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

Applicable module:
L60ADIL8, L60ADVL8

<CONTENTS>

Reference Manual Revision History 2
1. Overview 3
1.1. Overview of the FB Library 3
1.2. Function of the FB Library 3
1.3. System Configuration Example 4
1.4. Relevant Manuals 4
1.5. Note 4
2. Details of the FB Library 5
2.1. M+L60ADL8_ReadADVal (Read A/D conversion data) 5
2.2. M+L60ADL8_ReadAllADVal (Read all A/D conversion data) 9
2.3. M+L60ADL8_ReadScalingVal (Read scaling value) 13
2.4. M+L60ADL8_ReadAllScalingVal (Read all scaling values) 17
2.5. M+L60ADL8_SetADConversion (A/D conversion enable/disable setting) 21
2.6. M+L60ADL8_SetAverage (Averaging process setting) 25
2.7. M+L60ADL8_SetScaling (Scaling setting) 30
2.8. M+L60ADL8_SetProcessAlarm (Process alarm setting) 34
2.9. M+L60ADL8_SetInputSignalErr (Input signal error detection setting) 38
2.10. M+L60ADL8_SetInputSignalErrExp (Input signal error detection extension setting) 42
2.11. M+L60ADL8_RequestSetting (Operating condition setting request) 48
2.12. M+L60ADL8_SetOffsetVal (Offset setting) 52
2.13. M+L60ADL8_SetGainVal (Gain setting) 56
2.14. M+L60ADL8_ErrorOperation (Error operation) 60
2.15. M+L60ADL8_OGBackup (Offset/gain value save) 64
2.16. M+L60ADL8_OGRestore (Offset/gain value restore) 69
2.17. M+L60ADL8_ShiftOperation (Shift operation) 74
2.18. M+L60ADL8_DiffOperation (Differential conversion process) 78
2.19. M+L60ADL8_DigitalClipOperation (Digital clipping operation) 82
Appendix 1. FB Library Application Examples 86

Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M117-A	2014/7/31	First edition
FBM-M117-B	2015/9/25	1) Added applicable GX Works2 Version. • This FB is able to install on GX Works2 of all language versions.

1. Overview

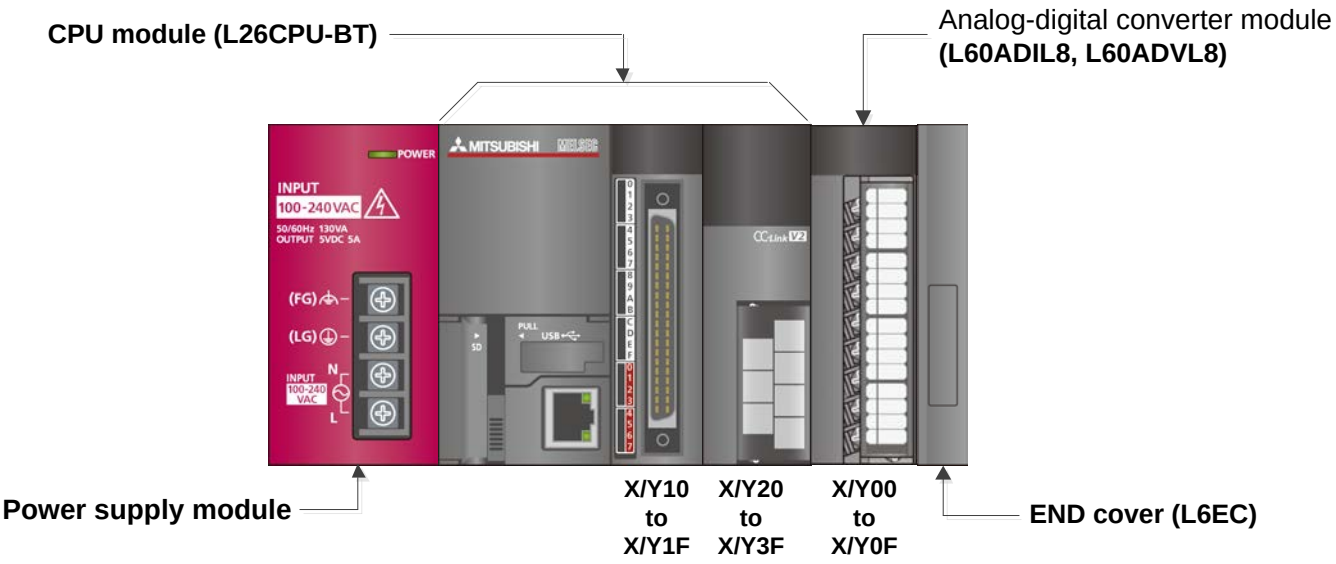
1.1. Overview of the FB Library

This FB library is for using the MELSEC-L analog-digital converter module L60ADIL8 and L60ADVL8 (hereinafter L60ADIL8 and L60ADVL8).

1.2. Function of the FB Library

Item	Description
M+L60ADL8_ReadADVal	Reads the A/D conversion data of the specified channel.
M+L60ADL8_ReadAllADVal	Reads the A/D conversion data of all channels.
M+L60ADL8_ReadScalingVal	Reads the scaling value of the specified channel.
M+L60ADL8_ReadAllScalingVal	Reads the scaling values of all channels.
M+L60ADL8_SetADConversion	Enables or disables the A/D conversion for a specified channel or all channels.
M+L60ADL8_SetAverage	Sets the averaging processing of the specified channel.
M+L60ADL8_SetScaling	Sets the scaling of the specified channel.
M+L60ADL8_SetProcessAlarm	Sets the process alarm of the specified channel.
M+L60ADL8_SetInputSignalErr	Sets the input signal error detection of the specified channel.
M+L60ADL8_SetInputSignalErrExp	Sets the input signal error detection extension of the specified channel.
M+L60ADL8_RequestSetting	Validates the settings of each function.
M+L60ADL8_SetOffsetVal	Sets the offset of the specified channel.
M+L60ADL8_SetGainVal	Sets the gain of the specified channel.
M+L60ADL8_ErrorOperation	Monitors error codes and resets errors.
M+L60ADL8_OGBackup	Reads the offset/gain setting values of the user range and save them to a file.
M+L60ADL8_OGRestore	Restores the offset/gain setting values of the user range setting that are saved in a file to the module.
M+L60ADL8_ShiftOperation	Adds the shift amount to the digital value.
M+L60ADL8_DiffOperation	Outputs the difference obtained by subtracting the standard value from the digital value.
M+L60ADL8_DigitalClipOperation	Limits a digital value at the digital clipping upper and lower limit values.

1.3. System Configuration Example



1.4. Relevant Manuals

- MELSEC-L Analog-Digital Converter Module User's Manual
- MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)
- MELSEC-L CPU Module User's Manual (Data Logging Function)
- GX Works2 Version 1 Operating Manual (Common)
- GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

1.5. Note

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

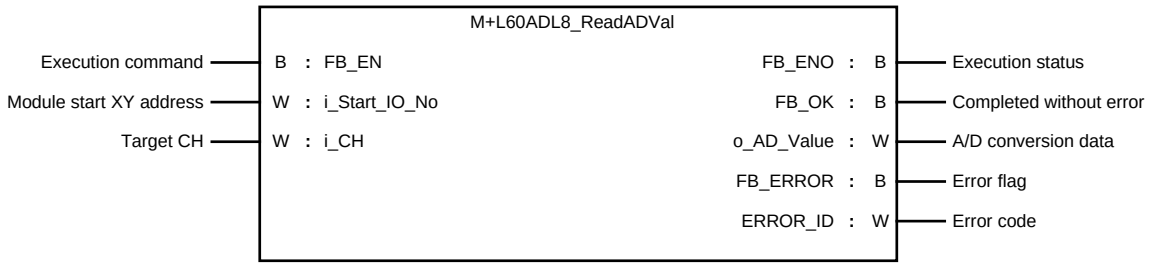
2. Details of the FB Library

2.1. M+L60ADL8_ReadADVal (Read A/D conversion data)

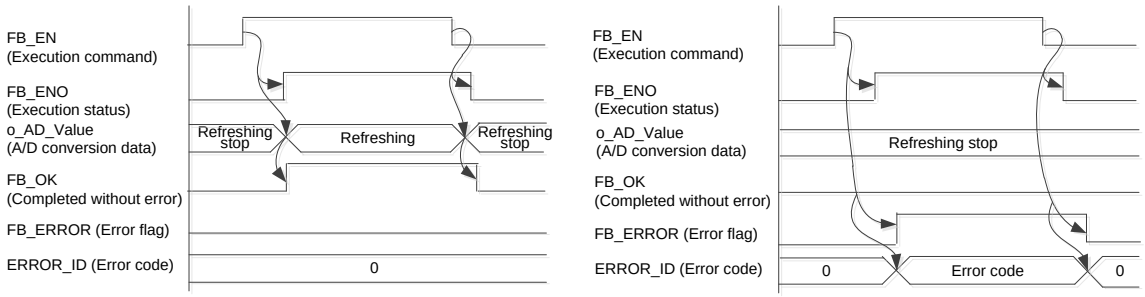
FB Name

M+L60ADL8_ReadADVal

Function Overview

Item	Description	
Function overview	Reads the A/D conversion data of the specified channel.	
Symbol		
Applicable hardware and software	Analog-digital converter module	L60ADIL8, L60ADVL8
	CPU module	Series: MELSEC-L Series; Model: LCPU
	Engineering software	GX Works2 *1 Japanese version: Version1.86Q or later English version: Version1.24A or later Chinese (Simplified) version: Version1.49B or later Chinese (Traditional) version: Version1.49B or later Korean version: Version1.49B or later *1 For software versions applicable to the modules used, refer to "Relevant manuals".
Programming language	Ladder	
Number of steps	303 steps (for MELSEC-L series CPU) *The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.	

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the A/D conversion data of the specified channel is read. 2) The read o_AD_Value (A/D conversion data) depends on the settings of the input range and averaging processing function. 3) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR (Error flag) output turns ON, the 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. 4) When the digital output value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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] [When an error occurs] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the A/D conversion value is being read.
A/D conversion data	o_AD_Value	Word	0	The A/D conversion value is stored.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

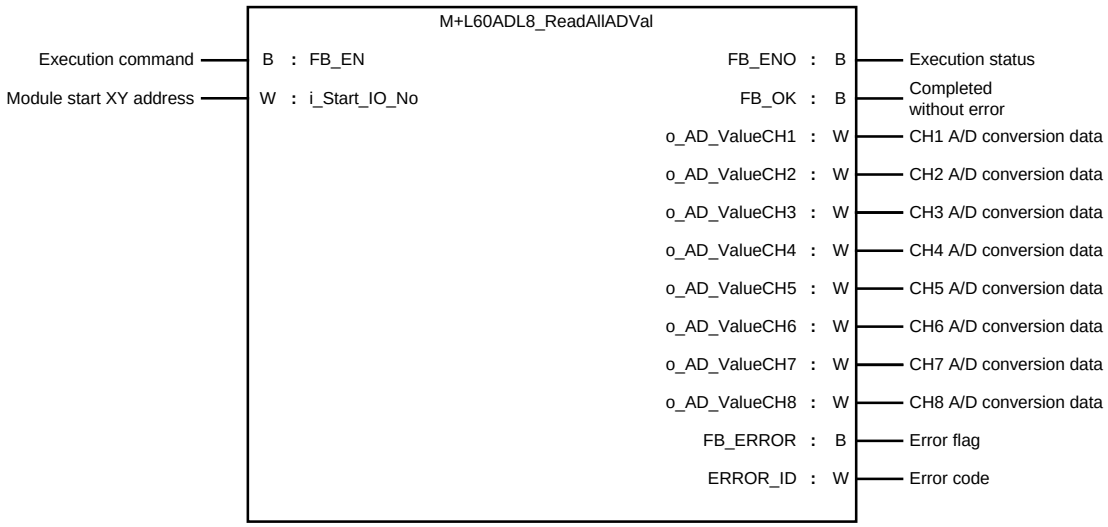
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

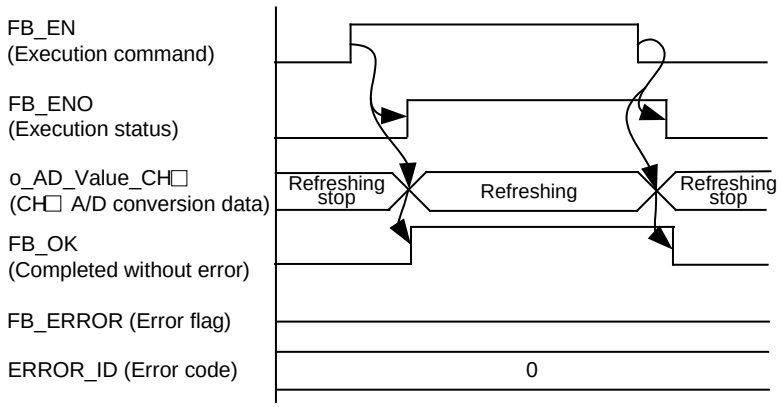
2.2. M+L60ADL8_ReadAllADVal (Read all A/D conversion data)

FB Name

M+L60ADL8_ReadAllADVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the A/D conversion data of all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
</table>

Item	Description
Number of steps	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.
Function description	1) By turning ON FB_EN (Execution command), the A/D conversion data of all channels are read. 2) The read o_AD_ValueCH1 (CH1 A/D conversion data) to o_AD_ValueCH8 (CH8 A/D conversion data) depend on the settings of the input range and averaging processing function. 3) When the digital output value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 L60ADIL8 or L60ADVL8, 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".
Timing chart	[When operation completes without error] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the A/D conversion value is being read.
CH1 A/D conversion data	o_AD_ValueCH1	Word	0	The A/D conversion value of channel 1 is stored.
CH2 A/D conversion data	o_AD_ValueCH2	Word	0	The A/D conversion value of channel 2 is stored.
CH3 A/D conversion data	o_AD_ValueCH3	Word	0	The A/D conversion value of channel 3 is stored.
CH4 A/D conversion data	o_AD_ValueCH4	Word	0	The A/D conversion value of channel 4 is stored.
CH5 A/D conversion data	o_AD_ValueCH5	Word	0	The A/D conversion value of channel 5 is stored.
CH6 A/D conversion data	o_AD_ValueCH6	Word	0	The A/D conversion value of channel 6 is stored.
CH7 A/D conversion data	o_AD_ValueCH7	Word	0	The A/D conversion value of channel 7 is stored.
CH8 A/D conversion data	o_AD_ValueCH8	Word	0	The A/D conversion value of channel 8 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	2014/7/31	First edition

Note

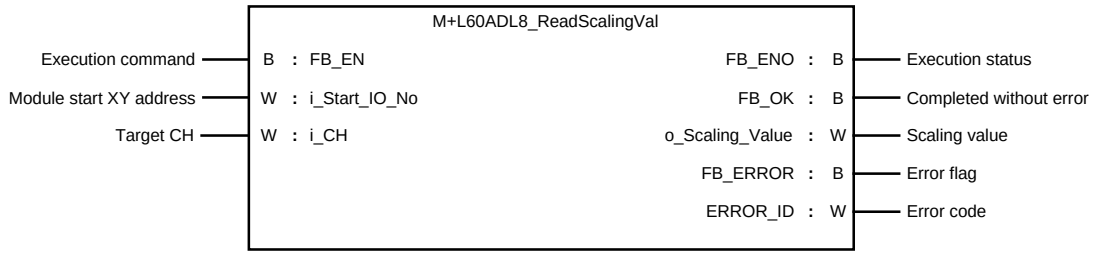
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

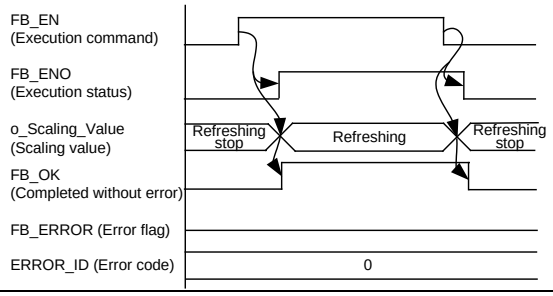
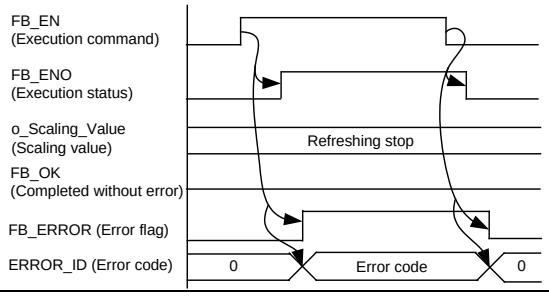
2.3. M+L60ADL8_ReadScalingVal (Read scaling value)

FB Name

M+L60ADL8_ReadScalingVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the scaling value of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">299 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the scaling value of the specified channel is read. 2) The read o_Scaling_Value (Scaling value) depends on the settings of the input range, averaging processing function, and scaling function. 3) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR (Error flag) output turns ON, the 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. 4) When the scaling value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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".
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the scaling value is being read.
Scaling value	o_Scaling_Value	Word	0	The scaling value is stored.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

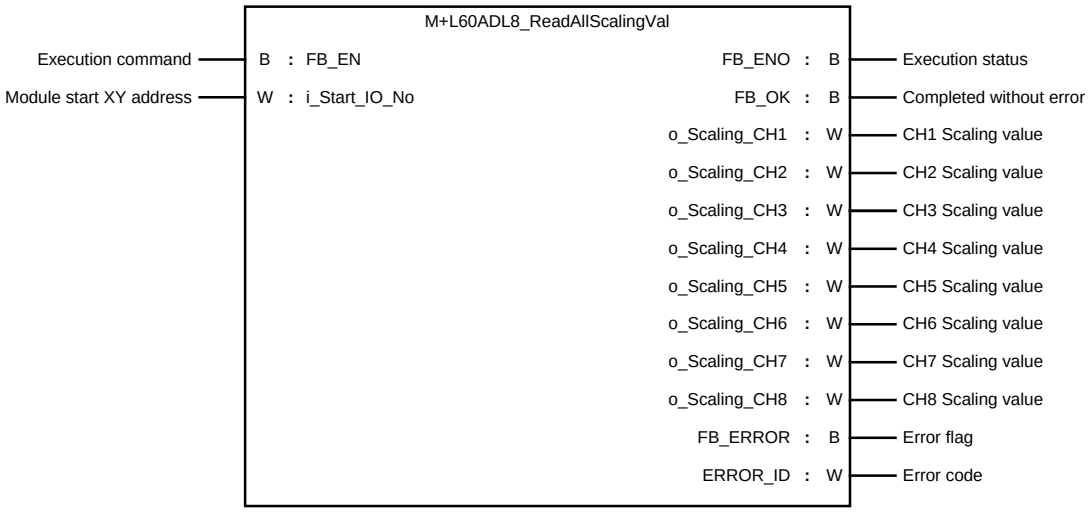
Please make sure to read user's manuals for the corresponding products before using the products.

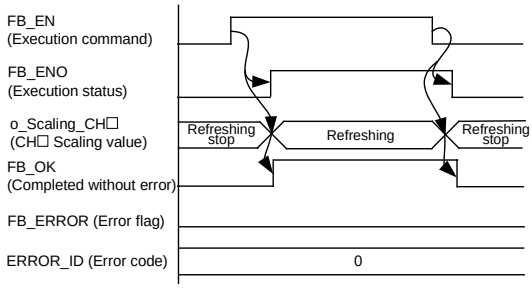
2.4. M+L60ADL8_ReadAllScalingVal (Read all scaling values)

FB Name

M+L60ADL8_ReadAllScalingVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the scaling values of all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
</table>

Item	Description
Number of steps	277 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 scaling values of channel 1 to channel 8 are read. 2) The read o_Scaling_CH1 (CH1 Scaling value) to o_Scaling_CH8 (CH8 scaling value) depend on the settings of the input range, averaging processing function, and scaling function. 3) When the scaling value is set in the auto refresh setting of the intelligent function module, this FB is unnecessary.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 L60ADIL8 or L60ADVL8, 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".
Timing chart	[When operation completes without error] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the scaling value is being read.
CH1 Scaling value	o_Scaling_CH1	Word	0	The scaling value of channel 1 is stored.
CH2 Scaling value	o_Scaling_CH2	Word	0	The scaling value of channel 2 is stored.
CH3 Scaling value	o_Scaling_CH3	Word	0	The scaling value of channel 3 is stored.
CH4 Scaling value	o_Scaling_CH4	Word	0	The scaling value of channel 4 is stored.
CH5 Scaling value	o_Scaling_CH5	Word	0	The scaling value of channel 5 is stored.
CH6 Scaling value	o_Scaling_CH6	Word	0	The scaling value of channel 6 is stored.
CH7 Scaling value	o_Scaling_CH7	Word	0	The scaling value of channel 7 is stored.

Name (comment)	Label name	Data type	Initial value	Description
CH8 Scaling value	o_Scaling_CH8	Word	0	The scaling value of channel 8 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	2014/7/31	First edition

Note

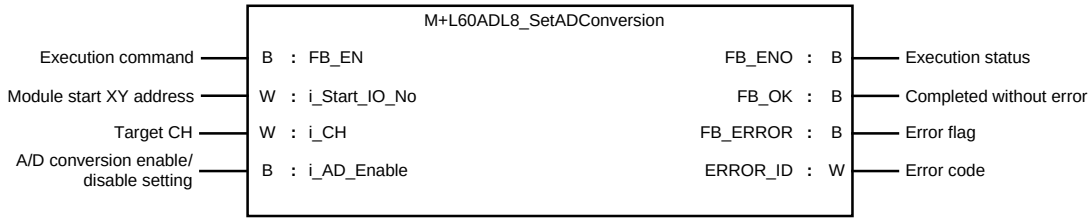
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

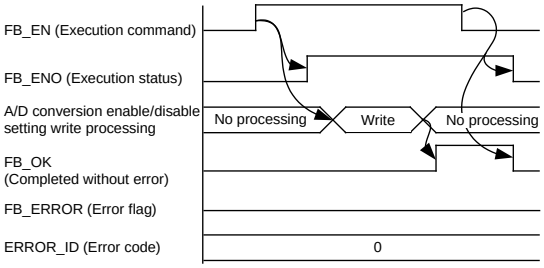
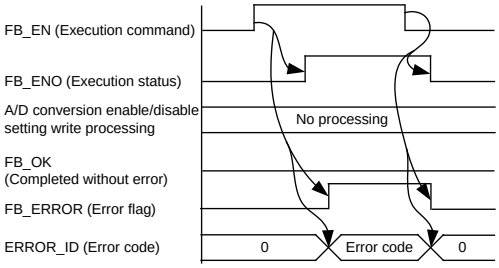
2.5. M+L60ADL8_SetADConversion (A/D conversion enable/disable setting)

FB Name

M+L60ADL8_SetADConversion

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Enables or disables the A/D conversion for a specified channel or all channels.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">364 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the A/D conversion for the specified channel or all channels 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR (Error flag) output turns ON, the 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 precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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 (1 scan execution type)
Application example	Refer to "Appendix 1. FB Library Application Examples".
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8 or 15.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8 or 15	1 to 8: Specify the channel number. 15: Specify all the channels.
A/D conversion enable/disable setting	i_AD_Enable	Bit	ON, OFF	ON: Enable the A/D conversion. OFF: Disable the A/D conversion.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

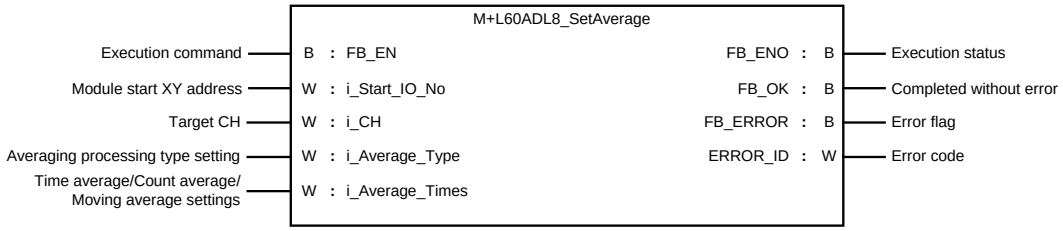
Please make sure to read user's manuals for the corresponding products before using the products.

2.6. M+L60ADL8_SetAverage (Averaging process setting)

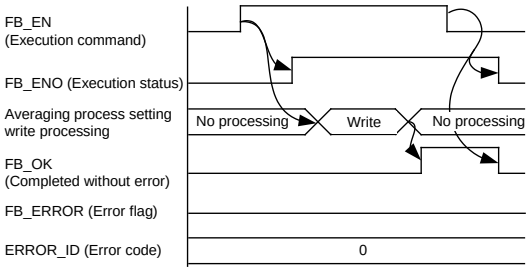
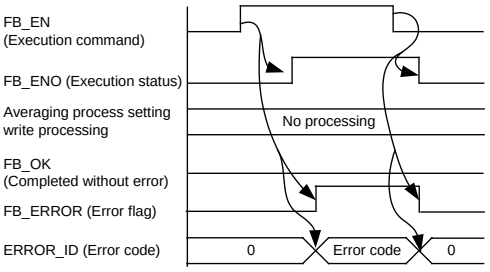
FB Name

M+L60ADL8_SetAverage

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the averaging processing of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">510 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the averaging processing of the specified channel 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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). 8) When a value set for i_Average_Type (Averaging processing type setting) or i_Average_Times (Time average/Count average/Moving average settings) is out of the setting range, no errors occur in this FB; however an error occurs in the module at an operating condition setting. Please read the MELSEC-L Analog-Digital Converter Module User's Manual.
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] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.
Averaging processing type setting	i_Average_Type	Word	0_H: Sampling processing 1_H: Time average 2_H: Count average 3_H: Moving average	Specify the averaging processing type.
Time average/Count average/Moving average settings	i_Average_Times	Word	Time average 4 to 5000 (ms) Count average 4 to 62500 (times) Moving average 2 to 1000 (times)	Set the time average, count average, and moving average of the specified channel.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

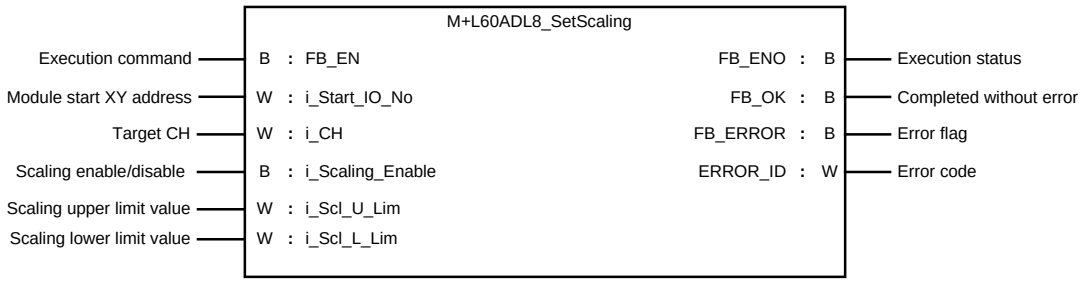
Please make sure to read user's manuals for the corresponding products before using the products.

2.7. M+L60ADL8_SetScaling (Scaling setting)

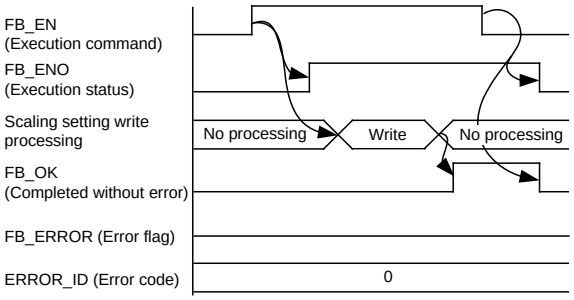
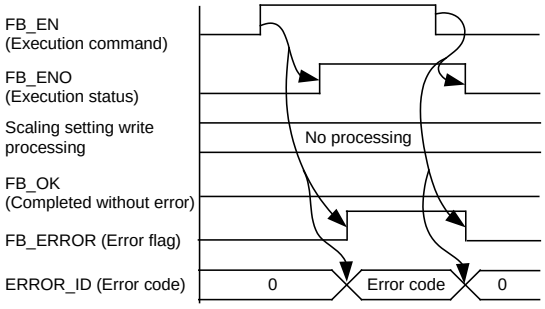
FB Name

M+L60ADL8_SetScaling

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the scaling of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">348 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the scaling setting of the specified channel is configured. 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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). 8) In either of the following cases 1) and 2), no errors occur in this FB; however an error occurs in the module at an operating condition setting. Please read the MELSEC-L Analog-Digital Converter Module User's Manual. 1) When a value set for i_Scl_U_Lim (Scaling upper limit value) or i_Scl_L_Lim (Scaling lower limit value) is out of the setting range 2) When a value equal to or greater than the value set for i_Scl_U_Lim (Scaling upper limit value) is set for i_Scl_L_Lim (Scaling lower limit value)
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] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.
Scaling enable/disable	i_Scaling_Enable	Bit	ON, OFF	ON: Enabled OFF: Disabled
Scaling upper limit value	i_Scl_U_Lim	Word	-32,000 to 32,000	Specify the scaling upper limit value.
Scaling lower limit value	i_Scl_L_Lim	Word	-32,000 to 32,000	Specify the scaling lower limit value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

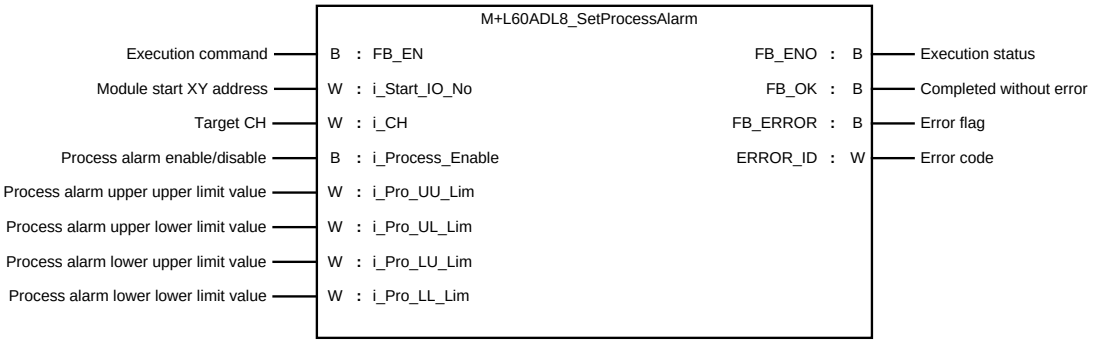
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

2.8. M+L60ADL8_SetProcessAlarm (Process alarm setting)

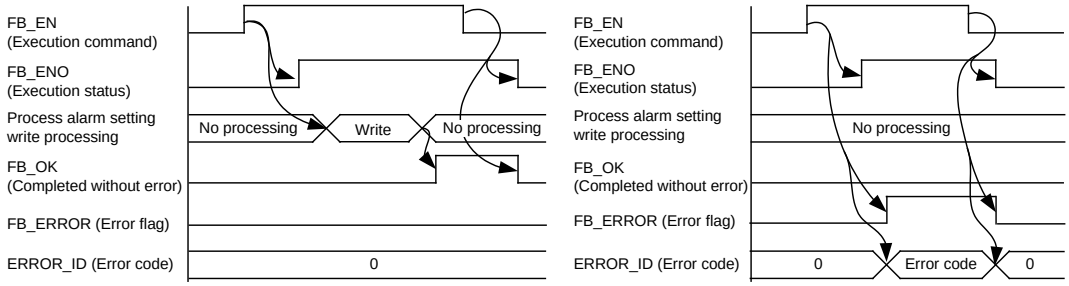
FB Name

M+L60ADL8_SetProcessAlarm

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the process alarm of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">263 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the process alarm of the specified channel 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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 device and system connected. For details on how to use the intelligent function module switch setting, refer to GX Works2 Version 1 Operating Manual (Common). 9) In any of the following cases 1) to 3), no errors occur in this FB; however an error occurs in the module at an operating condition setting. Please read the MELSEC-L Analog-Digital Converter Module User's Manual. 1) When a value greater than the value set for i_Pro_LU_Lim (Process alarm lower upper limit value) is set for i_Pro_LL_Lim (Process alarm lower lower limit value) 2) When a value that exceeds i_Pro_UL_Lim (Process alarm upper lower limit value) is set for i_Pro_LU_Lim (Process alarm lower upper limit value) 3) When a value that exceeds i_Pro_UU_Lim (Process alarm upper upper limit value) is set for i_Pro_UL_Lim (Process alarm upper lower limit value)
FB operation type	Pulsed execution (1 scan execution type)

Item	Description
Application example	Refer to "Appendix 1. FB Library Application Examples".
Timing chart	[When operation completes without error] [When an error occurs] 
Relevant manuals	MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.
Process alarm enable/disable	i_Process_Enable	Bit	ON, OFF	ON: Enable the warning output of the process alarm. OFF: Disable the warning output of the process alarm.

Name (comment)	Label name	Data type	Setting range	Description
Process alarm upper upper limit value	i_Pro_UU_Lim	Word	-32,768 to 32,767	Specify the process alarm upper upper limit value.
Process alarm upper lower limit value	i_Pro_UL_Lim	Word	-32,768 to 32,767	Specify the process alarm upper lower limit value.
Process alarm lower upper limit value	i_Pro_LU_Lim	Word	-32,768 to 32,767	Specify the process alarm lower upper limit value.
Process alarm lower lower limit value	i_Pro_LL_Lim	Word	-32,768 to 32,767	Specify the process alarm lower lower limit value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

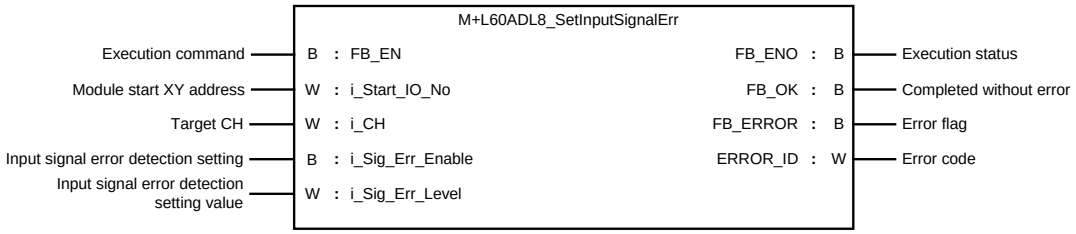
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

2.9. M+L60ADL8_SetInputSignalErr (Input signal error detection setting)

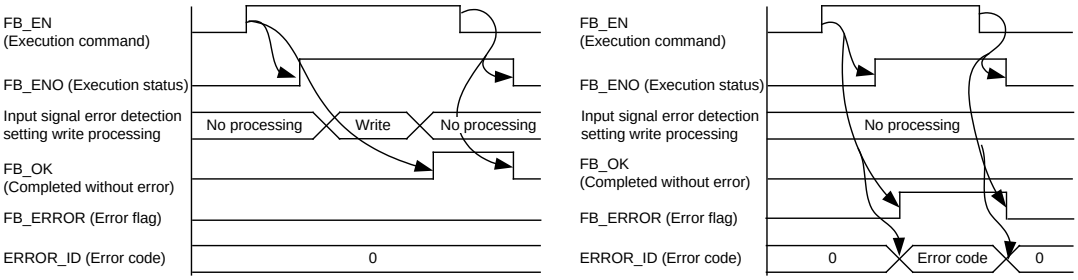
FB Name

M+L60ADL8_SetInputSignalErr

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the input signal error detection of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">244 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the input signal error detection setting of the specified channel is configured. 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of the target channel is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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). 8) When a value set for i_Sig_Err_Level (Input signal error detection setting value) is out of the setting range, no errors occur in this FB; however an error occurs in the module at an operating condition setting request. Please read the MELSEC-L Analog-Digital Converter Module User's Manual.
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] 
Relevant manuals	MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. The target channel is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.

Name (comment)	Label name	Data type	Setting range	Description
Input signal error detection setting	i_Sig_Err_Enable	Bit	ON, OFF	ON: Enable the input signal error detection setting. OFF: Disable the input signal error detection setting.
Input signal error detection setting value	i_Sig_Err_Level	Word	0 to 250 (Unit: 0.1%)	Specify the input signal error detection setting value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

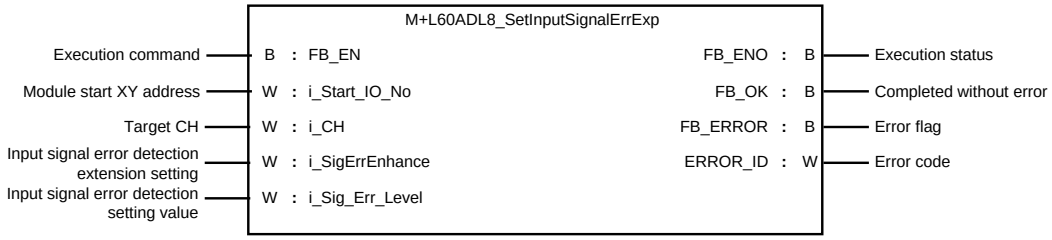
Please make sure to read user's manuals for the corresponding products before using the products.

2.10. M+L60ADL8_SetInputSignalErrExp (Input signal error detection extension setting)

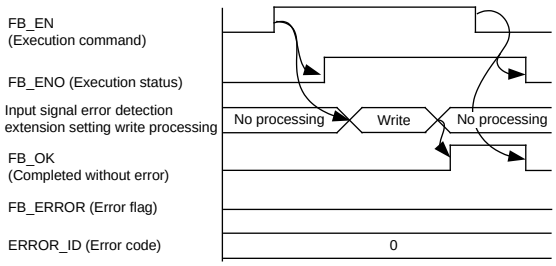
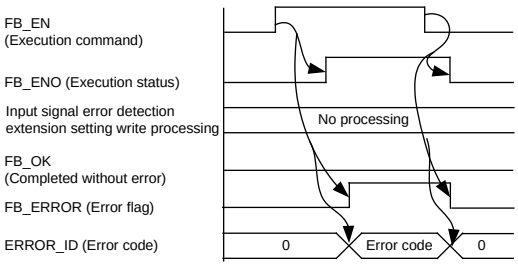
FB Name

M+L60ADL8_SetInputSignalErrExp

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the input signal error detection extension of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">466 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the input signal error detection extension setting of the specified channel is configured. 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 → ON → OFF or the Operating condition setting request function FB (M+L60ADL8_RequestSetting) is executed. 4) When the setting value of i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 5) When the setting value of i_SigErrEnhance (Input signal error detection extension setting) is out of range, the FB_ERROR output turns ON, the 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 precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 i_CH (Target CH). 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 L60ADIL8 or L60ADVL8, 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). 8) In either of the following cases 1) to 2), no errors occur in this FB; however an error occurs in the module at an operating condition setting. Please read the MELSEC-L Analog-Digital Converter Module User's Manual. 1) When i_SigErrEnhance (Input signal error detection extension setting) is set to "4_H: Disconnection detection" while either of "4 to 20 mA (Expansion)" or "0 to 5 V (Expansion) is not selected in the input range setting of i_CH (Target CH) 2) When a value set for i_Sig_Err_Level (Input signal error detection setting value) is out of the setting range
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1. FB Library Application Examples".
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.
11 (Decimal)	The input signal error detection extension setting is not valid. i_SigErrEnhance (Input signal error detection extension setting) is not within the range of 0_H to 4_H.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.
Input signal error detection extension setting	i_SigErrEnhance	Word	0_H: Disable 1_H: Upper and lower limit detection 2_H: Lower limit detection 3_H: Upper limit detection 4_H: Disconnection detection	Set the input signal error detection extension setting.
Input signal error detection setting value	i_Sig_Err_Level	Word	0 to 250 (Unit: 0.1%)	Specify the input signal error detection setting value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

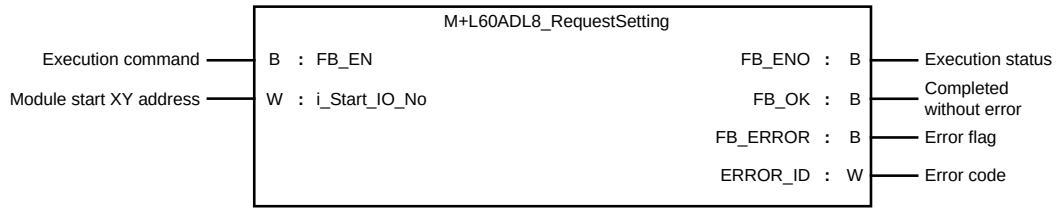
Please make sure to read user's manuals for the corresponding products before using the products.

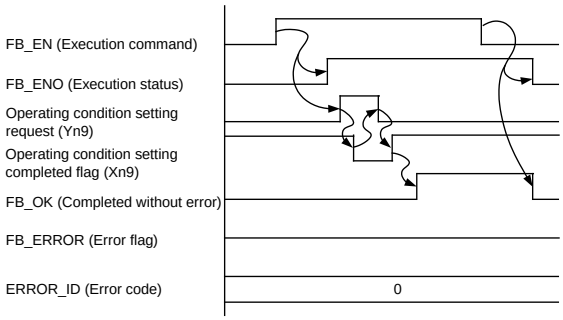
2.11. M+L60ADL8_RequestSetting (Operating condition setting request)

FB Name

M+L60ADL8_RequestSetting

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Validates the settings of each function.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">275 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the settings of all channels (channel 1 to channel 8) are enabled. For the setting contents to be enabled, refer to MELSEC-L Analog-Digital Converter 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
Restrictions and precautions	1) When this FB is executed while the L60ADIL8 or L60ADVL8 is being operated, the A/D conversion is stopped. 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 L60ADIL8 or L60ADVL8, 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] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

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

2.12. M+L60ADL8_SetOffsetVal (Offset setting)

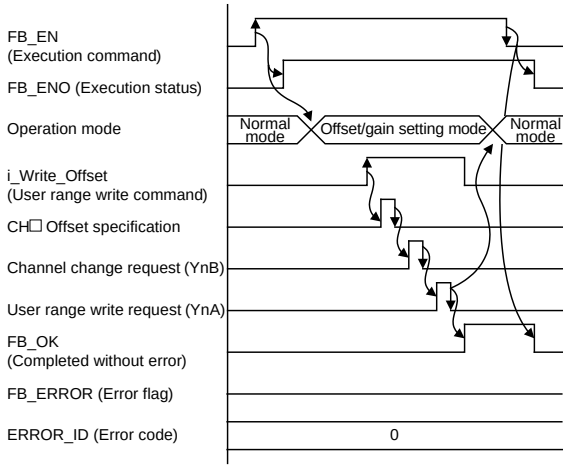
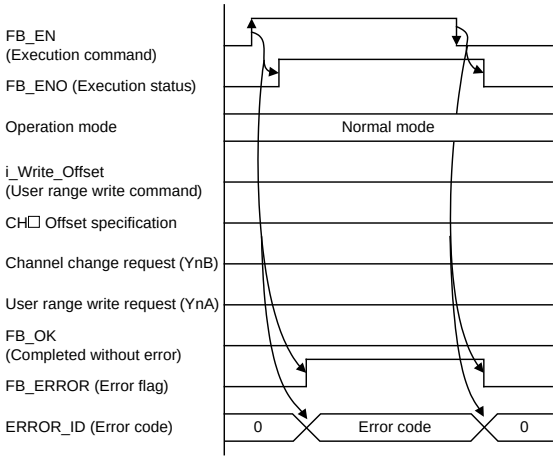
FB Name

M+L60ADL8_SetOffsetVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the offset of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">463 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the offset value of the specified channel 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 i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop because it is impossible to turn OFF. 4) Externally implement an interlock to prevent the following FBs from being executed simultaneously. Do not use two or more of this FB simultaneously. When these FBs are executed simultaneously, the offset or gain cannot be set properly. • M+L60ADL8_SetOffsetVal • M+L60ADL8_SetGainVal 5) This FB cannot set the offset and gain of channel 1 to channel 8 simultaneously. To set the offset and gain simultaneously, create a program without using this FB. 6) This FB uses index registers Z7 to Z9. Please do not use these index registers in 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 L60ADIL8 or L60ADVL8, 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".

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.

Name (comment)	Label name	Data type	Setting range	Description
User range write command	i_Write_Offset	Bit	ON, OFF	Turn ON this label to write the adjusted offset value to a flash memory device. Turn OFF this label after writing the value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

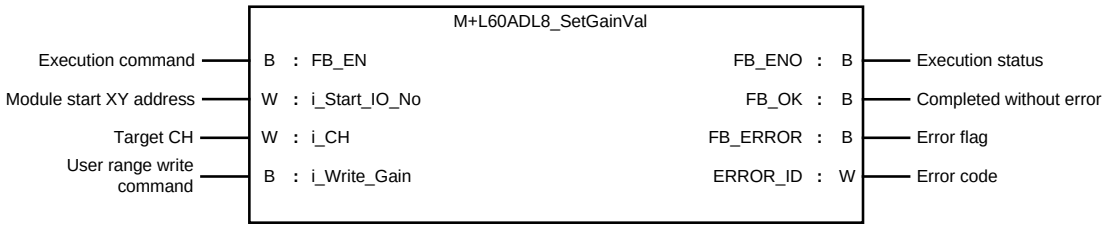
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

2.13. M+L60ADL8_SetGainVal (Gain setting)

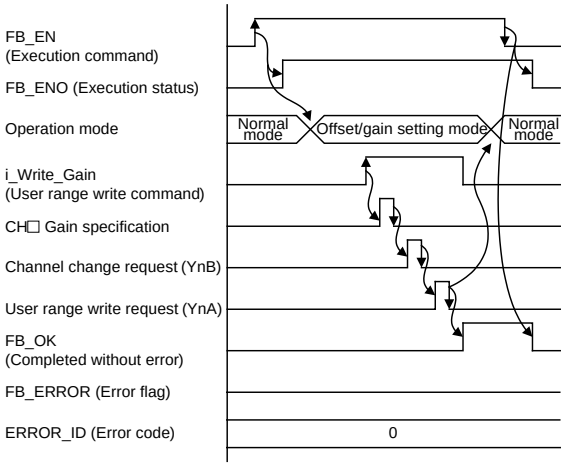
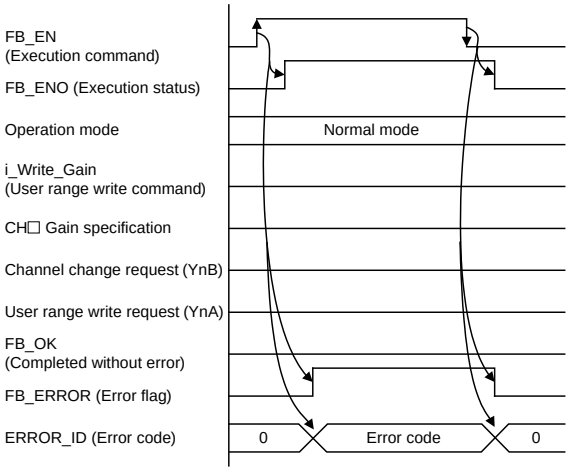
FB Name

M+L60ADL8_SetGainVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Sets the gain of the specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td>MELSEC-L Series</td><td>LCPU</td></tr>
</table>
</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B or later</td></tr>
</table>
*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">446 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the gain value of the specified channel 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 i_CH (Target CH) is out of range, the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop because it is impossible to turn OFF. 4) Externally implement an interlock to prevent the following FBs from being executed simultaneously. Do not use two or more of this FB simultaneously. When these FBs are executed simultaneously, the offset or gain cannot be set properly. • M+L60ADL8_SetOffsetVal • M+L60ADL8_SetGainVal 5) This FB cannot set the offset and gain of channel 1 to channel 8 simultaneously. To set the offset and gain simultaneously, create a program without using this FB. 6) This FB uses index registers Z7 to Z9. Please do not use these index registers in 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 L60ADIL8 or L60ADVL8, 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".

Item	Description
Timing chart	[When operation completes without error]  [When an error occurs] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified channel is not valid. i_CH (Target CH) is not within the range of 1 to 8.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1 to 8	Specify the channel number.

Name (comment)	Label name	Data type	Setting range	Description
User range write command	i_Write_Gain	Bit	ON, OFF	Turn ON this label to write the adjusted gain value to a flash memory device. Turn OFF this label after writing the value.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

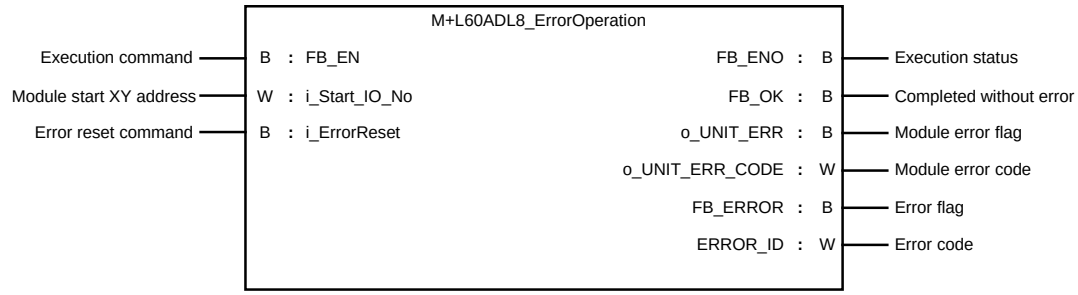
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

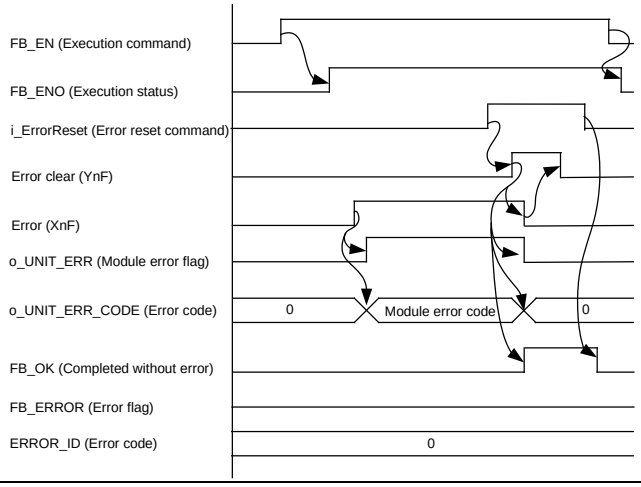
2.14. M+L60ADL8_ErrorOperation (Error operation)

FB Name

M+L60ADL8_ErrorOperation

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Monitors error codes and resets errors.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">288 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the current error code in the target intelligent function module is output. 2) After FB_EN (Execution command) is turned ON, the error is reset when i_Error_Reset (Error reset command) is turned ON during error occurrence.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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) 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. 7) To operate the L60ADIL8 and L60ADVL8, set the required settings 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] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)
Error reset command	i_ErrorReset	Bit	ON, OFF	Turn ON for the error reset. Turn OFF after the error reset.

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

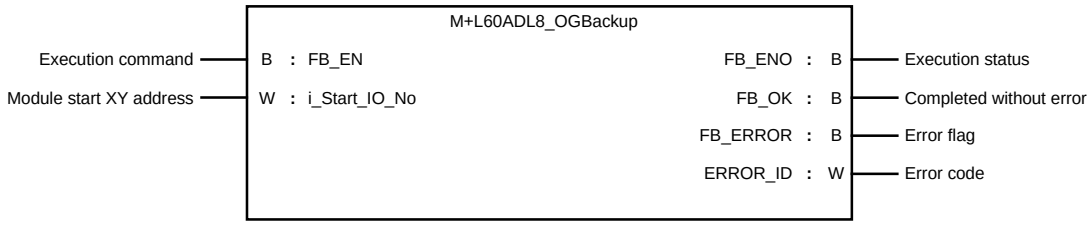
This chapter includes information related to the function block.
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.
Please make sure to read user's manuals for the corresponding products before using the products.

2.15. M+L60ADL8_OGBackup (Offset/gain value save)

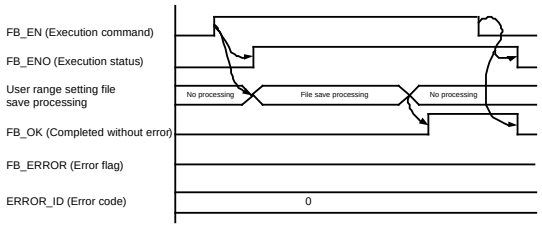
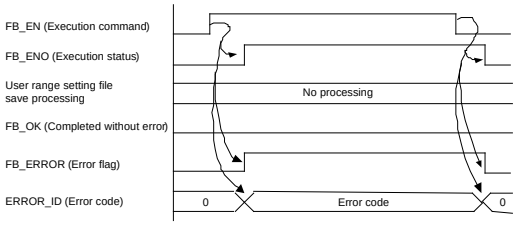
FB Name

M+L60ADL8_OGBackup

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads the offset/gain setting values of the user range and save them to a file.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table>*Only the model that has the SD memory card slot is applicable.</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">552 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the offset/gain value of the user range 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 "LADL" + "Module start XY address" + ".BIN". [File name example] When the module start XY address is H0120, the file name is "LADL0120.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 installed SD memory card 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	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop 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 with the CPU module that does not have the SD memory card slot. If used with such a CPU module, this FB cannot be executed. 7) If this FB is executed while the protect switch of the SD memory card is set to ON, the offset/gain value cannot be saved. In this case, the FB_ERROR output turns ON, the processing is interrupted, and the error code 31 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 8) When this FB is executed without the SD memory card inserted to the CPU module, the FB_ERROR output turns ON, processing is interrupted, and the error code 33 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.

Item	Description
Restrictions and precautions	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 (Error flag) turns ON, the processing is interrupted, and the error code 35 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 10) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, the SP.FWRITE instruction is not processed and the offset/gain value cannot be read. In this case, the FB_ERROR output turns ON, the processing is interrupted, and the error code 36 (Decimal) is stored in ERROR_ID (Error code). 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 the 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 L60ADIL8 or L60ADVL8, 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]  [When an error occurs] 
Relevant manuals	• MELSEC-L Analog-Digital Converter Module User's Manual • MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) • MELSEC-L CPU Module User's Manual (Data Logging Function) • GX Works2 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 card because SM601 (Memory card protect flag) is ON (Write prohibited).	Execute the FB again after turning OFF the protect switch of the SD memory card and confirming that SM601 is OFF (Write permitted).
33 (Decimal)	This FB is executed with no SD memory card on the CPU module.	Execute this FB again after mounting the SD memory card to which the target file is saved on the CPU module.
35 (Decimal)	The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF.	Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward.
36 (Decimal)	SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable.	Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF.
40 (Decimal)	The offset/gain value file saving processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB.	Reduce the frequency of the access processing to the SD memory card.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)

●Output labels

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

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

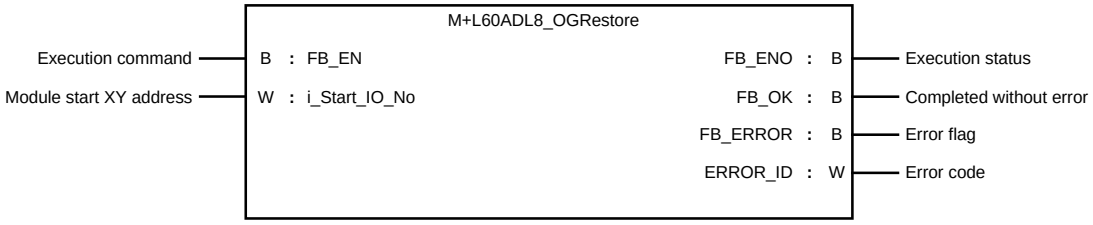
Please make sure to read user's manuals for the corresponding products before using the products.

2.16. M+L60ADL8_OGRestore (Offset/gain value restore)

FB Name

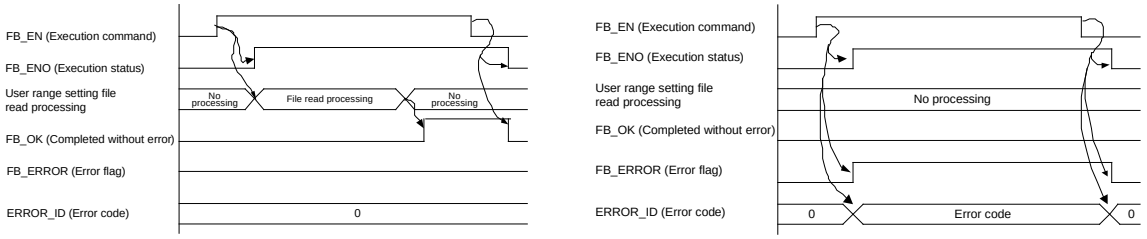
M+L60ADL8_OGRestore

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Restores the offset/gain setting values of the user range setting that are saved in a file to the module.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td>MELSEC-L Series</td><td>LCPU</td></tr>
</table>
*Only the model that has the SD memory card slot is applicable.
</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B or later</td></tr>
</table>
*1 For software versions applicable to the modules used, refer to "Relevant manuals".
</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">572 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the offset/gain value of the user range 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 is set to "disabled" for all channels. 4) Execute this FB after executing M+L60ADL8_OGBackup. When reading a file created other than by M+L60ADL8_OGBackup, a module error (Error code: 163) occurs. 5) The name of the file which this FB reads from the memory card is "LADL" + "Module start XY address" + ".BIN". [File name example] When the module start XY address is H0120, the file name to be read is "LADL0120.BIN". 6) When no target file containing the user range setting exists 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	Macro type

Item	Description
Restrictions and precautions	1) Set the A/D conversion to "disabled" for all channels before 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+L60ADL8_OGBackup. 7) Every input must be provided with a value for proper FB operation. 8) Do not use this FB with the CPU module that does not have the SD memory card slot. If used with such a CPU module, this FB cannot be executed. 9) When this FB is executed without the SD memory card inserted to the CPU module, the FB_ERROR output turns ON, processing is interrupted, and the error code 33 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 10) 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 (Error flag) turns ON, the processing is interrupted, and the error code 35 (Decimal) is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 11) When this FB is executed with SM606 (SD memory card forced disable instruction) ON, the SP.FREAD instruction is not processed and the offset/gain value cannot be restored. In this case, the FB_ERROR output turns ON, the processing is interrupted, and the error code 36 (Decimal) is stored in ERROR_ID (Error code). 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 the 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 L60ADIL8 or L60ADVL8, 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).

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

Error codes

●Error code list

Error code	Description	Action
33 (Decimal)	This FB is executed with no SD memory card on the CPU module.	Execute this FB again after mounting the SD memory card that contains the target file on the CPU module.
35 (Decimal)	The SD memory card cannot be accessed because SM605 (Memory card remove/insert prohibit flag) is turned OFF.	Execute the FB again after turning ON SM605 (Memory card remove/insert prohibit flag) by sliding the SD memory card disabling switch downward.
36 (Decimal)	SM606 (SD memory card forced disable instruction) is ON, and access to the SD memory card is unavailable.	Execute the FB again after disabling the SD memory card forced disable instruction by turning OFF SM606 and confirming that SM607 (SD memory card use force stop condition flag) is OFF.
40 (Decimal)	The offset/gain value reading processing timeout occurred because accesses to the SD memory card were frequently made in addition to this FB.	Reduce the frequency of the access processing to the SD memory card.
90 (Decimal)	A channel whose A/D conversion is set to "enabled" exists.	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range of the CPU. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the L60ADIL8 or L60ADVL8 is connected. (For example, enter H10 for X10.)

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the restoration 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	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

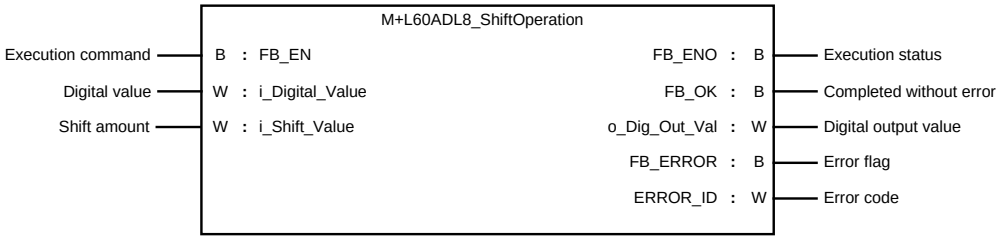
Please make sure to read user's manuals for the corresponding products before using the products.

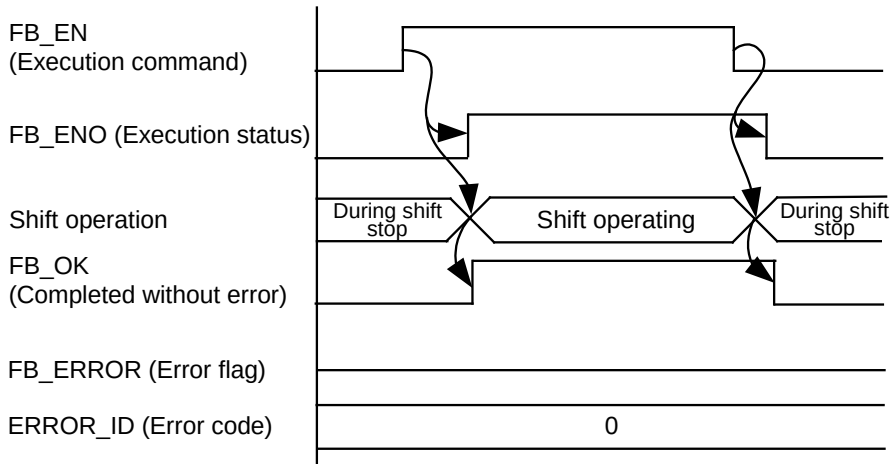
2.17. M+L60ADL8_ShiftOperation (Shift operation)

FB Name

M+L60ADL8_ShiftOperation

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Adds the shift amount to the digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">166 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the shift amount is added to a digital value*1. *1 Input the A/D conversion data read from the L60ADIL8 or L60ADVL8 with M+L60ADL8_ReadADVal or others as the digital value. 2) If the value after the addition is out of the range from -32,768 to 32,767, the value is fixed to -32,768 or 32,767.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 L60ADIL8 or L60ADVL8, 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). 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is enabled. 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] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

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

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the shift operation is being executed.
Digital output value	o_Dig_Out_Val	Word	0	The digital value after the 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	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

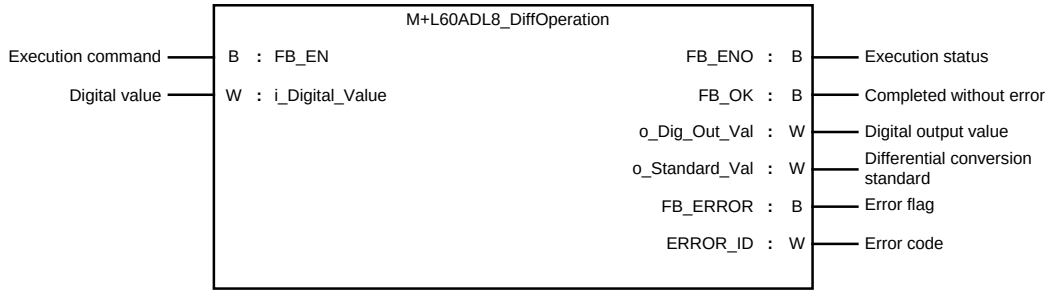
Please make sure to read user's manuals for the corresponding products before using the products.

2.18. M+L60ADL8_DiffOperation (Differential conversion process)

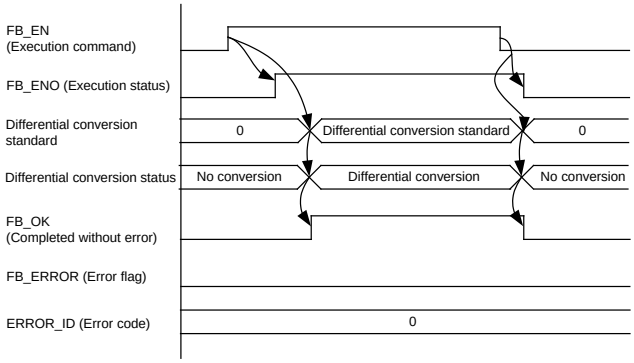
FB Name

M+L60ADL8_DiffOperation

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Outputs the difference obtained by subtracting the standard value from the digital value.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">182 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the differential conversion process is executed. 2) The remaining value after subtraction of o_Standard_Val (Differential conversion standard) from i_Digital_Value (Digital value) is output while FB_EN (Execution command) is ON. o_Standard_Val (Differential conversion standard) is i_Digital_Value (Digital value)*1 of when FB_EN (Execution command) is turned ON. *1 Input the A/D conversion data read from the L60ADIL8 or L60ADVL8 with M+L60ADL8_ReadADVal or others as the digital value.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 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 L60ADIL8 or L60ADVL8, 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). 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) and o_Standard_Val (Differential conversion standard) are enabled. 7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) and o_Standard_Val (Differential conversion standard) are cleared to 0.
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] 
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Digital value	i_Digital_Value	Word	-32,768 to 32,767	Specify a digital value for which the differential conversion is to be executed.

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the differential conversion is being executed.
Digital output value	o_Dig_Out_Val	Word	0	The digital value for which the differential conversion has been executed is stored.
Differential conversion standard	o_Standard_Val	Word	0	The differential conversion standard (a digital value when FB_EN is turned ON) is stored.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2014/7/31	First edition

Note

This chapter includes information related to the function block.

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

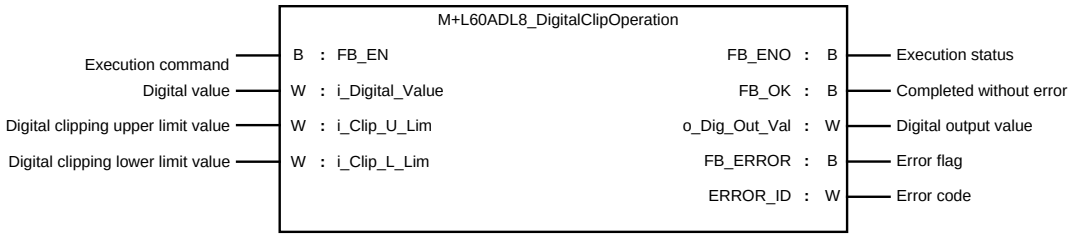
Please make sure to read user's manuals for the corresponding products before using the products.

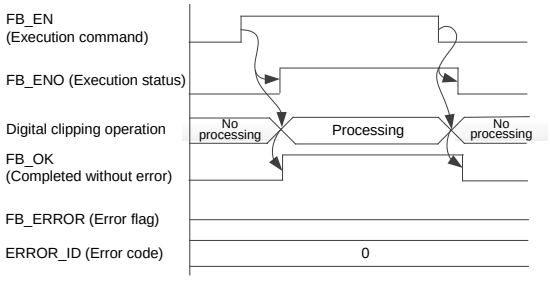
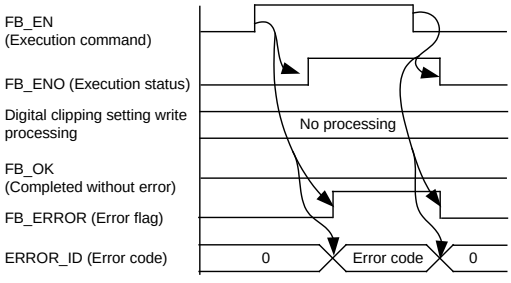
2.19. M+L60ADL8_DigitalClipOperation (Digital clipping operation)

FB Name

M+L60ADL8_DigitalClipOperation

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Limits a digital value at the digital clipping upper and lower limit values.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>L60ADIL8, L60ADVL8</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L Series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1<table><tr><th>Language</th><th>Software version</th></tr><tr><td>Japanese version</td><td>Version1.86Q or later</td></tr><tr><td>English version</td><td>Version1.24A or later</td></tr><tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr><tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr><tr><td>Korean version</td><td>Version1.49B or later</td></tr></table>*1 For software versions applicable to the modules used, refer to "Relevant manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">178 steps (for MELSEC-L series CPU)
*The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
</table>

Item	Description
Function description	1) By turning ON FB_EN (Execution command), the digital clipping operation is started. 2) If i_Digital_Value (Digital value)*1 exceeds i_Clip_U_Lim (Digital clipping upper limit value) or falls below i_Clip_L_Lim (Digital clipping lower limit value) while FB_EN (Execution command) is ON, i_Digital_Value (Digital value) is limited at the upper or lower limit value. *1 Input the A/D conversion data read from the L60ADIL8 or L60ADVL8 with M+L60ADL8_ReadADVal or others as the digital value. 3) If i_Clip_U_Lim (Digital clipping upper limit value) is equal to or less than i_Clip_L_Lim (Digital clipping lower limit value), the FB_ERROR output turns ON, the processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop because it is impossible to turn OFF. 4) Every input must be provided with a value for proper FB operation. 5) To operate the L60ADIL8 or L60ADVL8, 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). 6) When FB_OK (Completed without error) is ON, o_Dig_Out_Val (Digital output value) is enabled. 7) By turning OFF FB_EN, o_Dig_Out_Val (Digital output value) is cleared to 0.
FB operation type	Real-time execution
Application example	Refer to "Appendix 1. FB Library Application Examples".
Timing chart	[When operation completes without error]  [When an error occurs] 

Item	Description
Relevant manuals	• MELSEC-L Analog-Digital 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 codes

●Error code list

Error code	Description	Action
11 (Decimal)	i_Clip_U_Lim (Digital clipping upper limit value) is equal to or less than i_Clip_L_Lim (Digital clipping lower limit value).	Please try again after confirming the setting.

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Digital value	i_Digital_Value	Word	-32,768 to 32,767	Specify a digital value for which the digital clipping operation is to be executed.
Digital clipping upper limit value	i_Clip_U_Lim	Word	-32,768 to 32,767	Specify the digital clipping upper limit value.
Digital clipping lower limit value	i_Clip_L_Lim	Word	-32,768 to 32,767	Specify the digital clipping lower limit value.

●Output labels

Name (comment)	Label name	Data type	Initial value	Description
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	Bit	OFF	When ON, it indicates that the digital clipping operation is being executed.
Digital output value	o_Dig_Out_Val	Word	0	The digital value for which the digital clipping operation 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	2014/7/31	First edition

Note

This chapter includes information related to the function block.

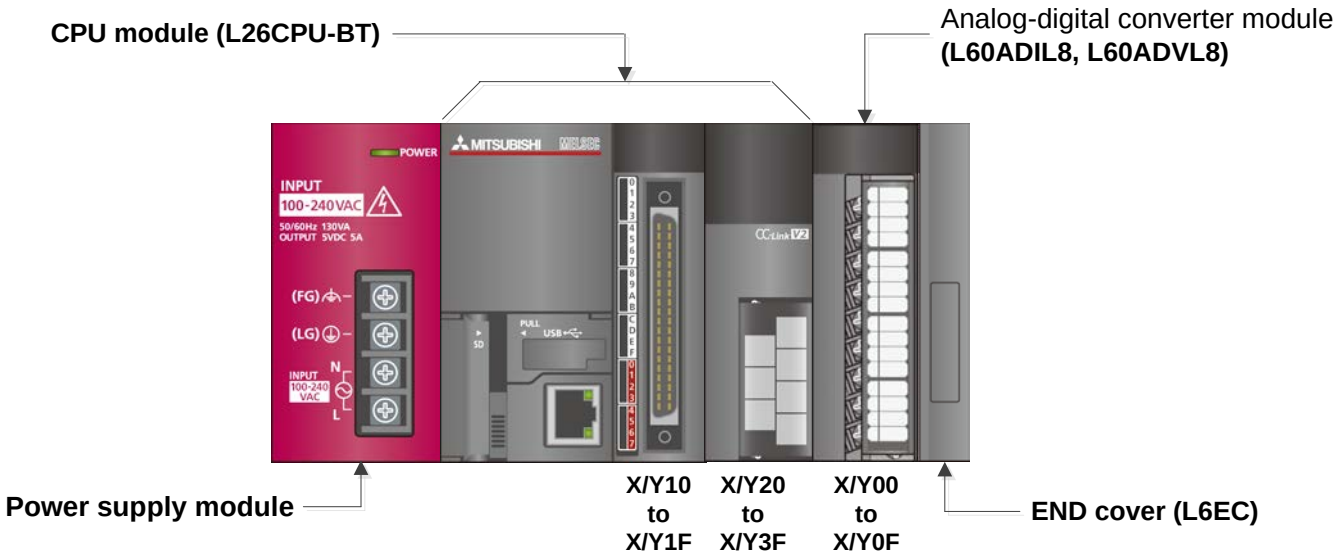
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

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

Appendix 1. FB Library Application Examples

L60ADL8 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 starting XY address where the L60ADIL8 or L60ADVL8 is connected.

List of devices

a) External input (command)

Device	FB name	Application (ON details)
M0	M+L60ADL8_ReadADVal	A/D value reading request
M10	M+L60ADL8_ReadAllADVal	AD value reading all CHs request
M20	M+L60ADL8_ReadScalingVal	Scaling value reading request
M30	M+L60ADL8_ReadAllScalingVal	All scaling value reading req.
M40	M+L60ADL8_SetADConversion	A/D enable/disable request
M41		A/D conv enable: ON/disable: OFF
M50	M+L60ADL8_SetAverage	Averaging specification request
M60	M+L60ADL8_SetScaling	Scaling setting request
M61		Scaling enable:ON/disable:OFF
M70	M+L60ADL8_SetProcessAlarm	Process alarm setting request
M71		Process alarm enable/disable
M80	M+L60ADL8_SetInputSignalErr	Input signal error setting req.
M81		Input signal error enable/disabl
M84	M+L60ADL8_SetInputSignalErrExp	Input signal err ext setting req
M90	M+L60ADL8_RequestSetting	Operating condition setting req.
M100	M+L60ADL8_SetOffsetVal	Offset setting request
M101		Offset value writing request
M110	M+L60ADL8_SetGainVal	Gain setting request
M111		Gain value writing request
M120	M+L60ADL8_ErrorOperation	Error operation request
M121		Error reset request
M130	M+L60ADL8_OGBackup	Offset/gain save to file request
M140	M+L60ADL8_OGRestore	Offset/gain restore request
M150	M+L60ADL8_ShiftOperation	Shift operation request
D150		Digital value
M160	M+L60ADL8_DiffOperation	Diff conversion proc start req
D160		Digital value
M170	M+L60ADL8_DigitalClipOperation	Digital clipping request
D170		Digital value

b) External output (check)

Device	FB name	Application (ON details)
M1	M+L60ADL8_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+L60ADL8_ReadAllADVal	A/D value all reading FB ready
M12		A/D value reading complete all
D10		CH1 A/D conversion data
D11		CH2 A/D conversion data
D12		CH3 A/D conversion data
D13		CH4 A/D conversion data
D14		CH5 A/D conversion data
D15		CH6 A/D conversion data
D16		CH7 A/D conversion data
D17		CH8 A/D conversion data
M21	M+L60ADL8_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+L60ADL8_ReadAllScalingVal	Scaling value all read FB ready
M32		Scaling value all read complete
D30		CH1 Scaling value
D31		CH2 Scaling value
D32		CH3 Scaling value
D33		CH4 Scaling value
D34		CH5 Scaling value
D35		CH6 Scaling value
D36		CH7 Scaling value
D37		CH8 Scaling value
M42	M+L60ADL8_SetADConversion	A/D enable/disable FB ready
M43		A/D enable/disable set complete
F10		A/D enable/disable FB error
D40		A/D enable/disable FB error code
M51	M+L60ADL8_SetAverage	Averaging proc setting FB ready

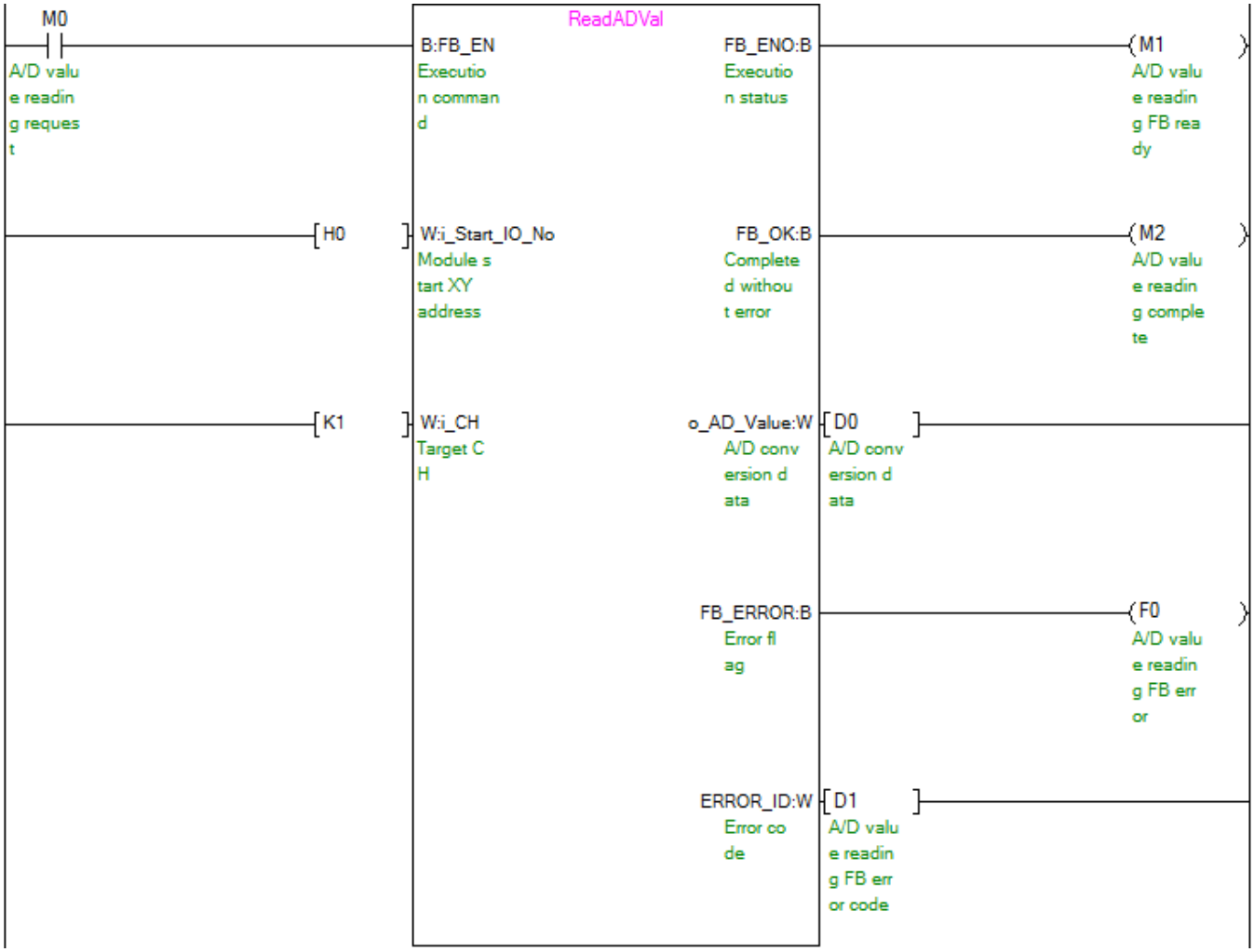
Device	FB name	Application (ON details)
M52		Averaging proc setting complete
F15		Averaging proc setting FB error
D50		Averaging proc set FB error code
M62	M+L60ADL8_SetScaling	Scaling setting FB ready
M63		Scaling setting complete
F20		Scaling setting FB error
D60		Scaling setting FB error code
M72	M+L60ADL8_SetProcessAlarm	Process alarm setting FB ready
M73		Process alarm setting complete
F25		Process alarm setting FB error
D70		Process alarm set FB error code
M82	M+L60ADL8_SetInputSignalErr	Input signal error set FB ready
M83		Input signal error setting comp.
F30		Input signal err setting FB err
D80		Input signal err set FB err code
M85	M+L60ADL8_SetInputSignalErrExp	Input signal err ext set FB rdy
M86		Input signal error ext set comp
F75		Input signal ext set FB error
D81		Input signal ext set FB err code
M91	M+L60ADL8_RequestSetting	Operate condition set req FB rdy
M92		Operating condition set req comp
M102	M+L60ADL8_SetOffsetVal	Offset setting FB ready
M103		Offset setting complete
F35		Offset setting FB error
D100		Offset setting FB error code
M112	M+L60ADL8_SetGainVal	Gain setting FB ready
M113		Gain setting complete
F40		Gain setting FB error
D110		Gain setting FB error code
M122	M+L60ADL8_ErrorOperation	Error operation FB ready
M123		Error operation complete
F45		Module error flag
D120		Module error code
M131	M+L60ADL8_OGBackup	Offset/gain save to file FB rdy.
M132		Offset/gain save to file comp.
F50		Offset/gain save file FB error

Device	FB name	Application (ON details)
D130		Offset/gain save file FB err cod
M141	M+L60ADL8_OGRestore	Offset/gain restore FB ready
M142		Offset/gain restore complete
F55		Offset/gain restore FB error
D140		Offset/gain restore FB err code
M151	M+L60ADL8_ShiftOperation	Shift operation FB ready
M152		Shift operation complete
D151		Shift conversion value
M161	M+L60ADL8_DiffOperation	Diff conversion proc FB ready
M162		Diff conversion process complete
D161		Differential conversion value
D162		Differential conversion standard
M171	M+L60ADL8_DigitalClipOperation	Digital clipping operate FB rdy.
M172		Digital clipping operation comp.
F60		Digital clipping operate FB err.
D171		Digital output value
D172		Digital clip operate FB err code

M+L60ADL8_ReadADVal (Read A/D conversion data)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K1	Set the target channel to channel 1.

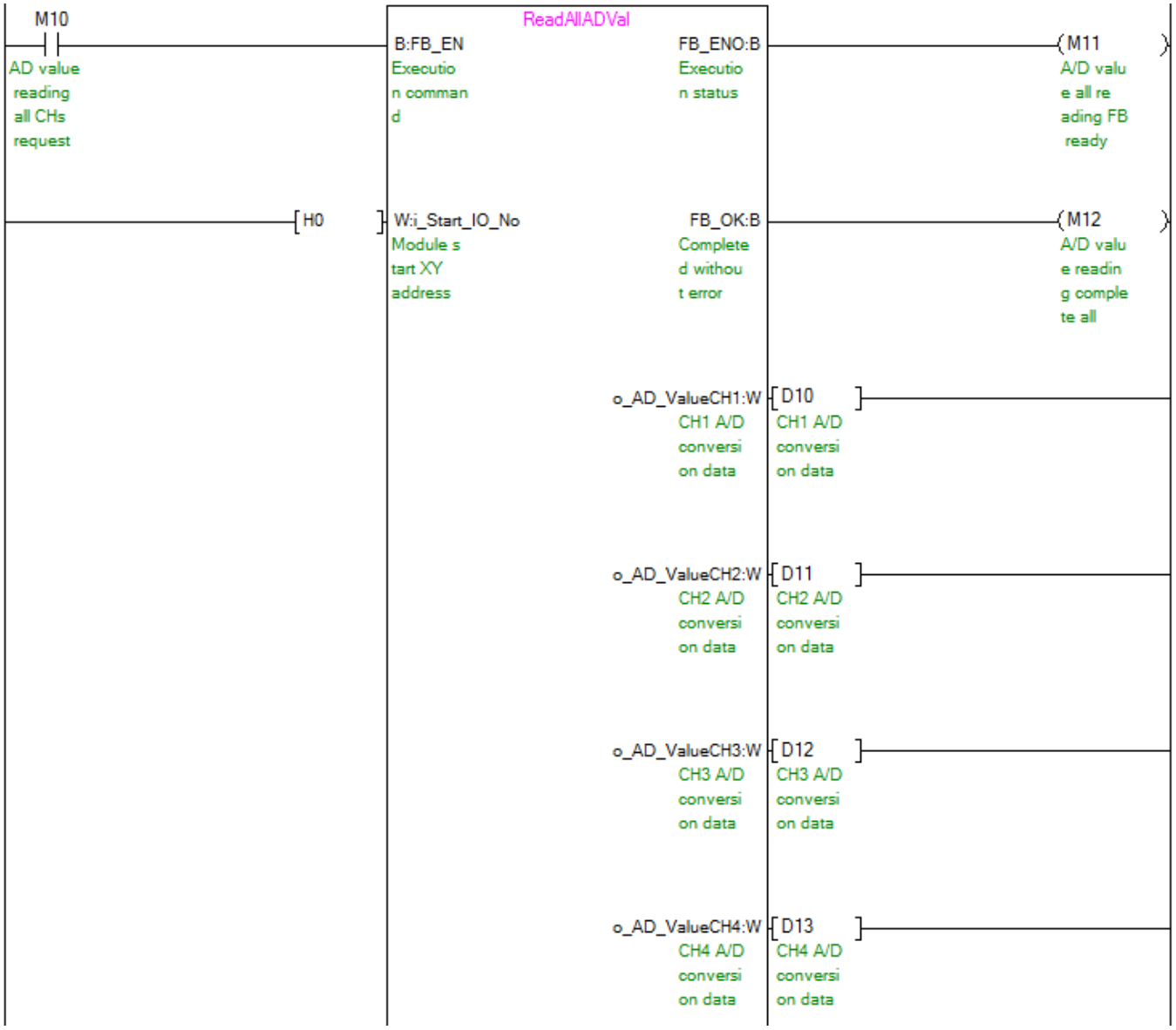
By turning ON M0, the A/D conversion data of channel 1 is read.

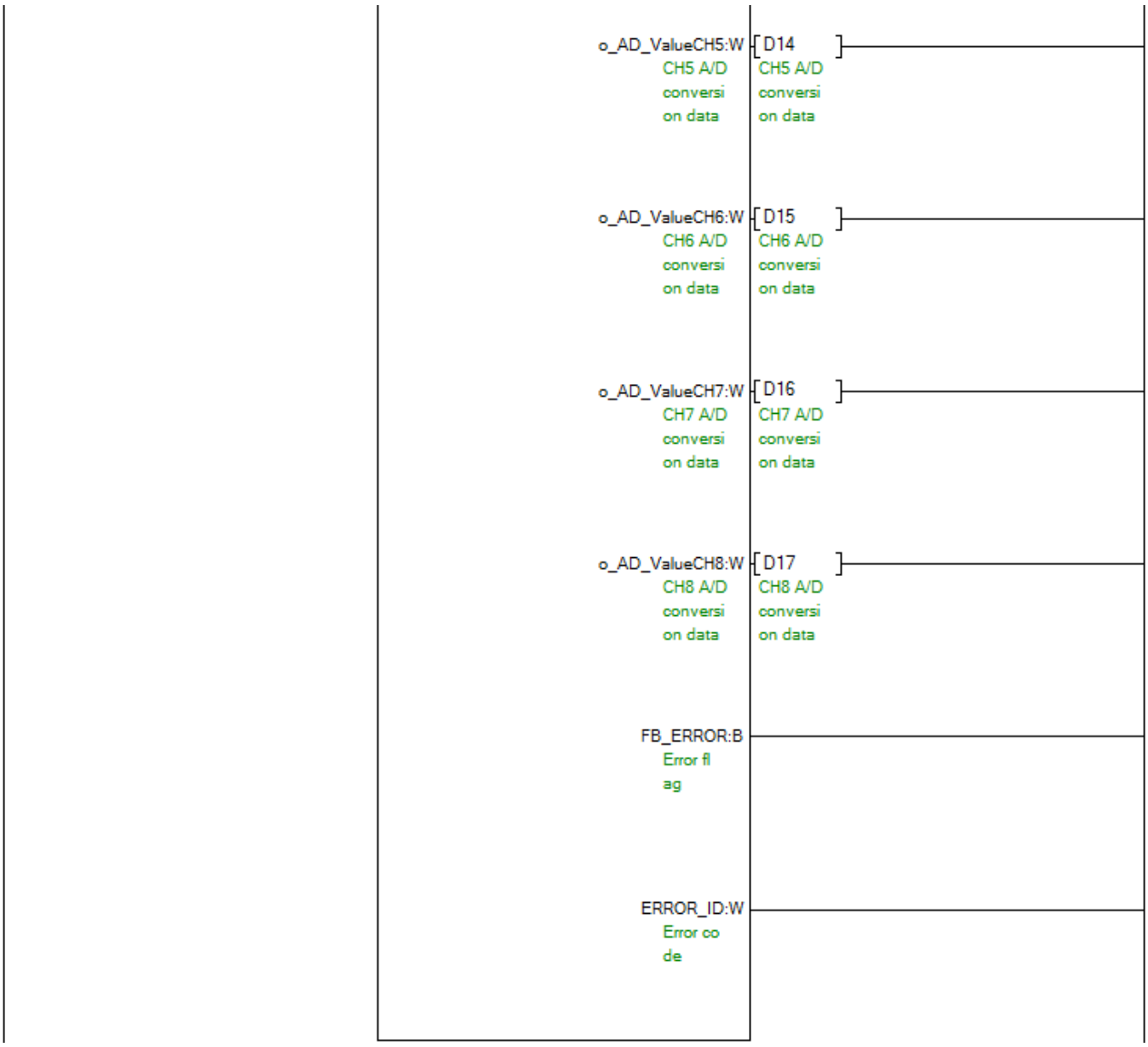


M+L60ADL8_ReadAllADVal (Read all A/D conversion data)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.

By turning ON M10, the A/D conversion data of all channels are read.

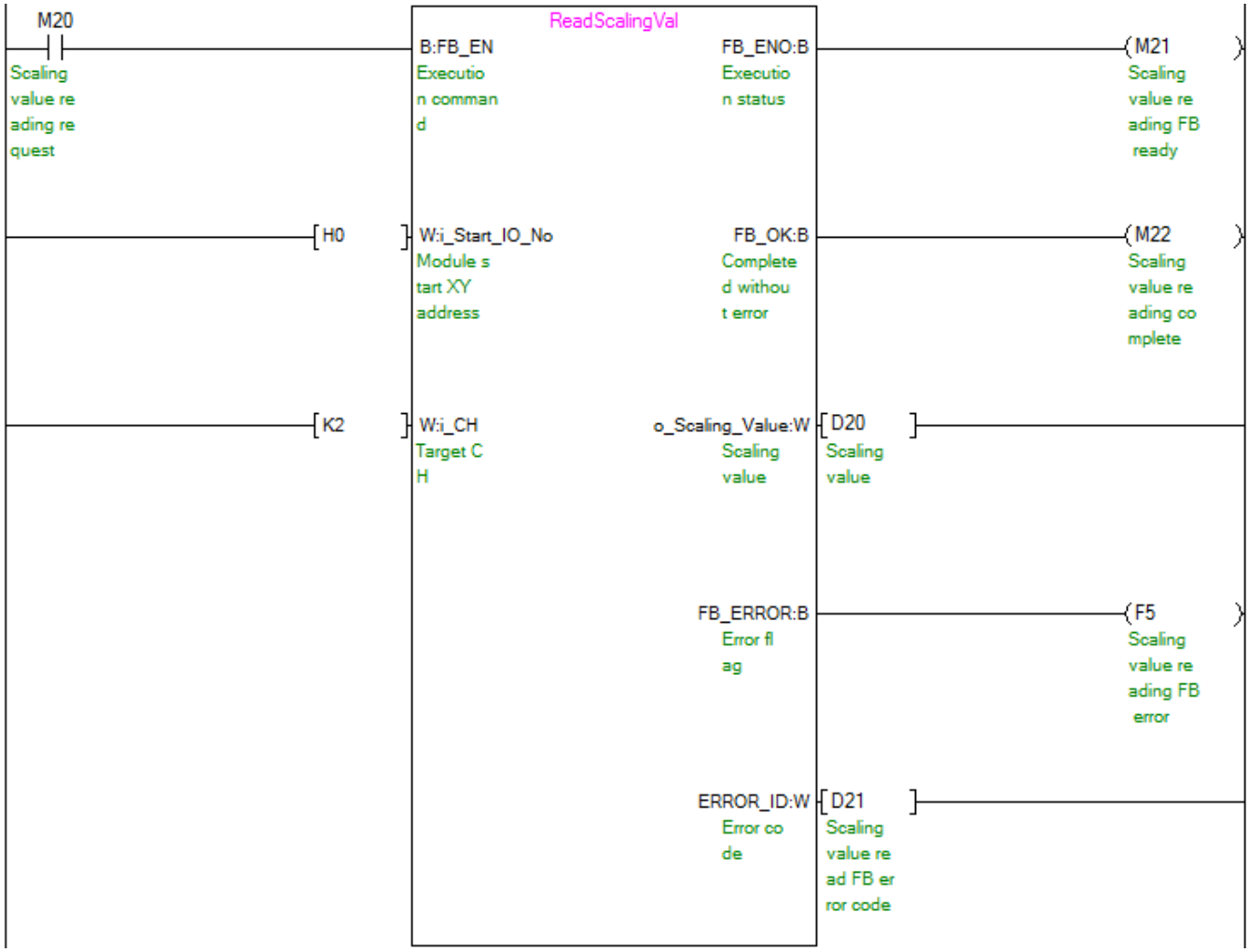



o_AD_ValueCH5:W
CH5 A/D conversion data
D14
CH5 A/D conversion data
o_AD_ValueCH6:W
CH6 A/D conversion data
D15
CH6 A/D conversion data
o_AD_ValueCH7:W
CH7 A/D conversion data
D16
CH7 A/D conversion data
o_AD_ValueCH8:W
CH8 A/D conversion data
D17
CH8 A/D conversion data
FB_ERROR:B
Error flag
ERROR_ID:W
Error code

M+L60ADL8_ReadScalingVal (Read scaling value)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K2	Set the target channel to channel 2.

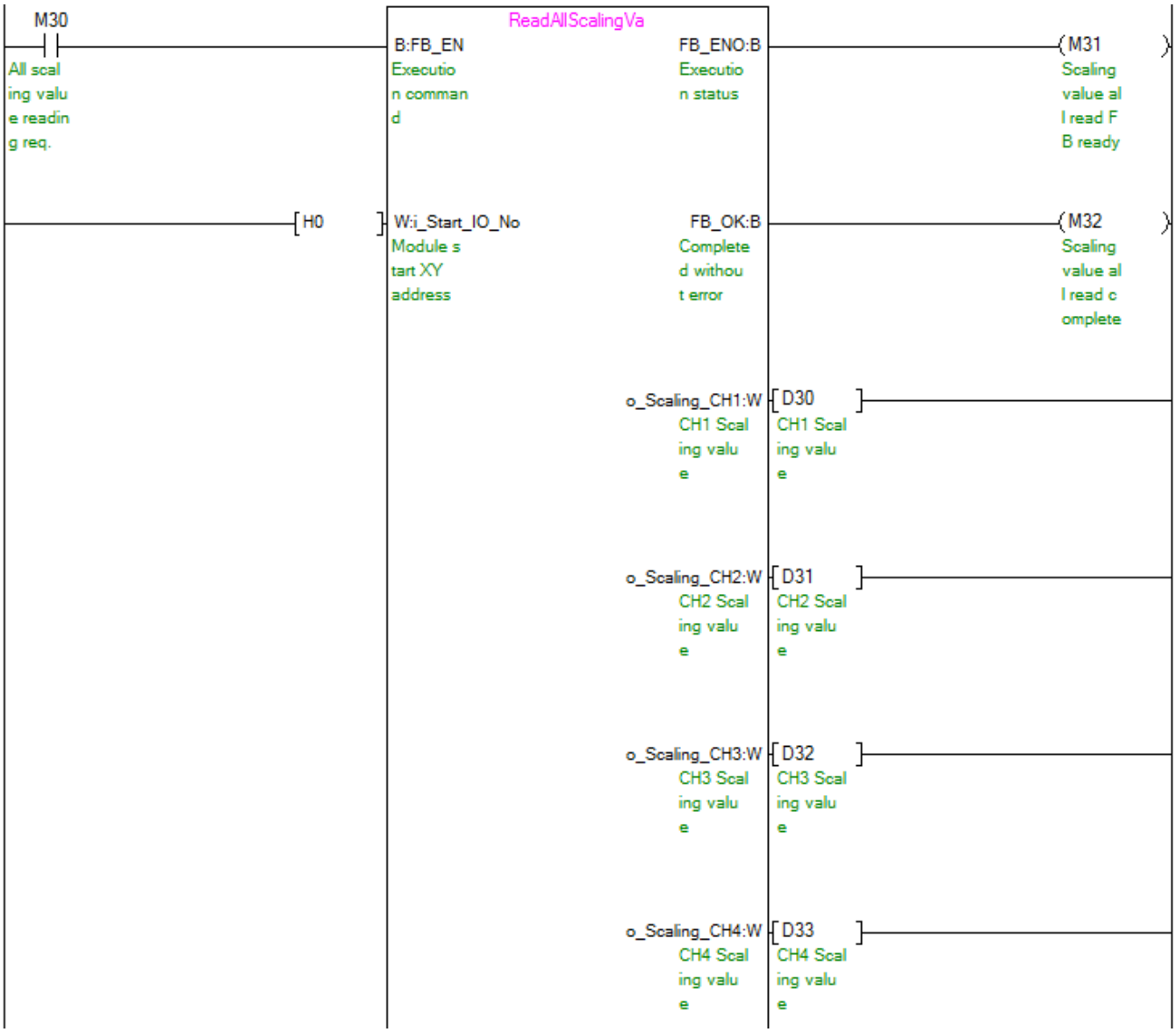
By turning ON M20, the scaling value of channel 2 is read.

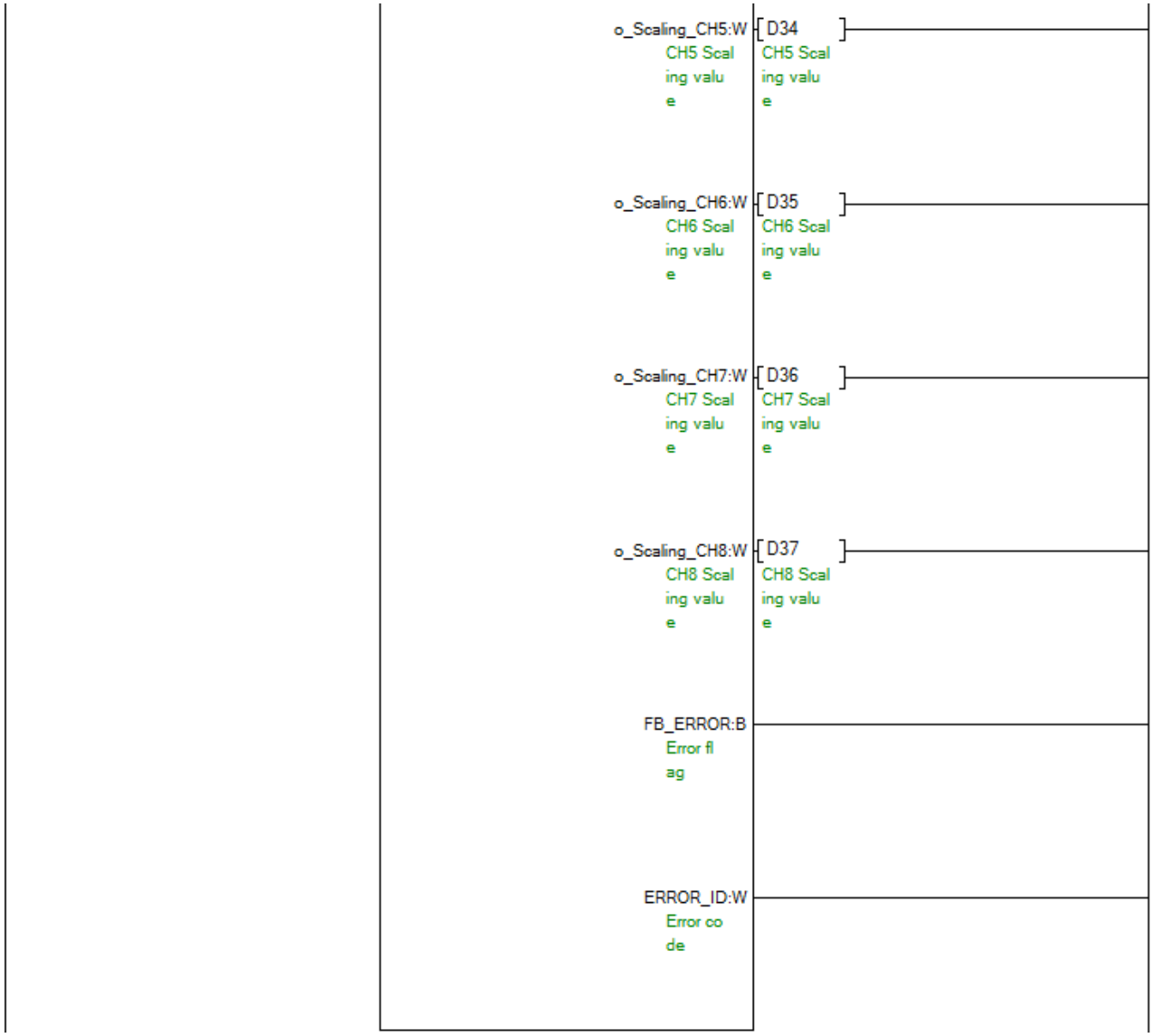


M+L60ADL8_ReadAllScalingVal (Read all scaling values)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.

By turning ON M30, the scaling values of all channels are read.

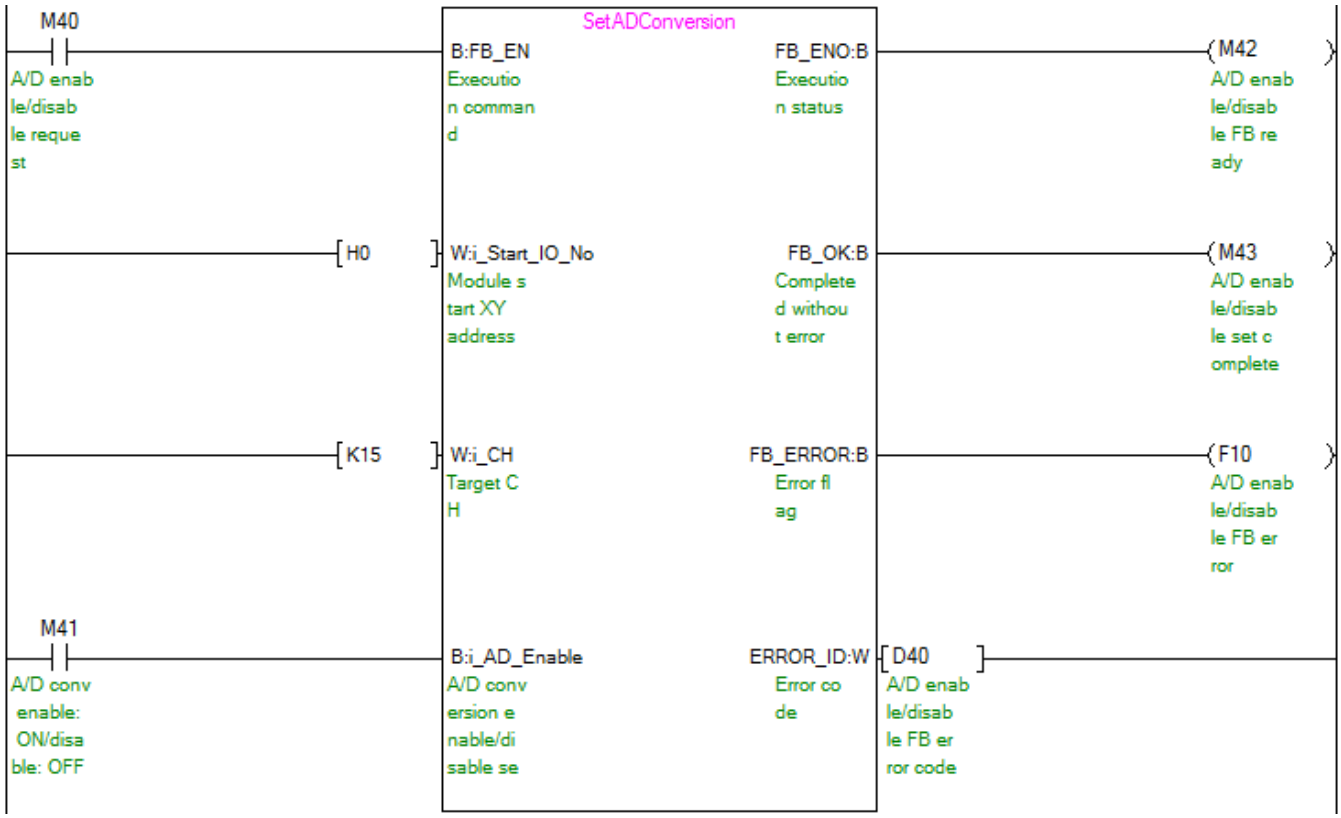



o_Scaling_CH5:W
CH5 Scaling value
D34
CH5 Scaling value
o_Scaling_CH6:W
CH6 Scaling value
D35
CH6 Scaling value
o_Scaling_CH7:W
CH7 Scaling value
D36
CH7 Scaling value
o_Scaling_CH8:W
CH8 Scaling value
D37
CH8 Scaling value
FB_ERROR:B
Error flag
ERROR_ID:W
Error code

M+L60ADL8_SetADConversion (Enable/disable A/D conversion)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K15	Set the target channel to all channels.
i_AD_Enable	ON/OFF	Turn ON to enable the A/D conversion of the target channel.

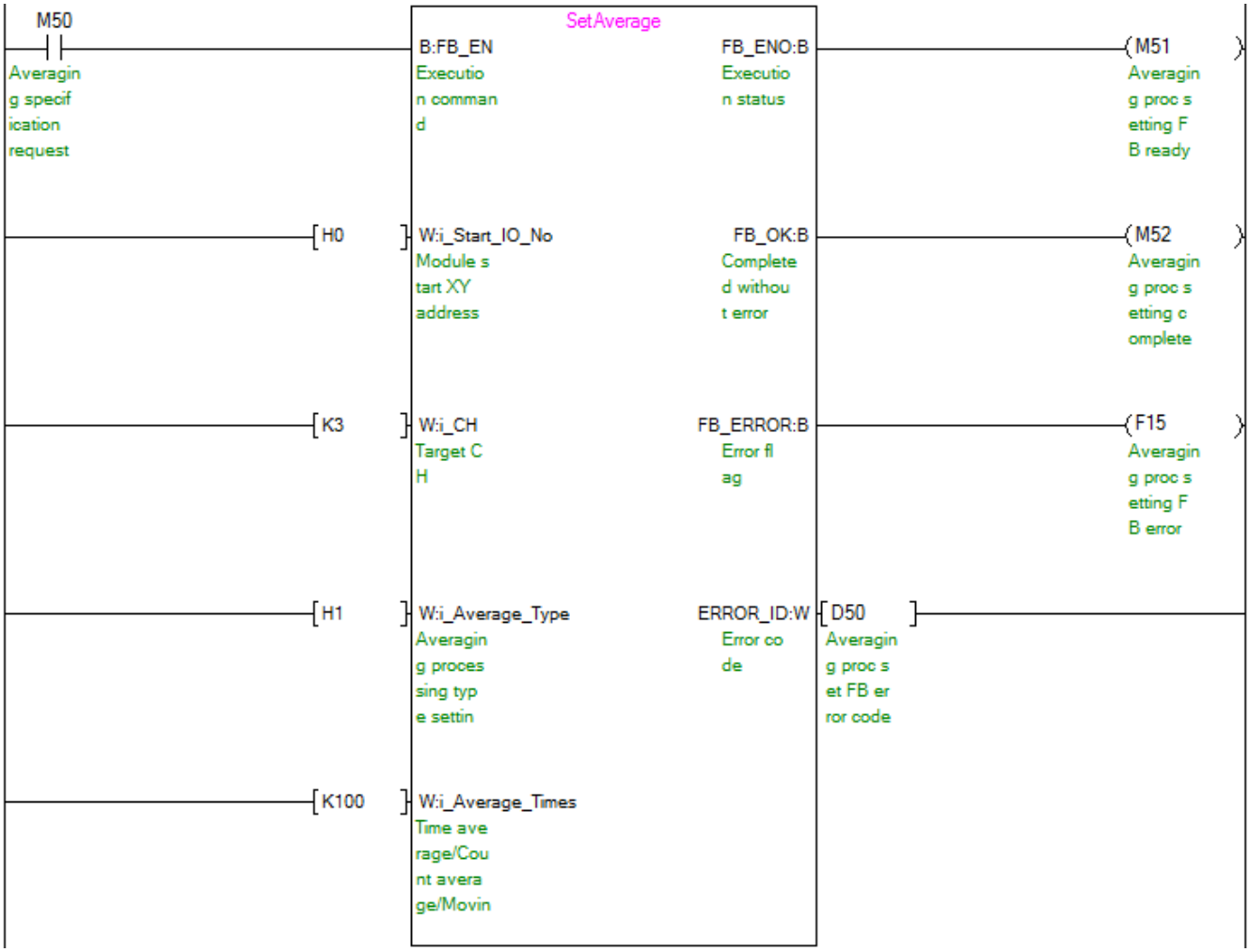
By turning ON M40, the value for the A/D conversion enable/disable setting is written to the buffer memory.



M+L60ADL8_SetAverage (Averaging process setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K3	Set the target channel to channel 3.
i_Average_Type	H1	Set the averaging processing type to "Time average".
i_Average_Times	K100	Set the average time to 100.

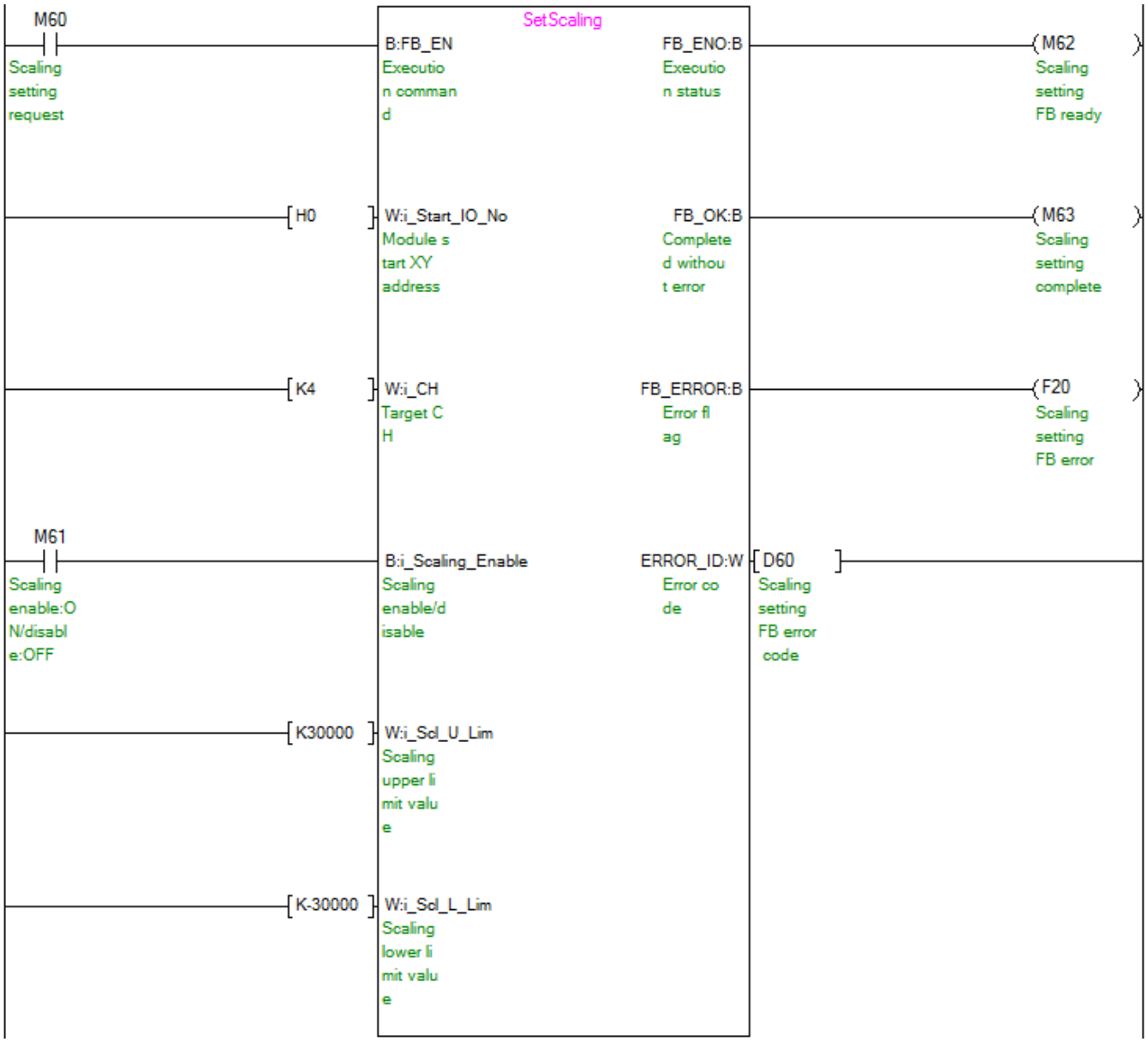
By turning ON M50, the averaging processing type setting value of channel 3 is written to the buffer memory.



M+L60ADL8_SetScaling (Scaling setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K4	Set the target channel to channel 4.
i_Scaling_Enable	ON/OFF	Turn ON to enable the scaling.
i_Scl_U_Lim	K30000	Set the scaling upper limit value to 30,000.
i_Scl_L_Lim	K-30000	Set the scaling lower limit value to -30,000.

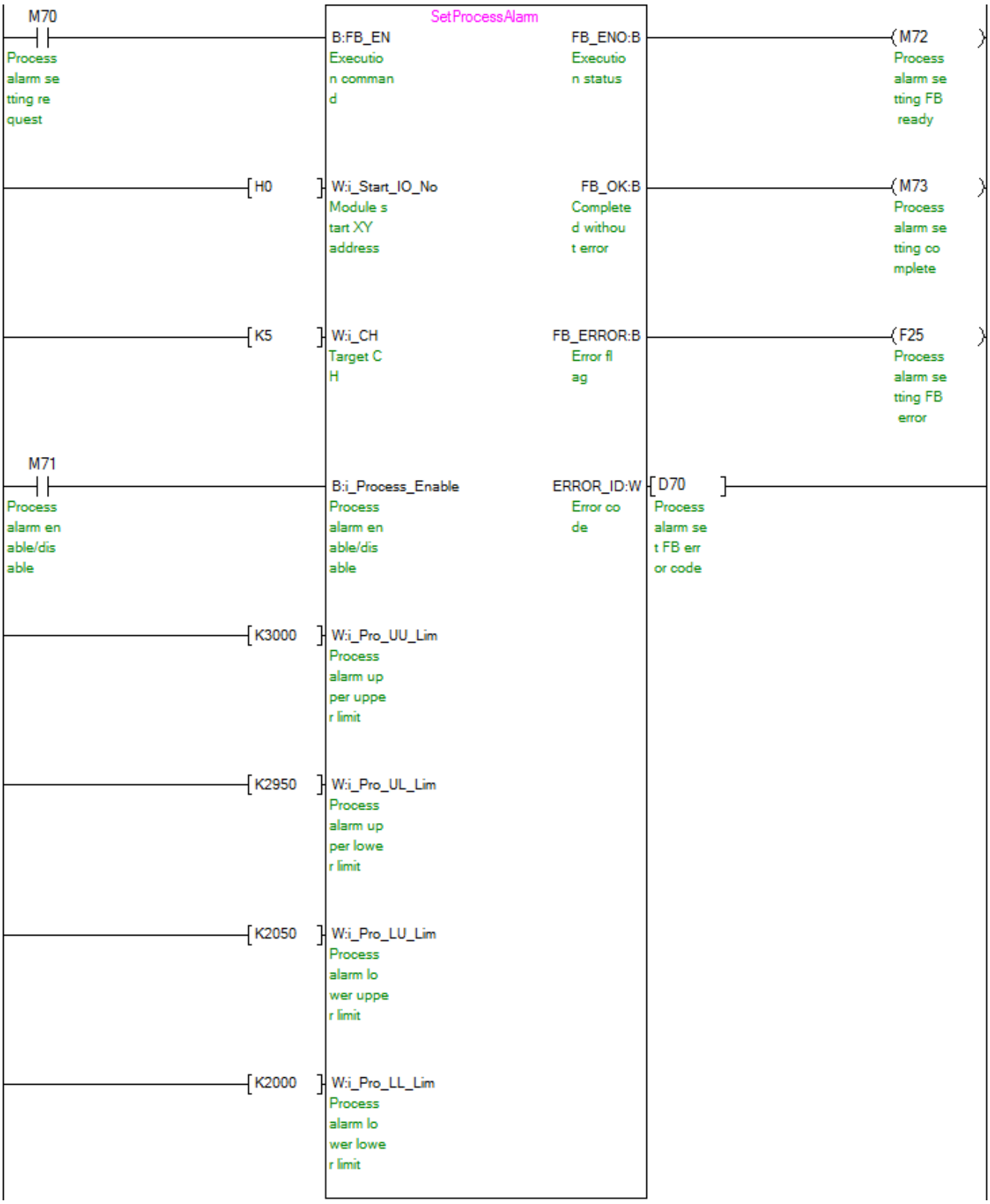
By turning ON M60, the scaling setting value of channel 4 is written to the buffer memory.



M+L60ADL8_SetProcessAlarm (Process alarm setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K5	Set the target channel to channel 5.
i_Process_Enable	ON/OFF	Turn ON to enable the process alarm.
i_Pro_UU_Lim	K3000	Set the process alarm upper upper limit value of channel 5 to 3000.
i_Pro_UL_Lim	K2950	Set the process alarm upper lower limit value of channel 5 to 2950.
i_Pro_LU_Lim	K2050	Set the process alarm lower upper limit value of channel 5 to 2050.
i_Pro_LL_Lim	K2000	Set the process alarm lower lower limit value of channel 5 to 2000.

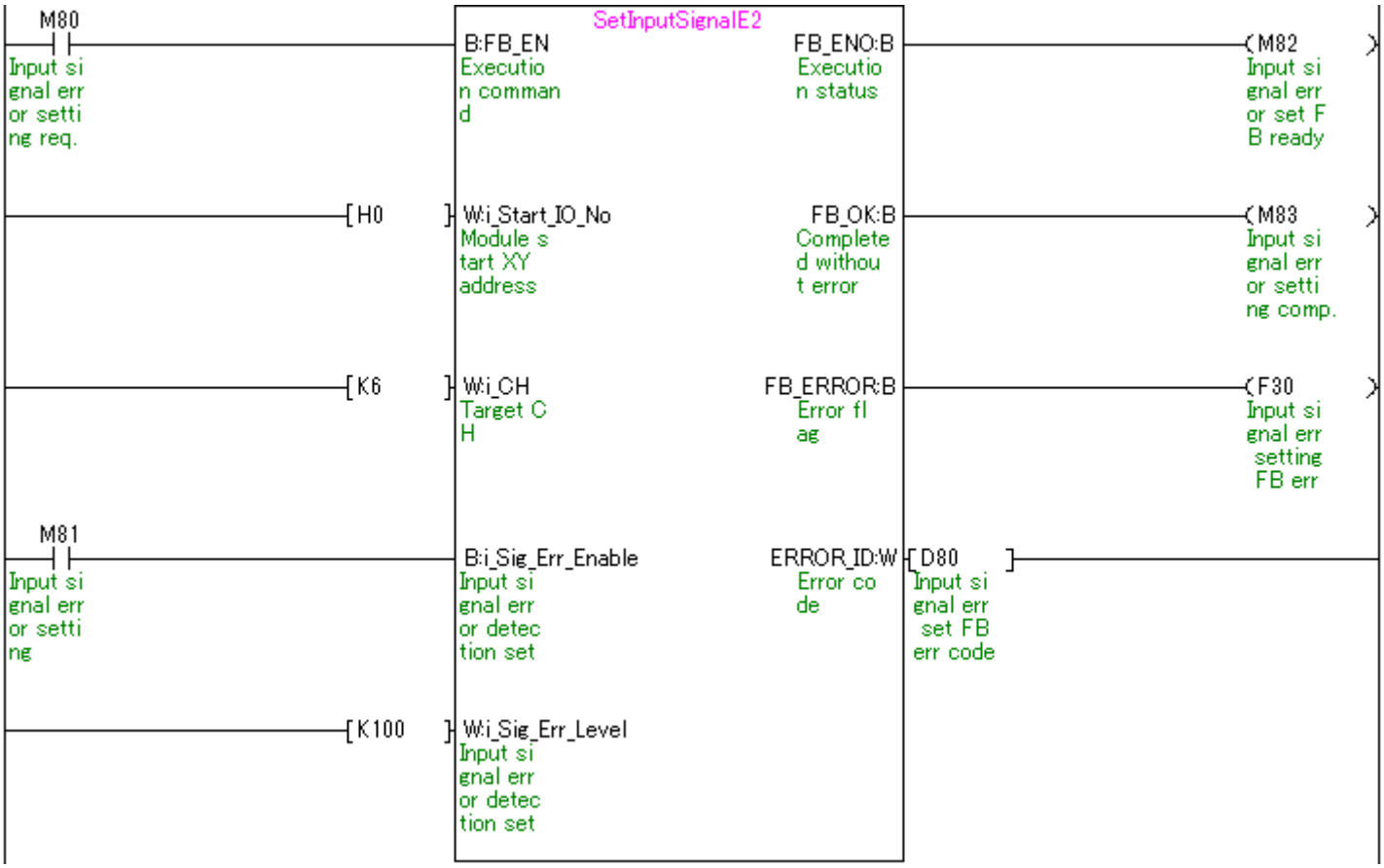
By turning ON M70, the process alarm setting value of channel 5 is written to the buffer memory.



M+L60ADL8_SetInputSignalErr (Input signal error detection setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K6	Set the target channel to channel 6.
i_Sig_Err_Enable	ON/OFF	Turn ON to enable the input signal error detection setting of channel 6.
i_Sig_Err_Level	K100	Set the input signal error detection setting value to 10.0%.

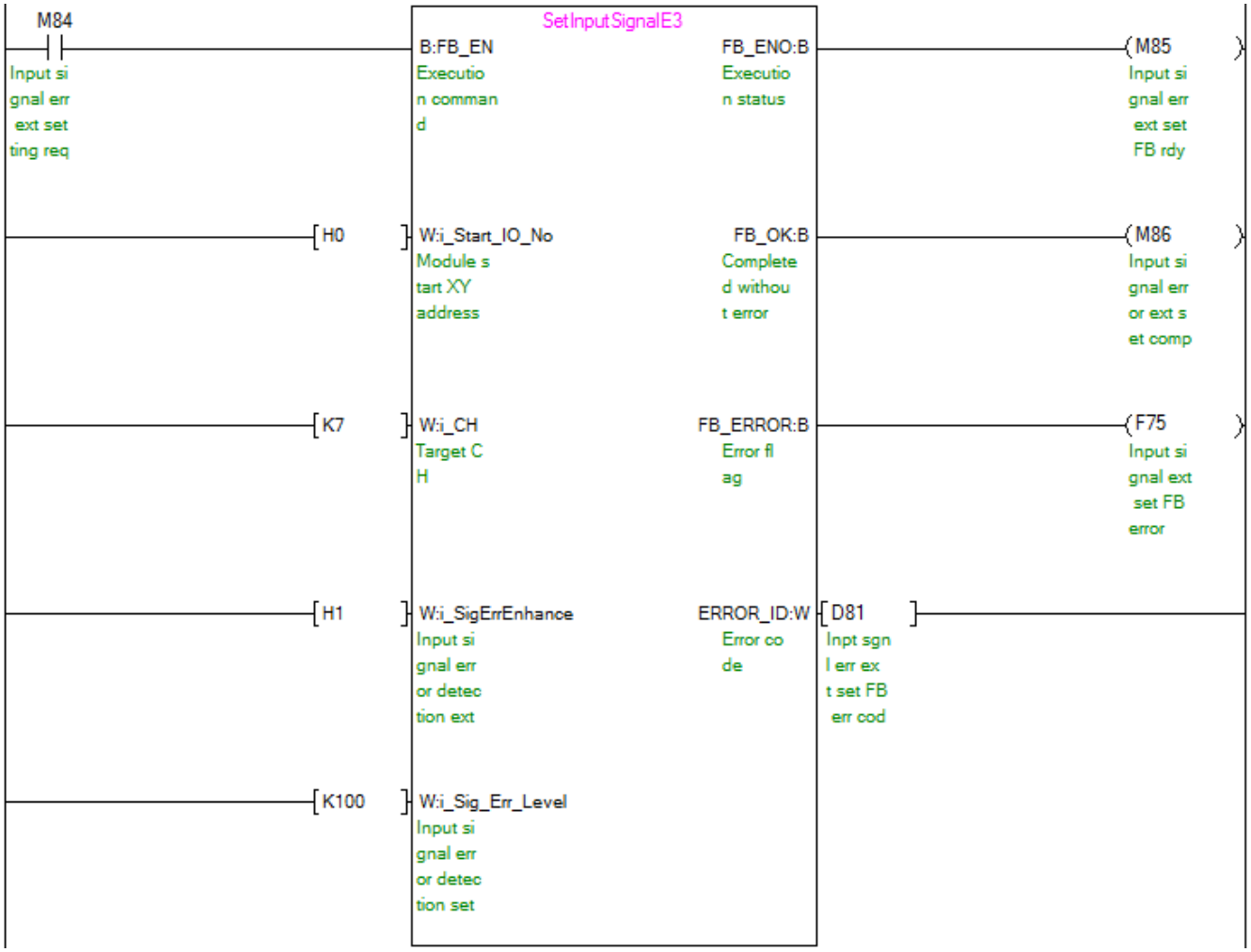
By turning ON M80, the input signal error detection setting value of channel 6 is written to the buffer memory.



M+L60ADL8_SetInputSignalErrExp (Input signal error detection extension setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K7	Set the target channel to channel 7.
i_SigErrEnhance	H1	Set the input signal error detection extension setting of channel 7 to "Upper and lower limit detection".
i_Sig_Err_Level	K100	Set the input signal error detection setting value to 10.0%.

By turning ON M84, the input signal error detection extension setting value of channel 7 is written to the buffer memory.



M+L60ADL8_RequestSetting (Operating condition setting request)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.

By turning ON M90, the following settings are enabled.

• A/D conversion enable/disable setting

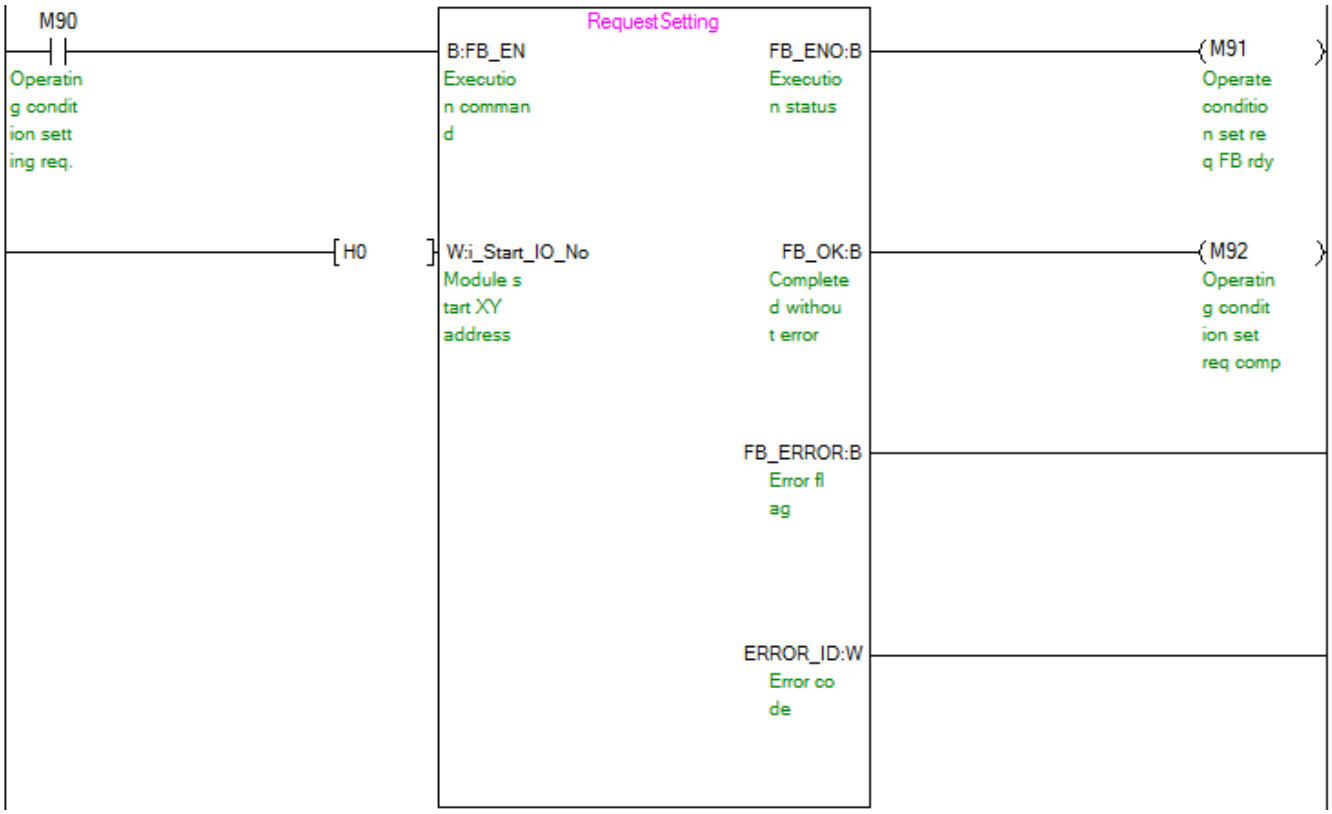
• Averaging processing setting

• Process alarm function setting

• Input signal error detection function setting

• Input signal error detection extension function setting

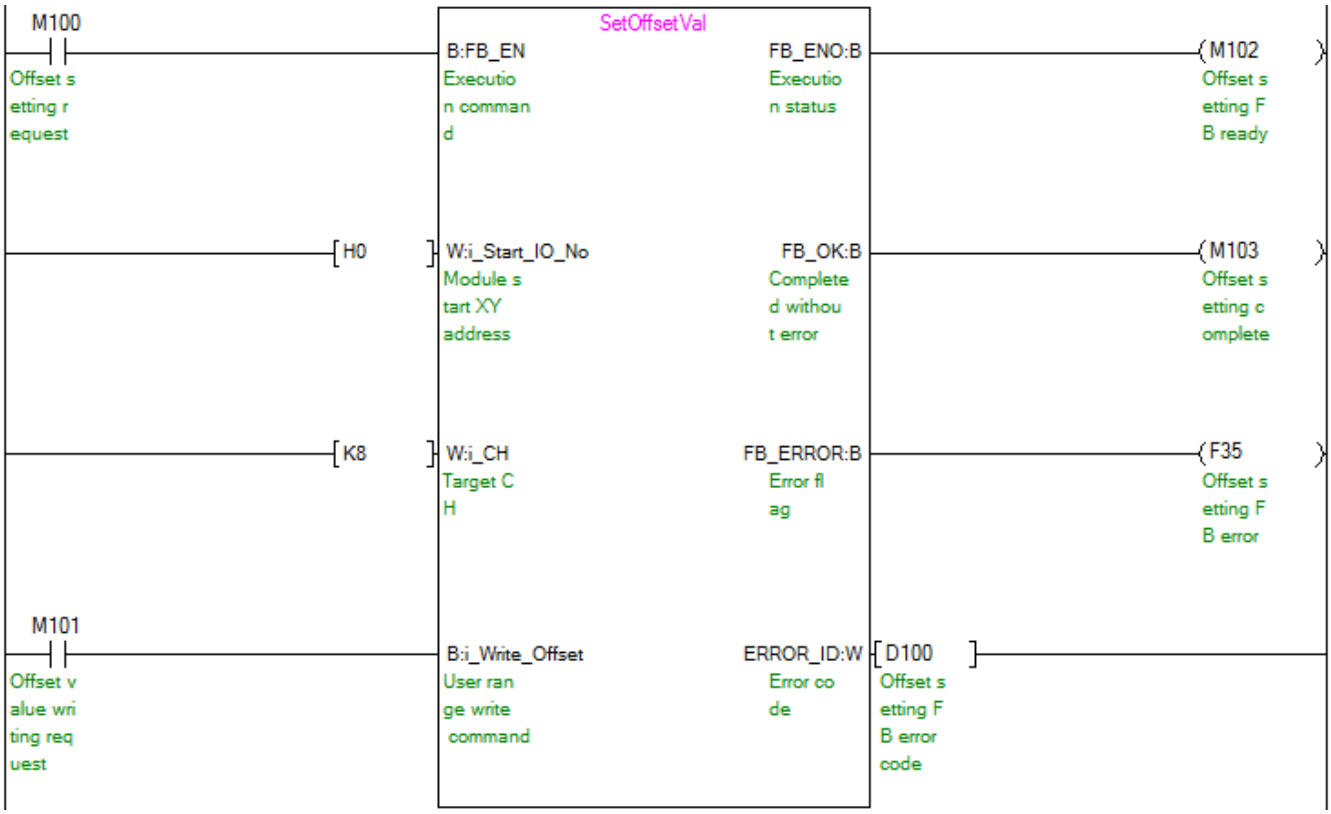
• Scaling function setting



M+L60ADL8_SetOffsetVal (Offset setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K8	Set the target channel to channel 8.
i_Write_Offset	ON/OFF	Turn ON to written the offset value of channel 8.

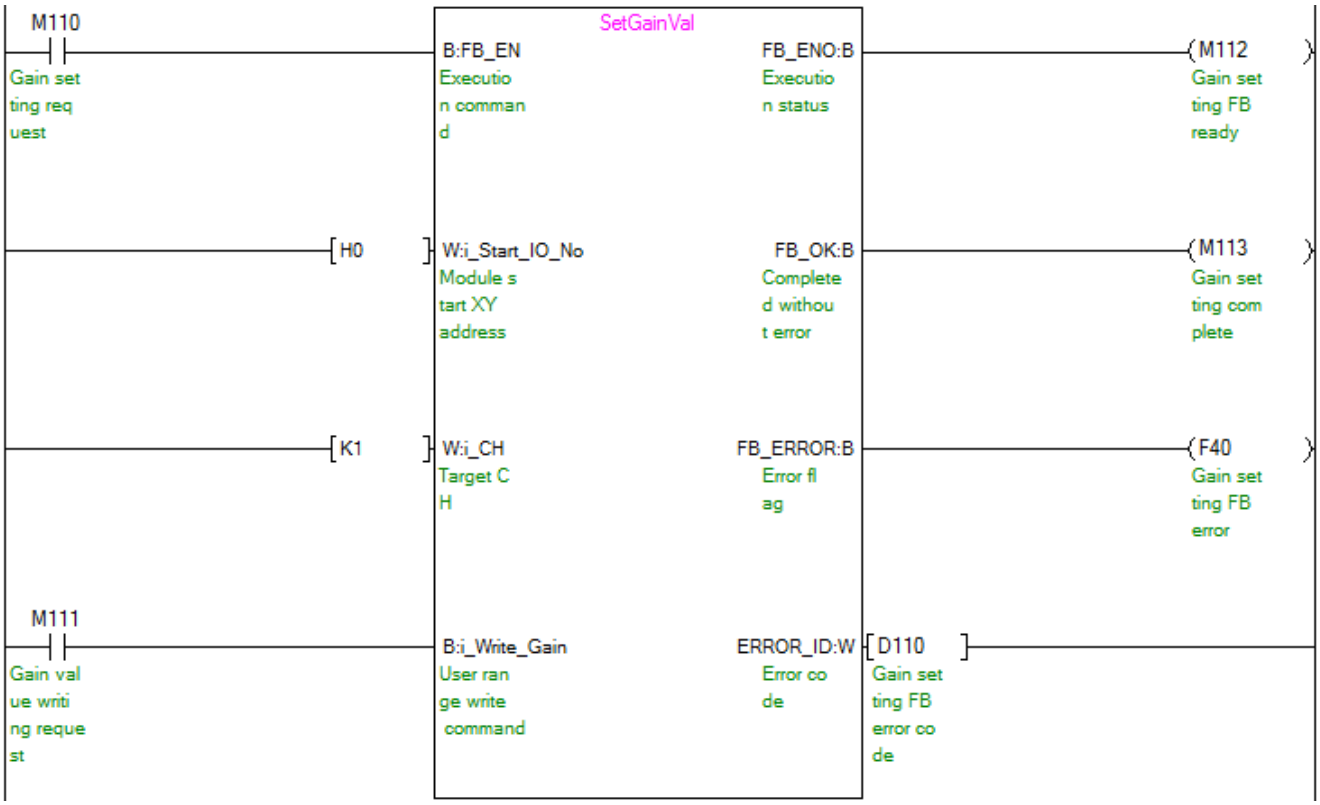
By turning ON M100 and then M101, the offset value of channel 8 is written.



M+L60ADL8_SetGainVal (Gain setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Write_Gain	ON/OFF	Turn ON to write the gain value of channel 1.

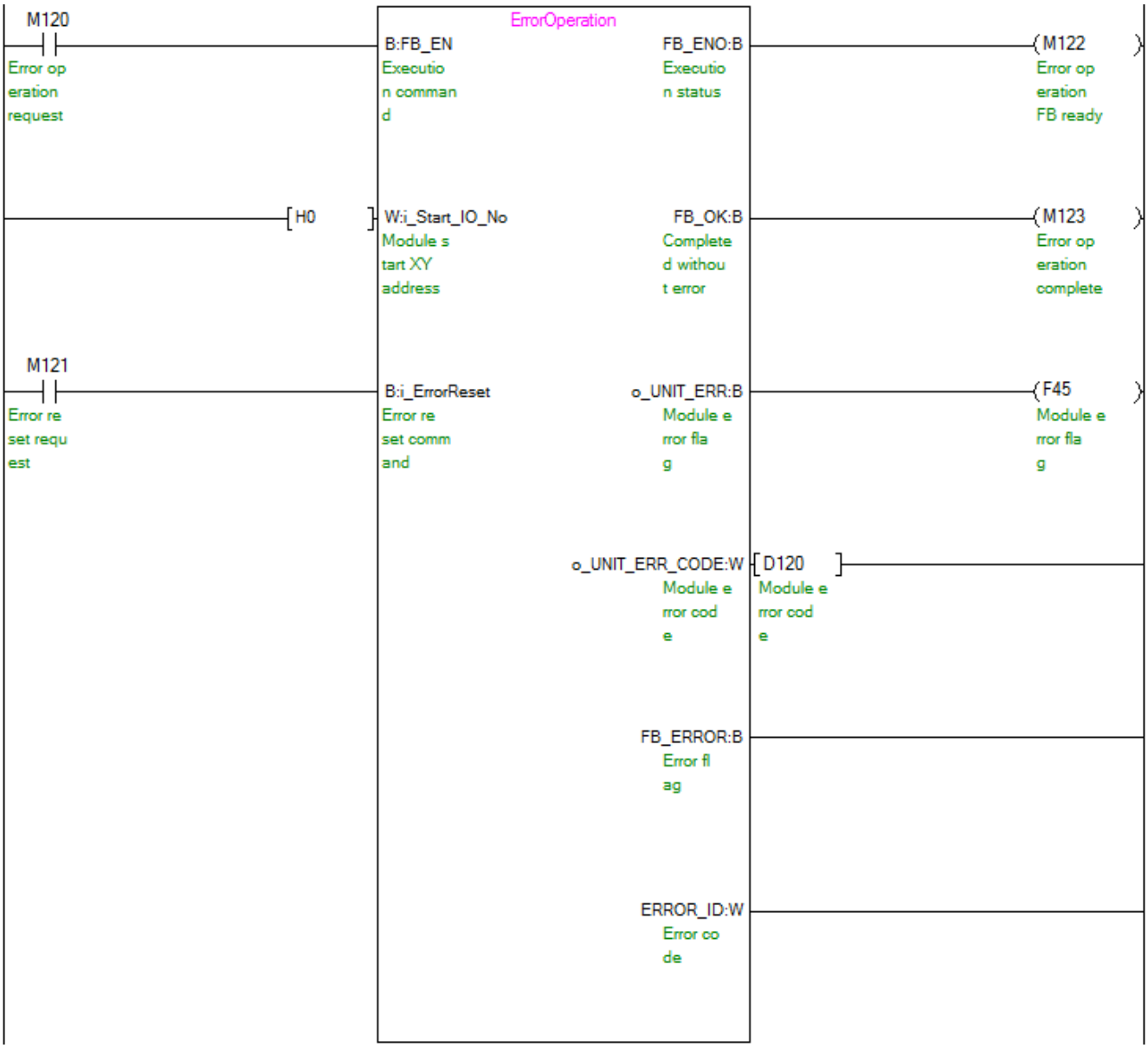
By turning ON M110 and then M111, the gain value of channel 1 is written.



M+L60ADL8_ErrorOperation (Error operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.
i_ErrorReset	ON/OFF	Turn ON for the error reset.

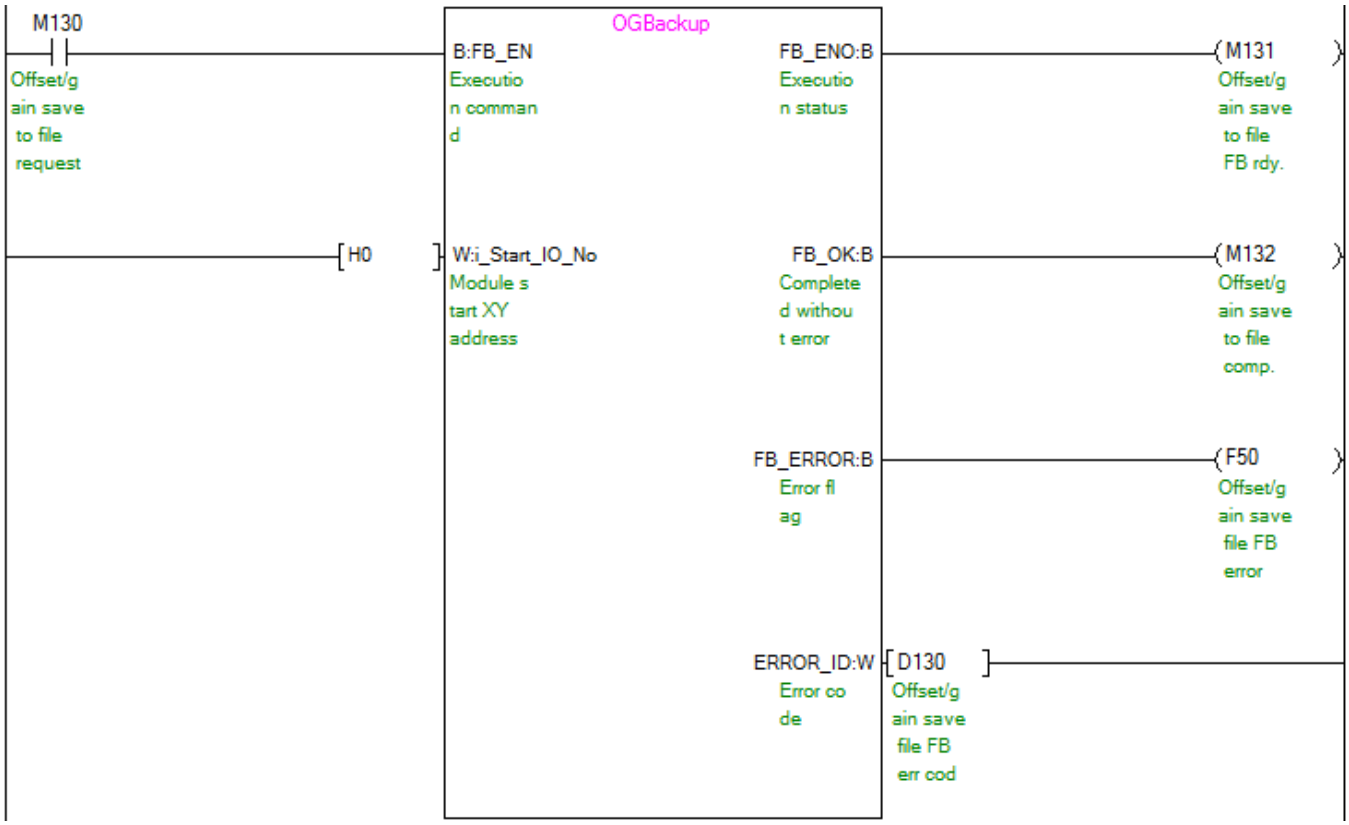
By turning ON M120, the error code is output when an error occurs. By turning ON M121 after the error output, the error is reset.



M+L60ADL8_OGBackup (Offset/gain value save)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.

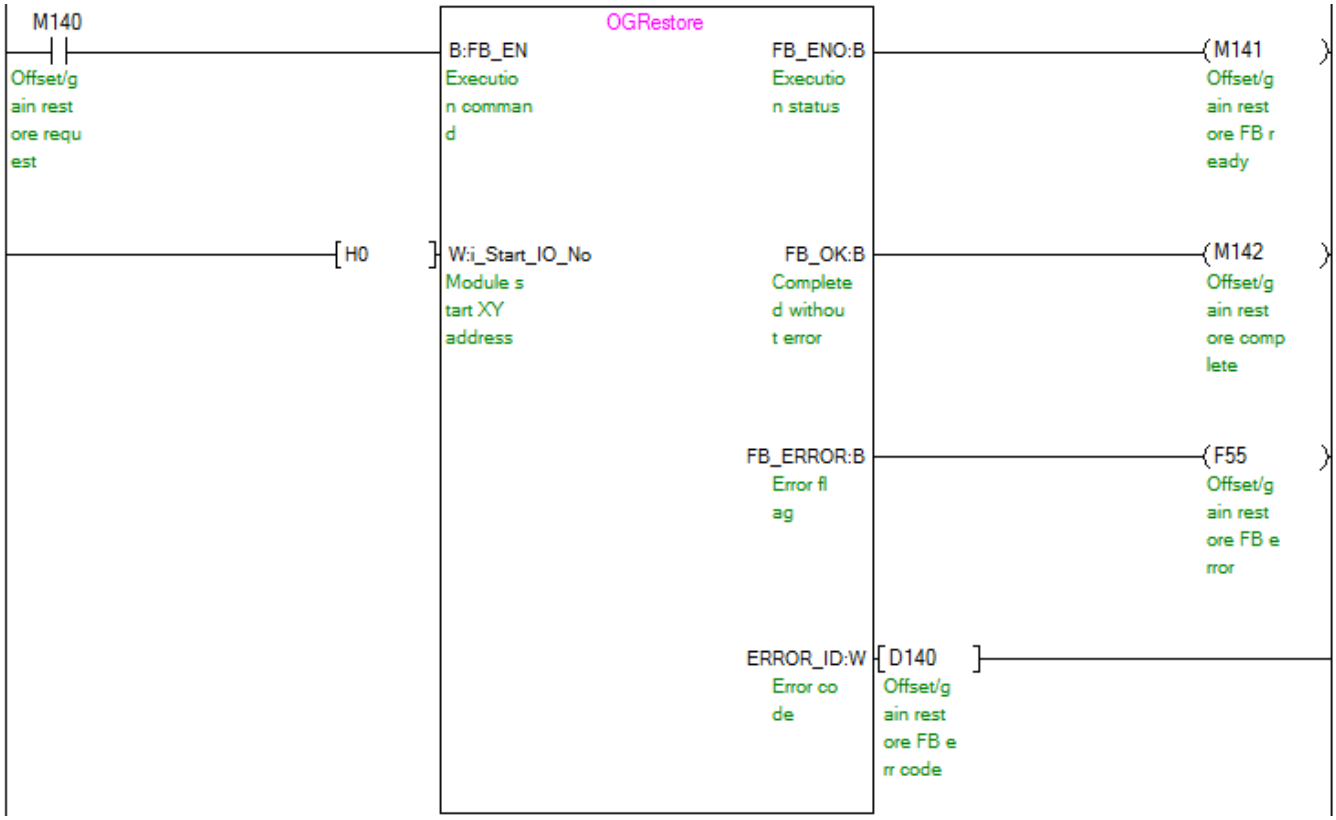
By turning ON M130, the offset/gain value of the user range is read and saved in the SD memory card inserted in the CPU module in a file format.



M+L60ADL8_OGRestore (Offset/gain value restore)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the L60ADIL8 or L60ADVL8 is connected to 0H.

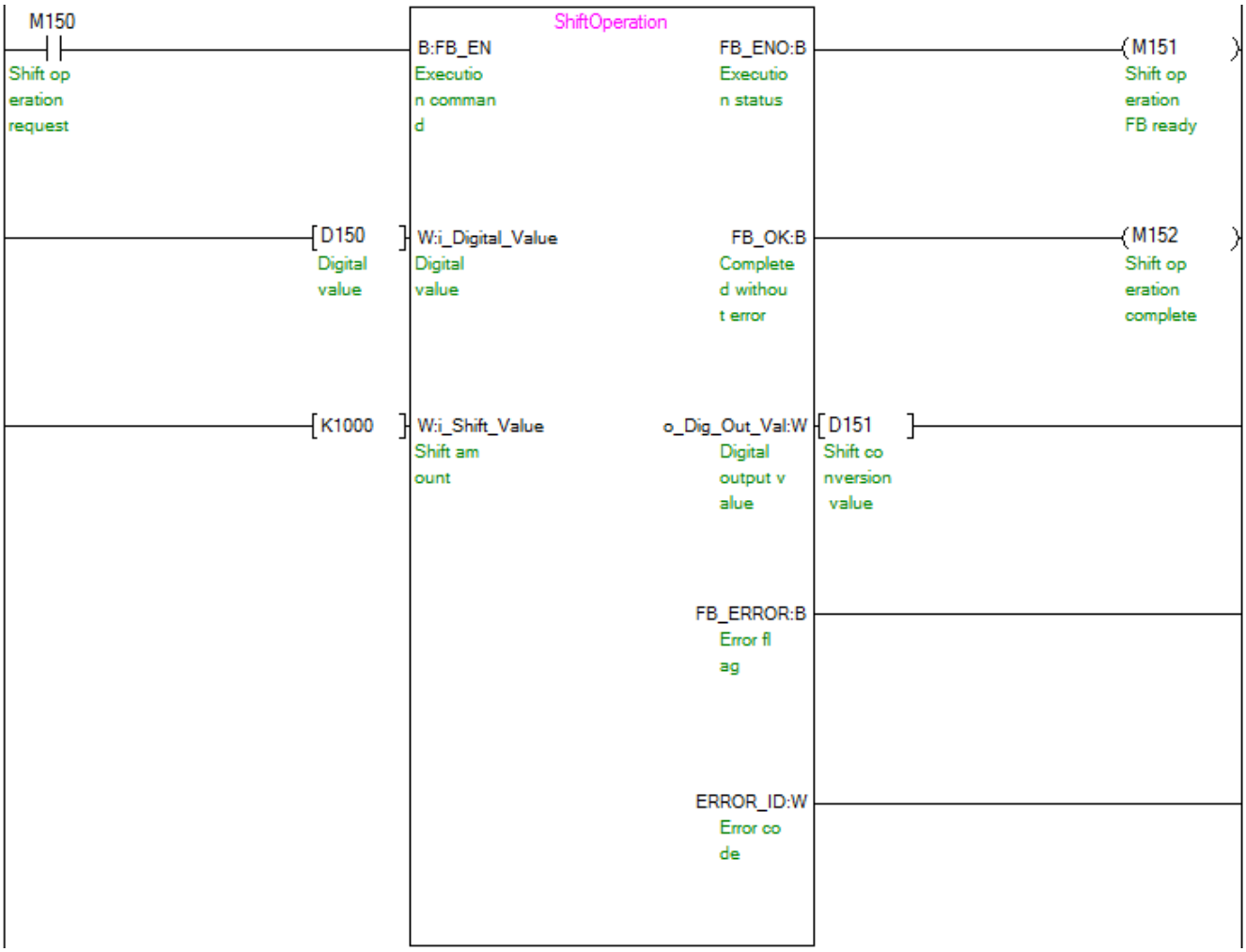
By turning ON M140, the offset/gain setting values of the user range is restored from a file to the module.



M+L60ADL8_ShiftOperation (Shift operation)

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

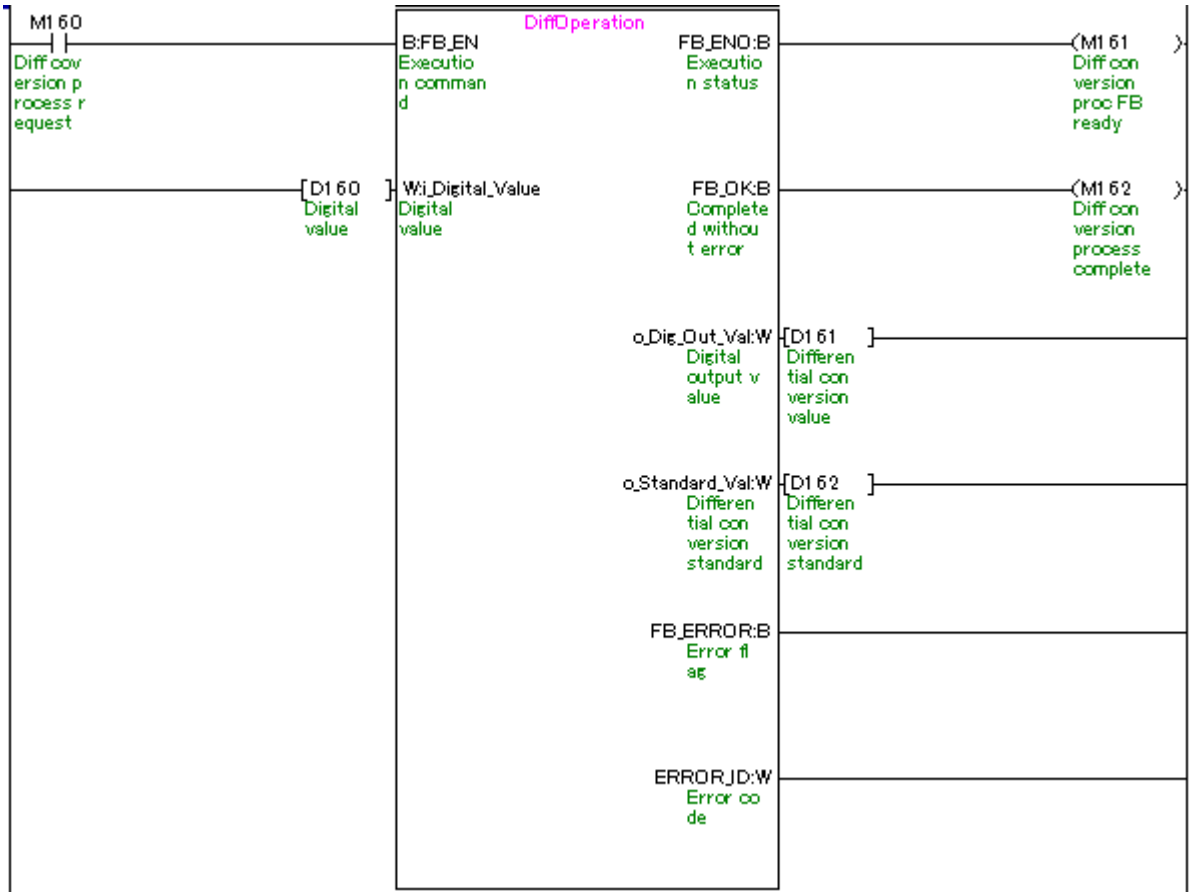
By turning ON M150, the digital value after the shift amount is added is output.



M+L60ADL8_DiffOperation (Differential conversion process)

Label name	Setting value	Description
i_Digital_Value	-	Store a digital value for which the differential conversion is to be executed.

By turning ON M160, the difference obtained by subtracting the standard value from the digital value is output.



M+L60ADL8_DigitalClipOperation (Digital clipping operation)

Label name	Setting value	Description
i_Digital_Value	-	Store a digital value for which the digital clipping operation is executed.
i_Clip_U_Lim	K8000	Set the digital clipping upper limit value to 8000.
i_Clip_L_Lim	K0	Set the digital clipping lower limit value to 0.

By turning ON M170, if the input digital value exceeds the digital clipping upper limit value or falls below the lower limit value, the value is limited at the upper or lower limit value and then output.