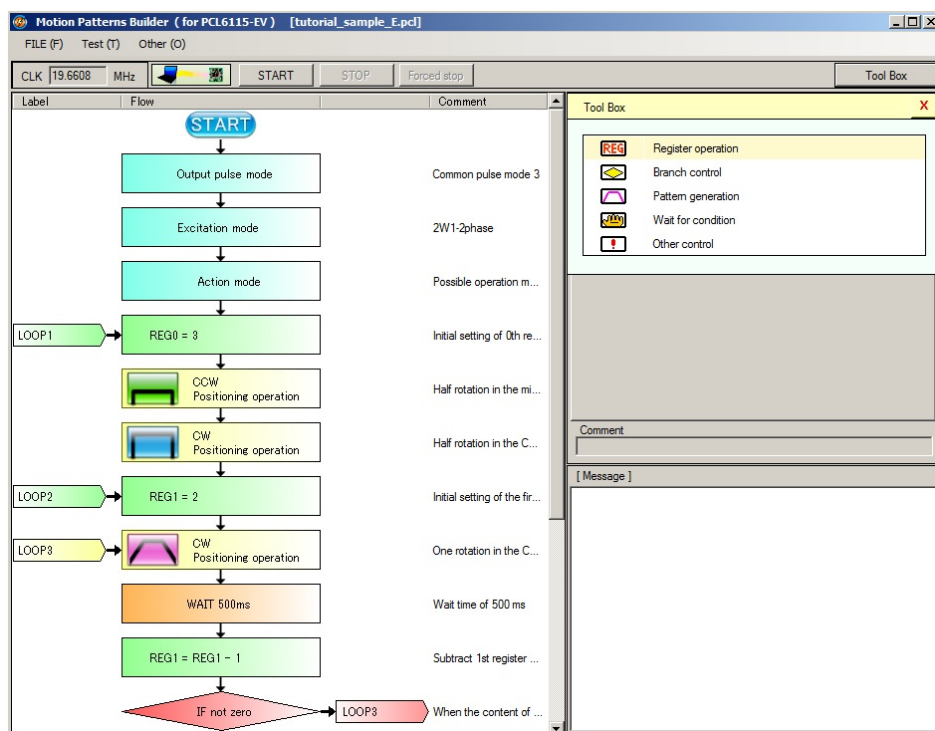


PCL6115 Starter Kit

PCL6115_EV

User's Manual

Motion Pattern Builder



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1. Preface

Thank you for choosing PCL6115-EV starter kit Motion Pattern Builder.

This manual describes the specifications, functions, connections, and usages of PCL6115-EV starter kit Motion Pattern Builder.

Be sure to read this manual thoroughly and keep it handy in order to use the product appropriately.

1.1 How to use this manual

1. Reproduction of this manual in whole or in part without permission is prohibited by the Copyright Act.
2. The contents of this manual are subject to change without the prior notice along with the improvement of performance and quality.
3. Although this manual is produced with the utmost care, please contact our sales representative if there are any questions, errors or omissions.

1.2 Production warranty

1.2.1 Warranty period

The warranty period is one year from the date of delivery to an assigned place.

1.2.2 Warranty scope

If any defect is found in a product during the warranty period under the normal use following this document, NPM will repair or replace the product without charge.

However, the following cases are not covered by the warranty even during the warranty period.

- 1) Products modified or repaired by anyone other than NPM or a person authorized by NPM.
- 2) Defects that result from dropping after the delivery or mishandling in transit.
- 3) Natural deterioration, wearing, and fatigue of components.
- 4) Defects result from any usage other than the original described in this manual.
- 5) Defects result from natural disaster or force majeure such as fires, earthquakes, lightning strikes, winds, floods, salts or electrical surges.
- 6) Defects or damages result from a cause that is not the fault of NPM.

When the product is purchased from a supplier other than NPM, please contact that supplier regarding the product's warranty.

Free repairs will only be conducted at NPM locations; no repairs will be made by business trips.

Warranty period of repaired product is the same as the warranty period before repair.

This warranty covers the product itself. The detriments or damages induced by the product failure etc. will not be covered by the warranty.

1.3 Notice

This document aims to describe the details of functions of the product. It does not warrant fitness for a particular purpose of the customer. Also, the examples of applications and circuit diagrams in this manual are included only for your reference. Please confirm the features and the safety of device or equipment before use.

1.4 Confirmation

Please do not use this product in the following conditions. If you need to use in the following conditions, please contact our sales representatives:

1. Any equipment that may require a high reliability or a safety, such as nuclear facilities, electricity or gas supply systems, transportation facilities, vehicles, various safety systems, medical equipment, etc.
2. Any equipment that may directly affect human survival or property.
3. Usages under conditions or circumstances that are not specified in the catalog, manual, etc.

For applications that may cause serious damages to a human life or property due to failure of this product, ensure high reliability and safety by redundant design.

2. Introduction

This is the operation manual of the application software that operates a control board.

By using this software and PCL6115-EV Starter Kit, you can learn motor control functions with pulse control LSI PCL6115.

Please refer to the following manuals along with this manual.

(x: revision)

	Manual Name [Outline]	Document File name	Software File name	Document No.
Hardware Manual	PCL6115 Starter Kit User's Manual (Hardware)	PCL6115-EV_HardwareManual_VerxE.pdf	—	TA600021-ENx/x
	PCL6115 Starter Kit User's Manual (Simple Manual)	PCL6115-EV_SimpleManual_VerxJE.pdf	—	TA600020-ENx/x
Application Software Manual	PCL6115 Starter Kit User's Manual (Application Software) [Setting accel/decel pattern and register display]	PCL6115-EV_ApplicationManual_VerxE.pdf	PCL6115-EV_Application_VxxxJEzip	TA600018-ENx/x
	PCL6115 Starter Kit User's Manual (Language File Creation Rule) [Multi-language]	PCL6115-EV_ApplicationLanguageFileManual_VerxE.pdf	PCL6115-EV_ApplicationLanguageFile_VxxxE.zip	TA600007-ENx/x
	PCL6115 Starter Kit User's Manual (Sample program) [Check and add motion pattern on development environment]	PCL6115-EV_ApplicationSampleManual_VerxE.pdf	PCL6115-EV_ApplicationSample_VxxxE.zip	TA600022-ENx/x

(x: revision)

	Manual Name [Outline]	Document File name	Software File name	Document No.
Motion Pattern Builder Manual	PCL6115 Starter Kit User's Manual (Motion Pattern Builder Application Software) [To describe function to perform axis control visually with a flowchart]	PCL6115-EV_MotionBuilderManual_VerxE.pdf	PCL6115-EV_MotionBuilder_VxxxJE.zip	TA600023-ENx/x (This document)
	PCL6115 Starter Kit User's Manual (Motion Pattern Builder Language File Creation Rule) [Motion Pattern Builder in Multi-language]	PCL6115-EV_MotionBuilderLanguageFileManual_VerxE.pdf	PCL6115-EV_MotionBuilderLanguageFile_VxxxE.zip	TA600008-ENx/x
	PCL6115 Starter Kit User's Manual (Motion Pattern Builder Sample Project) [Check and add motion pattern created by Motion Pattern Builder on development environment]	PCL6115-EV_MotionBuilderSampleManual_VerxE.pdf	PCL6115-EV_MotionBuilderSample_VxxxE.zip	TA600024-ENx/x
Reference	PCL6115/6125/6145 User's Manual		-	DA70152-0/xE

Please download application software and related materials from our NPM website.

2.1 Operating environment

We checked this software operation on Windows 7 and Windows10 (both 32-bit and 64-bit).

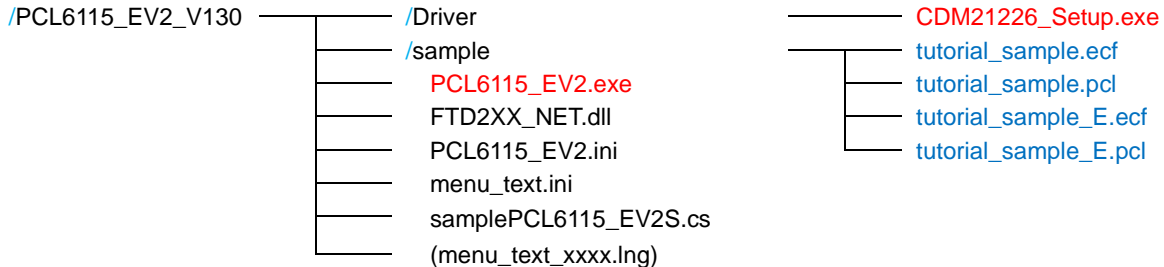
(We do not check it on OS other than the above.)

Please change power saving setting so as not to operate sleep mode during operation.

3. Install the device driver

3.1 Folder structure

When unzipping the compressed file (PCL6115-EV_MotionBuilder_V130JE.zip), the following folders are generated.



"PCL6115_EV2.exe" is an executable file of the software and "CDM21226_Setup.exe" is a device driver installer.

"tutorial_sample_E.pcl" is a tutorial sample flowchart file (7. Tutorial), "tutorial_sample_E.ecf" is a tutorial sample executable file.

"tutorial_sample.pcl" and "tutorial_sample.ecf" are Japanese version tutorial sample files.

"FTD2XX_NET.dll" is a FTDI's D2XX driver software.

"samplePCL6115EV2S.cs" is a text file for sample project (4.2.5.1 "C#").

"PCL6115_EV2.ini" and "menu_text.ini" are text files for PCL6115_EV2.

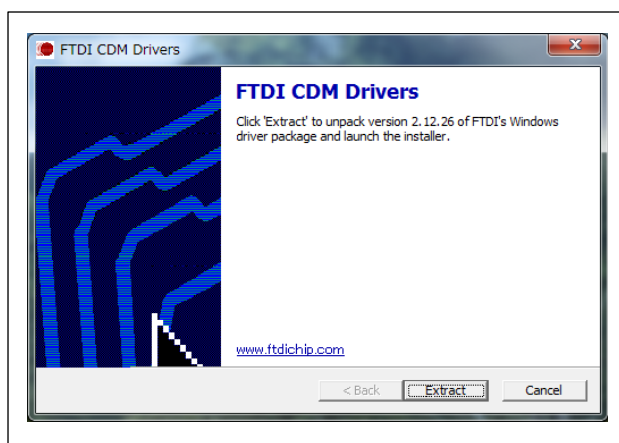
"Menu_text_xxxx.lng" is a multilingual text file for PCL6115_EV 2. This file is not included at the time of uncompressing the compressed file.

If you need multiple languages, create a multilingual text file and put it in this folder.

3.2 Install

Double-click "CDM21226_Setup.exe" to launch the installer and follow the instructions on the screen to complete the installation.

If you have already installed it, you do not need to install it again.

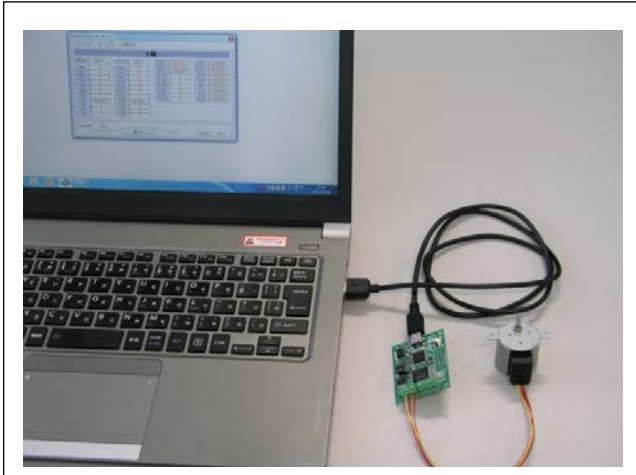


Note: There is the latest version of the device driver on FTDI's website (<http://www.ftdichip.com/Drivers/D2XX.htm>). If the version you have is not the latest one, download from the above website.

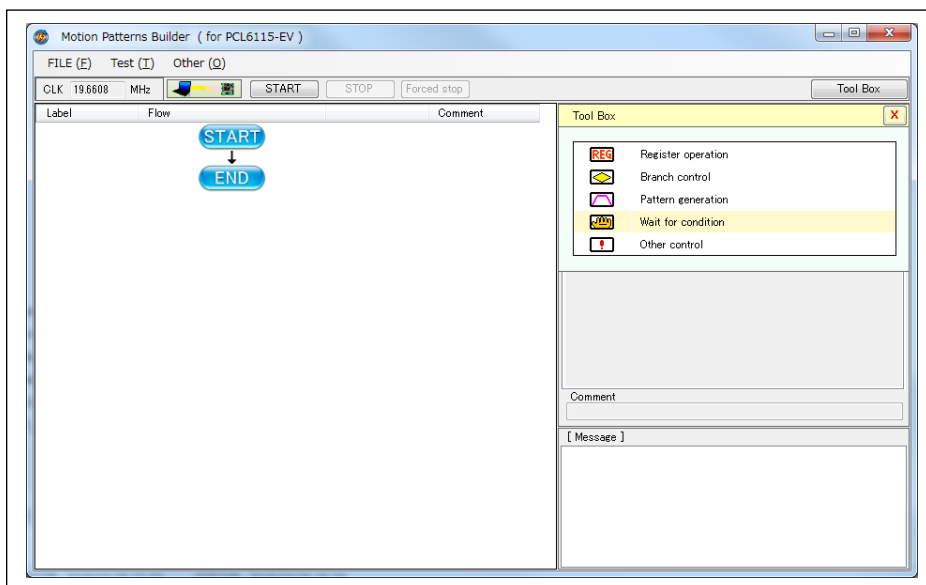
4. Basic operation method of software

4.1 Startup software

Please make sure that PCL6115-EV is connected to a PC.

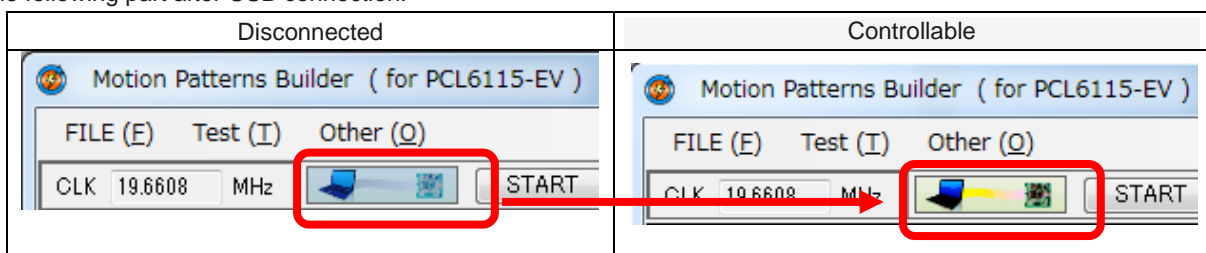


Double-click on the executable file "PCL6115_EV2.exe". The following initial screen starts.



The left side is the flowchart creation screen and the right side is the other operation screen.

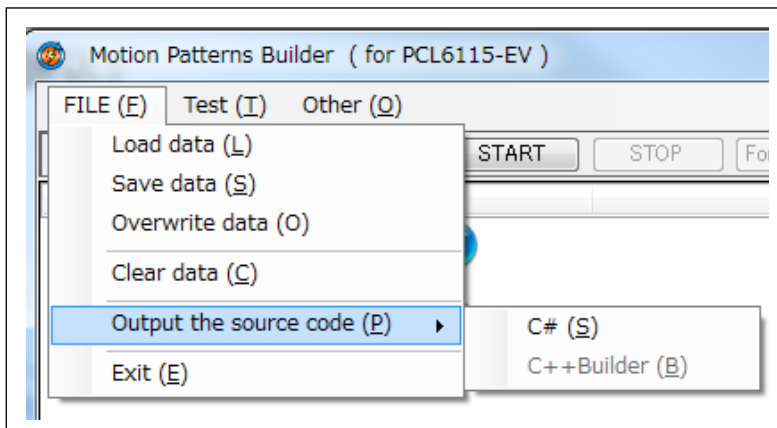
When the PCL6115-EV is not connected by USB at startup, please make it controllable by clicking on the following part after USB connection.



You can make only a flow chart even if USB is not connected.

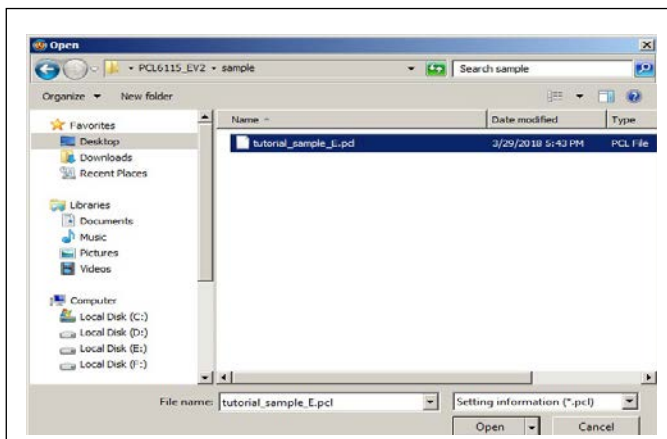
4.2 "File" menu

Click "FILE" to display the file menu.



4.2.1 "Load data"

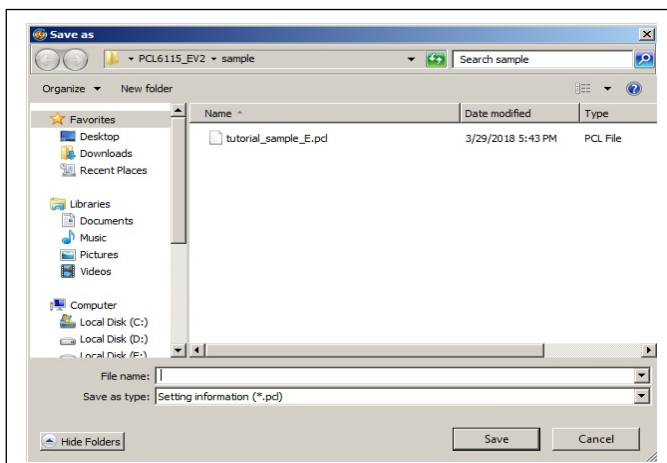
By selecting "Load data", you can display a dialog box where you can select a file and read the saved flowchart data saved by "4.2.2 Save data" menu.



Please select the saved file name (xxxx.pcl) and click "Open" button.

4.2.2 "Save data"

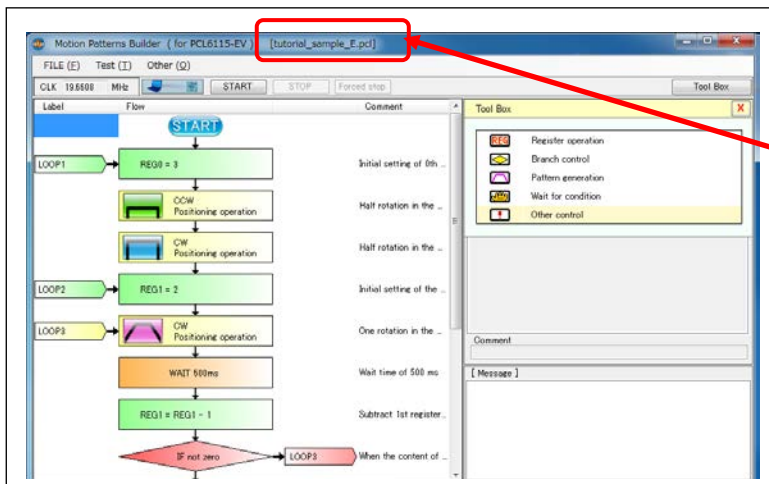
By selecting "Save data", you can display a dialog box in which you can save as a new file and save the flowchart displayed on the screen as a text file.



Write the file name (xxxxx.pcl) and click the "Save" button.

4.2.3 "Overwrite data"

The name of the file (xxxx.pcl) read is displayed, and by selecting "Overwrite data", it is overwritten and saved with the displayed file name (xxxx.pcl).



the file(xxxx.pcl) read.

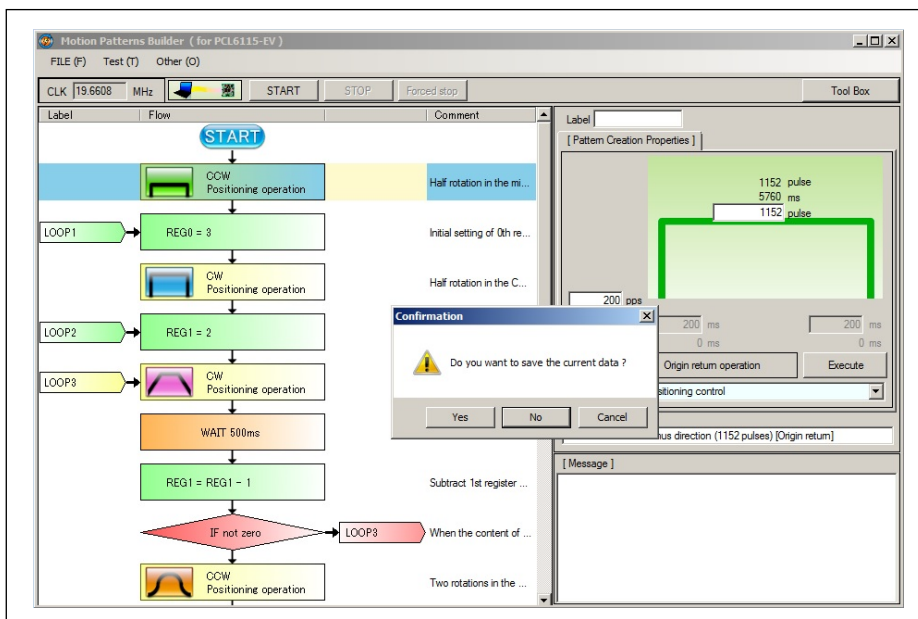
4.2.4 "Clear data"

When you click "Clear data", it is confirmed whether to save the flow chart data being created.

When "Yes" button is selected, the "Save data" screen will be displayed.

If you select the "No" button, the initial screen will be displayed without saving the data.

If click on "Clear data" when flow chart data that has not been edited is displayed, the initial screen will be displayed.



4.2.5. "Output the source code"

4.2.5.1. "C#"

By clicking "Output the source code" → "C #", you can output the source code that performs the operation of the created flowchart.

The source code is generated in the same folder as the software with the file name "samplePCL6115EV2S.cs".

The contents of this source code can be viewed using the sample project (PCL6115_EV2S).

Alternatively, you can see it using a text editor etc.

4.2.5.2. "C++Builder"

"Output the source code" → "C ++ Builder" cannot be used.

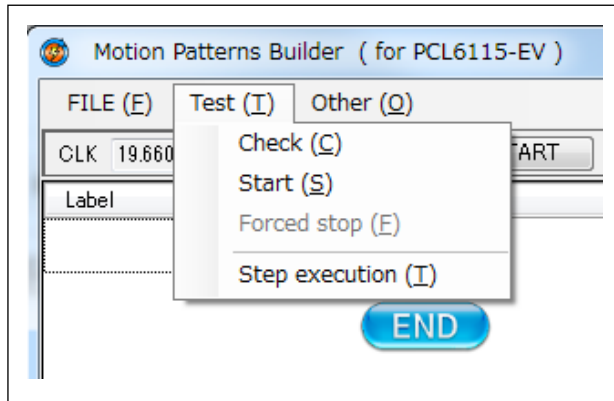
4.2.6. "Exit"

Quit the application software.

If there is flow chart data being created, confirmation will be made as to whether to save it.

4.3 "Test" menu

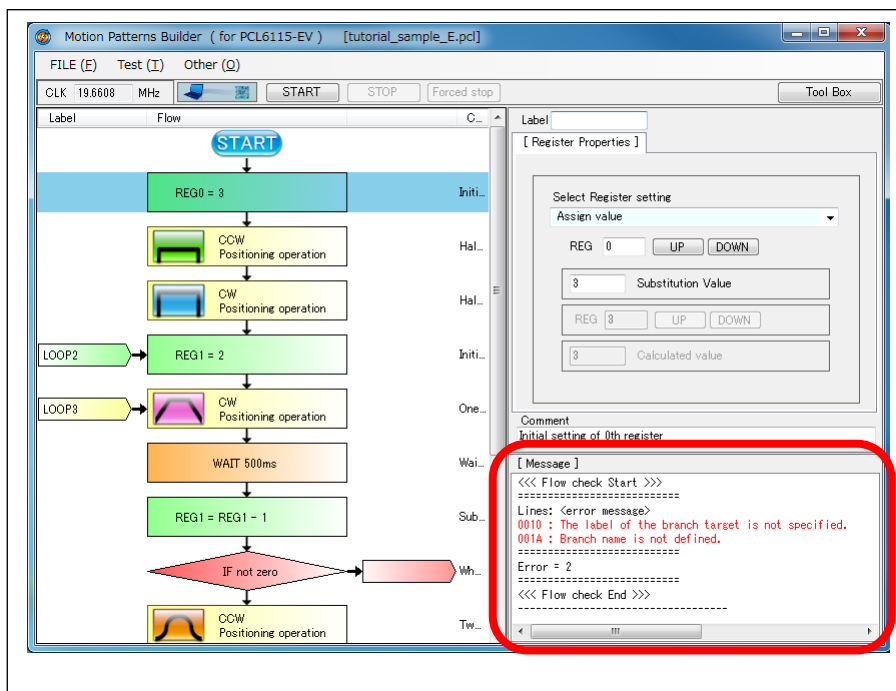
Click "Test" to display the test menu.



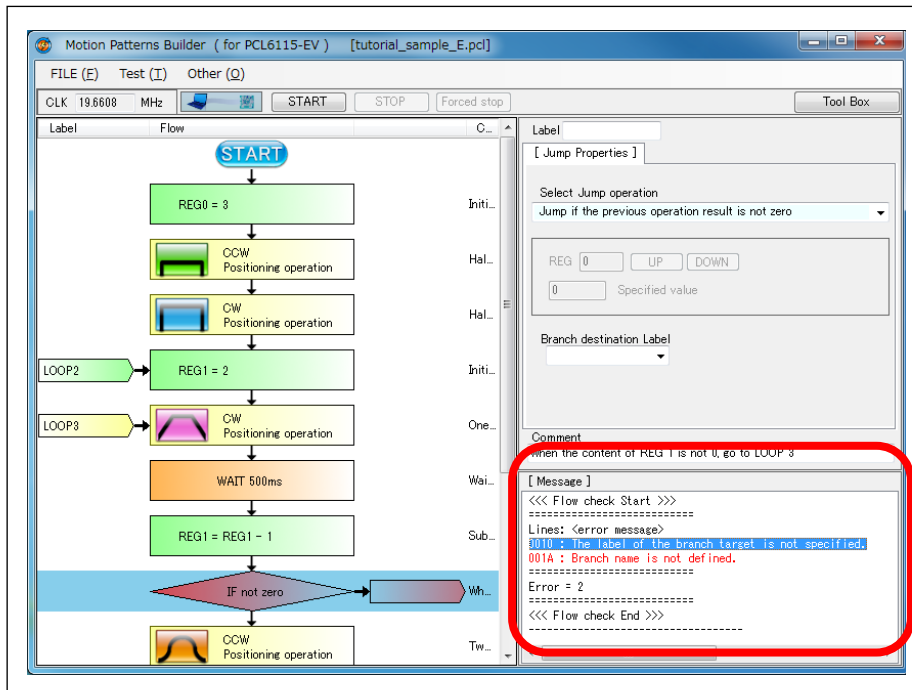
4.3.1 "Check"

Select "Check" from the menu to check the flow chart.

If there is a problem with the created flow chart, an error message will be displayed in red in the "Message" column at the bottom right.



Double clicking on the red letter and the part where the error occurred is highlighted.

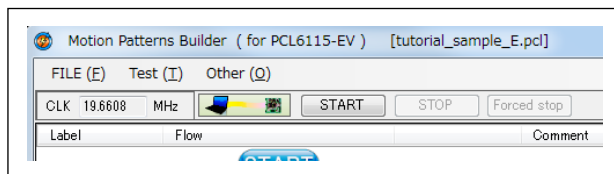


4.3.2. "Start"

Select "Start" from the menu to check the flow chart. If there is no problem, operation starts.

"Start" will be disabled when starting operation. When operation stops, "Start" button becomes effective.

"Start" button has the same function.



4.3.3. "Forced stop"

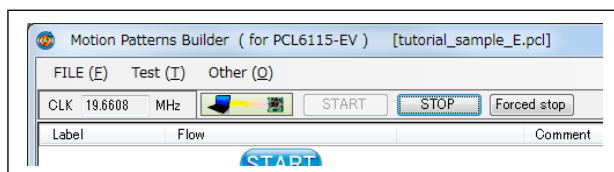
"Forced stop" becomes effective during operation, and clicking stops without waiting for the end of the operation specified in the line of the flowchart being executed.

"Forced stop" is disabled when operation is not working.

"Forced stop" button has the same function.

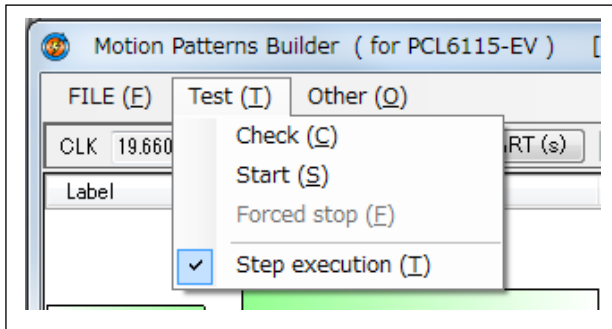
When you click "Stop" button, execution of the flowchart stops after the operation of the currently executed line complete.

During positioning control, it takes time to stop because operation stops after positioning control complete. When not working, "stop" button is disabled.



4.3.4 "Step execution"

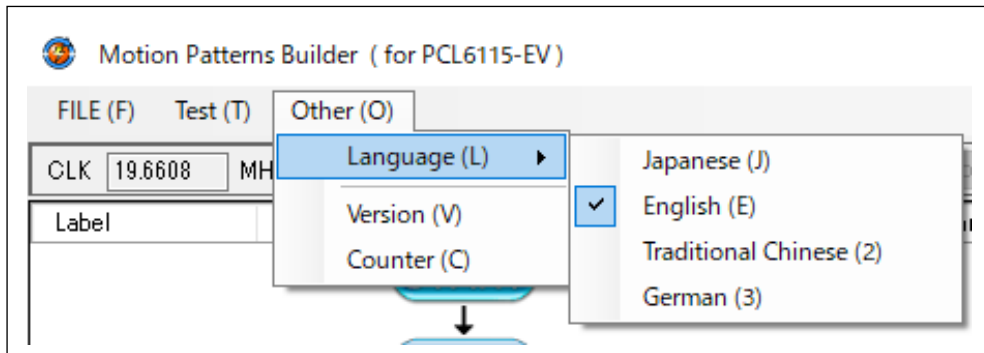
When you select "Step execution", a check mark is shown in front of "Step execution".
By clicking again, the check mark disappears.



If you select "start" when the check mark is displayed, it executes the flow chart line and stops.
To execute the next line, repeat clicking the "Step" button again.

4.4 "Other"

By clicking "Other", you can check the multi-language notation switching and the software version.



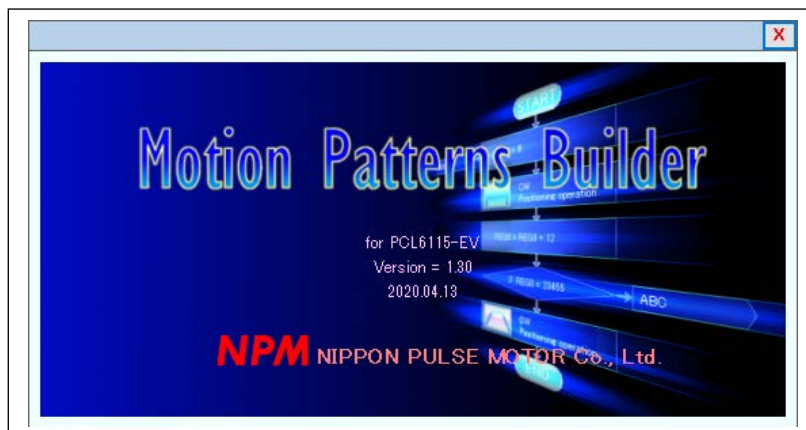
4.4.1. "Language"

Japanese and English can be selected by default.

Up to 18 different languages can be added by creating a multilingual text file ("menu_text_****.Lng"). A check mark is displayed in front of a selected language. (For example, it is displayed with Traditional Chinese and German added.)

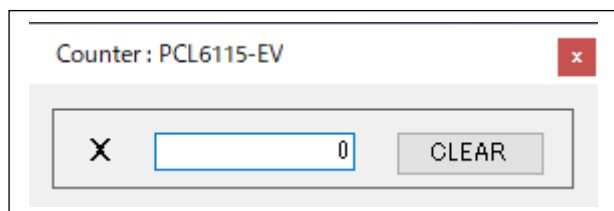
4.4.2. "Version"

You can check the software version.



4.4.3. "Counter"

Click "Counter (C)" to display the counter screen and check the number of operation pulses.








The counter can be cleared ("0") by clicking the "CLEAR" button.

5. Create flowchart

5.1 Placement of parts

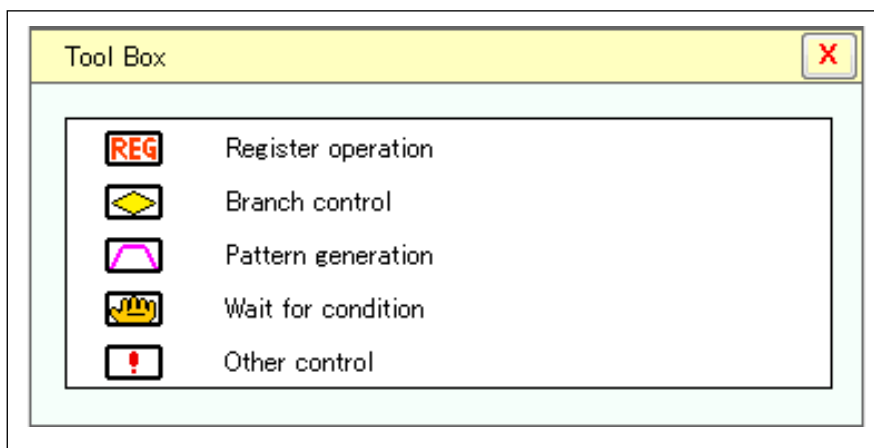
5.1.1 Part

There are five types of parts that make up flowchart.

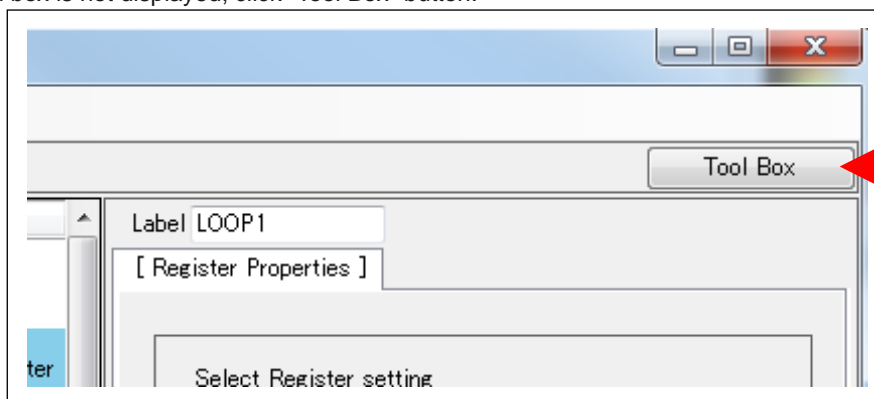
Part name	Part icon	Brief explanation
Register operation		Setting of register (variable) Substitution of value, arbitrary value and other register addition / subtraction
Branch control		Setting branching behavior Selection from six branch conditions, designation of branch destination
Pattern generation		Set motion pattern Selection from four positioning control, zero point return control
Wait for condition		Setting weight Set wait time in milliseconds
Other control		Extension setting Output pulse specification/ Excitation mode/ Operation mode setting

5.1.2 Tool Box

The parts are stored in the tool box.



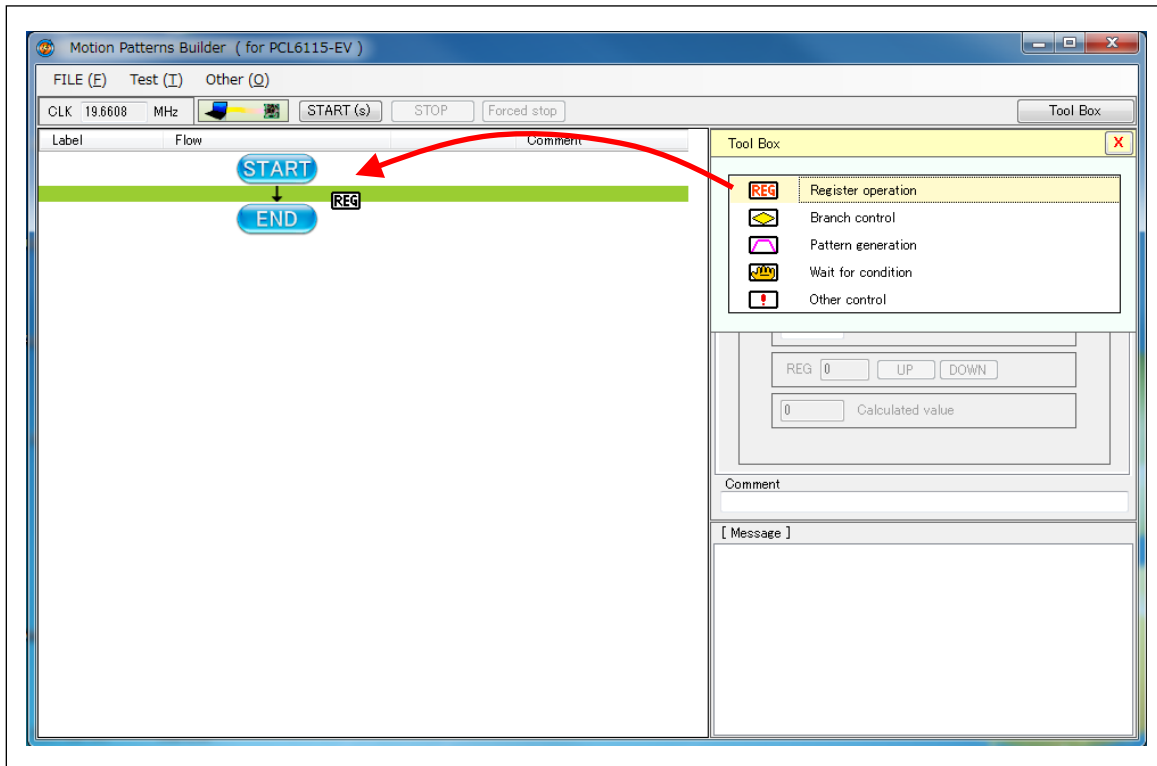
If the tool box is not displayed, click "Tool Box" button.



5.1.3 Pasting parts

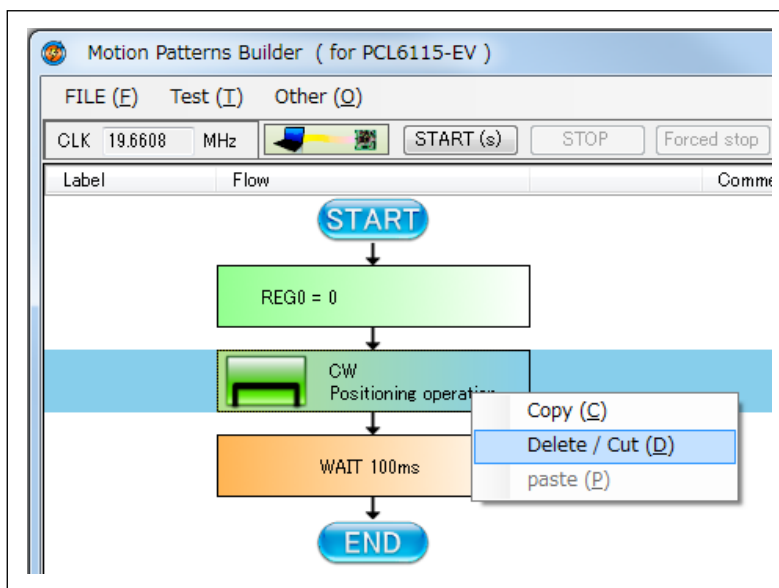
To paste the parts to the flow chart, follow the procedure below.

1. If you move the mouse cursor to the part in the tool box and hold down the left mouse button, you will grasp the part (the cursor shape changes).
2. Drag the part to the flowchart side with grasping the part.
3. When dragging it on the flow chart side, there are some lines that change to dark green. When you release the left mouse button there, the part is inserted in that line.
4. Repeat this to place the parts.



5.1.4 Delete parts on flowchart

Move the mouse cursor to the part you want to delete and right click to display the popup menu. Select "Delete / Cut (D)" from this menu.



5.1.5 Copy parts on flowchart

Display the pop-up menu with the same operation as deleting parts and select "Copy (C)".

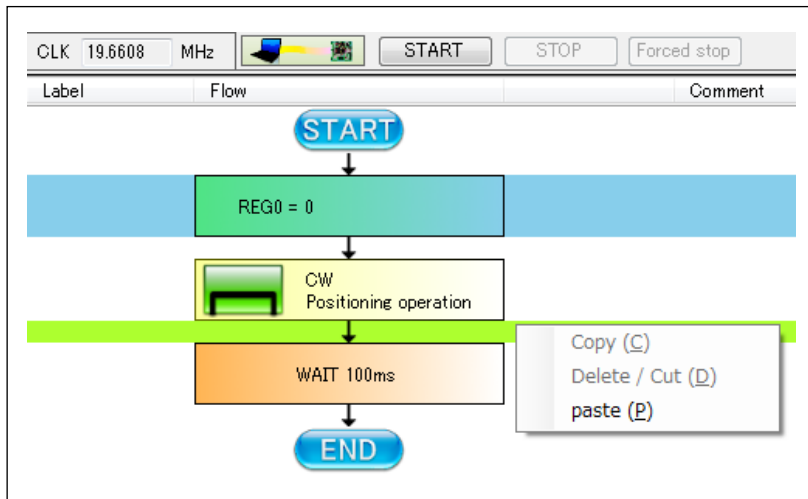
5.1.6 Pasting parts

You can paste the part that you deleted or copied just before into the flowchart.

Pasting will be inserted between existing parts.

Position the cursor between the parts you want to insert and right-click the mouse to display the pop-up menu.

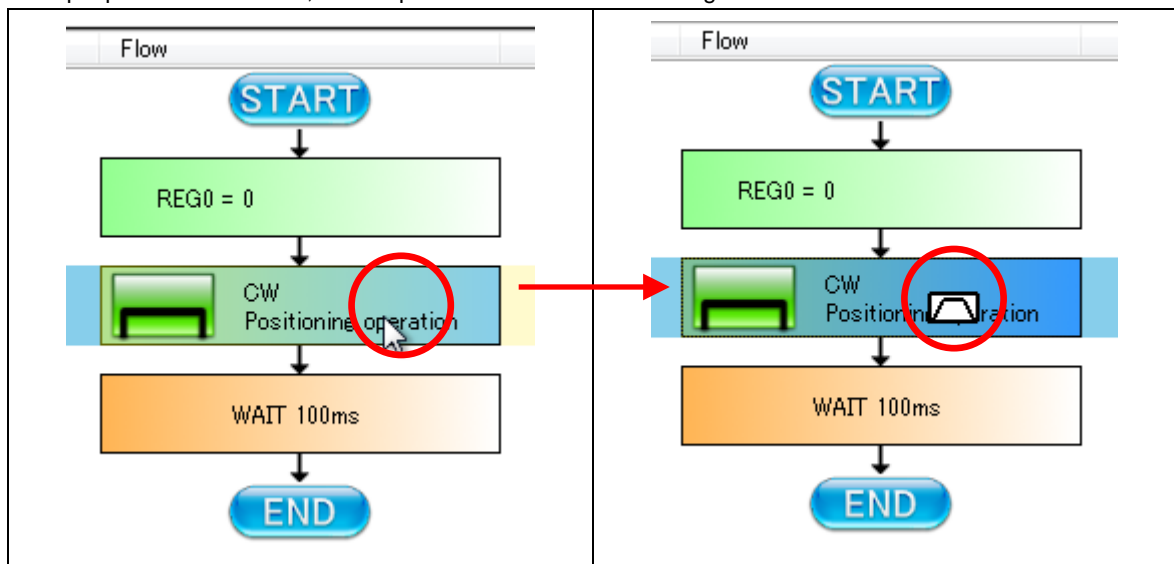
Please select "paste (P)" from this menu.



5.1.7 Movement of parts

Move the mouse cursor to the part you want to move and press the left button.

If you keep it pressed for a while, the shape of the mouse cursor changes.

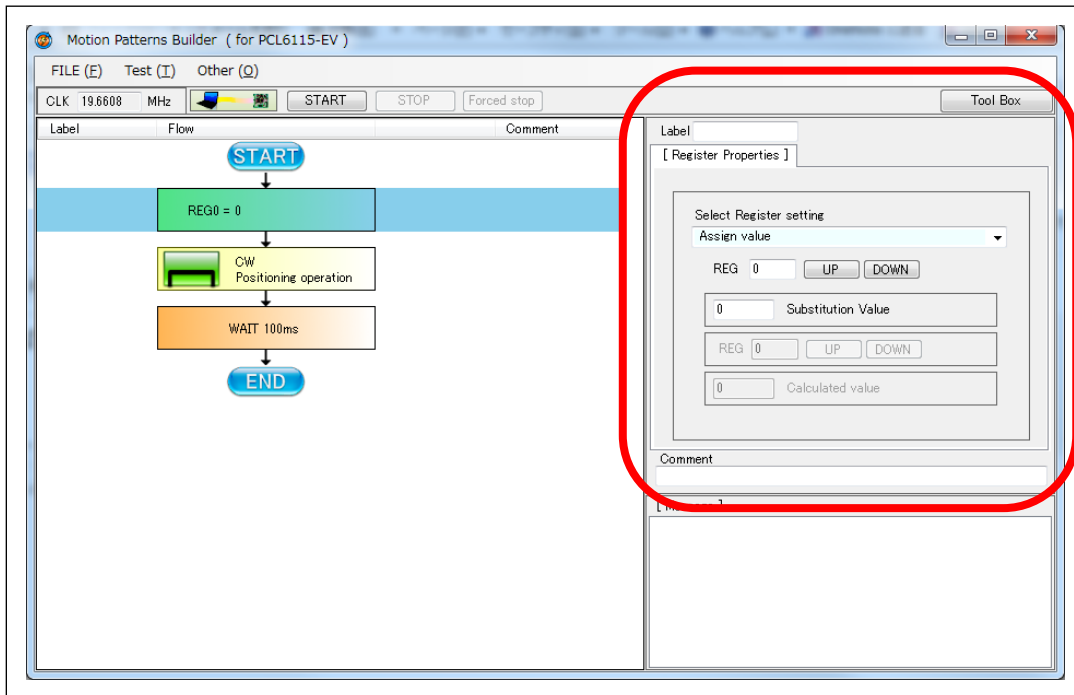


Changing the shape of the cursor means grasping the part.

When you grab the part, please drag it to the position where you want to move it.

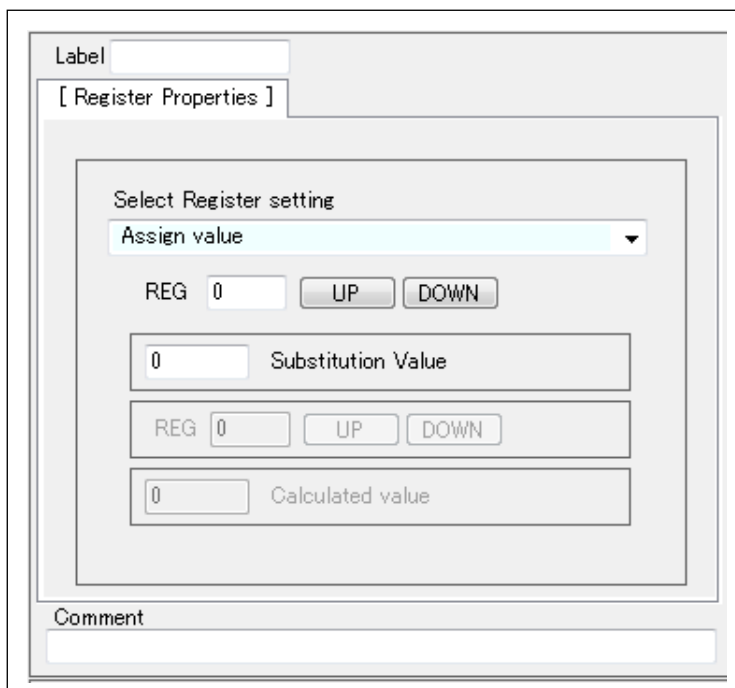
5.2 Motion setting of parts

When you click the placed part, the property setting is displayed on the right side of the screen.
At this time the toolbox disappears.



5.2.1. Register operation

Click on the register operation part of the flowchart and the following property screen will be displayed.



The following operations can be specified for the register.

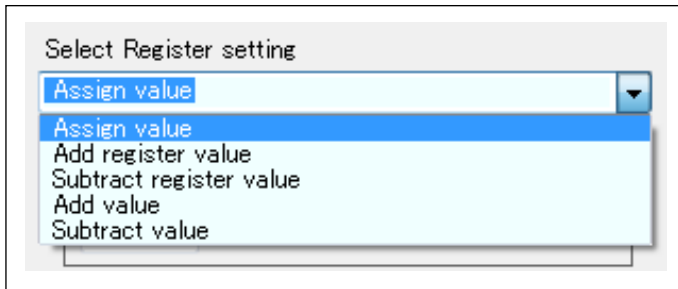
- (1) Assign a value
- (2) Add and subtract arbitrary values
- (3) Add and subtract with other registers

Values assigned to Register are unsigned 16 bits (0 to 65535).

Up to 256 registers can be handled.

Registers are distinguished by appending numbers (0 to 255) after "REG".

Select the operation for the register from the pull-down menu.

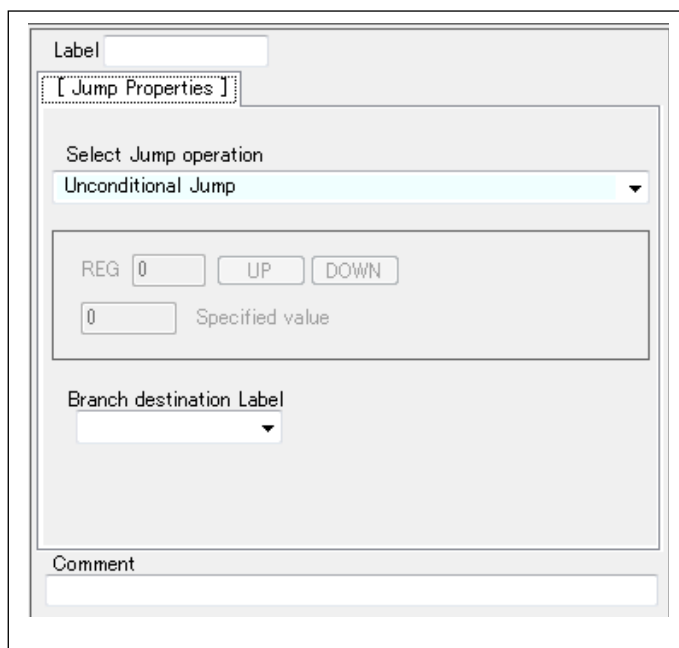
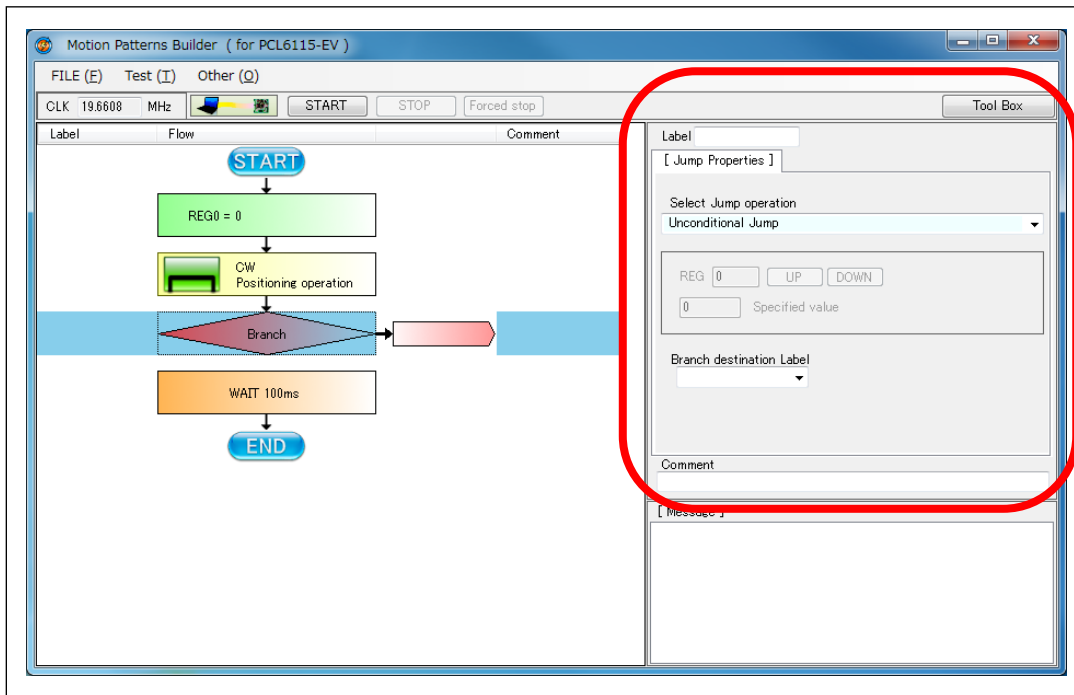


<p>(1) Assign value</p> <ol style="list-style-type: none"> 1. First, set a register number you want to assign in "REG" column. 2. Next, set a numerical value in the "Substitution Value" column 	
<p>(2) Add / subtract arbitrary values</p> <ol style="list-style-type: none"> 1. First, set a register number to be added / subtracted. 2. Next, set a value to be added or subtracted in the "Calculated value" column. 	
<p>(3) Addition and subtraction with other registers</p> <ol style="list-style-type: none"> 1. First, set a register number to be added / subtracted. 2. Next, set a register number holding a value to be added or subtracted. 	

The set status is reflected in the display on the part side.

5.2.2 Branch control

Click on the branch control part in the flow chart, the following property screen will be displayed.



The following branching behavior can be specified.

- (1) Unconditional Jump
Unconditionally transfers control to the specified branch destination.
- (2) Jump if the previous operation result is zero
If the result of register operation performed before coming to this branch part is zero, control is transferred to the specified branch destination.
- (3) Jump if the previous operation result is not zero
If the result of register operation performed before coming to this branch part is not zero, control is transferred to the specified branch destination.

- (4) Jump if over(under)flows occurs in previous calculation result.
When the addition result for register operation performed before coming to this branch part overflows, or when the subtraction result underflows, it transfers control to the specified branch destination.

- (5) Jump if register and specified value match

<ol style="list-style-type: none"> 1. Set the register number you want to compare. 2. Set the comparison value. <p>If these values are the same, the control is transferred to the specified branch destination.</p>	
--	--

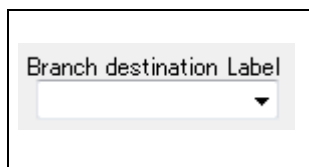
- (6) Branch when the register value does not match the specified value
The similar settings like the above (5) are made and if these values are different, control is transferred to the specified branch destination.

Designation of branch destination

Set the label of the branch destination.

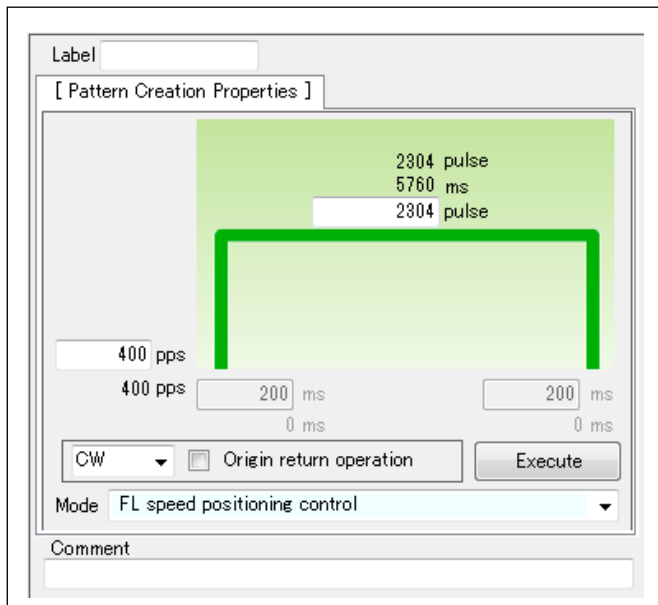
You can also enter the key directly, and you can also select from the label set in "Label Setting" to be described later.

However, you cannot use anything other than half-width characters.



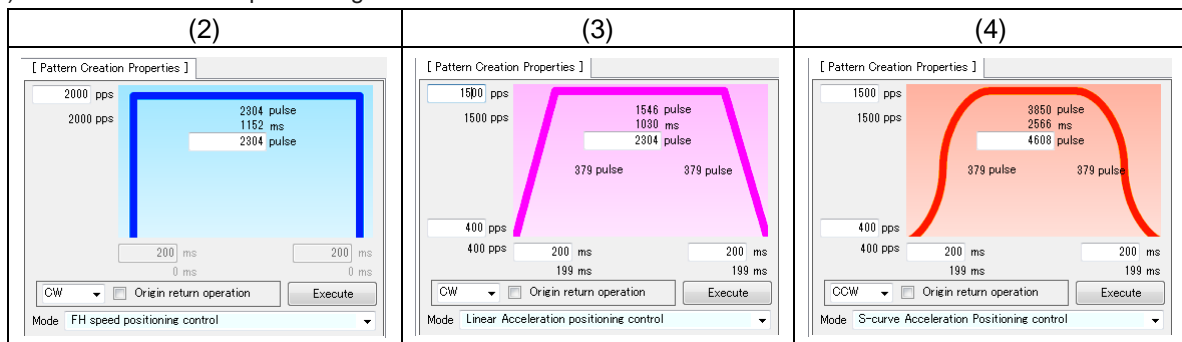
5.2.3 Pattern generation

Clicking the pattern generation part of the flow chart displays the following property screen.

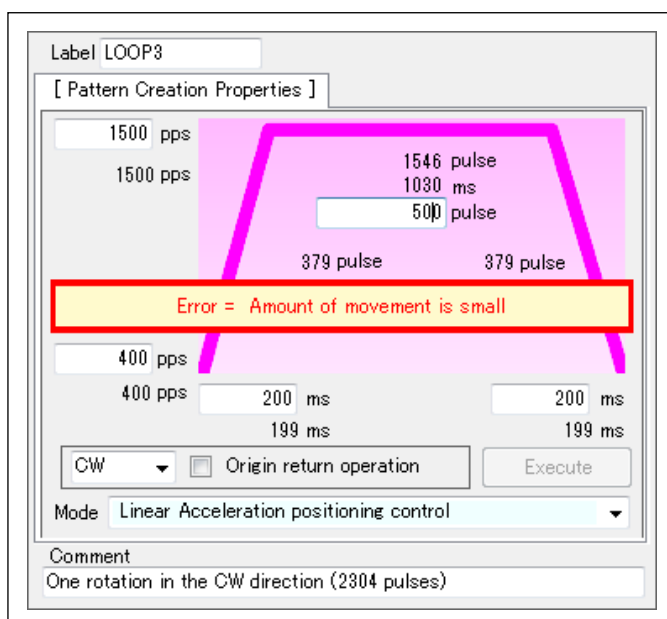


The following pattern can be generated.

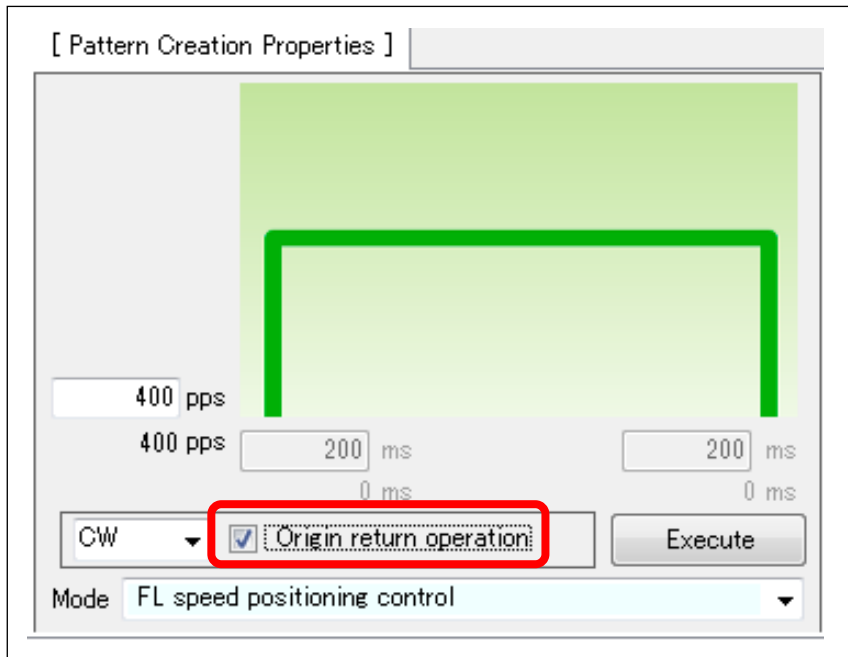
- (1) FL speed positioning control (Shown the above)
- (2) FH speed positioning control
- (3) Linear Acceleration positioning control
- (4) S-curve Acceleration positioning control



If you set a value and no error is displayed, you can check the operation by clicking "Execute" button.

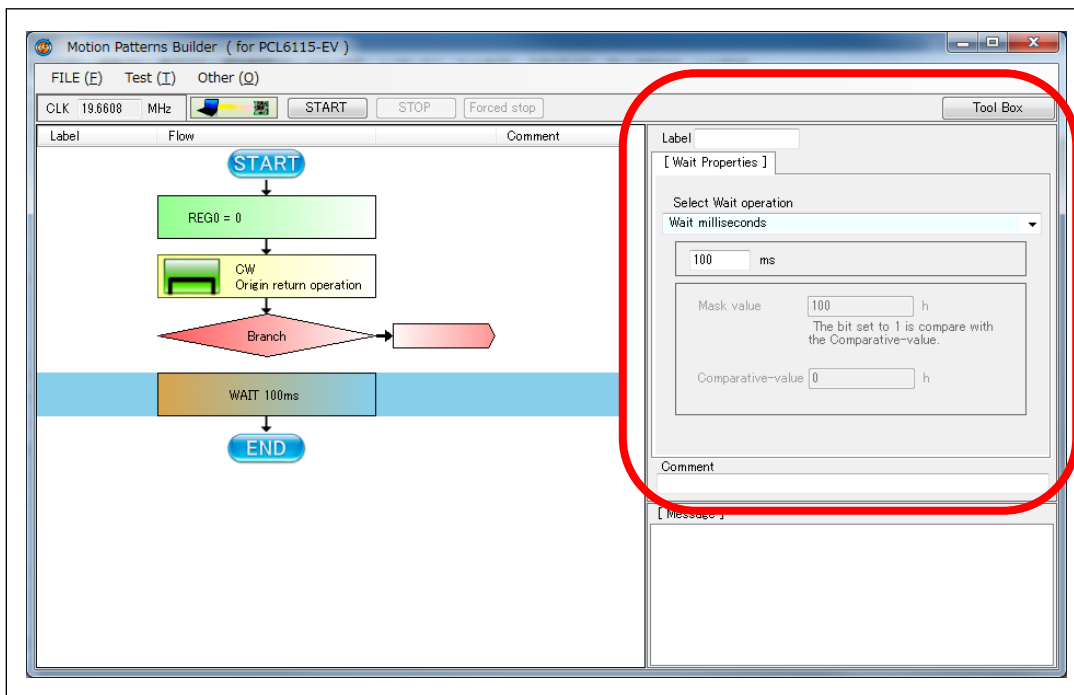


When tick the checkbox of g "Origin return operation", setting of movement amount is omitted.



5.2.4 Wait for condition

Click on the weight control part in the flowchart, the following property screen will be displayed.



You can set waiting time in milliseconds.

However, accuracy is not high because it is under Windows control.

5.2.5 Other control

Click on the other parts of the flowchart, the following property screen will be displayed.

Selection of other actions

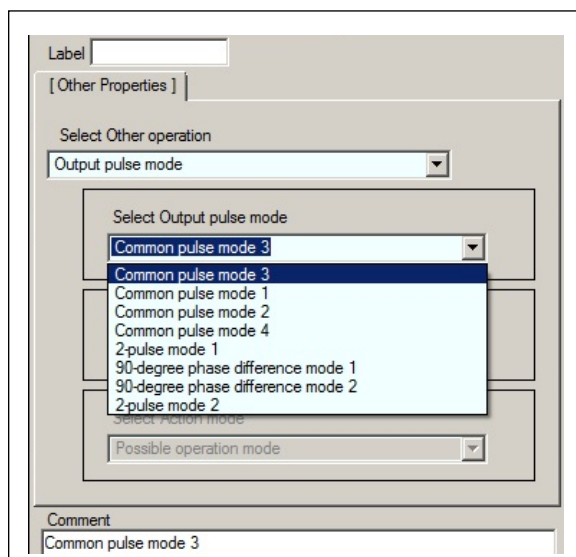
Output pulse mode / Excitation mode / Operation mode can be selected.

(1) Selection of Output pulse mode

You can select the output mode (PMD2-0) of the environment setting 1 register(RENV1) of the PCL6115.

1. PMD2-0=0x02: Common pulse mode 3
(OUT terminal Negative logic pulse signal, DIR terminal Negative logic direction signal)
2. PMD2-0=0x00: Common pulse mode 1
(OUT terminal Negative logic pulse signal, DIR terminal Positive logic direction signal)
3. PMD2-0=0x01: Common pulse mode 2
(OUT terminal Positive logic pulse signal, DIR terminal Positive logic direction signal)
4. PMD2-0=0x03: Common pulse mode 4
(OUT terminal Positive logic pulse signal, DIR terminal Negative logic direction signal)
5. PMD2-0=0x04: 2-pulse mode 1
(OUT terminal Negative logic + direction pulse signal, DIR terminal Negative logic - direction pulse signal)
6. PMD2-0=0x05: 90-degree phase mode 1
(OUT terminal A-phase pulse 4x multiplication, DIR terminal B-phase pulse 4x multiplication)
7. PMD2-0=0x06: 90-degree phase mode 2
(OUT terminal B-phase pulse 4x multiplication, DIR terminal A-phase pulse 4x multiplication)
8. PMD2-0=0x07: 2-pulse mode 2
(OUT terminal Positive logic + direction pulse signal, DIR terminal Positive logic - direction pulse signal)

CAUTION: When driving the attached stepping motor of PCL6115-EV, select Common pulse 3. To select other than Common Pulse 3, select a mode other than Operable Mode in the operation mode so as not to drive the attached stepping motor of PCL6115-EV.



(2) Selection of Excitation mode

You can select the excitation mode of the attached stepping motor of the PCL6115-EV.

1. 2W1-2 phase: (P3 general output = L, P4 general output = L)
2. W1-2 phase: (P3 general output = L, P4 general output = H)
3. 1-2 phase: (P3 general output = H, P4 general output = L)

CAUTION: Changing the excitation mode will change the maximum speed of the attached stepping motor of the PCL6115-EV and the amount of movement per rotation.

Label

[Other Properties]

Select Other operation
Excitation mode

Select Output pulse mode
Common pulse mode 3

Select Excitation mode
2W1-2 phase
W1-2 phase
1-2 phase

Possible operation mode

Comment
2W1-2 phase

(3) Selection of Operation mode

You can select the operation mode of the attached stepping motor of the PCL6115-EV.

1. Possible operable mode
2. Initial mode: (EZ input low level)
3. Enable Standby Mode: (Output OFF)
4. Standby mode: (Output OFF)

CAUTION: When driving the attached stepping motor of the PCL6115-EV, select 1. Operable mode.

Label

[Other Properties]

Select Other operation
Action mode

Select Output pulse mode
Common pulse mode 3

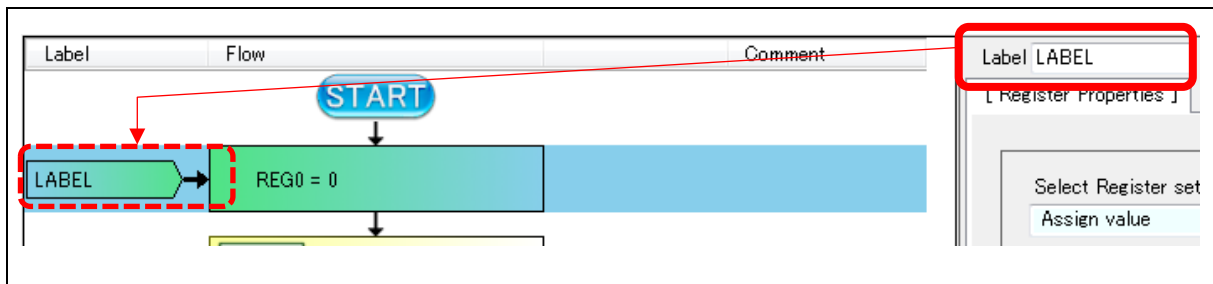
Select Excitation mode
2W1-2 phase

Select Action mode
Possible operation mode
Possible operation mode
Initial mode
Enable stanby mode
Stanby mode

Comment
Possible operation mode

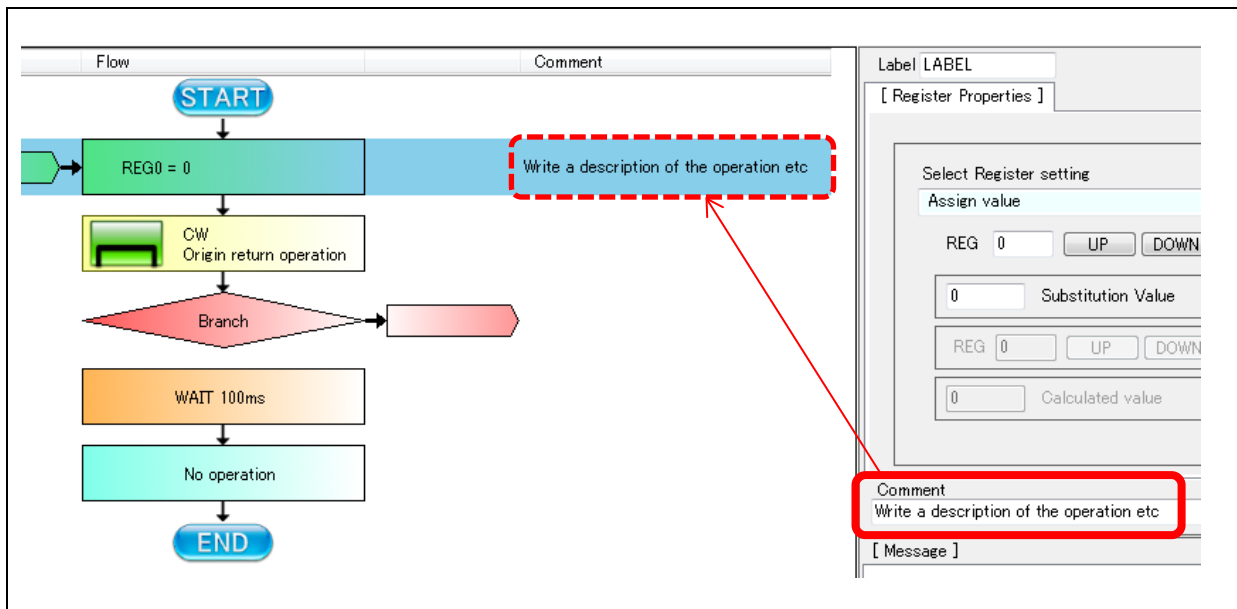
5.2.6 Label setting

By entering characters in the "Label" column, you can set the label to be branched to the selected part.
Labels are up to 10 single-byte characters.



5.2.7 Comment

If you enter characters in the "Comment" field, you can add a comment to the selected part.
In order to make the flow chart easier to read, we recommend entering comments .



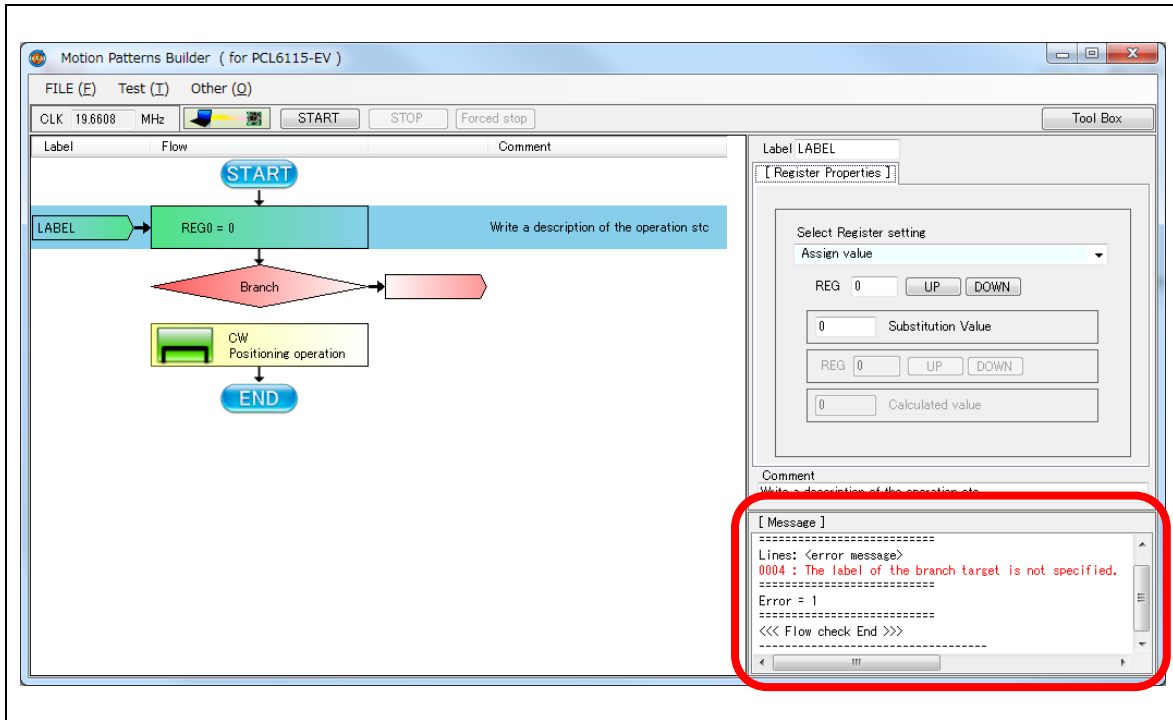
When it passes through the computation part of the register during operation, the result of computation is displayed.

6. Start operation

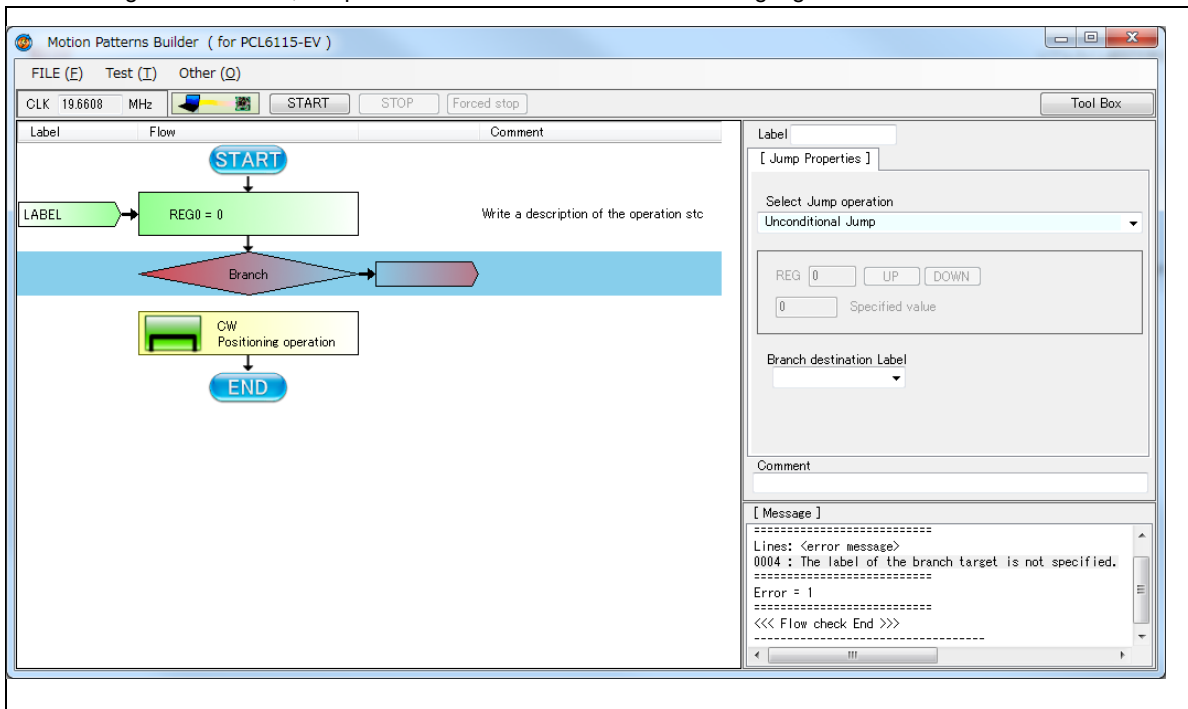
6.1 Execution of flowchart

When the flowchart is completed, please click "START" button.

The flow chart is checked and if there is a problem the contents of the problem will be displayed in red in the "Message" column.



If double clicking on a red letter, the part where the error occurred will be highlighted.



If there is no error, operation starts.

6.2 STOP operation

When you click the "STOP" button, execution of the flowchart stops after waiting for the completion of the operation of the currently performed part.

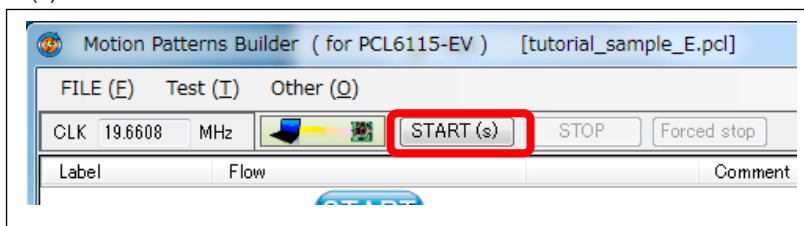
When positioning control is performed, it takes time to stop because operation stops after positioning control complete.

6.3 Forced STOP of operation

When clicking the "Forced stop" button, execution of the flowchart stops before the currently performed positioning control complete.

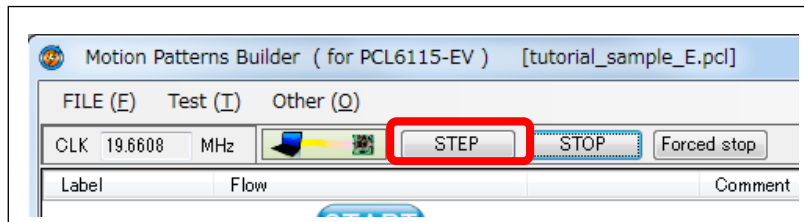
6.4 STEP operation

If "Step execution" is selected ("4.3.4. Step execution") from the "Test" menu, the "START" button display will be displayed as "START (s)" button.

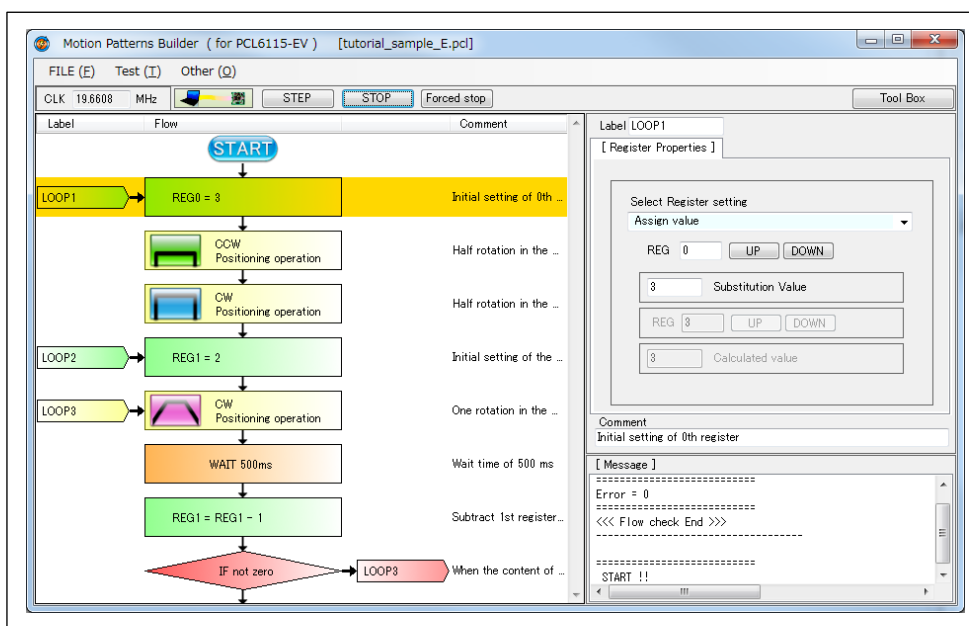


Click the "START (s)" button to execute the flow chart line and stop.

The display changes from "START (s)" button display to "STEP" button display.



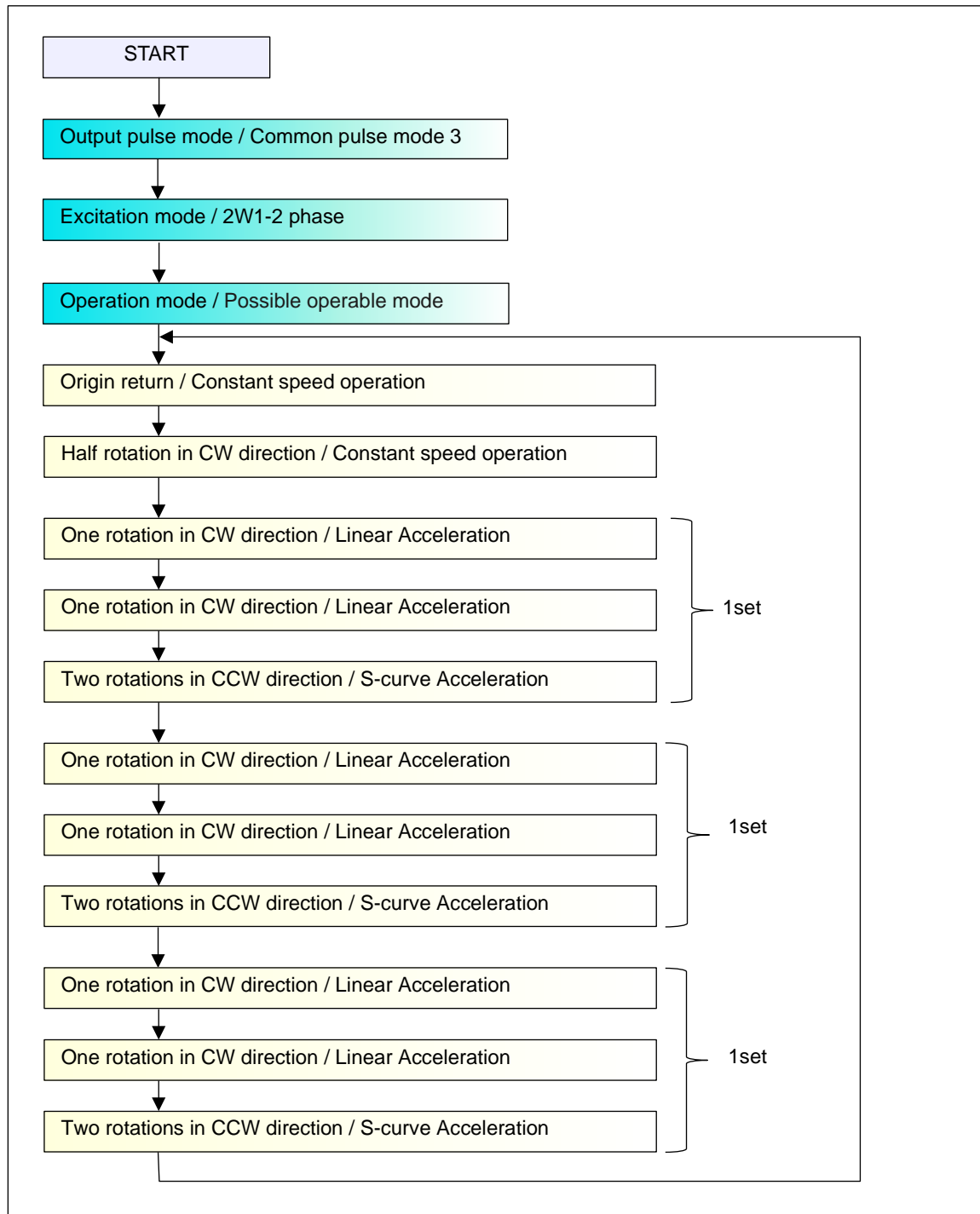
Click the "STEP" button repeatedly to execute the next line.



7. Tutorial

"tutorial_sample_E.pcl" file is in ¥sample folder. The followings explain this tutorial sample.

7.1 Created content



Operation summary:

After starting, find the origin point and move to the position half turn from the origin position. Subsequently, after repeating three sets of operations from forward rotation to reverse rotation, repeat the operation of searching the origin again. The operation is made in infinite loop, and the operation is ended by "STOP"/"Forced stop" button.

Other conditions:

Output pulse mode is Common pulse 3, Excitation mode is 2W1-2 phase, Operation mode is Possible operable mode.

The initial speed is 400 pps and the maximum speed is 1500 pps.

Acceleration time and deceleration time are both 200 ms.

The homing speed is 200 pps and the constant speed is 400 pps.

In the PCL6115-EV, the value that the output shaft of the stepping motor PFCU30-24V4GM

(1/12) makes one revolution is $48 \times 12 \times 4 = 2304$ according to 48 pulses per one revolution for 1-2 phase excitation, 1/12 gear, 2W1-2 phase excitation mode.

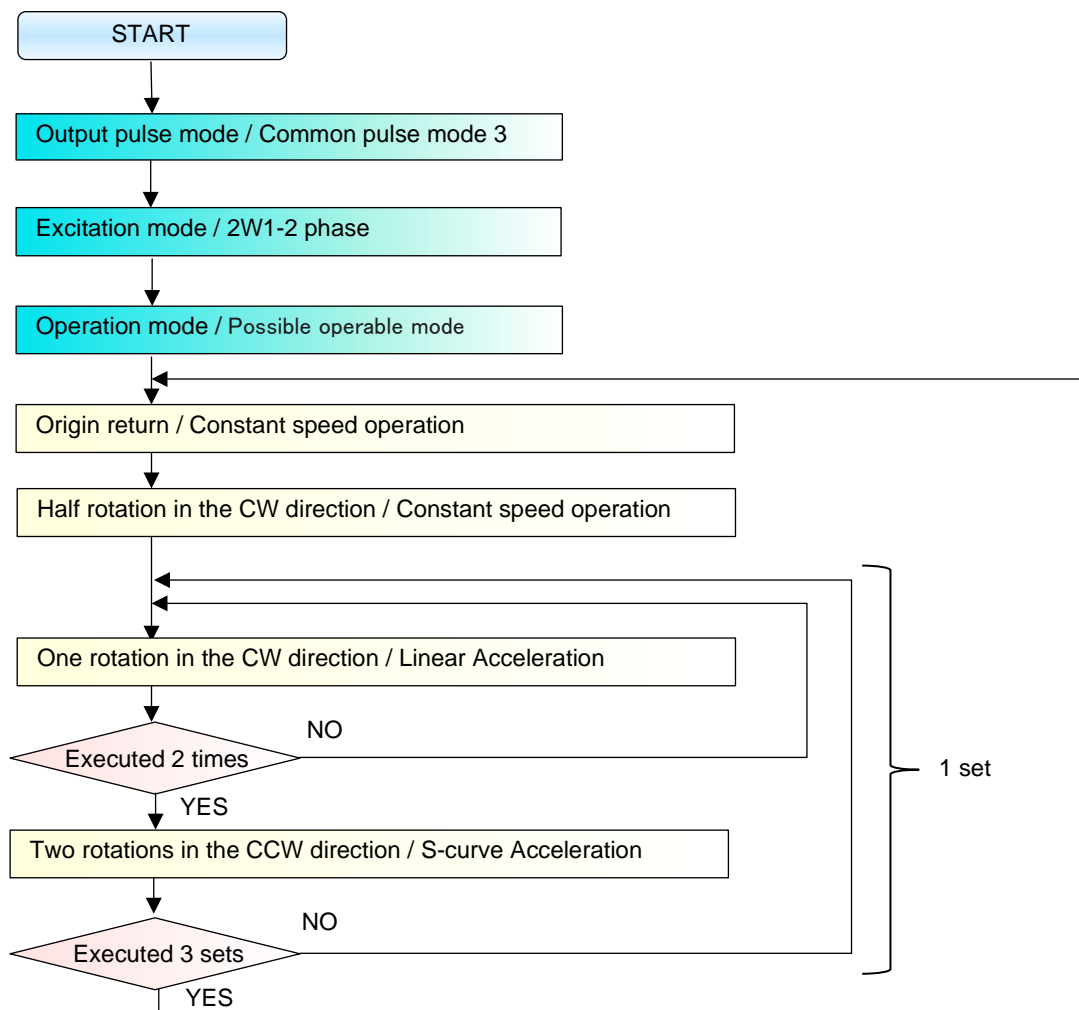
Insert a wait time of 500 ms between operations in one set and insert a wait time of 1000 ms between sets.

7.2 Organization of actions

There are some common items in the action you are creating.

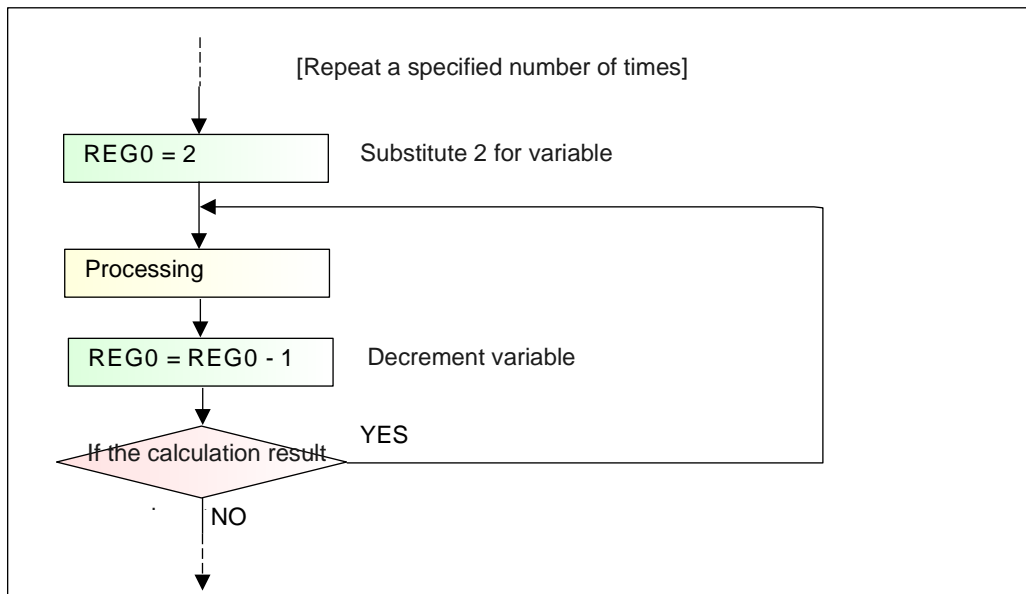
The unit of "1 set" is repeated three times. Next, the first two operations in "1 set" are the same.

These are organized as follows.



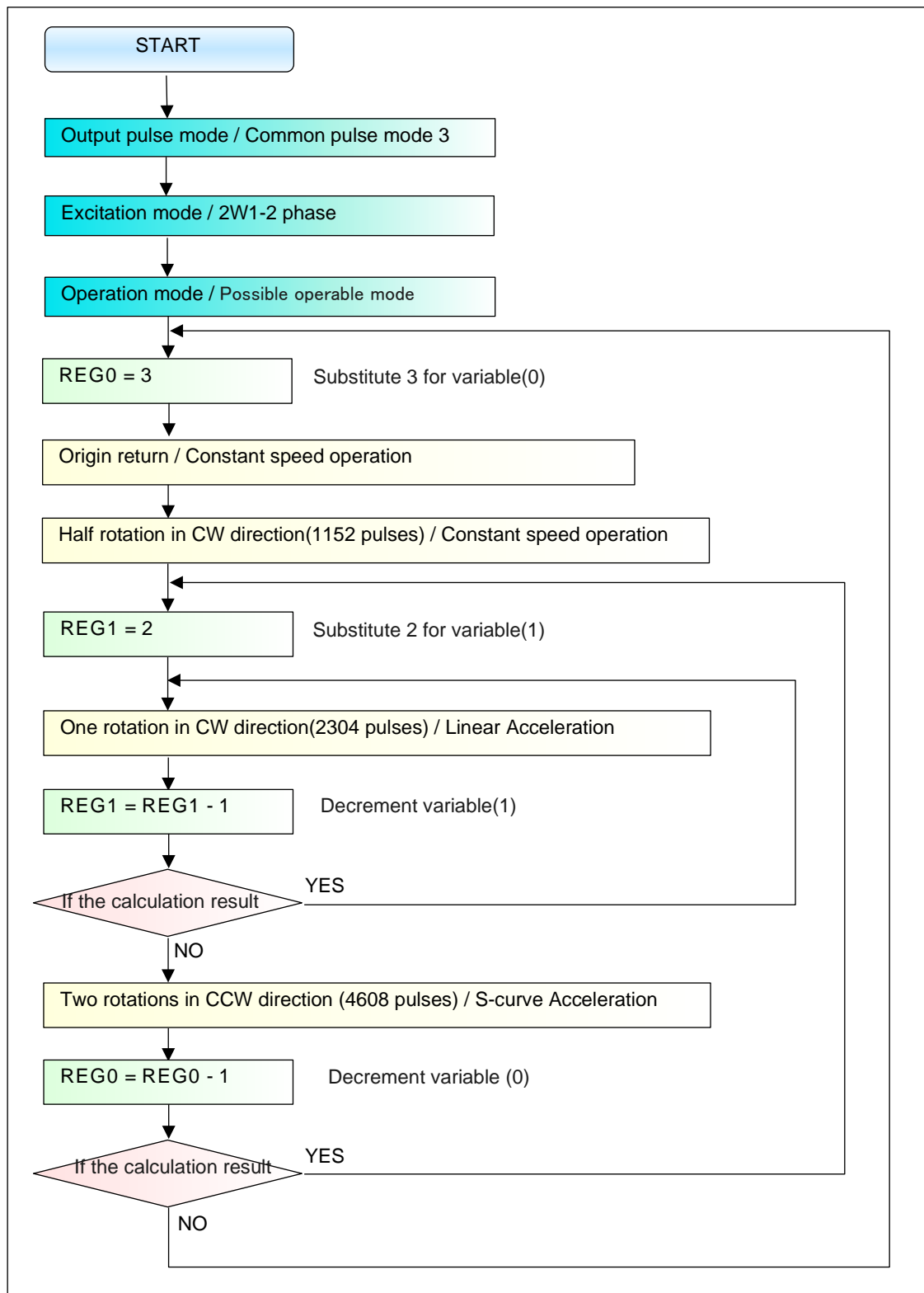
7.3 Repeat a specified number of times

Operations such as "Execute 2 times", "Execute 3 sets", etc. use variables as follows.
Variables in this software are treated as "REGn" ("n" is a number from 0 to 255).



7.4 Organizing the flowchart









Consider the composition of the flow chart based on the concept of iteration and the repetition the specified number of times.



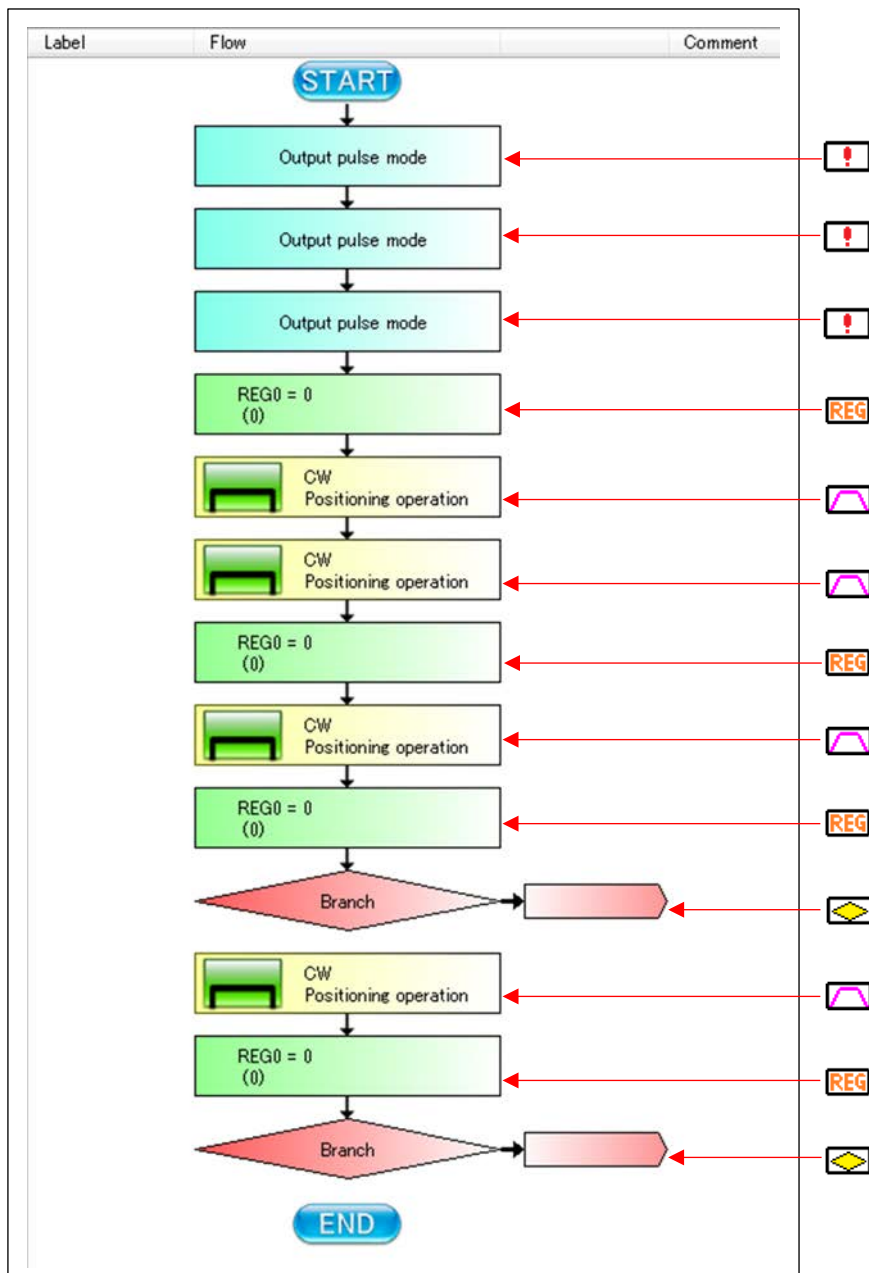
Based on this, we create a flow chart with this software.

7.5 Flowchart arrangement

Launch the software and place the corresponding parts as outlined above.
 Corresponding parts are as follows.

-  : Register operation ()
-  : Branch control ()
-  : Pattern generation ()
-  : Other control ()

Drag the parts of the toolbar and arrange them as follows.



7.6 Other control

There are 3 types of Output pulse mode, Excitation mode, and Operation mode.
The conditions defined for pattern creation were as follows.

Output pulse mode is Common pulse 3, Excitation mode is 2W1-2 phase, Operation mode is Possible operation mode.
The initial speed is 400 pps and the maximum speed is 1500 pps.
Acceleration time and deceleration time are both 200 ms.
The origin return speed is 200 pps and the constant speed is 400 pps.
In the PCL6115-EV, the value that the output shaft of the stepping motor PFCU30-24V4GM (1/12) makes one revolution is $48 \times 12 \times 4 = 2304$ according to 48 pulses per revolution for 1-2 phase excitation, 1/12 gear, 2W1-2 phase excitation mode.
Insert a wait time of 500 ms between operations and insert a wait time of 1000 ms between sets.

7.6.1 Other control select

Click on the first other control part and set the Output pulse mode and Common pulse mode 3 with the property.
Click on the second other control part and set the Excitation mode, 2W1-2 phase in the property.
Click the third other control part and set the Operation mode and Possible operation mode in the property.

The screenshot displays the Motion Patterns Builder software interface. The main window shows a flowchart with the following steps:

- START
- Output pulse mode
- Excitation mode
- Action mode (highlighted with a blue bar)
- REG0 = 0
- CW Positioning operation
- REG0 = 0
- CW Positioning operation
- REG0 = 0
- CW Positioning operation
- REG0 = 0
- Branch
- CW Positioning operation
- REG0 = 0
- Branch
- END

The right-hand side of the interface shows the 'Property' window, which is highlighted with a red box and labeled 'Property'. The 'Select Other operation' dropdown menu is open, showing the following options:

- Action mode
- Output pulse mode
- Excitation mode
- Action mode

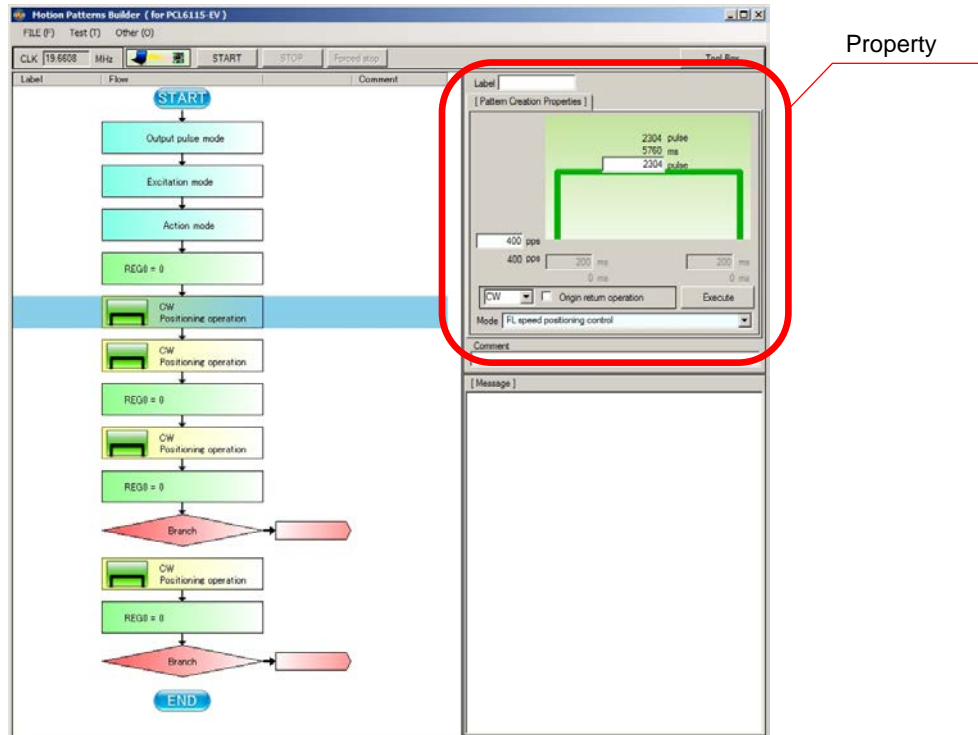
The 'Select Excitation mode' dropdown menu is set to '2W1-2 phase'. The 'Select Action mode' dropdown menu is set to 'Possible operation mode'.

7.7 Pattern generation content

There are 4 types of motion patterns this time.

7.7.1 First motion pattern (Origin return / Constant speed operation)

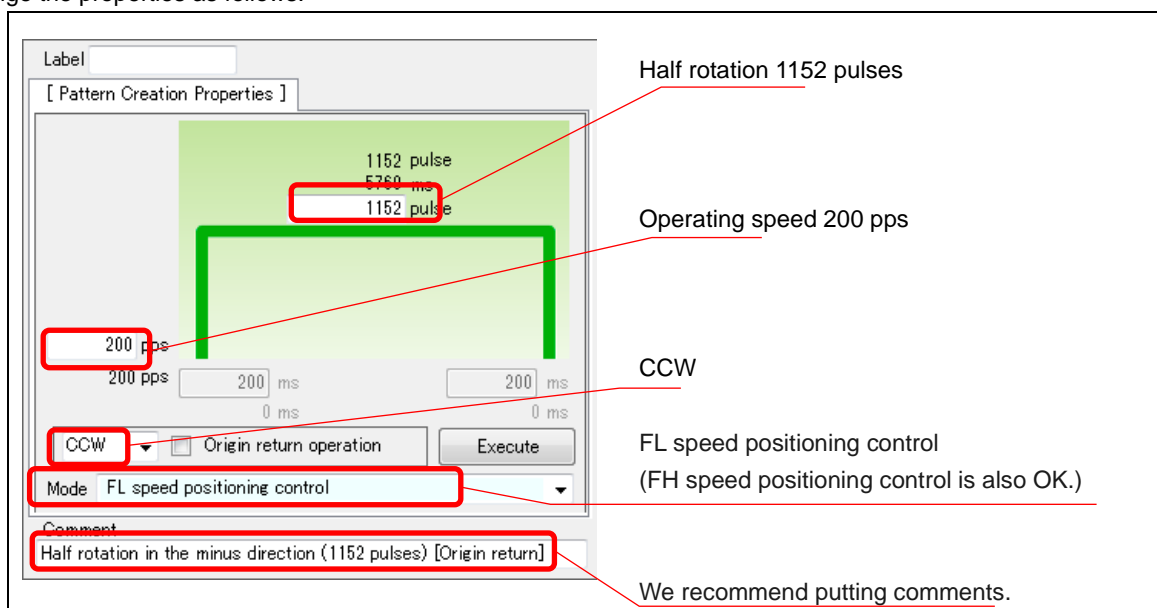
Click on the first pattern generation part and set property.



Although the PCL6115-EV has an input terminal for the origin signal, since the origin switch is not actually connected, the origin return operation cannot be performed.

Therefore, for the sake of convenience, we will perform the opposite operation to the second one (half rotation in the CCW direction [1152 pulses] / Constant speed operation).

Change the properties as follows:



(If you connect by connecting the origin switch, please check "Origin return operation".)

7.7.2 Second motion pattern (Half rotation in the CW direction / Constant speed operation)

Click on the second pattern generation part and set the properties.

Label

[Pattern Creation Properties]

400 pps

400 pps

1152 pulse

2880 ms

1152 pulse

200 ms

200 ms

0 ms

0 ms

CW

Origin return operation

Execute

Mode FH speed positioning control

Comment

Half rotation in the CW direction (1152 pulses)

Half rotation 1152 pulses

Operating speed 400 pps

CW

FH speed positioning control

We recommend putting comments.

7.7.3 Third motion pattern (One rotation in the CW direction / Linear Acceleration)

Click on the third pattern generation part and set the properties.

Label LOOP3

[Pattern Creation Properties]

1500 pps

1500 pps

1546 pulse

1030 ms

2304 pulse

379 pulse

379 pulse

400 pps

400 pps

200 ms

200 ms

199 ms

199 ms

CW

Origin return operation

Execute

Mode Linear Acceleration positioning control

Comment

One rotation in the CW direction (2304 pulses)

Set the label for the beginning of the most inner loop

Operation speed 1500 pps

One rotation 2304 pulses

Start speed 400 pps

Acc/dec time 200 ms

CW

Linear Acceleration positioning control

We recommend putting comments.

7.7.4 Fourth motion pattern(One rotation in CW direction / S-curve Acceleration)

Click on the fourth pattern generation part and set the properties.

Operation speed 1500 pps

Two rotations 4608 pulses

Start speed 400 pps

Acc/dec time 200 ms

CCW

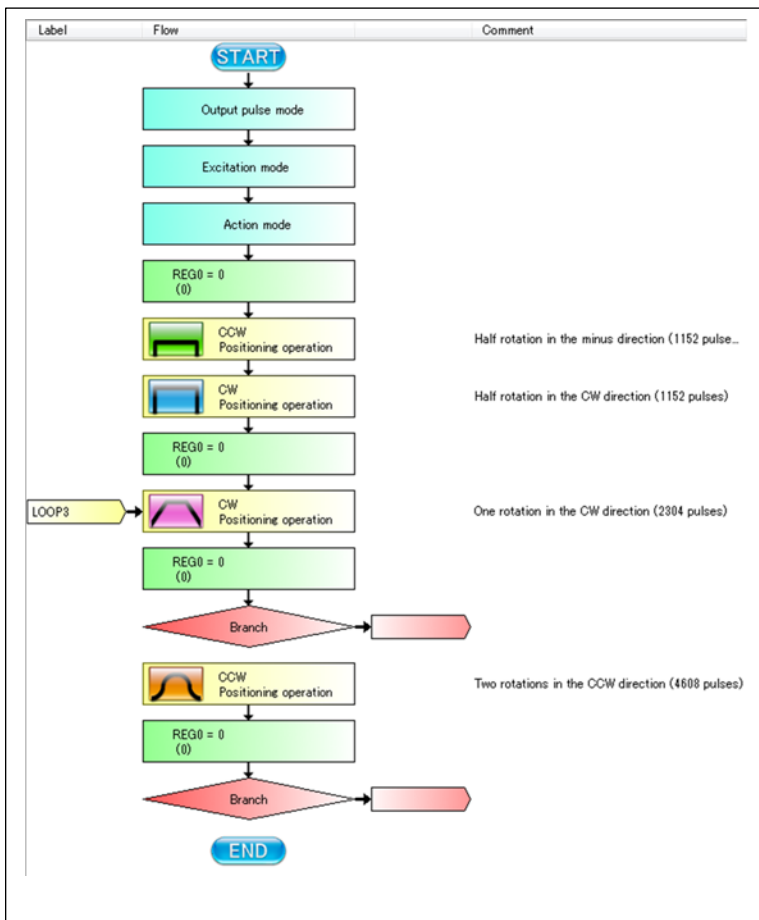
S-curve Acceleration Positioning control

We recommend putting comments.

Comment: Two rotations in the CCW direction (4608 pulses)

7.7.5 Operation pattern property setting end

After completing property setting of each pattern generation part, the flow chart should be as follows.



7.8 Register operation content

Two registers are used this time.

There are four "Register operation" parts as a flow chart. The first two are the initial setting, the remaining two are the decrement operations.

7.8.1 First Register operation (REG0 = 3)

Click on the first register operation part and set the properties.

The screenshot shows the Motion Patterns Builder interface. On the left, a flowchart starts with 'START', followed by 'Output pulse mode', 'Excitation mode', and 'Action mode'. The 'LOOP1' block is highlighted in blue and contains the text 'REG0 = 3' and 'Initial setting of 0th register'. Below it are 'CCW Positioning operation' and 'CW Positioning operation' blocks, followed by 'REG0 = 0'. The 'LOOP3' block contains 'CW Positioning operation' and 'REG0 = 0'. Further down are another 'CCW Positioning operation' and 'REG0 = 0', followed by a 'Branch' diamond and an 'END' block. On the right, a 'Property' dialog box for 'Label [LOOP1]' is open, showing 'Assign value' selected in the 'Select Register setting' dropdown, 'REG 0' with 'UP' and 'DOWN' buttons, a 'Substitution Value' of '3', and a 'Comment' field containing 'Initial setting of 0th register'.

Change the properties as follows:

This detailed view of the 'Property' dialog box shows the following settings highlighted with red boxes and callouts:

- Label LOOP1**: Set the label for the beginning of the most outer loop
- Assign value**: Select "Assign value"
- REG 0**: Set register number (0)
- 3**: Set "3" as a substitution value
- Initial setting of 0th register**: We recommend putting comments.

7.8.2 Second Register operation (REG1 = 2)

Click on the second register operation part and set the properties.

Label LOOP2

[Register Properties]

Select Register setting
Assign value

REG 1 UP DOWN

2 Substitution Value

REG 2 UP DOWN

2 Calculated value

Comment
Initial setting of the first register

Set the label for the beginning of the middle loop

Select "Assign value"

Set register number (1)

Set "2" as substitution value

We recommend putting comments.

7.8.3 Third Register operation (REG1 = REG1 - 1)

Click on the third register operation part and set the properties.

Label

[Register Properties]

Select Register setting
Subtract value

REG 1 UP DOWN

1 Substitution Value

REG 1 UP DOWN

1 Calculated value

Comment
Subtract 1st register contents by 1

Select "Subtract value"

Set register number (1)

Set "1" as a calculated value

We recommend putting comments.

7.8.4 Fourth Register operation (REG0 = REG0 - 1)

Click on the fourth register operation part and set the properties.

Select "Subtract value"

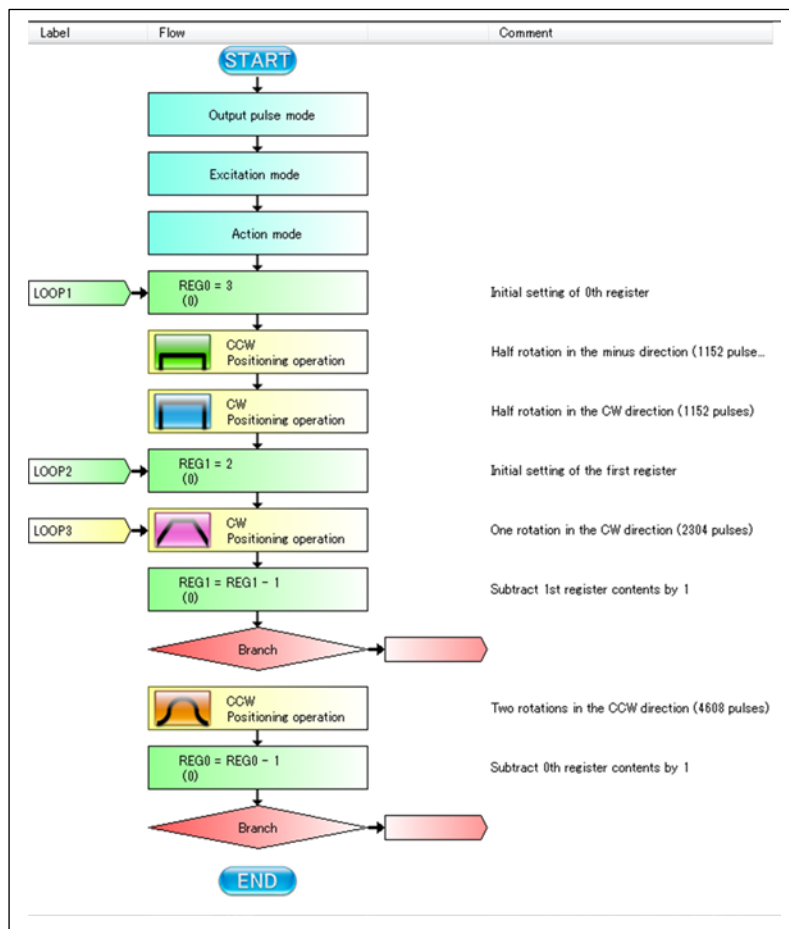
Set register number (0)

Set "1" as calculated value

We recommend putting comments.

7.8.5 Register operation property setting end

After completing property setting of each pattern generation part, the flowchart should be as follows.



7.9 Branch control content

Construct a loop by branch control.

7.9.1 First branch control (executed twice)

Click on the first branch control part and set the properties.

Change the properties as follows:

Select "Jump if the previous operation result is not zero"

Select the label of the third pattern generation part

We recommend putting comments.

7.9.2 Second branch control (execute 3 times)

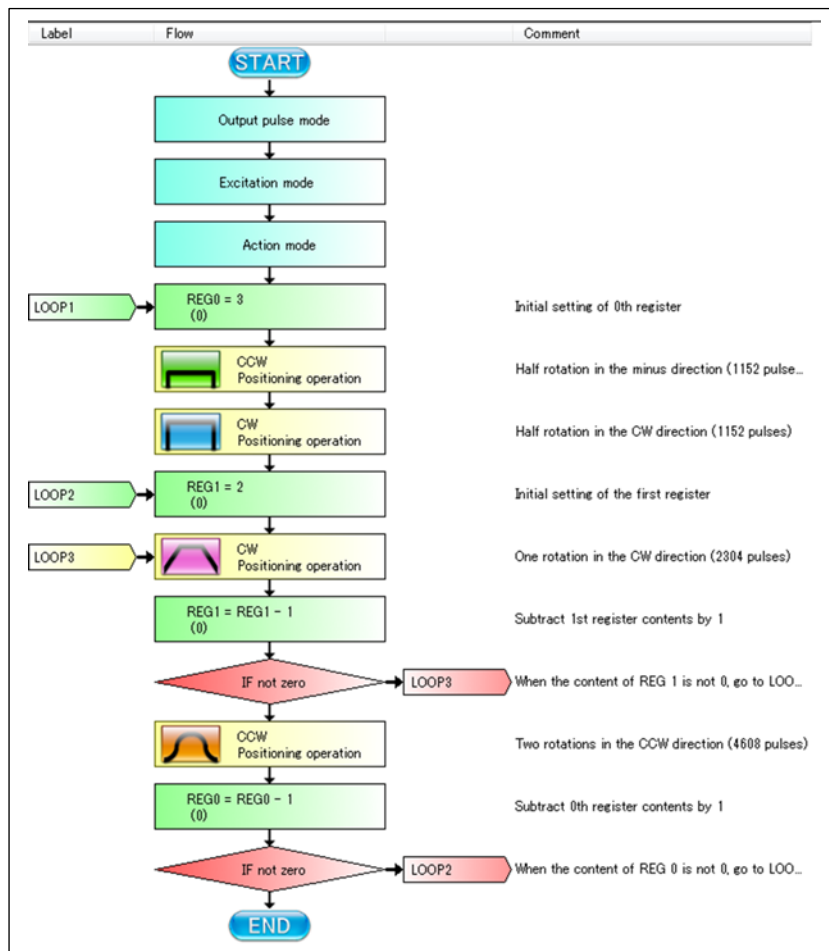
Click on the second branch control part and set the properties.

Annotations for the Jump Properties dialog:

- Select "Jump if the previous operation result is not zero"
- Select the label of the second pattern generation part
- We recommend putting comments.

7.9.3 Branch control property setting end

After completing property setting of each branch control part, the flowchart should be as follows.

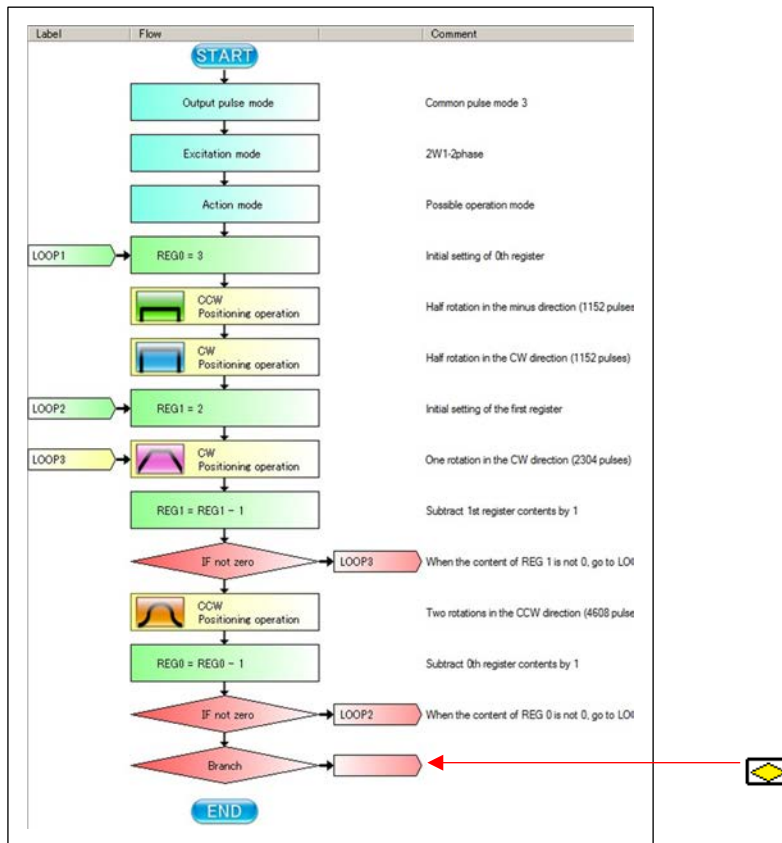


Clicking the "START" button in this flow chart executes three sets of "minus half rotation", "plus half rotation", "plus one rotation", "plus one rotation", "minus two rotations" set operation and then ends. Since the problem loops indefinitely, add the following actions.

7.9.4 Infinite loop

Add branch control part at the end of the flowchart.

Click the "Tool Box" button to display the toolbox, drag the "Branch control" part of the toolbar and paste it at the end of the flow chart.



Click the added branch control part and change its properties as follows

Label: []

[Jump Properties]

Select Jump operation: Unconditional Jump

REG: [0] [UP] [DOWN]

[0] Specified value

Branch destination Label: LOOP1

Comment: Unconditionally to LOOP1

Select "Unconditional Jump"

Select the label of the first pattern generation part

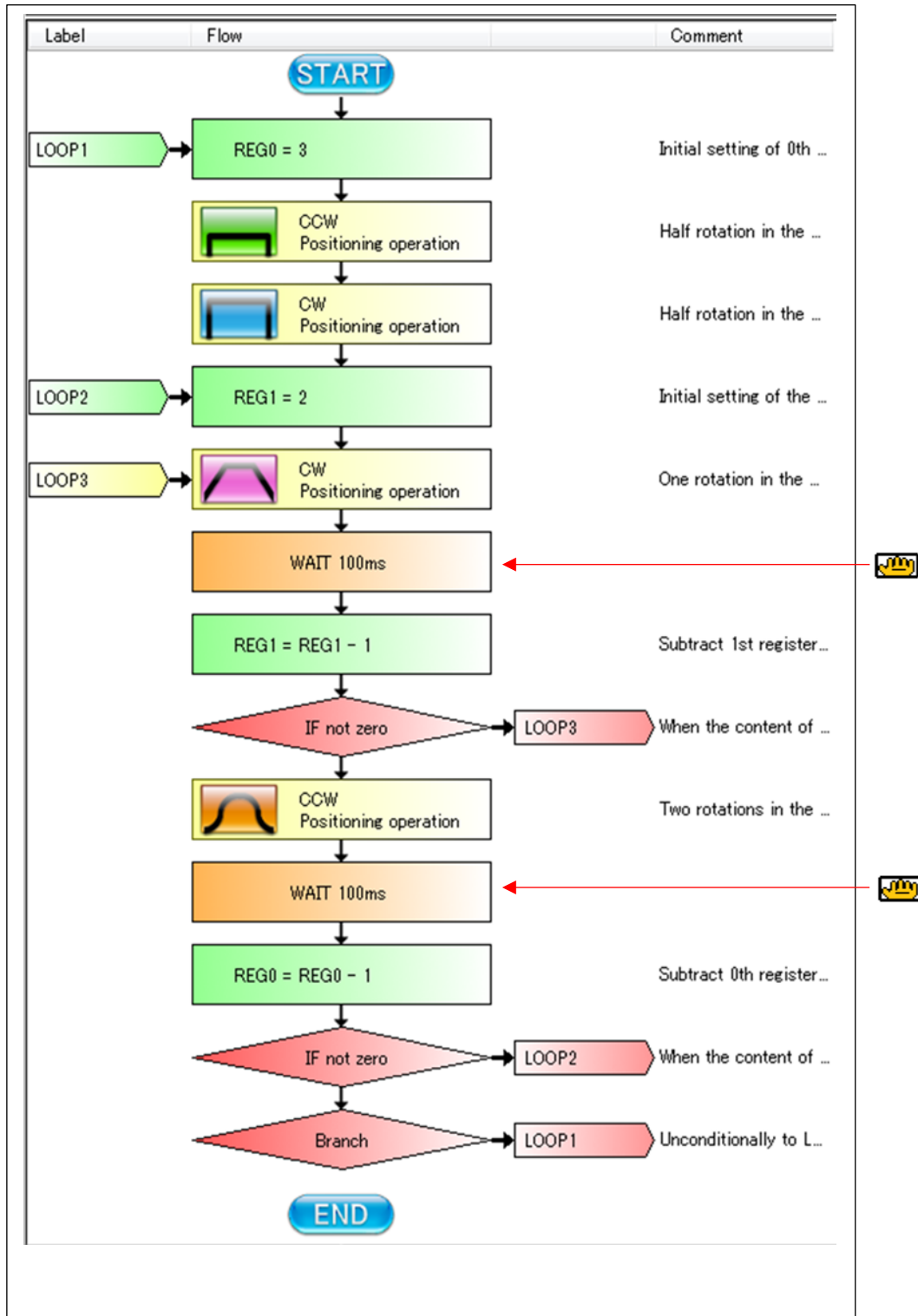
We recommend putting comments.

7.10 Wait for condition content

Configure wait time of the following condition in the flowchart.

Insert a wait time of 500 ms between each operation in one set, insert a wait time of 1000 ms between sets.

Click the "Tool Box" button to display the toolbox, drag the "Wait for control" part of the toolbar and paste it in the flow chart.



7.10.1 First wait time (500 ms)

Click on the first wait part and set the properties.

The screenshot shows the 'Wait Properties' dialog box with the following settings:

- Select Wait operation:** A dropdown menu with 'Wait milliseconds' selected and highlighted by a red box. A red line points to this box with the text 'Select "Wait milliseconds"'.
500 ms is entered in the adjacent field, also highlighted by a red box. A red line points to this box with the text 'Set wait time "500"'.
Mask value: A field containing '500' with a unit 'h'. Below it is the text: 'The bit set to 1 is compare with the Comparative-value.'
Comparative-value: A field containing '0' with a unit 'h'.
Comment: A text field containing '500ms wait time', highlighted by a red box. A red line points to this box with the text 'We recommend putting comments too.'

7.10.2 Second wait time (1000 ms)

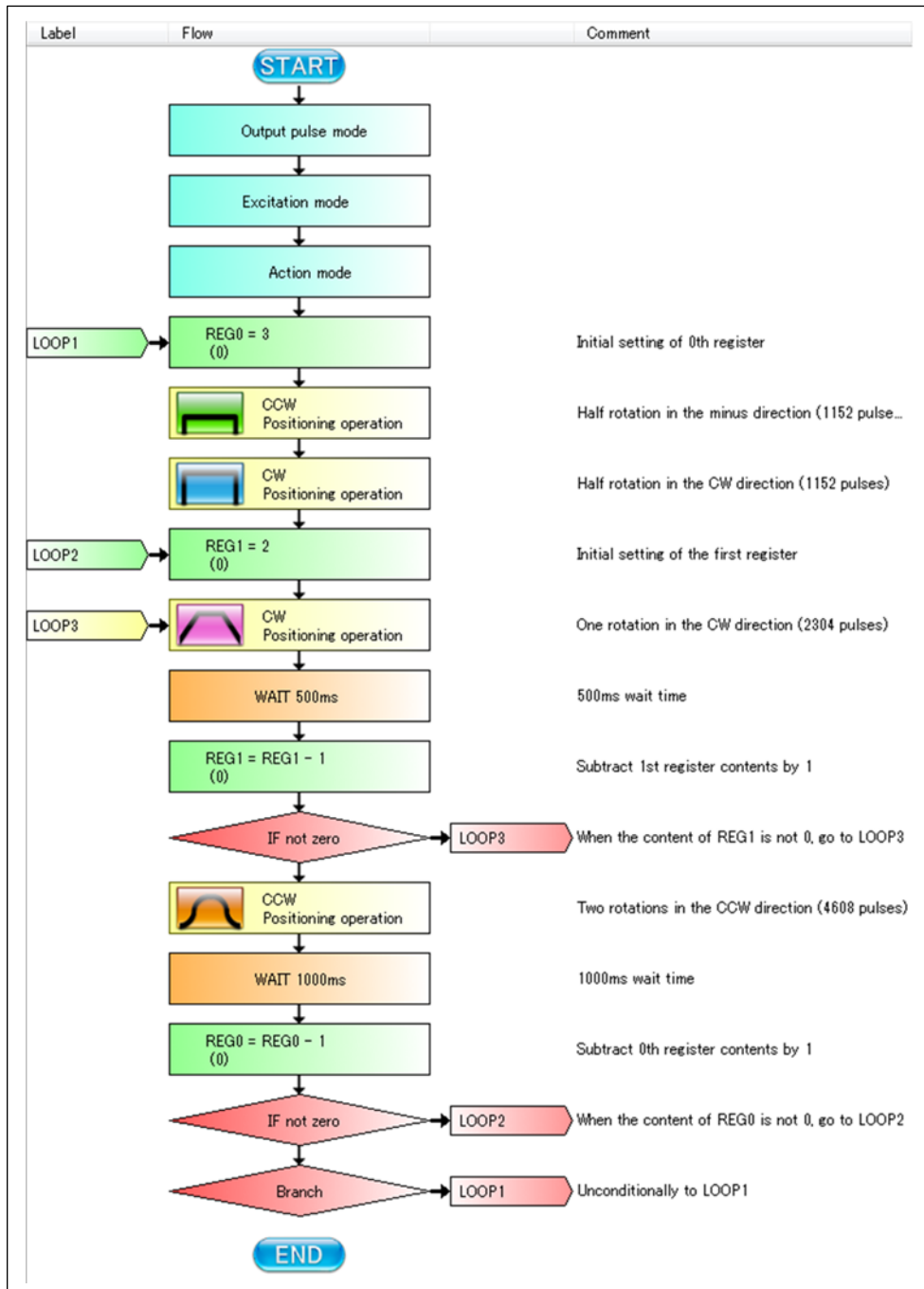
Click on the second wait and set the properties.

The screenshot shows the 'Wait Properties' dialog box with the following settings:

- Select Wait operation:** A dropdown menu with 'Wait milliseconds' selected and highlighted by a red box. A red line points to this box with the text 'Select "Wait milliseconds"'.
1000 ms is entered in the adjacent field, also highlighted by a red box. A red line points to this box with the text 'Set wait time "1000"'.
Mask value: A field containing '1000' with a unit 'h'. Below it is the text: 'The bit set to 1 is compare with the Comparative-value.'
Comparative-value: A field containing '0' with a unit 'h'.
Comment: A text field containing '1000ms wait time', highlighted by a red box. A red line points to this box with the text 'We recommend putting comments too'

7.10.3 Wait for condition property setting end

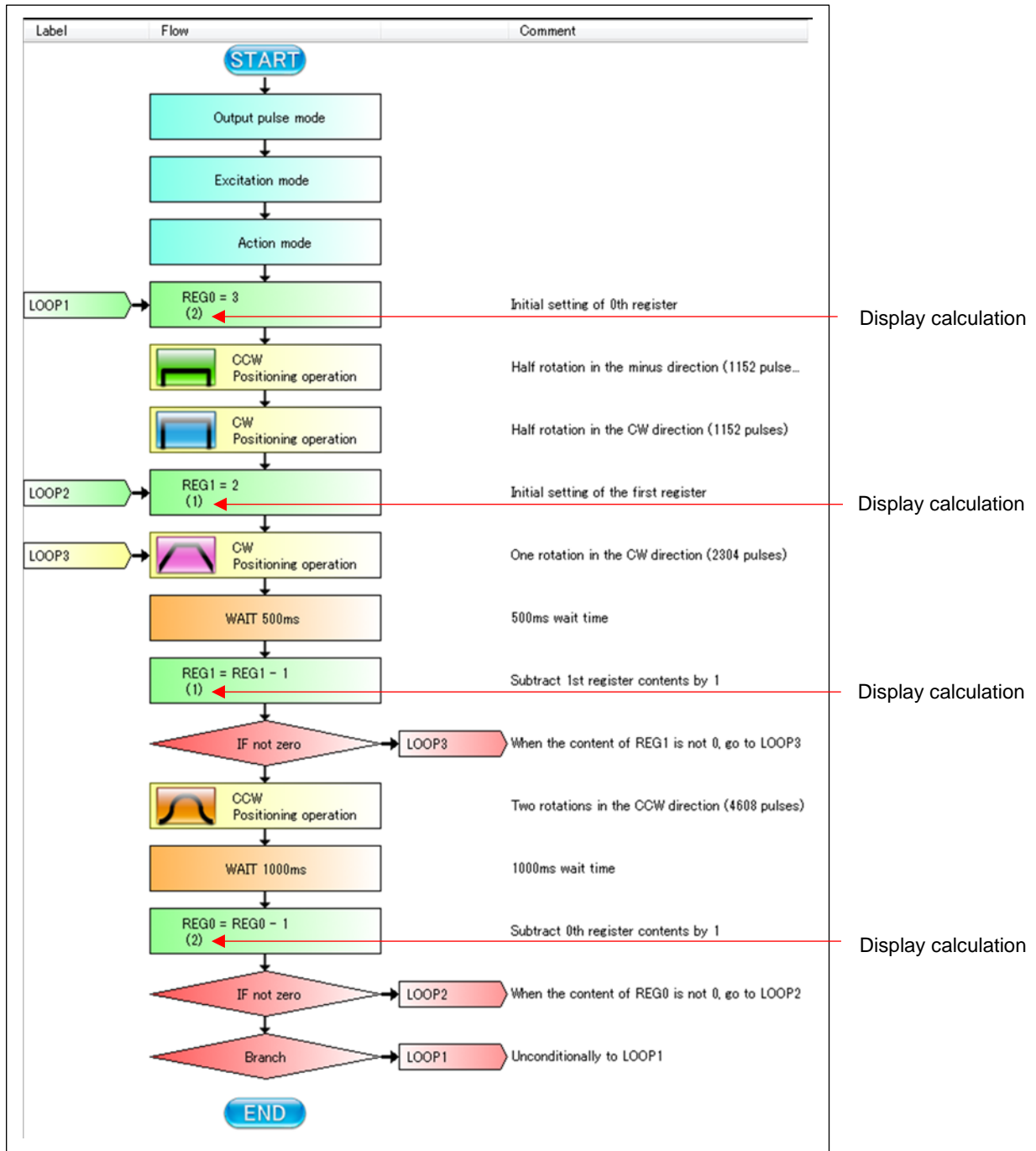
After completing property setting of each wait for condition part, the flowchart should be as follows.



The flow chart of the tutorial sample completed.

7.11 Display of register operation result at the time of operation

When it passes through the computation part of the register during operation, the computation result is displayed in the comment field.



You can drag parts of the toolbar into the flowchart of this tutorial sample and add actions.

You can also create a new flow chart.

Please enjoy motor control functions using PCL6115.

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Revision

Revision	Date	Contents
1st	Apr 4, 2018	Initial Release
2nd	Dec 11, 2018	<p>Output pulse specification / Excitation mode / Operation mode setting addition</p> <p>5.1.1 Part 5.2.5 Other control 7.1 Created content 7.2 Organization of actions 7.4 Organizing the flowchart 7.5 Flowchart arrangement 7.3.1 Other control</p> <p>Computed result display result in computation part of register is displayed 5.2.7 Comment 7.11 Display of register operation result at the time of operation</p> <p>Maximum speed is 1500 pps 5.2.3 Pattern generation 7.1 Created content 7.6 Other control 7.7.3 Third motion pattern (One rotation in the CW direction / Linear Acceleration) 7.7.4 Fourth motion pattern (One rotation in the CW direction / S-curve Acceleration)</p> <p>Multi-lingualization 9.1 Folder structure 4.4 "Other" 4.4.1 "Language"</p>
3rd	July 16, 2019	Change Document No. Add the manual list.
4th	June 9, 2020	Add counter display



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