DINGS'
Precision Motion Specialist

VER 1.0 **Technical Manual**

DS-CL28-SA / DS-CL42-SA

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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 DINGS' distributors 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 DS-CL28/42-SA thoroughly read the manual and fully understand the contents. Before operating DS-CL28/42-SA, please understand the mechanical characteristics of the DS-CL28/42-SA 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 an **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 DS-CL28/42-SA. 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 DS-CL28/42-SA is to be installed. Otherwise, a fire may occur. ● When installing several DS-CL28/42-SA in a sealed place, install a cooling fan to keep the ambient temperature of the DS-CL28/42-SA 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**	● Keep the rated range of Input Voltage for DS-CL28/42-SA. 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**	● Before connecting cables check if input power OFF. Otherwise, an electric shock or a fire may occur. ● The case of DS-CL28/42-SA is insulated for the ground of the internal circuit by the condenser. Ground the DS-CL28/42-SA. Otherwise, an electric shock or a fire may occur.

1.6   Operation

⚠	**Attention**	● 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.

1.7   Check and Repair

⚠	**Warning**	● Stop to supply power to the main circuit and wait for a while before checking or repairing the DS-CL28/42-SA. Electricity remaining in the capacitor may occur danger.
		● Do not change cabling wile power is being supplied. Otherwise, the user may get injured or the product may get damaged.
		● Do not reconstruct the DS-CL28/42-SA. Otherwise, an electric shock may occur or the reconstructed product cannot get after service.

This manual describes how to operate User Program(GUI) for DS-CL28/42-SA. For more information, refer related manuals.

(1)   User Manual-Text

(2)   User Manual-Communication Function

(3)   User Manual-Position Table Function

2.   Installation and Connection of the Program

2.1   Installation Environment of PC

DS-CL28/42-SA consists of two operation modes as follows:

1) Using Motion Library(DLL) provided for the program from Windows WINDOW7/8/10.

2) Using Position Table(PT) and external signals input by the user.

For the operation modes above, refer to each related manual.

This chapter describes the user program used for installation and running test of the controller. DS-CL28/42-SA is associated with RS-485. So, the user needs to convert RS-232C or USB for the PC into RS-485.

2.2   Program Version
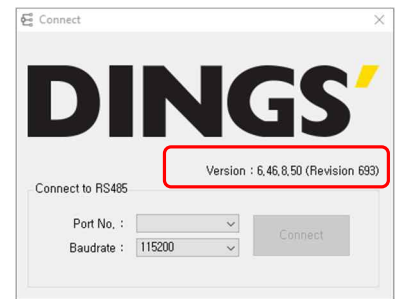
There are 2 kinds of program version for DS-CL28/42-SA.

1) Firmware program in drive :

After connect the User Program(GUI),
version number can be check in
'Board List' Window.
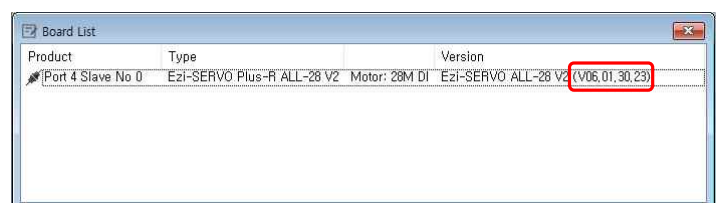
2) User Program(GUI) in PC :

After connect the User Program(GUI),　version number can
be check in 'About Plus-R GUI…'menu in 'Help' menu.

2.3　User Program (GUI) Installation

By executing 'Ezi-MOTION Plus-R V6 Install' program, please follow the next steps.
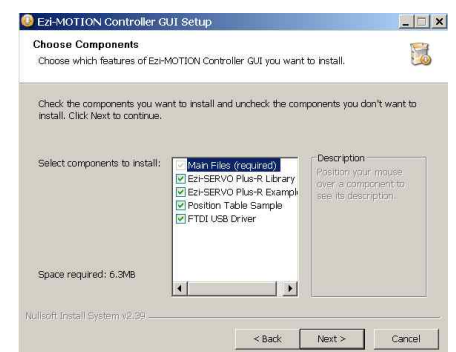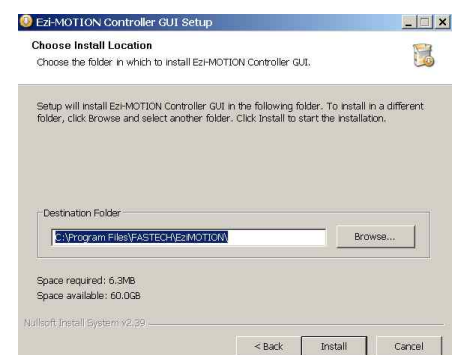
Select a language of installation screen.

Installation Start window.
Click 'Next' button

Select all installation components.
Click 'Next' button.

Select a folder where the program is installed
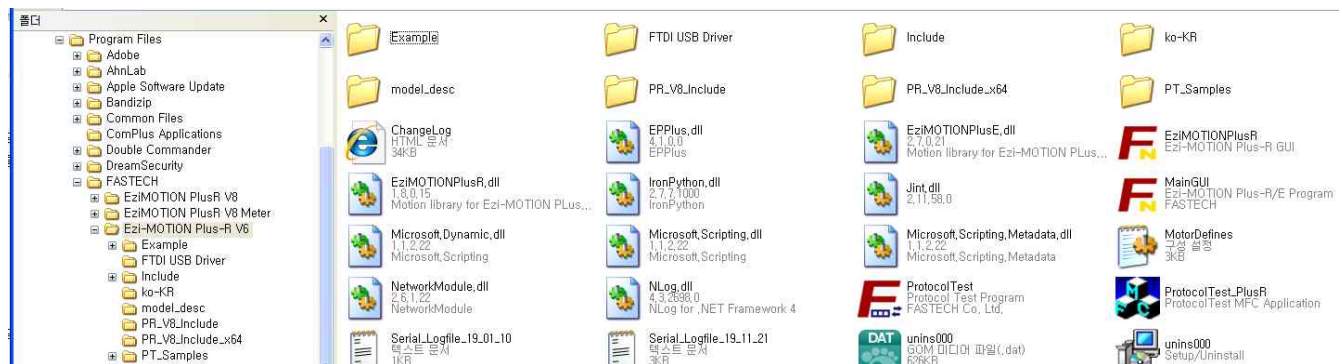Click 'Install' button.

Installation is completed.

Then installation is completed at the selected folder, 'Program Files/DINGS/Ezi MOTION Plus-R V6' folder is created and also GUI icon and program folders are installed.

1) Include folder : *dll, *.lib, *.h files
2) Example folder : source code for sample
3) PT Samples folder : sample data tiles for position table.

2.4   Connecting PC with Drive Module

Execute which is User Program(GUI),
click 'Connect' button,
and the following window will be displayed.
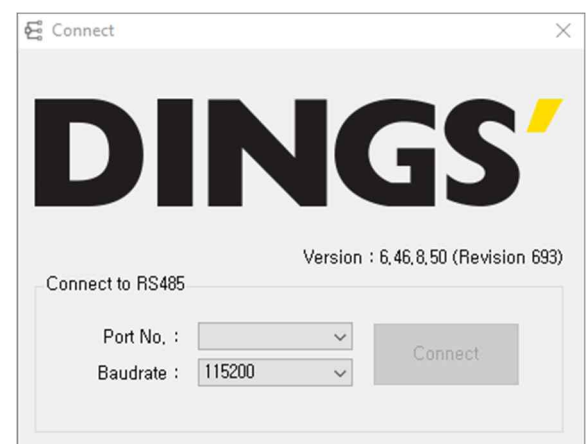
| Item	Description
Port No.	To assign the port number of RS-232 or USB which is connected with drive module at the PC.
Baud rate	This should correspond to the setting which sets the controller communication speed. (Drive : adjusted to 115200[bps] at the factory).

After setting, click 'Connect' button, and the drive module will try to connect 16 drives from 0 to 15 (firmware of same level version) at the setting speed through a pertinent communication port.

⚠	**Attention**	● The communication speed of drive modules connected with one network must be set to the same value. ● When they are not connected, the user needs to check the port or the baud rate.

3. Main Window
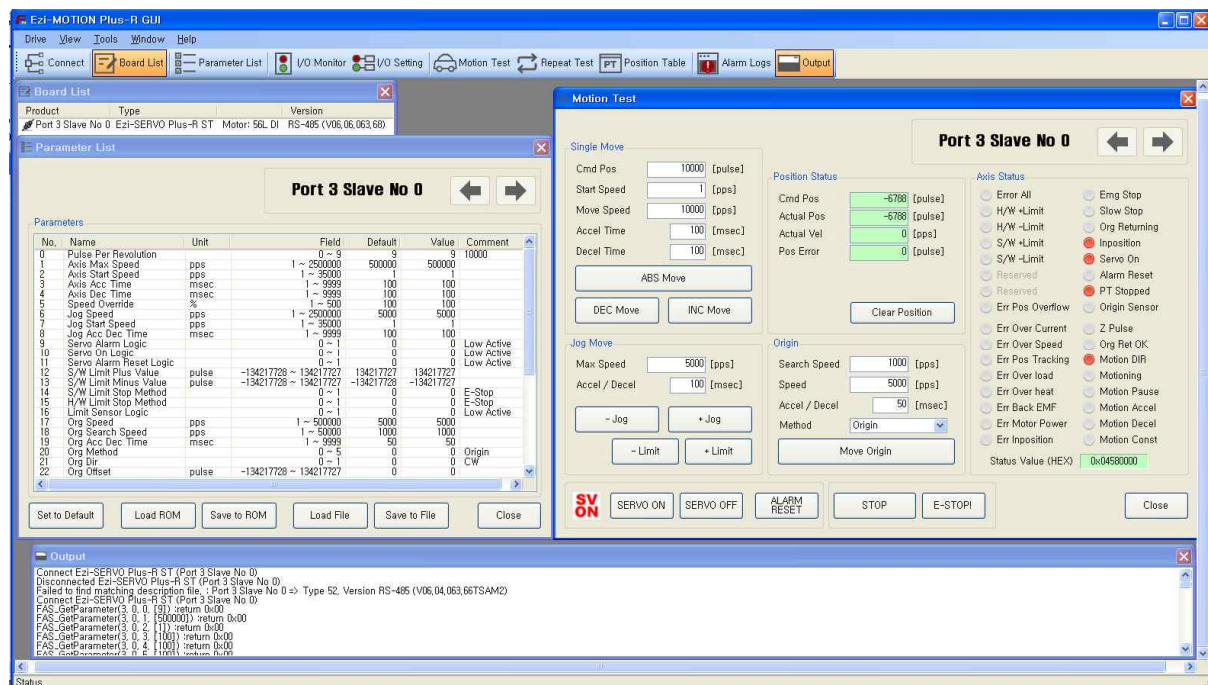
This is the basic window to operate the program. Each window is displayed in this window.
The user can open each window with a toolbar.

3.1 Menu

There are 'View' menu to display other windows simply and 'File' menu which the user can connect and disconnect communication.

3.2 Toolbar

Click each button, and the following functions will be executed

| Button	Description
Connect	To connect or disconnect with the drive
Board List	To display connected module information and communication status
Parameter list	To set parameter values related to operation control like a position command
I/O Monitor	To sort parameters that the user can change them easily
I/O Setting	To monitor digital I/O signals of CN1 connector
Motion Test	To set digital I/O signal assignment of CN1 connector
Repeat Test	To execute motion commands such as Jog operation, Position operation, Origin return operation
Position Table	To input and execute position table data
Alarm Log	To display DLL function corresponding to the command being executed
Output	To display the DLL command that is executed.

3.3 Output

Click 'Output Bar' at the toolbar or check 'Menu –View – Output Bar', and the above window will be displayed. This window includes commands used for the controller. The user can check that which function is used, how parameter values are inputted, and how they are normally processed.

The above window displays functions which the user inputs or functions used when he clicks. For more information of commands, refer to [User Manual-Communication Function].
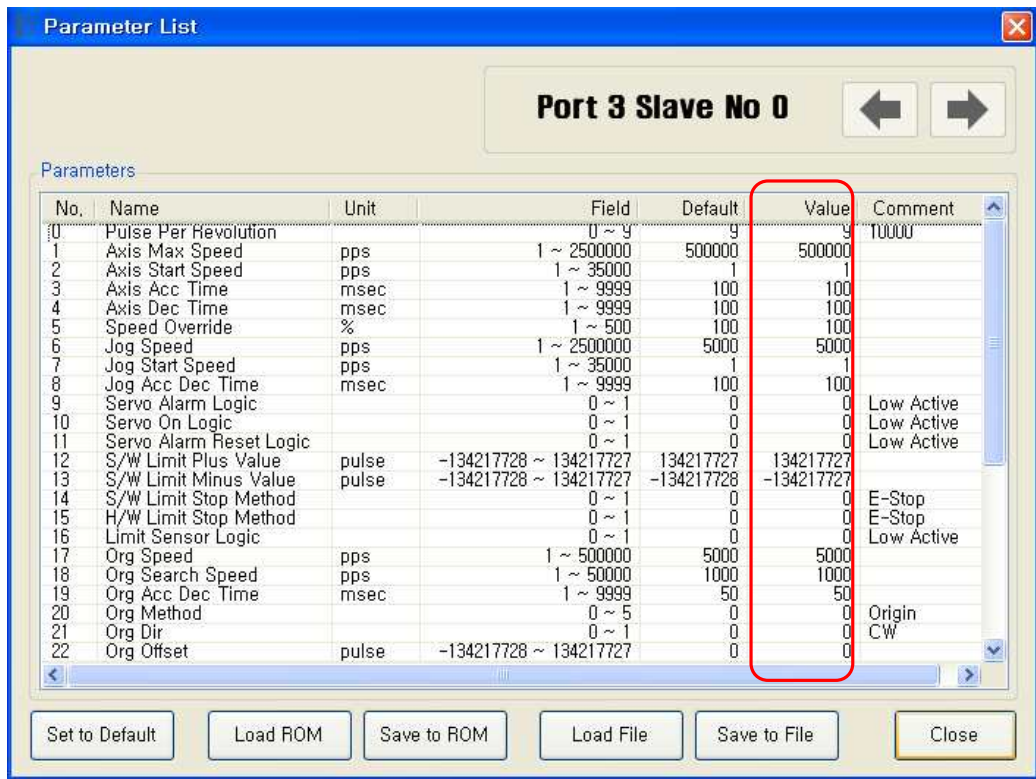

3.4 Board List
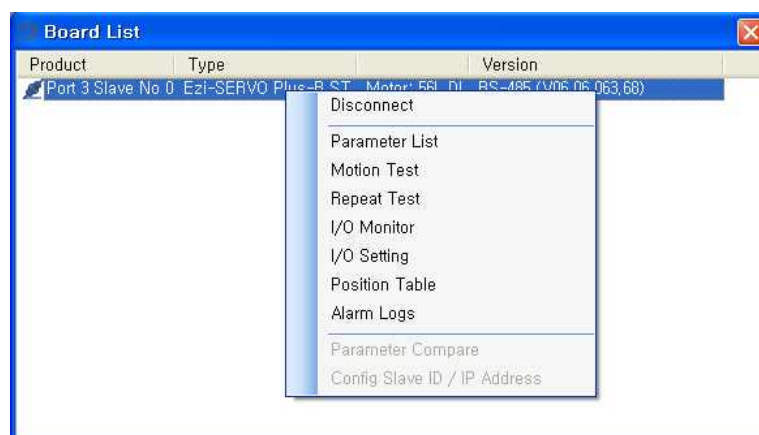
To check the drive list connected with communication. The user can check information of each drive. There are buttons to go to windows for function setting or testing.

3.5   Parameter List

The user can set and save parameter values related to motion control by each drive module. 'Value' column displays the value applied to current motion control and can be edited.

1) Slave No

To display drive number for the current parameter list window. By using right/left arrow key, the user can select other drive.

Buttons at the bottom bar including 'SAVE to ROM' is available only for the current drive. To control several drive parameters, the user should execute related each one of slave separately.

2) Parameter Edit

Select parameters as shown at the table, and the input box will be displayed and then the user can edit parameter values. When the user inputs the parameter value, it is saved to RAM area of the drive. The machine operates as the parameter is edited. However, when the drive is powered off, the value is deleted. To continuously operate the machine as the parameter value is set, the user must click 'SAVE to ROM' button and save the edited value to ROM.

When the input value is out of right range, it is displayed in red color. The value cannot be inputted in RAM of the drive.

3) Parameter List Window Buttons

Click each button, and the following functions will be executed.

Button	Description
Set to Default	Converts all parameter values into 'Default Value'.
Load ROM	Converts 'Value' items into values saved to the ROM area.
Save to ROM	Saves 'Value' items to the ROM area. (Even though the drive is powered off, they are not deleted.)
Load File	Sets 'Value' items to the values saved to an external file.
Save to File	Saves the current values to an external file. (The user defines folder position and file name. The extension is *.fpt.)

4) Save / Load to a File

DS-CL28/42-SA can save parameters, Input/output and position table data to an external file folder and can read them if necessary

File extension for parameter is *.fpt and for Input/output is *.fit.   File extension for position table data is *.txt.

3.6   Repeat Test
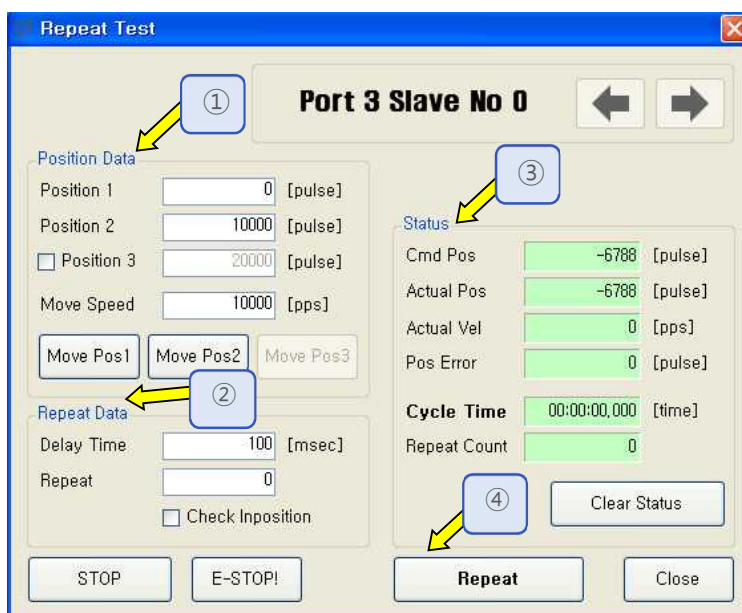
① The repeat test is possible for up to 3 absolute position values.

② Delay time and repeat count can be set every repeat.

   * Delay Time : Stand-by time until each motion is ended and then next motion is started. The unit is [msec].

   * Repeat : To define the motion loop count. If this is set to '0', the test is endlessly repeated.

③ Operation status and repeat count are displayed.

  * Cycle Time : displays the time until repeat test is completely finished.

  * Repeat Count : increases whenever one motion loop is finished.

④ When the user clicks 'Repeat' button while the machine is operating, the cycle in service ends and the machine stops operating. Click 'Stop' or 'E-Stop' button, and the machine will stop regardless of the cycle.

3.7 I/O Monitor
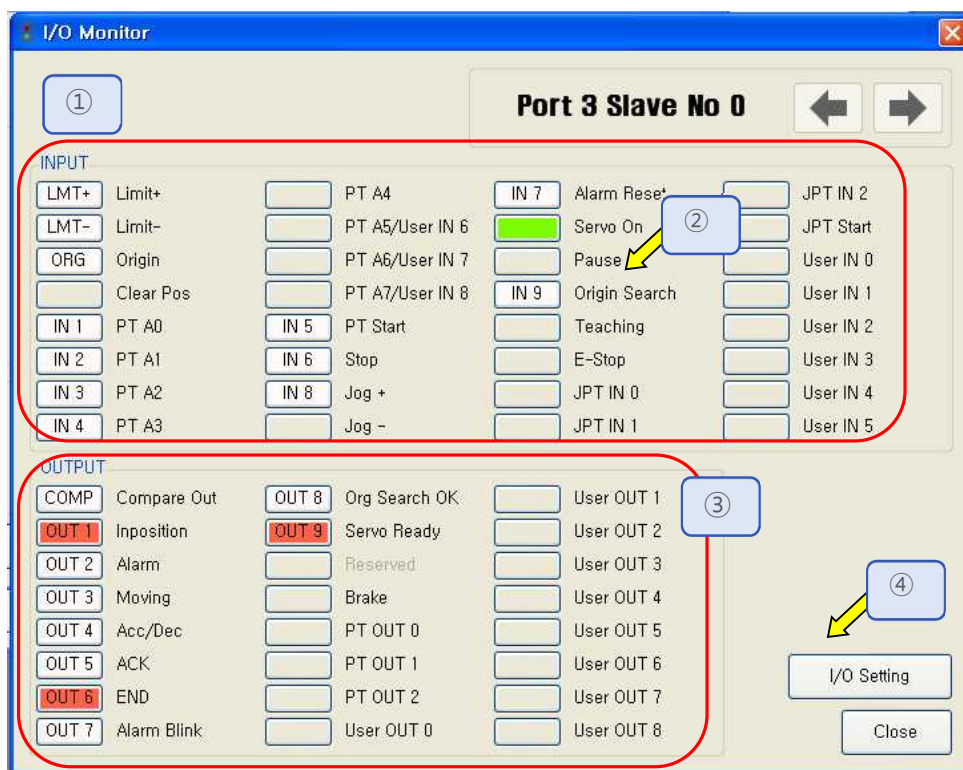
The user can set and check control I/O signals related to operation control through CN1 connecter. The next window is the sample setting of I/O Monitoring status.

1) Input Signal : ①

There are 32 definable input signals.
When each signal is [ON] through CN1 connecter, icon is changed into '**green**'. When the signal is [OFF], it returns to 'white' to the original state.

2) Virtual Input Function : ②

Even though the input pin is not assigned at all, the user can click each button and virtually change the signal into [ON]/[OFF]. For instance, click 'Pause' button, and the stop function will be operated temporarily. But only 'PT Start' signal is exceptional.

3) Output Signal : ③

There are 24 definable output signals.
When each signal is [ON] through CN1 connecter, icon is changed into '**red**'. When the signal is [OFF], it returns to 'white' to the original state. DS-CL28-SA is not supported.

4) Virtual Output Function:

After assigning the 'User OUT 0' ~ 'User OUT 8'signals to OUT1' ~ 'OUT3', when click that button the signal changed [ON]/[OFF] through that pin. DS-CL28-SA is not supported.
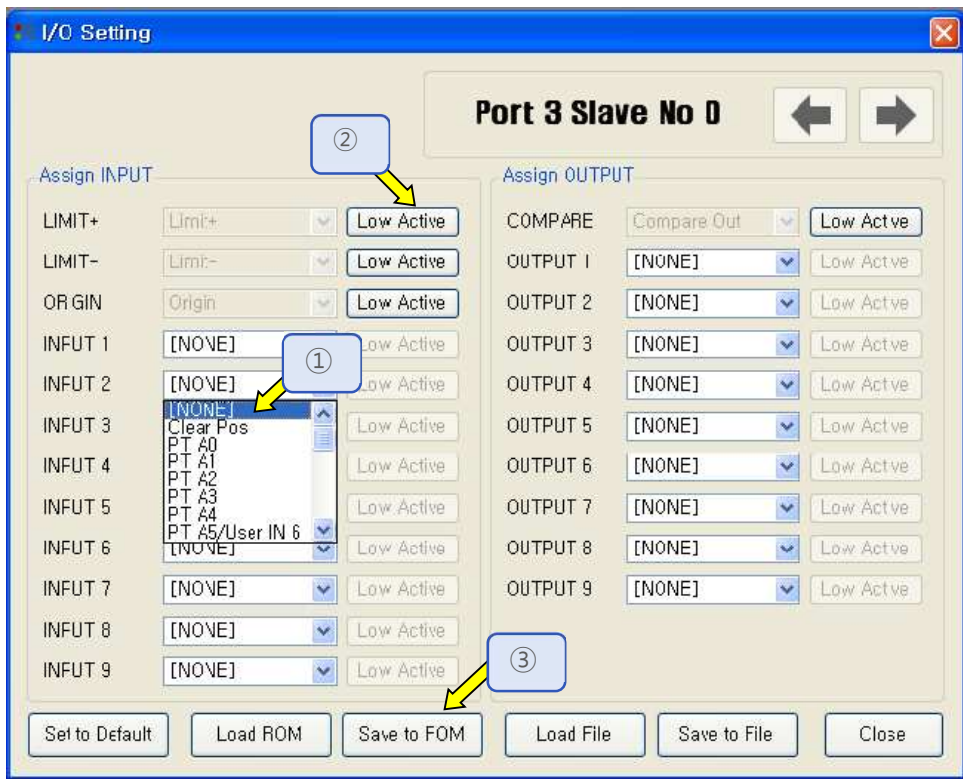
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5) I/O Logic Setting button : ④

Click this icon, and the following window will be displayed. Then he can assign a pertinent signal to the physical pin of CN1 connecter and define 'Active Level' of the signal.

3.8   I/O Setting

Click 'I/O Logic Setting' icon at the I/O Monitor window, and the following window will be displayed.

1) Signal Assignment : ①

To change pin assignment of CN1 connecter, click ▼ button to the right of the corresponding signal name as showed above, and select signals will be displayed at the drop-down menu.

2) Signal Level Assignment : ②

These buttons provide the user with functions that he can select the active level of signal for the signal to be recognized to [ON]. He can click the button to the right of the signal name and set the signal.

* Low Active :   when the signal is set[ON] to 0 volt
* High Active :   when the signal is set[ON] to 24 volt

3) Save : ③

Output pin of CN1 can be set described same as input. All changed signals are temporarily saved to the RAM area. To save them to the ROM area, the user must click 'Save to ROM' button. At this time, current parameter values are saved to the ROM area as well.

For more information of 'I/O Monitoring' and 'I/O Logic Setting' windows, refer to [User Manual-Text, 6. Control Input and Output Signal]

3.9   Motion Test

To test the motor connected with the controller drive. The user can test motion for one axis. He can test that the motor moves to the given position, and also simply transfer the motor to one direction. The user can move the motor to the origin or the limit and then test its sensor. At the position status and the axis status, the user can check the position, speed, and status of the current axis.

3.9.1   Initial Movement

1) Click 'Motion Test' at the manin menu.

2) The window as shown to the right is displayed

3) By click 'SERVO ON' , the motor will be start to be electrified and the motor becomes 'lock' status.
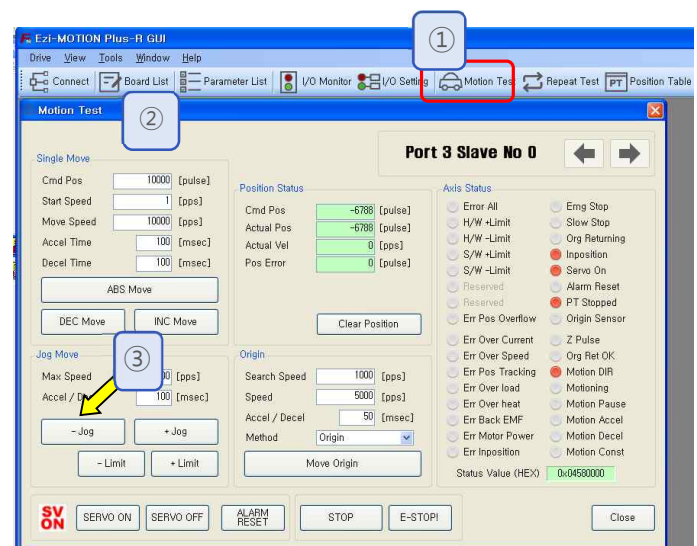
4) **JOG Operation**

After setting jog related parameters, click and press '-Jog' or '+Jog' button. The motor will be operated to the setting direction.

5) According to the motion of motor, the user can check its position and operation status.

For more information, refer to [User Manual -Text, 7. Other Operation Functions]
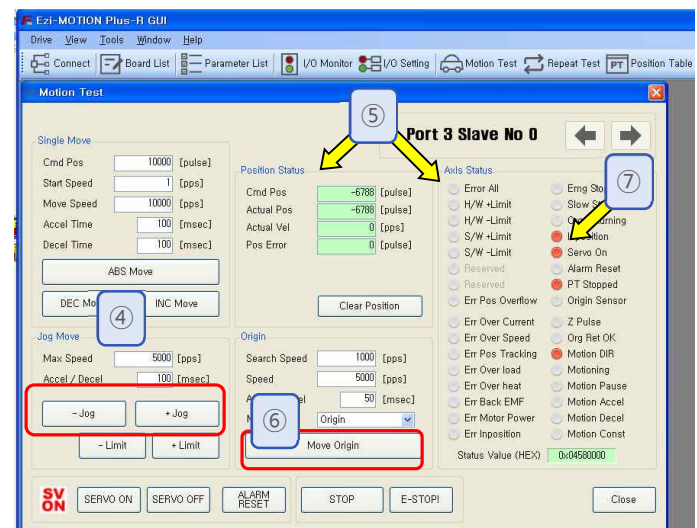
6) **Origin Return Operation**.

Click 'Origin', and origin return motion will be operated. The motion type may be different subject to how origin return type(parameter) is selected.

7) When origin return is finished, the red LED is displayed to ON like at the 'Axis Status' window.

For more information, refer to [User Manual-Text, 7.Operation Functions]

3.9.2 Single Move Operation
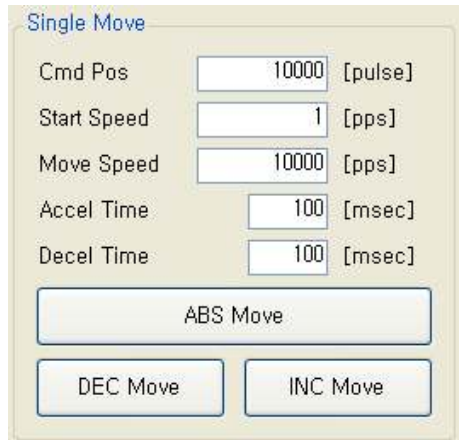
The user can test straight-line move command for one axis. 'ABS Move' button finds and moves to the absolute position, and 'DEC Move' and 'INC Move' find and move to the relative position.

* Cmd Pos : Indicates target position value. The unit is [pulse]. When 'ABS Move' is executed, this displays the absolute position. When 'DEC Move' or 'INC Move' is executed, this displays the relative position.

* Start Speed : To set AxisStartSpeed at the second item in parameter lists. 'Start Speed' should be smaller than 'Move Speed'.

* Move Speed : To set the moving speed when ABS Move, DEC Move, or INC Move is executed. 'Move Speed' should be larger than 'Start Speed'.

* Accel Time and Decel Time : To set AxisAccel and AxisDecelTime in parameter lists.

3.9.3 Position Status
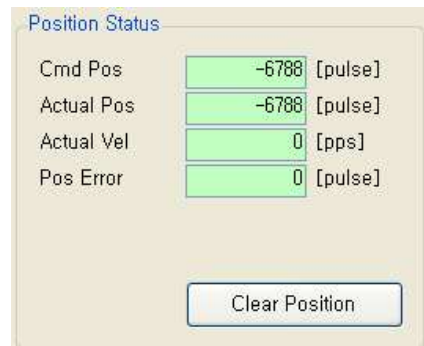
To displays the current position of axis. Click 'Clear Position' button, and Cmd Pos value and Actual Pos value will be initialized to '0(zero)'.

* Cmd Pos : displays target position value while the motor is operating.
* Actual Pos : displays current position value while the motor is operating.
* Actual Vel : displays the actual operation speed of motor.
* Pos Error : displays the difference between Cmd Pos value and Actual Pos value. By this value, the user can check how much the current target position is tracked correctly.

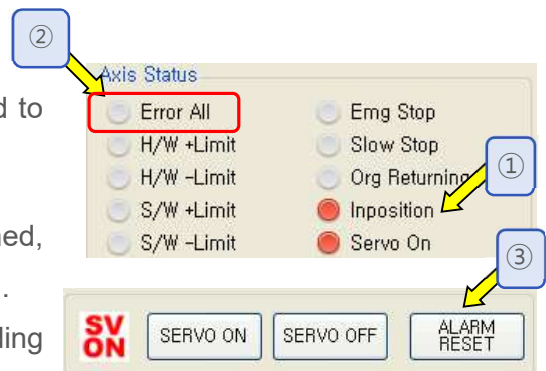### 3.9.4 Axis Status and Alarm

To display the current axis status. Each status is displayed to On/Off. 'On' indicates in red and 'Off' indicates in white.

1) When the motor stops operation and In position is finished, the corresponding LED at the right figure is displayed in red.
2) When an alarm occurs during operation, the corresponding LED is displayed in red.

3.9.5   Stop Operating

1) Temporary Stop

Click 'Pause' button at the I/O Monitoring window to stop the motion temporarily. When clicking the button again, the motor restarts to operate. If 'Pause' signal is set to IN1~IN9, the actual external signal must be supplied to [ON] status.

2) Complete Stop

When the motor needs to stop completely during operation, the button as shown to the right is available. 'STOP' button includes deceleration function and 'E-STOP' button does not include deceleration function.

3.10   Position Table (PT)

For more information of position table, refer to [User Manual-Position Table Function]. This chapter introduces its basic usage.

1) Reading position table data

Click 'Pos Table' icon at the main menu, and data saved to the RAM area will be loaded and then the following window will be displayed.

Position table data can be changed at any time. The position table can save up to 64 step data. If the position table is used to the program area, it may be used for all point numbers without restriction. That is, it is possible to start at a random point number and jump to other point number.

2) Position Table(PT) Edit

Put the mouse on a specific PT data line, click its right button, and the pop-up menu will be displayed as shown below.
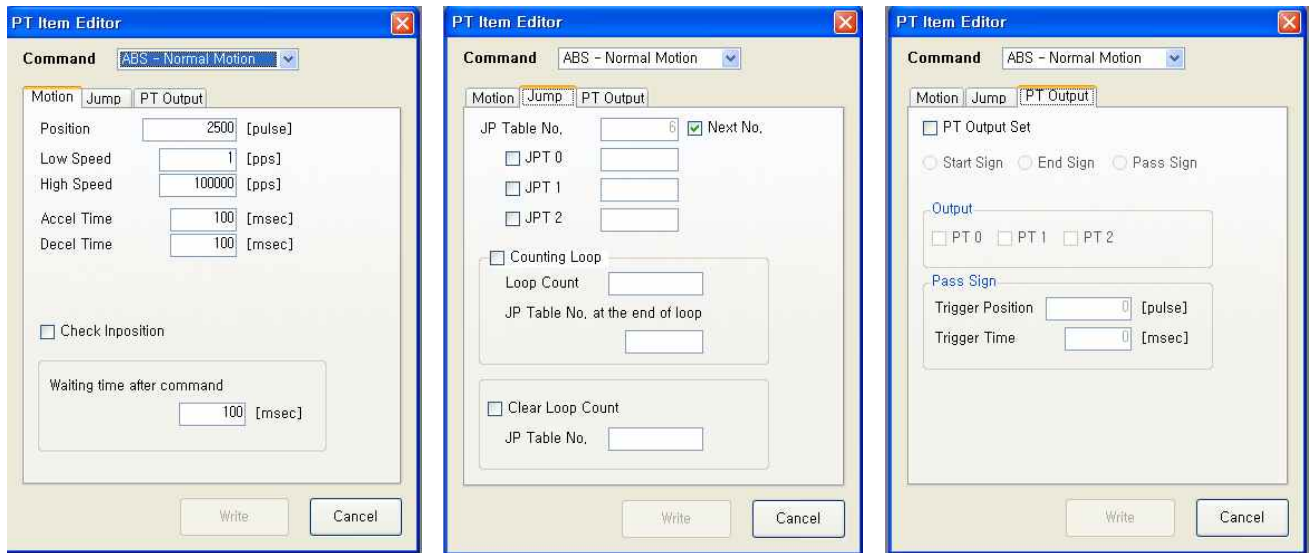
* Input the value in order from 'Command' related items according to operation modes.

* When all data of the positing table is completely inputted, click 'Save' key to save data.

* To edit the next position table, the user should use PT select button.

3) Position Table(PT) Operation
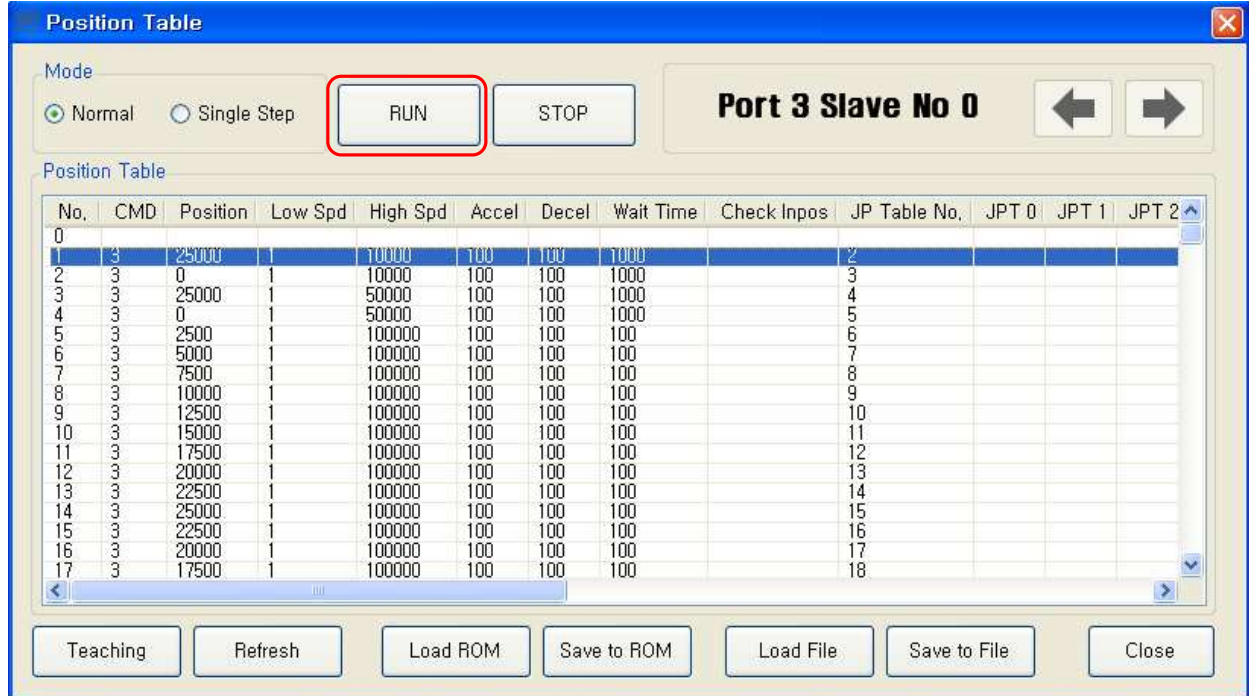
Set the motor to 'Servo ON' and select the mode 'Normal', click PT No to start motion, and then execute 'Run'.

While PT No is operated in sequence, PT lines in service are changed in grey. Also, the user may monitor the operation status as described at '3.9.3 Position Status' and '3.9.4 Axis Status and Alarm' through 'Motion Test' window.

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