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

Applicable module:
Q68ADV, Q68ADI

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Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M038-A	2010/11/15	First edition
FBM-M038-B	2012/06/29	1) Added the following FB library. •M+Q68AD_ScalingOperation •M+Q68AD_ScalingAllOperation •M+Q68AD_ScalingAllMaxMinOpe •M+Q68AD_ShiftOperation
FBM-M038-C	2015/03/27	1) Added applicable GX Works2 Version. •This FB is able to install on GX Works2 of all language versions. 2) Added the following "FB Version Upgrade History". •M+Q68AD_SetOffsetVal •M+Q68AD_SetGainVal •M+Q68AD_ScalingOperation

1. Overview

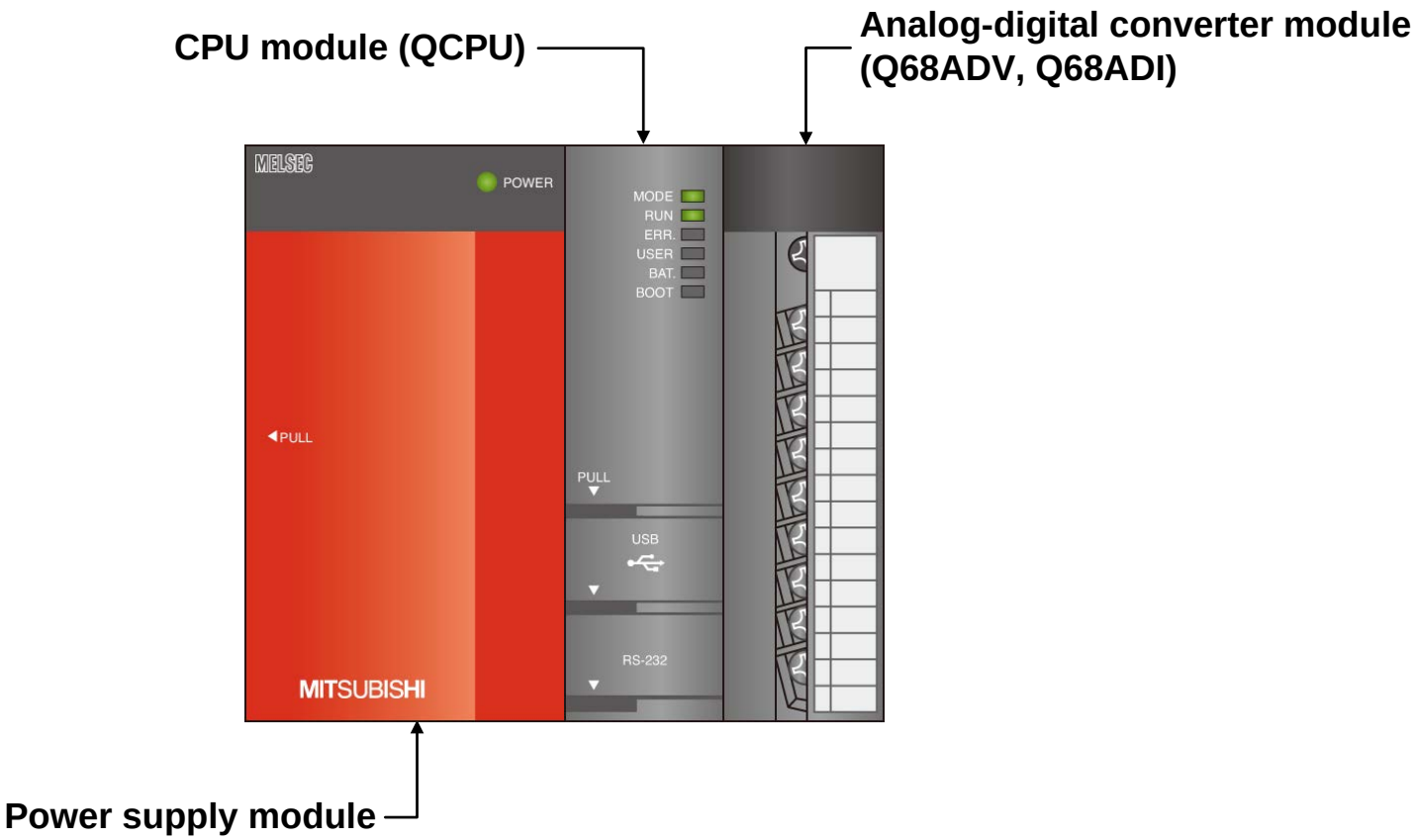
1.1 Overview of the FB Library

This FB library is for using the MELSEC-Q Q68AD analog-digital converter module.

1.2 Function of the FB Library

Item	Description
M+Q68AD_ReadADVal	Reads A/D conversion data of a specified channel.
M+Q68AD_ReadAllADVal	Reads A/D conversion data of all channels.
M+Q68AD_SetADConversion	Sets the A/D conversion enable/disable setting of a specified channel or all channels.
M+Q68AD_SetAverage	Sets averaging process of a specified channel.
M+Q68AD_RequestSetting	Enables settings of each function.
M+Q68AD_SetOffsetVal	Performs offset setting of a specified channel.
M+Q68AD_SetGainVal	Performs gain setting of a specified channel.
M+Q68AD_ErrorOperation	Monitors error codes and performs error reset.
M+Q68AD_ScalingOperation	Converts a digital value (A/D conversion value) of a specified channel to the ratio value in a set width.
M+Q68AD_ScalingAllOperation	Converts digital values (A/D conversion values) of all channels to the ratio values in set widths.
M+Q68AD_ScalingAllMaxMinOpe	Outputs the scaling maximum/minimum values by using the Scaling process FB (M+Q68AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q68AD_ScalingAllOperation).
M+Q68AD_ShiftOperation	Adds the shift amount to the digital value (A/D conversion value) that was read.

1.3 System Configuration Example



1.4 Relevant Manuals

- MELSEC-Q Analog-Digital Converter Module User's Manual
- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- GX Works2 Version1 Operating Manual (Common)
- GX Works2 Version1 Operating Manual (Simple Project, Function Block)

1.5 Note

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

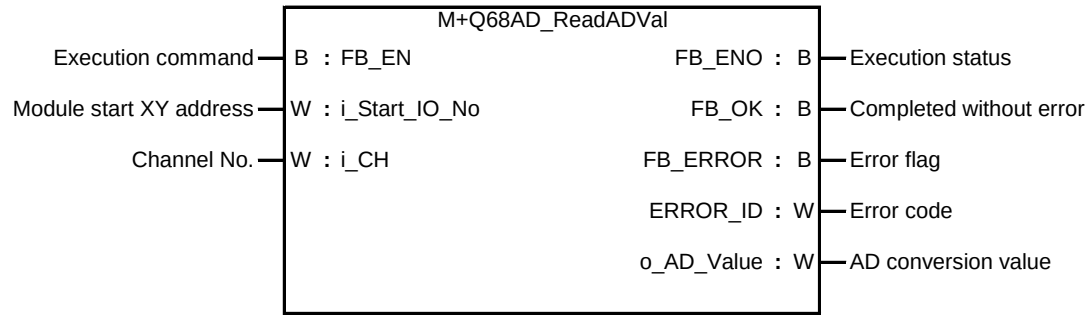
2. Details of the FB Library

2.1 M+Q68AD_ReadADVal (A/D conversion data read)

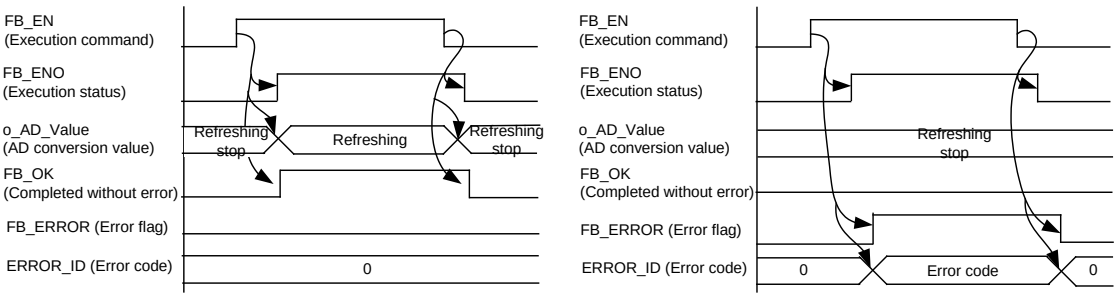
FB Name

M+Q68AD_ReadADVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Reads A/D conversion data of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</td></tr>
<tr><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B or later</td></tr>
</table>
*1 For software versions applicable to the modules used, refer to "Relevant Manuals".
</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">198 steps (for MELSEC-Q series universal model 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), A/D conversion data of the specified channel is read. 2) The read A/D conversion data depends on the resolution mode of the input range setting. 3) When the target channel setting value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details. 4) If the A/D converter module buffer memory is set to auto refresh the digital operation value, it is unnecessary to use this FB.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided with a value for proper FB operation. 7) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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 manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8	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.
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.
AD conversion value	o_AD_Value	Word	0	Store the A/D conversion data of the specified channel.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

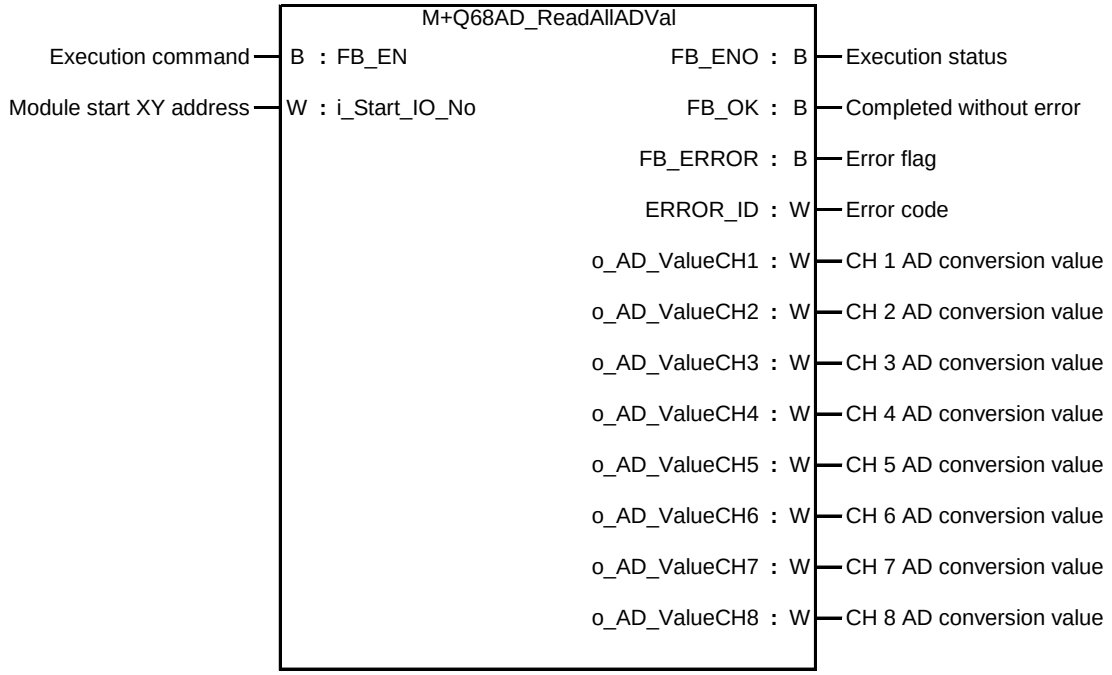
This chapter includes information related to the M+Q68AD_ReadADVal function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

2.2 M+Q68AD_ReadAllADVal (A/D conversion data read (All CHs))

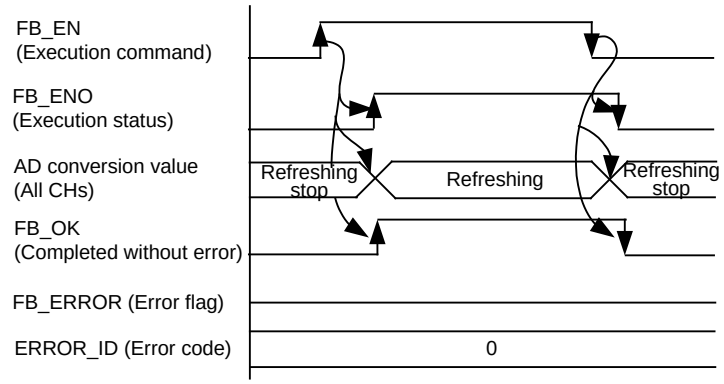
FB Name

M+Q68AD_ReadAllADVal

Function Overview

Item	Description	
Function overview	Reads A/D conversion data of all channels.	
Symbol		
Applicable hardware and software	Analog-digital converter module	Q68ADV, Q68ADI
	CPU module	Series: MELSEC-Q Series *1 — Model: Basic model / High performance model / Universal model *1 Not applicable to QCPU (A mode)

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td></td><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B or later</td></tr>
</table>
*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">230 steps (for MELSEC-Q series universal model CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) By turning ON FB_EN (Execution command), A/D conversion data of all channels is read.
2) The read A/D conversion data depends on the resolution mode of input range setting.
3) If the A/D converter module buffer memory is set to auto refresh the digital operation value, it is unnecessary to use this FB.</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
<tr><td>Restrictions and precautions</td><td colspan="2">1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
2) The FB cannot be used in an interrupt program.
3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF.
4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program.
5) Every input must be provided with a value for proper FB operation.
6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application.
For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</td></tr>
<tr><td>FB operation type</td><td colspan="2">Real-time execution</td></tr>
<tr><td>Application example</td><td colspan="2">Refer to "Appendix 1 - FB Library Application Examples".</td></tr>
</table>

Item	Description
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (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 A/D conversion data of all channels is being read.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0
CH 1 AD conversion value	o_AD_ValueCH1	Word	0	Stores the A/D conversion data of channel 1.
CH 2 AD conversion value	o_AD_ValueCH2	Word	0	Stores the A/D conversion data of channel 2.
CH 3 AD conversion value	o_AD_ValueCH3	Word	0	Stores the A/D conversion data of channel 3.
CH 4 AD conversion value	o_AD_ValueCH4	Word	0	Stores the A/D conversion data of channel 4.
CH 5 AD conversion value	o_AD_ValueCH5	Word	0	Stores the A/D conversion data of channel 5.
CH 6 AD conversion value	o_AD_ValueCH6	Word	0	Stores the A/D conversion data of channel 6.
CH 7 AD conversion value	o_AD_ValueCH7	Word	0	Stores the A/D conversion data of channel 7.
CH 8 AD conversion value	o_AD_ValueCH8	Word	0	Stores the A/D conversion data of channel 8.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

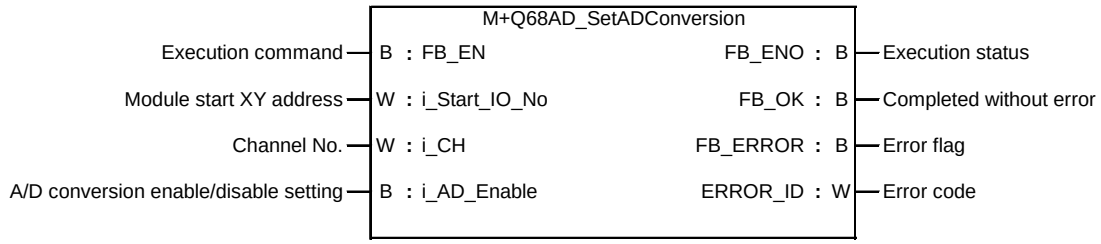
This chapter includes information related to the M+Q68AD_ReadAllADVal function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

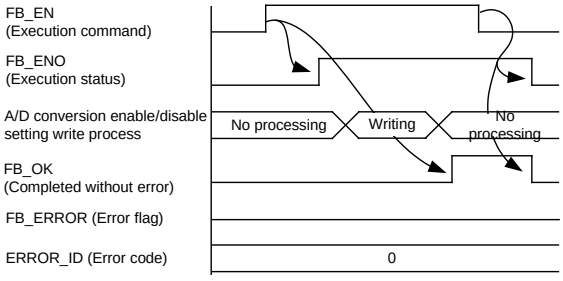
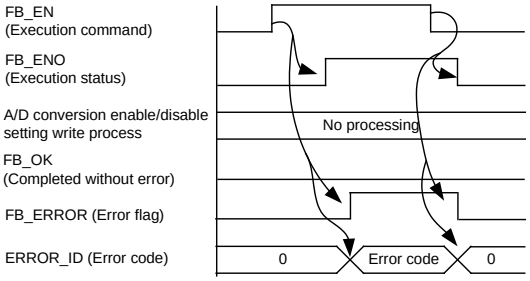
2.3 M+Q68AD_SetADConversion (A/D conversion enable/disable setting)

FB Name

M+Q68AD_SetADConversion

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets the A/D conversion enable/disable setting of 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>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">241 steps (for MELSEC-Q series universal model 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), A/D conversion enable/disable setting of the specified channel or all channels is set. 2) FB operation is one-shot only, triggered by the FB_EN signal. 3) The new setting value will not take effect until the 'operating condition setting request' signal (Yn9) is turned OFF->ON->OFF or the Operating condition setting request FB (M+Q68AD_RequestSetting) is executed. 4) When the target channel setting value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z7 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) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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 manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8,15	1~8: Specify a channel number. 15: Specify all channels.
A/D conversion enable/disable setting	i_AD_Enable	Bit	ON, OFF	ON: Enable output of A/D conversion value. OFF: Disable output of A/D conversion 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 A/D conversion enable/disable setting is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

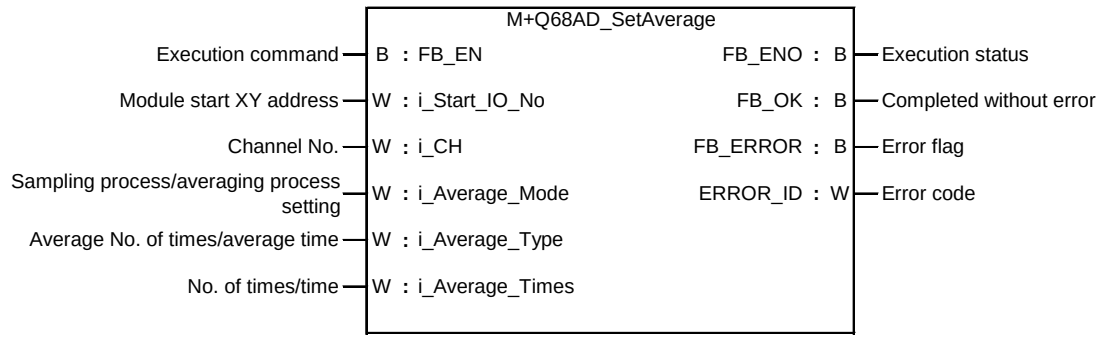
This chapter includes information related to the M+Q68AD_SetADConversion function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

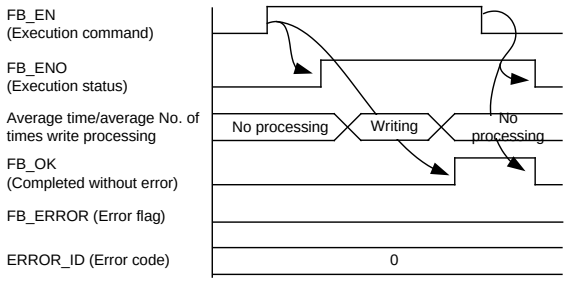
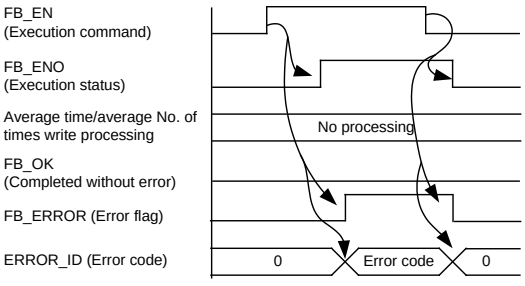
2.4 M+Q68AD_SetAverage (Averaging process setting)

FB Name

M+Q68AD_SetAverage

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Sets averaging process of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">274 steps (for MELSEC-Q series universal model 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), averaging process setting of the specified channel is set. 2) FB operation is one-shot only, triggered by the FB_EN signal. 3) The new setting value will not take effect until the 'operating condition setting request' signal (Yn9) is turned OFF->ON->OFF or the Operating condition setting request FB (M+Q68AD_RequestSetting) is executed. 4) When the target channel setting value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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 manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8	Specify the channel number.
Sampling process/averaging process setting	i_Average_Mode	Word	0: Sampling process 1: Averaging process	Specify the averaging process type.
Average No. of times/average time	i_Average_Type	Word	0: Average No. of times 1: Average time	
No. of times/time	i_Average_Times	Word	No. of times: 4~62,500 (times) Time: 2~5,000 (ms)	Set the time average and count 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 average process setting for the specified channel is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

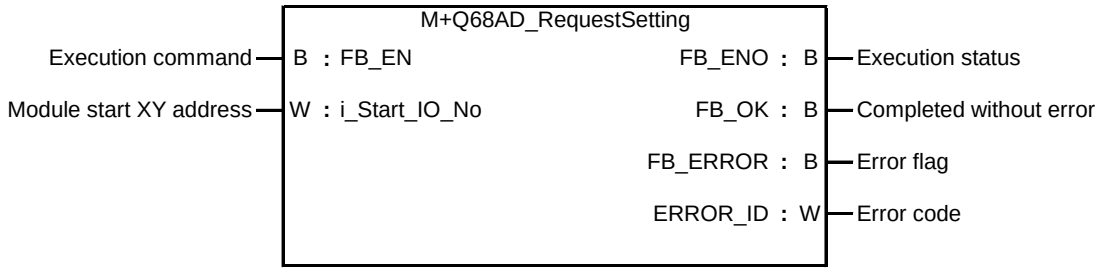
This chapter includes information related to the M+Q68AD_SetAverage function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

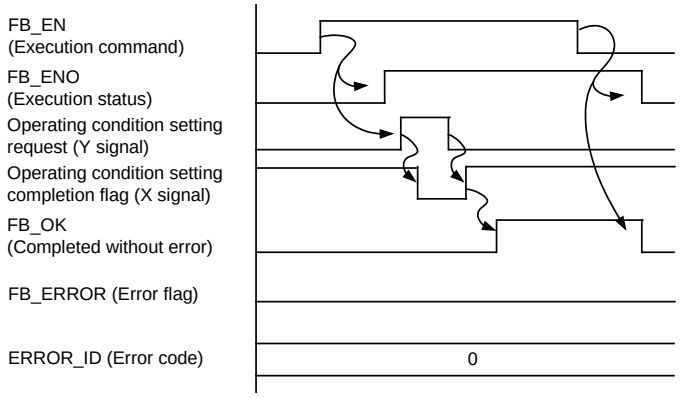
2.5 M+Q68AD_RequestSetting (Operating condition setting request operation)

FB Name

M+Q68AD_RequestSetting

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Enables 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>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">164 steps (for MELSEC-Q series universal model 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), settings of all channels are enabled. For information on the settings that are enabled, refer to the MELSEC-Q Analog-Digital Converter Module User's Manual. 2) When FB_EN is turned ON, the FB will continue to execute until the settings for each function are completed.
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) This FB uses index register Z9. Please do not use this index register in an interrupt program. 4) When this FB is executed, AD conversion processing is stopped. After turning ON FB_OK, the conversion processing resumes. 5) When this FB is used in two or more places, a duplicated coil warning may occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (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 enabled operation of each setting has been executed.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

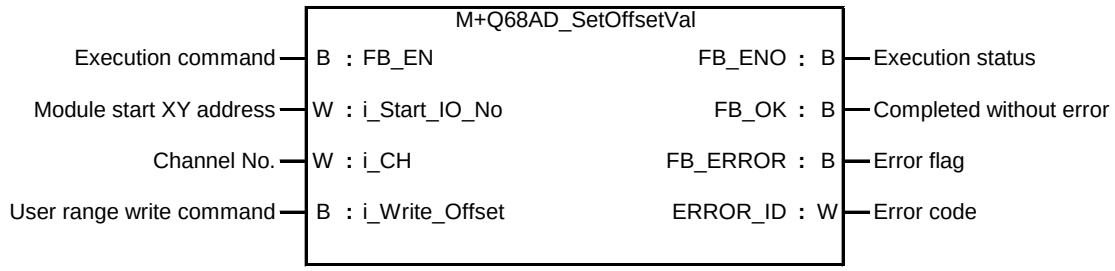
This chapter includes information related to the M+Q68AD_RequestSetting function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

2.6 M+Q68AD_SetOffsetVal (Offset setting)

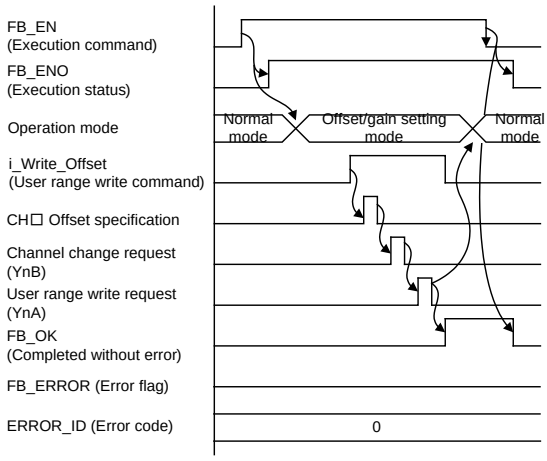
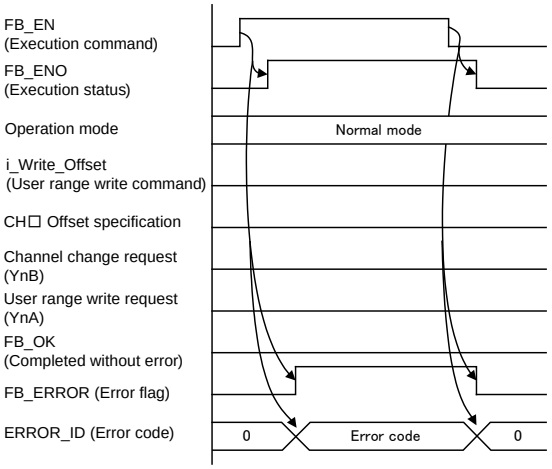
FB Name

M+Q68AD_SetOffsetVal

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Performs offset setting of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">298 steps (for MELSEC-Q series universal model 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 when FB_EN (Execution command) is ON, the offset value is written. 3) By turning ON FB_EN (Execution command), this FB continues its operation until the setting of offset value of the specified channel is completed. 4) When the target channel setting value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 4) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. 5) When this FB is used in two or more places, a duplicated coil warning may occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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 manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8	Specify the channel number.
User range write command	i_Write_Offset	Bit	ON, OFF	ON: Perform user range write operation. OFF: Do not perform user range write operation

●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 of the specified channel is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition
1.01B	2015/03/27	Optimized program (Not change this FB function)

Note

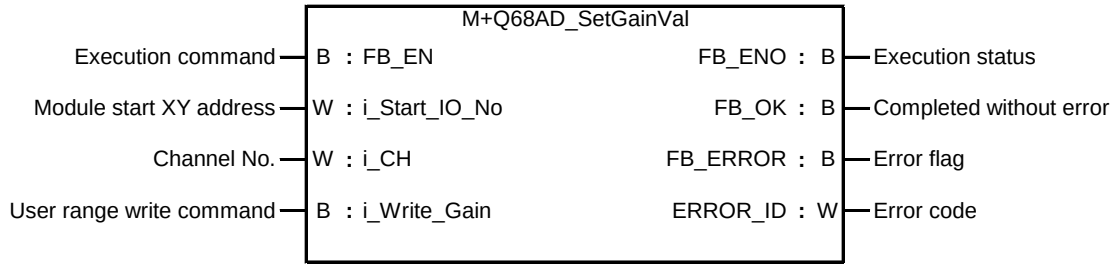
This chapter includes information related to the M+Q68AD_SetOffsetVal function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

2.7 M+Q68AD_SetGainVal (Gain setting)

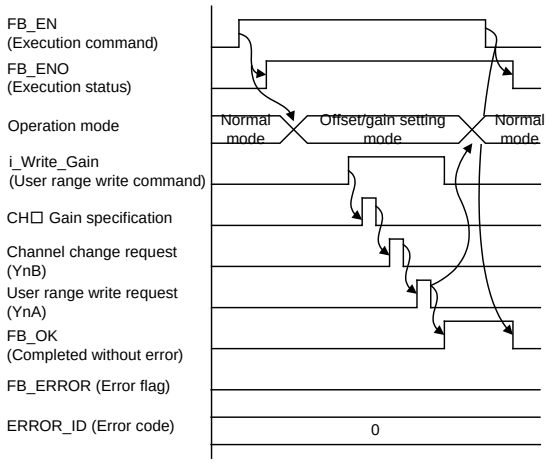
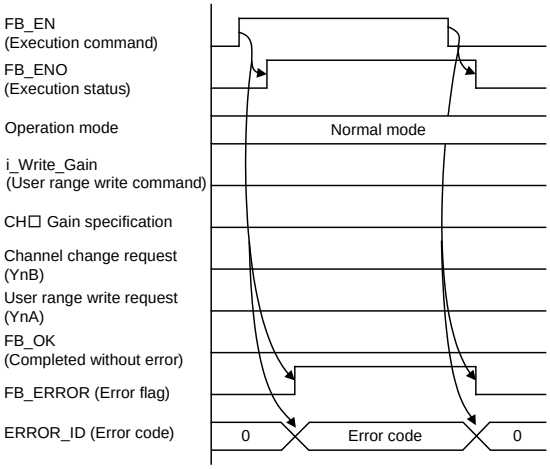
FB Name

M+Q68AD_SetGainVal

Function Overview

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Function overview</td><td colspan="2">Performs gain setting of a specified channel.</td></tr>
<tr><td>Symbol</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="3">Applicable hardware and software</td><td>Analog-digital converter module</td><td>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">296 steps (for MELSEC-Q series universal model 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 when FB_EN (Execution command) is ON, the gain value is written. 3) By turning ON FB_EN (Execution command), this FB continues its operation until the setting of gain value of the specified channel is completed. 4) When the target channel setting value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 4) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. 5) When this FB is used in two or more places, a duplicated coil warning may occur during compile operation due to the Y signal being operated by index modification. However this is not a problem and the FB will operate without error. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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 manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8	Specify the channel number.
User range write command	i_Write_Gain	Bit	ON, OFF	ON: Perform the user range write operation. OFF: Do not perform the user range write operation.

●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 of the specified channel is completed.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output.

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition
1.01B	2015/03/27	Optimized program (Not change this FB function)

Note

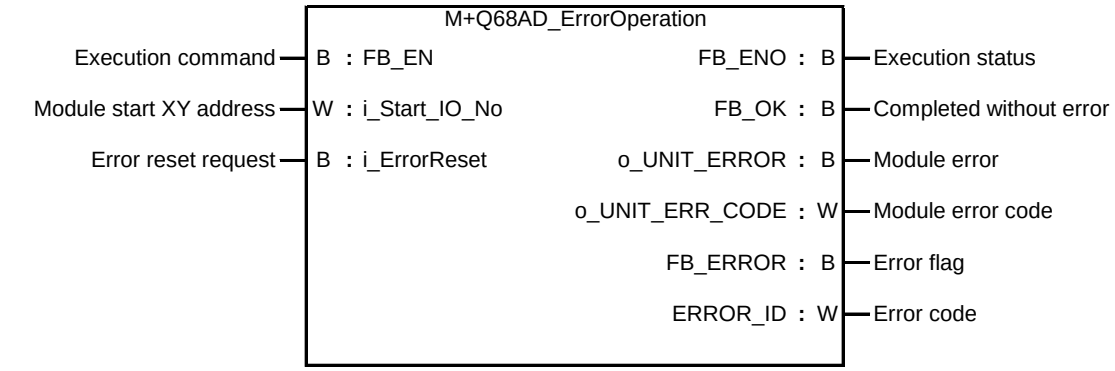
This chapter includes information related to the M+Q68AD_SetGainVal function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

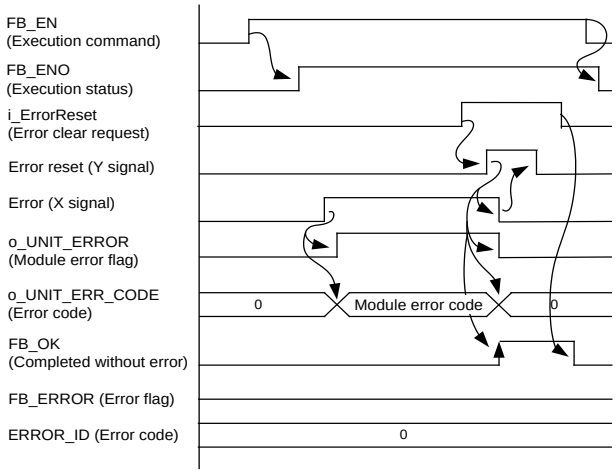
2.8 M+Q68AD_ErrorOperation (Error operation)

FB Name

M+Q68AD_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 performs error reset.</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>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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	191 steps (for MELSEC-Q series universal model 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), an error in the target module is monitored. 2) After turning ON FB_EN (Execution command), by turning ON i_ErrorReset (error reset request) during error occurrence, error reset is performed.
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) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program. 4) 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. 5) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Error reset request	i_ErrorReset	Bit	ON, OFF	Turn ON to perform the error reset. Turn OFF after completion of error reset.

●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 an error reset is completed.
Module error	o_UNIT_ERROR	Bit	OFF	When ON, it indicates a module error has occurred.
Module error code	o_UNIT_ERR_CODE	Word	0	Stores a code for an error occurring.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2010/11/15	First edition

Note

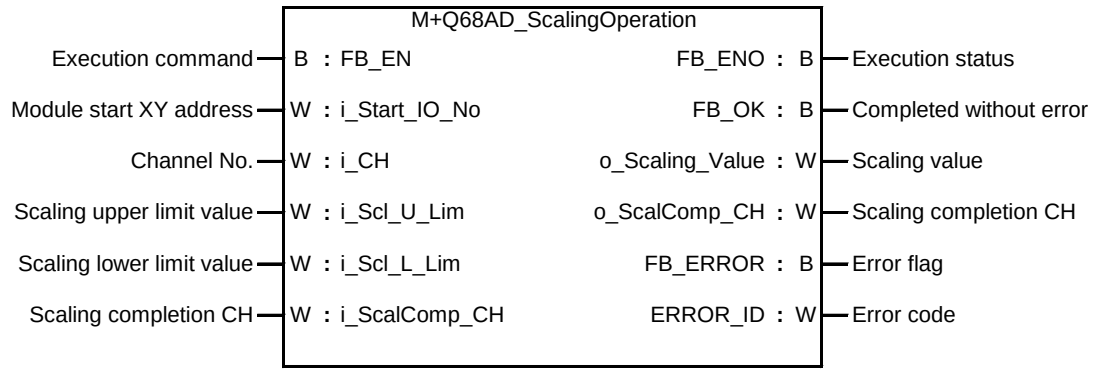
This chapter includes information related to the M+Q68AD_ErrorOperation function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

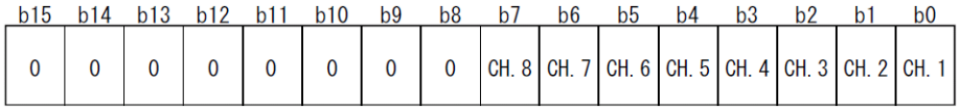
2.9 M+Q68AD_ScalingOperation (Scaling process)

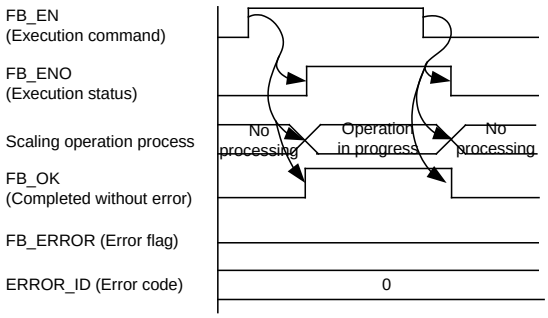
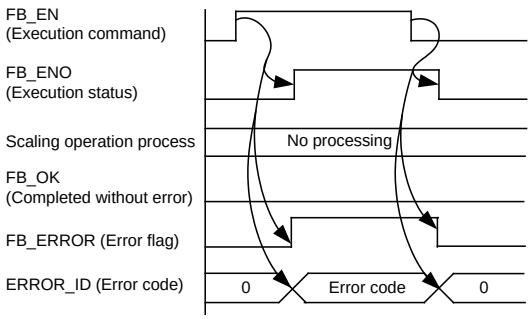
FB Name

M+Q68AD_ScalingOperation

Function Overview

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Function overview</td><td colspan="2">Converts a digital value (A/D conversion value) of a specified channel to the ratio value in a set width.</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>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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	560 steps (for MELSEC-Q series universal model 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 digital value (A/D conversion value) of a specified channel is converted to a ratio of the scaling upper/lower limit values and the result is output as a scaling value. 2) If the operation result exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767. 3) If the A/D conversion completed flag is turned OFF while FB_EN (Execution command) is turned ON, the scaling operation process stops and o_Scaling_Value (Scaling value) before it stops is hold. When the A/D conversion completed flag is turned ON, the operation process resumes. 4) After a scaling value of a specified channel is calculated, the bit (see figure below) corresponding to the specified channel is turned ON. The bit corresponding to the input i_ScalComp_CH (Scaling completion CH) is updated and the information are output in o_ScalComp_CH (Scaling completion CH).  1: Scaling process is performed. 0: Scaling process is not performed. The information of Scaling completion CHs are combined. Therefore, use the same device for the input and output. (Refer to "Appendix 1 - FB Library Application Examples".) The scaling maximum/minimum values can be easily obtained by inputting the information of o_ScalComp_CH (Scaling completion CH) and o_Scaling_Value (Scaling value) obtained by this FB in M+Q68AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs)). 5) When the input value is invalid, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.
Compiling method	Macro type

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel. 5) This FB uses index registers Z7 to Z9. Please do not use these index registers in an interrupt program. 6) Every input must be provided with a value for proper FB operation. 7) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 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] 
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
10 (Decimal)	The specified target channel is not valid. The target channel is not within the range of 1 to 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. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~8	Specify the channel number.
Scaling upper limit value	i_Scl_U_Lim	Word	-32,000~32,000	Specify the scaling upper/lower limit values.
Scaling lower limit value	i_Scl_L_Lim			
Scaling completion CH	i_ScalComp_CH	Word	b0: CH1 Scaling complete b1: CH2 Scaling complete b2: CH3 Scaling complete b3: CH4 Scaling complete b4: CH5 Scaling complete b5: CH6 Scaling complete b6: CH7 Scaling complete b7: CH8 Scaling complete b8~15: (Not used)	A scaling value of the channel specified with i_CH is calculated, the bit corresponding to i_CH is updated, and then the information is output in o_ScalComp_CH. (Refer to 4) in Restrictions and precautions).
			0: Scaling not complete 1: Scaling complete	

●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 process is being performed.
Scaling value	o_Scaling_Value	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value.
Scaling completion CH	o_ScalComp_CH	Word	0	A scaling value of the channel specified with i_CH is calculated, the bit corresponding to i_CH for i_ScalComp_CH is updated, and then the information is output in this label. (Refer to 4) in Restrictions and precautions).
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	Word	0	FB error code output

FB Version Upgrade History

Version	Date	Description
1.00A	2012/06/29	First edition
1.01B	2015/03/27	Optimized program (Not change this FB function)

Note

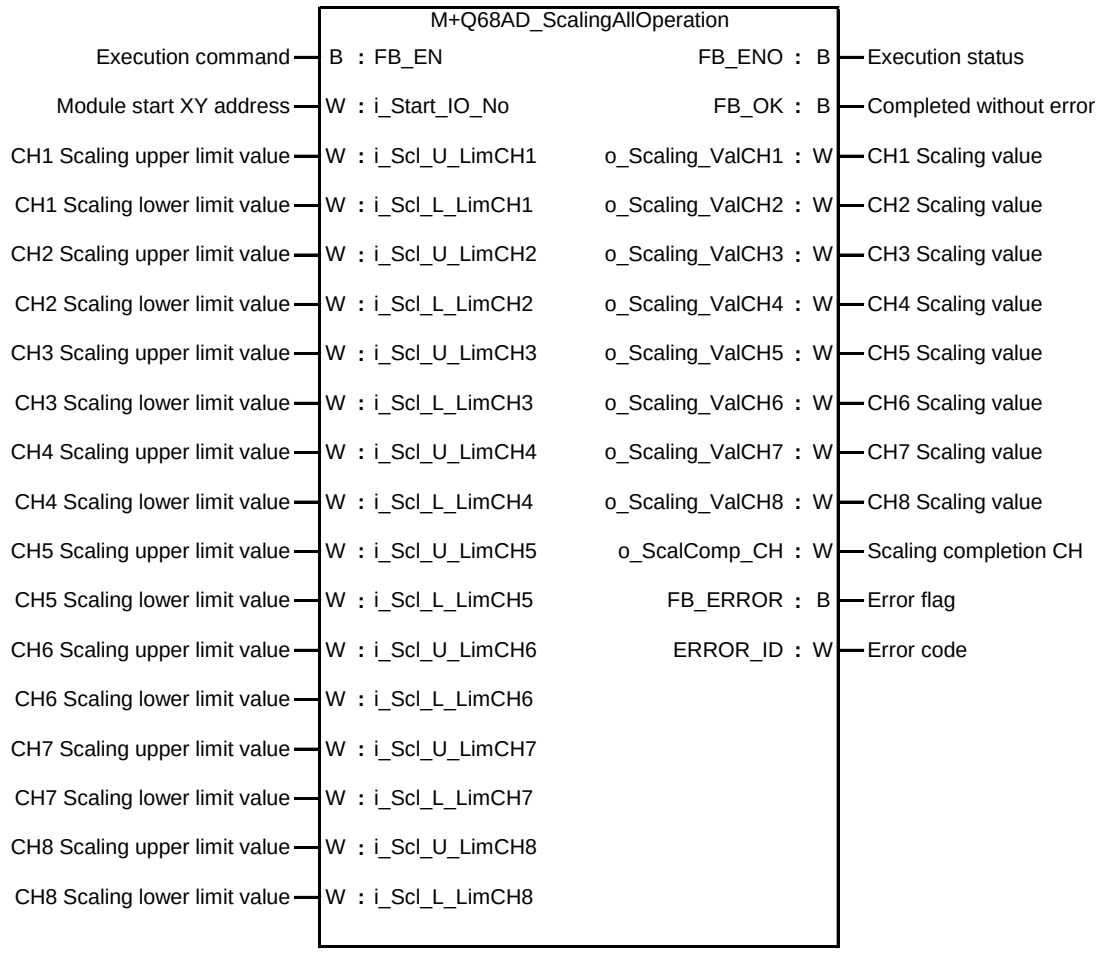
This chapter includes information related to the M+Q68AD_ScalingOperation function block.
It does not include information on restrictions of use such as combination with analog-digital converter modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all the relevant manuals.

2.10 M+Q68AD_ScalingAllOperation (Scaling process (All CHs))

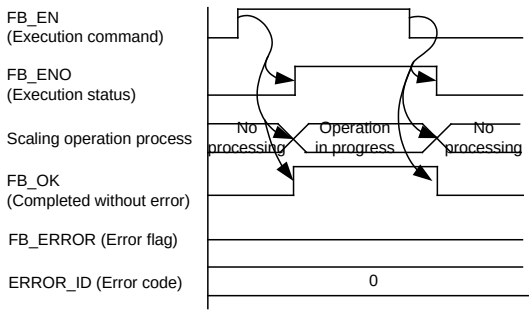
FB Name

M+Q68AD_ScalingAllOperation

Function Overview

Item	Description	
Function overview	Converts digital values (A/D conversion values) of all channels to the ratio values in set widths.	
Symbol		
Applicable hardware and software	Analog-digital converter module	Q68ADV, Q68ADI
	CPU module	<table><tr><th>Series</th><th>Model</th></tr><tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr><tr><td>High performance model</td></tr><tr><td>Universal model</td></tr></table> *1 Not applicable to QCPU (A mode)

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td></td><td>Engineering software</td><td>GX Works2 *1
<table>
<tr><th>Language</th><th>Software version</th></tr>
<tr><td>Japanese version</td><td>Version1.86Q or later</td></tr>
<tr><td>English version</td><td>Version1.24A or later</td></tr>
<tr><td>Chinese (Simplified) version</td><td>Version1.49B or later</td></tr>
<tr><td>Chinese (Traditional) version</td><td>Version1.49B or later</td></tr>
<tr><td>Korean version</td><td>Version1.49B or later</td></tr>
</table>
*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</td></tr>
<tr><td>Programming language</td><td colspan="2">Ladder</td></tr>
<tr><td>Number of steps</td><td colspan="2">1516 steps (for MELSEC-Q series universal model CPU)
* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</td></tr>
<tr><td>Function description</td><td colspan="2">1) By turning ON FB_EN (Execution command), the digital values (A/D conversion values) of all channels are converted to ratios of the scaling upper/lower limit values and the results are output as scaling values.
2) If the operation result exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767.
3) If the A/D conversion completed flag is turned OFF while FB_EN (Execution command) is turned ON, the scaling operation process stops and o_Scaling_Value (Scaling value) before it stops is hold. When the A/D conversion completed flag is turned ON, the operation process resumes.
4) After scaling values are calculated, the bits (see figure below) corresponding to the channels are turned ON and the information are output in o_ScalComp_CH (Scaling completion CH).
<table>
<tr><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>b11</th><th>b10</th><th>b9</th><th>b8</th><th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>CH. 8</td><td>CH. 7</td><td>CH. 6</td><td>CH. 5</td><td>CH. 4</td><td>CH. 3</td><td>CH. 2</td><td>CH. 1</td></tr>
</table>
1: Scaling process is performed.
0: Scaling process is not performed.
The scaling maximum/minimum values can be easily obtained by inputting the information and the scaling values in M+Q68AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs).</td></tr>
<tr><td>Compiling method</td><td colspan="2">Macro type</td></tr>
</table>

Item	Description
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) This FB uses index registers Z8 and Z9. Please do not use these index registers in an interrupt program. 5) Every input must be provided with a value for proper FB operation. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
CH1 Scaling upper limit value	i_Scl_U_LimCH1	Word	-32,000~32,000	Specify the scaling upper/lower limit values.
CH1 Scaling lower limit value	i_Scl_L_LimCH1			
CH2 Scaling upper limit value	i_Scl_U_LimCH2			
CH2 Scaling lower limit value	i_Scl_L_LimCH2			
CH3 Scaling upper limit value	i_Scl_U_LimCH3			
CH3 Scaling lower limit value	i_Scl_L_LimCH3			
CH4 Scaling upper limit value	i_Scl_U_LimCH4			
CH4 Scaling lower limit value	i_Scl_L_LimCH4			
CH5 Scaling upper limit value	i_Scl_U_LimCH5			
CH5 Scaling lower limit value	i_Scl_L_LimCH5			
CH6 Scaling upper limit value	i_Scl_U_LimCH6			
CH6 Scaling lower limit value	i_Scl_L_LimCH6			

Name (Comment)	Label name	Data type	Setting range	Description
CH7 Scaling upper limit value	i_Scl_U_LimCH7	Word	-32,000~32,000	Specify the scaling upper/lower limit values.
CH7 Scaling lower limit value	i_Scl_L_LimCH7			
CH8 Scaling upper limit value	i_Scl_U_LimCH8			
CH8 Scaling lower limit value	i_Scl_L_LimCH8			

●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 process is being performed.
CH1 Scaling value	o_Scaling_ValCH1	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH1.
CH2 Scaling value	o_Scaling_ValCH2	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH2.
CH3 Scaling value	o_Scaling_ValCH3	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH3.
CH4 Scaling value	o_Scaling_ValCH4	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH4.
CH5 Scaling value	o_Scaling_ValCH5	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH5.
CH6 Scaling value	o_Scaling_ValCH6	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH6.
CH7 Scaling value	o_Scaling_ValCH7	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH7.

Name (comment)	Label name	Data type	Initial value	Description
CH8 Scaling value	o_Scaling_ValCH8	Word	0	Stores a value obtained by performing the scaling process on the input A/D conversion value of CH8.
Scaling completion CH	o_ScalComp_CH	Word	0	Scaling values are calculated, the bits corresponding to the channels are turned ON, and the information is output in this label. (Refer to 4) in Restrictions and precautions).
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2012/06/29	First edition

Note

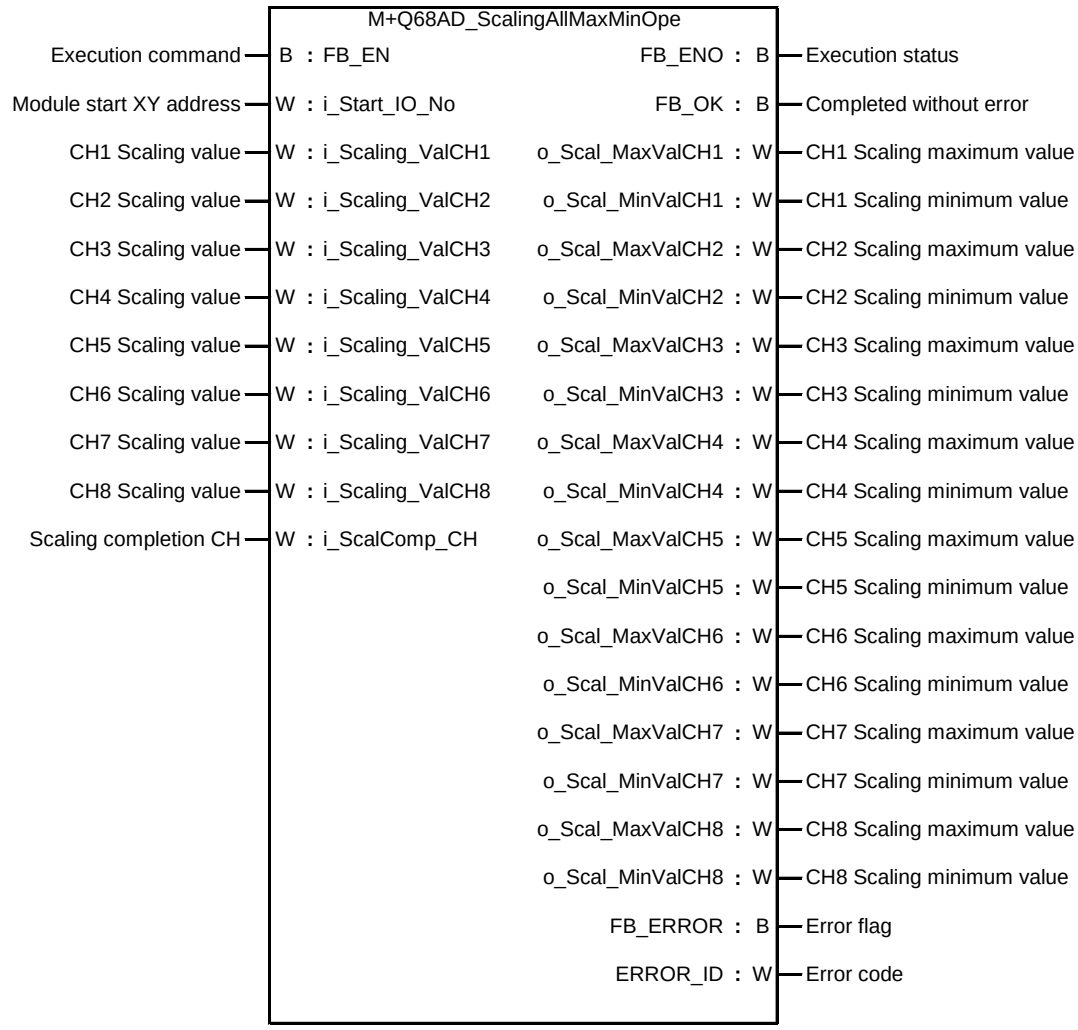
This chapter includes information related to the M+Q68AD_ScalingAllOperation function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

2.11 M+Q68AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs))

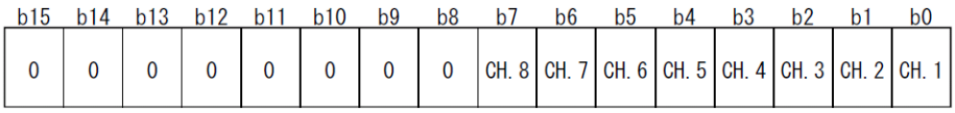
FB Name

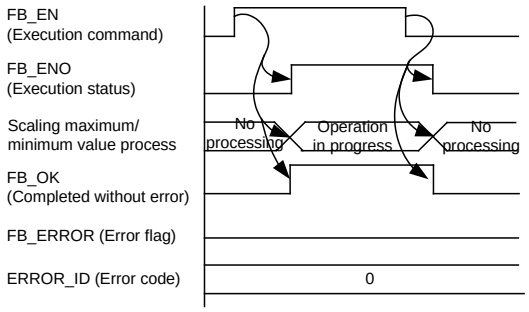
M+Q68AD_ScalingAllMaxMinOpe

Function Overview

Item	Description	
Function overview	Outputs the scaling maximum/minimum values by using the Scaling process FB (M+Q68AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q68AD_ScalingAllOperation).	
Symbol		
Applicable hardware and software	Analog-digital converter module	Q68ADV, Q68ADI

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="2"></td><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">746 steps (for MELSEC-Q series universal model 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 maximum/minimum values are output in the channels set with i_ScalComp_CH (Scaling completion CH). * i_ScalComp_CH  1: Enable (Output maximum/minimum values) 0: Disable (Do not output maximum/minimum values.) 2) If the following operation is performed while FB_EN (Execution command) is turned ON, the scaling maximum/minimum values will be returned to the scaling values. a) The operating condition setting request (Yn9) is turned ON, or the Operating condition setting request FB (M+Q68AD_RequestSetting) is executed. b) The maximum/minimum values reset request (YnD) is turned ON. * The scaling maximum/minimum values can be easily obtained by using this FB together with the Scaling process FB (M+Q68AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q68AD_ScalingAllOperation). The same device must be set for the Scaling completion CH (i_ScalComp_CH) of this FB and the Scaling completion CH (o_ScalComp_CH) of M+Q68AD_ScalingOperation or M+Q68AD_ScalingAllOperation.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) This FB uses index register Z9. Please do not use this index register in an interrupt program. 5) Every input must be provided with a value for proper FB operation. 6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".

Item	Description
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q68AD module is mounted. (For example, enter H10 for X10.)
CH1 Scaling value	i_Scaling_ValCH1	Word	-32768~32767	Specify the scaling values. For scaling values of the channels not used, specify word values (e.g., K0).
CH2 Scaling value	i_Scaling_ValCH2			
CH3 Scaling value	i_Scaling_ValCH3			
CH4 Scaling value	i_Scaling_ValCH4			
CH5 Scaling value	i_Scaling_ValCH5			
CH6 Scaling value	i_Scaling_ValCH6			
CH7 Scaling value	i_Scaling_ValCH7			
CH8 Scaling value	i_Scaling_ValCH8			
Scaling completion CH	i_ScalComp_CH	Word	b0: CH1 Scaling complete b1: CH2 Scaling complete b2: CH3 Scaling complete b3: CH4 Scaling complete b4: CH5 Scaling complete b5: CH6 Scaling complete b6: CH7 Scaling complete b7: CH8 Scaling complete b8~15: (Not used)	Specify the channels to output the scaling maximum/minimum values. (Refer to 1) in Restrictions and precautions).
			0: Disable (Do not perform the maximum/minimum value process because the scaling process is not completed.) 1: Enable (Perform the maximum/minimum value process because the scaling process is completed.)	

●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 process is being performed.
CH1 Scaling maximum value	o_Scal_MaxValCH1	Word	0	Stores the maximum value of the CH1 scaling value (i_Scaling_ValCH1).
CH1 Scaling minimum value	o_Scal_MinValCH1	Word	0	Stores the minimum value of the CH1 scaling value (i_Scaling_ValCH1).
CH2 Scaling maximum value	o_Scal_MaxValCH2	Word	0	Stores the maximum value of the CH2 scaling value (i_Scaling_ValCH2).
CH2 Scaling minimum value	o_Scal_MinValCH2	Word	0	Stores the minimum value of the CH2 scaling value (i_Scaling_ValCH2).
CH3 Scaling maximum value	o_Scal_MaxValCH3	Word	0	Stores the maximum value of the CH3 scaling value (i_Scaling_ValCH3).
CH3 Scaling minimum value	o_Scal_MinValCH3	Word	0	Stores the minimum value of the CH3 scaling value (i_Scaling_ValCH3).
CH4 Scaling maximum value	o_Scal_MaxValCH4	Word	0	Stores the maximum value of the CH4 scaling value (i_Scaling_ValCH4).
CH4 Scaling minimum value	o_Scal_MinValCH4	Word	0	Stores the minimum value of the CH4 scaling value (i_Scaling_ValCH4).
CH5 Scaling maximum value	o_Scal_MaxValCH5	Word	0	Stores the maximum value of the CH5 scaling value (i_Scaling_ValCH5).
CH5 Scaling minimum value	o_Scal_MinValCH5	Word	0	Stores the minimum value of the CH5 scaling value (i_Scaling_ValCH5).
CH6 Scaling maximum value	o_Scal_MaxValCH6	Word	0	Stores the maximum value of the CH6 scaling value (i_Scaling_ValCH6).
CH6 Scaling minimum value	o_Scal_MinValCH6	Word	0	Stores the minimum value of the CH6 scaling value (i_Scaling_ValCH6).
CH7 Scaling maximum value	o_Scal_MaxValCH7	Word	0	Stores the maximum value of the CH7 scaling value (i_Scaling_ValCH7).
CH7 Scaling minimum value	o_Scal_MinValCH7	Word	0	Stores the minimum value of the CH7 scaling value (i_Scaling_ValCH7).

Name (Comment)	Label name	Data type	Initial value	Description
CH8 Scaling maximum value	o_Scal_MaxValCH8	Word	0	Stores the maximum value of the CH8 scaling value (i_Scaling_ValCH8).
CH8 Scaling minimum value	o_Scal_MinValCH8	Word	0	Stores the minimum value of the CH8 scaling value (i_Scaling_ValCH8).
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2012/06/29	First edition

Note

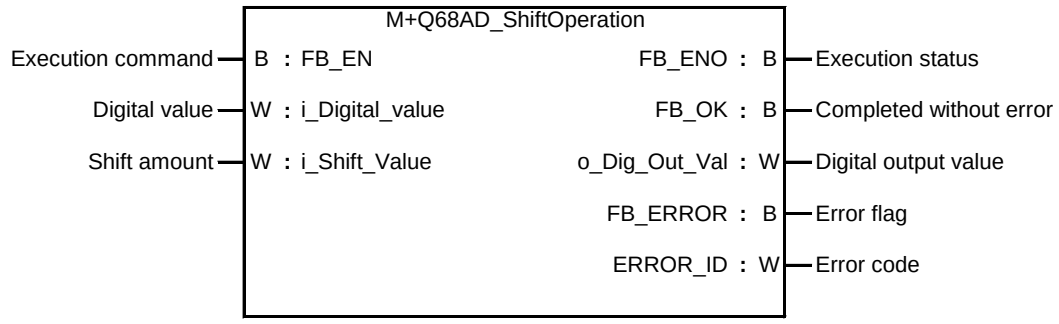
This chapter includes information related to the M+Q68AD_ScalingAllMaxMinOpe function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

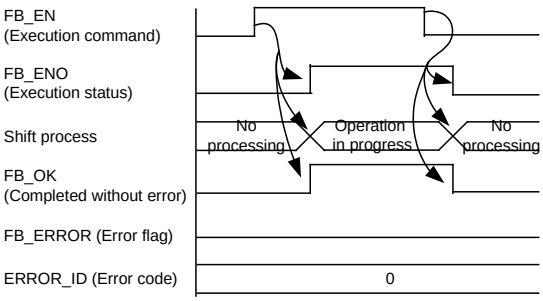
2.12 M+Q68AD_ShiftOperation (Shift process)

FB Name

M+Q68AD_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 (A/D conversion value) that was read.</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>Q68ADV, Q68ADI</td></tr>
<tr><td>CPU module</td><td>
<table>
<tr><th>Series</th><th>Model</th></tr>
<tr><td rowspan="3">MELSEC-Q Series *1</td><td>Basic model</td></tr>
<tr><td>High performance model</td></tr>
<tr><td>Universal model</td></tr>
</table>
*1 Not applicable to QCPU (A mode)
</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">162 steps (for MELSEC-Q series universal model 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 the following value. a) Digital value (A/D conversion value) b) Scaling value calculated by M+Q68AD_ScalingOperation (Scaling process) 2) If the sum exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767.
Compiling method	Macro type
Restrictions and precautions	1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation. 2) The FB cannot be used in an interrupt program. 3) Please ensure that the FB_EN signal is capable of being turned OFF by the program. Do not use this FB in programs that are only executed once such as a subroutine, FOR-NEXT loop, etc. because it is impossible to turn OFF. 4) Every input must be provided with a value for proper FB operation. 5) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q68AD module. Configure these settings by making the GX Works2 switch setting according to the application. For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common). 6) o_Dig_Out_Val (Digital output value) is valid when FB_OK (Completed without error) is turned ON. 7) o_Dig_Out_Val (Digital output value) is cleared to 0 by turning OFF FB_EN.
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	
Relevant manual	•Analog-Digital Converter Module User's Manual •QCPU User's Manual (Hardware Design, Maintenance and Inspection) •GX Works2 Version1 Operating Manual (Common) •GX Works2 Version1 Operating Manual (Simple Project, Function Block)

Error Codes

●Error code list

Error code	Description	Action
None	None	None

Labels

●Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Digital value	i_Digital_value	Word	-32,768~32,767	Specify the A/D conversion value that was read or specify the scaling value.
Shift amount	i_Shift_Value	Word	-32,768~32,767	Specify the amount to shift.

●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 process is being performed.
Digital output value	o_Dig_Out_Val	Word	0	Stores a sum obtained by adding the input digital value to the shift amount.
Error flag	FB_ERROR	Bit	OFF	Always OFF
Error code	ERROR_ID	Word	0	Always 0

FB Version Upgrade History

Version	Date	Description
1.00A	2012/06/29	First edition

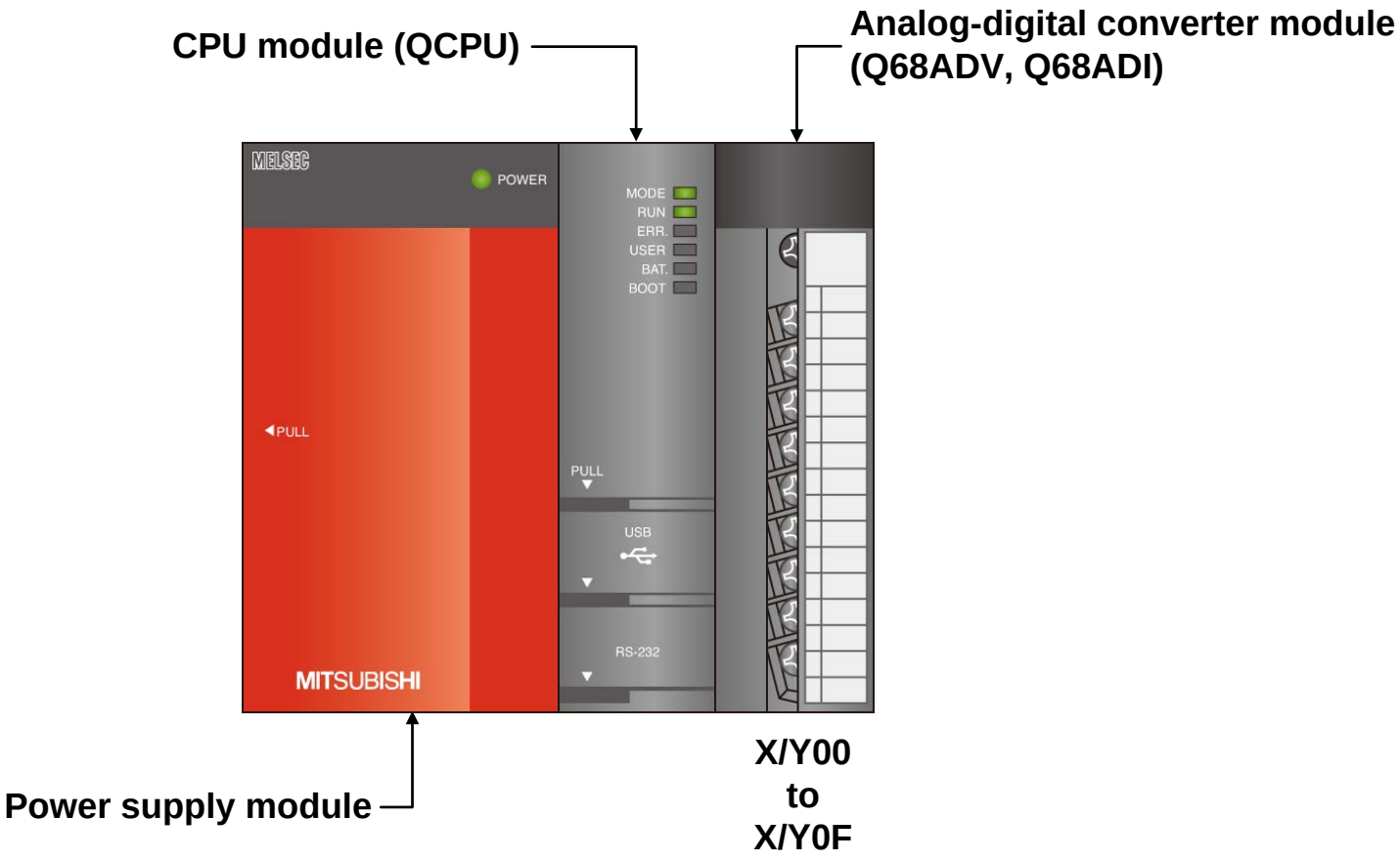
Note

This chapter includes information related to the M+Q68AD_ShiftOperation function block.
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.
Before using any Mitsubishi products, please read all relevant manuals.

Appendix 1. FB Library Application Examples

Q68AD FB application examples are as follows.

1) System configuration



Reminder

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

2) List of devices

a) External input (commands)

Device	FB name	Application (ON details)
M0	M+Q68AD_ReadADVal	Execution command
M10	M+Q68AD_ReadAllADVal	Execution command
M20	M+Q68AD_SetADConversion	Execution command
M21		A/D conversion enable/disable setting
M30	M+Q68AD_SetAverage	Execution command
M40	M+Q68AD_RequestSetting	Execution command
M50	M+Q68AD_SetOffsetVal	Execution command
M51		Offset value write request
M60	M+Q68AD_SetGainVal	Execution command
M61		Gain value write request
M70	M+Q68AD_ErrorOperation	Execution command
M71		Error reset request
M80	M+Q68AD_ScalingOperation	Execution command
D81		Scaling completion CH
M90	M+Q68AD_ScalingAllOperation	Execution command
M100	M+Q68AD_ScalingAllMaxMinOpe	Execution command
D90		CH1 Scaling value (CH1 Scaling output value (o_Scaling_ValCH1) of M+Q68AD_ScalingAllOperation)
D91		CH2 Scaling value (CH2 Scaling output value (o_Scaling_ValCH2) of M+Q68AD_ScalingAllOperation)
D92		CH3 Scaling value (CH3 Scaling output value (o_Scaling_ValCH3) of M+Q68AD_ScalingAllOperation)
D93		CH4 Scaling value (CH4 Scaling output value (o_Scaling_ValCH4) of M+Q68AD_ScalingAllOperation)
D94		CH5 Scaling value (CH5 Scaling output value (o_Scaling_ValCH5) of M+Q68AD_ScalingAllOperation)

Device	FB name	Application (ON details)
D95		CH6 Scaling value (CH6 Scaling output value (o_Scaling_ValCH6) of M+Q68AD_ScalingAllOperation)
D96		CH7 Scaling value (CH7 Scaling output value (o_Scaling_ValCH7) of M+Q68AD_ScalingAllOperation)
D97		CH8 Scaling value (CH8 Scaling output value (o_Scaling_ValCH8) of M+Q68AD_ScalingAllOperation)
D98		Scaling completion CH
M120	M+Q68AD_ShiftOperation	Execution command
D120		Digital value

b) External output (checks)

Device	FB name	Application (ON details)
M1	M+Q68AD_ReadADVal	A/D conversion data read FB ready
M2		A/D conversion data read complete
F0		A/D conversion data read FB error
D0		A/D conversion data read FB error code
D1		A/D conversion data
M11	M+Q68AD_ReadAllADVal	All channels batch read FB ready
M12		All channels batch read complete
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
M22	M+Q68AD_SetADConversion	A/D conversion enable/disable setting FB ready
M23		A/D conversion enable/disable setting complete
F5		A/D conversion enable/disable setting FB error
D20		A/D conversion enable/disable setting error code
M31	M+Q68AD_SetAverage	Averaging process setting FB ready
M32		Averaging process setting complete
F10		Averaging process setting FB error

Device	FB name	Application (ON details)
D30		Averaging process setting FB error code
M41	M+Q68AD_RequestSetting	Operating condition setting request operation FB ready
M42		Operating condition setting request operation FB setting complete
M52	M+Q68AD_SetOffsetVal	Offset value setting FB ready
M53		Offset value setting complete
F15		Offset value setting FB error
D50		Offset setting FB error code
M62	M+Q68AD_SetGainVal	Gain value setting FB ready
M63		Gain value setting complete
F20		Gain value setting FB error
D60		Gain setting FB error code
M72	M+Q68AD_ErrorOperation	Error operation ready
M73		Error operation complete
M74		Module error flag
D70		Module error code
M81	M+Q68AD_ScalingOperation	Scaling process FB ready
M82		Scaling process complete
D80		Scaling value
D81		Scaling completion CH
F25		Scaling process FB error
D82		Scaling process FB error code
M91	M+Q68AD_ScalingAllOperation	Scaling process (All CHs) FB ready
M92		Scaling process (All CHs) complete
D90		CH1 Scaling value
D91		CH2 Scaling value
D92		CH3 Scaling value
D93		CH4 Scaling value
D94		CH5 Scaling value
D95		CH6 Scaling value
D96		CH7 Scaling value
D97		CH8 Scaling value
D98		Scaling completion CH
M101	M+Q68AD_ScalingAllMaxMinOpe	Scaling maximum/minimum value process FB ready
M102		Scaling maximum/minimum value process complete
D100		CH1 Scaling maximum value
D101		CH1 Scaling minimum value

Device	FB name	Application (ON details)
D102		CH2 Scaling maximum value
D103		CH2 Scaling minimum value
D104		CH3 Scaling maximum value
D105		CH3 Scaling minimum value
D106		CH4 Scaling maximum value
D107		CH4 Scaling minimum value
D108		CH5 Scaling maximum value
D109		CH5 Scaling minimum value
D110		CH6 Scaling maximum value
D111		CH6 Scaling minimum value
D112		CH7 Scaling maximum value
D113		CH7 Scaling minimum value
D114		CH8 Scaling maximum value
D115		CH8 Scaling minimum value
M121	M+Q68AD_ShiftOperation	Shift process FB ready
M122		Shift process complete
D121		Digital output value

3) Global label settings

None

4) Application example settings

a) Common settings

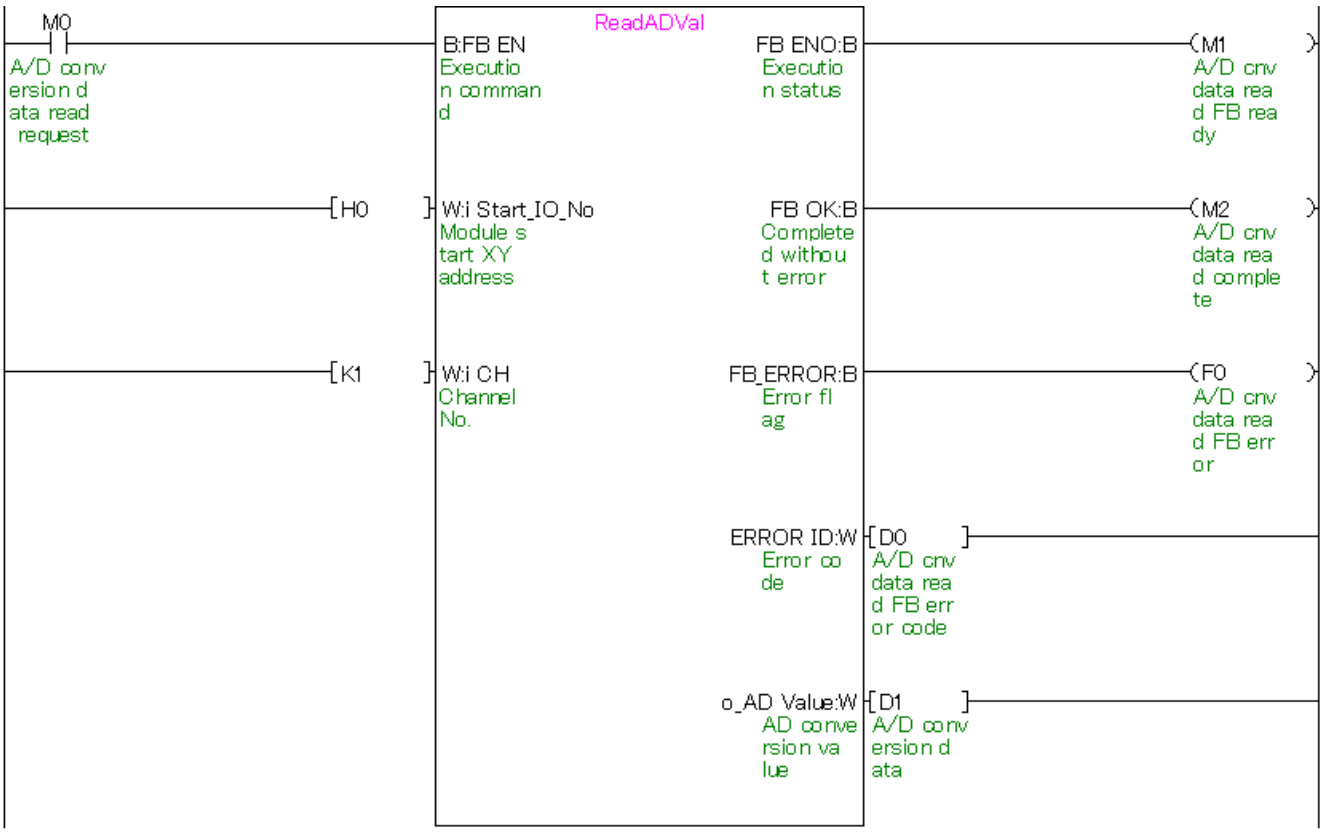
I/O item	Value	Description
Module start XY address	0	Specify the starting XY address where the Q68AD module is mounted.

5) Programs

M+Q68AD_ReadADVal (A/D conversion data read)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.

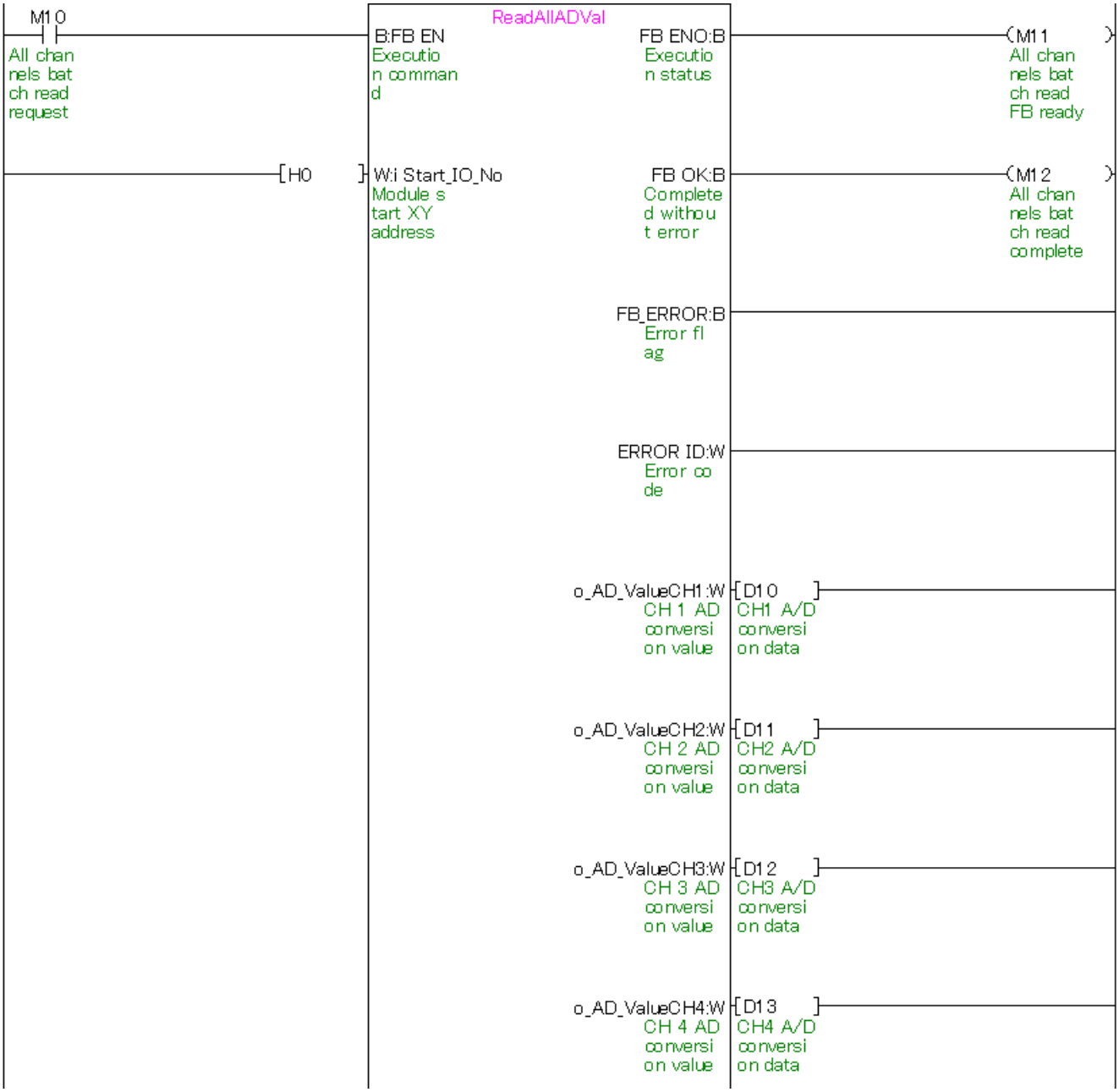
By turning ON M0, the A/D conversion data of channel 1 is read.



M+Q68AD_ReadAllADVal (A/D conversion data read (All CHs))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.

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



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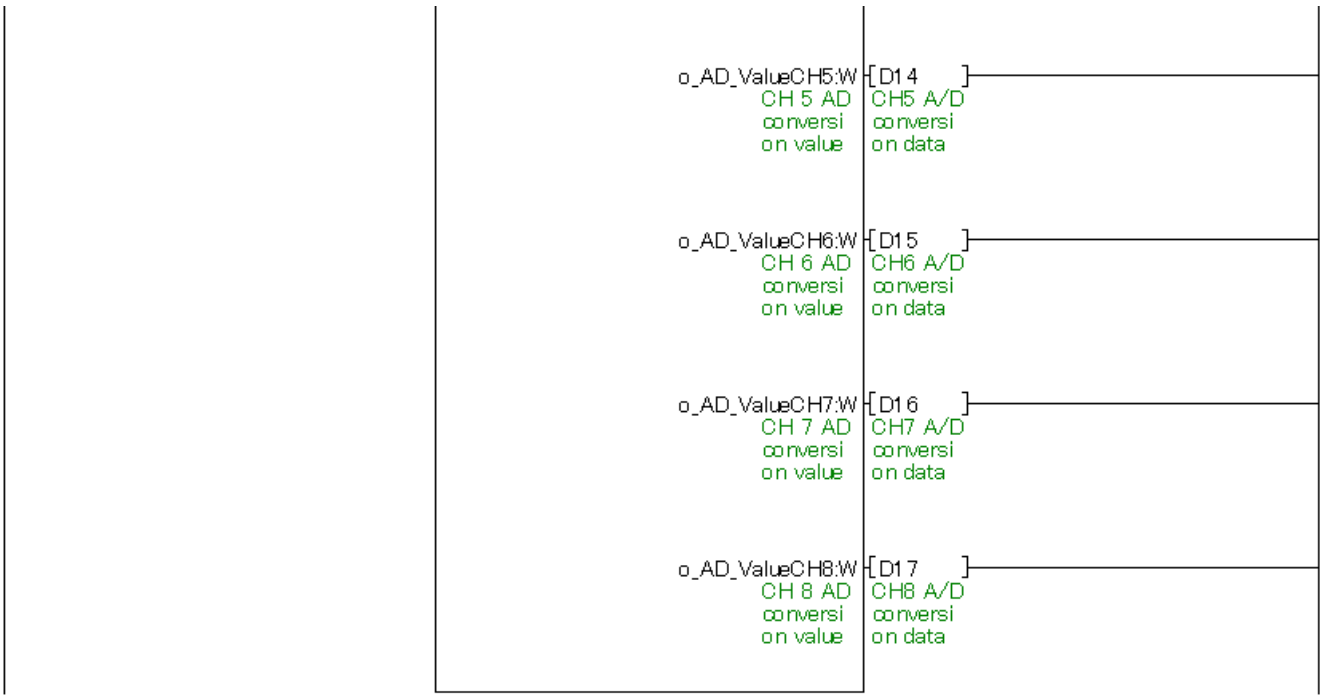
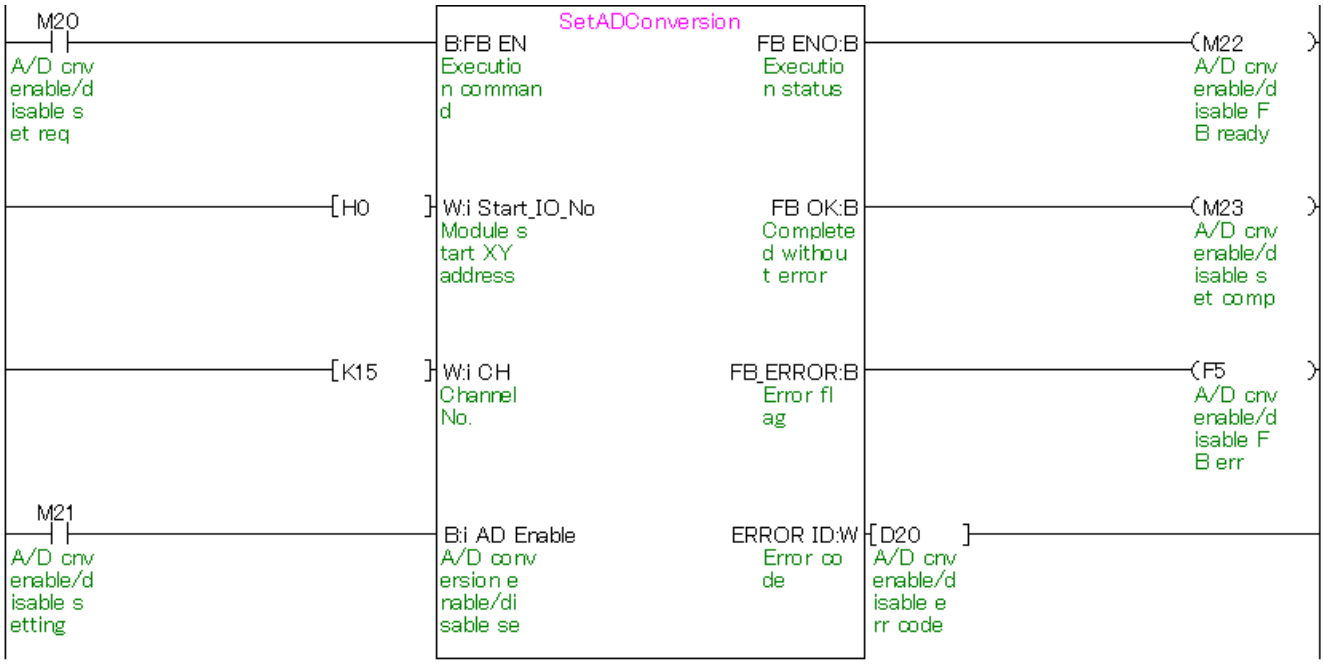

o_AD_ValueCH5:W
CH 5 AD conversion value
D14
CH5 A/D conversion data
o_AD_ValueCH6:W
CH 6 AD conversion value
D15
CH6 A/D conversion data
o_AD_ValueCH7:W
CH 7 AD conversion value
D16
CH7 A/D conversion data
o_AD_ValueCH8:W
CH 8 AD conversion value
D17
CH8 A/D conversion data

M+Q68AD_SetADConversion (A/D conversion enable/disable setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted 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 channels.

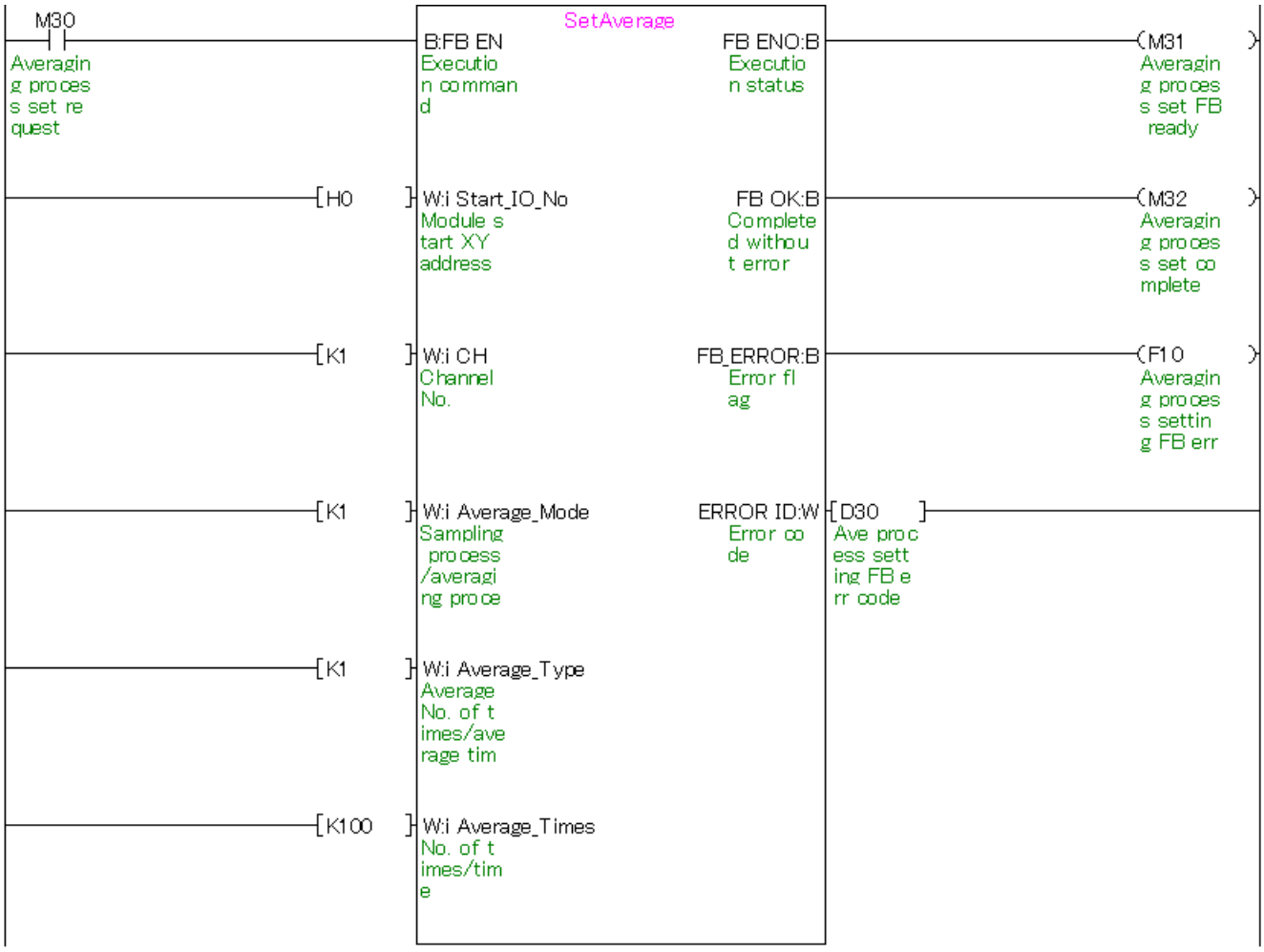
By turning ON M20, the A/D conversion enable/disable setting values of all channels are written to the buffer memory.



M+Q68AD_SetAverage (Averaging process setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Average_Mode	K1	Set the sampling process/averaging process setting to Averaging process.
i_Average_Type	K1	Set the average process type to Average time.
i_Average_Times	K100	Set the average time to 100.

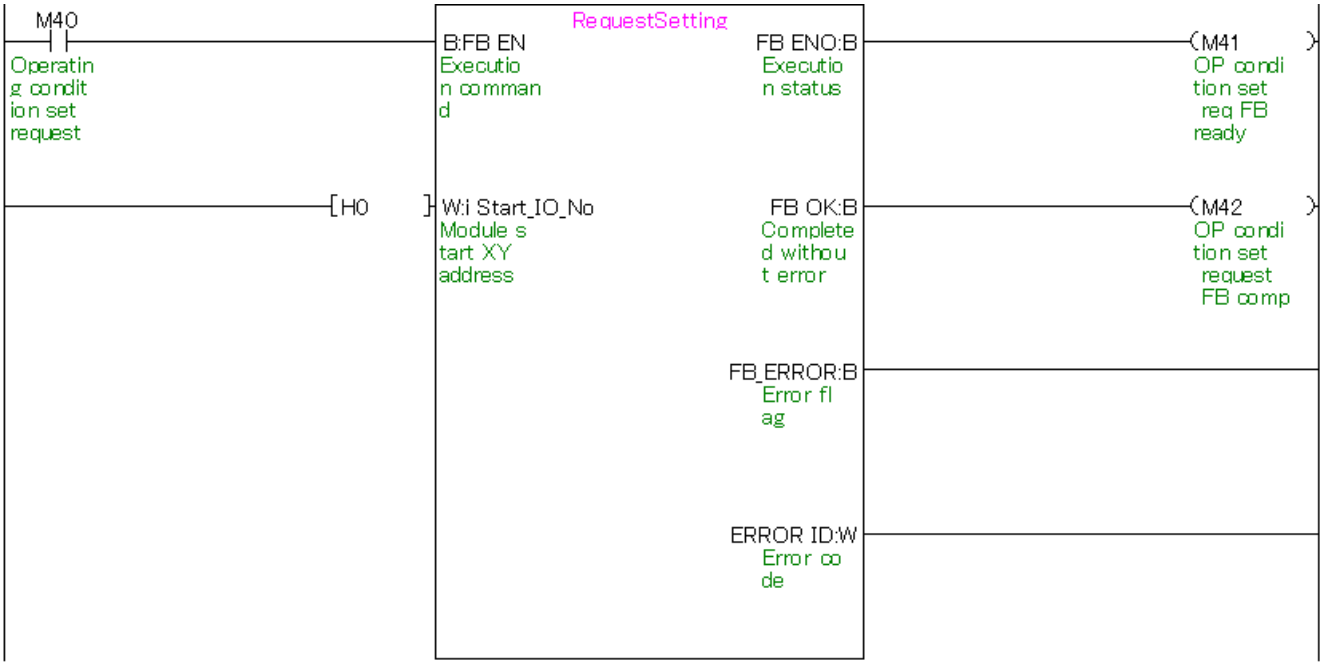
By turning ON M30, the averaging process setting value of channel 1 is written to the buffer memory.



M+Q68AD_RequestSetting (Operating condition setting request operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.

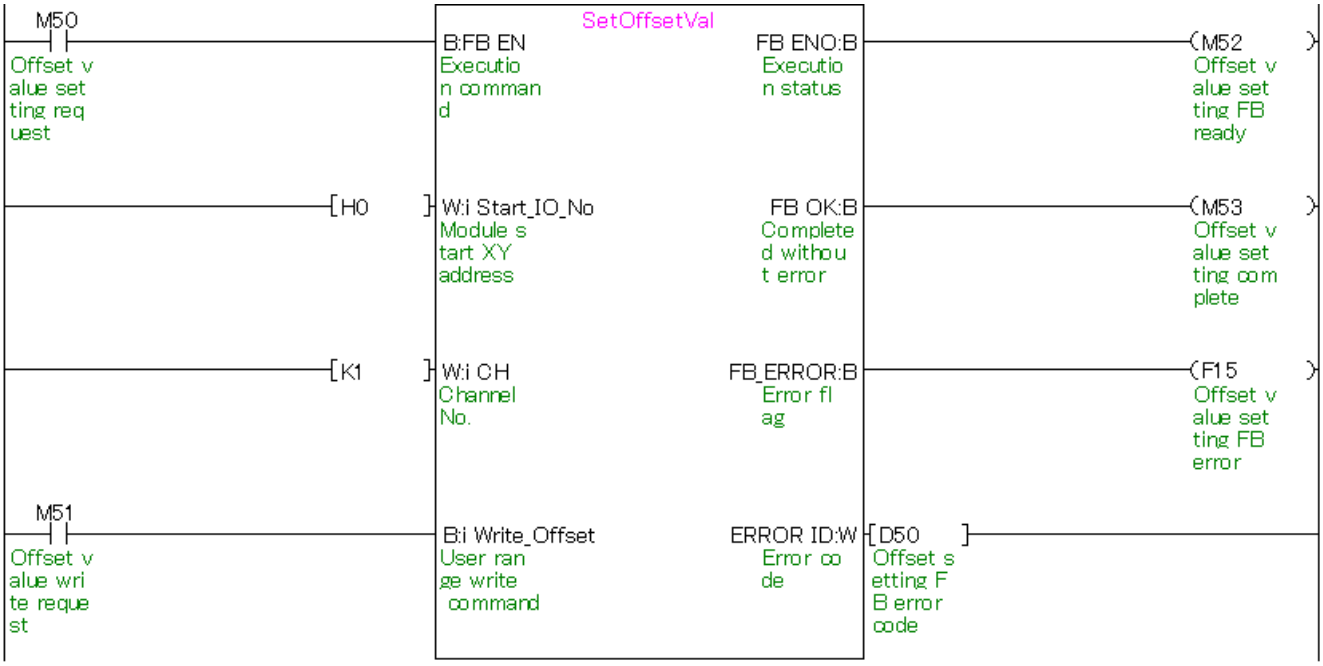
By turning ON M40, the A/D conversion enable/disable settings and averaging process settings are enabled.



M+Q68AD_SetOffsetVal (Offset setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Write_Offset	ON/OFF	Turn ON to perform user range write operation for channel 1.

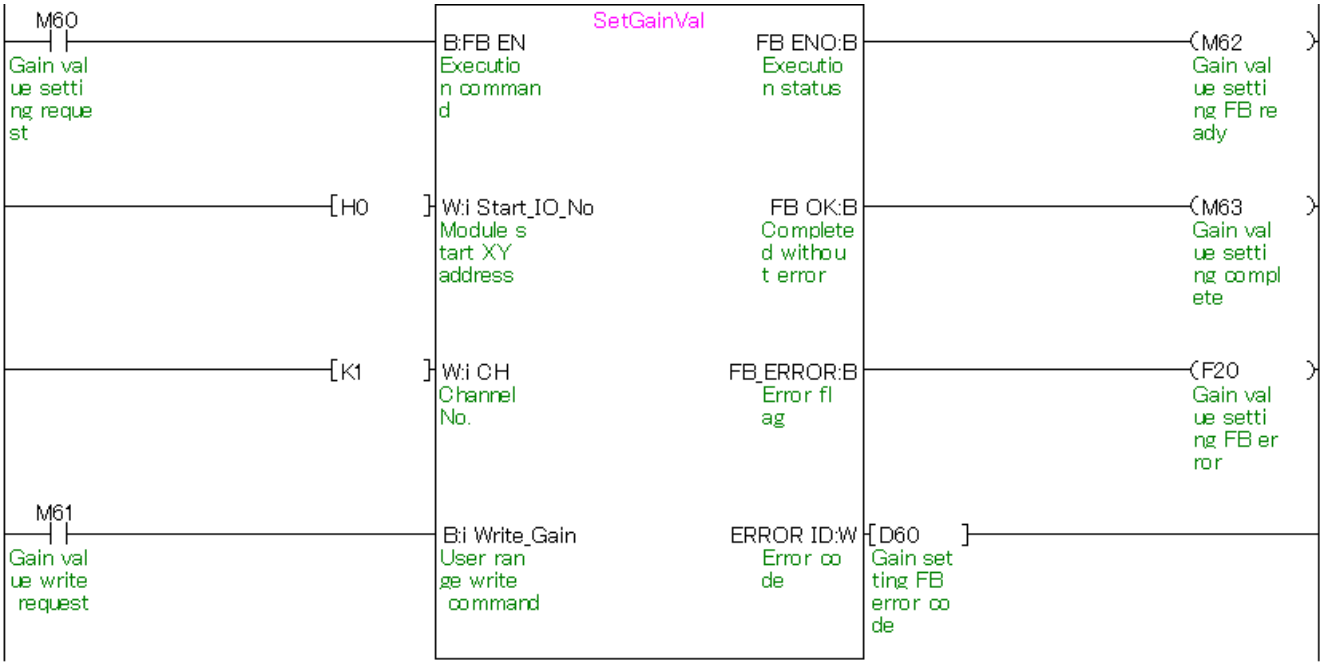
After turning ON M50, by turning ON M51, the offset value of channel 1 is written.



M+Q68AD_SetGainVal (Gain setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Write_Gain	ON/OFF	Turn ON to perform user range write operation for channel 1.

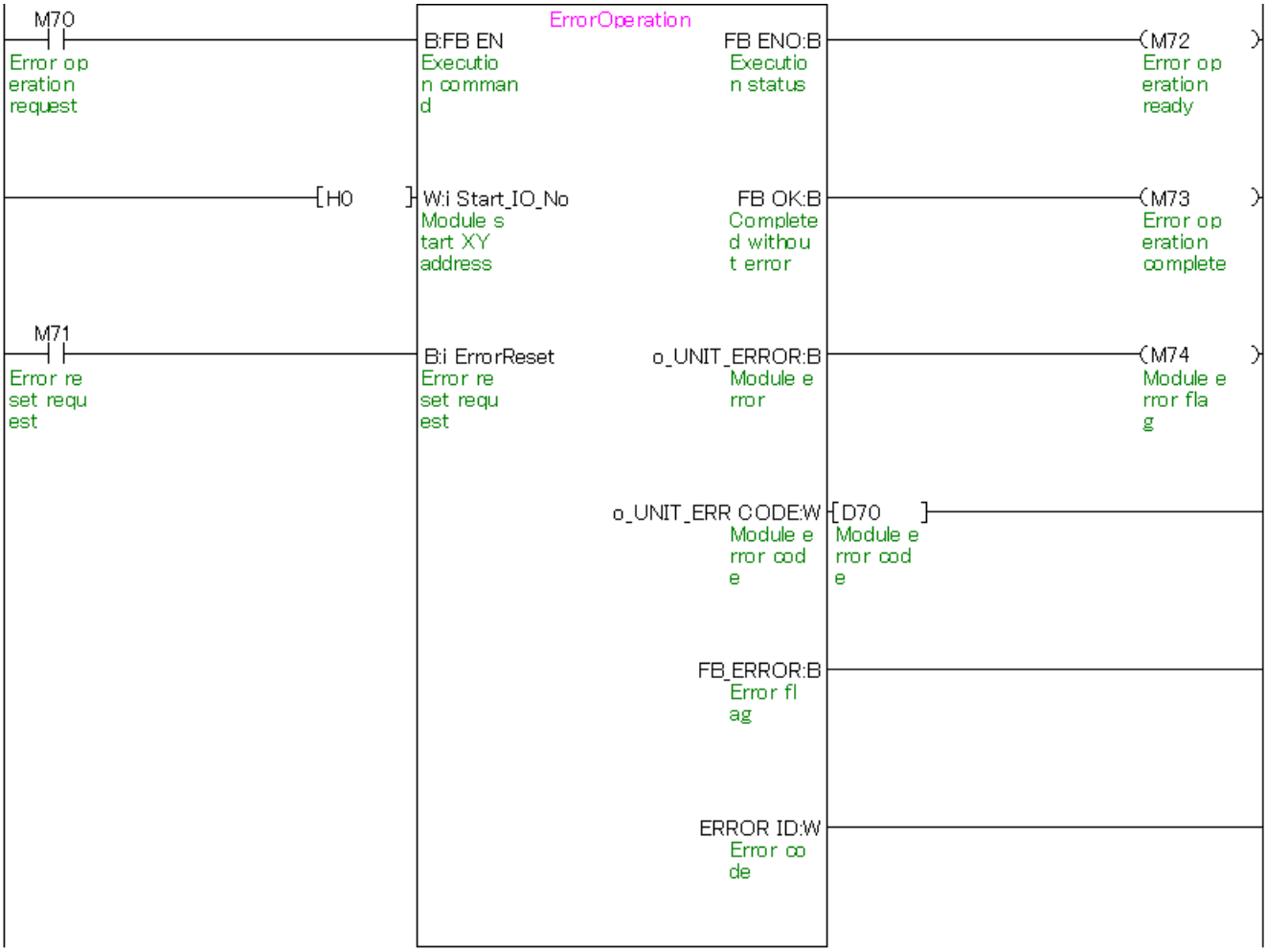
After turning ON M60, by turning ON M61, the gain value of channel 1 is written.



M+Q68AD_ErrorOperation (Error operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_ErrorReset	ON/OFF	Turn ON to perform error reset.

By turning ON M70, an error code is output when an error occurs. After an error output, by turning ON M71, the error is reset.

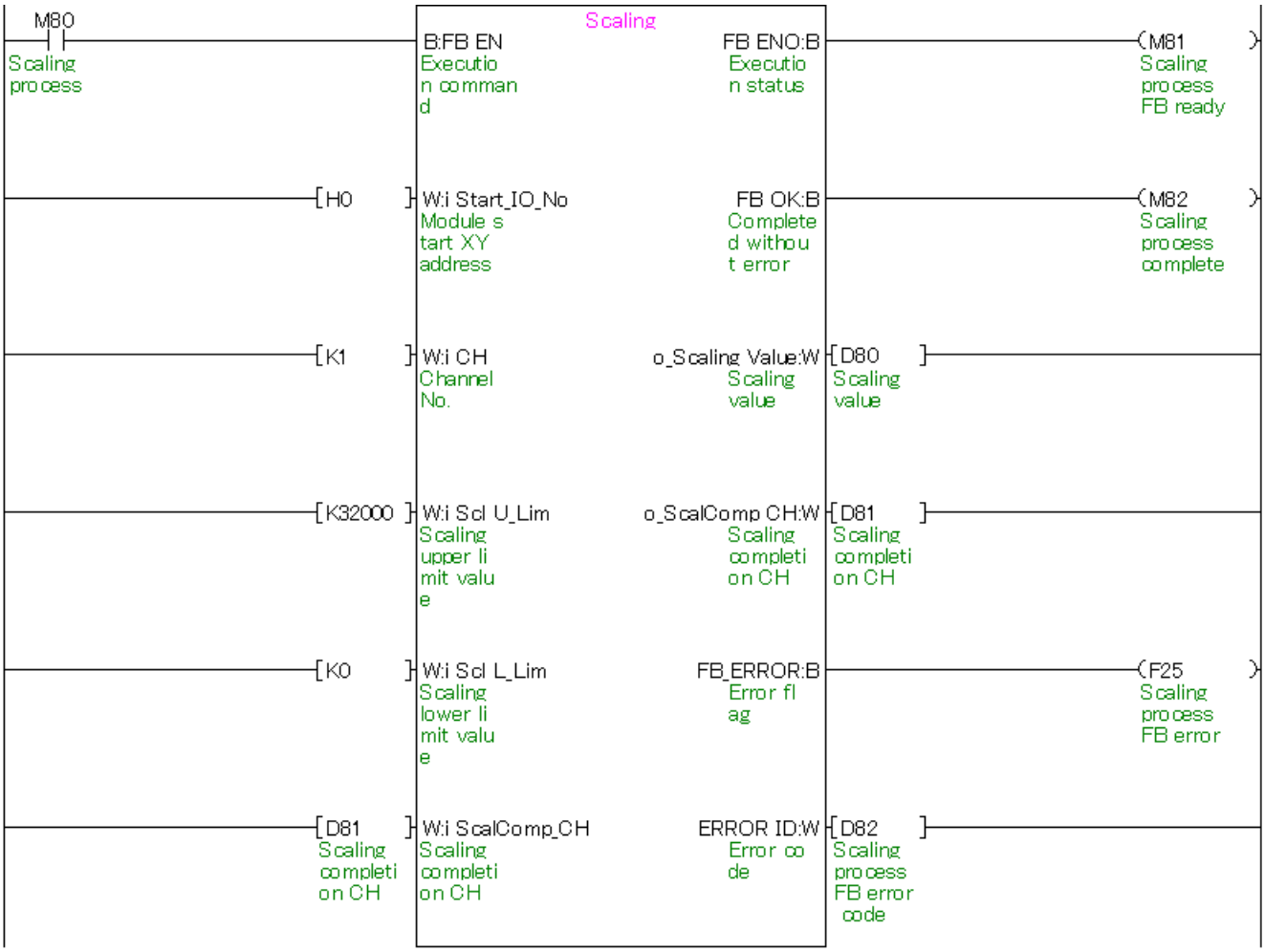


M+Q68AD_ScalingOperation (Scaling process)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_CH	K1	Set the target channel to all channels.
i_Scl_U_Lim	K32000	Set the scaling upper limit value to 32,000.
i_Scl_L_Lim	K0	Set the scaling lower limit value to 0.
i_ScalComp_CH	D81	Set information of the Scaling completion CH. *

* The same device must be set for i_ScalComp_CH (Scaling completion CH) and o_ScalComp_CH (Scaling completion CH).
When two or more of these FBs are used for channels, set the same device for the Scaling completion CHs of all FBs.

By turning ON M80, this FB performs conversion to the ratio value in a set width and outputs the conversion result to D80.



M+Q68AD_ScalingAllOperation (Scaling process (All CHs))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_Scl_U_LimCH1 to i_Scl_U_LimCH8	K32000	Set the scaling upper limit values of CH1 to CH8 to 32,000.
i_Scl_L_LimCH1 to i_Scl_L_LimCH8	K0	Set the scaling lower limit values of CH1 to CH8 to 0.

By turning ON M90, this FB performs conversion to the ratio values in set widths and outputs the conversion results to D90 to D97.

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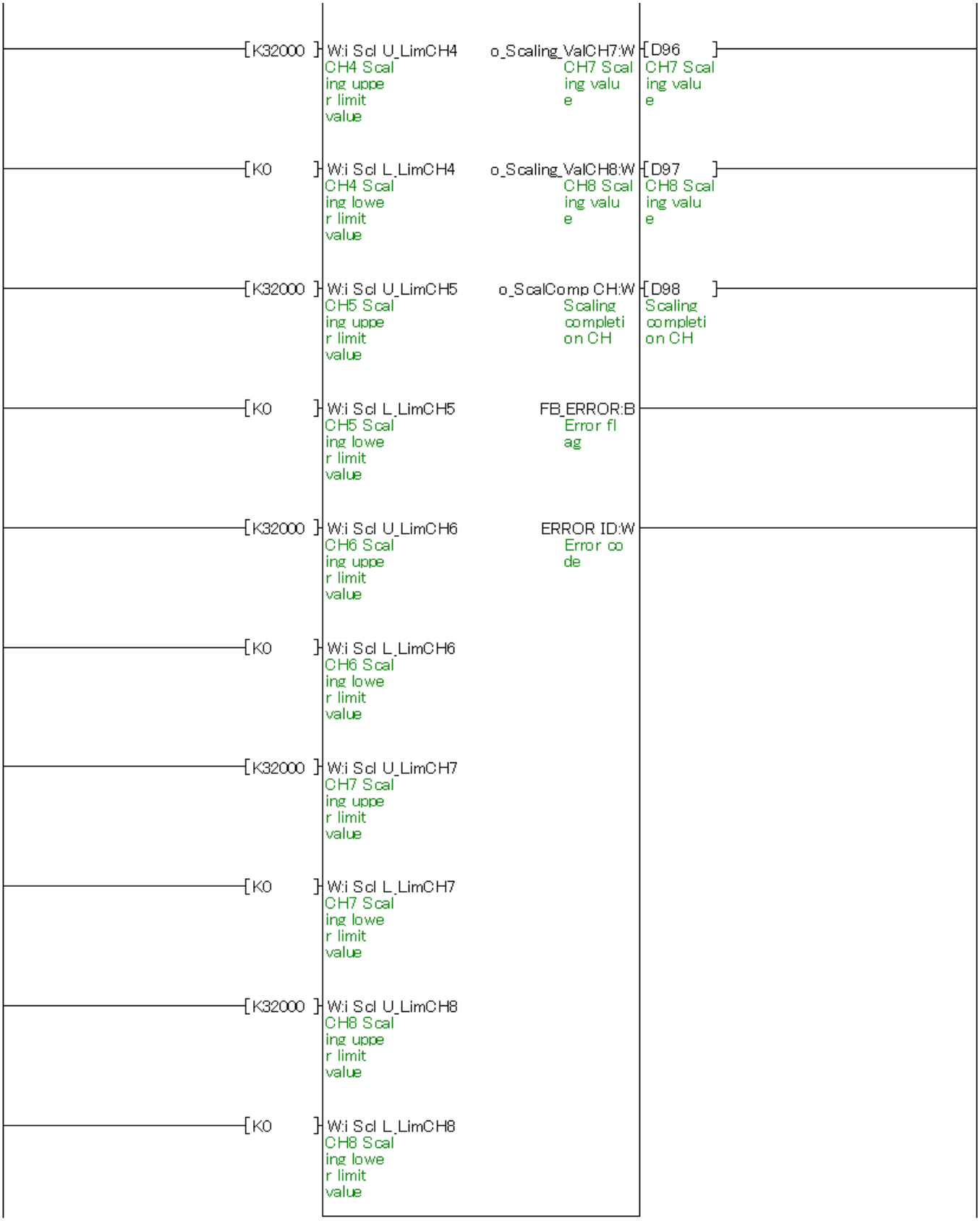
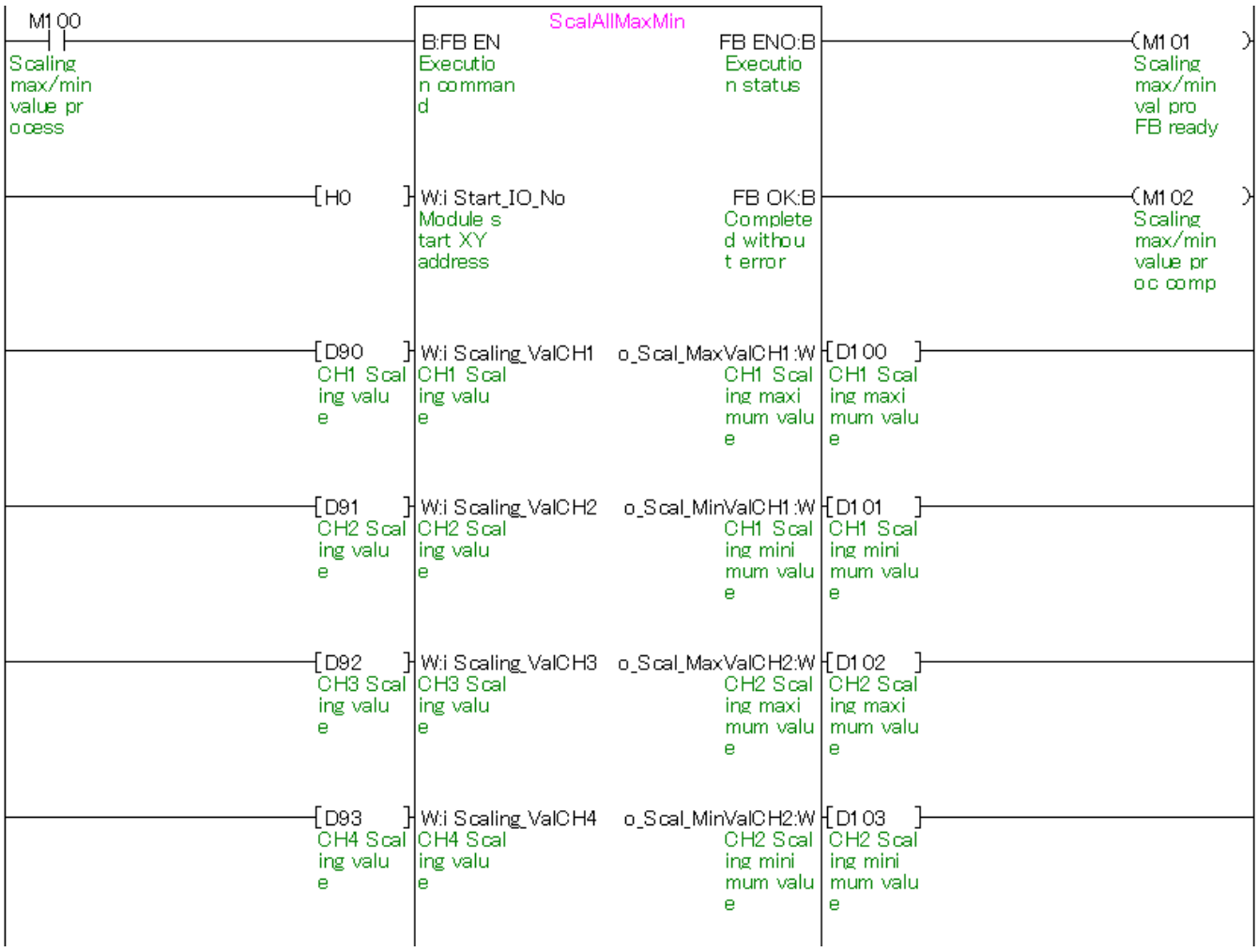

K32000
W:i Scl U_LimCH4
CH4 Scal
ing uppe
r limit
value
o_Scaling_ValCH7:W
CH7 Scal
ing valu
e
D96
CH7 Scal
ing valu
e
K0
W:i Scl L_LimCH4
CH4 Scal
ing lowe
r limit
value
o_Scaling_ValCH8:W
CH8 Scal
ing valu
e
D97
CH8 Scal
ing valu
e
K32000
W:i Scl U_LimCH5
CH5 Scal
ing uppe
r limit
value
o_ScalComp CH:W
Scaling
completi
on CH
D98
Scaling
completi
on CH
K0
W:i Scl L_LimCH5
CH5 Scal
ing lowe
r limit
value
FB_ERROR:B
Error fl
ag
K32000
W:i Scl U_LimCH6
CH6 Scal
ing uppe
r limit
value
ERROR ID:W
Error co
de
K0
W:i Scl L_LimCH6
CH6 Scal
ing lowe
r limit
value
K32000
W:i Scl U_LimCH7
CH7 Scal
ing uppe
r limit
value
K0
W:i Scl L_LimCH7
CH7 Scal
ing lowe
r limit
value
K32000
W:i Scl U_LimCH8
CH8 Scal
ing uppe
r limit
value
K0
W:i Scl L_LimCH8
CH8 Scal
ing lowe
r limit
value

M+Q68AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q68AD module is mounted to 0H.
i_Scaling_ValCH1 to i_Scaling_ValCH8	D90 to D97	Set the scaling values for CH1 to CH8.
i_ScalComp_CH	D98	Set the channels to perform the scaling maximum/minimum value process.

By turning ON M100, the scaling maximum/minimum values of CH1 to CH8 are output to D100 to D115.

* The scaling maximum/minimum values can be easily obtained by inputting the information of Scaling completion CH and scaling values, which were obtained by M+Q68AD_ScalingOperation (Scaling process) or M+Q68AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs)), in this FB.



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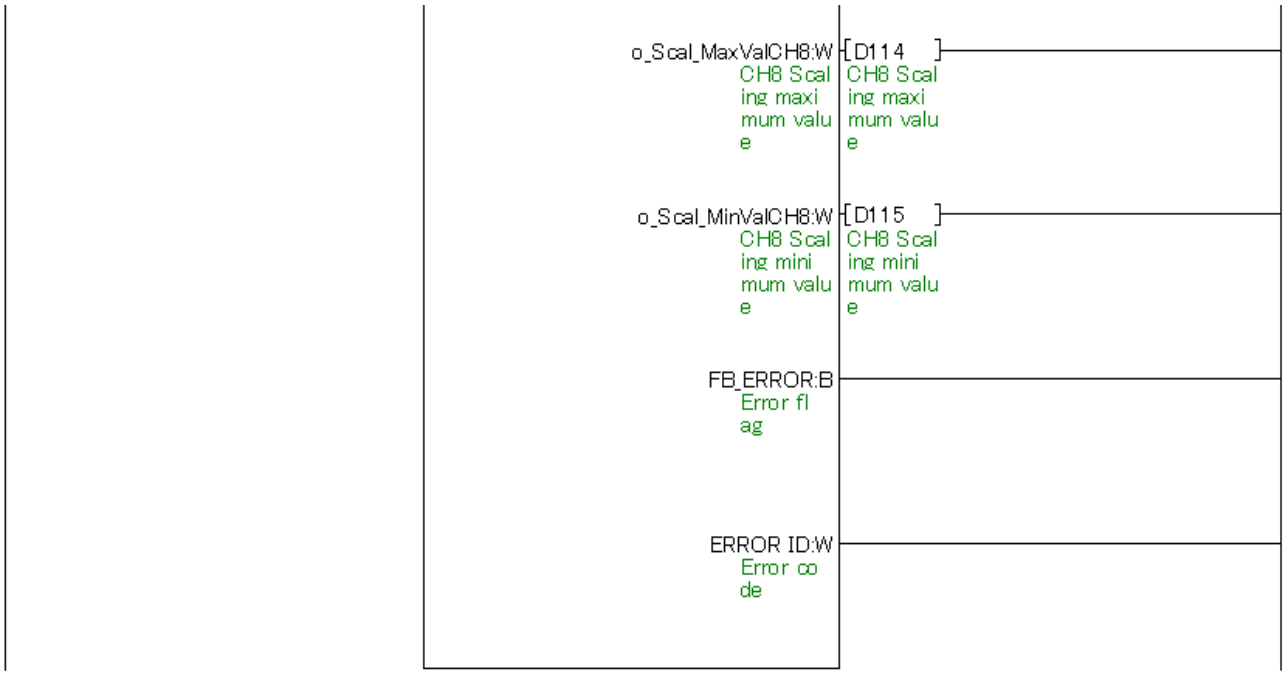
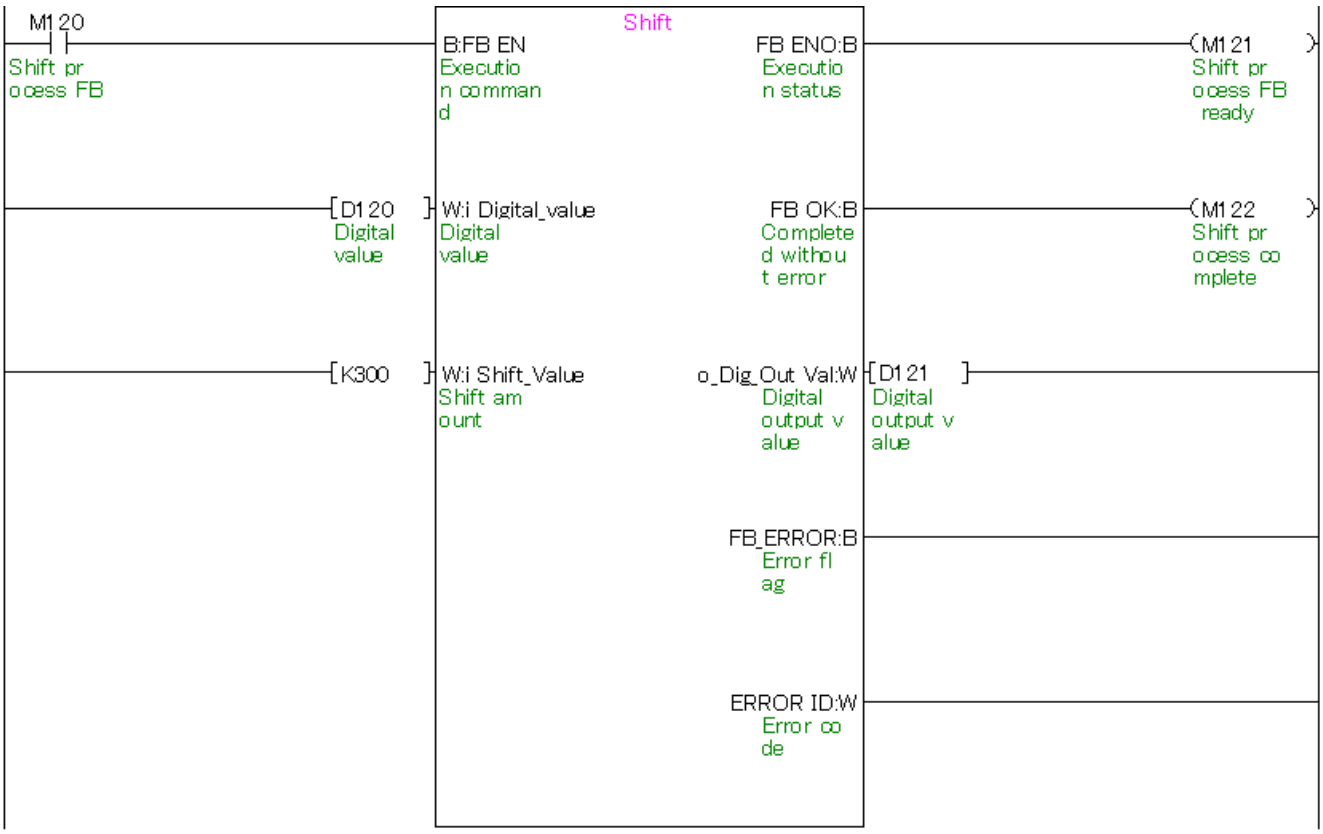

o_Scal_MaxValCH8:W
CH8 Scaling maximum value
D114
CH8 Scaling maximum value
o_Scal_MinValCH8:W
CH8 Scaling minimum value
D115
CH8 Scaling minimum value
FB_ERROR:B
Error flag
ERROR ID:W
Error code

M+Q68AD_ShiftOperation (Shift process)

Label name	Setting value	Description
i_Digital_Value	-	Set A/D conversion data.
i_Shift_Value	K300	Add 300 to the digital value.

By turning ON M120, 300 is added to D120 (Digital value) and the sum is output to D121.