MELSEC-L Temperature Control Module Sample Ladder Reference Manual

Applicable Modules:
L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW

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Reference Manual Revision History

Reference Manual Number	Date	Description
LDM-M024-A	2012/01/16	First edition

1. Overview

Overview of the Sample Ladder Programs

The sample ladder programs support a system that uses the MELSEC-L L60TC4 temperature control module.

Sample Ladder Program Functions

The programs have the following functions.

(1) When Using the Module in Standard System Configuration (When Using Intelligent Function Module Parameters)

No.	Project name	Program name	Item	Description	Version
1	LD-L60TC4_PRM1_V100A_E	01RdTmp	Temperature input	Performs the temperature input using the configuration function.	1.00A
2	LD-L60TC4_PRM2_V100A_E	01Tuning	Tuning	Performs the auto tuning, self-tuning and error code read operations using the configuration function.	1.00A
3	LD-L60TC4_PRM3_V100A_E	01PekHet	Peak current suppression, simultaneous temperature rise	Performs the peak current suppression and simultaneous temperature rise using the configuration function.	1.00A
4	LD-L60TC4_PRM4_V100A_E	01HetCol	Heating-cooling control	Performs the heating-cooling control using the configuration function.	1.00A

(2) When Using the Module in Standard System Configuration (When Not Using Intelligent Function Module Parameters)

No.	Project name	Program name	Item	Description	Version
1	LD-L60TC4_NPM1_V100A_E	01RdTmp	Temperature input	Performs the temperature input without using the configuration function.	1.00A
2	LD-L60TC4_NPM2_V100A_E	01Tuning	Tuning	Performs the auto tuning, self-tuning and error code read operations without using the configuration function.	1.00A
3	LD-L60TC4_NPM3_V100A_E	01Peak	Peak current suppression	Performs the peak current suppression without using the configuration function.	1.00A

No.	Project name	Program name	Item	Description	Version
4	LD-L60TC4_NPM3_V100A_E	02Heat	Simultaneous temperature rise	Performs the simultaneous temperature rise without using the configuration function.	1.00A
5	LD-L60TC4_NPM4_V100A_E	01HetCol	Heating-cooling control	Performs the heating-cooling control without using the configuration function.	1.00A

(3) When Connecting the Module to the Head Module

No.	Project name	Program name	Item	Description	Version
1	LD-L60TC4_IEF_V100A_E	01RdTmp	Temperature input	Performs the temperature input using the configuration function.	1.00A

Relevant Manuals

MELSEC-L Temperature Control Module User's Manual
MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual
MELSEC-L CC-Link IE Field Network Master/Local Module User's Manual
MELSEC-L CC-Link IE Field Network Head 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 Version1 Operating Manual (Common)
GX Developer Version8 Operating Manual

Note

This manual describes the functions of the sample ladder programs. It does not include information on restrictions of use such as combination with modules or programmable controller CPUs. Before using any Mitsubishi products, please read all the relevant manuals.

For information on the detailed specifications and operation timings of the sample ladder programs, refer to the MELSEC-L Temperature Control Module User's Manual. The descriptions of the sample ladder programs in this manual may be different from the ones found in the MELSEC-L Temperature Control Module User's Manual depending on the date created.

Operating procedures are explained using GX Works2. When using GX Developer, refer to the MELSEC-L Temperature Control Module User's Manual.

2. When Using the Module in Standard System Configuration (When Using Intelligent Function Module Parameters)

2.1. When Using the Module as a Temperature Input Module

2.1.1. Temperature Input

Function Overview

This program performs the temperature input using the intelligent function module parameters in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_PRM1_V100A_E(01RdTmp)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

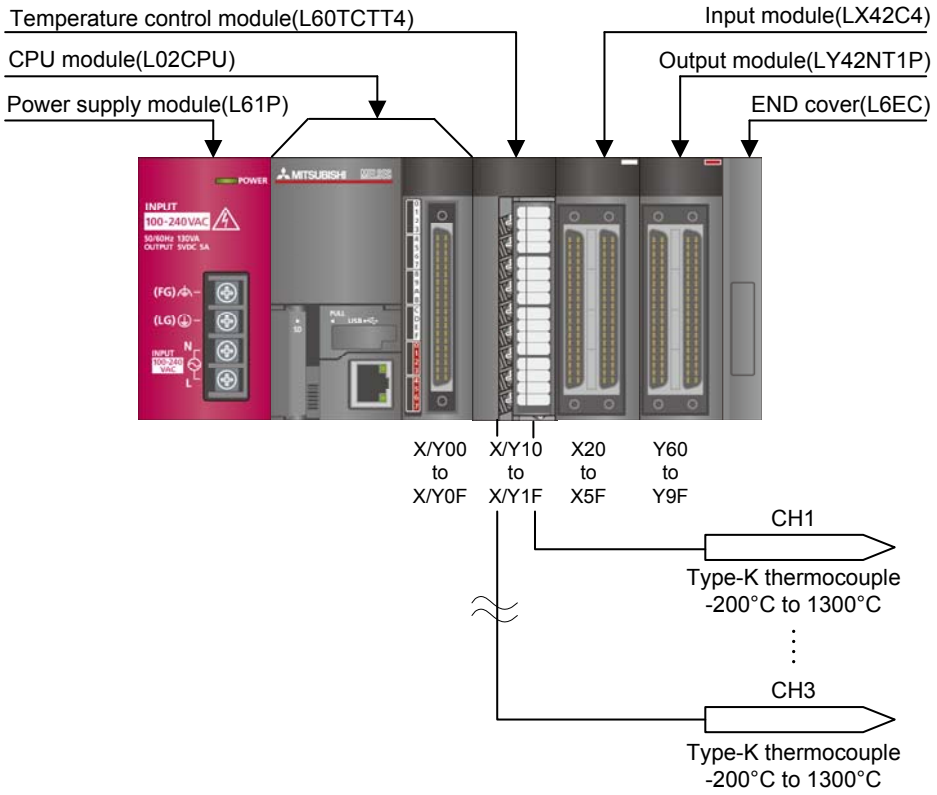
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2 *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder programs.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X25	Bit	Temperature process value read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y1B	Bit	Setting change instruction	-
9	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

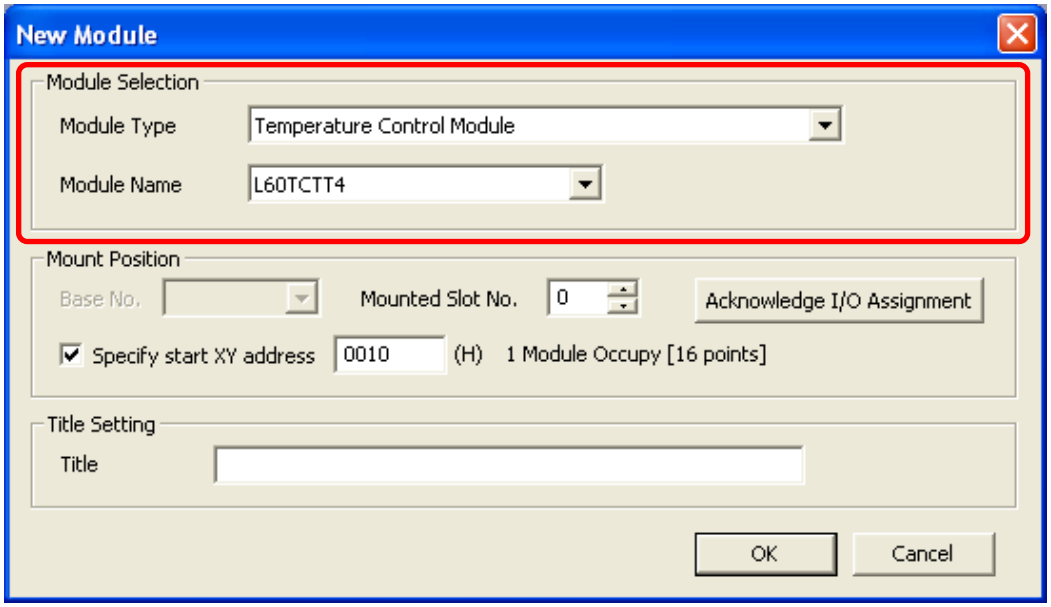
●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) Addition of L60TCTT4 Temperature Control Module

a) Open the new module window and configure the setting as follows.

Project window→[Intelligent Function Module]→Right-click→[New Module]



(2) Switch Setting

a) Open the switch setting window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Switch Setting]

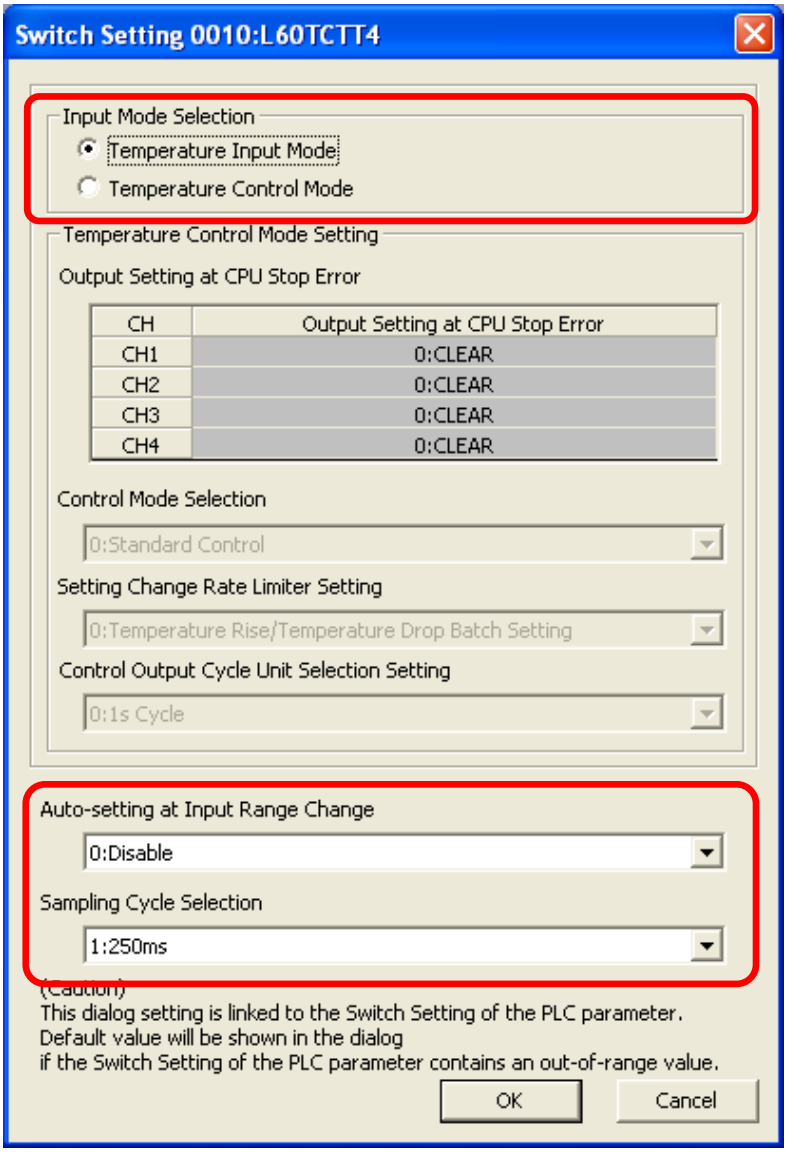


Table 2-1 Switch setting

Item	Set value
Input mode selection	Temperature input mode
Control mode selection	0: Standard control
Setting change rate limiter setting	0: Temperature rise/temperature drop batch setting
Control output cycle unit selection setting	0: 1 s cycle
Auto-setting at input range change	0: Disable
Sampling cycle selection	1: 250 ms

(3) Parameter Setting

a) Open the parameter setting window.

Project window→[Intelligent Function Module]→Module name→[Parameter]

b) Click the [Clear Value for Gray Cells] button to set unnecessary items to 0.

c) Set the following parameters.

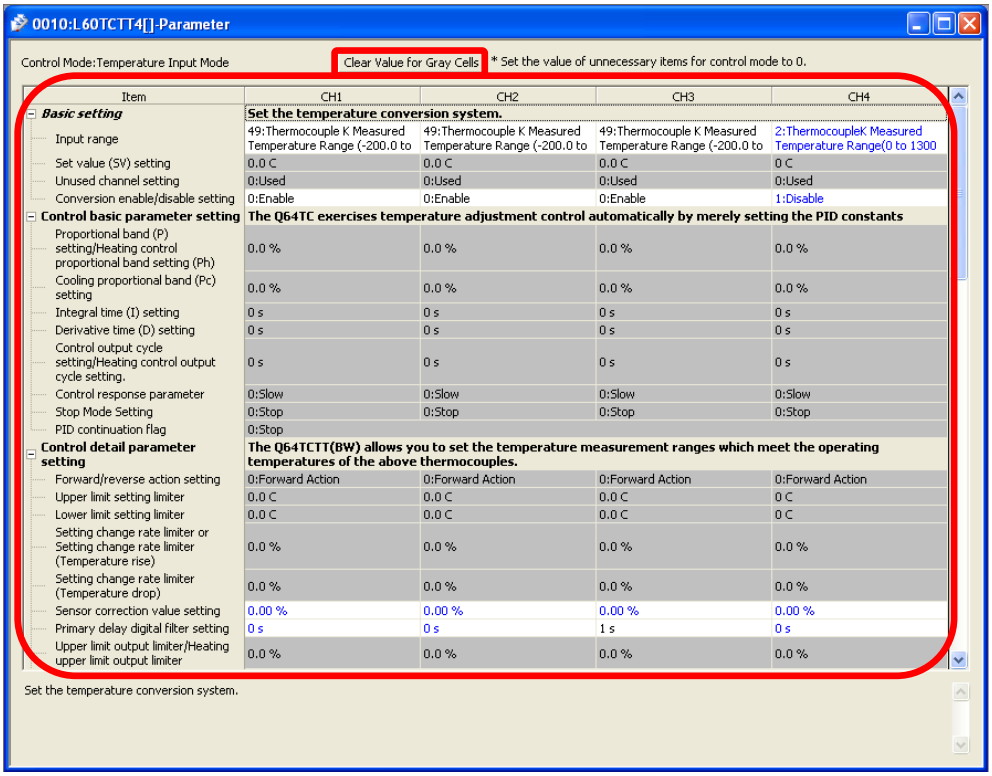


Table 2-2 Parameter setting

Item	Item	CH1	CH2	CH3	CH4
Basic setting	Input range	49: Thermocouple K Measured Temperature Range (-200.0 to 1300.0°C)	49: Thermocouple K Measured Temperature Range (-200.0 to 1300.0°C)	49: Thermocouple K Measured Temperature Range (-200.0 to 1300.0°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)
	Conversion enable/disable setting	0: Enable	0: Enable	0: Enable	1: Disable
Control detail parameter setting	Primary delay digital filter setting	0s	0s	1s	0s
Alert function setting	Process alarm alert output enable/disable setting	1: Disable	0: Enable	1: Disable	1: Disable
	Process alarm lower lower limit value	0.0°C	200.0°C	0.0°C	0°C
	Process alarm lower upper limit value	0.0°C	205.0°C	0.0°C	0°C
	Process alarm upper lower limit value	1300.0°C	295.0°C	1300.0°C	1300°C
	Process alarm upper upper limit value	1300.0°C	300.0°C	1300.0°C	1300°C
	Rate alarm alert output enable/disable setting	1: Disable	1: Disable	0: Enable	1: Disable
	Rate alarm alert detection cycle	1 Times	1 Times	4 Times	1 Times
	Rate alarm upper limit value	0	0	5	0
	Rate alarm lower limit value	0	0	-5	0

*For parameters other than above, use the default values.

(4) Auto Refresh Setting

a) Open the auto refresh window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Auto Refresh]

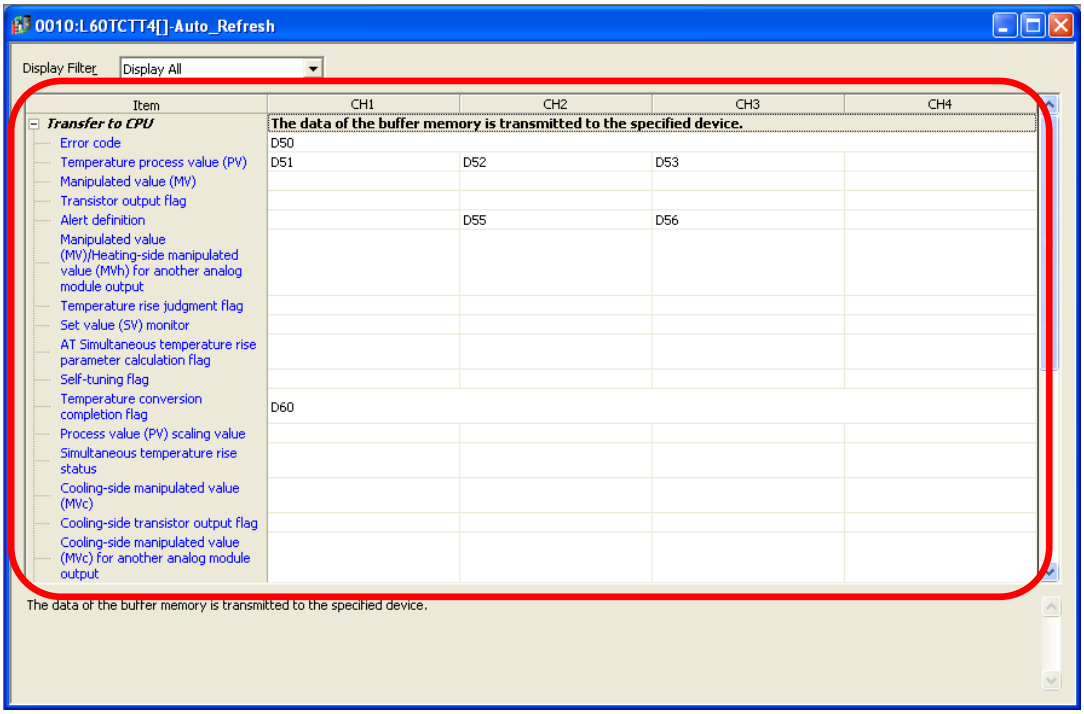


Table 2-3 Auto refresh setting

Item		CH1	CH2	CH3	CH4
Transfer to CPU	Error code	D50			
	Temperature process value (PV)	D51	D52	D53	-
	Alert definition	-	D55	D56	-
	Temperature conversion completion flag	D60			

Devices

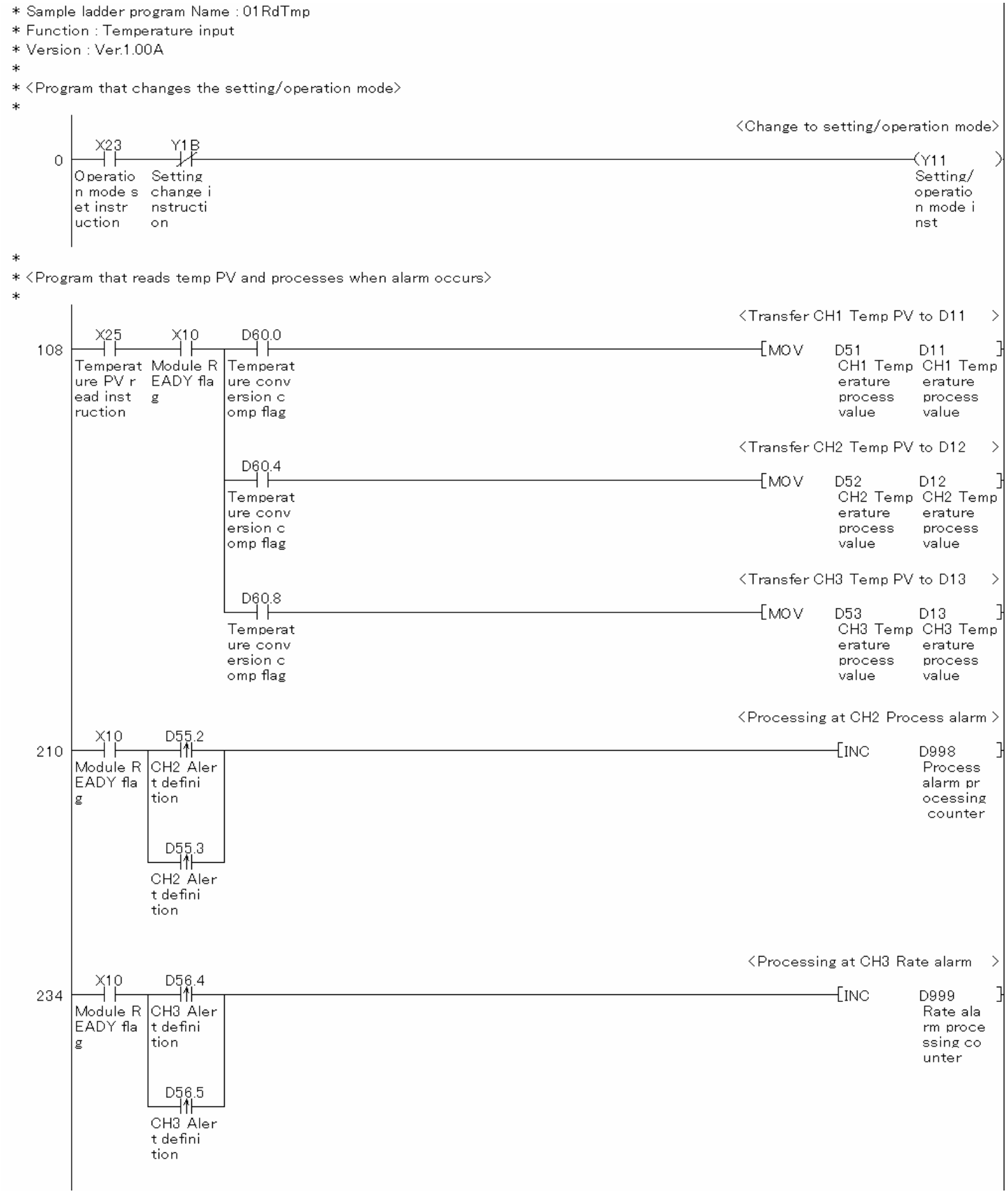
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X25	Bit	Temperature process value read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y1B	Bit	Setting change instruction	-
9	Y60 to Y6F	Word	Error code output	-
10	D11	Word	CH1 Temperature process value (PV)	-
11	D12	Word	CH2 Temperature process value (PV)	-
12	D13	Word	CH3 Temperature process value (PV)	-
13	D50	Word	Error code	-
14	D51	Word	CH1 Temperature process value (PV)	-
15	D52	Word	CH2 Temperature process value (PV)	-
16	D53	Word	CH3 Temperature process value (PV)	-
17	D55	Word	CH2 Alert definition	-
18	D56	Word	CH3 Alert definition	-
19	D60	Word	Temperature conversion completion flag	-
20	D998	Word	Process alarm processing counter	-
21	D999	Word	Rate alarm processing counter	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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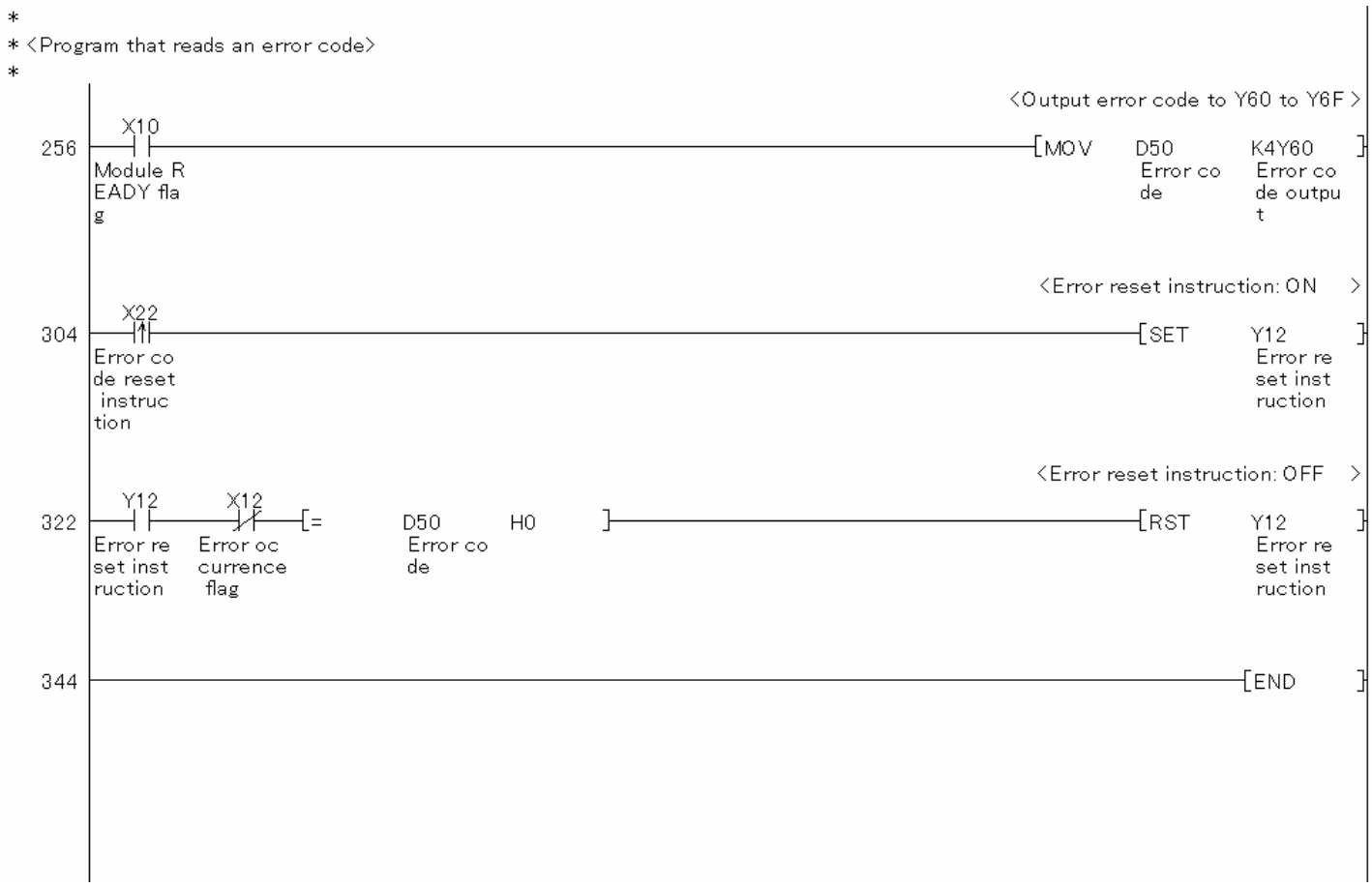


*CH2 D998 is incremented when a process alarm occurs.

*CH3 D999 is incremented when a process alarm occurs.

2.2. Standard Control (Such as Auto Tuning, Self-Tuning, and Error Code Read)

2.2.1. Tuning

Function Overview

This program performs the auto tuning, self-tuning and error code read operations using the intelligent function module parameters in a standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_PRM2_V100A_E(01Tuning)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

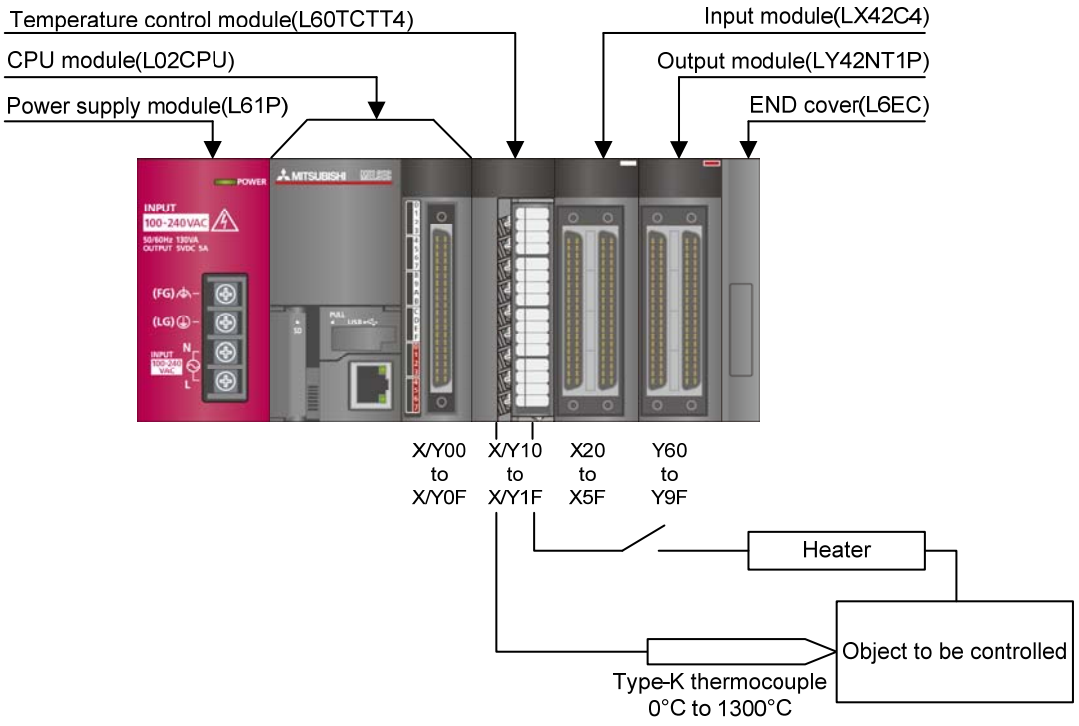
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2 *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder programs.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	X30	Bit	CH1 Set value (SV) change instruction	-
7	Y11	Bit	Setting/operation mode instruction	-
8	Y12	Bit	Error reset instruction	-
9	Y18	Bit	Set value backup instruction	-
10	Y1B	Bit	Setting change instruction	-
11	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

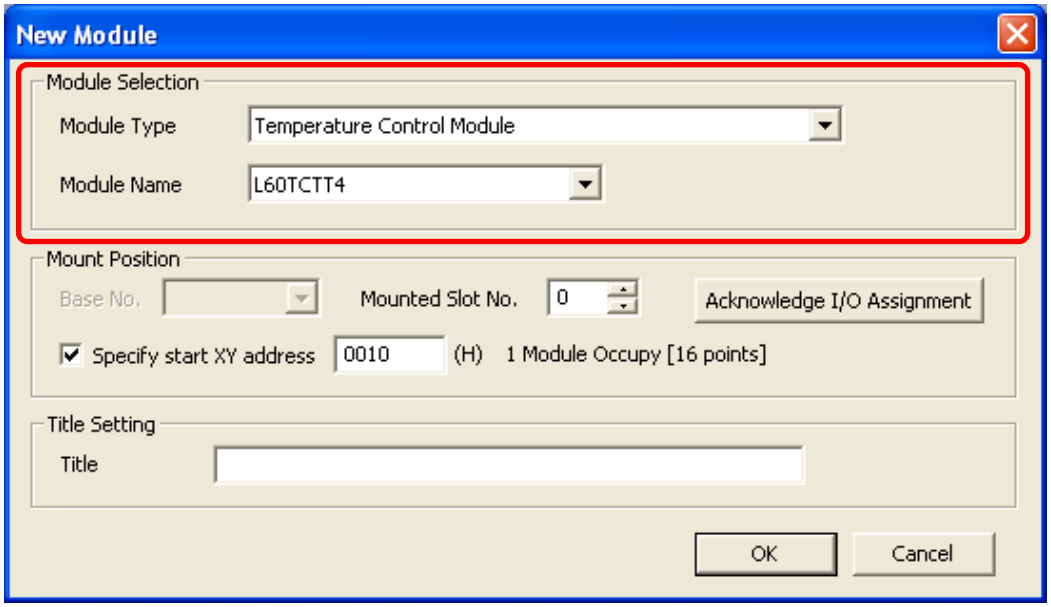
●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) Addition of L60TCTT4 Temperature Control Module

a) Open the new module window and configure the setting as follows.

Project window→[Intelligent Function Module]→Right-click→[New Module]



(2) Switch Setting

a) Open the switch setting window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Switch Setting]

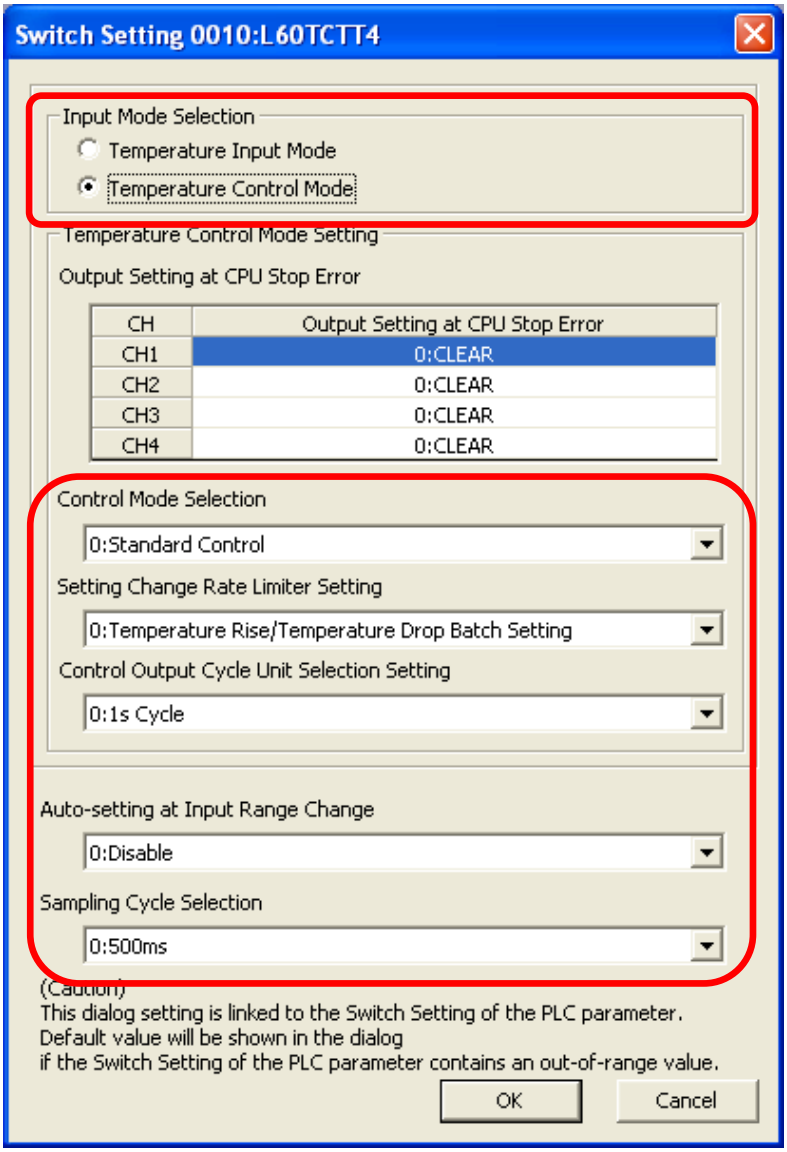


Table 2-4 Switch setting

Item	Set value
Input mode selection	Temperature control mode
Control mode selection	0: Standard control
Setting change rate limiter setting	0: Temperature rise/temperature drop batch setting
Control output cycle unit selection setting	0: 1 s cycle
Auto-setting at input range change	0: Disable
Sampling cycle selection*	0: 500 ms

(3) Parameter Setting

a) Open the parameter setting window.

Project window→[Intelligent Function Module]→Module name→[Parameter]

b) Click the [Clear Value for Gray Cells] button to set unnecessary items to 0.

c) Set the following parameters.

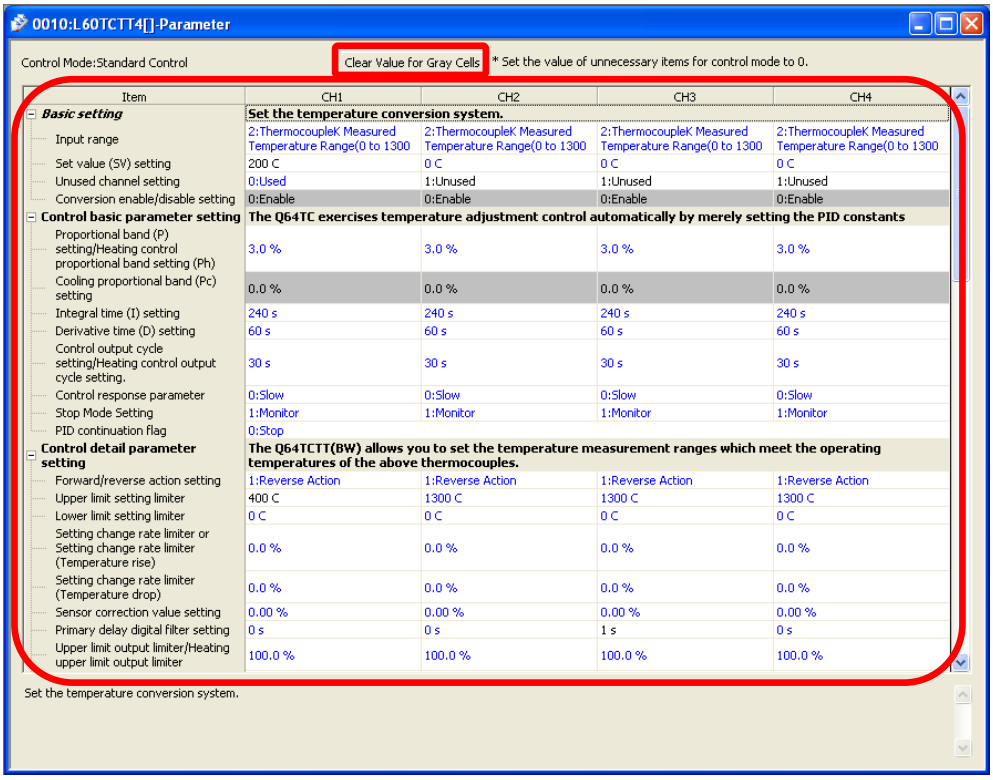


Table 2-5 Parameter setting

Item	Item	CH1	CH2	CH3	CH4
Basic setting	Input range	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)
	Set value (SV) setting	200°C	0°C	0°C	0°C
	Unused channel setting	0: Used	1: Unused	1: Unused	1: Unused
Control basic parameter setting	Control output cycle setting/Heating control output cycle setting	30s	30s	30s	30s
Control detail parameter setting	Upper limit setting limiter	400°C	1300°C	1300°C	1300°C
	Lower limit setting limiter	0°C	0°C	0°C	0°C
	Self-tuning setting	1: Starting ST (PID constant only)	0: Do not run the ST	0: Do not run the ST	0: Do not run the ST
Alert function setting	Alert 1 mode setting	1: Upper limit input alert	0: Not warning	0: Not warning	0: Not warning
	Alert set value 1	500 °C	0 °C	0 °C	0 °C

*For parameters other than above, use the default values.

(4) Auto Refresh Setting

a) Open the auto refresh window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Auto Refresh]

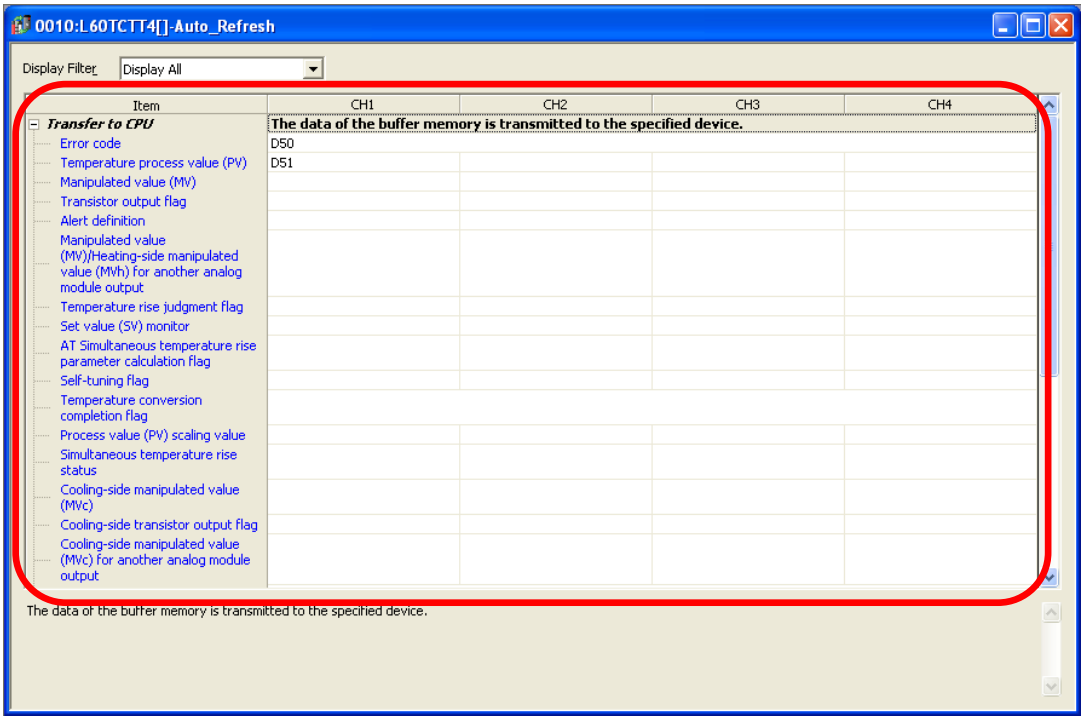


Table 2-6 Auto refresh setting

Item		CH1	CH2	CH3	CH4
Transfer to CPU	Error code	D50			
	Temperature process value (PV)	D51	-	-	-

Devices

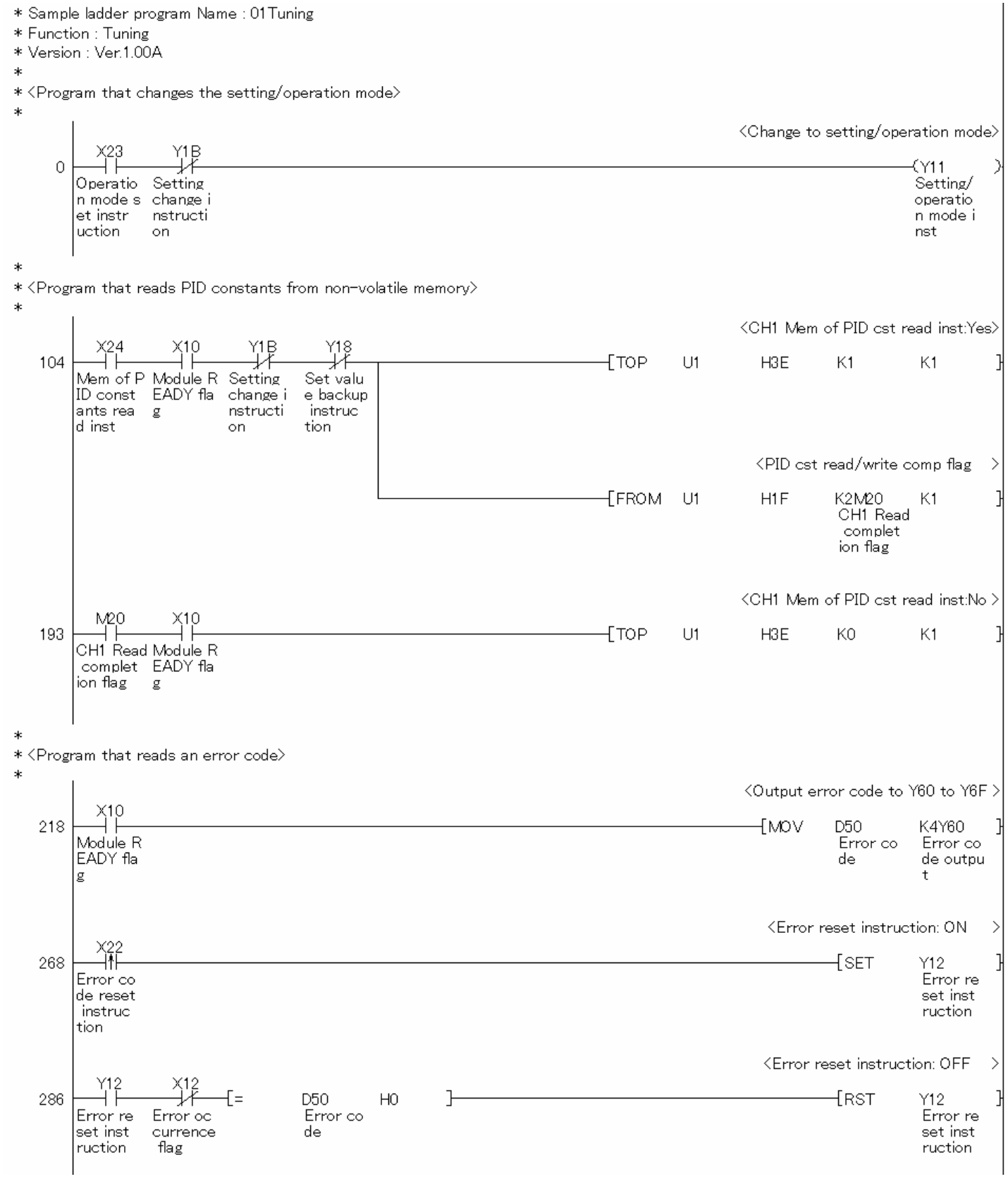
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	X30	Bit	CH1 Set value (SV) change instruction	-
7	Y11	Bit	Setting/operation mode instruction	-
8	Y12	Bit	Error reset instruction	-
9	Y18	Bit	Set value backup instruction	-
10	Y1B	Bit	Setting change instruction	-
11	Y60 to Y6F	Word	Error code output	-
12	D50	Word	Error code	-
13	D51	Word	CH1 Temperature process value (PV)	-
14	M20	Bit	CH1 Read completion flag	-
15	M21	Bit	CH2 Read completion flag	-
16	M22	Bit	CH3 Read completion flag	-
17	M23	Bit	CH4 Read completion flag	-
18	M24	Bit	CH1 Write completion flag	-
19	M25	Bit	CH2 Write completion flag	-
20	M26	Bit	CH3 Write completion flag	
21	M27	Bit	CH4 Write completion flag	

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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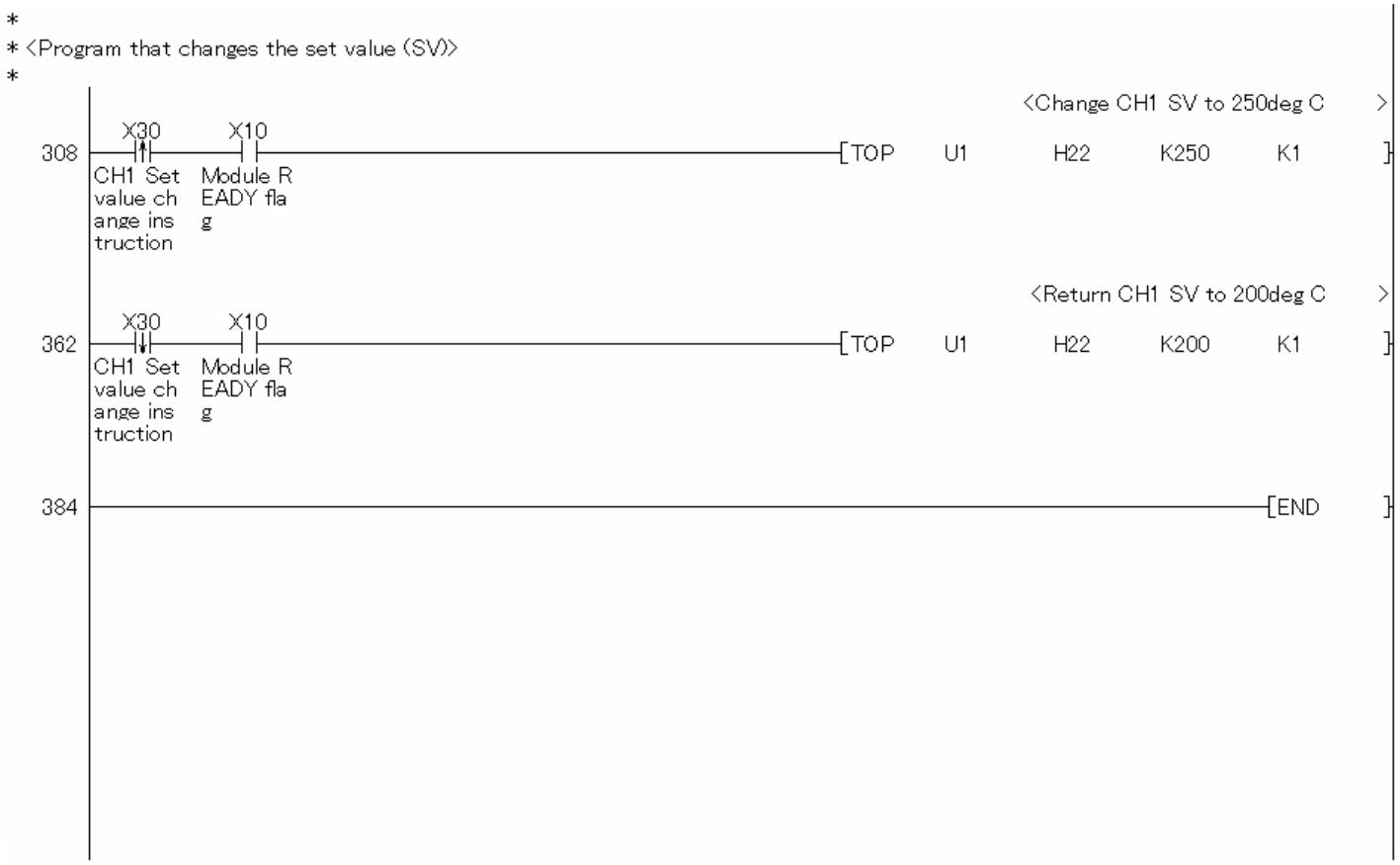

*
* <Program that changes the set value (SV)>
*
<Change CH1 SV to 250deg C >
308
X30
X10
CH1 Set value change instruction
Module READY flag
TOP U1 H22 K250 K1
<Return CH1 SV to 200deg C >
362
X30
X10
CH1 Set value change instruction
Module READY flag
TOP U1 H22 K200 K1
384
END

2.3. Standard Control (Peak Current Suppression Function, Simultaneous Temperature Rise Function)

2.3.1. Peak Current Suppression, Simultaneous Temperature Rise

Function Overview

This program performs the peak current suppression and simultaneous temperature rise using the intelligent function module parameters in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_PRM3_V100A_E(01PekHet)

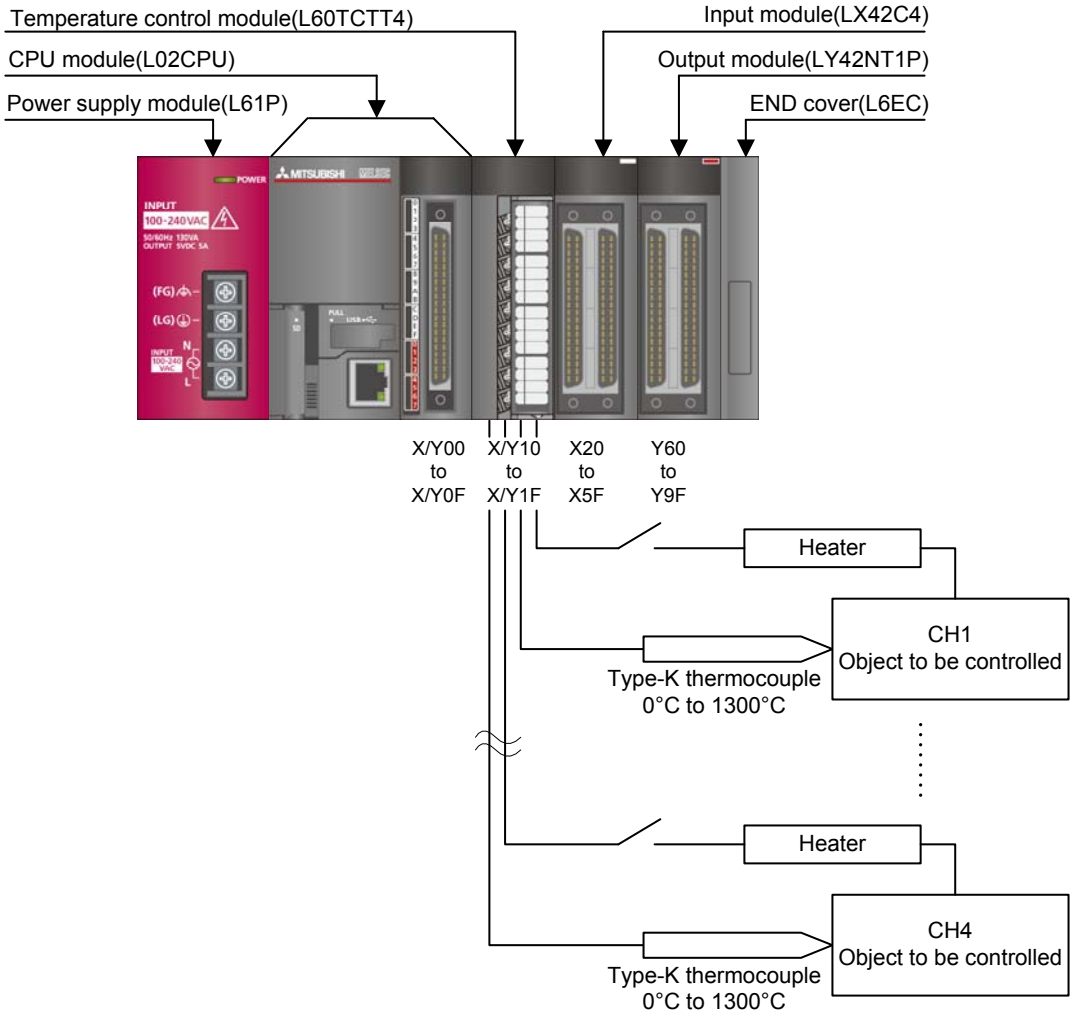
Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

Model	Description
Temperature control module	L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1 *1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.
CPU module	<table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table>
Input Module	MELSEC-L series input module
Output Module	MELSEC-L series output module
Compatible software	GX Works2 *1 *1 For information on the software versions applicable to the module used, refer to the related manual.

System Configuration

The following system configuration is used for the sample ladder program.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y18	Bit	Set value backup instruction	-
9	Y1B	Bit	Setting change instruction	-
10	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

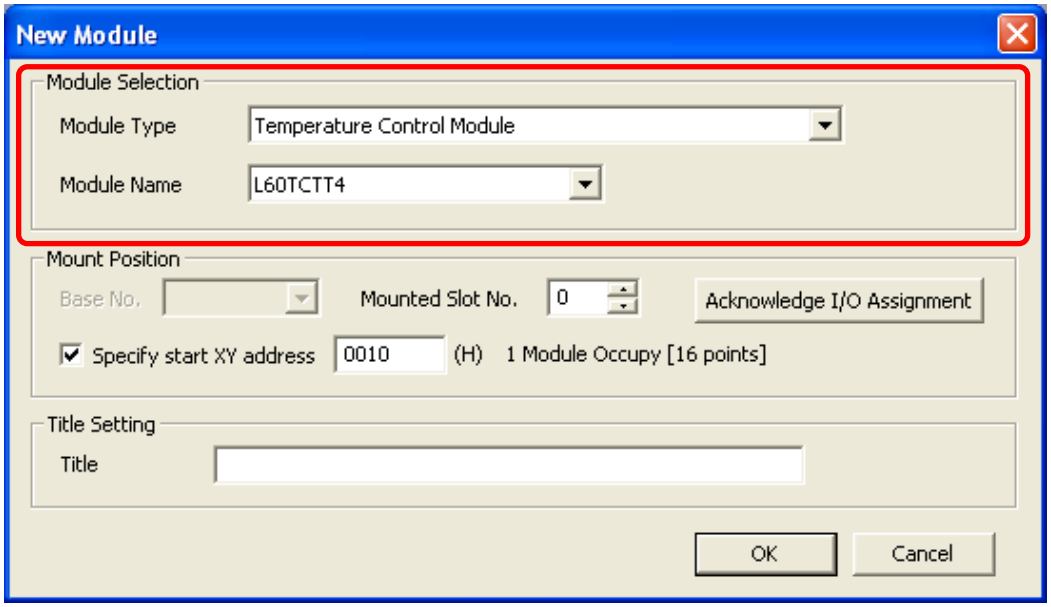
●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) Addition of L60TCTT4 Temperature Control Module

a) Open the new module window and configure the setting as follows.

Project window→[Intelligent Function Module]→Right-click→[New Module]



(2) Switch Setting

a) Open the switch setting window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Switch Setting]

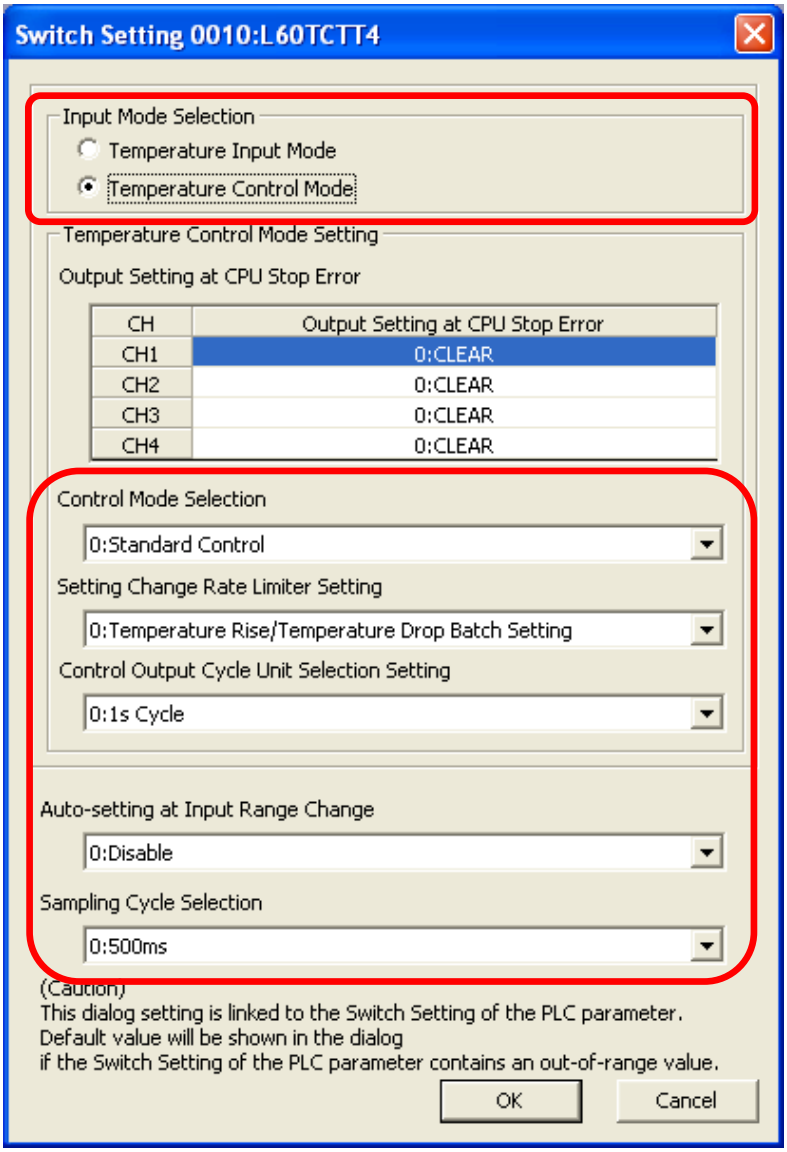


Table 2-7 Switch setting

Item	Set value
Input mode selection	Temperature control mode
Control mode selection	0: Standard control
Setting change rate limiter setting	0: Temperature rise/temperature drop batch setting
Control output cycle unit selection setting	0: 1 s cycle
Auto-setting at input range change	0: Disable
Sampling cycle selection	0: 500 ms

(3) Parameter Setting

a) Open the parameter setting window.

Project window→[Intelligent Function Module]→Module name→[Parameter]

b) Click the [Clear Value for Gray Cells] button to set unnecessary items to 0.

c) Set the following parameters.

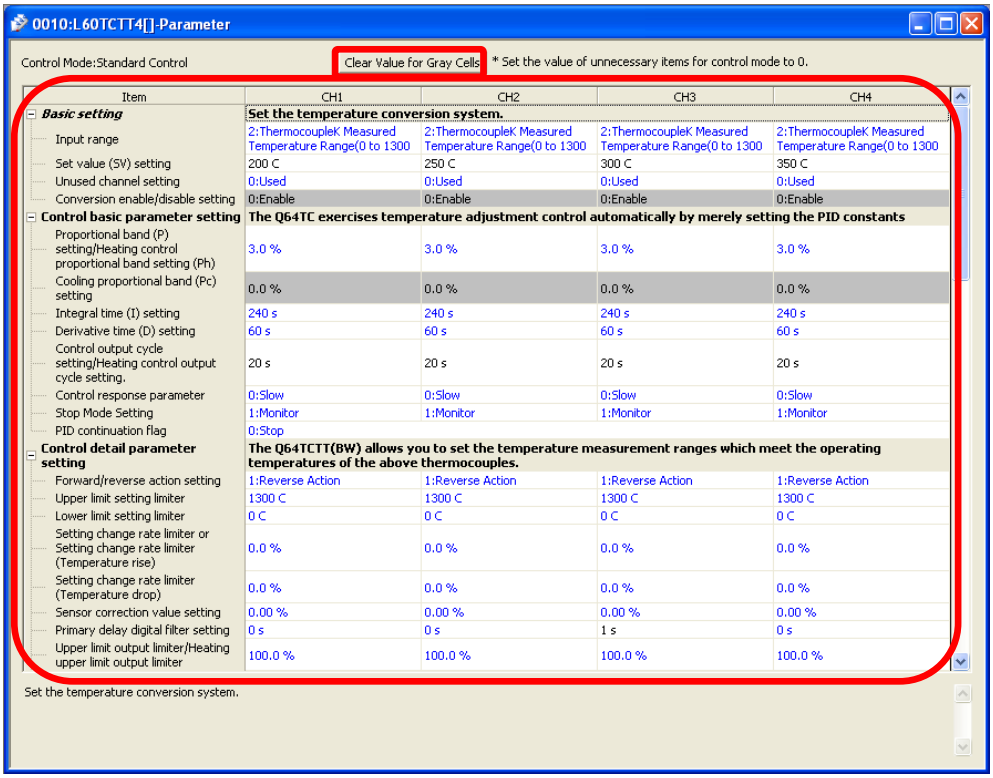


Table 2-8 Parameter setting

Item	Item	CH1	CH2	CH3	CH4
Basic setting	Input range	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)
	Set value (SV) setting	200 °C	250 °C	300 °C	350 °C
	Unused channel setting	0: Used	0: Used	0: Used	0: Used
Control basic parameter setting	Control output cycle setting/Heating control output cycle setting	20s	20s	20s	20s
Control detail parameter setting	Simultaneous temperature rise group setting	1: Group 1	1: Group 1	2: Group 2	2: Group 2
	Peak current suppression control group setting	1: Group 1	2: Group 2	3: Group 3	4: Group 4
	Simultaneous temperature rise AT mode selection	1: AT for Simultaneous Temperature Rise	1: AT for Simultaneous Temperature Rise	1: AT for Simultaneous Temperature Rise	1: AT for Simultaneous Temperature Rise

*For parameters other than above, use the default values.

(4) Auto Refresh Setting

a) Open the auto refresh window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Auto Refresh]

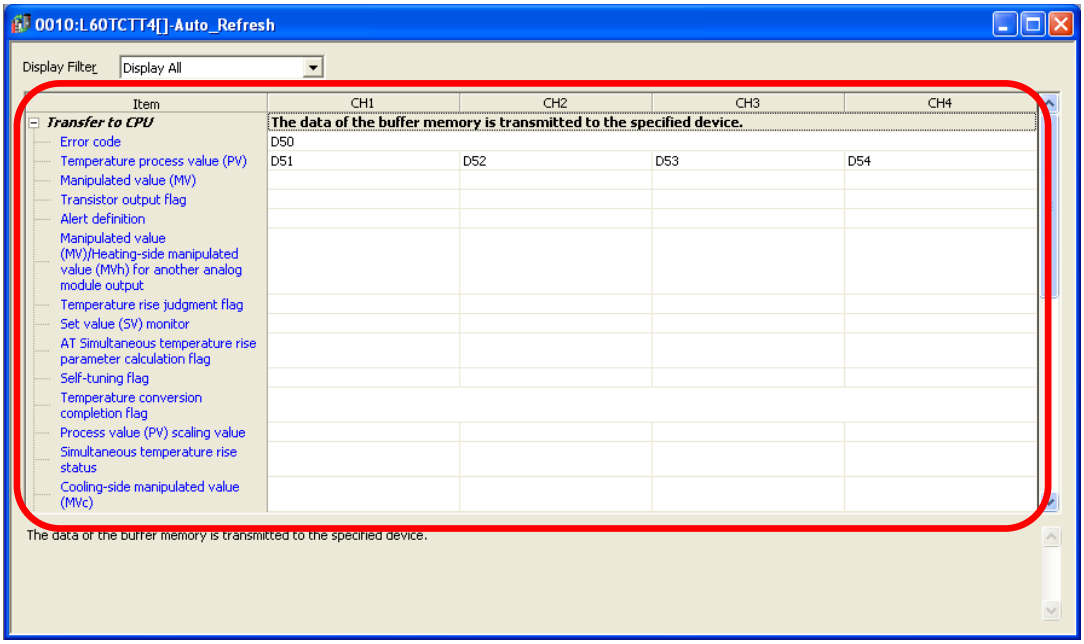


Table 2-9 Auto refresh setting

Item		CH1	CH2	CH3	CH4
Transfer to CPU	Error code	D50			
	Temperature process value (PV)	D51	D52	D53	D54

Devices

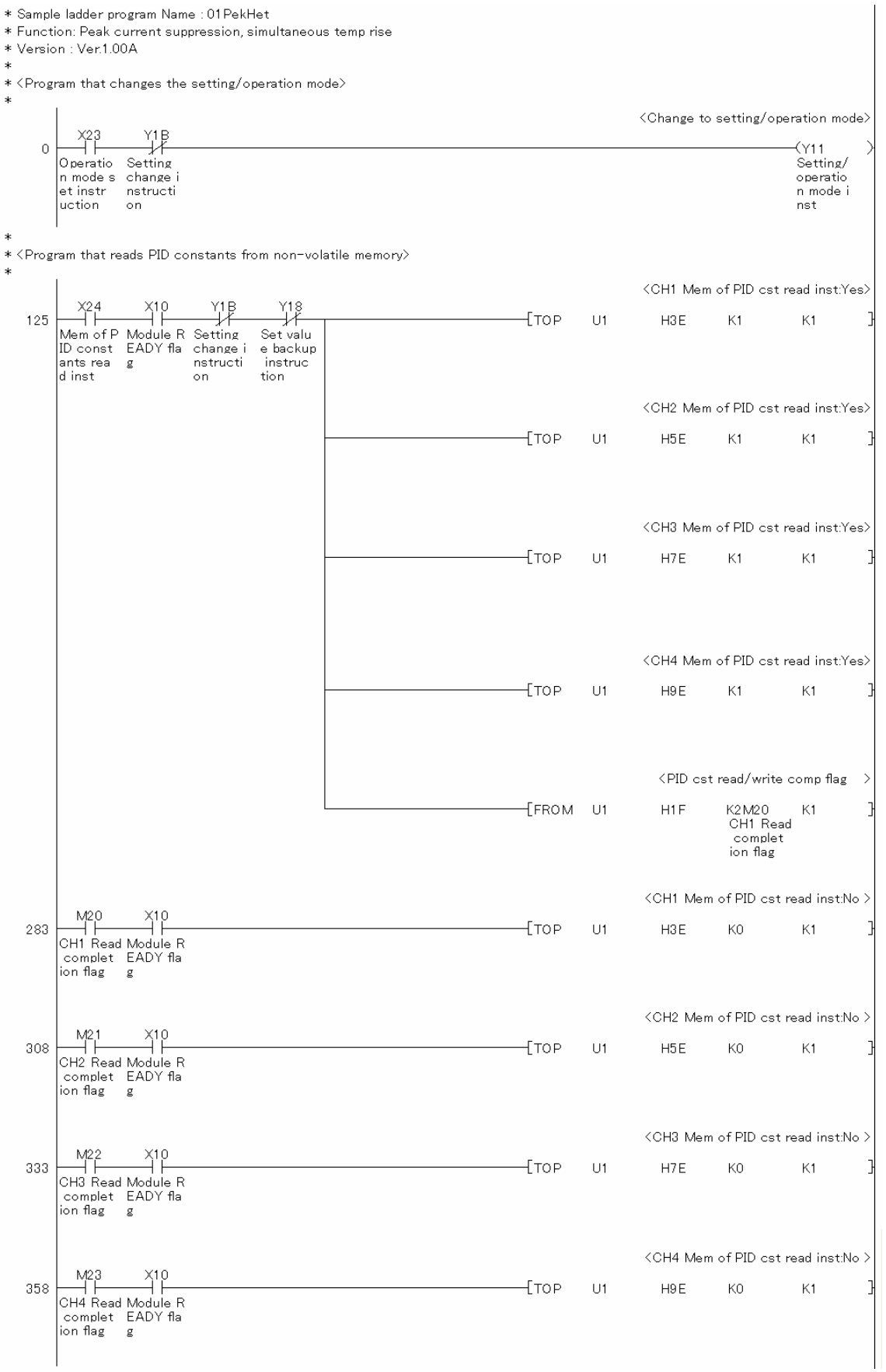
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y18	Bit	Set value backup instruction	-
9	Y1B	Bit	Setting change instruction	-
10	Y60 to Y6F	Word	Error code output	-
11	D50	Word	Error code	-
12	D51	Word	CH1 Temperature process value (PV)	-
13	D52	Word	CH2 Temperature process value (PV)	-
14	D53	Word	CH3 Temperature process value (PV)	-
15	D54	Word	CH4 Temperature process value (PV)	-
16	M20	Bit	CH1 Read completion flag	-
17	M21	Bit	CH2 Read completion flag	-
18	M22	Bit	CH3 Read completion flag	-
19	M23	Bit	CH4 Read completion flag	-
20	M24	Bit	CH1 Write completion flag	-
21	M25	Bit	CH2 Write completion flag	-
22	M26	Bit	CH3 Write completion flag	-
23	M27	Bit	CH4 Write completion flag	-

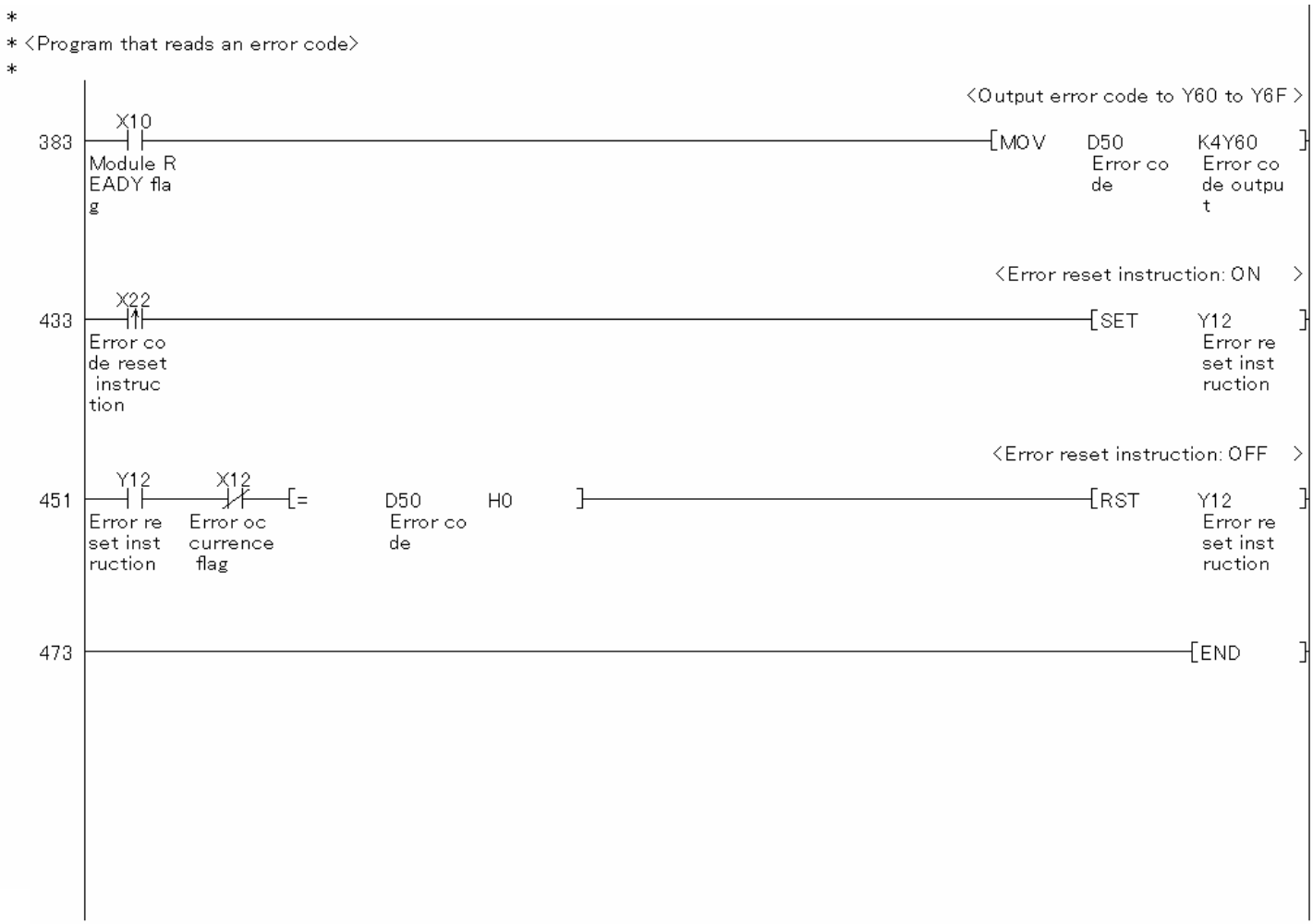
Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



Continues on next page.


*
* <Program that reads an error code>
*
<Output error code to Y60 to Y6F >
383
X10
Module R
EADY fla
g
MOV
D50
Error co
de
K4Y60
Error co
de outpu
t
<Error reset instruction: ON >
433
X22
Error co
de reset
instruc
tion
SET
Y12
Error re
set inst
ruction
<Error reset instruction: OFF >
451
Y12
Error re
set inst
ruction
X12
Error oc
currence
flag
=
D50
Error co
de
H0
RST
Y12
Error re
set inst
ruction
473
END

2.4. When Performing the Heating-Cooling Control

2.4.1. Heating-Cooling Control

Function Overview

This program performs the heating-cooling control using the intelligent function module parameters in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_PRM4_V100A_E(01HetCol)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

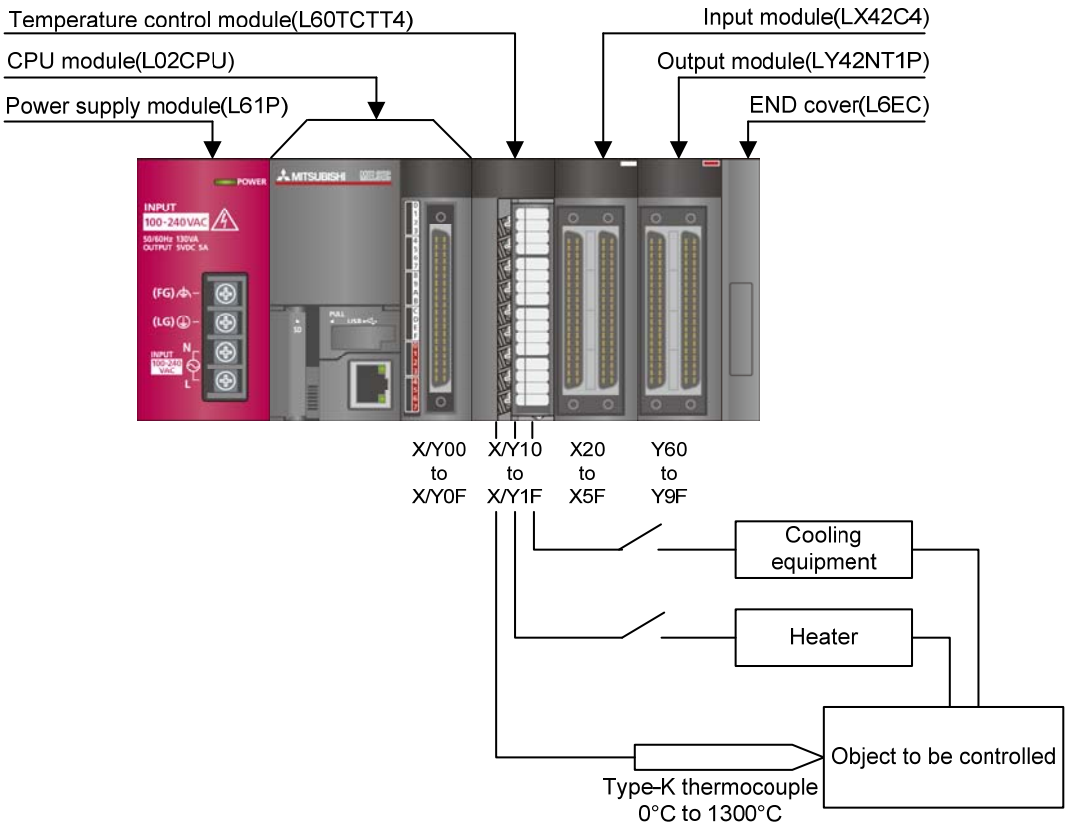
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2 *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder programs.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y18	Bit	Set value backup instruction	-
9	Y1B	Bit	Setting change instruction	-
10	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

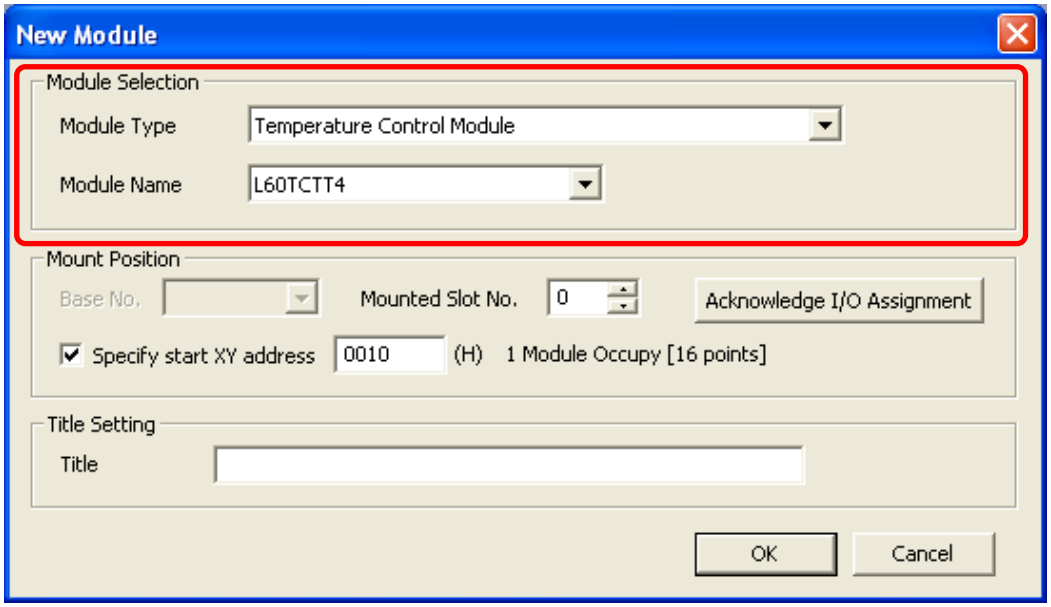
●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) Addition of L60TCTT4 Temperature Control Module

a) Open the new module window and configure the setting as follows.

Project window→[Intelligent Function Module]→Right-click→[New Module]



(2) Switch Setting

a) Open the switch setting window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Switch Setting]

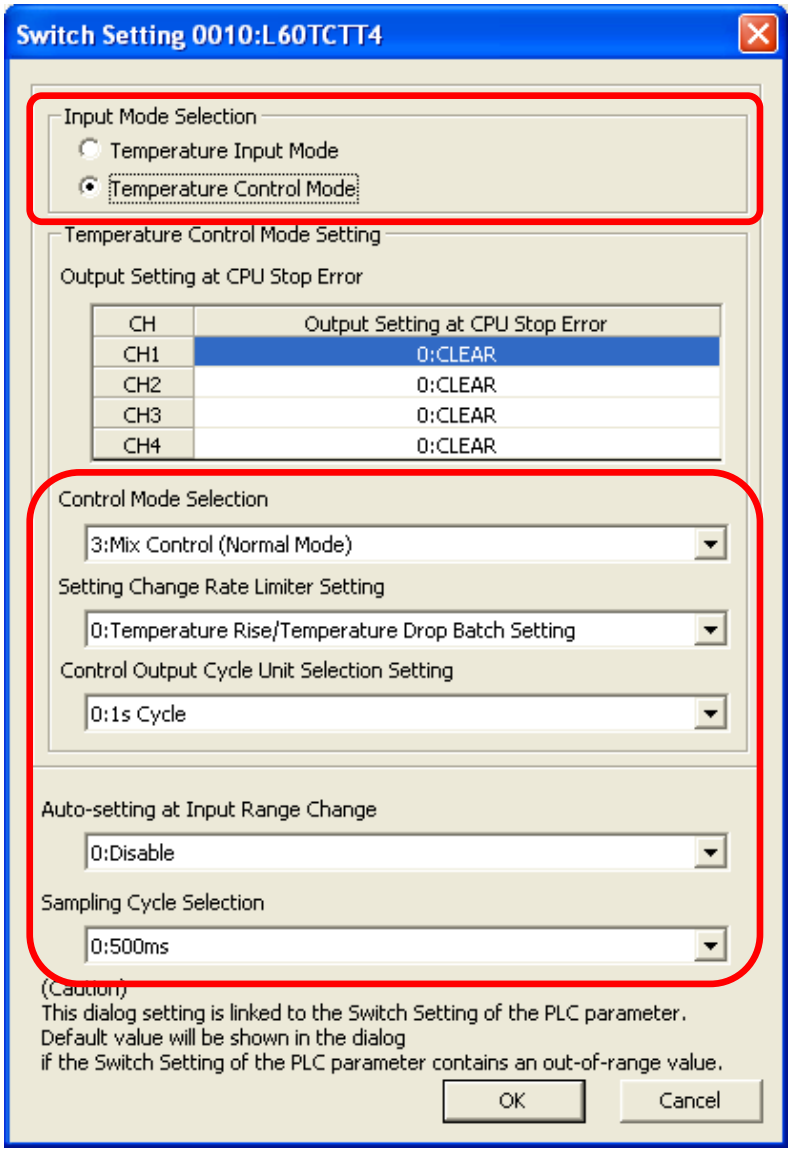


Table 2-10 Switch setting

Item	Set value
Input mode selection	Temperature control mode
Control mode selection	3: Mix control (normal mode)
Setting change rate limiter setting	0: Temperature rise/temperature drop batch setting
Control output cycle unit selection setting	0: 1 s cycle
Auto-setting at input range change	0: Disable
Sampling cycle selection	0: 500 ms

(3) Parameter Setting

a) Open the parameter setting window.

Project window→[Intelligent Function Module]→Module name→[Parameter]

b) Click the [Clear Value for Gray Cells] button to set unnecessary items to 0.

c) Set the following parameters.

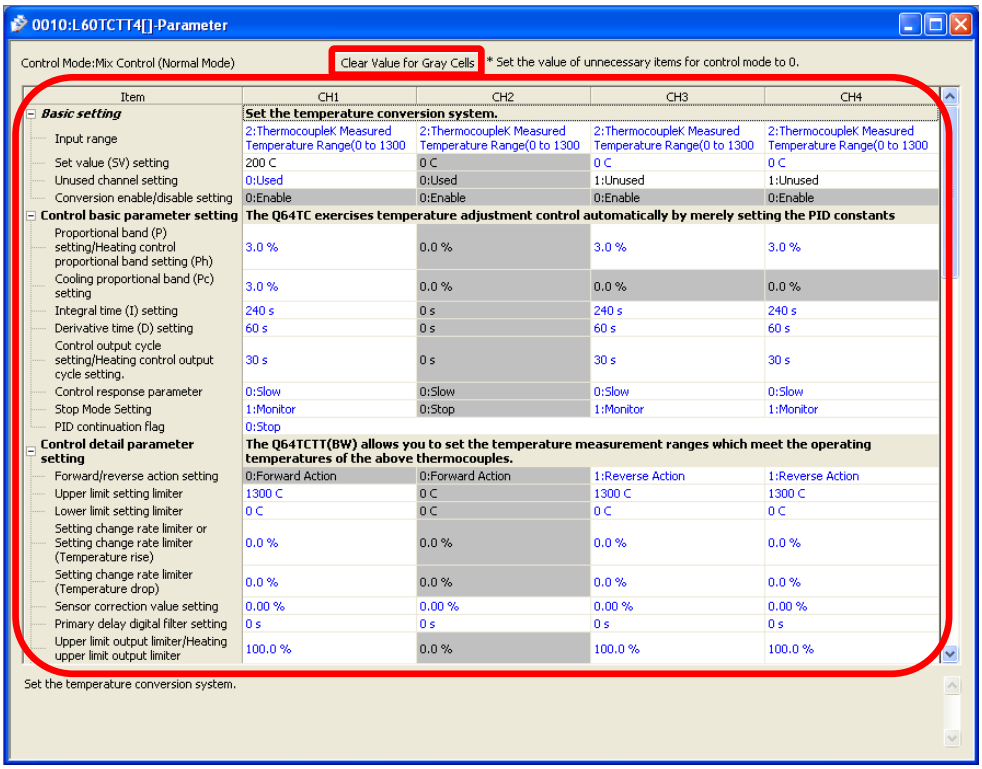


Table 2-11 Parameter setting

Item	Item	CH1	CH2	CH3	CH4
Basic setting	Input range	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)
	Set value (SV) setting	200°C	0°C	0°C	0°C
	Unused channel setting	0: Used	0: Used	1: Unused	1: Unused
Control basic parameter setting	Control output cycle setting/Heating control output cycle setting	30s	0s	0s	0s
Control detail parameter setting	Cooling method setting	0: Air Cooled	0: Air Cooled	0: Air Cooled	0: Air Cooled
	Cooling control output cycle setting	30s	0s	30s	30s
	Overlap/Dead band setting	-0.3%	0.0%	0.0%	0.0%

*For parameters other than above, use the default values.

(4) Auto Refresh Setting

a) Open the auto refresh window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Auto Refresh]

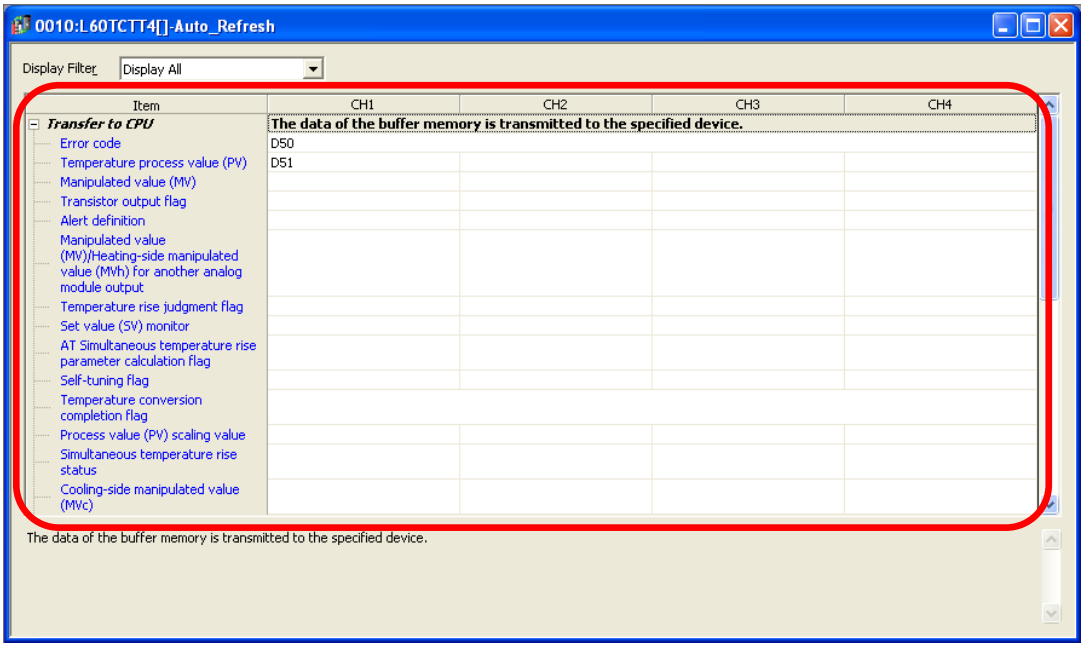


Table 2-12 Auto refresh setting

Item		CH1	CH2	CH3	CH4
Transfer to CPU	Error code	D50			
	Temperature process value (PV)	D51	-	-	-

Devices

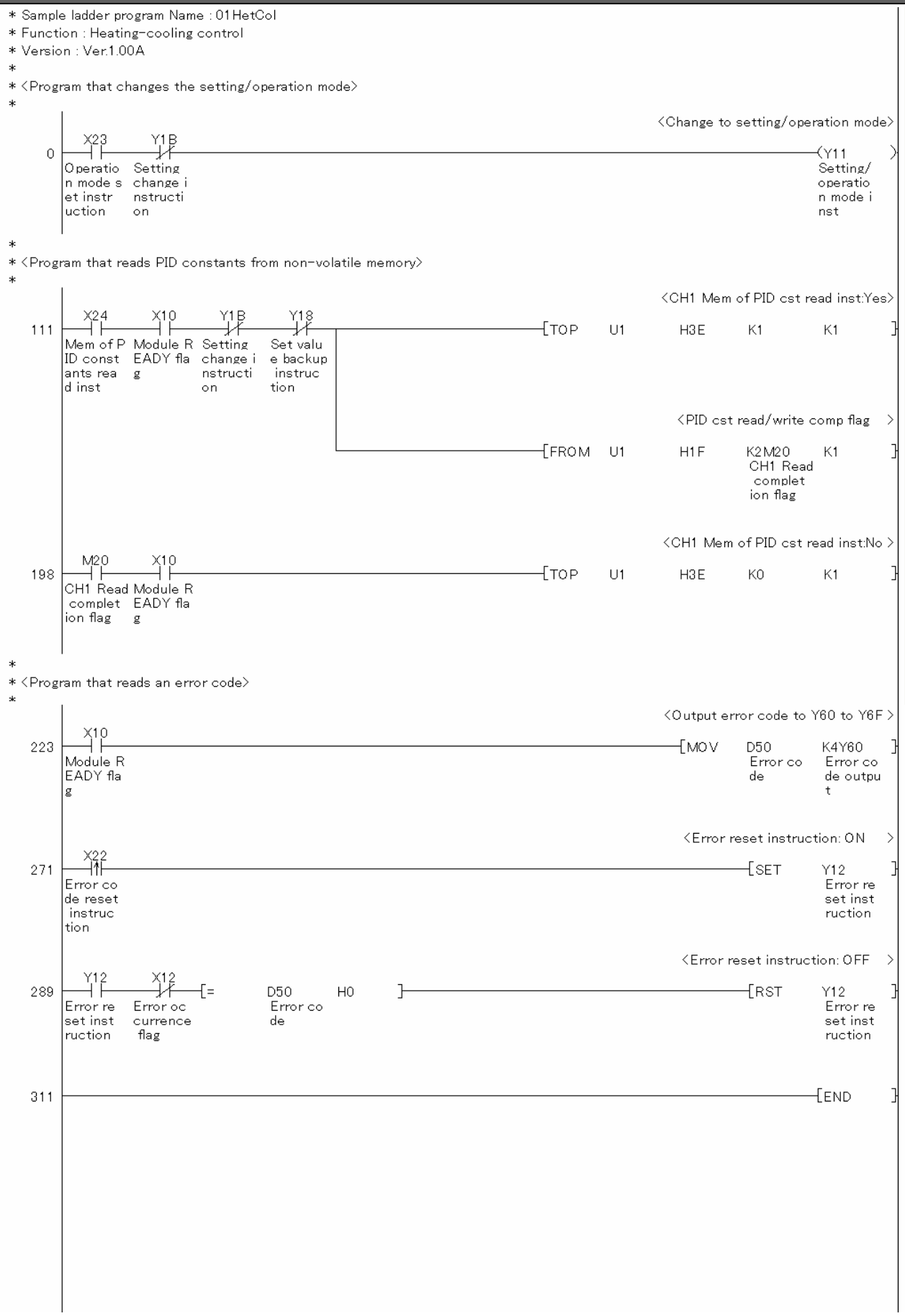
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X22	Bit	Error code reset instruction	-
4	X23	Bit	Operation mode setting instruction	-
5	X24	Bit	Memory of PID constants read instruction	-
6	Y11	Bit	Setting/operation mode instruction	-
7	Y12	Bit	Error reset instruction	-
8	Y18	Bit	Set value backup instruction	-
9	Y1B	Bit	Setting change instruction	-
10	Y60 to Y6F	Word	Error code output	-
11	D50	Word	Error code	-
12	D51	Word	CH1 Temperature process value (PV)	-
13	M20	Bit	CH1 Read completion flag	-
14	M21	Bit	CH2 Read completion flag	-
15	M22	Bit	CH3 Read completion flag	-
16	M23	Bit	CH4 Read completion flag	-
17	M24	Bit	CH1 Write completion flag	-
18	M25	Bit	CH2 Write completion flag	-
19	M26	Bit	CH3 Write completion flag	-
20	M27	Bit	CH4 Write completion flag	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program


* Sample ladder program Name : 01HetCol
* Function : Heating-cooling control
* Version : Ver.1.00A
*
* <Program that changes the setting/operation mode>
*
<Change to setting/operation mode>
0
X23
Operation mode set instruction
Y1B
Setting change instruction
Y11
Setting/operation mode inst
*
* <Program that reads PID constants from non-volatile memory>
*
<CH1 Mem of PID cst read inst:Yes>
111
X24
Mem of PID constants read inst
X10
Module READY flag
Y1B
Setting change instruction
Y18
Set value backup instruction
TOP U1 H3E K1 K1
<PID cst read/write comp flag >
FROM U1 H1F K2M20 K1
K2M20
CH1 Read completion flag
<CH1 Mem of PID cst read inst:No >
198
M20
CH1 Read completion flag
X10
Module READY flag
TOP U1 H3E K0 K1
*
* <Program that reads an error code>
*
<Output error code to Y60 to Y6F >
223
X10
Module READY flag
MOV D50 K4Y60
D50
Error code
K4Y60
Error code output
<Error reset instruction: ON >
271
X22
Error code reset instruction
SET Y12
Y12
Error reset instruction
<Error reset instruction: OFF >
289
Y12
Error reset instruction
X12
Error occurrence flag
= D50 H0
D50
Error code
RST Y12
Y12
Error reset instruction
311
END

3. When Using the Module in Standard System Configuration (When Not Using Intelligent Function Module Parameters)

3.1. When Using the Module as a Temperature Input Module

3.1.1. Temperature Input

Function Overview

This program performs the temperature input directly using the intelligent function module devices in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_NPM1_V100A_E(01RdTmp)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

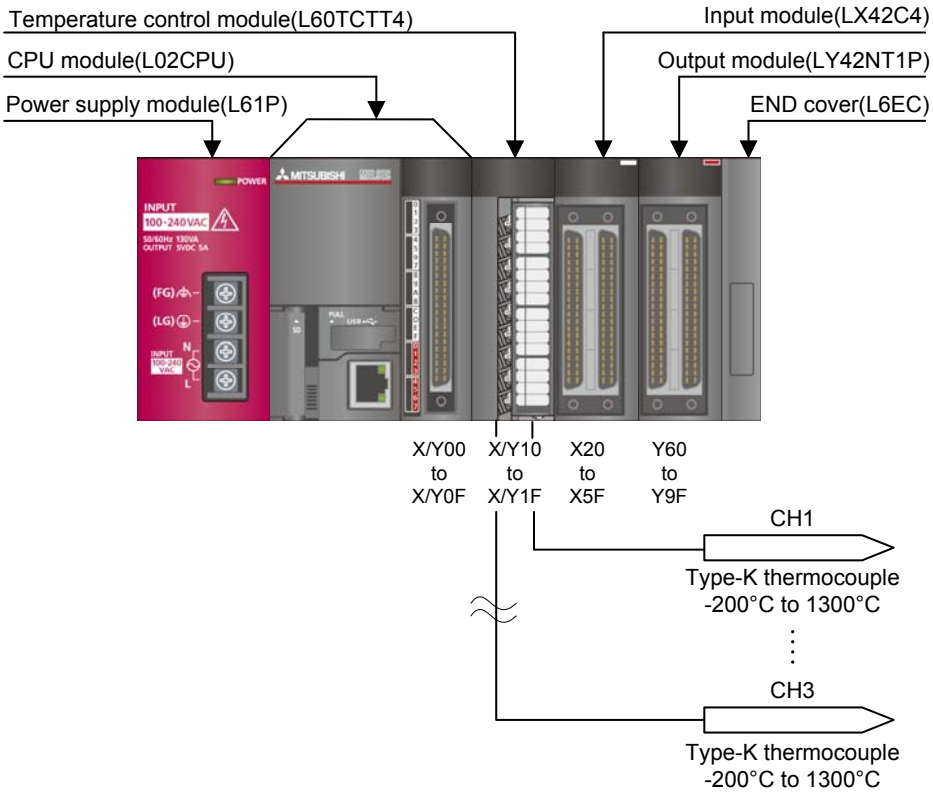
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2, GX Developer *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder programs.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X13	Bit	Hardware error flag	
4	X1B	Bit	Setting change completion flag	
5	X20	Bit	Set value write instruction	-
6	X22	Bit	Error code reset instruction	-
7	X23	Bit	Operation mode setting instruction	-
8	X25	Bit	Temperature process value read instruction	-
9	Y11	Bit	Setting/operation mode status	-
10	Y12	Bit	Error reset instruction	-
11	Y1B	Bit	Setting change instruction	-
12	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) PLC Parameter Settings

a) Open the PLC parameter setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]

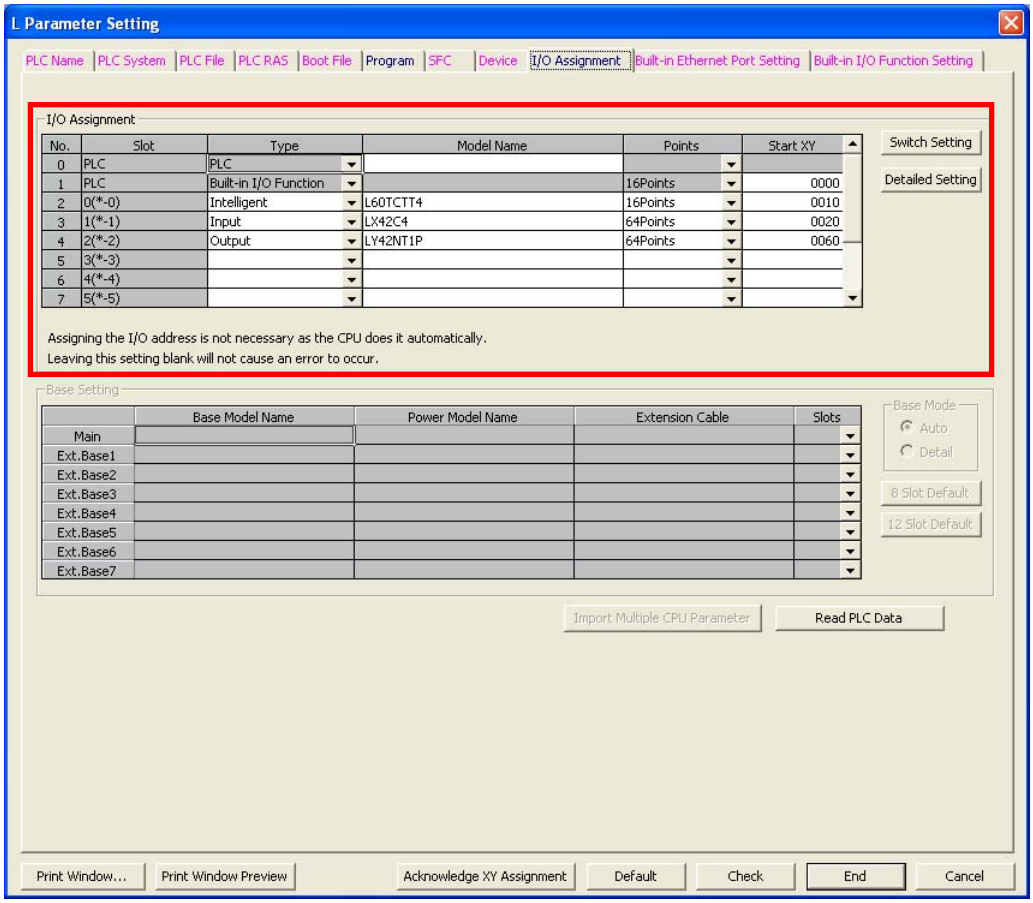


Table 3-1 I/O assignment setting

No.	Slot	Type	Module name	Points	StartXY
0	CPU	CPU	-		
1	0(*-0)	Intelli.	L60TCTT4	16point	0010
2	1(*-1)	Input	LX42C4	64point	0020
3	2(*-2)	Output	LY42NT1P	64point	0060

b) Open the switch setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]→Switch setting

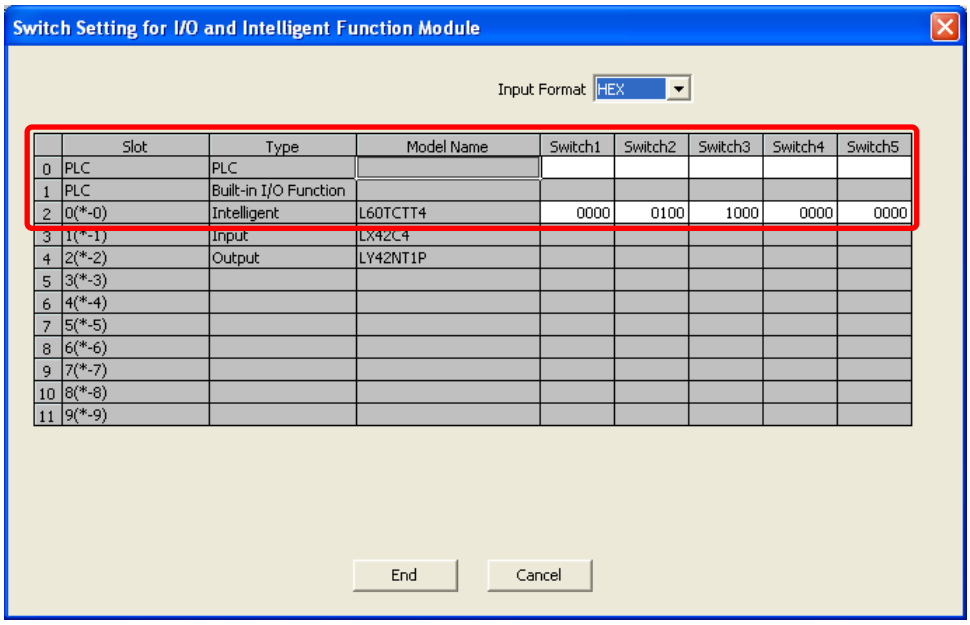


Table 3-2 Switch setting

No.	Slot	Type	Model name	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
0	CPU	CPU						
1	0(*-0)	Intelli.	L60TCTT4	0000	0100	1000	0000	0000
2	1(*-1)	Input	LX42C4					
3	2(*-2)	Output	LY42NT1P					

Devices

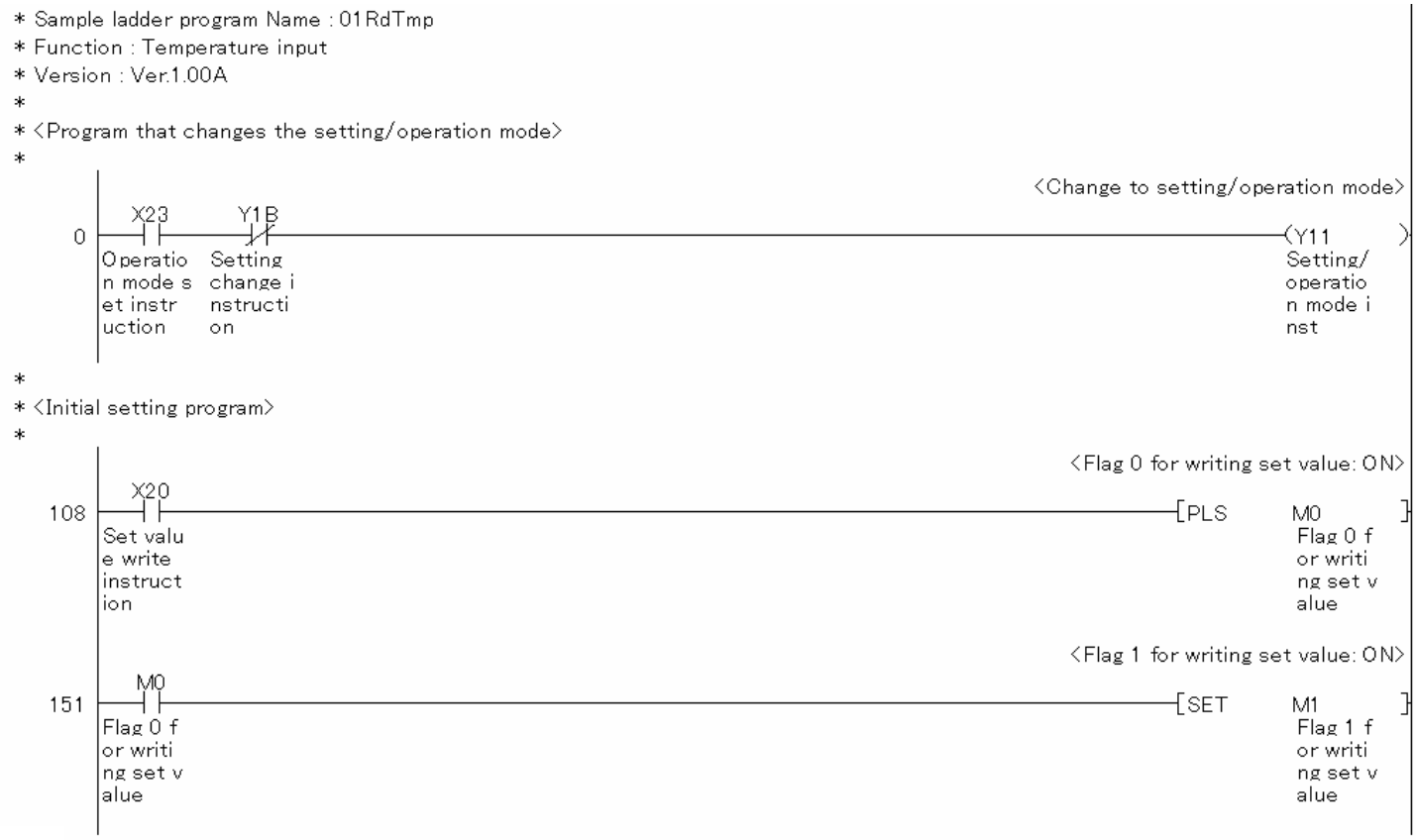
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X12	Bit	Error occurrence flag	
3	X13	Bit	Hardware error flag	
4	X1B	Bit	Setting change completion flag	
5	X20	Bit	Set value write instruction	-
6	X22	Bit	Error code reset instruction	-
7	X23	Bit	Operation mode setting instruction	-
8	X25	Bit	Temperature process value read instruction	-
9	Y11	Bit	Setting/operation mode instruction	-
10	Y12	Bit	Error reset instruction	-
11	Y1B	Bit	Setting change instruction	-
12	Y60 to Y6F	Word	Error code output	-
13	D11	Word	CH1 Temperature process value (PV)	-
14	D12	Word	CH2 Temperature process value (PV)	-
15	D13	Word	CH3 Temperature process value (PV)	-
16	D50	Word	Error code	-
17	D55	Word	CH2 Alert definition	-
18	D56	Word	CH3 Alert definition	-
19	D60	Word	Temperature conversion completion flag	-
20	D998	Word	Process alarm processing counter	-
21	D999	Word	Rate alarm processing counter	-
22	M0	Bit	Flag 0 for writing set value	-
23	M1	Bit	Flag 1 for writing set value	-
24	M2	Bit	Flag 2 for writing set value	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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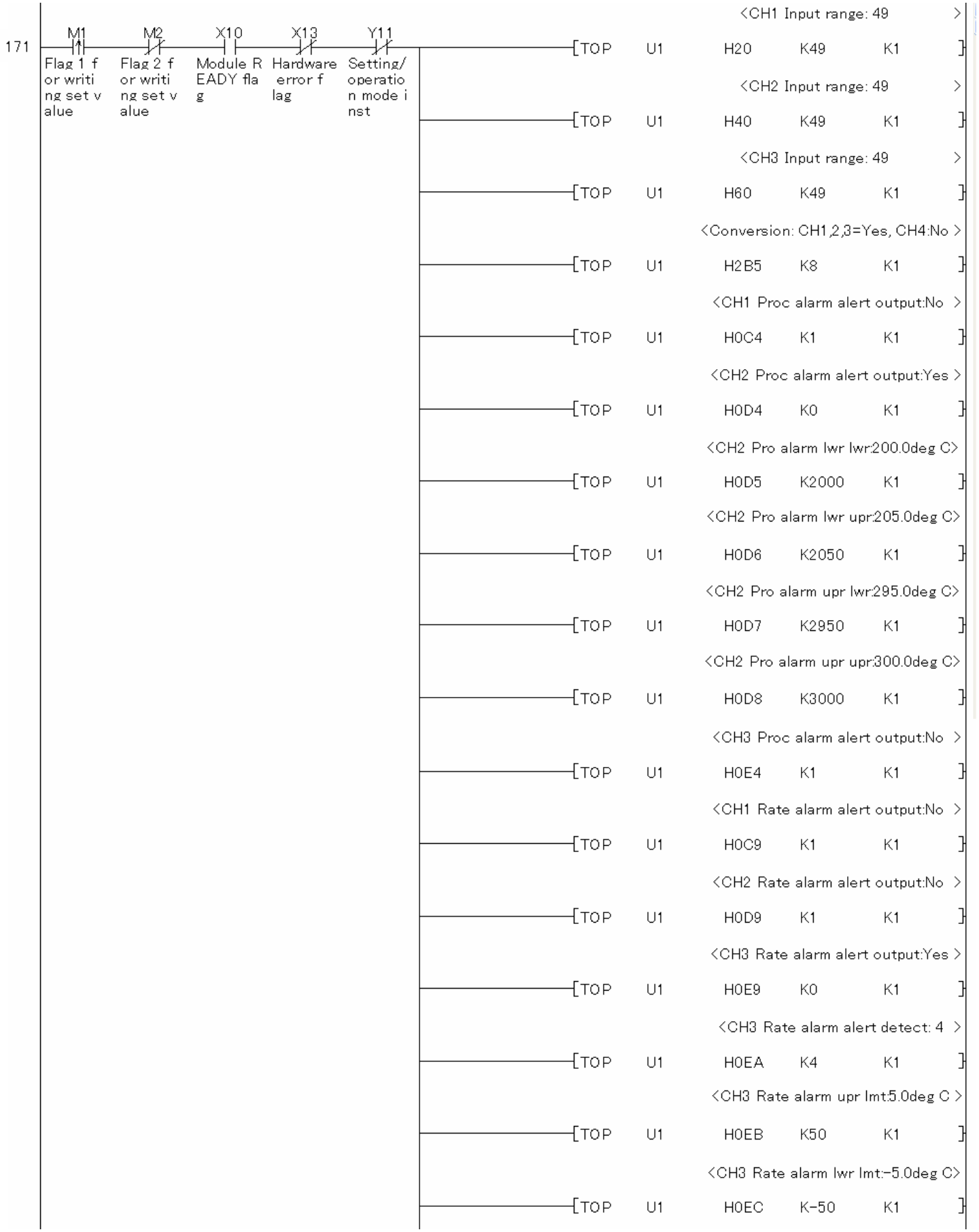
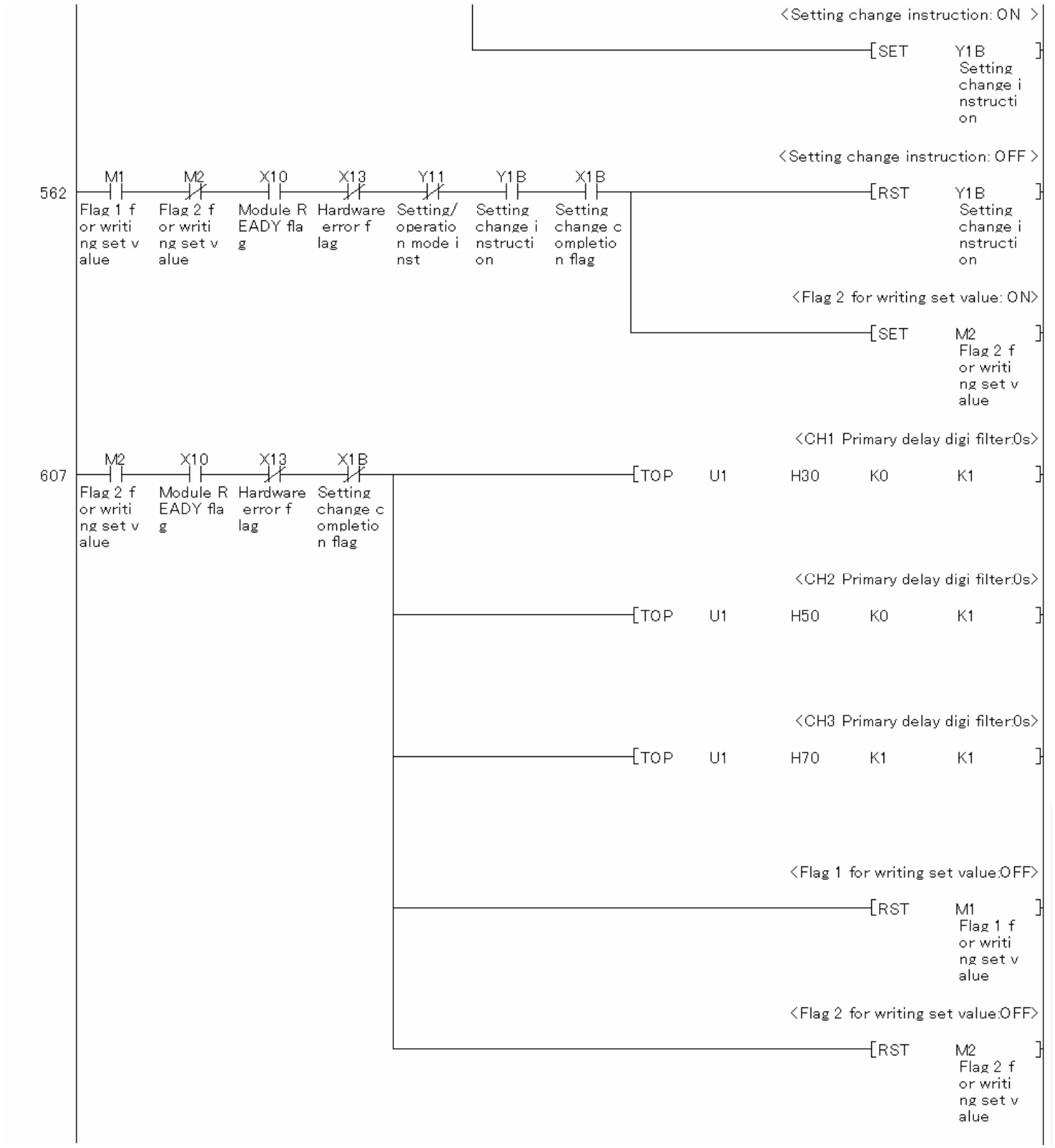


Continues on next page.



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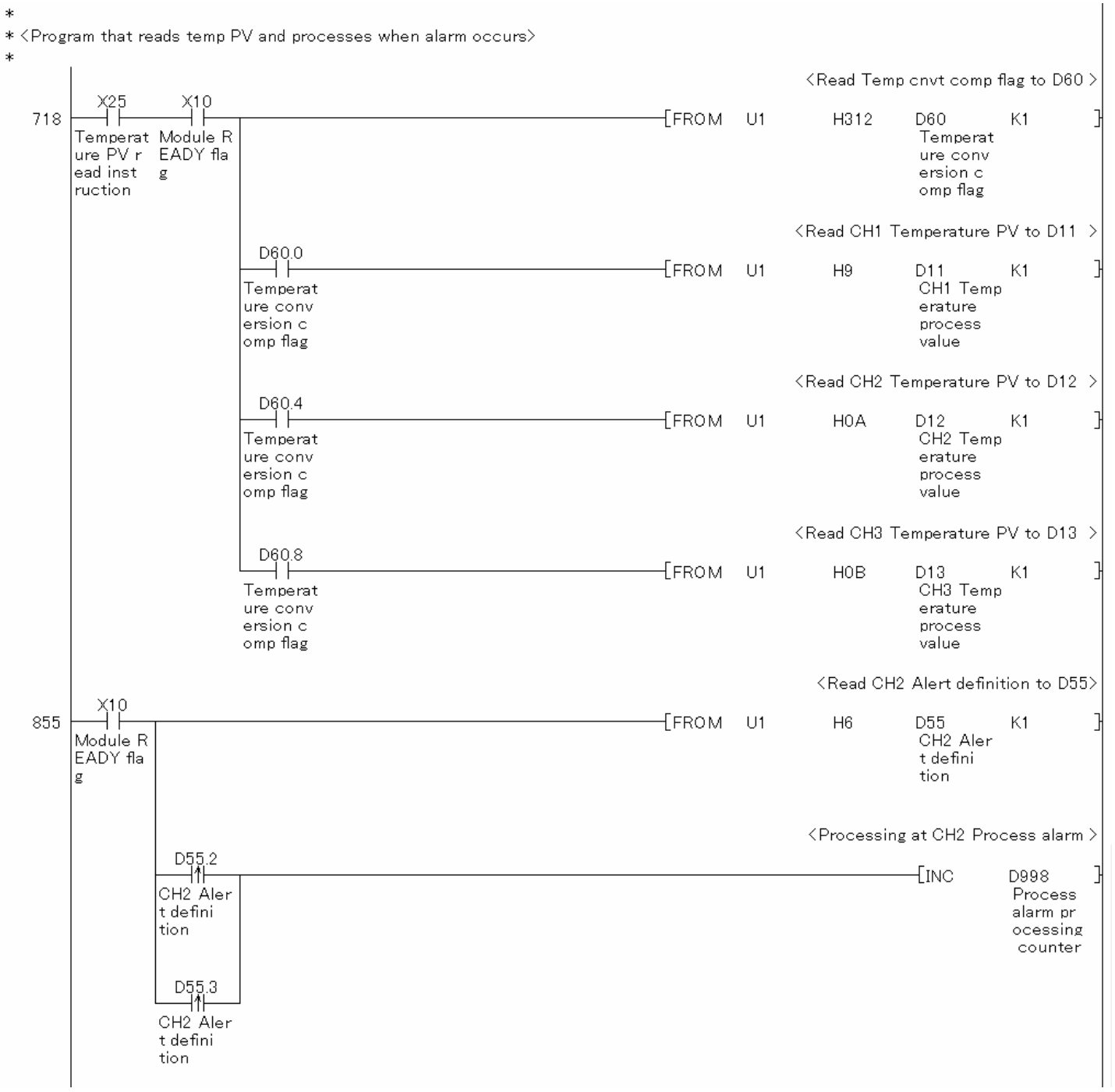
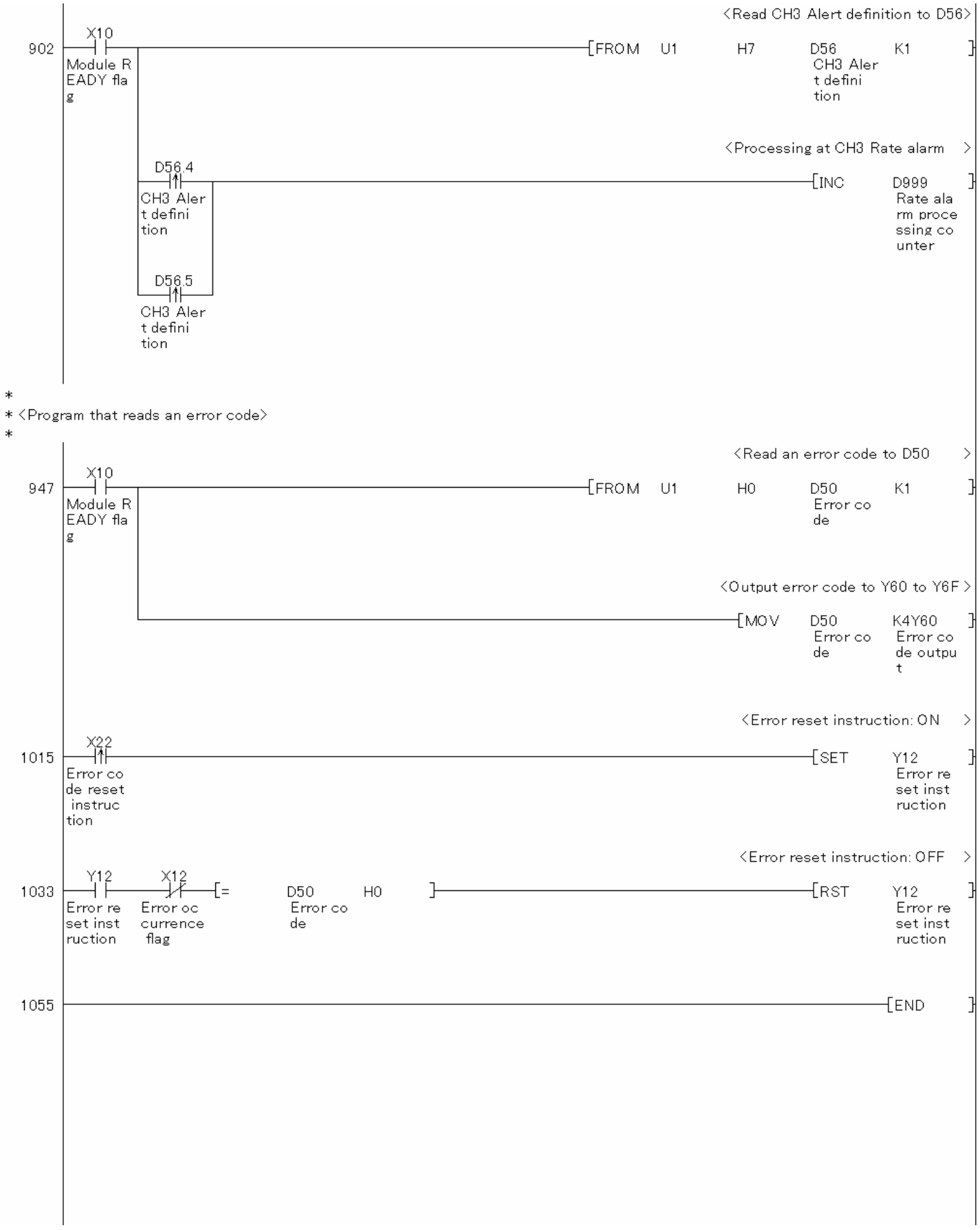


Continues on next page.



*CH2 D998 is incremented when a process alarm occurs.

*CH3 D999 is incremented when a process alarm occurs.

3.2. Standard Control (Such as Auto Tuning, Self-Tuning, and Error Code Read)

3.2.1. Tuning

Function Overview

This program performs the auto tuning, self-tuning and error code read operations directly using the intelligent function module devices in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_NPM2_V100A_E(01Tuning)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

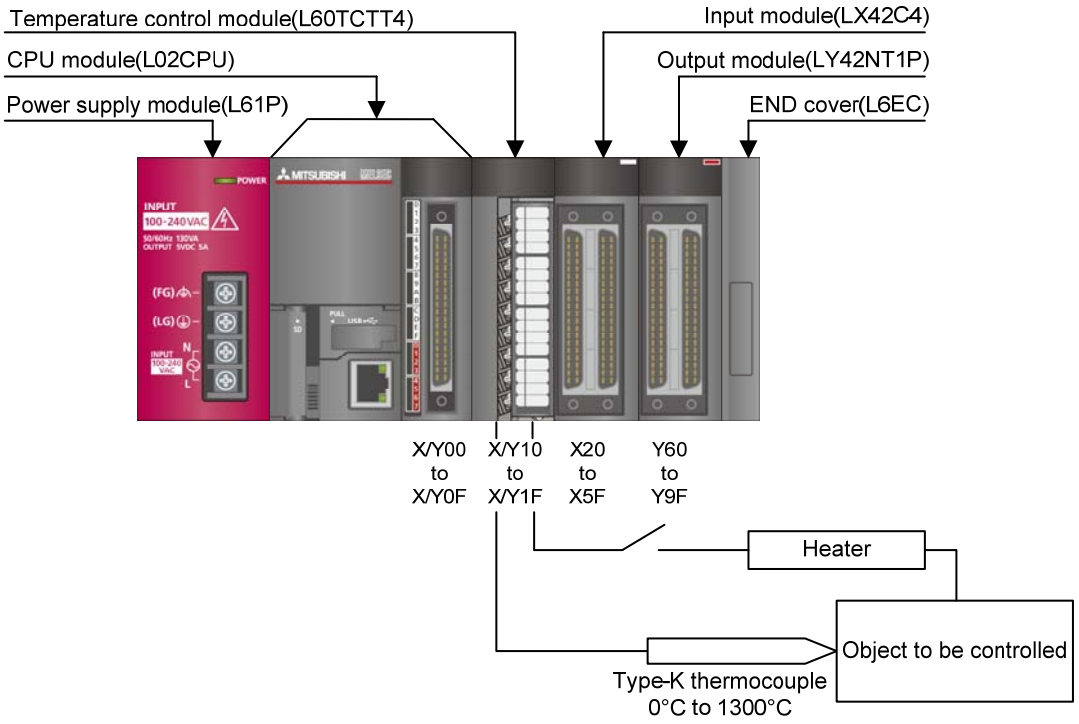
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2, GX Developer *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder program.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X18	Bit	Back-up of the set value completion flag	
7	X1B	Bit	Setting change completion flag	
8	X20	Bit	Set value write instruction	-
9	X21	Bit	Auto tuning execute instruction	-
10	X22	Bit	Error code reset instruction	-
11	X23	Bit	Operation mode setting instruction	-
12	X24	Bit	Memory of PID constants read instruction	-
13	X30	Bit	CH1 Set value (SV) change instruction	-
14	Y11	Bit	Setting/operation mode instruction	-
15	Y12	Bit	Error reset instruction	-
16	Y14	Bit	CH1 Auto tuning instruction	
17	Y18	Bit	Set value backup instruction	-
18	Y1B	Bit	Setting change instruction	-
19	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) PLC Parameter Settings

a) Open the PLC parameter setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]

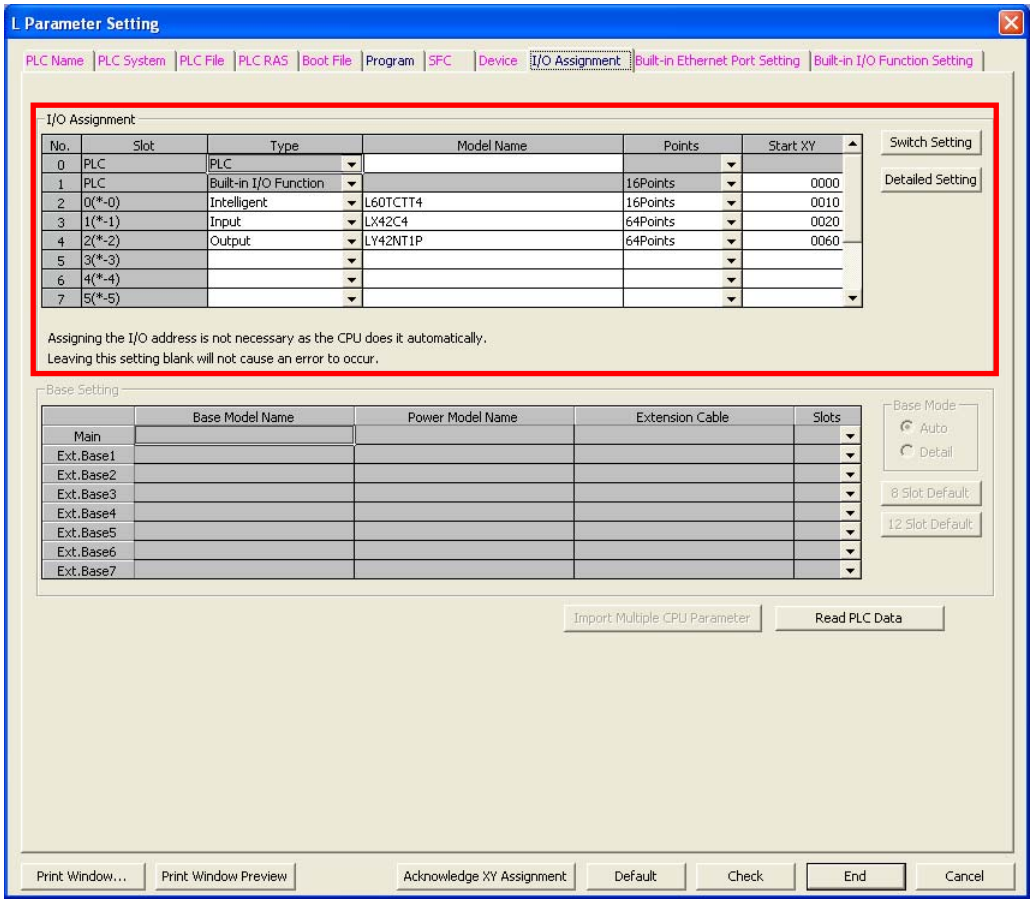


Table 3-3 I/O assignment setting

No.	Slot	Type	Module name	Points	StartXY
0	CPU	CPU	-		
1	0(*-0)	Intelli.	L60TCTT4	16point	0010
2	1(*-1)	Input	LX42C4	64point	0020
3	2(*-2)	Output	LY42NT1P	64point	0060

b) Open the switch setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]→Switch setting

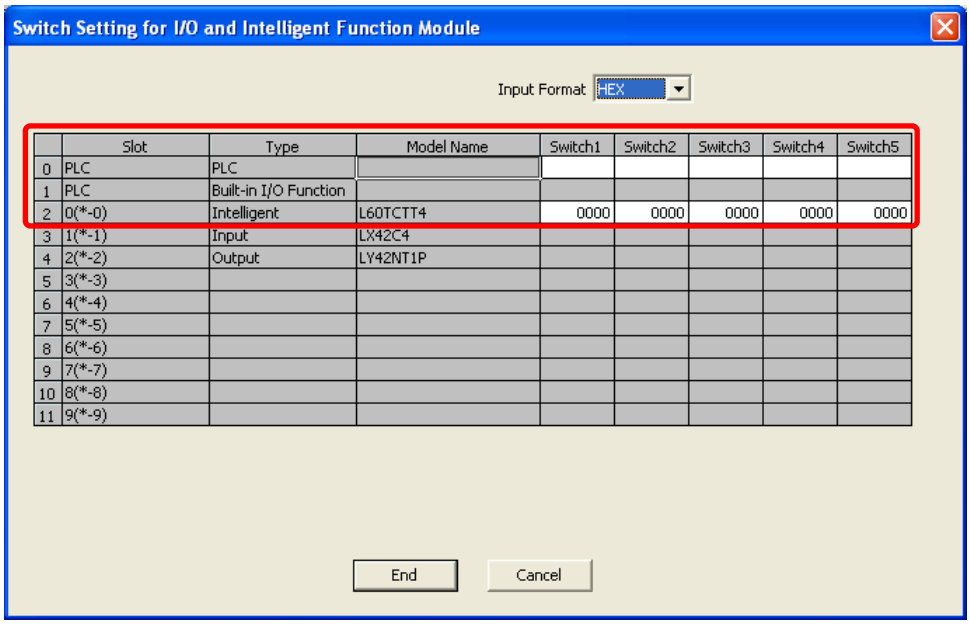


Table 3-4 Switch setting

No.	Slot	Type	Model name	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
0	CPU	CPU						
1	0(*-0)	Intelli.	L60TCTT4	0000	0000	0000	0000	0000
2	1(*-1)	Input	LX42C4					
3	2(*-2)	Output	LY42NT1P					

Devices

This program uses the following devices.

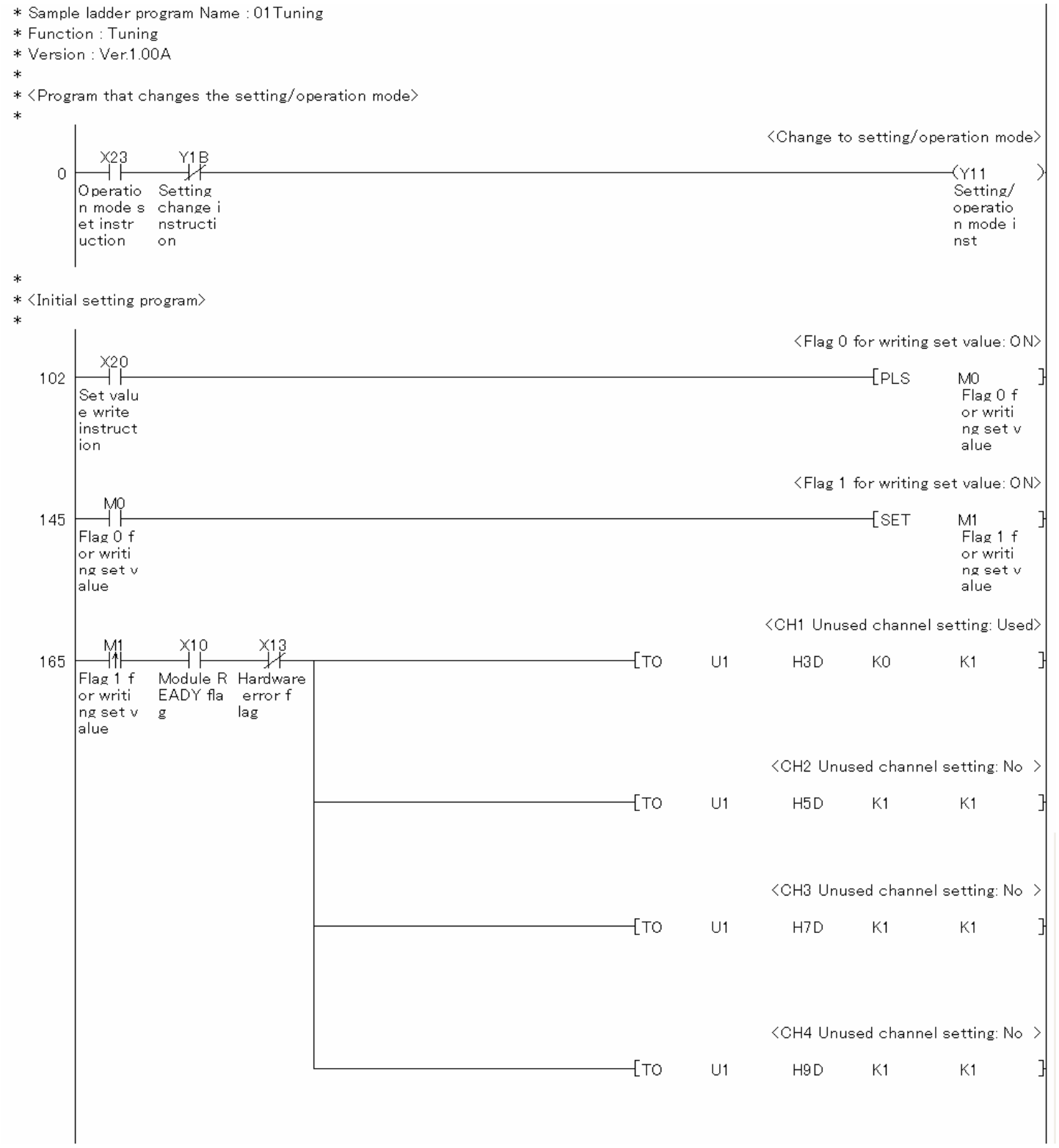
No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X18	Bit	Back-up of the set value completion flag	
7	X1B	Bit	Setting change completion flag	
8	X20	Bit	Set value write instruction	-
9	X21	Bit	Auto tuning execute instruction	-
10	X22	Bit	Error code reset instruction	-
11	X23	Bit	Operation mode setting instruction	-
12	X24	Bit	Memory of PID constants read instruction	-
13	X30	Bit	CH1 Set value (SV) change instruction	-
14	Y11	Bit	Setting/operation mode instruction	-
15	Y12	Bit	Error reset instruction	-
16	Y14	Bit	CH1 Auto tuning instruction	
17	Y18	Bit	Set value backup instruction	-
18	Y1B	Bit	Setting change instruction	-
19	Y60 to Y6F	Word	Error code output	-
20	D50	Word	Error code	-
21	D51	Word	CH1 Temperature process value (PV)	-
22	M0	Bit	Flag 0 for writing set value	
23	M1	Bit	Flag 1 for writing set value	
24	M2	Bit	Flag 2 for writing set value	
25	M10	Bit	CH1 Auto tuning completion flag	
26	M20	Bit	CH1 Read completion flag	-
27	M21	Bit	CH2 Read completion flag	-
28	M22	Bit	CH3 Read completion flag	-
29	M23	Bit	CH4 Read completion flag	-
30	M24	Bit	CH1 Write completion flag	-

No.	Device	Data Type	Application	Remarks
31	M25	Bit	CH2 Write completion flag	-
32	M26	Bit	CH3 Write completion flag	-
33	M27	Bit	CH4 Write completion flag	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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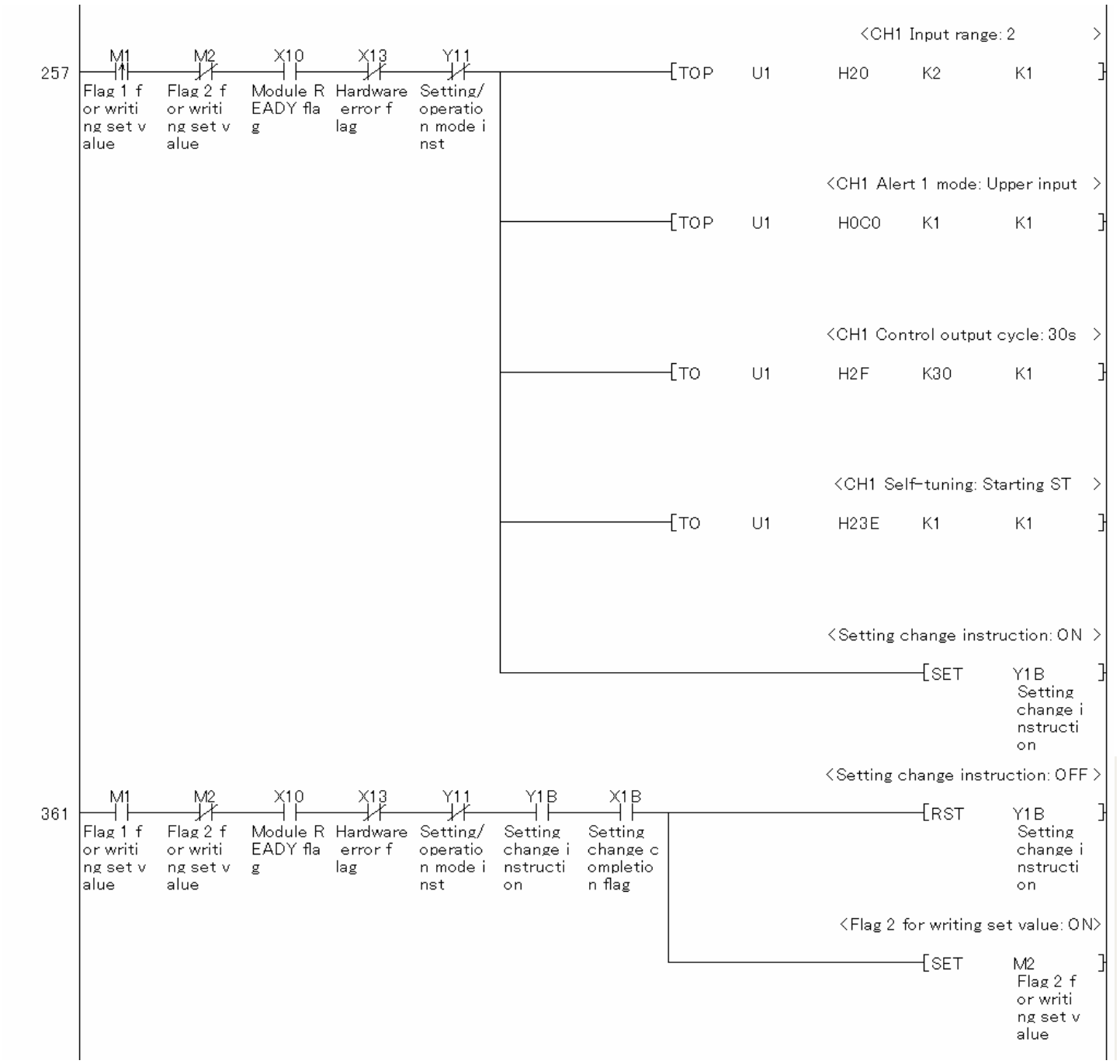

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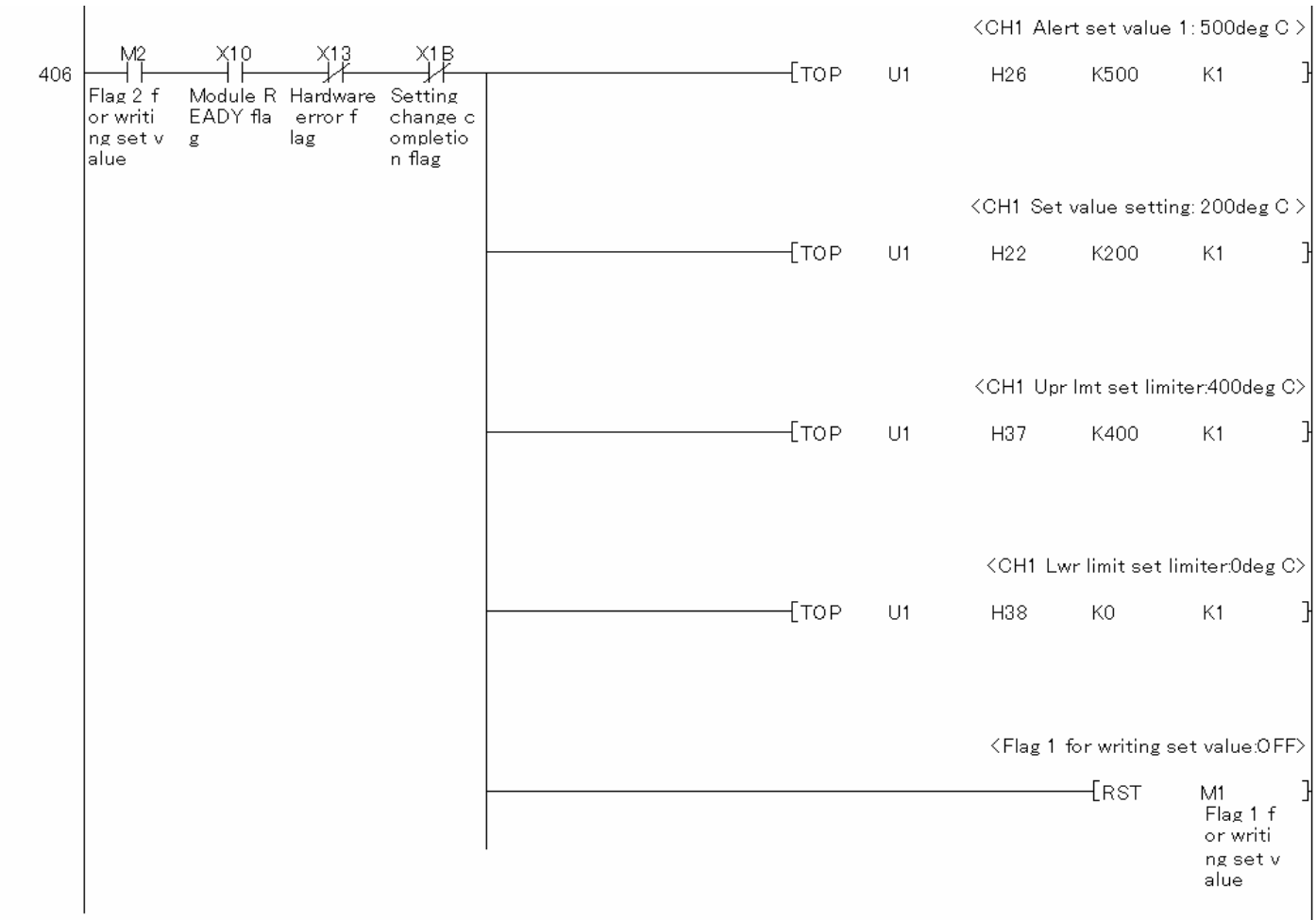
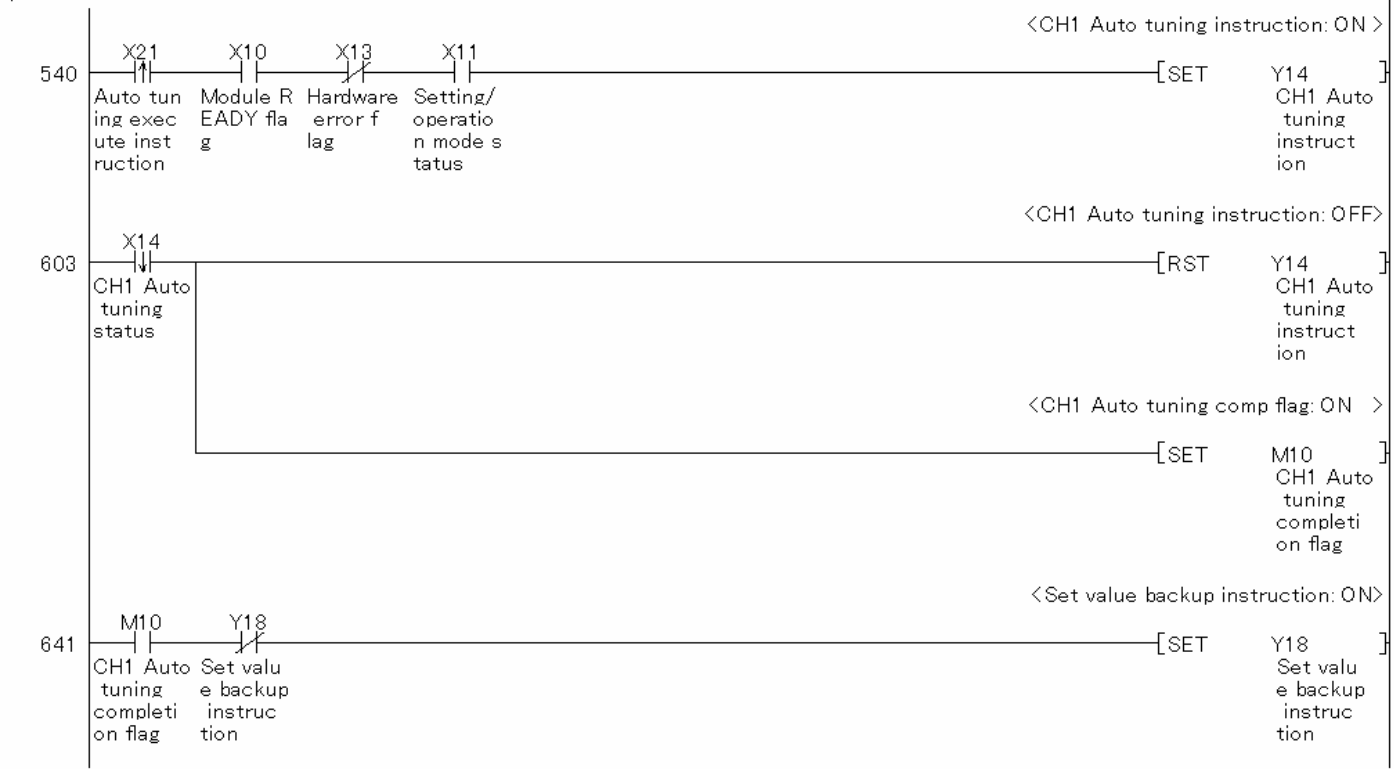


*

* <Pgm that exes auto tuning/backs up PID cst in non-volatile>

*



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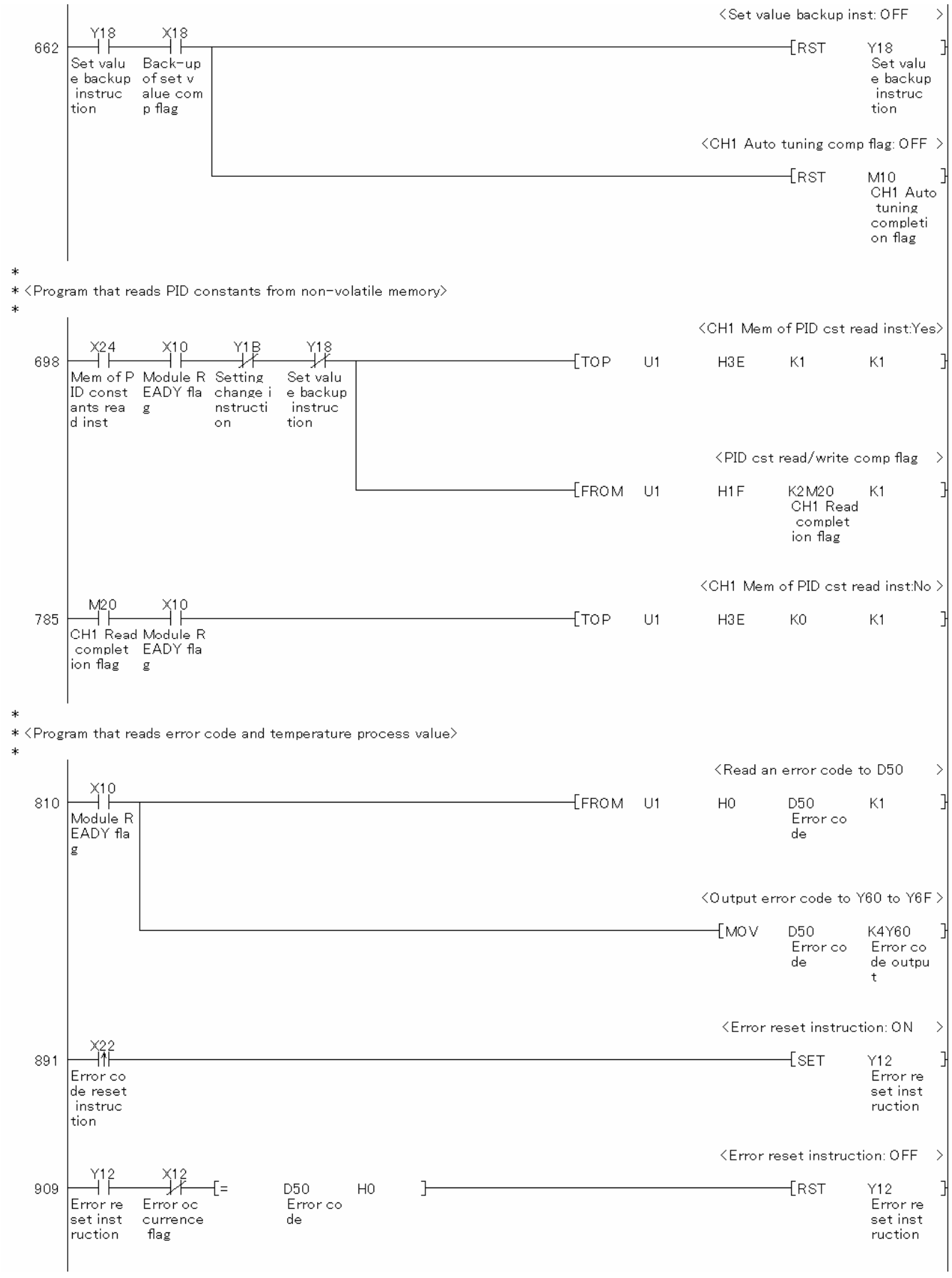

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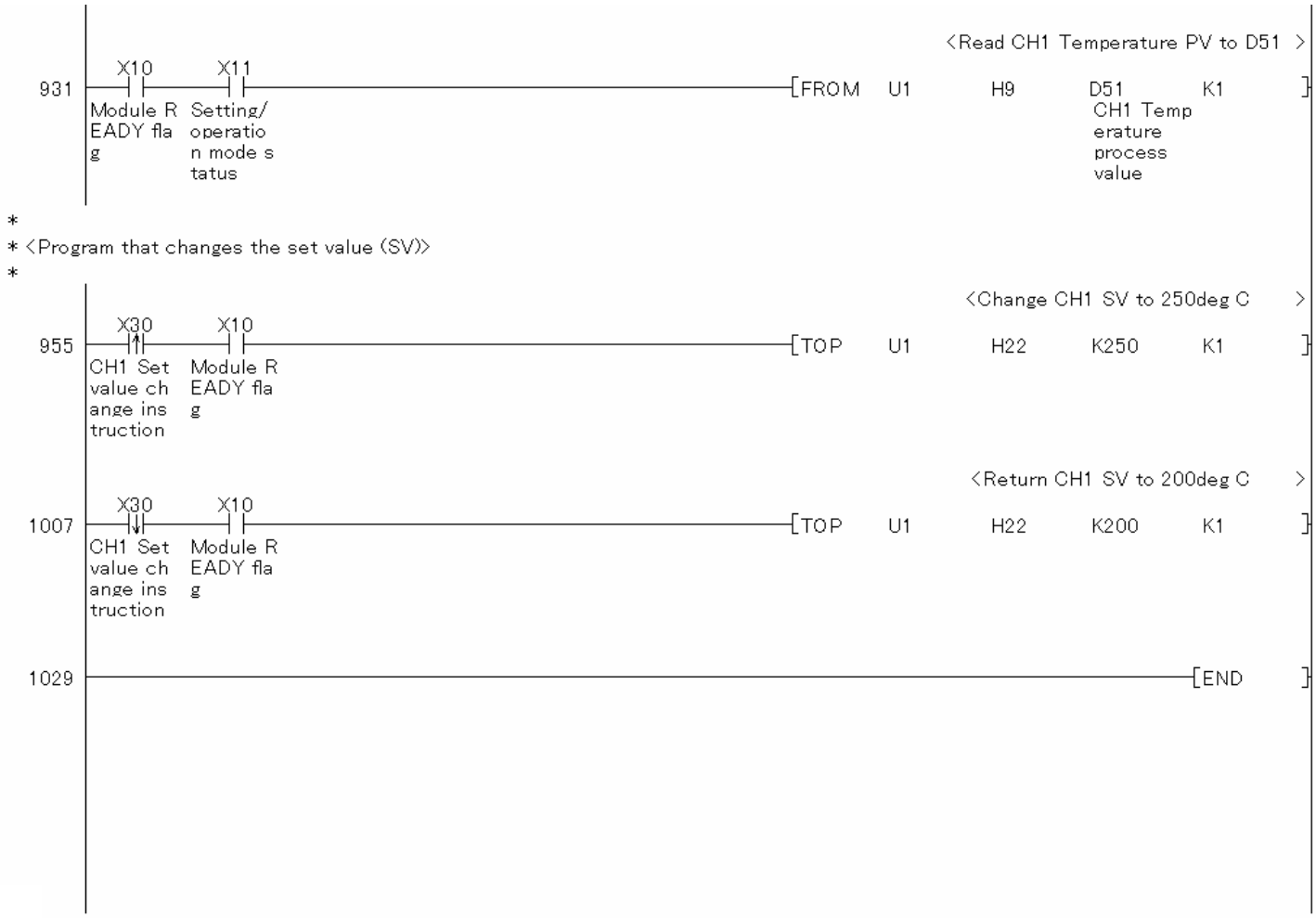

〈Read CH1 Temperature PV to D51 〉
931
X10
X11
Module READY flag
Setting/operation mode status
FROM U1 H9 D51 K1
CH1 Temperature process value
*
*〈Program that changes the set value (SV)〉
*
〈Change CH1 SV to 250deg C 〉
955
X30
X10
CH1 Set value change instruction
Module READY flag
TOP U1 H22 K250 K1
〈Return CH1 SV to 200deg C 〉
1007
X30
X10
CH1 Set value change instruction
Module READY flag
TOP U1 H22 K200 K1
1029
END

3.3. Standard Control (Peak Current Suppression Function, Simultaneous Temperature Rise Function)

3.3.1. Peak Current Suppression

Function Overview

This program performs the peak current suppression directly using the intelligent function module devices in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_NPM3_V100A_E(01Peak)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

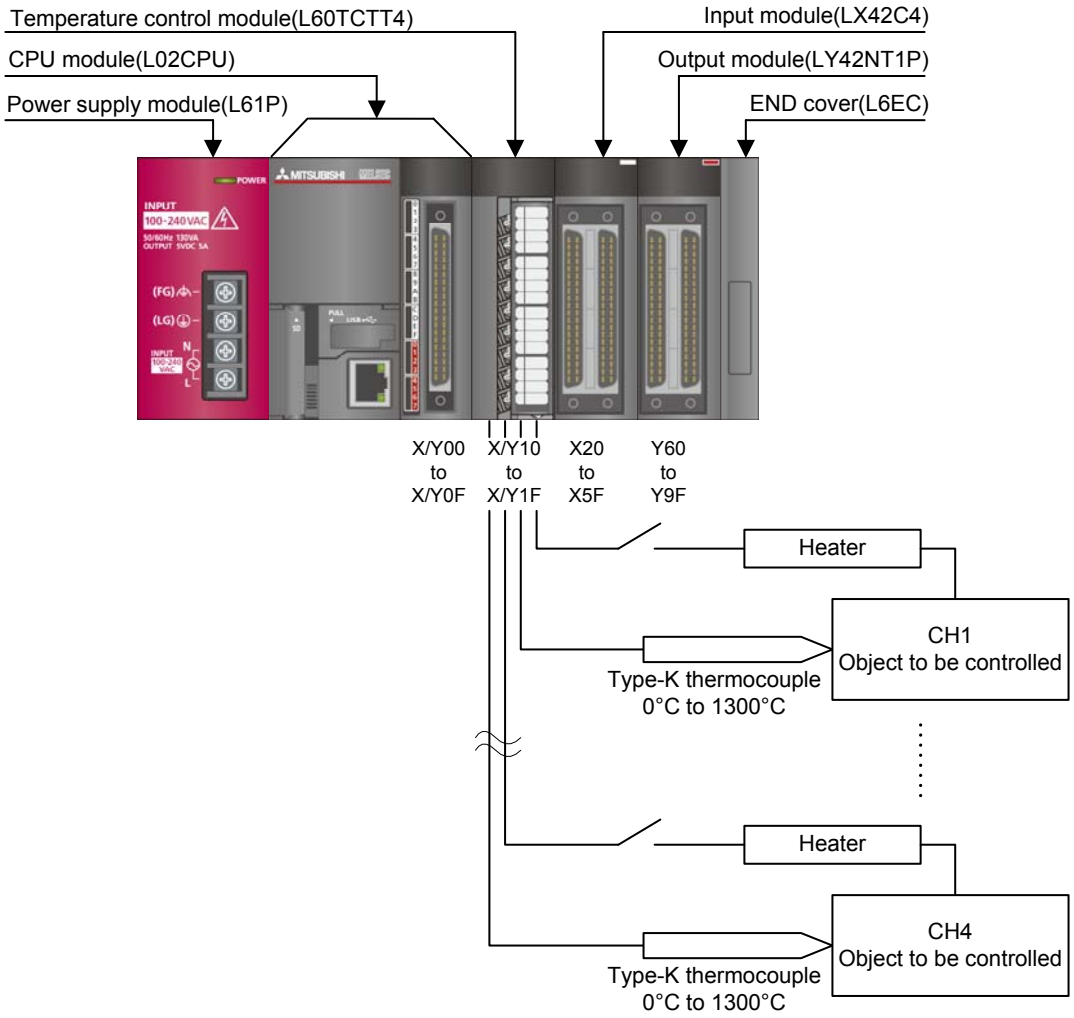
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2, GX Developer *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder program.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X15	Bit	CH2 Auto tuning status	
7	X16	Bit	CH3 Auto tuning status	
8	X17	Bit	CH4 Auto tuning status	
9	X18	Bit	Back-up of the set value completion flag	
10	X1B	Bit	Setting change completion flag	
11	X20	Bit	Set value write instruction	-
12	X21	Bit	Auto tuning execute instruction	-
13	X22	Bit	Error code reset instruction	-
14	X23	Bit	Operation mode setting instruction	-
15	X24	Bit	Memory of PID constants read instruction	-
16	Y11	Bit	Setting/operation mode instruction	-
17	Y12	Bit	Error reset instruction	-
18	Y14	Bit	CH1 Auto tuning instruction	-
19	Y15	Bit	CH2 Auto tuning instruction	-
20	Y16	Bit	CH3 Auto tuning instruction	-
21	Y17	Bit	CH4 Auto tuning instruction	-
22	Y18	Bit	Set value backup instruction	-
23	Y1B	Bit	Setting change instruction	-
24	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) PLC Parameter Settings

a) Open the PLC parameter setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]

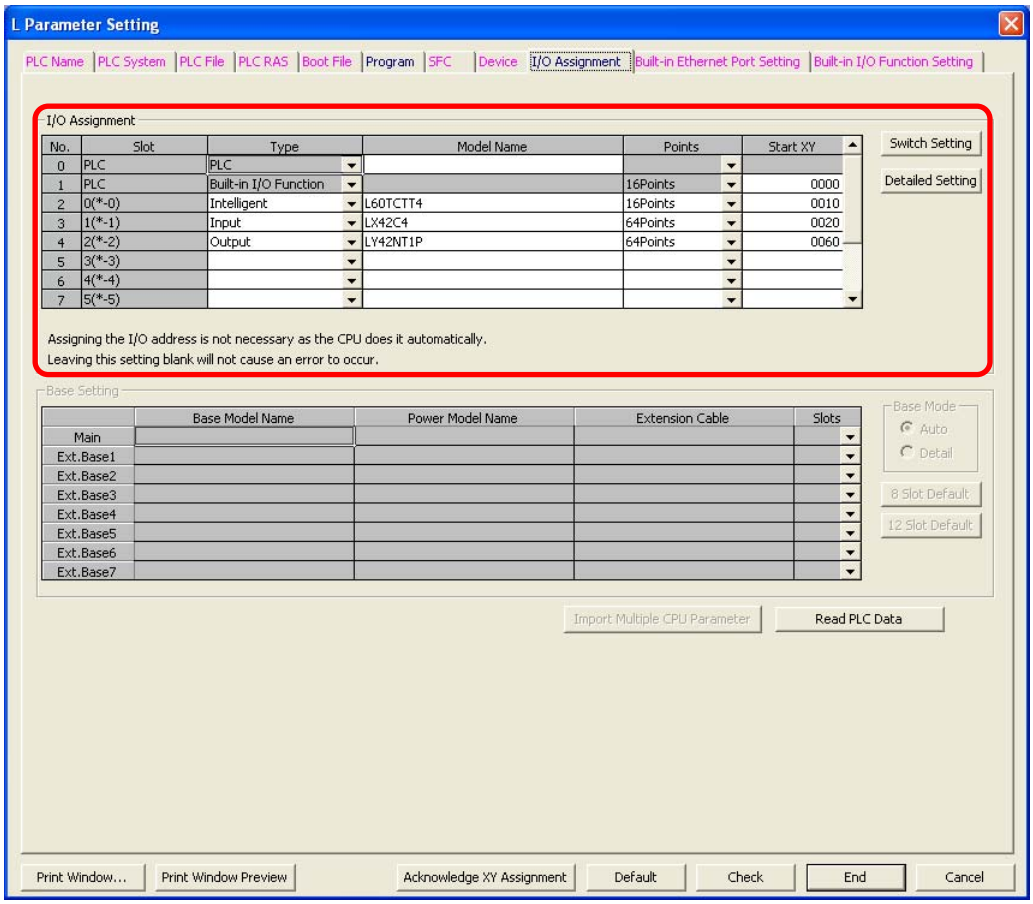


Table 3-5 I/O assignment setting

No.	Slot	Type	Module name	Points	StartXY
0	CPU	CPU	-		
1	0(*-0)	Intelli.	L60TCTT4	16point	0010
2	1(*-1)	Input	LX42C4	64point	0020
3	2(*-2)	Output	LY42NT1P	64point	0060

b) Open the switch setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]→Switch setting

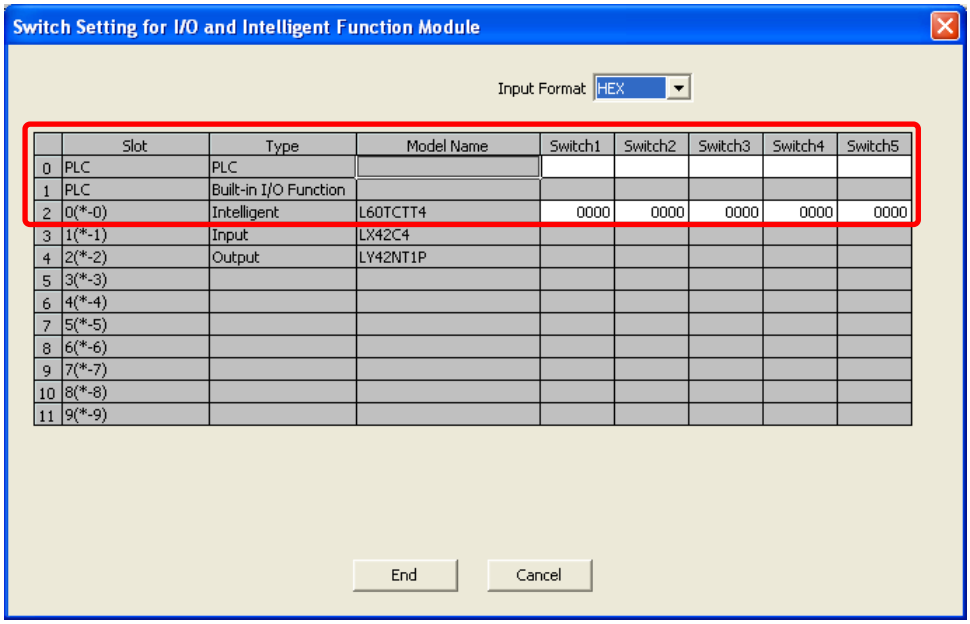


Table 3-6 Switch setting

No.	Slot	Type	Model name	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
0	CPU	CPU						
1	0(*-0)	Intelli.	L60TCTT4	0000	0000	0000	0000	0000
2	1(*-1)	Input	LX42C4					
3	2(*-2)	Output	LY42NT1P					

Devices

This program uses the following devices.

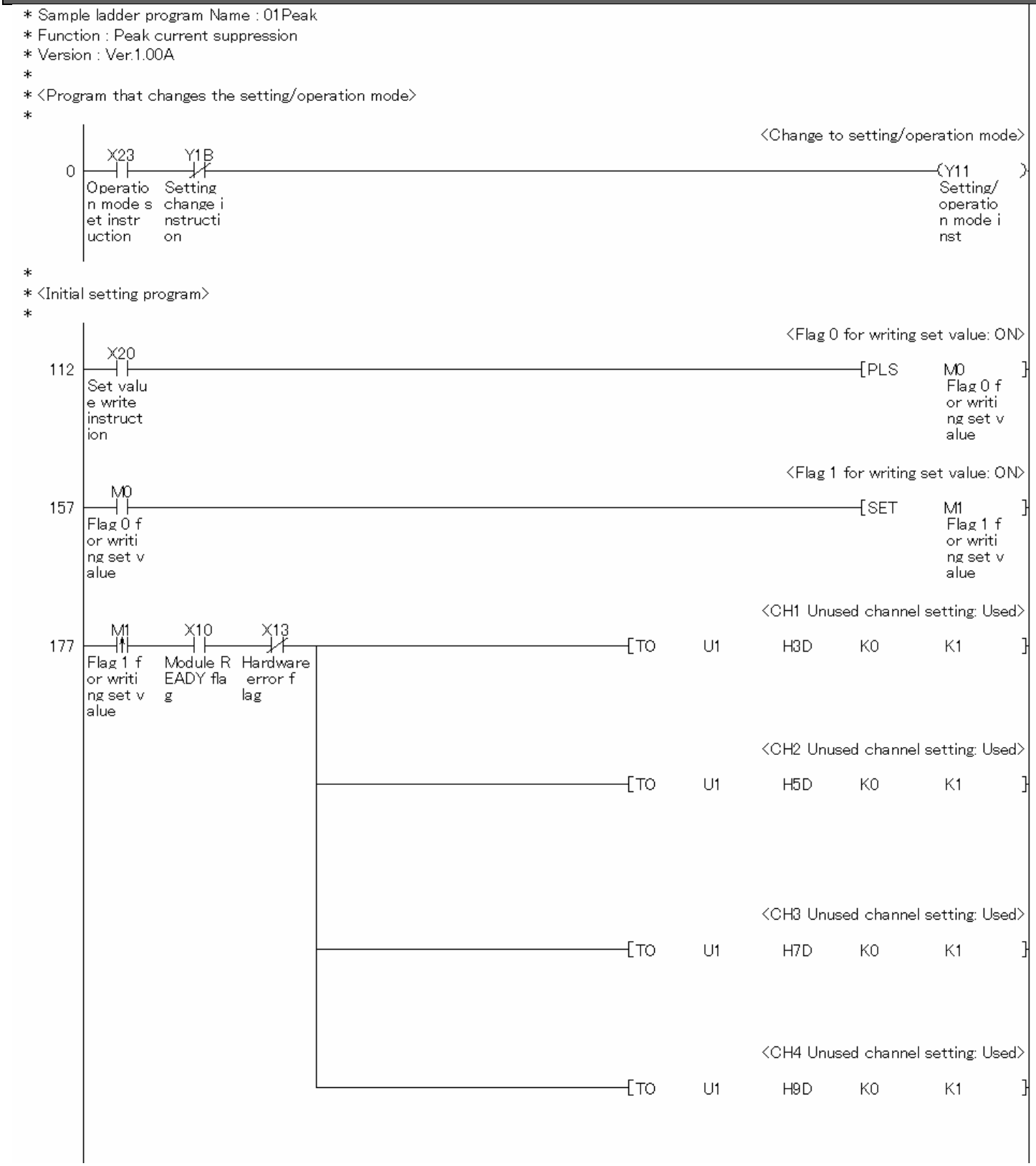
No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X15	Bit	CH2 Auto tuning status	
7	X16	Bit	CH3 Auto tuning status	
8	X17	Bit	CH4 Auto tuning status	
9	X18	Bit	Back-up of the set value completion flag	
10	X1B	Bit	Setting change completion flag	
11	X20	Bit	Set value write instruction	-
12	X21	Bit	Auto tuning execute instruction	-
13	X22	Bit	Error code reset instruction	-
14	X23	Bit	Operation mode setting instruction	-
15	X24	Bit	Memory of PID constants read instruction	-
16	Y11	Bit	Setting/operation mode instruction	-
17	Y12	Bit	Error reset instruction	-
18	Y14	Bit	CH1 Auto tuning instruction	-
19	Y15	Bit	CH2 Auto tuning instruction	-
20	Y16	Bit	CH3 Auto tuning instruction	-
21	Y17	Bit	CH4 Auto tuning instruction	-
22	Y18	Bit	Set value backup instruction	-
23	Y1B	Bit	Setting change instruction	-
24	Y60 to Y6F	Word	Error code output	-
25	D50	Word	Error code	-
26	D51	Word	CH1 Temperature process value (PV)	-
27	D52	Word	CH2 Temperature process value (PV)	-
28	D53	Word	CH3 Temperature process value (PV)	-

No.	Device	Data Type	Application	Remarks
29	D54	Word	CH4 Temperature process value (PV)	-
30	M0	Bit	Flag 0 for writing set value	-
31	M1	Bit	Flag 1 for writing set value	-
32	M2	Bit	Flag 2 for writing set value	-
33	M10	Bit	CH1 Auto tuning completion flag	-
34	M11	Bit	CH2 Auto tuning completion flag	-
35	M12	Bit	CH3 Auto tuning completion flag	-
36	M13	Bit	CH4 Auto tuning completion flag	-
37	M20	Bit	CH1 Read completion flag	-
38	M21	Bit	CH2 Read completion flag	-
39	M22	Bit	CH3 Read completion flag	-
40	M23	Bit	CH4 Read completion flag	-
41	M24	Bit	CH1 Write completion flag	-
42	M25	Bit	CH2 Write completion flag	-
43	M26	Bit	CH3 Write completion flag	-
44	M27	Bit	CH4 Write completion flag	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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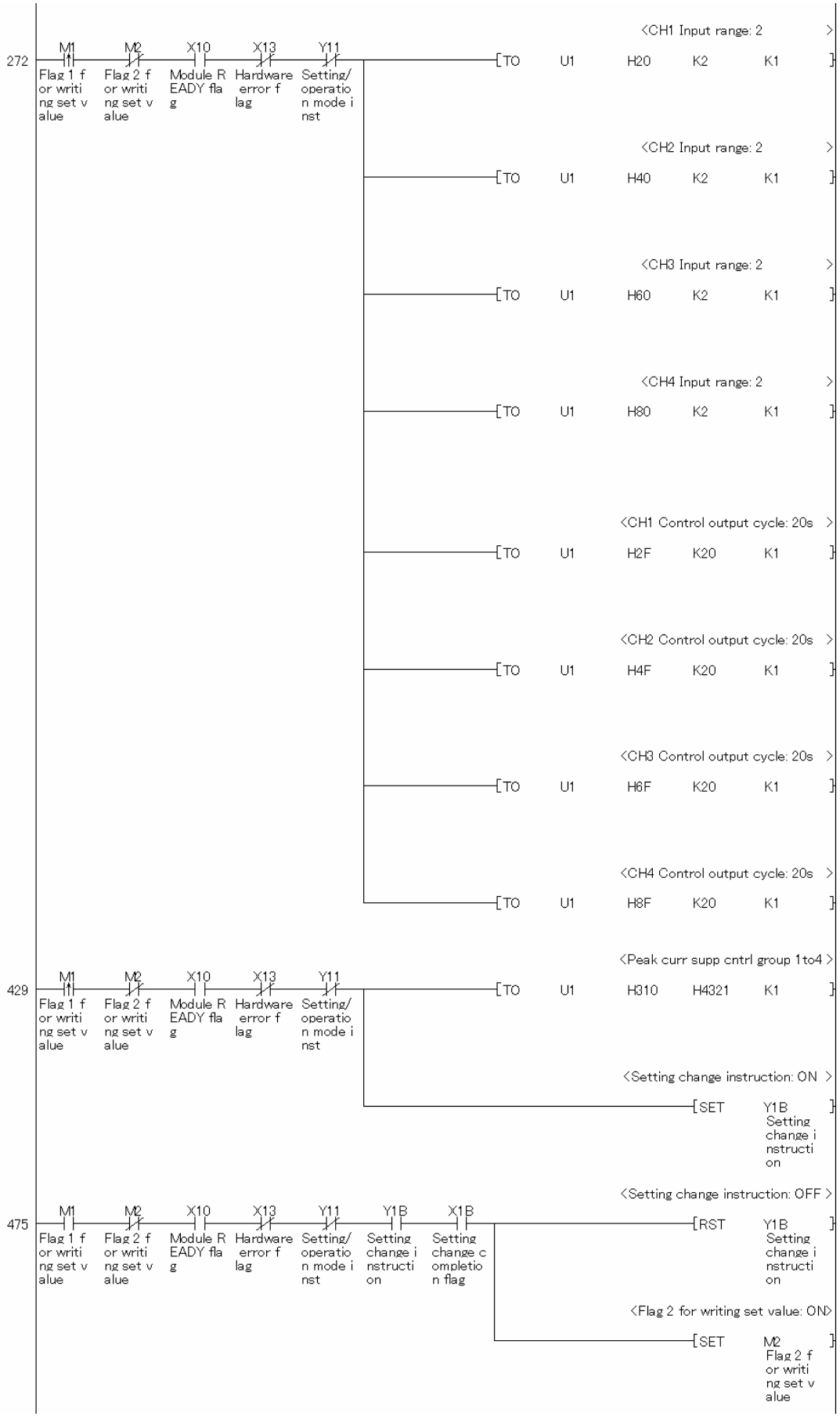

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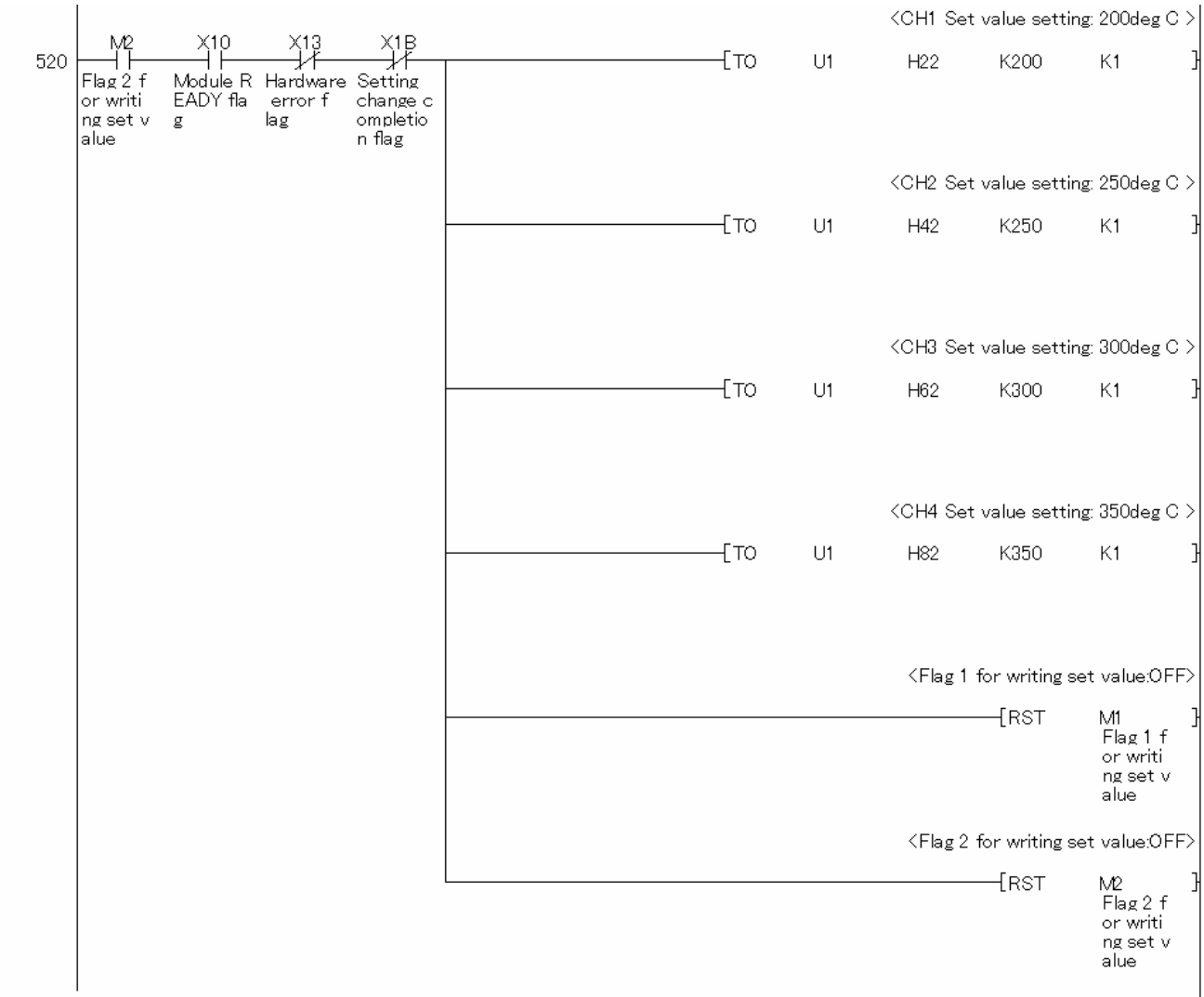
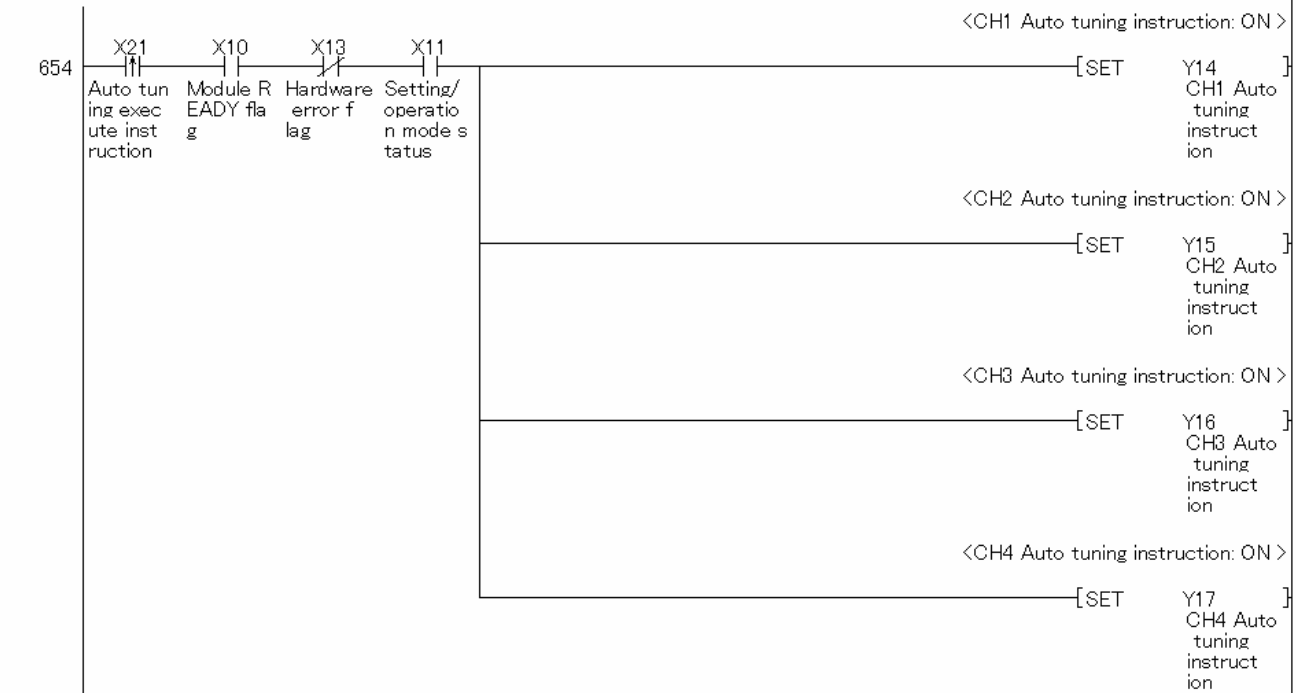


*

* <Pgm that exes auto tuning/backs up PID cst in non-volatile>

*



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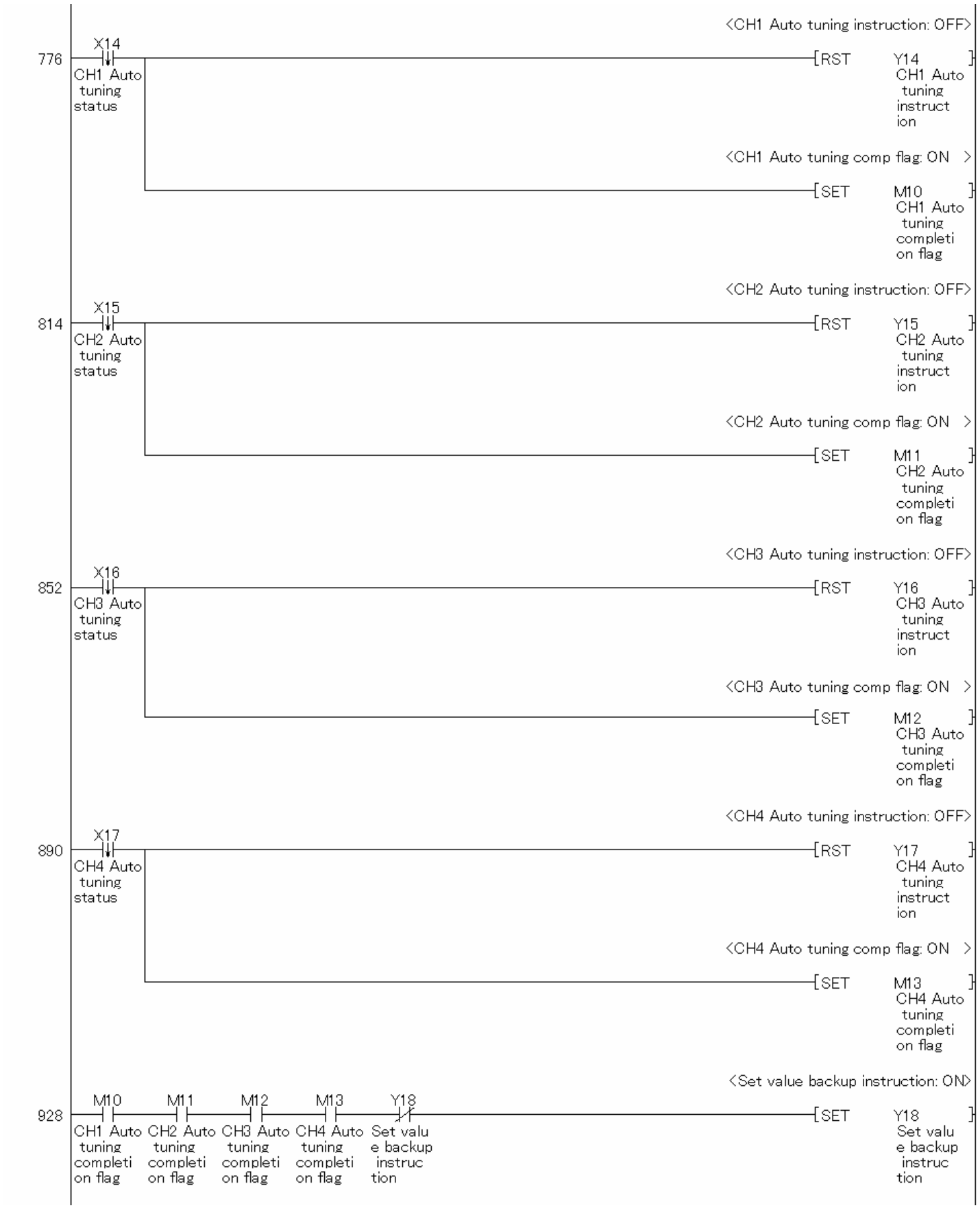

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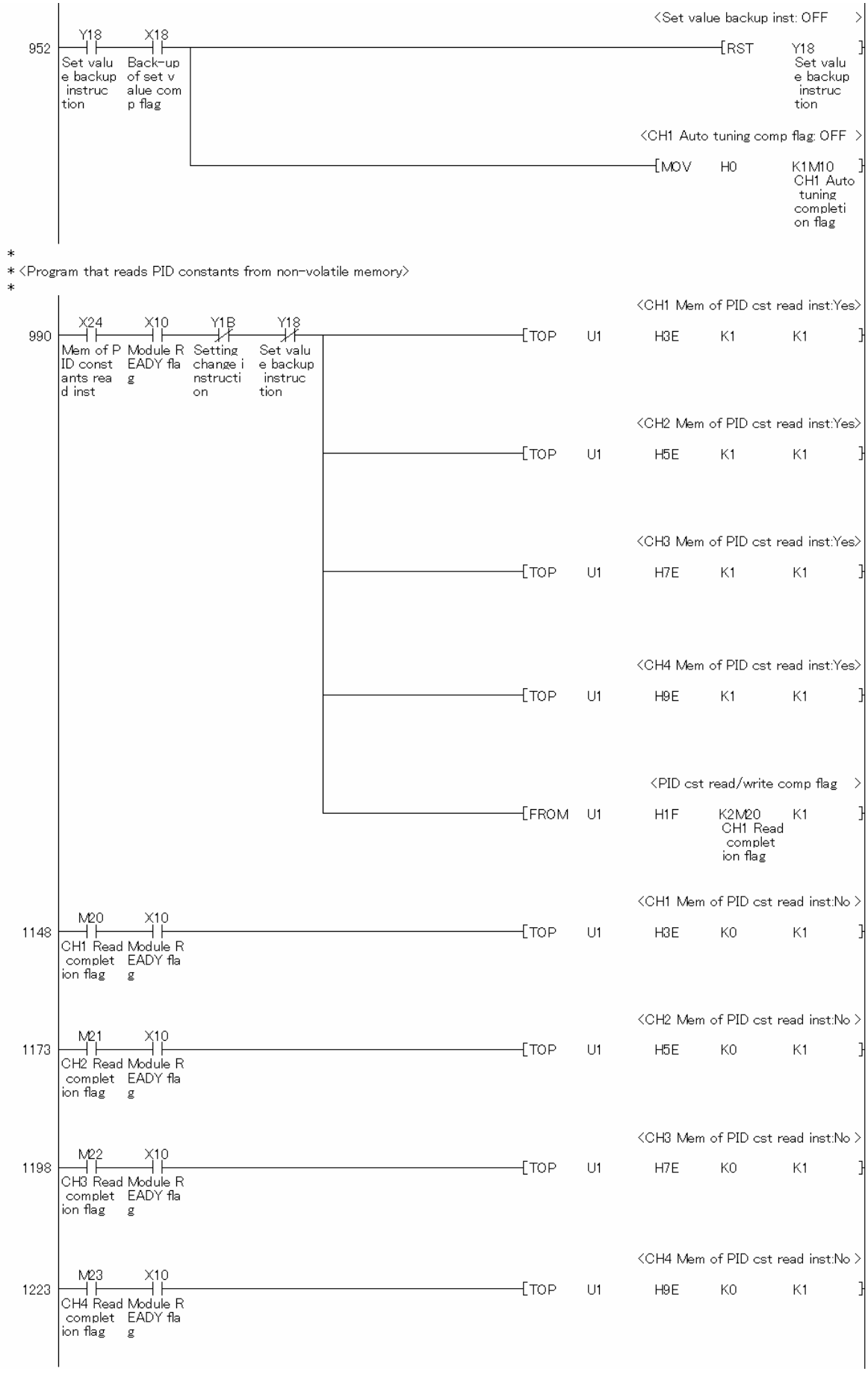

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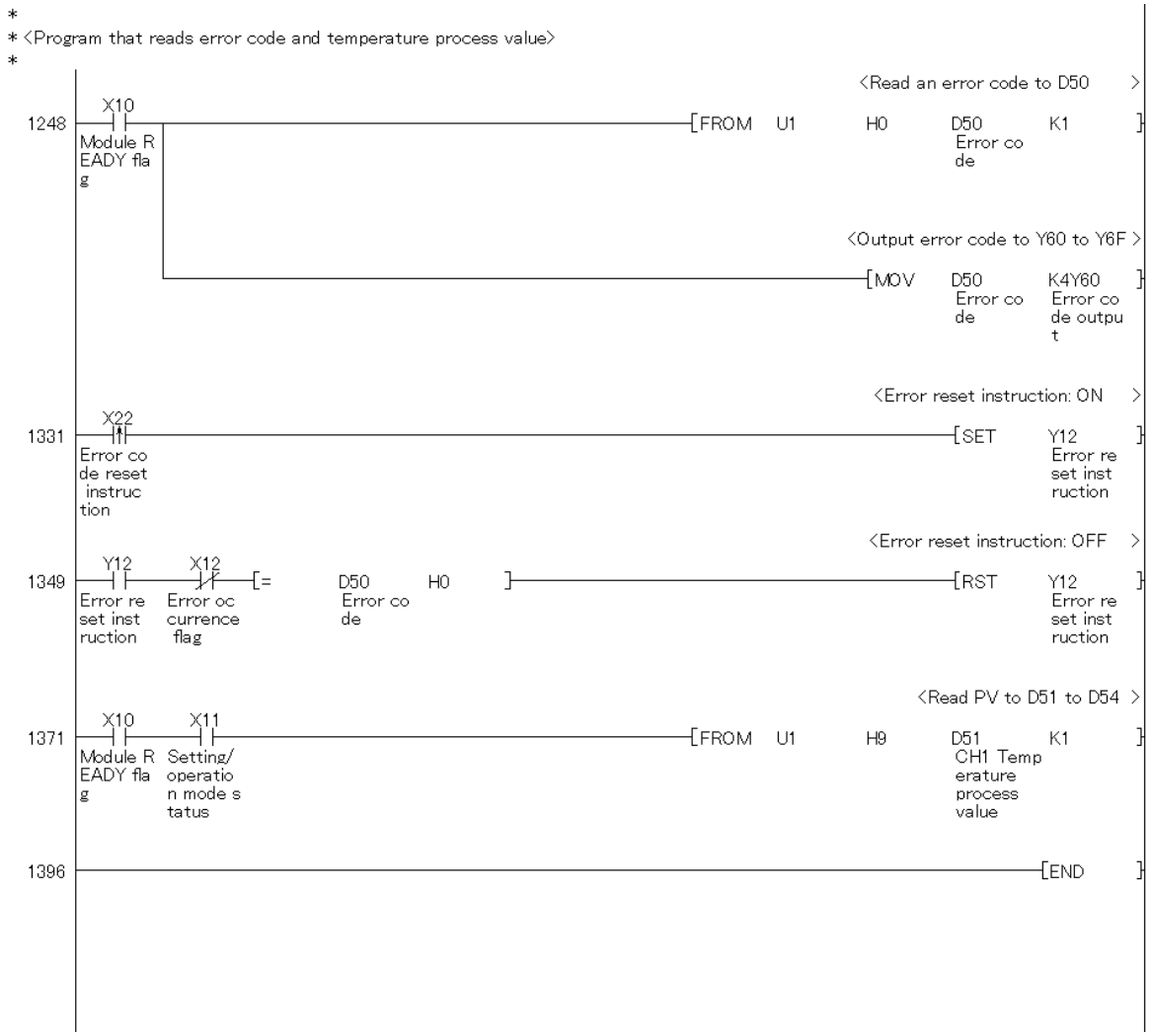

*
* <Program that reads error code and temperature process value>
*
<Read an error code to D50 >
1248
X10
Module READY flag
FROM U1 H0 D50 Error code K1
<Output error code to Y60 to Y6F >
MOV D50 Error code K4Y60 Error code output
<Error reset instruction: ON >
1331
X22
Error code reset instruction
SET Y12 Error reset instruction
<Error reset instruction: OFF >
1349
Y12
Error reset instruction
X12
Error occurrence flag
= D50 Error code H0
RST Y12 Error reset instruction
<Read PV to D51 to D54 >
1371
X10
Module READY flag
X11
Setting/ operation mode status
FROM U1 H9 D51 CH1 Temperature process value K1
1396
END

3.3.2. Simultaneous Temperature Rise

Function Overview

This program performs the simultaneous temperature rise directly using the intelligent function module devices in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_NPM3_V100A_E(02Heat)

Applicable Hardware and Software

Same as for 3.3.1 Peak Current Suppression.

System Configuration

Same as for 3.3.1 Peak Current Suppression.

Conditions for Using Sample Ladder Programs

Same as for 3.3.1 Peak Current Suppression.

Devices

This program uses the following devices.

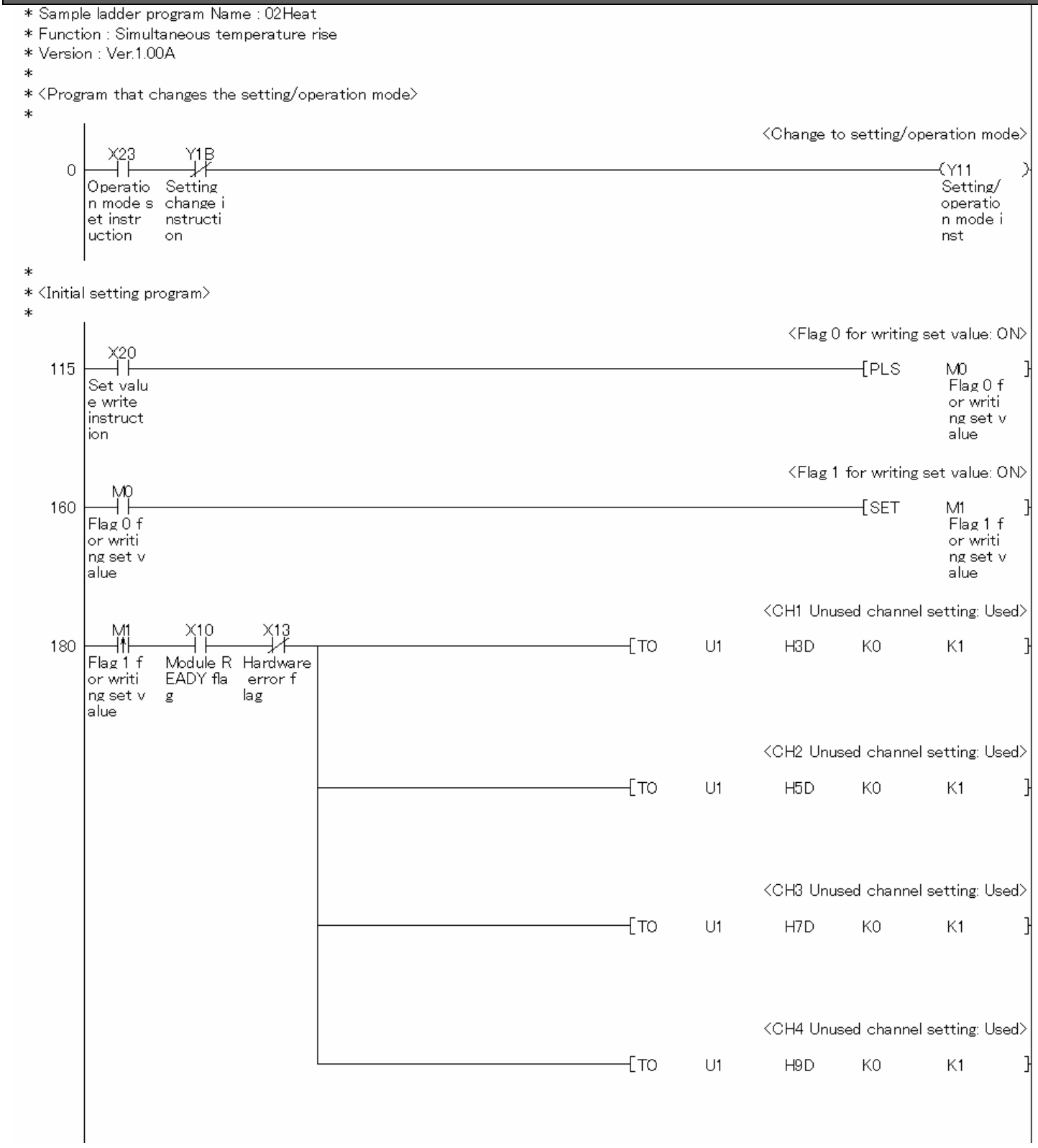
No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X15	Bit	CH2 Auto tuning status	
7	X16	Bit	CH3 Auto tuning status	
8	X17	Bit	CH4 Auto tuning status	
9	X18	Bit	Back-up of the set value completion flag	
10	X1B	Bit	Setting change completion flag	
11	X20	Bit	Set value write instruction	-
12	X21	Bit	Auto tuning execute instruction	-
13	X22	Bit	Error code reset instruction	-
14	X23	Bit	Operation mode setting instruction	-

No.	Device	Data Type	Application	Remarks
15	X24	Bit	Memory of PID constants read instruction	-
16	Y11	Bit	Setting/operation mode instruction	-
17	Y12	Bit	Error reset instruction	-
18	Y14	Bit	CH1 Auto tuning instruction	-
19	Y15	Bit	CH2 Auto tuning instruction	-
20	Y16	Bit	CH3 Auto tuning instruction	-
21	Y17	Bit	CH4 Auto tuning instruction	-
22	Y18	Bit	Set value backup instruction	-
23	Y1B	Bit	Setting change instruction	-
24	Y60 to Y6F	Word	Error code output	-
25	D50	Word	Error code	-
26	D51	Word	CH1 Temperature process value (PV)	-
27	D52	Word	CH2 Temperature process value (PV)	-
28	D53	Word	CH3 Temperature process value (PV)	-
29	D54	Word	CH4 Temperature process value (PV)	-
30	M0	Bit	Flag 0 for writing set value	-
31	M1	Bit	Flag 1 for writing set value	-
32	M2	Bit	Flag 2 for writing set value	-
33	M10	Bit	CH1 Auto tuning completion flag	-
34	M11	Bit	CH2 Auto tuning completion flag	-
35	M12	Bit	CH3 Auto tuning completion flag	-
36	M13	Bit	CH4 Auto tuning completion flag	-
37	M20	Bit	CH1 Read completion flag	-
38	M21	Bit	CH2 Read completion flag	-
39	M22	Bit	CH3 Read completion flag	-
40	M23	Bit	CH4 Read completion flag	-
41	M24	Bit	CH1 Write completion flag	-
42	M25	Bit	CH2 Write completion flag	-
43	M26	Bit	CH3 Write completion flag	-
44	M27	Bit	CH4 Write completion flag	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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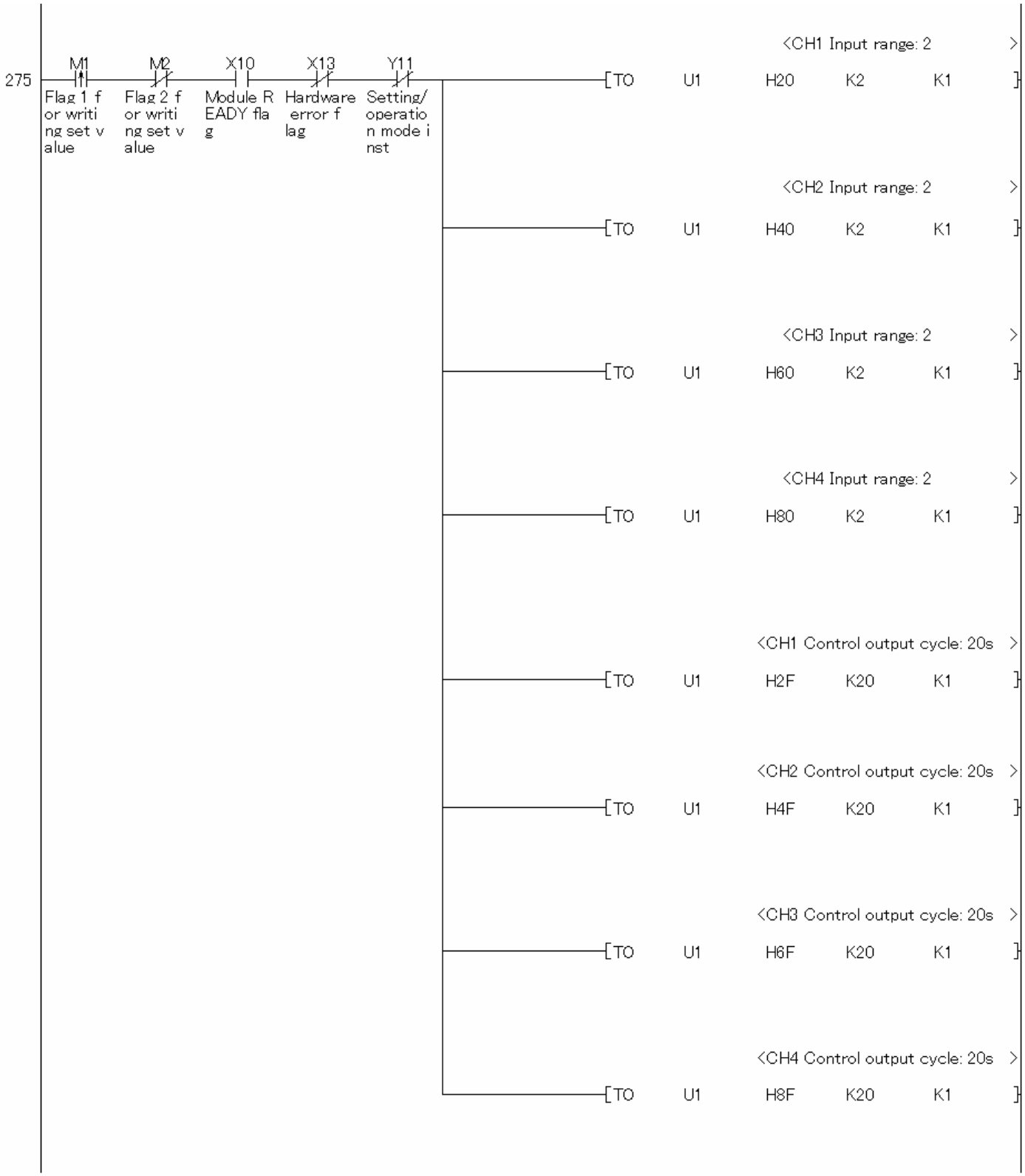

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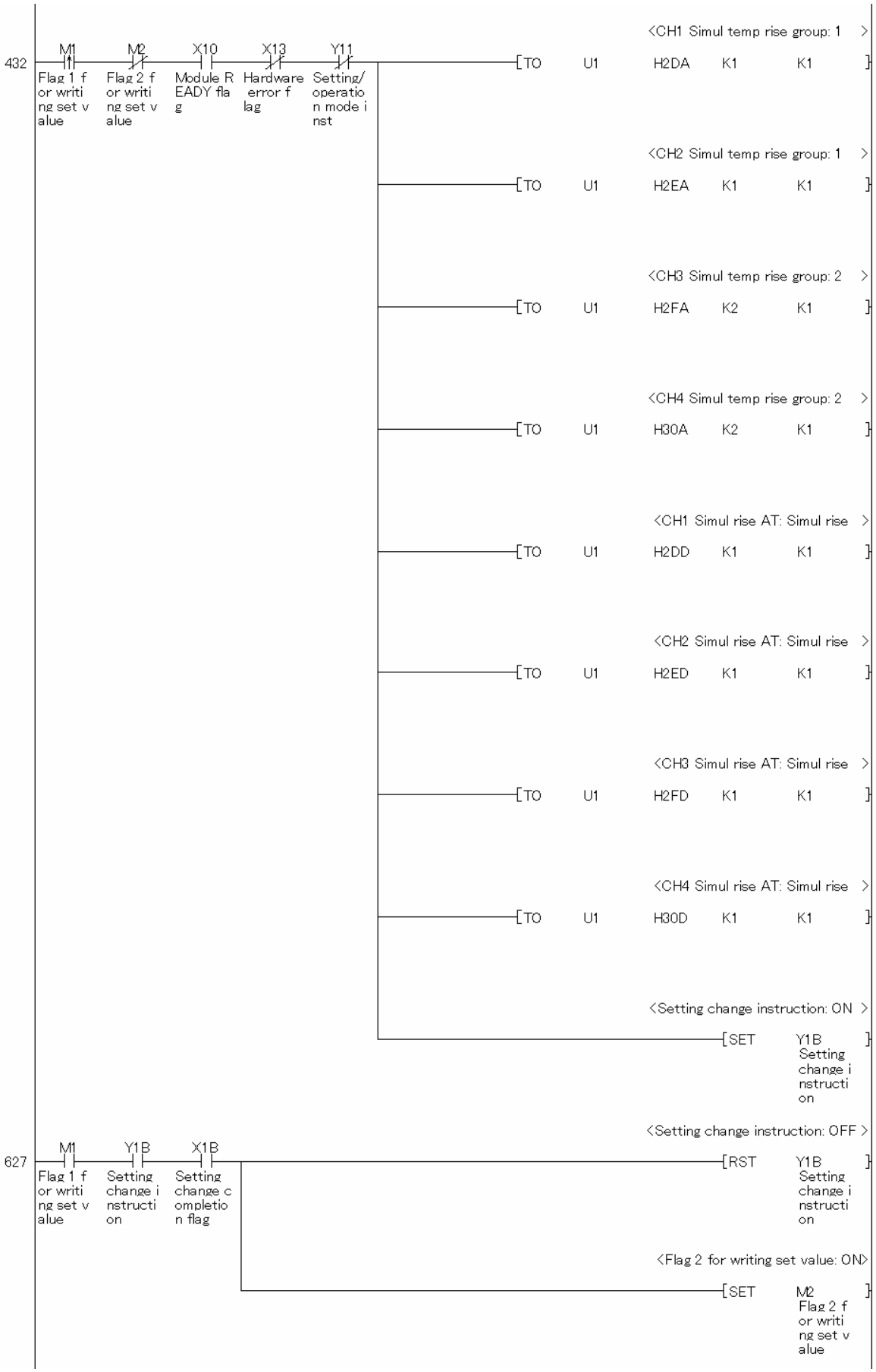

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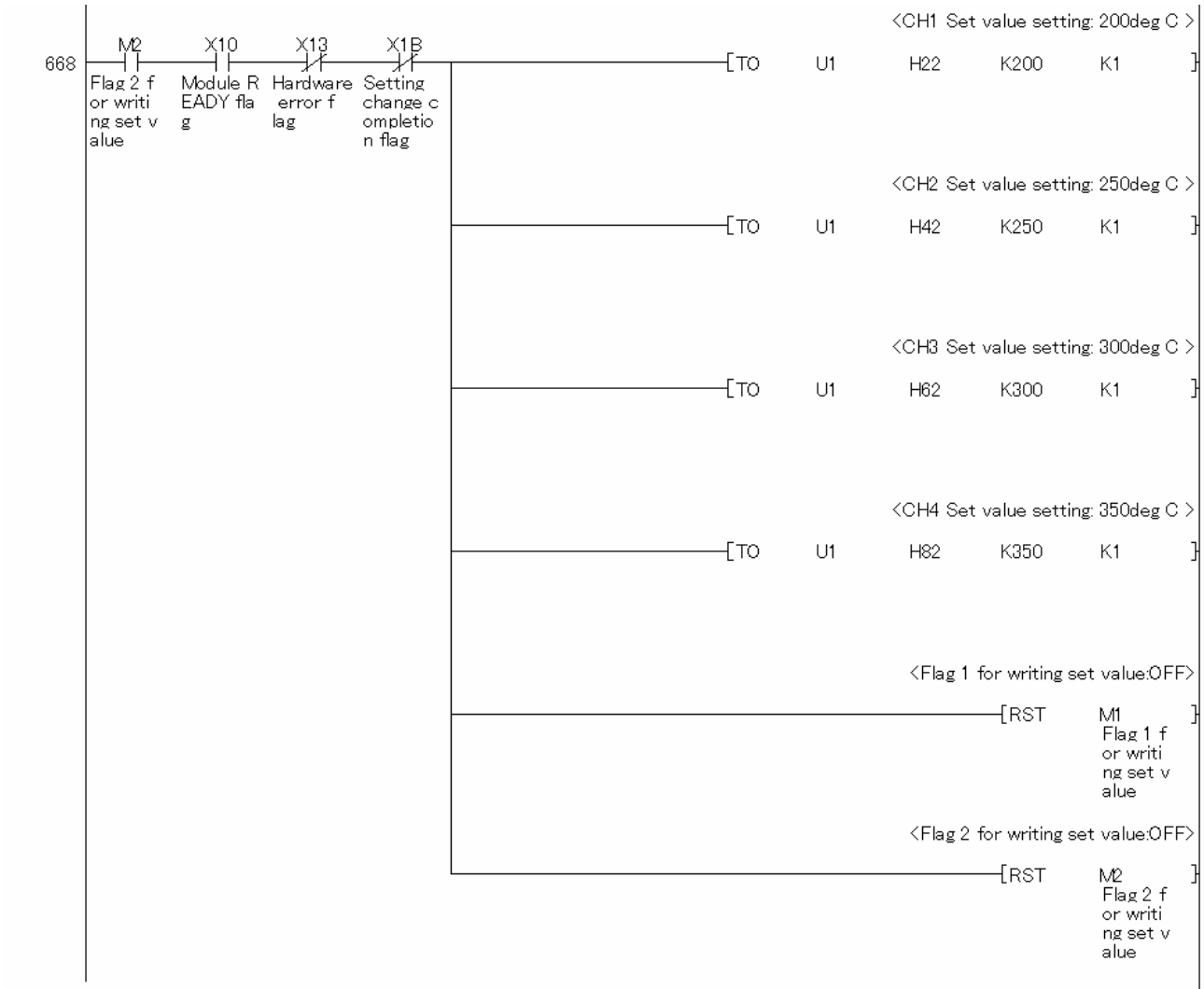
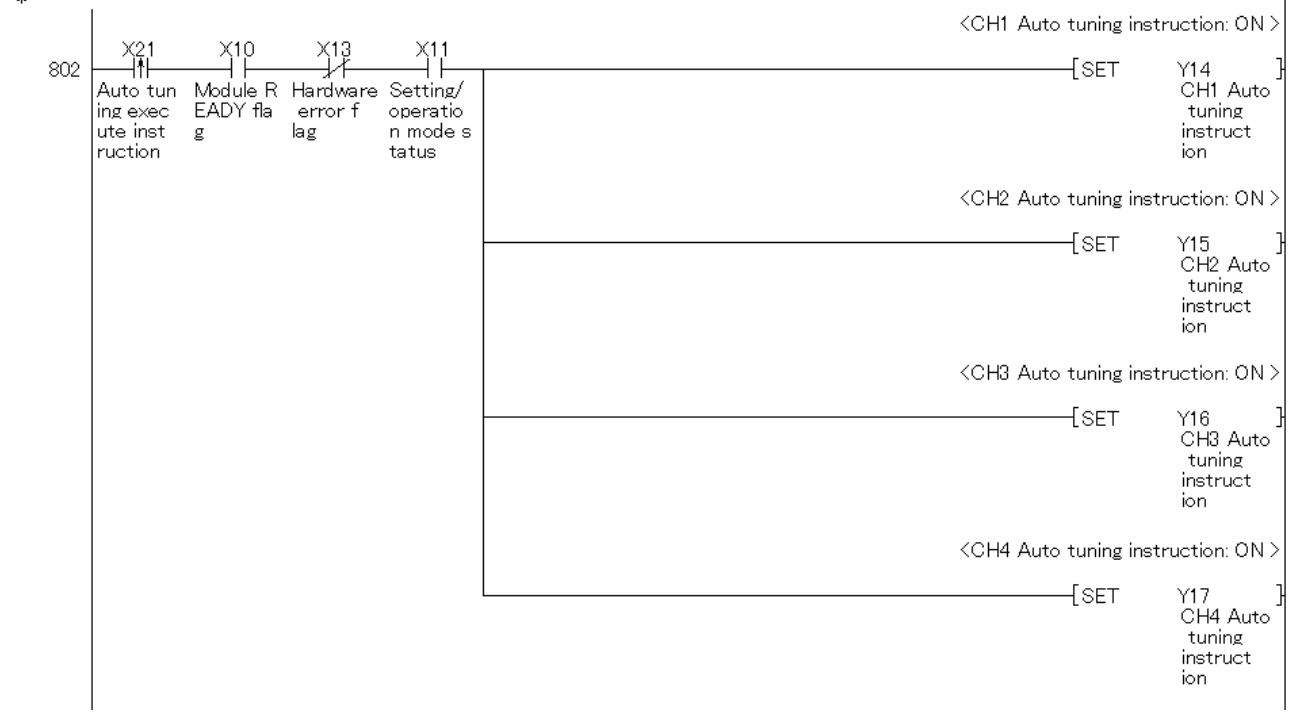


*

* <Pgm that exes auto tuning/backs up PID cst in non-volatile>

*



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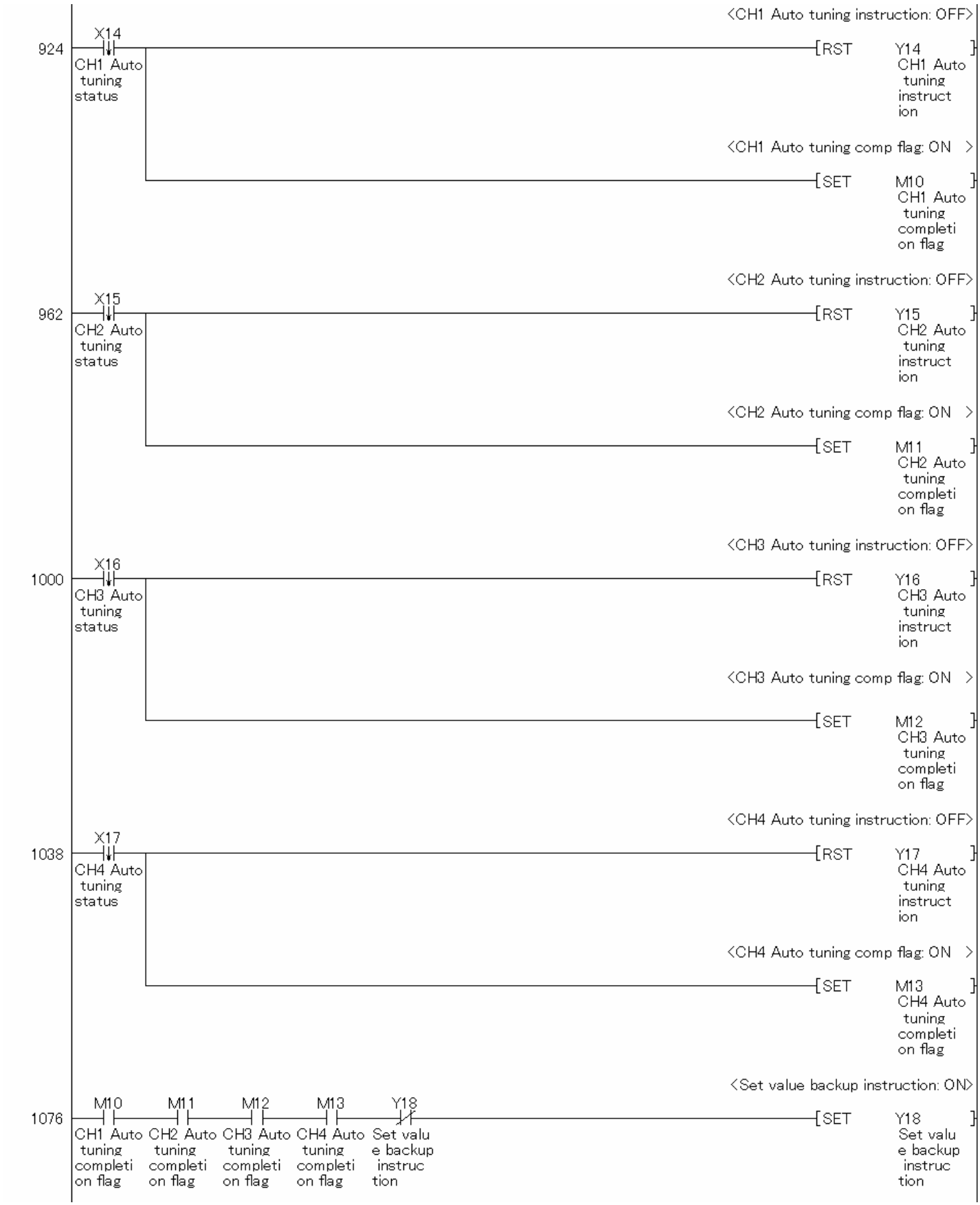

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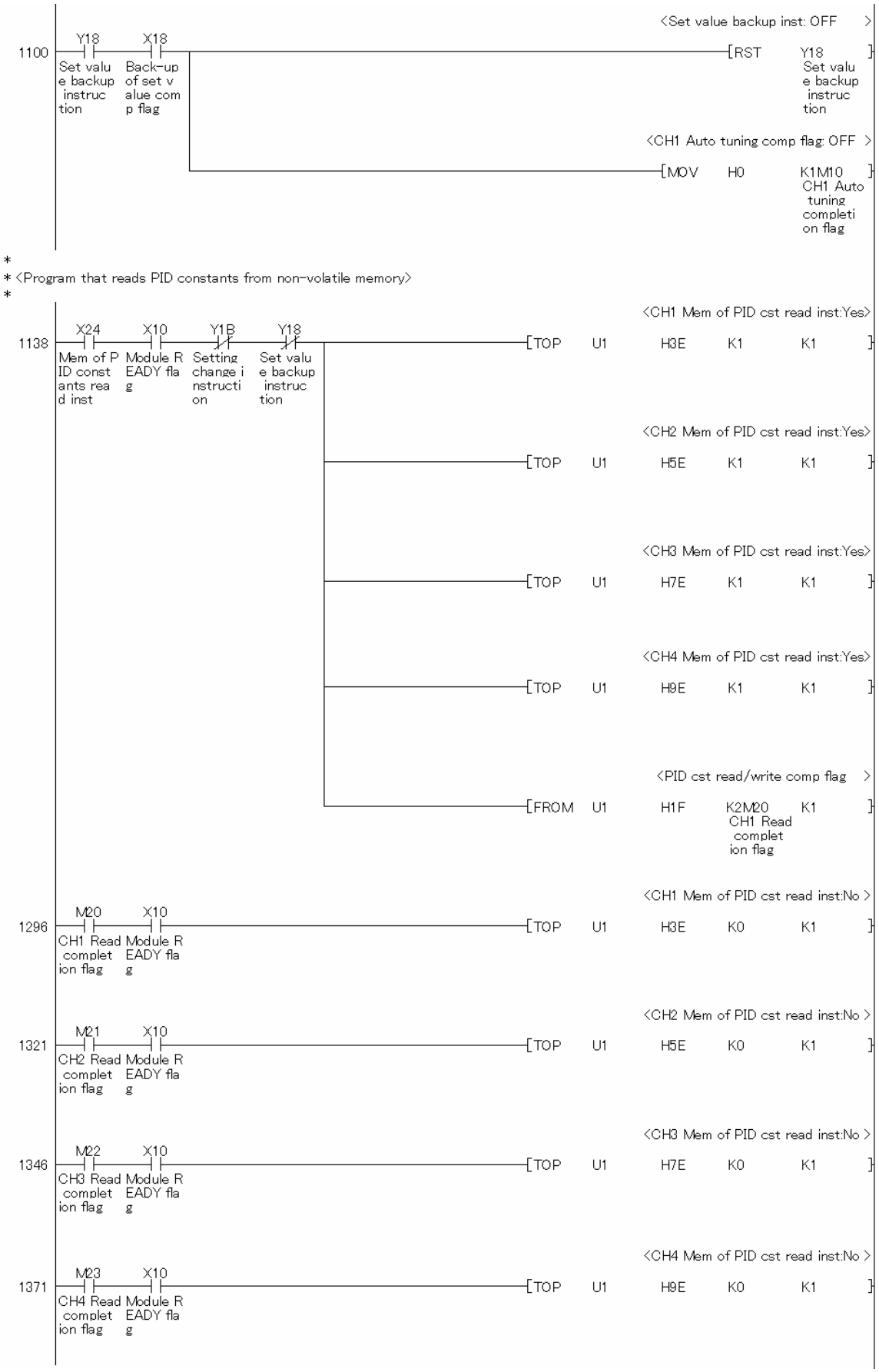

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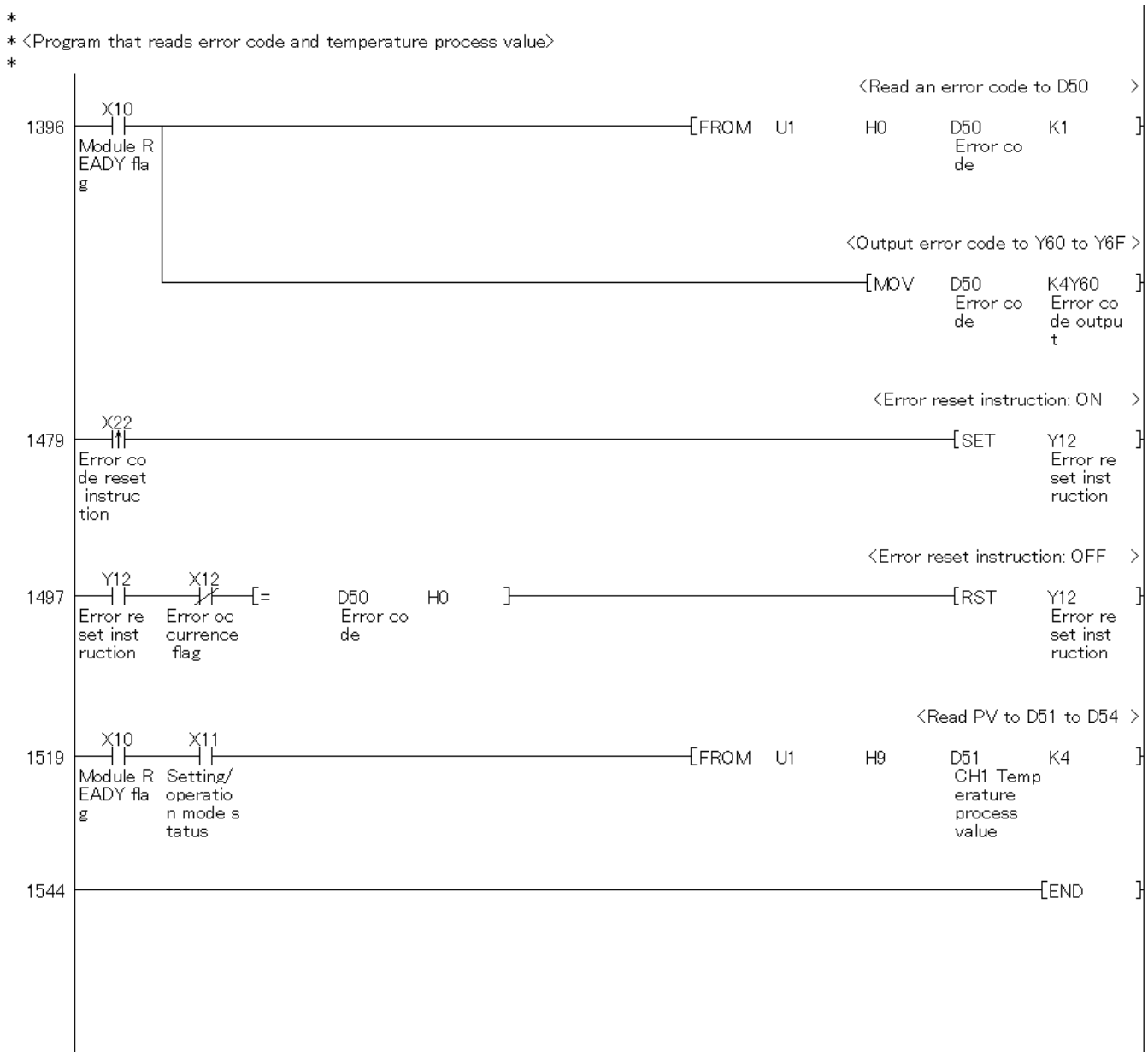

*
* <Program that reads error code and temperature process value>
*
<Read an error code to D50 >
1396
X10
Module READY flag
FROM U1 H0 D50 Error code K1
<Output error code to Y60 to Y6F >
MOV D50 Error code K4Y60 Error code output
<Error reset instruction: ON >
1479
X22
Error code reset instruction
SET Y12 Error reset instruction
<Error reset instruction: OFF >
1497
Y12
Error reset instruction
X12
Error occurrence flag
= D50 Error code H0
RST Y12 Error reset instruction
<Read PV to D51 to D54 >
1519
X10
Module READY flag
X11
Setting/ operation mode status
FROM U1 H9 D51 CH1 Temperature process value K4
1544
END

3.4. When Performing the Heating-Cooling Control

3.4.1. Heating-Cooling Control

Function Overview

This program performs the heating-cooling control directly using the intelligent function module devices in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_NPM4_V100A_E(01HetCol)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

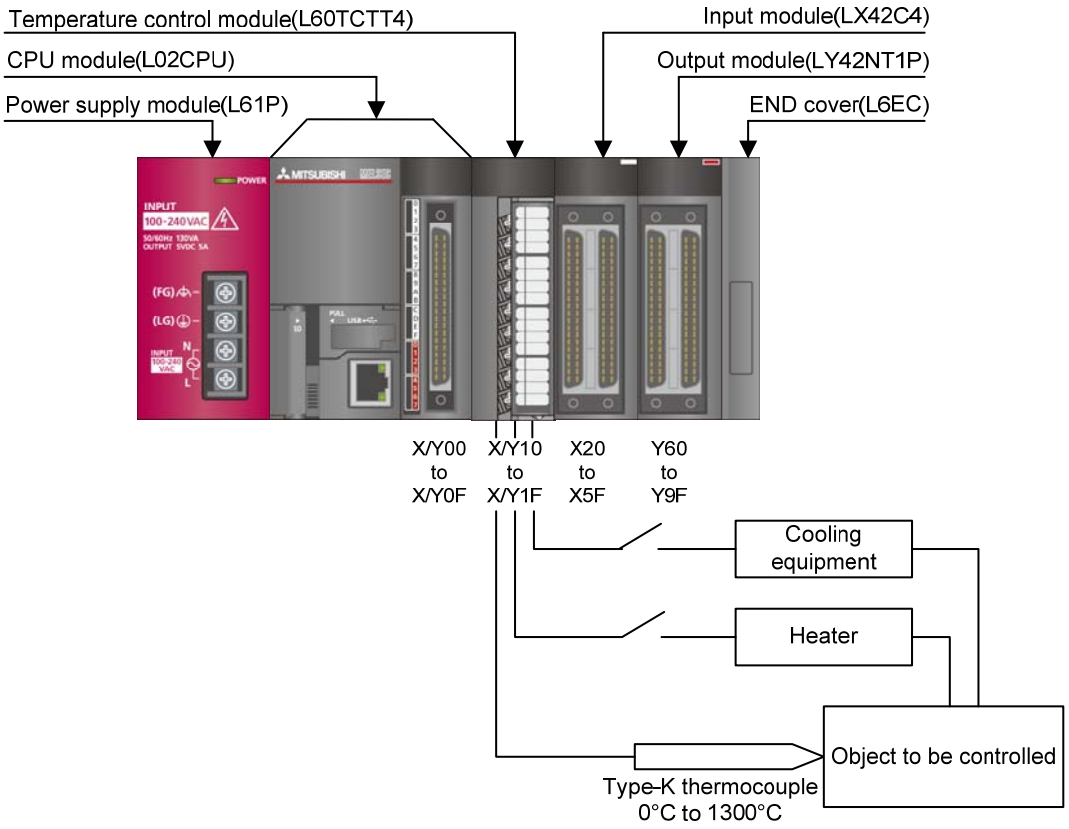
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-L series</td><td>LCPU</td></tr></table></td></tr>
<tr><td>Input Module</td><td>MELSEC-L series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-L series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2, GX Developer *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder programs.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X18	Bit	Back-up of the set value completion flag	
7	X1B	Bit	Setting change completion flag	
8	X20	Bit	Set value write instruction	-
9	X21	Bit	Auto tuning execute instruction	-
10	X22	Bit	Error code reset instruction	-
11	X23	Bit	Operation mode setting instruction	-
12	X24	Bit	Memory of PID constants read instruction	-
13	Y11	Bit	Setting/operation mode instruction	-
14	Y12	Bit	Error reset instruction	-
15	Y14	Bit	CH1 Auto tuning instruction	-
16	Y18	Bit	Set value backup instruction	-
17	Y1B	Bit	Setting change instruction	-
18	Y60 to Y6F	Word	Error code output	-

Conditions for Using Sample Ladder Programs

●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) PLC Parameter Settings

a) Open the PLC parameter setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]

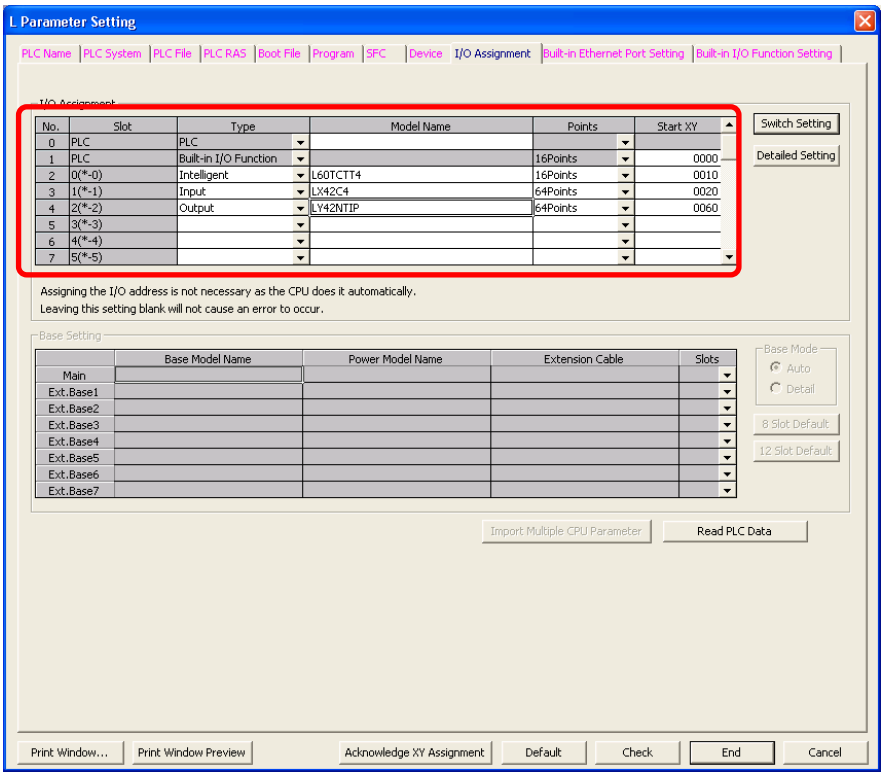


Table 3-7 I/O assignment setting

No.	Slot	Type	Module name	Points	StartXY
0	CPU	CPU	-		
1	0(*-0)	Intelli.	L60TCTT4	16point	0010
2	1(*-1)	Input	LX42C4	64point	0020
3	2(*-2)	Output	LY42NT1P	64point	0060

b) Open the switch setting window and configure the setting as follows.

Project window→[Parameter]→[PLC parameter]→[I/O assignment]→Switch setting

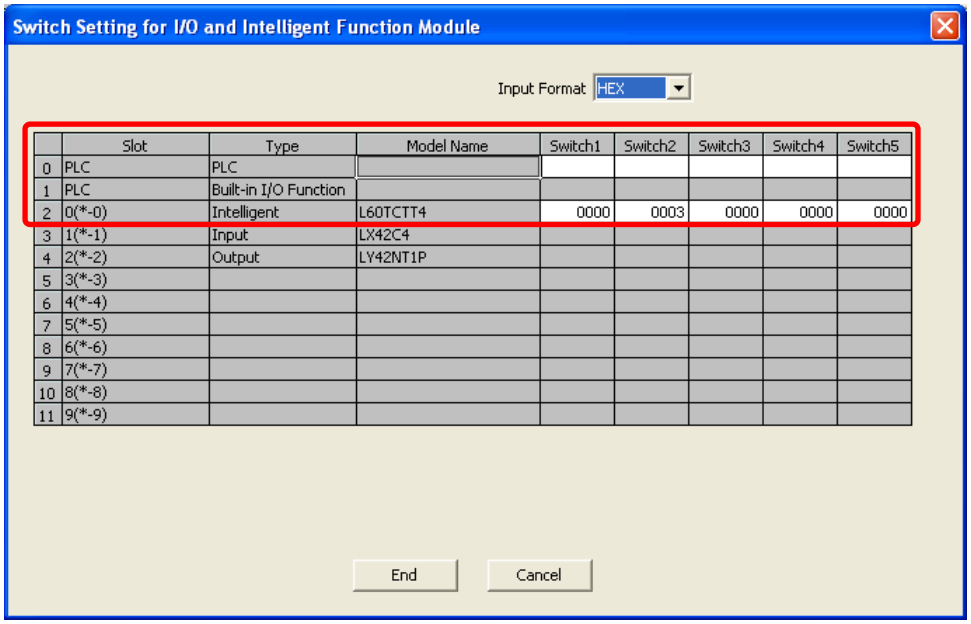


Table 3-8 Switch setting

No.	Slot	Type	Model name	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
0	CPU	CPU						
1	0(*-0)	Intelli.	L60TCTT4	0000	0003	0000	0000	0000
2	1(*-1)	Input	LX42C4					
3	2(*-2)	Output	LY42NT1P					

Devices

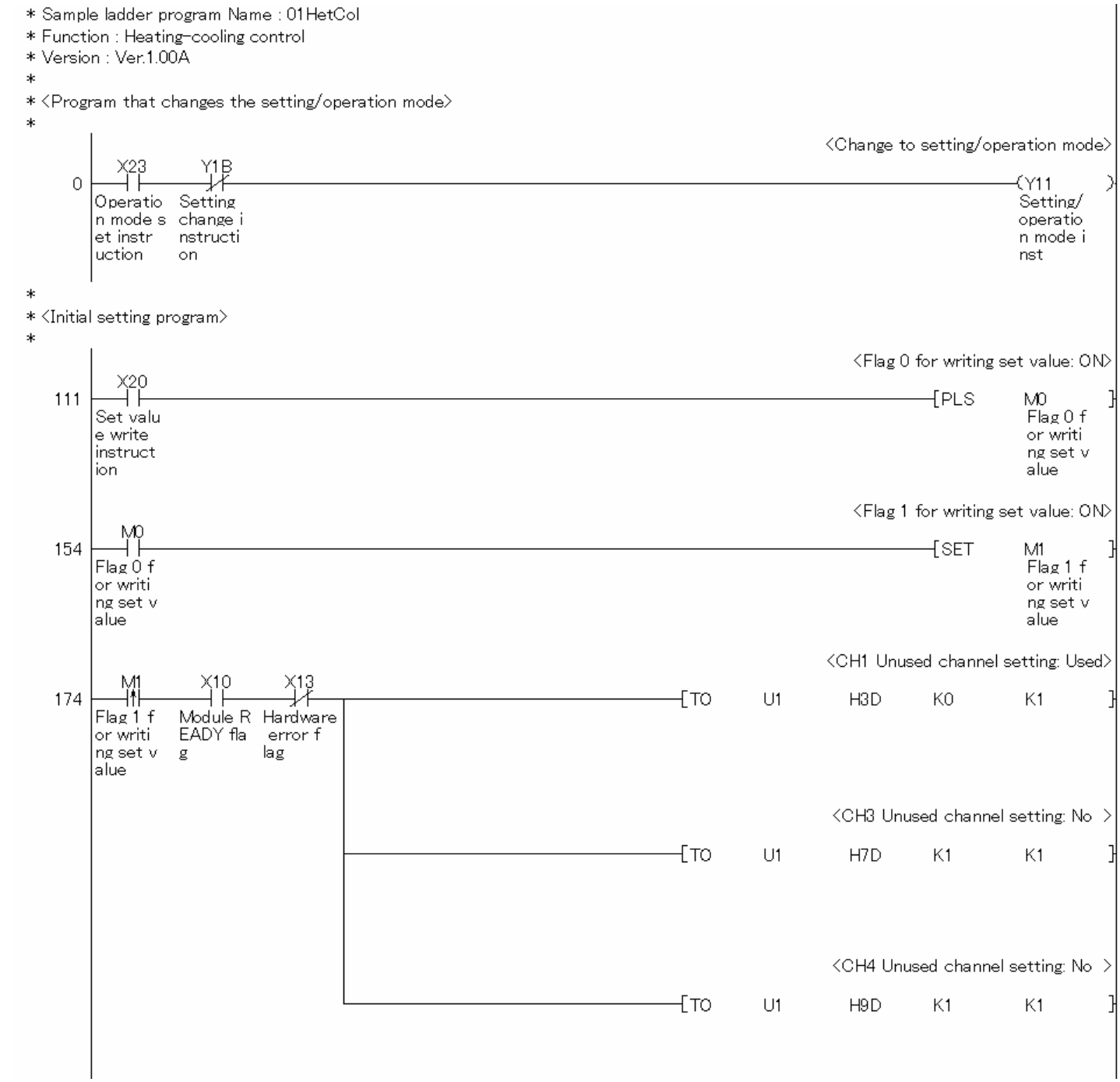
This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X10	Bit	Module READY flag	Used by the system and cannot be used by the user.
2	X11	Bit	Setting/operation mode status	
3	X12	Bit	Error occurrence flag	
4	X13	Bit	Hardware error flag	
5	X14	Bit	CH1 Auto tuning status	
6	X18	Bit	Back-up of the set value completion flag	
7	X1B	Bit	Setting change completion flag	
8	X20	Bit	Set value write instruction	-
9	X21	Bit	Auto tuning execute instruction	-
10	X22	Bit	Error code reset instruction	-
11	X23	Bit	Operation mode setting instruction	-
12	X24	Bit	Memory of PID constants read instruction	-
13	Y11	Bit	Setting/operation mode instruction	-
14	Y12	Bit	Error reset instruction	-
15	Y14	Bit	CH1 Auto tuning instruction	-
16	Y18	Bit	Set value backup instruction	-
17	Y1B	Bit	Setting change instruction	-
18	Y60 to Y6F	Word	Error code output	-
19	D50	Word	Error code	-
20	D51	Word	CH1 Temperature process value (PV)	-
21	M0	Bit	Flag 0 for writing set value	-
22	M1	Bit	Flag 1 for writing set value	-
23	M2	Bit	Flag 2 for writing set value	-
24	M10	Bit	CH1 Auto tuning completion flag	-
25	M20	Bit	CH1 Read completion flag	-
26	M21	Bit	CH2 Read completion flag	-
27	M22	Bit	CH3 Read completion flag	-
28	M23	Bit	CH4 Read completion flag	-
29	M24	Bit	CH1 Write completion flag	-
30	M25	Bit	CH2 Write completion flag	-
31	M26	Bit	CH3 Write completion flag	-
32	M27	Bit	CH4 Write completion flag	-

Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program



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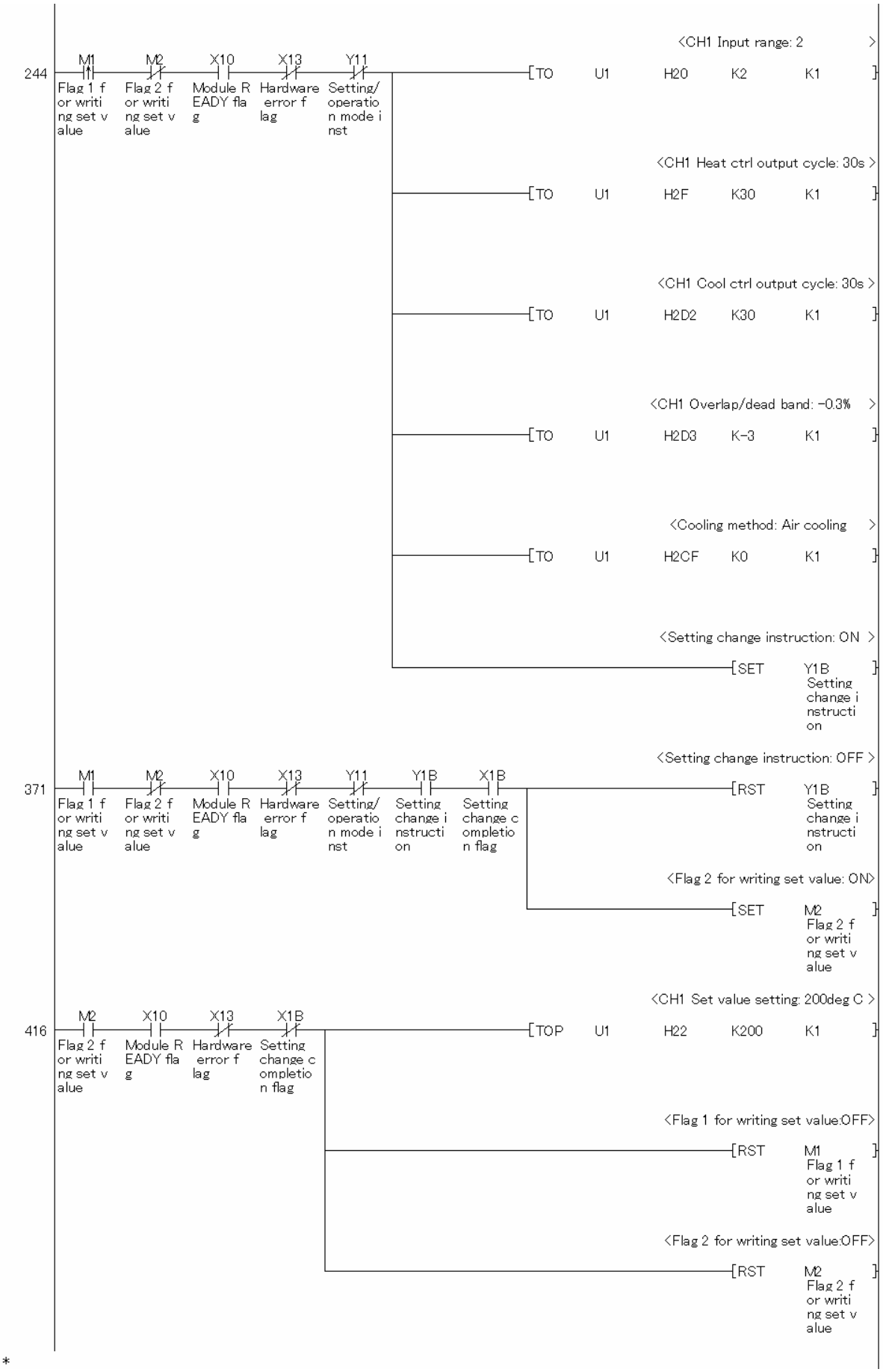

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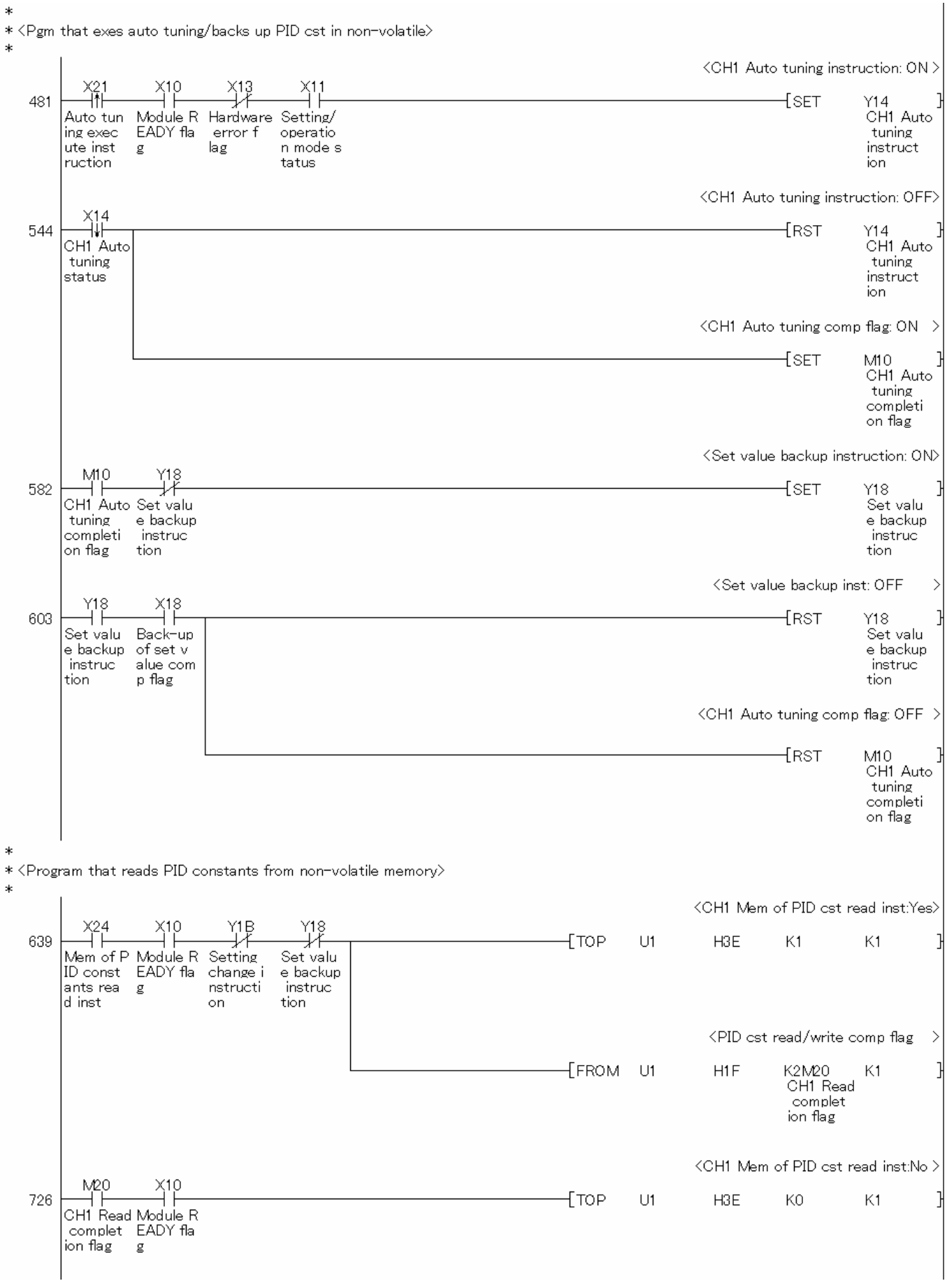

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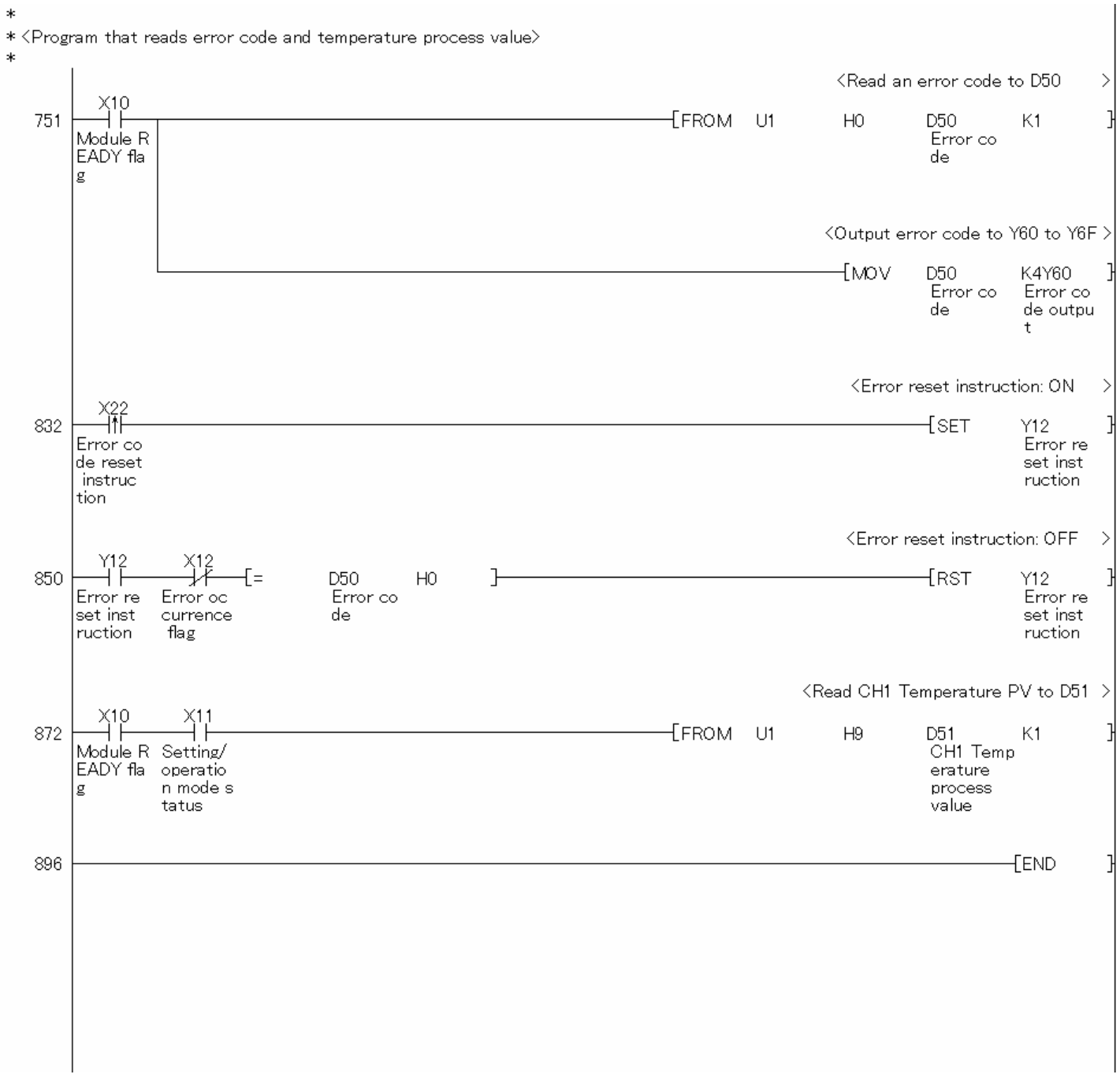

*
* <Program that reads error code and temperature process value>
*
<Read an error code to D50 >
751
X10
Module READY flag
FROM U1 H0 D50 Error code K1
<Output error code to Y60 to Y6F >
MOV D50 Error code K4Y60 Error code output
<Error reset instruction: ON >
832
X22
Error code reset instruction
SET Y12 Error reset instruction
<Error reset instruction: OFF >
850
Y12
Error reset instruction
X12
Error occurrence flag
= D50 Error code H0
RST Y12 Error reset instruction
<Read CH1 Temperature PV to D51 >
872
X10
Module READY flag
X11
Setting/ operation mode status
FROM U1 H9 D51 CH1 Temperature process value K1
896
END

4. When Connecting the Module to the Head Module

4.1. Temperature Input

Function Overview

This program performs the temperature input using the intelligent function module parameters in the standard system configuration.

Program

This function uses the project (program name).

•LD-L60TC4_IEF_V100A_E(01RdTmp)

Applicable Hardware and Software

The following are the hardware and software applicable to the sample ladder programs.

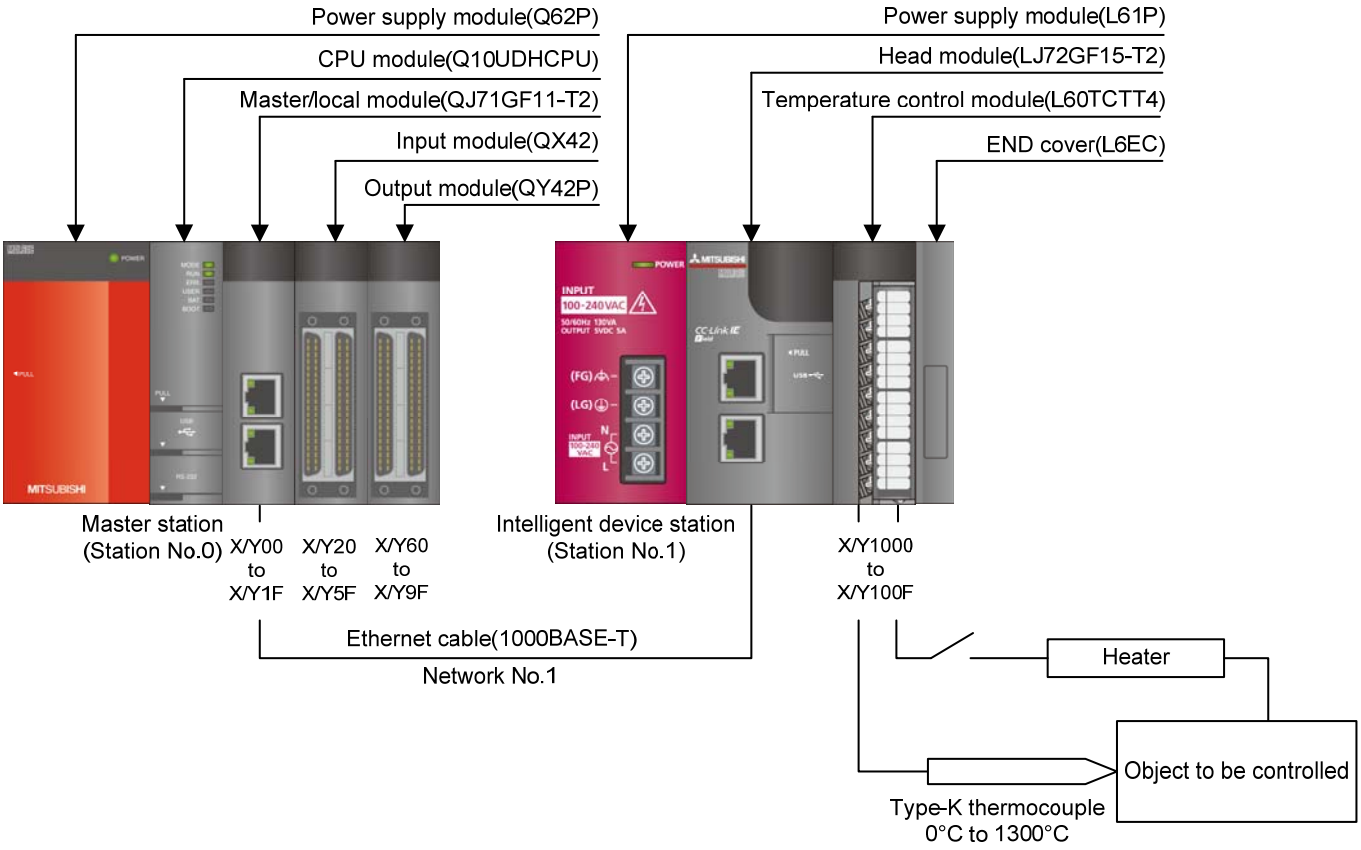
<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Temperature control module</td><td>L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW *1

*1 The type of usable temperature sensors and the temperature measurement range depend on the module used. Parameters must be configured to match the connected devices and systems.</td></tr>
<tr><td>CC-Link IE Field Network module</td><td>CC-Link IE Field Network master/local module
CC-Link IE Field Network head module</td></tr>
<tr><td>CPU module</td><td><table><tr><th>Series</th><th>Model</th></tr><tr><td>MELSEC-Q series</td><td>Universal model QCPU *1</td></tr><tr><td>MELSEC-L series</td><td>LCPU *2</td></tr></table>*1 The first five digits of the serial number are “12012” or later.
*2 The first five digits of the serial number are “13012” or later.</td></tr>
<tr><td>Input Module</td><td>MELSEC-Q series input module</td></tr>
<tr><td>Output Module</td><td>MELSEC-Q series output module</td></tr>
<tr><td>Compatible software</td><td>GX Works2 *1

*1 For information on the software versions applicable to the module used, refer to the related manual.</td></tr>
</table>

System Configuration

The following system configuration is used for the sample ladder program.



This program uses the following XY devices.

No.	Device	Data Type	Application	Remarks
1	X22	Bit	Error code reset instruction	-
2	X23	Bit	Operation mode setting instruction	-
3	X24	Bit	Memory of PID constants read instruction	-
4	X1000	Bit	Module READY flag	Used by the system and cannot be used by the user.
5	X1002	Bit	Error occurrence flag	
6	Y60 to Y6F	Word	Error code output	-
7	Y1001	Bit	Setting/operation mode instruction	-
8	Y1002	Bit	Error reset instruction	-
9	Y1008	Bit	Set value backup instruction	-
10	Y100B	Bit	Setting change instruction	-

Conditions for Using Sample Ladder Programs

Use GX Works2 when connecting to the head module.

●Parameter Settings for the Temperature Control Module

The following explains the settings for the L60TCTT4 temperature control module that the programs use.

(1) Settings for the Master Station

a) Configure settings for the master station.

Project window→[Parameter] → [Network Parameter] →[Ethernet/CC IE/MELSECNET]

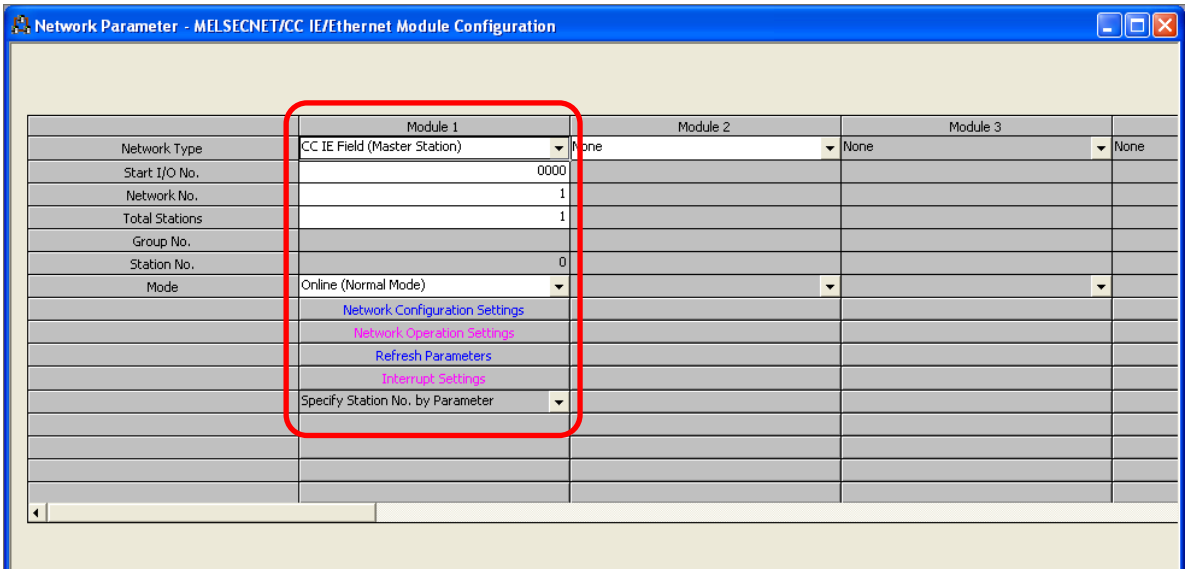


Table 4-1 Network parameter setting

	Module 1
Network Type	CC IE Field (Master Station)
Start I/O No.	0000
Network No.	1
Total Stations	1

b) Open the network configuration setting screen and configure the setting as follows.

Project window→[Parameter]→[Network Parameter]→[Ethernet/CC IE/MELSECNET]→Network Configuration Setting

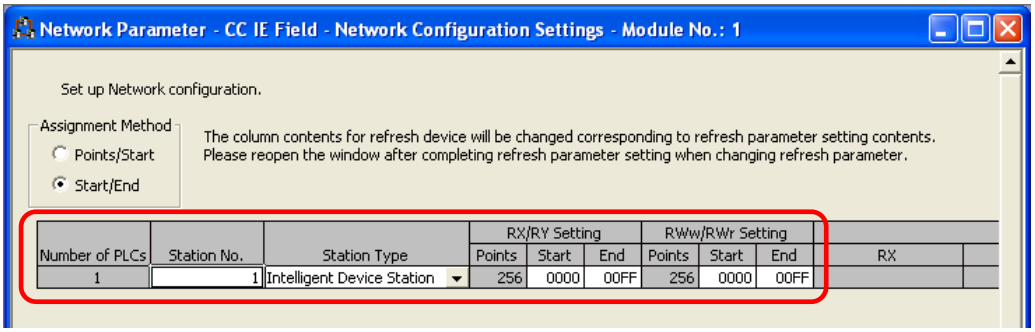


Table 4-2 Network configuration setting

	Station No.	Station Type	RX/RY Setting		RWw/RWr Setting	
			Start	End	Start	End
1	1	Intelligent Device Station	0000	00FF	0000	00FF

c) Open the refresh parameter setting screen and configure the setting as follows.

Project window→[Parameter]→[Network Parameter]→[Ethernet/CC IE/MELSECNET]→Refresh parameters setting screen

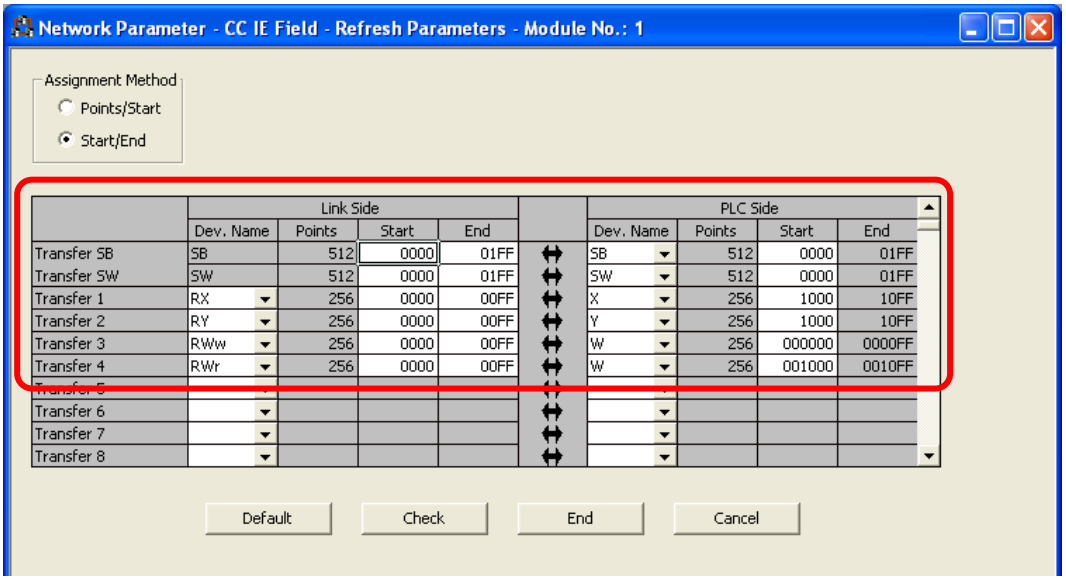


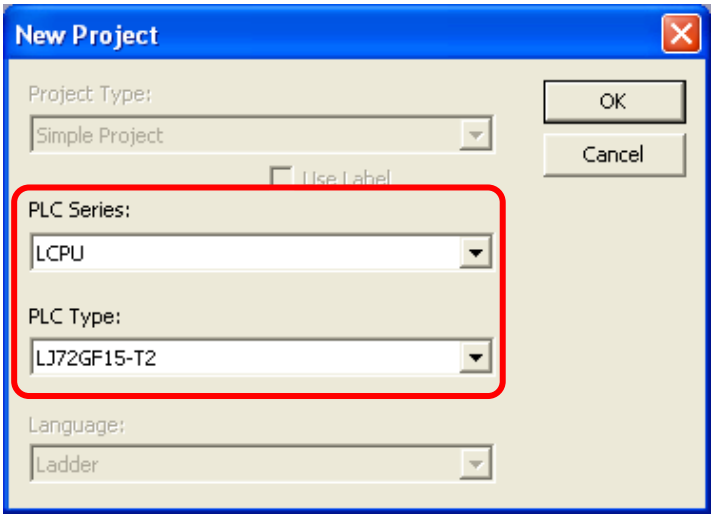
Table 4-3 Refresh parameters setting

Link Side				PLC Side	
Device Name	Start	End		Device Name	Start
SB	0000	01FF	↔	SB	0000
SW	0000	01FF	↔	SW	0000
RX	0000	00FF	↔	X	1000
RY	0000	00FF	↔	Y	1000
RWw	0000	00FF	↔	W	000000
RWr	0000	00FF	↔	W	001000

(2) Settings for the intelligent device station.

a) Select [LCPU] in [PLC Series] and [LJ72GF15-T2] for [PLC Type] and create a project.

[Project]→[New Project]



b) Open the PLC parameter setting screen and configure the setting as follows.

Project window→[Parameter]→[PLC Parameter]→[Communication Head Setting]

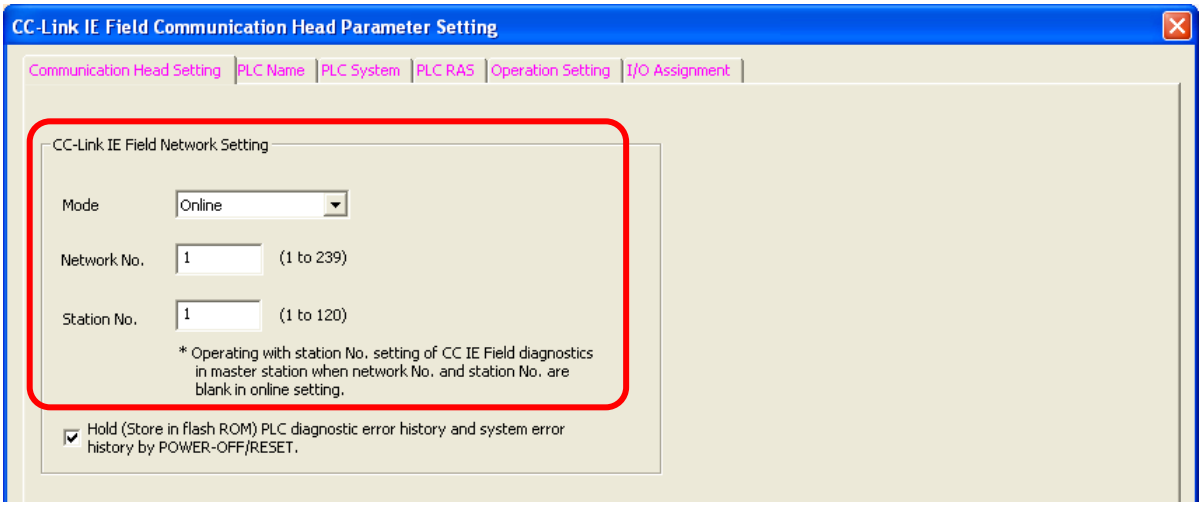
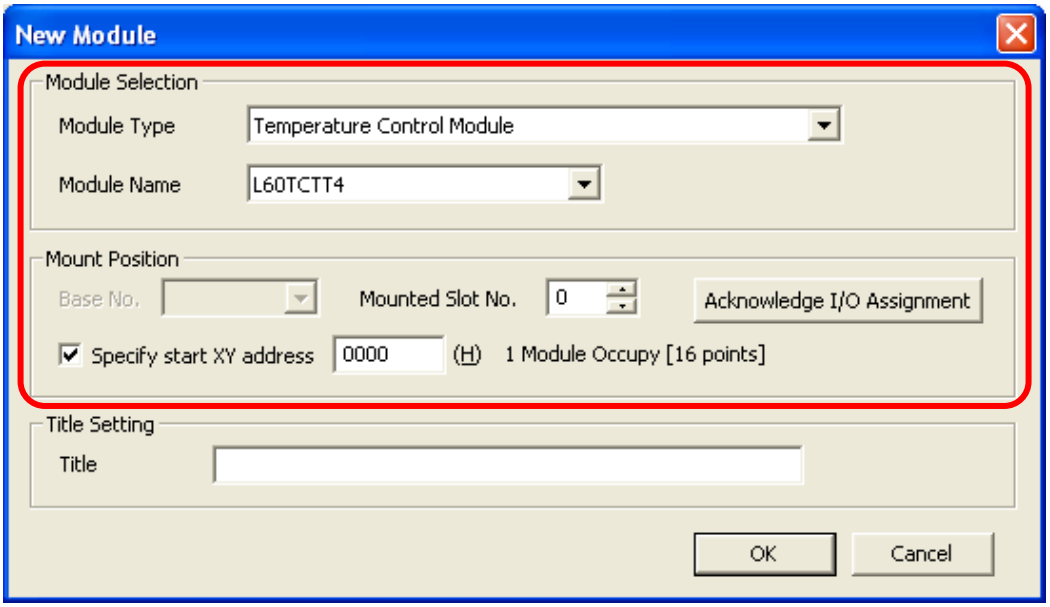


Table 4-4 Communication head setting

	Set value
Mode	Online
Network No.	1
Station No.	1

c) Open the new module setting screen and configure the setting as follows.

Project window→[Intelligent Function Module]→right-click→[New Module]



d) Open the switch setting screen and configure the setting as follows.

Project window→[Intelligent Function Module]→Module name→[Switch Setting]

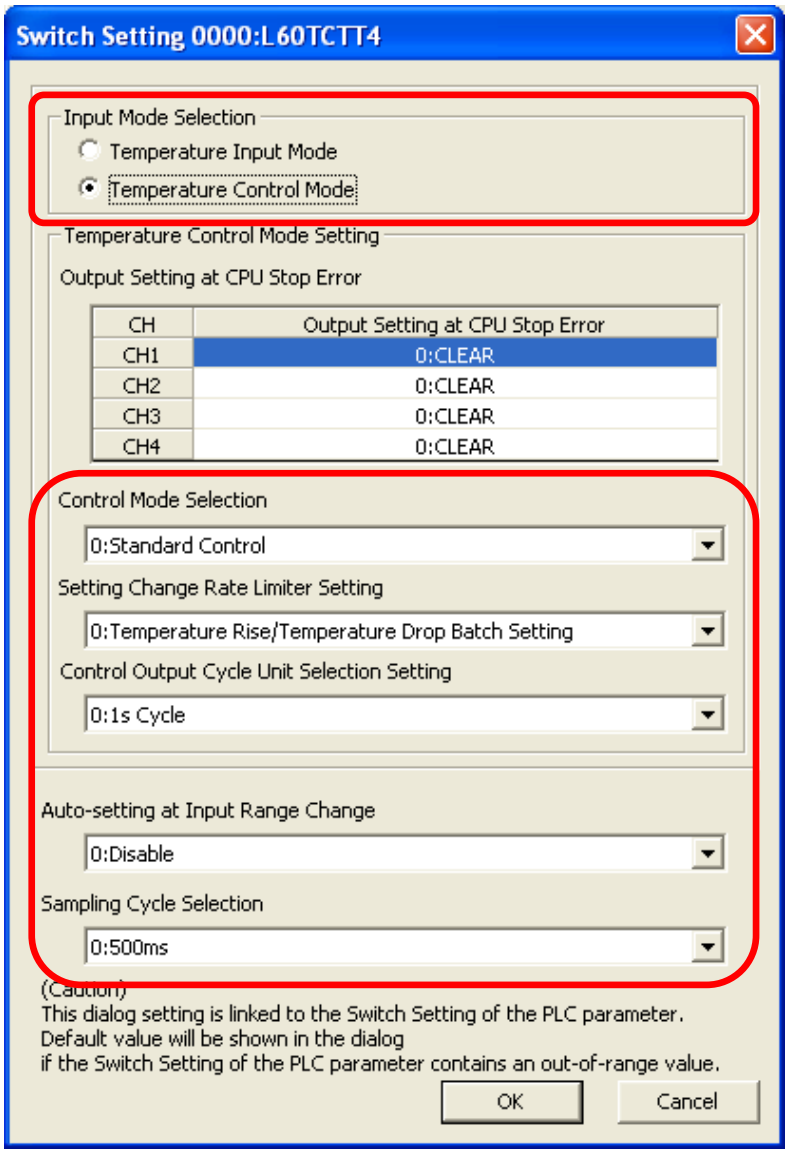


Table 4-5 Switch setting

Item	Set value
Input mode selection	Temperature control mode
Control mode selection	0: Standard control
Setting change rate limiter setting	0: Temperature rise/temperature drop batch setting
Control output cycle unit selection setting	0: 1 s cycle
Auto-setting at input range change	0: Disable
Sampling cycle selection	0: 500ms

e) Open the parameter setting window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Parameter]

f) Click the [Clear Value for Gray Cells] button to set unnecessary items to 0.

g) Set the following parameters.

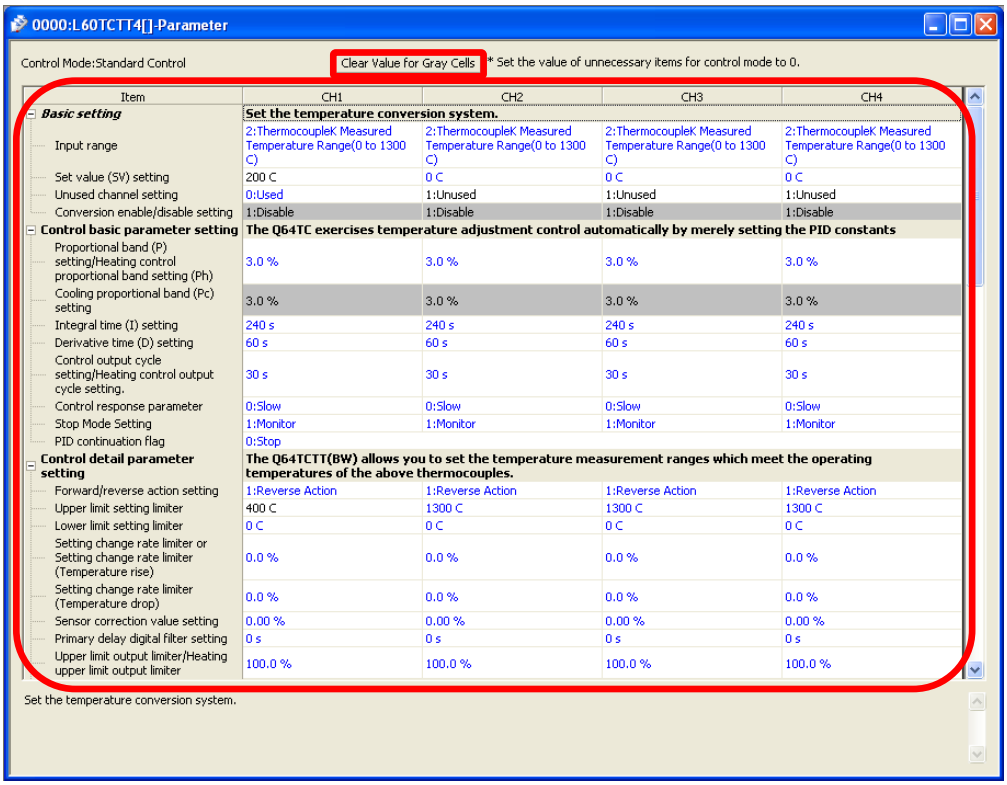


Table 4-6 Parameter setting

Item	Item	CH1	CH2	CH3	CH4
Basic setting	Input range	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)	2: Thermocouple K Measured Temperature Range (0 to 1300°C)
	Set value (SV) setting	200°C	0°C	0°C	0°C
	Unused channel setting	0: Used	1: Unused	1: Unused	1: Unused
Alert function setting	Upper limit setting limiter	400°C	1300°C	1300°C	1300°C
	Lower limit setting limiter	0°C	0°C	0°C	0°C
	Alert 1 mode setting	1: Upper limit input alert	0: Not warning	0: Not warning	0: Not warning
	Alert set value 1	500°C	0°C	0°C	0°C

*For parameters other than above, use the default values.

h) Open the auto refresh window and configure the settings as follows.

Project window→[Intelligent Function Module]→Module name→[Auto Refresh]

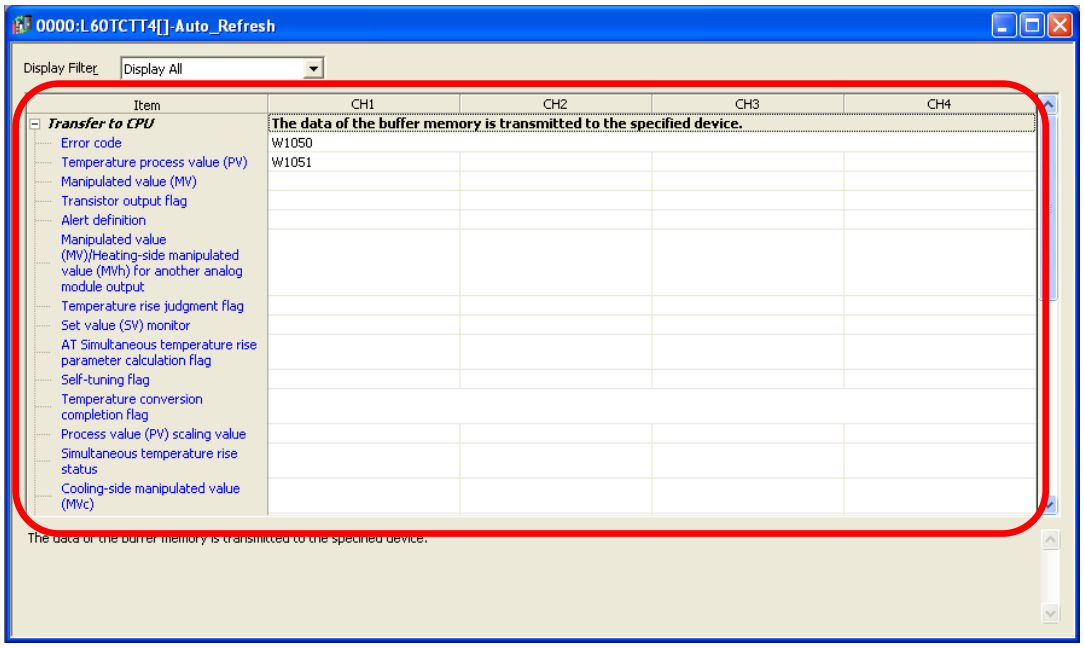


Table 4-7 Auto refresh setting

Item		CH1	CH2	CH3	CH4
Transfer to CPU	Error code	W1050			
	Temperature process value (PV)	W1051	-	-	-

Devices

This program uses the following devices.

No.	Device	Data Type	Application	Remarks
1	X22	Bit	Error code reset instruction	-
2	X23	Bit	Operation mode setting instruction	-
3	X24	Bit	Memory of PID constants read instruction	-
4	X1000	Bit	Module READY flag	Used by the system and cannot be used by the user.
5	X1002	Bit	Error occurrence flag	
6	Y60 to Y6F	Word	Error code output	-
7	Y1001	Bit	Setting/operation mode instruction	-
8	Y1002	Bit	Error reset instruction	-
9	Y1008	Bit	Set value backup instruction	-
10	Y100B	Bit	Setting change instruction	-
11	D9	Word	Data storage device for Z(P).REMTO instruction	-
12	D10	Word	Data storage device for Z(P).REMFR instruction	-
13	D11	Word	Data storage device for Z(P).REMTO instruction	-
14	M0	Bit	Master module status check device	-
15	M300	Bit	CH1 Memory of PID constants read flag	-
16	M301	Bit	CH1 Memory of PID constants read flag	-
17	M302	Bit	CH1 Memory of PID constants read flag	-
18	M303	Bit	CH1 Memory of PID constants read flag	-
19	M304	Bit	CH1 Memory of PID constants read flag	-
20	M305	Bit	CH1 Memory of PID constants read flag	-
21	M310	Bit	Z(P).REMTO instruction completion/result device	-
22	M311	Bit	Z(P).REMTO instruction completion/result device	-

No.	Device	Data Type	Application	Remarks
23	M312	Bit	Z(P).REMFR instruction completion/result device	-
24	M313	Bit	Z(P).REMFR instruction completion/result device	-
25	M314	Bit	Z(P).REMTO instruction completion/result device	-
26	M315	Bit	Z(P).REMTO instruction completion/result device	-
27	W1050	Word	Error code	-
28	W1051	Word	CH1 Temperature process value (PV)	-
29	SB49	Bit	Data link status (own station)	-
30	SW0B0.0	Bit	Data link status (each station) (station number 1)	-

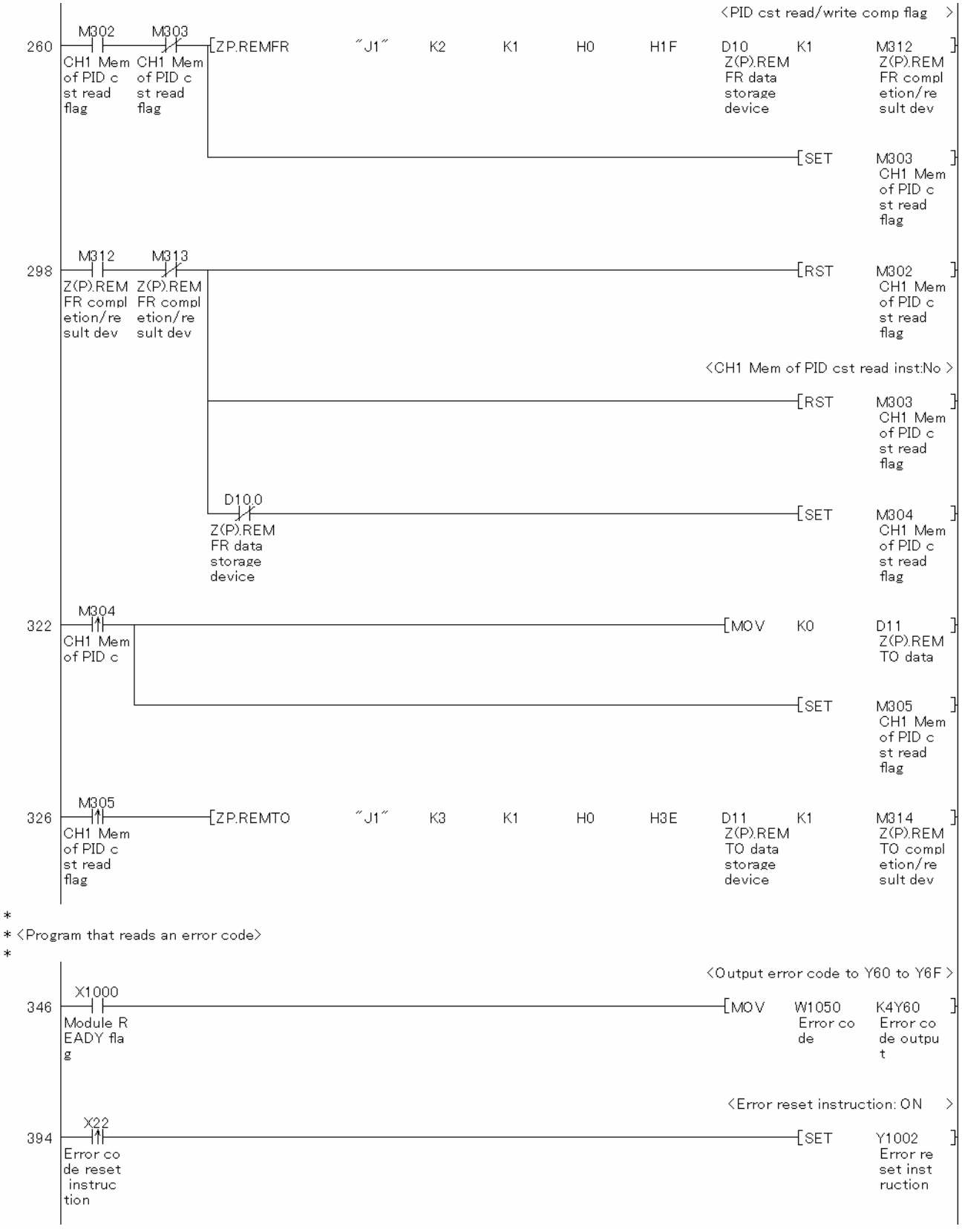
Version Upgrade History

Version	Date	Description
1.00A	2012/01/16	First edition

Program

```
* Sample ladder program Name : 01RdTmp
* Function : Temperature input
* Version : Ver.1.00A
*
* <Program that checks the data link status of the head module>
*
                                                                                    <Check head module data link    >
    0   SB49        SW0B0.0                                                         [MC      N0          M0          ]
        Data lin    Each st                                                                          Master m
        k status    data lin                                                                         odule st
        (own st     k status                                                                         atus che
        ation)      , st No1                                                                         ck dev
*
* <Program that changes the setting/operation mode>
*
                                                                                    <Change to setting/operation mode>
  113   X23         Y100B                                                           (Y1001      )
        Operatio    Setting                                                                          Setting/
        n mode s    change i                                                                         operatio
        et instr    nstructi                                                                         n mode i
        uction      on                                                                               nst
*
* <Program that reads PID constants from non-volatile memory>
*
                                                                                    <CH1 Mem of PID cst read inst:Yes>
  168   X24         X1000       Y100B       Y1008                                   [MOVP    K1          D9          ]
        Mem of P    Module R    Setting     Set valu                                                     Z(P).REM
        ID const    EADY fla    change i    e backup                                                     TO data
        ants rea    g           nstructi    instruc                                                      storage
        d inst                  on          tion                                                         device
                                                                                    [SET     M300        ]
                                                                                                         CH1 Mem
                                                                                                         of PID c
                                                                                                         st read
                                                                                                         flag
        M300
  232   ||-------[ZP.REMTO      "J1"        K1          K1          H0      H3E     D9       K1          M310        ]
        CH1 Mem                                                                     Z(P).REM             Z(P).REM
        of PID c                                                                    TO data              TO compl
        st read                                                                     storage              etion/re
        flag                                                                        device               sult dev
        M310        M311
  252   Z(P).REM    Z(P).REM                                                        [SET     M301        ]
        TO compl    TO compl                                                                             CH1 Mem
        etion/re    etion/re                                                                             of PID c
        sult dev    sult dev                                                                             st read
                                                                                                         flag
        M301        M302        M303        M304
  255   CH1 Mem     CH1 Mem     CH1 Mem     CH1 Mem                                 [SET     M302        ]
        of PID c    of PID c    of PID c    of PID c                                                     CH1 Mem
        st read     st read     st read     st read                                                      of PID c
        flag        flag        flag        flag                                                         st read
                                                                                                         flag
```

Continues on next page.



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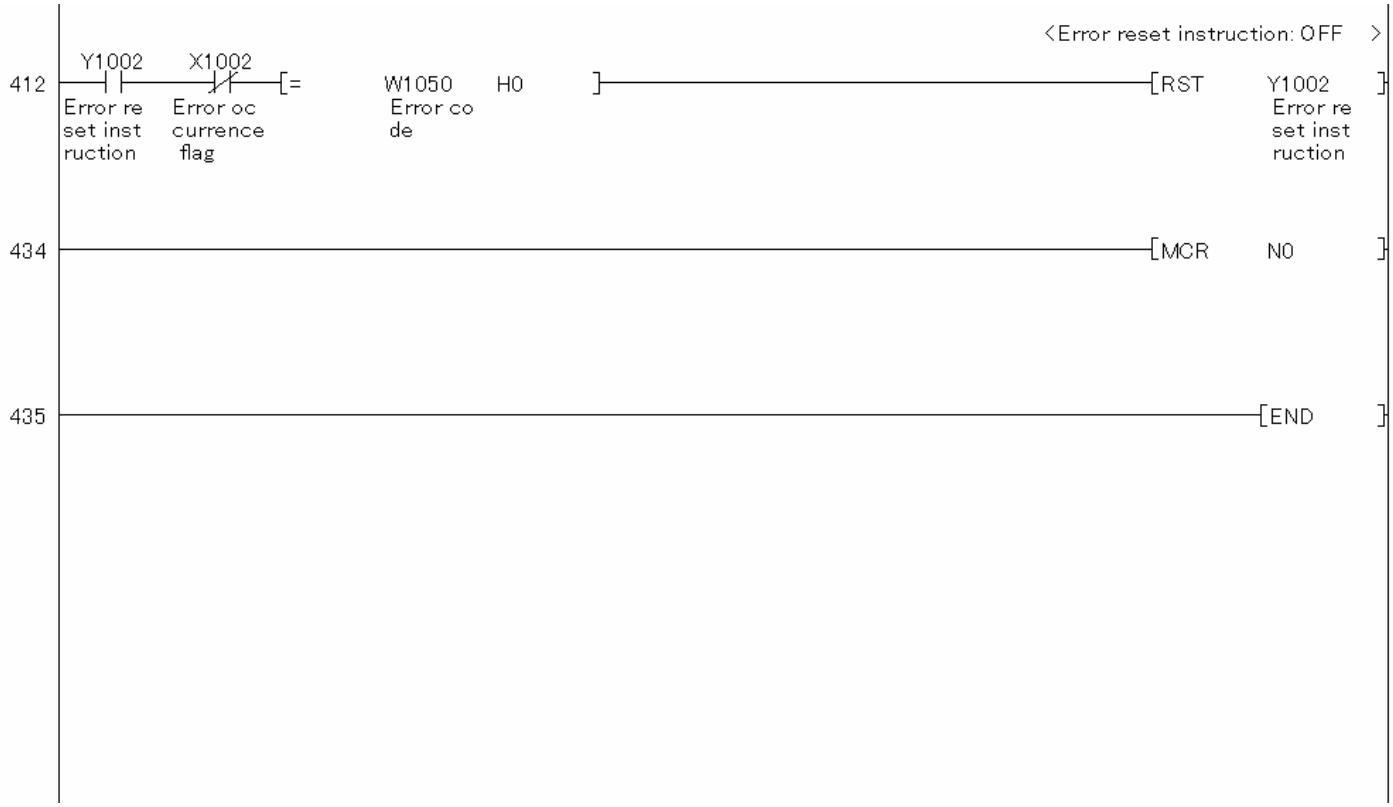
Error reset instruction: OFF
412
Y1002
Error reset instruction
X1002
Error occurrence flag
[=
W1050
Error code
H0
]
[RST
Y1002
Error reset instruction
]
434
[MCR
N0
]
435
[END
]