# MELSEC-L Analog Input/Output Module FB Library Reference Manual

Applicable modules:
L60AD2DA2

<CONTENTS>

Reference Manual Revision History

| Reference Manual Number | Date | Description |
|---|---|---|
| FBM-M111-A | 2013/08/30 | First edition |
| FBM-M111-B | 2015/04/03 | 1) The following FB libraries have been added.<br>•M+L60AD2DA2_FreeCalDataStoreDev<br>•M+L60AD2DA2_FreeConvDataStoreCsv<br>•M+L60AD2DA2_FreeConvDataStoreDev<br>2) Added applicable GX Works2 Version.<br>•This FB is able to install on GX Works2 of all language versions. |

# 1. Overview

## 1.1. Overview of the FB Library

This FB Library is for using the MELSEC-L Analog Input/Output Module L60AD2DA2 (hereinafter L60AD2DA2).

## 1.2. Function of the FB Library

[A/D conversion]

| Item | Description |
|---|---|
| M+L60AD2DA2_AD_ReadADVal | Reads the A/D conversion data of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_ReadAllADVal | Reads the A/D conversion data of the A/D conversion channels (CH1 and CH2). |
| M+L60AD2DA2_AD_ReadScalingVal | Reads the scaling value of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_ReadAllScalingVal | Reads the scaling values of the A/D conversion channels (CH1 and CH2). |
| M+L60AD2DA2_AD_SetADConversion | Enables or disables the A/D conversion for the specified A/D conversion channel (CH1 or CH2) or all the A/D conversion channels (CH1 and CH2). |
| M+L60AD2DA2_AD_SetAverage | Sets the averaging processing of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_SetScaling | Sets the scaling of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_SetInputSignalErr | Sets the input signal error detection of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_SetOffsetVal | Sets the offset of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_SetGainVal | Sets the gain of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_ShiftOperation | Adds the conversion value shift amount to the digital value. |
| M+L60AD2DA2_AD_DiffOperation | Outputs the remaining value after subtraction of the reference value from the digital value. |
| M+L60AD2DA2_AD_ClipOperation | Limits the digital value with the upper and lower limit values of the digital clipping. |
| M+L60AD2DA2_AD_SetLoggingPARAM | Sets the logging function of the specified A/D conversion channel (CH1 or CH2). |
| M+L60AD2DA2_AD_SaveLogging | Saves the logging data to a file. |

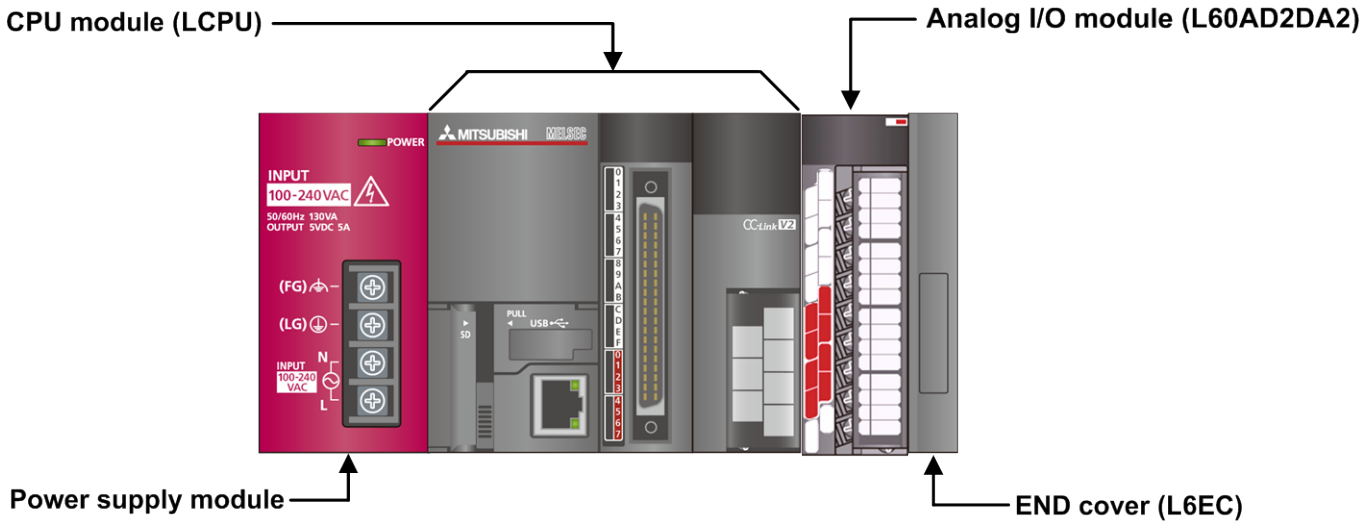
[D/A conversion]

| Item | Description |
|---|---|
| M+L60AD2DA2_DA_WriteDAVal | Writes the D/A conversion data of the specified D/A conversion channel (CH3 or CH4). |
| M+L60AD2DA2_DA_WriteAllDAVal | Writes the D/A conversion data of the D/A conversion channels (CH3 and CH4). |
| M+L60AD2DA2_DA_SetDAConversion | Enables or disables the D/A conversion for the D/A conversion specified channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4). |
| M+L60AD2DA2_DA_SetDAOutput | Enables or disables the D/A output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4). |
| M+L60AD2DA2_DA_SetScaling | Sets the scaling of the specified D/A conversion channel (CH3 or CH4). |
| M+L60AD2DA2_DA_SetAlarm | Sets the alert output of the specified D/A conversion channel (CH3 or CH4). |
| M+L60AD2DA2_DA_SetOffsetVal | Sets the offset of the specified D/A conversion channel (CH3 or CH4). |
| M+L60AD2DA2_DA_SetGainVal | Sets the gain of the specified D/A conversion channel (CH3 or CH4). |
| M+L60AD2DA2_DA_ShiftOperation | Adds the input value shift amount to the digital value. |
| M+L60AD2DA2_DA_WaveDataStoreCsv | Reads data from the CSV file where parameters and wave data (wave data and wave data points) of the wave output function are stored, then writes them to the buffer memory of the L60AD2DA2. |
| M+L60AD2DA2_DA_WaveDataStoreDev | Reads data from the file register (ZR) where parameters and wave data (wave data and wave data points) of the wave output function are stored, then writes them to the buffer memory of the L60AD2DA2. |
| M+L60AD2DA2_DA_WaveOutputSetting | Sets the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4). |
| M+L60AD2DA2_DA_WaveOutReqSetting | Sets the starting, stopping, or pausing of the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4). |

[Common]

| Item | Description |
|---|---|
| M+L60AD2DA2_ReadADVal_WriteDAVal | Reads the A/D conversion data of the A/D conversion channels (CH1 and CH2) and writes the D/A conversion data of the D/A conversion channels (CH3 and CH4). |
| M+L60AD2DA2_RequestSetting | Validates each setting. |
| M+L60AD2DA2_ErrorOperation | Monitors error codes and resets errors. |
| M+L60AD2DA2_OGBackup | Reads the offset/gain setting value of the user range setting and stores it to a file. |
| M+L60AD2DA2_OGRestore | Restores the offset/gain setting values of the user range setting that are saved in a file to the module. |
| M+L60AD2DA2_FreeCalDataStoreDev | Reads calculation expression data of the free calculation function from the file register (ZR), and then writes them to the buffer memory of the L60AD2DA2. |
| M+L60AD2DA2_FreeConvDataStoreCsv | Reads the parameters and free conversion characteristics table of the free conversion characteristics function from the CSV file, and then writes them to the buffer memory of the L60AD2DA2. |
| M+L60AD2DA2_FreeConvDataStoreDev | Reads the parameters and free conversion characteristics table of the free conversion characteristics function from the file register (ZR), and then writes them to the buffer memory of the L60AD2DA2. |

## 1.3. System Configuration Example



## 1.4. Relevant Manuals

- MELSEC-L Analog Input/Output 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 Version 1 Operating Manual (Common)
- GX Works2 Version 1 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

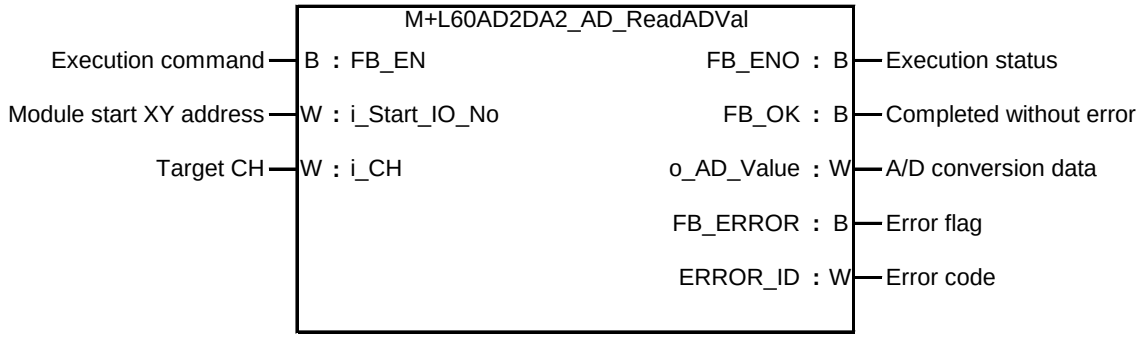
## 2.1. A/D conversion FB

### 2.1.1. M+L60AD2DA2_AD_ReadADVal (Read A/D conversion data)

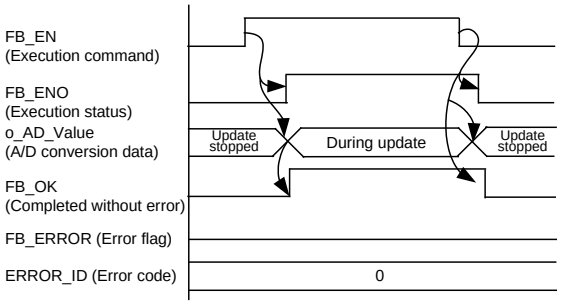
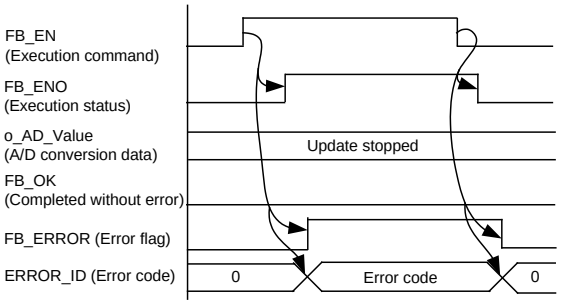
**FB Name**

M+L60AD2DA2_AD_ReadADVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads the A/D conversion data of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">324 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the A/D conversion data of the specified A/D conversion channel (CH1 or CH2) is read.<br>2) The read A/D conversion data depends on the settings of the input range and the averaging processing function.<br>3) When the A/D conversion completed flag (XnE) is OFF, the A/D conversion data of the specified channel is not read.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code 10 (Decimal) is stored in ERROR_ID (Error code).<br>Refer to the error code explanation section for details.<br>5) When the digital output value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion value is being read. |
| A/D conversion data | o_AD_Value | Word | 0 | The A/D conversion value is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

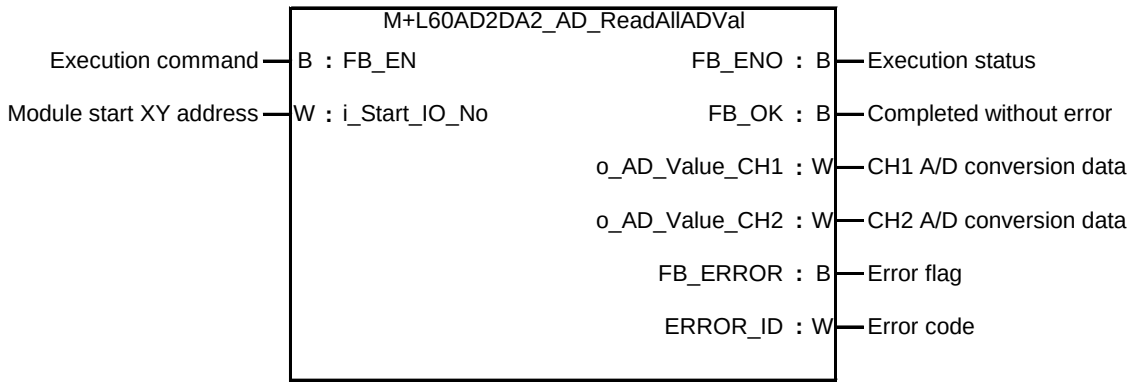
Please make sure to read user's manuals for the corresponding products before using the products.

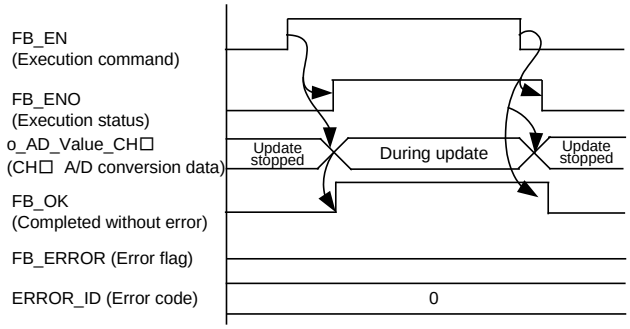
### 2.1.2. M+L60AD2DA2_AD_ReadAllADVal (Read A/D conversion data (all CHs))

**FB Name**

M+L60AD2DA2_AD_ReadAllADVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads the A/D conversion data of the A/D conversion channels (CH1 and CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">280 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the A/D conversion data of the A/D conversion channels (CH1 and CH2) is read.<br>2) The read A/D conversion data depends on the settings of the input range and the averaging processing function.<br>3) When the A/D conversion completed flag (XnE) is OFF, the A/D conversion data of channel 1 and channel 2 is not read.<br>4) When the digital output value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation<br>6) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion value is being read. |
| CH1 A/D conversion data | o_AD_Value_CH1 | Word | 0 | The A/D conversion value of channel 1 is stored. |
| CH2 A/D conversion data | o_AD_Value_CH2 | Word | 0 | The A/D conversion value of channel 2 is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

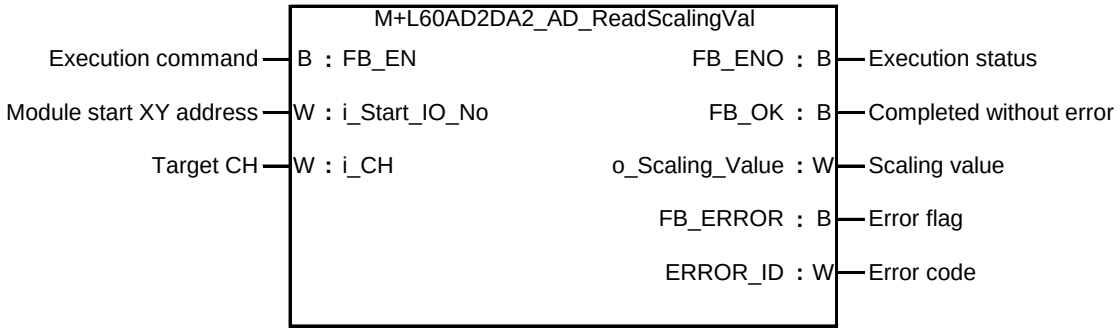
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.1.3. M+L60AD2DA2_AD_ReadScalingVal (Read A/D conversion scaling value)

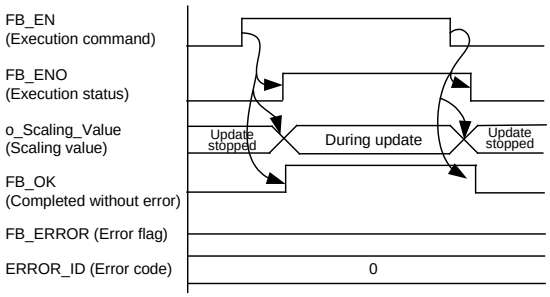
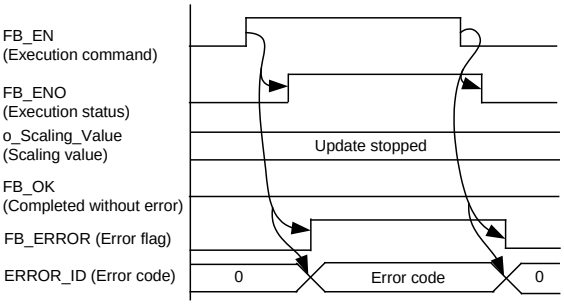
**FB Name**

M+L60AD2DA2_AD_ReadScalingVal

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the scaling value of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">365 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the scaling value of the specified A/D conversion channel (CH1 or CH2) is read.<br>2) The read scaling value depends on the setting of the input range, the averaging processing function, and the scaling function (A/D conversion).<br>3) In the following cases, the scaling data is not read.<br>• When the A/D conversion scaling enable/disable setting (Un\G53) the specified channel is invalid<br>• When the A/D conversion completed flag (XnE) is OFF<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code 10 (Decimal) is stored in ERROR_ID (Error code).<br>Refer to the error code explanation section for details.<br>5) When the scaling value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the scaling value is being read. |
| Scaling value | o_Scaling_Value | Word | 0 | The scaling value is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

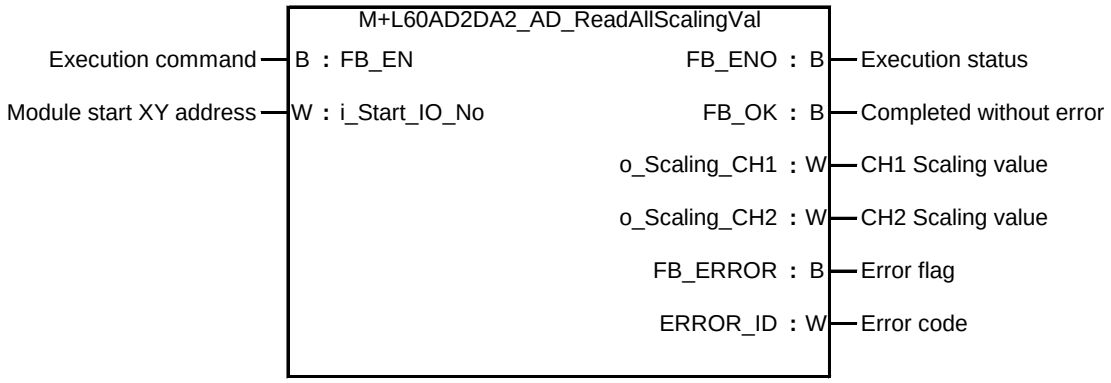
Please make sure to read user's manuals for the corresponding products before using the products.

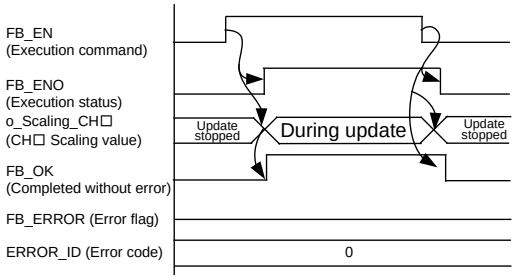
### 2.1.4. M+L60AD2DA2_AD_ReadAllScalingVal (Read A/D conversion scaling value (all CHs))

**FB Name**

M+L60AD2DA2_AD_ReadAllScalingVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads the scaling values of the A/D conversion channels (CH1 and CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">312 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the scaling values of the A/D conversion channels (CH1 and CH2) are read.<br>2) The read scaling value depends on the setting of the input range, the averaging processing function, and the scaling function (A/D conversion).<br>3) The scaling value of the channel for which the A/D conversion scaling enable/disable setting (Un\G53) is invalid is not read.<br>4) When the A/D conversion completed flag (XnE) is OFF, the scaling values of the channels (CH1 and CH2) are not read.<br>5) When the scaling value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation<br>6) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the scaling value is being read. |
| CH1 Scaling value | o_Scaling_CH1 | Word | 0 | The scaling value of channel 1 is stored. |
| CH2 Scaling value | o_Scaling_CH2 | Word | 0 | The scaling value of channel 2 is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

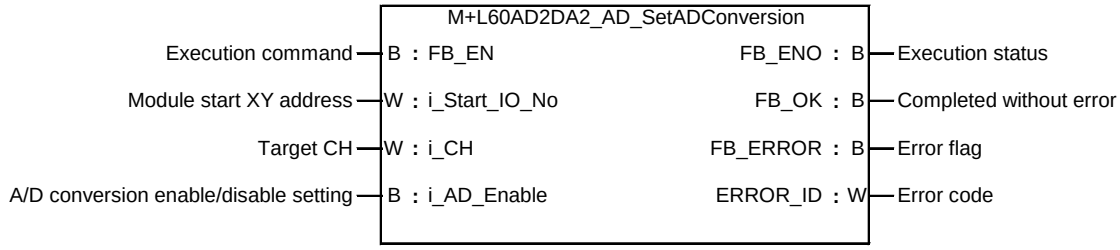
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.1.5. M+L60AD2DA2_AD_SetADConversion (A/D conversion enable/disable setting)

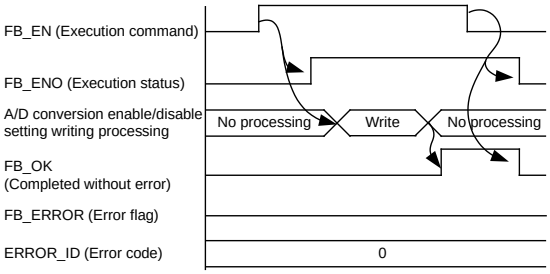
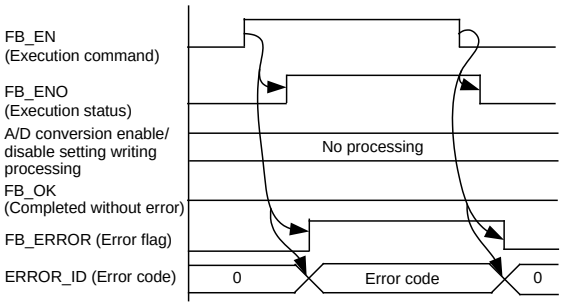
**FB Name**

M+L60AD2DA2_AD_SetADConversion

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Enables or disables the A/D conversion for the specified A/D conversion channel (CH1 or CH2) or all the A/D conversion channels (CH1 and CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">385 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the A/D conversion for the specified A/D conversion channel (CH1 or CH2) or all the A/D conversion channels (CH1 and CH2) is enabled or disabled.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code 10 (Decimal) is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Pulsed execution (1 scan execution type) |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |

| Item | Description |
|---|---|
| Timing chart | [When operation completes without error]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1, 2, 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2, 15 | 1 or 2: Specify the channel number.<br>15: Specify channel 1 and channel 2. |
| A/D conversion enable/disable setting | i_AD_Enable | Bit | ON, OFF | ON: A/D conversion enabled<br>OFF: A/D conversion disabled |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the conversion enable/disable 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 | 2013/08/30 | First edition |

## Note

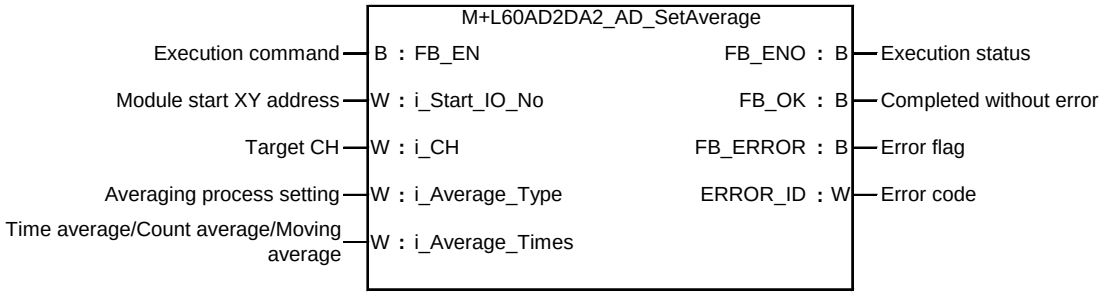
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

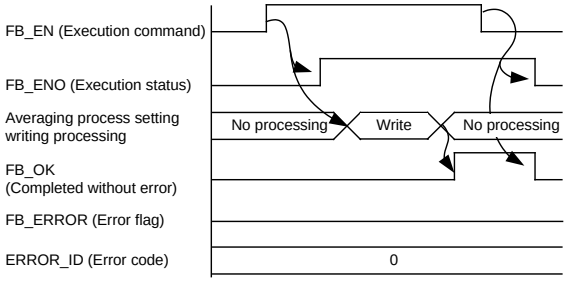
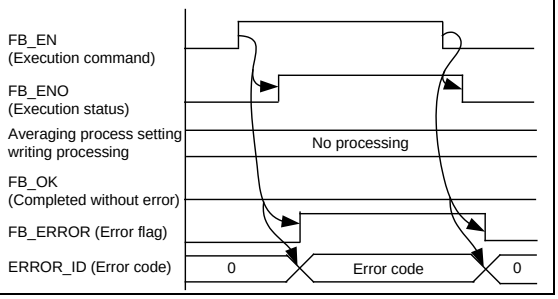
### 2.1.6. M+L60AD2DA2_AD_SetAverage (A/D conversion averaging process setting)

**FB Name**

M+L60AD2DA2_AD_SetAverage

**Function Overview**

| Item | Description | |
|---|---|---|
| Function overview | Sets the averaging processing of the specified A/D conversion channel (CH1 or CH2). | |
| Symbol |  | |
| Applicable hardware and software | Analog I/O module | L60AD2DA2 |
| | CPU module | Series: MELSEC-L Series / Model: LCPU |
| | Engineering software | GX Works2 *1<br>Japanese version: Version1.86Q or later<br>English version: Version1.24A or later<br>Chinese (Simplified) version: Version1.49B or later<br>Chinese (Traditional) version: Version1.49B or later<br>Korean version: Version1.49B or later<br>*1 For software versions applicable to the modules used, refer to "Relevant Manuals". |
| Programming language | Ladder | |
| Number of steps | 421 steps (for MELSEC-L series CPU)<br>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition. | |

| Item | Description |
|---|---|
| Function description | 1) By turning ON FB_EN (Execution command), the averaging processing of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | Please try again after confirming the setting. |
| 11 (Decimal) | The specified averaging processing type is not valid. The averaging processing type is not set within the range of 0 to 3H. | 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| Averaging process setting | i_Average_Type | Word | 0H: Sampling processing<br>1H: Time average<br>2H: Count average<br>3H: Moving average | Specify the averaging processing type. |
| Time average/Count average/Moving average | i_Average_Times | Word | Time average<br>2 to 5000 (ms)<br>Count average<br>4 to 65000 (times)<br>Moving average<br>2 to 1000 (times) | Set the time average, count average, and moving average of the channel specified for the averaging processing. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the averaging processing 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

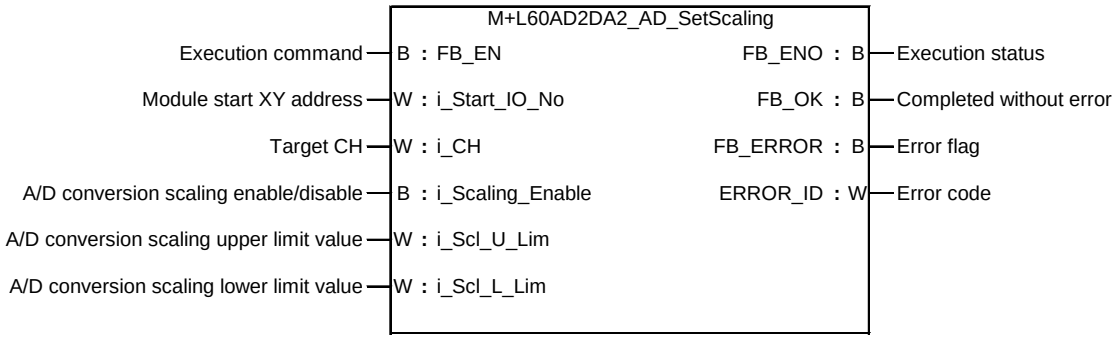
Please make sure to read user's manuals for the corresponding products before using the products.

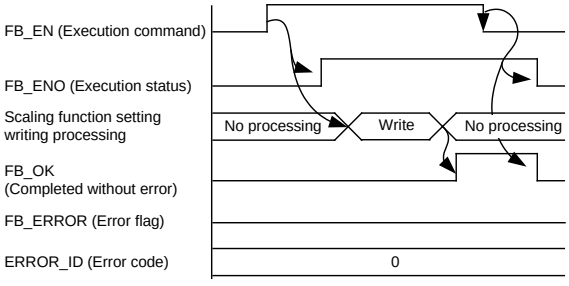
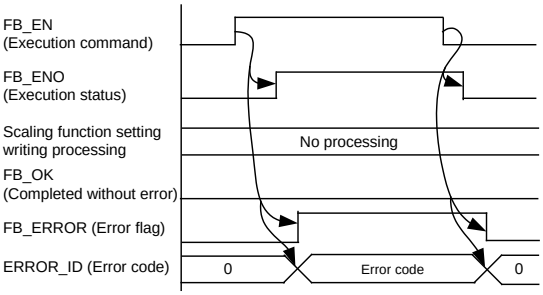
### 2.1.7. M+L60AD2DA2_AD_SetScaling (A/D conversion scaling setting)

**FB Name**

M+L60AD2DA2_AD_SetScaling

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the scaling of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">375 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the scaling of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| A/D conversion scaling enable/disable | i_Scaling_Enable | Bit | ON, OFF | ON: Enabled<br>OFF: Disabled |
| A/D conversion scaling upper limit value | i_Scl_U_Lim | Word | -32,000 to 32,000 | Specify the A/D conversion scaling upper limit value. |
| A/D conversion scaling lower limit value | i_Scl_L_Lim | Word | -32,000 to 32,000 | Specify the A/D conversion scaling lower limit value. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion scaling 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

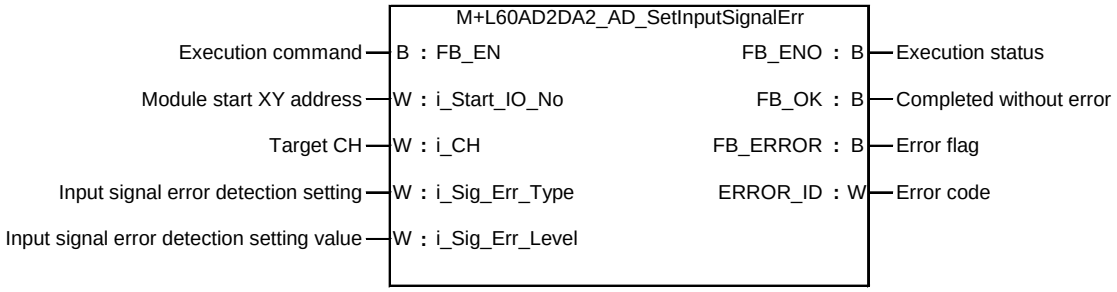
Please make sure to read user's manuals for the corresponding products before using the products.

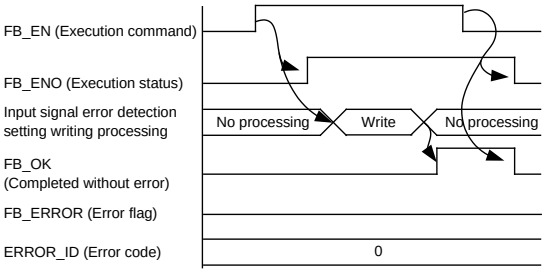
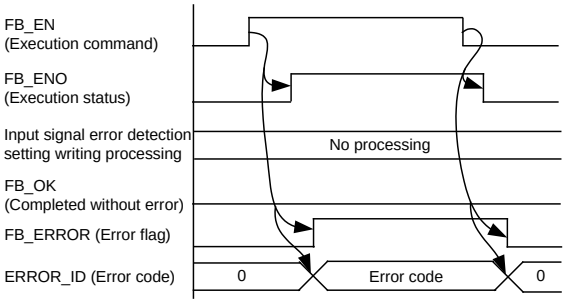
### 2.1.8. M+L60AD2DA2_AD_SetInputSignalErr (A/D conversion input signal error detection setting)

**FB Name**

M+L60AD2DA2_AD_SetInputSignalErr

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the input signal error detection of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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)<br>* 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) By turning ON FB_EN (Execution command), the input signal error detection of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | Please try again after confirming the setting. |
| 11 (Decimal) | The input signal error detection setting is not valid. The input signal error detection setting is not within the range of 0 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| Input signal error detection setting | i_Sig_Err_Type | Word | 0H: Disabled<br>1H: Upper lower limit detection<br>2H: Lower limit detection<br>3H: Upper limit detection<br>4H: Disconnection detection | Set the input signal error detection. |
| Input signal error detection setting value | i_Sig_Err_Level | Word | 0 to 250<br>(unit: 0.1%) | Specify the input signal error detection setting value. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the input signal error detection 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

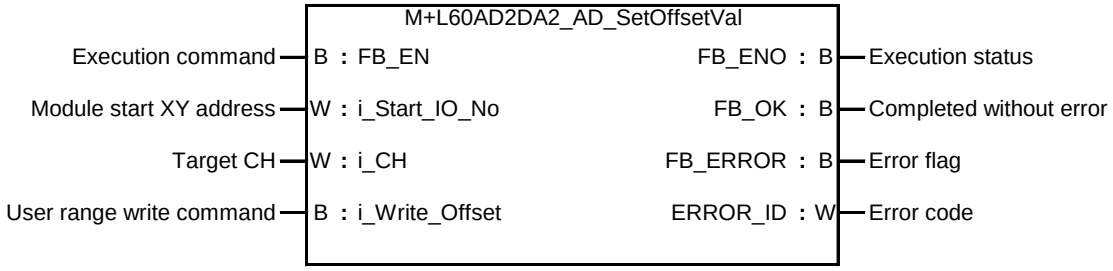
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.1.9. M+L60AD2DA2_AD_SetOffsetVal (A/D conversion offset setting)

**FB Name**

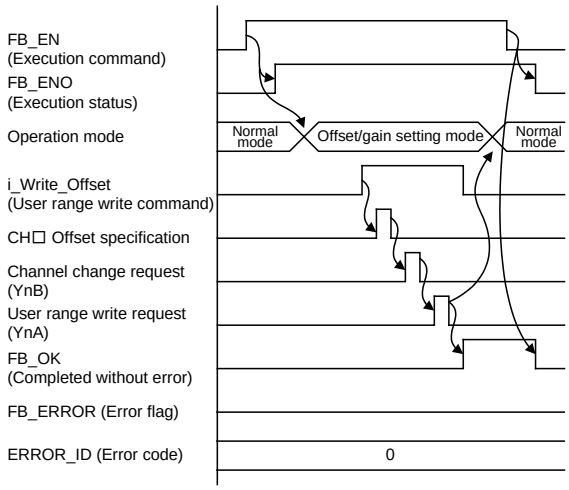
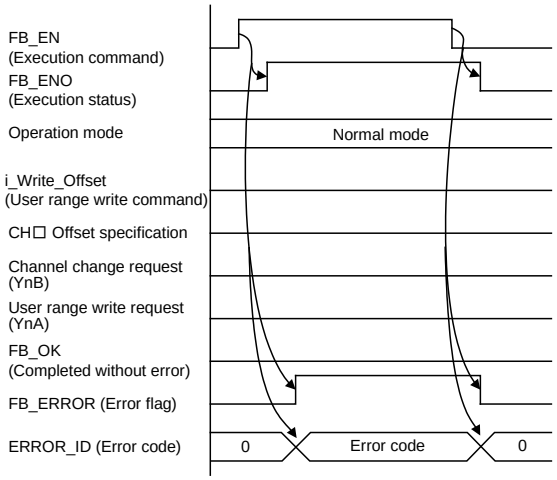
M+L60AD2DA2_AD_SetOffsetVal

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the offset of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">491 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the offset of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) By turning ON the user range write command while FB_EN (Execution command) is ON, the offset value is written.<br>3) After FB_EN (Execution command) is turned ON, the execution of this FB continues until the setting of the offset value of the specified channel is completed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>Refer to the error code explanation section for details. |
| Compiling method | Macro type |

| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When the following FBs are used, implement an external interlock to prevent them from being executed simultaneously. Do not use two or more of these FBs simultaneously. If two or more of these FBs are executed simultaneously, the offset/gain is set incorrectly.<br>• M+L60AD2DA2_AD_SetOffsetVal<br>• M+L60AD2DA2_AD_SetGainVal<br>• M+L60AD2DA2_DA_SetOffsetVal<br>• M+L60AD2DA2_DA_SetGainVal<br>5) This FB cannot configure the offset/gain settings of channel 1 and channel 2 simultaneously. To configure the offset/gain settings simultaneously, create a program instead of the use of this FB.<br>6) This FB uses index registers Z7 to Z9. Please do not use these index registers with an interrupt program.<br>7) Every input must be provided with a value for proper FB operation.<br>8) When this FB is used in two or more places, a duplicated coil warning may 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.<br>9) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog-Digital Converter Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| User range write command | i_Write_Offset | Bit | ON, OFF | Turn ON for the adjusted offset value writing to a flash memory. Turn OFF after the writing. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion offset 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

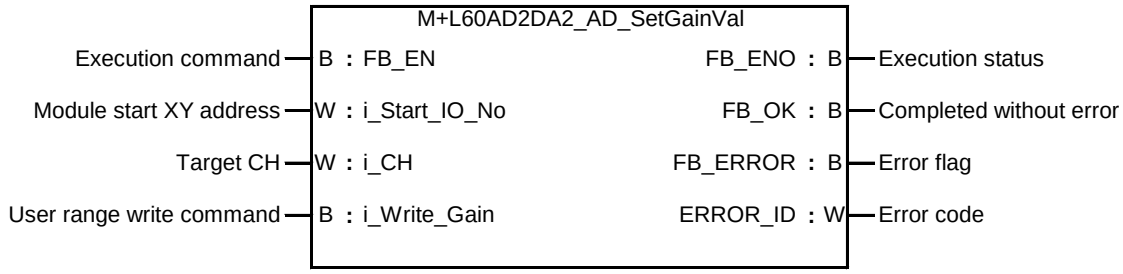
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.1.10. M+L60AD2DA2_AD_SetGainVal (A/D conversion gain setting)

**FB Name**

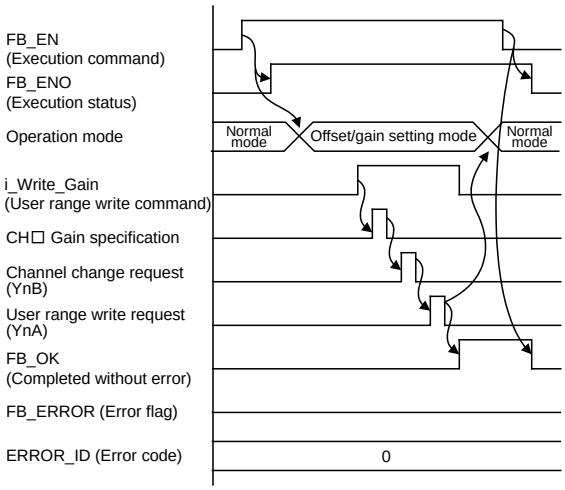
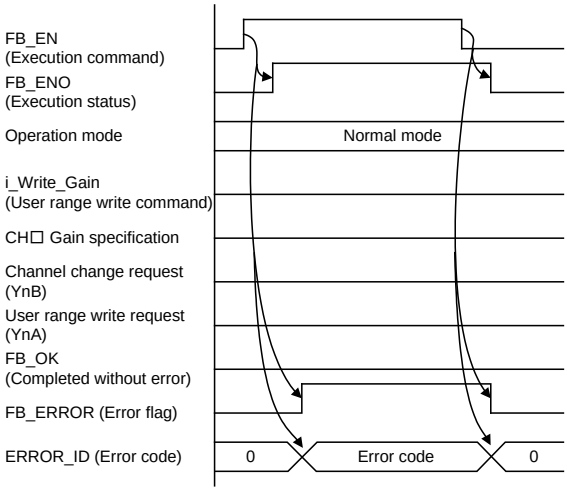
M+L60AD2DA2_AD_SetGainVal

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the gain of the specified A/D conversion channel (CH1 or CH2).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">474 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the gain of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) By turning ON the user range write command while FB_EN (Execution command) is ON, the gain value is written.<br>3) After FB_EN (Execution command) is turned ON, the execution of this FB continues until the setting of the gain value of the specified channel is completed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>Refer to the error code explanation section for details. |
| Compiling method | Macro type |

| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When the following FBs are used, implement an external interlock to prevent them from being executed simultaneously. Do not use two or more of these FBs simultaneously. If two or more of these FBs are executed simultaneously, the offset/gain is set incorrectly.<br>• M+L60AD2DA2_AD_SetOffsetVal<br>• M+L60AD2DA2_AD_SetGainVal<br>• M+L60AD2DA2_DA_SetOffsetVal<br>• M+L60AD2DA2_DA_SetGainVal<br>5) This FB cannot configure the offset/gain settings of channel 1 and channel 2 simultaneously. To configure the offset/gain settings simultaneously, create a program instead of the use of this FB.<br>6) This FB uses index registers Z7 to Z9. Please do not use these index registers with an interrupt program.<br>7) Every input must be provided with a value for proper FB operation.<br>8) When this FB is used in two or more places, a duplicated coil warning may 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.<br>9) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| User range write command | i_Write_Gain | Bit | ON, OFF | Turn ON for the adjusted gain value writing to a flash memory. Turn OFF after the writing. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

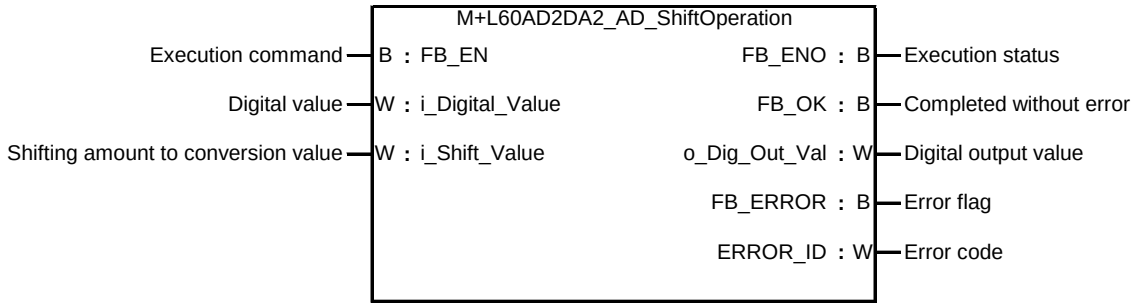
Please make sure to read user's manuals for the corresponding products before using the products.

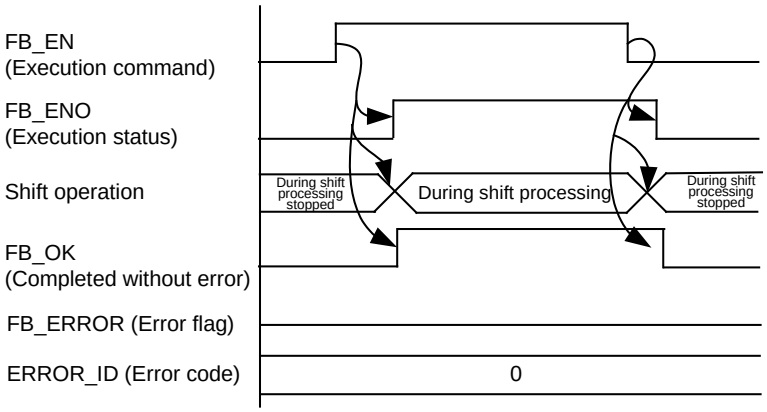
### 2.1.11. M+L60AD2DA2_AD_ShiftOperation (A/D conversion shift operation)

**FB Name**

M+L60AD2DA2_AD_ShiftOperation

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Adds the conversion value shift amount to the digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">193 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the conversion value shift amount is added to the digital value *1.<br>*1 Input the A/D conversion data that is read by M+L60AD2DA2_AD_ReadADVal or other methods from the L60AD2DA2 to the digital value.<br>2) When the addition result falls below -32,768 (exceeds 32,767), the value is fixed to -32,768 (32,767). |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) Every input must be provided with a value for proper FB operation.<br>5) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is effective.<br>7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) is cleared to 0. |
| FB operation type | Real-time execution |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>OFF: The FB is not activated. |
| Digital value | i_Digital_Value | Word | -32,768 to 32,767 | Specify the digital value. |
| Shifting amount to conversion value | i_Shift_Value | Word | -32,768 to 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 command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion shift operation is being executed. |
| Digital output value | o_Dig_Out_Val | Word | 0 | The digital value to which the conversion value shift amount is added is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

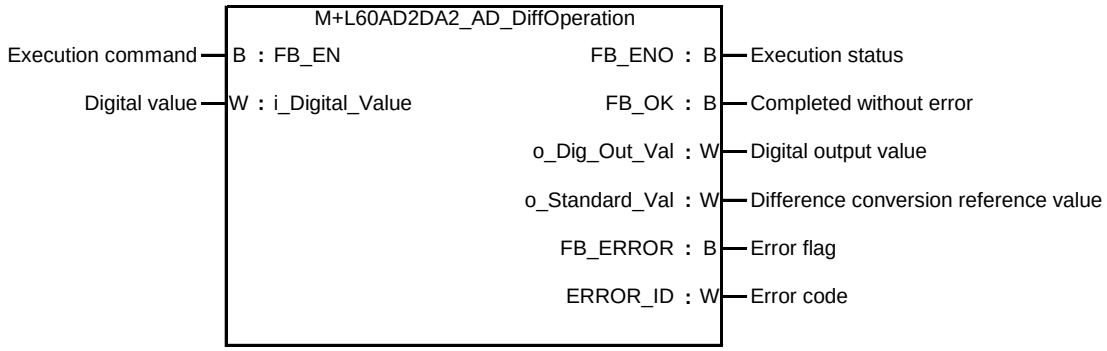
Please make sure to read user's manuals for the corresponding products before using the products.

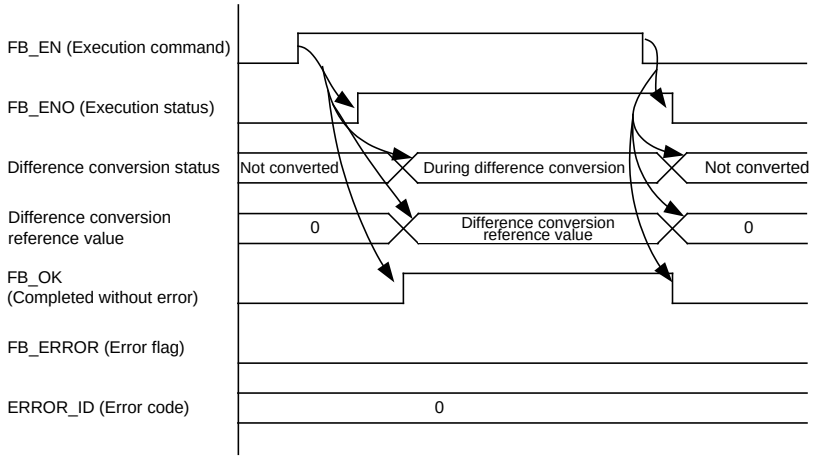
### 2.1.12. M+L60AD2DA2_AD_DiffOperation (A/D difference conversion)

**FB Name**

M+L60AD2DA2_AD_DiffOperation

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Outputs the remaining value after subtraction of the reference value from the digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">200 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the differential conversion is executed.<br>2) The remaining value after subtraction of o_Standard_Val (Difference conversion reference value) from i_Digital_Value (Digital value) is output while FB_EN (Execution command) is ON. o_Standard_Val (Difference conversion reference value) is i_Digital_Value (Digital value)*1 of when FB_EN (Execution command) is turned ON.<br>*1 Input the A/D conversion data that is read by M+L60AD2DA2_AD_ReadADVal or other methods from the L60AD2DA2 to the digital value. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) Every input must be provided with a value for proper FB operation.<br>5) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) and o_Standard_Val (Difference conversion reference value) are effective.<br>7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) and o_Standard_Val (Difference conversion reference value) are cleared to 0. |
| FB operation type | Real-time execution |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>OFF: The FB is not activated. |
| Digital value | i_Digital_Value | Word | -32,768 to 32,767 | Specify the digital value for the difference conversion. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the difference conversion is being executed. |
| Digital output value | o_Dig_Out_Val | Word | 0 | The input digital value to which the difference conversion has been executed is stored. |
| Difference conversion reference value | o_Standard_Val | Word | 0 | The difference conversion reference value (the digital value of when FB_EN is turned ON) is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

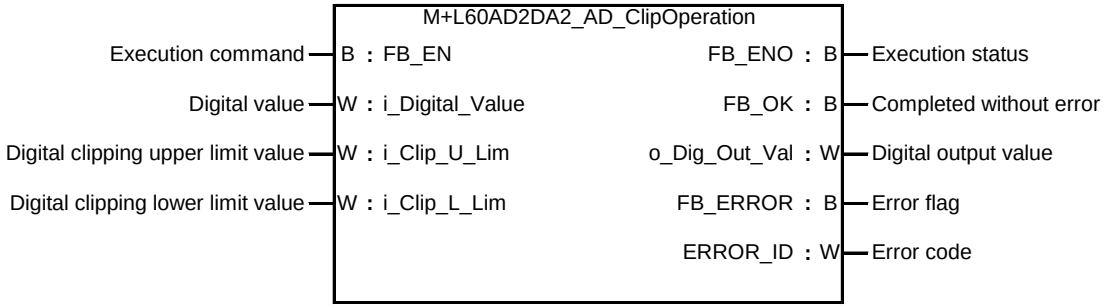
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.1.13. M+L60AD2DA2_AD_ClipOperation (A/D conversion digital clipping)

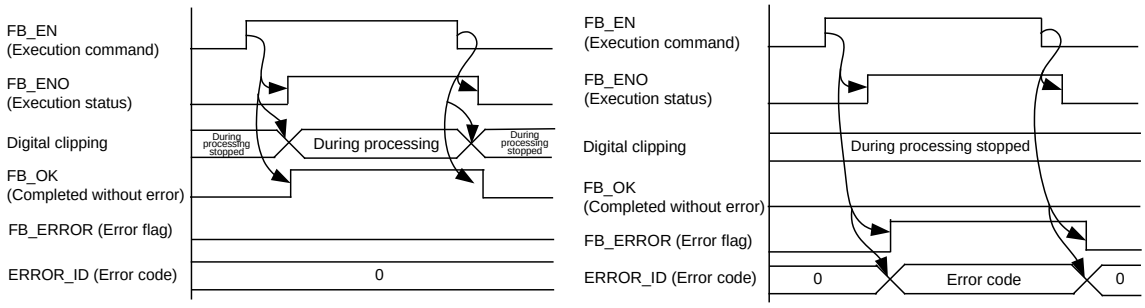
**FB Name**

M+L60AD2DA2_AD_ClipOperation

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Limits the digital value with the upper and lower limit values of the digital clipping.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">198 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the digital clipping is executed.<br>2) While FB_EN (Execution command) is ON, i_Digital_Value (Digital value)*1 is fixed to the upper limit value or lower limit value if i_Digital_Value (Digital value) exceeds i_Clip_U_Lim (Digital clipping upper limit value) or falls below i_Clip_L_Lim (Digital clipping lower limit value).<br>*1 Input the A/D conversion data that is read by M+L60AD2DA2_AD_ReadADVal or other methods from the L60AD2DA2 to the digital value.<br>3) When the setting value of i_Clip_U_Lim (Digital clipping upper limit value) is equal to or smaller than the value of i_Clip_L_Lim (Digital clipping lower limit value), FB_ERROR is turned ON and the processing is interrupted. An 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) Every input must be provided with a value for proper FB operation.<br>5) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is effective.<br>7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) is cleared to 0. |
| 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 Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 11 (Decimal) | The digital clipping upper limit value is equal to or smaller than the digital clipping lower limit value. | 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.<br>OFF: The FB is not activated. |
| Digital value | i_Digital_Value | Word | -32,768 to 32,767 | Specify the target digital value for the digital clipping. |
| Digital clipping upper limit value | i_Clip_U_Lim | Word | -32,768 to 32,767 | Specify the digital clipping upper limit value. |
| Digital clipping lower limit value | i_Clip_L_Lim | Word | -32,768 to 32,767 | Specify the digital clipping lower limit value. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the digital clipping is being executed. |
| Digital output value | o_Dig_Out_Val | Word | 0 | The input digital value to which the digital clipping has been executed is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

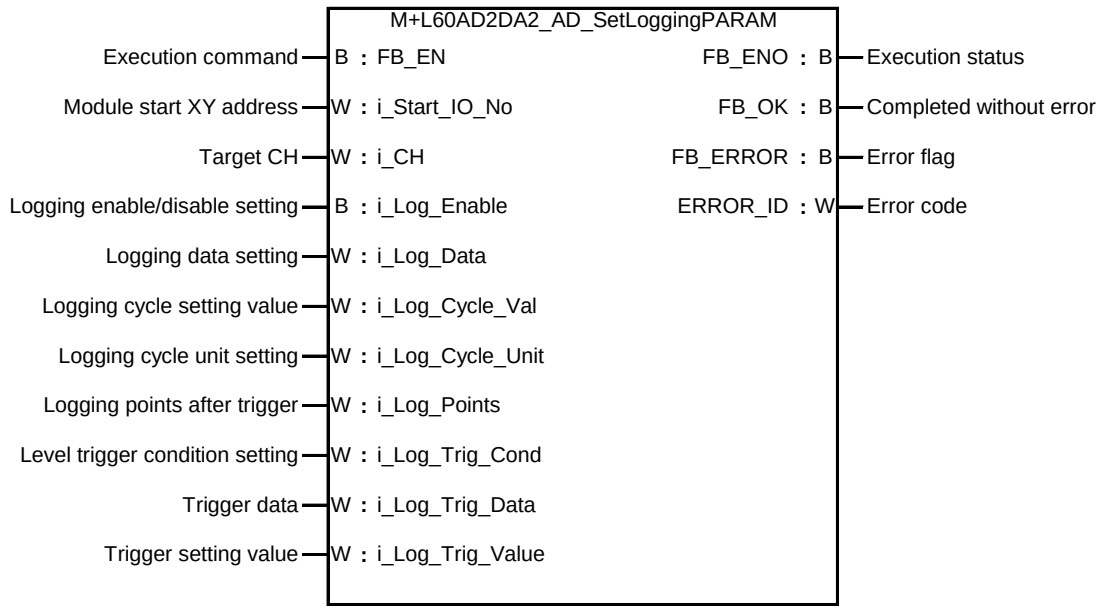
Please make sure to read user's manuals for the corresponding products before using the products.

## 2.1.14. M+L60AD2DA2_AD_SetLoggingPARAM (Logging function parameter setting)

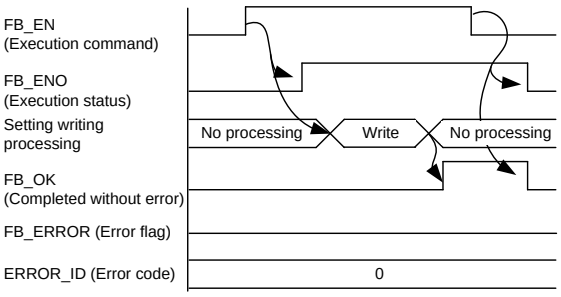
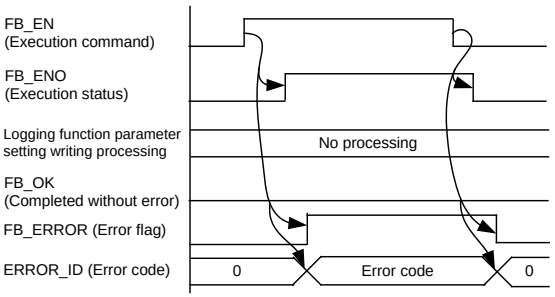
### FB Name

M+L60AD2DA2_AD_SetLoggingPARAM

### Function Overview

| Item | Description | |
|---|---|---|
| Function overview | Sets the logging function of the specified A/D conversion channel (CH1 or CH2). | |
| Symbol |  | |
| Applicable hardware and software | Analog I/O module | L60AD2DA2 |
| | CPU module | Series: MELSEC-L Series / Model: LCPU |
| | Engineering software | GX Works2 *1<br>Japanese version: Version1.86Q or later<br>English version: Version1.24A or later<br>Chinese (Simplified) version: Version1.49B or later<br>Chinese (Traditional) version: Version1.49B or later<br>Korean version: Version1.49B or later<br>*1 For software versions applicable to the modules used, refer to "Relevant Manuals". |

| Item | Description |
|---|---|
| Programming language | Ladder |
| Number of steps | 404 steps (for MELSEC-L series CPU)<br>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition. |
| Function description | 1) By turning ON FB_EN (Execution command), the logging function of the specified A/D conversion channel (CH1 or CH2) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the function selection of this FB is set for logging function, this FB is available.<br>5) When the function selection is not set for the logging function or the setting value of the target channel is out of range, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 10 (Decimal) or 60 (Decimal) is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) If the parameter is set using the configuration function of GX Works2, this FB is unnecessary.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Pulsed execution (1 scan execution type) |

| Item | Description |
|---|---|
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | Please try again after confirming the setting. |
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the logging function. | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the logging function, and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| Logging enable/disable setting | i_Log_Enable | Bit | ON, OFF | ON: Logging function enabled<br>OFF: Logging function disabled |
| Logging data setting | i_Log_Data | Word | 0, 1 | Set the logging target data.<br>0: Digital output value<br>1: Scaling value |
| Logging cycle setting value | i_Log_Cycle_Val | Word | 1) Logging cycle unit setting = 0<br>80 to 32,767<br>2) Logging cycle unit setting = 1<br>1 to 32,767<br>3) Logging cycle unit setting = 2<br>1 to 3,600 | Set the cycle for storing data. |
| Logging cycle unit setting | i_Log_Cycle_Unit | Word | 0: µs<br>1: ms<br>2: s | Set the cycle unit for storing data. |
| Logging points after trigger | i_Log_Points | Word | 1 to 10,000 | Set the data points to be collected after the hold trigger is detected. |
| Level trigger condition setting | i_Log_Trig_Cond | Word | 0: Disable<br>1: Above<br>2: Below<br>3: Pass through | Set whether to use the level trigger or not and the condition for the level trigger when using the level trigger. |

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Trigger data | i_Log_Trig_Data | Word | 0 to 4,999 | Set the buffer memory address to be monitored by the level trigger. |
| Trigger setting value | i_Log_Trig_Value | Word | -32,768 to 32,767 | Set a level at which a level trigger is generated. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the logging function parameter 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 | 2013/08/30 | First edition |

## Note

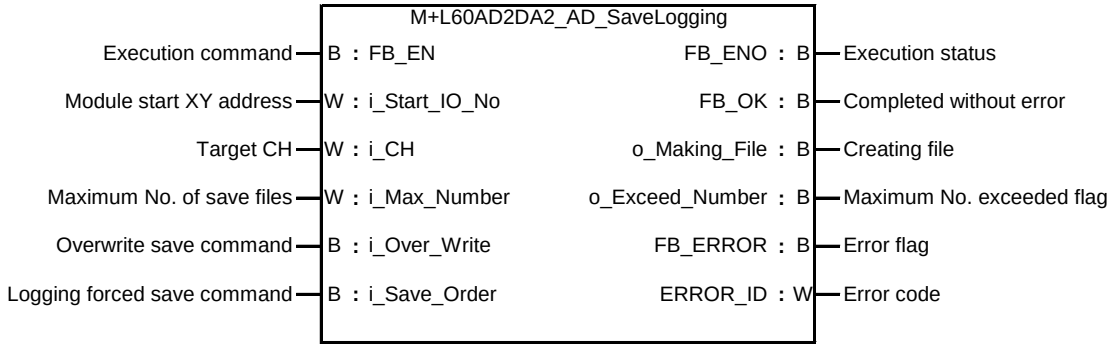
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

## 2.1.15. M+L60AD2DA2_AD_SaveLogging (Logging data save)

### FB Name

M+L60AD2DA2_AD_SaveLogging

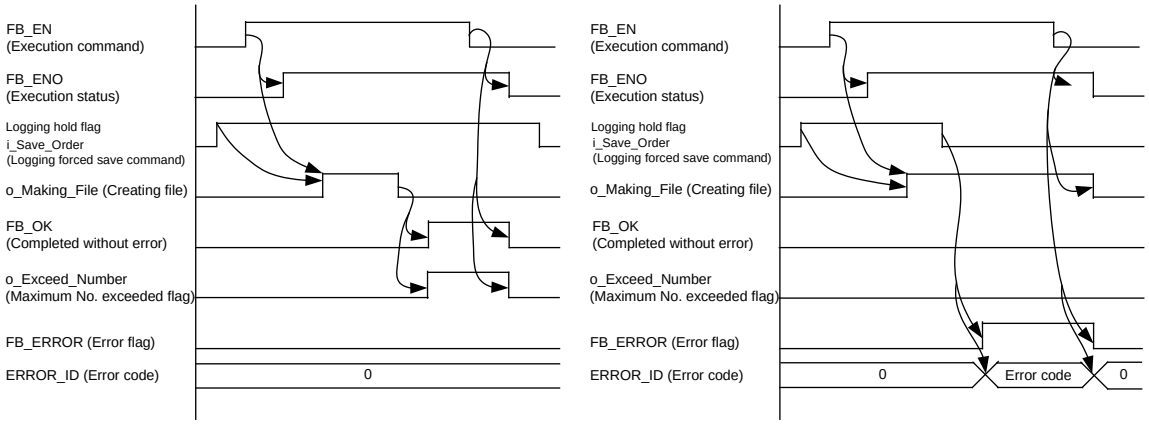
### Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Saves the logging data of the specified A/D conversion channel (CH1 or CH2) to a file.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>
* Only the model having an SD memory card slot is applicable.
</td></tr>
<tr><td></td><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">2142 steps (for MELSEC-L series CPU)<br>* 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) and the logging hold flag, the logging data</td></tr>
</table>

| Item | Description |
|---|---|
| | is sorted chronologically from the head pointer. Then, the logging data and the trigger detection information are saved in CSV format in the SD memory card mounted on the CPU.<br>2) When FB_EN (Execution command) is ON, the FB starts the save processing of the logging data each time the logging hold flag is turned ON.<br>3) If an input signal error is detected or the external power supply is turned OFF during the logging, the logging stops.<br>In this case, the logging data is saved by turning on FB_EN (Execution command) after i_Save_Order (Logging forced save command) is turned ON.<br>When the logging enable/disable setting is disabled, the logging data is not saved even if FB_EN (Execution command) is turned ON after i_Save_Order (Logging forced save command) is turned ON. FB_ERROR is turned ON and the processing is interrupted. The error code 70 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>4) It requires multiple scans to complete the save processing of the logging data. To check whether it is completed, check FB_OK (Completed without error).<br>5) The format for the file name that the FB saves in an SD memory card is "AD" + "second and third digits of the module start XY address that is expressed in 4 digits" + "Target channel" + "serial number" + ".CSV". The maximum serial number depends on i_Max_Number (Maximum No. of save files). If FB_EN (Execution command) is turned OFF, the serial number is reset and the serial number starts from 1 again.<br>[File name example]<br>The file name is "AD452006.CSV" in the following case. The module start XY address is H0450, the target channel is 2, i_Max_Number (Maximum No. of save files) is 30, and the number of files this FB created is 6.<br>6) When a file with the same name exists in the SD memory card, the existing file is replaced with a new CSV file created by this FB.<br>7) When FB_EN (Execution command) is turned ON after i_Over_Write (Overwrite save command) is turned ON and the number of files that this FB stored in the SD memory card exceeds i_Max_Number (Maximum No. of save files), the serial number returns to 1 and the save processing of the logging data continues.<br>8) When FB_EN (Execution command) is turned ON after i_Over_Write (Overwrite save command) is turned OFF and the number of files that this FB stored in the SD memory card exceeds i_Max_Number (Maximum No. of save files), the save processing of the logging data stops.<br>9) If the number of files that the FB stored in the SD memory card has reached i_Max_Number (Maximum No. of save files), o_Exceed_Number (Maximum No. |

| Item | Description |
|---|---|
| | exceeded flag) is turned ON regardless of whether i_Over_Write (Overwrite save command) is ON or OFF.<br>10) Only when the target module is processing the logging and the logging status monitor value (Un\G1146, Un\G1147) is not "F: Stop (disabled)", this FB can be used.<br>11) When FB_EN (Execution command) is turned ON while the target module is not processing the logging and the logging status monitor value (Un\G1146, Un\G1147) is "F: Stop (disabled)", FB_ERROR is turned ON and the processing of the FB is interrupted. Additionally, when the setting of the target channel or the setting value of the maximum No. of save files is out of range, FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 10 (Decimal), 11 (Decimal), or 60 (Decimal) is stored in ERROR_ID. Refer to the error code explanation section for details.<br>12) When the SD memory card mounted on the CPU does not have enough capacity or when the number of files to be created exceeds the number of storable files *1, a CPU error *2 occurs. When the CPU is set to stop at the error occurrence, FB_ERROR and ERROR_ID are not updated.<br>When the CPU is set to continue running at the error occurrence, FB_ERROR is turned ON and an error code is stored in ERROR_ID.<br>13) For the format of the CSV file that this FB creates, refer to "Appendix 2. CSV File Format for Logging data save FB".<br>*1 For information on the size of SD memory card and the number of files that can be saved, refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).<br>*2 Setting the operation status of the CPU module (RUN/STOP) when an access error to the SD memory card occurs is available with parameters. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z6 to Z9. Please do not use these index registers in an interrupt program.<br>5) In this FB, the logging data can be saved only in the SD memory card.<br>6) This FB uses the SP.FWRITE command. Thus, when an execution error of the SP.FWRITE command occurs, a CPU error occurs. |

| Item | Description |
|---|---|
| | 7) Do not use this FB when the CPU module that does not have a SD memory slot is used. Even if used with such a CPU module, this FB does not operate.<br>8) When two or more of these FBs are used, implement an interlock to prevent them from being executed simultaneously.<br>[Interlock example]<br>When the target channels are set to channels 1 and 2 and their logging data are saved, confirm that FB_OK (Completed without error) for channel 1 is turned ON before turning ON FB_EN (Execution command) for channel 2.<br>9) When this FB is executed while the protect switch of the SD memory card ON, the logging data cannot be saved. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 31 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>10) When this FB is executed without an SD memory card on the CPU module, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 33 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>11) When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF, which can be set by sliding the SD memory card disabling switch upward, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 35 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>12) When SM606 (SD memory card forced disable instruction) is turned ON while the logging data is being saved, SP.FWRITE is not processed and the logging data cannot be saved. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 36 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>13) When this FB is executed with the SD memory card accessed by, for example, the data logging function of LCPU, the time for completing this FB may extend or a timeout error (Error code 40 (Decimal)) may occur. For details, refer to Section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of MELSEC-L CPU Module User's Manual (Data Logging Function).<br>Refer to the error code explanation section for details.<br>14) Every input must be provided with a value for proper FB operation.<br>15) Pay attention to the size of the SD memory card and the number of files that can be saved when determining i_Max_Number (Maximum No. of save files). If the size of the SD memory card or the number of files that can be saved is exceeded when this FB is |

| Item | Description |
|---|---|
| | executed, a CPU error occurs. For information on the size of SD memory card and the number of files that can be saved, refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).<br>16) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• MELSEC-L CPU Module User's Manual (Data Logging Function)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 1 or 2. | Please try again after confirming the setting. |
| 11 (Decimal) | The maximum number of save files is not valid. The maximum number of save files is not within the range of 1 to 999. | Please try again after confirming the setting. |

| Error code | Description | Action |
|---|---|---|
| 20 (Decimal) | The processing is interrupted because the logging hold flag or i_Save_Order (Logging forced save command) is turned OFF while the logging data is being saved.<br>An incomplete CSV file is saved in the SD memory card. | Please try again after confirming the setting so that the logging hold flag or i_Save_Order (Logging forced save command) is not turned OFF while the logging data is being saved. |
| 31 (Decimal) | No data can be written to the SD memory card because SM601 (Memory card protect flag) is ON (Write prohibited). | Execute the FB again after turning OFF the protect switch of the SD memory card and confirming that SM601 is OFF (Write permitted). |
| 33 (Decimal) | This FB is executed with no SD memory card on the CPU module. | Execute this FB again after mounting the SD memory card to which the target CSV file is saved on the CPU module. |
| 35 (Decimal) | The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF. | Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward. |
| 36 (Decimal) | SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable.<br>If SM606 (SD memory card forced disable instruction) is turned ON while the logging data is being saved, an incomplete CSV file is saved in the SD memory card. | Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF. |
| 40 (Decimal) | The logging data saving 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. |

| Error code | Description | Action |
|---|---|---|
| 60 (Decimal) | When the target module was not processing the logging and the logging status monitor value (Un\G1146, Un\G1147) was "F: Stop (disabled)", FB_EN (Execution command) was turned ON. | After enabling the logging enable/disable setting (Un\G1000, Un\G1001), turn OFF → ON → OFF the Operating condition setting request signal (Yn9) or execute the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) to execute the logging.<br>Execute the FB again after confirming that the logging status monitor value (Un\G1146, Un\G1147) is other than "F: Stop (disabled)".<br>To save data while the logging is stopped, turn ON FB_EN (Execution command) after turning ON i_Save_Order (Logging forced save instruction). |
| 70 (Decimal) | When the logging enable/disable setting was disabled, FB_EN (Execution command) was turned ON after i_Save_Order (Logging forced save instruction) was turned ON to start saving the logging data. | After enabling the logging enable/disable setting (Un\G1000, Un\G1001), turn OFF → ON → OFF the Operating condition setting request signal (Yn9) or execute the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) to execute the logging.<br>After the logging, execute the FB again. |
| Error codes other than above | The error code of the CPU module | For details on the caused error code, refer to Appendix 1 Error Code Lists of 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 1, 2 | Specify the channel number. |
| Maximum No. of save files | i_Max_Number | Word | 1 to 999 | Specify the maximum number of CSV files the FB saves. |
| Overwrite save command | i_Over_Write | Bit | ON, OFF | Set whether to overwrite a CSV file with the youngest serial number when the number of CSV files saved by this FB exceeds the maximum number of save files. (When OFF, the save processing of logging data stops.) |
| Logging forced save command | i_Save_Order | Bit | ON, OFF | Turn ON to save the logging data while the logging is stopped (disabled).<br>Turn OFF after the saving. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the file save is completed.<br>Turned OFF when the logging resumes. |
| Creating file | o_Making_File | Bit | OFF | When ON, it indicates that a file is being created. |
| Maximum No. exceeded flag | o_Exceed_Number | Bit | OFF | When ON, it indicates that the number of CSV files saved by this FB has reached the maximum number of save files. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

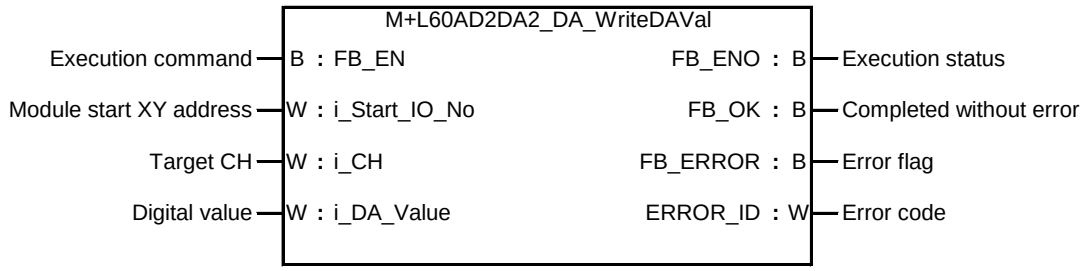
## 2.2. D/A conversion FB

### 2.2.1. M+L60AD2DA2_DA_WriteDAVal (Write D/A conversion data)

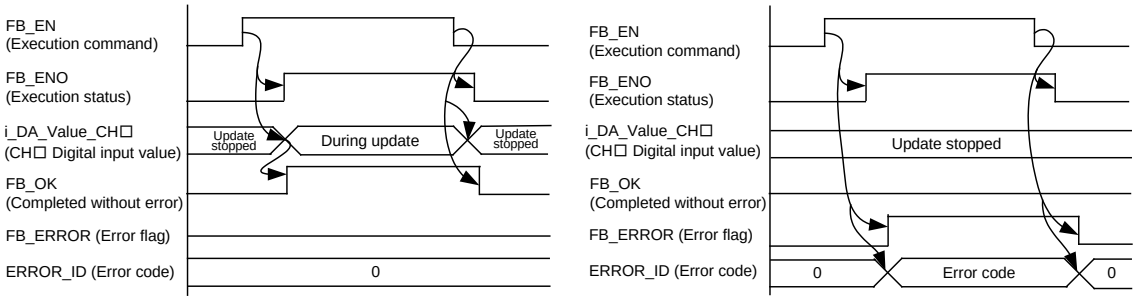
**FB Name**

M+L60AD2DA2_DA_WriteDAVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Writes the D/A conversion data of the specified D/A conversion channel (CH3 or CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">254 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the digital input value of the specified D/A conversion channel (CH3 or CH4) is written.<br>2) The digital value to be written depends on the output range setting.<br>When the scaling function (D/A conversion) of the L60AD2DA2 is enabled, the digital value is scaled before the D/A conversion.<br>3) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>Refer to the error code explanation section for details.<br>4) When the digital value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3 or 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4 | Specify the channel number. |
| Digital value | i_DA_Value | Word | -32,000 to 32,000 | Specify the digital input value.<br>The available setting range differs depending on the output range setting and whether the scaling function (D/A conversion) is used or not. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the digital value is being written. |
| 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 | 2013/08/30 | First edition |

## Note

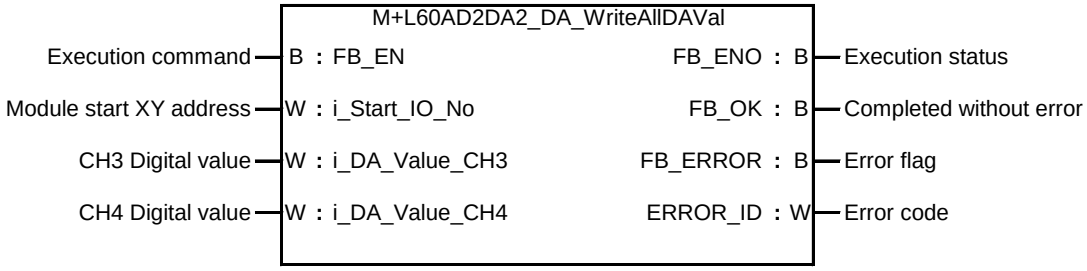
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

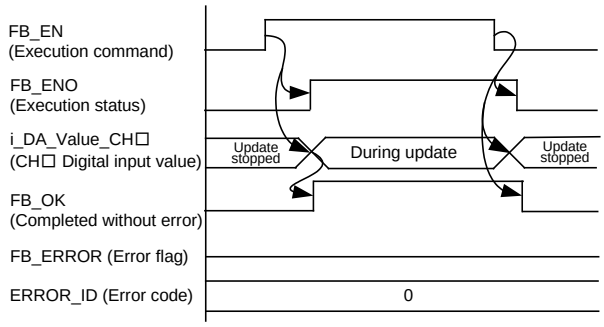
### 2.2.2. M+L60AD2DA2_DA_WriteAllDAVal (Write D/A conversion data (all CHs))

**FB Name**

M+L60AD2DA2_DA_WriteAllDAVal

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Writes the D/A conversion data of the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">228 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the digital input values of the D/A conversion channels (CH3 and CH4) are written.<br>2) The digital input value to be written depends on the output range setting.<br>When the scaling function (D/A conversion) of the L60AD2DA2 is enabled, the digital input value is scaled before the D/A conversion.<br>3) When the digital input value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation<br>6) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| CH3 Digital value | i_DA_Value_CH3 | Word | -32,000 to 32,000 | Specify the digital input value of channel 3.<br>The available setting range differs depending on the scaling function (D/A conversion) and output range setting. |
| CH4 Digital value | i_DA_Value_CH4 | Word | -32,000 to 32,000 | Specify the digital input value of channel 4.<br>The available setting range differs depending on the scaling function (D/A conversion) and output range setting. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the digital input value is being written. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

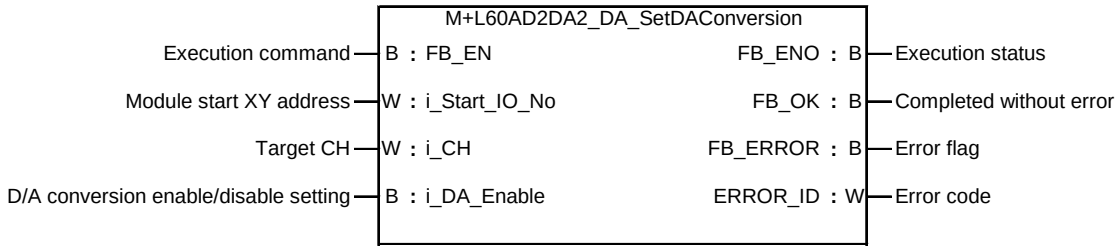
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.3. M+L60AD2DA2_DA_SetDAConversion (D/A conversion enable/disable setting)

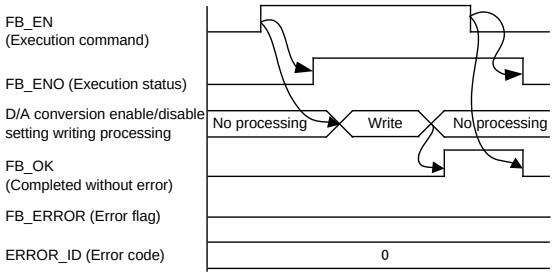
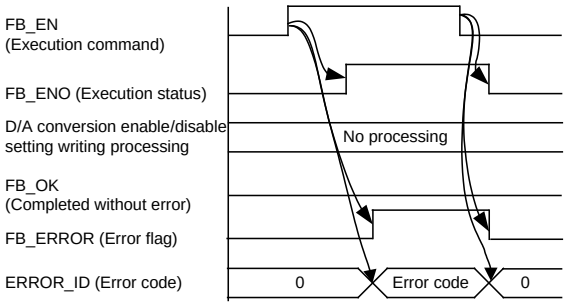
**FB Name**

M+L60AD2DA2_DA_SetDAConversion

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Enables or disables the D/A conversion for the D/A conversion specified channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">308 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the D/A conversion for the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4) is enabled or disabled.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Pulsed execution (1 scan execution type) |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |

| Item | Description |
|---|---|
| Timing chart | [When operation completes without error]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3, 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4, 15 | 3 or 4: Specify the channel number.<br>15: Specify channel 3 and channel 4. |
| D/A conversion enable/disable setting | i_DA_Enable | Bit | ON, OFF | ON: D/A conversion enabled<br>OFF: D/A conversion disabled |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the conversion enable/disable 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 | 2013/08/30 | First edition |

## Note

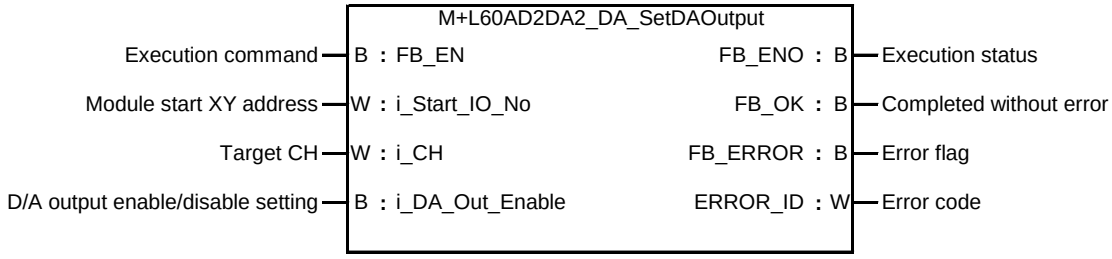
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.4. M+L60AD2DA2_DA_SetDAOutput (D/A output enable/disable setting)

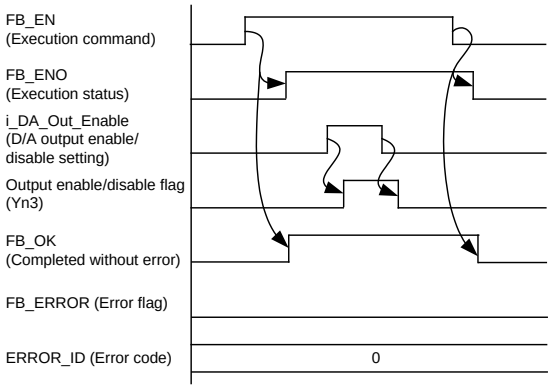
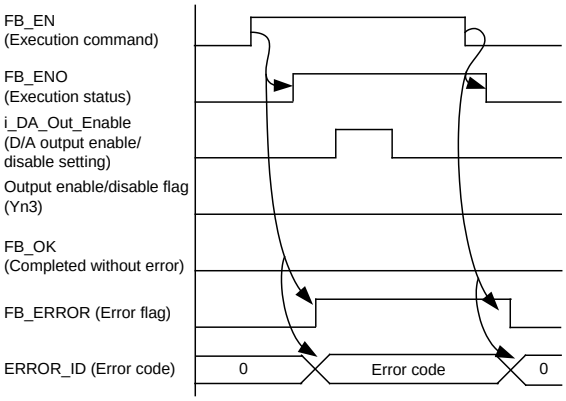
**FB Name**

M+L60AD2DA2_DA_SetDAOutput

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Enables or disables the D/A output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">279 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the D/A output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4) is enabled or disabled.<br>2) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) When this FB is used in two or more places, a duplicated coil warning may 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.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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] (for CH3)<br>  <br><br>[When an error occurs] (for CH3)<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid.<br>Set 3, 4, or 15 to the target channel. | 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4, 15 | 3 or 4: Specify the channel number.<br>15: Specify channel 3 and channel 4. |
| D/A output enable/disable setting | i_DA_Out_Enable | Bit | ON, OFF | ON: D/A output enabled<br>OFF: D/A output disabled |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the FB is being executed properly. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

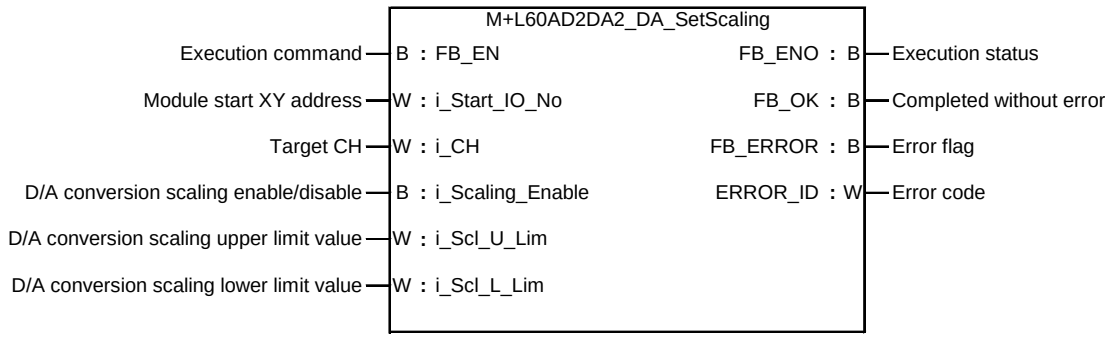
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.5. M+L60AD2DA2_DA_SetScaling (D/A conversion scaling setting)

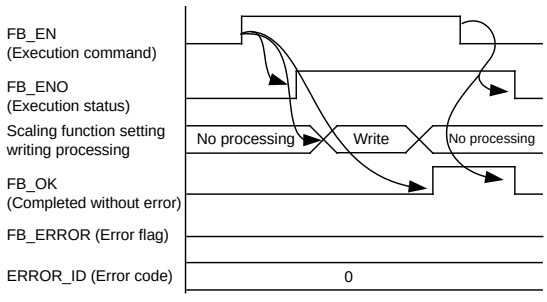
**FB Name**

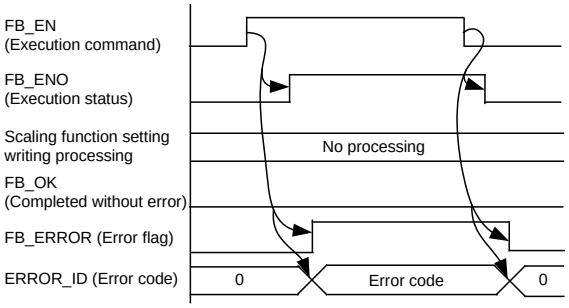
M+L60AD2DA2_DA_SetScaling

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the scaling of the specified D/A conversion channel (CH3 or CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">305 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the scaling of the specified D/A conversion channel (CH3 or CH4) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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 Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3 or 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4 | Specify the channel number. |
| D/A conversion scaling enable/disable | i_Scaling_Enable | Bit | ON, OFF | ON: Enabled<br>OFF: Disabled |
| D/A conversion scaling upper limit value | i_Scl_U_Lim | Word | -32,000 to 32,000 | Specify the D/A conversion scaling upper limit value. |
| D/A conversion scaling lower limit value | i_Scl_L_Lim | Word | -32,000 to 32,000 | Specify the D/A conversion scaling lower limit value. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the D/A conversion scaling 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 | 2013/08/30 | First edition |

## Note

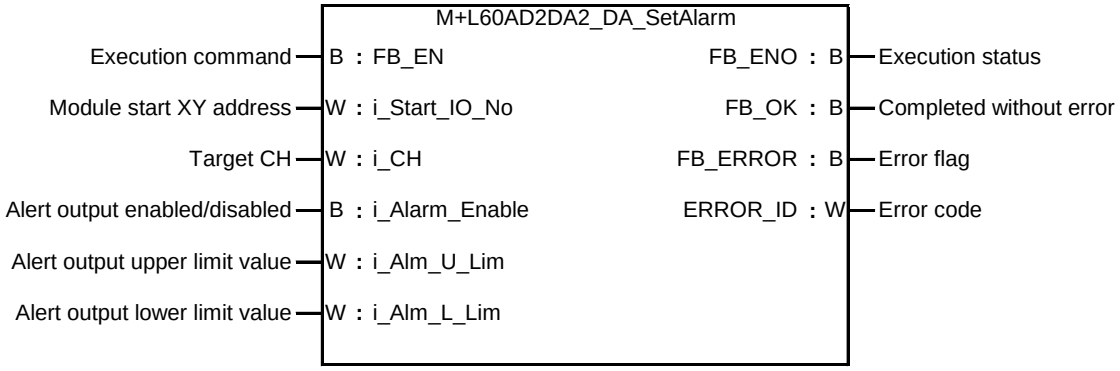
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

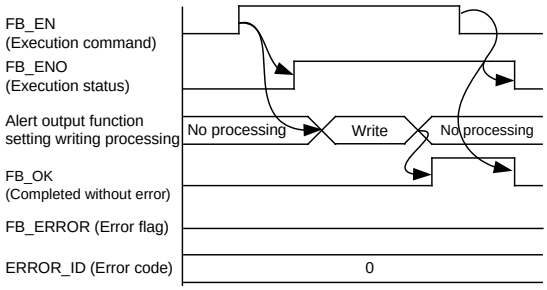
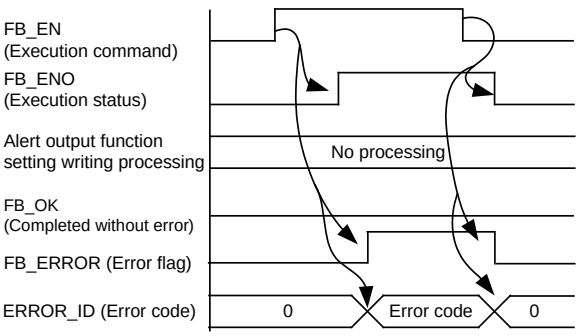
### 2.2.6. M+L60AD2DA2_DA_SetAlarm (D/A conversion alert output setting)

**FB Name**

M+L60AD2DA2_DA_SetAlarm

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the alert output of the specified D/A conversion channel (CH3 or CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">288 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the alert output of the specified D/A conversion channel (CH3 or CH4) is set.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the output range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3 or 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4 | Specify the channel number. |
| Alert output enabled/disabled | i_Alarm_Enable | Bit | ON, OFF | ON: Enabled<br>OFF: Disabled |
| Alert output upper limit value | i_Alm_U_Lim | Word | -32,768 to 32,767 | Specify the alert output upper limit value. |
| Alert output lower limit value | i_Alm_L_Lim | Word | -32,768 to 32,767 | Specify the alert output lower limit value. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the alert output function 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

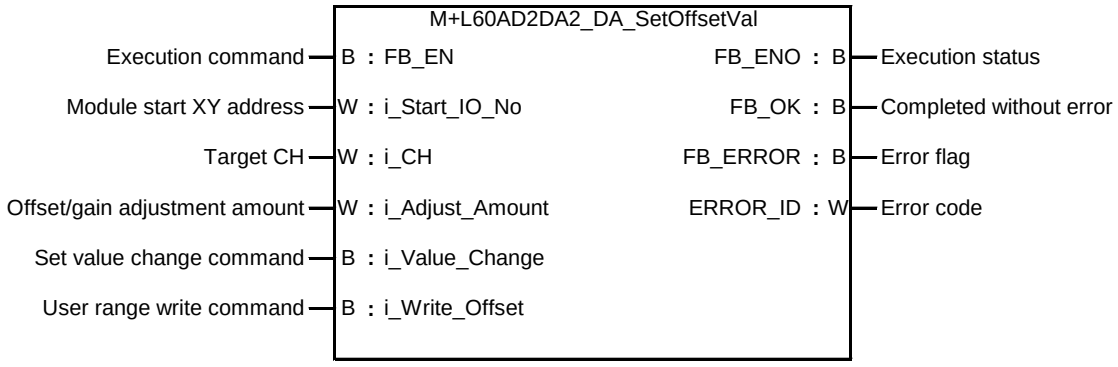
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.7. M+L60AD2DA2_DA_SetOffsetVal (D/A conversion offset setting)

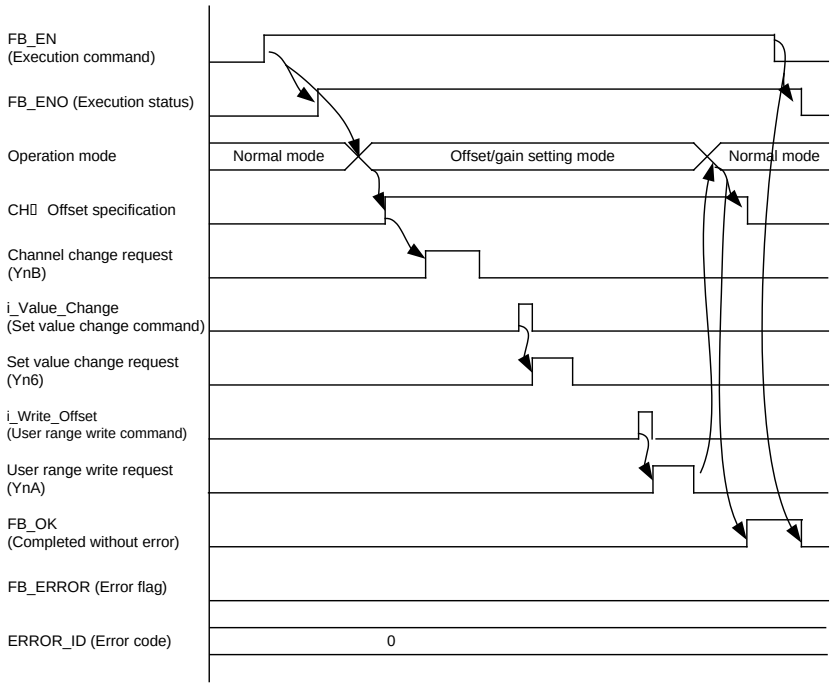
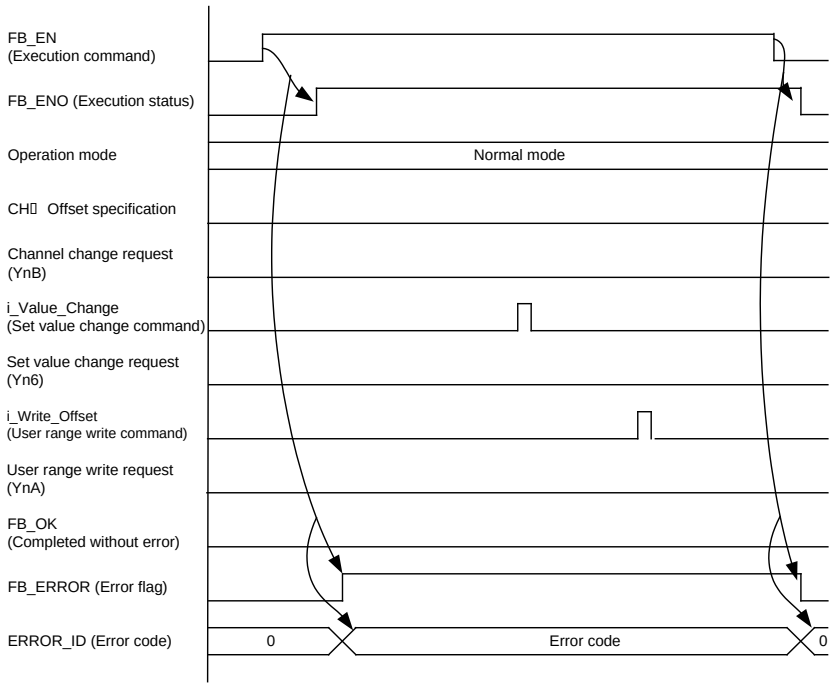
**FB Name**

M+L60AD2DA2_DA_SetOffsetVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the offset of the specified D/A conversion channel (CH3 or CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">482 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the offset of the specified D/A conversion channel (CH3 or CH4) is set.<br>2) To adjust the D/A output, set i_Adjust_Amount (Offset/gain adjustment amount) and turn ON from OFF i_Value_Change (Set value change command) while the FB_EN (Execution command) is ON.<br>3) By turning ON the user range write command while FB_EN (Execution command) is ON, the offset value is written.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When the following FBs are used, implement an external interlock to prevent them from being executed simultaneously. Do not use two or more of these FBs simultaneously. If two or more of these FBs are executed simultaneously, the offset/gain is set incorrectly.<br>• M+L60AD2DA2_AD_SetOffsetVal<br>• M+L60AD2DA2_AD_SetGainVal<br>• M+L60AD2DA2_DA_SetOffsetVal<br>• M+L60AD2DA2_DA_SetGainVal<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) When this FB is used in two or more places, a duplicated coil warning may 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.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Pulsed execution (multiple scan execution type) |

| Item | Description |
|---|---|
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3 or 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4 | Specify the channel number. |
| Offset/gain adjustment amount | i_Adjust_Amount | Word | -3,000 to 3,000 | Specify the adjustment amount for the D/A output adjustment. |
| Set value change command | i_Value_Change | Bit | ON, OFF | Turn ON for D/A output change. Turn OFF after the D/A output change. |
| User range write command | i_Write_Offset | Bit | ON, OFF | Turn ON for the adjusted offset value writing to a flash memory. Turn OFF after the writing. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the D/A conversion offset 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

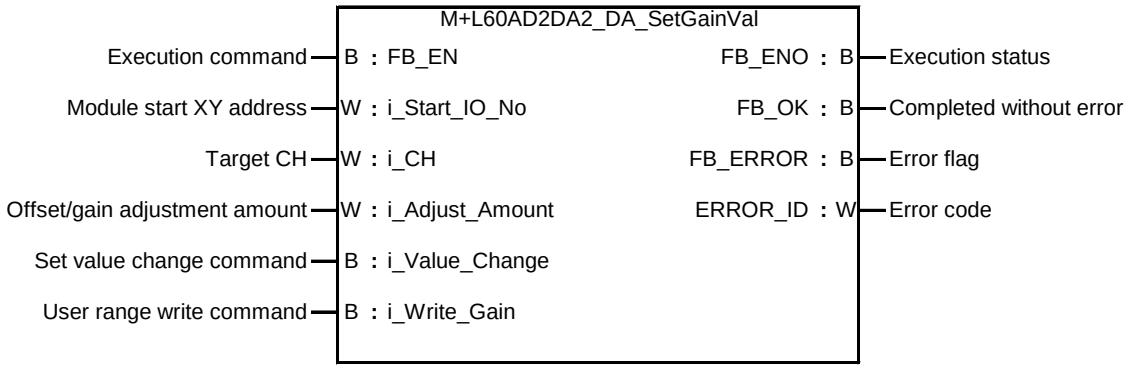
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.8. M+L60AD2DA2_DA_SetGainVal (D/A conversion gain setting)

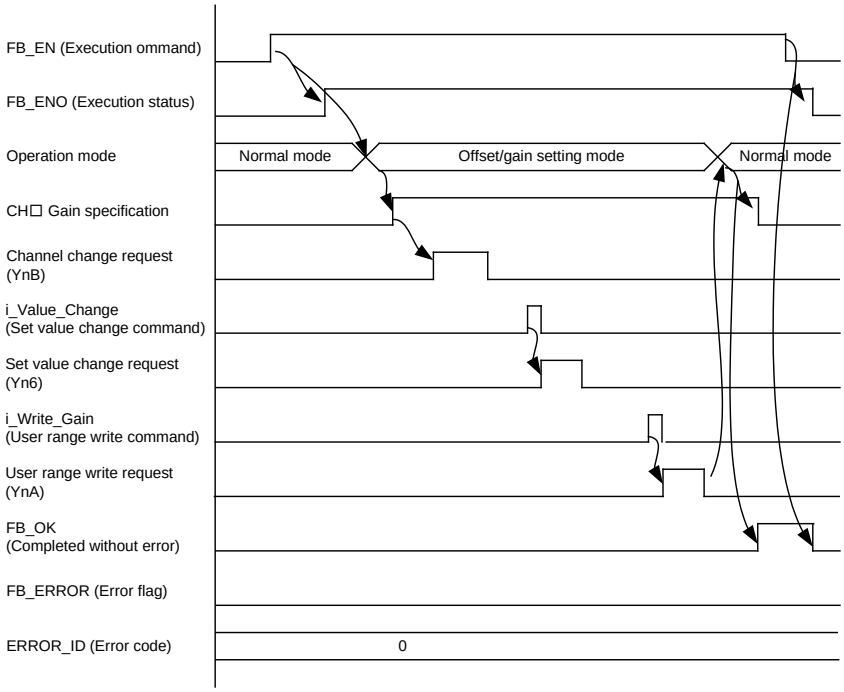
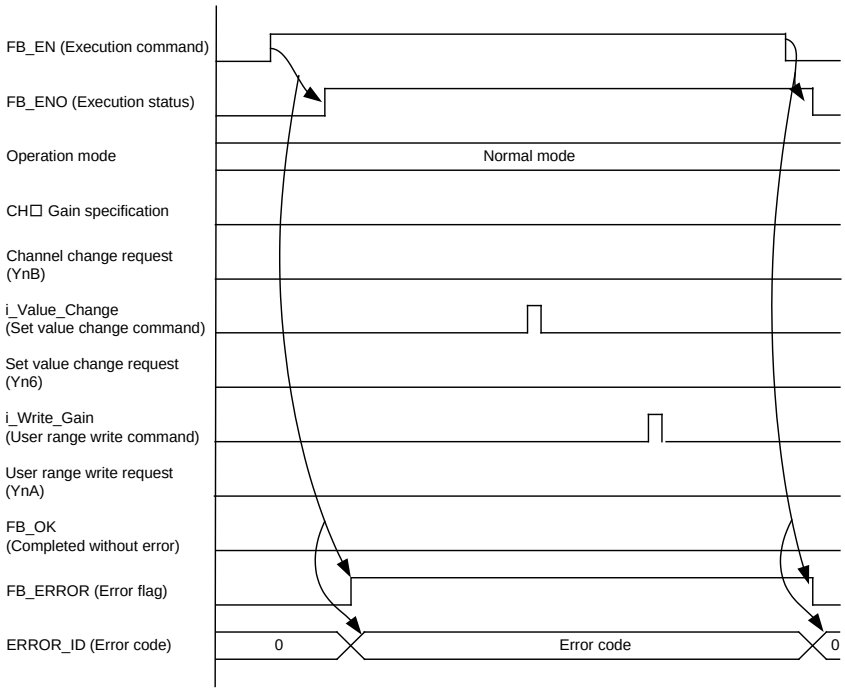
**FB Name**

M+L60AD2DA2_DA_SetGainVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the gain of the specified D/A conversion channel (CH3 or CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">450 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the gain of the specified D/A conversion channel (CH3 or CH4) is set.<br>2) To adjust the D/A output, set i_Adjust_Amount (Offset/gain adjustment amount) and turn ON from OFF i_Value_Change (Set value change command) while the FB_EN (Execution command) is ON.<br>3) By turning ON the user range write command while FB_EN (Execution command) is ON, the gain value is written.<br>4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON and processing is interrupted, and the error code is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When the following FBs are used, implement an external interlock to prevent them from being executed simultaneously. Do not use two or more of these FBs simultaneously. If two or more of these FBs are executed simultaneously, the offset/gain is set incorrectly.<br>• M+L60AD2DA2_AD_SetOffsetVal<br>• M+L60AD2DA2_AD_SetGainVal<br>• M+L60AD2DA2_DA_SetOffsetVal<br>• M+L60AD2DA2_DA_SetGainVal<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) If the gain is set using the configuration function of GX Works2, this FB is unnecessary.<br>8) When this FB is used in two or more places, a duplicated coil warning may 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.<br>9) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |

| Item | Description |
|---|---|
| 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]<br>  <br><br>[When an error occurs]<br>  <br> |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid. The target channel is not within the range of 3 or 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4 | Specify the channel number. |
| Offset/gain adjustment amount | i_Adjust_Amount | Word | -3,000 to 3,000 | Specify the adjustment amount for the D/A output adjustment. |
| Set value change command | i_Value_Change | Bit | ON, OFF | Turn ON for D/A output change. Turn OFF after the D/A output change. |
| User range write command | i_Write_Gain | Bit | ON, OFF | Turn ON for the adjusted gain value writing to a flash memory. Turn OFF after the writing. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the D/A conversion offset 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

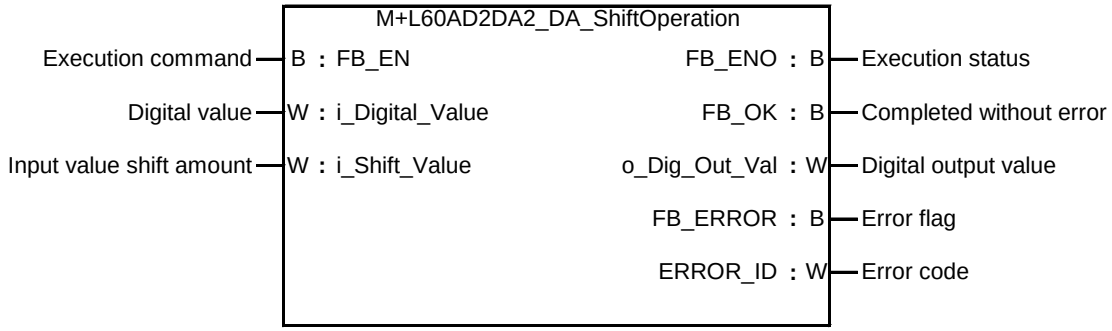
Please make sure to read user's manuals for the corresponding products before using the products.

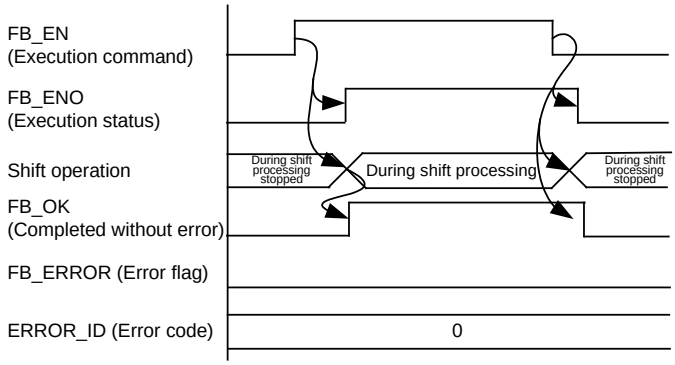
### 2.2.9. M+L60AD2DA2_DA_ShiftOperation (D/A conversion shift operation)

**FB Name**

M+L60AD2DA2_DA_ShiftOperation

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Adds the input value shift amount to the digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">192 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the input value shift amount is added to the digital value *1.<br>*1 Input a digital value that is to be written by M+L60AD2DA2_DA_WriteDAVal or other methods to the L60AD2DA2 as the digital value.<br>2) When the addition result falls below -32,768 (exceeds 32,767), the value is fixed to -32,768 (32,767). |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) Every input must be provided with a value for proper FB operation.<br>5) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is effective.<br>7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) is cleared to 0. |
| FB operation type | Real-time execution |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>OFF: The FB is not activated. |
| Digital value | i_Digital_Value | Word | -32,768 to 32,767 | Specify the digital value. |
| Input value shift amount | i_Shift_Value | Word | -32,768 to 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 command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the D/A conversion shift operation is being executed. |
| Digital output value | o_Dig_Out_Val | Word | 0 | The digital value to which the input value shift amount is added is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

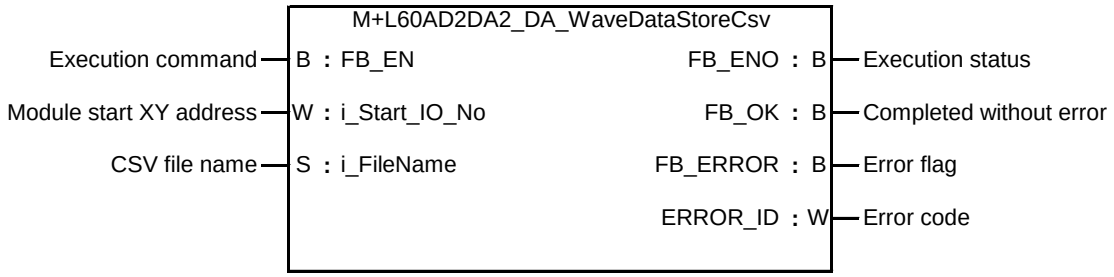
Please make sure to read user's manuals for the corresponding products before using the products.

2.2.10. M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file))

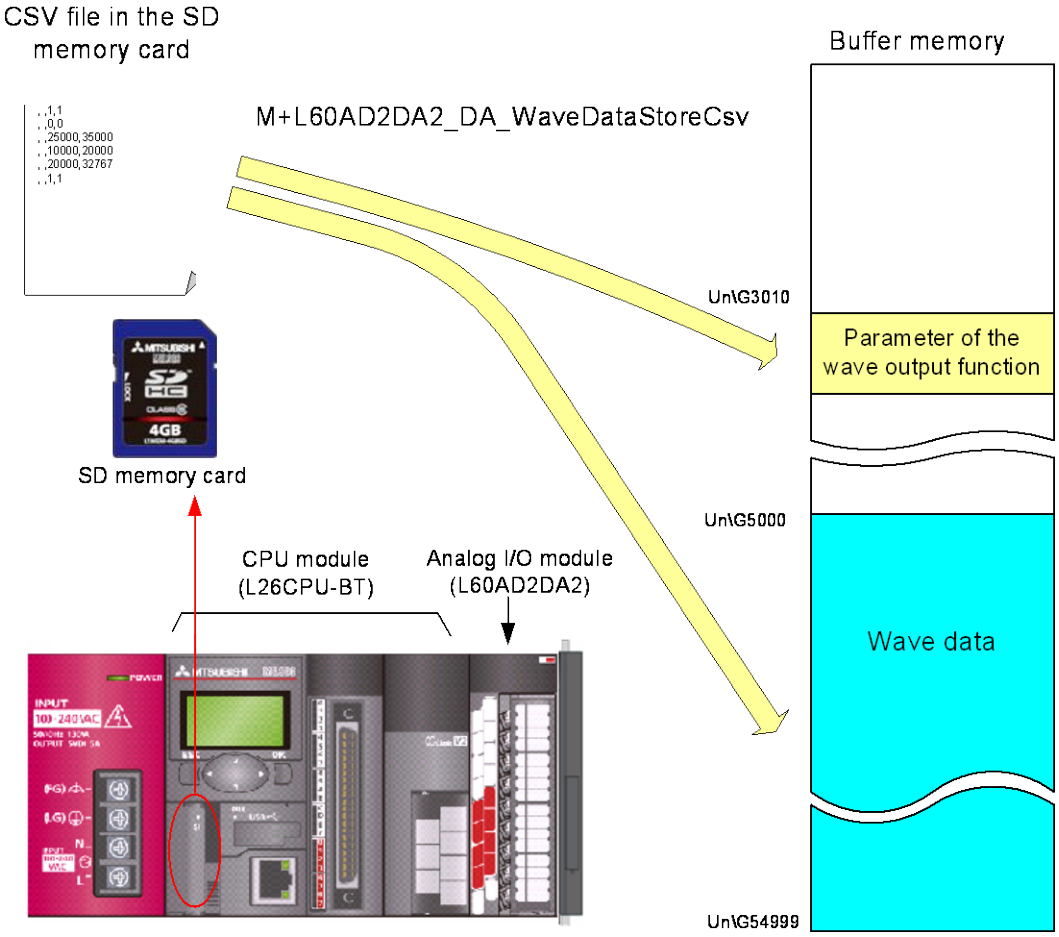
## FB Name

M+L60AD2DA2_DA_WaveDataStoreCsv

## Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads data from the CSV file where parameters and wave data (wave data and wave data points) of the wave output function are stored, then writes them to the buffer memory of the L60AD2DA2.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>* Only the model having an SD memory card slot is applicable.</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">1029 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the parameters and wave data of the wave output function is read from the CSV file stored in the SD memory card inserted in the CPU module and stored in the buffer memory of the L60AD2DA2. |



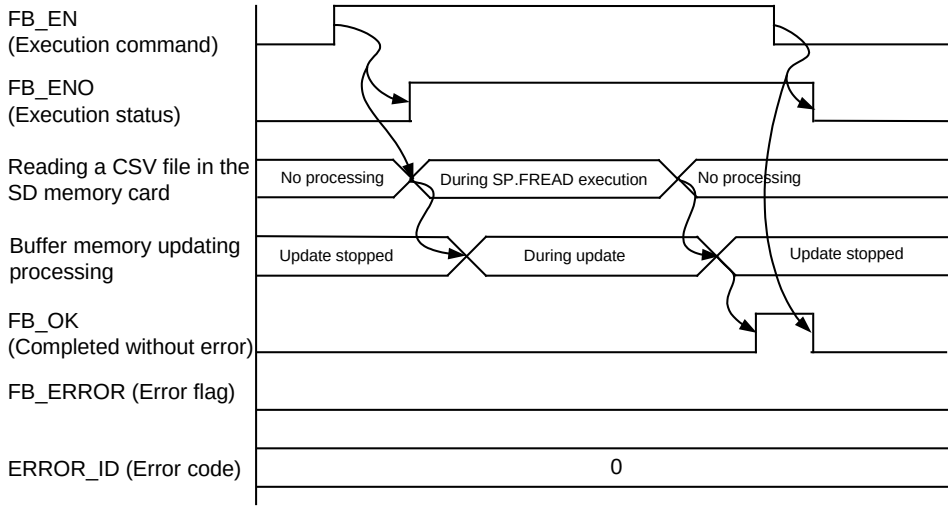
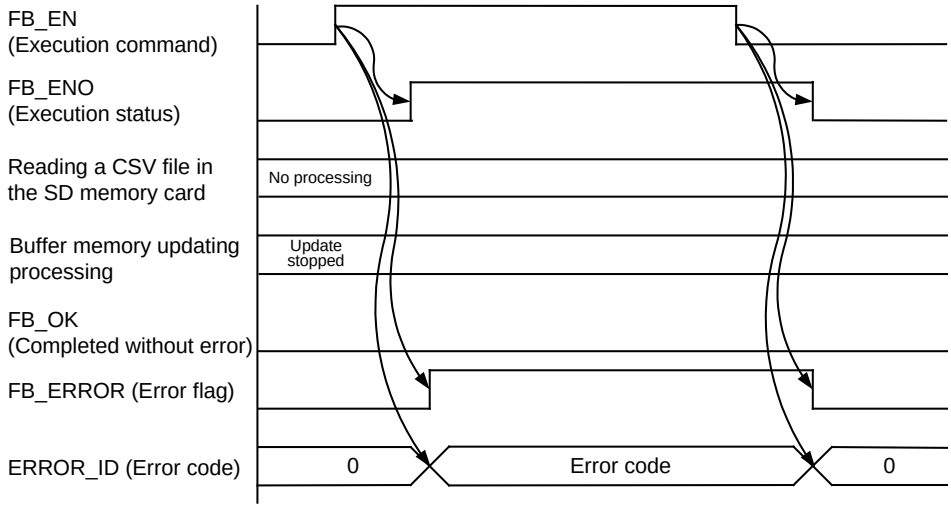

For the wave output function, refer to MELSEC-L Analog Input/Output Module User's Manual.

2) The read parameters of the wave output function is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.

3) "Table 1 Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory" in Appendix 3 lists "parameters and data of the wave output function" and the storage location buffer memory address that this FB processes. Describe the parameters and data in the list to a file according to "Appendix 4. CSV File Format for Wave Data Reading FB (CSV File)" and save the file in the root folder (directory) of the SD memory card.
This FB reads all the parameters of the wave output function from the CSV file and stores them in the buffer memory (Un\G3010 to 3067). Then, this FB reads "Wave data" specified in "Number of wave data" of the line 100 in the CSV file from the line 101 in

| Item | Description |
|---|---|
| | order for the number of specified points, and stores them into the start address (Un\G5000) or later of the wave data registration area of the buffer memory.<br>The CSV file of the wave output function can be created easily with the "Create wave output data" tool of GX Works2.<br>4) When the CSV file specified by i_FileName (CSV file name) does not exist in the SD memory card inserted to the CPU module, a CPU error (Error code: 2410) occurs.<br>* When the CPU is set to stop at the CPU error occurrence, FB_ERROR and ERROR_ID are not updated. The operation status of the CPU module (RUN/STOP) for when the CPU error occurs can be set in [PLC RAS] *1.<br>*1: [Parameter]⇨[PLC Parameter]⇨[PLC RAS]⇨"File Access Error " in "When There is an Error"<br>5) When FB_EN (Execution command) is turned OFF before the execution of this FB is completed, the processing is interrupted. At that time, the data stored in the buffer memory is not cleared.<br>When the FB is executed again, the reading processing is started from the beginning.<br>6) Only when the function selection is set to the wave output function, this FB can be used.<br>7) When the function selection is set to other than the wave output function, FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 60 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>8) Do not remove the SD memory card during the execution of this FB. For the insertion or removal method of the SD memory card, refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection). |
| Compiling method | Macro type |
| Restrictions and precautions | 1) This FB requires many scans and takes long time to complete the processing. Therefore, this FB should be executed during the warm up of the L60AD2DA2.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>3) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) This FB uses the SP.FREAD command. Thus, when an execution error of the SP.FREAD command occurs, a CPU error occurs.<br>7) Do not use this FB when the CPU module that does not have a SD memory slot is used. |

| Item | Description |
|---|---|
| | Even if used with such a CPU module, this FB does not operate.<br>8) When this FB is executed without an SD memory card on the CPU module, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 33 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>9) When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF, which can be set by sliding the SD memory card disabling switch upward, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 35 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>10) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, SP.FREAD is not processed and the wave data cannot be read. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 36 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>11) When this FB is executed with the SD memory card accessed by, for example, the data logging function of LCPU, the time for completing this FB may extend or a timeout error (Error 40 (Decimal)) may occur. For details, refer to Section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of MELSEC-L CPU Module User's Manual (Data Logging Function).<br>12) When two or more of these FBs are used, they cannot be used simultaneously.<br>13) Every input must be provided with a value for proper FB operation.<br>14) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• MELSEC-L CPU Module User's Manual (Data Logging Function)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 33 (Decimal) | This FB is executed with no SD memory card on the CPU module. | Execute this FB again after mounting the SD memory card to which the target CSV file is saved on the CPU module. Or execute this FB again after inserting the available SD memory card and saving the target CSV file to the SD memory card using "Write PLC User Data" of GX Works2. |
| 35 (Decimal) | The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF. | Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward. |
| 36 (Decimal) | SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable. | Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF. |
| 40 (Decimal) | The wave data reading processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB. | Reduce the frequency of the access processing to the SD memory card. |
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the wave output function. | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the wave output function, and execute the FB again. |
| Error codes other than above | The error code of the CPU module | For details on the caused error code, refer to Appendix 1 Error Code Lists of 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| CSV file name | i_FileName | Character string | 12 characters or less | Specify the name of the CSV file in which the parameters and the wave data of the wave output function are stored. (Only CSV is valid for a file attribute.)<br>For details of the CSV file format, refer to "Appendix 4. CSV File Format for Wave Data Reading FB (CSV File)". |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that writing the parameters and wave data of the wave output function in the CSV file to the buffer memory of the L60AD2DA2 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

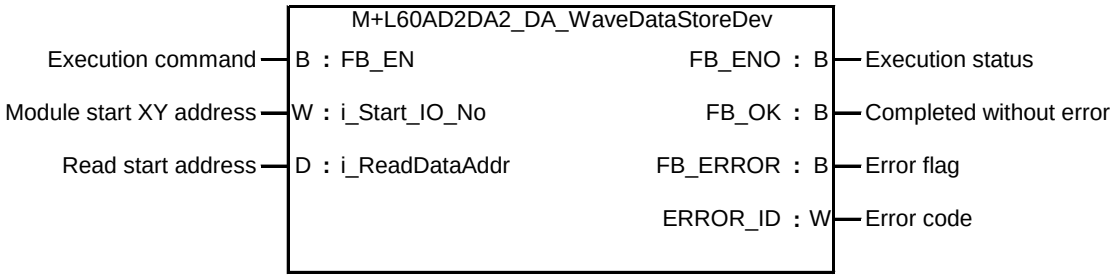
Please make sure to read user's manuals for the corresponding products before using the products.

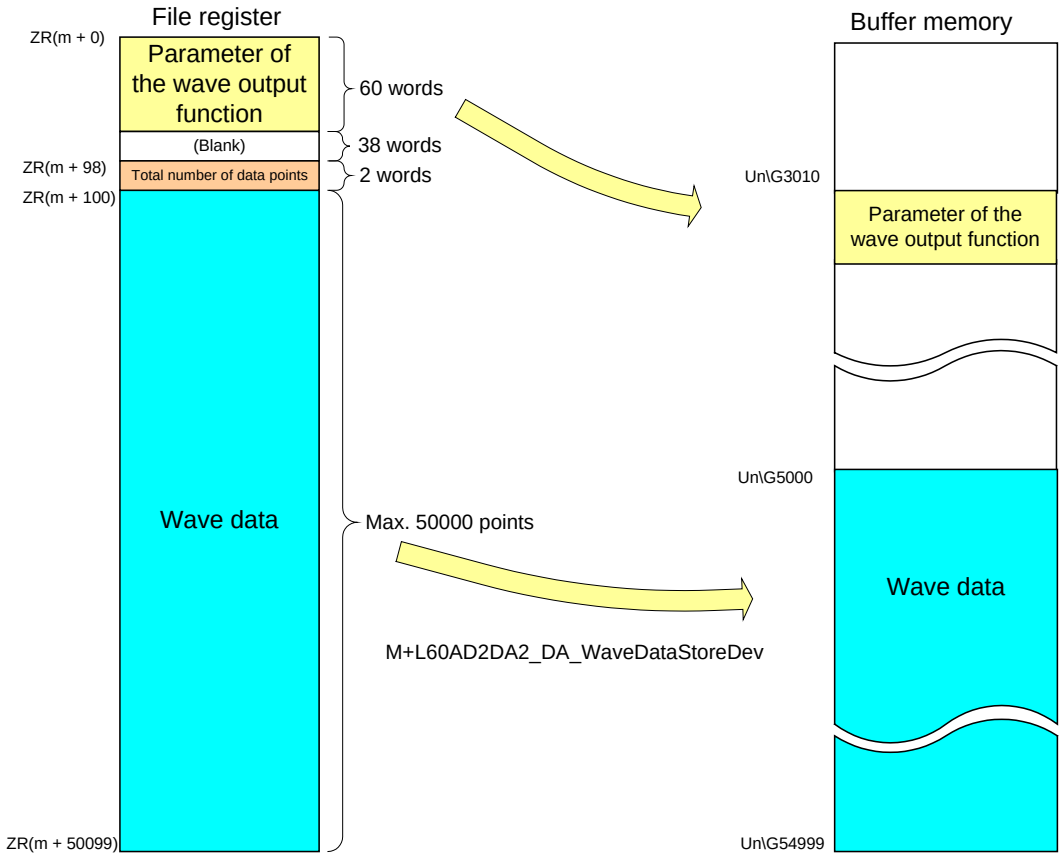
### 2.2.11. M+L60AD2DA2_DA_WaveDataStoreDev (Read wave data (device))

**FB Name**

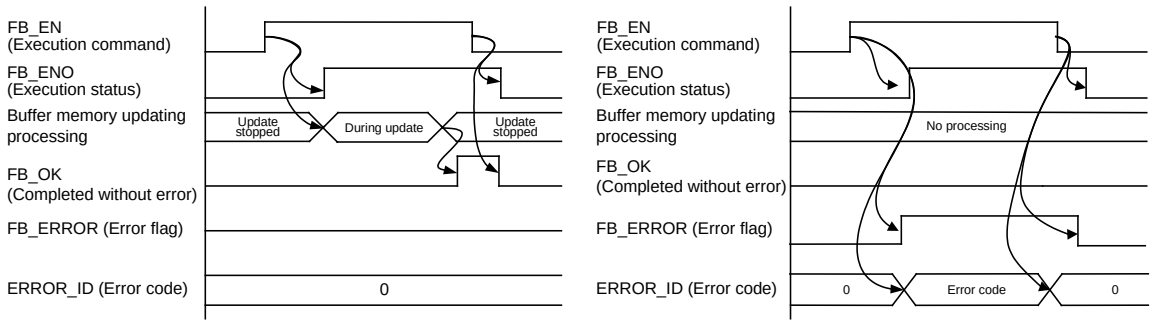
M+L60AD2DA2_DA_WaveDataStoreDev

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads data from the file register (ZR) where parameters and wave data (wave data and wave data points) of the wave output function are stored, then writes them to the buffer memory of the L60AD2DA2.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">614 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the parameters and the wave data of the wave output function is read from the serial number access format file register (ZR) and stored in the buffer memory of the analog I/O module.<br>  <br><br>For the wave output function, refer to MELSEC-L Analog Input/Output Module User's Manual.<br>2) The read parameters of the wave output function is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>3) "Table 1 Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory" in Appendix 3 lists "parameters and data of the wave output function" and the storage location buffer memory address that this FB processes. Save the parameter and the data in the file register (ZR) described in "Storage source" in the table in advance.<br>This FB reads the parameters of the wave output function from ZR (m+0) specified by i_ReadDataAddr (read start address) and stores them in the buffer memory (Un\G3010 to Un\G3067). Then, this FB reads "Wave data" of specified points specified in "Number of wave data" of ZR(m+98,99) from ZR(m+100) in order, and stores them into the Start address (Un\G5000) or later of the wave data registration area of the buffer memory.<br>The file register (ZR) data of the wave output function can be created easily with the |

| Item | Description |
|---|---|
| | "Create wave output data" tool of GX Works2.<br>* m: File register (ZR) read start address. Specifying the points to be used in [PC File]*1 and the device points of the file register (ZR) in [Device]*2 can reserve the points of the file register and arrange the data in the desired address.<br>*1 [Parameter]⇨[PLC Parameter]⇨[PLC File]⇨"File Register"<br>*2 [Parameter]⇨[PLC Parameter]⇨[Device]⇨"File Register Extension Setting"<br>4) Reserve "Number of wave data" +100 points or more for the file register (ZR) to be used. When this FB is executed with the points specified in i_ReadDataAddr (Read start address) less than "Number of wave data" +100 of ZR(m+98,99), the available range of the file register (ZR) is exceeded and a CPU error (Error code: 4101) occurs.<br>5) Only when the function selection is set to the wave output function, this FB can be used.<br>6) When the function selection is set to other than the wave output function, FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 60 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>7) When FB_EN (Execution command) is turned OFF before the execution of this FB is completed, the processing is interrupted. At that time, the data stored in the buffer memory is not cleared.<br>When the FB is executed again, the reading processing is started from the beginning. |
| Compiling method | Macro type |
| Restrictions and precautions | 1) This FB requires many scans and takes long time to complete the processing. Therefore, this FB should be executed during the warm up of the L60AD2DA2.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>3) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) When two or more of these FBs are used, they cannot be used simultaneously.<br>7) Every input must be provided with a value for proper FB operation.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |

| Item | Description |
|---|---|
| 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 Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the wave output function. | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the wave output function, and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Read start address | i_ReadDataAddr | Double Word | Effective device range | Specify the start address of the file register (ZR) in which the parameters and the wave data of the wave output function are stored. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that writing the parameters and the wave data of the wave output function in the file register (ZR) to the buffer memory of the 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

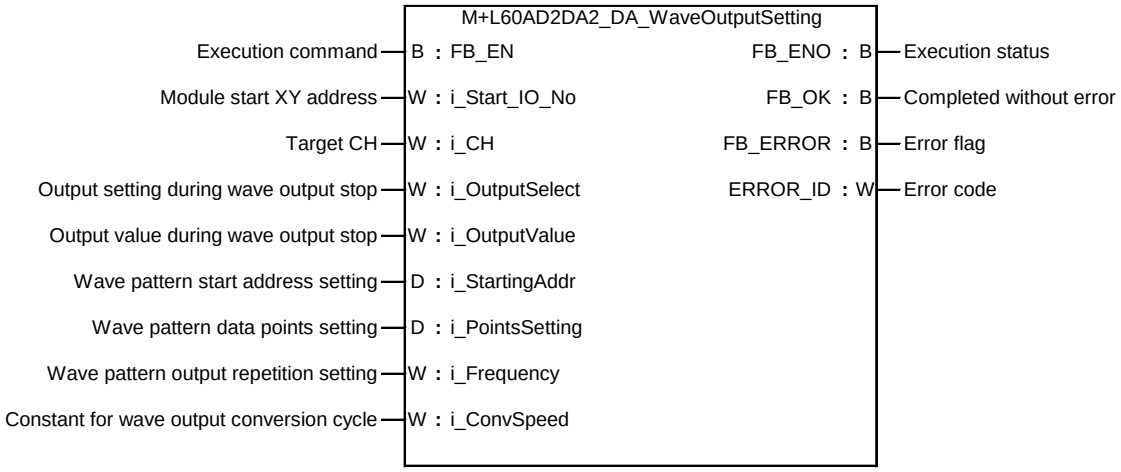
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.12. M+L60AD2DA2_DA_WaveOutputSetting (Wave output setting)

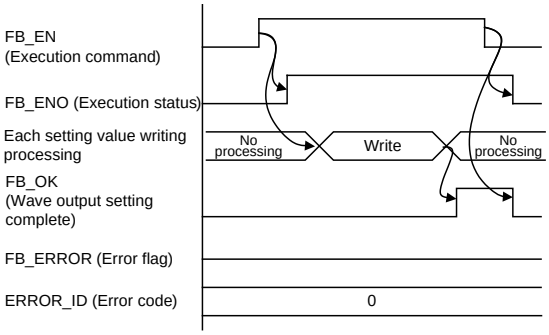
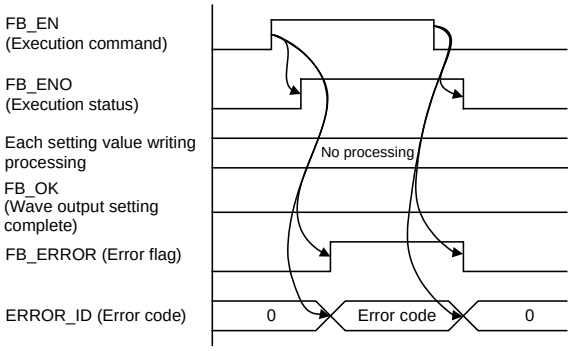
**FB Name**

M+L60AD2DA2_DA_WaveOutputSetting

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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>
</table>

| Item | Description |
|---|---|
| Number of steps | 403 steps (for MELSEC-L series CPU)<br>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition. |
| Function description | 1) By turning ON FB_EN (Execution command), the wave output for the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4) is set.<br>2) The setting value is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>3) Only when the function selection is set to the wave output function, this FB can be used. Set the wave output data for the analog output in advance.<br>4) When the function selection is not set for the wave output function or the setting value of the target channel is out of range, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 10 (Decimal) or 60 (Decimal) 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z6 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Pulsed execution (1 scan execution type) |
| Application example | Refer to "Appendix 1. FB Library Application Examples". |

| Item | Description |
|---|---|
| Timing chart | [When operation completes without error]<br>  <br>[When an error occurs]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid.<br>Set 3, 4, or 15 to the target channel. | Please try again after confirming the setting. |
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the wave output function. | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the wave output function, and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4, 15 | 3 or 4: Specify the channel number.<br>15: Specify channel 3 and channel 4. |

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Output setting during wave output stop | i_OutputSelect | Word | 0: 0V/0mA<br>1: Offset value<br>2: Output value during wave output stop | Specify the output value during the wave output stop. |
| Output value during wave output stop | i_OutputValue | Word | • 0 to 12,287 (For range of 0 to 5V, 1 to 5V, 0 to 20mA, and 4 to 20mA)<br>• -16,384 to 16,383 (For range of -10 to 10V) | Set the value to be output when "2: Output value during wave output stop" is selected in "Output setting during wave output stop".<br>The available setting range differs depending on the output range setting. |
| Wave pattern start address setting | i_StartingAddr | Double Word | 5,000 to 54,999 | Set the start address of the wave pattern to be output. |
| Wave pattern data points setting | i_PointsSetting | Double Word | 1 to 50,000 (points) | Set the data points of the wave pattern to be output. |
| Wave pattern output repetition setting | i_Frequency | Word | -1: Unlimited repetition<br>1 to 32,767: Specified number of times | Set the output times of the wave pattern. |
| Constant for wave output conversion cycle | i_ConvSpeed | Word | 1 to 5,000 | Set the constant to determine the conversion cycle 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.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

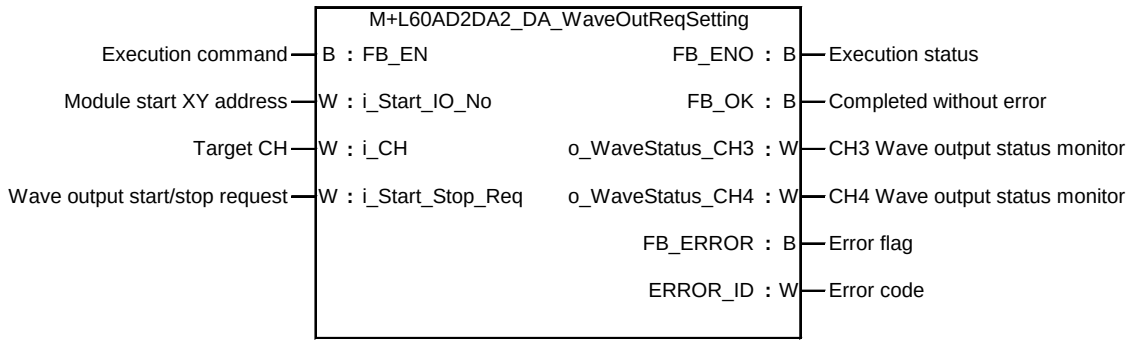
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.2.13. M+L60AD2DA2_DA_WaveOutReqSetting (Wave output start/stop request)

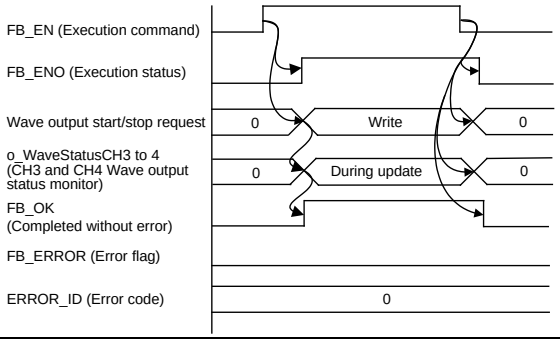
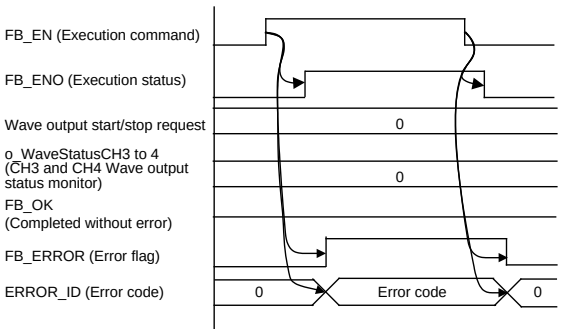
**FB Name**

M+L60AD2DA2_DA_WaveOutReqSetting

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the starting, stopping, or pausing of the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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></td><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">353 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the starting, stopping, or pausing of the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A conversion channels (CH3 and CH4) is set.<br>2) By turning ON FB_EN (Execution command), the value of the wave output status monitor (Un\G3102, Un\G3103) is output.<br>When a channel is specified in the input label, only the wave output status monitor value of the specified channel is updated. For other channels, "0" is output.<br>When all channels are set in the input label, the wave output status monitor values of all the channels are output.<br>3) After FB_EN (Execution command) is turned ON, the FB is always executed.<br>4) To restart the wave output, after the wave output is finished, set i_Start_Stop_Req (Wave output start/stop request) to "1 (Wave output start request)", "0 (Wave output stop request)", then "1 (Wave output start request)".<br>5) Only when the function selection is set to the wave output function, this FB can be used.<br>6) When the function selection is not set for the wave output function or the setting value of the target channel is out of range, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 10 (Decimal) or 60 (Decimal) is stored in ERROR_ID (Error code).<br>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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). |
| FB operation type | Real-time execution |

| Item | Description |
|---|---|
| Application example | Refer to "Appendix 1. FB Library Application Examples". |
| Timing chart | [When operation completes without error]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Digital-Analog Converter Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 10 (Decimal) | The specified channel is not valid.<br>Set 3, 4, or 15 to the target channel. | Please try again after confirming the setting. |
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the wave output function. | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the wave output function, and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Target CH | i_CH | Word | 3, 4, 15 | 3 or 4: Specify the channel number.<br>15: Specify channel 3 and channel 4. |
| Wave output start/stop request | i_Start_Stop_Req | Word | 0: Wave output stop request<br>1: Wave output start request<br>2: Wave output pause request | Specify the request for the wave output start or stop. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the FB is being executed properly. |
| CH3 Wave output status monitor | o_WaveStatus_CH3 | Word | 0 | Outputs the wave output status value (stop, during output, pause).<br>0: Wave output stop<br>1: Wave output<br>2: Wave output pause<br>3: Wave output step action *1<br><br>*1: The wave output step action function is unavailable with the FB. To execute, refer to Section 8.18 Wave Output Function of MELSEC-L Analog Input/Output Module User's Manual and use the device test function of GX Works2. |
| CH4 Wave output status monitor | o_WaveStatus_CH4 | Word | 0 | |

| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

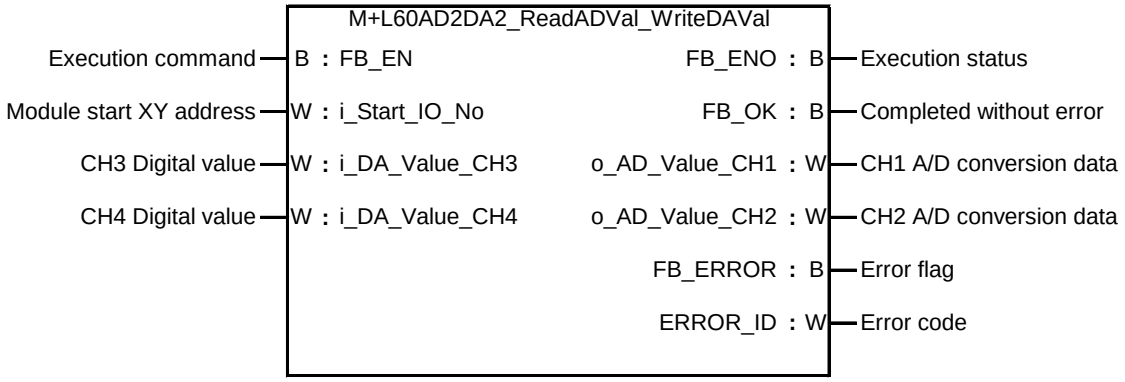
## 2.3. Common FB

### 2.3.1. M+L60AD2DA2_ReadADVal_WriteDAVal (Read A/D conversion data and write D/A conversion data)

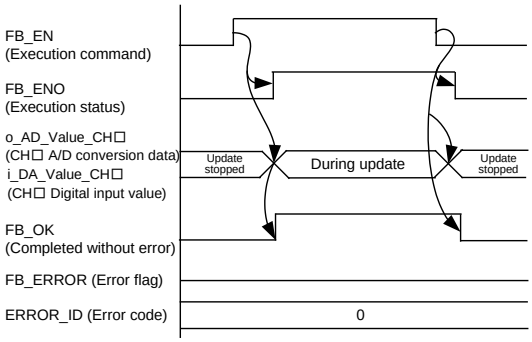
**FB Name**

M+L60AD2DA2_ReadADVal_WriteDAVal

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads the A/D conversion data of the A/D conversion channels (CH1 and CH2) and writes the D/A conversion data of the D/A conversion channels (CH3 and CH4).</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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>
</table>

| Item | Description |
|---|---|
| Number of steps | 312 steps (for MELSEC-L series CPU)<br>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition. |
| Function description | 1) By turning ON FB_EN (Execution command), the A/D conversion data of the A/D conversion channels (CH1 and CH2) is read and the digital input values of the D/A conversion channels (CH3 and CH4) are written.<br>2) The read A/D conversion data depends on the settings of the input range and the averaging processing function.<br>3) When the A/D conversion completed flag (XnE) is OFF, the A/D conversion data of channel 1 and channel 2 is not read.<br>4) The digital input value to be written depends on the output range setting.<br>When the scaling function (D/A conversion) of the L60AD2DA2 is enabled, the digital input value is scaled before the D/A conversion.<br>5) When the digital output value and digital input value are set in the auto refresh setting of the intelligent function module, this FB is unnecessary. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation.<br>6) To operate the L60AD2DA2, set the input range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| CH3 Digital value | i_DA_Value_CH3 | Word | -32,000 to 32,000 | Specify the digital input value of channel 3. The available setting range differs depending on the scaling function (D/A conversion) and output range setting. |
| CH4 Digital value | i_DA_Value_CH4 | Word | -32,000 to 32,000 | Specify the digital input value of channel 4. The available setting range differs depending on the scaling function (D/A conversion) and output range setting. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the A/D conversion value is being read or the digital input value is being written. |
| CH1 A/D conversion data | o_AD_Value_CH1 | Word | 0 | The A/D conversion value of channel 1 is stored. |
| CH2 A/D conversion data | o_AD_Value_CH2 | Word | 0 | The A/D conversion value of channel 2 is stored. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

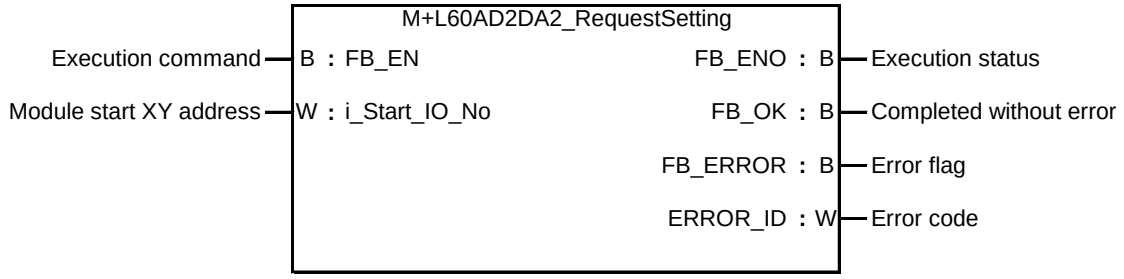
Please make sure to read user's manuals for the corresponding products before using the products.

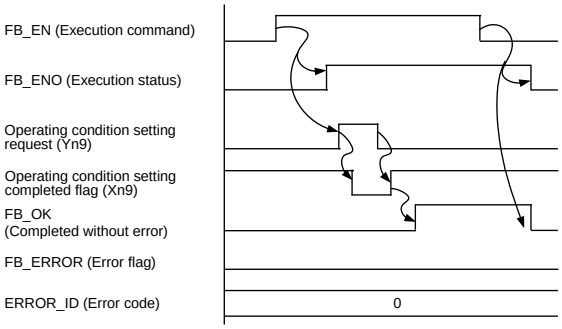
### 2.3.2. M+L60AD2DA2_RequestSetting (Operating condition setting request)

**FB Name**

M+L60AD2DA2_RequestSetting

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Validates each setting.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">294 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the setting contents of all the channels (CH1 to CH4) are validated. For the applicable setting, refer to MELSEC-L Analog Input/Output Module User's Manual.<br>2) After FB_EN (Execution command) is turned ON, the execution of this FB continues until each function setting is completed. |
| Compiling method | Macro type |
| Restrictions and precautions | 1) When this FB is executed while the L60AD2DA2 is being operated, A/D conversion and D/A conversion are stopped. The D/A output before the stop is held.<br>The conversion restarts after FB_OK turns ON.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>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 because it is impossible to turn OFF.<br>4) The FB cannot be used in an interrupt program.<br>5) This FB uses index register Z9. Please do not use the index register in an interrupt program.<br>6) Every input must be provided with a value for proper FB operation.<br>7) When this FB is used in two or more places, a duplicated coil warning may 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.<br>8) To operate the L60AD2DA2, set the input range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |

| Item | Description |
|---|---|
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that the operating condition 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

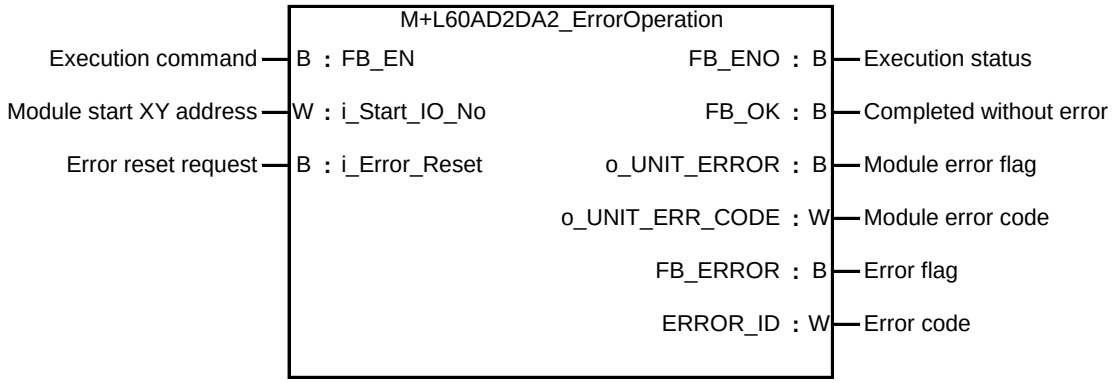
Please make sure to read user's manuals for the corresponding products before using the products.

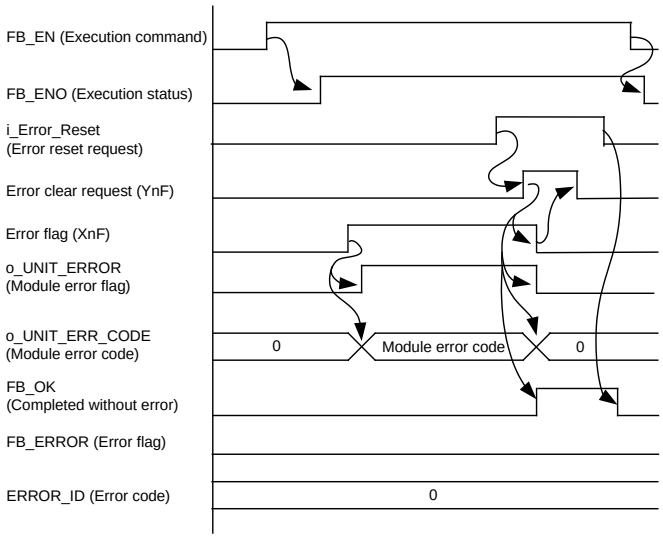
### 2.3.3. M+L60AD2DA2_ErrorOperation (Error operation)

**FB Name**

M+L60AD2DA2_ErrorOperation

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Monitors error codes and resets errors.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">307 steps (for MELSEC-L series CPU)<br>* 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, an error of the target module is monitored.<br>2) After FB_EN (Execution command) is turned ON, an error is reset when i_Error_Reset (Error reset command) is turned ON during error occurrence. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation.<br>6) When this FB is used in two or more places, a duplicated coil warning may 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.<br>7) To operate the L60AD2DA2, the setting must be appropriate to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |

| Item | Description |
| --- | --- |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Error reset request | i_Error_Reset | Bit | ON, OFF | Turn ON for the error reset.<br>Turn OFF after the error reset. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON (Module errors are being monitored.)<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that an error reset is completed. |
| Module error flag | o_UNIT_ERROR | Bit | OFF | When ON, it indicates that a module error has occurred. |
| Module error code | o_UNIT_ERR_CODE | Word | 0 | Stores the error code of the current error. |
| 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

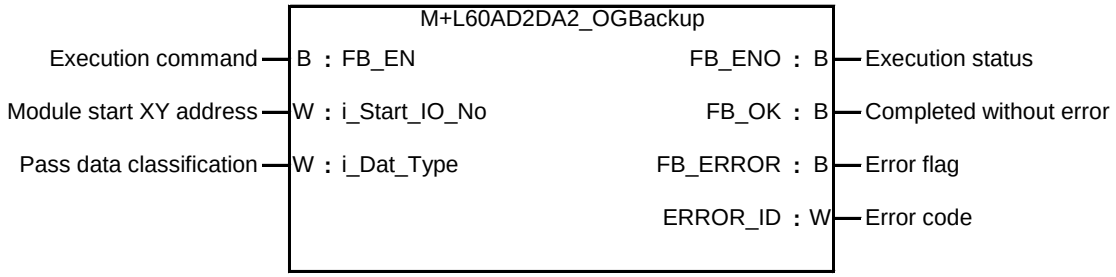
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.3.4. M+L60AD2DA2_OGBackup (Offset/gain value save)

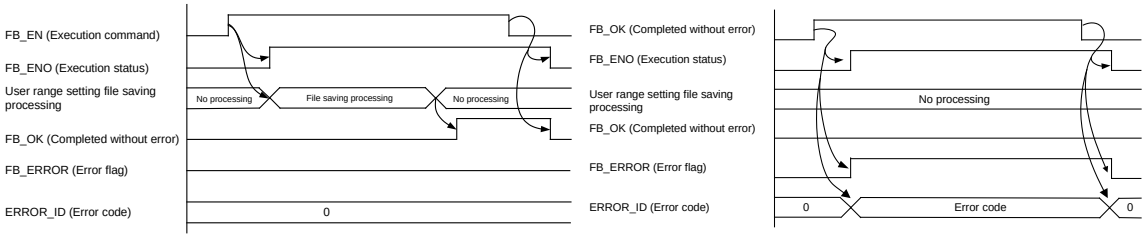
**FB Name**

M+L60AD2DA2_OGBackup

**Function Overview**

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Reads the offset/gain setting value of the user range setting and stores it to a file.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>
* Only the model having an SD memory card slot is applicable.
</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">570 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the offset/gain value of the user range setting is read and saved to an SD memory card inserted into the CPU module.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) The name of the file which this FB creates is "LADA" + "Module start XY address" + ".BIN".<br>[File name example]<br>When the module start XY address is H0120, the file name is "LADA0120.BIN".<br>4) When a file with the same name exists in the SD memory card, the existing file is replaced with a new BIN file created by this FB.<br>5) When the SD memory card mounted on the CPU does not have enough capacity or when the number of files to be created exceeds the number of storable files *1, a CPU error *2 occurs.<br>*1 For information on the size of SD memory card and the number of files that can be saved, refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).<br>*2 Setting the operation status of the CPU module (RUN/STOP) when an access error to the SD memory card occurs is available with parameters. |
| 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.<br>2) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>4) This FB uses index register Z9. Please do not use the index register in an interrupt program.<br>5) Every input must be provided with a value for proper FB operation.<br>6) Do not use this FB when the CPU module that does not have a SD memory slot is used. Even if used with such a CPU module, this FB does not operate.<br>7) When this FB is executed while the protect switch of the SD memory card ON, the offset/gain value cannot be saved. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 31 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>8) When this FB is executed without an SD memory card on the CPU module, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 33 (Decimal) is stored in ERROR_ID. |

| Item | Description |
|---|---|
| | Refer to the error code explanation section for details.<br>9) When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF, which can be set by sliding the SD memory card disabling switch upward, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 35 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>10) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, SP.FWRITE is not processed and the offset/gain value cannot be read. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 36 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>11) When this FB is executed with the SD memory card accessed by, for example, the data logging function of LCPU, the time for completing this FB may extend or a timeout error (Error code 40 (Decimal)) may occur. For details, refer to Section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of MELSEC-L CPU Module User's Manual (Data Logging Function).<br>12) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• MELSEC-L CPU Module User's Manual (Data Logging Function)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

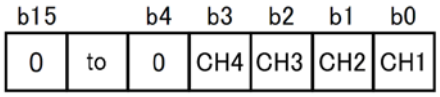
## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 31 (Decimal) | No data can be written to the SD memory card because SM601 (Memory card protect flag) is ON (Write prohibited). | Execute the FB again after turning OFF the protect switch of the SD memory card and confirming that SM601 is OFF (Write permitted). |
| 33 (Decimal) | This FB is executed with no SD memory card on the CPU module. | Execute this FB again after mounting the SD memory card to which the target file is saved on the CPU module. |
| 35 (Decimal) | The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF. | Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward. |
| 36 (Decimal) | SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable. | Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF. |
| 40 (Decimal) | The offset/gain value saving processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB. | Reduce the frequency of the access processing to the SD memory card. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Pass data classification | i_Dat_Type | Word | 0 to FH | Specify the type of the data to be stored for each channel.<br>0: Voltage, 1: Current<br>  |



●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command 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 | 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

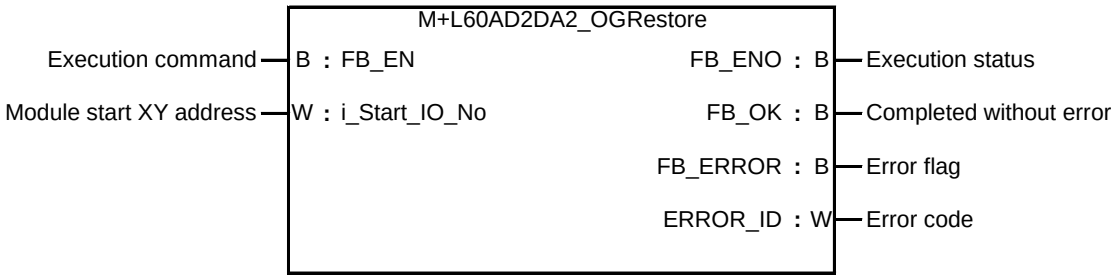
Please make sure to read user's manuals for the corresponding products before using the products.

### 2.3.5. M+L60AD2DA2_OGRestore (Offset/gain value restore)

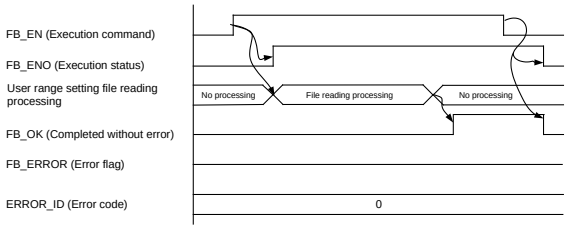
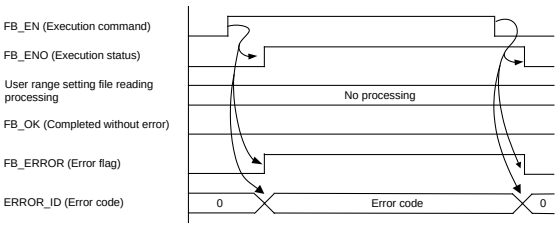
**FB Name**

M+L60AD2DA2_OGRestore

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Restores the offset/gain setting values of the user range setting that are saved in a file to the module.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2</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>
* Only the model having an SD memory card slot is applicable.
</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B 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">593 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the offset/gain value in the SD memory card inserted in the CPU module is read and restored to the module.<br>2) FB operation is one-shot only, triggered by the FB_EN signal.<br>3) This FB operates only when the A/D conversion and D/A conversion are set to "disabled" for all channels.<br>4) Execute this FB after executing M+L60AD2DA2_OGBackup.<br>When reading a file created other than by M+L60AD2DA2_OGBackup, a Module error (Error code: 163) occurs.<br>5) The name of the file which this FB reads from the memory card is "LADA" + "Module start XY address" + ".BIN".<br>[File name example]<br>When the module start XY address is H0120, the read file name is "LADA0120.BIN".<br>6) When no target file containing the user range setting exist in the installed SD memory card, a CPU error *1 occurs.<br>*1 Setting the operation status of the CPU module (RUN/STOP) when an access error to the SD memory card occurs is available with parameters. |
| Compiling method | Macro type |
| Restrictions and precautions | 1) Set the A/D conversion and D/A conversion to "disabled" for all channels before executing this FB.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>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 because it is impossible to turn OFF.<br>4) The FB cannot be used in an interrupt program.<br>5) This FB uses index register Z9. Please do not use the index register in an interrupt program.<br>6) This FB cannot restore the user range setting from a file created other than by M+L60AD2DA2_OGBackup.<br>7) Every input must be provided with a value for proper FB operation.<br>8) Do not use this FB when the CPU module that does not have a SD memory slot is used. Even if used with such a CPU module, this FB does not operate.<br>9) When this FB is executed without an SD memory card on the CPU module, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 33 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>10) When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF, |

| Item | Description |
|---|---|
| | which can be set by sliding the SD memory card disabling switch upward, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 35 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>11) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, SP.FREAD is not processed and the offset/gain value cannot be restored. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 36 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>12) When this FB is executed with the SD memory card accessed by, for example, the data logging function of LCPU, the time for completing this FB may extend or a timeout error (Error code 40 (Decimal)) may occur. For details, refer to Section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of MELSEC-L CPU Module User's Manual (Data Logging Function).<br>13) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• MELSEC-L CPU Module User's Manual (Data Logging Function)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 33 (Decimal) | This FB is executed with no SD memory card on the CPU module. | Execute this FB again after mounting the SD memory card to which the target file is saved on the CPU module. |
| 35 (Decimal) | The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF. | Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward. |
| 36 (Decimal) | SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable. | Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF. |
| 40 (Decimal) | The offset/gain value reading processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB. | Reduce the frequency of the access processing to the SD memory card. |
| 90 (Decimal) | A channel whose A/D conversion is set to "enabled" exists. | 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.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command 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 | 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 | 2013/08/30 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

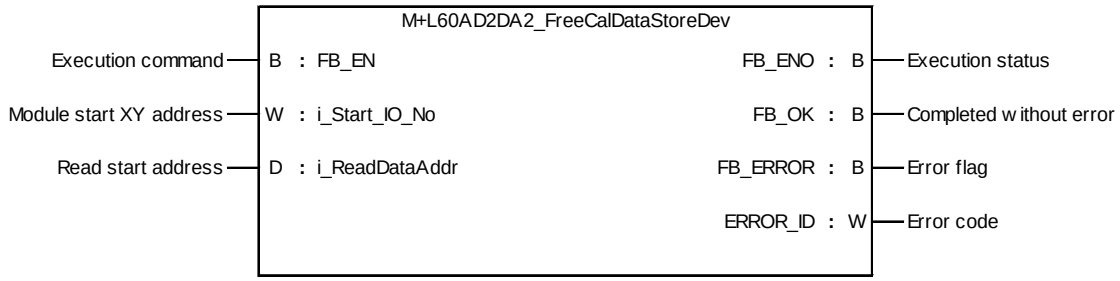
Please make sure to read user's manuals for the corresponding products before using the products.

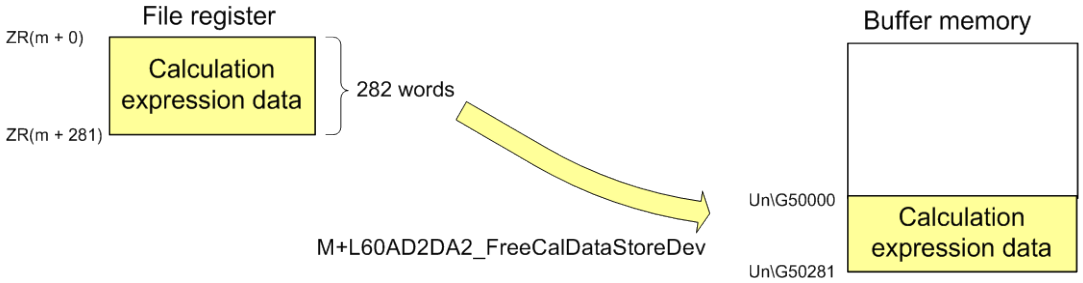
### 2.3.6. M+L60AD2DA2_FreeCalDataStoreDev (Read calculation expression data)

**FB Name**

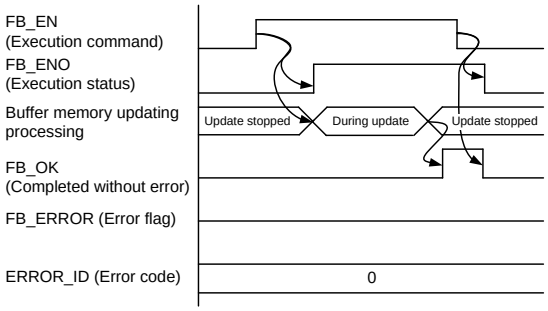
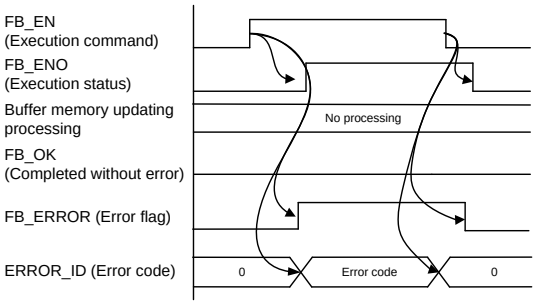
M+L60AD2DA2_FreeCalDataStoreDev

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads calculation expression data of the free calculation function from the file register (ZR), and then writes them to the buffer memory of the L60AD2DA2.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2<br>* Applicable to analog I/O modules whose first five digits of the product information are "17012" 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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">485 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the calculation expression data of the free calculation function is read from the serial number access format file register (ZR) and stored in the buffer memory of the analog I/O module.<br>  <br><br>For the free calculation function, refer to MELSEC-L Analog Input/Output Module User's Manual.<br>2) The read calculation expression data of the free calculation function is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>3) This FB reads the calculation expression data of the free calculation function from ZR (m+0) specified by i_ReadDataAddr (Read start address) and stores them in the buffer memory (Un\G50000 to Un\G50281). To create the calculation expression data to be stored in the file register (ZR), use the "Free calculation function setting" tool of GX Works2.<br>*m: File register (ZR) read start address. Specifying the points to be used in [PC File]*1 and the device points of the file register (ZR) in [Device]*2 can reserve the points of the file register and arrange the data in the desired address.<br>*1 [Parameter]⇨[PLC Parameter]⇨[PLC File]⇨"File Register"<br>*2 [Parameter]⇨[PLC Parameter]⇨[Device]⇨"File Register Extension Setting"<br>4) Reserve 282 file registers (ZR) or more to be used. When this FB is executed with the points specified in i_ReadDataAddr (Read start address) less than 282 points, the available range of the file register (ZR) is exceeded and a CPU error (Error code: 4101) occurs.<br>5) Only when the function selection is set to the "free calculation function" or the "free conversion characteristics function + free calculation function", this FB can be used.<br>6) When the function selection is set to other than the "free calculation function" or the "free conversion characteristics function + free calculation function", FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 60 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details. |

| Item | Description |
|---|---|
| | 7) When FB_EN (Execution command) is turned OFF before the execution of this FB is completed, the processing is interrupted. At that time, the data stored in the buffer memory is not cleared.<br>When the FB is executed again, the reading processing is started from the beginning. |
| Compiling method | Macro type |
| Restrictions and precautions | 1) This FB requires many scans and takes long time to complete the processing. Therefore, this FB should be executed during the warm up of the L60AD2DA2.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>3) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) When two or more of these FBs are used, they cannot be used simultaneously.<br>7) Every input must be provided with a value for proper FB operation.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>However, set the I/O range in the free conversion characteristics range setting (Un\G4101) for channels for which the "free calculation function" or the "free conversion characteristics function + free calculation function" is used. Please read the MELSEC-L Analog Input/Output Module User's Manual for the free conversion characteristics range setting (Un\G4101)". |
| 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]<br>  <br><br>[When an error occurs]<br>  <br> |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the "free calculation function" or the "free conversion characteristics function + free calculation function". | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the "free calculation function" or the "free conversion characteristics function + free calculation function", and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Read start address | i_ReadDataAddr | Double Word | Effective device range | Specify the start address of the file register (ZR) in which the calculation expression data of the free calculation function is stored. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that writing the calculation expression data of the free calculation function in the file register (ZR) to the buffer memory of the 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 | 2015/04/03 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

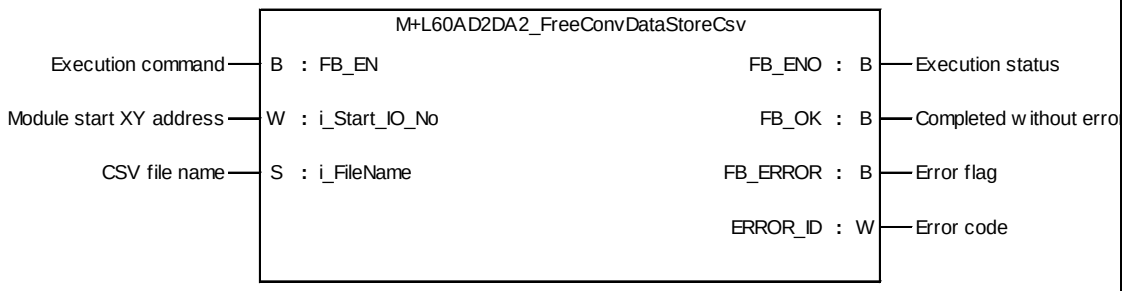
Please make sure to read user's manuals for the corresponding products before using the products.

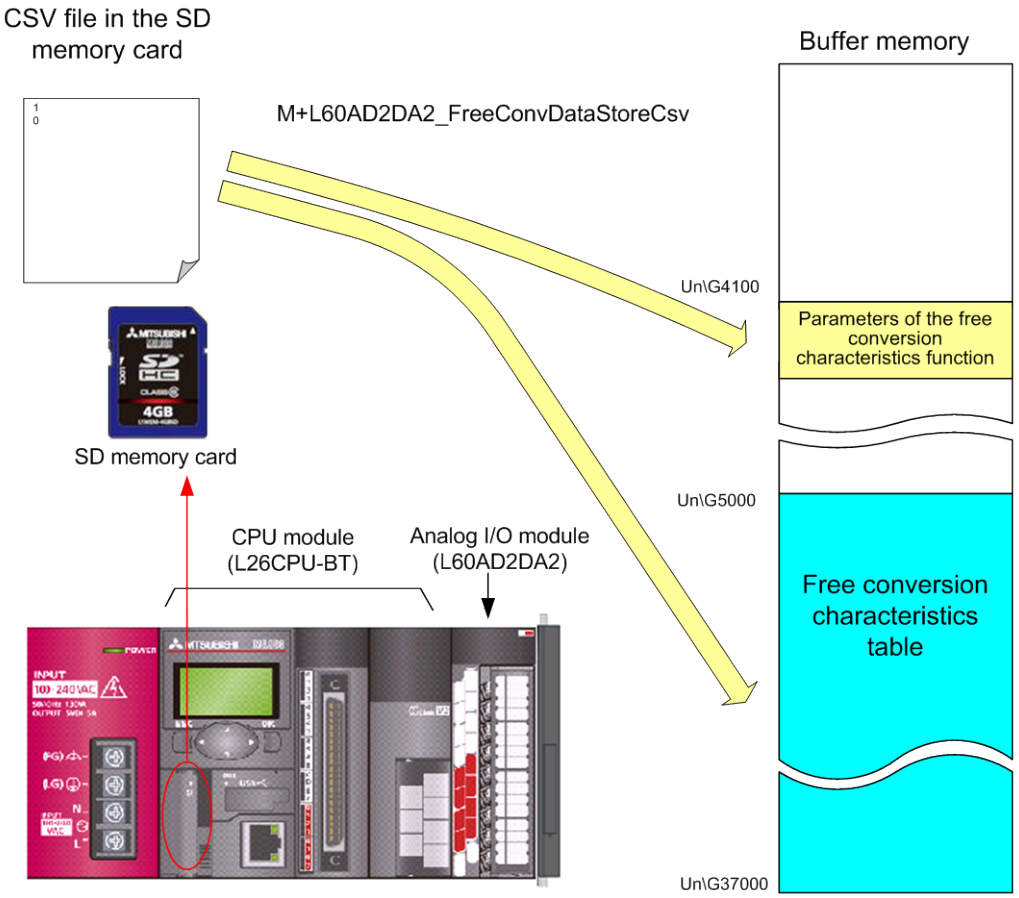
### 2.3.7. M+L60AD2DA2_FreeConvDataStoreCsv (Read conversion characteristics data (CSV file))

**FB Name**

M+L60AD2DA2_FreeConvDataStoreCsv

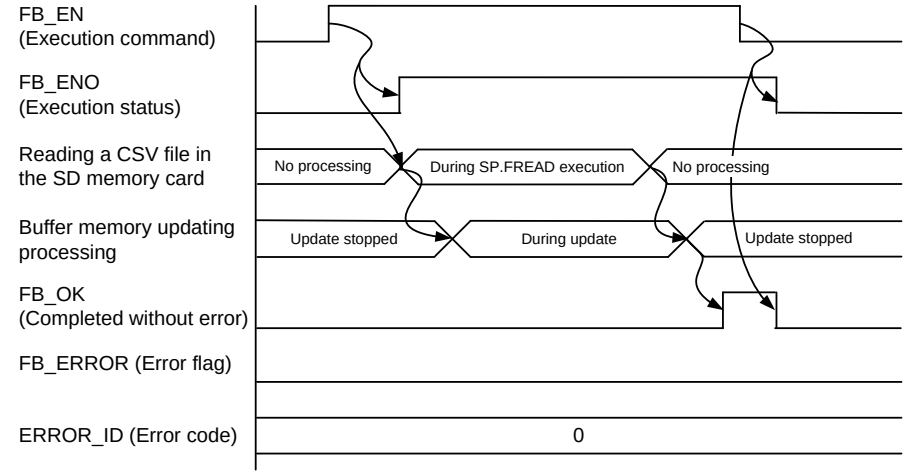
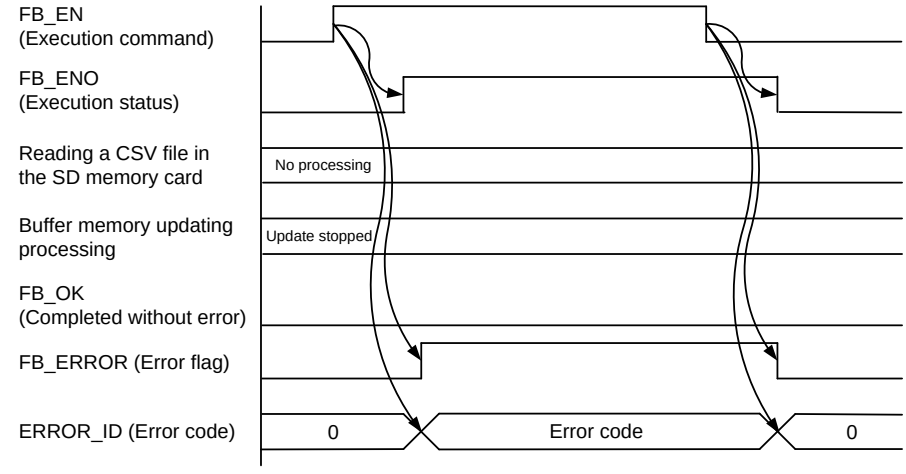
**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the parameters and free conversion characteristics table of the free conversion characteristics function from the CSV file, and then writes them to the buffer memory of the L60AD2DA2.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2<br>* Applicable to analog I/O modules whose first five digits of the product information are "17012" 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>* Only the model having an SD memory card slot is applicable.</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">1028 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the parameters and free conversion characteristics table of the free conversion characteristics function is read from the CSV file stored in the SD memory card inserted in the CPU module and stored in the buffer memory of the L60AD2DA2.<br>  <br><br>For the free conversion characteristics function, refer to MELSEC-L Analog Input/Output Module User's Manual.<br>2) The read parameters of the free conversion characteristics function is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>3) "Table 2 Storage Source "Parameters and Free Conversion Characteristics Table of the Free Conversion Characteristics Function" and Storage Location Buffer Memory" in Appendix 5 lists the "parameters and free conversion characteristics table of the free conversion characteristics function" and the storage location buffer memory address that this FB processes. Describe the parameters and data in the list to a file according to "Appendix 6. CSV File Format for Conversion Characteristics Data Reading FB (CSV File)" and save the file in the root folder (directory) of the SD memory card. |

| Item | Description |
|---|---|
| | This FB reads all the parameters of the free conversion characteristics function from the CSV file and stores them in the buffer memory (Un\G4100 and Un\G4101). Then, this FB reads "Free conversion characteristics table" specified in "Number of free conversion characteristics table data points" of the line 100 in the CSV file from the line 101 in order for the number of specified points, and stores them into the Start address (Un\G5000) or later of the free conversion characteristics table registration area of the buffer memory.<br>The CSV file of the free conversion characteristics function can be created easily with the "Create free conversion characteristics table" tool of GX Works2.<br>4) When the CSV file specified by i_FileName (CSV file name) does not exist in the SD memory card inserted to the CPU module, a CPU error (Error code: 2410) occurs.<br>* When the CPU is set to stop at the CPU error occurrence, FB_ERROR and ERROR_ID are not updated. The operation status of the CPU module (RUN/STOP) for when the CPU error occurs can be set in [PLC RAS] *1.<br>*1: [Parameter]⇨[PLC Parameter]⇨[PLC RAS]⇨"File Access Error" in "When There is an Error"<br>5) When FB_EN (Execution command) is turned OFF before the execution of this FB is completed, the processing is interrupted. At that time, the data stored in the buffer memory is not cleared.<br>When the FB is executed again, the reading processing is started from the beginning.<br>6) Only when the function selection is set to the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", this FB can be used.<br>7) When the function selection is set to other than the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 60 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>8) Do not remove the SD memory card during the execution of this FB. For the insertion or removal method of the 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 and takes long time to complete the processing. Therefore, this FB should be executed during the warm up of the L60AD2DA2.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>3) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) This FB uses the SP.FREAD command. Thus, when an execution error of the SP.FREAD command occurs, a CPU error occurs.<br>7) Do not use this FB when the CPU module that does not have a SD memory slot is used. Even if used with such a CPU module, this FB does not operate.<br>8) When this FB is executed without an SD memory card on the CPU module, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 33 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>9) When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF, which can be set by sliding the SD memory card disabling switch upward, FB_ERROR is turned ON and the processing is interrupted.<br>The error code 35 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>10) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, SP.FREAD is not processed and the conversion characteristics data cannot be read. FB_ERROR is turned ON and the processing is interrupted.<br>The error code 36 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>11) When this FB is executed with the SD memory card accessed by, for example, the data logging function of LCPU, the time for completing this FB may extend or a timeout error (Error code 40 (Decimal)) may occur. For details, refer to Section 13.2.4 Troubleshooting on the entire system during operation of the data logging function of MELSEC-L CPU Module User's Manual (Data Logging Function).<br>12) When two or more of these FBs are used, they cannot be used simultaneously.<br>13) Every input must be provided with a value for proper FB operation. |

| Item | Description |
|---|---|
| | 14) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>However, set the I/O range in the free conversion characteristics range setting (Un\G4101) for channels for which the "free calculation function" or the "free conversion characteristics function + free calculation function" is used.<br>Please read the MELSEC-L Analog Input/Output Module User's Manual for the free conversion characteristics range setting (Un\G4101)". |
| 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]<br>  <br>[When an error occurs]<br>  |

| Item | Description |
| --- | --- |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• MELSEC-L CPU Module User's Manual (Data Logging Function)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 33 (Decimal) | This FB is executed with no SD memory card on the CPU module. | Execute this FB again after mounting the SD memory card to which the target CSV file is saved on the CPU module. Or execute this FB again after inserting the available SD memory card and saving the target CSV file to the SD memory card using "Write PLC User Data" of GX Works2. |
| 35 (Decimal) | The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF. | Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward. |
| 36 (Decimal) | SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable. | Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF. |
| 40 (Decimal) | The conversion characteristics data reading processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB. | Reduce the frequency of the access processing to the SD memory card. |
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function". | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", and execute the FB again. |
| Error codes other than above | The error code of the CPU module | For details on the caused error code, refer to Appendix 1 Error Code Lists of 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.<br>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.<br>For details, refer to the CPU user's manual. | Specify the start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| CSV file name | i_FileName | Character string | 12 characters or less | Specify the name of the CSV file in which the parameters and the free conversion characteristics table of the free conversion characteristics function are stored. (Only CSV is valid for a file attribute.)<br>For details of the CSV file format, refer to "Appendix 6. CSV File Format for Conversion Characteristics Data Reading FB (CSV File). |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that writing the parameters and free conversion characteristics table of the free conversion characteristics function in the CSV file to the buffer memory of the L60AD2DA2 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 | 2015/04/03 | First edition |

## Note

This chapter includes information related to the function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

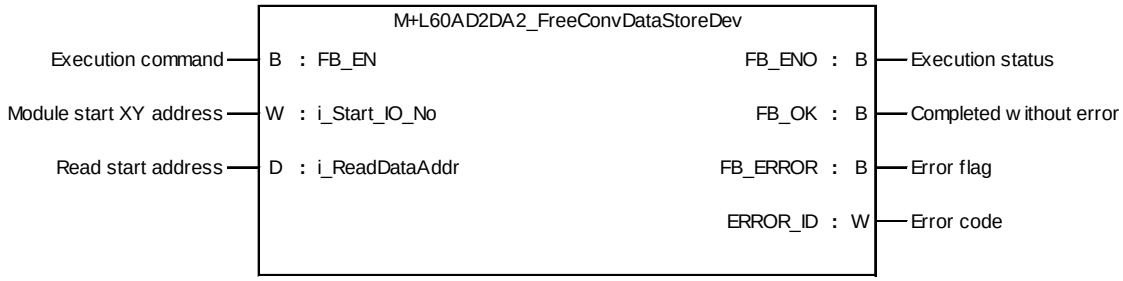
Please make sure to read user's manuals for the corresponding products before using the products.

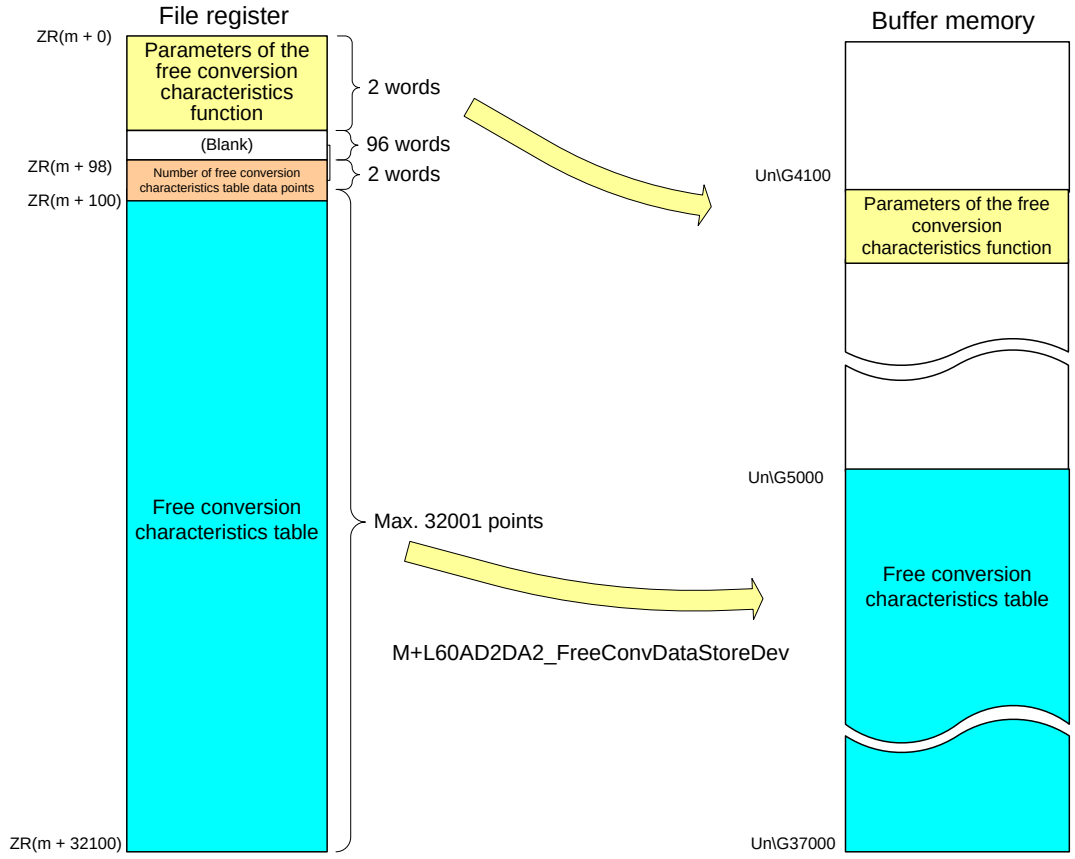
### 2.3.8. M+L60AD2DA2_FreeConvDataStoreDev (Read conversion characteristics data (device))

**FB Name**

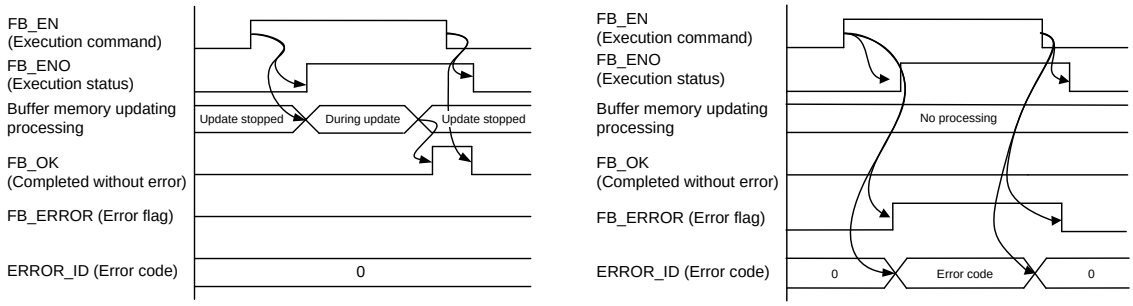
M+L60AD2DA2_FreeConvDataStoreDev

**Function Overview**

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the parameters and free conversion characteristics table of the free conversion characteristics function from the file register (ZR), and then writes them to the buffer memory of the L60AD2DA2.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog I/O module</td><td>L60AD2DA2<br>* Applicable to analog I/O modules whose first five digits of the product information are "17012" 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>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B 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">622 steps (for MELSEC-L series CPU)<br>* 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) By turning ON FB_EN (Execution command), the parameters and free conversion characteristics table of the free conversion characteristics function are read from the serial number access format file register (ZR) and stored in the buffer memory of the analog I/O module.<br>  <br><br>For the free conversion characteristics function, refer to MELSEC-L Analog Input/Output Module User's Manual.<br>2) The read parameters of the free conversion characteristics function is validated when the Operating condition setting request signal (Yn9) is turned OFF → ON → OFF or the Operating condition setting request FB (M+L60AD2DA2_RequestSetting) is executed.<br>3) "Table 2 Storage Source "Parameters and Free Conversion Characteristics Table of the Free Conversion Characteristics Function" and Storage Location Buffer Memory" in Appendix 5. lists "parameters and data of the free conversion characteristics function" and the storage location buffer memory address that this FB processes. Save the parameter and the data in the file register (ZR) described in "Storage source" in the table.<br>This FB reads the parameters of the free conversion characteristics function from ZR (m+0) specified by i_ReadDataAddr (read start address) and stores them in the buffer memory (Un\G4100 and Un\G4101). |

| Item | Description |
|---|---|
| | Then, this FB reads "Free conversion characteristics table" of specified points specified in "Number of free conversion characteristics table data points" of ZR (m+98, 99) from ZR (m+100) in order, and stores them into the Start address (Un\G5000) or later of the free conversion characteristics table registration area the buffer memory.<br>The file register (ZR) data of the free conversion characteristics function can be created easily with the "Create free conversion characteristics table" tool of GX Works2.<br>*m: File register (ZR) read start address. Specifying the points to be used in [PC File]*1 and the device points of the file register (ZR) in [Device]*2 can reserve the points of the file register and arrange the data in the desired address.<br>*1 [Parameter]⇨[PLC Parameter]⇨[PLC File]⇨"File Register"<br>*2 [Parameter]⇨[PLC Parameter]⇨[Device] ⇨"File Register Extension Setting"<br>4) Reserve "Number of free conversion characteristics table data points" +100 points or more for the file register (ZR) to be used. When this FB is executed with the points specified in i_ReadDataAddr (Read start address) less than "Number of free conversion characteristics table data points" +100 of ZR (m+98, 99), the available range of the file register (ZR) is exceeded and a CPU error (Error code: 4101) occurs.<br>5) Only when the function selection is set to the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", this FB can be used.<br>6) When the function selection is set to other than the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", FB_ERROR is turned ON and the processing of the FB is interrupted.<br>The error code 60 (Decimal) is stored in ERROR_ID.<br>Refer to the error code explanation section for details.<br>7) When FB_EN (Execution command) is turned OFF before the execution of this FB is completed, the processing is interrupted. At that time, the data stored in the buffer memory is not cleared.<br>When the FB is executed again, the reading processing is started from the beginning. |
| Compiling method | Macro type |

| Item | Description |
|---|---|
| Restrictions and precautions | 1) This FB requires many scans and takes long time to complete the processing. Therefore, this FB should be executed during the warm up of the L60AD2DA2.<br>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.<br>3) The FB cannot be used in an interrupt program.<br>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 because it is impossible to turn OFF.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.<br>6) When two or more of these FBs are used, they cannot be used simultaneously.<br>7) Every input must be provided with a value for proper FB operation.<br>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be connected. Configure the setting in Switch Setting of GX Works2 according to the application.<br>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).<br>However, set the I/O range in the free conversion characteristics range setting (Un\G4101) for channels for which the "free calculation function" or the "free conversion characteristics function + free calculation function" is used.<br>Please read the MELSEC-L Analog Input/Output Module User's Manual for the free conversion characteristics range setting (Un\G4101)". |
| 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]<br>  |
| Relevant manuals | • MELSEC-L Analog Input/Output Module User's Manual<br>• MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)<br>• GX Works2 Version 1 Operating Manual (Common)<br>• GX Works2 Version 1 Operating Manual (Simple Project, Function Block) |

## Error codes

●Error code list

| Error code | Description | Action |
|---|---|---|
| 60 (Decimal) | The function selection of Switch 4 of the intelligent function module switch setting of the target module is set to other than the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function". | Set the function selection of Switch 4 of the intelligent function module switch setting of the target module to the "free conversion characteristics function" or the "free conversion characteristics function + free calculation function", and execute the FB again. |

## Labels

●Input labels

| Name (Comment) | Label name | Data type | Setting range | Description |
|---|---|---|---|---|
| Execution command | FB_EN | Bit | ON, OFF | ON: The FB is activated.<br>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 start XY address (in hexadecimal) where the L60AD2DA2 is connected. (For example, enter H10 for X10.) |
| Read start address | i_ReadDataAddr | Double Word | Effective device range | Specify the start address of the file register (ZR) in which the parameters and the conversion characteristics data of the free conversion characteristics function are stored. |

●Output labels

| Name (Comment) | Label name | Data type | Initial value | Description |
|---|---|---|---|---|
| Execution status | FB_ENO | Bit | OFF | ON: Execution command is ON.<br>OFF: Execution command is OFF. |
| Completed without error | FB_OK | Bit | OFF | When ON, it indicates that writing the parameters and the conversion characteristics data of the free conversion characteristics function in the file register (ZR) to the buffer memory of the 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 | 2015/04/03 | First edition |

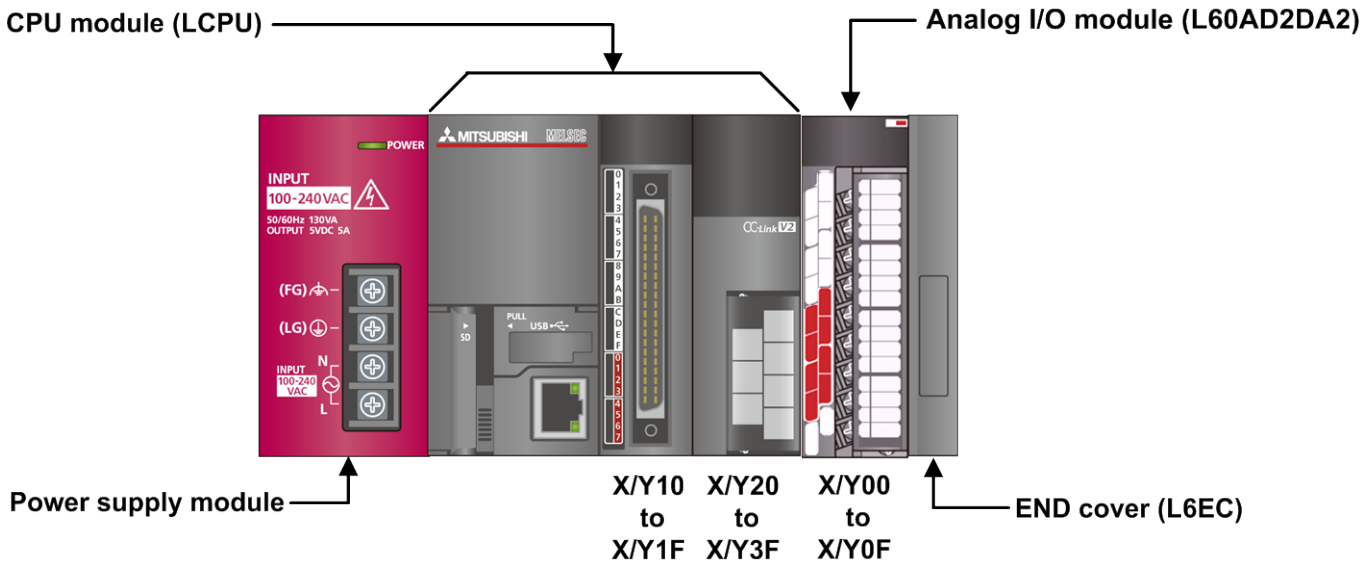
## Note

This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

Appendix 1. FB Library Application Examples

L60AD2DA2 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) Global label setting

None

## 3) Application example settings

a) Common setting

| Input and output item | Value | Description |
|---|---|---|
| Module start XY address | 0 | Specify the start XY address where the L60AD2DA2 is connected. |

Appendix 1.1. Application examples of the A/D conversion FBs

## 1) List of devices

a) External input (commands)

| Device | FB name | Application (ON details) |
|---|---|---|
| M0 | M+L60AD2DA2_AD_ReadADVal | A/D value reading request |
| M10 | M+L60AD2DA2_AD_ReadAllADVal | A/D value read req. (all CHs) |
| M20 | M+L60AD2DA2_AD_ReadScalingVal | Scaling value reading request |
| M30 | M+L60AD2DA2_AD_ReadAllScalingVal | Scaling val read req. (all CHs) |
| M40 | M+L60AD2DA2_AD_SetADConversion | A/D conv enable/disable set req. |
| M41 | | A/D conv enabl:ON/disabl:OFF set |
| M50 | M+L60AD2DA2_AD_SetAverage | Averaging proc setting request |
| M60 | M+L60AD2DA2_AD_SetScaling | A/D conversion scaling set req. |
| M61 | | A/D conv scaling enab/disab set |
| M70 | M+L60AD2DA2_AD_SetInputSignalErr | Input signal error setting req. |
| M80 | M+L60AD2DA2_AD_SetOffsetVal | A/D conv offset setting request |
| M81 | | A/D conv offset value write req. |
| M90 | M+L60AD2DA2_AD_SetGainVal | A/D conv gain setting request |
| M91 | | A/D conv gain value write req. |
| M100 | M+L60AD2DA2_AD_ShiftOperation | A/D conv shift operation req. |
| D100 | | Digital value |
| M110 | M+L60AD2DA2_AD_DiffOperation | Difference conversion request |
| D110 | | Digital value |
| M120 | M+L60AD2DA2_AD_DigitalClipOperation | Digital clipping request |
| D120 | | Digital value |
| M130 | M+L60AD2DA2_AD_SetLoggingPARAM | Logging fnc param setting req. |
| M131 | | Log fnc enabl:ON/disabl:OFF set |
| M140 | M+L60AD2DA2_AD_SaveLogging | Logging data save request |
| M141 | | Log file ovr enable/disable set |
| M142 | | Logging forced save command |

b) External output (checks)

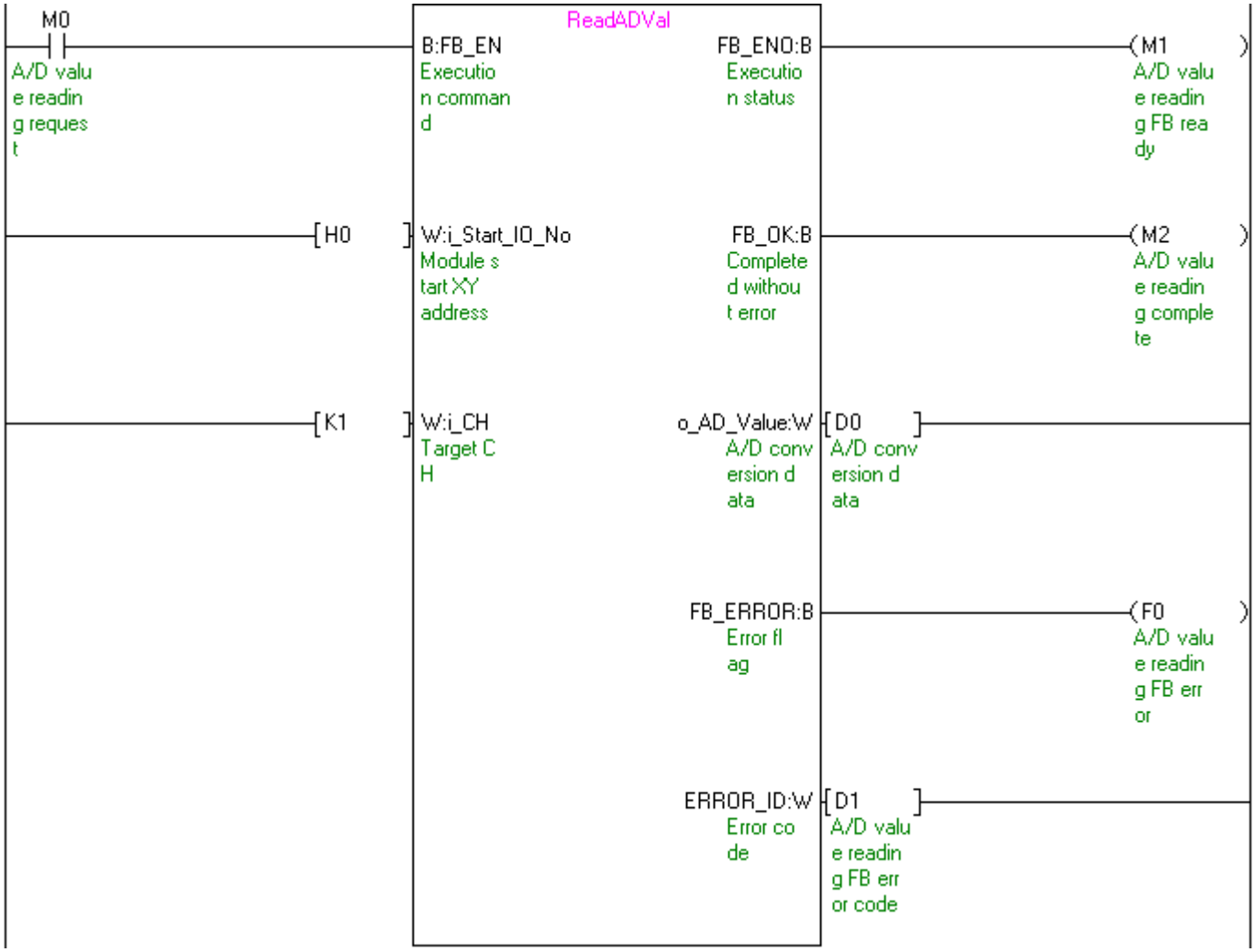
| Device | FB name | Application (ON details) |
|---|---|---|
| M1 | M+L60AD2DA2_AD_ReadADVal | A/D value reading FB ready |
| M2 | | A/D value reading complete |
| F0 | | A/D value reading FB error |
| D0 | | A/D conversion data |
| D1 | | A/D value reading FB error code |
| M11 | M+L60AD2DA2_AD_ReadAllADVal | A/D value read FB rdy. (all CHs) |
| M12 | | A/D value read comp. (all CHs) |
| D10 | | CH1 A/D conversion data |
| D11 | | CH2 A/D conversion data |
| M21 | M+L60AD2DA2_AD_ReadScalingVal | Scaling value reading FB ready |
| M22 | | Scaling value reading complete |
| F5 | | Scaling value reading FB error |
| D20 | | Scaling value |
| D21 | | Scaling value read FB error code |
| M31 | M+L60AD2DA2_AD_ReadAllScalingVal | Scaling val read rdy. (all CHs) |
| M32 | | Scaling val read comp. (all CHs) |
| D30 | | CH1 Scaling value |
| D31 | | CH2 Scaling value |
| M41 | M+L60AD2DA2_AD_SetADConversion | A/D conv enabl:ON/disabl:OFF set |
| M42 | | A/D conv enable/disable FB ready |
| F10 | | A/D conv enable/disable FB error |
| D40 | | A/D enable/disable FB error code |
| M51 | M+L60AD2DA2_AD_SetAverage | Averaging proc setting FB ready |
| M52 | | Averaging proc setting complete |
| F15 | | Averaging proc setting FB error |
| D50 | | Averaging proc set FB error code |
| M62 | M+L60AD2DA2_AD_SetScaling | A/D conv scaling setting FB rdy. |
| M63 | | A/D conv scaling req. complete |
| F20 | | A/D conv scaling setting FB err |
| D60 | | A/D conv scaling set FB err code |
| M71 | M+L60AD2DA2_AD_SetInputSignalErr | Input signal error setting ready |
| M72 | | Input signal error setting comp. |
| F25 | | Input signal err setting FB err |
| D70 | | Input signal err set FB err code |
| M82 | M+L60AD2DA2_AD_SetOffsetVal | A/D conv offset setting FB ready |

| Device | FB name | Application (ON details) |
|---|---|---|
| M83 | | A/D conv offset setting comp. |
| F30 | | A/D conv offset setting FB error |
| D80 | | A/D conv offset set FB err code |
| M92 | M+L60AD2DA2_AD_SetGainVal | A/D conv gain setting FB ready |
| M93 | | A/D conv gain setting complete |
| F35 | | A/D conv gain setting FB error |
| D90 | | A/D conv gain set FB error code |
| M101 | M+L60AD2DA2_AD_ShiftOperation | A/D conv shift operation FB rdy. |
| M102 | | A/D conv shift operation comp. |
| D101 | | A/D conv shift conversion value |
| M111 | M+L60AD2DA2_AD_DiffOperation | Difference conversion FB ready |
| M112 | | Difference conversion complete |
| D111 | | Difference conversion value |
| D112 | | Difference conv reference value |
| M121 | M+L60AD2DA2_AD_DigitalClipOperation | Digital clipping FB ready |
| M122 | | Digital clipping complete |
| F40 | | Digital clipping FB error |
| D121 | | Digital output value |
| D122 | | Digital clipping FB error code |
| M132 | M+L60AD2DA2_AD_SetLoggingPARAM | Logging func param set FB ready |
| M133 | | Logging fnc param set complete |
| F45 | | Logging fnc param setting FB err |
| D130 | | Log fnc param set FB err code |
| M143 | M+L60AD2DA2_AD_SaveLogging | Logging data save FB ready |
| M144 | | Logging data save complete |
| M145 | | Logging data saving |
| M146 | | Logging file max No. reached |
| F50 | | Logging data save FB error |
| D140 | | Logging data save FB error code |

M+L60AD2DA2_AD_ReadADVal (Read A/D conversion data)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K1 | Set the target channel to channel 1. |

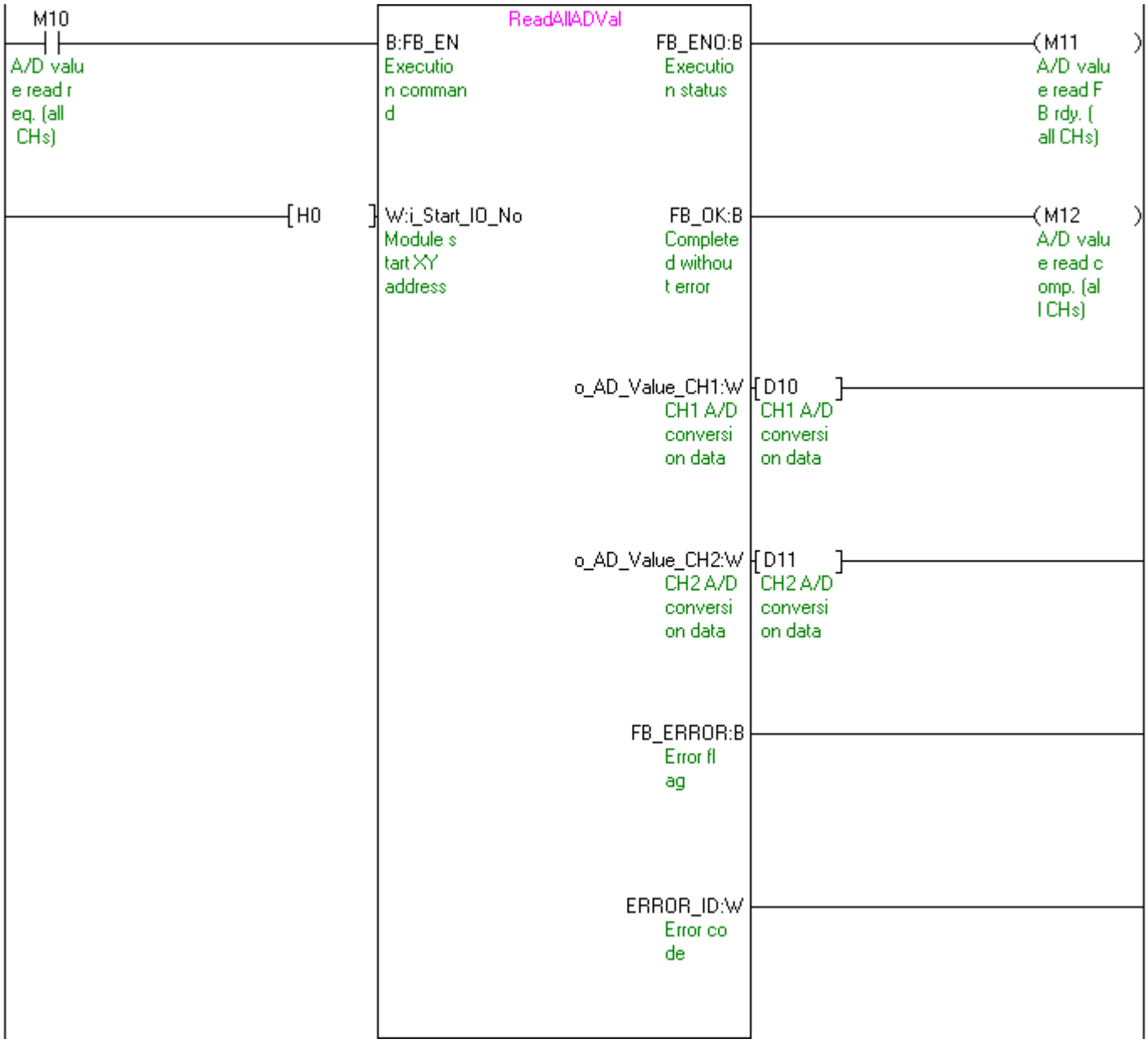
By turning ON M0, the A/D conversion data of channel 1 is read.



M+L60AD2DA2_AD_ReadAllADVal (Read A/D conversion data (all CHs))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |

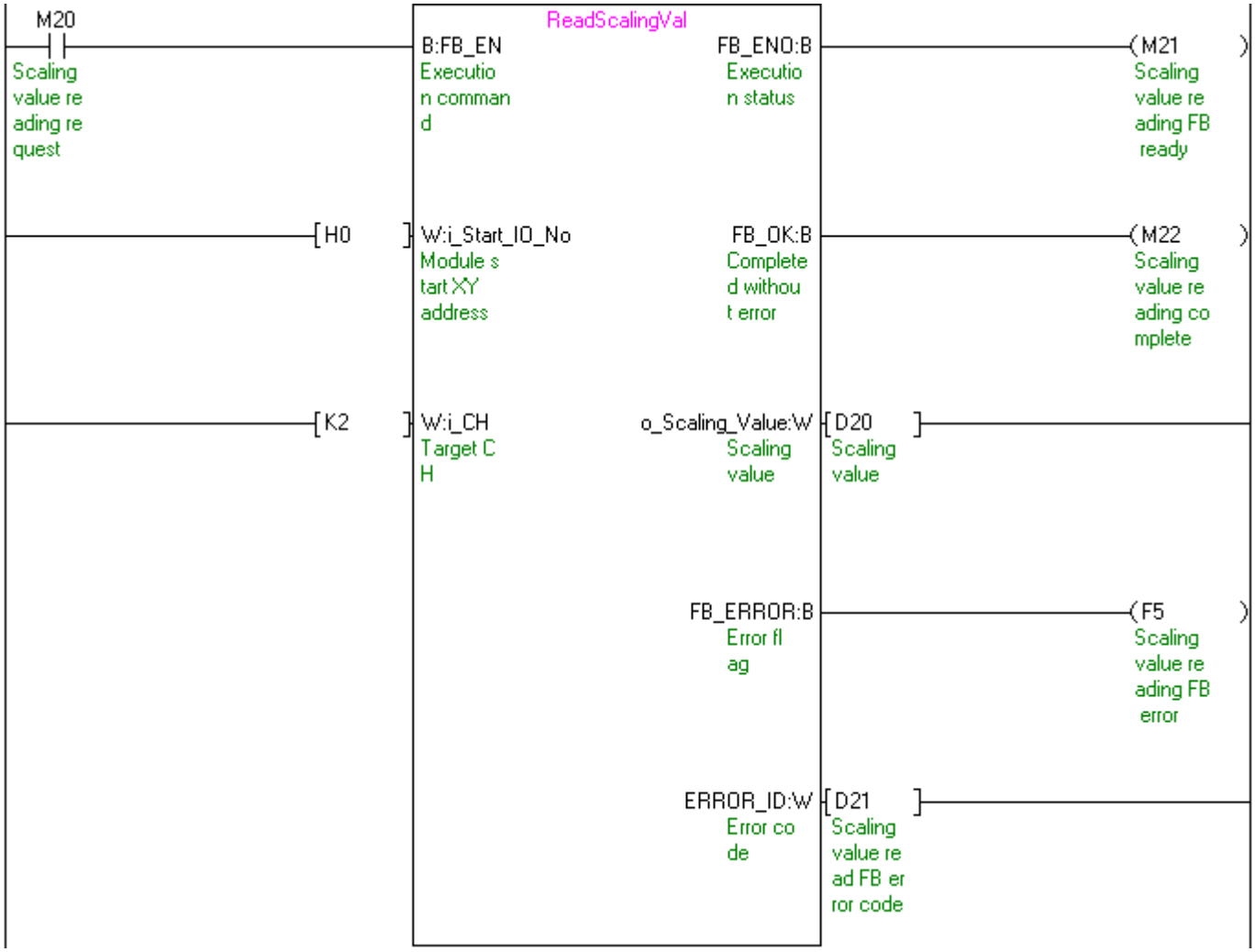
By turning ON M10, the A/D conversion data of the A/D conversion channels (CH1 and CH2) is read.



M+L60AD2DA2_AD_ReadScalingVal (Read A/D conversion scaling value)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K2 | Set the target channel to channel 2. |

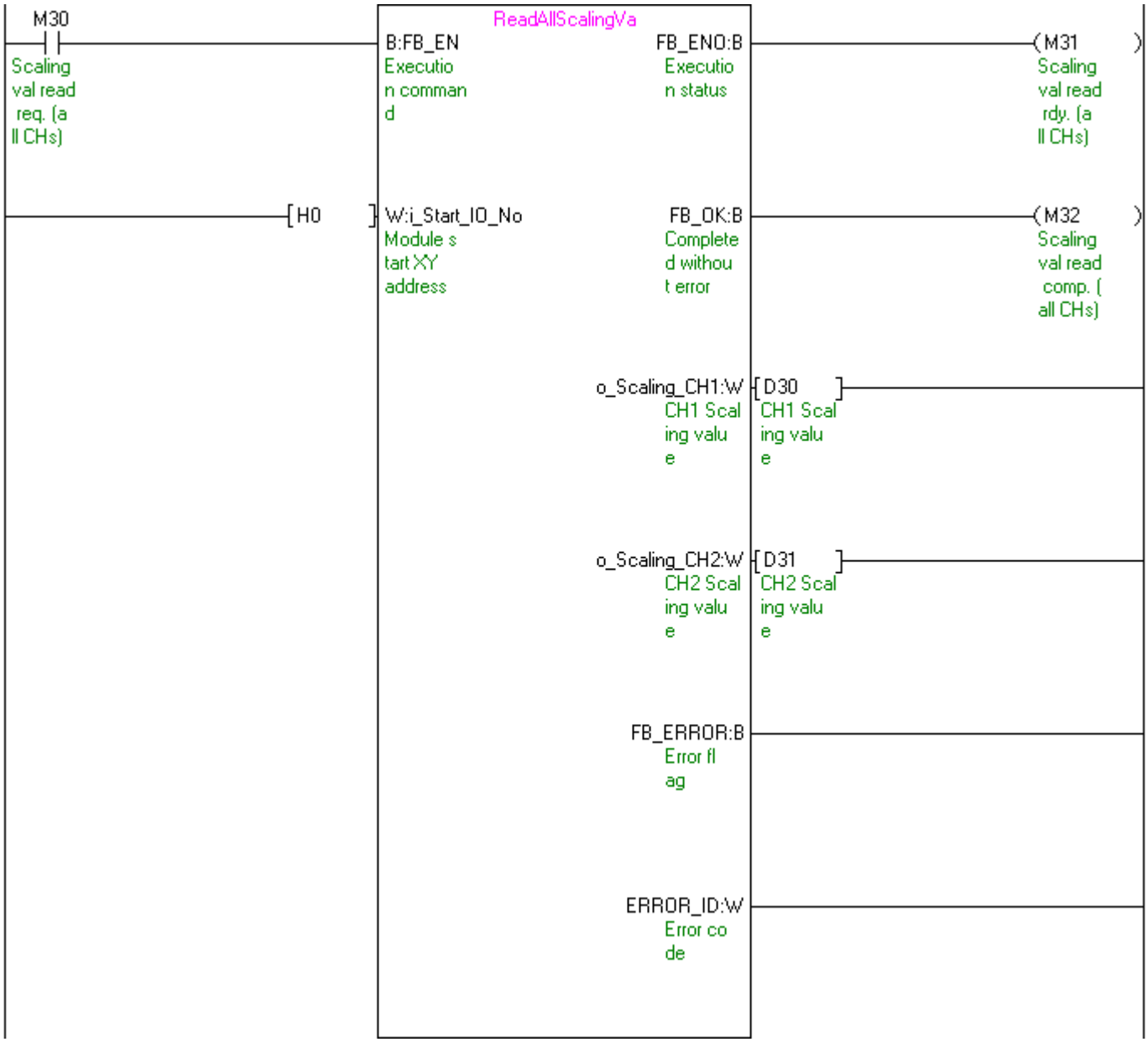
By turning ON M20, the scaling value of channel 2 is read.



M+L60AD2DA2_AD_ReadAllScalingVal (Read A/D conversion scaling value (all CHs))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |

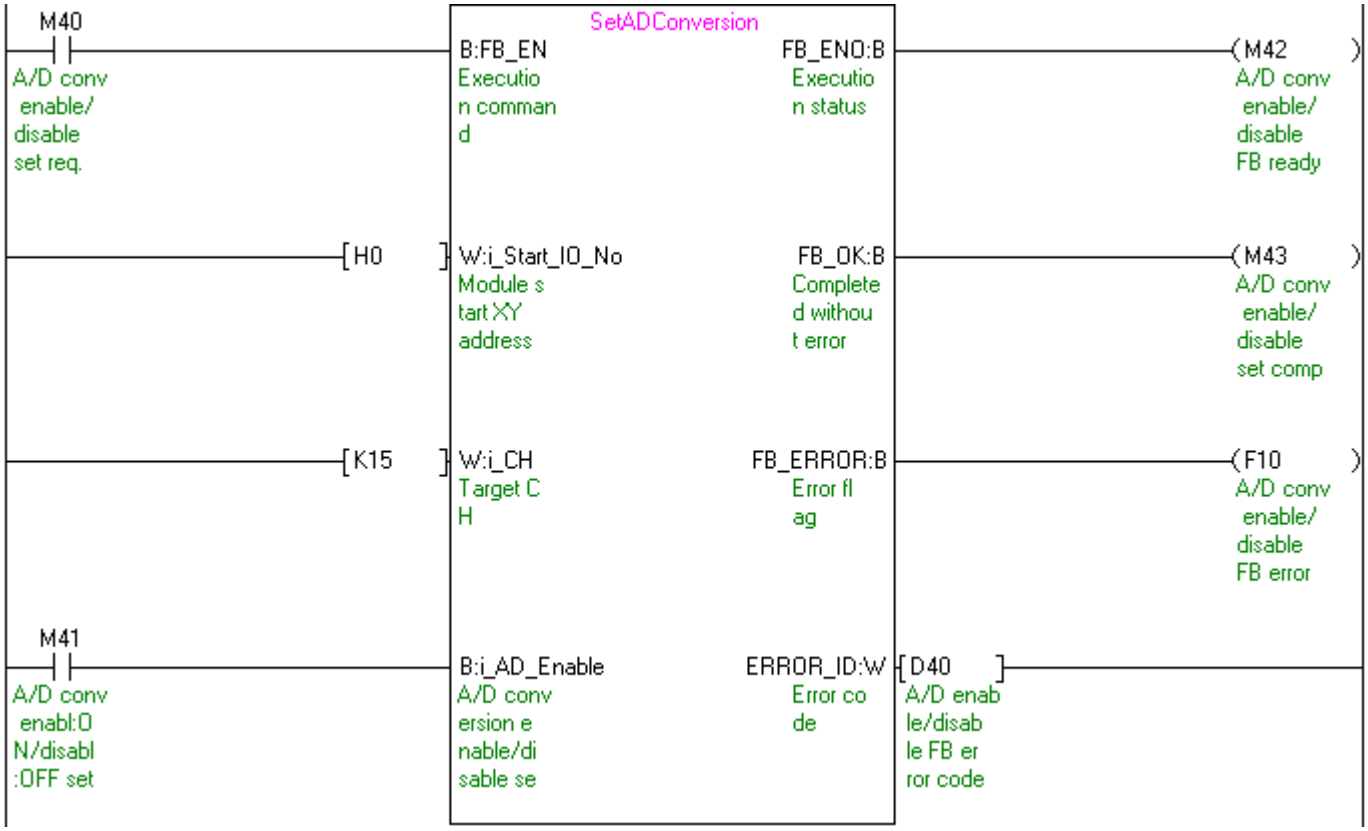
By turning ON M30, the scaling values of the A/D conversion channels (CH1 and CH2) are read.



M+L60AD2DA2_AD_SetADConversion (A/D conversion enable/disable setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K15 | Set the target channel to channel 1 and 2. |
| i_AD_Enable | ON/OFF | Turn ON to enable the A/D conversion of the target channel. |

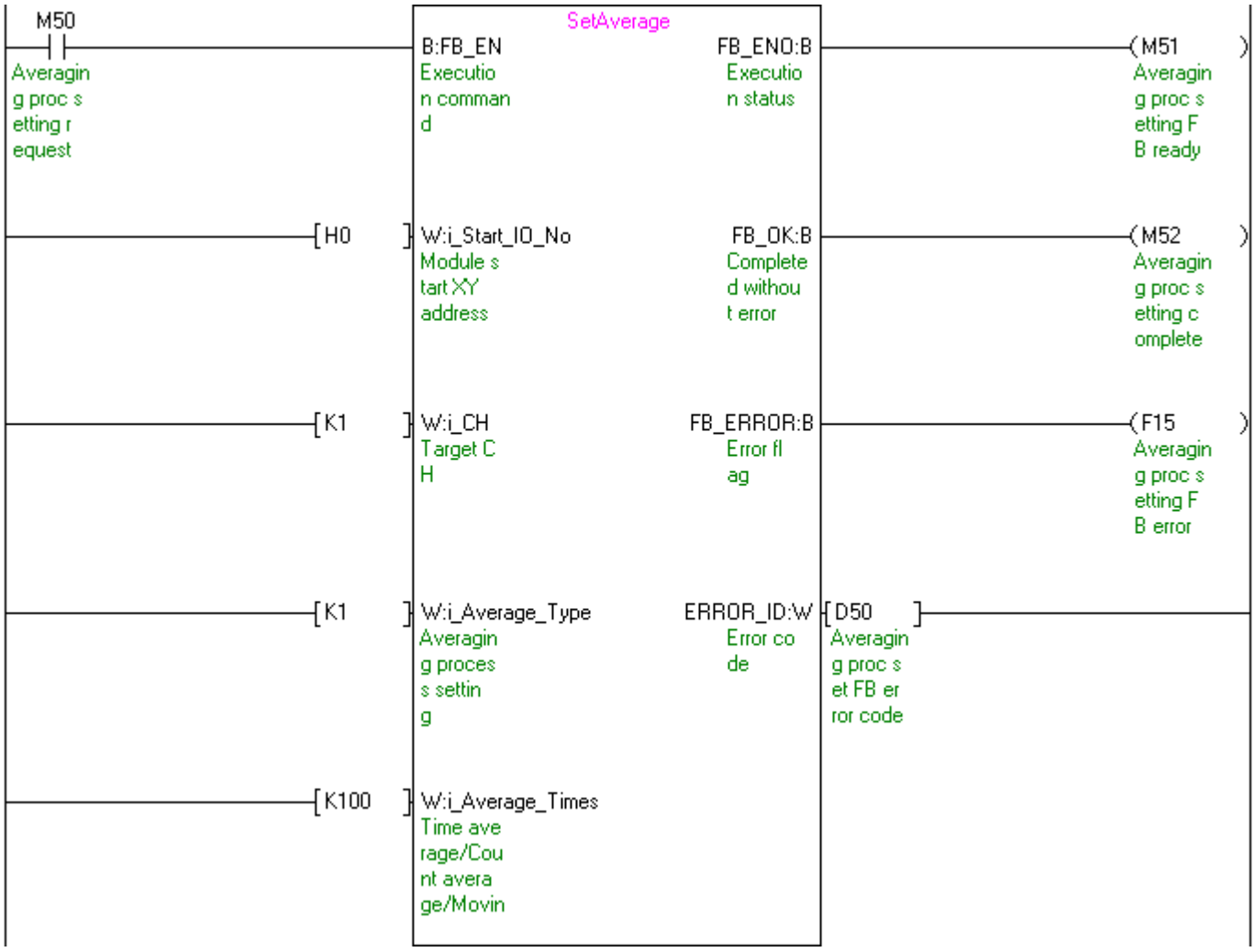
By turning ON M40, the values for the A/D conversion enable/disable setting of the A/D conversion channels (CH1 and CH2) are written to the buffer memory.



M+L60AD2DA2_AD_SetAverage (A/D conversion averaging process setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K1 | Set the target channel to channel 1. |
| i_Average_Type | K1 | Set the averaging processing type to "Time average". |
| i_Average_Times | K100 | Set the time average to 100. |

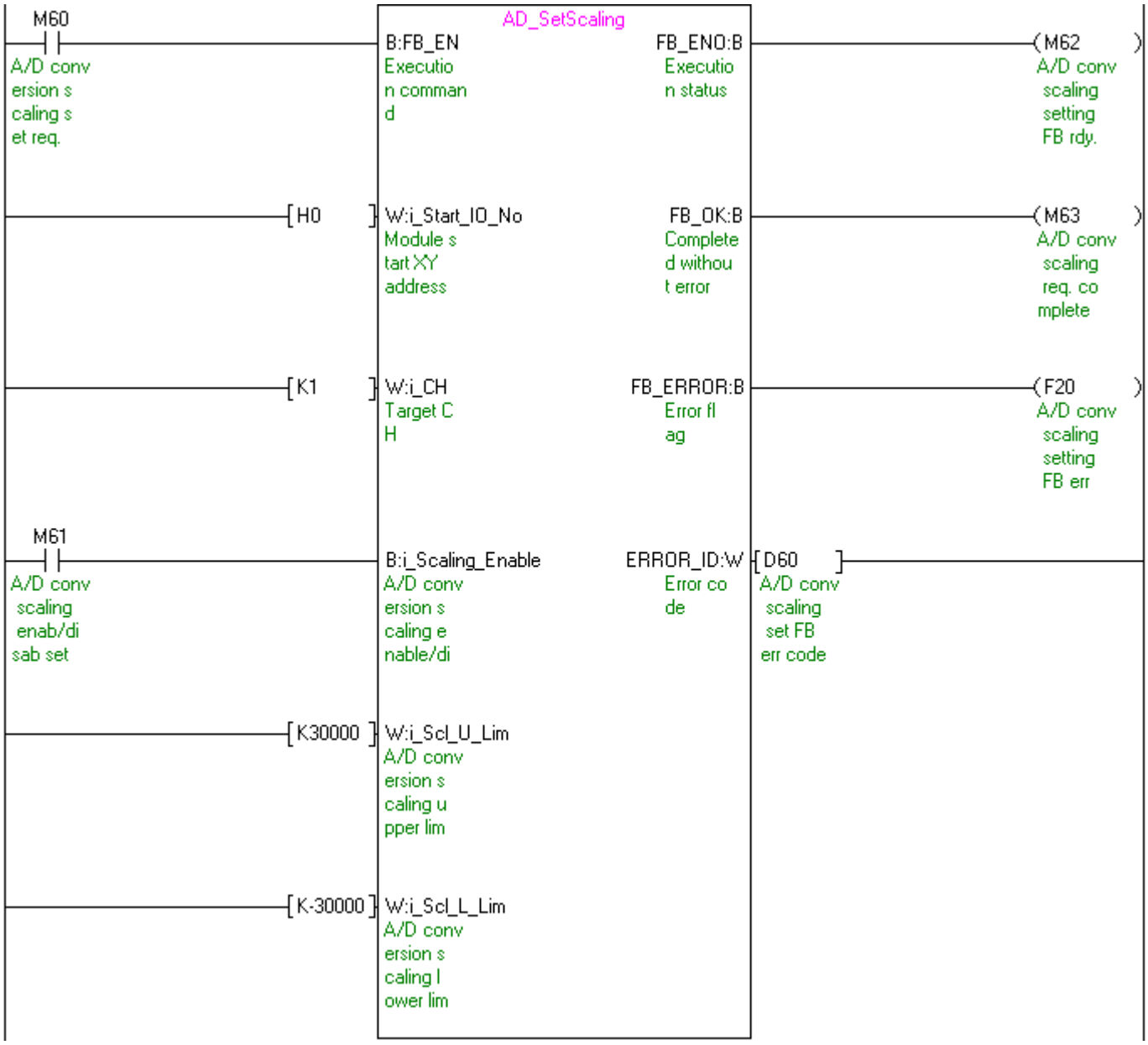
By turning ON M50, the value for the averaging processing type setting of channel 1 is written to the buffer memory.



M+L60AD2DA2_AD_SetScaling (A/D conversion scaling setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K1 | Set the target channel to channel 1. |
| i_Scaling_Enable | ON/OFF | Turn ON to enable the 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. |

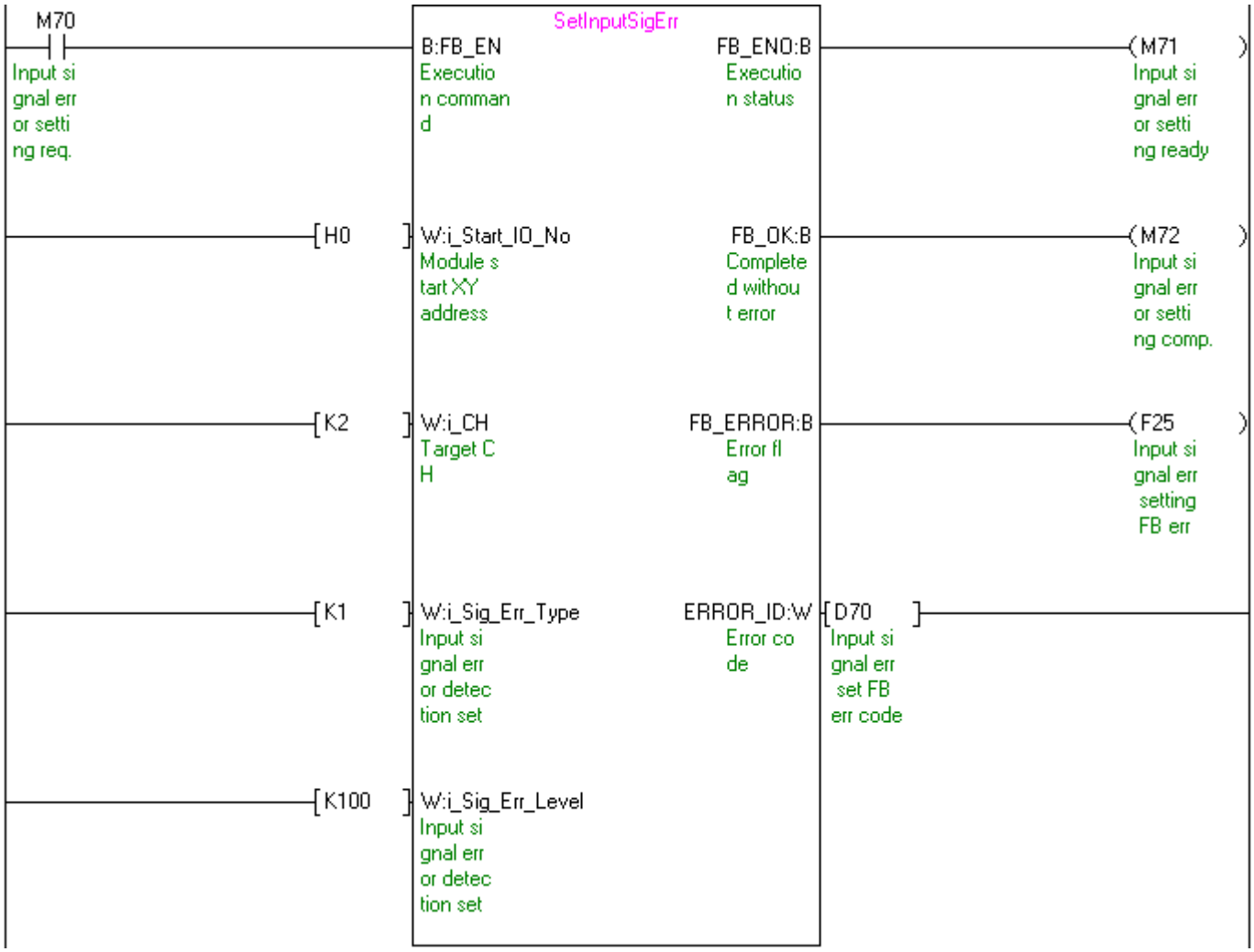
By turning ON M60, the value for the scaling setting of channel 2 is written to the buffer memory.



M+L60AD2DA2_AD_SetInputSignalErr (A/D conversion input signal error detection setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K2 | Set the target channel to channel 2. |
| i_Sig_Err_Type | K1 | Set the input signal error detection setting of channel 2 to "Upper lower limit detection". |
| i_Sig_Err_Level | K100 | Set the value for the input signal error detection setting to 10.0%. |

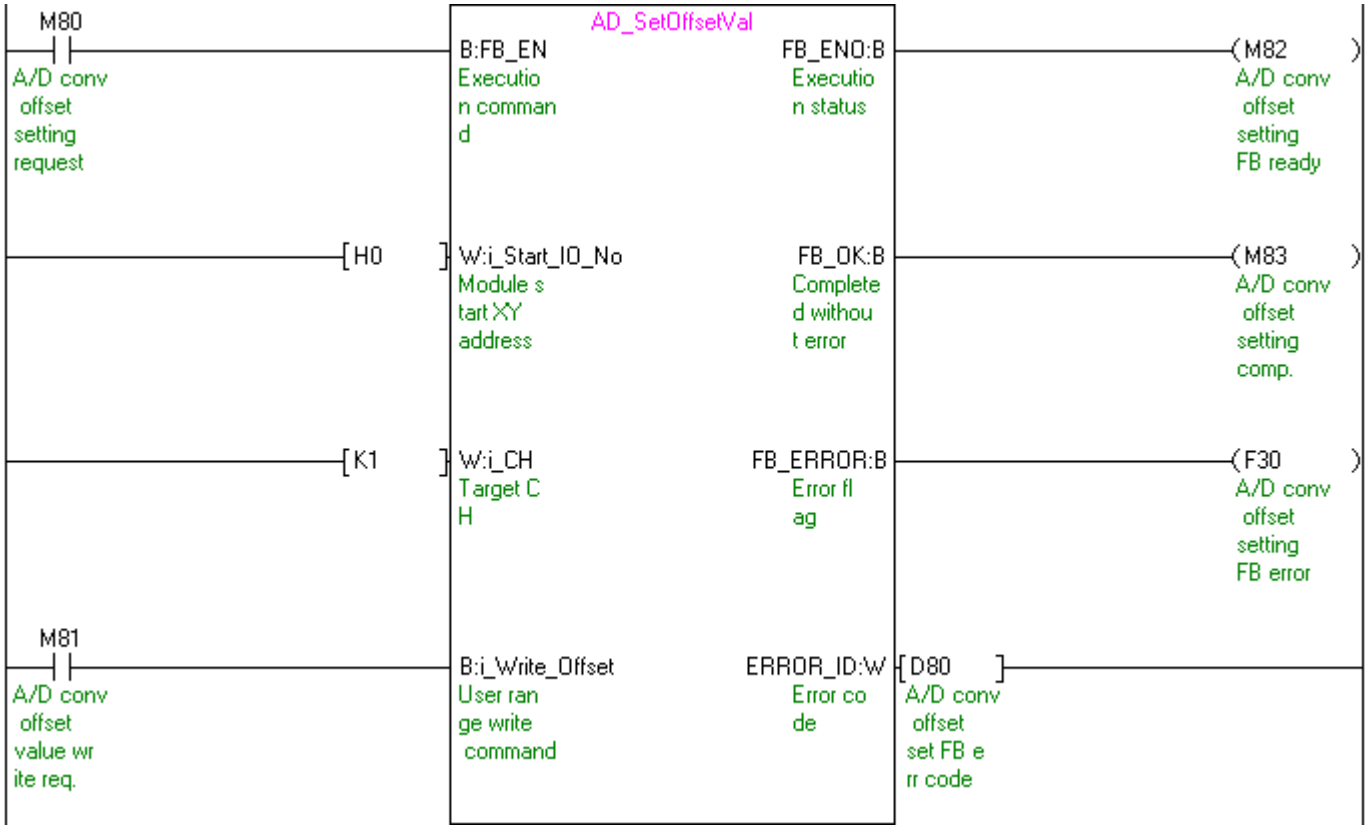
By turning ON M70, the input signal error detection setting value of channel 2 is written to the buffer memory.



M+L60AD2DA2_AD_SetOffsetVal (A/D conversion offset setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K1 | Set the target channel to channel 1. |
| i_Write_Offset | ON/OFF | Turn ON to write the offset value of channel 1. |

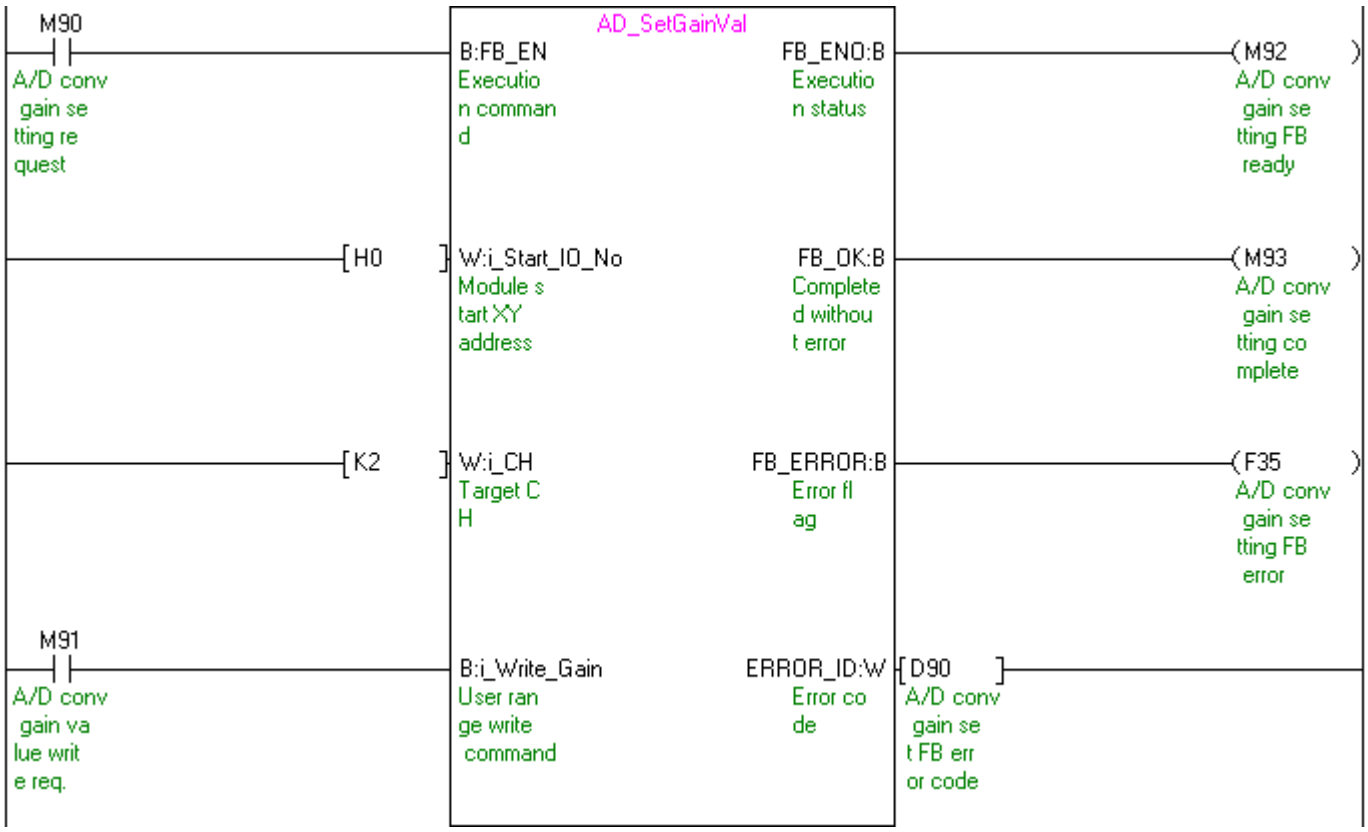
By turning ON M80 and then M81, the offset value of channel 1 is written.



M+L60AD2DA2_AD_SetGainVal (A/D conversion gain setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K2 | Set the target channel to channel 2. |
| i_Value_Change | ON/OFF | Turn ON to change the gain value. |
| i_Write_Gain | ON/OFF | Turn ON to write the gain value of channel 2. |

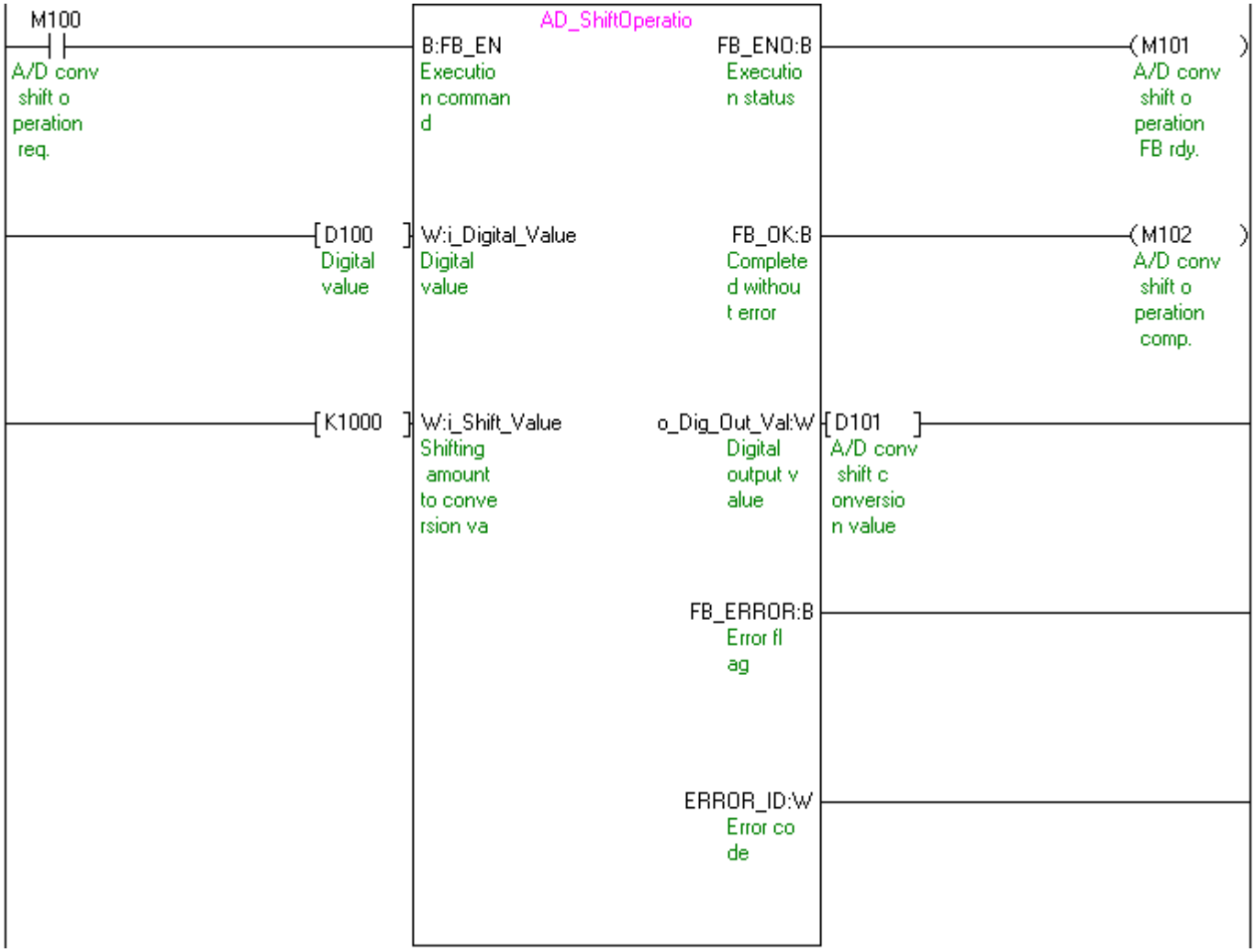
By turning ON M90 and then M91, the gain value of channel 2 is written.



M+L60AD2DA2_AD_ShiftOperation (A/D conversion shift operation)

| Label name | Setting value | Description |
|---|---|---|
| i_Digital_Value | - | Store the target digital output value to which the shift amount is to be added. |
| i_Shift_Value | K1000 | Set the shift amount to 1,000. |

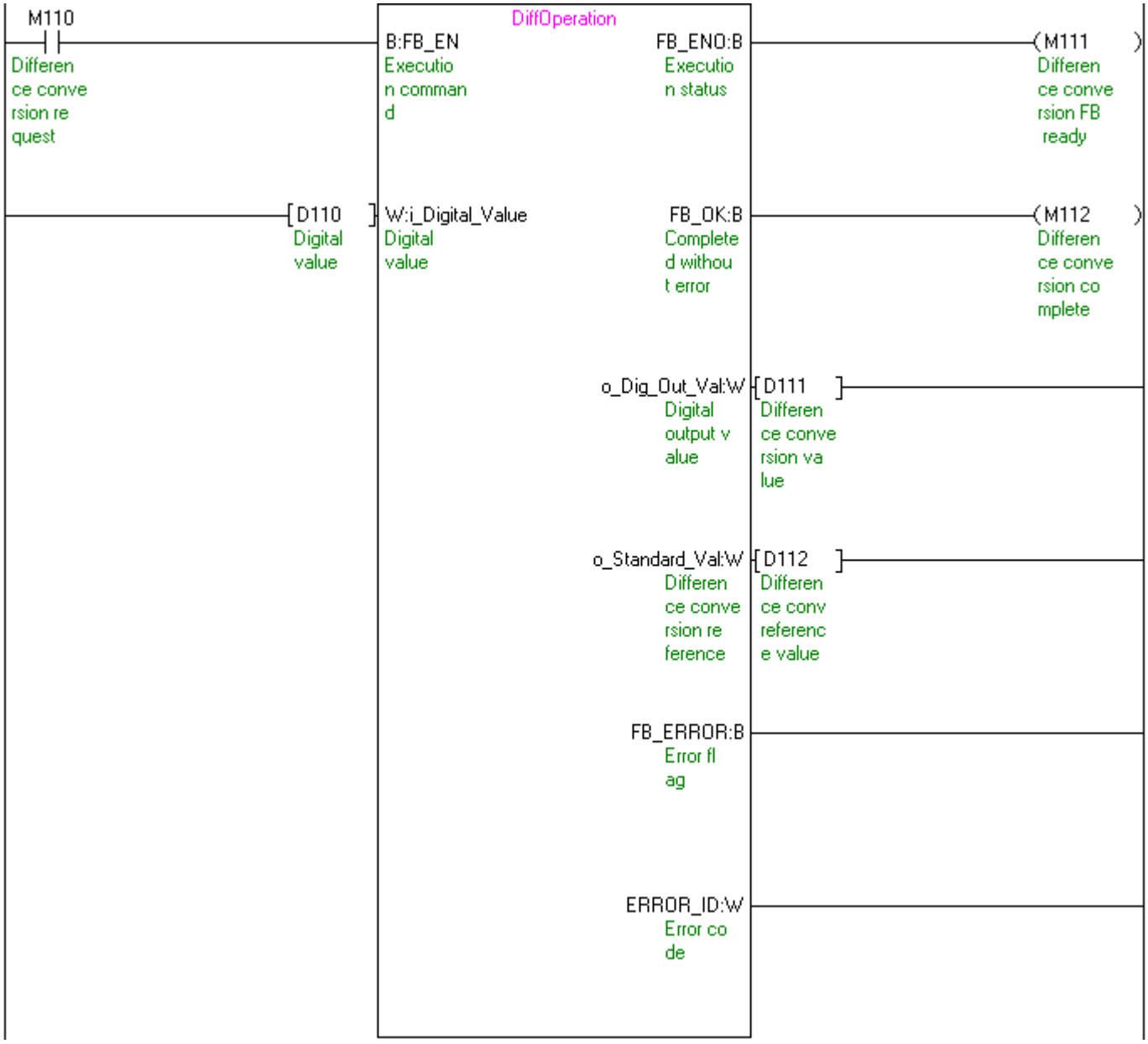
By turning ON M100, the digital value to which the conversion value shift amount is added is output.



M+L60AD2DA2_AD_DiffOperation (A/D difference conversion)

| Label name | Setting value | Description |
|---|---|---|
| i_Digital_Value | - | Store the digital value for the difference conversion. |

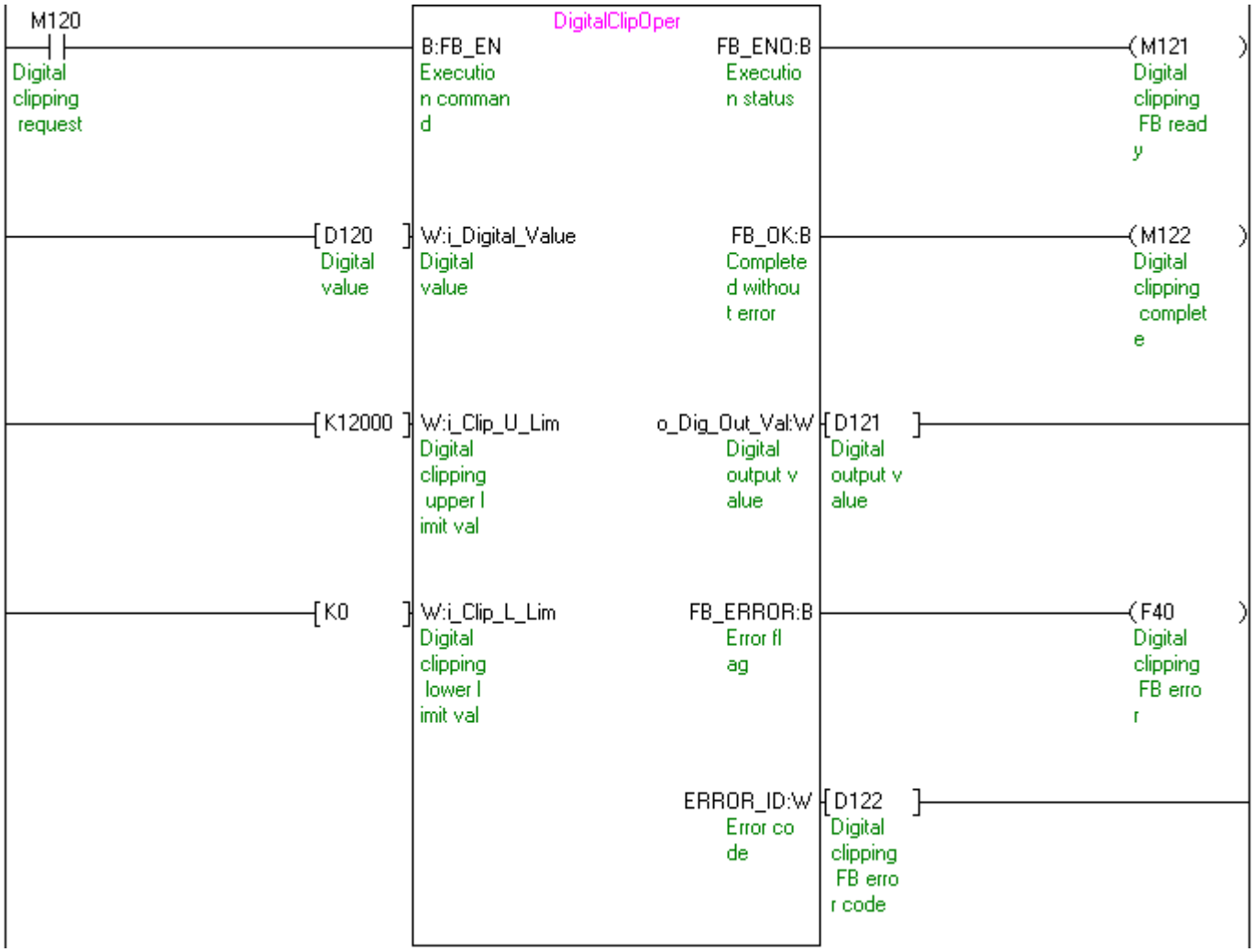
By turning ON M110, the remaining value after subtraction of the reference value from the input digital value is output.



M+L60AD2DA2_AD_ClipOperation (A/D conversion digital clipping)

| Label name | Setting value | Description |
|---|---|---|
| i_Clip_U_Lim | K12000 | Set the upper limit value of digital clipping to 12000. |
| i_Clip_L_Lim | K0 | Set the lower limit value of digital clipping to 0. |

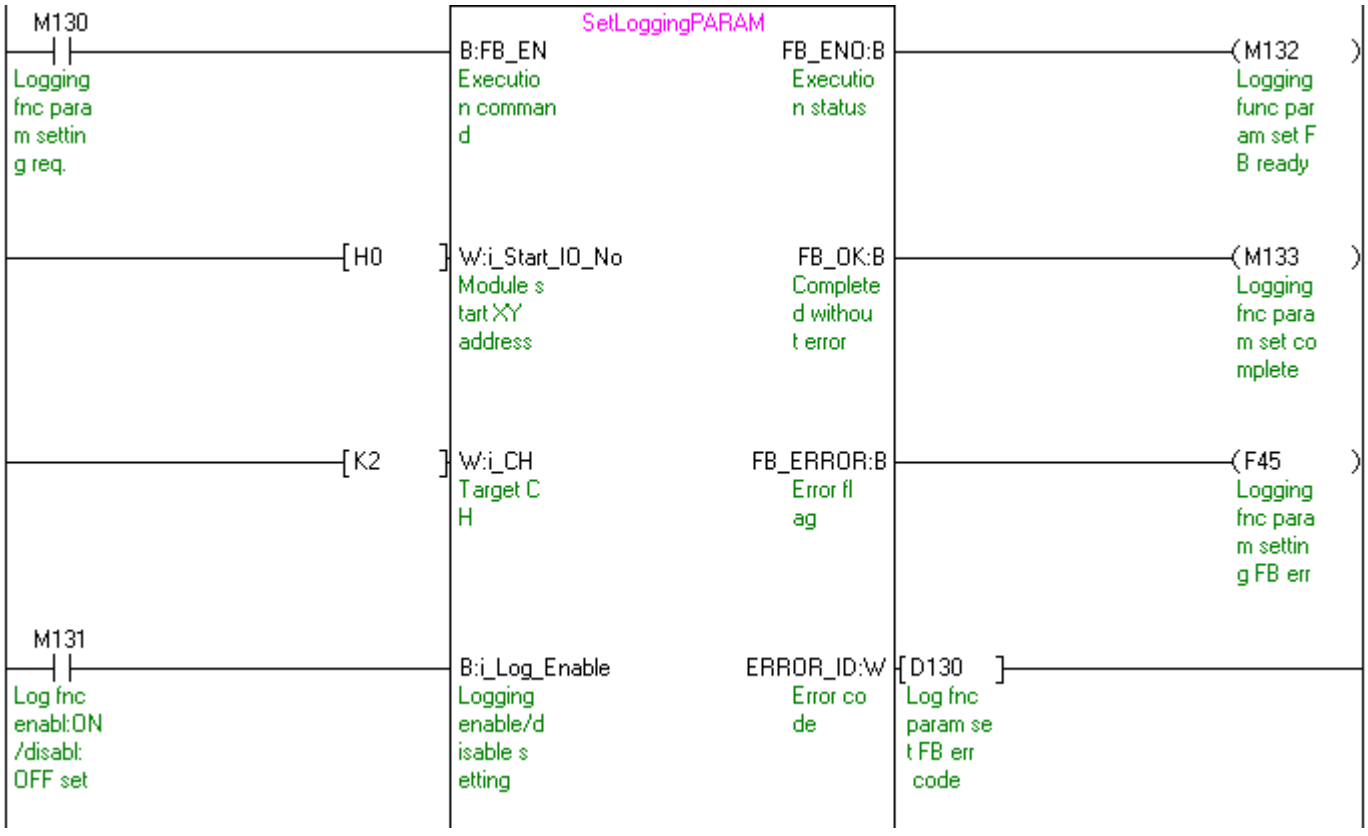
By turning ON M120, the value fixed to the upper limit value or lower limit value is output when the input digital value exceeds the upper limit value or falls below the lower limit value of the digital clipping.



M+L60AD2DA2_AD_SetLoggingPARAM (Logging function parameter setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K2 | Set the target channel to channel 2. |
| i_Log_Enable | ON/OFF | Turn ON to enable the logging. |
| i_Log_Data | K0 | Set the logging data to "Digital output value". |
| i_Log_Cycle_Val | K320 | Set the cycle for storing logging data to 320µs. |
| i_Log_Cycle_Unit | K0 | Set the logging cycle unit to "µs". |
| i_Log_Points | K1 | Set the data points to be recorded before the hold trigger is detected and the logging function is paused to 1. |
| i_Log_Trig_Cond | K1 | Set the condition for which a level trigger is generated to "Above". |
| i_Log_Trig_Data | K12 | Set the buffer memory address for activating the level trigger to 12. |
| i_Log_Trig_Value | K10000 | Set a level at which the level trigger is activated to 10,000. |

By turning ON M130, the value for the logging function parameter setting of channel 2 is written to the buffer memory.



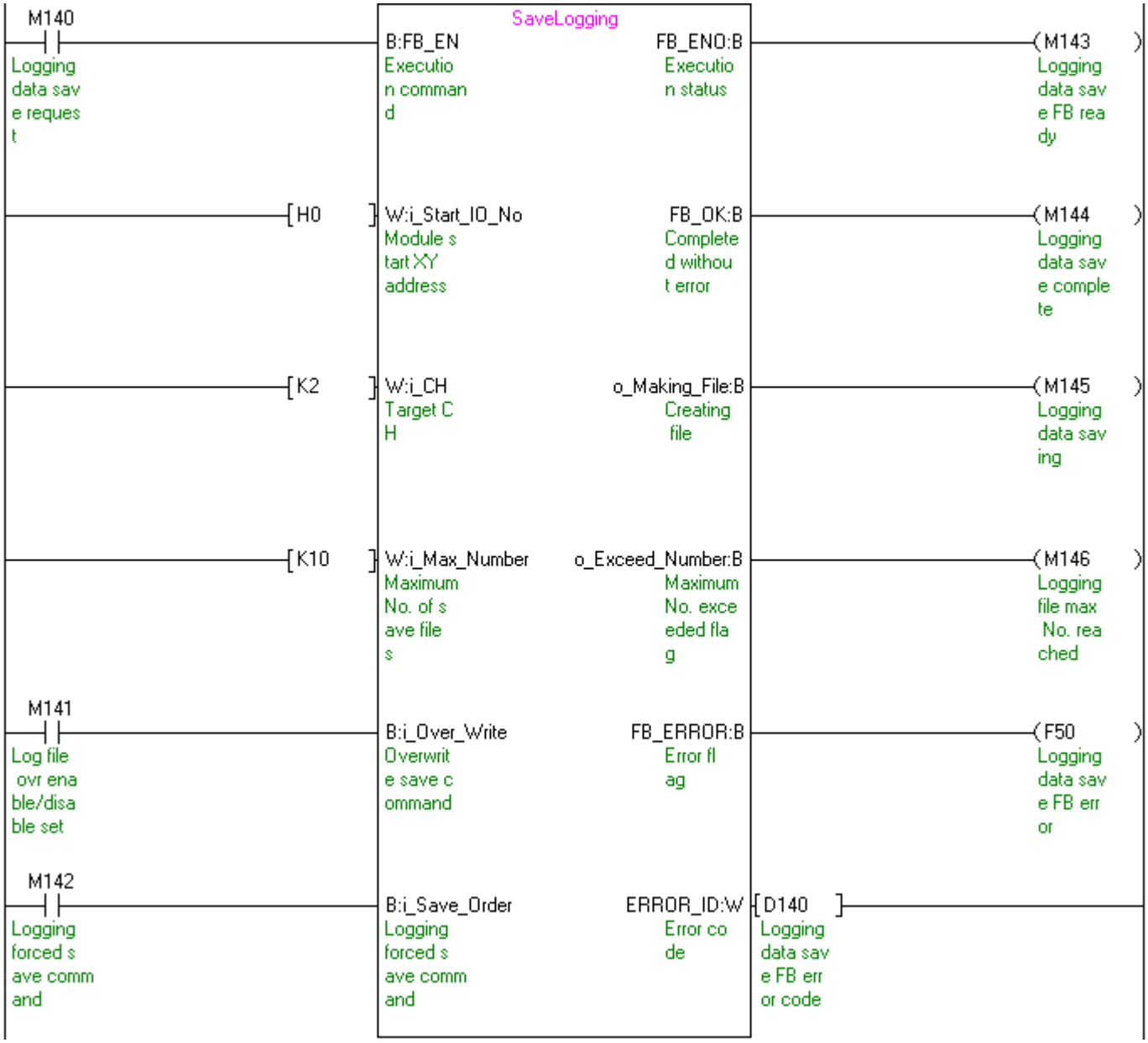

(Continues to the next page)


K0
W:i_Log_Data
Logging
data set
ting
K320
W:i_Log_Cycle_Val
Logging
cycle se
tting va
lue
K0
W:i_Log_Cycle_Unit
Logging
cycle un
it setti
ng
K1
W:i_Log_Points
Logging
points a
fter tri
gger
K1
W:i_Log_Trig_Cond
Level tr
igger co
ndition
setting
K12
W:i_Log_Trig_Data
Trigger
data
K10000
W:i_Log_Trig_Value
Trigger
setting
value

M+L60AD2DA2_AD_SaveLogging (Logging data save)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K2 | Set the target channel to channel 2. |
| i_Max_Number | K10 | Set the maximum number of CSV files the FB saves to 10. |
| i_Over_Write | ON/OFF | Set whether to overwrite the file to which the logging data is written. |
| i_Save_Order | ON/OFF | Turn ON to save the logging data while the logging is stopped (disabled). |

By turning ON M140, the logging data from the start pointer of channel 2 for the number of the logging data are sorted chronologically. Then, the logging data and the trigger detection information are saved in CSV format in the SD memory card mounted on the CPU.


M140
Logging data save request
SaveLogging
B:FB_EN
Execution command
FB_ENO:B
Execution status
M143
Logging data save FB ready
H0
W:i_Start_IO_No
Module start XY address
FB_OK:B
Completed without error
M144
Logging data save complete
K2
W:i_CH
Target CH
o_Making_File:B
Creating file
M145
Logging data saving
K10
W:i_Max_Number
Maximum No. of save files
o_Exceed_Number:B
Maximum No. exceeded flag
M146
Logging file max No. reached
M141
Log file ovr enable/disable set
B:i_Over_Write
Overwrite save command
FB_ERROR:B
Error flag
F50
Logging data save FB error
M142
Logging forced save command
B:i_Save_Order
Logging forced save command
ERROR_ID:W
Error code
D140
Logging data save FB error code

Appendix 1.2. Application examples of the D/A conversion FBs

## 1) List of devices

a) External input (commands)

| Device | FB name | Application (ON details) |
|---|---|---|
| M150 | M+L60AD2DA2_DA_WriteDAVal | D/A conversion data write req. |
| M160 | M+L60AD2DA2_DA_WriteAllDAVal | D/A data write req. (all CHs) |
| M170 | M+L60AD2DA2_DA_SetDAConversion | D/A conv enable/disable set req. |
| M171 | | D/A conv enabl:ON/disabl:OFF set |
| M180 | M+L60AD2DA2_DA_SetDAOutput | DA output enable/disable set req |
| M181 | | DA outpt enabl:ON/disabl:OFF set |
| M190 | M+L60AD2DA2_DA_SetScaling | D/A conversion scaling set req. |
| M191 | | DA conv scaling enabl/disabl set |
| M200 | M+L60AD2DA2_DA_SetAlarm | Alert output setting request |
| M201 | | Alrt outpt enbl:ON/disbl:OFF set |
| M210 | M+L60AD2DA2_DA_SetOffsetVal | D/A conv offset setting request |
| M211 | | D/A conv offset value change req |
| M212 | | D/A conv offset value write req. |
| D210 | | Offset/gain adjustment amount |
| M220 | M+L60AD2DA2_DA_SetGainVal | D/A conv gain setting request |
| M221 | | D/A conv gain value change req. |
| M222 | | D/A conv gain value write req. |
| D220 | | Offset/gain adjustment amount |
| M230 | M+L60AD2DA2_DA_ShiftOperation | D/A conv shift opearation req. |
| D230 | | Digital value |
| M240 | M+L60AD2DA2_DA_WaveDataStoreCsv | Wave data read (CSV) request |
| M250 | M+L60AD2DA2_DA_WaveDataStoreDev | Wave data read (device) request |
| M260 | M+L60AD2DA2_DA_WaveOutputSetting | Wave output setting request |
| M270 | M+L60AD2DA2_DA_WaveOutReqSetting | Wave output start/stop request |

b) External output (checks)

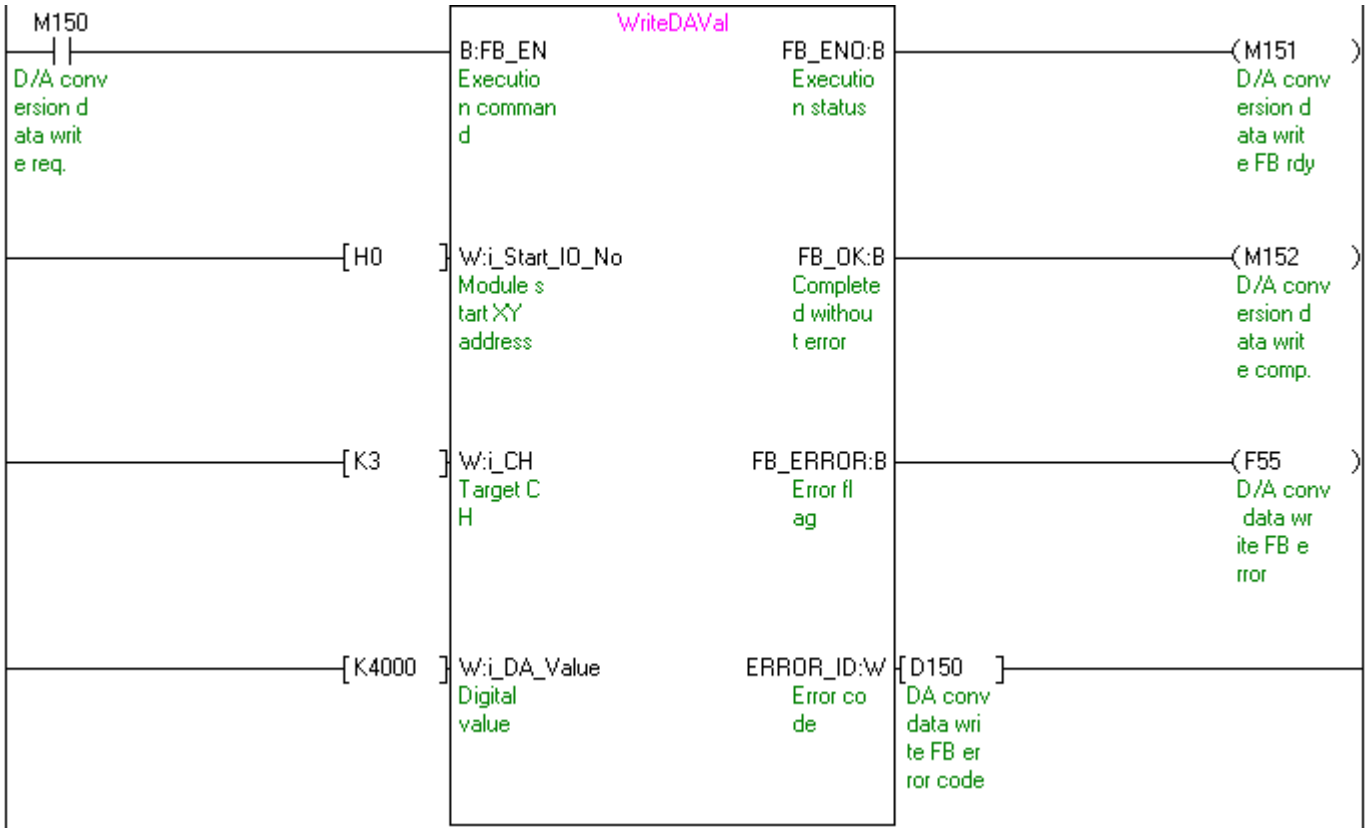
| Device | FB name | Application (ON details) |
|---|---|---|
| M151 | M+L60AD2DA2_DA_WriteDAVal | D/A conversion data write FB rdy |
| M152 | | D/A conversion data write comp. |
| F55 | | D/A conv data write FB error |
| D150 | | DA conv data write FB error code |
| M161 | M+L60AD2DA2_DA_WriteAllDAVal | D/A data write FB rdy. (all CHs) |
| M162 | | D/A data write comp. (all CHs) |
| M172 | M+L60AD2DA2_DA_SetDAConversion | D/A conv enable/disable FB ready |
| M173 | | D/A conv enable/disable set comp |
| F60 | | D/A conv enable/disable FB error |
| D170 | | D/A enable/disable FB error code |
| M182 | M+L60AD2DA2_DA_SetDAOutput | D/A output enable/disable FB rdy |
| M183 | | DA outpt enable/disable set comp |
| F65 | | D/A outpt enable/disable FB err |
| D180 | | DA otpt enable/disable FB er cod |
| M192 | M+L60AD2DA2_DA_SetScaling | D/A conv scaling setting FB rdy. |
| M193 | | D/A conv scaling set complete |
| F70 | | D/A conv scaling setting FB err |
| D190 | | D/A conv scaling set FB err code |
| M202 | M+L60AD2DA2_DA_SetAlarm | Alert output setting FB ready |
| M203 | | Alert output setting complete |
| F75 | | Alert output setting FB error |
| D200 | | Alert output setting FB err code |
| M213 | M+L60AD2DA2_DA_SetOffsetVal | D/A conv offset setting FB ready |
| M214 | | D/A conv offset setting comp. |
| F80 | | D/A conv offset setting FB error |
| D211 | | D/A conv offset set FB err code |
| M223 | M+L60AD2DA2_DA_SetGainVal | D/A conv gain setting FB ready |
| M224 | | D/A conv gain setting complete |
| F85 | | D/A conv gain setting FB error |
| D221 | | D/A conv gain set FB error code |
| M231 | M+L60AD2DA2_DA_ShiftOperation | D/A conv shift operation FB rdy. |
| M232 | | D/A conv shift operation comp. |
| D231 | | D/A conv shift conversion value |

| Device | FB name | Application (ON details) |
|---|---|---|
| M241 | M+L60AD2DA2_DA_WaveDataStoreCsv | Wave data read (CSV) FB ready |
| M242 | | Wave data read (CSV) complete |
| F90 | | Wave data read (CSV) FB error |
| D240 | | Wave data read (CSV) FB err code |
| M251 | M+L60AD2DA2_DA_WaveDataStoreDev | Wave data read (device) FB ready |
| M252 | | Wave data read (device) complete |
| F95 | | Wave data read (device) FB error |
| D250 | | Wave data read (dev) FB err code |
| M261 | M+L60AD2DA2_DA_WaveOutputSetting | Wave output setting FB ready |
| M262 | | Wave output setting complete |
| F100 | | Wave output setting FB error |
| D260 | | Wave output setting FB err code |
| M271 | M+L60AD2DA2_DA_WaveOutReqSetting | Wave output start/stop FB ready |
| M272 | | Wave output start/stop complete |
| D270 | | CH3 Wave output status monitor |
| D271 | | CH4 Wave output status monitor |
| F105 | | Wave output start/stop FB error |
| D272 | | Wave output start/stop err code |

M+L60AD2DA2_DA_WriteDAVal (Write D/A conversion data)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_DA_Value | K4000 | Set the digital value to 4,000. |

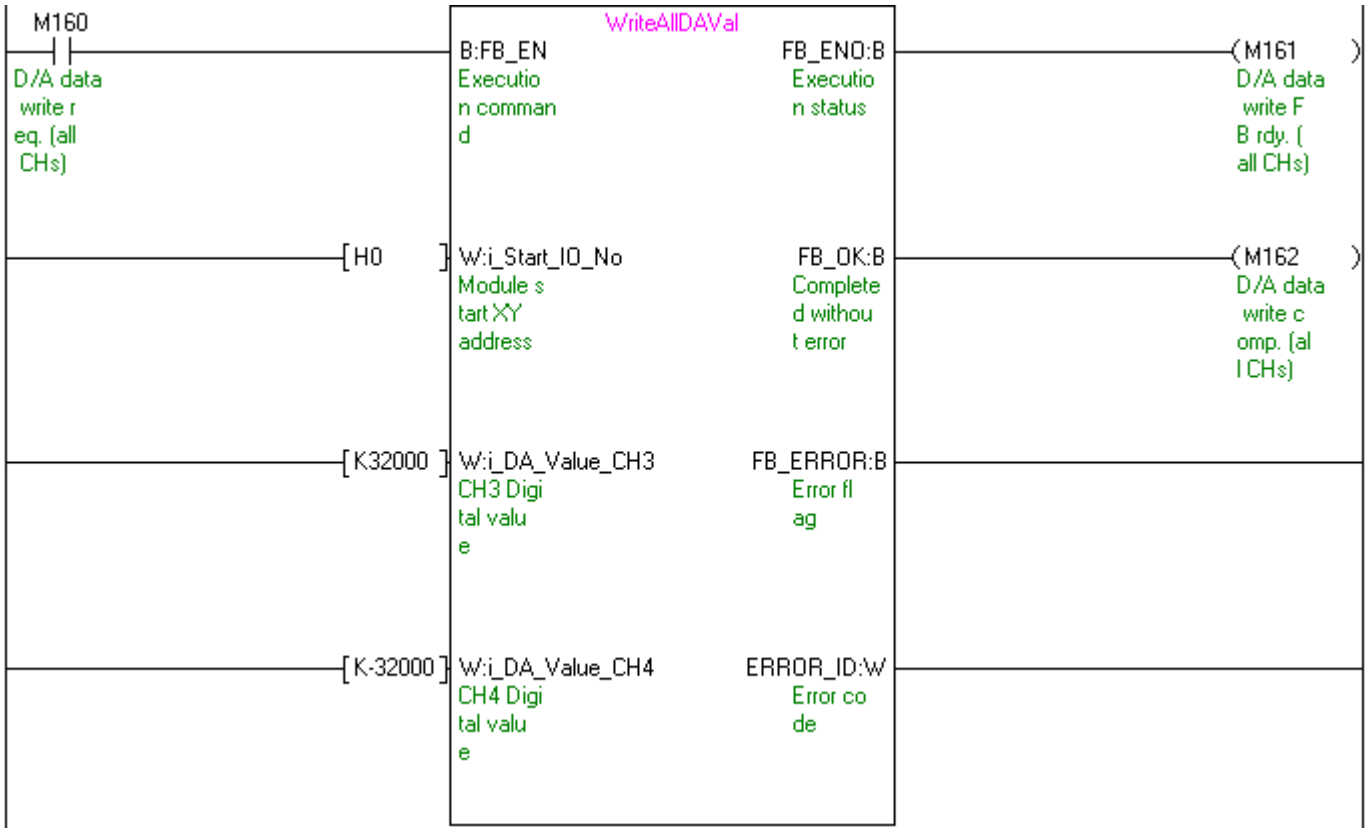
By turning ON M150, the digital value of channel 3 is written to the buffer memory.



M+L60AD2DA2_DA_WriteAllDAVal (Write D/A conversion data (all CHs))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| 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. |

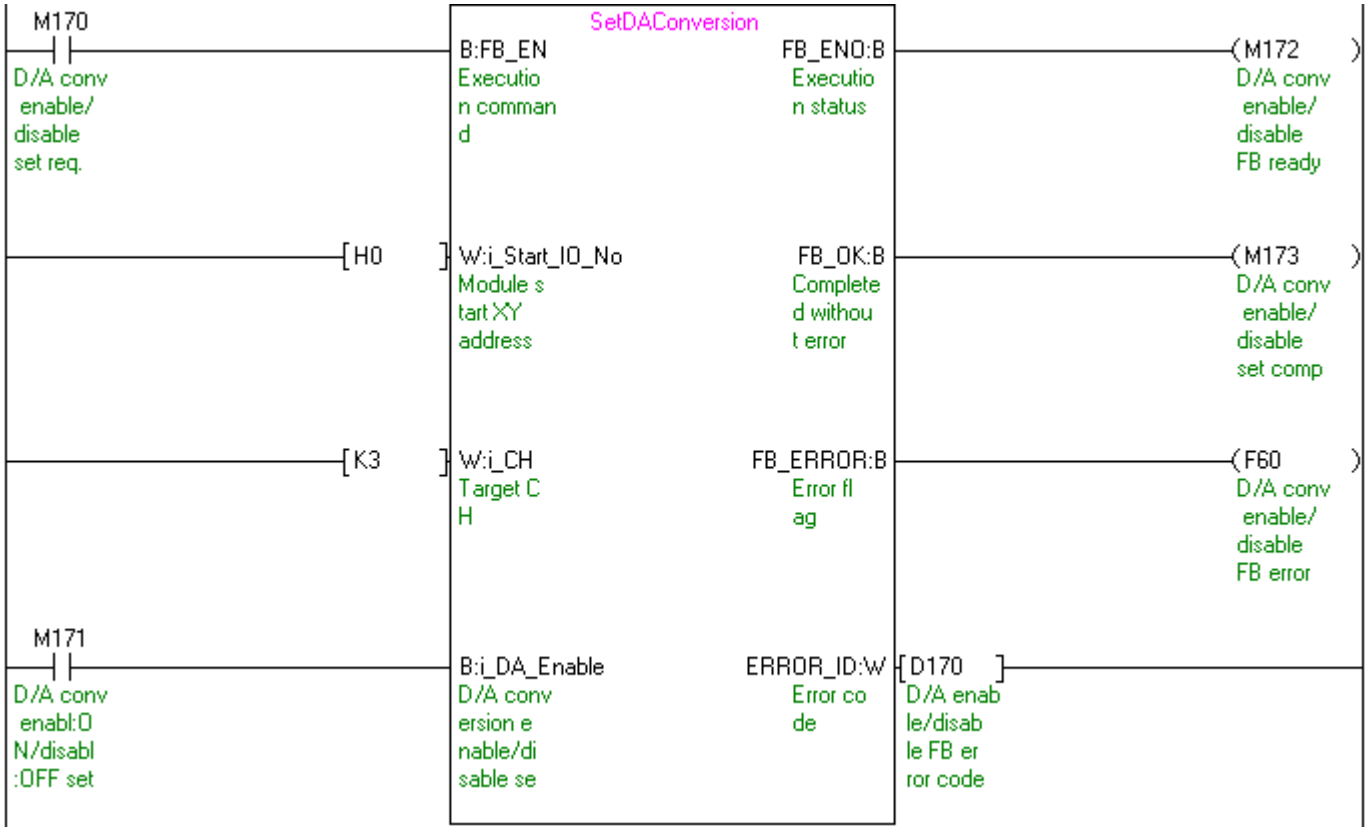
By turning ON M160, the digital values of channel 3 and 4 are written to the buffer memory.



M+L60AD2DA2_DA_SetDAConversion (D/A conversion enable/disable setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_DA_Enable | ON/OFF | Turn ON to enable the D/A conversion of the target channel. |

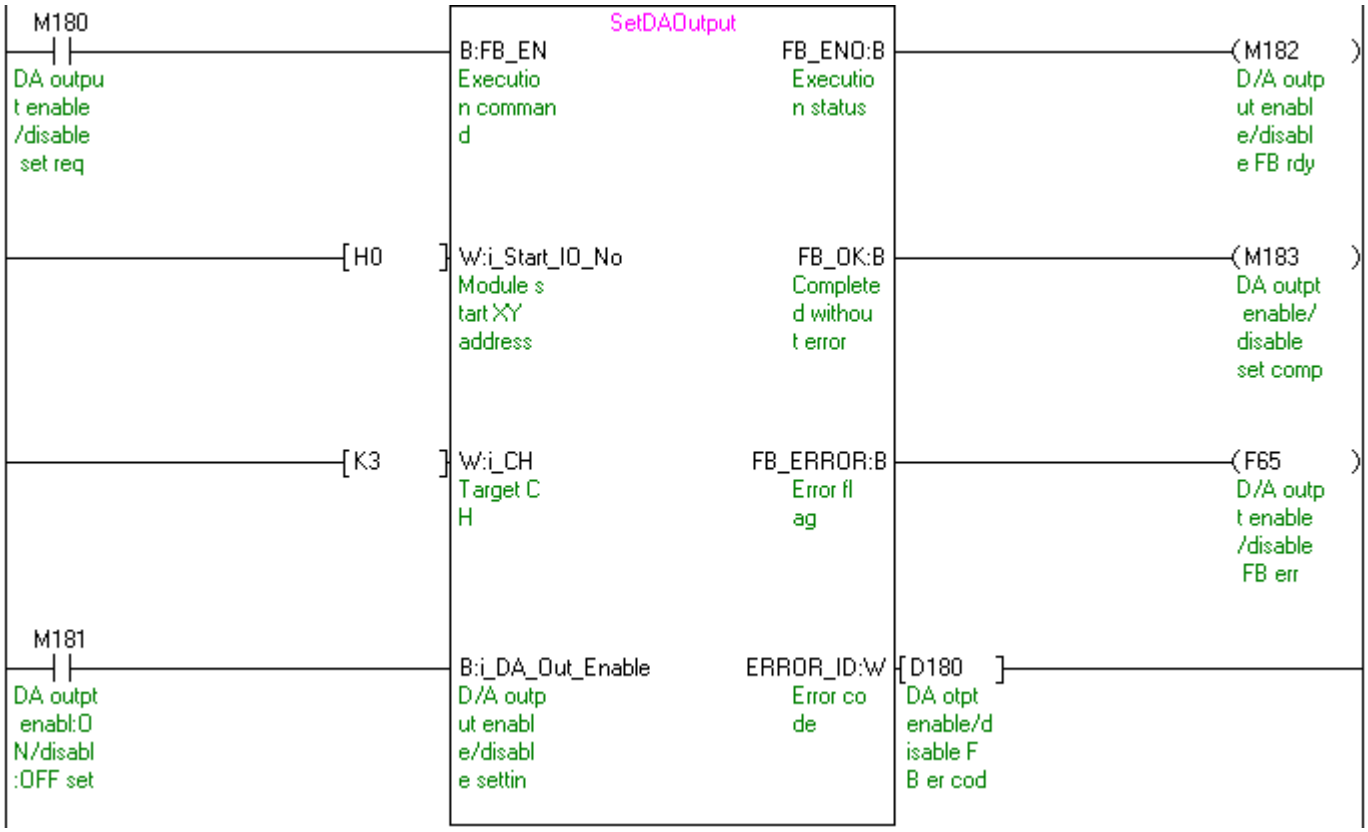
By turning ON M170, the value for the D/A conversion enable/disable setting of channel 3 is written to the buffer memory.



M+L60AD2DA2_DA_SetDAOutput (D/A output enable/disable setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected 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 of the target channel. |

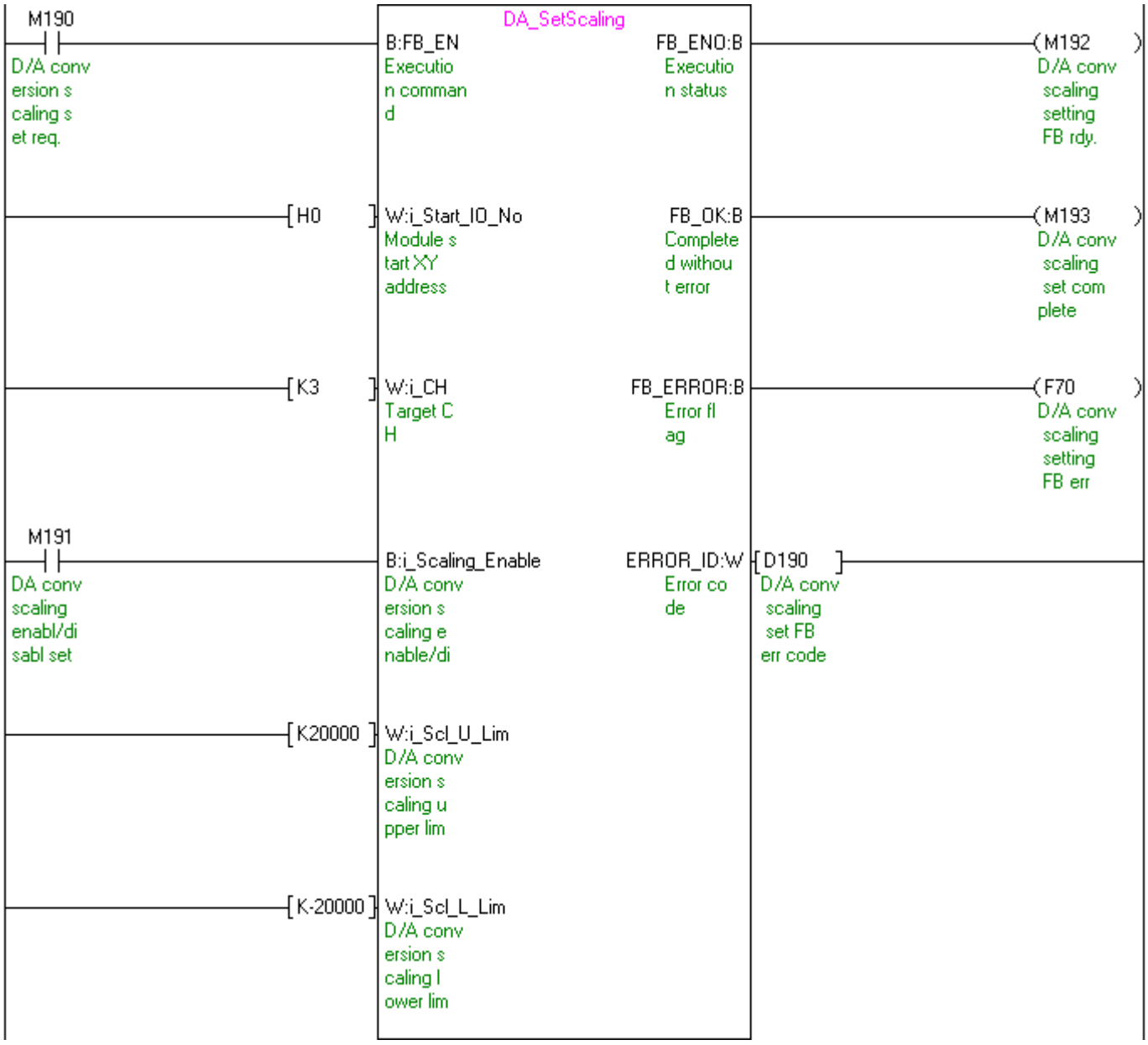
By turning ON M180 and then M181, the D/A output of channel 3 is enabled.



M+L60AD2DA2_DA_SetScaling (D/A conversion scaling setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_Scaling_Enable | ON/OFF | Turn ON to enable the scaling. |
| i_Scl_U_Lim | K20000 | Set the scaling upper limit value to 20,000. |
| i_Scl_L_Lim | K-20000 | Set the scaling lower limit value to -20,000. |

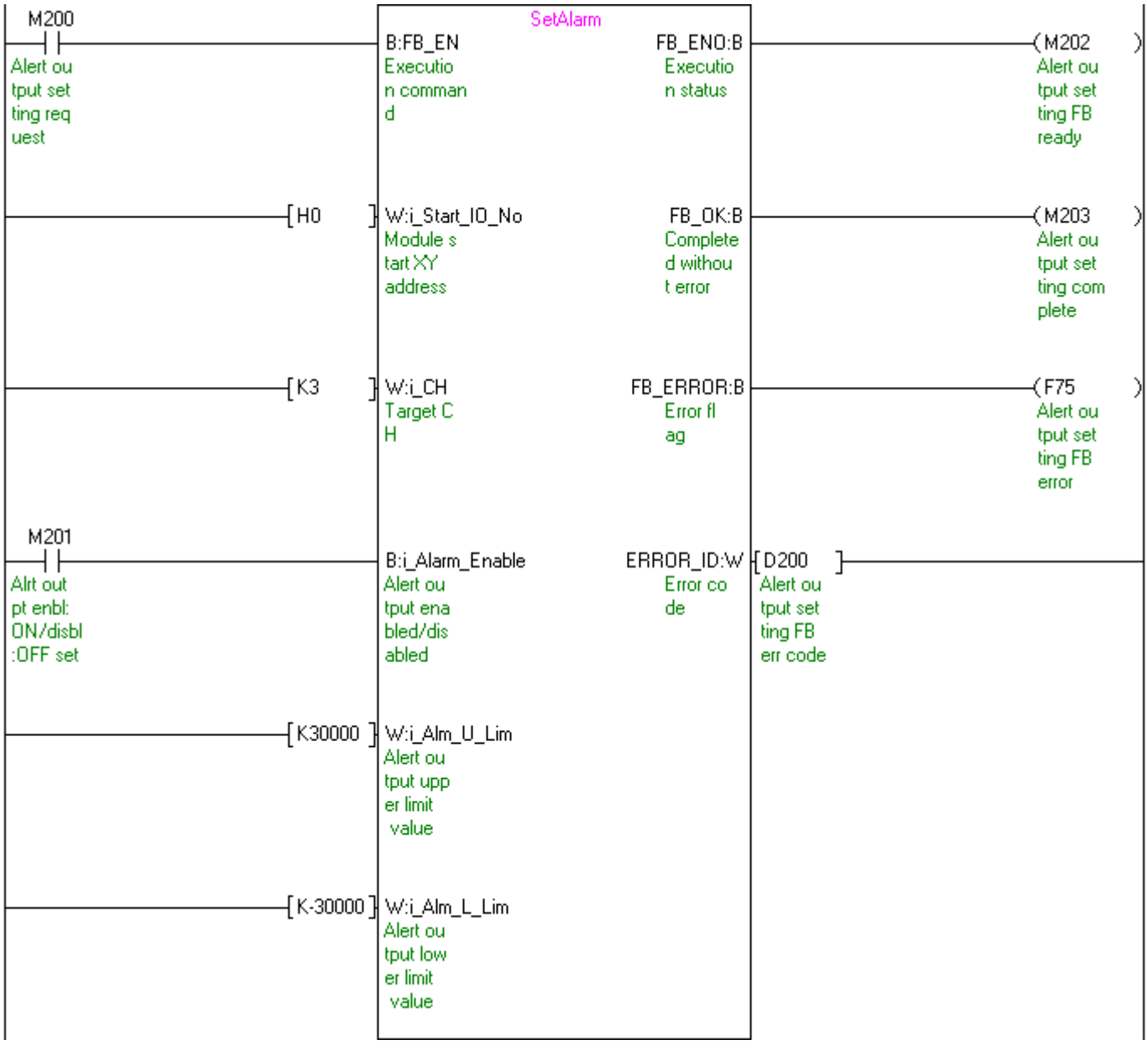
By turning ON M190, the value for the scaling setting of channel 3 is written to the buffer memory.



M+L60AD2DA2_DA_SetAlarm (D/A conversion alert output setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_Alarm_Enable | ON/OFF | Turn ON to enable the alert output. |
| i_Alm_U_Lim | K30000 | Set the alert output upper limit value to 30,000. |
| i_Alm_L_Lim | K-30000 | Set the alert output lower limit value to -30,000. |

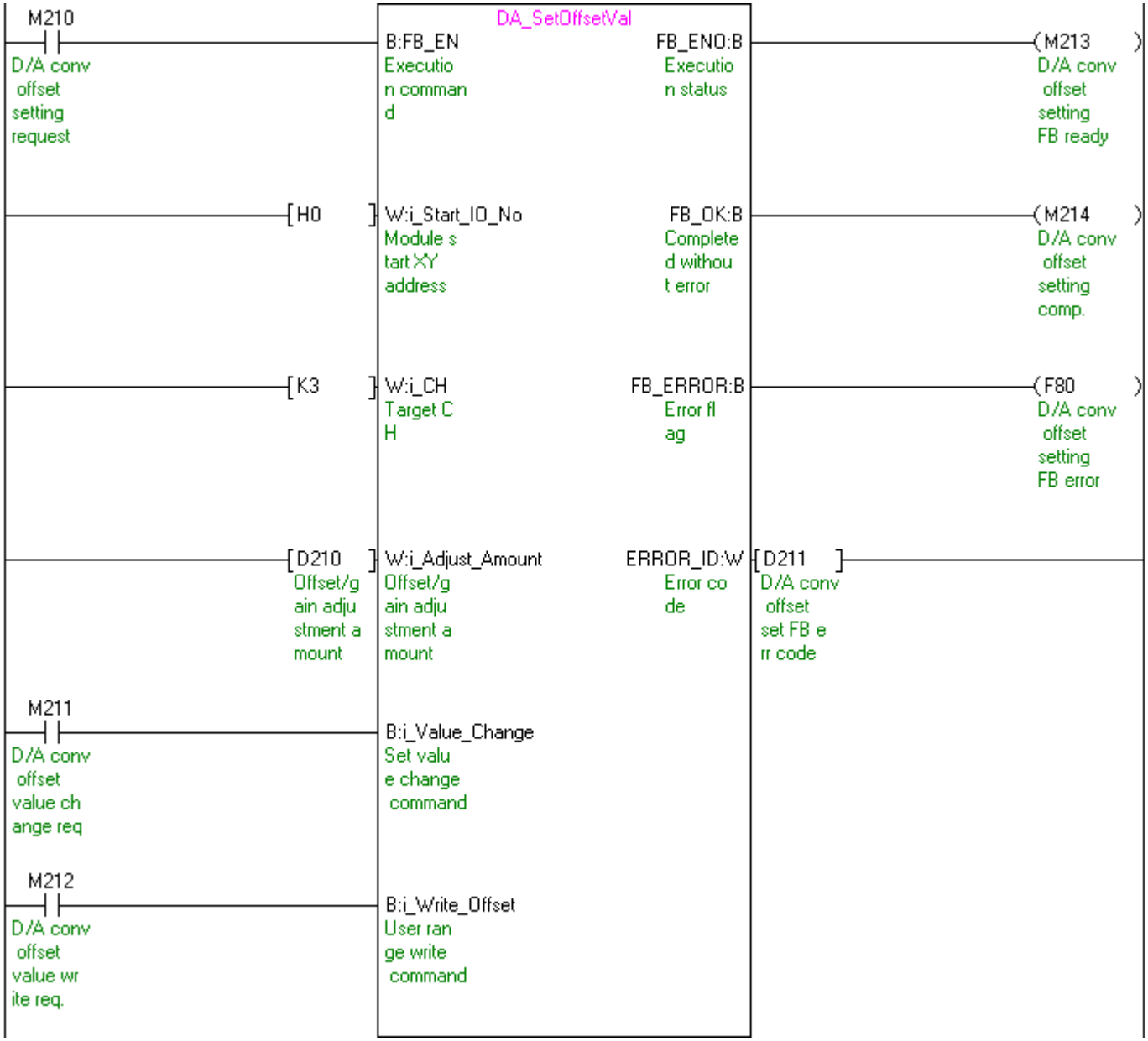
By turning ON M200, the value for the alert output of channel 3 is written to the buffer memory.



M+L60AD2DA2_DA_SetOffsetVal (D/A conversion offset setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_Value_Change | ON/OFF | Turn ON to change the offset value. |
| i_Write_Offset | ON/OFF | Turn ON to write the offset value of channel 3. |

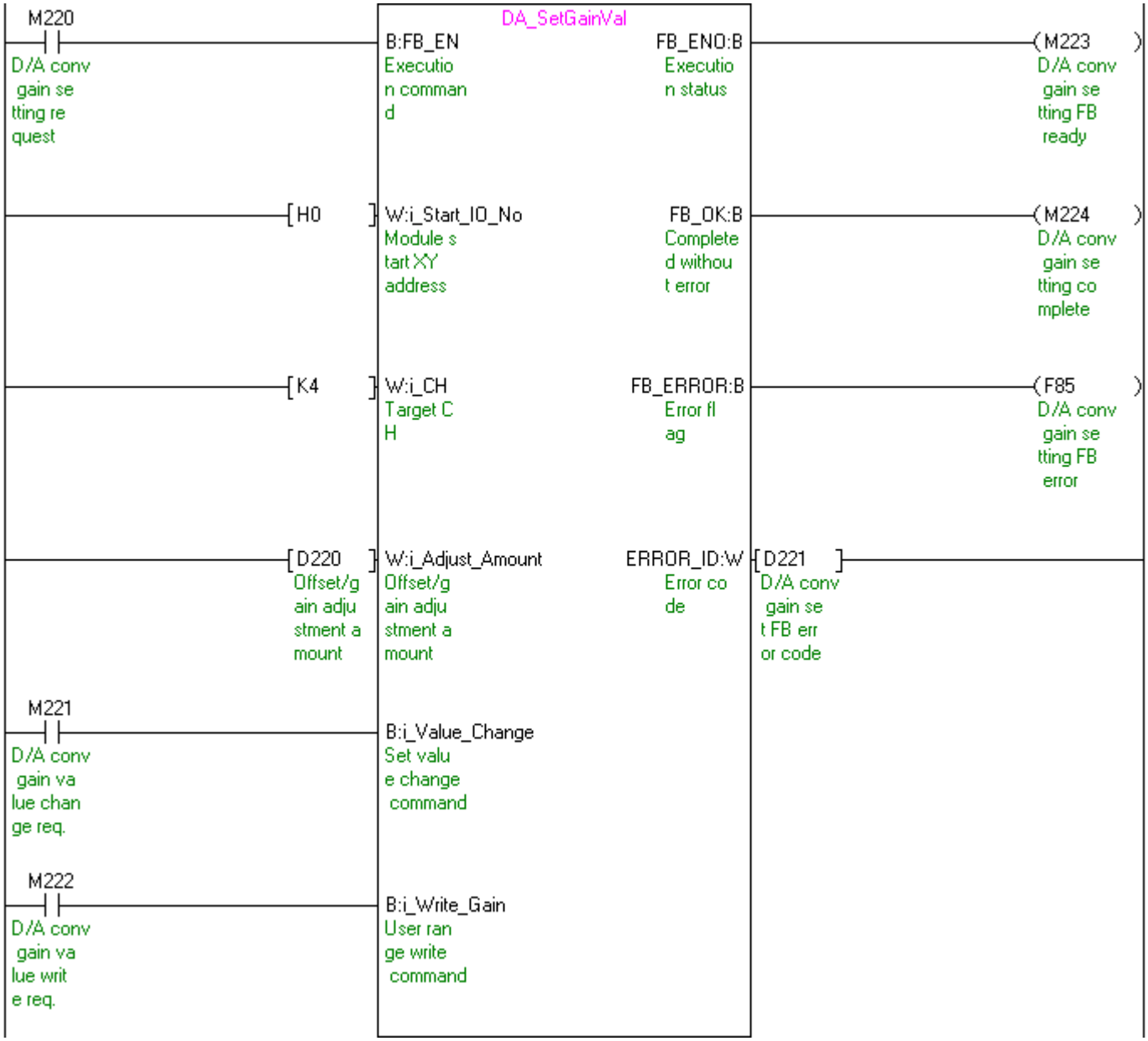
By turning ON M210 and then M211, the offset value of channel 3 is changed. Then, by turning ON M212 the offset value of channel 3 is written.



M+L60AD2DA2_DA_SetGainVal (D/A conversion gain setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K4 | Set the target channel to channel 4. |
| i_Value_Change | ON/OFF | Turn ON to change the gain value. |
| i_Write_Gain | ON/OFF | Turn ON to write the gain value of channel 4. |

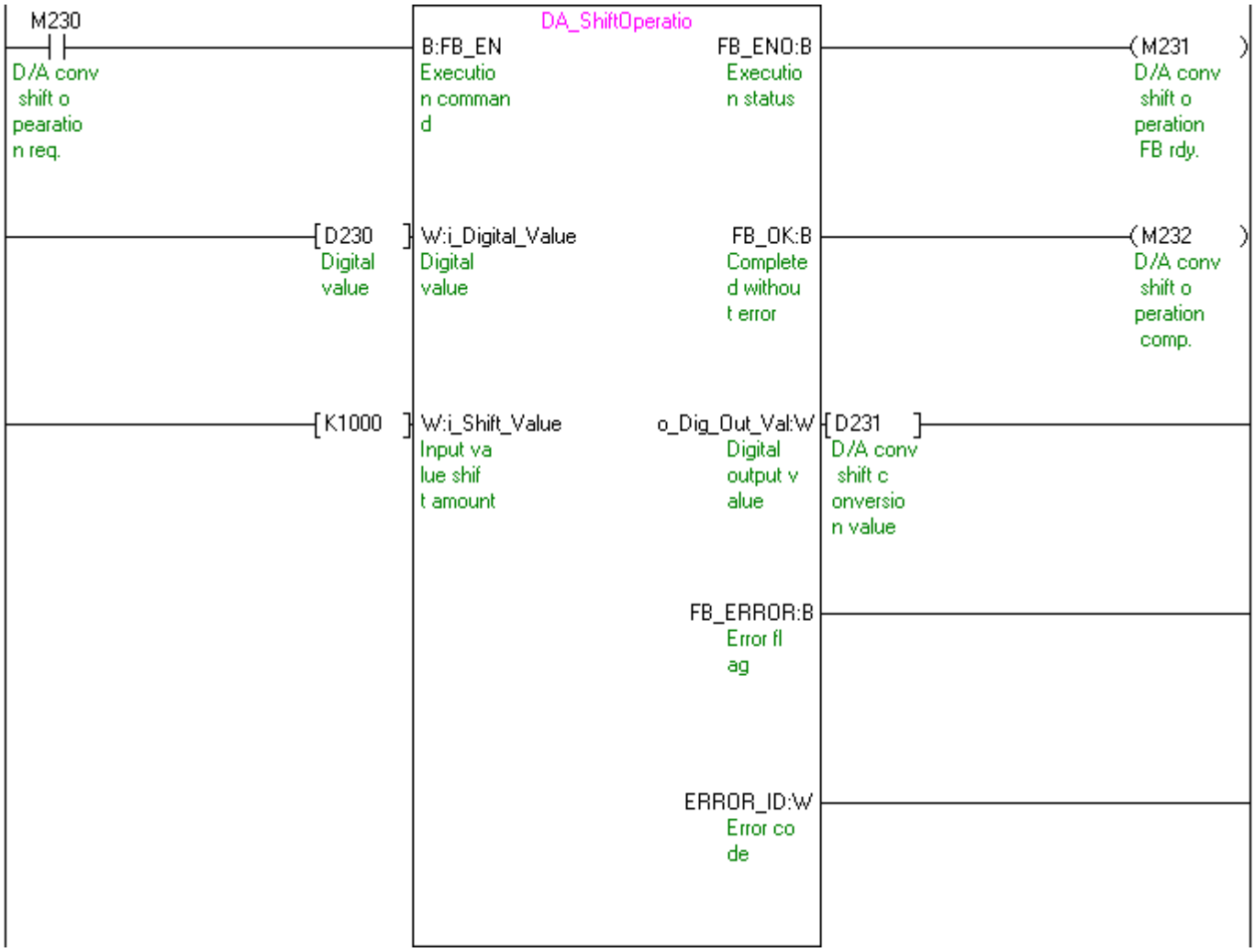
By turning ON M220 and then M221, the gain value of channel 4 is changed. Then, by turning ON M232, the gain value of channel 4 is written.



M+L60AD2DA2_DA_ShiftOperation (D/A conversion shift operation)

| Label name | Setting value | Description |
|---|---|---|
| i_Digital_Value | - | Store the target digital output value to which the shift amount is to be added. |
| i_Shift_Value | K1000 | Set the shift amount to 1,000. |

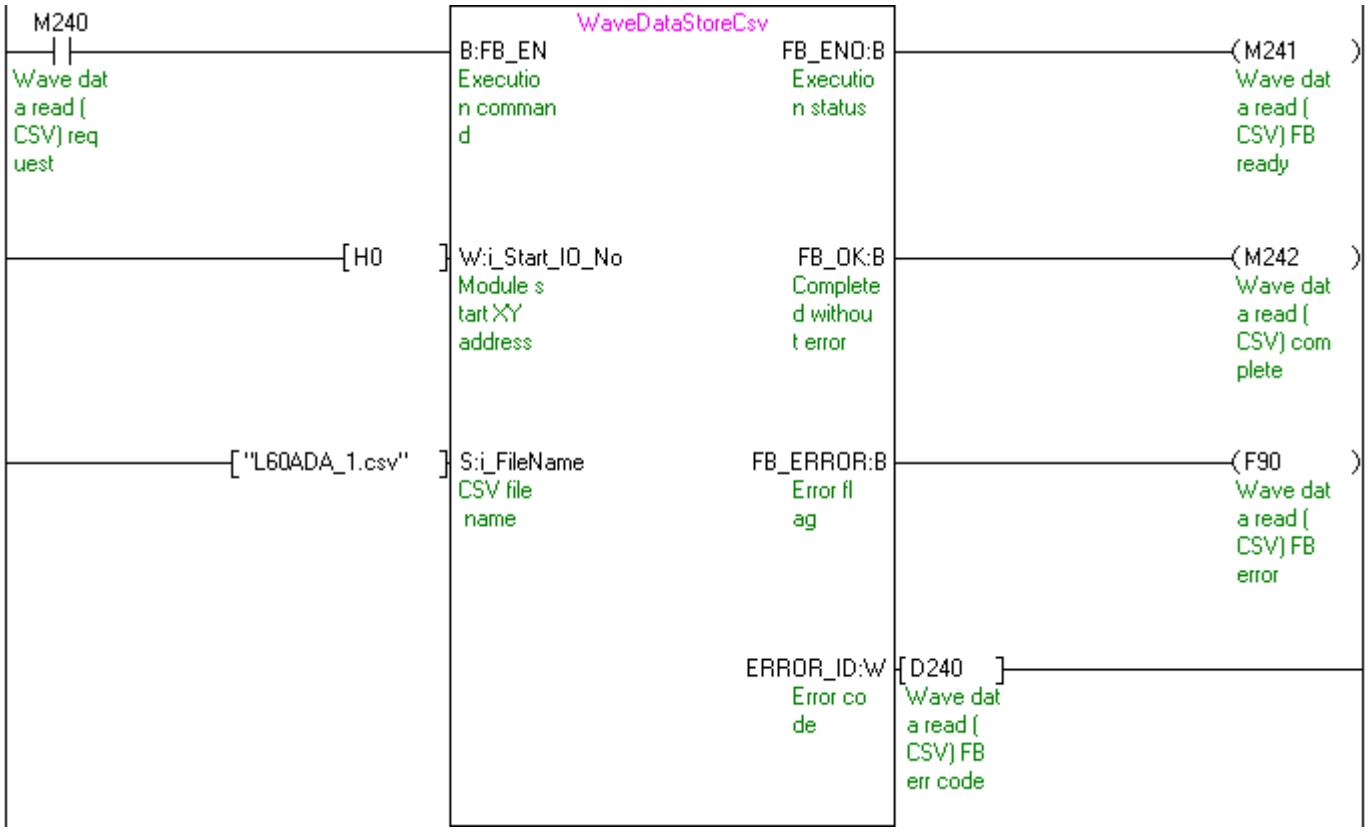
By turning ON M230, the digital value to which the input value shift amount is added is output.



M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_FileName | "L60ADA_1.csv" | Set "L60ADA_1.csv" as the name of the CSV file from which the parameters and the wave data of the wave output function are read. |

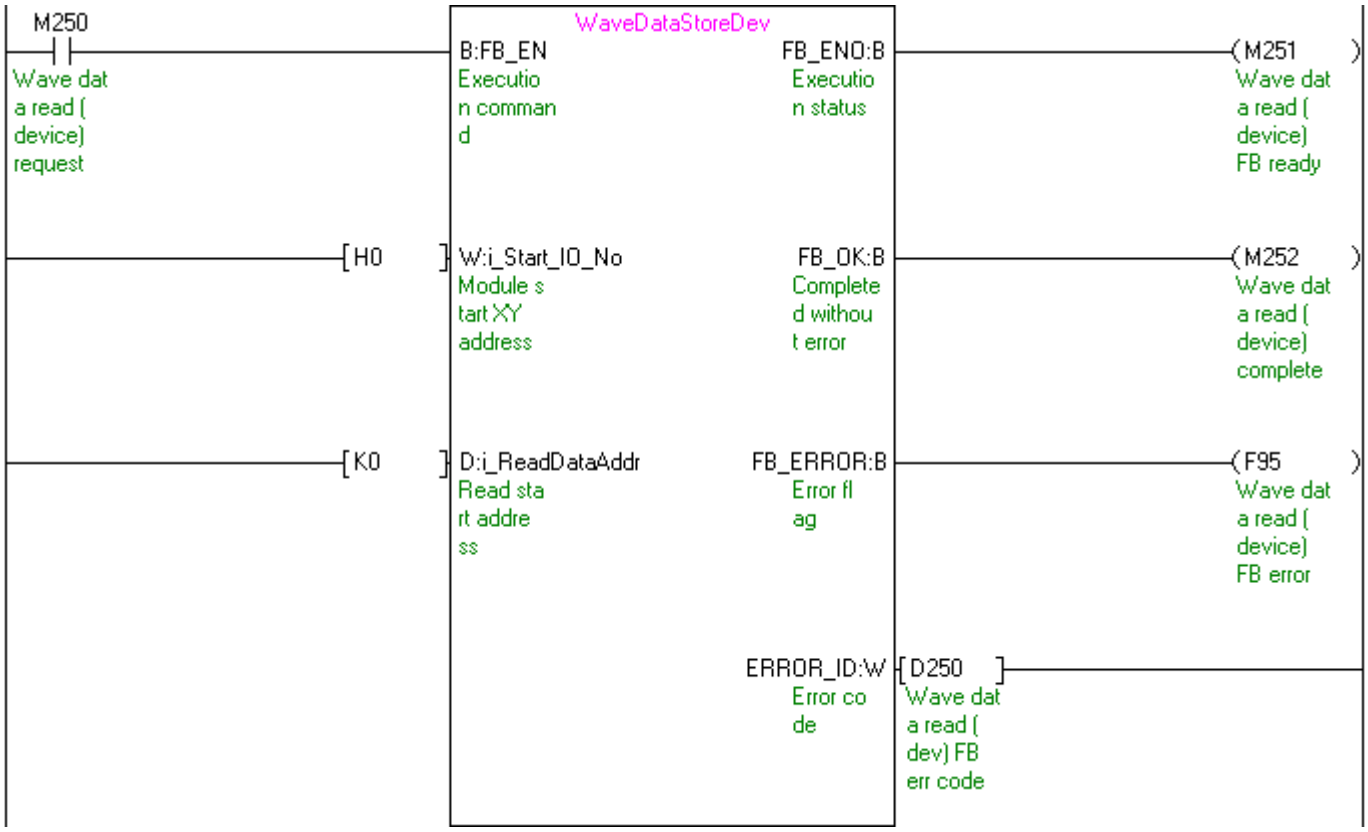
By turning ON M240, the parameters and wave data of the wave output function are read from "L60ADA_1.csv" in the SD memory card and stored in the buffer memory.



M+L60AD2DA2_DA_WaveDataStoreDev (Read wave data (device))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_ReadDataAddr | K0 | Set ZR0 as the read start address where the parameters and the wave data of the wave output function are stored. |

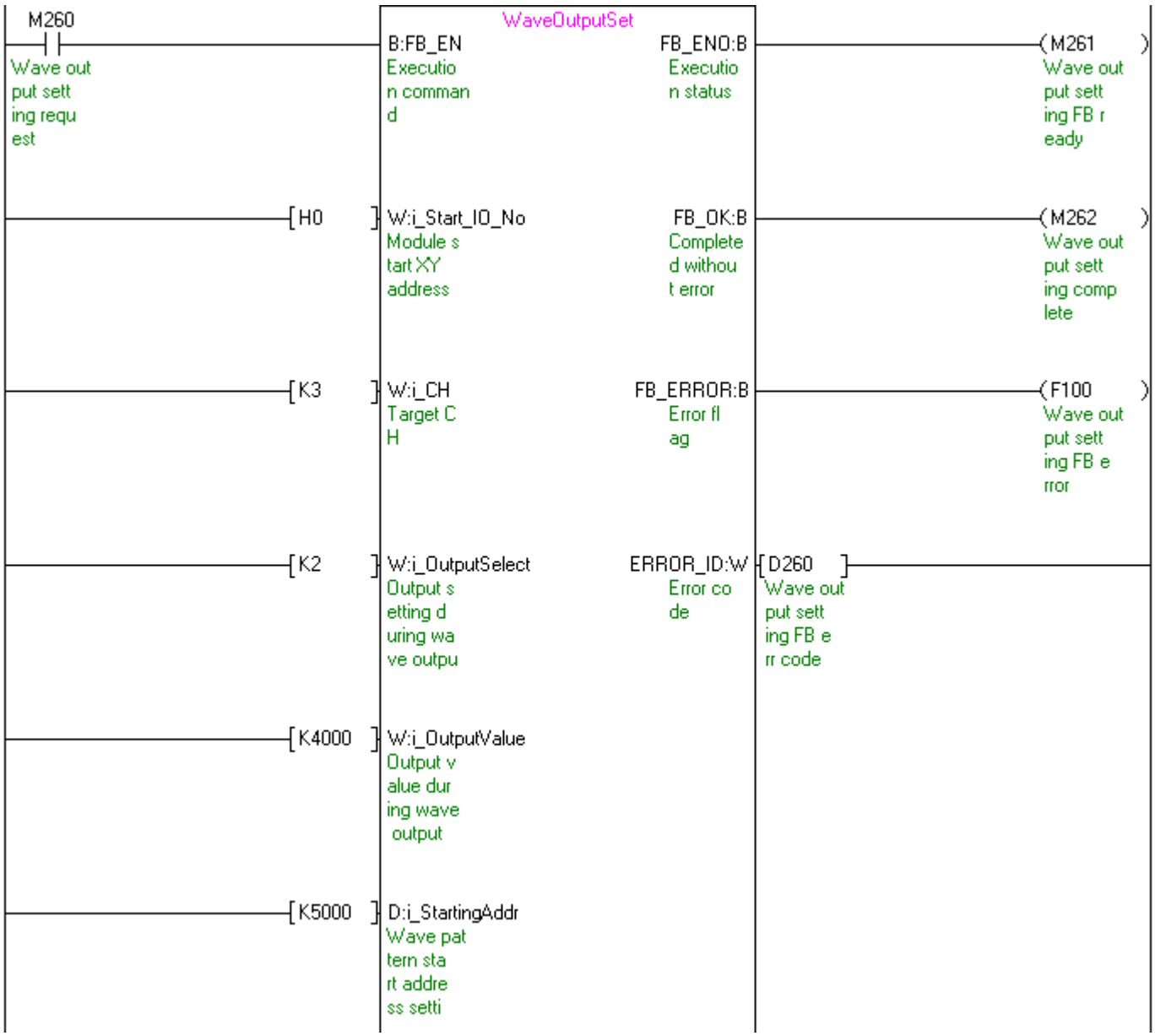
By turning ON M250, the parameters and wave data of the wave output function are read from the file register ZR0 or later, and stored in the buffer memory.



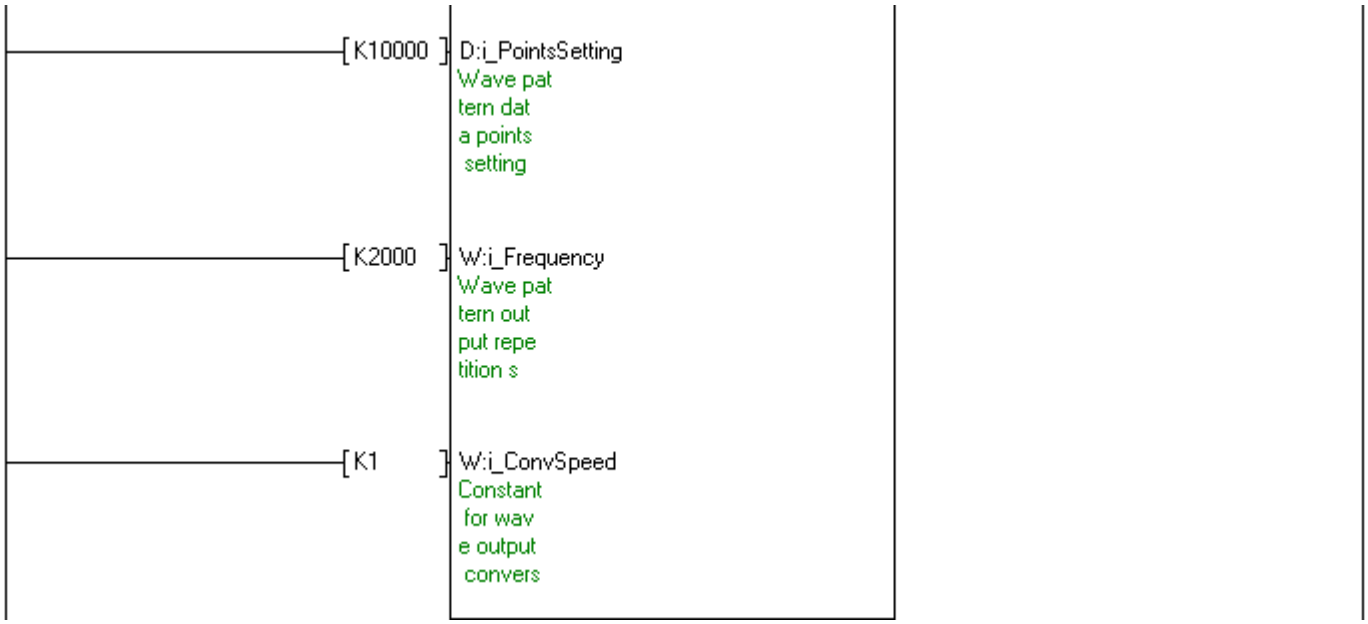
M+L60AD2DA2_DA_WaveOutputSetting (Wave output setting)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_OutputSelect | K2 | Set "Output setting during wave output stop" to 2 (Output value during wave output stop). |
| i_OutputValue | K4000 | Set the output setting value during the wave output stop to 4,000. |
| i_StartingAddr | K5000 | Set the start address of the wave pattern to be output to 5,000. |
| i_PointsSetting | K10000 | Set the data points of the wave pattern to be output to 10,000. |
| i_Frequency | K2000 | Set the wave output times to 2,000. |
| i_ConvSpeed | K1 | Set the constant for wave output conversion cycle to 1. |

By turning ON M260, the wave output setting of channel 3 is performed.



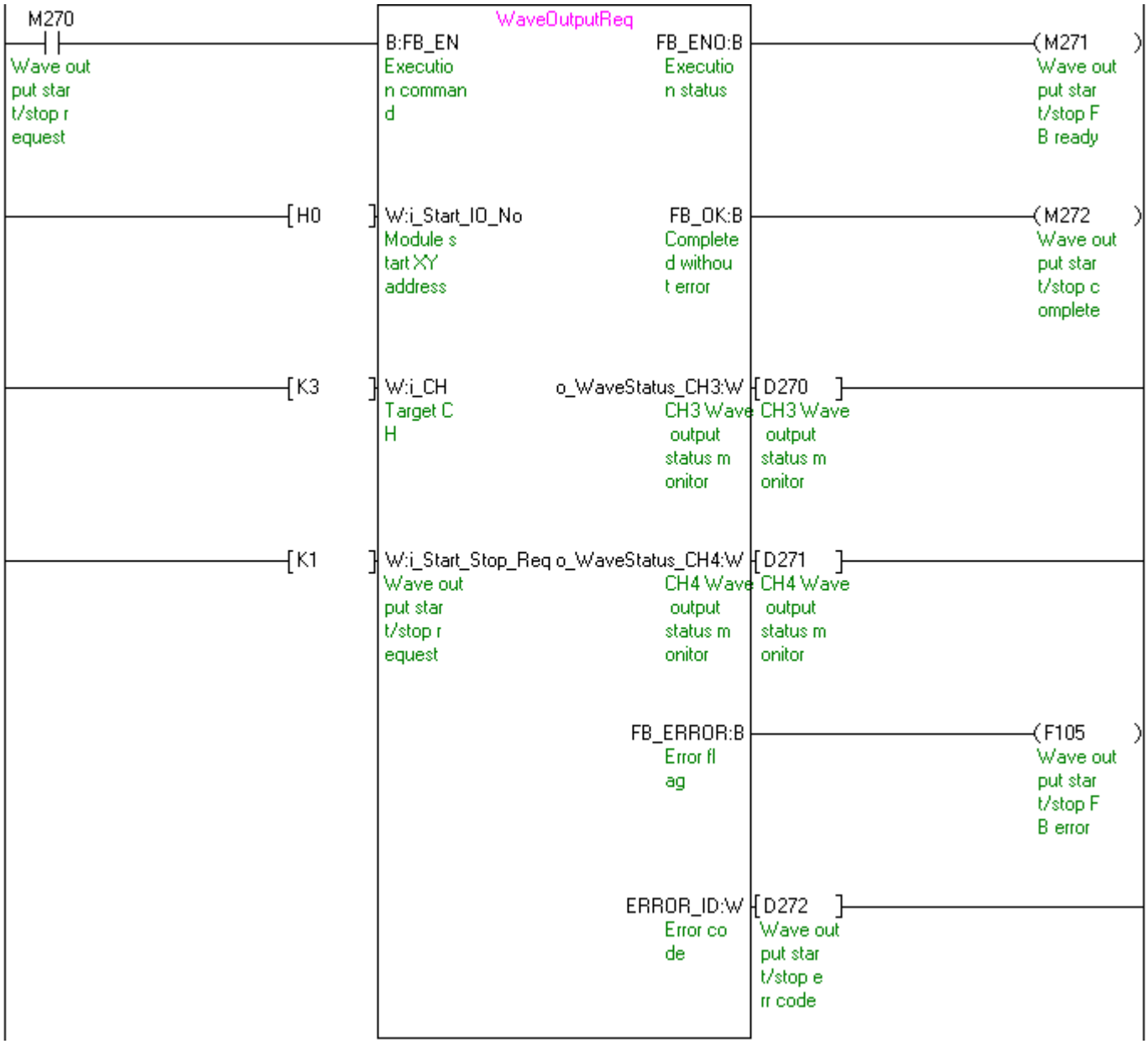

(Continues to the next page)


K10000
D:i_PointsSetting
Wave pat
tern dat
a points
setting
K2000
W:i_Frequency
Wave pat
tern out
put repe
tition s
K1
W:i_ConvSpeed
Constant
for wav
e output
convers

M+L60AD2DA2_DA_WaveOutReqSetting (Wave output start/stop request)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH | K3 | Set the target channel to channel 3. |
| i_Start_Stop_Req | K1 | Set Wave output start/stop request to 1 (Wave output start request). |

By turning ON M270, the wave output of channel 3 is started.



Appendix 1.3. Application examples of the common FBs

## 1) List of devices

a) External input (commands)

| Device | FB name | Application (ON details) |
|---|---|---|
| M280 | M+L60AD2DA2_ReadADVal_WriteDAVal | AD value read/DA value write req |
| M290 | M+L60AD2DA2_RequestSetting | Operating condition setting req. |
| M300 | M+L60AD2DA2_ErrorOperation | Error operation request |
| M301 | | Error reset request |
| M310 | M+L60AD2DA2_OGBackup | Offset/gain save to file request |
| M320 | M+L60AD2DA2_OGRestore | Offset/gain restore request |
| M330 | M+L60AD2DA2_FreeCalDataStoreDev | Calculate express data read req. |
| M340 | M+L60AD2DA2_FreeConvDataStoreCsv | Conv. chara data read (CSV) req. |
| M350 | M+L60AD2DA2_FreeConvDataStoreDev | Conv. chara data read (dev) req. |

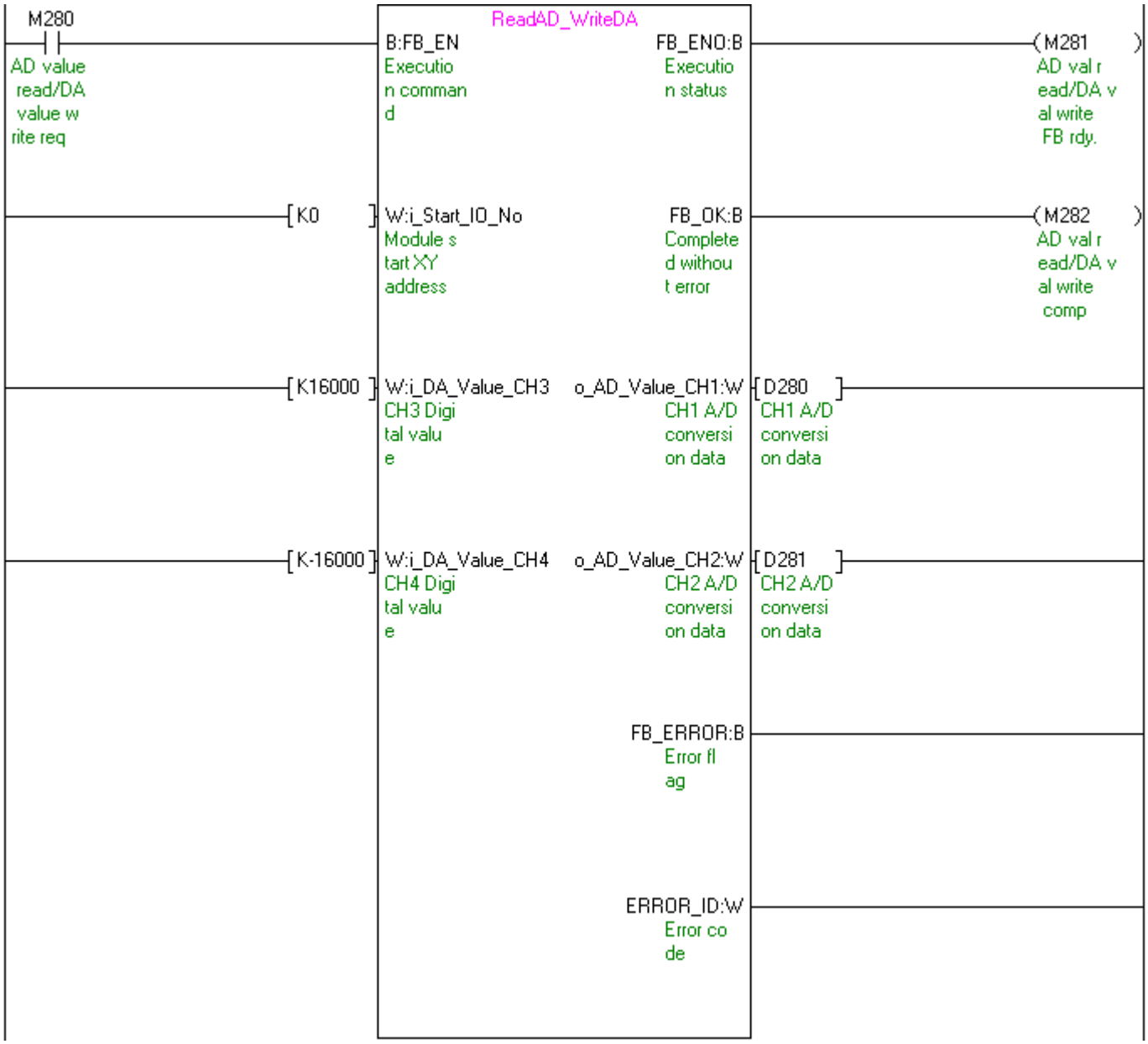
b) External output (checks)

| Device | FB name | Application (ON details) |
|---|---|---|
| M281 | M+L60AD2DA2_ReadADVal_WriteDAVal | AD val read/DA val write FB rdy. |
| M282 | | AD val read/DA val write comp |
| M291 | M+L60AD2DA2_RequestSetting | OP condition request FB ready |
| M292 | | OP condition request complete |
| M302 | M+L60AD2DA2_ErrorOperation | Error operation FB ready |
| M303 | | Error operation complete |
| F110 | | Module error flag |
| D300 | | Module error code |
| M311 | M+L60AD2DA2_OGBackup | Offset/gain save to file FB rdy. |
| M312 | | Offset/gain save to file comp. |
| F115 | | Offset/gain save file FB error |
| D310 | | Offset/gain save file FB err cod |
| M321 | M+L60AD2DA2_OGRestore | Offset/gain restore FB ready |
| M322 | | Offset/gain restore complete |
| F120 | | Offset/gain restore FB error |
| D320 | | Offset/gain restore FB err code |
| M331 | M+L60AD2DA2_FreeCalDataStoreDev | Calclat express data read FB rdy |
| M332 | | Calculate express data read comp |
| F125 | | Calclat express data read FB err |
| D330 | | Clclat exprs dat read FB err cod |
| M341 | M+L60AD2DA2_FreeConvDataStoreCsv | Conv. chara data read(CSV)FB rdy |
| M342 | | Conv chara data read(CSV)FB comp |
| F130 | | Conv. chara data read(CSV)FB err |
| D340 | | Conv chr dat read(CSV)FB err cod |
| M351 | M+L60AD2DA2_FreeConvDataStoreDev | Conv. chara data read(dev)FB rdy |
| M352 | | Conv chara data read(dev)FB comp |
| F135 | | Conv. chara data read(dev)FB err |
| D350 | | Conv chr dat read(dev)FB err cod |

M+L60AD2DA2_ReadADVal_WriteDAVal (Read A/D conversion data and write D/A conversion data)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_DA_ValueCH3 | K16000 | Set the digital value of channel 3 to 16,000. |
| i_DA_ValueCH4 | K-16000 | Set the digital value of channel 4 to -16,000. |

By turning ON M280, the A/D conversion data of the A/D conversion channels (CH1 and CH2) is read and the digital values of the D/A conversion channels (CH3 and CH4) are written.

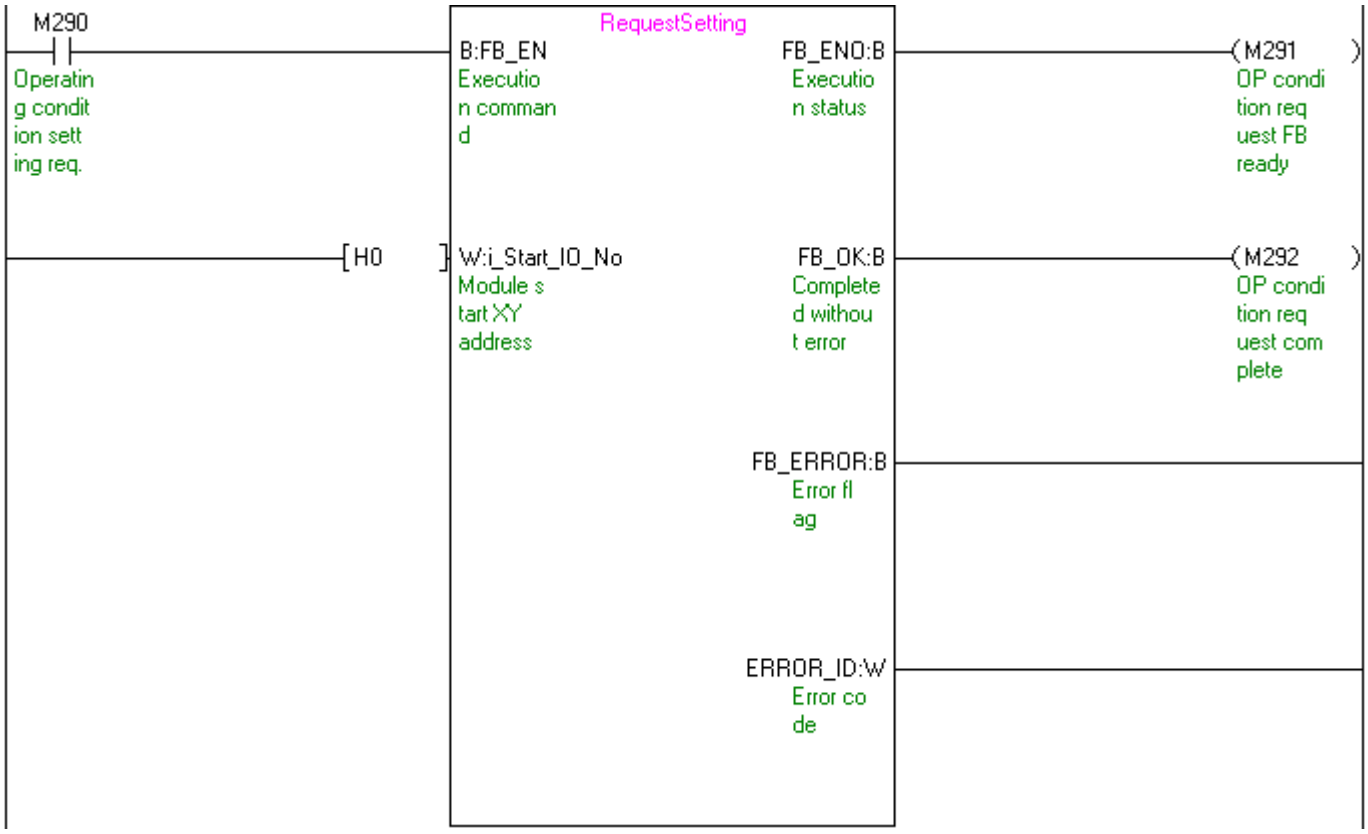


M+L60AD2DA2_RequestSetting (Operating condition setting request)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |

By turning ON M290, the following settings are validated.

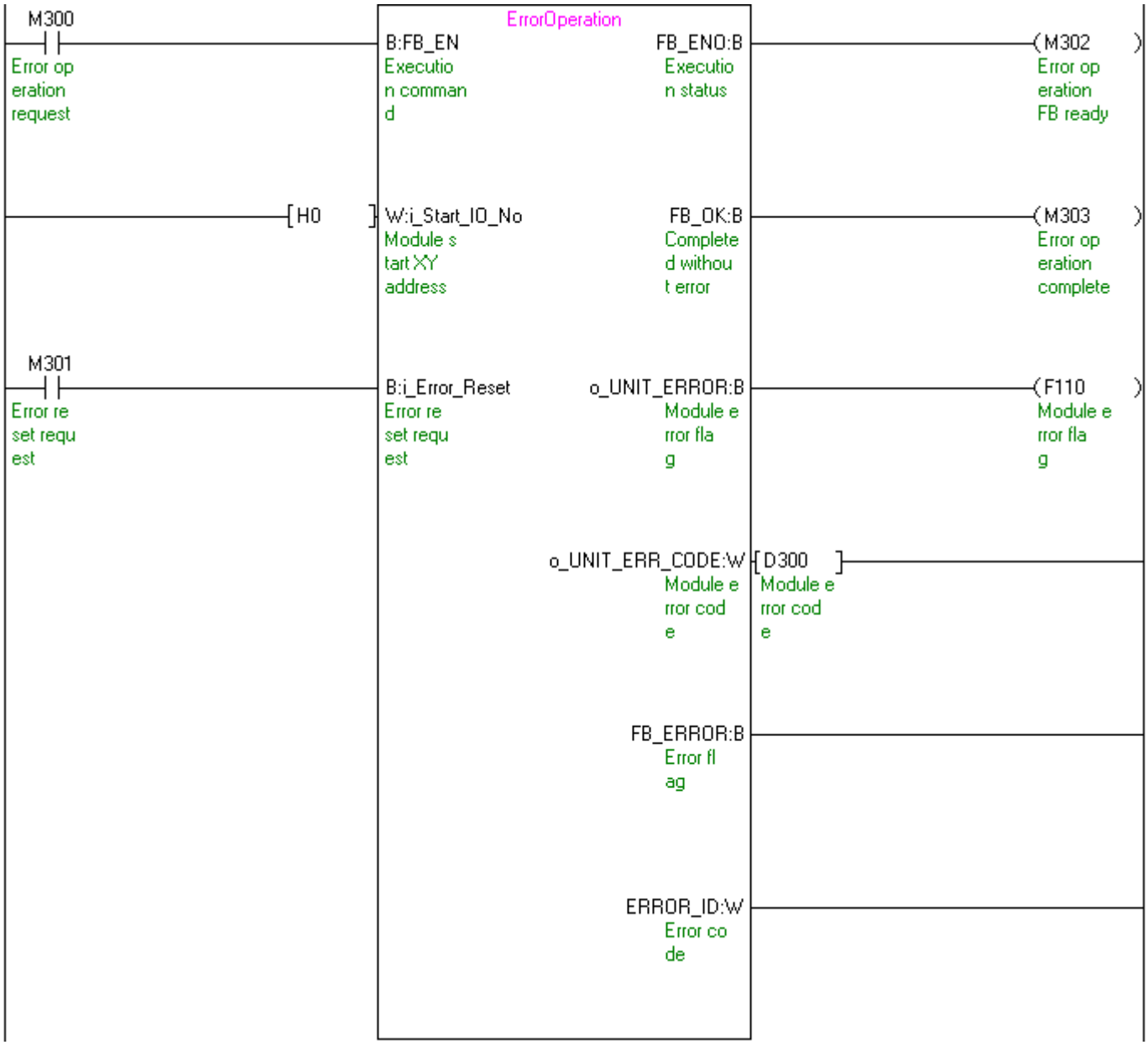
• A/D conversion enable/disable setting
• Averaging processing setting
• Input signal error detection setting
• Scaling function (A/D conversion) setting
• Logging function setting
• D/A conversion enable/disable setting
• Alert output function setting
• Scaling function (D/A conversion) setting
• Wave output function setting
• Free conversion calculation function setting
• Free conversion characteristics function setting



M+L60AD2DA2_ErrorOperation (Error operation)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_Error_Reset | ON/OFF | Turn ON for the error reset. |

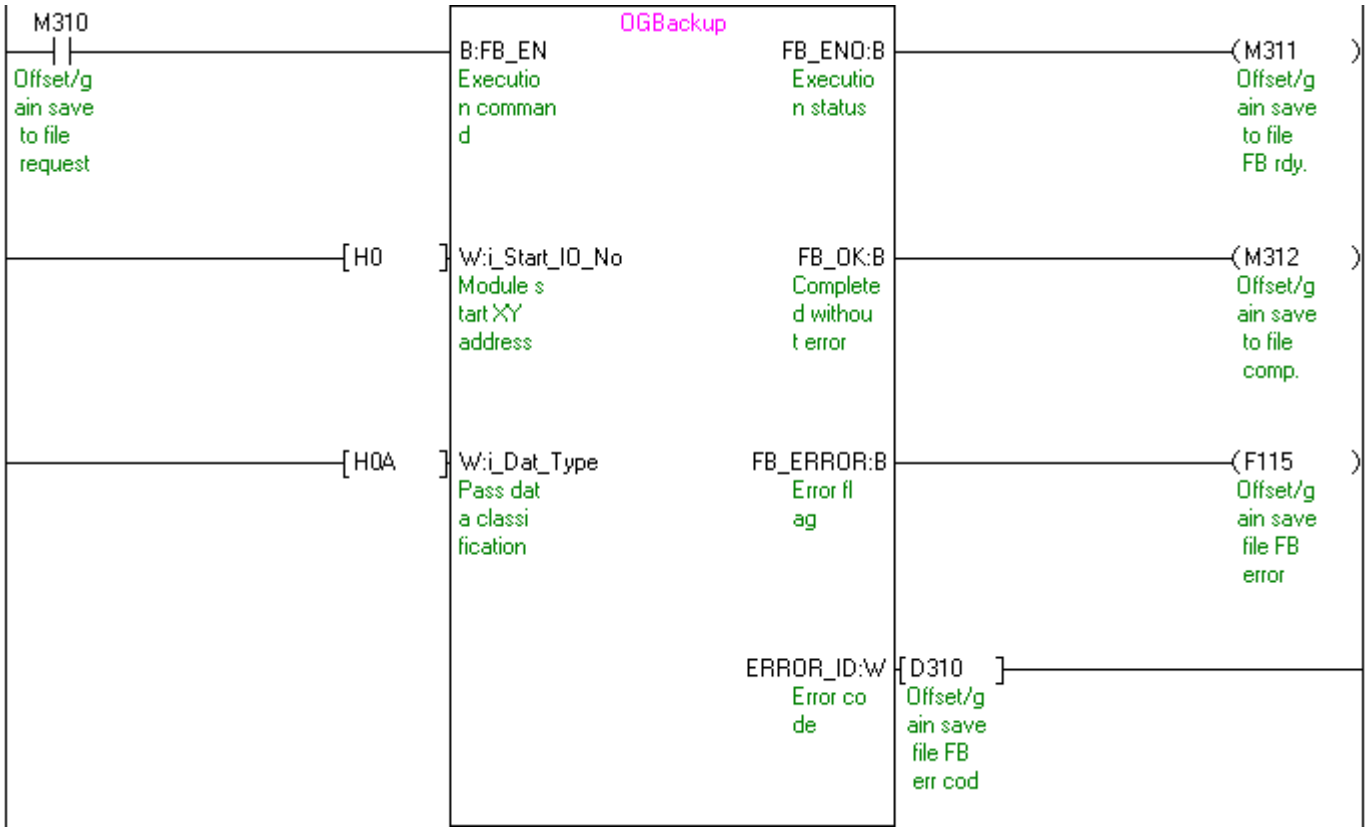
By turning ON M300, the error code is output when an error occurs. By turning ON M301 after the error output, the error is reset.



M+L60AD2DA2_OGBackup (Offset/gain value save)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_Dat_Type | H0A | Set the pass data classification to "Voltage" for channel 1 and 3 and "Current" for channel 2 and 4. |

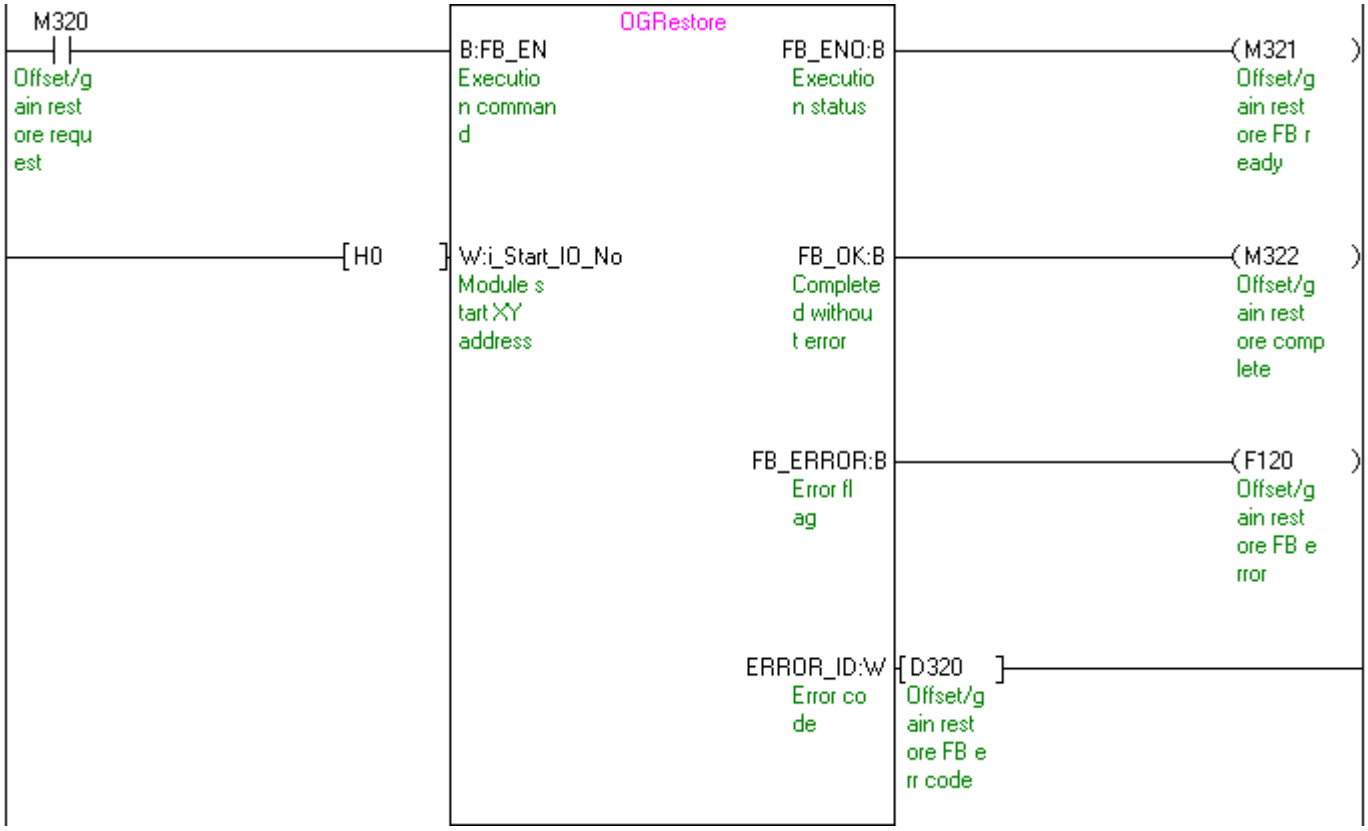
By turning ON M310, the offset/gain value of the user range setting is read and saved in the SD memory card inserted in the CPU module in a file format.



M+L60AD2DA2_OGRestore (Offset/gain value restore)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |

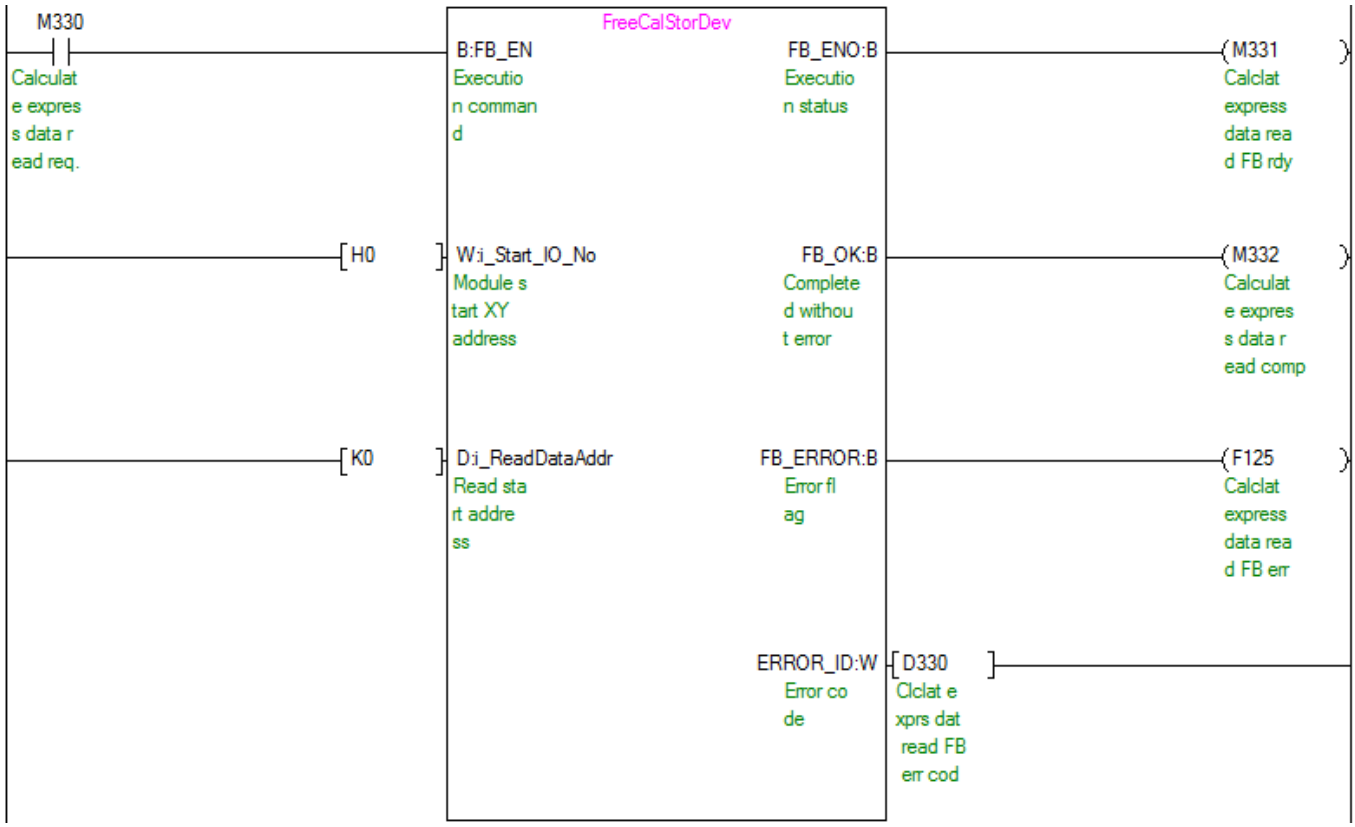
By turning ON M320, the offset/gain setting values of the user range setting that are saved in a file is restored to the module.



M+L60AD2DA2_FreeCalDataStoreDev (Read calculation expression data)

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_ReadDataAddr | K0 | Set ZR0 as the read start address where the calculation expression data of the free calculation function are stored. |

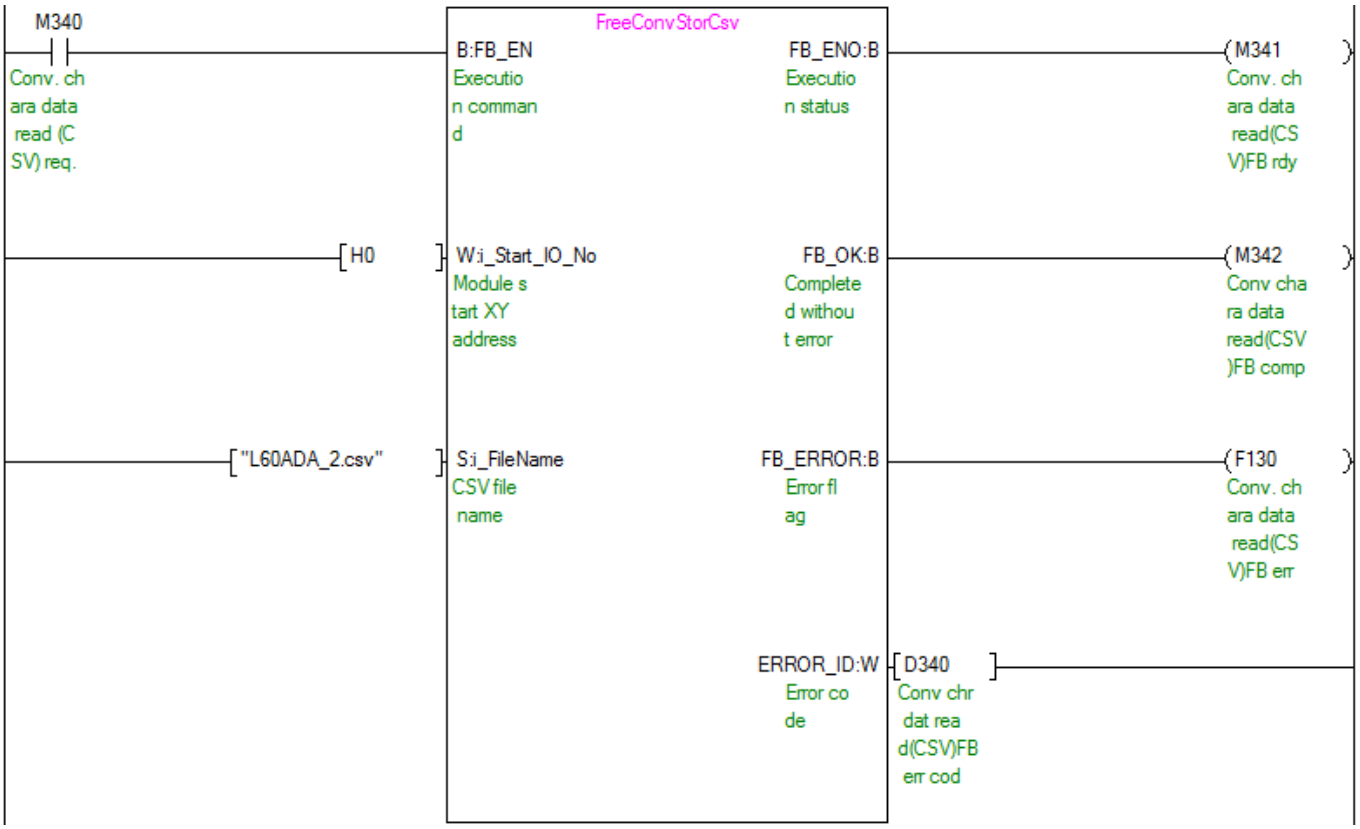
By turning ON M330, calculation expression data of the free calculation function is read from the file register ZR0 or later and written to the buffer memory.



M+L60AD2DA2_FreeConvDataStoreCsv (Read conversion characteristics data (CSV file))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_FileName | "L60ADA_2.csv" | Set "L60ADA_2.csv" as the name of the CSV file from which the parameters and conversion characteristics table of the free conversion characteristics function are read. |

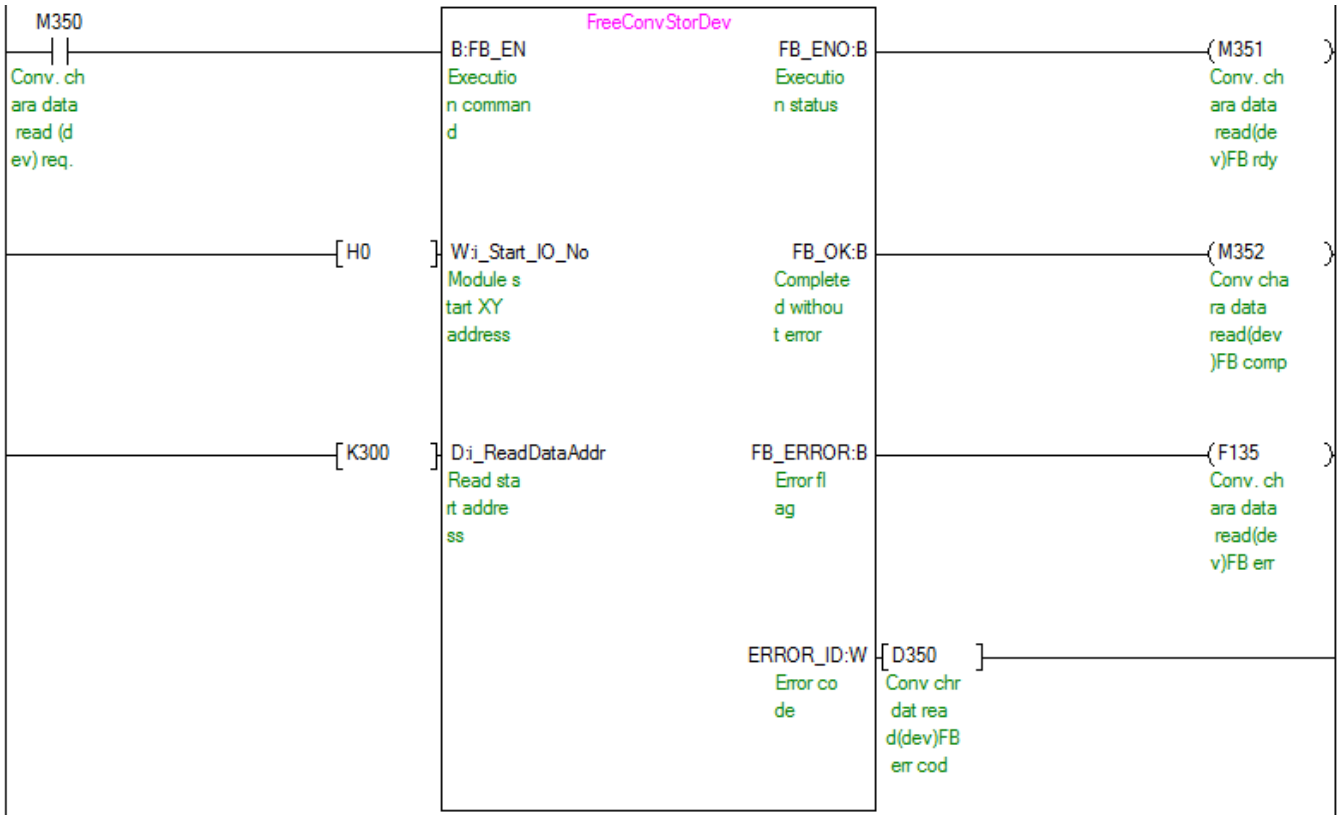
By turning ON M340, the parameters and conversion characteristics table of the free conversion characteristics function are read from "L60ADA_2.csv" in the SD memory card and stored in the buffer memory.



M+L60AD2DA2_FreeConvDataStoreDev (Read conversion characteristics data (device))

| Label name | Setting value | Description |
|---|---|---|
| i_Start_IO_No | H0 | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_ReadDataAddr | K300 | Set ZR300 as the read start address where the parameters and conversion characteristics table of the free conversion characteristics function are stored. |

By turning ON M350, the parameters and conversion characteristics table of the free conversion characteristics function are read from the file register ZR300 or later and stored in the buffer memory.



## Appendix 2. CSV File Format for Logging data save FB

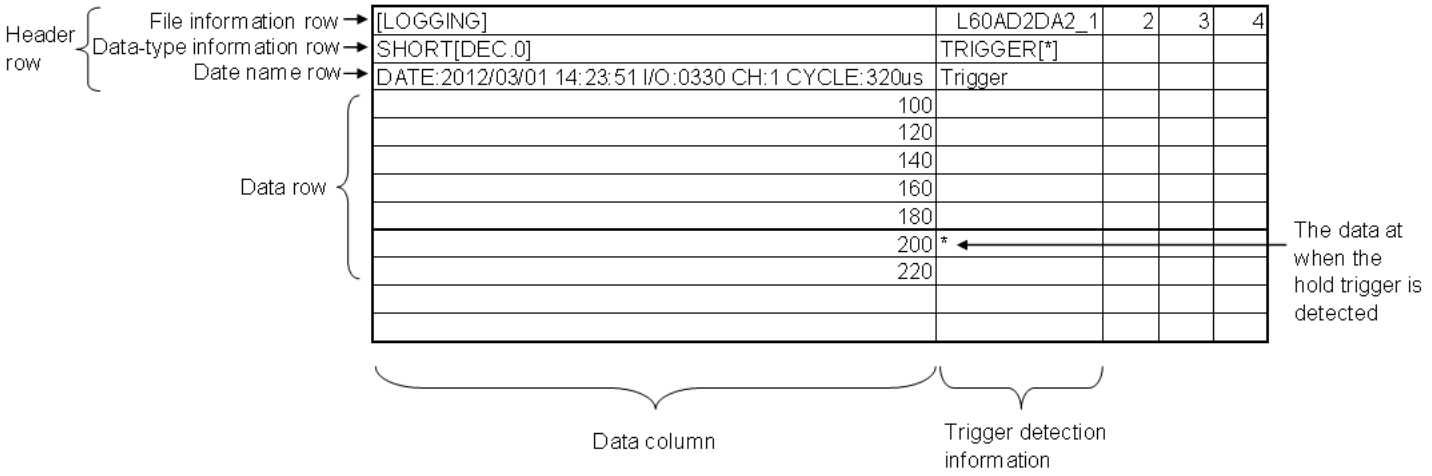
This following shows the specification of the CSV file format that M+L60AD2DA2_AD_SaveLogging (Logging data save) outputs.

| Item | Description |
|---|---|
| Delimiter | Comma (,) |
| Linefeed code | CRLF (0DH, 0AH) |
| Character code | ASCII |
| File size | Maximum 80130 bytes *1 |

*1 When the number of logging data points is 10000 and all the logging data is negative with 5 digits, the file size is maximum.

(1) Output details of the row and column in a file

The following shows an output example of the rows and columns in a CSV file.



(a) Header row

The head row contains the necessary information for the display in GX LogViewer. Do not change this row.

The file size of the header row is fixed to 128 bytes.

• File information row

The information related to the CSV file is written according to the order listed in the following table.

| Column number | Item | Output detail | Size |
|---|---|---|---|
| Column 1 | File type | [LOGGING] | 9 bytes |
| Column 2 | File version | L60AD2DA2_△*1 (the value indicating the file version) | 11 bytes |
| Column 3 | Data-type information row number | 2 (the value indicating where the data-type information row is) | 1 byte |
| Column 4 | Date name row number | 3 (the value indicating where the data name row is) | 1 byte |
| Column 5 *2 | Data start column number | 4 (the value indicating where the data row is) | 1 byte |

*1 Displays the specifications of the file version.

△: Version

*2 At the end of row 5, NULL is output in one byte.

• Data-type information row

The data type of each column is written according to the order listed in the following table. The data type of each column is output in the format of "Data type" + "[Additional information]".

| Column number | Item | Output detail of "Data type" | Output detail of "Additional information" | Size |
|---|---|---|---|---|
| Column 1 | Data column | SHORT (signed 16bit integer specification) | [DEC.0] (decimal specification) | 12 bytes |
| Column 2 | Trigger detection information column | TRIGGER | [*] ("*" is used to indicate trigger detection.) | 10 bytes |

• Date name row

The title of each column is written according to the order listed in the following table. The data type of each column is output in the format of "Data name" + "[Additional information]". (The information written in the data row is displayed as the title when the logging data is displayed in GX LogViewer.

| Column number | Column name | Output detail of "Data name" | Output detail of "Additional information" | Size |
|---|---|---|---|---|
| Column 1 | Data column | DATE *1 | Hold trigger detection time*2*3 | 24 bytes |
| | | I/O: | Start XY address of the module that acquires the logging data *4 | 8 bytes |
| | | CH: | Target channel *4 | 4 bytes |
| | | CYCLE: | Logging cycle *3 | 9 to 23 bytes |
| Column 2 | Trigger detection information column | Trigger | - | 7 bytes |
| | | - | - (NULL) *5 | 1 to 15 bytes |

*1 Spaces are output between each output item in the data column.

*2 The time is output in the format of YYYY/MM/DD hh/mm/ss.

*3 The values of CH□ Trigger detection time (Un\G1154 to Un\G1161) and CH□ Logging cycle monitor value (Un\G1122 to Un\G1127) are output as the hold trigger (logging stop request) detection time and logging cycle.

*4 The value that is specified as a parameter of FB (M+L60AD2DA2_SaveLogging) is output to the XY address number and target channel.

*5 To fix the file size of the header row, NULL is output in 1 to 15 bytes at the end of the trigger detection information column.

(b) Data row

The data is written to the data row according the order listed in the following table. (The information is displayed in GX LogViewer)

| Column name | Output detail | Size |
|---|---|---|
| Data column | Logging data stored in the buffer memory of the L60AD2DA2 | 1 to 6 bytes *1 |
| Trigger detection information column | * (output only to the logging data row indicated by trigger pointer.) | 0 to 1 byte |

*1 When the size of the logging data of the data row indicated by the trigger pointer is smaller than 6 bytes, NULL is output at the end of the logging data to fix the data to 6 bytes.

## Appendix 3. Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory

The following table lists the relation between the storage source "Wave output function parameter and data" and the storage location buffer memory handled by M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file)) and M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file)).

Table 1 Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory

| No. | Parameter/data of the wave output function | Setting range (decimal) | CH | Storage source | | | Storage location |
|---|---|---|---|---|---|---|---|
| | | | | CSV file in the SD memory card | | Serial number access format file register (ZR)<br><br>(m: Read start address) | Analog I/O module buffer memory<br><br>(n: Module start XY address upper) |
| | | | | Row | Column | | |
| - | Unused | - | - | - | - | ZR (m + 0) | - |
| - | Unused | - | - | - | - | ZR (m + 1) | - |
| 1) | Output setting during wave output stop<br>Select the output during the wave output stop for each channel. | 0: 0V/0mA<br>1: Offset value<br>2: Output value during wave output stop | 3 | 1 | 3 | ZR (m + 2) | Un\G3010 |
| | | | 4 | 1 | 4 | ZR (m+3) | Un\G3011 |
| 2) | Output value during wave output stop<br>Set the value to be output for each channel when "2: Output value during wave output stop" is selected in "Output setting during wave output stop". | (*1) 0 to 12,287 (practical range: 0 to 12,000) | 3 | 2 | 3 | ZR (m + 10) | Un\G3018 |
| | | (*2) -16,384 to 16,383 (practical range: -16,000 to 16,000) | 4 | 2 | 4 | ZR (m + 11) | Un\G3019 |
| 3) | Wave pattern start address setting<br>Set the start address of the wave pattern to be output for each channel. | 5,000 to 54,999 | 3 | 3 | 3 | ZR (m + 20 and 21) | Un\G3028 and 3029 |
| | | | 4 | 3 | 4 | ZR (m + 22 and 23) | Un\G3030 and 3031 |
| 4) | Wave pattern data points setting<br>Set the data points of the wave pattern to be output for each channel. | 1 to 50,000 (points) | 3 | 4 | 3 | ZR (m + 36 and 37) | Un\G3044 and 3045 |
| | | | 4 | 4 | 4 | ZR (m + 38 and 39) | Un\G3046 and 3047 |
| 5) | Wave pattern output repetition setting<br>Set the output times of the wave pattern for each channel. | -1: Unlimited repetition<br>1 to 32,767: Specified number of times | 3 | 5 | 3 | ZR (m + 50) | Un\G3058 |
| | | | 4 | 5 | 4 | ZR (m + 51) | Un\G3059 |
| 6) | Constant for wave output conversion cycle<br>Set the constant to determine the conversion cycle (multiple of the conversion speed) for each channel. | 1 to 5,000 | 3 | 6 | 3 | ZR (m + 58) | Un\G3066 |
| | | | 4 | 6 | 4 | ZR (m + 59) | Un\G3067 |
| 7) | Number of wave data points<br>Set the total points of the wave data. | 0 to 50,000 (points) | | 100 | 1 | ZR (m + 98 and 99) | - |
| 8) | Wave data | (*1) 0 to 12,287 (practical range: 0 to 12,000) | | 101 to 50,100 | 1 | ZR (m + 100) to ZR (m + 50099) | Un\G5000 to Un\G54999 |
| | | (*2) -16,384 to 16,383 (practical range: -16,000 to 16,000) | | | | | |

*1: When the output range setting is (CH3, CH4) is 0 to 5V, 1 to 5V, and 0 to 20mA, 4 to 20mA

*2: When the output range setting is (CH3, CH4) is -10 to 10V

* The number 1) to 8) in the table corresponds to the number in the row and column example of a CSV file in Appendix 4.

## Appendix 4. CSV File Format for Wave Data Reading FB (CSV File)

This section shows the CSV file format that M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file)) handles. (A CSV file has an extension ".csv" and can be opened in general applications such as Microsoft Excel and Notepad.)

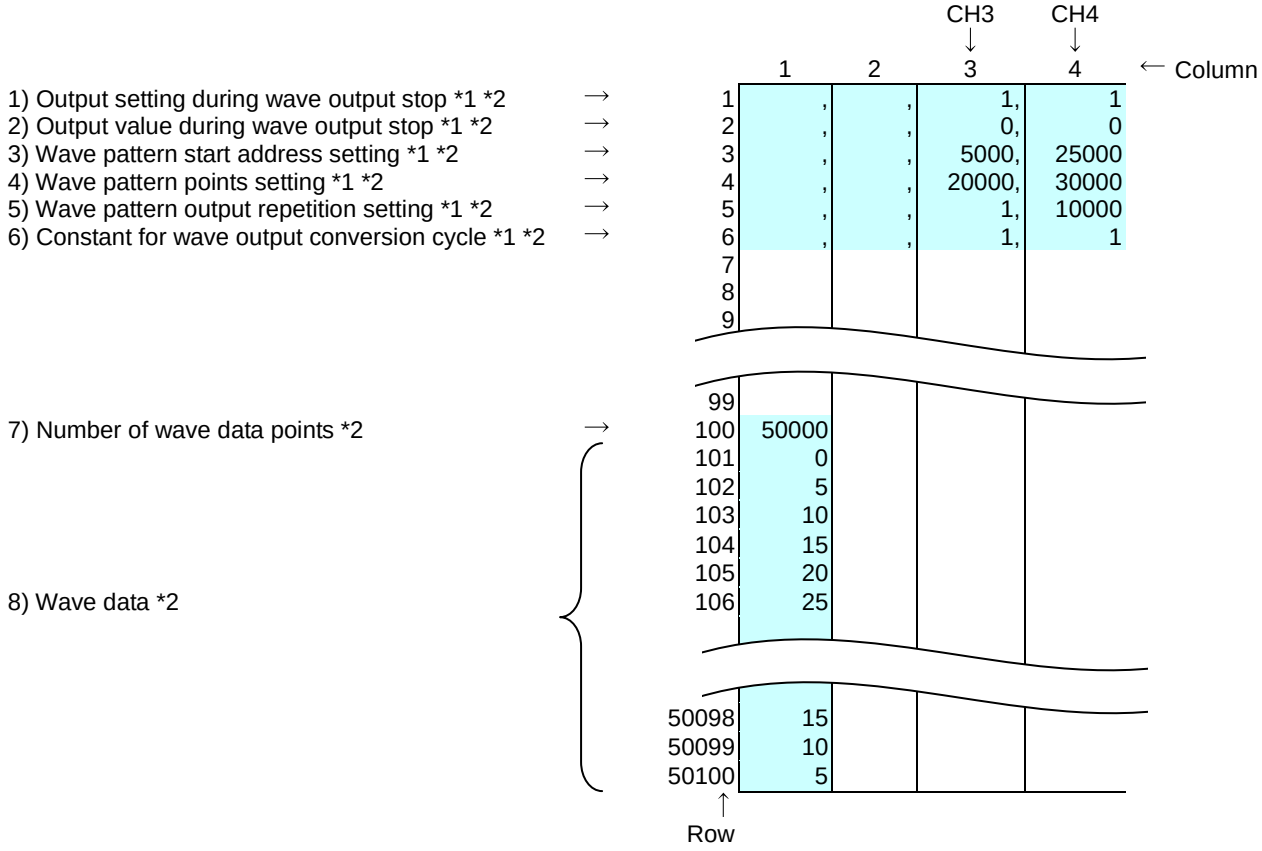
The following table lists the CSV format specification.

| Item | Description |
|---|---|
| Delimiter | Comma (,) |
| Linefeed code | CRLF (0x0D, 0x0A) |
| Character code | ASCII or Shift JIS |
| File size | Maximum 400275 bytes *1 |

*1 When the number of wave data points is 50000 and all the wave data is negative with 5 digits, the file size is maximum.

The number of characters for the CSV file name must be within 12 including the extension ".csv". (Two-byte characters can be used. One two-byte character equals to two one-byte characters.) (Example) L60ADA_1.csv, wd000001.csv, WaveData.csv

The following figure shows a row and column example of a CSV file. In this example, the number of wave data points is 50000 (points) (maximum).




*1 Values set in 1) to 6) of row 1 and 2 are ignored.

*2 The number 1) to 8) corresponds to each item of "Table 1 Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory" in Appendix 3. For details on the items, refer to the table.

## Appendix 5. Storage Source "Parameters and Conversion Characteristics Table of the Free Conversion Characteristics Function" and Storage Location Buffer Memory

The following table lists the relation between the storage source "parameters and conversion characteristics table of the free conversion characteristics function" and the storage location buffer memory handled by M+L60AD2DA2_FreeConvDataStoreCsv (Read conversion characteristics data (CSV file)) and M+L60AD2DA2_FreeConvDataStoreDev (Read conversion characteristics data (device)).

Table 2 Storage Source "Parameters and Conversion Characteristics Table of the Free Conversion Characteristics Function" and Storage Location Buffer Memory

| No. | Parameters and conversion characteristics table of the free conversion characteristics function | Setting range (decimal) | | Storage location | | |
|---|---|---|---|---|---|---|
| | | | | CSV file in the SD memory card<br><br>Row | Serial number access format file register (ZR)<br><br>(m: Read start address) | Analog I/O module buffer memory<br><br>(n: Module start XY address upper) |
| 1) | Selection of free conversion characteristics table<br>Select the conversion characteristics table to be used. | 0: Analog input<br>1: Analog output<br>2: Analog input/output | | 1 | ZR (m + 0) | Un\G4100 |
| 2) | Free conversion characteristics range setting<br>Select the range of the channel in which the free conversion characteristics function is used. The set range is shared by all the channels in which the free conversion characteristics function is used. | (*1) | 0H: 4 to 20mA<br>1H: 0 to 20mA<br>2H: 1 to 5V<br>3H: 0 to 5V<br>4H: -10 to 10V<br>5H: 0 to 10V<br>AH: 4 to 20mA (Extended mode)<br>BH: 1 to 5V (Extended mode) | 2 | ZR (m + 1) | Un\G4101 |
| | | (*2) | 0H: 4 to 20mA<br>1H: 0 to 20mA<br>2H: 1 to 5V<br>3H: 0 to 5V<br>4H: -10 to 10V | | | |
| 3) | Number of conversion characteristics table data points<br>Set the total points of the conversion characteristics data.* | (*3) | 12001 (points) | 100 | ZR (m + 98 and 99) | - |
| | | (*4) | 16501 (points) | | | |
| | | (*5) | 16001 (points) | | | |
| | | (*6) | 32001 (points) | | | |
| 4) | Conversion characteristics table | (*3) | 0 to 12000 | 101<br>to<br>32,101 | ZR (m + 100)<br>to<br>ZR (m + 32100) | Un\G5000<br>to<br>Un\G37000 |
| | | (*4) | -3,000 to 13,500 | | | |
| | | (*5) | 0 to 16,000 | | | |
| | | (*6) | -16,000 to 16,000 | | | |

*1: When the selection of free conversion characteristics table is the analog input

*2: When the selection of free conversion characteristics table is the analog output or analog input/output

*3: When the free conversion characteristics range setting is 4 to 20mA, 0 to 20mA, 1 to 5V, or 0 to 5V

*4: When the free conversion characteristics range setting is 4 to 20mA (Extended mode) or 1 to 5V (Extended mode)

*5: When the free conversion characteristics range setting is 0 to 10V

*6: When the free conversion characteristics range setting is -10 to 10V

* This parameter is used by the system. Always set a value within the setting range. If a value outside the setting range, the proper operation cannot be guaranteed.

## Appendix 6. CSV File Format for Conversion Characteristics Data Reading FB (CSV File)

This section shows the CSV file format that M+L60AD2DA2_FreeConvDataStoreCsv(M+L60AD2DA2_FreeConvDataStoreCsv (Read conversion characteristics data (CSV file))) handles. (A CSV file has an extension ".csv" and can be opened in general applications such as Microsoft Excel and Notepad.)

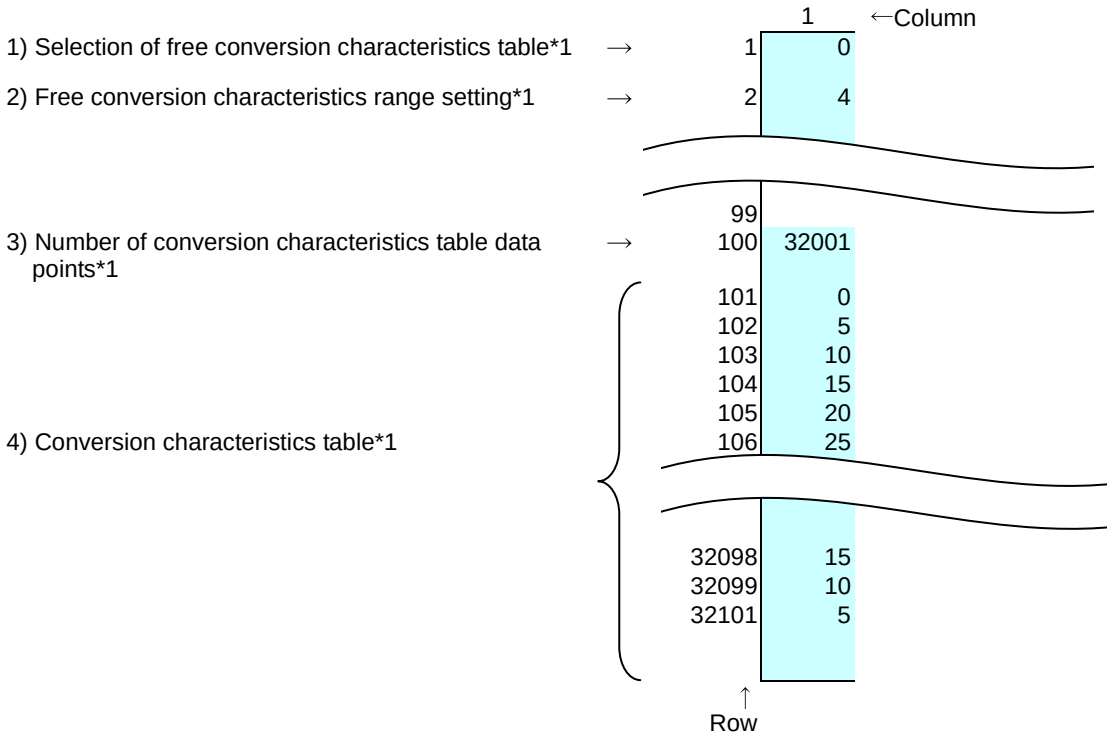
The following table lists the CSV format specification.

| Item | Description |
|---|---|
| Delimiter | Comma (,) |
| Linefeed code | CRLF (0x0D, 0x0A) |
| Character code | ASCII or Shift JIS |
| File size | Maximum ***** bytes *1 |

*1 When the number of conversion characteristics table data points is 32001 and all the data in the conversion characteristics table is negative with 5 digits, the file size is maximum.

The number of characters for the CSV file name must be within 12 including the extension ".csv". (Two-byte characters can be used. One two-byte character equals to two one-byte characters.)
(Example) L60ADA_1.csv, fd000001.csv, ConversionData.csv

The following figure shows a row and column example of a CSV file. In this example, the number of conversion characteristics table data points is 32001 (points) (maximum).




*1 The number 1) to 4) corresponds to each item of "Table 2 Storage Source "Parameters and Conversion Characteristics Table of the Free Conversion Characteristics Function" and Storage Location Buffer Memory" in Appendix 5. For details on the items, refer to the table.