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DELTA_IA-ASD_ASDA-Soft_UM_EN_20140710

ASDA-*Soft* User Guide

ASDA-*Soft* User Guide

www.delta.com.tw/ia

Important Notice

- Different device has different features and operational ways. Technical personnel who is in charge of operating the software shall implement appropriate measures and follow the instructions of the user guide.
- Delta will not take responsibility for the results of unauthorized modifications of this product. Delta shall not be liable for any damages or troubles resulting from unauthorized modification.
- The drawings presented in this user guide are typical examples and are only used for functional description. However, there must have different demands and variations in practical operation and settings. It is not suggested to do any practical application and operation in accordance with the examples in the user guide. Delta will not take responsibility for it.
- No patent liability is assumed with respect to the use of the information contained herein.
- No part of this work may be reproduced in any form (by photocopying, microfilmor any other method) without the written permission of Delta.
- Technical changes which improve the performance of the device may be made. Delta has the right to change the definition and contents of this user guide.

Safety Precautions

[Important Messages]

Before installing the software, please read through this manual carefully in order to ensure the correct use of the product.

[Notice]

Pay special attention to the following safety precautions anytime during inspection, installation, wiring, operation and examination.

The symbol of **danger**, **warning** and **stop** represent:

DANGER	It indicates the potential hazards. It is possible to cause severe injury or fatal harm if not follow the instructions.
WARNING	It indicates the potential hazards. It is possible to cause minor injury or lead to serious damage of the product or even malfunction if not follow the instructions.
STOP	It indicates the absolute prohibited activity. It is possible to damage the product or cannot be used due to malfunction if not follow the instructions.

Inspection

DANGER

- Please follow the instruction when using servo drive and servo motor, or it is possible to cause fire or malfunction.

Installation

STOP

- When servo motor and servo drive are working, it is prohibited to connect the communication cable of software to the servo drive. It might danger the personnel safety.
- Conduct the software communication setting when servo motor and servo drive stops operation for avoiding the malfunction.

Wiring

DANGER

- Power on the servo drive first. Then, connect the communication cable to the servo drive. This is for avoiding the malfunction of the motor.
- Please use standard wires and shielded-pair wires for communication cable for avoiding signal interference.
- The maximum length of software communication cable is 1.5 meters (= 4.92 feet). Otherwise, it might attenuate the signal.
- Please connect wiring according to the wire rod in order to prevent any danger.

Operation

WARNING

- Before the operation, please change the parameter setting value according to the needs. If it is not adjusted to the correct setting value, it is possible to lead to malfunction of the machine or the operation might out of control.
- Before the machine starts to operate, please be ensured the emergency stop can be activated anytime.
- When applying monitor function of “Scope” and “System Analysis”, please make sure the communication cable is correctly connected. Any loose or fall off might influence the monitoring data.

DANGER

- When applying function of “Auto Gain Tuning”, do not touch the motor shaft by hand or any hard object.
- It is strongly recommended that during operation, do not remove the communication cable. It would cause the damage of the equipments and lead to the personnel injury.

DANGER

- In order to prevent any accident, please make sure all parameter, monitor and tuning function is set to the correct status before trial operation.
- When adjusting or testing the servo motor and servo drive by triggering function of the software, make sure the technician has to be presence. If not, make sure all triggering function is stopped to avoid any danger it might occur.

Preface

[About this Manual]

ASDA-Soft (servo software) introduced in this manual uses version V4.08 as the examples to describe the functional settings, including:

- Interface Operation
- Scope
- System Analysis
- Motion Control
- Alarm Messages

NOTE

1. Please refer to ASDA series user manual for detailed description of parameters.
2. Please refer to ASDA series user manual for detailed description of system framework and motion control mode.
3. Please download the user manual at Delta's website.

[Personnel]

This book is for personnel who have already purchased ASDA series servo drive or engineers and technicians who use ASDA series servo drive to configure the product. In addition, in-site maintenance and inspection personnel can refer this manual to troubleshoot the problems.

If you have any enquiry, please contact the distributors or DELTA customer service center.

[Safety Precautions]

Safety precautions and the operating procedures are included in each chapter of this manual.

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Table of Contents

Chapter 1 Environment and Software Installation

【Summary】

ASDA-Soft (version V4.08.04) should be stalled in **Windows® system.** This software can connect to ASDA series servo drive via standard USB communication cable (or IEEE 1394 communication cable). Delta does provide standard communication cable for software (Please refer to ASDA-A2/B2 product catalogue from Delta's website for further detailed information). Please refer to the user manual of ASDA servo drive as well.

NOTE

1. **Microsoft® Windows®** is the registered trademark of Microsoft Corporation in the United States or other countries.
2. **IEEE1394 communication cable uses** RS232 interface and does not support scope function.

【Applicable Servo Drive】

This software is for Delta's ASDA series servo drive only. Other brands of servo drive will not be applicable.

The corresponding servo drives are:

ASDA-A2 / ASDA-B2 / ASDA-A / ASDA-A+ / ASDA-AB / ASDA-B

NOTE

1. Servo drive operation mentioned in this manual mainly focuses on ASDA-A2. Software setting and operation of other series servo drive will not be described here.
2. ASDA-Soft can be downloaded via Delta's website: **ASDA-Soft V4.08.04**.
3. If you find any mistake or any comment you would like to share, please email: Servo.Support@delta.com.tw.

【Required Installation Site】

Personal Computer

OS system	**Windows® Vista Sp1 (32bit version)** **Windows® 7 (32bit version, 64bit version)** **Windows® XP SP3 (32bit version)** OS system that mentioned above also includes English, Simplified Chinese, Japanese and Korean version. * 64bit version is only suitable for Windows 7
CPU rating	Pentium Ⅲ, > 512MHz
Memory Demand	➢ 512MB (1GB is recommended)
Hard discs	Over 100MB is required

capacity	
Function of serial communication	USB communication port / IEEE1394 communication port (RS232)

Screen Setup

Screen resolution	Over 1024 × 768 pixel
Color quality	Over 24bit of color (TrueColor)

WARNING

1. **Windows®** operating system is a must for clients.
2. This software does not support other operating system.
3. Hard discs capacity indicates the installation required capacity of ASDA-Soft.
4. Please install the latest version of ASDA-Soft in **Windows®** operating system.
5. The window display of ASDA-Soft might be abnormal. Please setup the screen property by the following method:
   - For **Windows®**, please change the screen property to「Windows Classic」mode.
   - For **Windows®XP**, change the themes of 「Windows XP」 to 「Windows Classic」in the 「Appearance」tab under control panel/screen.
   - For **Windows®Vista** or **Windows®7**, change the themes of 「Windows Vista」 to「Windows Classic」in Personalization.
6. ASDA-Soft builds closed-loop data exchange with servo drive through continuous data transmission. If users open more than one operating procedures, ASDA-Soft might occupy a lot of memory space. It is suggested that not to open other software which also needs a huge amount of memory capacity when performing tuning or motion control testing. This is for avoiding error occurs during operation.

NOTE

1. We cannot ensure that ASDA-Soft can operate properly in non-**Windows®** operating system.
2. The latest version released in November, 2008 corresponds to **Windows®XP** and **Windows®Vista.** Version released in February, 2012 corresponds to **Windows®7**. Other **Windows®** operating systems might be not compatible.
3. Do not activate more than one or different version of ASDA-Soft to operate ASDA servo drive. This might cause ASDA-Soft operation abnormalities.

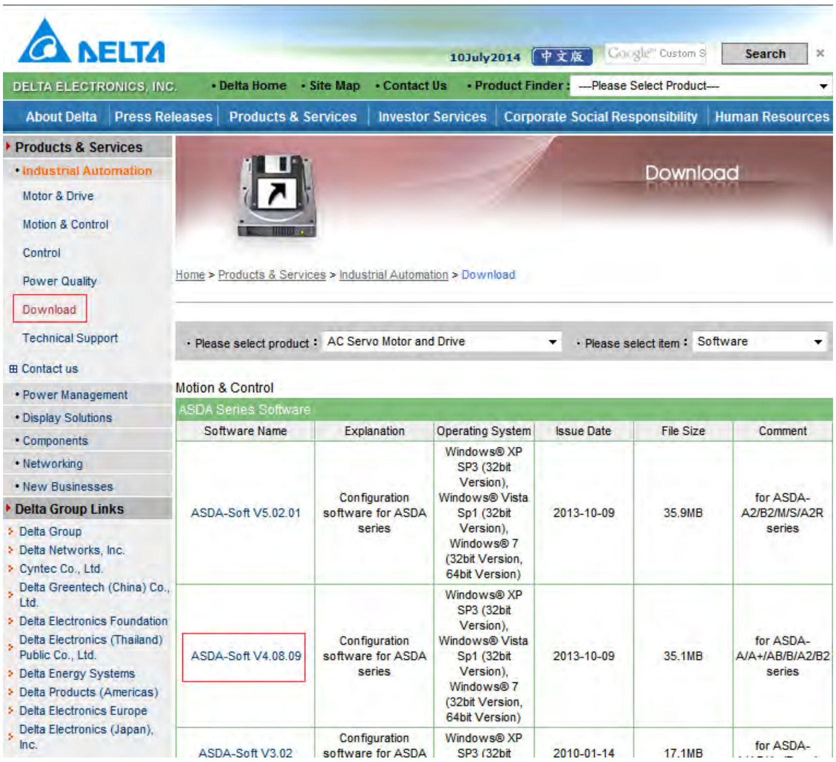
4. If figures in this manual are different from the latest ASDA-Soft on Delta’s website, please take the one from the website as the final version.

1.1 Software Installation

【Download Installer】

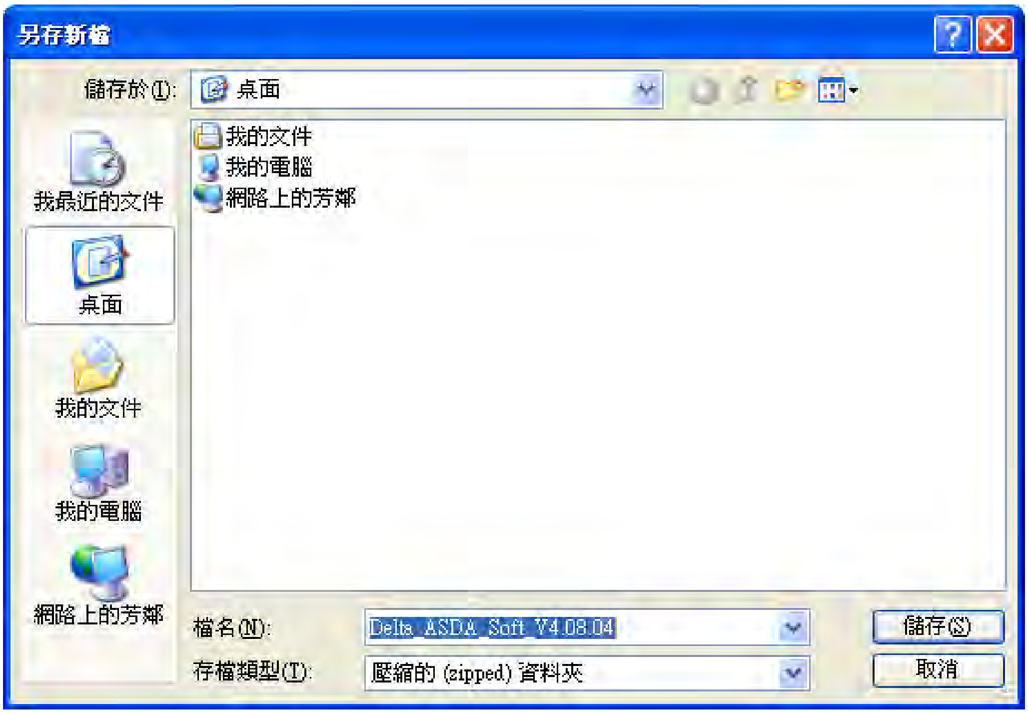
1. Download ASDA-Soft from Delta's website;

NOTE The software version download from Delta's website might be different from the example of this manual. If there is any question, please contact your distributors for further information.



2. When the following message pops up, click [儲存(S)], and save it to the designated position;

3. When designate the saving file from the following window, click 儲存(S) ;



4. After downloading the file, please unzip it. Contents are shown below:

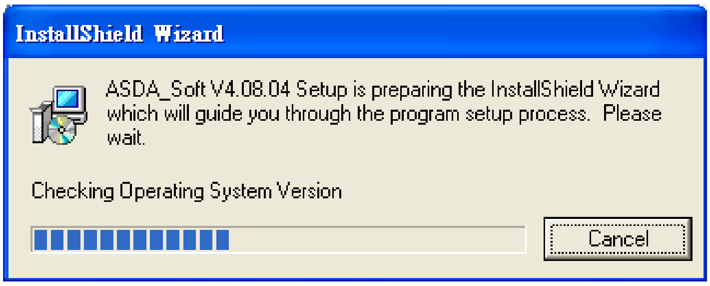
Files below are included in the contents:

【Install ASDA-Soft in Windows®Vista / Windows®XP】

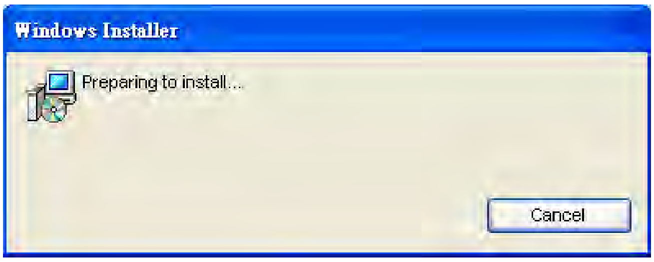
1. Click 

for installing the program.

2. InstallationShield Wizard starts to check the system.

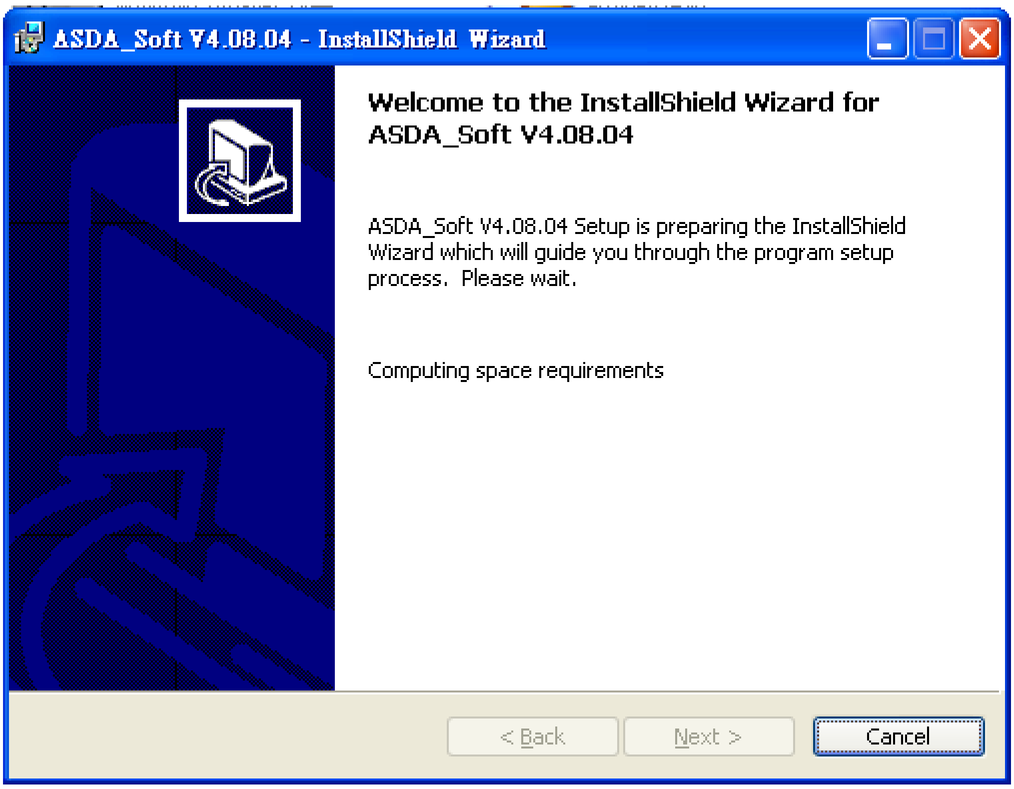


3. Then, the main program starts to prepare the installation.



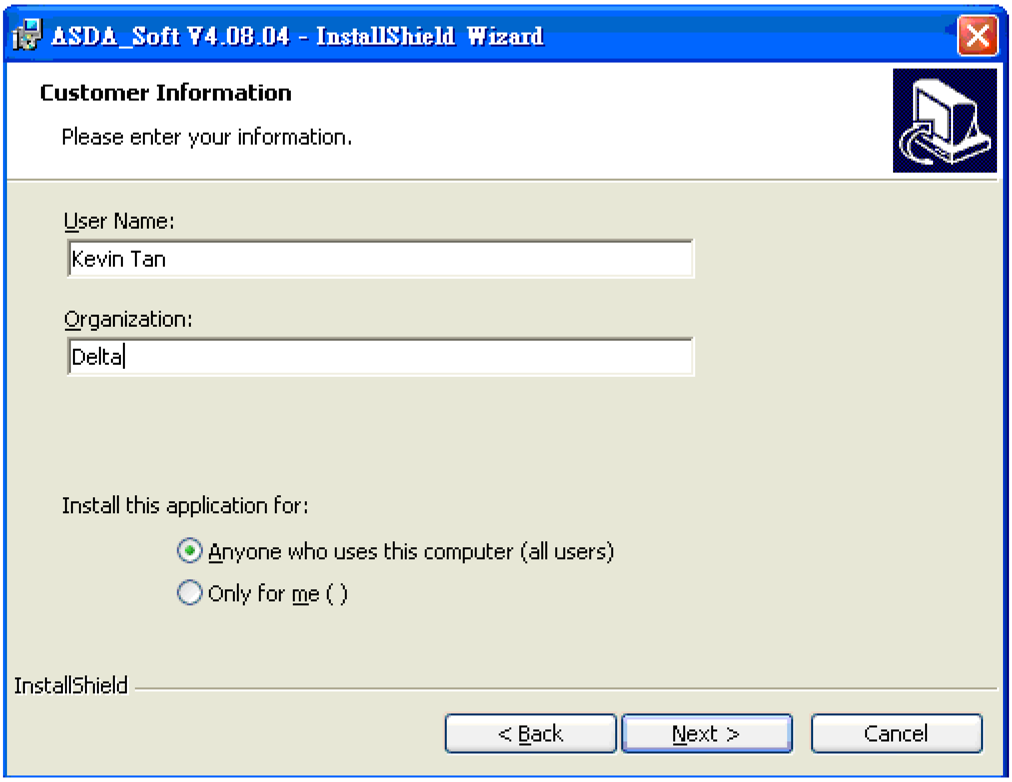
4. When the installation window pops up, please click 

.



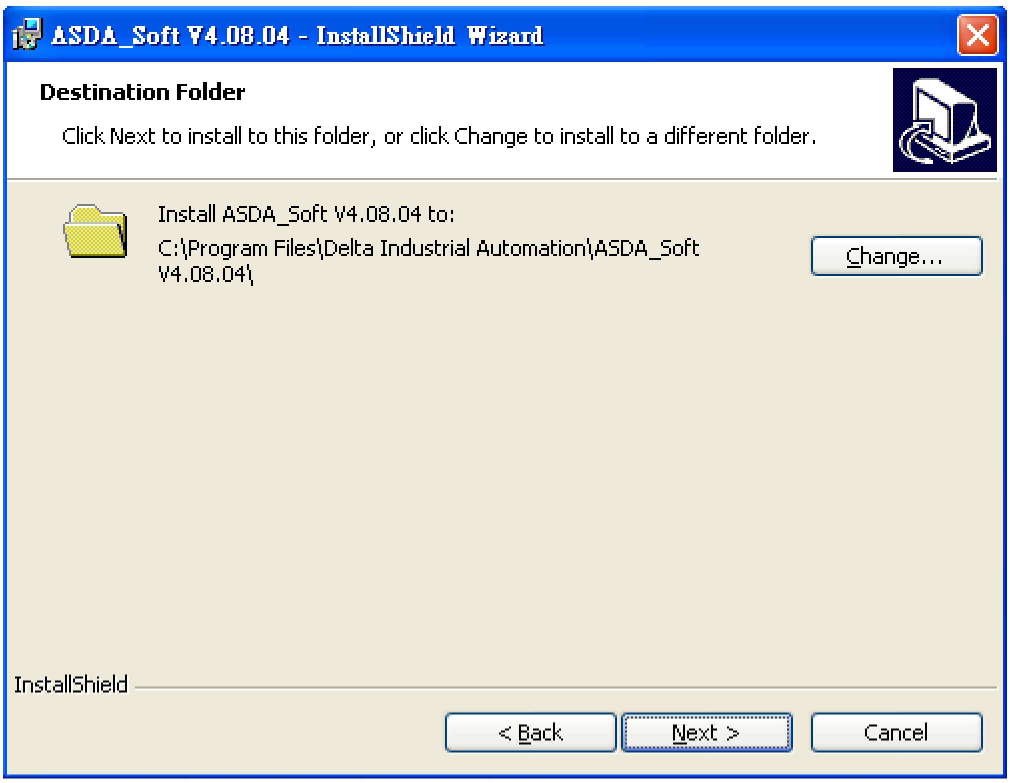
5. Enter the user name and organization; then, click 

.

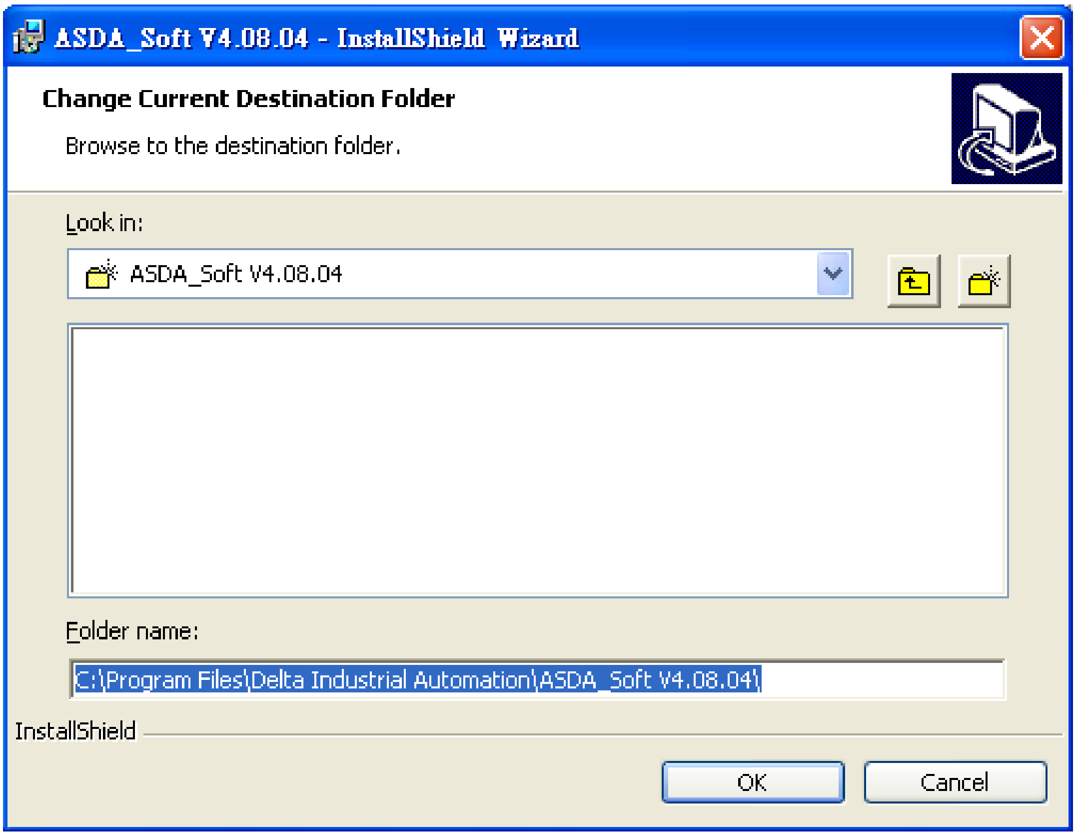


6. Setup the destination folder. If users desire to change the folder, please click 

.

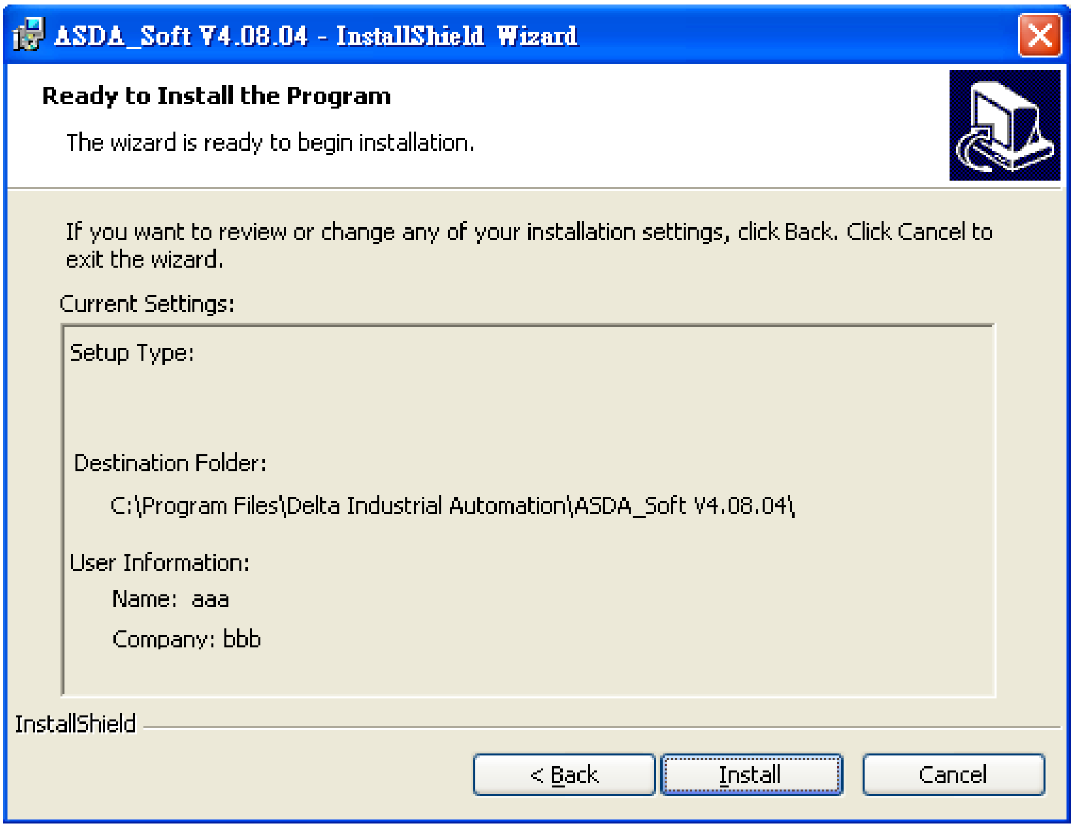


Users now can change the destination folder.

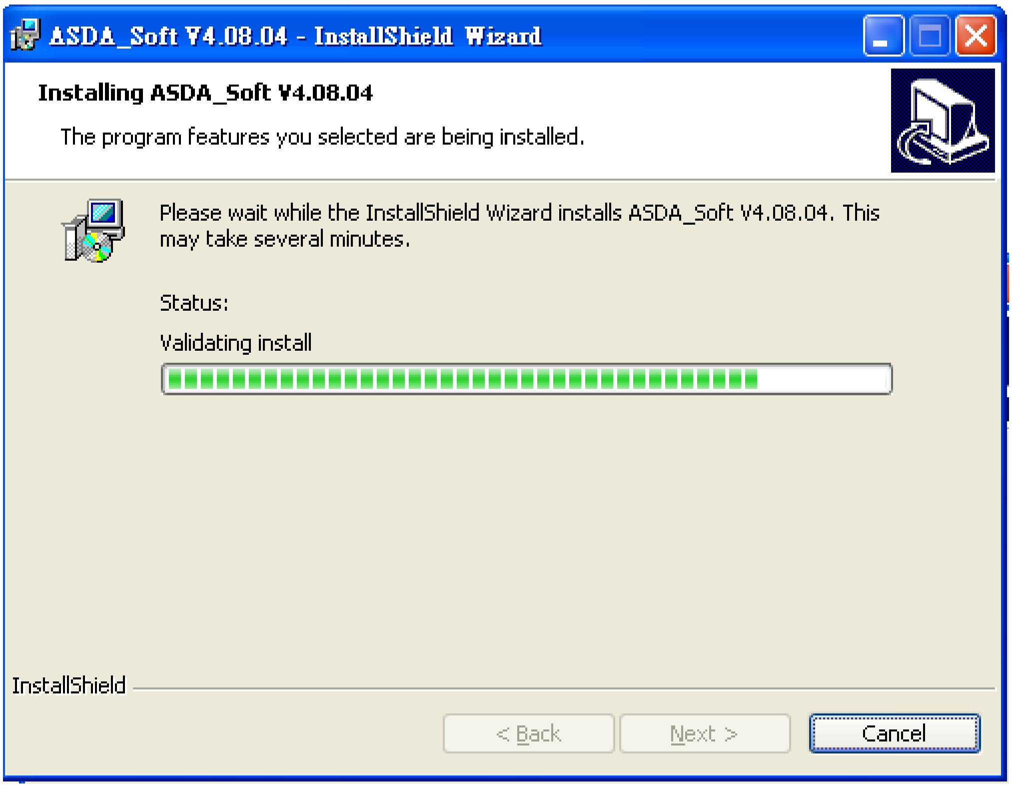


7. When it is ready, click 

to install the program.

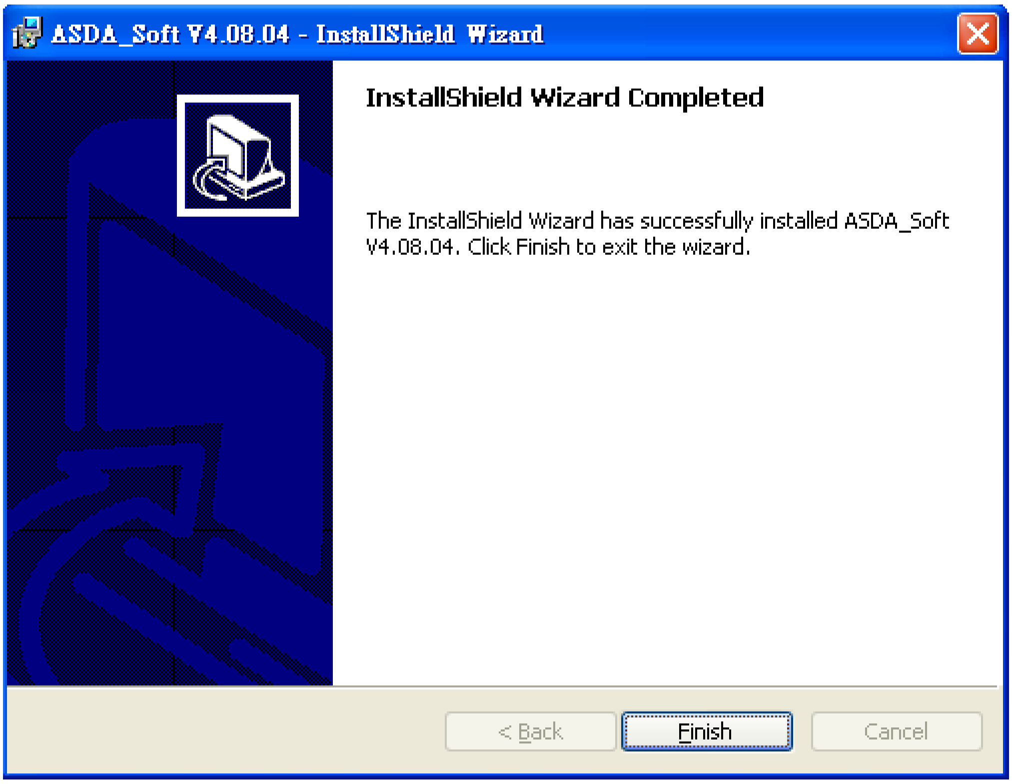


8. Program is installing.



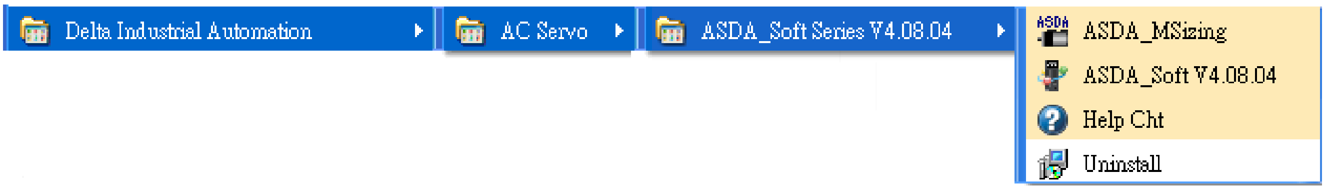
9. The InstallShield Wizard has successfully installed. Click 

to exist the installer.



10. Click 開始 → 所有程式(P) ▶, Users can see the following program paths, which included in the content.

- ASDA_MSizing: Tool to select the motor;
- ASDA_Soft V5.01.Beta: Main program of ASDA-Soft;
- Help Cht: Document about software introduction;
- Uninstall: Uninstall the program.



NOTE

1. When error occurs during installation, please cancel it immediately and re-start the installation.
2. Do not cut off the power or activate other software installer before the installation is completed, or failure might occur.
3. Do not delete the file which installed in profile (C:\PRogram Files\Delta Industrial Automation\ASDA_Soft V 4.08.04). When desire to delete the program, please use Uninstall Uninstall to delete it.

1.2 Wiring Configuration

【Hardware Requirement】

<table>
<tr><td>Item</td><td colspan="2">Description</td></tr>
<tr><td>Personal Computer</td><td colspan="2">1. Please use Windows® operating system.
2. USB connector needs to support version above 2.0.</td></tr>
<tr><td rowspan="4">Communication cable for software</td><td colspan="2">1. ASDA-A2 series of communication cable supports two kinds:</td></tr>
<tr><td></td><td>DOP-CAUSBAB (with IEEE1394 connector, it can connect to servo drive via RS232 interface. When using this communication cable, scope function will be unable to use.)</td></tr>
<tr><td></td><td>ASD-CNUS0A08 (It connects to servo drive through USB (version 2.0 or above). Since the USB connector has no tenon and cannot firmly connect to PC USB connector, please avoid the unstable location or the place where the cable is easy to be pulled during the operation.)</td></tr>
<tr><td colspan="2">2. Communication cable from ASDA-B2 and other series of servo drive also support ASD-CNUS0A08 communication rods.</td></tr>
</table>

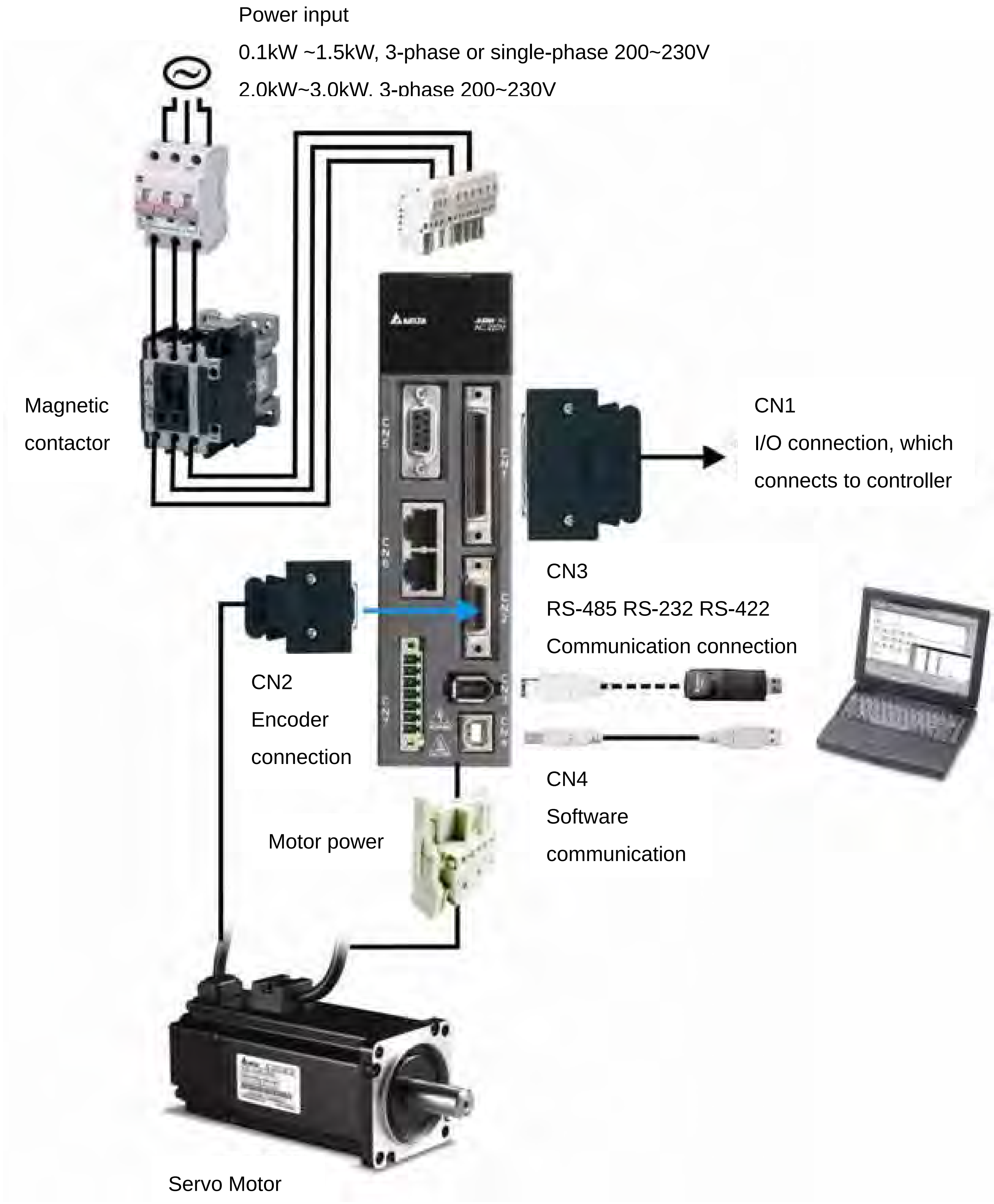
WARNING

- Do not connect to Delta’s servo drive with the wrong software communication cable. It might damage the servo drive.
- Please use metal shielded-twisted pair cable as USB communication cable. If no metal shielded cable is included, signal might be interfered.
- Do not self-produce multi-connector for software communication cable.

NOTE

1. Please refer to Chapter 2 for specification and setup of personal computer.
2. For Delta’s servo drive installation and setting, please download the user manual from Delta’s website.
3. The standard communication cable for Delta is 1.5 meters (4.92 feet).
4. The above mentioned communication connection is based on ASDA-A2 series servo drive.

【ASDA-A2 Software Connection】

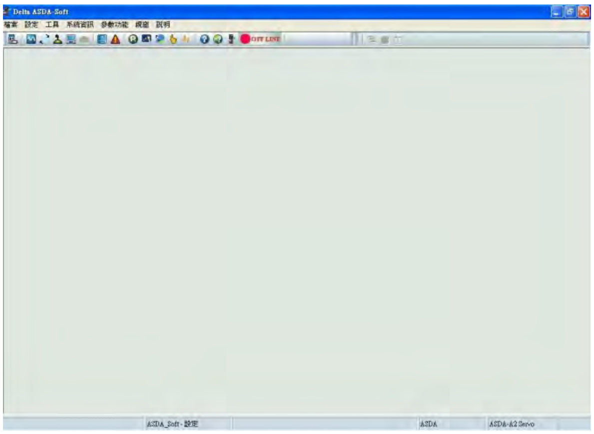


1.3 Software Screen Description

【Main Page】

After clicking the icon of ASDA-Soft, a system initialization screen will pop up.

When the system has been initialized, it enters the screen of main program automatically. There are tool bar, quick launch, and status bar from top to bottom.



Icon	Description
File Setting Tools Parameter Function Window Help	Tool bar: Users can enable each application and documents from Help.
 OFF LINE	Quick launch: Users can quickly open the commonly used or important tool.
ASDA_Soft - 設定 ~ ASDA ASDA-A2 Servo	Status bar: it displays the current status of software

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Chapter 2 Basic Operation

【Introduction】ASDA-Soft on Delta's website provides different version of operation software. These versions are for new series of servo drive and contain various advanced function for product applications.
Basic operation (non-programming function) will be introduced in this chapter. Users can learn how to setup software communication port, interface and language.

Functions that will be mentioned in this chapter are:

1.) 【File】

2.) 【Setting】

3.) 【Language】

4.) 【Status Monitor】

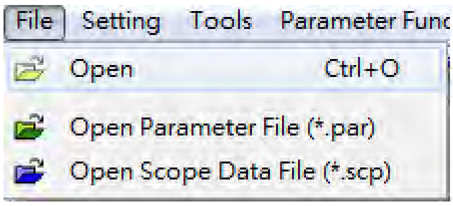
5.) 【Window】

6.) 【Help】

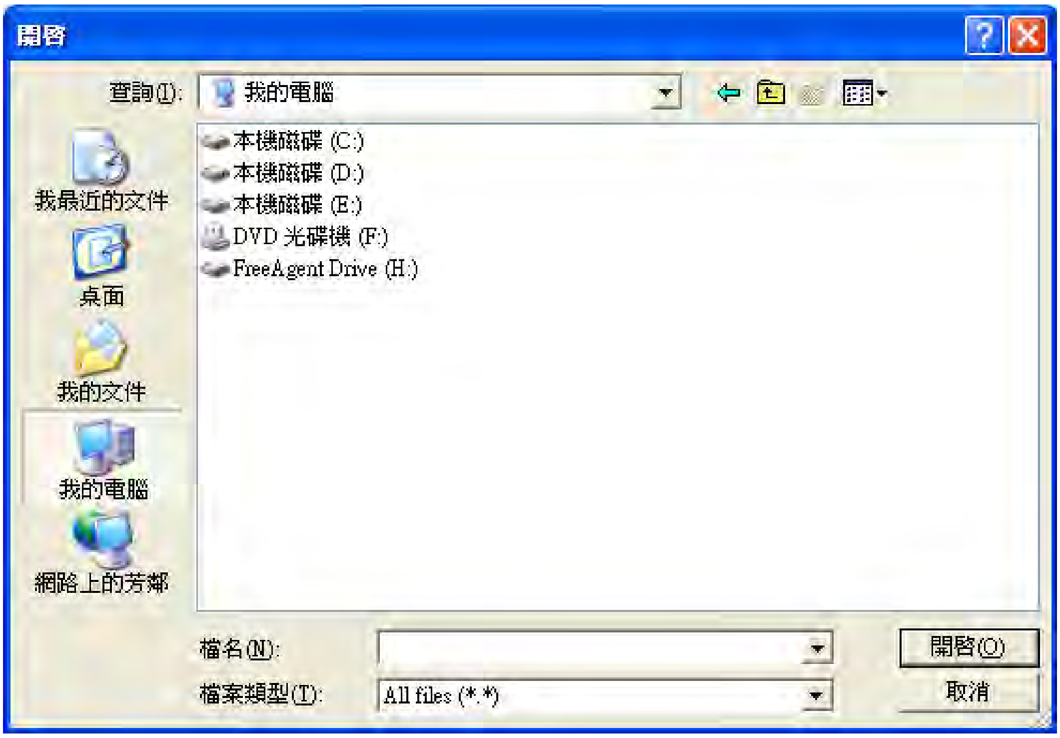
2.1 File

【Description】

Click【File】could open parameter file and scope data file.



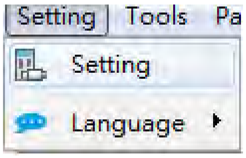
Click 開啓, window that showed below will pop up:



2.2 Setting

【Description】

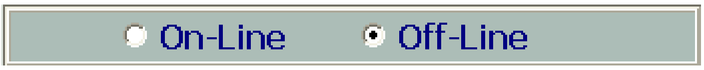
Users could setup two functions below through【Setting】:



【Software connection setting】 will be introduced here. 【Language】 will be elaborated in later part.

【Software connection setting】: Click , a software communication setting window will pop up;

The following descriptions detail each function.

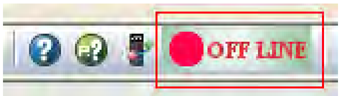
a.)【Communication setup】 

ASDA-Soft can quickly connect to ASDA servo drive via this function.

: Setup communication On-Line operation

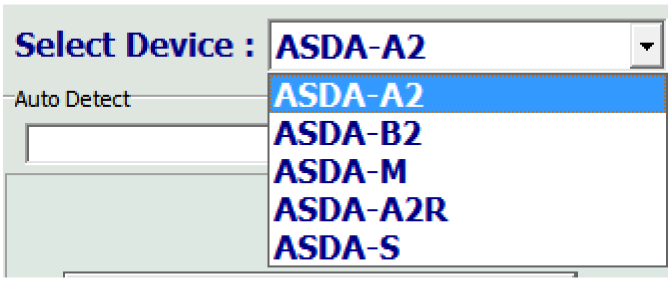
: Setup communication Off-Line operation

NOTE Users can also use software communication connection button on function bar.



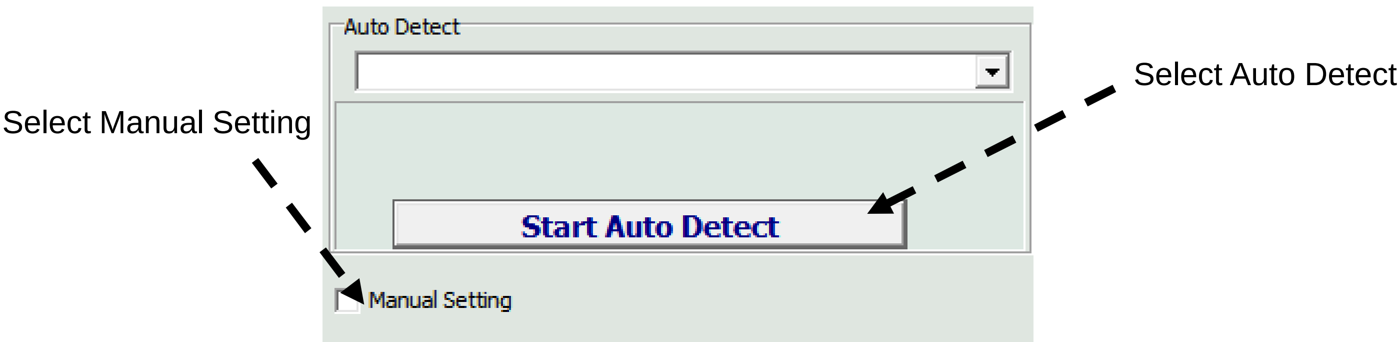
Directly left click this button to setup software communication connection.

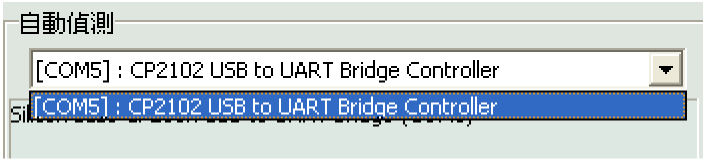
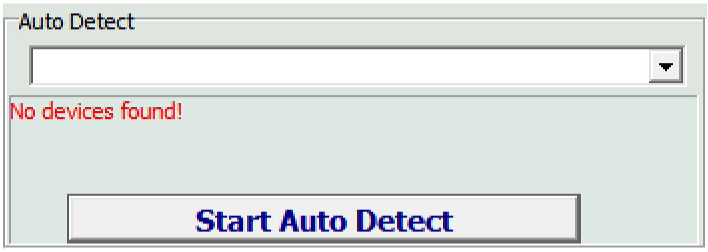
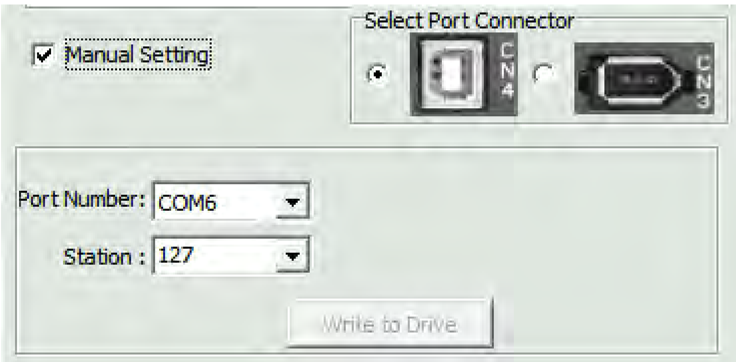
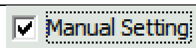
b.)【Select Device】, through this function, users can select Delta's servo drive that desire to connect.

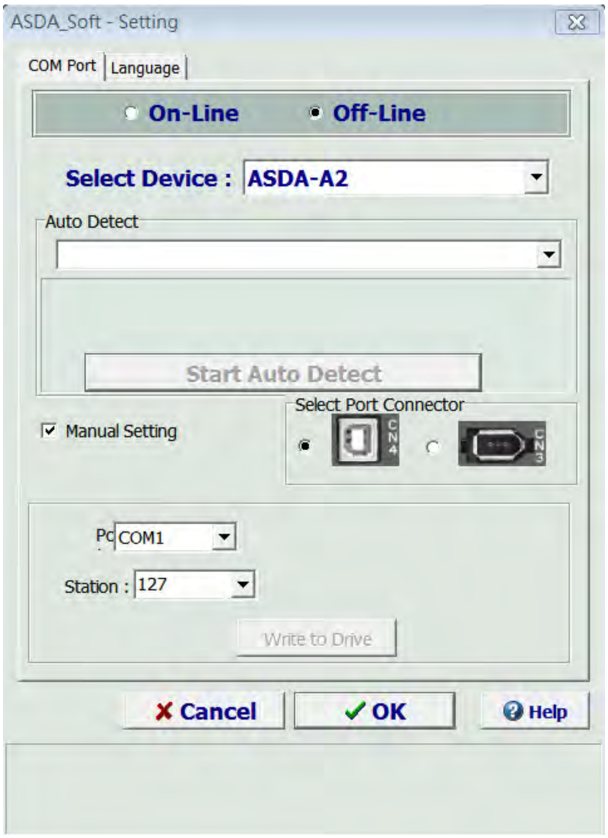


c.)【Auto Detect】 / Manual setting:

In following figure, users can select Auto Detect or Manual Setting to connect ASDA-Soft and ASDA-A2 servo drive.



Icon	Description
	It displays USB port number that connects ASDA-Soft and ASDA servo drive. The left figure shows that COM5 is the current USB port number.
	 This button is for detecting USB port. When software communication is successfully connected, the left icon will pop up and automatically display the USB port number in drop-down function list.
	When it is failed to auto detect the software communication, it will show **No device found**.
	Click  to complete the setting of communication position of ASDA servo drive manually.【Select Port Connector】, on the right up corner, enables users to select【CN3】or【CN4】as communication port: 【CN4】: USB software communication port is for connecting ASDA-Soft and ASDA servo drive. Through【Manual Setting】, users can adjust the station number and confirm the port number of PC end, see the left figure.



【CN3】: Communication signal cable is used to operate servo drive or PLC, HMI through MODBUS communication that combines assembly language. However, when users has no USB communication cable to connect ASDA-Soft and ASDA servo drive, the signal cable of IEEE1394 communication port can be used. See figure d.

Please note that when using CN3 as the software communication port, it only can be used to reading and writing parameters (because the transmission rate and instantaneity is not enough. It does not support connecting monitor function of scope. An warning message in color red will be shown in the screen. See figure d.

d.) 【Confirm Setting】 

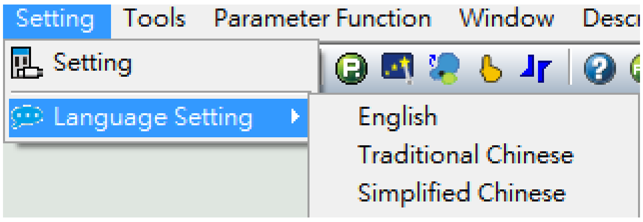
When the setting of communication connection is completed, click【OK】 to close the window; If not, click【Cancel】. In addition, use the standard close button  can also close the window.

button can help users to open the document file for software description and to understand the setting of software communication.

2.3 Language

【Description】ASDA-Soft V4.08 supports three languages . Two setting methods are provided.

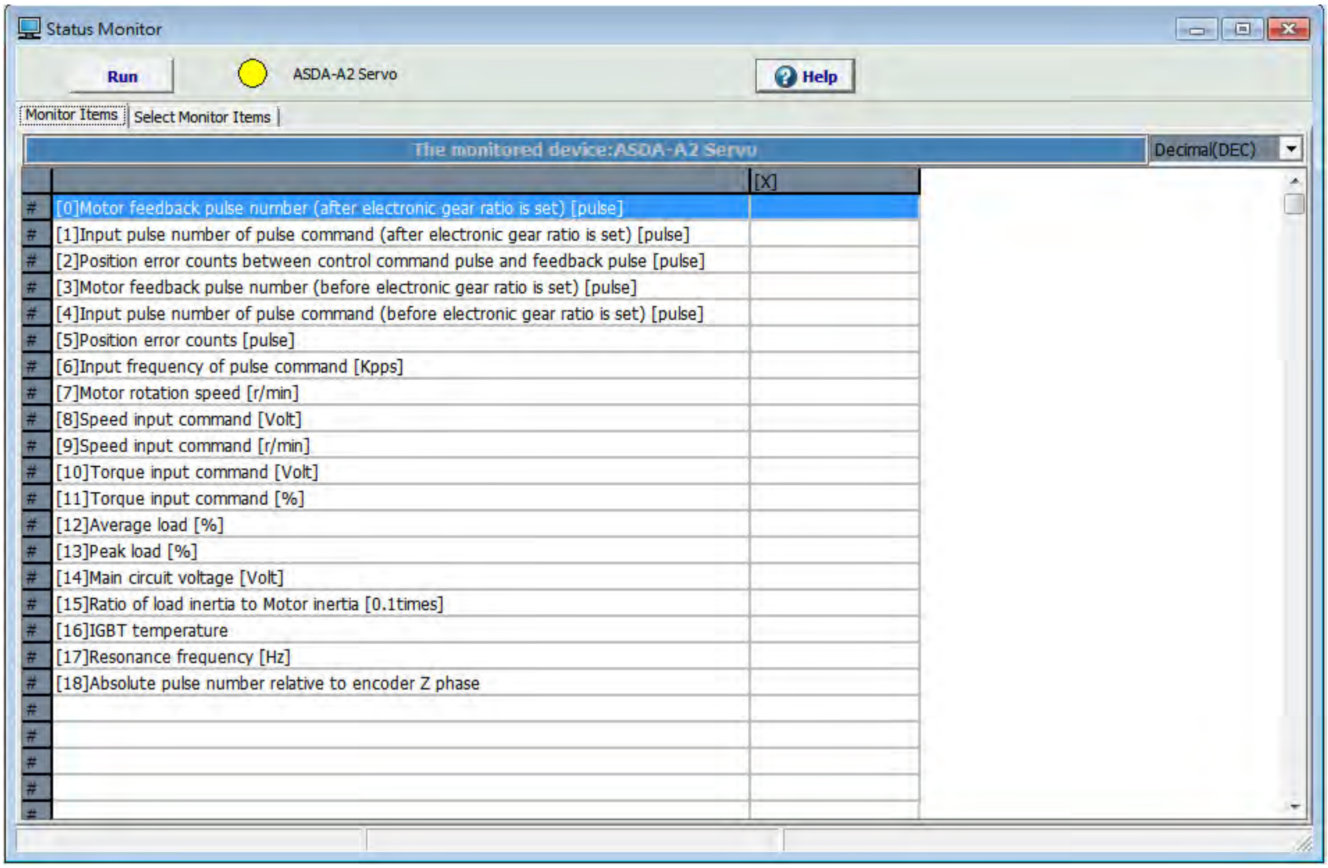
1.) User【Setting】from tool bar. See figure below.



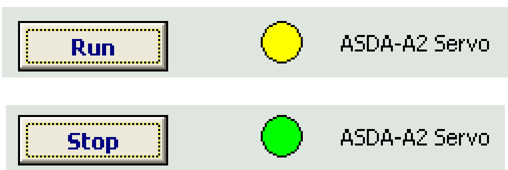
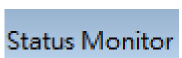
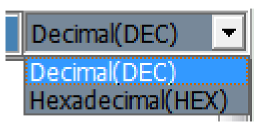
2.) Directly click  button from tool bar, the following window will pop up. Users select the specified language, the operation interface of ASDA-Soft will switch to the specified language automatically/

2.4 Status Monitor

【Description】Through communication, ASDA-Soft could display the built-in status monitor parameters of ASDA-A2 servo drive in diagram and shows the current data.



Followings are the description of【Monitor Items】:

Icon	Description
	After pressing【Run】, the light will turn to color green from color yellow. And the button display will be switched to【Stop】. Users can simply press 【Stop】 when desiring to stop status monitor. Then the light will be switched back to color yellow.
	【Monitor Items】 will be displayed in the table according to different series of servo drive. The above figure is the example of ASDA-A2, which has19 monitor items in total.
	If the selected monitor command is displayed in hexadecimal format, users can select the format from the drop-down list which is in the right side of the window.

When users switch the window to “Select Monitor Items”, users can manually setup different monitor items according to your demand. Please refer to the detailed description below:

【Description】Users can self-select the monitor items. Three items can be setup:

Monitor Item Setting → Users can select the monitor items which provided by each series of ASDA servo drive.

Mapping Parameters Setting → Users can flexibly setup the required parameters through mapping parameters provided by ASDA-A2 series servo drive. It enables users to edit a group of continuous parameter group and can access or write in parameters via communication. Apart from shortening the time of parameter reading and writing, it also can setup for various applications.

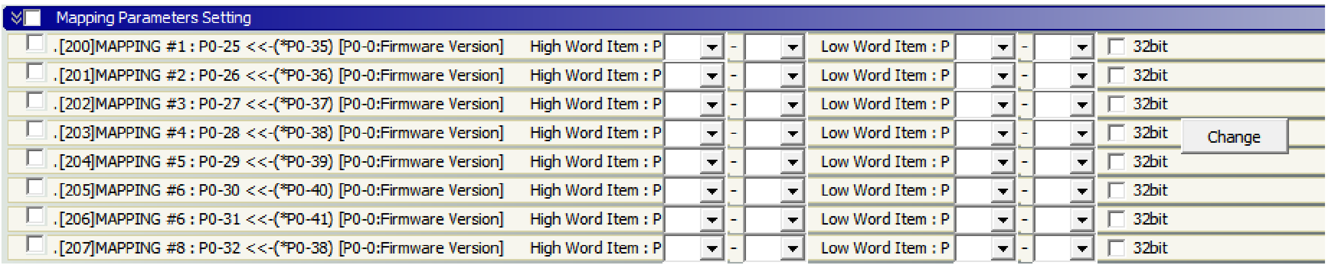
Monitor Parameters Setting → ASDA-A2 series servo drive provides 5 groups of monitor parameters for users to setup different monitor items. Users can access the status of these 5 groups of monitor items through communication.

【Monitor Item Setting】: This function is for the built-in monitor items. Users can self-select the required ones.

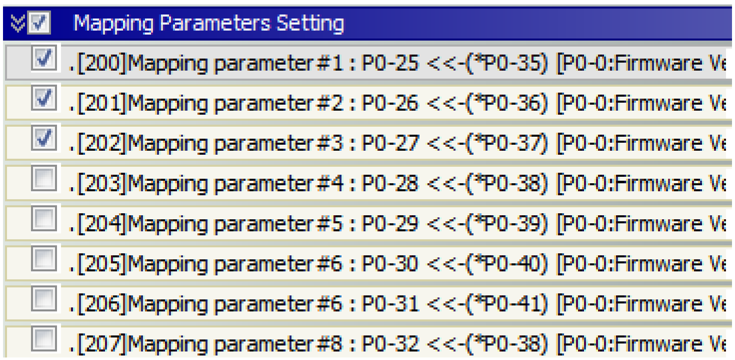
The following table shows the monitor items:

Moitor Item Setting
.[0]Motor feedback pulse number (after electronic gear ratio is set) [pulse]
.[1]Input pulse number of pulse command (after electronic gear ratio is set) [pulse]
.[2]Position error counts between control command pulse and feedback pulse [pulse]
.[3]Motor feedback pulse number (before electronic gear ratio is set) [pulse]
.[4]Input pulse number of pulse command (before electronic gear ratio is set) [pulse]
.[5]Position error counts [pulse]
.[6]Input frequency of pulse command [Kpps]
.[7]Motor rotation speed [r/min]
.[8]Speed input command [Volt]
.[9]Speed input command [r/min]
.[10]Torque input command [Volt]
.[11]Torque input command [%]
.[12]Average load [%]
.[13]Peak load [%]
.[14]Main circuit voltage [Volt]
.[15]Ratio of load inertia to Motor inertia [0.1times]
.[16]IGBT temperature
.[17]Resonance frequency [Hz]
.[18]Absolute pulse number relative to encoder Z phase

【Mapping Parameters Setting】: Monitor variables in 【Mapping Parameters】group can be displayed in the table of【Monitor Items】 through this function. Users can setup the mapping parameters by its checkbox function. Please refer to the description below:



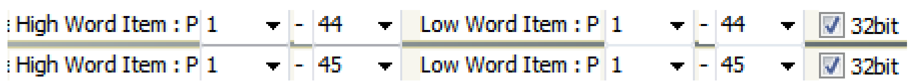
Step 1: Check the preset mapping parameters



Step 2: Setup the mapped parameter

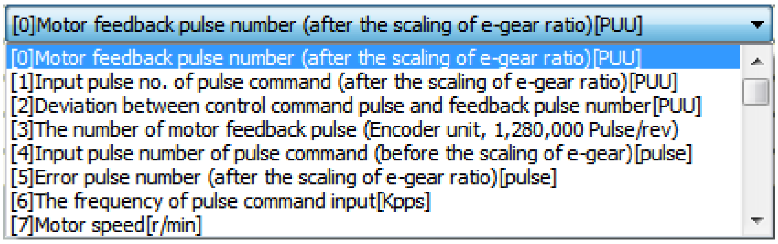
The mapped parameters have two kinds, 16bit and 32bit. When setting up 16bit parameters, users could setup the specified parameters according to low/high-word. See the above example. When users read the value of P2-02 and P2-04 respectively, users could set them up in low-word and high-word items.

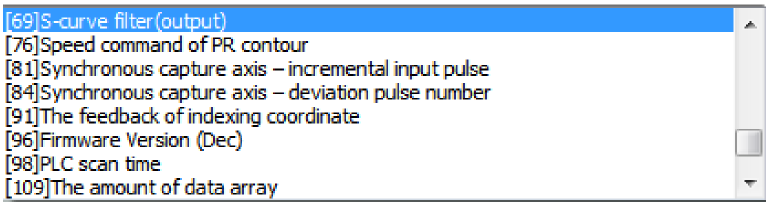
When desire to set 32bit parameters, please directly setup the low-word item. Then click 32bit item. The system will fill in high-word items and complete the setting of 32bit mapping parameters. See the above example. If desire to access the numerator and denominator of E-gear ratio, users can refer to the setting of 32bit mapping parameters.



Step 3: After complete the above steps, please press【change】 to finish all setting of mapping parameters.

【Monitor Parameter Setting】: Users can select 【Status Monitor Register】parameters from P0-09 to P0-13 via this function. Use the drop-down list on the right to setup the parameter displayed content from P0-17 to P0-21. See the above example of ASDA-A2:



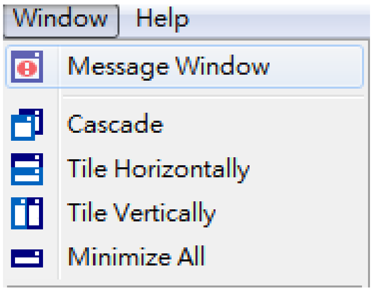


NOTE

1. Please note that after complete the setting of【Mapping Parameters Setting】 and【Monitor Parameters Setting】, be ensure to press Change to write in the setting into the servo drive.
2. When completing the above selected parameters, please press【Save Change】to setup the selected monitor parameters group. Users can also use【Select All】and【Cancel All】for one-time setting.

2.5 Window

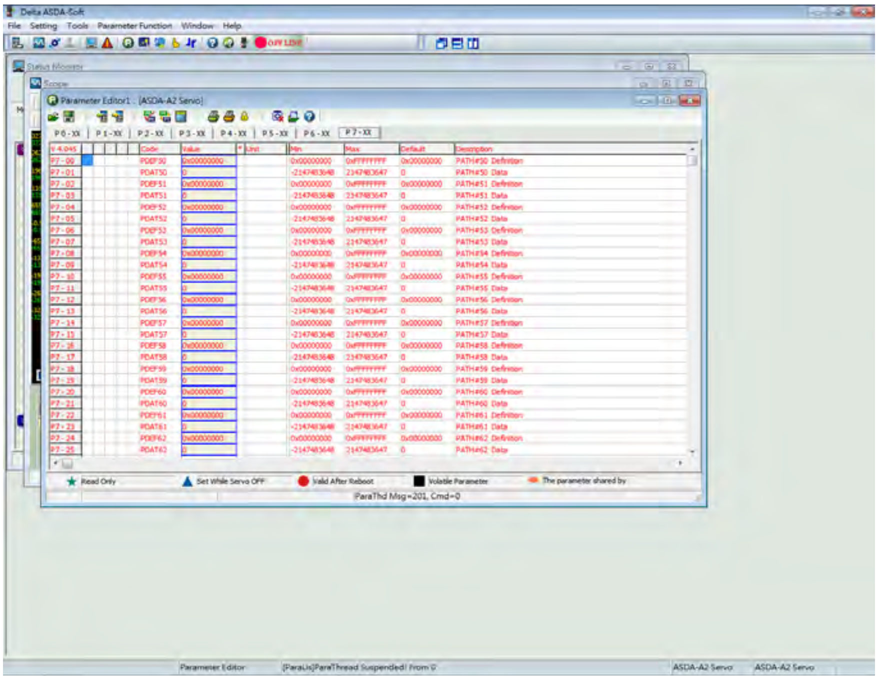
【Description】When open more than one windows, the item in【window】can help to arrange the window display.



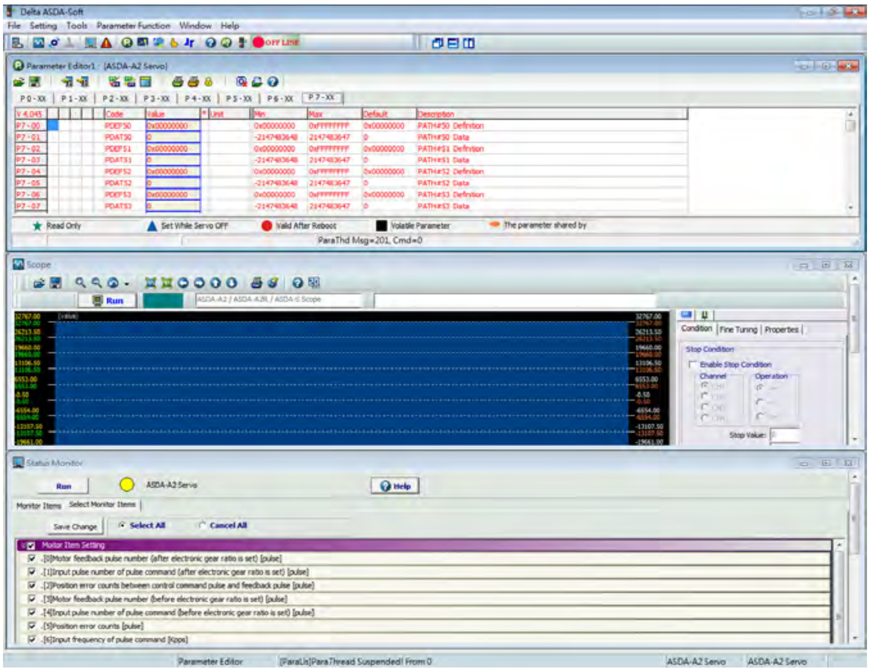
ASDA-Soft provides various selections of window display, such as【Cascade】,【Title Horizontally】, 【Title Vertically】 and【Minimize All】. In addition,【Message Window】can display the warning message or fault message of the system when setting up or reading/writing parameters.

The upper right corner of【Message Window】has two buttons,  .  means to hide the window; while  means to close the window.

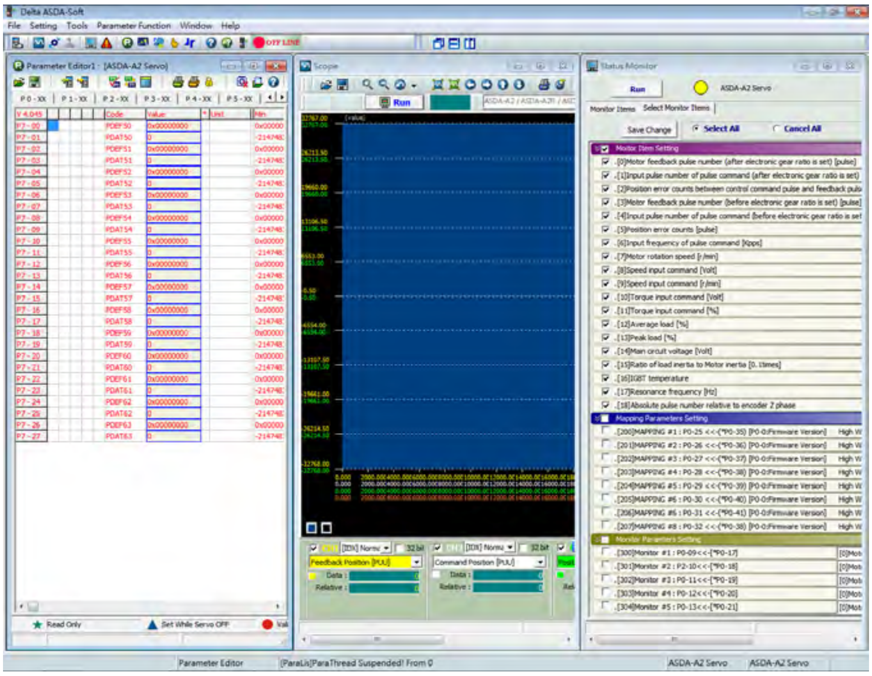
Cascade



Title Horizontally

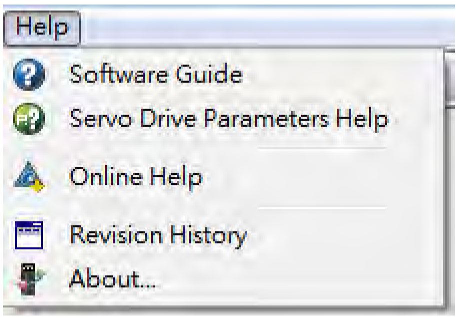


Title Vertically



2.6 Help

【Description】The descriptive document is provided in【Help】. Users can know how to use ASDA-Soft in a faster way.【Servo Drive Parameters Help】 and 【Revision History 】 are also added into it. Clients can acquire the timely support on parameter setting and troubleshooting.



Icon	Description
Software Guide	It provides the function description and operation procedure of the software.
Servo Drive Parameters Help	It provides parameter descriptive file of each series of servo drive.
Online Help	Any questions or comments, feel free to e-mail us: Servo.Support@delta.com.tw
Revision History	It provides the function description of each updated version.
About...	It provides version information.

Chapter 3 Advanced Operation

【Introduction】Users will learn how to operate scope, auto gain tuning for different mechanisms, parameters editor for quickly setting up parameters and parameter initial wizard to complete the mode setting. Functions that will be mentioned are showed below:

1.) 【Scope】

2.) 【Auto Gain Tuning】

3.) 【Digital IO / Jog Control】

4.) 【System Analysis】

5.) 【Alarm Information】

6.) 【Parameters Editor】

7.) 【Parameter Initial Wizard】

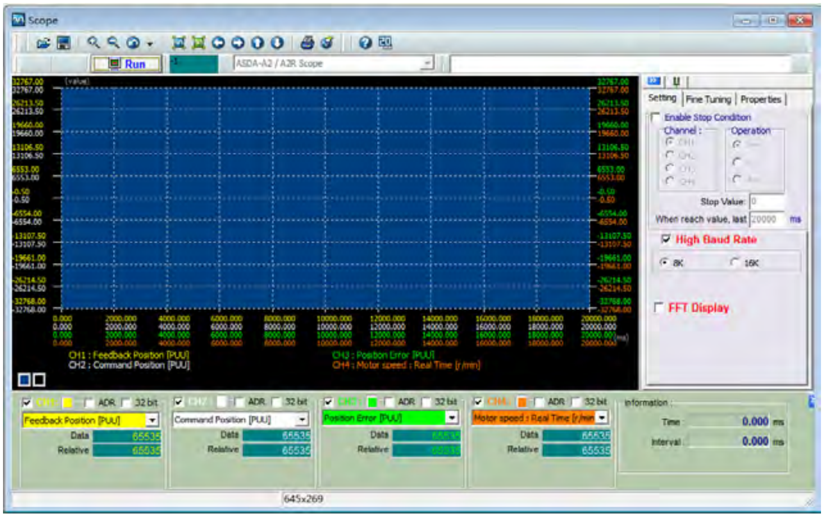
3.1 Scope

ASDA-Soft provides built-in high-speed timely monitor tool. Users could use this tool to capture and analyze the information.

Scope adopts one main screen and supports flexible setting for multi channel. Apart from basic hardware function, its features include various functions aiming at internal motion control for ASDA-A2. Followings are the main features:

- It provides 4 channels at most and the high-speed sampling frequency provides two bandwidths, 8 kHz and 16 kHz. Data can be set as 16 bit or 32 bit. Users can setup different monitor source for analysis. This manual is based on ASDA-A2 servo drive.
- Users could circumscribe and select the area that desire to magnify. And double left click it to minimize the image.
- Channel with individual coordinate shows the actual monitor variables.
- Users can directly setup monitor command (**[IDX] Normal**), enter the specific position format (**[ADR] Address**), monitor variable code (**[VAR] Variables**, parameter code (**[PAR] Parameters**) and CANopen Index code (**[CAN] CANopen)** as the command source. Engineers can have more precise analysis.
- Aiming to waveform analysis of resonance suppression, the software provides **Fast Fourier Transform – FFT**. Users could self-select the area that desire to analyze and suppress the resonance point.
- The event trigger function enables users to setup the condition to stop capture of each channel. It is convenient for conditional analysis.
- Users can manually adjust the setting of scale factor of scope screen and moving range, which enhance the applicability. It is the same as the rotary switch of scope.
- Three kinds of waveform storage forms are provided: SCP, TXT and BMP. SCP is special for ASDA-Soft, which can storage all kinds of data.

Followings are the main screen of scope:



This chapter will be divided into three parts to introduce scope:

【Interface Introduction】: It detailed describe the function and definition of each button.

【Operation Description】: It guides the users about how to create a wave file, starting from the setting of command source, screen, wave capturing and save the file. Users will learn several ways to analyze the wave, use the scale function to observe the detailed wave information, slight adjust the setting to specify the displayed range and use the stop condition to trigger the event.

【FFT Analysis】: It introduces the special tool FFT and describes how to search the resonance point on mechanism by this function. Then, suppress the resonance by notch filter.

Interface Introduction

1.【Tool bar of scope】:

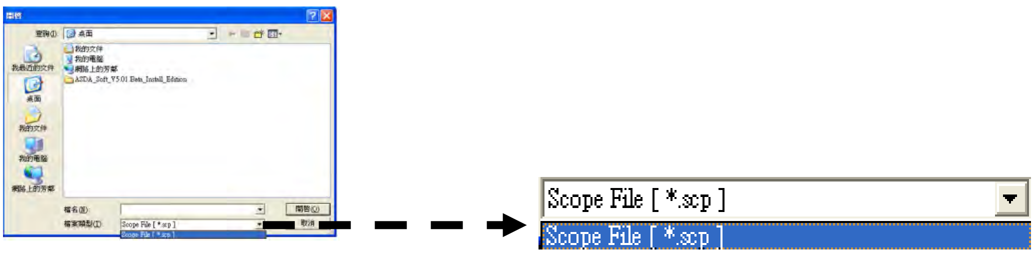
ASDA-Soft provides instant monitor tool. Uses could use it to monitor each data.

Icon	Description
 Open a SCP (scope curve) file	Open the saved SCP file.
 Save as a SCP (scope curve) file	Save the captured SCP file in the computer.
 Zoom in (F5) / Zoom out (F6)	Zoom in or zoom out the whole oscillograph, so that users can analysis the details.
 Previous screen (F7)	When adjusting the size of oscillograph, this function can be used to turn back the graph

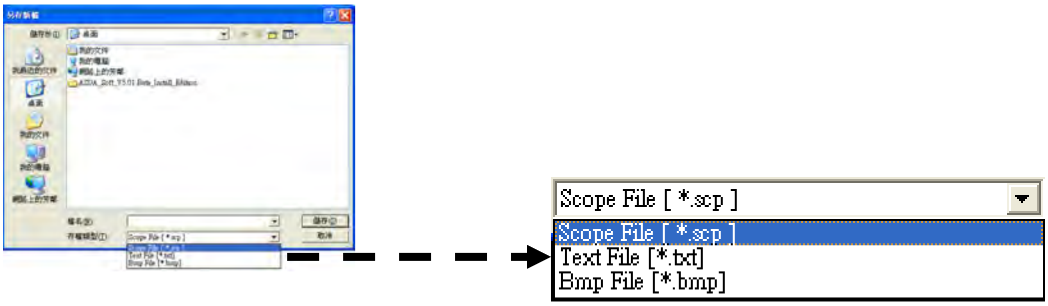
	to the previous adjusted page.
Show all data in screen	After adjusting the oscillograph, this button can turn the image back to the original size.
Show all data and adjust the max. / min. value automatically.	Aiming at the displayed data of each channel to automatically adjust the data to the max. / min. value.
Direction key	Adjust the image position of oscillograph
Print screen	Print the imgae of oscillograph
Clear screen	Clear the current image of oscillograph
Descriptions	Quickly open the file of software manual so that user can know more about the setting of scope.
Screen second switch (adjust the resolution)	Adjust the resolution of time axis (X axis of scope). The resolution of scope image can be enhanced. The setting range is from 1 to 6. (20,000ms ~ 120,000ms)

Followings are the description of each item:

1.) Open a SCP (scope curve) file. The following window will pop up when click the button. Users could open the file with “*.SCP”:



2.)  Save as a SCP (scope curve) file. The following window will pop up when click the button. Users could save the scope data. 【Save as】 provides three format for file saving:



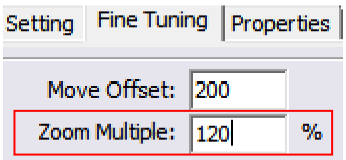
a.) Scope File [*.scp]; It is the file format for ASDA-Soft only.

b.) Text File [*.txt]; The file can be opened by **Microsoft® Word®**.

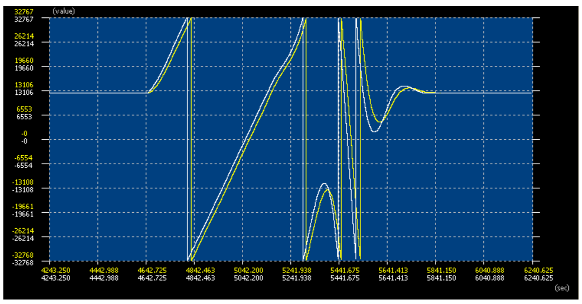
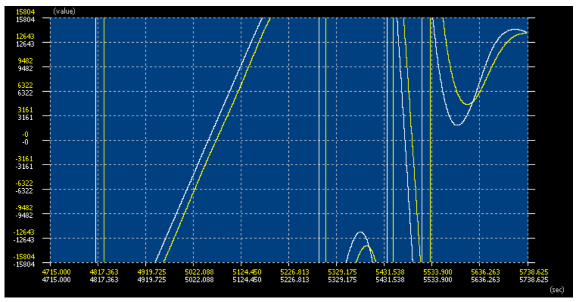
c.) Bmp File [*.bmp]; The file can be opened by **Microsoft®** Office Picture Manager.

3.)  Zoom in (F5) / Zoom out (F6) the screen. Users can use button of【Zoom in】 or【Zoom out】 to adjust the window size of scope. Also, users also can directly press F5 to zoom in or F6 to zoom out the image.

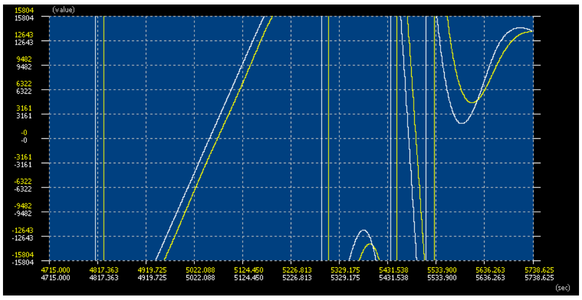
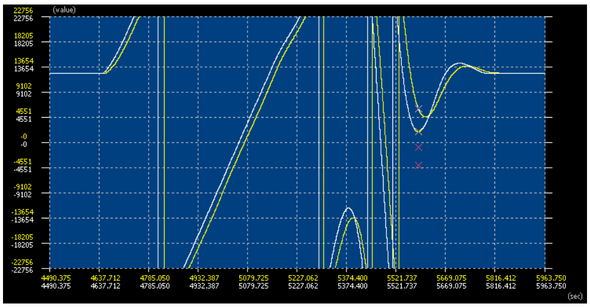
Through【Fine Tuning】, on the right of the screen, to setup "Zoom Multiple" to adjust the factor. Its percentage takes integer only. The minimum value is 1% and the maximum one is 999999999%.



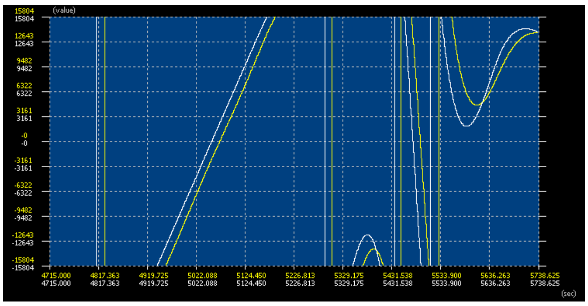
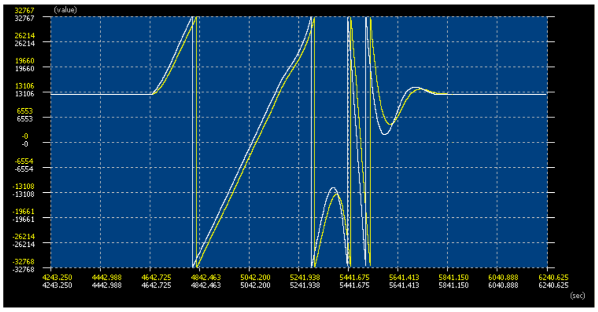
For example:

After capturing a section of curve,	use  or F5 to magnify the whole graph.
	

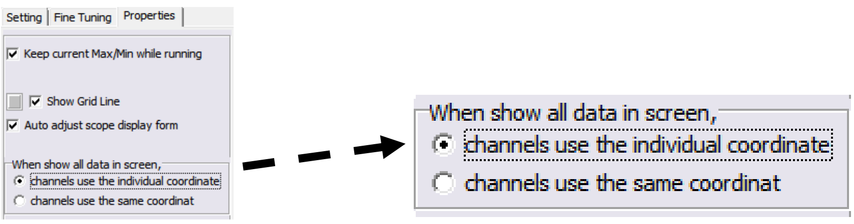
4.)  Previous screen (F7). When using【Zoom in】or【Zoom out】to adjust the size of oscillograph. This function can turn the graph back to the previous status. For example:

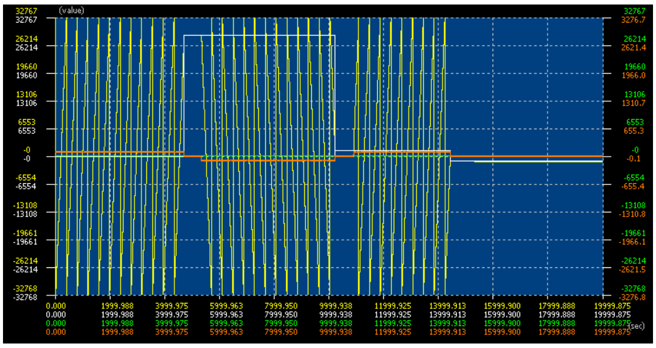
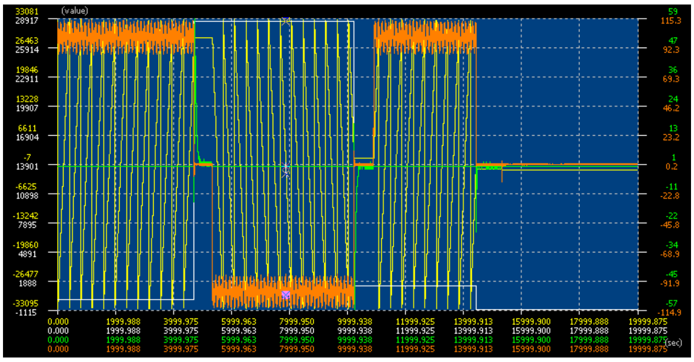
When adjusting a section of curve,	use  or F7 to turn the curve back to the previous screen.
	

5.)  Show all data in screen. This function can turn the graph back to the original captured size. However, this function cannot automatically adjust the max. / min. value of each channel.

When adjusting a section of curve,	use  to show the data of all channel in one time axis.
	

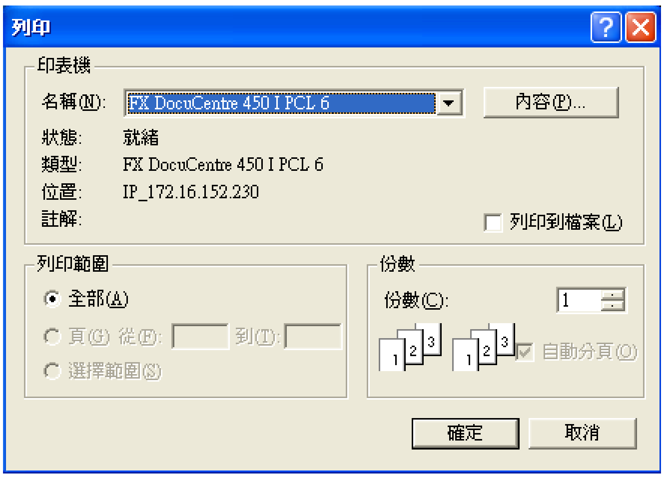
6.)  Show all data in the screen and adjust the max. / min. value automatically. When setting "When show all data in screen," as " channels use the individual coordinate" in【Properties】, on the right side of the main screen, users could use this function to adjust the max. / min value of each channel individually:



Display oscillograph. (Channels use the same coordinate)	
Display oscillograph. (Channels use individual coordinate)	

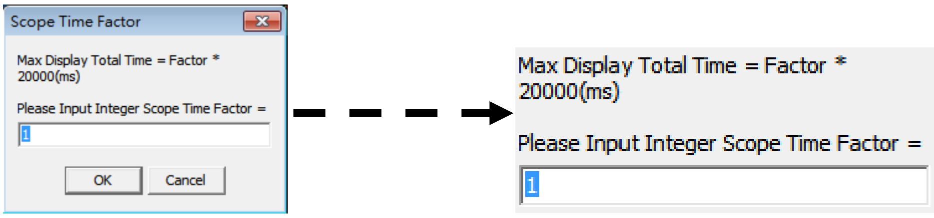
7.) Direction key. After adjusting the size of the graph,【Direction key】can be used to move the scope window to the monitoring position. The offset amount of【Direction key】 can be set through【Fine Tuning】, on the right of the screen. The move offset takes integer as its unit. The minimum value is 1 and the maximum value is 999999999.

8.) Print screen. This function can be used to print the captured curve. Click this button, the following window will pop up. Select the printer and click OK.

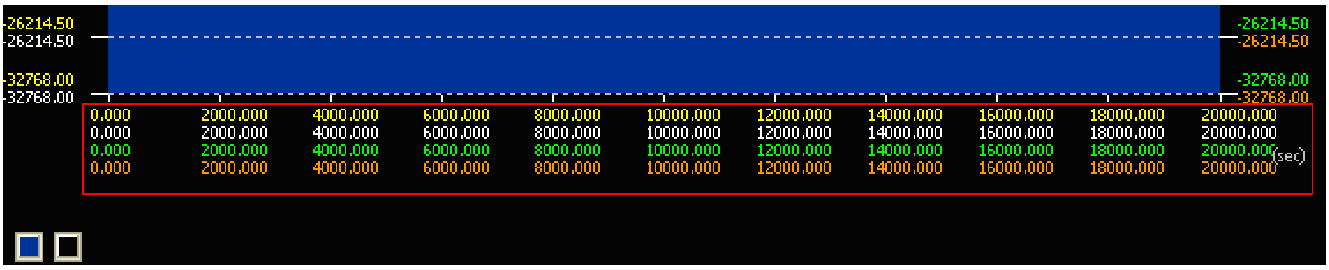


9.) Clear screen. When users have already saved, printed or desire to reset the data definition, function of【Clear screen】can clear the current curve on scope. Then, access the next one.

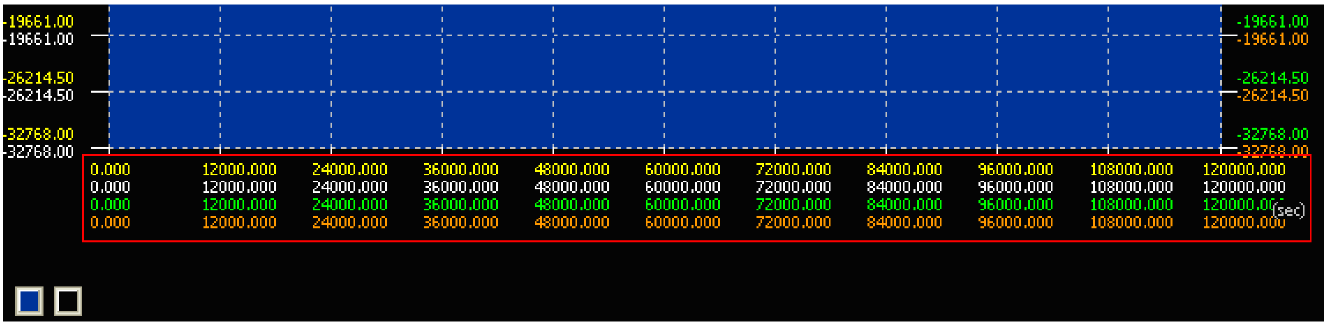
10.) Screen second switch (adjust the resolution). The standard range is between 0ms and 20,000ms. Users could use to enhance the resolution of time axis. The setting range is (1 ~ 6) and the maximum value can be set up to 120,000ms.



For example, if n = 6, then when the setting is complete and press OK, the following time frame within the red frame will become 120,000.000(sec).



When the maximum value of initial time axis is 20,000.000 (sec);



When n = 6, the maximum setting will become 120,000.000 (sec).

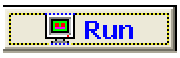
WARNING

When n is set to 5 ~ 6, since the data amount is more (Time axis is bigger), the moving speed of the image will become slower if users click Stop / Zoom in or zoom out / show all data in the screen and etc, there is no need to worry.

11.) Description. Users can quickly open the description file and know more about the operation and setting of the scope.

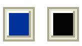
2. 【Scope Toolbar】:

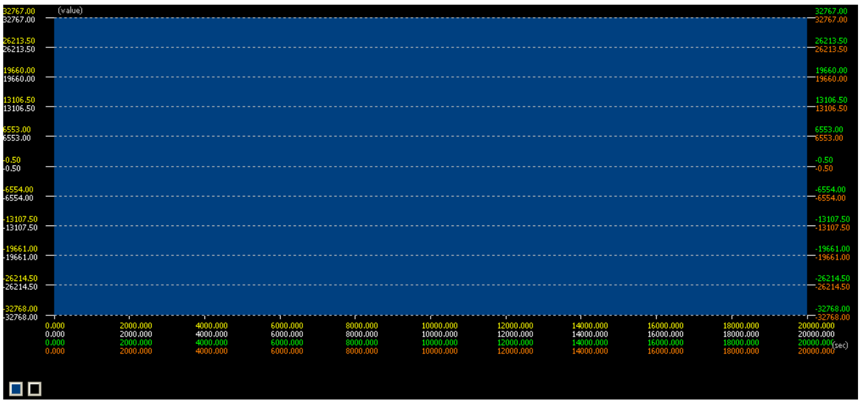
Users could use【Scope Toolbar】to operate scope:

Icon	Description
 / 	Click【Run】to capture data. Click【Stop】to stop capturing.
: Scope is not activated : Scope is operating : Scope stops operating : Communication error	Status indicator of the scope: when the light turns green, it means the scope works normally; when the light turns yellow, it means the scope stops capturing data; when the light turns red, it means something is wrong with the communication.
	It displays the current ASDA series servo drive that connects to ASDA-Soft. If the oscillograph is opened with a SCP (scope curve) file, this drop down list will automatically switch to the saved model.
	Users can write down notes in this column. The note will represent the description of each curve. When open the file next time, this column will show the notes.

3. **【Scope Screen】:**

X axis of the screen represents time. Unit is second (sec).
Y axis of the screen represents data. Y axis on both sides will be allocated according to the channel users select.
Data unit displayed in Y axis is marked with the same coordinates when in initial status. It is suitable for the monitor items which have the same unit. If the monitor items have different unit, it is suggested to use <u>【Show all data in the screen and adjust the max. / min. value automatically】</u>introduced by【Scope Toolbar】 to see the actual value.

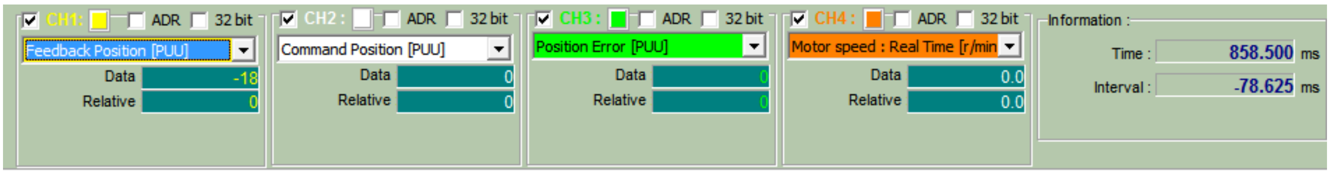
 at the bottom left corner of the screen is for change the screen ground color and the ground color of the graph.



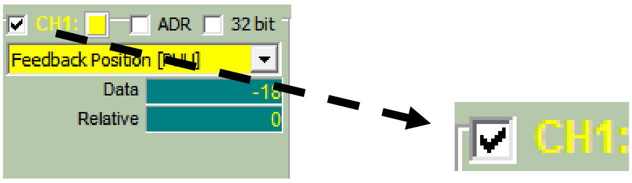
4.【Channel Setting】:

The flexible channel setting enables users to setup the access data according to different demand. ASDA-Soft also provides 【Data】and【Relative】 as well as【Time】 and【Interval】, so that users can quickly access the point.

Different ASDA series servo drive provides different monitor items. This manual only introduces the application of ASDA-A2 series servo drive. Followings are the description of the interface:

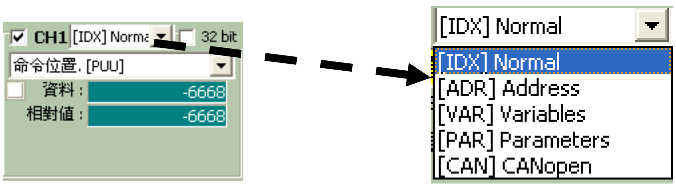


a). Check the channel



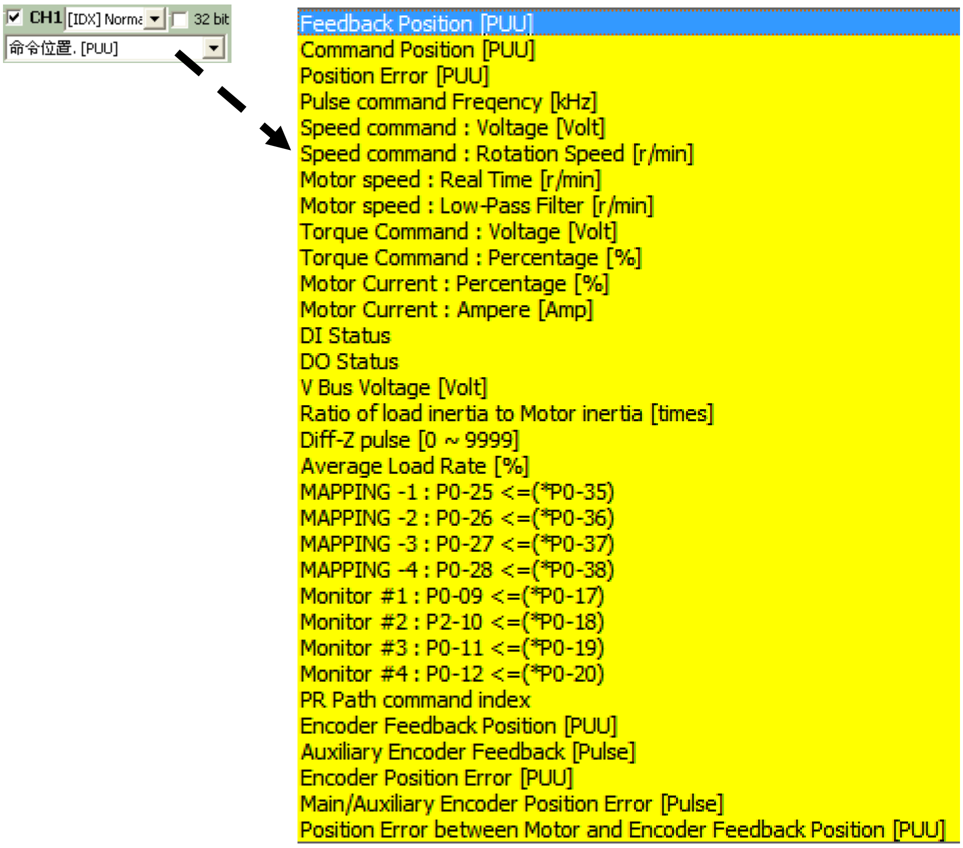
Users can select the desire channel.
The data amount and channel setting might be different because of different series of servo drive. Please refer to the descriptions below.

b). Select the command source



Users can select the command source from drop-down list:

【IDX】Normal: directly access the built-in monitor item. The current supported monitor item shall mainly base on ASDA-Soft V4.08.



【ADR】Address: Enter the specific position format can access monitor variable, parameter and CANopen Object. The unit is in hexadecimal. Followings are the descriptions of the setting format:

Monitor Variable	Specify Parameter	CANopen Object
0x100000**<u>XX</u>** **XX** = Monitor variable code Range: 0x00h ~ 0x7Fh	**0x20002<u>X</u> <u>YY</u>** **YY** = Parameter number **X** = Parameter group number	**0x20<u>XX</u> <u>YYYY</u>** **YYYY** = Index **XX** = Sub-Index
 Access monitor variable 0x01h	 Access parameter P1-44	 Access OB Index 60C1h, Sub 2

【VAR】 Variables: It can enter the specific monitor variable code. Unit is 0 ~ 127 in decimal.

The following example is the monitor variable which is set as【Feedback position (PUU)】.

Descriptions of monitor variables in sequence of code are as the following.

Code	Name of Variables / Attribute	Descriptions
000 (00h)	Feedback position (PUU) B	The current feedback position of the motor encoder. The unit is PUU (user unit).
001 (01h)	Position command (PUU) B	The current coordinate of position command. The unit is PUU (user unit). PT mode: it represents the pulse number the servo drive received. PR mode: the value of absolute coordinate from position command Equals to the pulse number sent by the controller.
002 (02h)	Position deviation (PUU) B	The deviation between the position command and feedback position. The unit is PUU (user unit).
003 (03h)	Feedback position (pulse) B	Current feedback position of the motor encoder. The unit is pulse (encoder unit).
004 (04h)	Position command (pulse) B	The current coordinate of the position command. The unit is pulse (encoder unit). The command that had gone through E-gear.
005 (05h)	Position deviation (pulse) B	The deviation between the position command and feedback position. The unit is pulse (encoder unit).
006 (06h)	Pulse command frequency B	Frequency of pulse command received by the servo drive. The unit is Kpps. It is suitable in PT/PR mode.
007 (07h)	Speed feedback B D1 Dec	Current speed of the motor. The unit is 0.1 r/min. The value is more stable since it has been though low-pass filter.
008 (08h)	Speed command (analog) B D2 Dec	The speed command is issued by analog. The unit is 0.01 Volt.
009 (09h)	Speed command (processed) B	The processed speed command. The unit is 0.1 r/min. The source might be analog, register or position loop.
010 (0Ah)	Torque command (analog) B D2 Dec	The torque command is issued by analog. The unit is 0.01 Volt.
011 (0Bh)	Torque command (processed) B	The processed torque (force) command. The unit is percentage (%). The source might be analog, register or speed loop.
012 (0Ch)	Average load B	The average load output by the servo drive. The unit is percentage (%).
013 (0Dh)	Peak load B	The maximum load output by the servo drive. The unit is percentage (%).
014 (0Eh)	DC Bus voltage B	Capacitor voltage after rectification. The unit is Volt.
015 (0Fh)	Inertia ratio B D1 Dec	Ratio of load inertia and motor inertia. The unit is 0.1 times.

Code	Name of Variables / Attribute	Descriptions
016 (10h)	IGBT temperature B	The temperature of IGBT. The unit is °C.
017 (11h)	Resonance frequency B Dec	Resonance frequency of the system, including 2 groups of frequency, F1 and F2. When monitoring via panel, pressing **SHF** can switch the display of both: F2 shows no decimal point while F1 shows one. When reading through communication (mapping parameter): Low-16 Bit (Low WORD) returns frequency F2. High-16 Bit (High WORD) returns frequency F1.
018 (12h)	Z phase offset B Dec	The offset between the motor position and Z phase. The range is from -5000 to +5000. If the position is the same as Z phase, its value is 0. The bigger the value is, the more the offset will be.
019 (13h)	Mapping parameter #1B	Return the value of parameter P0-25 which is mapped by P0-35
020 (14h)	Mapping parameter #2 B	Return the value of parameter P0-26 which is mapped by P0-36
021 (15h)	Mapping parameter #3 B	Return the value of parameter P0-27 which is mapped by P0-37
022 (16h)	Mapping parameter #4 B	Return the value of parameter P0-28 which is mapped by P0-38
023 (17h)	Mapping monitor variable #1 B	Return the value of parameter P0-09 which is the monitor variables mapped by P0-17
024 (18h)	Mapping monitor variable #2 B	Return the value of parameter P0-20 which is the monitor variables mapped by P0-18
025 (19h)	Mapping monitor variable #3 B	Return the value of parameter P0-11 which is the monitor variables mapped by P0-19
026 (1Ah)	Mapping monitor variable #4 B	Return the value of parameter P0-12 which is the monitor variables mapped by P0-20
039 (27h)	DI status (processed) Hex	The processed DI status of the servo drive. Each bit corresponds to one DI channel. The source includes hardware channel / software P4-07 which is determined by P3-06.
040 (28h)	DO status (hardware) Hex	The real status of Digital Output hardware. Each bit corresponds to one DI channel.
041	Drive status	Return the value of P0-46. Please refer to the

Code	Name of Variables / Attribute	Descriptions
(29h)		description of the parameter.
043 (2Bh)	CAP, data capturing	The Data captured by CAP hardware from the latest time Note: CAP could continuously capture many points.
048 (30h)	Auxiliary encoder CNT	The value of pulse counter from auxiliary encoder (CN5)
049 (31h)	Pulse command CNT	The value of pulse counter from pulse command (CN1)
050 (32h)	Speed command (processed) D1 Dec	The processed speed command. The unit is 0.1 r/min. The source might be analog, register or position loop.
051 (33h)	Speed feedback (immediate) D1 Dec	Current actual speed of the motor. The unit is 0.1 r/min.
052 (34h)	Speed feedback (filter) D1 Dec	Current actual speed of the motor. The unit is 0.1 r/min.
053 (35h)	Torque command (processed) D1 Dec	The processed torque command. The unit is 0.1 percent (%). The source might be analog, register or speed loop.
054 (36h)	Torque feedback D1 Dec	Current actual torque of the motor. The unit is 0.1 percent (%).
055 (37h)	Current feedback D2 Dec	Current actual electric current of the motor. The unit is 0.01 ampere (Amp).
056 (38h)	DC Bus voltage D1 Dec	Capacitor voltage after rectification. The unit is 0.1 volt.
059 (3Bh)	Pulse from E-Cam master axis (accumulation)	The accumulative pulse number of E-Cam master axis. It is the same as P5-86. A2L does not support E-Cam function.
060 (3Ch)	Pulse from E-Cam master axis (increment)	The incremental pulse number from master axis. The unit is pulse number per msec. A2L does not support E-Cam function.
061 (3Dh)	Pulse from E-Cam mast axis (lead pulse)	The lead pulse of E-Cam master axis which is used to judge the engaging condition. When it is disengaged: lead pulse = P5-87 or P5-92. When it is engaged: lead pulse = P5-89. When the value is 0, it will be disengaged. A2L does not support E-Cam function.
062 (3Eh)	The position of E-Cam axis	The position of E-Cam axis. Unit: The pulse is from the master axis. When the incremental pulse from master axis is P, the axis rotates M cycle (P5-83 = M, P5-84 = P). A2L does not support E-Cam function.
063	Position of E-Cam	The position of E-Cam slave axis.

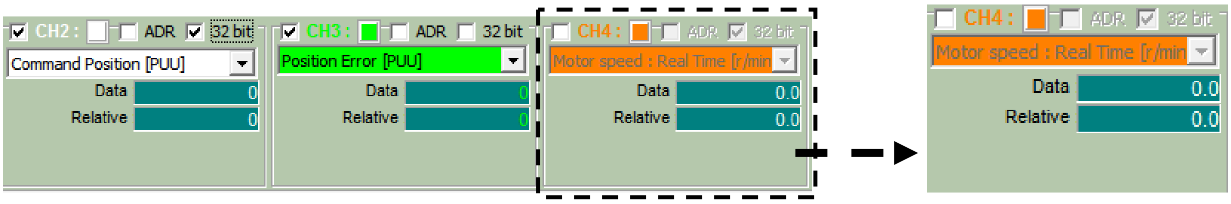
Code	Name of Variables / Attribute	Descriptions
(3Fh)	slave axis	Unit: PUU A2L does not support E-Cam function.
064 (40h)	Terminal register of PR command	In PR mode, the termination of position command (Cmd_E)
065 (41h)	Output register of PR command	In PR mode, the accumulative output of position command
067 (43h)	PR target speed	The target speed of path command in PR mode. The unit is PPS (Pulse Per Second)
068 (44h)	S-curve filter (input)	The input command of S-curve filter which is used to smooth the input command. It is effective in PR mode, E-Cam and speed command. A2L does not support E-Cam function.
069 (45h)	S-curve filter (output)	The output command of S-curve filter which is used to smooth the output command. It is effective in PR mode, E-Cam and speed command. A2L does not support E-Cam function.
076 (4Ch)	Speed command of PR contour	In PR mode, the programmed trapezoid speed curve is determined by the target speed, acceleration, deceleration and moving distance (before S-curve filter). The unit is PPS (Pulse Per Second).
081 (51h)	Synchronous capture axis Incremental input pulse	When synchronous capture axis is enabled, the received pulse number between two captures can be used to measure the real distance of Mark.
084 (54h)	Synchronous capture axis Deviation pulse number	The deviation between the real output pulse and the target pulse when synchronous capture axis is enabled. If it reaches the synchronization, the value will close to 0.
096 (60h)	Firmware version Dec	It includes two versions, DSP and CPLD. When monitoring via panel, pressing the **SHF** Key can switch the display of both: DSP shows no decimal point while CPLD shows one. When reading through communication (parameter mapping): Low-16 Bit (Low WORD) returns DSP version number. High-16 Bit (High WORD) returns CPLD version number.
098 (62h)	PLC scan time	The update time of DI/DO. The unit is 0.5 msec.
109 (6Dh)	The amount of data array	Returns the amount of data array. The unit is DWORD (32 Bits)

Code	Name of Variables / Attribute	Descriptions
111 (6Fh)	Error code of the servo drive	Error code of the servo drive: only for the control loop, not including the motion controller.
112 (70h)	CANopen SYNC TS (hasn't been through the filter)	The time the servo drive receives SYNC signal (TimeStamp) The unit is usec.
113 (71h)	CANopen SYNC TS (has been through the filter)	The time the servo drive receives SYNC signal and has been through the filter The unit is usec.
114 (72h)	CANopen timing synchronization	To synchronize the device timing with the controller during the operation. The unit is usec.
123 (7Bh)	The returned value when monitoring via panel	The returned value when monitoring via panel

【PAR】Parameters: Users can enter the desire accessing parameter. Parameter format can be divided into two kinds, 16-bit and 32-bit. If users desire to access 32-bit parameter, please check 

. The standard setting of channel data is 16-bit. Thus, when users check 32 bit to expand the amount of one channel, ASDA-Soft will automatically close another channel to support the selected one.

Channel 1 and 3 are in one group; while channel 2 and 4 are in one. For example, if channel 2 is set as 32-bit, channel 4 will be closed so as support channel 2:

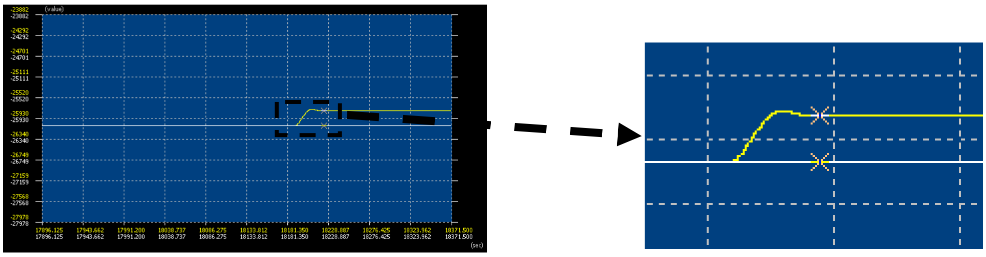


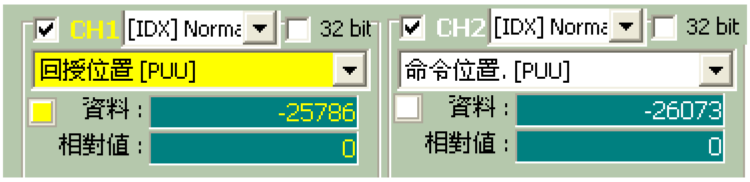
【CAN】CANopen: Users can enter the desire access CANopen objects data. Enter the specified accessing position, Index, then specify the flag position, Sub-Index.

For example, if Index is set to 60C1h, Sub-Index will be set to 02:

c). Data

The position data when cursor stops. See example below, when the cursor stops at one position, channel 1 and 2 will show the current coordinates.

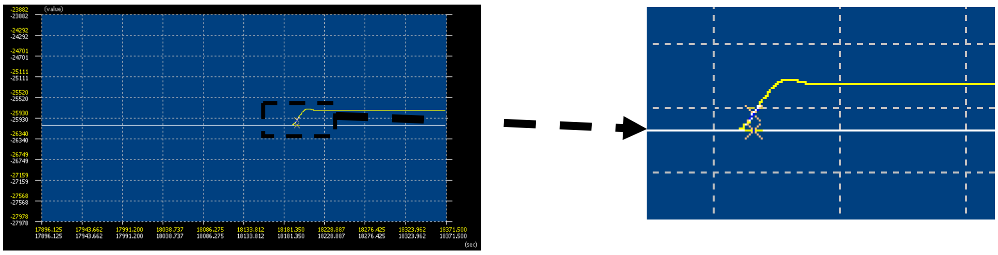


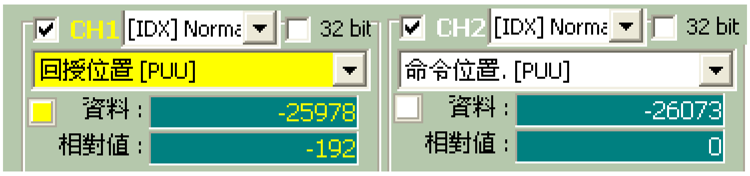


Click the cursor, the data will be fixed and the relative value will be set to 0.

d). Relative

It is the comparing value between the original data and current position data. When clicking the cursor, the relative value will be set to 0. Then, when the cursor moves around the curve, the system will automatically compare the value. Please refer to the following figures for description:





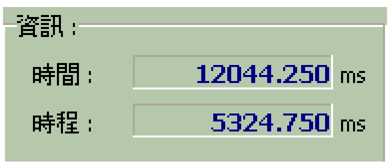
When cursor moves, the relative will show the comparing value according to the cursor’s current position.

e). Time

It is the time when cursor stops. Its operation method is similar to【Data】.

f). Interval

It is the comparing value between the homing time and stop time. Its operation method is similar to【Relative】.

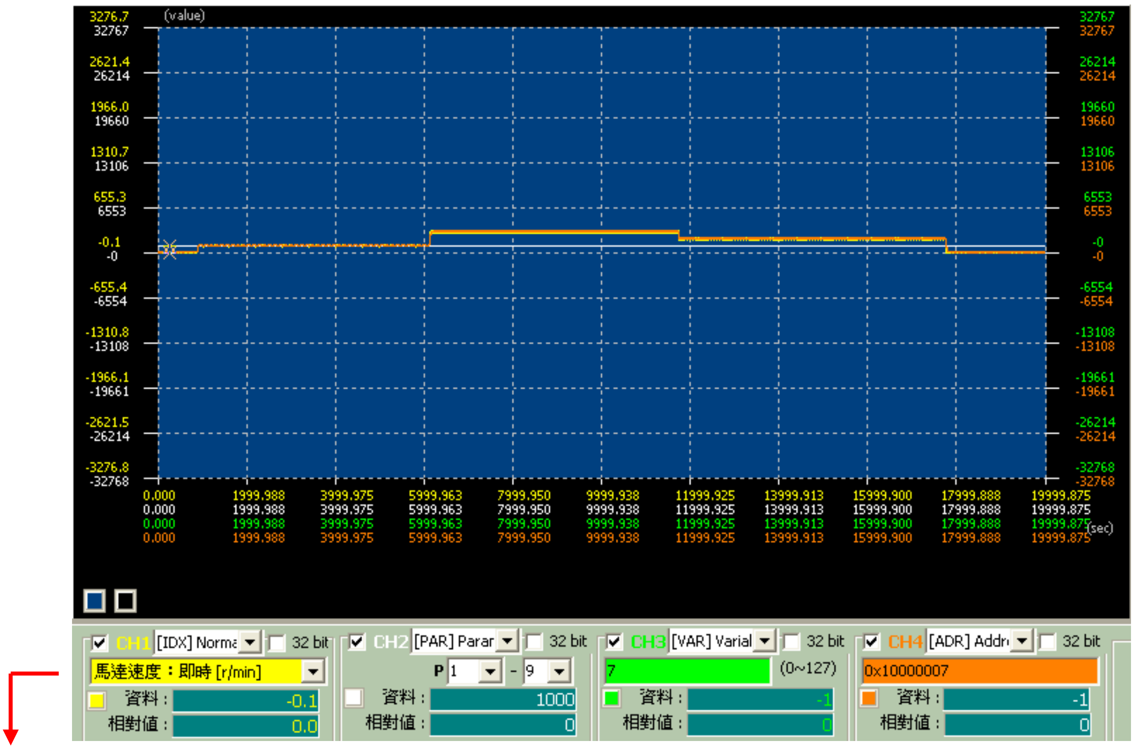


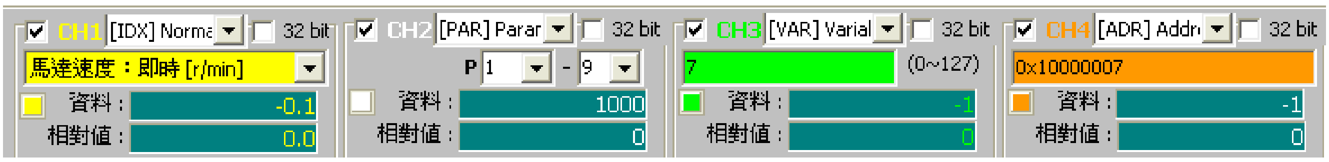
Operation

【**Description**】: Setup software scope of ASDA-A2 series:

Software scope function is introduced here with the following oscillograph. Its control mode is set to the internal speed mode (Sz mode). The scope can be used to make sure the change of speed command and motor speed.

Command: Use DI to switch three sections of speed command so as to control the motor speed. Set channel 1 as Motor speed: Real Time (r/min), channel 2 to access parameter, P1-09 (1st Speed Setting), channel 3 to access monitor variable, 07h (Speed feedback) and channel 4 to access monitor variable, 07h (Speed feedback).



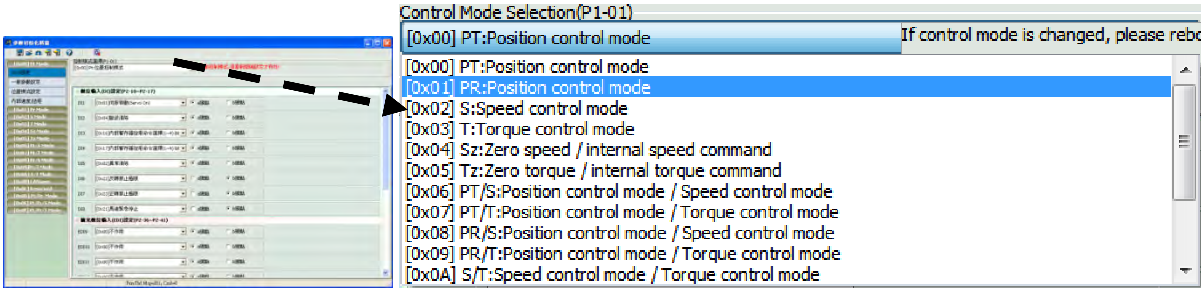


From this example, users could learn:

1. Setting of scope screen
2. How to capture the waveform
3. How to adjust the size of the waveform and the function of direction key
4. How to zoom in the special area or adjust the time range that desire to monitor
5. Save the captured waveform

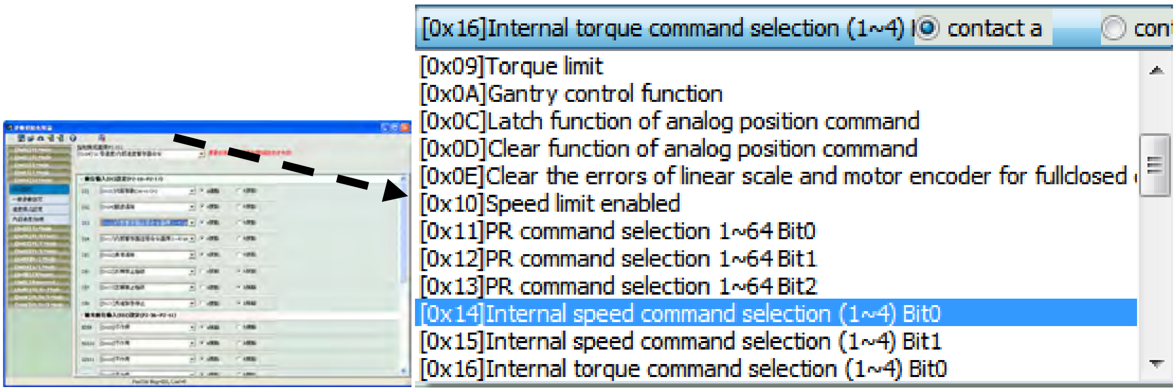
Followings are the parameter setting method of this example (Other functions will be detailed in later chapter):

1). Open software and make sure the connection is successfully built. Then, use  (Parameter Initial Wizard) to setup internal speed control mode.

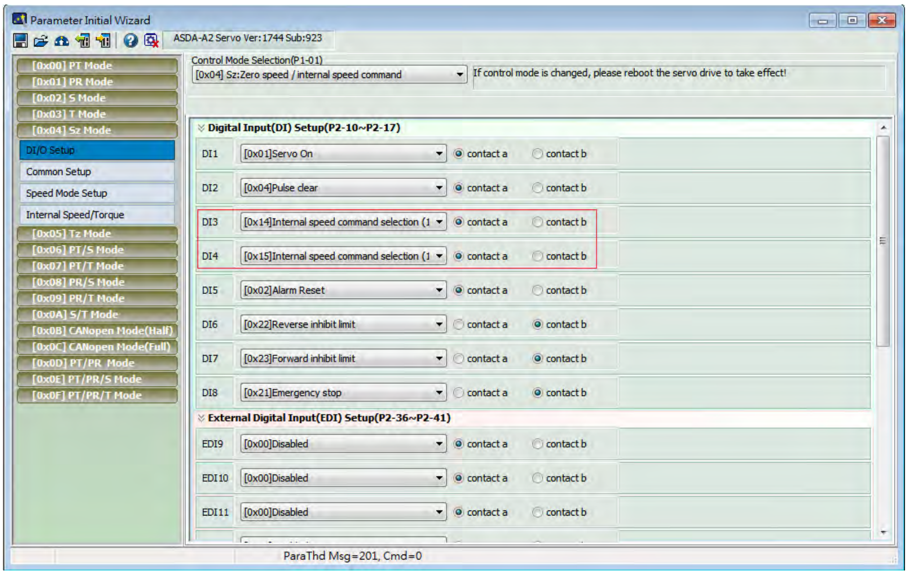


Use drop-down list to setup -- [0x04] Sz: Zero speed / internal speed command

2). Setup Digital Input (DI); DI3 and DI4 are used in this example:



Use drop-down list for setting -- [0x14] Speed command selection (1~4) Bit0
[0x15] Speed command selection (1~4) Bit1



3). After the setting is completed, please click (write to servo drive). The following window will pop up:

4). Click 是(Y), the setting will be written into the servo drive automatically. Then, a confirmation box will pop up:

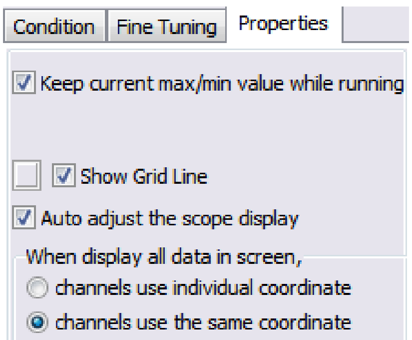
5). Click OK. Since the control mode has been changed, please disconnect the software communication and remove the communication cable. Then, re-servo On the servo drive.

6). After the servo drive is re-power on, users can directly click OFF LINE. The communication setting is complete.

Please refer to the following description for the setting method of scope:
Step 1, format setting of the screen:

Users have to firstly setup scope display form, including the setting of coordinate and coordinate status when capturing the waveform. See below for further explanations:

1.) Adjust the range of coordinate: Users can use 【Properties】, which is on the right of the window, to adjust the setting.



a. Keep current max./min. value while running

Check represents the initial value. It means every time when scope starts to capture the data, the max./min. value on Y-axis will be used as the capturing range. If users desire to return to the initial setting after capturing the waveform, please manually cancel this function.

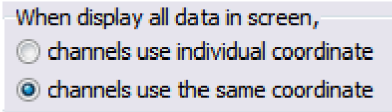
b. Show Grid Line

Check this function to show grid line on screen; the gray button in the front can be used to setup the color. Light gray is the default setting.

c. Auto adjust the scope display

Check this function to enable the software auto adjusts scope display form.

2.) Adjust the coordinate of each channel: Users can use the function under 【Properties】 to adjust the displayed coordinate of each channel:

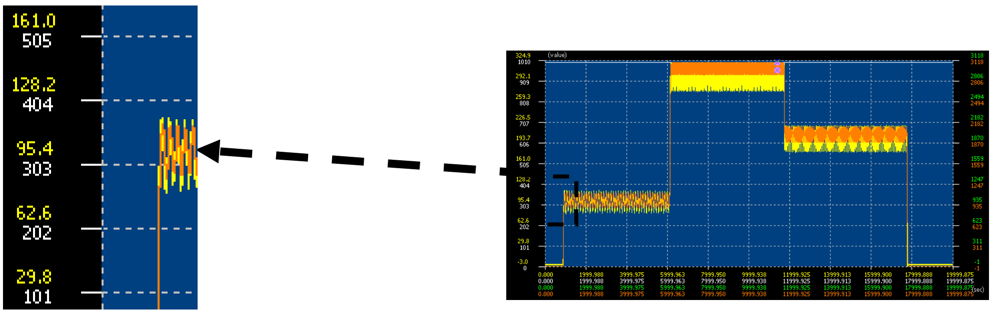


Select【**channels use the individual coordinate**】, means the value and time of each channel will be different according to different setting of monitor items.

Select【**channels use the same coordinate**】, means the value and time of each channel will be the same according to the same setting of monitor items.

This function is frequently used: When analyzing the waveform with different unit of monitor item, applying same coordinate might cause the incorrect proportion of the value. For example, when comparing the monitor item with PUU unit to the one with r/min unit, setting the same coordinate would result in incorrect proportion of the waveform.

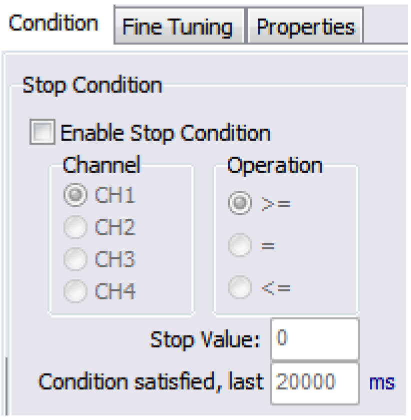
The coordinate of each channel in this example also needs to be adjusted. The waveform will be changed as below. Data in channel 1 and 2 of Y axis on the left has been adjusted to the one for each coordinate:



The default setting of this function is【**channels use the same coordinate**】. Please note that scope function will return to the default setting every time when the scope is re-opened.

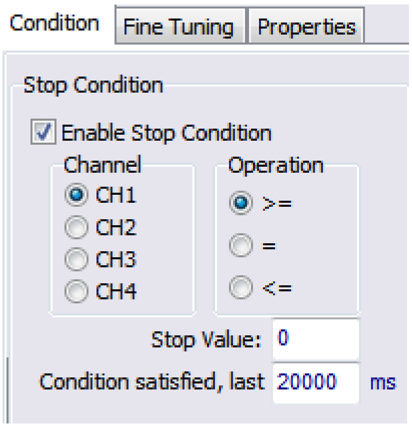
In addition, set the function as【**channels use the individual coordinate**】, please click  to adjust the screen to the proper size. Please note that if not to do so, after the setting of【**channels use the individual coordinate**】is complete, the waveform is still incorrect.

3.) Function of “Stop Condition”: In some specific condition, if users desire to setup auto stop capturing waveform, go to “Stop Condition”, which shown as below:



This function can individually setup the stop condition of each channel. See the following for the example:

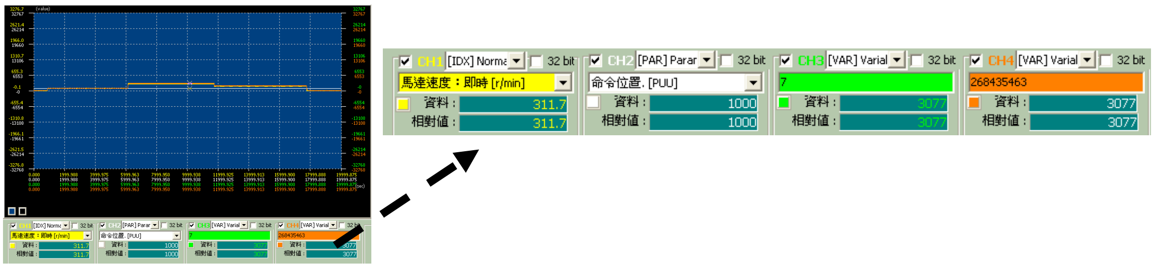
Check “Enable Stop Condition”, channel below can be setup.



Select the channel, e.g. channel 1 from the above example; then, setup the operation. Users can specify the status of each channel when stop capturing waveform by following methods:
Setup “Stop Value”: Users can setup the value to stop capturing waveform.
Setup “Operation”: Users can use “Stop Value” as the condition, then see if the value is bigger / equal >=, or equal =, or smaller / equal <= to stop waveform capturing.
Finally, setup “Condition satisfied, last”. With this function, the stop command will be issued after the delay time.

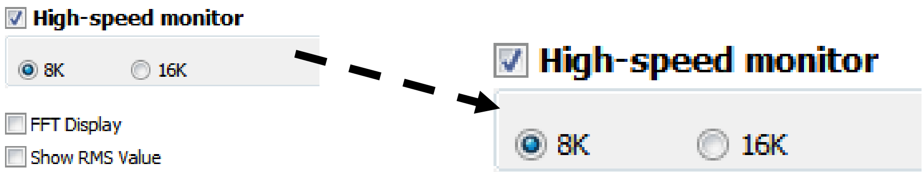
Step 2 Channel Setting:

Take ASDA-A2 series servo drive as the example, 4 groups of channel are supported.

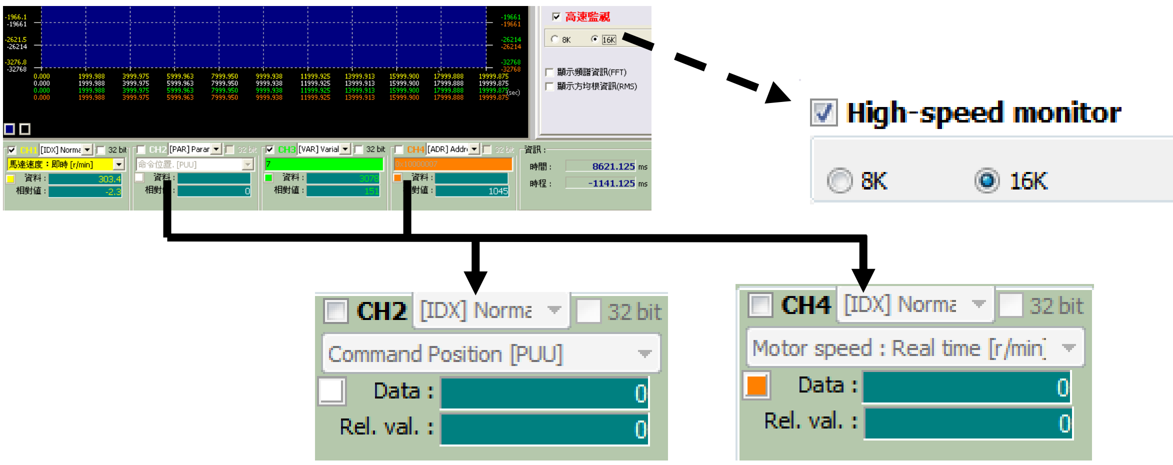


Users can refer to the previous chapter 【Channel Setting】 for the setting method of channel. The setting of different command input and parameter size (16-bit or 32-bit) must be accurate. Or the captured waveform will be incorrect.

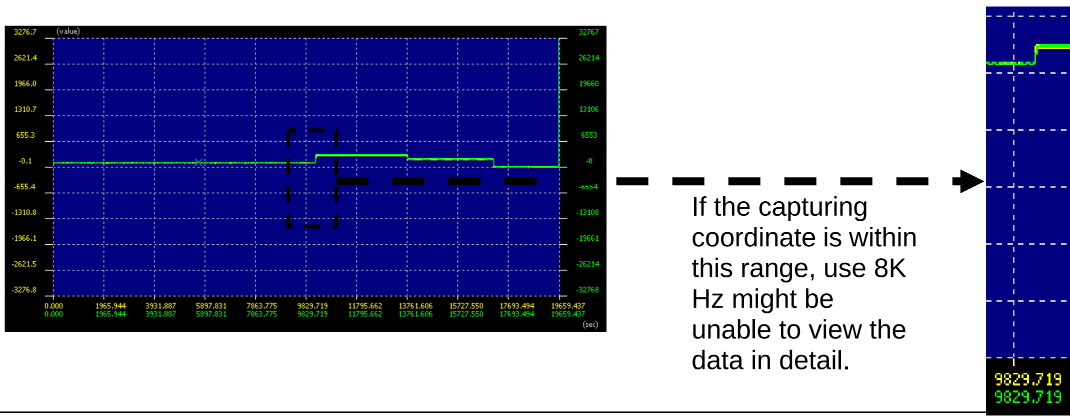
Special function: The channel width provided here is 8k Hz. Users can use the function of High Baud Rate, which is on the right of the window, for higher speed of communication (enhance the resolution to monitor the detailed movement):

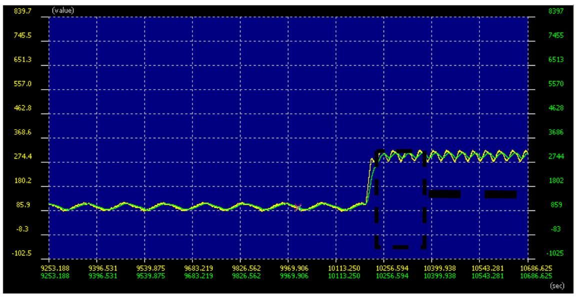


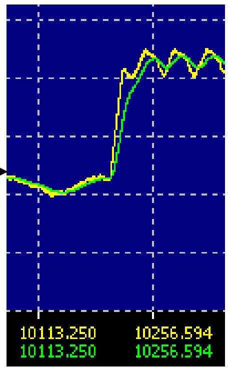
Its initial setting is 8k Hz, if check 16k Hz, channel 2 and 4 will be closed automatically. This is because the system has to share the bandwidth to channel 1 and 3.



If users apply zoom in function, the zoom in area will be different from the one when in full screen.



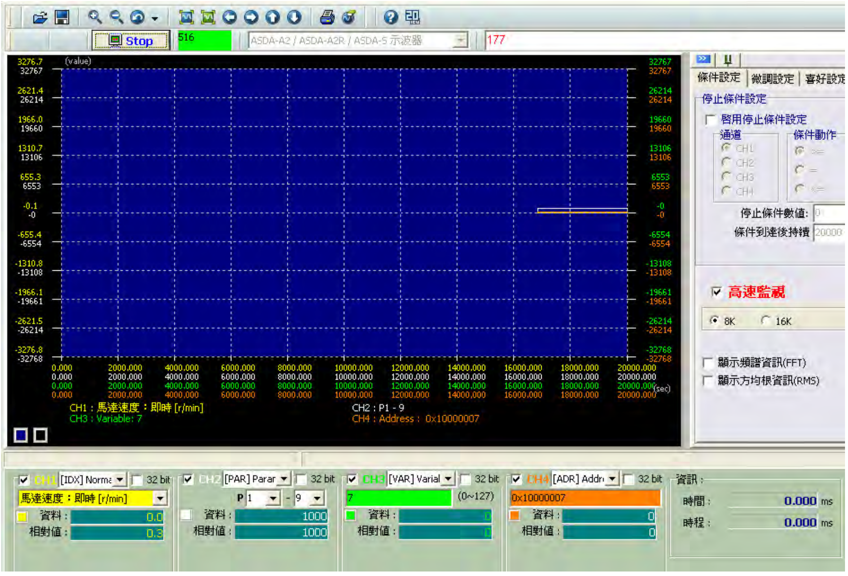




The resolution is better with the width of 16K Hz, users can also magnify the wave for viewing.

Step 3 Start to capture the waveform:

After the setting of screen and channel is complete, click Run to start to capture the waveform.

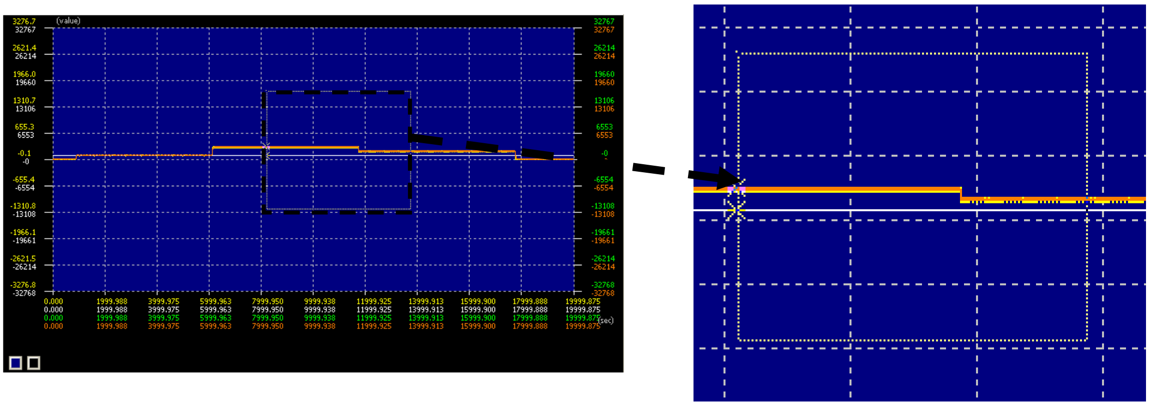


The distance and range of the captured waveform can be manually control according to different control mode and actual operation distance. Users also can use the function of “Stop Condition” to stop capture. Click Stop, the screen will stop capturing and will automatically adjust to the coordinate format which is set by the user.

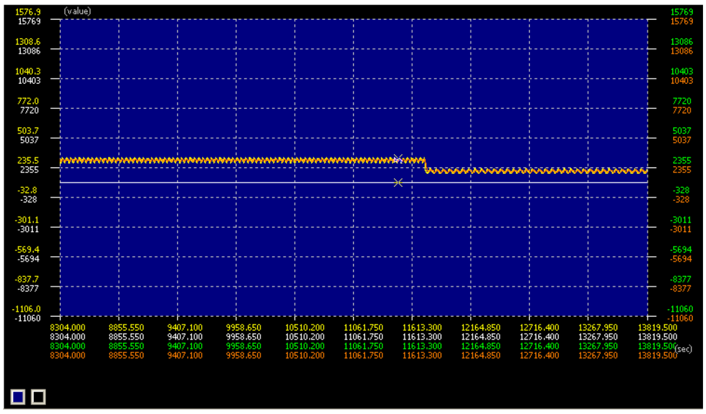
Step 4 Zoom in and zoom out the waveform:

The above chapter introduces the basic way to zoom in and zoom out the waveform. However, the most common way is to border select the analyzing area to monitor the curve. For example:

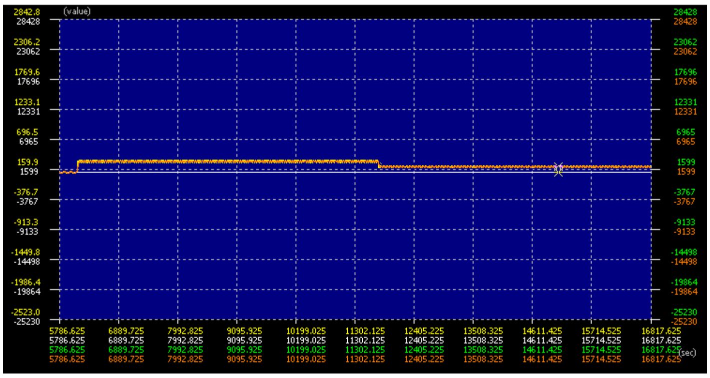
a.) Use left mouse button as the start point, starting from the top left, and border select the area towards the bottom right corner.



b.) After releasing the left mouse button, the screen will automatically adjust to the selected area in full screen.



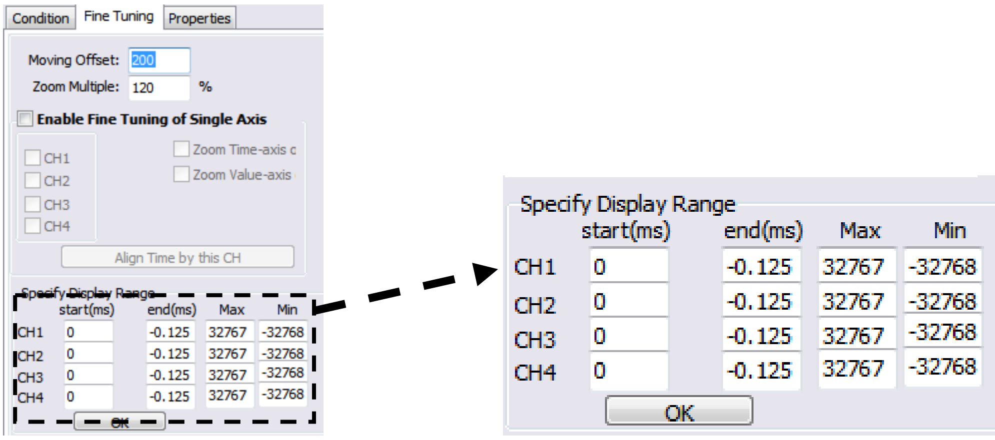
c.) If desire to zoom out the screen, double click the left mouse button will do.



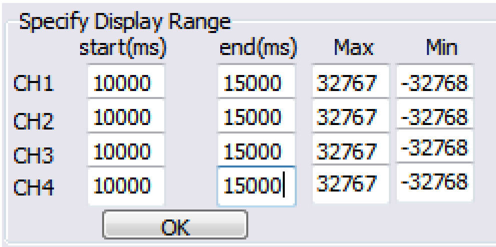
It is an easy way to quickly monitor the waveform and can freely change the monitor coordinate.

When users are accessing values from more than one channels, if desire to specify the range in one or all channel, “Fine Tuning” on the right can be applied.

a. Click “Fine Tuning”:

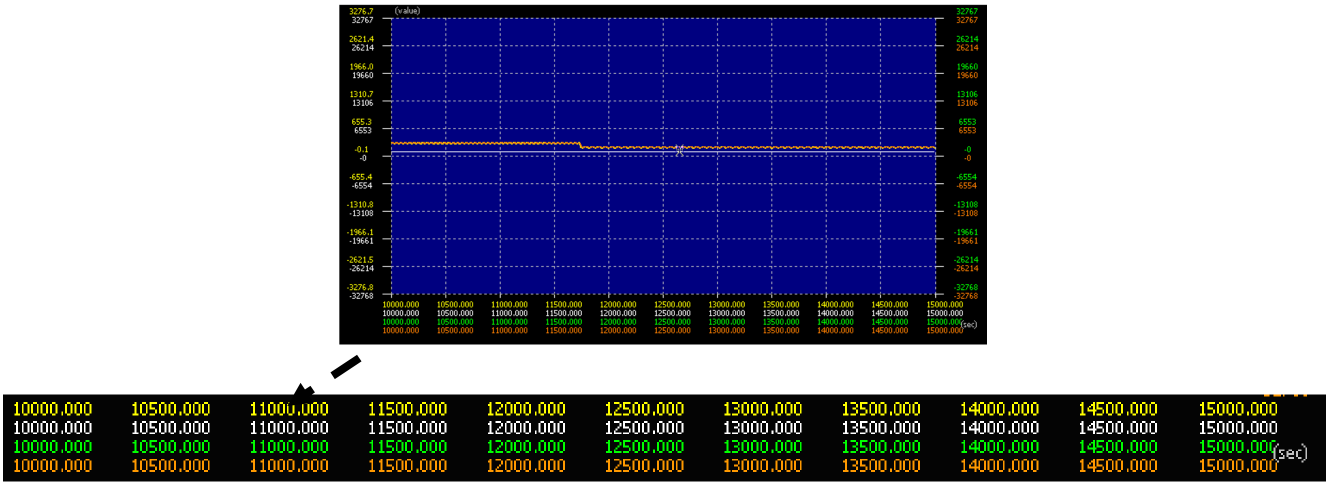


b. Setup the range of “Start” and “End”; For instance, set the displayed range as “10000 ~ 15000” for all channels.



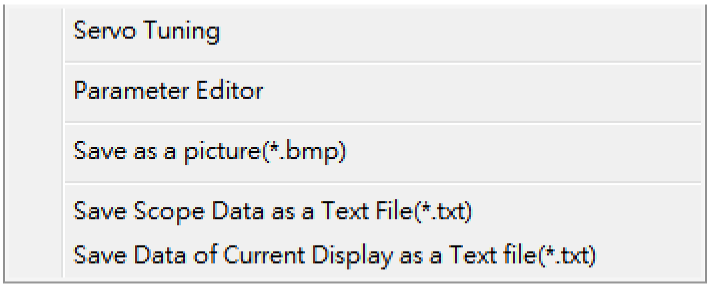
Click 

, the screen will be adjusted to the setting range automatically.



【Other Functions Application】: By the above mentioned four steps, users can easily capture the waveform and complete the related settings. Some other special functions are introduced in later parts:

- Right click the screen, the window below will pop up:



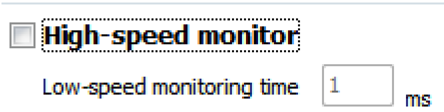
【Servo Tuning】: Click to enable the function of "Auto Gain Tuning".

【Parameter Editor】: Click to enable Parameter Editor.

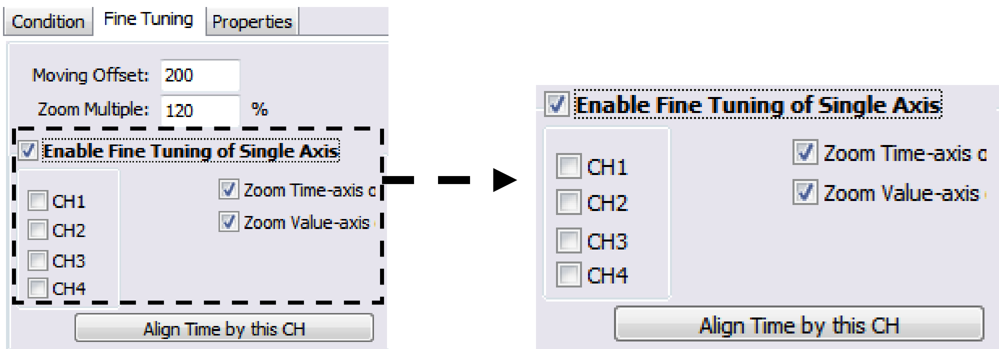
【Save as a picture (*.bmp)】: Click to save it as a BMP file.

【Save Scope Data as Text File (*.txt)】 / **【Save Data of Current Display as Text (*.txt)】**: Click to save it as the TXT file.

- If the computer's performance runs slow, High Baud Rate might slower the whole operation. Uncheck High-speed Monitor at the moment and change the channel width to 1ms (1kHz). Then, do the preliminary analysis with fewer sampling point first.



- If users desire to move, zoom in or zoom out the specific channel, enable Single Channel Fine, which is under Fine Tuning, will do.

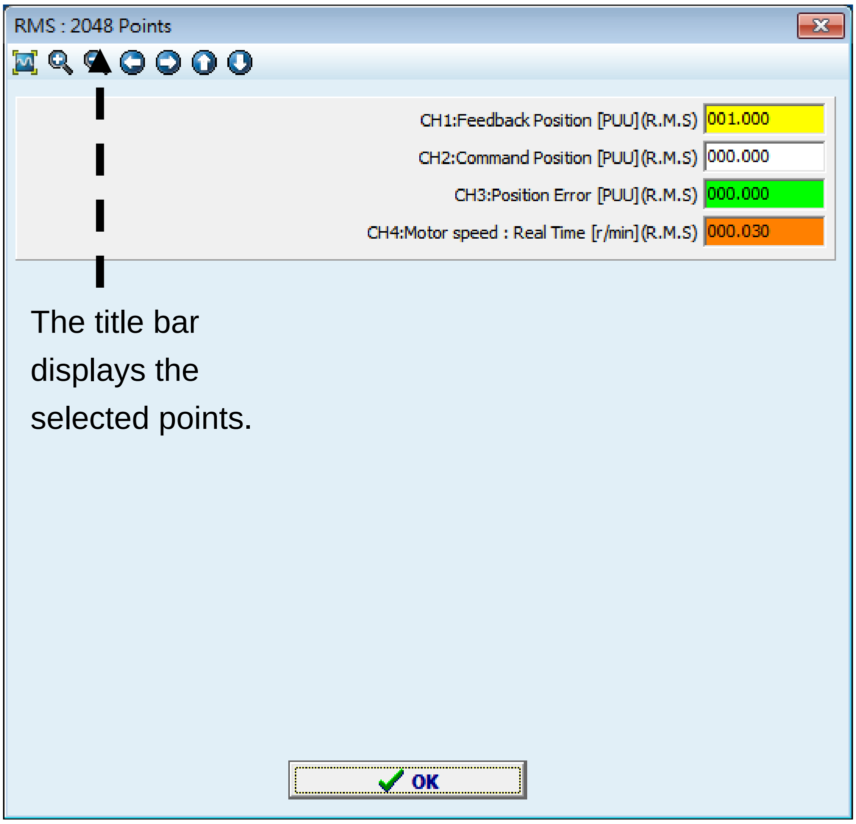


Enable Single Channel Fine:

- Check: It means the system only zooms and moves the selected channel.
- Uncheck: The system zooms and moves all channel.

- Only Zoom Time: If uncheck this function, range of Time (X axis) will not be changed when zooming or moving.
- Only Zoom Value: If uncheck this function, range of Value (Y axis) will not be changed when zooming or moving.
- Match Time by this CH: Click this, the time of other channels will be set to the same as the selected one.

- If users desire to acquire the mean deviation of the selected channel value through root mean square calculation, please check **Show RMS Value**, and use left mouse button to border select the range. Then, the software will pop up the calculation result:



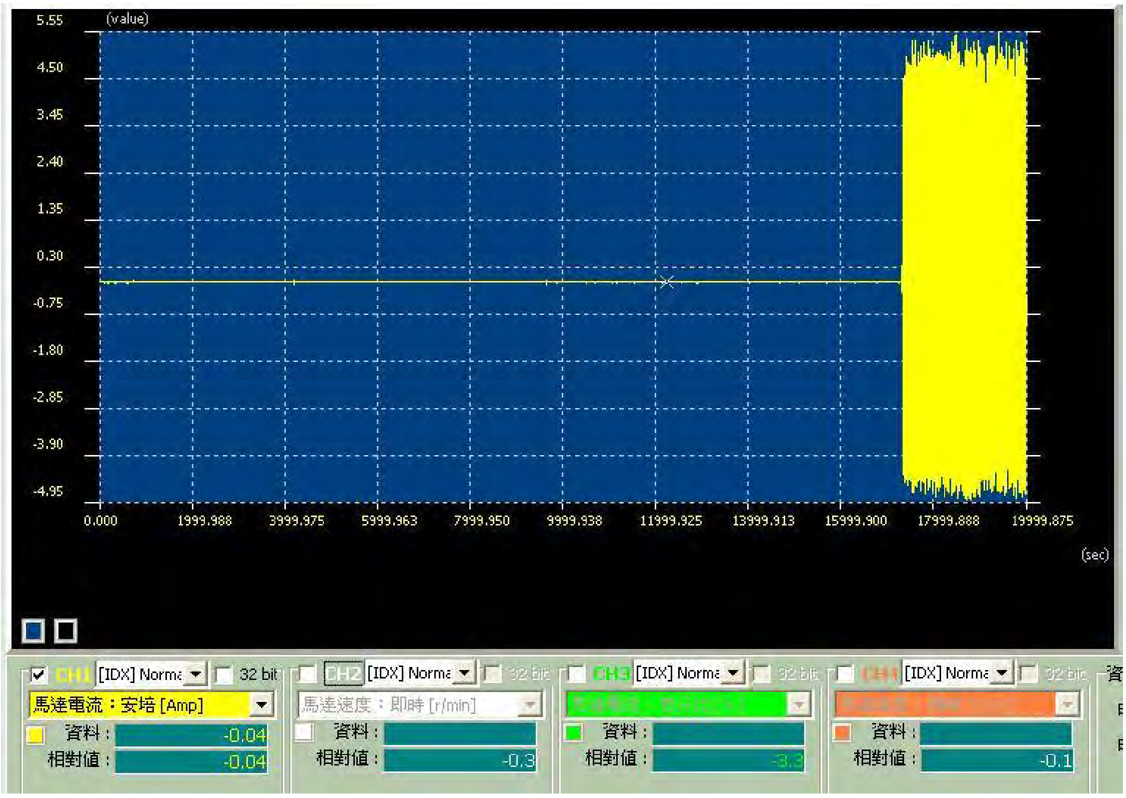
Spectrum Analysis (FFT)

The analysis of resonance point is conducted by spectrum analysis (FFT). The so called spectrum analysis (FFT) uses the mathematic operation of **Fast Fourier Transform** to find the resonance point. The servo drive fetches (offsets) resonance point by notch filter and to smooth the curve. The unit of the vibration value is decibel (dB). Its calculation formula is $N(\mathrm{dB}) \equiv 20 \times \log_{10}\left(A/A_{ref}\right)$. Please refer to the related documents for further information about Fast Fourier Transform.

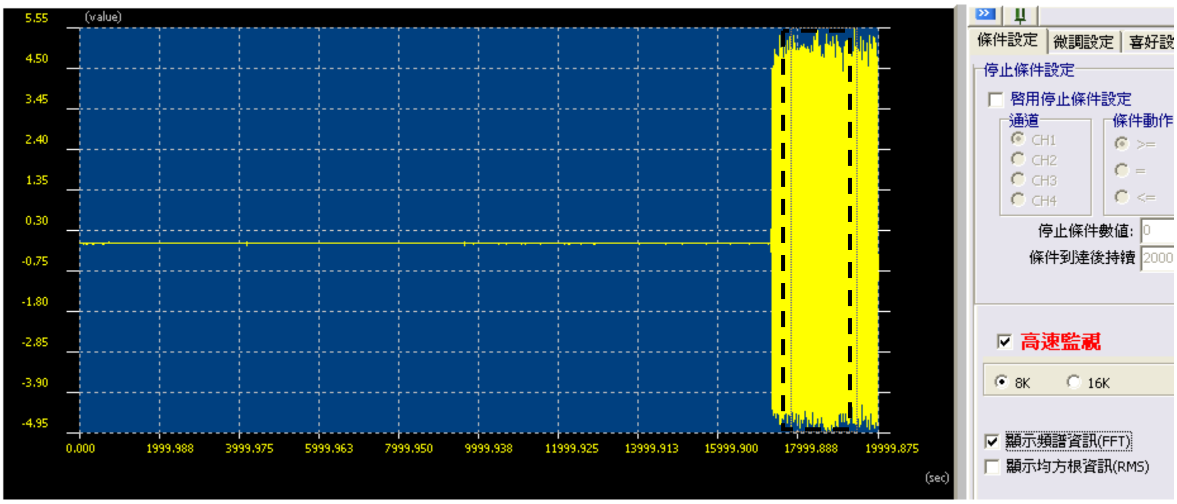
In real situation, during operation, when resonance (or vibration) occurs, it is probably because the stiffness of the control system is too strong or the resonance is too fast. Eliminating these two factors might improve the situation. If both have been checked and still cannot suppress the resonance, this function of FFT display can fetch the waveform during operation so that users can analysis the resonance point.

Followings are the operation description:

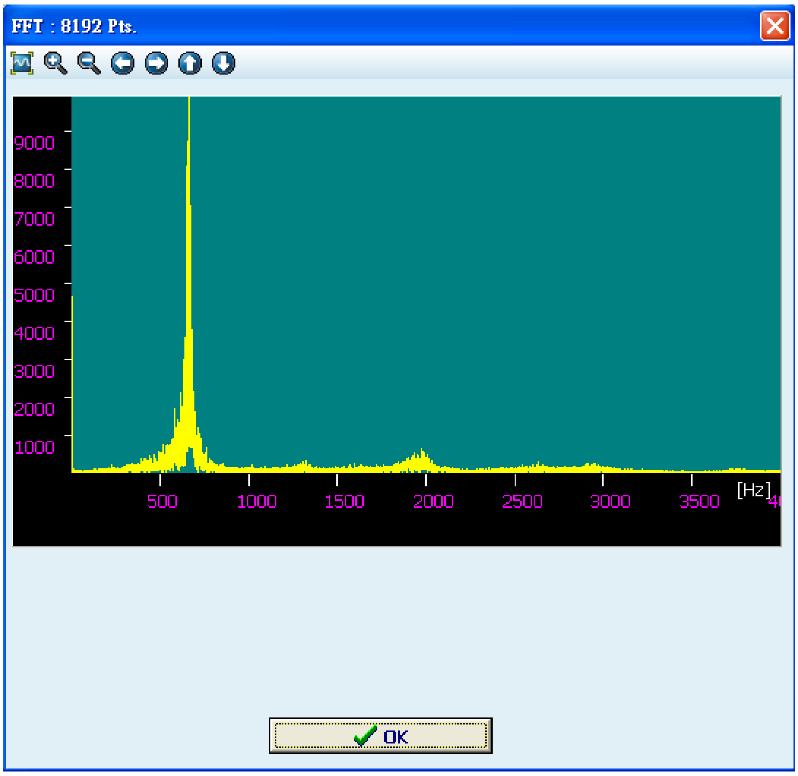
Step 1: When desire to fetch the waveform, please set one of the channel as “motor current”. Then, operate the mechanism and activate the scope for monitoring. Stop the scope and motor once the resonance occurs.



Step 2: Check FFT Display, then use left mouse button to border select the range of resonance.



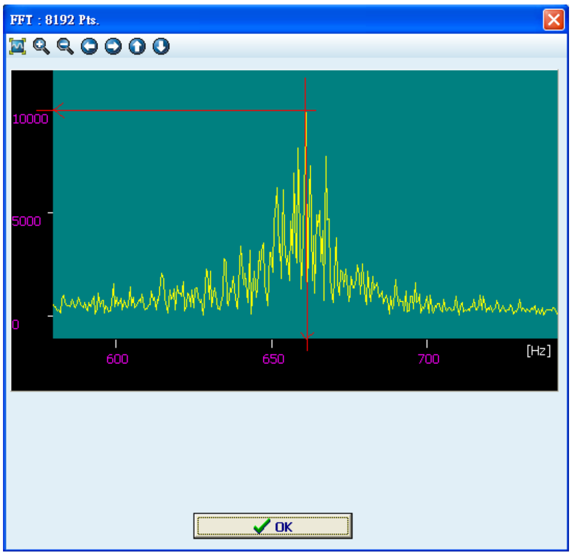
Step 3: Release the left mouse button, a FFT window will pop up automatically.



Axis Y represents the strength of resonance gain (output); The corresponding value is the relative unit.

Axis X represents frequency. Range is between 0 and 4,000 Hz.

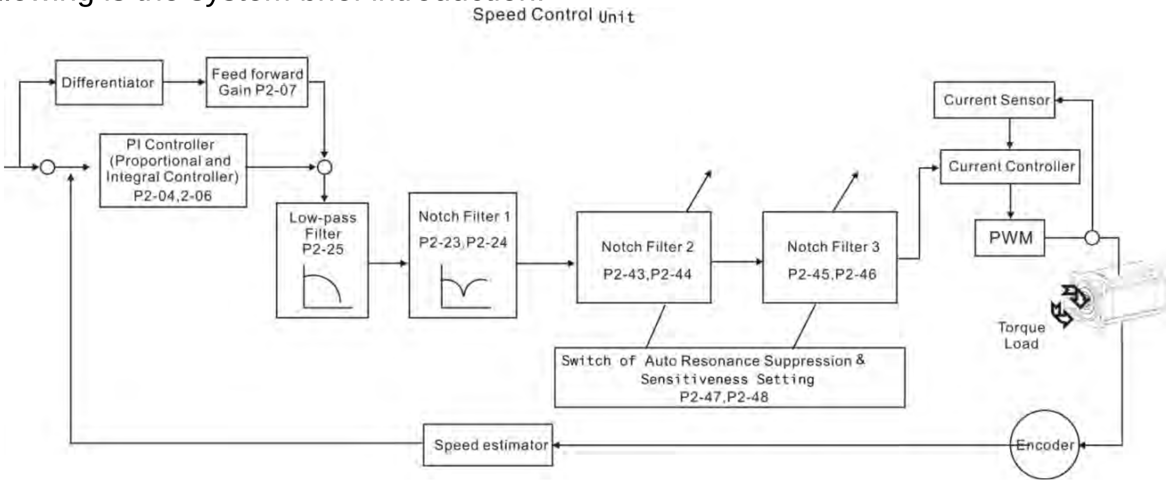
Step 4: Users can zoom the screen via toolbar . However, it is suggested to directly border select the resonance point, then analysis it with the relative value, which is on the right. From the above example, zoom in the frequency domain, we could find the highest resonance point is at the position of 660Hz, relatve value is about 10,000.



Step 5: Before the introduction of setting resonance suppression via software, here comes the parameter definition first.

If resonance frequency is acquired via step 4, users may setup notch filter to eliminate the resonance. ASDA-A2 servo drive provides 3 sets of notch filter: the first one is manual setting (P2-23), which sets the frequency between 50 and 1,000Hz; the second set (P2-43) and the third set (P2-45), which set the bandwidth from 50 to 2,000Hz. The suppression strength of three sets (P2-24, P2-44 and P2-46) is 32d.

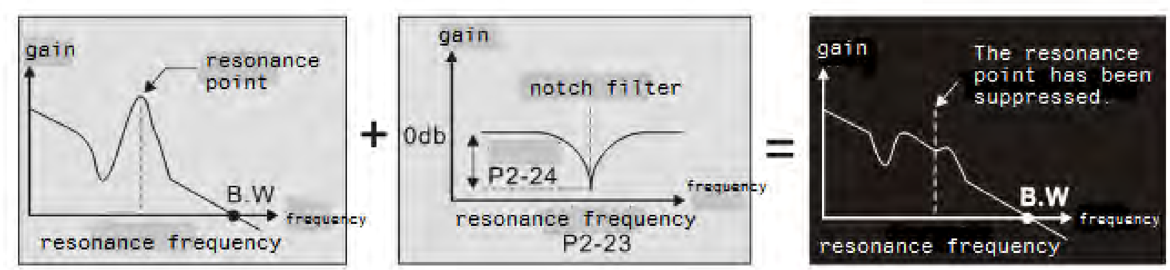
The Following is the system brief introduction:



If the resonance frequency is over 2,000Hz, it means the response frequency and gain value have exceeded the one the mechanism can take. It is suggested to reduce both, and then re-do FFT analysis.

The following diagrams are the system of open-loop gain with resonance. Notch filter can be used to suppress the resonance.

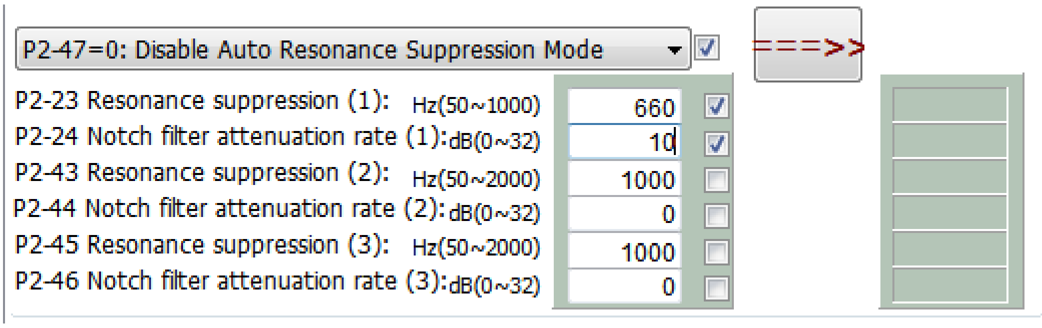
Resonance suppression with low-pass filter



Step 6: The resonance point is at 660Hz, the relative value is 10, 000.

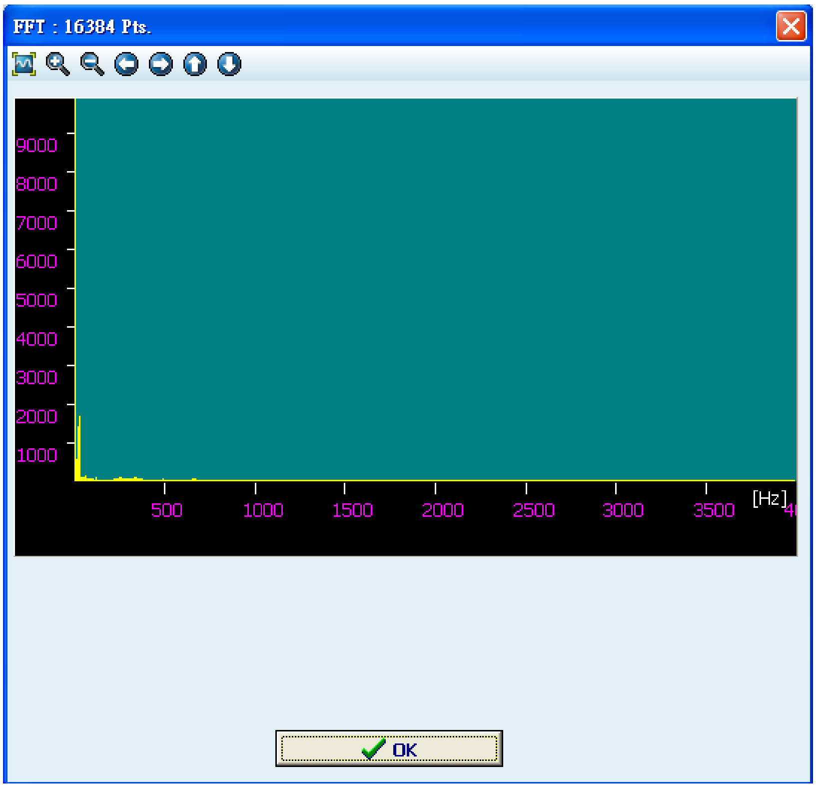
In frequency domain, software is unable to fetch the relative signal value (input and output) simultaneously, thus, it is suggested to regard the frequency point as the main parameter. Then, gradually adjust the value starting from 10dB.

Thus, use the function of resonance suppression under , Auto Gain Tuning:



Step 7: Follow the way from above figure to setup parameter (resonance suppression). Then, click ===>> to download the parameter into the servo drive.

Step 8: Repeat the steps from step 1 to 7 and watch the change of frequency domain until the resonance has been suppressed. Conduct FFT analysis with the normal frequency domain. Users shall acquire the following waveform.



Others:

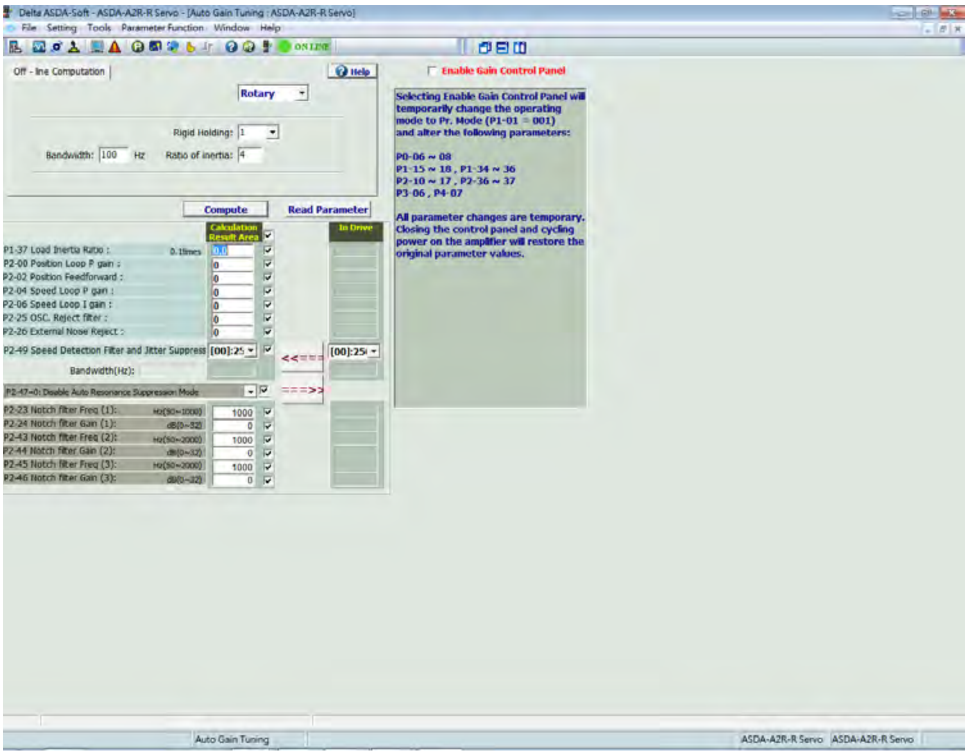
- Number on title bar (FFT：16384 PTs.) represents the data number within the selected range. Bigger number means better resolution. Please keep the number over 512 points.
- The spectrum figure can be saved as BMP file. Right click the mouse when the cursor is on FFT Display. A pop-up function list will appear. Please click 存成BMP圖檔(*.bmp)(B), then select the file name will do.

3.2 Auto Gain Tuning

Users can auto adjust the gain value of control loop via [Auto Gain Tuning] provided by ASDA-Soft. Followings are its main features:

- Fill in the data of bandwidth, inertia ratio and rigid holding to compute the gain value. Then, the value will be downloaded into the servo drive for testing.
- Through the motor speed and travelling distance (distance between two points), users can estimate the inertia during operation. Use the average inertia value to compute the relative gain value of control loop.
- Manually enter all related gain value. This is for a higher level of engineer for advanced setting.
- For the adjustment of resonance suppression, users can setup parameters after acquiring the resonance position and value from the scope.

Figure below is the main screen after enabling scope function:



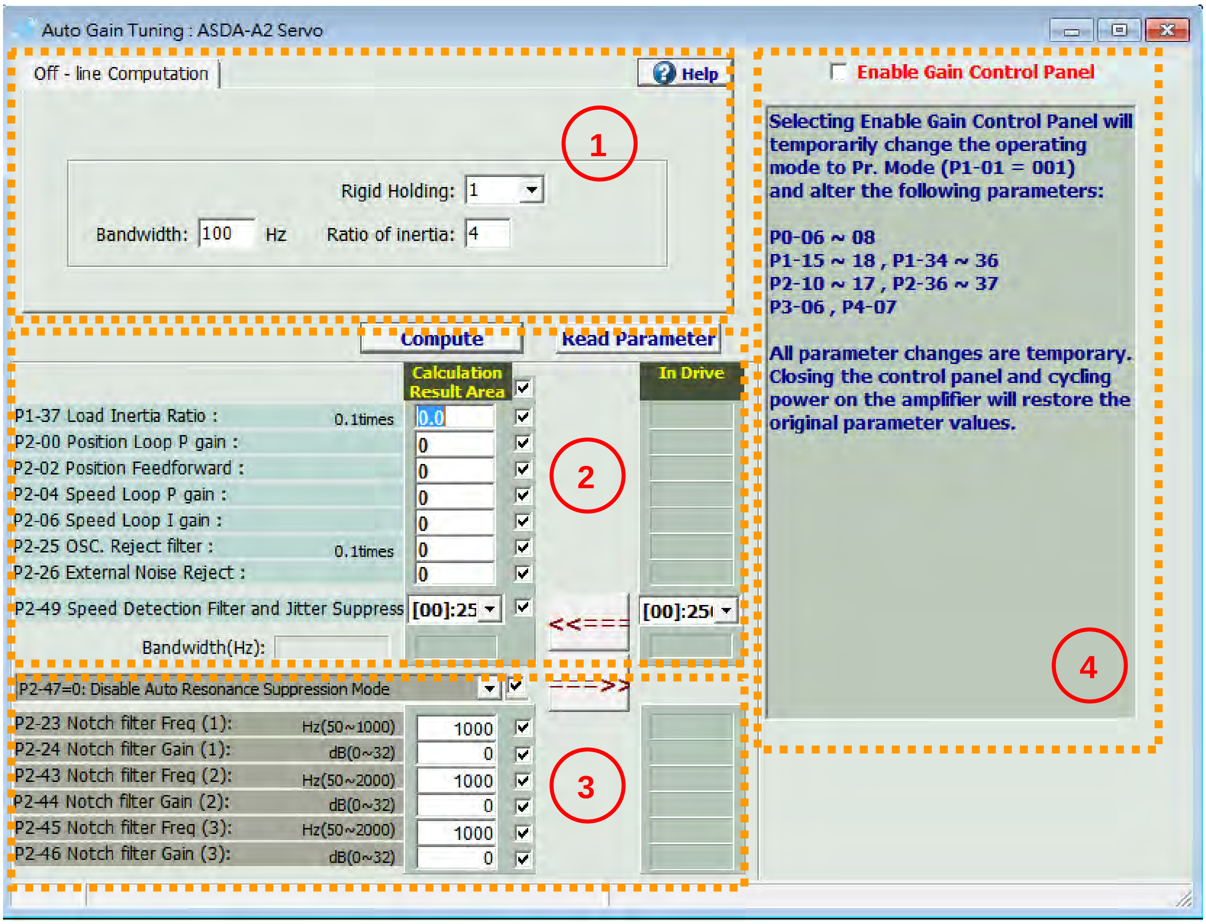
This section will be divided into two parts:

【**Interface Introduction**】: It detailed describes the function of auto gain tuning.

【**Description of Tuning**】: It describes the setup tuning procedures, including the setting of motor speed, operation distance and inertia estimation.

Interface Introduction

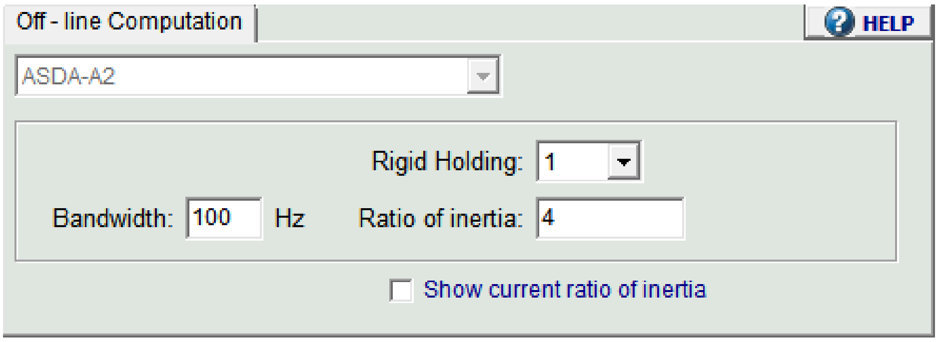
【Screen Analysis】:

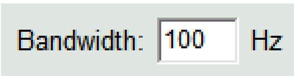
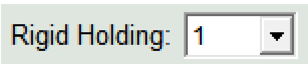
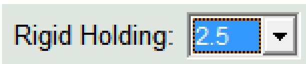
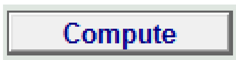
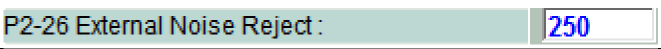
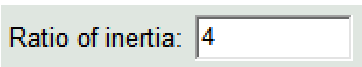


1). Setup low-frequency stiffness, response bandwidth and inertia ratio.
2). Setup each gain value and upload/download the gain value.
3). Setup three parameters of resonance suppression.
4). “Enable Gain Control Panel”

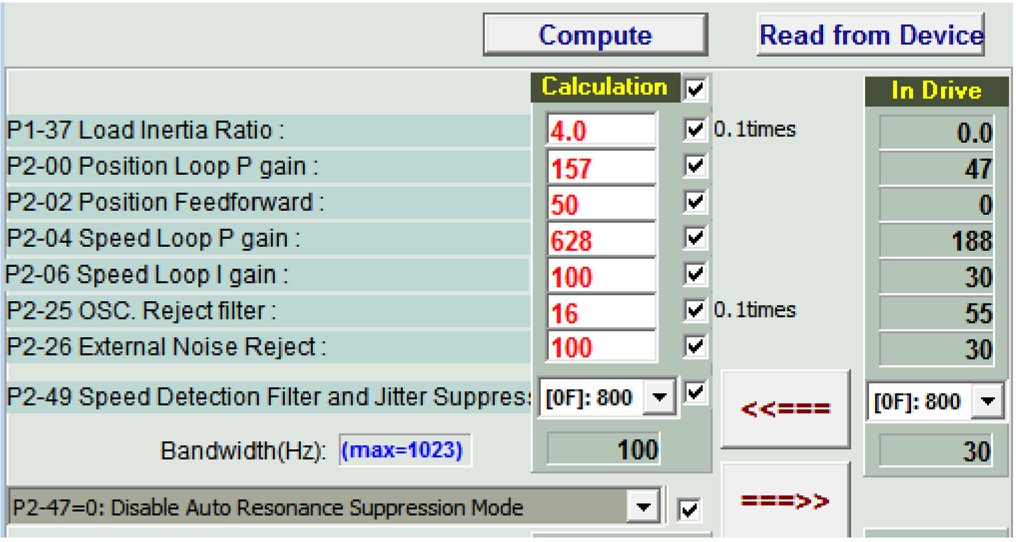
Followings are the description of each item:

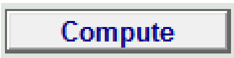
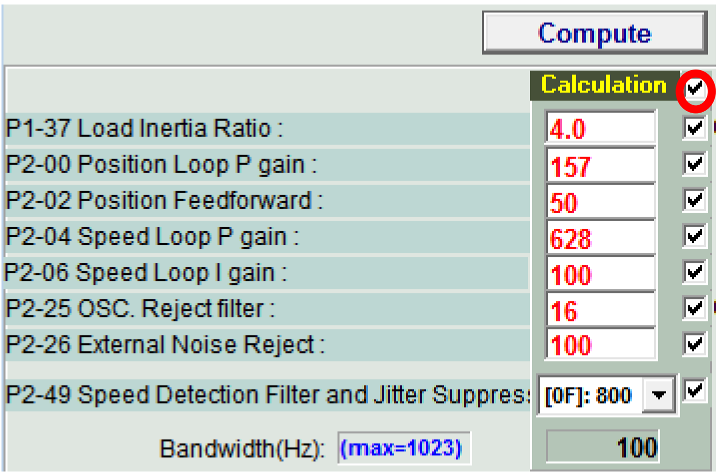
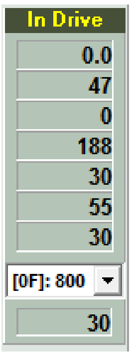
[Window for setting motor type, low-frequency stiffness, response bandwidth and inertia ratio]

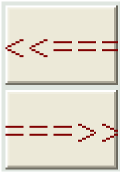
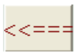
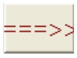


Icon	Function Description
	Setup response bandwidth of the servo drive. Users can also manually modify the value. After tuning, value will be displayed in this column.
	If the stiffness is not enough, when the position command is complete, the drive end still vibrates even when the motor almost stops. The adjustment will influence the value of P2-06 (Speed Integral Compensation) and P2-26 (Anti-interference Gain): Adjust the value of [low-frequency stiffness]. Use the value x 100 to setup P2-06 and P2-26. For example, Setup  . Click  , then the following two parameters will be:  
	Setup the inertia ratio of the servo drive. After tuning, value will be displayed in this column.

[Window for setting each gain value]

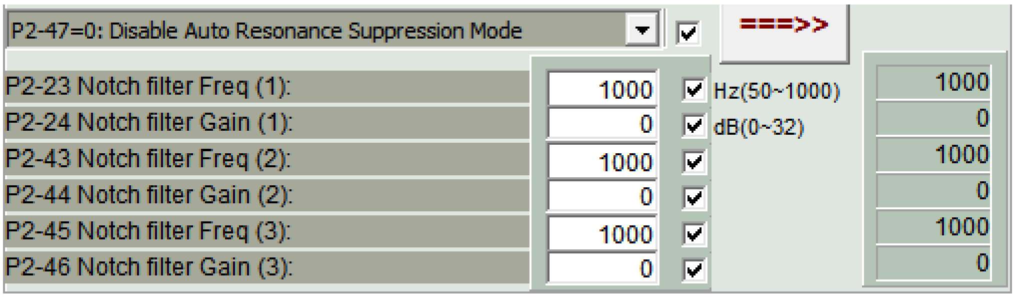


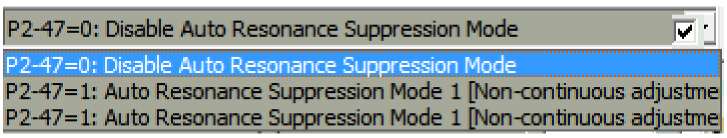
Icon	Function Description
	When all parameter setting is complete, click this to compute the gain value.
	This button can be used to read parameters from the servo drive.
	Click , the computing result will show in this area. In addition, users can determine if the modified parameters will be downloaded into the servo drive. The check box highlighted in red means users can select or cancel all parameter.
	Click , the gain value of the servo drive will be uploaded to this window.

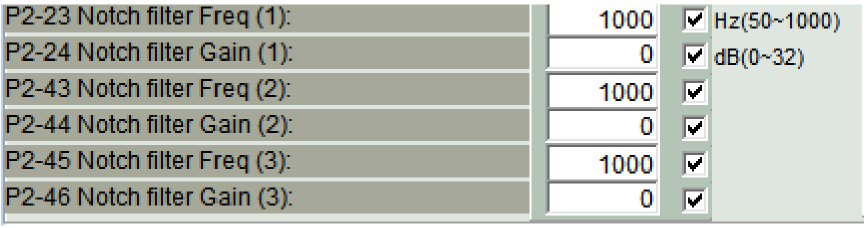
	Users can use these two buttons to upload and download the parameter:  : Upload the parameter from servo drive to .  : After computing, download the parameter to .

[Setup three parameters of resonance suppression]

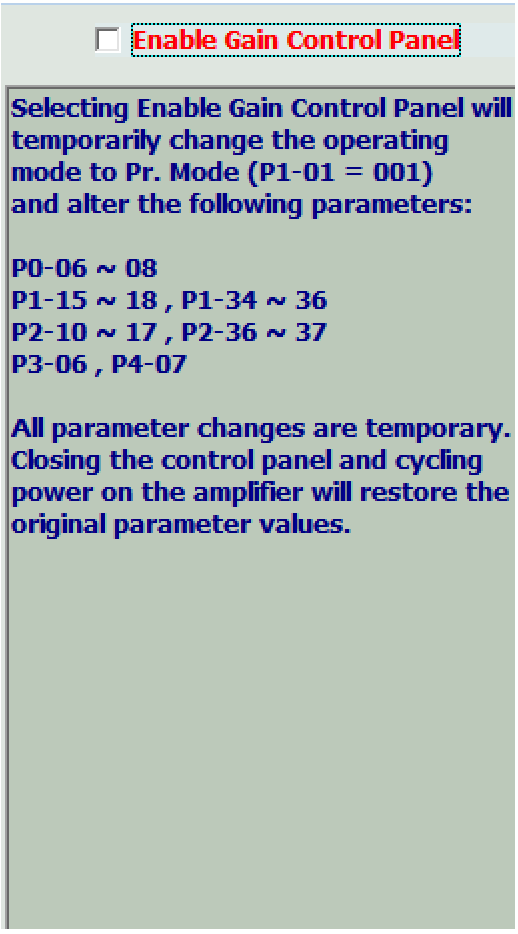
Use FFT to analysis the resonance position and value, users can setup three parameters of resonance suppression here.



Icon	Function Description
	Setup resonance suppression mode from drop-down menu; P2-47 provides three methods: **When the value of P2-47 is set to 0:** Users can manually setup three parameters of resonance suppression. **When the value of P2-47 is set to 1:** Auto resonance suppression. When the system is stable, the value will return to 0 automatically and the system will store the resonance suppression point; if not, it will re-estimate when re-power on or when the value is 1. **When the value of P2-47 is set to 2:** Continuous

	adjustment. When the system is stable, it will store the resonance suppression point, if not, it will re-estimate when re-power on.
	Users can setup three parameters via P2-47 that mentioned above. When P2-47 is set to 1 and 2, the 2nd and 3rd parameter of resonance suppression will be unable to setup. These two parameters will be set as auto estimation.

[Open the window of "Enable Gain Control Panel"]

Icon	Function Description
	Check ☐ Enable Gain Control Panel, the system will switch to the setting page of tuning. Please pay attention that when enabling this function, the operation mode is temporarily changed to PR mode. Some parameters will be changed temporarily. When complete tuning, please uncheck ☐ Enable Gain Control Panel.

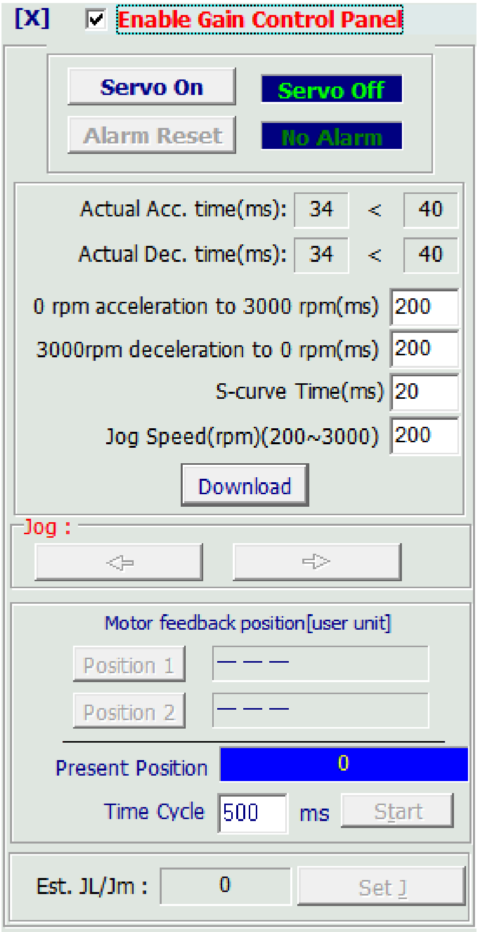
Description of Tuning

It is recommended to use tuning to setup control loop parameters. Through the actual operation, users can directly estimate the change of inertia.

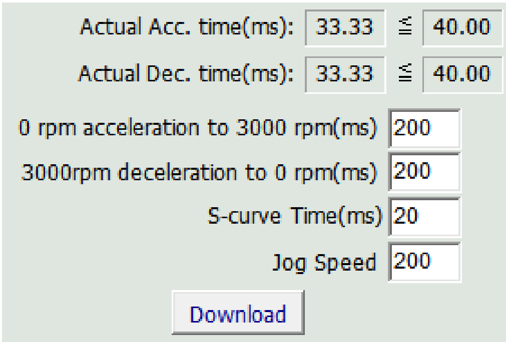
NOTE In order to acquire the accurate result of estimation, the servo motor must operate a distance at forward / reverse direction. Also, the motor speed should be set up to 200rpm.

Following is the operation procedure:

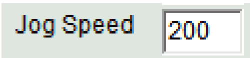
Step 1: Check "Enable Gain Control Panel", screen on the right will switch to the one of tuning.



Step 2: Setup the parameter of motor speed. It is suggested to set from low speed to the actual operation one:



- Setup JOG speed first; The JOG speed is used when applying hand wheel or manually adjusting the positioning point. The system will regard this speed as the motor speed (at forward / reverse direction) when estimating inertia.
  Note: JOG speed must faster than 200rpm so as to achieve the desired result of inertia estimation.
  JOG speed will be used to estimate the max. allowable time. See the following example:

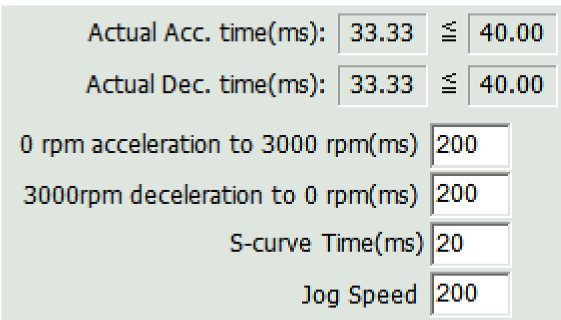
  

  Max. allowable time (ms) = Current JOG speed (rpm) ÷ (5000(rpm)÷1(s))

  So, max. allowable time (ms): 200rpm÷(5000rpm÷1000ms) = 40ms

  It means when JOG speed is 200rpm, the max. allowable time is 40ms.

- Users can setup acceleration constant, deceleration constant and S-curve smooth constant according to the actual machinery situation.
  Note: The acceleration/deceleration time cannot exceed the max. allowable time.
  Formula of auto computing the actual acceleration/deceleration time is shown as below:
  Actual acceleration/deceleration time = setting value + S-curve smooth constant
  Setting value = The acceleration time from 0 to 3000 rpm x JOG speed (rpm) ÷ 3000(rpm)

  Take the above figure as the example. When the acceleration time and deceleration time is 200ms; the setting value should be:

  200(ms) × 200(rpm) ÷ 3000(rpm) = 13.33(ms)

  The actual acceleration or deceleration time = 13.33(ms) + 20(ms) = 33.33(ms)

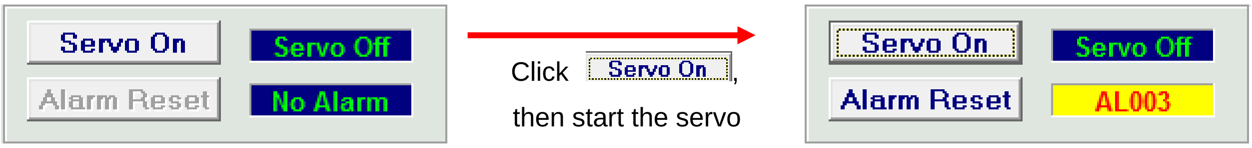
  Thus, the actual acceleration and deceleration time is shorter than the max.

allowable time which eligible for inertia estimation.

- When the setting is complete, click Download to download the motor speed to the servo drive temporarily.

  Note: Click Download, if the input value is not an integer or the actual acceleration/deceleration time exceeds the max. allowable time, the following window will pop up and the data will not be downloaded into the servo.

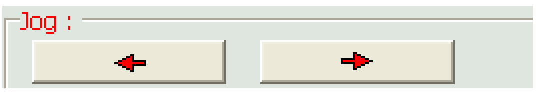
Step 3: After the setting of motor speed is complete, please start the servo.



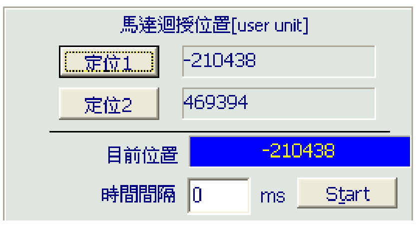
If an alarm occurs, please turn off the servo and troubleshoot the problem. And use Alarm Reset to resume the servo drive.

NOTE Some alarms cannot be cleared via reset button. Users have to re-power on the servo drive. Please refer to the user manual for detailed description about alarms.

Step 4: Setup motor operation distance. It is suggested to start from left limit to right limit. Users also can setup the specified section. The setting of positioning point is similar to the setting of hand wheel or JOG position. Users could use the direction key of JOG to adjust motor's moving direction.



Direction key could move the motor to the positioning point. Then, use "Position 1" and Position 2" to setup. Value in blue mark represents "Current Position". Users can access the actual feedback position of the motor.



"Time Interval" can be used to operate the motor after some delayed time when each section is complete.

WARNING

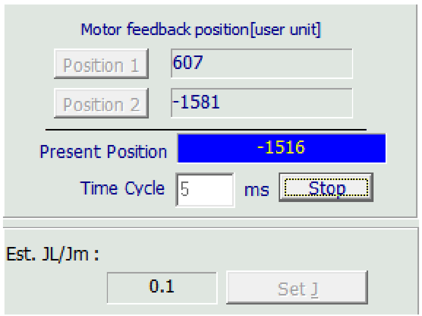
Please note that the position control is operated by JOG control of the servo drive. Followings are the situation users should bear in mind:

1. Pease make sure the hardware switch of emergency stop or the

controller's DO signal can work. Function of digital I/O can be used for testing.

2. Please make sure the software connection is successfully built. If the communication is breakdown, the motor might unable to run properly.
3. During the operation, if any alarm occurs, press the button of emergency stop immediately or issue the command to stop the motor.

Step 5: Click Start. The motor will operate automatically.

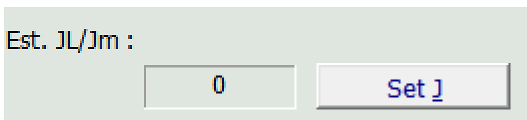


Please observe the variation of inertia ratio. The system will automatically adjust the gain value of control loop. Thus, the inertia ratio will gradually become stable.

It is suggested to use the proper speed to estimate the inertia. When the change of inertia ratio is smaller, click Stop to stop the motor.

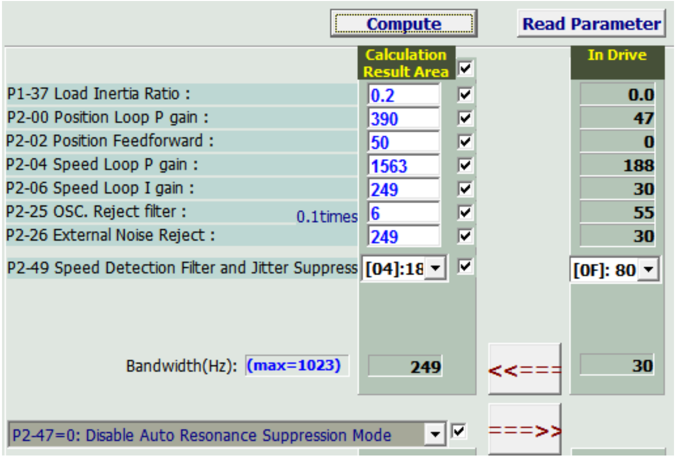
1. During the process of inertia estimation, press the button of emergency stop if any abnormality occurs and cut off the power supply of software and servo drive. Then, re-start the inertia estimation after troubleshooting the problem.
2. The value of estimated inertia ratio (value of P1-37) should bigger or smaller than 1, which means the system is actually tuning. Incorrect inertia value would result in wrong estimation of system bandwidth and gain value.

Step 6: When the estimation of inertia ratio is complete, the new value will show in the box below. Click Set J to the new value will display on the left.

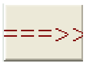


Value of inertia ratio on the left will be replaced by the new value

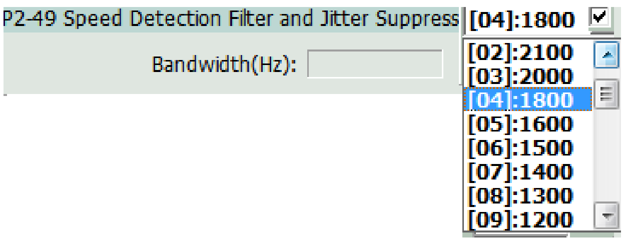
Step 7: When the above mentioned inertia ratio is altered, bandwidth and gain value will be adjusted, too.



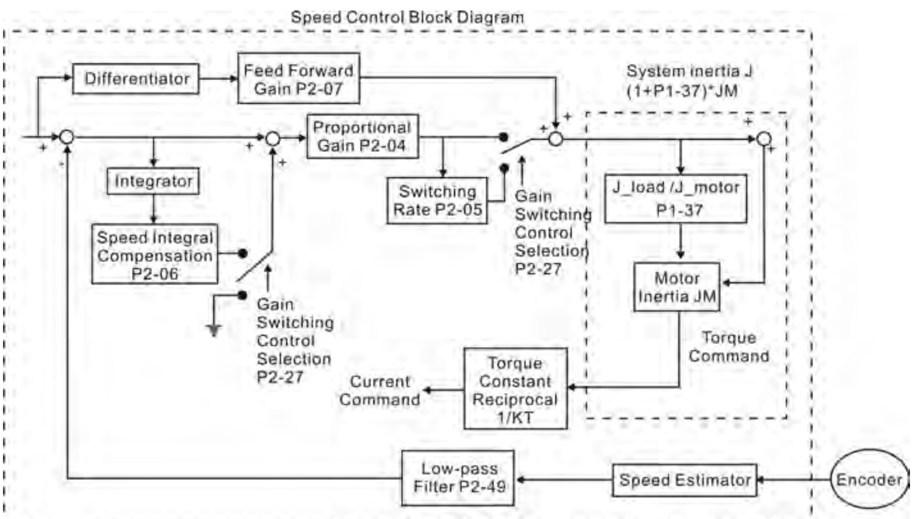
Please pay special attention to the variation of bandwidth. From the above example, the value is adjusted without load, so the bandwidth estimated by the system is 249Hz. However, for general mechanism, high response setting is unnecessary. Users can adjust the bandwidth and gain value according to the real situation.

Step 8: Click  to download the new value into the servo drive.

NOTE Value of P2-49 will not be adjusted by system. It should be set by users.

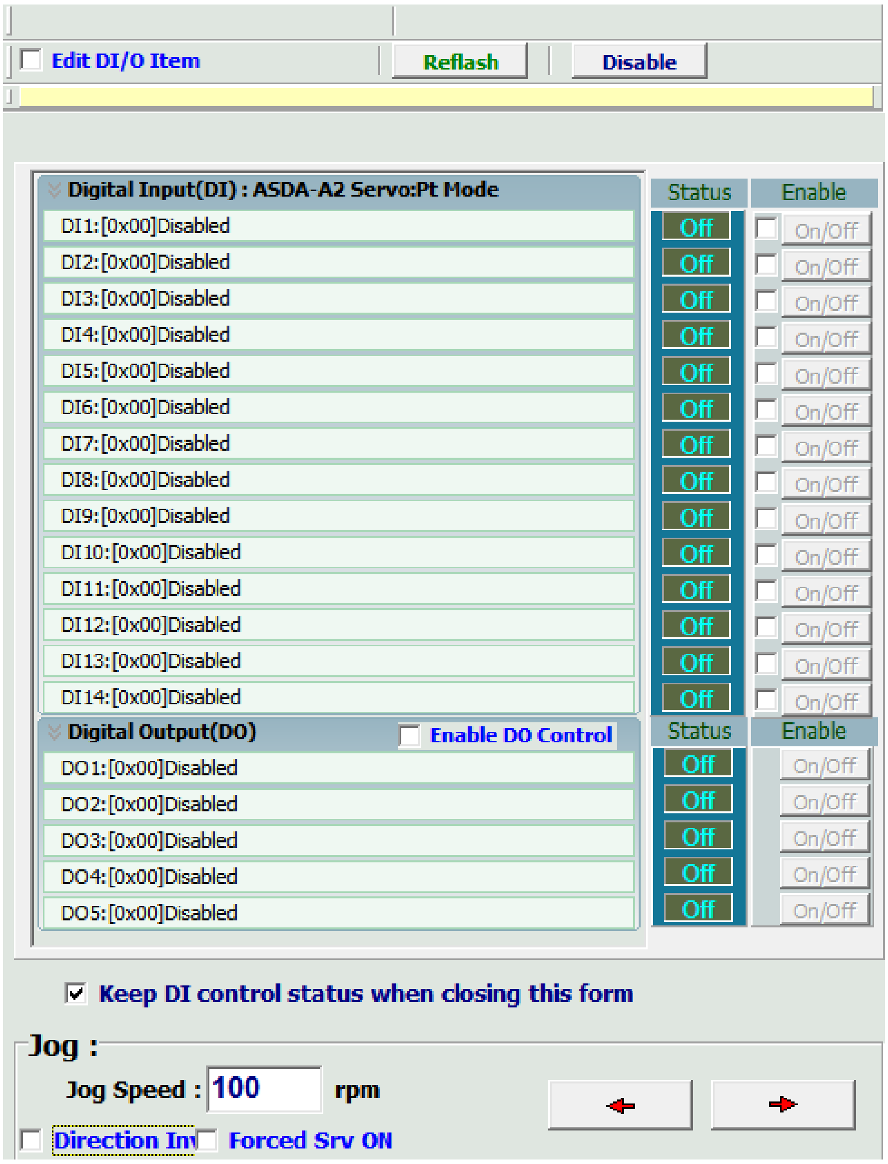


Following is the diagram of speed control: P2-49, low-pass filter, is used to process the feedback signal of encoder, which could reduce the interference and the error occurrence caused by speed control loop. Its setting value is from 100 to 2500 Hz.



3.3 Digital IO / JOG Control

Users can control digital input and output through the software interface. This function can be used to do simulation monitor of each signal. With the function of scope and E-Cam, status simulation can also be done. Moreover, it can make sure the contact works properly before the actual operation.
Simple JOG control is also provided. Users can slightly adjust the position.



This section is divided into two parts:

【**Setting of Digital I/O**】: It describes the definition of each button and item on interface.

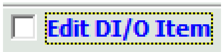
【**JOG**】: It describes JOG function.

Setting of Digital Input / Output

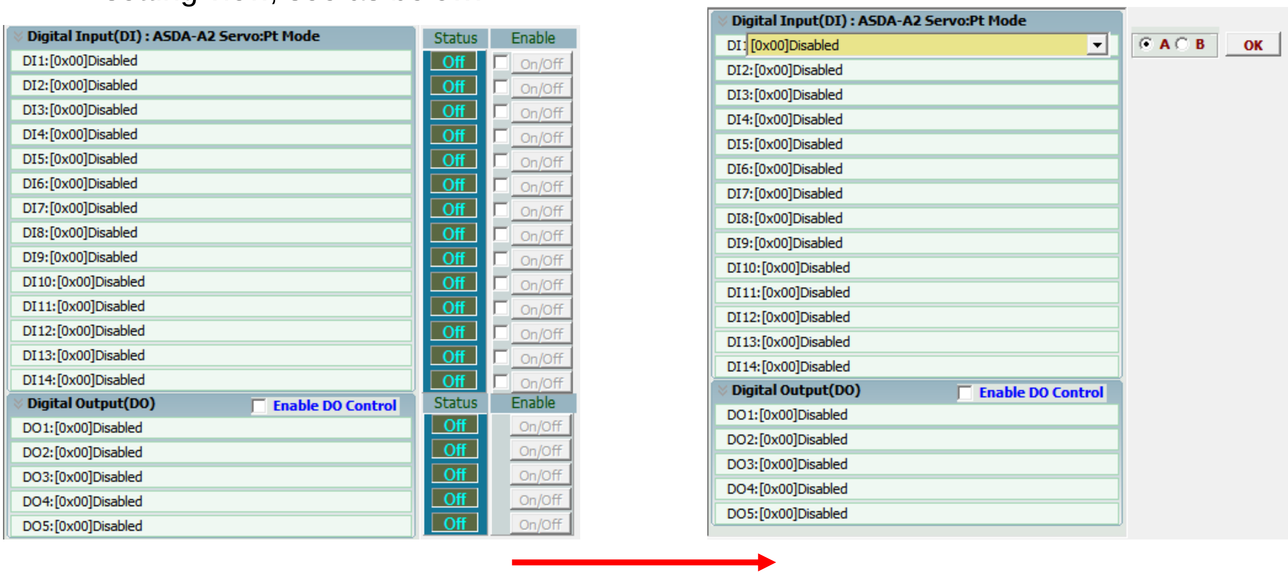
The system can simulate digital inputs / outputs via communication. Please note:

1. Since the simulation control is conducted by one-way communication, if more than one screen is opened, users will be unable to read the status of DI/O.
2. Before disable the function of simulation control, please disable all checked and enabled functions. This is for avoiding the unnecessary danger which caused by incomplete program closure.
3. All operation is controlled via communication. Please make sure the software communication is fully connected during operation.

Followings are the description of each button:

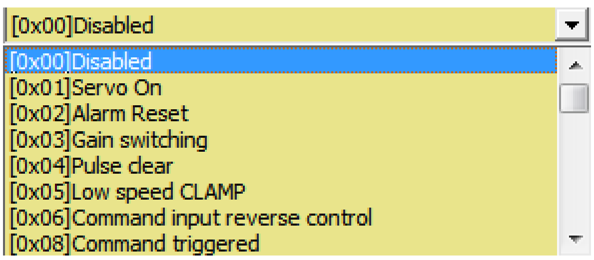
- 

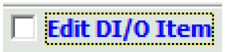
— The system will use the default value of DI/O at first. Users can directly change the setting of DI/O. Check this function, the window will switch to setting view, see as below:



[The initial view will switch to the setting view]

When switching to the setting view, users can start to setup DI/O:

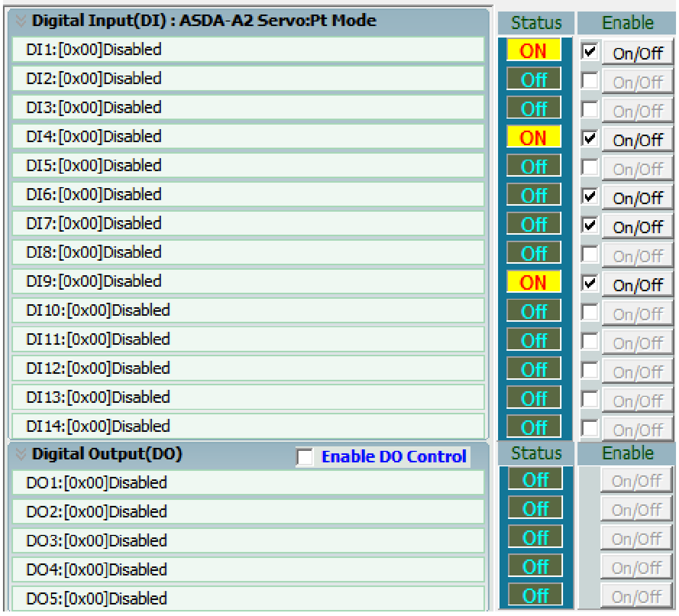
Icon	Function Description
	Click any one of DI or DO and setup DI/O from the drop-down menu.
	Use A / B contact, which is on the right, to setup frequently open or frequently close contact. Then, click “OK” to complete the setting.

When all DI/O setting is complete, click 

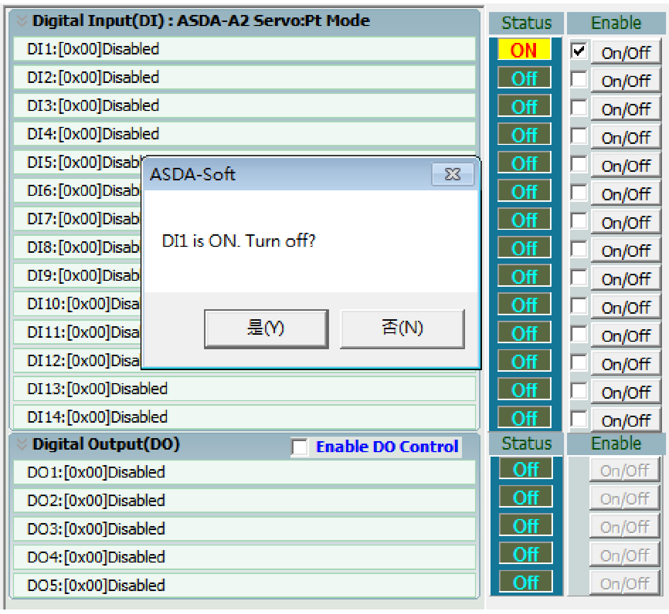
again to return to the operation view.

■ 

: Click this if users desire to reset all communication control setting of DI (digital input).

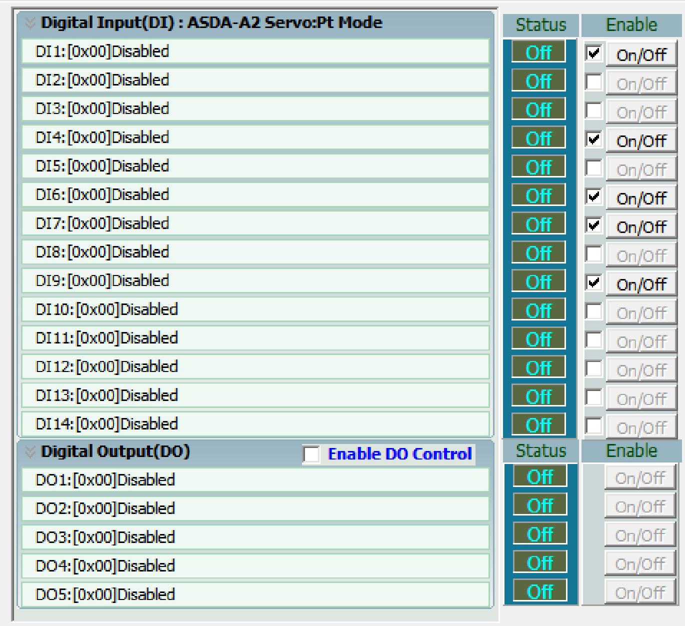


If users desire to close all DI status,



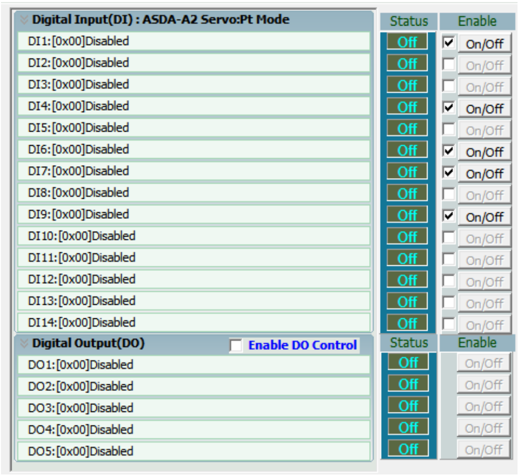
click 

. The prompt window will pop up starting from DI1.

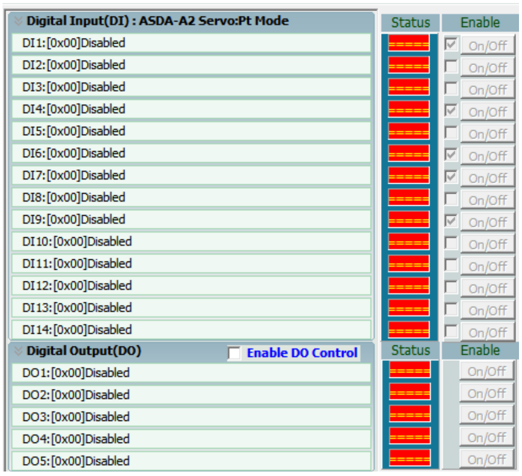


Close all DI, it will return to the original screen.

- **Disable**: Click this to disconnect the communication if users need to pause DI/O.



Click "Disable", the status columns will become red. Click "Enable" again to resume it.



- ☑ **Keep DI control status when closing this form**

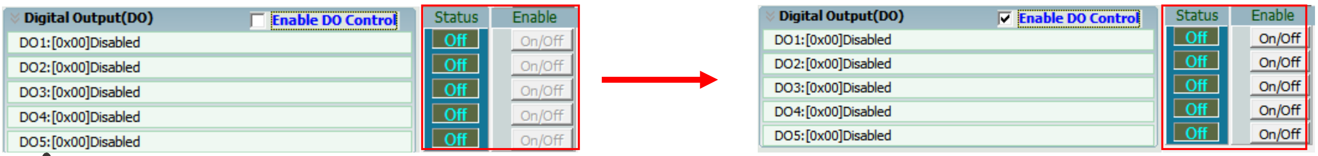
  In some situations, users would like to keep DI status after the window is closed. Click this function to keep the current DI status.

WARNING

Do not click this if the controller has connected to the servo drive and used DI/O control function. If DI/O control is not properly closed, it might pose danger.

- ☐ **Enable DO Control**

  If desire to use DO contact to conduct simulation control, check this item will activate the communication control. Users could force to frequently open or close the DO contact.

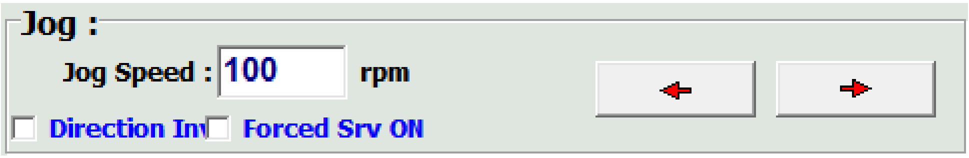


WARNING

Do not click this if the controller has connected to the servo drive and used DI/O control function. If DI/O control is not properly closed, it might pose danger.

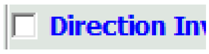
JOG

If the positioning point is not within the range which specified by the encoder, then users can use simulated handwheel to adjust coordinates position through software communication:



Followings are the operation steps:

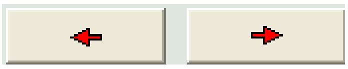
Step 1 Setup JOG speed. Users could set the motor speed as the JOG speed.

Step 2 If it needs to change the motor's moving direction, click 

will do.

Step 3 Check 

to control.

Step 4 Use  to control motor's moving direction.

WARNING

The position control is operated by JOG control. Please follow the instructions below:

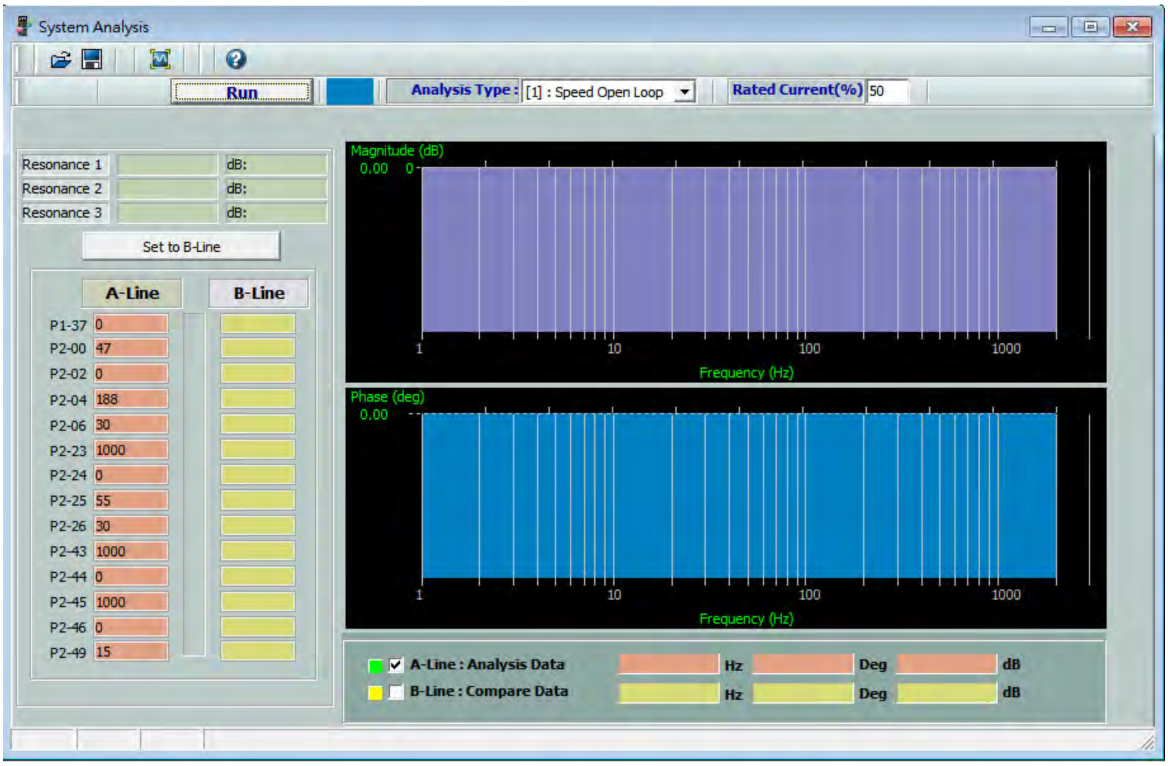
1. Make sure the hardware switch or the DO signal of emergency stop can work. Digital inputs and outputs can be used for testing.
2. Make sure the communication is normally connected. Communication breakdown might cause abnormal operation of the motor.
3. During the auto operation, press the emergency stop button or issue the command to stop the motor if there is any abnormality.

3.4 System Analysis

Users learn to adjust the parameter via system analysis. The analysis tool, Bode Plot assist users know more about system’s stability and the related information of resonance frequency.

System analysis is an advanced analysis tool. Basic scientific theory and principle foundation is required. Please refer to the related documentations.

It is suggested to pay attention to the actual operation from time to time. When adjusting the gain, take the machinery limit into consideration. This system detects the bandwidth only by the slightly move, which is different from the actual operation. It is better to leave some margin for the machinery to deal with the problem when facing the change of operation, such as the change of load or the loosen belt caused by the long-time operation.



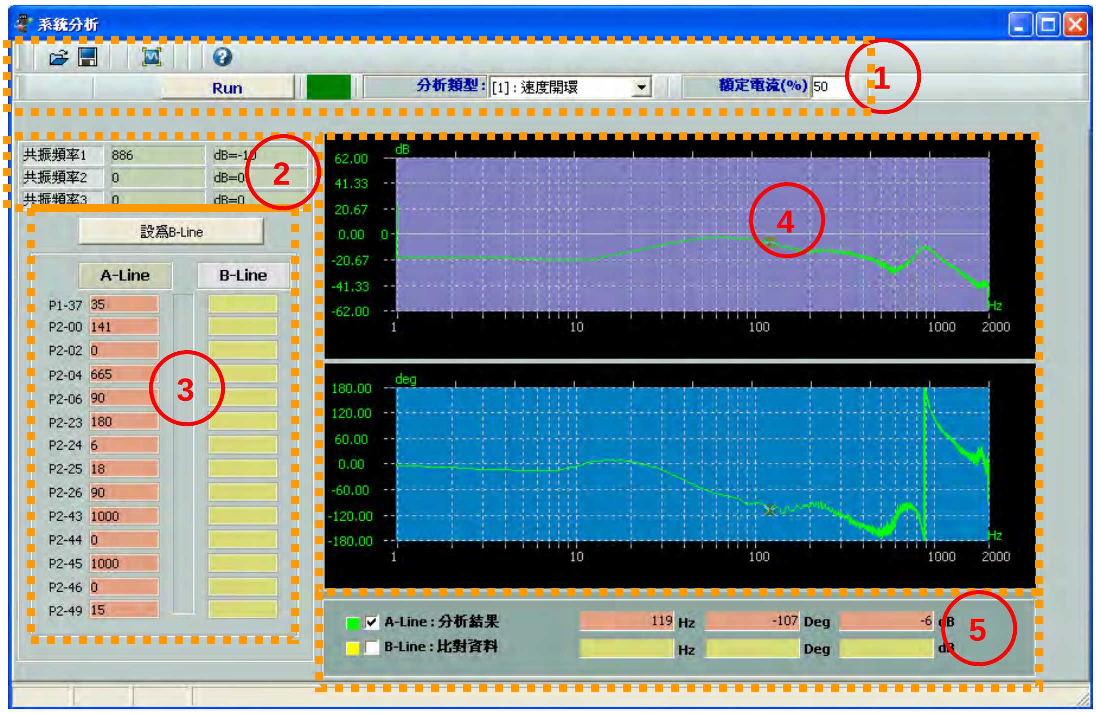
This section will be divided into two parts:

【**Interface Introduction**】: Introduce the definition of each button and icon.

【**Operation Description**】: Describe how to monitor time domain and the Bold Plot of frequency domain with the function of tuning.

Interface Introduction

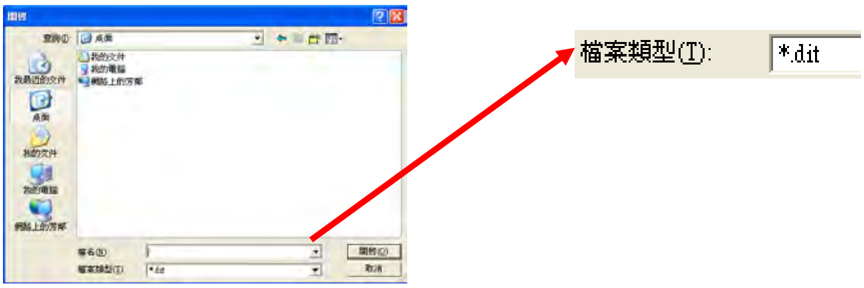
We divide the window into five parts:



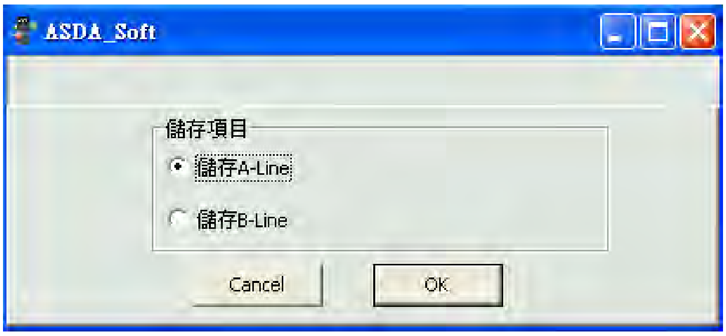
1.) Toolbar: Users can setup the basic function of system analysis.
2.) Resonance frequency: Three groups of resonance frequency (dB value) and frequency point will show in this section.
3.) Gain value: When the system analysis is complete, the internal gain value of the servo drive will be uploaded to this column. Column A and B is for comparing the old and updated value.
4.) Window of Bode Plot: Data after systemic analysis will be shown in these two sections: Purple for Gain, blue for Phase.
5.) Instant message: When moving the mouse around the curve in Bold Plot, the following two columns, A-Line (color pink) and B-Line (color yellow), will show the instant value.

[Toolbar]

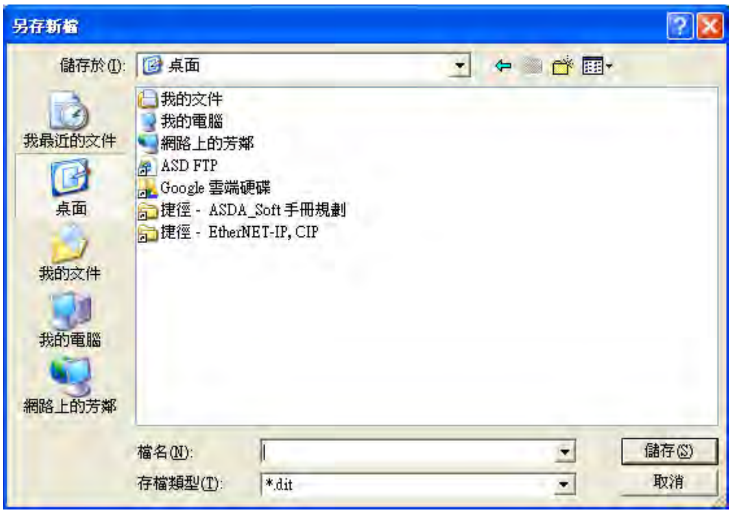
a.)  open dit file: Open the saved file for analysis. *.dit is the filename extension:



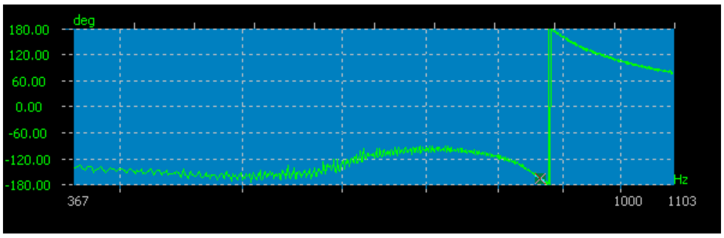
b.)  Save as dit file: Data in A-Line or B-Line can be saved as *.dit file. Click the icon, a message window will pop up:



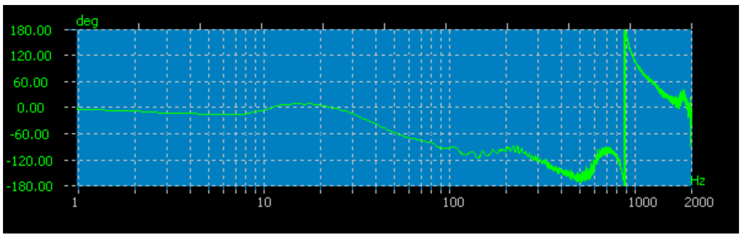
Then, the following window pops up:



c.)  Show all data in screen: This function can recover the Bode Plot to the initial captured screen.



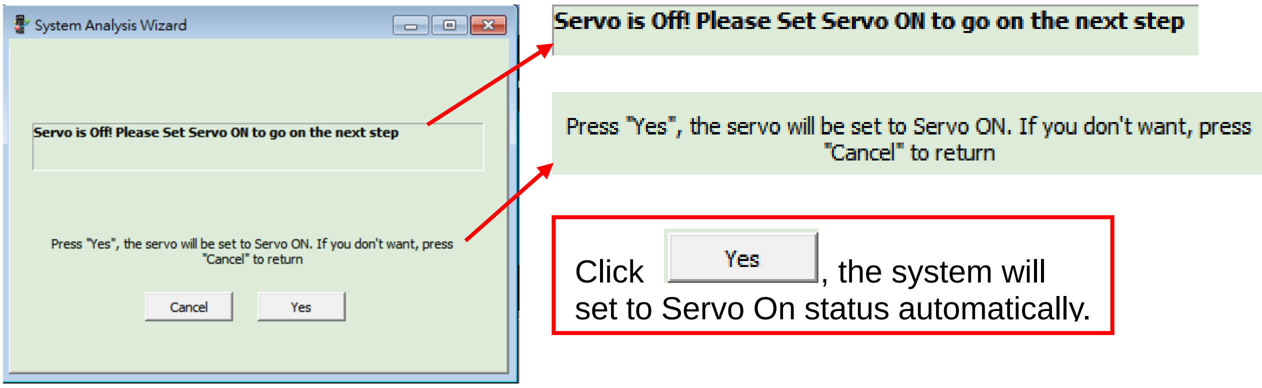
When adjusting a section of curve,



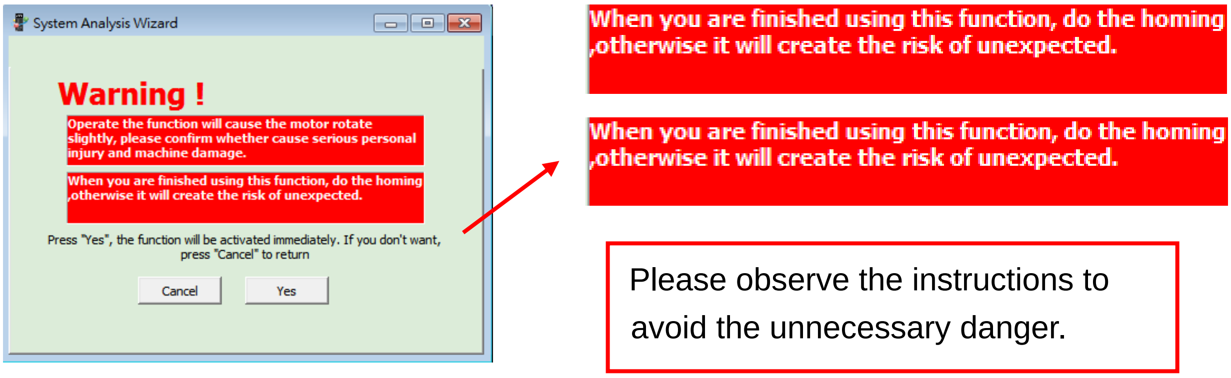
 can display all data of whole frequency domain.

d.) Run Execution: It is used to execute the function of system analysis.

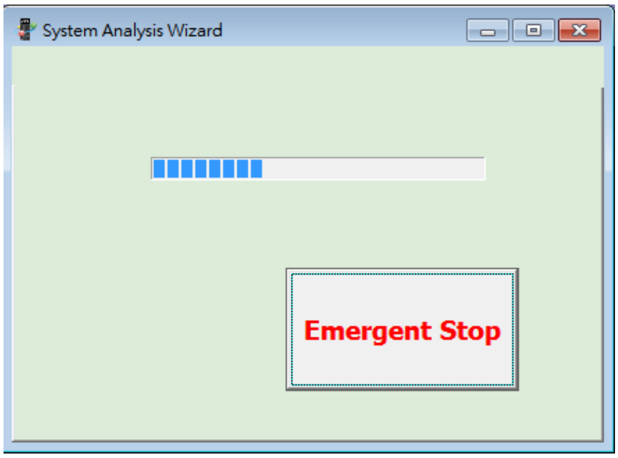
Users have to Servo ON the drive first so as to do system analysis. When clicking this button in Servo Off status, the following reminder will pop up:



When it is set to Servo ON, click Run, the following reminder will pop up:

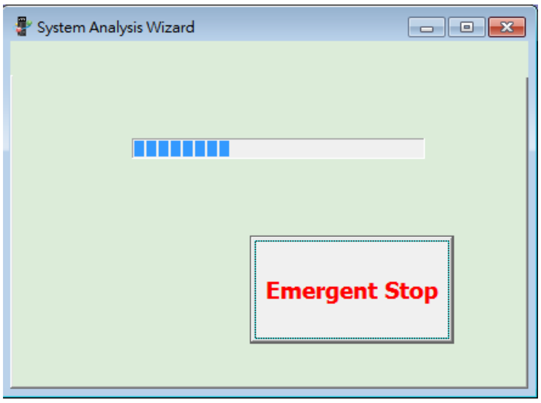


Click Yes, it starts to analysis, see as below:

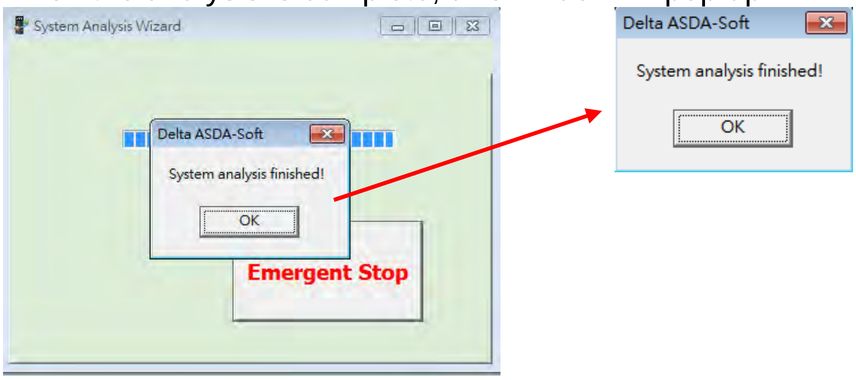


When analyzing, any problem occurs which requires emergency stop, users can click Emergent Stop [Emergency Stop] to stop analysis (apart from the hardware switch). The following window will pop up when click [Emergency Stop]. Please Servo Off the servo drive and troubleshoot the alarm immediately.

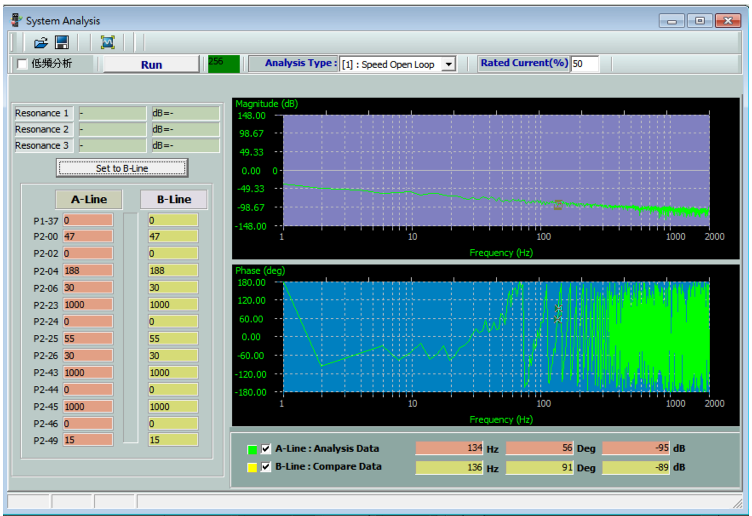
Click  to close the executing window.



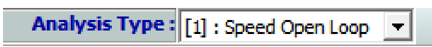
When the analysis is complete, a reminder will pop up:

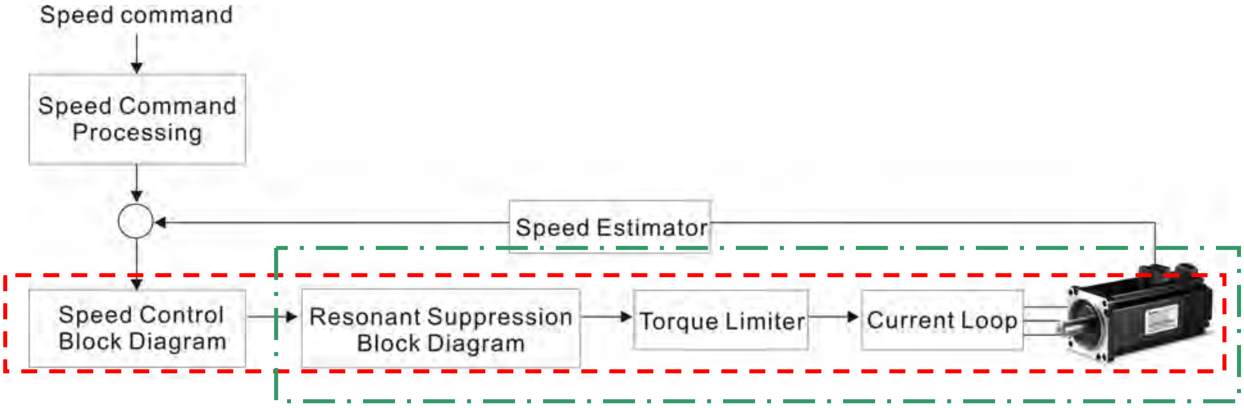


After analysis, the value will be saved in A-Line. Scope screen of Gain and Phase will show the result:



e.)  Status light: If the data packet is delivered normally, it shows green light. If an error occurs, it shows red light.

f.)  : Users can select the system for analyzing according to speed control loop. The analysis type can be categorized to speed loop and system module.



Speed Control Loop

[1]：Speed Loop	Speed control loop (in red frame) includes four control units, see as above. Analysis the Bode plot according to KP (from speed control) and KI (from integral). It will also analyze the framework, such as resonance suppression and current loop. The result can help to improve the system's stability.
[2]：System Module	System module mainly analyzes the hardware mechanism (in green frame). When users need to analyze the allowable command response or resonance features, or when abnormal vibration occurs and cannot be cleared by on-site personnel, this function can be used to analyze the hardware condition remotely.

WARNING

Please note that the actual variation of some transmission mechanism, e.g. belt, cannot be observed through Bode Plot. It is suggested not to use system module to analyze the data.

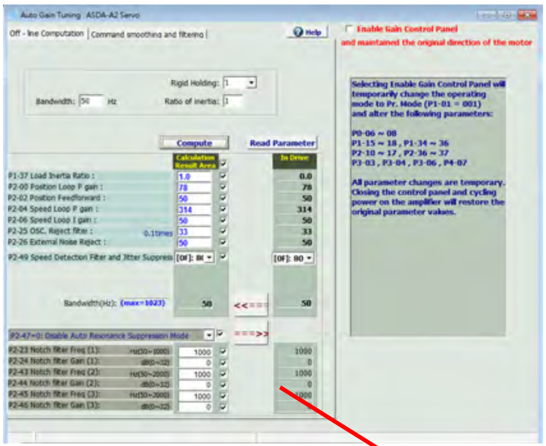
e.) Rated Current(%) 50 ：Users could setup the rated current (torque) which is captured when analyzing Bold plot. The rated current setting range is between 1 and 300%. The bigger load inertia of the mechanism, the higher proportional setting of the rated current will be.

Generally, the setting value is under 100%. Exceeding the range might lose the efficiency of the analysis data.

[Resonance Frequency]

Resonance 1	-	dB=-
Resonance 2	-	dB=-
Resonance 3	-	dB=-

When the analysis is complete, Phase and Gain will show here. ASDA-A2 series servo drive provides three parameters of resonance suppression. Thus, three screens are provided as well and the top three value of resonance points will display in this section.
Users can manually enter resonance frequency and the value into parameter groups of resonance suppression, [Auto tuning].



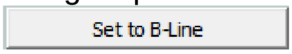
[Gain Value]

P2-23 Notch filter Freq (1):	Hz(50~1000)	1000	☑
P2-24 Notch filter Gain (1):	dB(0~32)	0	☑
P2-43 Notch filter Freq (2):	Hz(50~2000)	1000	☑
P2-44 Notch filter Gain (2):	dB(0~32)	0	☑
P2-45 Notch filter Freq (3):	Hz(50~2000)	1000	☑
P2-46 Notch filter Gain (3):	dB(0~32)	0	☑

Set to B-Line

	A-Line	B-Line
P1-37	0	0
P2-00	47	47
P2-02	0	0
P2-04	188	188
P2-06	30	30
P2-23	1000	1000
P2-24	0	0
P2-25	55	55
P2-26	30	30
P2-43	1000	1000
P2-44	0	0
P2-45	1000	1000
P2-46	0	0
P2-49	15	15

The gain parameter will be shown in A-Line section. Use the function of

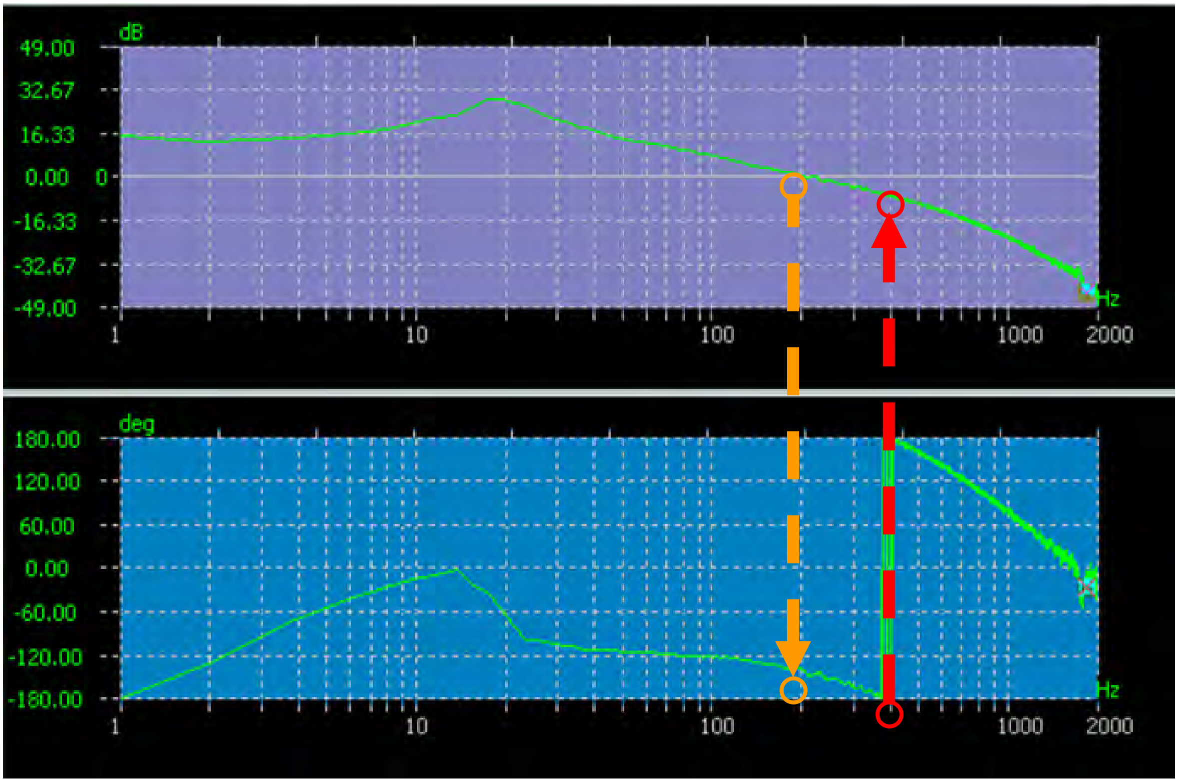


to fill in the gain value to B-Line. When re-adjusting the gain value and starts to analyze, the new gain value will be shown in A-Line. Users can analyze the value according to the curve of Bode Plot, which is on the right.

[Window of Bode Plot]

Users can observe the frequency response via Bode Plot. The Bode Plot consists of two graphs, Gain Magnitude (It represents the variation of frequency which is relative to decibel) and Phase (It represents the variation of frequency which is relative to phase)

The X axis of gain magnitude and phase is sampling frequency. Its sampling range is 1 ~ 2000Hz.



Definition of gain tuning:

Gain Margin, GM: Phase of Bode Plot corresponds to the point of decibel (dB) at -180 °. Please refer to the dotted line in red color. GM = 0-(corresponding Gain value).

Phase Margin, PM: Gain value of Bode Plot corresponds to the degree value of phase at rightmost 0 dB point. Please refer to the dotted line in orange color.

According the definition mentioned above, followings are the tuning principles:

(1) PM value: The phase value that corresponded by gain value which is at rightmost 0dB point should plus 180°. It is suggested to adjust the degree between 30 ~ 40. See the graph above.

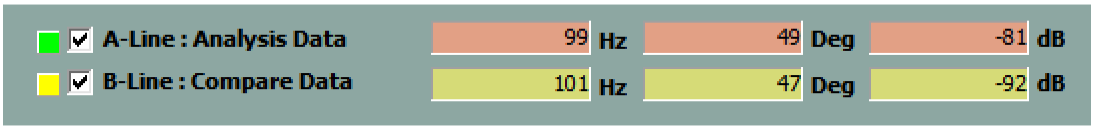
The phase degree corresponded by 0dB: -136° + 180° = 44°, which is close to the suggested range.

(2) GM value: Decibel value (dB) which corresponded by the phase degree at -180° should be smaller than 10dB. See the graph above.

0 - (-9.32)(the gain value corresponded by -180°) = 9.32, which is within the suggested range.

NOTE Spectral analysis can help to correctly setup the frequency of **Notch filter** and check if the gain is optimized and reserves enough margin for mechanism (6 ~ 10 dB).

[Instant Message]



When the cursor is moving around the curve, the data that cursor clicked will be shown in the window of instant message.

Operation Description

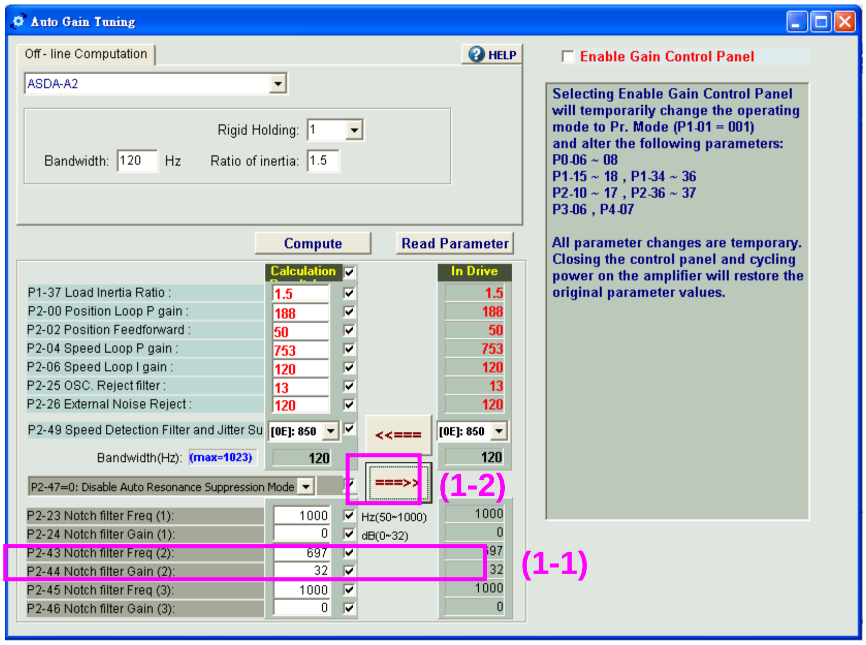
The following example describes the using method and operation steps:

Step 1: Use “Auto Tuning” to conduct the first inertia estimation. Please refer to the section of “Tuning” for tuning procedure.

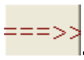
Step 2: After tuning, please start system analysis.

From the result, the size of resonance point at 697 Hz is 32 dB. Adjust the parameter of the first resonance point by this data.

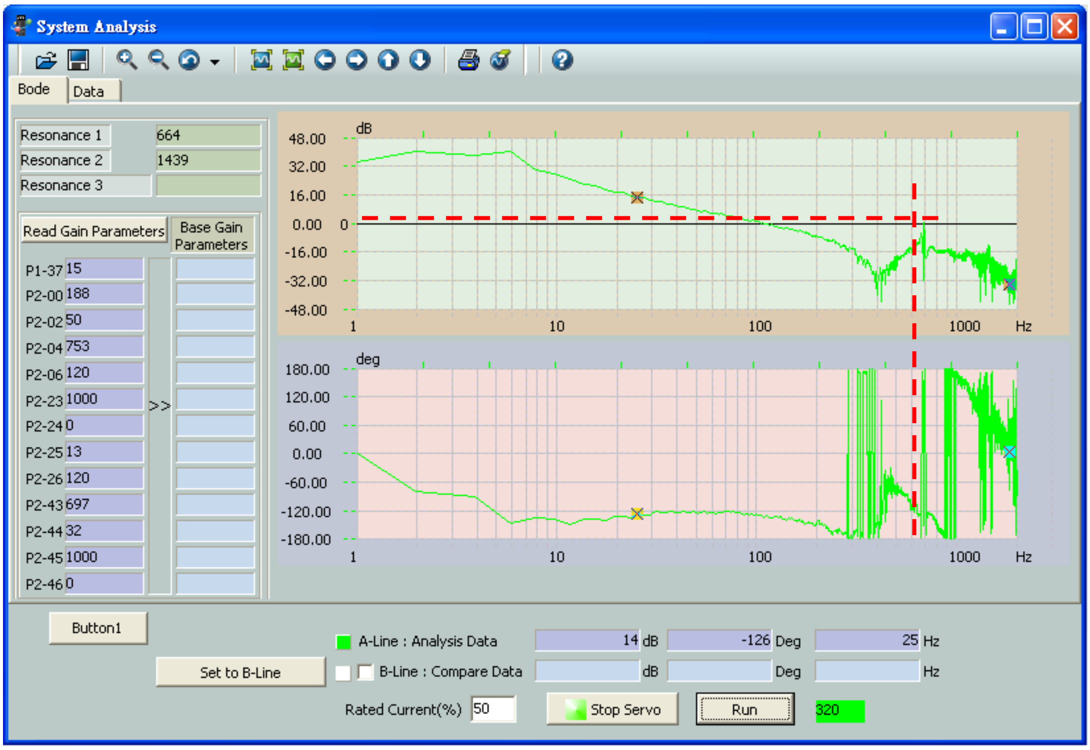
Step 3: Gain tuning for the second time.



Fill in the resonance frequency and decibel value (dB) to the second Notch filter (P2-43 ~ P2-44).

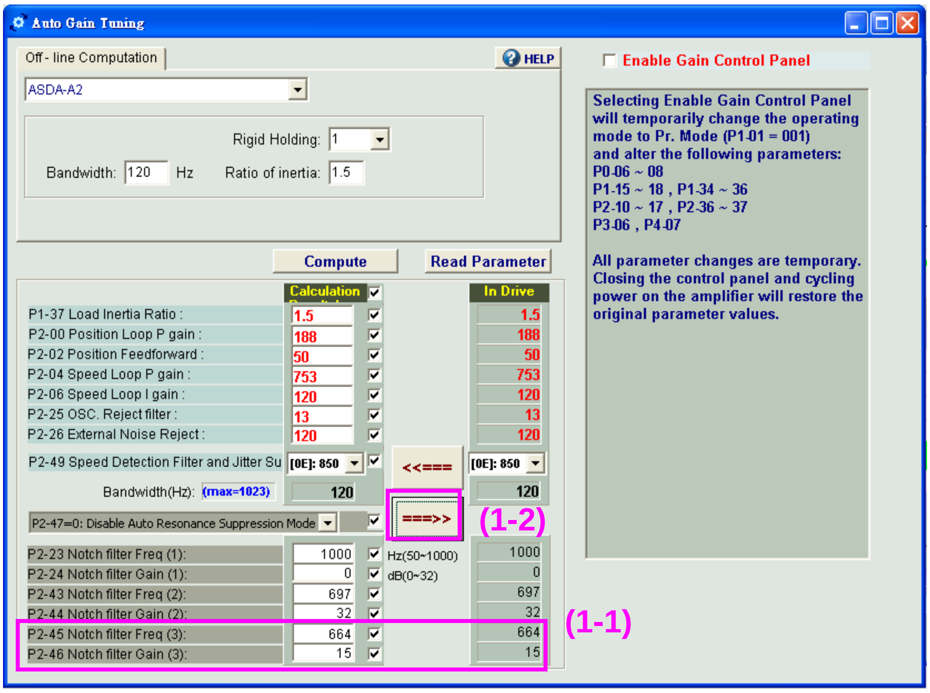
Then, click “Download parameter” 
.

Step 4: The second system analysis

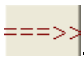


The size of resonance point at 664 Hz is about 3 ~ 4 dB. Thus, adjust Notch filter again.

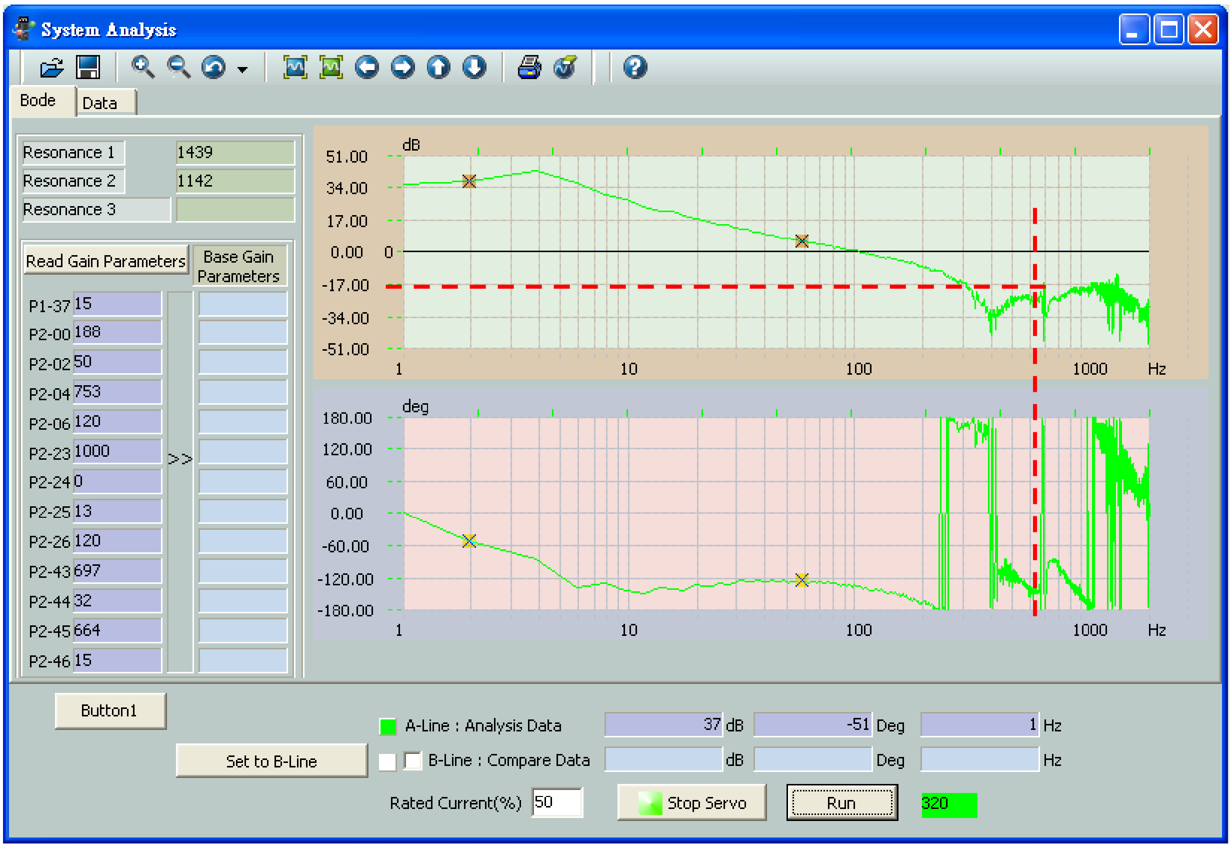
Step 5: Gain tuning for the third time.



Fill in the resonance frequency and decibel value (dB) to the third Notch filter (P2-45 ~ P2-46).

Then, click "Download parameter" .

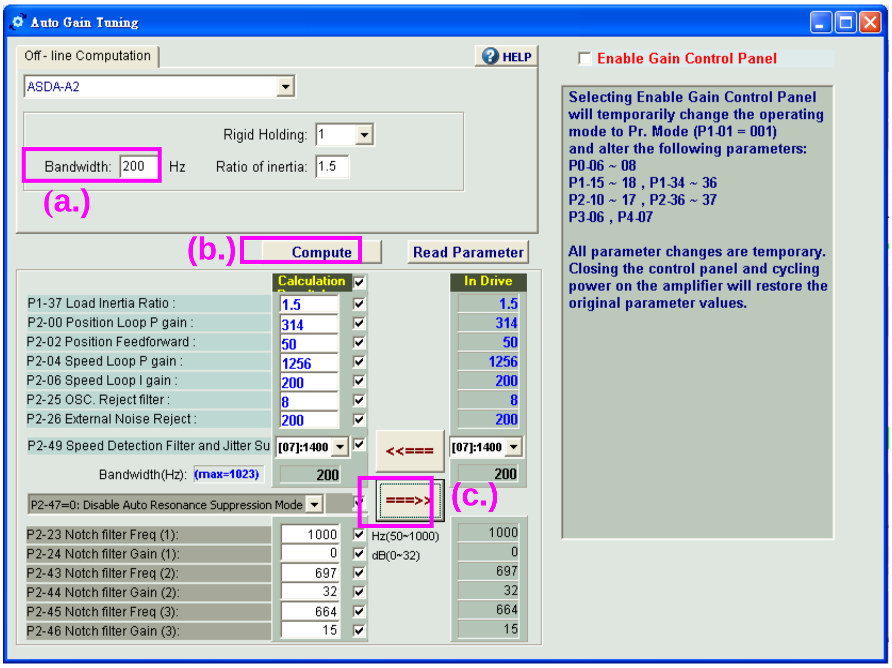
Step 6: The third system analysis



From this graph, the size of resonance point is over 10 dB (about 17 dB). Try to adjust the gain again.

Step 7: Gain tuning for the fourth time.

Increase the bandwidth from 120 Hz to 200 Hz (until Phase Margin is between 30°~ 40°).

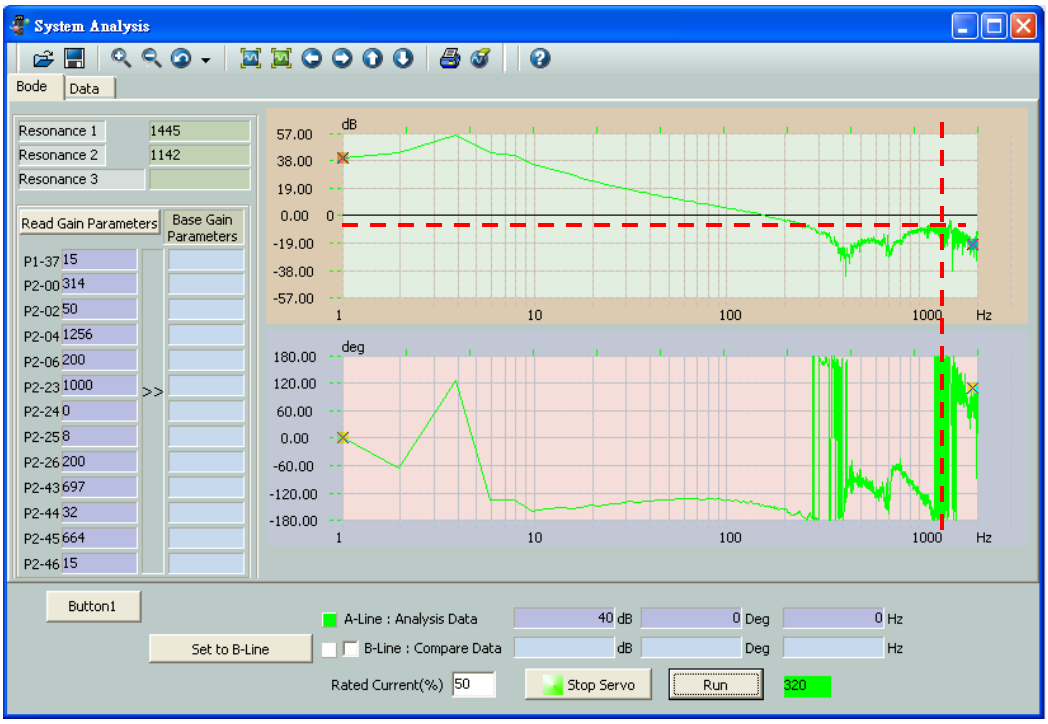


a.) Adjust bandwidth

b.) Compute the gain

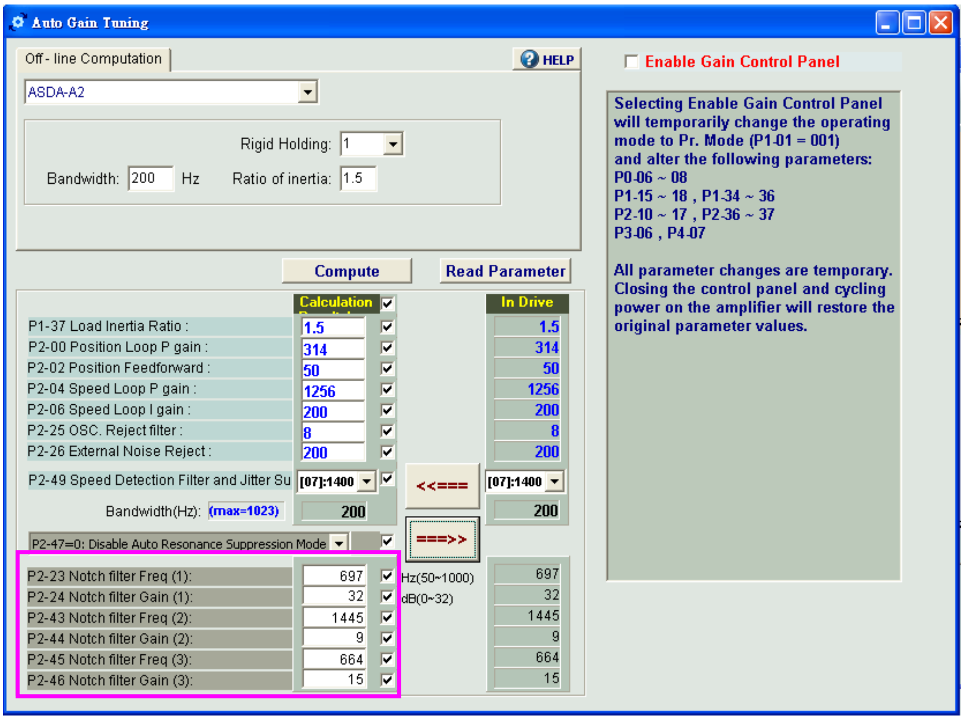
c.) Load in parameters

Step 8: The fourth system analysis



The size of resonance point at 1445 Hz is about -2 dB. Adjust Notch filter again.

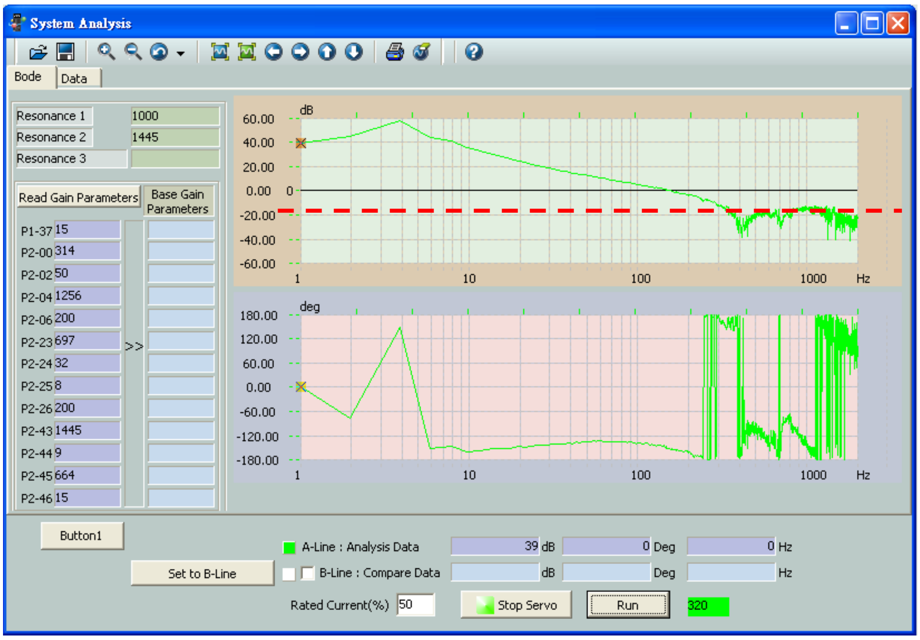
Step 9: Gain tuning for the fifth time.



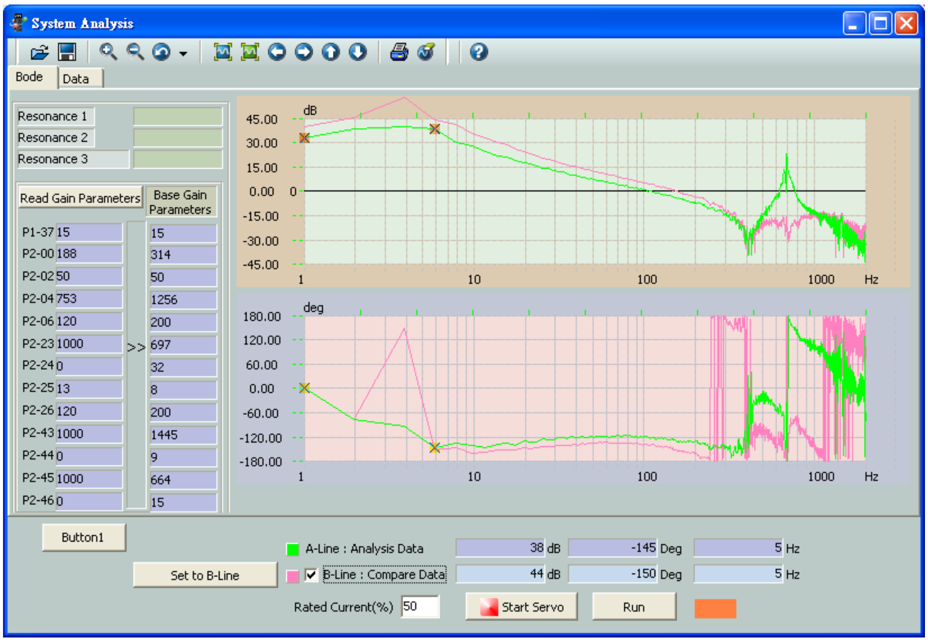
Since we are going to use the third Notch filter, plus the range of the first Notch filter is only 1000 Hz, the following adjustments should be done:

a.) Set parameter P2-47 to 1, auto resonance suppression. The value will set back to 0 when the system is stable. Also, it will store the resonance suppression point automatically. If not, please re-power on or set the value to 1 and re-estimate.
b.) Move the second Notch filter (P2-43 ~ P2-45) to the first Notch filter (P2-23 ~ P2-24).
c.) Set the second Notch filter (P2-43 ~ P2-44) to 1445 and 9.

Step 10: The fifth system analysis. The gain value is over the range of 10 dB.



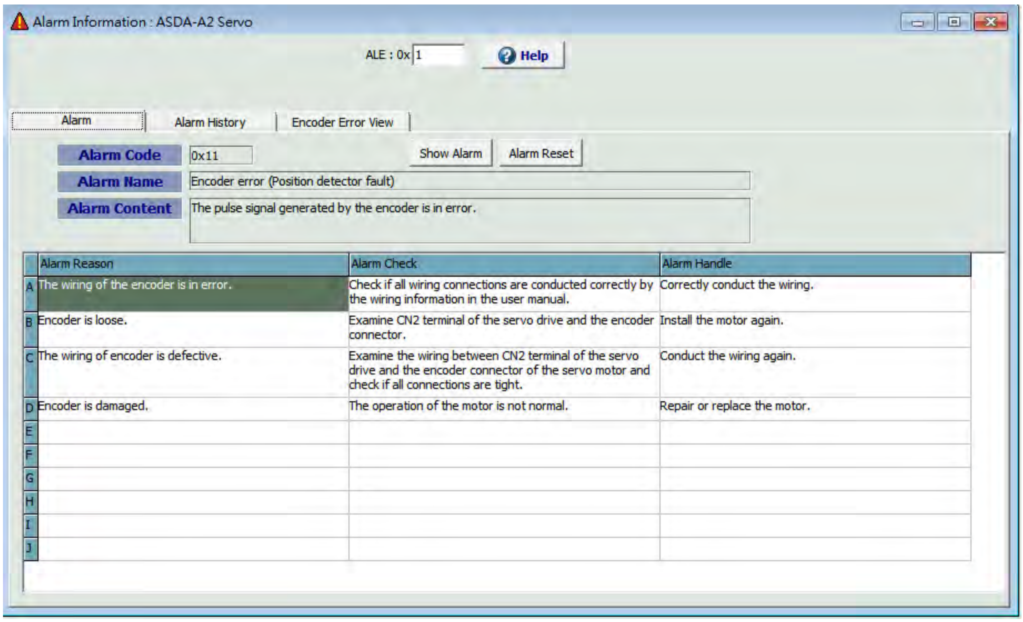
Step 11: Compare the data of A-Line and B-Line. The red curve is newly adjusted and the green one is the original one after the first gain setting. Apply the function of system analysis to suppress resonance point and adjust the system until it is stable.



A-Line: Before gain tuning; B-Line: After gain tuning.

3.5 Alarm Information

Users could know the error and basic troubleshooting via “Alarm Information” from ASDA-Soft, and then quickly clear the alarm and resume tuning.



This section is divided into three parts:

【**Basic operation**】: Introduce some basic operations

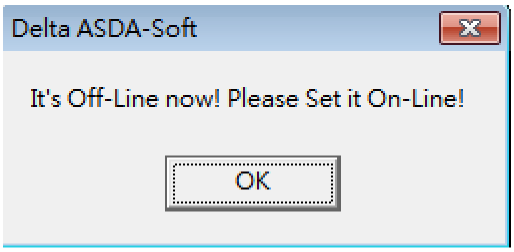
【**Current alarm**】: Describe the alarm information and content

【**Alarm history**】: Describe the definition of alarm history

Basic Operation

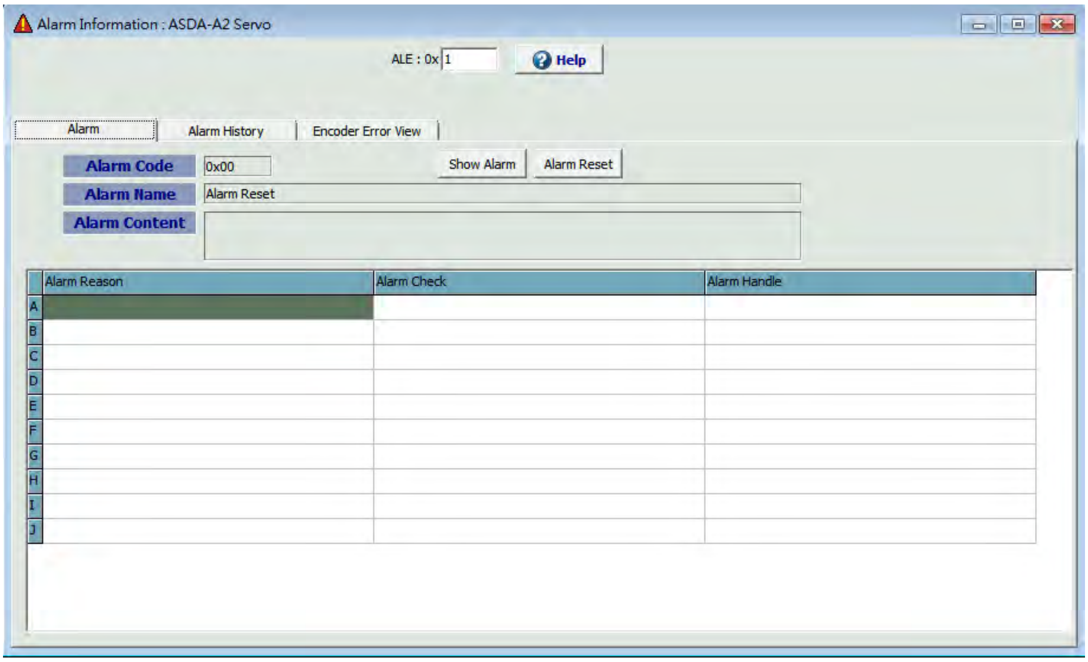
Open the window of “Alarm Information” when it is 

, the following reminder will pop up:

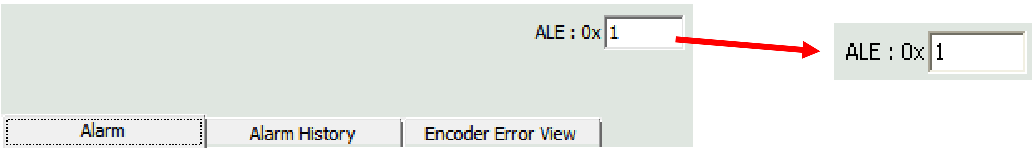


Since it is Off line, the software is unable to update the current alarm information and show in the screen. Click 

to close the pop-up window, the main screen will show nothing as the following one:

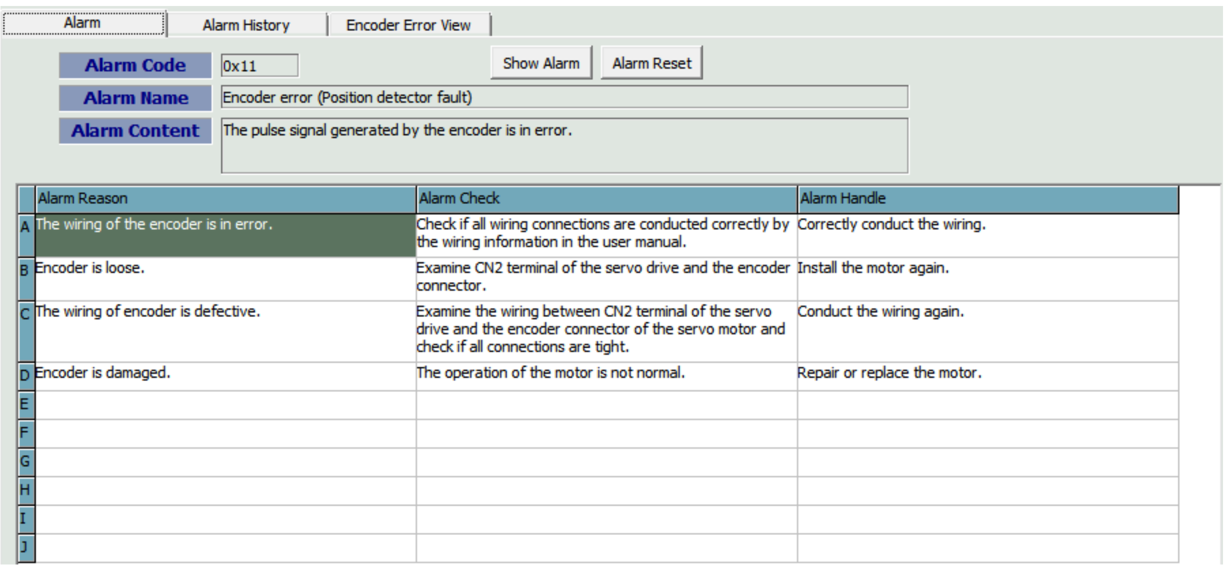


Users can look up alarm messages by entering the alarm number in Off line status. The system will show the alarm description for users' reference.



Current Alarm

can be used to check the alarm, causes, checking methods and corrective actions. Users can troubleshoot the problem according to the above mentioned information. Followings are the description of each item:



Icon	Function Description
Alarm Code 0x11	When software and servo drive is ON LINE, it will show the current alarm number. If different alarm occurs during operation, “Alarm Number” will display the last one.
Alarm Name Encoder error (Position detector fault)	According to the “Alarm Number”, here displays the alarm name.
Alarm Content The pulse signal generated by the encoder is in error.	It describes the definition of alarm.
Alarm Reason A The wiring of the encoder is in error. B Encoder is loose. C The wiring of encoder is defective. D Encoder is damaged. E F	Users can know the causes of alarm.
Alarm Check Check if all wiring connections are conducted correctly by the wiring information in the user manual. Examine CN2 terminal of the servo drive and the encoder connector. Examine the wiring between CN2 terminal of the servo drive and the encoder connector of the servo motor and check if all connections are tight. The operation of the motor is not normal.	According to different “Alarm Causes”, it provides the checking methods.
Alarm Handle Correctly conduct the wiring. Install the motor again. Conduct the wiring again. Repair or replace the motor.	This column provides corrective actions for users to troubleshoot the problem.
Show Alarm	Click this button to access the most updated alarm. If the alarm number showed in servo drive’s panel changes, this can help to update the alarm information of the software.

Alarm Reset	If the alarm can be cleared without re-power on the servo drive, click this button when the alarm is cleared.

Alarm History

Click Alarm History, the software will access parameter P4-00 ~ P4-04 (Alarm record) and display the related information in the following columns. Users can use this function to monitor the variation of alarms.

	Alarm Code	Alarm Name	Alarm Content
1	0x11	Encoder error (Positi	The pulse signal generated by the encoder is in error.
2	0x20	Serial communication	RS232/485 communication time out.
3	0x22	Input power phase l(	One phase of the input power is loss.
4	0x13	Emergency stop acti	Emergency stop is activated.
5	0x13	Emergency stop acti	Emergency stop is activated.

3.6 Parameter Editor

Parameter Editor integrates parameter setting and parameter conversion. Users usually setup parameters through the panel of the servo drive. With Parameter Editor, it is more convenient to complete the setting by the software now. Its main features are as the followings:

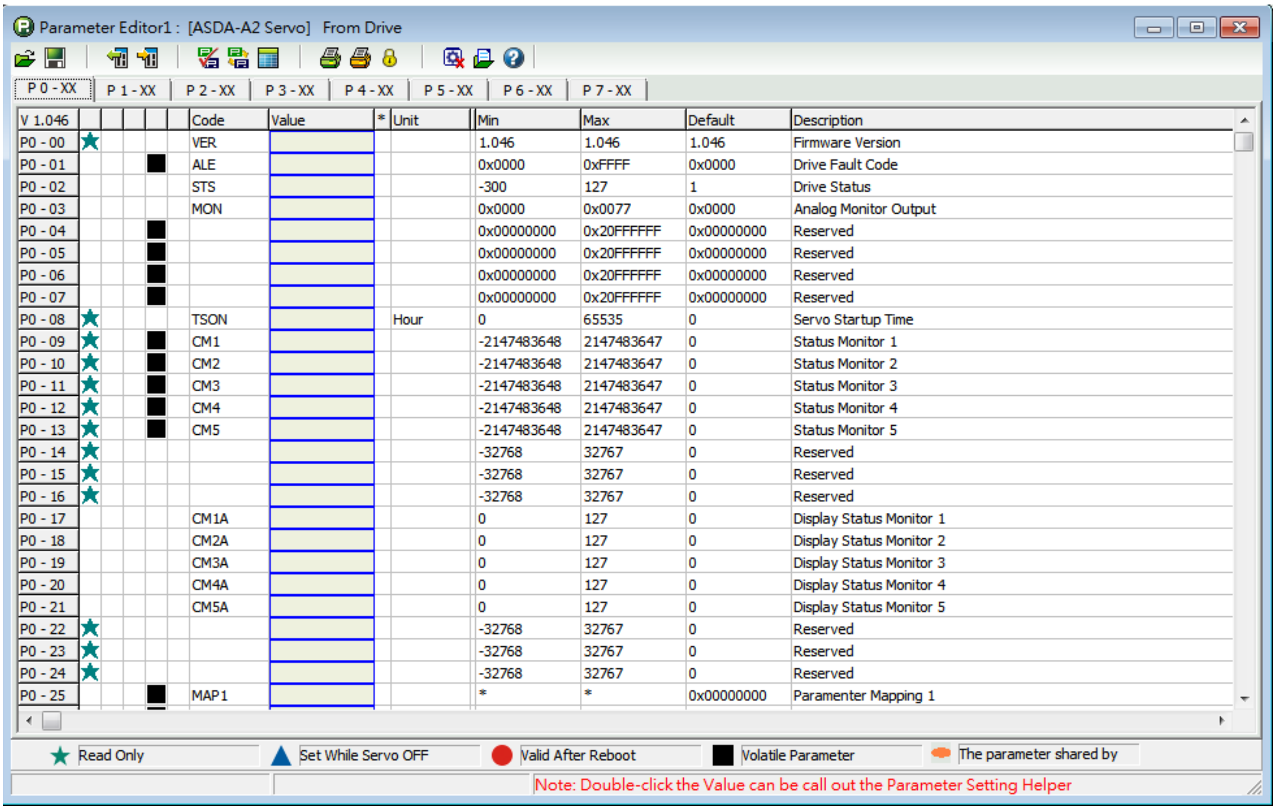
a.) A complete group list enables users to switch the group setting in a very convenient way.

b.) It provides the information of parameter definition and setting range.

c.) It provides the parameter configuration, parameter conversion and parameter comparison. This can help to deal with the problems that brought by different firmware version.

d.) Right click the mouse, and users can edit “Frequently Used Parameters”. Setup the specified parameter in this interface. This would be a short cut to check or adjust parameters.

e.) Double click the description, which is on the right, users can access the definition and description of each parameter.

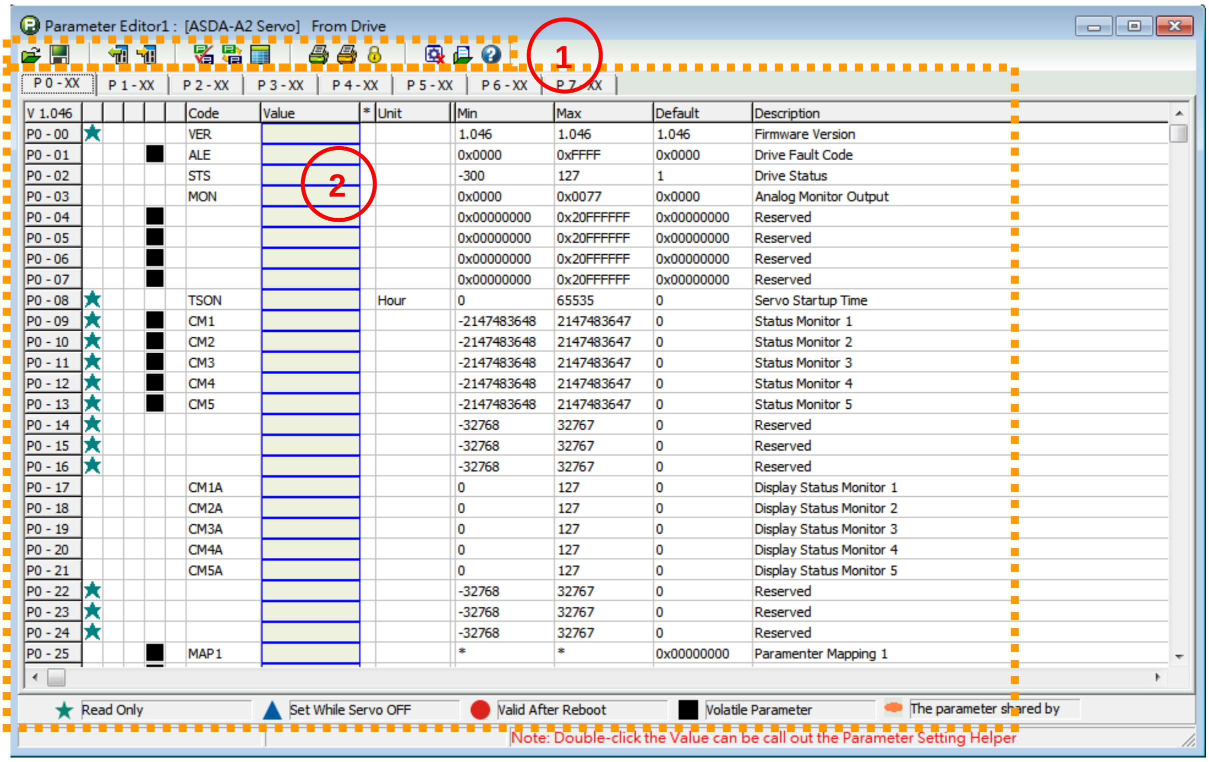


This section is divided into two parts:

【**Interface Introduction**】: Toolbar and screen of working area will be described here.

【**Parameter Configuration**】: It describes the function of parameter configuration, parameter conversion and parameter comparison.

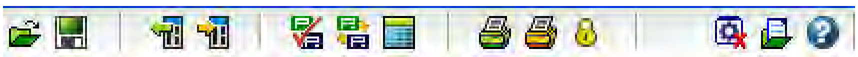
Interface Introduction



1.) Toolbar: Users can access, compare, converse and print parameters.

2.) Parameters in working area: Users can setup parameter value, create the frequently used group of parameters and access the description of parameters.

[Toolbar]



We divide the toolbar into five sections:

 : Save / Access the file

 : Upload / Download parameters

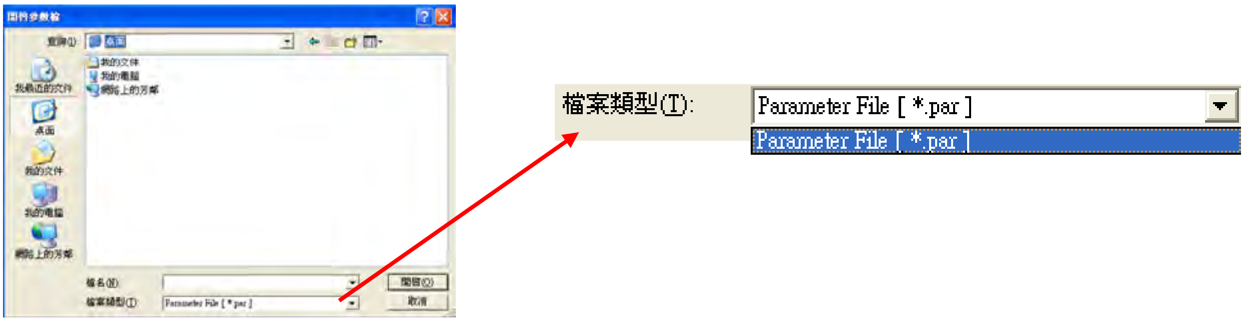
 : Compare, converse and configure parameters

 : Print parameters; Password for protecting data array.

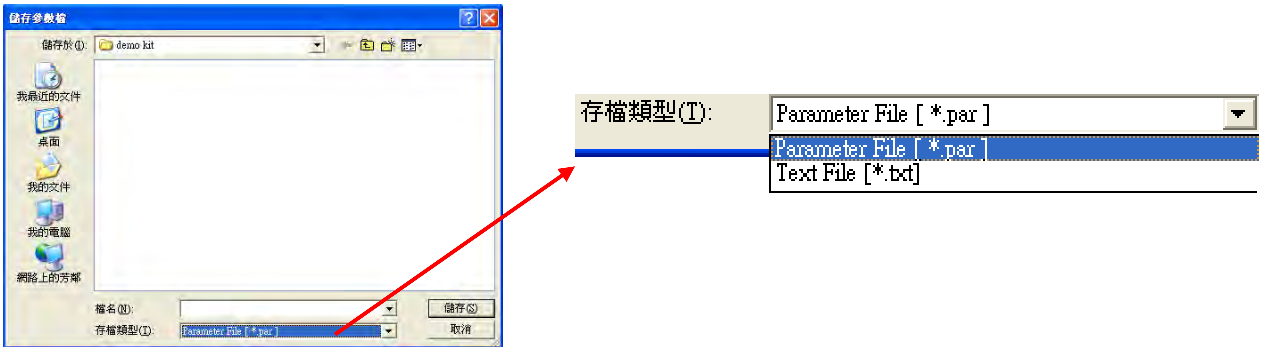
 : Other functions

Followings are the description of each button:

Open parameter file : Select the file. *.par is its filename extension.



Save parameter file : There are two storage format to save parameters from working area:

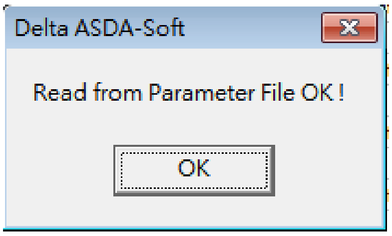


*.par: It is the file format of ASDA-Soft. Open it by the way of opening the parameter file.
*.txt: Save a parameter file as a Text file. See as below:

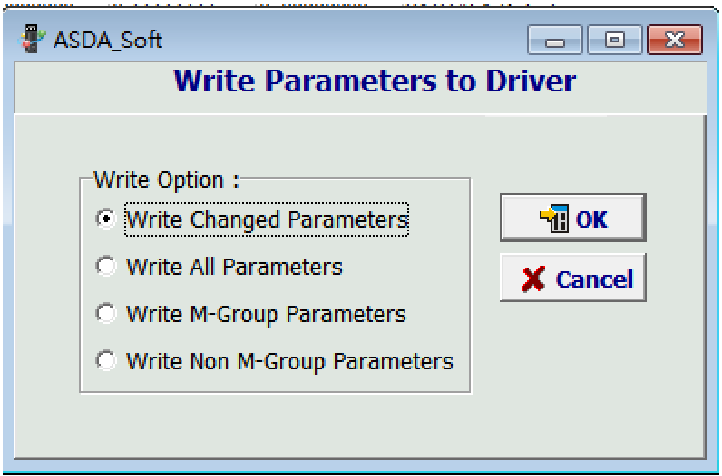
ASDA-A2 Servo

[Paramter]	[代碼]	[參數值]	[單位]	[最小值]	[最大值]	[預設值]	[說 明]
P0 - 00	VER	49	(null)	3604541	2097201	3604541	韌體版本
P0 - 01	ALE	0x0000	(null)	0x0000	0xFFFF	0x0000	驅動器錯誤狀態顯示
P0 - 02	STS	1	(null)	-300	127	-300	驅動器狀態顯示
P0 - 03	MON	0x0000	(null)	0x0000	0x0077	0x0000	類比輸出監控
P0 - 04		0x00000000	(null)	0x00000000	0x20FFFFFF	0x00000000	監視變數設定 1
P0 - 05		0x00000000	(null)	0x00000000	0x20FFFFFF	0x00000000	監視變數設定 2
P0 - 06		0x00000000	(null)	0x00000000	0x20FFFFFF	0x00000000	監視變數設定 3
P0 - 07		0x00000000	(null)	0x00000000	0x20FFFFFF	0x00000000	監視變數設定 4
P0 - 08	TSON	0	H	0	65535	0	伺服啓動時間
P0 - 09	CM1	0	(null)	-2147483648	2147483647	-2147483648	狀態監控暫存器 1
P0 - 10	CM2	0	(null)	-2147483648	2147483647	-2147483648	狀態監控暫存器 2
P0 - 11	CM3	0	(null)	-2147483648	2147483647	-2147483648	狀態監控暫存器 3
P0 - 12	CM4	0	(null)	-2147483648	2147483647	-2147483648	狀態監控暫存器 4
P0 - 13	CM5	0	(null)	-2147483648	2147483647	-2147483648	狀態監控暫存器 5
P0 - 14		0	(null)	-32768	32767	-32768	保留
P0 - 15		0	(null)	-32768	32767	-32768	保留
P0 - 16		0	(null)	-32768	32767	-32768	保留
P0 - 17	CM1A	0	(null)	0	127	0	選擇狀態監控暫存器1的顯示內容
P0 - 18	CM2A	0	(null)	0	127	0	選擇狀態監控暫存器2的顯示內容
P0 - 19	CM3A	0	(null)	0	127	0	選擇狀態監控暫存器3的顯示內容
P0 - 20	CM4A	0	(null)	0	127	0	選擇狀態監控暫存器4的顯示內容
P0 - 21	CM5A	0	(null)	0	127	0	選擇狀態監控暫存器5的顯示內容
P0 - 22		0	(null)	-32768	32767	-32768	保留
P0 - 23		0	(null)	-32768	32767	-32768	保留
P0 - 24		0	(null)	-32768	32767	-32768	保留
P0 - 25	MAP1	0x00000000	(null)	0x00000000	0xFFFFFFFF	0x00000000	映射參數#1
P0 - 26	MAP2	0x00000000	(null)	0x00000000	0xFFFFFFFF	0x00000000	映射參數#2
P0 - 27	MAP3	0x00000000	(null)	0x00000000	0xFFFFFFFF	0x00000000	映射參數#3

Access parameters : When the communication is connected, this function can help to access the parameter group of the servo drive and display in parameter list. Then, a reminder will pop up:



Write-in parameters : When the communication is connected, this function can help to download parameters from the working area into the servo drive. Click this function and the following window will pop up:



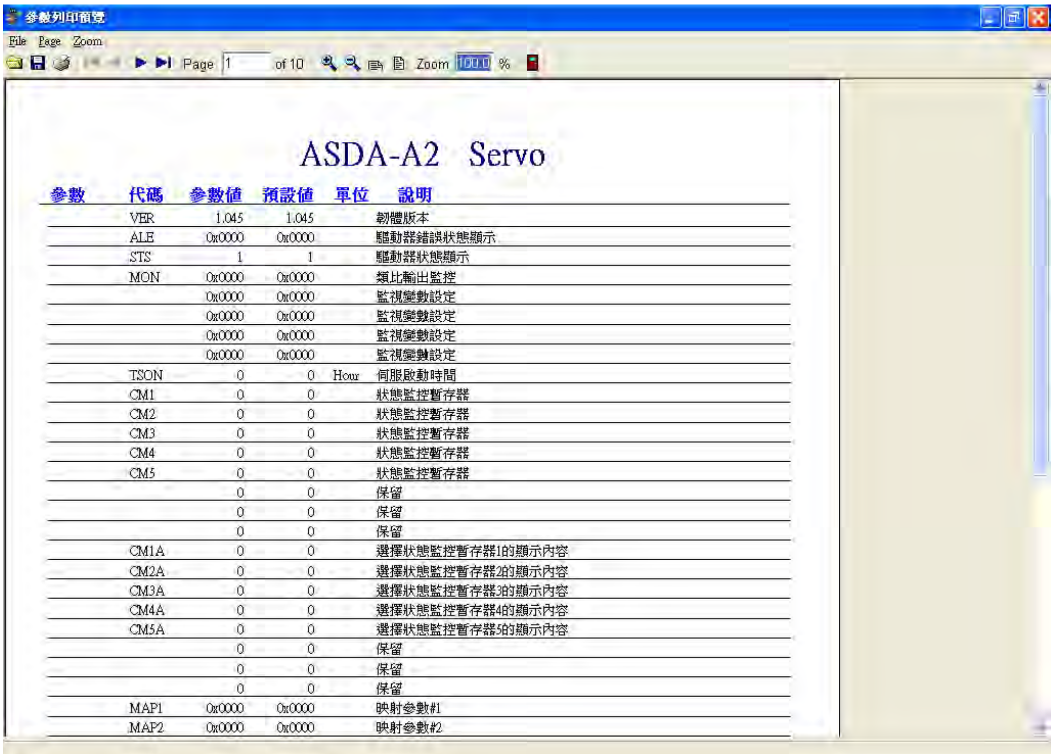
Icon	Function Description
Only download the parameter that has been changed.	The system will compare the default value and the one in working area. Then download the one that is different from the default value into the servo drive.
Download all parameter	All parameter will be downloaded into the servo drive.

Parameter comparison : When the communication is connected, compare the parameter value in working area to the one in servo drive or the saved file by this function. Please refer to the section of **[Parameter Configuration]** for detailed explanation.

Parameter conversion : When the communication is connected, select the firmware version and convert the default value in working area. Please refer to the section of **[Parameter Configuration]** for detailed explanation.

Open parameter configuration : When the communication is connected, use this function to change the firmware version. Please refer to section of **[Parameter Configuration]** for detailed explanation.

Print parameters : Print all parameter group in working area.



參數	代碼	參數值	預設值	單位	說明
	VER	1.045	1.045		韌體版本
	ALE	0x0000	0x0000		驅動器錯誤狀態顯示
	STS	1	1		驅動器狀態顯示
	MON	0x0000	0x0000		類比輸出監控
		0x0000	0x0000		監視變數設定
		0x0000	0x0000		監視變數設定
		0x0000	0x0000		監視變數設定
		0x0000	0x0000		監視變數設定
	TSON	0	0	Hour	伺服啟動時間
	CM1	0	0		狀態監控暫存器
	CM2	0	0		狀態監控暫存器
	CM3	0	0		狀態監控暫存器
	CM4	0	0		狀態監控暫存器
	CM5	0	0		狀態監控暫存器
		0	0		保留
		0	0		保留
		0	0		保留
	CM1A	0	0		選擇狀態監控暫存器1的顯示內容
	CM2A	0	0		選擇狀態監控暫存器2的顯示內容
	CM3A	0	0		選擇狀態監控暫存器3的顯示內容
	CM4A	0	0		選擇狀態監控暫存器4的顯示內容
	CM5A	0	0		選擇狀態監控暫存器5的顯示內容
		0	0		保留
		0	0		保留
		0	0		保留
	MAP1	0x0000	0x0000		映射參數#1
	MAP2	0x0000	0x0000		映射參數#2

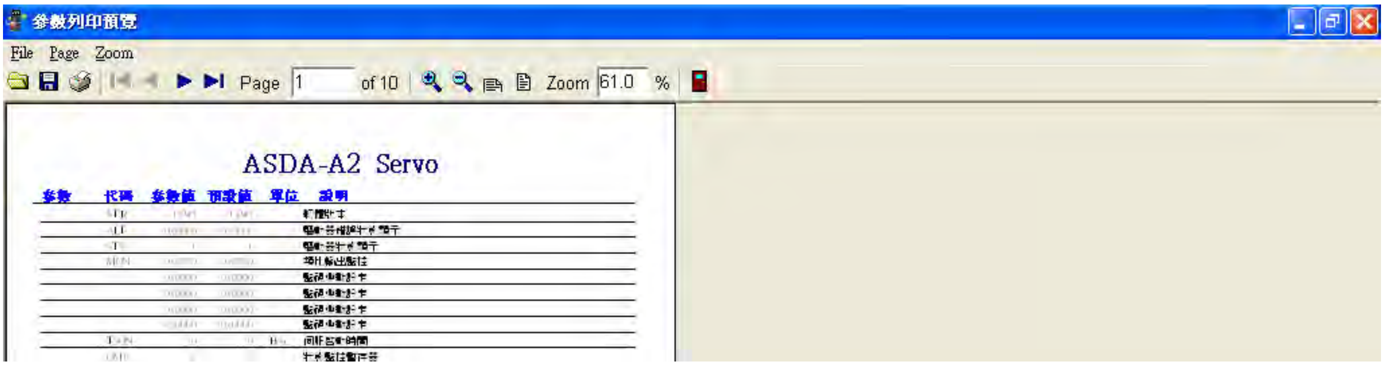
: Open file / Save file / Print file;

: Select the page: There are ten pages in total to show all parameter. Use this function to select the page.

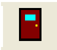
: Zoom in / Zoom out: This can zoom in or zoom out the displayed content of parameters.

: Page width: Align the width to display the content.

: Full-page: Click this to display in full page.



: Adjust the screen size.

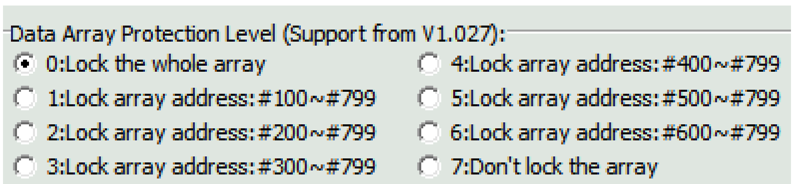
: Exit: Click this to close print function.

: Pint the parameter (only for those are different from the default value); Its operation is the same as “Print Parameter ”.

: Password for protection setting: Setup the password for protecting data array. This can ensure value in data array will not lose caused by wrong operation.

[Note] This function is available after firmware version V1.027.

The setting range can be divided into:



After the setting is complete, the following window will pop up:

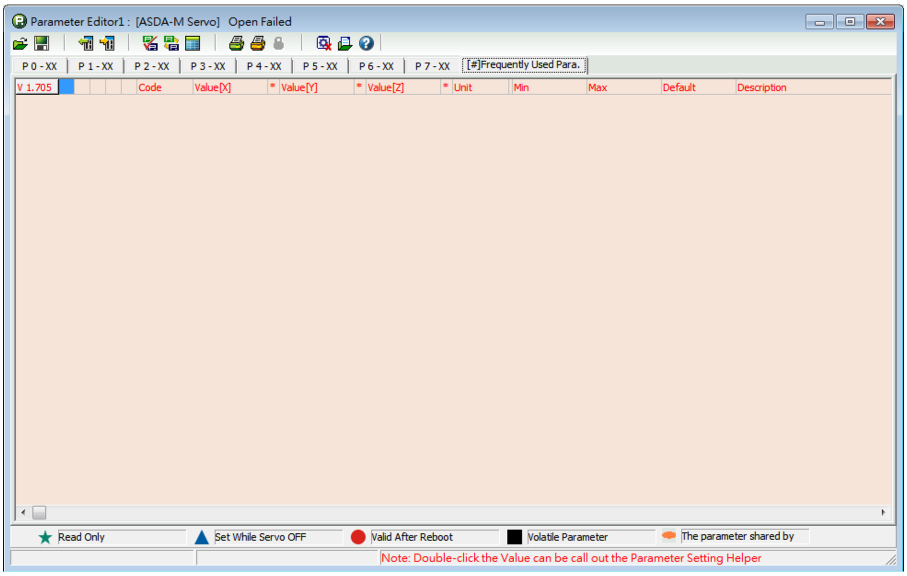
Enter the password to remove the protection function:

Stop Operation: When the communication is connected, if users desire to stop accessing parameters, click, a warning message will pop up and stop the operation:

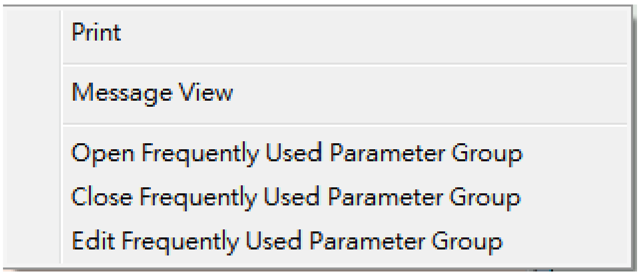
[Open frequently used parameters] : This could be used to setup the list of frequently used parameter group. Its features are:

a.) Centralize the parameter from different group in one page, which is easy to find and edit.

b.) Users can add or delete parameters.

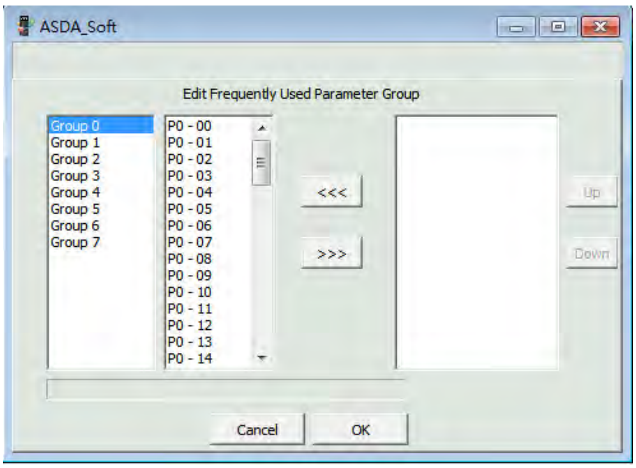


When "Frequently Used Parameter Group" is opened, right click the mouse to setup the list:



Print (V):
Message View (W): Click "Message View" to open the screen on the left. It is easy for users to access the software status.
Open Frequently Used Parameter Group (X): Open the page of frequently used parameter.
Close Frequently Used Parameter Group (Y): Close the page of frequently used parameter.
Edit Frequently Used Parameter Group (Z): Edit the page of frequently used parameter.

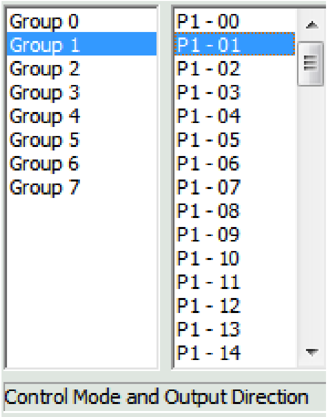
Click this, the following window will pop up:



Its operation steps are as follows:

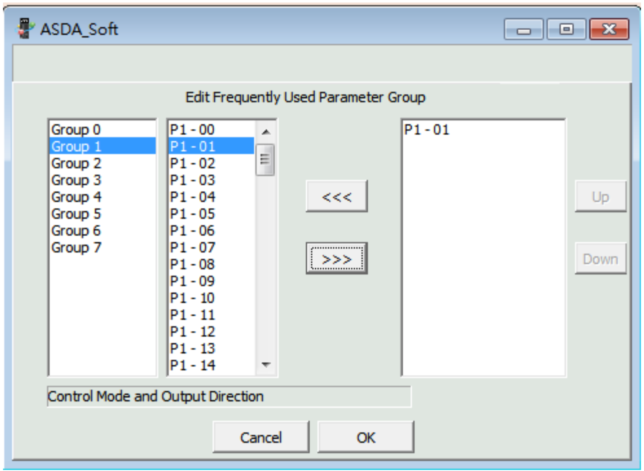
a.) Select the parameter group (Group 0 ~ 7);

b.) Select the parameter; Click the parameter and the below section will display the parameter name. See as below:

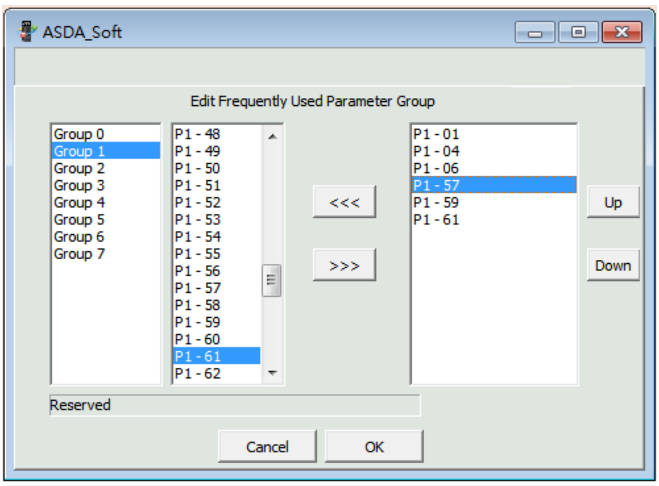


If the user selects P1-01 from Group 1, the below section will display its name, “Input Setting of Control Mode and Control Command”.

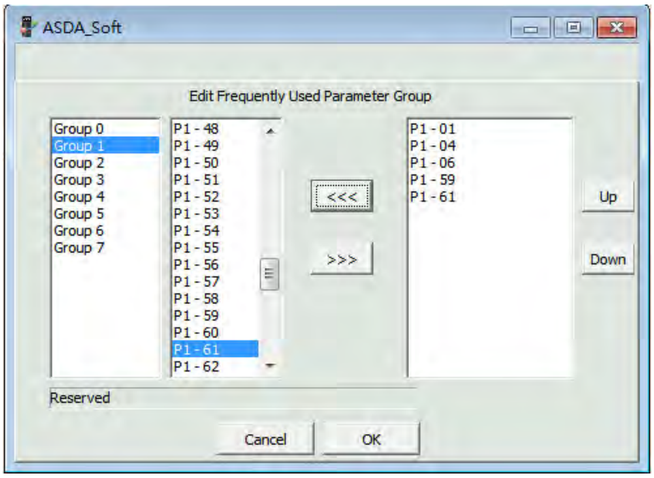
c.) Then, click >>> to download it to the frequently used parameter.



d.) If desire to remove the parameter, click <<< will do. For example, if users desire to remove P1-57 (Motor Crash Protection), select P1-57 on the right, and then click <<<.

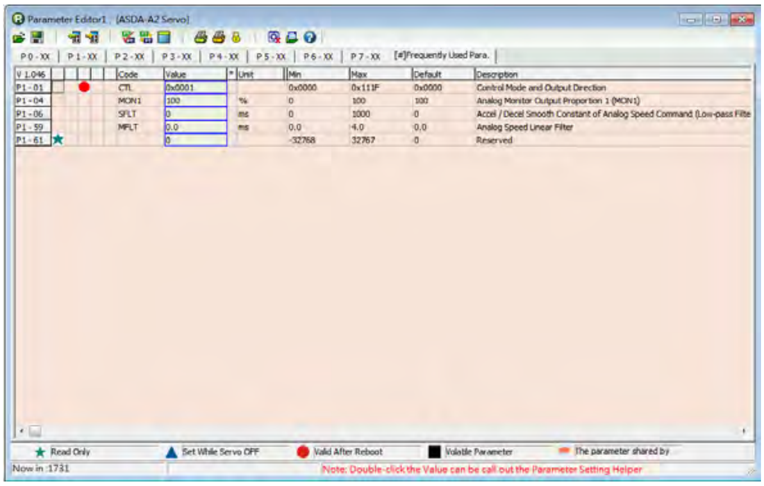


P1-57 will be removed.



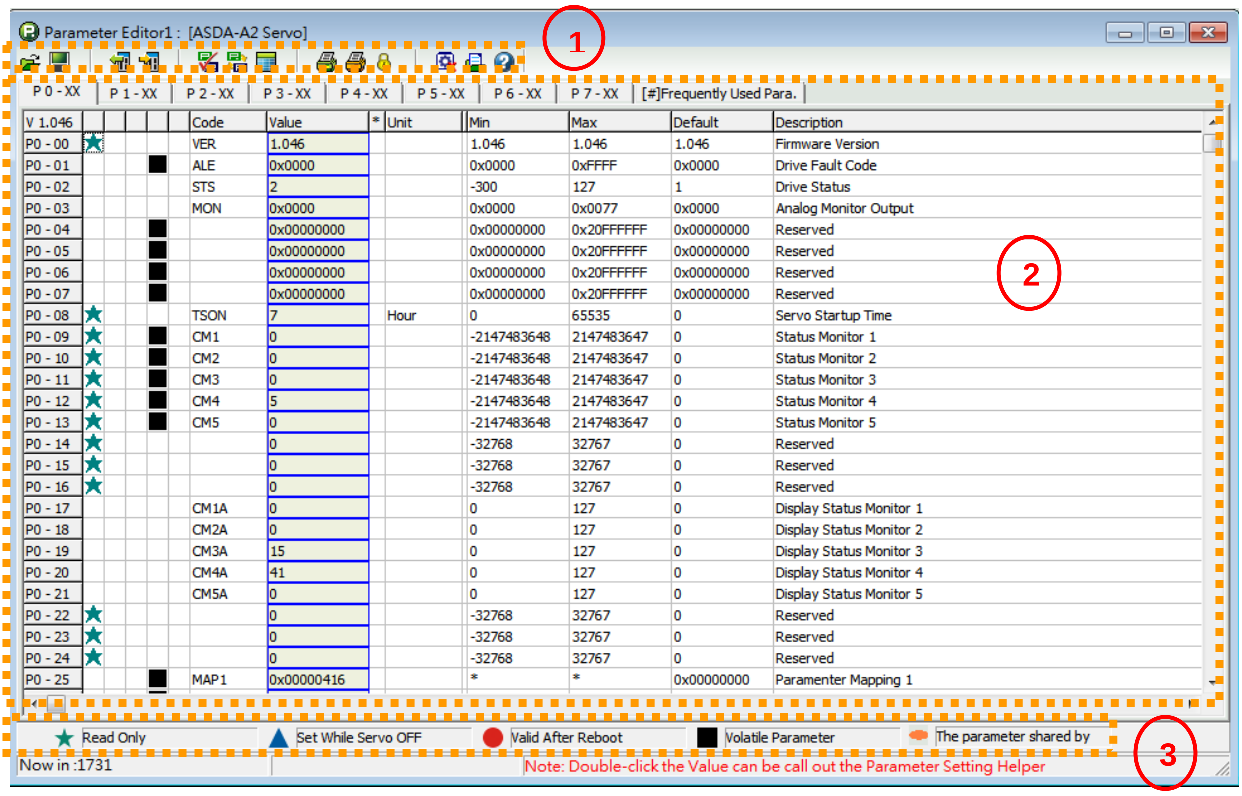
e.) The Up and Down Key can be used to change the order.

f.) Select all desired parameter, click OK to complete the setting.



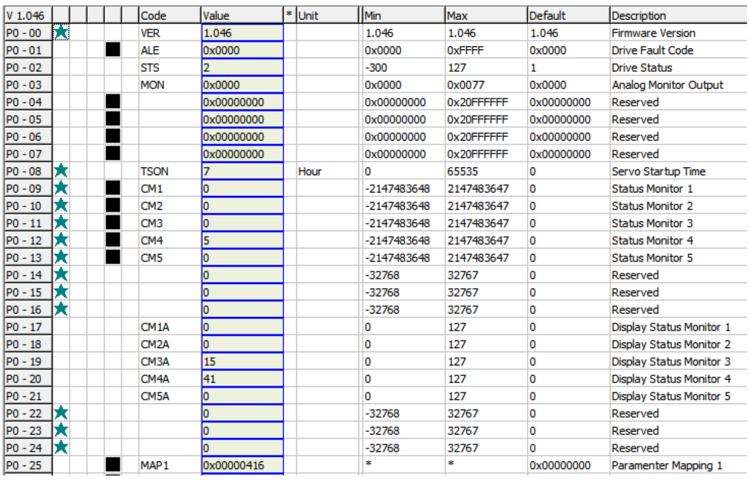
Description : This function can quickly access the operation description of parameter editor.

[Working Area]



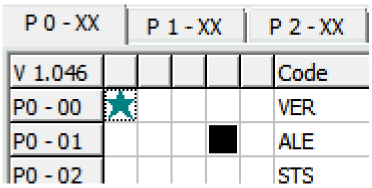
1.) Tabs: All parameter group number will be displayed here. Select the parameter group by switching the tab. When Frequently Used Parameter Group is opened, its tab will be displayed here.

2.) Main screen of working area: The detailed description of all parameter will be displayed here.

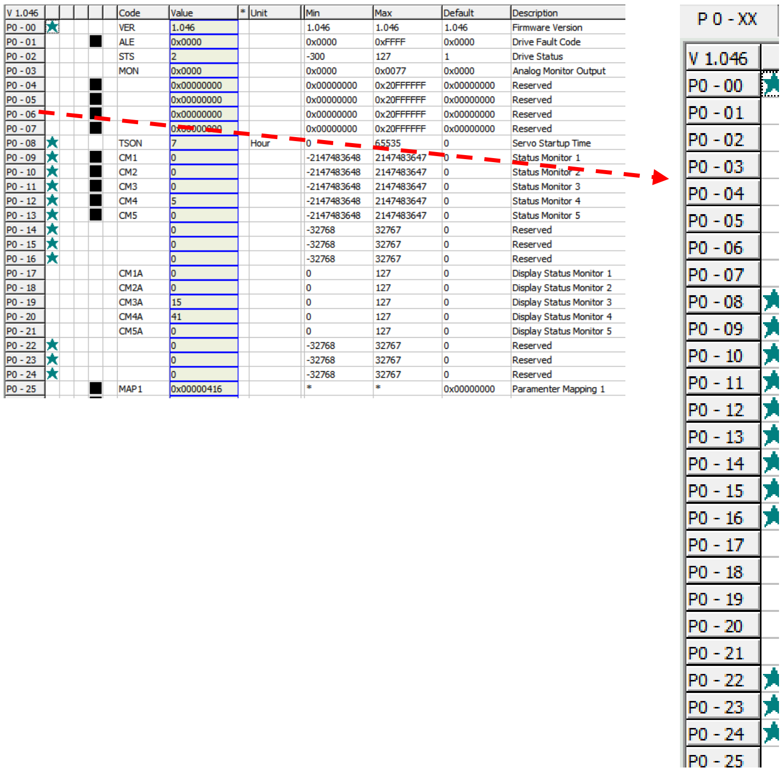


V 1.046				Code	Value	*	Unit	Min	Max	Default	Description
P0 - 00	★			VER	1.046			1.046	1.046	1.046	Firmware Version
P0 - 01			■	ALE	0x0000			0x0000	0xFFFF	0x0000	Drive Fault Code
P0 - 02				STS	2			-300	127	1	Drive Status
P0 - 03				MON	0x0000			0x0000	0x0077	0x0000	Analog Monitor Output
P0 - 04			■		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 05			■		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 06			■		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 07			■		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 08	★			TSON	7		Hour	0	65535	0	Servo Startup Time
P0 - 09	★		■	CM1	0			-2147483648	2147483647	0	Status Monitor 1
P0 - 10	★		■	CM2	0			-2147483648	2147483647	0	Status Monitor 2
P0 - 11	★		■	CM3	0			-2147483648	2147483647	0	Status Monitor 3
P0 - 12	★		■	CM4	5			-2147483648	2147483647	0	Status Monitor 4
P0 - 13	★		■	CM5	0			-2147483648	2147483647	0	Status Monitor 5
P0 - 14	★				0			-32768	32767	0	Reserved
P0 - 15	★				0			-32768	32767	0	Reserved
P0 - 16	★				0			-32768	32767	0	Reserved
P0 - 17				CM1A	0			0	127	0	Display Status Monitor 1
P0 - 18				CM2A	0			0	127	0	Display Status Monitor 2
P0 - 19				CM3A	15			0	127	0	Display Status Monitor 3
P0 - 20				CM4A	41			0	127	0	Display Status Monitor 4
P0 - 21				CM5A	0			0	127	0	Display Status Monitor 5
P0 - 22	★				0			-32768	32767	0	Reserved
P0 - 23	★				0			-32768	32767	0	Reserved
P0 - 24	★				0			-32768	32767	0	Reserved
P0 - 25			■	MAP1	0x00000416			*	*	0x00000000	Paramenter Mapping 1

a.) The first section in the upper-left corner will show the current firmware version:
See the example below, the current firmware version is V1.046.



b.) The 1st row of the main screen will display parameters in sequence.

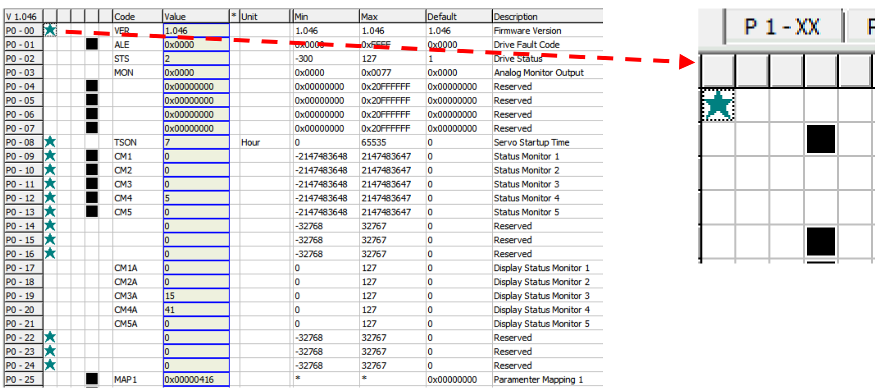


V 1.046	Code	Value	*	Unit	Min	Max	Default	Description
P0 - 00	VER	1.046			1.046	1.046	1.046	Firmware Version
P0 - 01	ALE	0x0000			0x0000	0xFFFF	0x0000	Drive Fault Code
P0 - 02	STS	2			-300	127	1	Drive Status
P0 - 03	MON	0x0000			0x0000	0x0077	0x0000	Analog Monitor Output
P0 - 04		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 05		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 06		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 07		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 08	TSON	7		Hour	0	65535	0	Servo Startup Time
P0 - 09	CM1	0			-2147483648	2147483647	0	Status Monitor 1
P0 - 10	CM2	0			-2147483648	2147483647	0	Status Monitor 2
P0 - 11	CM3	0			-2147483648	2147483647	0	Status Monitor 3
P0 - 12	CM4	5			-2147483648	2147483647	0	Status Monitor 4
P0 - 13	CM5	0			-2147483648	2147483647	0	Status Monitor 5
P0 - 14		0			-32768	32767	0	Reserved
P0 - 15		0			-32768	32767	0	Reserved
P0 - 16		0			-32768	32767	0	Reserved
P0 - 17	CM1A	0			0	127	0	Display Status Monitor 1
P0 - 18	CM2A	0			0	127	0	Display Status Monitor 2
P0 - 19	CM3A	15			0	127	0	Display Status Monitor 3
P0 - 20	CM4A	41			0	127	0	Display Status Monitor 4
P0 - 21	CM5A	0			0	127	0	Display Status Monitor 5
P0 - 22		0			-32768	32767	0	Reserved
P0 - 23		0			-32768	32767	0	Reserved
P0 - 24		0			-32768	32767	0	Reserved
P0 - 25	MAP1	0x00000416			*	*	0x00000000	Paramenter Mapping 1

c.) The 2nd to the 6th row of the main screen represents the parameter status of the servo drive; Each row represents different definition, which is:

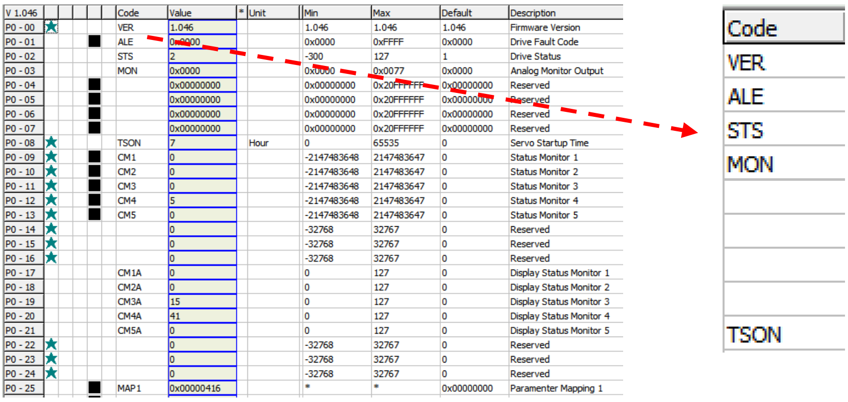
: Read-only; : Setup when Servo Off; : Not effective until re-power on

: Volatile; : Parameter for three axes

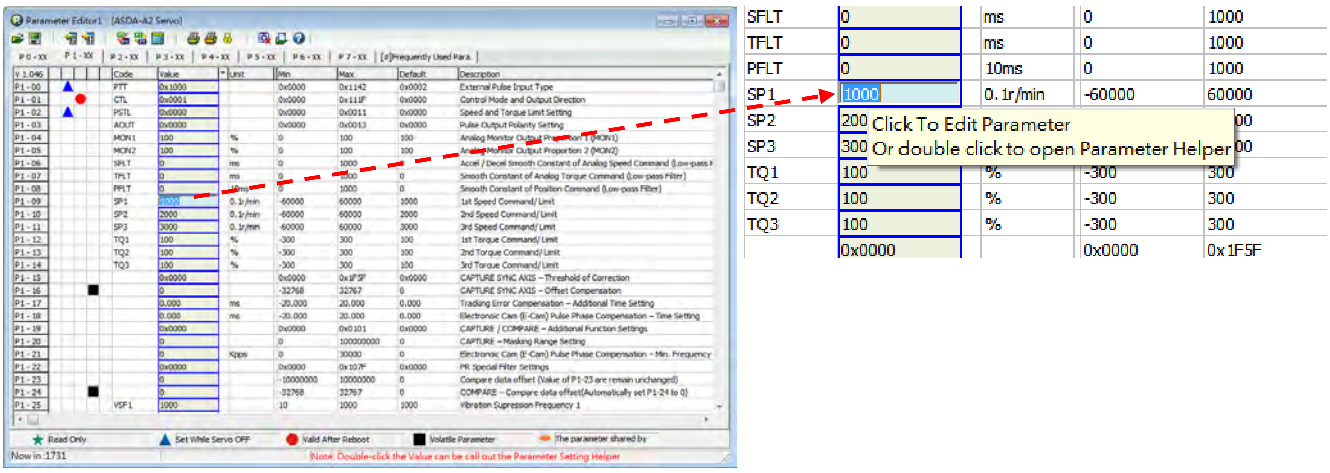


V 1.046	Code	Value	*	Unit	Min	Max	Default	Description
P0 - 00	VER	1.046			1.046	1.046	1.046	Firmware Version
P0 - 01	ALE	0x0000			0x0000	0xFFFF	0x0000	Drive Fault Code
P0 - 02	STS	2			-300	127	1	Drive Status
P0 - 03	MON	0x0000			0x0000	0x0077	0x0000	Analog Monitor Output
P0 - 04		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 05		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 06		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 07		0x00000000			0x00000000	0x20FFFFFF	0x00000000	Reserved
P0 - 08	TSON	7		Hour	0	65535	0	Servo Startup Time
P0 - 09	CM1	0			-2147483648	2147483647	0	Status Monitor 1
P0 - 10	CM2	0			-2147483648	2147483647	0	Status Monitor 2
P0 - 11	CM3	0			-2147483648	2147483647	0	Status Monitor 3
P0 - 12	CM4	5			-2147483648	2147483647	0	Status Monitor 4
P0 - 13	CM5	0			-2147483648	2147483647	0	Status Monitor 5
P0 - 14		0			-32768	32767	0	Reserved
P0 - 15		0			-32768	32767	0	Reserved
P0 - 16		0			-32768	32767	0	Reserved
P0 - 17	CM1A	0			0	127	0	Display Status Monitor 1
P0 - 18	CM2A	0			0	127	0	Display Status Monitor 2
P0 - 19	CM3A	15			0	127	0	Display Status Monitor 3
P0 - 20	CM4A	41			0	127	0	Display Status Monitor 4
P0 - 21	CM5A	0			0	127	0	Display Status Monitor 5
P0 - 22		0			-32768	32767	0	Reserved
P0 - 23		0			-32768	32767	0	Reserved
P0 - 24		0			-32768	32767	0	Reserved
P0 - 25	MAP1	0x00000416			*	*	0x00000000	Paramenter Mapping 1

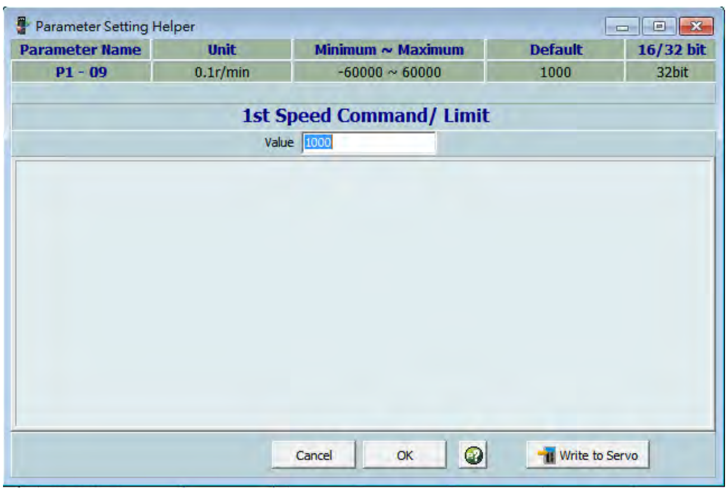
d.) The 7th row shows the parameter code.



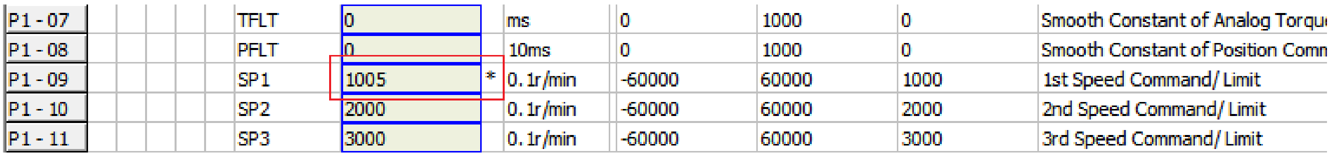
e.) The 8th row displays the parameter value; Users can directly acquire the parameter value in this pane.



See the above figure, click at this pane, the parameter value can be edited. Double left click this pane, “Parameter Setting Helper” will pop up. It is for setting parameter as well.



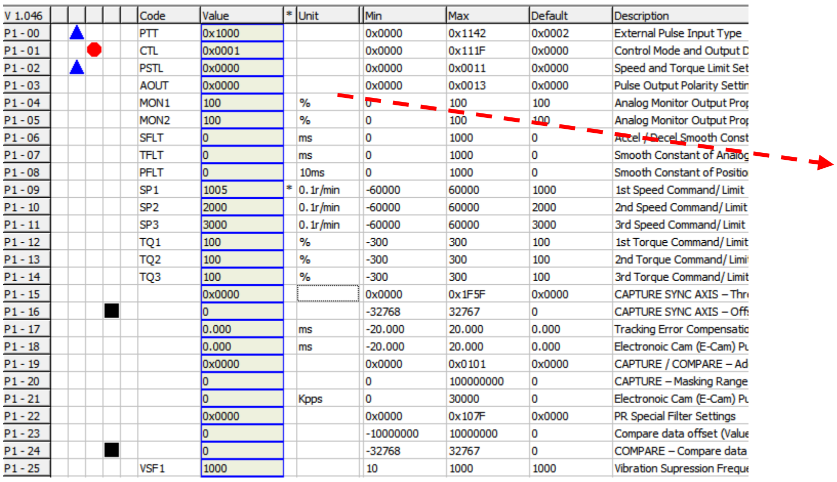
f.) The 9th row of the main screen “*” means the newly modified parameter that hasn’t been downloaded into the servo drive. If the user modifies a parameter’s value without pressing  “enter”, the 9th row will display “*”.

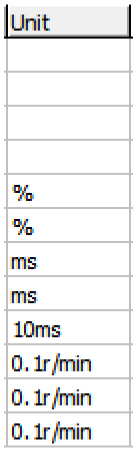


P1 - 07	TFLT	0		ms	0	1000	0	Smooth Constant of Analog Torqu
P1 - 08	PFLT	0		10ms	0	1000	0	Smooth Constant of Position Comn
P1 - 09	SP1	1005	*	0. 1r/min	-60000	60000	1000	1st Speed Command/ Limit
P1 - 10	SP2	2000		0. 1r/min	-60000	60000	2000	2nd Speed Command/ Limit
P1 - 11	SP3	3000		0. 1r/min	-60000	60000	3000	3rd Speed Command/ Limit

See the example above, if the user change the value of P1-09 from 1000 to 1005 without pressing the “Enter” Key, “*” will show next to the value.

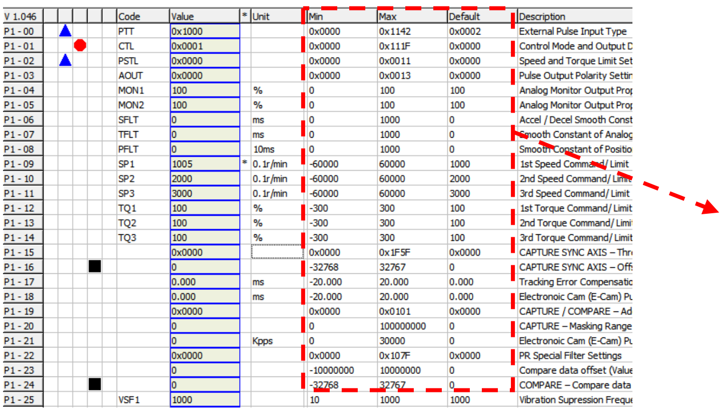
g.) The 10th row shows the unit of parameter.

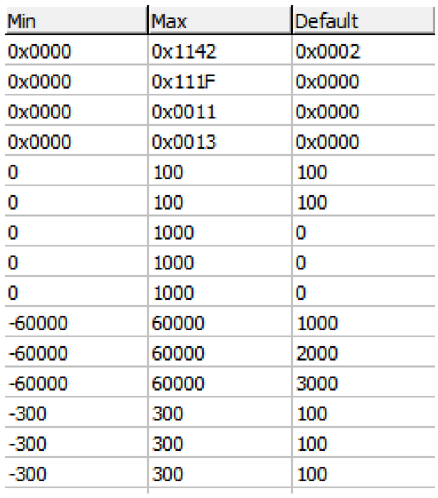




Unit
%
%
ms
ms
10ms
0. 1r/min
0. 1r/min
0. 1r/min

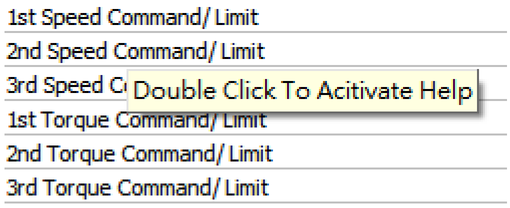
h.) The 11th, 12th, and 13th row represents the minimum, the maximum and default value respectively. Users can confirm if the setting value is within the allowable range.



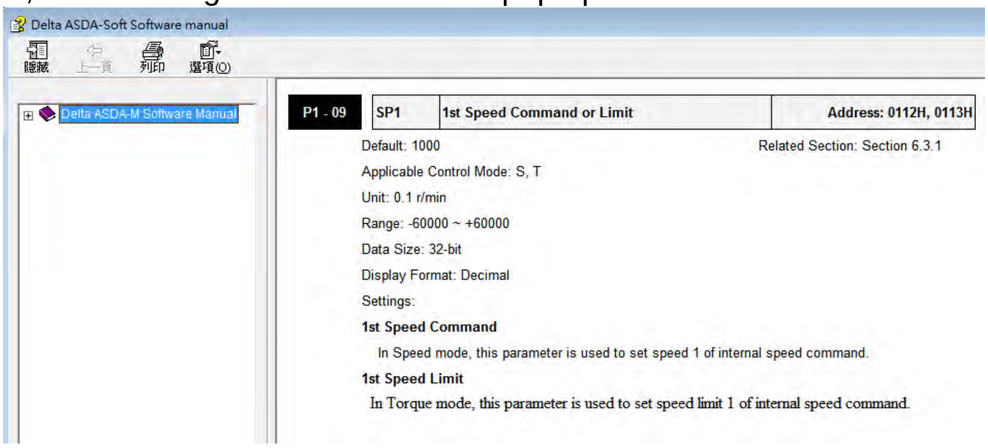


Min	Max	Default
0x0000	0x1142	0x0002
0x0000	0x111F	0x0000
0x0000	0x0011	0x0000
0x0000	0x0013	0x0000
0	100	100
0	100	100
0	1000	0
0	1000	0
0	1000	0
-60000	60000	1000
-60000	60000	2000
-60000	60000	3000
-300	300	100
-300	300	100
-300	300	100

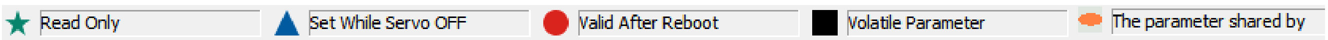
i.) The 14th row is the parameter descriptions. Move the cursor to the 14th row, the cursor will become a question mark and shows “Double Click to Activate Help”.



Then, the following documentation will pop up for users’ reference:



3.) Description of parameter status:



: Read-only; It only can access the status of parameters.

: Unable to setup parameters when Servo ON.

: Parameter is not effective until re-power on the servo drive.

: Volatile parameter.

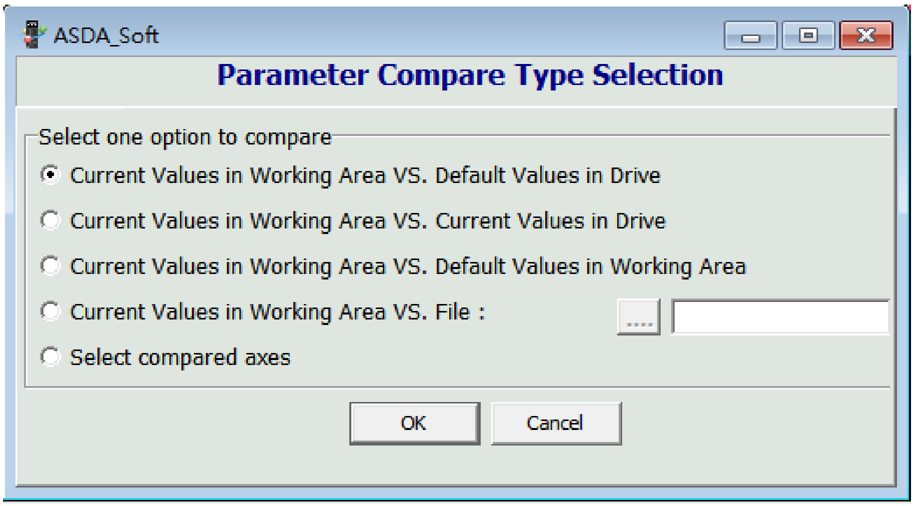
: Parameter for three axes; It marks parameters for three axes for ASDA-M series servo drive.

Parameter Configuration

Between two different firmware versions of servo drives, “Parameter Configuration” is for switching parameter setting and downloading parameters into the servo drive. Followings are the detailed description of this function:

: Parameter Comparison

Users can compare the parameter value from working area to the one from different sources. Click it, the following screen will pop up:



Current Values in Working Area VS. Default Values in Drive: It compares the current value in working area to the default ones in servo drive. Users can compare the difference when the communication is connected.

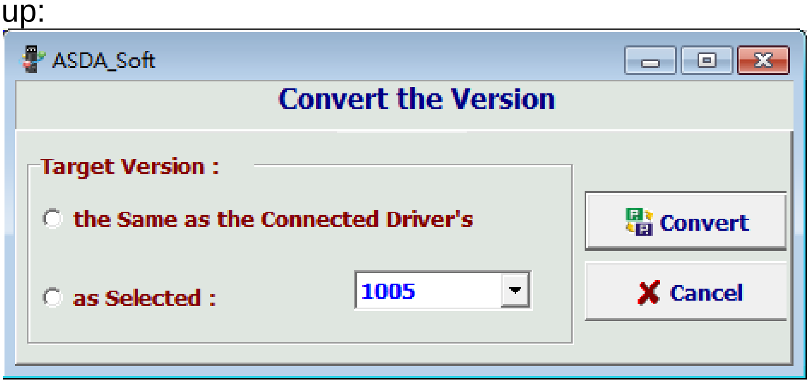
Current Values in Working Area VS. Current Values in Drive: It compares the current values in working area to the ones in servo drive. When the communication is connected, users could know which parameters in working area are modified but not downloaded into the servo drive.

Current Values in Working Area VS. Default Values in Working Area: It compares the current values in working area to the default ones. When the communication is disconnected, users could know the difference between the modified parameters and the default ones.

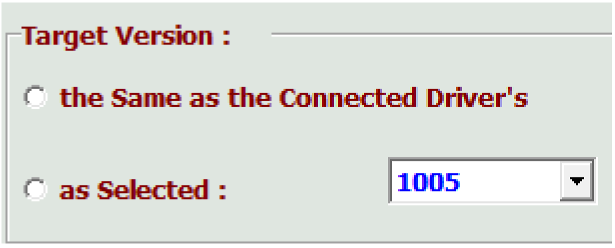
Current Values in Working Area VS. File: It compares the current values in working area to the ones in file. Users could know the differences between both when the communication is unconnected.

 : Parameter Conversion

Users can quickly switch the original version to the new one. The following screen will pop up:



It provides two firmware version:

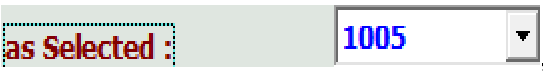


When select 

, regardless the opened firmware version, the system will adjust the parameter value based on the current version.

Select the target version and click 

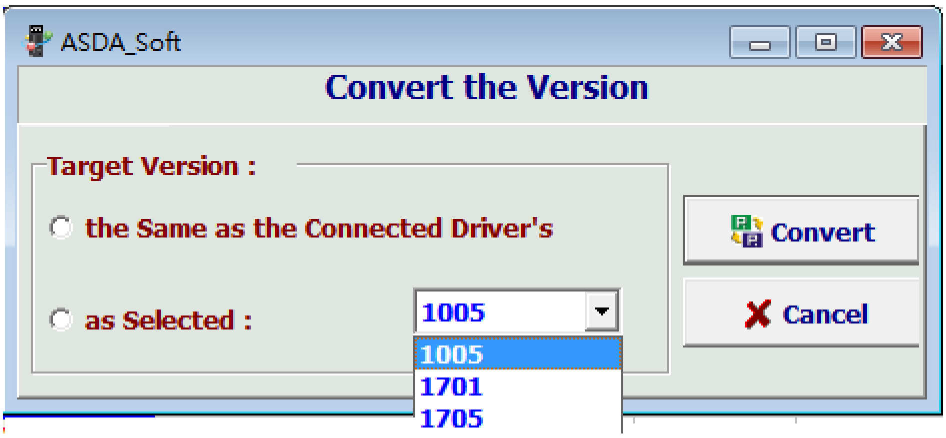
, the system will judge if there is any parameter that needs to be converted. If the firmware version is the same, the following reminder will pop up:

When select 

, users can use the built-in firmware version for conversion.

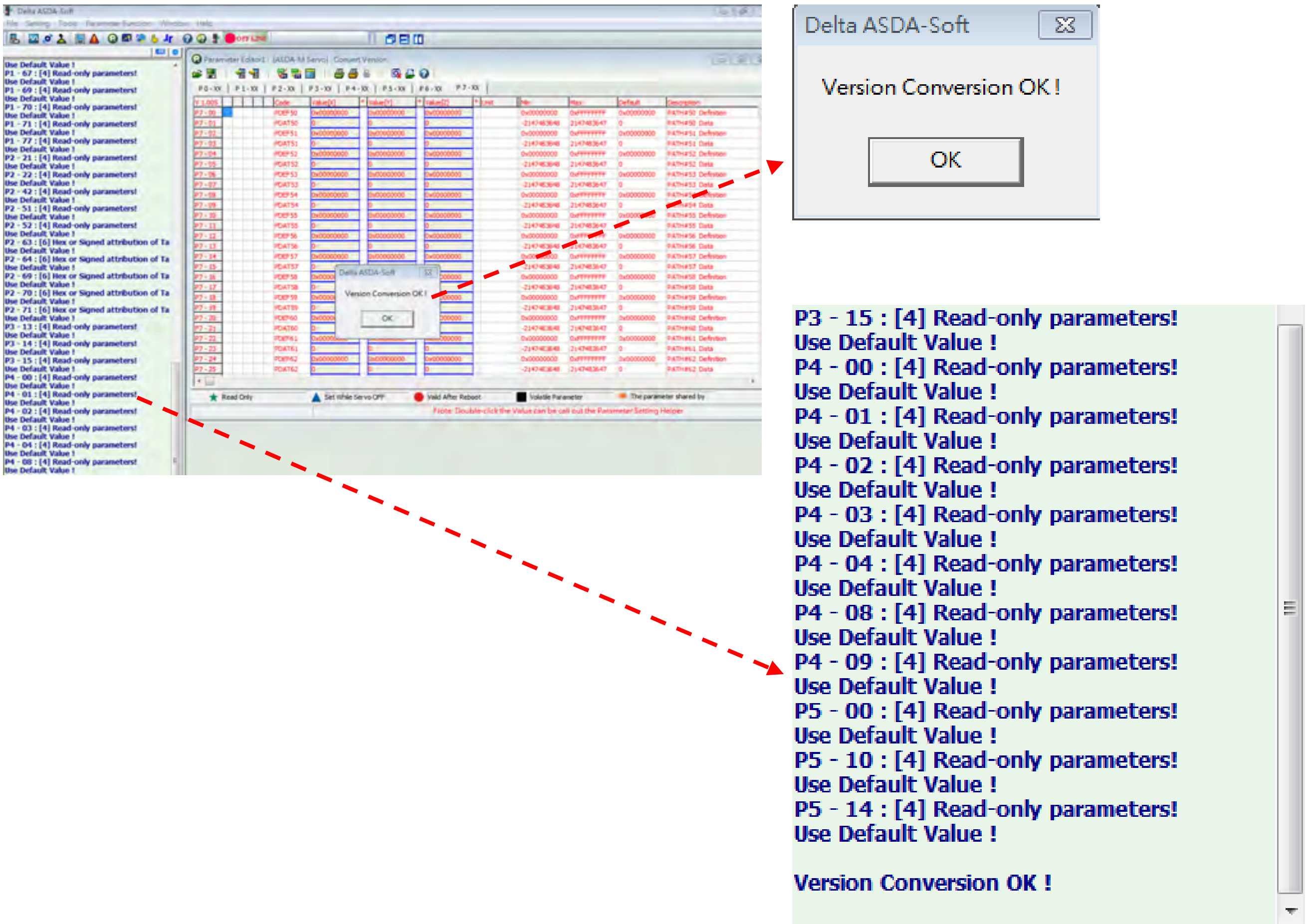
For example,

Step 1: Setup the desire version. Select from the drop-down menu.



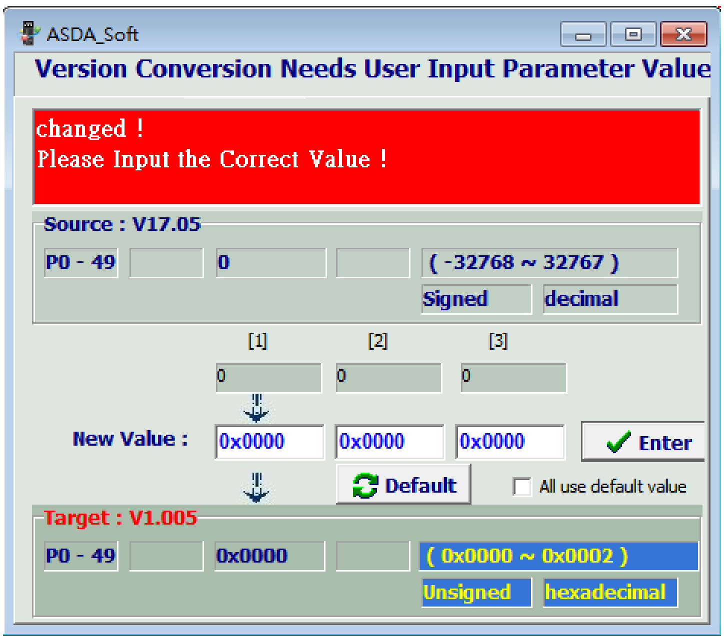
Step 2: Then, click 

Step 3: The system will convert the version. Then the following screen will pop up:



In addition, the message screen on the left will display the status of converted parameters.

During the conversion process, if the default value, max. and min. value in source version is different from the target version, a warning message will pop up and ask if the users would like to change the value as the one in target version. See as below. It is suggested to convert it according to the target version.

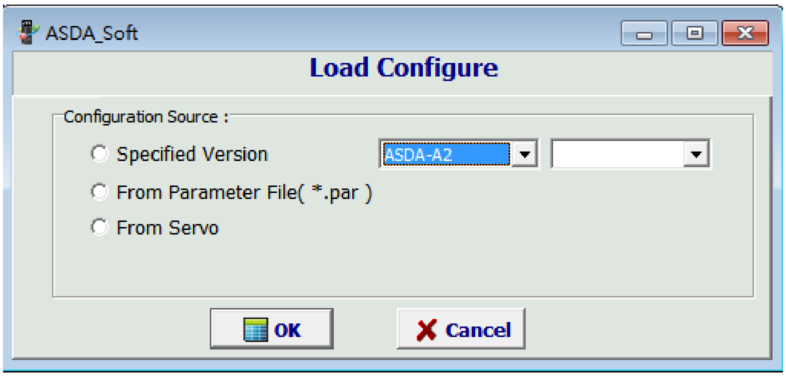


: Open Parameter Configuration

Different firmware version might result from the updated function of the servo drive. If the firmware version in ASDA-Soft cannot communicate with the one in servo drive, the communication problem will occur.

Users can download different firmware version in servo drive to ASDA-Soft by this function, .

Click , the following screen will pop up:



Three sources are provided:

a.) Specified Version: Users can specify the type of servo drive and firmware version. Then, users can access and read parameters via the specified version.

b.) From Parameter File (*.par): When the parameter file is sent by the client or on-site engineer, click From Parameter File(*.par) to select the firmware version.

Click OK, the following window will pop up:

Users can open the specified parameter file. Then, a reminder will pop up.

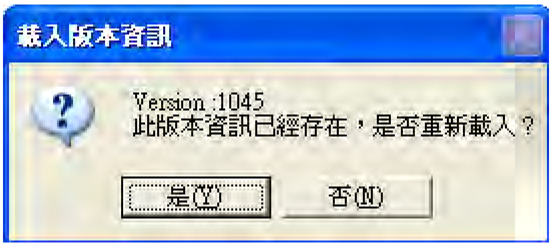
c.) From Servo: If the connected version is not stored in ASDA-Soft, this function can download the new version to the software.

Click 

, starting from Group 1, the software will download parameters of each group to the working area. And a reminder pops up:

If the firmware version has already stored in ASDA-Soft, the following reminder will pop up when click 

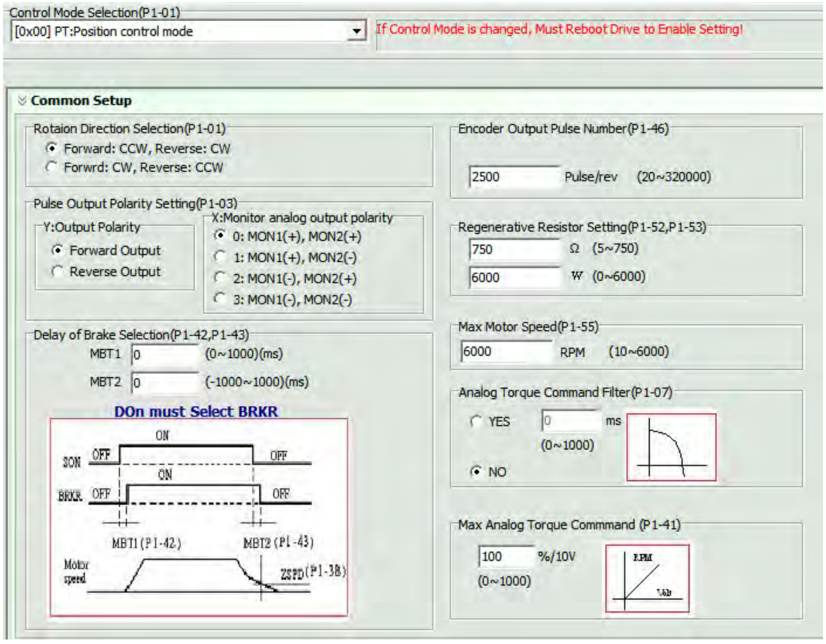
:



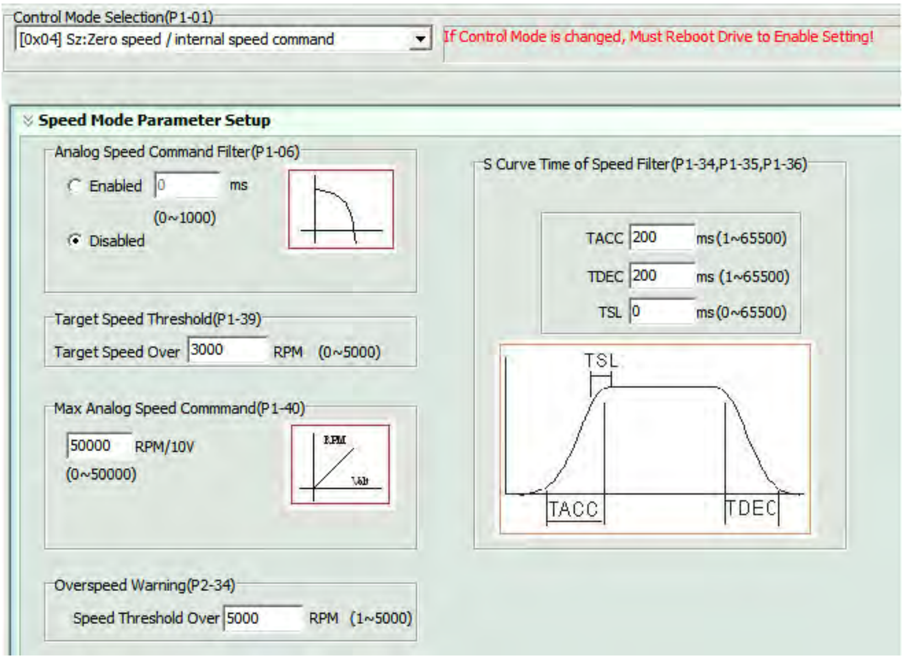
3.7 Parameter Initial Wizard

Parameter Initial Wizard enables users to quickly complete the setting of Delta's servo control mode. Its features are as follows:

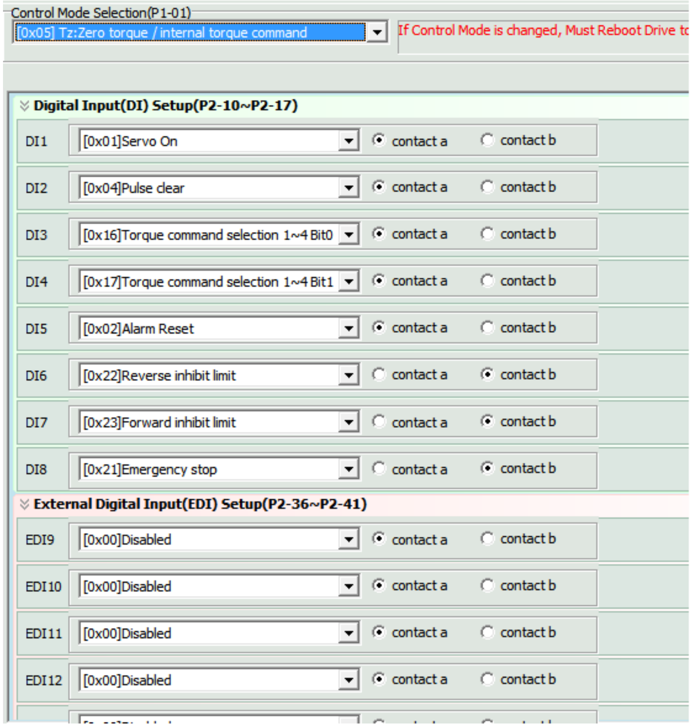
a.) Each control mode provides the specific interface so that Users can directly complete the setting. Following is the example of PT mode.



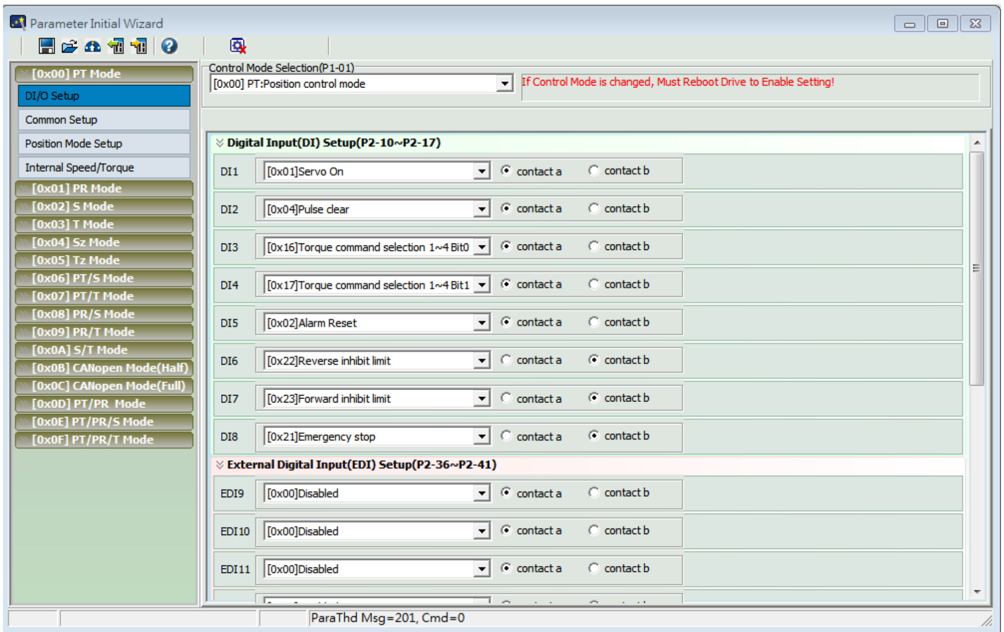
b.) Intuitive design: No need to memorize parameter codes or look up user manual for parameter description. Users can complete the setting by its user-friendly interface. Following is the example of Sz mode.



c.) Easier Digital Input / Output (DI/DO) setting. In the past, users have to look up user manual for the diversified DI and DO setting. With this function, users could setup and modify the setting by simply selecting the drop-down menu of Parameter Initial Wizard. Following is the example of Tz mode.



It is very suitable for electrical engineer to setup initial control mode and tuning. With intuitive design and convenient drop-down menu, it save users loads of time. Following is the main screen of Parameter Initial Wizard.



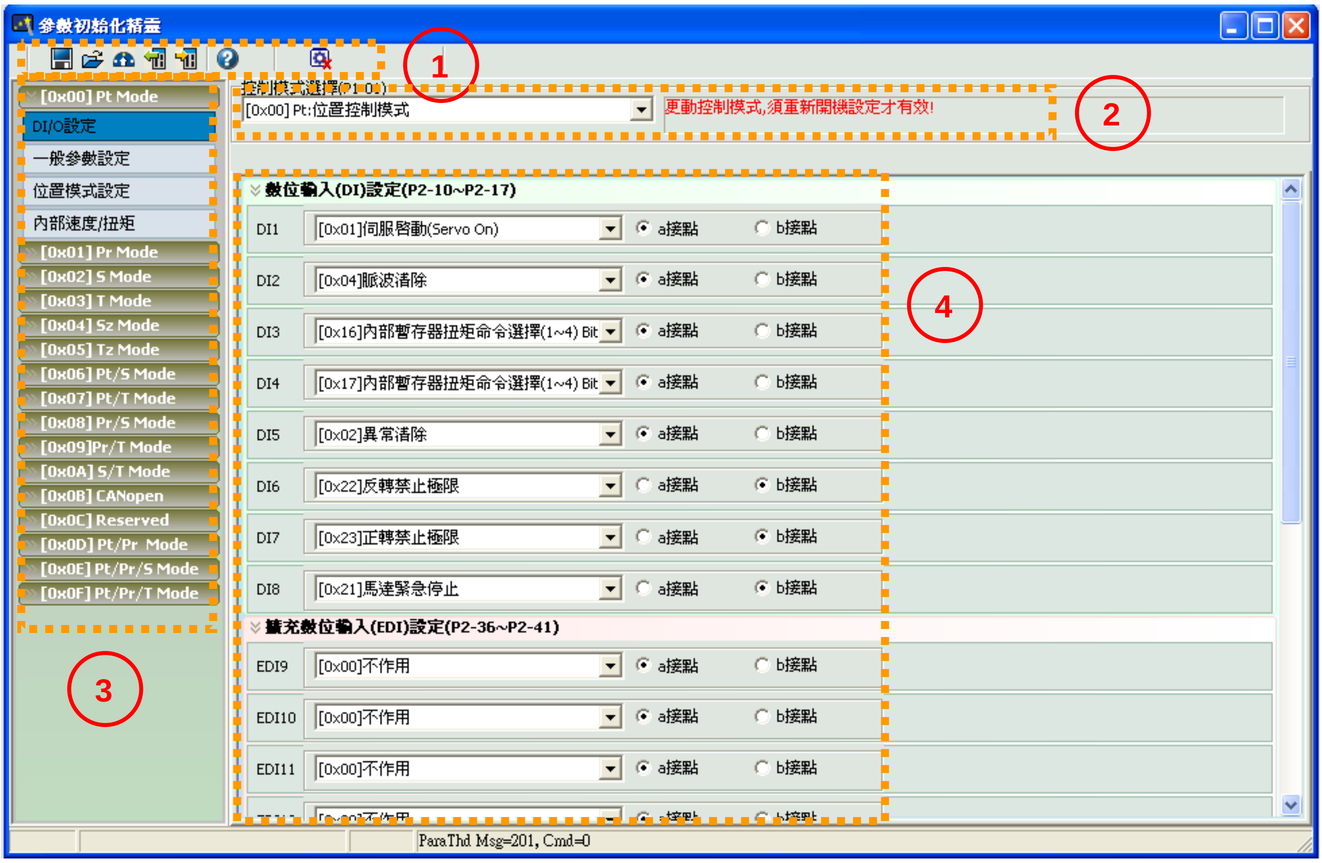
This section is divided into two parts:

【**Interface Introduction**】: It introduces Parameter Initial Wizard by three main parts: Working Area, Mode Setting and Function Setting.

【**Mode Setting**】: It describes how to complete the setting of control mode.

Interface Introduction

Parameter Initial Wizard integrates each control mode and gathers the commonly used parameter in one interface, which shortens the tuning time.



1.) [Working Area] : Users operate the basic function, e.g. upload / download parameter file, in this area.

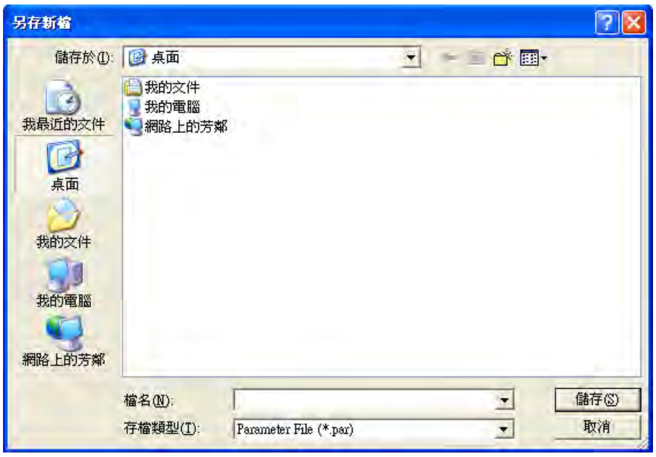
2.) [Control Mode Selection] : Use drop-down menu to select the control mode.

3.) [Mode Setting] : In the selected control mode, it lists the setting area of all parameter.

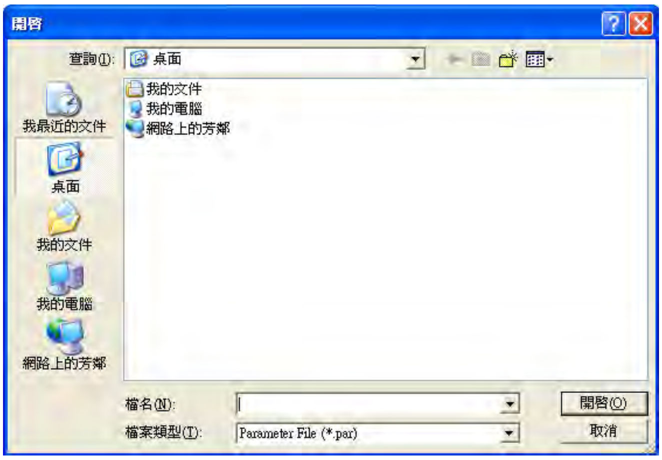
4.) [Function Setting] : Users can setup related parameter functions.

[Working Area]: When complete the setting of control mode, buttons in working area can be used to conduct basic operations, such as upload or download parameters.

Save file : Users can backup the parameter file of control mode. Click , the following screen will pop up:



Open file : Open the saved parameter file and modify the control mode or parameter setting via Parameter Initial Wizard. Click , the following screen will pop up:



New edit : During the editing, if desire to resume the initial status, click this button will do. The software will clear the current setting and return to the original status.

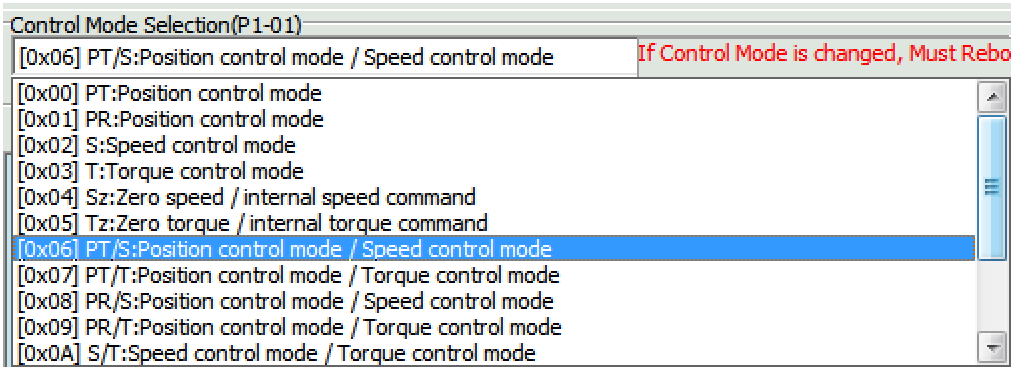
Load from servo : If users desire to change the control mode of the connected servo drive, use this function "Load from servo " to access the current setting value and change the setting.

Download to servo : When complete the new setting of control mode, use "Download to servo " to download the related parameter into the servo drive. Please re-power on the servo drive after downloading parameters into the servo to activate the new control mode.

Description : Click to open the operation description.

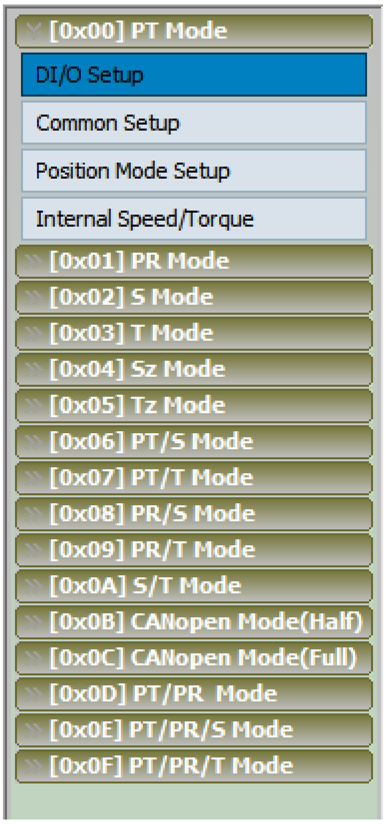
Stop operation : If desire to stop operation, click will do.

[Control Mode Selection] : Setup the control mode from drop-down menu. P1-01 represents "Control Mode Selection", thus, the drop-down menu will list all mode that can be set in P1-01.

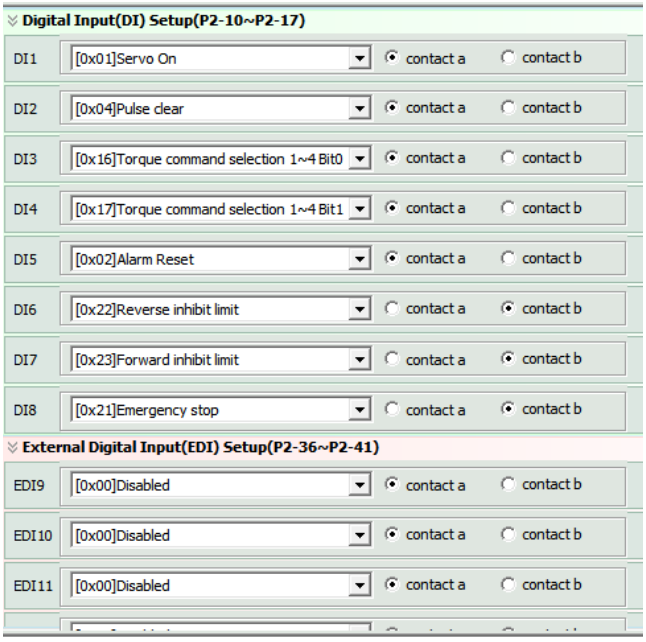


NOTE Re-power on the servo drive to complete the setting when change the control mode.

[Mode Setting] : Select the control mode via drop-down menu, this area will display the setting of this mode. See the example below. If it is in position (PT) mode, it will display four setting blocks. Users will be able to select the parameter through these four blocks.

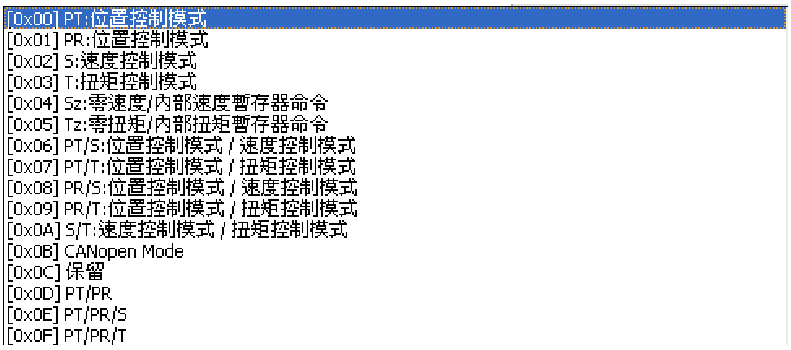


[Function Setting]：Users can setup parameters and functions of each control mode in this page.



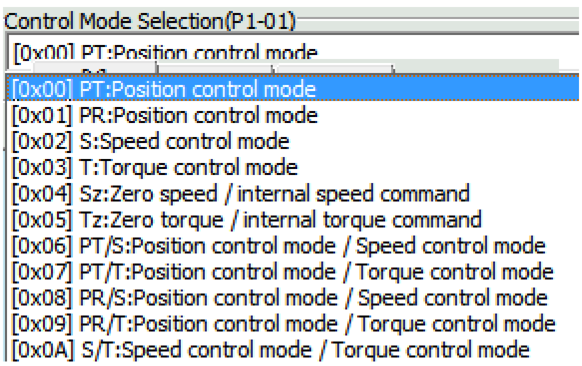
Mode Setting

This section describes the screen of parameters setting of each mode, which are 15 in total. Setup the mode first, then setup parameters:

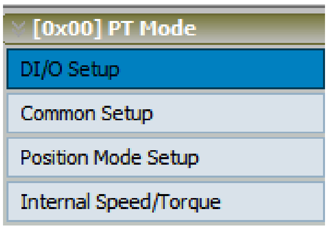


[0x00] PT：Position Control Mode

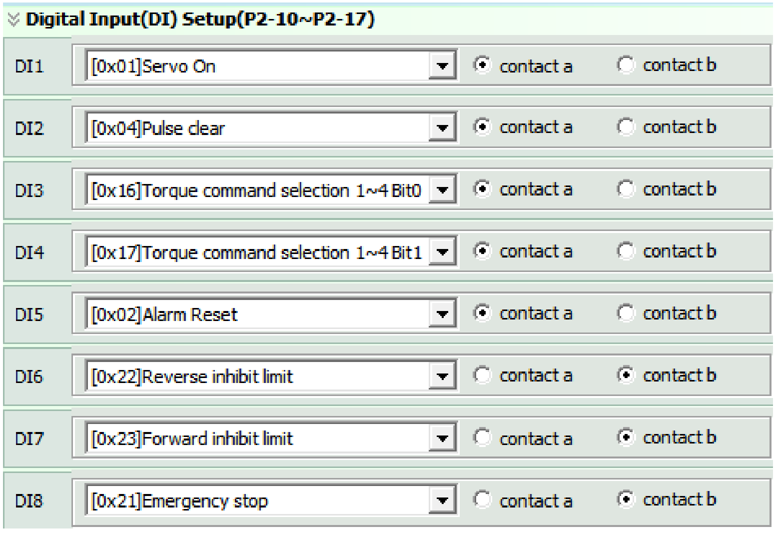
Step 1: Select the control mode from drop-down menu.



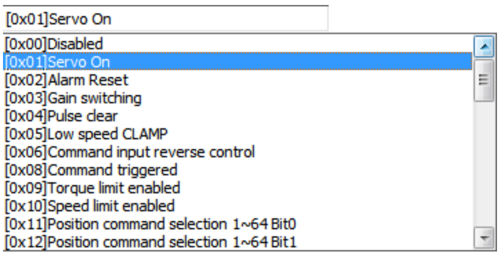
Step 2: Select Position control mode (PT), the setting block on the left will show as below:



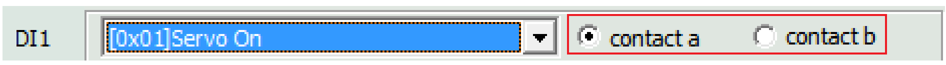
Step 3: Setup Digital Input (DI) command.



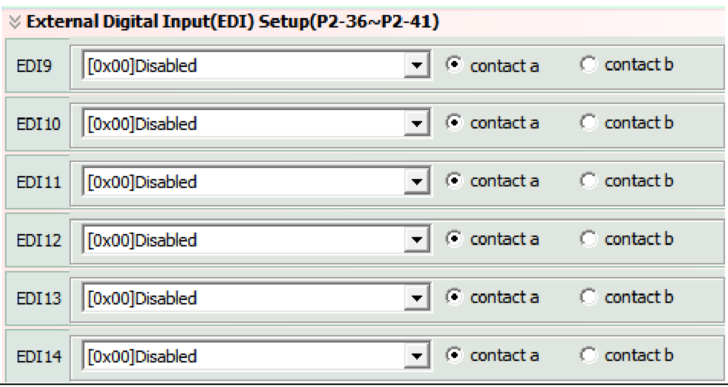
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

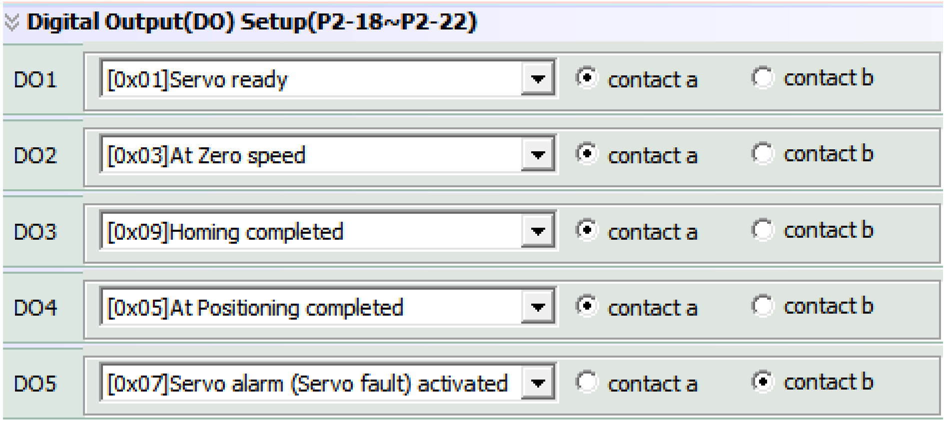


Step 4: Setup External Digital Input (EDI) command.

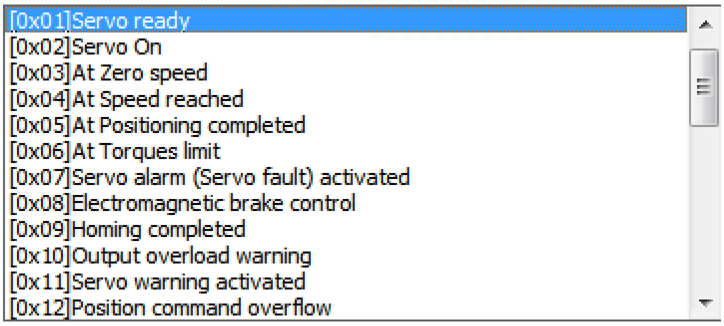


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

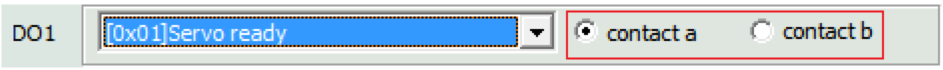
Step 5: Setup Digital Output (DO) command.



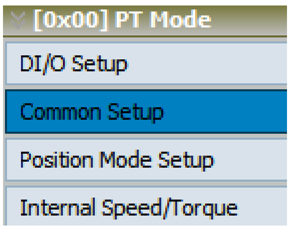
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



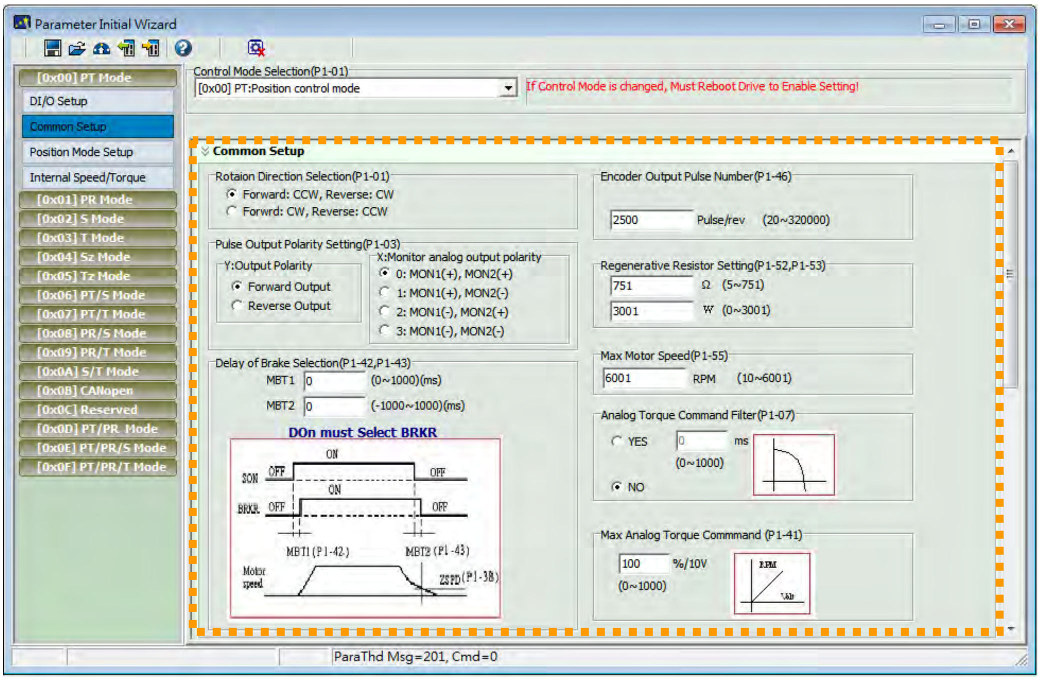
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



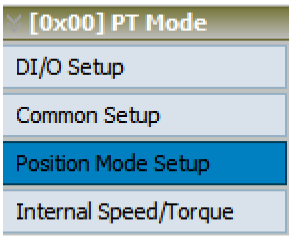
Step 6: “Common Setup”



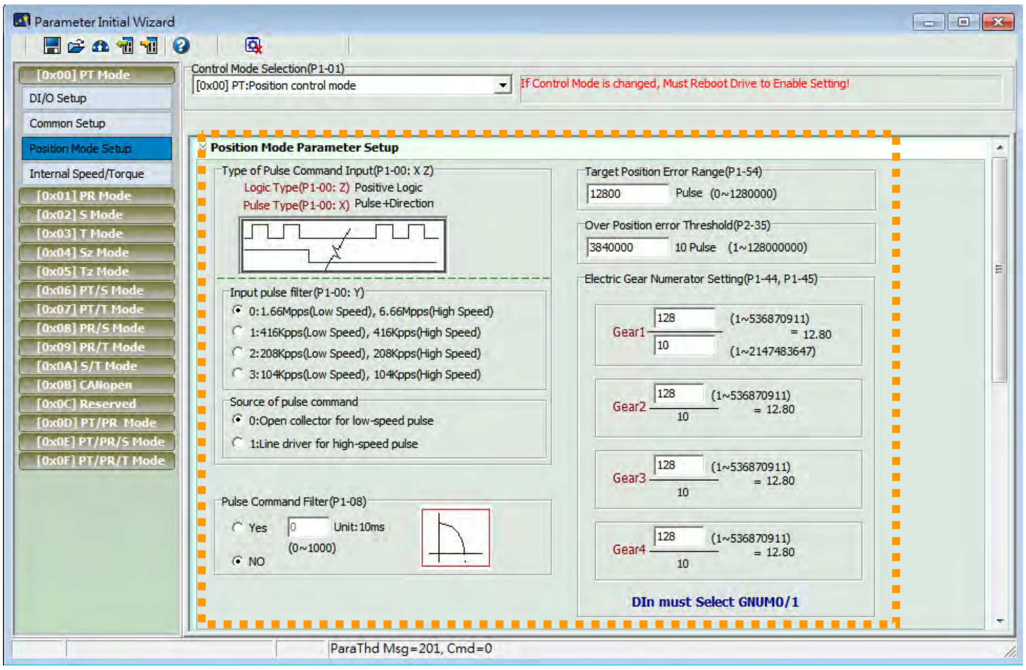
The screen on the right will be switched to the one as below:



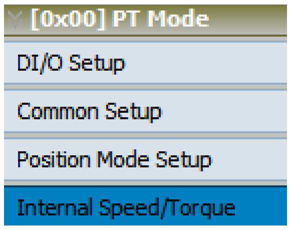
Step 7: When the setting of "Common Setup" is complete, the next step is "Position Mode Setup".



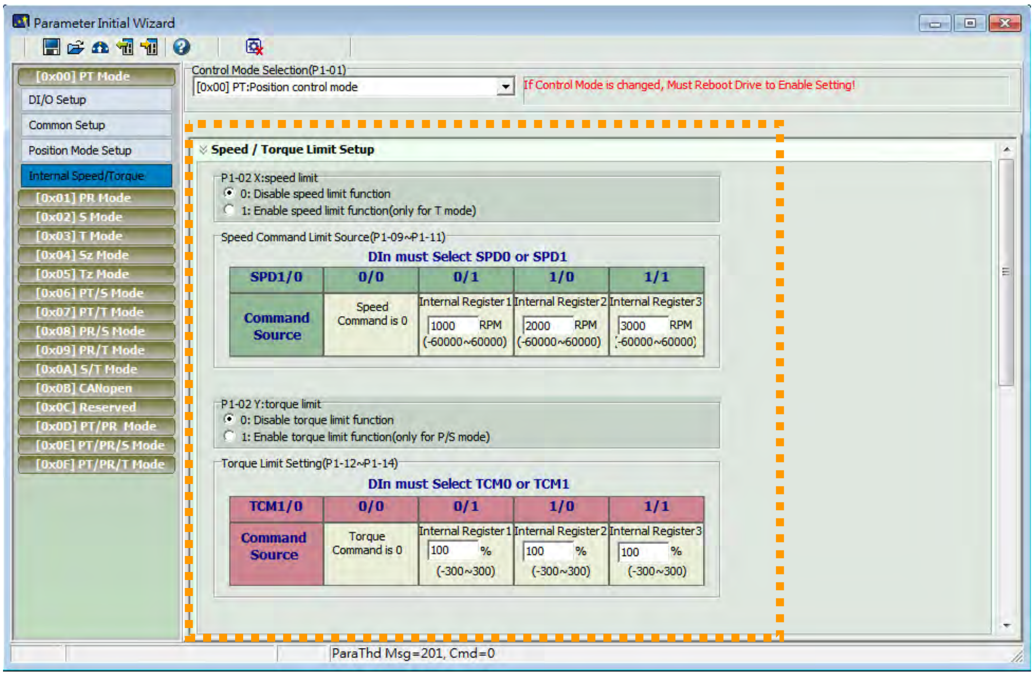
The screen on the right will be switched to the one as below:



Step 8: If users desire to setup speed or torque limit, please click the fourth block “Internal Speed/Torque”.

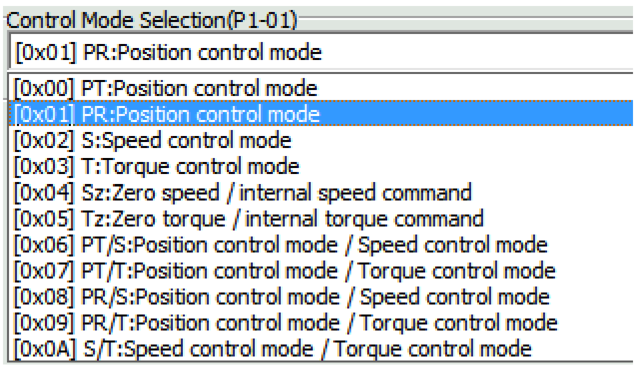


The screen on the right will be switched to the one as below:

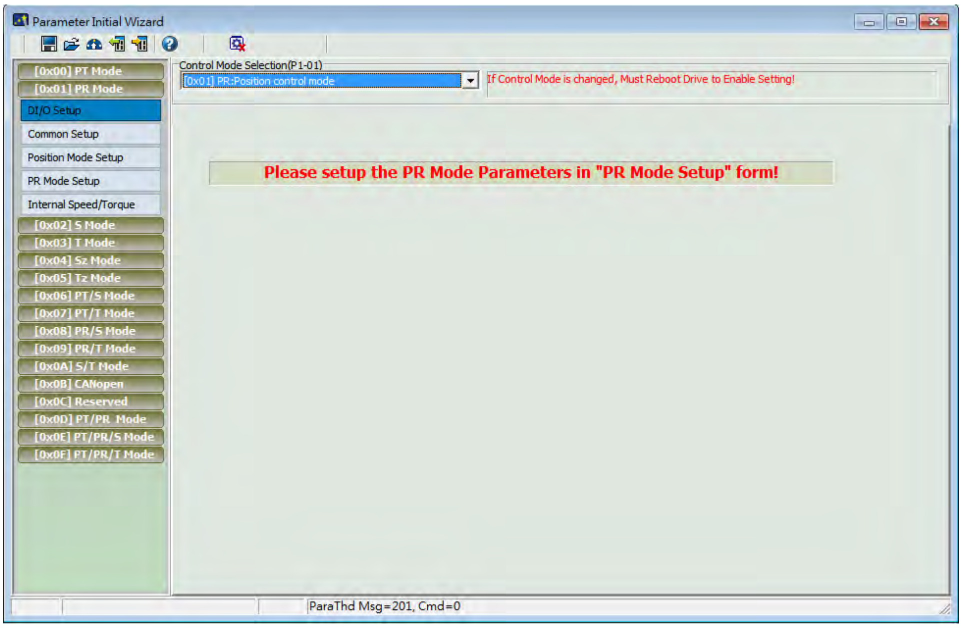


[0x01] PR：Position Control Mode

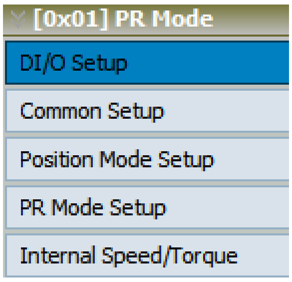
Step 1: Select the control mode from drop-down menu.



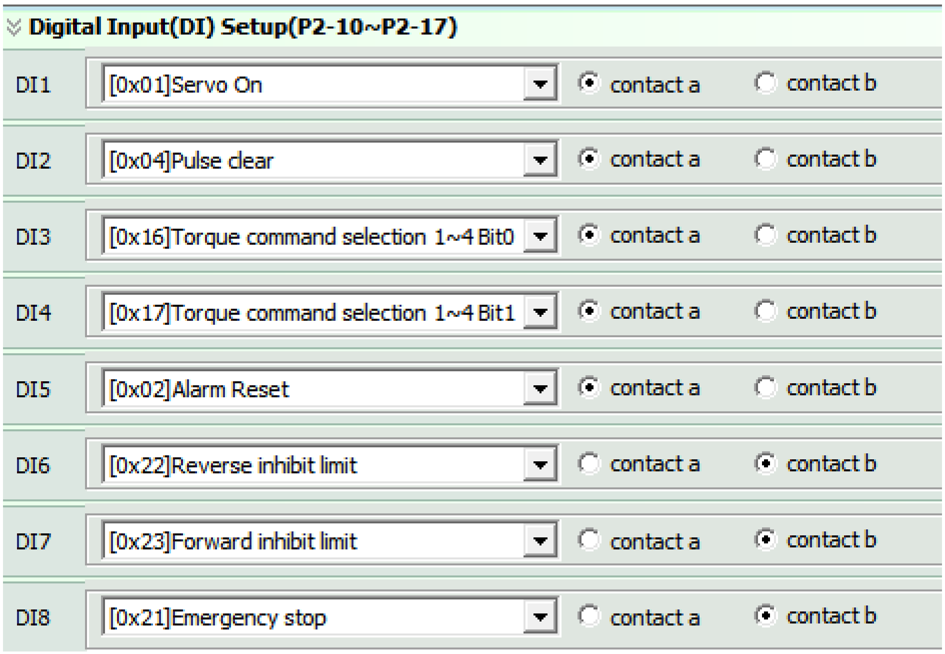
Step 2: Select Position control mode (PR), the main screen will show as below:



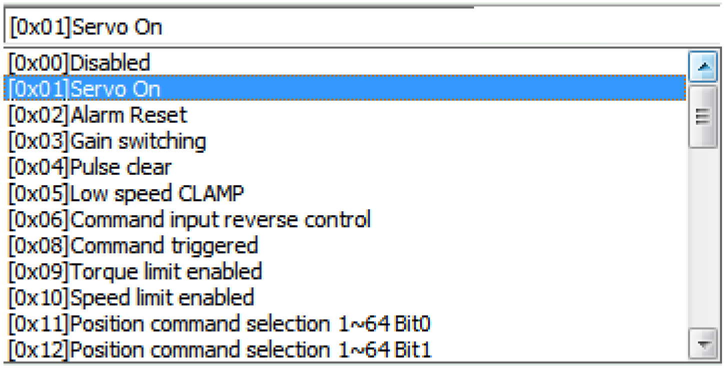
Since PR mode setting is a specific item in ASDA-Soft, please select “DI/O Setup” on the left first.



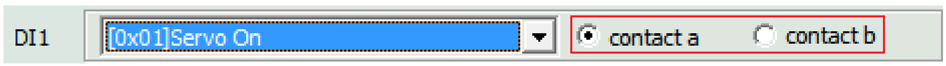
Step 3: Click “DI/O Setup”, the following screen pops up:



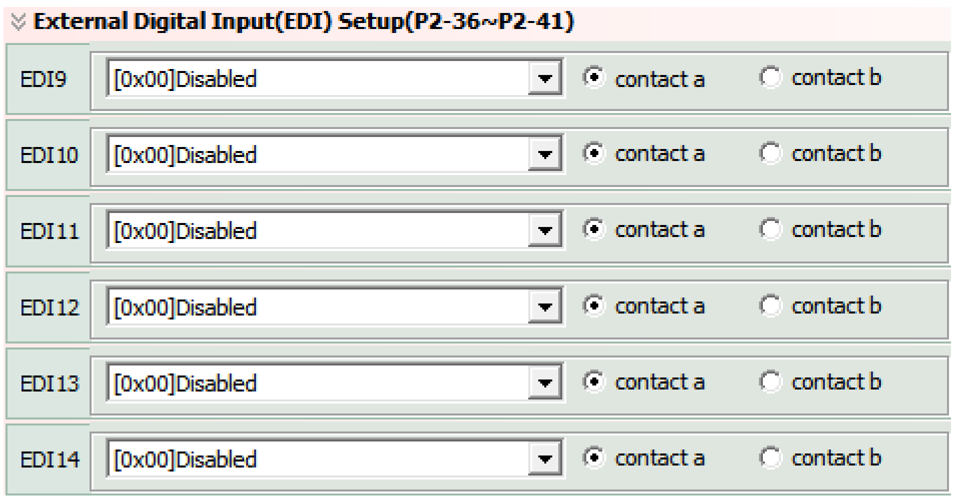
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

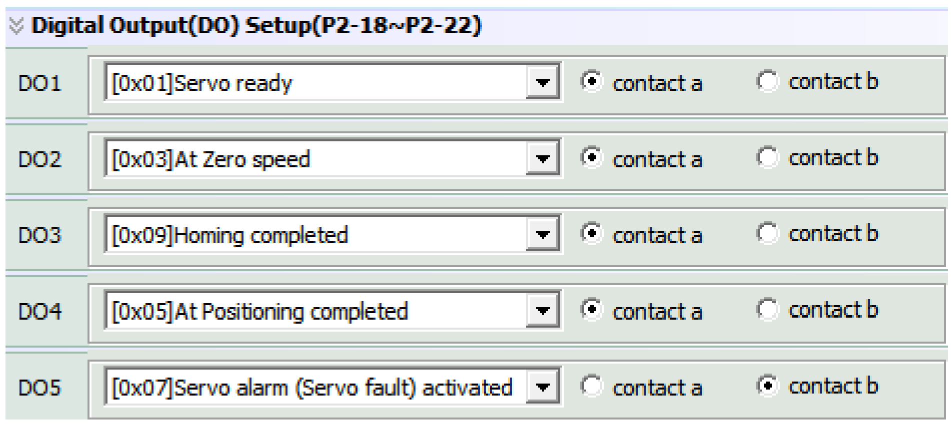


Step 4: Setup External Digital Input (EDI) command.

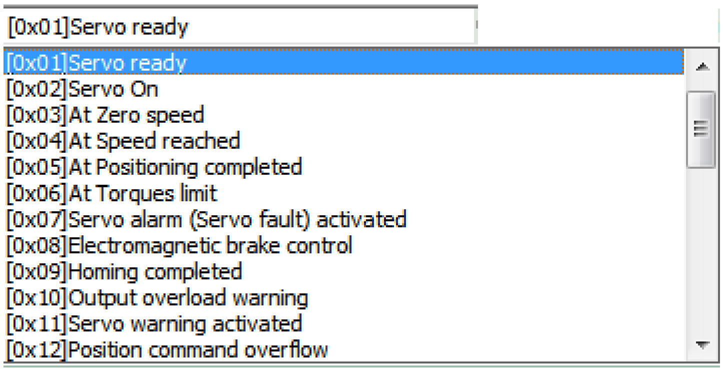


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

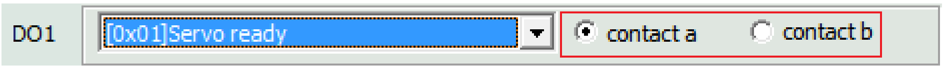
Step 5: Setup digital output (DO) command.



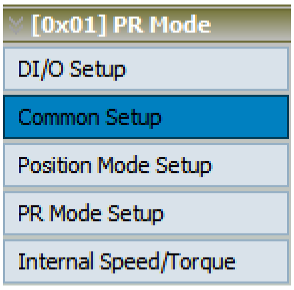
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



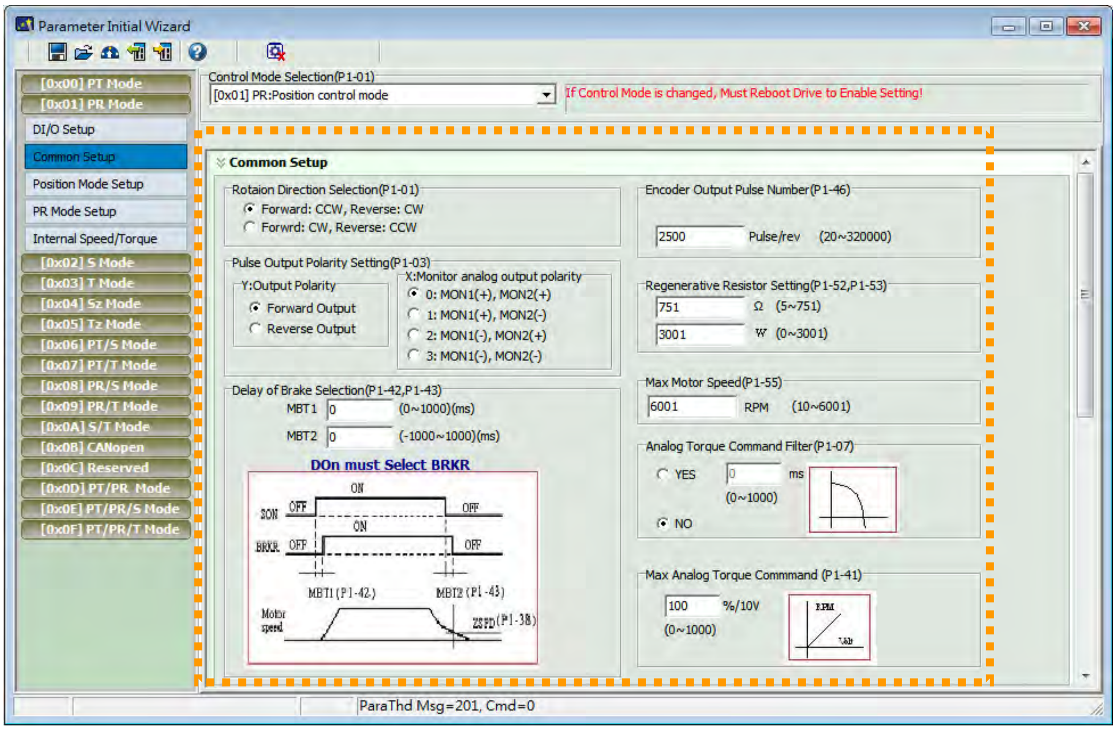
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



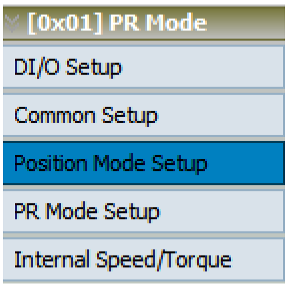
Step 6: “Common Setup”



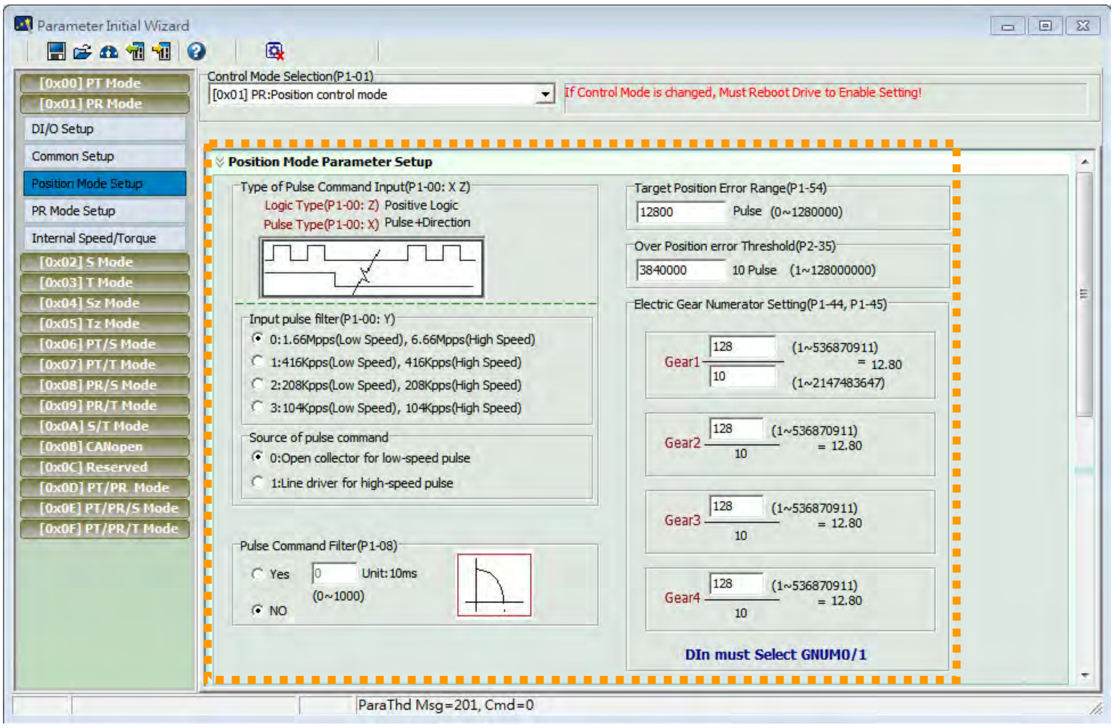
The screen on the right will be switched to the one as below:



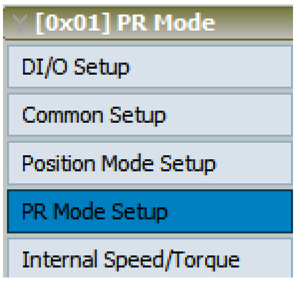
Step 7: When the setting of “Common Setup” is complete, the next step is “Position Mode Setup”.

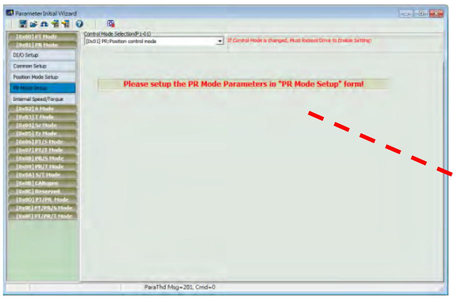


The screen on the right will be switched to the one as below:

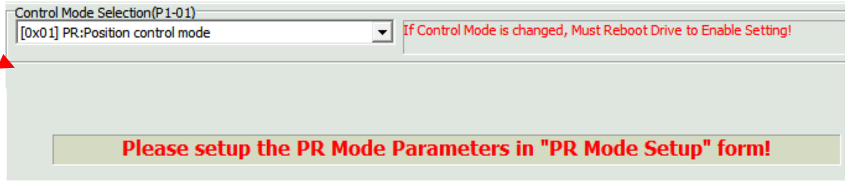


Step 8: If users desire to setup PR mode, click the fourth block and the main screen will be as below:

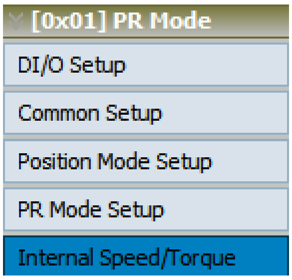




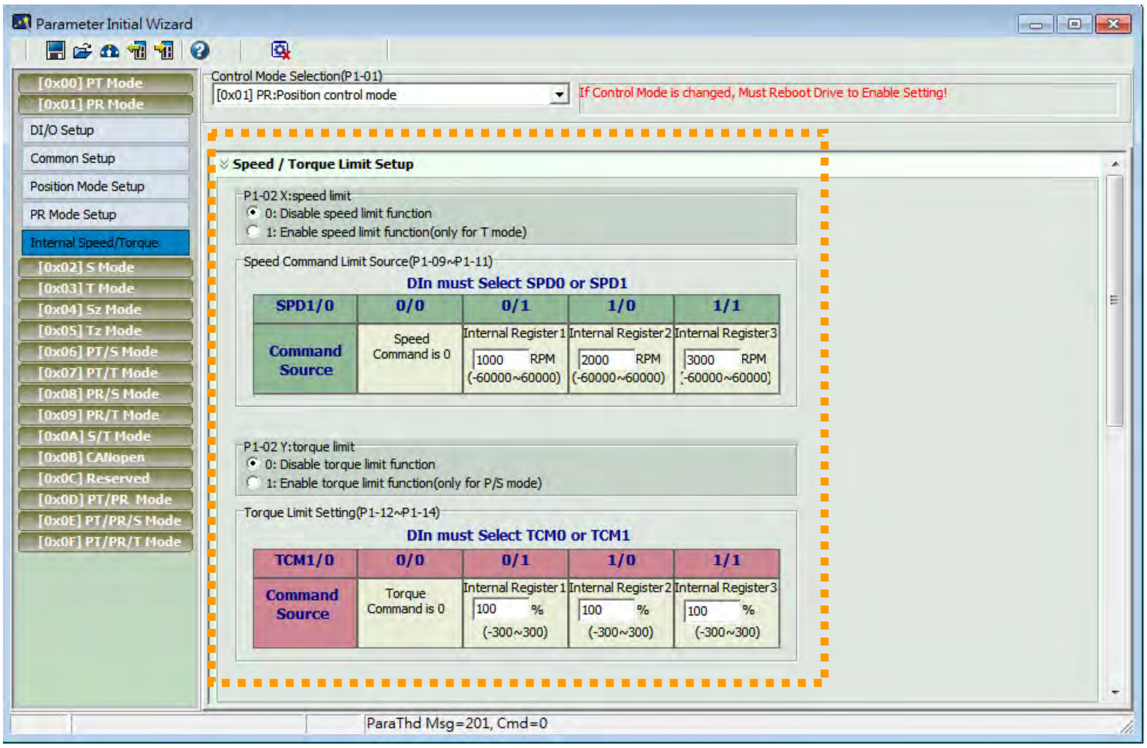
The prompting message in main screen: Setup the PR Mode in “PR Mode Setup ”.



Step 9: If users desire to setup speed or torque limit, click the fifth block “Internal Speed/Torque”.

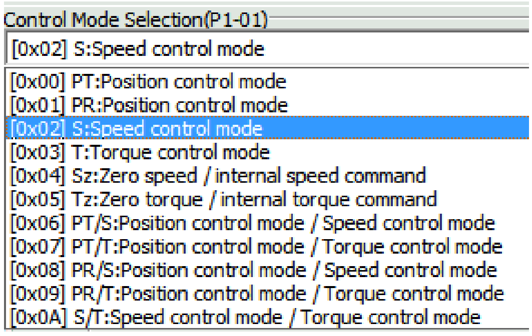


The screen on the right will be switched to the one as below:

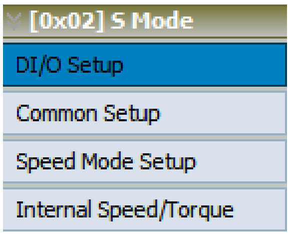


[0x02] S：Speed Control Mode

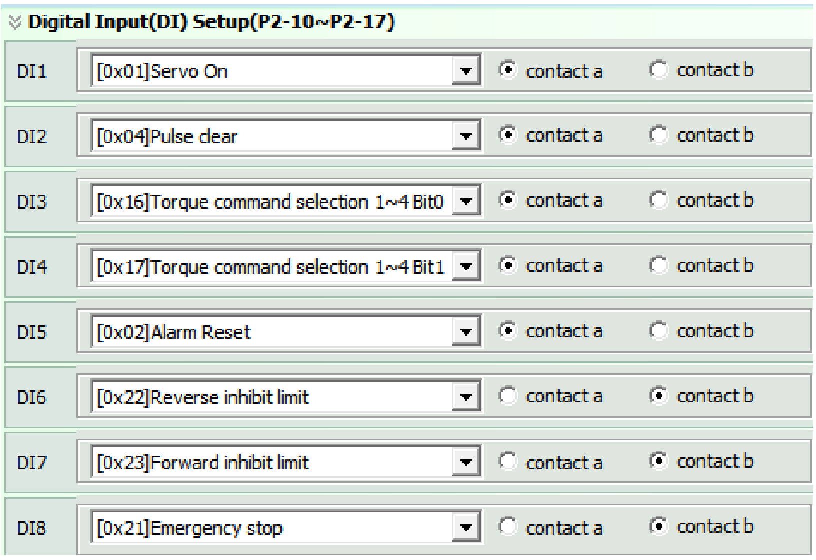
Step 1: Select the control mode from drop-down menu.



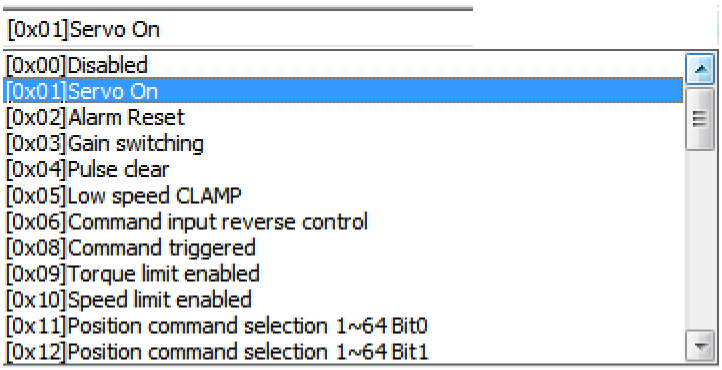
Step 2: Select Speed control mode (S), the setting block on the left will show as below:



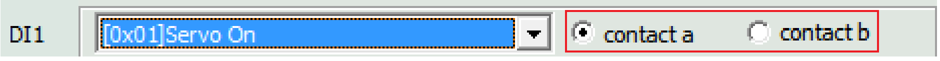
Step 3: Click "DI/O Setup", the following screen pops up.



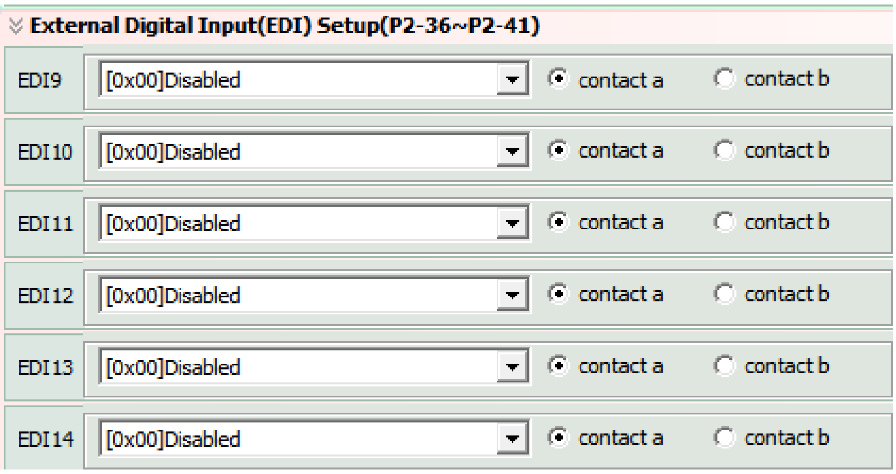
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as "a contact (frequently open)" or "b contact (frequently close)".

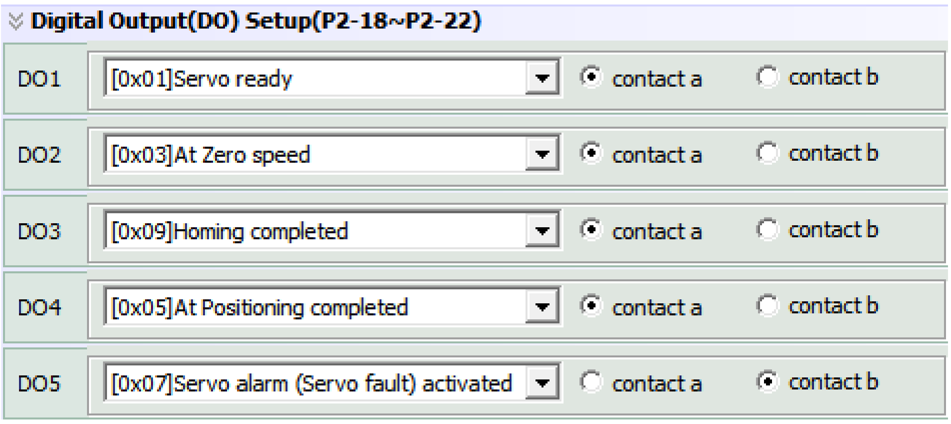


Step 4: Setup External Digital Input (EDI) command.

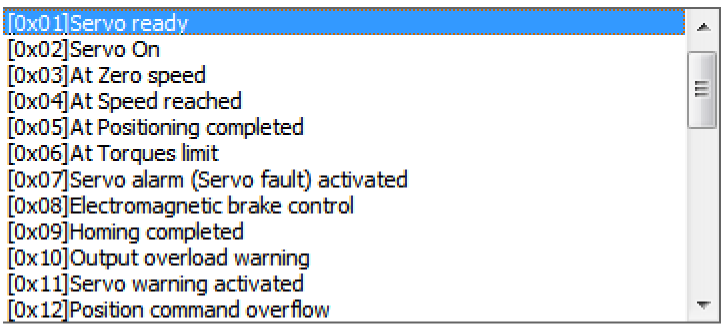


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

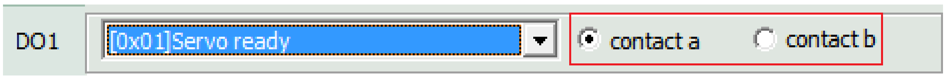
Step 5: Setup digital output (DO) command.



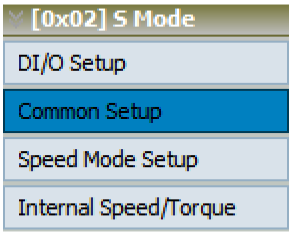
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



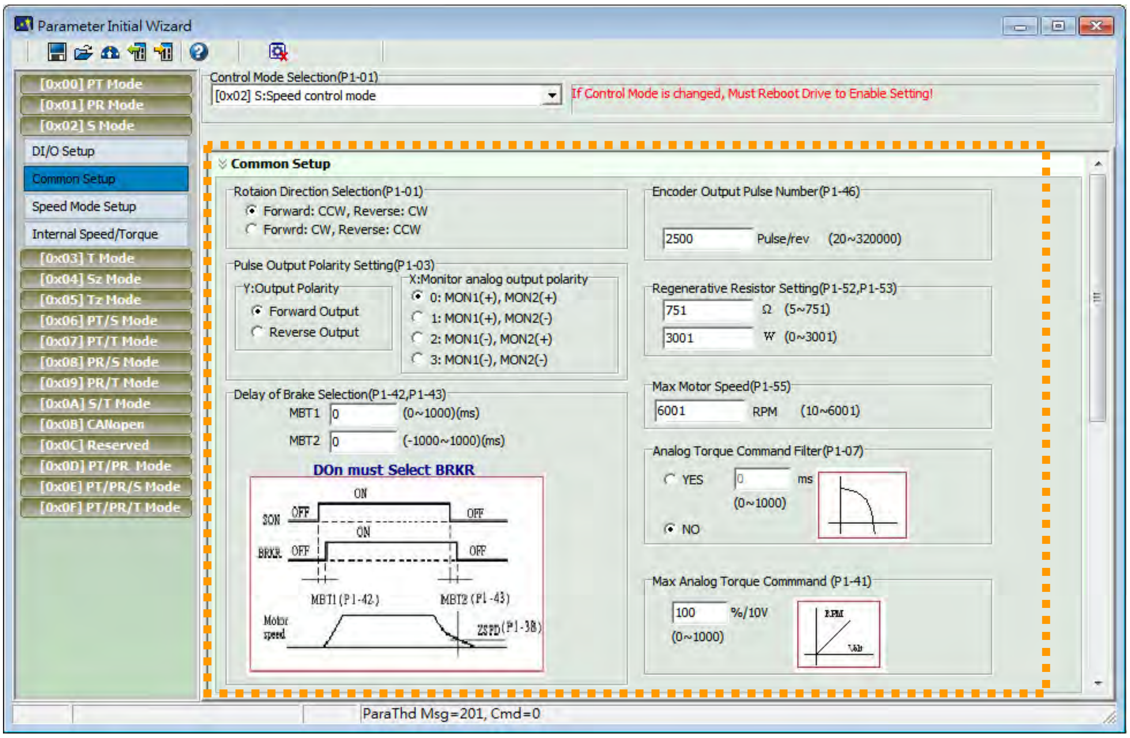
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



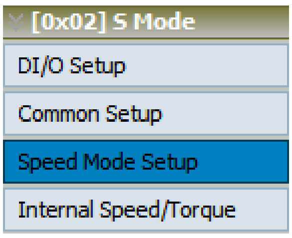
Step 6: “Common Setup”



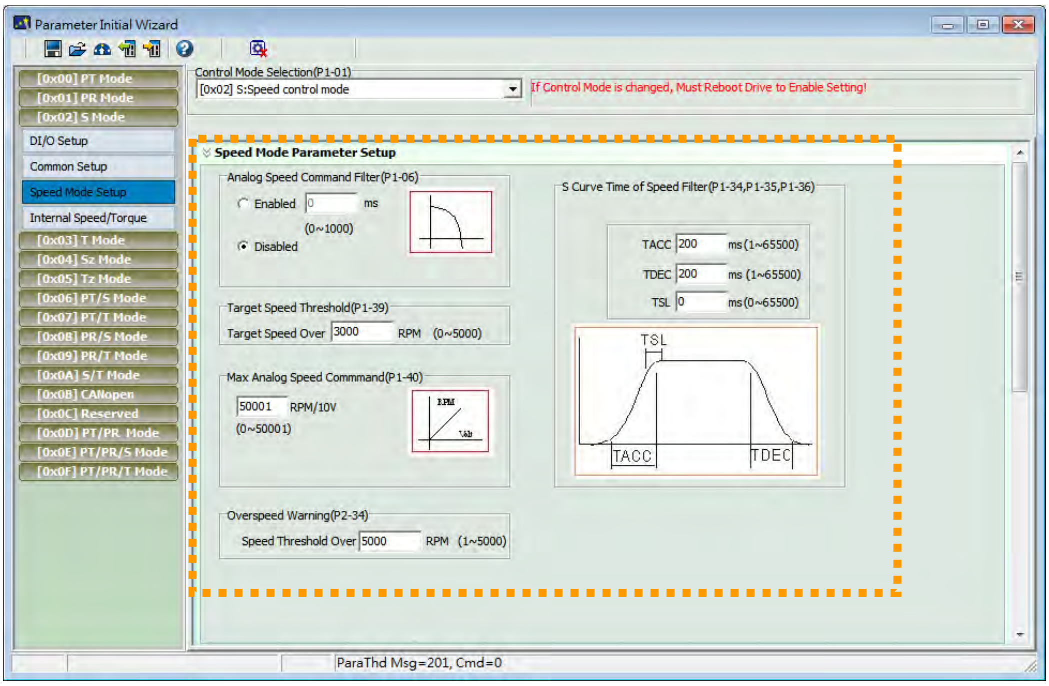
The screen on the right will be switched to the one as below:



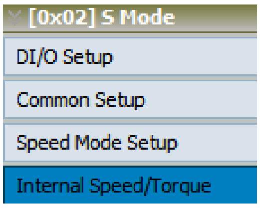
Step 7: When the setting of “Common Setup” is complete, the next step is “Position Mode Setup”.



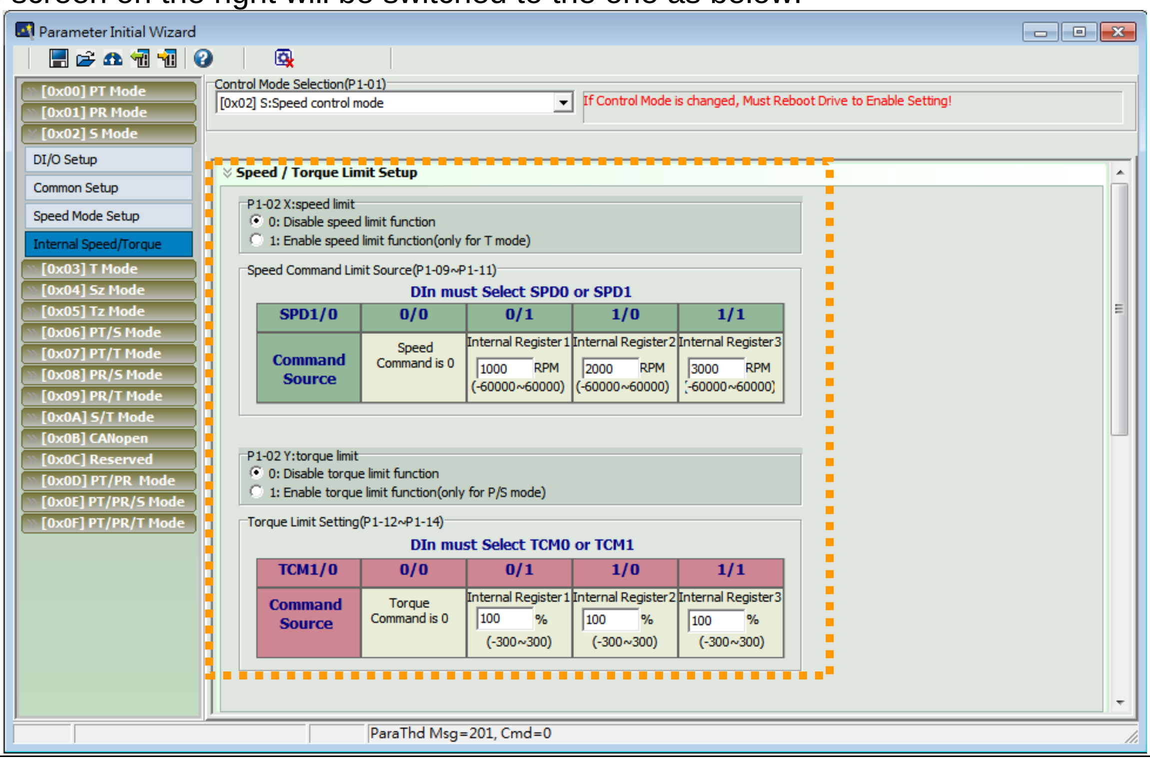
The screen on the right will be switched to the one as below:



Step 8: If users desire to setup speed or torque limit, click the fourth block "Internal Speed/Torque".

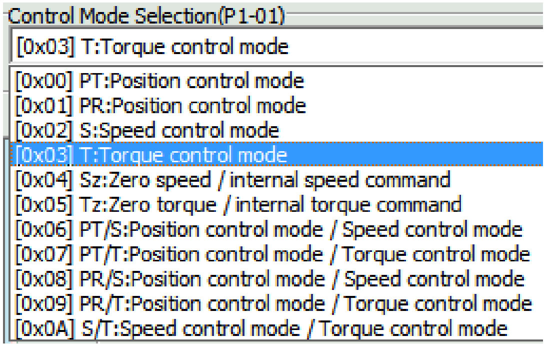


The screen on the right will be switched to the one as below:

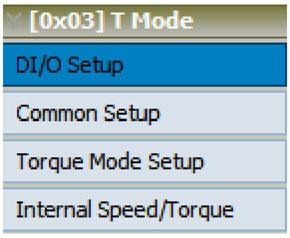


[0x03] T：Torque Control Mode

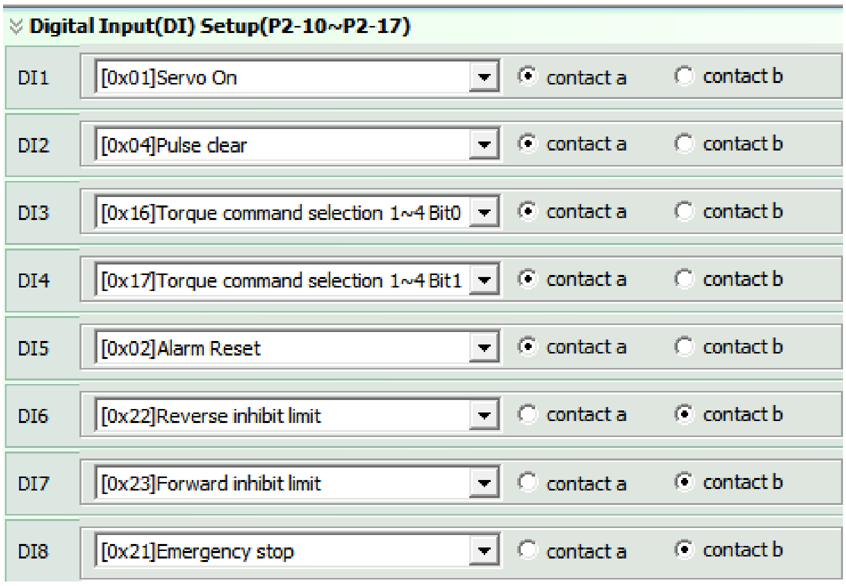
Step 1: Select the control mode from drop-down menu.



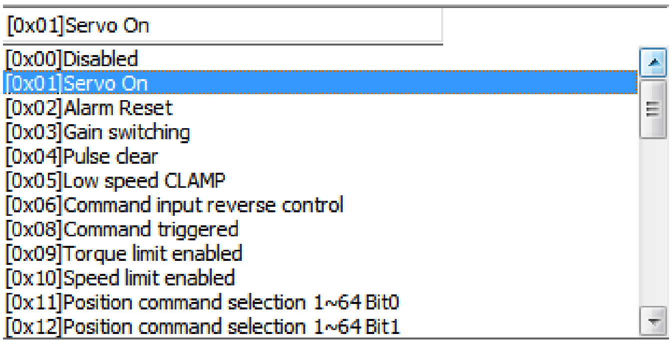
Step 2: Select Torque control mode (T), the setting block on the left will show as below:



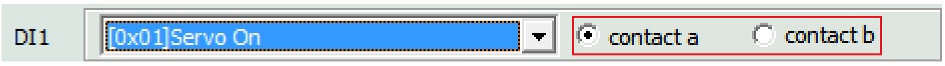
Step 3: Click “DI/O Setup”, the following screen pops up.



There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



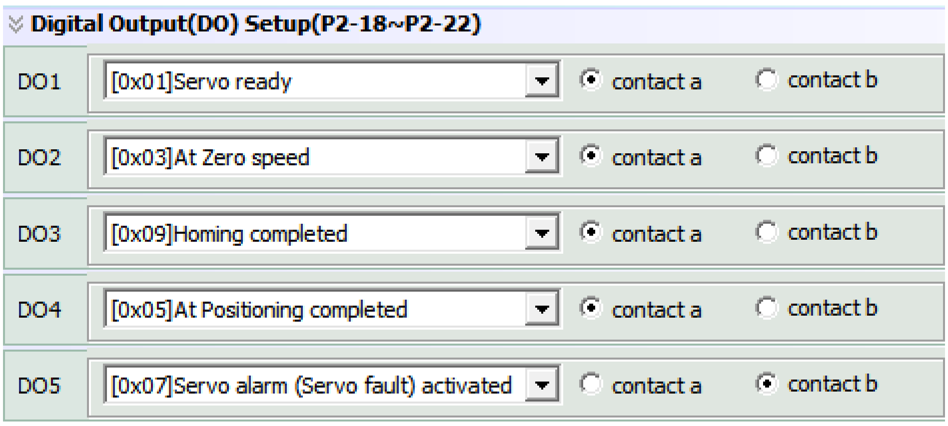
Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.



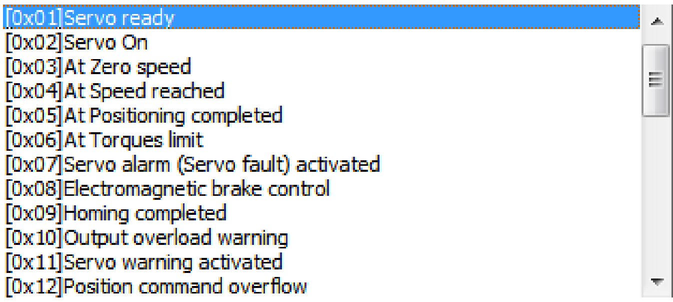
Step 4: Setup External Digital Input (EDI) command.

EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

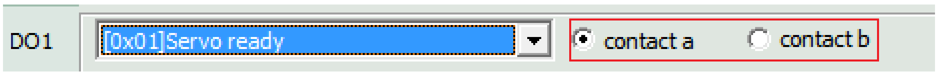
Step 5: Setup digital output (DO) command.



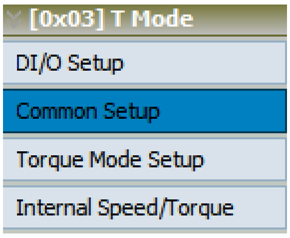
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



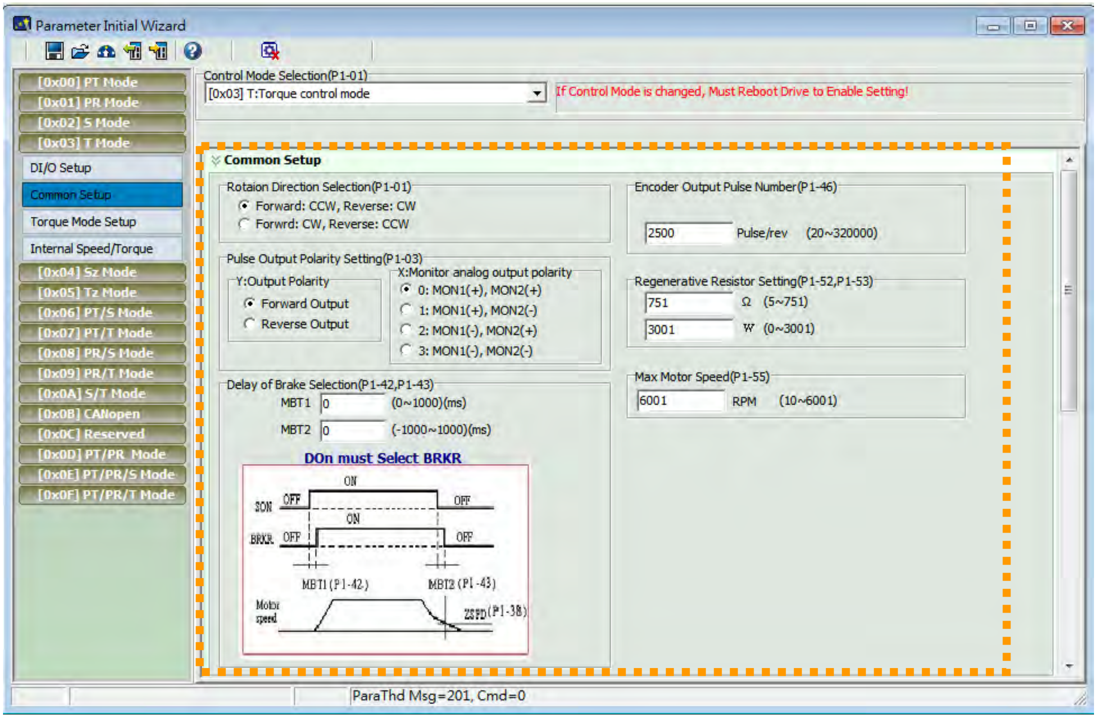
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



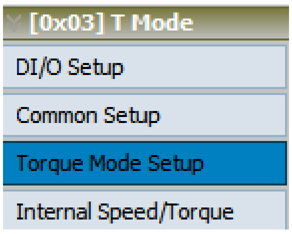
Step 6: “Common Setup”



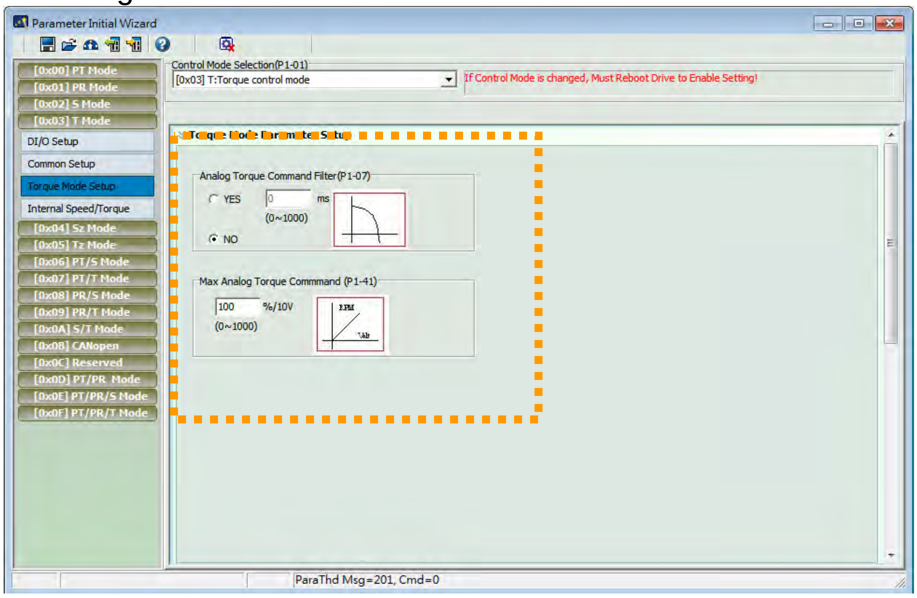
The screen on the right will be switched to the one as below:



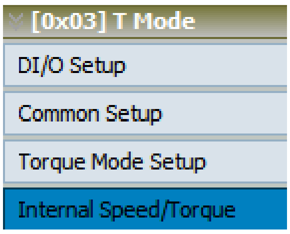
Step 7: When the setting of “Common Setup” is complete, the next step is “Torque Mode Setup”.



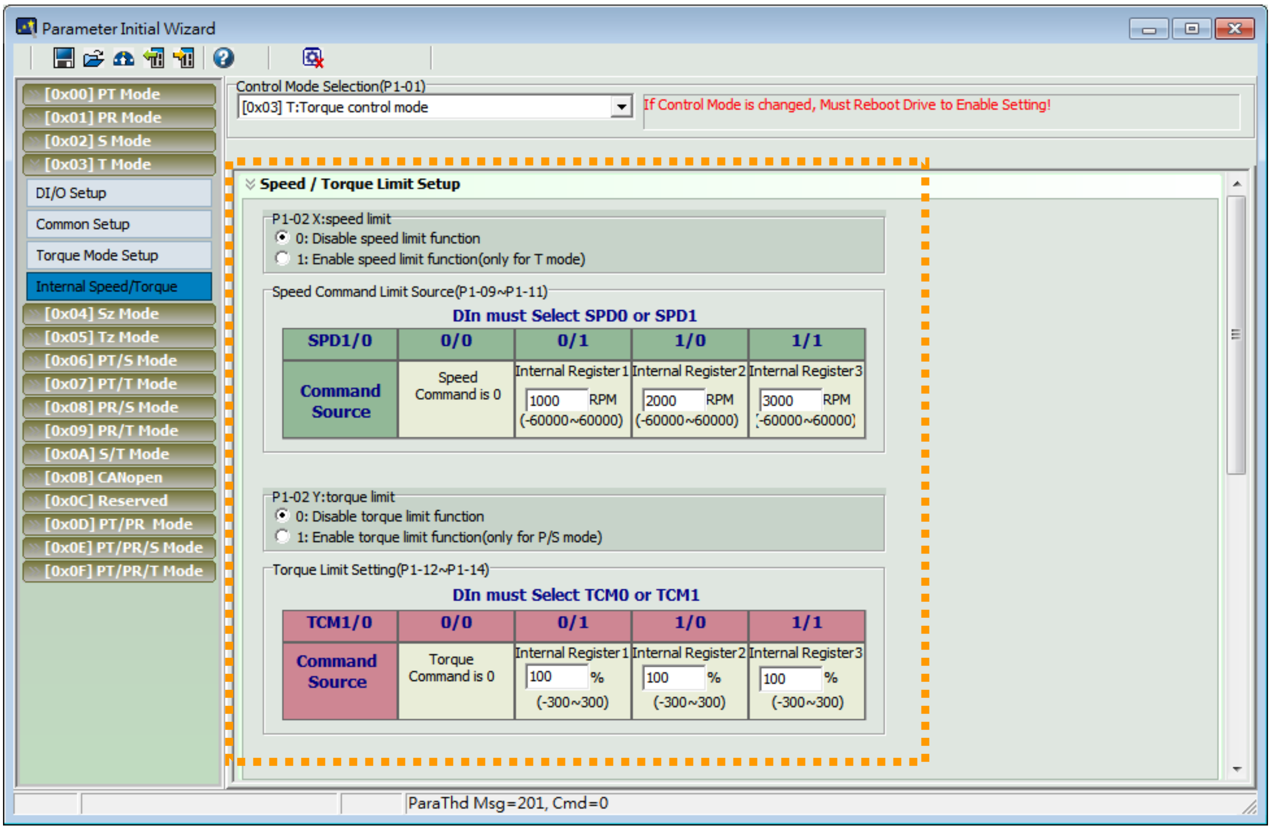
The screen on the right will be switched to the one as below:



Step 8: If users desire to setup speed or torque limit, click the fourth block “Internal Speed/Torque”.

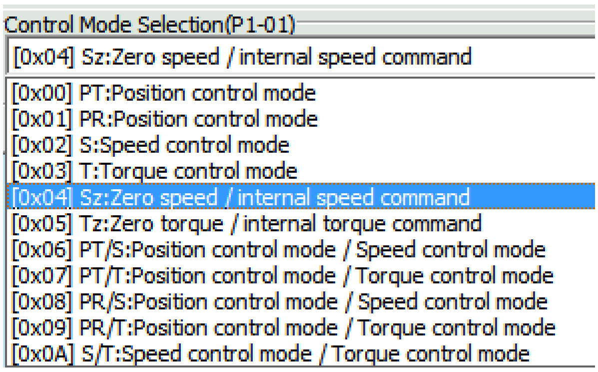


The screen on the right will be switched to the one as below:

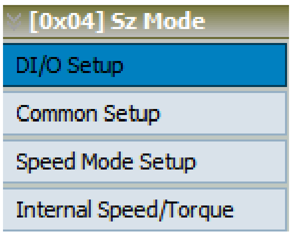


[0x04] Sz：Zero Speed / Internal Speed Command

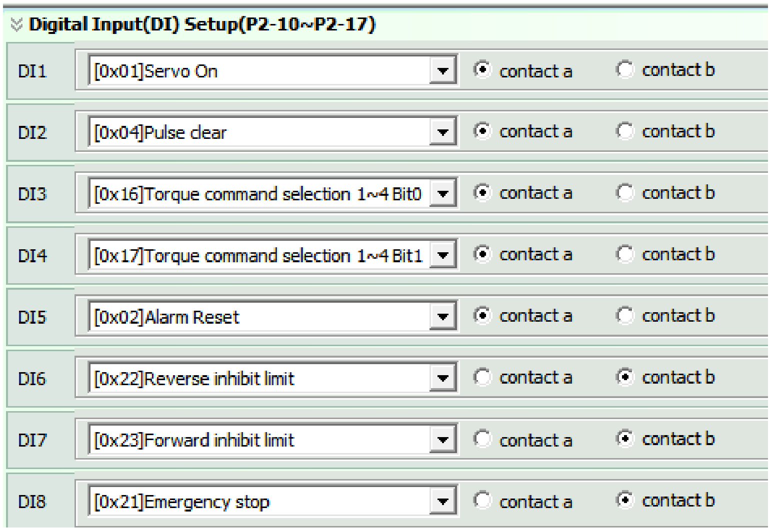
Step 1: Select the control mode from drop-down menu.



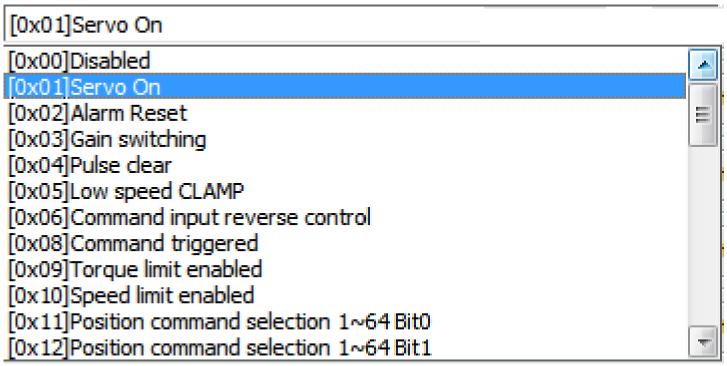
Step 2: Select Zero speed control mode (Sz), the setting block on the left will show as below:



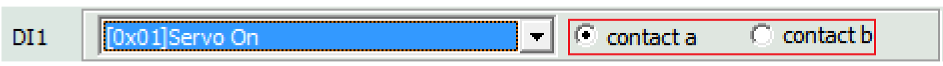
Step 3: Click “DI/O Setup”, the following screen pops up.



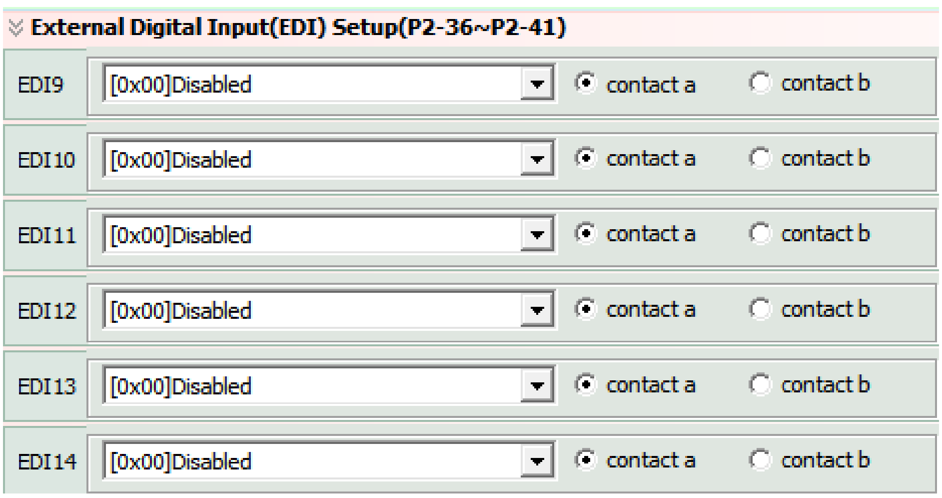
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

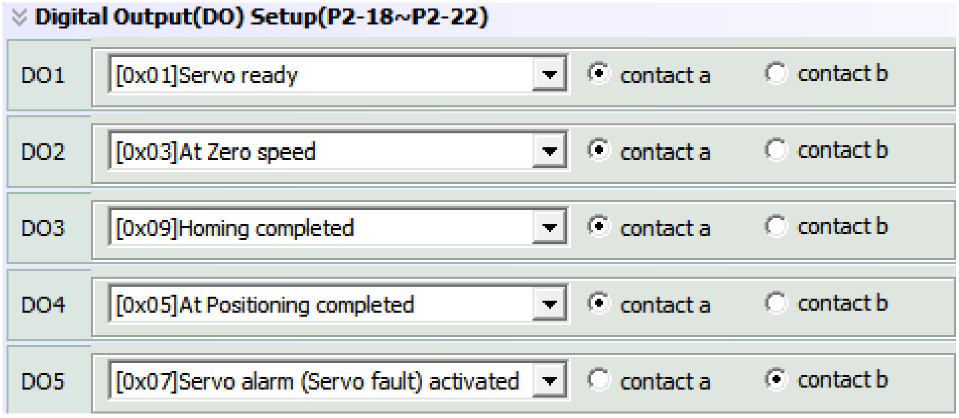


Step 4: Setup External Digital Input (EDI) command.

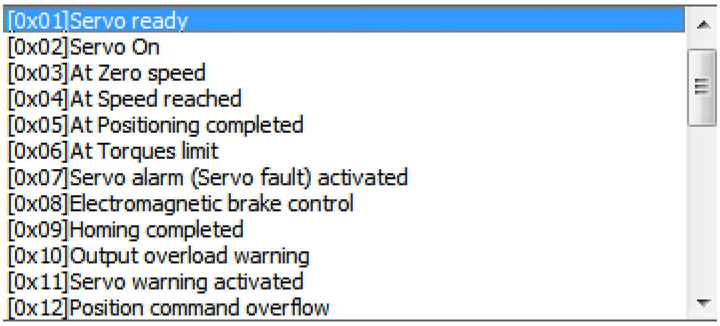


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

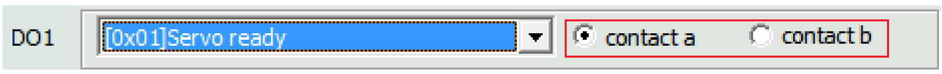
Step 5: Setup digital output (DO) command.



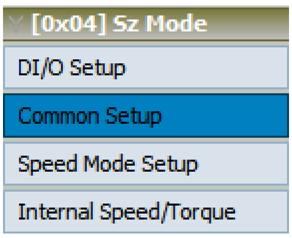
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



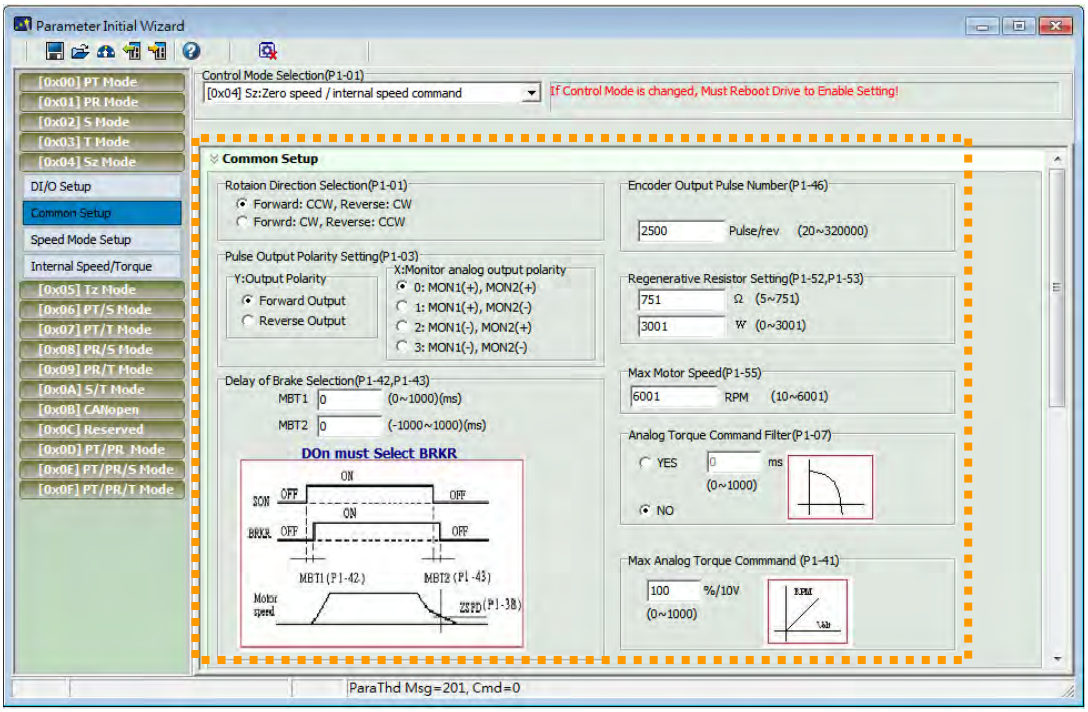
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



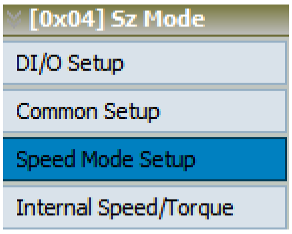
Step 6: “Common Setup”



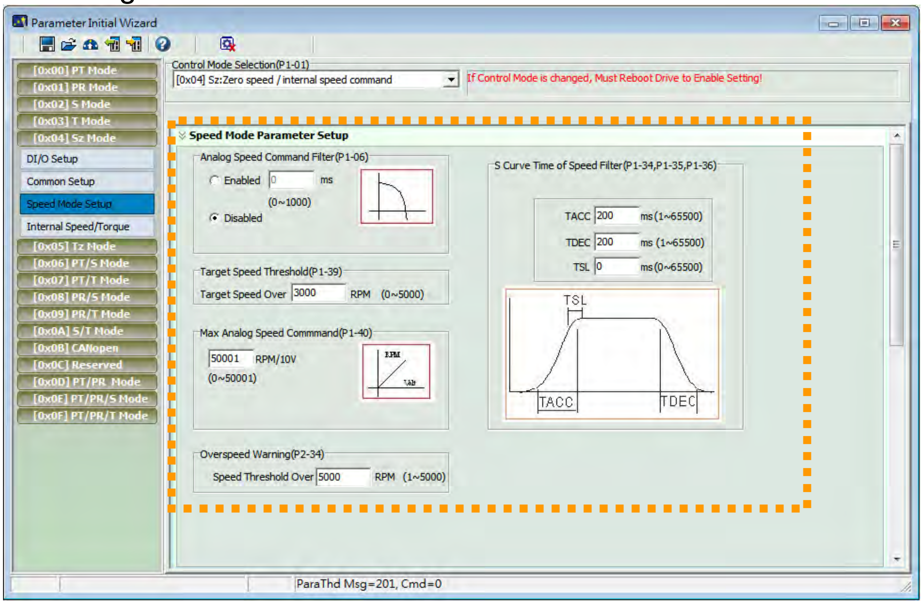
The screen on the right will be switched to the one as below:



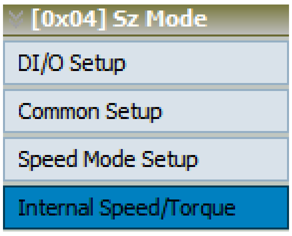
Step 7: When the setting of "Common Setup" is complete, the next step is "Speed Mode Setup".



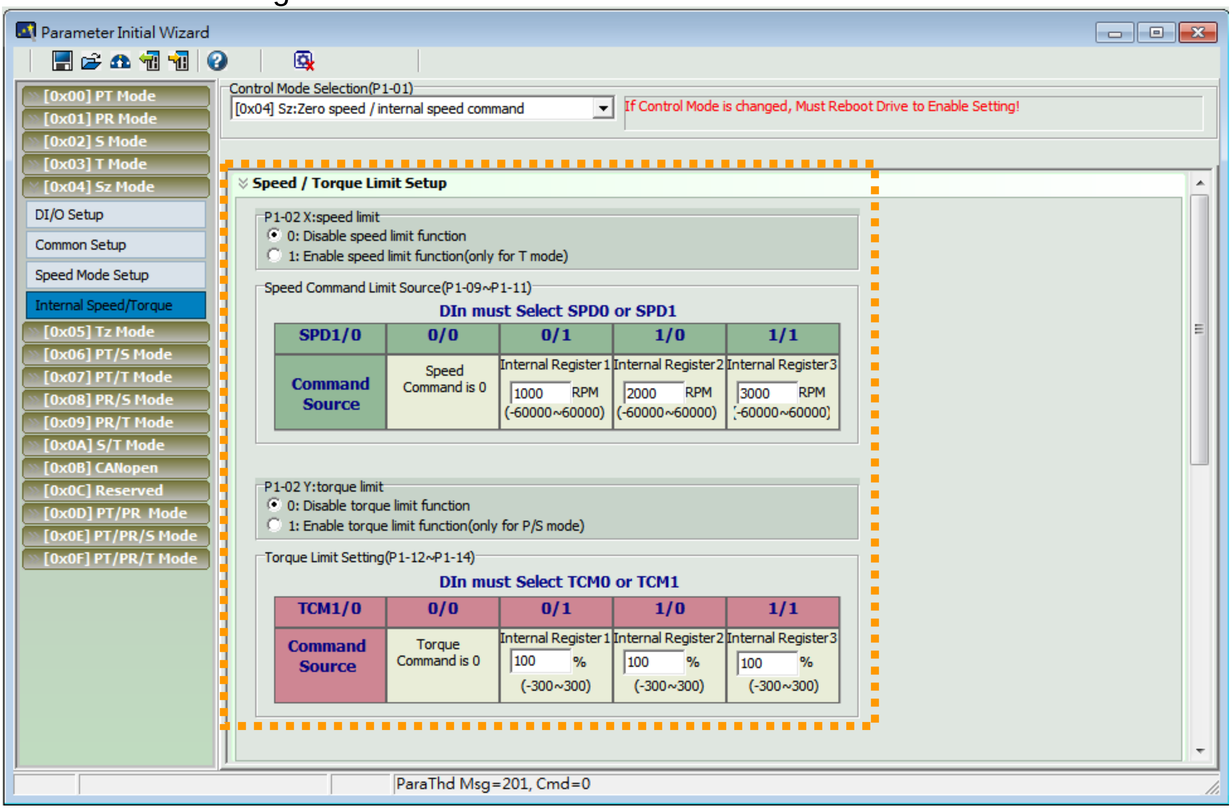
The screen on the right will be switched to the one as below:



Step 8: If users desire to setup speed or torque limit, click the fourth block "Internal Speed/Torque".

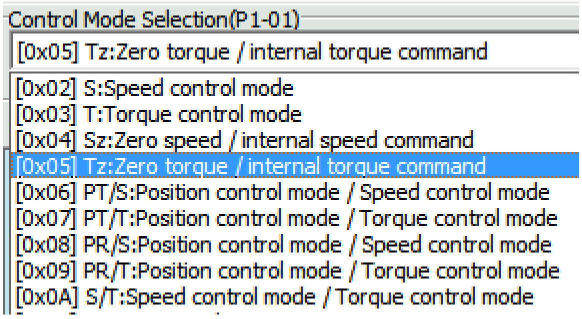


The screen on the right will be switched to the one as below:

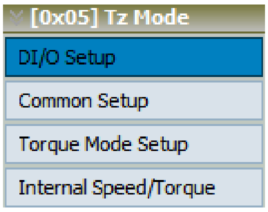


[0x05] Tz：Zero Torque / Internal Torque Command

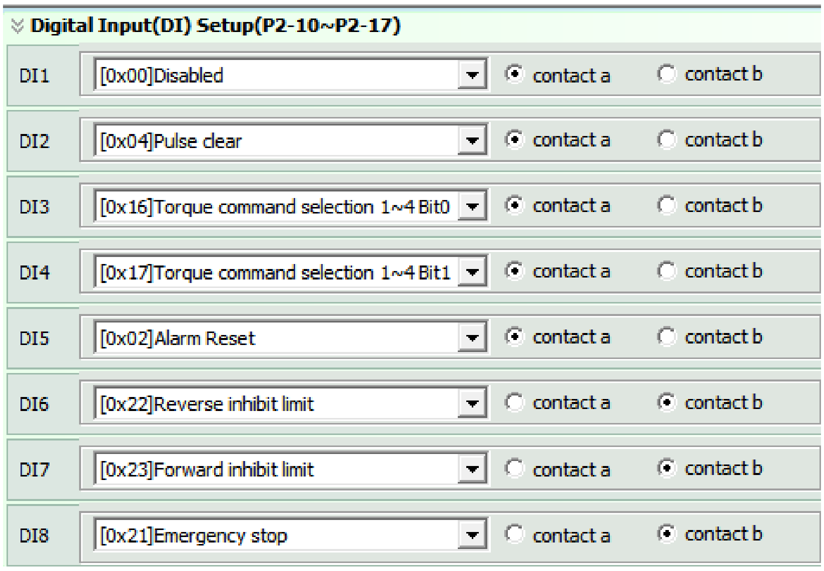
Step 1: Select the control mode from drop-down menu.



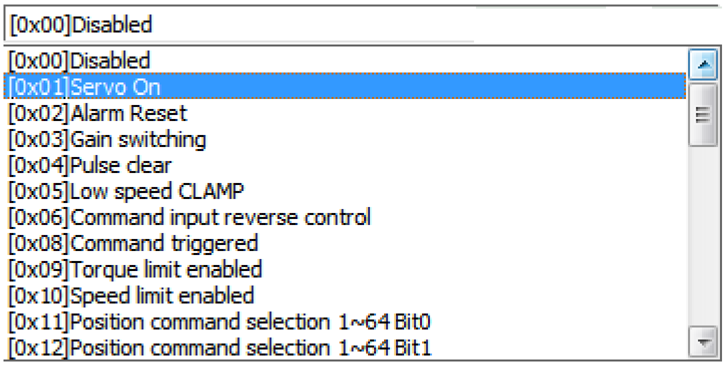
Step 2: Select Zero torque control mode (Tz), the setting block on the left will show as below:



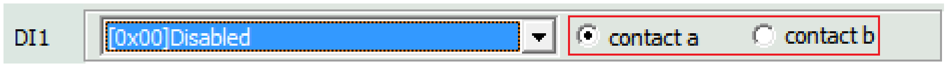
Step 3: Click “DI/O Setup”, the following screen pops up.



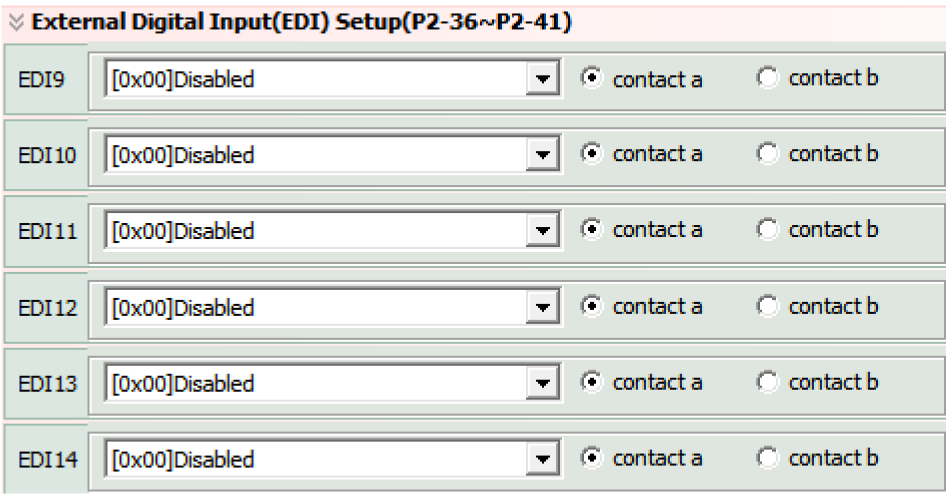
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

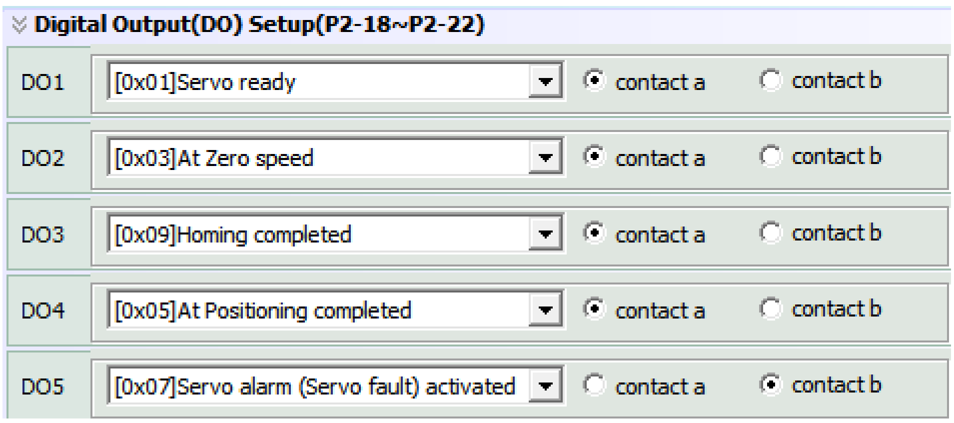


Step 4: Setup External Digital Input (EDI) command.

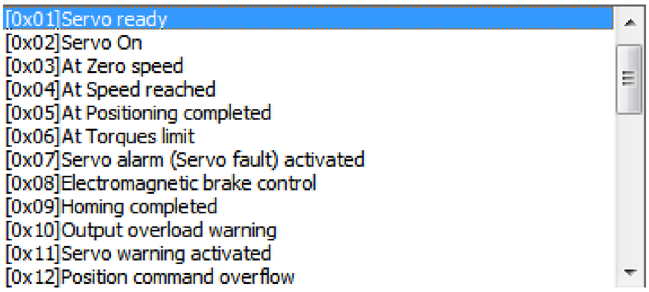


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

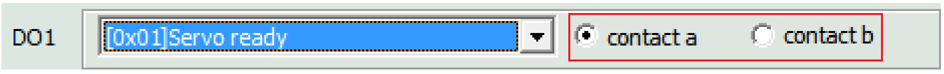
Step 5: Setup digital output (DO) command.



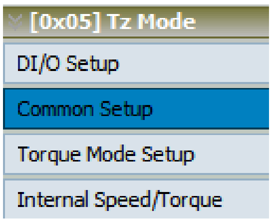
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



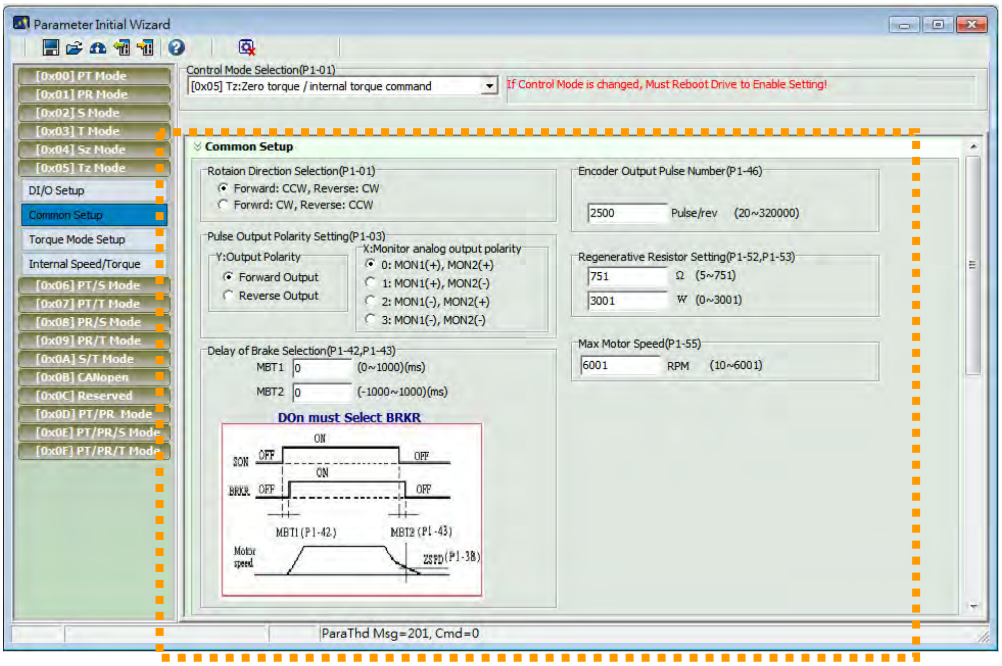
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



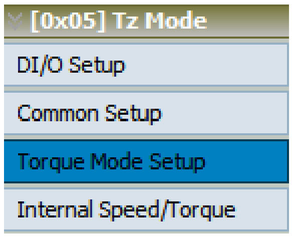
Step 6: “Common Setup”



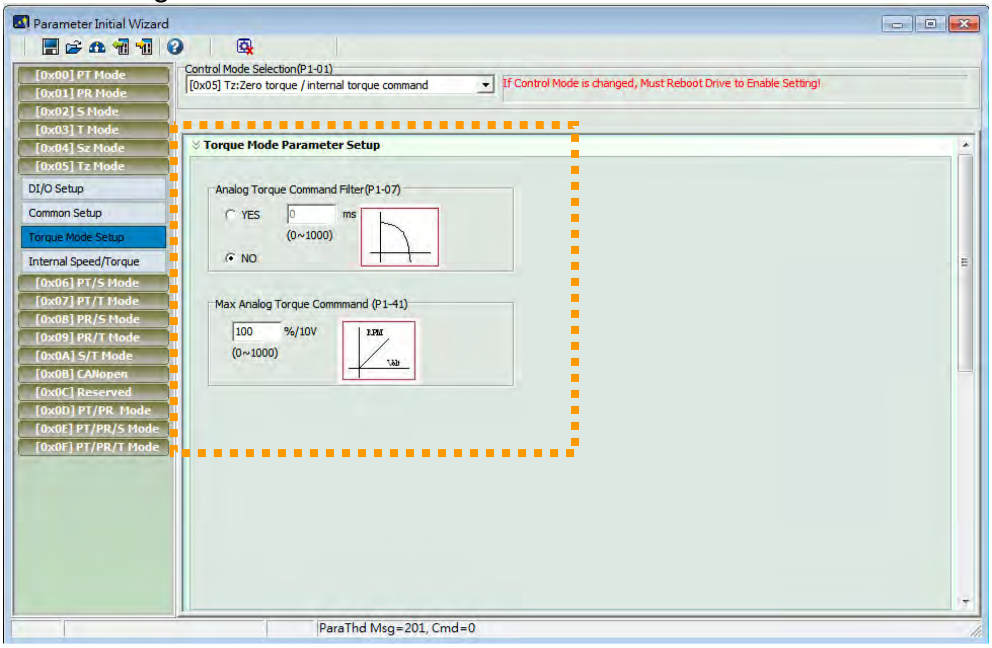
The screen on the right will be switched to the one as below:



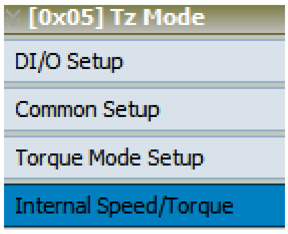
Step 7: When the setting of “Common Setup” is complete, the next step is “Torque Mode Setup”.



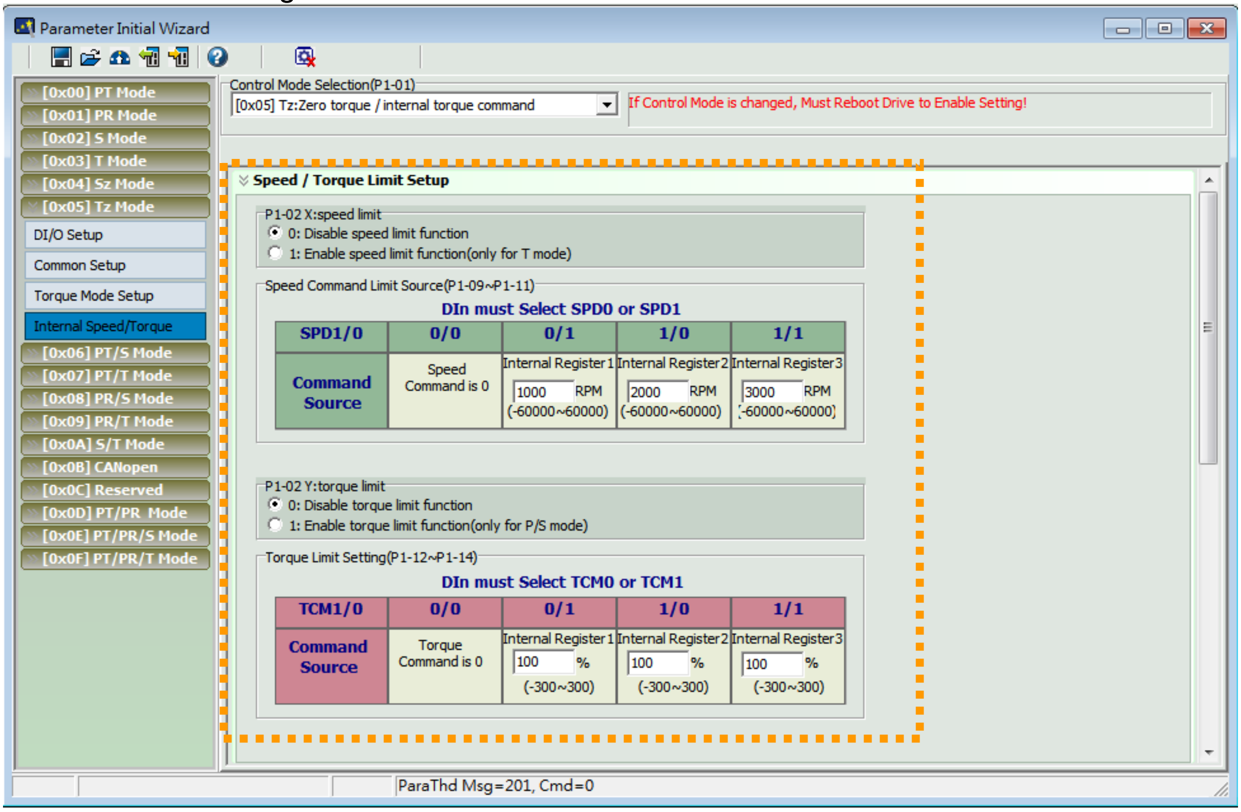
The screen on the right will be switched to the one as below:



Step 8: If users desire to setup speed or torque limit, click the fourth block “Internal Speed/Torque”.

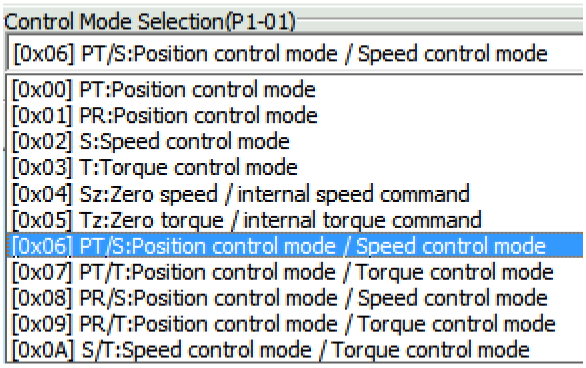


The screen on the right will be switched to the one as below:

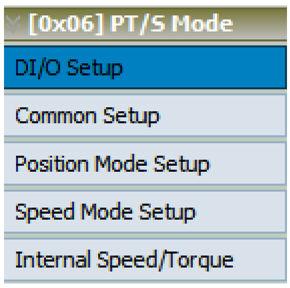


[0x06] PT/S：Position Control Mode / Speed Control Mode (Dual Mode)

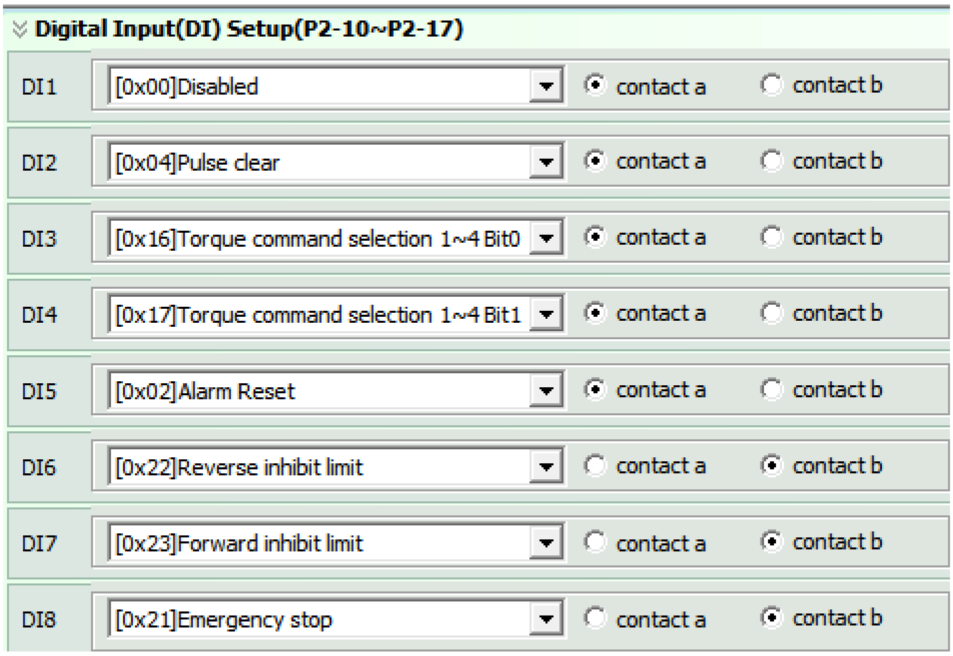
Step 1: Select the control mode from drop-down menu.



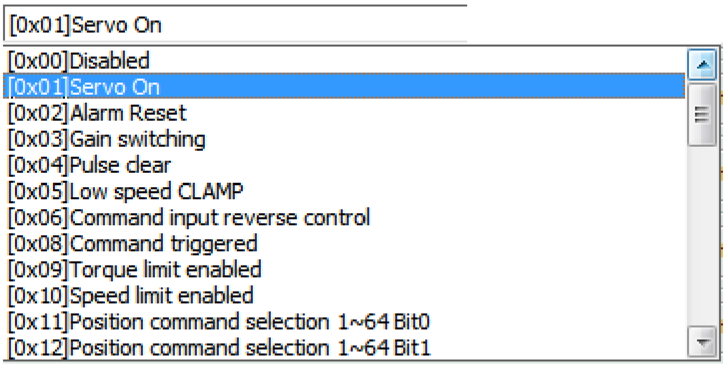
Step 2: Select Position control mode / Speed control mode, the setting block on the left will show as below:



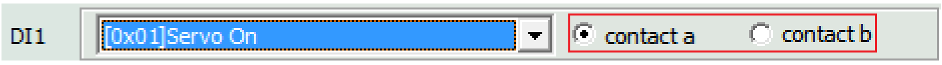
Step 3: Click "DI/O Setup", the following screen pops up.



There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



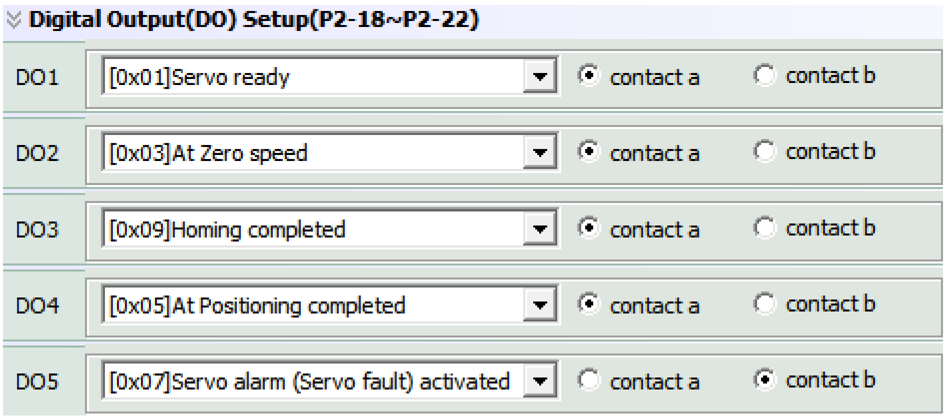
Users can set the digital input (DI) status as "a contact (frequently open)" or "b contact (frequently close)".



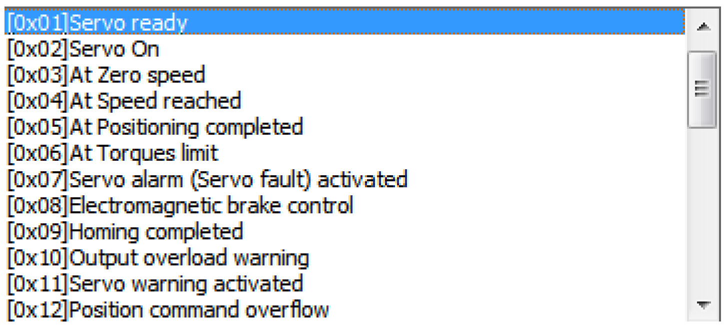
Step 4: Setup External Digital Input (EDI) command.

EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

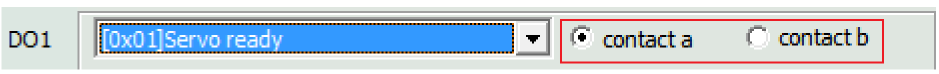
Step 5: Setup digital output (DO) command.



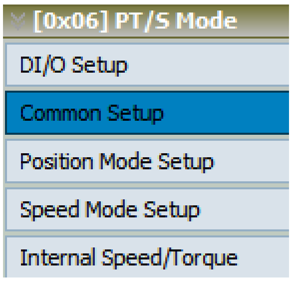
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



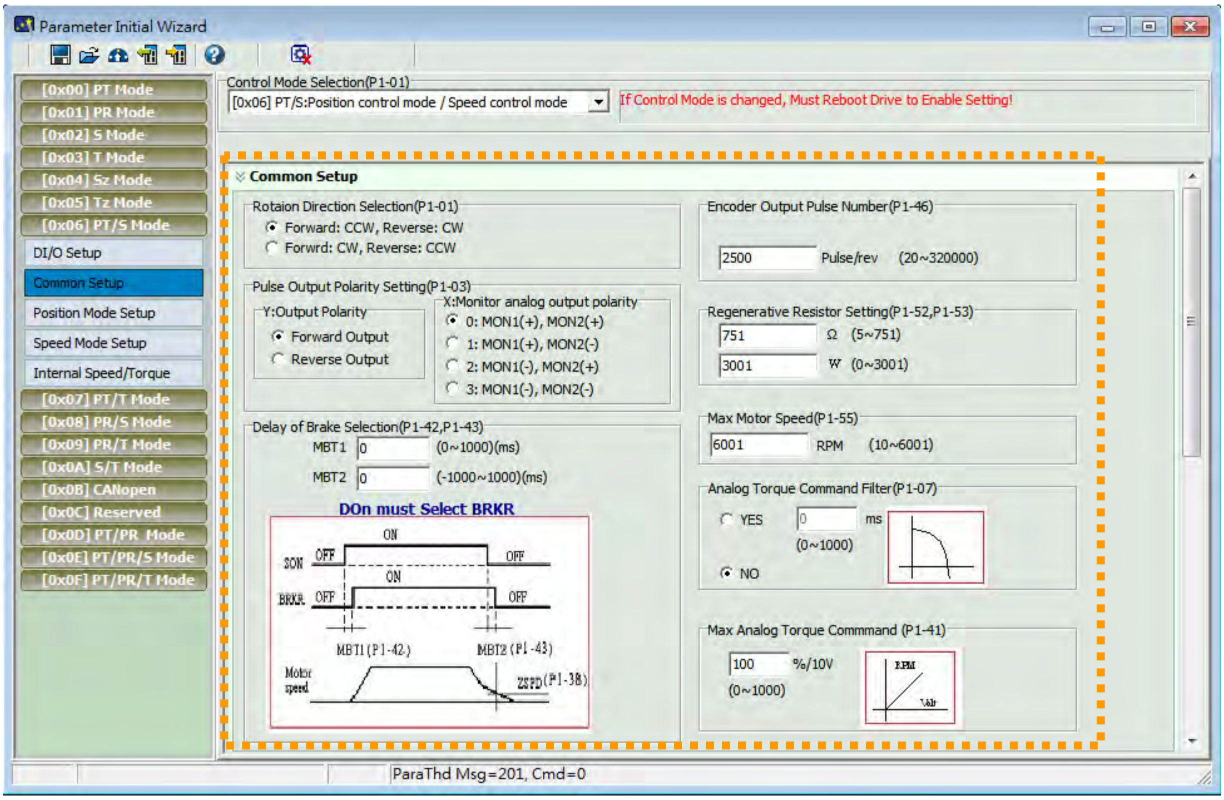
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



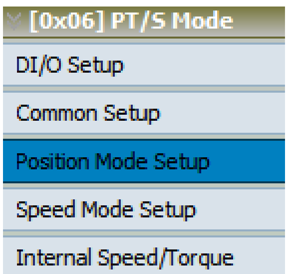
Step 6: “Common Setup”



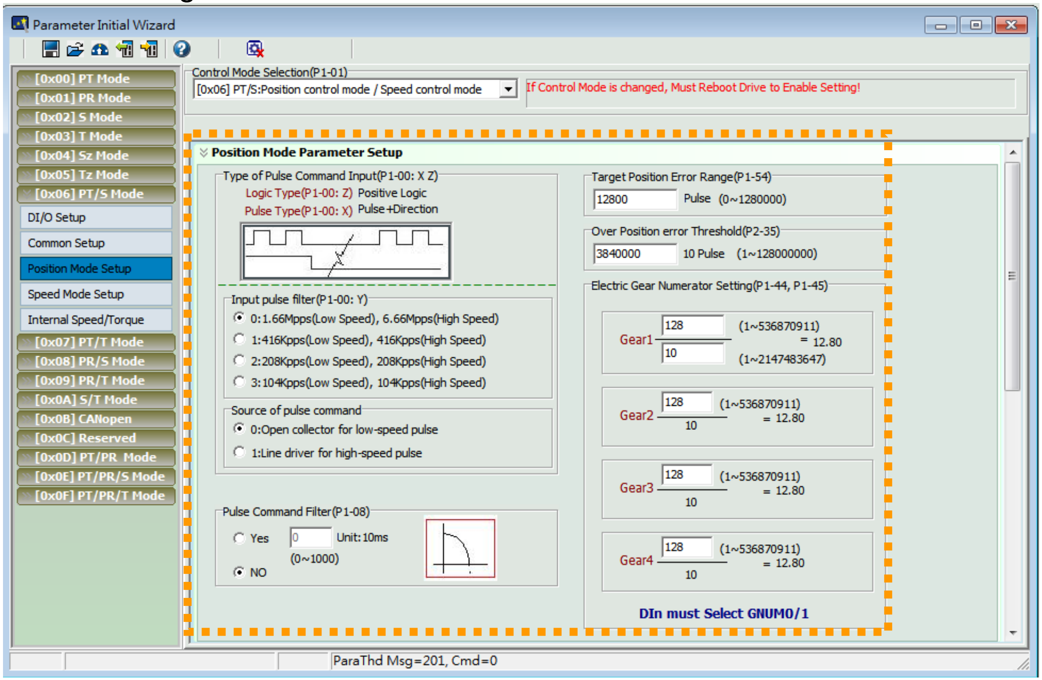
The screen on the right will be switched to the one as below:



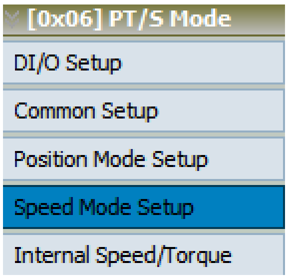
Step 7: Since it is in dual mode, the system provides setting blocks of position (PT) and speed mode. Setup “Position (PT) Mode” first.



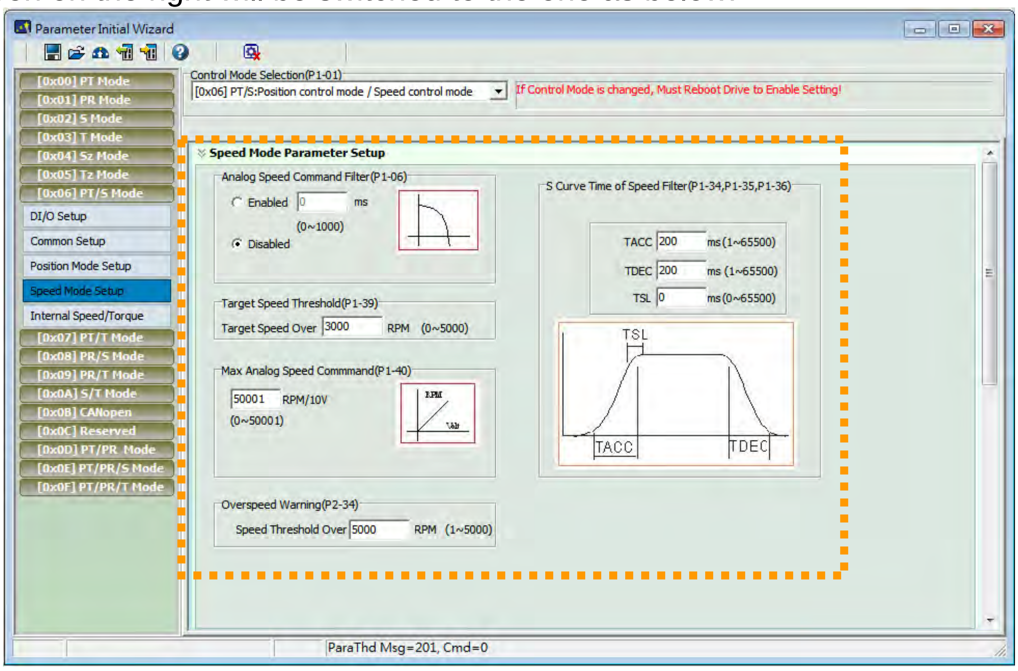
The screen on the right will be switched to the one as below:



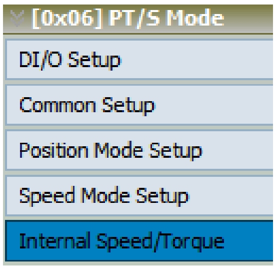
Step 8: Then, setup Speed Mode.



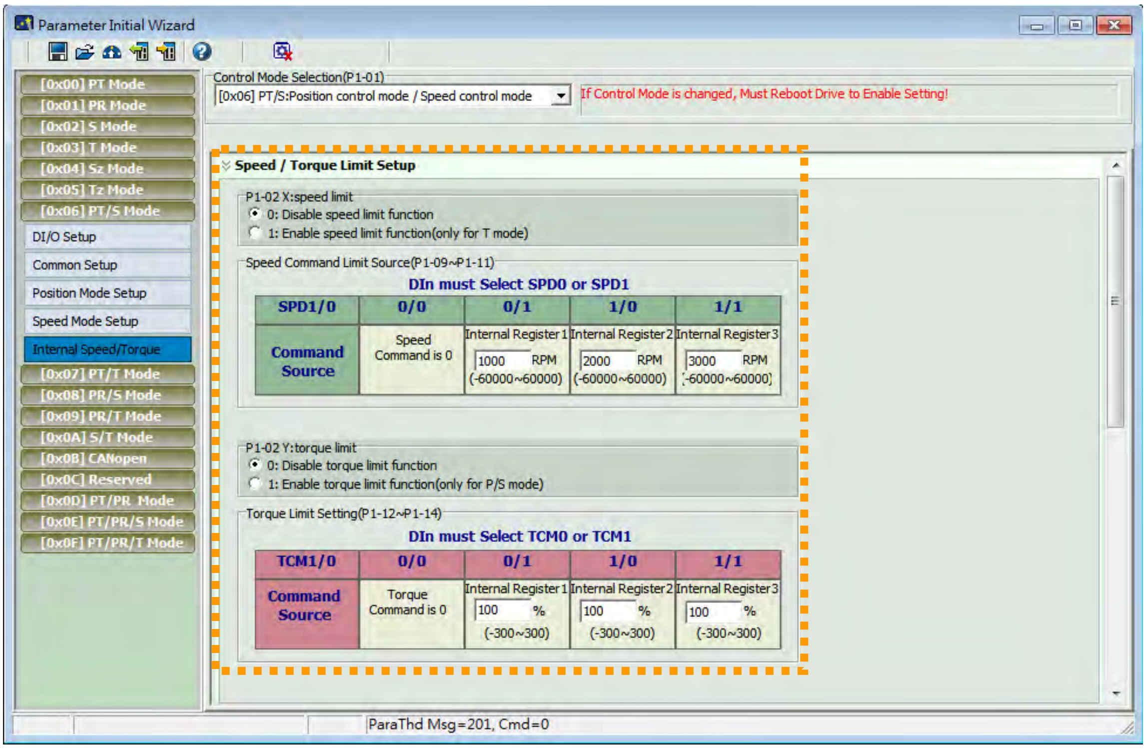
The screen on the right will be switched to the one as below:



Step 9: If users desire to setup speed or torque limit, click the fifth block “Internal Speed/Torque”.

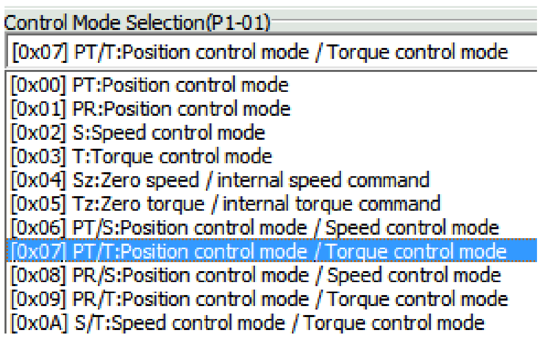


The screen on the right will be switched to the one as below:

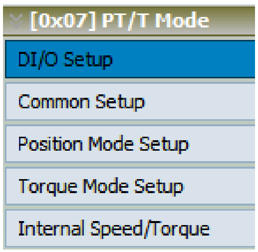


[0x07] PT/T：Position Control Mode / Torque Control Mode (Dual Mode)

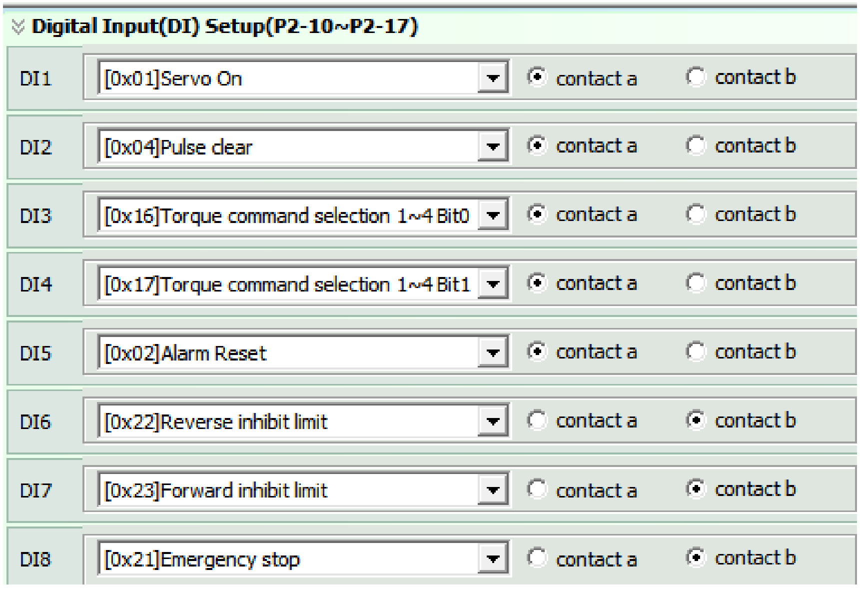
Step 1: Select the control mode from drop-down menu.



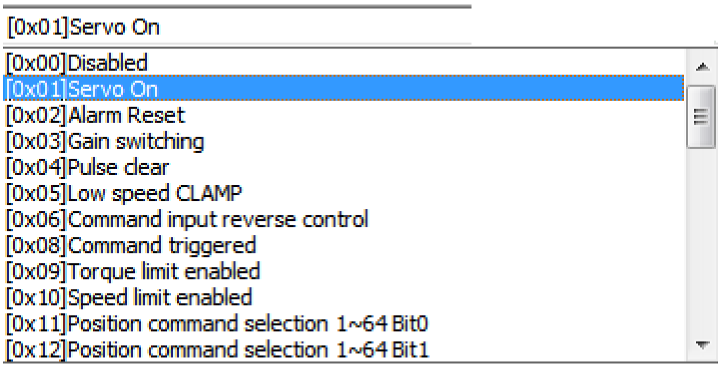
Step 2: Select Position control mode / Torque control mode, the setting block on the left will show as below:



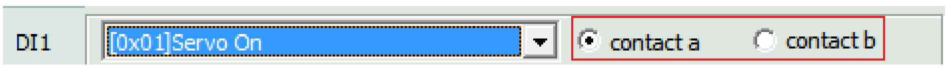
Step 3: Click “DI/O Setup”, the following screen pops up.



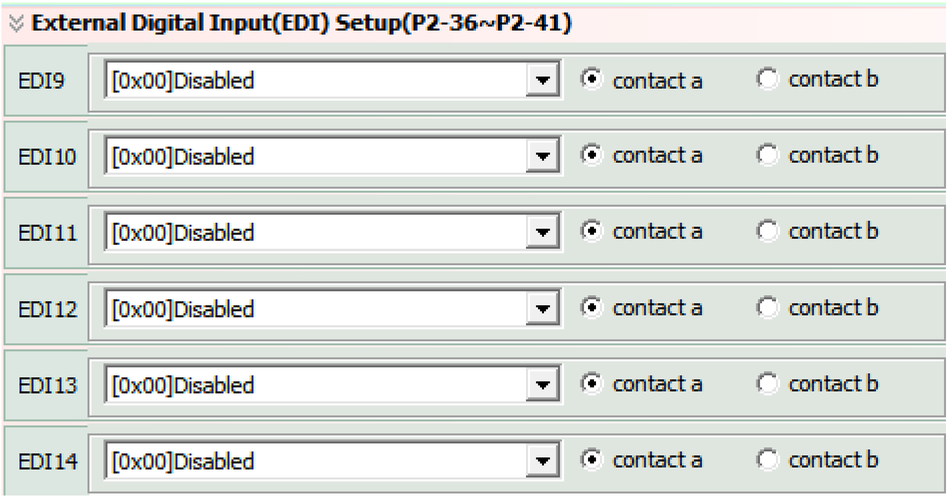
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

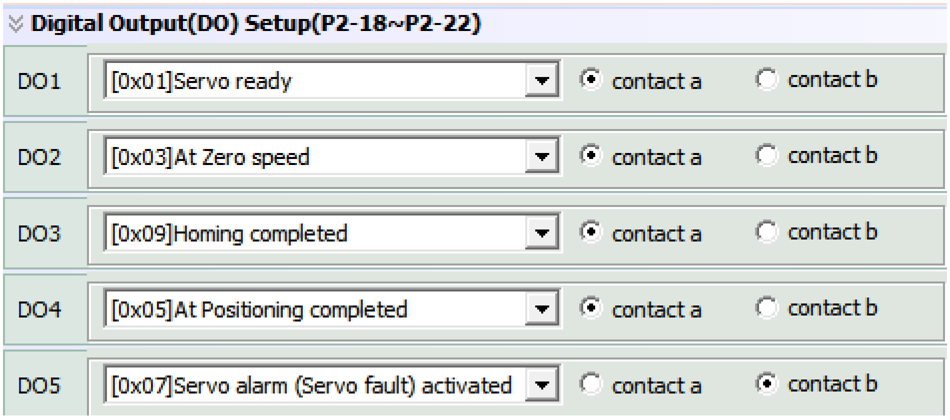


Step 4: Setup External Digital Input (EDI) command.

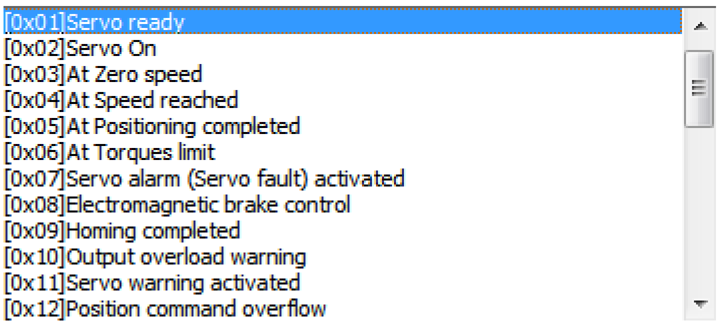


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

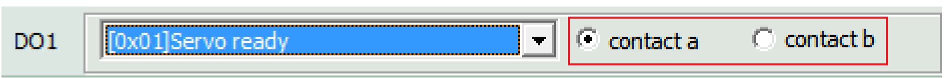
Step 5: Setup digital output (DO) command.



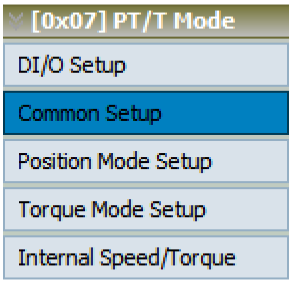
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



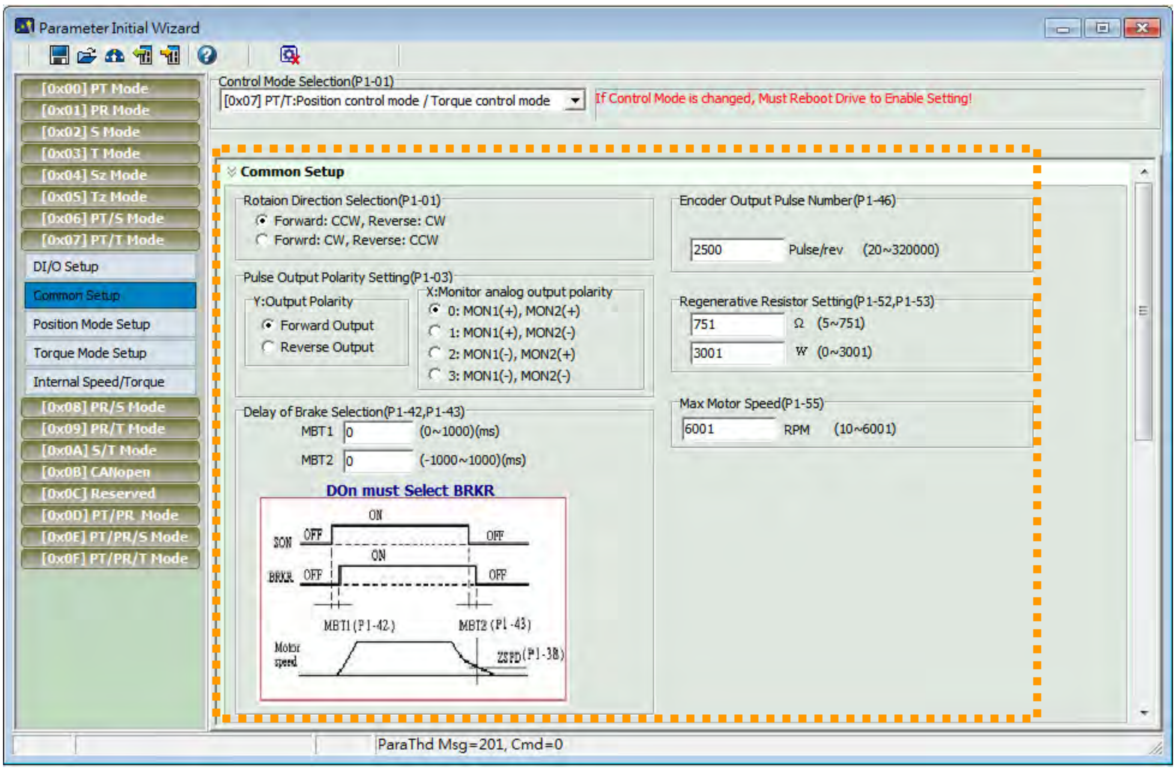
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



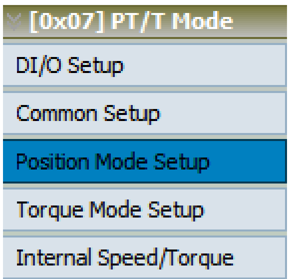
Step 6: “Common Setup”



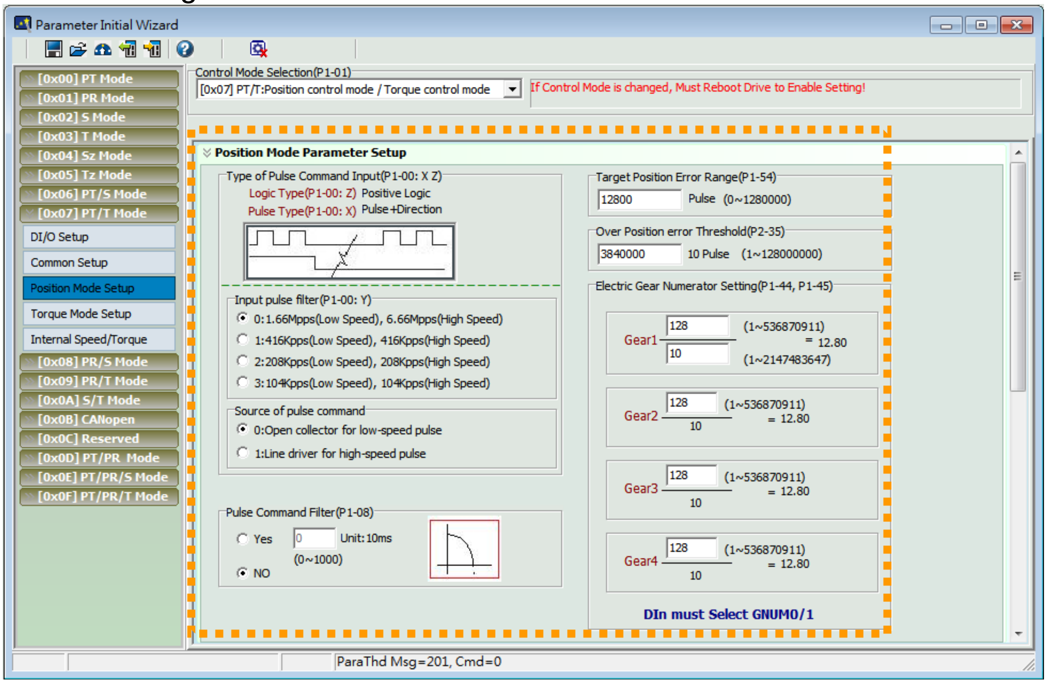
The screen on the right will be switched to the one as below:



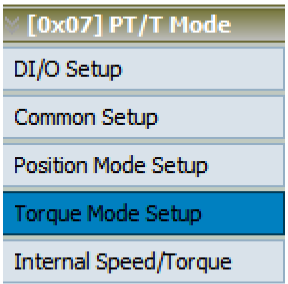
Step 7: Since it is in dual mode, the system provides setting blocks of position (PT) and torque mode. Setup “Position (PT) Mode” first.



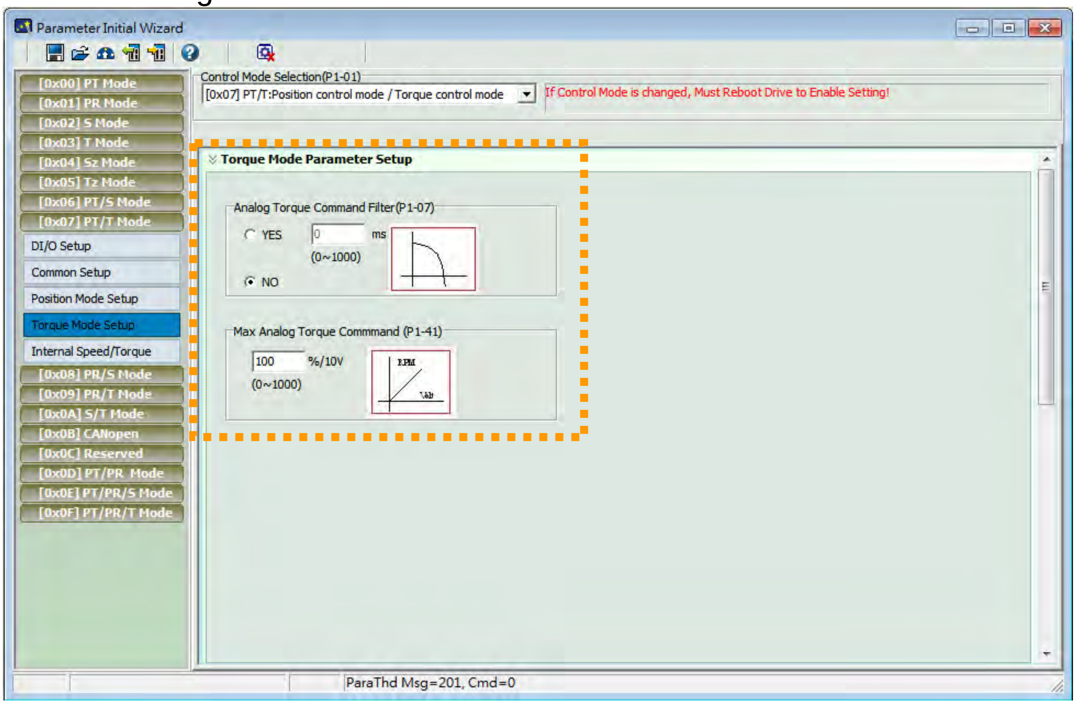
The screen on the right will be switched to the one as below:



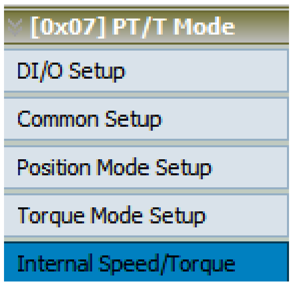
Step 8: Then, setup torque mode.



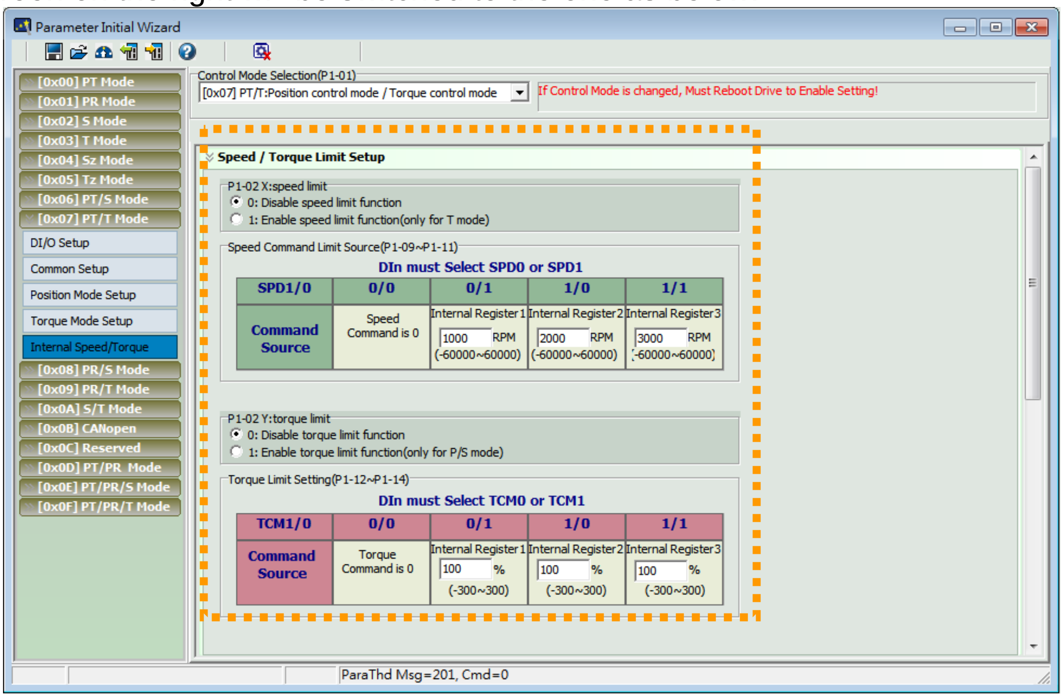
The screen on the right will be switched to the one as below:



Step 9: If users desire to setup speed or torque limit, click the fifth block “Internal Speed/Torque”.



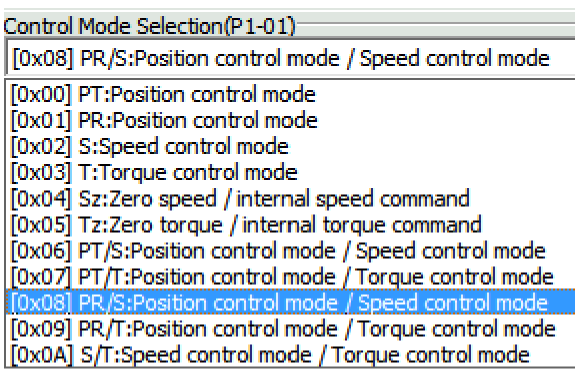
The screen on the right will be switched to the one as below:



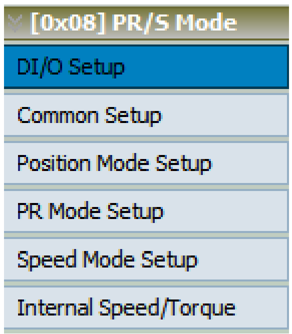
[0x08] PR/S：Position Control Mode / Speed Control Mode (Dual Mode)

[0x08] is a dual control mode of position and speed, which is the same as [0x06]. The difference between both is the command source of position control. The command source of [0x06] is external pulse signal while [0x08] is internal position command (PR). Users can select the position command according to different applications.

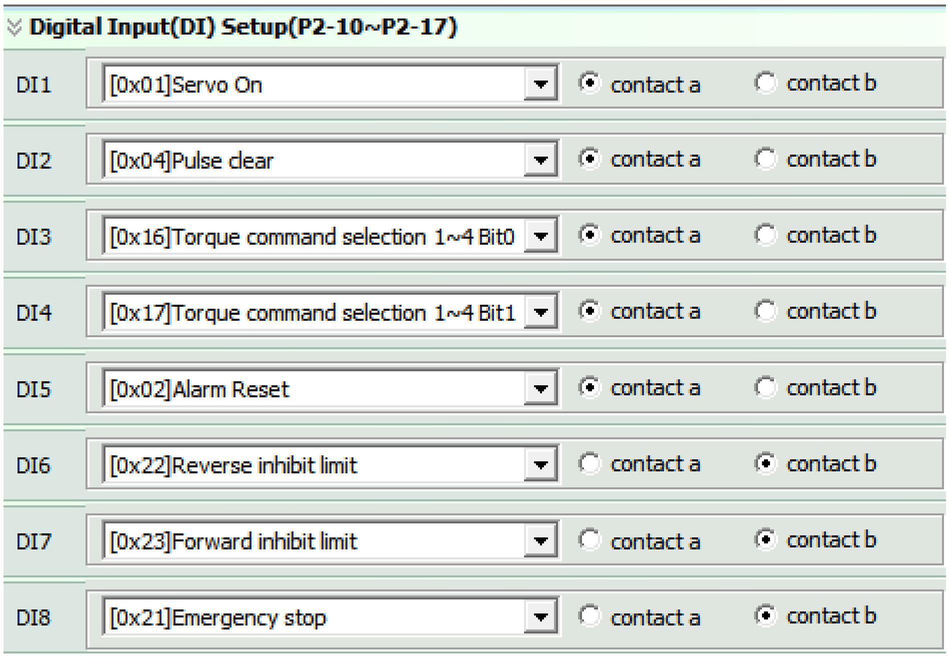
Step 1: Select the control mode from drop-down menu.



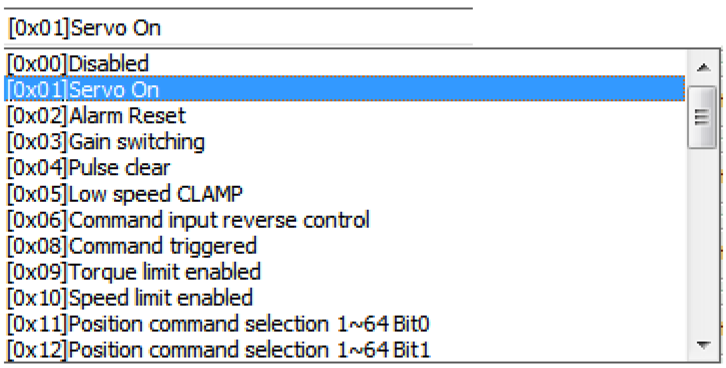
Step 2: Select position control mode / speed control mode, the setting block on the left will show as below:



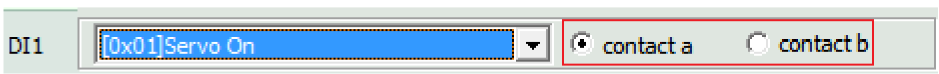
Step 3: Click "DI/O Setup", the following screen pops up.



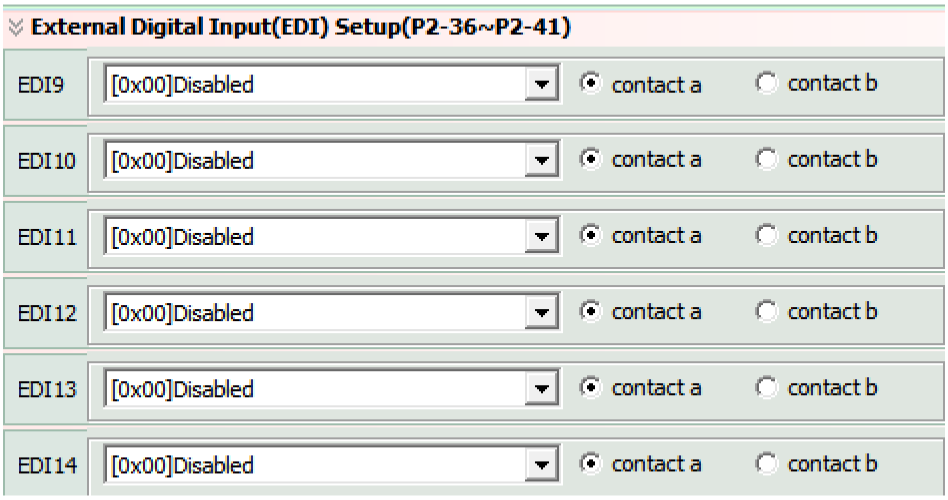
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as "a contact (frequently open)" or "b contact (frequently close)".

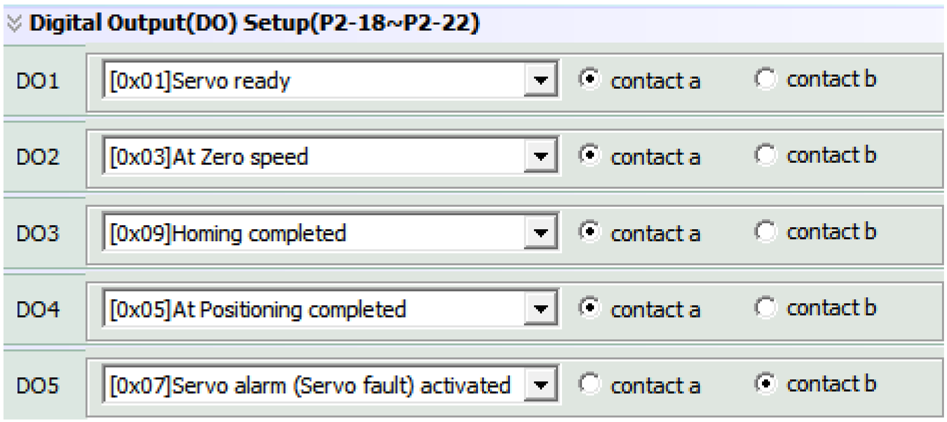


Step 4: Setup External Digital Input (EDI) command.

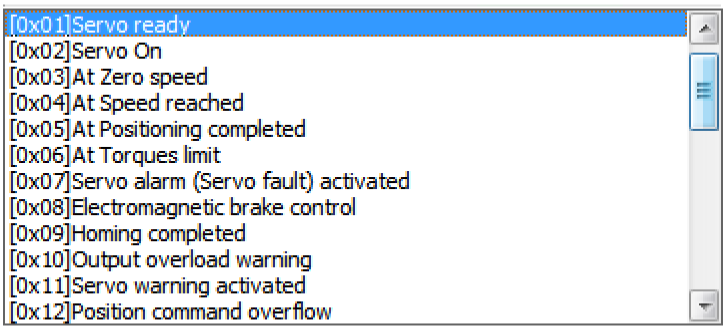


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

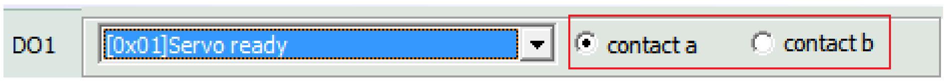
Step 5: Setup digital output (DO) command.



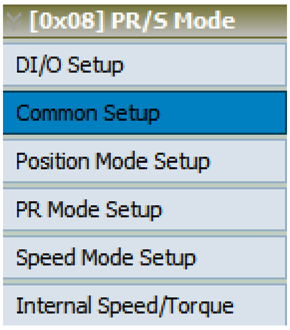
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



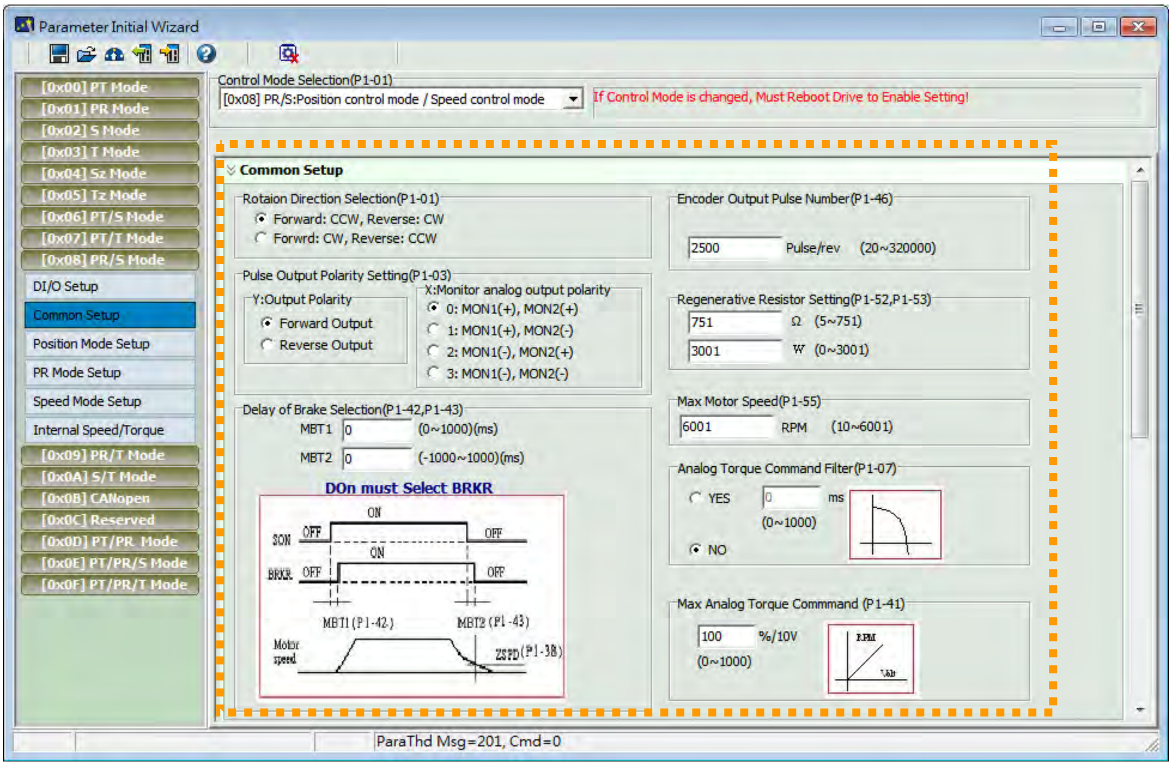
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



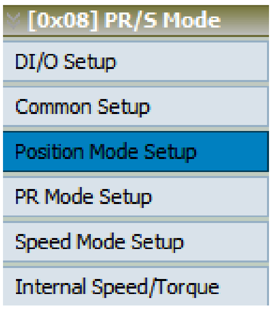
Step 6: "Common Setup"



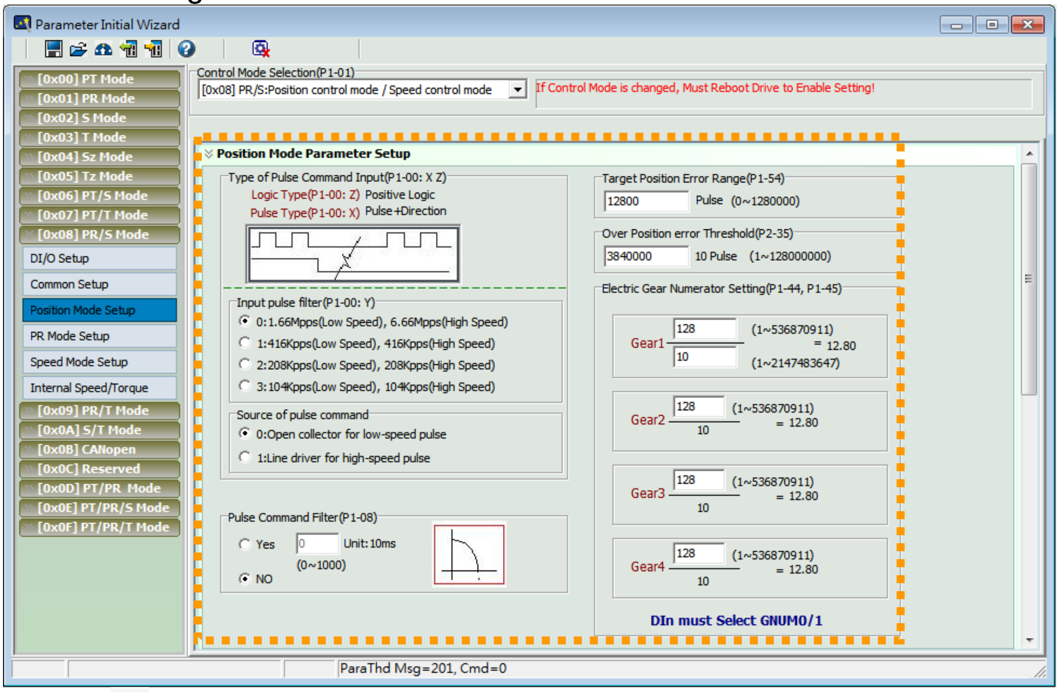
The screen on the right will be switched to the one as below:



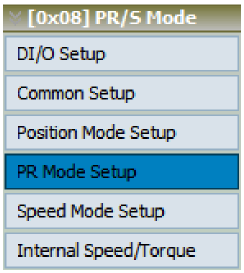
Step 7: Since it is in dual mode, the system provides setting blocks of position (PR) mode, PR mode and speed mode. Setup "Position (PR) Mode" first.



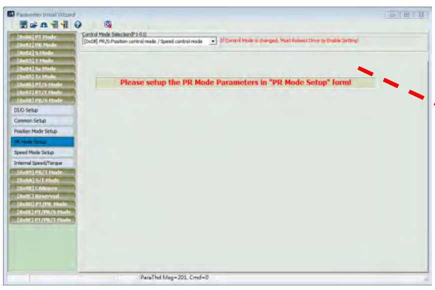
The screen on the right will be switched to the one as below:

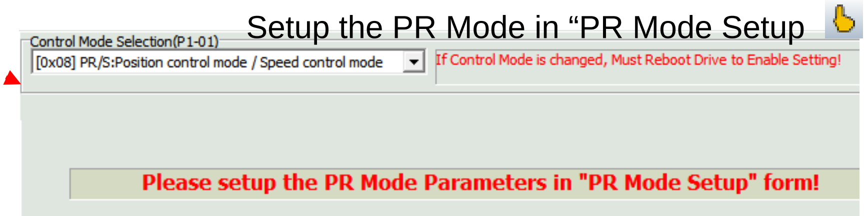


Step 8: Since  PR mode setting is a specific function in ASDA-Soft, click the function block below, a reminder will pop up and ask users to click  for PR mode setting.

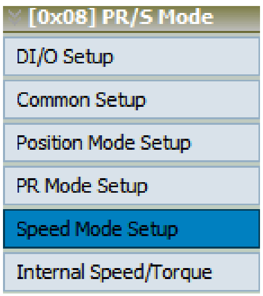


The prompting message in main screen:
Setup the PR Mode in “PR Mode Setup ”.

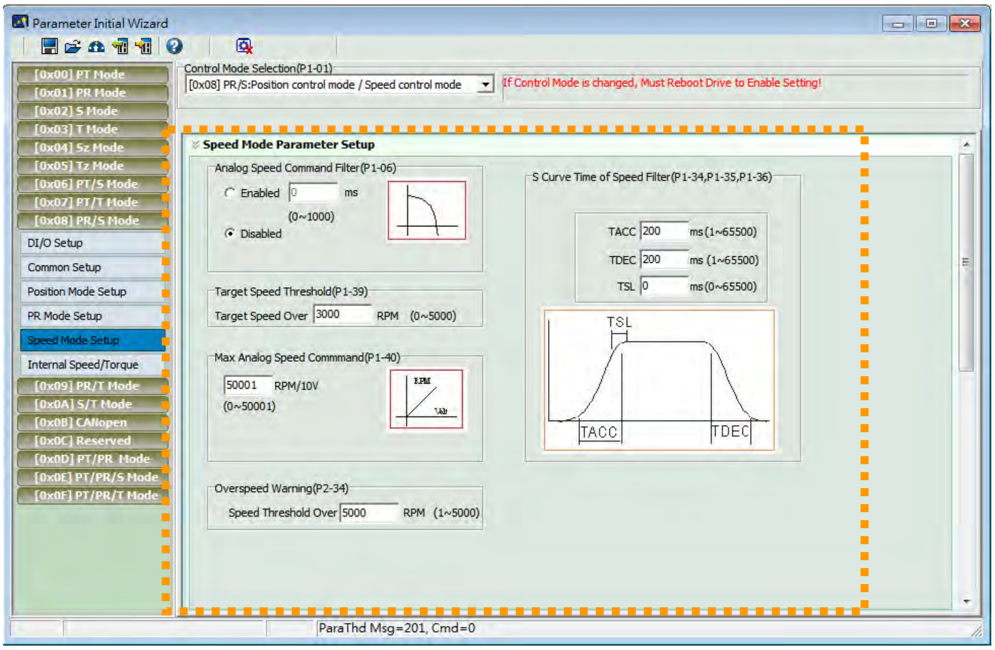




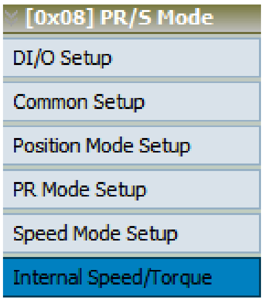
Step 9: Then, setup speed mode.



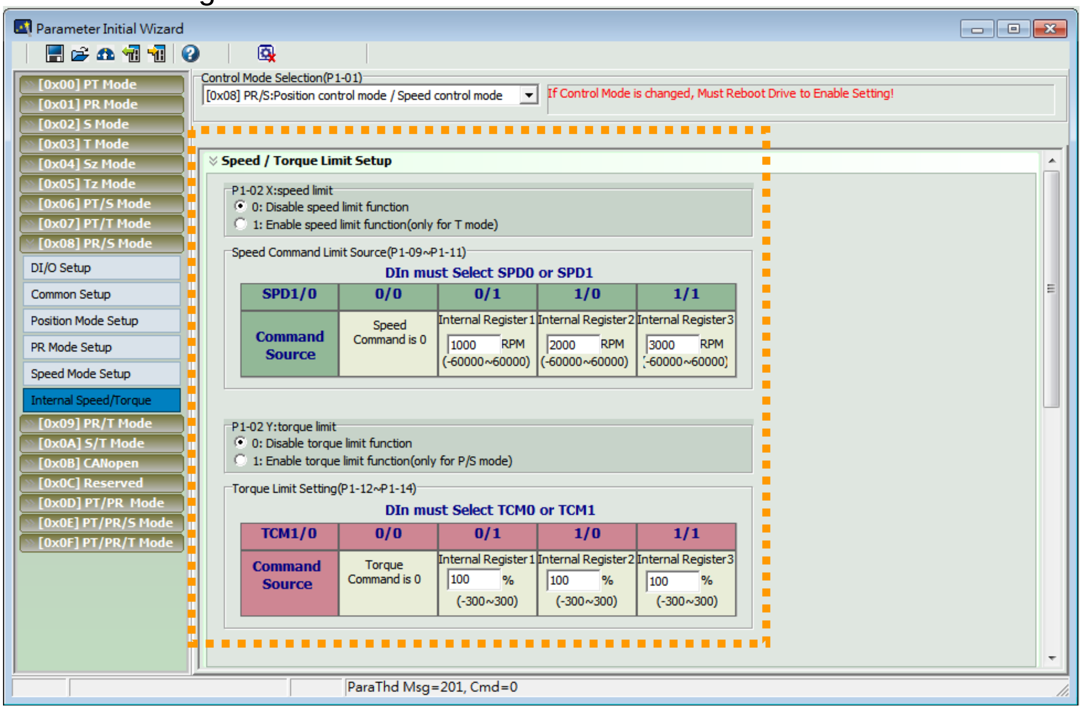
The screen on the right will be switched to the one as below:



Step 10: If users desire to setup speed or torque limit, click the sixth block “Internal Speed/Torque”.



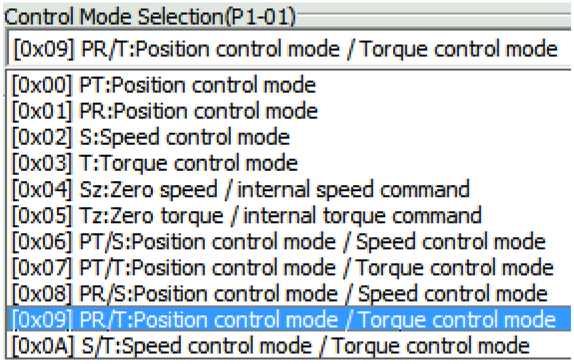
The screen on the right will be switched to the one as below:



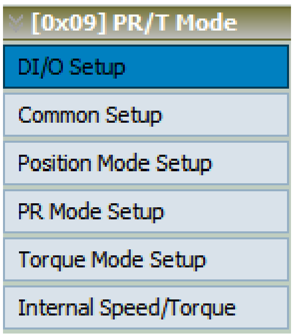
[0x09] PR/T：Position Control Mode / Torque Control Mode (Dual Mode)

[0x09] is a dual control mode of position and torque, which is the same as [0x07]. The difference between both is the command source of position control. The command source of [0x07] is external pulse signal while [0x09] is internal position command (PR). Users can select the position command according to different applications.

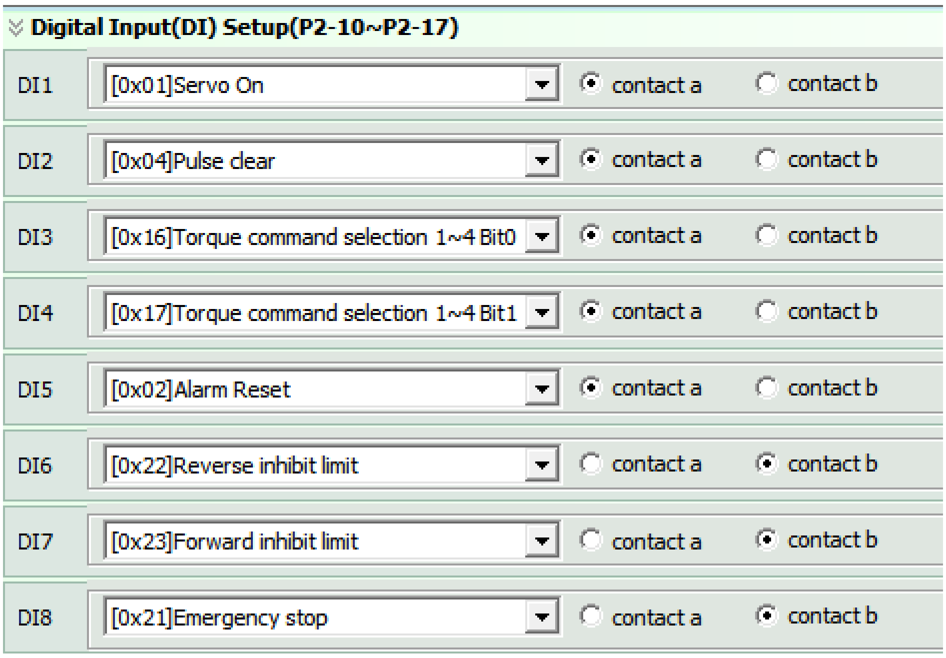
Step 1: Select the control mode from drop-down menu.



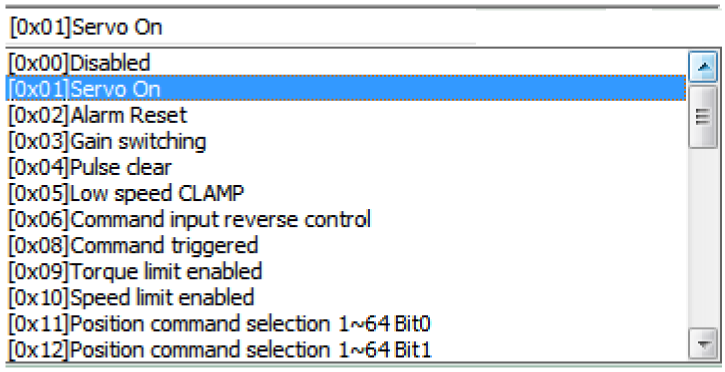
Step 2: Select Position control mode / Torque control mode, the setting block on the left will show as below:



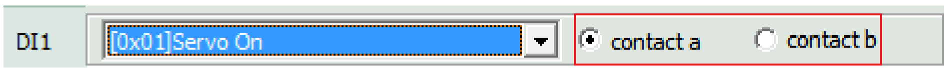
Step 3: Click “DI/O Setup”, the following screen pops up.



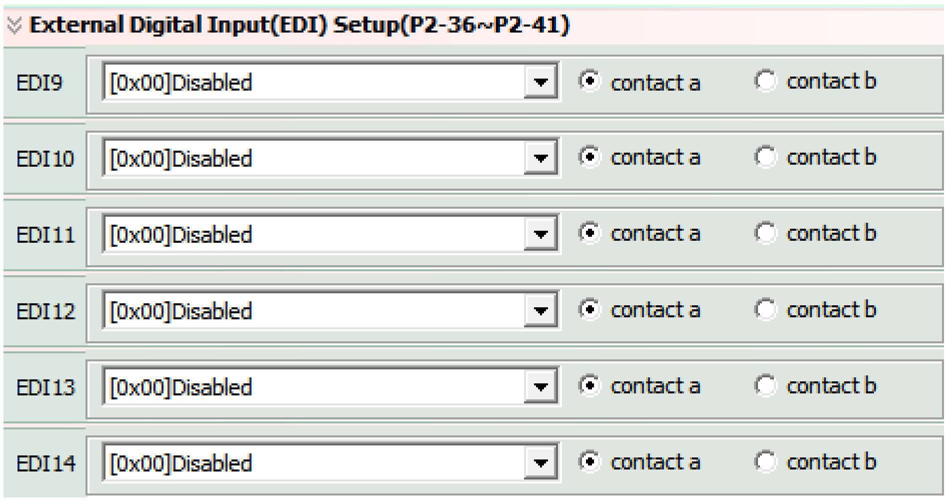
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

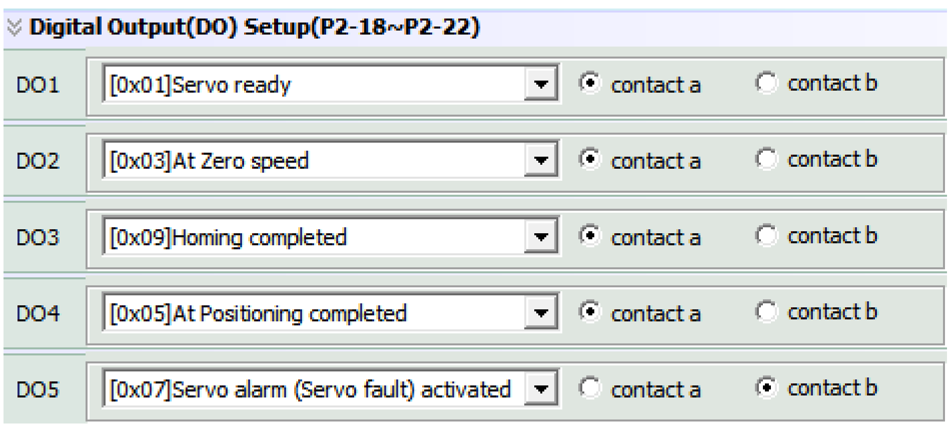


Step 4: Setup External Digital Input (EDI) command.

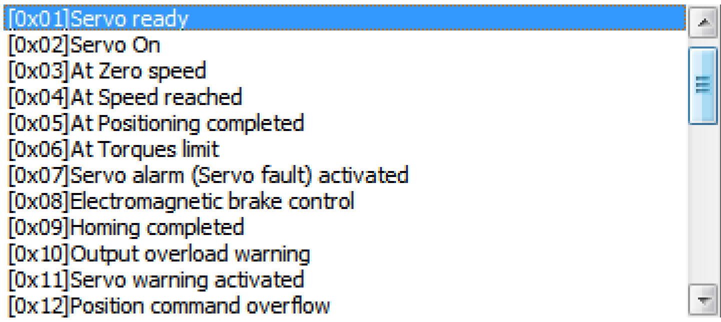


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

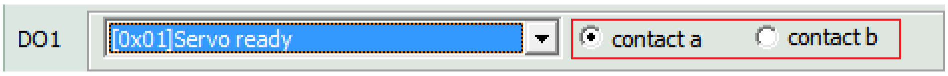
Step 5: Setup digital output (DO) command.



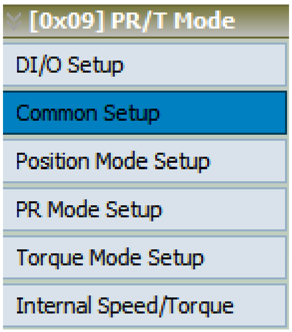
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



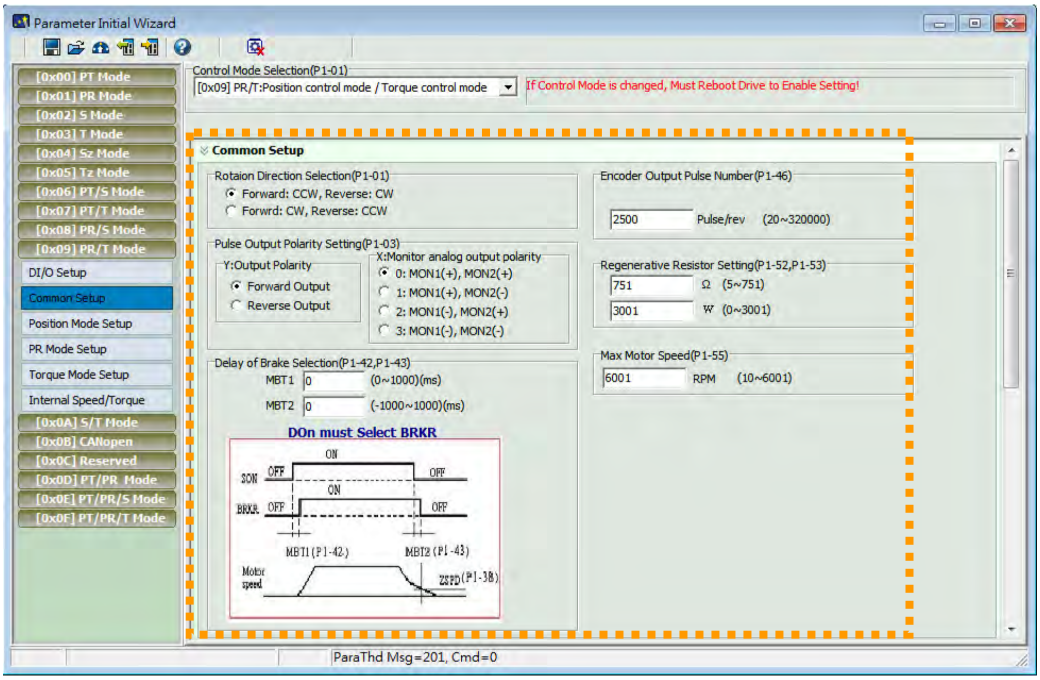
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



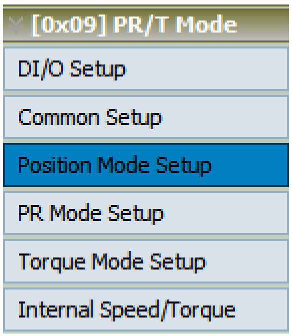
Step 6: “Common Setup”



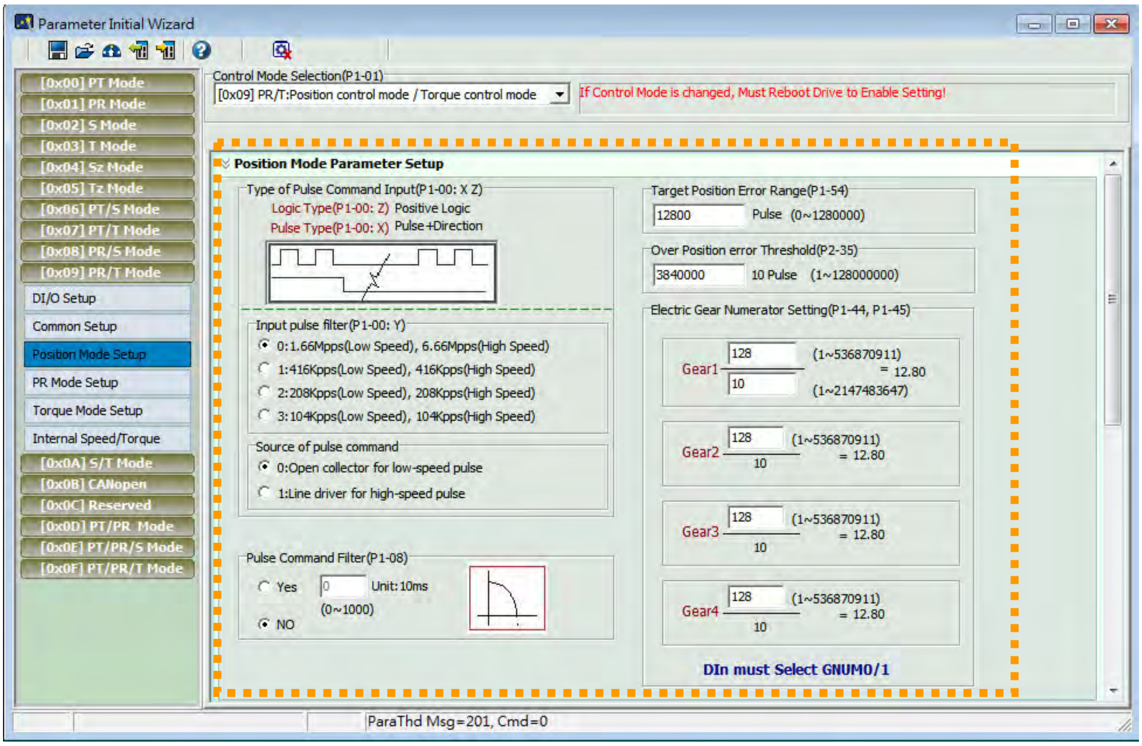
The screen on the right will be switched to the one as below:



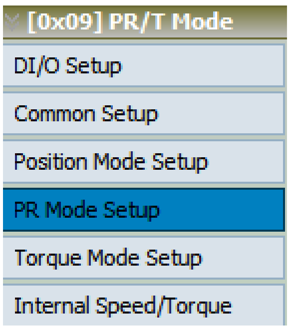
Step 7: Since it is in dual mode, the system provides setting blocks of position (PR) mode, PR mode and torque mode. Setup "Position (PR) Mode" first.

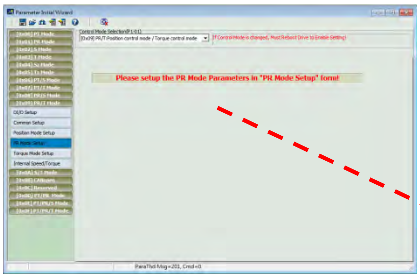


The screen on the right will be switched to the one as below:

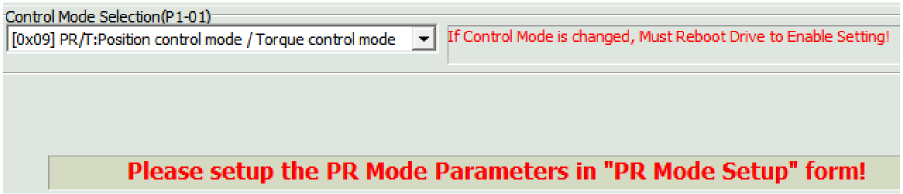


Step 8: Since PR mode setting is a specific function in ASDA-Soft, click the function block below, a reminder will pop up and ask users to click for PR mode setting.

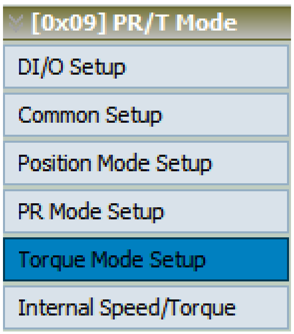




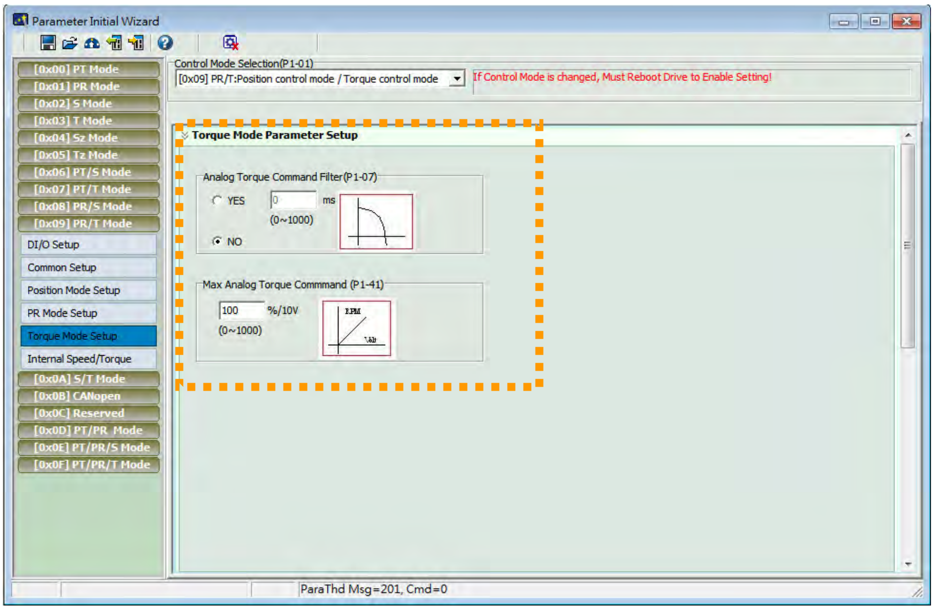
The prompting message in main screen: Setup the PR Mode in “PR Mode Setup ”.



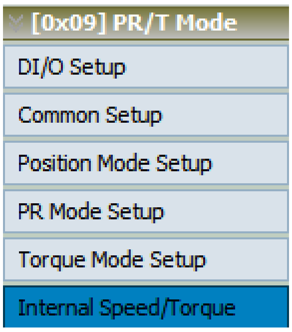
Step 9: Then, setup torque mode.



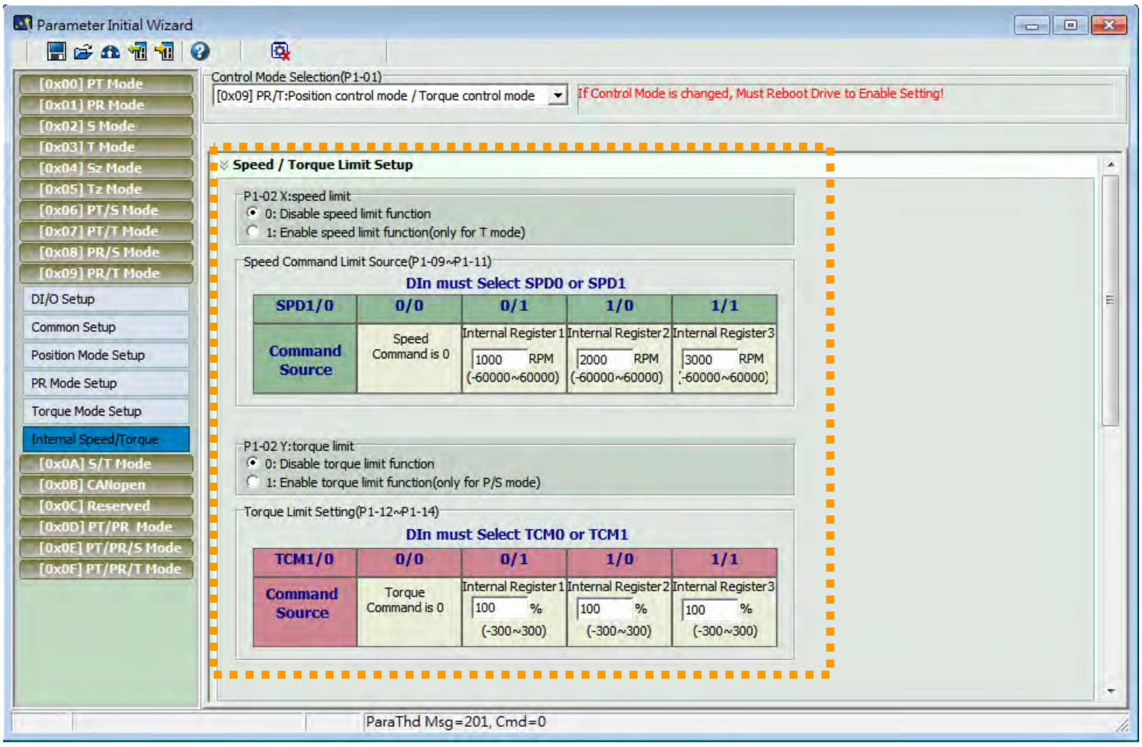
The screen on the right will be switched to the one as below:



Step 10: If users desire to setup speed or torque limit, click the sixth block “Internal Speed/Torque”.

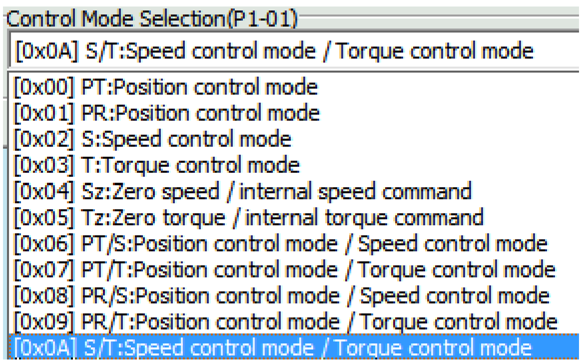


The screen on the right will be switched to the one as below:

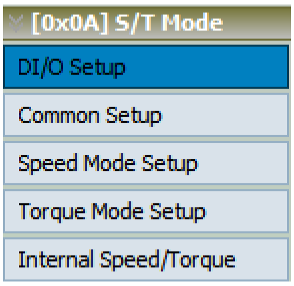


[0x0A] S/T：Speed Control Mode / Torque Control Mode (Dual Mode)

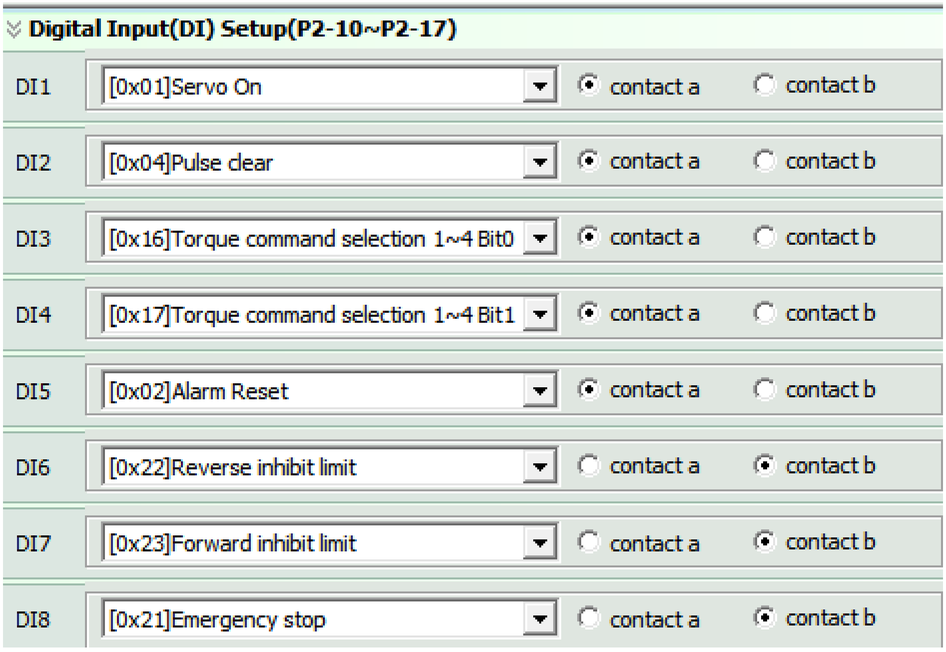
Step 1: Select the control mode from drop-down menu.



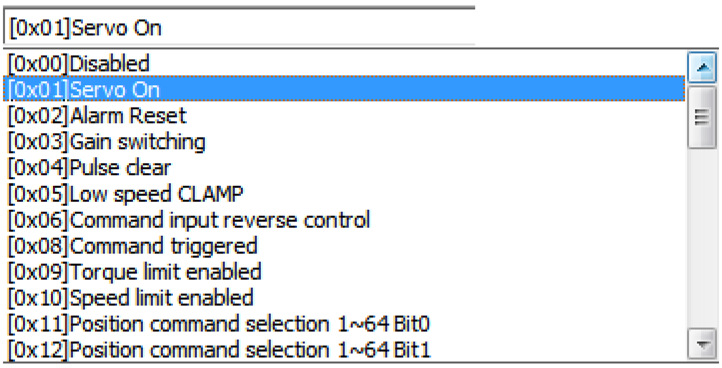
Step 2: Select Speed control mode / Torque control mode, the setting block on the left will show as below:



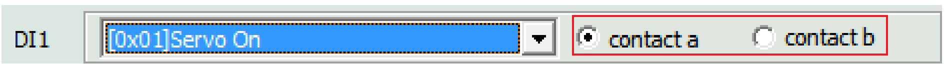
Step 3: Click “DI/O Setup”, the following screen pops up.



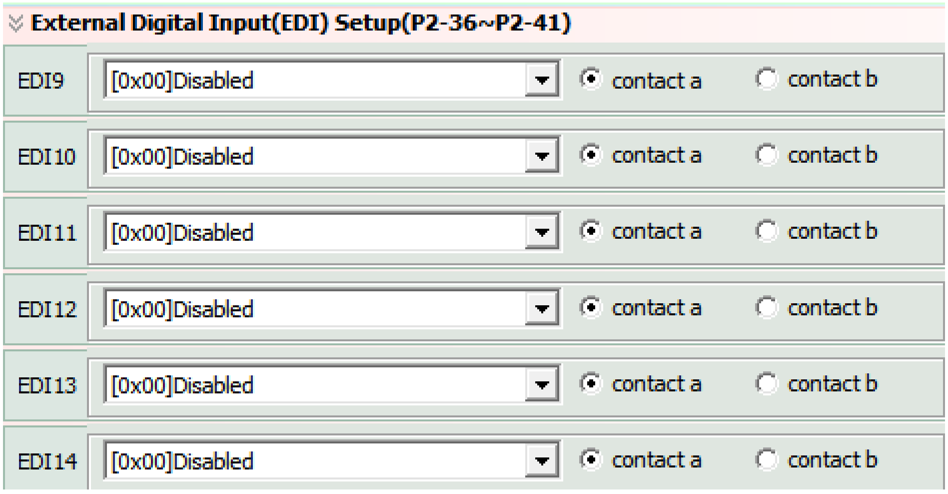
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

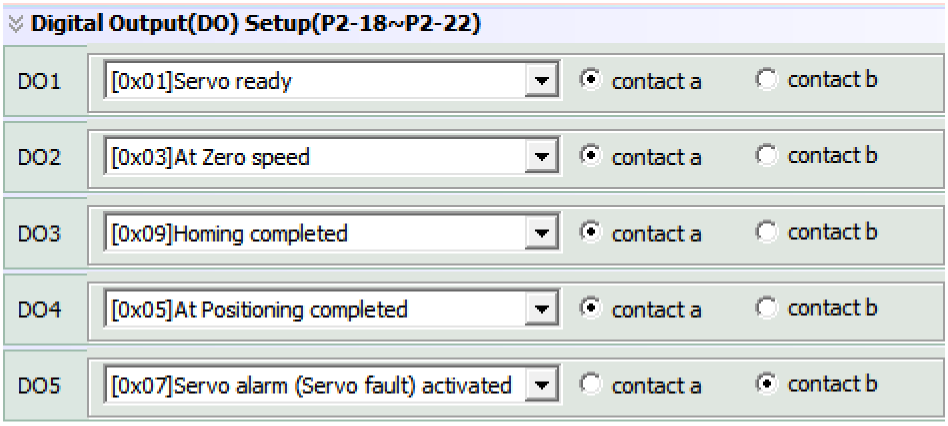


Step 4: Setup External Digital Input (EDI) command.

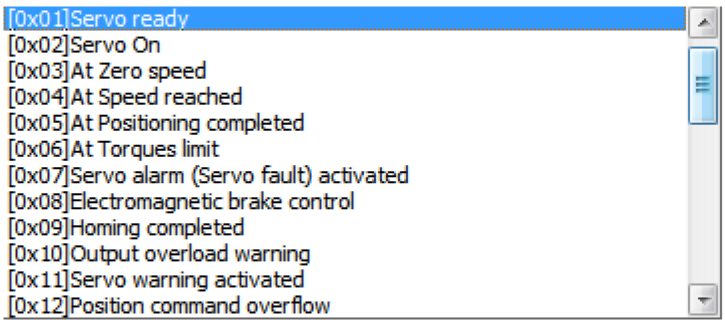


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

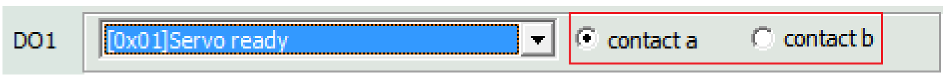
Step 5: Setup digital output (DO) command.



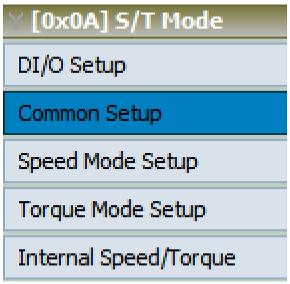
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



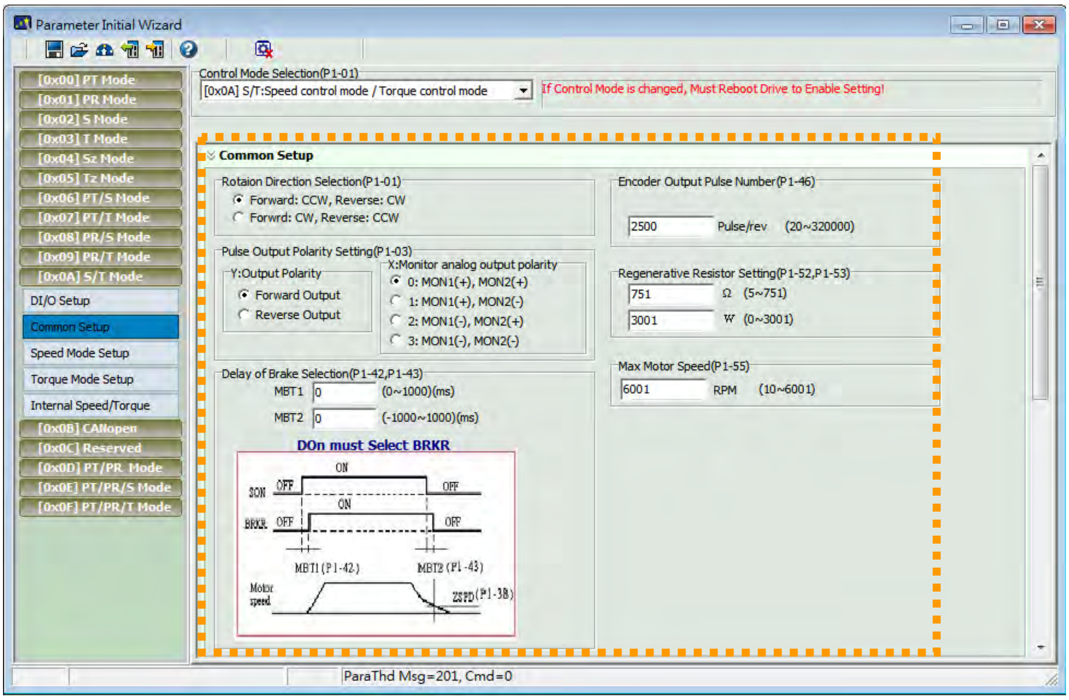
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



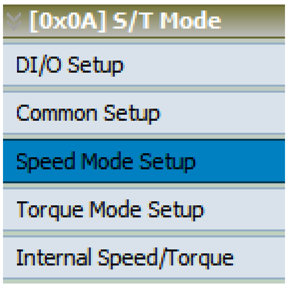
Step 6: "Common Setup"



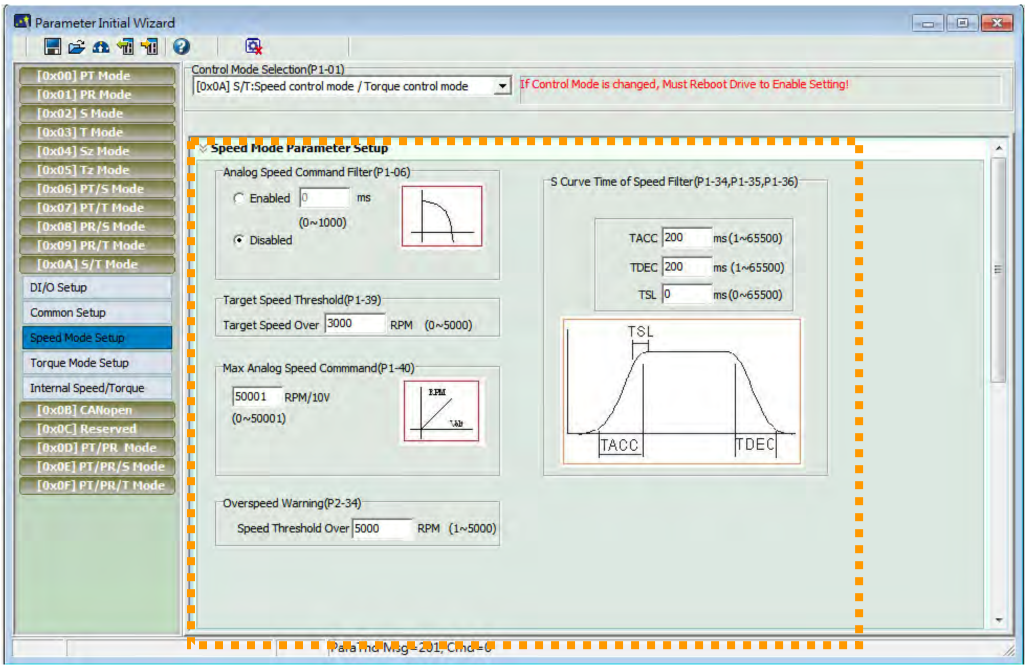
The screen on the right will be switched to the one as below:



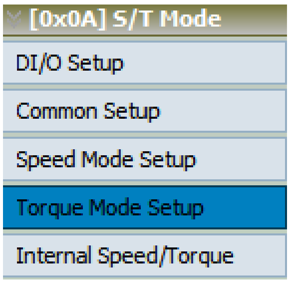
Step 7: Since it is in dual mode, the system provides setting blocks of speed and torque mode. Setup "Speed Mode" first.



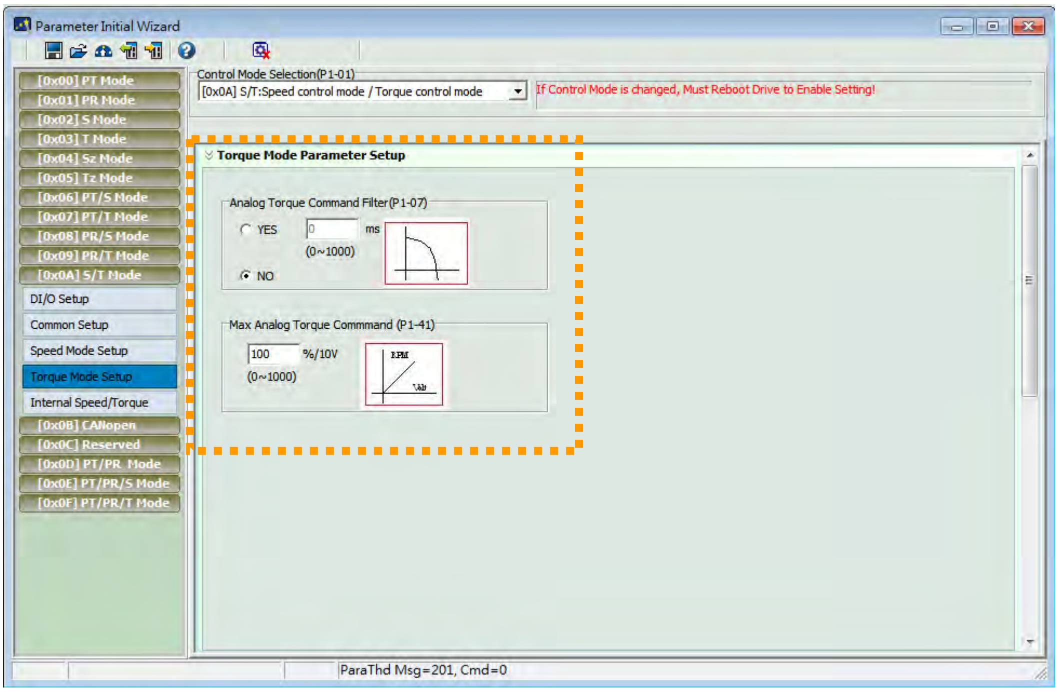
The screen on the right will be switched to the one as below:



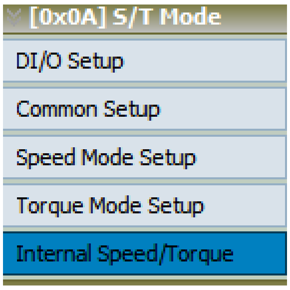
Step 8: Then, setup torque mode.



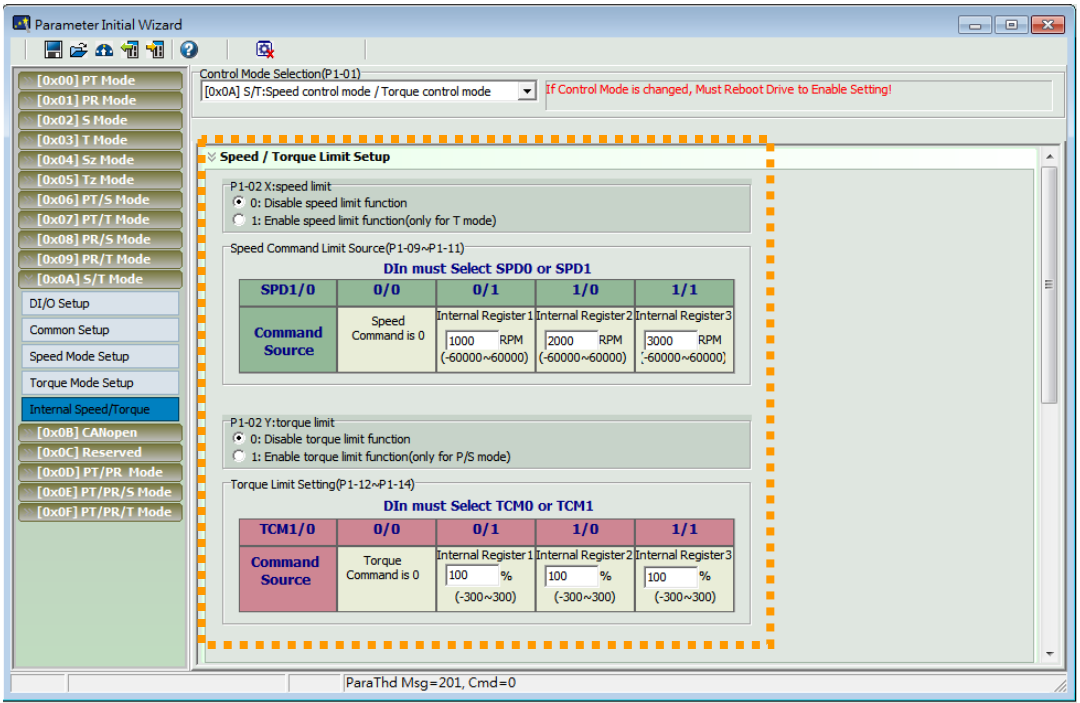
The screen on the right will be switched to the one as below:



Step 9: If users desire to setup speed or torque limit, click the fifth block “Internal Speed/Torque”.



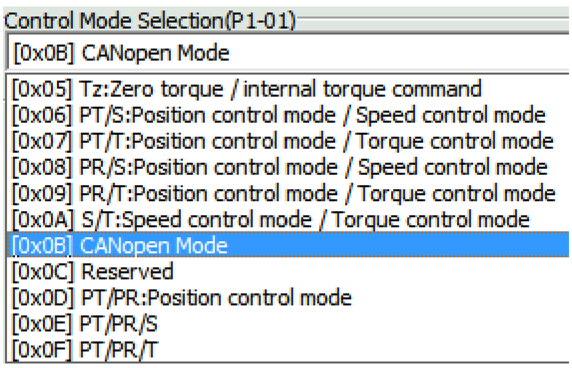
The screen on the right will be switched to the one as below:



[0x0B] CANopen：CANopen Control Mode (Motion control on CAN bus)

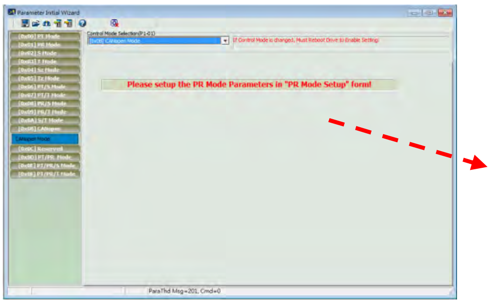
Users could activate CANopen mode via Parameter Initial Wizard. If the user applies position (PR) control mode of ASDA-A2 with CiA DS 301,  PR mode setup can help as well.

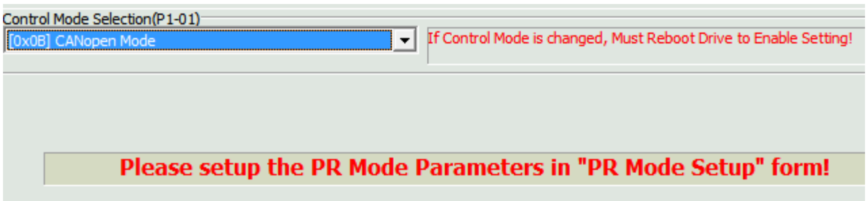
Step 1: Select the control mode from drop-down menu.



The main screen will be switched to the one as below:

The prompting message in main screen:
Setup the PR Mode in “PR Mode Setup ”.

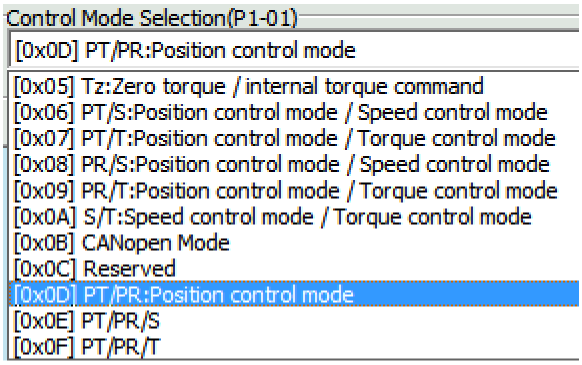




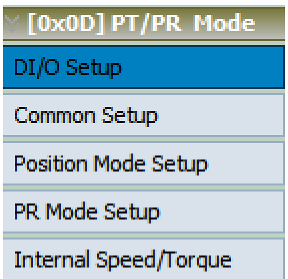
[0x0D] PT/PR：Dual Position Control Mode

This control mode is used for multi control mode (PT/PR/S and PT/PR/T). When applying multi mode, users can switch external pulse command (PT position control) and internal position command (PR position control) via DI signal.

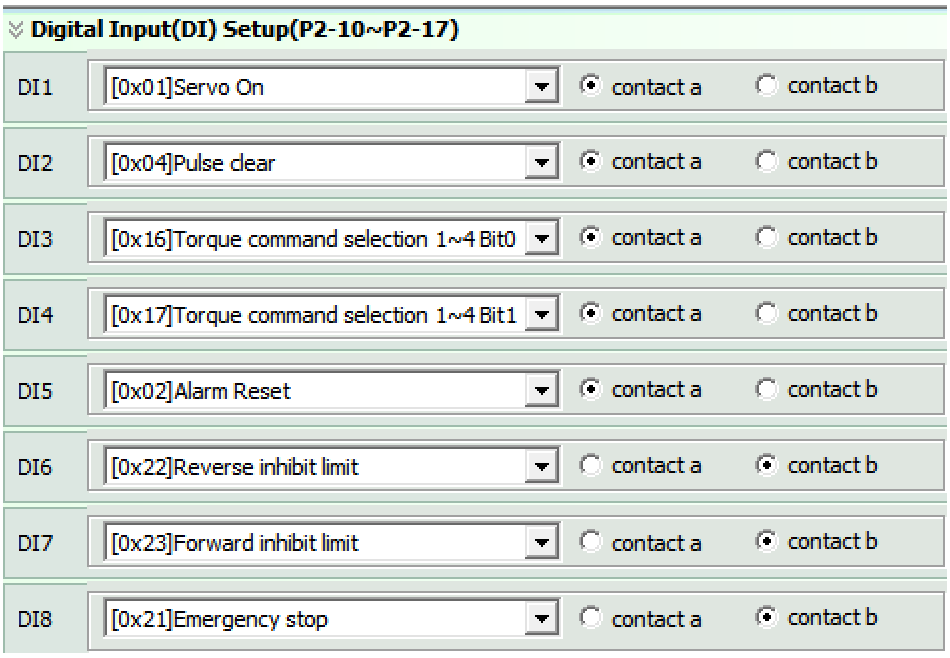
Step 1: Select the control mode from drop-down menu.



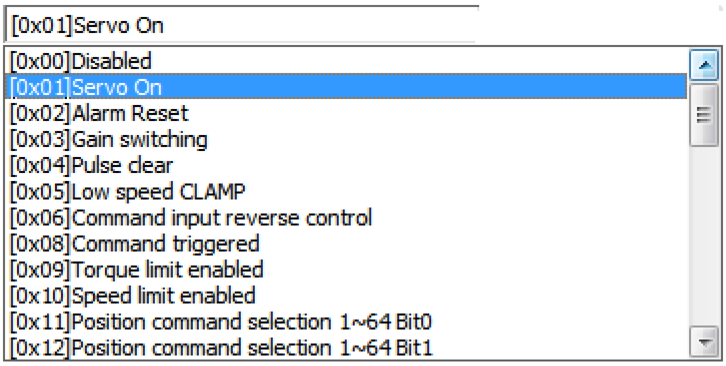
Step 2: Select dual position control mode. The setting block on the left will show as below:



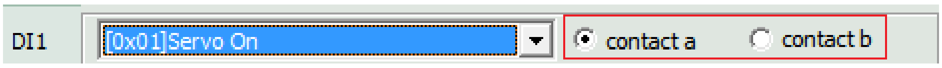
Step 3: Click “DI/O Setup”, the following screen pops up.



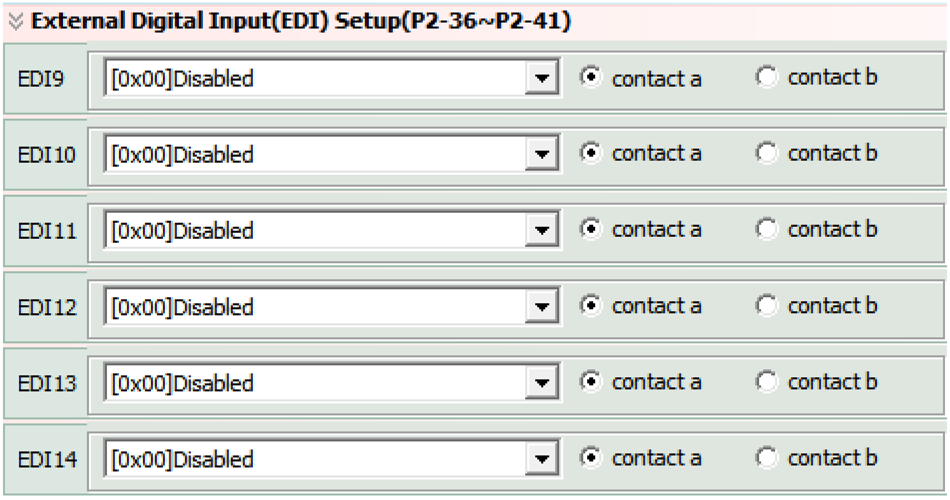
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

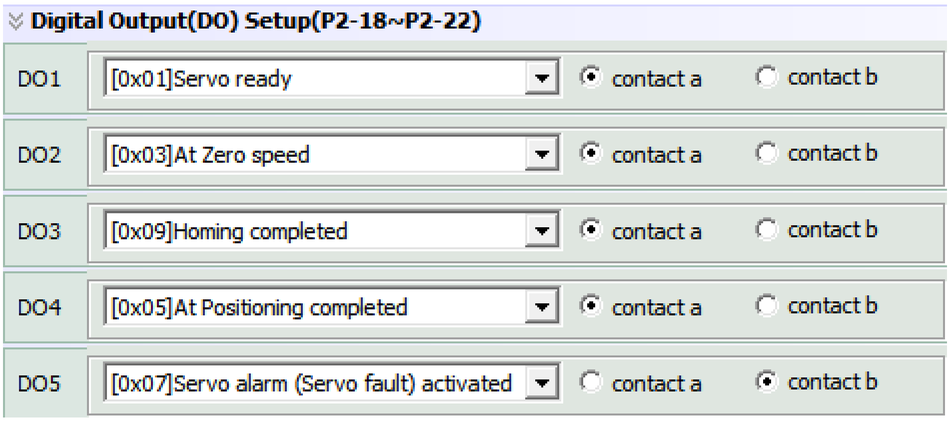


Step 4: Setup External Digital Input (EDI) command.

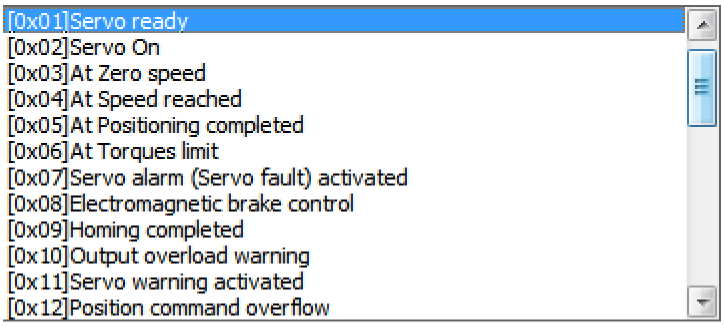


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

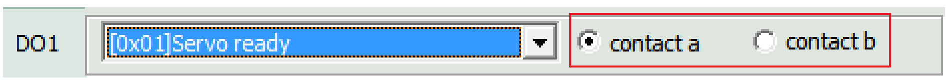
Step 5: Setup digital output (DO) command.



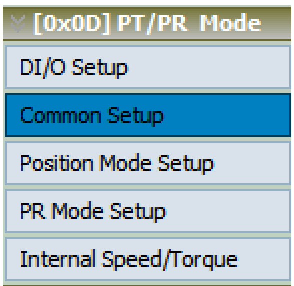
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



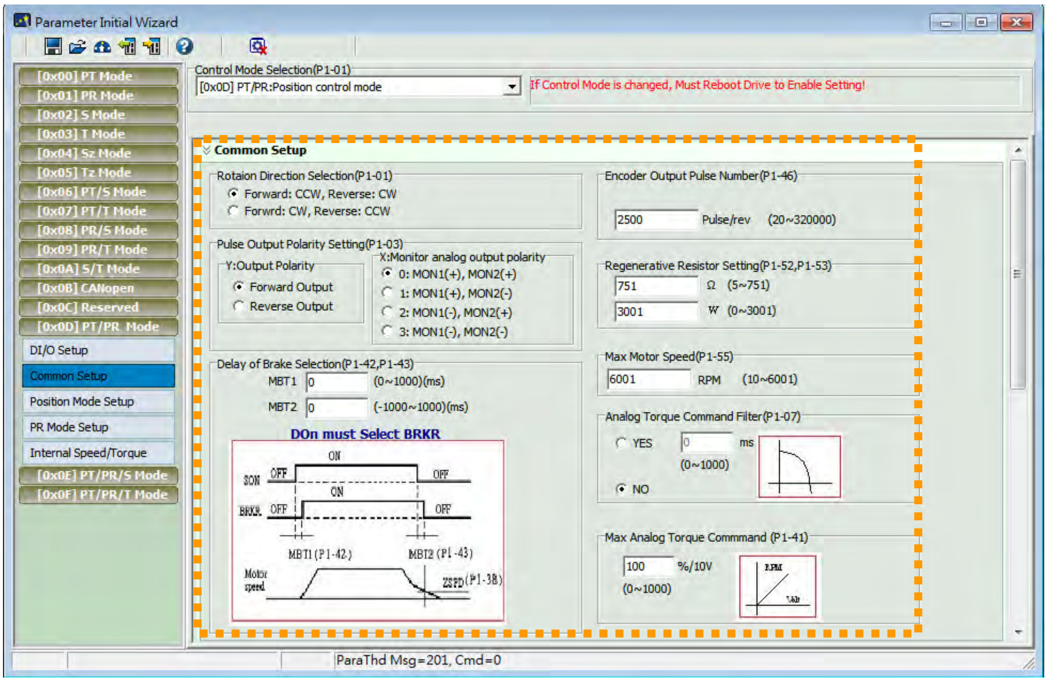
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



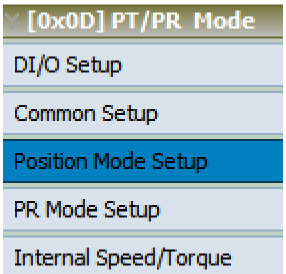
Step 6: “Common Setup”



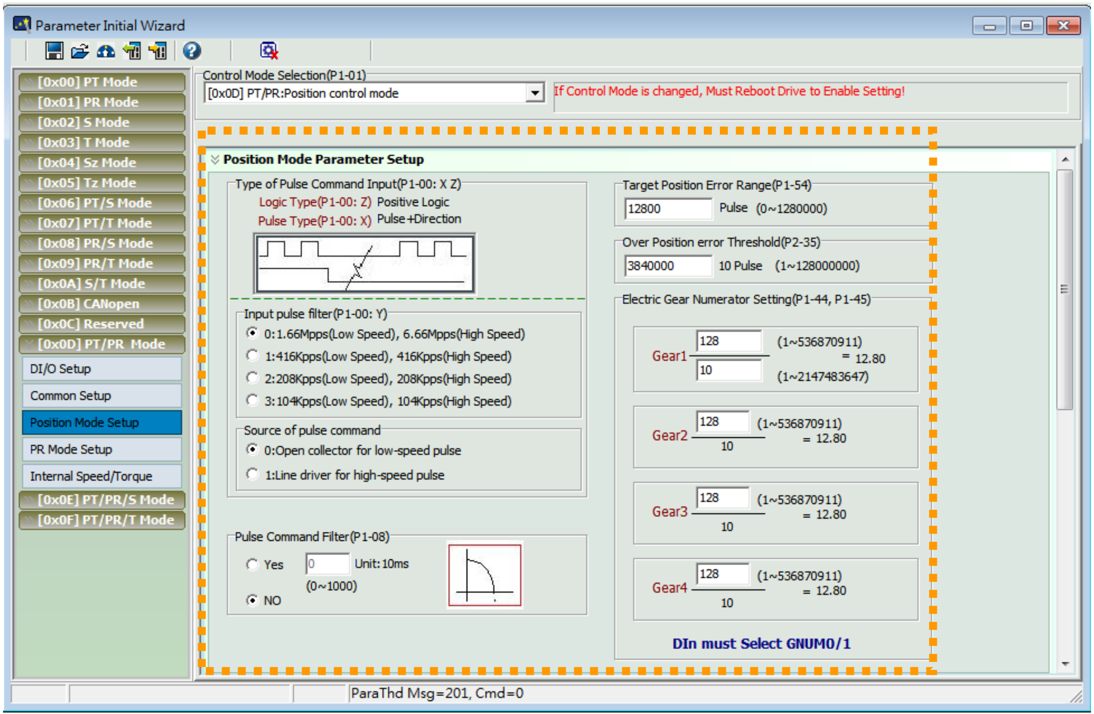
The screen on the right will be switched to the one as below:



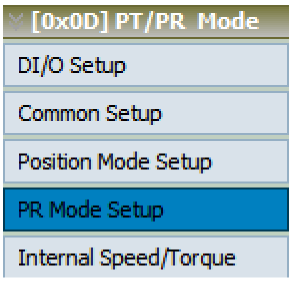
Step 7: Since it is in dual mode, the system provides setting blocks of position (PT) and PR mode. Setup “Position (PT) Mode” first.

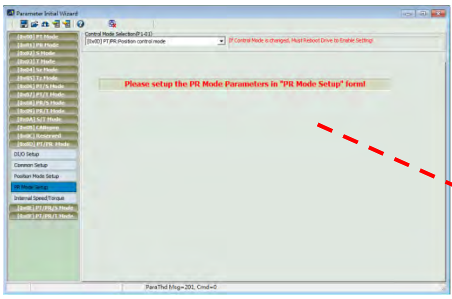


The screen on the right will be switched to the one as below:

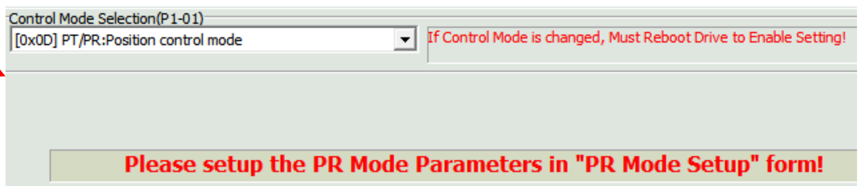


Step 8: Since PR mode setting is a specific function in ASDA-Soft has specific function, click the function block below, a reminder will pop up and ask users to click for PR mode setting.

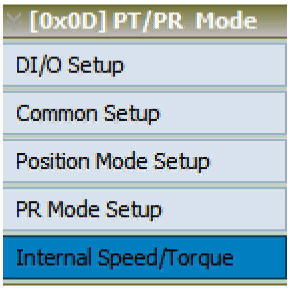




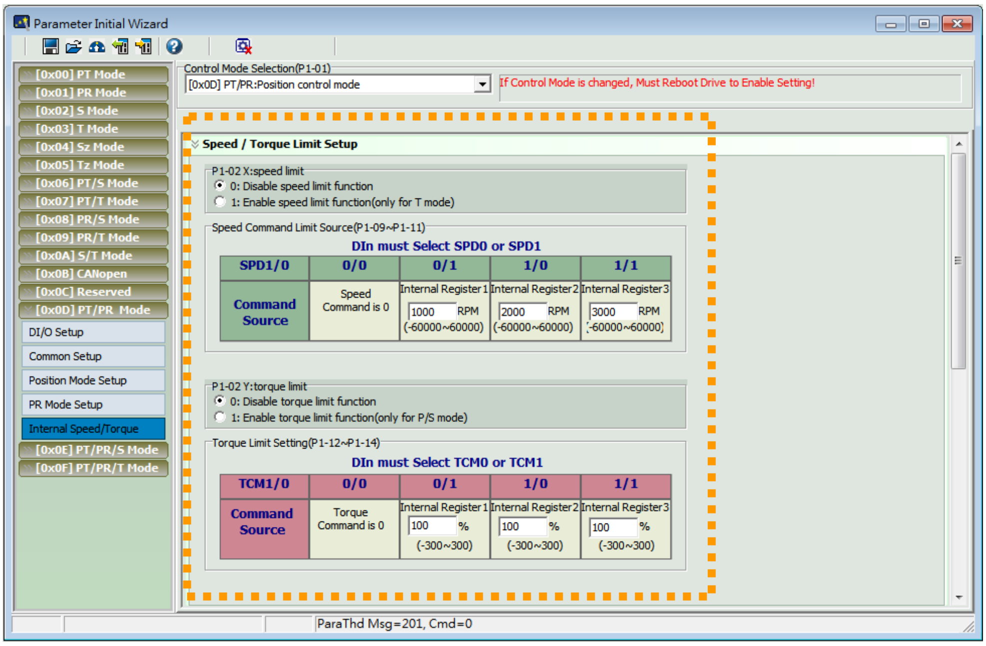
The prompting message in main screen: Setup the PR Mode in “PR Mode Setup ”.



Step 9: If users desire to setup speed or torque limit, click the fifth block “Internal Speed/Torque”.



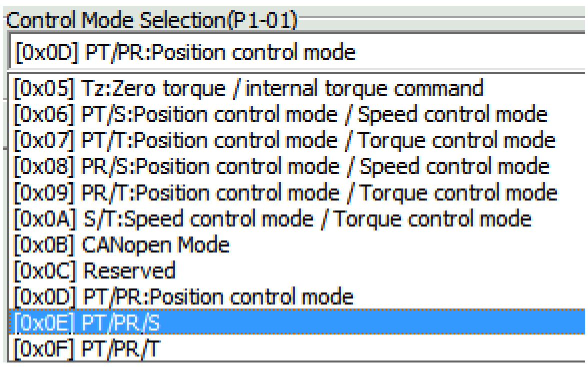
The screen on the right will be switched to the one as below:



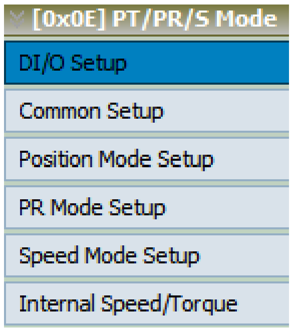
[0x0E] PT/PR/S：Multi Control Mode (Position and Speed Mode)

Users can switch two Di signal to setup PT, PR and S mode via this function. With Parameter Initial Wizard, users can quickly setup DI and these 3 modes.

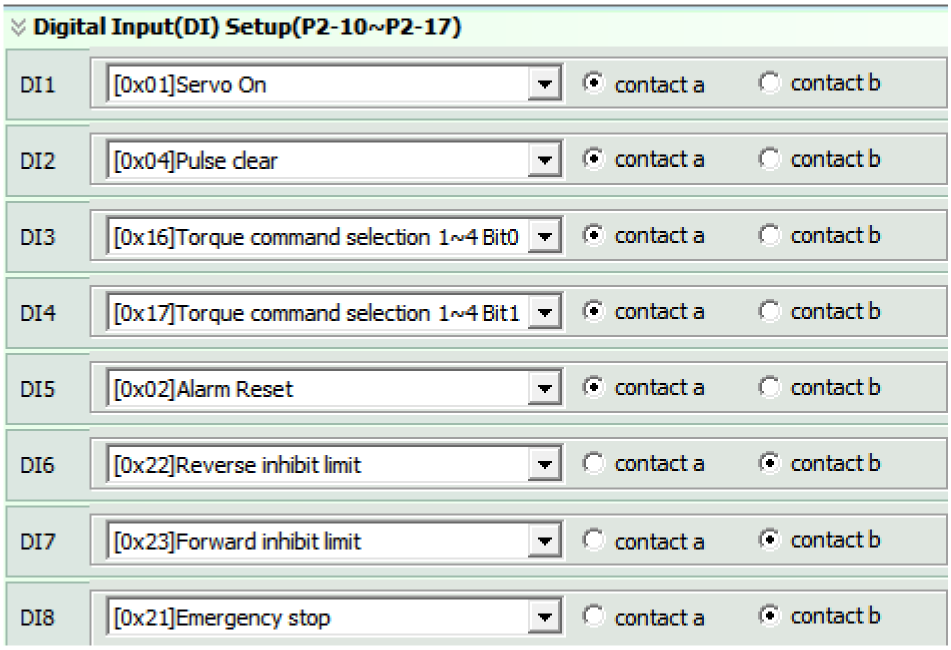
Step 1: Select the control mode from drop-down menu.



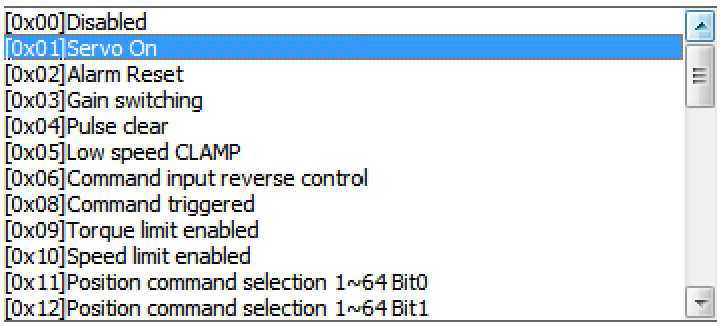
Step 2: Select multi control mode. The setting block on the left will show as below:



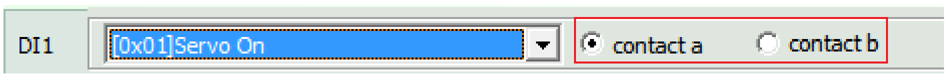
Step 3: Click “DI/O Setup”, the following screen pops up.



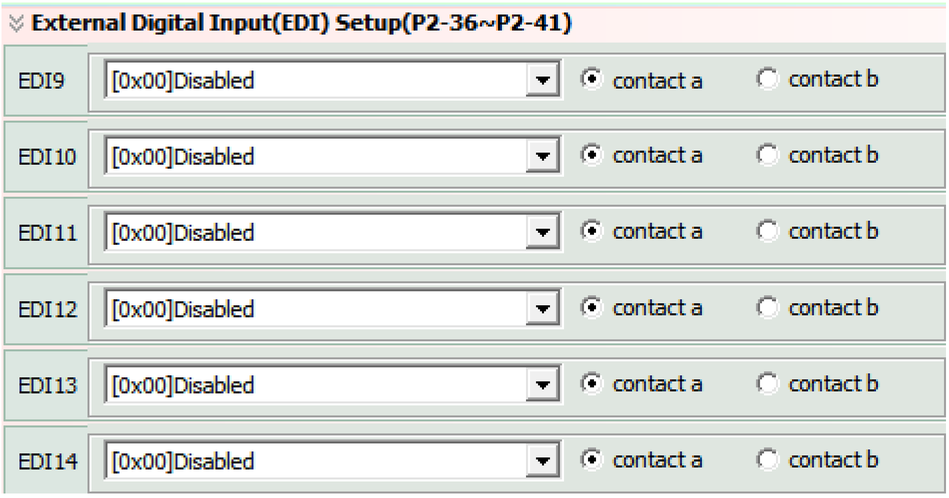
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as “a contact (frequently open)” or “b contact (frequently close)”.

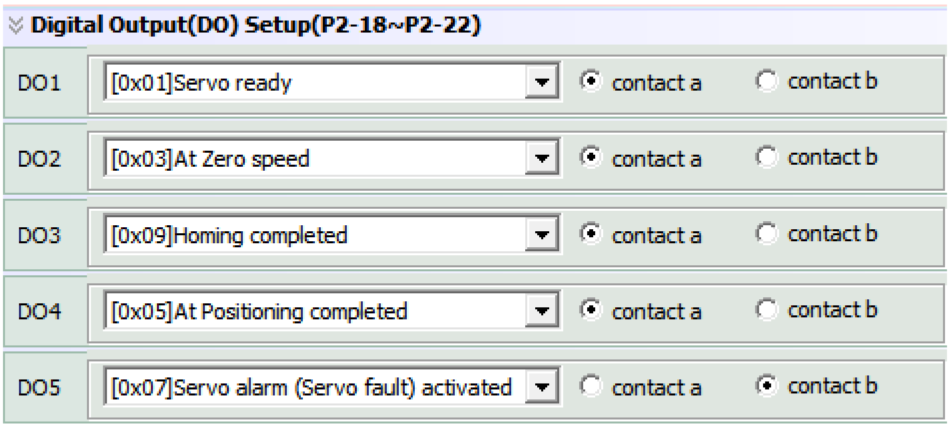


Step 4: Setup External Digital Input (EDI) command.

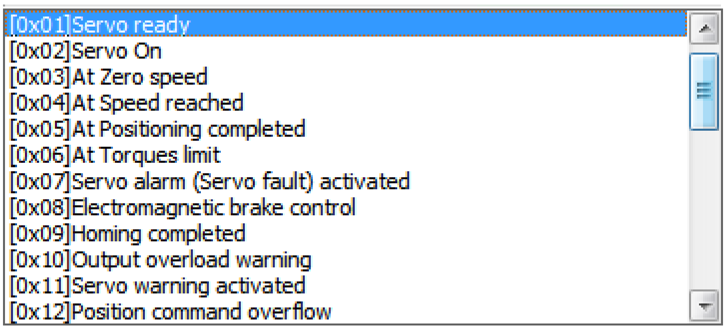


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

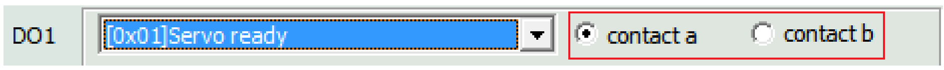
Step 5: Setup digital output (DO) command.



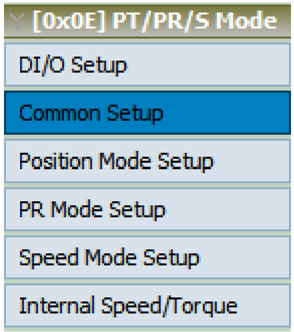
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



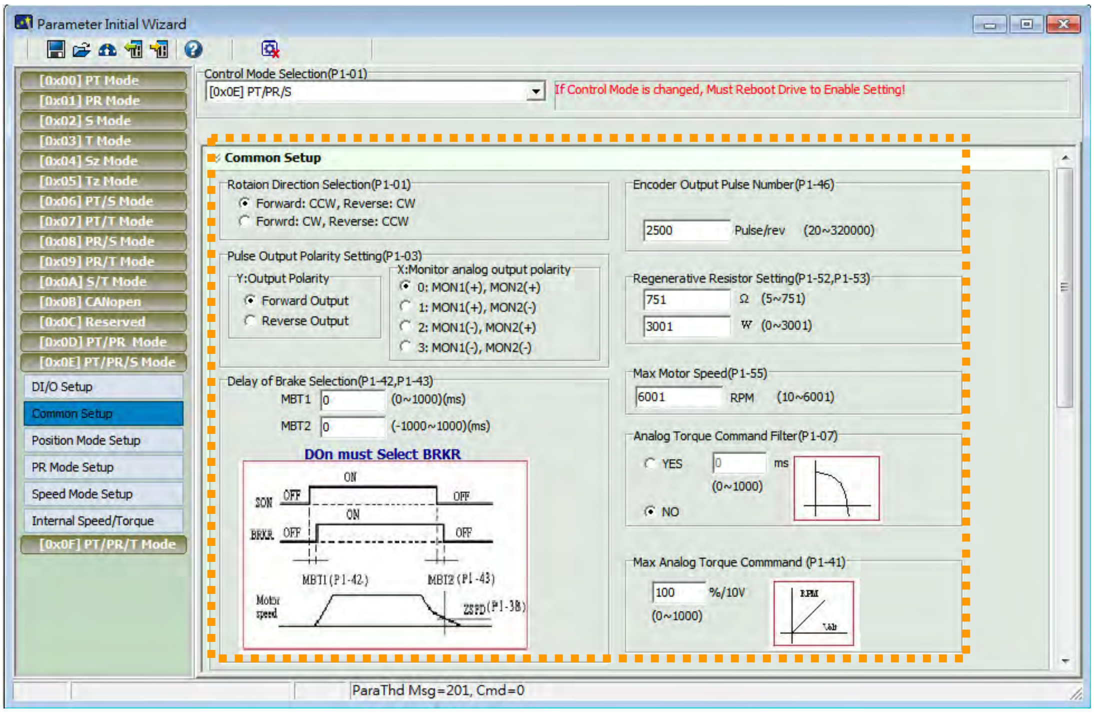
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



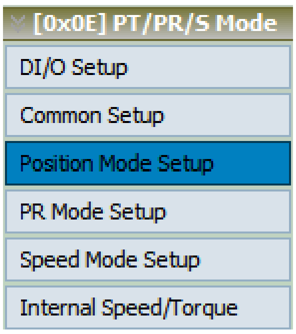
Step 6: “Common Setup”



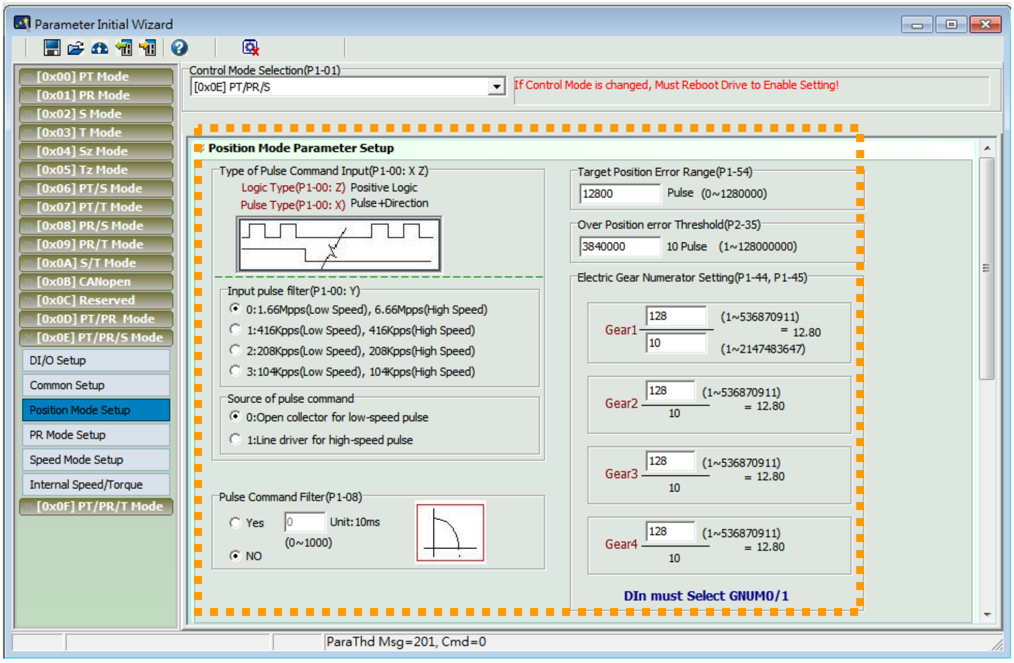
The screen on the right will be switched to the one as below:



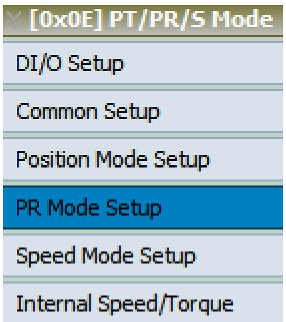
Step 7: Since it is in multi mode, the system provides setting blocks of position (PT) mode, PR mode and speed mode. Setup “Position (PT) Mode” first.



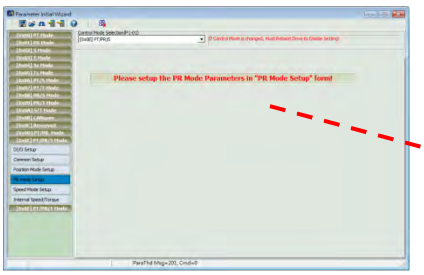
The screen on the right will be switched to the one as below:

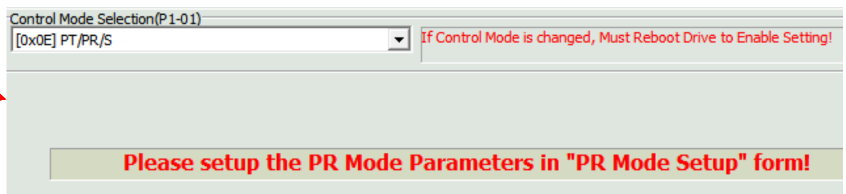


Step 8: Since  PR mode setting is a specific function in ASDA-Soft, click the function block below, a reminder will pop up and ask users to click  for PR mode setting.

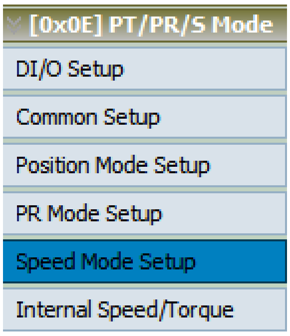


The prompting message in main screen: Setup the PR Mode in "PR Mode Setup ".

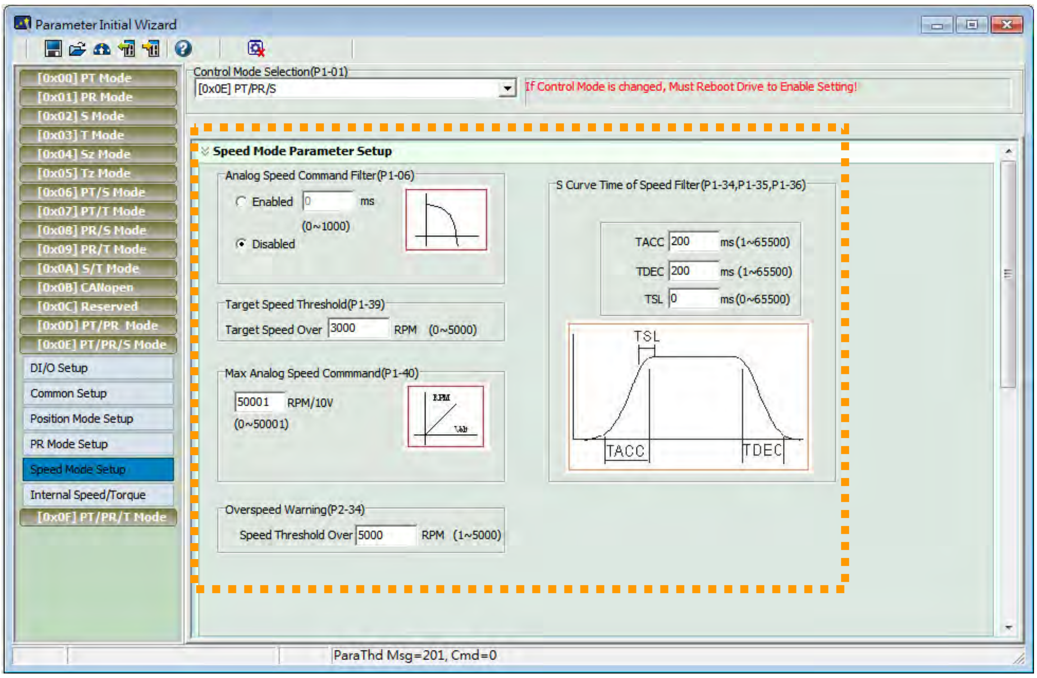




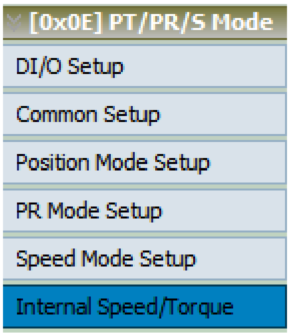
Step 9: Then, setup speed mode.



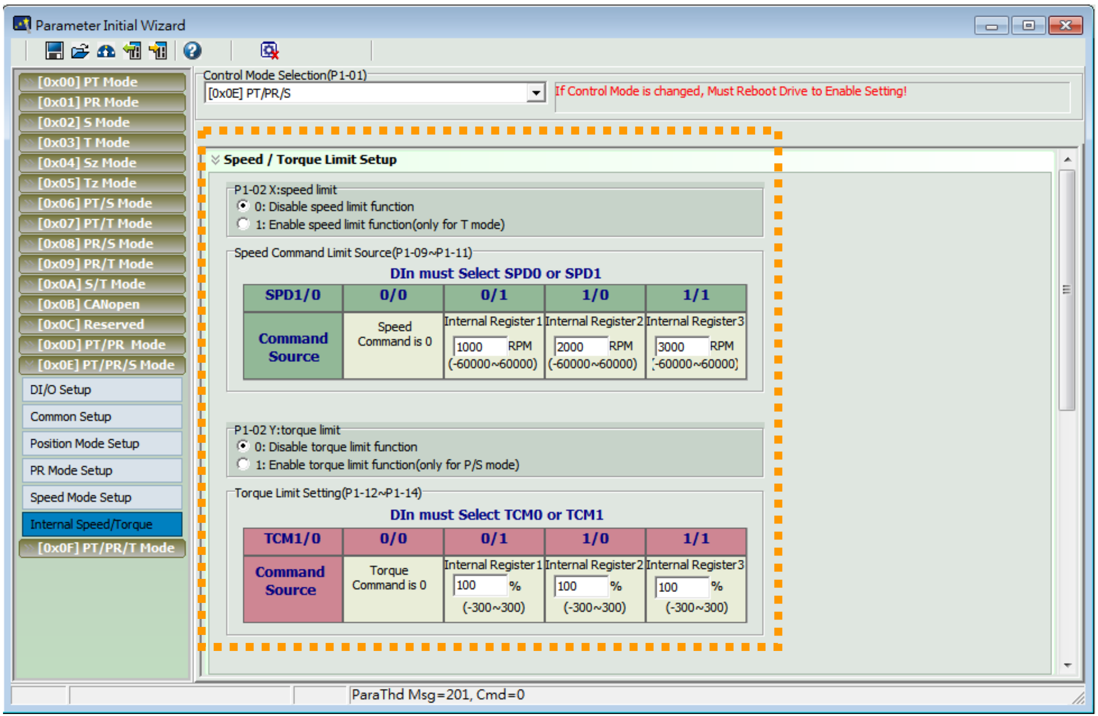
The screen on the right will be switched to the one as below:



Step 10: If users desire to setup speed or torque limit, click the sixth block “Internal Speed/Torque”.



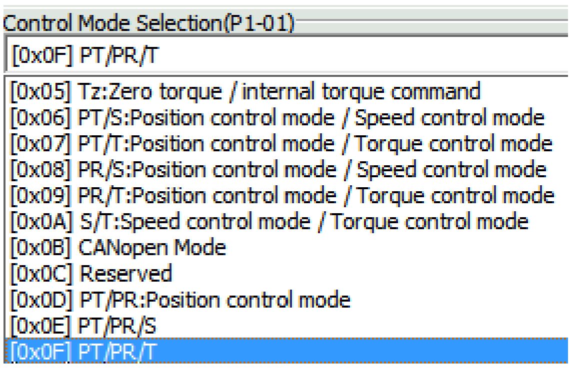
The screen on the right will be switched to the one as below:



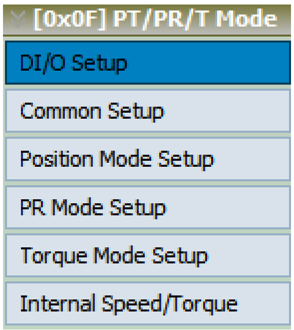
[0x0F] PT/PR/T：Multi Control Mode (Position and Torque Mode)

Users can switch two Di signal to setup PT, PR and T mode via this function. With Parameter Initial Wizard, users can quickly setup DI and these 3 modes.

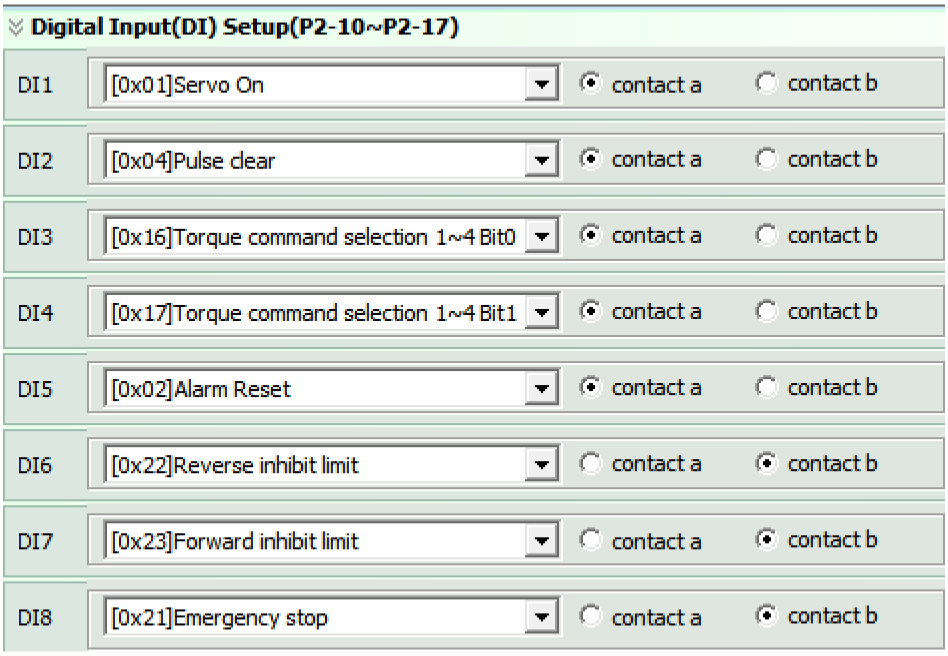
Step 1: Select the control mode from drop-down menu.



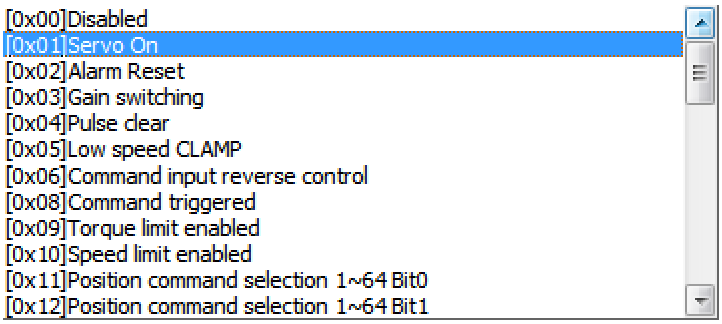
Step 2: Select multi control mode. The setting block on the left will show as below:



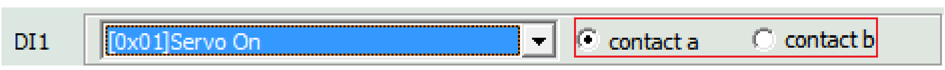
Step 3: Click "DI/O Setup", the following screen pops up.



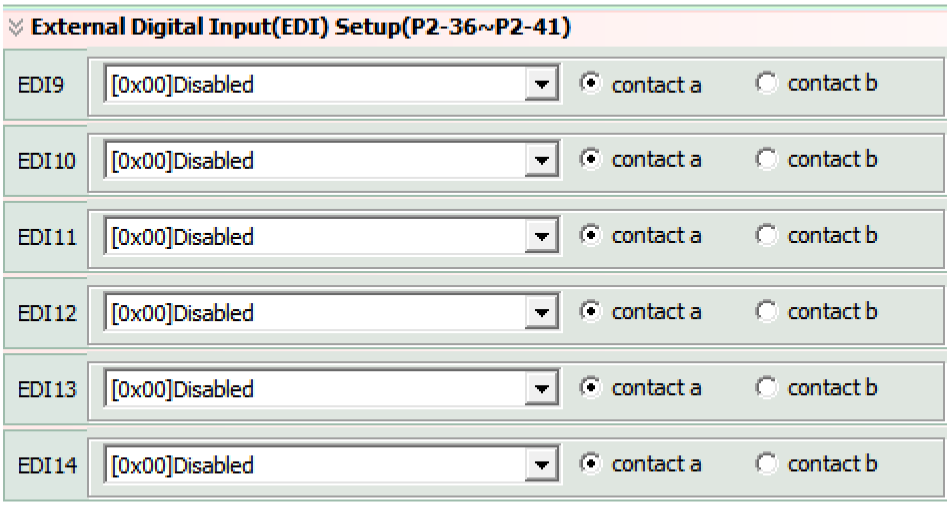
There are 43 command selections of digital input. Users could directly set it up via the drop-down menu.



Users can set the digital input (DI) status as "a contact (frequently open)" or "b contact (frequently close)".

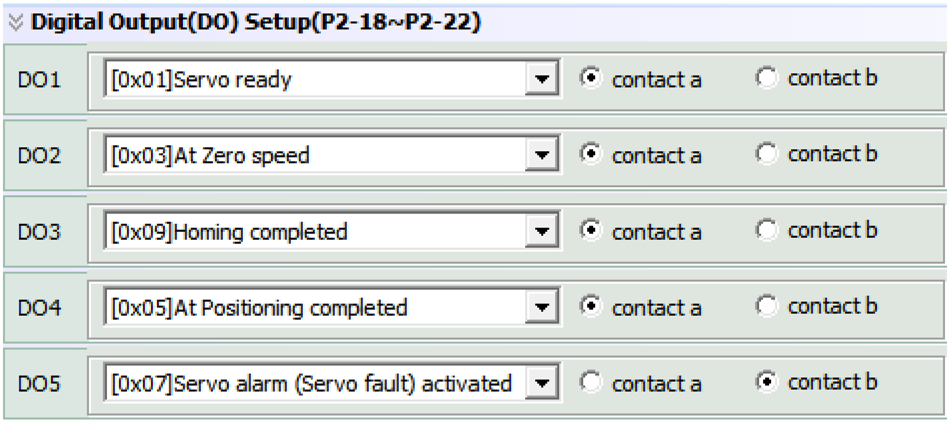


Step 4: Setup External Digital Input (EDI) command.

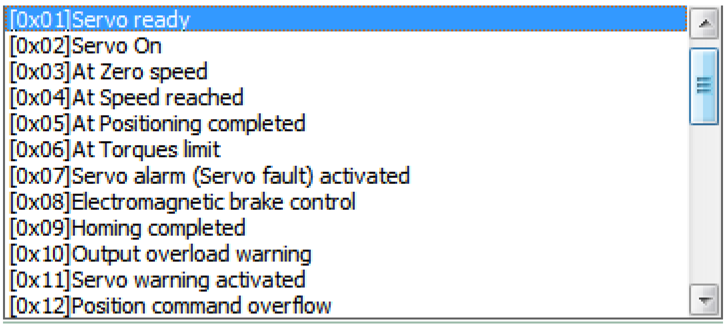


EDI setting (for ASDA-A2-U model) can be done here. Its setting method is the same as DI.

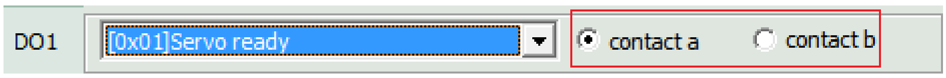
Step 5: Setup digital output (DO) command.



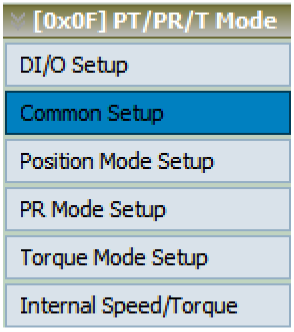
There are 35 command selections of digital output. Users could directly set it up via the drop-down menu.



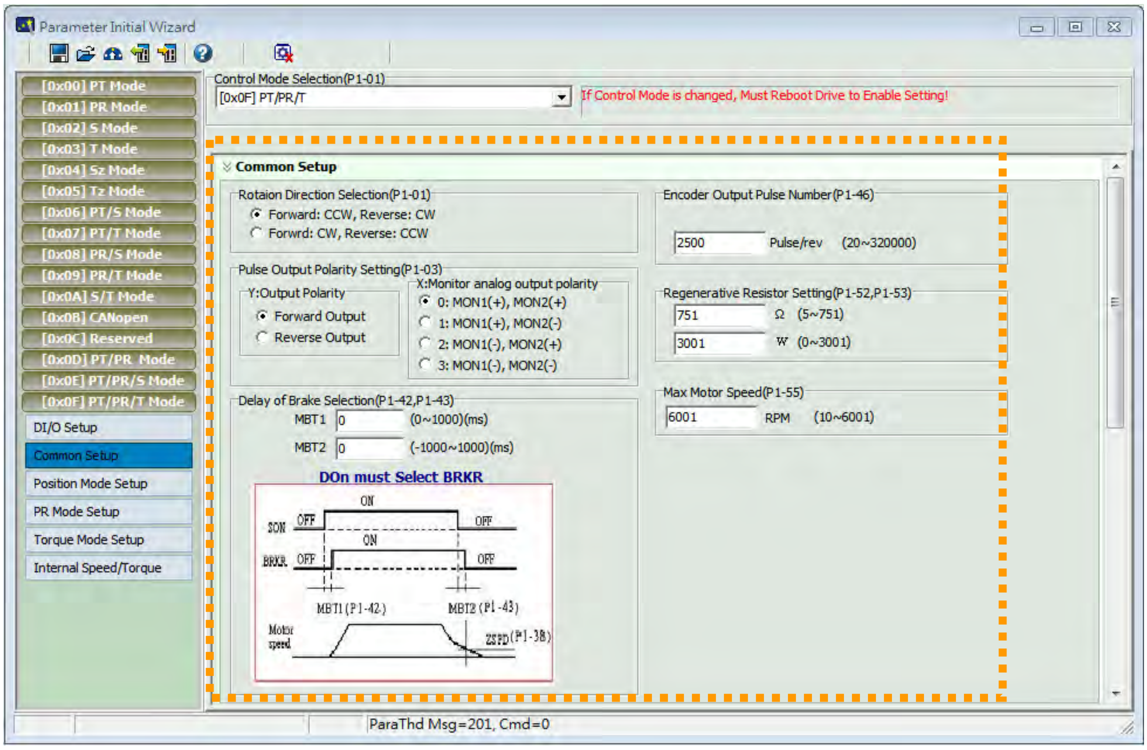
Users can set the digital output (DO) status as “a contact (frequently open)” or “b contact (frequently close)”.



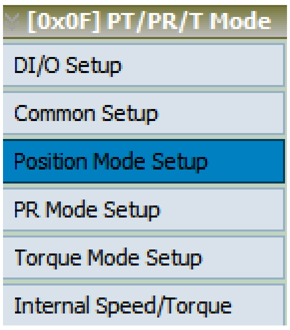
Step 6: “Common Setup”



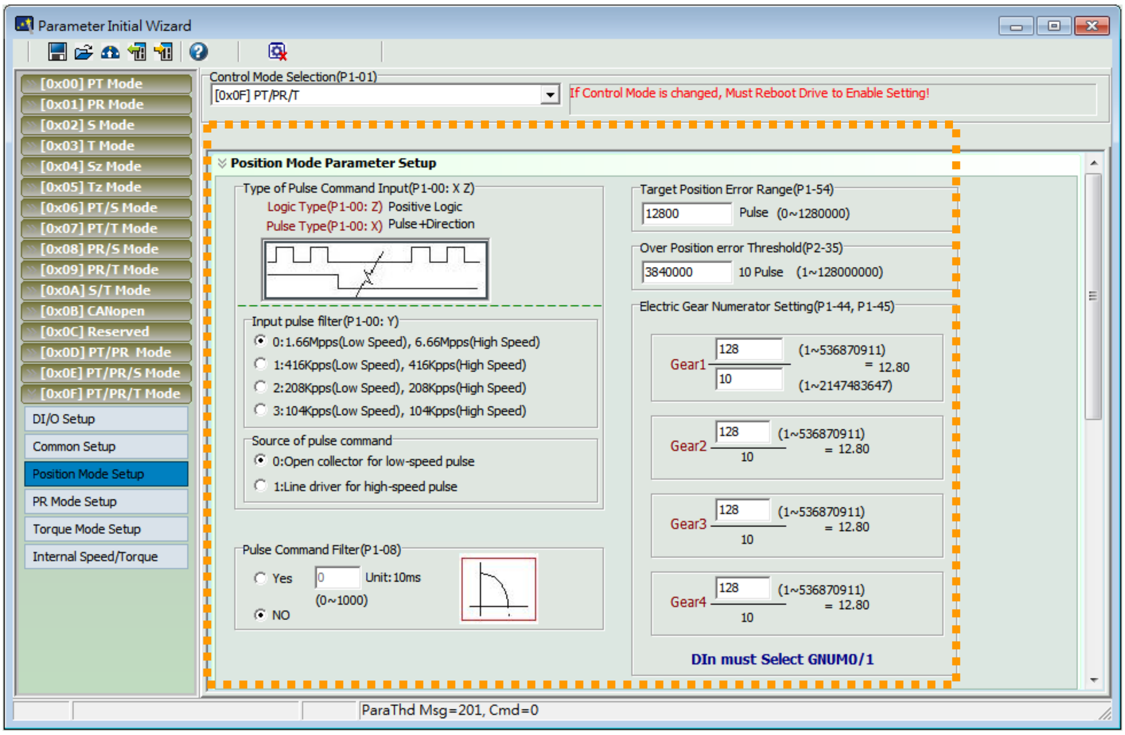
The screen on the right will be switched to the one as below:



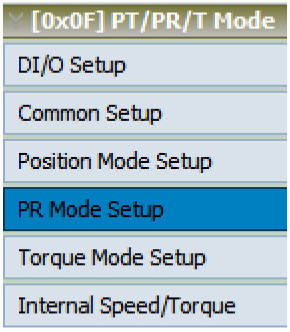
Step 7: Since it is in multi mode, the system provides setting blocks of position (PT) mode, PR mode and torque mode. Setup “Position (PT) Mode” first.

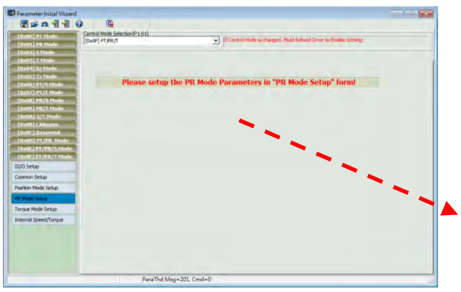


The screen on the right will be switched to the one as below:

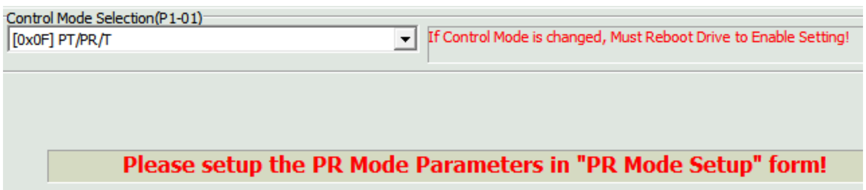


Step 8: Since  PR mode setting is a specific function in ASDA-Soft, click the function block below, a reminder will pop up and ask users to click  for PR mode setting.

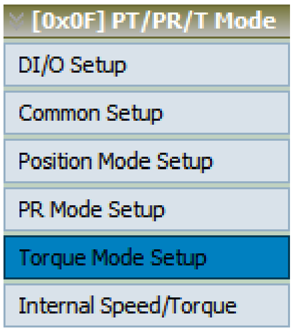




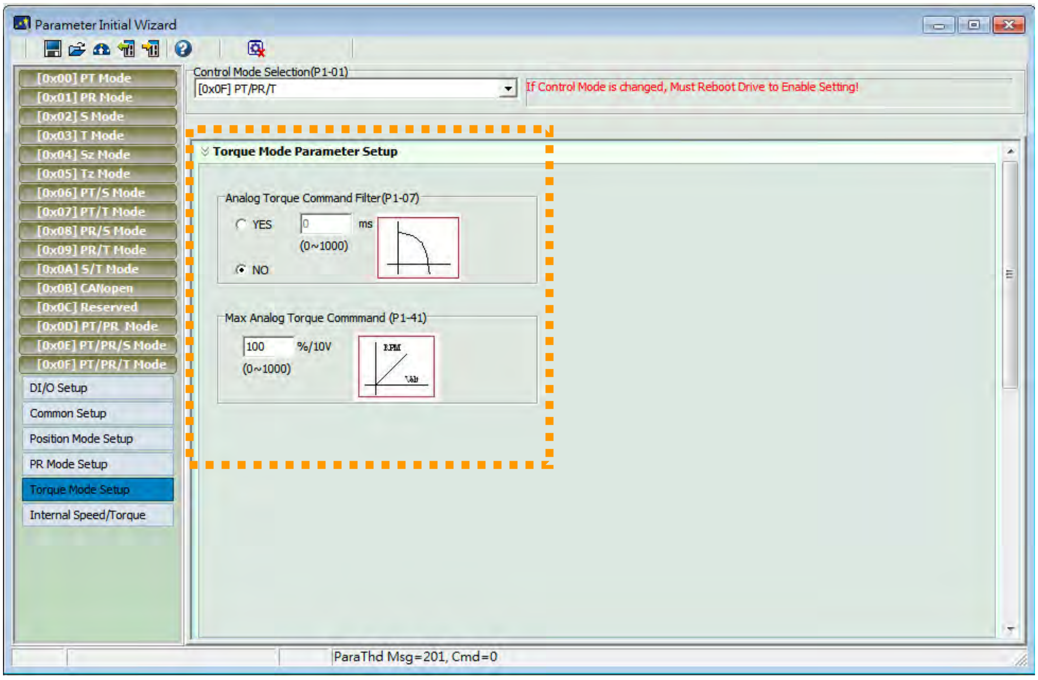
The prompting message in main screen:
Setup the PR Mode in "PR Mode Setup ".



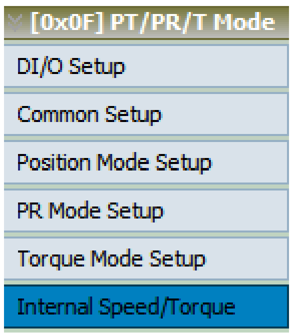
Step 9: Then, setup torque mode.



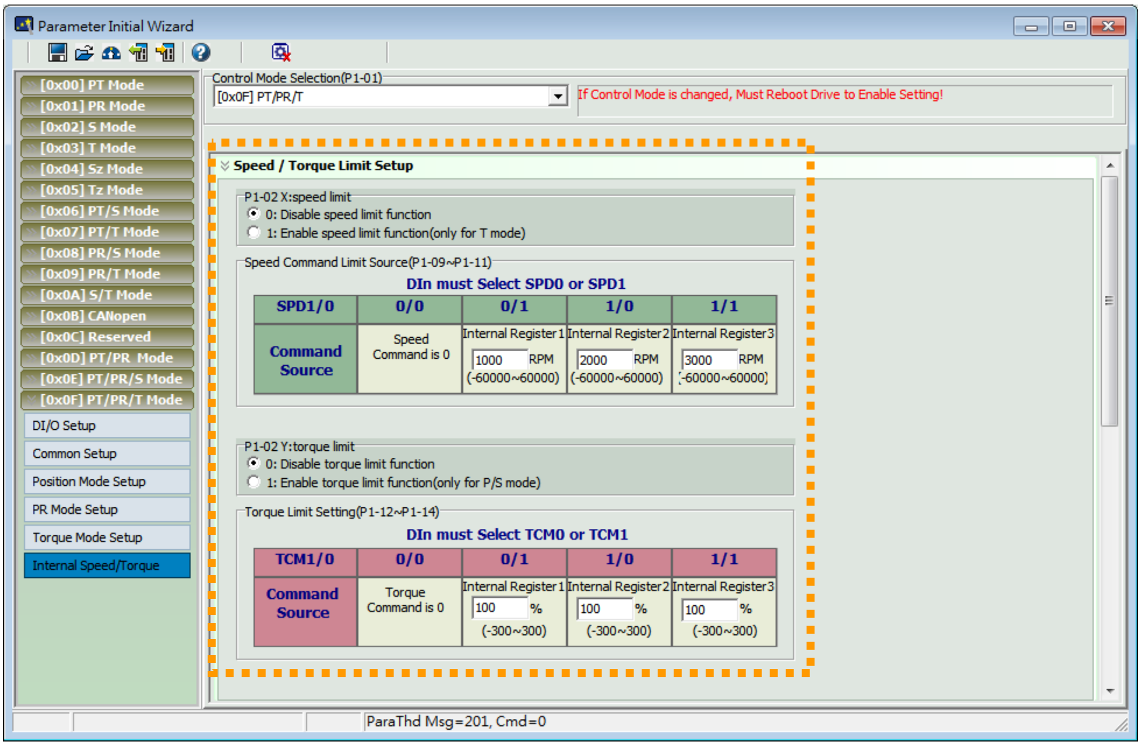
The screen on the right will be switched to the one as below:



Step 10: If users desire to setup speed or torque limit, click the sixth block “Internal Speed/Torque”.



The screen on the right will be switched to the one as below:



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Chapter 4 Motion Control

[Introduction] Users learn how to use E-Cam, PR mode and data array for different applications in this chapter.

1.) 【E-CAM】

2.) 【PR Mode Setting】

3.) 【Capture / Compare】

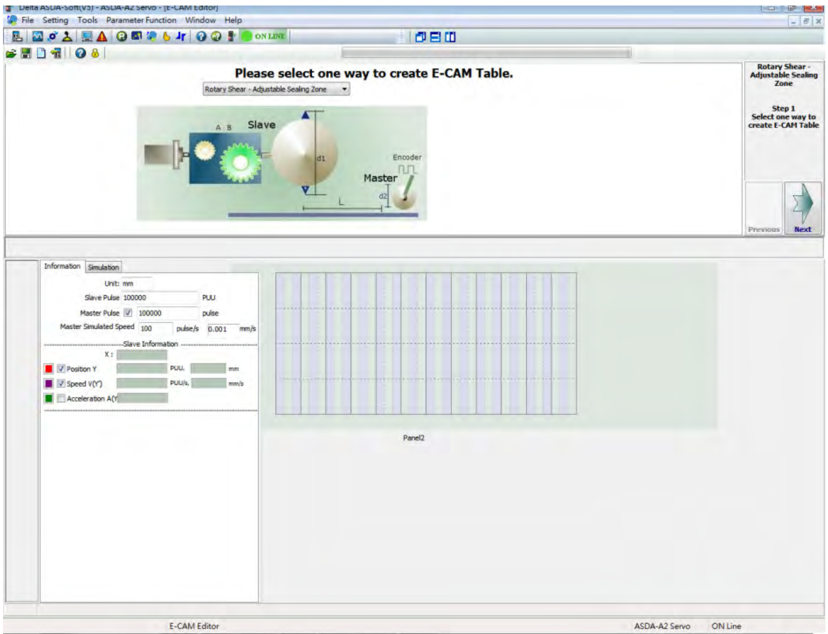
4.1 E-CAM

E-Cam is the built-in function in ASDA-A2 series servo drive. Its advantages are:

1. Increase the power efficiency: Without the friction among machinery parts, it reduces the power consumption.
2. E-Cam shape is easy to change: E-Cam shape can be changed simply by modifying the E-Cam curve.
3. Machinery maintenance: It is simulated by software.
4. Wide range of application: E-Cam software is applicable to any application which is required to use E-Cam curve.
5. Flexibility: One master axis can command several slave axes. It would be more difficult when doing it by machine cam.

With built-in E-Cam function, ASDA-Soft stabilizes the control system and enables the servo drive to complete motion control command, such as synchronous conveyor, flying shear and rotary cut. Followings are the main features of E-cam:

- It provides diversified Table Creating Wizard. Users could easily complete each kind of E-Cam application.
- 720 points of E-Cam contour can be done by manual setting.
- Parameter grouping. Complete E-Cam setting without memorizing parameter number.
- It provides E-Cam simulation so that users could simulate the E-Cam path.

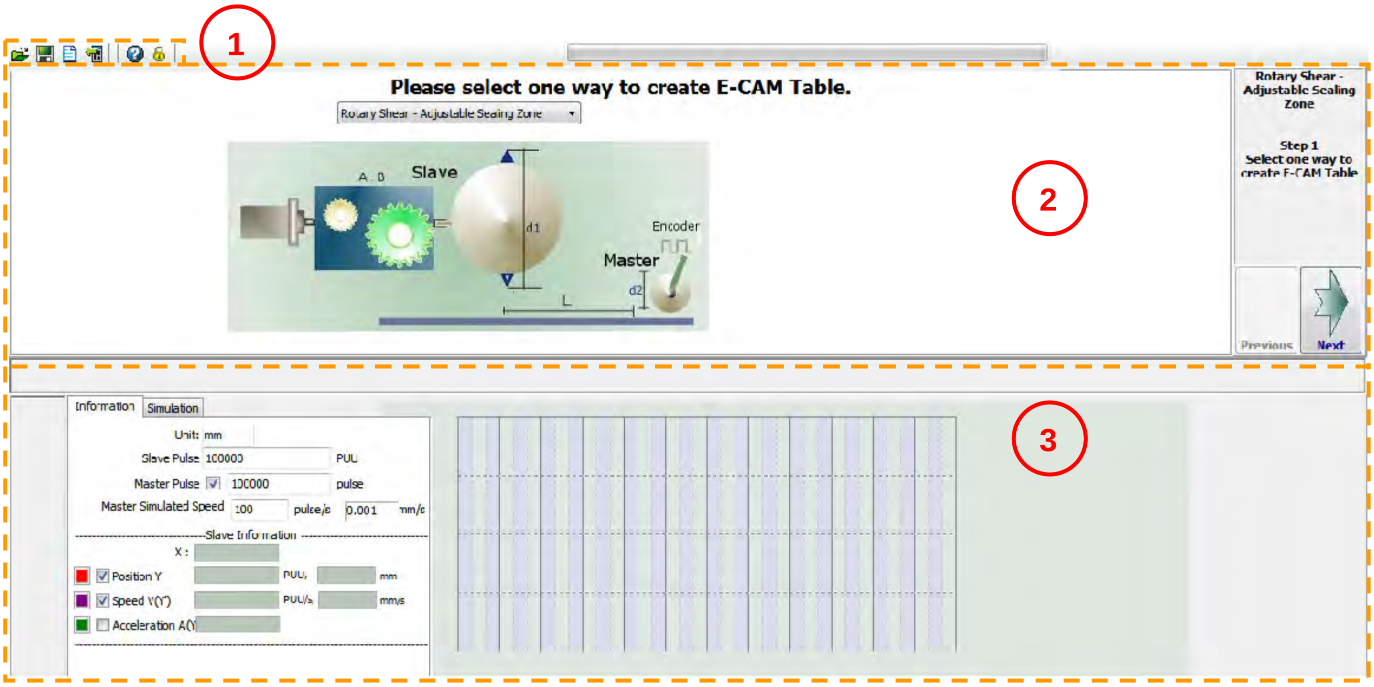


This section will be divided into two parts:

【Interface Introduction】: It introduces the function and feature of the interface.

【E-Cam Table Creation】: It describes the operation and setting steps of each method to create E-Cam.

Interface Introduction

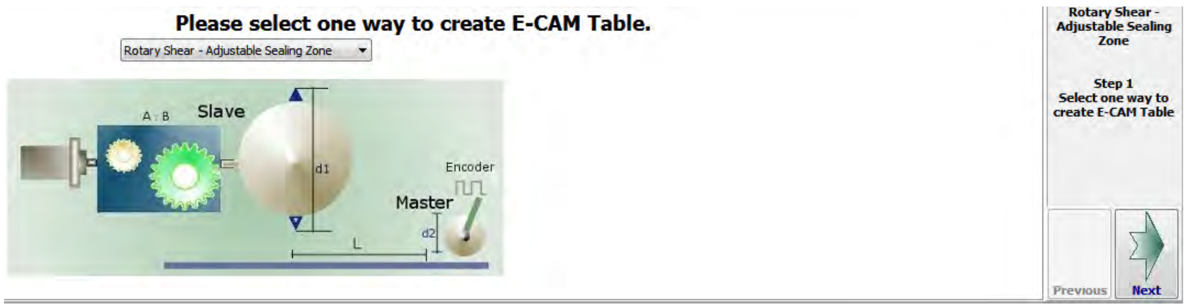


1. Toolbar: Open the E-Cam file or save the programmed E-Cam application.

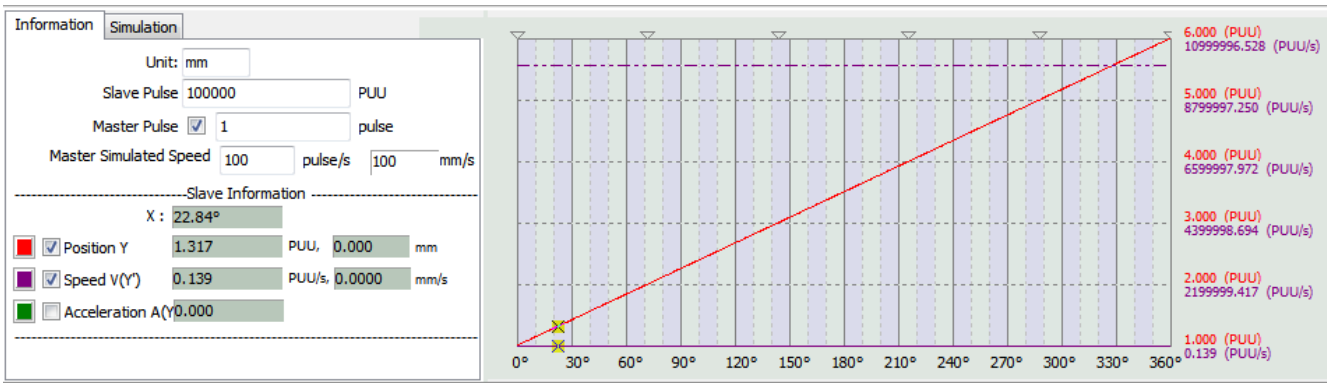
   

   Icons from left to right: Open files, Save as files, New edit, Load from servo, Description and Password setting.
   General function of the toolbar is the same as the others that described before.

2. E-Cam table setting: With the variety method of table creation, users can complete the E-Cam setting step by step.



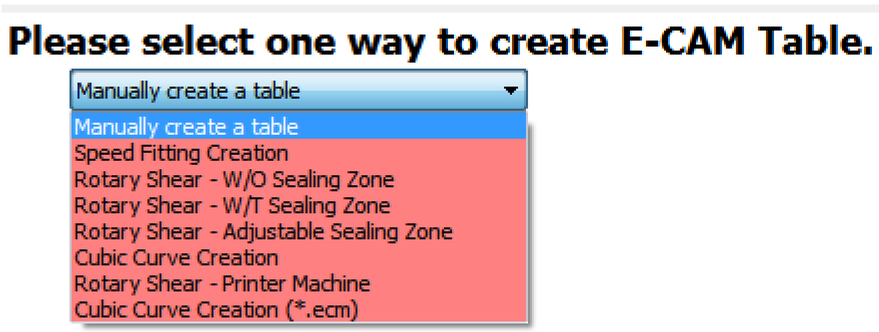
3. E-Cam sketch: According to the input pulse number of master and slave axis, the software will simulate the E-Cam curve.



It introduces the operation and setting steps of each method in section of E-Cam Table Creation below.

E-Cam Table Creation

When start to setup E-Cam curve via “E-Cam” function, please select from the following methods:

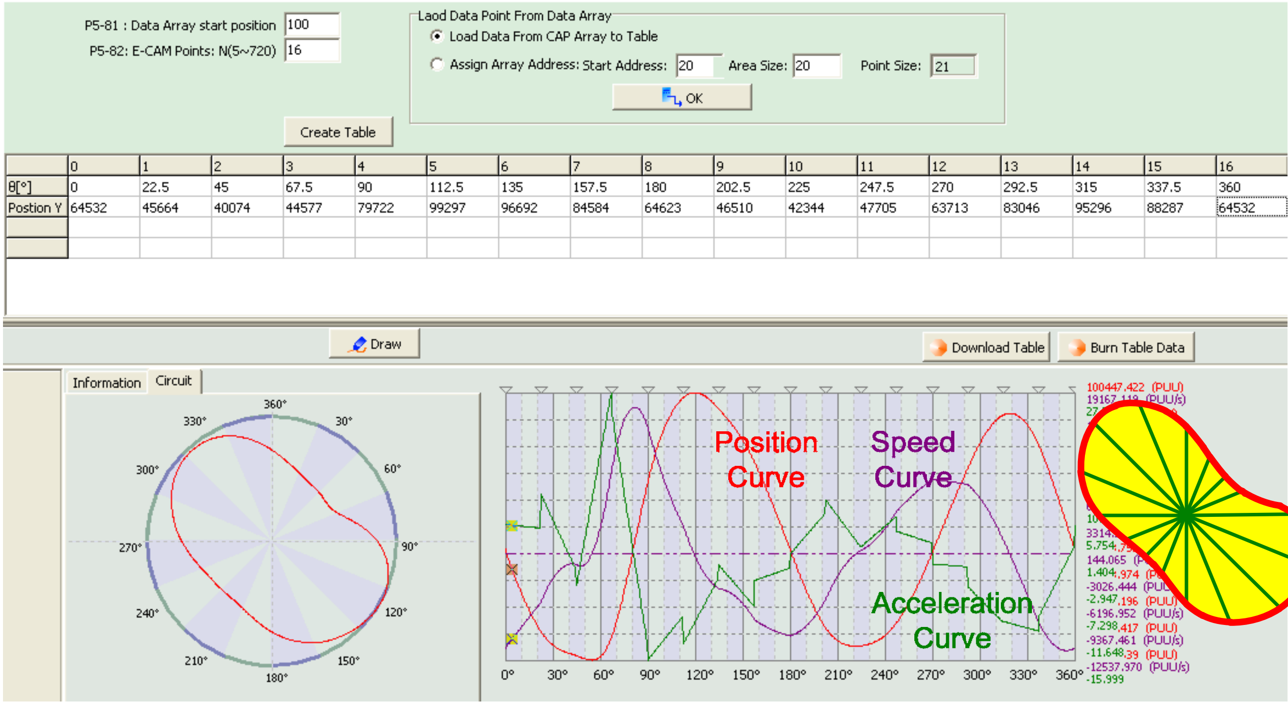


- Manually create a table
- Speed fitting creation
- Rotary shear-W/O sealing zone
- Rotary shear-W/T sealing zone
- Rotary shear-Adjustable sealing zone
- Cubic curve creation
- Rotary shear – Printer Machine

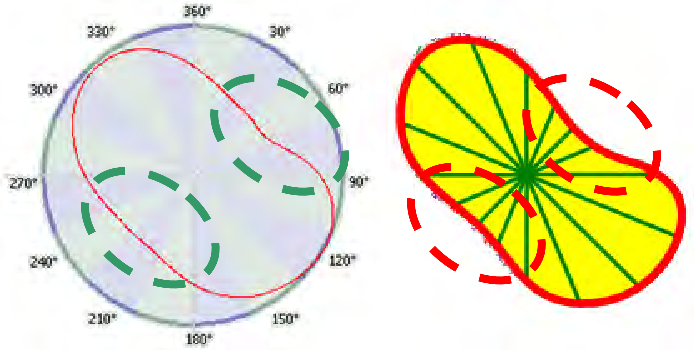
Before starting the setting of E-Cam, here are some reminders: Functions mentioned below are merely for setting up and operating E-Cam table. A complete motion framework shall be programmed in accordance with PR mode. Please refer to ASDA-A2 User Manual for further information of E-Cam. It has detailed description of each application and setting method of E-Cam with PR mode.

[Manually create a table]

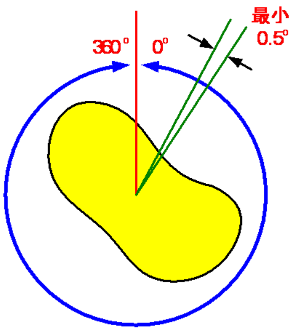
It could be applied to the application like machine cam that requires a complete cam contour. Use the center of the circle of E-Cam as the reference point and divide it into equal parts. Measure the length from the center of the circle to the periphery. Then, input the data to the table. And E-Cam curve will be acquired.



From the above figure, you may find that the E-Cam curve simulated by software is slightly different from the actual one which is marked on the right. It is because the above E-Cam curve is drew by 16 sampling points.

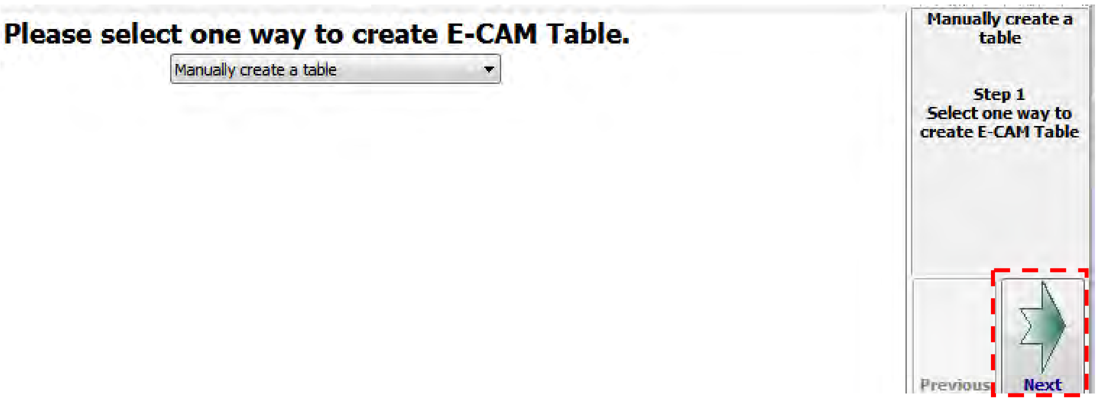


Actually, the built-in E-Cam in ASDA-A2 can be divided into 720 parts (721 points). The minimum degree of each part in one cycle (360°) is 0.5°.

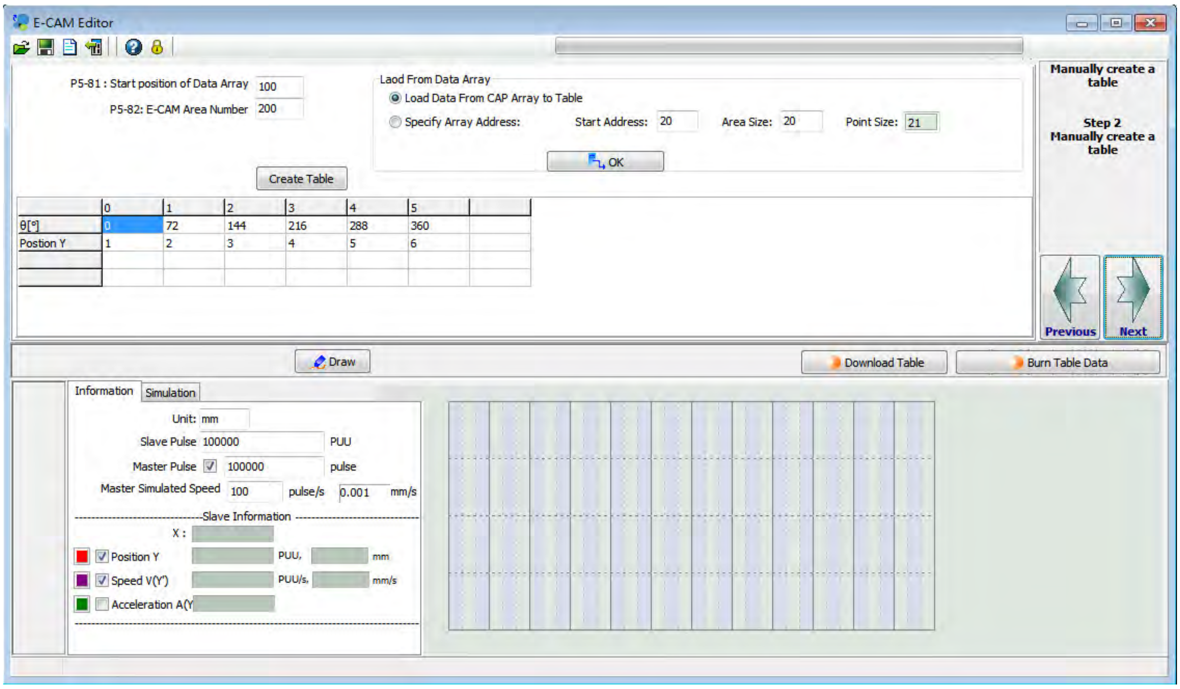


Thus, to create more the sampling points, the E-Cam curve is closer to the actual one. On the contrary, less points brings rougher E-Cam curve.
The following steps guide the user to create the E-Cam table.

Step 1: Select “Manually create a table” and click .



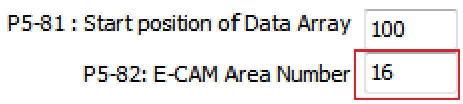
Step 2: Users will see the window which shown as below.

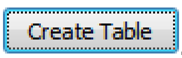


Please note that any type of E-Cam curve can be divided into 720 parts (721 points) at most. The minimum degree of each part in one cycle (360°) is 0.5°.

To set it up by parameters, P5-82, E-Cam: Area Number N, which means the parts the cam can be divided into. Its setting range is between 5 and 720.

Thus, users have to setup E-Cam area number (P5-82) first. For instance, when users desire to setup 16 points:



Click 

, the E-Cam table will be adjusted to 17 points.

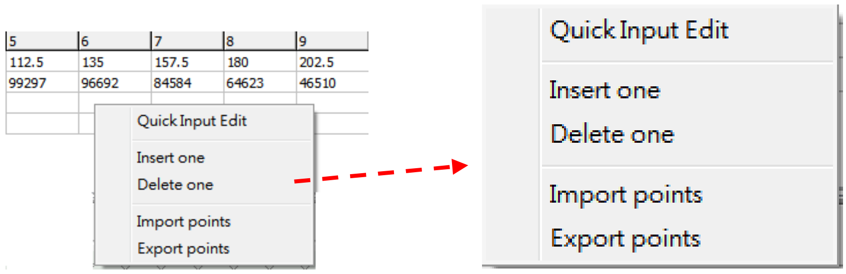
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Then, input the length from the center of the circle to periphery into the table:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	0	45564	40074	44577	79722	99297	96692	84584	64623	46510	42344	47705	63713	83046	95296	88287	64532

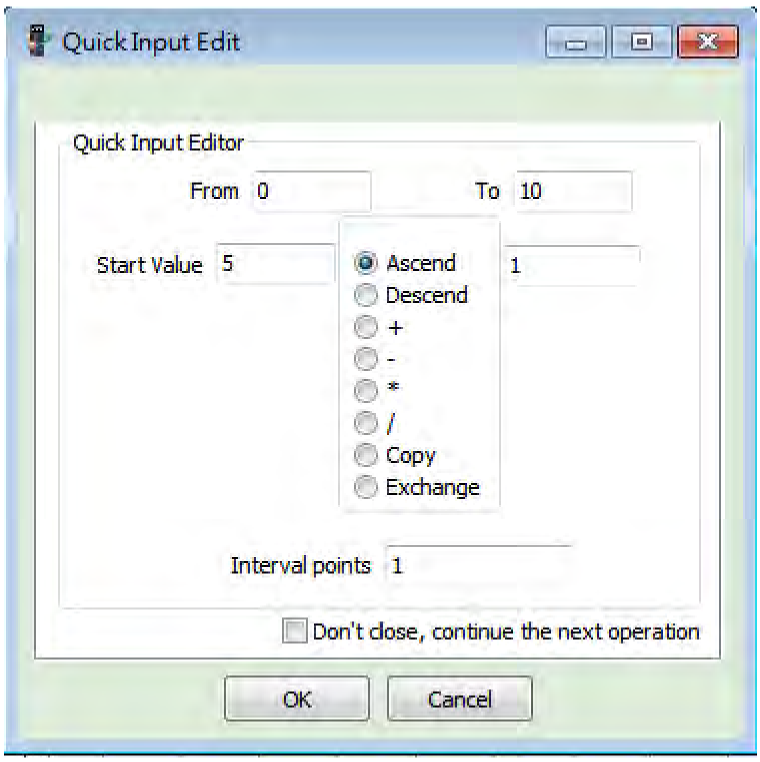
NOTE

Here provides a tool for quick setting: Right click on the table a quick setting window will pop up:



This enables users to edit E-Cam table in a very quick and easy way. For example, users can copy one same section of E-Cam curve or insert / delete one point in E-Cam curve that just created.

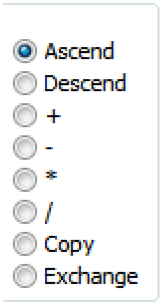
[Quick Input Edit]：The following window pops up when click Quick Input Edit.



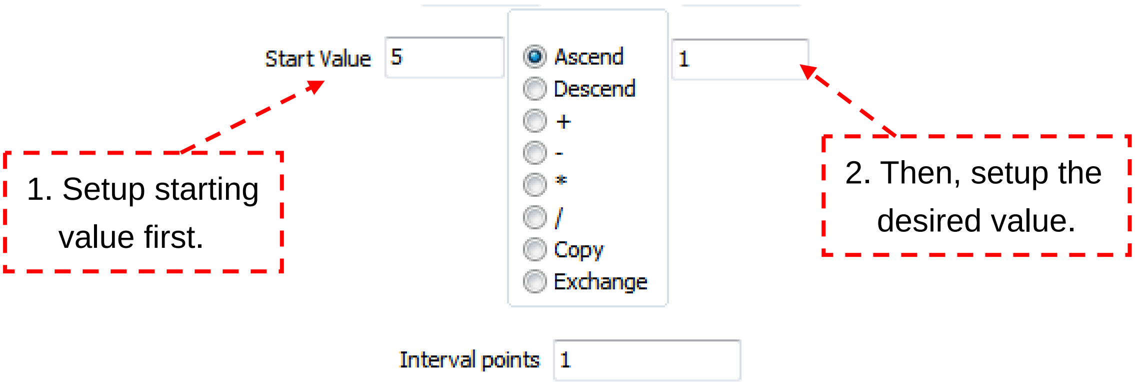
Operating method:

a.) Select the range that desire to modify. Please note that the max. value has to be set within the allowable range.

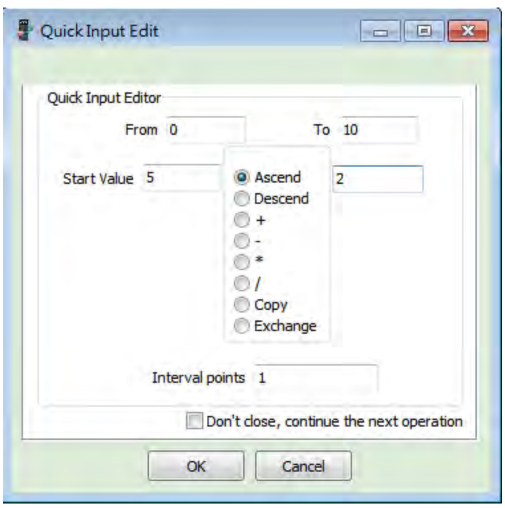
b.) Select one way to adjust E-Cam data:



- Ascend & Descend: modify the "start value" first then setup the desired ascending or descending value.



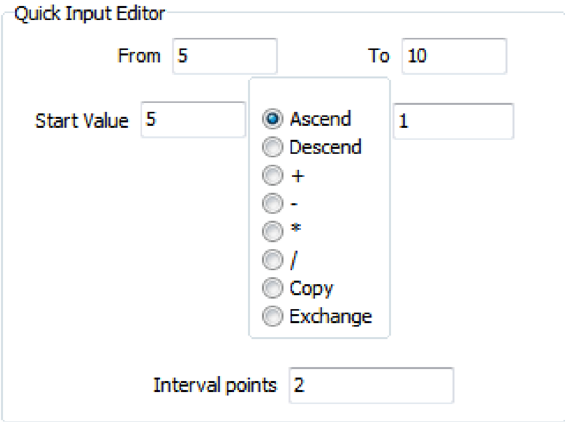
If the setting requires striding the E-Cam points, "Interval Points" can be used to change the position. For example:
Set start value and ascending value first. Then, set "Interval Points" to 1.



The setting of E-Cam table will show as below:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	1	2	3	4	5	5	7	9	11	13	15	12	13	14	15	16	17

If change the ascending value to 1, set Interval Value to 2.



The setting will be:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	1	2	3	4	5	5	7	7	11	9	15	12	13	14	15	16	17

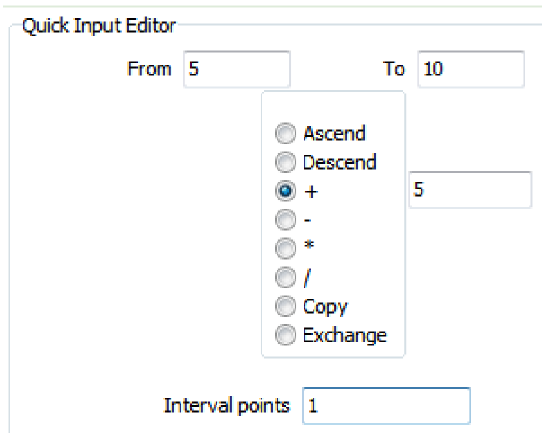
Its calculating method is:
Start point = 5; Start value = 5; Interval value = 2.

The next point after 5 is 7, then the value = 5 + 1 + 1=7 (point 7)

Similarly, position 9 = 7 + 1 + 1 = 9

- General calculation (+ - × ÷)

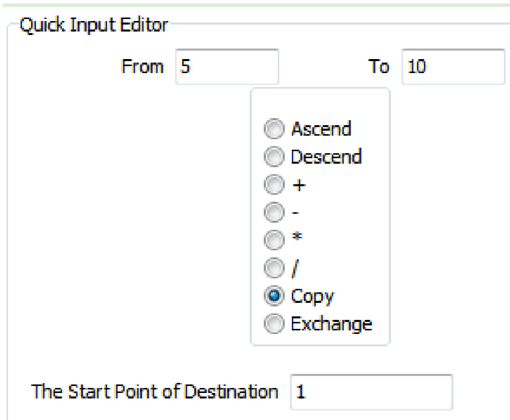
When desire to combine forward and reverse curve, function of (+ - × ÷) can help. For example:



Setup the position of E-Cam point, 5 to 10. Each point plus 5 and the interval value is 1:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	1	2	3	4	5	11	12	13	14	15	16	12	13	14	15	16	17

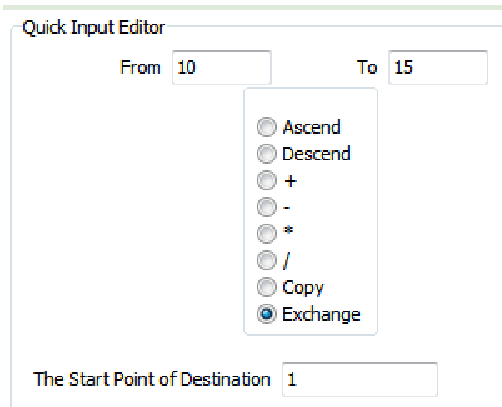
- Copy: Users can copy the position point from one E-Cam curve to another E-Cam curve. For example:



Copy the value from 5 to 10 to the target position starting from 1.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	1	6	7	8	9	10	11	8	9	10	11	12	13	14	15	16	17

- Exchange: Users can swap one position from an E-Cam curve to with another one. For example:



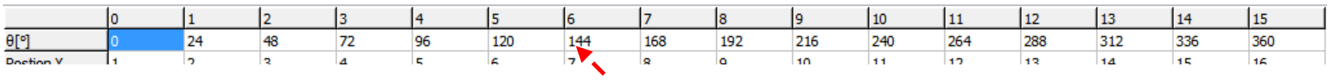
Swap the value from position 10 to 15 with the one from 1 to 6 by the above setting.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
θ[°]	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
Postion Y	1	11	12	13	14	15	16	8	9	10	2	3	4	5	6	7	17

Exchange the value of E-Cam curve

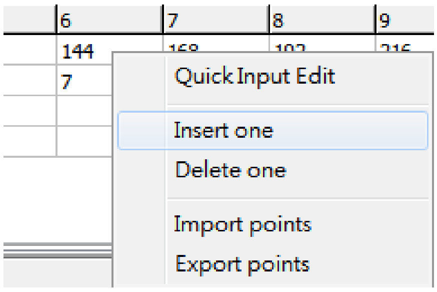
It is suggested to click "Don't close, continue the next operation" when using the function of "Quick Input Edit". So that the window of "Quick Input Edit" will not be closed every time when click OK. Users can click Cancel to close the window.

[Insert one] / [Delete one]: If the user desires to insert or delete one E-Cam point, use [Insert one] or [Delete one] to adjust the table. See the example below:

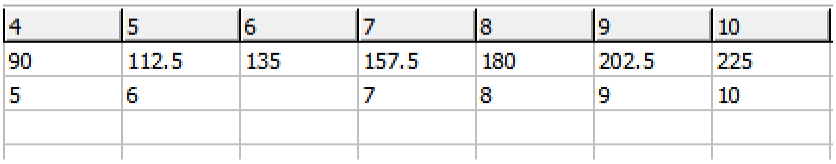


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
θ[°]	0	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360

Use the left-mouse button to select the insert or delete E-Cam point. Right click to select “Insert one”.



Then, the new E-Cam point is added.

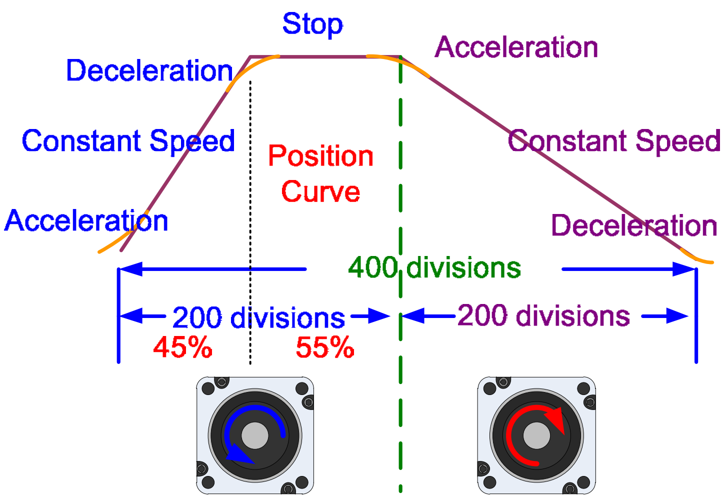


4	5	6	7	8	9	10
90	112.5	135	157.5	180	202.5	225
5	6		7	8	9	10

[Import points] / [Export points]:

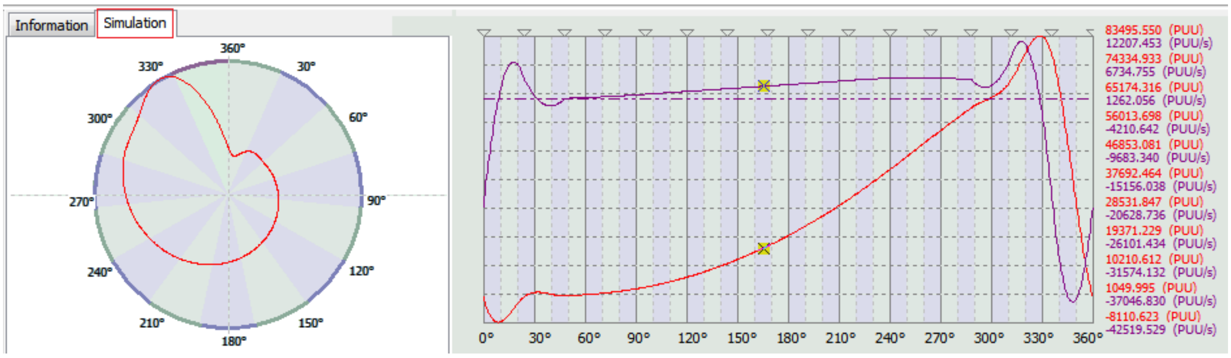
Function of creating forward and reverse curve in one speed area is not supported at the moment. However, users can create the curve individually then combine one with another. Its method is to divide the curve which has the same rotating direction into the same section. If the stop area is between the forward and reverse area, it can be regarded as the one for previous curve or the waiting area for the next curve.

See the figure below. The stop area is planned as the one for previous curve. If the whole section is divided into 400 parts, the forward curve plus the stop area will take 200 parts and the reverse one will take another 200.

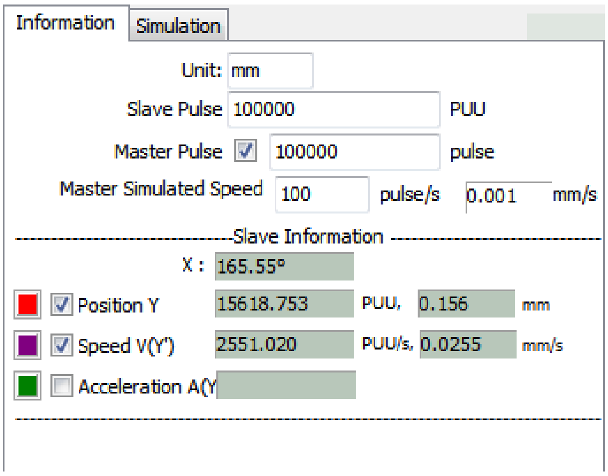


This method is to create the curve by dividing the same rotating direction of curves into different sections. The setting method will be elaborated in “Speed Fitting Creation”.

Step 3: Press  to draw the simulated E-Cam curve (see the left figure): Select “Simulation” which marked in red.

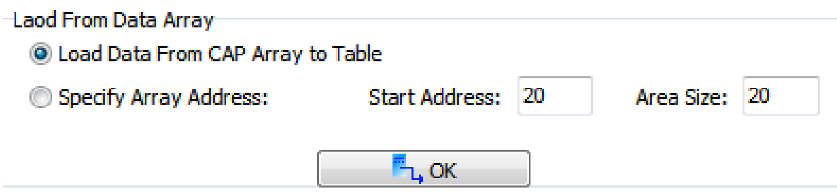


Step 4: Make sure the E-Cam curve is correct. Users can also use "Information" to simulate the master axis.



Step 5: Setup the start address of data array when it is saved into the servo drive. The default value of P5-81 is 100. The setting range is between 0 and 1999. Data array is a memory block which can store position data. It is used to store E-Cam point here.

If users had already created the E-Cam in servo drive, users can use the function below to download the data array from the drive and manually modify it.



- Load Data From CAP Array to Table :
  Use the data from "CAP Data Array" as the one for E-Cam curve. For example, setup the start address in data array (P5-36) and the capturing amount (P5-38). The start address of E-Cam curve is the address specified by P5-36. The setting of P5-38 refers to the area size. Click OK to directly download the data into the table.

- Specify Array Address: Start Address: 20 Area Size: 20 :
  Users also can specify the start address of data array and area size. Click OK to directly download the data into the table.

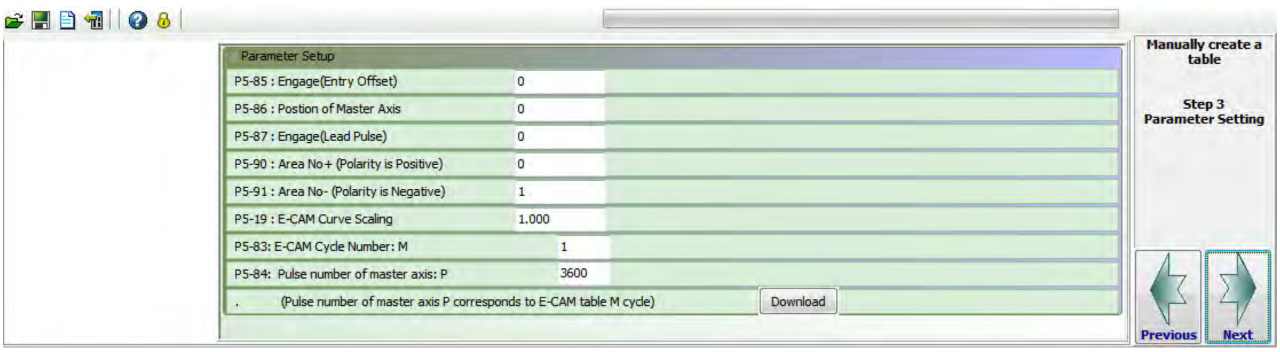
Step 6: If users need the data as non-volatile data when the power is off, click "Download Table / Burn Table data" will do.

: Download table data into EEPROM. When the power is off, the data will be volatile.

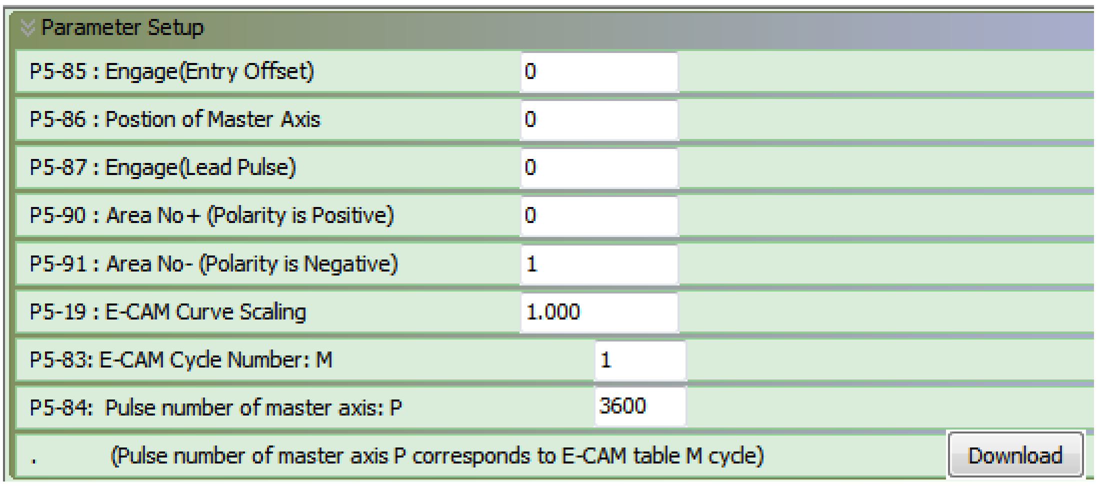
: Burn table data into EEPROM.

Step 7: Click 

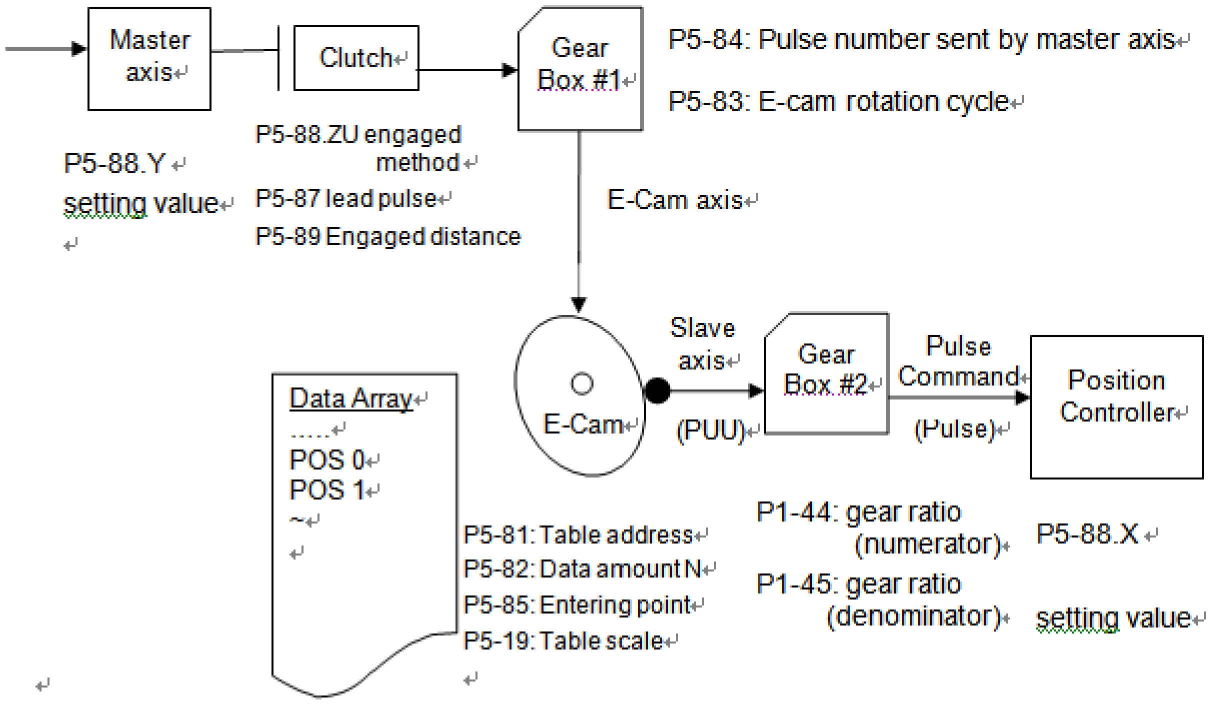
to enter the screen of "Parameter setup".



In this step, users can setup the following parameters according to the actual situation.



Let's describe the parameter setting via the functional blocks below:

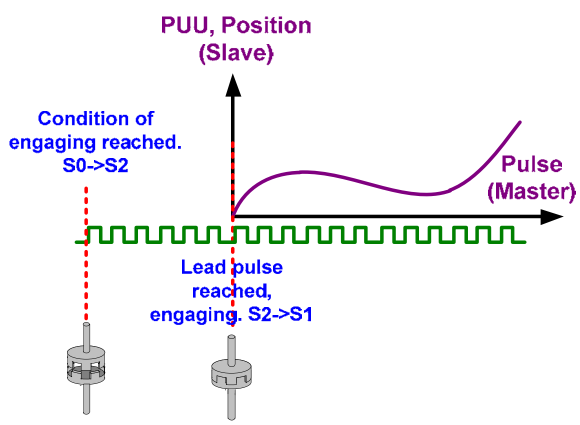


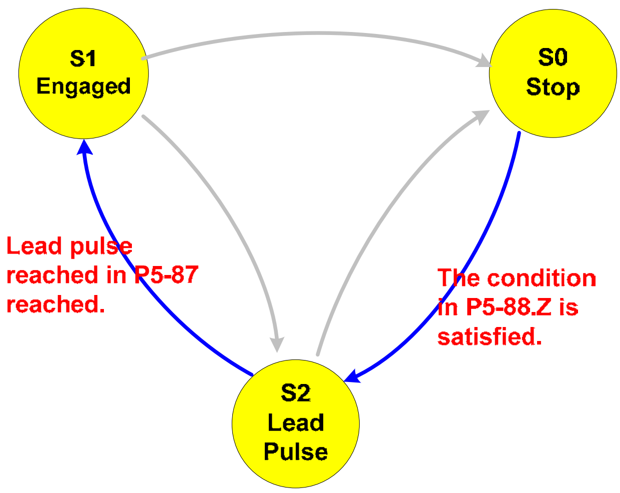
1. Master axis:

   In this area, users can setup P5-86 : Postion of Master Axis; its position can be monitored via P5-86 and can be written in before E-Cam engaging. Since the moving distance of master axis remains, change the value of P5-86 will not change the position of slave axis.

2. Clutch:

   Users can setup P5-87 : Engage(Lead Pulse) here. Followings describe the setting method:



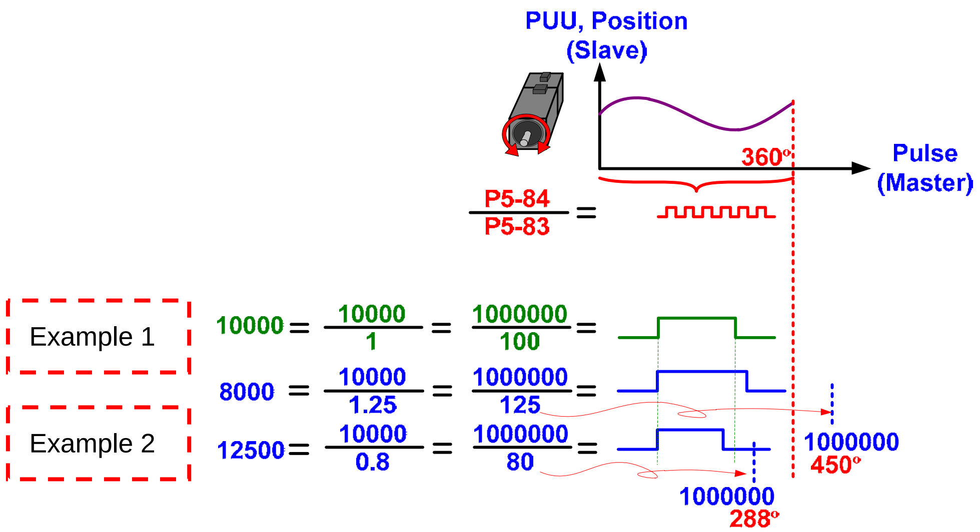


When the engaged condition is established, the E-Cam status will change from stop to pre-engaged, S0 → S2, and start to count the pulse number. When it reaches the pre-engaged amount, the status will change to engaged, S2 → S1.

P5-87 is working only when the status changes from S0 to S2.
The so-called lead pulse is the delayed pulse number when engaged condition is established. P5-87 is the lead pulse at the beginning which is required in first engaged.

3. Gear box#1(master axis):

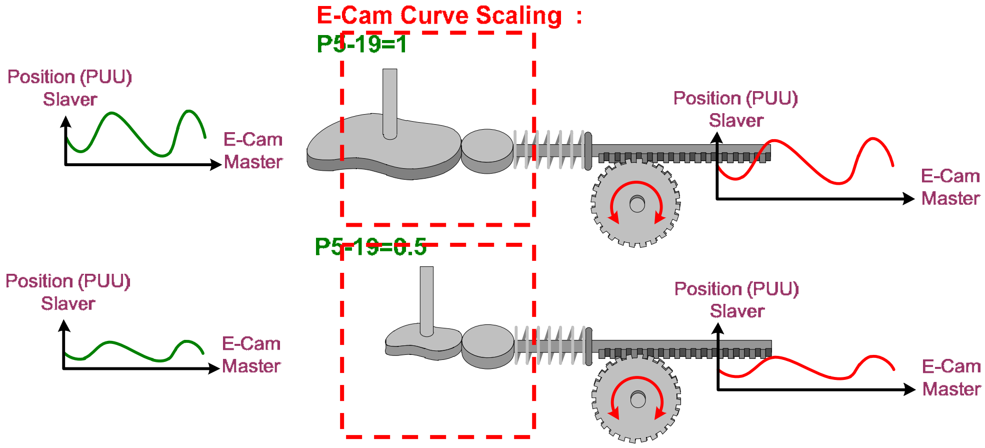
   In gear box#1, users can setup P5-83: E-CAM Cycle Number: M and P5-84: Pulse number of master axis: P : Following describes the E-gear ratio setting method of master axis.



E-gear ratio of master axis changes the resolution of pulse command. P5-83 can be used for adjustment when it is engaged.
When slave axis receives pulse number P from master axis which is defined by P5-84, the E-Cam axis will rotate M cycle defined by P5-83, which is M cycle in E-Cam table. These two parameters are mainly used to define the resolution of pulse command from master axis.
Example 1, P5-84 = 10000 & P5-83=1: When slave axis receives 10000 pulses from master axis, the E-Cam moves from 0 to 360 degrees, which is one cycle in E-Cam table.
P5-83 can be used to adjust the resolution even when E-Cam is engaged. The change takes effect immediately.
Example 2, value of P5-83 and P5-84 multiply 100 individually. If P5-84 = 1000000 remains, change the value of P5-83 from 100 to 80, the command resolution is higher. That is to say the pulse command width is 80% of the original one and it needs 12500 pulses from master axis to operate one cycle. If P5-83 is changed to 125, the resolution is lower. The pulse command width is 125% of the original one. It only needs 8000 pulses to complete one cycle.

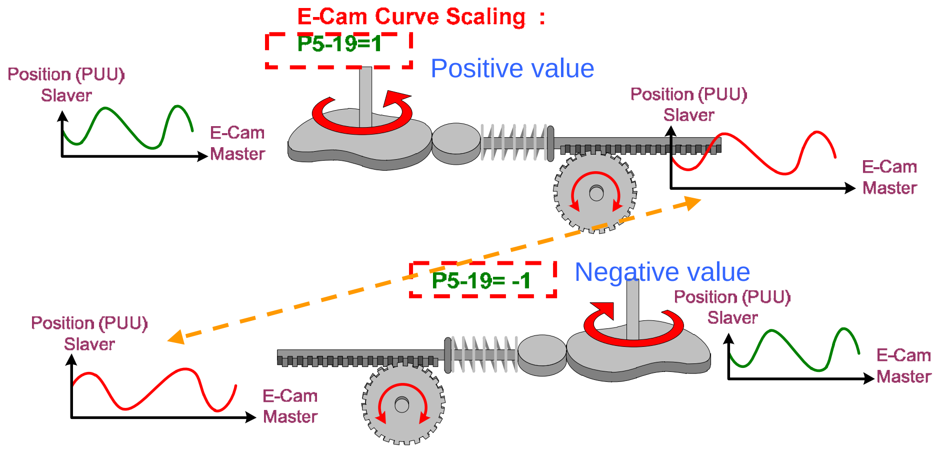
4. E-Cam:

   Users can setup P5-19 : E-CAM Curve Scaling and P5-85 : Engage(Entry Offset) here. Following is the setting method of P5-19.

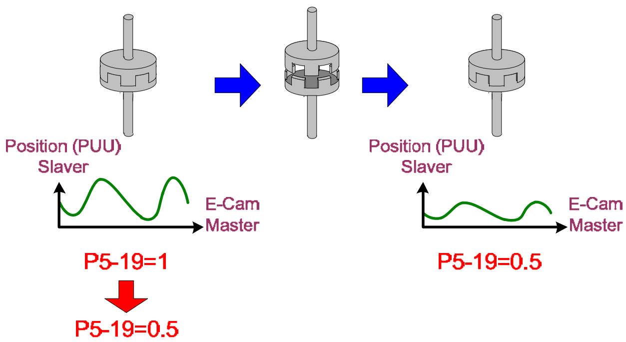


Effect brought by P5-19 is the same as E-gear of slave axis, but only influences E-Cam system. See as above. If P5-19 is set to 0.5, E-Cam axis will only output half of the PUU number, which is the same when adjusting P1-44 and P1-45, but it will not affect the E-gear ratio.

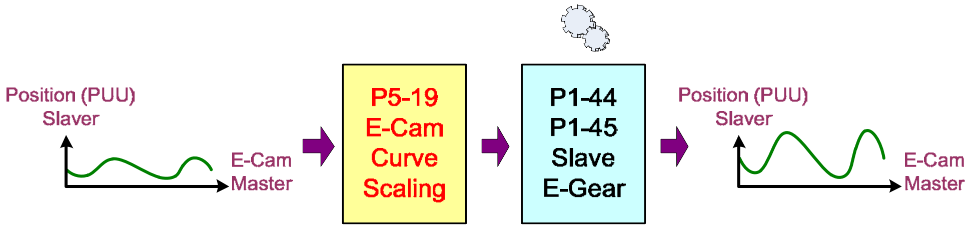
If P5-19 is set to the negative value, the output result will be upside down:



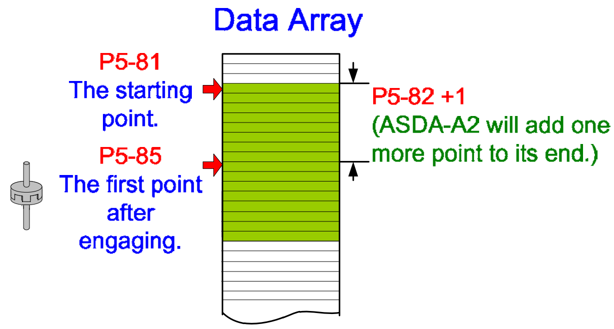
The value of P5-19 can be changed anytime. However, the change takes effect only when E-Cam is re-engaged (= leaves S1 status and back again). The change takes effect immediately in firmware version V1.038 sub48 (or later version).



NOTE E-Cam command will be outputted after the setting of P5-19, P1-44 and P1-45 is complete.



In E-Cam area, users can setup the start address after E-Cam is engaged: P5-85.

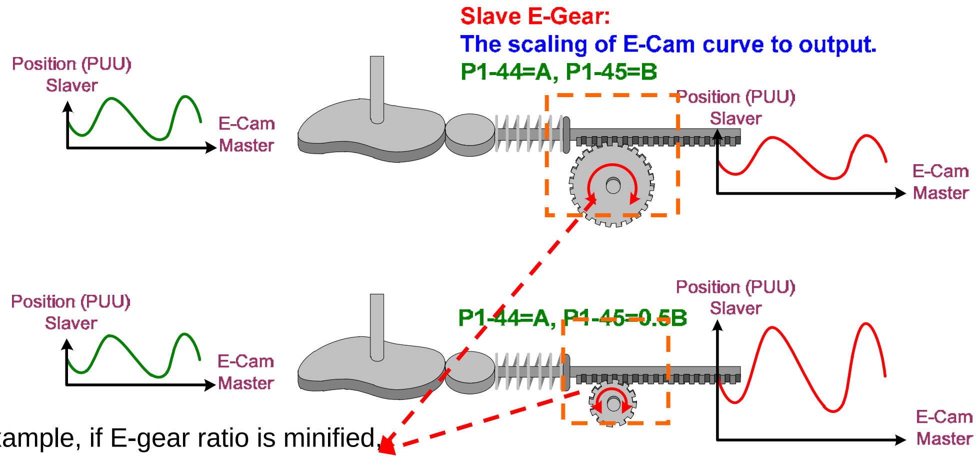


5. Gear box #2 (Slave axis):

   Followings are the brief introduction of gear box #2. Please note that in parameter setup window, no E-Cam related parameter is showed.

   E-gear ratio of E-Cam axis is the same as the one which defined by P1-44/P1-45. The change of it will change E-gear ratio of the system and the change of the system's E-gear ratio will not recover even when E-Cam is disengaged.

   Since the influence covers the whole system's E-gear ratio, it is not suggested to change E-Cam curve scaling by P1-44/P1-45. When E-Cam is disabled, the PR command will also refer to E-gear ratio.



In this example, if E-gear ratio is minified, the position of slave axis will change. The system's E-gear ratio and the moving distance will be changed.

6. Digital output of E-Cam

When E-Cam is engaged, users can use P5-90 : Area No+ (Polarity is Positive) and P5-91 : Area No- (Polarity is Negative) to setup the start/end degree of digital output of E-Cam (DO.CAM_AREA).

DO name and number	● DO.CAM_AREA (DO no.= 0x18)
Function	● If DO.CAM_AREA is ON, it means the position of E-cam axis is in the setting range.
When the E-Cam is engaging	● Set the angle range of DO ON by P5-90 and P5-91. ● Please refer to table 1 and 2 below.
When the E-Cam is disengaging	● DO.CAM_AREA is OFF.

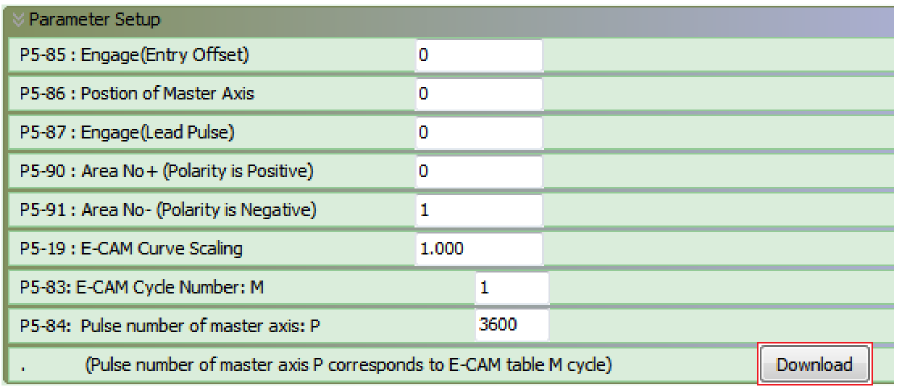
If P5-90 <= P5-91:

E-Cam degree	0°	~	P5-90	~	P5-91	~	360°
DO.CAM_AREA	OFF	OFF	ON	ON	ON	OFF	OFF

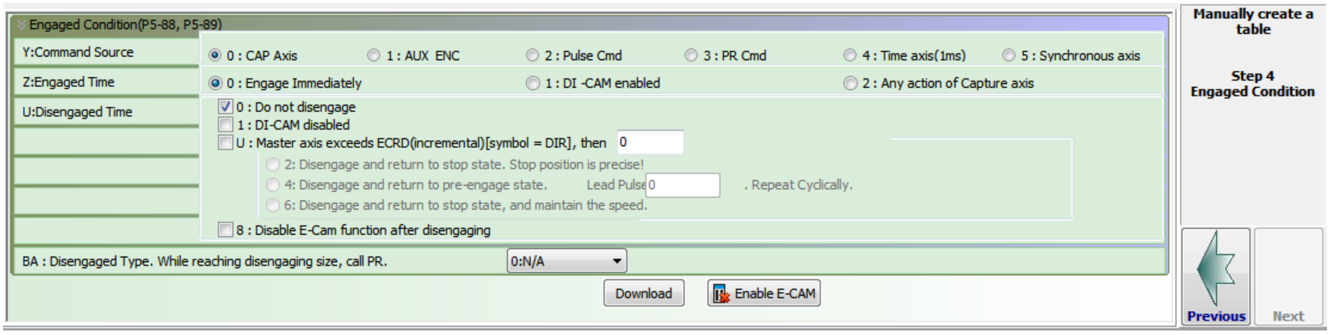
If P5-90 > P5-91:

E-Cam degree	0°	~	P5-91	~	P5-90	~	360°
DO.CAM_AREA	ON	ON	OFF	OFF	OFF	ON	ON

Step 8: When parameter setting is complete, click Download to download parameters into the servo drive.



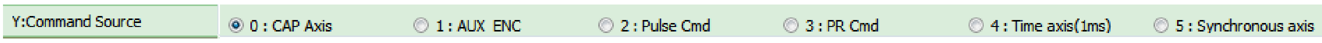
Step 9: Click  to enter the setup page of “Engaged Condition”:



After the E-Cam curve is established and the related setting is complete, users could setup engaged condition of E-Cam and simulate its operation.

In this window, the main adjusted function is divided into three parts:

- Command source: The command source of master axis:



0：CAP axis: The command is defined by synchronous axis (The setting is the same as P4-39.B).

1：AUX ENC: Use auxiliary encoder as the command of master axis.

2：Pulse Cmd: Use external pulse command as the command of master axis.

3：PR command: Command triggered by PR mode is regarded as the command of master axis.

4：Time axis (1ms): Use time pulse (1ms) as the command of master axis. When it is not connected to master axis, users can select time axis (1ms) as the master axis to drive E-Cam so as to simulate E-Cam operation.

5：Synchronous axis: Use synchronous axis as the command of master axis. Please complete the setting of macro 1 before selecting this function.

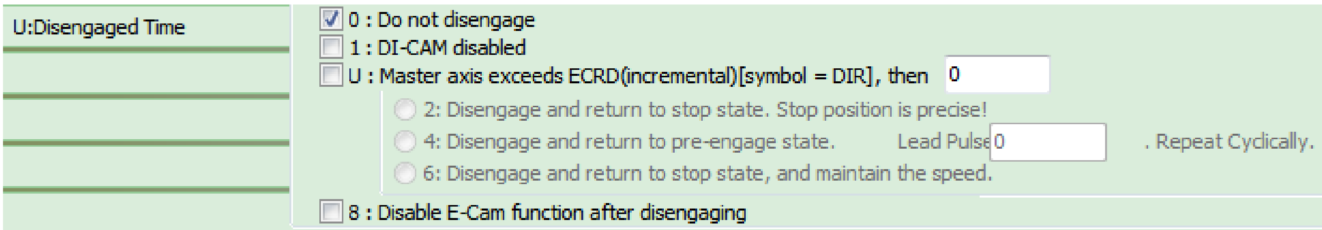
- Engaged time: The command source of master axis and engaged E-Cam.

0：Engaged Immediate: E-Cam is engaged right after it is enabled (P5-88.X=1).

1：DI-CAM enabled: DI Off. Control the engaged time (DI=0x36, DI-CAM On)

2：Any action of CAP axis: Use CAP function. When capturing the first point, E-Cam is engaged.

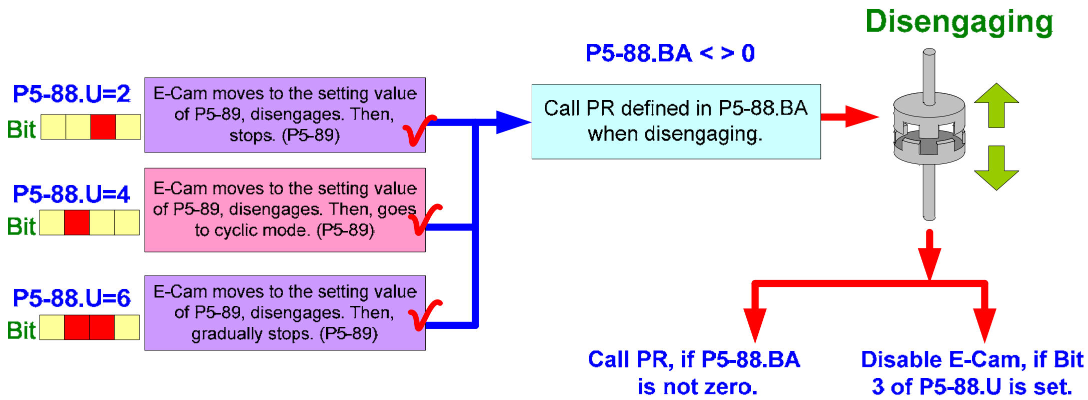
- Disengaged time: Disengaged command of master axis and E-Cam axis.



0：Do not disengage unless E-Cam is disabled.

1：DI-CAM disable: Trigger DI when it is disengaged (DI=0x36, DI-CAM Off)

U：Set the disengaged time via Bit-OR.



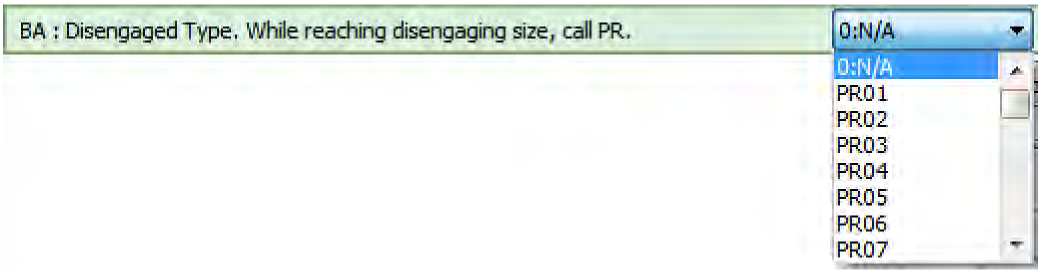
Please note that E-Cam disengages and E-Cam is disabled are not the same.
E-Cam disengages: It encounters disengaged problem only when it is in operation (P5-88.X=1).
Disable E-Cam function: Only when E-Cam function is disabled, the disengaged condition can be changed (P5-88.X=0).

NOTE

a. Disengaged condition 2, 4 and 6 cannot be setup simultaneously.
b. When the disengaged condition is 1, 2 or 6, users can disable E-Cam function after disengaged (Bit 3 of P5-88.U, P5-88.U=8). For example, if P5-88.U=6, and E-Cam function is disabled after E-Cam is disengaged, then:
P5-88.U=8+6=14 → P5-88.U=E (hexadecimal value)
c. When the disengaged condition is 2, 4, or 6, it can call PR after

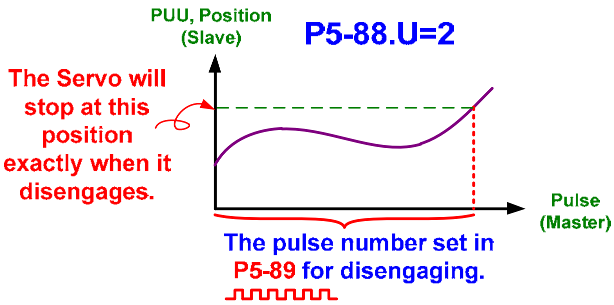
disengaging. PR can be specified from P5-88.BA.

- Disengaged type: See as above, when it reaches disengaged time (P5-88, U = 2, 4, 6), it automatically executes PR (hexadecimal): 00~3F (00 means no action).

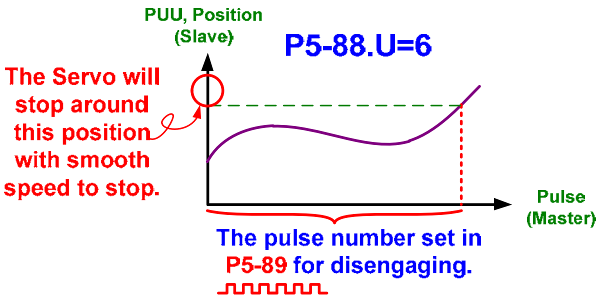


NOTE

a. When the pulse number received by E-Cam axis is the same as the setting value of p5-89, E-Cam disengages. If U = 2, the position will be controlled precisely. Set U to 6 can ensure the smooth speed. If E-Cam stops when disengaging, then the disengaged command of 2 and 6 will be the same.

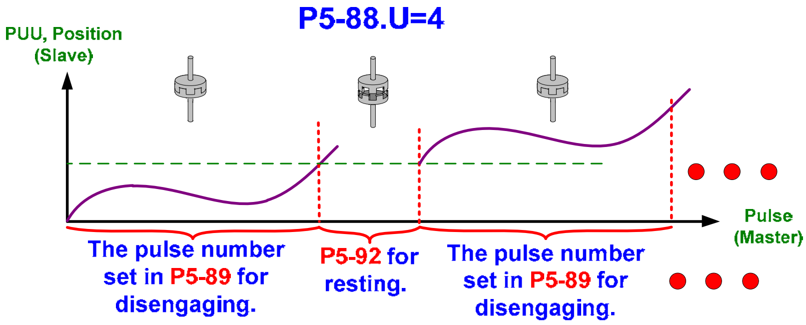


When U = 2,



When U = 6,

b. When the pulse number sent by master axis is the same as the setting value of P5-89, E-Cam disengages. If U = 4, it starts counting after E-Cam disengaged. When the pulse number sent by master axis is the same as the setting value of P5-92, E-Cam will engage again and so on so forth.



When the setting is complete, click 

to download the “Engaged condition” into the servo drive. As the previous description, if it is not connected to the master axis, users can select the time axis (1ms) as master axis to drive slave axis so as to simulate E-Cam operation.

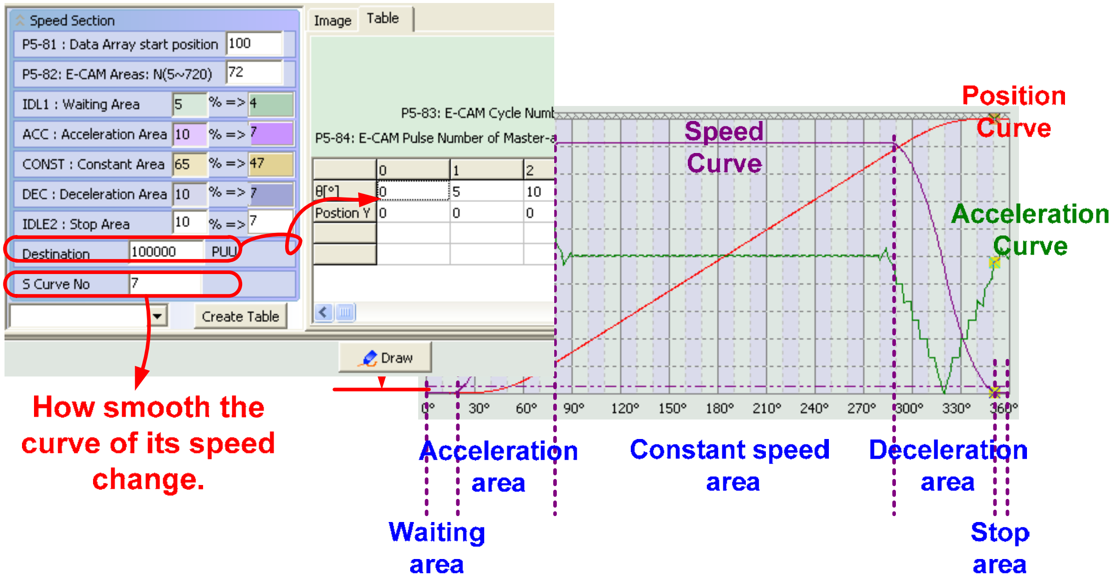
Click 

. Then, make sure the drive is Servo On so as to trail run the E-Cam.

[Speed Fitting Creation]

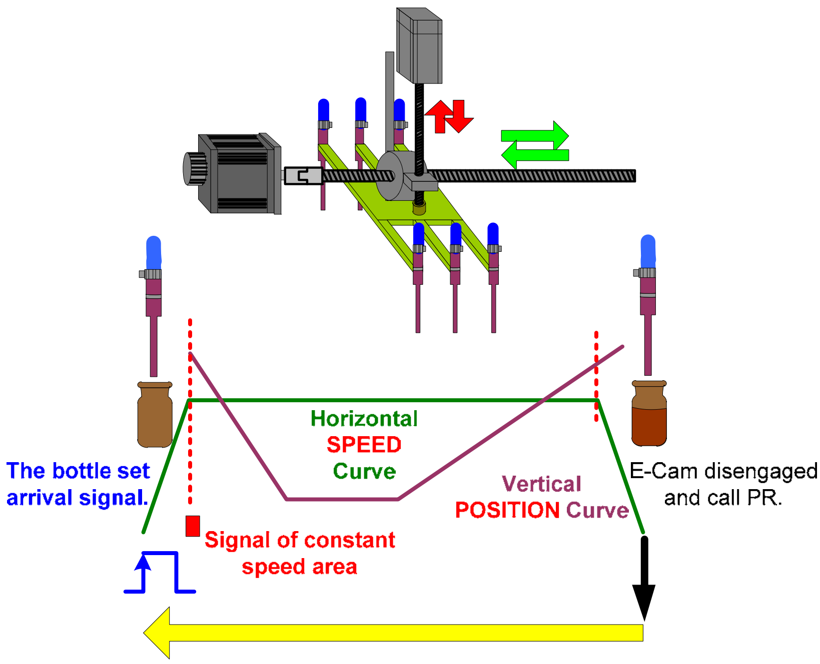
Although this method is called Speed Fitting Creation, the actual data in E-Cam table is the one of position curve. As long as the moving distance is the same during the same unit of time, both axes have the same speed. **When speed application is a vital issue to consider, Speed Fitting Creation can be use to create E-Cam curve.**

- To arrange the proportion of waiting area, acceleration area, constant speed area, deceleration area and stop area in one cycle of E-Cam curve.
- Destination is the distance the slave axis travels.
- The point number of S-curve is the same as the point number in stop area. The larger amount of S-curve number, the more smooth variation during acceleration and deceleration of the motor.
- The system can calculate the traveling distance of master axis base on slave axis so as to make the same operation speed; Or calculate the traveling distance of slave axis base on master axis; Or users can directly calculate the traveling distance of master axis and the destination of slave axis separately without aligning the slave speed with the master speed.
- Take the filling machine as the example for further explanation. Please see as below.



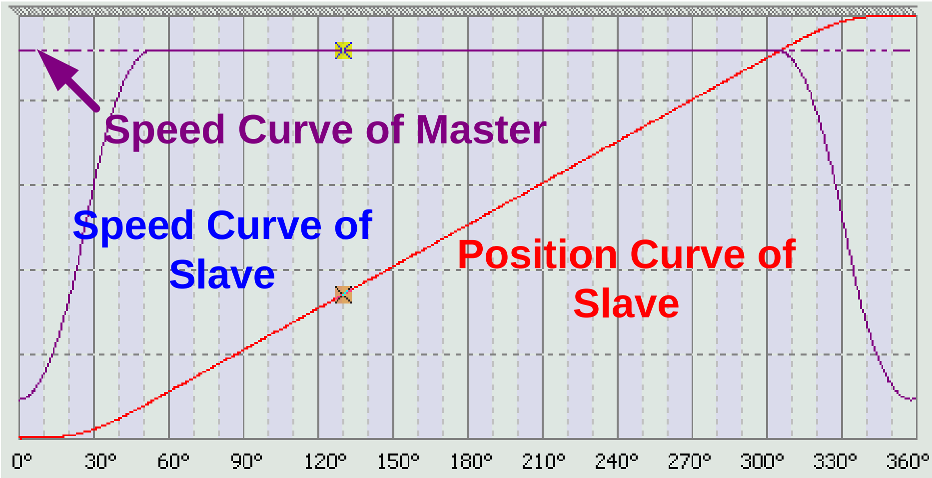
[Example – Filling Machine]

Design of E-Cam curve:

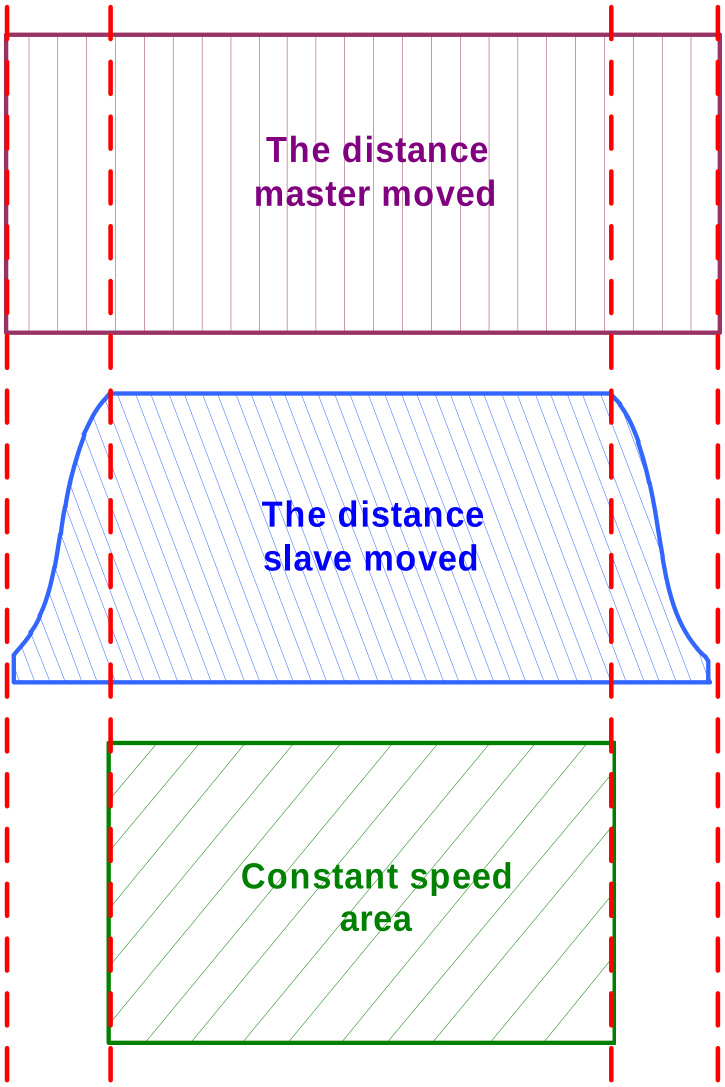


This system has two E-Cam curves. One is for controlling the platform in horizontal direction and another one is for controlling the filling axis in vertical direction. A complete cycle starts when the bottle is in accurate position and activate the signal, then ends when the platform returning to the start position controlled by PR command.

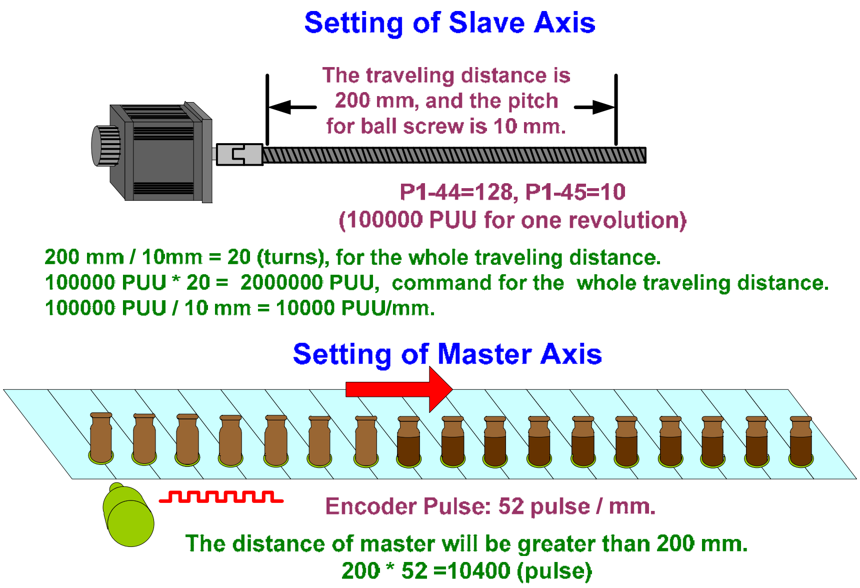
The master axis operates at constant speed on E-Cam curve. The slave axis is composed of acceleration area, constant speed area and deceleration area. It is because the integral of speed curve is the traveling distance. The max. speed of slave axis is the operation speed of master axis. Thus, master axis travels longer distance than slave axis in one cycle.



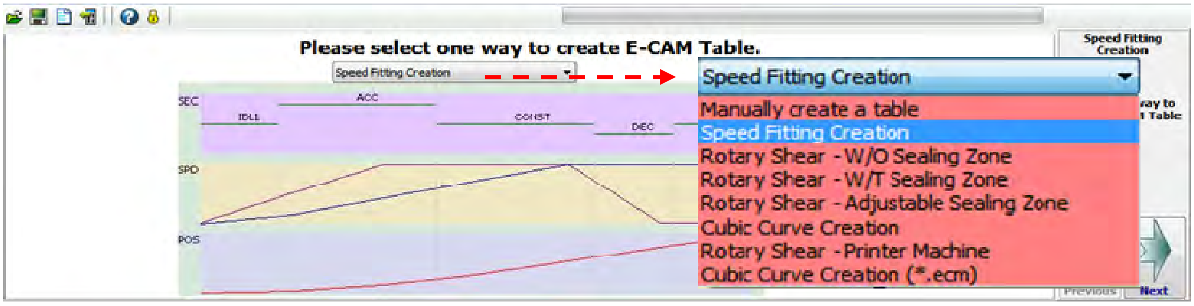
The following three figures illustrate the moving distance of master axis and slave axis as well as the constant speed area: **master axis travels longer distance than slave axis in one cycle**.



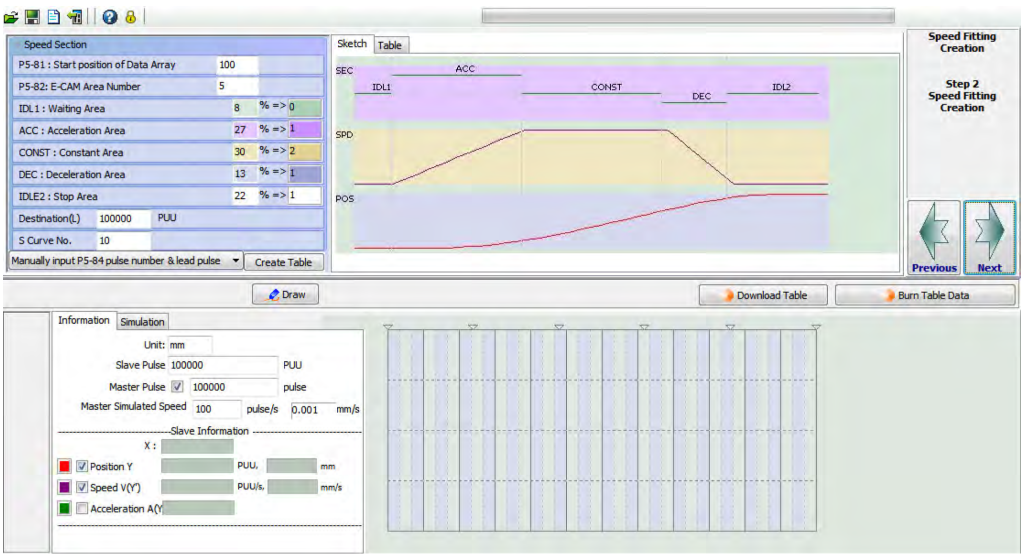
System setup:
Figure below is the specification of material feeding axis. Introduction of creating E-Cam curve via software will be illustrated here.



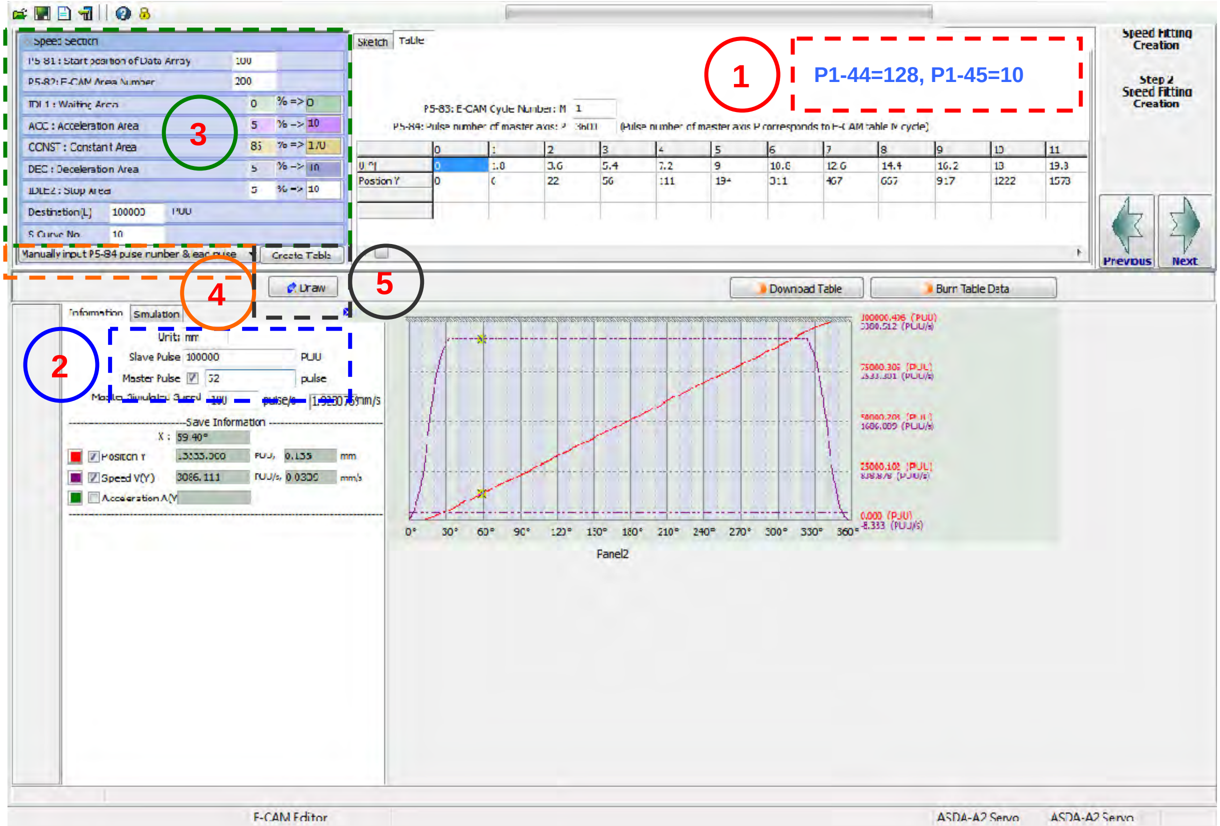
Step 1: Enable "E-CAM" and select "Speed Fitting Creation".



Step 2: Click  to enter the page of Speed Fitting Creation.

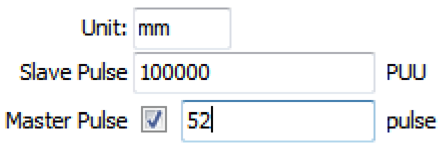


Step 3: To create E-Cam curve base on the traveling distance of slave axis. See the following 5 steps.

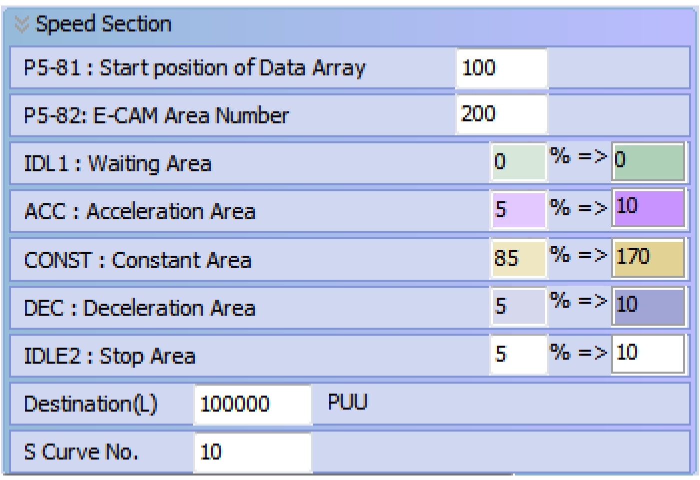


Step 1: Setup E-gear ratio. P1-44=128 and P1-45=10.

Step 2: Setup the required pulse number when master axis and slave axis operate one mm. The unit of master axis is pulse; PUU is for slave axis.



Step 3: Speed section. Setup waiting area, acceleration area, deceleration area, constant speed area and stop area.



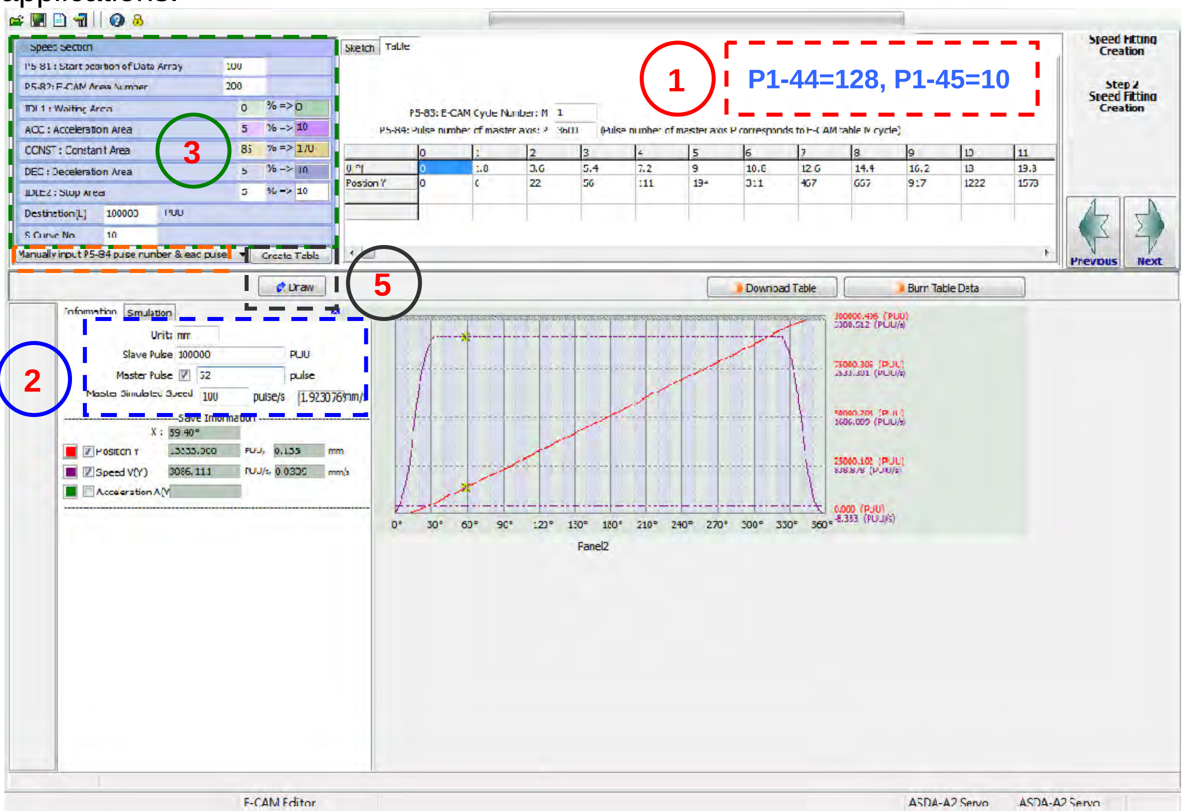
Step 4: According to destination (L), it automatically calculate the pulse number of master axis (P5-84). When select this option, if the destination is

unchangeable (the traveling distance for slave axis is fixed), the system will automatically calculate the value that P5-84 needs according to the destination.

Based on lead pulse, calculate P5-84 pulse num

Step 5: Click Create Table to complete the table on the right.

Then, click Draw to confirm the E-Cam simulation. In addition, the E-Cam curve can be created according to the traveling distance of master axis in some applications.



The table filling steps in this example is almost the same as the above description. The difference is on Step 4 when selecting Based on P5-84 pulse number, calculate lead pu.

There is no need to fill in Destination (L) in Step 3 when selecting this option. However, users have to self calculate the value of P5-83/P5-84 and fill in the value in Step 5.

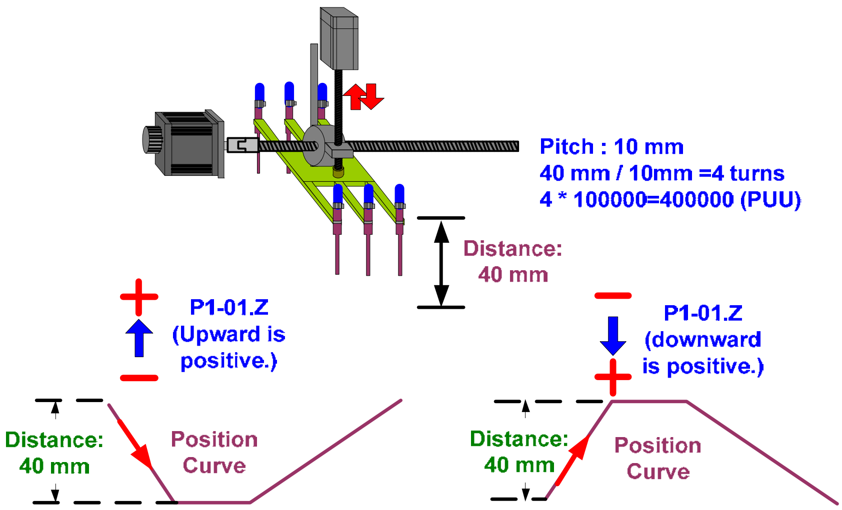
P5-83: E-CAM Cycle Number: M 1

P5-84: Pulse number of master axis: P 10400 (Pulse number of master axis P corresponds to E-CAM table M cycle)

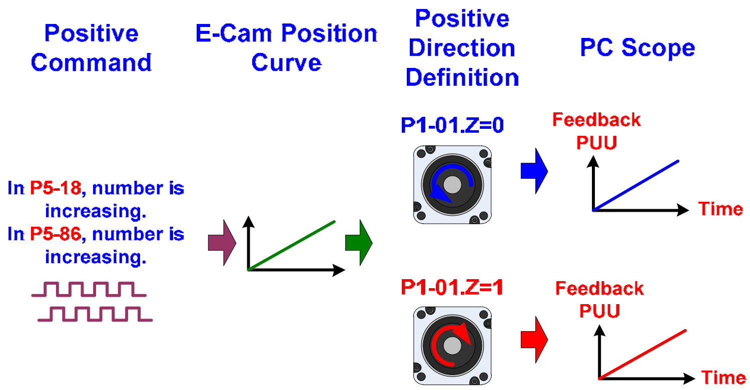
In Step 6, the system will calculate the destination of slave axis according to the value in Step 5. This function is selected when the traveling distance of slave axis is the same as master axis.

Next, the description is about the E-Cam setting of filling axis. “Speed Fitting Creation” and “Manually create a table” are required here to combine two sections of curves (forward and reverse):

Step 1: See as below. Curve for filling axis needs to go with P1-01.Z (Motor operates at forward direction).

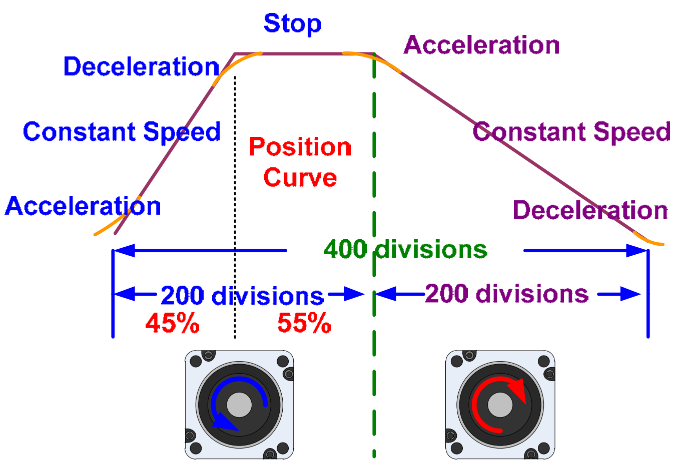


Before setting up forward and reverse curve, it is important to know that P5-18: Axis Position-Pulse Command (CN1); P5-86: E-CAM: Master Axis Position. When both pulse counts and feedback pulse counts increase at forward direction, the motor is defined to run at forward direction.

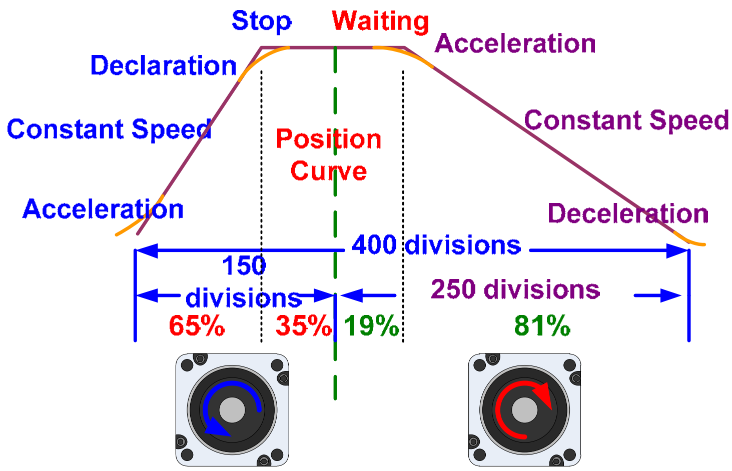


Step 2: Users need to create E-Cam curve here. The function of simultaneously creating forward and reverse curve is not supported. However, users can create the curve individually and then combine them afterwards.

Segment the curve which runs at the same direction into one section. For instance, the Stop area between forward and reverse curve can be regarded as the one for previous curve or the Waiting area for the next one. See the example in this page. The Stop area is programmed as the one for previous curve. If the whole curve is divided into 400 parts, forward curve pulse Stop area takes 200 parts. Another 200 is for reverse curve.



Another segment method is to program the curve in Stop area and Waiting area as any running direction since motor stops in both areas. To compare it with the above figure, curve in Stop area is programmed as the one for forward curve and the rest is for the reverse one in this example. Thus, 400 parts are in one curve, while the forward one takes 150, the reverse one takes 250.



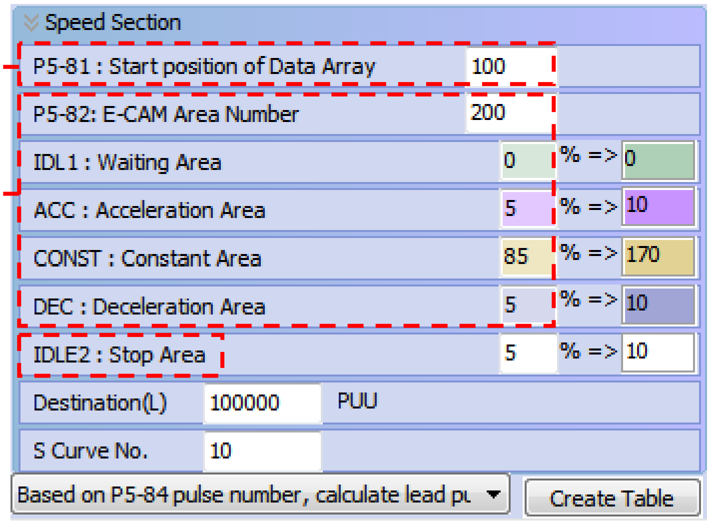
The following describes forward and reverse commands issued by the software:

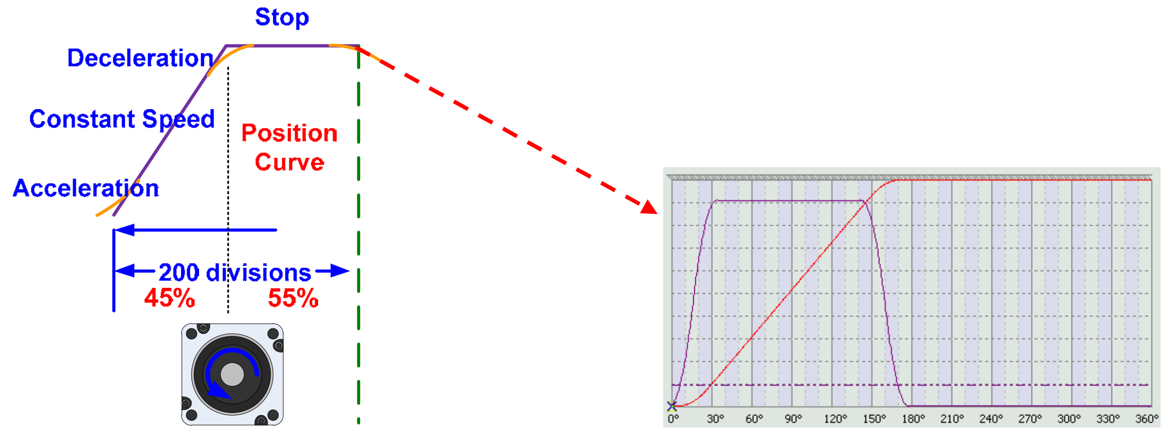
First section: Before creating the curve, please setup e-gear ratio (P1-44/P1-45) in advance. The Stop area is programmed as the one for previous curve in this example. Thus, the first section of curve takes 200 parts. Set P5-82 to 200 first. Then, fill in the proportion of Acceleration area, Constant speed area, Deceleration area and Stop area as well as the traveling distance of slave axis into the table.

200 parts (E-Cam area number)

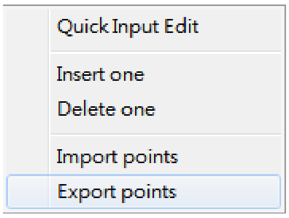
According to the figure below, allocate 55% for Stop area and 45% for the rest.

Moving distance of filling axis is 40mm and Pitch is 10mm, thus 40mm/10mm*100000=400000PUU, which is the destination (L)

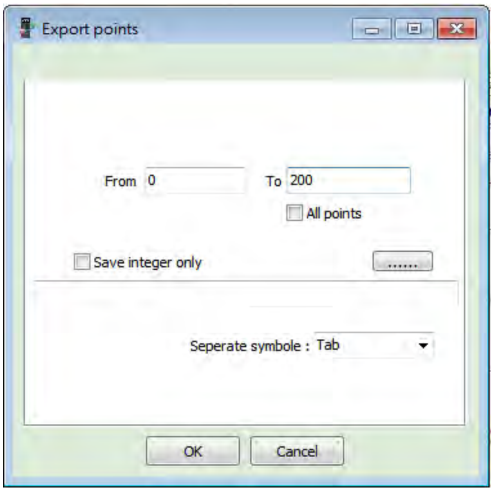




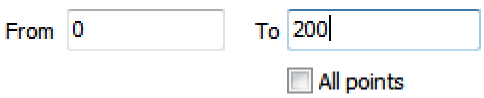
Export the first section: Right click the mouse at any column of the E-Cam table. Then, select “Export points”. Since there are 200 parts in this section, users should fill in values between 0 and 200. Save the data when complete.



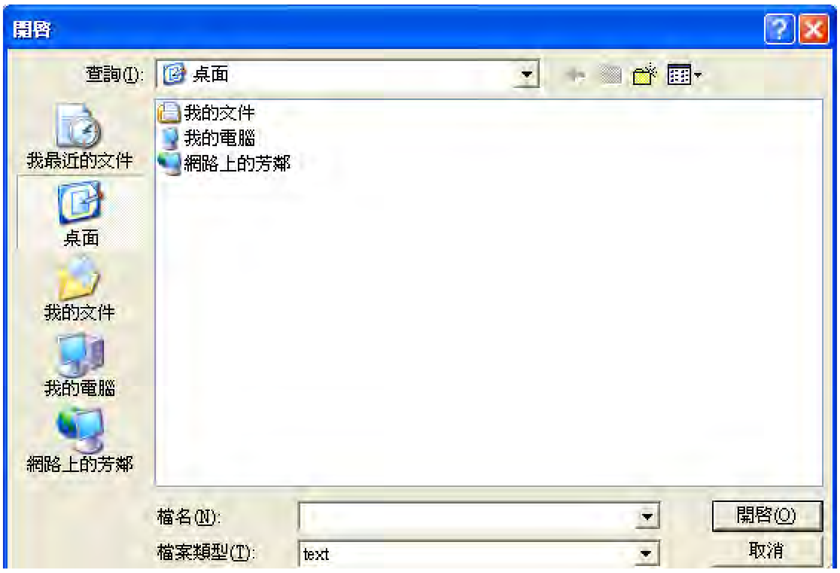
Right click the mouse on the table, select “Export points”. The following window will pop up.



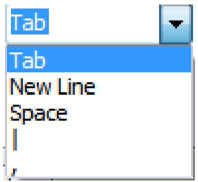
Then, setup the range. Cancel this option “All points” in this window. Manually enter the range from 0 to 200.



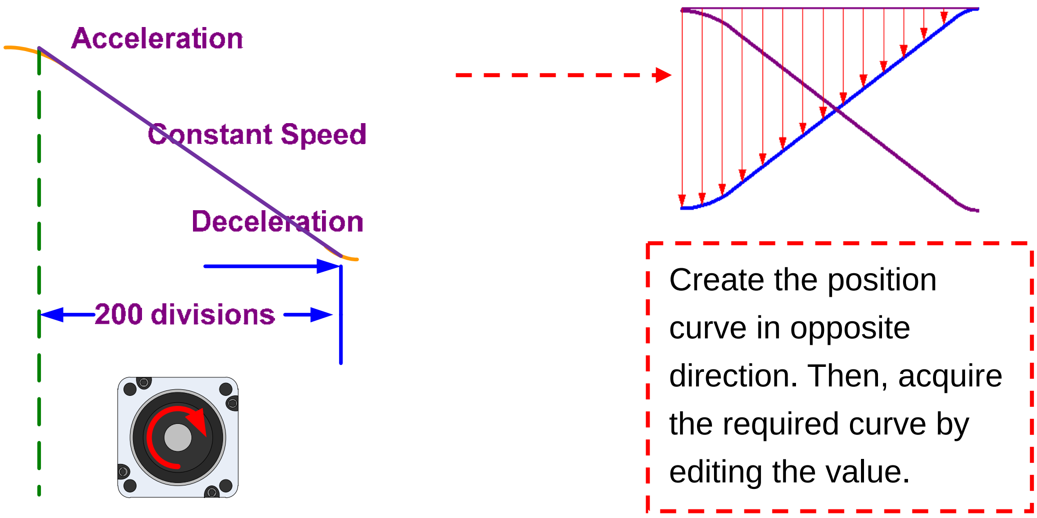
Click ...... to open the screen for exporting files to export the first section of curve.



can be used to divide the exporting data. Several ways are provided, see as below.



Second section: The second section is reverse operation. Create the position curve in opposite direction. Then, acquire the required curve by editing the value.

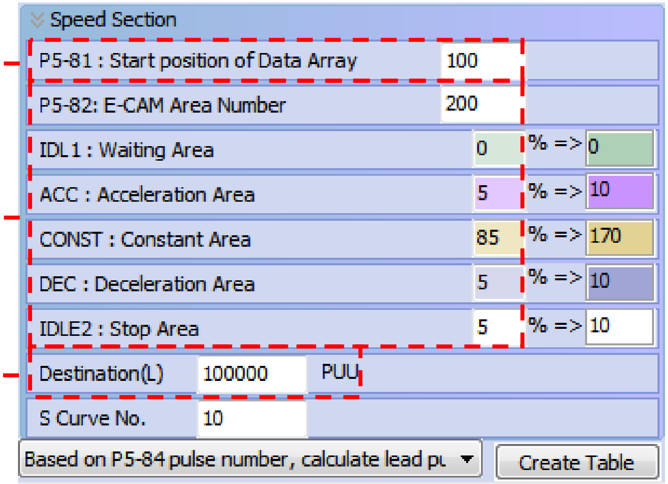


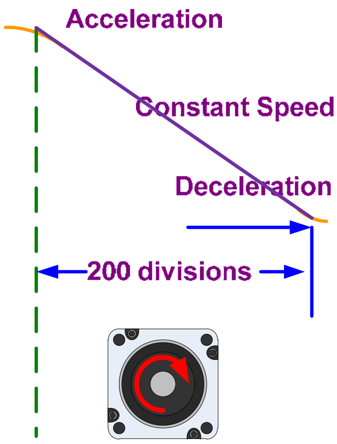
First, create the curve in opposite direction. 200 parts are in total. Then, enter the value according to the proportion of each area to acquire the curve in forward direction.

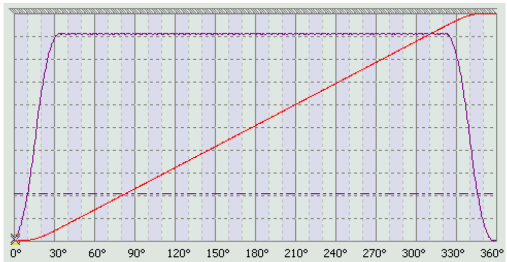
200 parts (E-Cam area number)

Allocate 85% for constant speed area and equal division for the rest.

According to the figure below, allocate 55% for Stop area and 45% for the others.

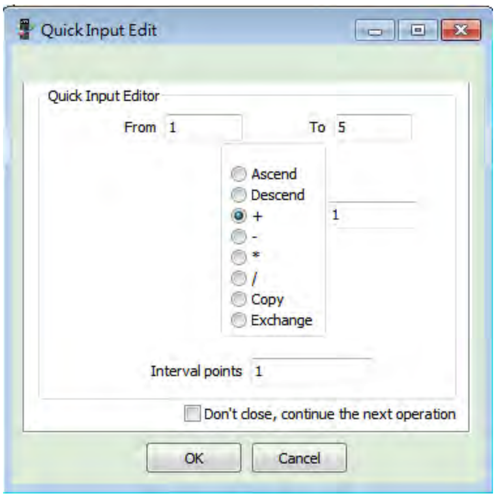






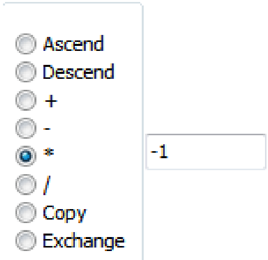
When the setting is complete, the user can acquire the curve in forward direction.

Then, use "Quick Input Edit" to edit the curve in reverse direction. Right click to enable the function:



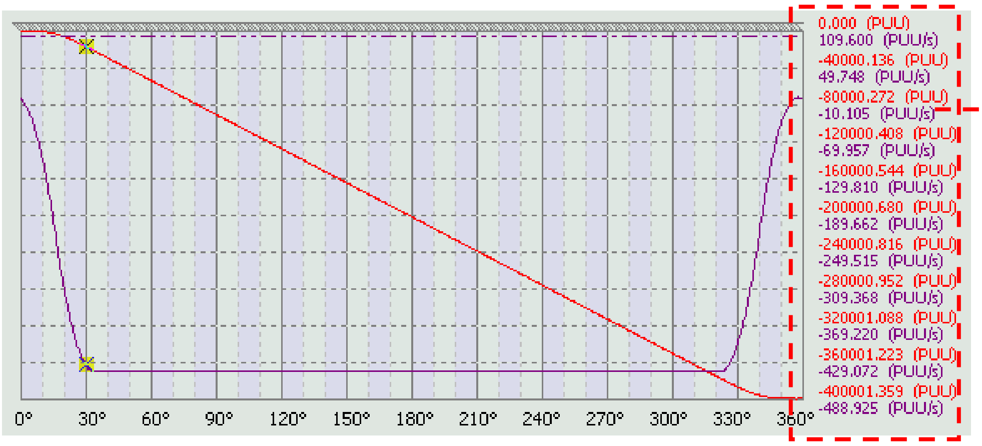
Setup the curve range from 0 to 200.

The edit method is **All Value in the Table *(-1)**. Reverse the position curve for 180 degrees first.



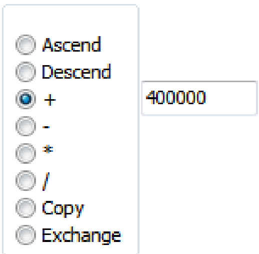
Click 

to simulate E-Cam, which shown as below. The coordinate is inverted at the moment and needs to be amended.



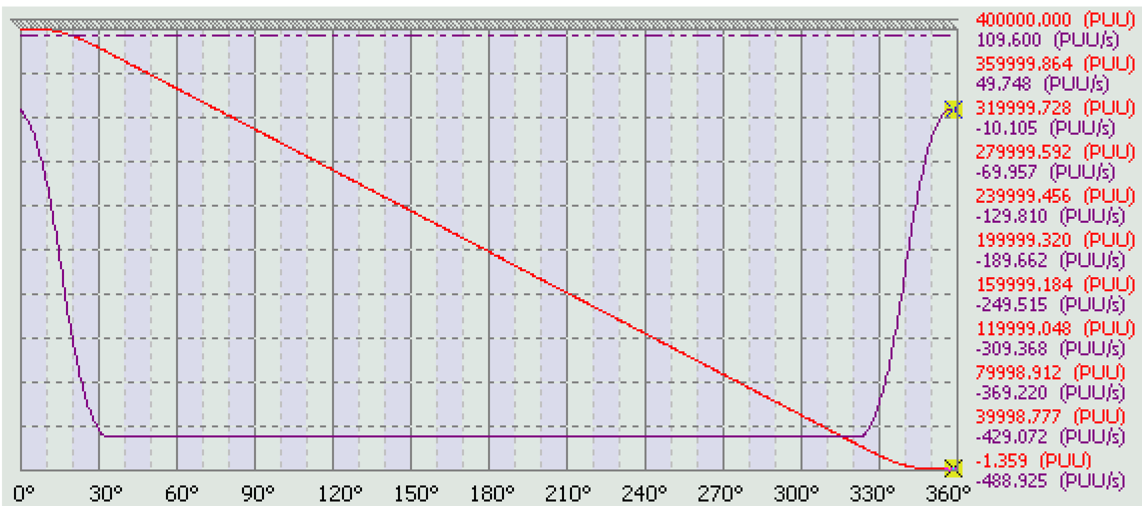
The coordinate needs to be amended.

Then, plus the max. value **400000** to adjust the coordinate of Y axis.

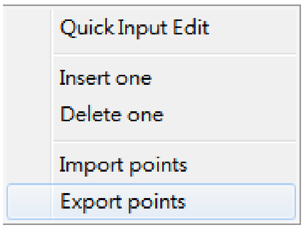


Click 

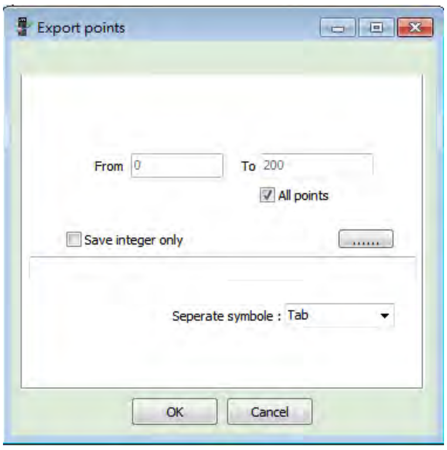
, the second simulated E-Cam is shown as below:



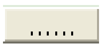
Export the second section: Right click the mouse at any column of the E-Cam table. Select “Export points”. Since there are 200 parts in this section, users should fill in values between 0 and 200. Then, save the data of the table.

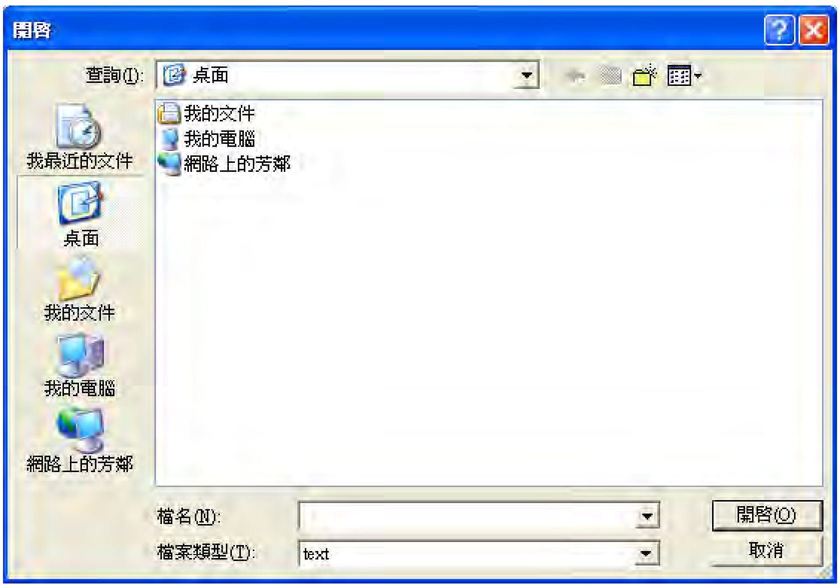


Right click the mouse on the table, select “Export points”. The following window will pop up.



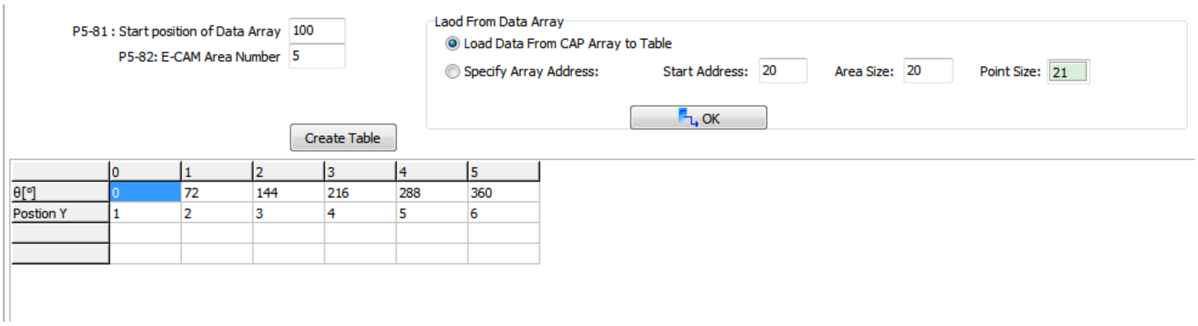
Then, setup the range. Cancel the option of All points in this window. Manually enter the range from 0 to 200.

Click  to open the screen for exporting files and to export the first section of curve.



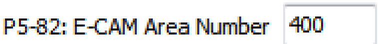
Step 3: When the setting of E-Cam table for two sections is complete, combine them with one another.

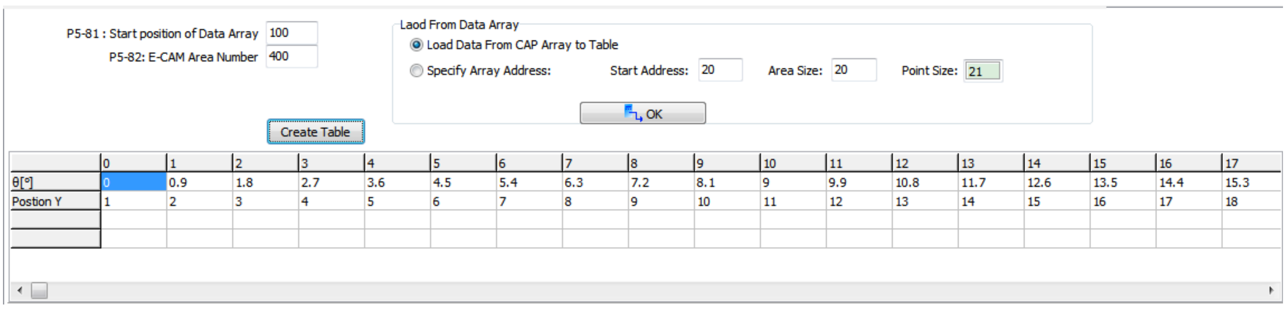
First, open the page of “Manually create a table”.



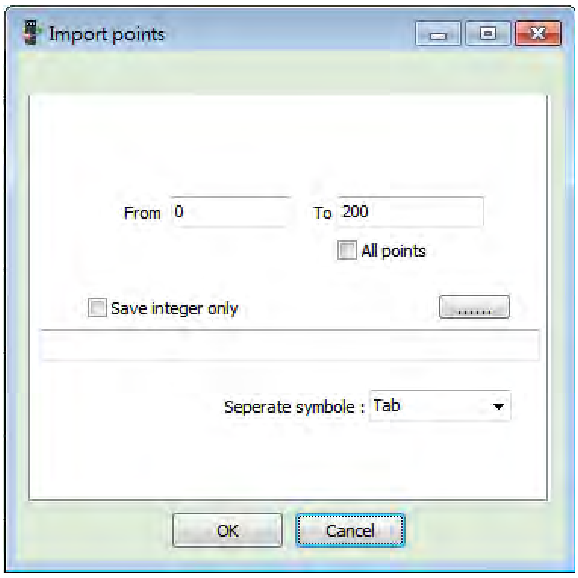
Set the E-Cam area number as 400 and click 

.





Right click the mouse to enable Import points.



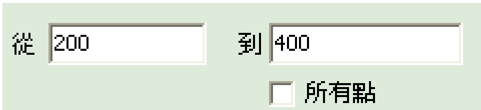
[Import points] Load in the first section, which has 200 parts. Its range is between 0 and 200. Then, load in the second one, which is from 200 to 400. The end position of the first section, 200 should be overlapped with the start position of the second section, 200.

Load in the first section first. The range is from 0 to 200.

Select the file with forward curve:

Click **OK** to load in the first section.

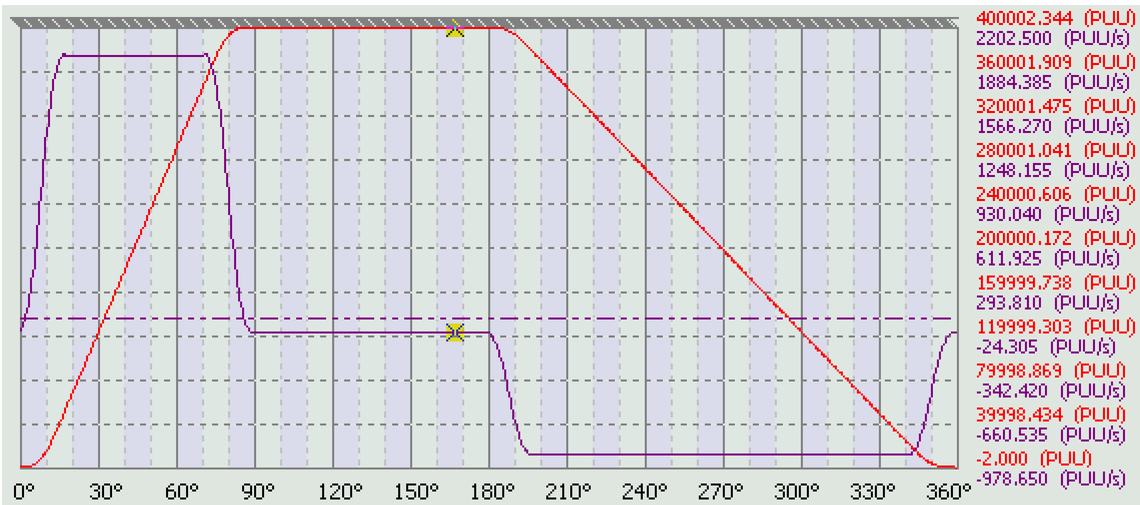
Then, load in the second section, whose range is between 200 and 400. Please note that **the end position of the first section, 200 should be overlapped with the start position of the second section, 200.**



Select the file with reverse curve:

Click **OK** to load in the second curve. Then, click 

. The combined diagram is done.



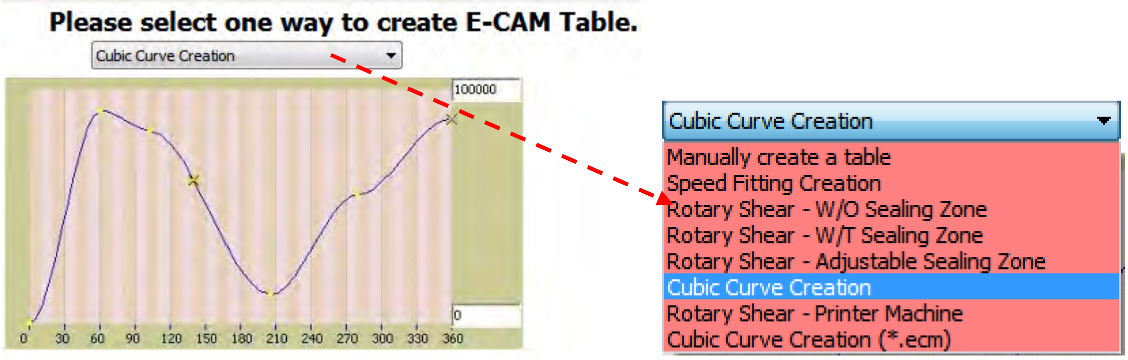
After the setting of material feeding axis and filling axis is complete, users now can setup “Parameter setting” and “Engaged condition” in Step 3 and 4 in section of Manually Crate a Table aiming at these two axes.

[Cubic Curve Creation]

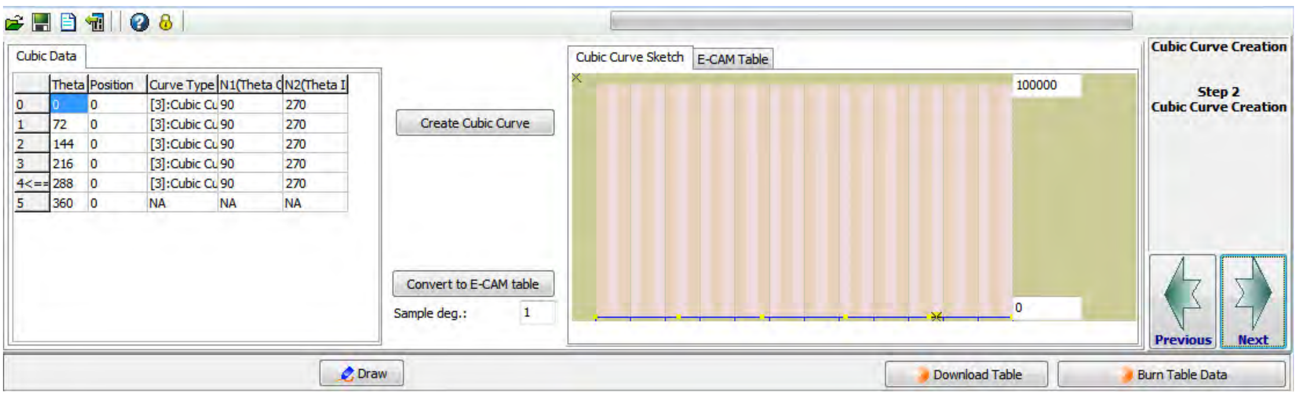
As long as users know the relation between E-Cam position and degree, this function is rather practical. By simply filling in the position (0 ~ 360°) of master axis and slave axis, this function can create and smooth the curve.

In some applications, users might need linear line or curve to complete the motion of point to point when applying the method of Manually Create a Table. Cubic curve creation can help to amend the curve on the diagram.

Step 1: Enable the function of “Cubic Curve Creation”.



Step 2: Enter into the page of functional setting.

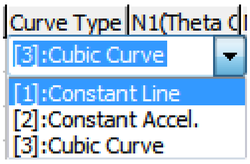


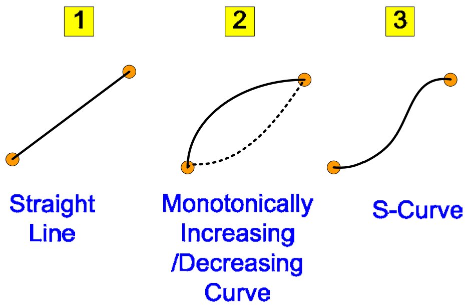
Its setting function is similar to “Manually create a table”. Users can self enter the degree and position of each point.

Cubic Data

	Theta	Position	Curve Type	N1(Theta d	N2(Theta I
0	0	0	[3]:Cubic Cu	90	270
1<==	72	0	[3]:Cubic Cu	90	270
2	144	0	[3]:Cubic Cu	90	270
3	216	0	[3]:Cubic Cu	90	270
4	288	0	[3]:Cubic Cu	90	270
5	360	0	NA	NA	NA

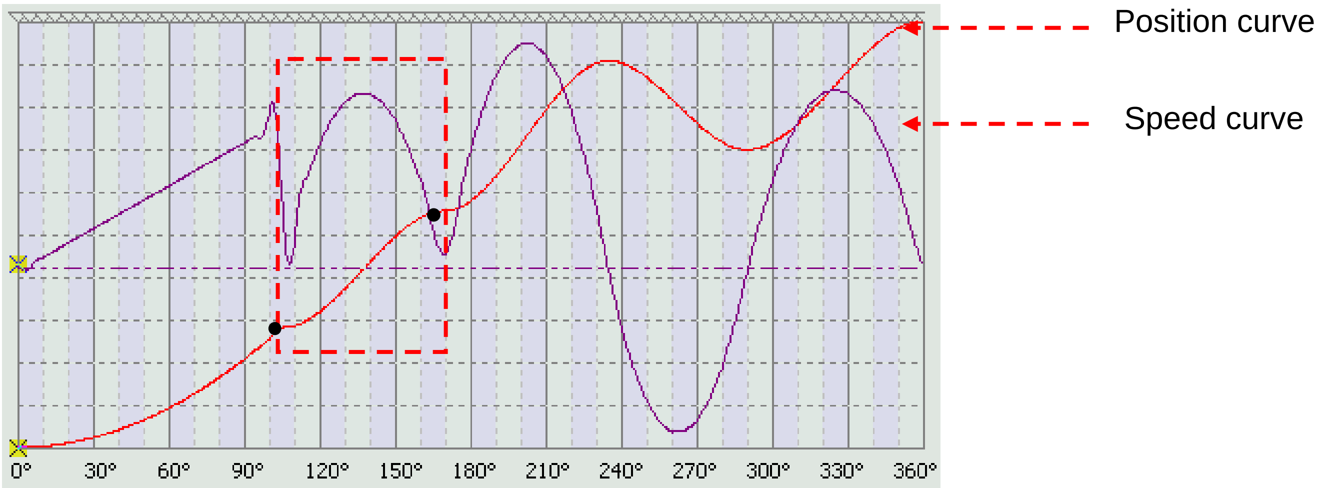
Adjusting the connecting line and degree can change the speed between two points. Improper selection and connection will result in dramatically change of the speed. Three types of curve between two points are provided for users:



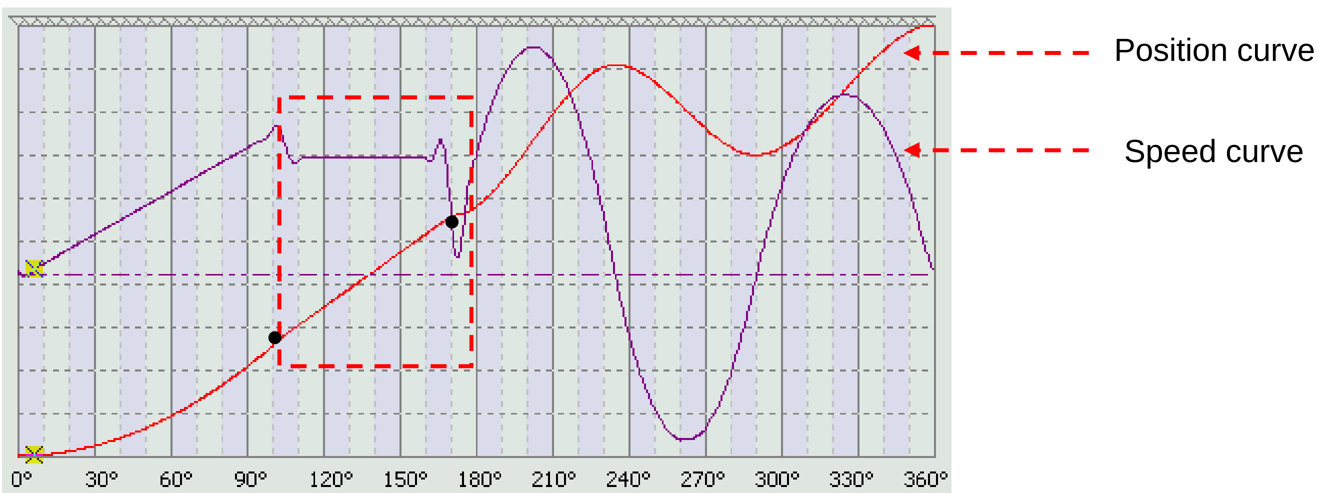


E-Cam curve is quite smooth in general. Users only need to setup E-Cam whose speed changes dramatically in some specific applications.

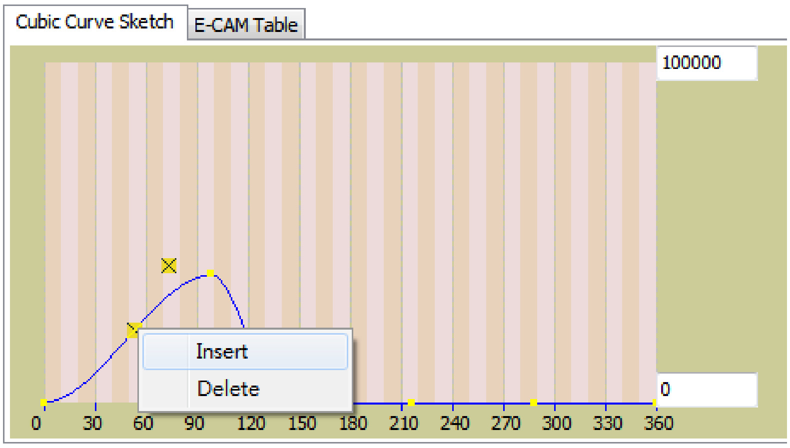
Take the Bode plot as the example below: To create E-Cam curve by S-curve, two points inside the red frame are all smoothly connected.



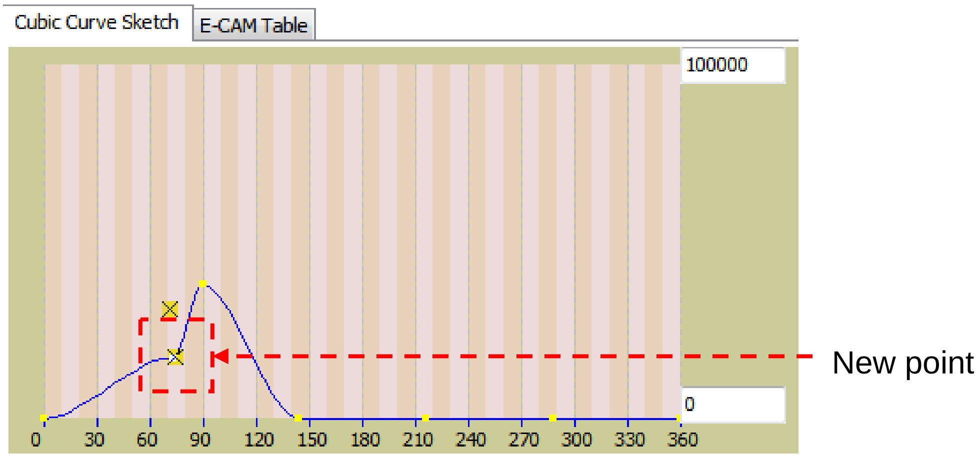
Adjust the curve from the second to third point as “linear”. Users can see the speed curve between two points becomes linear, which causes dramatic change.



Assume the user needs to insert or delete points, users can directly edit on simulated curve by right clicking the mouse.



Select “Insert” and the software will add one point around the curve. Since both position and degree of this new point are 0, users have to manually enter these two values and re-program the curve type to create new points.



In addition, the departure (theta out) and arrival (theta in) angle can be defined. Aiming to different type of curve, there are different settings:
For constant line, the departure and arrival angle are non-applicable.

Curve Type	N1(Theta C	N2(Theta I
ant Line	NA	NA

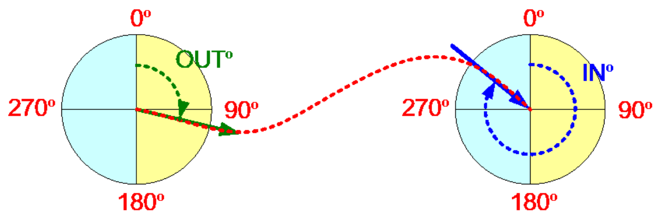
For constant acceleration, only the departure angle can be specified.

Curve Type	N1(Theta C	N2(Theta I
t Accel.	90	NA

For cubic curve, both departure and arrival angle can be set.

Curve Type	N1(Theta C	N2(Theta I
c Curve	90	270

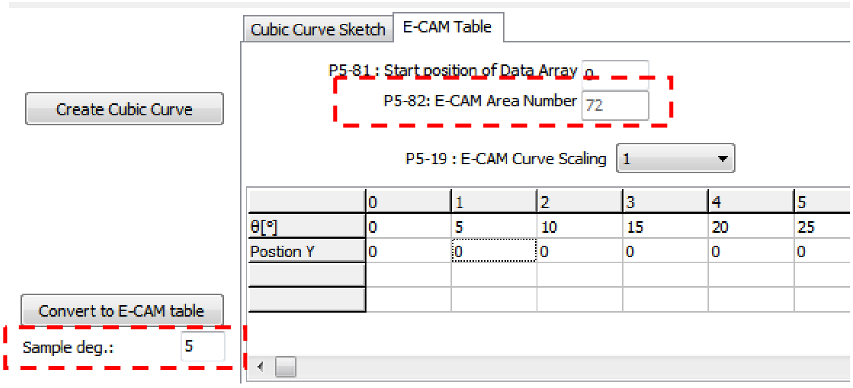
For the smooth operation, both departure and arrival angle are necessary to create an E-Cam curve.



Step 3: Create E-Cam table

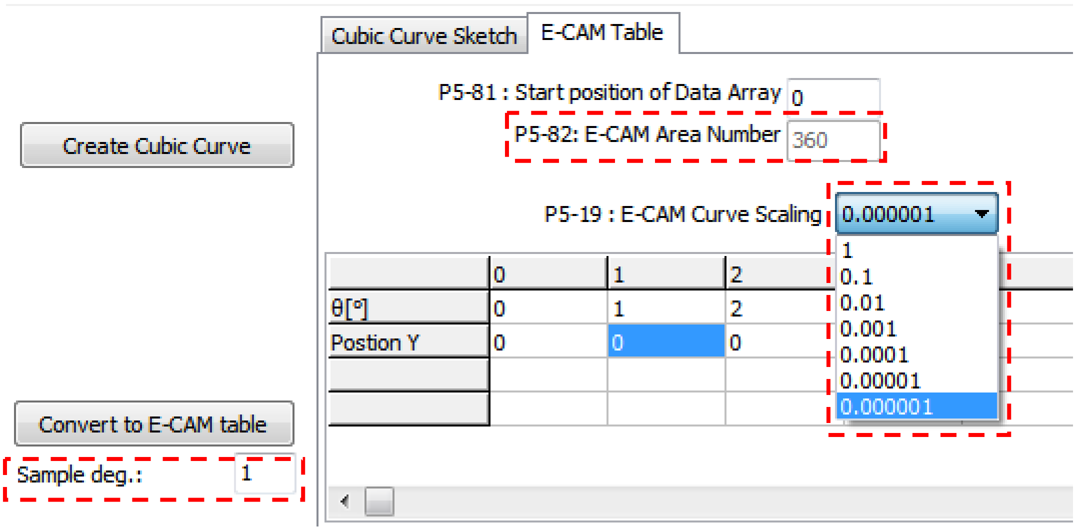
The next step is to create the actual E-Cam table.

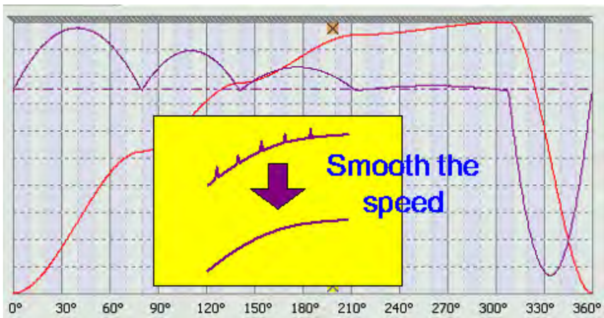
- The initial value of the sampling angle is 5°. When drawing the curve, the whole distance is 360°. The system divides the E-Cam points according to the value of cubic curve and sampling angle.



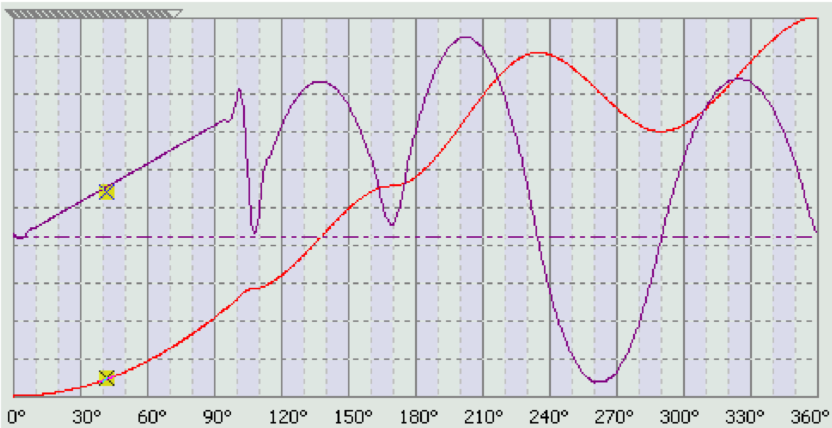
Sampling angle x E-Cam area number (P5-82)＝360°

- For creating a more precise curve, if the sampling degree is set to 1, it brings the trembling speed command which is derivative of the position curve. Users can choose the value with more decimal digits. Then, recover the command scaling by P5-19 so as to deal with this problem.





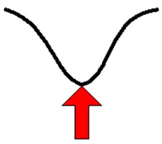
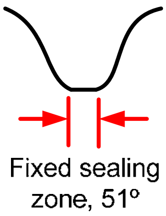
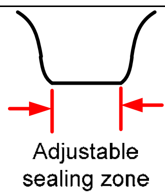
Step 4: Create simulated E-Cam curve
Complete the setting of Step 3 and 4. Click “**Convert to E-Cam Table**” to complete E-Cam table. The system will automatically create the simulated E-Cam curve. Users can download the table into the servo drive.



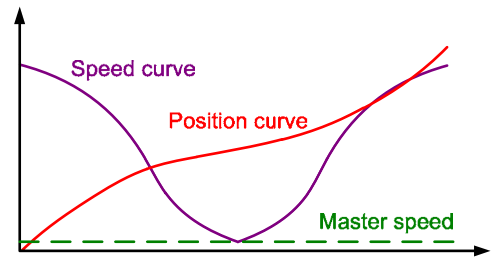
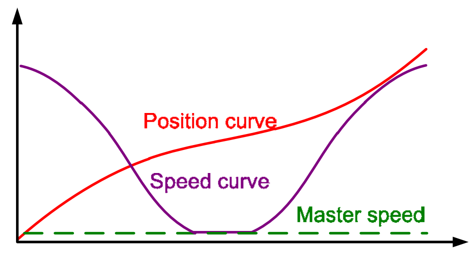
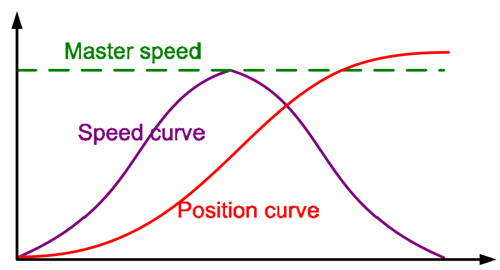
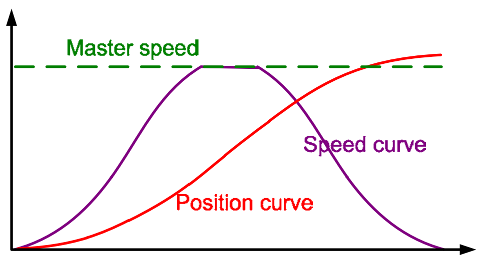
Then, users can complete the setting of E-Cam by following the setting of Step 3 and 4.

[Rotary Shear-W/O Sealing Zone]

ASDA-A2 provides different type of rotary shear curves, which all can be generated by PC software.

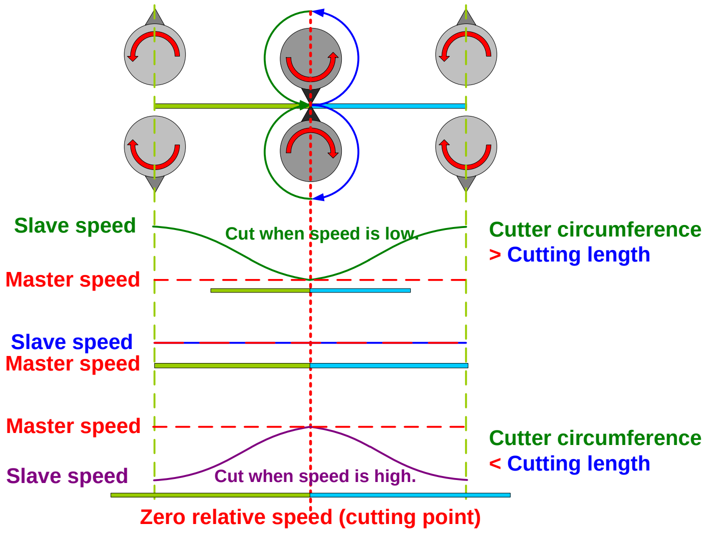
Curve of Rotary Shear	Servo Drive	**PC Software**
W/O sealing zone 	Not supported	**Supported**
W/T sealing zone 	Supported	**Supported**
Adjustable sealing zone 	Supported	**Supported**

Following describes the definition of rotary shear with and without sealing zone by four Bold plots: When the cutter reaches the cutting materials, the speed of master axis and slave axis should be the same.

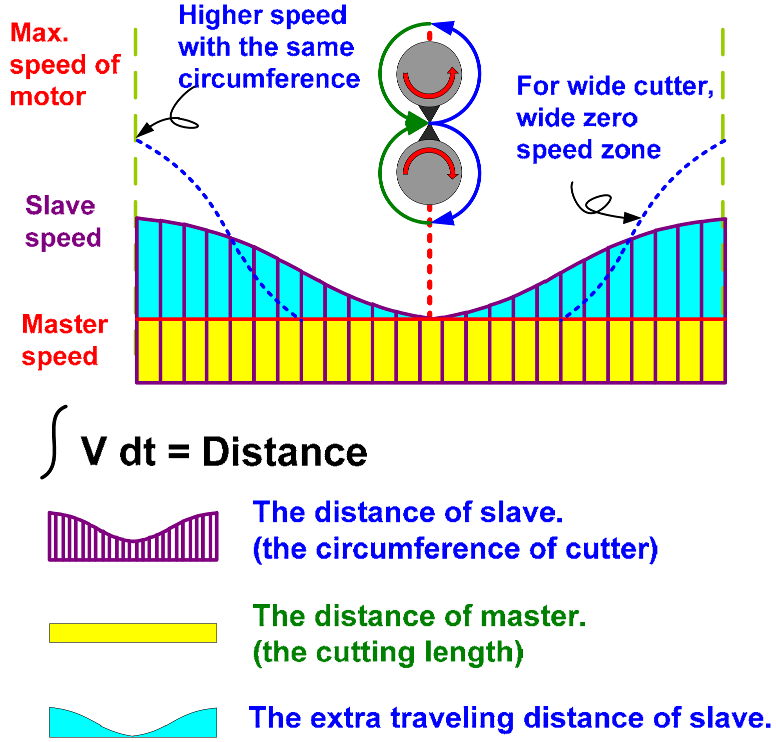
	Curves w/o sealing zone: for sharp cutter application	Curves w/t sealing zone: for flat cutter application
U-shape speed curve: The speed of slave axis slows down for cutting action because the cutter circumference is longer than the cutting length.		
Inverted U-shape speed curve: The speed of slave axis slows down for cutting action because the cutter circumference is shorter than the cutting length.		

In addition, users have to know the proportion of cutter circumference and cutting length since it determines the rotation speed of slave axis.

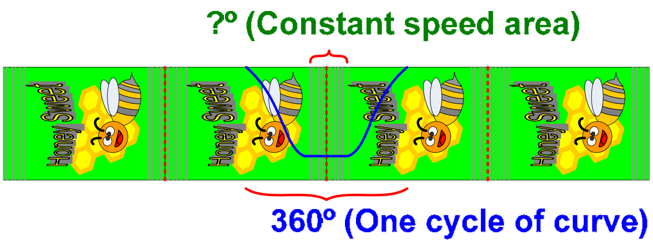
1. Cutter circumference > Cutting length: During cutting, two axes run at the same speed. Other than that, the speed of slave axis is faster than master axis. The faster the slave axis operates, the shorter the cutting length will be.
2. Cutter circumference = Cutting length: As long as two axes run at the same speed, it will be good.
3. Cutter circumference < Cutting length: During cutting, two axes run at the same speed. Other than that, the speed of slave axis is slower than master axis.

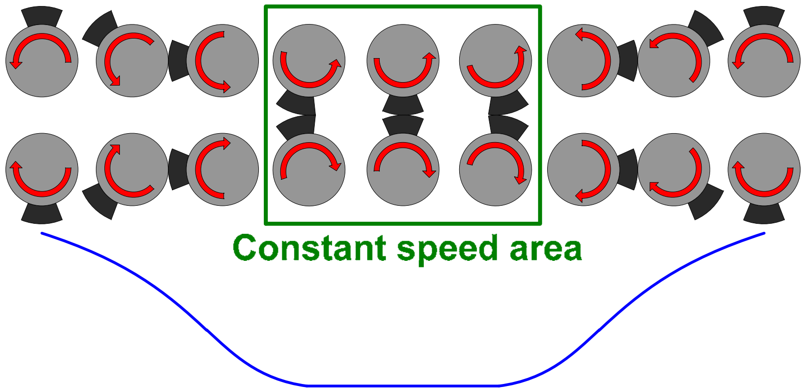


Difference of the speed of slave axis: The operation speed of slave axis can adjust the cutting length. The more constant speed area, the fewer users can do to adjust the cutting length.



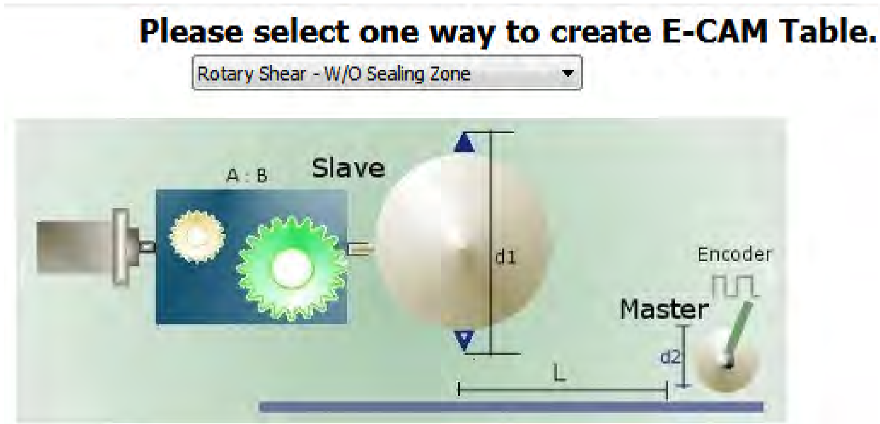
In addition, the definition of constant speed area is determined by the proportion of required constant speed during material feeding, not the constant speed area generated when cutter is operating. Different material needs different constant speed area. Thus, to generate different E-Cam curve is required. That is to say, the constant speed area is determined by the material.



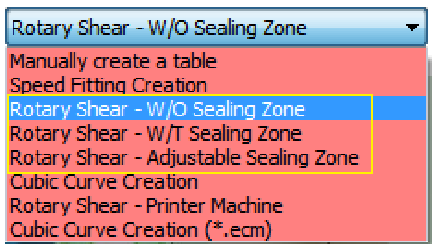


From the above figure, constant speed area is determined by material. E-Cam curve shall be set according to the material.

Here are the setting method and steps of creating rotary shear curves by ASDA-Soft:

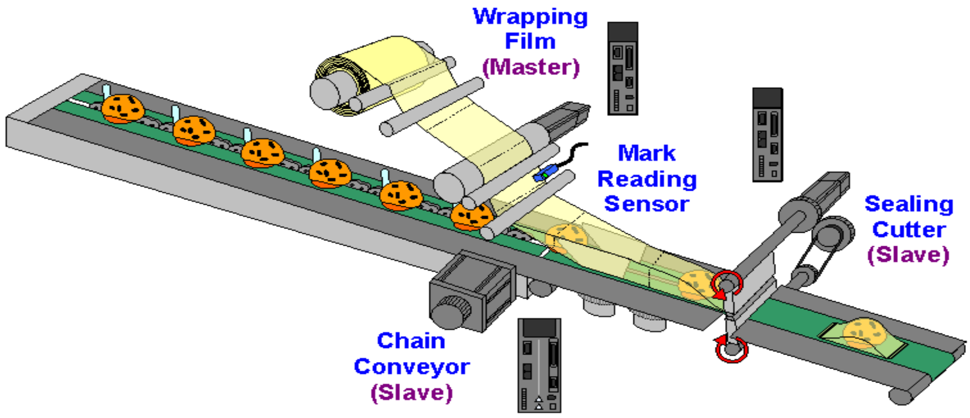


According to the above mentioned rotary shear curves, it provides three options for users:



- **Use “Rotary shear-W/O sealing zone” to create the curve.**
- **Use “Rotary shear-W/T sealing zone” to create the curve with fixed 51° in sealing zone.**
- **Use “Rotary shear-Adjustable sealing zone” to create the curve. Users can setup the width of constant speed area via the software.**

Take an actual application as the example: In packing machine, cutter and chain conveyor should follow the speed of film feeding axis. Please see as below.

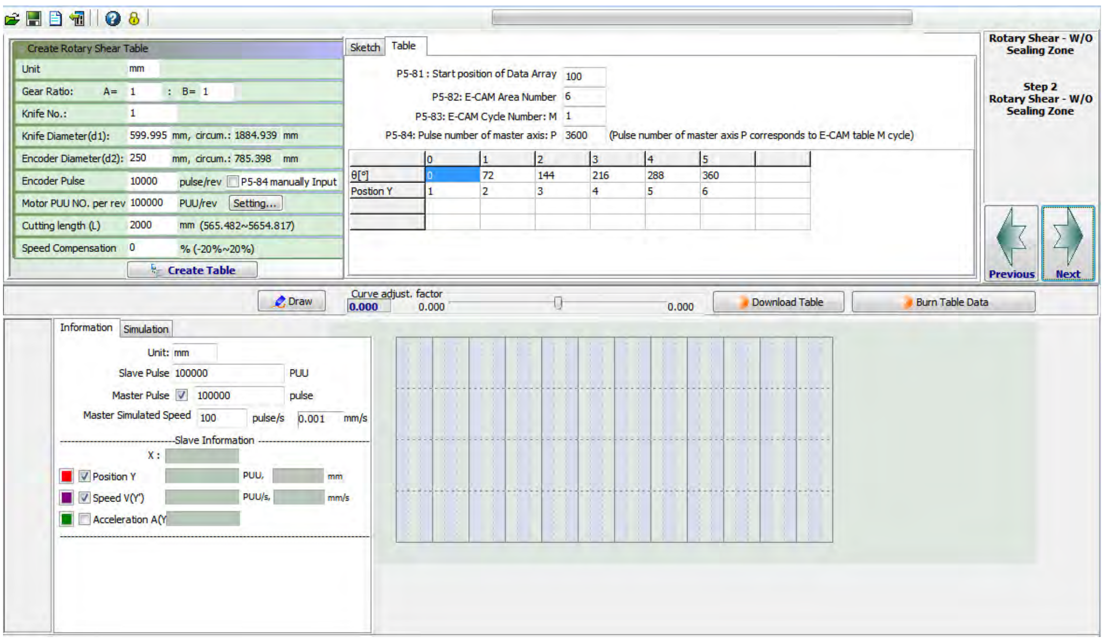


Synchronous axis has the function of mark tracking in packing machine. When the cutting is inaccurate, the system will correct the cutting timing so as to adjust the cutting length and position.

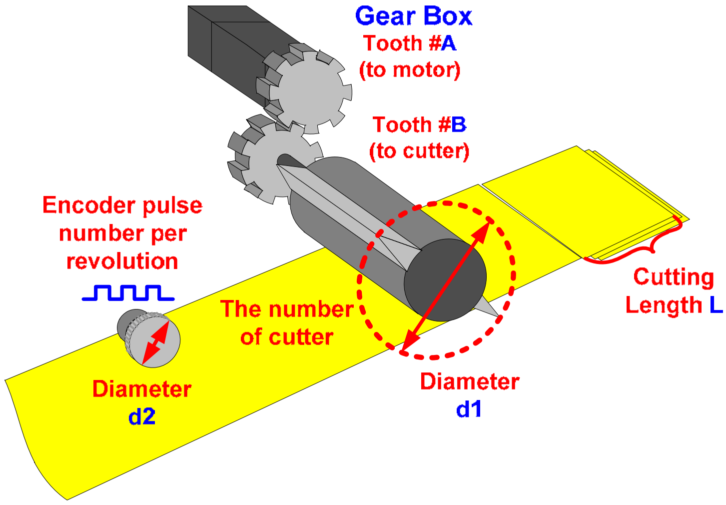
In this application, packing film is the master axis. The cutter and chain conveyor are the slave axes, which operate by following the speed of master axis. When the mark sensor detects the deviation between marks and the setting distance, the cutter and chain conveyor will adjust the speed.

This manual only provides detailed description of creating the table of rotary shear. Please refer to the user manual of ASDA-A2 for further information about the whole application.

Step 1: Click  to open the page of mechanism parameter setting.



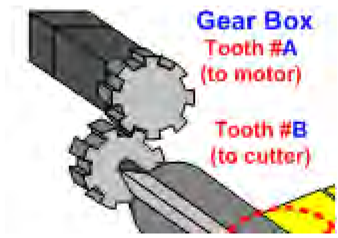
Users need to know the mechanical specifications when creating rotary shear curve. Users have to fill out the mechanical specifications into software then the E-Cam curve can be created.



Step 2: Enter the mechanism value.

Create Rotary Shear Table			
Unit	mm		
Gear Ratio: A=	1	: B= 1	
Knife No.:	1		
Knife Diameter(d1):	599.995	mm, circum.: 1884.939	mm
Encoder Diameter(d2):	250	mm, circum.: 785.398	mm
Encoder Pulse	10000	pulse/rev	P5-84 manually Input
Motor PUU NO. per rev	100000	PUU/rev	Setting...
Cutting length (L)	500	mm (565.482~5654.817)	
Speed Compensation	0	% (-20%~20%)	
	Create Table		

Gear ratio: Gear Ratio: A= 1 : B= 1. Set it up according to the actual mechanical proportion.

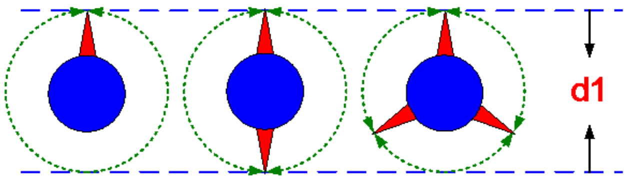


Cutter number and diameter: The cutter number can be changed according to the application and should be equally allocated on the cutter axis. “Cutter diameter” is the rotating distance of cutter tip. Regardless the cutter number, “cutter diameter” is always the same.

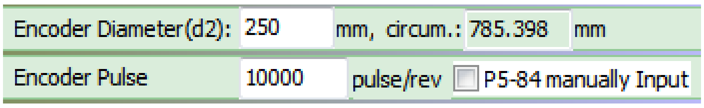
Knife No.:	1		
Knife Diameter(d1):	599.995	mm, circum.: 1884.939	mm

Cutter radius is the distance from the center point of the slave axis to the cutter tip. Thus, two times of the cutter radius is cutter diameter (d1).

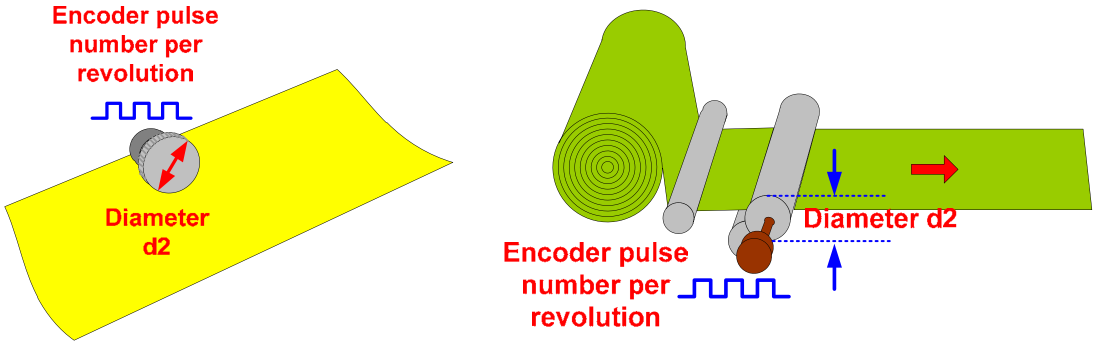
Knife Diameter(d1): 599.995 mm, = circum.: 1884.939 mm x π(pi)



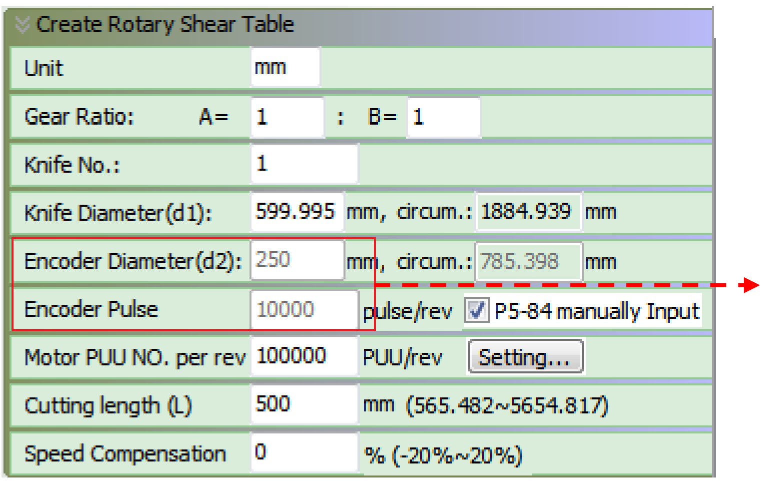
Pulse number and encoder diameter: Encoder diameter is mechanism that rotates along with the material feeding. Its resolution should be a known parameter.



Use the encoder diameter and pulse number per revolution to calculate the command resolution of master axis (= P5-84: Pulse number of master axis).



If the pulse number of master axis is already known, then there is no need to enter encoder diameter and resolution of master axis. Check “P5-84 Manually Input” and directly fill in the pulse number in the blank.



After P5-84 is selected, these two cannot be setup.

Users can manually modify the value of P5-84 at the moment. When P5-83 is set to 1, value of P5-84 represents the pulse number received by slave axis when it operates one cycle. When the value of P5-84 is known, users can manually enter the value.

P5-81 : Start position of Data Array 100

P5-82: E-CAM Area Number 6

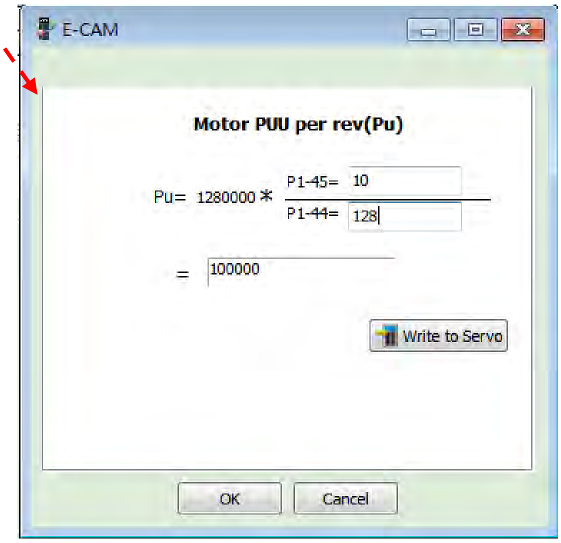
P5-83: E-CAM Cycle Number: M 1

P5-84: Pulse number of master axis: P 3600 (Pulse number of master axis P corresponds to E-CAM table M cycle)

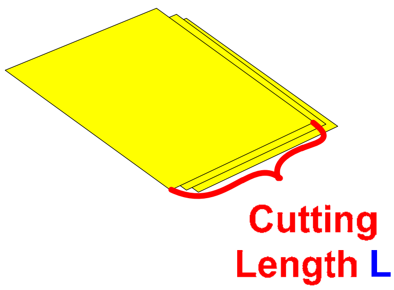
	0	1	2	3	4	5	
θ[°]	0	72	144	216	288	360	
Postion Y	1	2	3	4	5	6	

E-gear ratio of slave axis: It is the required PUU when motor operates one cycle. It the value is known, directly enter it. Users also can calculate the value via E-gear ratio.

Motor PUU NO. per rev 100000 PUU/rev Setting...



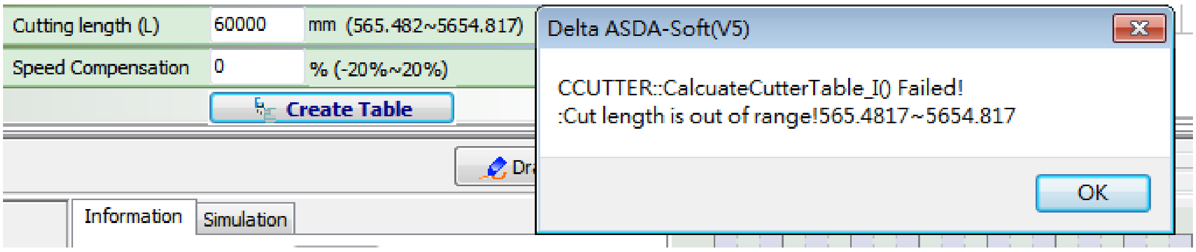
Cutting length (L): Cutting length of the material. Please enter the desired value.



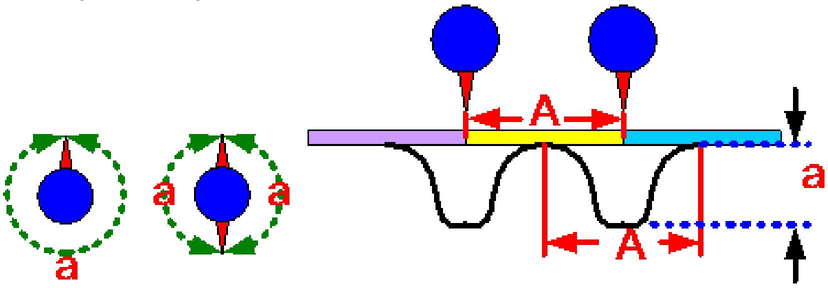
The software will limit the cutting range according to knife number and knife diameter.

Cutting length (L) 500 mm (565.482~5654.817) It limits the setting range of cutting length.

If exceeding the limit, a warning message will pop up:

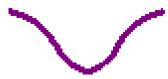
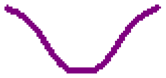
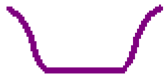


Please pay special attention to the **curve limit** set by the software. It is for avoiding the unreasonable rotary shear curve. For instance, if cutting length A is much shorter than the moving distance **a** of slave axis when cutting, it will be unable to increase the speed of slave axis to satisfy the demand of short cutting length. If the value of R is too small, it might need to modify the mechanism to conquer the problem.

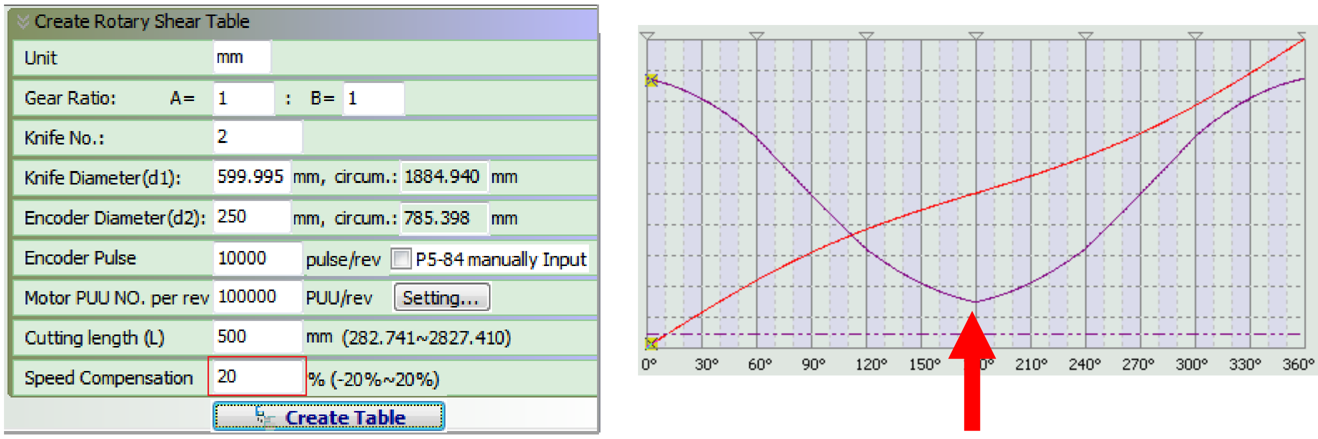


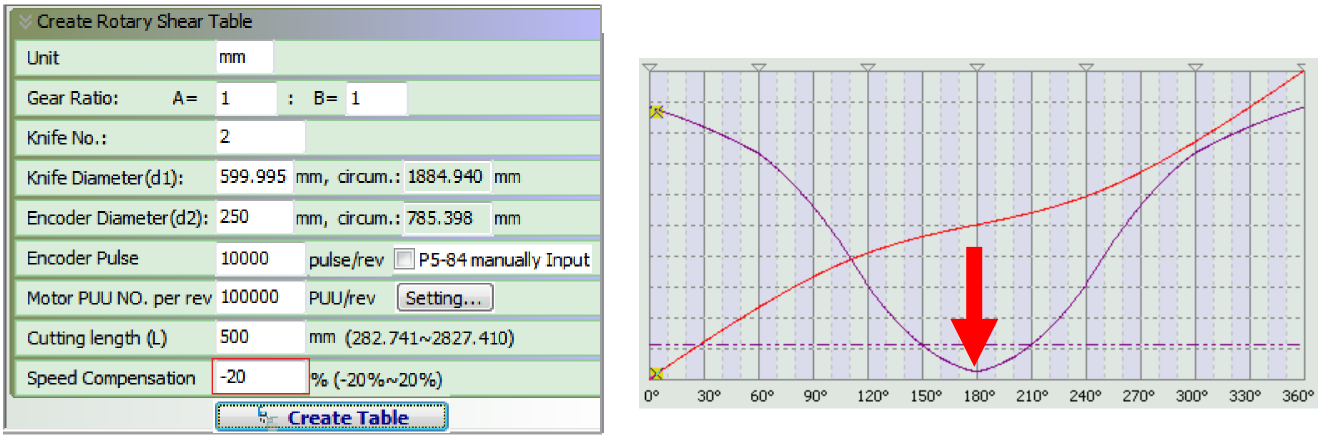
A: Cutting length

a: The moving distance of slave axis when cutting.

R (length ratio) = A / a		
W/O sealing zone		R: 0.3 ~ 3
W/T sealing zone (macro 6)		R: 0.07 ~ 2.5
Adjustable sealing zone (macro 7)		1.88 > R x **speed compensation**

Speed compensation: In some applications, if the speed of master axis and slave axis cannot be the same when cutting, users can change the relative speed between master and slave axis via speed compensation parameter. When the compensation value is positive, the speed of slave axis will be faster than master axis in waiting area. If the value is negative, than the speed of slave axis will be slower than the master.





Step 3: When entering all mechanical value, users have to proceed the setting according to the related parameters of E-Cam curve.

Sketch | Table

P5-81 : Start position of Data Array 100

P5-82: E-CAM Area Number 6

P5-83: E-CAM Cycle Number: M 1

P5-84: Pulse number of master axis: P 63661 (Pulse number of master axis P corresponds to E-CAM table M cycle)

	0	1	2	3	4	5	6
θ[°]	0	60	120	180	240	300	360
Postion Y	0	11557	20401	25000	29598	38442	50000

Users can setup the start address of data array. However, E-Cam area number is unchangeable since it is set by the system.

P5-81 : Start position of Data Array 100

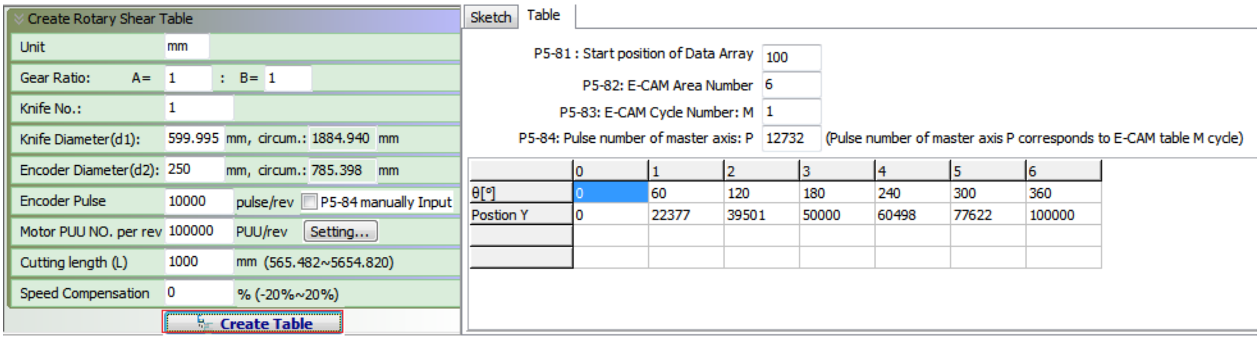
P5-82: E-CAM Area Number 6

If "P5-84 Manually Input" is checked, users can setup the pulse number of master axis.

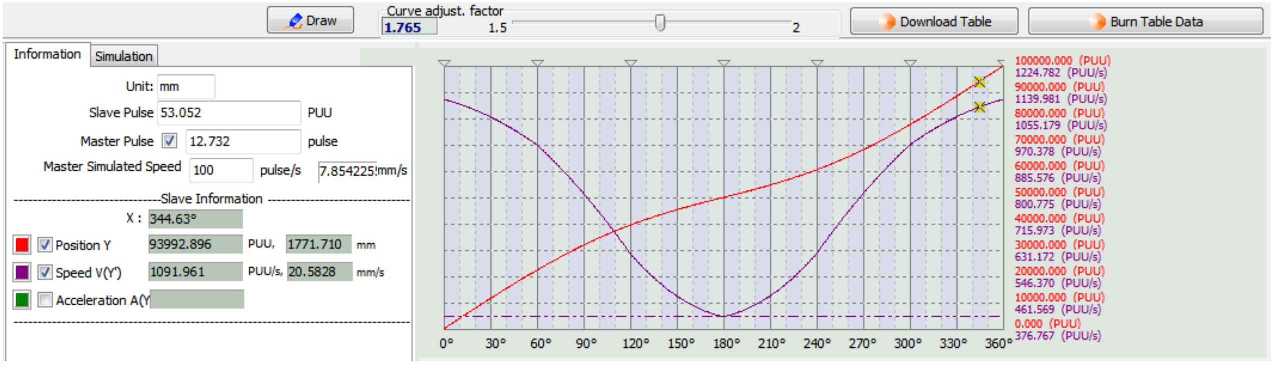
P5-83: E-CAM Cycle Number: M 1

P5-84: Pulse number of master axis: P 63661 (Pulse number of master axis P corresponds to E-CAM table M cycle)

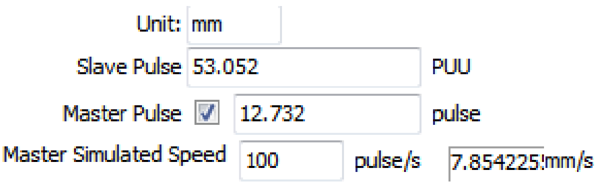
Click **Create Table** to complete the setting of E-Cam curve.



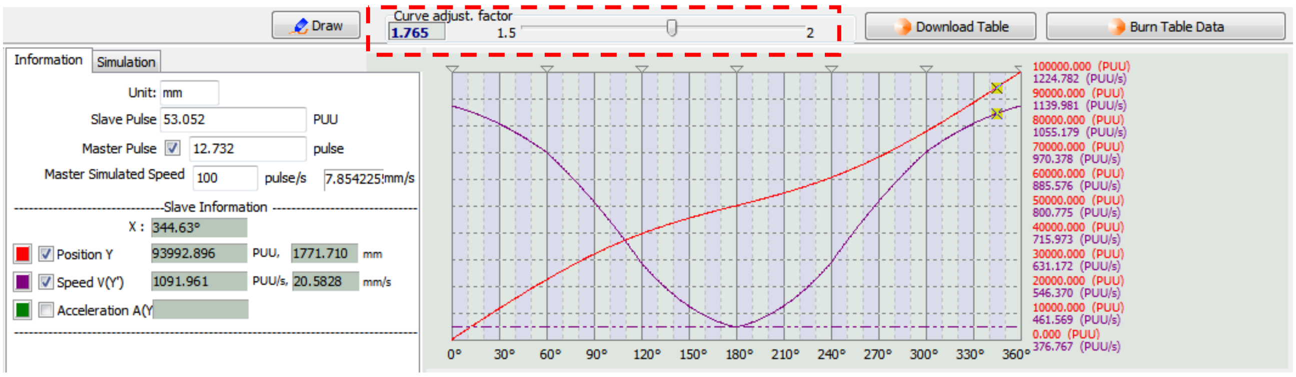
Step 4: Click **Create Table** and the system will automatically drive the curve.



The system will automatically calculate the pulse number of master and slave axis.



In addition, function of table creation in Rotary shear provides the function of “Curve Adjust. Factor”.



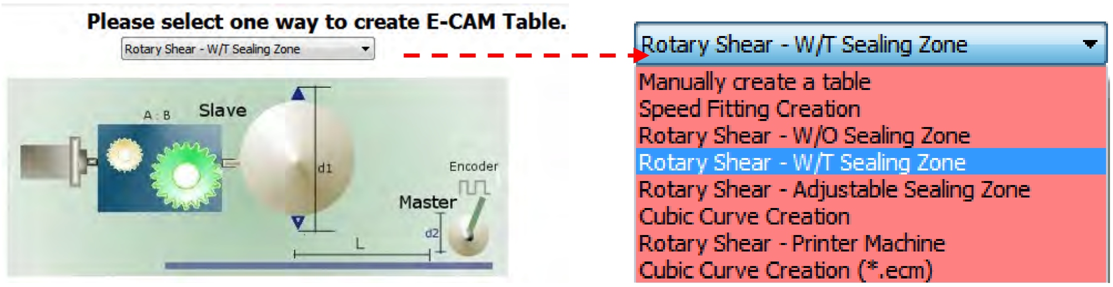
Confirm the diagram is correct. Then, users can download the table into the servo drive. If desire to keep the curve inside the servo drive when power off, click **Burn Table Data** to burn the table data into ROM.

When the setting of material feeding axis and filling axis is complete, please proceed to Step 3 and 4 (Please refer to the description of “Manually create a table” in previous section.).

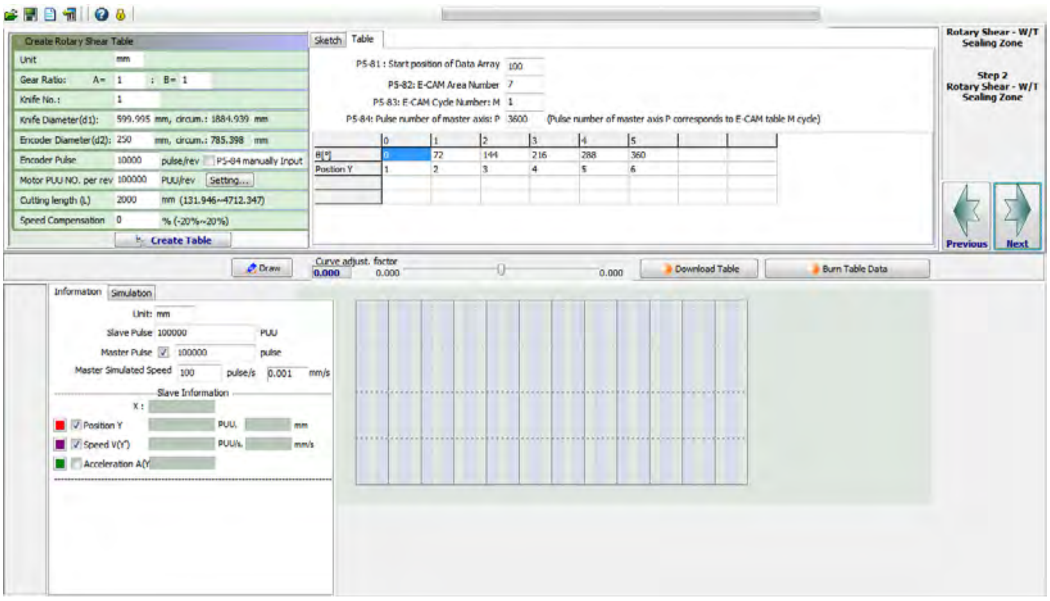
Followings introduce features of “Rotary shear-W/T sealing zone” and “Rotary shear-Adjustable sealing zone”.

- When applying “Rotary shear-W/O sealing zone”, the curve it created is the one without synchronous area.
- **When applying “Rotary shear-W/T sealing zone”, it could create the curve which fixed at 51°.**
- **When applying “Rotary shear-Adjustable sealing zone”, it could setup the width of constant speed area via the software.**

Create the curve by “Rotary shear-W/T sealing zone”.

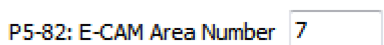


If the material is changed, setup the cutting length again and check if speed compensation is needed will do.
The setting in this page is the same as “Rotary shear-W/O sealing zone”.

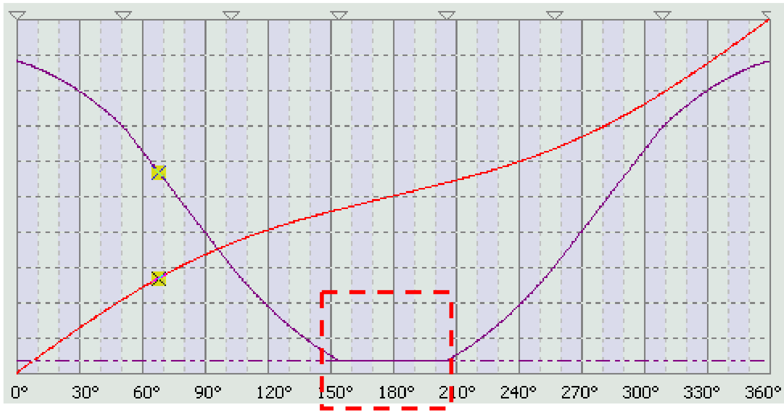


Its interface of setting value is different from “Rotary shear-W/O sealing zone”:

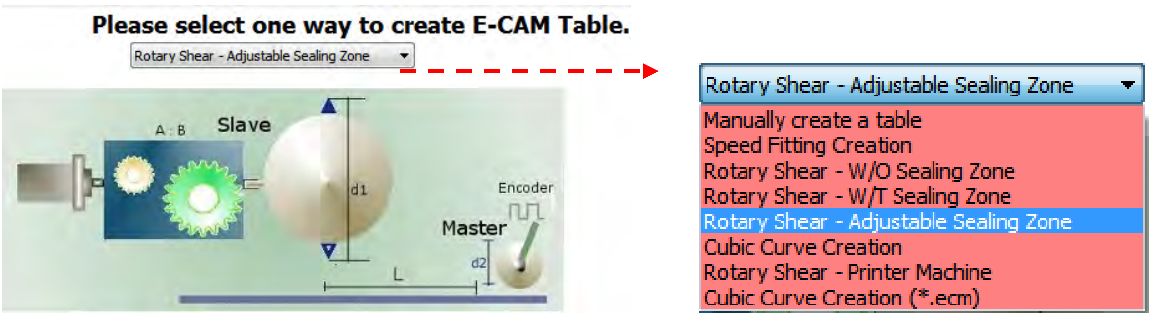
- The setting range of cutting length (L)
- Value of P5-82 (E-Cam: Area No.) has to be 7. It is because when using this macro, the value of P5-82 is fixed at 7, which means E-Cam only has 7+1 parts and is unchangeable.



- Since **"Rotary shear-W/T sealing zone"** would create the curve which fixed at 51º, the synchronous area is therefore generated.



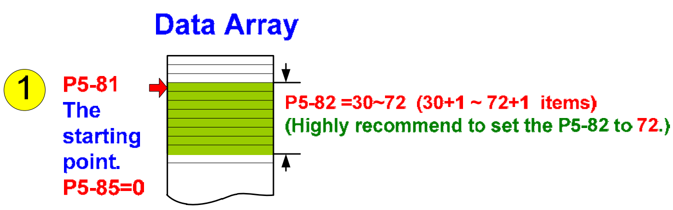
Create the curve with "**Rotary shear-Adjustable sealing zone**":

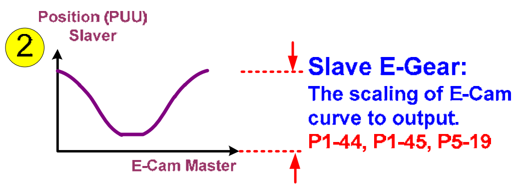


Normally the width of the cutter remains the same. However, different material needs different cutting length and the angle of synchronous zone. Setup the cutting length and make sure if speed compensation is necessary when the material is changed. The setting method is the same as "Rotary shear-W/O sealing zone", to complete the mechanical value.

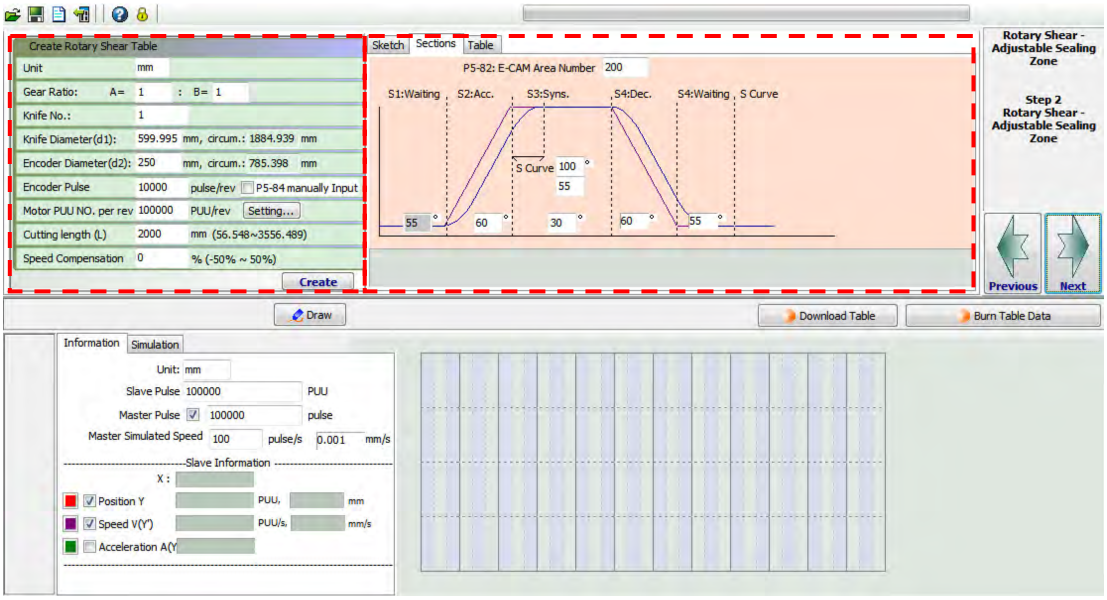
When applying **"Rotary shear-Adjustable sealing zone"** to create the curve, please pay special attention that the first step is to setup related parameters for storing E-Cam curve in data array, including P5-81 (E-Cam: Start address of data array) and P5-85 (Engaged time). When using macro 7, P5-82 is the only parameter that can be adjusted, whose range is between 30 and 72. It means users can divide the E-Cam curve into 30 ~ 72 parts. 72 can bring the best curve resolution.

The second step is for setting up the scaling of E-Cam curve, including E-gear ratio, P1-44/P1-45(E-Cam is a part of the system and would be influenced by E-gear ratio) and P5-19 (E-Cam curve scaling).

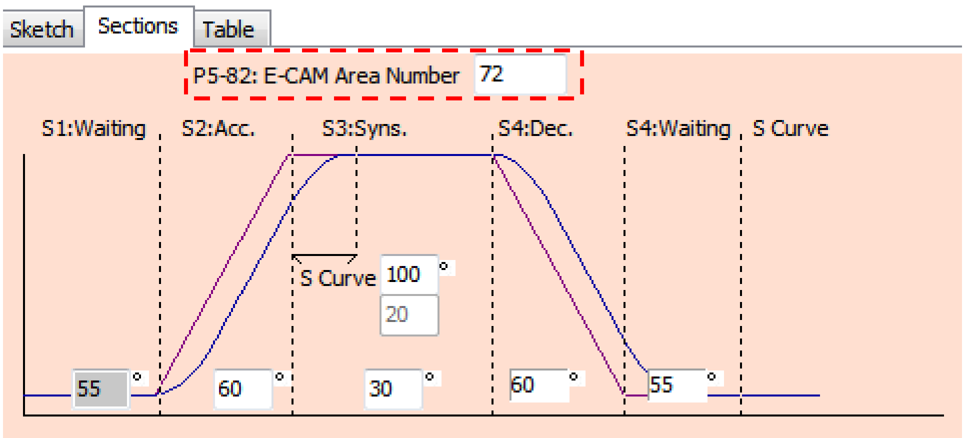




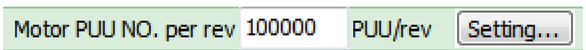
Please proceed the setting of the first and second step.



Step 1: Setup E-Cam area number. It is suggested to set the value to 72 to can bring the best curve resolution.



Step 2: Setup E-gear ratio P1-44/P1-45 **(If it's necessary)**.



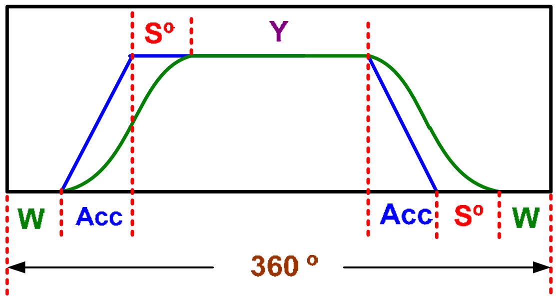
Step 3: Setup the speed allocation of E-Cam curve. The size of constant speed area in E-Cam curve is adjustable, thus other areas including Acceleration/deceleration area, S-Curve and Stop area should be manually setup. For a smooth operation, each part of the curve should be equally arranged. The aim of S-curve is to smooth the operation during speed variation. The S-curve is set by scale and it's setting range is from 1 to 4, while the others are set up by angle.

3

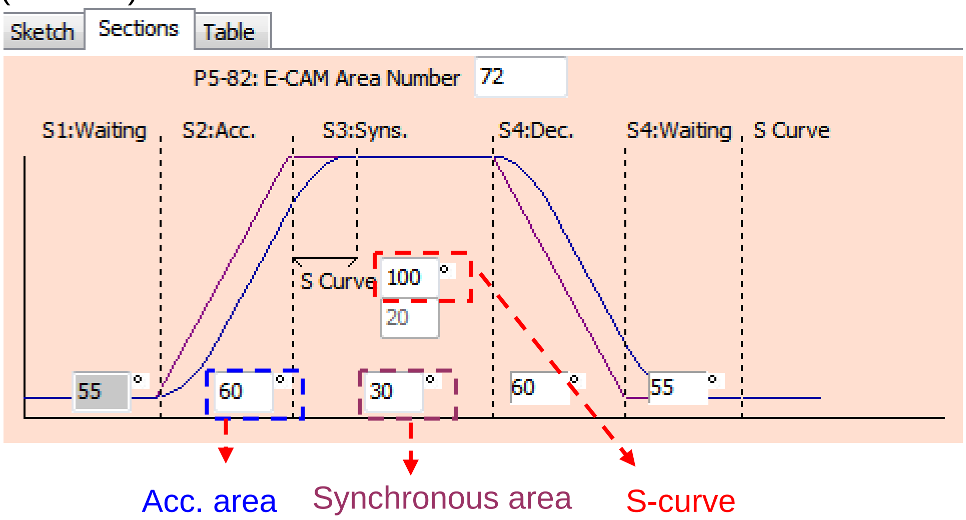
360° = 2W + 2Acc + 2S° +Y
S° = (2^S) * 360 / (P5-82)

P5-82=72

S	1	2	3	4
S°	10°	20°	40°	80°



Users have to setup three parameters when using software to setup speed allocation of E-Cam curve: **Acc** (Acceleration area), **Y** (Synchronous area) and **S°** (S-Curve) .

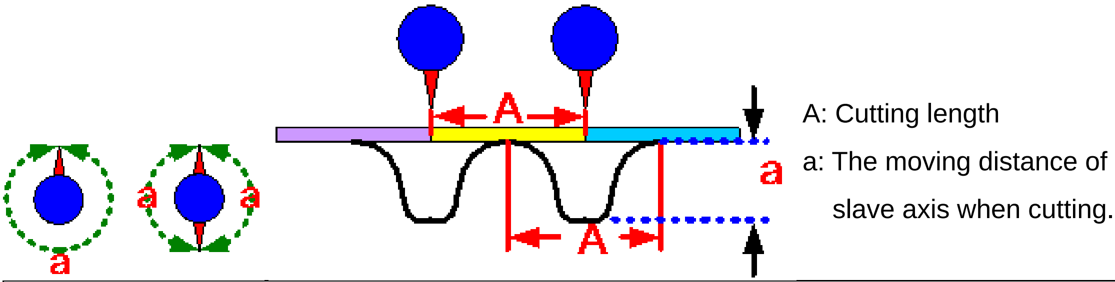


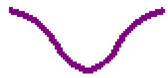
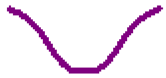
See the above graph as example, 2×55°(waiting area) + 2×60°(Acceleration area) + 30°(Synchronous area) + 100°(S-curve) = 360°.

Please note that P5-82 (E-Cam: area number), S-curve and waiting area are all related.
S°(S-curve) = (2^S) × 360° / (P5-82)
S1 waiting area = 180° + 360°/ (P5-82) - 360°/ **R** + (P5-94) / 2

	P5-93.H (Hex.)	P5-93.L (Hex.)
P5-93	**16 bits (S level, 1~4)**	**16 bits (W ,0~170°)**
P5-94	**32 bits (Y, Synchronous Area, 0~330°, Decimal)**	

Pay attention to the limit of curve creation. This is for avoiding the unreasonable rotary shear curve created by software. For example, when cutting length **A** is much shorter than the required moving distance **a**, it is unable to increase E-Cam speed to meet the requirement of short cutting length. If value of **R** is too small, it usually needs to conquer the problem by modifying the mechanism.



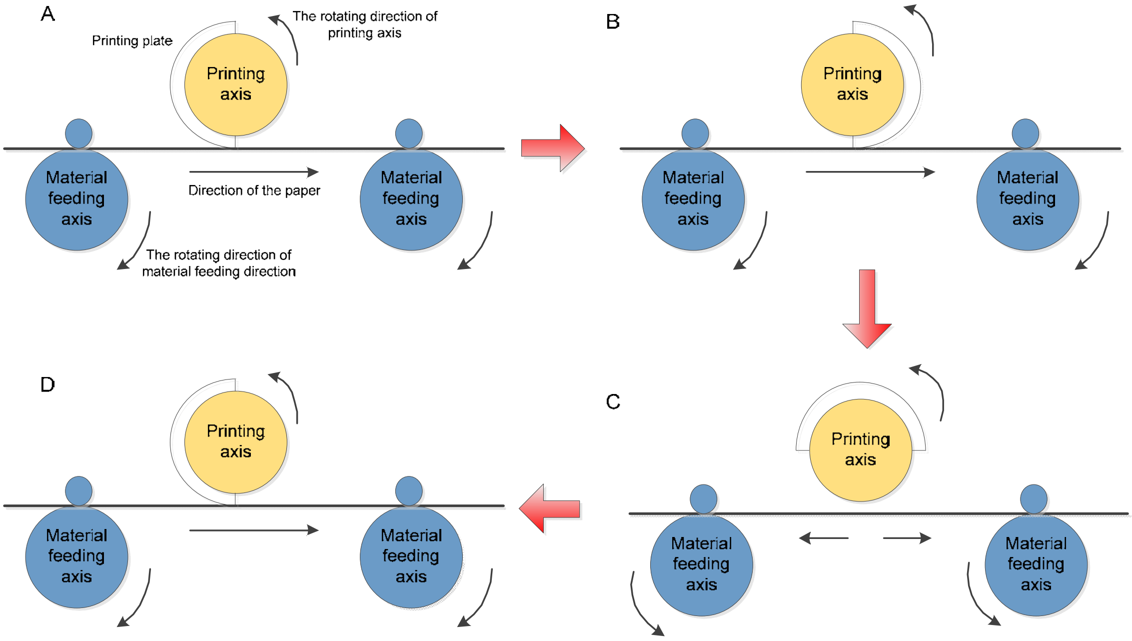
R (length ratio) = A / a		
W/O sealing zone		R：0.3 ~ 3
W/T sealing zone (macro 6)		R：0.07 ~ 2.5
Adjustable sealing zone (macro 7)		1.88 > R x **speed compensation**

Users shall complete the mechanical value, which is the same as Rotary shear-W/O sealing zone.

Then, proceed setting of Step 3 and 4. Please refer to the detailed description of “Manually create a table” in previous section.

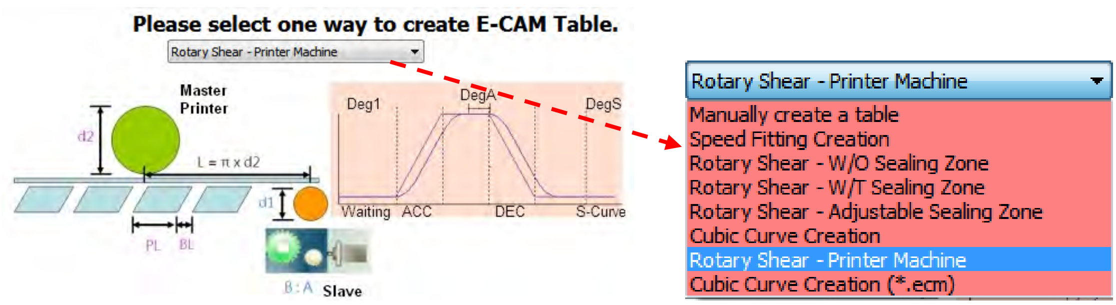
[Rotary shear – Printer machine]

Here comes the operational principles:
The relation between printing axis and material feeding axis is shown as below. Each printing axis does not connect to ball-screw but operates individually. Due to the printing length limit, it cannot do full printing. The printing axis operates at constant speed and same direction. When the printing plate reaches the paper (graph A), the speed of paper and printing plate is the same and both are in the same direction (graph B). When printing is complete, paper and printing plate separate (graph C). Then, paper decelerates to stop and operate towards the opposite direction for a short distance (graph D). When it starts printing again, paper operates at the same speed and same direction as the printing cylinder. So that the printing plate always synchronizes with the paper when printing. If the printing axis and paper separate, paper is retrieved. Both axes still synchronize with one another. With this pattern, the adjacent printing pattern is closely arranged with one another and it therefore saves the use of paper. This application is very common in intermittent printing machine.

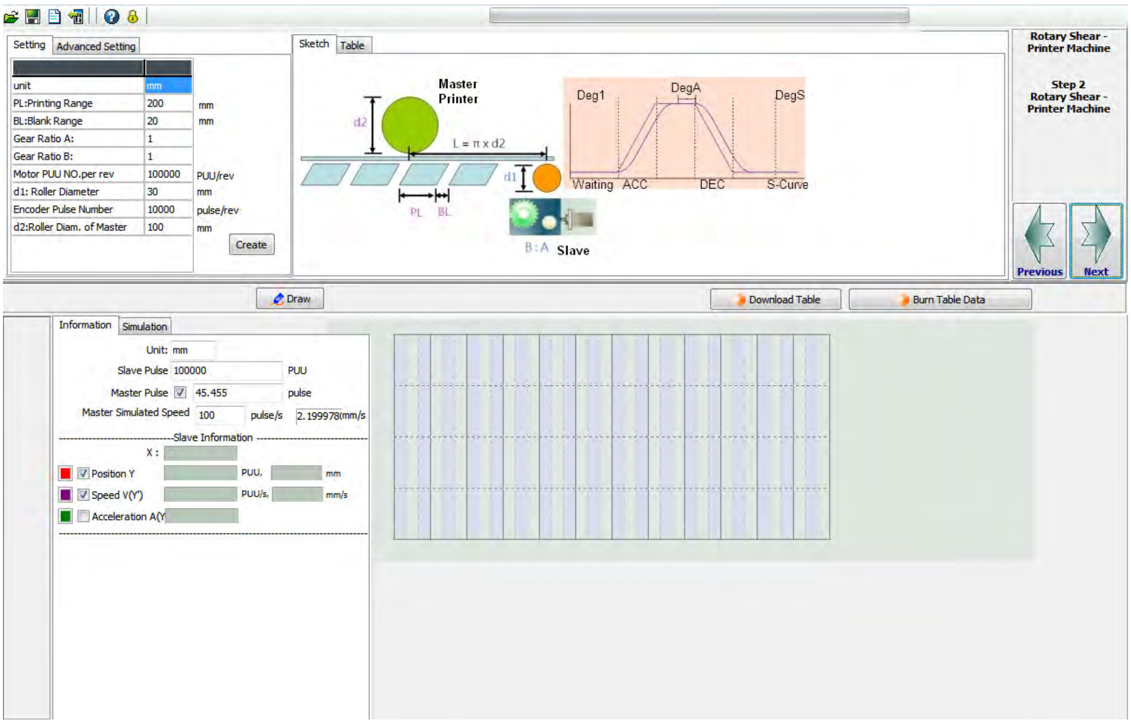


ASDA-Soft provides servo setting wizard for intermittent motion control. Users could plan it according to the required print area and blank area and manually adjust the angle in synchronous area and waiting area. Complete the setting of material feeding axis by following the steps below.

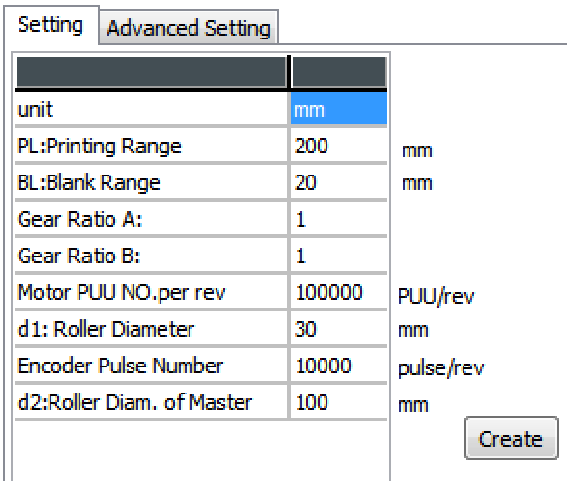
Step 1: Select “Rotary shear-Printer Machine” to enter the main page.



Step 2: Enter the main page.

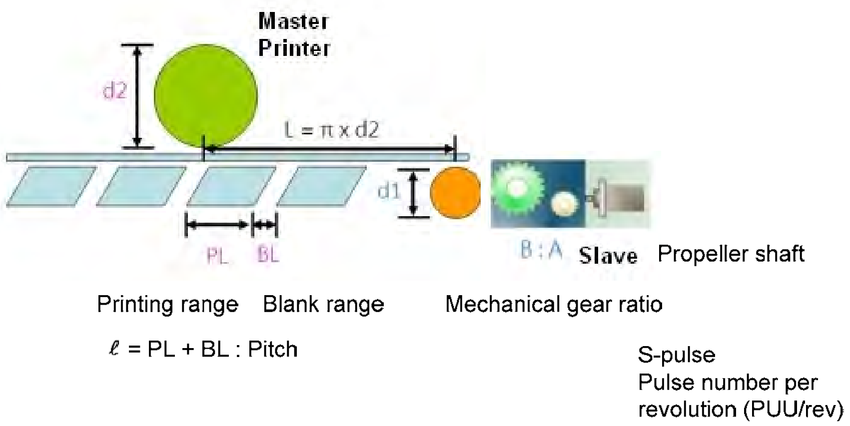


Parameter setting of mechanism is provided in "Setting".



unit	mm	
PL:Printing Range	200	mm
BL:Blank Range	20	mm
Gear Ratio A:	1	
Gear Ratio B:	1	
Motor PUU NO.per rev	100000	PUU/rev
d1: Roller Diameter	30	mm
Encoder Pulse Number	10000	pulse/rev
d2:Roller Diam. of Master	100	mm

Followings are the theorem of software function and its setting method:



Users have to learn the relation of each unit of length in advance.

L (Circumference of printing cylinder) = π x d2

ℓ (Pitch of materials) = PL + BL

R = L / ℓ (equals to the "cutting length" in Rotary shear. In printing application, most cases are R > 1.)

Take the initial parameter in software as the example:

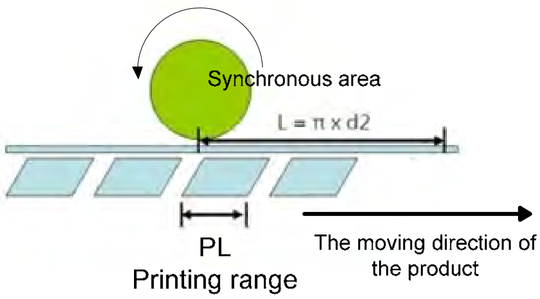
L (Circumference of printing cylinder) = π x 100 = 314.15 mm

ℓ (Pitch of materials) = PL + BL = 200 + 20 = 220 mm

R = L / ℓ = 314.15 / 220 = 1.428 (R > 1, reasonable range)

In addition, L (Circumference of printing cylinder) has to be larger than ℓ (Pitch of materials). The purpose of intermittent motion is to save the use of space and reduce the cost. Idling wastes the materials.

How we determine the width of synchronous area:



deg_sync (Degree of synchronous area) = PL / L x 360°. This formula can help to calculate the degree of synchronous area.

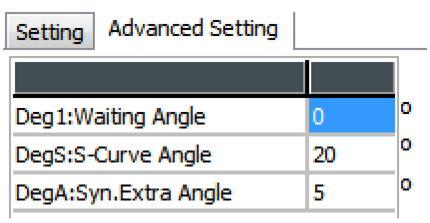
Take the initial parameter in software as the example:

deg_sync (Degree of synchronous area) = PL / L x 360° = 200 / 314.15 × 360 = 229.190°

Please note that the setting of Degree in waiting area and S-curve cannot exceed 360°.

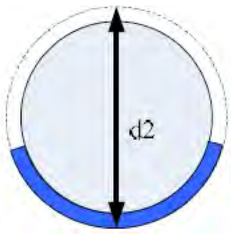
In addition, if desire to stabilize the printing quality, increase the range of synchronous area will do, deg_sync (Angle of synchronous area) = PL / L x 360° + SyncAdd (increase the degree of synchronous area).

SyncAdd(increase the degree of synchronous area) can be setup via DegA in "Advanced setting".



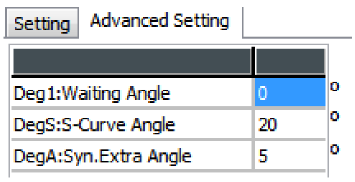
Complete the setting of printing range and setup mechanical parameters. Users only have to fill in the value of the setting mechanical parameters. Please note that pulse number of the encoder: Printing axis is the master axis of printing machine. Pulse number from the encoder represents the one sent by printing roller per cycle. If master axis connects to the printing roller, its setting value is (P1-46)*4. If the printing roller is equipped with decelerator, then the factor needs to be taken into consideration. For instance, if the decelerator is 1:5, then the setting value should be (P1-46)*4*5.

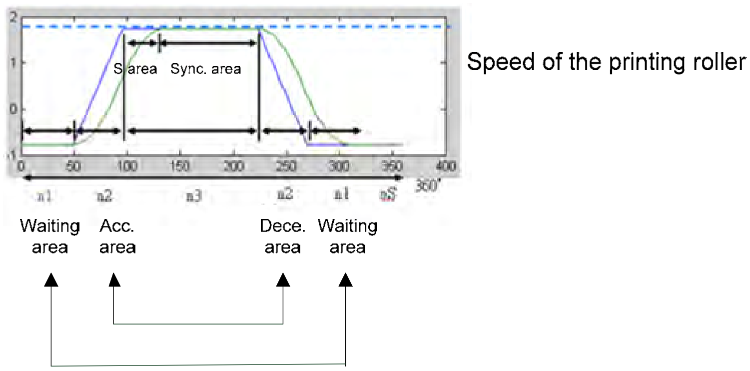
d2: Diameter of printing cylinder includes the length of printing plate.



When “Setting” is complete, users can click “Advanced setting” to slightly adjust the curve.

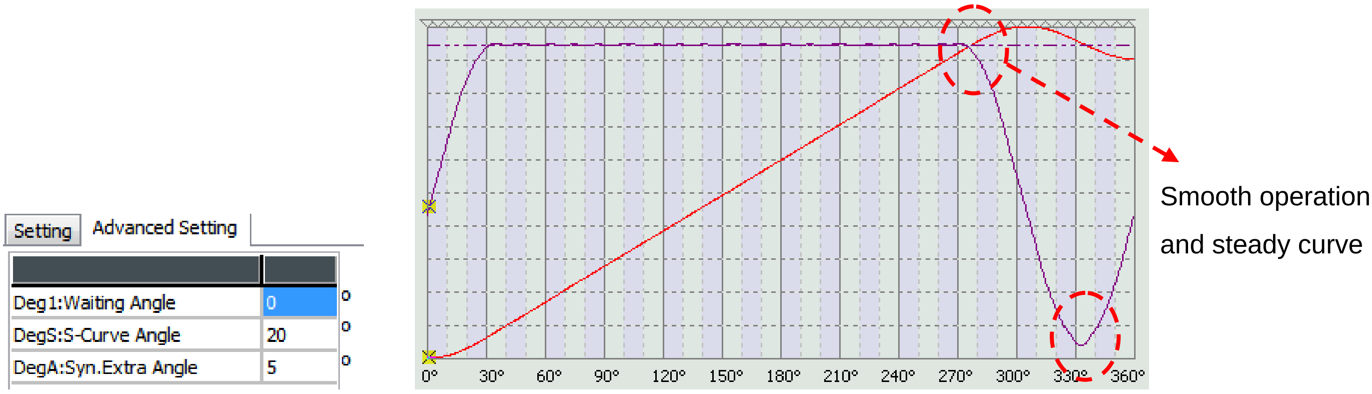
We also use rotary shear to program the E-Cam curve. Thus, the setting method is still the same. The synchronous area is set according to the mechanical condition. Users can slightly adjust the degree of waiting area and S-curve.



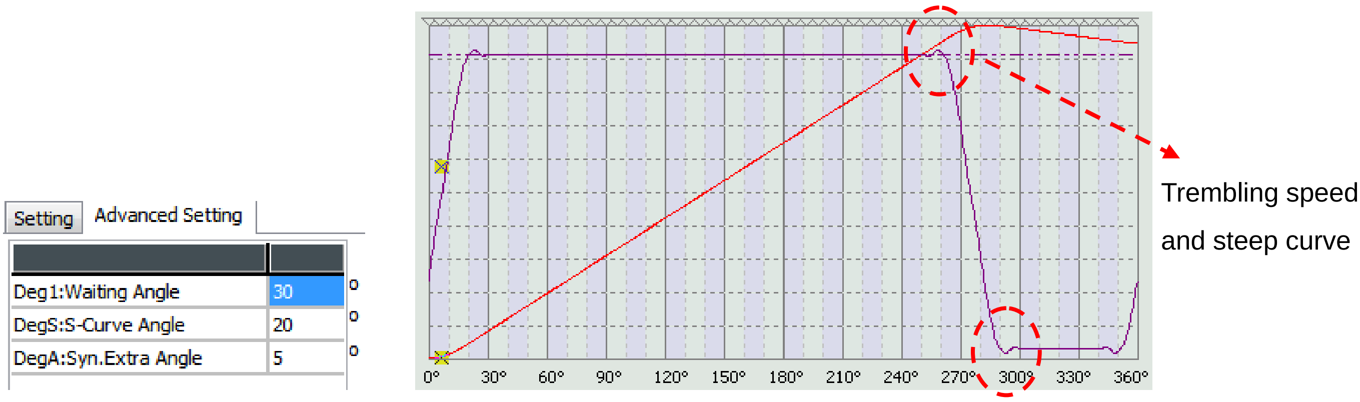


The setting method of waiting area: The initial value in waiting area is 0. It is because the acceleration/deceleration curve is smoother than no one in this status. The bigger value in waiting area, the shorter distance motor can run in reverse direction and the speed change is severer. It is easier to cause current overload.

See the example below. The waiting area is set to 0°.



See the example below. The waiting area is set to 30°.



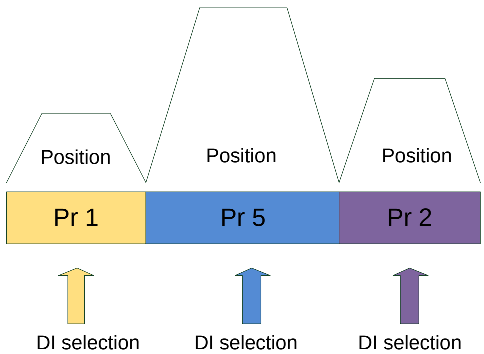
A special example: If the motor is still overload when the waiting area is set to 0, then, it is suggest to:
(1) Reduce the speed of master axis (printing cylinder)
(2) Replace by a motor with bigger horsepower.

After the above setting is all complete, users have already created the E-Cam curve for intermittent motion. The next step is to continue the parameter setting of Step 3, Step 4 and PR mode.

4.2 PR Mode Setting

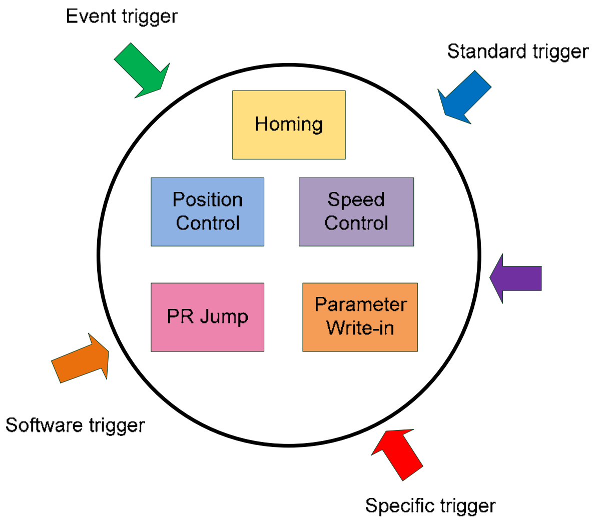
PR (Position Register) is a brand new built-in motion control mode in ASDA-A2 series servo drive. It is no longer the traditional point-to-point control, but enables the servo drive to change the motion command anytime. ASDA-A2 has 64 PR in total. Followings describe the difference between traditional and new PR of ASDA-A2.

Traditional method: Motor runs when DI triggers one PR. Its command is non-continuous. One command has to be executed completely in order to run the next one. For point-to-point control, the command only can be interrupted but not changed in half way.



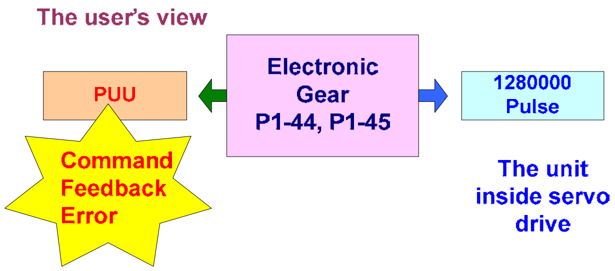
Traditional Method

Innovative Method of ASDA-A2: The command can be changed by external trigger or internal interruption. Various external triggering methods are offered in ASDA-A2, which differs from the traditional one. Users can operate with different kind of functions, such as homing control, position control, speed control, procedure jump, parameters written-in and ect.



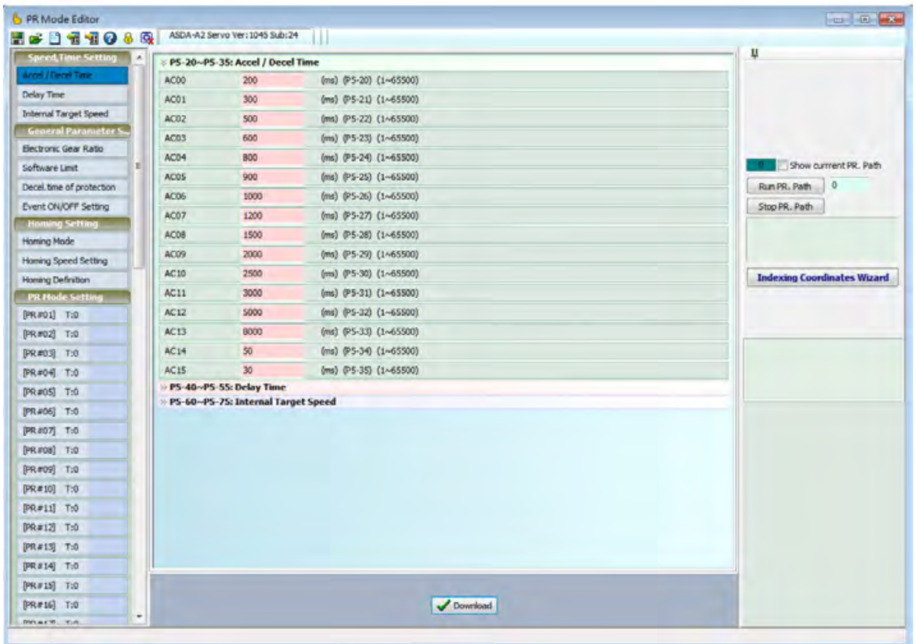
Innovative Function of A2

Before introducing PR mode, here comes the description of PUU, a newly defined unit. It is a value which is scaled by E-gear ratio, “feedback value equals to the command”. For example, when the servo drive issue the command with 10000 PUU, users can acquire the feedback value of 10000 PUU after the position is complete. When the setting of e-gear ratio is done, values of command, feedback and error will remain, which is easy for users to monitor.



Features of "PR Mode Setting" of ASDA-A2 are described as below:

- 9 main homing modes and more than 30 combinations as sub-items are included.
- Users can do constant speed control in speed mode, including acceleration/deceleration curve program.
- Excellent position control, such as position command (absolute command, relative command, incremental command, CAP command and etc).
- Newly added jump function: It can change the sequence of procedure, increase the repetition and flexibility of the system.



This section is divided into three parts:

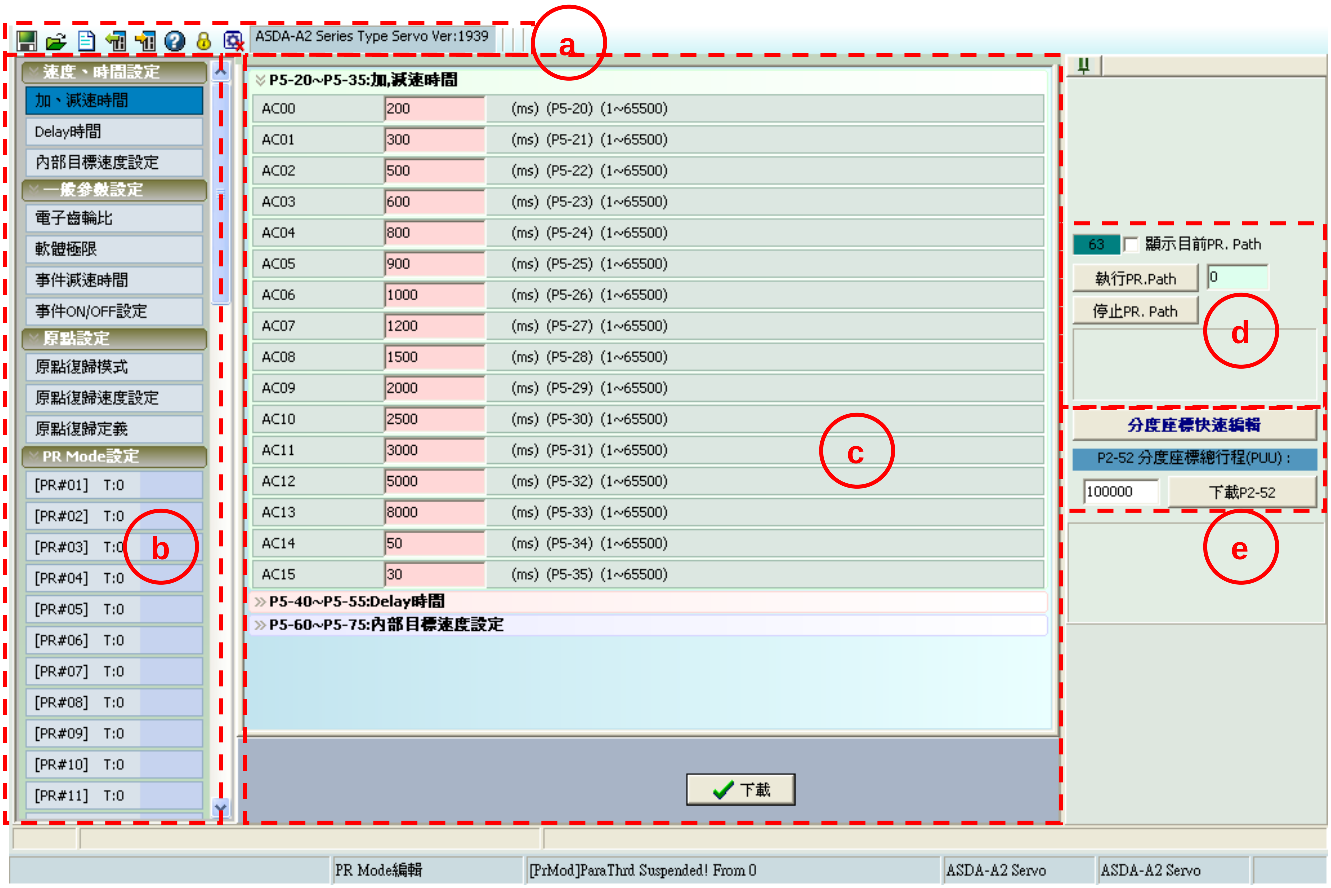
【**Interface Introduction**】: It describes the functions and features of the interface.

【**Mode Setting**】: It describes operation steps of homing mode, position mode and event setting.

【**Example**】: Users can practice how to setup the software.

Interface Introduction

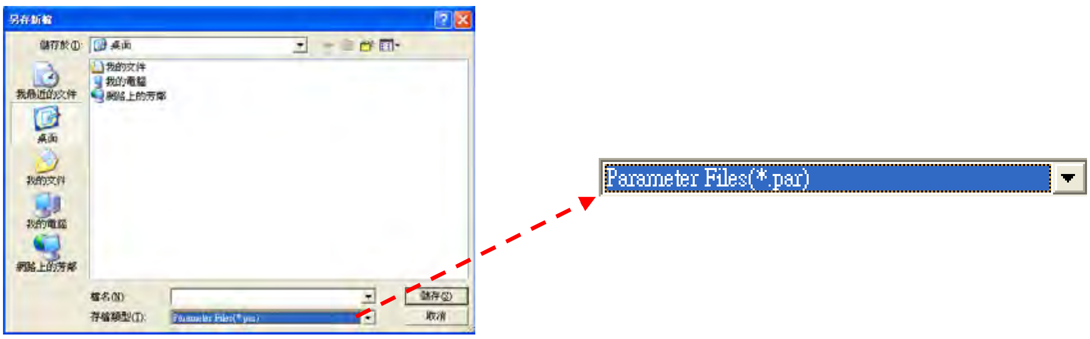
The following main screen is divided into 5 parts:



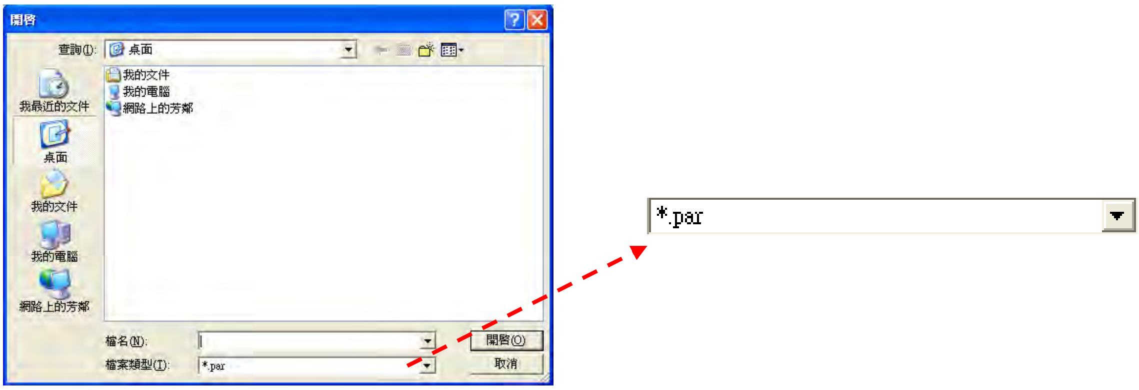
a.) Firstly introduces [Toolbar]:

: Save as a file

Save the PR mode as a parameter file.

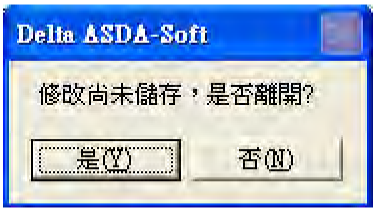


: Open files



: New edit

A confirmation window will pop up. Please make sure if desire to close the current setup status.

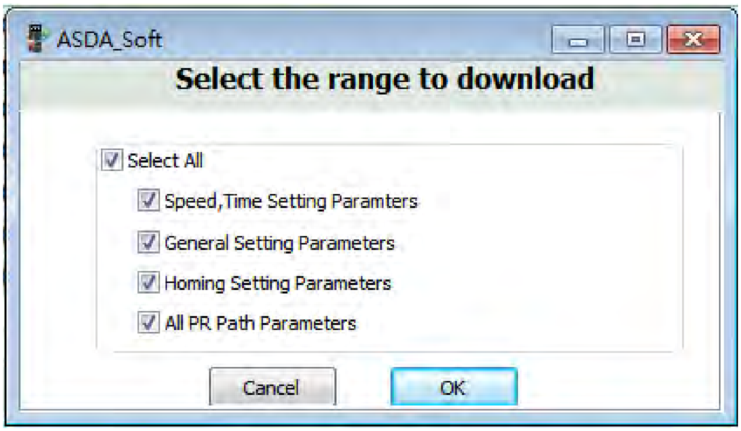


: Load from servo

Load the related parameters of PR mode from servo drive to the software for editing.

: Write all into the servo

Write the related parameters of PR mode from servo drive to the software for editing. In addition, users can download the parameter of each mode.



: Operation Description

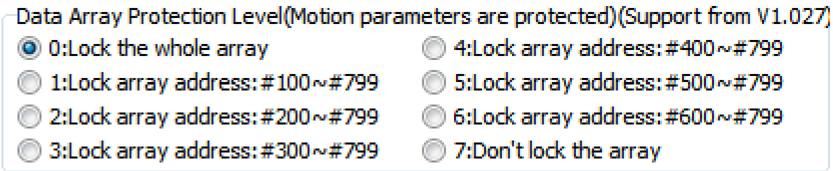
A description window will pop up when click this. Users can read through the operation of PR mode.

: Password Setting

This function can be used to setup password to protect data array. This function can make sure users will not lose data in data array caused by improper operation.

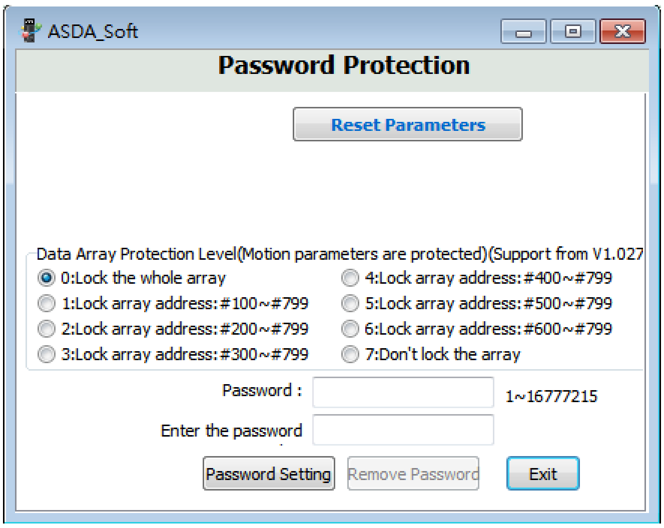
Please note that this function is available from firmware version V1.027.

The setting range can be divided into:



When password setting is complete, the following window will pop up.

Enter the password to remove this function.

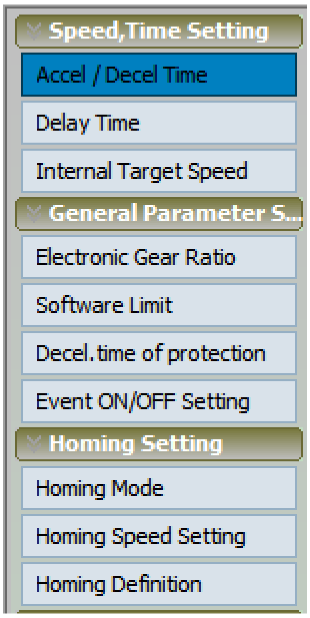


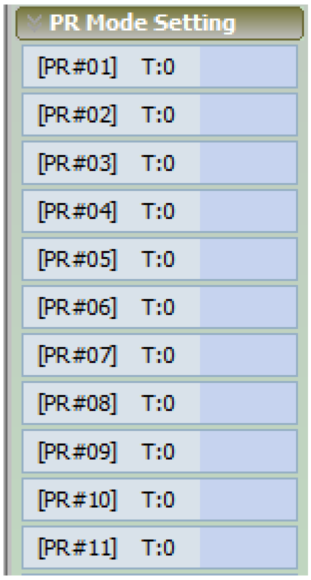
: Stop Operation

When users is editing parameters in online status, if desire to stop accessing parameters via communication, click  and the following warning message will pop up and stop parameters accessing.

The firmware version of the connected servo drive is showed in the most right of the toolbar. (ASDA-A2 Series Type Servo Ver:1939)

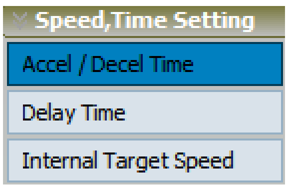
b.) [Mode Setting]:



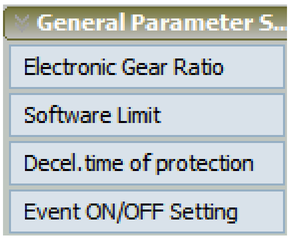


Four modes setting are showed in the left side of the main screen. Followings are the descriptions:

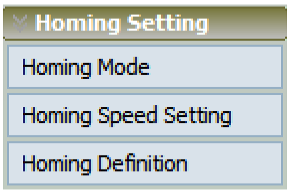
- Speed, Time Setting: 16 sets of acceleration and deceleration can be defined in parameter P5-20 ~ P5-35. 16 sets of delay time can be defined in parameter P5-40 ~ P5-55. 16 sets of target speed can be defined in parameter P5-60 ~ P5-75. The above mentioned data are shared by all PR.



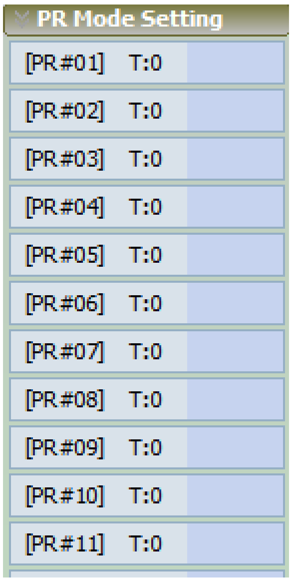
- General Parameters Setting: Some basic parameters which are commonly used in PR mode can be setup here, such as electronic gear ratio, software limit (forward/reverse), deceleration time of protection and event on/off setting.



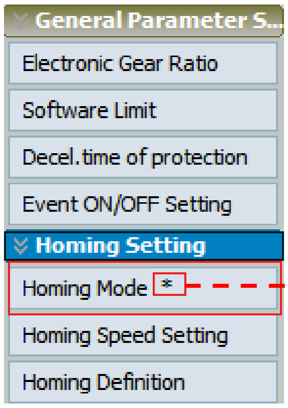
- Homing Setting: Users can setup homing function in this mode. Next section will have detailed description.



- PR Mode Setting: Users can use different specifiable ways to setup PR path in this function, such as PR jump and PR overlap. Total 63 PR are provided, from PR#1 to PR#63.

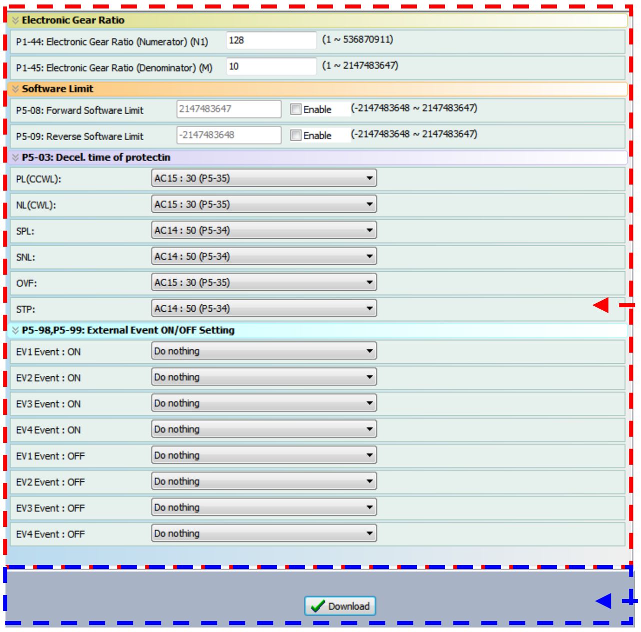


In addition, when users did modify the setting but not download the changed one into the servo drive, the modified area will show the symbol of "*****".



It means the setting is modified but hasn't been downloaded into the servo drive.

c.) [Main Setting Window]:



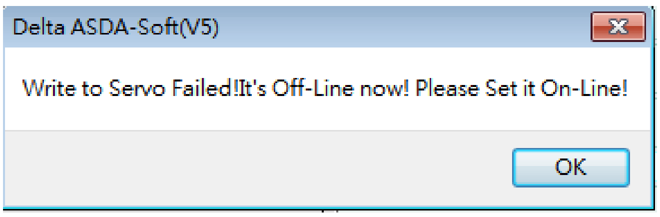
Function Setting

Download into the servo

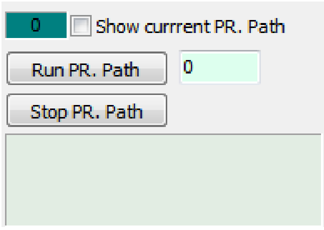
[Function Setting]：Users can setup and modify the relevant parameters.

[Download into the Servo]：When the setting of PR parameters is complete, users can download them into the servo drive in online status. Please click **Download** to download the parameters.

If click "**Download**" in offline status, the following warning message will pop up.



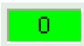
d.) [PR Simulation]:

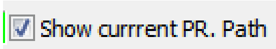


 : Status light. Numbers in this column represents the status of P5-07. The software accesses the value of P5-07 every 300 ms

The light has two kinds:

: If it is offline, the light shows dark green.



: If it is online and 

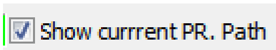
is checked, the light shows light green. 0 means P5-07 is not triggered and PR command has not been executed yet.

When proceeding PR Path simulation, the displayed value is showed according to the change of P5-07.

When the command is incomplete, the displayed value will be the one of P5-07.

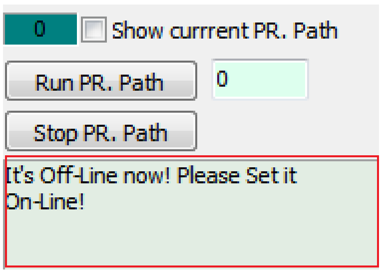
When the command is complete, the displayed value will be the value of P5-07 + 10000.

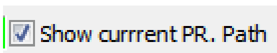
When the command is complete and DO.TPOS is ON (motor position reached), the displayed value will be the value of P5-07 + 20000.



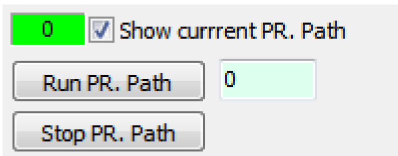
: Users can simulate PR path via this function.

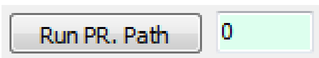
This function is enabled only when it is online. If not connects to the servo drive or communication fails, the warning message will pop up.

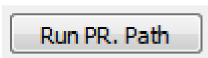


Check 

when communication is OK, the status light will turn light green. Then, click "Run PR. Path".



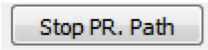


: Activate PR command. Users have to fill in the number of PR Path. Then click 

to activate PR command.

Please fill in the field:

- Fill in 0 to start homing.
- Fill in 1 ~ 63 to execute the specified PR, which means DI.CTRG + DI.POSn is triggered.

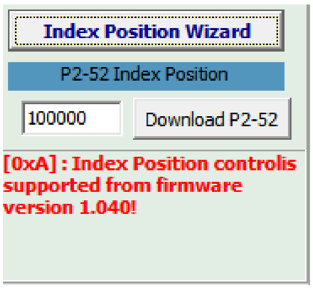


: Stop PR command, which means to set P5-07 to 1000 and DI.STOP is on.

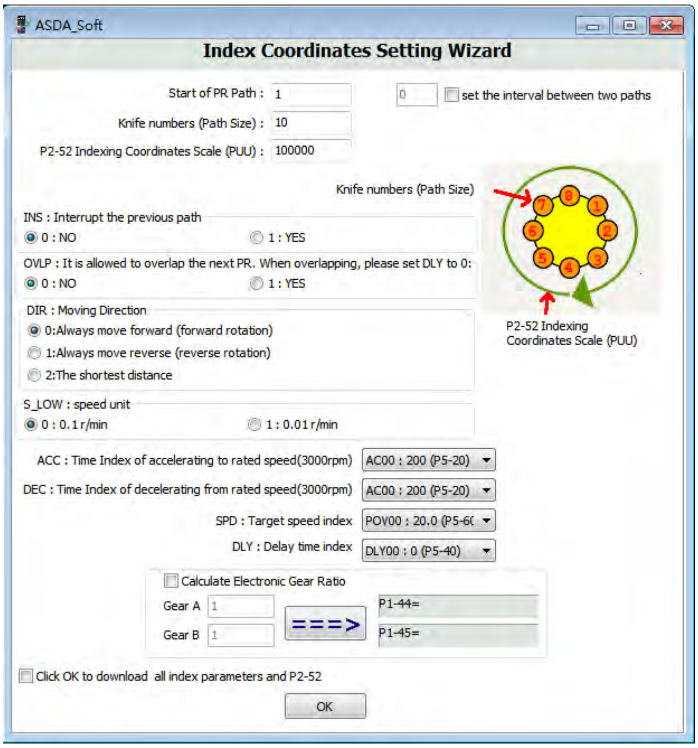
e.) [Indexing Coordinates Setting Wizard]:

*this is for V4 version only.

: This function enables users to complete the programming of PR path and the relevant parameters setting. Users can also easily download the setting into the servo drive after the setting is complete. For those who need to create indexing table, this function helps to shorten the setting time.



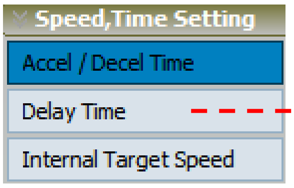
: Users can adjust the setting of indexing range.



Mode Setting

Followings are the introduction and setting method of four setting modes.

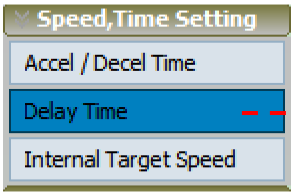
1. **[Speed, Time Setting]**：Acceleration / deceleration time, delay time and target speed are the basic setting when setting up PR path. ASDA-A2 series provides 16 sets of acceleration/deceleration time, 16 sets of delay time and 16 sets of target speed. Those are shared for each kind of PR mode.



The unit of 16 sets of acceleration/deceleration time is ms. Its setting range is from 1 to 65,500ms.

P5-20~P5-35: Accel / Decel Time

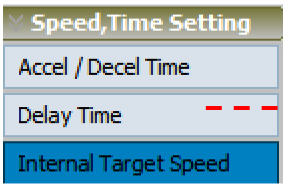
AC00	200	(ms)	(P5-20)	(1~65500)
AC01	300	(ms)	(P5-21)	(1~65500)
AC02	500	(ms)	(P5-22)	(1~65500)
AC03	600	(ms)	(P5-23)	(1~65500)
AC04	800	(ms)	(P5-24)	(1~65500)
AC05	900	(ms)	(P5-25)	(1~65500)
AC06	1000	(ms)	(P5-26)	(1~65500)
AC07	1200	(ms)	(P5-27)	(1~65500)
AC08	1500	(ms)	(P5-28)	(1~65500)
AC09	2000	(ms)	(P5-29)	(1~65500)
AC10	2500	(ms)	(P5-30)	(1~65500)
AC11	3000	(ms)	(P5-31)	(1~65500)
AC12	5000	(ms)	(P5-32)	(1~65500)
AC13	8000	(ms)	(P5-33)	(1~65500)
AC14	50	(ms)	(P5-34)	(1~65500)
AC15	30	(ms)	(P5-35)	(1~65500)



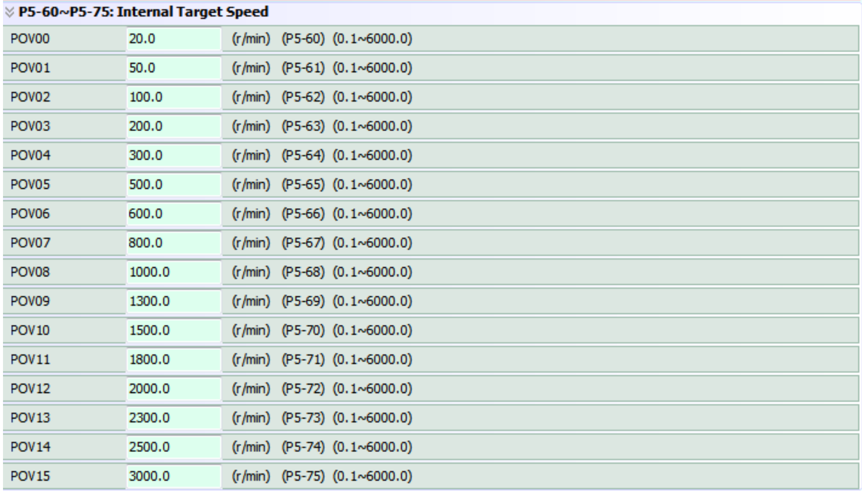
The unit of 16 sets of delay time is ms. Its setting range is from 0 to 32,767 ms.

P5-40~P5-55: Delay Time

DLY00	0	(ms)	(P5-40)	(0~32767)
DLY01	100	(ms)	(P5-41)	(0~32767)
DLY02	200	(ms)	(P5-42)	(0~32767)
DLY03	400	(ms)	(P5-43)	(0~32767)
DLY04	500	(ms)	(P5-44)	(0~32767)
DLY05	800	(ms)	(P5-45)	(0~32767)
DLY06	1000	(ms)	(P5-46)	(0~32767)
DLY07	1500	(ms)	(P5-47)	(0~32767)
DLY08	2000	(ms)	(P5-48)	(0~32767)
DLY09	2500	(ms)	(P5-49)	(0~32767)
DLY10	3000	(ms)	(P5-50)	(0~32767)
DLY11	3500	(ms)	(P5-51)	(0~32767)
DLY12	4000	(ms)	(P5-52)	(0~32767)
DLY13	4500	(ms)	(P5-53)	(0~32767)
DLY14	5000	(ms)	(P5-54)	(0~32767)
DLY15	5500	(ms)	(P5-55)	(0~32767)



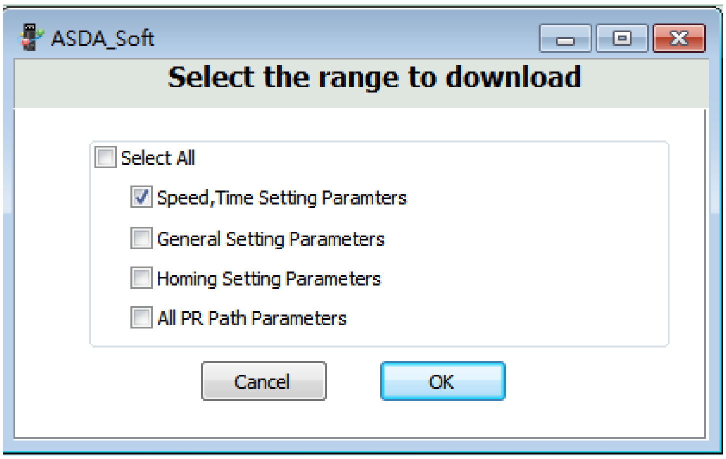
The unit of 16 sets of internal target speed is r/min. Its setting range is from 0.1 to 6000.0 r/min.



P5-60~P5-75: Internal Target Speed

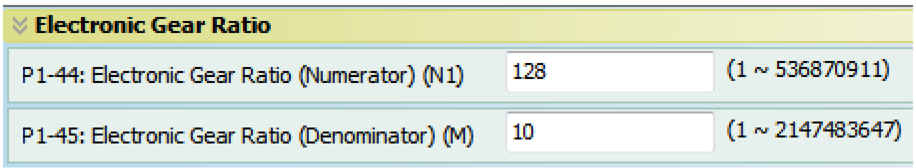
POV00	20.0	(r/min)	(P5-60)	(0.1~6000.0)
POV01	50.0	(r/min)	(P5-61)	(0.1~6000.0)
POV02	100.0	(r/min)	(P5-62)	(0.1~6000.0)
POV03	200.0	(r/min)	(P5-63)	(0.1~6000.0)
POV04	300.0	(r/min)	(P5-64)	(0.1~6000.0)
POV05	500.0	(r/min)	(P5-65)	(0.1~6000.0)
POV06	600.0	(r/min)	(P5-66)	(0.1~6000.0)
POV07	800.0	(r/min)	(P5-67)	(0.1~6000.0)
POV08	1000.0	(r/min)	(P5-68)	(0.1~6000.0)
POV09	1300.0	(r/min)	(P5-69)	(0.1~6000.0)
POV10	1500.0	(r/min)	(P5-70)	(0.1~6000.0)
POV11	1800.0	(r/min)	(P5-71)	(0.1~6000.0)
POV12	2000.0	(r/min)	(P5-72)	(0.1~6000.0)
POV13	2300.0	(r/min)	(P5-73)	(0.1~6000.0)
POV14	2500.0	(r/min)	(P5-74)	(0.1~6000.0)
POV15	3000.0	(r/min)	(P5-75)	(0.1~6000.0)

When the setting is complete, click **Download** to write parameters into the servo drive or use (write all into the servo) to download parameters. Click it and the following window will pop up. Please select "Speed, Time Setting Parameters" first, and click OK to complete the setting.



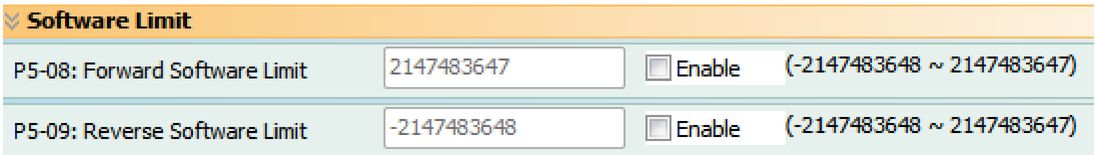
2. **[General Parameter Setting]**： Electronic gear ratio, software limit, deceleration time of protection and event On/Off setting are parameters that are commonly used when programming PR path. The software programs these parameters in this area so that users can select it from the drop-down list.

Electronic Gear Ratio ：Electronic gear ratio is the E-gear ratio of the servo drive. P1-44 is Gear Ratio (Numerator) (N1) and P1-45 is Gear Ratio (Denominator) (M).



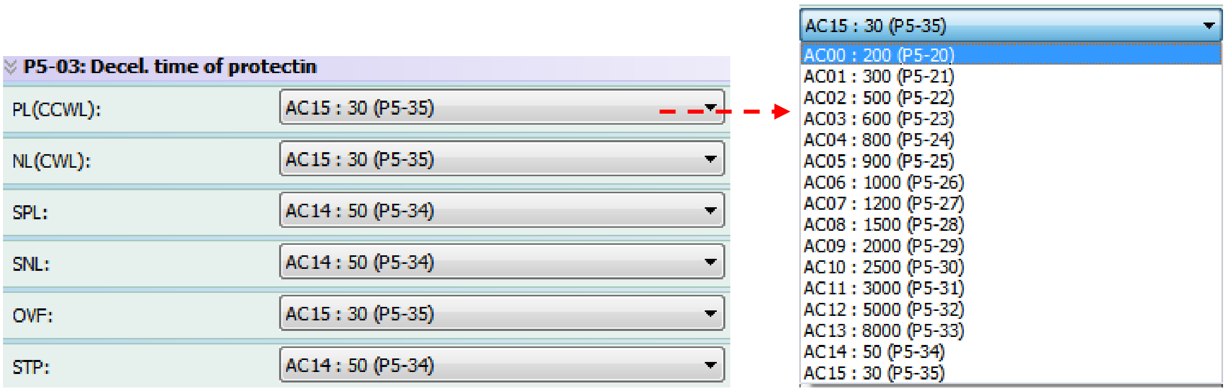
Software Limit ：When designing the mechanism, apart from the installation of hardware limit switch, function of software limit will be added for the safety. It is for avoiding the motor exceeding the traveling distance or free to use hardware limit. The motor stops when reaching software limit. Users can enable or disable the function and setup the limit position here.

If set one side of the software limit to the max. value and another side as the min. value, this function will be disabled.



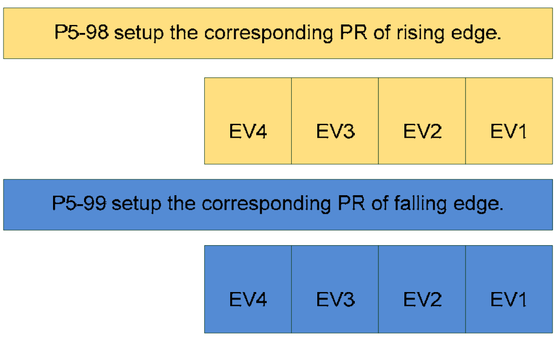
Decel.time of protection : If desire to slowly stop the motor by activating the limit switch or triggering DI.STOP in auto protection, according to the definition of P5-03, users can setup PL(CCWL) Positive Limit, NL(CWL) Negative Limit, SPL (SCCWL) Software Positive Limit, SNL(SCWL) Software Negative Limit, OVF Position Command Overflows , CTO (Communication timeout AL020) and STP Stop Command.

To use the setting of P5-03, users have to know the meaning of each byte stands for. Then, users can use the drop-down list to complete the setting from via software.



Users can select the acceleration/ deceleration time from the drop-down list and can setup the deceleration time from "Speed, Time Setting" that mentioned above.

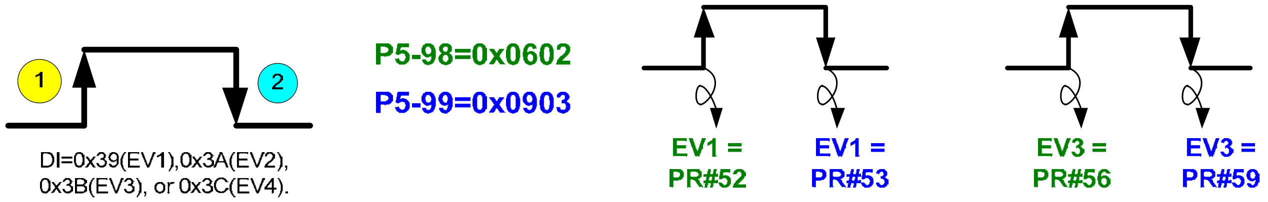
Event ON/OFF Setting : For setting the function of event trigger, a drop-down list is provided for users to setup rising- or falling edge. For example, definitions of P5-98 and P5-99 are must-know when using parameters to set it up.



Setting value	1	2	3	4	5	6	7	8	9	A	B	C	D
Corresponding PR	51	52	53	54	55	56	57	58	59	60	67	62	63

Assume that we use parameter to setup event trigger, see as below, when the rising edge signal of EV1 is triggered, PR#52 will be triggered as well since the first digit of P5-98 is set to 2. If the falling edge signal of EV1 is triggered, PR#53 will be triggered because the first digit of P5-99 is set to 3.

When the rising edge signal of EV3 is triggered, PR#56 will be triggered because the third digit of P5-98 is set to 6. And when the falling edge signal of EV3 is triggered, since the third digit of P5-99 is set to 9, PR#59 will be triggered, too.



However, if we use drop-down menu of the software to setup, users only need to specify the PR of EV1 and EV3 and to complete the setting of DI (digital input) in **Parameter Initial Wizard**.

P5-98,P5-99: External Event ON/OFF Setting

EV1 Event : ON	PR #52
EV2 Event : ON	Do nothing
EV3 Event : ON	PR #56
EV4 Event : ON	Do nothing
EV1 Event : OFF	PR #53
EV2 Event : OFF	Do nothing
EV3 Event : OFF	PR #59
EV4 Event : OFF	Do nothing

Then, click **Download** or use  to write parameters into the servo drive.

3. **[Homing Setting]**：Here we are going to talk about reference coordinates before introducing homing. In general mechanism design, such as CNC (computer numerical control), it usually needs to select one reference point to calculate the coordinates value of each point. The reference point is the so called Zero Points. If it is in CNC machining application, the commonly used reference points are machine reference point, homing point, work reference point and program reference point. That is to say, the setting of reference point is the coordinates point that users defined.

   The origin of coordinate in servo system is the initial coordinate setting when the machine is start-up. Usually, each axis of the machine shall return to the origin point before executing commands when CNC system is power on. Users can either use manual mode or program control mode to return each axis back to its machine origin point. Activate the homing button on control panel when using manual mode and the machine tool base will return to the origin point of each axis. In addition, it could be regarded as the point for tools exchanging. For safety concerns, before tools exchanging, axis Z returns to machine origin point first. This is for avoiding the collision between tool and materials.

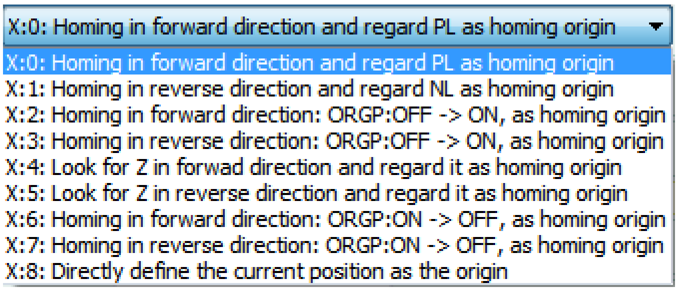
   Method of connecting the hardware is to connect Z pulse to internal coordinate of the servo through encoder cable. And the coordinates value corresponded by Z pulse can also be specified.

When the homing is complete, the position motor will not exactly stop on Z pulse. It is because when Z pulse is found, motor has to decelerate to stop. And it might exceed a short distance according to the deceleration curve. However, if the position of Z pulse is correctly setup, it will not influence the accuracy of positioning.
For example, specify the coordinate value which corresponded by Z pulse is 100, then Cmd_O = 300 after homing is complete. It means the deceleration distance is 300-100=200 (PUU). Since Cmd_E = 100 (the absolute coordinate of Z), if desire to return to Z, issue the positioning command will do, either absolute command 100 or incremental command 0.

Users can execute the specified procedure after homing. After homing, it will move for a distance of offset. When executing homing, function of software limit is disabled.

With the excellent function of PR mode, ASDA-A2 series servo drive provides 9 main homing modes:

- Homing in forward direction and regard PL as homing origin
- Homing in reverse direction and regard NL as homing origin
- Homing in forward direction: DI.ORG: OFF→ON, as homing origin
- Homing in reverse direction: DI.ORG: OFF→ON, as homing origin
- Look for Z in forward direction and regard it as homing origin
- Look for Z in reverse direction and regard it as homing origin
- Homing in forward direction: DI.ORG: ON→OFF, as homing origin
- Homing in reverse direction: DI.ORG: ON→OFF, as homing origin
- Directly define the current position as the origin

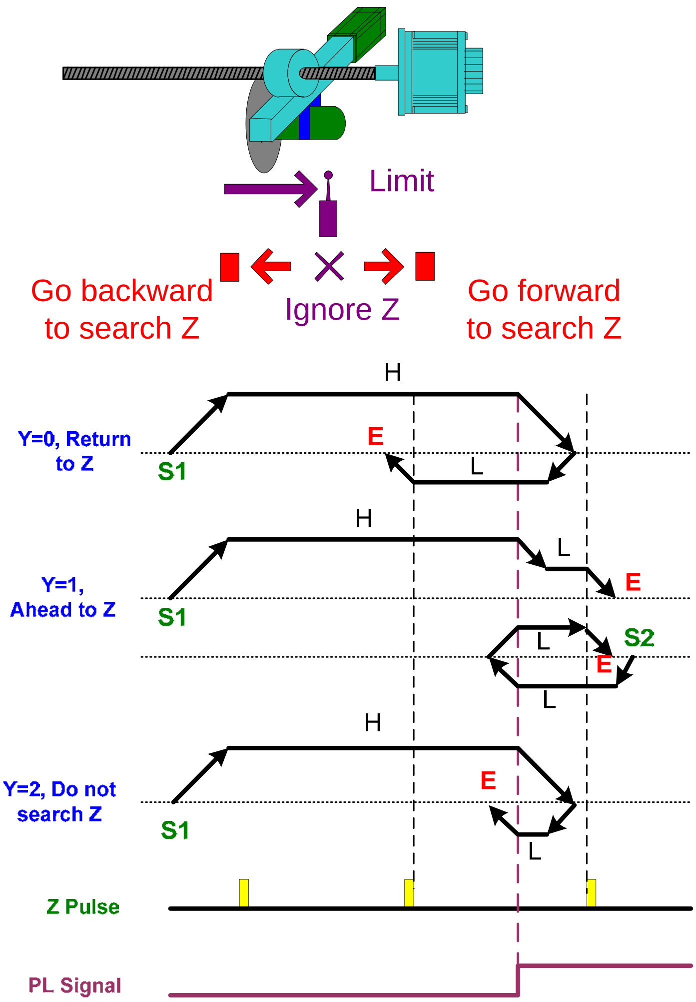


Before preceding software operation, let’s have the basic description of the 9 modes that mentioned above.

- Homing in forward direction and regard PL as homing origin
- Homing in reverse direction and regard NL as homing origin

These two modes regard positive limit or negative limit as reference point. When the limit is detected, users can set if Z pulse will be used as origin point. Please note that the “origin point” will not have to be the absolute position 0. ASDA-A2 is allowed to setup coordinates offset, which means users can specify any coordinate value as the “homing origin”.

P5-04.X = 0: Homing in forward direction and regard PL as homing origin
P5-04.X = 1: Homing in reverse direction and regard NL as homing origin
P5-04.Y: signal setup. 0 = return to Z; 1 = forward to Z; 2 = never find Z.



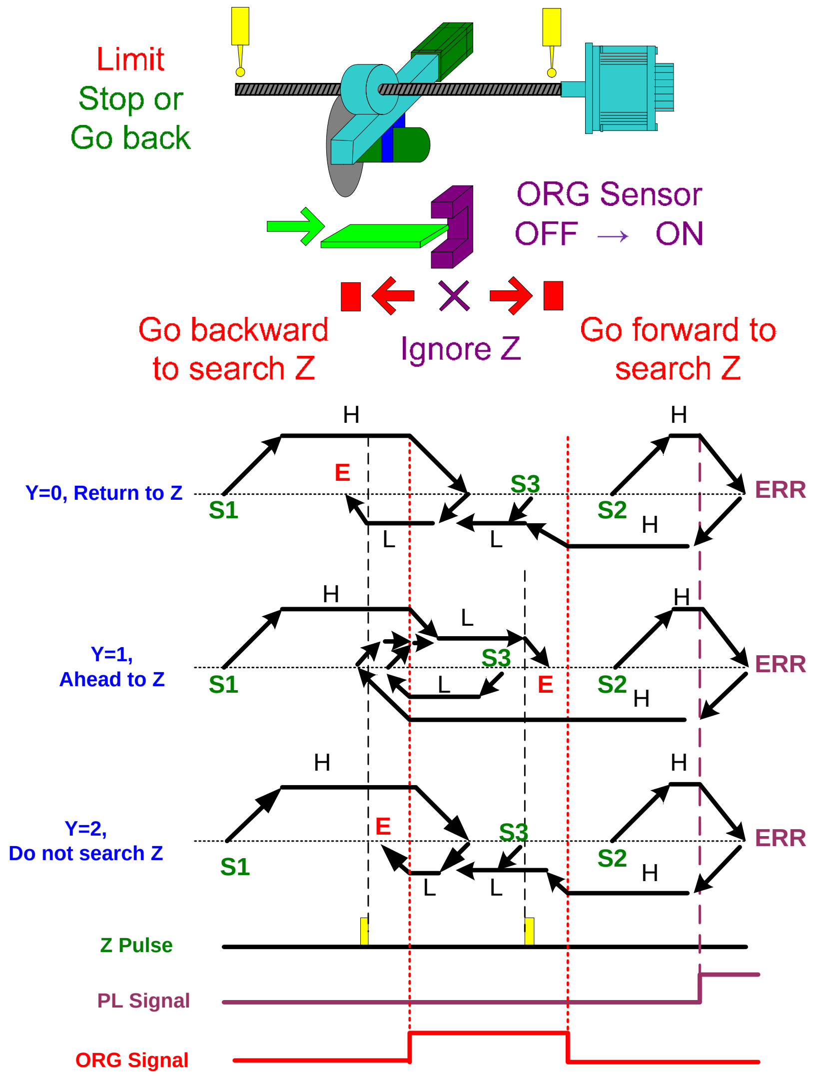
- Homing in forward direction: DI.ORG: OFF→ON, as homing origin
- Homing in reverse direction: DI.ORG: OFF→ON, as homing origin

These two modes regard ORG sensor as reference point. Use its rising edge signal as the origin point. When the signal is detected, users can set if Z pulse will be used as origin point.

P5-04.X = 2: Homing in forward direction: DI.ORG: OFF→ON, as homing origin

P5-04.X = 3: Homing in reverse direction: DI.ORG: OFF→ON, as homing origin

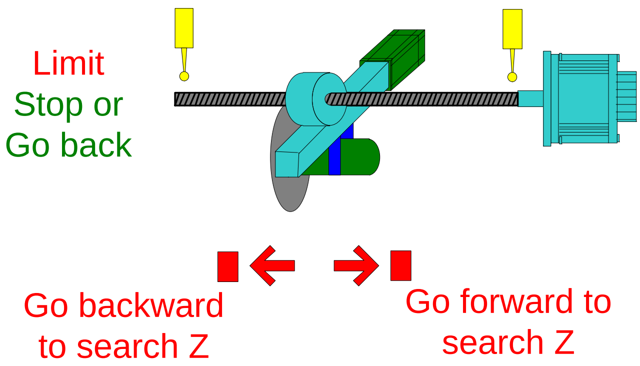
P5-04.Y: signal setup. 0 = return to Z; 1 = forward to Z; 2 = never find Z.
P5-04.Z: limit setup. 0 = shows error; 1 = reverse direction

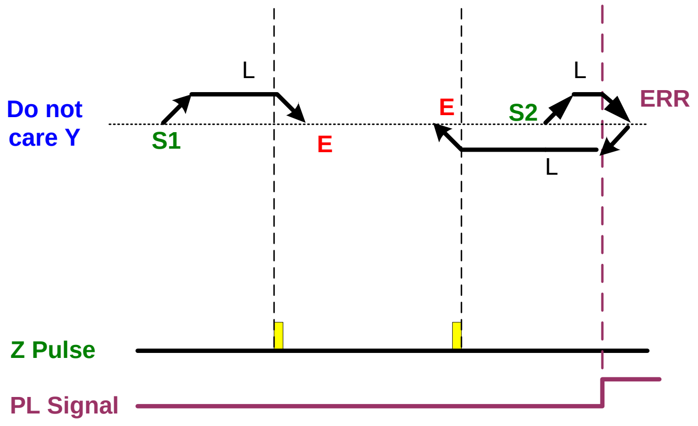


- Look for Z in forward direction and regard it as homing origin
- Look for Z in reverse direction and regard it as homing origin

This mode directly regards Z pulse as reference point. There is one Z pulse when motor runs a cycle. This method is applicable when the moving distance is within one motor run.

P5-04.X = 4: Look for Z in forward direction and regard it as homing origin
P5-04.X = 5: Look for Z in reverse direction and regard it as homing origin
P5-04.Z: limit setup. 0 = shows error; 1 = reverse direction





■ Homing in forward direction: DI.ORG: ON→OFF, as homing origin

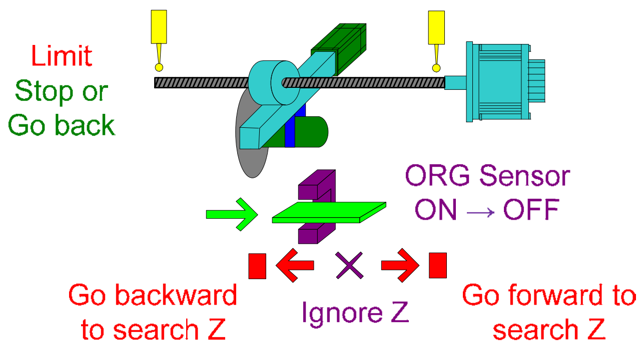
■ Homing in reverse direction: DI.ORG: ON→OFF, as homing origin

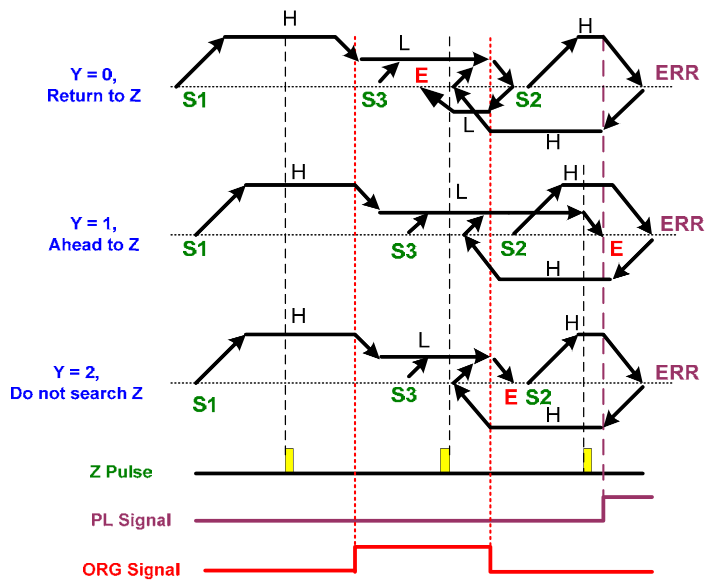
These two modes regard the ORG sensor as reference point. Use its falling edge signal as origin point. When the signal is detected, users can set if Z pulse will be used as origin point.

P5-04.X = 6: Homing in forward direction: DI.ORG: ON→OFF, as homing origin

P5-04.X = 7: Homing in reverse direction: DI.ORG: ON→OFF, as homing origin

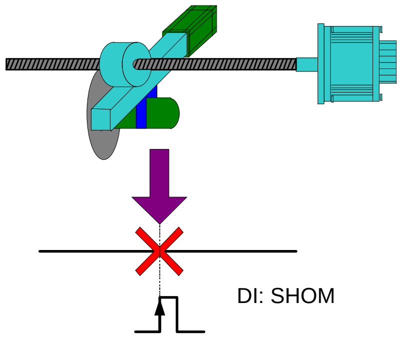
P5-04.Y: signal setting. 0 = return to Z; 1 = forward to Z; 2 = never find Z.
P5-04.Z: limit setup. 0 = shows error; 1 = reverse direction





■ Define the current position as origin point

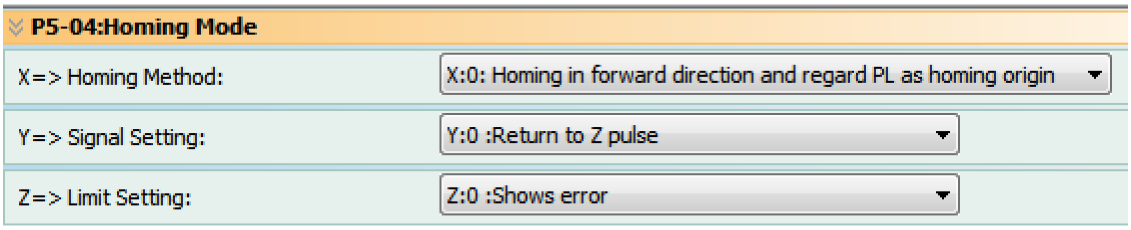
Take the current motor position as reference point. Positioning is complete when motor does not move.



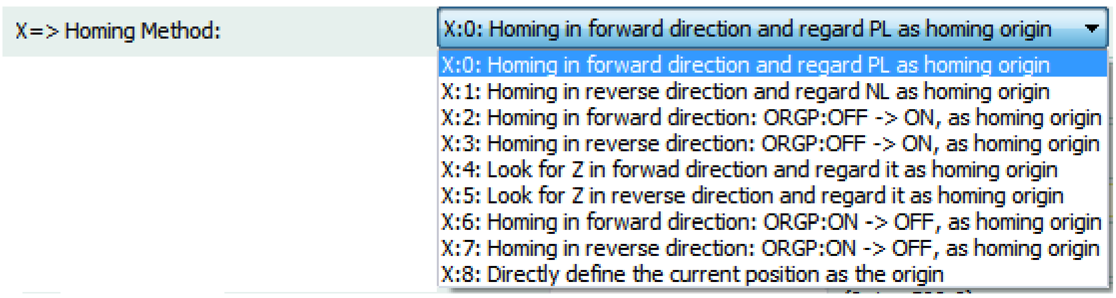
The home position is defined to the place the motor stops at the moment of SHOM signal triggered.

Next, we are going to talk about the operation setting of the software.

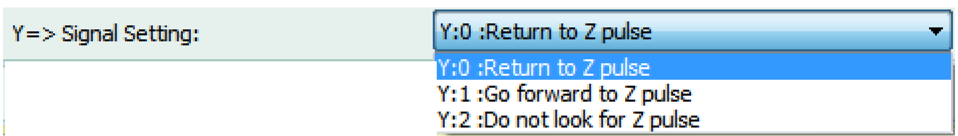
: Through the drop-down menu, 9 kinds of homing modes which mentioned above can be done in a very easy way.



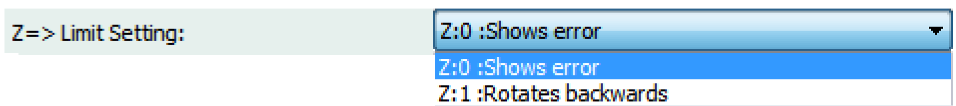
Step 1: Select the homing mode (Setup P5-08: X)



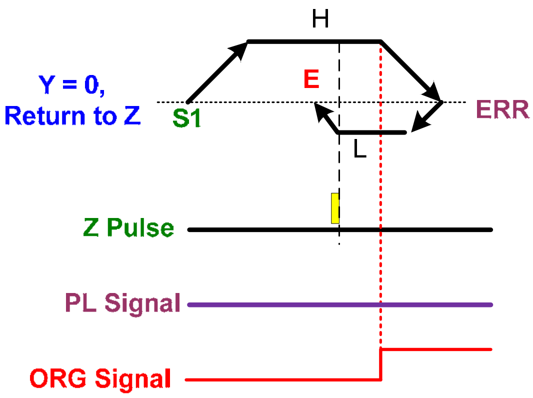
Step 2: Setup the command when ORG signal is detected.



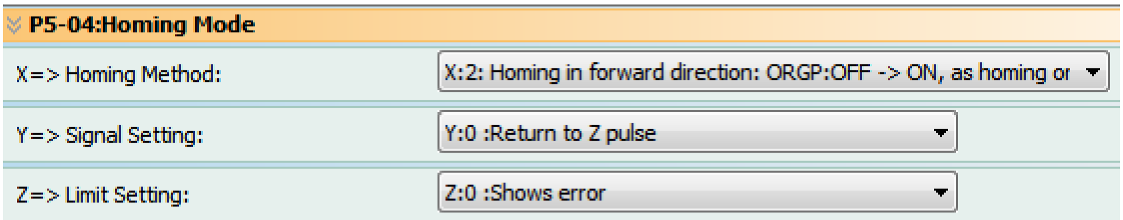
Step 3: Setup the command when the limit is reached.



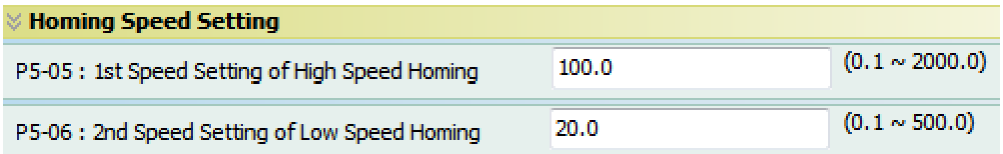
For example, if **Homing in forward direction: DI.ORG: OFF→ON, as homing origin** is set as the homing mode, then set P5-04. X to 2 (homing in forward direction, DI.ORG: OFF→ON); Y: Signal setting - 0: return to Z; Z: Limit setting – 0 shows error.



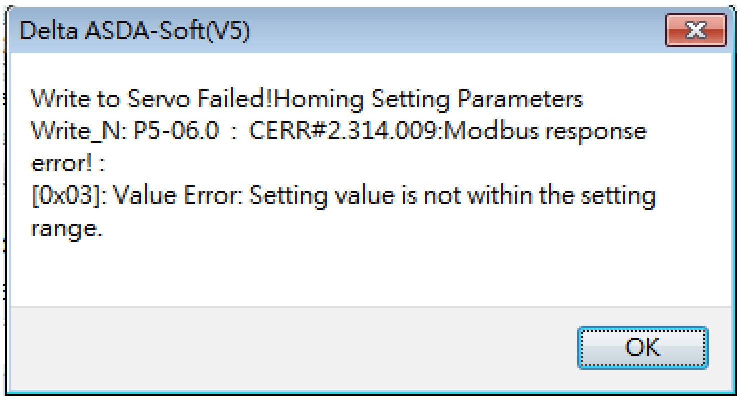
Users can complete the setting by following the parameter setting which mentioned above.



Homing Speed Setting : When executing homing, the ORG signal will be regarded as the divide of speed setting. After the servo drive is power on or the homing command is triggered, the motor runs at the 1st speed and looks for Z first. When the signal is detected, the motor runs at the 2nd speed and decelerates to stop or returns to Z. In general, the 1st speed is faster than the 2nd one. It is because when motor runs at the 2nd speed, it will stop at the end. Users can adjust the setting according to the demand. To setup the 1st and 2nd speed of homing via the software, users can simply fill in the speed value in the window that showed below.



Please note that the speed value shall not exceed the setting range. If so, a warning message will pop up when click **Download**.



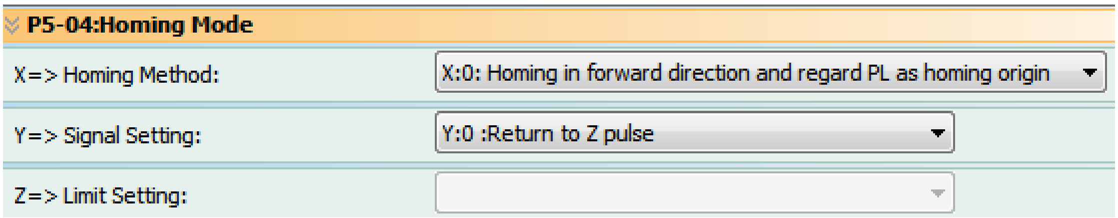
Homing Definition : This selection provides 5 advanced function setting.

- Advanced setting after homing:

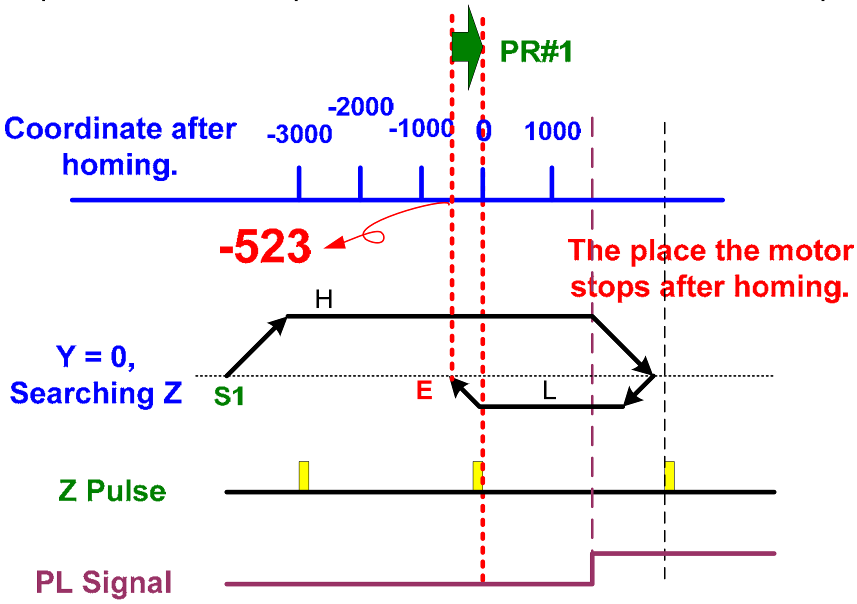
When the origin point is found, the motor will stop at the position near the origin point. This is because motor has to decelerate to stop. ASDA-A2 servo drive will not automatically command the motor to move back to the exact origin point. The initial setting is the stop status. (0 (Stop) means it will not execute the next PR after homing.)

Users can use another PR (absolute position command) to command the motor to move to the specify position or any position of coordinate. The coordinate system is built up after homing is complete.

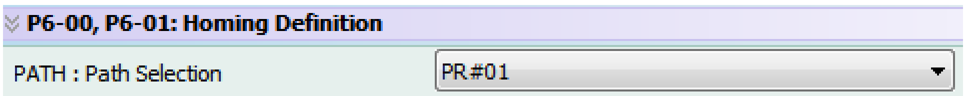
Please see below. If we set the homing mode as **Homing in forward direction and regard PL as homing origin**:



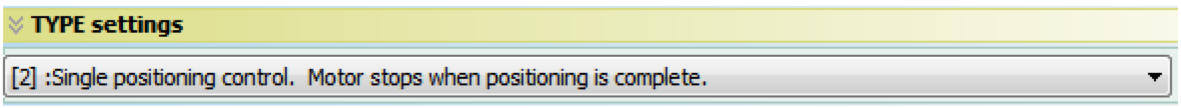
The actual position motor stops is "-523" in coordinate of absolute position.



Through the software setting, users can command the motor returning to the origin point (absolute position 0). The first step is to specify one PR path.



Setup the path of PR#01. Since we simply need the motor to return to the origin point, please select Type.



Setup the end of position command and position command since we assume the motor is going back to the 0 point. The command has to be ABS (absolute command) and the command point should be 0.

CMD:End of position command	00 : ABS Absolute Position, CMD=DATA
-	01 : REL Relative Position, CMD=Current Position+DATA
-	10 : INC Incremental Position, CMD=Previous CMD+DATA
-	11 : CAP Capture in high speed, CMD=Captured+DATA

Data		
Position CMD DATA(PUU)	0	(0x0000 ~ 0xFFFF)

■ Setup acceleration/deceleration time of the 1st and 2nd speed of homing:
When mechanical stiffness is softer, in the setting of the 1st high-speed and 2nd low-speed command, users might need to setup one acceleration/deceleration time to enable the motor gradually runs to the setting speed. This can be done by the software setting.

ACC : Acceleration Time	AC00 : 200 (P5-20)
DEC1 : 1st Deceleration Time	AC00 : 200 (P5-20)
DEC2 : 2nd Deceleration Time	Use the same deceleration time as STP command. STP command in "General Parameter Setting".

ACC: Acceleration Time: When the function of searching origin point is triggered, motor accelerates from 0 to the one that users need.

P5-05 : 1st Speed Setting of High Speed Homing	100.0	(0.1 ~ 2000.0)

Use the drop-down list to setup the 16 sets of acceleration/deceleration time:

Speed,Time Setting
Accel / Decel Time

DEC1: The first deceleration time: When the signal is triggered, setup the first deceleration time of returning to the origin point.

DEC1 : 1st Deceleration Time	AC00 : 200 (P5-20)

Use the drop-down list to setup the 16 sets of acceleration/deceleration time:

Speed,Time Setting
Accel / Decel Time

DEC2: The second deceleration time: After the function of searching origin point is triggered,

DEC2 : 2nd Deceleration Time	Use the same deceleration time as STP command. STP command in "General Parameter Setting".

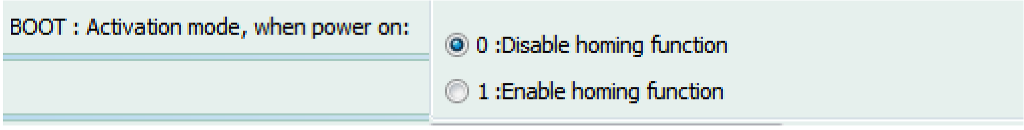
use STP: from Deceleration Time of Protection under “General Parameter Setting” for this setting.

■ Delay Time after Homing is Complete:
For some applications, after homing is complete (command reached, not feedback signal), users need to setup the delay time before proceeding to the next command. Then, the following function can be used:

DLY : Delay Time	DLY00 : 0 (P5-40)

With the value of 16 sets of delay time in “Speed, Time Setting”, users can extend the time length.

■ Set if homing is executed right after the servo drive is power on:
Homing must be executed when the servo drive is just power on in some applications, such as the stand of metal working machine.



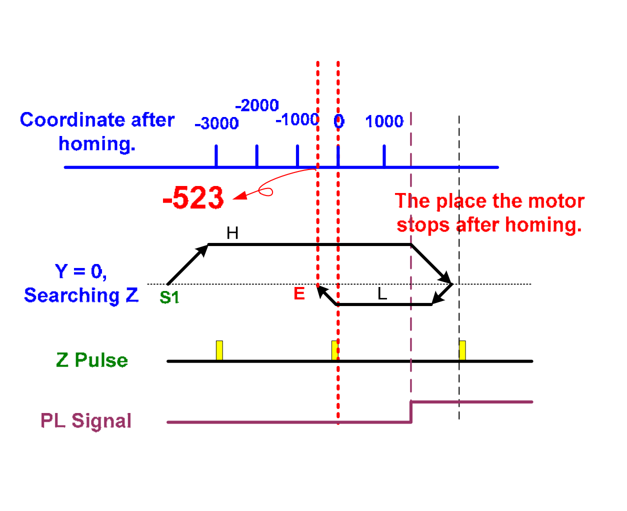
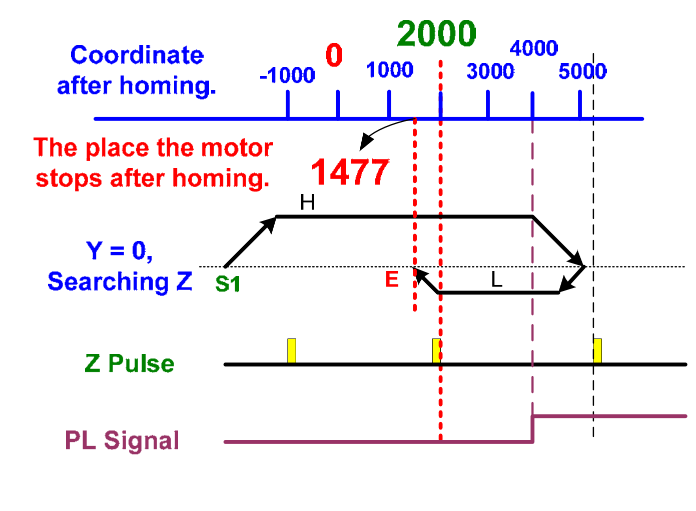
0：Homing will not be executed right after power on. It has to be triggered by DI

(0x27).SHOM.

1：Auto Homing (When the servo drive is supplied to the power and first Servo On)

■ Coordinate Offset: Any reference point can be homing reference point
Any reference point can be defined as homing reference point by ASDA-A2. The reference point is not necessary to be position 0. As long as the homing reference point is confirmed, the coordinates system can be built up.

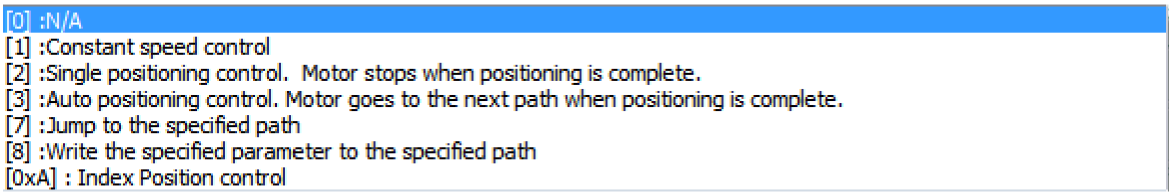
Take the diagram below as the example. The coordinate of homing reference point is set to position 2000 and the motor stops at position 1477. The coordinate system is built up after homing so that the system knows where the position 0 is in this coordinate system. Users can confirm the position after coordinate offset via “Status Monitor” or “Scope”.

<table>
<tr>
<td>
</td>
<td>
</td>
</tr>
<tr>
<td>When homing is complete, the motor exactly stops at the absolute position -523. (It is because the motor will decelerate to stop at the position near homing point.)</td>
<td>To setup the function of coordinate offset: P6-01: Homing Definition Value-2000 (-2147483648~2147483647) .The whole absolute position will shift to the left and the actual position the motor stops will be position 1477.</td>
</tr>
</table>

4. **[PR Mode Setting]**：As mentioned before in “Parameter Initial Wizard”, PR mode has to be programmed and designed in this function. ASDA-A2 servo drive provides a new built-in internal control mode (PR mode). It not merely provides PR for users to execute single-axis motion, ASDA-A2 even adopts the theory of distributed motion control framework to issue commands based on speed control, position control, PR jump and

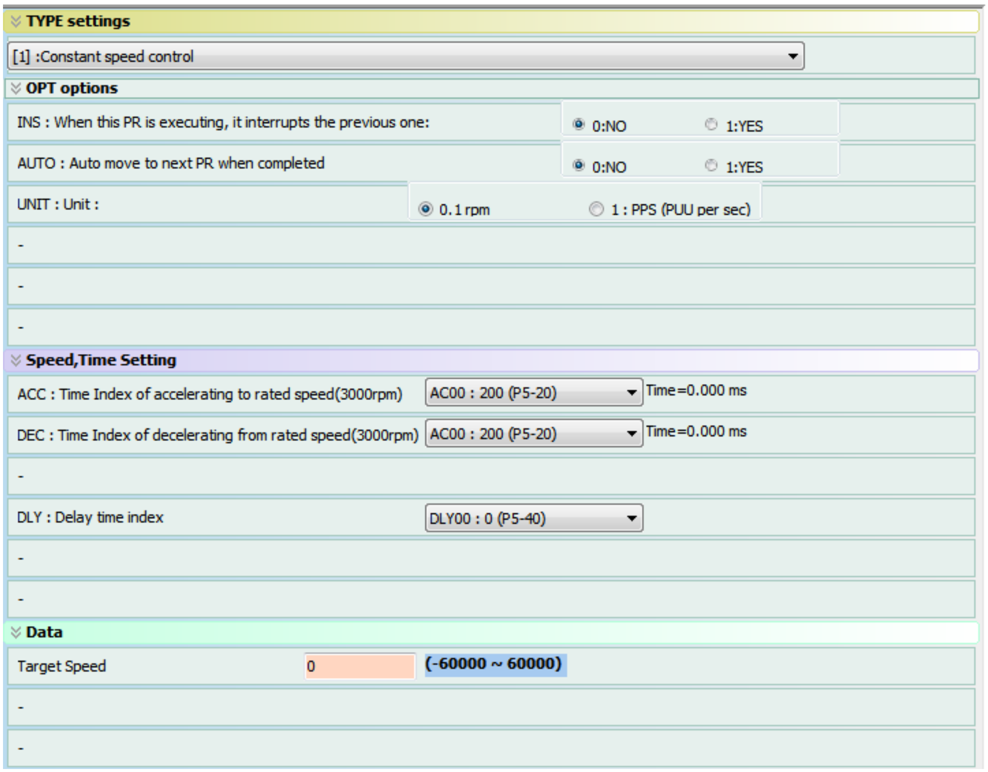
DI. Diversified combination allows flexible operation and enables ASDA-A2 to stand in the leading position.

PR mode supports 63 paths in total. Each one can individually program 5 different programming methods. In addition, Indexing Coordinate Wizard can be used to program PR as well.



Please see the description of each method below:

- Constant Speed Control: When this command is executing, the motor accelerates (or decelerates) from current speed (not always 0). Once it reaches the target speed, the command is complete. Then, the motor does not stop and keeps operating at the same speed.
  Users can program acceleration / deceleration time, delay time and target speed. The delay time is defined by command end. It is calculated after the target speed is reached. Since the settling time of feedback varies from system to system, the delay time is not defined by feedback signal. See the main setting page that shown below:



OPT options：In constant speed control, 3 parameters can be used to interrupt PR

INS：When this PR is executing, it interrupts the previous PR. Use the internal or external interruption (via DI.POS* to specify the path or P5-07 to trigger position register). Please refer to “Single Position Control. Motor Stops when Positioning is Complete” for further description.

INS : When this PR is executing, it interrupts the previous one: 0:NO 1:YES

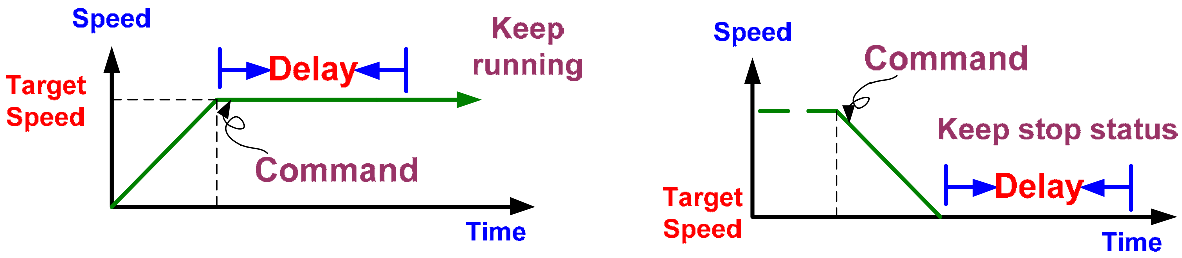
AUTO：Auto move to next PR when it reaches constant speed area.

AUTO : Auto move to next PR when completed 0:NO 1:YES

If the function of auto call next PR is set, the motor keeps the current status (It keeps constant speed if the command is issued, and remains stop if zero speed command is issued) after the target speed is reached until servo off or interrupted by another PR. If next PR is called automatically, it will move to next PR after the delay time.

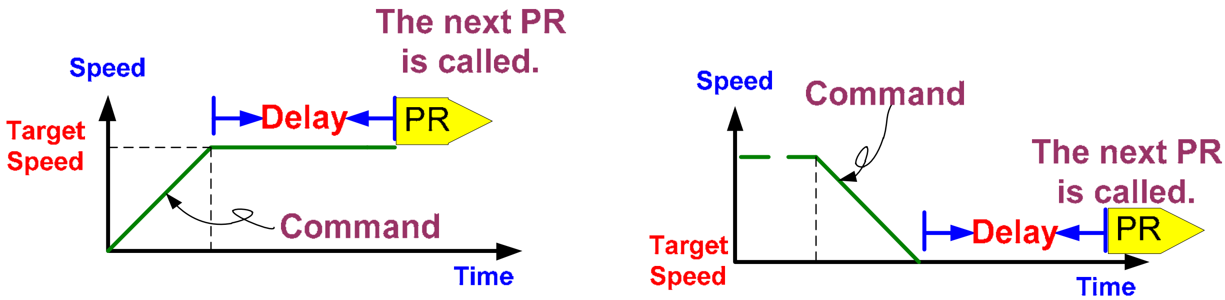
AUTO : Auto move to next PR when completed 0:NO 1:YES

It stops as soon as the current PR is complete.



AUTO : Auto move to next PR when completed 0:NO 1:YES

When current PR is complete, the next PR is called after the delay time.



UNIT： 0: unit is 0.1r/min; 1: unit is PPS (Pulse Per Second)

UNIT : Unit : 0.1 rpm 1 : PPS (PUU per sec)

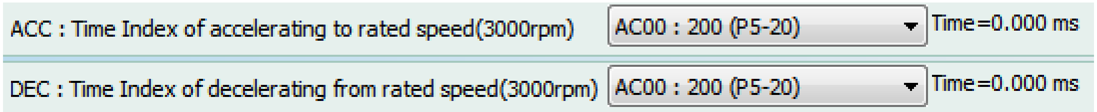
In general constant speed control, users can specify the speed via the setting of target speed. The unit can be set as 0: unit is 0.1r/min. Its setting range is from -60, 000 to 60, 000 r/min.

If users desire to control the speed in specific time and distance, select the unit as PPS: 1 (PUU Per Second). Assume PUU is 10,000 per cycle, and it has to reach the target speed within 3 minutes. The cycle motor needs to operate should be: target speed = (traveling distance) / (time). If the target speed is set to 200 PPS, then:

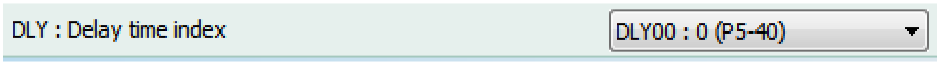
$$\frac{motor\ rotation\ number\ (PUU)}{3 \times 60\ (sec)} \equiv 200\ (target\ speed\ \ PPS)$$

Thus, motor rotating number = 36,000 PUU. Since PUU of the motor is 10,000 per cycle, the target speed shall be 200 r/min in 3 minutes. The motor rotating number will be $\frac{36,000}{10,000} \equiv 3.6\, cycles$.

Speed,Time Setting : In constant speed control, users can setup the acceleration / deceleration time and accelerates (or decelerates) from current speed (not always 0) to target speed. The time index is selected via acceleration/deceleration time in “Speed, Time Setting”.



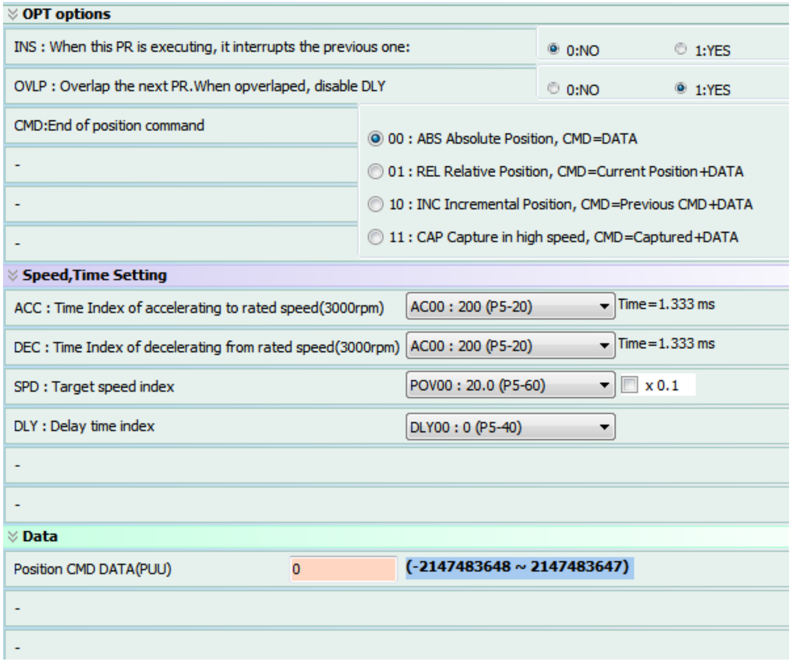
In addition, users can also setup delay time via this function. Please note that the delay setting in constant speed control shall wait until the target speed is reached and is selected via delay time register in “Speed, Time Setting”.



Data : This is used to setup target speed, which is the speed motor accelerates (or decelerates) from current speed (not always 0). Users can manually enter the value.

- Single positioning control. Motor stops when positioning is complete.
- Auto positioning control. Motor goes to the next path when positioning is complete.

Two modes that mentioned above are position control mode. The difference is that the motor stops after PR is complete in “Single positioning control” until the next PR command is triggered. In “Auto positioning control” mode, it automatically moves to next PR when current PR command is complete. See the main setting page that shown below:

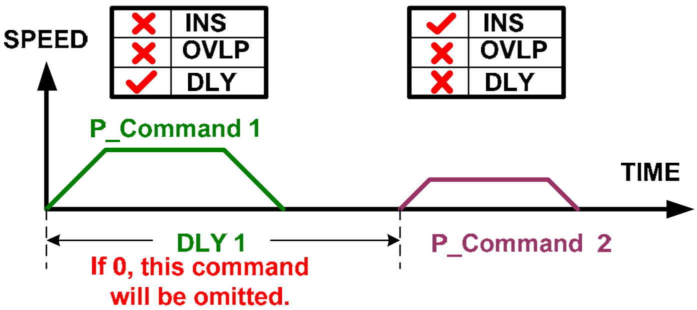


OPT options : In position control, 3 parameters are available for selection.

INS : When this PR is executing, it interrupts the previous PR. Use the internal or external interruption (via DI.POS* to specify the path or P5-07 to trigger position register).

Followings are the descriptions of position interrupt function and its using method. Interrupt command is the setting of later commands. The internal interrupt is executed when the previous command is complete, and the next command which is set with interrupt command (INS) is called automatically. No trigger in between. In addition, the delay time is effective to internal interrupt. For internal interrupt, regardless the later command (absolute or relative command), the command result is the same.

Take two diagrams below as the example. When position command 2 is set with interrupt command, the delay time of position command 1 starts from the beginning of command 1. If the delay time is 0 and position command 2 is set with interrupt command, then position command 1 will be ignored and position command 2 will be executed directly.

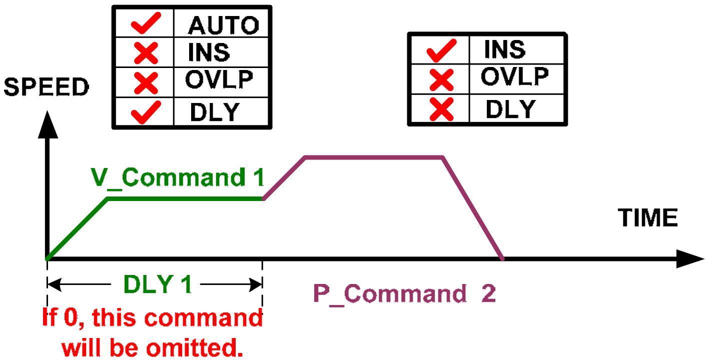


Final destination

Absolute commend: Cmd_E = command

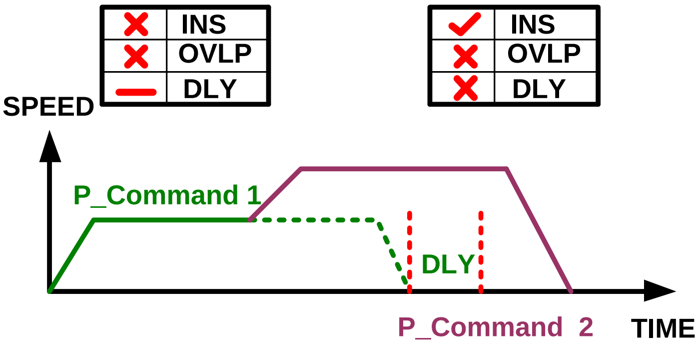
Relative/Incremental command: Cmd_E = previous Cmd_E + command

In this diagram, the previous PR is speed control. If the speed command 1 is set with delay time and will auto move to the next PR (speed control is set to AUTO), the position command will be executed when the delay time is reached. Speed command 1 and position command 2 will be executed in sequence smoothly.

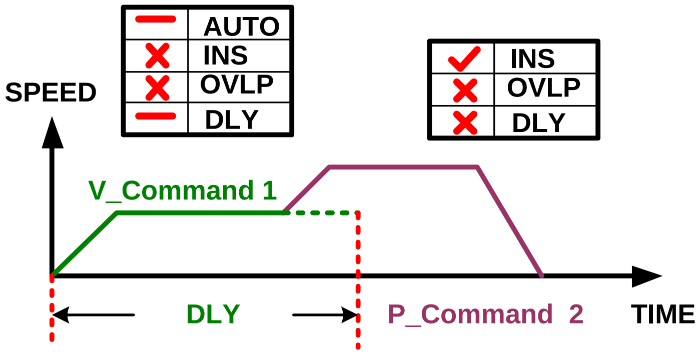


Final destination
Absolute commend: Cmd_E = command
Relative/Incremental command:
Cmd_E = previous Cmd_E +

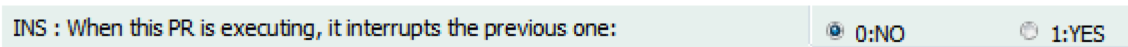
Moreover, the interrupt command also supports external trigger, such as event trigger, DI.POS* trigger and P5-07 (Trigger PR position command). When PR is set with interrupt command (INS), the command will be executed immediately.
Different type of interrupt command brings different result. ASDA-A2 can combine a new command within 1ms when it receives the interrupt command.



Final destination
Absolute command: Cmd_E = Position Command
Absolute command: Cmd_E = Fb_PUU + Position command
Incremental command: Cmd_E = Previous Cmd_E + Position Command
High-speed capturing command:
CAP data + position command
When using external interrupt, delay time in the 1st PR is in valid.

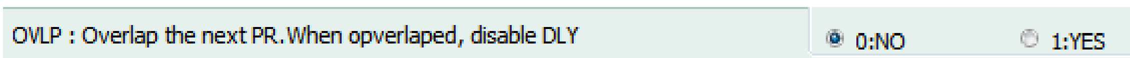


Final destination
Absolute command: Cmd_E = Position Command
Absolute command: Cmd_E = Fb_PUU + Position command
Incremental command: Cmd_E = Previous Cmd_E + Position Command
High-speed capturing command:
CAP data + position command
When using external interrupt, AUTO and delay time set in the 1st speed control are invalid.



Users can determine to use interrupt command or not.

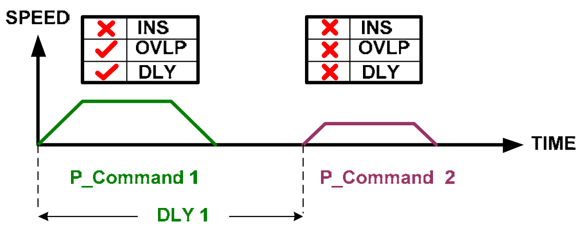
OVLP: Overlap the next PR. When overlapped, disable DLY.



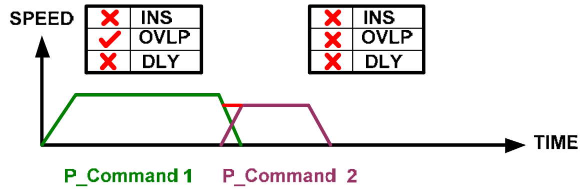
Apart from internal/external interrupt command setting, ASDA-A2 also provides function of PR overlap in position control mode.

PR overlap is set at the front command. It allows the later command overlaps the front command when the front command is in deceleration area. When the setting is overlapped, delay time of the front command starts from the beginning of the command.

Since the delay time influences the sequence of overlap, it is suggested to set the delay time to 0.



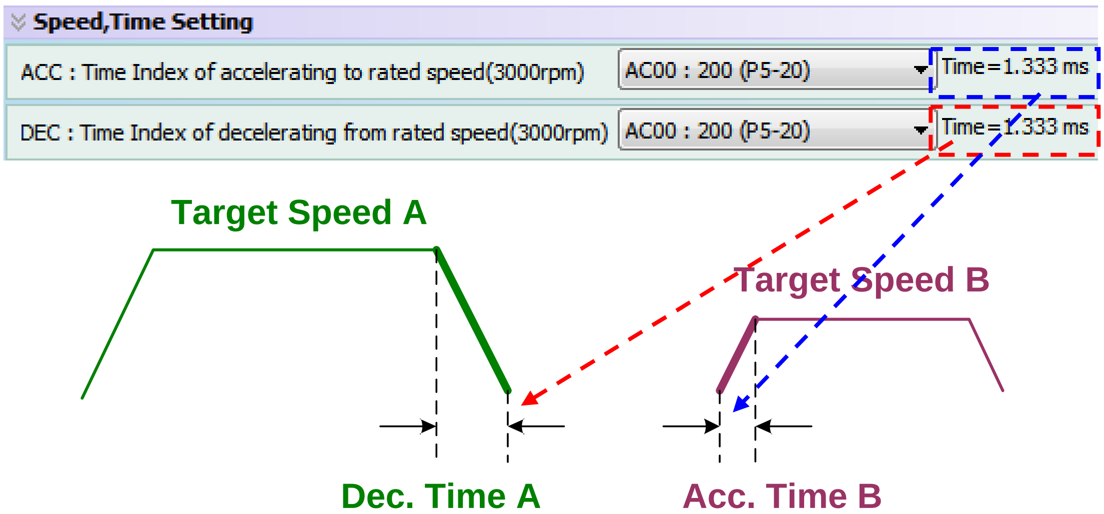
Cannot satisfy the function of overlap



Correct Overlap Sequence

The left diagram is set with delay time. The position command 2 is executed when the delay time is reached. However, it cannot satisfy the function of overlap. Therefore, it is suggested to set the delay time to 0. Diagram on the right has no delay time. It therefore brings the correct overlap sequence.

If the ratio of deceleration for the front command equals to the ratio for acceleration in the later command, the overlap portion of these two commands will have a good shape. This will reduce velocity trembling.



$$\frac{\text{Target Speed A}}{\text{Dec. Time A}} = \frac{\text{Target Speed B}}{\text{Acc. Time B}}$$

CMD：End of position command (Cmd_E):

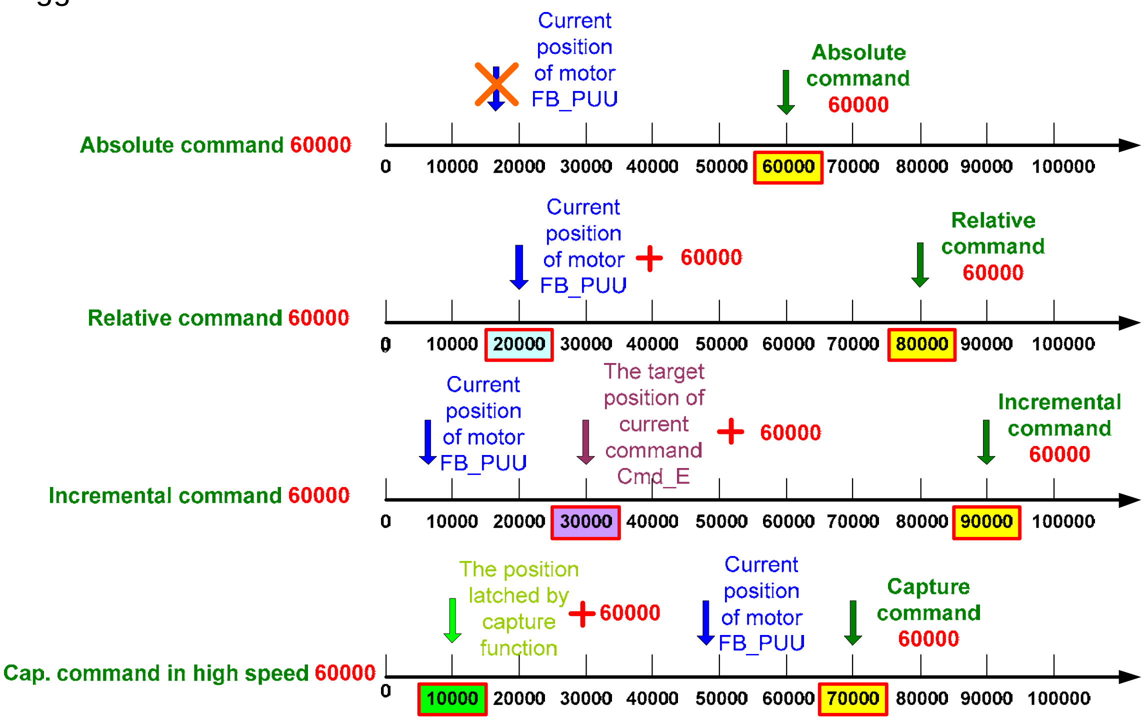
CMD:End of position command	00 : ABS Absolute Position, CMD=DATA
-	01 : REL Relative Position, CMD=Current Position+DATA
-	10 : INC Incremental Position, CMD=Previous CMD+DATA
-	11 : CAP Capture in high speed, CMD=Captured+DATA

4 position commands are provided by ASDA-A2 PR position control mode:

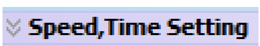
1. Absolute command: Value of position command is the coordinate position. No matter where the motor stops, it must stop at the position of position command at the end.

2. Relative command: Value of motor's current position plus position command is the target position, which is the position the motor might be referred to.
3. Incremental command: End position of current position command plus the value of new position command will be the new target position. The position command takes the target position of current command as the reference position.
4. Capture in high speed: The new target position is the value of Capture plus the value of position command. The position command takes the last captured value in data array as the reference position.

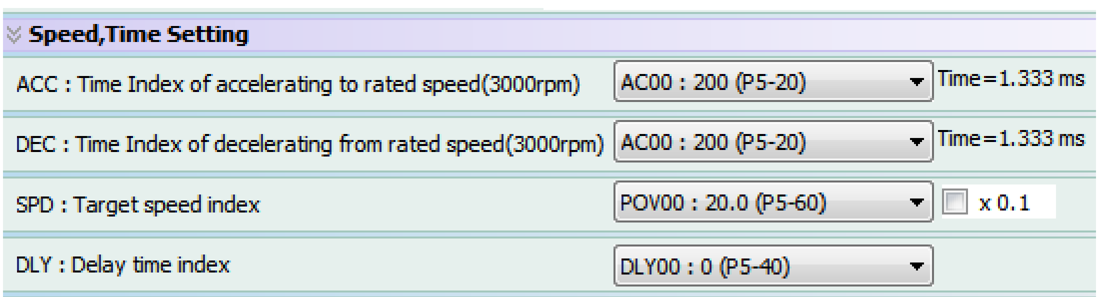
The following 4 graphs show the operating status when PR position command is triggered:



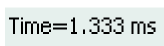
Setup motion control first and then determine the PR command. It means to define the acceleration, deceleration and target speed of the motor. Without the setting of interrupt (INS) and overlap command (OVLP), the delay time starts when target position is reached.



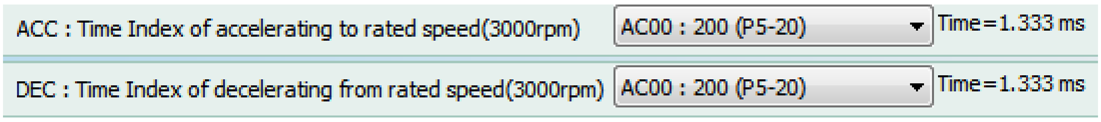
: In position control, motor's acceleration/deceleration time, target speed and delay can be set here.



The setting of acceleration/deceleration time uses "Acce. /Dece. Time" from Speed, Time Setting as the index:

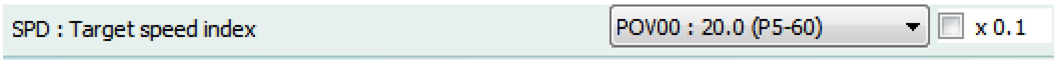
Please note that the calculation method of 

is the same as "PR Overlap" that mentioned above.

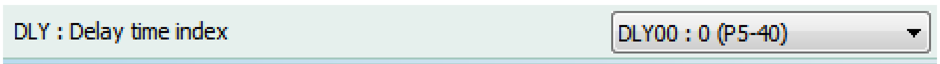


The setting of target speed uses "Internal Target Speed" from Speed, Time Setting as the index:

Please note that x 0.1 indicates the value of minimized speed. Setting of low-speed value can be more precise and more stable in low frequency. If desire to increase the speed unit from 0.1 r/min to 0.01 r/min, check x 0.1 can improve the precision.

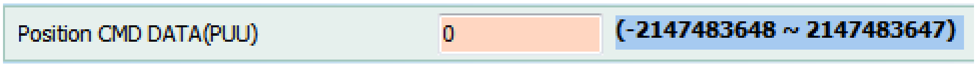


The setting of delay time uses "Delay time" from Speed, Time Setting as the index: Please note that without interrupt (INS) and overlap (OVLP) command, the delay time will start from the moment the target position is reached. If external interrupt is set, the setting of delay time will be invalid.



Data : In position control, DATA is the command of target position, which is the moving distance of PR. The moving distance can be planned by users.

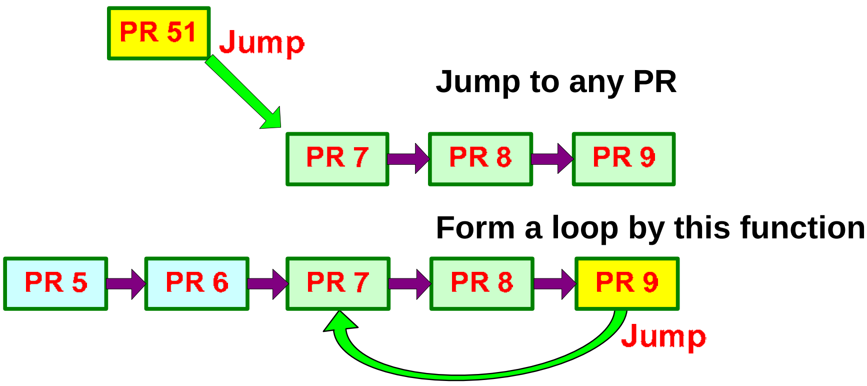
Please note that the parameter format of position command is 32-bit (e.g. P6-03). Thus, the allowable setting range of DATA is between -2^{31} (-2147483648) and 2^{31}(2147483647).



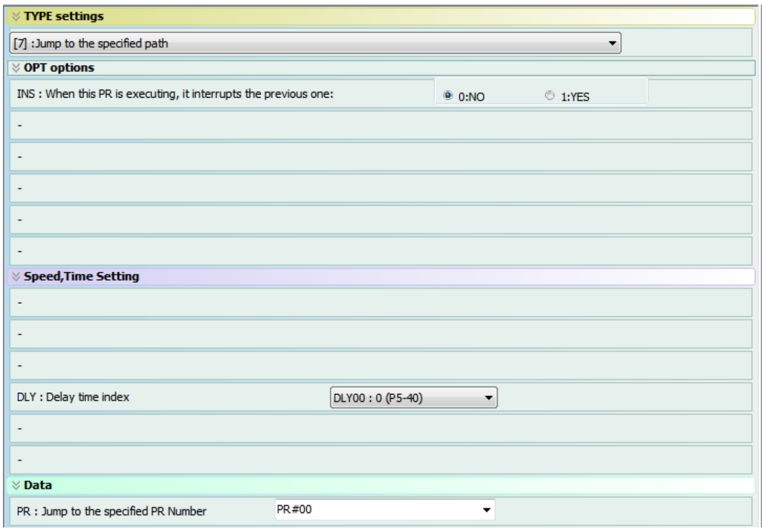
■ Jump to the specified PR

Jump mode is designed for special application, which can be used to call any PR.

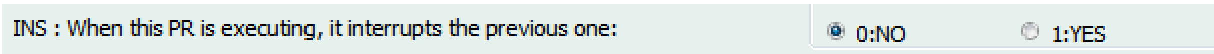
a. Switch PR procedures so the PR can be executed without order
b. The function is similar to sub-program
c. Form a loop of PR procedures



The following is the main setting window:

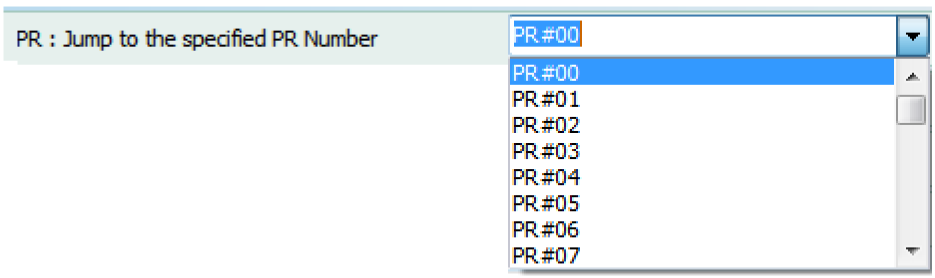


OPT options: Users can select “PR Interrupt” from OPT options.



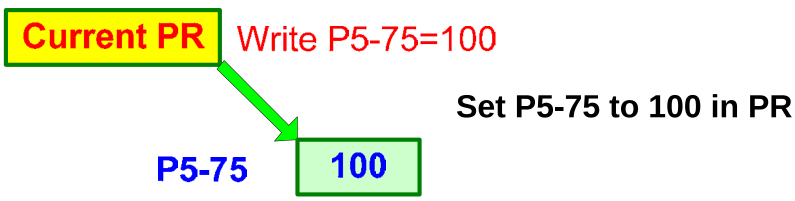
Speed,Time Setting: In jump command, to setup delay time means users need to proceed PR jump after a period of time. The command will jump to the next specified PR after delay time.

Data: In jump command, this represents the PR that users specify to jump to.

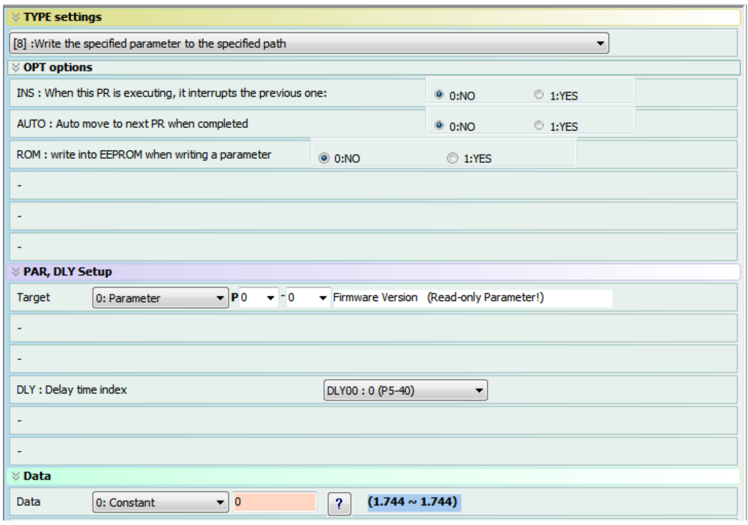


■ Write specify parameters into specified PR

This function can be used to change any parameter that written into the servo drive. As long as the parameter is changeable, it can be changed by PR. Base on this, more methods are provided to change parameters, such as call PR via DI.

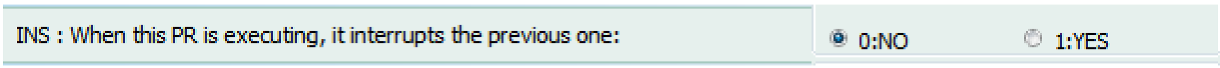


The following is the main setting window:

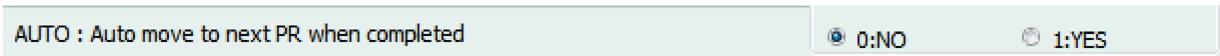


OPT options : 3 parameters are provided for users here.

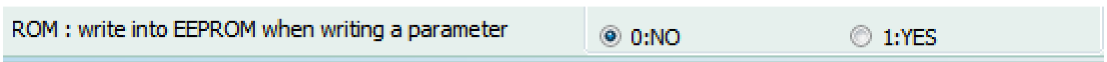
INS : When this PR is executing, it interrupts the previous PR, which is the same as jump command.



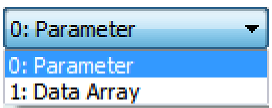
AUTO : Automatically move to next PR when this PR is complete.



ROM : 0 means not to write into EEPROM; 1 means to write into EEPROM when writing a parameter. (The written target is parameter. If select Data Array as the target, then the data will not be written into EEPROM.)

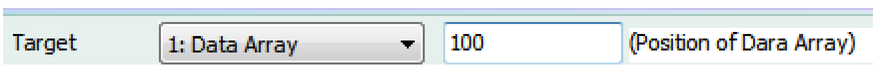


PAR, DLY Setup : Users can setup the written target and delay time (parameter or data array).



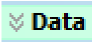
Select the specify parameter and setup parameter groups and parameter number.

Select data array to specify the position of data array.

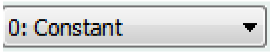


Please note that function of ROM : write into EEPROM when writing a parameter is invalid when the written target is data array.

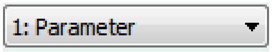
In addition, delay time after writing parameters can be set here. If delay time is set, parameters will be written into when delay time is reached. Setting of delay time uses Delay Time from “Speed, Time Setting” as index:



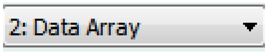
: 4 formats of data source are provided:

- 

  Constant is the value in decimal. Users can directly enter the constant into the specify parameters.

- 

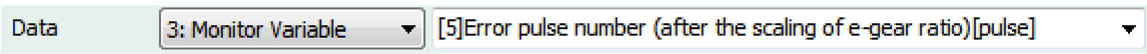
  Users can write a value from one parameter into another parameter by setting up parameter group and parameter number. Please note that the data format and data size of two parameters should be the same. Make sure the correctness of the position before the parameter is written in.

- 

  Users can write a value from one data array into another parameter by setting up the position of data array. Please note that the data format and data size of two parameters should be the same. Make sure the correctness of the position before the parameter is written in.

- 

  Users can write the current status of one variable into another parameter by setting up the monitoring item.
  In general application, it might need to monitor motor speed or position error. Users can write the status into the specify parameter group for monitoring or alteration via this function.

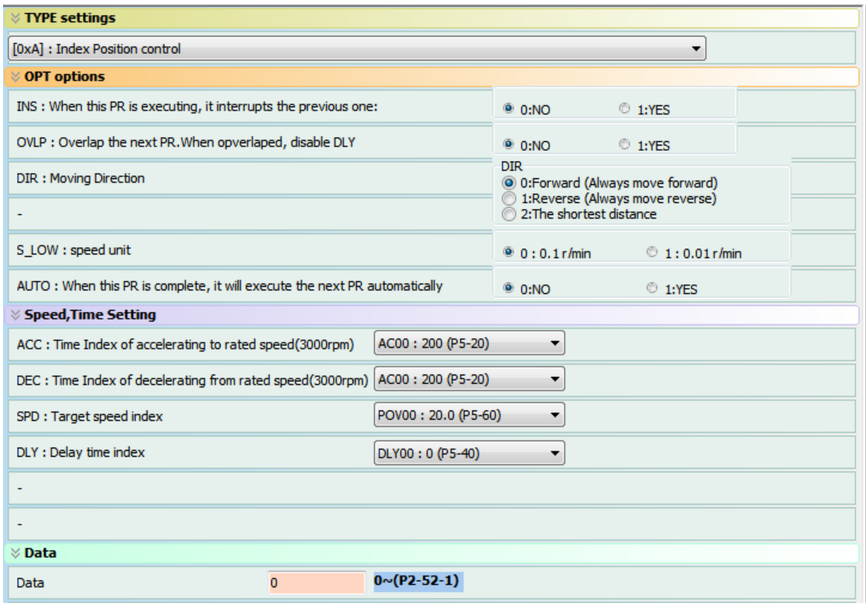


NOTE Writing parameters via PR usually enables/disables or adjusts one function (e.g. adjust P2-00, Position Loop Gain according to different positioning command). This procedure will go over and over again during operation. If all parameter is written into EEPROM, it might shorten the life of EEPROM. Thus, it is suggested to setup parameters that do not need to be written in continuously. Then, set P2-30 to 5. The alternation of parameters from panel or communication will not be stored. And this will help.

If it is failed to write in parameters, AL.213 ~ AL.219 will occur (Please see Chapter 11). The next PR will not be executed automatically.

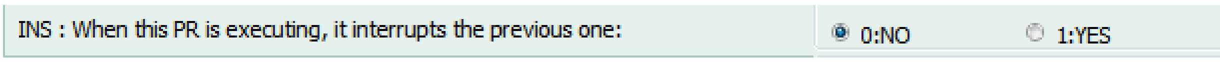
■ Index Position Control

Two kinds of interface for setting index points are provided. If the design of programming the index points is complete, it is suggested to use the following interface to complete other settings.

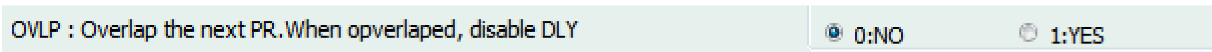


: 3 parameters are provided here.

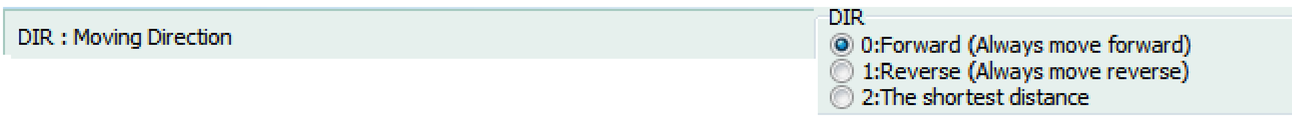
INS: When this PR is executing, it interrupts the previous PR. (Please refer to Constant Speed Control for further information.)

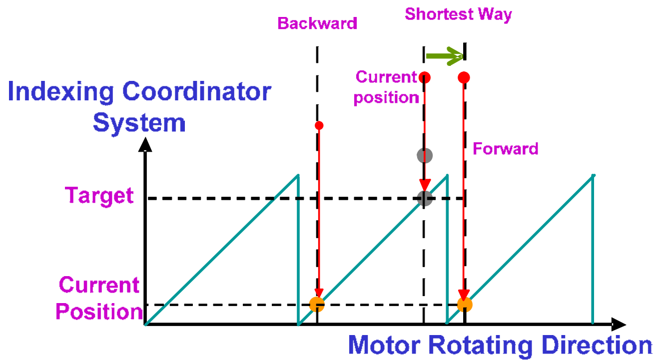


OVLP: Overlap the next PR. When overlapped, disable DLY. (Please refer to Single Positioning Control for further information.)



DIR: Moving direction. When setting up the moving direction of index point, different application requires different path, forward, reverse or shortest distance. For example, for tool magazine in machining application, users need to setup the shortest distance so as to rapidly change tools in different situation. Please note that the shortest distance is determined by the current and target position. There is nothing to do with moving in forward or reverse direction.





S_LOW：Select the unit of low speed. 0 means the speed unit is 0.1r/min; 1 means the speed unit is 0.01r/min. In index position control, low-speed operation is needed. For stable the operation, this function enables users to set the unit to the second decimal place so as to control the variation of motor speed in hundredth unit and maintain the accuracy of low speed.

S_LOW : speed unit	0 : 0.1 r/min	1 : 0.01 r/min

AUTO：When this PR is complete, it will execute the next PR.

AUTO : When this PR is complete, it will execute the next PR automatically	0:NO	1:YES

Speed,Time Setting：In index position control, acceleration/deceleration time, target speed and delay time of the motor all can be set here.

ACC : Time Index of accelerating to rated speed(3000rpm)	AC00 : 200 (P5-20)
DEC : Time Index of decelerating from rated speed(3000rpm)	AC00 : 200 (P5-20)
SPD : Target speed index	POV00 : 20.0 (P5-60)
DLY : Delay time index	DLY00 : 0 (P5-40)

The setting of acceleration/deceleration time uses "Acceleration, Deceleration Time" in Speed, Time Setting as index:

ACC : Time Index of accelerating to rated speed(3000rpm)	AC00 : 200 (P5-20)
DEC : Time Index of decelerating from rated speed(3000rpm)	AC00 : 200 (P5-20)

The setting of target speed uses "Internal Target Speed" in Speed, Time Setting as index:

SPD : Target speed index	POV00 : 20.0 (P5-60)

The setting of delay time uses "Delay Time" in Speed, Time Setting as index:

DLY : Delay time index	DLY00 : 0 (P5-40)

Please note that without interrupt (INS) and overlap (OVLP) command, delay time starts when target position is reached. If external interrupt is set, the setting of delay time is invalid.

Data : In index position control, data setting represents “Total Indexing Distance (PUU)”, which is the total PUU value of indexing. Each part of the indexing is equally divided by the total one.

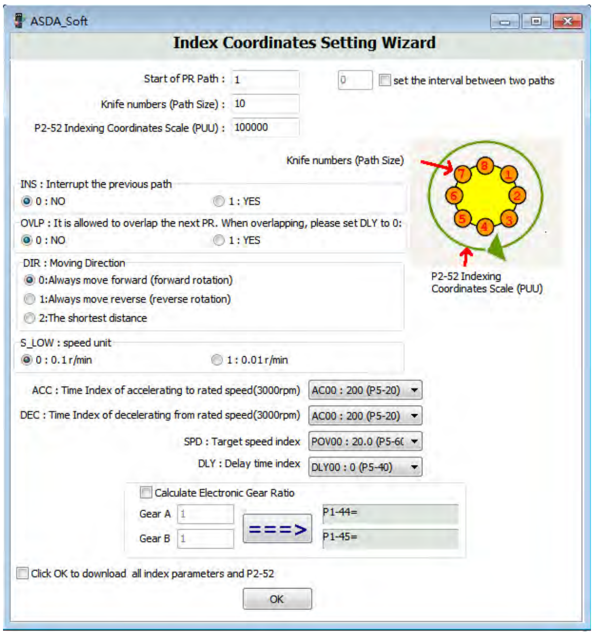
If the value is set too small, it might cause indexing coordinate error. The range of parameter value should be:

$$\text{P2-52} > 1.05 \times \max.speed\,(\text{r/min}) \times \frac{1280000}{60000} \times \frac{\text{P1-45}}{\text{P1-44}}$$

$$\text{P2-52} > 22.4 \times \max.speed\,(\text{r/min}) \times \frac{\text{P1-45}}{\text{P1-44}}$$

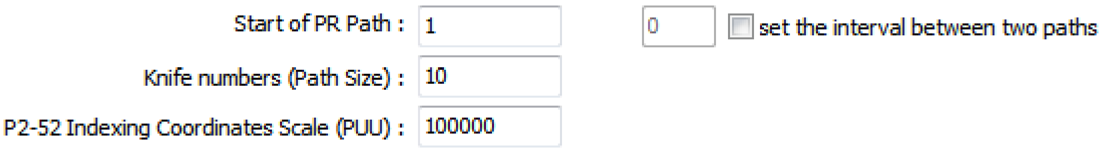
The above mentioned indexing function is for users who already knew the indexing coordinate and indexing setting. Users can manually setup the indexing path. For those who desire to complete the indexing program via software. Indexing Coordinates Wizard provided by ASDA-Soft will be a great tool.

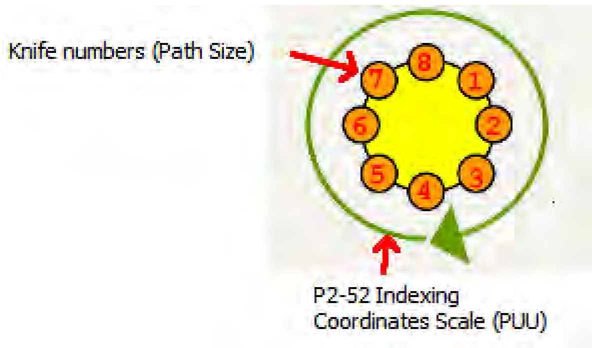
This Indexing Coordinates Wizard is for users who would like to arrange a new set of indexing procedure. Users can arrange and setup the indexing point with simple specific requirements. The following is the main page of this function:



Here are the setting procedures:

Step 1: Setup indexing coordinates scale and total points.



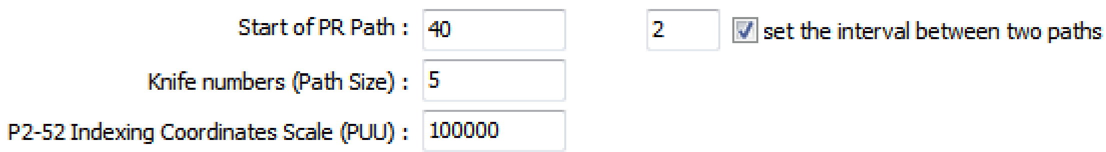


In first step, specify knife number and indexing coordinates scale (PUU). These two values relate to the coordinates (motor's rotating angle) of each index point. For example, if indexing coordinates scale is set to 100,000PUU and knife number (path size) is 10, path of each index will be: $\frac{100{,}000}{10} \equiv 10{,}000 \text{ PUU}$

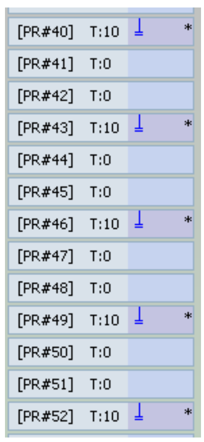
In addition, users can also specify the start of PR path Start of PR Path : 1 to program the system with other PR.

If desire to interrupt other PR between two indexing points, e.g. write the parameter of current feedback position (monitor parameter) into the specify parameter. Check this function ☐ set the interval between two paths , and users can select where to insert the PR. Please note that the inserting path number will be set according to the interval set by the user at every section.

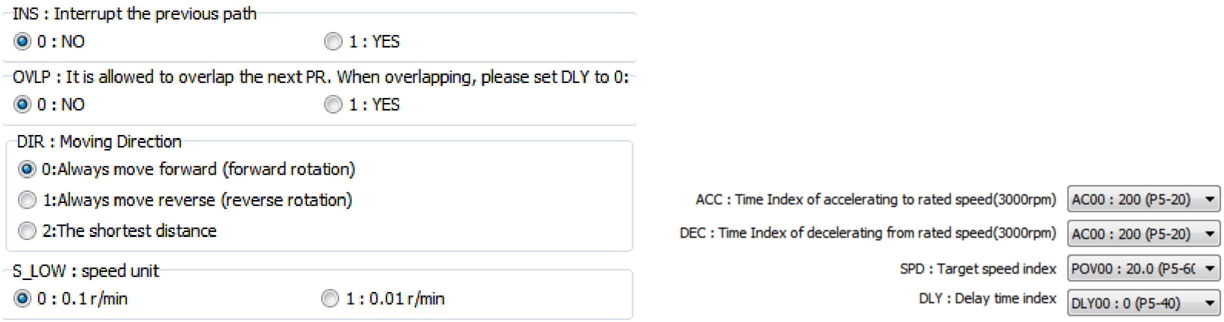
Assume the interval between two paths is 2,



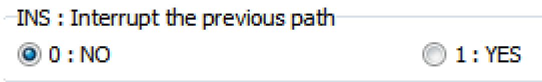
PR path programming on the left, starting from PR#40, will be programmed one index point every two paths.



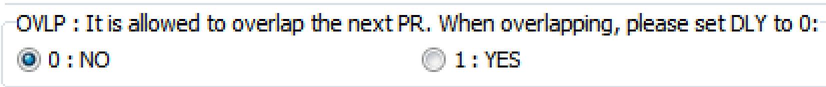
Step 2: Setup related parameters, such as indexing scale, rotating direction, acceleration/deceleration time and target speed.



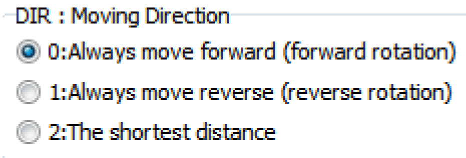
INS：When this PR is executing, it interrupts the previous PR. (Please refer to constant speed control for further information.)



OVLP：Overlap the next PR. When overlapped, disable DLY. (Please refer to single positioning control for further information.)

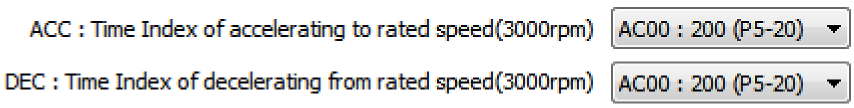


DIR：Moving direction. When setting up the moving direction of index point, different application requires different path, forward, reverse or shortest distance. For example, for tool magazine in machining application, users need to setup the shortest distance so as to rapidly change tools in different situation. Please note that the shortest distance is determined by the current and target position. There is nothing to do with moving in forward or reverse direction.

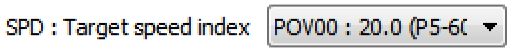


S_LOW：Select the unit of low speed. 0 means the speed unit is 0.1r/min; 1 means the speed unit is 0.01r/min. In index position control, low-speed operation is needed. For stable the operation, this function enables users to set the unit to the second decimal place so as to control the variation of motor speed in hundredth unit and maintain the accuracy of low speed.

The setting of acceleration/deceleration time uses “Acceleration, Deceleration Time” in Speed, Time Setting as index:



The setting of target speed uses “Internal Target Speed” in Speed, Time Setting as index:



The setting of delay time uses “Delay Time” in Speed, Time Setting as index:

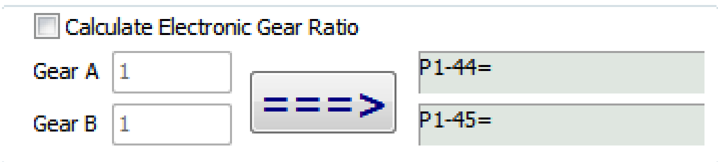
Please note that without interrupt (INS) and overlap (OVLP) command, delay time starts when target position is reached. If external interrupt is set, the setting of delay time is invalid.

Step 3: Setup E-Gear Ratio

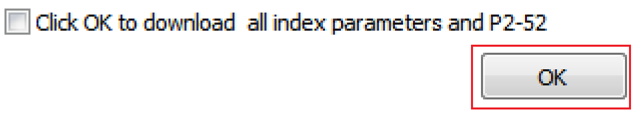
If users need to estimate the actual operating distance aiming at different mechanism, such as the roller with smaller diameter or different pitch of ball screw, it is suggested to modify the moving distance via e-gear ratio so as to satisfy the demand.
Limit of e-gear ratio set by ASDA-A2 servo drive is:

E-gear ratio: $\frac{\text{Gear A(N)}}{\text{Gear B(M)}} \equiv \frac{\text{P1-44}}{\text{P1-45}}$, the limit is $\frac{1}{50} \leq \frac{\text{Gear A(N)}}{\text{Gear B(M)}} \leq 5000$

E-gear ratio enables users to easily modify the proportion of moving distance. A big e-gear ratio usually causes stepping of position command. The situation can be improved via S-Curve or low-pass filter. When e-gear ratio is 1, the pulse number from encoder is 10000 PPR per cycle. Every two pulses from command end will correspond to one pulse from motor if e-gear ratio turns to 0.5. Users can check this function to setup e-gear ratio.



Step 4: Users now can decide whether to write the related parameters into servo drive.



Example

Tips of accessing a series of different types of PR:

1. Since the servo drive updates the command every 1 ms, the first step is to find the command section, which is the PR that can stays in PR Executor for more than 1 ms.
2. Write command and jump command will be finished right after they are read, and will only occupy “PR Executor”. Motion commands, such as speed and position command, will occupy both “PR Executor” and “Motion Command Generator”. As long as the motion command is issued to “Motion Command Generator”, it will continue to execute even when “PR Executor” is occupied by anther PR.
3. Regarding a group of PRs that are read in the same 1ms, the later command will replace the front command for motion command; for write command and

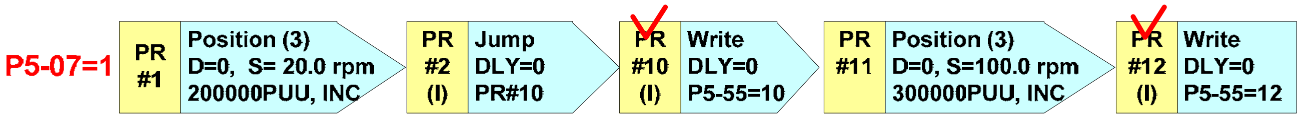
jump command, the mission is complete once they have been accessed.

4. The best way is to get an ASDA-A2 servo drive and entering these PR. Then, use PC scope to monitor the two different combinations:
   a. Feedback position (PUU) (32 bit) + Motor speed: Real time r/min + Parameter P5-55 (use mapping parameter or directly enter the address 0 x 20002537.).
   b. Motor speed: Real time r/min + Parameter P5-55 (use mapping parameter or directly enter the address 0 x 20002537) + Parameter P5-07 (uses mapping parameter or directly enters the address 0 x 20002507)
5. P5-07 displays the next PR that is going to be executed.

Setting tips: Find out the stop point of 1ms, and then read back from behind. This way can quickly check the execution result of PR group.

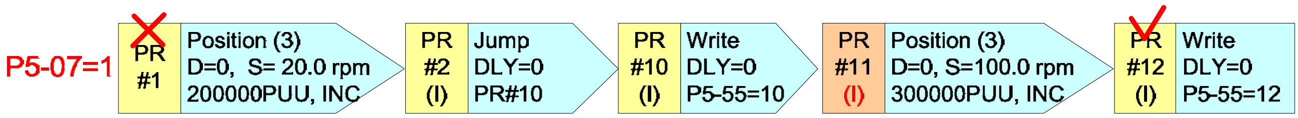
Please refer to Chapter 1.6 in ASDA-A2 Application Note for further information.

Case 1:



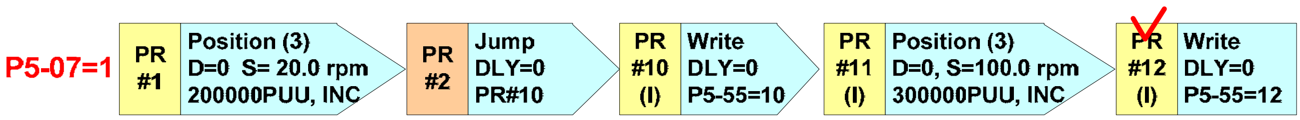
(PR#1(PR#2(PR#10) (1ms group) **((**PR#11(PR#12) (1ms group)
PR#10 to PR#11are sequent command, since PR#11 has no insertion setting. PR#11 can be executed not until all PR group is done and releases the resource. In this case, when the motor operates 200000PUU by 20rpm, P5-55 = 10. When the motor operates 300000PUU by 100rpm, P5-55 = 12.

Case 2:



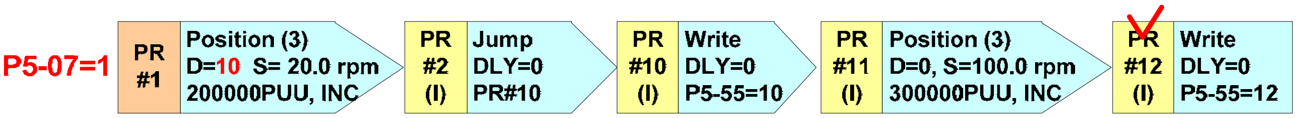
(PR#1(PR#2(PR#10**(**PR#11(PR#12) (1ms group)
PR#1 to PR#12, total 5 PRs (less than 8 PRs), will be read in at one time. This is because they all have insertion setting. PR#1 has no chance to stay in Motion Command Generator for more than 1 ms and it will be kicked out by PR#11. PR#2, PR#10 and PR#12 will be executed. However, the final result will be P5-55 = 12, since the result of PR#10 will be covered by PR#12. The motor will operate 300000PUU by 100rpm and P5-55 = 12.

Case 3:



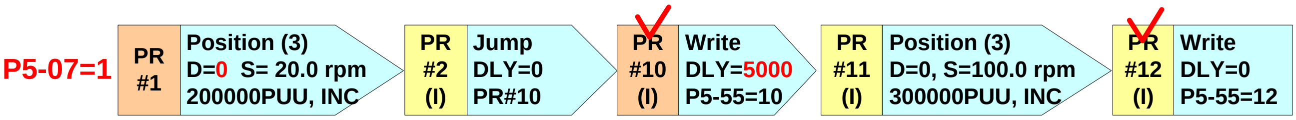
(PR#1)(1ms group) ((PR#2(PR#10**(**PR#11(PR#12) (1ms group)
PR#1 to PR#2 are sequent command, since PR#2 has no insertion setting. It will be executed no until all PR group is done and releases the resource. After PR#1 is complete, the next PR group will start from PR#2 to PR#12. The result of the second group is that PR#11 occupies Motion Command Generator and PR#12 occupies PR Executor until the command is complete.

Case 4:



(PR#1)(1ms group) ((PR#2(PR#10**(**PR#11(PR#12) (1ms group)
PR#1 will occupy PR Executor and Motion Command Generator for 10 ms since the delay is set in PR#1. After 10ms, PR#2 and PR#12 will be read in at one time. This is because command of PR#1 is already accepted by the system. The later command can only be combined not replaced. Thus, PR#11 will combine with PR#1. The combined rules will follow the rules that introduced before.

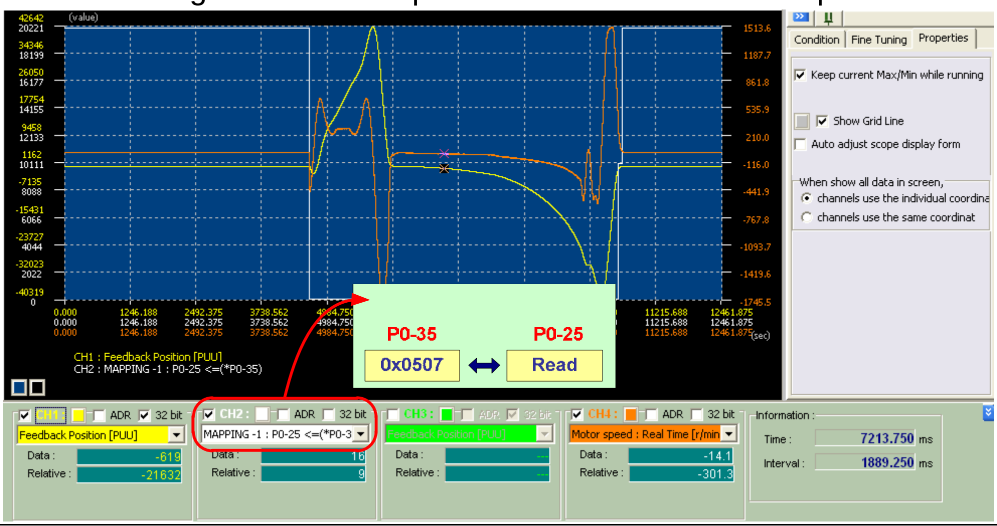
Case 5:



(PR#1(PR# 2**(**PR#10) (1ms group) ((PR#11(PR#12) (1ms group)
Since PR#10 has delay command, PR#1 to PR#10 will be read in at one time. PR#2 and PR#10 are non-motion control command. When using PR Executor, PR#1 occupies motion command generator all the time during this period. When the delay time, 5000 ms is reached, PR#11 and PR#12 will be read in at one time. If the execution of PR#1 is complete, PR#11 will be executed alone. If PR#11 is not finished yet, PR#11 will combine with PR#1.

To monitor PR procedure via P5-07 from PC scope:
Mapping parameter can be used to read the content of P5-07. A scope channel can be assigned to monitor the variation of P5-07, which can display the next PR that is going to be executed. P5-07. For example, PR#3 to PR#4 and so on, when PR#3 is executed in PR Executor, PR#4 will be shown in P5-07.

To read P5-07, if
1. The accessing value is the input PR#: This PR is waiting for the authorization of PR Executor, or the last executed PR is complete.
2. The accessing value is the input PR# + 10000: PR command is complete, but the motor is not in position yet.
3. The accessing value is the input PR# + 20000: PR is complete.



4.3 Capture (CAP) / Compare (CMP)

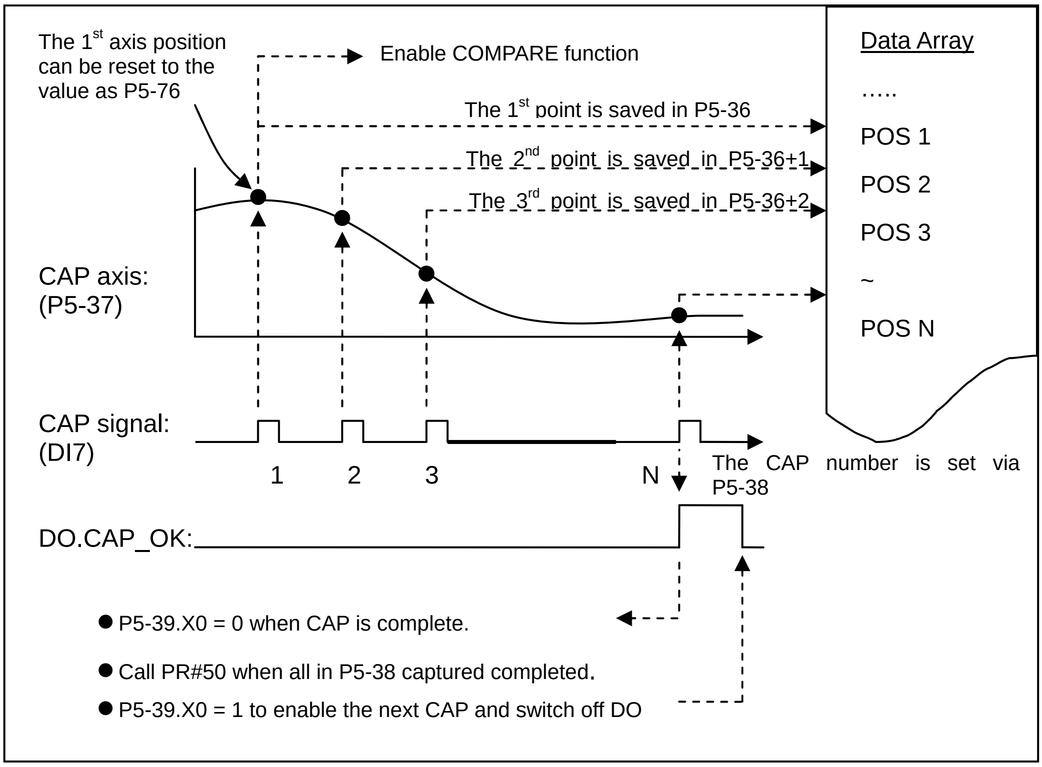
For the applications that require the instant position record and compare positions, such as dynamic mark tracking or visual inspection which needs continuous trigger. Usually, using software communication to read/write cannot satisfy the demand of immediacy applications. They all trigger and capture data by hardware directly. Digital input (DI7) and digital output (DO4) are provided for specific specifications in ASDA-A2. 5µs of high-speed analog signal is used to capture and compare data.

The concept of CAPTURE is to capture the position of motion axis instantaneously by using the external trigger signal DI7. Then save it in data array so as to be used for motion control afterwards. Since CAPTURE is finished by hardware, there is no problem of software delay. It also can accurately capture the high-speed motion axis. The CAPTURE features provided by ASDA-A2 servo drive is as follows.

CAPTURE Features	
Pulse Source	● Main encoder of the motor ● Auxiliary encoder (linear scale) ● Pulse command The selected axis will be displayed in P5-37, the default value can be written in before capture. Note: When the source of COMPARE is CAP axis, the CAP source cannot be changed.
Trigger Signal	● Triggered by DI7, the response time is 5 µsec. Note: DI7 directly connects to CAPTURE hardware. Thus, regardless the setting value of P2-16 (DI Code), CAPTURE can work. When using CAPTURE, in order to avoid DI error, system will force to disable DI function, which means the setting will be P2-16 = 0x0100 automatically. Since the value is not written into EEPROM, P2-16 will return to the default value after re-power on.

Trigger method	● Edge trigger can select contact A/B ● It is capable to continuously capture more than one point. ● It can set the trigger interval. (The interval between this trigger and the next one.)
Data storage position	● Data array. The start address is set by P5-36.
Capture number	● It is set via P5-38 and will not exceed the limit of data array.
Capture format	● 32-bit (It has positive and negative.)
Auxiliary selection	● After capturing the first data, the CAP axis coordinate system will be set to the value the same as P5-76. ● After capturing the first data, the COMPARE function is enabled automatically. ● After capturing all points, PR procedure＃50 is triggered automatically.
DO.CAP_OK	● The default value is OFF. ● After capturing the last point, this DO is ON. ● Set P5-39.X0 to 1 so as to activate CAPTURE function and this DO is OFF.
Note	● If P5-38=0, set the value of P5-39 X, Bit0 to 1 will disable the CAPTURE function. Clear the setting value of P5-39 X, Bit0 to 0 and set DO.CAP_OK to OFF. ● Since the capture axis is 32-bit wide, the accumulation will cause overflow. Please avoid this.

Diagram of CAP:

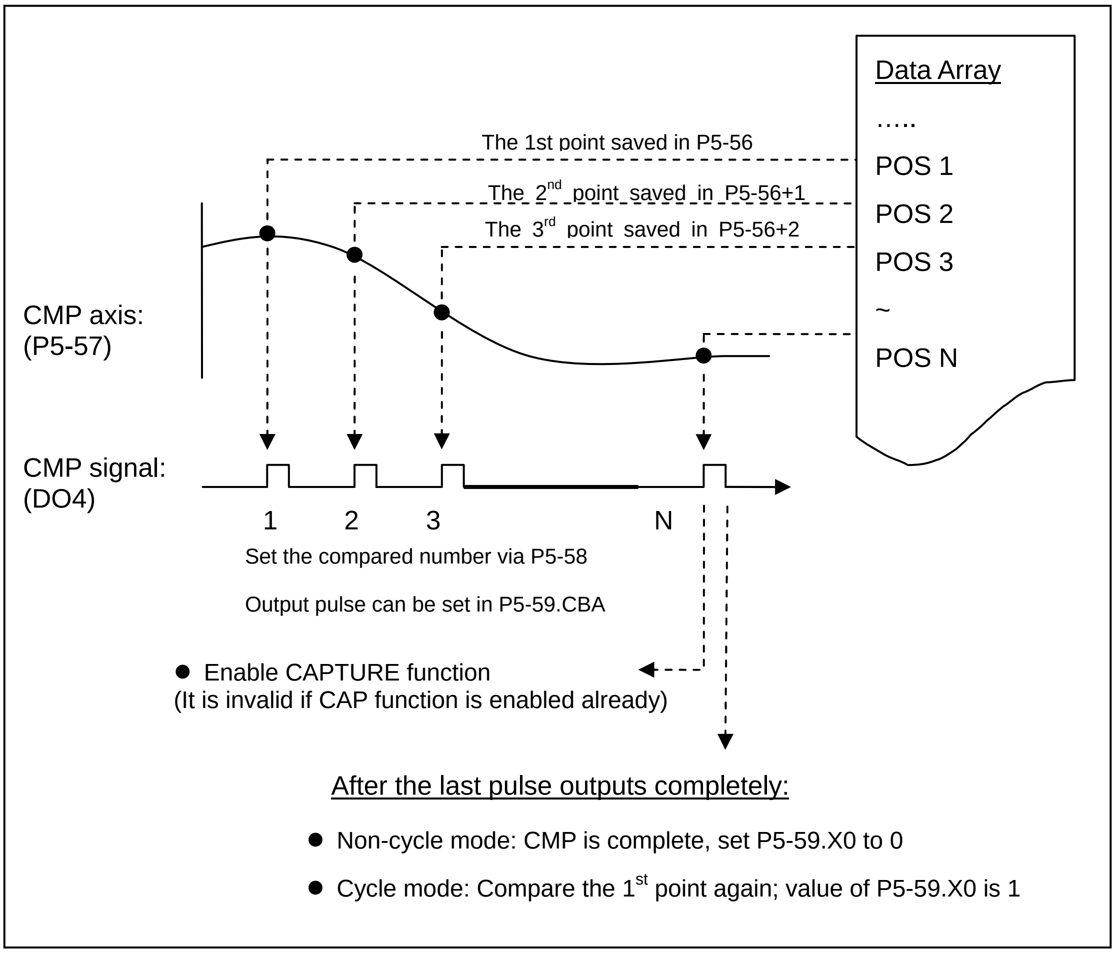


The concept of COMPARE is to compare the instant position of motion axis with the value which is saved in data array. Then output DO4 after the COMPARE condition is established for motion control. Since COMPARE is finished by hardware, there is no problem of software delay. It also can accurately compare the high-speed motion axis. The COMPARE features provided by ASDA-A2 servo drive is as follows.

COMPARE Features	
Pulse Source	● Main Encoder of the Motor ● Auxiliary Encoder (linear scale) ● Pulse Command ● CAP Axis (set by CAPTURE). When selecting this axis, CAP source cannot be changed. The selected axis is displayed in P5-57. Before compare, the default value can be written in.
Output Signal	● Output by DO4 and the response time is 5 usec. Note: DO4 directly connects to COMPARE hardware, thus, regardless the setting value of P2-21 (DO Code), the function can work. When using COMPARE, in order to avoid DO error, the system will force to disable DO function, which means the setting will be P2-21 = 0x0100 automatically. Since the value is not written into EEPROM, P2-21 will return

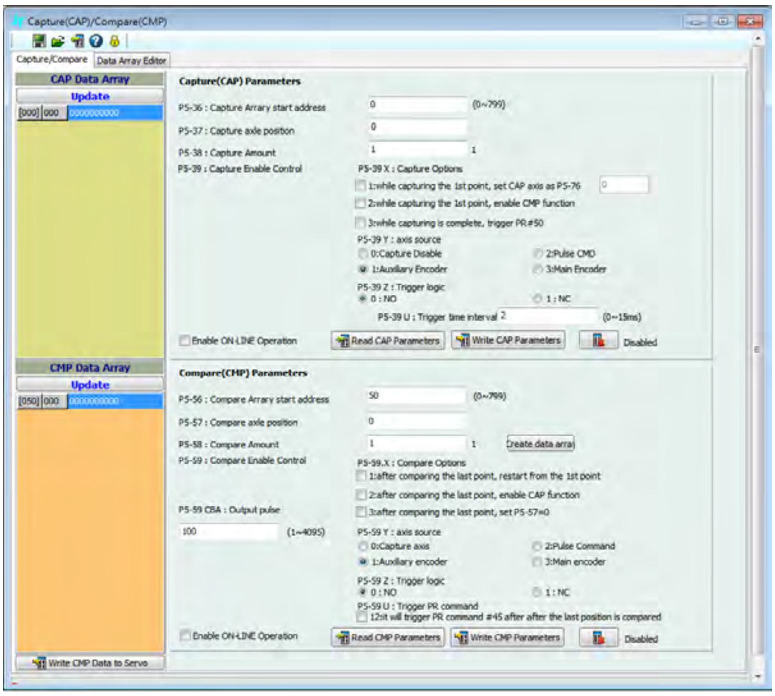
	to the default value after re-power on.
Output Method	● Pulse output can select contact A/B. ● It is capable to continuously output more than one point. ● It can set the pulse output time.
Data Storage Position	● Data array. The start address is set by P5-56.
Compare Number	● It is set via P5-58 and will not exceed the limit of data array.
Compare Format	● 32-bit (It has positive and negative.)
Compare Condition	● It will be triggered when the source of compare axis pass through the compare value.
Auxiliary Selection	● Cycle mode: When comparing to the last point, it automatically returns to the first point and starts to compare. ● When the last compare is completed, the CAPTURE function is activated automatically.
Note	● If P5-58 is set to 0, set the value of P5-59 X, Bit0 to1 will be unable to compare. Set the value of P5-59 X, Bit0 to 0. ● Since the capture axis is 32-bit wide, the accumulation will cause overflow. Please avoid this.

Diagram of COMPARE:

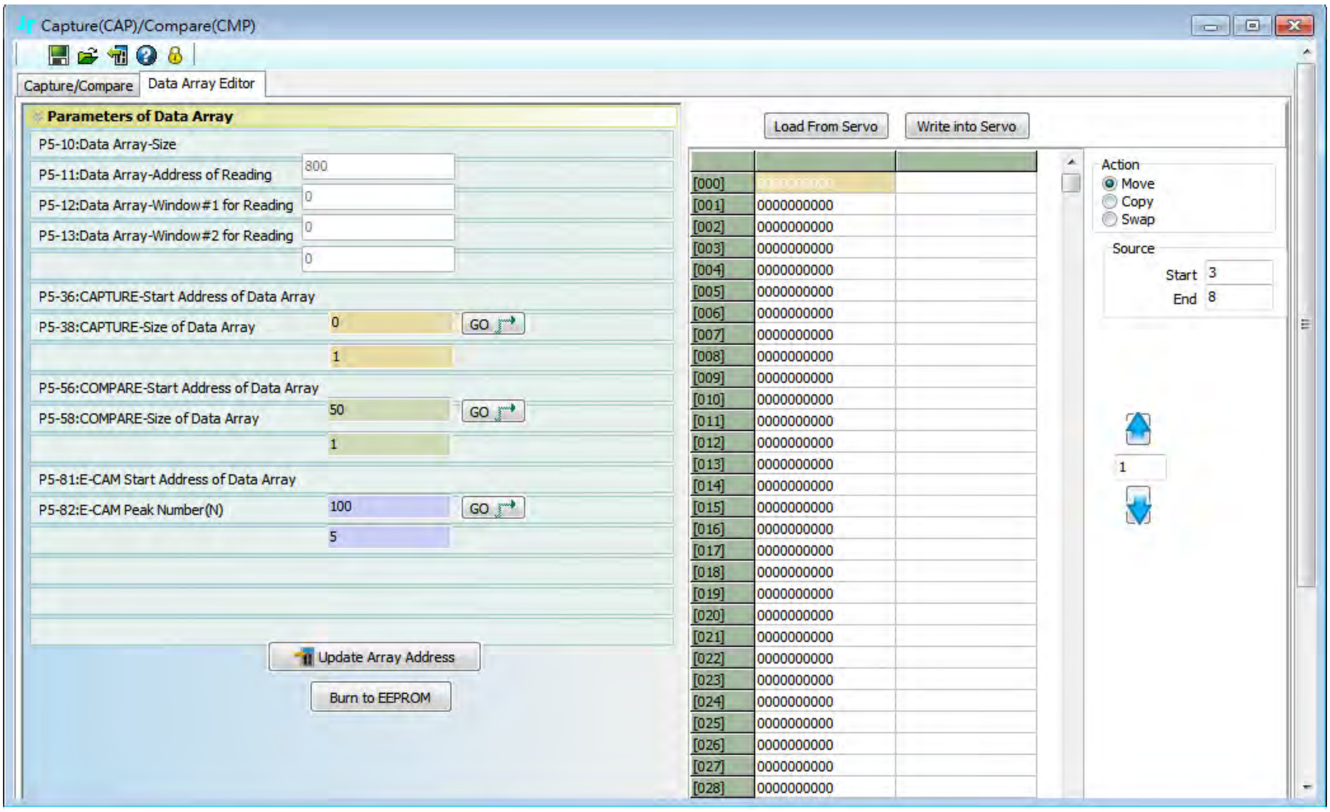


Next, we are going to introduce the main setting screen of software:

Window of Capture / Compare



Data Array Editor



This section is divided into four parts:

【**Interface Introduction**】: It describes the basic function of toolbar.

【**Functions**】: Functions of Capture and Compare are described here.

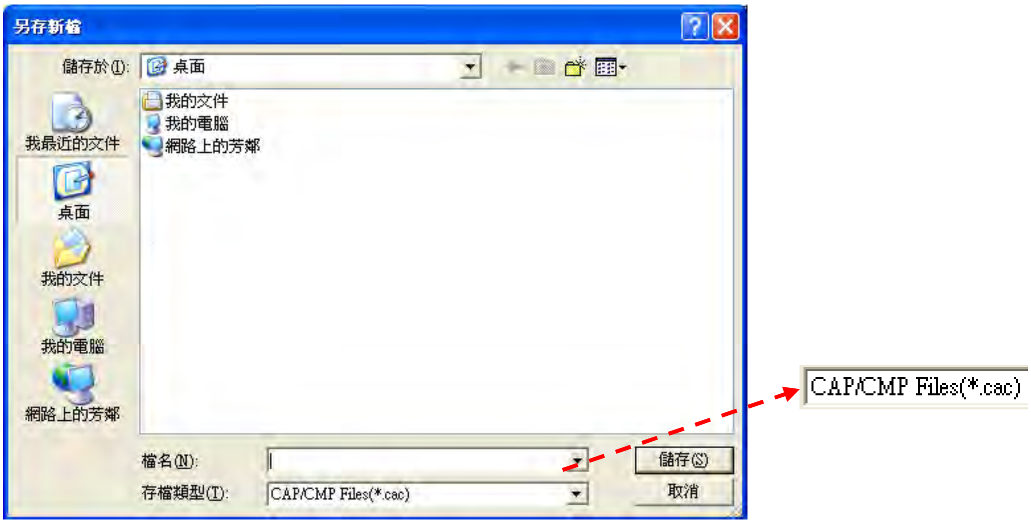
【**Data Array**】: It describes the operation method of data array editor.

【**Example**】: Examples are provided for users to know how to operate the function via software.

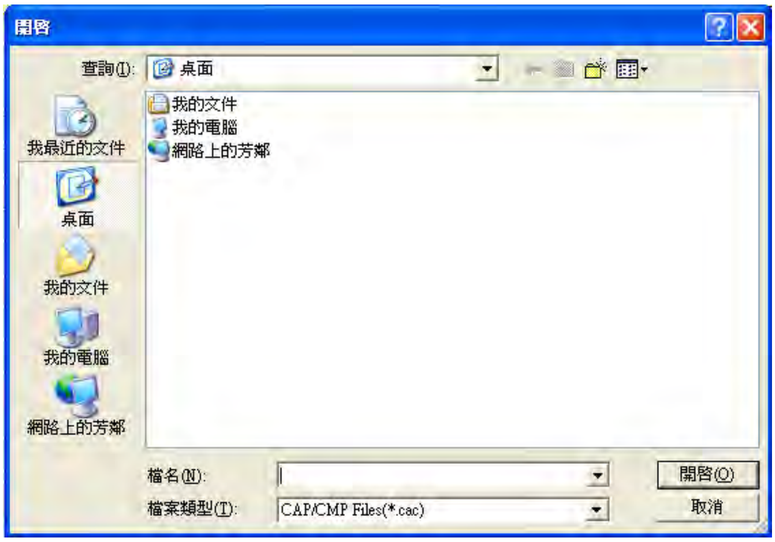
Interface Introduction

Before the introduction of Capture, Compare and Data array, let’s talk about the basic operation of toolbar first:

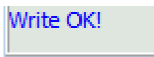
 : **Save as files.** It saves CAP and CMP parameter files as the special format (CAC) for users to confirm and modify. Click , the following window will pop up.



 : **Open files.** Click this to open the *.cac files.



 :**Load from Servo**. If the parameter file inside the servo drive already has the setting of CAP and CMP and users desire to modify or test via software or to make sure if the changed parameter is downloaded into the servo drive, this function can help to upload parameters from servo drive to the software. When the uploading is complete, message below will show:



 : **Help** / **Password Setting**. These functions were described before. “Help” provides the description of software operation; while “Password Setting” can setup the password to protect data array.

Functions

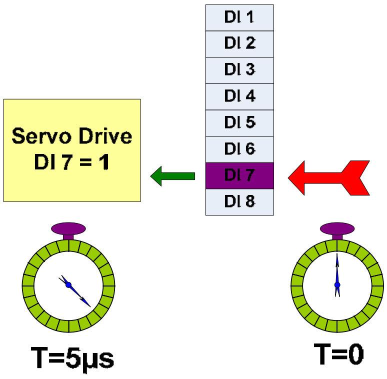
This section is divided into two parts for descriptions: 1. Capture (CAP). 2. Compare (CMP).

Function of Capture

■ Hardware introduction (digital input) - **DI7**

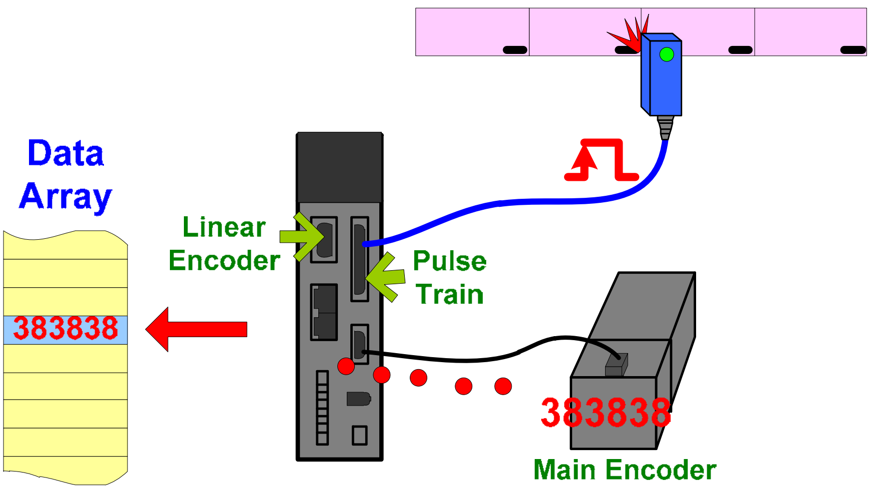
DI7 is the only high-speed digital input of ASDA-A2. The servo drive only needs 5 µs to know the change of signal. The general digital input takes 0.5 ms. Function of Capture must set on DI7.

Please note that DI7 is a high-speed DI and currently only Capture is applying its characteristic. The signal is processed by hardware directly. Thus, the current position can be captured very quickly.



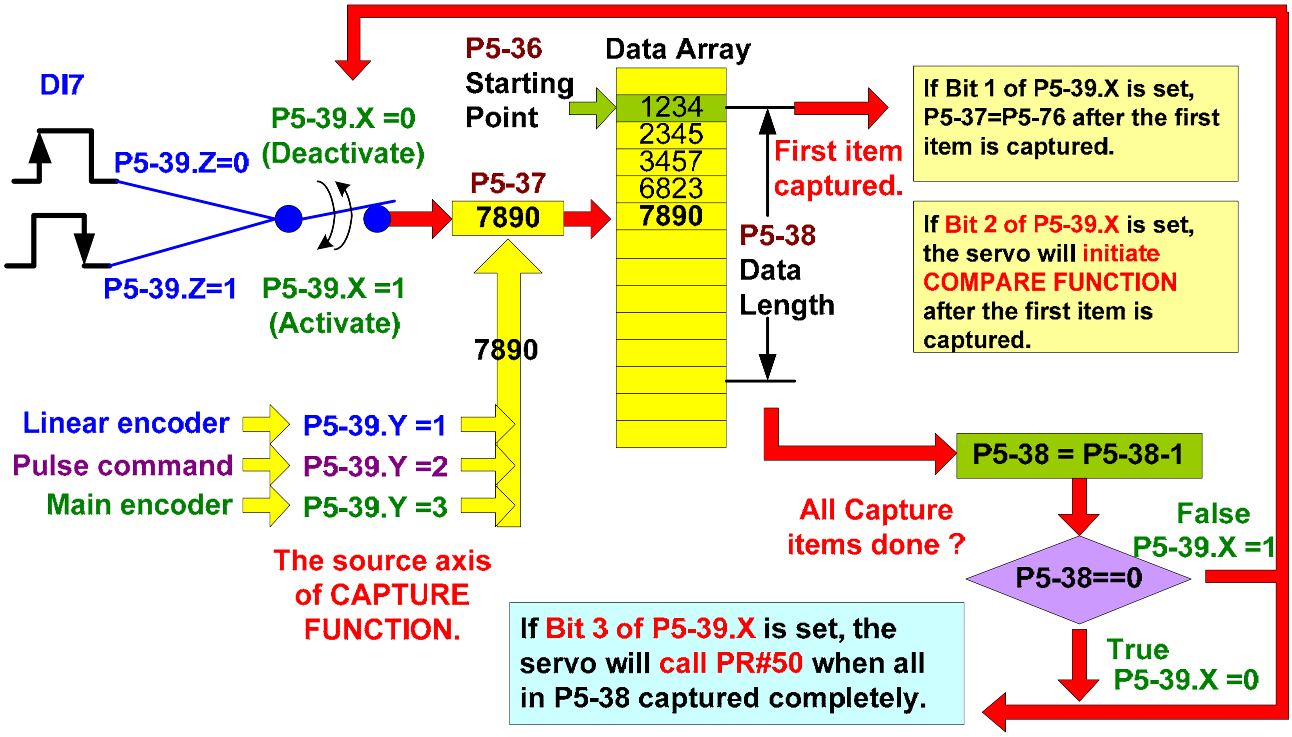
■ Brief introduction

The main function of Capture is to record the position into “Data Array” and the record can up to 800. The recording resource is pulse command, auxiliary encoder or main encoder from servo drive. The so-called position is “Motor Feedback PUU” and the start point can start from any location of data array.



■ Parameter setting and operating testing procedure

Please note that function in software is only applicable to quick testing. In real application, it usually applies PR writing function or controller to initialize and proceed capture function. Followings are the operating procedure and parameter setting methods:



1. Set the source of capturing reference signal by **P5-39.Y**.
   - ➢ Auxiliary encoder (CN5): The source could be linear scale.
   - ➢ Pulse command (CN1): The source could be the controller.
   - ➢ Main encoder (CN2): The source could be motor encoder.
2. Switch of CAP function: It is set by **P5-39.X bit 0**. This function can be enabled only when all necessary setting is set.
3. CAP active signal: When DI7 is triggered, it captures the axis position (shown in P5-37) of source axis and store the data in data array. **P5-39.Z** can set whether the CAP function is triggered by rising edge of falling edge of DI7 signal.
4. **P5-37**：It displays the position of CAP axis.
5. **P5-36**：The CAP data stores in the start address of data array.
6. **P5-38**：It sets the total CAP amount.

After settings of P5-36 (start address of data array), P5-37 (axis position of CAP axis) and P5-38 (CAP amount) are complete, next step is to setup Capture actions.

7. Capture actions: While the position of source axis is changing, P5-37 will also vary according to the source axis. Once DI7 is triggered, if P5-38 is not 0, the value displayed by P5-37 will be written into data array.

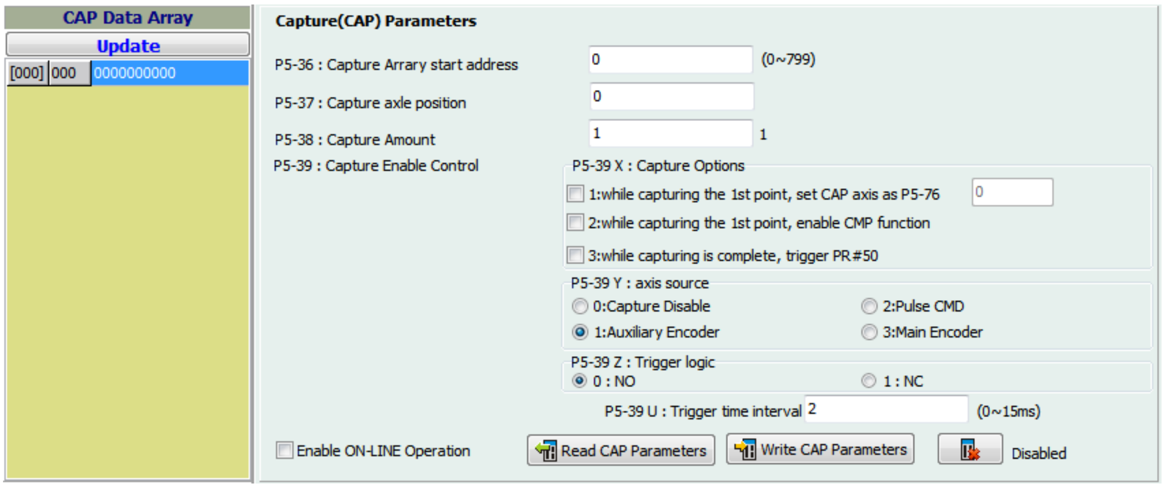
Several ways are provided to setup high-speed CAP:

8. **When it captures the first item, if Bit1 of P5-39.X is set, value set in P5-76 will be written into P5-37 and data array as the captured first value. The value of P5-37 will increase or decrease based on it. This is the concept of increment counting.**

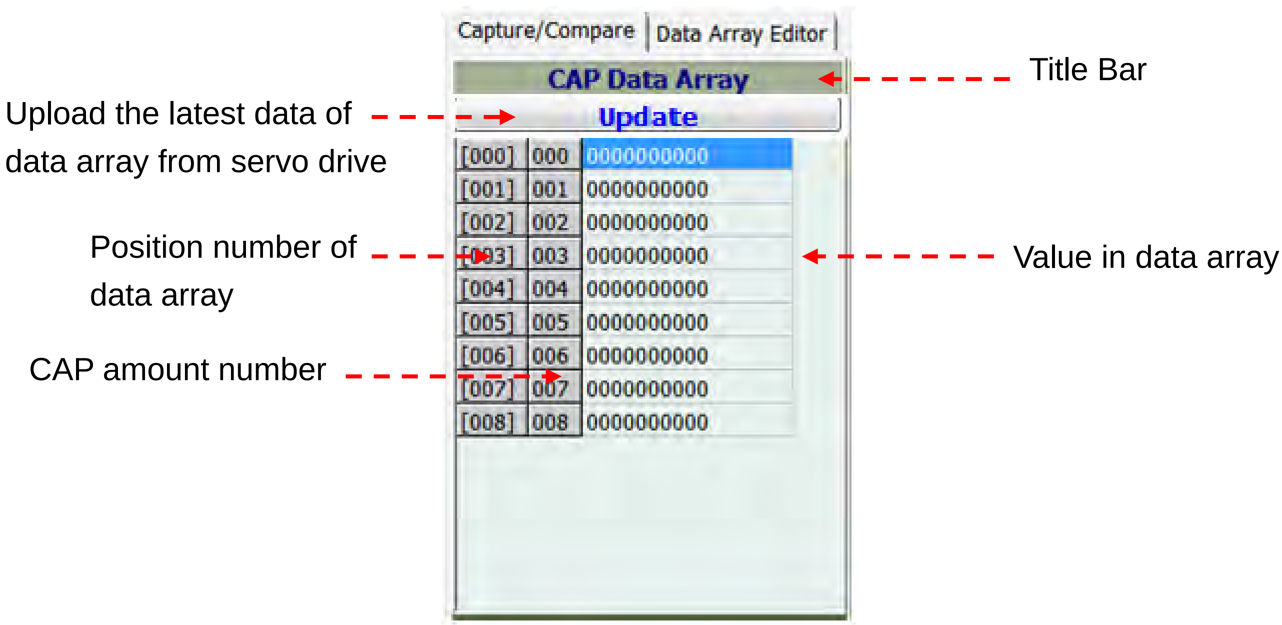
9. When it captures the first item, if Bit2 of P5-39.X is set, CMP function is enabled.
10. The value of P5-38 will automatically subtract 1 after each item is captured. When P5-38 is 0, the CAP function is disabled, which means the CAP amount is met.
11. When CAP is complete, if Bit3 of P5-39.X is set, the servo will call PR#50.

■ Software Operation

The software provides setting interface and the function to test actions. A complete CAP setting has to be with PR setting, host controller and triggering switch. Following is the setting window of Capture:

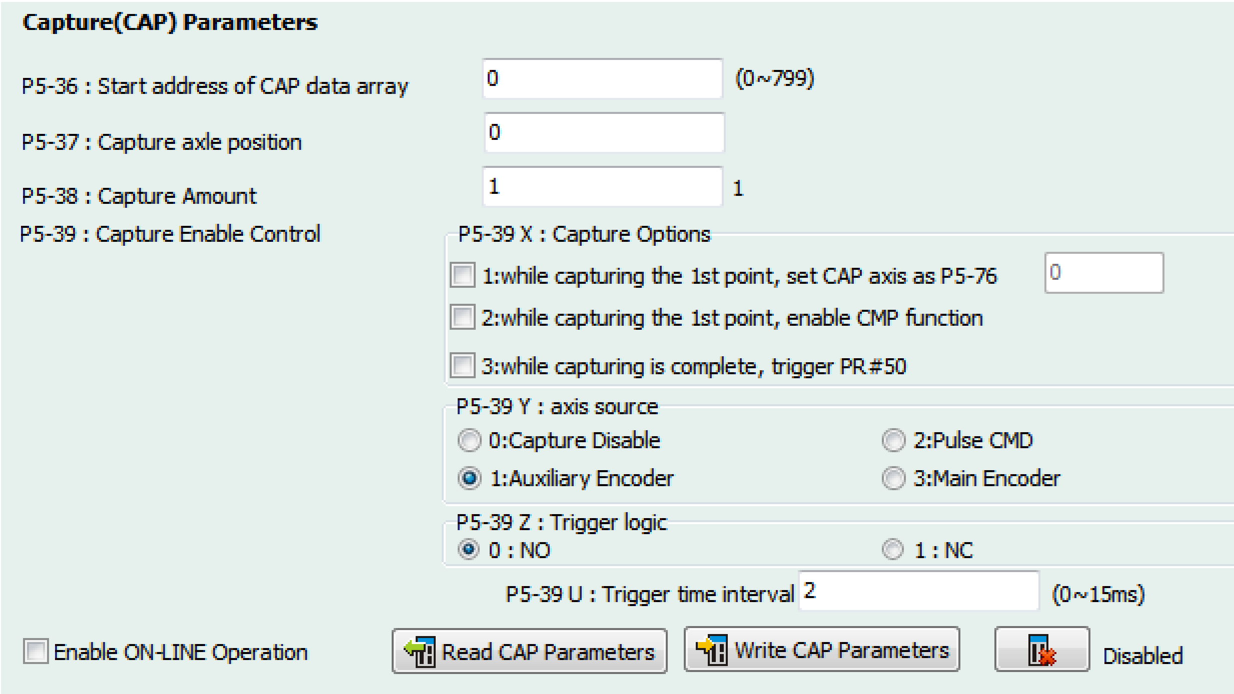


The left window displays the current list and value of each data array. Here is the brief introduction:



During the test process, users can click  to update the value in data array if needed.

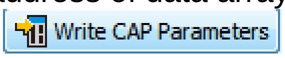
The right window shows the related parameters of CAP.



Users can quickly setup the start position of CAP data array here, which is the same as the setting method of "Parameter setting and operation procedure".

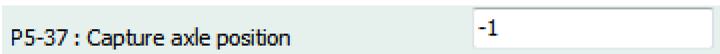
➢ Start position of CAP data array:

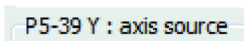
Setup the start position of writing the CAP data.
Please note that if the start position of E-Cam data is also 100, and the area number of E-Cam is 4, if the setting value of P5-36 (Start address of CAP data array) and P5-38 (CAP amount) is the same as E-Cam, an error (data in data array is overlapped) will occur.

If the start address of data array is set to the same, a warning message will pop up when click 

:

➢ Position of Capture axis: It displays the position of CAP source, which can be auxiliary encoder (linear scale), pulse command and main encoder (motor encoder).

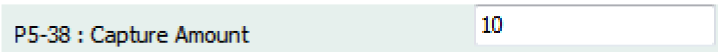


Value in this part is related to the setting of 

. Different axis source brings different value.

Please note that this setting is enabled when function of CAPTURE is disabled (Please refer to P5-39). If the axis source is main encoder, this parameter is prohibited to write in and its content will be motor feedback position (monitor variable 00h).

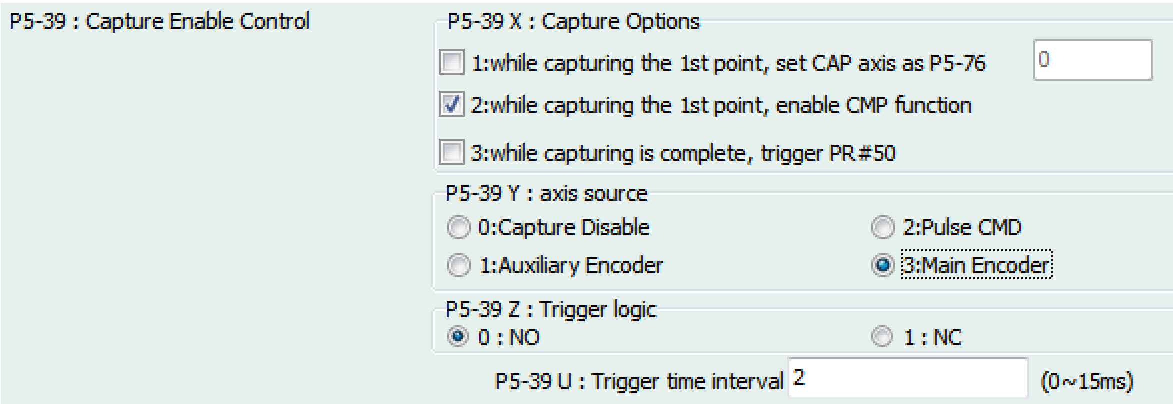
➢ Capture amount: It is used to set the captured amount. When the setting is done, window in the left will display all data array according to the setting. For example, if it is set to 10,



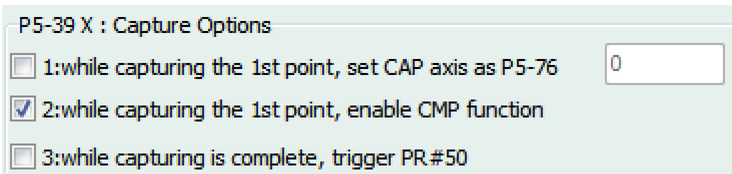
window in the left will be:

[100]	000	0000000000
[101]	001	0000000000
[102]	002	0000000000
[103]	003	0000000000
[104]	004	0000000000
[105]	005	0000000000
[106]	006	0000000000
[107]	007	0000000000
[108]	008	0000000000
[109]	009	0000000000

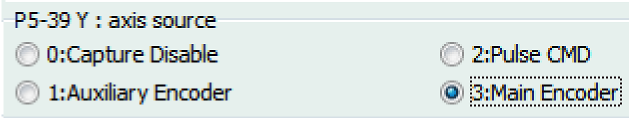
➢ Capture control setting: Please refer to section of "Parameter setting and operation testing procedure" that mentioned above for this part. Some other reminders are as follows:



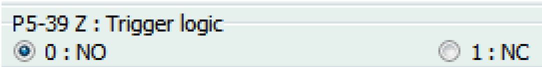
■ Capture options: If you choose 1:while capturing the 1st point, set CAP axis as P5-76, the blank can be used to set the value of P5-76. There is no need to set it up in Parameter Editor.



- Axis source: If it is set to main encoder, then the position of CAP axis will be the current feedback position of motor encoder.



- Trigger logic:



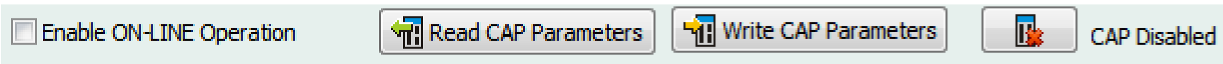
- Trigger time interval: The range should be between 0 and 15 ms.

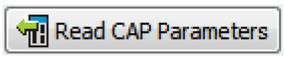
When the above setting is all complete, click 

to download new parameters into the servo drive.

P5-37, P5-38 and P5-39 are volatile parameters, which will return to the initial value after re-servo on.

Use the function of “ON-LINE operation” to simulate the action and to make sure if the setting can satisfy the demand.

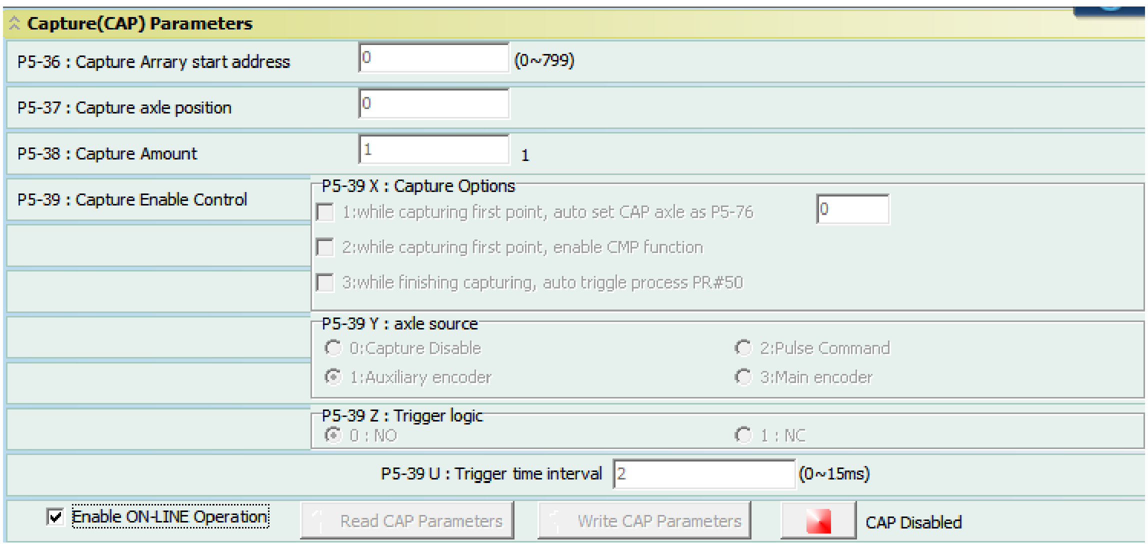


Before enabling ON-LINE operation, it is suggested to use 

to check if the servo drive is still in initial setting or has completed the setting of CAP after re-servo on if the captured parameter is not set from the beginning.

In CAP function, DI7 accepts the physical signal only and cannot simulate by software. Thus, neither digital input/output signal of ASDA-soft nor DI control of communication can simulate the input of CAP function. Please make sure the wiring of command signal from the controller is correct before operation.

When ON-LINE operation is enabled, the setting page will be locked by software so as to avoid any occurrence of error during testing procedure.



Click 

means to trigger bit 0 of P5-39.X (Start to CAP). And the status will become 

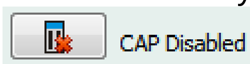
.

: **P5-39.X bit0 = 0**

: **P5-39.X bit0 = 1**

When the value of P5-38 (Capture amount) is more than 0, 

will start capturing and DO.CAP_OK is OFF. When it captures one item, value of P5-38 descends one. When P5-38 is 0, the CAP is complete and DO.CAP_OK is ON. Bit 0 will reset to 0 automatically.

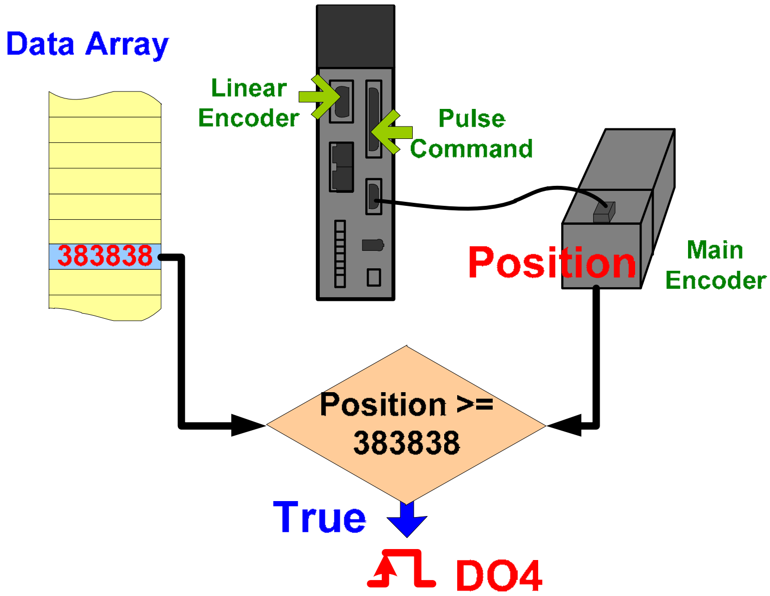
If P5-38 is 0, click 

will not do capturing, DO.CAP_OK will be OFF and bit 0 will reset to 0 automatically. If bit 0 is 1, users can only set the value to 0 and disable CAP.

Function of Compare

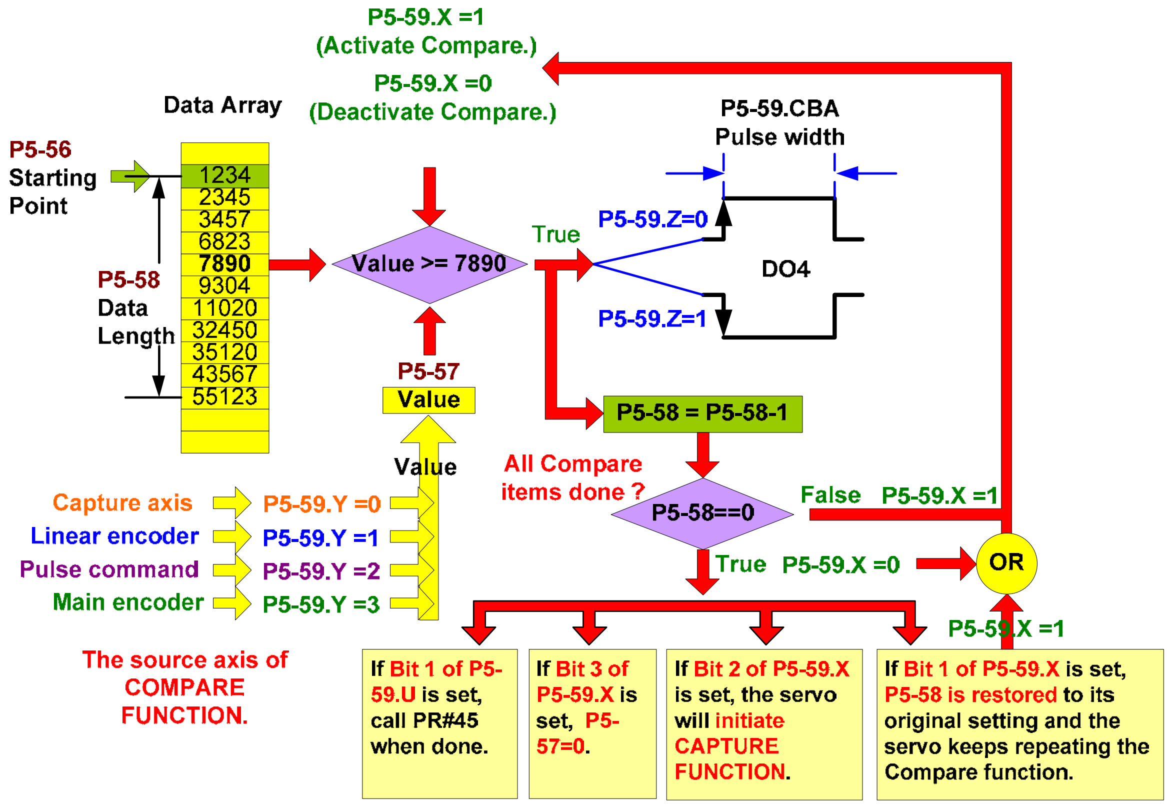
■ Hardware introduction (Digital output) - **DO4**

The Compare function is a reverse process of Capture function. Items stored in data array will be compared to the signal of a physical axis, such as main encoder (motor encoder), auxiliary encoder (linear scale) or pulse command. DO4 is the only digital output that is used by Compare function, which only takes 5µs. When the position of source axis is the same as the one stored in data array, DO4 is on.



■ Parameter setting and operation testing procedure

Same as Capture, function in software is only applicable to quick test. In real application, PR writing function or controller is usually applied to initialize and proceed capture function. Followings are the operating procedure and parameter setting methods: :



1. Source of CMP function is set by **P5-59.Y**:
   - Same as CAP function: When CMP and CAP function used together, this setting can make sure the signal source is the same.
   - Auxiliary encoder (CN5): Its source can be linear scale.
   - Pulse command (CN1): Its source can be controller.
   - Main encoder (CN2): Its source can be motor encoder.
2. Switch of CMP function: It is set by **P5-59.X bit 0.** To enable the setting only when all necessary setting is complete.
3. **P5-57**：It displays the position of CMP axis.
4. **P5-56**：It specifies the address that stored the first compared data.
5. **P5-58**：It sets the total compared amount.

When settings of **P5-56** (start address of data array), **P5-57** (position of CMP axis) and **P5-58** (compared amount) are complete, next step is the setting of compare actions:

6. Compare actions: When the position of source axis is changing, P5-57 is varied according to it. When the value of P5-57 is the same as the specified value in data array, DO4 is on.
7. The output signal type of DO4 is set by rising edge or falling edge signal of P5-59.Z.
8. The pulse width of output signal can be set in P5-59.CBA. Its setting should consider the time interval between two compared data. Otherwise the next DO4 cannot be recognized.
9. Value of P5-58 will automatically subtract one after each item is compared. When P5-58 = 0, the CMP action is complete and the function is disabled.

For the control setting of CMP, it can be set through P5-59.X / U:

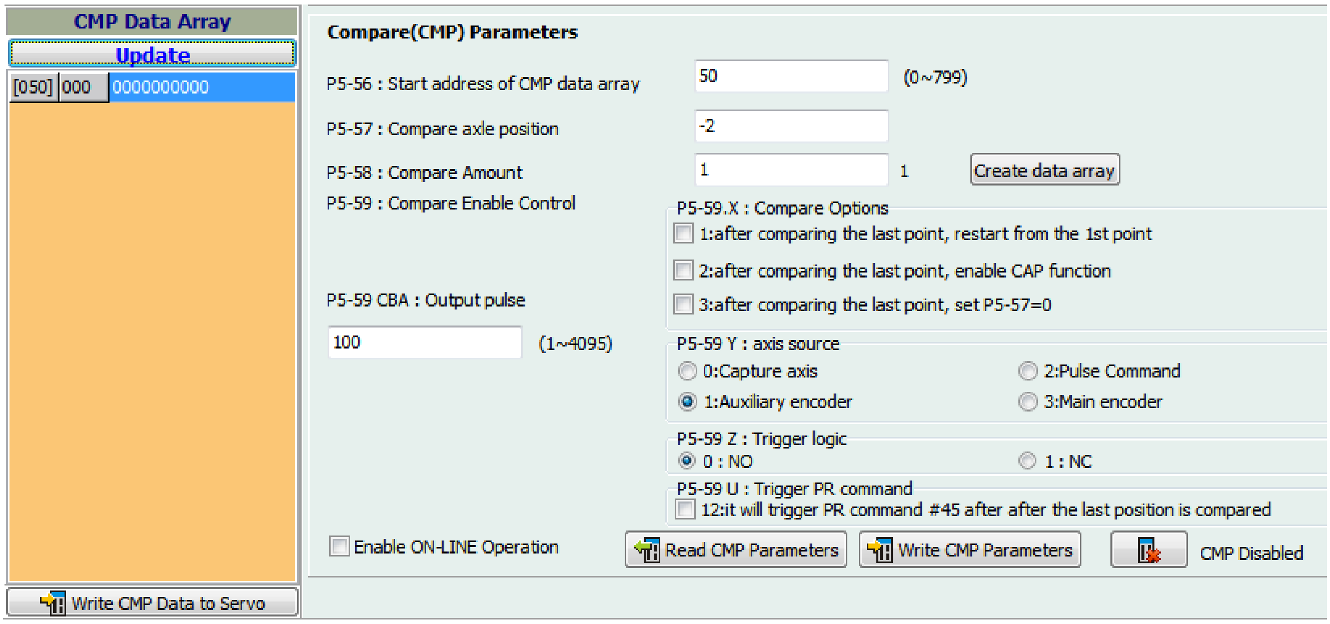
10. When CMP is complete, if Bit 1 of P5-59.X is set, P5-58 returns to its initial value and all compared item will be reset.
11. When CMP is complete, if Bit 2 of P5-59.X is set, it enables CAP function.
12. When CMP is complete, if Bit 3 of P5-59.X is set, P5-57 = 0.

In addition, two advanced setting functions are provided by P5-59.U. Users can have customized setting for application:

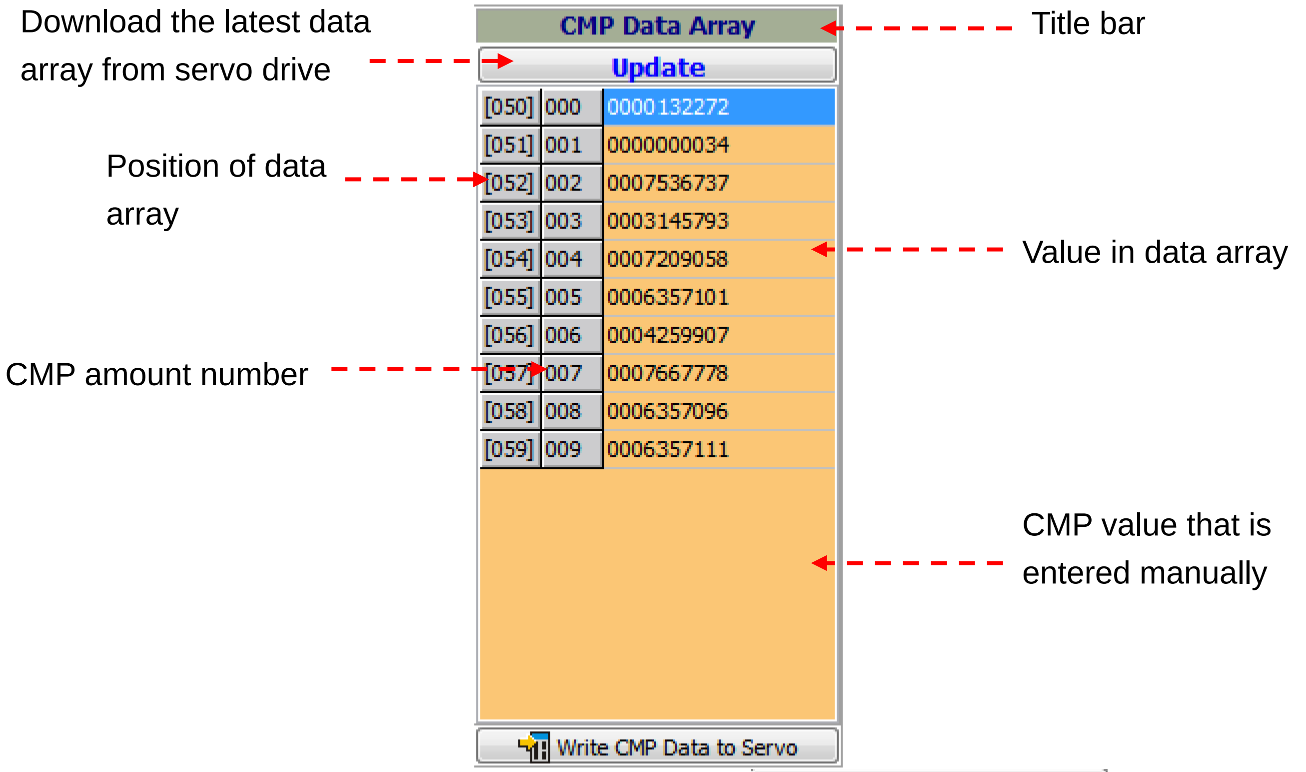
13. From (and including) firmware version V1.038 sub09, If Bit 12 of P5-59.U is set, when the last point is compared, PR#45 will be triggered.
14. From (and including) firmware version V1.038 sub19, If Bit 13 of P5-59.U is set, the setting of Compare will follow the setting of Capture.

■ Software Operation

The software merely provides the function of parameter setting interface and action testing. A complete CMP setting should be with PR setting, host controller and trigger switch. Following is the main setting page of CMP:

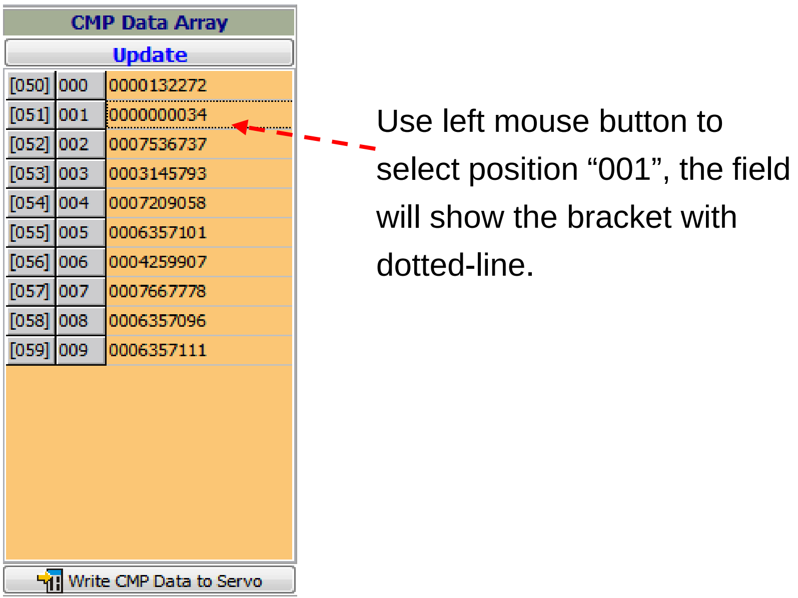


The left window displays the current list and value of each data array. See as below:

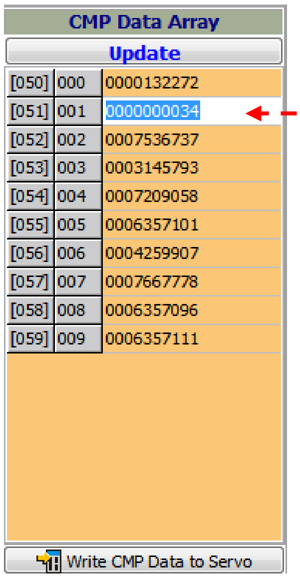


During the test process, users can click **Update** to update the value in data array if needed.

In addition, users can modify the compared value in data array through manual setting. Left click the mouse on any field of the table and select the data that you are going to modify.

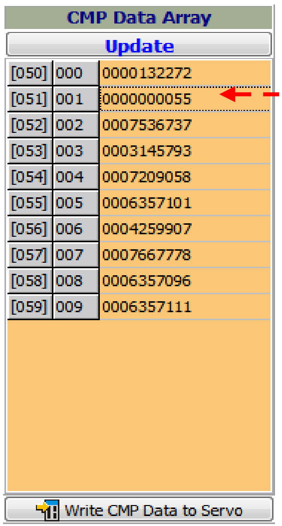


Left click the mouse to edit.



Left click the mouse to edit.

Users can enter the compared value at the moment. When finish, left click on the other fields to complete editing.



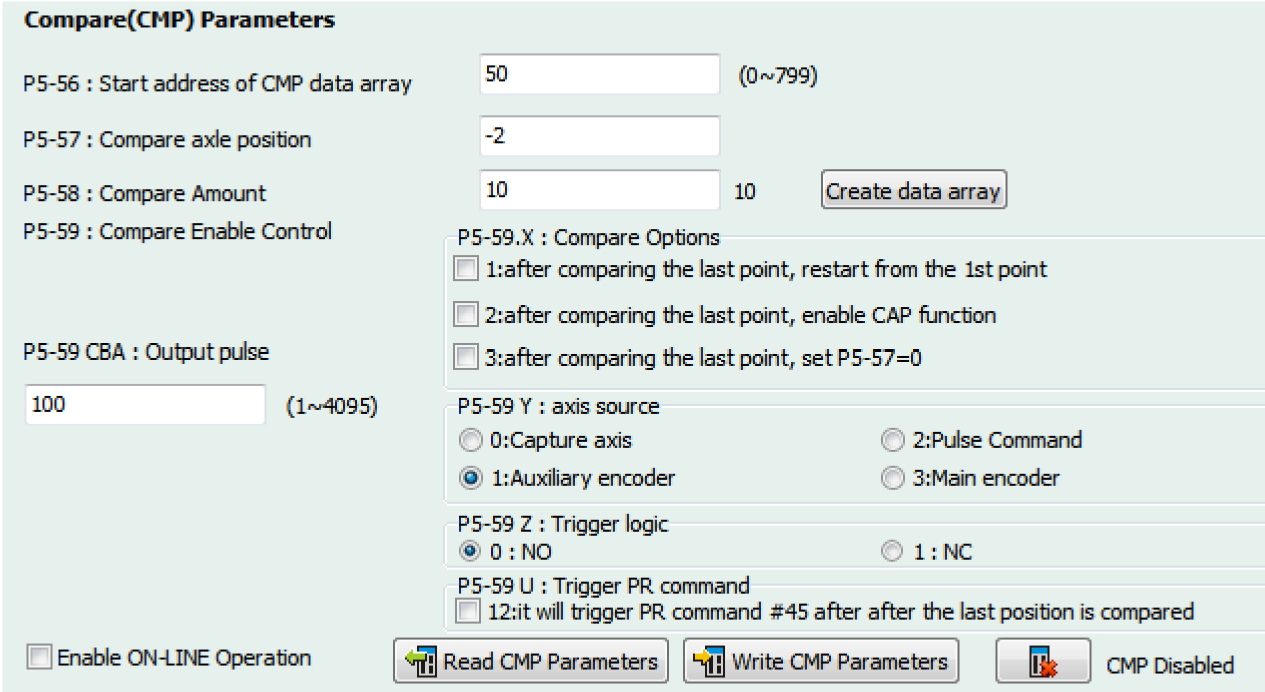
When finish, left click on the other fields to complete editing.

When all manual setting is complete, use Write CMP Data to Servo to download the modified data array into the servo drive.

Please note that Write CMP Data to Servo here can only download the value in data array into the servo drive. If desire to burn data array into EEPROM, please switch to “Data Array Editor”. Then, click Burn to EEPROM.

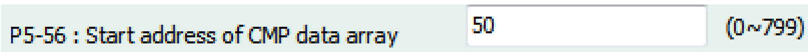
In addition, Write CMP Data to Servo and the related parameters of Compare are not relevant. Please use Write CMP Parameters to modify parameters.

Window in the right displays the related parameters of Compare.



Users can quickly setup the start position of CAP data array here, which is the same as the setting method of “Parameter setting and operation procedure”.

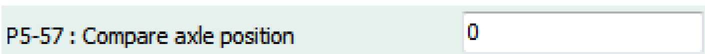
- Start address of Compare data array: Set up the start address of Compare data array.



Please note that if the start position of E-Cam data is also 100, and the area number of E-Cam is 4, if the setting value of P5-56 (Start address of CMP data array) and P5-58 (CMP amount) is the same as E-Cam, an error (data in data array is overlapped) will occur.

If the start address of data array is set to the same, a warning message will pop up when click :

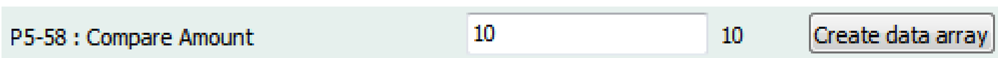
- Position of Compare axis: It displays the axis position of COMPARE pulse source, which can be set as CAP axis, auxiliary encoder (linear scale), pulse command and main encoder (motor encoder).



This value is related to the setting of 

. Different source brings different value.

- Compare amount: It is used to set the compared amount.



Before COMPARE is enabled: estimate the compared amount (readable and writable)

When COMPARE is working: the amount that hasn't been compared; 0 means it is complete (read-only)

Value of this parameter descends one when one point is compared. When the value is 0, it means the compare is complete.

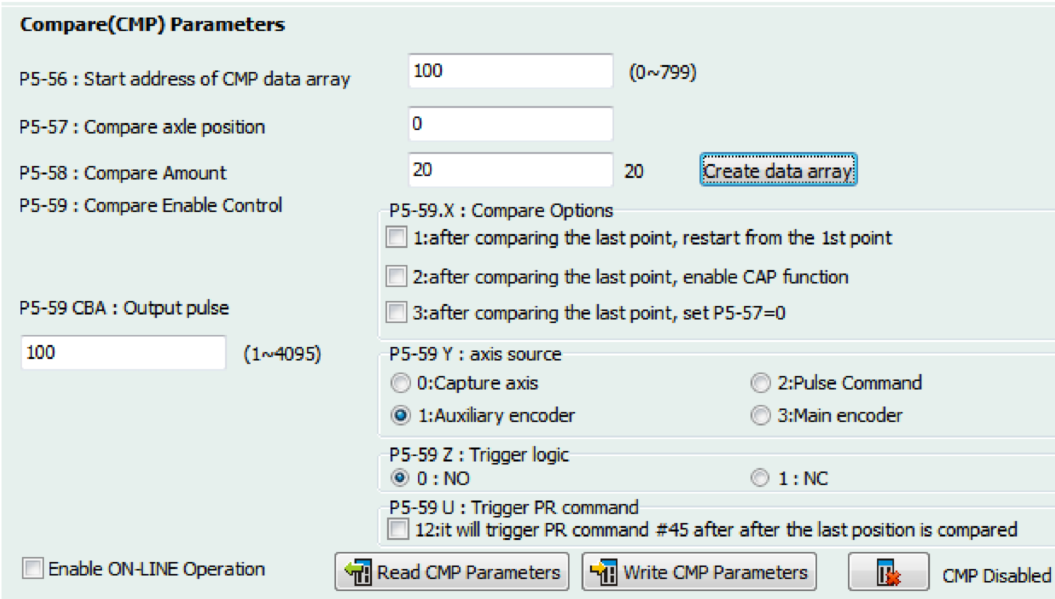
After setting up the CMP amount, window on the left will display all data array according to the setting. For example, if the amount is set to 20, fill in 20 in the blank and click Create data array. You will see the left window is changed to 20 data array and the value beside the bracket becomes 20 instead 20 20. It means data array has been modified.

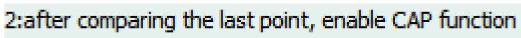
[108]	008	0000000000
[109]	009	0000000000
[110]	010	0000000000
[111]	011	0000000000
[112]	012	0000000000
[113]	013	0000065536
[114]	014	0000000000
[115]	015	0000000000
[116]	016	-000000001
[117]	017	0000000000
[118]	018	0000000000
[119]	019	0000000000

Please click 

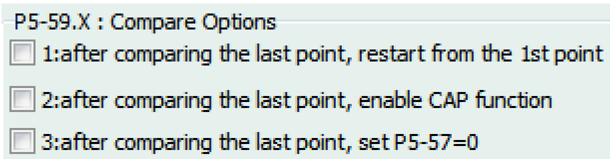
to write new data value into the servo drive.

➢ Compare control setting: It is used to setup CMP control. Please refer to the previous section "Parameter setting and operation testing procedure" for other related settings.

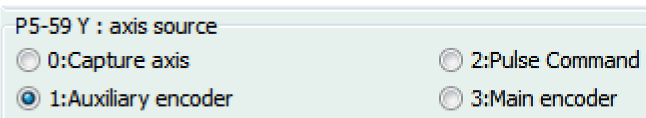


■ Compare options: When select 

, if CAP has already enabled, this function will be invalid.

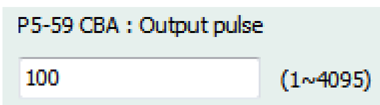


■ Axis source: If it is set to main encoder, CMP position will be the current feedback position of motor encoder.



■ Trigger logic:

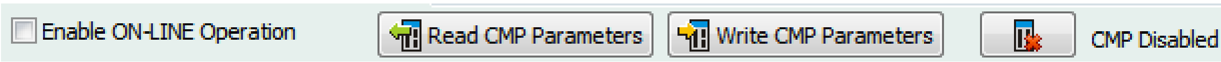
■ Output pulse of DO4: The range shall between 1 and 4095 ms. It is because data format in P5-59 is in hexadecimal. Thus, the max. setting range can up to FFF.



After all setting is complete, click Write CMP Parameters to download the newly setup parameters into the servo drive.

Please note that both P5-57 and P5-58 are volatile parameters. When the servo drive is re-powered on, value will return to the initial value.

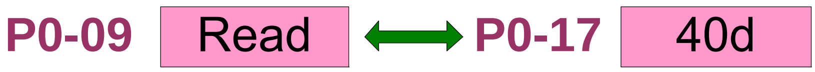
Use the function of "ON-LINE operation" to simulate the action and to make sure if the setting can satisfy the demand.



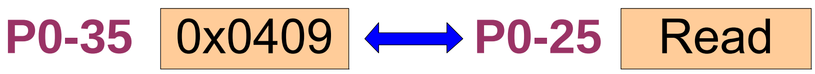
Before enabling ON-LINE operation, it is suggested to use Read CMP Parameters to check if the servo drive is still in initial setting or has completed the setting of CMP after re-servo on if the compared parameter is not set from the beginning.

There are four methods to see the output status of CMP DO4:

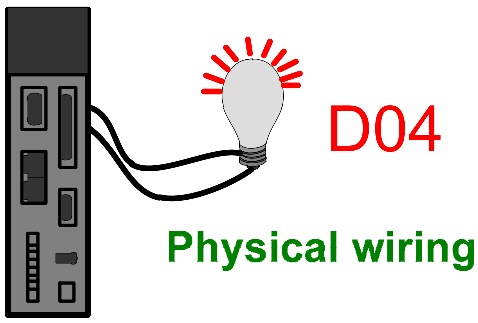
1. Monitor parameters: From monitor variable 40, users can know the real hardware output status of DO. Each Bit corresponds to one DO channel.



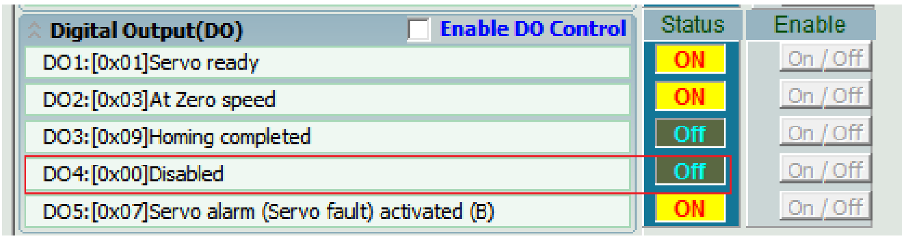
2. Mapping parameters: From system parameter P4-09, users can monitor the contact status of digital output.



3. Physical wiring: Access DO4 via physical wiring. There is no need to specify the function of digital output. When CMP function is enabled, DO4 will be the output of CMP function regardless the setting of it.

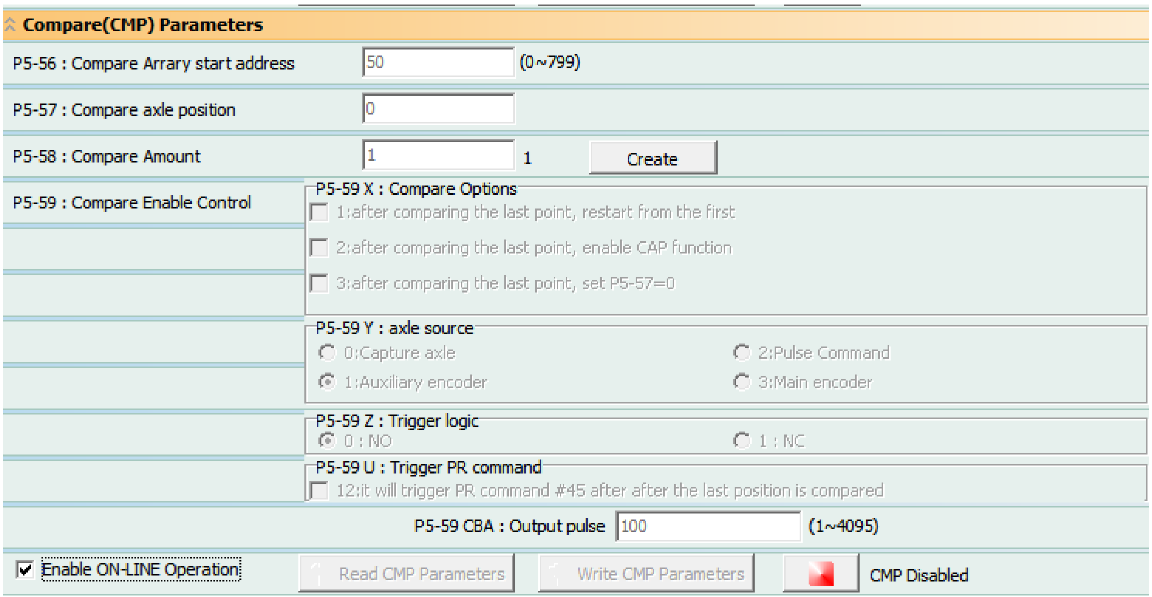


4. Software: Read the output signal from digital IO panel  **of ASDA-Soft. There is no need to specify the function of digital output. The CMP function will occupy DO4.**

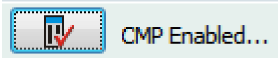


Users can choose one of the methods to monitor CMP DO4.

When ON-LINE operation is enabled, the setting page will be locked by software so as to avoid any occurrence of error during testing procedure.

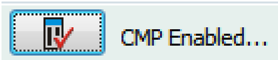


Click 

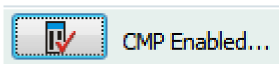
means to trigger bit 0 of P5-59.X (Start to CMP). And the status will become 

.

: P5-59.X bit0 = 0

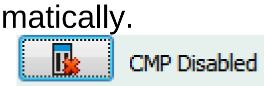


: P5-59.X bit0 = 1

When value of P5-58 (Compare amount) is bigger than 0, 

it starts to compare when CMP is enabled.

Value of P5-58 descends one when it compared one point. When the value is 0, CMP is complete and bit0 will return to 0 automatically.

If P5-58 = 0, it will not do compare when click 

and bit0 will return to 0 automatically.
If bit 0 is 1, users can only set the value to 0 and disable CMP.

Data Array Editor

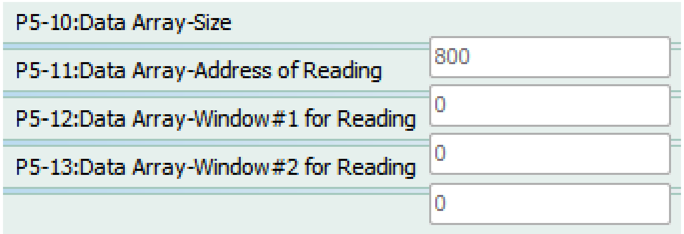
Data array is a newly added memory group in ASDA- A2 servo drive. Many functions of motion control, such as CAPTURE, COMPARE and E-Cam are the data that needs to be stored in a large amount of memory space. It can store up to 800 data in total. Users have to program the address for different data.

Features of Data Array	
Usage	● Save the captured data of CAPTURE ● Save the compared value of COMPARE ● Save the contour table of E-Cam Note: 1. The system does not partition off the data array into the individual space of CAP, CMP and E-Cam. The user could program it according to the demand. Therefore, the space might be overlapped. Please pay close attention to it when using. 2. A2L does not support E-Cam function.
Size of Data Array	● 32-bit integer x 800 (refer to P5-10) ● Each data has its corresponding address. Specify the address is a must when reading or writing the data. ● The 800 data is from 0 to 799.
Non-volatile	● Manually set up the saving (P2-08 = 30, 35) is a must and the data should be saved in EEPROM of the servo drive. ● Save the data when it is Servo Off. ● The data will be loaded into data array automatically when it is Servo On.
Accessing Window	● Should be access via parameter P5-10 ~ P5-13.

Here are the descriptions of data array editor:

[1] To access the value and setting of data array by parameters:

Through the interface, we can access the value of P5-10, P5-11, P5-12 and P5-13:



These four parameters cannot be modified in software. Users can only access their status via . If desire to read the value of data array so as to make sure the previous written content is correct, specify the start address to P5-11 through MODBUS communication command 0x06 (write one data). The issued command is showed as below:

Content of communication command: Set the Reading Address of Data Array			
Number	Command	Start Add.	Written Data
4	0x06	P5-11	11

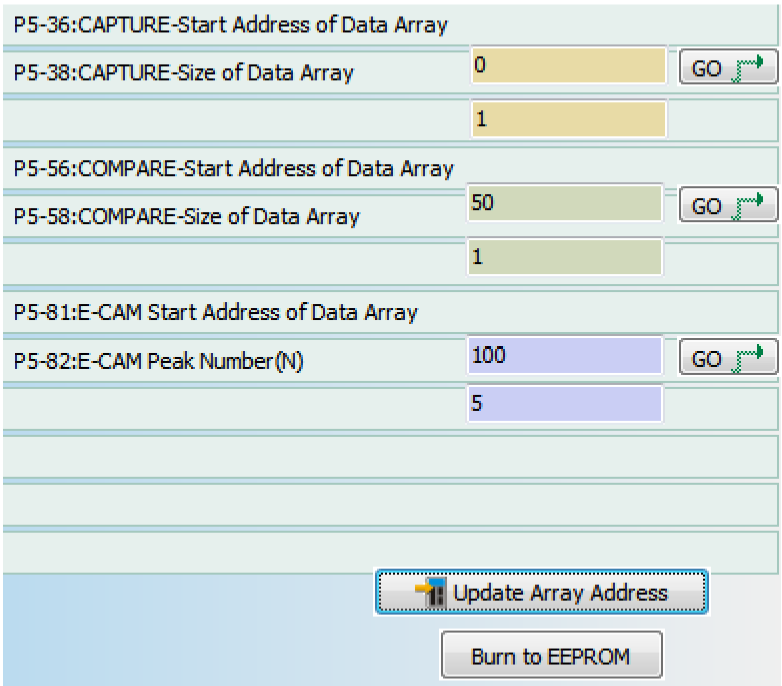
Then, read the content of specified address by communication command 0x03 (continuous reading). The issuing communication command is as follows:

<table>
<tr><th colspan="4">Content of Communication Command: Read Data Array</th><th colspan="6">Return Data</th></tr>
<tr><td rowspan="2">No.</td><td rowspan="2">Command</td><td rowspan="2">Start Add.</td><td rowspan="2">Accessing Amount</td><td colspan="2">P5-11</td><td colspan="2">P5-12</td><td colspan="2">P5-13</td></tr>
<tr><td>Low Word</td><td>High Word</td><td>Low Word</td><td>High Word</td><td>Low Word</td><td>High Word</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">0x03</td><td rowspan="2">P5-11</td><td rowspan="2">6 (Word)</td><td>11</td><td>0</td><td>100</td><td>0</td><td>200</td><td>0</td></tr>
<tr><td colspan="2">Read Address</td><td colspan="2">Data of address 11</td><td colspan="2">Data of address 12</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">0x03</td><td rowspan="2">P5-11</td><td rowspan="2">6 (Word)</td><td>13</td><td>0</td><td>300</td><td>0</td><td>400</td><td>0</td></tr>
<tr><td colspan="2">Read Address</td><td colspan="2">Data of address 13</td><td colspan="2">Data of address 14</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">0x03</td><td rowspan="2">P5-11</td><td rowspan="2">6 (Word)</td><td>15</td><td>0</td><td>500</td><td>0</td><td>600</td><td>0</td></tr>
<tr><td colspan="2">Read Address</td><td colspan="2">Data of address 15</td><td colspan="2">Data of address 16</td></tr>
</table>

The return data on above table represents parameters (P5-11, P-12 and P5-13) that had been read back, which is the data content in address 11 ~ 16 of data array. Value will also be displayed in this window.

[2] Easily setup data array of Capture, Compare and E-Cam:

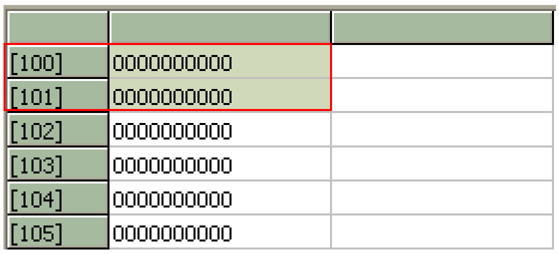
Users can setup the start address and amount of data array, including Capture, Compare and E-Cam.



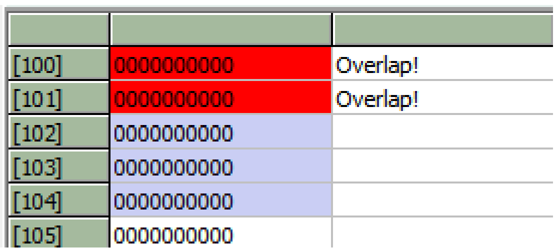
When the setting is complete, click 

, on the right of these three items. Data array will directly jump to the start position. For example, if click 

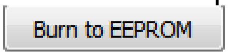
on the right of Compare, table of data array will jump to field 100 as the beginning.



If the data array is overlapped, a warning will show. Please see the example below. Data array of Compare and E-Cam is overlapped.



In addition, click 

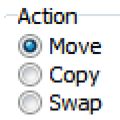
can write the status into the servo drive. If users desire to keep the setting of data array in servo drive after power off, please click 

to burn data array into EEPROM. This function is similar to 

which mentioned before.

[3] Editor that can modify the content of data array

Three ways are provided for users to quickly edit the value of data array:

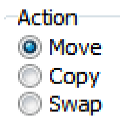


➢ Move

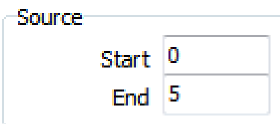
Assume that setting value in position [000] to [005] of data array is as the following:

[000]*	0000000001
[001]*	0000000002
[002]*	0000000003
[003]*	0000000004
[004]*	0000000005
[005]*	0000000006

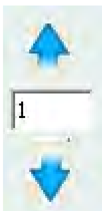
If users want to move down the block of data array for one field, please select “Move”.

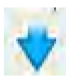


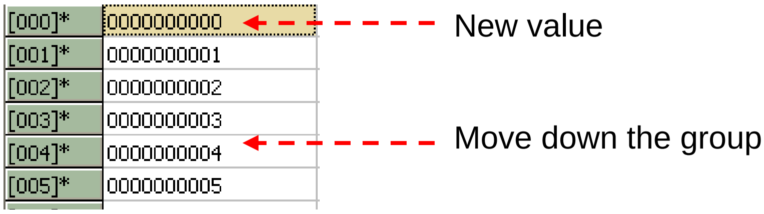
Then, set up the start position 0[000] and end position 5[005].



And set 1 as offset amount.

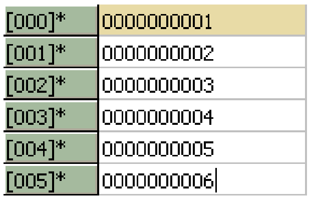


To move down one field, please click  when the setting is complete. Then, position 0 to 5 is moved down for a field in the data array table. And the original position [000] is replaced by a new value, 0000000000.

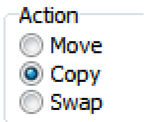


➢ Copy

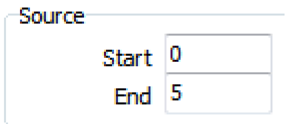
Assume the setting value of position [000] to position [005] in data array is as below:



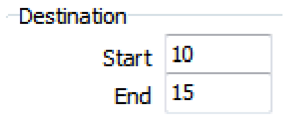
If users desire to copy position [010] ~ [015], please select “Copy” first.



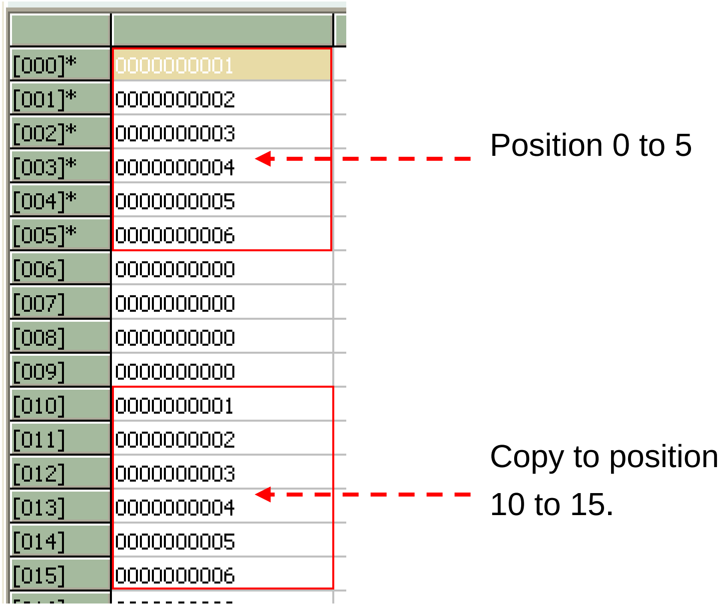
Setup the copy source: from position 0[000] ~ 5[005].



Then, setup the target position, 10[010] ~ 15[015].

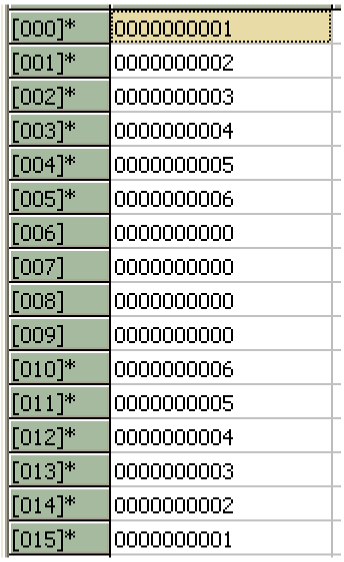


Click  to complete the setting. You can see position 0 to 5 has been copied to position 10 to 15.

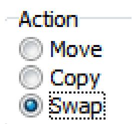


➢ Swap

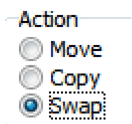
In data array, the setting value of position [000] to [005] and position [010] to [015] are showed as below:



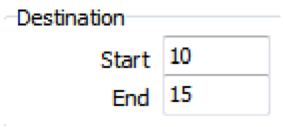
If users desire to swap these two blocks of data array, please select “Swap” first.



Set up the swap source, position 0[000] ~ 5[005].



Then, set up the target position of swap, position 10[010] ~ 15[015].



Click Ok to complete the setting.

[000]*	0000000006
[001]*	0000000005
[002]*	0000000004
[003]*	0000000003
[004]*	0000000002
[005]*	0000000001
[006]	0000000000
[007]	0000000000
[008]	0000000000
[009]	0000000000
[010]*	0000000001
[011]*	0000000002
[012]*	0000000003
[013]*	0000000004
[014]*	0000000005
[015]*	0000000006

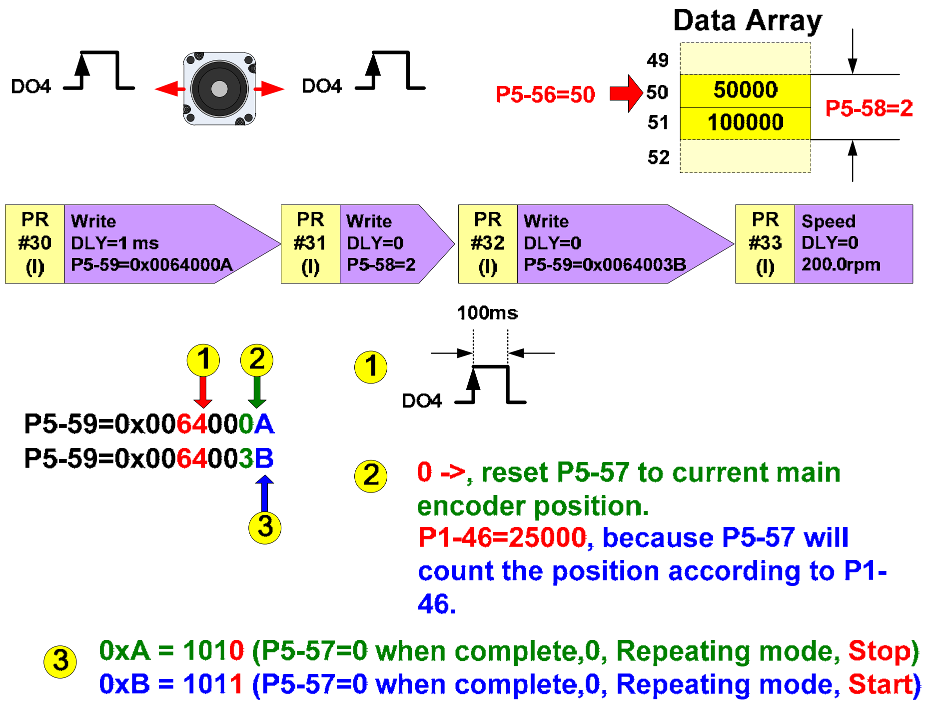
Value in position 0 to 5 is swapped to position 10 and 15.

Click Write into Servo to download the modified data array into the servo drive. Users can also click Burn to EEPROM to burn data into EEPROM. To access the data array from servo drive, click Load From Servo to upload it to the software.

Example

From the example below, users can try to setup CMP function via the software and aim at the application of masking and mark reading to complete the setting of mark alignment. Please refer to ASDA-A2 application note for further information.

Example of CMP function: It sends one signal every half turns.

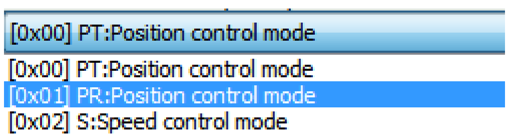


Description:

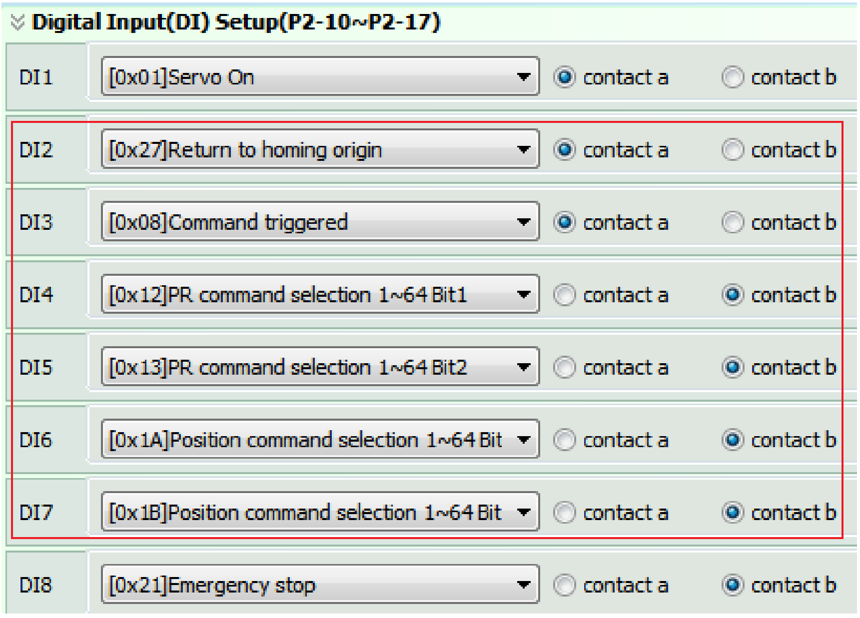
1. When the compare axis is the main encoder, the Compare function will refer to the pulse resolution set by P1-46, but not P1-44 and P1-45. It must set P1-46 = 25000 pulses in this example, which means when motor runs a cycle, P5-57 can read 25000x4 = 100000 pulses.
2. Fill in 50000 and 100000 into the data array starting from position **50.** The Compare function outputs DO4 every time when motor runs half cycle (when the counting pulse is 50000) and one cycle (when the counting pulse is 100000).
3. Enable **Bit1** of **P5-59.X**. When CMP is complete, P5-58 returns to the initial value. The system will repeat the CMP function.
4. Enable **Bit3** of **P5-59.X.** When CMP is complete, P5-57 = 0. The system will start another CMP cycle.
5. P5-59.X = 0x000A → 0x003B, the second digit is from 0 → 3. The system will copy the current position of the main encoder to P5-57 and enable CMP function. Therefore, the system has to do the homing before enabling CMP function. If the position of main encoder is larger than the value in data array, which means P5-57 > 100000, then there will has no output for CMP function.

Setting steps:

Step 1: Make sure the control mode must set to PR mode. Use Parameter Initial Wizard to select.



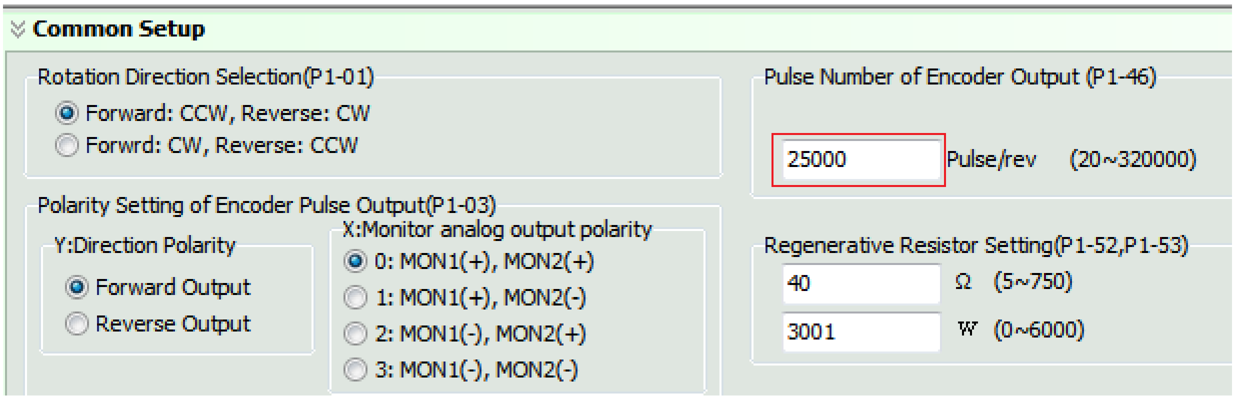
Then, setup digital input (DI) DI/O Setup. Select homing, PR command trigger and internal PR command (since servo drive needs to specify the start PR): Please refer to the setting below:



The next step is to adjust the pulse number of motor encoder.

Step 2: In 

, please set the P1-46 (pulse number of motor encoder) to 25,000.

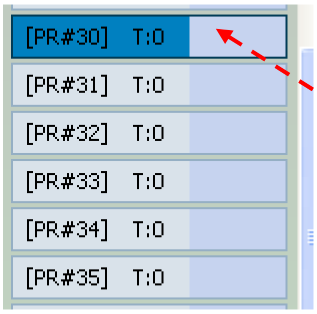


Step 3: Write the setting value into the servo drive . A message window will pop. Please click 

.

Step 4: Re-power on the servo drive and complete the setting of mode and parameters.

Step 5: Click  for PR mode setting so as to setup 4 sets of PR path. Please select position PR#30 in the left.

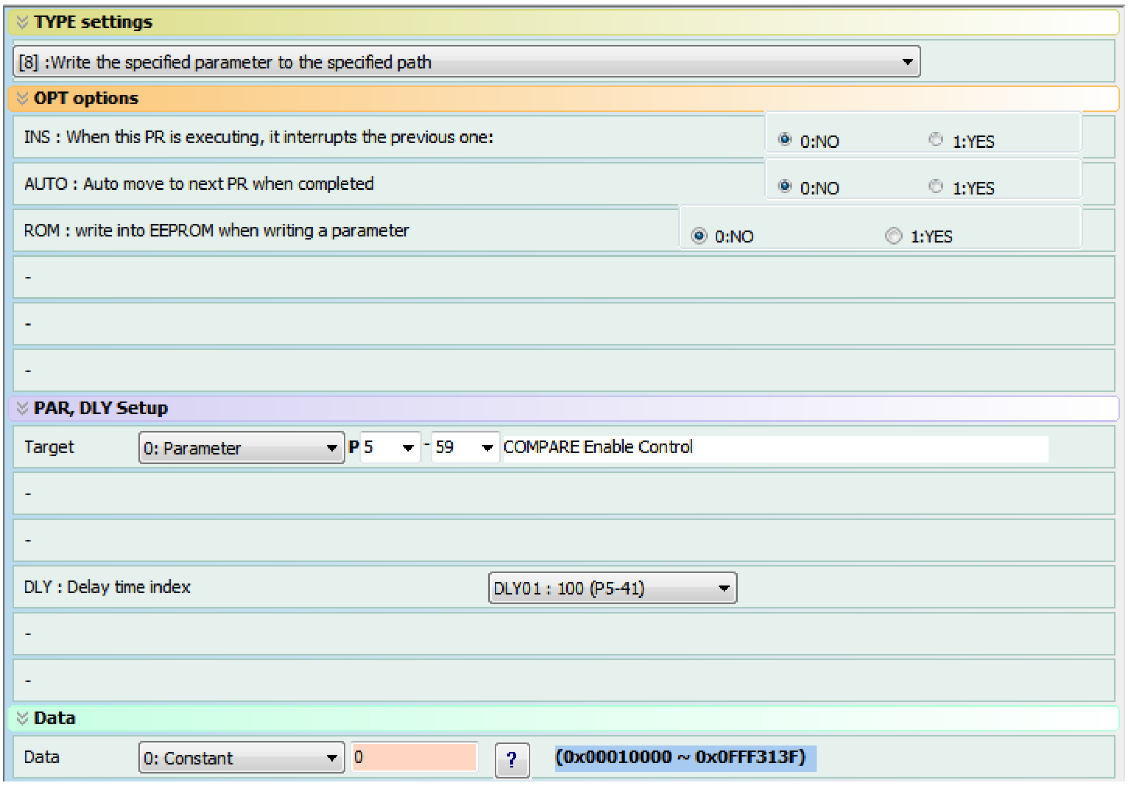


Select PR#30 in the left.

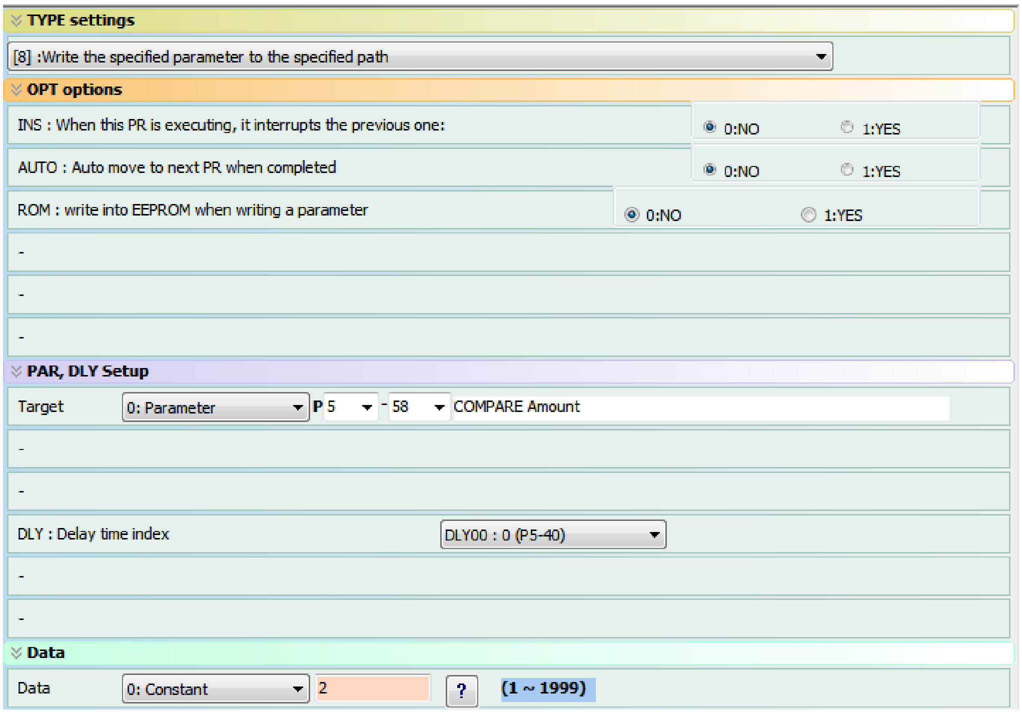
Step 6: Setup PR#30, 31, 32 and 33 in sequence.

PR#30: Set P5-59 to 0x00 64 00 0 A

64: Length of output pulse: 100ms. (Convert the format to hexadecimal, so the value is 64l.)
0: Set the source axis as CAP axis.
A: Set Bit1 and Bit 3 of P5-59.X to 1. The CMP function will repeat. Every time when it compares to the last point, the counter will clear to 0.



PR#31: Set P5-58 to 2 and to setup the compared amount of data array.

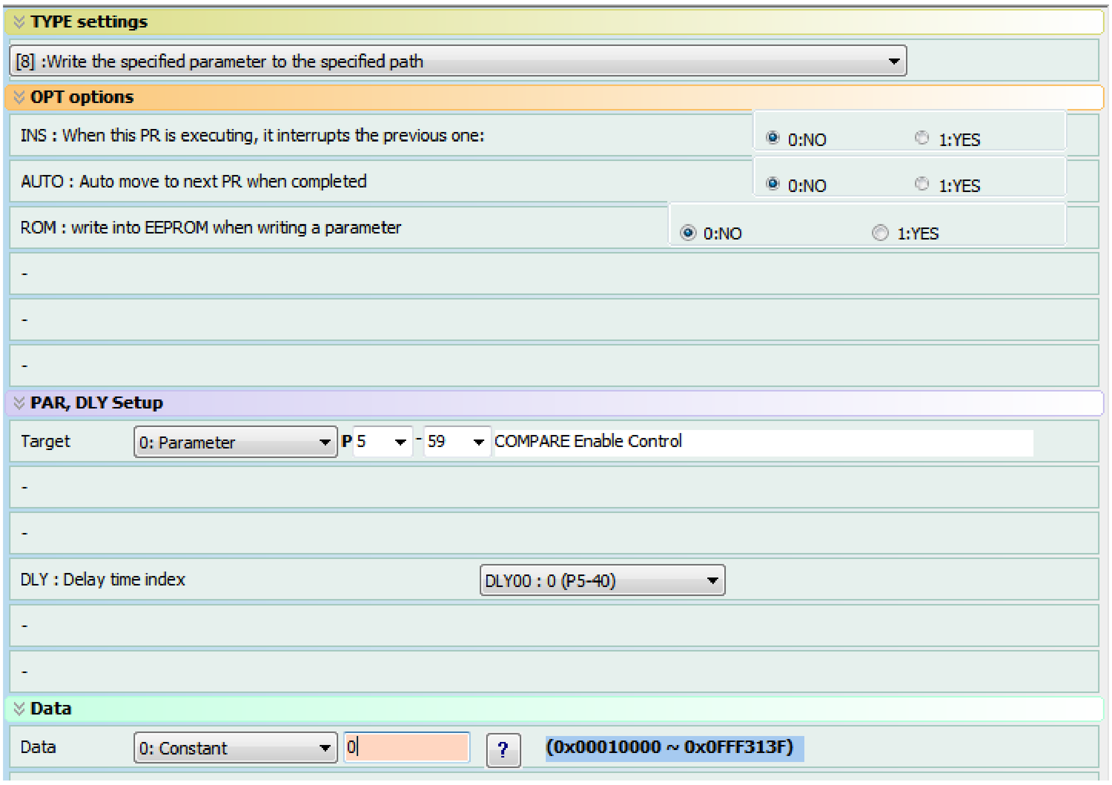


PR#32: Set P5-59 to 0x00 64 00 3 B

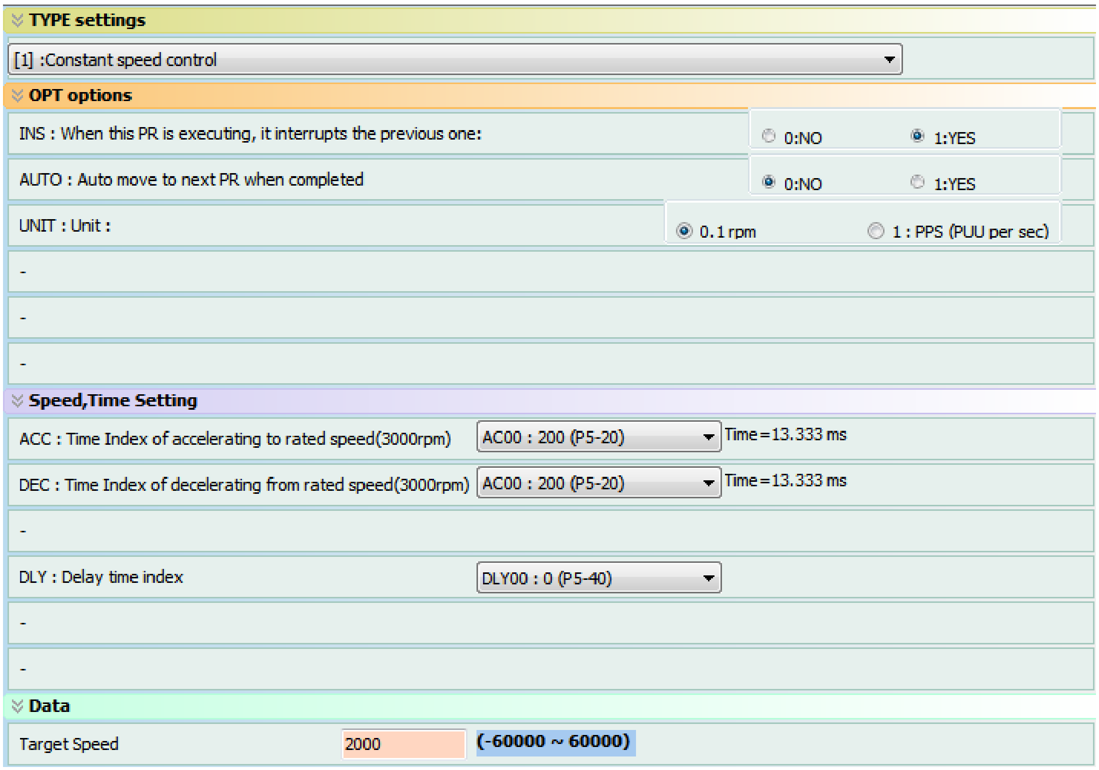
64: Length of output pulse: 100ms. (Convert the format to hexadecimal, so the value is 64.)

3: Set the source axis as main encoder (motor encoder).

B: Set Bit0, Bit1 and Bit 3 of P5-59.X to 1. Enable and repeat CMP function. Every time when it compares to the last point, the count will clear to 0.

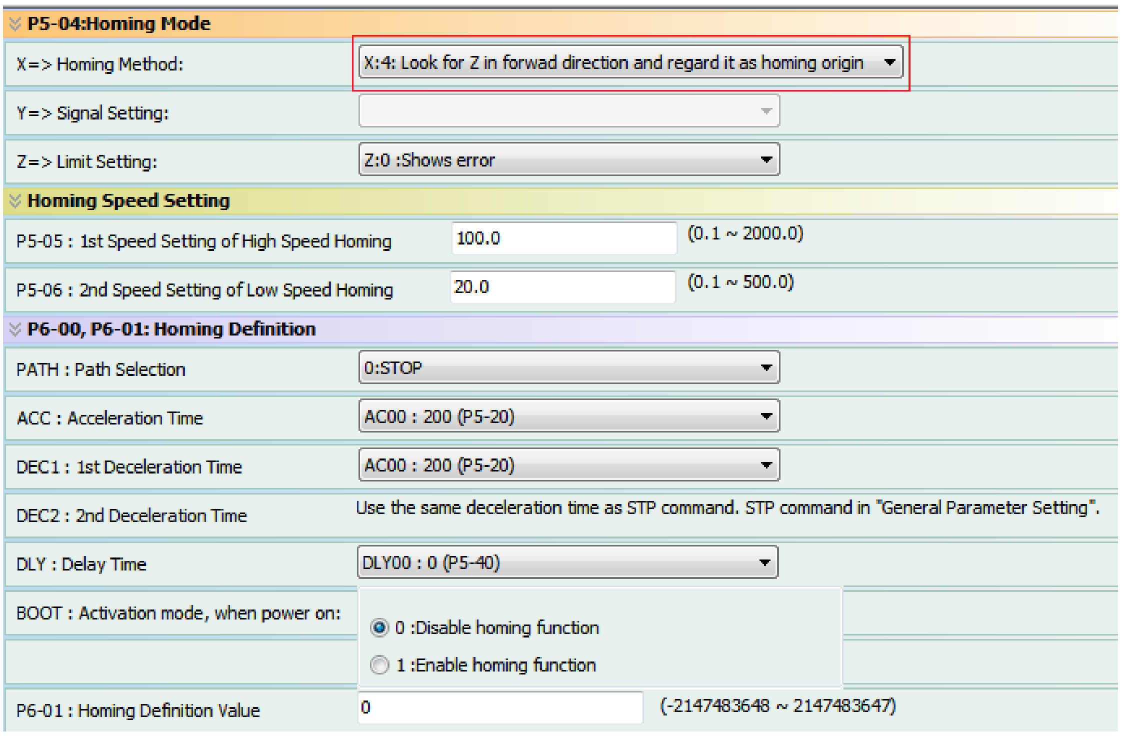


PR#33: Setup “Constant Speed Control”. The target speed is 200 r/min.

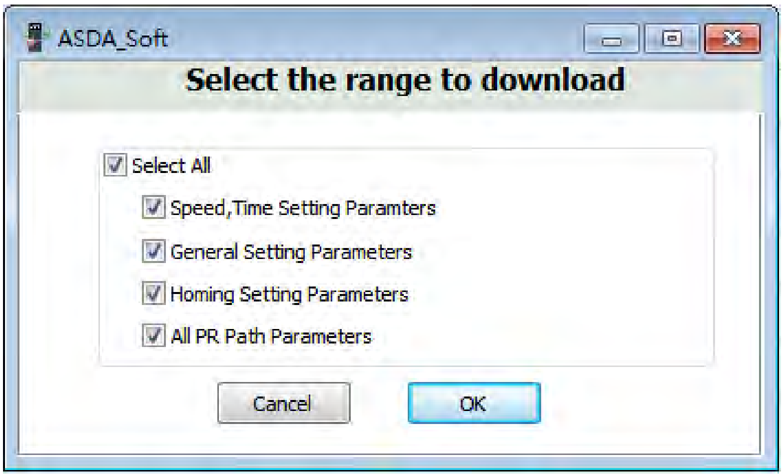


For the setting of PR#31 and PR#32 that mentioned before, P5-59.X = 0x000A → 0x003B. The second digit is 0 → 3. At the moment, the system will copy the current position of the main encoder into P5-57 and enable CMP function. The system needs to do homing before enabling CMP function. Therefore, the system has to do the homing before enabling CMP function. If the position of main encoder is larger than the value in data array, which means P5-57 > 100000, then there will has no output for CMP function.

Step 7: Refer to the diagram below to setup homing mode.



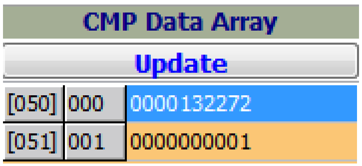
Step 8: Click to write all into the servo drive and complete the setting of PR mode.



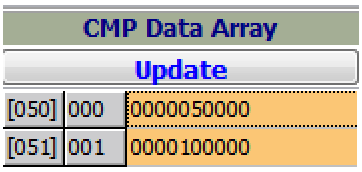
Step 9: Set up the compared value of data array.

Enable CAP/CMP function . Click to read parameters from servo drive. Since we haven't executed PR, to setup the value of P5-58 (Compared amount) first so can fill in the value into compared data array.

Change P5-58 : Compare Amount to 2. Click Create data array, Data array will be changed into 2 fields:



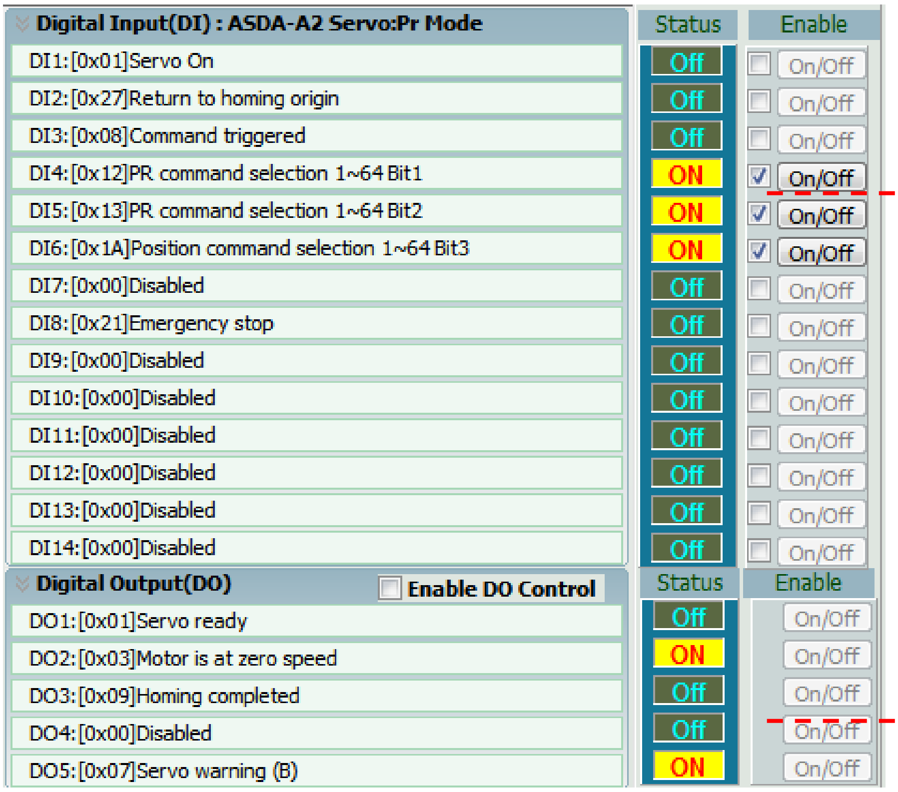
Left click the mouse on [050] and [051] and change the value to 50,000 and 100,000, respectively.



When the setting is complete, click Write CMP Data to Servo to write new value into data array. Then, the window will display Write OK! below.

Step 10: Use (Digital IO) and (Software Scope) to monitor the output of DO4.

Click :



DI setting and control

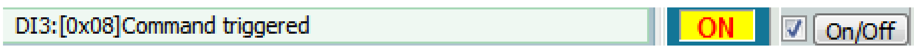
DO4 becomes the output for high-speed compare and no longer display the current output command.

Step 11: Use DI to control the operation steps. Select DI1 ~ DI3 to control SON (servo on), SHOM (search homing) and CTRG (PR command trigger) first.

Step 12: Select DI1 On/Off to enable DI1 as NC (frequently close contact) and servo on.

Step 13: Select DI2 On/Off to enable DI2 as NC (frequently close contact) and start to search homing origin. Then, click On/Off again to change DI2 to NO (frequently open contact), since we only need to trigger it once.

Step 14: When homing is complete, select DI3 On/Off to enable DI3 as NC (frequently close contact) and trigger PR#30. Then, click On/Off to change DI3 to NO (frequently open contact), since we only need to trigger it once.

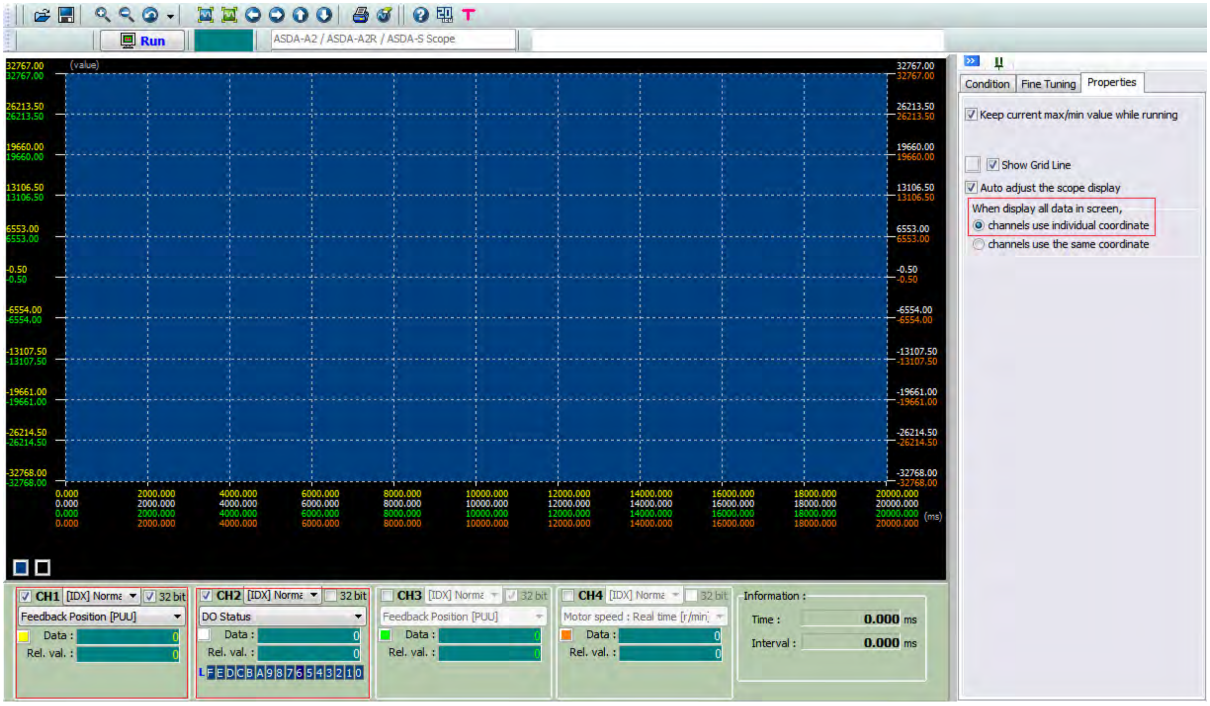


Step 15: Check if DO4 is glittering. If the answer is yes, it means it is working and CMP function is executing. Function of DO4 has been changed.

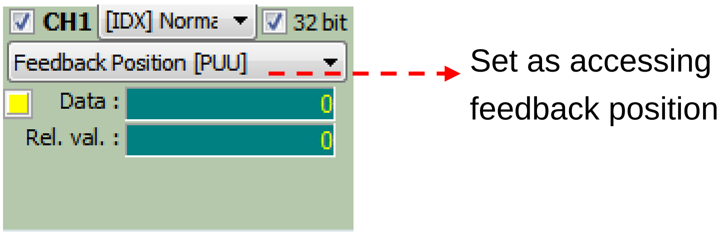
When compare does output, the light is ON.

When compare does not output, the light is off.

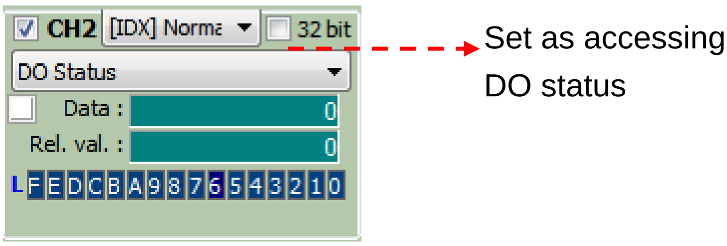
Step 16: Make sure DO4 does output. Then, use scope to confirm that DO4 outputs every half turns. The setting of scope is shown as below: select Channel 1 and 2 to monitor.



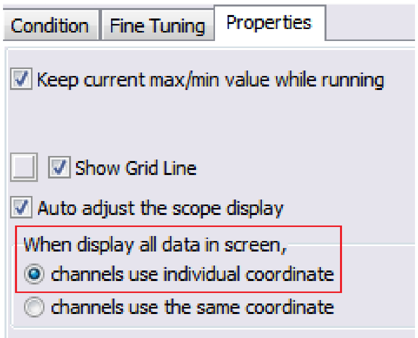
Channel 1: Set as accessing feedback position (PUU). Since the unit of PUU is 32-bit, please check .



Channel 2: Set as accessing DO status.

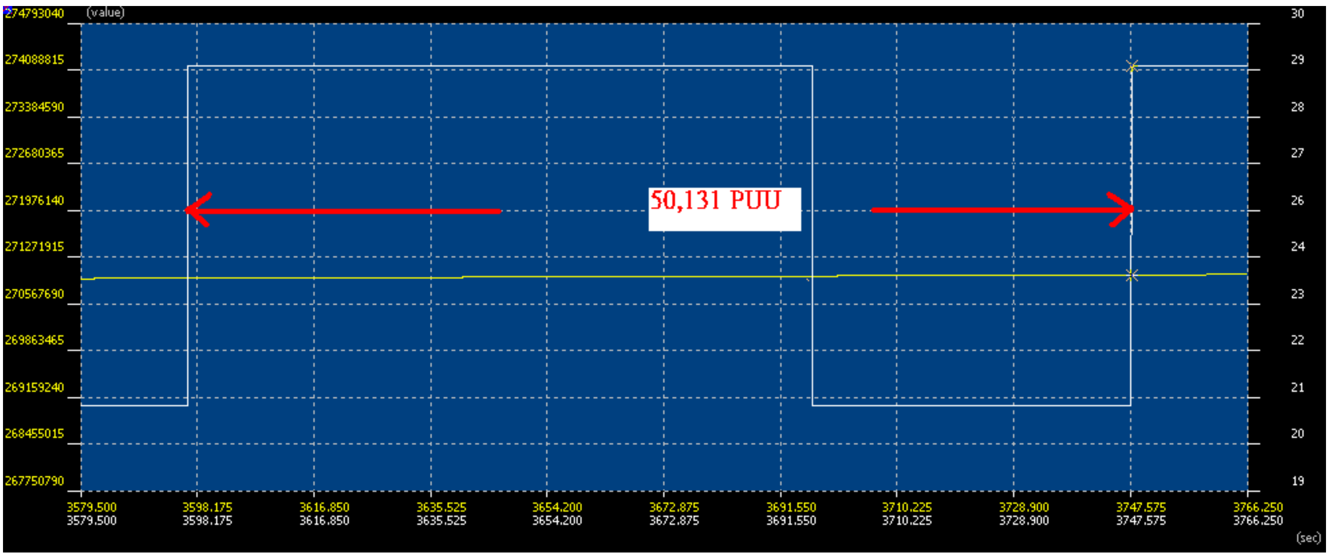


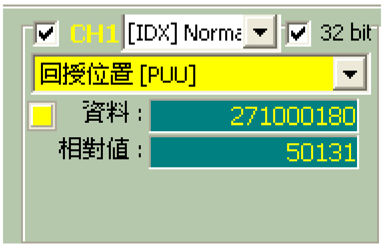
In addition, since the unit of feedback position and DO status is different, please use individual coordinate.

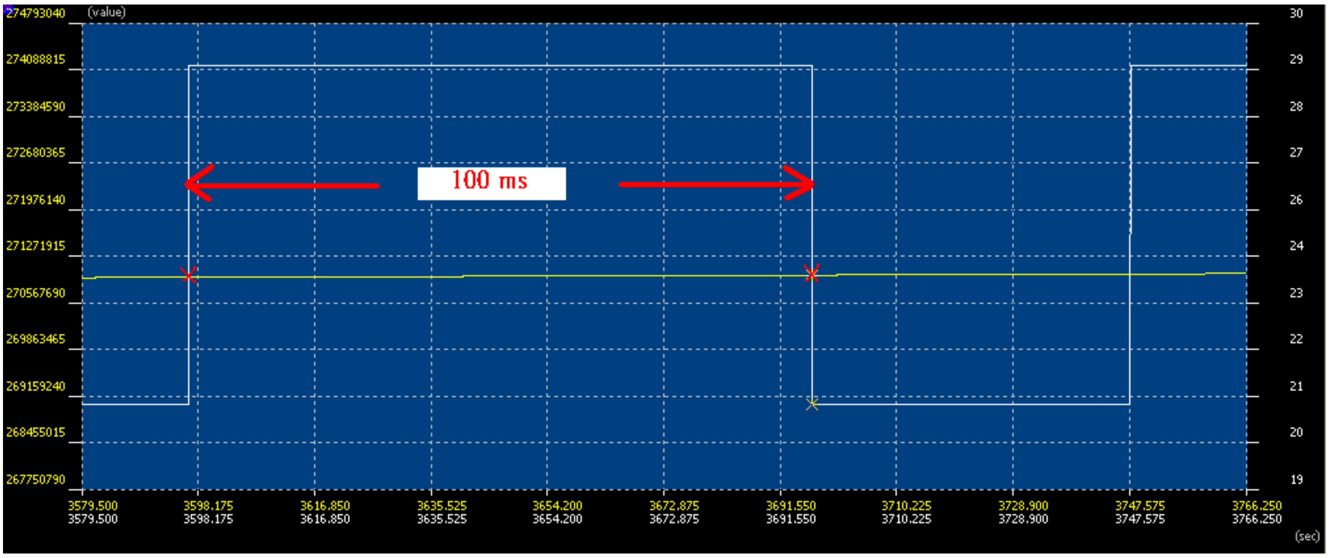


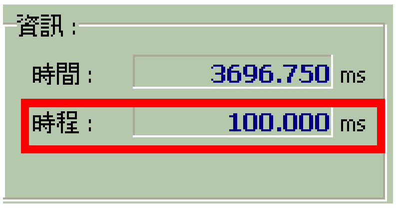
Step 17: It is suggested to enable (digital IO) and (software scope) to operate. Use DI to execute homing and trigger PR command. Then, use scope to monitor the curve simultaneously.

Step 18: Take one part of Bold Plot to observe. We can see the triggered cycle of DO4 is 50,131PUU, which is close to 50,000PUU set by us. The length of input length is also close to 100ms of P5-59 CBA.




CH1
[IDX] Norma
32 bit
回授位置 [PUU]
資料：
271000180
相對值：
50131


100 ms
(value)
(sec)


資訊：
時間：
3696.750 ms
時程：
100.000 ms

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