# **MELSEC-Q/L Temperature Control Module FB Library Reference Manual**

### Applicable modules:

Q64TCTT, Q64TCTTBW, Q64TCRT, Q64TCRTBW, Q64TCTTN, Q64TCTTBWN, Q64TCRTN, Q64TCRTBWN, L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW

#### <CONTENTS>

Refere	nce Manual Revision History	3
1.	Overview	4
1.1.	Overview of the FB Library	4
1.2.	Function of the FB Library	4
1.3.	System Configuration Example	5
1.4.	Relevant Manuals	6
1.5.	Note	6
2.	Details of the FB Library	7
2.1.	M+TC4_SetBPARAM (Basic settings)	7
2.2.	M+TC4_SetCNTBPARAM (Control basic parameters settings)	12
2.3.	M+TC4_SetCNTDPARAM (Control detailed parameters settings)	17
2.4.	M+TC4_SetAlertsFunction (Alert function setting)	24
2.5.	M+TC4_SetOtherSettings (Other settings)	29
2.6.	M+TC4_SetConversion (Conversion enable/disable setting)	35
2.7.	M+TC4_SetProcessAlarm (Process alarm setting)	39
2.8.	M+TC4_SetRateAlarm (Rate alarm setting)	44
2.9.	M+TC4_SetPVScaling (Process value (PV) scaling function setting)	48
2.10	M+TC4_MoniCJTemperature (Cold junction temperature process value monitoring function)	53
2.11.	M+TC4_Autotuning (Auto tuning)	57
2.12	M+TC4_Selftuning (Self tuning)	64
2.13	M+TC4_PIDControl (PID control)	69
2.14	M+TC4_HeaterDisconnection (Heater disconnection detection function)	76
2.15	M+TC4_LoopDisconnection (Loop disconnection detection function)	81
2.16	M+TC4_SimultaneousTemperature (Simultaneous temperature rise function setting)	86
2.17	M+TC4_SetPeakCurrentSuppress (Peak current limit control setting)	91
2.18	M+TC4_AlertStatus (Alert status check)	96
2.19	M+TC4_ErrorOperation (Error operation)	102
2.20	M+TC4_ReadVal (Value read)	107
2.21	M+TC4_ParamBackup (Setting value backup)	113



2.22.	M+T	C4_SetPVAverage (Process value (PV) moving averaging process setting)	118
Appendix	<b>κ</b> 1.	FB Library Application Examples	123



# Reference Manual Revision History

Reference Manual Number	Date	Description	
FBM-M064-A	2011/09	First edition	
FBM-M064-B	2014/06	The following FB Library is added.	
		•M+TC4_SetPVAverage	
FBM-M064-C	2017/05	Added applicable GX Works2 Version.	
		This FB is able to install on GX Works2 of all language versions.	



### 1. Overview

### 1.1. Overview of the FB Library

This FB library is for using the MELSEC-Q temperature control module Q64TCTT(BW), Q64TCRT(BW), Q64TCTT(BW)N, Q64TCRT(BW)N, or the MELSEC-L temperature control module L60TCTT4(BW), L60TCRT4(BW).

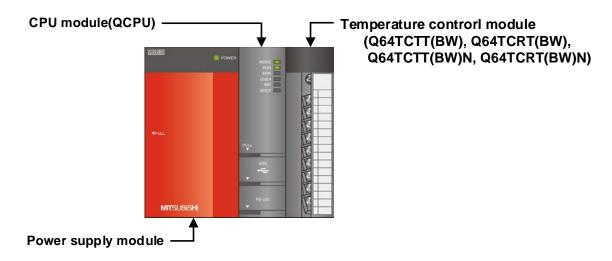
## 1.2. Function of the FB Library

Item	Description			
M+TC4_SetBPARAM	Sets the basic settings.			
M+TC4_SetCNTBPARAM	Sets the control basic parameters settings.			
M+TC4_SetCNTDPARAM	Set the control detailed parameters settings.			
M+TC4_SetAlertsFunction	Sets the alert function setting.			
M+TC4_SetOtherSettings	Sets the other settings.			
M+TC4_SetConversion	Sets the conversion enable/disable setting.			
M+TC4_SetProcessAlarm	Sets the process alarm setting.			
M+TC4_SetRateAlarm	Sets the rate alarm.			
M+TC4_SetPVScaling	Sets the process value (PV) scaling function.			
M+TC4_MoniCJTemperature	Sets the cold junction temperature compensation and reads the cold junction			
M+1C4_Monics temperature	temperature process value.			
M+TC4_Autotuning	Sets and executes auto tuning.			
M+TC4_Selftuning	Sets the self tuning setting and monitors the self tuning flag.			
M+TC4_PIDControl	Reads the PID constants and executes a forced PID control stop.			
M+TC4_HeaterDisconnection	Sets the heater disconnection detection and monitors the heater disconnection.			
M+TC4_LoopDisconnection	Sets the loop disconnection detection and monitors the loop disconnection.			
	Sets simultaneous temperature rise function setting and monitors the status			
M+TC4_SimultaneousTemperature	of the simultaneous temperature rise.			
M+TC4_SetPeakCurrentSuppress	Sets the peak current limit control setting.			
M+TC4_AlertStatus	Monitors an alert that has occurred.			
M+TC4_ErrorOperation	Monitors an error code and perform an error reset.			
M+TC4_ReadVal	Reads the values to the specified devices.			
MuTC4 DoromPooleum	Backs up the setting value or executes the default setting registration			
M+TC4_ParamBackup	command.			
M+TC4_SetPVAverage	Sets the number of moving averaging of the moving averaging process			
	function for the temperature process value (PV).			

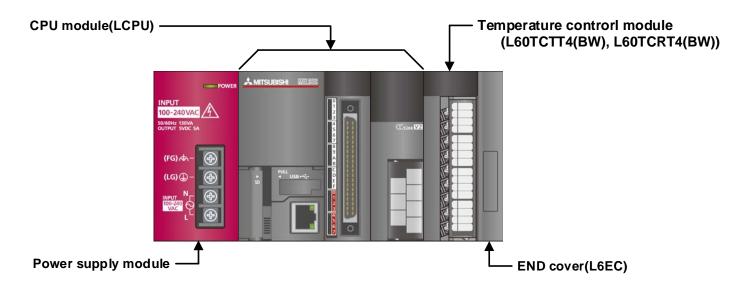


### 1.3. System Configuration Example

(1) Q series system configuration Example



(2) L series system configuration Example





#### 1.4. Relevant Manuals

MELSEC-Q Temperature Control Module User's Manual

MELSEC-L Temperature Control Module User's Manual

QCPU User's Manual (Hardware Design, Maintenance and Inspection)

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

GX Works2 Version 1 Operating Manual (Common)

GX Works2 Version 1 Operating Manual (Simple Project, Function Block)

#### 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+TC4\_SetBPARAM (Basic settings)

## **FB Name**

M+TC4\_SetBPARAM

Item	Description					
Function overview	Sets the basic settings.					
Symbol		M+TC4_SetBP	ARAM			
	Execution command-		FB_ENO : B — Execution status			
	Module start XY address-	W: i_Start_IO_No	FB_OK: B — Completed without error			
	Target CH-	W:i_CH	FB_ERROR: B — Error flag			
	_	 ─W:i_InputRange	ERROR_ID: W—Error code			
	Set value (SV) setting-	W: i_SVSetting				
	Unused channel setting-					
Applicable hardware Temperature control						
and software	module	Series	Model			
			Q64TCTT(BW), Q64TCRT(BW),			
			Q64TCTT(BW)N, Q64TCRT(BW)N			
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)			
	Hardware details					
		Series	Model			
		MELSEC-Q series *1	Basic model			
			High performance model			
			Universal model			
		MELSEC-L series	LCPU			
		*1 Not applicable to QCF	PU (A mode)			



Item	Description				
	Engineering software	GX Works2 *1			
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applical	ble to the modules used, refer to		
		"Relevant manuals".			
Programming	Ladder				
language					
Number of steps	197 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definition.				
Function description	By turning ON FB_EN (Execution command), the basic settings are written to the				
	buffer memory.				
	2) To enable the settin	g values, turn the setting change	command (YnB) OFF, ON and		
	then OFF in the setting mode.				
	3) FB operation is one-shot only, triggered by the FB_EN signal.				
	4) When the setting value of the target channel is out of range, the FB_ERROR output				
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error code).				
	Refer to the error code explanation section for details.				
Compiling method	Macro type				



Item	Description					
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery					
Precautions	processing separately in accordance with the required system operation.					
	2) The FB cannot be used in an interrupt program.					
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.					
	Do not use this FB in programs that are only executed once such as a subroutine,					
	FOR-NEXT loop, etc. because it is impossible to turn OFF.					
	When two or more of these FBs are used, precaution must be taken to avoid repetition					
	of the target channel.					
	) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.					
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in					
	an interrupt program.					
	7) Every input must be provided with a value for proper FB operation.					
	8) If the parameters are set using the configuration function of GX Works 2, using this FB					
	is unnecessary.					
	9) Perform the setting using the GX Works2 intelligent function module switch setting to					
	match systems and devices connected to the temperature control module.					
	For details on how to use the intelligent function module switch setting, refer to GX					
	Works2 Operating Manual (Common).					
FB operation type	Pulsed execution (1 scan execution type)					
Application example	Refer to "Appendix 1. FB Library Application Examples".					
Timing chart	[When operation completes without error] [When an error occurs]					
	FB_EN (Execution command) FB_EN (Execution command)					
	FB_ENO (Execution status)					
	Basic settings write processing Write processing processing processing processing processing					
	FB_OK FB_OK					
	(Completed without error)  FB_ERROR (Error flag)  FB_ERROR (Error flag)					
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code 0					
Dalament as a surela						
Relevant manuals	•MELSEC-Q Temperature Control Module User's Manual					
	MELSEC-L Temperature Control Module User's Manual					
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)  MEL CEC L CRU Madula Haarla Manual (Hardware Basing, Maintenance and Inspection)					
	MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)      CV Works 2 Version 4 Operation Manual (Common)					
	GX Works2 Version 1 Operating Manual (Common)  OX Works2 Version 1 Operating Manual (Circle Building Block)  OX Works2 Version 1 Operating Manual (Circle Building Block)					
	Works2 Version 1 Operating Manual (Simple Project, Function Block)					



### ●Error code list

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

## Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Input range	i_InputRange		When using the internal	Set the input range so that
			temperature sensor.	the type of the
			1~99: The unit is	thermocouple and the
			Centigrade.	measurement
		Word	100~199: The unit is	temperature range are set
			Fahrenheit.	automatically.
			When using other analog	
			module input.	
			200~299: The unit is digit.	
Set value (SV)	i_SVSetting		Set a value within the	Sets the temperature for
setting		Word	temperature setting range	the set value of PID
	v		specified in the input	operation.
			range setting.	



Name(Comment)	Label name	Data	Setting range	Description
		type		
Unused channel	i_UnusedCH		0: Used	Use to specify as unused
setting			1: Unused	channels where
		Word		temperature control will
		vvoid		not be performed and
				temperature sensors will
				not be connected.

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status			ON: Execution command is ON.	
		Bit OFF O		OFF: Execution command is OFF.
Completed without	FB_OK	D:t	OFF	When ON, it indicates that the basic settings
error		Bit OFF		are completed.
Error flag	FB_ERROR	Dit	OFF	When ON, it indicates that an error has
		Bit OFF		occurred.
Error code	ERROR_ID	Word	0	FB error code output.

# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

## Note

This chapter includes information related to the M+TC4\_SetBPARAM function block.

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



# 2.2. M+TC4\_SetCNTBPARAM (Control basic parameters settings)

## **FB Name**

M+TC4\_SetCNTBPARAM

Item	Description			
Function overview	Sets the control basic parameters settings.			
Symbol	M+TC4_SetCNTBPARAM			
	Execution command-		FB_ENO: B — Execution status	
	Module start XY address-	W : i_Start_IO_No	FB_OK: B —Completed without error	
	Target CH-	W : i_CH	FB_ERROR: B —Error flag	
	Proportional band (P) setting-	W: i_PSetting	ERROR_ID: W—Error code	
	Integral time (I) setting-	W: i_ISetting		
	Derivative time (D) setting-	W : i_DSetting		
	Control output period setting-	W: i_OutputPeriod		
	Control response parameter-	W: i_ResponseParam		
	Stop mode setting-	W: i_StopMode		
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),	
			Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
		Series Model		
		MELSEC-Q series *1 Basic model		
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCP	U (A mode)	



Item	Description				
	Engineering software	GX Works2 *1			
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applica "Relevant manuals".	ble to the modules used, refer to		
Programming	Ladder				
language					
Number of steps	227 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definit	ion.			
Function description	1) By turning ON FB_EN (Execution command), the control basic parameters settings is				
	written to the buffer memory.				
	2) FB operation is one-shot only, triggered by the FB_EN signal.				
	3) When the setting value of the target channel is out of range, the FB_ERROR output				
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error code).				
	Refer to the error code explanation section for details.				
Compiling method	Macro type				



Item	Description		
Restrictions and	The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	2) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop, etc. because it is impossible to turn OFF.		
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition		
	of the target channel.		
	5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in		
	an interrupt program.		
	6) Every input must be provided with a value for proper FB operation.		
	7) If the parameters are set using the configuration function of GX Works 2, using this FB		
	is unnecessary.		
	8) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	FB_EN (Execution command) FB_EN (Execution command)		
	FB_ENO (Execution status)		
	Control basic parameters setting write processing Write processing write processing write processing setting write processing		
	FB_OK (Completed without error)  FB_OK (Completed without error)		
	FB_ERROR (Error flag)  FB_ERROR (Error flag)		
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code		
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		



### ●Error code list

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

## Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O	Specify the starting XY
address			point range. For details,	address (in hexadecimal)
		Word	refer to the CPU user's	where the temperature
		vvoid	manual.	control module is mounted.
				(For example, enter H10 for
				X10.)
Target CH	i_CH	Word	1~4	Specify the channel number.
Proportional band	i_PSetting	Word	0~10,000	Set the proportional band
(P) setting		vvoid		(P) setting.
Integral time (I)	i_ISetting	Word	0~3,600	Set the integral time (I)
setting		vvoid		setting.
Derivative time (D)	i_DSetting	Word	0~3,600	Set the derivative time (D)
setting		vvoid		setting.
Control output	i_OutputPeriod		Control output period	Set the ON/OFF period of
period setting			unit switch setting = 0:1s	the transistor output.
			*1	*1: For L60, the control
		Word	1~100	output period unit switch
		vvoid	Control output period	setting can be performed
			unit switch setting = 1:	by using the intelligent
			0.1s *1	function module switch.
			5~1,000	



Name(Comment)	Label name	Data	Setting range	Description
		type		
Control response	i_ResponseParam		0: Slow	Set the response to a PID
parameter		Word	1: Normal	control set value (SV)
			2: Fast	change.
Stop mode setting	i_StopMode		0: Stop	Set the mode to be entered
		Word	1: Monitor	at a PID operation stop.
			2: Alert	

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

# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

## Note

This chapter includes information related to the M+TC4\_SetCNTBPARAM function block.

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



# 2.3. M+TC4\_SetCNTDPARAM (Control detailed parameters settings)

## **FB Name**

M+TC4\_SetCNTDPARAM

Item	Description			
Function overview	Set the control detailed parameters settings.			
Symbol		M+TC4_SetCN	ITDPARAM	
	Execution comma	and—B:FB_EN	FB_ENO : B	—Execution status
	Module start XY addr	ess—W:i_Start_IO_No	FB_OK : B	—Completed without error
	Target	CH—W: i_CH	FB_ERROR : B	—Error flag
	Forward/reverse action set	ting—W: i_ActionSetting	ERROR_ID : W	—Error code
	Upper limit setting lim	niter—W: i_UpSetLimiter		
	Lower limit setting lim	iter—W: i_LowSetLimiter		
	Setting change rate lim	iter—W: i_ChgRateLimit		
	Setting change rate lim (temperature t			
	Sensor compensation value set	ting—W: i_SensorCompVal		
	Primary delay digital filter set	ting—W:i_PrimaryDelay		
	Upper output lim	niter—W: i_UpOutLimiter		
	Lower output limiter— W: i_LowOutLimiter			
	Output variation lim	iter—W:i_OutVariation		
	Adjustment sensiti (dead band) seti			
Applicable hardware	Temperature control			
and software	module	Series	N	lodel
		MELSEC-Q series	Q64TCTT(BW),	Q64TCRT(BW),
			Q64TCTT(BW)N	, Q64TCRT(BW)N
		MELSEC-L series	L60TCTT4(BW),	L60TCRT4(BW)



Item		Description		
	Hardware details			
		Series		Model
		MELSEC-Q series *1	Basic model	
			High p	performance model
			Unive	rsal model
		MELSEC-L series	LCPU	
		*1 Not applicable to QCP	U (A mo	ode)
	Engineering software	GX Works2 *1		
		Language		Software version
		Japanese version		Version1.86Q or later
		English version		Version1.24A or later
		Chinese (Simplified) vers	sion	Version1.49B or later
		Chinese (Traditional) ve	rsion	Version1.49B or later
		Korean version		Version1.49B or later
		*1 For software versions a	applicab	le to the modules used, refer to
		"Relevant manuals".		
Programming	Ladder	dder		
language				
Number of steps	254 steps (for MELSEC-Q series universal model CPU)			
		. •	nds on	the CPU model that is used and
	input and output definit			
Function description	, ,		the cont	trol detailed parameters settings
	is written to the buffer memory.			
	· ·	FB operation is one-shot only, triggered by the FB_EN signal.		
				range, the FB_ERROR output
		ng is interrupted, and the er	ror code	e 10 (Decimal) is stored in
	ERROR_ID (Error o	•		
		ode explanation section for	details.	
Compiling method	Macro type			



Item	Description		
Restrictions and	The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	2) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop, etc. because it is impossible to turn OFF.		
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition		
	of the target channel.		
	5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in		
	an interrupt program.		
	6) Every input must be provided with a value for proper FB operation.		
	7) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.		
	8) If the parameters are set using the configuration function of GX Works 2, using this FB		
	is unnecessary.		
	9) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	FB_EN (Execution command) FB_EN (Execution command)		
	FB_ENO (Execution status)		
	Control detailed parameters setting write processing Write No processing Setting write Processin		
	FB_OK FB_OK		
	(Completed without error)  FB_ERROR (Error flag)  FB_ERROR (Error flag)		
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0		
Relevant manuals			
Televant manuals	MELSEC-Q Temperature Control Module User's Manual     MELSEC-L Temperature Control Module User's Manual		
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		
	The state of the s		



### ●Error code list

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

## Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Forward/reverse	i_ActionSetting	Word	0: Forward action	Specify the forward or
action setting		vvoid	1: Reverse action	reverse action.
Upper limit setting	i_UpSetLimiter		Set a value within the	Specify a value within the
limiter			measurement temperature	measurement
		Word	range that has been set	temperature range that
			with the input range.	has been set with the
				input range.
Lower limit setting	i_LowSetLimiter		Set a value within the	Specify a value within the
limiter			measurement temperature	measurement
		Word	range that has been set	temperature range that
			with the input range.	has been set with the
				input range.



Name(Comment)	Label name	Data Setting range type		Description
Setting change rate limiter	i_ChgRateLimit	Word	0: Disabled 1~1,000 (0.1~100.0%)	Set the variation of the set value per unit time to a set value (SV) change.  If the separate settings of the rise temperature and fall temperature are set for the change rate limiter setting of the intelligent function module switch setting, the setting change rate limiter is the rise temperature setting.
Setting change rate limiter (temperature fall)	i_ChgRateDELimit	Word	0: Disabled 1~1,000(0.1~100.0%) *1	This parameter can be set when the separate settings of the rise temperature and fall temperature are set for the change rate limiter setting of the switch setting 3.  *1: To disable this setting, set 0.
Sensor compensation value setting	i_SensorCompVal	Word	-5,000~5,000 (-50.00~50.00%)	Sets the compensation value used when there is a difference between the measured temperature and the actual temperature.
Primary delay digital filter setting	i_PrimaryDelay	Word	0: Disabled 1~100	Specify the primary delay digital filter.
Upper output limiter	i_UpOutLimiter	Word	Standard control -50~1,050 (-5.0~105.0%) Heating/cooling control 0~1,050 (0.0~105.0%)	Specify the upper limit value for outputting to an external device.



Name(Comment)	Label name	Data	Setting range	Description
		type		
Lower output limiter	i_LowOutLimiter		Standard control	Specify the lower limit
		Word	-50~1,050 (-5.0~105.0%)	value for outputting to an
		vvoid	Heating/cooling control	external device.
			0~1,050 (0.0~105.0%)	
Output variation	i_OutVariation		0: Disabled	Specify a range to
limiter		Word	1~1,000 (0.1~100.0%/s)	suppress the variation of
				the manipulated value.
Adjustment	i_AdjustSetting		1~100 (0.1~10.0%)	Set a range to prevent
sensitivity (dead		Word		chattering of the transistor
band) setting				output.

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		Bit OFF (		OFF: Execution command is OFF.
Completed without	FB_OK	Dit	OFF	When ON, it indicates that the control
error		Bit OFF		detailed parameters settings is completed.
Error flag	FB_ERROR	D:: 055	When ON, it indicates that an error has	
		Bit OFF		occurred.
Error code	ERROR_ID	Word	0	FB error code output.



# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_SetCNTDPARAM function block.

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



# 2.4. M+TC4\_SetAlertsFunction (Alert function setting)

## **FB Name**

M+TC4\_SetAlertsFunction

Item		Description	1			
Function overview	Sets the alert function setting.					
Symbol						
		M+TC4_SetAlertsF	unction			
	Execution command—	B : FB_EN	FB_ENO: B — Execution status			
	Module start XY address—	W:i_Start_IO_No	FB_OK: B —Completed without error			
	Target CH—	W:i_CH	FB_ERROR: B — Error flag			
	Alert 1 mode setting—	W:i_Alert1ModeSet	ERROR_ID: W — Error code			
	Alert 2 mode setting—	W: i_Alert2ModeSet				
	Alert 3 mode setting—	W: i_Alert3ModeSet				
	Alert 4 mode setting—	W: i_Alert4ModeSet				
	Alert set value 1—	W: i_AlertSetVal1				
	Alert set value 2—	W: i_AlertSetVal2				
	Alert set value 3—	W : i_AlertSetVal3				
	Alert set value 4—	W:i_AlertSetVal4				
Applicable hardware	Temperature control					
and software	module	Series	Model			
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),			
			Q64TCTT(BW)N, Q64TCRT(BW)N			
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)			
	Hardware details					
	Tial arrai o dotallo	Series	Model			
		MELSEC-Q series *1	Basic model			
			High performance model			
			Universal model			
		MELSEC-L series	LCPU			
		*1 Not applicable to QCP	U (A mode)			



Item	Description				
	Engineering software	GX Works2 *1			
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applica	ble to the modules used, refer to		
		"Relevant manuals".			
Programming	Ladder				
language					
Number of steps	246 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definition.				
Function description	1) By turning ON FB_EN (Execution command), the alert function setting is written to the				
	buffer memory.				
	•	g values, turn the setting change	command (YnB) OFF, ON and		
	then OFF in the setting mode.				
	3) FB operation is one-shot only, triggered by the FB_EN signal.				
	4) When the setting value of the target channel is out of range, the FB_ERROR output				
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error code).				
	Refer to the error code explanation section for details.				
Compiling method	Macro type				



Item	Description					
Restrictions and	The FB does not include error recovery processing. Program the error recovery					
Precautions	processing separately in accordance with the required system operation.					
	The FB cannot be used in an interrupt program.					
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.					
	Do not use this FB in programs that are only executed once such as a subroutine,					
	FOR-NEXT loop, etc. because it is impossible to turn OFF.					
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition					
	of the target channel.					
	5) This FB uses index registers Z6, Z7, Z8 and Z9. Please do not use these index					
	registers in an interrupt program.					
	6) Every input must be provided with a value for proper FB operation.					
	7) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.					
	8) If the parameters are set using the configuration function of GX Works 2, using this FB					
	is unnecessary.					
	9) Perform the setting using the GX Works2 intelligent function module switch setting to					
	match systems and devices connected to the temperature control module.					
	For details on how to use the intelligent function module switch setting, refer to GX					
	Works2 Operating Manual (Common).					
FB operation type	Pulsed execution (1 scan execution type)					
Application example	Refer to "Appendix 1. FB Library Application Examples".					
Timing chart	[When operation completes without error] [When an error occurs]					
	FB_EN (Execution command) FB_EN (Execution command)					
	FB_ENO (Execution status)					
	Alert function setting write processing Write Processing Write Processing Pro					
	FB_OK					
	(Completed without error)  FB_ERROR (Error flag)  FB_ERROR (Error flag)					
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code					
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual					
	MELSEC-L Temperature Control Module User's Manual					
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)					
	MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)					
	•GX Works2 Version 1 Operating Manual (Common)					
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)					
	1 0 (1					



### ●Error code list

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

## Labels

Name(Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Alert 1 mode setting	i_Alert1ModeSet	Word	0: No alert	Set the alert 1 mode
		vvoid	1~24	setting.
Alert 2 mode setting	i_Alert2ModeSet	Word	0: No alert	Set the alert 2 mode
		vvoid	1~24	setting.
Alert 3 mode setting	i_Alert3ModeSet	Word	0: No alert	Set the alert 3 mode
		vvoid	1~24	setting.
Alert 4 mode setting	i_Alert4ModeSet	Word	0: No alert	Set the alert 4 mode
		vvoid	1~24	setting.
Alert set value 1	i_AlertSetVal1	Word	Perform the setting	Set the alert set value 1.
Alert set value 2	i_AlertSetVal2	Word	according to the alert type.	Set the alert set value 2.
Alert set value 3	i_AlertSetVal3	Word	1 and 2: The temperature	Set the alert set value 3.



Name(Comment)	Label name	Data	Setting range	Description
		type		
Alert set value 4	i_AlertSetVal4		measurement range of the	Set the alert set value 4.
			input range.	
		Word	3, 4, 15, and 16:	
		vvoid	-(full-scale)~+(full-scale)	
			5, 6, 17, and 18:	
			0~+(full-scale)	

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		Bit OFF (		OFF: Execution command is OFF.
Completed without	FB_OK	D:t	OFF	When ON, it indicates that the alert function
error		Bit	OFF	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	2011/09/16	First edition

## Note

This chapter includes information related to the M+TC4\_SetAlertsFunction function block.

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



# 2.5. M+TC4\_SetOtherSettings (Other settings)

## **FB Name**

M+TC4\_SetOtherSettings

Item	Description				
Function overview	Sets the other settings.				
Symbol			M+TC4_SetO	therSettings	]
	Execution con	nmand—	B : FB_EN	FB_ENO : B	Execution status
	Module start XY a	ddress—	W:i_Start_IO_No	FB_OK : B	— Completed without error
	Temperature rise completion	range setting	W : i_TemCmpRange	FB_ERROR : B	— Error flag
	Temperature rise completion soa	ak time setting	W : i_TemCmpSoakTime	ERROR_ID : W	Error code
	Transistor output monitor ON dela	ay time setting	W: i_TraMtONDlyTime		
	Manipulated value resolution sw for other analog module		W:i_ValResolution		
	PID continuati	on flag—	W : i_PIDFlag		
	Alert dead band	setting—	W: i_AlertDeadBand		
	Alert delay	count—	W: i_AlertDlyCount		
	Heater disconnection/output of current error detection delay		W: i_UnusualCount		
	Heater disconnection comper function se		W: i_ReviseFunction		
Applicable hardware	Temperature control				
and software	module		Series	M	lodel
		MEI	_SEC-Q series	Q64TCTT(BW),	Q64TCRT(BW),
				Q64TCTT(BW)N	, Q64TCRT(BW)N
		MEI	_SEC-L series	L60TCTT4(BW),	L60TCRT4(BW)
	Hardware details				
			Series	M	lodel
		MEI	_SEC-Q series *1	Basic model	
				High performanc	e model
				Universal model	
		MEI	_SEC-L series	LCPU	
		*1 No	ot applicable to QCP	U (A mode)	



Item	Description				
	Engineering software GX Works2 *1				
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applica	ble to the modules used, refer to		
		"Relevant manuals".			
Programming	Ladder				
language					
Number of steps	194 steps (for MELSEC	-Q series universal model CPU)			
	* The number of steps of	of the FB in a program depends or	n the CPU model that is used and		
	input and output definition.				
Function description	1) When FB_EN (Execution command) is turned ON, the other settings are written to the				
	buffer memory.				
	2) FB operation is one-shot only, triggered by the FB_EN signal.				
Compiling method	Macro type				
Restrictions and	1) The FB cannot be used in an interrupt program.				
Precautions	2) Please ensure that the FB_EN signal is capable of being turned OFF by the program.				
		in programs that are only execute			
	•	tc. because it is impossible to turn			
		registers Z8 and Z9. Please do n	ot use these index registers in an		
	interrupt program.		FD		
		e provided with a value for proper	·		
		re set using the configuration fund	ction of GX Works 2, using this FB		
	is unnecessary.	union the CV Marke 2 intelligent	ive stice produle quitale sottice to		
	,	using the GX Works2 intelligent f			
	_	devices connected to the temper			
		to use the intelligent function mod Manual (Common)	idio switch setting, refer to GA		
FB operation type	Works2 Operating Manual (Common).  Pulsed execution (1 scan execution type)				
Application example	Refer to "Appendix 1. FB Library Application Examples".				
Application example	Toler to Appelluix 1.1	b Library Application Examples .			



Item	Description		
Timing chart	[When operation completes without error]  FB EN (Execution command)		
	FB_ENO (Execution status)  Other settings write processing  No processing  Write processing  FB_OK (Completed without error)  FB_ERROR (Error flag)		
	ERROR_ID (Error code) 0		
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		

### ●Error code list

Error code	Description	Countermeasure
None	None	None



# Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Temperature rise	i_TemCmpRange		1~10 (°C)	Set the temperature rise
completion range				value, at which a
setting		Word		temperature rise will be
				judged as completed,
				relative to the set value.
Temperature rise	i_TemCmpSoakTime		0~3600 (min)	Set a delay from when a
completion soak				temperature rise is
time setting		Word		completed until the
		vvoid		temperature rise
				completion judgment flag
				is turned ON.
Transistor output	i_TraMtONDlyTime		0: Disabled	Set the delay time for
monitor ON delay		Word	1~50 (10~500ms)	transistor ON delay
time setting				output.
Manipulated value	i_ValResolution		0: 0~4,000	Set the resolution for the
resolution switching		Word	1: 0~12,000	manipulated value.
for other analog		vvoid	2: 0~16,000	
module output			3: 0~20,000	
PID continuation flag	i_PIDFlag		0: Stop	Set the operation mode to
			1: Continue	be entered when the
		Word		setting/operation mode
				command (Yn1) turns
				OFF.



Name(Comment)	Label name	Data type	Setting range	Description
Alert dead band	i_AlertDeadBand	\	0~100 (0.0~10.0%)	Set the dead band for
setting		Word		alerts.
Alert delay count	i_AlertDlyCount	Word	0~255 (times)	Set the sampling count for
		vvora		judging an alert.
Heater	i_UnusualCount		3~255 (times)	Set how many errors will
disconnection/output				occur before alert
off-time current error				judgment is made.
detection delay				*1: Set 0 for modules other
count *1				than below because
				they do not support the
		\\/ord		heater disconnection
		Word		detection function.
				Q64TCTTBW,
				Q64TCRTBW,
				Q64TCTTBWN,
				Q64TCRTBWN,
				L60TCTT4BW, and
				L60TCRT4BW
Heater	i_ReviseFunction		0: Heater disconnection	Set whether the heater
disconnection			compensation function is	disconnection
compensation			not used	compensation function is
function selection *1			1: Heater disconnection	used or not.
			compensation function is	*1: Set 0 for modules other
			used	than below because
				they do not support the
		Word		heater disconnection
				detection function.
				Q64TCTTBW,
				Q64TCRTBW,
				Q64TCTTBWN,
				Q64TCRTBWN,
				L60TCTT4BW, and
				L60TCRT4BW



Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		Bit OFF (		OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates the other settings are
error		DIL	OFF	completed.
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	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_SetOtherSettings function block.

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



## **FB Name**

M+TC4\_SetConversion

Item	Description			
Function overview	Sets the conversion ena	ble/disable setting.		
Symbol	M+TC4_SetConversion			
	Execution command—			B — Execution status
	Module start XY address—	W: i_Start_IO_No	FB_OK:	B — Completed without error
	CH1 conversion setting—	B: i_ConvertCH1	FB_ERROR :	B — Error flag
	CH2 conversion setting—	B: i_ConvertCH2	ERROR_ID :	W Error code
	CH3 conversion setting—			
	CH4 conversion setting—			
	 	_		
Applicable hardware	Temperature control			
and software	module	Series		Model
		MELSEC-L series	L60TCTT4	4(BW), L60TCRT4(BW)
	Hardware details			
	Haidware details	Series		Model
		MELSEC-L series LCPU		Wodel
	Engineering software	GX Works2 *1		
		Language		Software version
		Japanese version	Ver	sion1.86Q or later
		English version	Ver	sion1.24A or later
		Chinese (Simplified) vers	sion Ver	sion1.49B or later
		Chinese (Traditional) ve		sion1.49B or later
		Korean version		sion1.49B or later
		*1 For software versions applicable to the modules used, refe		the modules used, refer to
Due me marie m	l adda.	"Relevant manuals".		
Programming	Ladder			
language				



Item	Description			
Number of steps	221 steps (for MELSEC-L series CPU)			
	* The number of steps of the FB in a program depends on the CPU model that is used and			
	input and output definition.			
Function description	1) By turning ON FB_EN (Execution command), the conversion enable/disable setting of			
	the specified channel is performed.			
	2) FB operation is one-shot only, triggered by the FB_EN signal.			
Compiling method	Macro type			
Restrictions and	The FB cannot be used in an interrupt program.			
Precautions	2) 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.			
	3) This FB uses index registers Z8 and Z9. Please do not use these index registers in an			
	interrupt program.			
	4) Every input must be provided with a value for proper FB operation.			
	5) If the parameters are set using the configuration function of GX Works 2, using this FB			
	is unnecessary.			
	6) Perform the setting using the GX Works2 intelligent function module switch setting to			
	match systems and devices connected to the temperature control module.			
	For details on how to use the intelligent function module switch setting, refer to GX			
	Works2 Operating Manual (Common).			
FB operation type	Pulsed execution (1 scan execution type)			
Application example	Refer to "Appendix 1. FB Library Application Examples".			
Timing chart	[When operation completes without error]			
	FB_EN (Execution command)			
	FB_ENO (Execution status)			
	Conversion enable/disable			
	setting write processing  FB OK			
	(Completed without error)			
	FB_ERROR (Error flag)			
	ERROR_ID (Error code) 0			
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual			
	MELSEC-L Temperature Control Module User's Manual			
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)			
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)			
	Works2 Version 1 Operating Manual (Common)			
	Works2 Version 1 Operating Manual (Simple Project, Function Block)			



### ●Error code list

Error code	Description	Countermeasure
None	None	None

# Labels

# ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
CH1 conversion	i_ConvertCH1	Bit	ON,OFF	By turning ON each
setting		Ы		parameter, conversion is
CH2 conversion	i_ConvertCH2	D:t		disabled for the
setting		Bit		corresponding channel.
CH3 conversion	i_ConvertCH3	D:t		
setting		Bit		
CH4 conversion	i_ConvertCH4	Dit		
setting		Bit		

# Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		Bit OFF		OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates the conversion
error		ы	OFF	enable/disable setting is completed.
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	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_SetConversion function block.

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



# 2.7. M+TC4\_SetProcessAlarm (Process alarm setting)

### **FB Name**

 $M+TC4\_SetProcessAlarm$ 

Item	Description				
Function overview	Sets the process alarm setting.				
Symbol	Module start XY ad Tarç Process alarm output enable/o	t value—W: i_ProLULimit t value—W: i_ProULLimit	FB_ENO : B		
Applicable hardware and software	Temperature control module	Series MELSEC-L series		Model L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details	Series MELSEC-L series	M LCPU	Model LCPU	
	Engineering software	GX Works2 *1  Language  Japanese version  English version  Chinese (Simplified) ver  Chinese (Traditional) ve  Korean version  *1 For software versions a  "Relevant manuals".	Version1.8 Version1.2 sion Version1.4 rsion Version1.4 Version1.4	ware version  GAA or later  PB or later	



Item	Description
Programming	Ladder
language	
Number of steps	216 steps (for MELSEC-L series CPU)
	* The number of steps of the FB in a program depends on the CPU model that is used and
	input and output definition.
Function description	1) By turning ON FB_EN (Execution command), the setting values of the process alarm
	are written to the buffer memory.
	2) To enable the setting values, turn the setting change command (YnB) OFF, ON and
	then OFF in the setting mode.
	3) FB operation is one-shot only, triggered by the FB_EN signal.
	4) When the setting value of the target channel is out of range, the FB_ERROR output
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in
	ERROR_ID (Error code).
	Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery
Precautions	processing separately in accordance with the required system operation.
	2) The FB cannot be used in an interrupt program.
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.
	Do not use this FB in programs that are only executed once such as a subroutine,
	FOR-NEXT loop, etc. because it is impossible to turn OFF.
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition
	of the target channel.
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in
	an interrupt program.
	7) Every input must be provided with a value for proper FB operation.
	8) Do not use this FB in modules other than applicable modules. If used in modules other
	than applicable modules, an error will occur in the module.
	9) To use this FB, set the temperature input mode.
	10) Perform the setting using the GX Works2 intelligent function module switch setting to
	match systems and devices connected to the temperature control module.
	For details on how to use the intelligent function module switch setting, refer to GX
	Works2 Operating Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1. FB Library Application Examples".



Item	Description			
Timing chart	[When operation completes without error] [When an error occurs]			
	FB_EN (Execution command)  FB_ENO (Execution status)  Process alarm setting write processing  FB_OK (Completed without error)  FB_EROR (Error flag)  ERROR_ID (Error code)  FB_ENO (Execution command)  FB_ENO (Execution status)  Process alarm setting write processing  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code)  O Error code			
Relevant manuals	<ul> <li>MELSEC-Q Temperature Control Module User's Manual</li> <li>MELSEC-L Temperature Control Module User's Manual</li> <li>QCPU User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)</li> <li>GX Works2 Version 1 Operating Manual (Common)</li> <li>GX Works2 Version 1 Operating Manual (Simple Project, Function Block)</li> </ul>			

### ●Error code list

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

# Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		VVOIG		number.



Name(Comment)	Label name	Data	Setting range	Description
		type		
Process alarm	i_ProcessEnable		0: Enabled	Set whether to enable or
output		Word	1: Disabled	disable the output of the
enable/disable		vvoid		process alarm.
setting				
Process alarm lower	i_ProLLLimit		Set values within the	Set the lower/lower limit
lower limit value		Word	temperature setting range	value of the process
			specified in the input	alarm
Process alarm lower	i_ProLULimit		range setting.	Set the lower/upper limit
upper limit value		Word		value of the process
				alarm.
Process alarm upper	i_ProULLimit			Set the upper/lower limit
lower limit value		Word		value of the process
				alarm.
Process alarm upper	i_ProUULimit			Set the upper/upper limit
upper limit value		Word		value of the process
				alarm.

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

# FB Version Upgrade History

Version	Date	Description
1.00A	2011/09/16	First edition



### Note

This chapter includes information related to the M+TC4\_SetProcessAlarm function block.

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



### **FB Name**

M+TC4\_SetRateAlarm

Item	Description					
Function overview	Sets the rate alarm.					
Symbol			M+TC4_Set	tRateAlarn	n	1
	Execution con	nmand—				—Execution status
	Module start XY a	ddress-	W:i_Start_IO_No		FB_OK : B	—Completed without error
	Tarç	get CH—	W:i_CH	F	B_ERROR : B	—Error flag
	Rate alarm output enable/disable	setting—	W:i_RateEnable		ERROR_ID : W	—Error code
	Rate alarm detection	period—	W:i_RateOut			
	Rate alarm upper limi	t value—	W:i_RateUpLim			
	Rate alarm lower limi	t value—	W:i_RateLowLim			
						1
Applicable hardware	Temperature control					
and software	module		Series		M	odel
		MEL	SEC-L series	L60T	CTT4(BW),	L60TCRT4(BW)
	Hardware details					
			Series		Me	odel
		MEL	SEC-L series	LCPL	J	
	Engineering software	GX W	/orks2 *1			
	Engineering soliware		Language		Soft	ware version
		Japa	anese version		Version1.8	6Q or later
		Eng	lish version		Version1.2	24A or later
		Chir	nese (Simplified) vers	sion	Version1.4	9B or later
		Chir	nese (Traditional) vei	rsion	Version1.4	9B or later
		Kore	ean version		Version1.4	9B or later
		*1 Fo	r software versions a	applicat	ole to the mo	odules used, refer to
		"R	elevant manuals".			
Programming	Ladder					
language						



	Description
Number of steps	207 steps (for MELSEC-L series CPU)
	* The number of steps of the FB in a program depends on the CPU model that is used and
	input and output definition.
Function description	1) By turning ON FB_EN (Execution command), the setting values of the rate alarm are
	written to the buffer memory.
	2) To enable the setting values, turn the setting change command (YnB) OFF, ON and
	then OFF in the setting mode.
	3) FB operation is one-shot only, triggered by the FB_EN signal.
	4) When the setting value of the target channel is out of range, the FB_ERROR output
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in
	ERROR_ID (Error code).
	Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery
Precautions	processing separately in accordance with the required system operation.
	2) The FB cannot be used in an interrupt program.
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.
	Do not use this FB in programs that are only executed once such as a subroutine,
	FOR-NEXT loop, etc. because it is impossible to turn OFF.
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition
	of the target channel.
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in
	an interrupt program.
	7) Every input must be provided with a value for proper FB operation.
	8) Do not use this FB in modules other than applicable modules. If used in modules other
	than applicable modules, an error will occur in the module.
	9) To use this FB, set the temperature input mode.
	10) Perform the setting using the GX Works2 intelligent function module switch setting to
	match systems and devices connected to the temperature control module.
	For details on how to use the intelligent function module switch setting, refer to GX
	Works2 Operating Manual (Common).
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to "Appendix 1. FB Library Application Examples".



Item	Desci	ription	
Timing chart	[When operation completes without error]	[When an error occurs]	
	FB_EN (Execution command)  FB_ENO (Execution status)  Rate alarm setting write processing  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code)	FB_EN (Execution command)  FB_ENO (Execution status)  Rate alarm setting write processing  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code)  0 Error code	
Relevant manuals	•MELSEC-Q Temperature Control Module Us	ser's Manual	
	MELSEC-L Temperature Control Module User's Manual		
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Sir	mple Project, Function Block)	

### ●Error code list

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

# Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		VVOIG		number.



Name(Comment)	Label name	Data	Setting range	Description
		type		
Rate alarm output	i_RateEnable		0: Enabled	Set the rate alarm.
enable/disable		Word	1: Disabled	
setting				
Rate alarm detection	i_RateOut		1~6000 (times)	Set the number of periods
period		Word		to check the changes of
		vvoid		the measured
				temperature value.
Rate alarm upper	i_RateUpLim	Word	-32,768~32,767	Set the upper limit value
limit value		vvoid		of the rate alarm.
Rate alarm lower	i_RateLowLim	Word	-32,768~32,767	Set the lower limit value of
limit value		vvord		the rate alarm.

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

# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_SetRateAlarm function block.

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



# 2.9. M+TC4\_SetPVScaling (Process value (PV) scaling function setting)

### **FB Name**

M+TC4\_SetPVScaling

Item	Description			
Function overview	Sets the process value (PV) scaling function.			
Symbol				
		M+TC4_SetI		
	Execution comm	and—B: FB_EN	FB_ENO : B — Execution status	
	Module start XY addr	ress—W: i_Start_IO_No	FB_OK: B — Completed without error	
	Target	CH—W:i_CH	FB_ERROR: B — Error flag	
	Process value (PV) scaling fund enable/disable set		ERROR_ID: W—Error code	
	Process value (PV) scaling up limit va			
	Process value (PV) scaling lo limit va	— W · i Scaling owl im		
		T		
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
	Hardware details	0 :		
		Series	Model	
		MELSEC-Q series *1	Basic model	
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCF	PU (A mode)	



Item	Description		
	Engineering software	GX Works2 *1	
		Language	Software version
		Japanese version	Version1.86Q or later
		English version	Version1.24A or later
		Chinese (Simplified) version	Version1.49B or later
		Chinese (Traditional) version	Version1.49B or later
		Korean version	Version1.49B or later
		*1 For software versions applical	ble to the modules used, refer to
		"Relevant manuals".	
Programming	Ladder		
language			
Number of steps	232 steps (for MELSEC-Q series universal model CPU)		
	* The number of steps of the FB in a program depends on the CPU model that is used and		
	input and output definition.		
Function description	1) By turning ON FB_EN (Execution command), the set parameters are written to the		
	buffer memory.		
		g values, turn the setting change	command (YnB) OFF, ON and
	then OFF in the set	J	
	3) FB operation is one-shot only, triggered by the FB_EN signal.		
	4) When the setting value of the target channel is out of range, the FB_ERROR output		
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in		
	ERROR_ID (Error code).		
		ode explanation section for details	S
Compiling method	Macro type		



Item	Description		
Restrictions and	The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	2) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop, etc. because it is impossible to turn OFF.		
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition		
	of the target channel.		
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.		
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in		
	an interrupt program.		
	7) Every input must be provided with a value for proper FB operation.		
	8) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	FB_EN (Execution command) FB_EN (Execution command)		
	FB_ENO (Execution status)		
	Process value scaling function setting value write No processing Write Process value scaling function setting value write No processing No pro		
	processing  FB_OK  FB_OK		
	(Completed without error) (Completed without error)		
	FB_ERROR (Error flag)  ERROR_ID (Error code)  FB_ERROR (Error flag)  0  ERROR_ID (Error code)  0  Error code)  0		
<b>D</b> 1			
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	GX Works2 Version 1 Operating Manual (Common)		
	Works2 Version 1 Operating Manual (Simple Project, Function Block)		



### ●Error code list

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

### 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 temperature control module is mounted. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel number.
Process value (PV) scaling function enable/disable setting	i_ScalingEnable	Word	0: Disabled 1: Enabled	Set whether to enable or disable the process value (PV) scaling function.
Process value (PV) scaling upper limit value	i_ScalingUpLim	Word	-32,000~32,000	Set the process value (PV) scaling upper limit value.
Process value (PV) scaling lower limit value	i_ScalingLowLim	Word	-32,000~32,000	Set the process value (PV) scaling lower limit value.



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

# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_SetPVScaling function block.

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



### **FB Name**

M+TC4\_MoniCJTemperature

Item	Description					
Function overview	Sets the cold junction temperature compensation and reads the cold junction temperature					
	process value.	ue.				
Symbol		M+TC4_MoniCJTemperature				
	Execution command—	· ·				
	Module start XY address—	W: i_Start_IO_No	FB_OK	B —Completed without error		
	Cold junction temperature compensation selection	W: i_TempCompSelect o_Te		process value		
				: B — Error flag		
			ERROR_ID	Error code		
Applicable hardware	Temperature control					
and software	module	Series		Model		
		MELSEC-Q series	Q64TCTT(E	BW), Q64TCTT(BW)N		
		MELSEC-L series	L60TCTT4(	BW)		
	Hardware details					
		Series		Model		
		MELSEC-Q series *1	Basic mode	)		
			High perfor	mance model		
			Universal m	nodel		
		MELSEC-L series	LCPU			
		*1 Not applicable to QCP	U (A mode)			
	Engineering software	GX Works2 *1				
		Language		Software version		
		Japanese version		ion1.86Q or later		
		English version		ion1.24A or later		
		Chinese (Simplified) version V		ion1.49B or later		
				ion1.49B or later		
		Korean version Version1.49B or later				
		*1 For software versions applicable to the modules used, refer "Relevant manuals".				



Item	Description				
Programming	Ladder				
language					
Number of steps	203 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definition.				
Function description	By turning ON FB_EN (Execution command), the value of i_TempCompSelect (Cold				
	junction temperature compensation selection) is written to the buffer memory and the				
	cold junction temperature process value is read from the buffer memory.				
Compiling method	Macro type				
Restrictions and	The FB cannot be used in an interrupt program.				
Precautions	2) 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.				
	3) This FB uses index registers Z8 and Z9. Please do not use these index registers in an				
	interrupt program.				
	4) Every input must be provided with a value for proper FB operation.				
	5) Do not use this FB in modules that are not listed in applicable hardware section. If				
	used in modules other than applicable modules, an error will occur in the module.				
	6) Perform the setting using the GX Works2 intelligent function module switch setting to				
	match systems and devices connected to the temperature control module.				
	For details on how to use the intelligent function module switch setting, refer to GX				
	Works2 Operating Manual (Common).				
FB operation type	Real-time execution				
Application example	Refer to "Appendix 1. FB Library Application Examples".				
Timing chart	[When operation completes without error]				
	FB_EN (Execution command)				
	FB_ENO (Execution status)				
	Cold junction temperature compensation selection processing No processing Write No processing				
	o TempProcessVal (Cold junction temperature process value)  No refreshing ref				
	FB_OK (Completed without error)				
	FB_ERROR (Error flag)				
	ERROR_ID (Error code) 0				



Item	Description			
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual			
	MELSEC-L Temperature Control Module User's Manual			
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)			
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)			
	•GX Works2 Version 1 Operating Manual (Common)			
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)			

### ●Error code list

Error code	Description	Countermeasure
None	None	None

# 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 temperature control module is mounted. (For example, enter H10 for X10.)
Cold junction temperature compensation selection	i_TempCompSelect	Word	O: Standard terminal block is used.  1: Temperature control terminal block conversion module  2: Cold junction temperature compensation is not used. *1	Set the cold junction temperature compensation. *1: For Q64TCTT(BW), do not set "2" because this model does not support the setting.



Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		DIL	OFF	OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates that the cold junction
error		Dit	OII	temperature process value is being read.
Cold junction	o_TempProcessVal			Store the cold junction temperature process
temperature process		Word	0	value.
value				
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	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_MoniCJTemperature function block.

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



# 2.11. M+TC4\_Autotuning (Auto tuning)

### **FB Name**

M+TC4\_Autotuning

Item	Description				
Function overview	Sets and executes auto tuning.				
Symbol					
	F	M+TC4_Autotunin	•	For extra status	
	Execution command-	_	_	Execution status	
	Module start XY address-	W: i_Start_IO_No		Completed without error	
	Target CH-	W:i_CH	o_ReadP: W	Proportional band (P)/ heating proportional band (Ph) setting	
	Auto tuning execution-	B:i_AT	o_ReadPc: W	Cooling proportional band (Pc)	
	Upper output limiter-	W: i_UpSetLimiter	o_ReadI: W	-Integral time (I) setting	
	Lower output limiter-	W: i_LowSetLimiter	o_ReadD : W	Derivative time (D) setting	
	Cooling upper output limiter-	W: i_CoolUpLimit o_Ju	udgmentTime: W	Loop disconnection detection judgment time setting	
	Output variation limiter-	W: i_OutVariation	FB_ERROR : B	— Error flag	
	Sensor compensation value setting-	W : i_SensorCompVal	ERROR_ID : W	—Error code	
	Control output period setting-	W: i_OutputPeriod			
	Primary delay digital filter setting-	W : i_PrimaryDelay			
	AT bias setting-	W: i_ATbias			
	Forward/reverse action setting-	W: i_ActionSetting			
	Automatic backup setting after auto_ tuning of PID constants	W : i_AutoBackup			
	Auto tuning mode selection-	W: i_ATModeSelect			
	T				
Applicable hardware	Temperature control				
and software	module	Series		Model	
		MELSEC-Q series Q64TCTT(I		(BW), Q64TCRT(BW),	
			(BW)N, Q64TCRT(BW)N		
		MELSEC-L series L60TCTT4(BW), L60TCRT4(BW)			
			•		



Item	Description					
	Hardware details					
		Series		Model		
		MELSEC-Q series *1	Basic	model		
			High p	performance model		
			Unive	rsal model		
		MELSEC-L series	LCPU			
		*1 Not applicable to QCP	U (A mo	ode)		
	Engineering software	GX Works2 *1				
		Language		Software version		
		Japanese version		Version1.86Q or later		
		English version		Version1.24A or later		
		Chinese (Simplified) vers	sion	Version1.49B or later		
		Chinese (Traditional) ve	rsion	Version1.49B or later		
		Korean version		Version1.49B or later		
		*1 For software versions a	applicab	le to the modules used, refer to		
		"Relevant manuals".				
Programming	Ladder					
language						
Number of steps	352 steps (for MELSEC-	-Q series universal model C	CPU)			
	* The number of steps o	f the FB in a program depe	nds on	the CPU model that is used and		
	input and output definit	tion.				
Function description	1) By turning ON FB_f	EN (Execution command),	the para	ameters are set, and by turning		
	ON i_AT (Auto tunir	ng execution), auto tuning is executed.				
	2) When the setting va	alue of the target channel is out of range, the FB_ERROR output				
	turns ON, processir	ng is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error o	ode).				
	Refer to the error co	ode explanation section for	de explanation section for details.			
Compiling method	Macro type					



Item	Description				
Restrictions and	The FB does not include error recovery processing. Program the error recovery				
Precautions	processing separately in accordance with the required system operation.				
	2) The FB cannot be used in an interrupt program.				
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.				
	Do not use this FB in programs that are only executed once such as a subroutine,				
	FOR-NEXT loop, etc. because it is impossible to turn OFF.				
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition				
	of the target channel.				
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned ON.				
	6) This FB uses index registers Z4, Z5, Z6, Z7, Z8 and Z9. Please do not use these index				
	registers in an interrupt program.				
	7) Every input must be provided with a value for proper FB operation.				
	8) When this FB is used in two or more places, a duplicated coil warning will occur during				
	compile operation due to the Y signal being operated by index modification. However				
	this is not a problem and the FB will operate without error.				
	9) Perform the setting using the GX Works2 intelligent function module switch setting to				
	match systems and devices connected to the temperature control module.				
	For details on how to use the intelligent function module switch setting, refer to GX				
	Works2 Operating Manual (Common).				
FB operation type	Pulsed execution (multiple scan execution type)				
Application example	Refer to "Appendix 1. FB Library Application Examples".				
Timing chart	[When operation completes without error] [When an error occurs] (CH1)				
	(CH1)  FB_EN (Execution command)				
	FB_EN (Execution command)  FB_ENO (Execution status)				
	FB_ENO (Execution status)  Auto tuning setting value write processing  No processing				
	Auto tuning setting value write processing   No processing   i_AT (Auto tuning execution)				
	i_AT (Auto tuning execution)				
	Auto tuning command(Yn4)  Auto tuning status(Xn4)				
	Auto tuning status(Xn4)  Auto tuning read processing  No refreshing				
	Auto tuning read processing  No refreshing  No refreshing  No refreshing  No refreshing  (Completed without error)				
	FB_OK (Completed without error)  FB_ERROR (Error flag)				
	FB_ERROR (Error flag) ERROR_ID (Error code) 0 Error code 0				
	ERROR_ID (Error code) 0				



Item	Description	
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual	
	MELSEC-L Temperature Control Module User's Manual	
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)	
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)	
	•GX Works2 Version 1 Operating Manual (Common)	
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)	

### ●Error code list

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

# Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Auto tuning	i_AT	Bit	ON,OFF	To execute auto tuning,
execution		DIL		turn ON this parameter.
Upper output limiter	i_UpSetLimiter		Standard control	Specify the upper limit
		Word	-50~1,050 (-5.0~105.0%)	value for outputting to an
		vvoid	Heating/cooling control	external devise.
			0~1,050 (0.0~105.0%)	



Name(Comment)	Label name	Data	Setting range	Description
		type		-
Lower output limiter	i_LowSetLimiter		Standard control	Specify the lower limit
			-50~1,050 (-5.0~105.0%)	value for outputting to an
		Word	Heating/cooling control *1	external devise.
			This parameter is disabled	*1: Set 0 for
			even if it is set.	heating/cooling control.
Cooling upper output	i_CoolUpLimit		Standard control	Set the cooling upper
limiter			This parameter is disabled	limiter.
		\\/a ===	even if it is set.	*1: Set 0 for Q64TCTT
		Word	Heating/cooling control *1	(BW) and Q64TCRT
			0~1,050 (0.0~105.0%)	(BW) because they are
				not supported.
Output variation	i_OutVariation		0: Disabled	Specify a range to prevent
limiter		Word	1~1,000(0.1~100.0%/s)	a sudden manipulated
				value change.
Sensor	i_SensorCompVal		-5,000~5,000	Set the compensation
compensation value			(-50.00~50.00%)	value for when there is a
setting		Word		difference between the
				measured temperature
				and actual temperature.
Control output	i_OutputPeriod		Control output period unit	Set the ON/OFF period of
period setting			switch setting = 0: 1s	the transistor output.
			1~100	·
		Word	Control output period unit	
			switch setting = 1: 0.1s	
			5~1,000	
Primary delay digital	i_PrimaryDelay		0: Disabled	Set the primary delay
filter setting		Word	1~100 s	digital filter.
AT bias setting	i_ATbias	Word	Input range	Set the AT bias setting.
Forward/reverse	i_ActionSetting		0: Forward action *1	Set the forward/reverse
action setting	_		1: Reverse action	action setting.
C		Word		*Set 0 for heating/cooling
				control.
Automatic backup	i_AutoBackup		0: Disable	Set whether to
setting after auto	- '		1: Enable	automatically back up the
tuning of PID		Word		PID constants.
constants				
33110101110		1	1	1



Name(Comment)	Label name	Data	Setting range	Description
		type		
Auto tuning mode	i_ATModeSelect	Word	0: Standard mode	Set the auto tuning mode.
selection		vvord	1: Fast response mode	

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 auto tuning is completed.
Proportional band (P)/heating proportional band (Ph) setting	o_ReadP	Word	0	Store the proportional band (P)/heating proportional band (Ph) setting.
Cooling proportional band (Pc)	o_ReadPc	Word	0	Store the cooling proportional band (Pc).  *Do not set any output label circuits for Q64TCTT(BW) and Q64TCRT(BW) because they do not have read targets.
Integral time (I) setting	o_Readl	Word	0	Store the integral time (I) setting.
Derivative time (D) setting	o_ReadD	Word	0	Store the derivative time (D) setting.
Loop disconnection detection judgment time setting	o_JudgmentTime	Word	0	Store the loop disconnection detection judgment time setting.
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	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_ Autotuning function block.

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



# **FB Name**

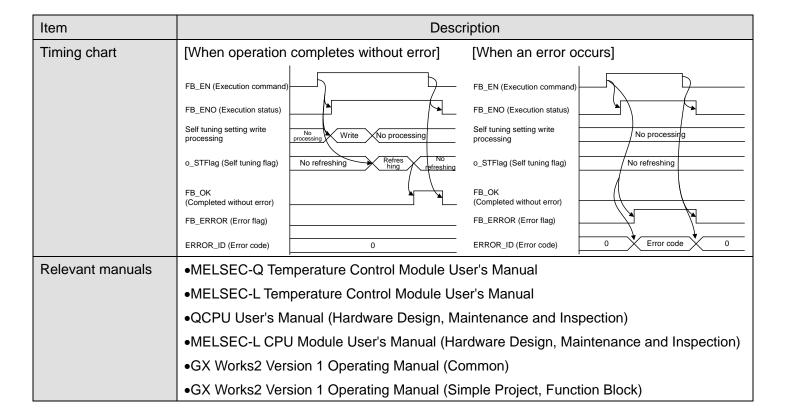
M+TC4\_Selftuning

Item	Description					
Function overview	Sets the self tuning setting	Sets the self tuning setting and monitors the self tuning flag.				
Symbol	M+TC4_Selftuning					
	Execution command—		-	ENO : B — Execution status		
	Module start XY address—	W:i_Start_IO_No	FE	B_OK : B — Completed without error		
	Target CH—	W:i_CH	o_S	FFlag: W Self tuning flag		
	Self tuning setting—	W: i_STSetting	FB_ER	ROR: B — Error flag		
			ERRO	R_ID: W — Error code		
Applicable hardware	Temperature control					
and software	module	Series		Model		
		MELSEC-Q series	Q64T	CTT(BW)N, Q64TCRT(BW)N		
		MELSEC-L series	L60T	CTT4(BW), L60TCRT4(BW)		
	Hardware details					
		Series		Model		
		MELSEC-Q series *1	Basic model			
			High	performance model		
			Unive	ersal model		
		MELSEC-L series	LCPU	J		
		*1 Not applicable to QCP	U (A m	ode)		
	Engineering software	GX Works2 *1				
		Language		Software version		
		Japanese version		Version1.86Q or later		
		English version Version1.24A or later		Version1.24A or later		
		Chinese (Simplified) version Version1.49B or later				
		Chinese (Traditional) version Version1.49B or later				
		Korean version Version1.49B or later				
		*1 For software versions applicable to the modules used, refer to				
		"Relevant manuals".				



Item	Description
Programming	Ladder
language	
Number of steps	189 steps (for MELSEC-Q series universal model CPU)
	* The number of steps of the FB in a program depends on the CPU model that is used and
	input and output definition.
Function description	1) By turning ON FB_EN (Execution command), i_STSetting (Self tuning setting) is set
	and o_STFlag (Self tuning flag) is monitored.
	2) When the setting value of the target channel is out of range, the FB_ERROR output
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in
	ERROR_ID (Error code).
	Refer to the error code explanation section for details.
Compiling method	Macro type
Restrictions and	The FB does not include error recovery processing. Program the error recovery
Precautions	processing separately in accordance with the required system operation.
	2) The FB cannot be used in an interrupt program.
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.
	Do not use this FB in programs that are only executed once such as a subroutine,
	FOR-NEXT loop, etc. because it is impossible to turn OFF.
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition
	of the target channel.
	5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in
	an interrupt program.
	6) Every input must be provided with a value for proper FB operation.
	7) This FB sets the self tuning and monitors its flag. For details on the self tuning, refer to
	MELSEC-L Temperature Control Module User's Manual.
	8) Perform the setting using the GX Works2 intelligent function module switch setting to
	match systems and devices connected to the temperature control module.
	For details on how to use the intelligent function module switch setting, refer to GX
	Works2 Operating Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1. FB Library Application Examples".





#### Error code list

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



# Labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Self tuning setting	i_STSetting		0: Self tuning is not	Set the self tuning
			performed	operation setting.
			1: Start-up ST (Calculates	
			PID constants only)	
			2: Start-up ST (Calculates	
			simultaneous	
			temperature rise	
		Word	parameter only)	
		Word	3: Start-up ST (Calculates	
			PID constants and	
			simultaneous	
			temperature rise	
			parameter)	
			4: Start-up ST + Vibration	
			ST (Both calculates PID	
			constants only)	



Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit OFF	ON: Execution command is ON.	
				OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates that the self tuning is
error		DIL	OFF	being monitored.
Self tuning flag	o_STFlag	Word	0	Store the status of the self tuning.
Error flag	FB_ERROR	Bit OFF		When ON, it indicates that an error has
		DIL	OFF	occurred.
Error code	ERROR_ID	Word	0	FB error code output.

# FB Version Upgrade History

Version	Date	Description
1.00A	2011/09/16	First edition

### Note

This chapter includes information related to the M+TC4\_Selftuning function block.

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



# **FB Name**

M+TC4\_PIDControl

Item	Description			
Function overview	Reads the PID constants	and executes a forced PI	D control stop.	
Symbol		M+TC4_PIDControl		
	Execution command—	B : FB_EN	FB_ENO : B — Execution status	
	Module start XY address-	W: i_Start_IO_No	FB_OK: B — Completed without error	
	Target CH-	W: i_CH	PIDReadOK B PID constant read completion	
	PID constant memory read_ command	B: i_PIDReadCommand o_	PIDReadNG B — PID constant read failure	
	PID control forced stop command-	B : i_PIDStop	o_PIDStop B — PID control stop	
		o_R	ReadPSetting W—Proportional band (P)	
		o_Re	eadPcSetting W—Cooling proportional band (Pc)	
		0_	ReadISetting W—Integral time (I)	
		o_R	ReadDSetting W Derivative time (D)	
		o_Re	eadLoopJudg W Loop disconnection detection judgment time	
			FB_ERROR : B — Error flag	
			ERROR_ID : W — Error code	
Applicable hardware	Tomporatura control			
• •	Temperature control	Carias	Madal	
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
		Series	Model	
		MELSEC-Q series *1  Basic model  High performance model		
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCP	U (A mode)	

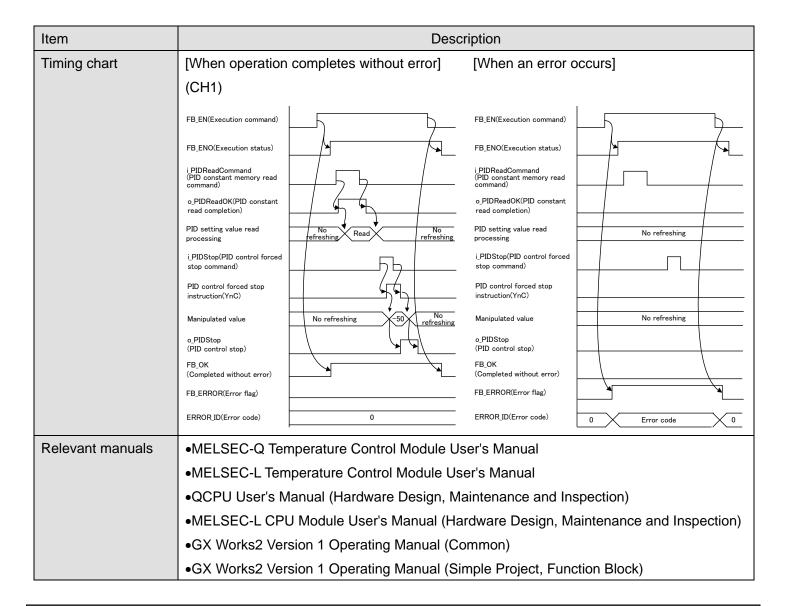


Item	Description			
	Engineering software	neering software GX Works2 *1		
		Language	Software version	
		Japanese version	Version1.86Q or later	
		English version	Version1.24A or later	
		Chinese (Simplified) version	Version1.49B or later	
		Chinese (Traditional) version	Version1.49B or later	
		Korean version	Version1.49B or later	
		*1 For software versions applica	ble to the modules used, refer to	
		"Relevant manuals".		
Programming	Ladder			
language				
Number of steps	313 steps (for MELSEC-Q series universal model CPU)			
	* The number of steps of the FB in a program depends on the CPU model that is used and			
	input and output definition.			
Function description	After FB_EN (Execution command) is turned ON, the PID constants are read by			
	turning ON i_PIDReadCommand (PID constant memory read command) and a forced			
	PID control stop is executed by turning ON i_PIDStop (PID control forced stop			
	command).			
	2) When the setting value of the target channel is out of range, the FB_ERROR output			
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in			
	ERROR_ID (Error code).			
	Refer to the error code explanation section for details.			
Compiling method	Macro type			



Item	Description
Restrictions and	The FB does not include error recovery processing. Program the error recovery
Precautions	processing separately in accordance with the required system operation.
	2) The FB cannot be used in an interrupt program.
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.
	Do not use this FB in programs that are only executed once such as a subroutine,
	FOR-NEXT loop, etc. because it is impossible to turn OFF.
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition
	of the target channel.
	5) This FB uses index registers Z5, Z6, Z7, Z8, and Z9. Please do not use these index
	registers in an interrupt program.
	6) Every input must be provided with a value for proper FB operation.
	7) The action to be taken at a PID operation stop depends on the setting of the stop mode
	setting. For details, refer to MELSEC-L Temperature Control Module User's Manual
	and MELSEC-Q Temperature Control Module User's Manual.
	8) When this FB is used in two or more places, a duplicated coil warning will occur during
	compile operation due to the Y signal being operated by index modification. However
	this is not a problem and the FB will operate without error.
	9) Perform the setting using the GX Works2 intelligent function module switch setting to
	match systems and devices connected to the temperature control module.
	For details on how to use the intelligent function module switch setting, refer to GX
	Works2 Operating Manual (Common).
FB operation type	Real-time execution
Application example	Refer to "Appendix 1. FB Library Application Examples".





#### Error code list

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



# Labels

### ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
,		type	3 3	'
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		\\/.a	the CPU user's manual.	where the temperature
		Word		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Mord	1~4	Specify the channel
		Word		number.
PID constant	i_PIDReadComman		ON,OFF	ON: Read the PID
memory read	d	Bit		commands.
command		DIL		OFF: Do not read the PID
				commands.
PID control forced	i_PIDStop		ON,OFF	ON: Execute a forced PID
stop command		Bit		control stop.
		DIL		OFF: Do not execute a
				forced PID control stop.



# Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		Bit	OFF	OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, the PID setting can be read and
error		DIL	OFF	a forced PID control stop can be executed.
PID constant read	o_PIDReadOK	Bit	OFF	ON: Read is completed.
completion		DIL	OFF	OFF: Read is not executed.
PID constant read	o_PIDReadNG	Bit	OFF	ON: Read failed.
failure		DIL	OFF	OFF: Read is not executed.
PID control stop	o_PIDStop	Bit	OFF	ON: PID control is stopped.
		DIL	OFF	OFF: PID control is being performed.
Proportional band	o_ReadPSetting	Word	0	Store the proportional band (P) that was
(P)		vvoid	U	read.
Cooling proportional	o_ReadPcSetting			Store the cooling proportional band (Pc) that
band (Pc)				was read.
		Word	0	*Do not set any output label circuits for
				Q64TCTT(BW) or Q64TCRT(BW)
				because they do not have read targets.
Integral time (I)	o_ReadISetting	Word	0	Store the integral time (I) that was read.
Derivative time (D)	o_ReadDSetting	Word	0	Store the derivative time (D) that was read.
Loop disconnection	o_ReadLoopJudg			Store the loop disconnection detection
detection judgment		Word	0	judgment time that was read.
time				
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has
		DIL	UFF	occurred.
Error code	ERROR_ID	Word	0	FB error code output.



# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_PIDControl function block.

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



# 2.14. M+TC4\_HeaterDisconnection (Heater disconnection detection function)

### **FB Name**

M+TC4\_HeaterDisconnection

Item	Description			
Function overview	Sets the heater disconnection detection and monitors the heater disconnection.			
Symbol				
		M+TC4_HeaterDisco		
	Execution command—	B : FB_EN	FB_ENO : B — Execution status	
	Module start XY address-	W : i_Start_IO_No	FB_OK: B — Completed without error	
	Target CH-	W:i_CH	o_Disconnect : B — Disconnection detection flag	
	Heater disconnection alert setting-	W: i_HeaterSetting	FB_ERROR: B —Error flag	
			ERROR_ID: W — Error code	
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTTBW, Q64TCRTBW,	
			Q64TCTTBWN, Q64TCRTBWN	
		MELSEC-L series	L60TCTT4BW, L60TCRT4BW	
	Hardware details			
		Series	Model	
		MELSEC-Q series *1	Basic model	
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
	*	1 Not applicable to QCP	U (A mode)	



Item	Description				
	Engineering software	GX Works2 *1			
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applica	ble to the modules used, refer to		
		"Relevant manuals".			
Programming	Ladder				
language					
Number of steps	252 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definition.				
Function description	1) By turning ON FB_EN (Execution command), the set parameters are written to the				
	buffer memory and the heater disconnection is monitored.				
	2) When the setting value of the target channel is out of range, the FB_ERROR output				
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error code).				
	Refer to the error code explanation section for details.				
Compiling method	Macro type				



Item	Description			
Restrictions and	The FB does not include error recovery processing. Program the error recovery			
Precautions	processing separately in accordance with the required system operation.			
	2) The FB cannot be used in an interrupt program.			
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.			
	Do not use this FB in programs that are only executed once such as a subroutine,			
	FOR-NEXT loop, etc. because it is impossible to turn OFF.			
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition			
	of the target channel.			
	5) This FB uses index registers Z6, Z7, Z8 and Z9. Please do not use these index			
	registers in an interrupt program.			
	6) Every input must be provided with a value for proper FB operation.			
	7) Do not use this FB in modules other than applicable modules. If used in modules other			
	than applicable modules, an error will occur in the module.			
	8) If the parameters are set using the configuration function of GX Works 2, using this FB			
	is unnecessary.			
	9) Perform the setting using the GX Works2 intelligent function module switch setting to			
	match systems and devices connected to the temperature control module.			
	For details on how to use the intelligent function module switch setting, refer to GX			
	Works2 Operating Manual (Common).			
FB operation type	Real-time execution			
Application example	Refer to "Appendix 1. FB Library Application Examples".			
Timing chart	[When operation completes without error] [When an error occurs]			
	FB_EN (Execution command)  FB_EN (Execution command)			
	FB_ENO (Execution status)			
	Heater disconnection detection function write processing  Write  No processing  Write  No processing  Write  No processing  Heater disconnection detection function write processing  No processing			
	Alert occurrence b12: Heater disconnection detected disconnection detected			
	o_Disconnect (Disconnection detection flag)  o_Disconnect (Disconnection detection flag)			
	FB_OK (Completed without error)			
	FB_ERROR (Error flag)  FB_ERROR (Error flag)			
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0			
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual			
	MELSEC-L Temperature Control Module User's Manual			
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)			
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)			
	GX Works2 Version 1 Operating Manual (Common)			
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)			



#### ●Error code list

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

### Labels

# ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Heater	i_HeaterSetting		0: Disabled	Set the heater
disconnection alert		Word	1~100(%)	disconnection alert
setting				setting.



#### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		ы	OFF	OFF: Execution command is OFF.
Completed without	FB_OK			When ON, it indicates that the heater
error		Bit	OFF	disconnection detection function setting is
			completed.	
Disconnection	o_Disconnect	Bit	OFF	ON: Heater disconnection occurring.
detection flag		DIL	OFF	OFF: Heater disconnection not occurring.
Error flag	FB_ERROR	Dit	OFF	When ON, it indicates that an error has
		Bit	OFF	occurred.
Error code	ERROR_ID	Word	0	FB error code output.

### **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_HeaterDisconnection function block.

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



# 2.15. M+TC4\_LoopDisconnection (Loop disconnection detection function)

### **FB Name**

M+TC4\_LoopDisconnection

Item		Descriptio	n	
Function overview	Sets the loop disconnection detection and monitors the loop disconnection.			
Symbol	M+TC4_LoopDisconnection			
	Execution command-	B : FB_EN	FB_ENO: B —Execution status	
	Module start XY address-	W: i_Start_IO_No	FB_OK: B —Completed without error	
	Target CH-	W : i_CH	o_Disconnect : B — Disconnection detection flag	
	Loop disconnection detection judgment time	W: i_LoopJudgTime	FB_ERROR: B —Error flag	
	Loop disconnection detection dead band	W : i_DeadBand	ERROR_ID: W—Error code	
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),	
			Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
	Transmare detaile	Series	Model	
		MELSEC-Q series *1	Basic model	
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCF	PU (A mode)	



Item	Description			
	Engineering software	GX Works2 *1		
		Language	Software version	
		Japanese version	Version1.86Q or later	
		English version	Version1.24A or later	
		Chinese (Simplified) version	Version1.49B or later	
		Chinese (Traditional) version	Version1.49B or later	
		Korean version	Version1.49B or later	
		*1 For software versions applica	ble to the modules used, refer to	
		"Relevant manuals".		
Programming	Ladder			
language				
Number of steps	248 steps (for MELSEC-Q series universal model CPU)			
	* The number of steps of the FB in a program depends on the CPU model that is used and			
	input and output definition.			
Function description	1) By turning ON FB_EN (Execution command), the set parameters are written to the			
	buffer memory and the loop disconnection is monitored.			
	2) When the setting value of the target channel is out of range, the FB_ERROR output			
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in			
	ERROR_ID (Error code).			
	Refer to the error code explanation section for details.			
Compiling method	Macro type			



Item	Description					
Restrictions and	The FB does not include error recovery processing. Program the error recovery					
Precautions	processing separately in accordance with the required system operation.					
	2) The FB cannot be used in an interrupt program.					
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.					
	Do not use this FB in programs that are only executed once such as a subroutine,					
	FOR-NEXT loop, etc. because it is impossible to turn OFF.					
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition					
	of the target channel.					
	5) This FB uses index registers Z6, Z7, Z8, and Z9. Please do not use these index					
	registers in an interrupt program.					
	6) Every input must be provided with a value for proper FB operation.					
	7) If the parameters are set using the configuration function of GX Works 2, using this FB					
	is unnecessary.					
	8) Perform the setting using the GX Works2 intelligent function module switch setting to					
	match systems and devices connected to the temperature control module.					
	For details on how to use the intelligent function module switch setting, refer to GX					
	Works2 Operating Manual (Common).					
FB operation type	Real-time execution					
Application example	Refer to "Appendix 1. FB Library Application Examples".					
Timing chart	[When operation completes without error] [When an error occurs]					
	FB_EN (Execution command)					
	FB_ENO (Execution status)					
	Loop disconnection detection function write processing  Write  No processing  Write  No processing  Loop disconnection detection function write processing  processing					
	Alert occurrence b13: Loop disconnection detection					
	o_Disconnect (Disconnection detection flag)  o_Disconnect (Disconnection detection flag)					
	FB_OK (Completed without error)					
	FB_ERROR (Error flag)  FB_ERROR (Error flag)					
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code					
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual					
	MELSEC-L Temperature Control Module User's Manual					
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)					
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)					
	•GX Works2 Version 1 Operating Manual (Common)					
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)					



#### ●Error code list

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

### Labels

### ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvord		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Loop disconnection	i_LoopJudgTime		0~7,200(s)	Set the loop disconnection
detection judgment		Word		detection judgment time.
time				
Loop disconnection	i_DeadBand	Word	Input range	Set the loop disconnection
detection dead band		vvoid		detection dead band.



#### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		DIL	OFF	OFF: Execution command is OFF.
Completed without	FB_OK			When ON, it indicates that the loop
error		Bit	OFF	disconnection detection function setting is
				completed.
Disconnection	o_Disconnect	Bit	OFF	ON: Loop disconnection occurring.
detection flag		DIL	OFF	OFF: Loop disconnection not occurring.
Error flag	FB_ERROR	Bit OFF		When ON, it indicates that an error has
		Bit	OFF	occurred.
Error code	ERROR_ID	Word	0	FB error code output.

### **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_LoopDisconnection function block.

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



# 2.16. M+TC4\_SimultaneousTemperature (Simultaneous temperature rise function setting)

### **FB Name**

M+TC4\_SimultaneousTemperature

Item		Description	ı		
Function overview	Sets simultaneous temperature rise function setting and monitors the status of the				
	simultaneous temperature	rise.			
Symbol	M+TC4_SimultaneousTemperature				
	Execution command-		FB_ENO: B — Execution status		
	Module start XY address-	W: i_Start_IO_No	FB_OK: B — Completed without error		
	Target CH-	W:i_CH	o_RiseState : B Simultaneous temperature rise status		
	Simultaneous temperature rise _ group setting	W: i_GroupSetting	FB_ERROR: B — Error flag		
	Simultaneous temperature rise gradient data	W: i_GradientData	ERROR_ID: W — Error code		
	Simultaneous temperature riseidle time	W:i_ldleTime			
	Simultaneous temperature riseAT mode selection	W: i_ATModeSelect			
Applicable hardware	Temperature control				
and software	module	Series	Model		
		MELSEC-Q series	Q64TCTT(BW)N, Q64TCRT(BW)N		
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)		
	Hardware details				
		Series	Model		
		MELSEC-Q series *1	Basic model		
			High performance model		
			Universal model		
		MELSEC-L series	LCPU		
	*	1 Not applicable to QCP	U (A mode)		



Item	Description				
	Engineering software	GX Works2 *1			
		Language	Software version		
		Japanese version	Version1.86Q or later		
		English version	Version1.24A or later		
		Chinese (Simplified) version	Version1.49B or later		
		Chinese (Traditional) version	Version1.49B or later		
		Korean version	Version1.49B or later		
		*1 For software versions applica	ble to the modules used, refer to		
		"Relevant manuals".			
Programming	Ladder				
language					
Number of steps	253 steps (for MELSEC-Q series universal model CPU)				
	* The number of steps of the FB in a program depends on the CPU model that is used and				
	input and output definit	ion.			
Function description	1) By turning ON FB_EN (Execution command), the setting values of the simultaneous				
	temperature rise function are written to the buffer memory.				
	2) After FB_OK (Completed without error) is turned ON, the simultaneous temperature				
	rise status is monito	ored.			
	3) To enable the settin	g values, turn the setting change	command (YnB) OFF, ON and		
	then OFF in the set	ting mode.			
	4) When the setting value of the target channel is out of range, the FB_ERROR output				
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in				
	ERROR_ID (Error code).				
	Refer to the error code explanation section for details.				
Compiling method	Macro type				



Item	Description					
Restrictions and	The FB does not include error recovery processing. Program the error recovery					
Precautions	processing separately in accordance with the required system operation.					
	2) The FB cannot be used in an interrupt program.					
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.					
	Do not use this FB in programs that are only executed once such as a subroutine,					
	FOR-NEXT loop, etc. because it is impossible to turn OFF.					
	4) When two or more of these FBs are used, precaution must be taken to avoid repetition					
	of the target channel.					
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.					
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in					
	an interrupt program.					
	7) Every input must be provided with a value for proper FB operation.					
	8) If the parameters are set using the configuration function of GX Works 2, using this FB					
	is unnecessary.					
	9) Perform the setting using the GX Works2 intelligent function module switch setting to					
	match systems and devices connected to the temperature control module.					
	For details on how to use the intelligent function module switch setting, refer to GX					
	Works2 Operating Manual (Common).					
FB operation type	Real-time execution					
Application example	Refer to "Appendix 1. FB Library Application Examples".					
Timing chart	[When operation completes without error] [When an error occurs]					
	FB_EN (Execution command)					
	FB_ENO (Execution status)					
	Simultaneous temperature rise function setting value write processing writ					
	Simultaneous temperature sign etatus (huffer mamps)					
	o_RiseState (Simultaneous temperature rise status)					
	FB_OK (Completed without error)					
	FB_ERROR (Error flag)  FB_ERROR (Error flag)					
	ERROR_ID (Error code) 0 ERROR_ID (Error code) 0 Error code					
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual					
	MELSEC-L Temperature Control Module User's Manual					
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)					
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)					
	•GX Works2 Version 1 Operating Manual (Common)					
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)					



# ●Error code list

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

# Labels

# ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvoid		number.
Simultaneous	i_GroupSetting		<standard control=""></standard>	Set the simultaneous
temperature rise			0: Simultaneous	temperature rise group
group setting			temperature rise is not	setting.
			performed	
			1: Group 1 selection	
			2: Group 2 selection	
		Word	<mixed control=""></mixed>	
			0: Simultaneous	
			temperature rise is not	
			performed	
			1: Simultaneous	
			temperature rise is	
			performed	
Simultaneous	i_GradientData		0~Upper limit value of the	Set the simultaneous
temperature rise		Word	input range	temperature rise gradient
gradient data				data.



Name(Comment)	Label name	Data Setting range I		Description
		type		
Simultaneous	i_ldleTime		0~3,600(s)	Set the simultaneous
temperature rise idle		Word		temperature rise idle time.
time				
Simultaneous	i_ATModeSelect		0: Standard auto tuning	Set the auto tuning mode
temperature rise AT			selection	setting.
mode selection		Word	1: Simultaneous	
			temperature rise auto	
			tuning selection	

#### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit OFF		ON: Execution command is ON.
		DIL	OFF	OFF: Execution command is OFF.
Completed without	FB_OK			When ON, it indicates that the simultaneous
error		Bit	OFF	temperature rise function setting is
				completed.
Simultaneous	o_RiseState			ON: Simultaneous temperature rise is being
temperature rise		Bit OFF '		performed.
status				OFF: Simultaneous temperature rise is not
				performed.
Error flag	FB_ERROR	Dit	OFF	When ON, it indicates that an error has
		Bit OFF		occurred.
Error code	ERROR_ID	Word	0	FB error code output.

# FB Version Upgrade History

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_SimultaneousTemperature function block. It does not include information on restrictions of use such as combination with temperature modules or programmable controller CPUs.



# 2.17. M+TC4\_SetPeakCurrentSuppress (Peak current limit control setting)

### **FB Name**

M+TC4\_SetPeakCurrentSuppress

Item	Description			
Function overview	Sets the peak current limit control setting.			
Symbol				
	[	M+TC4_SetPeakCurrer	ntSuppress	
	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	
	Group setting CH 1—	W: i_SetGroupCH1	FB_ERROR: B — Error flag	
	Group setting CH 2—	W: i_SetGroupCH2	ERROR_ID: W—Error code	
	Group setting CH 3—	W: i_SetGroupCH3		
	Group setting CH 4—	W: i_SetGroupCH4		
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
		Series	Model	
		MELSEC-Q series *1	Basic model	
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCP	U (A mode)	



Item	Description		
	Engineering software GX Works2 *1		
		Language	Software version
		Japanese version	Version1.86Q or later
		English version	Version1.24A or later
		Chinese (Simplified) version	Version1.49B or later
		Chinese (Traditional) version	Version1.49B or later
		Korean version	Version1.49B or later
		*1 For software versions applical	ble to the modules used, refer to
		"Relevant manuals".	
Programming	Ladder		
language			
Number of steps	236 steps (for MELSEC-Q series universal model CPU)		
	* The number of steps of the FB in a program depends on the CPU model that is used and		
	input and output definition.		
Function description	1) By turning ON FB_E	EN (Execution command), the div	ided groups of each channel is
	written to the peak current limit control setting divided group setting.		
	2) To enable the setting values, turn the setting change command (YnB) OFF, ON and		
	then OFF in the setting mode.		
	3) FB operation is one-shot only, triggered by the FB_EN signal.		
	4) When the setting value of i_SetGroupCH1 (Group setting CH1) to i_SetGroupCH4		
	(Group setting CH 4) is out of range, the FB_ERROR output turns ON, processing is		
	interrupted, and the error code 11 (Decimal) is stored in ERROR_ID (Error code).		
		ode explanation section for details	5.
Compiling method	Macro type		



Item	Description		
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	2) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop, etc. because it is impossible to turn OFF.		
	4) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.		
	5) This FB uses index registers Z8 and Z9. Please do not use these index registers in an		
	interrupt program.		
	6) Every input must be provided with a value for proper FB operation.		
	7) Do not use this FB in modules that are not listed in applicable hardware section. If		
	used in modules other than applicable modules, an error will occur in the module.		
	8) If the parameters are set using the configuration function of GX Works 2, using this FB		
	is unnecessary.		
	9) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	FB_EN (Execution command)  FB_EN (Execution command)		
	FB_ENO (Execution status)		
	Peak current limit control setting write processing  No processing  Write Peak current limit control setting write processing setting write processing setting write processing		
	FB_OK FB_OK		
	(Completed without error) (Completed without error)		
	FB_ERROR (Error flag)  ERROR_ID (Error code)  FB_ERROR (Error flag)  0  ERROR_ID (Error code)  0  Error code)  0		
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual     Manual (Userture Parism Maintenance and Income time)		
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)      CX Works 2 Version 4 Operating Manual (Common)		
	GX Works2 Version 1 Operating Manual (Common)      CX Works2 Version 1 Operating Manual (Circula Brainet, Function Block)		
	Works2 Version 1 Operating Manual (Simple Project, Function Block)		



#### ●Error code list

Error code	Description	Countermeasure
11 (Decimal)	Group settings CH1 to CH4 are not valid.	Please try again after confirming the setting.
	Group settings CH1 to CH 4 are not	
	within the range of 0 to 4.	

### Labels

### ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Group setting CH 1	i_SetGroupCH1	Word	0: Not divided	Set the peak current limit
Group setting CH 2	i_SetGroupCH2	Word	1: Group 1	control divided group
Group setting CH 3	i_SetGroupCH3	Word	2: Group 2	settings for CH1 to CH4.
Group setting CH 4	i_SetGroupCH4	Word	3: Group 3	
		vvoid	4: Group 4	

# Output labels

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



# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_SetPeakCurrentSuppress function block.

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



### **FB Name**

M+TC4\_AlertStatus

Item	Description		
Function overview	Monitors an alert that has occurred.		
Symbol		M+TC4_AlertStatus	
	Execution command—B:	_	NO : B — Execution status
	Module start XY address—W:	i_Start_IO_No FB_	OK: B — Completed without error
	Target CH— W:		Bit0: B — PV has exceeded the temperature measurement range of the set input range  Bit1: B — PV has fallen below the temperature measurement range of the set input range
		0_	Bit2: B — Process alarm upper limit alert occurrence
		0_	Bit3 : B — Process alarm lower limit alert occurrence
		0_	Bit4 : B — Rate alarm upper limit alert occurrence
		0_	Bit5 : B — Rate alarm lower limit alert occurrence
		0_	Bit8 : B — Alert 1 occurrence
		0_	Bit9: B — Alert 2 occurrence
		o_B	it10 : B — Alert 3 occurrence
		о_В	it11: B—Alert 4 occurrence
			it12 : B — Heater disconnection detection
		о_В	it13 : B — Loop disconnection detection
			it14 : B — Output off-time current error detection
			OR: B—Error flag
			_ID: W—Error code
Applicable hardware	Temperature control		
and software	module	Series	Model
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),
			Q64TCTT(BW)N, Q64TCRT(BW)N
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)



Item	Description		
	Hardware details		
		Series	Model
		MELSEC-Q series *1	Basic model
			High performance model
			Universal model
		MELSEC-L series	LCPU
		*1 Not applicable to QCPI	J (A mode)
	Engineering software	GX Works2 *1	
		Language	Software version
		Japanese version	Version1.86Q or later
		English version	Version1.24A or later
		Chinese (Simplified) vers	sion Version1.49B or later
		Chinese (Traditional) ver	rsion Version1.49B or later
		Korean version	Version1.49B or later
		*1 For software versions a	applicable to the modules used, refer to
		"Relevant manuals".	
Programming	Ladder		
language			
Number of steps	262 steps (for MELSEC-Q series universal model CPU)		
	* The number of steps of	f the FB in a program depe	nds on the CPU model that is used and
	input and output definit	ion.	
Function description	1) By turning ON FB_EN (Execution command), an alert is monitored.		
	2) When the setting value of the target channel is out of range, the FB_ERROR output		
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in		
	ERROR_ID (Error code).		
	Refer to the error code explanation section for details.		
Compiling method	Macro type		



Item	Description		
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop, etc. because it is impossible to turn OFF.		
	When two or more of these FBs are used, precaution must be taken to avoid repetition		
	of the target channel.		
	5) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in		
	an interrupt program.		
	6) Every input must be provided with a value for proper FB operation.		
	7) If the parameters are set using the configuration function of GX Works 2, using this FB		
	is unnecessary.		
	8) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Real-time execution		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	(When alert occurrence b0 is monitored) (When alert occurrence b0 is monitored)		
	FB_EN (Execution command) FB_EN (Execution command)		
	FB_ENO (Execution status)		
	Alert occurrence b0: PV has exceeded the temperature measurement temperature measurement		
	range o_Bit0 (PV has exceeded the temperature range ra		
	measurement range of the set input range)  FB OK  measurement range of the set input range)  FB_OK		
	(Completed without error)  FB ERROR (Error flag)  FB_ERROR (Error flag)		
	ERROR_ID (Error code)  0 ERROR_ID (Error code)  0 Error code		
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		



#### ●Error code list

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

### 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 temperature control module is mounted. (For example, enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel number.

### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.
		DIL	Bit OFF	OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates that an alert is being
error		DIL	OFF	monitored.
PV has exceeded	o_Bit0			ON: PV has exceeded the temperature
the temperature				measurement range of the set input range.
measurement range		Bit	OFF	OFF: Alert not occurring.
of the set input				
range				



Name(Comment)	Label name	Data	Initial	Description
		type	value	
PV has fallen below	o_Bit1			ON: PV has fallen below the temperature
the temperature				measurement range of the set input range.
measurement range		Bit	OFF	OFF: Alert not occurring.
of the set input				
range				
Process alarm upper	o_Bit2			ON: Process alarm upper limit alert
limit alert occurrence		Bit	OFF	occurring.
				OFF: Alert not occurring.
Process alarm lower	o_Bit3			ON: Process alarm lower limit alert
limit alert occurrence		Bit	OFF	occurring.
				OFF: Alert not occurring.
Rate alarm upper	o_Bit4	Bit	OFF	ON: Rate alarm upper limit alert occurring.
limit alert occurrence		Dit	011	OFF: Alert not occurring.
Rate alarm lower	o_Bit5	Bit	OFF	ON: Rate alarm lower limit alert occurring.
limit alert occurrence		Dit	011	OFF: Alert not occurring.
Alert 1 occurrence	o_Bit8	Bit	OFF	ON: Alert 1 occurring.
		Dit.	011	OFF: Alert not occurring.
Alert 2 occurrence	o_Bit9	Bit	OFF	ON: Alert 2 occurring.
		Dit.	011	OFF: Alert not occurring.
Alert 3 occurrence	o_Bit10	Bit	OFF	ON: Alert 3 occurring.
		Dit.	011	OFF: Alert not occurring.
Alert 4 occurrence	o_Bit11	Bit	OFF	ON: Alert 4 occurring.
		Dit.	011	OFF: Alert not occurring.
Heater	o_Bit12			ON: Heater disconnection was detected.
disconnection		Bit	OFF	OFF: Alert not occurring.
detection				
Loop disconnection	o_Bit13	Bit	OFF	ON: Loop disconnection was detected.
detection		Dit.	011	OFF: Alert not occurring.
Output off-time	o_Bit14			ON: A current error when the output is OFF
current error		Bit	OFF	was detected.
detection				OFF: Alert not occurring.
Error flag	FB_ERROR	Bit	OFF	When ON, it indicates that an error has
		Dit.	011	occurred.
Error code	ERROR_ID	Word	0	FB error code output.



# **FB Version Upgrade History**

Version	Date	Description
1.00A	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC-4\_AlertStatus function block.

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



# 2.19. M+TC4\_ErrorOperation (Error operation)

# **FB Name**

M+TC4\_ErrorOperation

Item	Description					
Function overview	Monitors an error code and perform an error reset.					
Symbol	M+TC4_ErrorOperation					
	Execution command—	•	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_UnitError: B — Module error detection			
			o_ErrorCode : W — Module error code			
		0_	_ErrorAddress: W — Error occurrence address			
			FB_ERROR: B — Error flag			
			ERROR_ID: W — Error code			
	<u> </u>		<u>'</u>			
Applicable hardware	Temperature control					
and software	module	Series	Model			
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),			
			Q64TCTT(BW)N, Q64TCRT(BW)N			
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)			
	Hardware details					
		Series	Model			
		MELSEC-Q series *1	Basic model			
		High performance model				
			Universal model			
		MELSEC-L series	LCPU			
		*1 Not applicable to QCP	U (A mode)			



Item	Description						
	Eng	Engineering software GX Works2 *1					
			Language	Software version			
			Japanese version	Version1.86Q or later			
			English version	Version1.24A or later			
			Chinese (Simplified) version	Version1.49B or later			
			Chinese (Traditional) version	Version1.49B or later			
			Korean version	Version1.49B or later			
			*1 For software versions applica "Relevant manuals".	ble to the modules used, refer to			
Programming	Lac	dder	<u> </u>				
language							
Number of steps	219	9 steps (for MELSEC	-Q series universal model CPU)				
	* T	he number of steps of	of the FB in a program depends or	the CPU model that is used and			
	in	nput and output defini	tion.				
Function description	1)	By turning ON FB_	EN (Execution command), whether	er an error occurred is monitored.			
	2)	When a module err	or occurs, o_UnitError (Module er	ror detection) is turned ON and			
		the module error in	formation is stored in o_ErrorCode	e (Module error code) and			
		o_ErrorAddress (E	rror occurrence address).				
	3)	3) After FB_EN (Execution command) is turned ON, an error reset is performed by					
		turning ON i_ErrorReset (Error reset request) during error occurrence.					
Compiling method	Ма	icro type					
Restrictions and	1)	The FB does not include error recovery processing. Program the error recovery					
Precautions		processing separately in accordance with the required system operation.					
	2)	2) The FB cannot be used in an interrupt program.					
	3)	Please ensure that	the FB_EN signal is capable of be	eing turned OFF by the program.			
		Do not use this FB	in programs that are only execute	d once such as a subroutine,			
		FOR-NEXT loop, e	tc. because it is impossible to turn	OFF.			
	4)	This FB uses index	registers Z8 and Z9. Please do n	ot use these index registers in an			
		interrupt program.					
	5)	5) Every input must be provided with a value for proper FB operation.					
	6)		ed in two or more places, a duplica				
		compile operation of	due to the Y signal being operated	by index modification. However			
			m and the FB will operate without of				
	7)	_	using the GX Works2 intelligent for	_			
		•	d devices connected to the temper				
			to use the intelligent function mod	ule switch setting, refer to GX			
		Works2 Operating	Manual (Common).				



Item	Description				
FB operation type	Real-time execution				
Application example	Refer to "Appendix 1. FB Library Application Examples".				
Timing chart	[When operation completes without error]				
	FB_EN (Execution command)				
	FB_ENO (Execution status)				
	i_ErrorReset (Error reset request)				
	Error reset command (Yn2)				
	Write error flag (Xn2)				
	o_UnitError (Module error detection)				
	o_ErrorCode (Module error code)  0 Error code				
	o_ErrorAddress (Error occurrence address)  0 Address 0				
	FB_OK (Completed without error)				
	FB_ERROR (Error flag)				
	ERROR_ID (Error code) 0				
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual				
	MELSEC-L Temperature Control Module User's Manual				
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)				
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)				
	•GX Works2 Version 1 Operating Manual (Common)				
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)				

### ●Error code list

Error code	Description	Countermeasure
None	None	None



# Labels

# ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvord		control module is
				mounted. (For example,
				enter H10 for X10.)
Error reset request	i_ErrorReset		ON,OFF	Turn ON this parameter to
				perform an error reset.
		Bit		Turn OFF the request
		ы		when FB_OK (Completed
				without error) is turned
				ON.

### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		DIL	OFF	OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates that an error reset is
error		DIL	OFF	completed.
Module error	o_UnitError	Bit	OFF	When ON, it indicates that an error has
detection		DIL	OFF	occurred.
Module error code	o_ErrorCode	Word	0	Store an error code for an error that
		vvoid	0	occurred in the module.
Error occurrence	o_ErrorAddress	Mord	0	Store an address in which an error has
address		Word 0		occurred.
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	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_ErrorOperation function block.

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



# **FB Name**

M+TC4\_ReadVal

Item	Description							
Function overview	Reads the values to the specified devices.							
Symbol								
		M+TC4_ReadV						
	Execution command—	B : FB_EN	FB_ENO : B	- Execution status				
	Module start XY address—	W:i_Start_IO_No	FB_OK : B	— Completed without error				
	Target CH—	W:i_CH	o_ReadData: W	Read data				
			FB_ERROR : B	— Error flag				
			ERROR_ID : W	— Error code				
	_							
Applicable hardware	Temperature control							
and software	module	Series		Model				
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),					
			Q64TCTT(BW)N, Q64TCRT(BW)N					
		MELSEC-L series	L60TCTT4(BW	/), L60TCRT4(BW)				
	Handrian datalla							
	Hardware details							
		Series		Model				
		MELSEC-Q series *1 Basic model						
		High performance model Universal model  MELSEC-L series LCPU		nce model				
				el				
		*1 Not applicable to QCP	U (A mode)					



Item	Description		
	Engineering software GX Works2 *1		
		Language	Software version
		Japanese version	Version1.86Q or later
		English version	Version1.24A or later
		Chinese (Simplified) version	Version1.49B or later
		Chinese (Traditional) version	Version1.49B or later
		Korean version	Version1.49B or later
		*1 For software versions applica	ble to the modules used, refer to
		"Relevant manuals".	
Programming	Ladder		
language			
Number of steps	267 steps (for MELSEC-Q series universal model CPU)  * The number of steps of the FB in a program depends on the CPU model that is used and input and output definition.		
Function description	<ol> <li>By turning ON FB_EN (Execution command), the specified values are read to o_ReadData (Read data).</li> <li>When the setting value of the target channel is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in</li> </ol>		
	ERROR_ID (Error code).		
	Refer to the error code explanation section for details.		
Compiling method	Macro type		
Restrictions and	The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	<ol> <li>The FB cannot be used in an interrupt program.</li> <li>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>When two or more of these FBs are used, precaution must be taken to avoid repetition of the target channel.</li> <li>This FB uses index registers Z5, Z6, Z7, Z8 and Z9. Please do not use these index registers in an interrupt program.</li> <li>Every input must be provided with a value for proper FB operation.</li> <li>If the parameters are set using the configuration function of GX Works 2, using this FB</li> </ol>		
		e set using the configuration func	TION OF GX VVORKS 2, USING THIS FB
CD on orotic a turn a	is unnecessary.		
FB operation type	Real-time execution		
Application example	Refer to "Appendix 1. FB Library Application Examples".		



Item	Description				
Timing chart	[When operation completes without error] [When an error occurs]				
	FB_EN (Execution command)  FB_ENO (Execution status)  Setting value read processing  FB_OK (Completed without error)  FB_EROR (Error flag)  ERROR_ID (Error code)  FB_ENO (Execution command)  FB_ENO (Execution status)  Setting value read processing  FB_OK (Completed without error)  FB_ERROR (Error flag)  ERROR_ID (Error code)  O  ERROR_ID (Error code)				
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual				
	●MELSEC-L Temperature Control Module User's Manual				
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)				
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)				
	•GX Works2 Version 1 Operating Manual (Common)				
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)				

# **Error codes**

#### ●Error code list

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

## Labels

## ●Input labels

- Input labele				
Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1~4	Specify the channel
		vvolu		number.



## Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		Dit.	011	OFF: Execution command is OFF.
Completed without	FB_OK	Bit	OFF	When ON, it indicates that the data are
error		Dit	OIT	being read.
Read data	o_ReadData			The following values are stored in the
				specified devices.
				(Example: If D0 is set, the temperature
				process value (PV) is stored in D2.)
				+0: Error code
				+1: Alert occurrence data
				+2: Temperature process value (PV)
				+3: Manipulated value (MV)
				+4: Temperature rise judgment flag
				+5: Transistor output flag
				+6: Set value (SV) setting
				+7: Proportional band (P) setting
			0	+8: Integral time (I) setting
				+9: Derivative time (D) setting
		\\/and		+10: Alert setting value 1
		Word		+11: Alert setting value 2
				+12: Alert setting value 3
				+13: Alert setting value 4
				+14: Heater disconnection alert setting
				+15: Loop disconnection detection judgment
				time setting
				+16: Manipulated value for other analog
				module output (MV)
				+17: CT1 Heater current measurement
				value
				+18: CT2 Heater current measurement
				value
				+19: CT3 Heater current measurement
				value
				+20: CT4 Heater current measurement



Name(Comment)	Label name	Data	Initial	Description
		type	value	
				value
				+21: CT5 Heater current measurement
				value
				+22: CT6 Heater current measurement
				value
				+23: CT7 Heater current measurement
				value
				+24: CT8 Heater current measurement
				value
	+25: Cooling		+25: Cooling proportional band setting (Pc)	
				+26: Cooling manipulated value (MVc)
				+27: Cooling transistor output flag
				+28: Cooling manipulated value (MVc) (For
				other analog module output)
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	2011/09/16	First edition

#### Note

This chapter includes information related to the M+TC4\_ReadVal function block.

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

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



# 2.21. M+TC4\_ParamBackup (Setting value backup)

## **FB Name**

M+TC4\_ParamBackup

# **Function Overview**

Item	Description			
Function overview	Backs up the setting value or executes the default setting registration command.			
Symbol				
		M+TC4_ParamBackup		
	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	
	Command	B: i_Backup o_Back	kupComp : B — Setting value backup completion flag	
	Default setting registration command	B: i_DefaultSetting o_Defa	aultComp: B — Default value write completion flag	
		o_Back	upFailure : B Setting value backup failure flag	
		FB	_ERROR : B —Error flag	
		EF	RROR_ID: W —Error code	
	'			
Applicable hardware	Temperature control			
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW), Q64TCRT(BW),	
			Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
	Hardware details			
		Series	Model	
		MELSEC-Q series *1	Basic model	
		High performance model		
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCP	U (A mode)	



Item	Description					
	Engineering software	GX Works2 *1				
		Language	Software version			
		Japanese version	Version1.86Q or later			
		English version	Version1.24A or later			
		Chinese (Simplified) version	Version1.49B or later			
		Chinese (Traditional) version	Version1.49B or later			
		Korean version	Version1.49B or later			
		*1 For software versions applica	ble to the modules used, refer to			
		"Relevant manuals".				
Programming	Ladder					
language						
Number of steps	174 steps (for MELSEC-Q series universal model CPU)					
	* The number of steps o	f the FB in a program depends or	the CPU model that is used and			
	input and output definit	tion.				
Function description	1) After FB_EN (Exec	ution command) is turned ON, the	control mode selection of the			
	switch setting and t	he parameter settings in the buffe	r memory are backed up by			
	turning ON i_Backup (Setting value backup command) and the buffer memory					
	contents are returned to the default values by turning ON i_DefaultSetting (Default					
	setting registration command).					
Compiling method	Macro type					



Item	Description
Restrictions and	The FB does not include error recovery processing. Program the error recovery
Precautions	processing separately in accordance with the required system operation.
	2) The FB cannot be used in an interrupt program.
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.
	Do not use this FB in programs that are only executed once such as a subroutine,
	FOR-NEXT loop, etc. because it is impossible to turn OFF.
	4) This FB uses index register Z9. Please do not use this index register in an interrupt program.
	5) Every input must be provided with a value for proper FB operation.
	6) If the parameters are set using the configuration function of GX Works 2, using this FB is unnecessary.
	7) When this FB is used in two or more places, a duplicated coil warning will occur during compile operation due to the Y signal being operated by index modification. However
	this is not a problem and the FB will operate without error.
	8) Perform the setting using the GX Works2 intelligent function module switch setting to
	match systems and devices connected to the temperature control module.
	For details on how to use the intelligent function module switch setting, refer to GX
ED operation type	Works2 Operating Manual (Common).  Real-time execution
FB operation type  Application example	Refer to "Appendix 1. FB Library Application Examples".
Timing chart	[When operation completes without error]
Tilling Chart	[when operation completes without entity
	FB_EN (Execution command)
	FB_ENO (Execution status)
	i_Backup (Setting value backup command)
	Setting value backup command (Yn8)
	Setting value backup completion flag (Xn8)
	o_BackupComp (Setting value backup completion flag)
	i DefaultSetting (Default setting registration command)
	Default value registration command (Yn9)
	Default value write completion flag (Xn9)
	o_DefaultComp (Default value write completion flag)
	FB_OK (Completed without error)
	FB_ERROR (Error flag)
	ERROR_ID (Error code) 0



Item	Description		
Relevant manuals	●MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	•QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		

# **Error codes**

## ●Error code list

Error code	Description	Countermeasure
None	None	None

# Labels

## ●Input labels

Name(Comment)	Label name	Data	Setting range	Description
		type		
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		vvoid		control module is
				mounted. (For example,
				enter H10 for X10.)
Setting value backup	i_Backup		ON,OFF	When ON, the parameter
command		Bit		setting in the buffer
		DIL		memory is written to the
				non-volatile memory.
Default setting	i_DefaultSetting		ON,OFF	When ON, the buffer
registration		Bit		memory contents are
command		DIL		returned to the default
				values.



#### Output labels

Name(Comment)	Label name	Data	Initial	Description
		type	value	
Execution status	FB_ENO	Bit	OFF	ON: Execution command is ON.
		DIL	OFF	OFF: Execution command is OFF.
Completed without	FB_OK			When ON, it indicates that it is possible to
error		Bit	OFF	back up the setting values and return to the
				default values.
Setting value backup	o_BackupComp	Bit	OFF	When ON, it indicates that backing up the
completion flag		DIL	OFF	setting values is completed.
Default value write	o_DefaultComp	Bit	OFF	When ON, it indicates that writing the default
completion flag		DIL	OFF	values is completed.
Setting value backup	o_BackupFailure			When ON, it indicates backing up the setting
failure flag				values failed.
				*When the setting value backup failure flag
		Bit	OFF	is turned ON, it can be turned OFF by
				re-executing the setting value backup
				command (i_Backup) and after the write
				operation is completed normally.
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	2011/09/16	First edition

## Note

This chapter includes information related to the M+TC4\_ParamBackup function block.

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

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



# 2.22. M+TC4\_SetPVAverage (Process value (PV) moving averaging process setting)

## **FB Name**

M+TC4\_SetPVAverage

# **Function Overview**

Item	Description			
Function overview	Sets the number of moving averaging of the moving averaging process function for the			
	temperature process valu	ie (PV) of the specified c	hannel.	
Symbol		M+TC4_SetP\	(Average	
	Execution command—		FB ENO : B — Execution status	
		_	_	
	Module start XY address-	W: i_Start_IO_No	FB_OK: B — Completed without error	
	Target CH-	W: i_CH	FB_ERROR: B — Error flag	
	Number of moving averaging—	W: i_Average_Count	ERROR_ID: W—Error code	
Applicable hardware	Temperature control			
and software	module	Carias	Madal	
and software	module	Series	Model	
		MELSEC-Q series	Q64TCTT(BW)N, Q64TCRT(BW)N	
		MELSEC-L series	L60TCTT4(BW), L60TCRT4(BW)	
			ure control modules whose first five digits	
		of the product informat	tion are "14032" or later	
	Hardware details			
		Series	Model	
		MELSEC-Q series *1	Basic model	
			High performance model	
			Universal model	
		MELSEC-L series	LCPU	
		*1 Not applicable to QCI	PU (A mode)	



Item	Description			
	Engineering software	GX Works2 *1		
		Language	Software version	
		Japanese version	Version1.86Q or later	
		English version	Version1.24A or later	
		Chinese (Simplified) version	Version1.49B or later	
		Chinese (Traditional) version	Version1.49B or later	
		Korean version	Version1.49B or later	
		*1 For software versions applica	ble to the modules used, refer to	
		"Relevant manuals".		
Programming	Ladder			
language				
Number of steps	277 steps (for MELSEC-Q series universal model CPU)			
	* The number of steps of	f 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_E	EN (Execution command), the set	parameters are written to the	
	buffer memory.			
	2) To enable the setting values, turn the setting change command (YnB) OFF, ON and			
	then OFF in the setting mode.			
	3) FB operation is one-shot only, triggered by the FB_EN signal.			
	4) When the setting value of the target channel is out of range, the FB_ERROR output			
	turns ON, processing is interrupted, and the error code 10 (Decimal) is stored in			
	ERROR_ID (Error code).			
	Refer to the error code explanation section for details.			
Compiling method	Macro type			



Item	Description		
Restrictions and	1) The FB does not include error recovery processing. Program the error recovery		
Precautions	processing separately in accordance with the required system operation.		
	2) The FB cannot be used in an interrupt program.		
	3) Please ensure that the FB_EN signal is capable of being turned OFF by the program.		
	Do not use this FB in programs that are only executed once such as a subroutine,		
	FOR-NEXT loop because it is impossible to turn OFF.		
	When two or more of these FBs are used, precaution must be taken to avoid repetition		
	of the target channel.		
	5) To execute this FB, the setting/operation mode command (Yn1) must be turned OFF.		
	6) This FB uses index registers Z7, Z8 and Z9. Please do not use these index registers in		
	an interrupt program.		
	7) Every input must be provided with a value for proper FB operation.		
	8) Do not use this FB in modules other than applicable modules. If used in modules other		
	than applicable modules, an error will occur in the module.		
	9) To use this FB, set the temperature input mode.		
	10) Perform the setting using the GX Works2 intelligent function module switch setting to		
	match systems and devices connected to the temperature control module.		
	For details on how to use the intelligent function module switch setting, refer to GX		
	Works2 Operating Manual (Common).		
FB operation type	Pulsed execution (1 scan execution type)		
Application example	Refer to "Appendix 1. FB Library Application Examples".		
Timing chart	[When operation completes without error] [When an error occurs]		
	FB_EN (Execution command) FB_ENO		
	(Execution status)  Number of moving averaging  No  No  No  No  No  No  No  No  No  N		
	write processing write processing write processing write processing No processing FB_OK		
	(Completed without error)  FB_ERROR (Error flag)  (Completed without error)  FB_ERROR (Error flag)		
	ERROR_ID (Error code)  0  ERROR_ID (Error code)  0  Error code		
Relevant manuals	MELSEC-Q Temperature Control Module User's Manual		
	MELSEC-L Temperature Control Module User's Manual		
	QCPU User's Manual (Hardware Design, Maintenance and Inspection)		
	•MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)		
	•GX Works2 Version 1 Operating Manual (Common)		
	•GX Works2 Version 1 Operating Manual (Simple Project, Function Block)		



# **Error codes**

#### ●Error code list

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

## Labels

## ●Input labels

Name(Comment)	Label name	Data type	Setting range	Description
Execution command	FB_EN		ON,OFF	ON: The FB is activated.
		Bit		OFF: The FB is not
				activated.
Module start XY	i_Start_IO_No		Depends on the I/O point	Specify the starting XY
address			range. For details, refer to	address (in hexadecimal)
		Word	the CPU user's manual.	where the temperature
		VVOIG		control module is
				mounted. (For example,
				enter H10 for X10.)
Target CH	i_CH	Word	1 to 4	Specify the channel
		vvoid		number.
Number of moving	i_Average_Count	Word	2 to 10 (times)	Set the number of moving
averaging		vvord		averaging.

## Output labels

Name(Comment)	Label name	Data	Setting	Description	
		type	range		
Execution status	FB_ENO	Dit	OFF	ON: Execution command is ON.	
		Bit	OFF	OFF: Execution command is OFF.	
Completed without	FB_OK	Bit	OFF	When ON, it indicates that setting the	
error		DIL	OFF	number of moving averaging is completed.	
Error flag	FB_ERROR	D:4	D:t	OFF	When ON, it indicates that an error has
		Bit OFF		occurred.	
Error code	ERROR_ID	Word	0	FB error code output.	



# **FB Version Upgrade History**

Version	Date	Description
1.00A	2014/06/30	First edition

#### Note

This chapter includes information related to the M+TC4\_SetPVAverage function block.

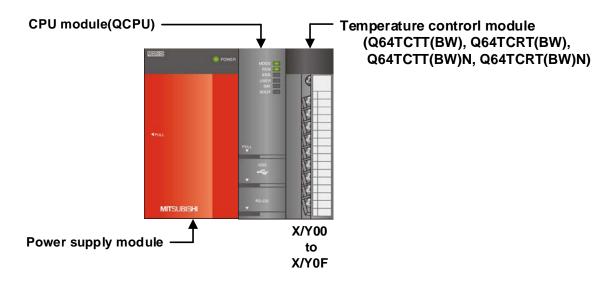
It does not include information on restrictions of use such as combination with temperature modules or programmable controller CPUs.

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

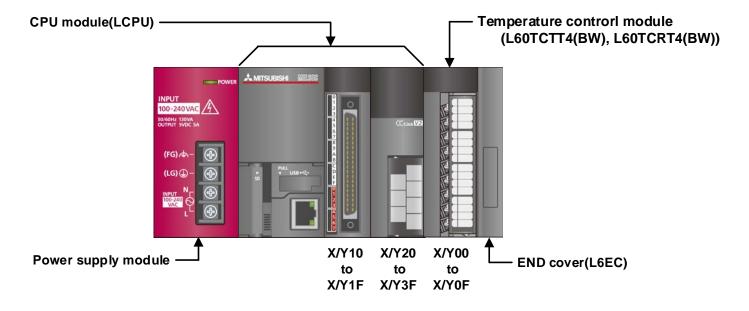


#### 1) System Configuration

(1) Q series system configuration Example



(2) L series system configuration Example



#### 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) Device list

## a) External Input (commands)

Device	FB name	Application (ON details)
MO	M+TC4_SetBPARAM	Basic settings request
M10	M+TC4_SetCNTBPARAM	Cnt BParam setting request
M20	M+TC4_SetCNTDPARAM	Cnt DParam setting request
M30	M+TC4_SetAlertsFunction	Alert function setting request
M40	M+TC4_SetOtherSettings	Other settings request
M50	M+TC4_SetConversion	Conv enable/disable set request
M51		CH1 conversion command
M52		CH2 conversion command
M53		CH3 conversion command
M54		CH4 conversion command
M60	M+TC4_SetProcessAlarm	Process alarm setting request
M70	M+TC4_SetRateAlarm	Rate alarm setting request
M80	M+TC4_SetPVScaling	scaling function setting request
M90	M+TC4_MoniCJTemperature	CJ temp PV monitor request
M100	M+TC4_Autotuning	Auto tuning request
M101		Auto tuning ready
M110	M+TC4_Selftuning	Self tuning request
M120	M+TC4_PIDControl	PID control command
M121		PID control FB
M122		PID control forced stop command
M130	M+TC4_HeaterDisconnection	Heater disc detection request
M140	M+TC4_LoopDisconnection	Loop disc detection command
M150	M+TC4_SimultaneousTemperature	Simultaneous temp rise request
M160	M+TC4_SetPeakCurrentSuppress	Peak current limit cnt request
M170	M+TC4_AlertStatus	Alert status check command
M190	M+TC4_ErrorOperation	Error operation FB start
M191		Error reset request
M200	M+TC4_ReadVal	Value read command
M210	M+TC4_ParamBackup	Setting value backup FB start
M211		Setting value backup command
M212		Default set registration command
M220	M+TC4_SetPVAverage	Moving ave proc set request



# b) External Output (checks)

Device	FB name	Application (ON details)
M1	M+TC4_SetBPARAM	Basic settings FB ready
M2		Basic settings complete
F0		Basic settings FB error
D0		Basic settings FB error code
M11	M+TC4_SetCNTBPARAM	Cnt BParam setting FB ready
M12		Cnt BParam setting complete
F5		Cnt BPraam setting FB error
D10		Cnt BParam setting FB error code
M21	M+TC4_SetCNTDPARAM	Cnt DParam setting FB ready
M22		Cnt DParam setting complete
F10		Cnt DParam setting FB error
D20		Cnt DParam setting FB error code
M31	M+TC4_SetAlertsFunction	Alert function setting FB ready
M32		Alert function setting complete
F15		Alert function setting error
D30		Alert function setting err code
M41	M+TC4_SetOtherSettings	Other settings FB ready
M42		Other settings complete
M55	M+TC4_SetConversion	Conv enable/disable set ready
M56		Conv enable/disable set complete
M61	M+TC4_SetProcessAlarm	Process alarm setting FB ready
M62		Process alarm setting complete
F20		Process alarm setting FB error
D60		Process alarm setting error code
M71	M+TC4_SetRateAlarm	Rate alarm setting FB ready
M72		Rate alarm setting complete
F25		Rate alarm setting FB error
D70		Rate alarm setting FB error code
M81	M+TC4_SetPVScaling	scaling function setting ready
M82		scaling function set complete
F30		scaling function setting error
D80		scaling function set error code
M91	M+TC4_MoniCJTemperature	CJ temp PV monitor ready
M92		CJ temp PV monitor complete
D90		Cold junction temp PV



Device	FB name	Application (ON details)
M102	M+TC4_Autotuning	Auto tuning FB ready
M103		Auto tuning complete
D100		Proportional / heat proportional
D101		Cooling proportional band
D102		Integral time value
D103		Derivative time value
D104		Loop disc detection time value
F35		Auto tuning FB error
D105		Auto tuning FB error code
M111	M+TC4_Selftuning	Self tuning FB ready
M112		Self tuning complete
D110		Self tuning flag
F40		Self tuning FB error
D111		Self tuning FB error code
M123	M+TC4_PIDControl	PID control FB ready
M124		PID control complete
M125		PID constant read completion
M126		PID constant read failure
M127		PID control stop flag
D120		Proportional band
D121		Cooling proportional band
D122		Integral time
D123		Derivative time
D124		Loop disconnection detection jud
F45		PID control FB error
D125		PID control FB error code
M131	M+TC4_HeaterDisconnection	Heater disc detection ready
M132		Heater disc detection complete
M133		Heater disc detection flag
F50		Heater disc detection error
D130		Heater disc detection error code
M141	M+TC4_LoopDisconnection	Loop disc detection FB ready
M142		Loop disc detection complete
M143		Loop disc detection flag
F55		Loop disc detection FB error
D140		Loop disc detection FB error cod



Device	FB name	Application (ON details)
M151	M+TC4_SimultaneousTemperature	Simultaneous temp rise ready
M152		Simultaneous temp rise complete
M153		Simultaneous temperature rise st
F60		Simultaneous temp rise error
D150		Simultaneous temp rise err code
M161	M+TC4_SetPeakCurrentSuppress	Peak current limit cnt ready
M162		Peak current limit cnt complete
F65		Peak current limit cnt error
D160		Peak current limit cnt err code
M171	M+TC4_AlertStatus	Alert status check FB ready
M172		Alert status checking
M173		PV exceeded the temp range
M174		PV fallen below the temp range
M175		Process alarm upper limit alert
M176		Process alarm lower limit alert
M177		Rate alarm upper limit alert
M178		Rate alarm lower limit alert
M179		Alert 1 occurrence
M180		Alert 2 occurrence
M181		Alert 3 occurrence
M182		Alert 4 occurrence
M183		Heater disconnection detection
M184		Loop disconnection detection
M185		Output off-time current error
F70		Alert status check FB error
D170		Alert status check FB error code
M192	M+TC4_ErrorOperation	Error operation FB ready
M193		Error reset request complete
M194		Module error detection
D190		Module error code
D191		error occurrence address



Device	FB name	Application (ON details)
M201	M+TC4_ReadVal	Value read FB ready
M202		Value read complete
F75		Value read FB error
D200		Value read FB error code
D201 to		
D229		Read data
M213	M+TC4_ParamBackup	Setting value backup FB ready
M214		Setting value backup complete
M215		Backup complete flag
M216		Default value write comp flag
M217		Backup failure flag
M221	M+TC4_SetPVAverage	Moving ave proc set FB ready
M222		Moving ave proc set complete
F80		Moving ave proc set FB error
D230		Moving ave proc set FB err code

# 3) Global label setting

none

# 4) Application example settings

## a) Common setting

Input and output item	Value	Description
Module start XY address	0	Specify the starting XY address where the
		temperature control module is mounted.



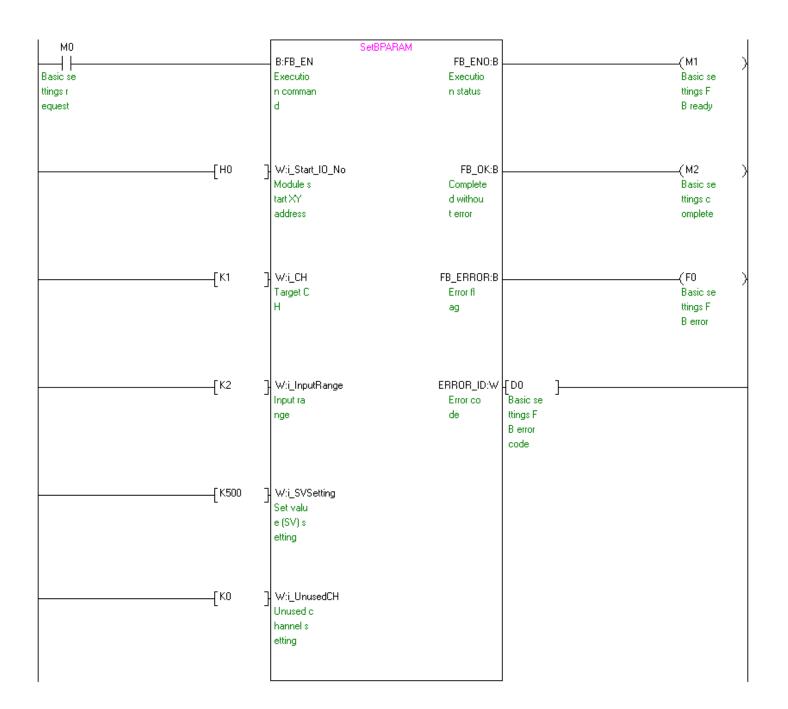
# 5) Program

# M+TC4\_SetBPARAM (Basic settings)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_InputRange	K2	Set the measurement temperature range to 0 to
		1300 °C.
i_SVSetting	K500	Sets the temperature for the set value to 500°C.
i_UnusedCH	K0	Set the channel 1 as the channel where temperature
		control will be performed and temperature sensors
		will be connected.

By turning ON M0, the values of the basic settings for channel 1 are written to the buffer memory.



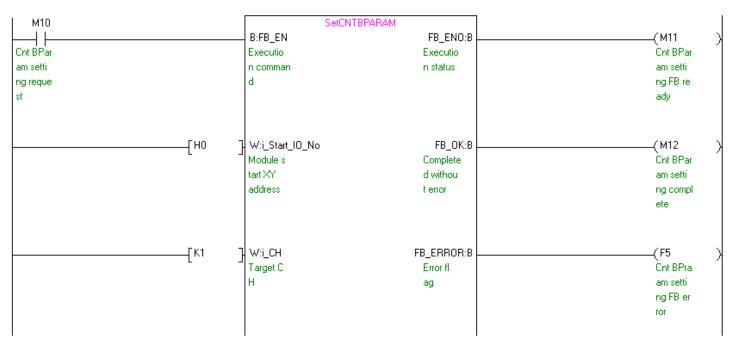




M+TC4\_SetCNTBPARAM (Control basic parameters settings)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_PSetting	K100	Set the proportional band (P) setting for PID
		operation to 10.0%.
i_ISetting	K200	Set the integral time (I) setting for PID operation to
		200s.
i_DSetting	K300	Set the derivative time (D) setting for PID operation
		to 300s.
i_OutputPeriod	K5	Set the control output period setting to 5 s. (When
		"Control output period unit switch setting" which is bit
		2 of switch 3 is 0.)
i_ResponseParam	K1	Set the response to a PID control set value (SV)
		change to "Normal".
i_StopMode	K1	Set the mode to be entered at a PID operation stop
		to "monitor".

By turning ON M10, the values of the control basic parameters settings for channel 1 are written to the buffer memory.





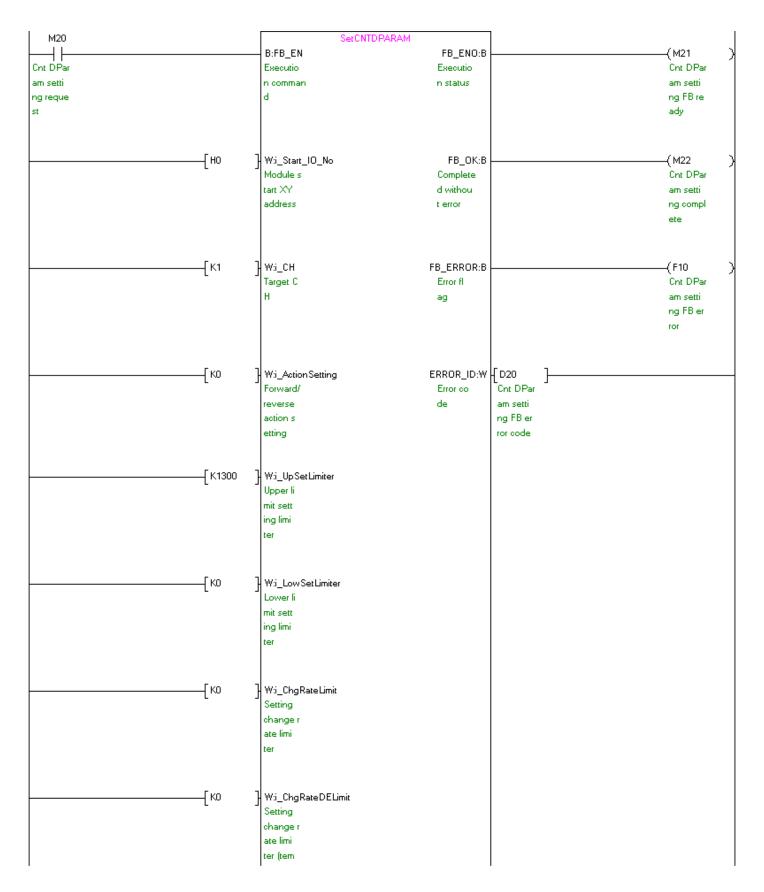
[K100 ]	W:i_PSetting ERROR_ID:W Proporti Error co onal ban de d (P) se tting	-{D10 }
[K200 ]	W:i_ISetting Integral time (I ) settin g	
	W:i_DSetting Derivati ve time (D) sett ing	
[K5 ]	W:i_OutputPeriod Control output p eriod se tting	
	W:i_ResponseParam Control response paramet er	
[K1 ]	W:i_StopMode Stop mod e settin g	

# M+TC4\_SetCNTDPARAM (Control detailed parameters settings)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_ActionSetting	K0	Set the action for channel 1 to "Forward action".
i_UpSetLimiter	K1300	Set the upper limit value of the set value (SV) to
		1300.
i_LowSetLimiter	K0	Set the lower limit value of the set value (SV) to 0.
i_ChgRateLimit	K0	Set the change rate limiter of the set value per unit
		time to a set value (SV) change to "Disabled".
i_ChgRateDELimit	K0	Set the change rate limiter of the set value per unit
		time to a set value (SV) change to "Disabled".
i_SensorCompVal	K100	Sets the compensation value used when there is a
		difference between the measured temperature and
		the actual temperature to 10.0%.
i_PrimaryDelay	K0	Set the primary delay digital filter for channel 1 to
		"Disabled".
i_UpOutLimiter	K500	Set the upper limit value for outputting to an external
		device to 50.0%.
i_LowOutLimiter	K0	Set the lower limit value for outputting to an external
		device to 0.0%.
i_OutVariation	K0	Set the output variation limiter for channel 1 to
		"Disabled".
i_AdjustSetting	K10	Set the adjustment sensitivity for the set value to
		1.0%.

By turning ON M20, the values of the control detailed parameters settings for channel 1 are written to the buffer memory.





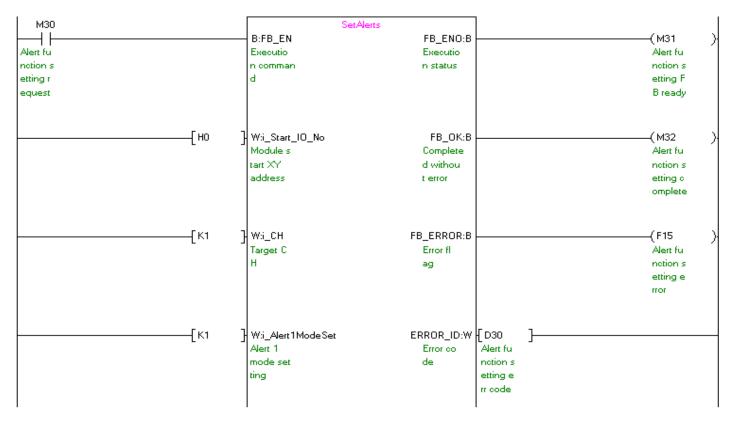


 K100 }	W:i_SensorCompVal Sensor c ompensat ion valu e settin	
 ко }	W:i_PrimaryDelay Primary delay di gital fi Iter set	
 к500 }	W:i_UpOutLimiter Upper ou tput lim iter	
 ко }	W:i_LowOutLimiter Lower ou tput lim iter	
 ко }	W:i_OutVariation Output v ariation limiter	
 K10 }	W:i_AdjustSetting Adjustme nt sensi tivity ( dead ban	

#### M+TC4\_SetAlertsFunction (Alert function setting)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Alert1ModeSet	K1	Set the alert 1 mode setting to "Upper limit input
		alert".
i_Alert2ModeSet	K0	Set the alert 2 mode setting to "No alert".
i_Alert3ModeSet	K15	Set the alert 3 mode setting to "Upper limit deviation
		alert".
i_Alert4ModeSet	K17	Set the alert 4 mode setting to "Upper/lower limit
		deviation alert".
i_AlertSetVal1	K1000	Set the alert set value 1 to 1000.
i_AlertSetVal2	K0	Set the alert set value 2 to "No alert".
i_AlertSetVal3	K1000	Set the alert set value 3 to 1000.
i_AlertSetVal4	K500	Set the alert set value 4 to 500.

By turning ON M30, the alert function setting values for channel 1 are written to the buffer memory.





-[ĸo ]	W:i_Alert2ModeSet Alert 2 mode set ting	
-[K15 ]	W:i_Alert3ModeSet Alert 3 mode set ting	
-[K17 ]	W:i_Alert4ModeSet Alert 4 mode set ting	
-[K1000 ]	W:i_AlertSetVal1 Alert se t value 1	
-[ĸɒ ]	W:i_AlertSetVal2 Alert se t value 2	
-[K1000 ]	W:i_AlertSetVal3 Alert se t value 3	
-[K500 ]	W:i_AlertSetVal4 Alert se t value 4	

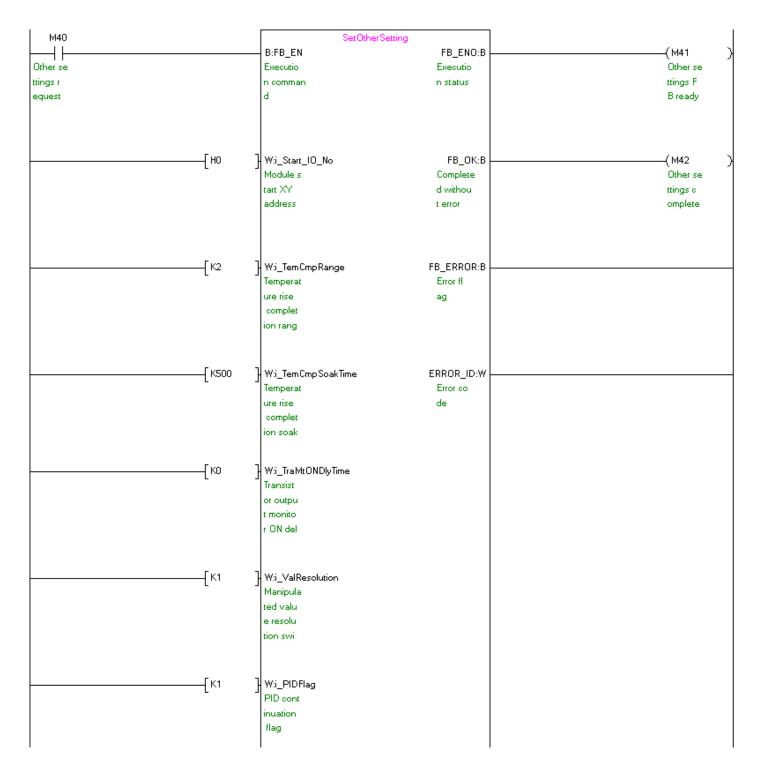


# M+TC4\_SetOtherSettings (Other settings)

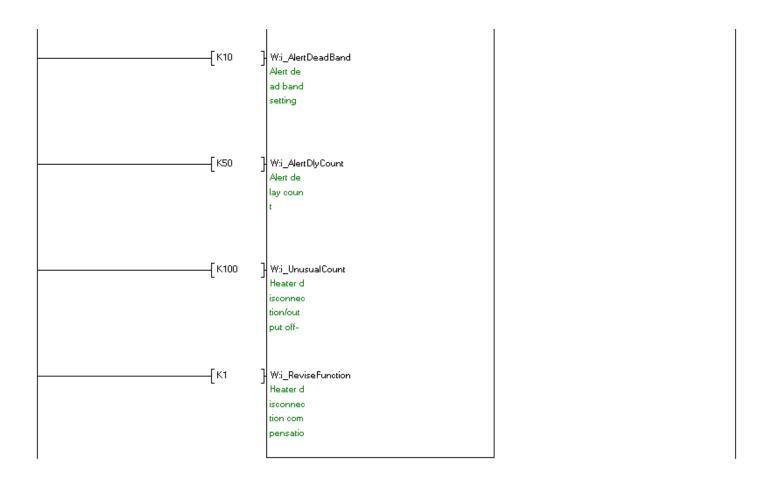
Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_TemCmpRange	K2	Set the temperature rise completion range to ±2°C.
i_TemCmpSoakTime	K500	Set a delay from when a temperature rise is
		completed until the temperature rise completion
		judgment flag is turned ON to 500 min.
i_TraMtONDlyTime	K0	Set the transistor output monitor ON delay time to
		"Disabled".
i_ValResolution	K1	Set the manipulated value resolution to "0 to
		12,000".
i_PIDFlag	K1	Set the PID continuation flag to "Continue".
i_AlertDeadBand	K10	Set the alert dead band to 1.0%.
i_AlertDlyCount	K50	Set the alert delay count to 50 times.
i_UnusualCount	K100	Set the heater disconnection/output off-time current
		error detection delay count to 100 times.
i_ReviseFunction	K1	Set the heater disconnection compensation to
		"Heater disconnection compensation function is
		used".

By turning ON M40, the values of the other settings for channel 1 are written to the buffer memory.







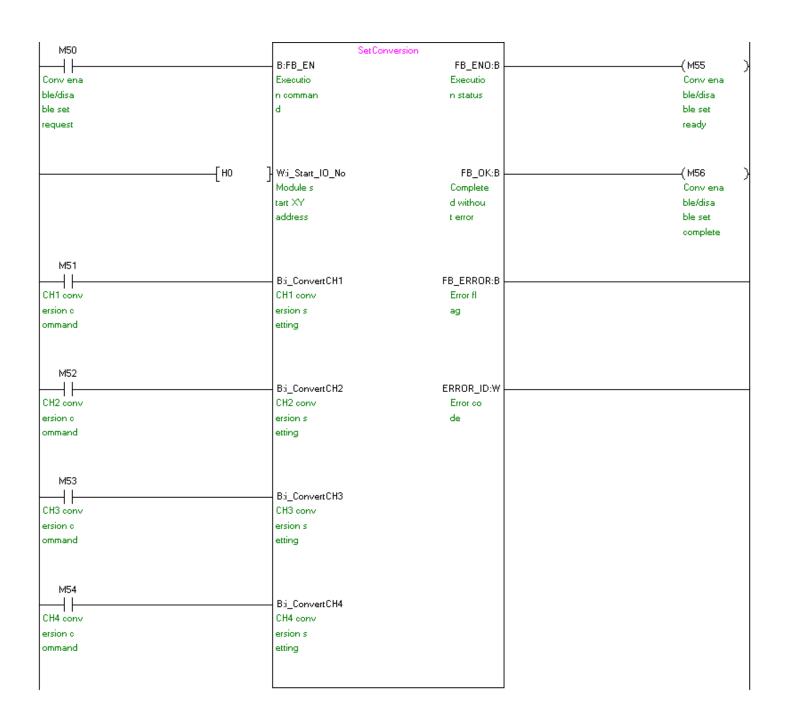


# M+TC4\_SetConversion (Conversion enable/disable setting)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_ConvertCH1	ON/OFF	Turn ON this parameter to disable the conversion
		setting for the specified channel 1.
i_ConvertCH2	ON/OFF	Turn ON this parameter to disable the conversion
		setting for the specified channel 2.
i_ConvertCH3	ON/OFF	Turn ON this parameter to disable the conversion
		setting for the specified channel 3.
i_ConvertCH4	ON/OFF	Turn ON this parameter to disable the conversion
		setting for the specified channel 4.

After turning ON M51 to M54, the conversion settings for the specified channels are disabled by turning ON M50.



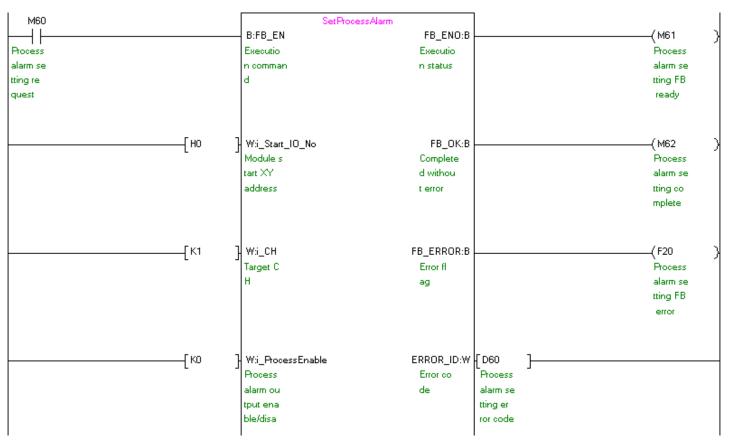




M+TC4\_SetProcessAlarm (Process alarm setting)

Label Name	setting values	Description	
i_Start_IO_No	H0	Specify the starting XY address where the	
		temperature control module is mounted to 0H.	
i_CH	K1	Set the target channel to channel 1.	
i_ProcessEnable	K0	Set the process alarm to "Enabled".	
i_ProLLLimit	K100	Set the process alarm lower lower limit value to 100.	
i_ProLULimit	K200	Set the process alarm lower upper limit value to 200.	
i_ProULLimit	K1000	Set the process alarm upper lower limit value to	
		1000.	
i_ProUULimit	K1100	Set the process alarm upper upper limit value to	
		1100.	

By turning ON M60, the process alarm setting values for channel 1 are written to the buffer memory.



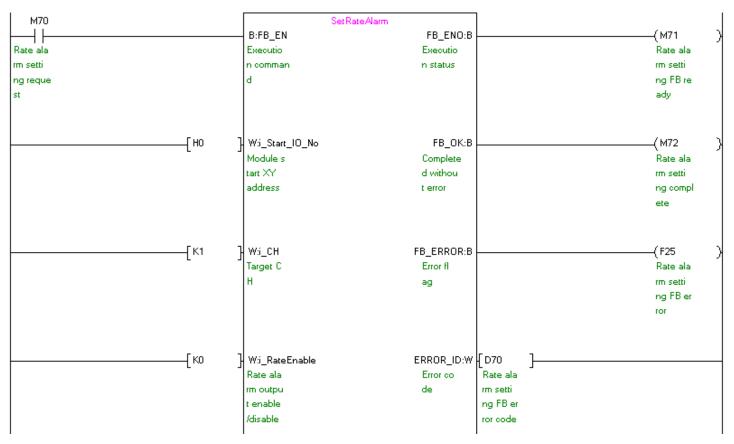


[K100]	- W:i_ProLLLimit Process alarm lo wer lowe r limit	
[K200 ]	W:i_ProLULimit Process alarm lo wer uppe r limit	
[K1000 ]	W:i_ProULLimit Process alarm up per lowe r limit	
[K1100 ]	W:i_ProUULimit Process alarm up per uppe r limit	

M+TC4\_SetRateAlarm (Rate alarm setting)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_RateEnable	K0	Set the rate alarm output to "Enabled".
i_RateOut	K1000	Set the number of periods to check the changes of
		the measured temperature value using the rate
		alarm function to 1000 times.
i_RateUpLim	K5000	Set the rate alarm upper limit value to 5000.
i_RateLowLim	K-5000	Set the rate alarm lower limit value to -5000.

By turning ON M70, the rate process alarm setting values for channel 1 are written to the buffer memory. The setting values of the rate alarm are written to the buffer memory.





[K1000 ]	W:i_RateOut Rate ala rm detec tion per iod	
	W:i_RateUpLim Rate ala rm upper limit v alue	
[K-5000 ]	W:i_RateLowLim Rate ala rm lower limit v alue	

# M+TC4\_SetPVScaling (Process value (PV) scaling function setting)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_ScalingEnable	K1	Set the process value (PV) scaling function to
		"Enabled".
i_ScalingUpLim	K32000	Set the process value (PV) scaling upper limit value
		to 32000.
i_ScalingLowLim	K-32000	Set the process value (PV) scaling lower limit value
		to -32000.

By turning ON M80, the process value (PV) scaling function setting values for channel 1 are written to the buffer memory.



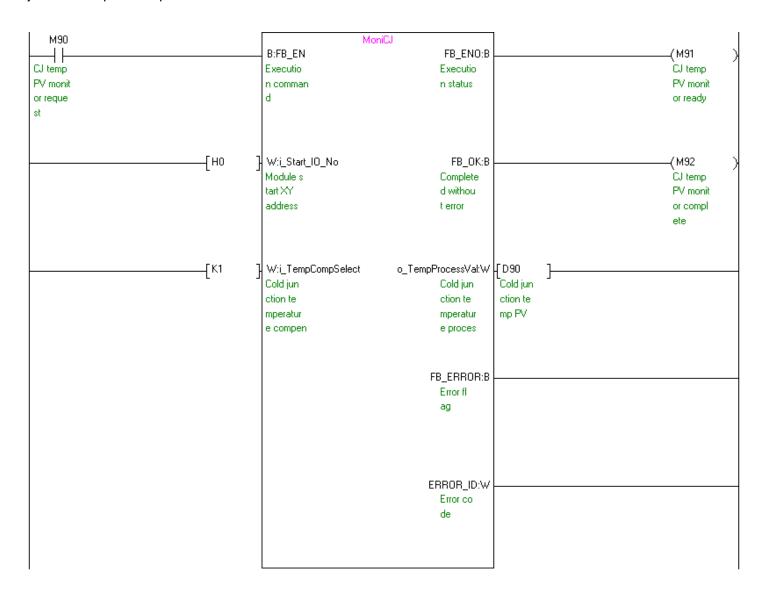
м80	SetPVScaling			ı
scaling	B:FB_EN Executio	FB_ENO:B Executio		-(M81 ) scaling
function	n comman	n status		function
setting request	d			setting ready
i oquoti				loddy
				4
[H0]	W:i_Start_IO_No Module s	FB_OK:B Complete		-(M82 ) scaling
	tart XY	d withou		function
	address	t error		set com
				plete
[K1]	W:i_CH	FB_ERROR:B		-(F30 )
	Target C H	Error fl ag		scaling function
		- J		setting
				error
[K1]	W:i_ScalingEnable	ERROR_ID:W		
	Process value (P	Error co de	scaling function	
	V) scali	de	set err	
	ng funct		or code	
K32000 ]	W:i_ScalingUpLim			
	Process			
	value (P V) scali			
	ng upper			
K-32000 ]	W:i_ScalingLowLim			
[	Process			
	value (P V) scali			
	ng lower			



M+TC4\_MoniCJTemperature (Cold junction temperature process value monitoring function)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_TempCompSelect	K1	Set the cold junction temperature compensation to
		"Temperature control terminal block conversion
		module".

By turning ON M90, the cold junction temperature compensation selection value is written to the buffer and the cold junction temperature process value is monitored.



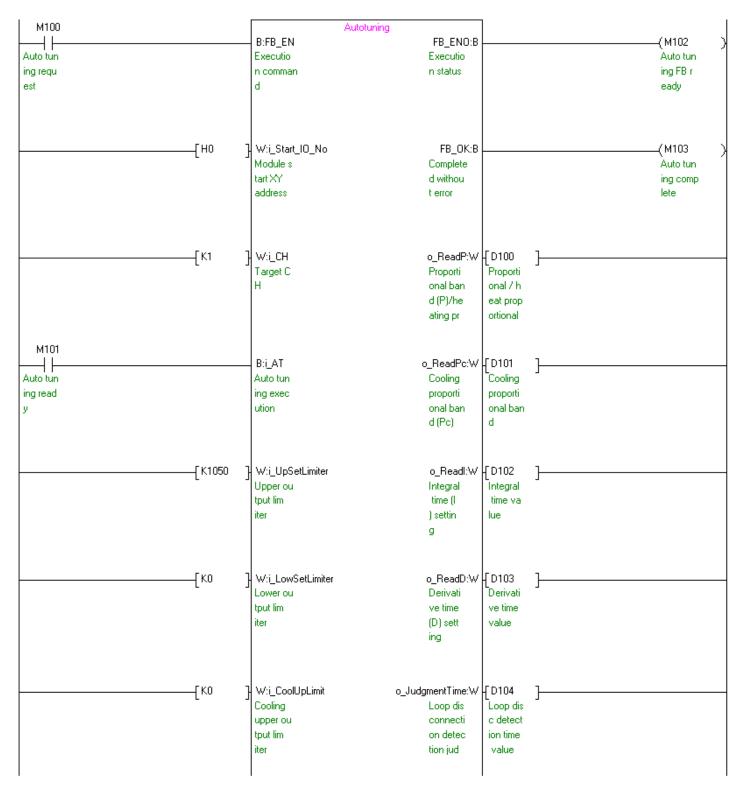


# M+TC4\_Autotuning (Auto tuning)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_AT	ON/OFF	To execute auto tuning, turn ON this parameter.
i_UpSetLimiter	K1050	Specify the upper limit value for outputting to an
		external devise to 105.0%.
i_LowSetLimiter	K0	Specify the lower limit value for outputting to an
		external devise to 0.0%.
i_CoolUpLimit	K0	Set the cooling upper limit value for outputting to an
		external devise to 0.0%.
i_OutVariation	K1	Set a range to prevent a sudden manipulated value
		change to 0.1%/s.
i_SensorCompVal	K1000	Set the compensation value for when there is a
		difference between the measured temperature and
		actual temperature to 10.00%.
i_OutputPeriod	K1	Set the ON/OFF period of the transistor output to 1 s.
		(When "Control output period unit switch setting"
		which is bit 2 of switch 3 is 0.)
i_PrimaryDelay	K100	Set the primary delay digital filter setting to 100s.
i_ATbias	K500	Set the AT bias setting to 500.
i_ActionSetting	K0	Set the forward action for channel 1.
i_AutoBackup	K1	Set the automatic backup setting after auto tuning of
		PID constants to enabled.
i_ATModeSelect	K1	Set the auto tuning mode to "Fast response mode".

The auto tuning parameters are set by turning ON M100, and the auto tuning is executed by turning ON M101.







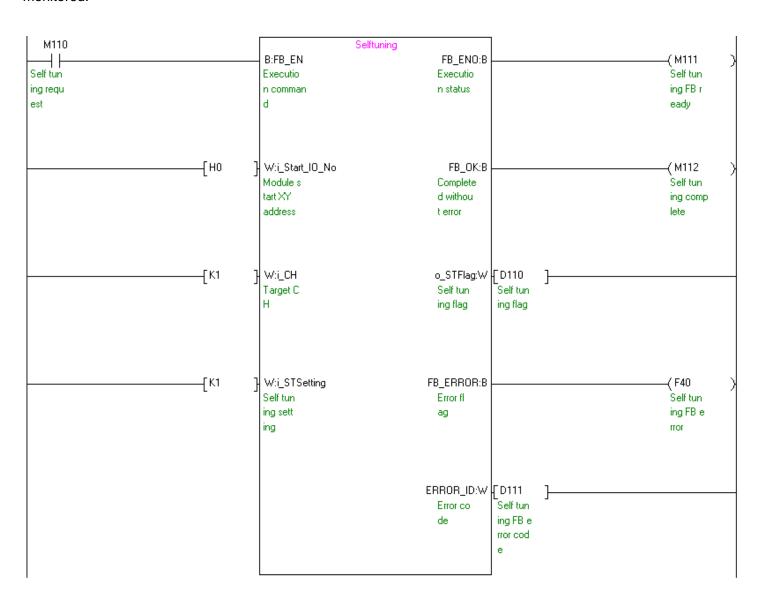
<u>—</u> [к1	W:i_OutVariation Output v ariation limiter	FB_ERROR:B - Error fl ag		(F35 ) Auto tun ing FB e rror
<u> </u> [K1000	W:i_SensorCompVal Sensor c ompensat ion valu e settin	de	[D105]————————————————————————————————————	
<u>—</u> [к1	W:i_OutputPeriod Control output p eriod se tting			
—[K100	W:i_PrimaryDelay Primary delay di gital fi Iter set			
——[ K500	W:i_ATbias AT bias setting			
— <u>(</u> ко	W:i_ActionSetting Forward/ reverse action s etting			
<u>—</u> [к1	W:i_AutoBackup Automati c backup setting after a			
<u>—</u> [к1	W:i_ATModeSelect Auto tun ing mode selecti on			



### M+TC4\_Selftuning (Self tuning)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_STSetting	K1	Set the self tuning setting to "Start-up ST (Calculates
		PID constants only)".

By turning ON M110, the self tuning setting values are written to the buffer memory and the self tuning flag is monitored.

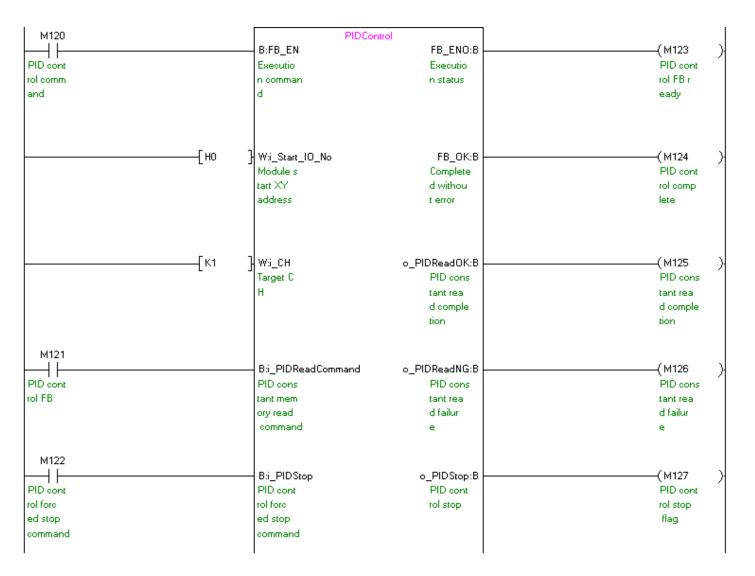




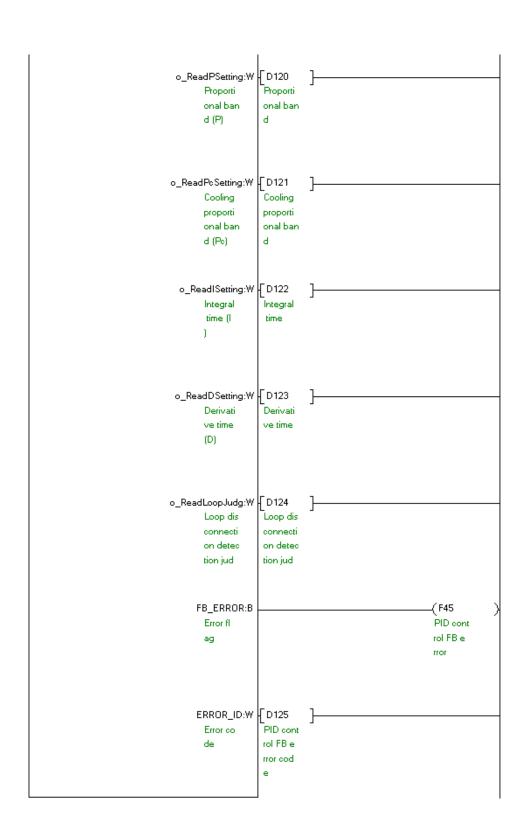
#### M+TC4\_PIDControl (PID control)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_PIDReadCommand	ON/OFF	Turn ON to execute the PID constant memory read
		command for channel 1.
i_PIDStop	ON/OFF	Turn ON to execute the PID control forced stop
		command for channel 1.

After M120 is turned ON, the PID constant memory read command is executed by turning ON M121 and the PID control forced stop command is executed by turning ON M122.





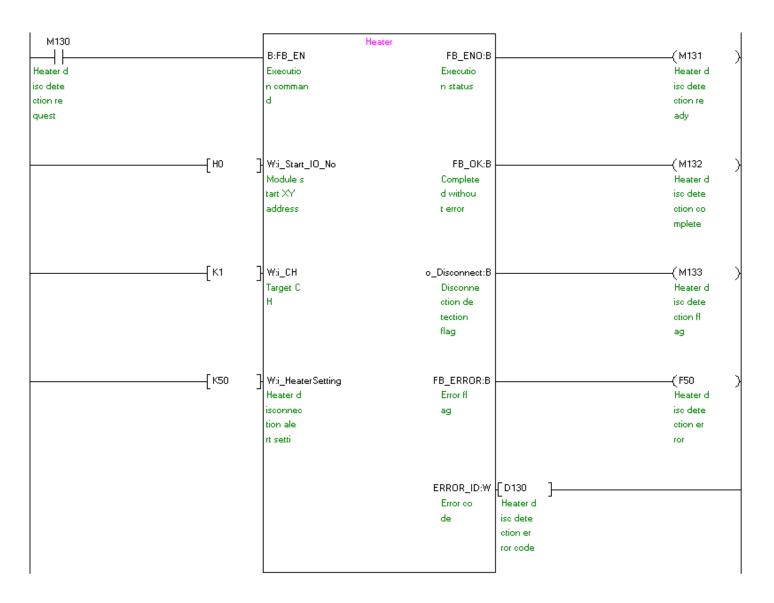




M+TC4\_HeaterDisconnection (Heater disconnection detection function)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_HeaterSetting	K50	Set the reference heater current value to 50%.

By turning ON M130, the heater disconnection alert setting values are written to the buffer memory and a heater disconnection is monitored.

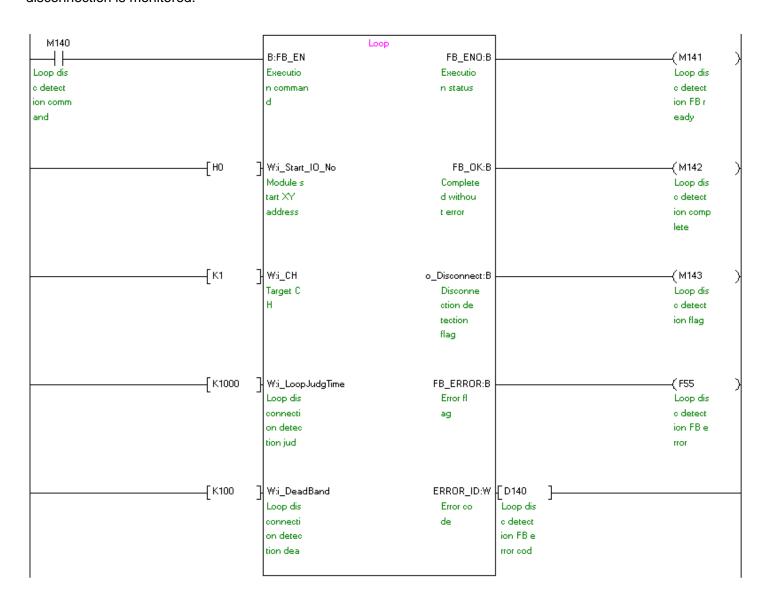




M+TC4\_LoopDisconnection (Loop disconnection detection function)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_LoopJudgTime	K1000	Set the judgment time of a loop disconnection to
		1000s.
i_DeadBand	K100	Set the temperature width where loop disconnection
		is not detected to 100.

By turning ON M140, the values for the loop disconnection detection are written to the buffer memory and a loop disconnection is monitored.





M+TC4\_SimultaneousTemperature (Simultaneous temperature rise function setting)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_GroupSetting	K1	Set channel 1 to group 1 selection.
i_GradientData	K500	Set the simultaneous temperature rise gradient data
		to 500.
i_ldleTime	K1000	Set the time from when the output is turned ON until
		the temperature starts rising to 1000s.
i_ATModeSelect	K0	Set the simultaneous temperature rise AT mode to
		"Standard auto tuning selection".

By turning ON M150, the simultaneous temperature rise function setting values are written to the buffer memory and the simultaneous temperature rise status is monitored.



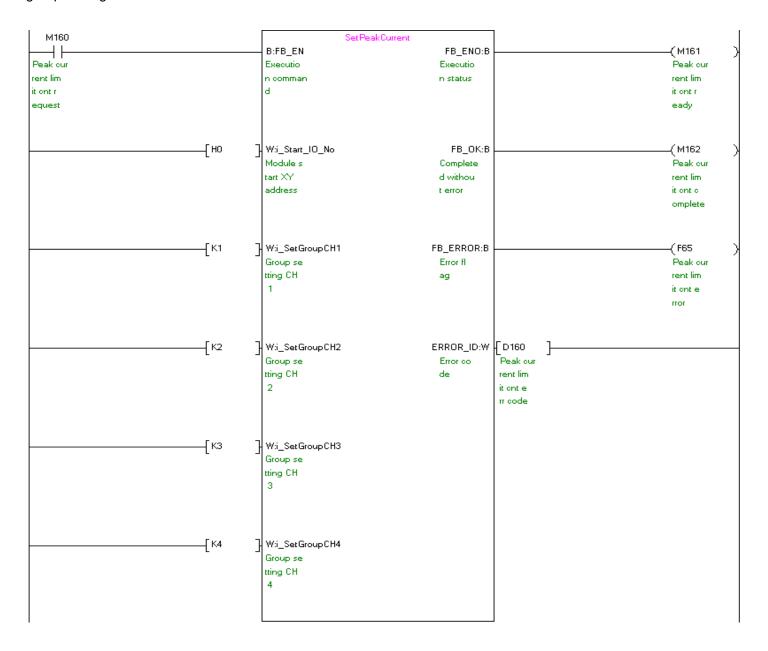
M150		Simultane			
<u> </u>		B:FB_EN	FB_ENO:B		———( М151
Simultan		Executio	Executio		Simultan
ous tem		n comman	n status		eous tem
rise r		d			p rise r
equest					eady
	Гно ¬	W:i_Start_IO_No	FB_OK:B		( M152
		Module s	Complete		Simultan
		tart XY	d withou		eous tem
		address			
		address	t error		p rise c
					omplete
		W:i_CH	o_RiseState:B		————( М153
		Target C	Simultan		Simultan
		Н	eous tem		eous tem
			perature		perature
			rise st		rise st
	{К1 }	W:i_Group Setting	FB_ERROR:B		( F60
	- 1	Simultan	Error fl		Simultan
		eous tem	ag		eous tem
		perature	-3		p rise e
		rise gr			ttot
		3			
	[VE00 ]	W: ContinueDate	EDDOD ID.W	[D150 ]	
	{(K500 }	W:i_GradientData			
		Simultan	Error co	Simultan	
		eous tem	de	eous tem	
		perature		p rise e	
		rise gr		rr code	
	EK4000 7	w: urt			
	{K1000 }	W:i_ldleTime			
		Simultan			
		eous tem			
		perature			
		rise id			
	——[ко ]	W:i_ATModeSelect			
	١ - ا	Simultan			
		eous tem			
		perature			
		•			
		rise AT			



M+TC4\_SetPeakCurrentSuppress (Peak current limit control setting)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_SetGroupCH1	K1	Set channel 1 to group 1.
i_SetGroupCH2	K2	Set channel 2 to group 2.
i_SetGroupCH3	K3	Set channel 3 to group 3.
i_SetGroupCH4	K4	Set channel 4 to group 4.

By turning ON M160, the divided groups of each channel is written to the peak current limit control setting divided group setting.

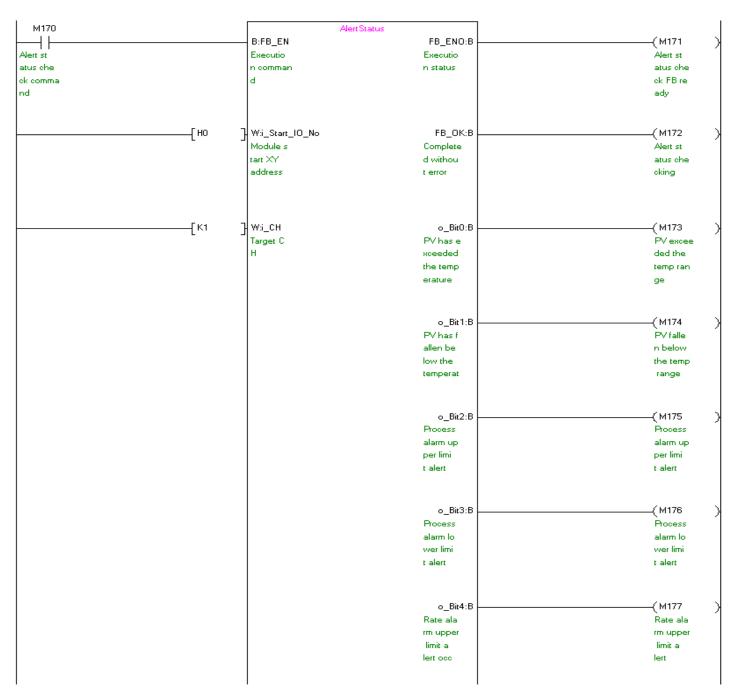




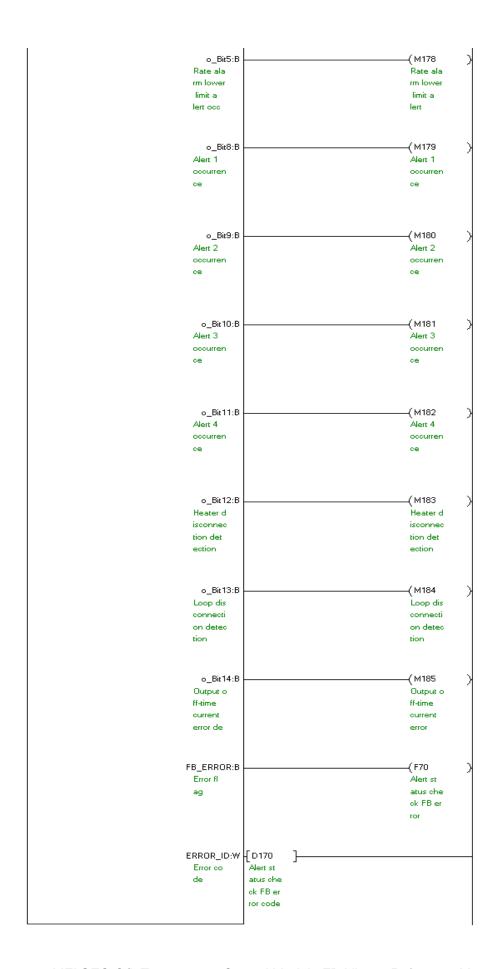
#### M+TC4\_AlertStatus (Alert status check)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.

By turning ON M170, an alert that has occurred is monitored.





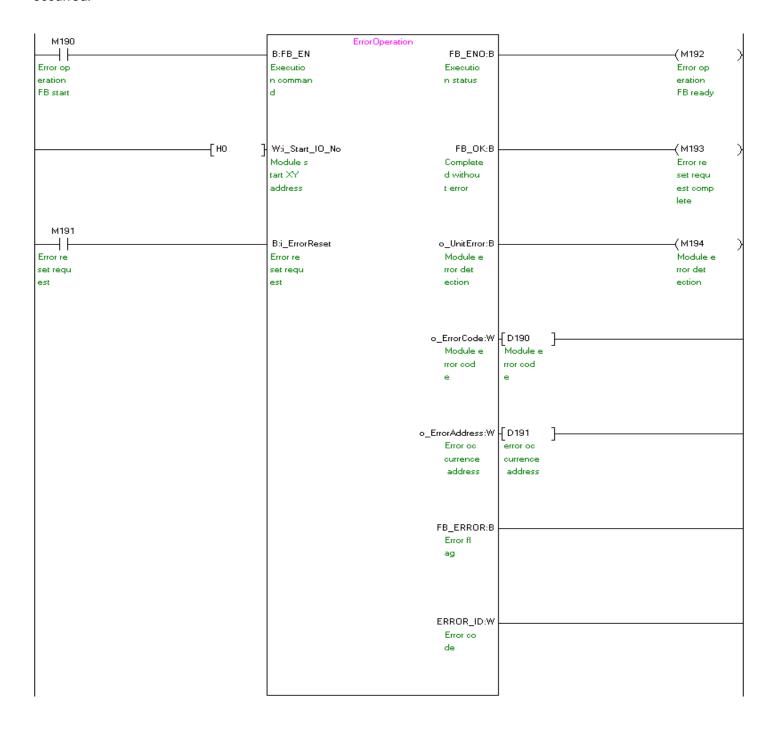




#### M+TC4\_ErrorOperation (Error operation)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_ErrorReset	ON/OFF	Turn ON this parameter to perform an error reset.

By turning ON M190, an error code and an address in which an error has occurred are output when an error has occurred.

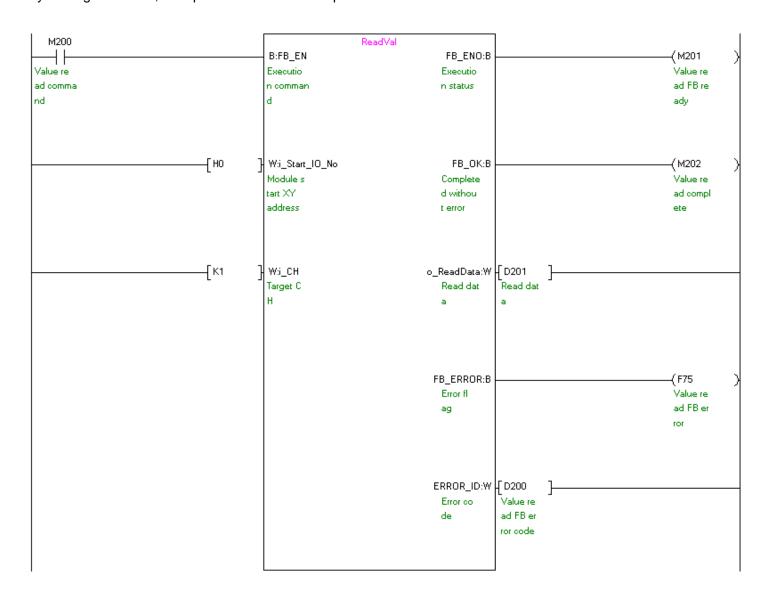




### M+TC4\_ReadVal (Value read)

Label Name	setting values	Description
i_Start_IO_No	Н0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_CH	K1	Set the target channel to channel 1.

By turning ON M200, the specified values are output to the read data.





# M+TC4\_ParamBackup (Setting value backup)

Label Name	setting values	Description
i_Start_IO_No	H0	Specify the starting XY address where the
		temperature control module is mounted to 0H.
i_Backup	ON/OFF	Turn ON this parameter to write the parameter
		setting in the buffer memory to the non-volatile
		memory.
i_DefaultSetting	ON/OFF	Turn ON this parameter to return the buffer memory
		contents to the default values.

After M210 is turned ON, the setting value backup command is performed by turning ON M211 and the buffer memory contents are returned to the default values by turning ON M212.



M210	Par	am Backup	
	B:FB_EN	FB_ENO:B	( M213
I I Setting	Executio	Executio	Setting
value ba	n comman	n status	value ba
kup FB	d		ckup FB
start	l"		ready
tait			ready
	——[H0 ]   W:i_Start_IO_No	FB_OK:B	(M214
	Module s	Complete	Setting
	tart XY	d withou	value ba
	address	t error	ckup com
			plete
M211			
	B:i_Backup	o_BackupComp:B	( M215
ietting	Setting	Setting	N Backupic
alue ba	value ba	value ba	omplete
kup com	ckup com	ckup com	flag
nand	mand	pletion	
		F-3-3-1	
M212			
$\dashv$	B:i_DefaultSetting	o_DefaultComp:B	( M216
Pefault	Default	Default	Default
et regi	setting	value wr	value wr
tration	registra	ite comp	ite comp
command	tion com	letion f	flag
		o_Backup Failure:B	(M217
		Setting	Backup f
		value ba	ailure f
		ckup fai	lag
		lure fla	
		FB_ERROR:B	
		Error fl	
		ag	
		-3	
		ERROR_ID:W	
		Error co	
		de	
		GE	
		ı	



M+TC4\_SetPVAverage (Process value (PV) moving averaging process setting)

Label Name	setting	Description
	values	
i_Start_IO_No	H0	Specify the starting XY address where the temperature control module is
		mounted to 0H.
i_CH	K1	Set the target channel to channel 1.
i_Average_Count	K8	Set the number of moving averaging to 8.

By turning on M220, the number of moving averaging of the moving averaging process function for the temperature process value (PV) of channel 1 is written to the buffer memory.

