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

Applicable modules:

L60AD2DA2

### <CONTENTS>

| Reference Manual Revision History  | 3     |
|--|-------|
| 1. Overview  | 4     |
| 1.1. Overview of the FB Library  | 4     |
| 1.2. Function of the FB Library  | 4     |
| 1.3. System Configuration Example  | 6     |
| 1.4. Relevant Manuals  | 6     |
| 1.5. Note  | 6     |
| 2. Details of the FB Library   |       |
| 2.1. A/D conversion FB   | 7     |
| 2.1.1. M+L60AD2DA2_AD_ReadADVal (Read A/D conversion data)                                   | 7     |
| 2.1.2. M+L60AD2DA2_AD_ReadAllADVal (Read A/D conversion data (all CHs))                      | 12    |
| 2.1.3. M+L60AD2DA2_AD_ReadScalingVal (Read A/D conversion scaling value)                     | 16    |
| 2.1.4. M+L60AD2DA2_AD_ReadAllScalingVal (Read A/D conversion scaling value (all CHs))        | 21    |
| 2.1.5. M+L60AD2DA2_AD_SetADConversion (A/D conversion enable/disable setting)                | 25    |
| 2.1.6. M+L60AD2DA2_AD_SetAverage (A/D conversion averaging process setting)                  | 29    |
| 2.1.7. M+L60AD2DA2_AD_SetScaling (A/D conversion scaling setting)                            |       |
| 2.1.8. M+L60AD2DA2_AD_SetInputSignalErr (A/D conversion input signal error detection setting | g) 39 |
| 2.1.9. M+L60AD2DA2_AD_SetOffsetVal (A/D conversion offset setting)                           | 44    |
| 2.1.10.M+L60AD2DA2_AD_SetGainVal (A/D conversion gain setting)                               | 50    |
| 2.1.11. M+L60AD2DA2_AD_ShiftOperation (A/D conversion shift operation)                       | 55    |
| 2.1.12.M+L60AD2DA2_AD_DiffOperation (A/D difference conversion)                              | 59    |
| 2.1.13.M+L60AD2DA2_AD_ClipOperation (A/D conversion digital clipping)                        | 63    |
| 2.1.14.M+L60AD2DA2_AD_SetLoggingPARAM (Logging function parameter setting)                   | 67    |
| 2.1.15.M+L60AD2DA2_AD_SaveLogging (Logging data save)  | 72    |
| 2.2. D/A conversion FB   | 81    |
| 2.2.1. M+L60AD2DA2_DA_WriteDAVal (Write D/A conversion data)                                 | 81    |
| 2.2.2. M+L60AD2DA2_DA_WriteAllDAVal (Write D/A conversion data (all CHs))                    | 85    |
| 2.2.3. M+L60AD2DA2_DA_SetDAConversion (D/A conversion enable/disable setting)                | 89    |
| 2.2.4. M+L60AD2DA2_DA_SetDAOutput (D/A output enable/disable setting)                        |       |
| 2.2.5. M+L60AD2DA2_DA_SetScaling (D/A conversion scaling setting)                            |       |
| 2.2.6. M+L60AD2DA2_DA_SetAlarm (D/A conversion alert output setting)                         | 102   |



| 2.2.7. M+L60AD2DA2_DA_SetOffsetVal (D/A conversion offset setting)10                                       | 07 |
|--|----|
| 2.2.8. M+L60AD2DA2_DA_SetGainVal (D/A conversion gain setting)11   | 12 |
| 2.2.9. M+L60AD2DA2_DA_ShiftOperation (D/A conversion shift operation)11                                    | 18 |
| 2.2.10.M+L60AD2DA2_DA_WaveDataStoreCsv (Read wave data (CSV file))   | 22 |
| 2.2.11. M+L60AD2DA2_DA_WaveDataStoreDev (Read wave data (device))  | 30 |
| 2.2.12.M+L60AD2DA2_DA_WaveOutputSetting (Wave output setting)  | 36 |
| 2.2.13.M+L60AD2DA2_DA_WaveOutReqSetting (Wave output start/stop request)                                   | 41 |
| 2.3. Common FB   | 46 |
| 2.3.1. M+L60AD2DA2_ReadADVal_WriteDAVal (Read A/D conversion data and write D/A conversion data) 14        | 46 |
| 2.3.2. M+L60AD2DA2_RequestSetting (Operating condition setting request)                                    | 51 |
| 2.3.3. M+L60AD2DA2_ErrorOperation (Error operation)15  | 54 |
| 2.3.4. M+L60AD2DA2_OGBackup (Offset/gain value save)15   | 58 |
| 2.3.5. M+L60AD2DA2_OGRestore (Offset/gain value restore)16   | 64 |
| Appendix 1. FB Library Application Examples16  | 69 |
| Appendix 1.1. Application examples of the A/D conversion FBs17   | 70 |
| Appendix 1.2. Application examples of the D/A conversion FBs19   | 90 |
| Appendix 1.3. Application examples of the common FBs   | 80 |
| Appendix 2. CSV File Format for Logging data save FB21   | 14 |
| Appendix 3. Storage Source "Wave Output Function Parameter and Data" and Storage Location Buffer Memory 21 | 17 |
| Appendix 4. CSV File Format for Wave Data Reading FB (CSV File)21  | 18 |



# Reference Manual Revision History

| Reference Manual | Date       | Description   |
|------------------|------------|---------------|
| Number           |            |               |
| FBM-M111-A       | 2013/08/30 | First edition |



### 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] |
|---------|-------------|
| 1, 1, 1 | controlong  |

| 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_SetLoggingPARA    | Sets the logging function of the specified A/D conversion channel (CH1 or     |  |
| Μ                                | CH2).   |  |
| M+L60AD2DA2_AD_SaveLogging       | Saves the logging data to a file.   |  |



[D/A conversion]

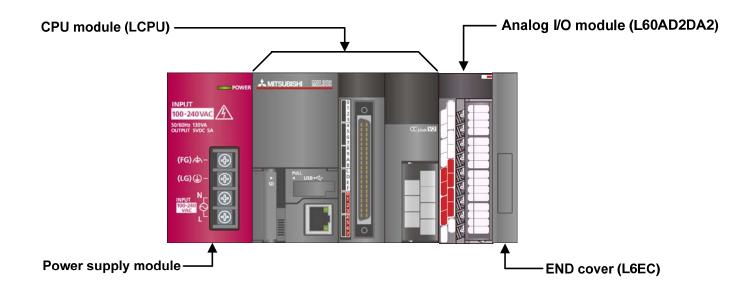
| Item  | Description   |  |
|---|---|--|
|   | Writes the D/A conversion data of the specified D/A conversion channel  |  |
| M+L60AD2DA2_DA_WriteDAVal   | (CH3 or CH4).   |  |
|   | Writes the D/A conversion data of the D/A conversion channels (CH3      |  |
| M+L60AD2DA2_DA_WriteAllDAVal  | and CH4).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



#### [Common]

| Item                             | Description   |  |
|----------------------------------|---|--|
|                                  | Reads the A/D conversion data of the A/D conversion channels (CH1 and       |  |
| M+L60AD2DA2_ReadADVal_WriteDAVal | 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.                                     |  |
|                                  | Reads the offset/gain setting value of the user range setting and stores it |  |
| M+L60AD2DA2_OGBackup             | to a file.  |  |
|                                  | Restores the offset/gain setting values of the user range setting that are  |  |
| M+L60AD2DA2_OGRestore            | saved in a file to the module.  |  |

#### 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



## 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

| Item              | Description  |                         |   |  |
|-------------------|--|-------------------------|---|--|
| Function overview | Reads the A/D conversion data of the specified A/D conversion channel (CH1 or CH2).    |                         |   |  |
| Symbol            | M+L60AD2DA2_AD_ReadADVal   |                         |   |  |
|                   | Execution command —  | B : FB_EN               | FB_ENO : B — Execution status               |  |
|                   | Module start XY address —  | W:i_Start_IO_No         | FB_OK : B Completed without error           |  |
|                   | Target CH-   | <i>N</i> : i_CH         | o_AD_Value :W—A/D conversion data           |  |
|                   |  |                         | FB_ERROR : B — Error flag                   |  |
|                   |  |                         | ERROR_ID : W Error code                     |  |
|                   | l l  |                         |   |  |
| Applicable        | Analog I/O module  | L60AD2DA2               |   |  |
| hardware and      | CPU module   |                         |   |  |
| software          |  | Series                  | Model                                       |  |
|                   |  | MELSEC-L Series         | LCPU  |  |
|                   | Engineering software   | GX Works2 *1            |   |  |
|                   |  | Language                | Software version                            |  |
|                   |  | English version         | Version1.24A or later                       |  |
|                   |  | Chinese version         | Version1.49B or later                       |  |
|                   |  | *1 For software version | ns applicable to the modules used, refer to |  |
|                   |  | "Relevant manuals".     | ·   |  |
| Programming       | Ladder   |                         |   |  |
| language          |  |                         |   |  |
| Number of steps   | 324 steps (for MELSEC-L series CPU)  |                         |   |  |
|                   | * The number of steps of the FB in a program depends on the CPU model that is used and |                         |   |  |
|                   | input and output definition.   |                         |   |  |



| Item              | Description   |
|-------------------|---|
| Function          | 1) By turning ON FB_EN (Execution command), the A/D conversion data of the specified            |
| description       | A/D conversion channel (CH1 or CH2) is read.  |
|                   | 2) The read A/D conversion data depends on the settings of the input range and the              |
|                   | averaging processing function.  |
|                   | 3) When the A/D conversion completed flag (XnE) is OFF, the A/D conversion data of the          |
|                   | specified channel is not read.  |
|                   | 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).  |
|                   | Refer to the error code explanation section for details.  |
|                   | 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  | 1) The FB does not include error recovery processing. Program the error recovery                |
| precautions       | processing separately in accordance with the required system operation.                         |
|                   | 2) The FB cannot be used in an interrupt program.   |
|                   | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.           |
|                   | Do not use this FB in programs that are only executed once such as a subroutine,                |
|                   | FOR-NEXT loop because it is impossible to turn OFF.   |
|                   | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition         |
|                   | of the target channel.  |
|                   | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an         |
|                   | interrupt program.  |
|                   | 6) Every input must be provided with a value for proper FB operation                            |
|                   | 7) 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.  |
|                   | 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       | Refer to "Appendix 1. FB Library Application Examples".   |
| example           |   |



| Item             | Description  |   |  |  |
|------------------|--|---|--|--|
| Timing chart     | [When operation completes without error]   | [When an error occurs]  |  |  |
|                  | FB_EN<br>(Execution command)       FB_ENO<br>(Execution status)<br>o_AD_Value<br>(A/D conversion data)       FB_OK<br>(Completed without error)       FB_OK<br>(Completed without error)       FB_ERROR (Error flag)       ERROR_ID (Error code) | FB_EN<br>(Execution command)         FB_ENO<br>(Execution status)         o_AD_Value<br>(A/D conversion data)         FB_OK<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code)         0         Error code |  |  |
| Relevant manuals | MELSEC-L Analog Input/Output Module User's Manual  |   |  |  |
|                  | MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)  |   |  |  |
|                  | GX Works2 Version 1 Operating Manual (Common)  |   |  |  |
|                  | <ul> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>  |   |  |  |

### •Error code list

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



# Labels

# Input labels

| Name (Comment)    | Label name    | Data type | Setting range                 | Description              |
|-------------------|---------------|-----------|-------------------------------|--------------------------|
| Execution command | FB_EN         |           | ON, OFF                       | ON: The FB is activated. |
|                   |               | Bit       |                               | OFF: The FB is not       |
|                   |               |           |                               | activated.               |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O point      | Specify the start XY     |
| address           |               |           | range of the CPU.             | address (in hexadecimal) |
|                   |               | Word      | For details, refer to the CPU | where the L60AD2DA2 is   |
|                   |               |           | user's manual.                | connected. (For example, |
|                   |               |           |                               | enter H10 for X10.)      |
| Target CH         | i_CH          | Word      | 1, 2                          | Specify the channel      |
|                   |               | word      |                               | number.                  |

#### Output labels

|                     | •          |           |               |   |
|---------------------|------------|-----------|---------------|---|
| Name (Comment)      | Label name | Data type | Initial value | Description                             |
| Execution status    | FB_ENO     | Dit       | Bit OFF       | ON: Execution command is ON.            |
|                     |            | ы         |               | OFF: Execution command is OFF.          |
| Completed without   | FB_OK      | Dit       | Bit OFF       | When ON, it indicates that the A/D      |
| error               |            | DIL       |               | 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 |
|                     |            | ы         |               | 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.



## 2.1.2. M+L60AD2DA2\_AD\_ReadAllADVal (Read A/D conversion data (all CHs))

#### FB Name

M+L60AD2DA2\_AD\_ReadAllADVal

| Item                | Description  |   |  |  |  |
|---------------------|--|---|--|--|--|
| Function overview   | Reads the A/D conversion   | Reads the A/D conversion data of the A/D conversion channels (CH1 and CH2). |  |  |  |
| Symbol              | M+L60AD2DA2_AD_ReadAllADVal  |   |  |  |  |
|                     | Execution command — B  | : FB_EN   | FB_ENO : B Execution status                |  |  |
|                     | Module start XY address  | /:i_Start_IO_No   | FB_OK : B Completed without error          |  |  |
|                     |  | 0_/   | AD_Value_CH1 : W—CH1 A/D conversion data   |  |  |
|                     |  | 0_/   | AD_Value_CH2 : W—CH2 A/D conversion data   |  |  |
|                     |  |   | FB_ERROR : B Error flag                    |  |  |
|                     |  |   | ERROR_ID : W Error code                    |  |  |
|                     | L  |   |  |  |  |
| Applicable hardware | Analog I/O module  | le L60AD2DA2  |  |  |  |
| and software        | CPU module   |   |  |  |  |
|                     |  | Series  | Model                                      |  |  |
|                     |  | MELSEC-L Series   | LCPU                                       |  |  |
|                     | Engineering software   | GX Works2 *1  |  |  |  |
|                     |  | Language  | Software version                           |  |  |
|                     |  | English version   | Version1.24A or later                      |  |  |
|                     |  | Chinese version   | Version1.49B or later                      |  |  |
|                     |  | *1 For software version   | s applicable to the modules used, refer to |  |  |
|                     |  | "Relevant manuals".   |  |  |  |
| Programming         | Ladder   |   |  |  |  |
| language            |  |   |  |  |  |
| Number of steps     | 280 steps (for MELSEC-L series CPU)  |   |  |  |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |   |  |  |  |
|                     | input and output definition.   |   |  |  |  |



| 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.  |  |
|                      | 2) The read A/D conversion data depends on the settings of the input range and the                                      |  |
|                      | averaging processing function.  |  |
|                      | 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.  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do                                |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,   |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |
|                      | 4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an                                |  |
|                      | interrupt program.  |  |
|                      | 5) Every input must be provided with a value for proper FB operation  |  |
|                      | 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.  |  |
|                      | 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]  |  |
|                      | FB_EN   |  |
|                      | (Execution command)<br>FB_ENO   |  |
|                      | (Execution status)<br>o_AD_Value_CH Update Update Update Update Stopped Update  |  |
|                      | (CH□ A/D conversion data) stopped Solving speare stopped  |  |
|                      | (Completed without error)   |  |
|                      | FB_ERROR (Error flag) ERROR_ID (Error code) 0   |  |
| Delevent menuele     |   |  |
| Relevant manuals     | MELSEC-L Analog Input/Output Module User's Manual   |  |
|                      | MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |  |
|                      | GX Works2 Version 1 Operating Manual (Common)     GX Works2 Version 1 Operating Manual (Simple Project, Eurotian Plack) |  |
|                      | 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     | Input labels  |           |                    |                                  |
|-------------------|---------------|-----------|--------------------|----------------------------------|
| Name (Comment)    | Label name    | Data type | Setting range      | Description                      |
| Execution command | FB_EN         | Bit       | ON, OFF            | ON: The FB is activated.         |
|                   |               | DIL       |                    | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No |           | Depends on the     | Specify the start XY address (in |
| address           |               |           | I/O point range    | hexadecimal) where the           |
|                   |               | Word      | of the CPU.        | L60AD2DA2 is connected. (For     |
|                   |               | vvoru     | For details, refer | example, enter H10 for X10.)     |
|                   |               |           | to the CPU         |                                  |
|                   |               |           | user's manual.     |                                  |

# Output labels

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



# 2.1.3. M+L60AD2DA2\_AD\_ReadScalingVal (Read A/D conversion scaling value)

### FB Name

M+L60AD2DA2\_AD\_ReadScalingVal

| Item                | Description  |                          |  |  |
|---------------------|--|--------------------------|--|--|
| Function overview   | Reads the scaling value of the specified A/D conversion channel (CH1 or CH2).          |                          |  |  |
| Symbol              | M+L60AD2DA2_AD_ReadScalingVal  |                          |  |  |
|                     | Execution command — I  |                          | FB_ENO : B Execution status                |  |
|                     | Module start XY address —  | <i>N</i> : i_Start_IO_No | FB_OK : B—Completed without error          |  |
|                     | Target CH-V  | W : i_CH                 | o_Scaling_Value : W—Scaling value          |  |
|                     |  |                          | FB_ERROR : B Error flag                    |  |
|                     |  |                          | ERROR_ID : W Error code                    |  |
|                     | L  |                          |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                |  |  |
| and software        | CPU module   |                          |  |  |
|                     |  | Series                   | Model                                      |  |
|                     |  | MELSEC-L Series          | LCPU                                       |  |
|                     | Engineering software   | GX Works2 *1             |  |  |
|                     |  | Language                 | Software version                           |  |
|                     |  | English version          | Version1.24A or later                      |  |
|                     |  | Chinese version          | Version1.49B or later                      |  |
|                     |  | *1 For software version  | s applicable to the modules used, refer to |  |
|                     |  | "Relevant manuals".      |  |  |
| Programming         | Ladder   |                          |  |  |
| language            |  |                          |  |  |
| Number of steps     | 365 steps (for MELSEC-   | ,                        |  |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                          |  |  |
|                     | input and output definit   | ION.                     |  |  |



| 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.  |
|                      | 2) The read scaling value depends on the setting of the input range, the averaging                |
|                      | processing function, and the scaling function (A/D conversion).                                   |
|                      | 3) In the following cases, the scaling data is not read.  |
|                      | <ul> <li>When the A/D conversion scaling enable/disable setting (Un\G53) the specified</li> </ul> |
|                      | channel is invalid  |
|                      | <ul> <li>When the A/D conversion completed flag (XnE) is OFF</li> </ul>                           |
|                      | 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).  |
|                      | Refer to the error code explanation section for details.  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery                  |
| precautions          | processing separately in accordance with the required system operation.                           |
|                      | 2) The FB cannot be used in an interrupt program.   |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.             |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,                  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition           |
|                      | of the target channel.  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an           |
|                      | interrupt program.  |
|                      | 6) Every input must be provided with a value for proper FB operation                              |
|                      | 7) 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.  |
|                      | 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]         FB_EN<br>(Execution command)         FB_ENO<br>(Execution status)         o_Scaling_Value<br>(Scaling value)         FB_OK<br>(Completed without error)         FB_EROR (Error flag)         ERROR ID (Error code) | [When an error occurs]         FB_EN         (Execution command)         FB_ENO         (Execution status)         o_Scaling_Value         (Scaling value)         FB_OK         (Completed without error)         FB_ERROR (Error flag) |  |  |
|                  |   | ERROR_ID (Error code) 0 Error code 0   |  |  |
| Relevant manuals | MELSEC-L Analog Input/Output Module User's Manual   |  |  |  |
|                  | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |  |  |  |
|                  | <ul> <li>GX Works2 Version 1 Operating Manual (Common)</li> </ul>   |  |  |  |
|                  | • GX Works2 Version 1 Operating Manual (Si  | mple Project, Function Block)  |  |  |

### •Error code list

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



# Labels

# Input labels

| Name (Comment)    | Label name    | Data type | Setting range         | Description                      |
|-------------------|---------------|-----------|-----------------------|----------------------------------|
| Execution command | FB_EN         | Bit       | ON, OFF               | ON: The FB is activated.         |
|                   |               | DIL       |                       | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in |
| address           |               |           | point range of the    | hexadecimal) where the           |
|                   |               | Word      | CPU.                  | L60AD2DA2 is connected. (For     |
|                   |               |           | For details, refer to | example, enter H10 for X10.)     |
|                   |               |           | the CPU user's        |                                  |
|                   |               |           | manual.               |                                  |
| 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          | Dit       | Bit OFF       | ON: Execution command is ON.                 |
|                   |                 | ы         |               | OFF: Execution command is OFF.               |
| Completed without | FB_OK           | Dit       | Bit OFF       | When ON, it indicates that the scaling value |
| error             |                 | DIL       |               | 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      |
|                   |                 | DIL       |               | 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.



# 2.1.4. M+L60AD2DA2\_AD\_ReadAllScalingVal (Read A/D conversion scaling value (all CHs))

### FB Name

M+L60AD2DA2\_AD\_ReadAllScalingVal

| Item                | Description  |                           |   |  |  |
|---------------------|--|---------------------------|---|--|--|
| Function overview   | Reads the scaling values of the A/D conversion channels (CH1 and CH2). |                           |   |  |  |
| Symbol              | M+L60AD2DA2_AD_ReadAllScalingVal                                       |                           |   |  |  |
|                     | Execution command —  | B : FB_EN                 | FB_ENO : B Execution status                 |  |  |
|                     | Module start XY address -  | W:i_Start_IO_No           | FB_OK : B Completed without error           |  |  |
|                     |  |                           | o_Scaling_CH1:W—CH1 Scaling value           |  |  |
|                     |  |                           | o_Scaling_CH2:W—CH2 Scaling value           |  |  |
|                     |  |                           | FB_ERROR : B Error flag                     |  |  |
|                     |  |                           | ERROR_ID : W Error code                     |  |  |
|                     |  |                           |   |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                 |   |  |  |
| and software        | CPU module   |                           |   |  |  |
|                     |  | Series                    | Model                                       |  |  |
|                     |  | MELSEC-L Series           | LCPU  |  |  |
|                     |  |                           |   |  |  |
|                     | Engineering software   | GX Works2 *1              |   |  |  |
|                     |  | Language                  | Software version                            |  |  |
|                     |  | English version           | Version1.24A or later                       |  |  |
|                     |  | Chinese version           | Version1.49B or later                       |  |  |
|                     |  | *1 For software version   | ns applicable to the modules used, refer to |  |  |
|                     |  | "Relevant manuals"        |   |  |  |
| Programming         | Ladder   |                           |   |  |  |
| language            |  |                           |   |  |  |
| Number of steps     | 312 steps (for MELSEC  | C-L series CPU)           |   |  |  |
|                     | * The number of steps of   | of the FB in a program de | epends 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 scaling values of the A/D conversion   |  |  |  |  |
|                      | channels (CH1 and CH2) are read.   |  |  |  |  |
|                      | 2) The read scaling value depends on the setting of the input range, the averaging   |  |  |  |  |
|                      | processing function, and the scaling function (A/D conversion).  |  |  |  |  |
|                      | 3) The scaling value of the channel for which the A/D conversion scaling enable/disable  |  |  |  |  |
|                      | setting (Un\G53) is invalid is not read.   |  |  |  |  |
|                      | 4) When the A/D conversion completed flag (XnE) is OFF, the scaling values of the  |  |  |  |  |
|                      | channels (CH1 and CH2) are not read.   |  |  |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery   |  |  |  |  |
| precautions          | processing separately in accordance with the required system operation.  |  |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.  |  |  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.  |  |  |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,   |  |  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.  |  |  |  |  |
|                      | 4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an   |  |  |  |  |
|                      | interrupt program.   |  |  |  |  |
|                      | 5) Every input must be provided with a value for proper FB operation   |  |  |  |  |
|                      | 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.   |  |  |  |  |
|                      | 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]   |  |  |  |  |
|                      | FB_EN<br>(Execution command)     FB_ENO<br>(Execution status)<br>o_Scaling_CHD<br>(CHD Scaling value)     Update<br>Update<br>Stopped     Update<br>Stopped       FB_OK<br>(Completed without error)     FB_ERROR (Error flag)     0 |  |  |  |  |



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

| 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.         |
|                   |               | ы         |                       | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in |
| address           |               |           | point range of the    | hexadecimal) where the           |
|                   |               | Word      | CPU.                  | L60AD2DA2 is connected. (For     |
|                   |               | vvora     | For details, refer to | example, enter H10 for X10.)     |
|                   |               |           | the CPU user's        |                                  |
|                   |               |           | manual.               |                                  |

### Output labels

| Name (Comment)    | Label name    | Data type | Initial value  | Description                                  |
|-------------------|---------------|-----------|----------------|--|
| Execution status  | FB_ENO        | Dit       | Bit OFF        | ON: Execution command is ON.                 |
|                   |               | DIL       |                | OFF: Execution command is OFF.               |
| Completed without | FB_OK         | Bit       | OFF            | When ON, it indicates that the scaling value |
| error             |               | BIT       | 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      |
|                   |               | DIL       | OFF            | 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.



# 2.1.5. M+L60AD2DA2\_AD\_SetADConversion (A/D conversion enable/disable setting)

#### FB Name

M+L60AD2DA2\_AD\_SetADConversion

| Item                | Description   |  |  |  |  |
|---------------------|---|--|--|--|--|
| Function overview   | 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).                                  |  |  |  |  |
| Symbol              | Module start XY ac  | nmand — B:FB_EN<br>ddress — W:i_Start_IO_No<br>get CH — W:i_CH | AD_SetADConversion<br>FB_ENO : B — Execution status<br>FB_OK : B — Completed without error<br>FB_ERROR : B — Error flag<br>ERROR_ID : W — Error code |  |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2  |  |  |  |
| and software        | CPU module  |  |  |  |  |
|                     |   | Series   | Model  |  |  |
|                     |   | MELSEC-L Series  | LCPU   |  |  |
|                     | Engineering software  | GX Works2 *1   |  |  |  |
|                     |   | Language   | Software version   |  |  |
|                     |   | English version  | Version1.24A or later  |  |  |
|                     |   | Chinese version  | Version1.49B or later  |  |  |
|                     |   | *1 For software version:<br>"Relevant manuals".                | s applicable to the modules used, refer to   |  |  |
| Programming         | Ladder  |  |  |  |  |
| language            |   |  |  |  |  |
| Number of steps     | 385 steps (for MELSEC-L series CPU)   |  |  |  |  |
|                     | * The number of steps o   | f the FB in a program dep                                      | pends on the CPU model that is used and  |  |  |
|                     | input and output definit  | tion.  |  |  |  |



| 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.  |  |  |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |  |  |  |  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)   |  |  |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB                                      |  |  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |  |  |
|                      | 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).  |  |  |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |  |  |
| Compiling method     | Macro type  |  |  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |  |  |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |  |  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |  |  |
|                      | <ol> <li>When two or more of these FBs are used, precaution must be taken to avoid repetition<br/>of the target channel.</li> </ol> |  |  |  |  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.                          |  |  |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation  |  |  |  |  |
|                      | 7) 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.  |  |  |  |  |
|                      | 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>FB_EN (Execution command)<br>FB_ENO (Execution status)<br>A/D conversion enable/disable   | [When an error occurs]<br>FB_EN<br>(Execution command)<br>FB_ENO<br>(Execution status)  |  |  |
|                  | ADD conversion enable/usable     No processing     Write     No processing       FB_OK<br>(Completed without error)     FB_ERROR (Error flag)     Image: Complete and the second sec | A/D conversion enable/       disable setting writing processing       FB_OK       (Completed without error)       FB_ERROR (Error flag)       ERROR_ID (Error code)       0 |  |  |
| Relevant manuals | MELSEC-L Analog Input/Output Module Use   | er's Manual   |  |  |
|                  | • MELSEC-L CPU Module User's Manual (Ha   | ardware Design, Maintenance and Inspection)   |  |  |
|                  | <ul> <li>GX Works2 Version 1 Operating Manual (Common)</li> </ul>   |   |  |  |
|                  | • GX Works2 Version 1 Operating Manual (Si  | mple Project, Function Block)   |  |  |

### •Error code list

| Error code   | Description                                  | Action   |
|--------------|--|--|
| 10 (Decimal) | The specified channel is not valid. The      | Please try again after confirming the setting. |
|              | target channel is not within the range of 1, |  |
|              | 2, or 15.                                    |  |

# Labels

### Input labels

| Name (Comment)    | Label name    | Data | Setting range             | Description                           |
|-------------------|---------------|------|---------------------------|---------------------------------------|
|                   |               | type |                           |                                       |
| Execution command | FB_EN         | Bit  | ON, OFF                   | ON: The FB is activated.              |
|                   |               | ы    |                           | OFF: The FB is not activated.         |
| Module start XY   | i_Start_IO_No |      | Depends on the I/O        | Specify the start XY address (in      |
| address           |               |      | point range of the        | hexadecimal) where the L60AD2DA2      |
|                   |               | Word | CPU.                      | is connected. (For example, enter H10 |
|                   |               |      | For details, refer to the | for X10.)                             |
|                   |               |      | CPU user's manual.        |                                       |
| Target CH         | i_CH          | Mord | 1, 2, 15                  | 1 or 2: Specify the channel number.   |
|                   |               | Word |                           | 15: Specify channel 1 and channel 2.  |
| A/D conversion    | i_AD_Enable   |      | ON, OFF                   | ON: A/D conversion enabled            |
| enable/disable    |               | Bit  |                           | OFF: A/D conversion disabled          |
| setting           |               |      |                           |                                       |



#### Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                               |
|-------------------|------------|-----------|---------------|---|
| Execution status  | FB_ENO     | Bit       | OFF           | ON: Execution command is ON.              |
|                   |            | DIL       |               | OFF: Execution command is OFF.            |
| Completed without | FB_OK      | Bit       | OFF           | When ON, it indicates that the conversion |
| error             |            | DIL       | OFF           | enable/disable setting is completed.      |
| Error flag        | FB_ERROR   | Bit       | OFF           | When ON, it indicates that an error has   |
|                   |            | DIL       |               | 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.



## 2.1.6. M+L60AD2DA2\_AD\_SetAverage (A/D conversion averaging process setting)

#### FB Name

M+L60AD2DA2\_AD\_SetAverage

| Item                | Description   |                                 |  |
|---------------------|---|---------------------------------|--|
| Function overview   | Sets the averaging processing of the specified A/D conversion channel (CH1 or CH2). |                                 |  |
| Symbol              | M+L60AD2DA  |                                 | AD_SetAverage                              |
|                     | Execution comm  | mand B : FB_EN                  | FB_ENO : B — Execution status              |
|                     | Module start XY add   | dress—W:i_Start_IO_No           | FB_OK : B — Completed without error        |
|                     | Targe   | et CH—W:i_CH                    | FB_ERROR : B - Error flag                  |
|                     |   | etting-W:i_Average_Type         | ERROR_ID : W — Error code                  |
|                     | Time average/Count average/Mo<br>ave  | ovingW:i_Average_Times<br>erage |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2                       |  |
| and software        | CPU module  |                                 |  |
|                     |   | Series                          | Model                                      |
|                     |   | MELSEC-L Series                 | LCPU                                       |
|                     | Engineering software  | GX Works2 *1                    |  |
|                     |   | Language                        | Software version                           |
|                     |   | English version                 | Version1.24A or later                      |
|                     |   | Chinese version                 | Version1.49B or later                      |
|                     |   | *1 For software version         | s applicable to the modules used, refer to |
|                     |   | "Relevant manuals".             |  |
| Programming         | Ladder  | ·                               |  |
| language            |   |                                 |  |
| Number of steps     | 421 steps (for MELSEC-I   | L series CPU)                   |  |
|                     | * The number of steps of  | the FB in a program depe        | ends on the CPU model that is used and     |
|                     | input and output definiti   | on.                             |  |



| 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.   |  |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |  |  |  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)   |  |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB  |  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |  |
|                      | 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).   |  |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |  |
| Compiling method     | Macro type  |  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |  |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |  |
|                      | When two or more of these FBs are used, precaution must be taken to avoid repetition  |  |  |  |
|                      | of the target channel.  |  |  |  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an   |  |  |  |
|                      | interrupt program.  |  |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation  |  |  |  |
|                      | 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.  |  |  |  |
|                      | 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]   |  |  |  |
|                      | FB_EN (Execution command)   |  |  |  |
|                      | FB_ENO (Execution status)     FB_ENO (Execution status)   |  |  |  |
|                      | Averaging process setting<br>writing processing         No processing         Write         No processing         Averaging process setting<br>writing processing         Averaging process setting |  |  |  |
|                      | FB_OK     FB_OK       (Completed without error)     FB_OK   |  |  |  |
|                      | FB_ERROR (Error flag)     FB_ERROR (Error flag)       FBDDD ID (Frame da)     FBDDD ID (Frame da)   |  |  |  |
|                      | ERROR_ID (Error code)     0     ERROR_ID (Error code)     0     Error code     0  |  |  |  |



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

## ●Error code list

| Error code   | Description                                 | Action   |
|--------------|---|--|
| 10 (Decimal) | The specified channel is not valid. The     | Please try again after confirming the setting. |
|              | target channel is not within the range of 1 |  |
|              | or 2.                                       |  |
| 11 (Decimal) | The specified averaging processing type is  | Please try again after confirming the setting. |
|              | not valid. The averaging processing type is |  |
|              | not set within the range of 0 to 3H.        |  |



# Labels

# Input labels

| Name (Comment)     | Label name      | Data type | Setting range         | Description                      |
|--------------------|-----------------|-----------|-----------------------|----------------------------------|
| Execution command  | FB_EN           |           | ON, OFF               | ON: The FB is activated.         |
|                    |                 | Bit       |                       | OFF: The FB is not activated.    |
| Module start XY    | i_Start_IO_No   |           | Depends on the I/O    | Specify the start XY address (in |
| address            |                 |           | point range of the    | hexadecimal) where the           |
|                    |                 | Word      | CPU.                  | L60AD2DA2 is connected. (For     |
|                    |                 | vvora     | For details, refer to | example, enter H10 for X10.)     |
|                    |                 |           | the CPU user's        |                                  |
|                    |                 |           | manual.               |                                  |
| Target CH          | i_CH            | Word      | 1, 2                  | Specify the channel number.      |
| Averaging process  | i_Average_Type  |           | 0H: Sampling          | Specify the averaging processing |
| setting            |                 |           | processing            | type.                            |
|                    |                 | Word      | 1H: Time average      |                                  |
|                    |                 |           | 2H: Count average     |                                  |
|                    |                 |           | 3H: Moving average    |                                  |
| Time average/Count | i_Average_Times |           | Time average          | Set the time average, count      |
| average/Moving     |                 |           | 2 to 5000 (ms)        | average, and moving average of   |
| average            |                 | Word      | Count average         | the channel specified for the    |
|                    |                 | VVOIU     | 4 to 65000 (times)    | averaging processing.            |
|                    |                 |           | Moving average        |                                  |
|                    |                 |           | 2 to 1000 (times)     |                                  |

## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                              |
|-------------------|------------|-----------|---------------|--|
| Execution status  | FB_ENO     | Bit OFF   |               | ON: Execution command is ON.             |
|                   |            |           |               | OFF: Execution command is OFF.           |
| Completed without | FB_OK      | Dit       | 055           | When ON, it indicates that the averaging |
| error             |            | Bit OFF   |               | 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.



# 2.1.7. M+L60AD2DA2\_AD\_SetScaling (A/D conversion scaling setting)

#### FB Name

M+L60AD2DA2\_AD\_SetScaling

| Item                | Description  |  | Description   |                                   |  |  |  |
|---------------------|--|--|---------------|-----------------------------------|--|--|--|
| Function overview   | Sets the scaling of the specified A/D conversion channel (CH1 or CH2).   |  |               |                                   |  |  |  |
| Symbol              |  | M+L60AD2DA2_AD_SetScaling                                      |               |                                   |  |  |  |
|                     |  | command — B : FB_EN  |               | FB_ENO : B Execution status       |  |  |  |
|                     | Module start XY addr   | Module start XY address —W:i_Start_IO_No                       |               | FB_OK : B Completed without error |  |  |  |
|                     | Target   | Target CH—W:i_CH   |               | FB_ERROR : B Error flag           |  |  |  |
|                     | A/D conversion scaling enable/disa   | on scaling enable/disable — B:i_Scaling_Enable                 |               | ERROR_ID : W—Error code           |  |  |  |
|                     | A/D conversion scaling upper limit va  | conversion scaling upper limit value — W:i_Scl_U_Lim           |               |                                   |  |  |  |
|                     | A/D conversion scaling lower limit va  | alue —   | W:i_Scl_L_Lim |                                   |  |  |  |
|                     |  |  |               |                                   |  |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2  |               |                                   |  |  |  |
| and software        | CPU module   |  |               |                                   |  |  |  |
|                     |  |  | Series        | Model                             |  |  |  |
|                     |  | MELSEC-L Series  |               | LCPU                              |  |  |  |
|                     |  |  |               |                                   |  |  |  |
|                     | Engineering software   | GX Works2 *1   |               |                                   |  |  |  |
|                     |  | Language<br>English version<br>Chinese version                 |               | Software version                  |  |  |  |
|                     |  |  |               | Version1.24A or later             |  |  |  |
|                     |  |  |               | Version1.49B or later             |  |  |  |
|                     |  | *1 For software versions applicable to the modules used, refer |               |                                   |  |  |  |
|                     |  | to "Relevant manuals".   |               |                                   |  |  |  |
| Programming         | Ladder   |  |               |                                   |  |  |  |
| language            |  |  |               |                                   |  |  |  |
| Number of steps     | <ul> <li>375 steps (for MELSEC-L series CPU)</li> <li>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</li> </ul> |  |               |                                   |  |  |  |
|                     |  |  |               |                                   |  |  |  |
|                     |  |  |               |                                   |  |  |  |



| Item                 | Description   |  |  |  |  |
|----------------------|---|--|--|--|--|
| Function description | By turning ON FB_EN (Execution command), the scaling of the specified A/D   |  |  |  |  |
|                      | conversion channel (CH1 or CH2) is set.   |  |  |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |  |  |  |  |
|                      | The setting value is validated when the Operating condition setting request signal (Yn  |  |  |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB  |  |  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |  |  |
|                      | 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).   |  |  |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |  |  |
| Compiling method     | Macro type  |  |  |  |  |
| Restrictions and     | ) The FB does not include error recovery processing. Program the error recovery   |  |  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |  |  |
|                      | B) 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,<br>FOR-NEXT loop because it is impossible to turn OFF.   |  |  |  |  |
|                      |   |  |  |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition   |  |  |  |  |
|                      | of the target channel.  |  |  |  |  |
|                      | <ul> <li>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.</li> <li>6) Every input must be provided with a value for proper FB operation.</li> <li>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.</li> <li>For details on how to use the intelligent function module switch setting, refer to GX</li> </ul> |  |  |  |  |
|                      |   |  |  |  |  |
|                      |   |  |  |  |  |
|                      |   |  |  |  |  |
|                      |   |  |  |  |  |
|                      |   |  |  |  |  |
|                      | 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]   |  |  |  |  |
|                      | FB_EN (Execution command)   |  |  |  |  |
|                      | FB_ENO (Execution status)   |  |  |  |  |
|                      | Scaling function setting<br>writing processing Write No processing FB_ENO<br>(Execution status)   |  |  |  |  |
|                      | FB_OK Scaling function setting writing processing No processing   |  |  |  |  |
|                      | (Completed without error)<br>FB_ERROR (Error flag) FB_CK<br>(Completed without error)   |  |  |  |  |
|                      | ERROR_ID (Error code) 0 FB_ERROR (Error flag) 0 ERPOR_ID (Error code) 0 Error code  |  |  |  |  |
|                      | ERROR_ID (Error code) 0 Error code 0  |  |  |  |  |



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

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



# Input labels

| Name (Comment)      | Label name       | Data type | Setting range      | Description                        |
|---------------------|------------------|-----------|--------------------|------------------------------------|
| Execution command   | FB_EN            | Bit       | ON, OFF            | ON: The FB is activated.           |
|                     |                  | ы         |                    | OFF: The FB is not activated.      |
| Module start XY     | i_Start_IO_No    |           | Depends on the     | Specify the start XY address (in   |
| address             |                  |           | I/O point range    | hexadecimal) where the             |
|                     |                  | Word      | of the CPU.        | L60AD2DA2 is connected. (For       |
|                     |                  | vvoru     | For details, refer | example, enter H10 for X10.)       |
|                     |                  |           | to the CPU         |                                    |
|                     |                  |           | user's manual.     |                                    |
| Target CH           | i_CH             | Word      | 1, 2               | Specify the channel number.        |
| A/D conversion      | i_Scaling_Enable |           | ON, OFF            | ON: Enabled                        |
| scaling             |                  | Bit       |                    | OFF: Disabled                      |
| enable/disable      |                  |           |                    |                                    |
| A/D conversion      | i_Scl_U_Lim      |           | -32,000 to         | Specify the A/D conversion scaling |
| scaling upper limit |                  | Word      | 32,000             | upper limit value.                 |
| value               |                  |           |                    |                                    |
| A/D conversion      | i_Scl_L_Lim      |           | -32,000 to         | Specify the A/D conversion scaling |
| scaling lower limit |                  | Word      | 32,000             | lower limit value.                 |
| value               |                  |           |                    |                                    |

# Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                              |  |
|-------------------|------------|-----------|---------------|--|--|
| Execution status  | FB_ENO     |           |               | ON: Execution command is ON.             |  |
|                   |            | Bit       | OFF           | OFF: Execution command is OFF.           |  |
| Completed without | FB_OK      |           | 055           | When ON, it indicates that the A/D       |  |
| error             |            | Bit       | OFF           | conversion scaling setting is completed. |  |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has  |  |
|                   |            | DIL       | OFF           | 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.



# 2.1.8. M+L60AD2DA2\_AD\_SetInputSignalErr (A/D conversion input signal error detection setting)

### FB Name

M+L60AD2DA2\_AD\_SetInputSignalErr

| Item                    | Description   |  |  |
|-------------------------|---|--|--|
| Function overview       | Sets the input signal error detection of the specified A/D conversion channel (CH1 or CH2). |  |  |
| Symbol                  | M+L60AD2DA2_AD_SetInputSignalErr<br>Execution command B : FB_EN FB_ENO : B Execution status |  |  |
|                         |   | ′ address — W:i_Start_IO_No                                    | FB_OK : B — Completed without error        |
|                         |   | arget CH—W:i_CH  | FB_ERROR : B Error flag                    |
|                         |   | on setting — W:i_Sig_Err_Type<br>ing value — W:i_Sig_Err_Level | ERROR_ID : W—Error code                    |
| Applicable hardware     | Analog I/O module   | L60AD2DA2  |  |
| and software            | CPU module  |  |  |
|                         |   | Series   | Model                                      |
|                         |   | MELSEC-L Series  | LCPU                                       |
|                         | Engineering software  | GX Works2 *1   |  |
|                         |   | Language   | Software version                           |
|                         |   | English version  | Version1.24A or later                      |
|                         |   | Chinese version  | Version1.49B or later                      |
|                         |   | *1 For software version<br>"Relevant manuals".                 | s applicable to the modules used, refer to |
| Programming<br>language | Ladder  |  |  |
| Number of steps         | 398 steps (for MELSEC   | -L series CPU)   |  |
|                         | * The number of steps of  | of the FB in a program de                                      | pends on the CPU model that is used and    |
|                         | input and output defini   | ition.   |  |



| 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.   |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |  |  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)   |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |
|                      | 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).   |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |
| Compiling method     | Macro type  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition   |  |  |
|                      | of the target channel.  |  |  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an   |  |  |
|                      | <ul><li>interrupt program.</li><li>Every input must be provided with a value for proper FB operation.</li></ul>   |  |  |
|                      |   |  |  |
|                      | 7) To operate the L60AD2DA2, set the I/O range according to the device and system to be<br>connected. Configure the setting in Switch Setting of GX Works2 according to the |  |  |
|                      | application.  |  |  |
|                      | 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]   |  |  |
|                      | FB_EN (Execution command)   |  |  |
|                      | (Execution command)   |  |  |
|                      | Input signal error detection status)  |  |  |
|                      | FB_OK Input signal error detection No processing No processing  |  |  |
|                      | (Completed without error) FB_ERROR (Error flag) FB_OK (Completed without error)   |  |  |
|                      | ERROR_ID (Error code) 0 FB_ERROR (Error flag)   |  |  |
|                      | ERROR_ID (Error code) 0 Error code 0  |  |  |



| Item             | Description   |
|------------------|---|
| Relevant manuals | MELSEC-L Analog Input/Output Module User's Manual                                 |
|                  | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) |
|                  | GX Works2 Version 1 Operating Manual (Common)                                     |
|                  | 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                                    | Please try again after confirming the |
|                  | channel is not within the range of 1 or 2.  | setting.                              |
| 11 (Decimal)     | The input signal error detection setting is not Please try again after confirming |                                       |
|                  | valid. The input signal error detection setting is setting.                       |                                       |
|                  | not within the range of 0 to 4.   |                                       |



## Input labels

| Name               | Label name      | Data type | Setting range             | Description                           |
|--------------------|-----------------|-----------|---------------------------|---------------------------------------|
| (Comment)          |                 |           |                           |                                       |
| Execution          | FB_EN           | Bit       | ON, OFF                   | ON: The FB is activated.              |
| command            |                 | DIL       |                           | OFF: The FB is not activated.         |
| Module start XY    | i_Start_IO_No   |           | Depends on the I/O        | Specify the start XY address (in      |
| address            |                 | Word      | point range of the CPU.   | hexadecimal) where the                |
|                    |                 | vvoru     | For details, refer to the | L60AD2DA2 is connected. (For          |
|                    |                 |           | CPU user's manual.        | example, enter H10 for X10.)          |
| Target CH          | i_CH            | Word      | 1, 2                      | Specify the channel number.           |
| Input signal error | i_Sig_Err_Type  |           | 0H: Disabled              | Set the input signal error detection. |
| detection setting  |                 |           | 1H: Upper lower limit     |                                       |
|                    |                 |           | detection                 |                                       |
|                    |                 | Word      | 2H: Lower limit detection |                                       |
|                    |                 |           | 3H: Upper limit detection |                                       |
|                    |                 |           | 4H: Disconnection         |                                       |
|                    |                 |           | detection                 |                                       |
| Input signal error | i_Sig_Err_Level |           | 0 to 250                  | Specify the input signal error        |
| detection setting  |                 | Word      | (unit: 0.1%)              | detection setting value.              |
| value              |                 |           |                           |                                       |

## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                                 |  |
|-------------------|------------|-----------|---------------|---|--|
| Execution status  | FB_ENO     | Bit OFF C |               | ON: Execution command is ON.                |  |
|                   |            | DIL       | OFF           | OFF: Execution command is OFF.              |  |
| Completed without | FB_OK      | Dit       | OFF           | When ON, it indicates that the input signal |  |
| error             |            | Bit OFF   |               | error detection setting is completed.       |  |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has     |  |
|                   |            | DIL       | OFF           | 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.



## 2.1.9. M+L60AD2DA2\_AD\_SetOffsetVal (A/D conversion offset setting)

### FB Name

M+L60AD2DA2\_AD\_SetOffsetVal

| Item                | Description   |                             |                       |                                      |
|---------------------|---|-----------------------------|-----------------------|--------------------------------------|
| Function overview   | Sets the offset of the specified A/D conversion channel (CH1 or CH2).                       |                             |                       |                                      |
| Symbol              |   | M+L60AD2DA2_AD_SetOffsetVal |                       |                                      |
|                     | Execution command -   | B : FB_EN                   | FB_ENO : B            | <ul> <li>Execution status</li> </ul> |
|                     | Module start XY address -   | W : i_Start_IO_No           | FB_OK : B             | — Completed without error            |
|                     | Target CH-  | W:i_CH                      | FB_ERROR : B          | —Error flag                          |
|                     | User range write command -  | B : i_Write_Offset          | ERROR_ID : W          | -Error code                          |
|                     |   |                             |                       |                                      |
| Applicable hardware | Analog I/O module   | L60AD2DA2                   |                       |                                      |
| and software        | CPU module  |                             |                       |                                      |
|                     |   | Series                      | Мо                    | del                                  |
|                     |   | MELSEC-L Series             | LCPU                  |                                      |
|                     | Engineering software  | GX Works2 *1                |                       |                                      |
|                     |   | Language                    | Software              | e version                            |
|                     |   | English version             | Version1.24A or lat   | ter                                  |
|                     |   | Chinese version             | Version1.49B or la    | ter                                  |
|                     |   | *1 For software versions    | s applicable to the m | nodules used, refer to               |
|                     |   | "Relevant manuals".         |                       |                                      |
| Programming         | Ladder  |                             |                       |                                      |
| language            |   |                             |                       |                                      |
| Number of steps     | 491 steps (for MELSEC-L series CPU)   |                             |                       |                                      |
|                     | $^{*}$ The number of steps of the FB in a program depends on the CPU model that is used and |                             |                       |                                      |
|                     | input and output definition.  |                             |                       |                                      |



| 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.  |
|                      | 2) By turning ON the user range write command while FB_EN (Execution command) is ON,      |
|                      | the offset value is written.  |
|                      | 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.                    |
|                      | 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).   |
|                      | Refer to the error code explanation section for details.                                  |
| Compiling method     | Macro type  |



| Item                | Description                                     |   |  |
|---------------------|---|---|--|
| Restrictions and    | 1)  | The FB does not include error recovery processing. Program the error recovery                             |  |
| precautions         |   | processing separately in accordance with the required system operation.                                   |  |
|                     | 2)  | The FB cannot be used in an interrupt program.  |  |
|                     | 3)  | Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do                     |  |
|                     |   | not use this FB in programs that are only executed once such as a subroutine,                             |  |
|                     |   | FOR-NEXT loop because it is impossible to turn OFF.   |  |
|                     | 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.                 |  |
|                     |   | M+L60AD2DA2_AD_SetOffsetVal   |  |
|                     |   | • M+L60AD2DA2_AD_SetGainVal   |  |
|                     |   | M+L60AD2DA2_DA_SetOffsetVal   |  |
|                     |   | • M+L60AD2DA2_DA_SetGainVal   |  |
|                     | 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.  |  |
|                     | 6)  | This FB uses index registers Z7 to Z9. Please do not use these index registers with an interrupt program. |  |
|                     | 7)  | Every input must be provided with a value for proper FB operation.  |  |
|                     | 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.  |  |
|                     | 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.  |  |
|                     |   | 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 | Ref   | er to "Appendix 1. FB Library Application Examples".  |  |



| Item             | Description   |  |  |  |
|------------------|---|--|--|--|
| Timing chart     | [When operation completes without error]         FB_EN<br>(Execution command)<br>FB_ENO<br>(Execution status)         Operation mode         i_Write_Offset<br>(User range write command)         CH□ Offset specification         Channel change request<br>(YnB)         User range write request<br>(YnA)         FB_OK         Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) | [When an error occurs]         FB_EN<br>(Execution command)<br>FB_ENO<br>(Execution status)         Operation mode         i_Write_Offset<br>(User range write command)         CH□ Offset specification<br>Channel change request<br>(YnB)         User range write request<br>(YnB)         User range write request<br>(YnB)         FB_OK<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) |  |  |
| Relevant manuals | <ul> <li>MELSEC-L Analog-Digital Converter Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>   |  |  |  |

# Error codes

•Error code list

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



# Input labels

| Name (Comment)   | Label name     | Data type | Setting range             | Description                      |
|------------------|----------------|-----------|---------------------------|----------------------------------|
| Execution        | FB_EN          | Dit       | ON, OFF                   | ON: The FB is activated.         |
| command          |                | Bit       |                           | OFF: The FB is not activated.    |
| Module start XY  | i_Start_IO_No  |           | Depends on the I/O        | Specify the start XY address (in |
| address          |                | Word      | point range of the CPU.   | hexadecimal) where the           |
|                  |                | vvora     | For details, refer to the | L60AD2DA2 is connected. (For     |
|                  |                |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Target CH        | i_CH           | Word      | 1, 2                      | Specify the channel number.      |
| User range write | i_Write_Offset |           | ON, OFF                   | Turn ON for the adjusted offset  |
| command          |                | Bit       |                           | 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     |           |               | ON: Execution command is ON.            |  |
|                   |            | Bit OFF   |               | OFF: Execution command is OFF.          |  |
| Completed without | FB_OK      | Bit OFF   |               | When ON, it indicates that the A/D      |  |
| error             |            |           |               | conversion offset setting is completed. |  |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has |  |
|                   |            | DIL       |               | 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.



## 2.1.10. M+L60AD2DA2\_AD\_SetGainVal (A/D conversion gain setting)

### FB Name

M+L60AD2DA2\_AD\_SetGainVal

| Item                | Description  |                                     |   |  |  |
|---------------------|--|-------------------------------------|---|--|--|
| Function overview   | Sets the gain of the specified A/D conversion channel (CH1 or CH2).                    |                                     |   |  |  |
| Symbol              |  | M+L60AD2DA2_AD_SetGainVal           |   |  |  |
|                     | Execution command  | B : FB_EN                           | FB_ENO : B — Execution status               |  |  |
|                     | Module start XY address  | —W:i_Start_IO_No                    | FB_OK : B Completed without error           |  |  |
|                     | Target CH-   | —W : i_CH                           | FB_ERROR : B — Error flag                   |  |  |
|                     | User range write command   | B : i_Write_Gain                    | ERROR_ID : W Error code                     |  |  |
|                     |  |                                     |   |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                           |   |  |  |
| and software        | CPU module   |                                     |   |  |  |
|                     |  | Series                              | Model                                       |  |  |
|                     |  | MELSEC-L Series                     | LCPU  |  |  |
|                     | Engineering software   | GX Works2 *1                        |   |  |  |
|                     |  | Language                            | Software version                            |  |  |
|                     |  | English version                     | Version1.24A or later                       |  |  |
|                     |  | Chinese version                     | Version1.49B or later                       |  |  |
|                     |  |                                     | is applicable to the modules used, refer to |  |  |
|                     |  | "Relevant manuals".                 |   |  |  |
| Programming         | Ladder   |                                     |   |  |  |
| language            |  |                                     |   |  |  |
| Number of steps     |  | 474 steps (for MELSEC-L series CPU) |   |  |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                                     |   |  |  |
|                     | input and output definit   | tion.                               |   |  |  |



| 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.   |
|                      | 2) By turning ON the user range write command while FB_EN (Execution command) is ON,       |
|                      | the gain value is written.   |
|                      | 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.                       |
|                      | 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).   |
|                      | Refer to the error code explanation section for details.                                   |
| Compiling method     | Macro type   |



| Item                | Description   |
|---------------------|---|
| Restrictions and    | 1) The FB does not include error recovery processing. Program the error recovery  |
| precautions         | processing separately in accordance with the required system operation.   |
|                     | 2) The FB cannot be used in an interrupt program.   |
|                     | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do  |
|                     | not use this FB in programs that are only executed once such as a subroutine,   |
|                     | FOR-NEXT loop because it is impossible to turn OFF.   |
|                     | 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.   |
|                     | M+L60AD2DA2_AD_SetOffsetVal   |
|                     | M+L60AD2DA2_AD_SetGainVal   |
|                     | M+L60AD2DA2_DA_SetOffsetVal   |
|                     | M+L60AD2DA2_DA_SetGainVal   |
|                     | 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.  |
|                     | <ol> <li>This FB uses index registers Z7 to Z9. Please do not use these index registers with an<br/>interrupt program.</li> </ol> |
|                     | 7) Every input must be provided with a value for proper FB operation.   |
|                     | 3) 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.   |
|                     | 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.  |
|                     | 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   |   |  |  |  |  |
|----------------------|---|---|--|--|--|--|
| Item<br>Timing chart | [When operation completes without error]       [M         FB_EN       [Execution command)         FB_ENO       [Execution status]         Operation mode       [Mormal Mode         i_Write_Gain       [User range write command]         CH□ Gain specification       CH         Channel change request       CH         User range write request       User (YnA) | B_EN         ixecution command)         3_ENO         ixecution status)         peration mode         Write_Gain         Iser range write command)         Iser range write command)         Iser range write request inB)         ser range write request inA)         A |  |  |  |  |
|                      | (Completed without error) (Co<br>FB_ERROR (Error flag) FB   | S_OK<br>completed without error)<br>S_ERROR (Error flag)<br>RROR_ID (Error code)<br>0<br>Error code<br>0  |  |  |  |  |
| Relevant manuals     | MELSEC-L Analog Input/Output Module User's N  | Manual  |  |  |  |  |
|                      | MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |   |  |  |  |  |
|                      | GX Works2 Version 1 Operating Manual (Common)   |   |  |  |  |  |
|                      | • GX Works2 Version 1 Operating Manual (Simple  | e Project, Function Block)  |  |  |  |  |

| Error codes      |   |  |
|------------------|---|--|
| ●Error code list |   |  |
| Error code       | Description                                 | Action   |
| 10 (Decimal)     | The specified channel is not valid. The     | Please try again after confirming the setting. |
|                  | target channel is not within the range of 1 |  |



or 2.

### Input labels

| Name (Comment)   | Label name    | Data type | Setting range             | Description                      |
|------------------|---------------|-----------|---------------------------|----------------------------------|
| Execution        | FB_EN         | D:4       | ON, OFF                   | ON: The FB is activated.         |
| command          |               | Bit       |                           | OFF: The FB is not activated.    |
| Module start XY  | i_Start_IO_No |           | Depends on the I/O        | Specify the start XY address (in |
| address          |               |           | point range of the CPU.   | hexadecimal) where the           |
|                  |               | Word      | For details, refer to the | L60AD2DA2 is connected. (For     |
|                  |               |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Target CH        | i_CH          | Word      | 1, 2                      | Specify the channel number.      |
| User range write | i_Write_Gain  |           | ON, OFF                   | Turn ON for the adjusted gain    |
| command          |               | Bit       |                           | 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     | Dit       | OFF           | ON: Execution command is ON.            |
|                   |            | Bit       | OFF           | OFF: Execution command is OFF.          |
| Completed without | FB_OK      | Bit OFF   |               | When ON, it indicates that the A/D      |
| error             |            | DIL       | OFF           | conversion gain setting is completed.   |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has |
|                   |            | ы         | OFF           | 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.



## 2.1.11. M+L60AD2DA2\_AD\_ShiftOperation (A/D conversion shift operation)

### FB Name

M+L60AD2DA2\_AD\_ShiftOperation

| Item                | Description  |  |  |  |
|---------------------|--|--|--|--|
| Function overview   | Adds the conversion value shift amount to the digital value. |  |  |  |
| Symbol              | Execution comm   | M+L60AD2DA2<br>nand — B:FB_EN<br>/alue — W:i_Digital_Value | PAR VERVER<br>PAD_ShiftOperation<br>FB_ENO : B — Execution status<br>FB_OK : B — Completed without error<br>o_Dig_Out_Val : W — Digital output value<br>FB_ERROR : B — Error flag<br>ERROR_ID : W — Error code |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2  |  |  |
| and software        | CPU module   |  |  |  |
|                     |  | Series   | Model  |  |
|                     |  | MELSEC-L Series  | LCPU   |  |
|                     | Engineering software   | GX Works2 *1   |  |  |
|                     |  | Language   | Software version   |  |
|                     |  | English version  | Version1.24A or later  |  |
|                     |  | Chinese version  | Version1.49B or later  |  |
|                     |  | *1 For software version                                    | s applicable to the modules used, refer to   |  |
|                     |  | "Relevant manuals".  |  |  |
| Programming         | Ladder   |  |  |  |
| language            |  |  |  |  |
| Number of steps     | 193 steps (for MELSEC-L series CPU)                          |  |  |  |
|                     |  |  | pends on the CPU model that is used and  |  |
|                     | input and output definit                                     | tion.  |  |  |



| Item                 | Description  |  |  |
|----------------------|--|--|--|
| Function description | 1) By turning ON FB_EN (Execution command), the conversion value shift amount is added   |  |  |
|                      | to the digital value *1.   |  |  |
|                      | *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.                                   |  |  |
|                      | 2) When the addition result falls below -32,768 (exceeds 32,767), the value is fixed to  |  |  |
|                      | -32,768 (32,767).  |  |  |
| Compiling method     | acro type  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery         |  |  |
| precautions          | processing separately in accordance with the required system operation.                  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do |  |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,            |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.                                      |  |  |
|                      | 4) Every input must be provided with a value for proper FB operation.                    |  |  |
|                      | 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.   |  |  |
|                      | For details on how to use the intelligent function module switch setting, refer to GX    |  |  |
|                      | Works2 Version 1 Operating Manual (Common).  |  |  |
|                      | 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is   |  |  |
|                      | effective.   |  |  |
|                      | 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]   |  |  |
|                      |  |  |  |
|                      | (Execution command)  |  |  |
|                      | FB_ENO<br>(Execution status)   |  |  |
|                      | Shift operation  |  |  |
|                      | FB_OK<br>(Completed without error)   |  |  |
|                      | FB_ERROR (Error flag)  |  |  |
|                      | ERROR_ID (Error code) 0  |  |  |



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

| Error codes     |             |        |
|-----------------|-------------|--------|
| Error code list |             |        |
| Error code      | Description | Action |
| None            | None        | None   |



### Input labels

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

### Output labels

| Name (Comment)       | Label name    | Data type | Initial value | Description                               |
|----------------------|---------------|-----------|---------------|---|
| Execution status     | FB_ENO        | Bit       | OFF           | ON: Execution command is ON.              |
|                      |               | DIL       | OFF           | OFF: Execution command is OFF.            |
| Completed without    | FB_OK         |           |               | When ON, it indicates that the A/D        |
| error                |               | Bit       | OFF           | conversion shift operation is being       |
|                      |               |           |               | executed.                                 |
| Digital output value | o_Dig_Out_Val | Word      | 0             | The digital value to which the conversion |
|                      |               | vvolu     | 0             | 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.



## 2.1.12. M+L60AD2DA2\_AD\_DiffOperation (A/D difference conversion)

### FB Name

M+L60AD2DA2\_AD\_DiffOperation

| Item                | Description   |                         |  |
|---------------------|---|-------------------------|--|
| Function overview   | Outputs the remaining value after subtraction of the reference value from the digital value.                      |                         |  |
| Symbol              |   |                         |  |
|                     |   | M+L60AD2DA2_AD_DiffOp   | eration  |
|                     | Execution command — B   | : FB_EN                 | FB_ENO : B Execution status                        |
|                     | Digital value — W   | : i_Digital_Value       | FB_OK : B Completed without error                  |
|                     |   | o_Di                    | ig_Out_Val:W—Digital output value                  |
|                     |   | o_Sta                   | andard_Val:W—Difference conversion reference value |
|                     |   | F                       | B_ERROR : B—Error flag                             |
|                     |   | E                       | ERROR_ID : W—Error code                            |
|                     |   |                         |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2               |  |
|                     |   |                         |  |
| and software        | CPU module  |                         |  |
|                     |   | Series                  | Model  |
|                     |   | MELSEC-L Series         | LCPU   |
|                     |   |                         |  |
|                     | Engineering software  | GX Works2 *1            |  |
|                     |   | Language                | Software version                                   |
|                     |   | English version         | Version1.24A or later                              |
|                     |   | Chinese version         | Version1.49B or later                              |
|                     |   | *1 For software version | is applicable to the modules used, refer to        |
|                     |   | "Relevant manuals".     |  |
| Programming         | Ladder  | ·                       |  |
| language            |   |                         |  |
| Number of steps     | 200 steps (for MELSEC   | C-L series CPU)         |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used a input and output definition. |                         |  |
|                     |   |                         |  |



| Item                 | Description   |  |  |
|----------------------|---|--|--|
| Function description | 1) By turning ON FB_EN (Execution command), the differential conversion is executed.    |  |  |
|                      | 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.       |  |  |
|                      | *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     | cro type  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery        |  |  |
| precautions          | processing separately in accordance with the required system operation.                 |  |  |
|                      | 2) The FB cannot be used in an interrupt program.                                       |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,        |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.                                     |  |  |
|                      | 4) Every input must be provided with a value for proper FB operation.                   |  |  |
|                      | 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.  |  |  |
|                      | For details on how to use the intelligent function module switch setting, refer to GX   |  |  |
|                      | Works2 Version 1 Operating Manual (Common).   |  |  |
|                      | 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.               |  |  |
|                      | 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]  |  |  |
|                      | FB_EN (Execution command)   |  |  |
|                      |   |  |  |
|                      | FB_ENO (Execution status)   |  |  |
|                      | Difference conversion status Not converted During difference conversion Not converted   |  |  |
|                      | Difference conversion<br>reference value 0  |  |  |
|                      | FB_OK<br>(Completed without error)  |  |  |
|                      | FB_ERROR (Error flag)   |  |  |
|                      | ERROR_ID (Error code) 0   |  |  |
|                      |   |  |  |



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

# •Error code list

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



| ●Input labels     |                 |           |               |                                   |  |  |
|-------------------|-----------------|-----------|---------------|-----------------------------------|--|--|
| Name (Comment)    | Label name      | Data type | Setting range | Description                       |  |  |
| Execution command | FB_EN           | Bit       | ON, OFF       | ON: The FB is activated.          |  |  |
|                   |                 | DIL       |               | OFF: The FB is not activated.     |  |  |
| Digital value     | i_Digital_Value | Word      | -32,768 to    | Specify the digital value for the |  |  |
|                   |                 | vvora     | 32,767        | difference conversion.            |  |  |

### Output labels

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



# 2.1.13. M+L60AD2DA2\_AD\_ClipOperation (A/D conversion digital clipping)

### FB Name

M+L60AD2DA2\_AD\_ClipOperation

| Item                | Description   |                          |                        |   |  |
|---------------------|---|--------------------------|------------------------|---|--|
| Function overview   | Limits the digital value with the upper and lower limit values of the digital clipping. |                          |                        |   |  |
| Symbol              |   |                          |                        |   |  |
|                     |   |                          | AD_ClipOperation       | Fundation status                            |  |
|                     | Execution comma   |                          |                        | <ul> <li>Execution status</li> </ul>        |  |
|                     |   | ue — W:i_Digital_Value   |                        | <ul> <li>Completed without error</li> </ul> |  |
|                     | Digital clipping upper limit val  | ue—W : i_Clip_U_Lim      | o_Dig_Out_Val:W        | <ul> <li>Digital output value</li> </ul>    |  |
|                     | Digital clipping lower limit val  | ue—W:i_Clip_L_Lim        | FB_ERROR : B           | -Error flag                                 |  |
|                     |   |                          | ERROR_ID : W           | Error code                                  |  |
|                     |   |                          |                        |   |  |
|                     |   |                          |                        |   |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2                |                        |   |  |
| and software        | CPU module  |                          |                        |   |  |
|                     |   | Series                   | Mod                    | lel   |  |
|                     |   | MELSEC-L Series          | LCPU                   |   |  |
|                     | Engineering software  | GX Works2 *1             |                        |   |  |
|                     |   | Language                 | Software               | version                                     |  |
|                     |   | English version          | Version1.24A or lat    | er  |  |
|                     |   | Chinese version          | Version1.49B or lat    | er  |  |
|                     |   | *1 For software version  | ns applicable to the m | odules used, refer to                       |  |
|                     |   | "Relevant manuals"       |                        |   |  |
| Programming         | Ladder  |                          |                        |   |  |
| language            |   |                          |                        |   |  |
| Number of steps     | 198 steps (for MELSEC   | -L series CPU)           |                        |   |  |
|                     | * The number of steps of  | f the FB in a program de | epends on the CPU m    | odel that is used and                       |  |
|                     | input and output definition.  |                          |                        |   |  |



| Item                 | Description   |  |  |  |  |
|----------------------|---|--|--|--|--|
| Function description | 1) By turning ON FB_EN (Execution command), the digital clipping is executed.                       |  |  |  |  |
|                      | 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).  |  |  |  |  |
|                      | *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.  |  |  |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery                    |  |  |  |  |
| precautions          | processing separately in accordance with the required system operation.                             |  |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.               |  |  |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,                    |  |  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |  |  |
|                      | Every input must be provided with a value for proper FB operation.                                  |  |  |  |  |
|                      | 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.  |  |  |  |  |
|                      | For details on how to use the intelligent function module switch setting, refer to GX               |  |  |  |  |
|                      | Works2 Version 1 Operating Manual (Common).   |  |  |  |  |
|                      | 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is              |  |  |  |  |
|                      | effective.  |  |  |  |  |
|                      | 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]                                     |  |  |  |  |
|                      | B_EN FB_EN (Execution command)  |  |  |  |  |
|                      | FB_ENO  |  |  |  |  |
|                      | (Execution status)<br>Digital clipping During processing During processing During processing topped |  |  |  |  |
|                      | FB_OK   |  |  |  |  |
|                      | FB_ERROR (Error flag)     FB_ERROR (Error flag)   |  |  |  |  |
|                      | ERROR_ID (Error code) 0 Error code 0  |  |  |  |  |
|                      |   |  |  |  |  |



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

# Error codes

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

## Output labels

| Name (Comment)       | Label name    | Data type | Initial value | Description                                  |
|----------------------|---------------|-----------|---------------|--|
| Execution status     | FB_ENO        | Bit OFF   |               | ON: Execution command is ON.                 |
|                      |               | DIL       | OFF           | OFF: Execution command is OFF.               |
| Completed without    | FB_OK         | Bit       | OFF           | When ON, it indicates that the digital       |
| error                |               |           |               | 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.



# 2.1.14. M+L60AD2DA2\_AD\_SetLoggingPARAM (Logging function parameter setting)

### FB Name

M+L60AD2DA2\_AD\_SetLoggingPARAM

| Item                | Description   |                       |                                   |  |  |
|---------------------|---|-----------------------|-----------------------------------|--|--|
| Function overview   | Sets the logging function of the specified A/D conversion channel (CH1 or CH2). |                       |                                   |  |  |
| Symbol              |   |                       |                                   |  |  |
|                     | M+L60AD2DA2_AD_SetLoggingPARAM  |                       |                                   |  |  |
|                     | Execution command   | d - B : FB_EN         | FB_ENO : B Execution status       |  |  |
|                     | Module start XY address   | s—W:i_Start_IO_No     | FB_OK : B Completed without error |  |  |
|                     | Target CH   | 1-W : i_CH            | FB_ERROR : B - Error flag         |  |  |
|                     | Logging enable/disable setting  | g — B:i_Log_Enable    | ERROR_ID : W— Error code          |  |  |
|                     | Logging data setting  | g—W:i_Log_Data        |                                   |  |  |
|                     | Logging cycle setting value   | e — W:i_Log_Cycle_Val |                                   |  |  |
|                     | Logging cycle unit setting  | g—W:i_Log_Cycle_Unit  |                                   |  |  |
|                     | Logging points after trigge   | r—W:i_Log_Points      |                                   |  |  |
|                     | Level trigger condition setting — W : i_Log_Trig_Cond                           |                       |                                   |  |  |
|                     | Trigger data — W:i_Log_Trig_Data  |                       |                                   |  |  |
|                     | Trigger setting value — W:i_Log_Trig_Value                                      |                       |                                   |  |  |
|                     |   |                       |                                   |  |  |
|                     |   | Γ                     |                                   |  |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2             |                                   |  |  |
| and software        | CPU module  |                       |                                   |  |  |
|                     |   | Series                | Model                             |  |  |
|                     |   | MELSEC-L Series       | LCPU                              |  |  |
|                     | <b>_</b> <i>k</i>   |                       |                                   |  |  |
|                     | Engineering software  | GX Works2 *1          |                                   |  |  |
|                     |   | Language              | Software version                  |  |  |
|                     |   | English version       | Version1.24A or later             |  |  |
|                     |   | Chinese version       | Version1.49B or later             |  |  |
|                     | *1 For software versions applicable to the modules used, ref                    |                       |                                   |  |  |
|                     |   | "Relevant manuals"    |                                   |  |  |
| Programming         | Ladder  |                       |                                   |  |  |
| language            |   |                       |                                   |  |  |



| Item                 | Description  |  |  |  |
|----------------------|--|--|--|--|
| Number of steps      | 404 steps (for MELSEC-L series CPU)  |  |  |  |
|                      | * The number of steps of the FB in a program depends on the CPU model that is used and         |  |  |  |
|                      | input and output definition.   |  |  |  |
| 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.  |  |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.                               |  |  |  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)    |  |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB |  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.  |  |  |  |
|                      | 4) When the function selection of this FB is set for logging function, this FB is available.   |  |  |  |
|                      | 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.   |  |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery               |  |  |  |
| precautions          | processing separately in accordance with the required system operation.                        |  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.  |  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.          |  |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,               |  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.  |  |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition        |  |  |  |
|                      | of the target channel.   |  |  |  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an        |  |  |  |
|                      | interrupt program.   |  |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation.                          |  |  |  |
|                      | 7) If the parameter is set using the configuration function of GX Works2, this FB is           |  |  |  |
|                      | unnecessary.   |  |  |  |
|                      | 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.   |  |  |  |
|                      | 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] [When an error occurs]   |  |  |  |  |
|                  | FB_EN<br>(Execution command)       FB_ENO<br>(Execution status)         FB_ENO<br>(Execution status)       FB_EN<br>(Execution command)         Setting writing<br>processing       No processing         FB_OK<br>(Completed without error)       No processing         FB_EROR (Error flag)       FB_CK         ERROR_ID (Error code)       0 |  |  |  |  |
| Relevant manuals | MELSEC-L Analog Input/Output Module User's Manual   |  |  |  |  |
|                  | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |  |  |  |  |
|                  | GX Works2 Version 1 Operating Manual (Common)   |  |  |  |  |
|                  | 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     | Please try again after confirming the setting. |
|              | target channel is not within the range of 1 |  |
|              | or 2.                                       |  |
| 60 (Decimal) | The function selection of Switch 4 of the   | Set the function selection of Switch 4 of the  |
|              | intelligent function module switch setting  | intelligent function module switch setting of  |
|              | of the target module is set to other than   | the target module to the logging function,     |
|              | the logging function.                       | and execute the FB again.                      |



# Input labels

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



| Name (Comment)        | Label name       | Data   | Setting range     | Description                   |
|-----------------------|------------------|--------|-------------------|-------------------------------|
|                       |                  | type   |                   |                               |
| Trigger data          | i_Log_Trig_Data  |        | 0 to 4,999        | Set the buffer memory address |
|                       |                  | Word   |                   | to be monitored by the level  |
|                       |                  |        |                   | trigger.                      |
| Trigger setting value | i_Log_Trig_Value | \//ord | -32,768 to 32,767 | Set a level at which a level  |
|                       |                  | Word   |                   | 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.             |
|                   |            |           |               | OFF: Execution command is OFF.           |
| Completed without | FB_OK      | Bit OFF   |               | When ON, it indicates that the logging   |
| error             |            |           |               | function parameter setting is completed. |
| Error flag        | FB_ERROR   | Dit       | OFF           | When ON, it indicates that an error has  |
|                   |            | Bit       | OFF           | 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.



# 2.1.15. M+L60AD2DA2\_AD\_SaveLogging (Logging data save)

### FB Name

M+L60AD2DA2\_AD\_SaveLogging

| Item                       | Description   |  |  |  |  |
|----------------------------|---|--|--|--|--|
| Function overview          | Saves the logging data of the specified A/D conversion channel (CH1 or CH2) to a file.  |  |  |  |  |
| Symbol                     | Execution command   | M+L60AD2DA2_AD<br>B : FB_EN<br>G W : i_Start_IO_No<br>I W : i_CH<br>G W : i_Max_Number C<br>H B : i_Over_Write | · · · ·  |  |  |
| Applicable<br>hardware and | Analog I/O module<br>CPU module   | L60AD2DA2  |  |  |  |
| software                   | CPO module  | Series<br>MELSEC-L Series  | Model<br>LCPU *                                |  |  |
|                            | * Only the model having an SD memory card slot is applica<br>Engineering software GX Works2 *1  |  |  |  |  |
|                            |   | Language   | Software version                               |  |  |
|                            |   | English version<br>Chinese version   | Version1.24A or later<br>Version1.49B or later |  |  |
|                            |   |  | s applicable to the modules used, refer to     |  |  |
| Programming<br>language    | Ladder  | 1  |  |  |  |
| Number of steps            | <ul> <li>2142 steps (for MELSEC-L series CPU)</li> <li>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</li> </ul>   |  |  |  |  |
| Function description       | <ol> <li>By turning ON FB_EN (Execution command) and the logging hold flag, the logging data<br/>is sorted chronologically from the head pointer. Then, the logging data and the trigger<br/>detection information are saved in CSV format in the SD memory card mounted on the<br/>CPU.</li> </ol> |  |  |  |  |



| Item | Des | scription  |
|------|-----|--|
|      | 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.                                 |
|      | 3)  | If an input signal error is detected or the external power supply is turned OFF during the |
|      |     | logging, the logging stops.  |
|      |     | 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.                                   |
|      |     | 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.   |
|      |     | Refer to the error code explanation section for details.                                   |
|      | 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).                            |
|      | 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.                 |
|      |     | [File name example]  |
|      |     | 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.  |
|      | 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.   |
|      | 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.                                   |
|      | 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.  |
|      | 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.                     |
|      |     | exceeded flag) is turned ON regardless of whether i_Over_Write (Overwrite save             |
|      |     | command) is ON or OFF.   |
|      | 10) | Only when the target module is processing the logging and the logging status monitor       |



| Item             | Description   |  |  |
|------------------|---|--|--|
|                  | value (Un\G1146, Un\G1147) is not "F: Stop (disabled)", this FB can be used.              |  |  |
|                  | 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.  |  |  |
|                  | The error code 10 (Decimal), 11 (Decimal), or 60 (Decimal) is stored in ERROR_ID.         |  |  |
|                  | Refer to the error code explanation section for details.                                  |  |  |
|                  | 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.   |  |  |
|                  | 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.   |  |  |
|                  | 13) For the format of the CSV file that this FB creates, refer to "Appendix 2. CSV File   |  |  |
|                  | Format for Logging data save FB".   |  |  |
|                  | *1 For information on the size of SD memory card and the number of files that can be save |  |  |
|                  | refer to MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and              |  |  |
|                  | Inspection).  |  |  |
|                  | *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 | 1) The FB does not include error recovery processing. Program the error recovery          |  |  |
| precautions      | processing separately in accordance with the required system operation.                   |  |  |
|                  | 2) The FB cannot be used in an interrupt program.   |  |  |
|                  | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.     |  |  |
|                  | Do not use this FB in programs that are only executed once such as a subroutine,          |  |  |
|                  | FOR-NEXT loop because it is impossible to turn OFF.                                       |  |  |
|                  | 4) This FB uses index registers Z6 to Z9. Please do not use these index registers in an   |  |  |
|                  | interrupt program.  |  |  |
|                  | 5) In this FB, the logging data can be saved only in the SD memory card.                  |  |  |
|                  | 6) This FB uses the SP.FWRITE command. Thus, when an execution error of the               |  |  |
|                  | SP.FWRITE command occurs, a CPU error occurs.   |  |  |
|                  | 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.                            |  |  |
|                  | 8) When two or more of these FBs are used, implement an interlock to prevent them from    |  |  |



| Item | Description   |
|------|---|
|      | being executed simultaneously.  |
|      | [Interlock example]   |
|      | 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.   |
|      | 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.  |
|      | The error code 31 (Decimal) is stored in ERROR_ID.                                      |
|      | Refer to the error code explanation section for details.                                |
|      | 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.   |
|      | The error code 33 (Decimal) is stored in ERROR_ID.                                      |
|      | Refer to the error code explanation section for details.                                |
|      | 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.   |
|      | The error code 35 (Decimal) is stored in ERROR_ID.                                      |
|      | Refer to the error code explanation section for details.                                |
|      | 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.                      |
|      | The error code 36 (Decimal) is stored in ERROR_ID.                                      |
|      | Refer to the error code explanation section for details.                                |
|      | 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).                              |
|      | Refer to the error code explanation section for details.                                |
|      | 14) Every input must be provided with a value for proper FB operation.                  |
|      | 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     |
|      | 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).  |



| Item                | Description   |
|---------------------|---|
|                     | <ul> <li>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.</li> <li>For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common).</li> </ul>   |
| 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]         FB_EN<br>(Execution command)       FB_EN<br>(Execution status)         Logging hold flag<br>i_save_Order<br>(Logging forced save command)       FB_EN<br>(Execution status)         o_Making_File (Creating file)       FB_OK<br>(Completed without error)         o_Exceed_Number<br>(Maximum No. exceeded flag)       FB_EROR (Error flag)         FB_EROR (Error flag)       0 |
| Relevant manuals    | <ul> <li>MELSEC-L Analog Input/Output Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>MELSEC-L CPU Module User's Manual (Data Logging Function)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>   |

# ●Error code list

| Error code   | Description                                    | Action                                   |
|--------------|--|--|
| 10 (Decimal) | The specified channel is not valid. The target | Please try again after confirming the    |
|              | channel is not within the range of 1 or 2.     | setting.                                 |
| 11 (Decimal) | The maximum number of save files is not        | Please try again after confirming the    |
|              | valid. The maximum number of save files is     | setting.                                 |
|              | not within the range of 1 to 999.              |  |
| 20 (Decimal) | The processing is interrupted because the      | Please try again after confirming the    |
|              | logging hold flag or i_Save_Order (Logging     | setting so that the logging hold flag or |
|              | forced save command) is turned OFF while       | i_Save_Order (Logging forced save        |
|              | the logging data is being saved.               | command) is not turned OFF while the     |
|              | An incomplete CSV file is saved in the SD      | logging data is being saved.             |
|              | memory card.                                   |  |



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



| Error code             | Description                                  | Action   |
|------------------------|--|--|
| 60 (Decimal)           | When the target module was not processing    | After enabling the logging enable/disable                  |
|                        | the logging and the logging status monitor   | setting (Un\G1000, Un\G1001), turn OFF                     |
|                        | value (Un\G1146, Un\G1147) was "F: Stop      | ightarrow ON $ ightarrow$ OFF the Operating condition      |
|                        | (disabled)", FB_EN (Execution command) was   | setting request signal (Yn9) or execute                    |
|                        | turned ON.                                   | the Operating condition setting request                    |
|                        |  | FB (M+L60AD2DA2_RequestSetting) to                         |
|                        |  | execute the logging.                                       |
|                        |  | Execute the FB again after confirming                      |
|                        |  | that the logging status monitor value                      |
|                        |  | (Un\G1146, Un\G1147) is other than "F:                     |
|                        |  | Stop (disabled)".  |
|                        |  | 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  | After enabling the logging enable/disable                  |
|                        | disabled, FB_EN (Execution command) was      | setting (Un\G1000, Un\G1001), turn OFF                     |
|                        | turned ON after i_Save_Order (Logging forced | $\rightarrow$ ON $\rightarrow$ OFF the Operating condition |
|                        | save instruction) was turned ON to start     | setting request signal (Yn9) or execute                    |
|                        | saving the logging data.                     | the Operating condition setting request                    |
|                        |  | FB (M+L60AD2DA2_RequestSetting) to                         |
|                        |  | execute the logging.                                       |
|                        |  | After the logging, execute the FB again.                   |
| Error codes other than | The error code of the CPU module             | For details on the caused error code,                      |
| above                  |  | 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.     |
|                     |               |           |                           | OFF: The FB is not           |
|                     |               |           |                           | activated.                   |
| Module start XY     | i_Start_IO_No | Word      | Depends on the I/O        | Specify the start XY address |
| address             |               |           | point range of the CPU.   | (in hexadecimal) where the   |
|                     |               |           | For details, refer to the | L60AD2DA2 is connected.      |
|                     |               |           | CPU user's manual.        | (For example, enter H10 for  |
|                     |               |           |                           | X10.)                        |
| Target CH           | i_CH          | Word      | 1, 2                      | Specify the channel number.  |
| Maximum No. of      | i_Max_Number  | Word      | 1 to 999                  | Specify the maximum          |
| save files          |               |           |                           | number of CSV files the FB   |
|                     |               |           |                           | saves.                       |
| Overwrite save      | i_Over_Write  | Bit       | ON, OFF                   | Set whether to overwrite a   |
| command             |               |           |                           | 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 | i_Save_Order  | Bit       | ON, OFF                   | Turn ON to save the logging  |
| command             |               |           |                           | data while the logging is    |
|                     |               |           |                           | stopped (disabled).          |
|                     |               |           |                           | Turn OFF after the saving.   |



#### Output labels

| Name (Comment)    | Label name      | Data type | Initial value | Description                                 |
|-------------------|-----------------|-----------|---------------|---|
| Execution status  | n status FB_ENO |           | OFF           | ON: Execution command is ON.                |
|                   |                 |           |               | OFF: Execution command is OFF.              |
| Completed without | FB_OK           | Bit       | OFF           | When ON, it indicates that the file save is |
| error             |                 |           |               | completed.                                  |
|                   |                 |           |               | 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.       | o_Exceed_Number | Bit       | OFF           | When ON, it indicates that the number of    |
| exceeded flag     |                 |           |               | 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.



## 2.2. D/A conversion FB

#### 2.2.1. M+L60AD2DA2\_DA\_WriteDAVal (Write D/A conversion data)

# FB Name

#### M+L60AD2DA2\_DA\_WriteDAVal

| Item                | Description  |                           |  |  |
|---------------------|--|---------------------------|--|--|
| Function overview   | Writes the D/A conversion data of the specified D/A conversion channel (CH3 or CH4).   |                           |  |  |
| Symbol              |  | M+L60AD2DA2_DA_WriteDAVal |  |  |
|                     | Execution command  |                           | FB_ENO : B — Execution status              |  |
|                     | Module start XY address —  | W:i_Start_IO_No           | FB_OK : B — Completed without error        |  |
|                     | Target CH—   | W:i_CH                    | FB_ERROR : B — Error flag                  |  |
|                     | Digital value —  | W:i_DA_Value              | ERROR_ID : W - Error code                  |  |
|                     |  |                           |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                 |  |  |
| and software        | CPU module   |                           |  |  |
|                     |  | Series                    | Model                                      |  |
|                     |  | MELSEC-L Series           | LCPU                                       |  |
|                     | Engineering software   | GX Works2 *1              |  |  |
|                     |  | Language                  | Software version                           |  |
|                     |  | English version           | Version1.24A or later                      |  |
|                     |  | Chinese version           | Version1.49B or later                      |  |
|                     |  | *1 For software version   | s applicable to the modules used, refer to |  |
|                     |  | "Relevant manuals".       |  |  |
| Programming         | Ladder   |                           |  |  |
| language            |  |                           |  |  |
| Number of steps     | 254 steps (for MELSEC-L series CPU)  |                           |  |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                           |  |  |
|                     | input and output definiti  | on.                       |  |  |



| 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.   |  |  |
|                      | 2) The digital value to be written depends on the output range setting.   |  |  |
|                      | When the scaling function (D/A conversion) of the L60AD2DA2 is enabled, the digital   |  |  |
|                      | value is scaled before the D/A conversion.  |  |  |
|                      | 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).   |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.                                       |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition<br>of the target channel.           |  |  |
|                      | <ol> <li>This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.</li> </ol> |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation  |  |  |
|                      | 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.  |  |  |
|                      | 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]         FB_EN<br>(Execution command)         FB_ENO<br>(Execution status)         i_DA_Value_CH□<br>(CH□ Digital input value)         FB_OK<br>(Completed without error)         FB_EROR (Error flag)         ERROR_ID (Error code)         0 | FB_EN         (Execution command)         FB_ENO         (Execution status)         i_DA_Value_CH□         (CH□ Digital input value)         FB_OK         (Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) |
| Relevant manuals | MELSEC-L Analog Input/Output Module Use     MELSEC-L CPU Module User's Manual (Ha     GX Works2 Version 1 Operating Manual (Co     GX Works2 Version 1 Operating Manual (Sin   | rdware Design, Maintenance and Inspection)<br>ommon)   |

## •Error code list

| Error code   | Description                                 | Action   |
|--------------|---|--|
| 10 (Decimal) | The specified channel is not valid. The     | Please try again after confirming the setting. |
|              | target channel is not within the range of 3 |  |
|              | or 4.                                       |  |

# Labels

| ●Input labels   |               |           |                       |  |
|-----------------|---------------|-----------|-----------------------|--|
| Name (Comment)  | Label name    | Data type | Setting range         | Description                            |
| Execution       | FB_EN         | Bit       | ON, OFF               | ON: The FB is activated.               |
| command         |               | ы         |                       | OFF: The FB is not activated.          |
| Module start XY | i_Start_IO_No |           | Depends on the        | Specify the start XY address (in       |
| address         |               |           | I/O point range of    | hexadecimal) where the L60AD2DA2 is    |
|                 |               | Mord      | the CPU.              | connected. (For example, enter H10 for |
|                 |               | Word      | For details, refer to | X10.)                                  |
|                 |               |           | the CPU user's        |  |
|                 |               |           | manual.               |  |
| Target CH       | i_CH          | Word      | 3, 4                  | Specify the channel number.            |
| Digital value   | i_DA_Value    |           | -32,000 to 32,000     | Specify the digital input value.       |
|                 |               |           |                       | The available setting range differs    |
|                 |               | Word      |                       | 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     | Dit       | OFF           | ON: Execution command is ON.                    |
|                   |            | Bit       |               | OFF: Execution command is OFF.                  |
| Completed without | FB_OK      | Bit       | OFF           | When ON, it indicates that the digital value is |
| error             |            | ы         | UFF           | being written.                                  |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has         |
|                   |            | Bit       |               | 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.



# 2.2.2. M+L60AD2DA2\_DA\_WriteAllDAVal (Write D/A conversion data (all CHs))

## FB Name

M+L60AD2DA2\_DA\_WriteAllDAVal

| Item                 | Description  |                                       |  |
|----------------------|--|---------------------------------------|--|
| Function overview    | Writes the D/A conversion data of the D/A conversion channels (CH3 and CH4). |                                       |  |
| Symbol               |  |                                       | _WriteAllDAVal<br>FB_ENO : B — Execution status<br>FB_OK : B — Completed without error<br>FB_ERROR : B — Error flag<br>ERROR_ID : W — Error code |
| Applicable hardware  | Analog I/O module  | L60AD2DA2                             |  |
| and software         | CPU module   |                                       |  |
|                      |  | Series                                | Model  |
|                      |  | MELSEC-L Series                       | LCPU   |
|                      | Engineering software   | GX Works2 *1                          |  |
|                      |  | Language                              | Software version   |
|                      |  | English version                       | Version1.24A or later  |
|                      |  | Chinese version                       | Version1.49B or later  |
|                      |  | "Relevant manuals".                   | s applicable to the modules used, refer to   |
| Programming language | Ladder   |                                       |  |
| Number of steps      | 228 steps (for MELSEC-   | L series CPU)                         |  |
|                      | * The number of steps of   | f the FB in a program de              | pends on the CPU model that is used and  |
|                      | input and output definit   | tion.                                 |  |
| Function description | 1) By turning ON FB_E  | EN (Execution command                 | ), the digital input values of the D/A   |
|                      | conversion channel   | s (CH3 and CH4) are wri               | itten.   |
|                      | 2) The digital input val   | ue to be written depends              | on the output range setting.   |
|                      | 5  | , , , , , , , , , , , , , , , , , , , | of the L60AD2DA2 is enabled, the digital   |
|                      |  | d before the D/A convers              |  |
|                      |  |                                       | o refresh setting of the intelligent function  |
|                      | module, this FB is u   | innecessary.                          |  |



| Item                | Description  |  |
|---------------------|--|--|
| Compiling method    | Macro type   |  |
| Restrictions and    | 1) The FB does not include error recovery processing. Program the error recovery         |  |
| precautions         | processing separately in accordance with the required system operation.                  |  |
|                     | 2) The FB cannot be used in an interrupt program.  |  |
|                     | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.    |  |
|                     | Do not use this FB in programs that are only executed once such as a subroutine,         |  |
|                     | FOR-NEXT loop because it is impossible to turn OFF.                                      |  |
|                     | 4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an |  |
|                     | interrupt program.   |  |
|                     | 5) Every input must be provided with a value for proper FB operation                     |  |
|                     | 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.   |  |
|                     | 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]   |  |
|                     |  |  |
|                     | (Execution command)  |  |
|                     | (Execution status)<br>i_DA_Value_CHD   |  |
|                     | (CH□ Digital input value) Unving update Update Update                                    |  |
|                     | FB_OK (Completed without error)  |  |
|                     | FB_ERROR (Error flag)  |  |
|                     | ERROR_ID (Error code) 0  |  |
| Relevant manuals    | MELSEC-L Analog Input/Output Module User's Manual  |  |
|                     | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)        |  |
|                     | GX Works2 Version 1 Operating Manual (Common)  |  |
|                     | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)                    |  |

| •Error | code | list |  |
|--------|------|------|--|
|        |      |      |  |

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



# Labels

# Input labels

| Name (Comment)    | Label name    | Data type | Setting range         | Description                           |
|-------------------|---------------|-----------|-----------------------|---------------------------------------|
| Execution         | FB_EN         | Bit       | ON, OFF               | ON: The FB is activated.              |
| command           |               | DIL       |                       | OFF: The FB is not activated.         |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in      |
| address           |               |           | point range of the    | hexadecimal) where the L60AD2DA2      |
|                   |               | Word      | CPU.                  | is connected. (For example, enter H10 |
|                   |               | vvoru     | For details, refer to | for X10.)                             |
|                   |               |           | the CPU user's        |                                       |
|                   |               |           | manual.               |                                       |
| CH3 Digital value | i_DA_Value_C  |           | -32,000 to 32,000     | Specify the digital input value of    |
|                   | H3            |           |                       | channel 3.                            |
|                   |               | Word      |                       | The available setting range differs   |
|                   |               | vvoru     |                       | depending on the scaling function     |
|                   |               |           |                       | (D/A conversion) and output range     |
|                   |               |           |                       | setting.                              |
| CH4 Digital value | i_DA_Value_C  |           | -32,000 to 32,000     | Specify the digital input value of    |
|                   | H4            |           |                       | channel 4.                            |
|                   |               |           |                       | The available setting range differs   |
|                   |               | Word      |                       | 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.                 |
|                         |            | DIL       | OFF           | OFF: Execution command is OFF.               |
| Completed without error | FB_OK      | Bit       | OFF           | When ON, it indicates that the digital input |
|                         |            | DIL       | OFF           | 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.



# 2.2.3. M+L60AD2DA2\_DA\_SetDAConversion (D/A conversion enable/disable setting)

## FB Name

M+L60AD2DA2\_DA\_SetDAConversion

| Item                | Description   |                                 |                     |  |                           |
|---------------------|---|---------------------------------|---------------------|--|---------------------------|
| Function overview   | 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).                                  |                                 |                     |  |                           |
| Symbol              | Execution command —   |                                 |                     | DA_SetDAConversion<br>FB_ENO:B                 | Execution status          |
|                     | Module start XY ad  | dress —                         | W:i_Start_IO_No     | FB_OK : B                                      | - Completed without error |
|                     | Targe   | et CH-                          | W:i_CH              | FB_ERROR : B                                   | —Error flag               |
|                     | D/A conversion enable/disable s   | etting —                        | B:i_DA_Enable       | ERROR_ID : W                                   | -Error code               |
|                     |   |                                 |                     |  |                           |
| Applicable hardware | Analog I/O module   | L60A                            | D2DA2               |  |                           |
| and software        | CPU module  |                                 |                     |  |                           |
|                     |   |                                 | Series              | Model  |                           |
|                     |   | MELSEC-L Series<br>GX Works2 *1 |                     | LCPU   |                           |
|                     | Engineering software  |                                 |                     |  |                           |
|                     |   |                                 | Language            | Software                                       | /ersion                   |
|                     |   | Eng                             | lish version        | Version1.24A or later<br>Version1.49B or later |                           |
|                     |   | Chi                             | nese version        |  |                           |
|                     |   | *1 Fc                           | or software version | s applicable to the mo                         | dules used, refer to      |
|                     |   | "Relevant manuals".             |                     |  |                           |
| Programming         | Ladder  |                                 |                     |  |                           |
| language            |   |                                 |                     |  |                           |
| Number of steps     | 308 steps (for MELSEC-  | L serie                         | es CPU)             |  |                           |
|                     | * The number of steps of  | the F                           | B in a program dep  | pends on the CPU mo                            | del that is used and      |
|                     | input and output definiti   | on.                             |                     |  |                           |



| 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.  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)   |
|                      | is turned OFF $ ightarrow$ ON $ ightarrow$ OFF or the Operating condition setting request FB  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |
|                      | 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).   |
|                      | Refer to the error code explanation section for details.  |
| Compiling method     | Macro type  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |
| precautions          | processing separately in accordance with the required system operation.   |
|                      | 2) The FB cannot be used in an interrupt program.   |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |
|                      | <ol> <li>When two or more of these FBs are used, precaution must be taken to avoid repetition<br/>of the target channel.</li> </ol> |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.                          |
|                      | 6) Every input must be provided with a value for proper FB operation.   |
|                      | 7) 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.  |
|                      | 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]  | [When an error occurs]  |  |  |
|                  | FB_EN<br>(Execution command)         FB_ENO (Execution status)         D/A conversion enable/disable<br>setting writing processing         FB_OK<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) | FB_EN<br>(Execution command)         FB_ENO (Execution status)         D/A conversion enable/disable<br>setting writing processing         FB_OK<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) |  |  |
| Relevant manuals | MELSEC-L Analog Input/Output Module User's Manual   |   |  |  |
|                  | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |   |  |  |
|                  | • GX Works2 Version 1 Operating Manual (Co  | ommon)  |  |  |
|                  | • GX Works2 Version 1 Operating Manual (Si  | mple Project, Function Block)   |  |  |

## •Error code list

| Error code   | Description                                  | Action   |  |  |
|--------------|--|--|--|--|
| 10 (Decimal) | The specified channel is not valid. The      | Please try again after confirming the setting. |  |  |
|              | target channel is not within the range of 3, |  |  |  |
|              | 4, or 15.                                    |  |  |  |

# Labels

| ●Input labels   |               |           |                       |                                       |
|-----------------|---------------|-----------|-----------------------|---------------------------------------|
| Name (Comment)  | Label name    | Data type | Setting range         | Description                           |
| Execution       | FB_EN         | Bit       | ON, OFF               | ON: The FB is activated.              |
| command         |               | DIL       |                       | OFF: The FB is not activated.         |
| Module start XY | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in      |
| address         |               |           | point range of the    | hexadecimal) where the L60AD2DA2      |
|                 |               | Word      | CPU.                  | is connected. (For example, enter H10 |
|                 |               |           | For details, refer to | for X10.)                             |
|                 |               |           | the CPU user's        |                                       |
|                 |               |           | manual.               |                                       |
| Target CH       | i_CH          | \A/~      | 3, 4, 15              | 3 or 4: Specify the channel number.   |
|                 |               | Word      |                       | 15: Specify channel 3 and channel 4.  |
| D/A conversion  | i_DA_Enable   |           | ON, OFF               | ON: D/A conversion enabled            |
| enable/disable  |               | Bit       |                       | OFF: D/A conversion disabled          |
| setting         |               |           |                       |                                       |



## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                               |
|-------------------|------------|-----------|---------------|---|
| Execution status  | FB_ENO     |           |               | ON: Execution command is ON.              |
|                   |            | Bit       | OFF           | OFF: Execution command is OFF.            |
| Completed without | FB_OK      | Bit       | OFF           | When ON, it indicates that the conversion |
| error             |            | Ы         |               | enable/disable setting is completed.      |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has   |
|                   |            | ы         | OFF           | 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.



# 2.2.4. M+L60AD2DA2\_DA\_SetDAOutput (D/A output enable/disable setting)

## FB Name

M+L60AD2DA2\_DA\_SetDAOutput

| Item                | Description  |              |   |  |
|---------------------|--|--------------|---|--|
| Function overview   | 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).   |              |   |  |
| Symbol              |  |              |   |  |
|                     | Europetice comm  | l            | M+L60AD2DA2_DA_SetDAOutput<br>- B : FB_EN FB_ENO : B Execution status |  |
|                     | Execution comma  |              | _   |  |
|                     | Module start XY addr   | ess —        | W : i_Start_IO_No   | FB_OK : B Completed without error          |
|                     | Target   | сн—          | W:i_CH  | FB_ERROR : B Error flag                    |
|                     | D/A output enable/disable set  | ting —       | B: i_DA_Out_Enable  | ERROR_ID:W—Error code                      |
|                     |  |              |   |  |
| Applicable hardware | Analog I/O module  | L6           | 0AD2DA2   |  |
| and software        | CPU module   |              |   |  |
|                     |  |              | Series  | Model                                      |
|                     |  | Ν            | IELSEC-L Series   | LCPU                                       |
|                     | Engineering software   | GX Works2 *1 |   |  |
|                     |  |              | Language  | Software version                           |
|                     |  | E            | nglish version  | Version1.24A or later                      |
|                     |  | С            | hinese version  | Version1.49B or later                      |
|                     |  | *1           | For software version  | s applicable to the modules used, refer to |
|                     |  |              | "Relevant manuals".   |  |
| Programming         | Ladder   |              |   |  |
| language            |  |              |   |  |
| Number of steps     | 279 steps (for MELSEC  | -L se        | eries CPU)  |  |
|                     | * The number of steps of   | f the        | e FB in a program de  | pends on the CPU model that is used and    |
|                     | input and output defini  | tion.        |   |  |



| 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.   |
|                      | 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).  |
|                      | Refer to the error code explanation section for details.   |
| Compiling method     | Macro type   |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery   |
| precautions          | processing separately in accordance with the required system operation.  |
|                      | 2) The FB cannot be used in an interrupt program.  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,   |
|                      | FOR-NEXT loop because it is impossible to turn OFF.  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition  |
|                      | of the target channel.   |
|                      | <ol> <li>This FB uses index registers Z8 and Z9. Please do not use these index registers in an<br/>interrupt program.</li> </ol> |
|                      | 6) Every input must be provided with a value for proper FB operation.  |
|                      | 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.   |
|                      | 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.   |
|                      | 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)         FB_EN         (Execution command)         FB_ENO         (Execution status)         i_DA_Out_Enable         (D/A output enable/disable flag<br>(Yn3)         FB_OK         FB_OK         (Completed without error)         FB_EROR (Error flag)         ERROR_ID (Error code) | [When an error occurs]<br>(for CH3)<br>FB_EN<br>(Execution command)<br>FB_ENO<br>(Execution status)<br>i_DA_Out_Enable<br>(D/A output enable/<br>disable setting)<br>Output enable/disable flag<br>(Yn3)<br>FB_OK<br>(Completed without error)<br>FB_ERROR (Error flag)<br>ERROR_ID (Error code) |  |  |
| Relevant manuals | <ul> <li>MELSEC-L Analog Input/Output Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>   |  |  |  |

| Error codes      |  |  |
|------------------|--|--|
| ●Error code list |  |  |
| Error code       | Description                            | Action   |
| 10 (Decimal)     | The specified channel is not valid.    | Please try again after confirming the setting. |
|                  | Set 3, 4, or 15 to the target channel. |  |



# Labels

# Input labels

| Name (Comment)  | Label name      | Data type | Setting range         | Description                         |
|-----------------|-----------------|-----------|-----------------------|-------------------------------------|
| Execution       | FB_EN           | Bit       | ON, OFF               | ON: The FB is activated.            |
| command         |                 | DIL       |                       | OFF: The FB is not activated.       |
| Module start XY | i_Start_IO_No   |           | Depends on the I/O    | Specify the start XY address (in    |
| address         |                 |           | point range of the    | hexadecimal) where the              |
|                 |                 | Word      | CPU.                  | L60AD2DA2 is connected. (For        |
|                 |                 | vvora     | For details, refer to | example, enter H10 for X10.)        |
|                 |                 |           | the CPU user's        |                                     |
|                 |                 |           | manual.               |                                     |
| Target CH       | i_CH            |           | 3, 4, 15              | 3 or 4: Specify the channel number. |
|                 |                 | Word      |                       | 15: Specify channel 3 and channel   |
|                 |                 |           |                       | 4.                                  |
| D/A output      | i_DA_Out_Enable |           | ON, OFF               | ON: D/A output enabled              |
| enable/disable  |                 | Bit       |                       | OFF: D/A output disabled            |
| setting         |                 |           |                       |                                     |

## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                                |
|-------------------|------------|-----------|---------------|--|
| Execution status  | FB_ENO     | Bit OFF   |               | ON: Execution command is ON.               |
|                   |            | Dit       | 011           | OFF: Execution command is OFF.             |
| Completed without | FB_OK      | Dit       |               | When ON, it indicates that the FB is being |
| error             |            | Bit       | OFF           | executed properly.                         |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has    |
|                   |            | ы         | OFF           | 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.



# 2.2.5. M+L60AD2DA2\_DA\_SetScaling (D/A conversion scaling setting)

## FB Name

M+L60AD2DA2\_DA\_SetScaling

| Item                | Description   |                 |   |  |
|---------------------|---|-----------------|---|--|
| Function overview   | Sets the scaling of the specified D/A conversion channel (CH3 or CH4).                    |                 |   |  |
| Symbol              | M+L60AD2D<br>Execution command — B : FB_EN<br>Module start XY address — W : i_Start_IO_No |                 | DA2_DA_SetScaling<br>FB_ENO : B — Execution status<br>FB_OK : B — Completed without error |  |
|                     |   | arget CH—W:     |   | FB_ERROR : B - Error flag                  |
|                     | D/A conversion scaling enab   | -               |   |  |
|                     | D/A conversion scaling upper I  | imit value — W: | i_Scl_U_Lim   |  |
|                     | D/A conversion scaling lower I  | imit value - W: | i_Scl_L_Lim   |  |
|                     |   |                 |   |  |
| Applicable hardware | Analog I/O module   | L60AD2DA        | 12  |  |
| and software        | CPU module  |                 |   |  |
|                     |   | Se              | eries   | Model                                      |
|                     |   | MELSEC          | -L Series   | LCPU                                       |
|                     | Engineering software  | GX Works        | 2 *1  |  |
|                     |   | Lan             | guage   | Software version                           |
|                     |   | English v       | ersion  | Version1.24A or later                      |
|                     |   | Chinese         | version   | Version1.49B or later                      |
|                     |   | *1 For soft     | ware version  | s applicable to the modules used, refer to |
|                     |   | "Releva         | nt manuals".  |  |
| Programming         | Ladder  |                 |   |  |
| language            |   |                 |   |  |
| Number of steps     | 305 steps (for MELSEC   |                 | ,   |  |
|                     |   |                 | a program de  | pends on the CPU model that is used and    |
|                     | input and output defin  | ition.          |   |  |



| 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.   |  |  |
|                      | 2) FB operation is one-shot only, triggered by the FB_EN signal.  |  |  |
|                      | The setting value is validated when the Operating condition setting request signal (Yn9)  |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |
|                      | 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).   |  |  |
| _                    | Refer to the error code explanation section for details.  |  |  |
| Compiling method     | Macro type  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.   |  |  |
|                      | Do not use this FB in programs that are only executed once such as a subroutine,  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition   |  |  |
|                      | of the target channel.<br>5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an   |  |  |
|                      | This FB uses index registers Z7 to Z9. Please do not use these index registers in an  |  |  |
|                      | interrupt program.  |  |  |
|                      | <ul> <li>Every input must be provided with a value for proper FB operation</li> <li>To operate the L60AD2DA2, set the L/O range according to the device and system to be</li> </ul>   |  |  |
|                      | 7) To operate the L60AD2DA2, set the I/O range according to the device and system to be<br>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   |  |  |
|                      | For details on now to use the intelligent function module switch setting, refer to GX<br>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]   |  |  |
| Ŭ                    |   |  |  |
|                      | FB_EN<br>(Execution command)  |  |  |
|                      | FB_ENO<br>(Execution status)  |  |  |
|                      | Scaling function setting<br>writing processing         No processing         Write         No processing         Scaling function setting<br>writing processing         No processing |  |  |
|                      | FB_OK<br>(Completed without error)  |  |  |
|                      | FB_ERROR (Error flag)   |  |  |
|                      | ERROR_ID (Error code) 0 Error code 0 Error code   |  |  |



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

| ●Error code list |  |  |
|------------------|--|--|
| Error code       | Description                                    | Action   |
| 10 (Decimal)     | The specified channel is not valid. The target | Please try again after confirming the setting. |
|                  | channel is not within the range of 3 or 4.     |  |

# Labels •Input labels

| Name (Comment)      | Label name       | Data type | Setting range         | Description                        |
|---------------------|------------------|-----------|-----------------------|------------------------------------|
| Execution command   | FB_EN<br>Bit     |           | ON, OFF               | ON: The FB is activated.           |
|                     |                  | ы         |                       | OFF: The FB is not activated.      |
| Module start XY     | i_Start_IO_No    |           | Depends on the        | Specify the start XY address (in   |
| address             |                  |           | I/O point range of    | hexadecimal) where the             |
|                     |                  | Word      | the CPU.              | L60AD2DA2 is connected. (For       |
|                     |                  | vvoru     | For details, refer to | example, enter H10 for X10.)       |
|                     |                  |           | the CPU user's        |                                    |
|                     |                  |           | manual.               |                                    |
| Target CH           | i_CH             | Word      | 3, 4                  | Specify the channel number.        |
| D/A conversion      | i_Scaling_Enable |           | ON, OFF               | ON: Enabled                        |
| scaling             |                  | Bit       |                       | OFF: Disabled                      |
| enable/disable      |                  |           |                       |                                    |
| D/A conversion      | i_Scl_U_Lim      |           | -32,000 to 32,000     | Specify the D/A conversion scaling |
| scaling upper limit |                  | Word      |                       | upper limit value.                 |
| value               |                  |           |                       |                                    |
| D/A conversion      | i_Scl_L_Lim      |           | -32,000 to 32,000     | Specify the D/A conversion scaling |
| scaling lower limit |                  | Word      |                       | lower limit value.                 |
| value               |                  |           |                       |                                    |



## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                              |
|-------------------|------------|-----------|---------------|--|
| Execution status  | FB_ENO     | Bit       | OFF           | ON: Execution command is ON.             |
|                   |            | DIL       | OFF           | OFF: Execution command is OFF.           |
| Completed without | FB_OK      | Dit       |               | When ON, it indicates that the D/A       |
| error             |            | Bit       | OFF           | conversion scaling setting is completed. |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has  |
|                   |            | ы         | OFF           | 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.



# 2.2.6. M+L60AD2DA2\_DA\_SetAlarm (D/A conversion alert output setting)

## FB Name

M+L60AD2DA2\_DA\_SetAlarm

| Item                | Description   |                         |   |  |
|---------------------|---|-------------------------|---|--|
| Function overview   | Sets the alert output of the specified D/A conversion channel (CH3 or CH4). |                         |   |  |
| Symbol              |   | M+L60AD2DA2_DA_SetAlarm |   |  |
|                     | Execution command   | B : FB_EN               | FB_ENO : B — Execution status               |  |
|                     | Module start XY address   | —W : i_Start_IO_No      | FB_OK : B Completed without error           |  |
|                     | Target CH   | —W : i_CH               | FB_ERROR : B — Error flag                   |  |
|                     | Alert output enabled/disabled   | B : i_Alarm_Enable      | ERROR_ID : W—Error code                     |  |
|                     | Alert output upper limit value  | -W : i_Alm_U_Lim        |   |  |
|                     | Alert output lower limit value  | W : i_Alm_L_Lim         |   |  |
|                     |   |                         |   |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2               |   |  |
| and software        | CPU module  |                         |   |  |
|                     |   | Series                  | Model                                       |  |
|                     |   | MELSEC-L Series         | LCPU  |  |
|                     |   |                         |   |  |
|                     | Engineering software  | GX Works2 *1            |   |  |
|                     |   | Language                | Software version                            |  |
|                     |   | English version         | Version1.24A or later                       |  |
|                     |   | Chinese version         | Version1.49B or later                       |  |
|                     |   | *1 For software version | as applicable to the modules used, refer to |  |
|                     |   | "Relevant manuals".     |   |  |
| Programming         | Ladder  |                         |   |  |
| language            |   |                         |   |  |
| Number of steps     | 288 steps (for MELSEC-  | L series CPU)           |   |  |
|                     | * The number of steps of  | the FB in a program dep | ends on the CPU model that is used and      |  |
|                     | input and output definiti   | on.                     |   |  |



| 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.   |  |  |
|                      | FB operation is one-shot only, triggered by the FB_EN signal.   |  |  |
|                      | 3) The setting value is validated when the Operating condition setting request signal (Yn9)   |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB  |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.   |  |  |
|                      | 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).  |  |  |
|                      | Refer to the error code explanation section for details.  |  |  |
| Compiling method     | Macro type  |  |  |
| Restrictions and     | 1) The FB does not include error recovery processing. Program the error recovery  |  |  |
| precautions          | processing separately in accordance with the required system operation.   |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do  |  |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,   |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of  |  |  |
|                      | the target channel.   |  |  |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an   |  |  |
|                      | interrupt program.  |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation.   |  |  |
|                      | 7) 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.  |  |  |
|                      | 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]   |  |  |
|                      | FB_EN<br>(Execution command)<br>FB ENO  |  |  |
|                      | (Execution status)  |  |  |
|                      | Alert output function<br>setting writing processing Write No processing Alert output function<br>setting writing processing No processing No processing |  |  |
|                      | FB_OK (Completed without error)   |  |  |
|                      | FB_ERROR (Error flag) (Completed without error)   |  |  |
|                      | ERROR_ID (Error code) 0 FB_ERROR (Error flag)   |  |  |
|                      | ERROR_ID (Error code) 0 Error code 0  |  |  |



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

# 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          | FB_EN          | Bit       | ON, OFF                   | ON: The FB is activated.         |
| command            |                | ы         |                           | OFF: The FB is not activated.    |
| Module start XY    | i_Start_IO_No  |           | Depends on the I/O        | Specify the start XY address (in |
| address            |                | Word      | point range of the CPU.   | hexadecimal) where the           |
|                    |                | vvoru     | For details, refer to the | L60AD2DA2 is connected. (For     |
|                    |                |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Target CH          | i_CH           | Word      | 3, 4                      | Specify the channel number.      |
| Alert output       | i_Alarm_Enable | Dit       | ON, OFF                   | ON: Enabled                      |
| enabled/disabled   |                | Bit       |                           | OFF: Disabled                    |
| Alert output upper | i_Alm_U_Lim    | Word      | -32,768 to 32,767         | Specify the alert output upper   |
| limit value        |                | vvora     |                           | limit value.                     |
| Alert output lower | i_Alm_L_Lim    | Mord.     | -32,768 to 32,767         | Specify the alert output lower   |
| limit value        |                | Word      |                           | limit value.                     |

## Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                                 |
|-------------------|------------|-----------|---------------|---|
| Execution status  | FB_ENO     | Dit       |               | ON: Execution command is ON.                |
|                   |            | Bit OFF   |               | OFF: Execution command is OFF.              |
| Completed without | FB_OK      | Dit       | OFF           | When ON, it indicates that the alert output |
| error             |            | Bit       |               | function setting is completed.              |
| Error flag        | FB_ERROR   | Dit       |               | When ON, it indicates that an error has     |
|                   |            | Bit       | OFF           | 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.



# 2.2.7. M+L60AD2DA2\_DA\_SetOffsetVal (D/A conversion offset setting)

## FB Name

M+L60AD2DA2\_DA\_SetOffsetVal

| Item                | Description  |                         |   |  |
|---------------------|--|-------------------------|---|--|
| Function overview   | Sets the offset of the specified D/A conversion channel (CH3 or CH4).                  |                         |   |  |
| Symbol              | M+L60AD2DA2_DA_SetOffsetVal  |                         |   |  |
|                     | Execution comman   |                         | FB_ENO : B Execution status                 |  |
|                     | Module start XY address —W:i_Start_IO_No   |                         | FB_OK : B Completed without error           |  |
|                     | Target C   | CH—W:i_CH               | FB_ERROR : B — Error flag                   |  |
|                     | Offset/gain adjustment amou  | nt—W:i_Adjust_Amount    | ERROR_ID : W Error code                     |  |
|                     | Set value change commar  | nd — B:i_Value_Change   |   |  |
|                     | User range write commar  | nd — B:i_Write_Offset   |   |  |
|                     |  |                         |   |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2               |   |  |
| and software        | CPU module   |                         |   |  |
|                     |  | Series                  | Model                                       |  |
|                     |  | MELSEC-L Series         | LCPU  |  |
|                     | Engineering software   | GX Works2 *1            |   |  |
|                     |  | Language                | Software version                            |  |
|                     |  | English version         | Version1.24A or later                       |  |
|                     |  | Chinese version         | Version1.49B or later                       |  |
|                     |  | *1 For software version | is applicable to the modules used, refer to |  |
|                     |  | "Relevant manuals".     |   |  |
| Programming         | Ladder   |                         |   |  |
| language            |  |                         |   |  |
| Number of steps     | 482 steps (for MELSEC-L series CPU)  |                         |   |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                         |   |  |
|                     | input and output definition.   |                         |   |  |



| 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.  |  |
|                      | 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.  |  |
|                      | 3)          | By turning ON the user range write command while FB_EN (Execution command) is                           |  |
|                      |             | ON, the offset value is written.  |  |
|                      | 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).   |  |
|                      |             | Refer to the error code explanation section for details.  |  |
| Compiling method     | Ма          | cro type  |  |
| Restrictions and     | 1)          | The FB does not include error recovery processing. Program the error recovery                           |  |
| precautions          |             | processing separately in accordance with the required system operation.                                 |  |
|                      | 2)          | The FB cannot be used in an interrupt program.  |  |
|                      | 3)          | Please ensure that the FB_EN signal is capable of being turned OFF by the program.                      |  |
|                      |             | Do not use this FB in programs that are only executed once such as a subroutine,                        |  |
|                      |             | FOR-NEXT loop because it is impossible to turn OFF.   |  |
|                      | 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.               |  |
|                      |             | M+L60AD2DA2_AD_SetOffsetVal   |  |
|                      |             | M+L60AD2DA2_AD_SetGainVal   |  |
|                      |             | M+L60AD2DA2_DA_SetOffsetVal   |  |
|                      |             | M+L60AD2DA2_DA_SetGainVal   |  |
|                      | 5)          | This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. |  |
|                      | 6)          | Every input must be provided with a value for proper FB operation.                                      |  |
|                      | 7)          | When this FB is used in two or more places, a duplicated coil warning may occur during                  |  |
|                      | <i>'</i> )  | compile operation due to the Y signal being operated by index modification. However                     |  |
|                      |             |   |  |
|                      | 0)          | this is not a problem and the FB will operate without error.  |  |
|                      | 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.  |  |
|                      |             | For details on how to use the intelligent function module switch setting, refer to GX                   |  |
| ED operation trac    |             | Works2 Version 1 Operating Manual (Common).   |  |
| FB operation type    | Pul         | lsed execution (multiple scan execution type)   |  |



| Item                | Description   |  |  |
|---------------------|---|--|--|
| Application example | Refer to "Appendix 1. FB Library Application Examples".                           |  |  |
| Timing chart        | [When operation completes without error]  |  |  |
|                     | FB_EN   |  |  |
|                     | (Execution command)   |  |  |
|                     | FB_ENO (Execution status)   |  |  |
|                     | Operation mode Offset/gain setting mode Normal mode                               |  |  |
|                     | CH1 Offset specification  |  |  |
|                     | Channel change request (YnB)  |  |  |
|                     | i_Value_Change<br>(Set value change command)                                      |  |  |
|                     | Set value change request (Yn6)  |  |  |
|                     | i_Write_Offset<br>(User range write command)                                      |  |  |
|                     | User range write request (YnA)  |  |  |
|                     | FB_OK<br>(Completed without error)  |  |  |
|                     | FB_ERROR (Error flag)   |  |  |
|                     | ERROR_ID (Error code) 0   |  |  |
|                     |   |  |  |
|                     | [When an error occurs]  |  |  |
|                     | FB_EN   |  |  |
|                     | (Execution command)<br>FB_ENO (Execution status)                                  |  |  |
|                     | Operation mode Normal mode  |  |  |
|                     | CH <sub>1</sub> Offset specification  |  |  |
|                     | Channel change request  |  |  |
|                     | (YnB)<br>i_Value_Change   |  |  |
|                     | (Set value change command)  |  |  |
|                     | (Yn6)   |  |  |
|                     | (User range write command)       User range write request                         |  |  |
|                     | (YnA)<br>FB_OK  |  |  |
|                     | (Completed without error)   |  |  |
|                     | FB_ERROR (Error flag)   |  |  |
|                     | ERROR_ID (Error code) 0 Error code 0  |  |  |
| Relevant manuals    | MELSEC-L Analog Input/Output Module User's Manual                                 |  |  |
|                     | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) |  |  |
|                     | GX Works2 Version 1 Operating Manual (Common)                                     |  |  |
|                     | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)             |  |  |



### ●Error code list

| Error code   | Description                                 | Action   |
|--------------|---|--|
| 10 (Decimal) | The specified channel is not valid. The     | Please try again after confirming the setting. |
|              | target channel is not within the range of 3 |  |
|              | or 4.                                       |  |

## Labels

| Name (Comment)    | Label name      | Data type | Setting range             | Description                      |
|-------------------|-----------------|-----------|---------------------------|----------------------------------|
| Execution         | FB_EN           | Bit       | ON, OFF                   | ON: The FB is activated.         |
| command           |                 | DIL       |                           | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No   |           | Depends on the I/O        | Specify the start XY address (in |
| address           |                 | Word      | point range of the CPU.   | hexadecimal) where the           |
|                   |                 | word      | For details, refer to the | L60AD2DA2 is connected. (For     |
|                   |                 |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Target CH         | i_CH            | Word      | 3, 4                      | Specify the channel number.      |
| Offset/gain       | i_Adjust_Amount | Word      | -3,000 to 3,000           | Specify the adjustment amount    |
| adjustment amount |                 | word      |                           | for the D/A output adjustment.   |
| Set value change  | i_Value_Change  |           | ON, OFF                   | Turn ON for D/A output change.   |
| command           |                 | Bit       |                           | Turn OFF after the D/A output    |
|                   |                 |           |                           | change.                          |
| User range write  | i_Write_Offset  |           | ON, OFF                   | Turn ON for the adjusted offset  |
| command           |                 | Bit       |                           | value writing to a flash memory. |
|                   |                 |           |                           | Turn OFF after the writing.      |

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



| 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.



### 2.2.8. M+L60AD2DA2\_DA\_SetGainVal (D/A conversion gain setting)

#### FB Name

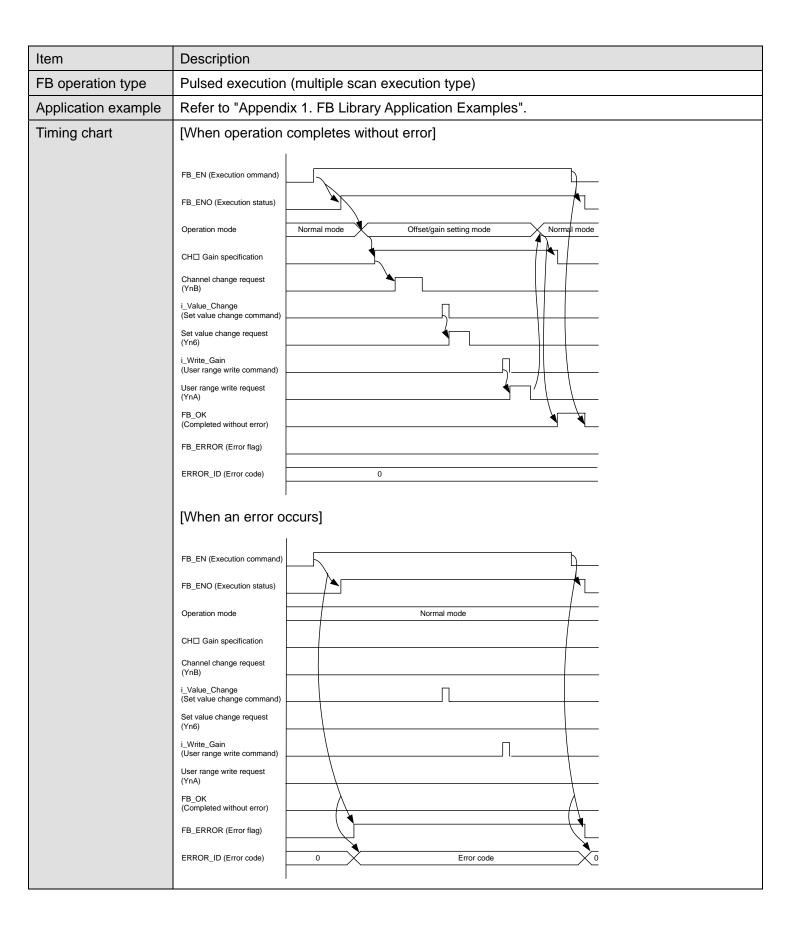
M+L60AD2DA2\_DA\_SetGainVal

| Item                | Description  |                           |   |  |
|---------------------|--|---------------------------|---|--|
| Function overview   | Sets the gain of the specified D/A conversion channel (CH3 or CH4).                    |                           |   |  |
| Symbol              |  | M+L60AD2DA2_DA_SetGainVal |   |  |
|                     | Execution comman   | d — B:FB_EN               | FB_ENO : B Execution status                 |  |
|                     | Module start XY addres   | s—W:i_Start_IO_No         | FB_OK : B — Completed without error         |  |
|                     | Target Cł  | н <b>—</b> W : i_CH       | FB_ERROR : B Error flag                     |  |
|                     | Offset/gain adjustment amour   | nt—W:i_Adjust_Amount      | ERROR_ID : W— Error code                    |  |
|                     | Set value change comman  | d — B:i_Value_Change      |   |  |
|                     | User range write comman  | d—B:i_Write_Gain          |   |  |
|                     |  |                           |   |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                 |   |  |
| and software        | CPU module   |                           |   |  |
|                     |  | Series                    | Model                                       |  |
|                     |  | MELSEC-L Series           | LCPU  |  |
|                     | Engineering software   | GX Works2 *1              |   |  |
|                     |  | Language                  | Software version                            |  |
|                     |  | English version           | Version1.24A or later                       |  |
|                     |  | Chinese version           | Version1.49B or later                       |  |
|                     |  | *1 For software version   | ns applicable to the modules used, refer to |  |
|                     |  | "Relevant manuals"        |   |  |
| Programming         | Ladder   |                           |   |  |
| language            |  |                           |   |  |
| Number of steps     | 450 steps (for MELSEC-L series CPU)  |                           |   |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                           |   |  |
|                     | input and output definit   | ion.                      |   |  |



| Item                 | De | scription   |
|----------------------|----|---|
| Function description | 1) | By turning ON FB_EN (Execution command), the gain of the specified D/A conversion         |
|                      |    | channel (CH3 or CH4) is set.  |
|                      | 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.  |
|                      | 3) | By turning ON the user range write command while FB_EN (Execution command) is ON,         |
|                      |    | the gain value is written.  |
|                      | 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).  |
|                      |    | Refer to the error code explanation section for details.                                  |
| Compiling method     | Ма | cro type  |
| Restrictions and     | 1) | The FB does not include error recovery processing. Program the error recovery             |
| precautions          |    | processing separately in accordance with the required system operation.                   |
|                      | 2) | The FB cannot be used in an interrupt program.  |
|                      | 3) | Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do     |
|                      |    | not use this FB in programs that are only executed once such as a subroutine,             |
|                      |    | FOR-NEXT loop because it is impossible to turn OFF.                                       |
|                      | 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. |
|                      |    | M+L60AD2DA2_AD_SetOffsetVal   |
|                      |    | M+L60AD2DA2_AD_SetGainVal   |
|                      |    | M+L60AD2DA2_DA_SetOffsetVal   |
|                      |    | M+L60AD2DA2_DA_SetGainVal   |
|                      | 5) | This FB uses index registers Z7 to Z9. Please do not use these index registers in an      |
|                      |    | interrupt program.  |
|                      | 6) | Every input must be provided with a value for proper FB operation.                        |
|                      | 7) | If the gain is set using the configuration function of GX Works2, this FB is unnecessary. |
|                      | 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.                                   |
|                      | 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.  |
|                      |    | For details on how to use the intelligent function module switch setting, refer to GX     |
|                      |    | Works2 Version 1 Operating Manual (Common).   |







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



### ●Error code list

| Error code   | Description                                 | Action   |
|--------------|---|--|
| 10 (Decimal) | The specified channel is not valid. The     | Please try again after confirming the setting. |
|              | target channel is not within the range of 3 |  |
|              | or 4.                                       |  |

## Labels

| Name (Comment)    | Label name      | Data type | Setting range             | Description                      |
|-------------------|-----------------|-----------|---------------------------|----------------------------------|
| Execution         | FB_EN           | Bit       | ON, OFF                   | ON: The FB is activated.         |
| command           |                 | DIL       |                           | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No   |           | Depends on the I/O        | Specify the start XY address (in |
| address           |                 | Word      | point range of the CPU.   | hexadecimal) where the           |
|                   |                 | word      | For details, refer to the | L60AD2DA2 is connected. (For     |
|                   |                 |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Target CH         | i_CH            | Word      | 3, 4                      | Specify the channel number.      |
| Offset/gain       | i_Adjust_Amount | Word      | -3,000 to 3,000           | Specify the adjustment amount    |
| adjustment amount |                 | word      |                           | for the D/A output adjustment.   |
| Set value change  | i_Value_Change  |           | ON, OFF                   | Turn ON for D/A output change.   |
| command           |                 | Bit       |                           | Turn OFF after the D/A output    |
|                   |                 |           |                           | change.                          |
| User range write  | i_Write_Gain    |           | ON, OFF                   | Turn ON for the adjusted gain    |
| command           |                 | Bit       |                           | value writing to a flash memory. |
|                   |                 |           |                           | Turn OFF after the writing.      |

| Name (Comment)    | Label name | Data type | Initial value | Description                             |
|-------------------|------------|-----------|---------------|---|
| Execution status  | FB_ENO     | Dit       | OFF           | ON: Execution command is ON.            |
|                   |            | Bit OFF   |               | OFF: Execution command is OFF.          |
| Completed without | FB_OK      | Bit       | OFF           | When ON, it indicates that the D/A      |
| error             |            |           |               | conversion offset setting is completed. |
| Error flag        | FB_ERROR   | Bit OFF   |               | When ON, it indicates that an error has |
|                   |            | ы         | OFF           | occurred.                               |
| Error code        | ERROR_ID   | Word      | 0             | FB error code output.                   |



| 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.



### 2.2.9. M+L60AD2DA2\_DA\_ShiftOperation (D/A conversion shift operation)

#### FB Name

M+L60AD2DA2\_DA\_ShiftOperation

| Item                | Description  |                              |   |  |
|---------------------|--|------------------------------|---|--|
| Function overview   | Adds the input value shift amount to the digital value.                                |                              |   |  |
| Symbol              | Execution command —  | M+L60AD2DA2_DA_<br>B : FB_EN | ShiftOperation<br>FB_ENO : B—Execution status |  |
|                     | Digital value —  | W:i_Digital_Value            | FB_OK : B Completed without error             |  |
|                     | Input value shift amount —   | W:i_Shift_Value              | o_Dig_Out_Val:W—Digital output value          |  |
|                     |  |                              | FB_ERROR : B Error flag                       |  |
|                     |  |                              | ERROR_ID:W—Error code                         |  |
|                     |  |                              |   |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                    |   |  |
| and software        | CPU module   |                              |   |  |
|                     |  | Series                       | Model   |  |
|                     |  | MELSEC-L Series              | LCPU  |  |
|                     |  |                              |   |  |
|                     | Engineering software   | GX Works2 *1                 | 0.4   |  |
|                     |  |                              | Software version                              |  |
|                     |  | English version              | Version1.24A or later                         |  |
|                     |  | Chinese version              | Version1.49B or later                         |  |
|                     |  | *1 For software version      | is applicable to the modules used, refer to   |  |
|                     |  | "Relevant manuals".          |   |  |
| Programming         | Ladder   |                              |   |  |
| language            |  |                              |   |  |
| Number of steps     | 192 steps (for MELSEC-L series CPU)  |                              |   |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and |                              |   |  |
|                     | input and output definit   | ion.                         |   |  |



| Item                 | Description  |  |  |
|----------------------|--|--|--|
| Function description | 1) By turning ON FB_EN (Execution command), the input value shift amount is added to the |  |  |
|                      | digital value *1.  |  |  |
|                      | *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.   |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery         |  |  |
| precautions          | processing separately in accordance with the required system operation.                  |  |  |
|                      | 2) The FB cannot be used in an interrupt program.  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do |  |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,            |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.                                      |  |  |
|                      | 4) Every input must be provided with a value for proper FB operation.                    |  |  |
|                      | 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.   |  |  |
|                      | For details on how to use the intelligent function module switch setting, refer to GX    |  |  |
|                      | Works2 Version 1 Operating Manual (Common).  |  |  |
|                      | 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is   |  |  |
|                      | effective.   |  |  |
|                      | 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]   |  |  |
|                      | FB_EN  |  |  |
|                      | (Execution command)  |  |  |
|                      | (Execution status)   |  |  |
|                      | Shift operation  |  |  |
|                      | FB_OK<br>(Completed without error)   |  |  |
|                      | FB_ERROR (Error flag)  |  |  |
|                      | ERROR_ID (Error code)  |  |  |
| Relevant manuals     | MELSEC-L Analog Input/Output Module User's Manual  |  |  |
|                      | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)        |  |  |
|                      | GX Works2 Version 1 Operating Manual (Common)  |  |  |
|                      | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)                    |  |  |



#### •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.      |
|                   |                 | DIL       |                   | OFF: The FB is not activated. |
| Digital value     | i_Digital_Value | Word      | -32,768 to 32,767 | Specify the digital value.    |
| Input value shift | i_Shift_Value   | Word      | -32,768 to 32,767 | Specify the shift amount.     |
| amount            |                 | vvora     |                   |                               |

| Name (Comment)       | Label name    | Data | Initial | Description                                |
|----------------------|---------------|------|---------|--|
|                      |               | type | value   |  |
| Execution status     | FB_ENO        | Bit  | OFF     | ON: Execution command is ON.               |
|                      |               | DIL  | OFF     | OFF: Execution command is OFF.             |
| Completed without    | FB_OK         |      |         | When ON, it indicates that the D/A         |
| error                |               | Bit  | OFF     | conversion shift operation is being        |
|                      |               |      |         | executed.                                  |
| Digital output value | o_Dig_Out_Val | Word | 0       | The digital value to which the input value |
|                      |               | word | 0       | shift amount is added is stored.           |
| Error flag           | FB_ERROR      | Bit  | OFF     | Always OFF                                 |
| Error code           | ERROR_ID      | Word | 0       | Always 0                                   |



| 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.



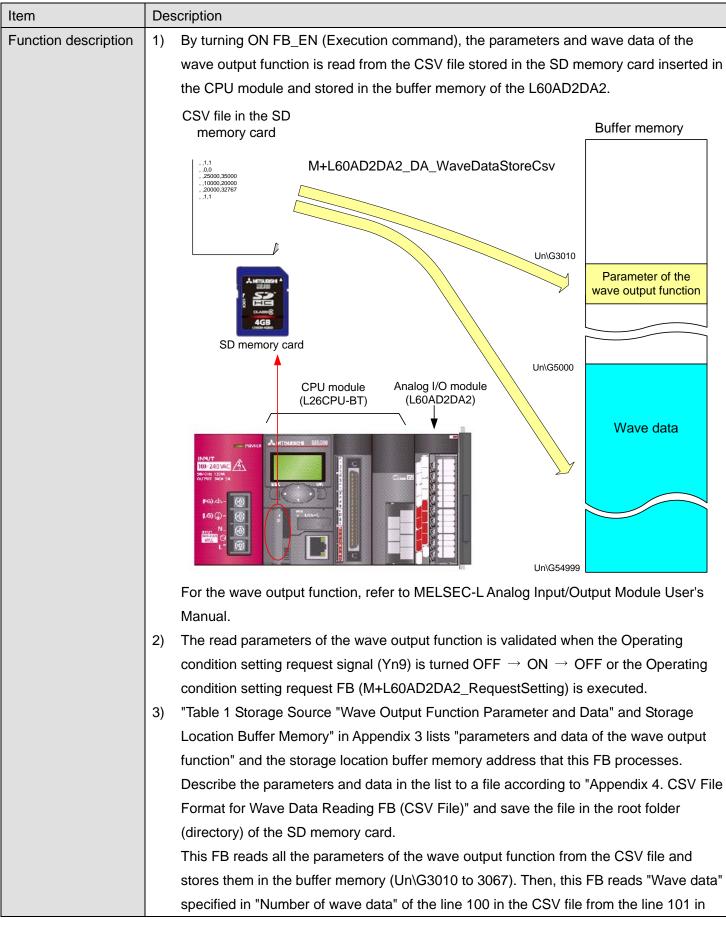
### 2.2.10. M+L60AD2DA2\_DA\_WaveDataStoreCsv (Read wave data (CSV file))

#### FB Name

M+L60AD2DA2\_DA\_WaveDataStoreCsv

| Item                | Description  |                               |   |  |  |
|---------------------|--|-------------------------------|---|--|--|
| Function overview   | 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.   |                               |   |  |  |
| Symbol              |  |                               |   |  |  |
|                     | Execution command —  | M+L60AD2DA2_DA_W<br>B : FB FN | FB_ENO : B Execution status                 |  |  |
|                     | Module start XY address –  |                               | FB_OK : B Completed without error           |  |  |
|                     |  |                               |   |  |  |
|                     | CSV file name –  | S:i_FileName                  | FB_ERROR : B Frror flag                     |  |  |
|                     |  |                               | ERROR_ID : W Error code                     |  |  |
|                     |  |                               |   |  |  |
| Applicable hardware | Analog I/O module  | L60AD2DA2                     |   |  |  |
| and software        | CPU module   |                               |   |  |  |
|                     |  | Series                        | Model                                       |  |  |
|                     |  | MELSEC-L Series               | LCPU *                                      |  |  |
|                     |  | * Only the model havin        | g an SD memory card slot is applicable.     |  |  |
|                     | Engineering software   | GX Works2 *1                  |   |  |  |
|                     |  | Language                      | Software version                            |  |  |
|                     |  | English version               | Version1.24A or later                       |  |  |
|                     |  | Chinese version               | Version1.49B or later                       |  |  |
|                     |  | *1 For software version       | ns applicable to the modules used, refer to |  |  |
|                     |  | "Relevant manuals".           |   |  |  |
| Programming         | Ladder   |                               |   |  |  |
| language            |  |                               |   |  |  |
| Number of steps     | 1029 steps (for MELSE  | C-L series CPU)               |   |  |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and       |                               |   |  |  |
|                     | input and output definition.   |                               |   |  |  |







| 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.                        |     |
|                  | The CSV file of the wave output function can be created easily with the "Create wave                |     |
|                  | output data" tool of GX Works2.   |     |
|                  | 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.                      |     |
|                  | * 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.   |     |
|                  | *1: [Parameter] <>[PLC Parameter] <>[PLC RAS] <>"File Access Error " in "When<br>There is an Error" |     |
|                  | 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.  |     |
|                  | When the FB is executed again, the reading processing is started from the beginning.                |     |
|                  | ) Only when the function selection is set to the wave output function, this FB can be use           | ed. |
|                  | ) 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.  |     |
|                  | The error code 60 (Decimal) is stored in ERROR_ID.  |     |
|                  | Refer to the error code explanation section for details.  |     |
|                  | b) 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 | flacro type   |     |
| Restrictions and | ) This FB requires many scans and takes long time to complete the processing.                       |     |
| precautions      | Therefore, this FB should be executed during the warm up of the L60AD2DA2.                          |     |
|                  | ) The FB does not include error recovery processing. Program the error recovery                     |     |
|                  | processing separately in accordance with the required system operation.                             |     |
|                  | ) The FB cannot be used in an interrupt program.  |     |
|                  | 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.   |     |
|                  | ) This FB uses index registers Z7 to Z9. Please do not use these index registers in an              |     |
|                  | interrupt program.  |     |
|                  | ) This FB uses the SP.FREAD command. Thus, when an execution error of the                           |     |
|                  | SP.FREAD command occurs, a CPU error occurs.  |     |
|                  | ) Do not use this FB when the CPU module that does not have a SD memory slot is use                 | ∍d. |



| Item                | Description  |
|---------------------|--|
|                     | Even if used with such a CPU module, this FB does not operate.                           |
|                     | 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.  |
|                     | The error code 33 (Decimal) is stored in ERROR_ID.                                       |
|                     | Refer to the error code explanation section for details.                                 |
|                     | 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.  |
|                     | The error code 35 (Decimal) is stored in ERROR_ID.                                       |
|                     | Refer to the error code explanation section for details.                                 |
|                     | 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.  |
|                     | The error code 36 (Decimal) is stored in ERROR_ID.                                       |
|                     | Refer to the error code explanation section for details.                                 |
|                     | 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).  |
|                     | 12) When two or more of these FBs are used, they cannot be used simultaneously.          |
|                     | 13) Every input must be provided with a value for proper FB operation.                   |
|                     | 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.   |
|                     | 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]  |
|                  | FB_EN<br>(Execution command)  |
|                  | FB_ENO<br>(Execution status)  |
|                  | Reading a CSV file in the During SP.FREAD execution No processing                 |
|                  | Buffer memory updating Update stopped During update Update stopped Update stopped |
|                  | FB_OK<br>(Completed without error)  |
|                  | FB_ERROR (Error flag)   |
|                  | ERROR_ID (Error code)   |
|                  | [When an error occurs]  |
|                  | FB_EN<br>(Execution command)  |
|                  | FB_ENO<br>(Execution status)  |
|                  | Reading a CSV file in<br>the SD memory card     No processing                     |
|                  | Buffer memory updating Update Stopped   |
|                  | FB_OK<br>(Completed without error)  |
|                  | FB_ERROR (Error flag)   |
|                  | ERROR_ID (Error code) 0 Error code 0  |
| 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)                         |
|                  | <ul> <li>GX Works2 Version 1 Operating Manual (Common)</li> </ul>                 |
|                  | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)             |



### •Error code list

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

| Name (Comment)    | Label name | Data    | Initial | Description                                   |
|-------------------|------------|---------|---------|---|
|                   |            | type    | value   |   |
| Execution status  | FB_ENO     | Bit OFF |         | ON: Execution command is ON.                  |
|                   |            |         |         | OFF: Execution command is OFF.                |
| Completed without | FB_OK      |         |         | When ON, it indicates that writing the        |
| error             |            | Bit O   |         | parameters and wave data of the wave          |
|                   |            | ы       | Bit OFF | 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.                         |



| 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.



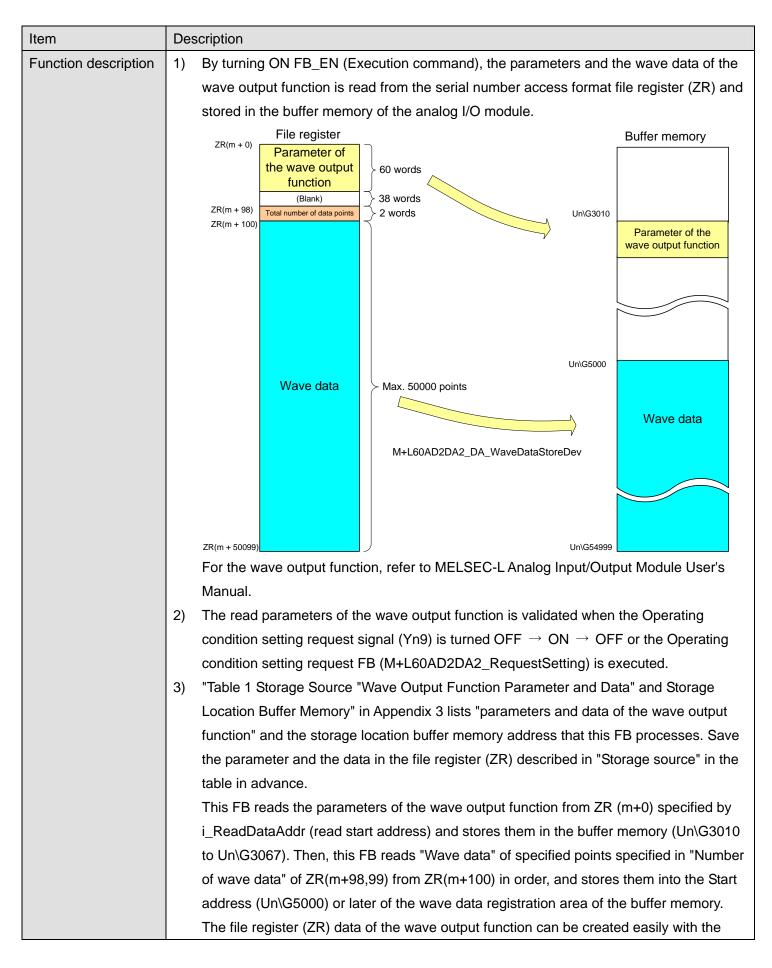
### 2.2.11. M+L60AD2DA2\_DA\_WaveDataStoreDev (Read wave data (device))

#### FB Name

M+L60AD2DA2\_DA\_WaveDataStoreDev

| Item                | Description   |                         |   |
|---------------------|---|-------------------------|---|
| Function overview   | 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.  |                         |   |
| Symbol              |   |                         |   |
|                     | Execution command —   | M+L60AD2DA2_DA_Wa       | FB_ENO : B Execution status                 |
|                     |   |                         | _   |
|                     | Module start XY address —   |                         | FB_OK : B Completed without error           |
|                     | Read start address —  | D:i_ReadDataAddr        | FB_ERROR : B Error flag                     |
|                     |   |                         | ERROR_ID : W Error code                     |
|                     |   |                         |   |
| Applicable hardware | Analog I/O module   | L60AD2DA2               |   |
| and software        | CPU module  |                         |   |
|                     |   | Series                  | Model                                       |
|                     |   | MELSEC-L Series         | LCPU  |
|                     |   |                         |   |
|                     | Engineering software  | GX Works2 *1            |   |
|                     |   | Language                | Software version                            |
|                     |   | English version         | Version1.24A or later                       |
|                     |   | Chinese version         | Version1.49B or later                       |
|                     |   | *1 For software version | is applicable to the modules used, refer to |
|                     |   | "Relevant manuals".     |   |
| Programming         | Ladder  |                         |   |
| language            |   |                         |   |
| Number of steps     | 614 steps (for MELSEC-  | L series CPU)           |   |
|                     |   | ,                       | ends on the CPU model that is used and      |
|                     | input and output definit  |                         |   |
|                     |   |                         |   |







| Item             | Description  |
|------------------|--|
|                  | "Create wave output data" tool of GX Works2.   |
|                  | * 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.   |
|                  | *1 [Parameter]=>[PLC Parameter]=>[PLC File]=>"File Register"   |
|                  | *2 [Parameter]=>[PLC Parameter]=>[Device]=>"File Register Extension Setting"   |
|                  | 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.  |
|                  | 5) Only when the function selection is set to the wave output function, this FB can be used.   |
|                  | 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.   |
|                  | The error code 60 (Decimal) is stored in ERROR_ID.   |
|                  | Refer to the error code explanation section for details.   |
|                  | 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.   |
|                  | When the FB is executed again, the reading processing is started from the beginning.   |
| Compiling method | Macro type   |
| Restrictions and | 1) This FB requires many scans and takes long time to complete the processing.   |
| precautions      | Therefore, this FB should be executed during the warm up of the L60AD2DA2.   |
|                  | 2) The FB does not include error recovery processing. Program the error recovery   |
|                  | processing separately in accordance with the required system operation.  |
|                  | 3) The FB cannot be used in an interrupt program.  |
|                  | 4) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do   |
|                  | not use this FB in programs that are only executed once such as a subroutine,  |
|                  | FOR-NEXT loop because it is impossible to turn OFF.  |
|                  | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program.   |
|                  | <ul><li>6) When two or more of these FBs are used, they cannot be used simultaneously.</li></ul>   |
|                  | <ul> <li>7) Every input must be provided with a value for proper FB operation.</li> </ul>  |
|                  | <ul> <li>8) To operate the L60AD2DA2, set the I/O range according to the device and system to be</li> </ul>  |
|                  |  |
|                  | connected. Configure the setting in Switch Setting of GX Works2 according to the   |
|                  | connected. Configure the setting in Switch Setting of GX Works2 according to the application.  |
|                  | 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 |



| 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]         FB_EN<br>(Execution command)       FB_EN<br>(Execution status)         Buffer memory updating<br>processing       Update<br>stopped       Update<br>Update<br>stopped       FB_EN<br>(Execution status)         FB_OK<br>(Completed without error)       Update<br>stopped       Update<br>stopped       Buffer memory updating<br>processing         FB_OK<br>(Completed without error)       FB_OK<br>(Completed without error)       FB_ERROR (Error flag) |  |  |  |  |
|                     | ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code 0  |  |  |  |  |
| Relevant manuals    | MELSEC-L Analog Input/Output Module User's Manual   |  |  |  |  |
|                     | MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |  |  |  |  |
|                     | GX Works2 Version 1 Operating Manual (Common)   |  |  |  |  |
|                     | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)   |  |  |  |  |

#### •Error code list

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



### Labels

### Input labels

| Name (Comment)     | Label name     | Data type | Setting range             | Description                           |
|--------------------|----------------|-----------|---------------------------|---------------------------------------|
| Execution          | FB_EN          | Bit       | ON, OFF                   | ON: The FB is activated.              |
| command            |                | ы         |                           | OFF: The FB is not activated.         |
| Module start XY    | i_Start_IO_No  |           | Depends on the I/O        | Specify the start XY address (in      |
| address            |                |           | point range of the        | hexadecimal) where the                |
|                    |                | Word      | CPU.                      | L60AD2DA2 is connected. (For          |
|                    |                |           | For details, refer to the | example, enter H10 for X10.)          |
|                    |                |           | CPU user's manual.        |                                       |
| Read start address | i_ReadDataAddr |           | Effective device range    | Specify the start address of the file |
|                    |                | Double    |                           | register (ZR) in which the            |
|                    |                | Word      |                           | parameters and the wave data of       |
|                    |                | vvoru     |                           | the wave output function are          |
|                    |                |           |                           | stored.                               |

| Name (Comment)    | Label name | Data type | Initial value                            | Description                                      |
|-------------------|------------|-----------|--|--|
| Execution status  | FB_ENO     |           | ON: Execution command is ON.             |  |
|                   |            | Bit       | OFF                                      | OFF: Execution command is OFF.                   |
| Completed without | FB_OK      |           |  | When ON, it indicates that writing the           |
| error             |            |           | parameters and the wave data of the wave |  |
|                   |            | Bit       | OFF                                      | 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   |



| 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.



### 2.2.12. M+L60AD2DA2\_DA\_WaveOutputSetting (Wave output setting)

#### FB Name

M+L60AD2DA2\_DA\_WaveOutputSetting

| Item                | Description  |  |                    |                                   |
|---------------------|--|--|--------------------|-----------------------------------|
| Function overview   | Sets the wave output of the specified D/A conversion channel (CH3 or CH4) or all the D/A |  |                    |                                   |
|                     | conversion channels (CH3 and CH4).   |  |                    |                                   |
| Symbol              | M+L60AD2DA2_DA_WaveOutputSetting   |  |                    | DA WayeQuitoutSetting             |
|                     | Execution co   | ommand —   | B : FB_EN          | FB_ENO : B Execution status       |
|                     | Module start XY  | address —  | W:i_Start_IO_No    | FB_OK : B Completed without error |
|                     | Та   | arget CH —   | W : i_CH           | FB_ERROR : B — Error flag         |
|                     | Output setting during wave ou  | tput stop —  | W:i_OutputSelect   | ERROR_ID : W—Error code           |
|                     | Output value during wave ou  | tput stop —  | W:i_OutputValue    |                                   |
|                     | Wave pattern start addres  | s setting —  | D: i_StartingAddr  |                                   |
|                     | Wave pattern data point  | s setting —  | D: i_PointsSetting |                                   |
|                     | Wave pattern output repetitio  | n setting —  | W:i_Frequency      |                                   |
|                     | Constant for wave output conversion  | ion cycle —  | W:i_ConvSpeed      |                                   |
|                     |  |  |                    |                                   |
| Applicable hardware | Analog I/O module  | L60AD2DA2  |                    |                                   |
| and software        | CPU module   |  |                    |                                   |
|                     |  |  | Series             | Model                             |
|                     |  | MELS   | EC-L Series        | LCPU                              |
|                     |  |  | rko0 *1            |                                   |
|                     | Engineering software   | GX Wo  | -                  |                                   |
|                     |  |  | Language           | Software version                  |
|                     |  |  | h version          | Version1.24A or later             |
|                     |  | Chinese version  |                    | Version1.49B or later             |
|                     |  | *1 For software versions applicable to the modules used, re- |                    |                                   |
|                     |  | "Relevant manuals".  |                    |                                   |
| Programming         | Ladder   |  |                    |                                   |
| language            |  |  |                    |                                   |
| Number of steps     | 403 steps (for MELSEC-L series CPU)  |  |                    |                                   |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and   |  |                    |                                   |
|                     | input and output definition.   |  |                    |                                   |



| Item                 | Description  |  |  |
|----------------------|--|--|--|
| 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.   |  |  |
|                      | 2) The setting value is validated when the Operating condition setting request signal (Yn9)    |  |  |
|                      | is turned OFF $\rightarrow$ ON $\rightarrow$ OFF or the Operating condition setting request FB |  |  |
|                      | (M+L60AD2DA2_RequestSetting) is executed.  |  |  |
|                      | 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.                                     |  |  |
|                      | 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.   |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery               |  |  |
| precautions          | processing separately in accordance with the required system operation.                        |  |  |
|                      | 2) The FB cannot be used in an interrupt program.  |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do       |  |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,                  |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.  |  |  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition        |  |  |
|                      | of the target channel.   |  |  |
|                      | 5) This FB uses index registers Z6 to Z9. Please do not use these index registers in an        |  |  |
|                      | interrupt program.   |  |  |
|                      | 6) Every input must be provided with a value for proper FB operation.                          |  |  |
|                      | 7) 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.   |  |  |
|                      | 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]       [When an error occurs]         FB_EN<br>(Execution command)       FB_ENO (Execution status)         Fach setting value writing<br>processing       No         FB_OK<br>(Wave output setting<br>complete)       No         FB_EROR (Error flag)       0         FB_EROR (Error flag)       0         ERROR_ID (Error code)       0 |
| Relevant manuals | <ul> <li>MELSEC-L Analog Input/Output Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>   |

### •Error code list

| Error code   | Description                                | Action   |
|--------------|--|--|
| 10 (Decimal) | The specified channel is not valid.        | Please try again after confirming the setting. |
|              | Set 3, 4, or 15 to the target channel.     |  |
| 60 (Decimal) | The function selection of Switch 4 of the  | Set the function selection of Switch 4 of the  |
|              | intelligent function module switch setting | intelligent function module switch setting of  |
|              | of the target module is set to other than  | the target module to the wave output function, |
|              | 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         | Dit       | ON, OFF               | ON: The FB is activated.              |
|                   |               | Bit       |                       | OFF: The FB is not activated.         |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in      |
| address           |               |           | point range of the    | hexadecimal) where the L60AD2DA2      |
|                   |               | Word      | CPU.                  | is connected. (For example, enter H10 |
|                   |               | word      | For details, refer to | for X10.)                             |
|                   |               |           | the CPU user's        |                                       |
|                   |               |           | manual.               |                                       |
| Target CH         | i_CH          | M/a nal   | 3, 4, 15              | 3 or 4: Specify the channel number.   |
|                   |               | Word      |                       | 15: Specify channel 3 and channel 4.  |



| Name (Comment)        | Label name      | Data type | Setting range        | Description                             |
|-----------------------|-----------------|-----------|----------------------|---|
| Output setting during | i_OutputSelect  |           | 0: 0V/0mA            | Specify the output value during the     |
| wave output stop      |                 |           | 1: Offset value      | wave output stop.                       |
|                       |                 | Word      | 2: Output value      |   |
|                       |                 |           | during wave output   |   |
|                       |                 |           | stop                 |   |
| Output value during   | i_OutputValue   |           | • 0 to 12,287        | Set the value to be output when "2:     |
| wave output stop      |                 |           | (For range of 0 to   | Output value during wave output stop"   |
|                       |                 |           | 5V, 1 to 5V, 0 to    | is selected in "Output setting during   |
|                       |                 | Word      | 20mA, and 4 to       | wave output stop".                      |
|                       |                 | vvord     | 20mA)                | The available setting range differs     |
|                       |                 |           | • -16,384 to 16,383  | depending on the output range           |
|                       |                 |           | (For range of -10    | setting.                                |
|                       |                 |           | to 10V)              |   |
| Wave pattern start    | i_StartingAddr  | Double    | 5,000 to 54,999      | Set the start address of the wave       |
| address setting       |                 | Word      |                      | pattern to be output.                   |
| Wave pattern data     | i_PointsSetting | Double    | 1 to 50,000 (points) | Set the data points of the wave pattern |
| points setting        |                 | Word      |                      | to be output.                           |
| Wave pattern output   | i_Frequency     |           | -1:                  | Set the output times of the wave        |
| repetition setting    |                 |           | Unlimited repetition | pattern.                                |
|                       |                 | Word      | 1 to 32,767:         |   |
|                       |                 |           | Specified number of  |   |
|                       |                 |           | times                |   |
| Constant for wave     | i_ConvSpeed     |           | 1 to 5,000           | Set the constant to determine the       |
| output conversion     |                 | Word      |                      | conversion cycle of the wave output.    |
| cycle                 |                 |           |                      |   |

| Name (Comment)    | Label name | Data | Initial | Description                                       |
|-------------------|------------|------|---------|---|
|                   |            | type | value   |   |
| Execution status  | FB_ENO     | Bit  | OFF     | ON: Execution command is ON.                      |
|                   |            | DIL  | UFF     | OFF: Execution command is OFF.                    |
| Completed without | FB_OK      | Bit  | OFF     | When ON, it indicates that the wave output        |
| error             |            | DIL  | UFF     | 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.                             |



| 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.



### 2.2.13. M+L60AD2DA2\_DA\_WaveOutReqSetting (Wave output start/stop request)

#### FB Name

M+L60AD2DA2\_DA\_WaveOutReqSetting

| Description  |                                  |  |  |  |
|--|----------------------------------|--|--|--|
| 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).                     |                                  |  |  |  |
| E  | M+L60AD2DA2_DA_WaveOutReqSetting |  |  |  |
|  |                                  | FB_ENO : B Execution status                      |  |  |
|  |                                  | FB_OK : B Completed without error                |  |  |
|  |                                  | aveStatus_CH3 : W—CH3 Wave output status monitor |  |  |
| Wave output start/stop request -   | W : I_Start_Stop_Req O_Wa        | aveStatus_CH4 : W—CH4 Wave output status monitor |  |  |
|  |                                  |  |  |  |
|  |                                  | ERROR_ID : W Error code                          |  |  |
|  |                                  |  |  |  |
|  | L60AD2DA2                        | L60AD2DA2  |  |  |
| CPU module   |                                  |  |  |  |
|  | Series                           | Model  |  |  |
|  | MELSEC-L Series                  | LCPU   |  |  |
| Engineering software   | GX Works2 *1                     |  |  |  |
|  | Language                         | Software version                                 |  |  |
|  | English version                  | Version1.24A or later                            |  |  |
|  | Chinese version                  | Version1.49B or later                            |  |  |
|  | *1 For software version          | s applicable to the modules used, refer to       |  |  |
|  | "Relevant manuals".              |  |  |  |
| Ladder   | 1                                |  |  |  |
|  |                                  |  |  |  |
| 353 steps (for MELSEC-L series CPU)  |                                  |  |  |  |
| * The number of steps of the FB in a program depends on the CPU model that is used and     |                                  |  |  |  |
|  |                                  |  |  | Sets the starting, stoppin         channel (CH3 or CH4) o         Execution command-         Module start XY address -         Target CH-         Wave output start/stop request -         Analog I/O module         CPU module         Engineering software         Ladder         353 steps (for MELSEC-         * The number of steps o |



| 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.  |
|                      | 2) By turning ON FB_EN (Execution command), the value of the wave output status                                |
|                      | monitor (Un\G3102, Un\G3103) is output.  |
|                      | 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.  |
|                      | When all channels are set in the input label, the wave output status monitor values of all                     |
|                      | the channels are output.   |
|                      | 3) After FB_EN (Execution command) is turned ON, the FB is always executed.                                    |
|                      | 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)".   |
|                      | 5) Only when the function selection is set to the wave output function, this FB can be used.                   |
|                      | 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.   |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery                               |
| precautions          | processing separately in accordance with the required system operation.  |
|                      | 2) The FB cannot be used in an interrupt program.  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do                       |
|                      | not use this FB in programs that are only executed once such as a subroutine,                                  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.  |
|                      | 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. |
|                      | 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an                        |
|                      | interrupt program.   |
|                      | 6) Every input must be provided with a value for proper FB operation.  |
|                      | 7) 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.   |
|                      | 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] [When an error occurs]   |  |  |  |
|                     | FB_EN (Execution command)   |  |  |  |
|                     | FB_ENO (Execution status)   |  |  |  |
|                     | Wave output start/stop request 0 Write 0 Wave output start/stop request 0   |  |  |  |
|                     | o_WaveStatusCH3 to 4<br>(CH3 and CH4 Wave output<br>status monitor) 0<br>During update 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0 |  |  |  |
|                     | FB_OK<br>(Completed without error) FB_OK  |  |  |  |
|                     | FB_ERROR (Error flag)   |  |  |  |
|                     | ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code 0  |  |  |  |
| Relevant manuals    | MELSEC-L Digital-Analog Converter Module User's Manual  |  |  |  |
|                     | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)   |  |  |  |
|                     | GX Works2 Version 1 Operating Manual (Common)   |  |  |  |
|                     | GX Works2 Version 1 Operating Manual (Simple Project, Function Block)   |  |  |  |

### •Error code list

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



### Labels

### Input labels

| Name         | Label name       | Data | Setting range                 | Description                          |
|--------------|------------------|------|-------------------------------|--------------------------------------|
| (Comment)    |                  | type |                               |                                      |
| Execution    | FB_EN            | Bit  | ON, OFF                       | ON: The FB is activated.             |
| command      |                  | ы    |                               | OFF: The FB is not activated.        |
| Module start | i_Start_IO_No    |      | Depends on the I/O point      | Specify the start XY address (in     |
| XY address   |                  | Word | range of the CPU.             | hexadecimal) where the L60AD2DA2     |
|              |                  | word | For details, refer to the CPU | is connected. (For example, enter    |
|              |                  |      | user's manual.                | H10 for X10.)                        |
| Target CH    | i_CH             | Word | 3, 4, 15                      | 3 or 4: Specify the channel number.  |
|              |                  |      |                               | 15: Specify channel 3 and channel 4. |
| Wave output  | i_Start_Stop_Req |      | 0: Wave output stop request   | Specify the request for the wave     |
| start/stop   |                  | Word | 1: Wave output start request  | output start or stop.                |
| request      |                  |      | 2: Wave output pause request  |                                      |

| Name (Comment)    | Label name       | Data | Initial value | Description                              |
|-------------------|------------------|------|---------------|--|
|                   |                  | type |               |  |
| Execution status  | FB_ENO           | Bit  | OFF           | ON: Execution command is ON.             |
|                   |                  |      |               | OFF: Execution command is OFF.           |
| Completed without | FB_OK            | Bit  | OFF           | When ON, it indicates that the FB is     |
| error             |                  |      |               | being executed properly.                 |
| CH3 Wave output   | o_WaveStatus_CH3 |      |               | Outputs the wave output status value     |
| status monitor    |                  | Word | 0             | (stop, during output, pause).            |
|                   |                  |      |               | 0: Wave output stop                      |
|                   |                  |      |               | 1: Wave output                           |
|                   |                  |      |               | 2: Wave output pause                     |
| CH4 Wave output   | o_WaveStatus_CH4 |      |               | - 3: Wave output step action *1          |
| status monitor    |                  |      |               | *1: The wave output step action function |
|                   |                  |      |               | is unavailable with the FB. To execute,  |
|                   |                  | Word | 0             | 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.                                  |



| Name (Comment) | Label name | Data | Initial value | Description                                       |
|----------------|------------|------|---------------|---|
|                |            | type |               |   |
| 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.



### 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**

| Item                | Description   |                      |  |
|---------------------|---|----------------------|--|
| Function overview   | 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).                         |                      |  |
| Symbol              | M+L60AD2DA2_ReadADVal_WriteDAVal  |                      |  |
|                     | Execution command — B   | : FB_EN              | FB_ENO : B Execution status                |
|                     | Module start XY address — W   | : i_Start_IO_No      | FB_OK : B Completed without error          |
|                     | CH3 Digital value — W   | : i_DA_Value_CH3 o_A | AD_Value_CH1 : W—CH1 A/D conversion data   |
|                     | CH4 Digital value — W   | : i_DA_Value_CH4 o_A | AD_Value_CH2:W—CH2 A/D conversion data     |
|                     |   |                      | FB_ERROR : B Error flag                    |
|                     |   |                      | ERROR_ID : WError code                     |
|                     |   |                      |  |
| Applicable hardware | Analog I/O module   | L60AD2DA2            |  |
| and software        | CPU module  |                      |  |
|                     |   | Series               | Model                                      |
|                     |   | MELSEC-L Series      | LCPU                                       |
|                     | Engineering software  | GX Works2 *1         |  |
|                     |   | Language             | Software version                           |
|                     |   | English version      | Version1.24A or later                      |
|                     |   | Chinese version      | Version1.49B or later                      |
|                     | *1 For software versions applicable to the modules used, refer t                          |                      | s applicable to the modules used, refer to |
|                     |   | "Relevant manuals".  |  |
| Programming         | Ladder  |                      |  |
| language            |   |                      |  |
| Number of steps     | 312 steps (for MELSEC-L series CPU)   |                      |  |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and    |                      |  |
|                     | input and output definition.  |                      |  |



| 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 and the digital input values of the D/A               |  |  |
|                      | conversion channels (CH3 and CH4) are written.  |  |  |
|                      | 2) The read A/D conversion data depends on the settings of the input range and the              |  |  |
|                      | averaging processing function.  |  |  |
|                      | 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.  |  |  |
|                      | 4) The digital input value to be written depends on the output range setting.                   |  |  |
|                      | When the scaling function (D/A conversion) of the L60AD2DA2 is enabled, the digital             |  |  |
|                      | input value is scaled before the D/A conversion.  |  |  |
|                      | 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     | 1) The FB does not include error recovery processing. Program the error recovery                |  |  |
| precautions          | processing separately in accordance with the required system operation.                         |  |  |
|                      | 2) The FB cannot be used in an interrupt program.   |  |  |
|                      | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do        |  |  |
|                      | not use this FB in programs that are only executed once such as a subroutine,                   |  |  |
|                      | FOR-NEXT loop because it is impossible to turn OFF.   |  |  |
|                      | 4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an        |  |  |
|                      | interrupt program.  |  |  |
|                      | 5) Every input must be provided with a value for proper FB operation.                           |  |  |
|                      | 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.  |  |  |
|                      | 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]         FB_EN<br>(Execution command)         FB_ENO<br>(Execution status)         o_AD_Value_CHI<br>(CHI A/D conversion data)         i_DA_Value_CHI<br>(CHI Digital input value)         FB_ERO<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code) |
| Relevant manuals | <ul> <li>MELSEC-L Analog Input/Output Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>                               |

# Error codes Error code list Error code Description Action

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



### Labels

# Input labels

| Name            | Label name     | Data  | Setting range      | Description                                   |
|-----------------|----------------|-------|--------------------|---|
| (Comment)       |                | type  |                    |   |
| Execution       | FB_EN          | Bit   | ON, OFF            | ON: The FB is activated.                      |
| command         |                | ы     |                    | OFF: The FB is not activated.                 |
| Module start XY | i_Start_IO_No  |       | Depends on the     | Specify the start XY address (in              |
| address         |                |       | I/O point range    | hexadecimal) where the L60AD2DA2 is           |
|                 |                | Mord  | of the CPU.        | connected. (For example, enter H10 for        |
|                 |                | Word  | For details, refer | X10.)   |
|                 |                |       | to the CPU         |   |
|                 |                |       | user's manual.     |   |
| CH3 Digital     | i_DA_Value_CH3 |       | -32,000 to         | Specify the digital input value of channel 3. |
| value           |                | Word  | 32,000             | The available setting range differs           |
|                 |                | vvoru |                    | depending on the scaling function (D/A        |
|                 |                |       |                    | conversion) and output range setting.         |
| CH4 Digital     | i_DA_Value_CH4 |       | -32,000 to         | Specify the digital input value of channel 4. |
| value           |                | Word  | 32,000             | 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.            |
|                    |                | DIL       |               | OFF: Execution command is OFF.          |
| Completed without  | FB_OK          |           |               | When ON, it indicates that the A/D      |
| error              |                | Bit       | OFF           | conversion value is being read or the   |
|                    |                |           |               | digital input value is being written.   |
| CH1 A/D conversion | o_AD_Value_CH1 | Word      | 0             | The A/D conversion value of channel 1   |
| data               |                | vvoru     | 0             | is stored.                              |
| CH2 A/D conversion | o_AD_Value_CH2 | Mord      | 0             | The A/D conversion value of channel 2   |
| data               |                | Word      |               | is stored.                              |
| Error flag         | FB_ERROR       | Dit       | OFF           | When ON, it indicates that an error has |
|                    |                | Bit       | OFF           | 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.



# 2.3.2. M+L60AD2DA2\_RequestSetting (Operating condition setting request)

### FB Name

M+L60AD2DA2\_RequestSetting

### **Function Overview**

| Item                 | Description   |                     |  |
|----------------------|---|---------------------|--|
| Function overview    | Validates each setting.   |                     |  |
| Symbol               |   | M+L60AD2DA2_Red     | nuestSetting                               |
|                      | Execution command —   |                     | FB_ENO : B — Execution status              |
|                      | Module start XY address —   | W:i Start IO No     | FB_OK : B — Completed without error        |
|                      |   |                     | FB_ERROR : B — Error flag                  |
|                      |   |                     | ERROR_ID : W Error code                    |
|                      |   |                     |  |
|                      |   |                     |  |
| Applicable hardware  | Analog I/O module   | L60AD2DA2           |  |
| and software         | CPU module  |                     |  |
|                      |   | Series              | Model                                      |
|                      |   | MELSEC-L Series     | LCPU                                       |
|                      | Engineering software  | GX Works2 *1        |  |
|                      |   | Language            | Software version                           |
|                      |   | English version     | Version1.24A or later                      |
|                      |   | Chinese version     | Version1.49B or later                      |
|                      |   |                     | s applicable to the modules used, refer to |
|                      |   | "Relevant manuals". |  |
| Programming          | Ladder  |                     |  |
| language             |   |                     |  |
| Number of steps      | 294 steps (for MELSEC-L series CPU)   |                     |  |
|                      | * The number of steps of the FB in a program depends on the CPU model that is used and    |                     |  |
|                      | input and output definit  | ion.                |  |
| 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.  |                     |  |
|                      | 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  |                     |  |



| Item                | Description   |  |
|---------------------|---|--|
| Restrictions and    | 1) When this FB is executed while the L60AD2DA2 is being operated, A/D conversion and     |  |
| precautions         | D/A conversion are stopped. The D/A output before the stop is held.                       |  |
|                     | The conversion restarts after FB_OK turns ON.   |  |
|                     | 2) The FB does not include error recovery processing. Program the error recovery          |  |
|                     | processing separately in accordance with the required system operation.                   |  |
|                     | 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do  |  |
|                     | not use this FB in programs that are only executed once such as a subroutine,             |  |
|                     | FOR-NEXT loop because it is impossible to turn OFF.                                       |  |
|                     | 4) The FB cannot be used in an interrupt program.   |  |
|                     | 5) This FB uses index register Z9. Please do not use the index register in an interrupt   |  |
|                     | program.  |  |
|                     | 6) Every input must be provided with a value for proper FB operation.                     |  |
|                     | 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.                              |  |
|                     | 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.  |  |
|                     | 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]  |  |
|                     | FB_EN (Execution command)   |  |
|                     | FB_ENO (Execution status)   |  |
|                     | Operating condition setting<br>request (Yn9)  |  |
|                     | Operating completed flag (Xn9)  |  |
|                     | FB_OK<br>(Completed without error)  |  |
|                     | FB_ERROR (Error flag)   |  |
|                     | ERROR_ID (Error code) 0   |  |
| Relevant manuals    | MELSEC-L Analog Input/Output Module User's Manual   |  |
|                     | • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)         |  |
|                     | GX Works2 Version 1 Operating Manual (Common)   |  |
|                     | 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.         |
|                   |               | DIL       |                           | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O        | Specify the start XY address (in |
| address           |               |           | point range of the CPU.   | hexadecimal) where the           |
|                   |               | Word      | For details, refer to the | L60AD2DA2 is connected. (For     |
|                   |               |           | CPU user's manual.        | example, enter H10 for X10.)     |

#### Output labels

| Name (Comment)    | Label name | Data type | Initial value | Description                              |
|-------------------|------------|-----------|---------------|--|
| Execution status  | FB_ENO     |           |               | ON: Execution command is ON.             |
|                   |            | Bit       | OFF           | OFF: Execution command is OFF.           |
| Completed without | FB_OK      |           |               | When ON, it indicates that the operating |
| error             |            | Bit       | OFF           | condition setting is completed.          |
| Error flag        | FB_ERROR   | Dit       |               | When ON, it indicates that an error has  |
|                   |            | Bit       | OFF           | 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.



# 2.3.3. M+L60AD2DA2\_ErrorOperation (Error operation)

### FB Name

M+L60AD2DA2\_ErrorOperation

### **Function Overview**

| Item                 | Description                             |                           |  |  |
|----------------------|---|---------------------------|--|--|
| Function overview    | Monitors error codes and resets errors. |                           |  |  |
| Symbol               | M+L60AD2DA2_ErrorOperation              |                           |  |  |
|                      |   |                           | FB_ENO : B — Execution status              |  |
|                      | Module start XY address —W              | : i_Start_IO_No           | FB_OK : B — Completed without error        |  |
|                      | Error reset request - B                 | : i_Error_Reset o         | _UNIT_ERROR : B Module error flag          |  |
|                      |   | o_UN                      | IT_ERR_CODE : W Module error code          |  |
|                      |   |                           | FB_ERROR : B - Error flag                  |  |
|                      |   |                           | ERROR_ID : W — Error code                  |  |
|                      | L                                       |                           |  |  |
| Applicable hardware  | Analog I/O module                       | L60AD2DA2                 |  |  |
| and software         | CPU module                              |                           |  |  |
|                      |   | Series                    | Model                                      |  |
|                      |   | MELSEC-L Series           | LCPU                                       |  |
|                      |   |                           |  |  |
|                      | Engineering software                    | GX Works2 *1              |  |  |
|                      |   | Language                  | Software version                           |  |
|                      |   | English version           | Version1.24A or later                      |  |
|                      |   | Chinese version           | Version1.49B or later                      |  |
|                      |   | *1 For software version   | s applicable to the modules used, refer to |  |
|                      |   | "Relevant manuals".       |  |  |
| Programming          | Ladder                                  |                           |  |  |
| language             |   |                           |  |  |
| Number of steps      | 307 steps (for MELSEC-L                 | series CPU)               |  |  |
|                      | * The number of steps of t              | he FB in a program depe   | ends on the CPU model that is used and     |  |
|                      | input and output definition.            |                           |  |  |
| Function description | 1) When FB_EN (Execu                    | tion command) is turned   | ON, an error of the target module is       |  |
|                      | monitored.                              |                           |  |  |
|                      | 2) After FB_EN (Executi                 | on command) is turned (   | DN, an error is reset when i_Error_Reset   |  |
|                      | (Error reset command                    | d) is turned ON during er | ror occurrence.                            |  |



| Item                                | Description  |  |
|-------------------------------------|--|--|
| Compiling method                    | Macro type   |  |
| Restrictions and<br>precautions     | <ul> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> <li>2) Please ensure that the FB_EN signal is capable of being turned OFF by the program.</li> <li>3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.</li> <li>3) 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.</li> <li>4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.</li> <li>5) Every input must be provided with a value for proper FB operation.</li> <li>5) 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.</li> <li>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.</li> <li>For details on how to use the intelligent function module switch setting, refer to GX</li> </ul> |  |
|                                     | Works2 Version 1 Operating Manual (Common).  |  |
| FB operation type                   | Real-time execution  |  |
| Application example<br>Timing chart | Refer to "Appendix 1. FB Library Application Examples".         [When operation completes without error]         FB_EN (Execution command)         FB_ENO (Execution status)         i_Error_Reset         (Error reset request)         Error clear request (YnF)         Error flag (XnF)         o_UNIT_ERROR<br>(Module error code)         FB_OK<br>(Completed without error)         FB_ERROR (Error flag)         ERROR_ID (Error code)         0   |  |
| Relevant manuals                    | <ul> <li>MELSEC-L Analog Input/Output Module User's Manual</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>   |  |



|   | 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.         |
|                     |               | DIL       |                           | OFF: The FB is not activated.    |
| Module start XY     | i_Start_IO_No |           | Depends on the I/O        | Specify the start XY address (in |
| address             |               | Word      | point range of the CPU.   | hexadecimal) where the           |
|                     |               | vvoru     | For details, refer to the | L60AD2DA2 is connected. (For     |
|                     |               |           | CPU user's manual.        | example, enter H10 for X10.)     |
| Error reset request | i_Error_Reset | Dit       | ON, OFF                   | Turn ON for the error reset.     |
|                     |               | Bit       |                           | Turn OFF after the error reset.  |

### Output labels

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



# 2.3.4. M+L60AD2DA2\_OGBackup (Offset/gain value save)

### FB Name

M+L60AD2DA2\_OGBackup

### **Function Overview**

| Item              | Description  |                          |                     |                          |
|-------------------|--|--------------------------|---------------------|--------------------------|
| Function overview | Reads the offset/gain setting value of the user range setting and stores it to a file. |                          |                     |                          |
| Symbol            | M+L60AD2DA2_OGBackup   |                          |                     |                          |
|                   | Execution command —  | B : FB_EN                | FB_ENO : B          | Execution status         |
|                   | Module start XY address —  | W:i_Start_IO_No          | FB_OK : B           | -Completed without error |
|                   | Pass data classification —   | W:i_Dat_Type             | FB_ERROR : B        | —Error flag              |
|                   |  |                          | ERROR_ID : W        | Error code               |
|                   |  |                          |                     | J                        |
| Applicable        | Analog I/O module  | L60AD2DA2                |                     |                          |
| hardware and      | CPU module   |                          |                     |                          |
| software          |  | Series                   | N                   | Nodel                    |
|                   |  | MELSEC-L Series          | LCPU *              |                          |
|                   |  | * Only the model having  | an SD memory c      | ard slot is applicable.  |
|                   | Engineering software   | GX Works2 *1             | 1                   |                          |
|                   |  | Language                 | Softwa              | are version              |
|                   |  | English version          | Version1.24A or     | later                    |
|                   |  | Chinese version          | Version1.49B or     | later                    |
|                   |  | *1 For software versions | s applicable to the | modules used, refer to   |
|                   |  | "Relevant manuals".      |                     |                          |
| Programming       | Ladder   |                          |                     |                          |
| language          |  |                          |                     |                          |
| Number of steps   | 570 steps (for MELSEC-   | ,                        |                     |                          |
|                   | * The number of steps of the FB in a program depends on the CPU model that is used and |                          |                     |                          |
|                   | input and output definit   | tion.                    |                     |                          |



| Item                 | De | scription   |
|----------------------|----|---|
| 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.                  |
|                      | 2) | FB operation is one-shot only, triggered by the FB_EN signal.                                 |
|                      | 3) | The name of the file which this FB creates is "LADA" + "Module start XY address" + ".BIN".    |
|                      |    | [File name example]   |
|                      |    | When the module start XY address is H0120, the file name is "LADA0120.BIN".                   |
|                      | 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.  |
|                      | 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.  |
|                      |    | *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).  |
|                      |    | *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     | Ма | cro type  |
| Restrictions and     | 1) | The FB does not include error recovery processing. Program the error recovery                 |
| precautions          |    | processing separately in accordance with the required system operation.                       |
|                      | 2) | The FB cannot be used in an interrupt program.  |
|                      | 3) | Please ensure that the FB_EN signal is capable of being turned OFF by the program.            |
|                      |    | Do not use this FB in programs that are only executed once such as a subroutine,              |
|                      |    | FOR-NEXT loop because it is impossible to turn OFF.   |
|                      | 4) | This FB uses index register Z9. Please do not use the index register in an interrupt program. |
|                      | 5) | Every input must be provided with a value for proper FB operation.                            |
|                      | 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.                                |
|                      | 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.  |
|                      |    | The error code 31 (Decimal) is stored in ERROR_ID.  |
|                      |    | Refer to the error code explanation section for details.                                      |
|                      | 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.   |
|                      |    | The error code 33 (Decimal) is stored in ERROR_ID.  |



| Item                | Description  |  |  |  |
|---------------------|--|--|--|--|
|                     | Refer to the error code explanation section for details.   |  |  |  |
|                     | 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.  |  |  |  |
|                     | The error code 35 (Decimal) is stored in ERROR_ID.   |  |  |  |
|                     | Refer to the error code explanation section for details.   |  |  |  |
|                     | 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.   |  |  |  |
|                     | The error code 36 (Decimal) is stored in ERROR_ID.   |  |  |  |
|                     | Refer to the error code explanation section for details.   |  |  |  |
|                     | 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).   |  |  |  |
|                     | 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.   |  |  |  |
|                     | 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]  |  |  |  |
|                     | FB_EN (Execution command)       FB_OK (Completed without error)         FB_ENO (Execution status)       FB_ENO (Execution status)  |  |  |  |
|                     | User range setting file saving processing File saving processing No processing Processin |  |  |  |
|                     | FB_OK (Completed without error) FB_CK (Completed without error) FB_ERROR (Error flag) FB_ERROR (Error flag)  |  |  |  |
|                     | PD_ERROR (End) hag)     PD_ERROR_LO (End) hag)       ERROR_ID (Error code)     0       ERROR_ID (Error code)     0   |  |  |  |
| 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)  |  |  |  |



# Error codes

# ●Error code list

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



# Labels

# Input labels

| Name (Comment)    | Label name    | Data type | Setting range         | Description   |
|-------------------|---------------|-----------|-----------------------|---|
| Execution command | FB_EN         | Bit       | ON, OFF               | ON: The FB is activated.  |
|                   |               | DIL       |                       | OFF: The FB is not activated.   |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O    | Specify the start XY address (in  |
| address           |               |           | point range of the    | hexadecimal) where the  |
|                   |               | Word      | CPU.                  | L60AD2DA2 is connected. (For  |
|                   |               | Word      | For details, refer to | example, enter H10 for X10.)  |
|                   |               |           | the CPU user's        |   |
|                   |               |           | manual.               |   |
| Pass data         | i_Dat_Type    |           | 0 to FH               | Specify the type of the data to be  |
| classification    |               |           |                       | stored for each channel.  |
|                   |               |           |                       | 0: Voltage, 1: Current  |
|                   |               | Word      |                       | b15         b4         b3         b2         b1         b0           0         to         0         CH4         CH3         CH2         CH1 |

### Output labels

| Name (Comment)      | Label name | Data type | Initial value | Description   |
|---------------------|------------|-----------|---------------|---|
| Execution status    | FB_ENO     | Bit       | OFF           | ON: Execution command is ON.  |
| Completed without   | FB_OK      | Bit       | OFF           | OFF: Execution command is OFF.<br>When ON, it indicates that the file save is |
| error<br>Error flag | FB_ERROR   |           |               | completed.<br>When ON, it indicates that an error has                         |
|                     | T B_ERROR  | Bit       | OFF           | 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.



# 2.3.5. M+L60AD2DA2\_OGRestore (Offset/gain value restore)

#### FB Name

M+L60AD2DA2\_OGRestore

### **Function Overview**

| Item                | Description   |                         |                     |                         |
|---------------------|---|-------------------------|---------------------|-------------------------|
| Function overview   | Restores the offset/gain setting values of the user range setting that are saved in a file to the |                         |                     |                         |
|                     | module.   |                         |                     |                         |
| Symbol              |   | M+L60AD2DA2_C           | CRostoro            | 1                       |
|                     | Execution command —   |                         |                     | - Execution status      |
|                     | Module start XY address —   |                         |                     |                         |
|                     |   |                         | FB_ERROR : B        | -                       |
|                     |   |                         | ERROR_ID : W        | _                       |
|                     |   |                         |                     |                         |
|                     |   | 1                       |                     |                         |
| Applicable hardware | Analog I/O module   | L60AD2DA2               |                     |                         |
| and software        | CPU module  |                         |                     |                         |
|                     |   | Series                  | N                   | lodel                   |
|                     |   | MELSEC-L Series         | LCPU *              |                         |
|                     |   | * Only the model having | g an SD memory ca   | ard slot is applicable. |
|                     | Engineering software  | GX Works2 *1            |                     |                         |
|                     |   | Language                | Softwa              | re version              |
|                     |   | English version         | Version1.24A or I   | ater                    |
|                     |   | Chinese version         | Version1.49B or     | later                   |
|                     |   | *1 For software version | s applicable to the | modules used, refer to  |
|                     |   | "Relevant manuals".     |                     |                         |
| Programming         | Ladder  |                         |                     |                         |
| language            |   |                         |                     |                         |
| Number of steps     | 593 steps (for MELSEC-L series CPU)   |                         |                     |                         |
|                     | * The number of steps of the FB in a program depends on the CPU model that is used and            |                         |                     |                         |
|                     | input and output definition.  |                         |                     |                         |



| Item                 | Des | scription   |
|----------------------|-----|---|
| 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.   |
|                      | 2)  | FB operation is one-shot only, triggered by the FB_EN signal.   |
|                      | 3)  | This FB operates only when the A/D conversion and D/A conversion are set to "disabled" for all channels.      |
|                      | 4)  | Execute this FB after executing M+L60AD2DA2_OGBackup.   |
|                      |     | When reading a file created other than by M+L60AD2DA2_OGBackup, a Module error (Error code: 163) occurs.      |
|                      | 5)  | The name of the file which this FB reads from the memory card is "LADA" + "Module start XY address" + ".BIN". |
|                      |     | [File name example]   |
|                      |     | When the module start XY address is H0120, the read file name is "LADA0120.BIN".                              |
|                      | 6)  | When no target file containing the user range setting exist in the installed SD memory                        |
|                      |     | card, a CPU error *1 occurs.  |
|                      |     | *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     | Ma  | cro type  |
| Restrictions and     | 1)  | Set the A/D conversion and D/A conversion to "disabled" for all channels before                               |
| precautions          |     | executing this FB.  |
|                      | 2)  | The FB does not include error recovery processing. Program the error recovery                                 |
|                      |     | processing separately in accordance with the required system operation.                                       |
|                      | 3)  | Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do                         |
|                      |     | not use this FB in programs that are only executed once such as a subroutine,                                 |
|                      |     | FOR-NEXT loop because it is impossible to turn OFF.   |
|                      | 4)  | The FB cannot be used in an interrupt program.  |
|                      | 5)  | This FB uses index register Z9. Please do not use the index register in an interrupt program.                 |
|                      | 6)  | This FB cannot restore the user range setting from a file created other than by M+L60AD2DA2_OGBackup.         |
|                      | 7)  | Every input must be provided with a value for proper FB operation.  |
|                      | 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.  |
|                      | 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.   |
|                      |     | The error code 33 (Decimal) is stored in ERROR_ID.  |
|                      |     | Refer to the error code explanation section for details.  |
|                      | 10) | When this FB is executed with SM605 (Memory card remove/insert prohibit flag) OFF,                            |
|                      | (01 | when the r B is executed with endode (Mernory card remove/insert prohibit hag) Of r,                          |



| 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.   |  |  |  |  |  |
|                     | The error code 35 (Decimal) is stored in ERROR_ID.   |  |  |  |  |  |
|                     | Refer to the error code explanation section for details.   |  |  |  |  |  |
|                     | 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.  |  |  |  |  |  |
|                     | The error code 36 (Decimal) is stored in ERROR_ID.   |  |  |  |  |  |
|                     | Refer to the error code explanation section for details.   |  |  |  |  |  |
|                     | 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).  |  |  |  |  |  |
|                     | 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.   |  |  |  |  |  |
|                     | 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]  |  |  |  |  |  |
|                     | FB_EN (Execution command)       FB_EN (Execution command)         FB_EN (Execution status)       FB_EN (Execution status)         User range setting file reading processing       FB_EN (Execution status)         User range setting file reading processing       FB_EN (Execution status)         FB_CN (Completed without error)       FB_EROR (Error flag)         FB_EROR (Error flag)       FB_EROR (Error flag)         ERROR_ID (Error code)       0 |  |  |  |  |  |
| 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)  |  |  |  |  |  |
|                     | <ul> <li>GX Works2 Version 1 Operating Manual (Common)</li> </ul>  |  |  |  |  |  |
|                     | 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       | Execute this FB again after mounting the SD    |
|              | card on the CPU module.                     | memory card to which the target file is saved  |
|              |   | on the CPU module.                             |
| 35 (Decimal) | The SD memory card cannot be                | Execute the FB again after turning ON          |
|              | accessed because SM605 (Memory card         | SM605 (Memory card remove/insert prohibit      |
|              | remove/insert prohibit flag) is turned OFF. | flag) by sliding the SD memory card disabling  |
|              |   | switch downward.                               |
| 36 (Decimal) | SM606 (SD memory card forced disable        | Execute the FB again after disabling the SD    |
|              | instruction) is ON, and access to the SD    | memory card forced disable instruction by      |
|              | memory card is unavailable.                 | 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    | Reduce the frequency of the access             |
|              | timeout occurred because accesses to        | processing to the SD memory card.              |
|              | the SD memory card were frequently          |  |
|              | made in addition to this FB.                |  |
| 90 (Decimal) | A channel whose A/D conversion is set to    | Please try again after confirming the setting. |
|              | "enabled" exists.                           |  |



### Labels

### Input labels

| Name (Comment)    | Label name    | Data type | Setting range             | Description                      |
|-------------------|---------------|-----------|---------------------------|----------------------------------|
| Execution command | FB_EN         | Bit       | ON, OFF                   | ON: The FB is activated.         |
|                   |               | ы         |                           | OFF: The FB is not activated.    |
| Module start XY   | i_Start_IO_No |           | Depends on the I/O        | Specify the start XY address (in |
| address           |               | Word      | point range of the CPU.   | hexadecimal) where the           |
|                   |               | vvoru     | For details, refer to the | L60AD2DA2 is connected. (For     |
|                   |               |           | CPU user's manual.        | 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.                |
|                   |            | DIL       |               | OFF: Execution command is OFF.              |
| Completed without | FB_OK      | Dit       | OFF           | When ON, it indicates that the file save is |
| error             |            | Bit       |               | completed.                                  |
| Error flag        | FB_ERROR   | Bit       | OFF           | When ON, it indicates that an error has     |
|                   |            | DIL       | OFF           | 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

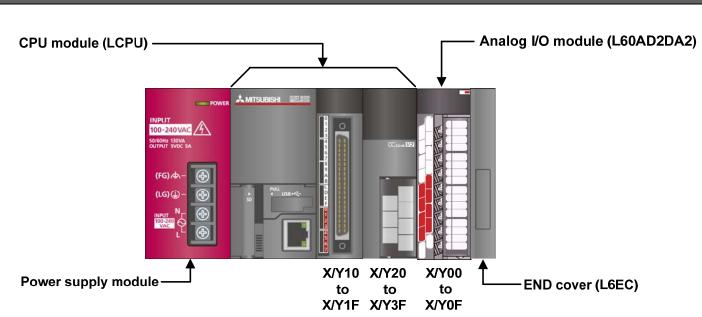
This chapter includes information related to the function block.

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



# 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)         |
|--------|-------------------------------------|----------------------------------|
| MO     | 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 |



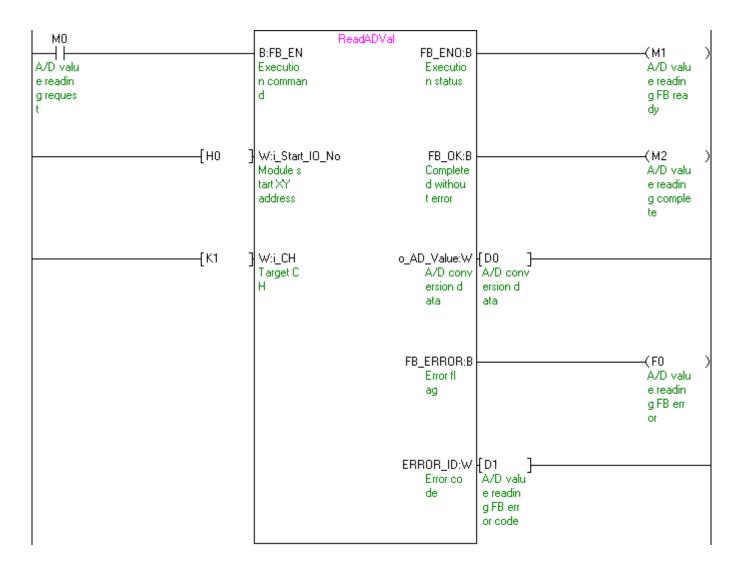
| Device | FB name                             | Application (ON details)         |
|--------|-------------------------------------|----------------------------------|
| M82    | M+L60AD2DA2_AD_SetOffsetVal         | A/D conv offset setting FB ready |
| M83    | _                                   | 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_R | eadADVal (Rea | d 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.





MELSEC-L Analog Input/Output Module FB Library Reference Manual FBM-M111-A

### 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.

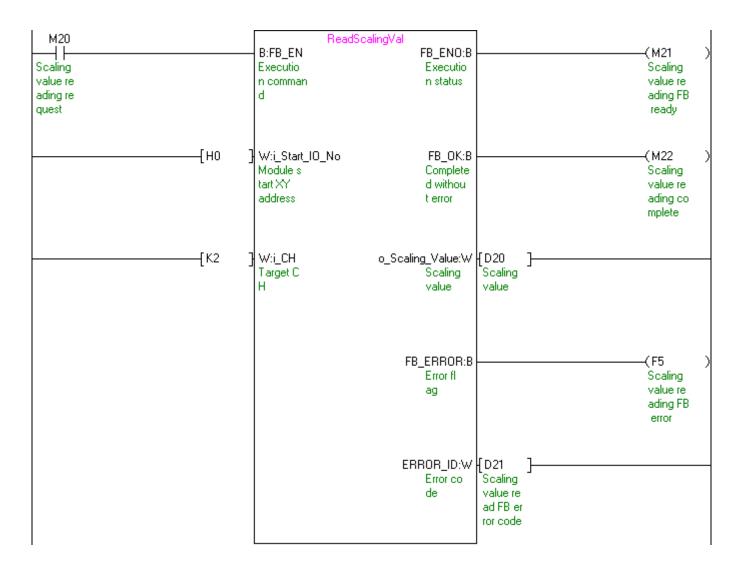
| M10                                     | ReadAllA        | DVal               |          |          |     |
|---|-----------------|--------------------|----------|----------|-----|
|   | B:FB_EN         | FB_ENO:B           |          | —(M11    | -1  |
| A/D valu                                | Executio        | Executio           |          | A/D valu | -1  |
|   | 1               |                    |          |          |     |
| e read r                                | n comman        | n status           |          | e read F |     |
| eq. (all                                | d               |                    |          | Birdy, ( |     |
| CHs)                                    |                 |                    |          | all CHs) |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
| [но ]                                   | W:i_Start_I0_No | FB_OK:B            |          | —(M12    | _   |
| [ | Module s        | Complete           |          | A/D valu | - 1 |
|   |                 |                    |          |          |     |
|   | tart XY         | d withou           |          | e read c |     |
|   | address         | t error            |          | omp. (al |     |
|   |                 |                    |          | I CHs)   |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   | .               | _AD_Value_CH1:W    | ۲D10 L   |          |     |
|   |                 | CU1 AD             |          |          | Γ   |
|   |                 | CH1 A/D            | CH1 A/D  |          |     |
|   |                 | conversi           | conversi |          |     |
|   |                 | on data            | on data  |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 | _AD_Value_CH2:W    | [D11 ]   |          |     |
|   |                 | CUD AD_Value_CH2.W |          |          | Γ   |
|   |                 | CH2 A/D            | CH2 A/D  |          |     |
|   |                 | conversi           | conversi |          |     |
|   |                 | on data            | on data  |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 | FB_ERROR:B         |          |          |     |
|   |                 | Error fl           |          |          |     |
|   |                 |                    |          |          |     |
|   |                 | ag                 |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 | ERROR_ID:W         |          |          |     |
|   |                 | Error co           |          |          | 7   |
|   |                 |                    |          |          |     |
|   |                 | de                 |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |
|   |                 |                    |          |          |     |



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

M+L60AD2DA2\_AD\_ReadScalingVal (Read A/D conversion scaling value)

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.

| M30                                       | ReadAllScalingVa                                  |   |   |
|---|---|---|---|
| Scaling<br>val read<br>req. (a<br>II CHs) | B:FB_EN<br>Executio<br>n comman<br>d              | FB_ENO:B<br>Executio<br>n status                                    | (M31)<br>Scaling<br>val read<br>rdy. (a<br>II CHs)    |
| [но]                                      | W:i_Start_IO_No<br>Module s<br>tart XY<br>address | FB_OK:B<br>Complete<br>d withou<br>t error                          | ——(M32)<br>Scaling<br>val read<br>comp. (<br>all CHs) |
|   | o_Sca   | aling_CH1:W {D30 }<br>CH1 Scal CH1 Scal<br>ing valu ing valu<br>e e |   |
|   | o_Sca   | aling_CH2:W {D31 }<br>CH2 Scal CH2 Scal<br>ing valu ing valu<br>e e |   |
|   | FE  | B_ERROR:B<br>Error fl<br>ag   |   |
|   | EF  | ROR_ID:W  |   |

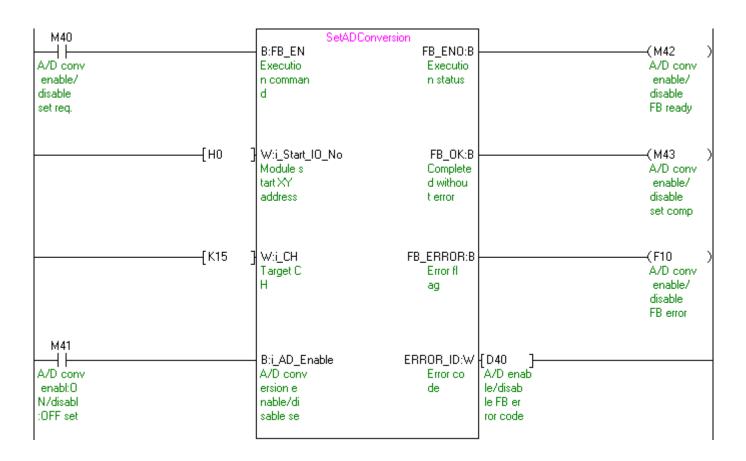


MELSEC-L Analog Input/Output Module FB Library Reference Manual FBM-M111-A

| 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.      |

M+L60AD2DA2\_AD\_SetADConversion (A/D conversion enable/disable setting)

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.

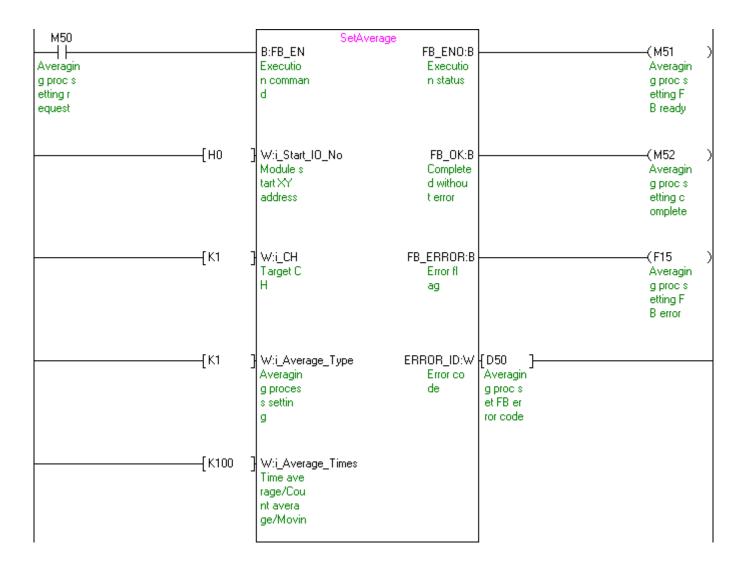




| Label name      | Setting value | Description  |
|-----------------|---------------|--|
| i_Start_IO_No   | H0            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH            | K1            | Set the target channel to channel 1.                             |
| i_Average_Type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

M+L60AD2DA2\_AD\_SetAverage (A/D conversion averaging process setting)

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

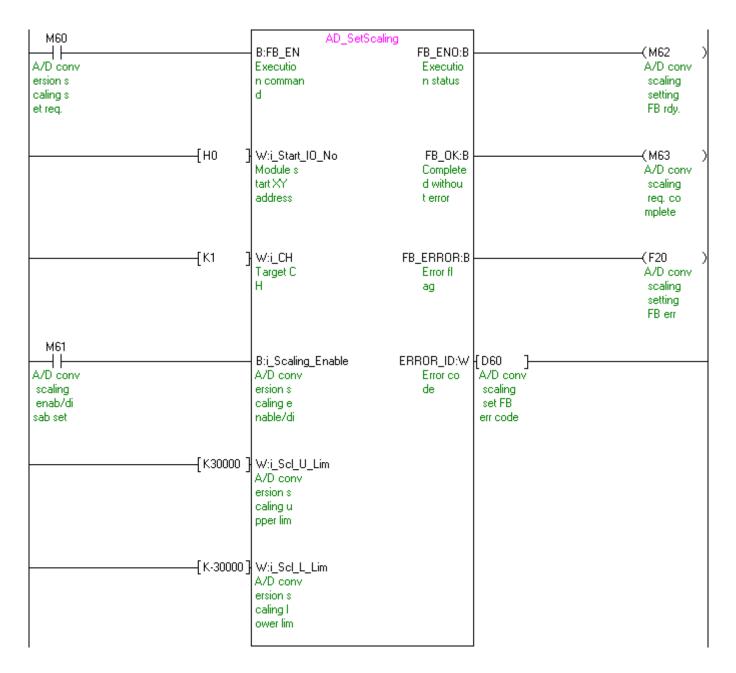




| Label name       | Setting value | Description  |
|------------------|---------------|--|
| i_Start_IO_No    | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH             | K1            | Set the target channel to channel 1.                             |
|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

M+L60AD2DA2\_AD\_SetScaling (A/D conversion scaling setting)

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

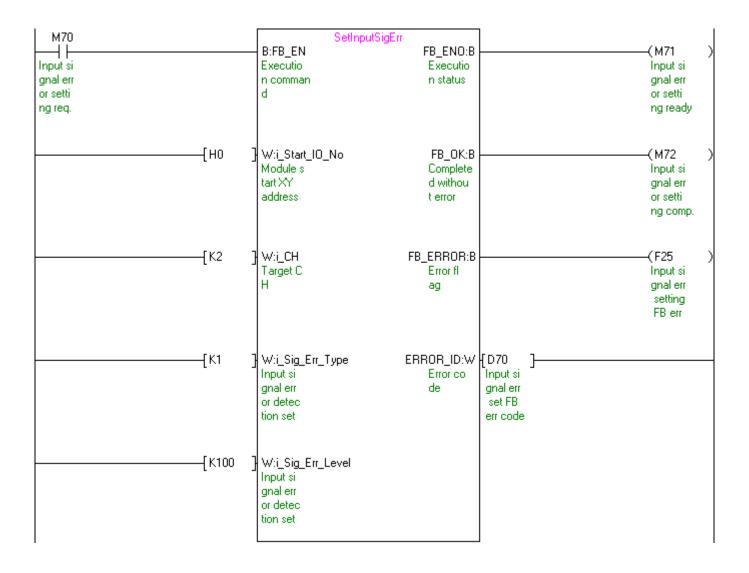




| Label name      | Setting value | Description   |
|-----------------|---------------|---|
| i_Start_IO_No   | H0            | Set the start XY address where the L60AD2DA2 is connected to 0H.                |
| i_CH            | K2            | Set the target channel to channel 2.  |
| i_Sig_Err_Type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

M+L60AD2DA2\_AD\_SetInputSignalErr (A/D conversion input signal error detection setting)

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

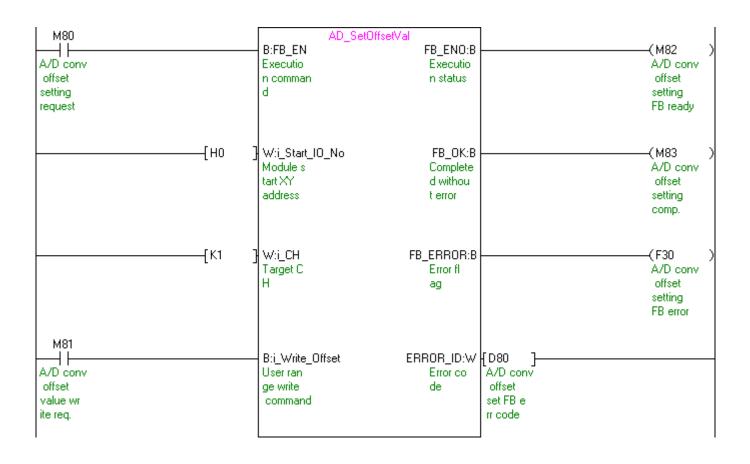




| Label name     | Setting value | Description  |
|----------------|---------------|--|
| i_Start_IO_No  | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH           | K1            | Set the target channel to channel 1.                             |
| i_Write_Offset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

M+L60AD2DA2\_AD\_SetOffsetVal (A/D conversion offset setting)

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

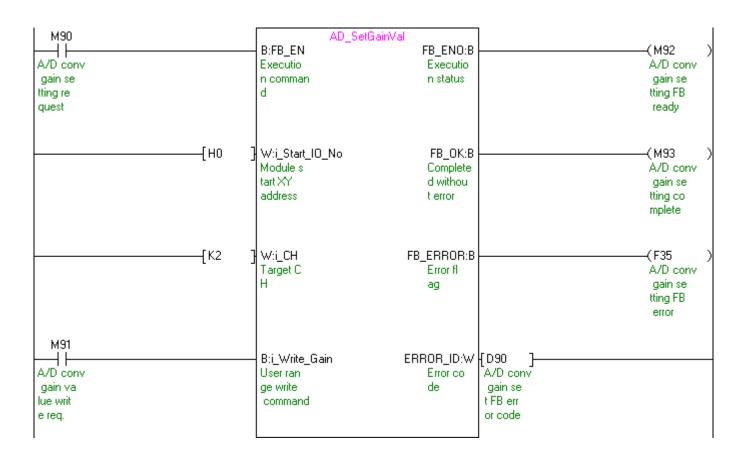




| Label name     | Setting value | Description  |
|----------------|---------------|--|
| i_Start_IO_No  | H0            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH           | K2            | Set the target channel to channel 2.                             |
| i_Value_Change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

M+L60AD2DA2\_AD\_SetGainVal (A/D conversion gain setting)

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.

| M100<br>A/D conv<br>shift o<br>peration<br>req. | AD_ShiftOp<br>B:FB_EN<br>Executio<br>n comman<br>d            | eratio<br>FB_ENO:B<br>Executio<br>n status     | shif  | t o<br>t o<br>ation |
|---|---|--|---|---------------------|
| D100 ]<br>Digital<br>value                      | W:i_Digital_Value<br>Digital<br>value                         | FB_OK:B<br>Complete<br>d withou<br>t error     | shif  | t o<br>to<br>ation  |
| [К1000 ]  | W:i_Shift_Value<br>Shifting<br>amount<br>to conve<br>rsion va | o_Dig_Out_Val:W<br>Digital<br>output v<br>alue | {D101 }<br>A/D conv<br>shift c<br>onversio<br>n value |                     |
|   |   | FB_ERROR:B<br>Error fl<br>ag                   |   |                     |
|   |   | ERROR_ID:W<br>Error co<br>de                   |   |                     |



### 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.

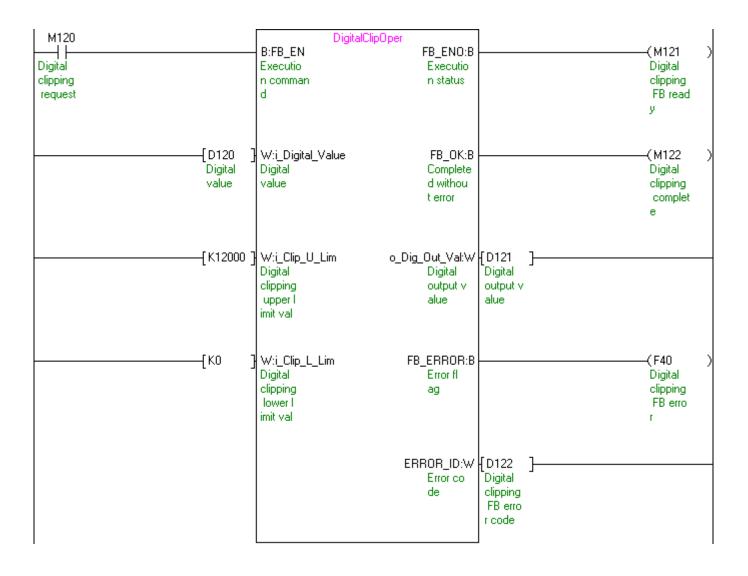
| M110                          | DiffOperatio                          | n  |   |  |   |
|-------------------------------|---------------------------------------|--|---|--|---|
| Differen                      | B:FB_EN<br>Executio                   | FB_ENO:B<br>Executio   |   | —(M111<br>Differen                                   |   |
| ce conve<br>rsion re<br>quest | n comman<br>d                         | n status   |   | ce conve<br>rsion FB<br>ready                        |   |
| D110 ]<br>Digital<br>value    | W:i_Digital_Value<br>Digital<br>value | FB_OK:B<br>Complete<br>d withou<br>t error                     |   | —(M112<br>Differen<br>ce conve<br>rsion co<br>mplete | > |
|                               |                                       | o_Dig_Out_Val:W<br>Digital<br>output v<br>alue                 | [D111 ]<br>Differen<br>ce conve<br>rsion va<br>lue    |  | _ |
|                               | o_                                    | _Standard_Val:W<br>Differen<br>ce conve<br>rsion re<br>ference | {D112 }<br>Differen<br>ce conv<br>referenc<br>e value |  | _ |
|                               |                                       | FB_ERROR:B<br>Error fl<br>ag                                   |   |  | _ |
|                               |                                       | ERROR_ID:W<br>Error co<br>de                                   |   |  | _ |



| Label name   | Setting value | Description   |
|--------------|---------------|---|
| i_Clip_U_Lim | K12000        | Set the upper limit value of digital clipping to 12000. |
| i_Clip_L_Lim | К0            | Set the lower limit value of digital clipping to 0.     |

M+L60AD2DA2\_AD\_ClipOperation (A/D conversion digital clipping)

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.

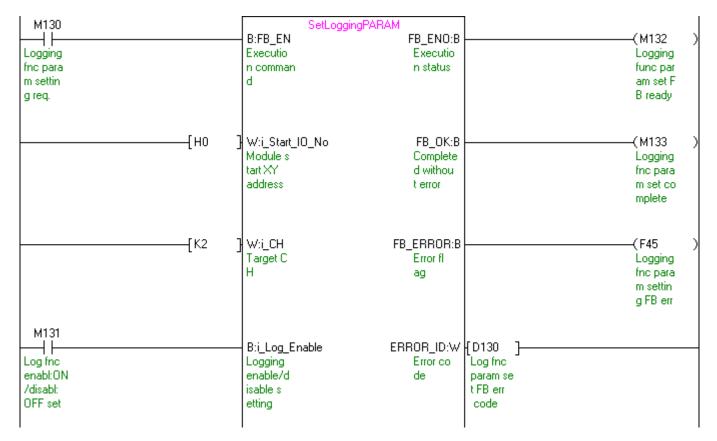




| Label name       | Setting value | Description  |  |
|------------------|---------------|--|--|
| i_Start_IO_No    | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H.               |  |
| i_CH             | K2            | Set the target channel to channel 2.   |  |
|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

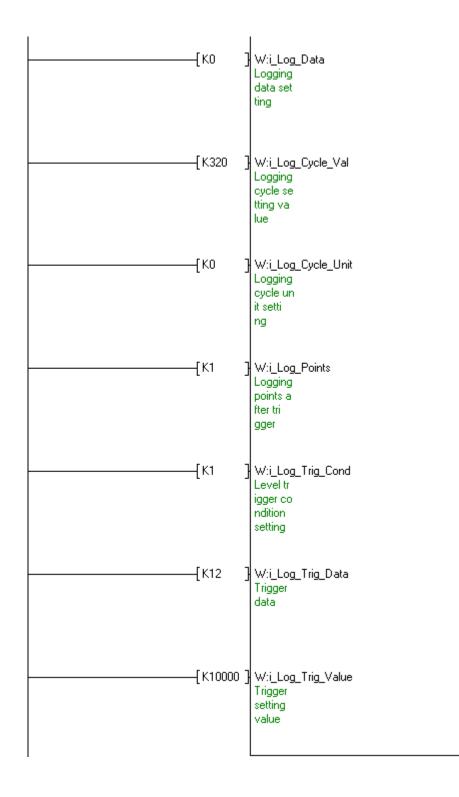
M+L60AD2DA2\_AD\_SetLoggingPARAM (Logging function parameter setting)

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)







| Label name    | Setting value | Description   |  |  |
|---------------|---------------|---|--|--|
| i_Start_IO_No | HO            | 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). |  |  |

#### M+L60AD2DA2\_AD\_SaveLogging (Logging data save)

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<br>Logging<br>data sav<br>e reques<br>t       | SaveLoggin<br>B:FB_EN<br>Executio<br>n comman<br>d       | g<br>FB_ENO:B<br>Executio<br>n status                  |   | -(M143<br>Logging<br>data sav<br>e FB rea<br>dy  | > |
|--|--|--|---|--|---|
| [H0 ]  | W:i_Start_IO_No<br>Module s<br>tart XY<br>address        | FB_OK:B -<br>Complete<br>d withou<br>t error           |   | -(M144<br>Logging<br>data sav<br>e comple<br>te  | ) |
| [K2 ]  | W:i_CH<br>Target C<br>H                                  | o_Making_File:B -<br>Creating<br>file                  |   | -(M145<br>Logging<br>data sav<br>ing             | ) |
| [K10 ]   | W:i_Max_Number o_E<br>Maximum<br>No.ofs<br>ave file<br>s | xceed_Number:B<br>Maximum<br>No. exce<br>eded fla<br>g |   | -(M146<br>Logging<br>file max<br>No. rea<br>ched | ) |
| M141<br>Log file<br>ovr ena<br>ble/disa<br>ble set | B:i_Over_Write<br>Overwrit<br>e save c<br>ommand         | FB_ERROR:B -<br>Error fl<br>ag                         |   | -(F50<br>Logging<br>data sav<br>e FB err<br>or   | ) |
| M142<br>Logging<br>forced s<br>ave comm<br>and     | B:i_Save_Order<br>Logging<br>forced s<br>ave comm<br>and | ERROR_ID:W -<br>Error co<br>de                         | {D140 }<br>Logging<br>data sav<br>e FB err<br>or 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      | aling 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        |  |  |
|        |                                |  |  |  |



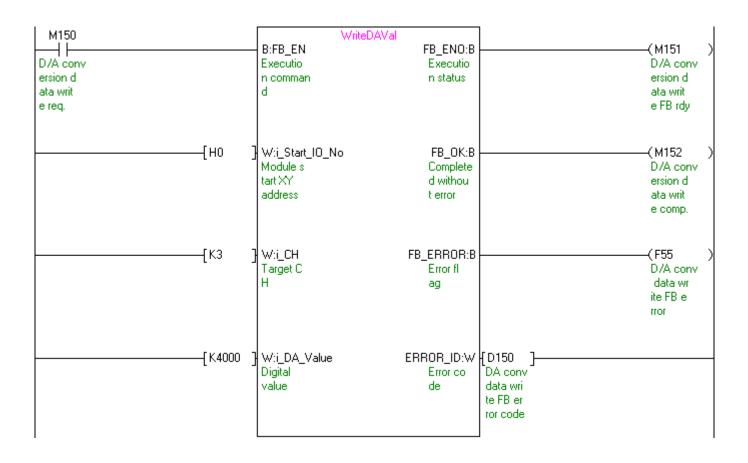
| Device | FB name                          | Application (ON details)         |  |  |
|--------|----------------------------------|----------------------------------|--|--|
| M241   | M+L60AD2DA2_DA_WaveDataStoreCsv  | Wave data read (CSV) FB ready    |  |  |
| M242   |                                  | 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  |  |  |



| 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.                                  |  |  |

M+L60AD2DA2\_DA\_WriteDAVal (Write D/A conversion data)

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





| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | 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.                   |

M+L60AD2DA2\_DA\_WriteAllDAVal (Write D/A conversion data (all CHs))

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

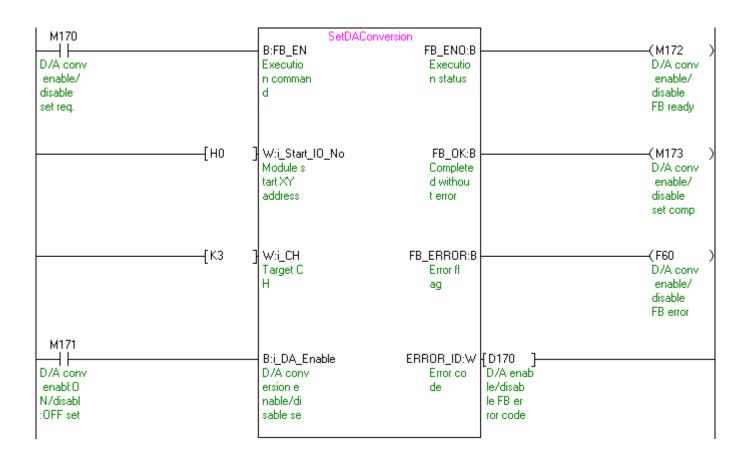
| м160       | Γ        | WriteAllDAVal      |           |          |
|------------|----------|--------------------|-----------|----------|
| ├──┤├───── |          | B:FB_EN            | FB_ENO:B  | (M161 )  |
| D/A data   |          | Executio           | Executio  | D/A data |
| write r    |          | n comman           | n status  | write F  |
| eq. (all   |          | d                  |           | Birdy. ( |
| CHs)       |          |                    |           | all CHs) |
|            |          |                    |           |          |
|            | _        |                    |           |          |
| [н         |          | W:i_Start_IO_No    | FB_OK:B   | (M162 )  |
|            |          | Module s           | Complete  | D/A data |
|            |          | tart XY            | d withou  | write c  |
|            |          | address            | t error   | omp. (al |
|            |          |                    |           | I CHs)   |
|            |          |                    |           |          |
| Γr'        | 32000 7  | W:i_DA_Value_CH3 F | B_ERROR:B |          |
|            |          | CH3 Digi           | Error fl  |          |
|            |          | tal valu           | ag        |          |
|            | I        | e                  | ug -      |          |
|            |          | -                  |           |          |
|            |          |                    |           |          |
|            |          |                    |           |          |
| <u> </u>   | ·32000 7 | W:i_DA_Value_CH4 E | RROR_ID:W |          |
| -          | -        | CH4 Digi           | Error co  |          |
|            |          | tal valu           | de        |          |
|            |          | e                  |           |          |
|            |          |                    |           |          |
|            | l        |                    |           |          |



| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | 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.      |

M+L60AD2DA2\_DA\_SetDAConversion (D/A conversion enable/disable setting)

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

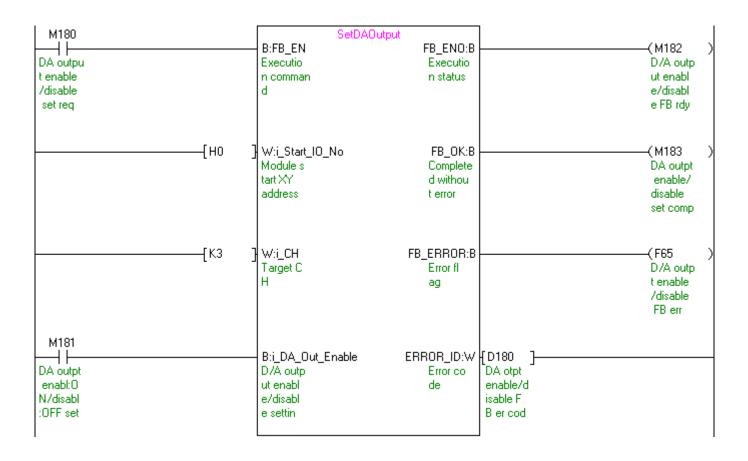




| Label name      | Setting value | Description  |
|-----------------|---------------|--|
| i_Start_IO_No   | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_CH            | K3            | Set the target channel to channel 3.                             |
| i_DA_Out_Enable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

M+L60AD2DA2\_DA\_SetDAOutput (D/A output enable/disable setting)

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





| Label name       | Setting value | Description  |
|------------------|---------------|--|
| i_Start_IO_No    | HO            | 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.                    |

M+L60AD2DA2\_DA\_SetScaling (D/A conversion scaling setting)

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

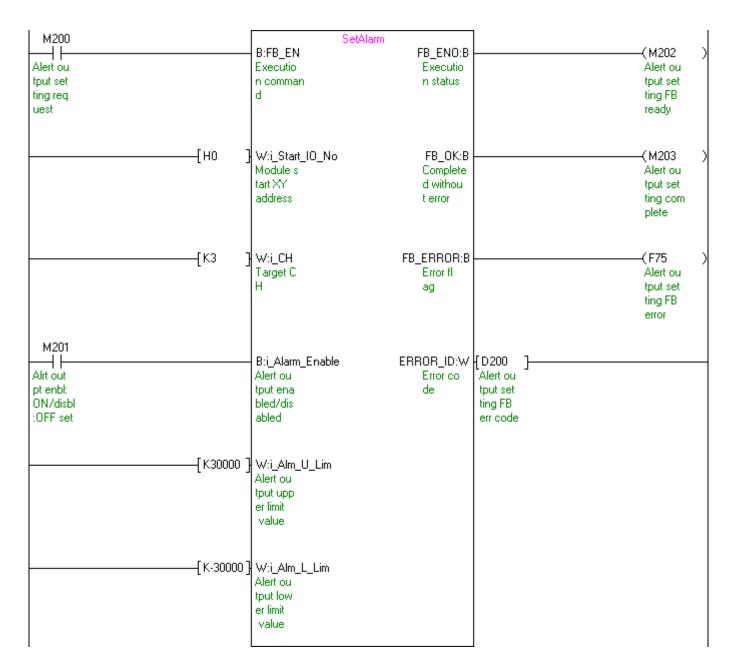
| M190<br>D/A conv<br>ersion s<br>caling s<br>et req. | DA_SetScaling<br>B:FB_EN<br>Executio<br>n comman<br>d              | FB_ENO:B<br>Executio<br>n status           |  | —(M192)<br>D/A conv<br>scaling<br>setting<br>FB rdy. |
|---|--|--|--|--|
| [но ]   | W:i_Start_IO_No<br>Module s<br>tart XY<br>address                  | FB_OK:B<br>Complete<br>d withou<br>t error |  | —(M193)<br>D/A conv<br>scaling<br>set com<br>plete   |
| [КЗ   | } W:i_CH<br>Target C<br>H  | FB_ERROR:B<br>Error fl<br>ag               |  | —(F70)<br>D/A conv<br>scaling<br>setting<br>FB err   |
| M191<br>DA conv<br>scaling<br>enabl/di<br>sabl set  | B:i_Scaling_Enable<br>D/A conv<br>ersion s<br>caling e<br>nable/di | ERROR_ID:W<br>Error co<br>de               | {D190 }<br>D/A conv<br>scaling<br>set FB<br>err code |  |
| [ К20000 ]  | W:i_Scl_U_Lim<br>D/A conv<br>ersion s<br>caling u<br>pper lim      |  |  |  |
| [K-20000]   | W:i_Scl_L_Lim<br>D/A conv<br>ersion s<br>caling I<br>ower lim      |  |  |  |



| Label name     | Setting value | Description  |
|----------------|---------------|--|
| i_Start_IO_No  | HO            | 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.               |

M+L60AD2DA2\_DA\_SetAlarm (D/A conversion alert output setting)

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





| Label name     | Setting value | Description  |
|----------------|---------------|--|
| i_Start_IO_No  | HO            | 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.                  |

M+L60AD2DA2\_DA\_SetOffsetVal (D/A conversion offset setting)

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.

| M210<br>D/A conv<br>offset<br>setting<br>request   | DA_SetOf<br>B:FB_EN<br>Executio<br>n comman<br>d    | fsetVal<br>FB_ENO:B -<br>Executio<br>n status |  | (M213)<br>D/A conv<br>offset<br>setting<br>FB ready |
|--|---|---|--|---|
| {НО  | ] W:i_Start_IO_No<br>Module s<br>tart XY<br>address | FB_OK:B -<br>Complete<br>d withou<br>t error  |  | (M214)<br>D/A conv<br>offset<br>setting<br>comp.    |
| [КЗ  | ] W:i_CH<br>Target C<br>H                           | FB_ERROR:B -<br>Error fl<br>ag                |  | (F80)<br>D/A conv<br>offset<br>setting<br>FB error  |
| D210<br>Offset/g<br>ain adju<br>stment a<br>mount  | ain adju  | de  | [D211 ]<br>D/A conv<br>offset<br>set FB e<br>rr code |   |
| M211<br>D/A conv<br>offset<br>value ch<br>ange req | B:i_Value_Change<br>Set valu<br>e change<br>command |   |  |   |
| M212<br>D/A conv<br>offset<br>value wr<br>ite req. | B:i_Write_Offset<br>User ran<br>ge write<br>command |   |  |   |



| 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.                    |

M+L60AD2DA2\_DA\_SetGainVal (D/A conversion gain setting)

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.

| M220<br>D/A conv<br>gain se<br>tting re<br>quest   | DA_SetGainV<br>B:FB_EN<br>Executio<br>n comman<br>d            | al<br>FB_ENO:B<br>Executio<br>n status     |   | —(M223<br>D/A conv<br>gain se<br>tting FB<br>ready  | > |
|--|--|--|---|---|---|
| [но ]  | W:i_Start_IO_No<br>Module s<br>tart XY<br>address              | FB_OK:B<br>Complete<br>d withou<br>t error |   | —(M224<br>D/A conv<br>gain se<br>tting co<br>mplete | > |
| [К4<br>[К4   | W:i_CH<br>Target C<br>H  | FB_ERROR:B<br>Error fl<br>ag               |   | —(F85<br>D/A conv<br>gain se<br>tting FB<br>error   | > |
| D220<br>Offset/g<br>ain adju<br>stment a<br>mount  | W:i_Adjust_Amount<br>Offset/g<br>ain adju<br>stment a<br>mount | ERROR_ID:W<br>Error co<br>de               | {D221 }<br>D/A conv<br>gain se<br>t FB err<br>or code |   | _ |
| M221<br>D/A conv<br>gain va<br>lue chan<br>ge req. | B:i_Value_Change<br>Set valu<br>e change<br>command            |  |   |   |   |
| M222<br>D/A conv<br>gain va<br>lue writ<br>e req.  | B:i_Write_Gain<br>Userran<br>gewrite<br>command                |  |   |   |   |



| 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.  |

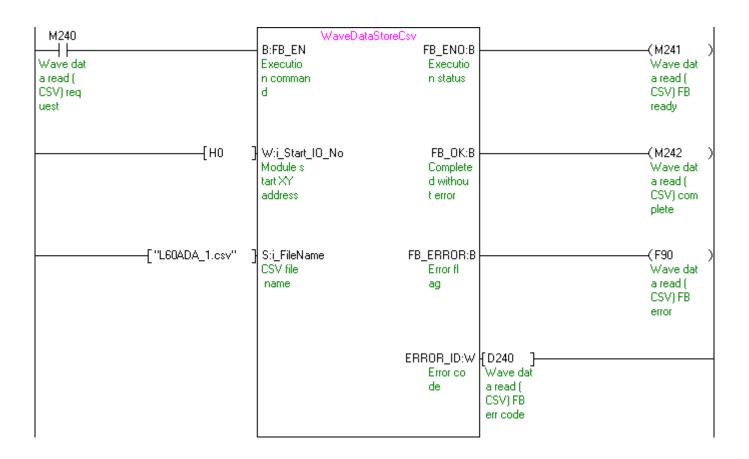
By turning ON M230, the digital value to which the input value shift amount is added is output.

| M230<br>D/A conv<br>shift o<br>pearatio<br>n req. | DA_ShiftOpe<br>B:FB_EN<br>Executio<br>n comman<br>d | eratio<br>FB_ENO:B<br>Executio<br>n status     | (M231<br>D/A conv<br>shift o<br>peration<br>FB rdy.   | ) |
|---|---|--|---|---|
| D230 ]<br>Digital<br>value                        | W:i_Digital_Value<br>Digital<br>value               | FB_OK:B<br>Complete<br>d withou<br>t error     | (M232<br>D/A conv<br>shift o<br>peration<br>comp.     | ) |
| [К1000 ]  | W:i_Shift_Value<br>Input va<br>lue shif<br>t amount | o_Dig_Out_Val:W<br>Digital<br>output v<br>alue | {D231 }<br>D/A conv<br>shift c<br>onversio<br>n value |   |
|   |   | FB_ERROR:B<br>Error fl<br>ag                   |   |   |
|   |   | ERROR_ID:W<br>Error co<br>de                   |   |   |



| 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.





| Label name     | Setting value | Description   |
|----------------|---------------|---|
| i_Start_IO_No  | HO            | 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.                        |

M+L60AD2DA2\_DA\_WaveDataStoreDev (Read wave data (device))

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.

| M250     | WaveDataStore        | Dev        |          |                      |
|----------|----------------------|------------|----------|----------------------|
|          | B:FB_EN              | FB_ENO:B   |          | —(M251 )             |
| Wave dat | Executio             | Executio   |          | Wave dat             |
| a read ( | n comman             | n status   |          | a read (             |
| device)  | d                    |            |          | device)              |
| request  |                      |            |          | FB ready             |
|          |                      |            |          |                      |
| [но ]    | W:i_Start_IO_No      | FB_OK:B    |          | -(M252 )             |
| []       | Module s             | Complete   |          | Wave dat             |
|          | tart XY              | d withou   |          | a read (             |
|          | address              | t error    |          | device)              |
|          |                      |            |          | complete             |
|          |                      |            |          |                      |
|          |                      |            |          | (                    |
| [K0 ]    | D:i_ReadDataAddr     | FB_ERROR:B |          | —(F95 )              |
|          | Read sta<br>rt addre | Error fl   |          | Wave dat<br>a read ( |
|          |                      | ag         |          | device)              |
|          |                      |            |          | FB error             |
|          |                      |            |          |                      |
|          |                      |            |          |                      |
|          |                      | ERROR_ID:W | {D250 ]  |                      |
|          |                      | Error co   | Wave dat |                      |
|          |                      | de         | a read ( |                      |
|          |                      |            | dev) FB  |                      |
|          |                      |            | err code |                      |
|          |                      |            |          |                      |

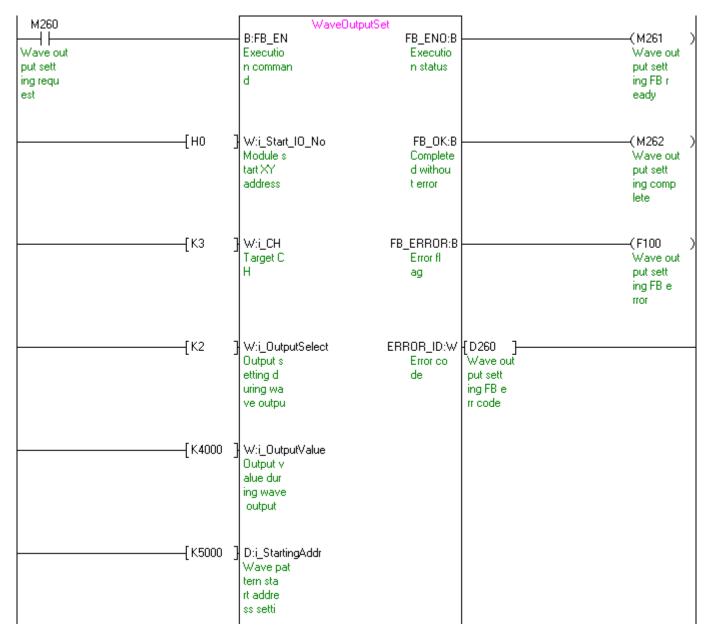


| Label name      | Setting value | Description  |
|-----------------|---------------|--|
| i_Start_IO_No   | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H.       |
| i_CH            | К3            | Set the target channel to channel 3.                                   |
| 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.                |

M+L60AD2DA2\_DA\_WaveOutputSetting (Wave output setting)

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





(Continues to the next page)



| [K10000 | D:i_PointsSetting<br>Wave pat<br>tern dat<br>a points<br>setting |
|---------|--|
| [K2000  | W:i_Frequency<br>Wave pat<br>tern out<br>put repe<br>tition s    |
| [К1     | W:i_ConvSpeed<br>Constant<br>for wav<br>e output<br>convers      |



| Label name       | Setting value | Description  |
|------------------|---------------|--|
| i_Start_IO_No    | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H.     |
| i_CH             | К3            | Set the target channel to channel 3.                                 |
| i_Start_Stop_Req | K1            | Set Wave output start/stop request to 1 (Wave output start request). |

M+L60AD2DA2\_DA\_WaveOutReqSetting (Wave output start/stop request)

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

| М270                                       | WaveOutputReg  |  |   |
|--|--|--|---|
| Wave out<br>put star<br>t/stop r<br>equest | B:FB_EN<br>Executio<br>n comman<br>d                                       | FB_ENO:B<br>Executio<br>n status   | (M271)<br>Wave out<br>put star<br>t/stop F<br>B ready |
| [НО ]                                      | W:i_Start_IO_No<br>Module s<br>tart XY<br>address                          | FB_OK:B<br>Complete<br>d withou<br>t error   | (M272)<br>Wave out<br>put star<br>t/stop c<br>omplete |
| [КЗ  | } W:i_CH o_WaveSta<br>Target C<br>H  | tus_CH3:W {D270 }<br>CH3 Wave CH3 Wave<br>output output<br>status m status m<br>onitor onitor  |   |
| [К1  | W:i_Start_Stop_Req o_WaveSta<br>Wave out<br>put star<br>t/stop r<br>equest | itus_CH4:W {D271 }<br>CH4 Wave CH4 Wave<br>output output<br>status m status m<br>onitor onitor |   |
|  | FB   | ERROR:B<br>Error fl<br>ag  |   |
|  | ER   | ROR_ID:W {D272 }<br>Error co Wave out<br>de put star<br>t/stop e<br>rr code                    |   |



### 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      |

#### 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  |



| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | 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.                   |

M+L60AD2DA2\_ReadADVal\_WriteDAVal (Read A/D conversion data and write D/A conversion data)

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.

| M280<br>AD value<br>read/DA<br>value w<br>rite req | ReadAD<br>B:FB_EN<br>Executio<br>n comman<br>d    | _WriteDA<br>FB_ENO:B<br>Executio<br>n status       |   | (M281)<br>AD valr<br>ead/DA v<br>al write<br>FBrdy. |
|--|---|--|---|---|
| [ко ]  | W:i_Start_IO_No<br>Module s<br>tart XY<br>address | FB_OK:B<br>Complete<br>d withou<br>t error         |   | (M282)<br>AD val r<br>ead/DA v<br>al write<br>comp  |
| [K16000 ]  | W:i_DA_Value_CH3<br>CH3 Digi<br>tal valu<br>e     | o_AD_Value_CH1:W<br>CH1 A/D<br>conversi<br>on data | {D280 }<br>CH1 A/D<br>conversi<br>on data |   |
| {K-16000 ]   | W:i_DA_Value_CH4<br>CH4 Digi<br>tal valu<br>e     | o_AD_Value_CH2:W<br>CH2 A/D<br>conversi<br>on data | {D281 }<br>CH2 A/D<br>conversi<br>on data |   |
|  |   | FB_ERROR:B<br>Error fl<br>ag                       |   |   |
|  |   | ERROR_ID:W<br>Error co<br>de                       |   |   |

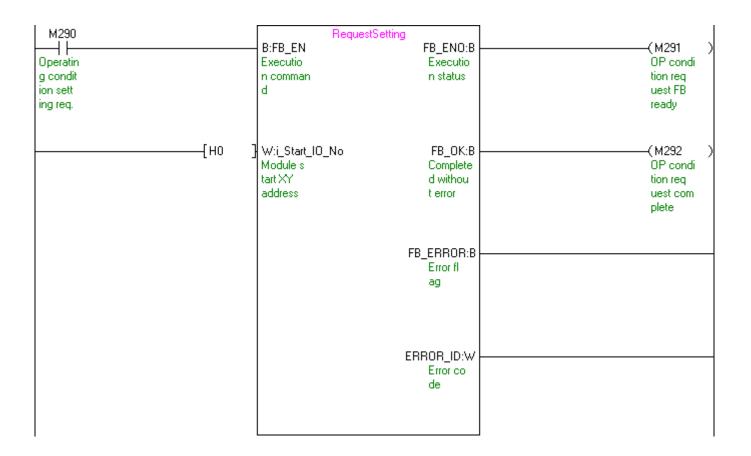


#### M+L60AD2DA2\_RequestSetting (Operating condition setting request)

| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | 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

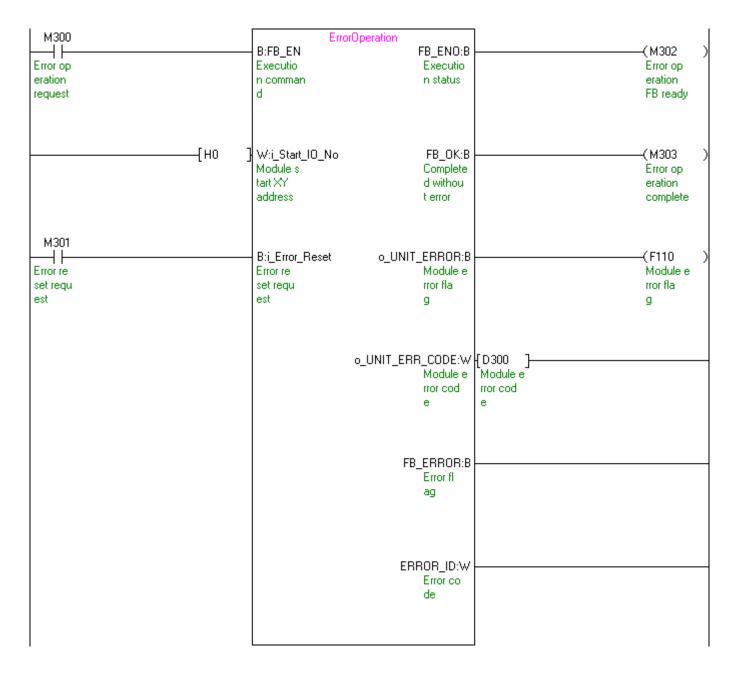




| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | Set the start XY address where the L60AD2DA2 is connected to 0H. |
| i_Error_Reset | ON/OFF        | Turn ON for the error reset.                                     |

M+L60AD2DA2\_ErrorOperation (Error operation)

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.





| MHEUOADZDAZ_OOBackup (Onsergain value save) |               |   |  |
|---|---------------|---|--|
| Label name                                  | Setting value | Description   |  |
| i_Start_IO_No                               | HO            | 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.  |  |

M+L60AD2DA2\_OGBackup (Offset/gain value save)

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.

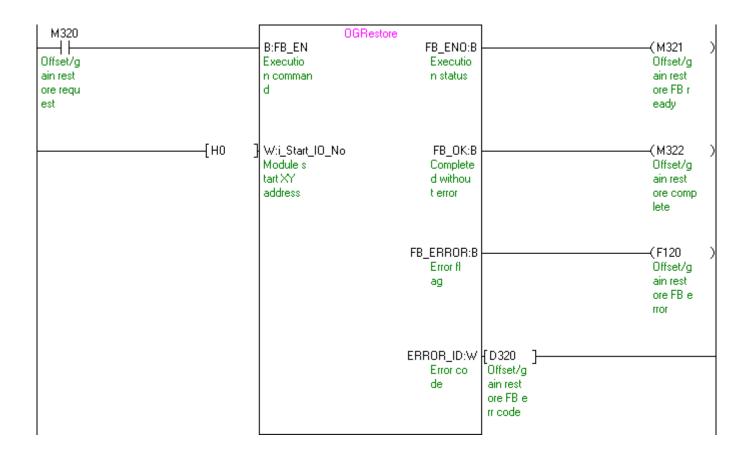
| M310                                       |         | OGBackup  |  |   |   | Ι |
|--|---------|---|--|---|---|---|
| Offset/g<br>ain save<br>to file<br>request |         | B:FB_EN<br>Executio<br>n comman<br>d              | FB_ENO:B<br>Executio<br>n status           |   | — (M311<br>Offset/g<br>ain save<br>to file<br>FB rdy. | ) |
|  | —(но ]  | W:i_Start_IO_No<br>Module s<br>tart XY<br>address | FB_OK:B<br>Complete<br>d withou<br>t error |   | —(M312<br>Offset/g<br>ain save<br>to file<br>comp.    | ) |
|  | —(нод ) | W:i_Dat_Type<br>Pass dat<br>a classi<br>fication  | FB_ERROR:B<br>Error fl<br>ag               |   | —(F115<br>Offset/g<br>ain save<br>file FB<br>error    | ) |
|  |         |   | ERROR_ID:W<br>Error co<br>de               | {D310 }<br>Offset/g<br>ain save<br>file FB<br>err cod |   |   |



#### M+L60AD2DA2\_OGRestore (Offset/gain value restore)

| Label name    | Setting value | Description  |
|---------------|---------------|--|
| i_Start_IO_No | HO            | 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.





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

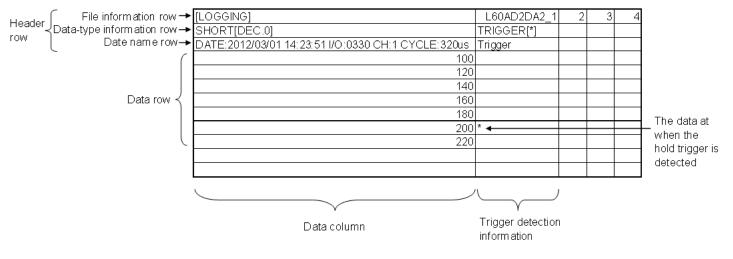
This following shows the specification of the CSV file format that M+L60AD2DA2\_AD\_SaveLogging (Logging data save) outputs.

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

\*1 Displays the specifications of the file version.

riangle: 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<br>number | Item   | Output detail of "Data type" | Output detail of "Additional information"        | Size     |
|------------------|--|------------------------------|--|----------|
| Column 1         | Data column SHORT (signed 1<br>integer specification |                              | [DEC.0] (decimal specification)                  | 12 bytes |
| Column 2         | Trigger detection<br>information<br>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<br>number | Column<br>name           | Output detail of<br>"Data name" | Output detail of "Additional information"    | Size          |
|------------------|--------------------------|---------------------------------|--|---------------|
| Column 1         | Data                     | DATE *1                         | Hold trigger detection time*2*3              | 24 bytes      |
|                  | column                   | I/O:                            | Start XY address of the module that acquires | 8 bytes       |
|                  |                          |                                 | the logging data *4                          |               |
|                  | CH:                      |                                 | Target channel *4                            | 4 bytes       |
|                  |                          | CYCLE:                          | Logging cycle *3                             | 9 to 23 bytes |
| Column 2         | Column 2 Trigger Trigger |                                 | -  | 7 bytes       |
|                  | detection                | -                               | - (NULL) *5                                  | 1 to 15 bytes |
|                  | information              |                                 |  |               |
|                  | column                   |                                 |  |               |

\*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 | * (output only to the logging data row indicated by trigger pointer.) | 0 to 1 byte     |
| information       |   |                 |
| column            |   |                 |

\*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)).

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

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

\*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.)

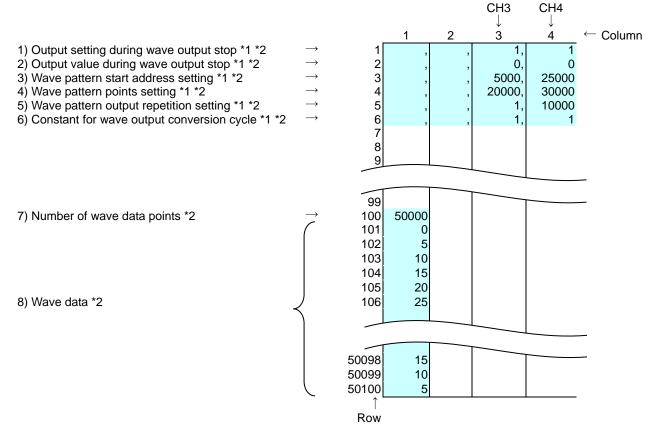
The following table lists the CSV format specification.

| 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.

