



Mitsubishi Programmable Controller

MELSEC iQ-R
series

MELSEC iQ-R Temperature Control Module
Function Block Reference

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1 FUNCTION BLOCK (FB) LIST

This chapter lists the FBs for the MELSEC iQ-R series temperature control module.

Temperature control module FBs

■R60TCTRT2TT2, R60TCRT4

Name*1	Description
M+R60TC_StartPeakCurrentSuppressionBetweenModule	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module peak current suppression function.
M+R60TC_StartSimultaneousTemperatureRiseBetweenModule	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module simultaneous temperature rise function.
M+R60TC_OperateError	Monitors and resets error codes.

*1 Note that this reference does not describe the FB version information which is displayed such as "_00A" at the end of FB name.

■R60TCTRT2TT2BW, R60TCRT4BW

Name*1	Description
M+R60TCBW_StartPeakCurrentSuppressionBetweenModule	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module peak current suppression function.
M+R60TCBW_StartSimultaneousTemperatureRiseBetweenModule	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module simultaneous temperature rise function.
M+R60TCBW_OperateError	Monitors and resets error codes.

*1 Note that this reference does not describe the FB version information which is displayed such as "_00A" at the end of FB name.

2 TEMPERATURE CONTROL MODULE FB

2.1 M+R60TC(BW)_StartPeakCurrentSuppressionBetweenModule

Name

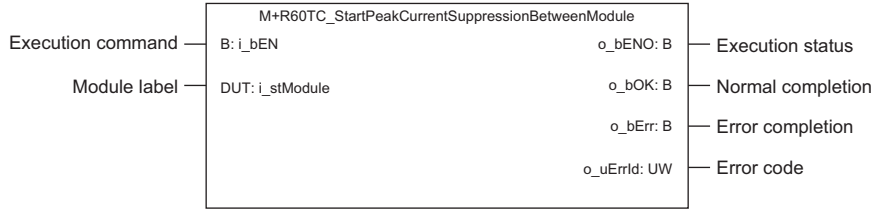
■R60TCTRT2TT2, R60TCRT4

M+R60TC_StartPeakCurrentSuppressionBetweenModule

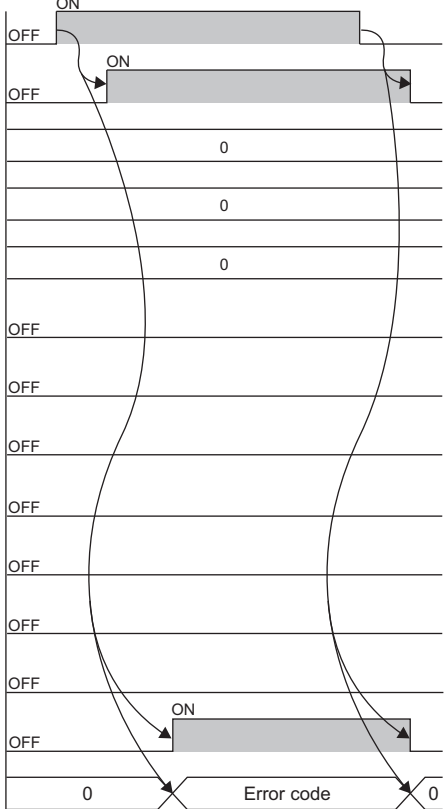
■R60TCTRT2TT2BW, R60TCRT4BW

M+R60TCBW_StartPeakCurrentSuppressionBetweenModule

FB details

Item	Description						
Overview	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module peak current suppression function.						
Symbol							
Available device	<table border="1"> <tr> <td>Target modules</td> <td>R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW</td> </tr> <tr> <td>CPU module</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Engineering tool</td> <td>GX Works3</td> </tr> </table>	Target modules	R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW	CPU module	MELSEC iQ-R series CPU modules	Engineering tool	GX Works3
Target modules	R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW						
CPU module	MELSEC iQ-R series CPU modules						
Engineering tool	GX Works3						
Language	Ladder diagram						
Number of basic steps	1534 steps The number of steps of the FB in a program depends on the CPU module used and input/output definition.						
Processing	<ul style="list-style-type: none"> 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module peak current suppression function are turned on simultaneously by turning on i_bEN (Execution command). 'Setting/operation mode command' (Yn1), which are turned on with this FB, are turned off by turning off i_bEN (Execution command). If "Peak current suppression function master/slave selection between multiple module" of the specified temperature control module is set to Slave (0), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 7 Error code) If any slave modules where the inter-module peak current suppression function is enabled do not exist, o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 7 Error code) If "Control mode selection" of the specified temperature control module is set to other than Standard Control (0), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 7 Error code) If "Peak current suppression control group setting" of the specified temperature control module and the slave modules are set to Not Divided (0) in all channels, o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 7 Error code) If "Peak current suppression function enable/disable between multiple module" in the specified temperature control module is set to Disable (0), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 7 Error code) 						
FB compilation method	Macro type						
FB operation	Pulsed execution type (multiple scan execution type)						

Item	Description
Timing chart of I/O signals	<p>■ When the operation is completed successfully</p> <ul style="list-style-type: none"> • The number of master modules: 1, Master module start I/O number: 0H • The number of slave modules: 2, Slave module start I/O number: 20H, 40H <p> ----▶ Executed by the temperature control module. —▶ Executed by the FB. </p> <p>The timing chart illustrates the following sequence of events:</p> <ol style="list-style-type: none"> The execution command <code>i_bEN</code> transitions from OFF to ON. The execution status <code>o_bENO</code> transitions from OFF to ON. Slave module counts are indicated: 2, 20, and 40. Setting/operation mode commands (<code>Y1</code>, <code>Y21</code>, <code>Y41</code>) transition from OFF to ON. Setting/operation mode statuses (<code>X1</code>, <code>X21</code>, <code>X41</code>) transition from OFF to ON. Normal completion signal <code>o_bOK</code> transitions from OFF to ON. Error completion signal <code>o_bErr</code> remains OFF. Error code <code>o_uErrId</code> is 0.

Item	Description
Timing chart of I/O signals	<p>■When the operation is completed with an error</p> <ul style="list-style-type: none"> The number of master modules: 1, Master module start I/O number: 0H The number of slave modules: 2, Slave module start I/O number: 20H, 40H  <p>The timing chart illustrates the sequence of I/O signals. It starts with the execution command <i>i_bEN</i> turning ON. This is followed by the execution status <i>o_bENO</i> turning ON. The chart then shows several 'Setting/operation mode command' (Yn1) and 'Setting/operation mode status' (Xn1) signals, all of which are OFF. The normal completion signal <i>o_bOK</i> is OFF, while the error completion signal <i>o_bErr</i> turns ON. The error code <i>o_uErrId</i> is shown as 0, indicating an error completion.</p>
Restrictions and precautions	<ul style="list-style-type: none"> This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation. Refer to the MELSEC iQ-R Temperature Control Module User's Manual (Application) at the occurrence of an error of the temperature control module during execution of this FB. Check the error description and take the action, and then execute the FB again. If "PID continuation Flag" is set to Continue (1), 'Setting/operation mode command' (Xn1) does not turn off. This FB cannot be used in an interrupt program. Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because <i>i_bEN</i> (Execution command) cannot be turned off and the normal operation cannot be acquired. Always use this FB in programs that can turn off <i>i_bEN</i> (Execution command). This FB uses Index register Z9. When using an interrupt program, do not use this index register in the interrupt program. This FB turns on and off 'Setting/operation mode command' (Yn1). Thus, do not turn on and off 'Setting/operation mode command' (Yn1) by other means while this FB is being executed. When this FB is used in two or more places, or when other FB that operates the Y signal same as the signal this FB does, create an interlock to prevent the FBs from being activated at the same time. This FB requires the configuration of the ladder for every input label. 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 the module label. However, this is not a problem and the FB will operate without an error. To operate the temperature control module, the setting must be configured according to each connected device and system. Set up the module parameters of GX Works3 according to the application. For the setting method of the module parameter, refer to the MELSEC iQ-R Temperature Control Module User's Manual (Application).

Error code

Error code	Description	Action
200H	"Peak current suppression function master/slave selection between multiple module" of the specified temperature control module is set to other than Master (1).	Review and correct the setting and then execute the FB again.
201H	Any slave modules where the inter-module peak current suppression function is enabled do not exist.	Review and correct the settings of the slave modules and then execute the FB again. Check that the settings of the slave modules are configured as follows. <ul style="list-style-type: none"> "Control mode selection": Standard Control (0) "Peak current suppression function enable/disable between multiple module": Valid (1) "Peak current suppression function master/slave selection between multiple module": Slave (0)
202H	"Control mode selection" of the specified temperature control module is set to other than Standard Control (0).	Review and correct the settings and then execute the FB again.
203H	"Peak current suppression control group setting" of the specified temperature control module or the slave modules are set to Not Divided (0) in all channels.	Review and correct the settings and then execute the FB again.
204H	"Peak current suppression function enable/disable between multiple module" in the specified temperature control module is set to Disable (0).	Review and correct the setting and then execute the FB again.

Labels

Input label

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specify the module label of the temperature control module. The module label of the temperature control module, where "Peak current suppression function master/slave selection between multiple module" is set to Master (1), must be specified.

Output label

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the inter-module peak current suppression function has been activated.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

2.2 M+R60TC(BW)_StartSimultaneousTemperatureRiseBetweenModule

Name

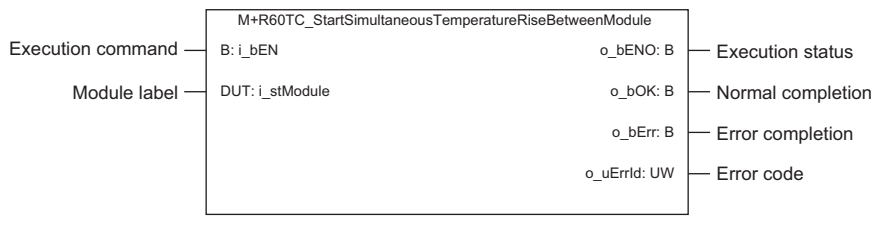
■R60TCTRT2TT2, R60TCRT4

M+R60TC_StartSimultaneousTemperatureRiseBetweenModule

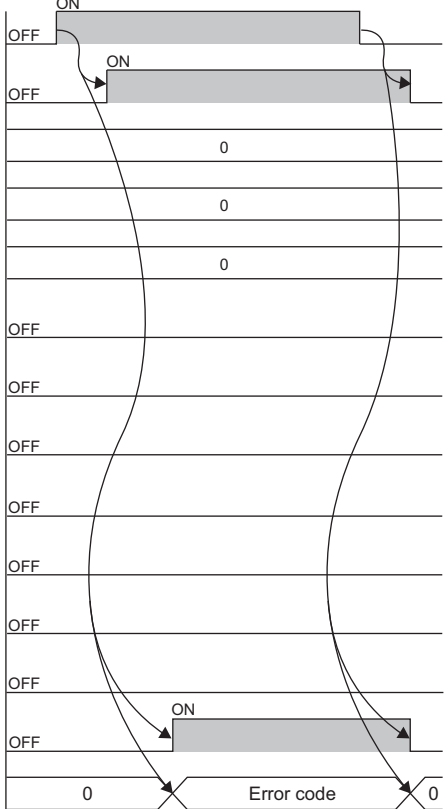
■R60TCTRT2TT2BW, R60TCRT4BW

M+R60TCBW_StartSimultaneousTemperatureRiseBetweenModule

FB details

Item	Description						
Overview	Simultaneously turns on/off 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module simultaneous temperature rise function.						
Symbol							
Available device	<table border="1"> <tr> <td>Target modules</td> <td>R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW</td> </tr> <tr> <td>CPU module</td> <td>MELSEC iQ-R series CPU modules</td> </tr> <tr> <td>Engineering tool</td> <td>GX Works3</td> </tr> </table>	Target modules	R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW	CPU module	MELSEC iQ-R series CPU modules	Engineering tool	GX Works3
Target modules	R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW						
CPU module	MELSEC iQ-R series CPU modules						
Engineering tool	GX Works3						
Language	Ladder diagram						
Number of basic steps	1606 steps The number of steps of the FB in a program depends on the CPU module used and input/output definition.						
Processing	<ul style="list-style-type: none"> 'Setting/operation mode command' (Yn1) of the temperature control modules which use the inter-module simultaneous temperature rise function are turned on simultaneously by turning on i_bEN (Execution command). 'Setting/operation mode command' (Yn1), which are turned on with this FB, are turned off by turning off i_bEN (Execution command). If "Simultaneous temperature rise function master/slave selection between multiple module" of the specified temperature control module is set to Slave (0), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 11 Error code) If any slave modules where the inter-module simultaneous temperature rise function is enabled do not exist, o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 11 Error code) If "Control mode selection" of the specified temperature control module is set to other than Standard Control (0), Mix Control (Normal Mode) (3), or Mix Control (Expanded Mode) (4), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 11 Error code) If "Simultaneous temperature rise group setting" of the specified temperature control module and the slave modules are set to Do not rise temperature simultaneously (0) in all channels, o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (However, when "Control mode selection" is set to Mix Control (Normal Mode) (3) or Mix Control (Expanded mode) (4), the target channels for the check whether "Do not rise temperature simultaneously (0)" is set or not are CH3 and CH4.) (Page 11 Error code) If "Simultaneous temperature rise function enable/disable between multiple module" in the specified temperature control module is set to Disable (0), o_bErr (Error completion) turns on and the processing of the FB is interrupted. In addition, the error code is stored in o_uErrId (Error code). For the error code, refer to the list of error codes. (Page 11 Error code) 						
FB compilation method	Macro type						
FB operation	Pulsed execution type (multiple scan execution type)						

Item	Description
Timing chart of I/O signals	<p>■ When the operation is completed successfully</p> <ul style="list-style-type: none"> • The number of master modules: 1, Master module start I/O number: 0H • The number of slave modules: 2, Slave module start I/O number: 20H, 40H <p> ----▶ Executed by the temperature control module. —▶ Executed by the FB. </p> <p> i_bEN (Execution command) o_bENO (Execution status) Number of slave modules with inter-module simultaneous temperature rise function enabled: 2 Start I/O [0] of slave module with inter-module simultaneous temperature rise function enabled: 20 Start I/O [1] of slave module with inter-module simultaneous temperature rise function enabled: 40 'Setting/operation mode command' (Y1) 'Setting/operation mode status' (X1) 'Setting/operation mode command' (Y21) 'Setting/operation mode status' (X21) 'Setting/operation mode command' (Y41) 'Setting/operation mode status' (X41) o_bOK (Normal completion) o_bErr (Error completion) o_uErrId (Error code): 0 </p>

Item	Description
Timing chart of I/O signals	<p>■When the operation is completed with an error</p> <ul style="list-style-type: none"> The number of master modules: 1, Master module start I/O number: 0H The number of slave modules: 2, Slave module start I/O number: 20H, 40H  <p> i_bEN (Execution command) o_bENO (Execution status) Number of slave modules with inter-module simultaneous temperature rise function enabled: 0 Start I/O [0] of slave module with inter-module simultaneous temperature rise function enabled: 0 Start I/O [1] of slave module with inter-module simultaneous temperature rise function enabled: 0 'Setting/operation mode command' (Y1): OFF 'Setting/operation mode status' (X1): OFF 'Setting/operation mode command' (Y21): OFF 'Setting/operation mode status' (X21): OFF 'Setting/operation mode command' (Y41): OFF 'Setting/operation mode status' (X41): OFF o_bOK (Normal completion): OFF o_bErr (Error completion): OFF (pulse ON) o_uErrId (Error code): 0 (pulse Error code) </p>
Restrictions and precautions	<ul style="list-style-type: none"> This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation. Refer to the MELSEC iQ-R Temperature Control Module User's Manual (Application) at the occurrence of an error of the temperature control module during execution of this FB. Check the error description and take the action, and then execute the FB again. If "PID continuation Flag" is set to Continue (1), 'Setting/operation mode command' (Xn1) does not turn off. This FB cannot be used in an interrupt program. Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (Execution command) cannot be turned off and the normal operation cannot be acquired. Always use this FB in programs that can turn off i_bEN (Execution command). This FB uses Index register Z9. When using an interrupt program, do not use this index register in the interrupt program. This FB turns on and off 'Setting/operation mode command' (Yn1). Thus, do not turn on and off 'Setting/operation mode command' (Yn1) by other means while this FB is being executed. When this FB is used in two or more places, or when other FB that operates the Y signal same as the signal this FB does, create an interlock to prevent the FBs from being activated at the same time. This FB requires the configuration of the ladder for every input label. 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 the module label. However, this is not a problem and the FB will operate without an error. To operate the temperature control module, the setting must be configured according to each connected device and system. Set up the module parameters of GX Works3 according to the application. For the setting method of the module parameter, refer to the MELSEC iQ-R Temperature Control Module User's Manual (Application).

Error code

Error code	Description	Action
205H	"Simultaneous temperature rise function master/slave selection between multiple module" of the specified temperature control module is set to other than Master (1).	Review and correct the setting and then execute the FB again.
206H	Any slave modules where the inter-module simultaneous temperature rise function is enabled do not exist.	Review and correct the settings of the slave modules and then execute the FB again. Check that the settings of the slave modules are configured as follows. <ul style="list-style-type: none"> "Control mode selection": Standard Control (0), Mix Control (Normal Mode) (3), or Mix Control (Expanded Mode) (4) "Simultaneous temperature rise function enable/disable between multiple module": Valid (1) "Simultaneous temperature rise function master/slave selection between multiple module": Slave (0)
207H	"Control mode selection" of the specified temperature control module is set to other than Standard Control (0), Mix Control (Normal Mode) (3), or Mix Control (Expanded Mode) (4).	Review and correct the setting and then execute the FB again.
208H	"Simultaneous temperature rise group setting" of the specified temperature control module or the slave modules are set to Do not rise temperature simultaneously (0) in all channels. (However, when "Control mode selection" is set to Mix Control (Normal Mode) (3) or Mix Control (Expanded mode) (4), the target channels for the check whether "Do not rise temperature simultaneously (0)" is set or not are CH3 and CH4.)	Review and correct the settings and then execute the FB again.
209H	"Simultaneous temperature rise function enable/disable between multiple module" in the specified temperature control module is set to Disable (0).	Review and correct the setting and then execute the FB again.

Labels

Input label

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specify the module label of the temperature control module. The module label of the temperature control module, where "Simultaneous temperature rise function master/slave selection between multiple module" is set to Master (1), must be specified.

Output label

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that the inter-module simultaneous temperature rise function has been activated.
Error completion	o_bErr	Bit	Off	The on state indicates that an error has occurred in the FB.
Error code	o_uErrId	Word [unsigned]	0	The error code of an error occurred in the FB is stored.

2.3 M+R60TC(BW)_OperateError

Name

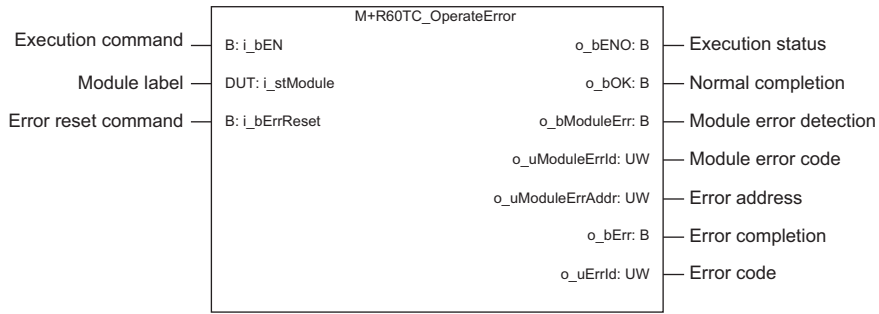
■R60TCTRT2TT2, R60TCRT4

M+R60TC_OperateError

■R60TCTRT2TT2BW, R60TCRT4BW

M+R60TCBW_OperateError

FB details

Item	Description	
Overview	Monitors and resets error codes.	
Symbol		
Available device	Target modules	R60TCTRT2TT2, R60TCTRT2TT2BW, R60TCRT4, R60TCRT4BW
	CPU module	MELSEC iQ-R series CPU modules
	Engineering tool	GX Works3
Language	Ladder diagram	
Number of basic steps	152 steps The number of steps of the FB in a program depends on the CPU module used and input/output definition.	
Processing	<ul style="list-style-type: none"> • By turning on i_bEN (Execution command), errors are monitored. • When a module error has occurred, o_uModuleErr (Module error detection) is turned on and description of the error is stored in o_uModuleErrId (Module error code) and o_uModuleErrAddr (Error address). • After i_bEN (Execution command) is turned on, the generated error is reset by turning on i_bErrReset (Error reset command). 	
FB compilation method	Macro type	
FB operation	Arbitrary execution type	

Item	Description
Timing chart of I/O signals	<p>■ When the operation is completed successfully</p> <p>-----▶ Executed by the temperature control module. ———▶ Executed by the FB.</p> <p>The timing chart illustrates the following sequence: i_bEN transitions from OFF to ON. This triggers o_bENO to transition from OFF to ON. Simultaneously, i_bErrReset transitions from OFF to ON, which causes 'Error reset command' (Yn2) to transition from OFF to ON. This in turn causes 'Error flag' (Xn2) to transition from OFF to ON. The 'Error flag' (Xn2) then triggers o_bModuleErr to transition from OFF to ON. This causes o_uModuleErrId to output a non-zero value (Module error code) and o_uModuleErrAddr to output a non-zero value (Error address). Finally, o_bOK transitions from OFF to ON, and o_bErr remains OFF. The error code o_uErrId remains at 0.</p>

Restrictions and precautions	<ul style="list-style-type: none"> • This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation. • This FB cannot be used in an interrupt program. • Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (Execution command) cannot be turned off and the normal operation cannot be acquired. Always use this FB in programs that can turn off i_bEN (Execution command). • This FB requires the configuration of the ladder for every input label. • 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 the module label. However, this is not a problem and the FB will operate without an error. • To operate the temperature control module, the setting must be configured according to each connected device and system. Set up the module parameters of GX Works3 according to the application. For the setting method of the module parameter, refer to the MELSEC iQ-R Temperature Control Module User's Manual (Application).
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Error code

Error code	Description	Action
None	None	None

Labels

■Input label

Name	Variable name	Data type	Scope	Description
Execution command	i_bEN	Bit	On or off	On: The FB is activated. Off: The FB is not activated.
Module label	i_stModule	Structure	The scope differs depending on the module label.	Specify the module label of the temperature control module.
Error reset command	i_bErrReset	Bit	On or off	On: Errors are reset. Off: Errors are not reset.

■Output label

Name	Variable name	Data type	Default value	Description
Execution status	o_bENO	Bit	Off	On: The execution command is on. Off: The execution command is off.
Normal completion	o_bOK	Bit	Off	The on state indicates that resetting the errors has been completed.
Module error detection	o_bModuleErr	Bit	Off	The on state indicates that an error has occurred.
Module error code	o_uModuleErrId	Word [unsigned]	0	The error code of the error that has occurred in the temperature control module is stored.
Error address	o_uModuleErrAddr	Word [unsigned]	0	The address where an error has occurred is output.
Error completion	o_bErr	Bit	Off	Always off
Error code	o_uErrId	Word [unsigned]	0	Always 0

INSTRUCTION INDEX

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MEMO

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
July 2015	BCN-P5999-0565-A	First edition

Japanese manual number: BCN-P5999-0516-A

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BCN-P5999-0565-A(1507)MEE

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