

Ezi-SERVO[®] Plus-R

Closed Loop Stepping System

**Ezi-SERVO[®] Plus-R
MINI**

Closed Loop Stepping System

Ezi-SERVO[®] ALL

Closed Loop Stepping System

- User Manual -

Position Table (Ver.4)

※ Before operation ※

- Thank you for your purchasing Ezi-SERVO.
- Ezi-SERVO is an all-in-one Unit, for high-speed and high-precision drive of a stepping motor, Ezi-SERVO is an unique drive that adopts a new control scheme owing to an on-board high-performance 32 bit digital signal processor.
- This manual describes handing, maintenance, repair, diagnosis and troubleshooting of Ezi-SERVO.
- Before operating Ezi-SERVO, thoroughly read this manual.
- After reading the manual, keep the manual near the Ezi-SERVO so that any user can read the manual whenever needed.

- Table of Contents -

1.	Safety Pre-caution	5
1.1	General Precaution	5
1.2	Put the safety First.....	5
1.3	Check the Product	5
1.4	Installation	5
1.5	Connect Cables	6
1.6	Operation.....	6
1.7	Check and Repair	6
2.	Windows of Position Table	7
2.1	Loading Position Table Data	7
2.2	Main Window of Position Table	8
2.3	Position Table Editor	9
3.	Position Table Item.....	10
3.1	Explanation of Position Table Item.....	10
3.2	Type of Command	13
4.	Execution of Position Table	14
4.1	How to start Position Table.....	14
4.2	Example for general operation.....	14
4.3	Operation Modes	15
4.3.1	Normal.....	15
4.3.2	Single Step.....	16
4.4	Teaching Function.....	16
4.4.1	Teaching by user program	17
4.4.2	Teaching by Input signal.....	17
4.5	Input Condition Jump	19
4.5.1	Automatic Jump.....	19

4.5.2	Jump by External Signal	20
4.6	Loop Condition Jump.....	21
4.6.1	Specifying Loop	21
4.6.2	Loop Counter Clear	22
4.7	Start/Pass/End Signal Function	23
4.7.1	Start/End Signal	23
4.7.2	Pass Signal	24
4.8	Push Motion Function.....	25
4.8.1	Setting	25
4.8.2	Process of Push mode	25

1. Safety Pre-caution

1.1 General Precaution

- ◆ Contents of this manual are subject to change without prior notice for functional improvement, change of specifications or user's better understanding.
- ◆ When the manual is damaged or lost, please contact with FASTECH's agents or our company at the address on the last page of the manual.
- ◆ Our company is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.

1.2 Put the safety First

- ◆ Before installation, operation and repairing the Ezi-SERVO thoroughly read the manual and fully understand the contents. Before operating Ezi-SERVO please understand the mechanical characteristics of the Ezi-SERVO and related safety information and precaution .
- ◆ This manual divides safely precautions into **Attention** and **Warning**.



Attention

If user does not properly handle the product, the user may seriously or slightly injured and damages may occur in the machine.



Warning

If user does not properly handle the product, a dangerous situation (such as an electric shock) may occur resulting in death or serious injuries.

- ◆ Although precaution is only a **Attention**, a serious result could be caused depending on the situation, Follow safely precautions.

1.3 Check the Product



Attention

Check the product is damaged or parts are missing. Otherwise the machine may get damaged or the user may get injured.

1.4 Installation



Attention



- Carefully move the Ezi-SERVO. Otherwise, the product may get damaged or user's foot may get injured by dropping the product..
- Use non-flammable materials such as metal in the place where the Ezi-SERVO is to be installed. Otherwise, a fire may occur.
- When installing several Ezi-SERVO in a sealed place, install a cooling fan to keep the ambient temperature of the Ezi-SERVO as 50℃ or lower. Otherwise, a fire or other kinds of accidents may occur due to overheating.




Warning

- The process of installation, connection, operation, checking and repairing should be done with qualified person. Otherwise, a fire or other kinds of accidents may occur.,


1.5 Connect Cables

 Attention	<ul style="list-style-type: none"> ■ Keep the rated range of Input Voltage for Ezi-SERVO. Otherwise, a fire or other kinds of accidents may occur. ■ Cable connection should follow the wiring diagram. Otherwise, a fire or other kinds of accidents may occur.
 Warning	<ul style="list-style-type: none"> ■ Before connecting cables check if input power OFF. Otherwise, an electric shock or a fire may occur. ■ The case of Ezi-SERVO is insulated from the ground of the internal circuit by the condenser. Ground the Ezi-SERVO. Otherwise, an electric shock or a fire may occur.

1.6 Operation

 Attention	<ul style="list-style-type: none"> ■ If a protection function(alarm) occurs, firstly remove its cause and then release(alarm reset) the protection function. If you operate continuously without removing its cause, the machine get damaged or the user may get injured. ■ Do not make Motor Free and make input signal to ON during operation. Motor will stop and stop current will become zero. The machine may get damaged or the user may get injured. ■ All parameter values are set by default factory setting value. Change this value after reading this manual thoroughly. Otherwise, the machine may get damaged or other kinds of accidents may occur.
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1.7 Check and Repair

 Warning	<ul style="list-style-type: none"> ■ Stop to supply power to the main circuit and wait for a while before checking or repairing the Ezi-SERVO. Electricity remaining in the capacitor may occur danger. ■ Do not change cabling while power is being supplied. Otherwise, the user may get injured or the product may get damaged. ■ Do not reconstruct the Ezi-SERVO. Otherwise, an electric shock may occur or the reconstructed product can not get after service.
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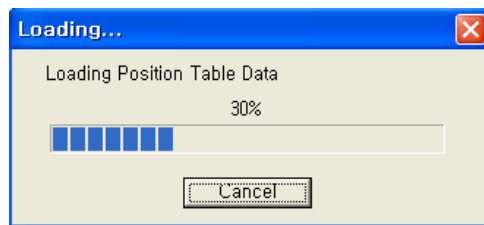
Presented 「Ezi-SERVO Plus-R User Manual “ Position Table”」 explains position table functions of Ezi-SERVO Plus-R. Here are 「[User Manual_ Text](#)」 , 「[User Manual_Communication Function](#)」 in this manual. Please utilize our product afterward understanding about proper usage method with reading these contents carefully.

The word as ‘Position Table’ can be presented as PT (Position Table) from the following text. In particular, In this manual the Ezi-SERVO Plus-R is the standard among various drive type. This PT function is not supported for Ezi-SERVL ALL28 drive.

2. Windows of Position Table

2.1 Loading Position Table Data

When click the ‘Pos Table’ button on main menu of User Program(GUI), then the system displays the following message box and loads data saved in RAM area of drive.



Functions of Position Table allows to process motions in the orders that were predefined by user. In the case of this Ezi-SERVO Plus-R drive, up to 256 steps can be saved. Up to 64 steps can be saved for Ezi-SERVO Plus-R MINI or Ezi-SERVO ALL series except Ezi-SERVO ALL-28.

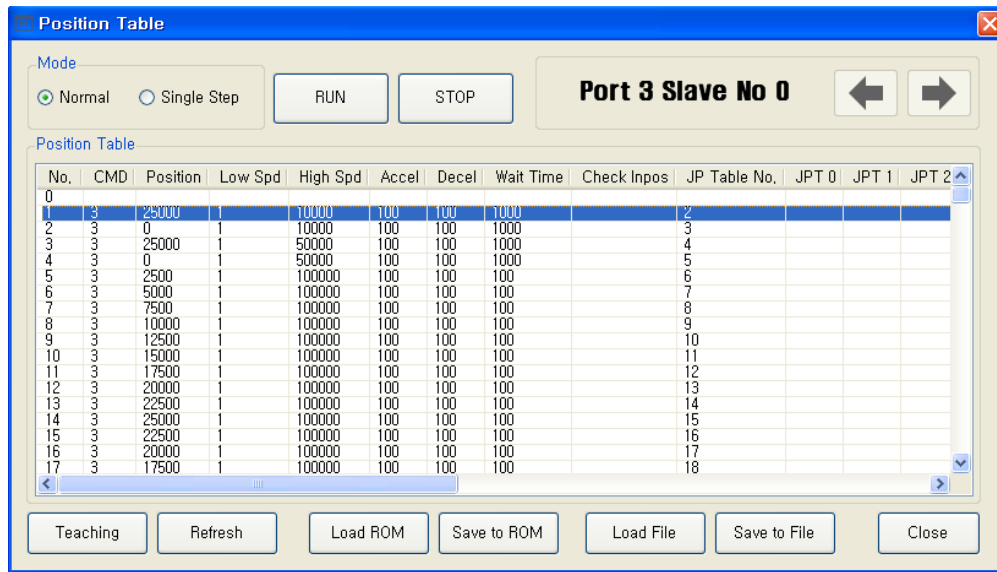
Major functions for saving items are shown as following.

- 1) Editing function of Motion step (Input/Edit/Delete/Copy)
- 2) Start and Stop function of Motion order at User Program(GUI)
- 3) Start and Stop Motion function by signal input from outside drive.
- 4) Teaching function.
- 5) Functions to save Motion steps as file and to load them from file.
- 6) View function of current Position Table order under execution status.

When electric power is supplied to drive, the Position Table data saved in ROM area of drive is copied to RAM area and once click the ‘Post Table’ button, then the system loads the data saved in RAM area of drive

2.2 Main Window of Position Table

The following window describes windows and buttons which execute the position table function.



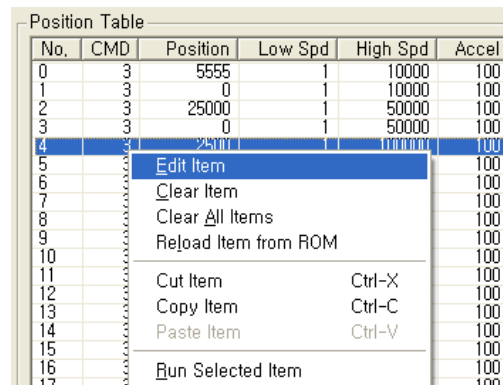
Button	Description
Normal/Single Step	The user can select modes to execute the position table. Normal : All position commands are in order executed according to conditions saved in the position table . Single Step: Only single position command is executed .
Run/Stop/Next	To run/stop items at the defined position table.
Teaching	Teaching is executed by either using external input signal or user program. By clicking this button, the user can easily use teaching function at the user program window. For more information, refer to 'Teaching Function'.
Refresh	To display the position value measured by the teaching function. For more information, refer to '4.4 Teaching Function'.
Save to ROM	To save current position table data in ROM area.
Load from ROM	To open position table data saved in ROM area.
Save to File	To save current position table data to an external file. (It is saved to a folder defined by the user with a file name defined by the user. The extension is *.txt.)
Load File	To read data from files that is saved. <div data-bbox="475 1700 1085 1993"> </div>

* Up to **256 position table** commands can be input and saved for **Ezi-SERVO Plus-R series**.

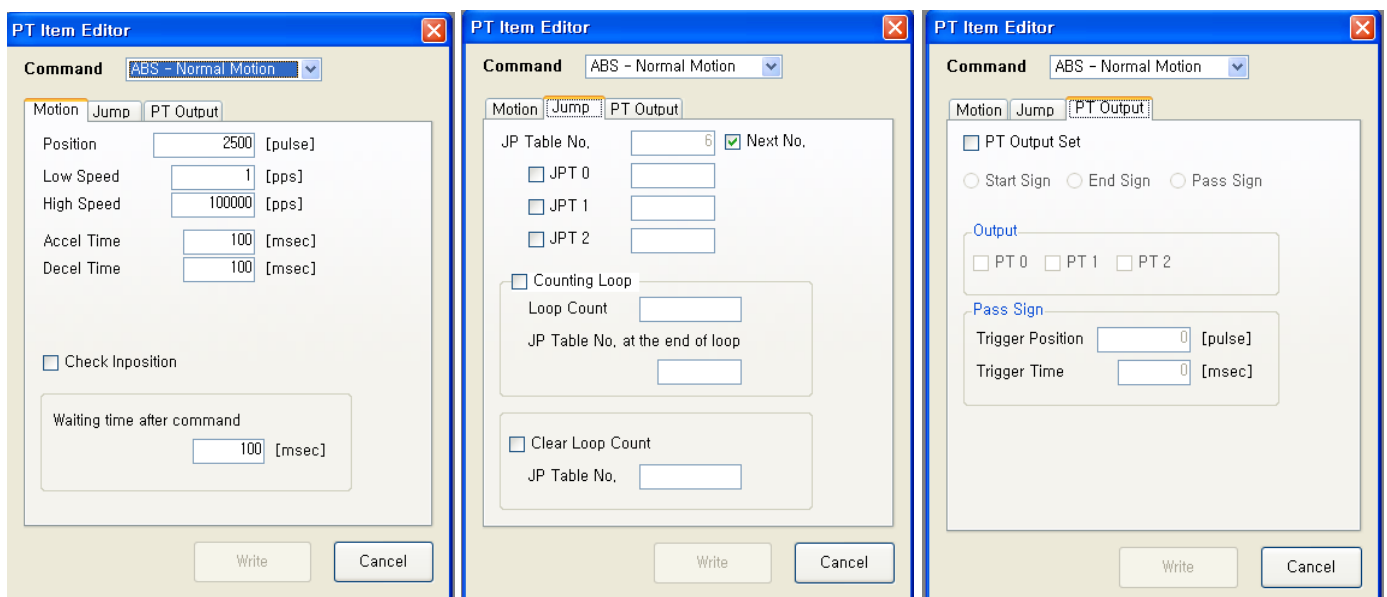
* Up to **64 position table** commands can be input and saved for **Ezi-SERVO Plus-R MINI and Ezi-SERVO ALL series**.

2.3 Position Table Editor

When click right mouse button on a selected Position Table data line, then the following popup menu is activated.



- 1) Edit Item: You can edit data on the following dialog box shown as below.
- 2) Clear Item: All the items of selected PT are cleared.
After executing this function all the items are shown as blank.
- 3) Clear All Items: While above function "Clear Item" clears data for one selected order, this function clears data for all the orders of 256(or 64) Position Table.
- 4) Reload Item from ROM: The data shown on the screen are values saved in the RAM.
This function is used for reload data saved in ROM area.
- 5) Cut Item: Used to cut selected item data of PT in order to paste on other position.
- 6) Copy Item: Used to copy selected item data of PT in order to paste on other position.
- 7) Paste Item: Paste the copied data to clipboard by "Cut" or "Copy" to other selected position.
- 8) Run Selected Item: Execute motion order from the selected No. of Position Table.



Double click on selected line of Position Table data or click the “Edit Item” from popup menu button shown above figure, then the dialog box shown right is activated.

Once complete editing of each item, and then you move and select other items to edit by using right/left arrow key.

After complete editing of all data completely, click ‘Save’ button to save data to RAM. In order to save data to ROM area, click ‘Save to ROM’ button on main screen of Position Table.

3. Position Table Item

3.1 Explanation of Position Table Item

Designated Item	Description	Unit	Lower limit	Upper limit
Command	Specifies type of motion. For more details, refer to 「3.2 Command」 .	-	0	10
Position *2	Specifies position/movement scale by number of pulse.	pulse	-134,217,728	+134,217,727
Low Speed	Specifies low speed by number of pulse in accordance with type of motion. For more details, refer to 「3.2 Command」 .	pps	1	500,000
High Speed	Specifies high speed by number of pulse in accordance with type of motion. For more details, refer to 「3.2 Command」 .	pps	1	2,500,000
ACC time	Specified acceleration time by msec when starting motion.	ms	1	9,999
DEC time	Specified acceleration time by msec when stopping motion.	ms	1	9,999
Wait time	Specifies waiting time by [msec] for starting motion of next PT when specifying PT No. for jump/skip. If JP Table No is specified as blank, this is ignored..	ms	0	60,000

JP Table No.	When this item specified, the system jumps to JP Table No and execute it after completing action of current position. If Position No is specified as 10XXX, system jumps to Position No XXX as soon as 'JPT Start' begins, one of the input digital signal from controller to outside, becomes ON. For program exit, specify as blank. For more details, refer to 「4.4 Input Condition - Jump」 .	-	0	255								
			10,000	10,255								
JPT 0	If any of these items is checked and there are corresponding input signals of JPT input0, JPT input1 or JPT input2, system jumps to JPT 0, JPT 1 or JPT 2 accordingly regardless of specified 'Jump Table No.'	-	0	255								
10,000			10,255									
JPT 1		-	0	255								
10,000			10,255									
JPT 2	For more details, refer to 「4.4 Input Condition Jump」 .	-	0	255								
10,000			10,255									
		<table><tr><th>Input signal</th><th>Corresponding Input Jump Position</th></tr><tr><td>JPT input0</td><td>Input Jump Position No 0</td></tr><tr><td>JPT input1</td><td>Input Jump Position No 1</td></tr><tr><td>JPT input2</td><td>Input Jump Position No 2</td></tr></table>			Input signal	Corresponding Input Jump Position	JPT input0	Input Jump Position No 0	JPT input1	Input Jump Position No 1	JPT input2	Input Jump Position No 2
Input signal	Corresponding Input Jump Position											
JPT input0	Input Jump Position No 0											
JPT input1	Input Jump Position No 1											
JPT input2	Input Jump Position No 2											
Loop Count	If these item are specified, system repeats action of the position under specified times (Loop Count) and after then jumps to corresponding position to Loop Jump Table No regardless of specified 'Jump Table No'. For more details, refer to 「4.5.1 Loop Setting」 .	-	0	100								
Loop Jump Table No.		-	0	255								
			10,000	10,255								
PT set	Specifies output signals such as PT Output0, PT Output1, PT Output2 in order to confirm the start, pass or end of motor operation for each position. 0,8,16 : Not use output signal 1~7 : Specifies output function when starting operation 9~15 : Specifies output function when completing operation 17~23: Specifies output function when the position reach to 'Trigger Position' For more details, refer to 「4.7 Start/Pass/End Signal Function」 .		0	23								

Loop Counter Clear	If this item is checked, Loop Count of specified no of PT is to be cleared. For more details, refer to 「 4.5.1 Loop Setting 」.	-	0	255
Check Inpos	If this item is checked, stop condition is recognized as Inposition finishes.	-	0	1
Trigger Pos *2	Specifies position where the PT Output0, PT Output1, PT Output2 signal is ON in case of 'PT set' is 17~23. For more details, refer to 「 4.7 Start/Pass/End Signal Function 」.	pulse	-134,217,728	+134,217,727
Trigger Time	Specifies pulse width where the PT Output0, PT Output1, PT Output2 signal is ON in case of 'PT set' is 17~23. For more details, refer to 「 4.7 Start/Pass/End Signal Function 」.	ms	0	65535
Push Ratio	Specifies motor torque ratio for push motioning. For more details, refer to 「 4.8 Push Motion Function 」.	%	20	90
Push Speed	Specifies motion speed of push motioning. (max 200[rpm])	pps	1	33333 *1
Push Position *2	Specifies absolute target position of push motioning.	pulse	-134,217,728	+134,217,727
Push Mode (Pulse Count)	Specifies the push mode : Stop mode(0) or Non-stop mode(1~10,000). For more details, refer to 「 4.8 Push Motion Function 」.		0	10,000

*1 : The unit of [pps] in this item is referenced to 10,000[ppr] encoder.

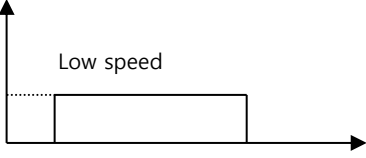
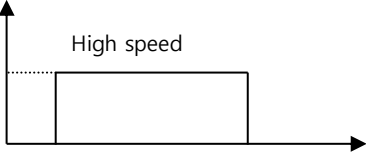
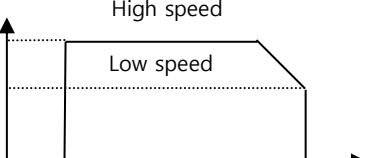
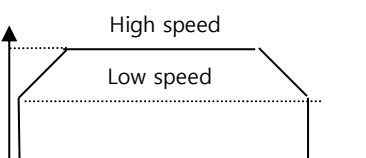
*2 Next value is used for bigger '06.0x.1xx.xx' Firmware version number.
(plus value is 2147483647 and minus value is -2147483647)

3.2 Type of Command

Item "Command" specifies type of action pattern to be executed for each position and the followings in the table are list of commands.

Command Name	Specified Value	Remark
Abs Move low speed.	0	The value in the item "Position" is value for absolute position. 'Teaching' function can be used.
Abs Move high speed	1	
Abs Move high speed with decel.	2	
Abs Move with accel. and decel.	3	'Continuous Action' function can be used.
Inc Move low speed.	4	The value in the item "Position" is value for relative position. 'Teaching' function is not supported.
Inc Move high speed	5	
Inc Move high speed with decel.	6	
Inc Move with accel. and decel.	7	'Continuous Action' is not supported .
Move to Origin	8	Execute the command to move to origin based on the specified current parameters specified.
Clear Position	9	Reset 'command position' value and 'actual position' value based on current position and clears the values as 0.
Push Abs Move	10	Execute the command to push motion
Stop	11	To stop the motioning of Push motion Non-stop mode command. For more details, refer to 「 4.8 Push Motion Function 」 .

The following table shows speed patterns for each action of command.

Command Name	Specified Value	Motion Profile
Abs Move low speed.	0	
Inc Move low speed.	4	
Abs Move high speed	1	
Inc Move high speed	5	
Abs Move high speed with decel.	2	
Inc Move high speed with decel.	6	
Abs Move with accel. and decel.	3	
Inc Move with accel. and decel..	7	

4. Execution of Position Table

When installing User Program(GUI), the following files are saved in the folder named as “\\FASTECH\\EziMOTION PlusR V6\\PT_Samples\\Ezi-SERVO ST” for version 6 as sample files to test Position Table.

- 1) PTsample (General Motioning).txt
- 2) PTsample (Loop Motioning).txt
- 3) PTsample (Loop counter clear).txt
- 4) PTsample (Clear Position).txt

4.1 How to start Position Table

Position Table operation is executed by input signal or communication command. The followings are example of Position Table operation by input signal to be explained step by step.

In the case of Position Table operation by communication command, the system is executed by sending the communication commands corresponding to the control input signal.

- 1) Specify Position Table No (0~255) operated by PT A0~PT A7.
- 2) If the motor is Servo OFF, click Servo ON.
- 3) Signal ON of ‘PTStart’ input to start operation.

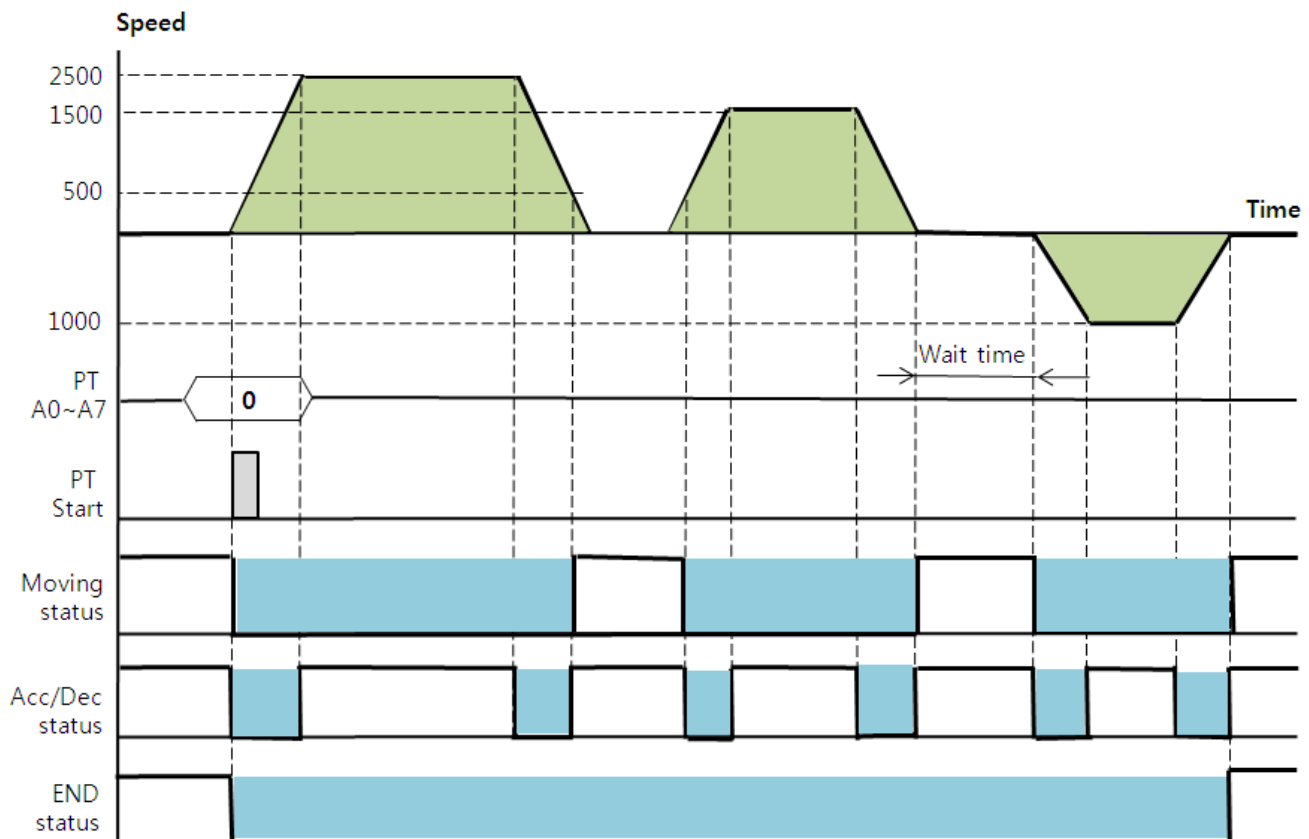
4.2 Example for general operation

Specify PT No through input data for PT A0 ~ PTA7 and then input ‘PT Start’ signal to start speed control operation.

【Specifying Position Table】

PT No.	Command type	Position	Low Speed	High Speed	Accel. time	Decel. time	Wait time	JP Table No.
0	3	10000	1	2500	50	300	0	1
1	3	1000	1	500	100	100	0	2
2	3	5000	1	1500	50	300	300	3
3	3	-2500	1	1000	300	300	0	-

By executing with above Position Table data, the motion will be as next diagram. Refer to the sample file for testing Position Table, ‘PTsample (General Motioning).fpt’.

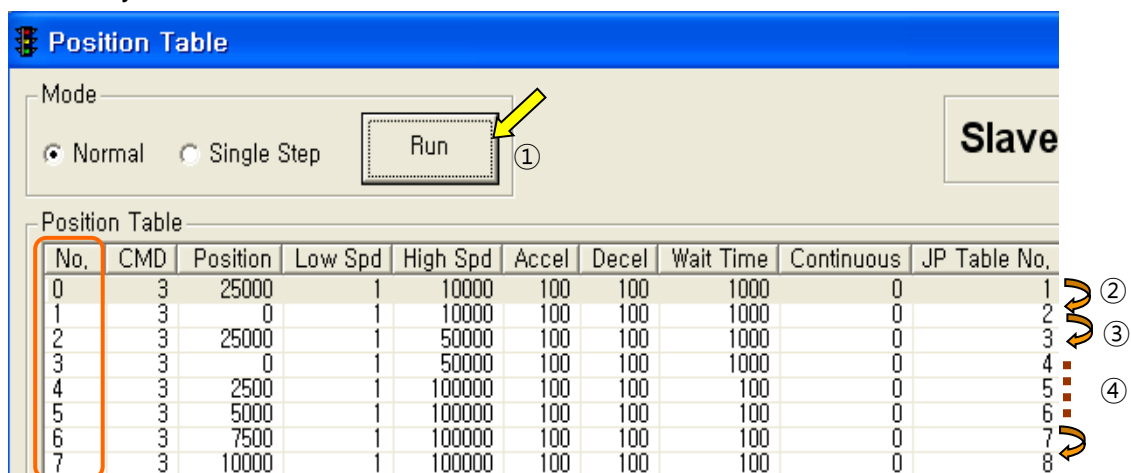


4.3 Operation Modes

Position Table commands can be executed by two modes as follows.

4.3.1 Normal

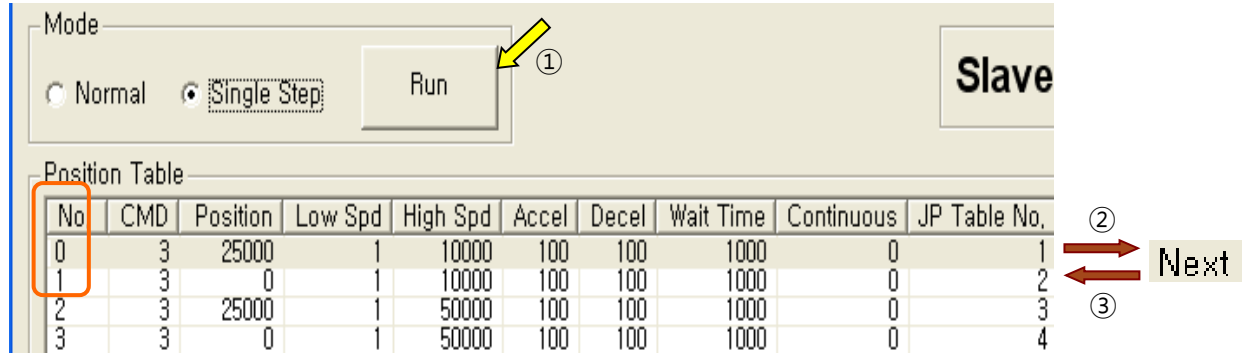
Select 'Normal' at the main window of position table, and all commands will be executed in order by conditions already loaded in PT data.



- 1) While Normal mode is selected, the user sets PT number to 0 and click 'Run' and then PT 0 is executed.
- 2) PT 1 is executed by PT data jump conditions.
- 3) PT 2 is executed by PT data jump conditions.
- 4) As mentioned above, next PT number is automatically executed by position data jump conditions.
- 5) Click 'Stop' to stop operating.

4.3.2 Single Step

Select 'Single Step' at the main window of position table, and only corresponding PT command will be executed and next PT commands will be on stand-by. This mode can be easily used when the user executes testing for each position command. And it is available for User Program(GUI) only.



- 1) While Single Step Mode is selected, the user sets PT number to 0 and click 'Run' and then PT 0 is executed.
- 2) After execution is stopped, 'Run' icon is changed into 'Next' and next command is on stand-by.
- 3) Click 'Next' button, and PT 1 will be executed.
- 4) When pressing each 'Next' button, one PT command is executed.
- 5) Click 'Stop' to stop operation. After operation is stopped, the user can set new PT number and click 'Run' button to start the program again.

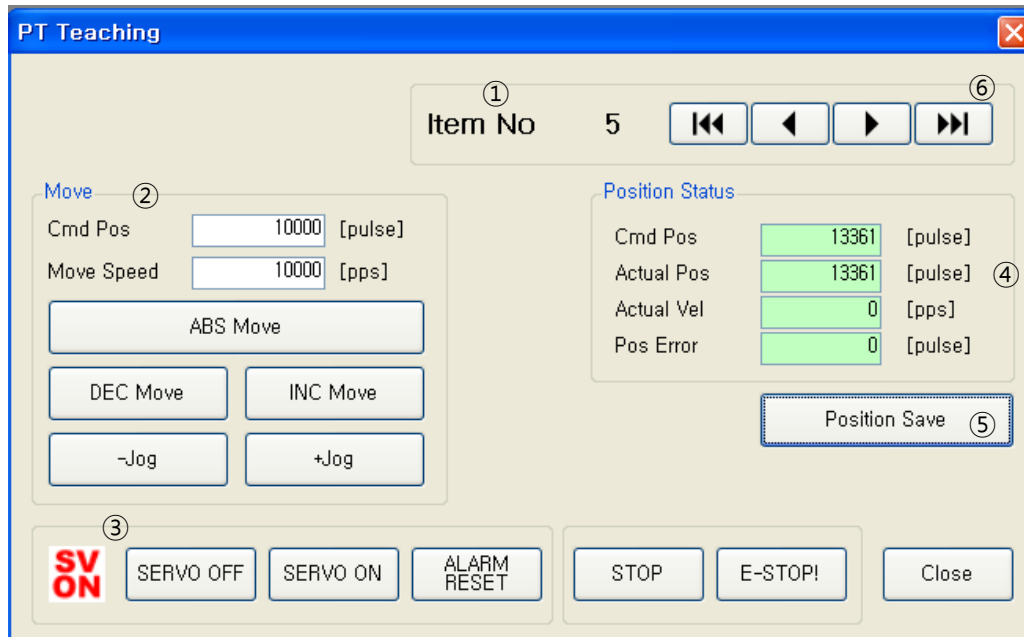
4.4 Teaching Function

Teaching signal functionalizes that the position value [pulse] being working can be automatically inputted into a 'position' value of a specific position table. The following table shows type of commands and whether teaching function can be used or not.

Command	Value	To be used or not
Abs Move low speed.	0	'Teaching' can be used.
Abs Move high speed	1	
Abs Move high speed with deceleration.	2	
Abs Move with acceleration and deceleration.	3	
Inc Move low speed.	4	'Teaching' cannot be used.
Inc Move high speed	5	
Inc Move high speed with deceleration.	6	
Inc Move with acceleration and deceleration.	7	
Move to Origin	8	
Clear Position, Push Abs Move, Stop	9,10,11	

4.4.1 Teaching by user program

When click 'Teaching' button on Position Table screen, the following dialog box is activated.

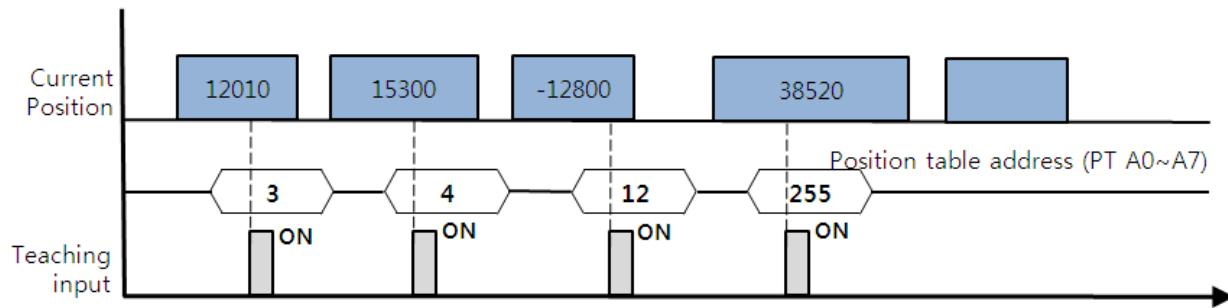


- ① Select Position Table No, the figure shows that no 5 of PT is selected among 256 Position Tables.
- ② Specify position of motor where to teach and move it.
- ③ Turn ON or OFF of Servo during teaching.
- ④ Displays current position information and the value displayed in "Actual Pos(ition)" is to be teaching value.
- ⑤ When clicking this "Teaching" button, current value displayed in "Actual Pos" will be saved in the item "Position" of the current PT (No 5 above case). The values are to be saved on RAM and click 'Save to ROM' button in order to save on ROM.
- ⑥ In order to move to the next position, select PT no by using arrow keys.

4.4.2 Teaching by Input signal

You can save current position information to the Position Table data by Turning ON teaching control input signal. Also when executes teaching, position value (no. of pulse) is specified as absolute position value. Teaching is carried out by following orders:

- 1) Select PT no. to save data and specify items like "Command", etc.
(except item 'Position' only)
- 2) Move motor to the position where you want to save data of it.
- 3) Specify PT no's that teaching is carried out by 'PT A0~PT A7'.
- 4) Turn ON teaching signal to save current position value into item 'Position' of Position Table data.
- 5) If you want to apply the saved value, you need to 'Refresh' PT data in order to verify the value on the User Program(GUI) screen.
- 6) The values are to be saved on RAM and click 'Save to ROM' button in order to save on ROM.



PT No (CMD)	Position Value for each PT [pulse] (Position)
Position 3	12010
Position 4	15300
Position 12	-12800
Position 255	38520

4.5 Input Condition Jump

Among the items to be specified, “JP Table No.”, “JPT 0”, “JPT 1” and “JPT 2” are used to specify next PT no. to be executed. Specified next PT no. to be executed, there are two different methods depending on the control signal as followings.

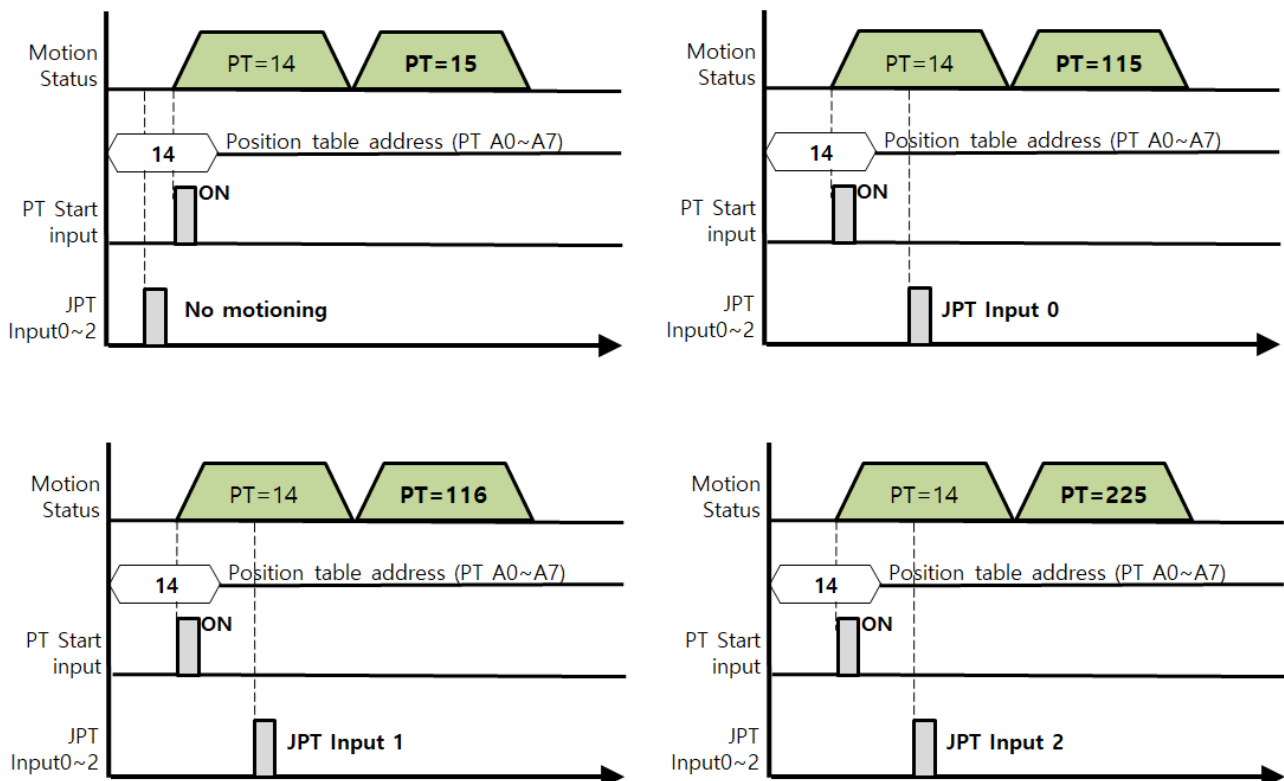
4.5.1 Automatic Jump

This is the method to specify next action pattern (PT no.) by input condition. System jumps to next PT no. to be executed automatically according to procedure.

For example as shown in the following figure, when PT no. 14 is executing, 1) if there is no input signal, next action pattern is to be executed by PT no. 15 as shown in figure 1). However, if any of input signal is ON such as JPT Input0, JPT Input1 or JPT Input2 during the operation of PT no. 14, then system jumps to JPT 0, JPT 1 or JPT2 accordingly and execute it that is specified in the Position Table data as shown in the figure 2) ~ 4).

Data of PT 14

PT No (CMD)	Position Table No to jump (JP Table No.)	Input Jump Position No 0 (JPT 0)	Input Jump Position No 1 (JPT 1)	Input Jump Position No 2 (JPT 2)
14	15	115	116	225



* Refer to the sample file for testing Position Table, 'PTsample (Loop Motioning).txt'.

4.5.2 Jump by External Signal

This is the method to specify next action pattern (PT no.) by input condition. However, system does not jump to next PT no. to be executed automatically according to procedure, but executed by external signal ("JPT Start").

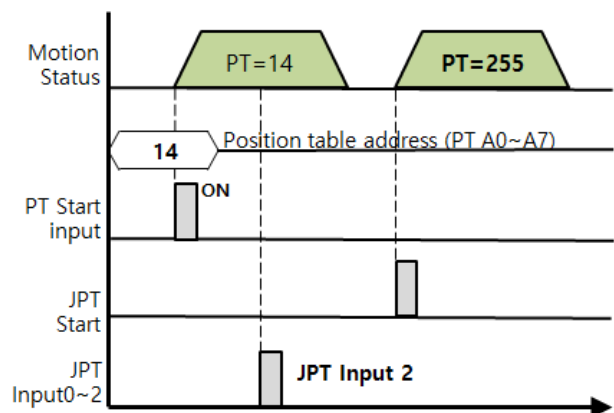
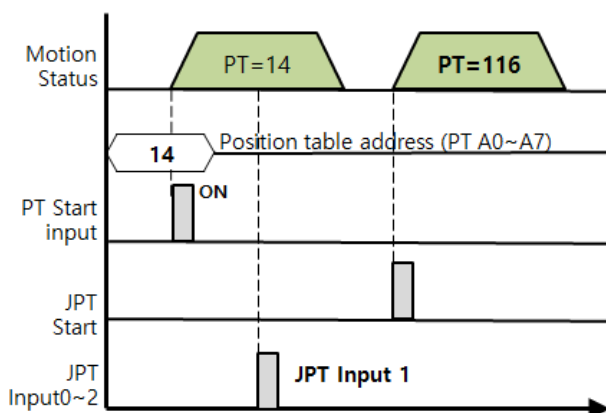
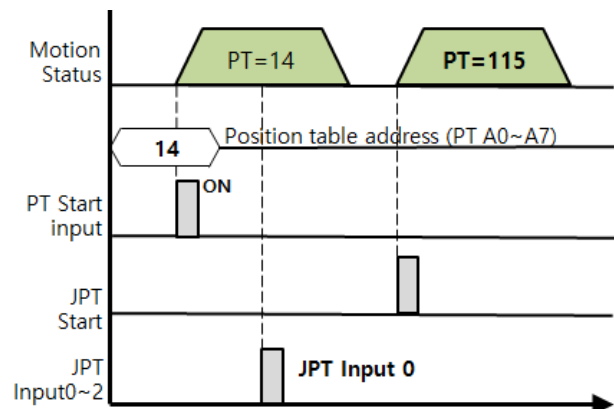
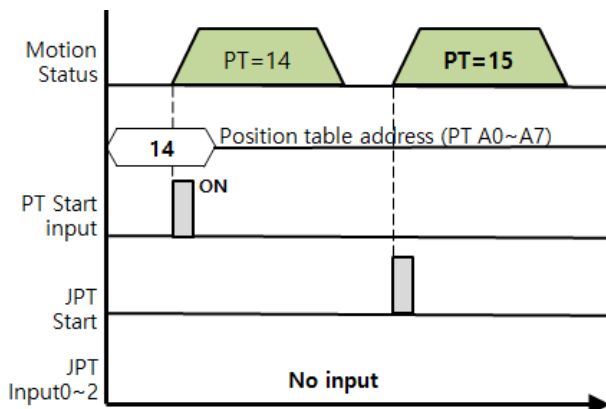
Difference from the function in '4.5.1 Automatic Jump' executed by input signal JPT Input0~Input2

- 1) Jump Position No to jump need to have the format of 10XXX and
- 2) 'JPT Start' needs to be [ON] in order to execute the next action.

If specified "Wait Time" of PT data is more than 0, then the next action is to be executed after the specified time from the external signal.

Data of PT 14

PT ,No (CMD)	Wait time (Wait Time)	Position Table No to jump (JP Table No.)	Input Jump Position No 0 (JPT 0)	Input Jump Position No 1 (JPT 1)	Input Jump Position No 2 (JPT 2)
14	0	10015	10115	10116	10255



* If more than 2 signals become [ON] of 3 'Input Jump Position No0 ~ Input Jump Position No2', the lower number (JPT0 > JPT1 > JPT2) has the high-priority and will be executed.

4.6 Loop Condition Jump

4.6.1 Specifying Loop

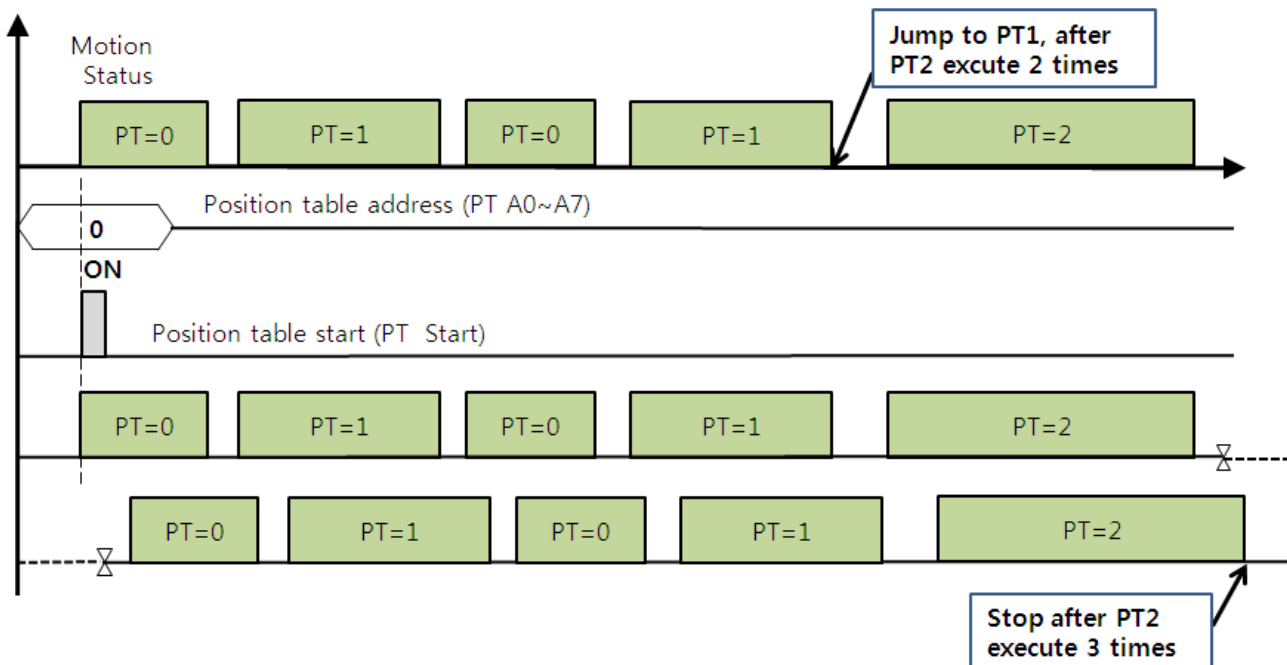
If 「Loop Count」 and 「Loop Jump Table No」 are specified, system repeats the action of position specified times (Loop Count) and then jumps to corresponding position to 「Loop Jump Table No. 」 regardless of specified 「Jump Position No」, that is, 「Jump Position No」 is ignored.

There are rules in specifying loop as following:

- 1) If '0' is specified for 「Loop Count」, loop function is cancelled.
- 2) If system needs to jump before repeating the specified times, it jumps to JP Table No.
- 3) If 'blank' is specified for 「Loop Jump Table No」, system exits in execution.
- 4) If 「Loop Jump Table No」 is specified in the form of 10XXX, next action is executed by the external signal "JPT Start".

Following Table is one of example for specifying loop.

PT No (CMD)	Movement scale (Position)	Position Table No to jump (JP Table No.)	No. of loop (Loop Count)	Position Table No to jump after completing loop (Loop Jump Table No)	Loop counter clear (Loop Counter Clear)
0	8000	1	0	0	-
1	4000	0	2	2	-
2	0	0	3	-	1



* Refer to the sample file for testing Position Table, 'PTsample (Loop Motioning).fpt'

4.6.2 Loop Counter Clear

“Loop Counter” is internal counter in drive to compare no. of repeat with the no. specified in the item “Loop Count” of PT data. This function clears “Loop Counter” to 0 (zero) of the specified PT data after completion of looping. If 「Loop Count Clear」 is specified as blank, this function is cancelled.

Following table shows an example of specifying Loop Counter Clear.

PT No (CMD)	Movement scale (Position)	Position Table No to jump (JP Table No.)	No. of loop (Loop Count)	Position Table No to jump after completing loop (Loop Jump Table No)	Loop counter clear (Loop Counter Clear)
0	8000	1	0	0	-
1	4000	0	2	2	-
2	0	0	0	0	1

1) Specify “Loop Counter Clear” of PT No 2 as PT No ‘1’.

2) Start operation from PT No 0.

When starts operation, system reset all “Loop Count” values as 0 (zero).

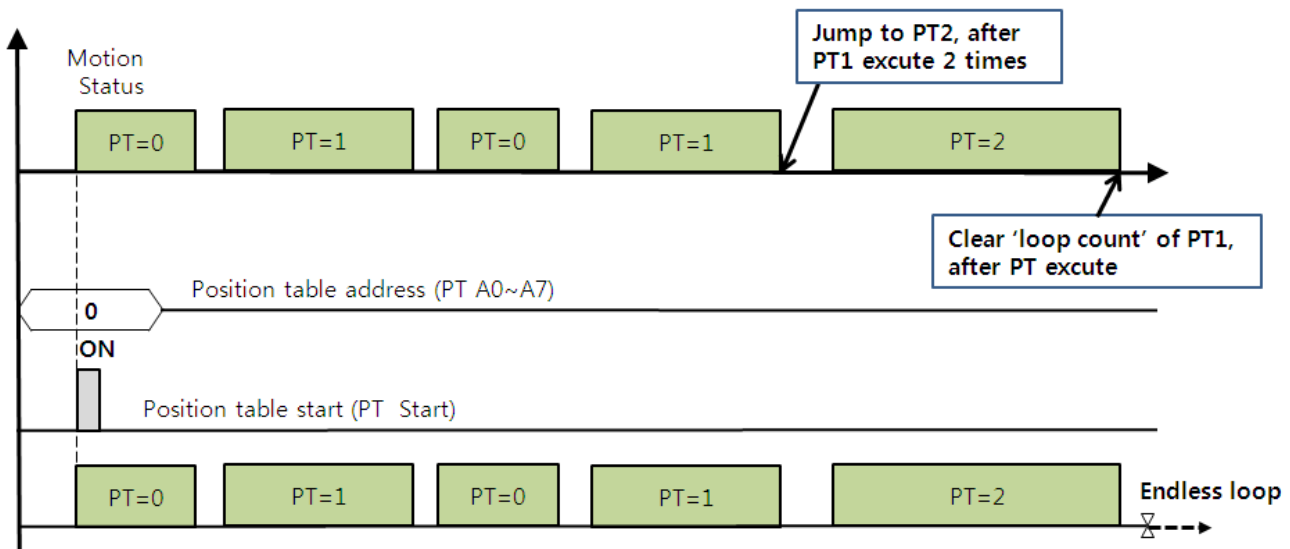
3) After repeats the loop block PT No 0 ~ PT No 1 two times, the “Loop Counter” becomes 2 (two) same as specified “Loop Count” so system completes looping and jumps to PT No 2.

4) After executing PT No 2, system jumps to PT No 0.

Before jumping to PT No 0, system clears “Loop Counter”- the internal counter as 0 (zero).

5) Then paragraph 3) and 4) are repeated infinitely.

6) If the “Loop Counter Clear” of PT No 2 was not specified, “Loop Counter” increased continuously and so jumping to PT No 2 occurs only once at the first time and then repeats the loop block ‘PT No 0 ~ PT No 1’ infinitely because the internal counter “Loop Counter” value will never meet the specified “Loop Count” value.



* Refer to the sample file for testing Position Table, 'PTsample (Loop counter clear).fpt'.

4.7 Start/Pass/End Signal Function

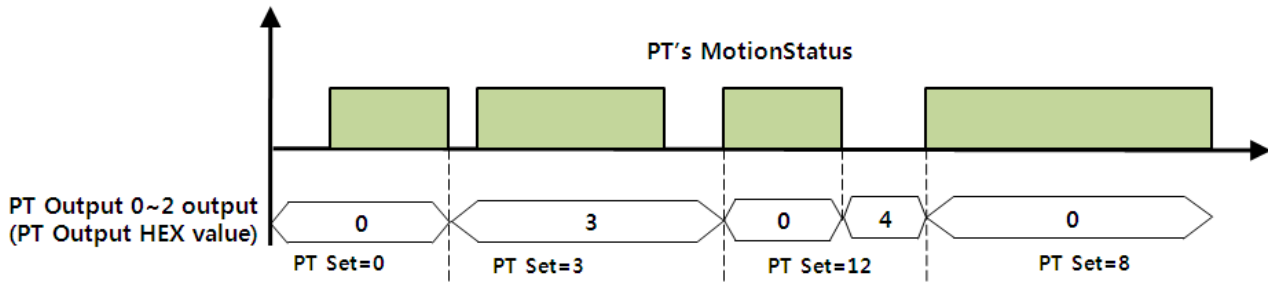
By specifying the item 「Start/Pass/End Signal Function」, user can recognize the status of Position Table whether operation started, is under pass operation, or completed operation through control signal output.

If you do not want to use 「Start/Pass/End Signal Function」, specify this item as 0,8 or 16. If other value is specified, the position performs following actions depending on specified value. This function is work on both absolute positioning and relative position motion.

4.7.1 Start/End Signal

- 1) If the value between 1 to 7(Start Sign) is specified for PT Set, PT Output HEX value is output through output of 'PT Output 0 ~ PT Output 2' at the time of starting operation.
- 2) If the value between 9 to 15(End Sign) is specified for PT Set, PT Output HEX value is output through output of 'PT Output 0 ~ PT Output 2' after completion of operation.

PT Set value	PT Output 2 output	PT Output 1 output	PT Output 0 output	PT Output HEX value	Function
0	OFF	OFF	OFF	0	Not use output function of PT Output 0~2.
1	OFF	OFF	ON	1	PT Output 0~2 signals turn to [ON] at the time of starting operation of the corresponding PT.
2	OFF	ON	OFF	2	
3	OFF	ON	ON	3	
4	ON	OFF	OFF	4	
5	ON	OFF	ON	5	
6	ON	ON	OFF	6	
7	ON	ON	ON	7	
8	OFF	OFF	OFF	0	Not use output function of PT Output 0~2.
9	OFF	OFF	ON	1	PT Output 0~2 signals turn to [ON] after end of operation of the corresponding PT.
10	OFF	ON	OFF	2	
11	OFF	ON	ON	3	
12	ON	OFF	OFF	4	
13	ON	OFF	ON	5	
14	ON	ON	OFF	6	
15	ON	ON	ON	7	

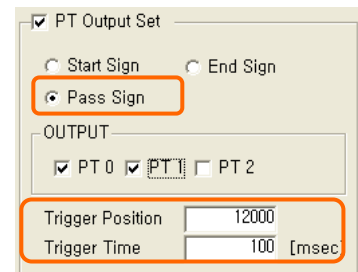


* PT Output signals are not working on next condition :

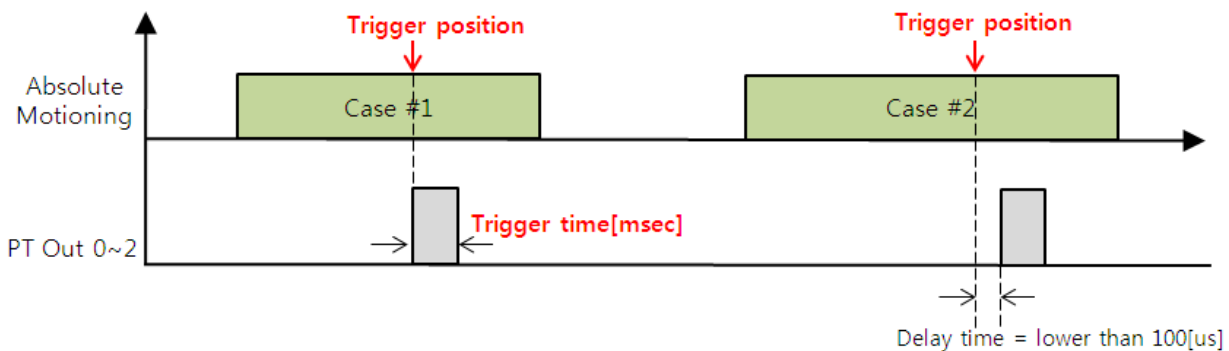
- 1) PT Set value : 9~15
- 2) at the same time using 'Jump' function
- 3) at the same time set 'Wait time = 0 [msec]'

4.7.2 Pass Signal

If the value between 17 to 23(Pass Sign) is specified for PT Set, PT Output HEX value is output through output of 'PT Output 0 ~ PT Output 2' at the position of 'Trigger Position'



PT Set value	PT Output 2 output	PT Output 1 output	PT Output 0 output	PT Output HEX value	Function
16	OFF	OFF	OFF	0	Not use output function of PT Output 0~2.
17	OFF	OFF	ON	1	PT Output 0~2 signals turn to [ON] for the time of trigger condition of the corresponding PT.
18	OFF	ON	OFF	2	
19	OFF	ON	ON	3	
20	ON	OFF	OFF	4	
21	ON	OFF	ON	5	
22	ON	ON	OFF	6	
23	ON	ON	ON	7	



* The signal pulse width of PT Output is set by 'Trigger Time' value.

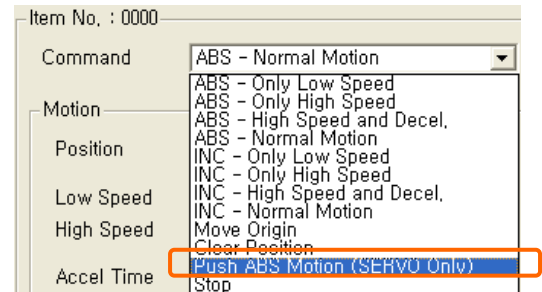
* The 'Trigger Position' is not the absolute position value, but the relative position value from the start position of that PT command.

4.8 Push Motion Function

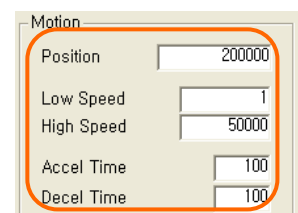
This function is used when the specified motor torque is needed during motioning and stop(only in Stop mode) status.

4.8.1 Setting

1) Select the command type to 'Push ABS Motion'

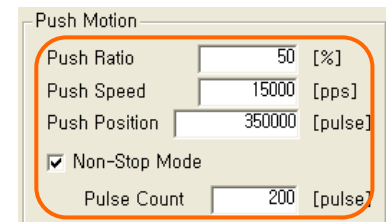


2) Specifies the normal position motion command settings.

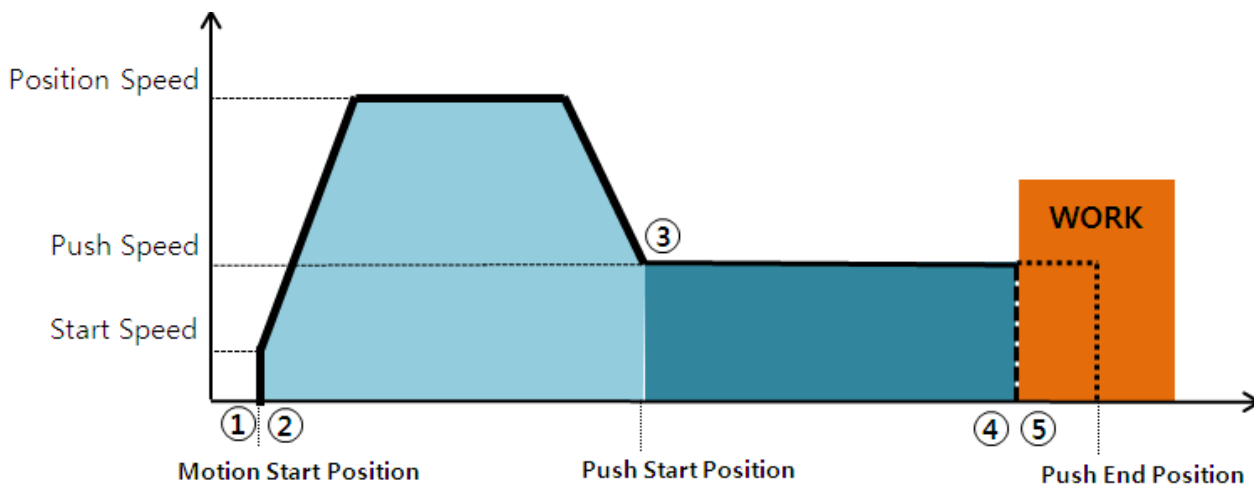


3) Specifies the Push motion command settings.

This is for Non-stop mode and set backward position value to 200[pulse] after stop procedure.



4.8.2 Process of Push mode



- ① Start Push Motion command.
- ② Normal position motion command is executed. (status : position mode)
- ③ Decelerate the speed from position motion to push motion.
(push motion speed must be lower than 200[rpm].)
- ④ Push motioning until the work detected with specified motor torque. (status : push mode)

- ⑤ There are 2 kinds of push motion types.

When Push mode is 'Stop' :

After the work detected, the motor will stop but the motor torque will be maintained and the 'inposition'/'END' signal is effective. The maintained motor torque will be return to normal Servo ON status (release 'push mode' and change to 'position mode') by 'stop' command.

The next PT data is a sample for simple 'Stop mode' push function.

The screenshot shows the 'Position Table' window with 'Mode' set to 'Normal' and 'Slave No' set to 0. The 'Position Table' contains the following data:

No.	CMD	Position	Low Spd	High Spd	Accel	Decel	Wait Time	Con...	JP Table No.
0									
1	10	200000	1	50000	100	100	5000	0	2
2	3	0	1	100000	100	100	1000	0	1
3									

Below the table, the 'Push' parameters are configured as follows:

Push Ratio	Push Speed	Push Position	Push Mode
50	15000	350000	0

When Push mode is 'Non-Stop' :

After the work detected, the motor maintain Non-stop mode during 'wait time'[msec], and the motor will not stop and the motor torque will be maintained and the 'inposition'/'END'signal is effective. The '**Stop' command must be executed** before next motion command

The next PT data is a sample for simple 'Non-stop mode' push function.

The screenshot shows the 'Position Table' window with 'Mode' set to 'Normal' and 'Slave No' set to 0. The 'Position Table' contains the following data:

No.	CMD	Position	Low Spd	High Spd	Accel	Decel	Wait Time	Con...	JP Table No.
9									
10	10	200000	1	50000	100	100	5000	0	11
11	11						1000		12
12	3	0	1	100000	100	100	1000	0	10
13									

Below the table, the 'Push' parameters are configured as follows:

Push Ratio	Push Speed	Push Position	Push Mode
50	15000	350000	200

- 1) PTno.10 : **push motioning during 5000[msec]** after work detect.
- 2) PTno.11 : Stop for next motion command
- 3) PTno.13 : move to start position and repeat push motioning again.

**Attention**

- Non-stop mode : **must be execute the 'Stop' command before next motion command** in work detect situation.
- If there is shock in mechanism, the **time delay is needed** after 'Stop' operation.
- The 'Wait Time' value of PT motioning can be used only 'jump' operation like above examples.
- If the work is not detected, the push mode is finished and the PT jump motion is also canceled.

To checking the current push motion status, refer to 「[User Manual Text 7.6 Push Motion](#)」



Fast, Accurate, Smooth Motion

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