atLogic V2.6

User Manual MWL-ALV2U1-V1.6-EN

Thank you for purchasing an Autonics product.
This user manual contains information about the product and its proper use,
and should be kept in a place where it will be easy to access.

Autonics

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Thank You for Purchasing The Product

Thank you for purchasing Autonics products.
Please familiarize yourself with the information contained in the **Safety Considerations** section before using this product.
This manual contains information about the porduct and its proper use, and should be kept in a place where it will be easy to access.

Manual Guide

- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- This manual is not provided as part of the product package. Please visit our website (www.autonics.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within Autonics, and is subject to change without prior notice. Upgrade notice is provided through our homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us these on our website.

Manual Symbols



Failure to follow instructions can result in serious injury or death.



Failure to follow instructions can lead to a minor injury or product damage.



Supplementary information for a particular feature.

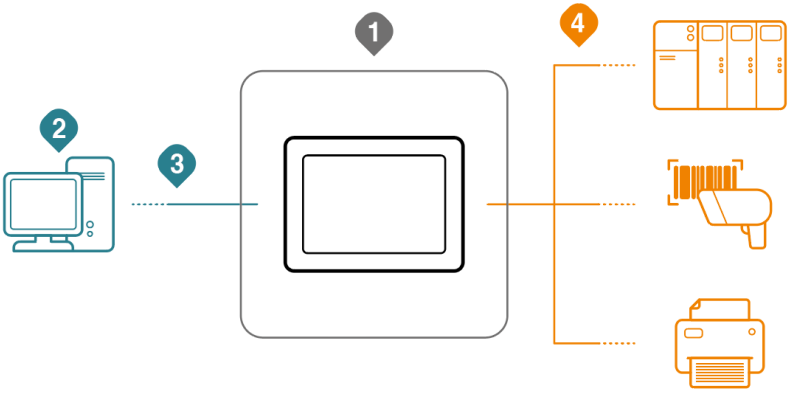


An example of the concerned feature’s use.



Important information of the concerned feature’s use.

Reference Manual for Each Configuration



① Graphic/Logic panel device specification, installation, maintenance, management, firmware update and system configuration

- Hardware Manual
  - A-Series: LP-A Series user manual
  - S-Series: LP-S070 Series user manual, LP-A044 Series user manual

② Project drawing

- Software Manual
  - A-Series drawing: atDesigner User Manual
    S-Series drawing: GP Editor user manual
  - Programming: atLogic user manual, atLogic programming manual

③ Project upload/download

- Hardware Manual
  - A-Series: LP-A Series user manual
  - S-Series: LP-S070 Series user manual, LP-A044 Series user manual

④ Connected device setting, communication setting

- Software Manual
  - A-Series drawing: atDesigner User Manual
    S-Series drawing: GP Editor user manual
  - Programming: atLogic user manual, atLogic programming manual
- Hardware Manual
  - A-Series: LP-A Series user manual
  - S-Series: LP-S070 Series user manual, LP-A044 Series user manual

④ Check connectable device, connection cable model name and protocol

- Communication Manual: GP/LP User Manual for Communication

Chapter 1. Overview

1.1. Feature of atLogic

atLogic is the exclusive software to write program and debug for LP series. Features and advantages of atLogic are as below.

- Supports multi project
  Able to open up to 5 projects at the same time and write or edit programs.
- Convenient program edit
  - Able to edit by cell unit
  - Able to edit with multi window
  - Support several view functions such as viewing device name, variable name, or device name & comment, etc. to edit program easily.
  - Able to edit ladder program and mnemonic program at the same time.
- Several monitor function
  Support several monitor function such as monitoring variable, device, system, or time chart, etc.
- Convenient user interface
  Easy adaptation for atLogic by same basic function of Microsoft window.
- Various message window
  Supports various message window for edit or check program easily.
- Real time switching ladder and mnemonic program
  Switching ladder or mnemonic program in real time and it is available to write or edit at two editors simultaneously.

1.1.1. Computer Specification

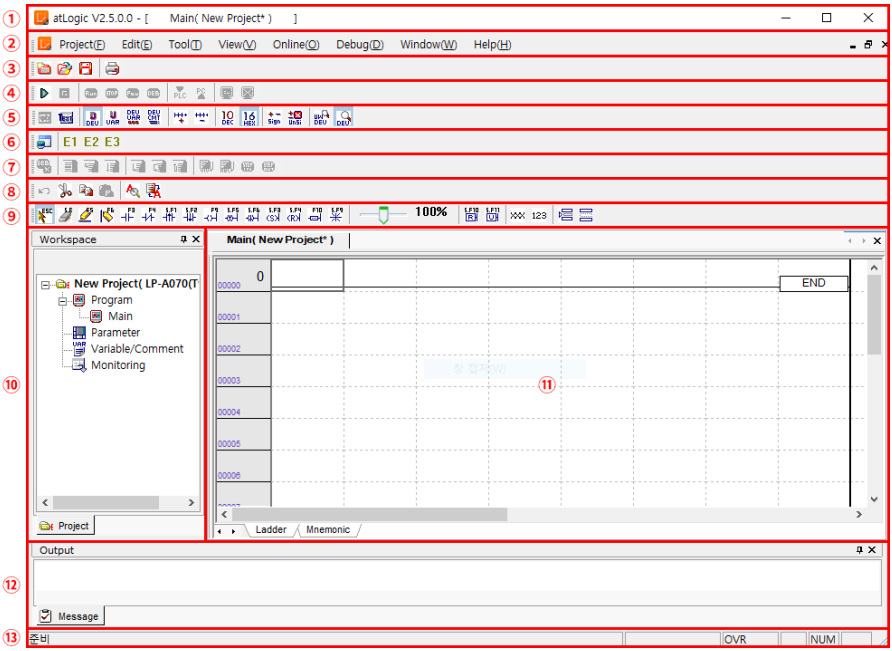
Item	Minimum spec.	Recommended spec.
Operating system	Windows 7/8.1/10	Windows 7/8.1/10
CPU	Pentium4	Over Pentium Dual Core
Memory	512 MB	Over 1 GB
Hard disk	1 GB free space	Over 5 GB free space
Resolution	1024×768	Over 1280×1024

1.2. Installation of atLogic

1. For installing atLogic, visit our website (www.autonics.com) and download atLogic program.
2. When run downloaded file, the installation start guide screen displays. Click ‘Next’ to continue installation, or ‘Cancel’ to discontinue installation.
3. Clicking ‘Next’, the license agreement displays.
4. Please check whole part of license agreement article by scrolling mouse, clicking downward or press “Page Down (PgDn)” key.
5. Read the articles thoroughly before click [I Agree] button.
6. Clicking [I Agree], the selecting the atLogic installation location screen appears. To change the installation location, click 'Browse' and specify the location to change. If the change is not required, click 'Install'.
7. The installation progress will be displayed as soon as the installation starts by clicking ‘Install’. Please wait for the installation to complete.
8. When the installation process is completed, the installation completion screen appears. After installation is completed, click 'Finish' to run atLogic. If you do not want atLogic to run, uncheck 'Run atLogic (R)' and click 'Finish'.

1.3. atLogic Screen Layout

atLogic consists of menu, toolbar, workspace, program, parameter, variable/comment, monitoring edit windows, message, and status bar.



① Title bar — Display atLogic version and the activated project title.

② Menu — Menu for all atLogic functions by each item.

③ Project tool — Tool for project menu

④ Online tool — Tool for communication between atLogic and LP

⑤ View tool — Tool for viewing the desired information in atLogic

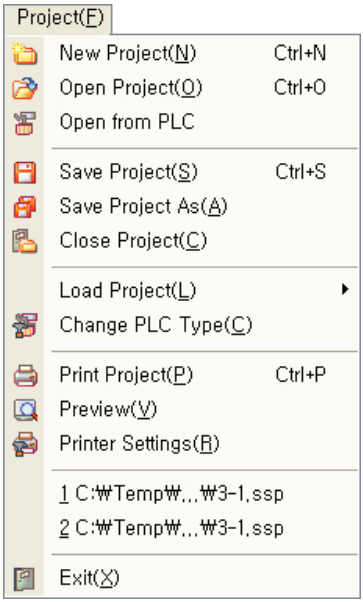
⑥ External program connection — Execute external program directly in atLogic

⑦ **Debug tool**	Tool for debugging the program after connecting atLogic and LP
⑧ **Edit tool**	Tool for editing such as cut, copy or paste
⑨ **Ladder tool**	Tool for ladder program
⑩ **Work space**	Display the project structure and the activated project
⑪ **Program, parameter, variable/comment, monitoring edit window**	Able to edit the program (ladder/mnemonic) of activated project, the setting of parameter, variable/comment, and check monitoring.
⑫ **Message**	Display messages during operating project
⑬ **Status bar**	Display LP operation status, edit mode status, NumLock key status

1.3.1. Menu

1.3.1.1. Project

Project menu is for overall project management.

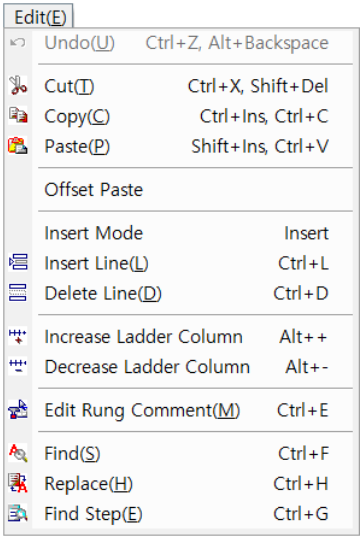


Menu	Function	Hot key
New Project	Creates a new project.	Ctrl + N
Open Project	Opens an existing project.	Ctrl + O
Open from PLC	Creates a new project by uploading a project stored in LP.	-
Save Project	Saves a project.	Ctrl + S
Save Project As	Saves a project as a different name.	-
Close Project	Closes the project.	-
Load Project	Creates a new project while the current project remains open for editing. Loads project with 'New Project', 'Saved Project' or 'Open from PLC' menu.	-
Change PLC Type	Changes LP type of the project open for editing.	-
Print Project	Prints the contents of the project you are currently working on.	Ctrl + P

Menu	Function	Hot key
Preview	Previews the to be printed contents of the project before printing	-
Printer Settings	Configures the printer before printing the project.	-
Recent Projects	Displays up to 4 most recently worked on project names.	-
Exit	Exits atLogic	-

1.3.1.2. Edit

Edit menu is for program editing such as cut, copy, and paste.

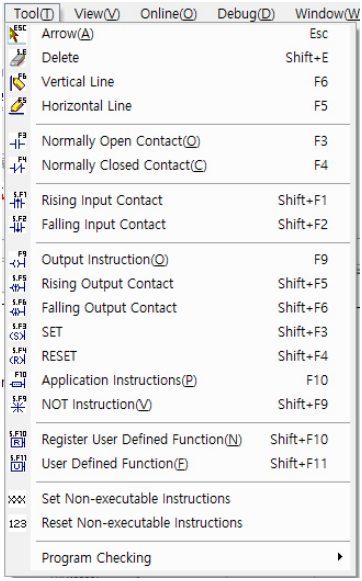


Menu	Function	Hot key
Undo	Cancels last edited contents and reverts to the previous state.	Ctrl + Z Alt + Backspace
Cut	Cuts selected content and pastes it to the clipboard.	Ctrl + X Shift + DEL
Copy	Copies selected content to the clipboard.	Ctrl + Insert Ctrl + C
Paste	Pastes content from the clipboard and places it on the ladder/mnemonic editor window (Enables this function only in atLogic)	Shift + Insert Ctrl + V
Offset Paste	Pastes content from the clipboard and places it on the ladder editor window by set the device offset (Enables this function only in the ladder editor)	-
Insert Mode/Edit Mode	Select insert or edit mode when writing the project	Insert
Insert Line	Inserts a new line into present location.	Ctrl + L
Delete Line	Deletes the present line.	Ctrl + D
Increase Ladder Column	Increases the number of columns by 2.	Alt + +

Menu	Function	Hot key
Decrease Ladder Column	Decreases the number of columns by 2.	Alt + -
Edit Rung Comment	Edits rung comments at the rung of the present position.	Ctrl + E
Find	Finds a device or a string in the project and moves it to the applicable location.	Ctrl + F
Replace	Finds a device or a string and changes it with the desired device or string.	Ctrl + H
Find Step	Moves to a desired step.	Ctrl + G

1.3.1.3. Tool

Tool menus are divided into the ladder tools and program checkup menus.

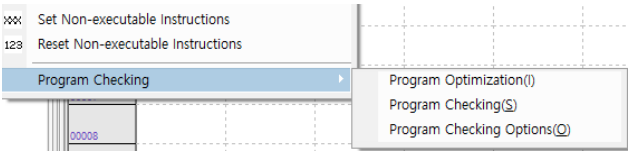


Ladder tool menu is for writing ladder program.

Menu	Function	Hot key
Arrow	Selects ladder objects.	ESC
Delete	Erases the selected ladder cell.	Shift + E
Vertical Line	Enters a vertical line into the ladder cell.	F6
Horizontal Line	Enters a horizontal line into the ladder cell.	F5
Normally Open Contact	Enters a normal open contact into the ladder cell.	F3
Normally Closed Contact	Enters a normal close contact into the ladder cell.	F4
Rising Input Contact	Enters a rising input contact point into the ladder cell.	Shift + F1
Falling Input Contact	Enters a falling input contact point into the ladder cell.	Shift + F2
Output Instruction	Enters an output instruction into the ladder cell.	F9
Rising Output Contact	Enters a rising output coil into the ladder cell.	Shift + F5
Falling Output Contact	Enters a falling output coil into the ladder cell.	Shift + F6
SET	Enters a SET instruction into the ladder cell.	Shift + F3
RESET	Enters a RESET instruction into the ladder cell.	Shift + F4

Menu	Function	Hot key
Application Instruction	Enters an application instruction into the ladder cell.	F10
NOT Instruction	Enters a NOT instruction into the ladder cell.	Shift + F9
Register User Defined Function	Registers the block designated rung as a user defined function .	Shift + F10
User Defined Function	Uses the registered user defined function.	Shift + F11
Set Non-executable Instructions	Sets the instruction not to execute	-
Reset Non-executable Instructions	Releases setting of non-executable instruction	-

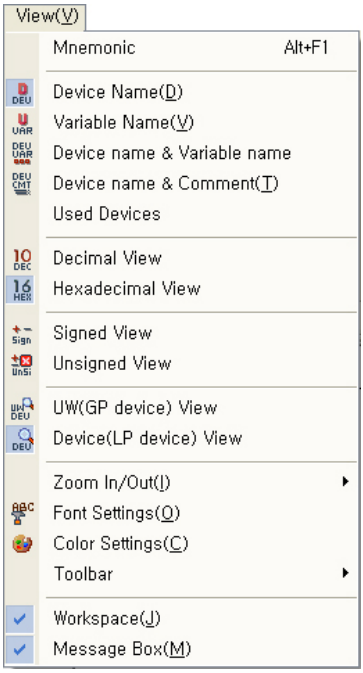
Program Checking menu has submenus for program optimization and checking.



Menu	Function	Hot key
Program Optimization	Optimizes the program.	-
Program Checking	Performs program checking. The result is shown in a message window.	-
Program Checking Options	Select processing dual coil as error or not during program checking	-

1.3.2. View

View menu has the functions to be set by users, in order to view information on atLogic screen.

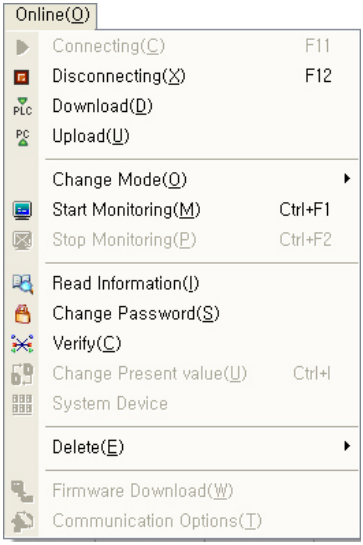


Menu	Function	Hot key
Ladder/Mnemonic	Exchanges ladder or mnemonic window	-
Device Name	Shows device name on the program window.	-
Variable Name	Shows variable name on the program window	-
Device name & Variable name	Shows device name and variable name together on the program window.	-
Device name & Comment	Shows device name and description together on the program window.	-
Used Devices	Shows numbers as decimal numbers.	-
Decimal View	Shows numbers as hexadecimal numbers.	-
Hexadecimal View	Shows decimal numbers as signed numbers.	-
Signed View	Shows decimal numbers as unsigned numbers.	-
Unsigned View	Shows devices used in the program as GP (UW) devices.	-
UW (GP device) View	Shows devices used in the program as LP devices.	-

Menu	Function	Hot key
Device (LP device) View	Increases or decreases the screen size.	-
Zoom In/Out	Shows device name on the program window.	-
Font Settings	Sets the font of program	-
Color Settings	Sets the color for ladder editor.	-
Toolbar	Shows toolbar	-
Workspace	Shows workspace.	-
Message Box	Shows message box.	-

1.3.2.1. Online

Online menu contains functions related to communications between atLogic and LP.

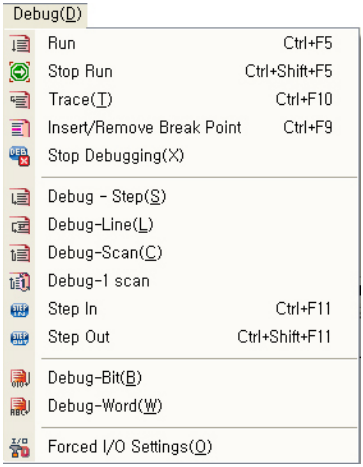


Menu	Function	Hot key
Connecting	Attempts to connect between atLogic and LP.	F11
Disconnecting	Ends the connection between atLogic and LP.	F12
Download	Downloads programs and parameters written in atLogic to LP system.	-
Upload	Uploads programs and parameters stored in LP to atLogic.	-
Change Mode	Changes the mode of LP system.	-
Start Monitoring	Monitors LP system from atLogic.	Ctrl + F1
Stop Monitoring	Stops LP system monitoring from atLogic.	Ctrl + F2
Read Information	Checks information about LP system.	-
Change Password	Changes password of the LP system. Default is not set. If you lost the password, notify Autonics of the password.	-
Verify	Verifies whether the contents written in atLogic match the ones in LP or not.	-
Change Present value	Changes present values of LP system devices.	Ctrl + I
System Device	Monitors LP system devices in batches.	-
Delete	Erases data on LP system.	-

Menu	Function	Hot key
Firmware Download	Download firmware to LP system by atLogic. (Only for LP-S044 series.)	-
Communication Options	Changes communication setting of atLogic	-

1.3.2.2. Debug

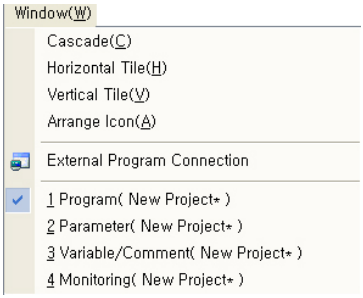
Debug menu are functions for program debugging after editor and LP communication is connected.



Menu	Function	Hot key
Run	Runs the program in debug mode.	Ctrl + F5
Stop Run	Stops running the program in debug mode.	Ctrl + Shift + F5
Trace	Debugs the program on an instruction basis.	Ctrl + F10
Insert/Remove Break Point	Inserts or removes break at the relevant points.	Ctrl + F9
Stop Debugging	Stops the debugging.	-
Debug-Step	Debugs up to a specified step.	-
Debug-Line	Debugs as specified lines.	-
Debug-Scan	Debugs as specified scan chains.	-
Debug-1 scan	Debugs only 1 scan.	-
Step In	Moves debug point into sub-routines or user defined functions.	Ctrl + F11
Step Out	Moves debug point from the present position to the main program.	Ctrl + Shift + F11
Debug-Bit	Debugs until a specified bit has reached the set value.	-
Debug-Word	Debugs until a specified word has reached the set value.	-
Forced I/O Settings	Forces present value setting of input/output device of LP system.	-

1.3.2.3. Window

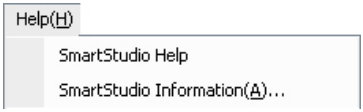
Window menu are functions for aligning the program window and monitoring window in the program, and for connecting external programs.



Menu	Function	Hot key
Cascade	Arranges opened windows in the program in a tiled view.	-
Horizontal Tile	Arranges opened windows in the program in horizontal boards.	-
Vertical Tile	Arranges opened windows in the program in vertical boards.	-
Arrange Icon	Aligns minimized open windows in the program.	-
External Program Connection	Registers external programs in order to run them in atLogic.	-

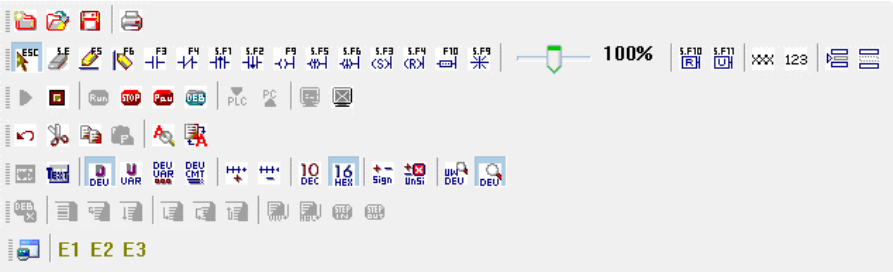
1.3.2.4. Help

Help menu contains for atLogic's information.



1.3.3. Toolbar

Users can arrange the icons for their own convenient.



Project tool



Ladder tool



Online tool



Edit tool



View tool



Debug tool

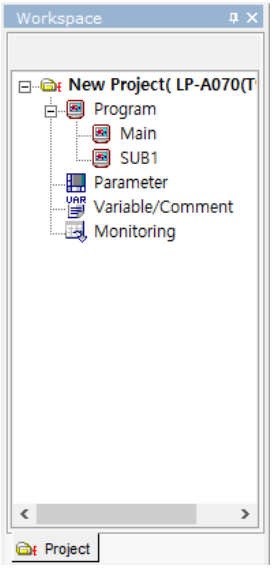


External program connection



1.3.4. Workspace

Displays project structure and currently active projects.



1.3.5. Message Box

Displays message to display during program operation.



1.3.6. Status Bar



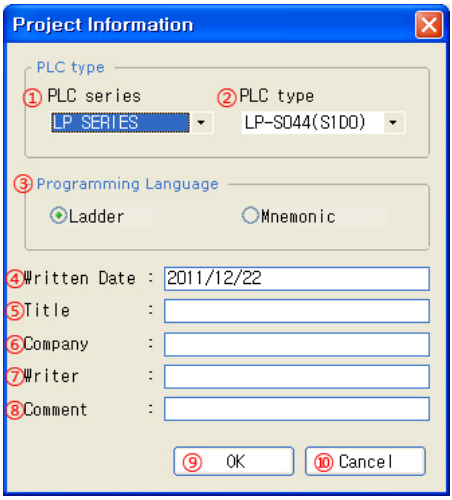
① LP operation status	Displays system operation status while communications with the system are connected. The system operation status could be one of RUN, STOP, PAUSE, DEBUG, and H/W STOP.
② Edit mode of ladder/mnemonic editor	Indicates the edit mode of the ladder editor or mnemonic editor. Edit mode is indicated as one of Edit or OVR.
③ NumLock key status	Displays the status of NumLock key on the number pad.

Chapter 2. Project

2.1. New Project

Creates a new project.

Select [Project]-[New Project] of menu, and 'Project Information' dialog box appears.



① **PLC series**	Select the series of the device by pull-down menu.
② **PLC type**	Select the type of the series by pull-down menu.
③ **Ladder/ Mnemonic**	Select a programming language for the new project.
④ **Written Date**	Enter the date created. The default is set to today's date.
⑤ **Title**	Enter the title.
⑥ **Company**	Enter the company name.
⑦ **Writer**	Enter the writer
⑧ **Comment**	Enter a brief project comment.

⑨ **OK**	Create a new project
⑩ **Cancel**	Cancel creating a new project.

④ to ⑧ are not required fields and do not affect project creation.

2.2. Open Project

Opens a saved project. Select [Project]-[Open Project] of menu and 'Open' dialog box appears. Select atLogic's the project (extension: *.ssp) file and click 'Open'. The project file opens in atLogic.

2.3. Open from PLC

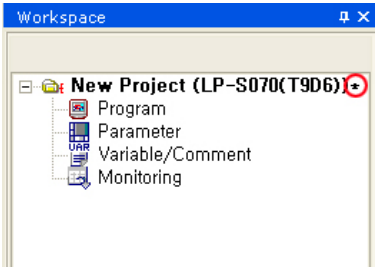
This feature closes all open projects and performs connection and upload consecutively. Therefore, communication with the system should not be connected to enable the menu.
It loads the project which is from LP and creates the new project. Select [Project]-[Open from PLC]. When the connection fails, it shows a message of failure and stops. If this is the case, check the communication option in [Online]-[Communication Option] of menu.

To read the contents of LP into currently open project, select [Online]-[Upload] of menu.

2.4. Save Project

Saves the edited project.
Select [Project]-[Save Project] of menu. If the project is already saved, it is saved in the present project file which has same file name.
If the project is saved for the first time, 'Save As' dialog box appears.
Specify the path, enter the file name, and click 'Save' to save the current project.

If the project is a newly created one, or there are changes to the project since it saved last time, the project name in the workspace displays with * at the end as shown inside a red circle in the image below.



2.5. Save Project As

Saves creating or created project as a different name.
Select [Project]-[Save Project As] of menu and 'Save As' dialog box appears.
Specify the path enter the file name and click 'Save' and the current project is saved. The file extension is '*.ssp'.

2.6. Close Project

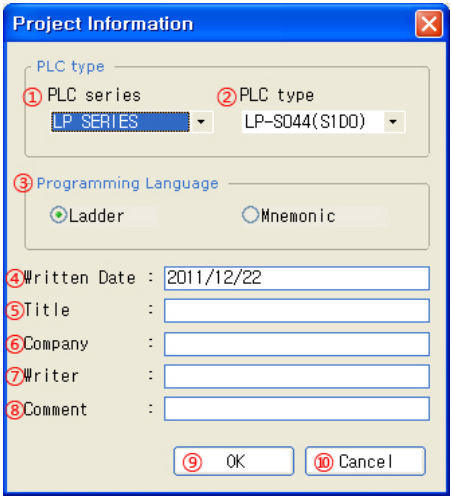
Closes an activated project.
Select [Project]-[Close Project] of menu and it executes as followings.
If the project is a newly created one or an existing project with changes, it confirms saving or not and then closes the project.
If the project is not changed since it opened, it closes the project without saving.

2.7. Load Project

This function is used to open an additional project while one or more projects are open. Therefore, this menu is activated only when more than one project is open.

2.7.1. New Project

Adds a new project to editor.
Select [Project]-[Load Project]-[New Project] of menu and 'Project Information' dialog box appears.



① **PLC series**	Select the series of the device by pull-down menu.
② **PLC type**	Select the type of the series by pull-down menu.
③ **Ladder/ Mnemonic**	Select a programming language for the new project.
④ **Written Date**	Enter the date created. The default is set to today's date.
⑤ **Title**	Enter the title.
⑥ **Company**	Enter the company name.
⑦ **Writer**	Enter the writer
⑧ **Comment**	Enter a brief project comment.
⑨ **OK**	Create a new project

⑩ **Cancel** Cancel creating a new project.



④ to ⑧ are not required fields and do not affect project creation.
After the project is added, the following message appears to activate this project.
Click 'Yes' to activate the added project. Click 'No' or 'Cancel' and the added project is not activated and this project is displayed in workspace.

2.7.2. Saved Project

Loads saved project and adds the project in atLogic.
Select [Project]-[Load Project]-[Saved Project] of menu and 'Open' dialog box appears.
Select atLogic's the project (extension: *.ssp) file and click 'Open' and the selected project is added in workspace. After adding the project, the program confirms whether to activate the added project or not.

2.7.3. Open from PLC

This is a feature that performs connection, upload and adds project consecutively. Therefore, this menu is enabled only when the program is not connected to the system.
Open the project stored in LP and add it in atLogic. Select [Project]-[Load Project]-[Open from PLC] of menu.
If the connection between the atLogic and LP is available, [Open from PLC] menu works and adds the uploaded project to workspace.
If an uploaded project and an existing project have the same project ID, a message appears and asks the user whether to apply the uploaded project to the project with the same ID, or to add as a new project.
Click 'Yes' to apply the uploaded project information to the project with the same ID. Click 'No' and the uploaded project is added as a new project. Click 'Cancel' and it stops upload operation.
When the project is added, the program confirms whether to activate the added project or not.

2.7.4. Change PLC Type

Select [Project]-[Change PLC Type] of menu and ‘Change PLC type’ dialog box appears.
Select the ‘PLC type’ to change by pull-down menu and it changes the appropriate device and instructions for the changed PLC.
If the devices and instructions are not compatible with the changed model, places for devices or instructions are replaced with”?”.
In case of color type PLC program which supports motion command, when change to the mono type program, the error occurs.

2.8. Print Project

Print the program.
It is allowed to select printing either parts or the whole of the program that is currently displayed.
When printing the parts of the program, specifying the range of steps to print is allowed.
The contents of print preview screen are printed.

2.9. Preview

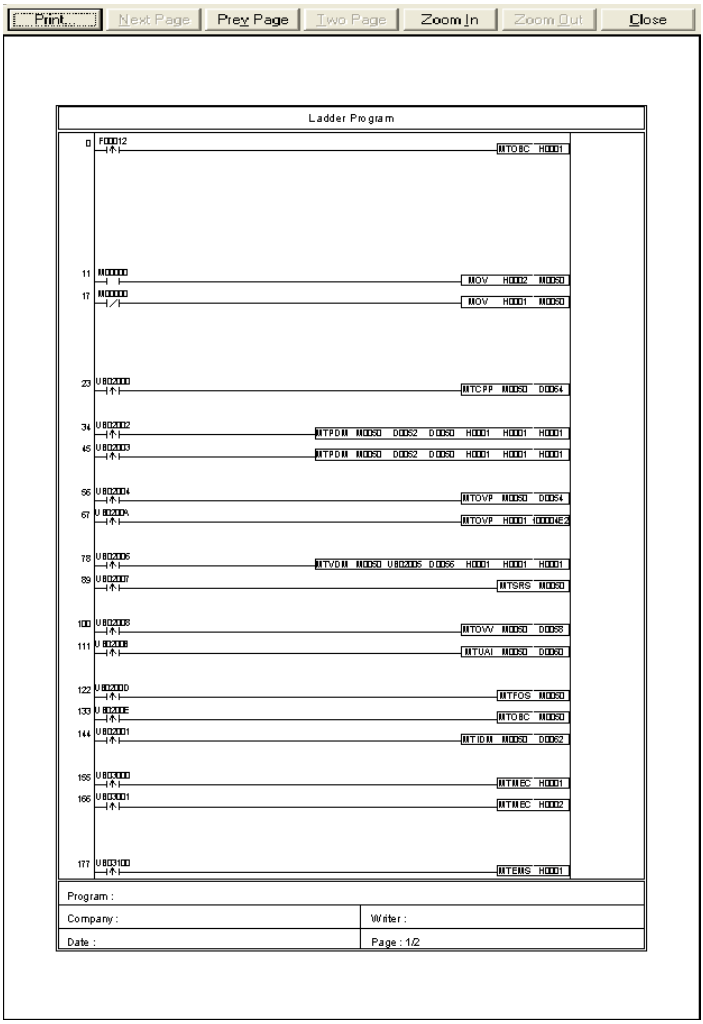
Show contents to be printed in currently activated windows, such as [ladder editor, mnemonic editor, parameter, variable/comment]. This is irrelevant to currently active projects.
Select [Project]-[Preview] of menu after activating the to be printed edit window, ‘Preview Print’ dialog box appears.
Select a program range to preview.

- Preview whole program: Previews whole program steps.
- Preview parts: Previews from the start step to end step of the program.

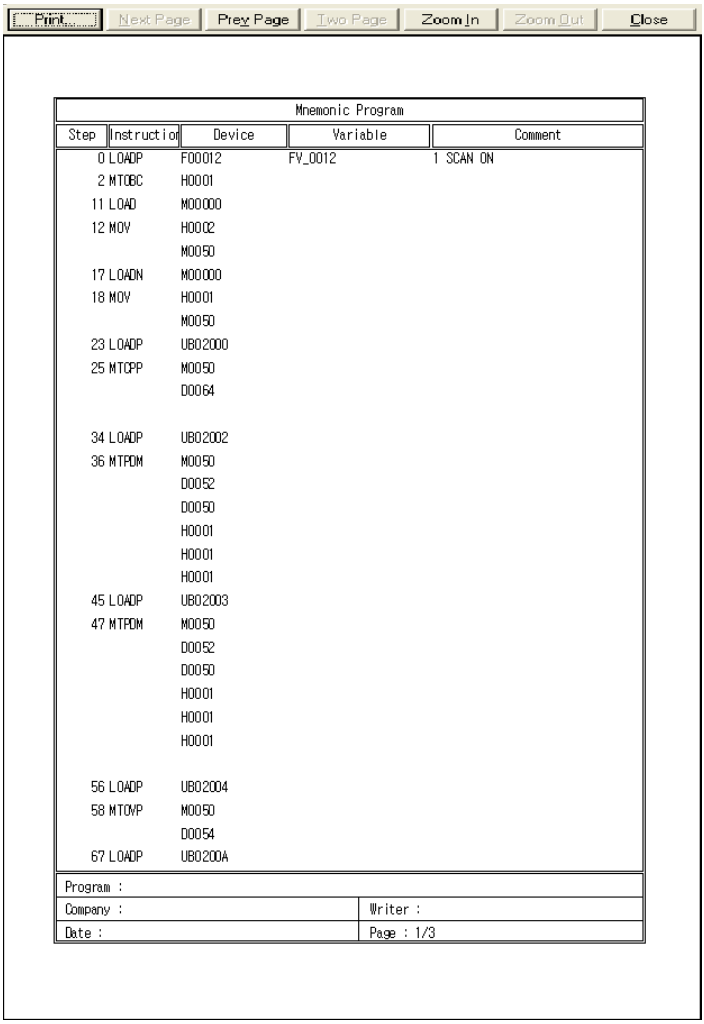


The project registered information of title, company, writer and written date will be printed in the bottom of the page on the preview screen.

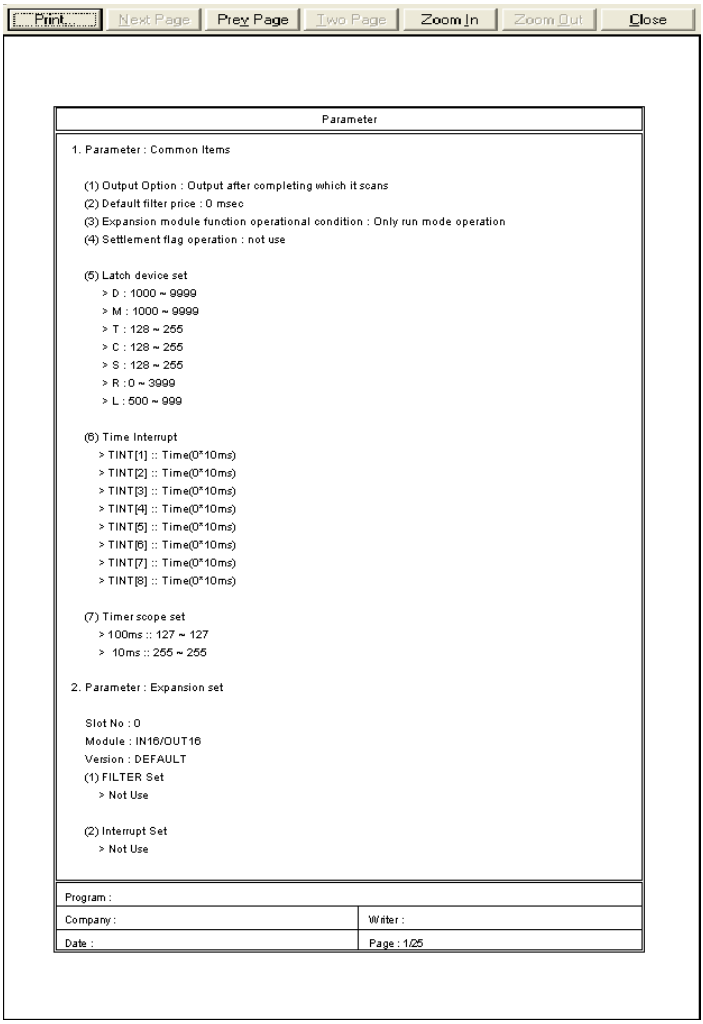
Preview for program (ladder editor)



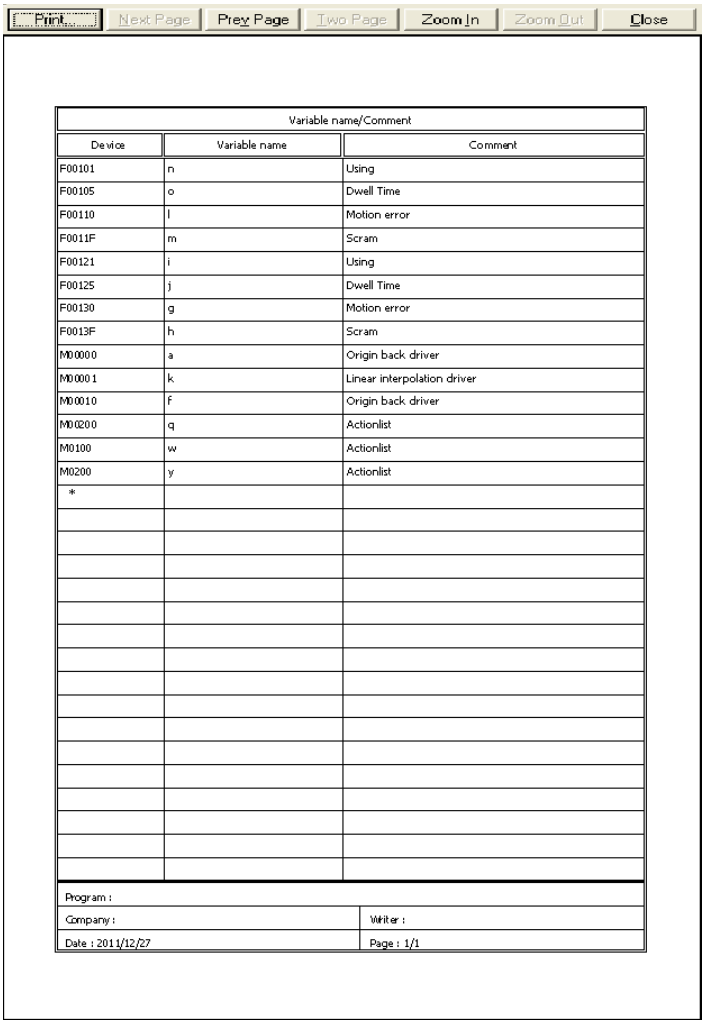
Preview for program (Mnemonic editor)



Preview for parameter



Preview for variable/comment



Variable name/Comment		
Device	Variable name	Comment
F00101	n	Using
F00105	o	Dwell Time
F00110	l	Motion error
F0011F	m	Scram
F00121	i	Using
F00125	j	Dwell Time
F00130	g	Motion error
F0013F	h	Scram
M00000	a	Origin back driver
M00001	k	Linear interpolation driver
M00010	f	Origin back driver
M00200	q	Actionlist
M0100	w	Actionlist
M0200	y	Actionlist
*		

Program :	
Company :	Writer :
Date : 2011/12/27	Page : 1/1

2.10. Printer settings

Configure the printer to be used.

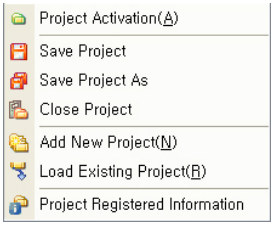
2.11. Exit

Exit atLogic.
If there is any unsaved project, the dialog box appears to check saving the project.
Click ‘Yes’ and it saves and exits atLogic.

Chapter 3. Edit

3.1. Undo

Select [Edit]-[Undo] of menu or press Ctrl+Z keyboard and the most recent operation is cancelled. User is able to designate the numbers of undo at 'The numbers of buffer to undo' in 'Project Registered Information' in workspace. Click the project menu with right mouse button in workspace and the following pop-up menu appears.



Select [Project Registered Information] of pop-up menu, 'Register Information' dialog box appears.

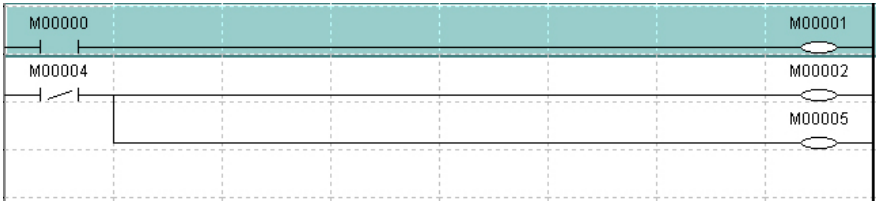
① PLC series / PLC type	Show LP series and type of present project.
② Written date / Title / Company / Writer / Comment	Enter the additional information of the project.
③ Save intervals for temporary file	Designate the saving interval of temporary files. If this value is set to 0, temporary files are not saved.
④ The numbers of buffer to undo	Designate the number of undo. (Setting range: 1 to 99)

3.2. Cut

Select the to be cut area and select [Edit]-[Cut] of menu or press Ctrl+X keyboard and the selected area is cut and saved in the clipboard.
The following is the example of cut instruction in ladder editor.

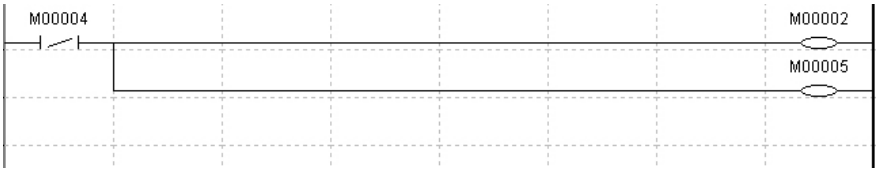
- **Before cut**

  Select a block to cut a certain area. You can select a cell instead of a block.



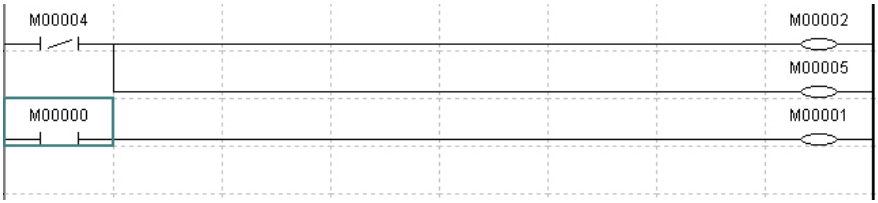
- **After cut**

  After cut instruction, the selected area disappears from the screen. It is copied to the clipboard.



- **After paste**

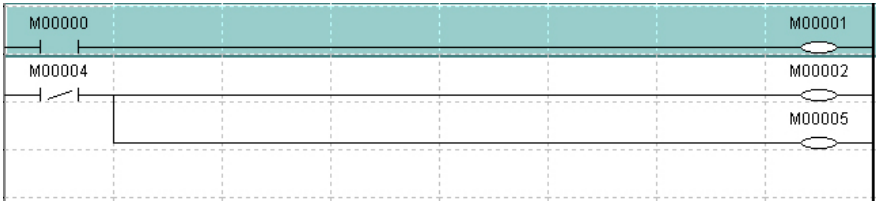
  The content copied to the clipboard is pasted to a selected cell.
  Select [Edit]-[Paste] of menu or press Ctrl+V keyboard.



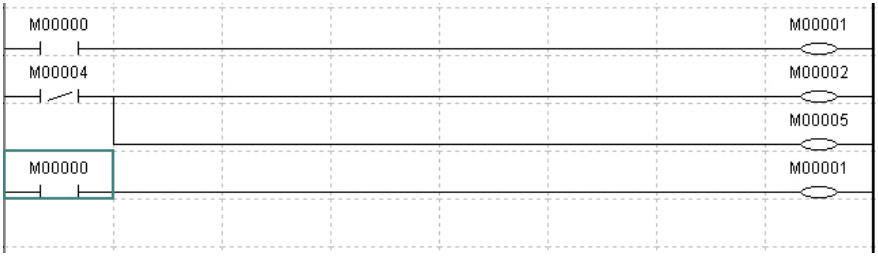
3.3. Copy

Select the to be copied area and select [Edit]-[Copy] of menu or press Ctrl+C keyboard and the selected area is copied in the clipboard.
The following is the example of copy instruction in ladder editor.

- **Copy**
  Select a block to copy a certain area. The screen does not show any change.



- **Paste**
  The content copied is pasted to a selected cell.
  Select [Edit]-[Paste] of menu or press Ctrl+V keyboard.

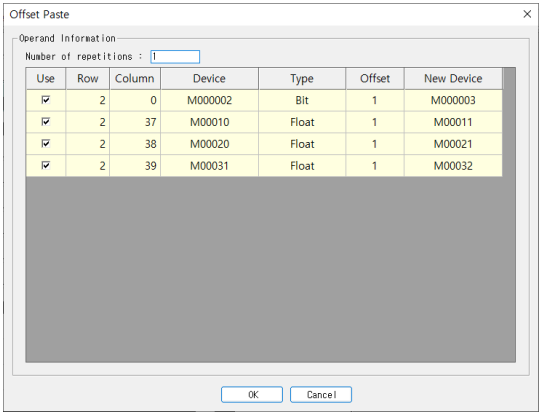


3.4. Paste

Select the desired area to be pasted and select [Edit]-[Paste] of menu or press Ctrl+V keyboard and [Cut] or [Copy] area is pasted to the selected area or the designated part.

3.5. Offset Paste

It is available to paste repeatedly. Select the desired line or ladder to be copied and select the desired area to be pastes. Select [Edit]-[Offset Paste] of menu and the dialog opens. Set the device offset value for paste repeatedly and click 'OK' and the device with the set offset pastes.



3.6. Insert Mode/Edit Mode

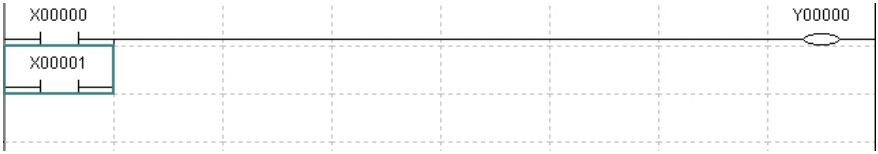
Whenever selecting [Edit]-[Insert Mode], [Insert Mode] or [Edit Mode] is set alternatively for ladder editor.

- **Insert mode:** Program entry pushes out the cell or line that is on the cursor position. In insert mode, the cursor changes to a green dotted line.
- **Edit mode:** Program entry deletes and replaces the cell or line that is on the cursor position. In insert mode, the cursor changes to a green line.

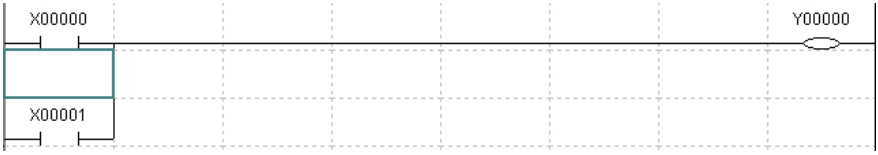
3.7. Insert Line

Insert a new line into the present cursor location.
Move the cursor to the position you want to add a line, and select [Edit]-[Insert Line] or press Ctrl+L keyboard. A new line is added to the cursor position.
The following is the example of insert line instruction in ladder editor.
In case of ladder editor, a line cannot be inserted if there is a instruction that occupies more than two lines at the cursor position. If the horizontal line is inserted in a cell divided by vertical lines, vertical columns are automatically created so that it conforms to the upper and lower lines.

- **Before insert**

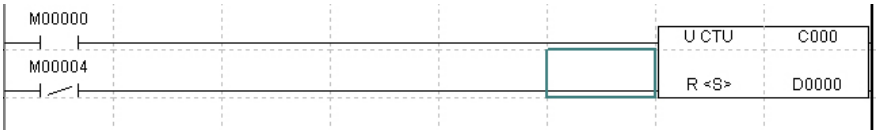


- **After insert**



- **In case of unable to insert**

  If there is an existing instruction across two lines as the following figure, a new line cannot be inserted to the line where the cursor is placed.



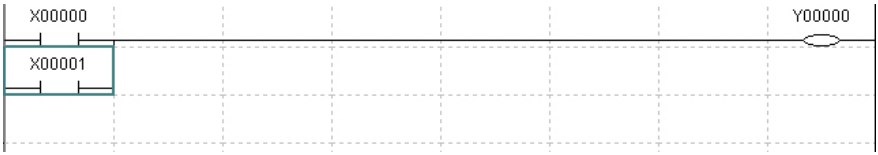
3.8. Delete line

Delete the line or block where the cursor is placed.
Block the area or place the cursor on the line where you want to delete and select [Edit]-[Delete Line] of menu or press Ctrl+D keyboard. It deletes the desired line.
The following is the example of delete line instruction in ladder editor.

- **Before delete**

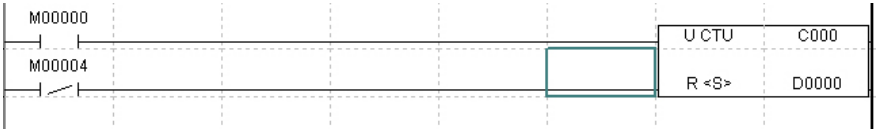


- **After delete**



- **In case of unable to delete**

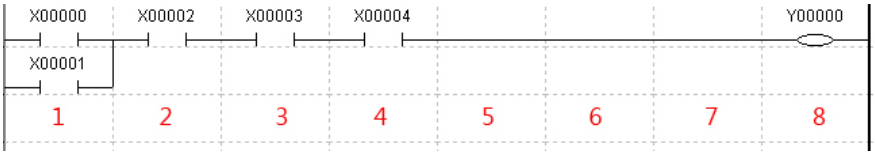
  If there is an existing instruction across two lines as the following figure, the line where the cursor is placed cannot be deleted.



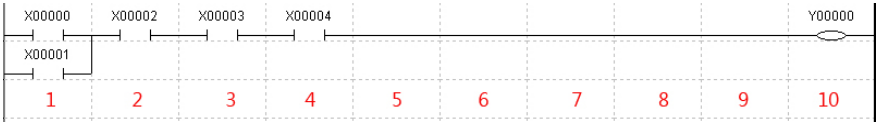
3.9. Increase Ladder Column

This function increases the number of columns displayed on the ladder editor.
Select [Edit]-[Increase Ladder Column] of menu or press Alt + '+' keyboard and present number of columns + 2 columns is displayed. Maximum number of columns allowed to increase to is 32.
Output instruction is displayed on the right side as the number of increased columns.

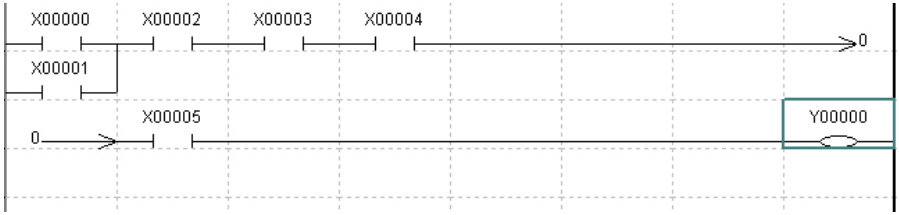
- **Before increase ladder column**



- **After increase ladder column**



If a ladder has created a wider than indicated number of columns, and an arrow appears as a result, increasing the number of columns makes the arrow disappear and a program can be shown in a line.





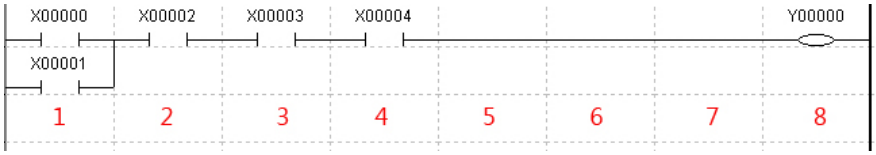
3.10. Decrease Ladder Column

This function decreases the number of columns that are displayed on the ladder editor.
Select [Edit]-[Decrease Ladder Column] of menu or press Alt + '-' keyboard. Present number of columns minus 2 columns is displayed. Minimum number of columns allowed to keep is 8.
Output instruction is displayed on the right side as the number of decreased columns.

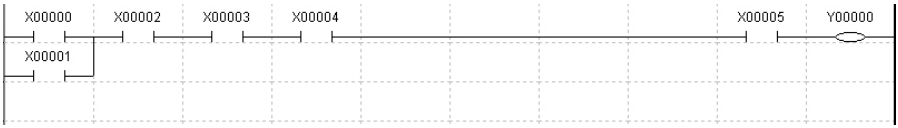
- **Before decrease ladder column**

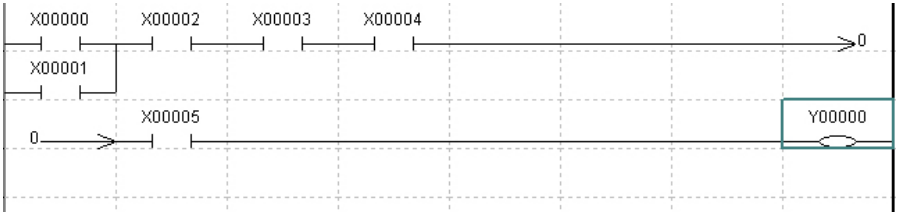


- **After decrease ladder column**



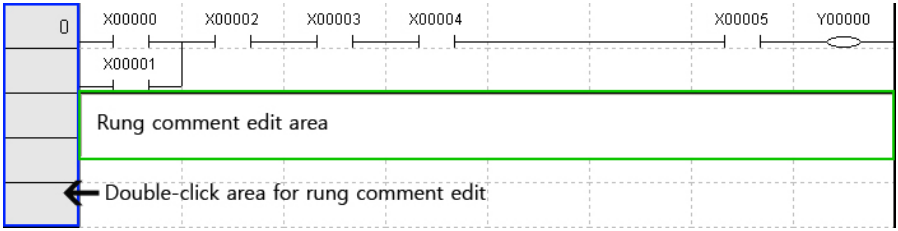
If the input instruction overlaps the output instruction that displays the decreased number of columns (present number - 2), an arrow appears on the last column of the input instruction line and also on the first column of the next line. Output instruction is displayed on the last column of the next line.





3.11. Edit Rung Comment

Edit the comment of the rung where the cursor is placed.
Select [Edit]-[Edit Rung Comment] of menu or double-click the desired line to edit the rung comment. Rung comment edit area appears and able to edit the rung comment. Press Ctrl + E keyboard and it operates as same.
The following is the example of edit rung comment instruction in ladder editor.



Maximum 127 byte characters can be entered. Press Ctrl+Enter keyboard in rung comment edit area and it is used as a forced line break.

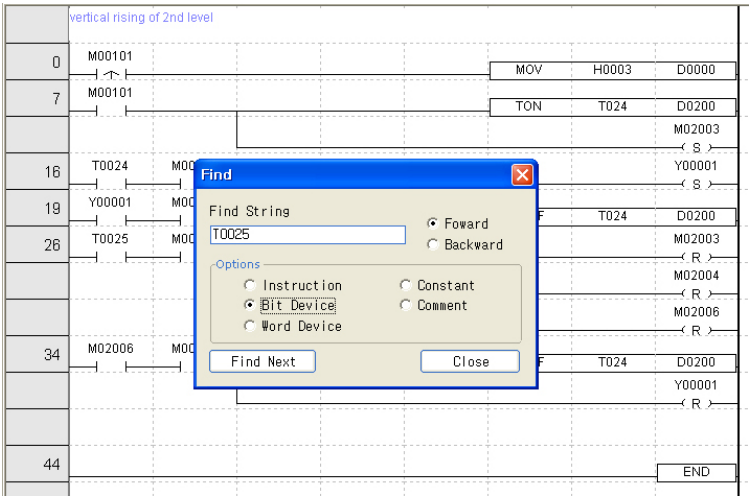
3.12. Find

Finds a string or text in the program.
Select [Edit]-[Find] of menu, or press Ctrl + F keyboard and 'Find' dialog box appears.

① **Find String**	Enter the text to find.
② **Forward/ Backward**	Select the direction to find, either forward or backward from the present cursor position.
③ **Options**	Select the target to find. Able to select one of options such as instruction, constant, bit device, comment, or word device.
④ **Find Next**	Finds the next for the nearest from the present cursor in find direction.
⑤ **Close**	Finishes find and closes 'Find' dialog box.

If there is no character to find in the program being worked on, the search continues in the next subroutine of the program tree of the project window.
When the cursor reaches the last step of the last subroutine, a message saying "Finding string has not found any more" appears.

The following is the example of find instruction in ladder editor.
If the text is found, the cursor is placed on the cell where the text is included as below.



3.13. Replace

Select [Edit]-[Replace] of menu or press Ctrl + H keyboard and ‘Replace’ dialog box appears.

① **Find String**	Enter the text to be found
② **Replace with**	Enter the text to be replaced with ①Find String
③ **Options**	Select the range of the text to be replaced. You can designate one of bit device, word device, comment, or constant.
④ **Find Next**	Find ①Find String for the nearest from the present cursor
⑤ **Replace**	Replace the found strings with the replaced strings.
⑥ **Change All**	Change all occurrences of the text without confirmation.
⑦ **Close**	Stop replacing and close ‘Replace’ dialog box.

If there is no character to find in the program being worked on, the search continues in the next subroutine of the program tree of the project window.
When the cursor reaches the last step of the last subroutine and there are no more existing character to find and replace, a message saying "The system can not find a string to be replaced" appears.

3.14. Find Step

Moves cursor to the desired step.
Select [Edit]-[Find Step] of menu or press Ctrl + G keyboard, ‘Find Step’ dialog box appears.

① **Step number**	Enter the step number to move.
② **Find**	Cursor moves to the step entered in ①
③ **Cancel**	Cancels step finding and closes ‘Find Step’ dialog box.

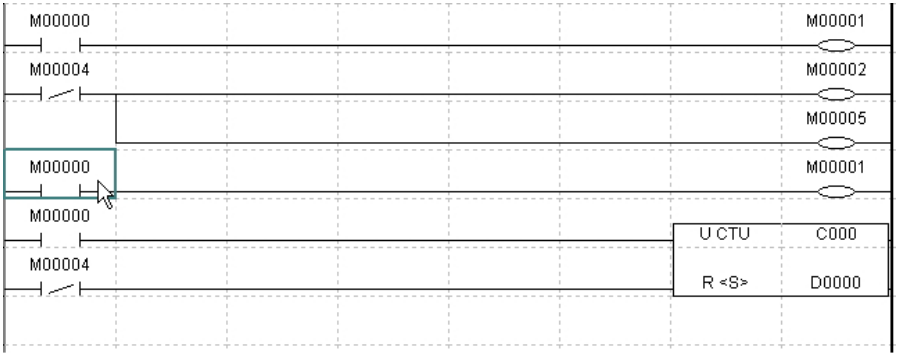
If you enter the non-existing step, the dialog box appears to display ‘The system could not find the step you want.’ message.

Chapter 4. Tool

4.1. Ladder Tool

4.1.1. Arrow

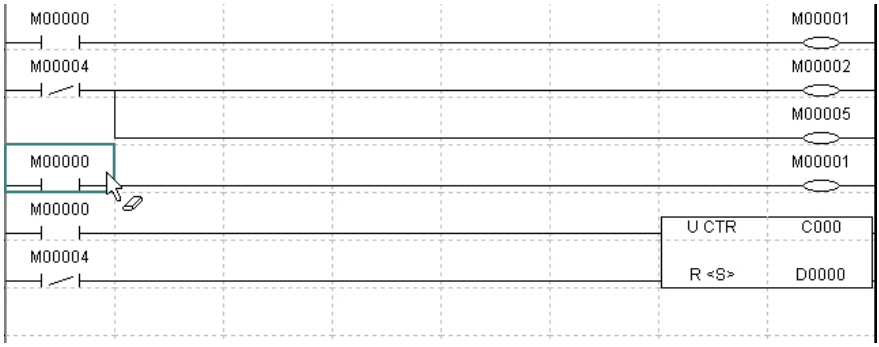
Select [Tool]-[Arrow] of menu or press Esc keyboard in ladder editor, you can select an object and change the cursor position.
You can select a cell or specify a cursor position as the following figure.



4.1.2. Delete

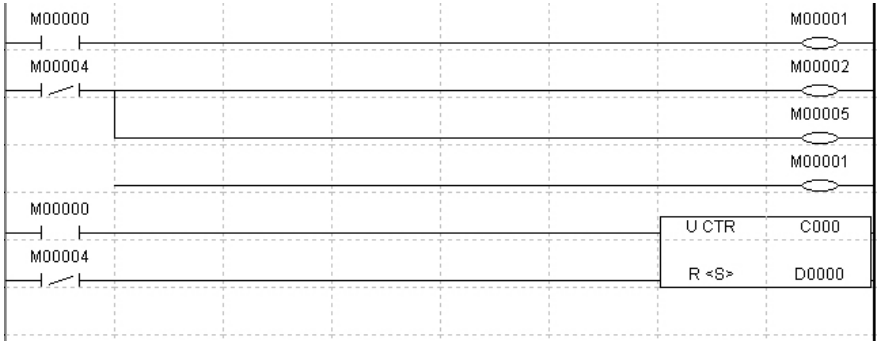
Select the area to be deleted and select [Tool]-[Delete] of menu or press Shift+E keyboard to delete the object in ladder, mnemonic editor. The following is the example of delete instruction in ladder editor.
If the one cell of the object occupies more than two cells is deleted, the whole object is deleted.
Deleted the object of ladder or mnemonic can be restored by [Edit]-[Undo] of menu.

- **Before delete**



- **After delete**

  You can check the cell where the cursor is placed is deleted.



4.1.3. Vertical Line

Select [Tool]-[Vertical Line] of menu or press F6 keyboard and it draws a vertical line on the right side of a selected cell in the ladder editor. A vertical line cannot be added on the last column of a ladder line.

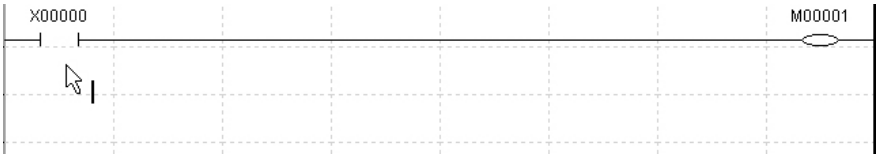
- **Before editing vertical line**

  Select [Tool]-[Vertical Line] of menu or press F6 keyboard.



- **Edit vertical line**

  Place the cursor or mouse pointer in the desired location to edit.



- **After editing vertical line**

  A vertical line is added in the relevant location.

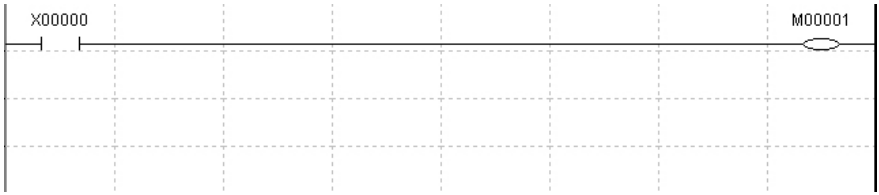


4.1.4. Horizontal Line

Select [Tool]-[Horizontal Line] of menu or press F5 keyboard and it draws a horizontal line in the selected cell in the ladder editor. Horizontal line cannot be added in the last column of a ladder line.

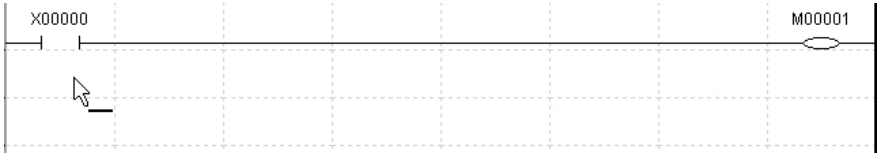
- **Before editing horizontal line**

  Select [Tool]-[Horizontal Line] of menu or press F5 keyboard.



- **Edit horizontal line**

  Place the cursor or mouse pointer in the desired location to edit.



- **After horizontal line**

  A horizontal line is drawn in the relevant location.



4.1.5. Input Instruction

This function enters normally open contact, normally closed contact, rising input contact, and falling input contact instructions.

Input instruction	Description
Normally open contact	Contact normally stays in OFF status. When a certain input condition is ON, it also becomes ON.
Normally closed contact	Contact normally stays in ON status. When a certain input condition is satisfied, it also becomes OFF.
Rising input contact	Contact becomes ON when the previous status of the input contact changes from OFF to ON.
Falling input contact	Contact becomes ON when the previous status of the input contact changes from ON to OFF.

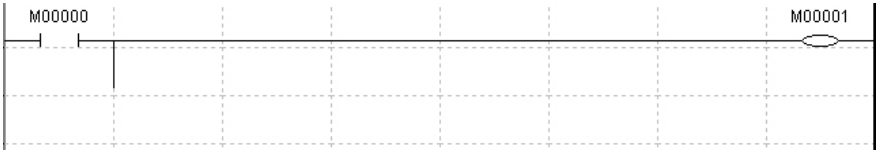
An input instruction cannot be located in the last column of the ladder line.
Hot key is as following table.

Input instruction	Hot key
Normally open contact	F3
Normally closed contact	F4
Rising input contact	Shift+F1
Falling input contact	Shift+F2

All input contacts are entered in the same way. The following is the example of input for normally open contact instruction in ladder editor.

- **Before editing normally open contact**

  Select [Tool]-[Normally Open Contact] of menu or press F3 keyboard.



- **Edit normally open contact**

  Place the cursor or mouse pointer in the desired location to edit.



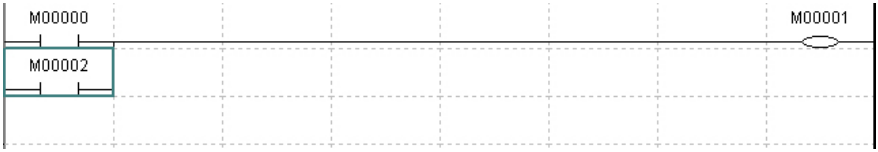
- **Device input**

  Press Enter keyboard or click with left mouse button, 'Device Input' dialog box appears.

Device input	Description
① Device	Enter the device of normally open contact
② Variable	Enter the variable of the normally open contact
③ Comment	Enter the comment of the normally open contact
④ Not Display	Not display any contents in ⑦
⑤ Variable/Comment	Displays registered variable/comment in ⑦
⑥ Flag	Displays special device information in ⑦
⑦ Variable, Device, Comment	Displays the selected contents from ④ to ⑥

- **After editing normally open contact**

  After entering the device and additional information, click 'OK' or press Enter keyboard. Normally open contact instruction with specified device is input at the relevant location.



4.1.6. Output Instruction

This function enters output instruction, rising output contact, falling output contact, SET, RESET instructions.

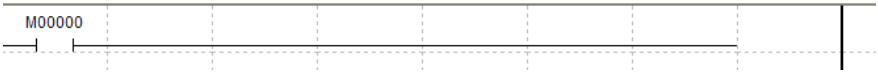
Output instruction	Description
Output contact	Output contact is for output the operation result to device
Rising output contact	When the operation result is output to as device, output turns from OFF to ON with one scan and at the other scans it turns OFF status as output contact.
Falling output contact	When the operation result is output to as device, output turns from ON to OFF with one scan and at the other scans it turns OFF status.
SET	Once after SET by SET instruction, this contact maintains SET status even though input condition is OFF. (SET contact by RESET instruction turns OFF)
RESET	RESET instruction turns OFF to the specified contact when input condition is ON. (RESET contact turns ON by SET instruction.)

An output instruction can be located only in the last column of the ladder line.
Hot key is as following table.

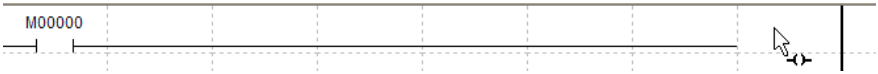
Output instruction	Hot key
Output instruction	F9
Rising output contact	Shift+F5
Falling output contact	Shift+F6
SET	Shift+F3
RESET	Shift+F4

The following is the example of input for output instructions.

- **Before editing output contact**
  Select [Tool]-[Output Instruction] of menu or press F9 keyboard.



- **Edit output contact**
  Place the cursor or mouse pointer in the desired location to edit.



- **Device input**

  Press Enter keyboard or click with left mouse button, 'Device Input' dialog box appears.

Device input	Description
① Device	Enter the device of output contact
② Variable	Enter the variable of output contact
③ Comment	Enter the comment of output contact
④ Not Display	Not display any contents in ⑦
⑤ Variable/Comment	Displays registered variable/comment in ⑦
⑥ Flag	Displays special device information in ⑦
⑦ Variable, Device, Comment	Displays the selected contents from ④ to ⑥

- **After editing output contact**

  After entering the device and additional information, click 'OK' or press Enter keyboard. Output contact instruction with specified device is input at the relevant location.



For further details of each instruction, refer to "LP series instruction manual". All output contacts are entered in the same way.

4.1.7. Application Instructions

This menu is used to enter application instructions.
Select [Tool]-[Application Instructions] of menu or press F10 keyboard, 'Edit Ladder(Application Instructions)' dialog box appears.

Application instruction	Description
① Application instruction	Enter application instruction directly.
② Application instruction	Displays available instructions to use for each tab. Double-click the instruction in ② and the selected instruction is entered in ①.
③ Usable Devices	Displays usable devices of operand by the selected instruction.
④ OK	Application instruction is applied to the ladder editor.
⑤ Cancel	Cancels application instruction input.
⑥ Instruction Help	Shows help for the selected instruction.
⑦ Register	Registers selected instructions as frequently used instructions. Registered instructions appear under 'Register' tab in ②
⑧ Delete	Deletes instruction registered to the 'Register' tab.
⑨ Delete All	Deletes all instructions registered to the 'Register' tab.

Select the menu and click the cell between the input motion and the output motion in the ladder editor to input a ladder. Optional input of an application instruction is available.
When a ladder is input, it is always created next to an output motion.

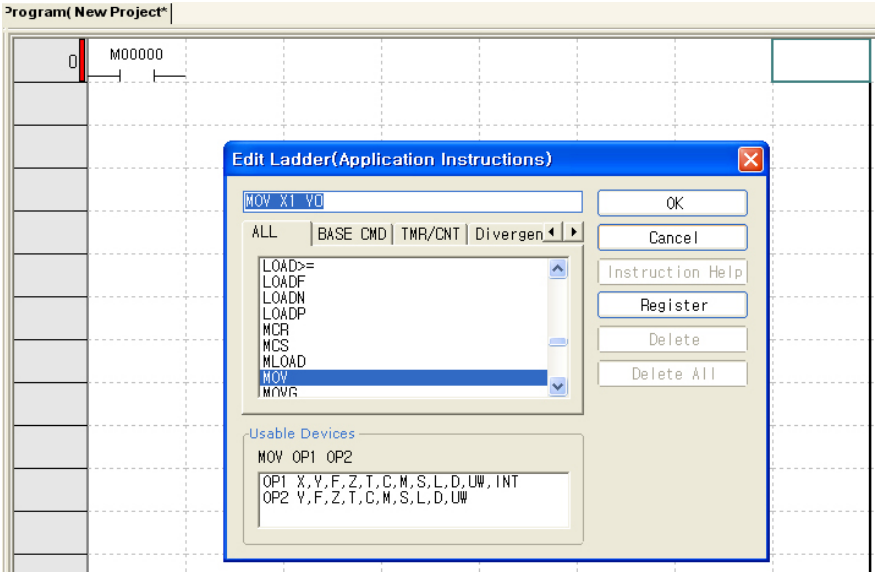
- **Before input application instruction**



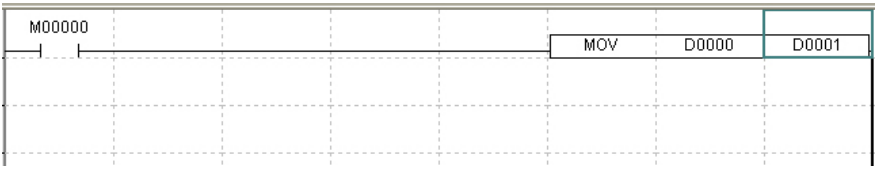
- **After input application instruction**



- **Edit ladder (Application instruction) dialog box**



- **After input application instruction**



4.1.8. NOT Instruction

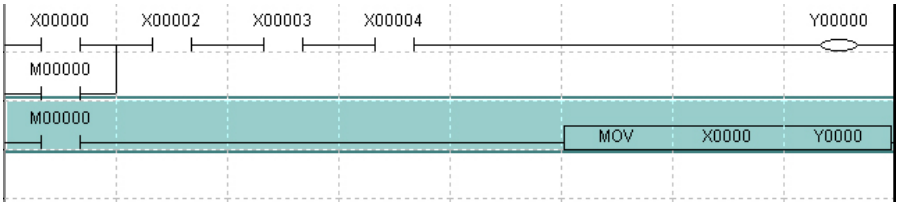
This instruction is for reversing the input so far.

Select [Tool]-[NOT Instruction] of menu or press Shift + F9 keyboard and the cursor displays with "*" sign. Click the desired cell to input the NOT instruction in ladder editor.

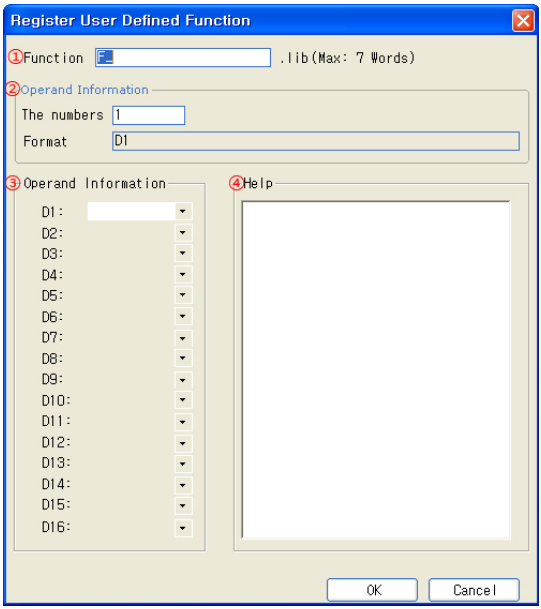


4.1.9. Register User Defined Function

This function is to register as a user defined function in order to reuse a specified rung.
Designate block of the area you want to register as a user defined function as below.



Select [Tool]-[Register User Defined Function] of menu , press Shift + F10 keyboard or click register user defined function in toolbar. 'Register User Defined Function' dialog box appears.

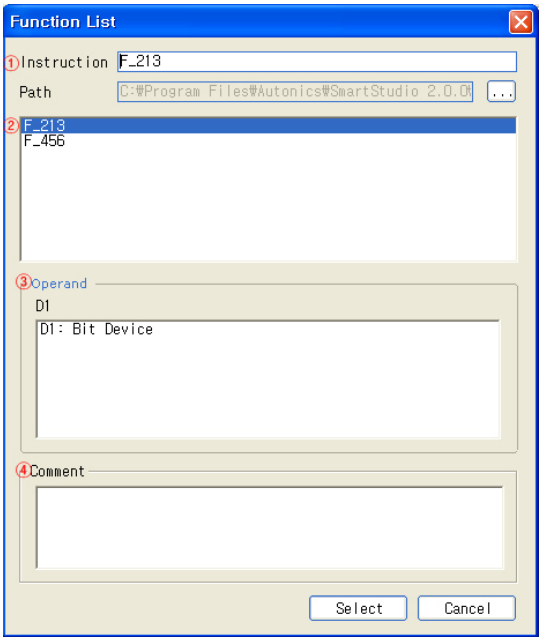


User defined function	Description
① Function	Enter the function name.
② Operand information	Specify the number of operands to use.
③ Operand information	Specify a device of each operand as much as the specified number of operand. Devices assigned to the block appear in pull-down menu.
④ Help	Enter the comment about the user defined function to be registered.

After completing above steps, click 'OK' and the user defined function is registered. The registered user defined function is stored in the \LIB folder as function name "function name.lib" file.

4.1.10. User Defined Function

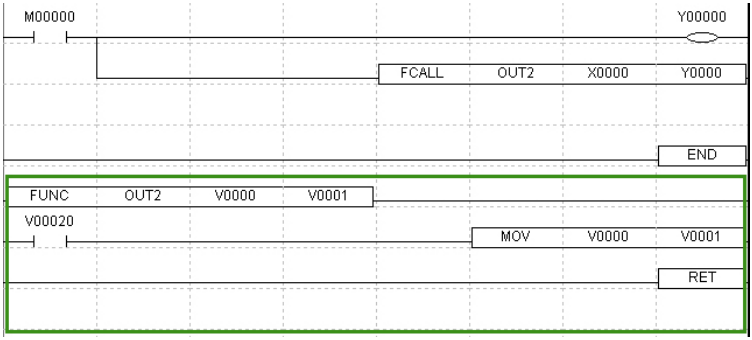
Calls a user defined function registered to the user defined function library.
Select [Tool]-[User Defined Function] of menu, press Shift + F11 keyboard or click user defined function in toolbar. 'Function List' dialog box appears.



Function list	Description
① Instruction	Shows the selected user defined function.
② User defined function list	Shows a list of user defined functions stored in the specified folder at path.
③ Operand	Shows the device for the selected user defined function.
④ Comment	Shows description assigned to the selected user defined function.

After entering user defined function and operand in ①, click 'Select' and the user defined function is applied in ladder editor.
Click 'Cancel' and 'Function List' dialog box closes regardless the contents entered.

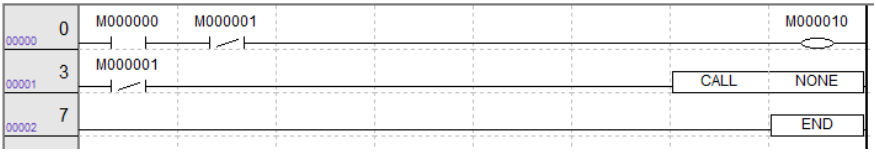
User defined function call is shown in the “FCALL+instruction+operand” format. The internal routine of the user defined function is added to the outside of the last END instruction, as shown in the green box in the image below.



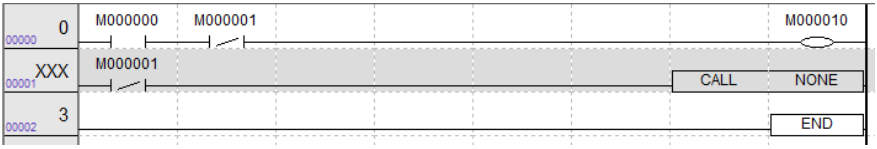
4.1.11. Set/Reset Non-executable Instructions

Sets whether the rung currently being worked on is to execute or not.
When setting a non-executable instruction, the background of the rung is changed to gray and the step number is displayed as XXX. It is missing from the step calculation and is not downloaded to the PLC. When the non-execution instruction setting is canceled, the gray background disappears and the step number is displayed. The step calculation again includes the the rung.

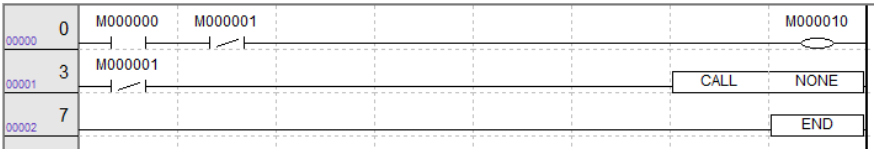
- **Before setting non-executable instruction**



- **After setting non-executable instruction**



- **After resetting non-executable instruction**



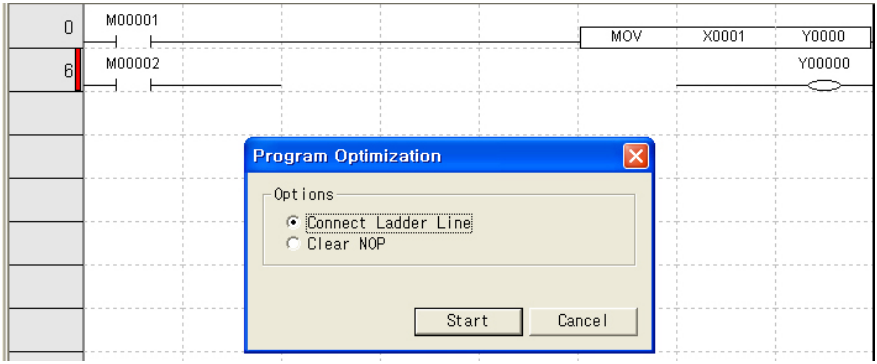
4.2. Program Checking

4.2.1. Program Optimization

Program optimization has two functions; connect ladder line in ladder editor, and clear NOP in ladder/mnemonic editor.
When executing program optimization in ladder editor, 'Program Optimization' dialog box appears and you can select 'Connect Ladder Line' or 'Clear NOP' function.
In mnemonic editor, there is only 'Clear NOP' function, 'Program Optimization' dialog box does not appear and it executes 'Clear NOP' function directly.

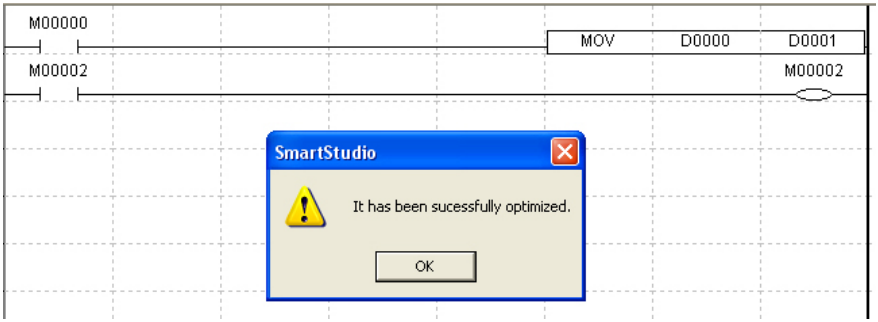
Program optimization	Description
① Connect ladder line	This feature forces connection of input lines of the open (not connected) ladder. This function does not guarantee validity of the ladder.
② Clear NOP	Mnemonic program can delete all NOP instructions. There is no change in the ladder shape.

- **Before connecting ladder line**
  Input contact and output contact in the second line are not connected together.
- **Connect ladder line**
  Select [Tool]-[Program Checking]-[Program Optimization] of menu, 'Program Optimization' dialog box appears. This dialog box appears only in ladder editor. You can select 'Connect Ladder Line' or 'Clear NOP' functions. In this example, select 'Connect Ladder Line'.



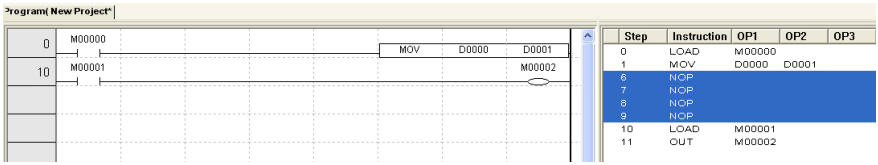
- **After connecting ladder line**

  You can see the input contact and output contact are now connected.



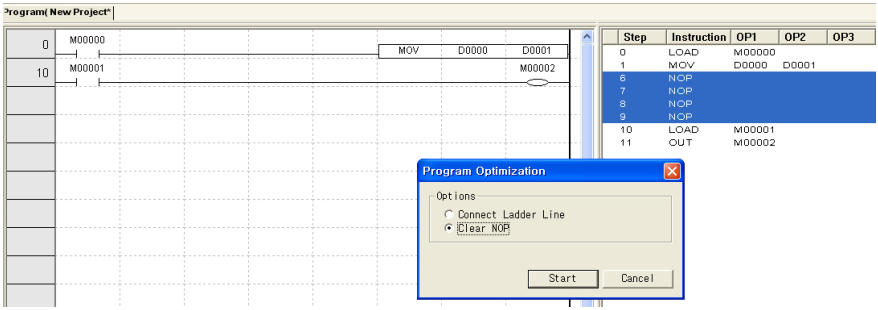
- **Before clearing NOP**

  Clear NOP is able to check in mnemonic editor.



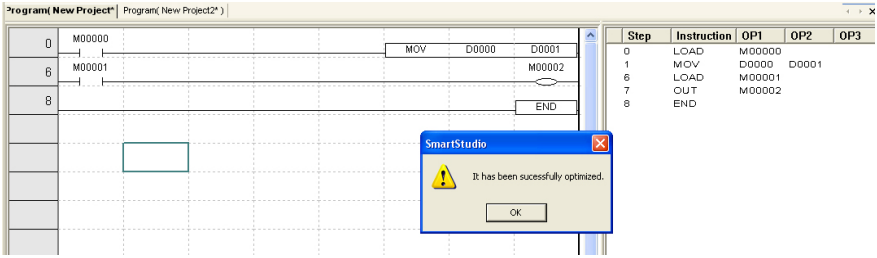
- **Clear NOP**

  With activated ladder editor, select [Tool]-[Program Checking]-[Program Optimization] of menu and ‘Program Optimization’ dialog box appears. Select ‘Clear NOP’. With only activated mnemonic editor, select [Tool]- [Program Checking]-[Program Optimization] of menu and ‘Program Optimization’ dialog box does not appear. It clears “NOP” instructions.



- **After clearing NOP**

  You can see, in the mnemonic editor on right side, that previous NOP instructions are deleted.



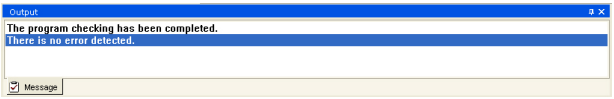
4.2.2. Program Checking and Options

This function checks to see whether there are program errors or not. Select [Tool]-[Program Checking]-[Program Checking Options] of menu and 'Checking Program Options' dialog box appears.
When checking 'Process dual coil as error', dual coil is processed as error and download is not available. When non-checking this, it displays warning message for dual coil and download is available.
Regardless option checking, click 'OK' and it checks the followings.

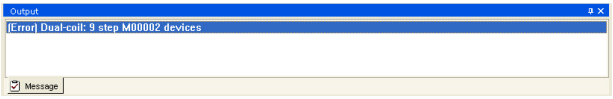
- Check dual coil
- Check program errors
- Check program capacity
- Others

Program checking result is output in message box as followings.

- **Example of without errors**
  "There is no error detected." message appears.



- **Example of errors**
  Lines and steps with errors are written in the message box.

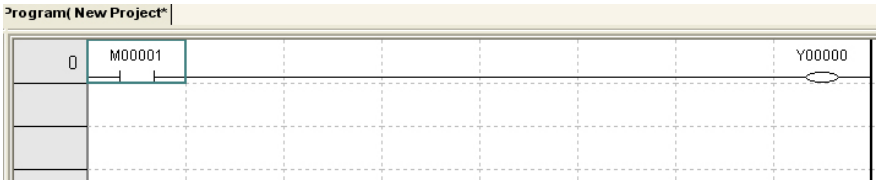


Chapter 5. View

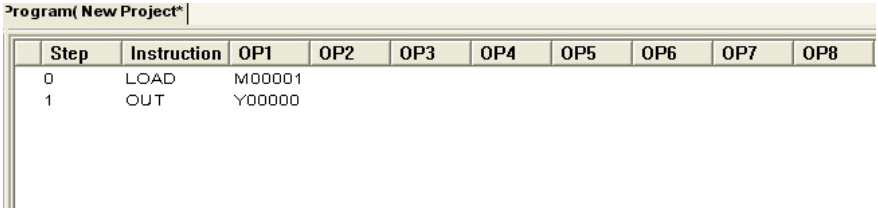
5.1. Ladder/Mnemonic

Whenever this menu is selected and the program editor window is ladder, it converts the to mnemonic and vice versa.

- **Ladder**

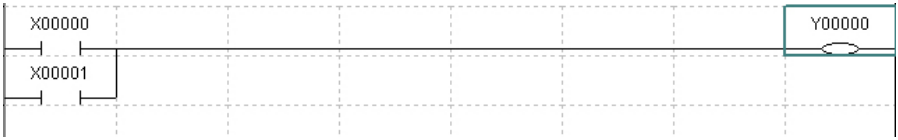


- **Mnemonic**



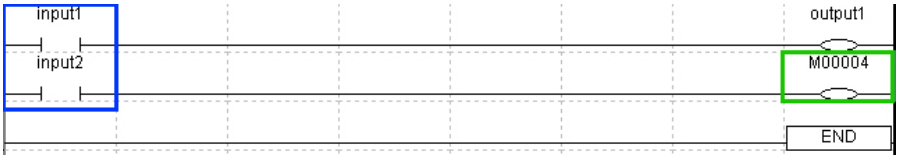
5.2. Device Name

Displays the devices used in the program by name.



5.3. Variable Name

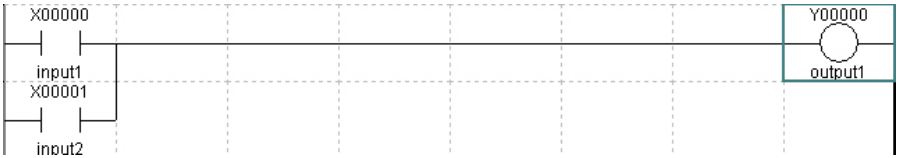
Displays variable names of the devices used in the program.



Devices with a registered variable name are displayed by the variable name (within blue box in the above image). Devices without a registered variable name are displayed by device name (within a green box as in the above image).

5.4. Device Name & Variable Name

Displays devices in both device name and variable name.



5.5. Device Name & Comment

Displays the device used in the program along with its description.

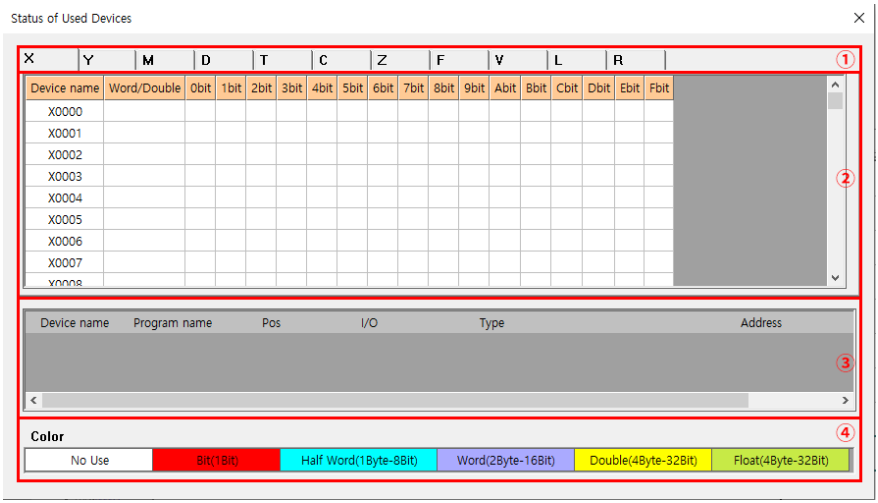


Device without a registered description is displayed only by device name such as the input contact in the above image.

5.6. Used Devices

Used devices displays the present usage state of the devices.
Select [View]-[Used Devices] of menu and 'Status of Used Devices' dialog box appears. You can check the information of devices to select a desired device. When using a device more than one time, used device displays the number of the using devices.

- **'Status of Used Devices' dialog box layout**



Status of used devices	Description
① Device tab bar	Device tab for the using device
② Present status list	Displays whether the device is using or not with color. Word/double: Displays using device except bit data 0 to F bit: display bit using devices The number is for the used times of appropriate device.
③ Detailed using list	Displays detailed information of the device by clicking present state list
④ Color	Classified devices by color

- **Present status list**

Device type	Description
Bit	Device in UB unit
Byte	Device in successive 8 UB unit
Word	Device in UW unit
Double word	Device in successive 2 UW unit
Floating point	Floating point device in successive 2 UW unit

Sign	Description
←	Device direction with each bit device when using device over 1 byte

- **Detailed using list**

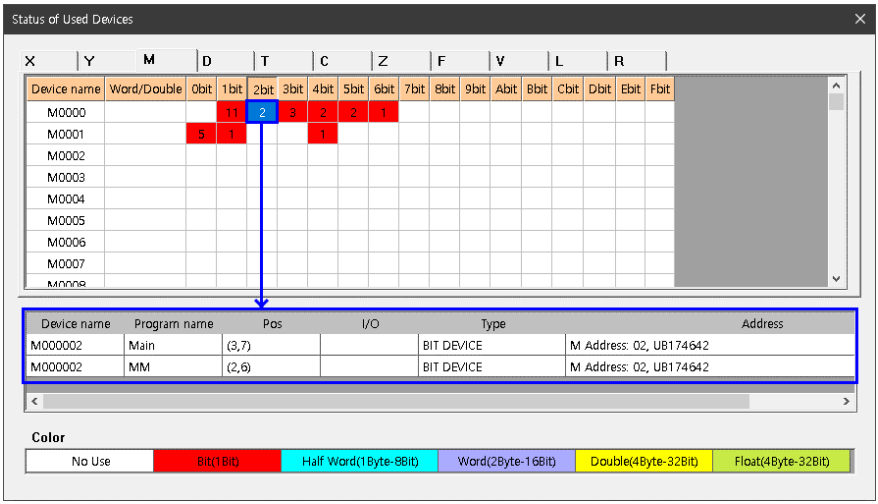
Item	Description
Device name	Displays the using device
Position	Coordinates of devices located in ladder cell
I/O	Displays the state (input/output) of the device
Type	Device type (Bit, Byte, Word, Double Word)
Address	Used address of LP system

- **Color**

No Use	Not using device
Bit(1Bit)	Displays using bit type device
Half Word(1Byte-8Bit)	Displays using 1byte (8bit) type device
Word(2Byte-16Bit)	Displays using 2byte (16bit) type device
Double(4Byte-32Bit)	Displays using 4byte (32bit) type device
Float(4Byte-32Bit)	Displays using 4byte (32bit) type floating point device

- **To display a device used more than one time**

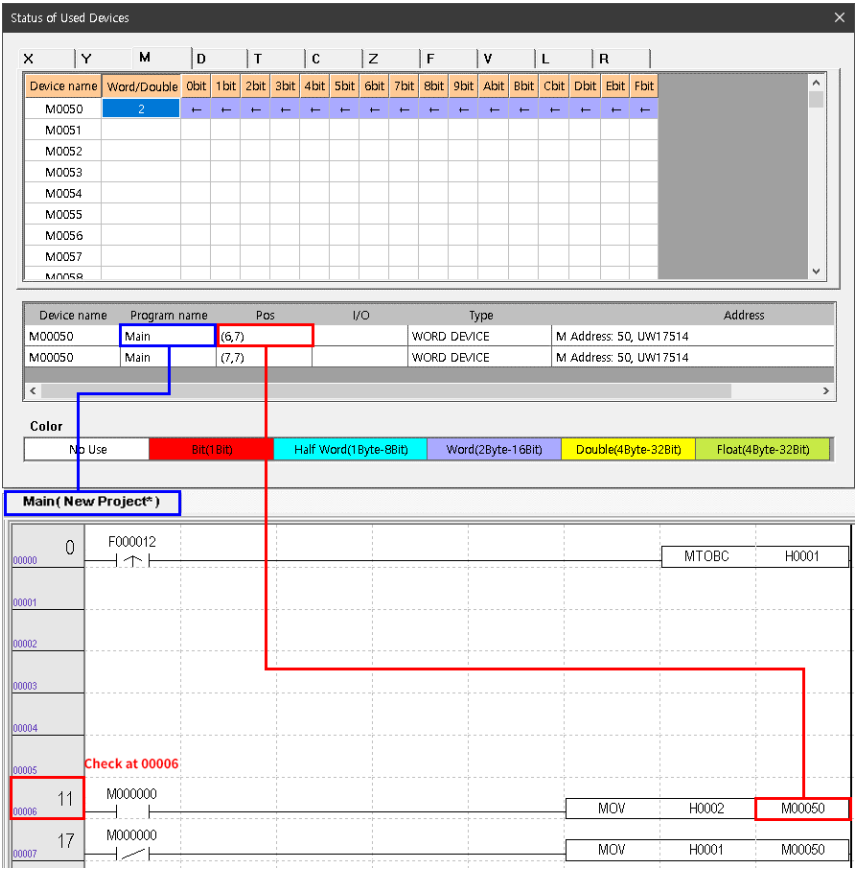
  When a device is used at more than one device, present state list displays the number of the using devices as following. Click the number, and detailed using list displays the device list information.



- **To find device on ladder by detailed using list**

  You can find position information of device at detailed using list at the device on ladder.

  - To find the device positioned position (6, 7)



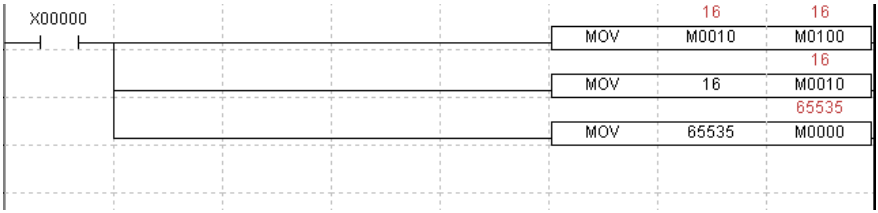
Position (x, y) of detailed using list is matched (line, column) of ladder. (The position of detailed using list starts from y, x (0, 0).)

Therefore, the device of above figure position (6, 7) is matched the device which is placed at 6th line (y) and 7th column of ladder.

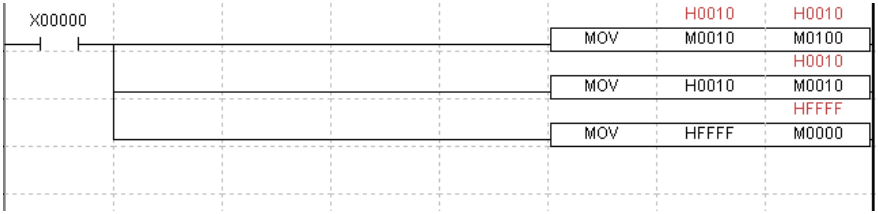
5.7. Decimal/Hexadecimal View

Sets integers in the program or data values for monitoring as decimal number view or hexadecimal number view.
These two status are not applied at the same time.

- **Decimal view**



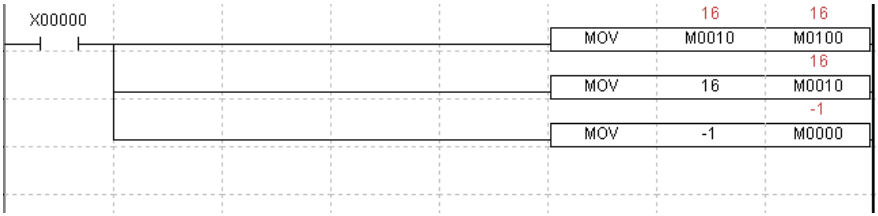
- **Hexadecimal view**



5.8. Signed/Unsigned View

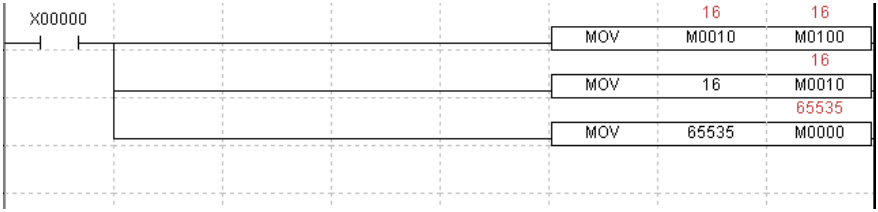
Shows integers in the program or monitoring values as Signed or Unsigned.
These two status are not applied at the same time.

- **Signed view**



When you change to [Singed View], it is changed decimal view and signed view both.

- **Unsigned view**



5.9. UW (GP device)/Device (LP device) View

Sets view mode of the device as either LP Device View or GP Device View.

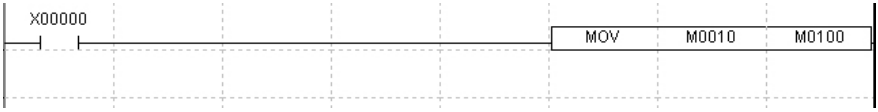
- **UW (GP device) view**

  It converts a LP device to a device that can be used in GP.



- **Device (LP device) view**

  It shows actual device used in LP.



5.10. Zoom In/Out

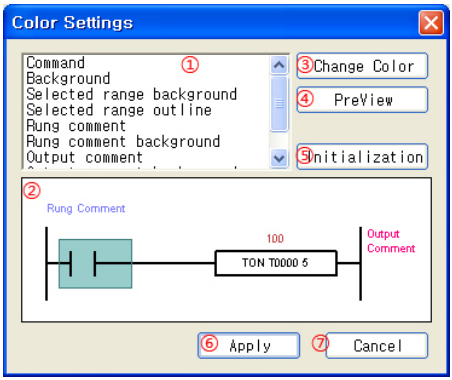
Increases or decreases the ladder editor screen.
The screen zoom range is from max 175% to min 25% increasing by steps of 25%.

5.11. Font Settings

Sets text font face used in the program.
Font size setting is interconnected with screen zoom.

5.12. Color Settings

Changes the color of the Ladder Editor. Select an item in the list box to change color. The color of the selected item is displayed in the preview of 'Color Settings' dialog box. Click 'Apply' and ladder editor color is changed.

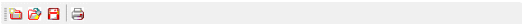


Color settings	Description
① Item	List of items to be changed color
② Preview	Previews the changed color
③ Change	Color Changes the color of selected items in the list
④ Preview	Shows the new color in the ladder editor
⑤ Initialization	Ignores user changed color and initializes the color of the ladder editor
⑥ Apply	Applies the new color and closes 'Color Settings' dialog box.
⑦ Cancel	Cancel the new color, applies the previous color and closes 'Color Settings' dialog box.

5.13. Toolbar

Selects whether to display the toolbar or not.

Project tool



Ladder tool



Online tool



Edit tool



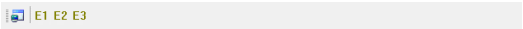
View tool



Debug tool

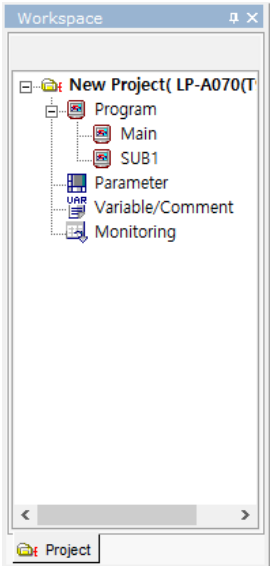


External program connection



5.14. Workspace

Selects whether to display the work space or not.



5.15. Message Box

Selects whether to display output message window or not.



Chapter 6. Online

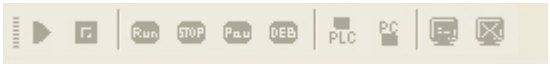
6.1. Connecting

Attempts to connect to LP and atLogic with predefined communication option (communication port, communication speed; BPS). Whether the connection succeeds or fails is notified through the message window.
You can check the connecting status as following toolbar.

- **Disconnection status**



- **Attempting to connect status**



- **Connected status**



6.2. Disconnecting

Disconnects between atLogic and LP.
After disconnected, online toolbar changes as above and online menus are disabled.

- **Before disconnecting**



- **After disconnecting**



6.3. Download

Downloads active project programs and parameters to the LP. Download is only available when status between atLogic and LP is "connected" and there is an active project.
You can choose programs and parameters to download.
When downloading the data, LP operation stops. When finishing downloading, you can set LP mode as RUN or STOP.

Please check the followings before downloading.
Make sure the PLC type in atLogic and the system's PLC type match before download.
The program does not check PLC type when connecting.
Automatically performs program error checking.
If there is error after checking, the dialog box appears to display 'An error has been found in program checking.' message.
If there is no error, the download processes will continue.

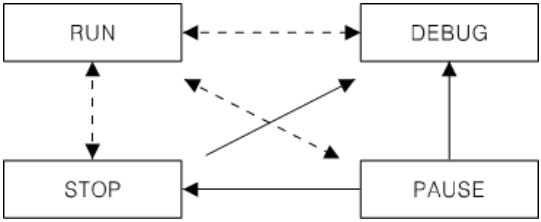
6.4. Upload

This feature brings programs and parameters from PLC to atLogic.
When connecting status atLogic and LP, select [Online]-[Upload] of menu and the following dialog box appears.
You can choose programs and parameters to upload.
If the uploaded project is the same project you are currently working on in atLogic, the dialog box appears asking whether to edit the uploaded project in current project. Select 'Yes (Y)" to continue editing on current project, or 'No (N)' to work on new project.

6.5. Change Mode

Changes operation mode of the LP.
There are 5 operation modes of the LP: RUN, STOP, PAUSE, DEBUG, H/W STOP.

- **If the LP system mode is set to RUN mode**
  It can be changed to STOP or PAUSE mode. If you are in the middle of monitoring, you can change the mode to DEBUG mode.
- **If the LP system mode is set to STOP mode**
  It can be changed to RUN mode. If you are in the middle of monitoring, you can change the mode to DEBUG mode.
- **If the LP system mode is set to PAUSE mode**
  It can be changed to RUN or STOP. If you are in the middle of monitoring, you can change the mode to DEBUG mode.
- **If the LP system mode is set to DEBUG mode**
  It can be changed to RUN mode.
- **If the LP system mode is set to H/W STOP mode**
  Mode control in atLogic is not available. H/W STOP is a mode where LP system switch is set to STOP.



- RUN: Executes the program downloaded to LP.
- STOP: Stops running program. This mode is enabled when the system mode is RUN.
- PAUSE: Temporarily stops the running program. When this mode is off, the program continues to run from the point of pause.
- DEBUG: Stops the program and enables debug menus.

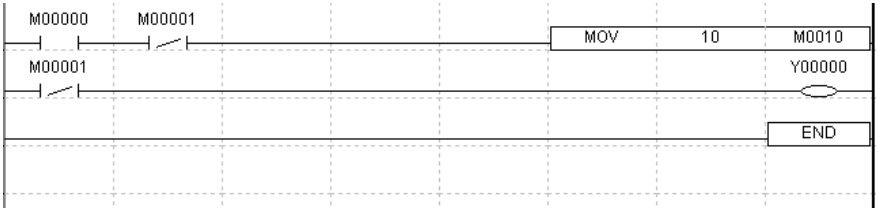
Operation mode

- **RUN mode**
  RUN mode repeats the following processes in order. Reads external contact status and saves it in internal memory; executes user program operations, such as step order or branch instruction and interrupt, to the END line; sends output device memory values as external output signals. This sequence is repeated.
- **STOP mode**
  STOP mode stops execution of user program, initializes internal memory data (latch area, some special devices are excluded) as well as turns all external output signals off to block external signals from the program.
- **PAUSE mode**
  Pause mode stops only the execution of user program, and keeps internal memories and external output signals.
- **DEBUG mode**
  DEBUG mode stops execution of user program at 0 step, initializes internal memory data (latch area, some special devices are excluded) as well as turns all external output signals off. It is also in a wait state for executing debug instructions.

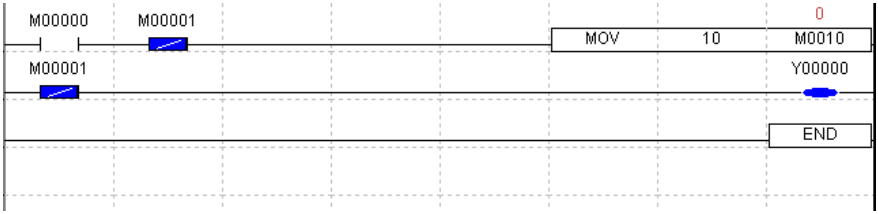
6.6. Start Monitoring/Stop Monitoring

Monitors to reflect system's operation status to the editor if programs of the active project and the system are same to applied it on the program.
The operation mode can be changed to DEBUG mode while monitoring. You cannot stop monitoring in DEBUG mode.
If programs of the active project and the system are not the same, monitored values may be inaccurate.
Bits or word device values are displayed in program editor while monitoring, as in the following image.

- **Before monitoring**



- **After monitoring**



6.7. Read Information

Reads and displays the system information of the connected LP system.
Select [Online]-[Read Information] of menu and ‘Read PLC information’ dialog box appears and reads the following items of PLC.

- PLC TYPE→SERIES + MODEL Ex)LP-S070 T9D6
- PLC version: Firmware version
- Status: PLC mode (RUN, STOP, PAUSE, DEBUG)
- Hardware switch status (RUN, STOP)
- Current scan time
- Maximum scan time
- Minimum scan time
- Average scan time
- Slot information

6.8. Change Password

Sets and edits communication password on LP system.
If the password is set already, it checks the password for upload.
Select [Online]-[Change Password] and 'Change PLC Password' dialog box appears.



- **Delete password**
  If the password is set, the coded password is shown in ①'Previous Password'.
  Delete the coded password in ① and enter the previous password and click ②'Delete'. It deletes the preset password in the LP system.
- **Change password**
  - When there is set password,
    1. Enter the previous password in ①
    2. Input new password in 'New Password' and 'Verify New Password'.
    3. Click 'Change'.
  - When the password is deleted,
    1. Maintains ① with blank.
    2. Input new password in 'New Password' and 'Verify New Password'.
    3. Click 'Change'.
- **Lost password**
  If you lost your password, notify Autonics for the coded password in atLogic.

6.9. Verify

Compares program and parameter settings of the editor with those of the system, and displays the result. Verify checking is for program and parameter.
This function is able to execute regardless LP operation modes. If you did not specify the range of steps to compare, it compares the whole steps.
Select [Online]-[Verify] of menu, and 'Verification of Program/Parameter configuration' dialog box appears.
Select the verified item and area, then click 'OK' will compare by reading program and parameter information from LP system.
Depend on compare result, the dialog box appears to display 'All programs are consistent.', 'The parameter range is inconsistent', 'The program area is inconsistent' message.

6.10. Change Present Value

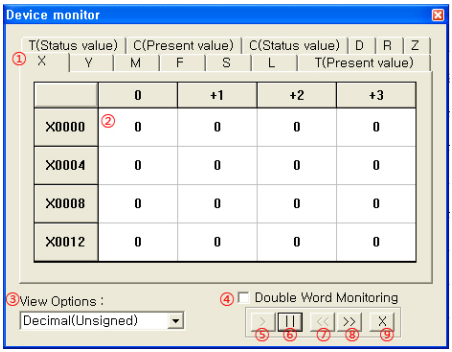
This function forces setting values for internal devices (except input/output devices) while monitoring. If a device value is set by changing present value, it is un-set when you change the mode of the LP system.
Select [Online]-[Change Preset Value] of menu, 'Change Present value' dialog box appears and you can change the present value.
Changing present value is executed regardless of LP operation mode.

Change present value	Description
① Type	Select the device type to be changed
② Device	Enter the device to change present value
③ Value	Enter the to be changed present value of the device
④ Change	After entering ① to ③, click 'Change' and the entered present value is applied to the device.
⑤ Close	Ignores input value and closes 'Change Present value' dialog box.

If you want to change the present value of a specific device in the program, move the cursor to the relevant device, click with right mouse button and pop-up menu appears. Select [Change Present Value] of pop-up menu and the device is designated automatically and the appropriated present value is selected.

6.11. System Device

Monitors devices of the entire system.



Device monitor	Description
① Device	Select the device of system to monitor
② Monitoring value	Displays monitoring value of the device.
③ View Options	Select view options for displaying monitoring value by pull-down menu. Decimal(Unsigned)/Hexadecimal/Binary/Decimal(Signed)
④ Double Word Monitoring	With non-checking this, it displays the value as word unit. Checking this, it displays the value as double word unit.
⑤ Start	Starts monitoring
⑥ Pause	Pauses monitoring
⑦ Move(decrease)	Moves (decrease) the device address.
⑧ Move(increase)	Moves (increase) the device address.
⑨ Exit	Finishes device monitoring.

6.12. Delete

6.12.1. Data

This function initializes system device. Delete data function is enabled only when LP operation mode is STOP.
Select a device to delete and click ‘OK’ to delete the device data.
If you check ‘ALL', entire system devices can be selected/deselected. Click ‘OK’ and it deletes (initializes) the selected devices.

6.12.2. Program/Parameter

Deletes program and parameter information stored in the LP system.
Delete program function is able to delete PLC program, line comment, rung comment, variable, LABEL, project, and password data.
Default is checked both ‘PLC program’ and ‘Parameter’. You can select each item to delete.
When deleting ‘PLC program’, password is also deleted.

6.13. Firmware Download

Firmware file is different by LP model. It is able to read only same set LP type in atLogic. Firmware download menu is only supported in LP-S044 series.

1. Select [Online]-[Firmware Download] of menu.
2. When the ‘Firmware download’ dialog box appears, select the items as the table below.

Firmware download	Description
① Version	Firmware version to download
② Processing	Process time to download
③ Path	Designate file path to download

3. Select the firmware file to be downloaded in LP and click ‘Download’,
4. When the ‘System Information’ dialog box appears, compare the current LP firmware with downloaded firmware.
5. If the downloaded firmware is older than the current LP firmware, the dialog box appears to ask whether to download. To continue download the firmware, click ‘Yes’ and to stop download, click ‘No’ or ‘Cancel’.

6. When the firmware download starts ‘Firmware Download’ dialog box appears and shows download processing. Do not shut down the program or the LP system during the firmware download.



In case that LP type is RS-232C A, RS-232C B port, only RS-232C B port is available for firmware download. In case that LP type with each RS-232C and RS-422 port, only RS-232C port is available for firmware download.
LP-S070, LP-A070 and LP-A104 Series does not support firmware upgrade by atLogic. Insert USB memory stick, which contains the firmware file, to USB HOST port of the LP system. Upgrade the firmware in [Data]-[Firmware upgrade] of LP system menu. For further details, refer to “LP-A Series user manual, LP-S070 user manual and LP-S070 (V2) user manual”.

6.14. Communication Options

This function is enabled only when the system and atLogic are not connected. Designate communication options for communication with LP.
Select [Online]-[Communication Options] and 'Communication Options' dialog box appears.

Options	Description
① Communication type	Communication type between LP and atLogic: Select Ethernet, USB, or Serial.
② Setting items	Communication setting items appears by communication type.

Communication type by LP model

	LP-S044 Series	LP-S070 Series	LP-A070 Series	LP-A104 Series
Serial	●	●	●	●
Ethernet	-	●	●	●
USB	-	●	●	●

6.14.1. Serial Communication

Connects LP and atLogic by 'Com' port.

Serial	Description
① Port	Select serial communication port to communicate with LP by pull-down menu.(COM1 to COM32)
② BPS	Select serial communication speed (BPS) to communicate with LP by pull-down menu. (110 bps to 115200 bps)

Except port and bps, the other items are fixed as below.

Item	Fixed value
Data	8 bit
Stop bit	1 bit
Parity	Even
Flow control	XON / XOFF

6.14.2. Ethernet Communication

Connects LP and atLogic by ‘Ethernet’.

Ethernet	Description
① Dest IP	Register IP address to actual use
② Lan Card IP	Select IP address of PC LAN card to communicate with LP by pull-down menu
③ IP ADDRESS list	Displays IP ADDRESS list of connected LP
④ Refresh	Refreshes IP ADDRESS list.

It is able to download PLC program only when registered on destination IP. Destination IP defaulted to 0.0.0.0 is able to enter destination IP directly or select destination IP from IP ADDRESS list by double clicking.

6.14.3. USB Communication

Connects LP and atLogic by ‘USB’.
It is not required additional communication setting.

Chapter 7. Debug

7.1. Run

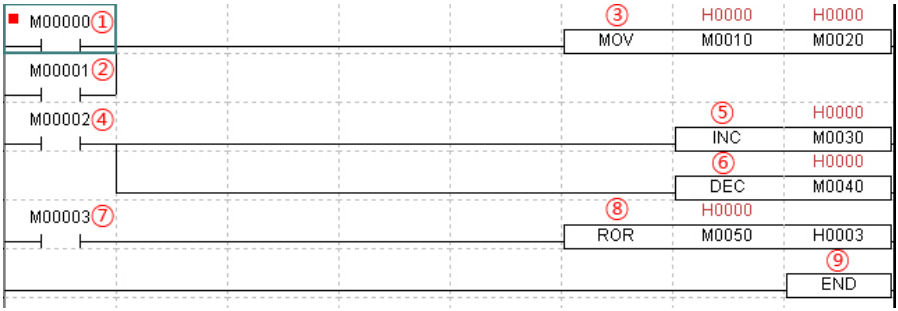
Switches to debug run mode.
Use this feature when you want to run the program until a certain condition, that is either run up to bit or run up to word, is satisfied, or you want to run the program to the position where the break point is set.

7.2. Stop Run

Stop while debug is running.
When debug is resumed, it starts from the first step.

7.3. Trace

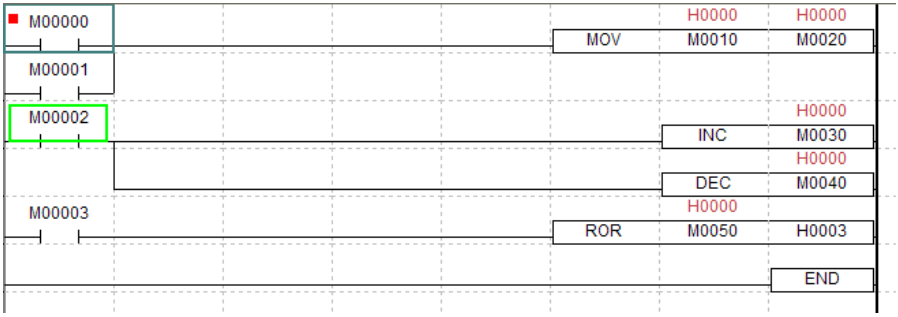
This is a command that executes debug by a command.
If the program receives a trace command again at the last step, it goes back to the first step and continues the trace.



In the above example, it starts tracing from ①, executes to the END instruction at ⑨ in order, and executes ① instruction again.

7.4. Insert/Remove Break Point

Inserts a break point to stop debugging at the specific step.
When a break point is set, the program stops debugging at the position where it encountered the break point while it was operating any of debug run, debug-scan, debug-bit and debug-word. Select [Debug]-[Insert/Remove Break Point] at the specified step, the break point is removed.



When a break point is inserted, green rectangle appears at cursor position as the above image.

7.5. Stop Debugging

Stops debug mode and switches the mode to STOP.

7.6. Debug-step

Makes the debug run execute to the specific step number in debug mode.
Starting step number could be selected in either the first step or the broken step.

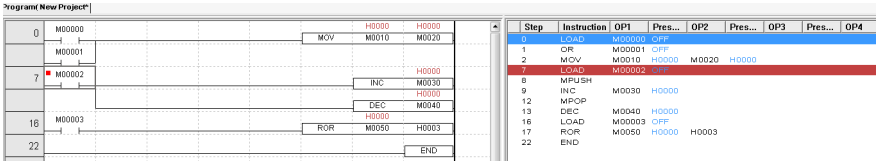
Debug-step	Description
① Step no.	Specify the step number where to start debugging. In the case of the specified step number being greater than the number of the entire steps, it executes 1 scan and stops at step 0.
② From the first step	If you choose the first step as the debug starting step, it jumps from the current step to step 0, and executes to the specified step at ①.
③ From the broken step	If you choose the stopped step as the debug starting step, it executes from the current step to the specified step at ①. If the specified step is located ahead of the stopped step, it executes 1 scan and then executes from the next scan to the specified step.

7.7. Debug-line

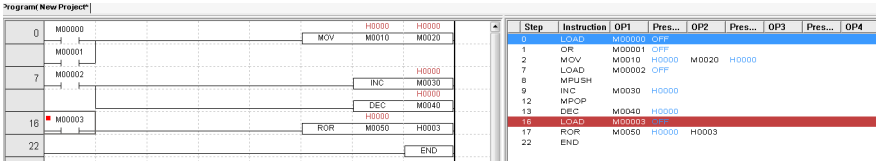
Executes the debug by the line(rung). It executes debugging line by a line in order and then moves the break point.

In the image below you can check that debug by the line started at step 7, in mnemonic editor, and the break point moved to step 16. In the mnemonic editor, it executes debugging commands for a line and then stops.

- **Before debug line**



- **After debug line**



7.8. Debug-scan

Executes program in debugging status for the specified number of scans.

Debug-scan	Description
① The number of scan	Specify the number of scans.
② From the first step	Starts debug from the first step.
③ From the broken step	After scanning from the stopped step to the number of scans, it stops debug at the stopped step.

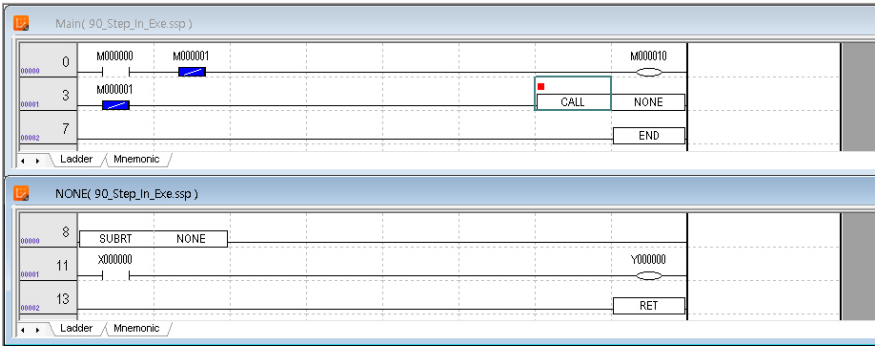
7.9. Debug-1 Scan

Executes 1 scan at the stopped step and stops at the original step (the stopped step).

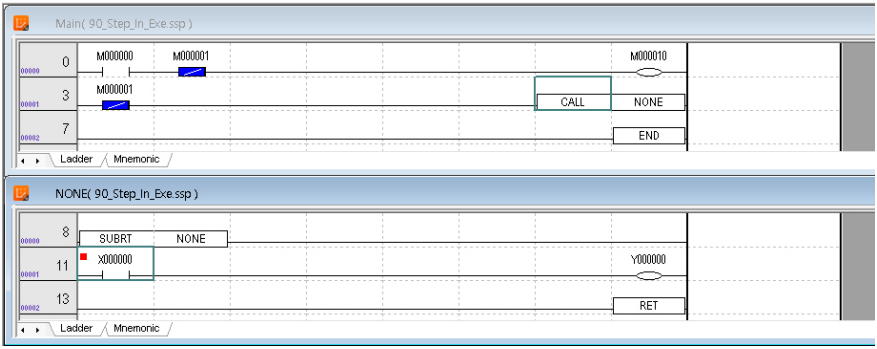
7.10. Step In

This traces into the inside of the operating function from the point of user function call or sub-routine call while debugging.
If the step in is not available at the step on which you tried to step in, it works the same way as a trace.

- **Before step in**



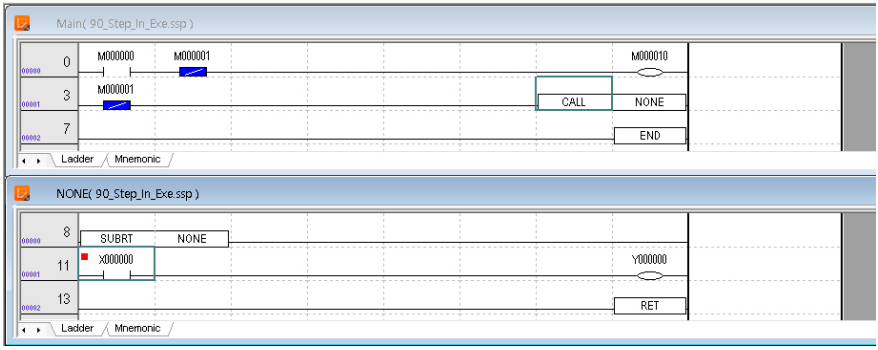
- **After step in**



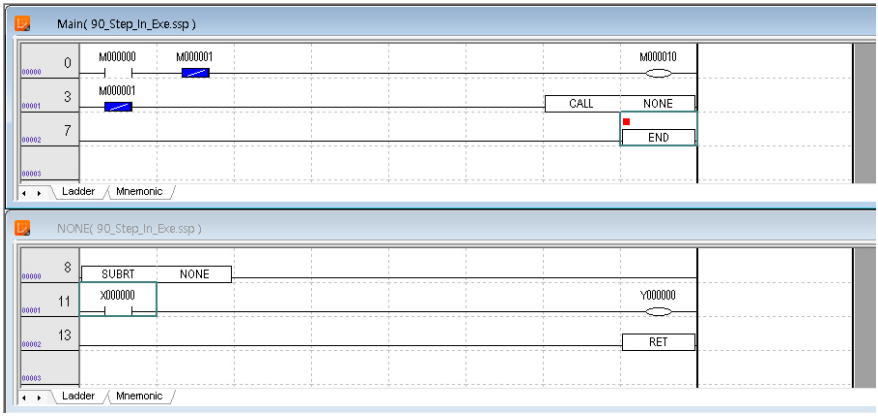
7.11. Step Out

Executes the sub-routine while inside the sub-routine directed by step in instruction, and stops at the next step from the step where the sub-routine is called.
If the current step is not a sub-routine, it works the same way as a trace.

- **Before step out**

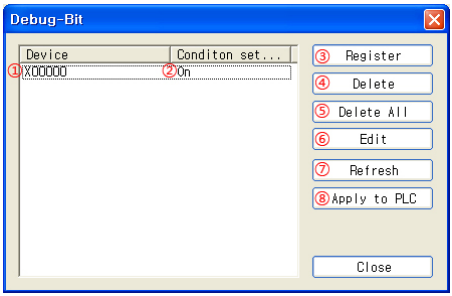


- **After step out**



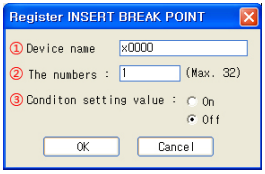
7.12. Debug-bit

Keeps debugging until the device reaches the specified value. Registers the bit device's break registration condition.
Registered break registration condition is deleted when the system operation mode is changed.



①,② Device condition setting — Displays registered bit device and break condition.

③ Register — Register new bit device break condition. Click ③ and 'Register INSERT BREAK POINT' dialog box appears.



① Device name: The bit device on which a break condition is registered.
② The numbers: Number of devices to be consecutively registered from the device specified in ①. Maximum 32 devices are allowed.
③ Condition setting value: Break condition (Off/ On)

④ Delete — Deletes a selected condition from registered conditions.

⑤ Delete All — Deletes all registered conditions.

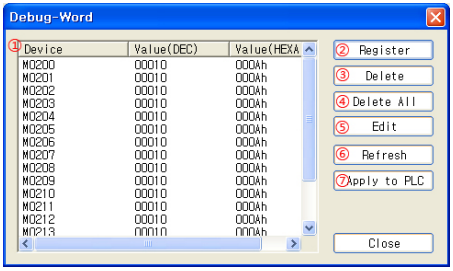
⑥ Edit — Edits a selected condition from registered conditions.

⑦ Refresh — Reads registered condition from the system and refreshes that condition.

⑧ Apply to PLC — Applies registered condition to the LP system.

7.13. Debug-word

Keeps debugging until the word device reaches the specified value.
Registers a break condition of the word device. The registered break registration condition is deleted when the system operation mode changes.

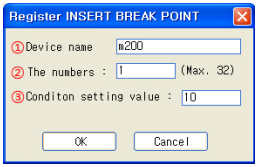


① Word device break condition

Displays registered break condition of the word device by reading registered information of LP.

② Register

Registers a new break condition of the word device. Click ② and 'Register INSERT BREAK POINT' dialog box appears.



① Device name: The word device on which a word break information is registered.
② The numbers: Number of devices to be consecutively registered from the device specified in ①. Maximum 32 devices are allowed.
③ Condition setting value: Break value of the device.

③ Delete

Deletes a selected condition from registered conditions.

④ Delete All

Deletes all registered conditions.

⑤ Edit

Edits a selected condition from registered conditions.

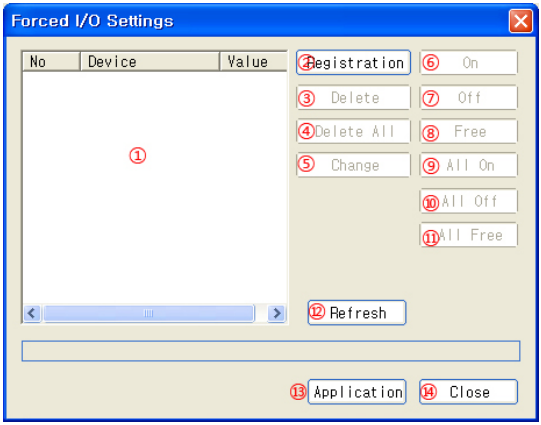
⑥ Refresh

Reads registered condition from the system and refreshes that condition.

⑦ **Apply to PLC**	Applies registered condition to the LP system.

7.14. Forced I/O Settings

This function is for controlling the device signal value for input/output by force. The registered device information by forced I/O settings is cleared when changing LP operation mode.
Select [Debug]-[Forced I/O Settings] of menu or click with right mouse button, 'Forced I/O Settings' dialog box appears.



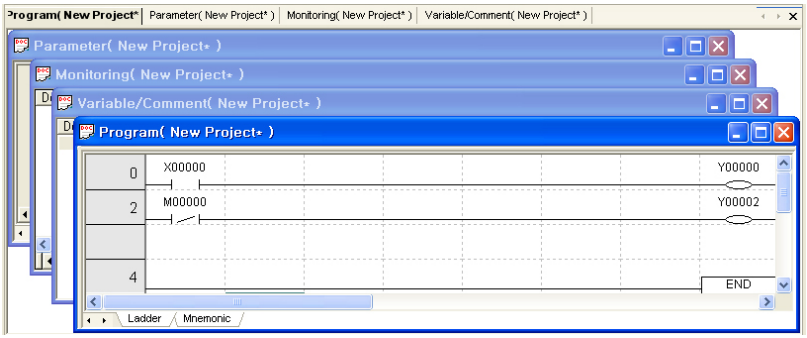
① I/O setting	Displays the registered forced I/O setting value on the list
② Registration	Adds new forced I/O
③ Delete	Deletes the selected I/O from the registered forced I/O list in ①
④ Delete All	Deletes all I/O from the registered forced I/O list in ①
⑤ Change	Edits the I/O from the registered forced I/O list in ①
⑥ On	Turns ON the selected I/O from the registered forced I/O list in ① by force
⑦ Off	Turns OFF the selected I/O from the registered forced I/O list in ① by force
⑧ Free	Releases control to the selected I/O from the registered forced I/O list in ①
⑨ All On	Turns ON all I/O from the registered forced I/O list in ①
⑩ All Off	Turns OFF all I/O from the registered forced I/O list in ①
⑪ All Free	Releases control to all I/O from the registered forced I/O list in ①

⑫ **Refresh**	Reads the registered I/O information from the LP system and refreshes ①I/O setting value list
⑬ **Application**	Applies the registered I/O information in ① to PLC
⑭ **Close**	Closes 'Forced I/O Setting' dialog box.

Chapter 8. Window

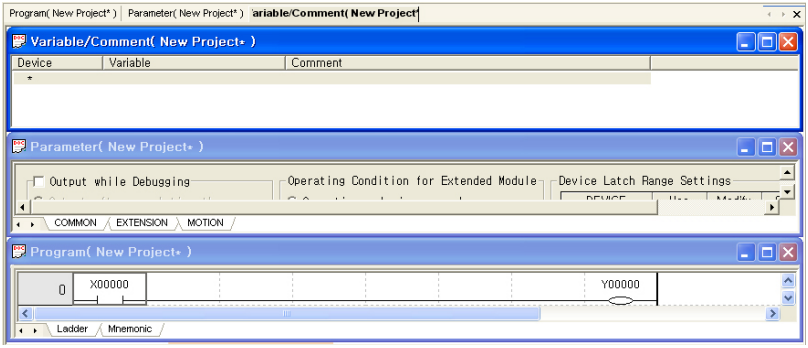
8.1. Cascade

This cascade option aligns opened windows like the image below.



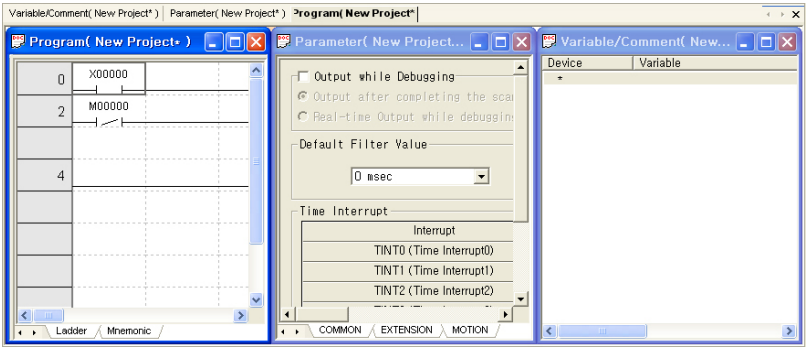
8.2. Horizontal Tile

Select [Window]-[Horizontal Tile] of menu, it aligns opened windows like the image below.



8.3. Vertical Tile

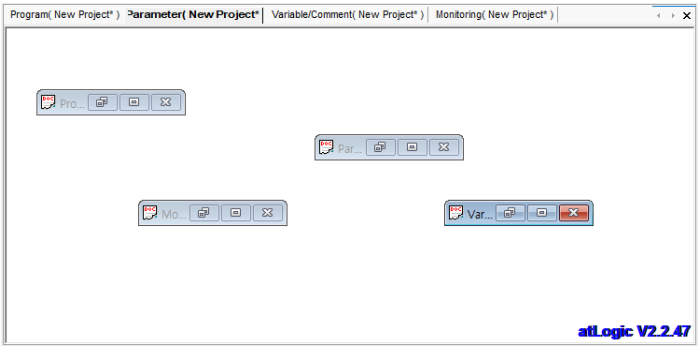
Select [Window]-[Vertical Tile] of menu, it aligns opened windows like the image below.



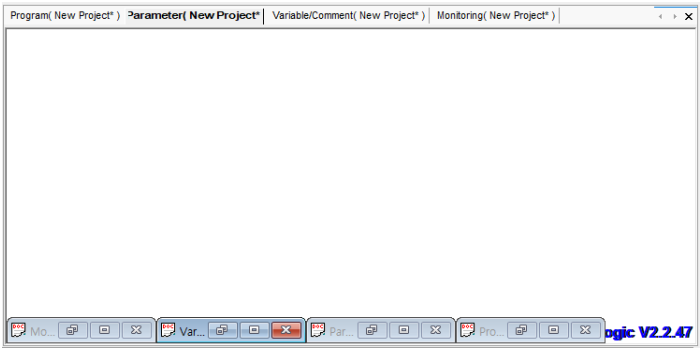
8.4. Arrange Icon

Select [Window]-[Arrange Icon] of menu, minimized icons are aligned as below.

- **Before arrange icon**

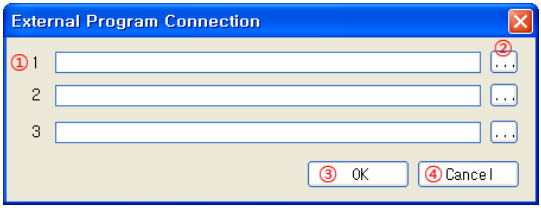


- **After arrange icon**



8.5. External Program Connection

This feature allows registering of other programs in order to run them in atLogic.



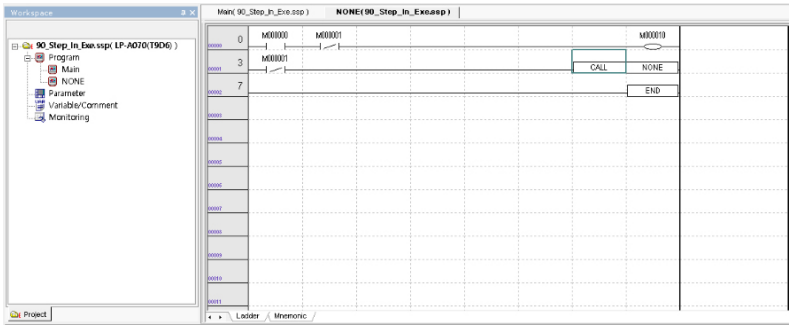
External program connection	Description
① Path	A path to the external program appears. You can directly enter the external program. Registered external program operates directly when clicking the icon in toolbar.
② Browse	Browses external program to be registered by window explorer.
③ OK	Registers the external program and closes 'External Program Connection' dialog box.
④ Cancel	Cancels the registration and closes 'External Program Connection' dialog box.

Chapter 9. Workspace

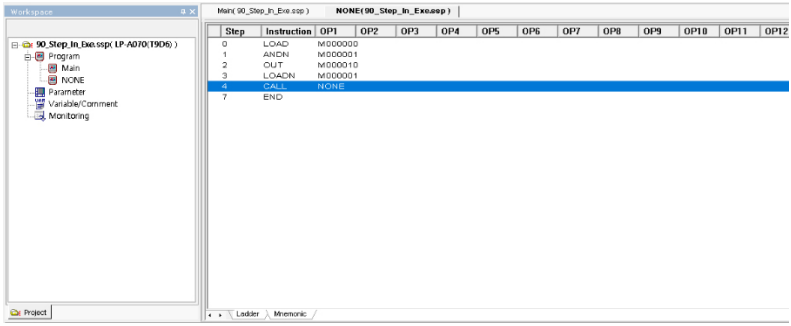
9.1. Ladder/Mnemonic Program

Programs are displayed in the workspace separated into main and subroutines. When double-clicking the main or subroutine,
it is displayed as a ladder or mnemonic program in the program editing window.
User can switch display format between ladder and mnemonic program.

- **Ladder program window**



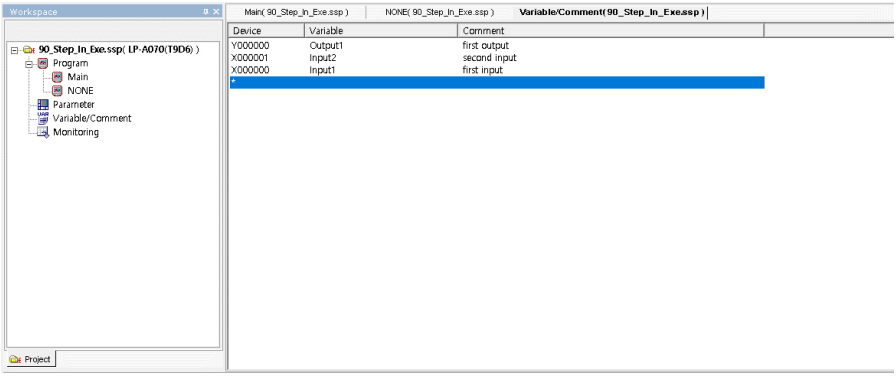
- **Mnemonic program window**



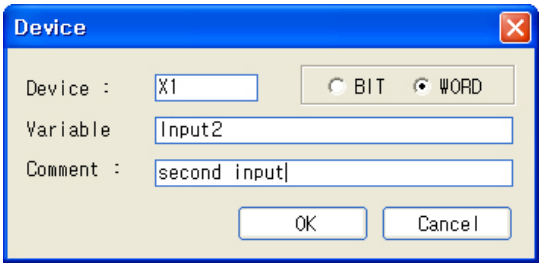
You can input instruction by pressing Enter keyboard or double-clicking in mnemonic editor. After inputting mnemonic, press Enter keyboard. If mnemonic grammar is correct, input is complete. If there is error in mnemonic grammar, grammar checking message appears and it returns to edit window.

9.2. Variable/Comment

When you select 'Variable/Comment' in workspace, the following screen opens.



The window outputs existing variables and descriptions. To enter a new variable, double-click the edit window or press Enter keyboard and 'Device' dialog box appears as below.



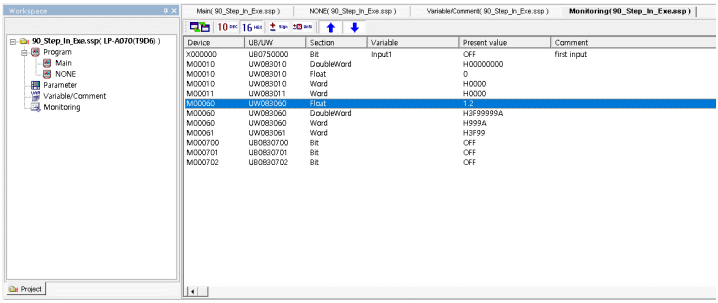
- **Adding variables**

1. Enter the device to register as variable and select 'BIT' or 'WORD'.
2. Enter variable name and comment of to be registered and click 'OK'.
   When entered variable name and comment are registered, check in 'Variable/Comment' edit window.

Variable name consists of English alphabet , number and underbar(_).

9.3. Monitoring

When you select ‘Monitoring’ in workspace, the following screen opens.



On the monitoring window, devices registered as monitoring devices are displayed. At the time of monitoring LP in atLogic, you can monitors the present value of the registered devices.
Double-click the edit window or press Enter keyboard and ‘Register Monitor Device’ dialog box appears.
Select monitoring device type; bit device, word device, double word device, enter the device name and click ‘Register’ and it is registered as monitoring device.
If you want to register consecutive devices, enter [Device - Device] (ex: x0-x5) in the Device Name field. It registers from the first device (x0) to the last device (x5).
If the device you want to register has a registered variable, selecting the variable name immediately registers the device.
After selecting a registered device from the list, press [Ctrl] + [Del] key to delete the device.
Devices in monitoring window are aligned in ascending order by device name.

- **Swirching window**



Monitoring window is available to separate or combine the program.

- **Display value**



Select the desired display value type: decimal / hexadecimal / signed value / unsigned value

- **Move**



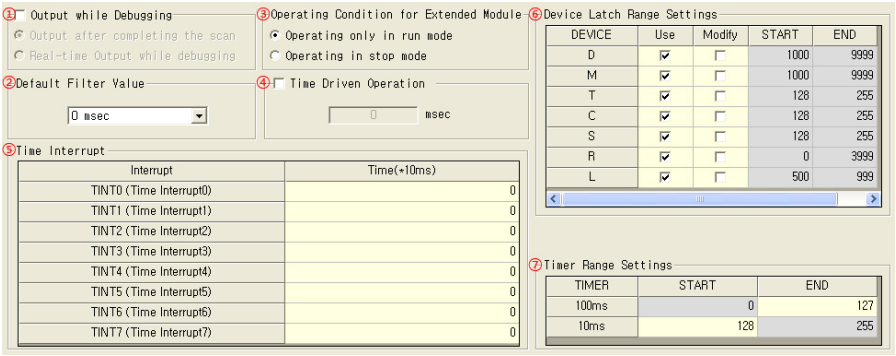
The selected device order is available to change up/down.

9.4. Parameter

When you select 'Parameter' in workspace, you can set the detailed configuration for LP.

9.4.1. Common

Sets parameters commonly applied to all LP series models.



Common	Description
① Output wile Debugging	Designate while debugging, output after completing the scan or real-time output. Output after completing the scan: Outputs the value of the present output device (Y device) after a scan in debug mode is complete. Real-time Output while debugging: Outputs the value when the value of the output device is changed in debug mode while debugging, regardless of the present debugging position.
② Default Filter Value	The filter value of each input port can be specified per port through the filter function. When you did not individually specify the input port value, the value specified in this item is assigned as a filter value. When '0' is set, it does not use filter value.
③ Operating Condition for Extended Module	This parameter is used to determine how the extension slot is operated according to the system's RUN/STOP mode. Operating only in run mode: The extension slot is operated only when LP operation mode is RUN. Operating in stop mode: The extension slot is operated when LP operation mode is set to STOP as well as RUN.
④ Time Driven Operation	A parameter to operate the LP logic program on a fixed cycle execution time.

Common	Description
⑤ Time Interrupt	Designate interrupt occurring interval of specified timer interrupt. Interrupt sources in a fixed cycle total 8, and the interrupt interval can be set in 10 ms increments from 10ms to 655350ms. Interrupt occurs in the interval of the time set and executes interrupt routine. For further details of interrupt instruction, refer to “atLogic programming manual” or “LP series instruction manual”.
⑥ Device Latch Range Settings※1	Indicates the latch range that the LP has by default. Check ‘Use’ of each device and the device becomes memory protection device and, it maintains the previous value even though power is OFF to ON. D : 1000 to 9999, M: 1000 to 9999, T: 127 to 255, C: 127 to 255, S: 127 to 255, R: 0 to 3999, L: 500 to 999
⑦ Timer Range Settings	Timer device area of the designated range has the appropriate time cycle. LP series supports 256 timers from 0 to 255. LP timer is two types; 100ms type, and 10ms type. Depending on using frequency, 256 timers are divided as two types. First allotted contents of 0 to 127 timers are 100ms type, 128 to 255 timers are 10ms type. You can designate the boundary between 100ms type timer and 10ms type timer. Timer type and available range - 100ms: 0 to 254 - 10ms: 1 to 255

※1: Caution for time driven operation

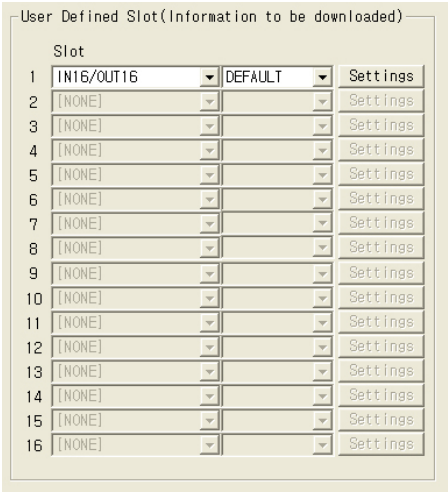
Check watch dog timer value and designate time driven operation time to shorter than watchdog timer setting. If you set the time driven operation time is longer than watchdog timer setting, LP operation stops by watchdog timer execution.
Be sure the scan time of program and set the time driven operation time. If you set the time driven operation time is shorter than the execution time of actual program, program may execute unexpected operation.

※2: Caution for latch range setting

- Input/output devices that reference actual input/output port values cannot be set as a latch range.
- Special devices that have influence to the system cannot be set as a latch range, as they operate according to their individual functions when LP restarts after stop or power failure.
- When using latch range, check the remaining battery capacity in [Diagnostics]-[Battery remaining] of system menu in LP.

9.4.2. Extension

Sets expansion function that is classified by type within LP series.



The above image shows available slots in LP series.

The default of LP-S044 Series is set asTYPE A, the default of LP-S070, LP-A070, LP-A104 Series are set as DEFAULT.

Click ‘Settings’ and ‘I/O Contact Setting’ dialog box appears by depending on the LP series.

(1) FILTER

This is a function used to set input filter value.
This function set X00000 to X00007 / X00008 to X0000F (LP-S044, LP-S070, LP-A070),
X00000 to X00007 / X00008 to X0000F / X00010 to X00017 / X00017 to X0001F (LP-A104) filter values respectively. With non-checking 'Using Filter', input filter of extension slot is operated by 'Default filter value' in 'Common' tab.
With checking 'Using Internal Device', the set filter value is saved in the designated inner device in order. By the logic to change this inner device value in ladder program, you can control filter value.

With checking using inner device, and setting inner device as M0000
M0000 - filter value of X0000 to X00007
M0001 - filter value of X0008 to X0000F are saved.
To control filter value by program with checking using inner device, you should write the program as following steps

1. Change M device which is to be inner device as changed filter value. Filter value is available only 0 to 63(6 bit) value. Please refer to below table of actual filter value by filter when setting filter value.

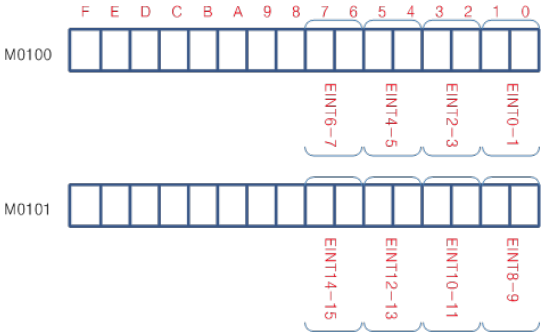
Filter time (ms)	Actual filter value
0	0
1	1
2	4
3	6
4	9
5	11
6	14
7	17
8	19
9	22
10	24
15	37
20	52

2. Give pulse input to special device F00090 to set using an internal device with slot 0 module function. (Then the value of M device used as an internal device is applied as a filter value.)

(2) INTERRUPT

This sets an input contact as an external interrupt.
With checking 'Using Interrupt' and double-click the type and pull-down menu appears to select one; No Int., Falling, or Rising. You can designate the output by two X0 and X1, X2 and X3.
Designate the device with checking 'Using internal device', the earlier set setting values are saved in 2 word by 2 bit of the appropriate device in order.

This is a mapping example in which the internal device is set to M0100



You can control the interrupt values by changing this internal device value in the Ladder program. The method to use an internal device and control the interrupt value with the program is the same as the one used for filter value.

(3) MATRIX

This tab is only for LP-S044 series.

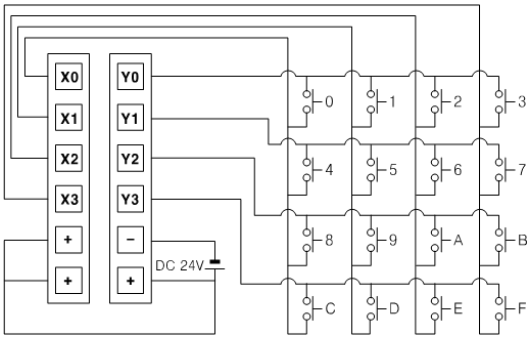
MATRIX tab	Setting range	Description
①Use 16 Key (MATRIX)	Checking: Use Non-checking: Not use	Choose whether to use matrix function or not.
②Input Register	return: X00000 –> X00003: Set X0 to X3 as return input return: X00008 –> X0000B: Set X8 to XB as return input	Select matrix return input signal.
③Output Register	COM: Y00000 –> Y00003: Set Y0 to Y3 as COM output COM: Y00008 –> Y0000B: Set Y8 to YB as COM output	Select matrix COM output signal.
④Device	Select M device	Select M device as a device to save 16 bit key input values.
⑤Device Extensions※1	Check: Applies key input value and extended setting information Non-check: Applies only key input value	Save input register and output register information in the expansion device.

※1: The contents of a device when checking 'Device Extensions'

- WDS: word device lead address: The set device in device item in matrix setting.
- WDS[0] to WDS[F]: word device bit

Using device extensions	WDS: [If input register setting is X0 to X3, it saves 0. If input register setting is X8 to XB, it saves 1.] WDS+1: [If output register setting is Y0 to Y3, it saves 0. If output register setting is Y8 to YB, it saves 1.] WDS+2[0]: [ON when pressing no. 0 switch is detected.] WDS+2[1]: [ON when pressing no. 1 switch is detected.] WDS+2[2]: [ON when pressing no. 2 switch is detected.] …. WDS+2[E]: [ON when pressing no. E switch is detected.] WDS+2[F]: [ON when pressing no. F switch is detected.]
Not using device extensions	WDS[0]: [ON when pressing no. 0 switch is detected.] WDS[1]: [ON when pressing no. 1 switch is detected.] WDS[2]: [ON when pressing no. 2 switch is detected.] …. WDS[E]: [ON when pressing no. E switch is detected.] WDS[F]: [ON when pressing no. F switch is detected.]

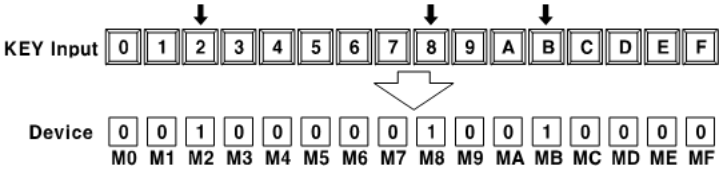
- **Matrix connection diagram**



- **Save method of input value**

  After setting input register as X0 to X3, output register as Y0 to Y3, and device as M0, wire it as above connection diagram. This is the operation description.

When press no. 2, no. 8, no, B keys at the same time



The result of key input is that 2nd, 8th, Bth bit of word device M0 turn ON and M0 value of word device is changed as 0x0904.

(4) 7 segment

This tab is only for LP-S044 series.
This tab is for controlling 7 segment.

7 SEGMENT tab	Setting range	Description
①Using 7-segment	Checking: Use Non-checking: Not use	Choose whether to use the segment feature or not.
②Output Register (COM)	Y00000–Y00003: Set Y0 to Y3 as latch output Y00008–Y0000B: Set Y8 to YB as latch output	Choose whether to use the segment feature or not.
③Output Register (SEG)	②Output Register(COM) is set as Y00000–Y00003, it is set as Y00008–>Y0000F automatically. ②Output Register(COM) is set as Y00008–Y0000B, it is set as Y00000–>Y00007 automatically.	Select data signal for segment output.
④Device	Select M device	Taking selected M device as a leading device, select 4-word devices as segment output devices.
⑤Device Extensions ※1	Check: Applies key input value and extended setting information Non-check: Applies only key input value	Save output register (COM) and output register (SEG) information in the expansion device.

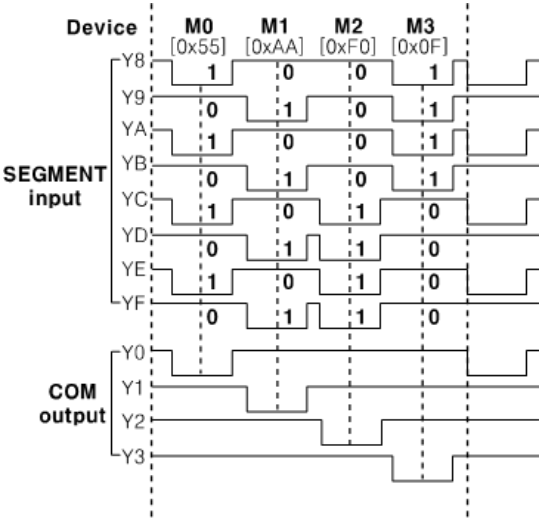
※1: The contents of a device when checking 'Device Extensions'

- WDS: word device lead address: The set device in device item in 7 segment setting.

Using device extensions	WDS: [If output register (COM) setting is Y0 to Y03, it saves 0. If output register (COM) setting is Y8 to YB, it saves 1.] WDS+1: [If output register (SEG) setting is Y8 to YF, it saves 0. If output register (SEG) setting is Y0 to Y7, it saves 1.] WDS+2: [First segment output data] WDS+3: [Second segment output data] WDS+4: [Third segment output data] WDS+5: [Fourth segment output data]
Not using device extensions	WDS: [First segment output data] WDS+1: [Second segment output data] WDS+2: [Third segment output data] WDS+3: [Fourth segment output data]

Setting example and output timing diagram

Setting item	Setting example
Using 7-segment	Check (Using)
Output Register(COM)	Y00000 – Y00003
Output Register (SEG)	Y00008 –> Y0000F
Device	Inputs M0[0x55], M1[0xAA], M2[0xF0], M3[0x0F] as present value



(5) SIO: synchronized signal output

This tab is only for LP-S044 series.
A synchronized signal output function that outputs data according to a specified timing using Clock, Data and Latch signal.

SIO tab	Setting range	Description
①Using SIO	Checking: Use Non-checking: Not use	Choose whether to use the SIO feature or not.
②Output Register	Y00004 – Y00006: Clock[Y4], Data[Y5], Latch[Y6] Y0000C – Y0000E: Clock[YC], Data[YD], Latch[YE]	Select SIO output signal.
③Data Bit※1	4 to 7 bit	Selecting data bits
④The Number of Data	1 to 8 word	Select output data.
⑤Device	Device lead address	Select heading address of the data to output.
⑥Device Extensions※2	Check: Applies key input value and extended setting information Non-check: Applies only key input value	Save information about output register, data bits and amount of data in the expansion device.

※1: Output data information range varies according to set data bits.

Data bit	Available output data range
4 bit	0x000 to 0x000F
5 bit	0x000 to 0x001F
6 bit	0x000 to 0x003F
7 bit	0x000 to 0x007F

※2: The contents of a device when checking ‘Device Extensions’

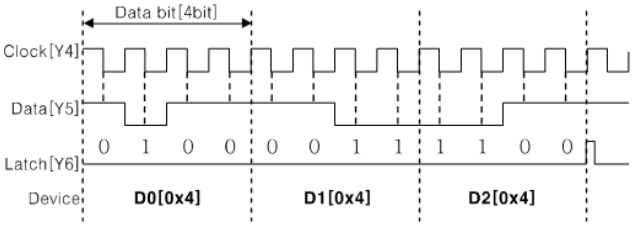
- WDS: word device lead address: The set device in device item in SIO setting.

Using device extensions	WDS: [If output register setting is Y4, Y5, and Y6, it saves 0. If output register setting is YC, YD, and YE, it saves 1.] WDS+1: [Saves the set number of data bits] WDS+2: [Saves the set number of data] WDS+3: [1st display data] … WDS+n: [(n-3)th display data] *n-3: the number of data

Not using device extensions	WDS: [1st display data] … WDS+n: [(n-3) th display data] *n : the number of data

Setting example and output timing diagram

Setting item	Setting example
Using SIO	Check (Using)
Output Register	Y00004 – Y00006
Data Bit	4
The Number of Data	3
Device	D0



9.4.3. Motion

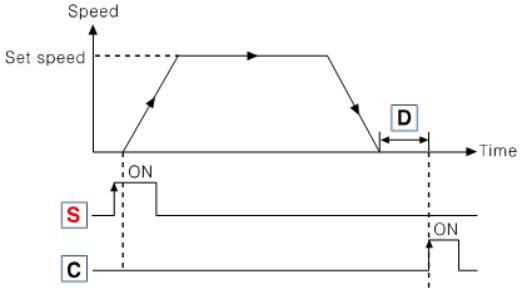
9.4.3.1. Motion Controller Overview

LP-S070, LP-A070 and LP-A104 Series includes motion controller function to drive motor driver.
Motion controller is able to move the object from the present to the precision destination position at the desired speed with controlling servo motor or stepping motor.
Motion controller function is able to control with basic motion operation as below.

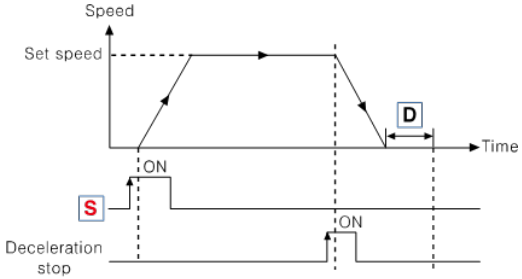
9.4.3.2. Basic Motion Drive List

S: start instruction, D: dwell signal, C: complete signal

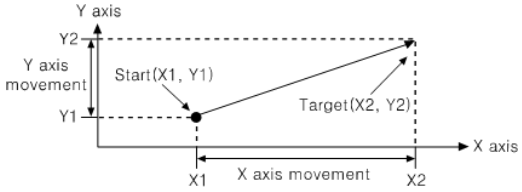
- **Position control**
  - Instruction: MTPDM
  - Operation: When occurring the rising edge of start instruction, it moves to the desired position with set speed. After dwell time, complete signal is ON with one scan.



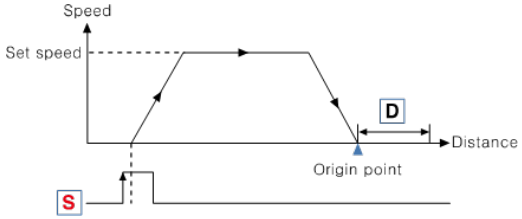
- **Speed control**
  - Instruction: MTVDM
  - Operation: When occurring the rising edge of start instruction, it moves to the desired position with set speed. After dwell time, complete signal is ON with one scan.



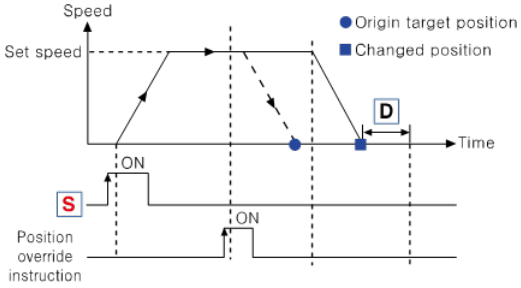
- **Line interpolation drive**
  - Instruction: MTIPT
  - Operation: By start instruction, it controls two axes linear interpolation from the present position to the target position.



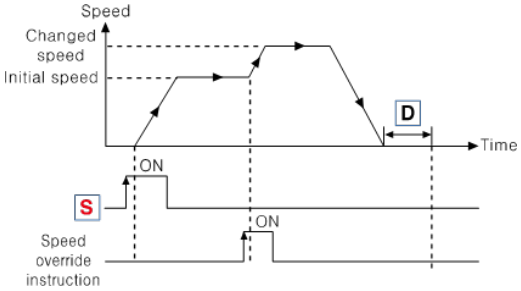
- **Origin back**
  - Instruction: MTOBC
  - Operation: By start instruction, it moves to the returning home direction and detects origin point. The type of origin back direction is according to the ‘Common Configuration’ of ‘MOTION’ tab..



- **Position override**
  - Instruction: MTOVP
  - Operation: By position override instruction, it drives with changing from the original target position to the changed position.



- **Speed override**
  - Instruction: MTOVV
  - Operation: By speed override instruction, it drives with changing from the present speed to the changed speed.



The basic motion operations as above are the unit operation, and each unit operation is divided 3 types which are single, continue and successive.

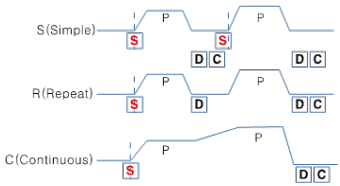
- **Simple:** Basic motion operation type is operating only by start instruction.
- **Repeat:** The motion operation type is operating repeatedly by the first start instruction. Because it goes to the next automatically after finishing every operation for one period, there is dwell time.
- **Continuous:** As similar as continue type, it has repeated operating by the first starting, but it goes the next without deceleration time and dwell time. Therefore, it is not able to change directions.

Each connection is as below.

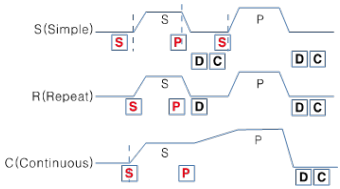
S: Start instruction, P: Pause operation instruction, D: Dwell signal, C: Complete signal

P: Postion Item, S: Speed Item

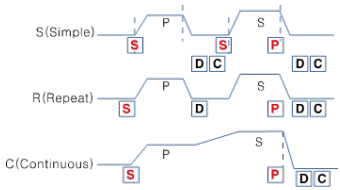
Position(P) → Position(P)



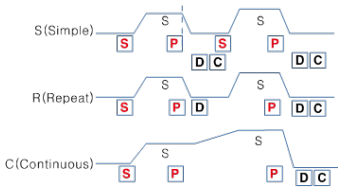
Speed(S) → Position(P)



Position(P) → Speed(S)



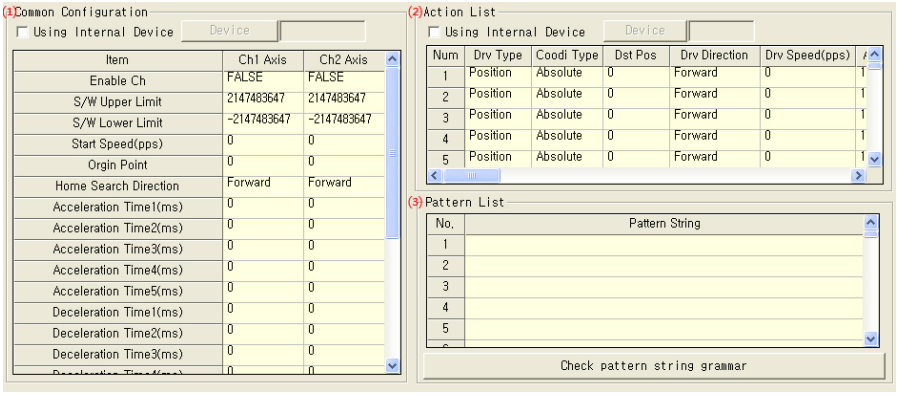
Speed(S) → Speed(S)



9.4.3.3. Motion Setting Parameter

'MOTION' tab in parameter is activated for LP-S070, LP-A070 and LP-A104 series type but it is not activated in other series.

You can set basic list for motion control; (1) Common Configuration, (2) Action List, (3) Pattern List.



(1) Common configuration

This configuration is basic for using motion, set CH1, CH2 operation.

- **Using internal device**
  Checking 'Using Internal Device', you can directly edit the setting items in LP-S070 system [Parameter]-[Common setting] without atLogic after downloading the program in LP.
  Check 'Using Internal Device' and 'Device' is activated.
  Click 'Device' and 'Select the device' dialog box appears to designate the inner device.
- **Device map with checking 'Using Internal Device'**
  With checking 'Using Internal Device' and designating the device, the setting values of common configuration are saved to from the designated device in order. The below device map is when inner device is set as M100.

Item	CH1 device address	CH2 device address	Setting range
Not used	M100	M132	-
Using status of an axis	M101	M133	FALSE : 0 / TRUE : 1
Home search direction	M102	M134	Forward : 0 / Backward : 1
Acceleration time 1 (ms)	M103	M135	0 to 65,535
Acceleration time 2 (ms)	M104	M136	0 to 65,535
Acceleration time 3 (ms)	M105	M137	0 to 65,535
Acceleration time 4 (ms)	M106	M138	0 to 65,535
Acceleration time 5 (ms)	M107	M139	0 to 65,535
Deceleration time 1 (ms)	M108	M140	0 to 65,535
Deceleration time 2 (ms)	M109	M141	0 to 65,535
Deceleration time 3 (ms)	M110	M142	0 to 65,535
Deceleration time 4 (ms)	M111	M143	0 to 65,535
Deceleration time 5 (ms)	M112	M144	0 to 65,535

Item	CH1 device address	CH2 device address	Setting range
Jog acceleration time (ms)	M113	M145	0 to 65,535
Jog deceleration time (ms)	M114	M146	0 to 65,535
Acceleration time to origin (ms)	M115	M147	0 to 65,535
Deceleration time to origin (ms)	M116	M148	0 to 65,535
Use S/W limit	M117	M149	FALSE : 0 / TRUE : 1
Use H/W limit	M118	M150	FALSE : 0 / TRUE : 1
Origin back type	M119	M151	H/W : 0 / S/W : 1
SW upper limit L	M120	M152	-2,147,483,647 to 2,147,483,647
SW upper limit H	M121	M153	-2,147,483,647 to 2,147,483,647
SW lower limit L	M122	M154	-2,147,483,647 to 2,147,483,647
SW lower limit H	M123	M155	-2,147,483,647 to 2,147,483,647
Start speed (pps) L	M124	M156	-2,147,483,647 to 2,147,483,647
Start speed (pps) H	M125	M157	-2,147,483,647 to 2,147,483,647
Origin point L	M126	M158	-2,147,483,647 to 2,147,483,647
Origin point H	M127	M159	-2,147,483,647 to 2,147,483,647
Jog speed (pps) L	M128	M160	-2,147,483,647 to 2,147,483,647
Jog speed (pps) H	M129	M161	-2,147,483,647 to 2,147,483,647
Home search speed (pps) L	M130	M162	-2,147,483,647 to 2,147,483,647
Home search speed (pps) H	M131	M163	-2,147,483,647 to 2,147,483,647

- **Common configuration item**

Item	Type	Description
Using status of an axis CH	BYTE (1Byte)	Whether to use Ch1, Ch2 or not, motion control or not. TRUE: Using it for I/O motion drive FALSE: Using it for I/O
Home search direction	BYTE (1Byte)	Designate home search direction when using H/W origin back. (Forward /Backward)

Item	Type	Description
Acceleration time 1 (ms)	Unsigned WORD (2Byte)	Designate acceleration time. Set range: 0 to 65535ms This is acceleration time to be taken from stop status (0) to maximum speed (100,000pps). If you set start speed, this acceleration time is to be taken time from the set start speed to maximum speed (100,000pps).
Acceleration time 2 (ms)	Unsigned WORD (2Byte)	
Acceleration time 3 (ms)	Unsigned WORD (2Byte)	
Acceleration time 4 (ms)	Unsigned WORD (2Byte)	
Acceleration time 5 (ms)	Unsigned WORD (2Byte)	
Deceleration time 1 (ms)	Unsigned WORD (2Byte)	Designate deceleration time. Set range: 0 to 65535ms This is deceleration time to be taken from maximum speed (100,000pps) to stop status (0). If you set start speed, this deceleration time is to be taken time from maximum speed (100,000pps) to the set start speed.
Deceleration time 2 (ms)	Unsigned WORD (2Byte)	
Deceleration time 3 (ms)	Unsigned WORD (2Byte)	
Deceleration time 4 (ms)	Unsigned WORD (2Byte)	
Deceleration time 5 (ms)	Unsigned WORD(2Byte)	
Jog acceleration time (ms)	Unsigned WORD (2Byte)	Designate jog acceleration time. Set range: 0 to 65535ms
Jog deceleration time (ms)	Unsigned WORD (2Byte)	Designate jog deceleration time. Set range: 0 to 65535ms
Acceleration time to origin (ms)	Unsigned WORD (2Byte)	Designate acceleration time to origin. Set range: 0 to 65535ms
Deceleration time to origin (ms)	Unsigned WORD (2Byte)	Designate deceleration time to origin. Set range: 0 to 65535ms
Use S/W limit	BYTE (1Byte)	Whether to use the limit of user-defined drive range by S/W or not. If it is out of the range, it executes emergency stop.
Use H/W limit	BYTE (1Byte)	Whether to use the limit of user-defined drive range by H/W or not. If it is out of the range, it executes emergency stop.
Origin back type	BYTE(1Byte)	Select origin back method. H/W: Designate the origin point with origin point signal. S/W: Use the user defined origin point on the program.
S/W upper limit	DWORD (4Byte)	Designate the movement range of the device as user-defined range by S/W. When using S/W limit, if the present position is over S/W upper/lower limit, it executes emergency stop.

Item	Type	Description
S/W lower limit	DWORD (4Byte)	Set range: -2,147,483,648 to 2,147,483,647
Start speed (pps)	Unsigned DWORD (4Byte)	Designate start speed. Set range: 100,000 pps
Origin point	DWORD (4Byte)	Designate origin point position. Set range: -2,147,483,648 to 2,147,483,647
Jog speed (pps)	Unsigned DWORD (4Byte)	Designate drive speed in jog drive. Set range: 1 to max. speed (100,000pps)
Home search position (pps)	Unsigned DWORD (4Byte)	Designate the progress speed to back origin point. Set range: 0 to max. speed (100,000pps)

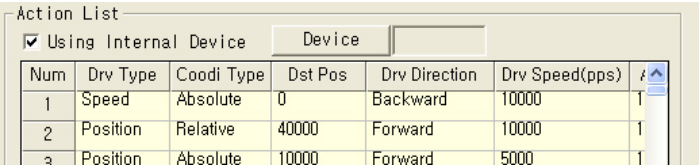
(2) Action list

Designate basic drive of one period.

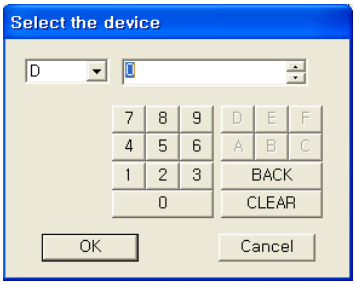
- **Using internal device**

  Checking 'Using Internal Device', you can directly edit the setting items in LP-S070 system [Parameter]-[Common setting] without atLogic after downloading the program in LP.

  Check 'Using Internal Device' and 'Device' is activated.



  Click 'Device' and 'Select the device' dialog box appears to designate the inner device.



- **Device map with checking 'Using Internal Device'**
  With checking 'Using Internal Device' and designating the device, the setting values of common configuration are saved to from the designated device in order. The below device map is when inner device is set as D100.

No.	Item	Device address	Data	Setting range
1	Number	D1000	1	Fixed value
	Drive type	D1001	-	1: Position, 0: Speed
	Coordinate type	D1002	-	1: Absolute, 0: Relative
	Drive direction	D1003	-	1: Forward, 0: Backward
	Destination position L	D1004	-	-2,147,483,647 to 2,147,483,647
	Destination position H	D1005	-	-2,147,483,647 to 2,147,483,647
	Drive speed L	D1006	-	0 to 100,000
	Drive speed H	D1007	-	0 to 100,000
	Acceleration time	D1008	-	1 to 5
	Deceleration time	D1009	-	1 to 5
	Dwell time	D1010	-	0 to 65535
	Not used	D1011	-	-
2	Number	D1012	2	Fixed value
	Drive type	D1013	-	1: Position, 0: Speed
	Coordinate type	D1014	-	1: Absolute, 0: Relative
	Drive direction	D1015	-	1: Forward, 0: Backward
	Destination position L	D1016	-	-2,147,483,647 to 2,147,483,647
	Destination position H	D1017	-	-2,147,483,647 to 2,147,483,647
	Drive speed L	D1018	-	0 to 100,000
	Drive speed H	D1019	-	0 to 100,000
	Acceleration time	D1020	-	1 to 5
	Deceleration time	D1021	-	1 to 5
	Dwell time	D1022	-	0 to 65535
	Not used	D1023	-	-

No.	Item	Device address	Data	Setting range
3	Number	D1024	3	Fixed value
	Drive type	D1025	-	1: Position, 0: Speed
	Coordinate type	D1026	-	1: Absolute, 0: Relative
	Drive direction	D1027	-	1: Forward, 0: Backward
	Destination position L	D1028	-	-2,147,483,647 to 2,147,483,647
	Destination position H	D1029	-	-2,147,483,647 to 2,147,483,647
	Drive speed L	D1030	-	0 to 100,000
	Drive speed H	D1031	-	0 to 100,000
	Acceleration time	D1032	-	1 to 5
	Deceleration time	D1033	-	1 to 5
	Dwell time	D1034	-	0 to 65535
	Not used	D1035	-	-
4	Number	D1036	4	Fixed value
	Drive type	D1037	-	1: Position, 0: Speed
	Coordinate type	D1038	-	1: Absolute, 0: Relative
	Drive direction	D1039	-	1: Forward, 0: Backward
	Destination position L	D1040	-	-2,147,483,647 to 2,147,483,647
	Destination position H	D1041	-	-2,147,483,647 to 2,147,483,647
	Drive speed L	D1042	-	0 to 100,000
	Drive speed H	D1043	-	0 to 100,000
	Acceleration time	D1044	-	1 to 5
	Deceleration time	D1045	-	1 to 5
	Dwell time	D1046	-	0 to 65535
	Not used	D1047	-	-
…				

- **Action list item**

Item	Description
Number	It is able to set up to 99.
Drive type	Position: Drives from present position to the destination position with the defined speed. Speed: Drives from present position with the defined speed and direction.
Coordinate type	Absolute: Fixed coordination based on the origin point. Relative: User defined coordination based on the last point.
Drive direction	When drive type is 'Speed', this item is activated to set drive direction. 1: Forward, 0: Backward
Destination position	When drive type is 'Position', this item is activated to set destination position. Set range: -2,147,483,648 to 2,147,483,647 When drive type is 'Position', it compares present position and destination position to control direction automatically.
Drive speed	Designate drive speed. (Unit: pps) Max. range: 100,000pps
Acceleration time	Designate the user defined acceleration time (1 to 5) in 'Common Configuration'. Using this, it converts the time to accelerate 100,000pps based on their speed.
Deceleration time	Designate the user defined deceleration time (1 to 5) in 'Common Configuration'. Using this, it converts the time to decelerate 100,000pps based on their speed.
Dwell time	Designate dwell time for after completing drive. Set range: 0 to 65535ms

- **Example of motion action by drive type from action list 1**

  Drive type: Position, Coordination type: Absolute

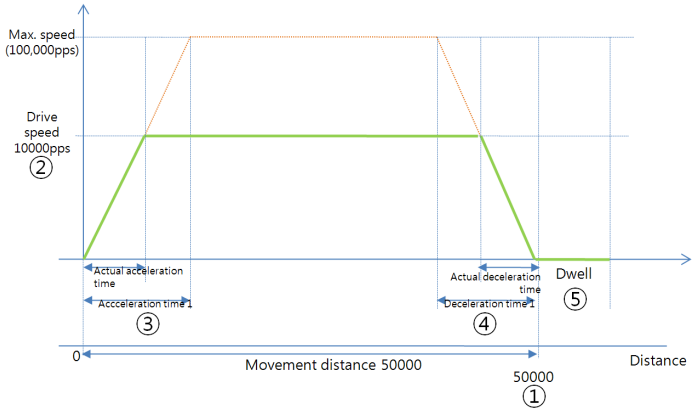
  Drives with drive speed (10000pps) and reaches destination position (50000).

  Each item's setting value is as below. (For position drive, it needs to set drive type, coordinate type, destination type, drive speed(pps), accel time, decel time and dwell time(ms) parameters.)

Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Position	Absolute	50000 ①	Forward	10000 ②	1 ③	1 ④	1000 ⑤

Item	Setting
Drive type	Position drive, when it reaches the destination position, drive is finished.
Coordination type	Absolute coordination, when it reaches the destination position, drive is finished regardless of present position.
Destination position	50000, drive is finished at this position.
Drive speed	10000pps, drive speed of motor.
Accel/Decel time	Selected each one from acceleration time 1 to 5 and deceleration time 1 to 5.
Dwell time	Stabilization time for next drive after completing motor drive.

The followings are the graph of this example.



- **Example of motion action by drive type from action list 2**

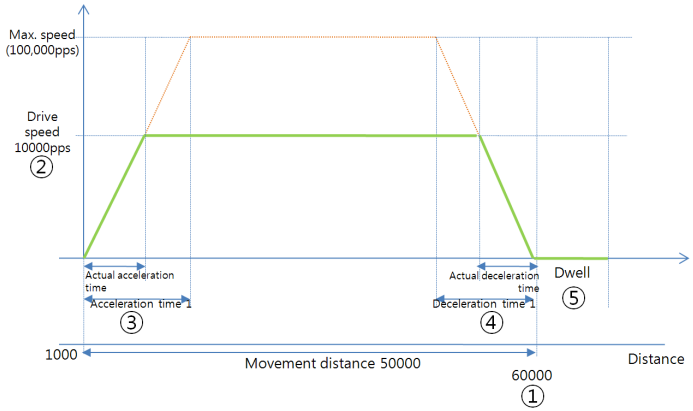
  Drives with drive speed (10000pps) and reaches destination position (50000).

  Each item's setting value is as below. (For position drive, it needs to set drive type, coordinate type, destination type, drive speed(pps), accel time, decel time and dwell time(ms) parameters.)

Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Position	Relative	50000 ①	Forward	10000 ②	1 ③	1 ④	1000 ⑤

Item	Setting
Drive type	Position drive, when it reaches the destination position, drive is finished.
Coordination type	Relative coordination.
Destination position	When coordination type is relative, destination position is movement distance. Therefore, destination position 50000 is same as movement distance 50000.
Drive speed	10000pps, drive speed of motor.
Accel/Decel time	Selected each one from acceleration time 1 to 5 and deceleration time 1 to 5.
Dwell time	Stabilization time for next drive after completing motor drive.

The followings are the graph of this example. (Present position of this example is 1000.)



- **Example of motion action by drive type from action list 3**

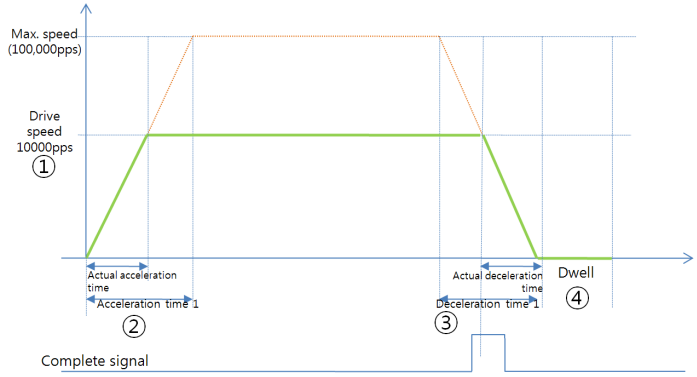
  Drive type: Speed

  Thi example is speed drive with the designated speed. Each item's setting value is as below. (For speed drive, it needs to set drive type, drive direction, drive speed (pps), accel time, decel time, and dwell time(ms) parameters).

Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Speed	Absolute	0	Forward	10000 ①	1 ②	1 ③	1000 ④

item	Setting
Drive type	Speed drive, it drives continuously until complete signal occurs.
Drive speed	10000pps, drive speed of motor.
Accel/Decel time	Selected each one from acceleration time 1 to 5 and deceleration time 1 to 5.
Dwell time	Stabilization time for next drive after completing motor drive.

The followings are the graph of this example.



- **Example of motion action by drive type from action list 4**

  To use the saved values of 'Action List'

  'Action List' is the setting for motion control. You can actual drive by MTUAI(action list drive) instruction which designates action number to drive, and by MTIDM (Indirect designation drive) with the user-defined pattern list.

(3) Pattern list

This pattern list is able to execute repeated drive and several drives as pattern form by binding action list.

- **Pattern list item**

Item	Description
Number	It is able to set pattern list number from 1 to 99.
Pattern string	Enters script strings to execute pattern. It has variable length up to 200 characters (byte).

- **Check pattern string grammar**
  This function is check whether each pattern string's grammar is correct or not. If there is no error, "Pattern string has been made correctly" message appears in message box. If there is error, this data is not downloaded to LP.



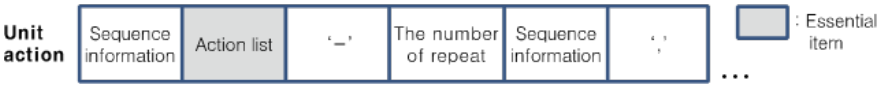
For pattern list structure and writing, refer to 9.4.3.4, "Pattern Writing".

9.4.3.4. Pattern Writing

LP system saves motor drive information as pattern form and is able to write repeated drive easily.

(1) Unit action

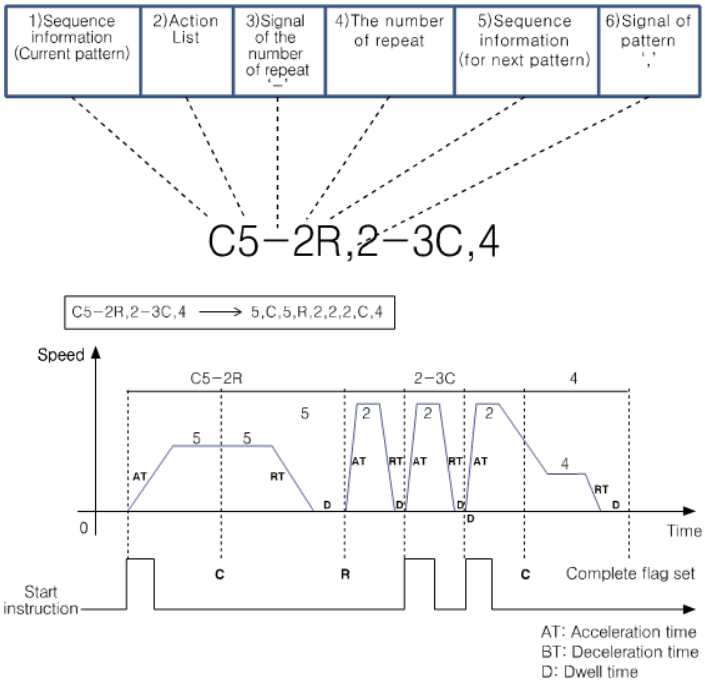
- **Pattern grammar structure**



- **Item description**

Item	Description
Sequence information (Current pattern)	Designation part for repeat connection information of current pattern with continue, repeat, or single. Continue: C, Repeat: R, Single: None (omissible)
Action list	Designate action list number. (essential)
Signal of the number of repeat "-"	Signal for dividing action list number and the number of repeat. If there is no number of repeat, please omit this.
The number of repeat	The number of repeat for action list (omissible) '0' means infinite repeat.
Sequence information (Next pattern)	Designate connect action for next pattern. If there is no next pattern, it is omissible.
Signal of pattern ","	Signal for dividing next unit action. If there is no next action, it is omissible.

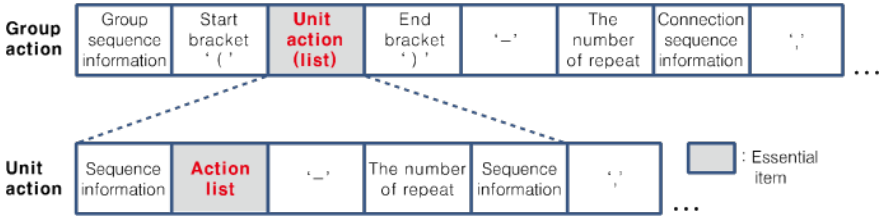
- **Example: Pattern grammar of unit action**



1. Repeats #5 action list twice with C(continue).
2. After repeated second #5 action list, connects #2 action list with R(repeat).
3. Repeats #2 action list three times with single.
4. To repeat action list with single, there should be start instruction to executes the action.
5. After repeated third #2 action list, connects #4 action list with C(continue).
6. Executes #4 action list once and completes this action.

(2) Group action

- **Pattern grammar structure**

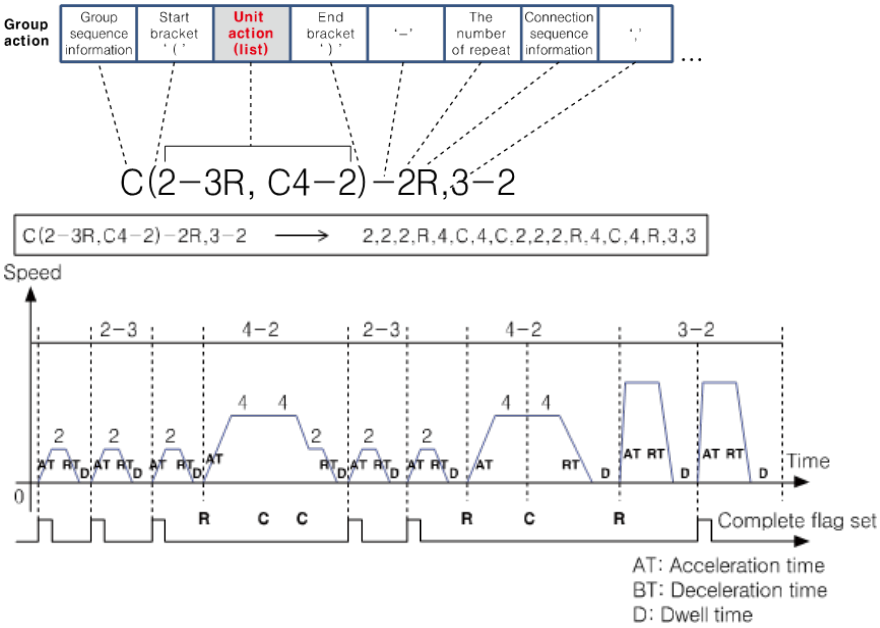


- **Item descriptions**

Item	Description
Group sequence information	Designation part for repeat connection information of current pattern Continue: C, Repeat: R, Single: None (Omissible)
Start bracket	When binding several unit actions as one group, this symbolizes the start of this group.
Unit action list	A binding of unit actions
End bracket	When binding several unit actions as one group, this symbolizes the end of this group.
Signal of the number of repeat "-"	Signal for dividing unit action or group action number and the number of repeat.
The number of repeat	The number of repeat for unit action or group action.
Connection sequence information	Designation part for connection information with next items
Signal of pattern ","	Signal for dividing next unit action or group action.

- **Example: Pattern grammar of group action**

  It is able to drive as unit action by binding other unit actions with bracket.



1. Repeats #2 action list three times with single.
2. To start or repeat action list with single, there should be start instruction to execute the action.
3. After repeated third #2 action list, connects #4 action list with R(repeat).
4. Repeats #4 action list twice with C(continue).
5. 1 to 3 steps are bound with start bracket “(” and end bracket “)” as a group action. Repeat this group action 1 to 3 steps one more with C(continue). (The number of repeat for group action is set two times.)
6. After the last of group action(repeated second #4 action list), connects #3 action list with R(repeat).
7. Repeats #3 action list twice with single.
8. To repeat action list with single, there should be start instruction to executes the action.



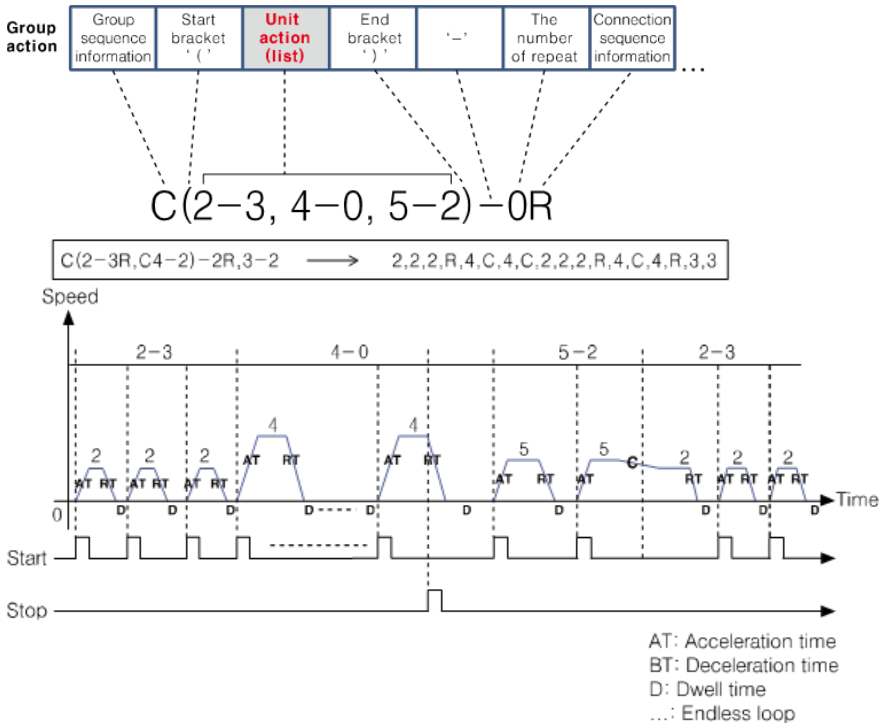
Group pattern grammar does not allow to use double brackets. Therefore, please separate each bracket pair for group pattern grammar.
(Example)) (C(R3-2C,C4-2)-2R)-2C,3-2 → C(R3-2C,c4-2)-2C, C(R3-2C,c4-2)-2C,3-2

(3) Infinite repeat

The number of repeat “0” means infinite repeat in pattern grammar structure. Action list or group action which has the number of repeat “0” is repeated infinitely.

- **Example: Pattern grammar of group action which has infinite repeat**

  C(2-3, 4-0, 5-2)-0R



◦ Above pattern stings has two ‘0’s which means infinite repeat.

1. Repeats #2 action list three times with single.
2. To start or repeat action list with single, there should be start instruction to execute the action.
3. After repeated third #2 action list, connects #4 action list with single and repeats it infinitely (the number of repeat is 0).
4. When #4 action list repeats infinitely, it can not execute the next action. To stop infinite repeat, executes MTSRS instruction. Therefore, #4 action list stops infinite repeat. It connects #5 action list with single and repeats it twice.

5. To start or repeat action list with single, there should be start instruction to execute the action.
6. 1 to 3 steps are bound with start bracket “(” and end bracket “)” as a group action. Connects the group action 1 to 3 steps with C(continue) and repeats it infinitely. (The number of repeat group action is “0” which means infinite repeat.)

◦ There are three instructions to stop infinite repeat.

- MTSRS (normal stop)
  After designating special flag for stop (F401, F403), execute MTSRS (normal stop) instruction to stop infinite repeat.
  With sequence information of when stopping infinite repeat, it connects the next action pattern.

◦ Following pattern list is the example of infinite repeat for ②, ③, ④ group action.

Pattern no.	①	②	③	④	⑤	⑥	⑦
Action	R(	1-4R,	2-2C,	4-2	)-0R,	3-4R,	2-6R

To finish infinite repeat of this pattern list, and execute ⑥ action list, designate F401 special flag and execute MTSRS(normal stop) instruction. If infinite repeat stops at ②, it connects ⑥ action list with R. If infinite repeat stops at ③, it connects ⑥ action list with C. Or if infinite repeat stops at ④, it connects ⑥ action list with single.

- MTSRS (normal stop)
  MTSRS (normal stop) without special flag for stop executes pattern stop instruction. Infinite repeat is also one of pattern. MTSRS (normal stop) instruction is able to stop as above.
- MTEMS (emergency stop)
  It stops all operating motion instruction and error flag occurs. This is emergency stop which does not have deceleration and dwell time to stabilize. To re-execute motion instruction, execute MTEMC (removing error flag) instruction to reset error flag.

9.4.3.5. Special Device and Error Device

(1) CH1 bit special device

Item	UB device	F device	R/W	Setting range
Using status of an axis	UB744100	F00100	R	0: Not using, 1: Using
Currently moving (accel/decel/constant drive)	UB744101	F00101	R	0: Not moving, 1: Moving
Currently accelerating	UB744102	F00102	R	0: Not accelerating, 1: Accelerating
Currently driving at set speed	UB744103	F00103	R	0: Not driving at set speed, 1: Driving at set speed
Currently decelerating	UB744104	F00104	R	0: Not decelerating, 1: Decelerating
Currently dwelling	UB744105	F00105	R	0: Not dwelling, 1: Dwelling
Driving finished	UB744106	F00106	R	0: Driving not finished, 1: driving finished
Detecting S/W lower limit	UB744107	F00107	R	0: Not detecting, 1: Detecting
Detecting S/W upper limit	UB744108	F00108	R	0: Not detecting, 1: Detecting
Detecting H/W lower limit	UB744109	F00109	R	0: Not detecting, 1: Detecting
Detecting H/W upper limit	UB74410A	F0010A	R	0: Not detecting, 1: Detecting
Detecting H/W home	UB74410B	F0010B	R	0: Not detecting, 1: Detecting
Channel error	UB744110	F00110	R	0: No error, 1: Error
Motion emergency stop error	UB74411F	F0011F	R	0: No error, 1: Error
Designating flag for MTSRS (action list finished)	UB744400	F00400	R	0: Not finished, 1: Finished
Designating flag for MTSRS (group finished)	UB744401	F00401	R	0: Not finished, 1: Finished

(2) CH1 word special device

Item	UW device	F Device	R/W	Setting range
Current position	UW74460 to UW74461	F60 to F61	R	-2,147,483,648 to 2,147,483,647
Current speed	UW74462 to UW74463	F62 to F63	R	0 to 100,000
Current action no.	UW74464	F64	R	1 to 99
Current pattern no.	UW74465	F65	R	1 to 99

Item	UW device	F Device	R/W	Setting range
Current home position	UW74466 to UW74467	F66 to F67	R	-2,147,483,648 to 2,147,483,647
Setting speed	UW74468	F68	R	0 to 100,000
Error code	UW74420	F20	R	Refer to (7) Error code

(3) CH2 bit special device

Item	UB device	F device	R/W	Setting range
Using status of an axis	UB744120	F00120	R	0: Not using, 1: Using
Currently moving (accel/decel/constant drive)	UB744121	F00121	R	0: Not moving, 1: Moving
Currently accelerating	UB744122	F00122	R	0: Not accelerating, 1: Accelerating
Currently driving at set speed	UB744123	F00123	R	0: Not driving at set speed, 1: Driving at set speed
Currently decelerating	UB744124	F00124	R	0: Not decelerating, 1: Decelerating
Currently dwelling	UB744125	F00125	R	0: Not dwelling, 1: Dwelling
Driving finished	UB744126	F00126	R	0: Driving not finished, 1: driving finished
Detecting S/W lower limit	UB744127	F00127	R	0: Not detecting, 1: Detecting
Detecting S/W upper limit	UB744128	F00128	R	0: Not detecting, 1: Detecting
Detecting H/W lower limit	UB744129	F00129	R	0: Not detecting, 1: Detecting
Detecting H/W upper limit	UB74412A	F0012A	R	0: Not detecting, 1: Detecting
Detecting H/W home	UB74412B	F0012B	R	0: Not detecting, 1: Detecting
Channel error	UB744130	F00130	R	0: No error, 1: Error
Motion emergency stop error	UB74413F	F0013F	R	0: No error, 1: Error
Designating flag for MTSRS (action list finished)	UB744402	F00402	R	0: Not finished, 1: Finished
Designating flag for MTSRS (group finished)	UB744403	F00403	R	0: Not finished, 1: Finished

(4) CH2 word special device

Item	UW device	F Device	R/W	Setting range
Current position	UW74470 to UW74471	F70 to F71	R	-2,147,483,648 to 2,147,483,647
Current speed	UW74472 to UW74473	F72 to F73	R	0 to 100,000
Current action no.	UW74474	F74	R	1 to 99
Current pattern no.	UW74475	F75	R	1 to 99
Current home position	UW74476 to UW74477	F76 to F77	R	-2,147,483,648 to 2,147,483,647
Setting speed	UW74478	F78	R	0 to 100,000

Item	UW device	F Device	R/W	Setting range
Error code	UW74421	F21	R	Refer to (7) Error code

(5) Jog device

Item	UW device	F Device	R/W	Setting range
CH1 Jog forward drive	UB744501	F00500	R/W	OFF falling: Jog Decelerates with jog forward, and stops, ON rising: Accelerates with jog forward, and drives with constant speed
CH1 Jog backward drive	UB744502	F00501	R/W	OFF falling: Decelerates with jog backward, and stops, ON rising: Accelerates with jog backward, and drives with constant speed
CH2 Jog forward drive	UB744503	F00501	R/W	OFF falling: Decelerates with jog forward, and stops, ON rising: Accelerates with jog forward, and drives with constant speed
CH2 Jog backward	UB744504	F00501	R/W	OFF falling: Decelerates with jog backward, and stops, ON rising: Accelerates with jog backward, and drives with constant speed

(6) Error device

CH	Error	F device	Function
CH1	Error occur	F110	Error occurs during motion driving
CH1	Emergency stop error	F11F	Error when executing MTEMS(emergency stop) instruction during motion driving
CH2	Error occur	F130	Error occurs during motion driving
CH2	Emergency stop error	F13F	Error when executing MTEMS(emergency stop) instruction during motion driving

(7) Error code

- **Special device for error code checking**

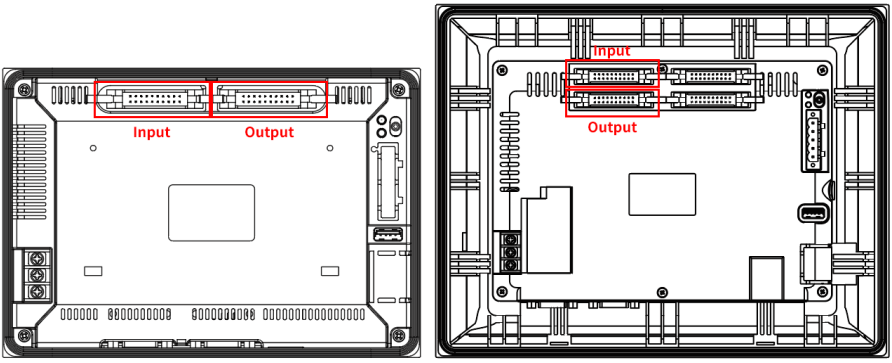
UW device	F device	Description
UW74420	F20	CH1 error code check
UW74421	F21	CH2 error code check

- **Error code**

Error code	Symptom	Troubleshooting
1	When inputting other starting instruction signal during using channel	Clear the error by MTMEC(removing error) instruction and executes next start instruction
2	During continuous operation, when inputting instruction to proceed in a direction different from the currently operating direction	After correcting the problematic pattern list and clearing the error with the MTMEC (remove error) instruction, executing the motion operation
3	When the initial setting value is incorrectly set (when setting a value out of upper/lower limit range)	clear the error with the MTMEC (remove error) instruction
4	When the motion speed is too slow (when setting the initial value)	After correcting the set value of the problematic action list, clear the error with the MTMEC (error removal) instruction
5	When speed, position, and stop designation error occurs - When the starting position of the pattern list in not 0, an error occurs - When the action list included in the pattern list is a position-based action list, an error occurs when a value is set out of the upper/lower limit range	Check and correct the problematic operation list and S/W limit value, and clear the error with the MTMEC (error removal) instruction
10	When detecting the upper/lower limit	After clearing the error with the MTMEC (error removal) instruction, operate again after deviating from the limit by jog or other operation.

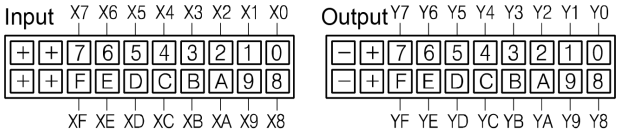
Error code	Symptom	Troubleshooting
20	When parameter setting error occurs - When setting the speed exceeding the maximum motion speed - WHen setting to a slower speed than the initial speed minimum - When the acceleration/deceleration index is set to a or less and 5 or more (an error not occurs because it is impossible to input an out-of-range value in atLogic)	After clearing the error with the MTMEC (Error Control) instruction, check the set parameter value

9.4.3.6. Motion Control I/O Signal allocation



LP-A070 LP-A104

Pin arrangement



I/O Signal

- CH1

Signal name	Input contact number	Description
Lower limit signal	X0	Detect CH1 lower limit, when there is signal at input contact.
Upper limit signal	X1	Detect CH1 upper limit, when there is signal at input contact.
Origin limit signal	X2	Detect CH1 origin limit, when there is signal at input contact.
Position select signal	Y2	Output CH1 position select signal.
PWM signal	Y0	Output CH1 PWM signal.

- CH2

Signal name	Input contact number	Description
Lower limit signal	X3	Detect CH2 lower limit, when there is signal at input contact.
Upper limit signal	X4	Detect CH2 upper limit, when there is signal at input contact.
Origin limit signal	X5	Detect CH2 origin limit, when there is signal at input contact.
Position select signal	Y3	Output CH2 position select signal.
PWM signal	Y1	Output CH2 PWM signal.



The number of the input contact points use the same number regardless of the ribbon type and the terminal type.
Products uses a 1-Pulse input method. Be careful when connecting the motion controller.
When the motion controller function and the high speed counter function are used at the same time, X0 to X5 are occupied by the motion controller and cannot be used as the input port of the high-speed counter.

9.4.3.7. Motion Instruction

(1) MTVDM: speed direct drive instruction

You can designate direct drive data(drive speed, drive direction, etc.) directly and it executes speed drive.

- **Instruction**

MTVDM	S0	S1	S2	S3	S4	S5

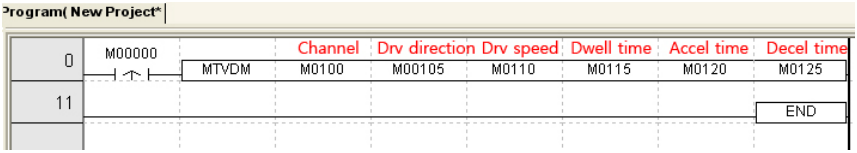
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	BIT	Drive direction to decide position	Forward(1), backward(0)
S2	DWORD	Drive speed to decide position	1 to 100,000pps
S3	WORD	Dwell time	0 to 65535ms
S4	WORD	Acceleration time	Acceleration time 1 to 5 of common configuration
S5	WORD	Deceleration time	Deceleration time 1 to 5 of common configuration

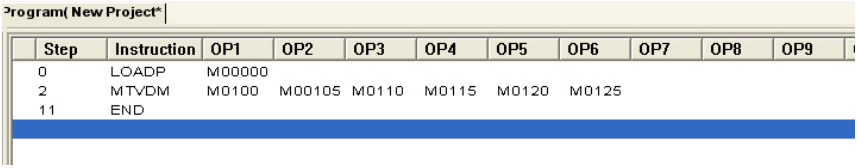
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	-	-	-	○	-	-	-	-	-	○	-
S2	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S3	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S4	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S5	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Be sure that if set drive speed is over than max. speed (100,000pps), it may cause malfunction.
Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.
If set drive speed is lower than start speed, this set drive speed drives constant without acceleration/deceleration drive.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



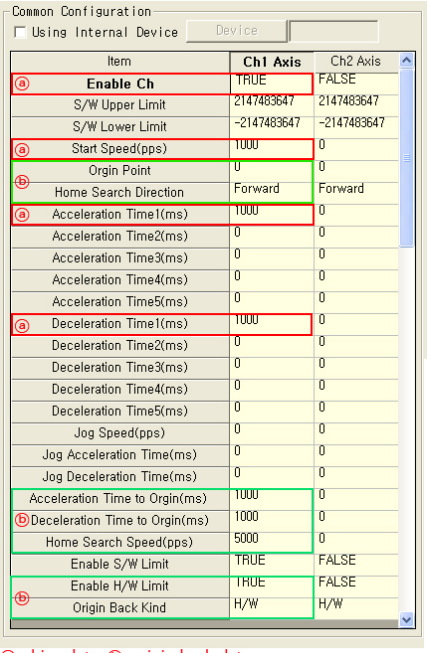
- **Function**
  - Executes speed direct drive at rising edge of input condition.
  - Drives set speed and direction until executing stop sign.
  - This instruction is able to set only drive data items. Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.



Caution for common configuration
To use motion instruction, please designate the appropriate CH whether to use or not.
Please set acceleration/deceleration time appropriately by drive speed. If you set acceleration/deceleration time is too short or too long, it may cause malfunction.
If set start speed is higher than starting frequency of motor, it may cause malfunction.

- **Example of usage: Speed drive with 10000 speed**
  - 'MOTION' tab setting

    Designate ‘Common Configuration’ at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.



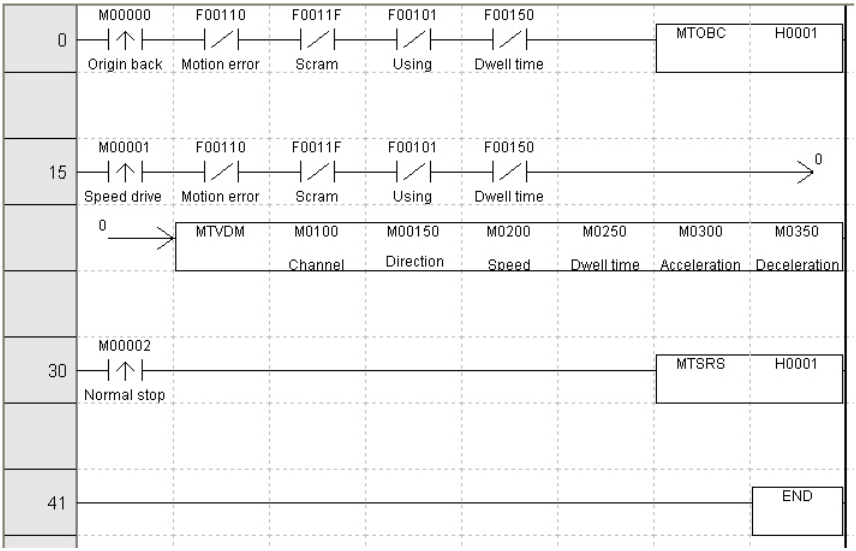
Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	FALSE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	0
Orgin Point	0	0
ⓑ Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	0
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	0
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	0
ⓑ Deceleration Time to Orgin(ms)	1000	0
Home Search Speed(pps)	5000	0
Enable S/W Limit	TRUE	FALSE
Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

For details of each setting value, refer to (1) Common configuration.

This example is set enable CH, s/w upper/lower limit, start speed, origin point, home search direction, acceleration time, deceleration time, acceleration time to origin, deceleration time to origin, home search speed, enable S/W limit, enable H/W limit, and origin back kind.

◦ PLC program



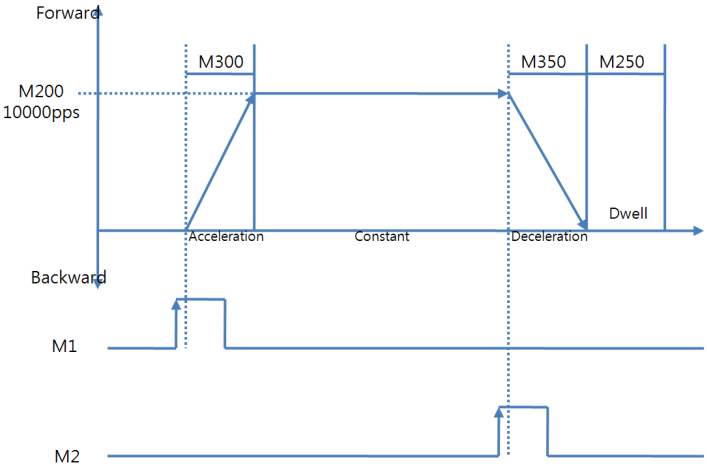
◦ Operation description

This example is programmed to speed direct drive by user's input after origin back. The device of MTVDM (speed direct drive) is as following.

Device	Value	Description
M100	1	Using CH
M150	1	Drive direction (0: backward, 1: forward)
M200	10000	Drive speed
M250	1000	Dwell time
M300	1	Acceleration time
M350	1	Deceleration time

1. When rising edge occurs at M0 device, executes MTOBC(origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge occurs at M1 device, executes MTVDM (speed direct drive) instruction.
4. When executing MTVDM(speed direct drive) instruction, accelerates up to the set drive speed during acceleration time and drives constant with the set drive speed.
5. MTVDM(speed direct drive) instruction is speed drive. It drives continuously until MTSRS(normal stop) instruction occurs.

6. MTVDM(speed direct drive) instruction is able to stop by MTSRS(normal stop), MTEMS(emergency stop) instructions.



Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic. The other time setting is not supported.
Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.

(2) MTPDM: position direct drive instruction

You can designate direct drive data(drive speed, drive direction, etc) directly and it executes position drive.

- **Instruction**

MTPDM	S0	S1	S2	S3	S4	S5

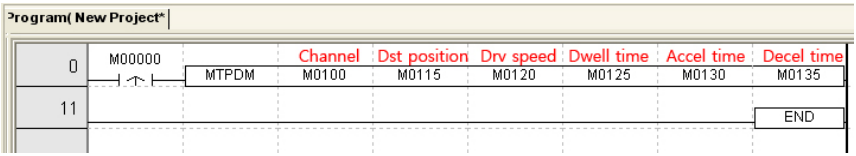
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	DWORD	Destination position to decide position	-2,147,483,648 to 2,147483,647
S2	DWORD	Drive speed to decide position	1 to 100,000pps
S3	WORD	Dwell time	0 to 65535ms
S4	WORD	Acceleration time	Acceleration time 1 to 5 of common configuration
S5	WORD	Deceleration time	Deceleration time 1 to 5 of common configuration

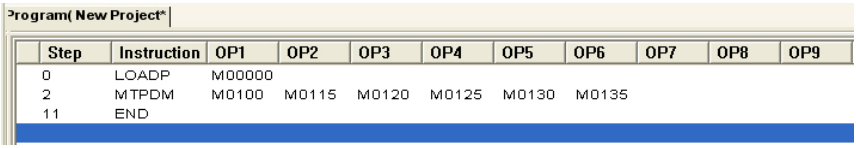
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S2	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S3	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S4	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S5	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Be sure that if set drive speed is over than max. speed (100,000pps), it may cause malfunction.
Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.
If set drive speed is lower than start speed, this set drive speed drives constant without acceleration/deceleration drive.
The range of destination position value is from -2,147,483,648 to 2,147483,647.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic

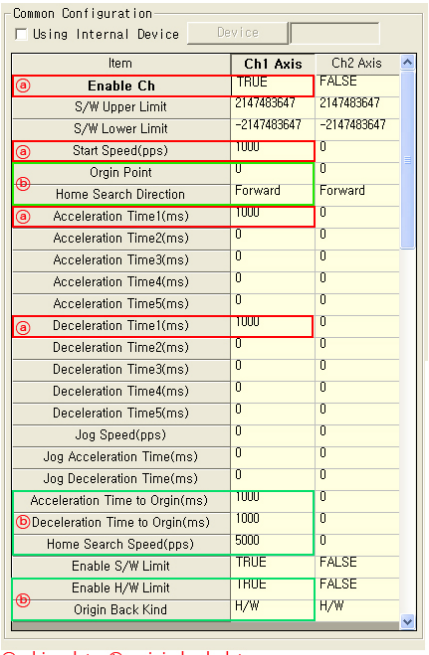


- **Function**
  - Executes position direct drive at rising edge of input condition.
  - When arriving set destination position, it decelerates and stops the drive.
  - This instruction is able to set only drive data items. Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.

Caution for common configuration
To use motion instruction, please designate the appropriate CH whether to use or not.
Please set acceleration/deceleration time appropriately by drive speed. If you set acceleration/deceleration time is too short or too long, it may cause malfunction.
If set start speed is higher than starting frequency of motor, it may cause malfunction.

- **Example of usage: Moves position from current position to 50000 position**
  - 'MOTION' tab setting

    Designate ‘Common Configuration’ at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.



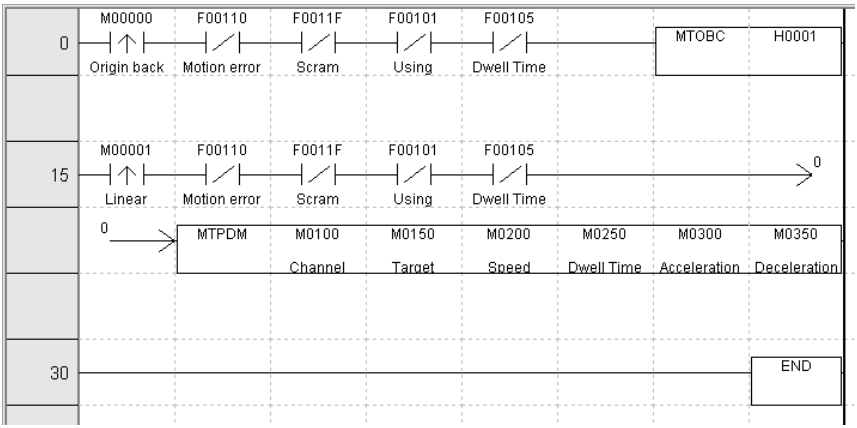
Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	FALSE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	0
ⓑ Orgin Point	0	0
ⓑ Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	0
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	0
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	0
ⓑ Deceleration Time to Orgin(ms)	1000	0
Home Search Speed(pps)	5000	0
Enable S/W Limit	TRUE	FALSE
ⓑ Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

For details of each setting value, refer to (1) Common configuration.

This example is set enable CH, s/w upper/lower limit, start speed, origin point, home search direction, acceleration time, deceleration time, acceleration time to origin, deceleration time to origin, home search speed, enable S/W limit, enable H/W limit, and origin back kind.

◦ PLC program

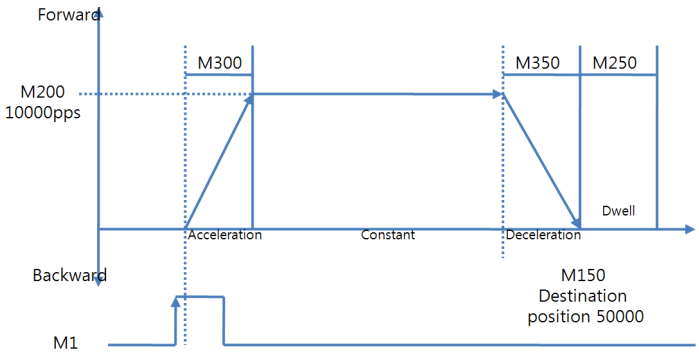


◦ Operation description

This example is programmed to position direct drive by user's input after origin back. The device of MTPDM (position direct drive) is as following.

Device	Value	Description
M100	1	Using CH
M150	50000	Destination position
M200	10000	Drive speed
M250	1000	Dwell time
M300	1	Acceleration time
M350	1	Deceleration time

1. When rising edge occurs at M0 device, executes MTOBC (origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge at M1 device, executes MTPDM(position direct drive) instruction .
4. When executing MTPDM(position direct drive) instruction, accelerates up to the set drive speed during acceleration time and drives constant with the set drive speed.



Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic. The other time setting is not supported.
Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.

(3) MTIDM: indirect designate drive instruction

You can designate pattern list number and operates motion.

- **Instruction**

MTIDM	S0	S1

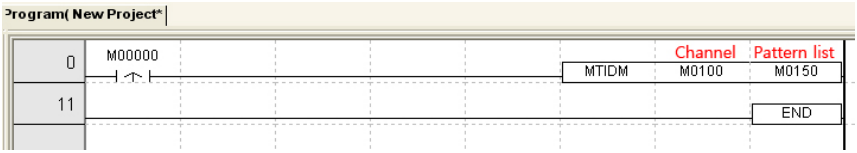
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	WORD	Number of pattern list	1 to 99

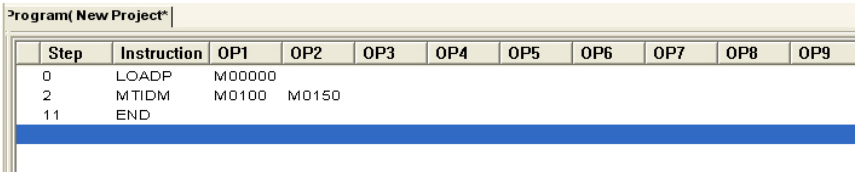
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

You cannot over pattern list range from 1 to 99.
Designated pattern list should have one more action list.
For pattern list writing, refer to 9.4.3.4, “Pattern Writing”.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Stop**

  There are other stop result by MTSRS(stop instruction) or by special flag.

  - MTSRS(normal stop): normal stop
    Completes executing action of action list and finishes the pattern.
  - MTSRS(normal stop)+ special flag (F400 or F402) : action list stop
    To execute next action list or group during executing pattern, use this instruction. If executing pattern is speed drive, this combination instructions stops speed drive and executes next action list.
  - MTSRS(normal stop)+ special flag(F401 or F403) : group stop
    Stops the pattern which is executing as group type and executes the next action list or group.
  - MTEMS (emergency stop) : emergency stop
    Executes emergency stop to action list which is executing as pattern drive.

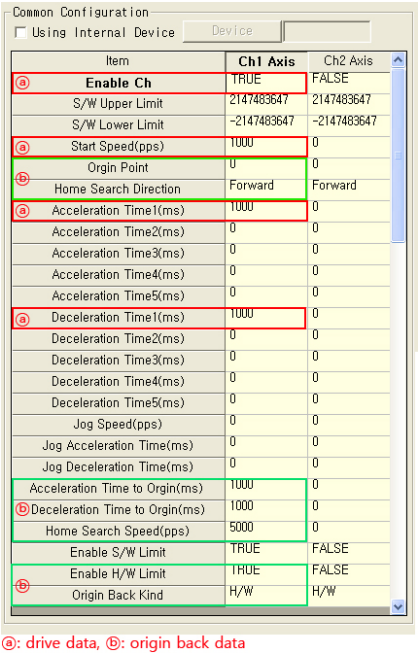
  

  MTEMS (emergency stop) instruction is emergency stop without deceleration and dwell time. It may cause malfunction to motor. If it is not in emergency, please use MTSRS (normal stop) instruction to stop normally.

- **Function**

  - Executes indirect designate drive at rising edge of input condition.
  - It is able to execute user-defined patterns.

- **Example of usage: Loads and executes the saved pattern at pattern list 1**
  MTIDM (indirect designate drive) instruction executes the designated pattern list number. It should be write pattern list. To write pattern list, common configuration, action list should be set.
  - 'MOTION' tab setting
    Designate 'Common Configuration', 'Action list', and 'Pattern list' at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.
    - Common configuration

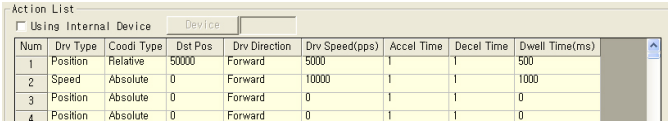


Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	FALSE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	0
ⓑ Orgin Point	0	0
Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	0
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	0
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	0
ⓑ Deceleration Time to Orgin(ms)	1000	0
Home Search Speed(pps)	5000	0
Enable S/W Limit	TRUE	FALSE
Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

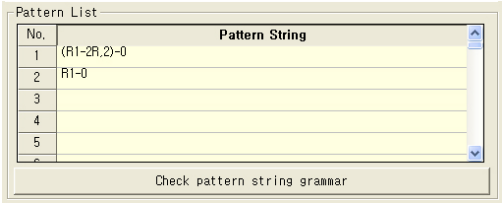
For details of each setting value, refer to (1) Common configuration.

- Action list



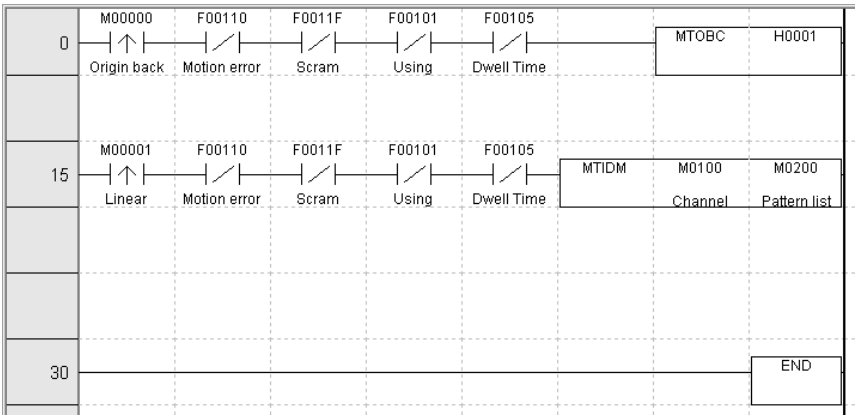
Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Position	Relative	50000	Forward	5000	1	1	500
2	Speed	Absolute	0	Forward	10000	1	1	1000
3	Position	Absolute	0	Forward	0	1	1	0
4	Position	Absolute	0	Forward	0	1	1	0

- Pattern list



For pattern list writing, refer to 9.4.3.4, “Pattern Writing”.

◦ PLC program

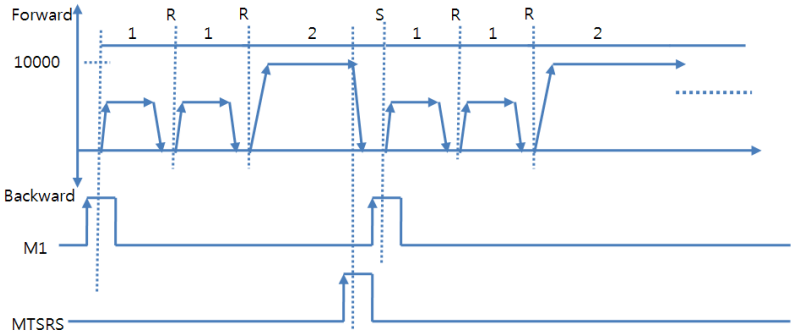


◦ Operation description

This example is programmed to position direct drive by user's input at pattern list after origin back. The device of MTIDM (indirect designate drive) is as following.

Device	Value	Description
M100	1	Using CH
M200	1	Pattern list

1. When rising edge occurs at M0 device, executes MTOBC (origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge occurs at M1 device, executes MTIDM(indirect designate drive) instruction.



Check there is value of designated pattern list.
Check there is action list value of designated pattern list contents.
MTSRS (normal stop) instruction in pattern list is available for pattern complete, action list complete, group complete.

(4) MTIPT: line interpolation instruction

It executes line interpolation drive with set action list.

- **Instruction**

MTIPT	S0	S1	S2	S3

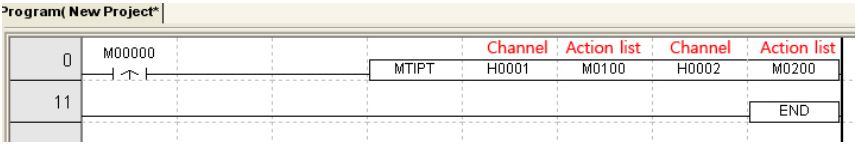
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH of first axis	1 to 2
S1	DWORD	Action list number of first axis	1 to 99
S2	WORD	CH of second axis	1 to 2
S3	WORD	Action list number of second axis	1 to 99

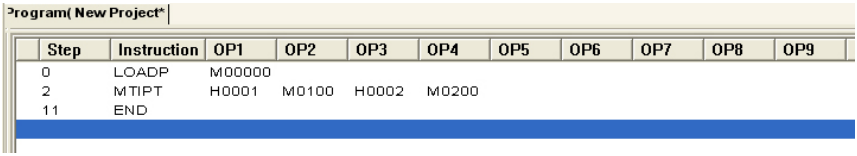
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S3	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

The action list designated as speed drive is not available to line interpolation drive.
The axis which is more distance than the other is set as main axis.
If each distance of CH1 and CH2 is same, CH1 becomes main axis.
Action list is available only when drive type is position drive.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



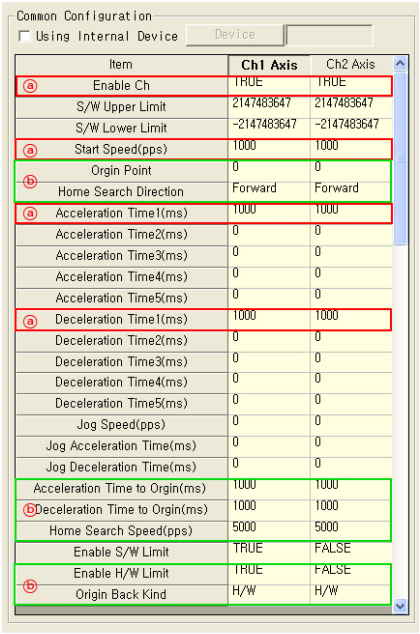
- **Stop**
  - MTSRS: normal stop
    Executes normal stop to two axis which are line driving at the same time.
  - MTEMS: emergency stop
    Executes emergency stop to two axis which are line driving at the same time.
- **Function**
  - Executes line interpolation drive at rising edge of input condition.
  - It drives for the moving distance of two axes to line from current stop position to destination position with CH1, CH2 axes.
  - The decision of main axis and sub axis is by movement distance. The axis which is more distance than the other is set as main axis. If each distance of two axes is same, CH1 becomes main axis.
  - The speed of main axis does not refer to drive parameter's value. The below operation formula helps to decide drive speed, acceleration time, and deceleration time and it executes the drive.
    Sub axis speed=(Main axis speed×sub axis destination position)/Main axis destination position

> Be sure that two axes stop at the same time when stopping drive.
> MTEMS (emergency stop) instruction is emergency stop without deceleration and dwell time. It may cause malfunction to motor. If it is not emergency, please use MTSRS (normal stop) instruction to stop normally.

- **Example of usage: Executes line interpolation drive with action list 1 and action list 2**
  - 'MOTION' tab setting

    Designate ‘Common Configuration’, ‘Action list’ at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.

    - Common configuration

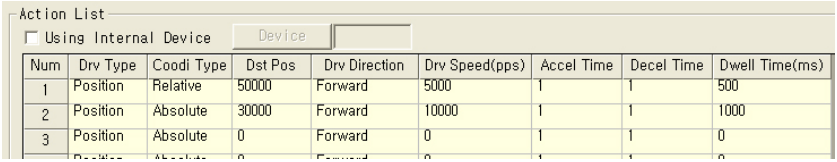


Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	TRUE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	1000
Orgin Point	0	0
ⓑ Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	1000
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	1000
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	1000
ⓑ Deceleration Time to Orgin(ms)	1000	1000
Home Search Speed(pps)	5000	5000
Enable S/W Limit	TRUE	FALSE
Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

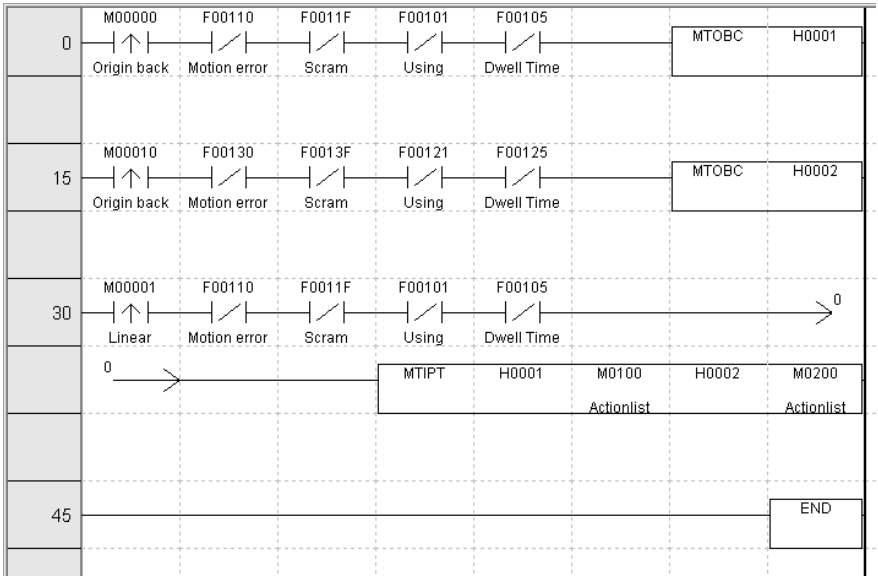
For details of each setting value, refer to (1) Common configuration.

- Action list



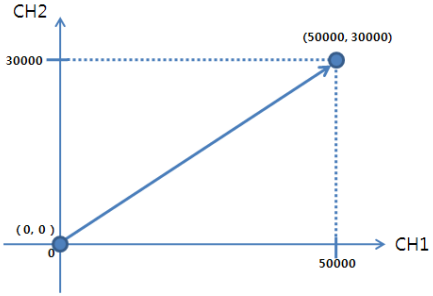
Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Position	Relative	50000	Forward	5000	1	1	500
2	Position	Absolute	30000	Forward	10000	1	1	1000
3	Position	Absolute	0	Forward	0	1	1	0

• PLC program


0
M00000
F00110
F0011F
F00101
F00105
Origin back
Motion error
Scram
Using
Dwell Time
MTOBC
H0001
15
M00010
F00130
F0013F
F00121
F00125
Origin back
Motion error
Scram
Using
Dwell Time
MTOBC
H0002
30
M00001
F00110
F0011F
F00101
F00105
Linear
Motion error
Scram
Using
Dwell Time
0
0
MTIPT
H0001
M0100
Actionlist
H0002
M0200
Actionlist
45
END

- Operation description

1. When rising edge occurs at M0 device, executes MTOBC (origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of ‘Common Configuration’ (This example is set as H/W.)
3. When rising edge at M10 device, executes MTOBC(origin back) instruction.
4. MTOBC(origin back) instruction searches origin point by origin back kind of ‘Common Configuration’ (This example is set as H/W.)
5. When rising edge at M1 device, executes MTIPT(line interpolation) instruction.
6. At line interpolation drive, the CH1 axis which is more distance than the other CH2 is set as main axis. In this case, CH2 sub axis’s drive data is ignored and it has the drive data by the below formula.
   3000=(5000×30000)/50000
7. Therefore, main axis speed is 5000 in this example and sub axis speed is 3000 by above formula.



(5) MTUAI: action list drive instruction

You can designate action list number to execute motion.

- **Instruction**

MTUAI	S0	S1

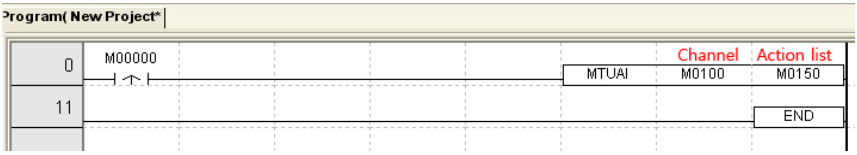
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	WORD	Number of action list	1 to 99

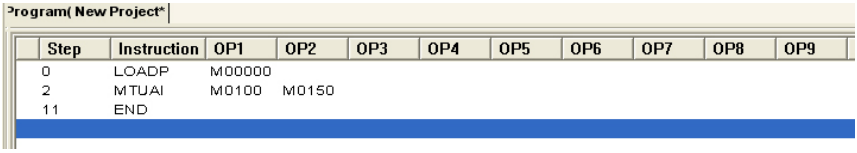
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

You cannot over pattern list range from 1 to 99.
You cannot use the action list which does not have any contents.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes action list drive at rising edge of input condition.
  - Executes user-defined action list.

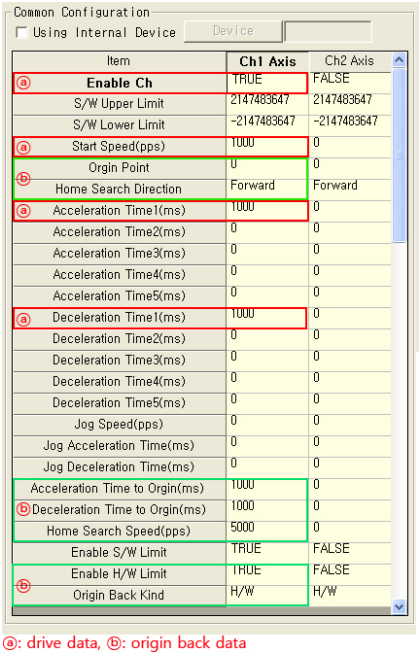
- **Example of usage: Executes action list 1**

  MTUAI (action list drive) instruction executes the designated action list number. You should write action list. To write action list, you should designate 'Common Configuration' at first.

  - 'MOTION' tab setting

    Designate 'Common Configuration', and 'Action list' at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.

    - Common configuration

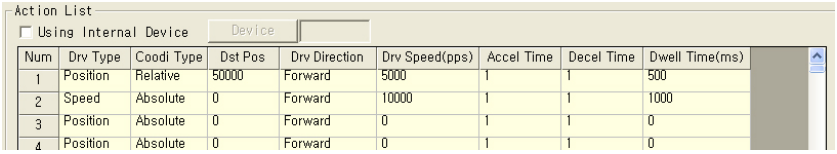


Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	FALSE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	0
Orgin Point	0	0
ⓑ Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	0
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	0
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	0
ⓑ Deceleration Time to Orgin(ms)	1000	0
Home Search Speed(pps)	5000	0
Enable S/W Limit	TRUE	FALSE
Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

For details of each setting value, refer to (1) Common configuration.

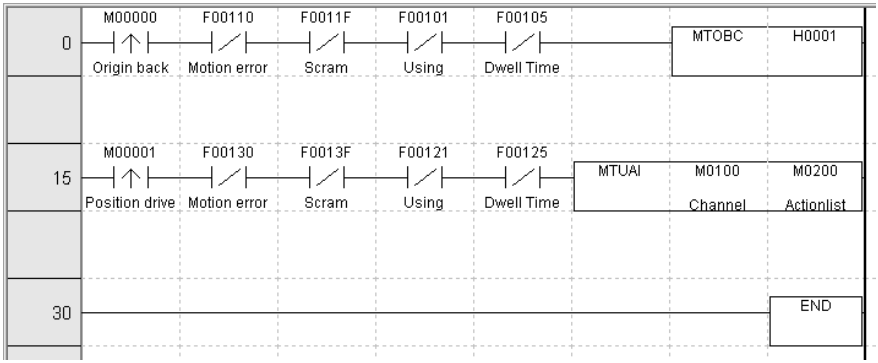
- Action list



Num	Drv Type	Coodi Type	Dst Pos	Drv Direction	Drv Speed(pps)	Accel Time	Decel Time	Dwell Time(ms)
1	Position	Relative	50000	Forward	5000	1	1	500
2	Speed	Absolute	0	Forward	10000	1	1	1000
3	Position	Absolute	0	Forward	0	1	1	0
4	Position	Absolute	0	Forward	0	1	1	0

There are two type of action list; position, or speed drive.

- PLC program

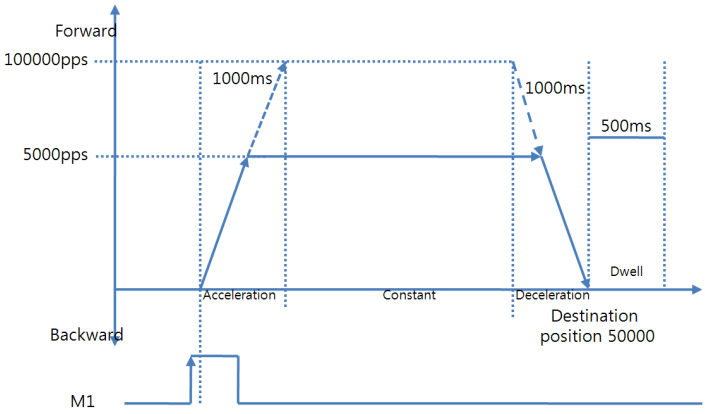


- Operation description

  This example is programmed to action list drive by user's input after origin back. The device of MTUAI (action list drive) is as following.

Device	Value	Description
M100	1	Using CH
M200	1	Action list

1. When rising edge occurs at M0 device, executes MTOBC (origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge occurs at M1 device, executes MTUAI(action list drive) instruction. MTUAI(action list drive) uses CH1 by operand setting value and executes action list 1.





Action list range is from 1 to 99.
There should be designated action list value before executing action list drive instruction.
You cannot use the action list which does not have any contents.
Position drive of action list has two types; absolute or relative. Be sure to use this properly.

(6) MTMEC: error remove instruction

This instruction clears error flag during motion drive.

- **Instruction**

MTMEC	S0

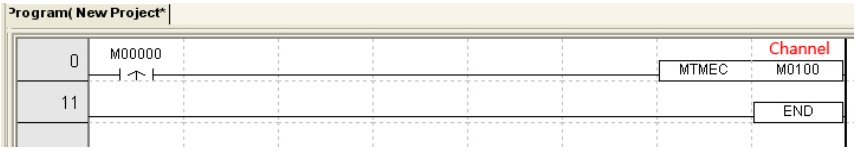
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2

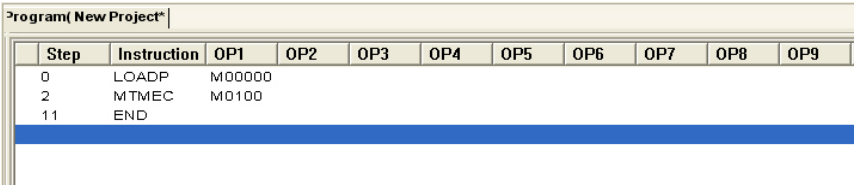
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes error remove instruction at rising edge of input condition.
  - Clears errors of user-defined CH.

(7) MTEMS: emergency stop instruction

If there is emergency situation during motion drive, executes emergency stop to stop all actions related with motion.

- **Instruction**

MTEMS	S0

- **Operand**

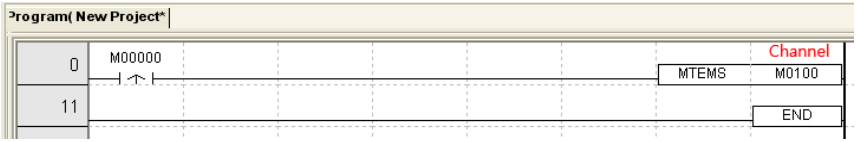
Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2

Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

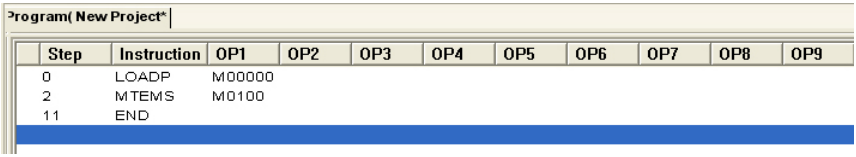


Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes emergency stop instruction at rising edge of input condition.
  - All motion actions of user-defined CH stops urgently.
  - Emergency stop flag of user-defined CH is activated.
  - Error designated CH is able to clear by MTMEC (error remove) instruction.



MTEMS (emergency stop) instruction is emergency stop without deceleration and

dwell time. It may cause malfunction to motor.

(8) MTCPP: current position preset instruction

It does not mechanical move and changes saved current position to set position.

- **Instruction**

MTCPP	S0	S1

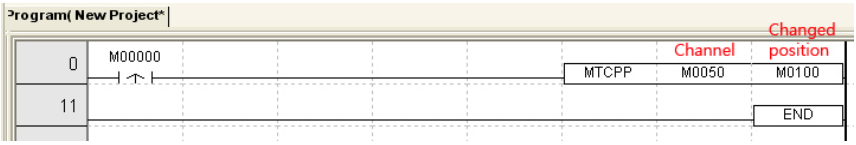
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	DWORD	To be changed position value	-2,147,483,648 to 2,147,483,647

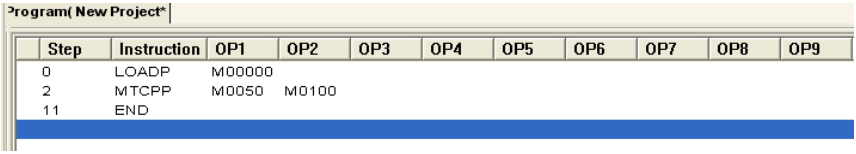
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

If using S/W limit, you cannot set current position preset value by over S/W limit value.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes current position preset instruction at rising edge of input condition.
  - Changes current position to user-defined set position.

If you set current position preset during motion driving, this instruction does not operate.

(9) MTFOS: forced home setting instruction

Sets current position as designated origin point position from 'Common Configuration'.

- **Instruction**

MTFOS	S0

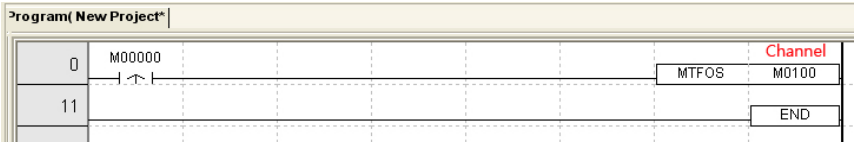
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2

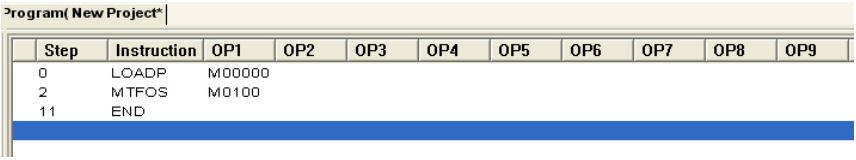
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes forced home setting instruction at rising edge of input condition.
  - It changes by force current position and origin point position from the set origin position in 'Common Configuration'. In this case, it does not mechanical move.

(10) MTSRS: normal stop instruction

Executes normal stop instruction to currently motion driving CH

- **Instruction**

MTSRS	S0

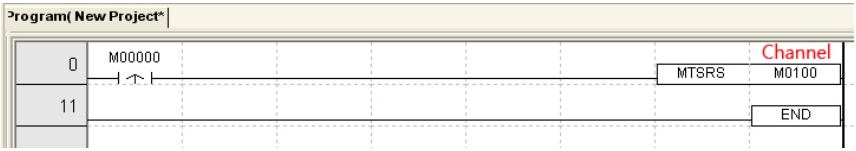
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2

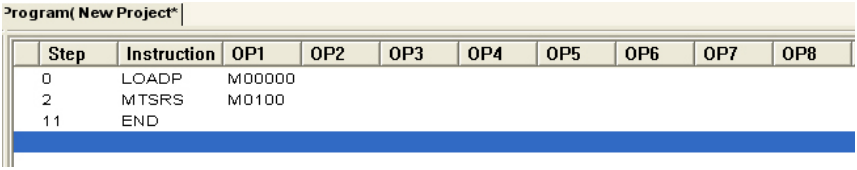
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic



- **Function**
  - Executes normal stop instruction at rising edge of input condition.
  - Normal stop gives stop sign to appropriate CH with deceleration, stop, dwell time for currently motion driving as basic stop method.
  - In MTIDM (indirect designate drive) instruction, MTSRS (normal stop) instruction and special flag execute as following.

- MTSRS(normal stop): normal stop
  Completes executing action of action list and finishes the pattern.
- MTSRS(normal stop)+ special flag (F400 or F402) : action list stop
  To execute next action list or group during executing pattern, use this instruction. If executing pattern is speed drive, this combination instructions stops speed drive and executes next action list.
- normal stop)+ special flag(F401 or F403) : group stop
  Stops the pattern which is executing as group type and executes the next action list or group.

(11) MTOBC: origin back instruction

Before executing motion action, designates action position as origin point or returns back the set origin point during motion driving.

- **Instruction**

MTOBC	S0

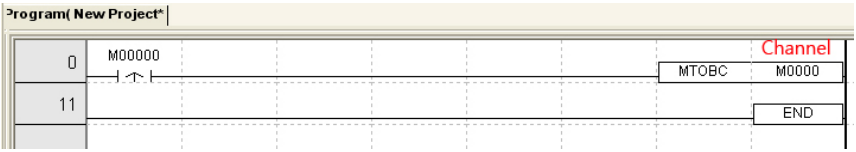
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2

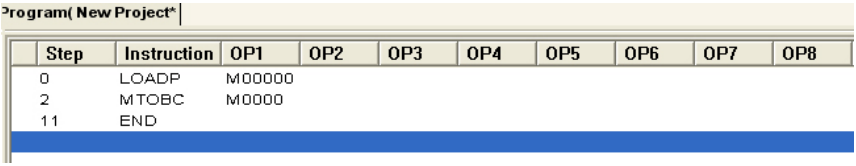
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder

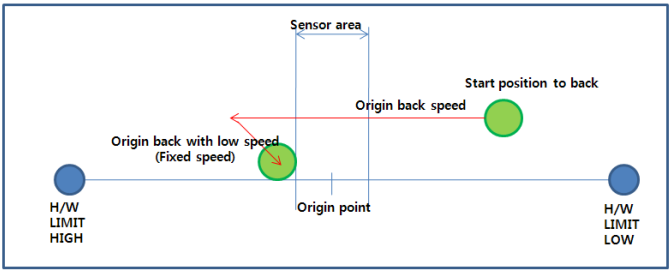


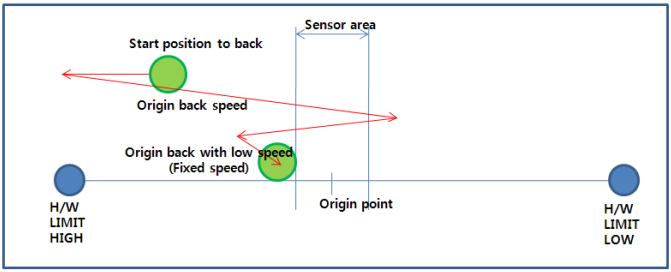
  - Mnemonic

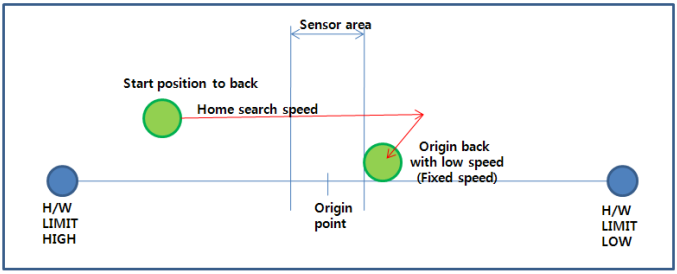


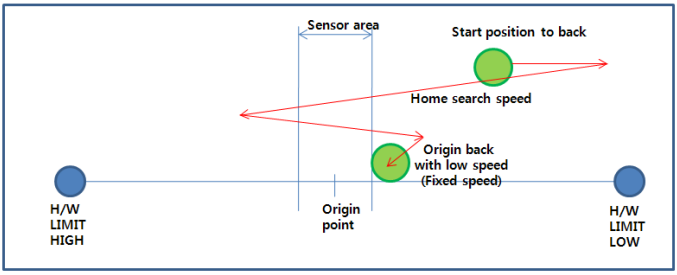
- **Origin point decision**
  - H/W

    If setting 'H/W' of origin back kind in ‘Common Configuration’, origin point is decided by current position and home search direction.









- S/W
  To use S/W origin point decision, use MTFOS(forced home setting) instruction to set origin point by force.

- **Origin back**
  - H/W
    H/W origin back type is searching by home search direction as same as that of the setting origin point.
  - S/W
    S/W origin back type is returning to the saved origin point with home search speed.

(12) MTOVV: speed override instruction

This instruction changes the set speed during speed driving.

- **Instruction**

MTOVV	S0	S1

- **Operand**

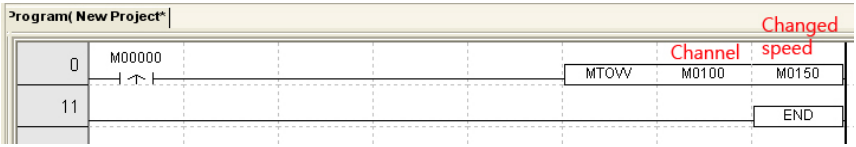
Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	DWORD	To be changed drive speed value	1 to100,000 pps

Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

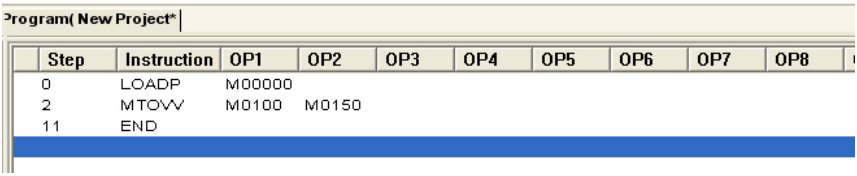
This instruction is only available when speed driving.
Be sure that this instruction is not able to use in stop status.
This instruction is available only for constant speed area. If you use this instruction to acceleration, deceleration, or dwell areas, it is not executed, and error occurs.
Current action driving is continued.
Please use the device that matches the size of each operand.

Be sure that if set drive speed is over than max. speed (100,000pps), it may cause malfunction.
If set drive speed is lower than start speed, this set drive speed drives constant without acceleration/deceleration drive.
Be sure that rapid speed change may cause motor step out.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic

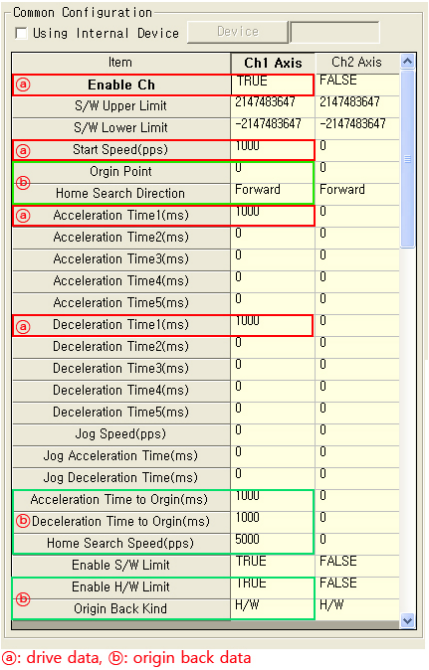


- **Function**
  - Executes speed override instruction at rising edge of input condition.
  - Changes drive speed from current drive speed to set drive speed.

- **Example of usage: Changes current driving speed 10000 to 50000**
  - 'MOTION' tab setting

    MTOVV (speed override) instruction is available only when speed drive. In this example, executes speed override drive during speed direct drive. Therefore, you should set the items for speed direct drive.

    Designate ‘Common Configuration’ at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.

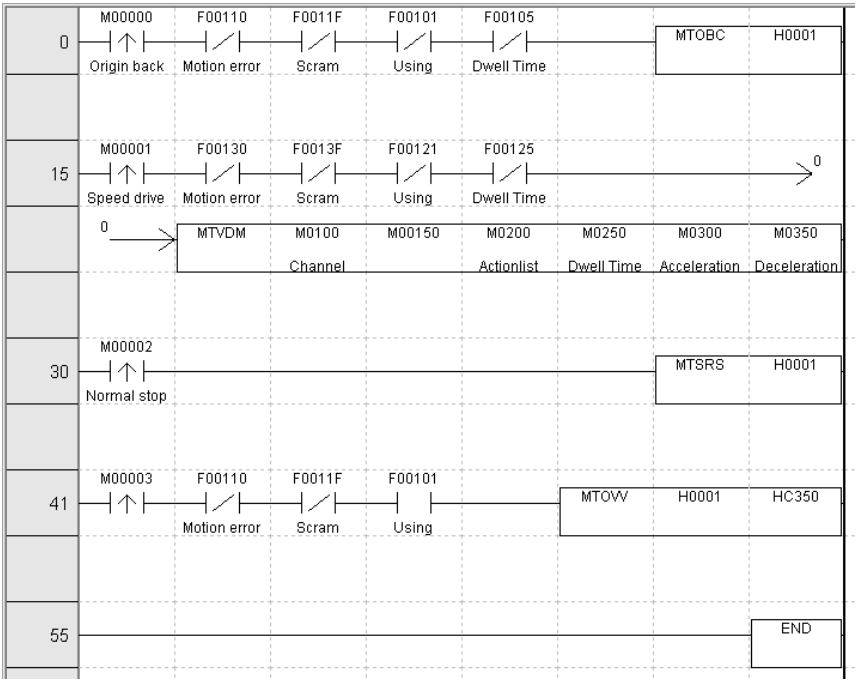


	Item	Ch1 Axis	Ch2 Axis
ⓐ	Enable Ch	TRUE	FALSE
	S/W Upper Limit	2147483647	2147483647
	S/W Lower Limit	-2147483647	-2147483647
ⓐ	Start Speed(pps)	1000	0
ⓑ	Orgin Point	0	0
ⓑ	Home Search Direction	Forward	Forward
ⓐ	Acceleration Time1(ms)	1000	0
	Acceleration Time2(ms)	0	0
	Acceleration Time3(ms)	0	0
	Acceleration Time4(ms)	0	0
	Acceleration Time5(ms)	0	0
ⓐ	Deceleration Time1(ms)	1000	0
	Deceleration Time2(ms)	0	0
	Deceleration Time3(ms)	0	0
	Deceleration Time4(ms)	0	0
	Deceleration Time5(ms)	0	0
	Jog Speed(pps)	0	0
	Jog Acceleration Time(ms)	0	0
	Jog Deceleration Time(ms)	0	0
	Acceleration Time to Orgin(ms)	1000	0
ⓑ	Deceleration Time to Orgin(ms)	1000	0
	Home Search Speed(pps)	5000	0
	Enable S/W Limit	TRUE	FALSE
ⓑ	Enable H/W Limit	TRUE	FALSE
ⓑ	Origin Back Kind	H/W	H/W

ⓐ: drive data, Ⓑ: origin back data

For details of each setting value, refer to (1) Common configuration.

◦ PLC program



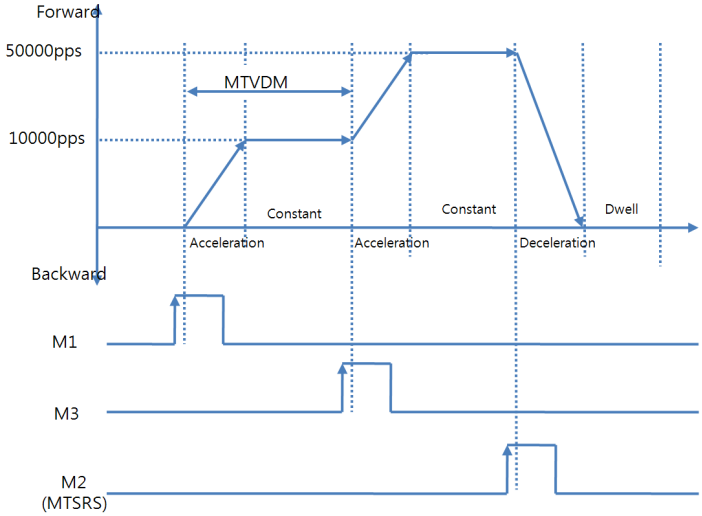
◦ Operation description

This example is programmed to speed direct drive by user's input after origin back. The device is as following.

Device	Value	Description
M100	1	Using CH
M150	1	Drive direction(0: backward 1: forward)
M200	10000	Drive speed
M250	1000	Dwell time
M300	1	Acceleration time
M350	1	Deceleration time

1. When rising edge occurs at M0 device, executes MTOBC(origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge occurs at M1 device, executes MTVDM (speed direct drive) instruction.

4. When executing MTVDM(speed direct drive) instruction, speed drives with set drive speed.
5. During operating MTVDM(speed direct drive) action, if rising edge occurs at M3 device, it executes MTOVV(speed override) instruction and changes drive speed to 50000.
6. MTOVV(speed override) instruction is speed drive. It drives continuously until MTSRS(normal stop) instruction occurs.
7. MTOVV(speed override) instruction is able to stop by MTSRS(normal stop), or MTEMS(emergency stop) instructions.



Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic. The other time setting is not supported.
Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.
Changed speed is not over maximum speed (100,000pps).

(13) MTOVP: position override instruction

This instruction changes the set position as destination position.

- **Instruction**

MTOVP	S0	S1

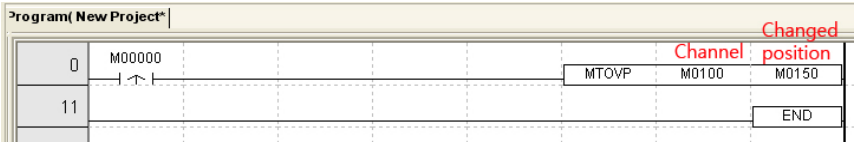
- **Operand**

Operand	Type	Description	Available range
S0	WORD	CH(axis) to execute instruction	CH1 or CH2
S1	DWORD	To be changed position value	-2,147,483,648 to 2,147,483,647

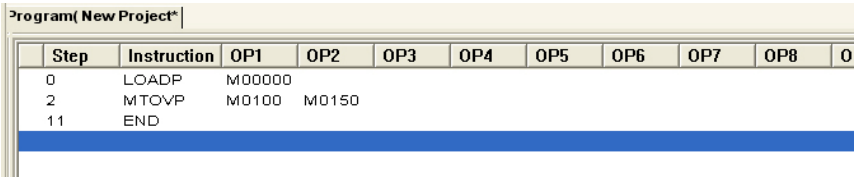
Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○
S1	○	-	○	-	○	-	-	○	-	-	-	-	○	-	○

In case of S/W limit using, changing position should not be over S/W limit value.
Please use the device that matches the size of each operand.
This instruction is only available when position driving.
Be sure that this instruction is not able to use in stop status.
This instruction is available only for constant speed area. If you use this instruction to acceleration, deceleration, or dwell areas, it is not executed, and error occurs.
Current action driving is continued.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic

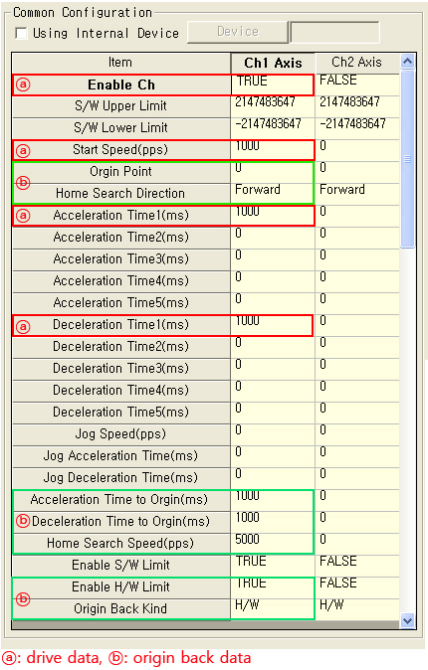


- **Function**
  - Executes position override instruction at rising edge of input condition.
  - Changes destination position from origin destination position to the set position during position driving.
  - If set position is lower than current position, it stops at the current position.
  - If set position is upper than current position, it stops at the set position.

- **Example of usage: Changes destination position 30000 to 50000 during position drive**
  - 'MOTION' tab setting

    MTOVP (position override) instruction is available only when position drive. In this example, executes position override during position direct drive. Therefore, you should set the item for position direct drive.

    Designate 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic as below figure.

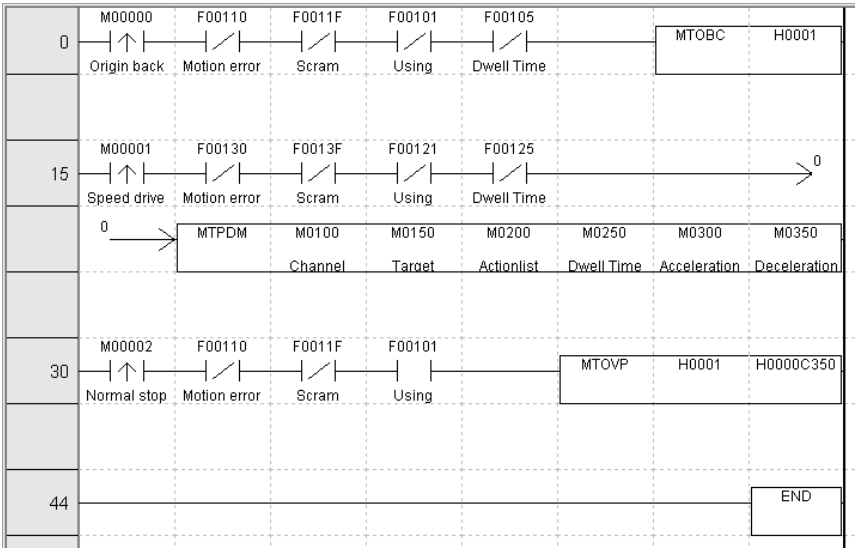


Item	Ch1 Axis	Ch2 Axis
ⓐ Enable Ch	TRUE	FALSE
S/W Upper Limit	2147483647	2147483647
S/W Lower Limit	-2147483647	-2147483647
ⓐ Start Speed(pps)	1000	0
ⓑ Orgin Point	0	0
Home Search Direction	Forward	Forward
ⓐ Acceleration Time1(ms)	1000	0
Acceleration Time2(ms)	0	0
Acceleration Time3(ms)	0	0
Acceleration Time4(ms)	0	0
Acceleration Time5(ms)	0	0
ⓐ Deceleration Time1(ms)	1000	0
Deceleration Time2(ms)	0	0
Deceleration Time3(ms)	0	0
Deceleration Time4(ms)	0	0
Deceleration Time5(ms)	0	0
Jog Speed(pps)	0	0
Jog Acceleration Time(ms)	0	0
Jog Deceleration Time(ms)	0	0
Acceleration Time to Orgin(ms)	1000	0
ⓑ Deceleration Time to Orgin(ms)	1000	0
Home Search Speed(pps)	5000	0
Enable S/W Limit	TRUE	FALSE
Enable H/W Limit	TRUE	FALSE
ⓑ Origin Back Kind	H/W	H/W

ⓐ: drive data, ⓑ: origin back data

For details of each setting value, refer to (1) Common configuration.

◦ PLC program



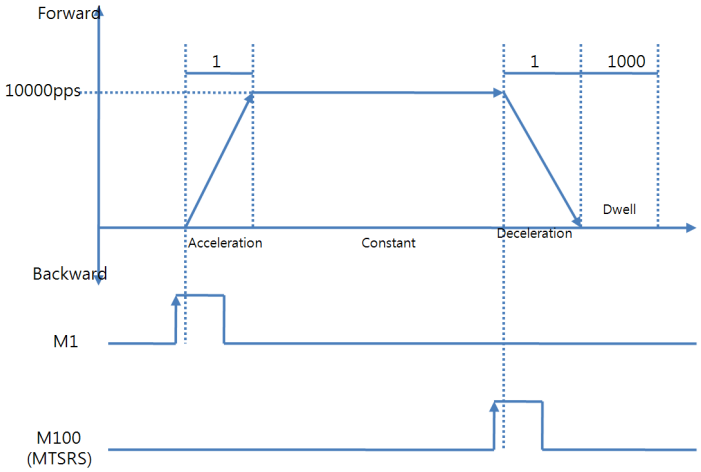
◦ Operation description

This example is programmed to position direct drive by user's input after origin back. The device is as following.

Device	Value	Description
M100	1	Using CH
M150	30000	Destination position
M200	10000	Drive speed
M250	1000	Dwell time
M300	1	Acceleration time
M350	1	Deceleration time

1. When rising edge occurs at M0 device, executes MTOBC(origin back) instruction.
2. MTOBC(origin back) instruction searches origin point by origin back kind of 'Common Configuration' (This example is set as H/W.)
3. When rising edge occurs at M1 device, executes MTPDM(position direct drive) instruction.
4. When executing MTPDM(position direct drive) instruction, accelerates up to the set drive speed during acceleration time and drives constant with the set drive speed.
5. During operating MTPDM(position direct drive) action, if rising edge occurs at M2 device, it executes MTOVP(position override) instruction and changes destination position to 50000.

6. Decelerates the drive for deceleration time and stops at the changed destination position.



Acceleration/Deceleration time is one of Acceleration/Deceleration time 1 to 5 of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic. The other time setting is not supported.
Basic drive data (start speed, acceleration time, deceleration time, etc.) is the set value of 'Common Configuration' at [Workspace]-[Parameter]-[MOTION] in atLogic.

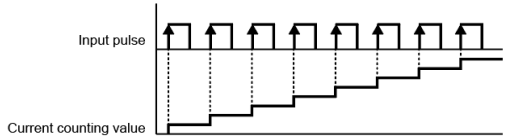
9.4.4. High-speed Counter

9.4.4.1. High-speed Counter Overview

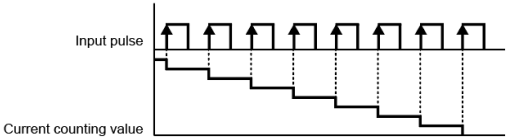
High-speed input signal can be counted. It is normally used to input and control the position information from pulse input devices such as encoder. It can be used up to 2CH and it can count signals with a maximum speed of 50kpps per CH. (1 multiplication standard, 2 multiplication: 25kpps, 4 multiplication 12.5kpps)
Only LP-A070 and LP-A104 series includes high-speed counter function..
High-speed counter contains total 2 types and 6 modes as below.

9.4.4.2. Type and Mode of High-speed Counter

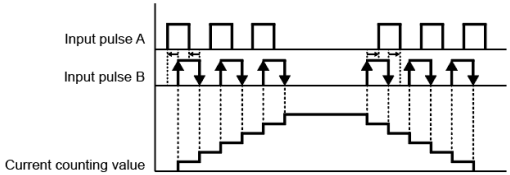
- **1 phase counter**
  - Mode 1: Up count when input is rising edge (Multiplication: ×1)



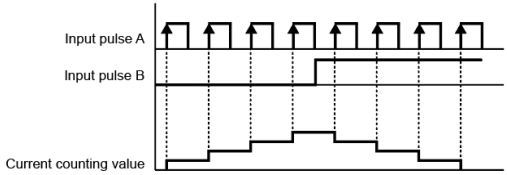
  - Mode 2: Down count when input is falling edge (Multiplication: ×1)



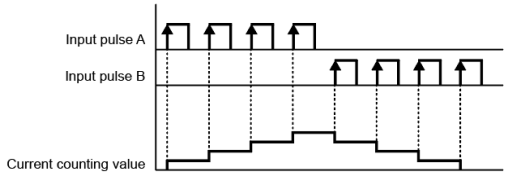
- **2 phase counter**
  - Mode 1: Up count when input A precedes and down count when input B precedes (count only on rising/falling edge) (Multiplication: ×2)



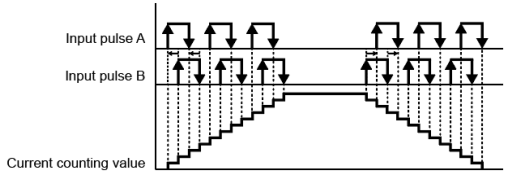
  - Mode 2: Up count when input A is rising edge, input B is 0 and down count when input A is rising edge, input B is 1 (Multiplication: ×1)



  - Mode 3: Up count when input A is rising edge, input B is 0 and down count when input A is 0, input B is rising edge (Multiplication: ×1)



  - Mode 4: Up count when input A precedes and down count when input B precedes (count all when input A/input B is rising/falling) (Multiplication: ×4)



9.4.4.3. High-speed Counter Parameter

High-speed counter tab is activated in LP-A070 and LP-A104 series.
At least one of CH1 or CH2 must be set in high-speed counter parameter to use the high-speed counter instruction in atLogic.
When both CH1 and CH2 are set as 'Std.Out (OFF)' in parameter phase, high-speed counter instruction is not on the application instruction list.

- **Using Internal device**
  When 'Use internal device' is checked, the direct modification is available through LP without using atLogic after download the program to LP.
  When 'Use internal device' is checked, 'Device' is activated.
  By clicking 'Device', 'Device select' dialog box appears to configure the internal device.
- **High-speed counter parameter**

Item	Type	Description	CH1 axis setting	CH2 axis setting
Phase	WORD	Whether to use high-speed counter, select the number of phase for each CH.	1 phase: use 1 phase counter 2 phase: use 2 phase counter (use 2 input port) Standard output (OFF): not use	1 phase: use 1 phase counter Standard output(OFF): not use When CH1 is set as 2 phase counter, CH2 is not available
Mode	WORD	Set high-speed counter mode.	Using 1 phase counter, 1: up count 2: down count Using 2 phase counter, 1: up/down count by phase difference of input 1/input 2 (2 multiplication) 2: up/down count by input 2 status 3: input 1 is up count, input 2 is down count 4: up/down count by phase difference of input 1/input 2 (4 multiplication)	1: up count 2: down count When CH1 is set as 2 phase counter, CH2 is not available
Match value 1	DWORD	Set counting value to generate interrupt	Set range: 0 to 16,777,216	

Item	Type	Description	CH1 axis setting	CH2 axis setting
Match value 2	DWORD	Set counting value to generate interrupt	Set range: 0 to 16,777,216	
Output type	-	Set output contact type	Set range: 0 to 16,777,216Contact A (open contact) Contact B (closed contact) Since the current high-speed counter parameter output type is PNP (sync type), only contact A is available.	
Input port 1	WORD	Select input port to use as input signal	Using 1 phase counter, pulse input port set range: X0 to X7 Using 2 phase counter, first input port set range: X0 to X7	Set range: X0 to X7
Input port 2	WORD	Select input port to use as input signal	Using 2 phase counter, second input port set range: X0 to X7	-

9.4.4.4. Special Device and I/O Device

(1) CH1 special device

F device	Type	R/W	Function
F300	BIT	R	Whether to start high-speed counter 1: start 2: stop
F303	BIT	R/W	Whether to match with match value1 (Stay ON after matching, user clear when needed) 1: match 0: not match
F304	BIT	R/W	Whether to match with match value2 (Stay ON after matching, user clear when needed) 1: match 0: not match
F301	BIT	R	Counter mode 1: up counting 0: down counting
F308	BIT	R/W	Overflow status (current counting value exceeds 16,777,216) 1: overflow 0: not overflow
F192	DWORD	R	Current counting value Range: 0 to 16,777,216
F196	DWORD	R/W	Match value 1 set value Range: 0 to 16,777,216
F198	DWORD	R/W	Match value 2 set value Range: 0 to 16,777,216
F212	WORD	R	Whether to use current CH 0: high-speed counter not use 1: use only CH1, 1 phase counter 2: use only CH2, 1 phase counter 3: use both CH1 and CH2, 1 phase counter 4: use CH1, 2 phase counter
F190	WORD	R	Display currently using high-speed counter mode Using 1 phase counter: 1, 2 Using2 phase counter: 1, 2, 3, 4 CH not use: -1

F device	Type	R/W	Function
F220	WORD	R	CH1 current total counting value The number of total pulse input after counting (64 bit) current total counting value = total counting value + current HSCNT counting value Initialize to 0 when using HSRST instruction or replacing PLC program

(2) CH2 special device

F device	Type	R/W	Function
F310	BIT	R	Whether to start High-speed counter 1: start 2: stop
F313	BIT	R/W	Whether to match with match value 1 (Stay ON after matching, user clear when needed) 1: match 0: not match
F314	BIT	R/W	Whether to match with match value 2 (stay ON after matching, user clear when needed) 1: match 0: not match
F311	BIT	R	Counter mode 1: up counting 0: down counting
F318	BIT	R/W	Overflow status (current counting value exceeds 16,777,216) 1: overflow 0: not overflow
F202	DWORD	R	Current counting value Range: 0 to 16,777,216
F204	DWORD	R/W	Match value 1 set value Range: 0 to 16,777,216
F206	DWORD	R/W	Match value 2 set value Range: 0 to 16,777,216
F212	WORD	R	Whether to use current CH 0: high-speed counter not use 1: use only CH1, 1 phase counter 2: use only CH2, 1 phase counter 3: use both CH1 and CH2, 1 phase counter 4: use CH1, 2 phase counter

F device	Type	R/W	Function
F191	WORD	R	Display currently using high-speed counter mode Using 1 phase counter: 1, 2 Using 2 phase counter: 1, 2, 3, 4 CH not use: -1
F228	WORD	R	CH2 current total counting value The number of total pulse input after counting (64 bit) current total counting value = total counting value + current HSCNT counting value Initialize to 0 when using HSRST instruction or replacing PLC program

(3) I/O Device

X0 to X7 is available as high-speed counter input port.
In case of using motion controller function and high-speed counter function at the same time, X0 to X5 is occupied by the motion controller and cannot be used as input port of high-speed counter.
The output pulse through high-speed counter HSCNT instruction is only available with Y4 to Y7.
For further details of motion controller I/O device, refer to 9.4.3.6, “Motion Control I/O Signal allocation”.

9.4.4.5. High-speed Counter Instruction

(1) HSCNT: high-speed counter instruction

Counting the input signal at high-speed and reaching the match value, interrupt occurs or output device turns ON. It can be set as ON and OFF as long as output device ON retention time.

- **Instruction**

HSCNT	S0	S1	S2	D	S3

- **Operand**

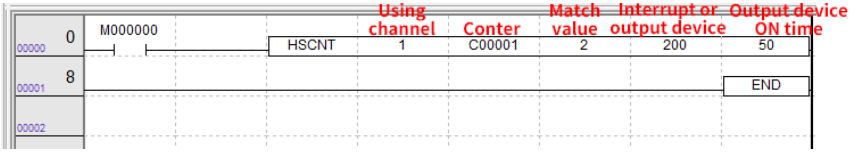
Operand	Type	Description	Available range
S0	WORD	Channel number	1 to 2
S1	DWORD	Counter contact to use	0 to 4,294,967,295 (32 bit)
S2	WORD	High-speed counter match value High-speed counter parameter match	value 1 or 2
D	BIT or Const	In case of current counting value and match value are same, interrupt occurs and output device prints out.	200: up counting→down counting, 100: down counting→up counting, 11 to 14: LP EEI instruction interrupt routine number 0: no output, output device: Y, M, S, D, T, C, Z, F, L, UB
S3	WORD	The time of D output device remains ON	1 to 10,000 (us), output remains when value is 0 (recommended to set over 40us when making output pulse)

Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S1	-	-	-	-	-	-	○	-	-	-	-	-	○	-	-
S2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
D	-	○	○	○	○	○	○	○	○	-	○	-	-	○	○
S3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○

Pulse input can be counted at a rate of 50kpps per channel at maximum at 1 multiplication, 25kpps at 2 multiplication and up to 12.5kpps at 4 multiplication.

Do not set the match value 1 and 2 to consecutive values. Set the match value to make different at least 3 from the high-speed counter
The output pulse through the high-speed counter HSCNT instruction is only available through the Y4 to Y7 port.
Please use the device that matches the size of each operand.

- **Ladder and mnemonic**
  - Ladder



  - Mnemonic

Step	Instruction	OP1	OP2	OP3	OP4	OP5	OP6
0	LOAD	M000000					
1	HSCNT	1	C00001	2	200	50	
8	END						

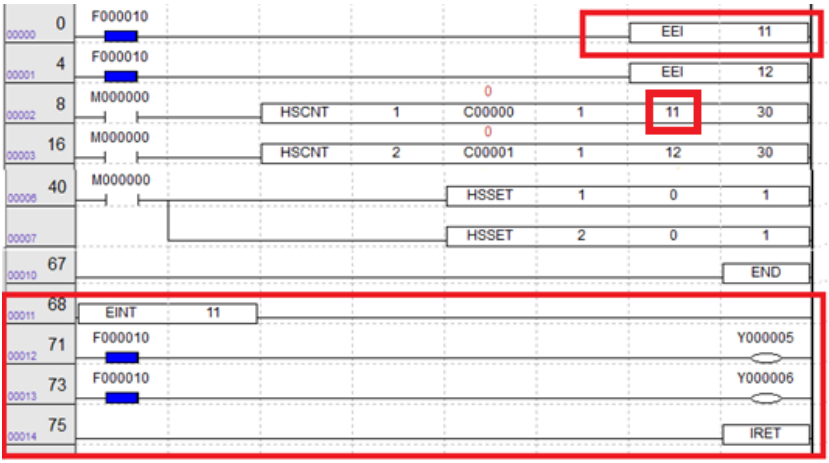
- **Function**
  - The pulse is counting if the external pulse is entered when input contact (M0).
  - Counting the input signal at high-speed and reaching the match value, interrupt occurs or output device turn ON.
  - Interrupt
    200: up counting→down counting, 100: down counting→up counting, 11 to 14: LP EEI Interrupt routine number, 0: no output
  - Output device
    M, D, F, Z, T, Y, C, L, S, UB bit device ON
  - Output device ON time
    Output device stays ON as long as the set time (us) then turns OFF.
  - The second parameter in HSCNT, the counter device, cannot be used as a contact device.
    If the contact is required, define directly on the output device.
  - The second parameter in HSCNT, the counter device, must be assigned a different number for each channel and for each match value.
  - It is not available to direct map the C device with High-speed counter HSCNT in drawing program at Designer. To use the high-speed counter current value in the programming screen, use the

special device which has current counting value among the special device of high-speed counter.

- CH1: F192, CH2 : F202

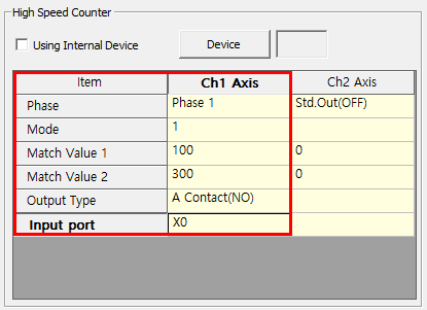
◦ Using the high-speed counter's interrupt signal, 4 ladder interrupt routines (EEI) can be configured up to EEI Instruction 11 to 14.

- In consideration of the PLC scan performance and the number of instruction steps, design the interrupt routine so that the entire high-speed counter interrupt routine does not load PLC operation.
- Be careful when designing the interrupt routine since it may cause scanning problems due to the interrupt service routine.
- If the interrupt routine is too long or the interrupt drive internal using HSSET is too short, only the interrupt routine will be activated without PLC scan operation.
- The example of configuring a ladder interrupt routine using the interrupt instruction EEI 11.



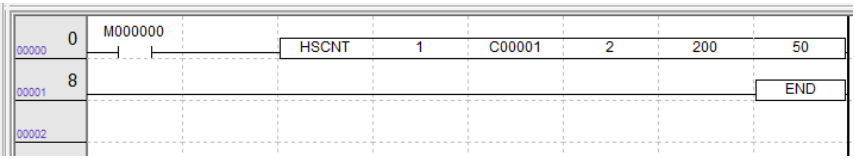
◦ When match value1 of HSCNT instruction CH1 matches current counting value, 11th interrupt is generated and Y5 and Y6 in the interrupt routine turns ON at the same time.

- **Example of usage: When the current counting value reaches 300, it switches to the down counter**
  - ‘High-speed counter’ tab setting
    Create the high-speed counter in atLogic [Work space]-[Parameter]-[High-speed counter] tab as shown below.



Item	Ch1 Axis	Ch2 Axis
Phase	Phase 1	Std.Out(OFF)
Mode	1	
Match Value 1	100	0
Match Value 2	300	0
Output Type	A Contact(NO)	
Input port	X0	

  - PLC program



  - Operation description
    It is programmed to switch as down counter when the current counting value reaches to match value. The devices are listed as the table below.

Device	Value	Description
M0	1/0	Start signal
C1	Current counting value	Counter device/Counter contact

1. If a pulse is entered to CH1 input port X0 while M0 is ON, the curent count value of counter device C1 will rise.
2. When C1 current counting value reaches match value 2(300), the interrupt 200(up counting→down counting) occurs.
3. After the interrupt occurs, the C1 current counting value is decremented depending on the pulse input of X0.

(2) HSSET: high-speed counter set instruction

Counting the input signal at high speed and reaching the match value, current counting value is set as set value.

- **Instruction**

HSSET	S0	S1	S2

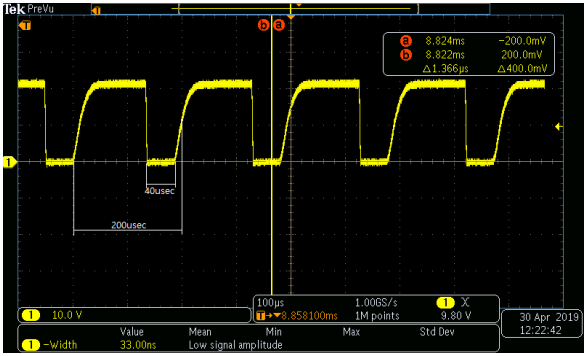
- **Operand**

Operand	Type	Description	Available range
S0	WORD	Channel number	1 to 2
S1	DWORD	Set value	-32,768 to 65,535
S2	WORD	High-speed counter match value	High-speed counter parameter match value 1 or 2

Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○

· Pulse input can be counted at a rate of 50kpps per channel at maximum at 1 multiplication, 25kpps at 2 multiplication and up to 12.5kpps at 4 multiplication.
· Do not set the match value 1 and 2 to consecutive values. Set the match value to make different at least 2 from the high-speed counter.
· Use with HSCNT instruction.
· Set the match value at least 60 us interval to reset the counting value using match value.
Ex) the time per 1 pulse is 20 us in case of 50kpps pulse. Since 60us=20us×3, set the match value to make different at least 3 form the set value.
· If the output pulse width through HSCNT is greater than the pulse width of the match value, the system may go down. Set the HSCNT output pulse width to less than half of the match value pulse width.
Ex) The image below shows the waveform measured when the pulse value of 50kpps is set to match value 10 (200us=20us×10) and output pulse 2 (40us=20us×2).
The output pulse length must be less than half of the input pulse period (100us).

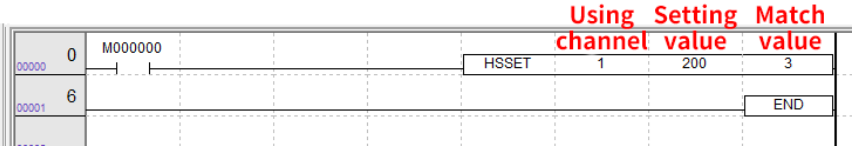




・Please use the device that matches the size of each operand.

atLogic output signal monitoring is may be missing because the output signal is processed at high speed.

- **Ladder and mnemonic**
  - Ladder

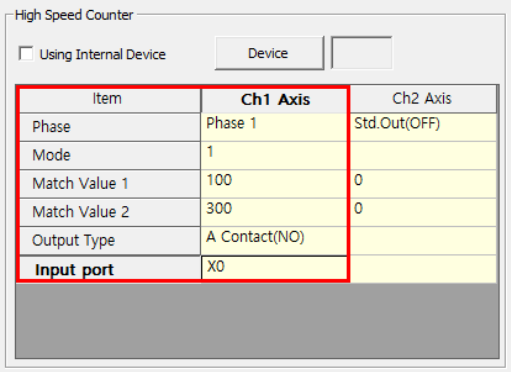


  - Mnemonic

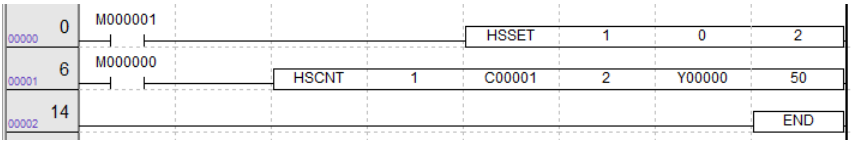
Step	Instruction	OP1	OP2	OP3	OP4
0	LOAD	M000000			
1	HSSET	1	200	3	
6	END				

- **Function**
  - Activate when the input signal turns ON.
  - Counting the input signal at high speed and reaching the match value, current counting value is set as set value.

- **Example of usage: When the current counting value reaches 300, the current counting value is set to 0**
  - ‘High-speed counter’ tab setting
    Create the high-speed counter in atLogic [Work space]-[Parameter]-[High-speed counter] tab as shown below.



  - PLC program



  - Operation description
    It is programmed to set the current counting value as the set value when the current counting value reaches to match value. The devices are listed as the table below.

Device	Value	Description
M0	1/0	Start signal
C1	Current counting value	Counter device
Y0	1/0	Output contact
M1	1/0	HSSET start signal

1. HSSET instruction activates as the HSSET start signal is entered.
2. If CH1 input signal is ON while M0 is ON, the current counting value of counter device C1 will rise.
3. When C1 current counting value reaches match value 1 (100), the output contact Y0 stays ON in 50us.

4. Even after Y0 is ON, the current counting value is set to 0 by the HSSET instruction when the current couniting value rises to reach match value 2 (300).
5. Repeat the process from 2 to 4.

(3) HSRST: high-speed counter reset instruction

When the start signal is ON while PLC program scanning, the current counting value is set as the set value.

- **Instruction**

HSSET	S0	S1

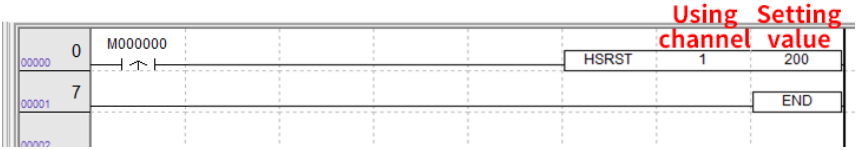
- **Operand**

Operand	Type	Description	Available range
S0	WORD	Channel number	1 to 2
S1	DWORD	Set value	-32,768 ~ 65,535

Operand	Device														
	X	Y	M	S	D	T	C	Z	F	V	L	R	UW	UB	Integer
S0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○
S1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○

· When the start signal is ON, the set value is applied on next scan. It may cause scan delay.
· Use with HSCNT instruction.
· Please use the device that matches the size of each operand.

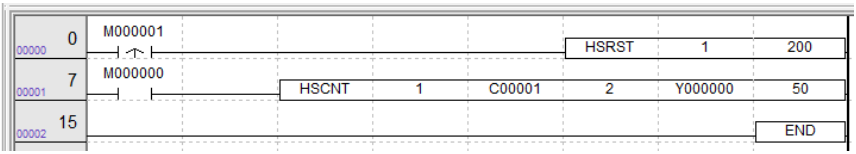
- **Ladder and mnemonic**
  - Ladder



  - Mnemonic

Step	Instruction	OP1	OP2	OP3
0	LOADP	M000000		
2	HSRST	1	200	
7	END			

- **Function**
  - When the start signal is on while PLC program scanning, the current counting value is set as the set value.
- **Example of usage: When the start signal is ON, the current counting value is set to 0**
  - PLC program



  - Operation description
    It is programmed to set the current counting value as the set value when the start signal is ON. The devices are listed as the table below.

Device	Value	Description
M0	1/0	Start signal
C1	Current counting value	Counter device
Y0	1/0	Output contact
M1	1/0	HSRST start signal

    When M1 is ON while PLC program scanning, the current counting value is set as the set value.

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Dimensions or specifications on this manual are subject to change and some models may be discontinued without notice.

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