MELSEC-L Digital-Analog Converter Module FB Library Reference Manual

Applicable module:
L60DA4

< CONTENTS >

Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M031-A	2010/06/28	First edition
FBM-M031-B	2010/10/29	Added "FB Version Upgrade History" except M+L60DA4_ShiftOperation.
FBM-M031-C	2011/04/30	Added "Overview", "Chinese version of GX Works2".
FBM-M031-D	2012/08/31	(1) Added a list of applicable modules. (2) Changed the formats of Applicable hardware and software and Error codes in Details of the FB Library. (3) Changed the item numbers of Function description and Restrictions and precautions in Details of the FB Library. (4) Added the applicable versions of the engineering software to Applicable hardware and software in Details of the FB Library. (5) Added descriptions on the setting values of input labels to Appendix 1. FB Library Application Examples. (6) Added the following FB library. •M+L60DA4_WaveDataStoreCsv •M+L60DA4_WaveDataStoreDev •M+L60DA4_WaveOutputSetting •M+L60DA4_WaveOutputReqSetting

1. Overview

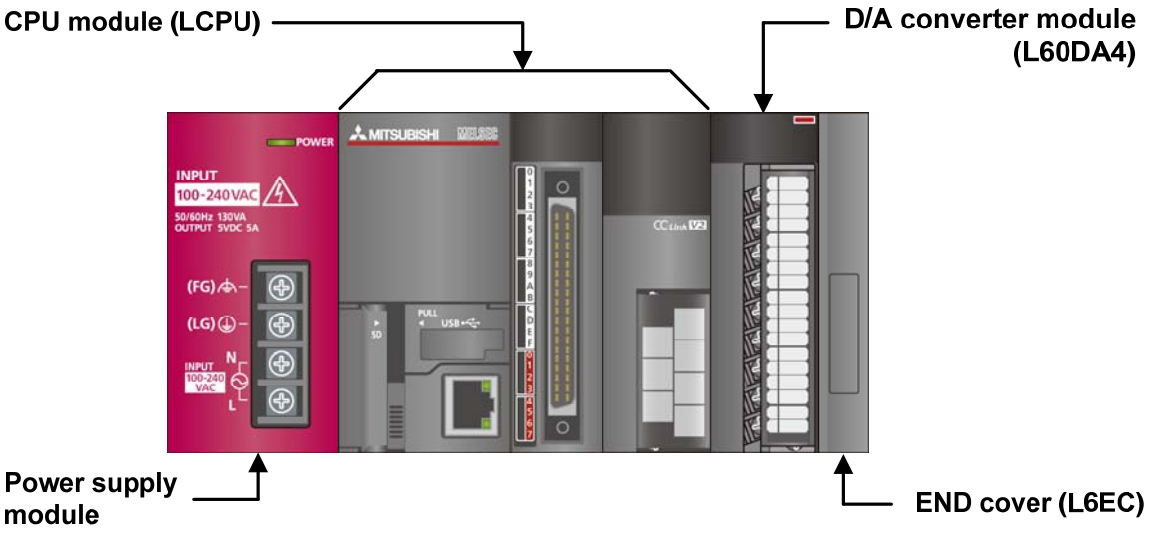
1.1 Overview of the FB Library

This FB library is for using the MELSEC-L L60DA4 digital-analog converter module.

1.2 Function of the FB Library

Item	Description
M+L60DA4_WriteDAVal	Write a DA conversion data value for a specified channel.
M+L60DA4_WriteAllDAVal	Write DA conversion data values for all specified channels.
M+L60DA4_SetDAConversion	Enable or disable DA conversion for a specified channel or all channels.
M+L60DA4_SetDAOutput	Enable or disable DA output for a specified channel or all channels.
M+L60DA4_SetScaling	Configure a specified channel's scaling function settings.
M+L60DA4_SetAlarm	Configure the warning output settings for a specified channel.
M+L60DA4_RequestSetting	Make changes made to each function's operational condition settings effective (valid).
M+L60DA4_SetOffsetVal	Set the offset value of a specified channel.
M+L60DA4_SetGainVal	Set the gain value of a specified channel.
M+L60DA4_ShiftOperation	Add the desired shift amount to a digital value.
M+L60DA4_ErrorOperation	Perform monitoring and reset of intelligent function module error codes.
M+L60DA4_OGBackup	Read the offset and gain values from the user range setting, and save to file.
M+L60DA4_OGRestore	Restore the user range offset / gain settings to a module from a file.
M+L60DA4_WaveDataStoreCsv	Read the wave output function parameters and wave data (wave data points and wave data) from the CSV file, and write them to the buffer memory of the D/A converter module.
M+L60DA4_WaveDataStoreDev	Read the wave output function parameters and wave data (wave data points and wave data) from the file register (ZR), and write them to the buffer memory of the D/A converter module.
M+L60DA4_WaveOutputSetting	Configure the wave output setting for a specified channel or all channels.
M+L60DA4_WaveOutputReqSetting	Specify a start, stop or temporary stop of the wave output for a specified channel or all channels.

1.3 System Configuration Example



1.4 Relevant Manual

•MELSEC-L Digital-Analog Converter Module User's Manual

•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

•GX Works2 Version1 Operating Manual (Common)

•GX Works2 Version1 Operating Manual (Simple Project, Function Block)

1.5 Note

Please make sure to read user's manuals for the corresponding products before using the products.

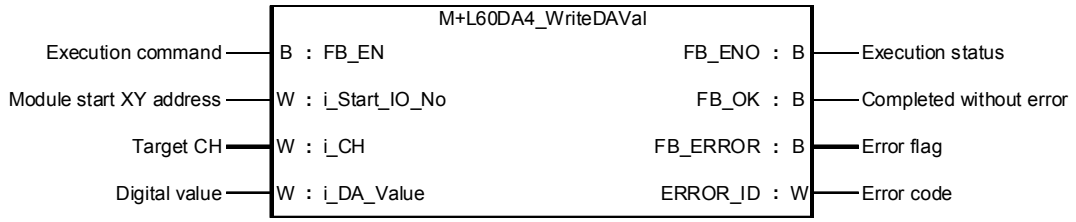
2. Details of the FB Library

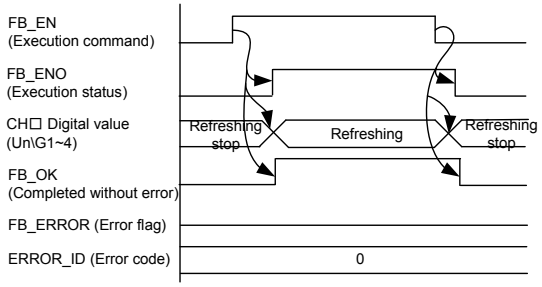
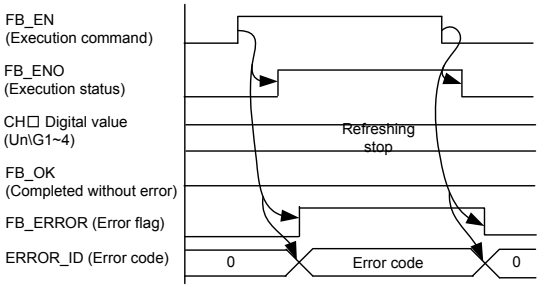
2.1 M+L60DA4_WriteDAVal (Write a digital conversion value)

FB Name

M+L60DA4_WriteDAVal

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Write a DA conversion data value for a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">215 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Write a digital value for a specified channel when FB_EN (Execution command) turns ON. 2) The digital value written depends on the output range setting. In addition, if the scaling function is enabled, the DA conversion is executed after scaling processing of the digital value is completed. 3) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details. 4) If the Intelligent function module is set to auto refresh the digital output value, it is unnecessary to use this FB.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4	Specify the CH number.
Digital value	i_DA_Value	Word	-32,000~32,000	Specify a digital value. When using output range and scaling functions, the available range is decreased.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the digital value is being written and there is no error.

Name (Comment)	Label name	Data type	Initial value	Description
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

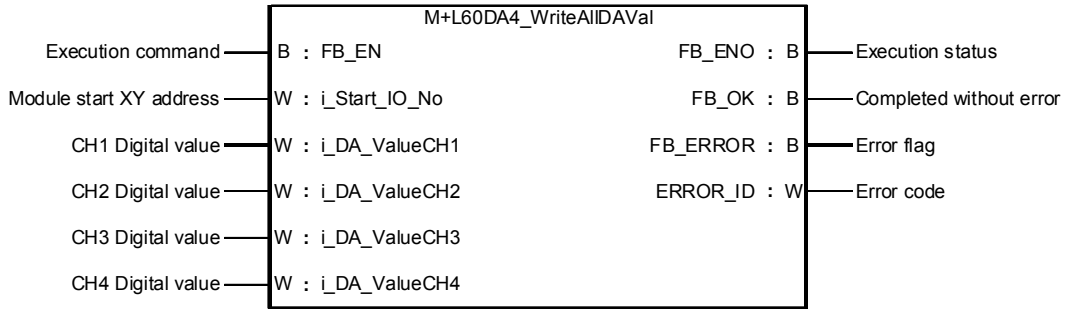
This chapter includes information related to the M+L60DA4_WriteDAVal function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

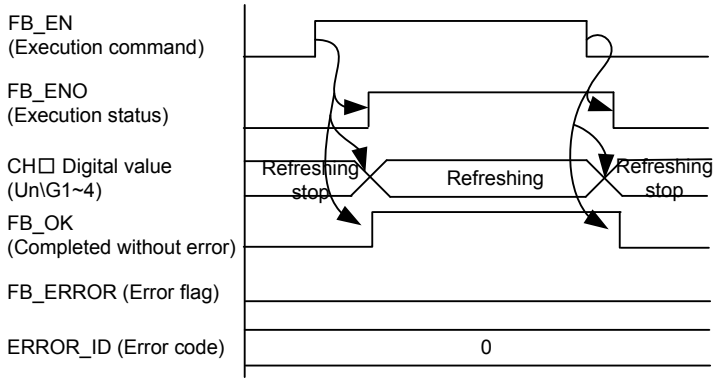
2.2 M+L60DA4_WriteAllDAVal (Write digital conversion values to all CH)

FB Name

M+L60DA4_WriteAllDAVal

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Write DA conversion data values for all specified channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">197 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Digital values for all specified channels are written when FB_EN (Execution command) turns ON. 2) The digital values written depend on the output range setting. In addition, if the scaling function is enabled, the DA conversion is executed after scaling processing of the digital value is completed. 3) If the Intelligent function module is set to auto refresh digital output values, it is unnecessary to use this FB.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) This FB uses index registers Z8, and Z9. Please do not use these index registers in an interrupt program. 5) Every input must be provided a value for proper FB operation. 6) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
CH1 Digital value	i_DA_ValueCH1	Word	-32,000~32,000 *1	Specify a digital value for CH1. *1 The allowable setting range depends on the scaling function and output range setting.
CH2 Digital value	i_DA_ValueCH2	Word	-32,000~32,000 *1	Specify a digital value for CH2. *1 The allowable setting range depends on the scaling function and output range setting.
CH3 Digital value	i_DA_ValueCH3	Word	-32,000~32,000 *1	Specify a digital value for CH3. *1 The allowable setting range depends on the scaling function and output range setting.
CH4 Digital value	i_DA_ValueCH4	Word	-32,000~32,000 *1	Specify a digital value for CH4. *1 The allowable setting range depends on the scaling function and output range setting.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.

Name (Comment)	Label name	Data type	Initial value	Description
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the digital values are being written and there is no error.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

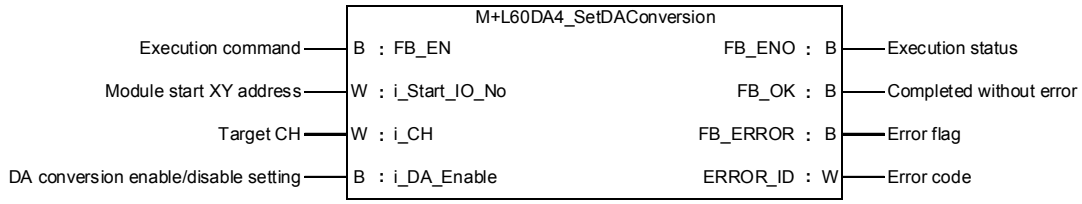
This chapter includes information related to the M+L60DA4_WriteAllDAVal function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

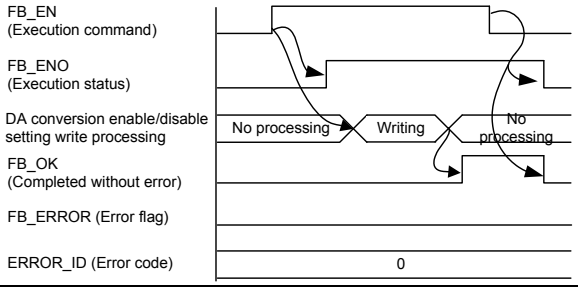
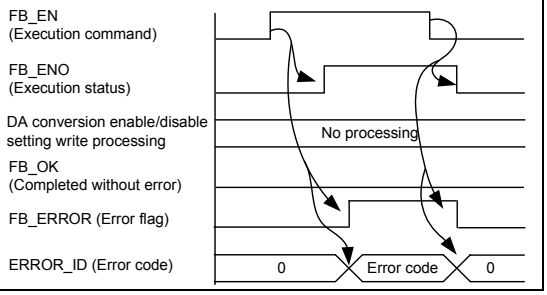
2.3 M+L60DA4_SetDAConversion (DA conversion enable/disable setting)

FB Name

M+L60DA4_SetDAConversion

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Enable or disable DA conversion for a specified channel or all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">269 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Enable or disable DA conversion for a specified channel or all channels when the FB_EN (Execution command) signal is turned ON. 2) FB operation is one-shot only, triggered by the FB_EN signal. 3) The new setting value will not take effect until the 'operation condition setting request' signal (Yn9) is turned (OFF->ON->OFF) or the Operation condition setting request FB (M+L60DA4_RequestSetting) is executed. 4) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4 or 15.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4 or 15	Specify a CH number, 1 to 4 or 15. Use 15 to specify all CH.
DA conversion enable/disable setting	i_DA_Enable	Bit	ON, OFF	ON: Enable DA conversion OFF: Disable DA conversion

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the DA conversion disable/enable setting has been completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

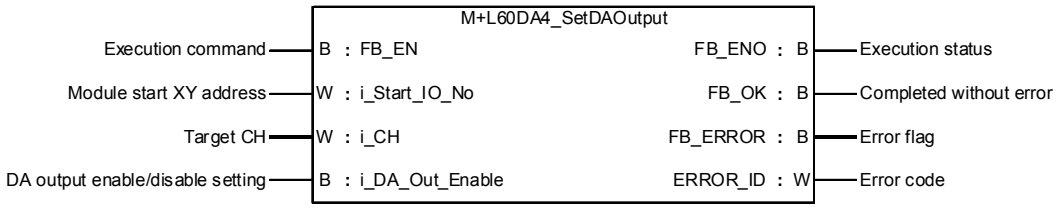
This chapter includes information related to the M+L60DA4_SetDAConversion function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

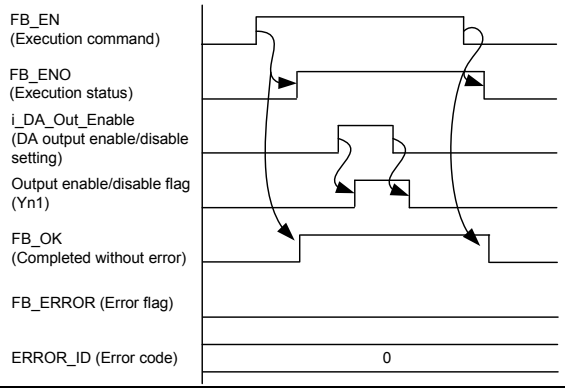
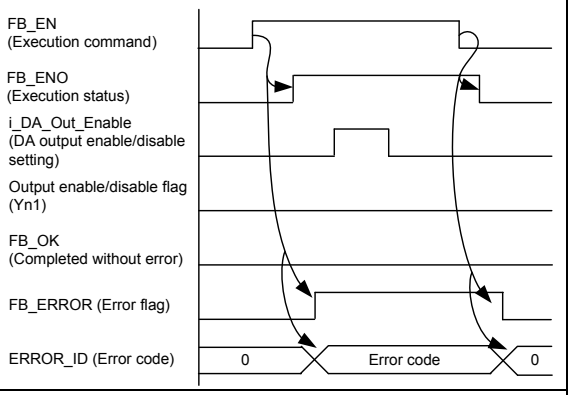
2.4 M+L60DA4_SetDAOutput (DA output enable/disable)

FB Name

M+L60DA4_SetDAOutput

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Enable or disable DA output for a specified channel or all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">242 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) Enable or disable DA output for a specified channel or all channels by turning on FB_EN (Execution command).
2) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID.
Refer to the error code explanation section for details.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z8, Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) Every input must be provided a value for proper FB operation. When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 8) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] (When using CH1)  [When an error occurs] (When using CH1) 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4 or 15.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4 or 15	Specify a CH number, 1 to 4 or 15. Use 15 to specify all CH.
DA output enable/disable setting	i_DA_Out_Enable	Bit	ON, OFF	ON: Enable DA output OFF: Disable DA output

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the DA output disable/enable setting has been completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

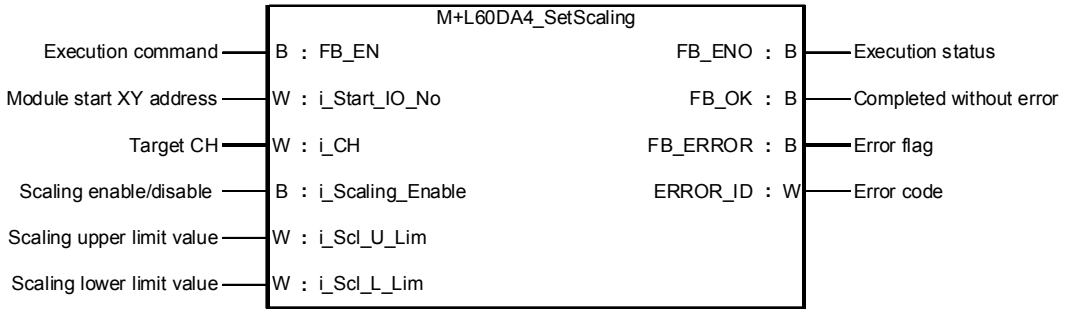
This chapter includes information related to the M+L60DA4_SetDAOutput function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

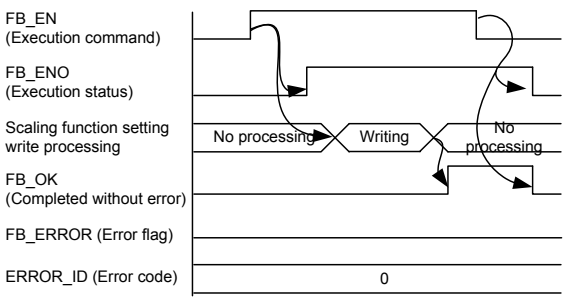
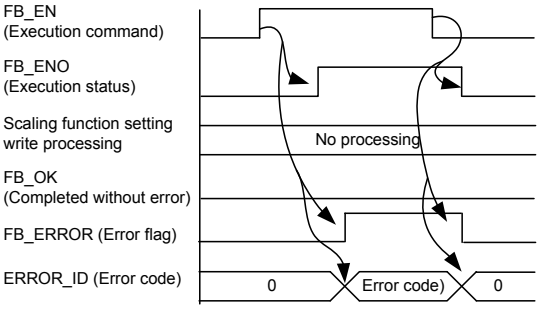
2.5 M+L60DA4_SetScaling (Scaling setting)

FB Name

M+L60DA4_SetScaling

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Configure a specified channel's scaling function settings.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">260 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Configure a specified channel's scaling function settings by turning on FB_EN (Execution command). 2) FB operation is one-shot only, triggered by the FB_EN signal. 3) The new setting will not take effect until the 'operation condition setting request' signal (Yn9) is turned (OFF->ON->OFF) or the operation condition setting request FB (M+L60DA4_RequestSetting) is executed. 4) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4	Specify the CH number.
Scaling enable/disable	i_Scaling_Enable	Bit	ON, OFF	ON: enabled OFF: disabled
Scaling upper limit value	i_Scl_U_Lim	Word	-32,000~32,000	Specify the scaling upper limit value.
Scaling lower limit value	i_Scl_L_Lim	Word	-32,000~32,000	Specify the scaling lower limit value.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the scaling function settings have been set.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

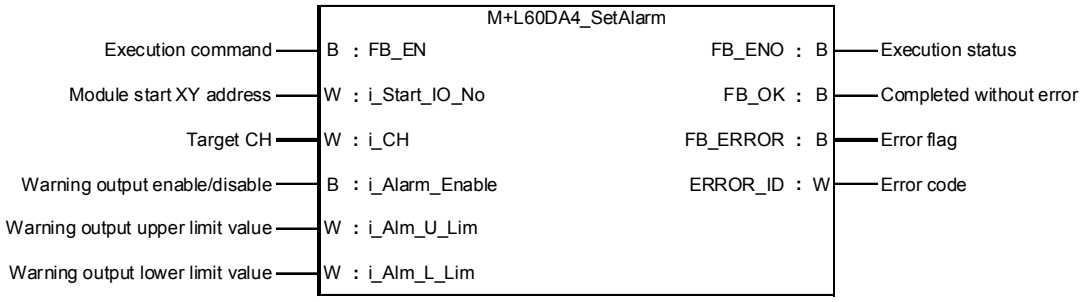
This chapter includes information related to the M+L60DA4_SetScaling function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

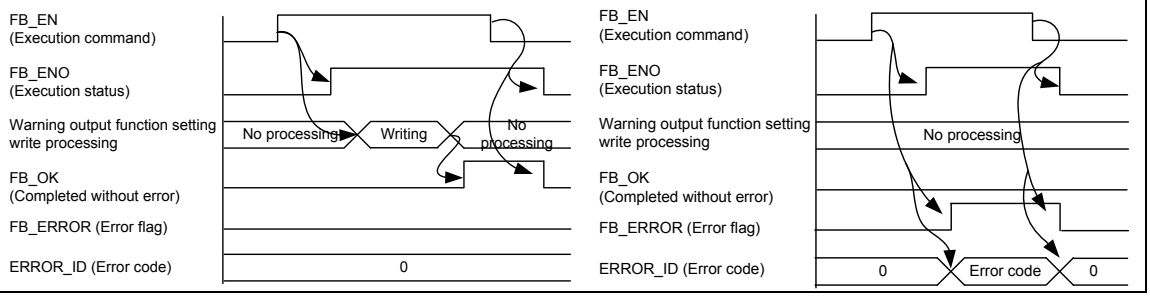
2.6 M+L60DA4_SetAlarm (Warning output setting)

FB Name

M+L60DA4_SetAlarm

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Configure the warning output settings for a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">243 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Configure the alarm warning output settings for a specified channel by turning on FB_EN (Execution command). 2) FB operation is one-shot only, triggered by the FB_EN signal. 3) The new setting will not take effect until the 'operation condition setting request' signal (Yn9) is turned (OFF->ON->OFF) or the Operation condition setting request FB (M+L60DA4_RequestSetting) is executed. 4) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4	Specify the CH number.
Warning output enable/disable	i_Alarm_Enable	Bit	ON, OFF	ON: enable OFF: disable
Warning output upper limit value	i_Alm_U_Lim	Word	-32,768~32,767	Specify the warning output upper limit value.
Warning output lower limit value	i_Alm_L_Lim	Word	-32,768~32,767	Specify the warning output lower limit value.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the warning output setting is complete.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

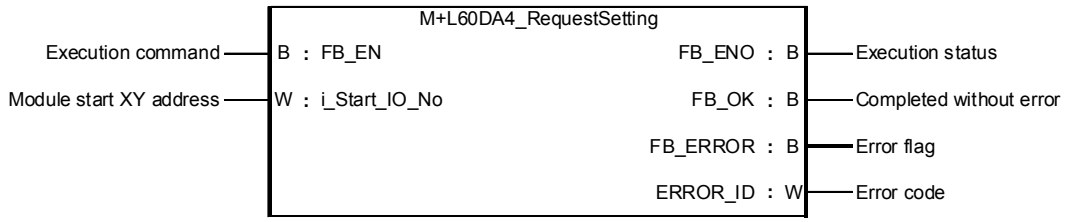
This chapter includes information related to the M+L60DA4_SetAlarm function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

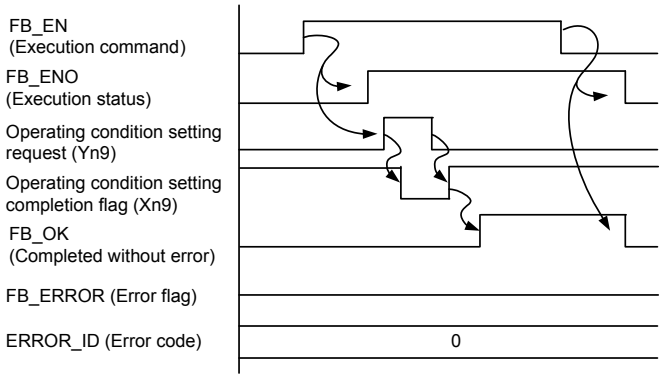
2.7 M+L60DA4_RequestSetting (Operating condition setting request)

FB Name

M+L60DA4_RequestSetting

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Make changes made to each function's operational condition settings effective (valid).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">179 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) Make changes made to each function's operational condition settings effective by turning on FB_EN (Execution command).
2) When FB_EN is turned ON, the FB will continue to execute until the settings for each function are completed.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The DA conversion process is interrupted by executing this FB. After the FB execution is complete and FB_OK turns ON, the DA conversion process will resume. 2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) The FB cannot be used in an interrupt program. 5) This FB uses index register Z9. Please do not use Z9 in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 8) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the operating condition settings have been completed.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

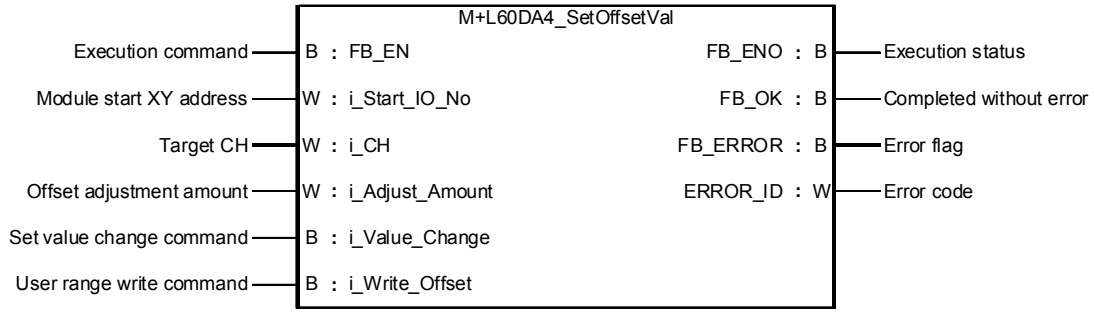
This chapter includes information related to the M+L60DA4_RequestSetting function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

2.8 M+L60DA4_SetOffsetVal (Offset setting)

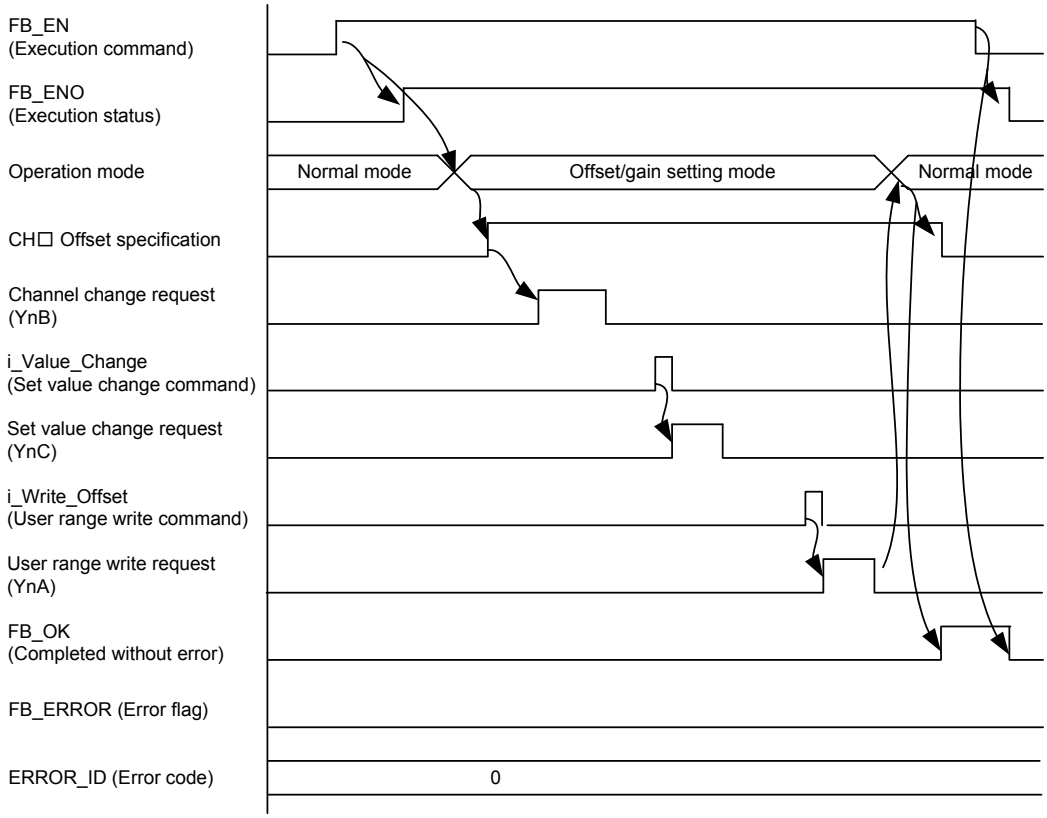
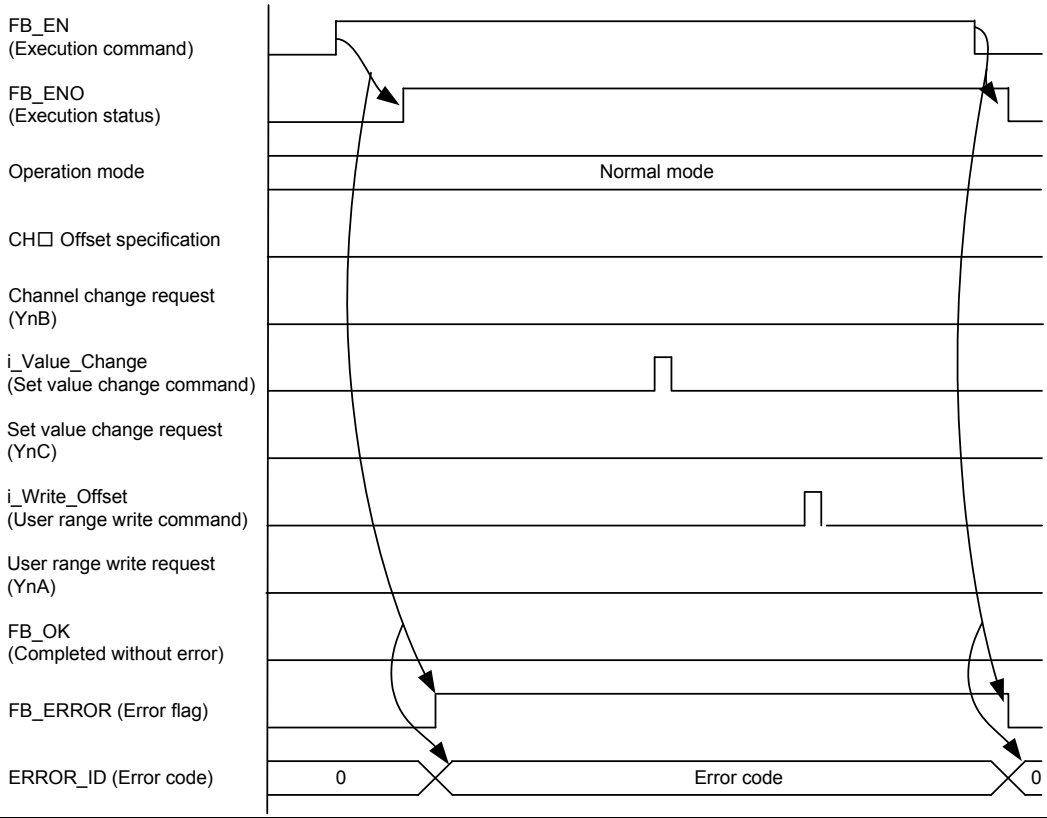
FB Name

M+L60DA4_SetOffsetVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Set the offset value of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">424 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Set the offset value of a specified channel by turning on FB_EN (Execution command). 2) To write the offset value, FB_EN, i_Write_Offset (User range write command), and i_Value_Change (Set value change command) must be ON. 3) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The DA conversion process is interrupted by executing this FB. After the FB execution is complete and FB_OK turns ON, the DA conversion process will resume. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 8) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4	Specify the CH number.
Offset adjustment amount	i_Adjust_Amount	Word	-3,000~3,000	Specify the DA output offset adjustment value.
Set value change command	i_Value_Change	Bit	ON, OFF	Turn ON to change the DA output to reflect changes made to the offset value. Please turn OFF after changing the offset.
User range write command	i_Write_Offset	Bit	ON, OFF	ON: The user range will be written. OFF: Nothing will be written.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that writing of the offset value has completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

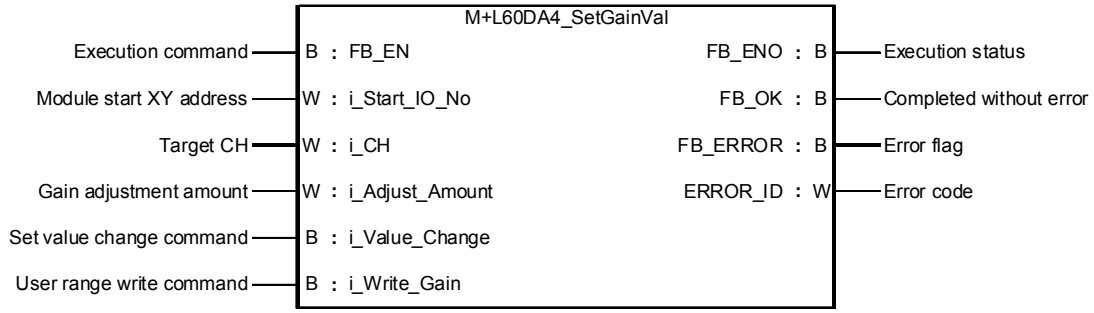
This chapter includes information related to the M+L60DA4_SetOffsetVal function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

2.9 M+L60DA4_SetGainVal (Gain setting)

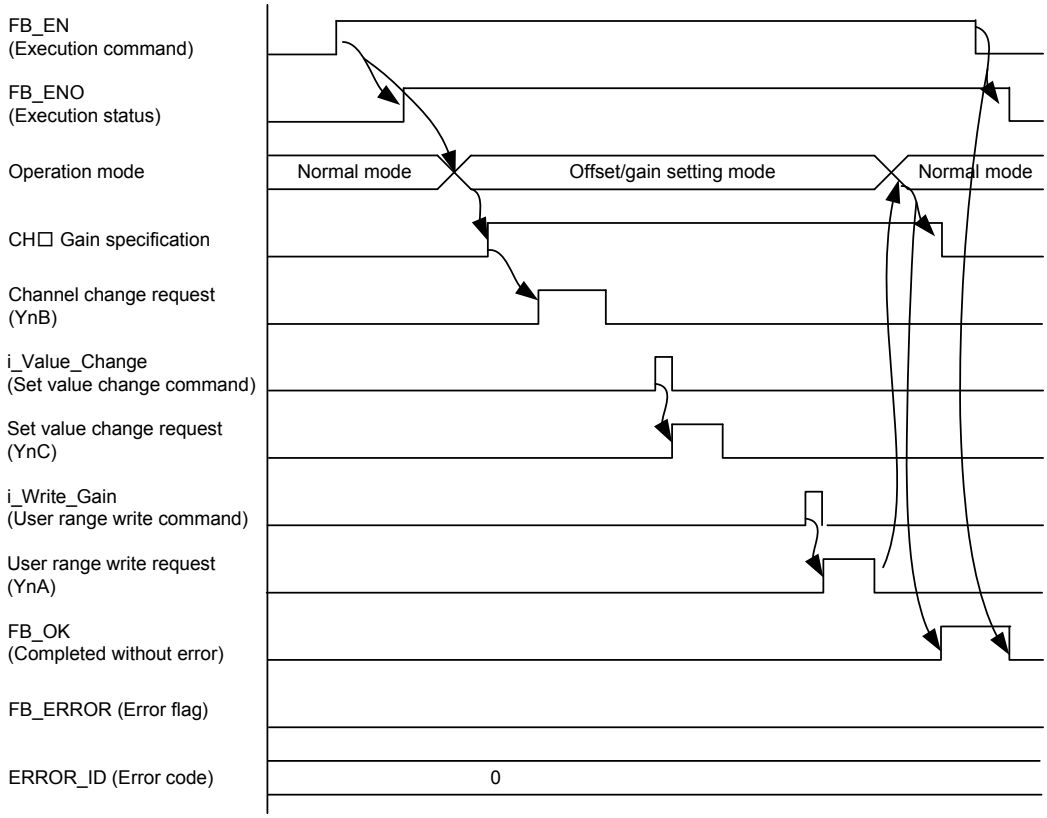
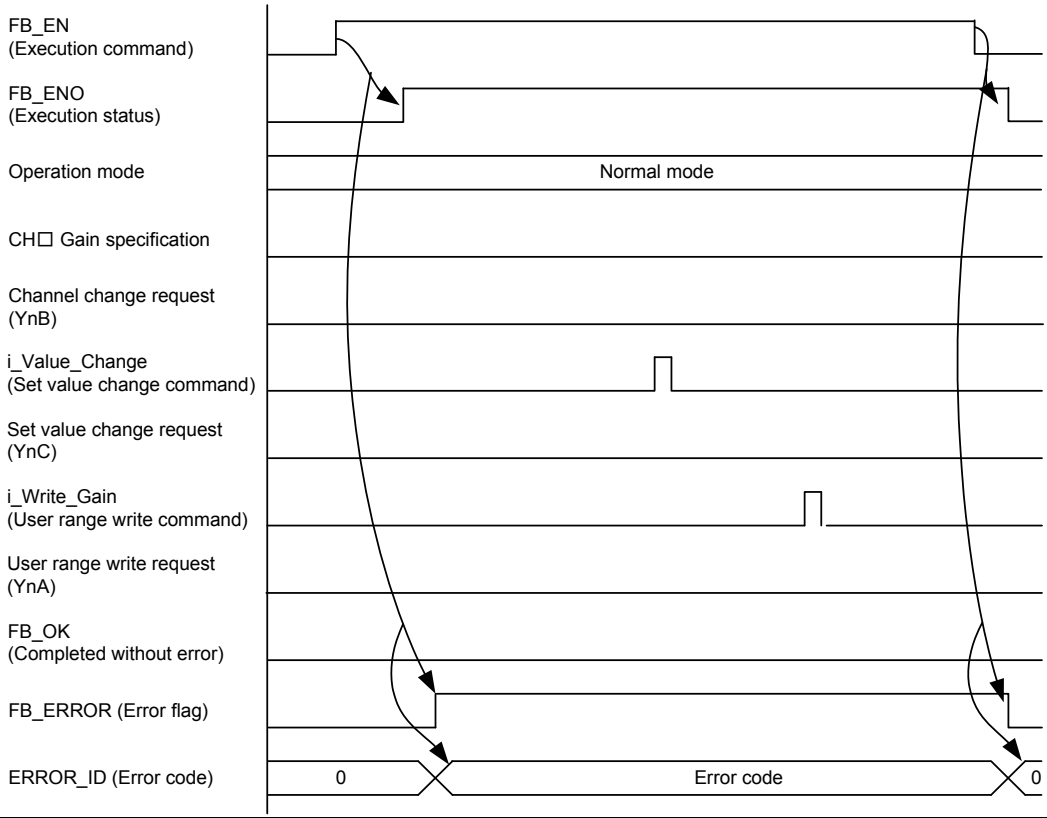
FB Name

M+L60DA4_SetGainVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Set the gain value of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">398 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) Set the gain value of a specified channel by turning on FB_EN (Execution command). 2) To write the gain value, FB_EN, i_Write_Offset (User range write command), and i_Value_Change (Set value change command) must be ON. 3) When the target CH setting value is out of range, the FB_ERROR output turns on, processing is interrupted, and the error code is stored in ERROR_ID. Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target CH. 5) This FB uses index registers Z7, Z8, and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) If the parameter is set using GX Configurator-DA or the configuration function of GX Works 2, using this FB is unnecessary. 8) When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 9) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Target CH	i_CH	Word	1~4	Specify the CH number.
Gain adjustment amount	i_Adjust_Amount	Word	-3,000~3,000	Specify the DA output gain adjustment value.
Set value change command	i_Value_Change	Bit	ON, OFF	Turn ON to change the DA output to reflect changes made to the offset value. Please turn OFF after changing the offset.
User range write command	i_Write_Gain	Bit	ON, OFF	ON: The user range will be written. OFF: Nothing will be written.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the gain setting is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

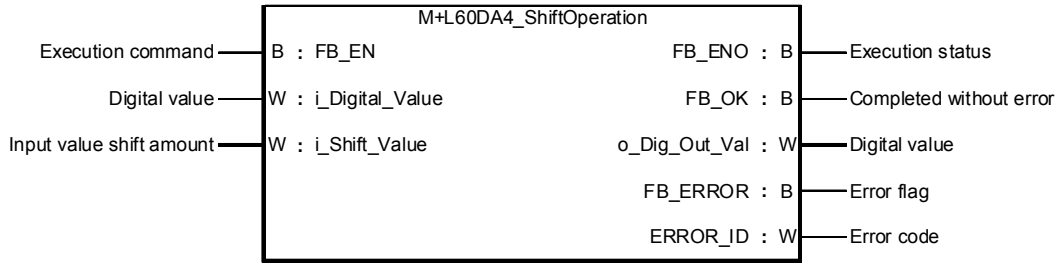
This chapter includes information related to the M+L60DA4_SetGainVal function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

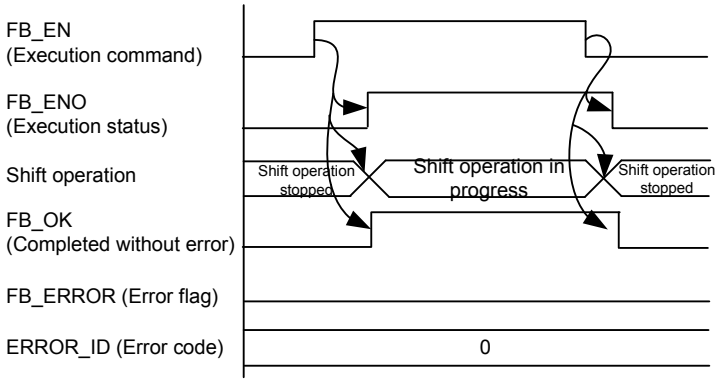
2.10 M+L60DA4_ShiftOperation (Shift operation)

FB Name

M+L60DA4_ShiftOperation

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Add the desired shift amount to a digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">162 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) The input value shift amount is added to the digital value by turning on FB_EN (Execution command).
2) When the addition result is -32768 or less, the digital output value remains -32768.
When the addition result is 32767 or greater, the digital output value remains 32767.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) Every input must be provided a value for proper FB operation. 5) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common). 6) The o_Dig_Out_Val(Digital output value) is valid while FB_OK (Completed without error) is ON. 7) o_Dig_Out_Val is cleared to zero when FB_EN turns OFF.
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Digital value	i_Digital_Value	Word	-32,768~32,767	Specify the digital value
Input value shift amount	i_Shift_Value	Word	-32,768~32,767	Specify the shift amount

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	Turns ON while performing shift operations.
Digital value	o_Dig_Out_Val	Word	0	The result of adding i_Shift_Value and i_Digital_Value.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition

Note

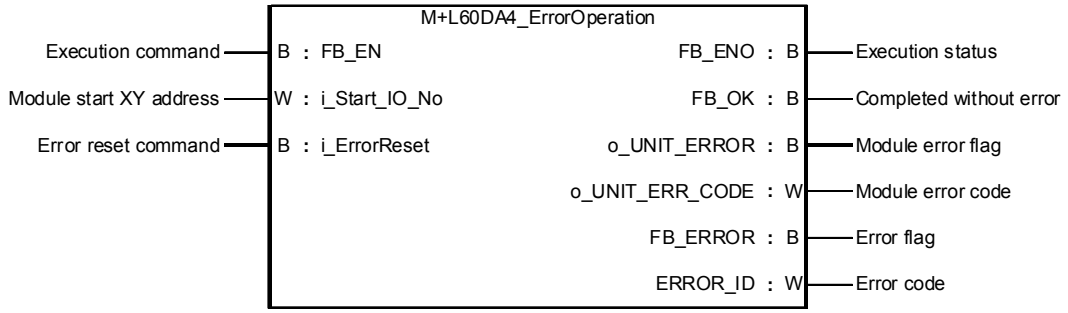
This chapter includes information related to the M+L60DA4_ShiftOperation function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

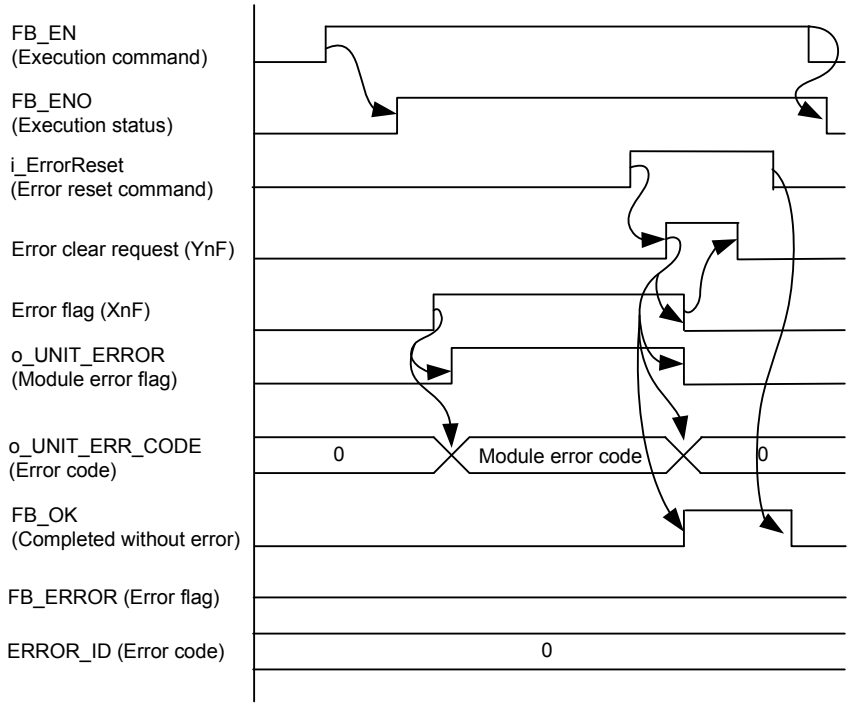
2.11 M+L60DA4_ErrorOperation (Error operation)

FB Name

M+L60DA4_ErrorOperation

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Perform monitoring and reset of intelligent function module error codes.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">220 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) By turning on FB_EN (Execution command), the current error code in the target intelligent function module is output.
2) After turning ON FB_EN, the error may be reset by turning ON i_ErrorReset (Error reset command) during the error occurrence.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) This FB uses index registers Z8, and Z9. Please do not use these index registers in an interrupt program. 5) Every input must be provided a value for proper FB operation. 6) When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] 

Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Error reset command	i_ErrorReset	Bit	ON, OFF	Turn ON to perform an error reset. After error reset is completed, please turn this input OFF.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the error reset is completed.
Module error flag	o_UNIT_ERROR	Bit	OFF	When ON, it indicates the presence of a module error.
Module error code	o_UNIT_ERR_CODE	Word	0	Specified module error code output.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

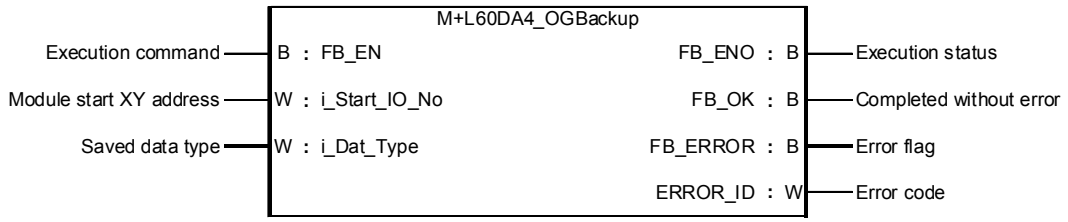
This chapter includes information related to the M+L60DA4_ErrorOperation function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

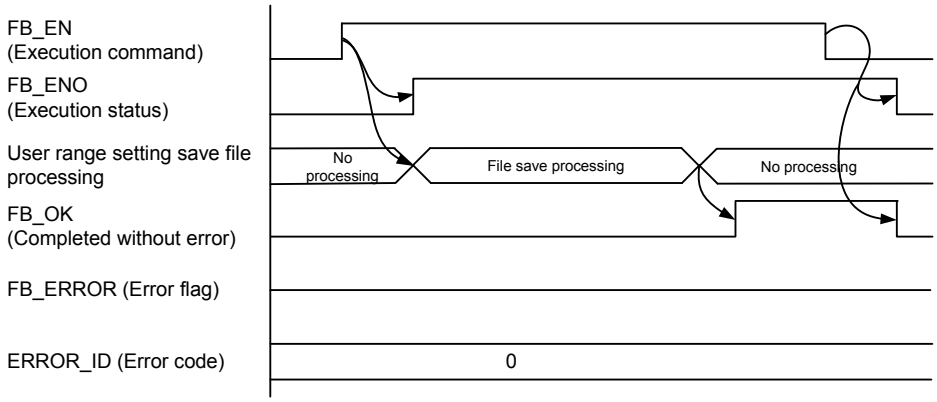
2.12 M+L60DA4_OGBackup (Offset/gain value save)

FB Name

M+L60DA4_OGBackup

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Read the offset and gain values from the user range setting, and save to file.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><td>Series</td><td>Model</td></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><td>Language</td><td>Software version</td></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">449 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) By turning on FB_EN (Execution command), the offset and gain user range settings are read from the CPU module and saved to a file on the SD memory card.
2) FB operation is one-shot only, triggered by the FB_EN signal.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) This FB uses index register Z9. Please do not use Z9 in an interrupt program. 5) Every input must be provided a value for proper FB operation. 6) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

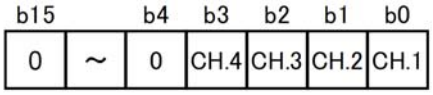
Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.
Saved data type	i_Dat_Type	Word	0~FH	Please specify each channels data type. 0: Voltage, 1: Current 

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the file save is completed.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

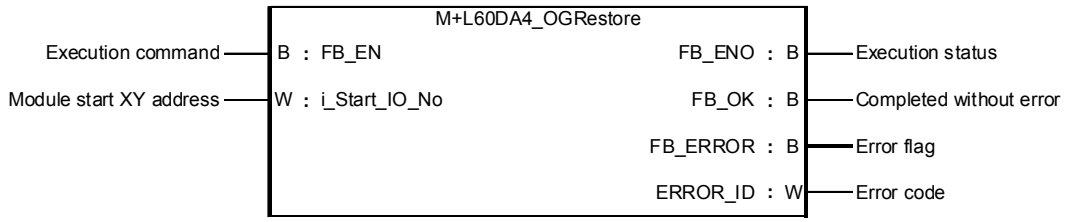
This chapter includes information related to the M+L60DA4_OGBackup function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

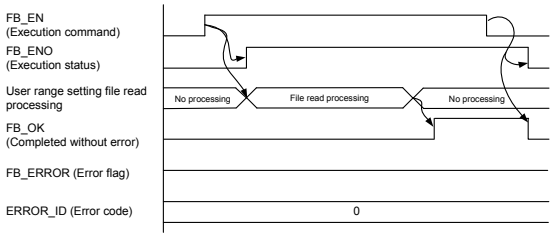
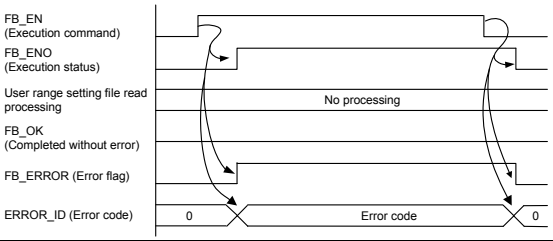
2.13 M+L60DA4_OGRestore (Offset/gain value restore)

FB Name

M+L60DA4_OGRestore

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Restore the user range offset / gain settings to a module from a file.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module.</td><td>L60DA4</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">434 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) By turning on FB_EN (Execution command), the offset and gain user range settings are read from the CPU module SD memory card and restored to the module.
2) FB operation is one-shot only, triggered by the FB_EN signal.
3) This FB can only be operated when the conversion enable/disable settings of all CH are disabled.
4) Only execute this FB after the M+L60DA4_OGBackup (Offset/gain value save) FB has been executed.</td></tr>
</table>

Item	Description
Compiling method	Macro type
Restrictions and precautions	1) Please only execute this FB after all CH are disabled (A/D conversion enable/disable setting). Digital output values may change suddenly if a CH is enabled. 2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) The FB cannot be used in an interrupt program. 5) This FB uses index register Z9. Please do not use Z9 in an interrupt program. 6) Every input must be provided a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error]  [When an error occurs] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
90(Decimal)	The conversion setting of at least one channel is still enabled.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution instruction is ON. OFF: Execution instruction is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the file restore has been completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/06/28	First edition
1.01B	2010/10/29	Solved the problem that causes an operation error (error code: 4101) if the device is out of range when using an index register number that is used by the FB.

Note

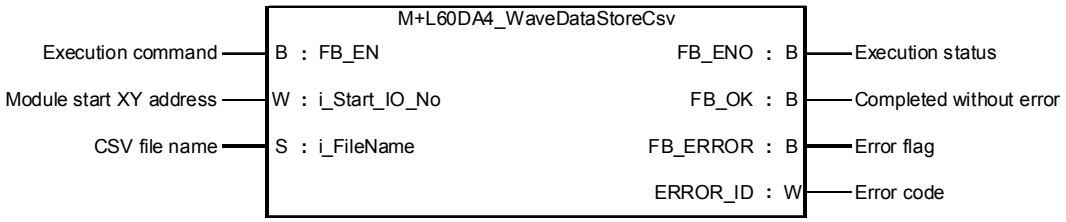
This chapter includes information related to the M+L60DA4_OGRestore function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

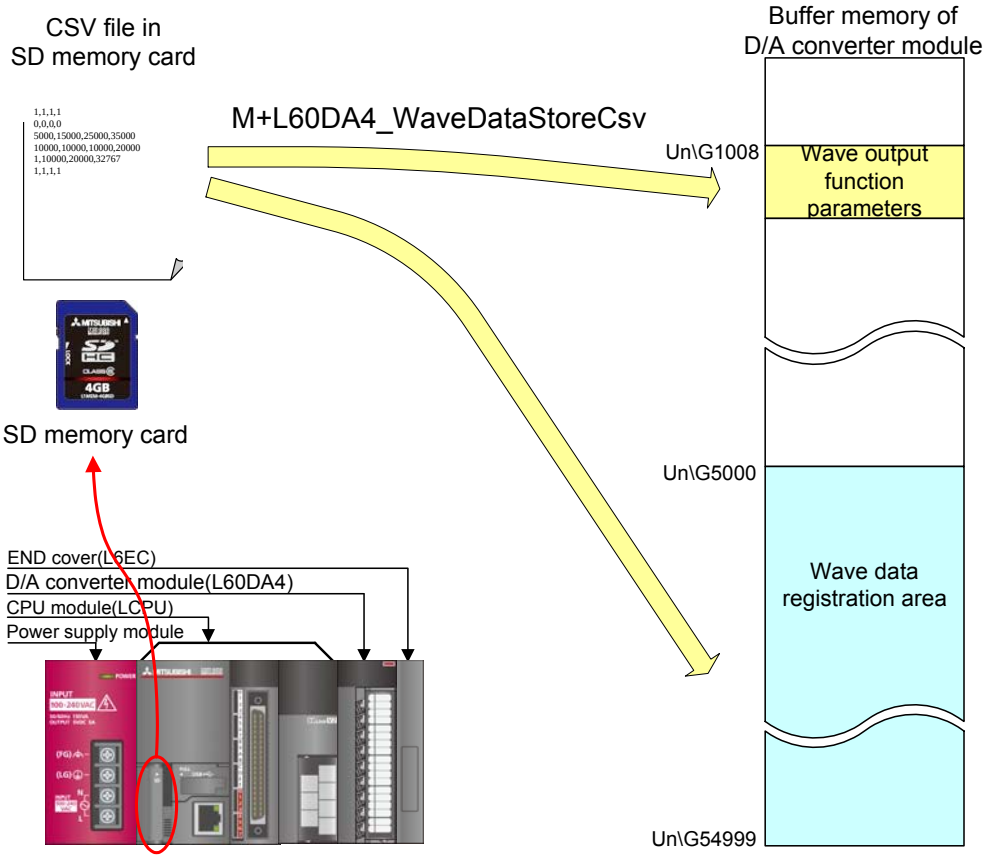
2.14 M+L60DA4_WaveDataStoreCsv (Read wave data (CSV file))

FB Name

M+L60DA4_WaveDataStoreCsv

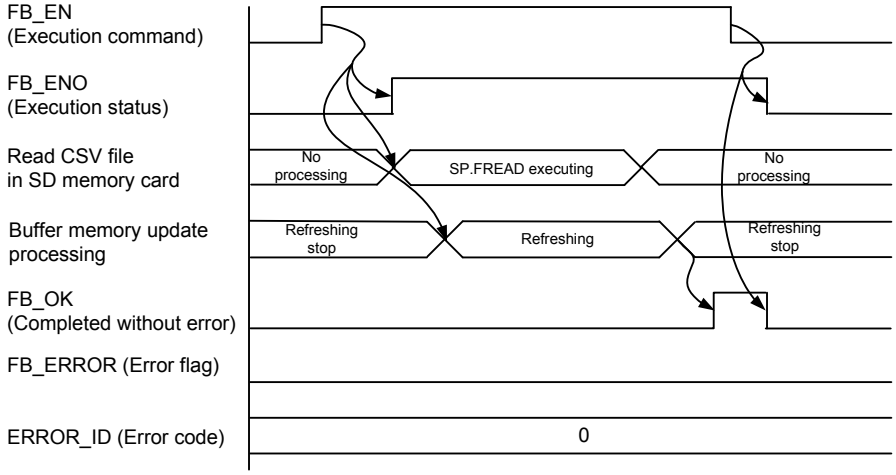
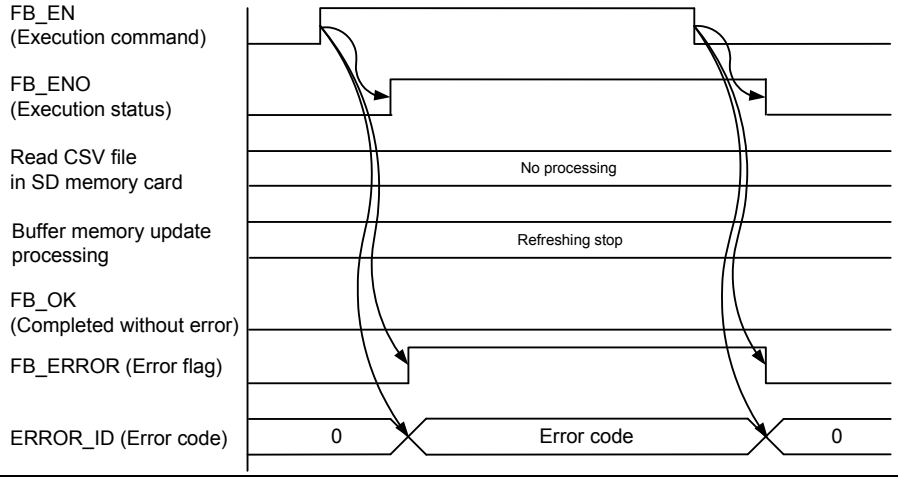
Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Read the wave output function parameters and wave data (wave data points and wave data) from the CSV file, and write them to the buffer memory of the D/A converter module.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module</td><td>L60DA4
* Applicable to D/A converter module whose first five digits of the product information are "14041" or later</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">1012 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) When FB_EN (Execution command) is turned on, the wave output function parameters and wave data are read from the CSV file stored in an SD memory card on the CPU module and they are stored in the buffer memory of the D/A converter module.  For information on the wave output function, refer to MELSEC-L Digital-Analog Converter Module User's Manual. 2) The wave output function parameters/data handled by this FB and the storage destination buffer memory addresses are described in "Table 1 Storage sources (wave output function parameters/data) and storage destination buffer memory". The parameters/data described in the table must be written in a file according to "CSV File Format for Wave Data Read (CSV File) FB", and this file must be saved in the root folder (directory) of the SD memory card beforehand. This FB firstly reads all wave output function parameters from the CSV file and stores them in Un\G1008 and subsequent buffer memory addresses. Then, it reads the "wave data" from 101st row for the number of points specified with "Wave data points" in 100th row, and stores them in the start address (Un\G5000) and subsequent addresses of the wave data registration area buffer memory. A CSV file of the wave output function can be easily created by using the "Create Wave Output Data" tool of GX Works2.

Item	Description
	3) If this FB is executed without inserting an SD memory card in the CPU module, the FB_ERROR output turns on, processing is interrupted, and error code 10 (decimal) is stored in ERROR_ID. Refer to the error code explanation section for details. 4) If this FB is executed while special relay SM606 (SD memory card forced disable instruction) is on, the FB_ERROR output turns on, processing is interrupted, and the error code 30 (decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. *The SD memory card forced disable instruction of SM606 can be used with a CPU module whose first five digits of the product information is "12022" or later. 5) If the CSV file specified with i_FileName (CSV file name) does not exist in the SD memory card inserted in the CPU module, a CPU error (error code: 2410) will occur. *When a CPU error causes a stop error in the CPU module, FB_ERROR and ERROR_ID is not updated. The CPU operation state (continue/stop) for when a CPU error occurs can be set in [PLC RAS]*1. *1 [Parameter] -> [PLC Parameter] -> [PLC RAS] -> "Operating Mode When There is an Error" -> "File Access Error" 6) If FB_EN (Execution command) is turned off before the FB operation is completed, processing is interrupted. In this case, the data already stored in the buffer memory is not cleared. When the FB is re-executed, the read operation is performed again. 7) Do not remove the SD memory card during execution of this FB. For information on how to insert/remove an SD memory card, refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).
Compiling method	Macro type

Item	Description
Restrictions and precautions	1) This FB requires many scans to complete the processing and thus it takes so long to complete the processing. It is recommended to execute this FB during warm-up operation of L60DA4. 2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 3) The FB cannot be used in an interrupt program. 4) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in an interrupt program. 6) This FB uses a SP.FREAD instruction. Therefore, if an error occurs during execution of the SP.FREAD instruction, a CPU error occurs. 7) When processes for accessing the SD card, such as the data logging function of the LCPU, are executed simultaneously, the time for completing this FB may extend or an error 40 (timeout) may occur. For details, refer to section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of the MELSEC-L CPU Module User's Manual (Data Logging Function). 8) When two or more of these FBs are used, they cannot be executed simultaneously. 9) Every input must be provided with a value for proper FB operation. 10) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •MELSEC-L CPU Module User's Manual (Data Logging Function) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	An attempt was made to execute this FB without inserting an SD memory card in the CPU module.	Insert an SD memory card, which saves the target CSV file, on the CPU module and please try again. Or, insert a usable SD memory card in the CPU module, save the target CSV file in the SD memory card by using [Write PLC User Data] of GX Works2, and please try again.
20 (Decimal)	Not possible to access the SD memory card because SM605 (Memory card remove/insert prohibit flag) is off (Remove/insert enabled).	Slide the SD memory card lock switch down to turn on SM605 (Memory card remove/insert prohibit flag) (remove/insert prohibited), and please try again.
30 (Decimal)	Not possible to access the SD memory card because SM606 (SD memory card forced disable instruction) is on.	Turn off SM606, confirm that SM607 (SD memory card forced disable status flag) is off, and please try again.
40 (Decimal)	The wave data reading processing timeout occurred because accesses to the SD memory card are frequently made in addition to this FB.	Reduce the frequency of the access processing to the SD memory card.
4-digit error code	CPU module error code	For details on the error codes, refer to Appendix 1 Error Code Lists in the MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted. (For example, enter H10 for X10.)
CSV file name	i_FileName	Character string	12 characters or less	Specify the name of the CSV file that stores the wave output function parameters and wave data. (Only CSV file is valid.) For details on CSV file format, refer to CSV File Format for Wave Data Read (CSV File) FB.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that writing the wave output function parameters and wave data from the CSV file to the buffer memory of the D/A converter module is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output

FB Version Upgrade History

Version	Date	Description
1.00A	2012/08/31	First edition

Note

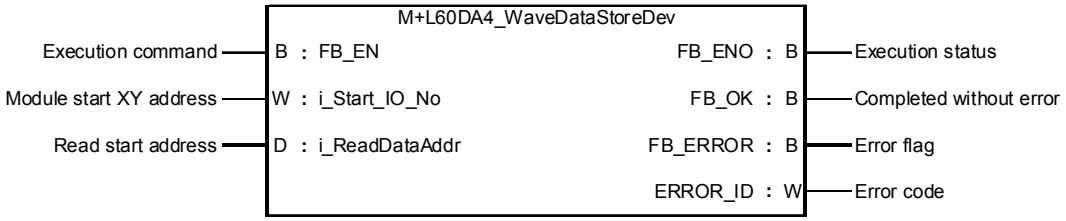
This chapter includes information related to the M+L60DA4_WaveDataStoreCsv function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

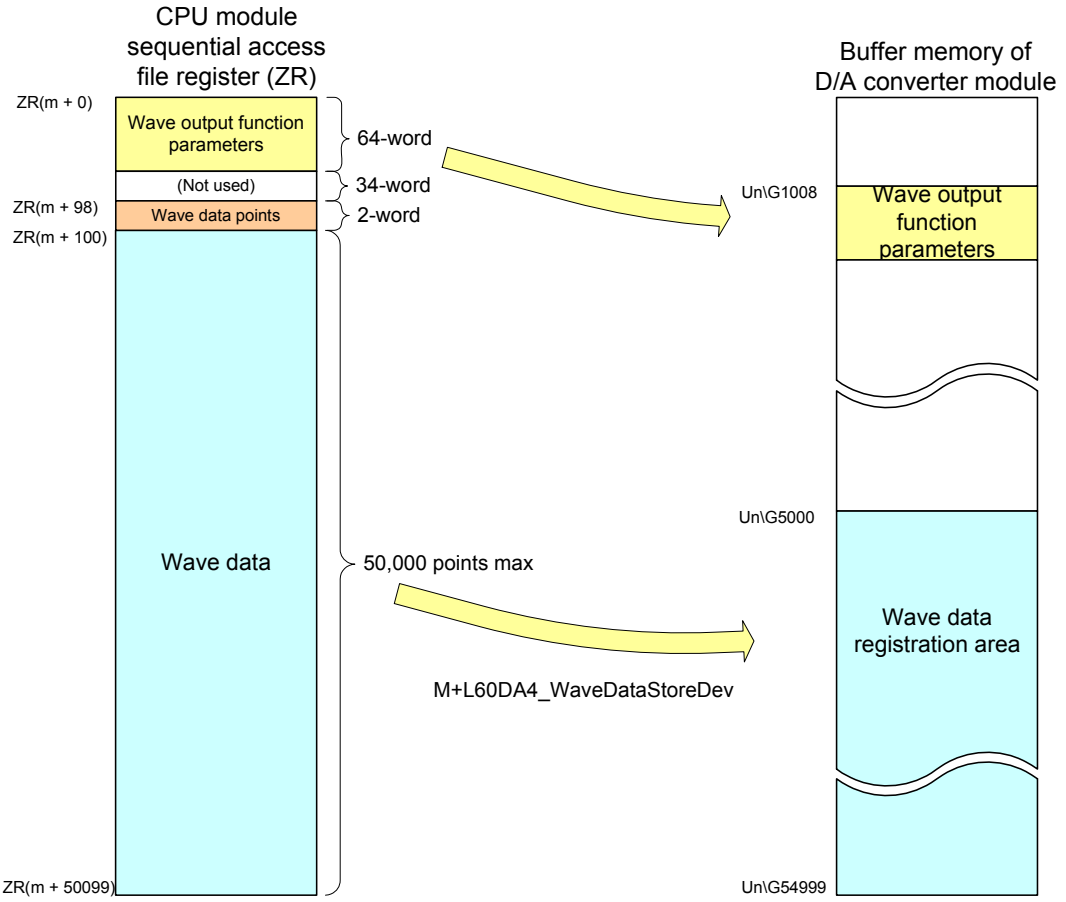
2.15 M+L60DA4_WaveDataStoreDev (Read wave data (device))

FB Name

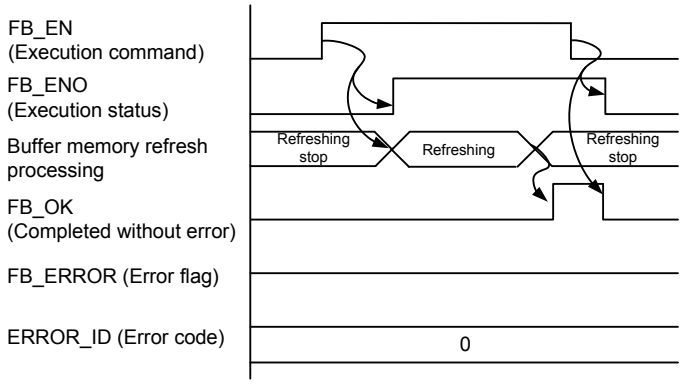
M+L60DA4_WaveDataStoreDev

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Read the wave output function parameters and wave data (wave data and wave data points) from the file register (ZR), and write them to the buffer memory of the D/A converter module.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module</td><td>L60DA4
* Applicable to D/A converter module whose first five digits of the product information are "14041" or later</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">535 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) When FB_EN (Execution command) is turned ON, read the wave output function parameters and wave data from the sequential access file register (ZR) and they are stored in the buffer memory of the D/A converter module.  For information on the wave output function, refer to MELSEC-L Digital-Analog Converter Module User's Manual. 2) The wave output function parameters/data handled by this FB and the storage destination buffer memory addresses are described in "Table 1 Storage sources (wave output function parameters/data) and storage destination buffer memory" in Appendix 2. The parameters/data described in the table must be saved in the file register (ZR) indicated in the "storage sources" column beforehand. This FB firstly reads the wave output function parameters from ZR(m+0) that is specified with i_ReadDataAddr (Read start address), and then stores them in Un\G1008 and subsequent buffer memory addresses. Then, it reads the "wave data" from ZR(m+100) for the number of points specified with "Wave data points" of ZR(m+98,99), and stores them in the wave data registration area's start address (Un\G5000) and subsequent buffer memory addresses. A CSV file of the wave output function can be easily created by using the "Create Wave Output Data" tool of GX Works2.

Item	Description
	*m: File register (ZR) read start address. To secure desired points of the file register and allocate data to the desired addresses, specify the points with [PLC File] *1 and specify the device points of the file register (ZR) with [Device] *2. *1 [Parameter] -> [PLC Parameter] -> [PLC File] -> "File Register" *2 [Parameter] -> [PLC Parameter] -> [Device] -> "File Register Extended Setting" 3) For file register (ZR), make sure to secure "Wave data points" + 100 (points) or more. If this FB is executed when the points of the file register (ZR) specified with i_ReadDataAddr (Read start address) is less than "Wave data points" of ZR (m+98, 99) + 100 (points), then the applicable range of the file register (ZR) will be exceeded and a CPU error (error code: 4101) will occur. 4) If FB_EN (Execution command) is turned off before the FB operation is completed, the processing is interrupted. In this case, the data already stored in the buffer memory is not cleared. When the FB is re-executed, the read operation is performed again.
Compiling method	Macro type
Restrictions and precautions	1) This FB requires many scans to complete the processing and thus it takes so long to complete the processing. It is recommended to execute this FB during warm-up operation of L60DA4. 2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 3) The FB cannot be used in an interrupt program. 4) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in an interrupt program. 6) When two or more of these FBs are used, they cannot be executed simultaneously. 7) Every input must be provided with a value for proper FB operation. 8) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"

Item	Description
Timing chart	[When operation completes without error] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted. (For example, enter H10 for X10.)
Read start address	i_ReadDataAddr	Double word	Valid device range	Specify the start address of the file register (ZR) that stores the wave output function parameters and wave data.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that writing the wave output function parameters and wave data from the file register (ZR) to the buffer memory of the D/A converter module is completed.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2012/08/31	First edition

Note

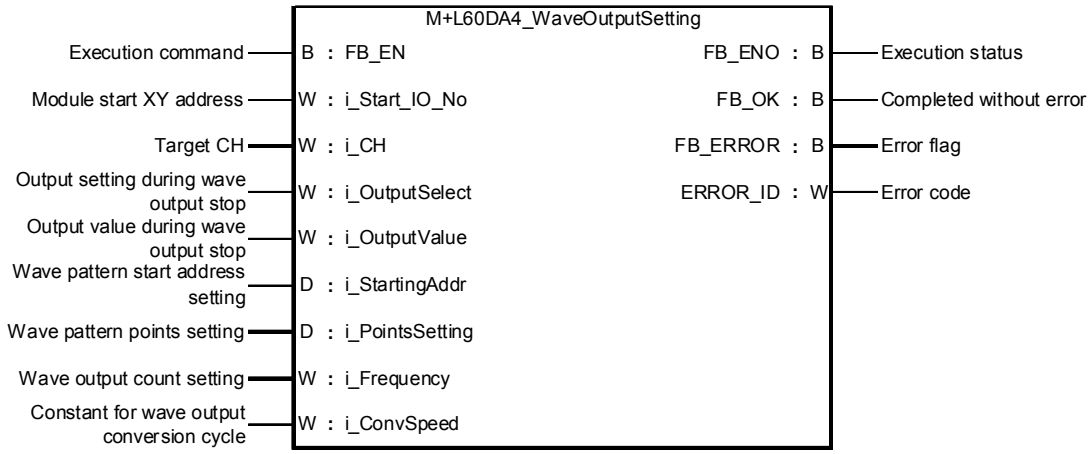
This chapter includes information related to the M+L60DA4_WaveDataStoreDev function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

2.16 M+L60DA4_WaveOutputSetting (Wave output setting)

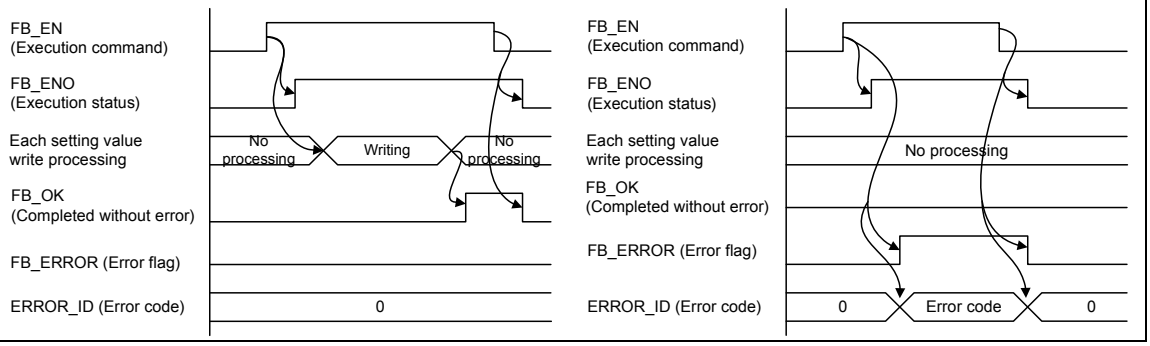
FB Name

M+L60DA4_WaveOutputSetting

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Configure the wave output setting for a specified channel or all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module</td><td>L60DA4
* Applicable to D/A converter module whose first five digits of the product information are "14041" or later</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">351 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) The wave output setting of a specified channel or all channels is written when FB_EN (Execution command) is turned on. 2) The wave output setting is effective only when the output mode setting is set to the "Wave output mode". Also, wave data for analog output must be set beforehand. 3) The new setting value will not take effect until the 'operating condition setting request' signal (Yn9) is turned OFF->ON->OFF or the Operating condition setting request FB (M+L60DA4_RequestSetting) is executed. 4) When the target channel setting value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z6, Z7, Z8 and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided with a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples"
Timing chart	[When operation completes without error] [When an error occurs]



Item	Description
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4 or 15.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1~4, 15	1~4: Specify a channel number. 15: Specify all channels.
Output setting during wave output stop	i_OutputSelect	Word	0: 0V/0mA 1: Offset value 2: Output value during wave output stop	Specify an output value while the wave output is stopped.
Output value during wave output stop	i_OutputValue	Word	•0~20,479 (When using 0~5V, 1~5V, 0~20mA, 4~20mA) •-20,480~20,479 (When using -10~10V)	Set a value to output when "Output setting during wave output stop" is set to "2: Output value during wave output stop".
Wave pattern start address setting	i_StartingAddr	Double word	5,000~54,999	Set the start address of the wave pattern to output.

Name (Comment)	Label name	Data type	Setting range	Description
Wave pattern points setting	i_PointsSetting	Double word	1~50,000 (points)	Set the data points of the wave pattern to output.
Wave output count setting	i_Frequency	Word	-1: Repeat outputs infinitely 1~32,767: Specify an output count.	Set the wave pattern output count.
Constant for wave output conversion cycle	i_ConvSpeed	Word	1~5,000	Set a constant to specify the conversion cycle of the wave output.

●Output labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates the wave output setting is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output

FB Version Upgrade History

Version	Date	Description
1.00A	2012/08/31	First edition

Note

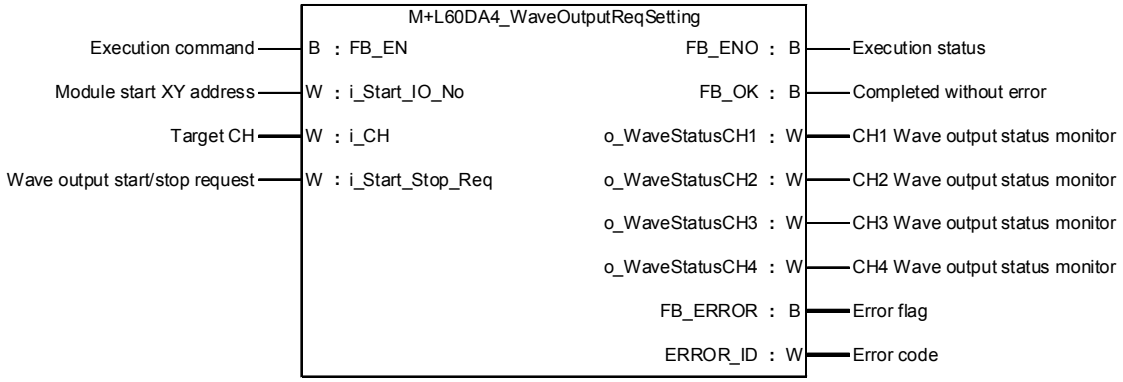
This chapter includes information related to the M+L60DA4_WaveOutputSetting function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

2.17 M+L60DA4_WaveOutputReqSetting (Wave output start/stop request)

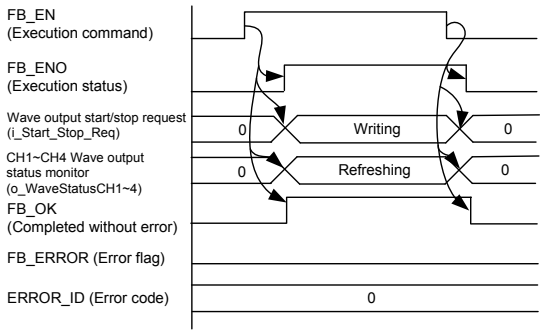
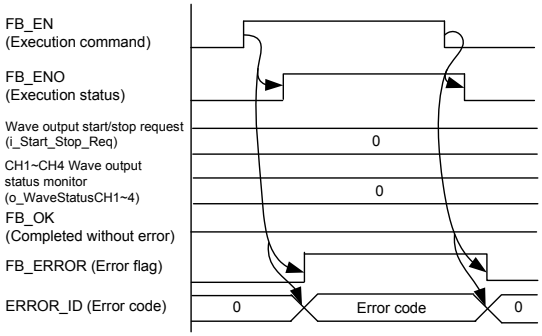
FB Name

M+L60DA4_WaveOutputReqSetting

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Specify a start, stop or temporary stop of the wave output for a specified channel or all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Digital-Analog converter module</td><td>L60DA4
* Applicable to D/A converter module whose first five digits of the product information are "14041" or later</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>English version</td><td>Version 1.24A or later</td></tr><tr><td>Chinese version</td><td>Version 1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">303 steps (for MELSEC-L series CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) A start/stop request of the wave output is set for a specified channel or all channels when FB_EN (Execution command) is turned on. 2) A value of the wave output status monitor (Un\G1100~Un\G1103) is output when FB_EN (Execution command) is turned on. If a channel is specified for the input label, only the specified channel's wave output status monitor value is updated and 0 is output for other channels. If all channels are specified for the input label, all channels' wave output status monitor values are output. 3) After FB_EN (Execution command) is turned ON, the FB is always executed. 4) To resume the wave output, set "1 (Wave output start request)", 0 (Wave output stop request)" and then "1 (Wave output start request) again after completing the wave output. 5) The wave output setting is effective only when the output mode setting is set to the "Wave output mode". Also, wave data for analog output must be set beforehand. 6) When the target channel setting value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided with a value for proper FB operation. 7) The output range settings must be properly configured to match devices connected to the L60DA4 module. Configure the settings by making the GX Works2 switch setting according to the application. For information about intelligent function module switch settings, refer to the GX Works2 Version1 Operation Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples"

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 
Relevant manuals	•MELSEC-L Digital-Analog Converter Module User's Manual •MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 4 or 15.	Please try again after confirming the setting.

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60DA4 module is mounted. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1~4,15	1~4: Specify a channel number. 15: Specify all channels.

Name (Comment)	Label name	Data type	Setting range	Description
Wave output start/stop request	i_Start_Stop_Req	Word	0: Wave output stop request 1: Wave output start request 2: Wave output pause request	Specify a start/stop request of the wave output.

●Output labels

Name (Comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the FB is executed normally.
CH1 Wave output status monitor	o_WaveStatusCH1	Word	0	Output a value of the wave output status (stopped, during output, temporarily stopped). 0: Wave output stop 1: Wave output 2: Wave output pause 3: Wave output step action *1 *1 The wave output step action function is unavailable with the FB. To execute, refer to section "8.8 Wave Output Function" of the MELSEC-L Digital-Analog Converter Module User's Manual and use the device test function of GX Works2.
CH2 Wave output status monitor	o_WaveStatusCH2	Word	0	
CH3 Wave output status monitor	o_WaveStatusCH3	Word	0	
CH4 Wave output status monitor	o_WaveStatusCH4	Word	0	
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output

FB Version Upgrade History

Version	Date	Description
1.00A	2012/08/31	First edition

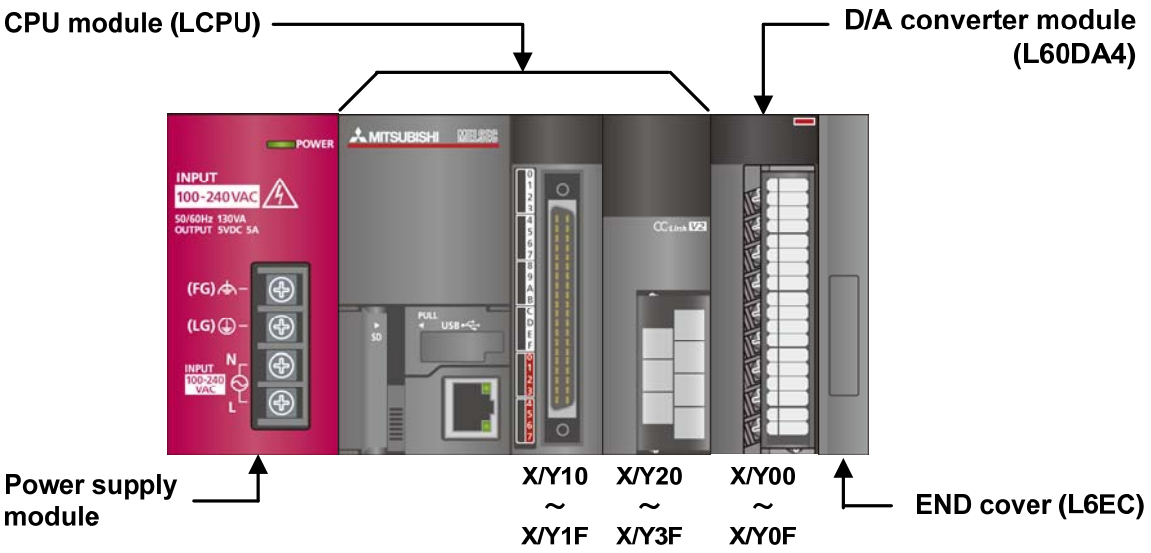
Note

This chapter includes information related to the M+L60DA4_WaveOutputReqSetting function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

Appendix 1. FB Library Application Examples

L60DA4 FB application examples are as follows.

1) System configuration



Reminder

- Every input must be provided with a value for proper FB operation.
  If not set, the values will be unspecified.
- Abbreviations may be used in the label comments due to the limitation on the number of the characters to display in GX Works2.

2) List of devices

a) External input (commands)

Device	FB name	Application (ON details)
M0	M+L60DA4_WriteDAVal	DA conversion data write request
M10	M+L60DA4_WriteAllDAVal	DA conversion data write request all CHs
M20	M+L60DA4_SetDAConversion	DA conversion enable/disable setting request
M21		DA conversion enable/disable setting
M30	M+L60DA4_SetDAOutput	DA output enable/disable setting request
M31		DA output enable/disable setting
M40	M+L60DA4_SetScaling	Scaling setting request
M41		Scaling enable/disable (ON/OFF)
M50	M+L60DA4_SetAlarm	Warning output setting request
M51		Warning output setting enable/disable (ON/OFF)
M60	M+L60DA4_RequestSetting	Operating condition setting request
M70	M+L60DA4_SetOffsetVal	Offset setting request
M71		Offset value change request
M72		Offset value write request
M80	M+L60DA4_SetGainVal	Gain setting request
M81		Gain value change request
M82		Gain value write request
M90	M+L60DA4_ShiftOperation	Shift function execution request
D90		Digital value
M100	M+L60DA4_ErrorOperation	Error operation request
M101		Error reset request
M110	M+L60DA4_OGBackup	Offset/gain value save request
M120	M+L60DA4_OGRestore	Offset/gain value restore request
M130	M+L60DA4_WaveDataStoreCsv	Wave data (CSV file) read request
M140	M+L60DA4_WaveDataStoreDev	Wave data (device) read request
M150	M+L60DA4_WaveOutputSetting	Wave output setting request
M160	M+L60DA4_WaveOutputReqSetting	Wave output start/stop request

b) External output (checks)

Device	FB name	Application (ON details)
M1	M+L60DA4_WriteDAVal	DA conversion data write FB ready
M2		DA conversion data write complete
F0		DA conversion data write FB error
D0		DA conversion data write FB error code
M11	M+L60DA4_WriteAllDAVal	DA conversion data write FB ready all CHs
M12		DA conversion data write complete all CHs
M22	M+L60DA4_SetDAConversion	DA conversion enable/disable setting FB ready
M23		DA conversion enable/disable setting complete
F5		DA conversion enable/disable FB error
D20		DA conversion enable/disable setting FB error code
M32	M+L60DA4_SetDAOutput	DA output enable/disable setting FB ready
M33		DA output enable/disable setting complete
F10		DA output enable/disable FB error
D30		DA output enable/disable setting FB error code
M42	M+L60DA4_SetScaling	Scaling value setting FB ready
M43		Scaling value averaging process setting complete
F15		Scaling value setting FB error
D40		Scaling setting FB error code
M52	M+L60DA4_SetAlarm	Warning output setting FB ready
M53		Warning output setting complete
F20		Warning output setting FB error
D50		Warning output setting FB error code
M61	M+L60DA4_RequestSetting	Operating condition setting request FB ready
M62		Operating condition setting request FB complete
M73	M+L60DA4_SetOffsetVal	Offset setting FB ready
M74		Offset setting complete
F25		Offset setting FB error
D70		Offset setting FB error code
M83	M+L60DA4_SetGainVal	Gain setting FB ready
M84		Gain setting FB complete
F30		Gain setting FB error
D80		Gain setting FB error code

Device	FB name	Application (ON details)
M91	M+L60DA4_ShiftOperation	Shift function FB ready
M92		Shift function complete
D91		Shift conversion value
M102	M+L60DA4_ErrorOperation	Error operation ready
M103		Error operation complete
M104		Module error
D100		Module operation error code
M111	M+L60DA4_OGBackup	Offset/gain value save ready
M112		Offset/gain value save complete
M121	M+L60DA4_OGRestore	Offset/gain value restore ready
M122		Offset/gain value restore complete
F35		Offset/gain value restore FB error
D120		Offset/gain value restore FB error code
M131	M+L60DA4_WaveDataStoreCsv	Wave data (CSV file) read ready
M132		Wave data (CSV file) read complete
F40		Wave data read (CSV file) FB error
D130		Wave data (CSV file) read FB error code
M141	M+L60DA4_WaveDataStoreDev	Wave data (device) read ready
M142		Wave data (device) read complete
M151	M+L60DA4_WaveOutputSetting	Wave output setting ready
M152		Wave output setting complete
F45		Wave output setting FB error
D150		Wave output setting FB error code
M161	M+L60DA4_WaveOutputReqSetting	Wave output start/stop ready
M162		Wave output start/stop complete
D160		CH1 Wave output status monitor
D161		CH2 Wave output status monitor
D162		CH3 Wave output status monitor
D163		CH4 Wave output status monitor
F50		Wave output start/stop FB error
D164		Wave output start/stop FB error code

3) Global label settings

None

4) Application example settings

a) Common settings

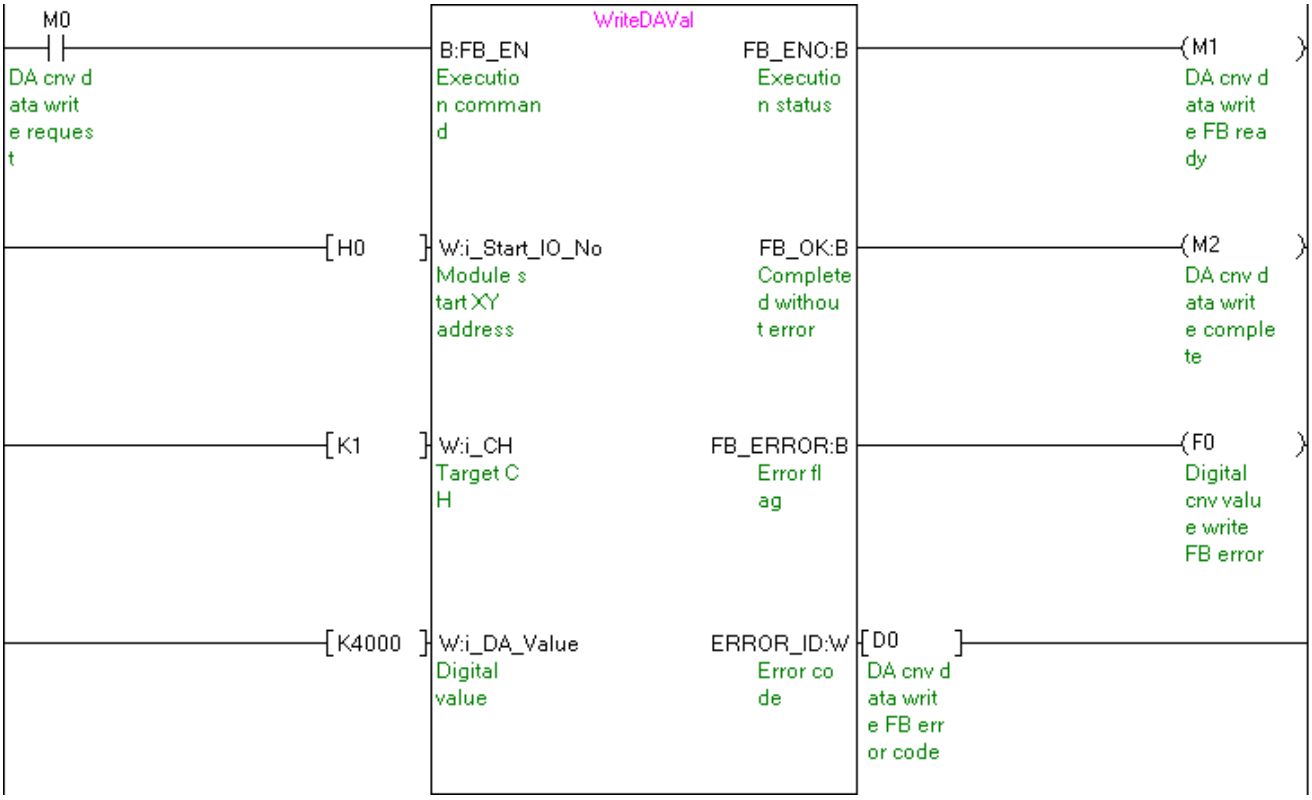
I/O item	Value	Description
Module start XY address	0	Specify the starting XY address where the L60DA4 module is mounted.

5) Programs

M+L60DA4_WriteDAVal (Write a digital conversion value)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_DA_Value	K4000	Set the digital value to 4,000.

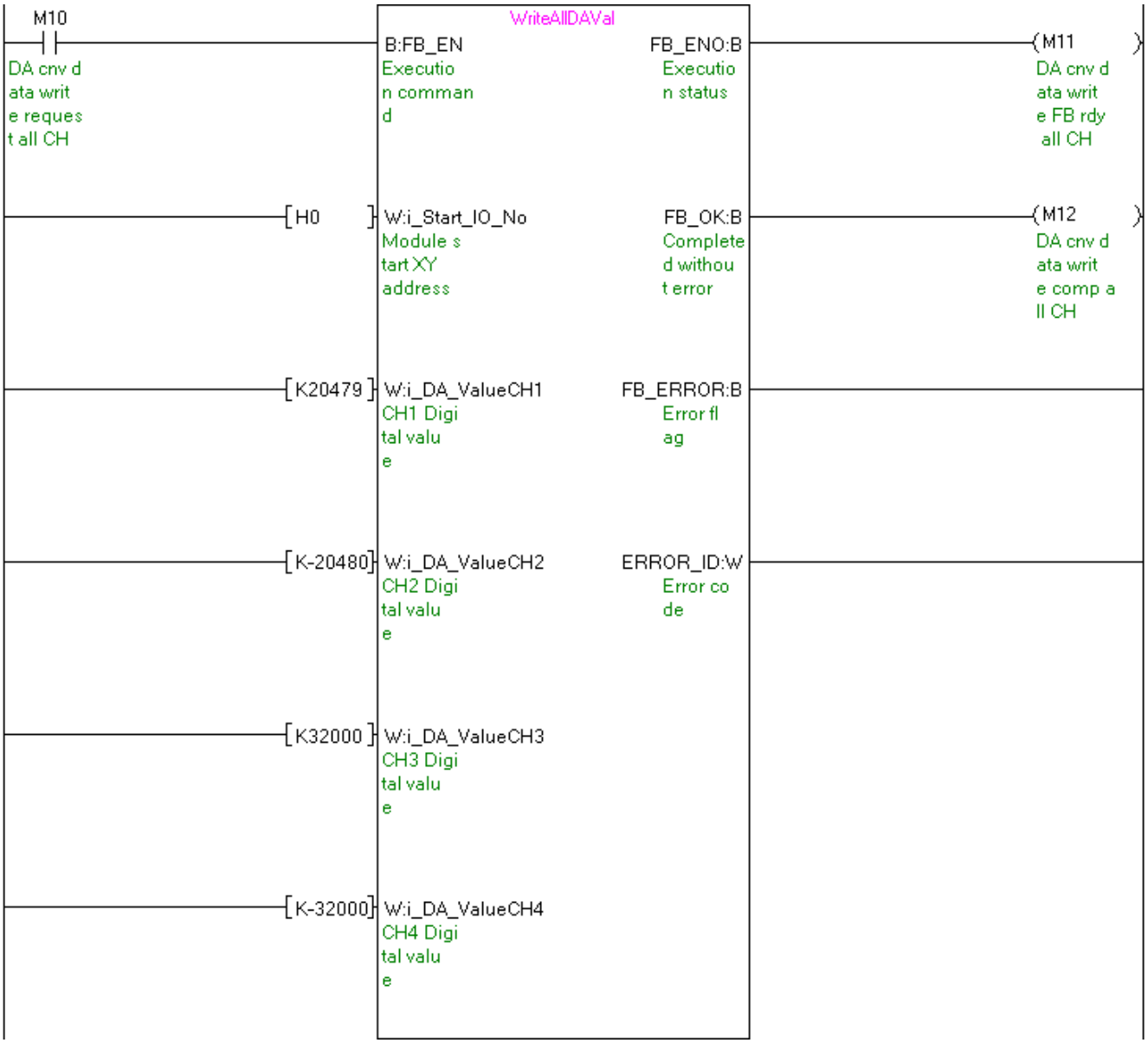
By turning ON M0, the digital value of channel 1 is written to the buffer memory.



M+L60DA4_WriteAllDAVal (Write digital conversion values to all CH)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_DA_ValueCH1	K20479	Set the digital value of channel 1 to 20,479.
i_DA_ValueCH2	K-20480	Set the digital value of channel 2 to -20,480.
i_DA_ValueCH3	K32000	Set the digital value of channel 3 to 32,000.
i_DA_ValueCH4	K-32000	Set the digital value of channel 4 to -32,000.

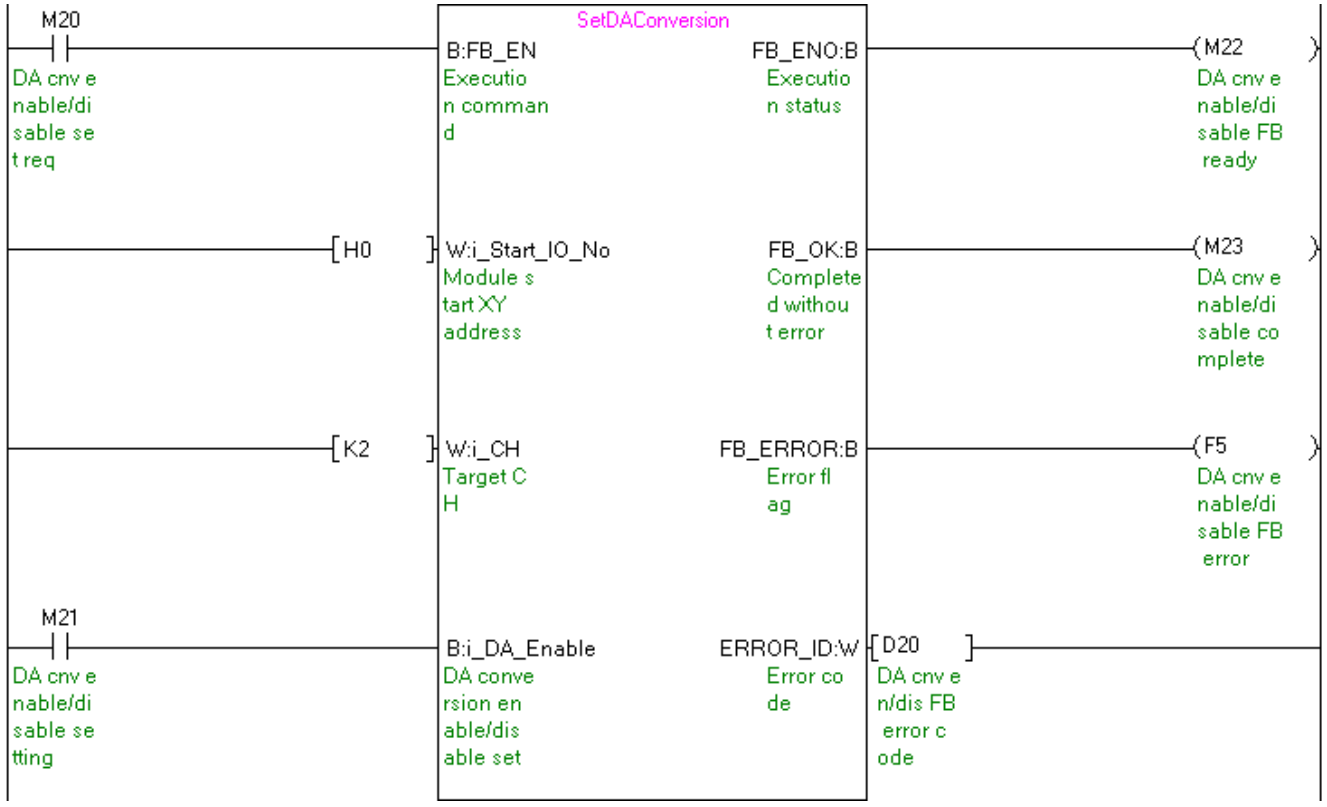
By turning ON M10, the digital values of all channels are written to the buffer memory.



M+L60DA4_SetDAConversion (DA conversion enable/disable setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K2	Set the target channel to channel 2.
i_DA_Enable	ON/OFF	Turn ON to enable the D/A conversion for the target channel.

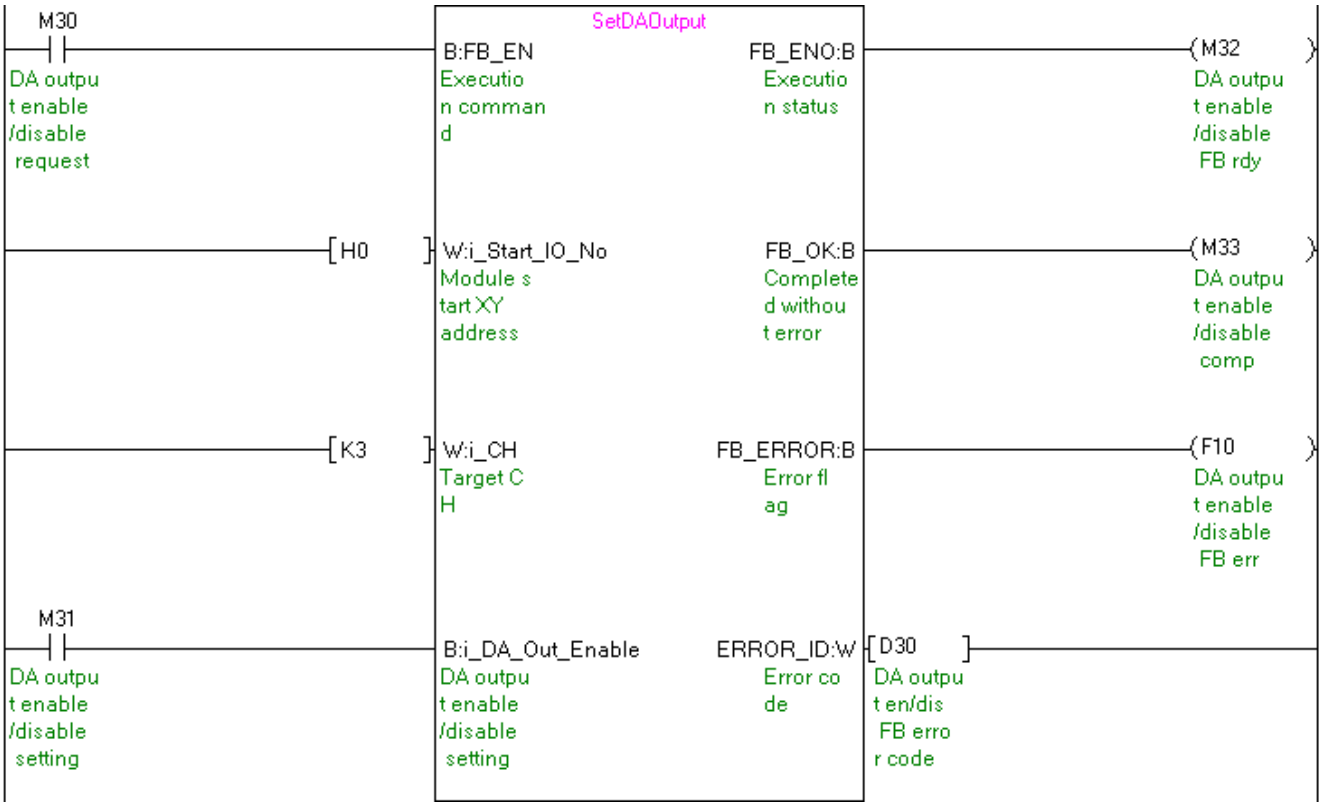
By turning ON M20, the D/A conversion enable/disable setting value of channel 2 is written to the buffer memory.



M+L60DA4_SetDAOutput (DA output enable/disable)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K3	Set the target channel to channel 3.
i_DA_Out_Enable	ON/OFF	Turn ON to enable the D/A output enable/disable setting for the target channel.

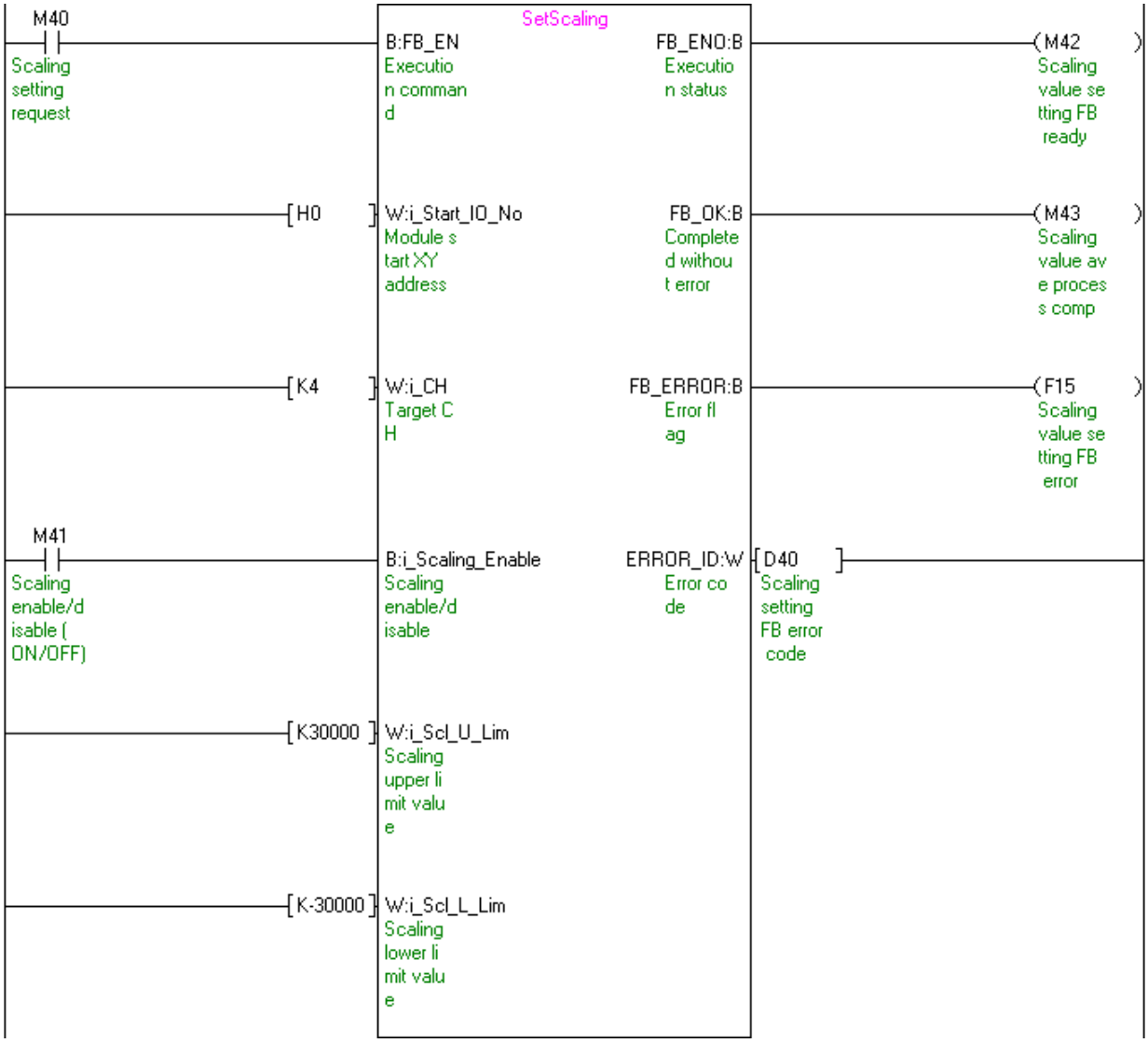
By turning ON M30, the D/A output for channel 3 is enabled.



M+L60DA4_SetScaling (Scaling setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K4	Set the target channel to channel 4.
i_Scaling_Enable	ON/OFF	Turn ON to enable scaling.
i_Scl_U_Lim	K30000	Set the scaling upper limit value to 30,000.
i_Scl_L_Lim	K-30000	Set the scaling lower limit value to -30,000.

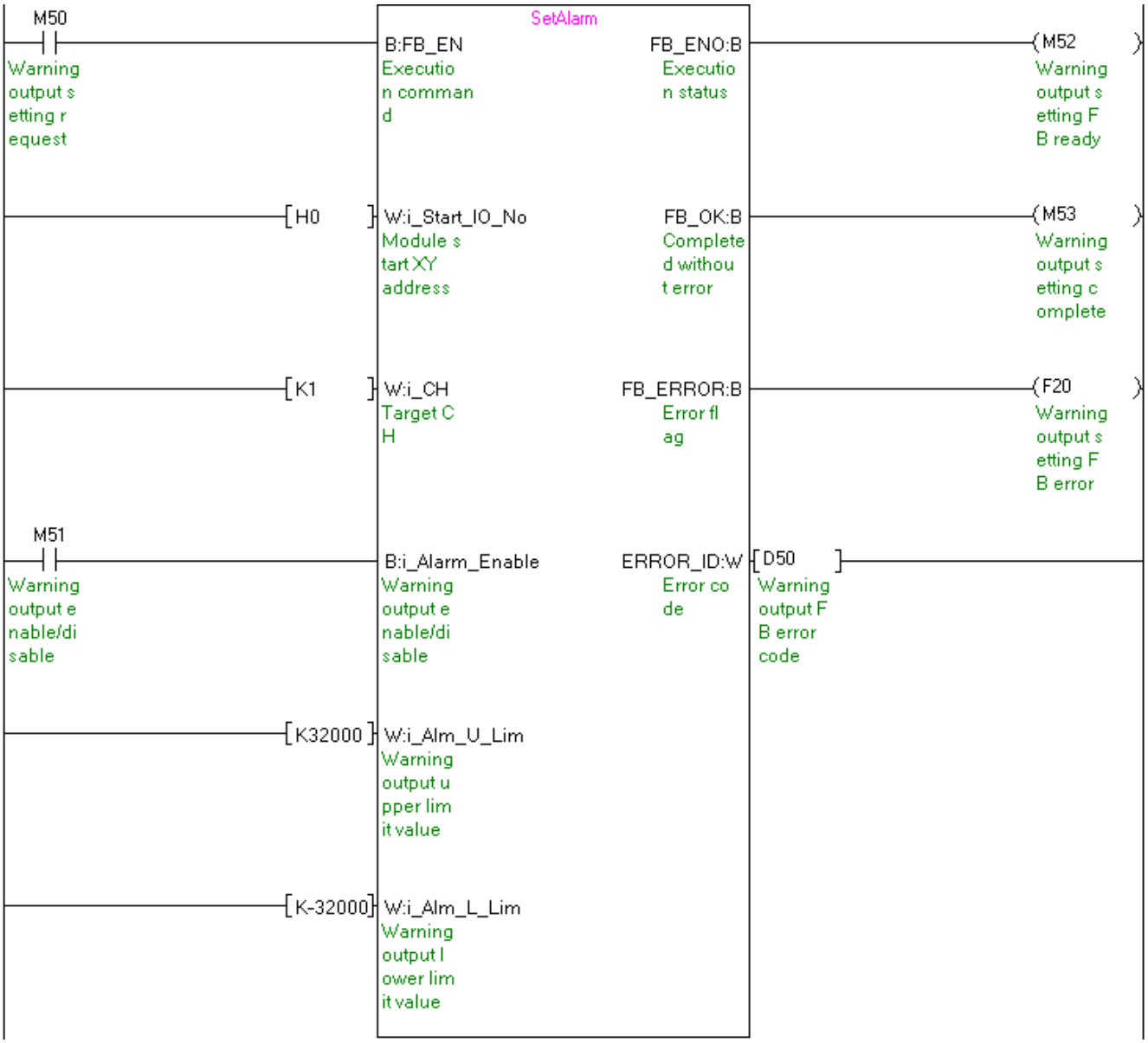
By turning ON M40, the scaling setting value for channel 4 is written to the buffer memory.



M+L60DA4_SetAlarm (Warning output setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Alarm_Enable	ON/OFF	Turn ON to enable warning output.
i_Alm_U_Lim	K32000	Set the warning output upper limit value to 32,000.
i_Alm_L_Lim	K-32000	Set the warning output lower limit value to -32,000.

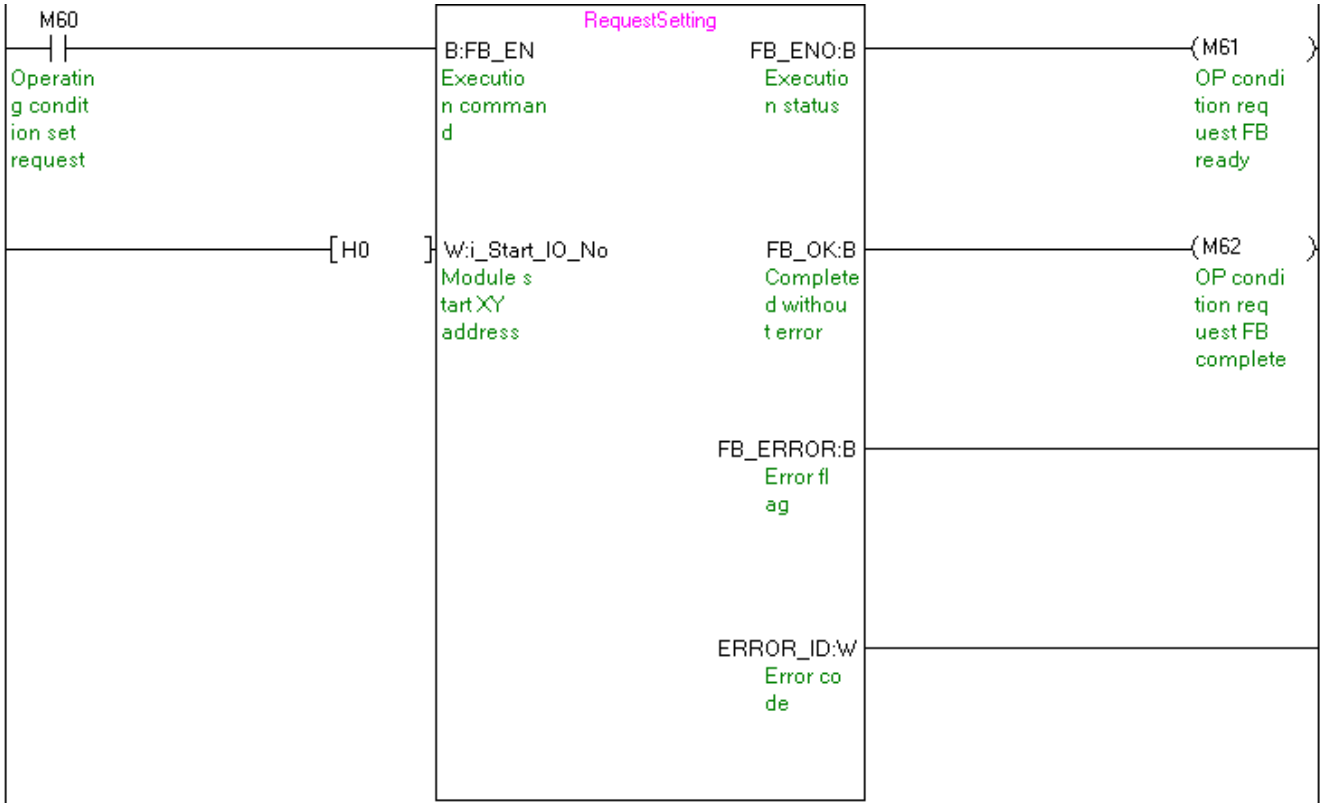
By turning ON M50, the warning output setting value for channel 1 is written to the buffer memory.



M+L60DA4_RequestSetting (Operating condition setting request)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.

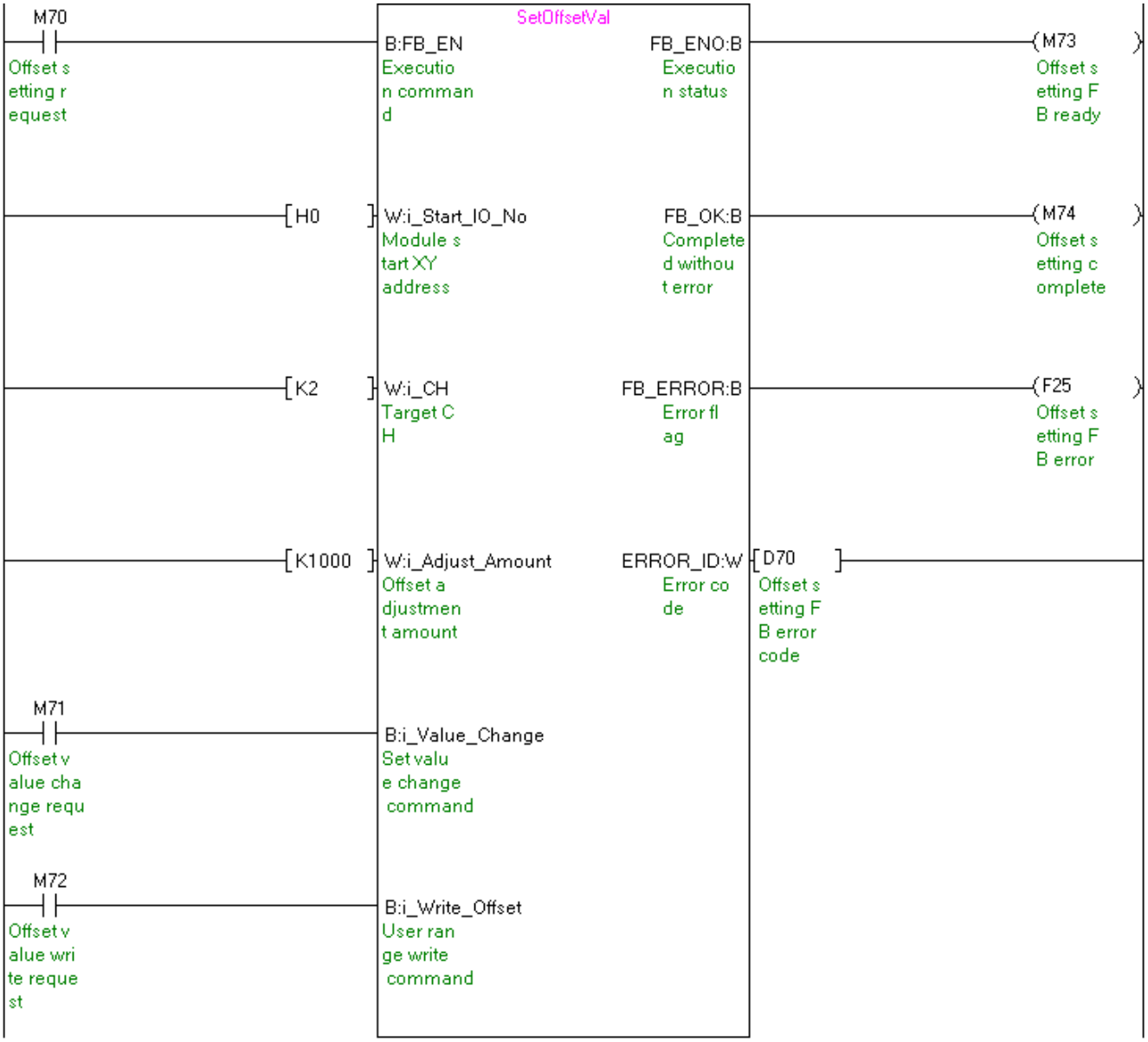
By turning ON M60, the settings of D/A conversion enable/disable setting, warning output setting, scaling function setting and wave output function setting are enabled.



M+L60DA4_SetOffsetVal (Offset setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K2	Set the target channel to channel 2.
i_Adjust_Amount	K1000	Set the offset adjustment amount to 1,000.
i_Value_Change	ON/OFF	Turn ON to change the offset value.
i_Write_Offset	ON/OFF	Turn ON to perform the user range write operation.

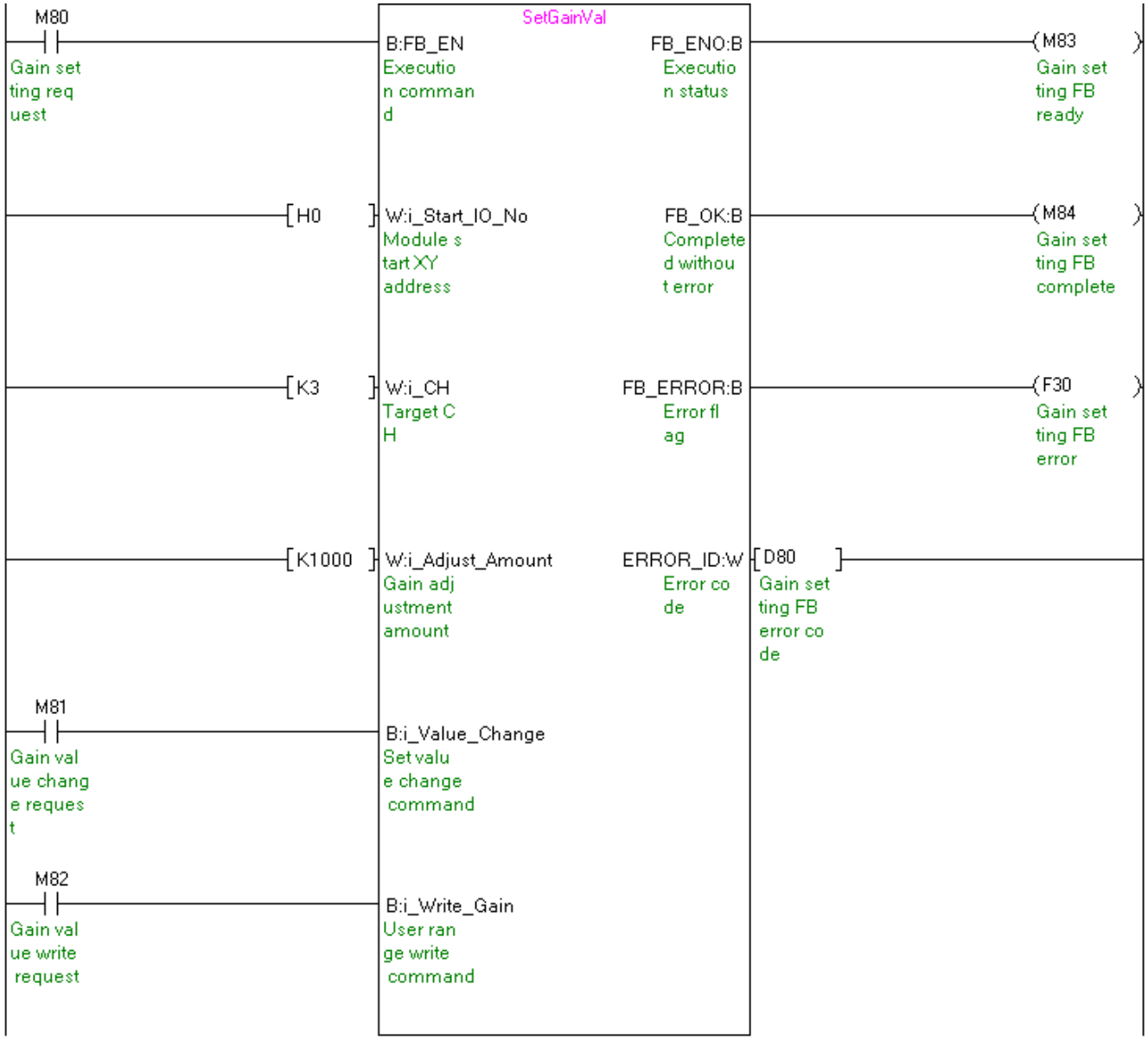
After turning ON M70, by turning ON M71, the offset value of channel 2 is changed, and by turning ON M72, the user range write operation is performed.



M+L60DA4_SetGainVal (Gain setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K3	Set the target channel to channel 3.
i_Adjust_Amount	K1000	Set the gain adjustment amount to 1,000.
i_Value_Change	ON/OFF	Turn ON to change the gain value.
i_Write_Gain	ON/OFF	Turn ON to perform the user range write operation.

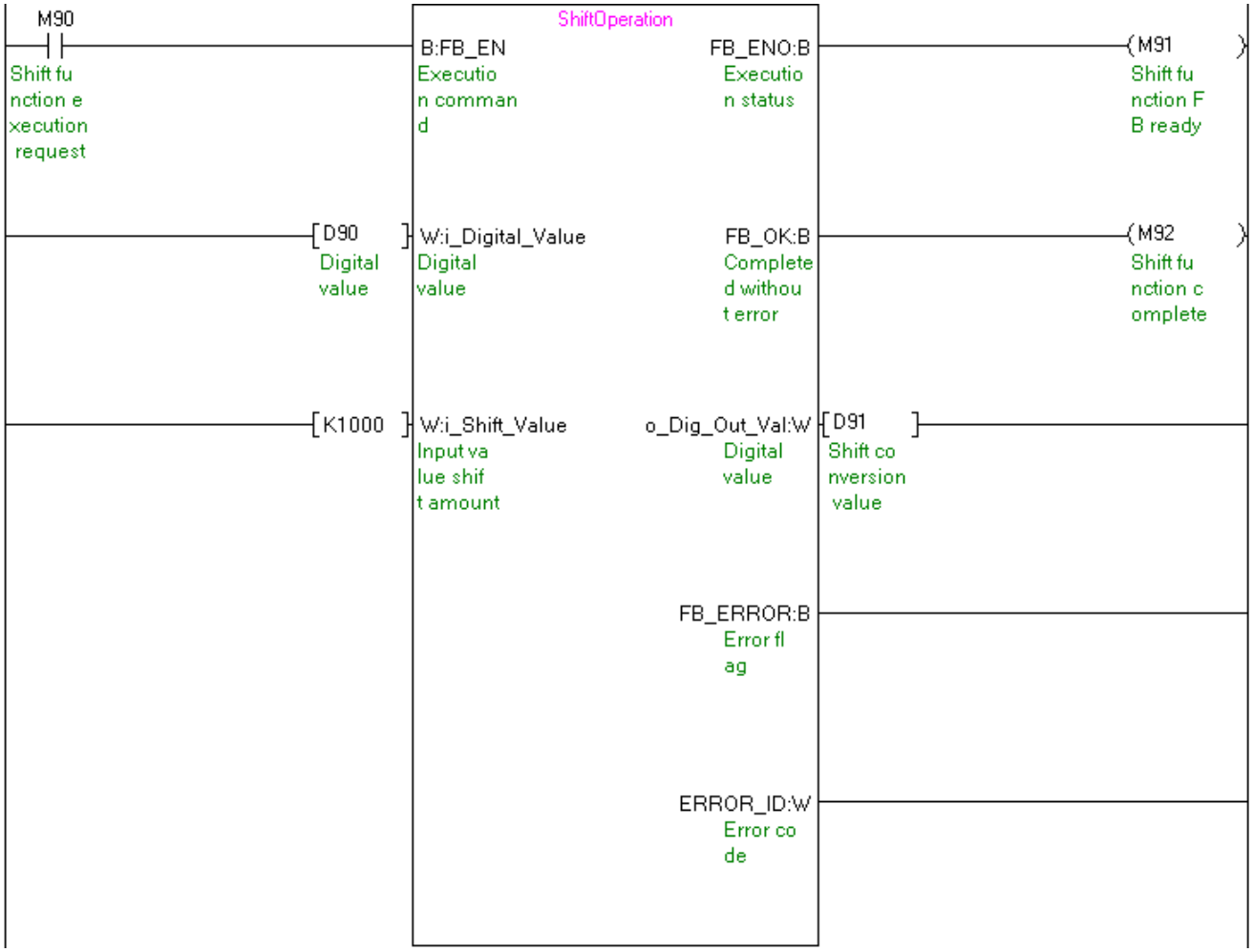
After turning ON M80, by turning ON M81, the gain value of channel 3 is changed, and by turning ON M82, the user range write operation is performed.



M+L60DA4_ShiftOperation (Shift operation)

Label name	Setting value	Description
i_Digital_Value	-	Set the digital value.
i_Shift_Value	K1000	Set the shift amount to 1,000.

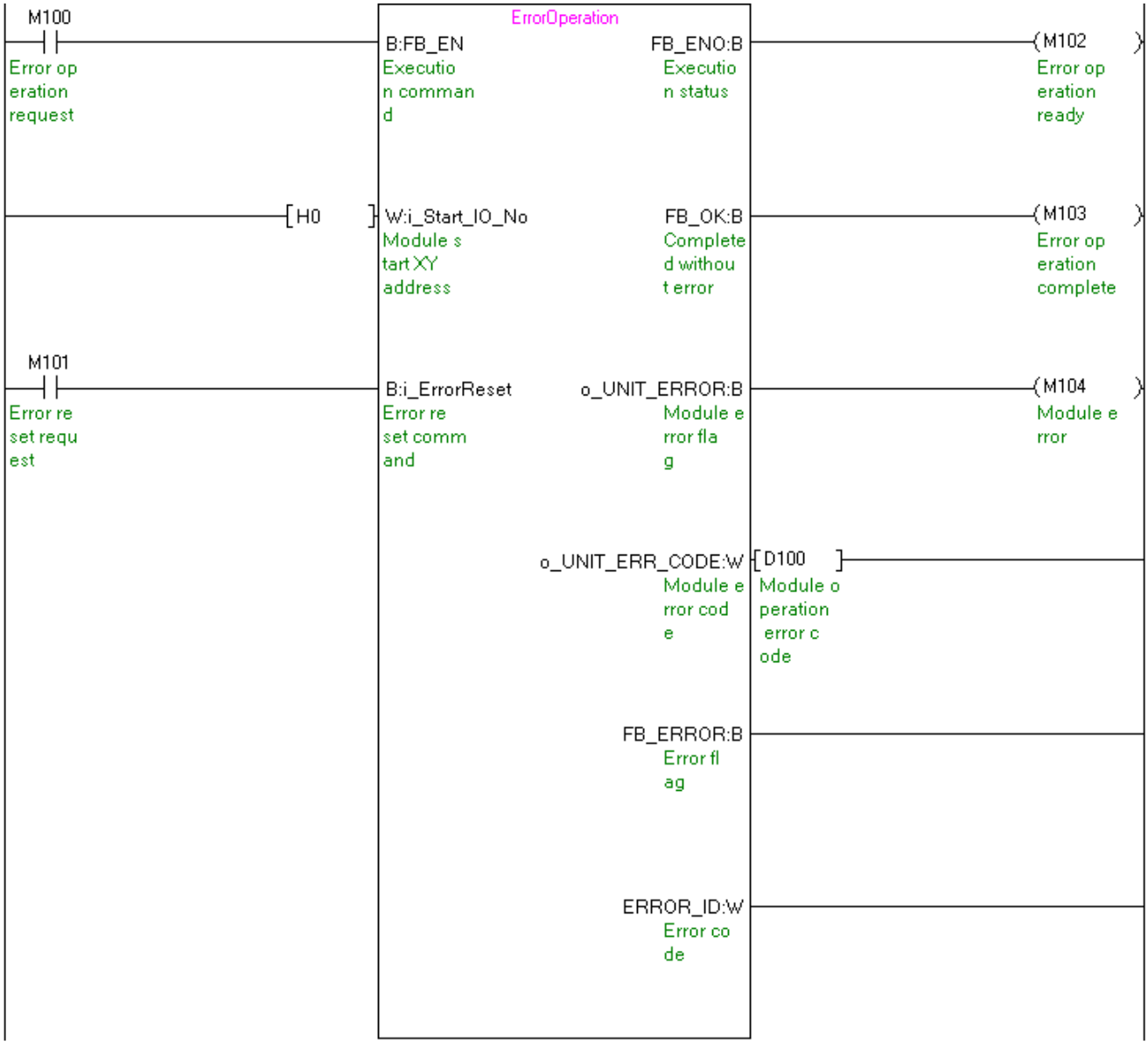
By turning ON M90, the sum obtained by adding the shift amount to conversion value to the input digital value is output.



M+L60DA4_ErrorOperation (Error operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_ErrorReset	ON/OFF	Turn ON to reset errors.

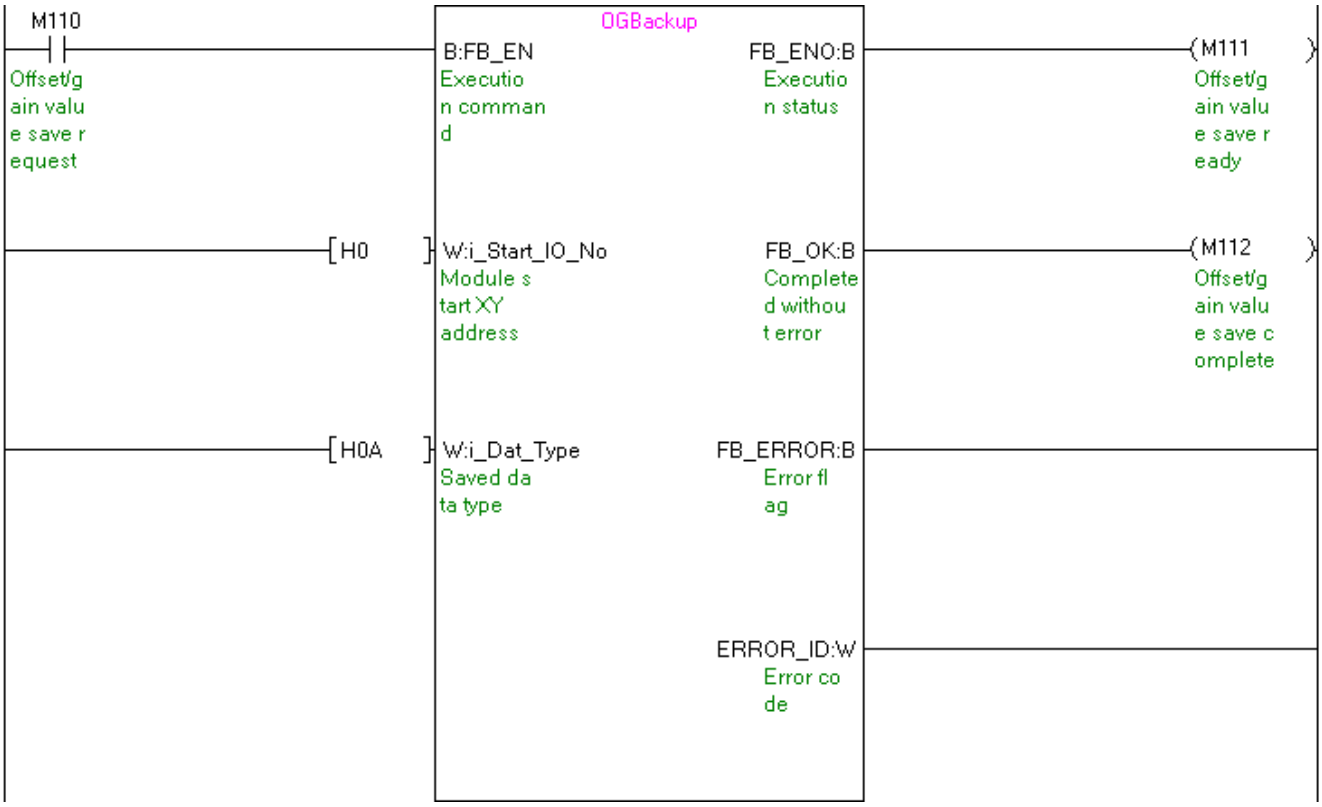
By turning ON M100, an error code is output if an error occurs. After an error output, by turning ON M101, the error is reset.



M+L60DA4_OGBackup (Offset/gain value save)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_Dat_Type	H0A	Set the type of save data to "Voltage" for channels 1 and 3 and "Current" for channels 2 and 4.

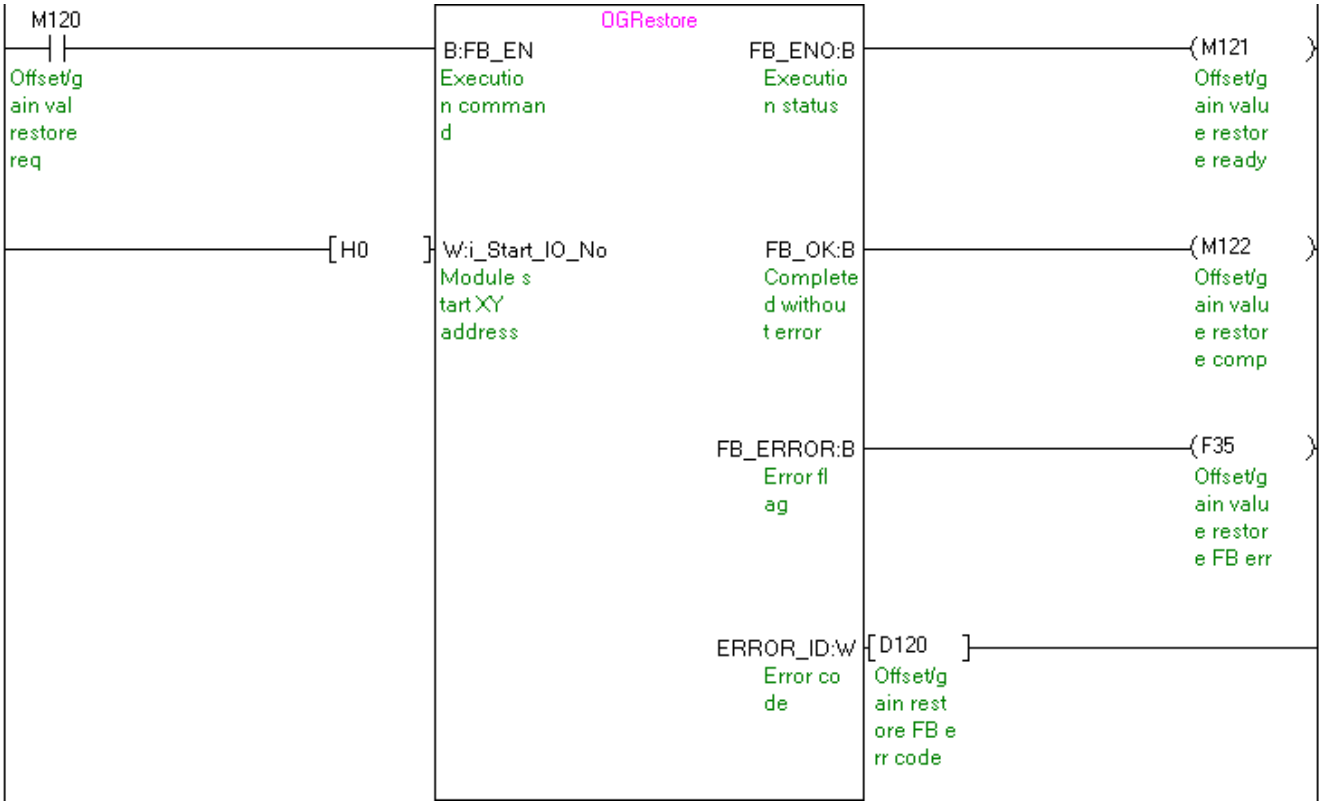
By turning ON M110, the offset/gain values are read from the user range setting and they are saved in the SD memory card inserted in the CPU module.



M+L60DA4_OGRestore (Offset/gain value restore)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.

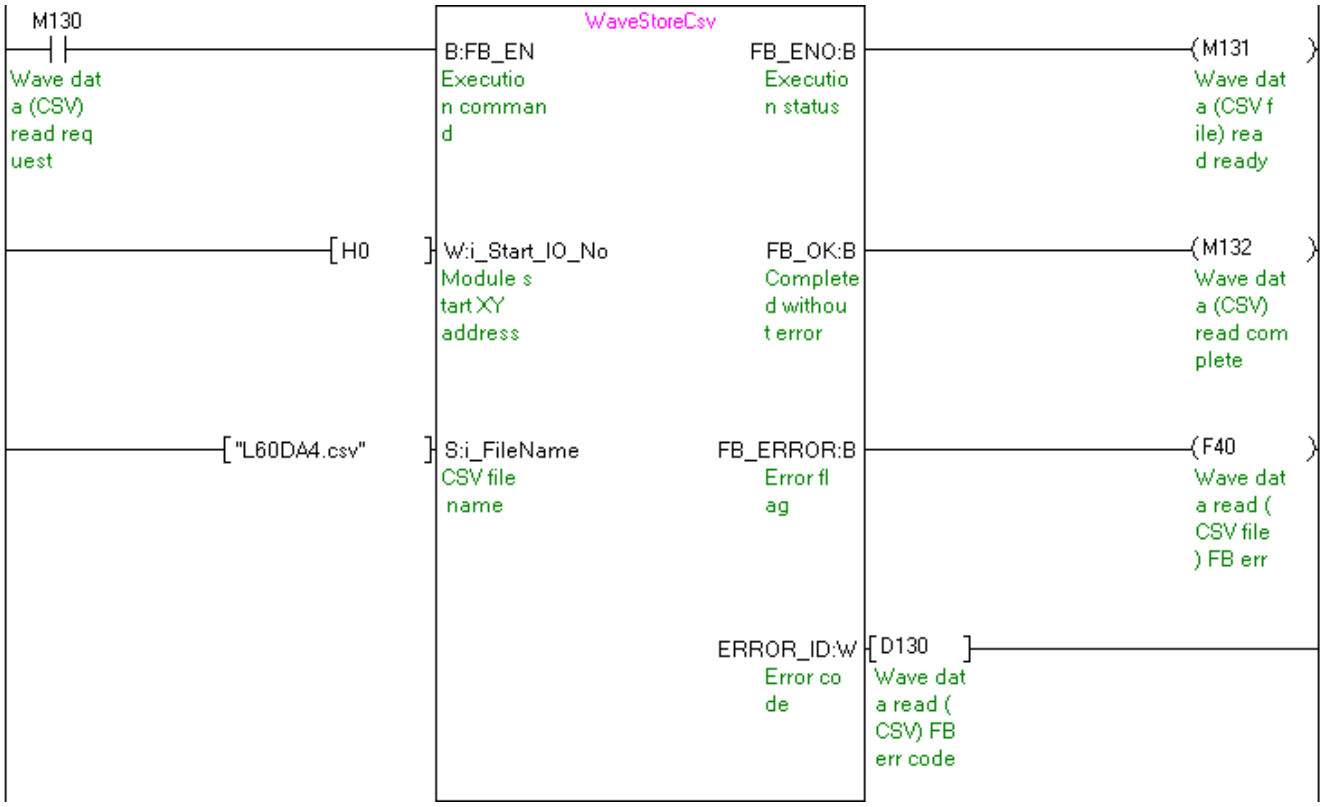
By turning ON M120, the user range offset/gain setting values stored in the file are restored to the module.



M+L60DA4_WaveDataStoreCsv (Read wave data (CSV file))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_FileName	"L60DA4.csv"	Set the name of the CSV file, which stores the wave output function parameters and wave data, to "L60DA4.csv".

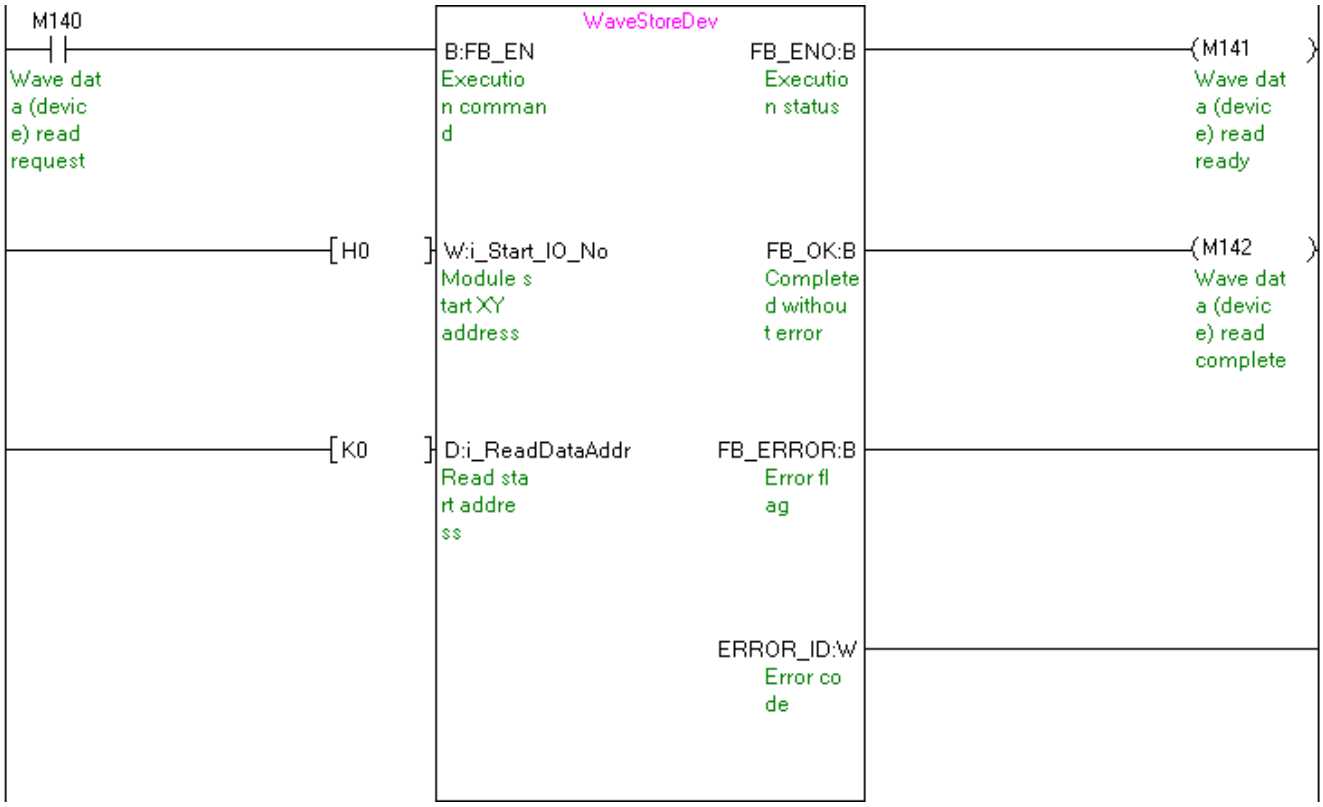
By turnig ON M130, the wave output function parameters and wave data are read from "L60DA4.csv" in the SD memory card and they are stored in the buffer memory.



M+L60DA4_WaveDataStoreDev (Read wave data (device))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_ReadDataAddr	K0	Set the read start address, which stores the wave output function parameters and wave data, to ZR0.

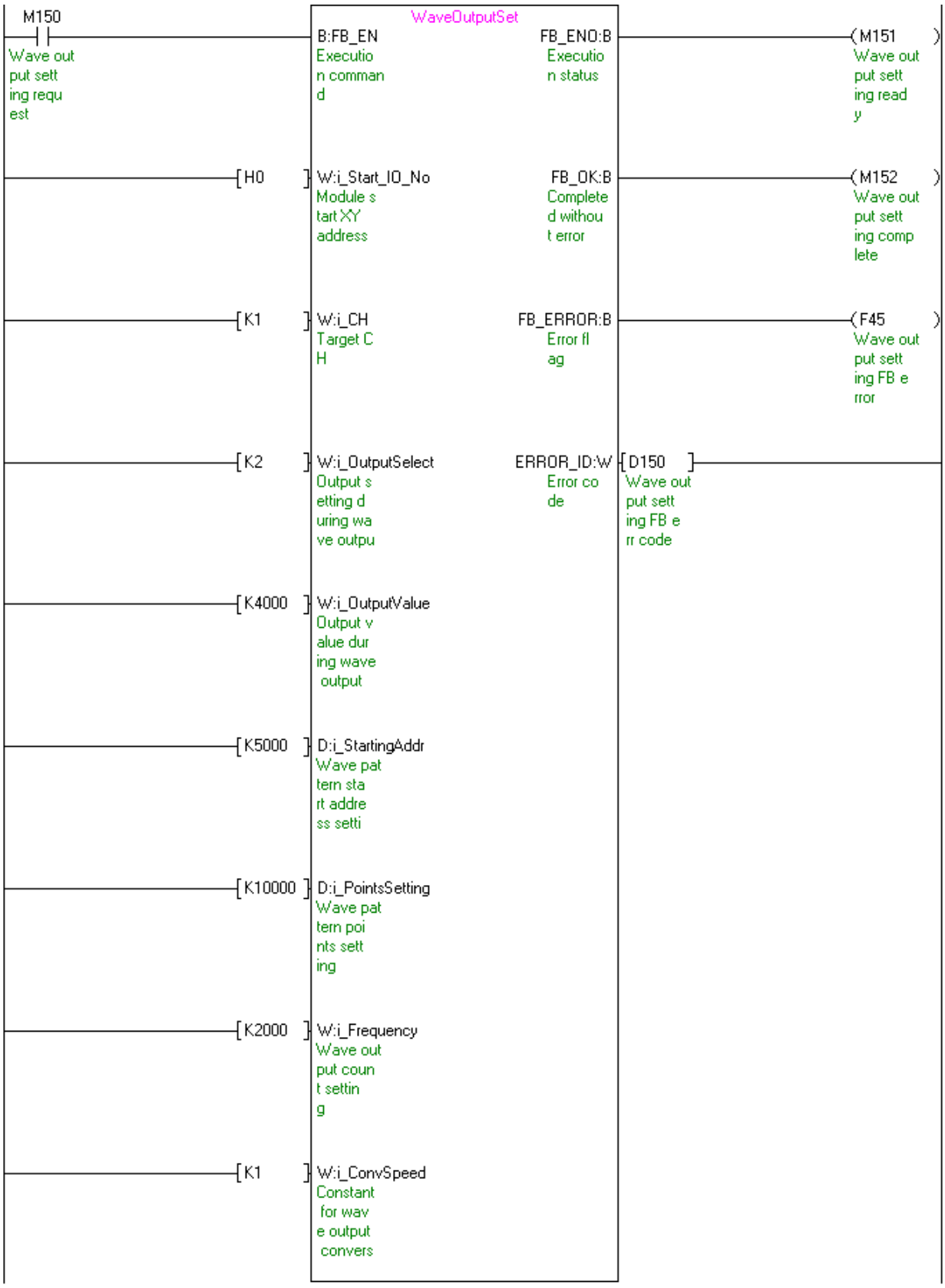
By turning ON M140, the wave output function parameters and wave data are read from file register ZR0 and subsequent addresses and they are stored in the buffer memory.



M+L60DA4_WaveOutputSetting (Wave output setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_OutputSelect	K2	Set the Output setting during wave output stop to 2 (Output value during wave output stop).
i_OutputValue	K4000	Set the Output value during wave output stop to 4,000.
i_StartingAddr	K5000	Set the start address of the wave pattern to output to 5,000.
i_PointsSetting	K10000	Set the data points of the wave pattern to output to 10,000.
i_Frequency	K2000	Set the wave output count to 2,000.
i_ConvSpeed	K1	Set the wave output conversion cycle constant to 1.

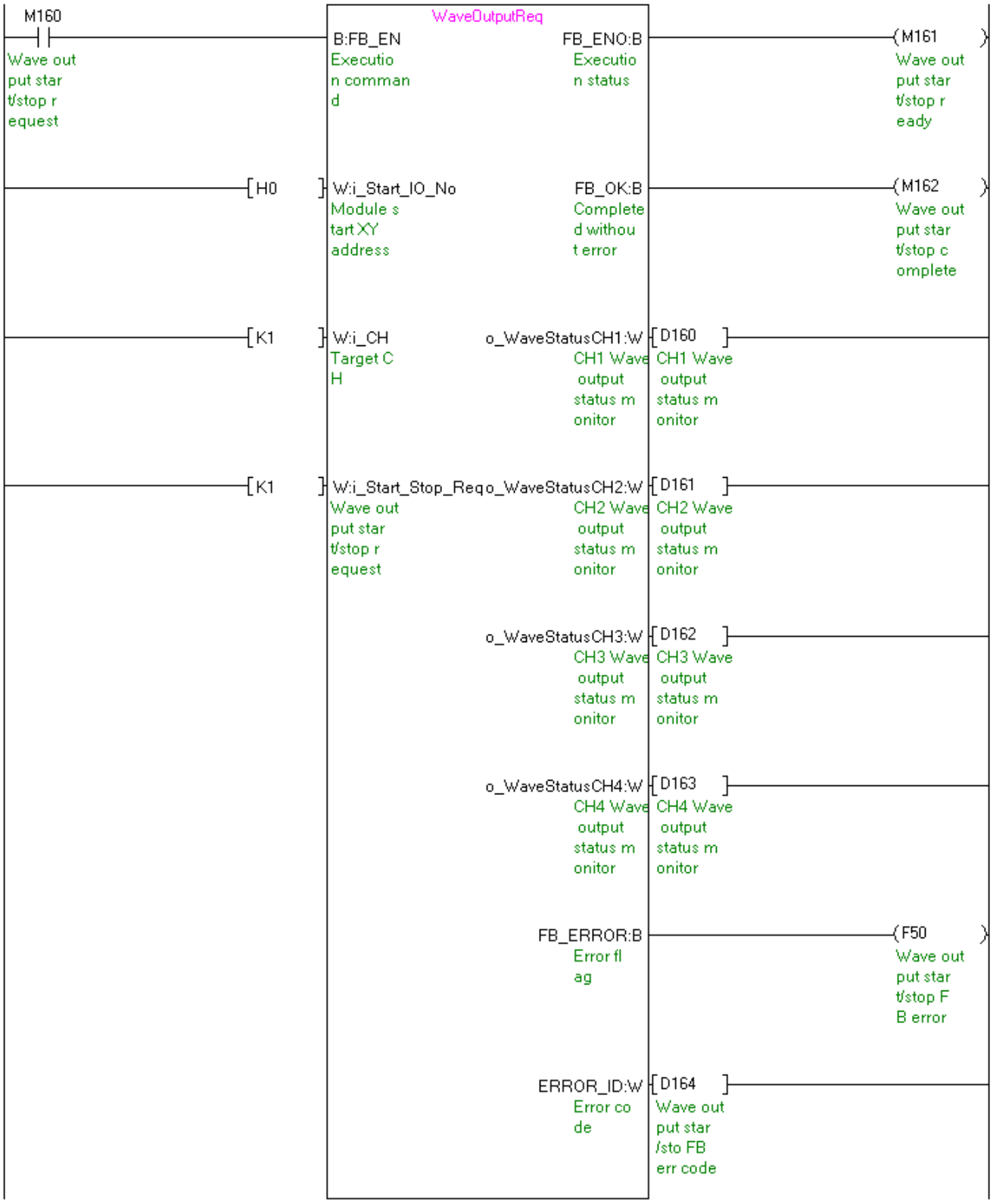
By turning ON M150, the wave output setting for channel 1 is performed.


M150
Wave out put sett ing requ est
WaveOutputSet
B:FB_EN Executio n comman d
FB_ENO:B Executio n status
M151 Wave out put sett ing read y
H0
W:i_Start_IO_No Module s tart XY address
FB_OK:B Complete d withou t error
M152 Wave out put sett ing comp lete
K1
W:i_CH Target C H
FB_ERROR:B Error fl ag
F45 Wave out put sett ing FB e rror
K2
W:i_OutputSelect Output s etting d uring wa ve outpu
ERROR_ID:W Error co de
D150 Wave out put sett ing FB e rr code
K4000
W:i_OutputValue Output v alue dur ing wave output
K5000
D:i_StartingAddr Wave pat tern sta rt addre ss setti
K10000
D:i_PointsSetting Wave pat tern poi nts sett ing
K2000
W:i_Frequency Wave out put coun t settin g
K1
W:i_ConvSpeed Constant for wav e output convers

M+L60DA4_WaveOutputReqSetting (Wave output start/stop request)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60DA4 module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Start_Stop_Req	K1	Set the wave output start/stop request to "1: Wave output start request".

By turning ON M160, the wave output for channel 1 is started.


M160
Wave out put star t/stop r equest
WaveOutputReq
B:FB_EN
Executio n comman d
FB_ENO:B
Executio n status
M161
Wave out put star t/stop r eady
H0
W:i_Start_IO_No
Module s tart XY address
FB_OK:B
Complete d withou t error
M162
Wave out put star t/stop c omplete
K1
W:i_CH
Target C H
o_WaveStatusCH1:W
CH1 Wave output status m onitor
D160
CH1 Wave output status m onitor
K1
W:i_Start_Stop_Req
Wave out put star t/stop r equest
o_WaveStatusCH2:W
CH2 Wave output status m onitor
D161
CH2 Wave output status m onitor
o_WaveStatusCH3:W
CH3 Wave output status m onitor
D162
CH3 Wave output status m onitor
o_WaveStatusCH4:W
CH4 Wave output status m onitor
D163
CH4 Wave output status m onitor
FB_ERROR:B
Error fl ag
F50
Wave out put star t/stop F B error
ERROR_ID:W
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Appendix 2. Storage Sources (Wave Output Function Parameters/Data) and Storage Destination Buffer Memory

The following table shows the relationship between the storage sources (wave output function parameters/data), which are handled by M+L60DA4_WaveDataStoreCsv (Read wave data (CSV file)) and M+L60DA4_WaveDataStoreDev (Read wave data (device)) and the storage destination buffer memory.

Table 1 Storage sources (wave output function parameters/data) and storage destination buffer memory

No.	Wave output function parameters/data	Setting range (Decimal)	CH	Storage sources			Storage destination
				CSV file in SD memory card		Sequential access file register (ZR) (m: Read start address)	D/A converter module Buffer memory (n: Module start XY address (Upper))
				Row	Column		
(1)	Output setting during wave output stop Select an output value while the wave output is stopped for each channel.	0: 0V/0mA 1: Offset value 2: Output value during wave output stop	1	1	1	ZR(m+0)	Un\G1008
			2	1	2	ZR(m+1)	Un\G1009
			3	1	3	ZR(m+2)	Un\G1010
			4	1	4	ZR(m+3)	Un\G1011
(2)	Output value during wave output stop Set a value to output for each channel when "Output setting during wave output stop" is set to "2: Output value during wave output stop".	(*1) 0~20,479 (Practical range: 0~20,000)	1	2	1	ZR(m+8)	Un\G1016
			2	2	2	ZR(m+9)	Un\G1017
			3	2	3	ZR(m+10)	Un\G1018
		(*2) -20,480~20,479 (Practical range: -20,000~20,000)	4	2	4	ZR(m+11)	Un\G1019
(3)	Wave pattern start address setting Set the start address of the wave pattern to output for each channel.	5,000~54,999	1	3	1	ZR(m+16, 17)	Un\G1024,1025
			2	3	2	ZR(m+18, 19)	Un\G1026,1027
			3	3	3	ZR(m+20, 21)	Un\G1028,1029
			4	3	4	ZR(m+22, 23)	Un\G1030,1031
(4)	Wave pattern points setting Set the data points of the wave pattern to output for each channel.	1~50,000 (points)	1	4	1	ZR(m+32, 33)	Un\G1040,1041
			2	4	2	ZR(m+34, 35)	Un\G1042,1043
			3	4	3	ZR(m+36, 37)	Un\G1044,1045
			4	4	4	ZR(m+38, 39)	Un\G1046,1047
(5)	Wave output count setting Set the wave pattern output count for each channel.	-1: Repeat outputs infinitely 1~32,767: Specify an output count.	1	5	1	ZR(m+48)	Un\G1056
			2	5	2	ZR(m+49)	Un\G1057
			3	5	3	ZR(m+50)	Un\G1058
			4	5	4	ZR(m+51)	Un\G1059
(6)	Constant for wave output conversion cycle Set a constant for each channel to specify the conversion cycle (in multiples of conversion speed).	1~5,000	1	6	1	ZR(m+56)	Un\G1064
			2	6	2	ZR(m+57)	Un\G1065
			3	6	3	ZR(m+58)	Un\G1066
			4	6	4	ZR(m+59)	Un\G1067
(7)	Wave data points Set the total wave data points.	0~50,000 (points)		100	1	ZR(m+98,99)	-
(8)	Wave data	-20,480~20,479 (Practical range: -20,000~20,000)		101 ~ 50,100	1	ZR(m+100) ~ ZR(m+50099)	Un\G5000 ~ Un\54999

*1: D/A converter module output range: When using 0~5V, 1~5V, 0~20mA, 4~20mA

*2: D/A converter module output range: When using -10~10V

* (1) to (8) in the table correspond to the numbers in "example of rows/columns of a CSV file" in Appendix 3.

Appendix 3. CSV File Format for Wave Data Read (CSV File) FB

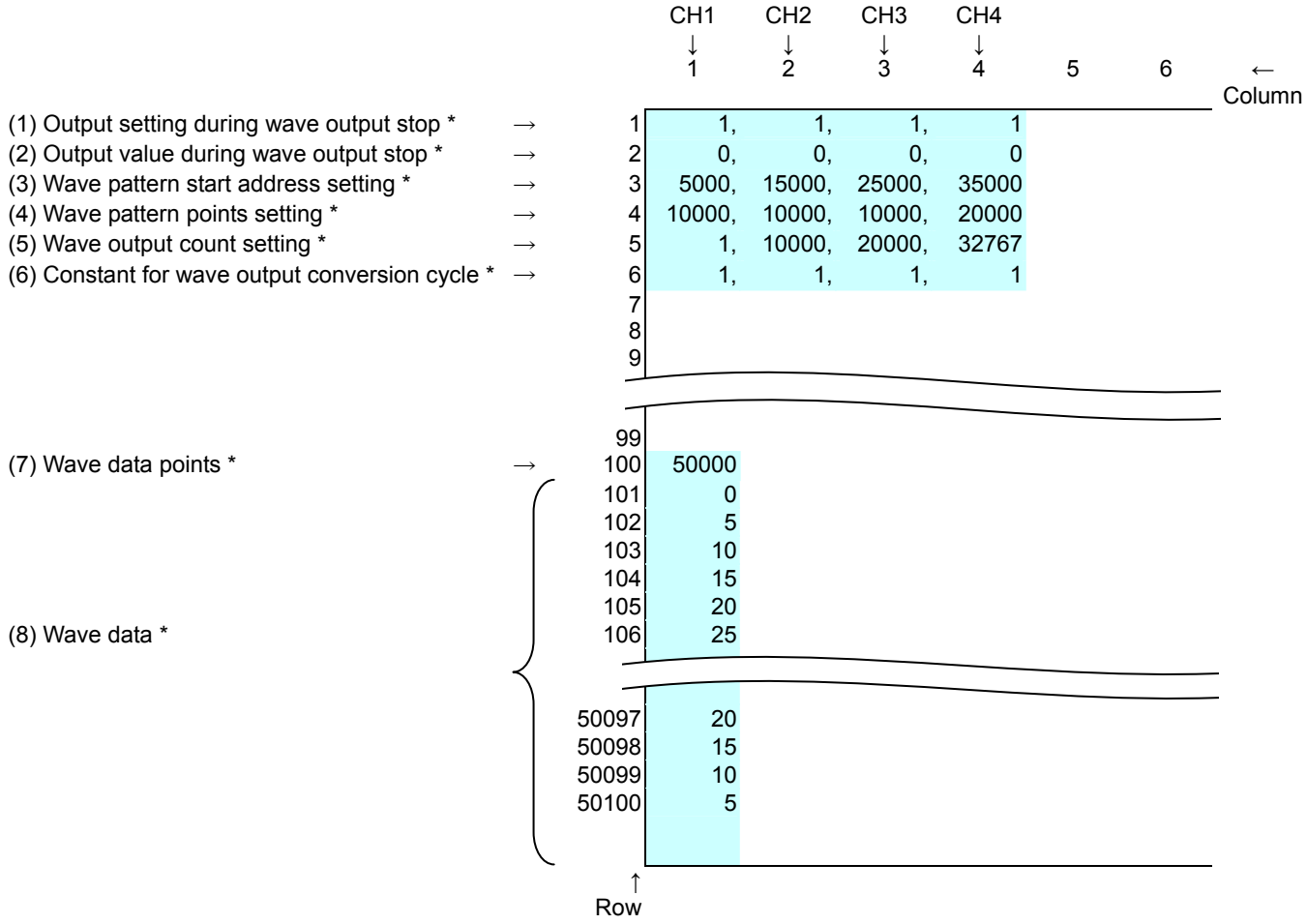
This section describes the CSV file format that can be handled by M+L60DA4_WaveDataStoreCsv (Read wave data (CSV file)). (The extension of the CSV file must be ".CSV" and the file must be able to open with a general-purpose application such as Excel or Notepad.)

The CSV format specifications are as follows:

Item	Description
Delimiter	Comma (,)
linefeed code	CRLF(0x0D,0x0A)
Character code	ASCII or shift JIS

The CSV file name must be up to 12 half-width characters including the extension ".CSV". (Two-byte characters can also be used. One full-width character is counted as 2 half-width characters.)
(Example) L60DA4_1.csv, wd000001.csv, Wave.csv, etc.

The following figure shows an example of rows/columns of a CSV file. In this example, the wave data points setting is set to 50000 (maximum points).



* (1) to (8) in the table above correspond to the items in Table 1 Storage sources (wave output function parameters/data) and storage destination buffer memory. For details on each item, refer to the table.