

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

Applicable module:

Q64AD

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## Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M037-A	2010/11/15	First edition
FBM-M037-B	2012/06/29	1) Added the following FB library. <ul style="list-style-type: none"><li>•M+Q64AD_ScalingOperation</li><li>•M+Q64AD_ScalingAllOperation</li><li>•M+Q64AD_ScalingAllMaxMinOpe</li><li>•M+Q64AD_ShiftOperation</li></ul>

## 1. Overview

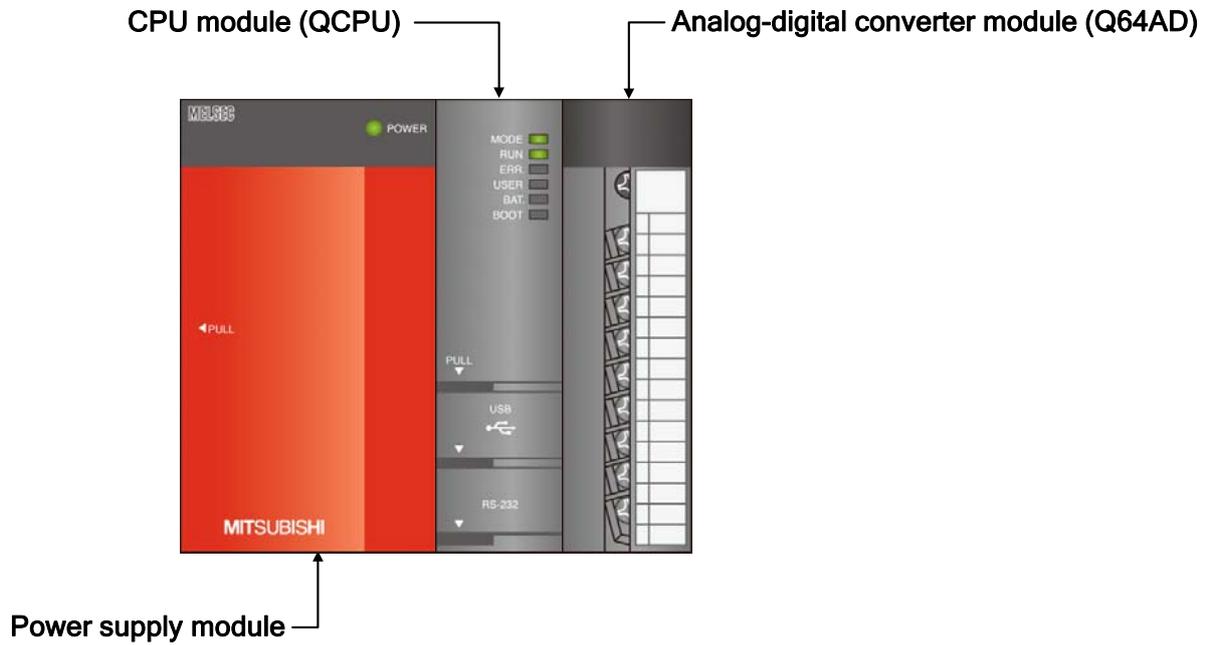
### 1.1 Overview of the FB Library

This FB library is for using the MELSEC-Q Q64AD analog-digital converter module.

### 1.2 Function of the FB Library

Item	Description
M+Q64AD_ReadADVal	Reads A/D conversion data of a specified channel.
M+Q64AD_ReadAllADVal	Reads A/D conversion data of all channels.
M+Q64AD_SetADConversion	Sets the A/D conversion enable/disable setting of a specified channel or all channels.
M+Q64AD_SetAverage	Sets averaging process of a specified channel.
M+Q64AD_RequestSetting	Enables settings of each function.
M+Q64AD_SetOffsetVal	Performs offset setting of a specified channel.
M+Q64AD_SetGainVal	Performs gain setting of a specified channel.
M+Q64AD_ErrorOperation	Monitors error codes and performs error reset.
M+Q64AD_ScalingOperation	Converts a digital value (A/D conversion value) of a specified channel to the ratio value in a set width.
M+Q64AD_ScalingAllOperation	Converts digital values (A/D conversion values) of all channels to the ratio values in set widths.
M+Q64AD_ScalingAllMaxMinOpe	Outputs the scaling maximum/minimum values by using the Scaling process FB (M+Q64AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q64AD_ScalingAllOperation).
M+Q64AD_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

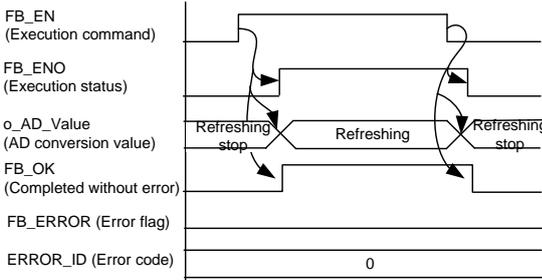
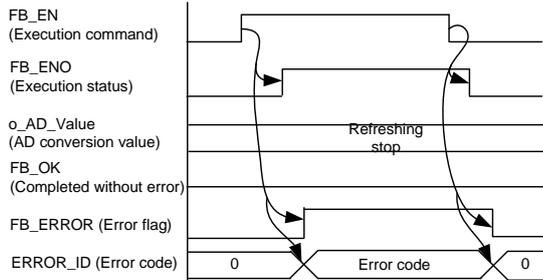
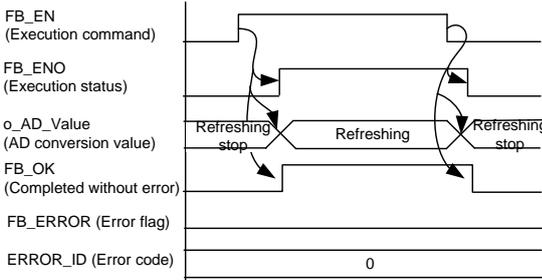
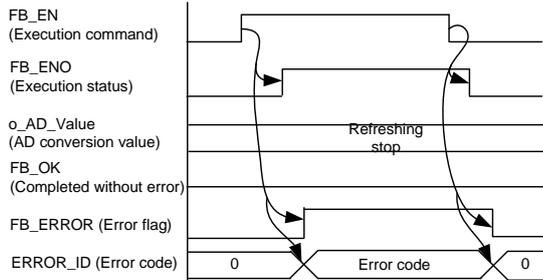
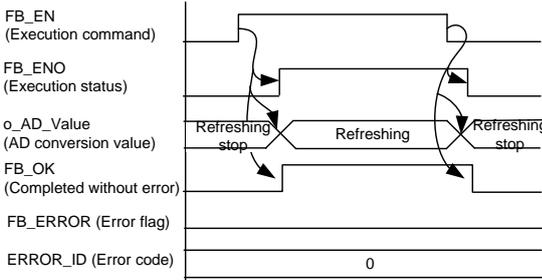
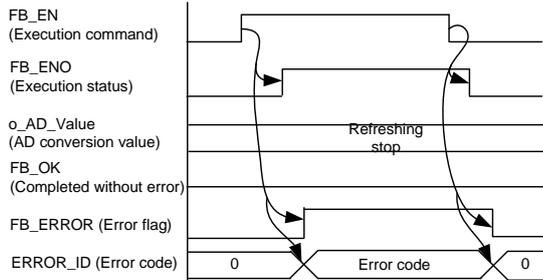
### 2.1 M+Q64AD\_ReadADVal (A/D conversion data read)

#### FB Name

M+Q64AD\_ReadADVal

#### Function Overview

Item	Description																				
Function overview	Reads A/D conversion data of a specified channel.																				
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center;">M+Q64AD_ReadADVal</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Execution command</td> <td style="width: 30%;">B : FB_EN</td> <td style="width: 30%;">FB_ENO : B</td> <td style="width: 10%;">Execution status</td> </tr> <tr> <td>Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B</td> <td>Completed without error</td> </tr> <tr> <td>Channel No.</td> <td>W : i_CH</td> <td>FB_ERROR : B</td> <td>Error flag</td> </tr> <tr> <td></td> <td></td> <td>ERROR_ID : W</td> <td>Error code</td> </tr> <tr> <td></td> <td></td> <td>o_AD_Value : W</td> <td>AD conversion value</td> </tr> </table> </div>	Execution command	B : FB_EN	FB_ENO : B	Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error	Channel No.	W : i_CH	FB_ERROR : B	Error flag			ERROR_ID : W	Error code			o_AD_Value : W	AD conversion value
Execution command	B : FB_EN	FB_ENO : B	Execution status																		
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		ERROR_ID : W	Error code																		
		o_AD_Value : W	AD conversion value																		
Applicable hardware and software	Analog-digital converter module	Q64AD																			
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model													
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	Universal model																				
Engineering software	GX Works2 *1 <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td>English version</td> <td>Version1.24A or later</td> </tr> <tr> <td>Chinese version</td> <td>Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later														
Language	Software version																				
English version	Version1.24A or later																				
Chinese version	Version1.49B or later																				
Programming language	Ladder																				
Number of steps	201 steps (for MELSEC-Q series high performance 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.																				

Item	Description		
Function description	<p>1) By turning ON FB_EN (Execution command), A/D conversion data of the specified channel is read.</p> <p>2) The read A/D conversion data depends on the resolution mode of the input range setting.</p> <p>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.</p> <p>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.</p>		
Compiling method	Macro type		
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>5) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>6) Every input must be provided with a value for proper FB operation.</p> <p>7) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>		
FB operation type	Real-time execution		
Application example	Refer to "Appendix 1 - FB Library Application Examples".		
Timing chart	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>[When operation completes without error]</p>  </td> <td style="width: 50%; vertical-align: top;"> <p>[When an error occurs]</p>  </td> </tr> </table>	<p>[When operation completes without error]</p> 	<p>[When an error occurs]</p> 
<p>[When operation completes without error]</p> 	<p>[When an error occurs]</p> 		

Item	Description
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4	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+Q64AD\_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+Q64AD\_ReadAllADVal (A/D conversion data read (All CHs))

### FB Name

M+Q64AD\_ReadAllADVal

### Function Overview

Item	Description							
Function overview	Reads A/D conversion data of all channels.							
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">M+Q64AD_ReadAllADVal</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">           Execution command — B : FB_EN            Module start XY address — W : i_Start_IO_No         </td> <td style="width: 40%; border: 1px solid black; padding: 5px;"> </td> <td style="width: 30%; vertical-align: top;">           FB_ENO : B — Execution status            FB_OK : B — Completed without error            FB_ERROR : B — Error flag            ERROR_ID : W — Error code            o_AD_ValueCH1 : W — CH 1 AD conversion value            o_AD_ValueCH2 : W — CH 2 AD conversion value            o_AD_ValueCH3 : W — CH 3 AD conversion value            o_AD_ValueCH4 : W — CH 4 AD conversion value         </td> </tr> </table> </div>		Execution command — B : FB_EN Module start XY address — W : i_Start_IO_No		FB_ENO : B — Execution status FB_OK : B — Completed without error FB_ERROR : B — Error flag ERROR_ID : W — Error code o_AD_ValueCH1 : W — CH 1 AD conversion value o_AD_ValueCH2 : W — CH 2 AD conversion value o_AD_ValueCH3 : W — CH 3 AD conversion value o_AD_ValueCH4 : W — CH 4 AD conversion value			
Execution command — B : FB_EN Module start XY address — W : i_Start_IO_No		FB_ENO : B — Execution status FB_OK : B — Completed without error FB_ERROR : B — Error flag ERROR_ID : W — Error code o_AD_ValueCH1 : W — CH 1 AD conversion value o_AD_ValueCH2 : W — CH 2 AD conversion value o_AD_ValueCH3 : W — CH 3 AD conversion value o_AD_ValueCH4 : W — CH 4 AD conversion value						
Applicable hardware and software	Analog-digital converter module	Q64AD						
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model
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	High performance model							
	Universal model							
Engineering software	GX Works2 *1 <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 30%;">Language</th> <th style="width: 70%;">Software version</th> </tr> </thead> <tbody> <tr> <td>English version</td> <td>Version1.24A or later</td> </tr> <tr> <td>Chinese version</td> <td>Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later	
Language	Software version							
English version	Version1.24A or later							
Chinese version	Version1.49B or later							
Programming language	Ladder							
Number of steps	200 steps (for MELSEC-Q series high performance 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.							

Item	Description
Function description	<p>1) By turning ON FB_EN (Execution command), A/D conversion data of all channels is read.</p> <p>2) The read A/D conversion data depends on the resolution mode of input range setting.</p> <p>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.</p>
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) This FB uses index registers Z9 and Z8. Please do not use these index registers in an interrupt program.</p> <p>5) Every input must be provided with a value for proper FB operation.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	<p>The timing chart illustrates the sequence of events during the execution of the FB. It shows the following signals and their states over time:</p> <ul style="list-style-type: none"> <li><b>FB_EN (Execution command):</b> A pulse that starts the execution.</li> <li><b>FB_ENO (Execution status):</b> A pulse that occurs during the AD conversion.</li> <li><b>AD conversion value (All CHs):</b> Shows a 'Refreshing stop' period followed by a 'Refreshing' period.</li> <li><b>FB_OK (Completed without error):</b> A pulse that occurs at the end of the AD conversion.</li> <li><b>FB_ERROR (Error flag):</b> Shown as 0, indicating no error.</li> <li><b>ERROR_ID (Error code):</b> Shown as 0, indicating no error.</li> </ul>
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. 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 Q64AD 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.

## FB Version Upgrade History

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

## Note

This chapter includes information related to the M+Q64AD\_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+Q64AD\_SetADConversion (A/D conversion enable/disable setting)

#### FB Name

M+Q64AD\_SetADConversion

#### Function Overview

Item	Description																	
Function overview	Sets the A/D conversion enable/disable setting of a specified channel or all channels.																	
Symbol	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">M+Q64AD_SetADConversion</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px;">Execution command</td> <td style="width: 30%; padding: 2px;">B : FB_EN</td> <td style="width: 30%; padding: 2px;">FB_ENO : B</td> <td style="width: 10%; padding: 2px;">— Execution status</td> </tr> <tr> <td style="padding: 2px;">Module start XY address</td> <td style="padding: 2px;">W : i_Start_IO_No</td> <td style="padding: 2px;">FB_OK : B</td> <td style="padding: 2px;">— Completed without error</td> </tr> <tr> <td style="padding: 2px;">Channel No.</td> <td style="padding: 2px;">W : i_CH</td> <td style="padding: 2px;">FB_ERROR : B</td> <td style="padding: 2px;">— Error flag</td> </tr> <tr> <td style="padding: 2px;">A/D conversion enable/disable setting</td> <td style="padding: 2px;">B : i_AD_Enable</td> <td style="padding: 2px;">ERROR_ID : W</td> <td style="padding: 2px;">— Error code</td> </tr> </table> </div>		Execution command	B : FB_EN	FB_ENO : B	— Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B	— Completed without error	Channel No.	W : i_CH	FB_ERROR : B	— Error flag	A/D conversion enable/disable setting	B : i_AD_Enable	ERROR_ID : W	— Error code
Execution command	B : FB_EN	FB_ENO : B	— Execution status															
Module start XY address	W : i_Start_IO_No	FB_OK : B	— Completed without error															
Channel No.	W : i_CH	FB_ERROR : B	— Error flag															
A/D conversion enable/disable setting	B : i_AD_Enable	ERROR_ID : W	— Error code															
Applicable hardware and software	Analog-digital converter module	Q64AD																
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Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later											
Language	Software version																	
English version	Version1.24A or later																	
Chinese version	Version1.49B or later																	
Programming language	Ladder																	
Number of steps	<p>244 steps (for MELSEC-Q series high performance model CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>																	

Item	Description		
Function description	<p>1) By turning ON FB_EN (Execution command), A/D conversion enable/disable setting of the specified channel or all channels is set.</p> <p>2) FB operation is one-shot only, triggered by the FB_EN signal.</p> <p>3) The new setting value will not take effect until the 'operating condition setting request' signal (Yn9) is turned OFF-&gt;ON-&gt;OFF or the Operating condition setting request FB (M+Q64AD_RequestSetting) is executed.</p> <p>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.</p>		
Compiling method	Macro type		
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>5) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>6) Every input must be provided with a value for proper FB operation.</p> <p>7) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1 - FB Library Application Examples".		
Timing chart	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>[When operation completes without error]</b></p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>[When an error occurs]</b></p> </td> </tr> </table>	<p><b>[When operation completes without error]</b></p>	<p><b>[When an error occurs]</b></p>
<p><b>[When operation completes without error]</b></p>	<p><b>[When an error occurs]</b></p>		

Item	Description
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4, 15	1~4: 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+Q64AD\_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.

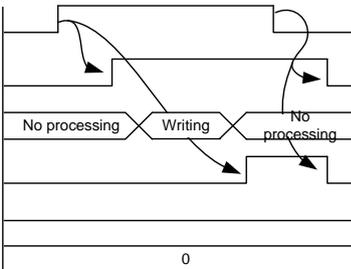
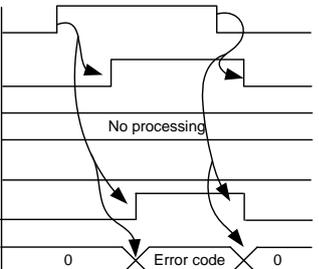
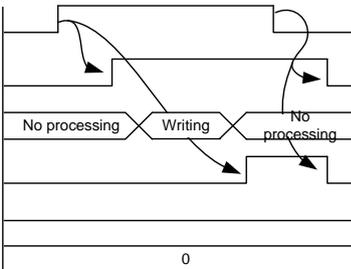
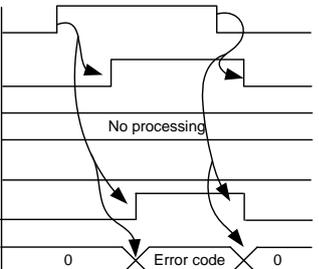
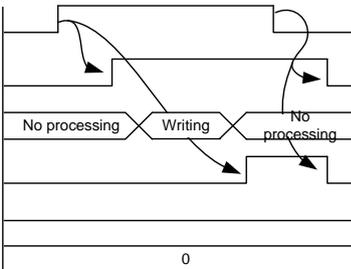
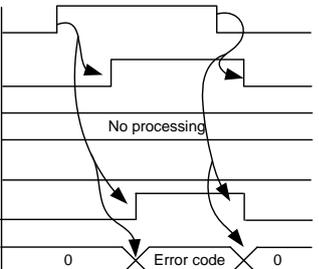
## 2.4 M+Q64AD\_SetAverage (Averaging process setting)

### FB Name

M+Q64AD\_SetAverage

### Function Overview

Item	Description							
Function overview	Sets averaging process of a specified channel.							
Symbol	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="width: 45%;"> <p>Execution command — B : FB_EN</p> <p>Module start XY address — W : i_Start_IO_No</p> <p>Channel No. — W : i_CH</p> <p>Sampling process/averaging process setting — W : i_Average_Mode</p> <p>Average No. of times/average time — W : i_Average_Type</p> <p>No. of times/time — W : i_Average_Times</p> </div> <div style="width: 10%; text-align: center; border: 1px solid black; padding: 5px;"> <p>M+Q64AD_SetAverage</p> </div> <div style="width: 40%;"> <p>FB_ENO : B — Execution status</p> <p>FB_OK : B — Completed without error</p> <p>FB_ERROR : B — Error flag</p> <p>ERROR_ID : W — Error code</p> </div> </div>							
Applicable hardware and software	Analog-digital converter module	Q64AD						
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model
	Series	Model						
MELSEC-Q Series *1	Basic model							
	High performance model							
	Universal model							
Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Language</th> <th style="width: 70%;">Software version</th> </tr> </thead> <tbody> <tr> <td>English version</td> <td>Version1.24A or later</td> </tr> <tr> <td>Chinese version</td> <td>Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later	
Language	Software version							
English version	Version1.24A or later							
Chinese version	Version1.49B or later							
Programming language	Ladder							
Number of steps	<p>277 steps (for MELSEC-Q series high performance model CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>							

Item	Description				
Function description	<p>1) By turning ON FB_EN (Execution command), averaging process setting of the specified channel is set.</p> <p>2) FB operation is one-shot only, triggered by the FB_EN signal.</p> <p>3) The new setting value will not take effect until the 'operating condition setting request' signal (Yn9) is turned OFF-&gt;ON-&gt;OFF or the Operating condition setting request FB (M+Q64AD_RequestSetting) is executed.</p> <p>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.</p>				
Compiling method	Macro type				
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>5) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>				
FB operation type	Pulsed execution (1 scan execution type)				
Application example	Refer to "Appendix 1 - FB Library Application Examples".				
Timing chart	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>[When operation completes without error]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>[When an error occurs]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p> </td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	<p><b>[When operation completes without error]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p>	<p><b>[When an error occurs]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p>		
<p><b>[When operation completes without error]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p>	<p><b>[When an error occurs]</b></p> <p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Average time/average No. of times write processing</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p>				
					

Item	Description
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4	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+Q64AD\_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+Q64AD\_RequestSetting (Operating condition setting request operation)

### FB Name

M+Q64AD\_RequestSetting

### Function Overview

Item	Description																			
Function overview	Enables settings of each function.																			
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">M+Q64AD_RequestSetting</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Execution command</td> <td>B : FB_EN</td> <td style="width: 30%;">FB_ENO : B</td> <td style="width: 30%;">Execution status</td> </tr> <tr> <td>Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B</td> <td>Completed without error</td> </tr> <tr> <td></td> <td></td> <td>FB_ERROR : B</td> <td>Error flag</td> </tr> <tr> <td></td> <td></td> <td>ERROR_ID : W</td> <td>Error code</td> </tr> </tbody> </table>		M+Q64AD_RequestSetting		Execution command	B : FB_EN	FB_ENO : B	Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error			FB_ERROR : B	Error flag			ERROR_ID : W	Error code
M+Q64AD_RequestSetting																				
Execution command	B : FB_EN	FB_ENO : B	Execution status																	
Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error																	
		FB_ERROR : B	Error flag																	
		ERROR_ID : W	Error code																	
Applicable hardware and software	Analog-digital converter module	Q64AD																		
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model												
	Series	Model																		
MELSEC-Q Series *1	Basic model																			
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	Universal model																			
Engineering software	GX Works2 *1 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td>English version</td> <td>Version1.24A or later</td> </tr> <tr> <td>Chinese version</td> <td>Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later													
Language	Software version																			
English version	Version1.24A or later																			
Chinese version	Version1.49B or later																			
Programming language	Ladder																			
Number of steps	165 steps (for MELSEC-Q series high performance 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), 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.																			

Item	Description
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>3) This FB uses index register Z9. Please do not use this index register in an interrupt program.</p> <p>4) When this FB is executed, AD conversion processing is stopped. After turning ON FB_OK, the conversion processing resumes.</p> <p>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.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	<p>The timing chart illustrates the sequence of events for the FB. It shows the following signals and their states over time:</p> <ul style="list-style-type: none"> <li><b>FB_EN (Execution command):</b> A pulse that starts the execution.</li> <li><b>FB_ENO (Execution status):</b> A signal that becomes active (low) when execution begins and returns to high when execution is complete.</li> <li><b>Operating condition setting request (Y signal):</b> A pulse that occurs during the execution period.</li> <li><b>Operating condition setting completion flag (X signal):</b> A pulse that occurs after the Y signal, indicating the completion of the setting process.</li> <li><b>FB_OK (Completed without error):</b> A pulse that occurs after the X signal, indicating successful completion.</li> <li><b>FB_ERROR (Error flag):</b> Remains inactive (low) throughout the execution.</li> <li><b>ERROR_ID (Error code):</b> Shows a value of 0, indicating no error occurred.</li> </ul>
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. 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 Q64AD 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+Q64AD\_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+Q64AD\_SetOffsetVal (Offset setting)

### FB Name

M+Q64AD\_SetOffsetVal

### Function Overview

Item	Description																
Function overview	Performs offset setting of a specified channel.																
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">M+Q64AD_SetOffsetVal</th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">Execution command</td> <td>B : FB_EN</td> <td>FB_ENO : B — Execution status</td> </tr> <tr> <td style="text-align: right;">Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B — Completed without error</td> </tr> <tr> <td style="text-align: right;">Channel No.</td> <td>W : i_CH</td> <td>FB_ERROR : B — Error flag</td> </tr> <tr> <td style="text-align: right;">User range write command</td> <td>B : i_Write_Offset</td> <td>ERROR_ID : W — Error code</td> </tr> </tbody> </table>		M+Q64AD_SetOffsetVal			Execution command	B : FB_EN	FB_ENO : B — Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error	Channel No.	W : i_CH	FB_ERROR : B — Error flag	User range write command	B : i_Write_Offset	ERROR_ID : W — Error code
M+Q64AD_SetOffsetVal																	
Execution command	B : FB_EN	FB_ENO : B — Execution status															
Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error															
Channel No.	W : i_CH	FB_ERROR : B — Error flag															
User range write command	B : i_Write_Offset	ERROR_ID : W — Error code															
Applicable hardware and software	Analog-digital converter module	Q64AD															
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">MELSEC-Q Series *1</td> <td style="text-align: center;">Basic model</td> </tr> <tr> <td style="text-align: center;">High performance model</td> </tr> <tr> <td style="text-align: center;">Universal model</td> </tr> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model									
	Series	Model															
MELSEC-Q Series *1	Basic model																
	High performance model																
	Universal model																
Engineering software	GX Works2 *1 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later										
Language	Software version																
English version	Version1.24A or later																
Chinese version	Version1.49B or later																
Programming language	Ladder																
Number of steps	296 steps (for MELSEC-Q series high performance 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.																

Item	Description
Function description	<p>1) By turning ON FB_EN (Execution command), the offset value of the specified channel is set.</p> <p>2) By turning ON the user range write command when FB_EN (Execution command) is ON, the offset value is written.</p> <p>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.</p> <p>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.</p>
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>3) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>4) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>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.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples".

Item	Description	
Timing chart	<p>[When operation completes without error]</p> <p>FB_EN (Execution command)  FB_ENO (Execution status)  Operation mode  i_Write_Offset (User range write command)  CH Offset specification  Channel change request (YnB)  User range write request (YnA)  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code) 0</p>	<p>[When an error occurs]</p> <p>FB_EN (Execution command)  FB_ENO (Execution status)  Operation mode  i_Write_Offset (User range write command)  CH Offset specification  Channel change request (YnB)  User range write request (YnA)  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code) 0 Error code 0</p>
Relevant manual	<ul style="list-style-type: none"> <li>●Analog-Digital Converter Module User's Manual</li> <li>●QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>●GX Works2 Version1 Operating Manual (Common)</li> <li>●GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>	

### Error Codes

● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4	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

## Note

This chapter includes information related to the M+Q64AD\_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+Q64AD\_SetGainVal (Gain setting)

### FB Name

M+Q64AD\_SetGainVal

### Function Overview

Item	Description																
Function overview	Performs gain setting of a specified channel.																
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">M+Q64AD_SetGainVal</th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">Execution command</td> <td>B : FB_EN</td> <td>FB_ENO : B — Execution status</td> </tr> <tr> <td style="text-align: right;">Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B — Completed without error</td> </tr> <tr> <td style="text-align: right;">Channel No.</td> <td>W : i_CH</td> <td>FB_ERROR : B — Error flag</td> </tr> <tr> <td style="text-align: right;">User range write command</td> <td>B : i_Write_Gain</td> <td>ERROR_ID : W — Error code</td> </tr> </tbody> </table>		M+Q64AD_SetGainVal			Execution command	B : FB_EN	FB_ENO : B — Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error	Channel No.	W : i_CH	FB_ERROR : B — Error flag	User range write command	B : i_Write_Gain	ERROR_ID : W — Error code
M+Q64AD_SetGainVal																	
Execution command	B : FB_EN	FB_ENO : B — Execution status															
Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error															
Channel No.	W : i_CH	FB_ERROR : B — Error flag															
User range write command	B : i_Write_Gain	ERROR_ID : W — Error code															
Applicable hardware and software	Analog-digital converter module	Q64AD															
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">MELSEC-Q Series *1</td> <td style="text-align: center;">Basic model</td> </tr> <tr> <td style="text-align: center;">High performance model</td> </tr> <tr> <td style="text-align: center;">Universal model</td> </tr> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model									
	Series	Model															
MELSEC-Q Series *1	Basic model																
	High performance model																
	Universal model																
Engineering software	GX Works2 *1 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later										
Language	Software version																
English version	Version1.24A or later																
Chinese version	Version1.49B or later																
Programming language	Ladder																
Number of steps	294 steps (for MELSEC-Q series high performance 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.																

Item	Description
Function description	<p>1) By turning ON FB_EN (Execution command), the gain value of the specified channel is set.</p> <p>2) By turning ON the user range write command when FB_EN (Execution command) is ON, the gain value is written.</p> <p>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.</p> <p>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.</p>
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>3) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>4) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>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.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Pulsed execution (multiple scan execution type)
Application example	Refer to "Appendix 1 - FB Library Application Examples".

Item	Description	
Timing chart	<p>[When operation completes without error]</p>	<p>[When an error occurs]</p>
Relevant manual	<ul style="list-style-type: none"> <li>●Analog-Digital Converter Module User's Manual</li> <li>●QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>●GX Works2 Version1 Operating Manual (Common)</li> <li>●GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>	

## Error Codes

### ● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4	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

## Note

This chapter includes information related to the M+Q64AD\_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+Q64AD\_ErrorOperation (Error operation)

### FB Name

M+Q64AD\_ErrorOperation

### Function Overview

Item	Description																						
Function overview	Monitors error codes and performs error reset.																						
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">M+Q64AD_ErrorOperation</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Execution command</td> <td style="width: 30%;">B : FB_EN</td> <td style="width: 40%;">FB_ENO : B — Execution status</td> </tr> <tr> <td>Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B — Completed without error</td> </tr> <tr> <td>Error reset request</td> <td>B : i_ErrorReset</td> <td>o_UNIT_ERROR : B — Module error</td> </tr> <tr> <td></td> <td></td> <td>o_UNIT_ERR_CODE : W — Module error code</td> </tr> <tr> <td></td> <td></td> <td>FB_ERROR : B — Error flag</td> </tr> <tr> <td></td> <td></td> <td>ERROR_ID : W — Error code</td> </tr> </tbody> </table>		M+Q64AD_ErrorOperation			Execution command	B : FB_EN	FB_ENO : B — Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error	Error reset request	B : i_ErrorReset	o_UNIT_ERROR : B — Module error			o_UNIT_ERR_CODE : W — Module error code			FB_ERROR : B — Error flag			ERROR_ID : W — Error code
M+Q64AD_ErrorOperation																							
Execution command	B : FB_EN	FB_ENO : B — Execution status																					
Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error																					
Error reset request	B : i_ErrorReset	o_UNIT_ERROR : B — Module error																					
		o_UNIT_ERR_CODE : W — Module error code																					
		FB_ERROR : B — Error flag																					
		ERROR_ID : W — Error code																					
Applicable hardware and software	Analog-digital converter module	Q64AD																					
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model															
	Series	Model																					
MELSEC-Q Series *1	Basic model																						
	High performance model																						
	Universal model																						
Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td>English version</td> <td>Version1.24A or later</td> </tr> <tr> <td>Chinese version</td> <td>Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later																
Language	Software version																						
English version	Version1.24A or later																						
Chinese version	Version1.49B or later																						
Programming language	Ladder																						
Number of steps	<p>193 steps (for MELSEC-Q series high performance model CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>																						
Function description	<p>1) By turning ON FB_EN (Execution command), an error in the target module is monitored.</p> <p>2) After turning ON FB_EN (Execution command), by turning ON i_ErrorReset (error reset request) during error occurrence, error reset is performed.</p>																						

Item	Description
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>3) This FB uses index registers Z9 and Z8. Please do not use these index registers in an interrupt program.</p> <p>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.</p> <p>5) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON, OFF	ON: The FB is activated. 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 Q64AD 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+Q64AD\_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+Q64AD\_ScalingOperation (Scaling process)

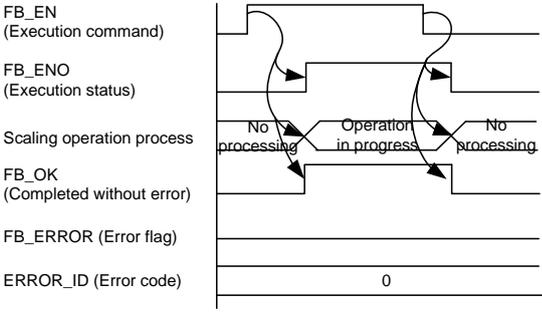
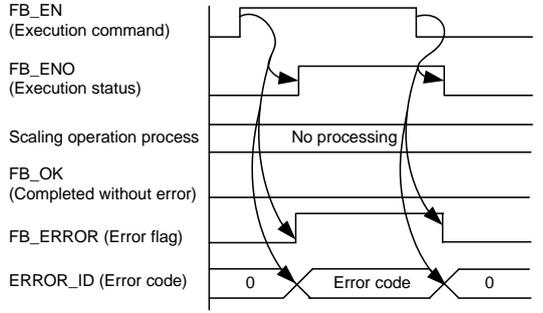
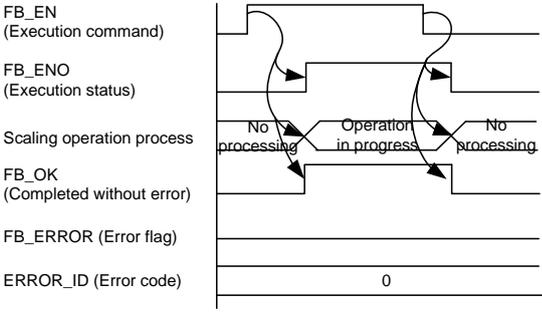
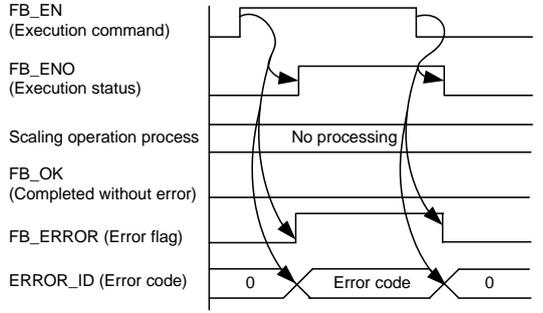
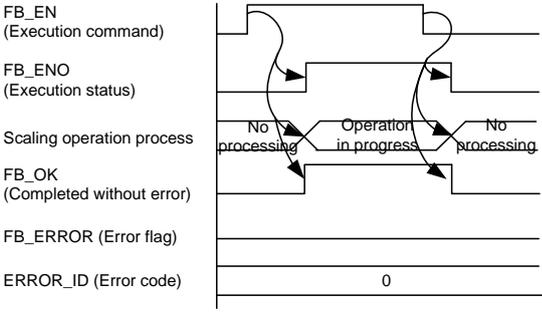
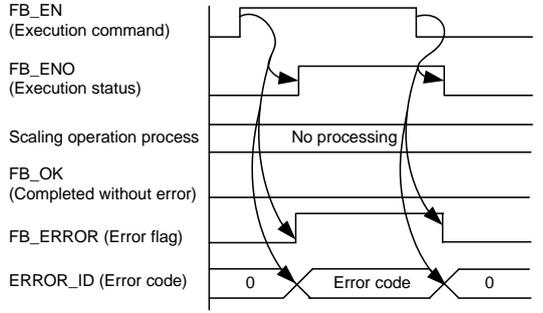
### FB Name

M+Q64AD\_ScalingOperation

### Function Overview

Item	Description																						
Function overview	Converts a digital value (A/D conversion value) of a specified channel to the ratio value in a set width.																						
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">M+Q64AD_ScalingOperation</th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">Execution command</td> <td>B : FB_EN</td> <td>FB_ENO : B — Execution status</td> </tr> <tr> <td style="text-align: right;">Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B — Completed without error</td> </tr> <tr> <td style="text-align: right;">Channel No.</td> <td>W : i_CH</td> <td>o_Scaling_Value : W — Scaling value</td> </tr> <tr> <td style="text-align: right;">Scaling upper limit value</td> <td>W : i_Scl_U_Lim</td> <td>o_ScalComp_CH : W — Scaling completion CH</td> </tr> <tr> <td style="text-align: right;">Scaling lower limit value</td> <td>W : i_Scl_L_Lim</td> <td>FB_ERROR : B — Error flag</td> </tr> <tr> <td style="text-align: right;">Scaling completion CH</td> <td>W : i_ScalComp_CH</td> <td>ERROR_ID : W — Error code</td> </tr> </tbody> </table>		M+Q64AD_ScalingOperation			Execution command	B : FB_EN	FB_ENO : B — Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error	Channel No.	W : i_CH	o_Scaling_Value : W — Scaling value	Scaling upper limit value	W : i_Scl_U_Lim	o_ScalComp_CH : W — Scaling completion CH	Scaling lower limit value	W : i_Scl_L_Lim	FB_ERROR : B — Error flag	Scaling completion CH	W : i_ScalComp_CH	ERROR_ID : W — Error code
M+Q64AD_ScalingOperation																							
Execution command	B : FB_EN	FB_ENO : B — Execution status																					
Module start XY address	W : i_Start_IO_No	FB_OK : B — Completed without error																					
Channel No.	W : i_CH	o_Scaling_Value : W — Scaling value																					
Scaling upper limit value	W : i_Scl_U_Lim	o_ScalComp_CH : W — Scaling completion CH																					
Scaling lower limit value	W : i_Scl_L_Lim	FB_ERROR : B — Error flag																					
Scaling completion CH	W : i_ScalComp_CH	ERROR_ID : W — Error code																					
Applicable hardware and software	Analog-digital converter module	Q64AD																					
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">MELSEC-Q Series *1</td> <td style="text-align: center;">Basic model</td> </tr> <tr> <td style="text-align: center;">High performance model</td> </tr> <tr> <td style="text-align: center;">Universal model</td> </tr> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model															
	Series	Model																					
MELSEC-Q Series *1	Basic model																						
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Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later																
Language	Software version																						
English version	Version1.24A or later																						
Chinese version	Version1.49B or later																						
Programming language	Ladder																						
Number of steps	<p>533 steps (for MELSEC-Q series high performance model CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>																						

Item	Description																																
Function description	<p>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.</p> <p>2) If the operation result exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767.</p> <p>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.</p> <p>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).</p> <table border="1" data-bbox="416 840 1382 949"> <tr> <td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td> </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>0</td><td>0</td><td>0</td><td>0</td><td>CH4</td><td>CH3</td><td>CH2</td><td>CH1</td> </tr> </table> <p>1: Scaling process is performed. 0: Scaling process is not performed.</p> <p>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".)</p> <p>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+Q64AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs)).</p> <p>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.</p>	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																		
0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1																		
Compiling method	Macro type																																

Item	Description		
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</p> <p>5) This FB uses index registers Z9, Z8 and Z7. Please do not use these index registers in an interrupt program.</p> <p>6) Every input must be provided with a value for proper FB operation.</p> <p>7) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>		
FB operation type	Real-time execution		
Application example	Refer to "Appendix 1 - FB Library Application Examples".		
Timing chart	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>[When operation completes without error]</p>  </td> <td style="width: 50%; vertical-align: top;"> <p>[When an error occurs]</p>  </td> </tr> </table>	<p>[When operation completes without error]</p> 	<p>[When an error occurs]</p> 
<p>[When operation completes without error]</p> 	<p>[When an error occurs]</p> 		
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>		

## Error Codes

### ● Error code list

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

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. OFF: The FB is not activated.
Module start XY address	i_Start_IO_No	Word	Depends on the I/O point range. For details, refer to the CPU user's manual.	Specify the starting XY address (in hexadecimal) where the Q64AD module is mounted. (For example, enter H10 for X10.)
Channel No.	i_CH	Word	1~4	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 b4~15: (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

### Note

This chapter includes information related to the M+Q64AD\_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+Q64AD\_ScalingAllOperation (Scaling process (All CHs))

### FB Name

M+Q64AD\_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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">M+Q64AD_ScalingAllOperation</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Execution command</td> <td style="width: 15%;">B : FB_EN</td> <td style="width: 30%;">FB_ENO : B</td> <td style="width: 25%;">Execution status</td> </tr> <tr> <td>Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B</td> <td>Completed without error</td> </tr> <tr> <td>CH1 Scaling upper limit value</td> <td>W : i_Scl_U_LimCH1</td> <td>o_Scaling_ValCH1 : W</td> <td>CH1 Scaling value</td> </tr> <tr> <td>CH1 Scaling lower limit value</td> <td>W : i_Scl_L_LimCH1</td> <td>o_Scaling_ValCH2 : W</td> <td>CH2 Scaling value</td> </tr> <tr> <td>CH2 Scaling upper limit value</td> <td>W : i_Scl_U_LimCH2</td> <td>o_Scaling_ValCH3 : W</td> <td>CH3 Scaling value</td> </tr> <tr> <td>CH2 Scaling lower limit value</td> <td>W : i_Scl_L_LimCH2</td> <td>o_Scaling_ValCH4 : W</td> <td>CH4 Scaling value</td> </tr> <tr> <td>CH3 Scaling upper limit value</td> <td>W : i_Scl_U_LimCH3</td> <td>o_ScalComp_CH : W</td> <td>Scaling completion CH</td> </tr> <tr> <td>CH3 Scaling lower limit value</td> <td>W : i_Scl_L_LimCH3</td> <td>FB_ERROR : B</td> <td>Error flag</td> </tr> <tr> <td>CH4 Scaling upper limit value</td> <td>W : i_Scl_U_LimCH4</td> <td>ERROR_ID : W</td> <td>Error code</td> </tr> <tr> <td>CH4 Scaling lower limit value</td> <td>W : i_Scl_L_LimCH4</td> <td></td> <td></td> </tr> </tbody> </table>		M+Q64AD_ScalingAllOperation				Execution command	B : FB_EN	FB_ENO : B	Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error	CH1 Scaling upper limit value	W : i_Scl_U_LimCH1	o_Scaling_ValCH1 : W	CH1 Scaling value	CH1 Scaling lower limit value	W : i_Scl_L_LimCH1	o_Scaling_ValCH2 : W	CH2 Scaling value	CH2 Scaling upper limit value	W : i_Scl_U_LimCH2	o_Scaling_ValCH3 : W	CH3 Scaling value	CH2 Scaling lower limit value	W : i_Scl_L_LimCH2	o_Scaling_ValCH4 : W	CH4 Scaling value	CH3 Scaling upper limit value	W : i_Scl_U_LimCH3	o_ScalComp_CH : W	Scaling completion CH	CH3 Scaling lower limit value	W : i_Scl_L_LimCH3	FB_ERROR : B	Error flag	CH4 Scaling upper limit value	W : i_Scl_U_LimCH4	ERROR_ID : W	Error code	CH4 Scaling lower limit value	W : i_Scl_L_LimCH4		
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Execution command	B : FB_EN	FB_ENO : B	Execution status																																											
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CH2 Scaling upper limit value	W : i_Scl_U_LimCH2	o_Scaling_ValCH3 : W	CH3 Scaling value																																											
CH2 Scaling lower limit value	W : i_Scl_L_LimCH2	o_Scaling_ValCH4 : W	CH4 Scaling value																																											
CH3 Scaling upper limit value	W : i_Scl_U_LimCH3	o_ScalComp_CH : W	Scaling completion CH																																											
CH3 Scaling lower limit value	W : i_Scl_L_LimCH3	FB_ERROR : B	Error flag																																											
CH4 Scaling upper limit value	W : i_Scl_U_LimCH4	ERROR_ID : W	Error code																																											
CH4 Scaling lower limit value	W : i_Scl_L_LimCH4																																													
Applicable hardware and software	Analog-digital converter module	Q64AD																																												
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">MELSEC-Q Series *1</td> <td style="text-align: center;">Basic model</td> </tr> <tr> <td style="text-align: center;">High performance model</td> </tr> <tr> <td style="text-align: center;">Universal model</td> </tr> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model																																						
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Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later																																							
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English version	Version1.24A or later																																													
Chinese version	Version1.49B or later																																													
Programming language	Ladder																																													

Item	Description																																
Number of steps	929 steps (for MELSEC-Q series high performance 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	<ol style="list-style-type: none"> <li>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.</li> <li>2) If the operation result exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767.</li> <li>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.</li> <li>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).</li> </ol> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center; border-collapse: collapse;"> <tr> <td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td> </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>0</td><td>0</td><td>0</td><td>0</td><td>CH4</td><td>CH3</td><td>CH2</td><td>CH1</td> </tr> </table> <p>1: Scaling process is performed.            0: Scaling process is not performed.</p> <p>The scaling maximum/minimum values can be easily obtained by inputting the information and the scaling values in M+Q64AD_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs)).</p>	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																		
0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1																		
Compiling method	Macro type																																
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> <li>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.</li> <li>4) This FB uses index registers Z9 and Z8. Please do not use these index registers in an interrupt program.</li> <li>5) Every input must be provided with a value for proper FB operation.</li> <li>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD 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).</li> </ol>																																

Item	Description
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	<p>The timing chart illustrates the execution sequence of the scaling operation. It features six horizontal lines representing different signals:</p> <ul style="list-style-type: none"> <li><b>FB_EN (Execution command):</b> A single pulse that initiates the operation.</li> <li><b>FB_ENO (Execution status):</b> A signal that transitions from high to low when the operation begins and returns to high upon completion.</li> <li><b>Scaling operation process:</b> A signal that transitions from 'No processing' to 'Operation in progress' when the command is received and returns to 'No processing' after the operation is finished.</li> <li><b>FB_OK (Completed without error):</b> A pulse that occurs immediately after the scaling operation process returns to 'No processing'.</li> <li><b>FB_ERROR (Error flag):</b> A signal that remains at a low level (0) throughout the entire process.</li> <li><b>ERROR_ID (Error code):</b> A signal that remains at a low level (0) throughout the entire process.</li> </ul>
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. 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 Q64AD 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			

● 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.
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+Q64AD\_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+Q64AD\_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs))

**FB Name**

M+Q64AD\_ScalingAllMaxMinOpe

**Function Overview**

Item	Description																																															
Function overview	Outputs the scaling maximum/minimum values by using the Scaling process FB (M+Q64AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q64AD_ScalingAllOperation).																																															
Symbol	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">M+Q64AD_ScalingAllMaxMinOpe</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Execution command</td> <td style="width: 30%;">B : FB_EN</td> <td style="width: 30%;">FB_ENO : B</td> <td style="width: 10%;">Execution status</td> </tr> <tr> <td>Module start XY address</td> <td>W : i_Start_IO_No</td> <td>FB_OK : B</td> <td>Completed without error</td> </tr> <tr> <td>CH1 Scaling value</td> <td>W : i_Scaling_ValCH1</td> <td>o_Scal_MaxValCH1 : W</td> <td>CH1 Scaling maximum value</td> </tr> <tr> <td>CH2 Scaling value</td> <td>W : i_Scaling_ValCH2</td> <td>o_Scal_MinValCH1 : W</td> <td>CH1 Scaling minimum value</td> </tr> <tr> <td>CH3 Scaling value</td> <td>W : i_Scaling_ValCH3</td> <td>o_Scal_MaxValCH2 : W</td> <td>CH2 Scaling maximum value</td> </tr> <tr> <td>CH4 Scaling value</td> <td>W : i_Scaling_ValCH4</td> <td>o_Scal_MinValCH2 : W</td> <td>CH2 Scaling minimum value</td> </tr> <tr> <td rowspan="4">Scaling completion CH</td> <td rowspan="4">W : i_ScalComp_CH</td> <td>o_Scal_MaxValCH3 : W</td> <td>CH3 Scaling maximum value</td> </tr> <tr> <td>o_Scal_MinValCH3 : W</td> <td>CH3 Scaling minimum value</td> </tr> <tr> <td>o_Scal_MaxValCH4 : W</td> <td>CH4 Scaling maximum value</td> </tr> <tr> <td>o_Scal_MinValCH4 : W</td> <td>CH4 Scaling minimum value</td> </tr> <tr> <td></td> <td></td> <td>FB_ERROR : B</td> <td>Error flag</td> </tr> <tr> <td></td> <td></td> <td>ERROR_ID : W</td> <td>Error code</td> </tr> </tbody> </table>		M+Q64AD_ScalingAllMaxMinOpe				Execution command	B : FB_EN	FB_ENO : B	Execution status	Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error	CH1 Scaling value	W : i_Scaling_ValCH1	o_Scal_MaxValCH1 : W	CH1 Scaling maximum value	CH2 Scaling value	W : i_Scaling_ValCH2	o_Scal_MinValCH1 : W	CH1 Scaling minimum value	CH3 Scaling value	W : i_Scaling_ValCH3	o_Scal_MaxValCH2 : W	CH2 Scaling maximum value	CH4 Scaling value	W : i_Scaling_ValCH4	o_Scal_MinValCH2 : W	CH2 Scaling minimum value	Scaling completion CH	W : i_ScalComp_CH	o_Scal_MaxValCH3 : W	CH3 Scaling maximum value	o_Scal_MinValCH3 : W	CH3 Scaling minimum value	o_Scal_MaxValCH4 : W	CH4 Scaling maximum value	o_Scal_MinValCH4 : W	CH4 Scaling minimum value			FB_ERROR : B	Error flag			ERROR_ID : W	Error code
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Execution command	B : FB_EN	FB_ENO : B	Execution status																																													
Module start XY address	W : i_Start_IO_No	FB_OK : B	Completed without error																																													
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CH3 Scaling value	W : i_Scaling_ValCH3	o_Scal_MaxValCH2 : W	CH2 Scaling maximum value																																													
CH4 Scaling value	W : i_Scaling_ValCH4	o_Scal_MinValCH2 : W	CH2 Scaling minimum value																																													
Scaling completion CH	W : i_ScalComp_CH	o_Scal_MaxValCH3 : W	CH3 Scaling maximum value																																													
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		o_Scal_MaxValCH4 : W	CH4 Scaling maximum value																																													
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		FB_ERROR : B	Error flag																																													
		ERROR_ID : W	Error code																																													
Applicable hardware and software	Analog-digital converter module	Q64AD																																														
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model																																								
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Language	Software version																																															
English version	Version1.24A or later																																															
Chinese version	Version1.49B or later																																															

Item	Description																																
Programming language	Ladder																																
Number of steps	536 steps (for MELSEC-Q series high performance 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	<p>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). *</p> <p style="text-align: center;">i_ScalComp_CH</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <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> </thead> <tbody> <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>0</td><td>0</td><td>0</td><td>0</td><td>CH4</td><td>CH3</td><td>CH2</td><td>CH1</td> </tr> </tbody> </table> <p>1: Enable (Output maximum/minimum values)            0: Disable (Do not output maximum/minimum values.)</p> <p>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.</p> <p>a) The operating condition setting request (Yn9) is turned ON, or the Operating condition setting request FB (M+Q64AD_RequestSetting) is executed.</p> <p>b) The maximum/minimum values reset request (YnD) is turned ON.</p> <p>* The scaling maximum/minimum values can be easily obtained by using this FB together with the Scaling process FB (M+Q64AD_ScalingOperation) or the Scaling process (All CHs) FB (M+Q64AD_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+Q64AD_ScalingOperation or M+Q64AD_ScalingAllOperation.</p>	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																		
0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1																		
Compiling method	Macro type																																

Item	Description
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) This FB uses index register Z9. Please do not use this index register in an interrupt program.</p> <p>5) Every input must be provided with a value for proper FB operation.</p> <p>6) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD module. Configure these settings by making the GX Works2 switch setting according to the application.</p> <p>For details on how to use the intelligent function module switch setting, refer to GX Works2 Operating Manual (Common).</p>
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	<p>FB_EN (Execution command)</p> <p>FB_ENO (Execution status)</p> <p>Scaling maximum/minimum value process</p> <p>FB_OK (Completed without error)</p> <p>FB_ERROR (Error flag)</p> <p>ERROR_ID (Error code)</p> <p>0</p>
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. 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 Q64AD 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			
Scaling completion CH	i_ScalComp_CH	Word	b0: CH1 Scaling complete b1: CH2 Scaling complete b2: CH3 Scaling complete b3: CH4 Scaling complete b4~15: (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).
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+Q64AD\_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+Q64AD\_ShiftOperation (Shift process)

**FB Name**

M+Q64AD\_ShiftOperation

**Function Overview**

Item	Description																					
Function overview	Adds the shift amount to the digital value (A/D conversion value) that was read.																					
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center;">M+Q64AD_ShiftOperation</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Execution command</td> <td style="width: 30%;">B : FB_EN</td> <td style="width: 30%;">FB_ENO : B</td> <td style="width: 10%;">— Execution status</td> </tr> <tr> <td>Digital value</td> <td>W : i_Digital_value</td> <td>FB_OK : B</td> <td>— Completed without error</td> </tr> <tr> <td>Shift amount</td> <td>W : i_Shift_Value</td> <td>o_Dig_Out_Val : W</td> <td>— Digital output value</td> </tr> <tr> <td></td> <td></td> <td>FB_ERROR : B</td> <td>— Error flag</td> </tr> <tr> <td></td> <td></td> <td>ERROR_ID : W</td> <td>— Error code</td> </tr> </table> </div>		Execution command	B : FB_EN	FB_ENO : B	— Execution status	Digital value	W : i_Digital_value	FB_OK : B	— Completed without error	Shift amount	W : i_Shift_Value	o_Dig_Out_Val : W	— Digital output value			FB_ERROR : B	— Error flag			ERROR_ID : W	— Error code
Execution command	B : FB_EN	FB_ENO : B	— Execution status																			
Digital value	W : i_Digital_value	FB_OK : B	— Completed without error																			
Shift amount	W : i_Shift_Value	o_Dig_Out_Val : W	— Digital output value																			
		FB_ERROR : B	— Error flag																			
		ERROR_ID : W	— Error code																			
Applicable hardware and software	Analog-digital converter module	Q64AD																				
	CPU module	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Series</th> <th style="width: 50%;">Model</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">MELSEC-Q Series *1</td> <td style="text-align: center;">Basic model</td> </tr> <tr> <td style="text-align: center;">High performance model</td> </tr> <tr> <td style="text-align: center;">Universal model</td> </tr> </tbody> </table> <p>*1 Not applicable to QCPU (A mode)</p>	Series	Model	MELSEC-Q Series *1	Basic model	High performance model	Universal model														
	Series	Model																				
MELSEC-Q Series *1	Basic model																					
	High performance model																					
	Universal model																					
Engineering software	<p>GX Works2 *1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Language</th> <th style="width: 50%;">Software version</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">English version</td> <td style="text-align: center;">Version1.24A or later</td> </tr> <tr> <td style="text-align: center;">Chinese version</td> <td style="text-align: center;">Version1.49B or later</td> </tr> </tbody> </table> <p>*1 For software versions applicable to the modules used, refer to "Relevant Manuals".</p>	Language	Software version	English version	Version1.24A or later	Chinese version	Version1.49B or later															
Language	Software version																					
English version	Version1.24A or later																					
Chinese version	Version1.49B or later																					
Programming language	Ladder																					
Number of steps	<p>162 steps (for MELSEC-Q series high performance model CPU)</p> <p>* The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.</p>																					

Item	Description
Function description	<p>1) By turning ON FB_EN (Execution command), the shift amount is added to the following value.</p> <p>a) Digital value (A/D conversion value)</p> <p>b) Scaling value calculated by M+Q64AD_ScalingOperation (Scaling process)</p> <p>2) If the sum exceeds the range of -32768 to 32767, it is fixed to -32768 or 32767.</p>
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p> <p>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.</p> <p>4) Every input must be provided with a value for proper FB operation.</p> <p>5) The input range, temperature drift compensation, resolution mode, and operation mode must be configured to match devices and systems connected to the Q64AD 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).</p> <p>6) o_Dig_Out_Val (Digital output value) is valid when FB_OK (Completed without error) is turned ON.</p> <p>7) o_Dig_Out_Val (Digital output value) is cleared to 0 by turning OFF FB_EN.</p>
FB operation type	Real-time execution
Application example	Refer to "Appendix 1 - FB Library Application Examples".
Timing chart	<p>The timing chart illustrates the sequence of events for the FB. It shows six signals over time: FB_EN (Execution command), FB_ENO (Execution status), Shift process, FB_OK (Completed without error), FB_ERROR (Error flag), and ERROR_ID (Error code). FB_EN is a pulse that starts at a low level, transitions to high during the 'Operation in progress' phase, and returns to low. FB_ENO is a pulse that starts during the 'Operation in progress' phase and ends at the start of the next 'Operation in progress' phase. FB_OK is a pulse that starts at the end of the 'Operation in progress' phase. FB_ERROR and ERROR_ID are shown as constant low signals throughout the entire process.</p>
Relevant manual	<ul style="list-style-type: none"> <li>•Analog-Digital Converter Module User's Manual</li> <li>•QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>•GX Works2 Version1 Operating Manual (Common)</li> <li>•GX Works2 Version1 Operating Manual (Simple Project, Function Block)</li> </ul>

## Error Codes

### ● Error code list

Error code	Description	Action
None	None	None

## Labels

### ● Input labels

Name (comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN	Bit	ON,OFF	ON: The FB is activated. 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+Q64AD\_ShiftOperation function block.

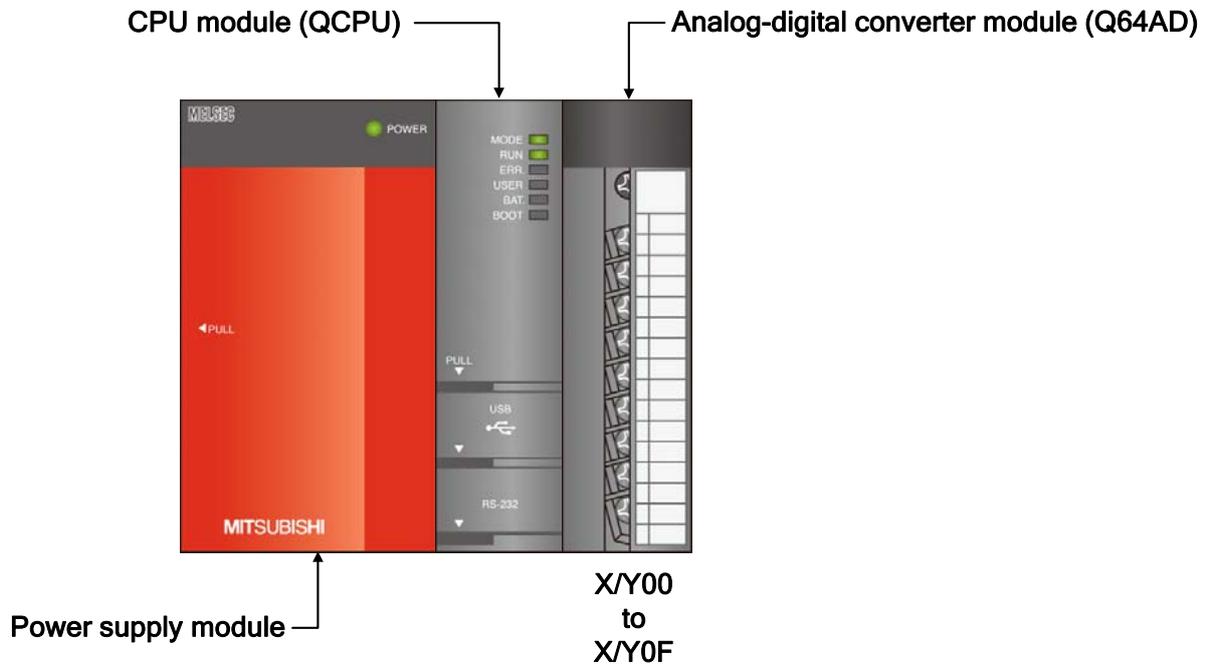
It does not include information on restrictions of use such as combination with intelligent function modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all relevant manuals.

## Appendix 1. FB Library Application Examples

Q64AD 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+Q64AD_ReadADVal	Execution command
M10	M+Q64AD_ReadAllADVal	Execution command
M20	M+Q64AD_SetADConversion	Execution command
M21		A/D conversion enable/disable setting
M30	M+Q64AD_SetAverage	Execution command
M40	M+Q64AD_RequestSetting	Execution command
M50	M+Q64AD_SetOffsetVal	Execution command
M51		Offset value write request
M60	M+Q64AD_SetGainVal	Execution command
M61		Gain value write request
M70	M+Q64AD_ErrorOperation	Execution command
M71		Error reset request
M80	M+Q64AD_ScalingOperation	Execution command
D81		Scaling completion CH
M90	M+Q64AD_ScalingAllOperation	Execution command
M100	M+Q64AD_ScalingAllMaxMinOpe	Execution command
D90		CH1 Scaling value (CH1 Scaling output value (o_Scaling_ValCH1) of M+Q64AD_ScalingAllOperation)
D91		CH2 Scaling value (CH2 Scaling output value (o_Scaling_ValCH2) of M+Q64AD_ScalingAllOperation)
D92		CH3 Scaling value (CH3 Scaling output value (o_Scaling_ValCH3) of M+Q64AD_ScalingAllOperation)
D93		CH4 Scaling value (CH4 Scaling output value (o_Scaling_ValCH4) of M+Q64AD_ScalingAllOperation)
D94		Scaling completion CH
M120	M+Q64AD_ShiftOperation	Execution command
D120		Digital value

b) External output (checks)

Device	FB name	Application (ON details)
M1	M+Q64AD_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+Q64AD_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
M22	M+Q64AD_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+Q64AD_SetAverage	Averaging process setting FB ready
M32		Averaging process setting complete
F10		Averaging process setting FB error
D30		Averaging process setting FB error code
M41	M+Q64AD_RequestSetting	Operating condition setting request operation FB ready
M42		Operating condition setting request operation FB setting complete
M52	M+Q64AD_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+Q64AD_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+Q64AD_ErrorOperation	Error operation ready
M73		Error operation complete
M74		Module error flag
D70		Module error code

Device	FB name	Application (ON details)
M81	M+Q64AD_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+Q64AD_ScalingAllOperation
M92	Scaling process (All CHs) complete	
D90	CH1 Scaling value	
D91	CH2 Scaling value	
D92	CH3 Scaling value	
D93	CH4 Scaling value	
D94	Scaling completion CH	
M101	M+Q64AD_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
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
M121	M+Q64AD_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

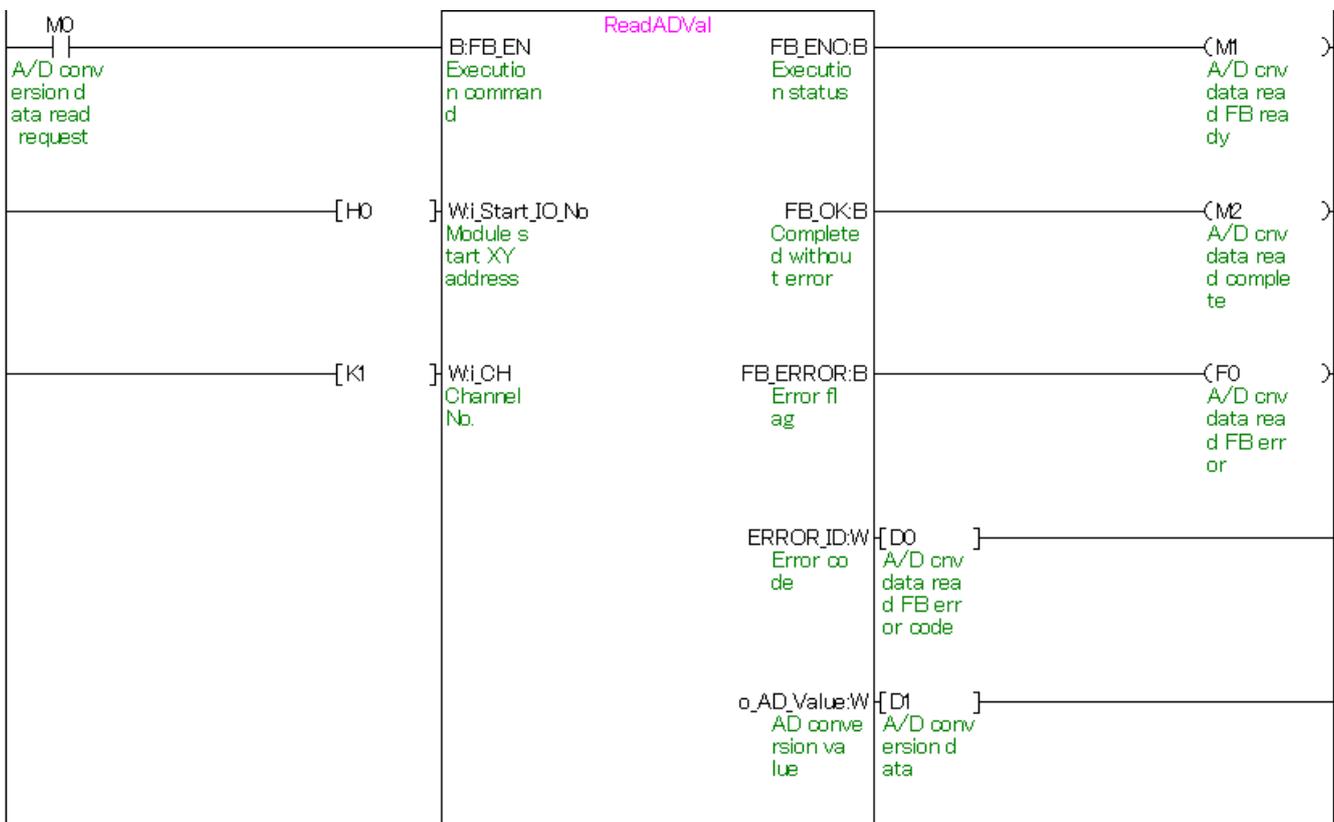
I/O item	Value	Description
Module start XY address	0	Specify the starting XY address where the Q64AD module is mounted.

## 5) Programs

### M+Q64AD\_ReadADVal (A/D conversion data read)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.

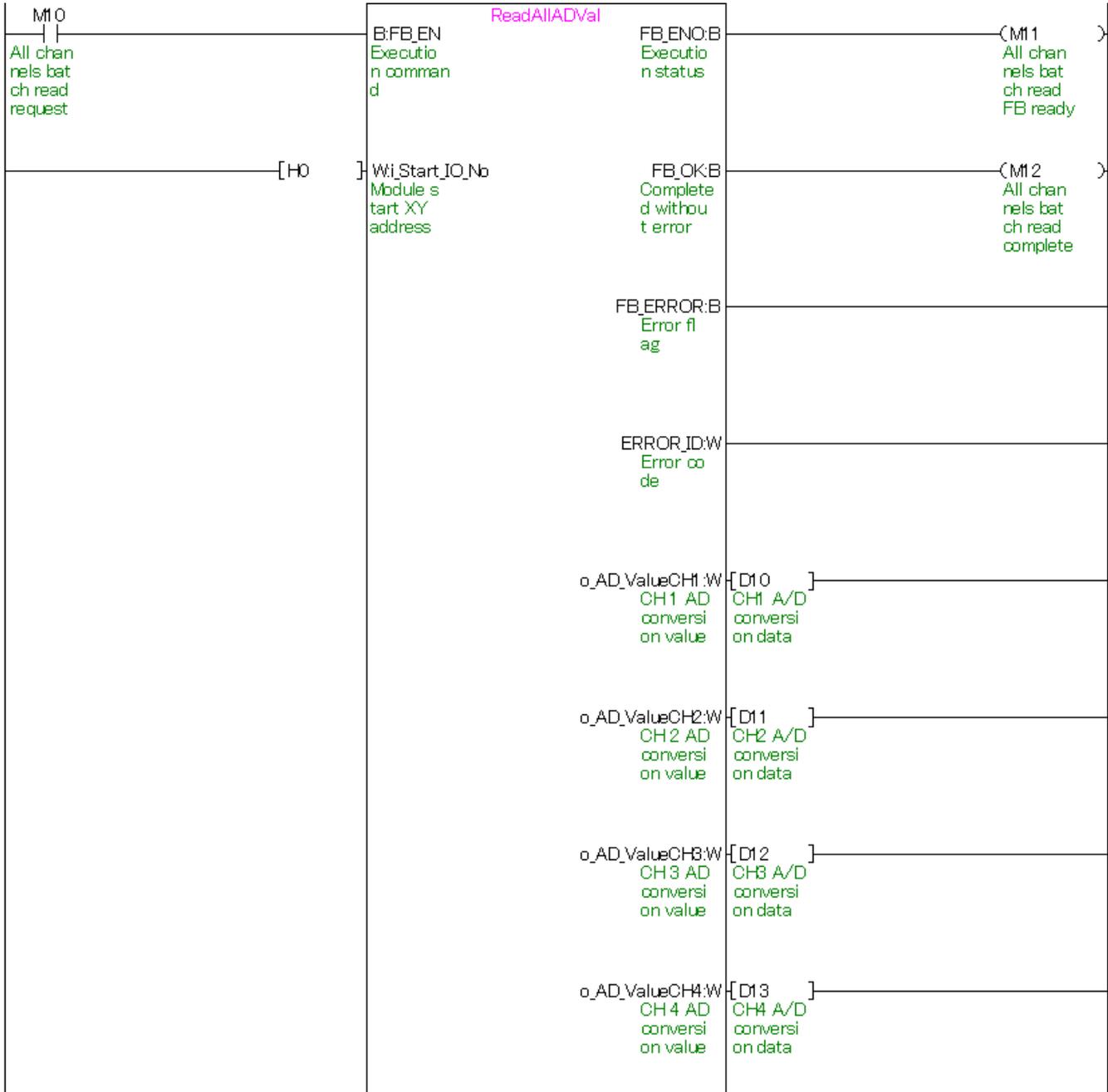
By turning ON M0, the A/D conversion data of channel 1 is read.



M+Q64AD\_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 Q64AD module is mounted to 0H.

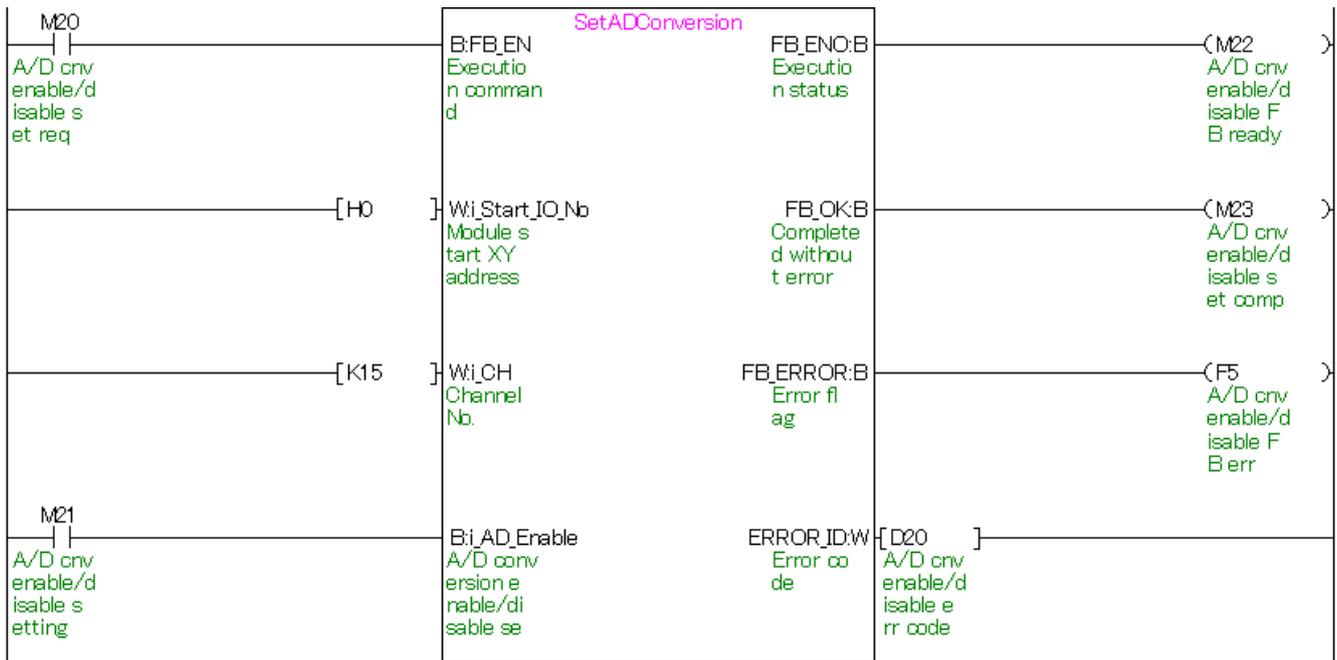
By turning ON M10, the A/D conversion data of all channels are read.



M+Q64AD\_SetADConversion (A/D conversion enable/disable setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.

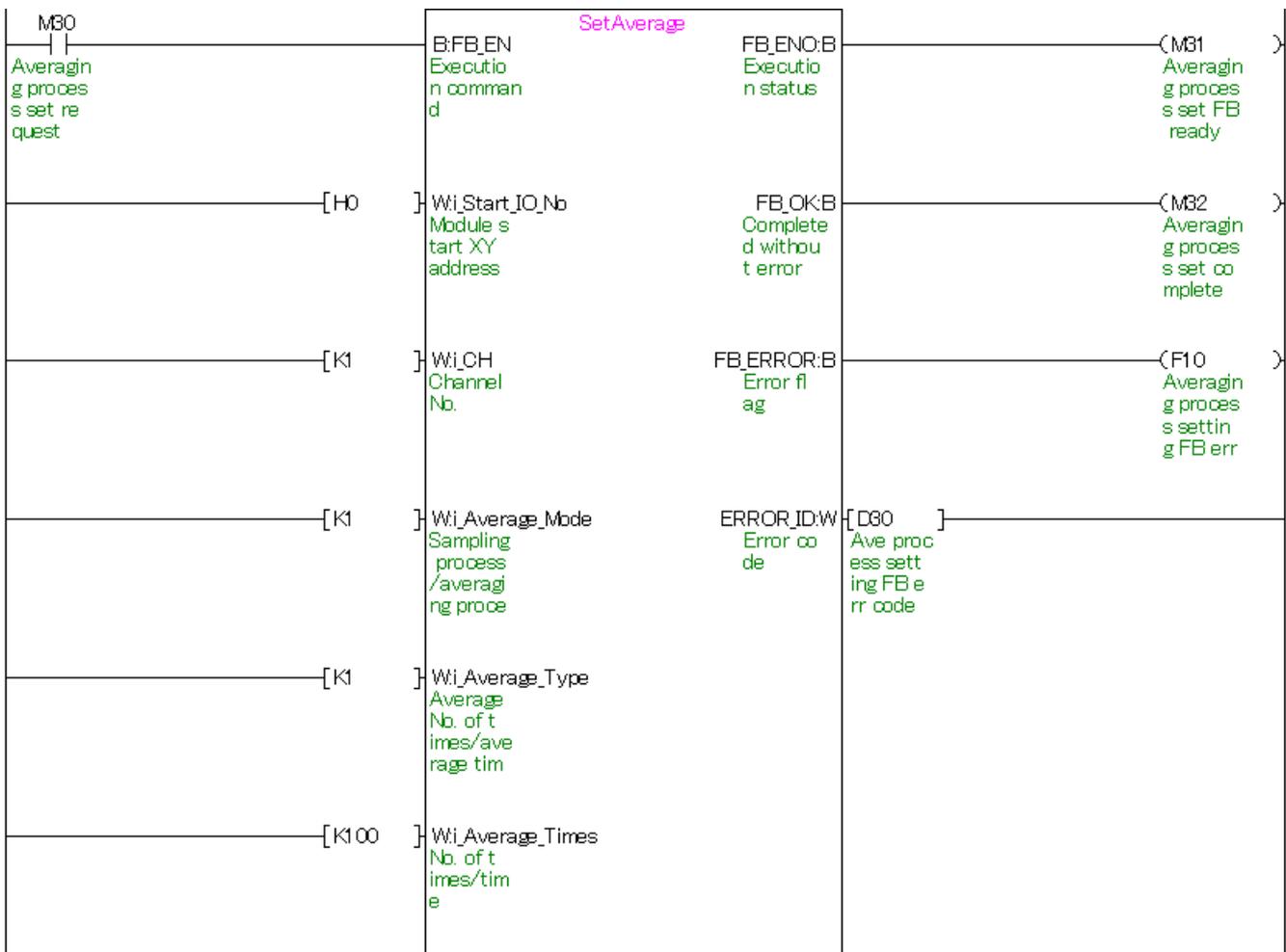
By turning ON M20, the A/D conversion enable/disable setting values of all channels are written to the buffer memory.



M+Q64AD\_SetAverage (Averaging process setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.

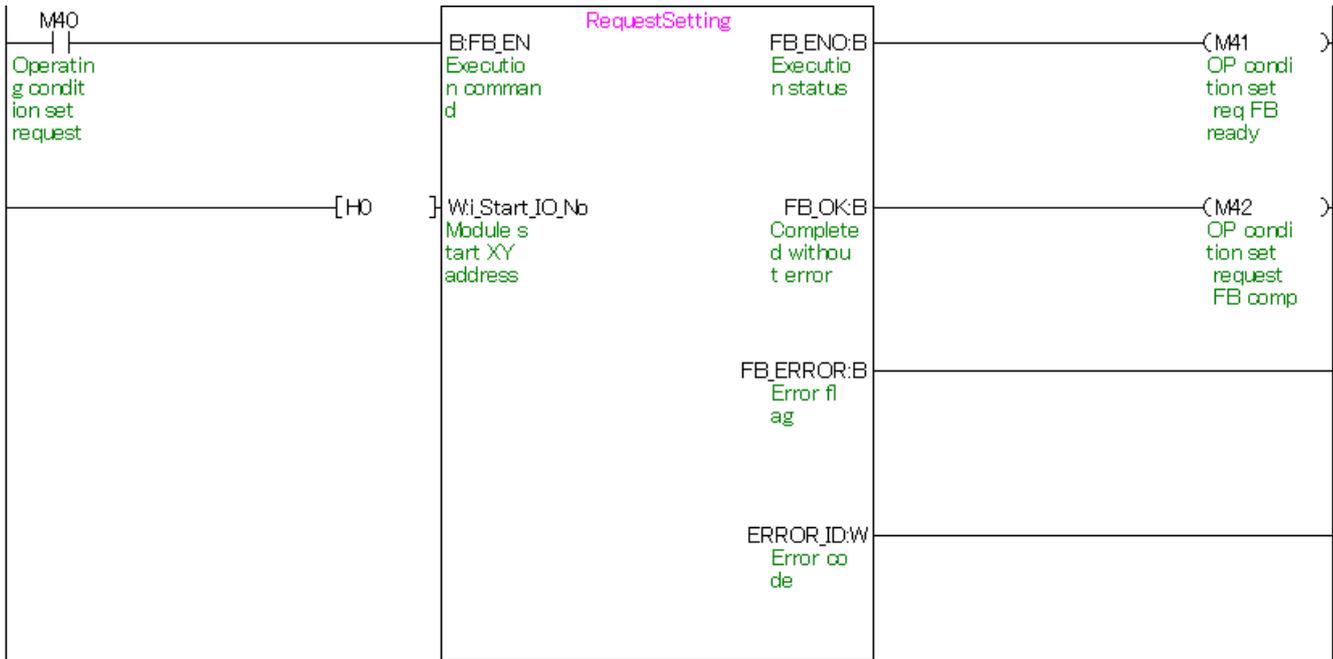
By turning ON M30, the averaging process setting value of channel 1 is written to the buffer memory.



M+Q64AD\_RequestSetting (Operating condition setting request operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD module is mounted to 0H.

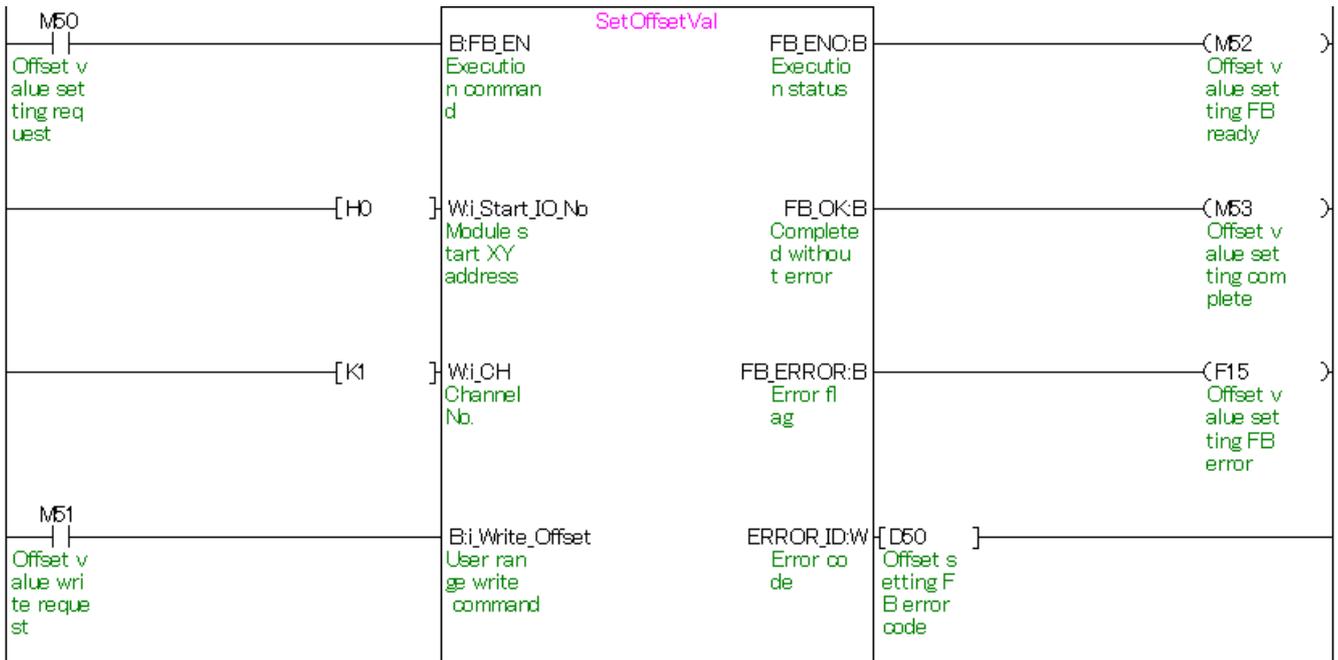
By turning ON M40, the A/D conversion enable/disable settings and averaging process settings are enabled.



M+Q64AD\_SetOffsetVal (Offset setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.

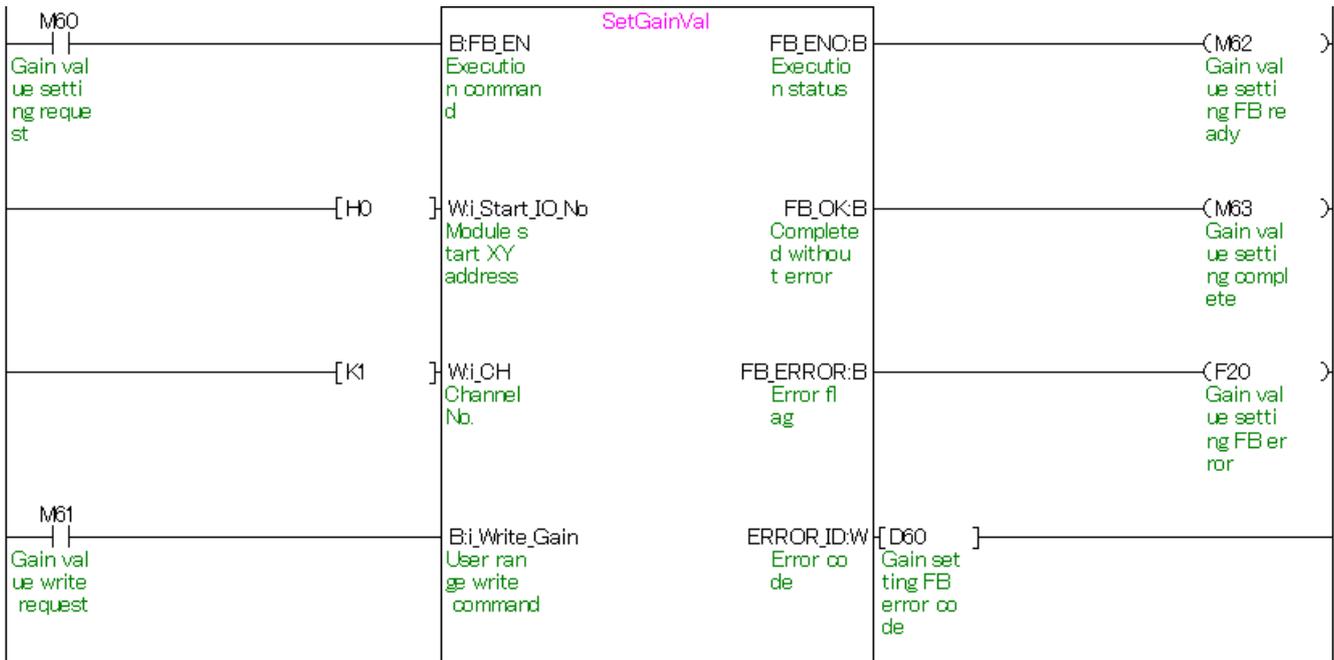
After turning ON M50, by turning ON M51, the offset value of channel 1 is written.



M+Q64AD\_SetGainVal (Gain setting)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.

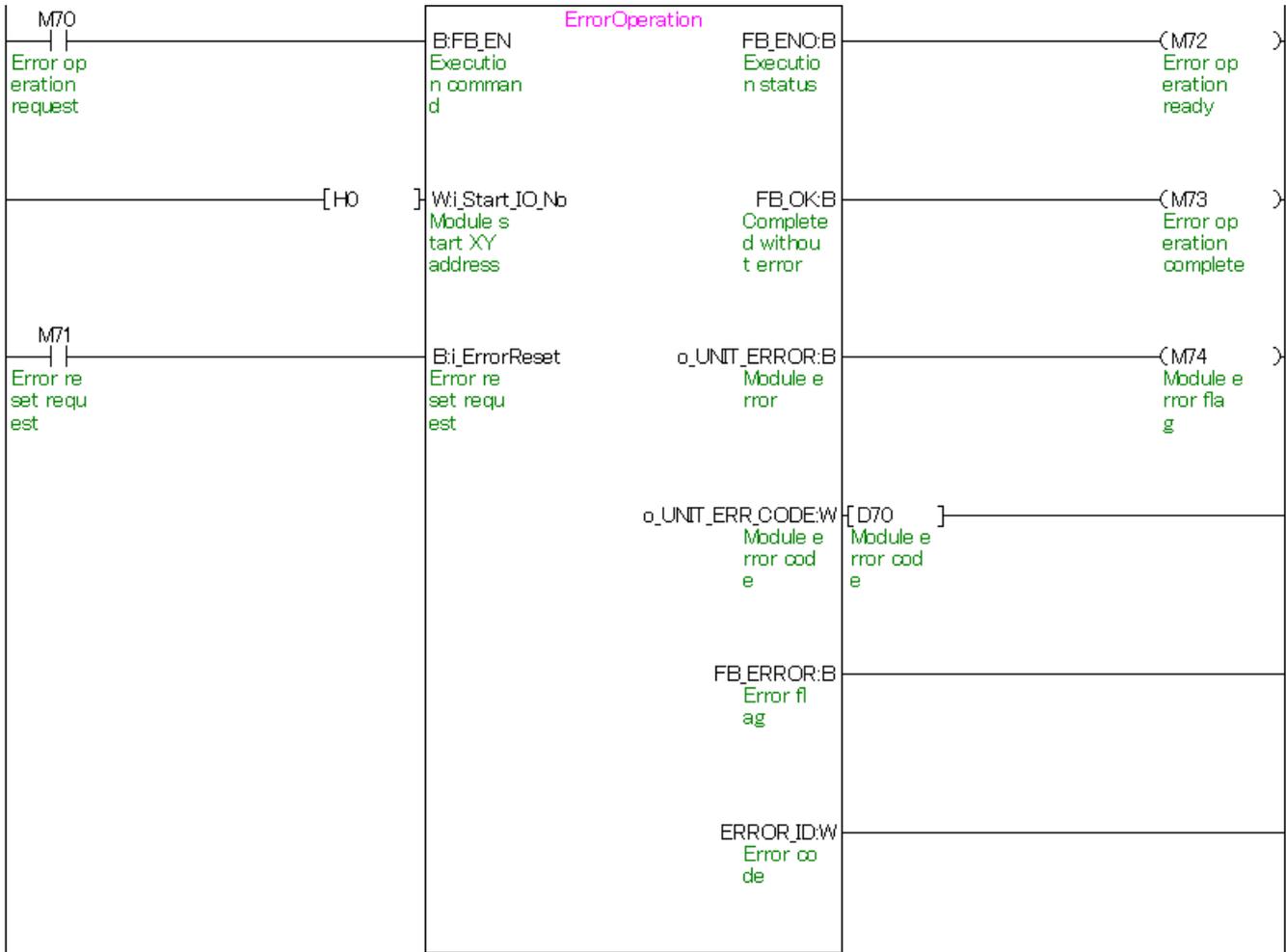
After turning ON M60, by turning ON M61, the gain value of channel 1 is written.



M+Q64AD\_ErrorOperation (Error operation)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.



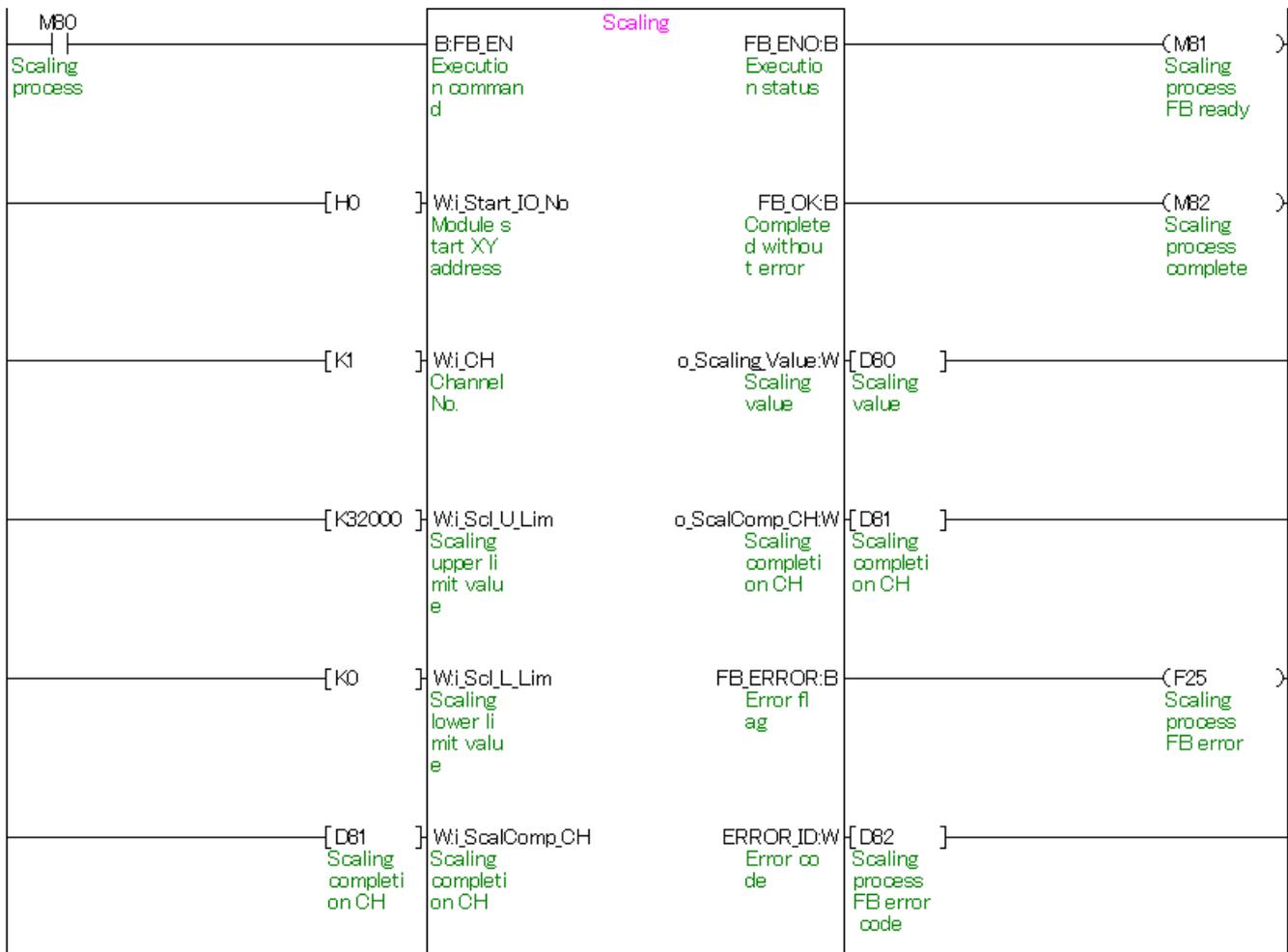
M+Q64AD\_ScalingOperation (Scaling process)

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD 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.

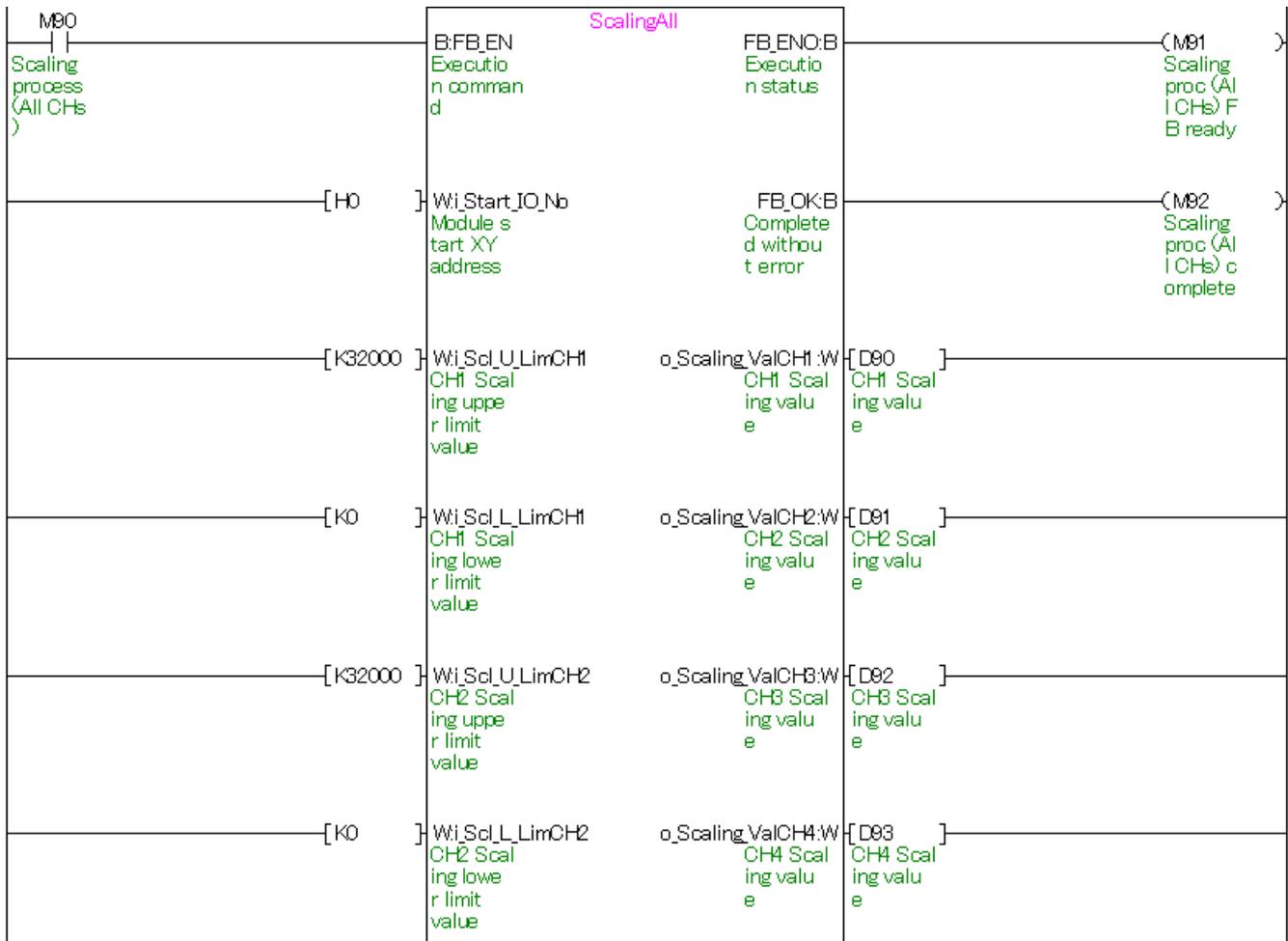
By turning ON M80, this FB performs conversion to the ratio value in a set width and outputs the conversion result to D80.



M+Q64AD\_ScalingAllOperation (Scaling process (All CHs))

Label name	Setting value	Description
i_Start_IO_No	H0	Set the starting XY address where the Q64AD module is mounted to 0H.
i_Scl_U_LimCH1 to i_Scl_U_LimCH4	K32000	Set the scaling upper limit values of CH1 to CH4 to 32,000.
i_Scl_L_LimCH1 to i_Scl_L_LimCH4	K0	Set the scaling lower limit values of CH1 to CH4 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 D93.



(Continues on next page.)

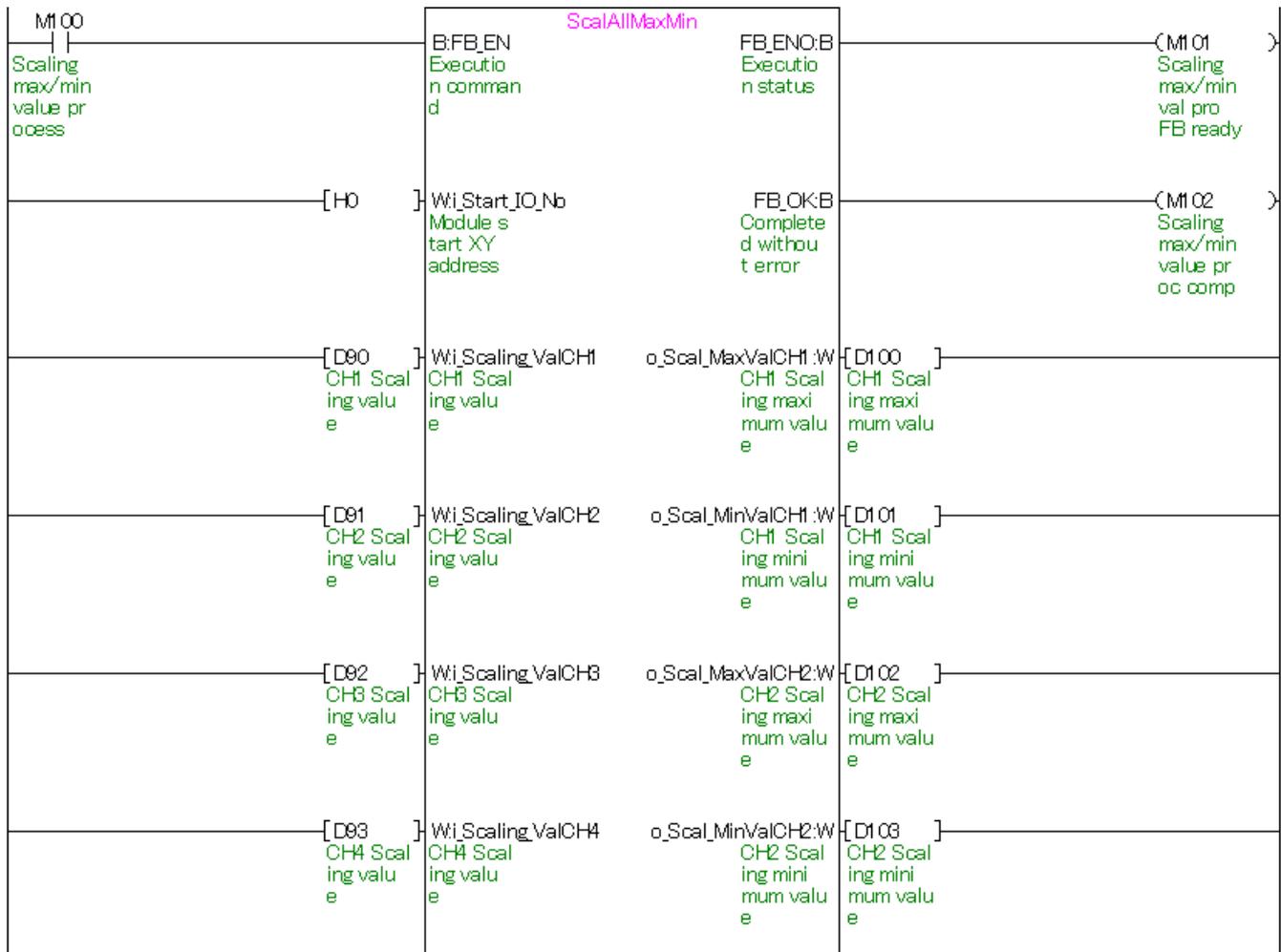
[K32000]	Wj_Scl_U_LimCH3 CH3 Scaling upper limit value	o_ScalComp_CHW Scaling completion on CH	[D04]	Scaling completion on CH
[K0]	Wj_Scl_L_LimCH3 CH3 Scaling lower limit value	FB_ERROR:B Error flag		
[K32000]	Wj_Scl_U_LimCH4 CH4 Scaling upper limit value	ERROR_ID:W Error code		
[K0]	Wj_Scl_L_LimCH4 CH4 Scaling lower limit value			

M+Q64AD\_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 Q64AD module is mounted to 0H.
i_Scaling_ValCH1	D90	Set the CH1 scaling value.
i_Scaling_ValCH2	D91	Set the CH2 scaling value.
i_Scaling_ValCH3	D92	Set the CH3 scaling value.
i_Scaling_ValCH4	D93	Set the CH4 scaling value.
i_ScalComp_CH	D94	Set the channels to perform the scaling maximum/minimum value process.

By turning ON M100, the scaling maximum/minimum values of CH1 to CH4 are output to D100 to D107.

\* 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+Q64AD\_ScalingOperation (Scaling process) or M+Q64AD\_ScalingAllMaxMinOpe (Scaling maximum/minimum value process (All CHs)), in this FB.



(Continues on next page.)

[ D04 ] Scaling completi on CH	Wi_ScalComp_CH Scaling completi on CH	o_Scal_MaxValCH3:W CH3 Scal ing maxi mum valu e	[ D104 ] CH3 Scal ing maxi mum valu e
		o_Scal_MinValCH3:W CH3 Scal ing mini mum valu e	[ D105 ] CH3 Scal ing mini mum valu e
		o_Scal_MaxValCH4:W CH4 Scal ing maxi mum valu e	[ D106 ] CH4 Scal ing maxi mum valu e
		o_Scal_MinValCH4:W CH4 Scal ing mini mum valu e	[ D107 ] CH4 Scal ing mini mum valu e
		FB_ERROR:B Error fl ag	
		ERROR_ID:W Error co de	

M+Q64AD\_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.

