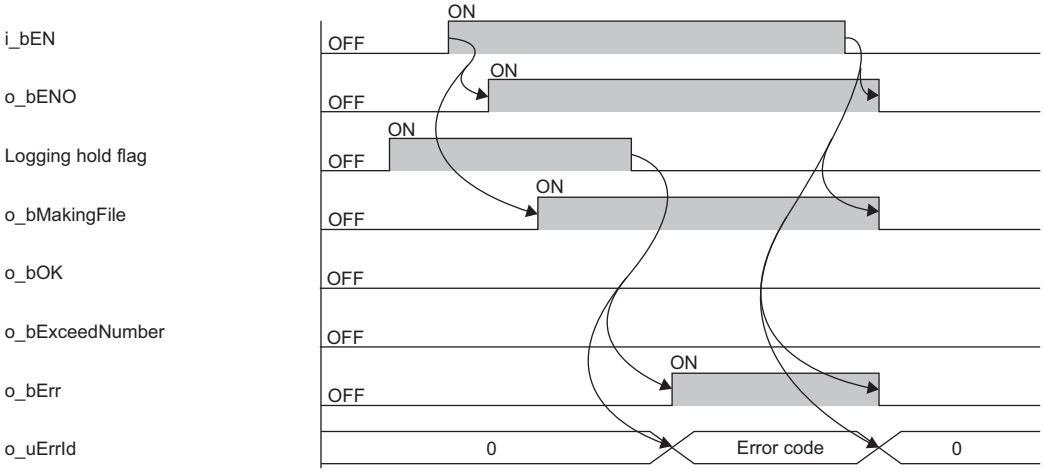
- If the number of files that this FB has saved in an SD memory card reaches i_uMaxNumber (maximum number of save files), o_bExceedNumber (maximum number reach flag) turns on regardless of the on or off state of i_bOverWrite (overwrite save command).
- If an incorrect value is set in i_uCH (target channel) or i_uMaxNumber (maximum number of save files), o_bErr (error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (error code).
- A CPU error occurs in the following cases: when this FB has been executed with no SD memory card inserted into the CPU module; when the inserted SD memory card has no sufficient free space; or when the number of files stored exceeds the limit. In the event of an error, if the CPU module is in a stop error state, o_bErr (error completion) and o_uErrId (error code) are not updated. In the event of an error, if the CPU module is in a continuation error state, o_bErr (error completion) turns on and the error code is stored in o_uErrId (error code). For the capacity of SD memory cards and the number of files stored, refer to the manual for the CPU module used. The operating status (continue or stop) of the CPU module at the time of the failure of access to the SD memory card can be set with the parameter.
- For the format of CSV files that this FB creates, refer to CSV File Output Format of the FB for Saving Logging Data (☞ Page 22 CSV File Output Format of the FB for Saving Logging Data).

## Timing chart of I/O signals

### ■Normal completion




### ■Error completion



## Restrictions and precautions

- This FB does not include the error recovery processing. Prepare the error recovery processing separately to suit the user's system and the expected operation.
- The FB cannot be used in an interrupt program.
- Using the FB in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, has a problem that i_bEN (execution command) can no longer be turned off and normal operation is not possible; Always use the FB in a program that is capable of turning off the execution command.
- This FB cannot save logging data in a medium other than an SD memory card.
- This FB makes use of the SP.FWRITE instruction, and thus if an error occurs in the execution of the SP.FWRITE instruction, a CPU error occurs.
- To use more than one of this FB, create an interlock to avoid simultaneous execution. When saving logging data of channel 1 and channel 2, first check that o_bOK (normal completion) of the FB on channel 1 is on, and turn on i_bEN (execution command) of the FB on channel 2.
- If SM606 (SD memory card forced disable instruction) is on at the time of saving logging data, the SP.FWRITE instruction is not processed, resulting in the logging data not being saved. In this case, o_bErr (error completion) turns on and the error code is stored in o_uErrId (error code).
- The FB requires the configuration of the ladder for every input label.
- Set i_uMaxNumber (maximum number of save files) with consideration for the capacity of the SD memory card and the number of files stored. If the capacity of the SD memory card or the number of files stored is exceeded as a result of execution of this FB, a CPU error occurs. For the capacity of SD memory cards and the number of files stored, refer to the manual for the CPU module used.
- Putting a temperature input module into operation requires the module parameters of GX Works3 to be set up according to the connected devices and the system in use. For how to set up the module parameters, refer to the MELSEC iQ-R Channel Isolated Thermocouple Input Module/Channel Isolated RTD Input Module User's Manual (Application).

# Error code

| Error code | Description | Action |
|---|---|---|
| 100H | The target channel is set out of the range. Set the target channel within 1 to 8. | Review and correct the setting and then execute the FB again. |
| 101H | The maximum number of save files is set out of the range.<br>The maximum number of save files is set out of the range of 1 to 999. | Review and correct the setting and then execute the FB again. |
| 200H | The processing is interrupted because the logging hold flag turns off while logging data is being saved.<br>The partially created CSV file is saved in the SD memory card. | — |
| 201H | An access to the SD memory card has failed because SM606 (SD memory card forced disable instruction) is turned on.<br>While logging data is being saved, turning on SM606 (SD memory card forced disable instruction) results in the partially created CSV file being saved in the SD memory card. | Turn off SM606 and check that SM607 (SD memory card forced stop status flag) is turned off, then execute the FB again. |
| 202H | Execution of this FB has been attempted without inserting an SD memory card into the CPU module. | Insert an SD memory card for saving the target CSV files into the CPU module, and then execute the FB again. |
| 203H | An access to the SD memory card has failed because SM600 (Memory card available flag) is off (unavailable). | Make the SD memory card an available state, and then execute the FB again. |
| 204H | The SD memory card is frequently accessed from programs in addition to this FB, and a timeout has occurred in the logging data write processing. | Reduce the frequency of the access to the SD memory card. |
| 205H | Because SM601 (Memory card protect flag) is on (write inhibited), data cannot be written to the SD memory card. | Turn off the protect switch on the SD memory card (write enabled), check that SM601 is off, and execute the FB again. |
| Error codes other than the above | Error codes related to the SP.FWRITE instruction executed when logging data is written to an SD memory card | For details on the error code that has occurred, refer to the description of the SP.FWRITE instruction. (MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks), MELSEC MX Controller (MX-R Model) Programming Manual) |

# APPENDIX

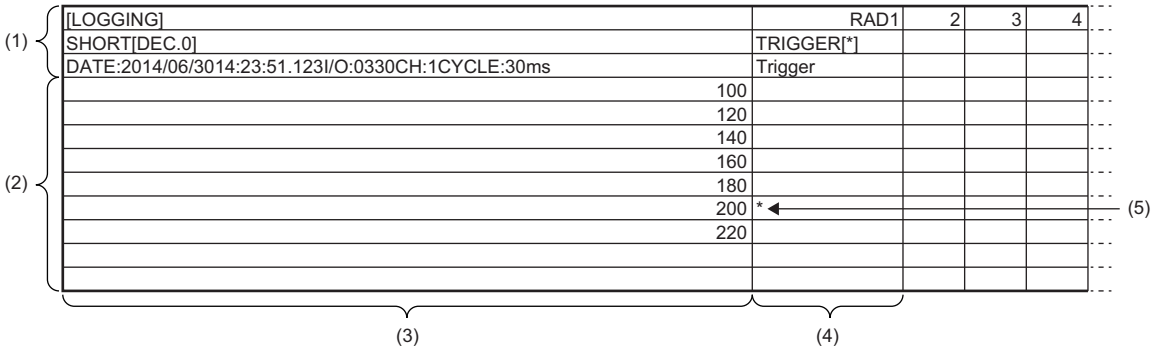
## Appendix 1 CSV File Output Format of the FB for Saving Logging Data

The format specifications of CSV files that the FB for saving logging data (M+R60TDG_SaveLogging, M+R60RDG_SaveLogging) output are shown below.

| Item | Description |
|---|---|
| Delimiter | Comma (,) |
| Line feed code | CRLF (0DH, 0AH) |
| Character code | ASCII |
| File size | 8130 bytes maximum*1 |

*1 When the number of logging data is 1000, and all the logging data are negative numbers with five digits, the file size reaches the maximum.

The following figure is an example of a thermocouple input module regarding how output contents are arranged in the rows and columns after a write to a CSV file.




(1) Header rows
(2) Data rows
(3) Data column
(4) Trigger data column
(5) Data at the time of a hold trigger

### Header row

The header row contains necessary information used for display on GX LogViewer; do not make any changes.
The file size of the header row is 128 bytes (fixed).

#### ■File information row

Information related to the CSV file is described in the order shown in the following table.

| Column No. | Item | Output content | Size (byte) |
|---|---|---|---|
| Column 1 | File type | [LOGGING] | 9 |
| Column 2 | File version | RAD1 (number indicating the file version) | 4 |
| Column 3 | Data type information row number | 2 (number indicating the row number of the data type information row) | 1 |
| Column 4 | Data name row number | 3 (number indicating the row number of the data name row) | 1 |
| Column 5 | Data start row number | 4 (number indicating the row number of the data row) | 1*1 |

*1 At the end of column 5, 4 bytes of NULL are added.

### ■Data type information row

The data type of each column is written in the order shown in the following table. The data type of each column is output in the format of "Data type""[Added information]".

| Column No. | Item | Output content of "Data type" | Size (byte) | Output content of "[Added information]" | Size (byte) |
|---|---|---|---|---|---|
| Column 1 | Data column | SHORT (signed 16-bit integer specification) | 5 | [DEC.0] (decimal format specification) | 7 |
| Column 2 | Trigger generation information column | TRIGGER | 7 | [*] (specification of the use of "*" as a generated character) | 3 |

### ■Data name row

The title of each column is written in the order shown in the following table. The data name of each column is output in the format of "Data name":"Added information". (The information written in the data column is shown as a title when the logging data appears on GX LogViewer.)

| Column No. | Column name | Output content of "Data name" | Size (byte) | Output content of "[Added information]" | Size (byte) |
|---|---|---|---|---|---|
| Column 1 | Data column | DATE: *1 | 5 | Hold trigger generation time*2*3 | 23 |
| | | I/O: *1 | 4 | XY address numbers of the module from which logging data is acquired*4 | 4 |
| | | CH: *1 | 3 | Target channel*4 | 1 |
| | | CYCLE: *1 | 6 | Logging cycle*3 | 3 to 17 |
| Column 2 | Trigger generation information column | Trigger | 7 | — | 7 |
| | | — | — | — (NULL)*5 | 1 to 15 |

*1 A half-width space is inserted between each output item in the data column.
*2 The time is output in the format of YYYY/MM/DD hh:mm:ss.mmm.
*3 The hold trigger generation time and the logging cycle would have the values of CH☐ Trigger generation time and CH☐ Logging cycle monitor value of the target channel, respectively. A half-width space is inserted between s and ms in the data of CH☐ Logging cycle monitor. (For example, if the module has a logging cycle of 3599 seconds, with a target of 3 channel logging, the logging cycle is 3598 seconds 920ms, which is displayed as "3599s 920ms".)
*4 XY address numbers and the target channel are the values specified as arguments to the FB for saving logging data.
*5 To fix the size of the header row (128 bytes), 1 to 15 bytes of NULL are added at the end of the trigger generation information column.

## Data row

Data is written in the order shown in the following table. (This data is the information displayed on GX LogViewer.)

| Column name | Output content | Size (byte) |
|---|---|---|
| Data column | Logging data stored in the buffer memory of a temperature input module | 1 to 6*1 |
| Trigger generation information column | *(output only to the row of the logging data to which the trigger pointer points) | 0 to 1 |

*1 If the logging data of the data row to which the trigger pointer points has a size of less than 6 bytes, NULL is output at the end of the logging data to fix the size to 6 bytes.

# MEMO

# INSTRUCTION INDEX

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# MEMO

# REVISIONS

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

| Revision date | *Manual number | Description |
|---|---|---|
| January 2015 | BCN-P5999-0462-A | First edition |
| April 2016 | BCN-P5999-0462-B | ■Added or modified parts<br>Section 2.1 to 2.4, Appendix 1 |
| April 2017 | BCN-P5999-0462-C | ■Added or modified parts<br>Section 2.1 to 2.4, Appendix 1 |
| February 2024 | BCN-P5999-0462-D | ■Added or modified parts<br>Chapter 1, Section 2.3 |
| May 2025 | BCN-P5999-0462-E | ■Added or modified parts<br>SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, INTRODUCTION, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Chapter 1, 2, INFORMATION AND SERVICES |

Japanese manual number: BCN-P5999-0461-E

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BCN-P5999-0462-E

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