



Mitsubishi Programmable Controller

**MELSEC iQ-R**  
series

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

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# 1 FUNCTION BLOCK (FB) LIST

This FB list is intended for those who use the MELSEC iQ-R series analog-digital converter module and digital-analog converter module.

## Analog-digital converter module FB

### ■R60AD4, R60ADV8, R60ADI8

Name*1	Description
M+R60AD_RequestSetting	Enables the settings of each function.
M+R60AD_OperateError	Monitors error codes and resets errors.
M+R60AD_SetLoggingParam	Sets up the logging function of a specified channel.
M+R60AD_SaveLogging	Saves the logging data of a specified channel into a file.

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

### ■R60AD8-G, R60AD16-G

Name*1	Description
M+R60ADG_RequestSetting	Enables the settings of each function.
M+R60ADG_OperateError	Monitors error codes and resets errors.
M+R60ADG_SetLoggingParam	Sets up the logging function of a specified channel.
M+R60ADG_SaveLogging	Saves the logging data of a specified channel into a file.

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

## Digital-analog converter module FB

### ■R60DA4, R60DAV8, R60DAI8

Name*1	Description
M+R60DA_RequestSetting	Enables the settings of each function.
M+R60DA_OperateError	Monitors error codes and resets errors.
M+R60DA_WaveOutputSetting	Sets the waveform output of a specified channel or all channels.
M+R60DA_WaveDataStoreCsv	Reads out data from the CSV file that holds the parameters and the waveform data (number of waveform data points and waveform data) of the waveform output function, and writes the data to the buffer memory of the digital-analog converter module.
M+R60DA_WaveDataStoreDev	Reads out data from the file register (ZR) that holds the parameters and the waveform data (number of waveform data points and waveform data) of the waveform output function, and writes the data to the buffer memory of the digital-analog converter module.
M+R60DA_WaveOutputReqSetting	Specifies whether to start, stop, or pause the waveform output of a specified channel or all channels.

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

### ■R60DA8-G

Name*1	Description
M+R60DAG_RequestSetting	Enables the settings of each function.
M+R60DAG_OperateError	Monitors error codes and resets errors.

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

### ■R60DA16-G

Name*1	Description
M+R60DAG16_RequestSetting	Enables the settings of each function.
M+R60DAG16_OperateError	Monitors error codes and resets errors.

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



# 2 ANALOG-DIGITAL CONVERTER MODULE FB

## 2.1 M+R60AD(G)\_RequestSetting

### Name

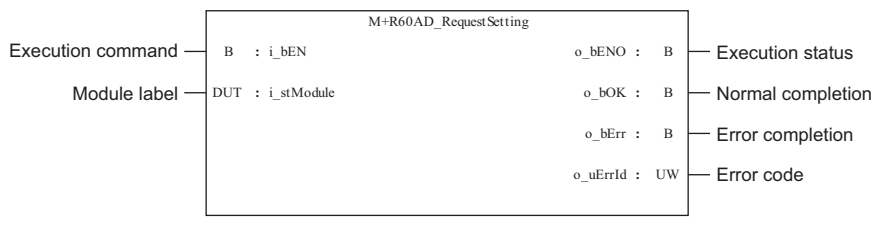
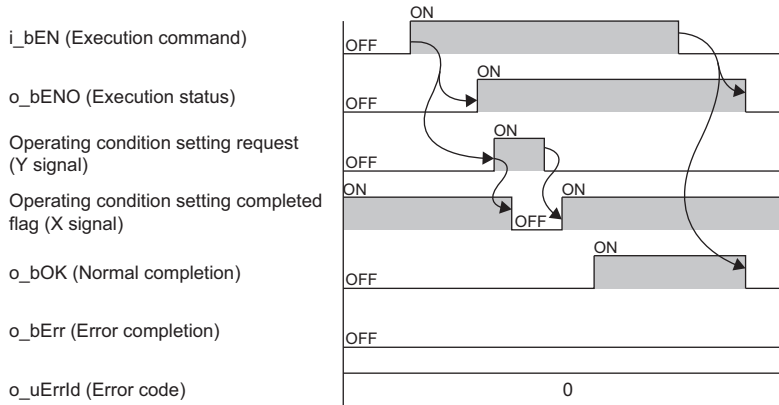
■R60AD4, R60ADV8, R60ADI8

M+R60AD\_RequestSetting

■R60AD8-G, R60AD16-G

M+R60ADG\_RequestSetting

### FB details

Item	Description						
Functional overview	Enables the settings of each function.						
Symbol							
Relevant devices	<table border="1"> <tr> <td>Relevant modules</td> <td>R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	25 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>Turning on i_bEN (execution command) allows the settings of all channels to be enabled. For what settings are enabled, refer to the user's manual (Application) of the analog-digital converter module used.</li> <li>This FB continues its execution until the completion of the settings of each function after i_bEN (execution command) turns on.</li> </ul>						
FB compilation method	Macro type						
FB operation	Pulse execution type (multiple scan execution type)						
Timing chart of I/O signals							
Restrictions and precautions	<ul style="list-style-type: none"> <li>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.</li> <li>The FB cannot be used in an interrupt program.</li> <li>As this FB is executed, the A/D conversion processing stops, and thereafter when o_bOK (normal completion) turns on, the conversion processing resumes.</li> <li>Putting an analog-digital converter module into operation requires the input range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual (Application) of the analog-digital converter module used.</li> </ul>						

## Error code

Error code	Description	Action
None	None	None

## Labels to use

### ■Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the analog-digital converter module.

### ■Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the operation to enable each setting is complete.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

## 2.2 M+R60AD(G)\_OperateError

### Name

#### ■R60AD4, R60ADV8, R60ADI8

M+R60AD\_OperateError

#### ■R60AD8-G, R60AD16-G

M+R60ADG\_OperateError

### FB details

Item	Description	
Functional overview	Monitors error codes and resets errors.	
Symbol	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Error reset request — B : i_bErrReset</p> </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p style="text-align: center; font-size: small;">M+R60AD_OperateError</p> </div> <div> <p>o_bENO : B — Execution status</p> <p>o_bOK : B — Normal completion</p> <p>o_bUnitErr : B — Module error flag</p> <p>o_uUnitErrCode : UW — Module error code</p> <p>o_uUnitAlarmCode : UW — Module alarm code</p> <p>o_bErr : B — Error completion</p> <p>o_uErrId : UW — Error code</p> </div> </div>	
Relevant devices	Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G
	Relevant CPU modules	MELSEC iQ-R series CPU modules
	Relevant engineering tool	GX Works3
Language to use	Ladder diagram	
Number of basic steps	61 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.	
Functional description	<ul style="list-style-type: none"> <li>As i_bEN (execution command) turns on, errors in the target module are monitored.</li> <li>After i_bEN (execution command) turns on, turning on i_bErrReset (error reset request) during an error allows the error to be reset.</li> </ul>	
FB compilation method	Macro type	
FB operation	Arbitrary execution type	
Timing chart of I/O signals		



Item	Description
Restrictions and precautions	<ul style="list-style-type: none"> <li>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.</li> <li>The FB cannot be used in an interrupt program.</li> <li>Putting an analog-digital converter module into operation requires the input range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual (Application) of the analog-digital converter module used.</li> </ul>

## Error code

Error code	Description	Action
None	None	None

## Labels to use

### ■Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the analog-digital converter module.
Error reset request	i_bErrReset	Bit	On or off	Turn on this label to reset errors. After completion of the error reset, turn off the label.

### ■Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the error reset is complete.
Module error flag	o_bUnitErr	Bit	Off	The on state indicates that a module error has occurred.
Module error code	o_uUnitErrCode	Word [unsigned]	0	The error code of an error occurred is stored.
Module alarm code	o_uUnitAlarmCode	Word [unsigned]	0	The alarm code of an alarm occurred is stored.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

## 2.3 M+R60AD(G)\_SetLoggingParam

### Name

#### ■R60AD4, R60ADV8, R60ADI8

M+R60AD\_SetLoggingParam

#### ■R60AD8-G, R60AD16-G

M+R60ADG\_SetLoggingParam

### FB details

Item	Description						
Functional overview	Sets up the logging function of a specified channel.						
Symbol	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Target CH — UW : i_uCH</p> <p>Logging enable/disable setting — B : i_bLogEnable</p> <p>Logging data setting — UW : i_uLogData</p> <p>Logging cycle setting value — UW : i_uLogCycleVal</p> <p>Logging cycle unit setting — UW : i_uLogCycleUnit</p> <p>Post-trigger logging points — UW : i_uLogPoints</p> <p>Level trigger condition setting — UW : i_uLogTrigCond</p> <p>Trigger data — UW : i_uLogTrigData</p> <p>Trigger setting value — W : i_wLogTrigValue</p> <p>Module type — UW : i_uUnitType</p> </div> <div style="flex: 1; border: 1px solid black; padding: 5px; margin: 0 10px;"> <p style="text-align: center; font-size: small;">M+R60AD_SetLoggingParam</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>o_bENO : B</p> <p>o_bOK : B</p> <p>o_bErr : B</p> <p>o_uErrId : UW</p> </div> <div style="width: 45%;"> <p>— Execution status</p> <p>— Normal completion</p> <p>— Error completion</p> <p>— Error code</p> </div> </div> </div> </div>						
Relevant devices	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Relevant modules</td> <td>R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	437 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>• Turning on i_bEN (execution command) allows the logging function of a specified channel to be set.</li> <li>• This FB works for only one shot as i_bEN (execution command) turns on.</li> <li>• The set values are enabled by turning on and off Operating condition setting request (Yn9) or executing the operating condition setting request FB (M+R60AD(G)_RequestSetting).</li> <li>• 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. (☞ Page 9 Error codes)</li> </ul>						
FB compilation method	Macro type						
FB operation	Pulse execution type (single scan execution type)						

Item	Description
Timing chart of I/O signals	<p>■When the operation is completed successfully</p> <p>■When the operation is completed with an error</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• To use more than one of this FB, care must be taken to avoid duplication of the target channel.</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• If the parameters are set by means of the configuration function of GX Works3, this FB is not required.</li> <li>• Putting an analog-digital converter module into operation requires the input range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual (Application) of the analog-digital converter module used.</li> </ul>

## Error codes

Error code	Description	Action
100H	<p>■R60AD4, R60ADV8, R60ADI8 The target channel is out of the setting range. Set the target channel within the following range.</p> <ul style="list-style-type: none"> <li>• R60AD4: 1 to 4</li> <li>• R60ADV8/R60ADI8: 1 to 8</li> </ul> <p>■R60AD8-G, R60AD16-G The target channel is set out of the range. Set the target channel within the following range.</p> <ul style="list-style-type: none"> <li>• R60AD8-G: 1 to 8</li> <li>• R60AD16-G: 1 to 16</li> </ul>	Review and correct the settings and then execute the FB again.
102H	<p>■R60AD4, R60ADV8, R60ADI8 The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60AD4: 0</li> <li>• R60ADV8: 1</li> <li>• R60ADI8: 2</li> </ul> <p>■R60AD8-G, R60AD16-G The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60AD8-G: 0</li> <li>• R60AD16-G: 1</li> </ul>	Review and correct the settings and then execute the FB again.

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the analog-digital converter module.
Target channel	i_uCH	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 R60AD4: 1 to 4 R60ADV8/R60ADI8: 1 to 8</p> <p>■R60AD8-G, R60AD16-G R60AD8-G: 1 to 8 R60AD16-G: 1 to 16</p>	Specifies a channel number.
Logging enable/disable setting	i_bLogEnable	Bit	On or off	On: Enables the logging function. Off: Disables the logging function.
Logging data setting	i_uLogData	Word [unsigned]	0: Digital output value 1: Digital operation value	Sets the data to be logged.
Logging cycle setting value	i_uLogCycleVal	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 When the logging cycle unit setting is 0: 80 to 32767 When the logging cycle unit setting is 1: 1 to 32767 When the logging cycle unit setting is 2: 1 to 3600</p> <p>■R60AD8-G, R60AD16-G When the logging cycle unit setting is 1: 10 to 32767 When the logging cycle unit setting is 2: 1 to 3600</p>	Sets the interval of cycles at which data is stored.
Logging cycle unit setting	i_uLogCycleUnit	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 0: <math>\mu</math>s 1: ms 2: s</p> <p>■R60AD8-G, R60AD16-G 1: ms 2: s</p>	Specifies the unit of cycles at which data is stored.
Post-trigger logging points	i_uLogPoints	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 1 to 10000</p> <p>■R60AD8-G, R60AD16-G 1 to 1000</p>	Specifies the number of data to be logged after a hold trigger occurs.
Level trigger condition setting	i_uLogTrigCond	Word [unsigned]	0: Disable 1: Rise 2: Fall 3: Rise and fall	Sets the condition in which a level trigger is to be used. Set 0 if using no level trigger.
Trigger data	i_uLogTrigData	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 0 to 4999</p> <p>■R60AD8-G, R60AD16-G 0 to 11999</p>	Specifies a buffer memory address to be monitored by level trigger.
Trigger setting value	i_wLogTrigValue	Word [signed]	-32768 to 32767	Sets the level at which a level trigger is generated.
Module type	i_uUnitType	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 0: R60AD4 1: R60ADV8 2: R60ADI8</p> <p>■R60AD8-G, R60AD16-G 0: R60AD8-G 1: R60AD16-G</p>	Specifies a module type.

## ■Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the setting of the logging function parameters is completed.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

## 2.4 M+R60AD(G)\_SaveLogging

### Name

#### ■R60AD4, R60ADV8, R60ADI8

M+R60AD\_SaveLogging

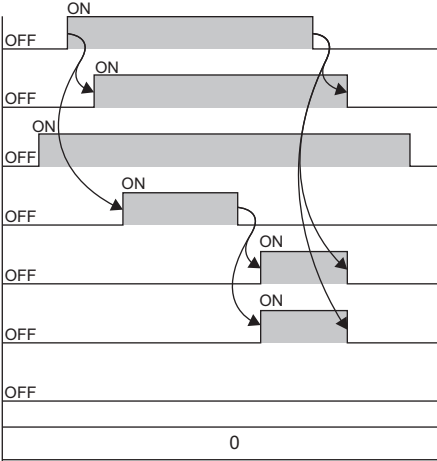
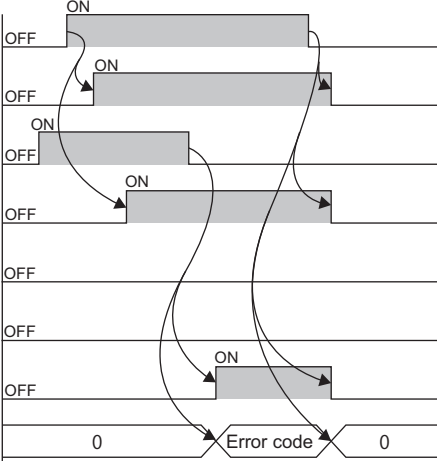
#### ■R60AD8-G, R60AD16-G

M+R60ADG\_SaveLogging

### FB details

Item	Description	
Functional overview	Saves the logging data of a specified channel into a file.	
Symbol	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="width: 30%;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Target CH — UW : i_uCH</p> <p>Maximum number of save files — UW : i_uMaxNumber</p> <p>Overwrite save command — B : i_bOverWrite</p> <p>Module type — UW : i_uUnitType</p> </div> <div style="width: 35%; border: 1px solid black; padding: 5px; text-align: center;"> <p>M+R60AD_SaveLogging</p> </div> <div style="width: 30%;"> <p>o_bENO : B — Execution status</p> <p>o_bOK : B — Normal completion</p> <p>o_bMakingFile : B — Creating a file</p> <p>o_bExceedNumber : B — Maximum number exceeded flag</p> <p>o_bErr : B — Error completion</p> <p>o_uErrId : UW — Error code</p> </div> </div>	
Relevant devices	Relevant modules	R60AD4, R60ADV8, R60ADI8, R60AD8-G, R60AD16-G
	Relevant CPU modules	MELSEC iQ-R series CPU modules
	Relevant engineering tool	GX Works3
Language to use	Ladder diagram	
Number of basic steps	2309 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.	

Item	Description
Functional description	<ul style="list-style-type: none"> <li>• 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, in a chronological order from the head pointer, and saves the data along with the trigger generation information in the SD memory card, inserted into the CPU module, in a CSV format.</li> <li>• 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.</li> <li>• It takes multiple scans to complete the save processing of logging data. Check o_bOK (normal completion) to see that the processing is complete.</li> <li>• When this FB saves data in an SD memory card, the file name is given as follows: "AD" + "Middle two digits of the four digits representing the start I/O number of the analog-digital converter 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 I/O number of the analog-digital converter 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. For the R60AD4, R60ADV8, and R60ADI8, the file name is "AD453006.CSV"; for the R60AD8-G and R60AD16-G, "AD4503006.CSV".</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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).</li> <li>• 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).</li> <li>• 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 MELSEC iQ-R Module Configuration Manual. 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.</li> <li>• For the format of CSV files that this FB creates, refer to CSV File Output Format of the FB for Saving Logging Data (Page 34 CSV File Output Format of the FB for Saving Logging Data). The specified module type is reflected in the file version of the CSV file.</li> </ul>
FB compilation method	Macro type
FB operation	Pulse execution type (multiple scan execution type)

Item	Description
Timing chart of I/O signals	<p> <b>■When the operation is completed successfully</b> </p>  <p> <b>■When the operation is completed with an error</b> </p> 
Restrictions and precautions	<ul style="list-style-type: none"> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• This FB cannot save logging data in a medium other than an SD memory card.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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).</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• 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 MELSEC iQ-R Module Configuration Manual.</li> <li>• Putting an analog-digital converter module into operation requires the input range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual (Application) of the analog-digital converter module used.</li> </ul>



## Error code

Error code	Description	Action
100H	<p>■R60AD4, R60ADV8, R60ADI8 The target channel is set out of the range. Set the target channel within the following range. R60AD4: 1 to 4 R60ADV8/R60ADI8: 1 to 8</p> <p>■R60AD8-G, R60AD16-G The target channel is set out of the range. Set the target channel within the following range. R60AD8-G: 1 to 8 R60AD16-G: 1 to 16</p>	Review and correct the settings and then execute the FB again.
101H	The maximum number of save files is set out of the range. The maximum number of save files is set out of the range of 1 to 999.	Review and correct the settings and then execute the FB again.
102H	<p>■R60AD4, R60ADV8, R60ADI8 The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60AD4: 0</li> <li>• R60ADV8: 1</li> <li>• R60ADI8: 2</li> </ul> <p>■R60AD8-G, R60AD16-G The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60AD8-G: 0</li> <li>• R60AD16-G: 1</li> </ul>	Review and correct the settings and then execute the FB again.
200H	The processing is interrupted because the logging hold flag turns off while logging data is being saved. 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. 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 (write enabled) the protect switch on the SD memory card, 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))

## Labels to use

### ■ Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the analog-digital converter module.
Target channel	i_uCH	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 R60AD4: 1 to 4 R60ADV8/R60ADI8: 1 to 8</p> <p>■R60AD8-G, R60AD16-G R60AD8-G: 1 to 8 R60AD16-G: 1 to 16</p>	Specifies a channel number.
Maximum number of save files	i_uMaxNumber	Word [unsigned]	1 to 999	Specifies the maximum number of CSV files that this FB saves.
Overwrite save command	i_bOverWrite	Bit	On or off	Specify 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. If the setting is off, the save processing of logging data stops.
Module type	i_uUnitType	Word [unsigned]	<p>■R60AD4, R60ADV8, R60ADI8 0: R60AD4 1: R60ADV8 2: R60ADI8</p> <p>■R60AD8-G, R60AD16-G 0: R60AD8-G 1: R60AD16-G</p>	Specifies a module type that is to be written to the file version of the CSV file that this FB saves.

### ■ Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the file save is complete. This label turns off as logging resumes.
Creating file	o_bMakingFile	Bit	Off	The on state indicates that files are being created.
Maximum number reach flag	o_bExceedNumber	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.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

# 3 DIGITAL-ANALOG CONVERTER MODULE FB

## 3.1 M+R60DA(G)(16)\_RequestSetting

### Name

#### ■R60DA4, R60DAV8, R60DAI8

M+R60DA\_RequestSetting

#### ■R60DA8-G

M+R60DAG\_RequestSetting

#### ■R60DA16-G

M+R60DAG16\_RequestSetting

3

### FB details

Item	Description						
Functional overview	Enables the settings of each function.						
Symbol							
Relevant devices	<table border="1"> <tr> <td>Relevant modules</td> <td>R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	24 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>Turning on i_bEN (execution command) allows the settings of all channels to be enabled. For what settings are enabled, refer to the user's manual (Application) of the digital-analog converter module used.</li> <li>This FB continues its execution until the completion of the settings of each function after i_bEN (execution command) turns on.</li> </ul>						
FB compilation method	Macro type						
FB operation	Pulse execution type (multiple scan execution type)						
Timing chart of I/O signals							

Item	Description
Restrictions and precautions	<ul style="list-style-type: none"> <li>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.</li> <li>The FB cannot be used in an interrupt program.</li> <li>This FB turns on or off Operating condition setting request (Yn9). While this FB is in execution, be careful that the D/A conversion stops.</li> <li>Putting a digital-analog converter module into operation requires the output range and operation mode to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual of the digital-analog converter module (Application).</li> </ul>

## Error code

Error code	Description	Action
None	None	None

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.

### Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the operation to enable each setting is complete.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

## 3.2 M+R60DA(G)(16)\_OperateError

### Name

#### ■R60DA4, R60DAV8, R60DAI8

M+R60DA\_OperateError

#### ■R60DA8-G

M+R60DAG\_OperateError

#### ■R60DA16-G

M+R60DAG16\_OperateError

3

### FB details

Item	Description						
Functional overview	Monitors error codes and resets errors.						
Symbol	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Error reset request — B : i_bErrReset</p> </div> <div style="border: 1px solid black; padding: 10px; text-align: center; width: 300px;"> <p>M+R60DA_OperateError</p> </div> <div style="margin-left: 20px;"> <p>o_bENO : B — Execution status</p> <p>o_bOK : B — Normal completion</p> <p>o_bUnitErr : B — Module error flag</p> <p>o_uUnitErrCode : UW — Module error code</p> <p>o_bErr : B — Error completion</p> <p>o_uErrId : UW — Error code</p> </div> </div>						
Relevant devices	<table border="1" style="width: 100%;"> <tr> <td>Relevant modules</td> <td>R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60DA4, R60DAV8, R60DAI8, R60DA8-G, R60DA16-G						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	45 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>As i_bEN (execution command) turns on, the error information in the target module is monitored.</li> <li>After i_bEN (execution command) turns on, turning on i_bErrReset (error reset request) during an error allows the error to be reset.</li> </ul>						
FB compilation method	Macro type						
FB operation	Arbitrary execution type						
Timing chart of I/O signals	<p>The timing chart illustrates the sequence of events for the M+R60DA_OperateError function block. It shows the following signal transitions:</p> <ul style="list-style-type: none"> <li><b>i_bEN (Execution command):</b> Transitions from OFF to ON.</li> <li><b>o_bENO (Execution status):</b> Transitions from OFF to ON shortly after i_bEN turns ON.</li> <li><b>i_bErrorReset (Error reset request):</b> Transitions from OFF to ON during an error state.</li> <li><b>Error clear request (Y signal):</b> Transitions from OFF to ON when i_bErrorReset is active.</li> <li><b>Error flag (X signal):</b> Transitions from OFF to ON when i_bErrorReset is active.</li> <li><b>o_bUnitErr (Module error flag):</b> Transitions from OFF to ON when i_bErrorReset is active.</li> <li><b>o_uUnitErrCode (Module error code):</b> Transitions from 0 to a non-zero value when i_bErrorReset is active.</li> <li><b>o_bErr (Error completion):</b> Transitions from OFF to ON when i_bErrorReset turns OFF.</li> <li><b>o_uErrId (Error code):</b> Transitions from 0 to a non-zero value when i_bErrorReset turns OFF.</li> </ul>						

Item	Description
Restrictions and precautions	<ul style="list-style-type: none"> <li>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.</li> <li>The FB cannot be used in an interrupt program.</li> <li>Putting a digital-analog converter module into operation requires the output range and operation mode to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the user's manual of the digital-analog converter module (Application).</li> </ul>

## Error code

Error code	Description	Action
None	None	None

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.
Error reset request	i_bErrReset	Bit	On or off	Turn on this label to reset the errors. Turn off this label after the error reset.

### Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. (Module errors are being monitored.) Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that executing the error reset instruction has been completed.
Module error flag	o_bUnitErr	Bit	Off	The on state indicates that a module error has occurred.
Module error code	o_uUnitErrCode	Word [unsigned]	0	The error code of an error occurred is stored.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

# 3.3 M+R60DA\_WaveOutputSetting

## Name

M+R60DA\_WaveOutputSetting

## FB details

Item	Description	
Functional overview	Sets the waveform output of a specified channel or all channels.	
Symbol	<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Target CH — UW : i_uCH</p> <p>Output setting during wave output stop — UW : i_uOutputSelect</p> <p>Output value during wave output stop — W : i_wOutputValue</p> <p>Wave pattern start address setting — UD : i_udStartingAddr</p> <p>Wave pattern data points setting — UD : i_udPointsSetting</p> <p>Wave pattern output repetition setting — W : i_wFrequency</p> <p>Constant for wave output conversion cycle — UW : i_uConvSpeed</p> <p>Module type — UW : i_uUnitType</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>M+R60DA_WaveOutputSetting</p> </div> <div style="margin-left: 20px;"> <p>o_bENO : B — Execution status</p> <p>o_bOK : B — Normal completion</p> <p>o_bErr : B — Error completion</p> <p>o_uErrId : UW — Error code</p> </div> </div>	
Relevant devices	Relevant modules	R60DA4, R60DAV8, R60DAI8
	Relevant CPU modules	MELSEC iQ-R series CPU modules
	Relevant engineering tool	GX Works3
Language to use	Ladder diagram	
Number of basic steps	862 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.	
Functional description	<ul style="list-style-type: none"> <li>As i_bEN (execution command) turns on, the waveform output settings of a specified channel or all channels are written.</li> <li>The waveform output setting is enabled only when the output mode setting is set to the waveform output mode. The waveform data for analog output is required to be set in advance.</li> <li>The set values are enabled by turning on and off Operating condition setting request (Yn9) or executing the operating condition setting request FB (M+R60DA_RequestSetting).</li> <li>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. (Page 22 Error code)</li> </ul>	
FB compilation method	Macro type	
FB operation	Pulse execution type (single scan execution type)	

Item	Description
Timing chart of I/O signals	<p>■When the operation is completed successfully</p> <p>■When the operation is completed with an error</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• To use more than one of this FB, care must be taken to avoid duplication of the target channel.</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• Putting the R60DA4, R60DAV8, or R60DAI8 into operation requires the output range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> </ul>

## Error code

Error code	Description	Action
100H	<p>The target channel is set out of the range. Set the target channel within the following range.</p> <ul style="list-style-type: none"> <li>• R60DA4: 1 to 4, 15</li> <li>• R60DAV8/R60DAI8: 1 to 8, 15</li> </ul>	Review and correct the settings and then execute the FB again.
102H	<p>The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60DA4: 0</li> <li>• R60DAV8: 1</li> <li>• R60DAI8: 2</li> </ul>	Review and correct the settings and then execute the FB again.



## Labels to use

### ■ Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.
Target channel	i_uCH	Word [unsigned]	For the R60DA4 • 1 to 4, 15 For the R60DAV8 and R60DAI8 • 1 to 8, 15	For the R60DA4 • 1 to 4: The corresponding channel number is specified. • 15: All channels are specified. For the R60DAV8 and R60DAI8 • 1 to 8: The corresponding channel number is specified. • 15: All channels are specified.
Output selection during waveform output stop	i_uOutputSelect	Word [unsigned]	0: 0V/0mA 1: Offset value 2: Output setting value during waveform output stop	Specifies the output value during waveform output stop.
Output setting value during waveform output stop	i_wOutputValue	Word [signed]	For a range of 0 to 5V, 1 to 5V, 0 to 20mA, or 4 to 20mA • 0 to 32767 For a range of -10 to 10V • -32768 to 32767	Sets the value to be output when 2 (Output setting value during waveform output stop) is selected in the output selection during waveform output stop.
Waveform pattern start address setting	i_udStartingAddr	Double Word [unsigned]	10000 to 89999	Sets the start address of a waveform pattern to be output.
Number of waveform pattern points setting	i_udPointsSetting	Double Word [unsigned]	1 to 80000 (point)	Sets the number of data points of a waveform pattern to be output.
Number of waveform outputs setting	i_wFrequency	Word [signed]	-1: Infinite repetition output 1 to 32767: Specified number of times output	Sets the number of output times of a waveform pattern.
Waveform output conversion cycle constant	i_uConvSpeed	Word [unsigned]	1 to 5000	Sets the constant that defines the conversion cycle of waveform output.
Module type	i_uUnitType	Word [unsigned]	0: R60DA4 1: R60DAV8 2: R60DAI8	Specifies a module type.

### ■ Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that setting the waveform output has been completed.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

# 3.4 M+R60DA\_WaveDataStoreCsv

## Name

M+R60DA\_WaveDataStoreCsv

## FB details

Item	Description						
Functional overview	Reads out data from the CSV file that holds the parameters and the waveform data (number of waveform data points and waveform data) of the waveform output function, and writes the data to the buffer memory of the digital-analog converter module.						
Symbol	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>CSV file name — S : i_sFileName</p> <p>Module type — UW : i_uUnitType</p> </div> <div style="border: 1px solid black; padding: 10px; text-align: center; width: fit-content;"> <p>M+R60DA_WaveDataStoreCsv</p> </div> <div style="margin-left: 20px;"> <p>o_bENO : B — Execution status</p> <p>o_bOK : B — Normal completion</p> <p>o_bErr : B — Error completion</p> <p>o_uErrId : UW — Error code</p> </div> </div>						
Relevant devices	<table border="1" style="width: 100%;"> <tr> <td>Relevant modules</td> <td>R60DA4, R60DAV8, R60DAI8</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60DA4, R60DAV8, R60DAI8	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60DA4, R60DAV8, R60DAI8						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	660 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>As i_bEN (execution command) turns on, the FB reads out the parameters and waveform data of the waveform output function from the CSV file, which is stored in the SD memory card inserted in the CPU module, and stores the data to the buffer memory of the digital-analog converter module. For the waveform output function, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> <li>For the parameters and data of the waveform output function and the buffer memory address of storage destination, which are related to this FB, refer to Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory (☞ Page 36 Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory). At first, the FB reads all the parameters of the waveform output function from the CSV file, and stores them in the buffer memory. Next, the FB reads the waveform data, the number of which is specified by the number of waveform data points in the row 100 in the CSV file, in the order starting from the row 101, and stores the data in the order from the start address (UnG10000) of the waveform data registration area in the buffer memory. The CSV file has the settings for eight channels. The number of channels to be used depends on the module type. Note that the waveform output data creation tool of GX Works3 makes it easy to create the CSV file of the waveform output function.</li> <li>If this FB is executed with no SD memory card inserted into the CPU module, o_bErr (error completion) turns on and the processing of the FB is interrupted. In addition, the error code 202H is stored in o_uErrId (error code). For the error code, refer to the list of error codes. (☞ Page 26 Error code)</li> <li>If this FB is executed with the special relay SM606 (SD memory card forced disable instruction) turning on, o_bErr (error completion) turns on and the processing of the FB is interrupted. In addition, the error code 201H is stored in o_uErrId (error code). For the error code, refer to the list of error codes. (☞ Page 26 Error code)</li> <li>If a CSV file specified by i_sFileName (CSV file name) does not exist in the SD memory card inserted into the CPU module, a CPU error (error code: 8002H) occurs.</li> <li>A setting that the CPU module enters a stop error state during a CPU error does not allow o_bErr (error completion) and o_uErrId (error code) to be updated. The operating status (continue/stop) of the CPU module that results from a CPU error can be set in [RAS Setting]. ("File Name Specification Incorrect" in "CPU Module Operation Setting at Error Detected" from [CPU Parameter] - [RAS Setting])</li> <li>Before processing of the FB is complete, turning off i_bEN (execution command) results in the processing being interrupted. In this case, the data that is already stored in the buffer memory is not cleared. Executing the FB once again allows read processing to start from the beginning.</li> <li>Do not remove the SD memory card while this FB is being executed. For how to insert and remove an SD memory card, refer to the MELSEC iQ-R CPU Module User's Manual (Startup).</li> </ul>						
FB compilation method	Macro type						
FB operation	Pulse execution type (multiple scan execution type)						

Item	Description
Timing chart of I/O signals	<p> <span style="color: black;">■</span> When the operation is completed successfully                     </p> <p> <span style="color: black;">■</span> When the operation is completed with an error                     </p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• This FB takes some time to complete the processing because a large number of scans is necessary until the completion of the processing. Thus, the recommended use is to execute the FB during a warm-up of the R60DA4, R60DAV8, or R60DAI8.</li> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• This FB makes use of the SP.FREAD instruction, and so an error in the execution of the SP.FREAD instruction causes a CPU error.</li> <li>• When processing that accesses the SD memory card, such as the data logging function of the CPU module, is executed together with this FB, the time to complete the execution of the FB may be extended or the error 204H (timeout) may occur.</li> <li>• If more than one of this FB is used, simultaneous execution is not possible.</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• Putting the R60DA4, R60DAV8, or R60DAI8 into operation requires the output range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> </ul>

## Error code

Error code	Description	Action
102H	The module type is set out of the range. Set the module type to the following values. • R60DA4: 0 • R60DAV8: 1 • R60DAI8: 2	Review and correct the settings and then execute the FB again.
201H	An access to the SD memory card has failed because SM606 (SD memory card forced disable instruction) is turned on.	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 that has the target CSV files into the CPU module, and execute the FB again. Insert a usable SD memory card in the CPU module, and save the target CSV file with the PLC user data write function of GX Works3. Then, execute the FB again.
203H	An access to the SD memory card has failed because SM605 (Memory card insertion/removal inhibit flag) is off (removal allowed).	Turn on (removal inhibited) SM605 (Memory card insertion/removal inhibit flag), and 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 waveform data reading processing.	Reduce the frequency of the access to the SD memory card.
Error codes other than the above	Error codes related to the SP.FREAD instruction executed when the parameter and waveform data of the waveform output function are read from the SD memory card	For details on the error code that has occurred, refer to the description of the SP.FREAD instruction. (MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks))

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.
CSV file name	i_sFileName	Character string [unicode]	Within 64 characters	Specifies a name of the CSV file in which the parameters and waveform data of the waveform output function are stored. Only the file attribute CSV is valid. For details on the CSV file format, refer to the following: Page 38 CSV File Format of the FB for Reading Wave Data (CSV File)
Module type	i_uUnitType	Word [unsigned]	0: R60DA4 1: R60DAV8 2: R60DAI8	Specifies a module type.

### Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that writing the parameters and waveform data of the waveform output function in the CSV file to the buffer memory of the digital-analog converter module is complete.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

# 3.5 M+R60DA\_WaveDataStoreDev

## Name

M+R60DA\_WaveDataStoreDev

## FB details

Item	Description						
Functional overview	Reads out data from the file register (ZR) that holds the parameters and the waveform data (number of waveform data points and waveform data) of the waveform output function, and writes the data to the buffer memory of the digital-analog converter module.						
Symbol	<p>The symbol diagram for M+R60DA_WaveDataStoreDev shows the following connections:</p> <ul style="list-style-type: none"> <li>Execution command: B : i_bEN</li> <li>Module label: DUT : i_stModule</li> <li>Read start address: UD : i_udReadDataAddr</li> <li>Module type: UW : i_uUnitType</li> <li>o_bENO : B (Execution status)</li> <li>o_bOK : B (Normal completion)</li> <li>o_bErr : B (Error completion)</li> <li>o_uErrId : UW (Error code)</li> </ul>						
Relevant devices	<table border="1"> <tr> <td>Relevant modules</td> <td>R60DA4, R60DAV8, R60DAI8</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60DA4, R60DAV8, R60DAI8	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60DA4, R60DAV8, R60DAI8						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	668 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>As i_bEN (execution command) turns on, the FB reads the parameters and waveform data of the waveform output function from the file register in the serial number access method (ZR), and stores them in the buffer memory of the digital-analog converter module. For the waveform output function, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> <li>For the parameters and data of the waveform output function and the buffer memory address of storage destination, which are related to this FB, refer to Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory (Page 36 Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory).</li> <li>This FB reads the parameters of the waveform output function from ZR (m+0) specified by i_udReadDataAddr (read start address), and stores them in the buffer memory. Next, the FB reads the waveform data, the number of which is specified by the number of waveform data points in ZR (m+98, 99), in the order starting from ZR (m+100), and stores the data in the order from the start address (Un\G10000) of the waveform data registration area in the buffer memory. Note that the waveform output data creation tool of GX Works3 makes it easy to create the data of the file register (ZR) of the wave output function. The character m is the read start address of the file register (ZR). Specifying the number of points to be used in [File Setting] allows the reservation of file registers for any desired number and the distribution of data at any desired address. ([Parameter] - Model of the CPU module - [CPU parameter] - "File Register Setting" of [File setting])</li> <li>For the file registers (ZR) to be used, reserve the number of points no less than the number of waveform data points plus 100 points. Under the condition that the number of points of the file register (ZR) specified by i_udReadDataAddr (read start address) is less than the number of waveform data points of ZR (m+98, 99) plus 100 points, an execution of the FB results in the file register (ZR) exceeding the allowable range, causing a CPU error (error code: 4101H).</li> <li>Before processing of the FB is complete, turning off i_bEN (execution command) results in the processing being interrupted. In this case, the data that is already stored in the buffer memory is not cleared. Executing the FB once again allows read processing to start from the beginning.</li> </ul>						
FB compilation method	Macro type						
FB operation	Pulse execution type (multiple scan execution type)						

Item	Description
Timing chart of I/O signals	<p>■When the operation is completed successfully</p> <p>■When the operation is completed with an error</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• This FB takes some time to complete the processing because a large number of scans is necessary until the completion of the processing. Thus, the recommended use is to execute the FB during a warm-up of the R60DA4, R60DAV8, or R60DAI8.</li> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• If more than one of this FB is used, simultaneous execution is not possible.</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• Putting the R60DA4, R60DAV8, or R60DAI8 into operation requires the output range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> </ul>

## Error code

Error code	Description	Action
102H	<p>The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60DA4: 0</li> <li>• R60DAV8: 1</li> <li>• R60DAI8: 2</li> </ul>	Review and correct the settings and then execute the FB again.

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.
Reading start address	i_udReadDataAddr	Double Word [unsigned]	Valid device range	Specifies the start address of the file register (ZR) in which the parameters and waveform data of the waveform output function are stored.
Module type	i_uUnitType	Word [unsigned]	0: R60DA4 1: R60DAV8 2: R60DAI8	Specifies a module type.

### Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that writing the parameters and waveform data of the waveform output function in the file register (ZR) to the buffer memory of the digital-analog converter module is complete.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

# 3.6 M+R60DA\_WaveOutputReqSetting

## Name

M+R60DA\_WaveOutputReqSetting

## FB details

Item	Description						
Functional overview	Specifies whether to start, stop, or pause the waveform output of a specified channel or all channels.						
Symbol	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="width: 30%;"> <p>Execution command — B : i_bEN</p> <p>Module label — DUT : i_stModule</p> <p>Target CH — UW : i_uCH</p> <p>Wave output start/stop request — UW : i_uStartStopReq</p> <p>Module type — UW : i_uUnitType</p> </div> <div style="width: 40%; border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">M+R60DA_WaveOutReqSetting</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>o_bENO : B</p> <p>o_bOK : B</p> <p>o_uWaveStatusCH1 : UW</p> <p>o_uWaveStatusCH2 : UW</p> <p>o_uWaveStatusCH3 : UW</p> <p>o_uWaveStatusCH4 : UW</p> <p>o_uWaveStatusCH5 : UW</p> <p>o_uWaveStatusCH6 : UW</p> <p>o_uWaveStatusCH7 : UW</p> <p>o_uWaveStatusCH8 : UW</p> <p>o_bErr : B</p> <p>o_uErrId : UW</p> </div> <div style="width: 45%;"> <p>— Execution status</p> <p>— Normal completion</p> <p>— CH1 Wave output status monitor</p> <p>— CH2 Wave output status monitor</p> <p>— CH3 Wave output status monitor</p> <p>— CH4 Wave output status monitor</p> <p>— CH5 Wave output status monitor</p> <p>— CH6 Wave output status monitor</p> <p>— CH7 Wave output status monitor</p> <p>— CH8 Wave output status monitor</p> <p>— Error completion</p> <p>— Error code</p> </div> </div> </div> </div>						
Relevant devices	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Relevant modules</td> <td>R60DA4, R60DAV8, R60DAI8</td> </tr> <tr> <td>Relevant CPU modules</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Relevant engineering tool</td> <td>GX Works3</td> </tr> </table>	Relevant modules	R60DA4, R60DAV8, R60DAI8	Relevant CPU modules	MELSEC iQ-R series CPU modules	Relevant engineering tool	GX Works3
Relevant modules	R60DA4, R60DAV8, R60DAI8						
Relevant CPU modules	MELSEC iQ-R series CPU modules						
Relevant engineering tool	GX Works3						
Language to use	Ladder diagram						
Number of basic steps	587 steps The number of steps of the FB embedded in a program depends on the CPU model used and the input/output definitions.						
Functional description	<ul style="list-style-type: none"> <li>• As i_bEN (execution command) turns on, a start or stop request for the waveform output of a specified channel or all channels is written to the buffer memory.</li> <li>• As i_bEN (execution command) turns on, the FB outputs the values of CH□ Waveform output status monitor (UnG401, UnG601, UnG801, UnG1001, UnG1201, UnG1401, UnG1601, UnG1801). When an individual channel is specified in the input label, only this specified channel updates a waveform output status monitor value and the other channels output 0. When all channels are specified in the input label, all the channels output waveform output status monitor values. The number of channels with all channels specified depends on the module type.</li> <li>• As i_bEN (execution command) turns on, the FB always starts its execution.</li> <li>• To start waveform output once again, after the waveform output ends, change i_uStartStopReq (waveform output start/stop request) from 1 (waveform output start request) to 0 (waveform output stop request), and then set 1 (waveform output start request) again.</li> <li>• The waveform output setting is enabled only when the output mode setting is set to the waveform output mode.</li> <li>• 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. (Page 31 Error code)</li> </ul>						
FB compilation method	Macro type						
FB operation	Arbitrary execution type						



Item	Description
Timing chart of I/O signals	<p>■When the operation is completed successfully</p> <p>■When the operation is completed with an error</p>
Restrictions and precautions	<ul style="list-style-type: none"> <li>• 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.</li> <li>• The FB cannot be used in an interrupt program.</li> <li>• 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.</li> <li>• To use more than one of this FB, care must be taken to avoid duplication of the target channel.</li> <li>• The FB requires the configuration of the ladder for every input label.</li> <li>• Putting the R60DA4, R60DAV8, or R60DAI8 into operation requires the output range to be set according to the connected devices and the system in use. Set up the module parameters of GX Works3 according to the application. For how to set up the module parameters, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).</li> </ul>

## Error code

Error code	Description	Action
100H	<p>The target channel is set out of the range. Set the target channel within the following range.</p> <ul style="list-style-type: none"> <li>• R60DA4: 1 to 4, 15</li> <li>• R60DAV8/R60DAI8: 1 to 8, 15</li> </ul>	Review and correct the settings and then execute the FB again.
102H	<p>The module type is set out of the range. Set the module type to the following values.</p> <ul style="list-style-type: none"> <li>• R60DA4: 0</li> <li>• R60DAV8: 1</li> <li>• R60DAI8: 2</li> </ul>	Review and correct the settings and then execute the FB again.

## Labels to use

### Input labels

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specifies a module label of the digital-analog converter module.
Target channel	i_uCH	Word [unsigned]	For the R60DA4 • 1 to 4, 15 For the R60DAV8 and R60DAI8 • 1 to 8, 15	For the R60DA4 • 1 to 4: The corresponding channel number is specified. • 15: All channels are specified. For the R60DAV8 and R60DAI8 • 1 to 8: The corresponding channel number is specified. • 15: All channels are specified.
Waveform output start/stop request	i_uStartStopReq	Word [unsigned]	0: Waveform output stop request 1: Waveform output start request 2: Waveform output pause request	Specifies a start or stop request for the waveform output.
Module type	i_uUnitType	Word [unsigned]	0: R60DA4 1: R60DAV8 2: R60DAI8	Specifies a module type.

### Output labels

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the execution of the FB is normal.
CH1 Waveform output status monitor	o_uWaveStatusCH1	Word [unsigned]	0	Outputs the value of the waveform output status (stopped, output, or paused). 0: Waveform output stopped 1: Waveform output 2: Waveform output paused 3: Waveform output step execution The FB is not capable of executing the waveform output step execution function. To execute the function, use the device/buffer memory batch monitor of GX Works3. For details, refer to the MELSEC iQ-R Digital-Analog Converter Module User's Manual (Application).
CH2 Waveform output status monitor	o_uWaveStatusCH2	Word [unsigned]	0	
CH3 Waveform output status monitor	o_uWaveStatusCH3	Word [unsigned]	0	
CH4 Waveform output status monitor	o_uWaveStatusCH4	Word [unsigned]	0	
CH5 Waveform output status monitor	o_uWaveStatusCH5	Word [unsigned]	0	
CH6 Waveform output status monitor	o_uWaveStatusCH6	Word [unsigned]	0	
CH7 Waveform output status monitor	o_uWaveStatusCH7	Word [unsigned]	0	
CH8 Waveform output status monitor	o_uWaveStatusCH8	Word [unsigned]	0	
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.





## ■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: * <sup>1</sup>	5	Hold trigger generation time <sup>2,3</sup>	23
		I/O: * <sup>1</sup>	4	XY address numbers of the module from which logging data is acquired <sup>4</sup>	4
		CH: * <sup>1</sup>	3	Target channel <sup>4</sup>	1
		CYCLE: * <sup>1</sup>	6	Logging cycle <sup>3</sup>	3 to 17
Column 2	Trigger generation information column	Trigger	7	—	7
		—	—	— (NULL) <sup>5</sup>	1 to 15

\*1 A single-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 single-width space is inserted between s and ms, and ms and μs in the data of CH□ Logging cycle monitor, respectively. (For example, if either of the R60AD4, R60ADV8, or R60ADI8 has a logging cycle of 3599 seconds, with a target of 3 channel logging, the logging cycle is 3598 seconds 999ms 920μs, which is displayed as "3599s 999ms 920μs".)

\*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 for the R60AD4, R60ADV8, and R60ADI8; 130 bytes for the R60AD8-G and R60AD16-G), 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 the analog-digital converter module	1 to 6 <sup>1</sup>
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.

# Appendix 2 Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory

The following table lists the relationship between the storage source "Parameter/data of the waveform output function" and the storage destination buffer memory, both of which are handled by M+R60DA\_WaveDataStoreCsv (wave data read (CSV File)) and M+R60DA\_WaveDataStoreDev (wave data read (device)).

Save the parameter/data in the table to the file register (ZR) shown in the storage source in advance. The number of channels to be used depends on the module type.

No.*1	Parameter/data of the waveform output function	Setting range (decimal)	CH	Storage source			Storage destination
				CSV file in SD memory card		File register in the serial number access method (ZR) (m: Read start address)	
				Row	Column		
1	Output selection during waveform output stop Select the output during waveform output stop for each channel.	0: 0V/0mA 1: Offset value 2: Output setting value during waveform output stop	1	1	1	ZR (m+0)	UnlG524
			2	1	2	ZR (m+1)	UnlG724
			3	1	3	ZR (m+2)	UnlG924
			4	1	4	ZR (m+3)	UnlG1124
			5	1	5	ZR (m+4)	UnlG1324
			6	1	6	ZR (m+5)	UnlG1524
			7	1	7	ZR (m+6)	UnlG1724
			8	1	8	ZR (m+7)	UnlG1924
2	Output setting value during waveform output stop When "Output selection during waveform output stop" is set to "2": Output setting value during waveform output stop", set the value to be output for each channel.	0 to 32767 (practical range: 0 to 32000)*2	1	2	1	ZR (m+8)	UnlG525
			2	2	2	ZR (m+9)	UnlG725
			3	2	3	ZR (m+10)	UnlG925
			4	2	4	ZR (m+11)	UnlG1125
		-32768 to 32767 (practical range: -32000 to 32000)*3	5	2	5	ZR (m+12)	UnlG1325
			6	2	6	ZR (m+13)	UnlG1525
			7	2	7	ZR (m+14)	UnlG1725
			8	2	8	ZR (m+15)	UnlG1925
3	Waveform pattern start address setting Set the start address of the waveform pattern to be output for each channel.	10000 to 89999	1	3	1, 2	ZR (m+16, 17)	UnlG526, UnlG527
			2	3	3, 4	ZR (m+18, 19)	UnlG726, UnlG727
			3	3	5, 6	ZR (m+20, 21)	UnlG926, UnlG927
			4	3	7, 8	ZR (m+22, 23)	UnlG1126, UnlG1127
			5	3	9, 10	ZR (m+24, 25)	UnlG1326, UnlG1327
			6	3	11, 12	ZR (m+26, 27)	UnlG1526, UnlG1527
			7	3	13, 14	ZR (m+28, 29)	UnlG1726, UnlG1727
			8	3	15, 16	ZR (m+30, 31)	UnlG1926, UnlG1927
4	Number of waveform pattern points setting Set the number of data points of the waveform pattern to be output for each channel.	1 to 80000 (point)	1	4	1, 2	ZR (m+32, 33)	UnlG528, UnlG529
			2	4	3, 4	ZR (m+34, 35)	UnlG728, UnlG729
			3	4	5, 6	ZR (m+36, 37)	UnlG928, UnlG929
			4	4	7, 8	ZR (m+38, 39)	UnlG1128, UnlG1129
			5	4	9, 10	ZR (m+40, 41)	UnlG1328, UnlG1329
			6	4	11, 12	ZR (m+42, 43)	UnlG1528, UnlG1529
			7	4	13, 14	ZR (m+44, 45)	UnlG1728, UnlG1729
			8	4	15, 16	ZR (m+46, 47)	UnlG1928, UnlG1929

No.*1	Parameter/data of the waveform output function	Setting range (decimal)	CH	Storage source			Storage destination
				CSV file in SD memory card		File register in the serial number access method (ZR) (m: Read start address)	
				Row	Column		
5	Number of waveform outputs setting Set the number of output times of the waveform pattern for each channel.	-1: Infinite repetition output 1 to 32767: Specified number of times output	1	5	1	ZR (m+48)	Un\G530
				5	2	ZR (m+49)	Un\G730
				5	3	ZR (m+50)	Un\G930
				5	4	ZR (m+51)	Un\G1130
				5	5	ZR (m+52)	Un\G1330
				5	6	ZR (m+53)	Un\G1530
				5	7	ZR (m+54)	Un\G1730
				5	8	ZR (m+55)	Un\G1930
6	Waveform output conversion cycle constant Set the constant used to determine the conversion cycle for each channel. (Specify a multiple of the conversion speed.)	1 to 5000	1	6	1	ZR (m+56)	Un\G531
				6	2	ZR (m+57)	Un\G731
				6	3	ZR (m+58)	Un\G931
				6	4	ZR (m+59)	Un\G1131
				6	5	ZR (m+60)	Un\G1331
				6	6	ZR (m+61)	Un\G1531
				6	7	ZR (m+62)	Un\G1731
				6	8	ZR (m+63)	Un\G1931
7	Number of waveform data points Set the total number of the waveform data points.	80000 (point)	—	100	1, 2	ZR (m+98, 99)	—
8	Waveform data	-32768 to 32767 (practical range: -32000 to 32000)		101 to 80100	1	ZR (m+100) to ZR (m+80099)	Un\G10000 to Un\G89999

\*1 No.1 to No.8 correspond to the No.1 to No.8 described in the following page. For details on each item, refer to the following:

 Page 38 Contents of rows and columns in a CSV file

\*2 When a digital-analog converter module has an output range of 0 to 5V, 1 to 5V, 0 to 20mA, or 4 to 20mA.

\*3 When a digital-analog converter module has an output range of -10 to 10V.

# Appendix 3 CSV File Format of the FB for Reading Wave Data (CSV File)

This section describes the CSV file format that M+R60DA\_WaveDataStoreCsv (Wave data read (CSV File)) can handle.

## Specifications of CSV format

Item	Description
Delimiter	Comma (,)
Line feed code	CRLF (ODH, OAH)
Character code	ASCII or Shift JIS

## CSV file name

The number of characters of the CSV file name must be 64 or less including the extension ".CSV".

**Ex.**

R60DA\_1.csv, wd000001.csv, WAVEdata.csv

## Contents of rows and columns in a CSV file

The following figure is an example of how a CSV file contains data in its rows and columns. This example assumes that the number of wave data points is a maximum of 80000 points.

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8								
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Column →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
No.1 Output setting during wave output stop <sup>*1*2</sup>	1	1	1	1	1	1	1	1								
No.2 Output value during wave output stop <sup>*1*2</sup>	2	0	0	0	0	0	0	0								
No.3 Wave pattern start address setting <sup>*1*2</sup>	3	0, 10000,	0, 20000,	0, 30000,	0, 40000,	0, 50000,	0, 60000,	1, 4464,	1, 14464							
No.4 Wave pattern points setting <sup>*1*2</sup>	4	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,	0, 10000,
No.5 Wave pattern output repetition setting <sup>*1*2</sup>	5	1, 10000,	20000,	32767,	1, 10000,	20000,	32767,									
No.6 Constant for wave output conversion cycle <sup>*1*2</sup>	6	1,	1,	1,	1,	1,	1,	1,	1,							
No.7 Number of wave data <sup>*1*2</sup>	100	1,	14464													
	101	0														
No.8 Wave data <sup>*1*2</sup>	80099	10														
	80100	5														
	↑	Row														

\*1 No.1 to No.8 correspond to the No.1 to No.8 described in the following page. For details on each item, refer to the following:

☞ Page 36 Storage Source "Parameter/Data of Waveform Output Function" and Storage Destination Buffer Memory

\*2 Always make settings for eight channels regardless of the number of channels of the digital-analog converter module.





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# REVISIONS

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

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January 2015	BCN-P5999-0375-B	■Added models R60AD8-G, R60AD16-G, R60DA8-G, R60DA16-G ■Added or modified parts Chapter 1, Section 2.1, 2.2, 2.3, 2.4, 3.1, 3.2, 3.3, Appendix 1, 2

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