Delta SCARA Robot
DROE Instruction Manual
ASDA- MS Series

www.deltaww.com

Smarter. Greener. Together.

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Robot language

1. System introduction and set up

1.1 Foreword

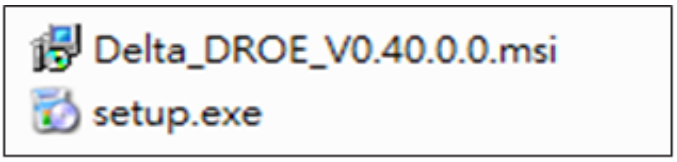
DROE(Delta Robot Operating Environment) this software system is developed to operate the robot shown in the figure below. After connection with ASDA-MS controller, it provides users with functions such as project management, JOG operation, teaching of points, editing of machine language, setting of IO, etc

1.2 Software Environment Requirements

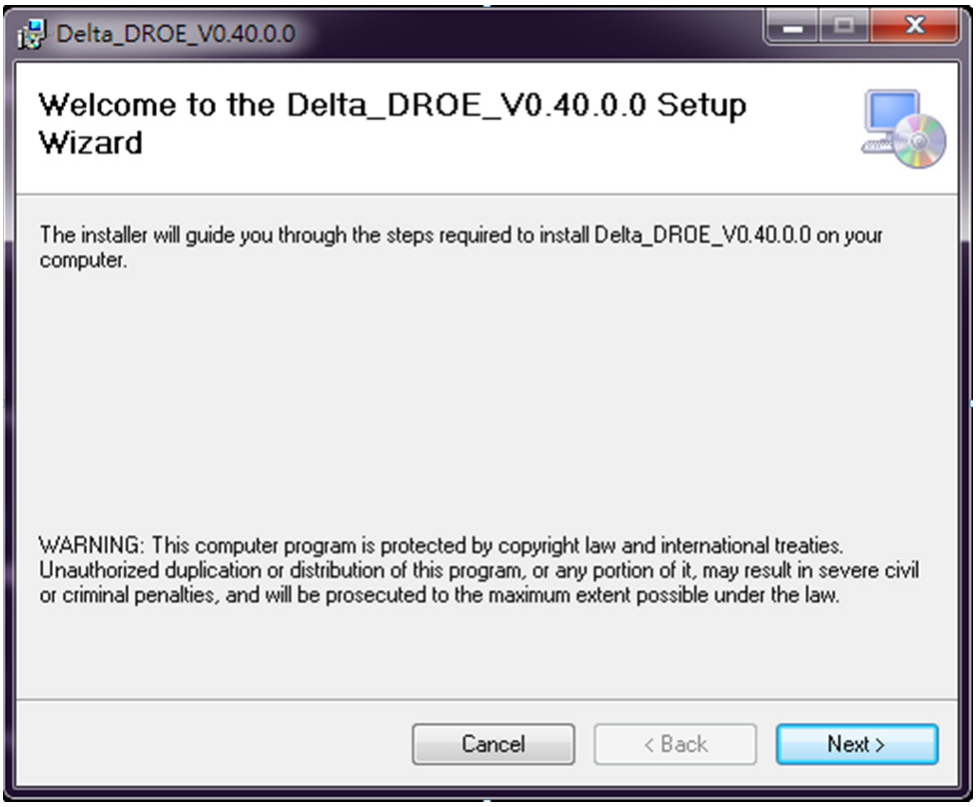
Operating system	Windows 7 Windows XP SP3
Hardware requirement	Intel DueCore 2 GHz or above
Memory	2 GHz RAM or above
Hard disk	1G
Installation Environment	.NET Framework 4

1.3 Installation Method

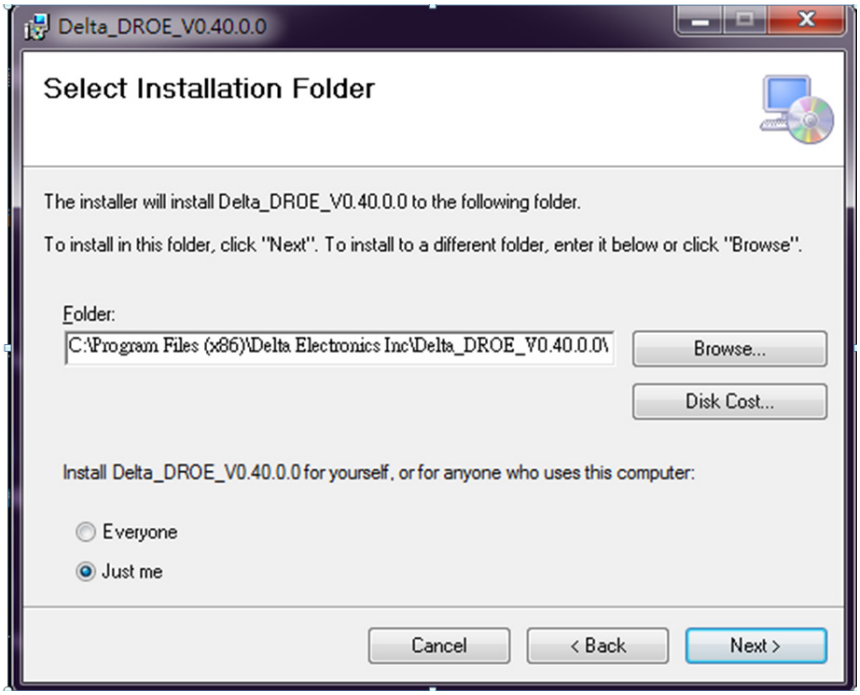
(1) Step 1



(2) Step 2



(3) Step 3



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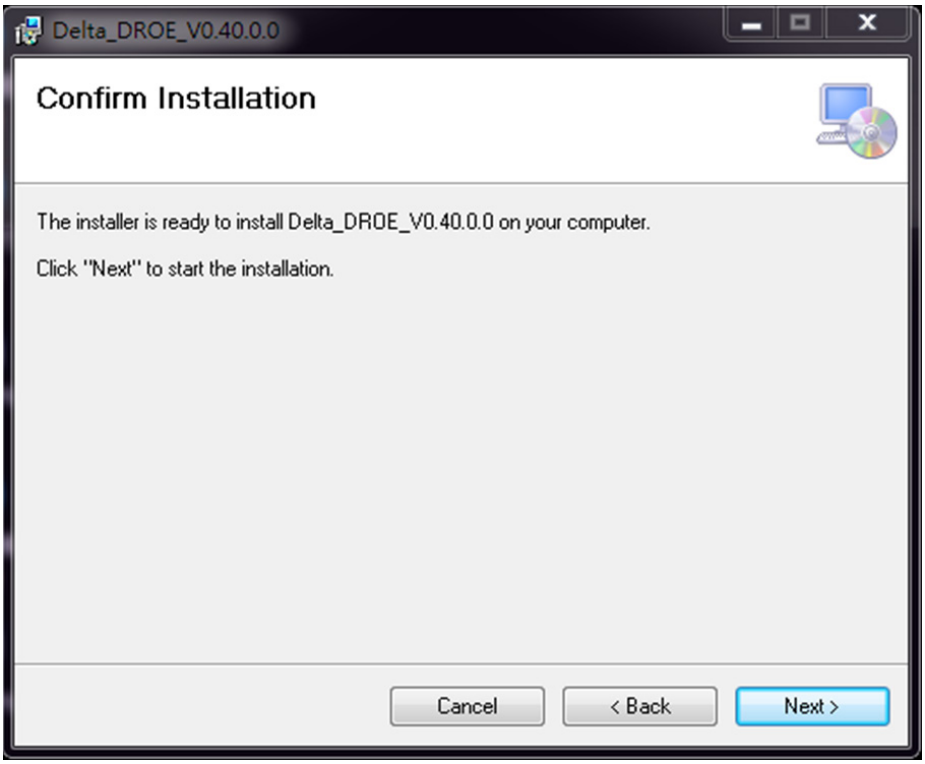

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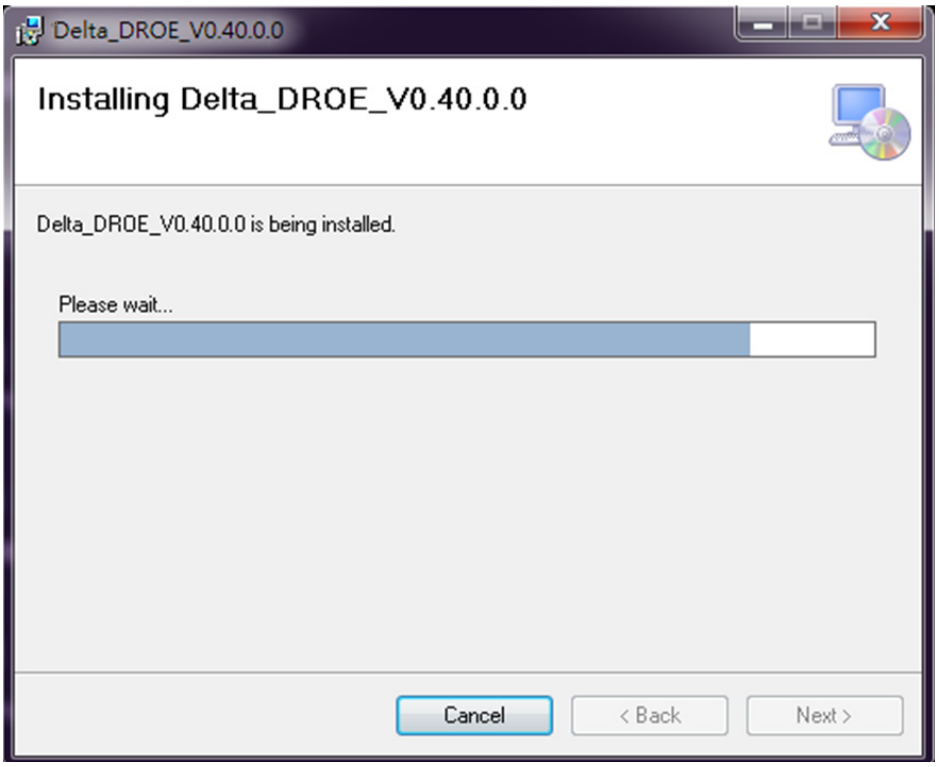
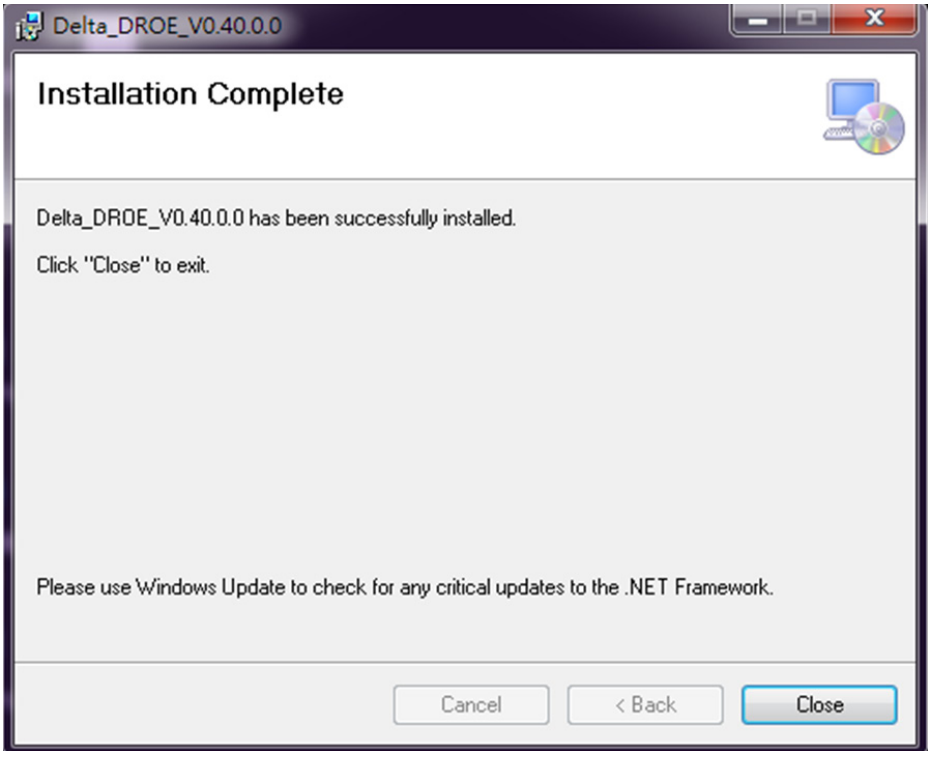
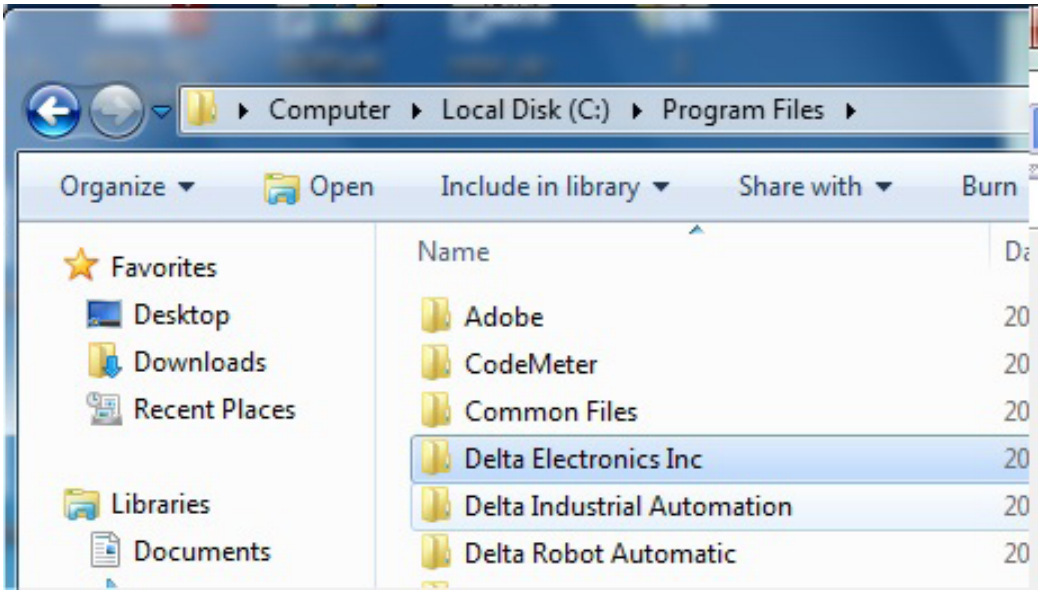


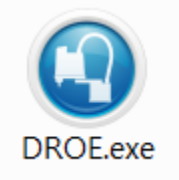
(6) Step 6



(7) Step 7



Step 8



2. Layout of Screen View

The layout of system screen view is mainly divided into main screen and auxiliary screen, as shown in Figure 1.

1. Main screen:

Tabs include: Main (main screen) , Connect (connection setting) , Execution (execute project) , Ser- vo (server setting) , Project (project management) , Jog (jog setting) , Points (point information) , RL (robot language editing) , Home (home setting) , Arm (arm parameters setting) , I/ O (IO monitoring) , Info (information display) and system (system setting) . The functions of each tab will be introduced in details below.

2. Auxiliary screen:

Tabs include: Alarm (alarm information) , Output (output information) , Project (project information) , Point (point function) , Jog (jog operation) and RL (robot language editing) . The functions of each tab will be introduced in details below.

Fig.1 System Screen

2.1 Main (main screen)

The system's Version (software version) and Release Date (release date) are recorded in details under "Main (main screen)" tab on the main screen, as shown in Fig.2.

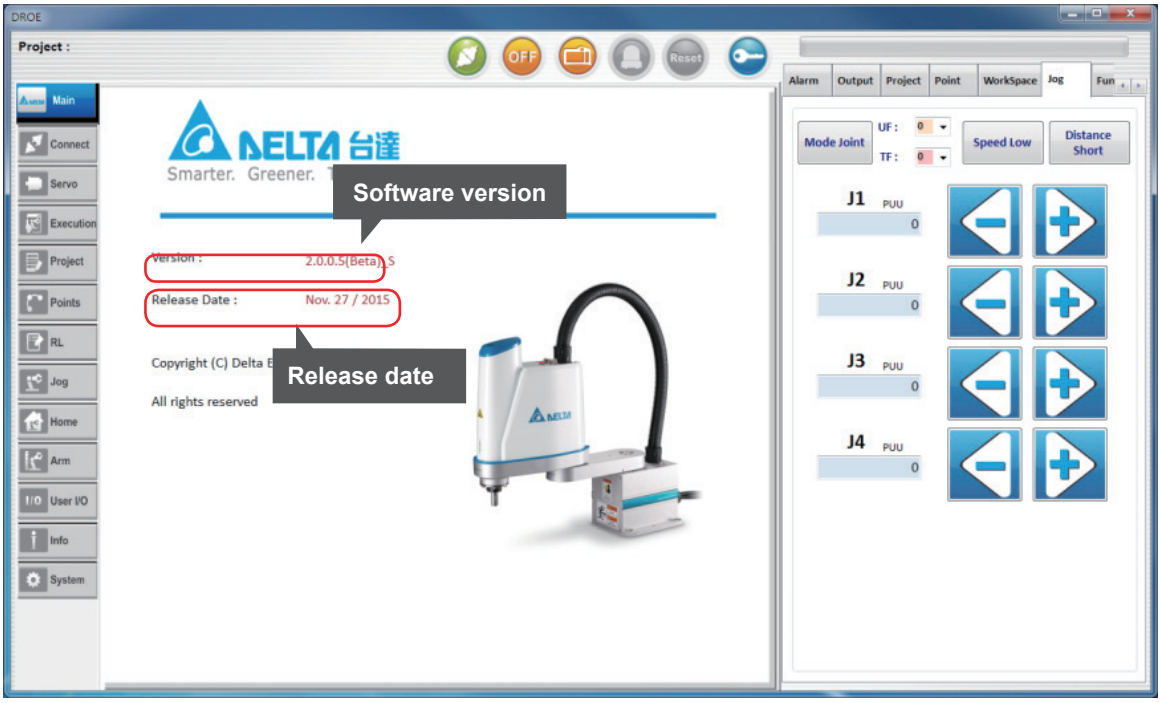


Fig.2 Main (main screen)

The following status will be monitored on top of the main screen, including the Project (project name), connection status of controller (/), Servo of robot actuated status (/), Teach Pendant Status (Teach Pendant) (/), Operation Status (/ /) alarm status (/), alarm reset (/) and authority setting ( ) have taken place, as shown in Fig.3.

1. Project (project name):

If any project is loaded, the project name will be displayed.

2. Connection status of controller (/):

When connected with the controller, the icon will be displayed; if not, the icon is displayed.

3. Servo of robot actuated status (/):

If the servo is actuated, the icon will be displayed; if not, the icon is displayed.

4. Teach pendant status (/):

When the operation right is switched to TP, the TP status will display the image; otherwise it will display the image.

5. Operation Status (/ /):

T1 mode shown as ; T2 mode shown as ; Auto mode shown as .

6. Alarm status (/):

If an alarm has been triggered, the red underline and the icon will blink; if not, the icon is displayed.

7. Alarm reset (/):

When an alarm has been triggered, the icon will be displayed, and when the alarm issue is removed, click on this button to clear the alarm. If no alarm has been triggered, the icon is displayed.

8. Authority setting ( ):

For user's authority input, click on this button to pop out the input screen. Enter the password and then click on "Ok" button.

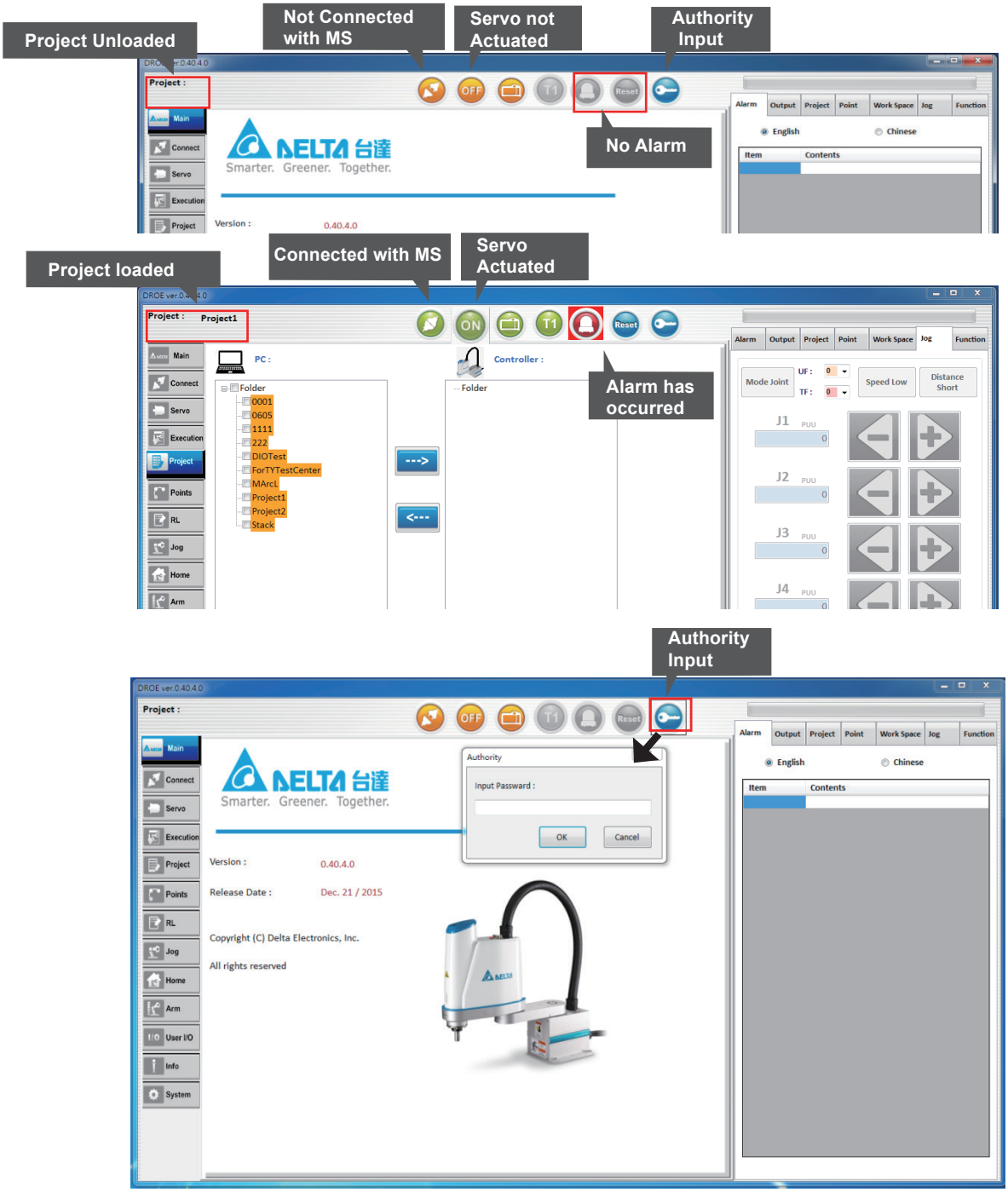


Fig.3 Status Monitoring

2.2 Connect (connection setting)

Under “Connect” tab on the main screen, connect with the controller.

1. **Controller:** Controller’s name.
2. **Connection:** Click on “Disconnect” button to perform connection, as shown in Fig.4.
   (1) After successful connection, color of the button will turn green, and the text “Connecting…” will be displayed.
   (2) If connection fails, the color of the button will turn orange, and the text “Disconnect” will be displayed.

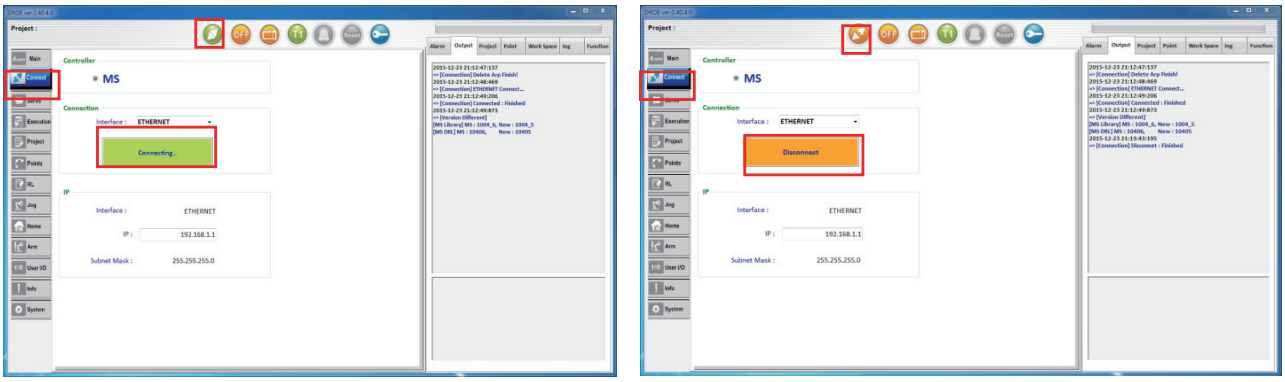


Fig.4 Connection setting

3. **Interface:** There are two communication interfaces, ETHERNET/USB1.
   (1) ETHERNET, set the IP and acquire the controller’s subnet mask information.
   (2) USB1, set the serial and acquire the protocol and transmission rate information.

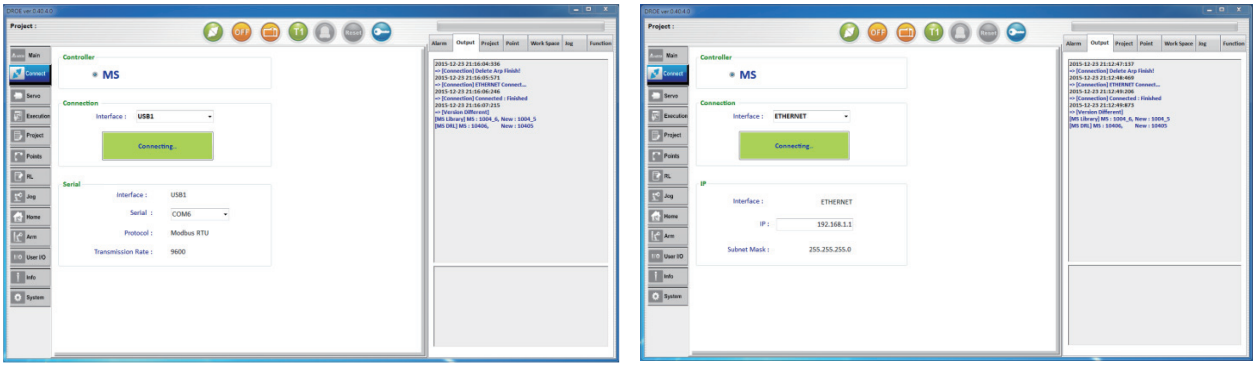


Fig.5 Interface Setting (Interface)

2.3 Servo (servo setting)

Under “Servo” tab on the main screen, start / stop the servo motor.

1. **All Axes:** start / stop all servo motors, as shown in Fig.5
   (1) After starting the servo, the color of the button will turn green, and the text “Servo ON” will be displayed.
   (2) After stopping the servo, the color of the button will turn orange, and the text “Servo OFF” will be displayed.
2. **Each Axis:** start / stop each servo motors.
   (1) After starting the servo successfully, the color of the button will turn green.
   (1) After stopping the servo, the color of the button will turn orange.

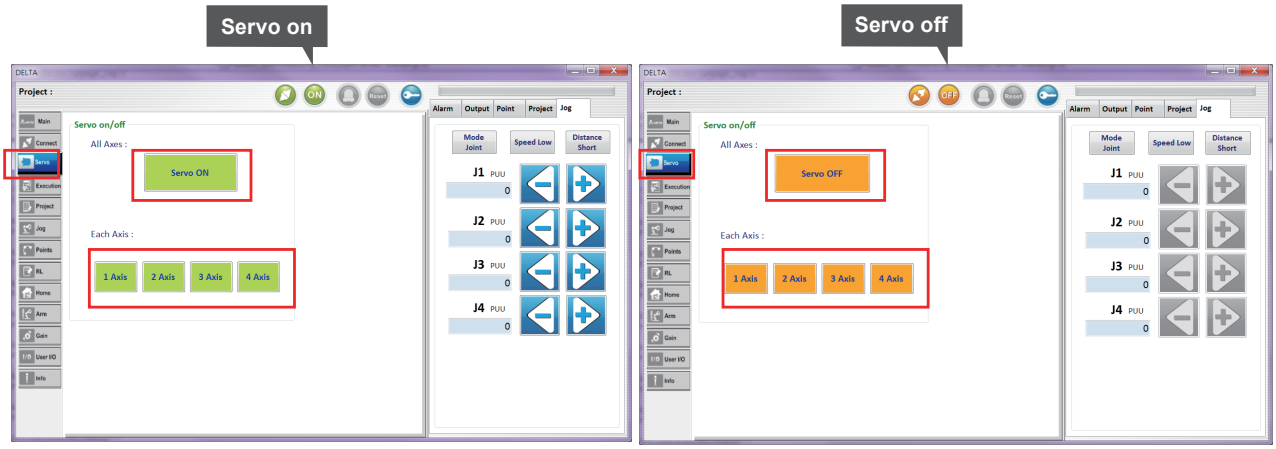


Fig.6 (a) Servo On **Fig.6 (b) Servo Off**

2.4 Teach Pendant Status(Teach Pendant)

1. **When TP is turned off :**
   (1) TP Disable Mode: It is not allowed to operate the robot in this mode. The DROE can be used to operate the robot.

Fig.7 The off status of the teach pendant

2. When operation status switches to the TP:

(1) TP Enable Mode: It is allowed to operate the robot in this mode. The DROE cannot be used to operate the robot.

Fig.8 The On status of the teach pendant

2.5 Operating Status

1. When operation switches to the T1 mode:

(1) The synthetic speed of the jog shall not exceed 250 mm/s. The TP/DROE can be operated in this mode. The IO execution procedure cannot be operated.

Fig.9 T1 operation mod

2. When operation switches to the T2 mode:

(1) The synthetic speed of the jog shall not exceed 2000 mm/s. The TP/DROE can be operated in this mode. The IO execution procedure cannot be operated.

Fig.10 T2 operation mode

3. When operation switches to the Auto mode.

(1) The TP cannot be operated in this mode. The DROE can be operated in this mode. The IO execution procedure can be operated.

Fig.11 Auto operations mode

2.6 Execution (execute project)

Under“Execution” tab on the main screen, aim to execute the internal project on the ASDA-MS controller, with functions including Project Name, Open Project, Run (run project), Pause (suspend executing project), Stop (stop executing project) and Status, as shown in Fig.12.

1. Name (project name)

Click the project name has been chosen to operate.

2. Open Project (open one project):

Click on “Open Project” button, a dialog window will appear, and its drop-down menu records the name of all internal projects of the ASDA-MS controller. Select one and click on “OK” to have the name of this project shown on the Name.

3. Run (run project):

Click on “Run” button to run the project.

4. Pause (suspend executing project):

Click on “Pause” button to suspend execution of the project.

5. Stop (stop executing project):

Click on “Stop” button to stop executing the project.

6. Status (current executing project status)

Showing the status of current executing project.

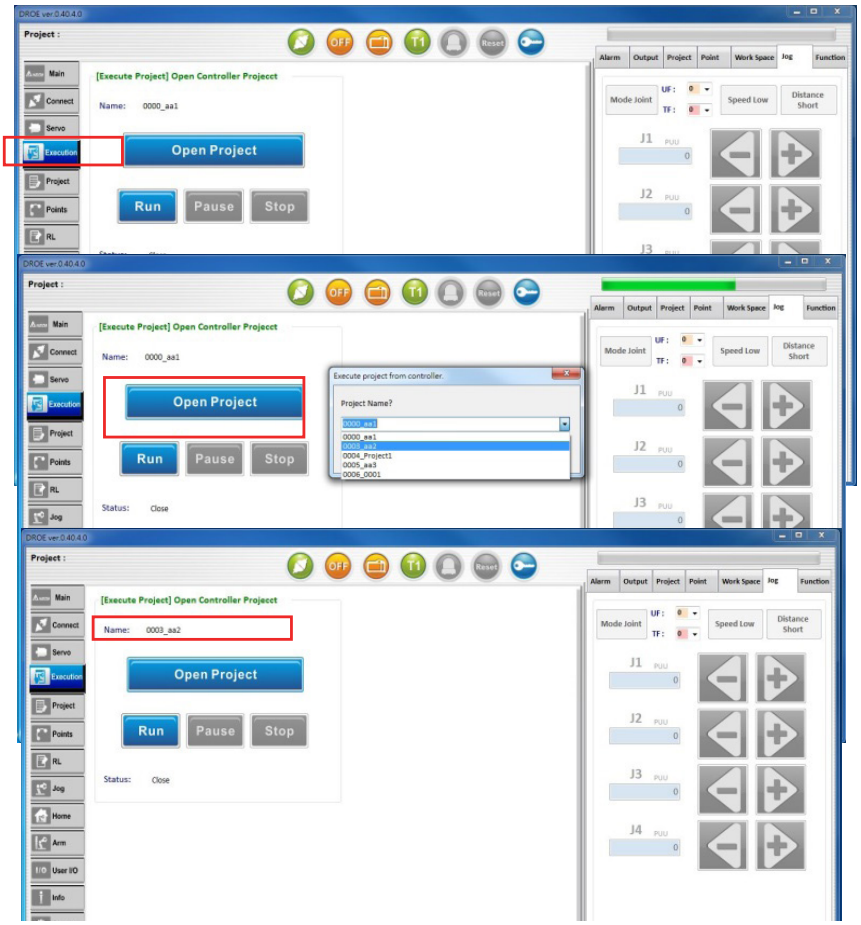


Fig.12 Execute ASDA-MS Controller’s Internal Project

2.7 Project (project management)

Under “Project” tab on the main screen, include project list of PC, Project list of MS controller, Projects [Up / Down Load], and Project Editing, as shown in Fig.13. Functions of each will be introduced in details below.

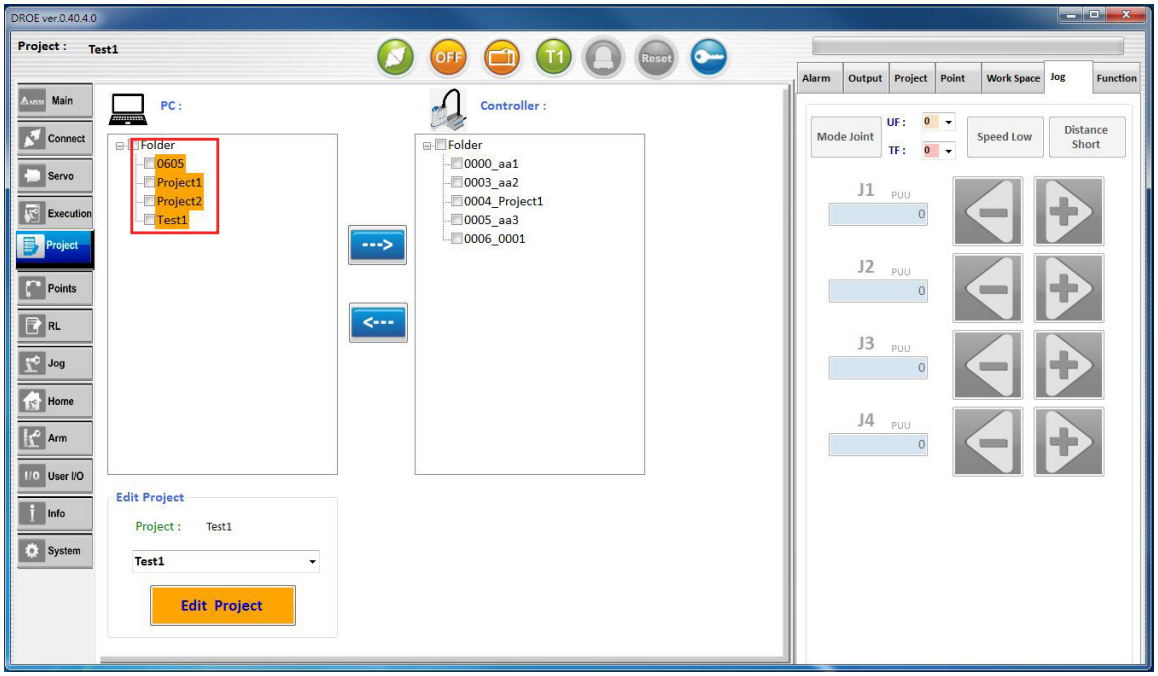


Fig.13 Project (project management)

1. Project list of PC:

(1) List the name of all projects stored on local side.

(2) You can also download from the ASDA-MS controller to the local side, and add the project name to the project list.

(3) Move the mouse to “Folder” tab and click the right button and choose “ Add New Project” will add new project on PC.

(4) Move the mouse to the project name and click the right button and choose “ Delete Project” will delete the project from PC.

A: Project route:

The system will preset the file folder storing file folders for all projects. The preset position is under the execution route of the system, and the preset project folder is “DROEsolution”.

B: Add new project:

Right-click on the “Folder”. The “Add New Project” button will appear and click on it to pop up a dialog window inquiring the name of the new project to be added. Enter the name and click on “OK”. The name of the new project will be added to the project list, and such project will be downloaded to the ASDA-MS controller, as shown in Fig.14.

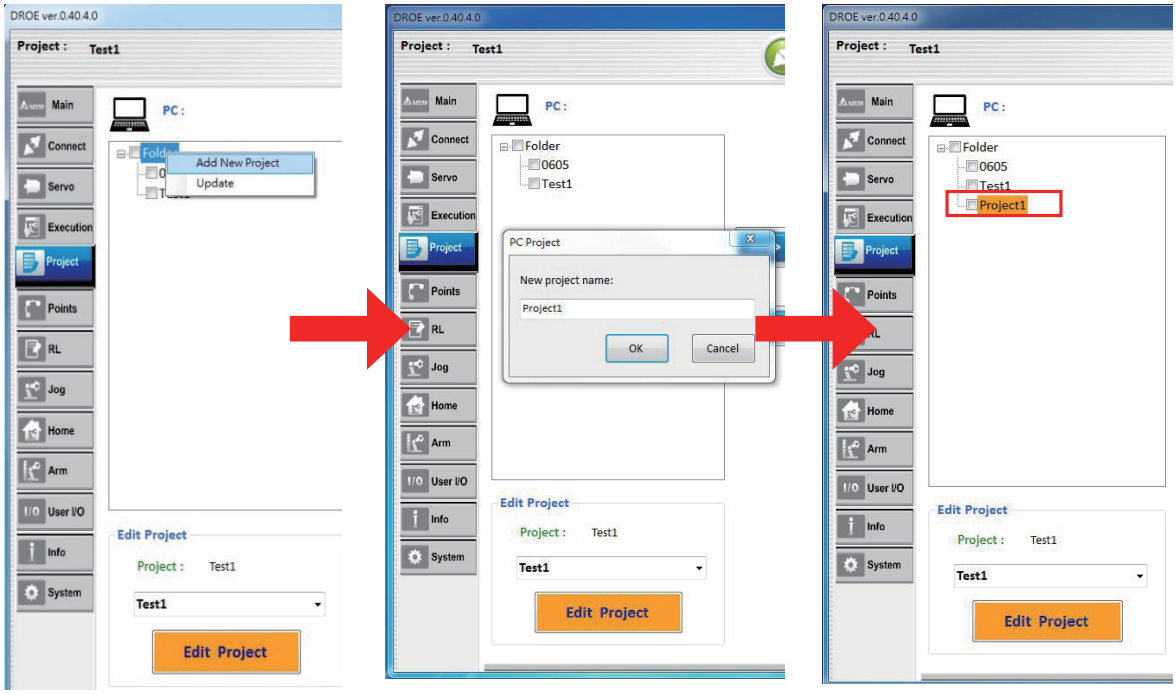


Fig.14 Add New Project

C: Delete project on PC

Right-click on the name of the project to be deleted. The “Delete Project” button will appear and click on it to pop up a dialog window asking whether to delete the project name. Click on “Y” and the project name will be deleted from the project list on PC as well the project list, as shown in Fig.9.

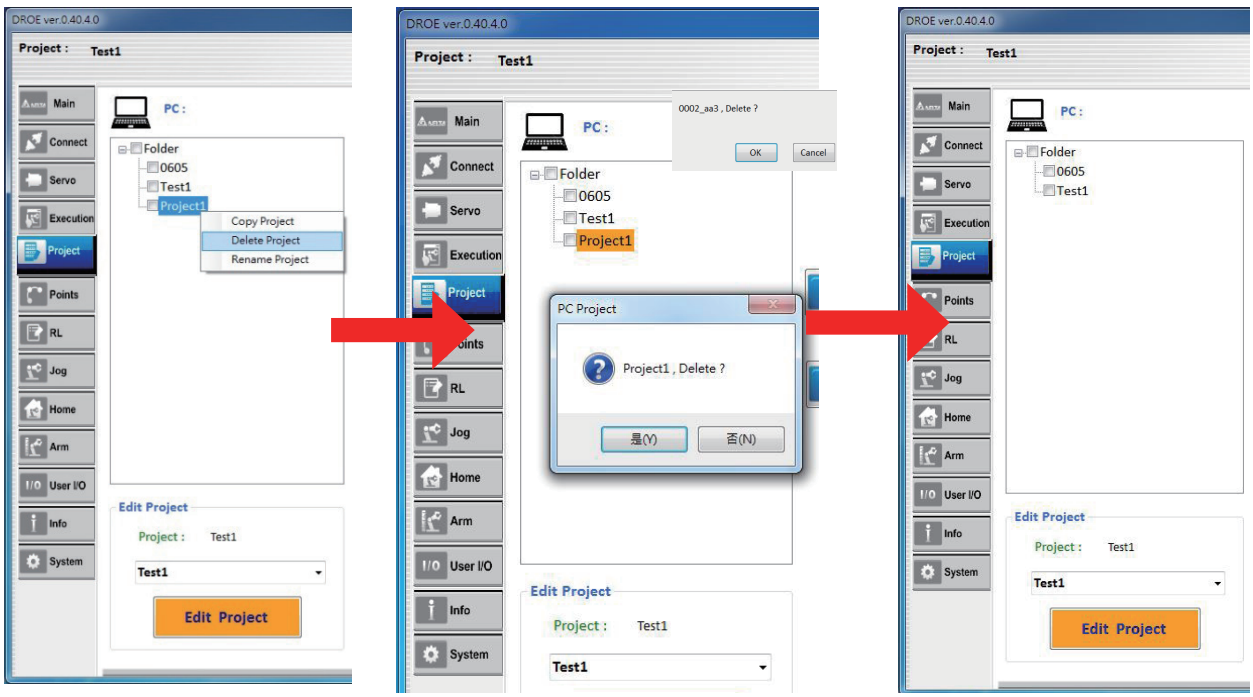


Fig.15 Delete Project

D: Meaning for the bottom color of the project list

If the bottom color of the project name on the project list is orange, the project on the local side is not synchronized with the project on the ASDA-MS controller. If the bottom color is white, the project on local side is synchronized with the project on the ASDA-MS controller, as shown in Fig.16.

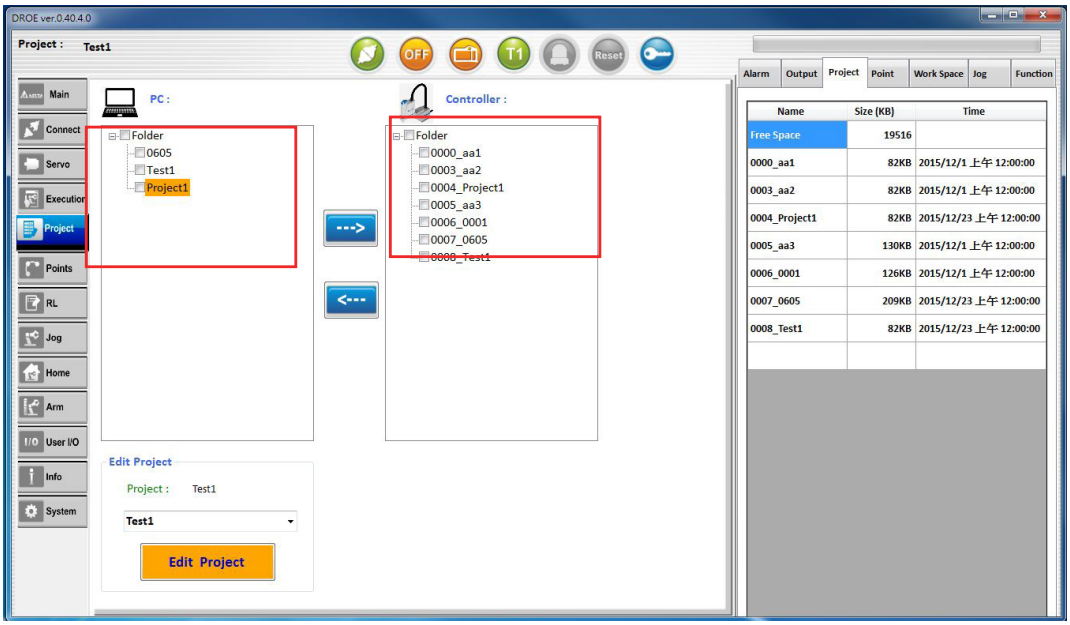


Fig.16 Load Project

2. Lists of projects on MS controller side:

(1) List names of all projects stored on the MS controller side.

(2) Can be uploaded from PC-side controller to MS controller side, with project name added to this project list.

(3) Update project information. Press the right mouse button at the “Folder” and click “Update” to obtain all projects on the MS controller side.

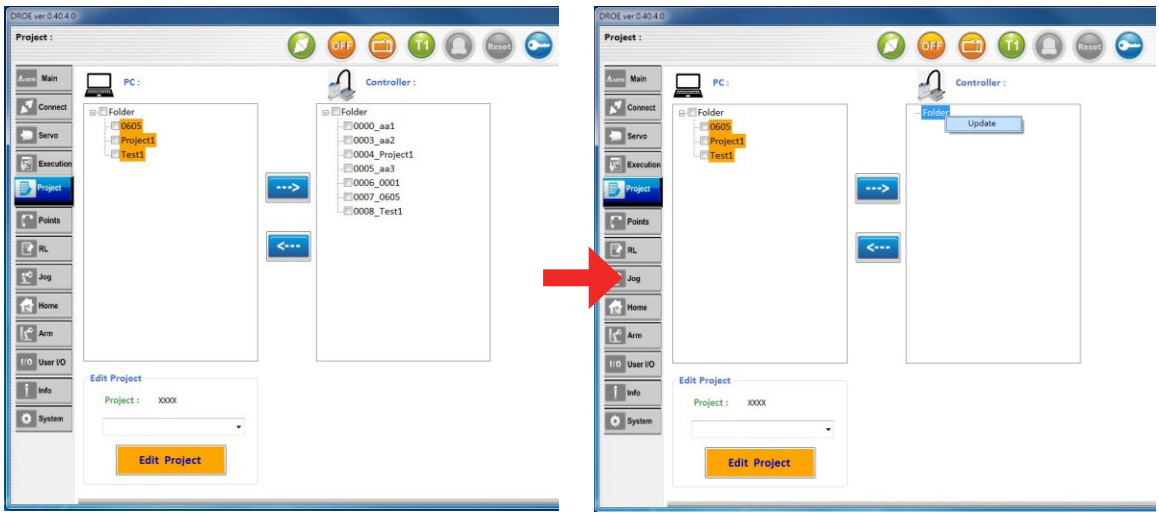


Fig.17 Update Project Information

(4) Delete MS controller projects. Press the right mouse button on a project name, and click “DeleteProject” to delete the project on the MS controller side. Right-click on the project name to be deleted and the “Delete Project” button appears. Click on this button and a dialog window appears asking whether to delete the name of this project. Click on “OK” to delete the project at the MS controller. The name of this project will be deleted from the project list. (Fig.18)

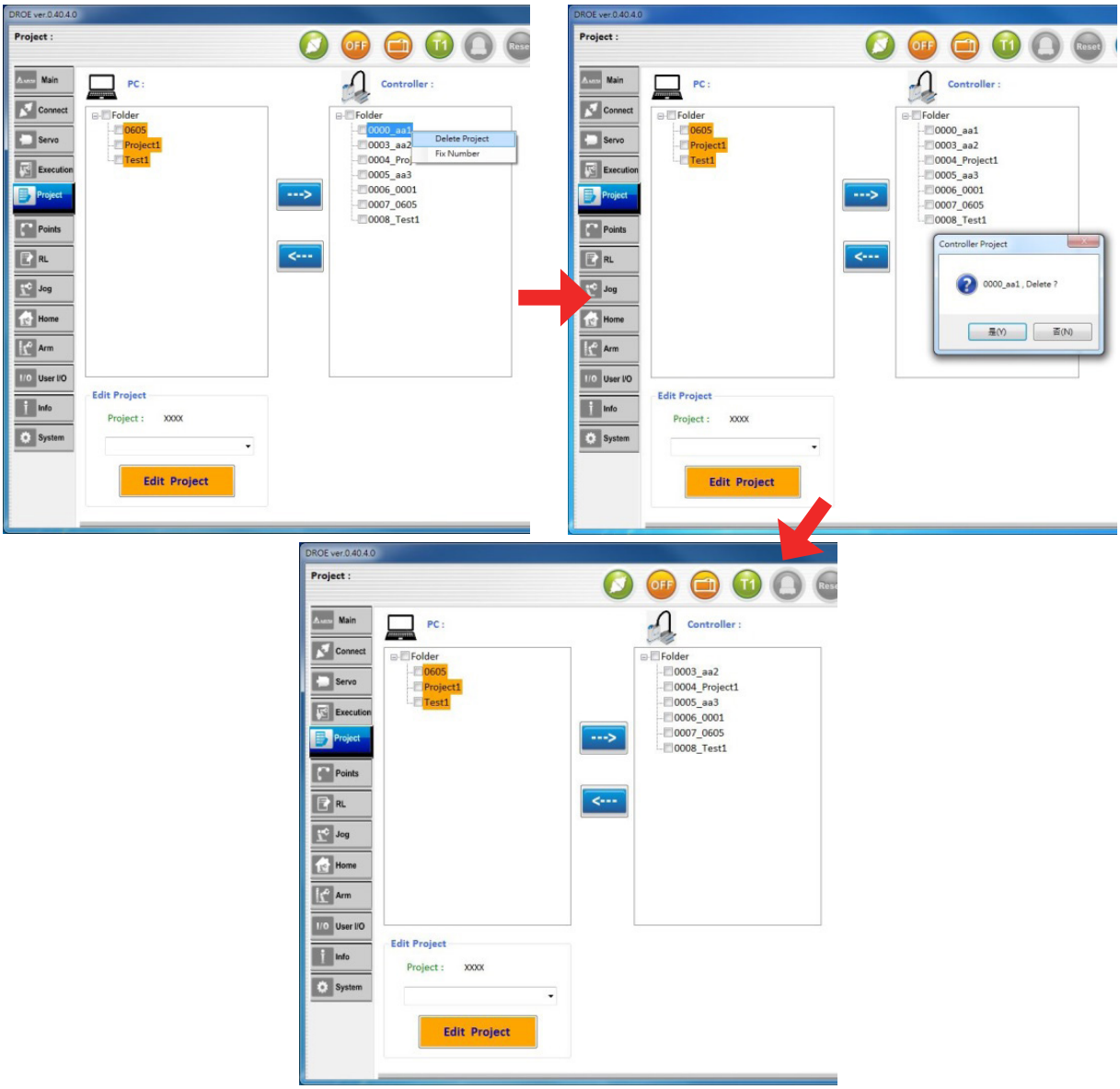


Fig.18 Delete MS controller projects

(5) Change Project Number:

Press the right mouse button on the name of the project whose number is to be changed, and the “Fix Number” button will appear. Click it and a dialog window will appear inquiring the project number to be changed into. Input the number between 1~1000, and each project number is unique, as shown in Fig.19.

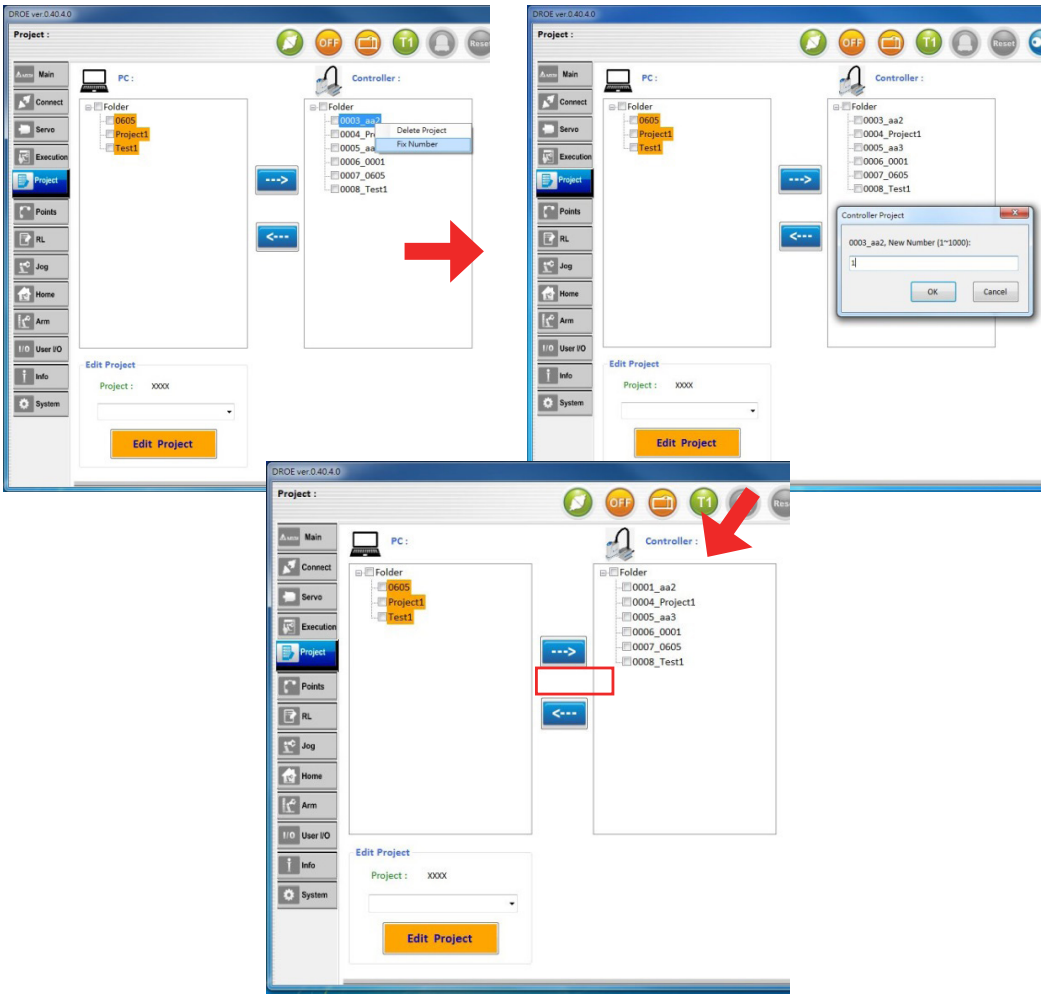


Fig.19 Update Project Number

3. Project upload and download:

(1) Upload the projects on the PC side to the MS controller side: tick the project in the PC-side project list, and click "--->" to upload the projects on the PC side to the MS controller side, as shown in Fig.20.

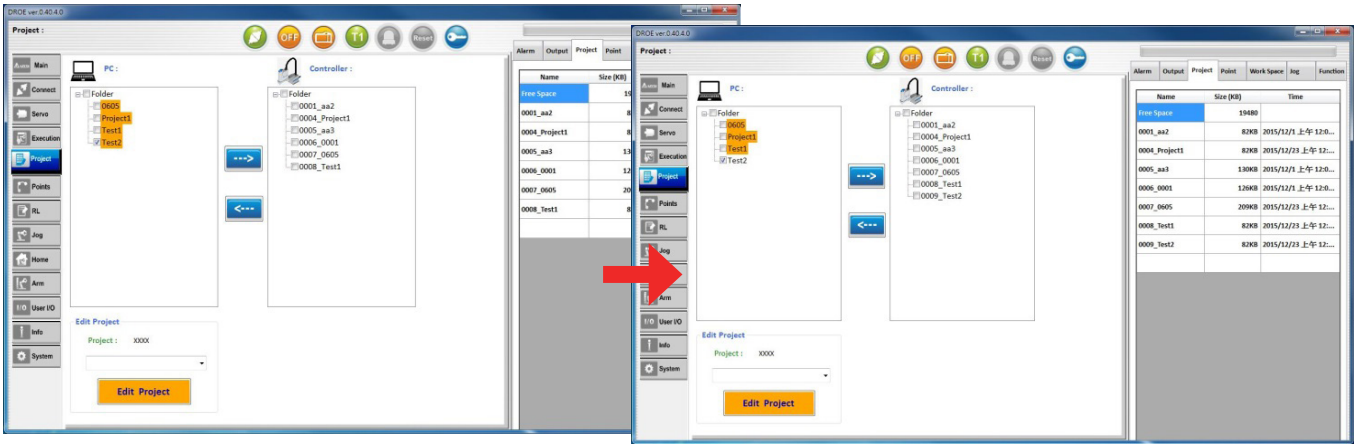


Fig.20 Upload Projects on PC Side to MS Controller

(2) Download the projects on the MS controller side to the PC side: tick the project in the MS-side project list, and click “<---” to download the projects on the MS controller side to the PC side, as shown in Fig.21.

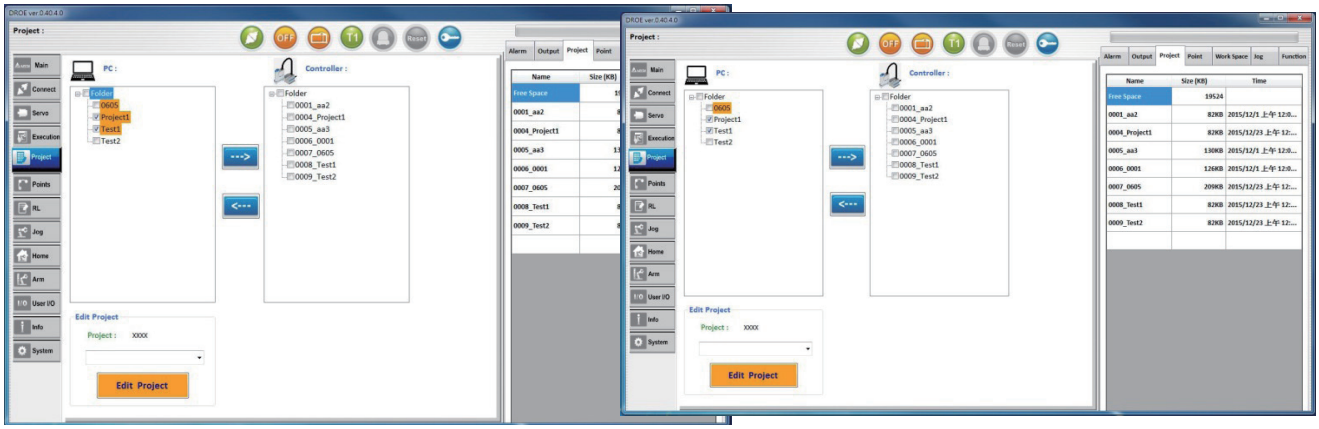


Fig.21 Download Projects on MS Controller Side to PC Side

4. Project information:

(1) Project information on auxiliary screen will display the remaining size of space on the MS controller for storing projects, and the size and time of the projects uploaded/downloaded from the PC side to the MS controller side, as shown in Fig.22

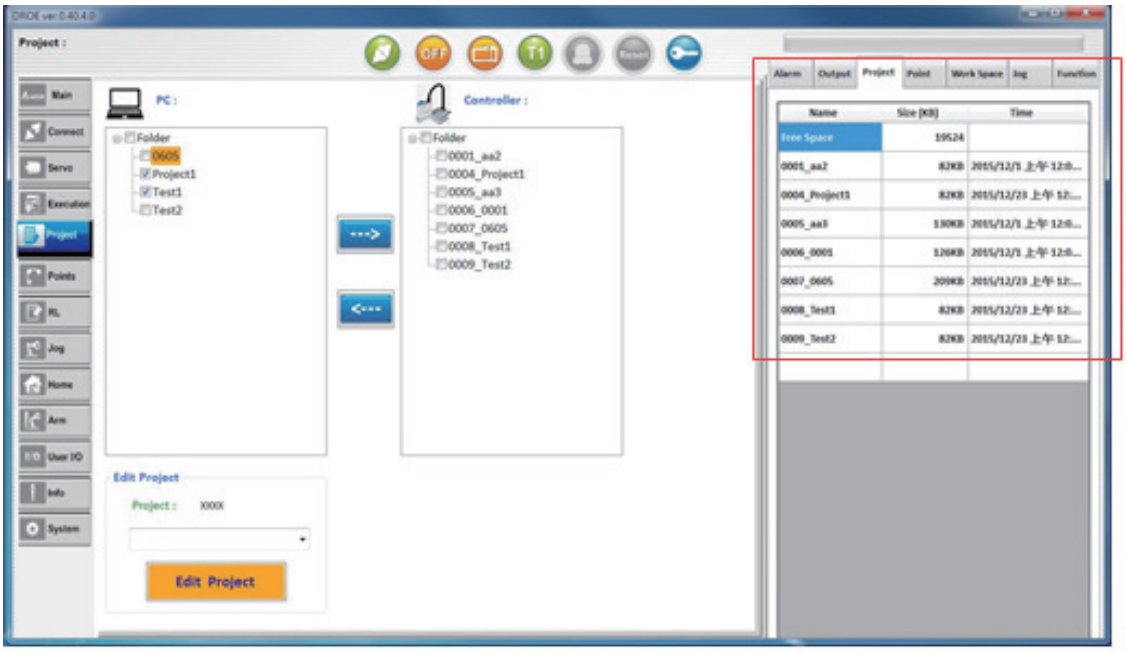


Fig.22 Project Information

5.Edit Project(open project):

(1) Select the name of the project to be edited, and click “Edit Project”. After the project loading is completed, the top of the main screen will monitor the state and display the project name, as shown in Fig.23.

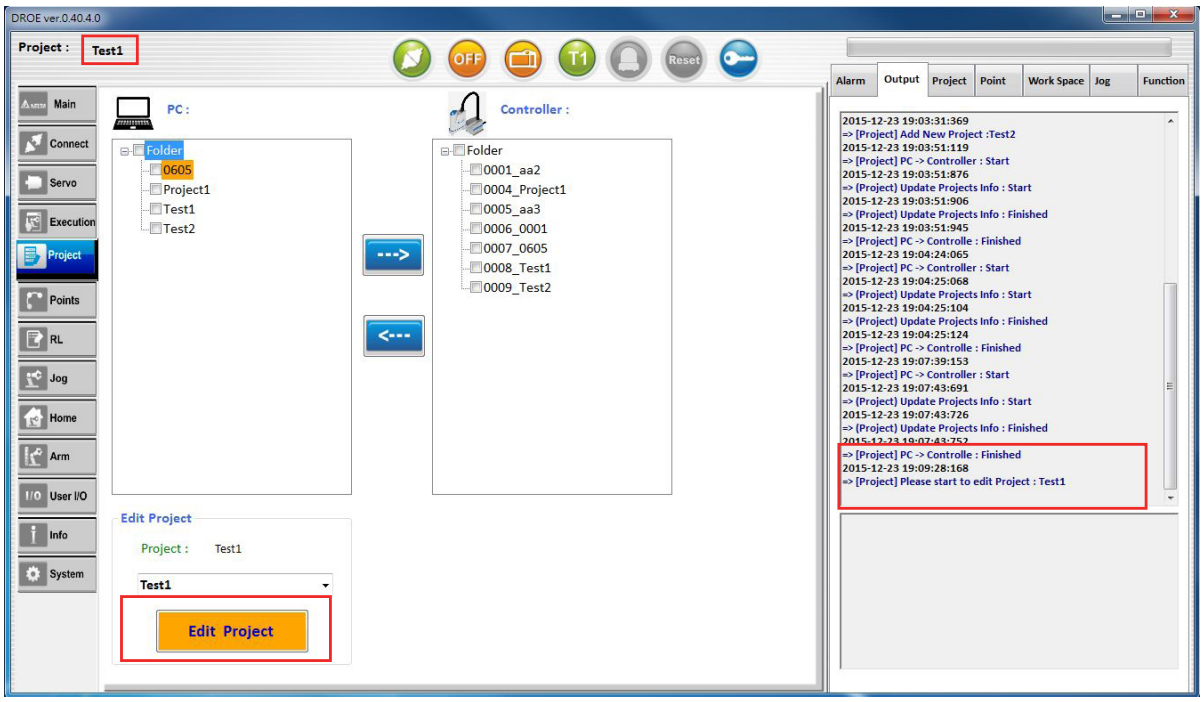


Fig.23 Edit Project(open project)

2.8 Points(point information)

Under “Point” tab on the main screen, settings include the local point (Local), global point, (Global), user coordinate (User Frame), tool coordinate (Tool Frame) and work space (Work Space) pages; and the auxiliary screen including Point and Jog.

Global Point (point position), Local Point (point position) these two paged include Global/Local (point position file) , Global point position up/down load from MS controller, add new Local point position, Save (save point position), Teach (teach point position), and GO (move to point position). Functions of each will be introduced in details below.

1.Global/Local(point position file), as shown in Fig.24.

(1) Global point file can save 1000 points shared by all projects and saved in MS controller.

(2) Local point file has up to 30000 points dedicated for each project.

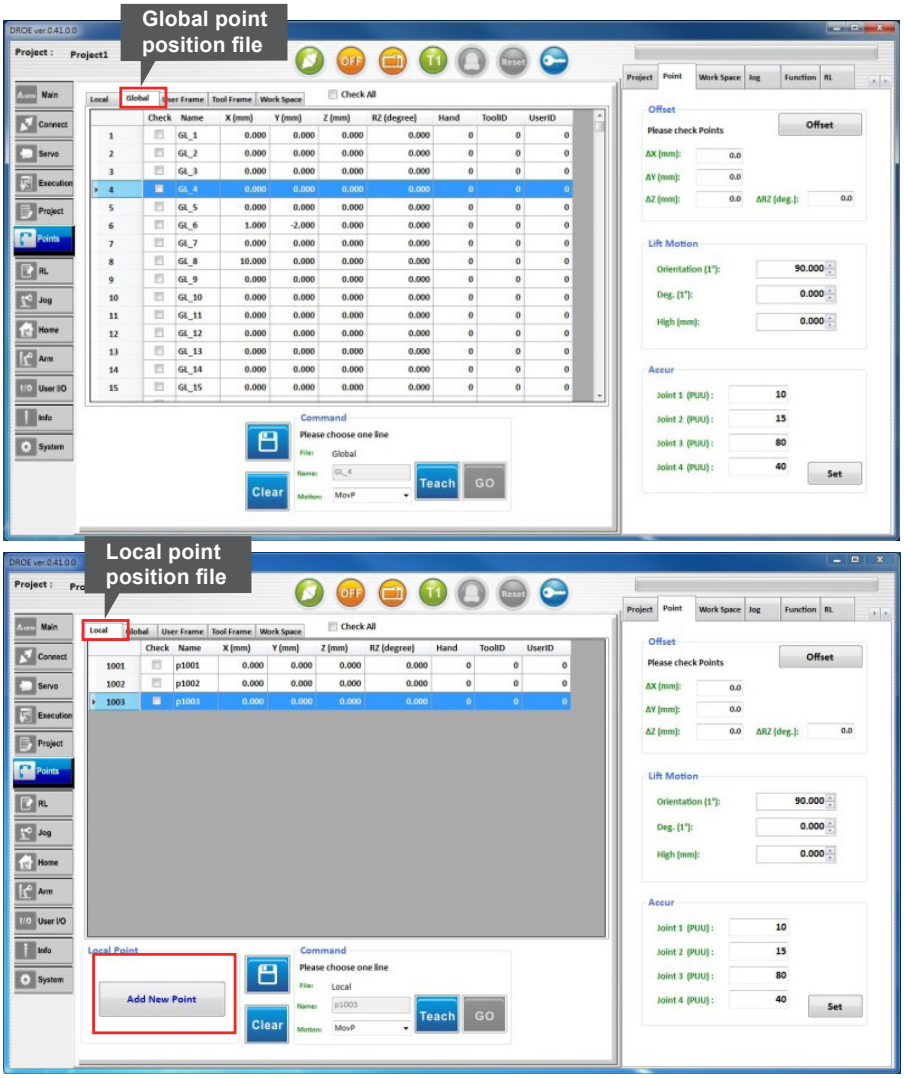


Fig.24 Global / Local (point position file)

2.Local Point (add new point position) , as shown in Fig.25:

(1) Click on ”Add New Point” to add new Local point.

(2) Local has up to 30000 points dedicated to each project.

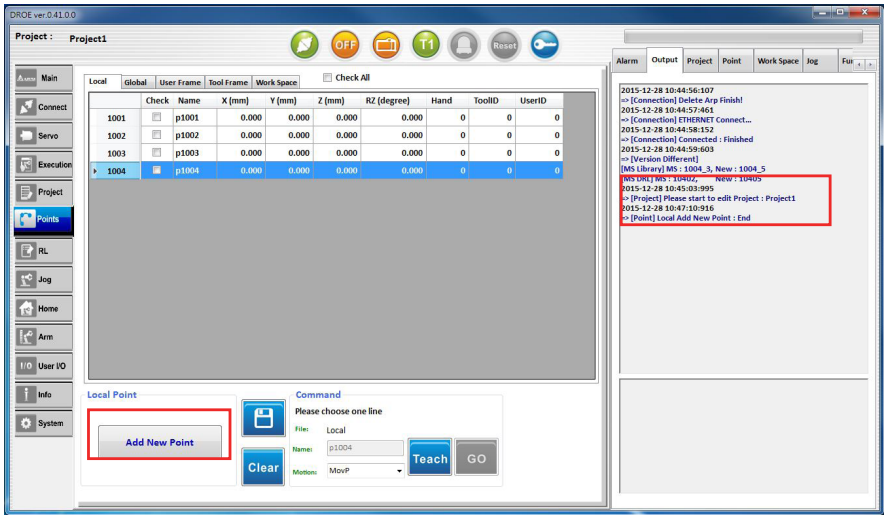


Fig.25 Increase Local Point

3.Teach (teach point position), as shown in Fig.26:

Can operate with JOG on auxiliary screen moving SCARA to some points and select a line of the Global/Local point position and input the Name (point name). Click on the “Teach” button to record the current arm position into the file for point position.

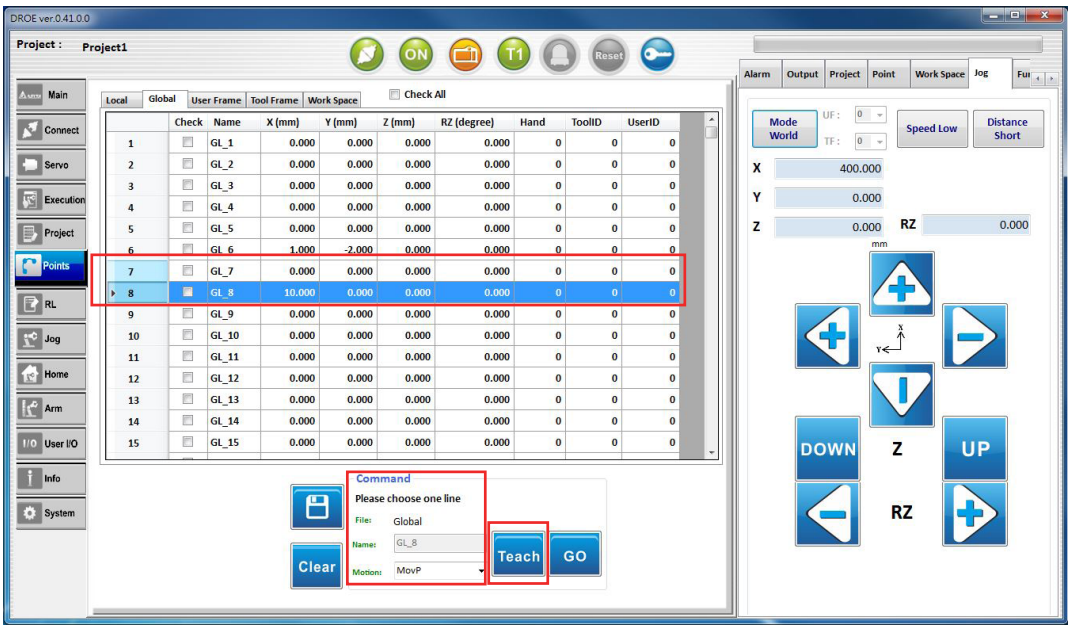


Fig.26 Teach (teach point)

4.GO (move to point position), as shown in Fig.27:

Select one line for the point position of Global/Local. Select the Motion mode and press and hold the “GO” button. The arm will move to the point position. Stop pressing and the arm will stop moving.

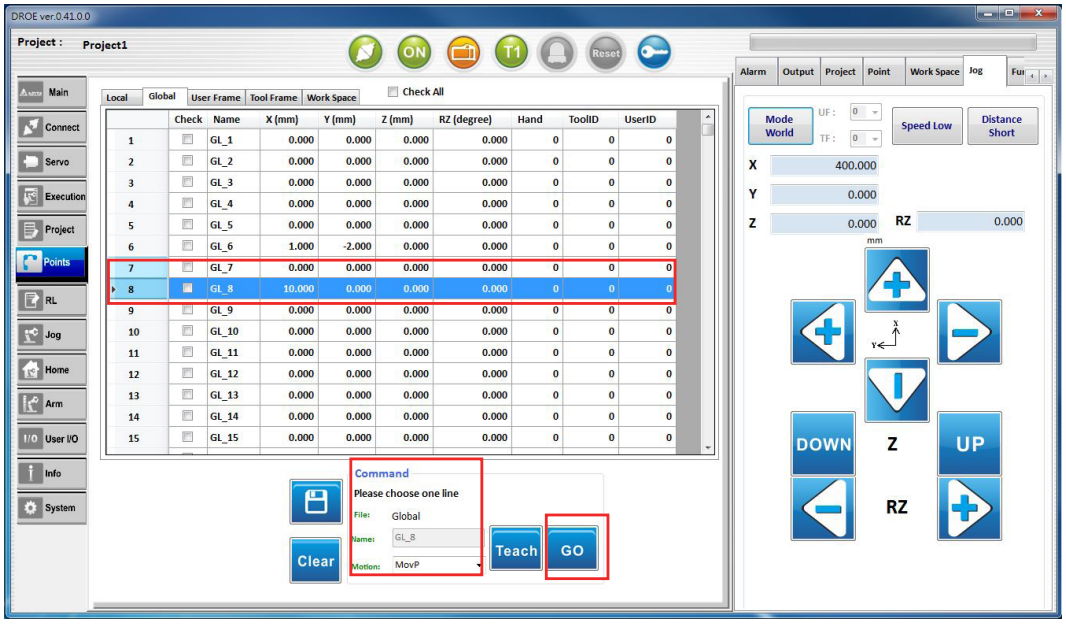


Fig.27 GO (move to point position)

5.Save (save point position file) , as shown in Fig.28:

Click and press and hold the “Save” button to save Global/Local point information.

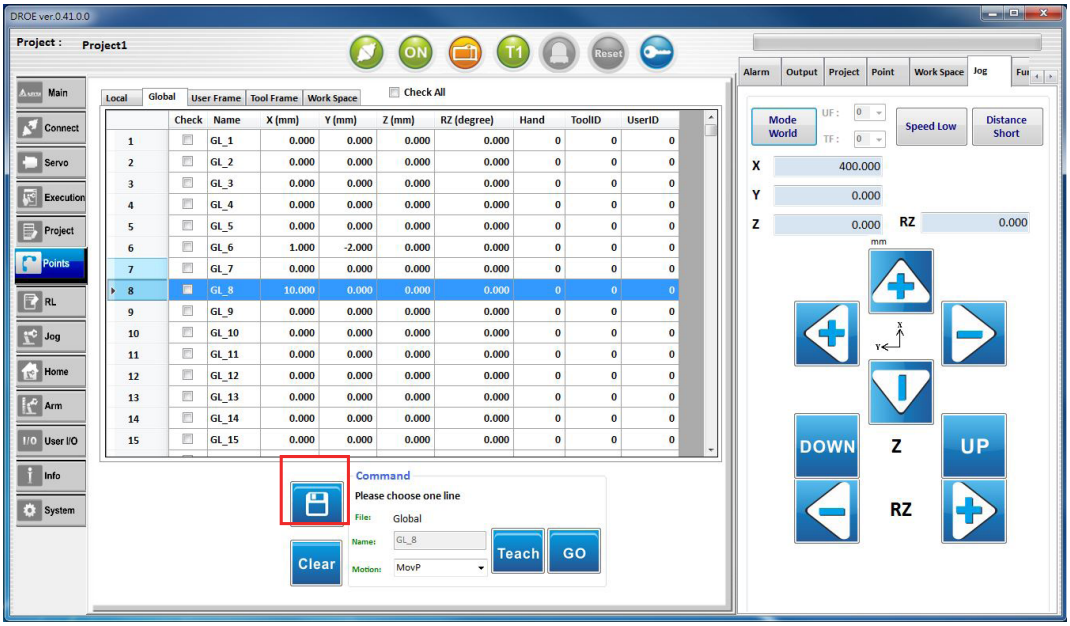


Fig.28 Save (save point position file)

6.Offset (coordinates data offset) , as shown in Fig.29:

(1) At Global/Local, perform offset correction for X, Y, Z and Rz of the ticked point data.

(2) Point (point function assistance collocated with the auxiliary screen) , ΔX is the offset of axis, ΔY is the offset of axis Y, ΔZ is the offset of axis Z. and ΔRz is the offset of axis Rz. Click “Offset” button to modify the point data.

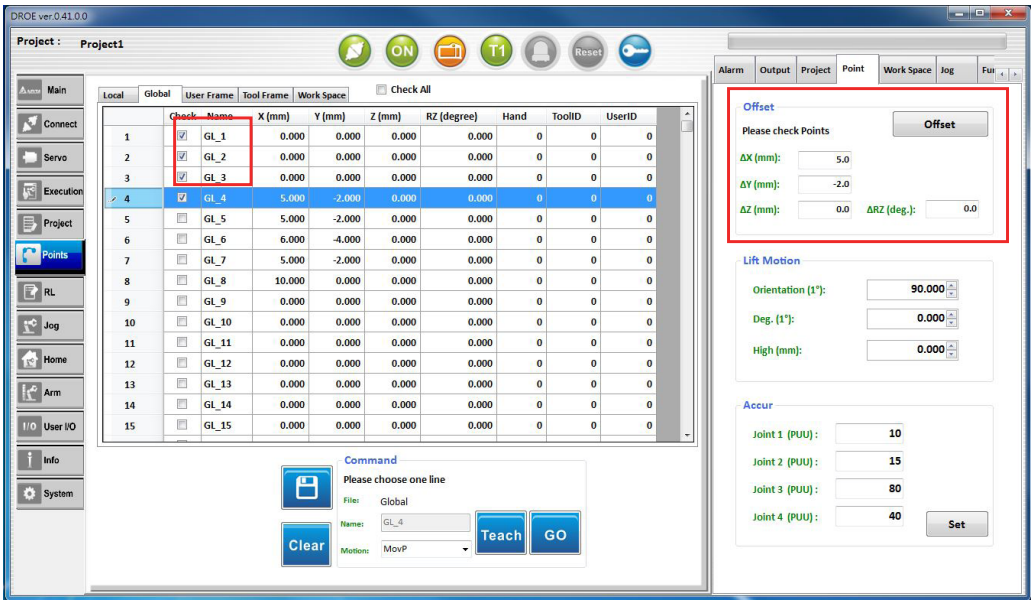


Fig.29 Offset (coordinates data offset)

7. Lift motion is as shown in Fig.30:

(1) Select the command motion type as “Lift”, Move an object along the tool device at the end of the robot or move it to a certain level toward the opposite direction. check the point on the point file (Global/Local), and then click the “GO” button to execute the Life motion.

(2) Use with the point function aid on the aid screen; orientation is the rising direction, Deg. is the rising angle and high is the rising height.

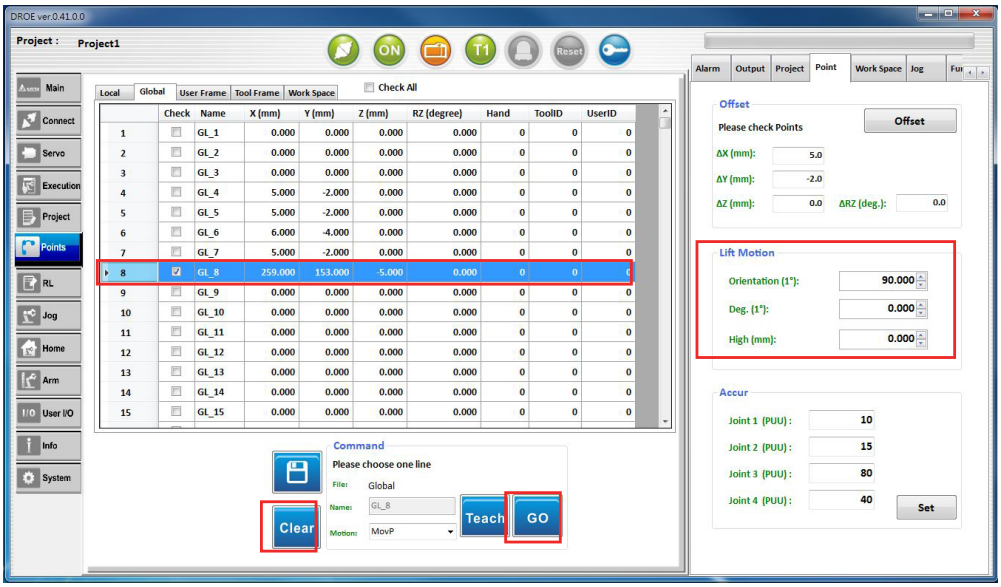


Fig.30 Lift Motion

8. Position reached the confirmed range (Accur), as shown in Fig.31:

(1) The point function aid on the aid screen; set the Accur parameter for each axis. When offset of the target position set with the actual motor position is less than the Accur parameter set, output the position reached signal to the controller.

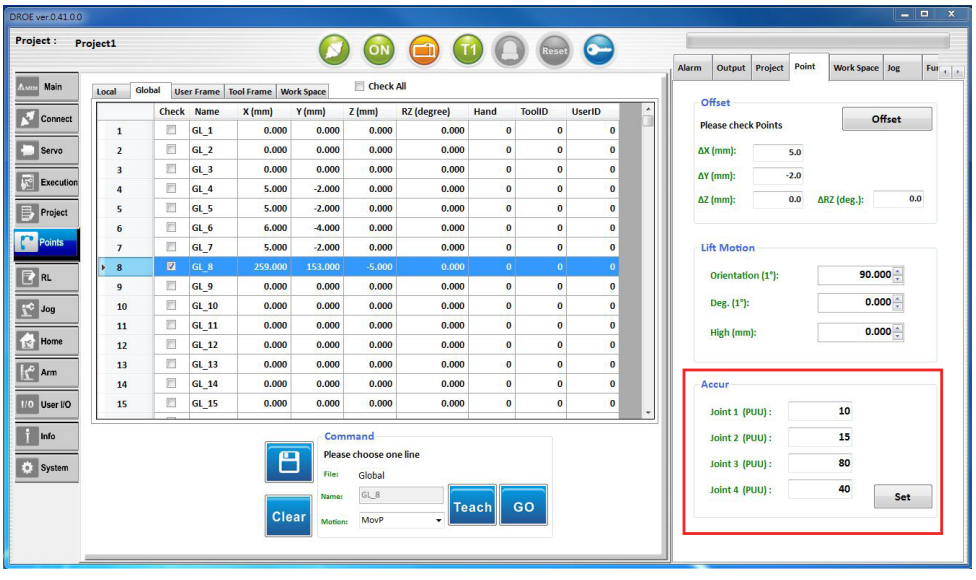


Fig.31 Accur

9. Clear (clear coordinates data), as shown in Fig.32:

(1) At Global / Local, clear the X, Y, Z and RZ of the ticked point data to zero.

(2) Point (point function assistance collocated with the auxiliary screen), click “Clear” button to clear the point data.

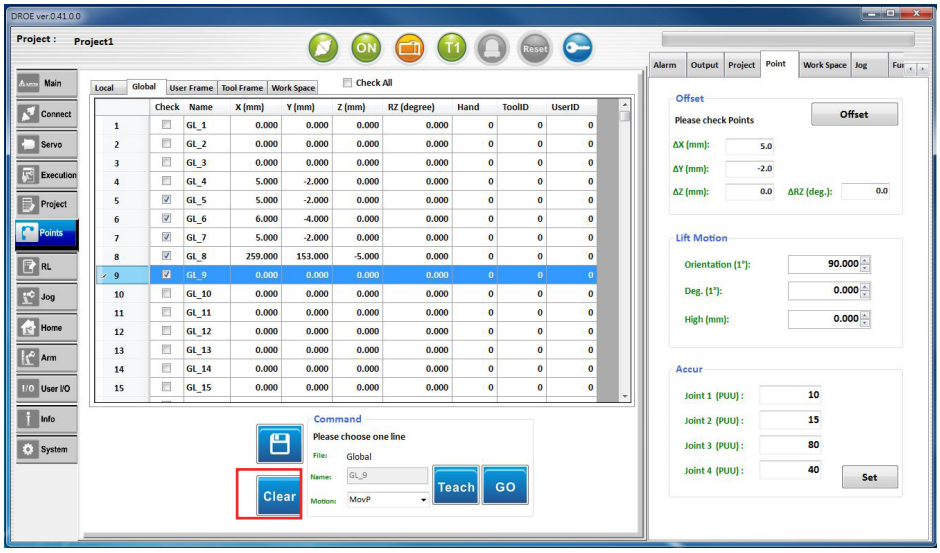


Fig.32 Clear (clear coordinates data)

10. User Frame (user coordinates screen), as shown in Fig.33:

User coordinates system is an unfixed coordinate system, and is the coordinates system defined by the user. Therefore, this coordinates system can be defined at any position, e.g. on the work piece or workbench.

The instruction method for the user coordinates system is the Three Point Method. It calculates the transformational relation between the user coordinates system and geodetic coordinates system through the coordinate values of a total of three points on the geodetic coordinates system by inputting the Original (original point) of the user coordinates system, +X axis (point X along the positive direction of axis X), and +Y axis (point Y along the positive direction of axis Y).

(1) Method: The instruction method is the Three Point Method.

(2) ID: Users can set 5 groups of user coordinates (1~5). If the ID is 0, it means that it is the system’s geodetic coordinate system, and cannot be changed.

(3) Type: Select type

A. Orthogonal / NonOrthogonal: Set whether the method is orthogonal or not.

B. Inclined / NonInclined.z: Set whether the method is inclined or not.

(4) Input: Input the Original (original point) of the user coordinates system, +Xaxis (point X along the positive direction of axis X), and +Yaxis (point Y along the positive direction of axis Y). There are two input methods, as described below.

A: The first method is Jog (jog operation assistance collocated with the auxiliary screen). Select the Mode Cartesian, and the UserFrame ID is O (UF: 0) . Move the arm to a certain position, select any one line of the Original (original point) of the user

coordinates system,+Xaxis (point X along the positive direction of axis X) , and +Y axis (point Y along the pos- itive direction of axis Y) , click Teach button to record the current arm position in the form. The coordinate of these three points in the coordinate system are used to calculate the conversion between the coordinate system of the specified user and the geodetic coordinate system.

B: The second method is to have the user input the Original (original point) of the user coor- dinates system, +Xaxis (point X along the positive direction of axis X) , and +Y axis (point Y along the positive direction of axis Y) manually.

(5) Write: According to the user selected User Frame ID, upload the user set User Frame data, i.e. Original (original point) of the user coordinates system, +Xaxis (point X along the positive direction of axis X), and +Y axis (point Y along the positive direction of axis Y) to the MS controller.

(6) Read: According to the user selected User Frame ID, upload the user set User Frame data, i.e. Original (original point) of the user coordinates system, +X axis (point X along the positive direction of axis X), and +Y axis (point Y along the positive direction of axis Y) to the PC side.

(7) Clear: According to the user frame ID selected by the user, clear all the data of this user frame set by the user from the MS controller.

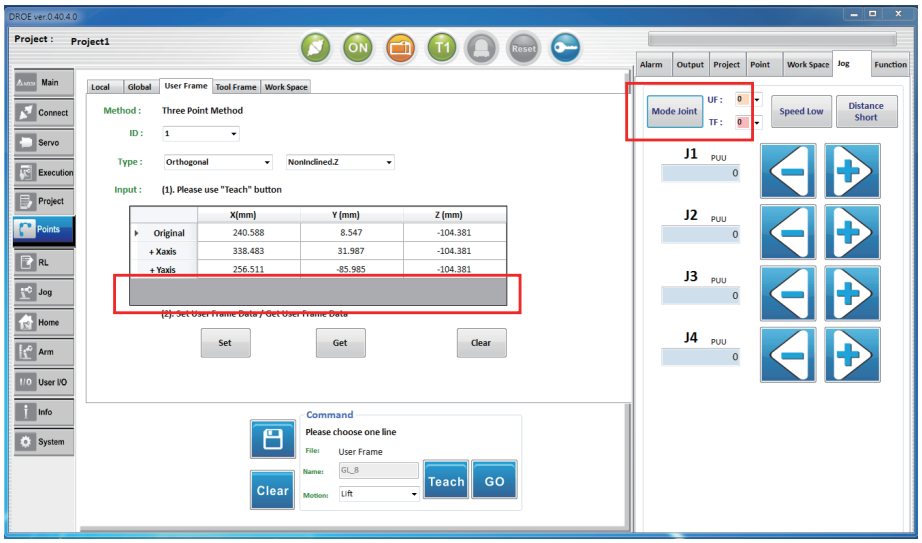


Fig.33 User Frame Page (User Frame)

11. Tool frame page, as shown in Fig.34:

A tool coordinate system is used to present the relationship between a tool and a robot. It is defined by the user. Its origin is often the endpoint of the tool.

(1) ID: Users can set 9 sets of tool frame series (1~9); ID 0 is the system's earth coordinates and cannot be changed.

(2). Tool frame translation (Translation)

Tool frame translation refers to defining a new end position for the robot; users can define it on their own according to different tools.

The use of tool frame translation is done by entering the width/height/angle parameters of the tool to reset the end position of the robot on the frame.

A. Set: Uploads the translation data set by the user for this tool frame, which is the width/height/angle parameters, to the MS controller according to the tool frame ID selected by the user. There are two setting methods as described below.

a. Option 1 : Direct input
Enter the height/width/angle of the tool directly.

b. Option 2 : Calibration
The robot is guided to the same position in different postures. A maximum of 8 pieces of information are recorded. The width and angle are calculated based on the information provided by the user, but the height must still be entered by the user manually.

B. Get: Uploads the translation data set by the user for this tool frame, which is the width/height/angle parameters, to the PC terminal according to the tool frame ID selected by the user.

(3) Tool frame rotation

Tool frame rotation refers to defining new XYZ faces for the end position for the robot; users can define it on their own according to different tools.

The use of tool frame rotation is by setting calibration to reset the XYZ face of the end position of the robot.

A. Set: Enter the tool frame rotation calibration page. Select the Mode Cartesian by pairing it up with the operating assistance (jog) of the help screen. The UserFrame ID is 0 (UF:0). Move the endpoint of the tool to a certain position. Select any line of an origin (Original)/an X point along the X-axis (+X axis)/a Y point along the Y-axis (+Y axis) and click on the “Teach" button to record the current location to the table.

B. Get: Uploads this tool frame rotation data calibrated by the user, which is the pitch/roll/yaw parameters, to the PC terminal according to the tool frame ID selected by the user.

(4) Clear: Clears all data of this tool frame set by the user (including tool frame rotation and rotation data) from the MS controller according to the tool frame ID selected by the user.

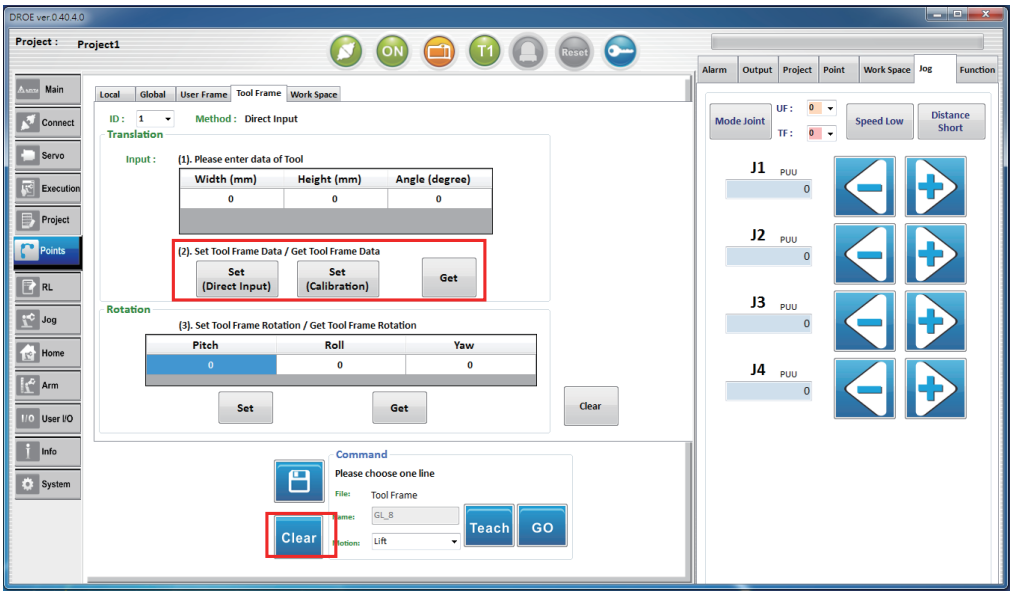


Fig.34 Tool Frame Page (Tool Frame)

12. Work space page as shown in Fig.35

Work space refers to defining the working area and restricted area in the robot movement space in order to protect the robot and other equipment; users can manually define it according to their needs.

The use of work space is by entering the position of the object or its related parameters to define the position of the object in the space.

(1) ID: Users can set 10 sets of work space (1~10).

(2) Type: Select the space type including the cylinder and rectangle.

(3) **Area:** Select the space area type including the restricted area and working area.

(4) Set: Uploads the work space data set by the user, which is the position or other related parameters of the object, to the MS controller according to the work space ID selected by the user.

(5) Get: Uploads the work space data set by the user, which is the position or other related parameters of the object, to the PC terminal according to the work space ID selected by the user.

(6) Open / Close Work Space: Enables or disables the work space function.

(7) It is required to conduct the action with the workspace assistance of the help screen, which helps recording the type and area of each working space.

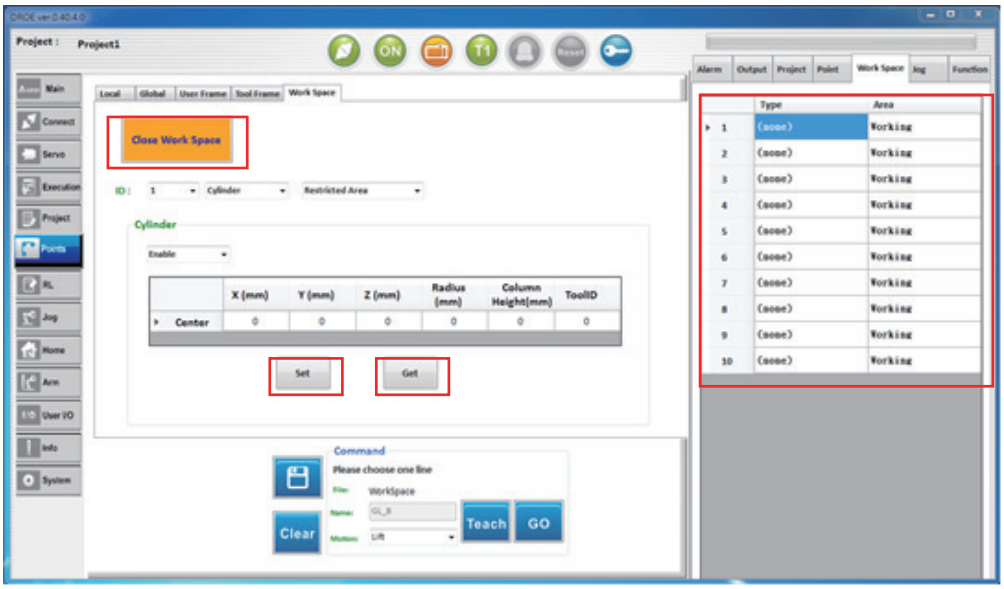


Fig.35 Work Space Page (WorkSpace)

2.9 RL (robot language editing)

Under “RL” tab on the main screen, settings include selection of robot language file, Save (saving robot language file), Syntax check (Buid), execute (Start), Pause, Stop, Step (execution by step) ,delete all break points (Delete Break Points), cut (Cut), copy (Copy), paste (Paste), search (Search), status list and RL (on auxiliary screen), as shown in Fig.36. Functions of each will be introduced in details below.

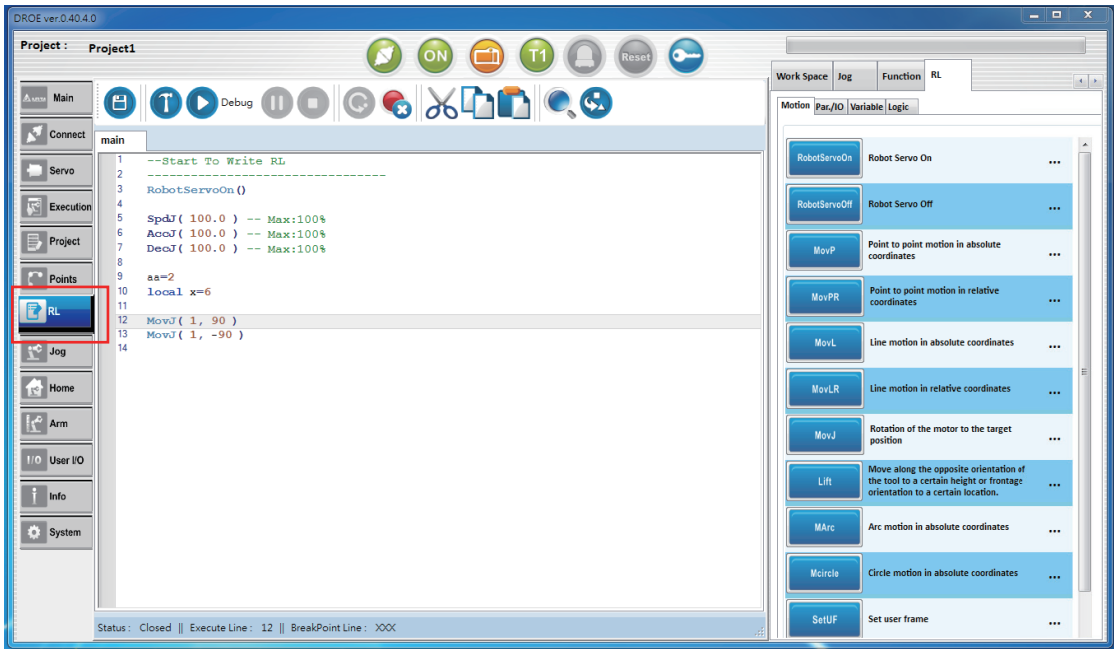


Fig.36 RL (Robot Language Editing)

1. Editing robot language file

Can go with the RL file on auxiliary screen and “ Motion”, “Parameter”, “Variable” “Logic” pages by clicking on the button and start editing robot language, as shown in fig. 37.

Fig.37 Editing robot language

2. Save (save robot language file)

Click on the “Save (save robot language file) ” button to save the file information

3. Syntax check (Buid)

Check whether there are any syntax errors in the machine language file compiled by the user.

4. Start (Start) ，as shown in Fig.38.

(1) Start: The green point indicates the line number executed by the robot.

(2) Breakpoint: The user may click to set the red point and the red underline appears, which is the breakpoint.

(3) Pause-break point (Pause-break Point): The program stops at a breakpoint and stays here. The break point is highlighted with yellow dots and underlines.

(4) RL execution status (Status): It is required to conduct the action with the editing assistance RL page, the “Status” page of the program, of the machine language regarding the help screen. The information of the current execution status of the RL. (Fig.38).

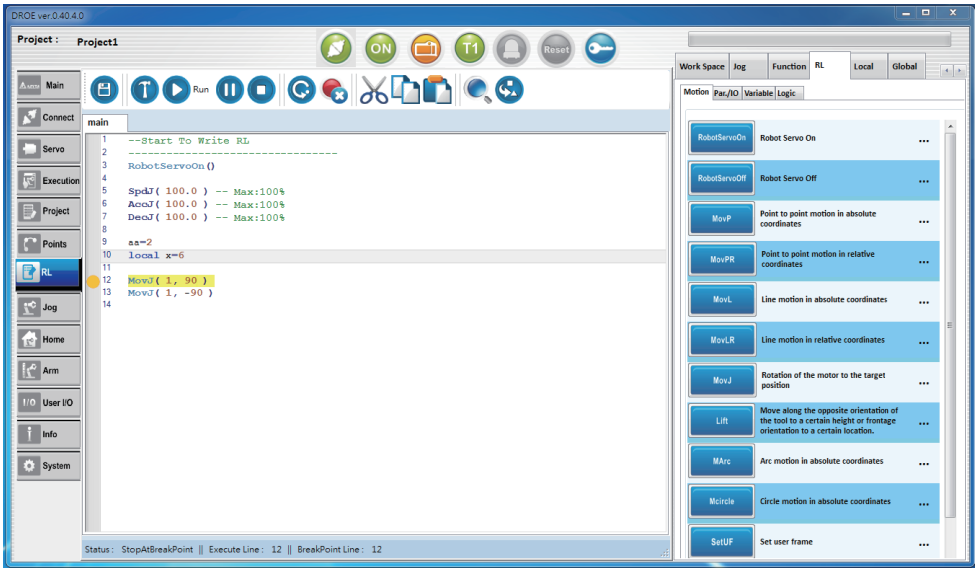


Fig.38 Status of RL execution

5. Pause

Suspend execution of robot language.

6. Stop

Stop executing the robot language.

7. Step execution (Step)

When the program stops at a break point, click the “Step” button to execute step execution and marked with yellow dots and yellow background on the machine language file.

8. Delete all break points (Delete Break Points)

Deletes all break point data in the machine language file.

9. Cut (Cut)

Click the cut icon and users can cut the selected text on the machine language file.

10. Copy (Copy)

Click the copy icon and users can copy the selected text on the machine language file.

11. Paste (Paste)

Click the paste icon and the users can paste the selected text onto the machine language file.

12. Search (Search)

Users can enter the text to search for and then click the search icon to search for that text in the machine language file.

13. Replace (Replace)

The user clicks to search the icon and the Replace screen pops up. Enter the text and setting function to replace texts in the machine language file.

14. “Local page tab” on the auxiliary screen

When the program stops on the interruption point, input the Local variable Name under the “Local page tab” on the auxiliary screen to learn the value.

15. “Global page tab” on the auxiliary screen

When the program stops on the interruption point, input the Global variable Name under the “Global page tab” on the auxiliary screen to learn the value, as shown in fig.39

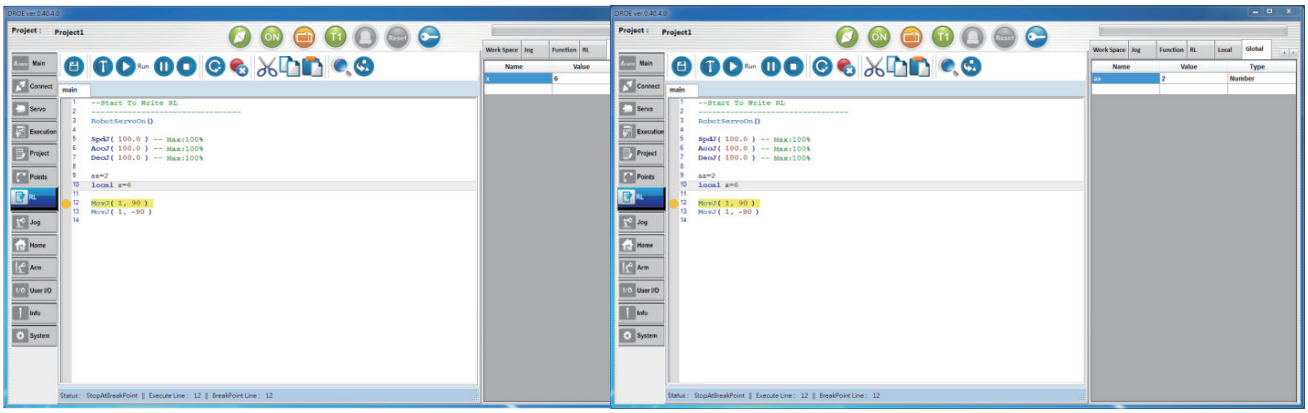


Fig.39 RL (Execution of robot language editing)

2.10 Jog (jog setting)

Under “Jog” tab on the main screen, settings include Speed (speed setting) , Mode (mode setting) , and Distance (distance setting) that are synchronized and matched the “Jog” tab on the auxiliary screen, as shown in Fig.40 (a) ~ (g) . Functions of each will be introduced in details below.

1. Mode (mode setting) :

The coordinate system mode includes the joint coordinate system, world coordinate system, user coordinate system and tool coordinate system. It is possible to set the user frame ID and tool frame ID.

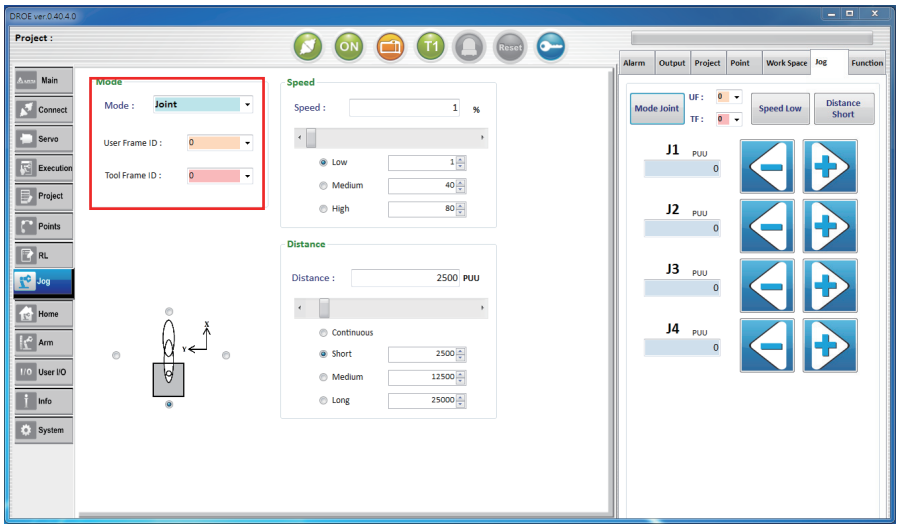


Fig.40 (a) The jog mode as the joint coordinate system

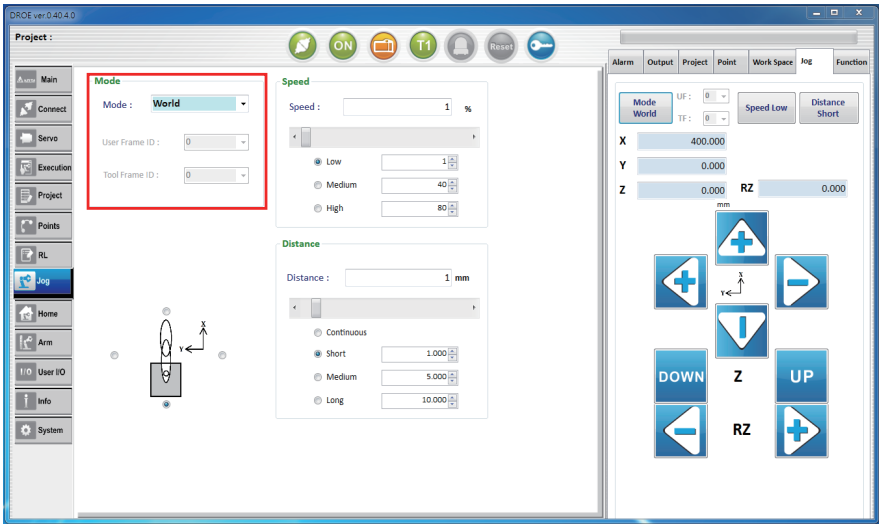


Fig.40 (b) The jog mode as the world coordinate system

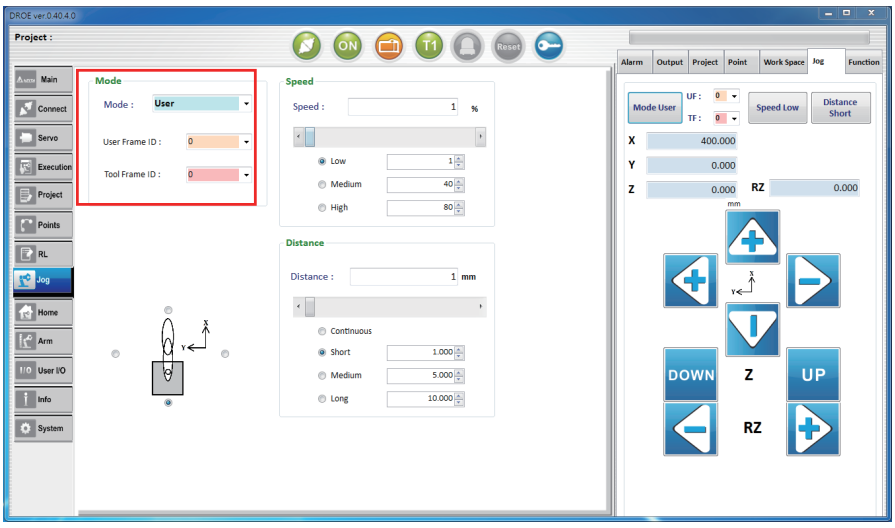


Fig.40 (c) The jog mode as the user coordinate system

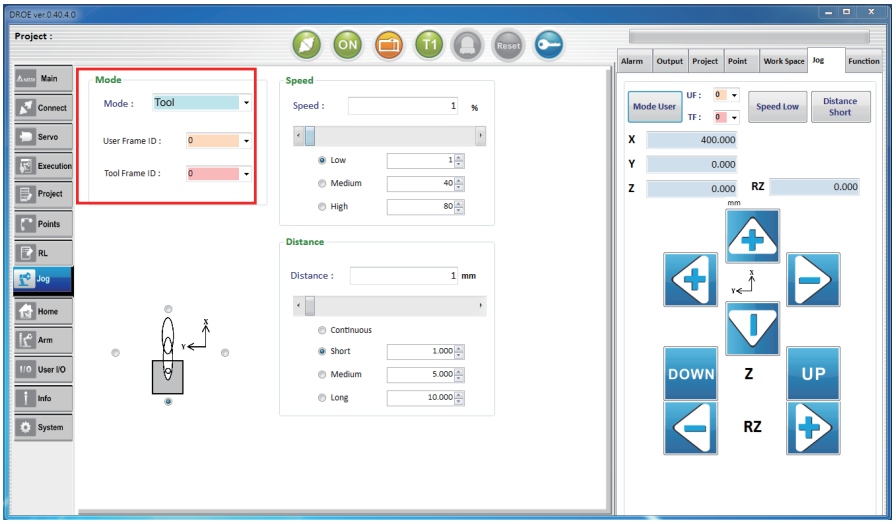


Fig.40 (d) The jog mode as the tool coordinate system

2. Speed (speed setting) :

Available options include Low (low speed) , Medium (medium speed) , High (high speed) , or use the pull tab for adjustment, with the unit in percentage.

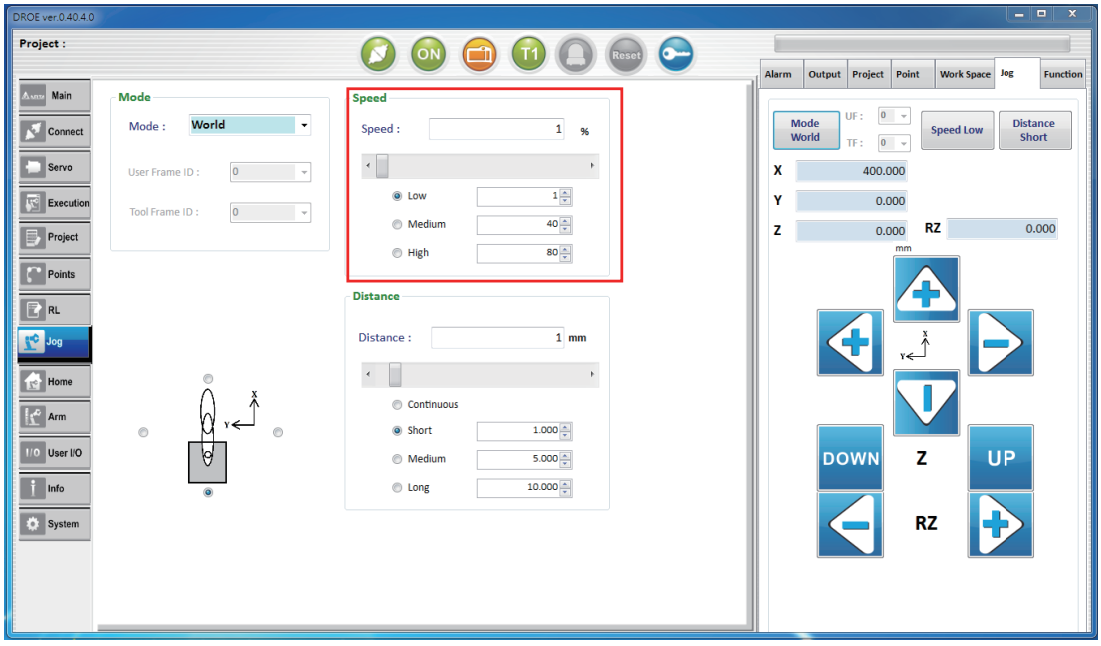


Fig.40 (e) Speed Setting

3. Distance (distance setting) :

(1) The “Jog” tab on the auxiliary screen will vary according to different Modes.

(2) If the Mode is Joint, the “Jog” tab on the auxiliary screen offers an ability to operate the angle of each joint, with the unit in PUU; For other modes, including the world coordinate system, user coordinate system and tool coordinate system, the “Jog” tab of the help screen may be used to operate the endpoint location of of the robot. The unit is um.

(3) For Distance, available options include Continuous (continuous distance, Short (short distance) , Medium (medium distance) , Long (long distance) or input by yourself.

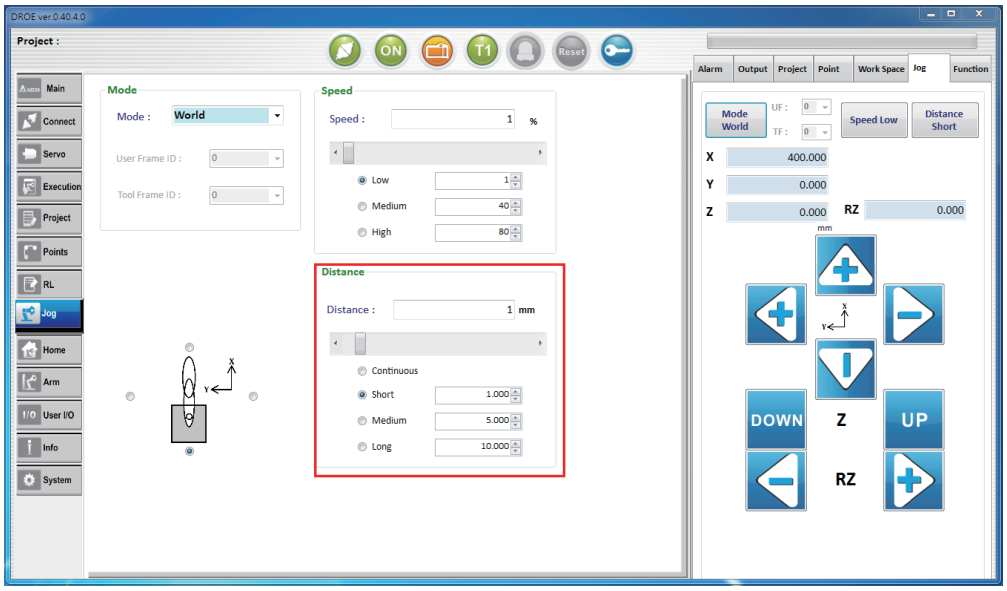


Fig.40 (f) Distance Setting

4. Relative orientation of user and robot setting:

Set the relative orientation relation between the user and robot.

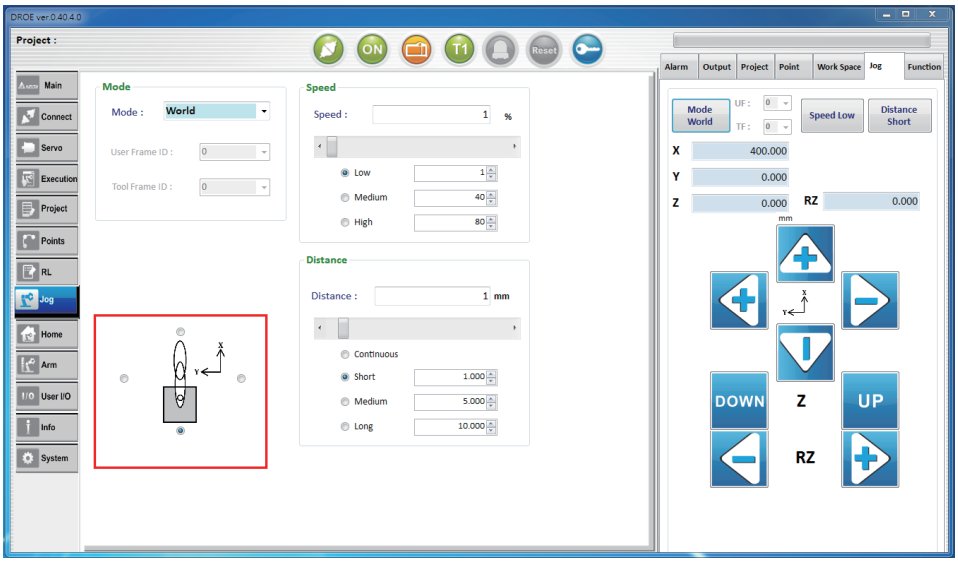


Fig.40 (g) Relative orientation of user and robot setting

2.11 Home (home setting)

Under “Home” tab on the main page, settings include Set Home (set home point) and Go Home (return to home point), as shown in Fig.41. Functions of each will be introduced in details below.

1. Go Home (return to home point)

(1) All Axes: all axes return to Home point.

(2) Each Axis: each axis returns to Home point.

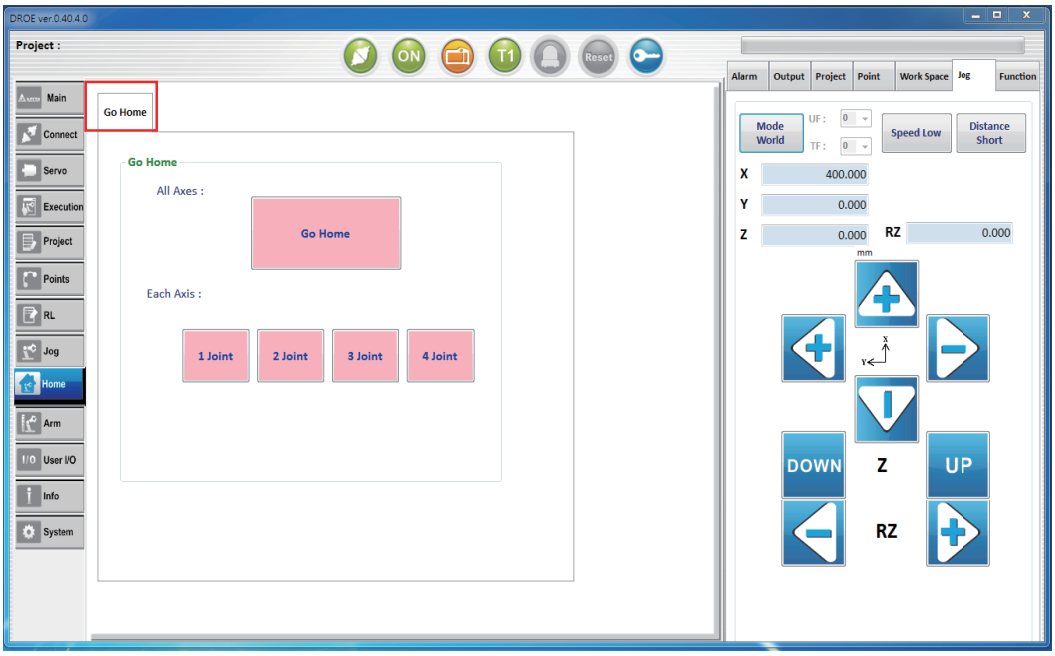


Fig.41 Go Home

2.12 User I/O (IO monitoring)

Functions of DI and DO under “I/O” tab on the main screen will be introduced in details be-low, as shown in Fig.42.

1. User IO

A. DI

For monitoring current IO status, the number is IO number, green light represents ON, and orange represents OFF.

B. DO

Users can click on the DO button manually to have it changed to green light represents ON, and orange represents OFF.

34

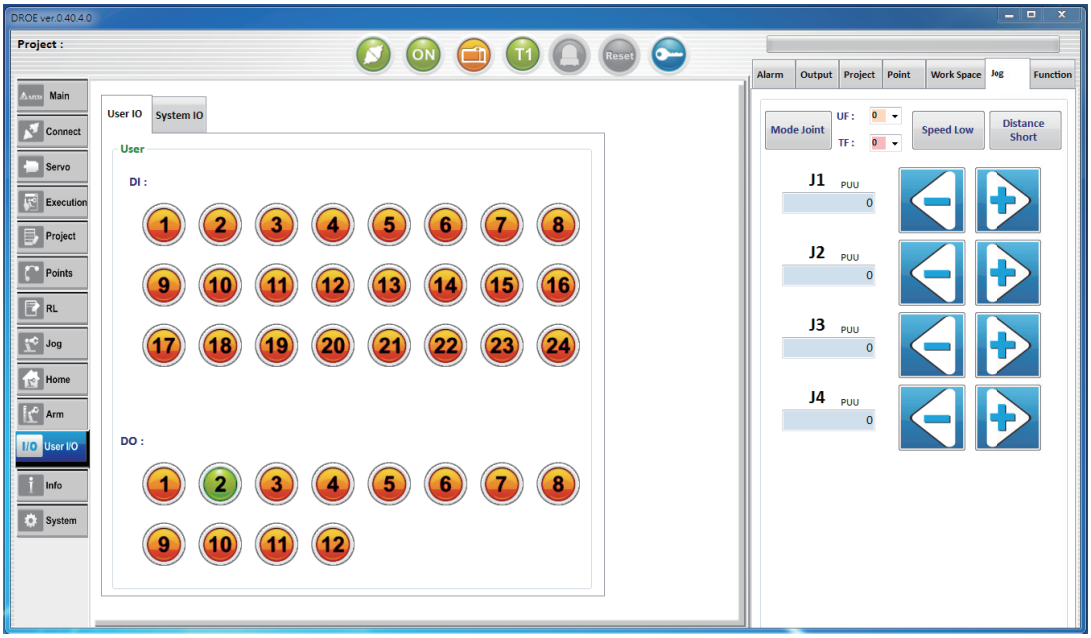


Fig.42 IO monitoring

2.13 Info. (information display)

Functions for Info. (information of arm) , Controller Info. (Information of ASDA-MS controller) and Controller Alarm History (Alarm History) under “Info.” tab on the main screen will be introduced in details below

1. Info.

Arm information, together with “Alarm” tab under the auxiliary screen, will display alarm number, cause, and solve, and also providing English and Chinese version for exchange, as shown in Fig.43.

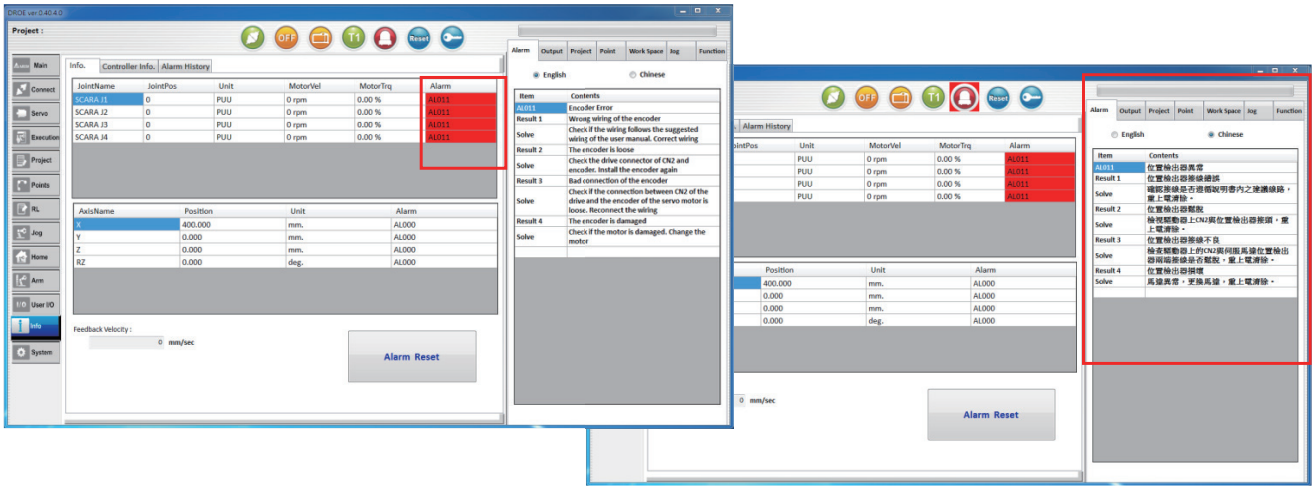


Fig.43 Information Display

2. ASDA-MS controller information

Information of controller shown as Fig.44

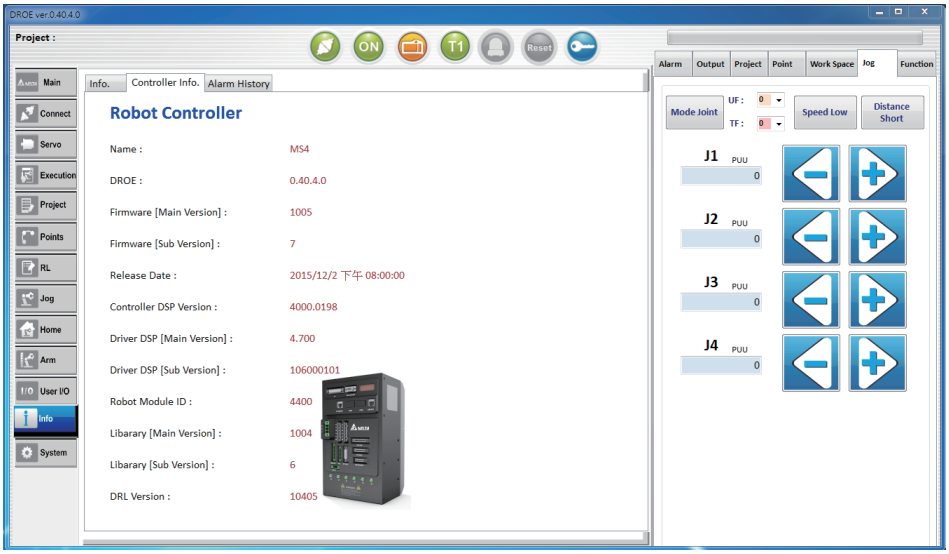


Fig44 Controller Information

3. MS controller historic error record (Alarm History)

Click the “Update” button to acquire the alarm history of the MS controller; there is a total of 1024 entries, as shown in Figure 45

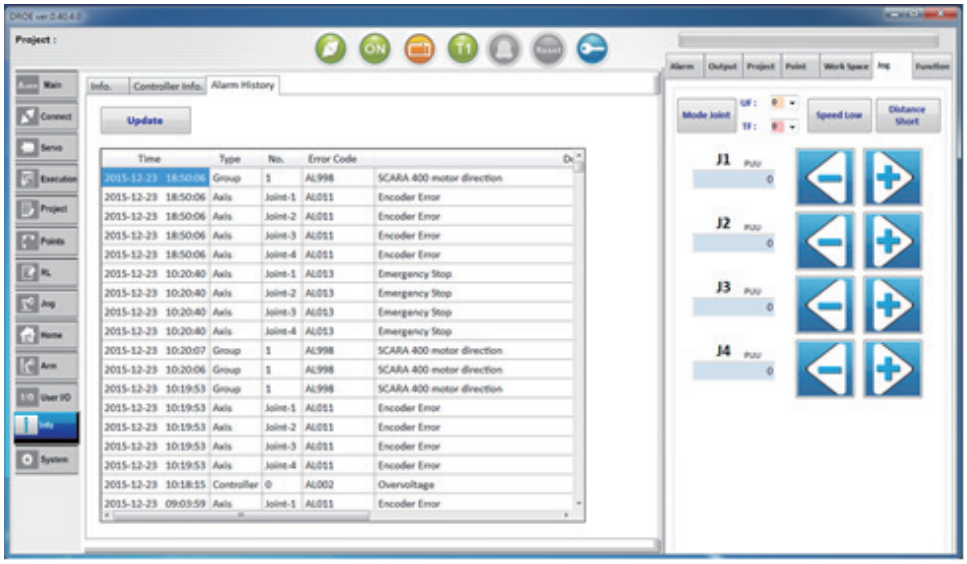


Fig.45 MS controller historic error record (Alarm History)

2.14 System (system setting)

The System (system setting) screen of the main screen includes set acquire RS232/485 parameters (RS232/485); switch language (Language);Controller IP (changing controller IP) screen.

1.Set acquire RS232/485 parameters (RS232/485), as shown in Figure 46.

(1) **Set Communications:** Set Mode (RS232/RS485); set Rate (4800/9600/19200/38400/57600/115200); set Protocol parameters.

(2) **Get Communications:** Acquire mode, rate, protocol parameters.

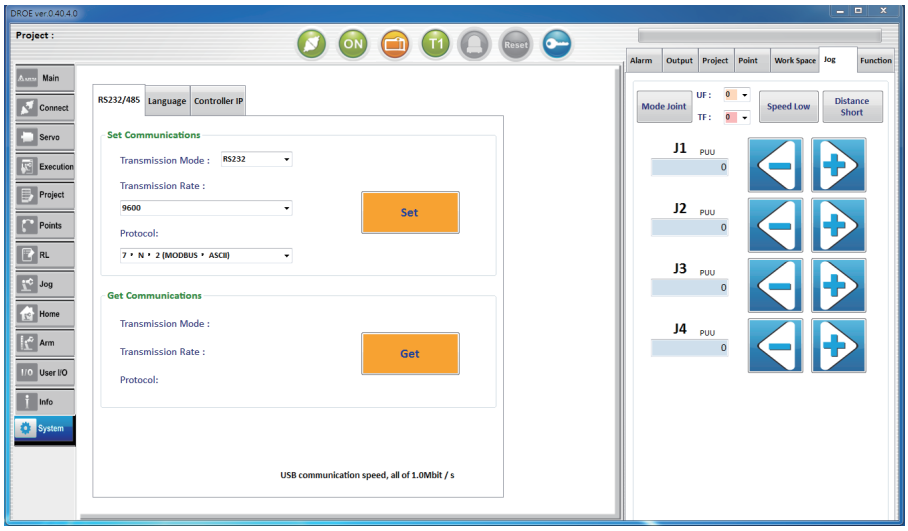


Fig.46 System Setting

2. Switch language (Language)

Supported language includes English, Traditional Chinese and Simplified Chinese.

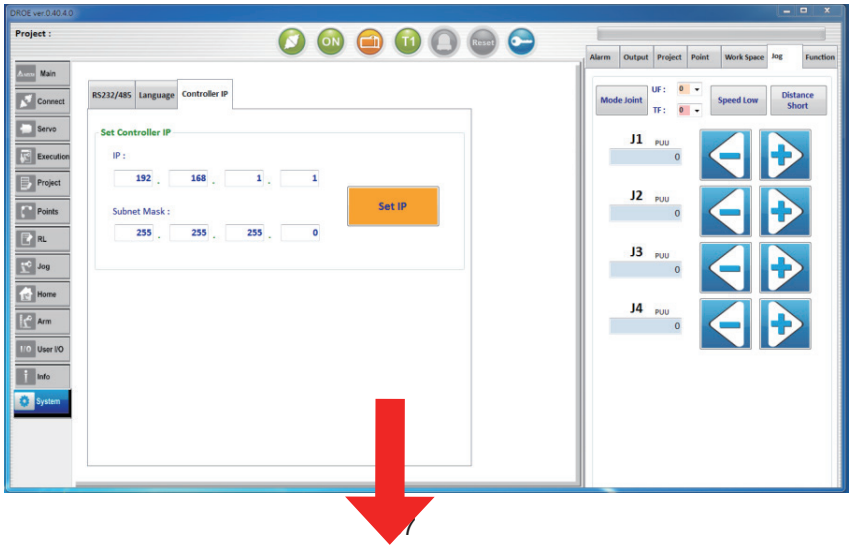
3. Controller IP (changing controller IP) , as shown in Fig.47.

(1) **Step1:** connect with the MS controller, and click “Set IP” button.

(2) **Step2**: The inquiry window “Set Controller IP?” appears, click “Yes (Y) ” button

(3) **Step3:** The “update succeeded” information is displayed on the Output page of the auxiliary screen.

STEP 1



STEP 2

STEP 3

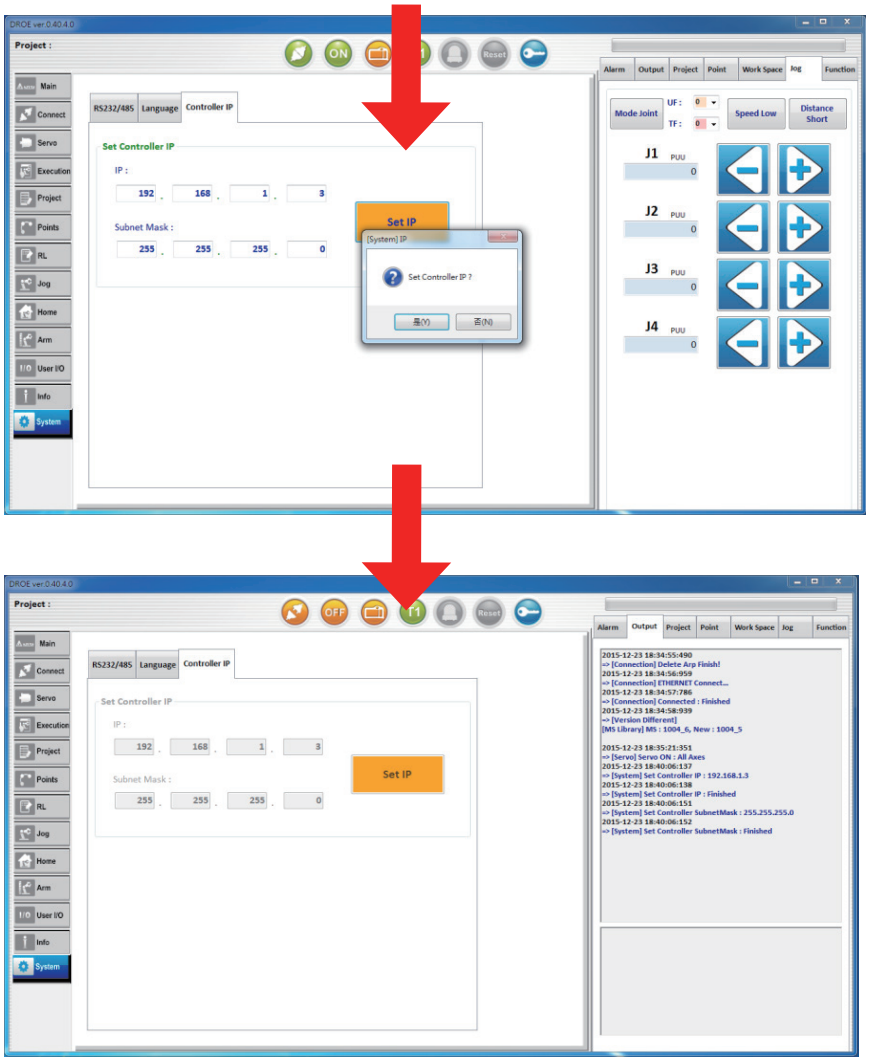


Fig.47 Changing controller IP

2.15 Authority (authority setting)

Under “Authority”, the required DROE function varies with different types of users.
Click on the “Authority” button to have the Authority window popped up for entering authority password.
As shown in Fig.48.

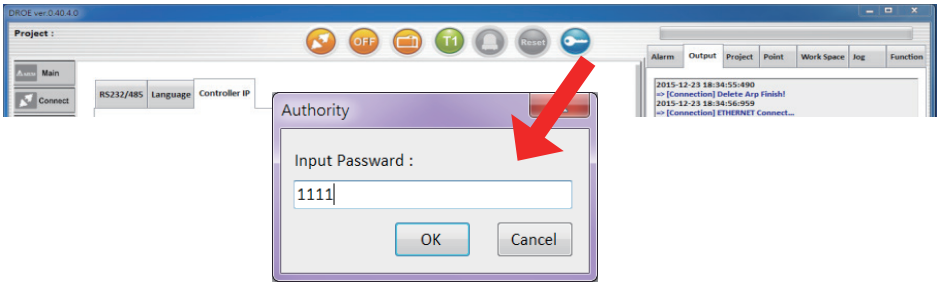


Fig.48 Authority (authority setting)

3. Alarm

3.1 Definitions of alarms

There are 4 major categories of abnormal alarms, namely the control type, customized type, group type, and axis type, the meanings of which are described as follows:

- Control type: alarms sent out by the controller.
- Customized type: alarms customized by the users through the PLC program written.
- Group type: alarms sent out by a group which is combined randomly from an axis group.
- Axis type: alar ms sent out by individual axis.

The 7-segment display shows the abnormal alarm code in the following way.

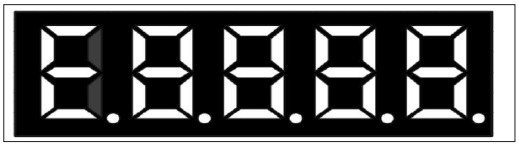


Fig 49 Seven-segment display of MS error code

1. Fixed display for abnormal alarm E

2.

Control type (Controller):	C This type of abnormal alarm is currently reserved.
Customized type (User):	U
Group type (Group):	1-2 * "?" is used to represent numbers in the List of Abnormal Alarms.
Axial type (Axis):	1-6 axis: number 1-6. 7-12 axis: reserved. 13-18 axis: English letter D-I * "?" is used to represent numbers and English letters in the List of Abnormal Alarms.

For example:

 Abnormal alarm code E1.803 is the alarm of Group 1 in the group type.

 Abnormal alarm code E1803 is the alarm of Axis 1 in the axial type.

 Abnormal alarm code ED803 is the alarm of Axis 13 in the axial type.

 Abnormal alarm code EI803 is the alarm of Axis 18 in the axial type.

3. Codes for Abnormal Alarms

3.2 Index of alarm

3.2.1 Group type

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo Status	
		ALM	WARN	ON	OFF
E?801	Axis did not return to the origin	○			○
E?803	Incompatible motion command	○			○
E?80A	Motion command is not ready	○			○
E?80B	Unknown motion command	○			○
E?80C	Error of the motion command in buffer region	○			○
E?813	Axis error during interpretation of commands	○			○
E?814	Axis error during implementation of the motion commands	○			○
E?815	Mono-axis exceeds the software limit	○			○
E?821	Arm gesture is inconsistent	○			○
E?822	Target position for P2P motion command is out of Robot's operating range	○			○
E?823	Target position of command for continuous path is out of Robot's operating range	○			○
E?824	Spatial movement exceeds the operating range of Robot	○			○
E?825	P2P movement path exceeds the operating range of Robot	○			○
E?827	Group does not exist	○			○
E?829	Error in switching the coordinates	○			○
E?82A	Error in switching user coordinates	○			○
E?82B	Error in switching tool coordinates	○			○
E?832	Loss of internal communication packet	○			○

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo Status	
		ALM	WARN	ON	OFF
E?833	Error in check code for internal communication	○			○
E?841	The arc command is out of boundary	○			○
E?842	The arc cannot be formed	○			○
E?843	Arc mode error	○			○
E?851	Time out error in transmission of vision parameters followed by conveyor belt	○			○
E?852	The following speed for conveyor belt exceeds limits	○			○
E?853	Overtime error in transmission of vision parameters followed by conveyor belt	○			○
E?861	The jogging speed of the TP hand wheel is too fast.	○			○
E?862	The TP hand wheel is jogging.	○			○

Note :
If there's other alarm code appearing, please contact the technique team or agent directly for further support.
"?"represents the number of "1. ~ 2." in the alarm of group type.

3.2.2 Axis type

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo State	
		ALM	WARN	ON	OFF
E?001	Overcurrent	○			○
E?002	Overvoltage	○			○
E?003	Low voltage		○		○
E?004	Motor matching error	○			○
E?005	Retrogradation error	○			○
E?006	Overload	○			○
E?007	Over speed	○			○
E?009	Error in position control is too large	○			○
E?011	Encoder abnormal	○			○
E?012	Calibration abnormal	○			○
E?013	Emergency stop		○		○
E?014	Reverse limit abnormal		○		○
E?015	Direct limit abnormal		○	○	
E?016	IGBT overheated	○			○
E?017	Memory abnormal	○			○
E?018	Detector output abnormal	○			○

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo State	
		ALM	WARN	ON	OFF
E?019	Serial communication abnormal between controller and drive	○			○
E?020	Overtime in sSerial communication between controller and drive		○	○	
E?022	Power abnormal on the main loop		○		○
E?023	Advanced overload warning		○	○	
E?024	Error in Initial magnetic field for the internal encoder	○			○
E?025	Internal error on the encoder	○			○
E?026	Error in reliability of internal data for the encoder	○			○
E?027	Error in internal reset for the encoder	○			○
E?028	High voltage on the encoder or internal error on the encoder	○			○
E?029	Gray code error	○			○
E?030	Motor collision error	○			○
E?031	Detection on disconnection of the motor power cable	○			○
E?034	Error in internal communication for the encoder	○			○
E?035	Encoder temperature exceeded protection limit.	○			○
E?044	Warning on usage of the drive functions		○		
E?060	Loss of absolute position		○		○
E?061	Low voltage error on the encoder		○	○	
E?062	Absolute position laps overflow		○	○	
E?067	Encoder temperature alarm		○	○	
E?069	Motor type error	○			○
E?06A	Loss of absolute position				
E?070	Incomplete encoder processing		○		○
E?099	EEPROM needs updating	○			○
E?111	DMCNET packet receiver overflows	○			○
E?185	DMCNET Bus hardware abnormal	○			○
E?201	Initial error of DMCNET data	○			○
E?235	Position command overflows	○			○
E?245	Positioning overtime	○			○
E?283	Drive direct limit		○	○	
E?285	Drive reverse limit		○	○	
E?289	Position counter overflows	○			○
E?301	DMCNET synchronizing signal failed	○			○
E?302	DMCNET synchronizing signal is too fast	○			○
E?303	DMCNET synchronizing signal overtime	○			○

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo State	
		ALM	WARN	ON	OFF
E?304	DMCNET IP command invalid	○			○
E?500	STO function is activated	○			○
E?501	STO_A lost	○			○
E?502	STO_B lost	○			○
E?503	STO_error	○			○
E?555	Drive failure	○			○

Note:
"?"represents the number of "1~6"and alphabet"D ~ I" in the alarm of axis type

3.2.3 Control type

Abnormal Alarm Display	Abnormal Alarm Name	Abnormal Alarm Type		Servo State	
		ALM	WARN	ON	OFF
EC001	PLC timeout	○			○
EC002	PLC Image load failed	○			○
EC003	PLC Exception	○			○
EC004	Motion module failed	○			○
EC005	Controller failed	○			○
EC006	Continuous 30 second write in alarm	○			○
EC007	DMCNET device setting mismatch	○			○
EC008	Mechanism parameter file load failed	○			○
EC009	Robot Type inconsistent	○			○
E1998	Operation mode not started	○			○

- **Group type:**

E?801 Axis did not return to the origin	
Cause	Axis did not return to the origin
Check and Correction	If the axis fails to return to the origin before the coordinates moved, please return the axis to the origin.
Solution	Reset alarm

E?803 Incompatible motion command	
Cause	The motion command does not support over-lapping mode
Check and Correction	Whether commands such as mono-axial P2P (MovJ), multi-axial P2P (MovP, MovPR, MArchP) and spatial commands (MovL, MovLR, MArc, MCircle, MArchL) are blended at the same time since these three types of motion commands cannot overlap. Please use other motion commands to replace or avoid command overlapping.
Solution	Reset alarm

E?80A Motion command is not ready	
Cause	The motion command is not ready and cannot be interpreted.
Check and Correction	Return to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?80B Unknown motion command	
Cause	The motion command cannot be identified.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?80C Error of the motion command in buffer region	
Cause	Error in Interpretation of the motion command for cache region.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?813 Axis error during interpretation of commands	
Cause	Axis error during interpretation of commands.
Check and Correction	Please use the original software (DROE) to check whether any abnormality of axis is found and eliminate any abnormality in accordance with the troubleshooting of alarms.
Solution	Reset alarm

E?814 Axis error during implementation of motion commands	
Cause	Axis error during implementation of the motion commands.
Check and Correction	Please use the original software (DROE) to check whether any abnormality of axis is found and eliminate any abnormality in accordance with the troubleshooting of alarms.
Solution	Reset alarm

E?815 Mono-axis exceeds the software limit	
Cause	Target position of the mono-axis exceeds the software limit.
Check and Correction	Whether target position of the command for each axis is within configured limits of software. If not, please move the arm (manual or Jog) back into the limits of software.
Solution	Reset alarm

E?821 Arm gesture is inconsistent	
Cause	Current arm gesture is inconsistent with gesture at target position.
Check and Correction	1. Continuous path command (MovL, MArc, MCircle, MArchL) does not support movements under hand changes. Check whether the gesture at current position is consistent with that at the target position. If not, please change the gesture at target position or use another motion command. 2. Please check whether this motion path can be ignored. If not, then determine the arm gesture with the controller.
Solution	Reset alarm

E?822 Target position for P2P motion command is out of Robot's operating range	
Cause	The target position for issued mono-axial P2P (MovJ), multi-axial P2P (MovP, MovPR, MArchP) is out of the operating range.
Check and Correction	Whether the target position of the motion command for each axis is within the software limits configured by the drive.
Solution	Reset alarm

E?823 Target position of command for continuous path is out of Robot's operating range	
Cause	The target position of spatial command issued (MovL, MovLR, MArc, MCircle, MArchL) is out of the operating range.
Check and Correction	Whether the target position of the motion command for each axis is within the software limits configured by the drive.
Solution	Reset alarm

E?824 Spatial movement exceeds the operating range of Robot	
Cause	Spatial command movement exceeds the operating range of Robot.
Check and Correction	Whether the target position of the motion command for each axis is within the configured limits of software.
Solution	Reset alarm

E?825 P2P movement path exceeds the operating range of Robot	
Cause	Error of computation for forward kinematics. Path of movements for mono-axial / multi-axial P2P commands exceeds the operating range.
Check and Correction	1. Whether the setting of software limits is normal. Whether the target position of the motion command for each axis is within the software limits configured by the drive. 2. Whether path is within the operating range defined by the user. 3. Whether the machine dimension is correct. (Please contact original manufacturer)
Solution	Reset alarm

E?827 Group does not exist	
Cause	The designated group does not exist.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?829 Error in switching the coordinates	
Cause	The coordinates to be switched to do not exist.
Check and Correction	Whether the designated coordinate number is between 0 and 9. If not, please fill in or select the correct coordinate number. Currently, only four coordinates systems of “world”, “tool”, “user” and “axis” are supported.
Solution	Reset alarm

E?82A Error in switching user coordinates	
Cause	Switching error of the user coordinates
Check and Correction	1. Whether the designated number of user coordinates system has been established or is between 0 and 9. If not, please fill in or select the correct coordinate number. 2. Please use the original software tool to check the coordinates instruction.
Solution	Reset alarm

E?82B Error in switching tool coordinates	
Cause	Switching error of the tool coordinates
Check and Correction	1. Whether the designated number of tool coordinates system has been established or is between 0 and 9. If not, please fill in or select the correct coordinate number. 2. Please use the original software tool to check the coordinates instruction.
Solution	Reset alarm

E?832 Loss of internal communication packet	
Cause	Between the controller and the drive, three continuous losses of the communication packet.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?833 Error in check code for internal communication	
Cause	Between the controller and the drive, three continuous errors of the communication check code(CRC).
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?841 The arc command is out of boundary	
Cause	The target position of the command issued is out of the operating range.
Check and Correction	Whether the target position of the motion command for each axis is within the configured limits of software.
Solution	Reset alarm

E?842 The arc cannot be formed	
Cause	The input conditions cannot form an arc.
Check and Correction	Whether the input conditions for forming an arc is correct, conditions like 3 points are collinear, the radius is 0, or the centre falls on the circumference cannot form a circle. Please reissue command positions according to conditions that can form a circle.
Solution	Reset alarm

E?843 Arc mode error	
Cause	Setting error of arc parameter mode.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?851 Time out error in transmission of vision parameters followed by conveyor belt	
Cause	1. Data transmission error 2. Vision system has not been triggered.
Check and Correction	1. Ensure the vision system has been triggered before the robot starts. 2. Check if the configuration and settings for the vision system are correct.
Solution	Reset alarm

E?852 The following speed for conveyor belt exceeds limits	
Cause	The speed of conveyor belt is too fast.
Check and Correction	Reduce the speed of conveyor belt.
Solution	Reset alarm

E?853 Overtime error in transmission of vision parameters followed by conveyor belt	
Cause	Error in setting of number for the user coordinates used in the conveyor belt following application.
Check and Correction	Whether the setting of number for the user coordinates used in the conveyor belt following meets the application specification (it cannot be 0 or larger than 9).
Solution	Reset alarm

E?861 TP handwheel Jog speed too fast	
Cause	TP handwheel Jog speed too fast.
Check and Correction	Please decrease TP handwheel jog speed.
Solution	Alarm reset.

E?862 TP handwheel performing jog	
Cause	TP handwheel performing jog.
Check and Correction	Stop TP handwheel jog first and then perform original movement.
Solution	Alarm reset.

- **Axis type:**

E?001 Overcurrent	
Cause	1. Short circuit of the drive output 2. Abnormal motor wiring 3. Abnormal IGBT
Check and Correction	1.Whether wiring between the motor and drive has short-circuited, and if circuited, eliminate the short-circuit condition and prevent exposed wiring. 2.Please refer to the wiring sequence in the instruction Manual and check whether the wiring sequence from the motor to the drive is correct and rewire. If the alarm continues, return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?002 Overvoltage	
Cause	1. Input voltage for the main loop is too high 2. Hardware failure on the drive
Check and Correction	1. Whether the input voltage of the main loop is within the rated voltage value; if not, use the correct voltage components or tandem voltage stabilizer to transform the voltage within the rated voltage value. 2. Whether the input voltage of the main loop is within the rated voltage value; if this error continues, please return the drive back to the dealer or original manufacturer for overhauling.
Solution	Reset alarm

E?003 Low voltage	
Cause	1. Input voltage for the main loop is too low 2. The main loop has no source of input voltage 3. Power input error
Check and Correction	1. Use the electric meter to check whether the voltage of the main loop is normal. 2. Please refer to the wiring sequence in the Instruction Manual to check whether the wiring for input voltage on the main loop is normal, if not, please rewire. 3. Whether the power system agrees with the definition of the specification, use the correct voltage elements or tandem voltage stabilizer to transform the voltage within the rated voltage value.
Solution	Clear alarm when voltage restores

E?004 Motor matching error	
Cause	1. Position encoder is loose 2. Motor matching error
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?005 Retrogradation error	
Cause	1. Wrong retrogradation resistance is chosen or no external retrogradation resistance is connected. 2. Parameter setting error
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?006 Overload	
Cause	1. Continuously exceeding the rated load of the drive 2. Error in wiring for the motor and the encoder 3. Motor drive abnormal
Check and Correction	1. Whether the wiring of U, V, W and the encoder is correct; if not, please rewire correctly. 2. Return the motor to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?007 Over speed	
Cause	Improper setting for parameter P2-34 (warning conditions for over speed)
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?009 Error in position control is too large	
Cause	1. External load is too large
Check and Correction	Please use within the maximum Payload value or adjust the Payload value.
Solution	Reset alarm

E?011 Encoder abnormal	
Cause	1. Wiring error for the encoder 2. Encoder is loose or the wiring is poor. 3. Encoder is damaged.
Check and Correction	1. Whether the wiring follows the suggested path in the Instruction Manual. 2. Whether the connection of MotorENC. in the drive and the encoder in the motor position is loose; if loose, reconnect MotorENC. of the drive with a position detector.
Solution	Reconnect power and clear alarm.

E?012 Calibration abnormal	
Cause	Current calibration is abnormal
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?013 Emergency stop	
Cause	Emergency stop switch is pressed.
Check and Correction	Whether the emergency switch is activated. The emergency stop switch is normally off; if activated unintentionally, please turn it off.
Solution	Reset alarm

E?014 Reverse limit abnormal	
Cause	1. The reverse limit switch is activated 2. The servo system is unstable
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?015 Direct limit abnormal	
Cause	1. The direct limit switch is activated 2. The servo system is unstable
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?016 IGBT overheated	
Cause	1. Continuous overloading on the drive 2. Short circuit upon output from the drive
Check and Correction	1. Check whether the load is too large, and use within the maximum Payload value or adjust the Payload value. 2. Check the drive output wiring to ensure the wiring is correct.
Solution	Reset alarm

E?017 Memory abnormal	
Cause	1. Reference data write-in error or parameter error, which occurs at factory reset for parameters due to error in setting of drive types. 2. Drive memory abnormal 3. ROM data is damaged, if error occurs during power transmission, it is usually due to damage on ROM data or no data available in the ROM. Please return it to the dealer or original manufacturer for repairing.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?018 Detector output abnormal	
Cause	1. Encoder error 2. The output pulse exceeds a permissible range for the hardware.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?019 Serial communication abnormal between controller and drive	
Cause	1. Improper settings for communication parameters 2. Incorrect communication address 3. Incorrect communication value
Check and Correction	1. Reset to the factory setting 2. Or return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?020 Overtime in serial communication between controller and drive	
Cause	The drive has not received communication command for a long time.
Check and Correction	Check whether the communication cable is loose or broken to ensure correct wiring.
Solution	Reset alarm

E?022 Power abnormal on the main loop	
Cause	Power abnormal on the main loop
Check and Correction	1. Whether RS power cable is loose or non-conductive. 2. Connect the power correctly. If power supply is normal but alarm remains, return the drive to the dealer or manufacturer for repairing.
Solution	Reset alarm

E?023 Advanced overload warning	
Cause	Advanced overload warning
Check and Correction	1. Whether the use of overloading. Please refer to the Corrective Action for E?006
Solution	Reset alarm

E?024 Error in Initial magnetic field for the internal encoder	
Cause	Error in initial magnetic field for the encoder (error in the magnetic field positions U, V and W)
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?025 Internal error on the encoder	
Cause	1. Internal error on the encoder (internal memory error and error in internal counting). 2. The motor rotates due to mechanical inertia or other reasons when it is connected to the power.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?026 Error in reliability of internal data for the encoder	
Cause	Encoder error (three continuous errors in internal data)
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?027 Error in internal reset for the encoder	
Cause	Encoder chip reset
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?028 High voltage on the encoder or internal error on the encoder	
Cause	1. Over- voltage on battery 2. Internal error of the encoder
Check and Correction	1. Whether the drive has a charging circuit and whether battery installation (voltage >3.8 V) is abnormal. Please use an electric meter to check whether the voltage is higher than 3.8V.
Solution	Reconnect power and clear alarm.

E?029 Gray code error	
Cause	Error in absolute position of one-loop
Check and Correction	Reconnect the power supply and run the motor to see if alarm reappears, if it remains, return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?030 Motor collision error	
Cause	1. Whether anti-collision function for the motor is activated. 2. Return it to the dealer or original manufacturer for repairing.
Check and Correction	Reconnect the power supply and run the motor to see if alarm reappears, if it remains, replace the encoder.
Solution	Reconnect power and clear alarm.

E?031 Detection on disconnection of the motor power cable	
Cause	Disconnection of the motor power cable
Check and Correction	Whether the motor power cables (U, V, W, GND) are disconnected, please connect the cables correctly according to the Instruction Manual and ground them correctly.
Solution	Reconnect power and clear alarm.

E?034 Error in internal communication for the encoder	
Cause	Error in internal communication for the encoder
Check and Correction	Whether the battery wiring is loose; if loose, reconnect the battery correctly and turn on the power again
Solution	Reconnect power and clear alarm.

E?044 Warning on usage of the drive functions	
Cause	Warning on usage of the drive functions
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?060 Loss of absolute position	
Cause	1. Battery voltage is too low 2. Replace the battery when power of the drive control is turned off 3. The initialization on coordinates for the absolute position has not been completed after activating the absolute function. 4. Poor contact or disconnection on the circuit for supply of battery power. 5. Change of the ratio on the electronic gear.
Check and Correction	1. Whether the battery voltage is lower than 2.8V. 2. Do not change or remove the battery when the drive control power is turned off. 3. Reset the coordinates for the absolute position after completing the initialization on the coordinates for the absolute position and the zero return procedure. 4. (1) Whether the battery installation and wiring is correct. (2) Check the encoder wiring (3) Check the wiring between the external battery holder and the drive Corrective action: Repeat the zero return procedure
Solution	Reconnect power and clear alarm.

E?061 Low voltage on the encoder	
Cause	Battery voltage is too low.
Check and Correction	1. Whether the voltage on panel battery is lower than 3.1V (provisional specification). 2. Whether the battery voltage is lower than 3.1V (provisional specification); if lower, please replace the battery with power ON for the drive control.
Solution	Auto-clear

E?062 Absolute position laps overflow	
Cause	The stroke is out of range.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?067 Encoder temperature alarm	
Cause	Temperature of the encoder is too high (85~100 ℃)
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?069 Motor type error	
Cause	Activation of absolute function by the incremental motor is not allowed.
Check and Correction	Whether the motor is of incremental motor or absolute encoder.
Solution	Reconnect power and clear alarm.

E?06A Loss of absolute position	
Cause	The initialization on coordinates for the absolute position has not been completed after activating the absolute function.
Check and Correction	1. Reset the coordinates for the absolute position after completing the initialization on the coordinates for the absolute position and the zero return procedure. 2. Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?070 Incomplete encoder processing	
Cause	Related commands are not completed when the encoder conducts Barcode write-in or relevant actions.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?099 EEPROM needs updating	
Cause	EEPROM needs updating
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?111 DMCNET packet receiver overflows	
Cause	More than 2 packets are received within 1ms.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?185 DMCNET Bus hardware abnormal	
Cause	DMCNET Bus hardware abnormal or loss of communication packet
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?201 Initial error of DMCNET data	
Cause	Initial error of DMCNET data
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reconnect power and clear alarm.

E?235 Position command overflows	
Cause	1. When temporary register for the feedback position overflows; 2. When the zero return is triggered, but the zero return procedure is not completed; 3. When E?060 and E?062 occur.
Check and Correction	Implement the zero return procedure.
Solution	Reconnect power and clear alarm.

E?245 Positioning overtime	
Cause	Positioning overtime for the position mode .
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	None.

E?283 Drive direct limit	
Cause	Exceeding software direct limit.
Check and Correction	Whether the position exceeds the value of P5-09. Please set the limit according to actual conditions; if the position doesn't exceed the limit, please set the maximum:2147483648.
Solution	Reset alarm.

E?285 Drive reverse limit	
Cause	Exceeding software reverse limit.
Check and Correction	Whether the position exceeds the value of P5-09. Please set the limit according to actual conditions; if the position doesn't exceed the limit, please set the maximum:-2147483648.
Solution	Reset alarm.

Note: Direct and reverse limits for the software are determined according to the position commands and not the actual feedback positions, because the commands always arrive before the feedback. When the limits play a protective role, the actual position may not have exceeded the limit; therefore, desired effect can be achieved by setting appropriate deceleration time. Please refer to the description of Parameter P5-03

E?289 Position counter overflows	
Cause	Position counter overflows.
Check and Correction	Do not make any modification on the original machine if this alarm occurs; return it back to the original manufacturer directly.
Solution	None.

E?301 DMCNET synchronizing signal failed	
Cause	Failure on transmission of synchronizing signal.
Check and Correction	1. Whether the quality of communication line is poor. 2. Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?302 DMCNET synchronizing signal is too fast	
Cause	Synchronizing signal is too fast.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm

E?303 DMCNET synchronizing signal overtime	
Cause	Synchronizing signal overtime
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm.

E?304 DMCNET IP command invalid	
Cause	The IP mode operation time is too long.
Check and Correction	Return it to the dealer or original manufacturer for repairing.
Solution	Reset alarm.

E?500 STO function is activated	
Cause	Safety function STO is activated.
Check and Correction	Safety function STO is manually activated; please check the activating cause.
Solution	Reset alarm.

E?501 STO_A lost	
Cause	STO_A loses enabling signal or STO_A and STO_B have not been synchronized for more than 1 second.
Check and Correction	Whether the STO_A wiring is correct.
Solution	Reset alarm.

E?502 STO_B lost	
Cause	STO_B loses enabling signal or STO_A and STO_B have not been synchronized for more than 1 second.
Check and Correction	Whether the STO_B wiring is correct.
Solution	Reset alarm.

E?503 STO_error	
Cause	STO self-diagnosis error.
Check and Correction	Whether STO_A and STO_B correctly connected.
Solution	Reset alarm.

E?555 Drive failure	
Cause	Drive processor abnormal.
Check and Correction	Do not make any modification on the original machine if this alarm occurs; return it to the original manufacturer directly.
Solution	None.

Note: If abnormal alarm code that isn't listed above, please notify the original manufacturer.

- **Control type:**

EC001 PLC timeout	
Cause	1. PLC program too big, execution time too long. 2. Debug operation.
Check and Correction	1. Confirm PLC Debug is closed.
Solution	Alarm reset.

EC002 PLC Image load failed	
Cause	The library version in the PLC Image does not match with the system.
Check and Correction	Check whether the controller parameter P1-01 is 1; if so, version mismatch is caused by firmware update. Please update to the same version of PLC Image.
Solution	Alarm reset.

EC003 PLC Exception	
Cause	PLC execution error.
Check and Correction	Please refer to the following error message for troubleshooting.

Error Message	Exception Code
PlcExcNon	0
ExcOutOfMemory	1
ExcDivisionByZero	2
ExcIndexOutOfRange	3
ExcIllegalCast	4
ExcStackOverflow	5
ExcNullReference	6
ExcMissingMethod	7
ExcThreadCreation	8
ExcThreadAbort	9
ExcSynchronizationLockException	10
ExcBreakpointIllegal	11
ExcBreakpoint	12
ExcExecutionEngine	13
ExcExternal	16
PlcExcString	32
PlcExcWatchDogExceeded	33
PlcExcMaximumCpuLoadExceeded	34
PlcExcSystem	35
PlcExcEnd	36

Solution	Alarm reset.

EC004 Motion module failed	
Cause	Abnormal movement module function.
Check and Correction	If this alarm occurred, do not make any modifications to the original machine and send it back to the manufacturer directly.
Solution	None.

EC005 Controller failed	
Cause	Abnormal controller function.
Check and Correction	If this alarm occurred, do not make any modifications to the original machine and send it back to the manufacturer directly.
Solution	None.

EC004 Motion module failed	
Cause	Abnormal movement module function.
Check and Correction	If this alarm occurred, do not make any modifications to the original machine and send it back to the manufacturer directly.
Solution	None.

EC006 Continuous 30 second write in alarm	
Cause	Write in operation executed for 30 seconds continually without interruptions.
Check and Correction	Check whether the logic of the PLC and RL program or Modbus operation has errors that caused continuous write in. If it occurs repeatedly, it is recommended to remove all external devices and restore original PLC settings and debug step by step.
Solution	Alarm reset.

EC007 DMCNET device setting mismatch	
Cause	DMCNET power on scan results does not match with the maintain power parameter settings.
Check and Correction	Please check the connection status of the DMCNET device and confirm whether the controller parameter P3-31~P3-42 settings matches the current DMCNET external device.
Solution	Alarm reset, to change settings please scan again and save the power maintain parameter.

EC009 Robot Type mismatch	
Cause	The Robot Type set in the parameter does not match the one loaded by the current movement module.
Check and Correction	1. Confirm the firmware version; is it an updated firmware (downgraded or failed) that caused parameters P1-00 and P0-03 to be inconsistent. 2. Reset parameter P1-00, confirm that the current firmware version supports this type, disconnect the power and restart.
Solution	Reconnect the power and clear.

E1998 Operation mode not started	
Cause	Operation mode not started, please confirm the reason or System DI4 and DI5 contact are not connected.
Check and Correction	Please conform the System DI4 and DI5 contacts of the operation mode, and restart the controller.
Solution	Alarm reset.

Note: If abnormal alarm code that isn't listed above, please notify the original manufacturer.

4. Robot Language

4.1 Basic Instructions

4.1.1 Robot Language Index

Function	Symbol	Description
Operation Symbols	+	Plus
	-	Minus
	*	Times
	/	Divided
	^	Power
	AND	Logical operation : conjunction operation
	OR	Logical operation : or operation
	XOR	Logical operation : nonequivalence operation
	>	Greater than
	>=	Greater than or equal
	<	Less than
	<=	Less than or equal
	=	equal
	~=	Not equal

Function	Symbol	Description
Operation Commands	ABS (x)	Absolute value
	ACOS (x)	Arc cosine (in degree)
	ASIN (x)	Arc sine (in degree)
	ATAN (x)	Arc tangent (in degree)
	ATAN2 (y, x)	Arc tangent of y / x (in degree)
	CEIL (x)	Smallest integer larger than or equal to input value
	COS (x)	Consine (in degree)
	COSH (x)	Hyperbolic consine
	DEG (x)	Angle radians to degrees
	EXP (x)	Calculate the x-th power based on e
	FLOOR (x)	Largest integer smaller than or equal to input value
	FMOD (x, y)	Remainder of the division of x by y
	LOG10 (x)	Logarithm of x in the base 10
	LOG (x[,base])	Logarithm of x in the base, default base is natural
	MAX (x, …)	Maximum value among its arguments
	MIN (x, …)	Minimum value among its arguments
	MODF (x)	Return integer part of x and fractional part of x
	POW (x, y)	Return x^y
	RAD (x)	Angle degrees to radians
	SIN (x)	Sine (in degree)
	SINH (x)	Hyperbolic sine
	SQRT (x)	Square root
	TAN (x)	Tangent (in degree)
	TANH (x)	Hyperbolic tangent
Basic Command	DELAY	Delay for a period of time
Point Management Commands	SetGlobalPoint	Save Global point
	CopyPoint	Copy point information
	ReadPoint	Read point information
	WritePoint	Write temporary storage value in the point data
	RobotX	The X-directional coordinate of current Cartesian coordinate
	RobotY	The Y-directional coordinate of current Cartesian coordinate
	RobotZ	The Z-directional coordinate of current Cartesian coordinate
	RobotC	The C-directional coordinate of current Cartesian coordinate
	Robothand	The L / R hand status of current robot

Function	Symbol	Description
Motion Parameters	AccJ	Acceleration, affecting the motion command of MovP, MovJ
	DecJ	Deceleration, affecting the motion command of MovP, MovJ
	SpdJ	Maximum speed, affecting the motion command of MovP, MovJ
	AccL	Acceleration, affecting the motion command of MovL, MArchL, Marc, MCircle
	DecL	Deceleration, affecting the motion command of MovL, MArchL, Marc, MCircle
	SpdL	Maximum speed, affecting the motion command of MovL, MArchL, Marc, MCircle
	Accur	Accuracy of points passed through
Motion Control Commands	RobotServoOn	Activate the robot's servo motor
	RobotServoOff	Stop the robot's servo motor
	MovJ	Control motor axis to rotate to the target position
	MovP	Perform point to point motion via absolute coordinates
	MovPR	Perform point to point motion in relative term
	MovL	Perform rectilinear motion via absolute coordinates
	MovLR	Perform rectilinear motion in relative term
	MArc	Make arc motion via absolute coordinates
	Lift	Use the absolute coordinate to move to the location of the relative point of reference.
	MArc	Make arc motion via absolute coordinates
	MCircle	Make circle motion via absolute coordinates
Coordinate System Commands	SetUF	Set the user coordinate system
	ChangeUF	Switch the user coordinate system
	SetTF	Set the tool coordinate system.
	ChangeTF	Switch the tool coordinate system
Process Control Commands	if…end	If conditional statement (predicate)
	if…elseif…end	If conditional statement (predicate)
	while…do..end	while loop
	for(type1)	for loop
	for(type2)	for loop
	repeat…until	repeat loop
	function…end	User-defined sub-function

IO Operation Commands	DI	Read digital input
	DO	Read or write in digital output
	ReadModbus	Read the value of the memory location
	WriteModbus	Write the value of the memory location
Program Executing Commands	QUIT	Stop executing program
	PAUSE	Suspend the current action
Application function Commands	SafetyMode	This is used for the raster pause function.
	SafetyStatus	This is used for the raster trigger status.

4.1.2 Syntax definition:

Table VI -1 Syntax Precautions

Precautions	Instructions
Case-sensitive	The robot language is case-sensitive, a and A are different
Delimiter statement	Robot language statements can be separated with either semicolon " ; " , or blank, e.g. a1=0 a2=1 a3=2 equivalent to a1, a2, a3 = 0, 1, 2
Number of variables > number of values	Make up nil based on the number of variables, e.g. a1, a2, a3 = 0, 1, then the value of a3 equals to nil
Number of variables < number of values	Expletory value will be ignored, e.g. a1, a2 = 0, 1, 2, then 2 will be ignored

4.1.3 Variable declaration

- In robot language, no variable becomes Local Variables by particularly having local added, and all of them are Global Variables. Examples of Global Variables and Local Variables are shown as follows.

Example

```
1.a=1
2.if a==1 then
3. Local b=2
4.end
5.if b==2 then -- the value of b here is nil
6. c=1
7.end
```

4.1.4 Reserved Keywords:

- The following keywords should not be used as variables naming declaration. Therefore, special attention should be paid at time of variables naming.
- Robot Languages are case-sensitive, “and” and “AND” are different.
- Users should not use the following names for naming the variables in the form: and, break, do, else, elseif, end, false, for, function, if, in, local, global, nil, not, or, repeat, return, then, true, until, while, P, p, table, boolean, number, string, thread, goto, in, pi, PI, Pi, pI,ON,OFF,On,Off,oN,oFF,on,off.

4.1.5 Point definition P：

- Two methods for indicating points in the form
- The first method: Inside the double quotation marks is the point name
- The second method: point number indication. n: point number

Example

1.MovP ("FirstPoint") – the first indication method, inside the double quotation marks is the point name

2.MovP (1) –the second indication method, point number

4.2 Operation symbols

Table VI-2 Operation Symbols

Symbol	Description
+	Plus
-	Minus
*	Times
/	Divided
^	Power
AND	Logical operation : conjunction operation
OR	Logical operation : or operation
XOR	Logical operation : nonequivalence operation
>	Greater than
>=	Greater than or equal
<	Less than
<=	Less than or equal
=	equal
~=	Not equal

4.3 Operation commands

Table VI-3 Operation Commands

Command	Description
ABS (x)	Absolute value
ACOS (x)	Arc cosine (in degree)
ASIN (x)	Arc sine (in degree)
ATAN (x)	Arc tangent (in degree)
ATAN2 (y, x)	Arc tangent of y / x (in degree)
CEIL (x)	Smallest integer larger than or equal to input value
COS (x)	Consine (in degree)
COSH (x)	Hyperbolic consine
DEG (x)	Angle radians to degrees
EXP (x)	Calculate the x-th power based on e
FLOOR (x)	Largest integer smaller than or equal to input value
FMOD (x, y)	Remainder of the division of x by y
LOG10 (x)	Logarithm of x in the base 10
LOG (x[,base])	Logarithm of x in the base, default base is natural
MAX (x, …)	Maximum value among its arguments
MIN (x, …)	Minimum value among its arguments
MODF (x)	Return integer part of x and fractional part of x
POW (x, y)	Return x^y
RAD (x)	Angle degrees to radians
SIN (x)	Sine (in degree)
SINH (x)	Hyperbolic sine
SQRT (x)	Square root
TAN (x)	Tangent (in degree)
TANH (x)	Hyperbolic tangent

4.4 Basic Commands

DELAY

Instruction

Delay for a period of time

Syntax

DELAY(a)

Parameter

a: Time, unit 0.01s, period of time delay from 0.05~60s

Example

1. DELAY(0.5)--- delay for 0.5s
2. Time=5 – variable time setting is 5
3. DELAY(Time)

4.5 Point Management Commands

SetGlobalPoint

Instruction

Save Global point

Syntax

SetGlobalPoint (a,b,c,d,e,f,g,h)

Parameter

This is the command for setting a point

Table VI-4: Point variable parameter form

Parameter	Name	Description
a	Number	Point number, range 1~1000
b	Name	Point name
c	X	Space coordinate X, floating-point number(unit: mm)can be entered, range 0.001 to 999
d	Y	Space coordinate Y, floating-point number(unit: mm)can be entered, range 0.001 to 999
e	Z	Space coordinate Z, floating-point number(unit: mm)can be entered, range 0.001 to 999
f	C	Space coordinate C, floating-point number(unit: degree)can be entered, range 0.001 to 999
g	HAND	SCARA: 0 or "R"(right hand) 1 or "L"(left hand)
h	UF	User coordinate system, up to 5 sets of coordinate can be entered, 0 is the geodetic coordinate
PT_TF	TF	Tool coordinate system, up to 5 sets of coordinate can be entered, 0 is the geodetic coordinate

CopyPoint

Instruction

Copy point information

Syntax

CopyPoint(a,b)

Parameter

This is the command for setting a point

Table VI-5: CopyPoint parameter form

Parameter	Name	Description
a	Point copied	The point, point number or point name being copied
b	Point copying	The point, point number or point name copying

Example

1. CopyPoint(1,2)– Take the point location of Point 1 as the temporary storage point location and copy the point location information of Point 2 to the point location of Point 1
2. CopyPoint("P1","P2")– Take the point named P1 as the temporary storage point location and copy the point location information of the point named P2 to the point named P1.

ReadPoint

Instruction

Read point information

Syntax

ReadPoint (a,b)

Parameter

Table VI-6: ReadPoint parameter form

Parameter	Name	Description
a	Point read	
b	Item to be read	"X" : X-directional coordinate(Unit:mm) "Y" : Y-directional coordinate(Unit:mm) "Z" : Z-directional coordinate(Unit:mm) "RZ" : RZ-directional coordinate(Unit: 0.001 degree) "H" : L/R hand information(0: right hand; 1: left hand)

Example

1. PostionX=ReadPoint(1001,"X")--Read the X coordinate of point Index 1001
2. PostionY=ReadPoint(1001,"Y")--Read the Y coordinate of point Index 1001
3. PostionZ=ReadPoint(1001,"Z")--Read the Z coordinate of point Index 1001
4. PostionRZ=ReadPoint(1001,"RZ")--Read the RZ coordinate of point Index 1001
5. PostionH=ReadPoint(1001,"H")--ead the L/R hand informaton of point Index 1001
6. PostionX1=ReadPoint("P1","X")--Read the X coordinate of point P1
7. PostionY1=ReadPoint("P1","Y")--Read the Y coordinate of point P1
8. PostionZ1=ReadPoint("P1","Z")--Read the Z coordinate of point P1
9. PostionRZ1=ReadPoint("P1","RZ")--Read the RZ coordinate of point P1
10. PostionH1=ReadPoint("P1","H")--Read the L/R hand information of point P1

WritePoint

Instruction

Write temporary storage value in the point data

Syntax

WritePoint (a,b,c)

Parameter

Table VI-7: WritePoint parameter form

Parameter	Name	Description
a	Point being written	
b	Parameters intended to be written in	"X" : X-directional coordinate (Unit: mm) "Y" : Y-directional coordinate (Unit: mm) "Z" : Z-directional coordinate (Unit: mm) "RZ" : RZ-directional coordinate (Unit:0.001 degree) "H" : L/R hand information (0 or "R": right hand; 1 or "L": left hand)
c	Input value	"X" : X-directional coordinate (Unit: mm); floating-point number can be entered, range 0.001 to 999 "Y" : Y-directional coordinate (Unit: mm); floating-point number can be entered, range 0.001 to 999 "Z" : Z-directional coordinate (Unit: mm); floating-point number can be entered, range 0.001 to 999 "RZ" : RZ-directional coordinate (Unit:0.001 degree); floating-point number can be entered, range 0.001 to 999 "H" : L/R hand information (0 or "R": right hand; 1 or "L": left hand)

Example

1. WritePoint(1001,"X",300)--Input 300mm for the X coordinate of point Index 1001
2. WritePoint(1001,"Y",50)--Input 50mm for the Y coordirnate of point Index 1001
3. WritePoint(1001,"Z",-50)--Input -50mm for the Z coordirnate of point Index 1001
4. WritePoint(1001,"RZ",30)--Input 30° for the RZ coordirnate of point Index 1001
5. WritePoint(1001,"H",0)--Input 0 for the L/R hand information of point Index 1001
6. WritePoint("P1","X",250)--Input 250mm for the X coordirnate of point P1
7. WritePoint("P1","Y",50)--Input 50mm for the Y coordirnate of point P1
8. WritePoint("P1","Z",-100)--Input -100mm for the Z coordirnate of point P1
9. WritePoint("P1","RZ",30)--Input 30° for the RZ coordirnate of point P1
10. WritePoint("P1","H",1)--Input 1 for the L/R hand information of point P1
11. WritePoint(1002,"X",300.223)--Input 300.223mm for the X coordirnate of point Index 1002
12. WritePoint(1002,"Y",50.671)--Input 50.671mm for the Y coordirnate of point Index 1002
13. WritePoint(1002,"Z",-50.111)--Input -50.111mm for the Z coordirnate of point Index 1002
14. WritePoint(1002,"RZ",30.456)--Input 30.456° for the RZ coordirnate of point Index 1002
15. WritePoint(1002,"H",0)--Input 0 for the L/R hand information of point Index 1002
16. WritePoint("P2","X",250.232)--Input 250.232mm for the X coordirnate of point P2
17. WritePoint("P2","Y",50.761)--Input 50.761mm for the Y coordirnate of point P2
18. WritePoint("P2","Z",-100.105)--Input -100.105mm for the Z coordirnate of point P2
19. WritePoint("P2","RZ",30.222)--Input 30.222° for the RZ coordirnate of point P2
20. WritePoint("P2","H",1)--Input 1 for the L/R hand information of point P2

RobotX

Instruction

The X-directional coordinate of current Cartesian coordinate, unit: mm

Syntax

RobotX()

Parameter

This is the command for reading the current position of X coorindate

Example

NowPosition_X=RobotX()

RobotY

Instruction

The Y-directional coordinate of current Cartesian coordinate, unit: mm

Syntax

RobotY()

Parameter

This is the command for reading the current position of Y coorindate

Example

NowPosition_Y=RobotY()

RobotZ

Instruction

The Z-directional coordinate of current Cartesian coordinate, unit: mm

Syntax

RobotZ()

Parameter

This is the command for reading the current position of Z coorindate

Example

NowPosition_Z=RobotZ()

RobotRZ

Instruction

RZ-direction coordinate value of the current cassette coordinate; when the tool coordinate or the RZ-direction coordinate value of the user coordinate needs to be read, it must switch to the corresponding coordinate status in order for the corresponding coordinate information to be read.

Syntax

RobotRZ()

Parameter

This is the command for reading the current position of RZ coorindate

Example

NowPosition_RZ=RobotRZ()

Robothand

Instruction

The L/R hand status of current robot; value 0 = right hand, value 1 = left hand

Syntax

Robothand()

Parameter

This is the command for reading the L/R hand information of the current position

Example

NowPosition_hand=Robothand()

4.6 Motion Parameters

AccJ

Instruction

Acceleration, affecting the motion command of MovP, MovJ

Syntax

AccJ(a)

Parameter

a: Percentage, range 1~100, cannot enter floating-point number

Example

AccJ(50)

DecJ

Instruction

Deceleration, affecting the motion command of MovP, MovJ

Syntax

AccJ(a)

Parameter

a: Percentage, range 1~100, cannot enter floating-point number

Example

DecJ(50)

SpdJ

Instruction

Maximum speed, affecting the motion command of MovP, MovJ

Syntax

SpdJ(a)

Parameter

a: Percentage, range 1~100, cannot enter floating-point number

Example

SpdJ(100)

AccL

Instruction

Acceleration, affecting the motion command of MovL, MArchL, Marc, MCircle

Syntax

AccL(a)

Parameter

a: Actual speed mm/sec^2, range 1~25000, cannot enter floating-point number

Example

AccL(5)

DecL

Instruction

Deceleration, affecting the motion command of MovL, MArchL, Marc, MCircle

Syntax

DecL(a)

Parameter

a: Actual speed mm/sec^2, range 1~25000, cannot enter floating-point number

Example

DecL(5)

SpdL

Instruction

Maximum speed, affecting the motion command of MovL, MArchL, Marc, MCircle

Syntax

SpdL(a)

Parameter

a: Actual speed mm/sec, range 1~2000, cannot enter floating-point number

Example

SpdL(10)–Line speed is 10 mm/sec

Accur

Instruction

Accuracy of points passed through

Valid for the motion command without PASS Parameter set

Syntax

Accur(a)

Parameter

a: "STANDARD"(0.1mm)

"HIGH"(0.01mm)

Example

1. Accur("HIGH")
2. MovL("P1")
3. MovL("P2")
4. Accur("STANDARD")
5. MovL("P3")

4.7 Motion Control Commands

RobotServoOn

Instruction

Activate the robot's servo motor

Syntax

RobotServoOn()

Example

RobotServoOn()

RobotServoOff

Instruction

Stop the robot's servo motor

Syntax

RobotServoOff()

Example

RobotServoOff()

MovJ

Instruction

Control motor axis to rotate to the target position

Syntax

MovJ(a,b)
MovJ(a,b,c)
MovJ(a,b,c,d,e)

Parameter

a: Motor shaft number, 1~4
b: In case of input for shaft 1, 2 or 4, this is the angle of absolute position, unit: degree
In case of input for shaft 3, this is the absolute position, unit: mm
In case of input for shaft 5 to 10(external shafts), this is the absolute position, unit: PUU(Plus User Unit)
c: Maximum speed %(optional), input range 1~100
d: Acceleration %(optional), input range 1~100
e: Deceleration %(optional), input range 1~100

Example

1. MovJ(4,180)
2. MovJ(4,180,50)--shaft 4 moves to the 180-degree position with speed set as 50%
3. MovJ(4,-180,100,10,10)--shaft 4 moves to the minus 180-degree position with speed set as 100% and acceleration/deceleration set as 10%

MovP

Instruction

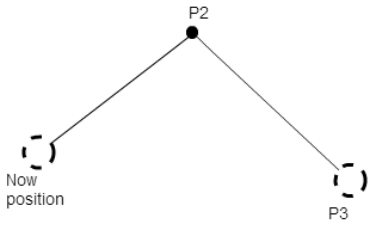
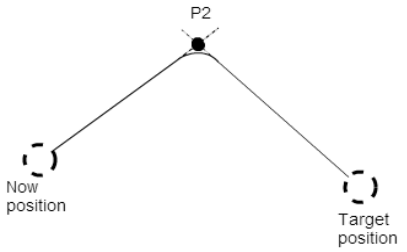
Perform point to point motion via absolute coordinates

Syntax

MovP(a,b,c,d,e)
MovP(a,c,d,e)
MovP(a,c)
MovP(a,b)
MovP(a)

Parameter

a: End point, point variable
b: PASS(optional), pass the end point

No PASS	PASS
When no PASS command is added, the robot will only move towards P3 after fully reaching P2	When a PASS command is added, the robot will move towards P3 without reaching P2. This function can help the robot to skip over unimportant point locations
	

c: Maximum speed % (optional), input range 1~100
d: Acceleration % (optional), input range 1~100
e: Deceleration % (optional), input range 1~100

Example

1. MovP (1) ---move to the first point via PtP
2. MovP (2,"PASS") --- move to the second point via PtP continuous movement
3. MovP (3,100,50,50) --- move to the third point via PtP, with speed set as 100% and acceleration / deceleration set as 50%
4. MovP ("P0",100,50,50) -- move to P0 with speed set as 100% and acceleration / deceleration set as 50%
5. MovP ("P1", "PASS",1000,500,500) ---move to point 1 via PtP continuous movement, with speed set as 1000mm / s and acceleration / deceleration set as 500mm / s^2

MovPR

Instruction

Perform point to point motion in relative term

Syntax

MovPR (a,b)
MovPR (a,b,c)

Parameter

a: Moving distance
Positive value: moving in positive direction
Negative value: moving in negative direction
When moving the direction of X, Y, Z coordinates, unit: mm
When moving the direction of C coordinate, unit: degree
b: Moving direction
"X": direction of X-coordinate
"Y": direction of Y-coordinate
"Z": direction of Z-coordinate
"C": direction of C-coordinate
c: moving speed % (optional), input range 1~100

Example

1. MovPR (10,"X") ---Move 10mm relatively towards positive X direction via PtP

2. MovPR(-10,"X")---Move 10mm relatively towards negative X direction via PtP
3. MovPR(10,"Y")---Move 10mm relatively towards positive Y direction via PtP
4. MovPR(10,"Z")---Move 10mm relatively towards positive Z direction via PtP
5. MovPR(-10,"Z")---Move 10mm relatively towards negative Z direction via PtP
6. MovPR(10,"C")---Move 10 ° degrees relatively towards positive C direction via PtP
7. MovPR(-10,"C")---Move 10 ° relatively towards negative C direction via PtP

MovL

Instruction

Perform rectilinear motion via absolute coordinates

Syntax

MovL(a,b,c,d,e)
MovL(a,c,d,e)
MovL(a,c)
MovL(a,b)
MovL(a)

Parameter

a: End point, point variable
b: PASS(optional), pass the end point
c: Maximum speed mm/sec(optional), input range 1~2000
d: Acceleration mm/sec^2(optional), input range 1~25000
e: Deceleration mm/sec^2(optional), input range 1~25000

Example

1. MovL("P1")---move to the first point via Line movement
2. MovL(1, "PASS")---move to the first point via Line continuous movement
3. MovL(1,1000,500,500)--- move to point 1 via Line movement, with speed set as 1000mm/s and acceleration/deceleration set as 500mm/s^2
4. MovL("P1", "PASS",1000,500,500)--- move to point 1 via Line continuous movement, with speed set as 1000mm/s and acceleration/deceleration set as 500mm/s^2

MovLR

Instruction

Perform rectilinear motion in relative term

Syntax

MovLR(a,b)
MovLR(a,b,c)

Parameter

a: Moving distance
Positive value: moving in positive direction
Negative value: moving in negative direction
When moving the direction of X, Y, Z coordinates, unit: mm
When moving the direction of C coordinate, unit: degree

b: Moving direction
"X": direction of X-coordinate
"Y": direction of Y-coordinate
"Z": direction of Z-coordinate
"C": direction of C-coordinate
c: moving speed % (optional)

Example

1. MovLR(10,"X")---Move 10mm relatively towards positive X direction via Line movement
2. MovLR(-10,"X")---Move 10mm relatively towards negative X direction via Line movement
3. MovLR(10,"Y")---Move 10mm relatively towards positive Y direction via Line movement
4. MovLR(10,"Z")---Move 10mm relatively towards positive Z direction via Line movement
5. MovLR(-10,"Z")---Move 10mm relatively towards negative Z direction via Line movement
6. MovLR(10,"C")---Move 10 ° relatively towards positive C direction via Line movement
7. MovLR(-10,"C")---Move 10 ° relatively towards negative C direction via Line movement

MArc

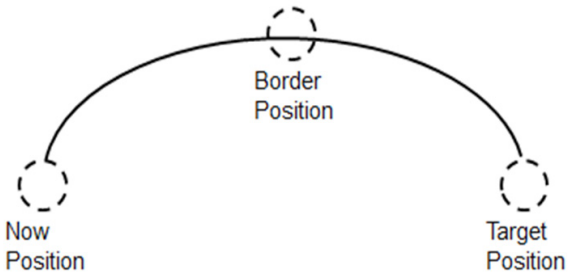
Instruction

Make arc motion via absolute coordinates

Syntax

MArc(a,b)
MArc(a,b,c)
MArc(a,b,c,d)
MArc(a,b,c,d,e,f)

Parameter



a: Passing point, point variable
b: End point, point variable
c: Circle mode, there is BORDER mode
d: Maximum speed mm/sec(optional), input range 1~2000
e: Acceleration mm/sec^2(optional), input range 1~25000
f: Deceleration mm/sec^2(optional), input range 1~25000

Example

1. MArc("P1","P2","BORDER")--P1 as the passing point and P2 as the target point, move via continuous mode
2. MArc("P1","P2","BORDER",100)-- P1 as the passing point and P2 as the target point, move via continuous mode with speed of 100mm/s
3. MArc("P1","P2",BORDER,100,100,100)-- P1 as the passing point and P2 as the target point, move via continuous mode with speed of 100mm/s, acceleration 100mm/s^2 and deceleration 100mm/s^2

MCircle

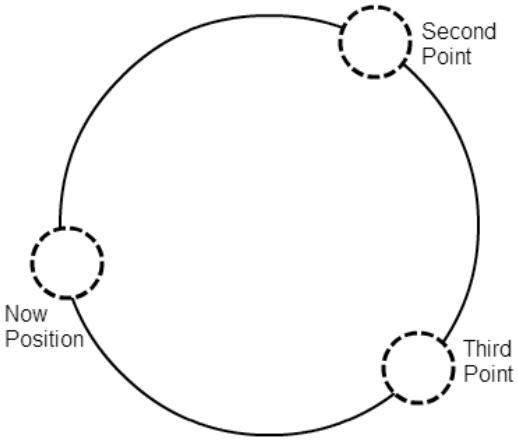
Instruction

Make circle motion via absolute coordinates, with 3 points forming a circle

Syntax

MCircle(a,b)
MCircle(a,b,c)
MCircle(a,b,c,d)
MCircle(a,b,c,d,e,f)

Parameter



a: Point 2, point variable
b: Point 3, point variable
c: Circle mode, there is BORDER mode
d: Maximum speed mm/sec(optional), input range 1~2000
e: Acceleration mm/sec^2(optional), input range 1~25000
f: Deceleration mm/sec^2(optional), input range 1~25000

Example

1. MCircle("P1","P2","BORDER")-- P1 as the passing point and P2 as the target point, move via continuous mode
2. MCircle("P1","P2","BORDER",100)-- P1 as the passing point and P2 as the target point, move via continuous mode with speed of 100mm/s
3. MCircle("P1","P2","BORDER",100,100,100)-- P1 as the passing point and P2 as the target point, move via continuous mode with speed of 100mm/s, acceleration 100mm/s^2 and deceleration 100mm/s^2

Lift

Instruction

Use the absolute coordinate to move to the location of the relative point of reference. The parameters entered are the upper-body angle, ascending angle, ascending level and ascending direction.

Syntax

Lift (a,b,c,d)

Parameter

a: Location of the Reference point and point location variable

b: Ascending angle (unit: degree) (1~90)
c: Ascending level (unit: mm)
d: Ascending direction (unit: degree) (-360~360)

Example

Lift ("P0",45,10,90) – The P0 point is used as the reference point. A point is moved to the location with 45-degree ascending angle referring to the specified reference point, 10 mm ascending level and 90-degree ascending direction.

4.8 Coordinate System Commands

SetUF

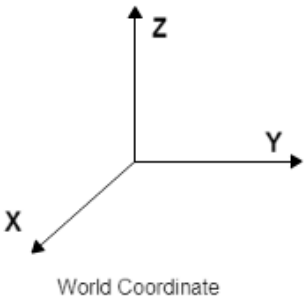
Instruction

Set the user coordinate system

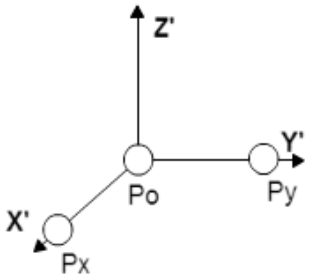
Syntax

SetUF (a,b,c,d)

Parameter



World Coordinate



User Coordinate

a: Index of the coordinate system; nine sets of user coordinate are provided for use, input range 1~9
b: The original point of the user coordinate system (Po in diagram)
c: Set the position point in the X-axis direction of the user coordinate system (Px in diagram)
d: Set the position point in the Y-axis direction of the user coordinate system (Py in diagram)

Example

1. SetUF (1,"P0","P1","P2") --Set P0 as the original point of the user coordinate system 1
--Set P1 as the position point in the X-axis direction of the user coordinate system 1
-- Set P2 as the position point in the Y-axis direction of the user coordinate system 1

ChangeUF

Instruction

Switch the user coordinate system

Syntax

ChangeUF (a)

Parameter

a: Index of the coordinate system; five sets of user coordinate are provided for use, input range 1~5. 0 will switch back to the geodetic coordinate system.

Example

1. ChangeUF (1) --- Switch to user coordinate system 1
2. ChangeUF (0) --- Switch to geodetic coordinate system

SetTF

Instruction

Set the tool coordinate system

Syntax

SetTF (a,b,c,d)

Parameter

a: The coordinate system index provides 9 sets of the tool coordinate system. (1~9)
b: Set the width of the tool
c: Set the height of the tool
d: Set the angle of the tool

Example

SetTF (1,10,20,30) -- Set the width of the tool coordinate system 1 to 10 mm
-- Set the length of the tool coordinate system 1 to 20 mm
-- Set the height of the tool coordinate system 1 to 30 mm

ChangeTF

Instruction

Switch the tool coordinate system

Syntax

ChangeTF (a)

Parameter

a: Coordinate system number (1~9) provides 9 sets of the tool coordinate system. Enter 0 to return to the world coordinate system.

Example

1. ChangeTF (1) --- Switch to the tool coordinate system 1
2. ChangeTF (0) --- Switch to the world coordinate system

4.9 Process Control Commands

if…end

Instruction

If conditional statement (predicate) : The program imports different program blocks based on the different conditions assumed.

Syntax

if a then
execute program 1
end

Parameter

a: The condition

Example

```
1. if DI (1) == "ON" then
2.      MovP ("P1")
3. end
```

---

if…elseif…end

Instruction

if assertion: The program introduces different program code segments via different assumed situations.

Syntax

if a then
execute program 1
elseif b then
execute program 2
end

Parameter

a: Condition 1
b: Condition 2

Example

```
1. if DI (1)  == "ON"  then
2. MovP ("P1")
3.     elseif DI(2) == “ON” then
4. MovL(“P2”)
5. end
```

---

while…do..end

Instruction

while loop: the program will continuously repeat an execution. To break the loop, use the "break" command.

Syntax

while a do
loop executing program
end

Parameter

a: Execute if signal is "true"

Example

Calculate accumulation of i until 100, then exit the while loop

```
1.i = 1
2.while true do
3. i = i + 1
4. if i==100 then
5.  break
6. end
7.end
```

---

for (type1)

Instruction

for loop: use the loop command to make the program continuously repeat an execution.

Syntax

for a=b,c do
loop executing program
end

Parameter

a: Loop variable
b: Set the initial value of loop variable
c: Set the final value of the loop variable.
The default updated value is 1.

Example

Calculate the sum of array a

```
1. a = {5, 4, 3, 2, 1}
2. i = 1
3. sum = 0
4. for i = 1, 5 do
5.    sum = sum + a[i]
6. end
```

---

for (type2)

Instruction

for loop: use the loop command to make the program continuously repeat an execution.

Syntax

for a=b,c do
loop executing program end

Parameter

a: Loop variable
b: Set the initial value of loop variable
c: Set the final value of the loop variable
d: Updated value

Example

Calculate the sum of array a

```
1. a = {5, 4, 3, 2, 1}
2. i = 1
3. sum = 0
4. for i = 1, 5 do
5.      sum = sum + a[i]
6. end
```

---

repeat…until

Instruction

repeat loop: the program will continuously repeat an execution. Remember to add the predicates where "until" appears.

Syntax

repeat
loop executing program
until a

Parameter

a: The condition

Example

Calculate the sum of array a

```
1. a = {5, 4, 3, 2, 1}
2. i = 1
3. sum = 0
4. repeat
5.    sum = sum + a[i] -- sum = 15
6.     i = i + 1
7. until i > #a -- #a: get size of array a
```

---

function…end

Instruction

User-defined sub-function. Before using the sub-function, the sub-function must be declared first.

Syntax

function a()
execute program
end

Parameter

a: Sub-function name; this must be in English alphabets or numbers, and must not be in word string or other languages.

Example

```
1.function MyFunc1()
2.    MovP(1)
3.    MovP("P2")
4. end
5. MovL(3)
6. MyFunc1()
```

4.10 IO Operation Commands

DI

Instruction

Read the status of digital input

Syntax

DI(n)

Parameter

n: Digital input pin number, input range 1~24

Example

```
1.if DI (1) == "ON" then
2. MovL ("P1")
3.end
```

DO

Instruction

Read or write in digital output

Syntax

DO(n,s)
DO(n,s,t)

Parameter

n: Digital output pin number, input range 1~12
s: ON / OFF
t: Delay time

Example

```
1. if DO (1) == "ON" then
2. DO (1,"OFF") --Let first DO Off
3. end
4. if DO (1) == "OFF" then
5. DO (1,"ON") --Let first DO On
6. end
7. DO (1,"ON",1) --Let first DO On for one second
```

ReadModbus

Instruction

It is the command for external communication to read the value of the memory location. The readable memory location is 0x1000 to 0x1FFF. A total of 4096 words can be used. When data is read in length of double word, the memory location to be read must be even numbers for the reading action to be performed.

Syntax

ReadModbus(a,b)

Parameter

a: Input the Modbus address to be read, input range 0x1000~0x1FFF
b: Input the length of data to be read, input value "W" or "DW"

Example

```
1. WriteModbus (0x1000,"W",1)
2. readModbus_0x1000=ReadModbus (0x1000,"W")
3. if readModbus_0x1000 == 1 then
4. WriteModbus (0x1F00,"DW",2)
5. DELAY (0.1)
6. end
7. readModbus_0x1F00=ReadModbus (0x1F00,"DW")
```

WriteModbus

Instruction

It is the command for external communication to write the value of the memory location. The writable memory location is 0x1000 to 0x1FFF. A total of 4096 words can be used. When data is written in length of double word, the memory location to be written in must be even numbers for the writing action to be performed.

Syntax

WriteModbus(a,b,c)

Parameter

a: Input the Modbus address to be written in, range 0x1000~0x1FFF

b: Input the length of data to be written in, input value "W" or "DW"
c: Input the value of Modbus address to be written in

Example

```
1.WriteModbus (0x1000,"W",1)
2.readModbus_0x1000=ReadModbus (0x1000,"W")
3.if readModbus_0x1000 == 1 then
4. WriteModbus (0x1F00,"DW",2)
5. DELAY (0.1)
6.end
7.readModbus_0x1F00=WriteModbus (0x1F00,"DW")
```

4.11 Program Executing Commands

QUIT

Instruction

Stop executing program

Syntax

QUIT ()

Parameter

None

Example

```
1.IOStatus=DI (1)
2.DELAY (1)
3.if IOStatus~=“ON” then
4. QUIT ()
5.end
```

PAUSE

Instruction

Suspend the current action. To continue with the execution, a start action must be externally triggered (method for starting: write 2 in the memory location 0x0228 by an external program)

Syntax

PAUSE ()

Parameter

None

Example

```
1.IOStatus=DI (1)
2.DELAY (1)
3.if IOStatus~="ON" then
4. PAUSE ()
5.end
```

4.12 Application Function Commands

SafetyMode

Instruction

This function is used to pause functions

Syntax

SafetyMode(a)

Parameter

a: There are five modes ranging from 1~5; the default status is set as mode 1.
1: Action completed when grating touches; IO stays in current status;
2: Action completed when grating touches; IO returns to OFF status;
3: Disable default function and user manually edits the function at RL;
4: Action slows down and stops when grating touches; IO stays in current status and triggers reset system DI (which is system DI 3),and it continues operating;
5: Action slows down and stops when grating touches; IO returns to OFF status and triggers reset system DI (which is system DI 3),and it continues operating;

Example

1. SafetyMode(4) – Set grating mode as mode 4; action slows down and stops when grating touches; IO stays in current status and triggers reset system DI (which is system DI 3), and it continues operating.
2. MovP(1)
3. SafetyMode(1) – Set grating mode as mode 1; action completed when grating touches; IO stays in current status.
4. MovP(2)

SafetyStatus

Instruction

This is the status used to trigger the grating

Syntax

SafetyStatus()

Parameter

Status read includes 0, 2 and 3
0: Means the grating was not triggered, which is the normal operating status.
2: Means the grating was triggered when the program was not operating; during this time the motor servo status if OFF.
3: Means the grating was triggered while the program was operating.

Example

```
1. if SafetyStatus()== 3 then
2.  PAUSE()
3.  end
```

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