

Programmable Controller

MELSEC iQ-R
series

MELSEC iQ-R File Operation Function Block Reference



SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual.

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

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

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

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

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

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.

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.

CONTENTS

SAFETY PRECAUTIONS	1
CONDITIONS OF USE FOR THE PRODUCT	2
INTRODUCTION	2
RELEVANT MANUALS	4
TERMS	5
GENERIC TERMS AND ABBREVIATIONS	5
CHAPTER 1 OVERVIEW	6
1.1 FB List	6
1.2 How to Obtain the FB Library	6
1.3 System Configuration	6
CHAPTER 2 FILE OPERATION FB	8
2.1 M+FileOperation_SaveLoggingCSV_W_R	8
Overview	8
Labels to use	8
FB details	9
Performance value	14
Error code	15
APPENDIX	16
Appendix 1 CSV File Output Format	16
INSTRUCTION INDEX	18
REVISIONS	20
WARRANTY	21
TRADEMARKS	22

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Module Configuration Manual [SH-081262ENG]	Common information on the hardware configuration of all modules, overview of each system configuration, and specifications of the power supply module, base unit, SD memory card, and battery.	Print book e-manual PDF
MELSEC iQ-R CPU Module User's Manual (Startup) [SH-081263ENG]	Specifications, procedures before operation, and troubleshooting of the CPU module	Print book e-manual PDF
MELSEC iQ-R CPU Module User's Manual (Application) [SH-081264ENG]	Memory, functions, devices, and parameters of the CPU module	Print book e-manual PDF
MELSEC iQ-R Programming Manual (CPU Module Instructions, Standard Functions/Function Blocks) [SH-081266ENG]	Instructions for the CPU module and standard functions/function blocks	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.

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

GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
FB	Function Block. An FB is used in a sequence program. It consists of individual circuit blocks which are used repeatedly in a sequence program. Using FBs helps to develop programs more efficiently, reduce mistakes, and improve quality of programs.

1 OVERVIEW

FB described in this reference manual indicates the FB library for file operation.

1.1 FB List

The following table lists the FB library in this reference manual.

Name*1	Description
M+FileOperation_SaveLoggingCSV_W_R	Reads the signed word logging data stored in the file register (ZR), such as the analog data of multiple channels, and stores the data in CSV format in an SD memory card.

*1 An FB name ends in the FB version information such as "_00A"; however, this reference manual leaves it out.

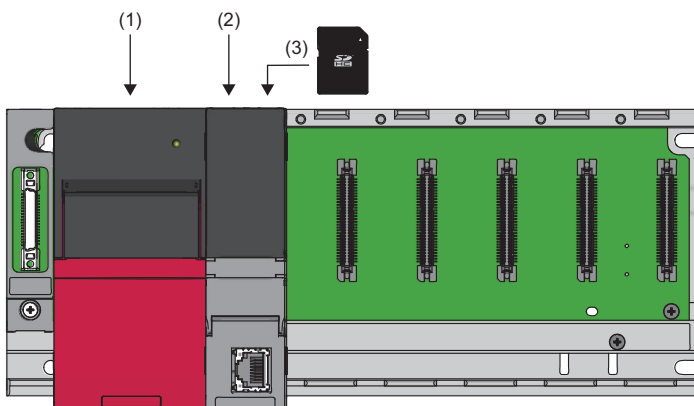
1.2 How to Obtain the FB Library

For the FB library, please consult your local Mitsubishi representative.

For how to register the FB library, refer to the GX Works3 Operating Manual.

1.3 System Configuration

The following figure shows a system configuration example to use the FB library in this reference manual.



- (1) Power supply module
- (2) CPU module
- (3) SD memory card

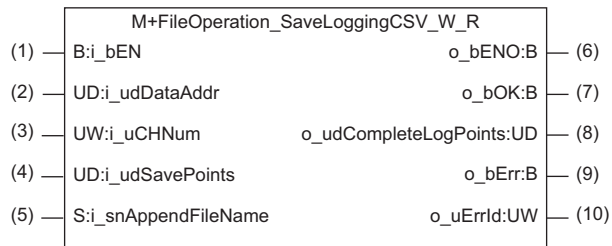
For the specifications of the modules, refer to the user's manual for the module used.

2 FILE OPERATION FB

2.1 M+FileOperation_SaveLoggingCSV_W_R

Overview

This FB reads signed word logging data stored in a file register (ZR), such as analog data of multiple channels, and stores the data in CSV format in an SD memory card.



Labels to use

Input label

No.	Variable name	Name	Data type	Scope	Description
(1)	i_bEN	Execution command	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_udDataAddr	Start address of the storage location of logging data	Double word [unsigned]	Valid device range.	Specify the start address of the file register (ZR) where logging data is stored. Store the logging data in signed word format.
(3)	i_uCHNum	Number of channels	Word [unsigned]	1 to 4	Specify the number of channels of the logging data to be stored.
(4)	i_udSavePoints	Number of save points	Double word [unsigned]	1 to 10000000	Specify the number of points of the logging data to be stored.
(5)	i_snAppendFileName	CSV file name	String	1 to 28 characters	Specify a CSV file name. The file extension (.CSV) is automatically added by this FB.

Output label

No.	Variable name	Name	Data type	Initial data	Description
(6)	o_bENO	Execution status	Bit	OFF	On: The execution command is on. Off: The execution command is off.
(7)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the storage of the logging data in an SD memory card is completed.
(8)	o_udCompleteLogPoints	Number of storage completed logging data points	Double word [unsigned]	0	Returns the number of points of the logging data stored in an SD memory card.
(9)	o_bErr	Error completion	Bit	OFF	The on state indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

FB details

Relevant devices

■CPU module

MELSEC iQ-R series programmable controller CPU of firmware version "31" or later

Point

- For the CPU modules classified as CPU module, refer to the MELSEC iQ-R Module Configuration Manual.
- The R01CPU and R02CPU of firmware version "06" or later can be used.
- This FB cannot be used in the R00CPU.




■Engineering tool

GX Works3 of version 1.045X or later

Point

The R01CPU and R02CPU can be used in GX Works3 of version 1.047Z or later.

Standard specifications

Item	Description
Language to use	ST
Number of steps	2871 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 following.  GX Works3 Operating Manual
Label usage	<ul style="list-style-type: none">• Label: 5268 points (word)• 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 following.  GX Works3 Operating Manual
Number of index register used	<ul style="list-style-type: none">• Index register: 0 points• Long index register: 1 point (device number used: LZ0) When using interrupt programs, do not use the corresponding index register in the interrupt programs.
Number of file registers used	Logging data must be stored in the file register. Refer to the following calculation formula and set the file register capacity. File register (ZR) capacity = $i_udDataAddr$ (start address of the storage location of logging data) + (i_uCHNum (number of channels) \times $i_udSavePoints$ (number of save points)) For the setting method, refer to the following.  MELSEC iQ-R CPU Module User's Manual (Application)
FB compilation method	Macro type
FB dependence	No dependence
FB operation	Pulse execution type (multiple scan execution type)

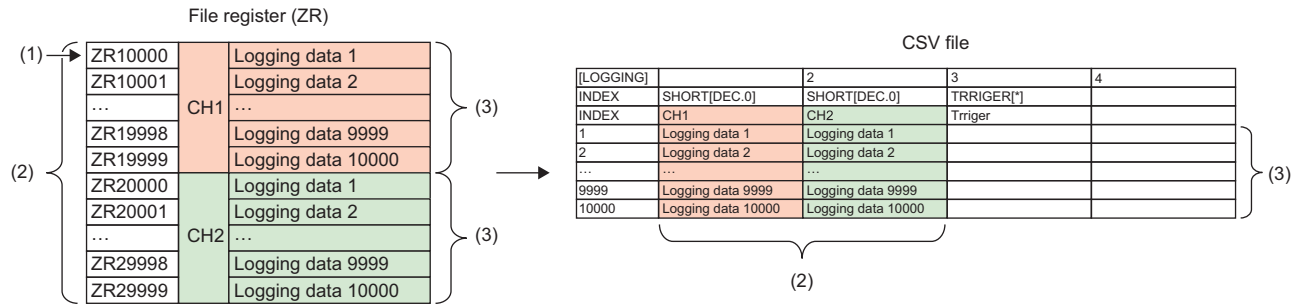
Functional description

- When i_bEN (execution command) is turned on, this FB stores the logging data stored in the file register in CSV format in the SD memory card attached to the CPU module sequentially from the specified address of the file register (ZR) specified in i_udDataAddr (start address of the storage location of logging data).

Ex.

The following shows an example of file register and CSV file content.

- i_udDataAddr (start address of the storage location of logging data): K10000
- i_uCHNum (number of channels): K2
- i_udSavePoints (number of save points): K10000



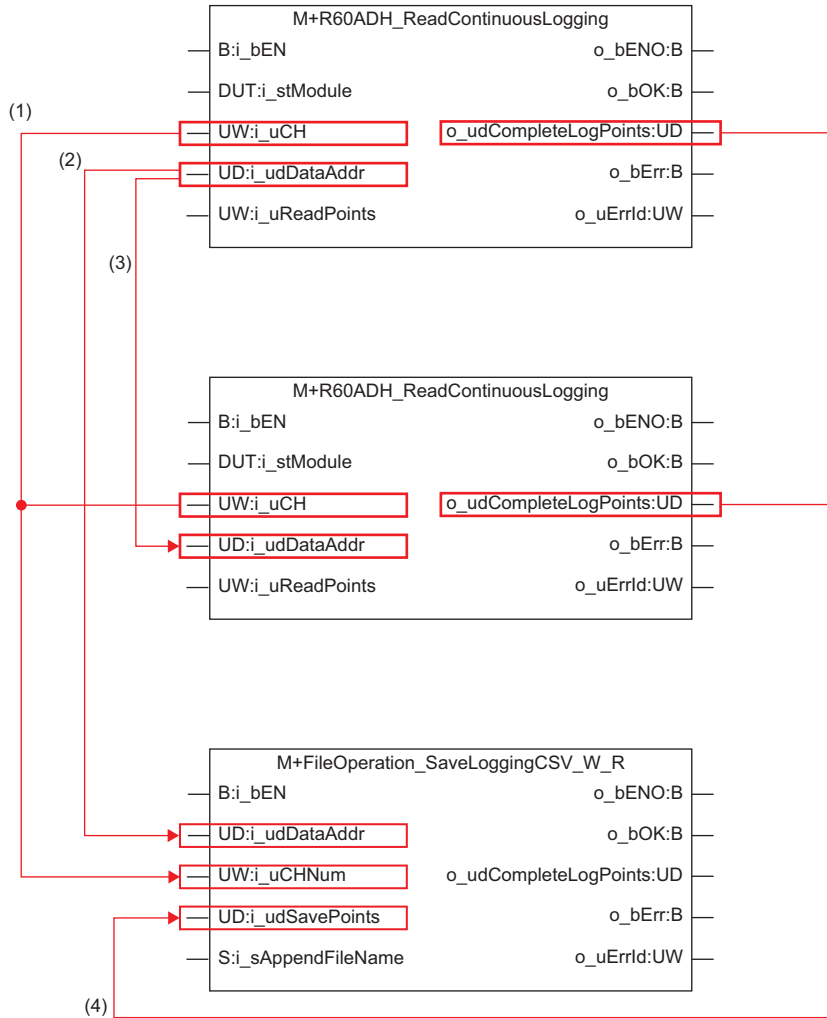
- Logging data is stored in increments of 500 points. When K1300 is specified for i_udSavePoints (number of save points), logging data of 500 points is stored in an SD memory card first. Sequentially, data from 501 points to 1000 points is stored and data from 1001 points to 1300 points is stored.
- Store logging data of each channel sequentially into the file register. Store signed word logging data into the file register.
- For the format of CSV files that this FB creates, refer to CSV File Output Format. (Page 16 CSV File Output Format)

- Logging data can be stored into the file register using M+R60ADH_ReadContinuousLogging of the R60ADH4 and other FBs. When using M+R60ADH_ReadContinuousLogging, set the value as follows. For details on M+R60ADH_ReadContinuousLogging, refer to the following.

📖 MELSEC iQ-R Analog-Digital Converter Module/Digital-Analog Converter Module Function Block Reference

Ex.

The following shows an example when the logging data of two channels is stored in an SD memory card.



- Specify CH1 for the first FB and CH2 for the second FB as target channels in M+R60ADH_ReadContinuousLogging. Specify 2 for the number of channels in M+FileOperation_SaveLoggingCSV_W_R.
- Specify the start address of the file register (ZR) where the CH1 logging data is stored for the start address of the storage location of logging data in M+FileOperation_SaveLoggingCSV_W_R.
- Specify the consecutive start addresses of the file register for CH1 and CH2 in M+R60ADH_ReadContinuousLogging.
- Specify the number of points of logging data that is read using M+R60ADH_ReadContinuousLogging for the number of save points in M+FileOperation_SaveLoggingCSV_W_R. In this case, check that the number of logging data that has been read from CH1 and CH2 is larger than the specified number of save points.

- 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 the set value of `i_uCHNum` (number of channels) is out of range, `o_bErr` (error completion) turns on and the processing of the FB is interrupted. In addition, 0100H is stored in `o_uErrId` (error code). (☞ Page 15 Error code)
- If the set value of `i_udSavePoints` (number of save points) is out of the range, `o_bErr` turns on and the processing of the FB is interrupted. In addition, 0101H is stored in `o_uErrId`. (☞ Page 15 Error code)
- If the character length of the set value of `i_snAppendFileName` (CSV file name) is out of range, `o_bErr` turns on and the processing of the FB is interrupted. In addition, 0102H is stored in `o_uErrId`. (☞ Page 15 Error code)
- If the number of points of logging data that is read from the file register exceeds the capacity of the file register (ZR), the processing of the FB is interrupted. In addition, 0200H is stored in `o_uErrId`. (☞ Page 15 Error code)
- If SM606 (SD memory card forced disable instruction) is on when the logging data is stored in a CSV file, the SP.FWRITE instruction is not processed, resulting in the logging data not being stored. In such a case, `o_bErr` turns on and the processing of the FB is interrupted. In addition, 0201H is stored in `o_uErrId`. (☞ Page 15 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 is exceeded. For the capacity of SD memory cards and the number of files stored, refer to the following.

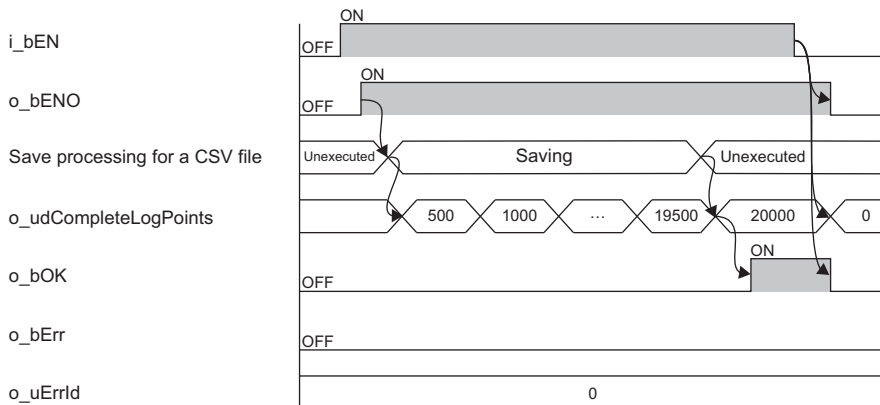
☞ MELSEC iQ-R Module Configuration Manual

- In the event of a CPU error, if the CPU module is in a stop error state, `o_bErr` and `o_uErrId` are not updated. In the event of a CPU error, if the CPU module is in a continuation error state, `o_bErr` turns on and the error code is stored in `o_uErrId`. (☞ Page 15 Error code)
- 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.
- If `i_bEN` (execution command) is turned off when `o_bOK` (normal completion) or `o_bErr` is off, `o_bErr` turns on in one scan. In addition, 0206H is stored in `o_uErrId` in one scan. (☞ Page 15 Error code)
- The SP.FWRITE instruction (type 1) is used in this FB. If an error occurs in the SP.FWRITE instruction, `o_bErr` turns on and the processing of the FB is interrupted. In addition, the error code for the SP.FWRITE instruction is stored in `o_uErrId`. (☞ Page 15 Error code)

Timing chart of I/O signals

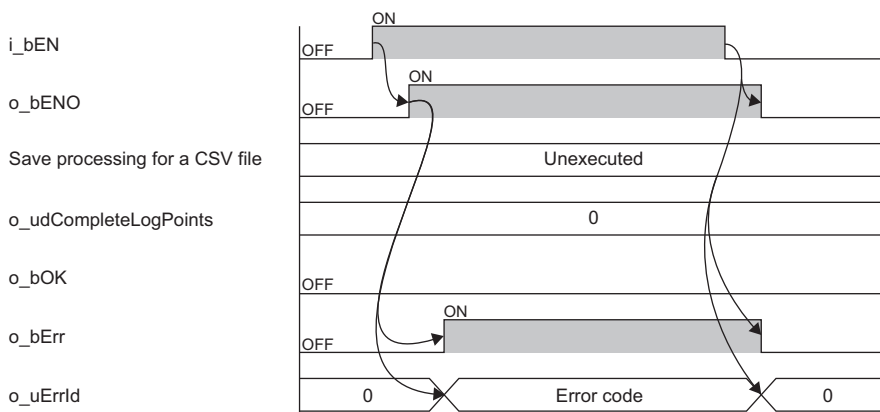
■ When the operation is completed successfully

When 20000 is set to the number of read points



■ When the operation is completed with an error

When an error is detected before a CSV file is stored



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.
- The FB requires the configuration of the ladder for every input label.
- To use more than one of this FB, create an interlock to avoid simultaneous execution.
- Change the memory/device setting of CPU parameter so that the memory capacity required to use this FB is secured. If the memory/device setting is not changed, an error may occur on GX Works3.
- The SP.FWRITE instruction is used in this FB. If a value that cannot be used in the SP.FWRITE instruction is specified for i_snAppendFileName (CSV file name), an operation error (3405H) may occur when the FB is executing. For details on the SP.FWRITE instruction, refer to the following.

📖 MELSEC iQ-R Programming Manual (CPU Module Instructions, Standard Functions/Function Blocks)

- Specify a string (ASCII code or Shift JIS code) for i_snAppendFileName. If anything other than string is specified for i_snAppendFileName, a file may not be written.

Performance value


The following table lists the performance values of this FB under the following conditions. The numeric value in the table varies depending on the time required for the processing programs other than this FB.

- CPU module: R120CPU
- SD memory card: NZ1MEM-4GBSD
- File register storage location: Extended SRAM cassette
- FB compilation method: Macro type

Input label		Time required for the processing*1 (ms)	Maximum scan time (ms)	Number of scans (scan)
Number of channels	Number of save points			
1	1	307	0.323	2171
	10000	4090	4.070	28435
	100000	38800	4.070	270103
	1000000	396000	4.070	2771811
	10000000	3930000	4.070	27063525
2	1	338	0.343	2308
	10000	6120	5.110	42817
	100000	55200	5.110	385939
	1000000	589000	5.110	4063547
3	1	352	0.366	2358
	10000	7570	6.160	52829
	100000	74700	6.190	521317
	1000000	769000	6.250	5297023
4	1	337	0.404	2413
	10000	9440	7.260	65646
	100000	93600	7.260	650558
	1000000	970000	7.400	6628888

*1 The time required from start to end of the processing

Error code

Error code	Description	Action
0100H	An out-of-range value is set in i_uCHNum (number of channels). The number of channels is set out of the range of 1 to 4.	Review and correct the settings and then execute the FB again.
0101H	An out-of-range value is set in i_udSavePoints (number of save points). The number of save points is set out of the range of 1 to 1000000.	Review and correct the settings and then execute the FB again.
0102H	A character string with an out-of-range character length is set in i_snAppendFileName (CSV file name).	Set a string with character length of 1 to 28.
0200H	The file register address exceeds the capacity of the file register (ZR).	Review and correct the settings according to the following relational expression, and then execute the FB again. $(i_udDataAddr \text{ (start address of the storage location of logging data)} + (i_uCHNum \text{ (number of channels)} \times i_udSavePoints \text{ (number of save points)}) - 1) \leq \text{Maximum assignment address of the file register (ZR)}$
0201H	An access to the SD memory card has failed because SM606 (SD memory card forced disable instruction) is on. While logging data is being saved, turning on SM606 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.
0202H	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.
0203H	An access to the SD memory card has failed because SM600 (Memory card available flag) is off.	Make the SD memory card an available state, and then execute the FB again.
0204H	The SD memory card is frequently accessed from programs in addition to this FB, and a timeout has occurred.	Reduce the frequency of the access to the SD memory card.
0205H	Because SM601 (Memory card protect flag) is on, data cannot be written to the SD memory card.	Turn off the protect switch on the SD memory card, check that SM601 is off, and execute the FB again.
0206H	i_bEN (execution command) has been turned off during the processing.	Do not turn off i_bEN until o_bOK (normal completion) or o_bErr (error completion) turns on.
Other than 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 (CPU Module Instructions, Standard Functions/Function Blocks)

APPENDIX

Appendix 1 CSV File Output Format

The following table shows the format specifications of CSV files stored using M+FileOperation_SaveLoggingCSV_W_R.

Item	Description
Delimiter	Comma (,)
Line feed code	CRLF (0DH, 0AH)
Character code	ASCII
File size	158888967 bytes at maximum*1

*1 The file size is maximum when i_uCHNum (number of channels) is 1, i_udSavePoints (number of save points) is 1000000, and logging data is a negative 5-digit value.

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

	[LOGGING]	2	3	4		
(1)	INDEX	SHORT[DEC.0]	SHORT[DEC.0]	SHORT[DEC.0]	SHORT[DEC.0]	TRIGGER[*]
	INDEX	CH1	CH2	CH3	CH4	Trigger
	1	-5000	-10000	10000	20000	
	2	-4998	-9996	9996	19992	
	3	-4996	-9992	9992	19984	
	4	-4994	-9988	9988	19976	
	5	-4992	-9984	9984	19968	
(2)	
	4996	4990	9980	-9980	-19960	
	4997	4992	9984	-9984	-19968	
	4998	4994	9988	-9988	-19976	
	4999	4996	9992	-9982	-19984	
	5000	4998	9996	-9996	-19992	

(3)
(4)
(5)

- (1) Header row
- (2) Data row
- (3) Index column
- (4) Data column
- (5) Trigger generation information column

Header row

■File information row

Information related to the CSV file is described.

Column No.	Item	Output content	Size (byte)
Column 1	File type	[LOGGING]	9
Column 2	(Blank)	—	0
Column 3	Data type information row number	2 (row number of the data type information row from the beginning of the file)	1
Column 4	Data name row number	3 (row number of the data name row from the beginning of the file)	1
Column 5	Data start row number	4 (row number of the data start row from the beginning of the file)	1

■Data information row

Data type of each column is described. 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	Index column	INDEX	5	—	0
Column 2	Data column ^{*1}	SHORT (signed 16-bit integer specification)	5	[DEC.0] (decimal format specification)	7
Column 3					
Column 4					
Column 5					
Column 6	Trigger generation information column	TRIGGER	7	[*] (specification of the use of "*" as a generated character)	3

*1 The number of data columns differs depending on the number of channels.

■Data name row

Data name of each column is described. The data name of each column is output in the format of "Data name".

Column No.	Item	Output content	Size (byte)
Column 1	Index column	INDEX	5
Column 2	Data column ^{*1}	CHn (A value of 1 to 4 is stored in n.)	3
Column 3			
Column 4			
Column 5			
Column 6	Trigger generation information column	Trigger	7

*1 The number of data columns differs depending on the number of channels.

Data row

Data of each column is described. The data of each column is output in the format of "Data".

Item	Description	Size (byte) ^{*1}
Index column	After 1 is output, the increment values are output in order.	1 to 8
Data column	Logging data is output.	1 to 6
Trigger generation information column	—	0

*1 The size differs depending on the number of digits of data. One digit requires one byte.

INSTRUCTION INDEX

M

M+FileOperation_SaveLoggingCSV_W_R. 8

MEMO

REVISIONS

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

Revision date	*Manual number	Description
October 2020	BCN-P5999-1368-A	First edition

Japanese manual number: BCN-P5999-1367-A

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WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

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

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

[Gratis Warranty Term]

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

[Gratis Warranty Range]

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

2. Onerous repair term after discontinuation of production

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

3. Overseas service

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

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

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

- (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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