DRAStudio User Manual

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Table of Contents

List of Figures

1. Introduction and Installation

1.1 Preface

This is a shared user manual for both the Delta DRS and DRV Series industrial robots. The pictures in this manual are for the DRS Series robot.

Figure 1 1 shows the DRAStudio (Delta Robotic Automation Studio) software system that you use to control the robot. After you connect DRAStudio to the robot controller, DRAStudio provides functions that include project management, JOG operations, point teaching, robot language editing and I/O setting.

Figure 1.1-1 Software System Screen

1.2 System Requirements

The following table lists the recommended system requirements for the DRAStudio software.

Operating System	Windows XP SP3, Windows 7, Windows 10
Central Processing Unit	Intel Core 2 Duo 2GHz (included) or higher
Memory	2 GB (included) or more RAM
Available Hard Drive Space	1 GB or more available space
Installation Environment	.NET Framework 4

1.3 Install DRAStudio

Step 1

Download the DRAStudio software from the Delta customer service website.

http://www.deltaww.com/services/DownloadCenter2.aspx?secID=8&pid=2&tid=0&itemID=&typeID=1&downloadID=&title=&dataType=&check=0&hl=zh-TW&CID=06

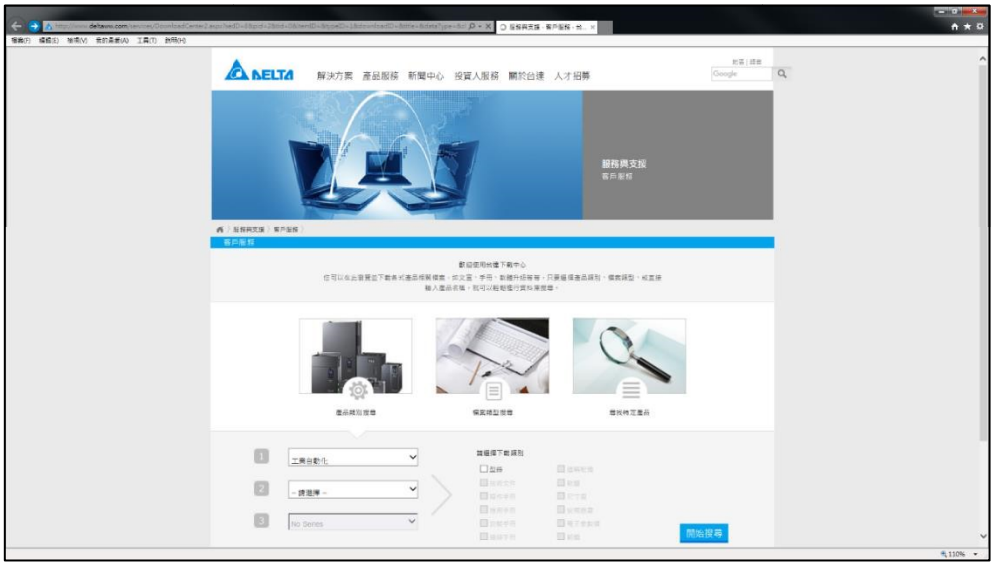


Figure 1.3-1 Delta Customer Service Website

Step 2

Select Industrial Automation and SCARA Industrial Robot in the first and second fields, then select the software options and then click Start Search.

Figure 1.3-2 Select the options for the DRAStudio software

Step 3

Figure 1-4 shows the search results. Click the link to download DRAStudio to your computer and then extract it.

Figure 1.3-3 Click the link to download the DRAStudio software

Step 4

Go to the folder containing the extracted software and double-click DELTA_IA-Robot_DRAStudio-V1-00-03-34_SW_TSE_20171206 to install DRAStudio, as shown in Figure 1-5. Note that the actual file name may be different depending on the version number.

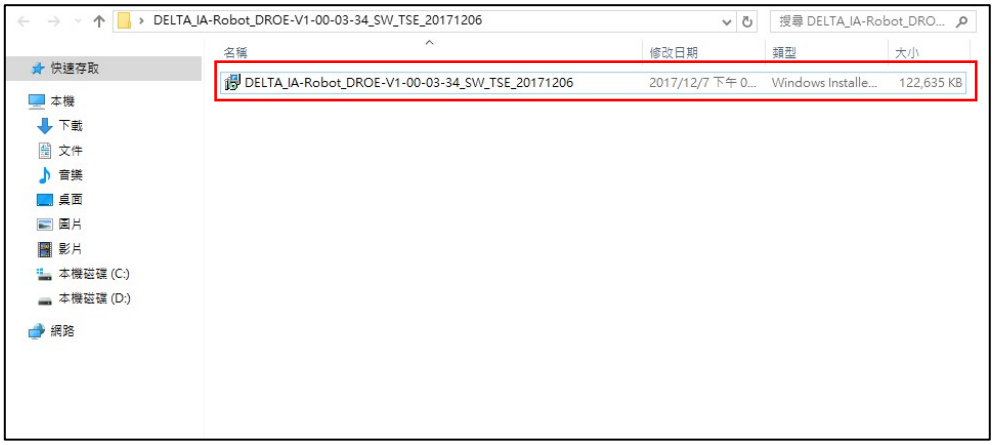


Figure 1.3-4 Double-click the DRAStudio Installation File

2. The Main DRAStudio Window

This chapter shows you how to log into DRAStudio, and then describes the DRAStudio program window.

2.1 Log in to DRAStudio (DRS/DRV Series)

On the Main screen, click Login to display the Login dialog box. The User ID field is read-only. Enter the Password, as shown in Figure 2.1-1. The available DRAStudio functions depend on the type of user according to the password. The following table lists the three levels (Engineer1, Engineer2, and Engineer3.)

Table 2.1-1 User authority levels

User type	Password	Description and Function
Engineer1	1111	Basic user, such as the machine operator; the DRAStudio screen shows only the basic tabs along the left side of the window.
Engineer2	2222	Advanced user, such as the engineer responsible for setting up and troubleshooting the robot; the DRAStudio screen shows additional tabs: Home, Arm, System, Scope, License.
Engineer3	3333	Delta application engineer responsible for updating system firmware; on the DRAStudio System tab, the screen shows the Update tab.

Note that you cannot change the User IDs or the passwords.

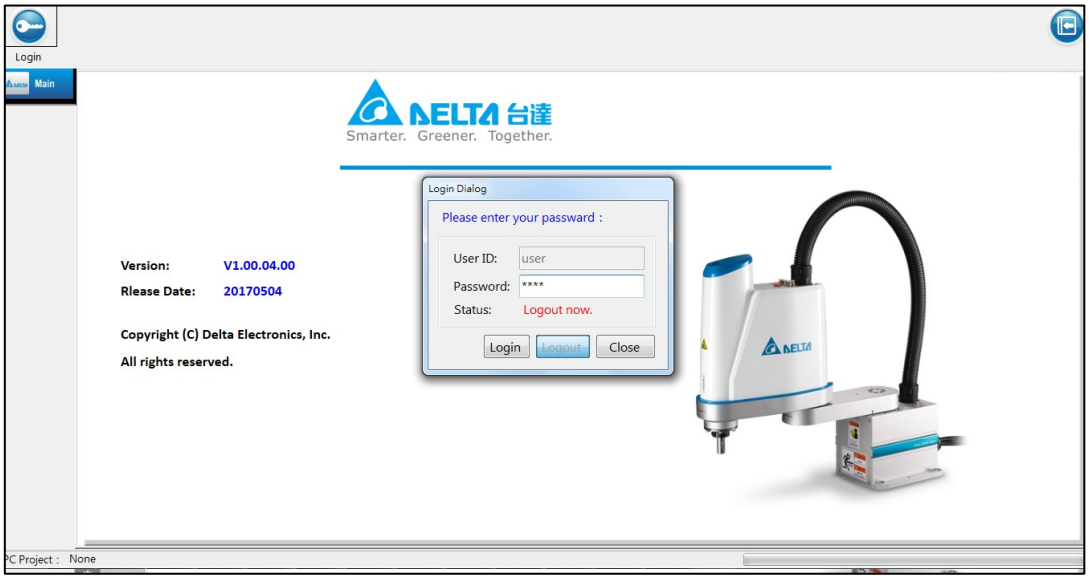


Figure 2.1-1 Log in (Login button)

2.2 The DRAStudio Program Window (DRS/DRV series)

Figure 2 2 shows the Main screen that includes the Login button, the software version and the software release date.

Figure 2.2-2 Main screen (Main tab)

The DRAStudio window is divided into two parts: the Main screen and Auxiliary screen, as shown in Figure 2 3.

- **Main Screen**

After you log in, the Main screen displays multiple tabs along the left side of the window to access the functions in the software. It also displays the system status buttons. See Section 2.3 Main Screen Tabs and Buttons.

- **Auxiliary Screen**

Figure 2.3-3 shows the Auxiliary screen includes tabs along the top of the screen. Before you log into DRAStudio, only the Alarm and Output tabs are visible. After you log in, the more tabs appear. See Section 2.4 Auxiliary Screen Tabs.

Figure 2.2-3 DRAStudio Main and Auxiliary screens before logging in

2.3 Main Screen Tabs and Buttons

After you log into DRAStudio, the Main screen shows a row of tabs along the left side of the window and a series of buttons.

- The tabs along the left side of the window access the various functions in the software. Click a tab to display the screen for each function. These are described in Chapter 3.
- The buttons have one or two functions depending on the button.
  - The color of the button shows you the status of the controller and the robot.
  - The picture on the button shows you the function of the button. You can click some of the buttons to quickly access the corresponding function in the software.

Figure 2.3-1 shows the tabs and buttons on the Main screen that monitor the system. Table 2.3-1 describes the tabs and Table 2.3-2 describes the buttons.

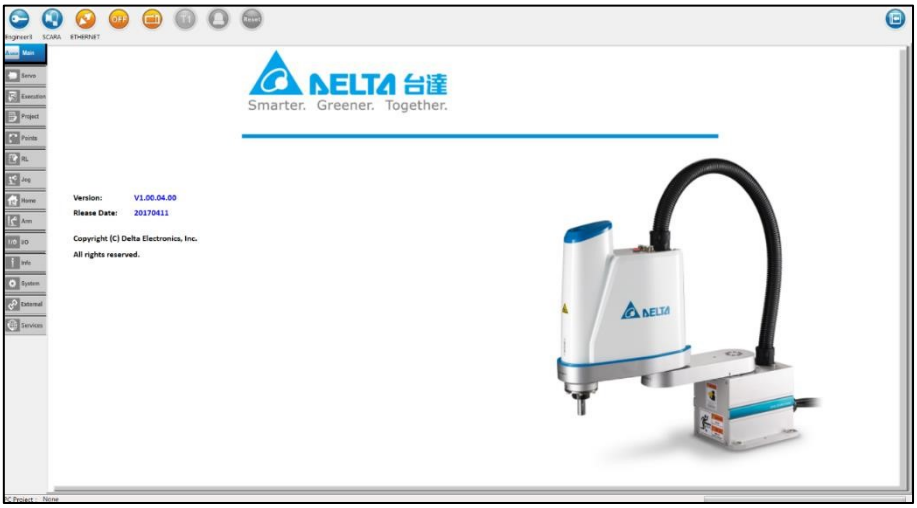


Figure 2.3-1 Main screen tabs and buttons

The following table lists the DRAStudio Main screen tabs. All tabs are available to the Engineer1 user unless noted in the description.

Table 2.3-1 Main Screen Tabs

Main Screen Tabs	Description and Function
Main	Display the Main screen in the DRAStudio window, described in this chapter
Servo	Configure servos. See Section 3.4 Set the Servos (Servo) (DRS/DRV Series).
Execution	Execute a program. See Section 3.7 Execute a Program (execute project) (DRS/DRV series).
Project	Manage projects. See Section 3.8 Manage Projects (project management) (DRS/DRV series).

Main Screen Tabs	Description and Function
Points	Create position points. See Section 3.9 Enter Point Information (Points) (DRS/DRV Series).
RL	Edit robot language programs. See Section 3.10 Edit a Delta Robot Language file (DRL) (DRS/DRV Series).
JOG	JOG settings. See Section 3.12 Specify JOG Settings (JOG) (DRS/DRV series)
Home	Define the Home point and Return To Home point. Available only to the Engineer2 and Engineer3 users. See Section 3.13 Specify Home Settings (Home) (DRS/DRV series).
Arm	Define the robot arm information, or read the information from the DCS controller. Available only to the Engineer2 and Engineer3 users. See Section 3.19 Specify Robot Arm Information (ARM) (DRS/DRV Series).
I/O	Monitor input and output values. See Section 3.14 Monitor IO (I/O) (DRS/DRV Series).
Info	View robot information for joints, axes, warnings, temperatures, controller information, and alarm history. See Section 3.15 View Information (Info.) (DRS/DRV series).
System	Define the communication, language, and backup settings. Available only to the Engineer2 and Engineer3 users. See Section 3.18 Specify System Setting (System) (DRS/DRV series)
External	View external equipment information. See Section 3.17 Set the External Devices (External) (DRS/DRV Series).
Scope	Capture real-time signals. The signals can be communication signals or robot movement information. Available only to the Engineer2 and Engineer3 users. See Section 3.20 Set the Scope (Scope) (DRS/DRV Series).
License	Launch and install applications for specific application features. Available only to the Engineer2 and Engineer3 users. See Section 3.21 View License and Module Status (License) (DRS/DRV Series).
Services	Contact Customer Service. See Section 3.20 Contact Customer Service (Services) (DRS/DRV Series).

Table 2.3-2 Main Screen Buttons

Buttons	Description and Function
 **Login**	Log in button Click this button to display the Login dialog box. This allows you to log in and log out of the software. See Section2.1 Log in to DRAStudio (DRS/DRV Series). After you log in, the user ID appears below the button
 **SCARA**	Robot Type button and current robot type (including the Virtual Robot). Click this button to select the type of robot for your system. The name of the robot type appears below the button. See Section 3.1 Select the Robot Type.
 **ETHERNET**	Robot connection button; shows the current connection status (connected / not connected); displays “Virtual” when connected to the Virtual Robot. Click this button to select the type of connection to the robot. The type of connection appears below the button. See Section 3.2 Select the Controller Connection (Connect) (DRS/DRV Series).
	Robot servo status button; shows the current robot servo actuation status (actuated / not actuated). Click this button to switch robot servos ON and OFF. You can also switch dynamic braking ON and OFF if the robot and controller use dynamic braking. See Section 3.4 Set Servos and Dynamic Brakes (Servo) (DRS/DRV Series).

Buttons	Description and Function
	Robot teaching pendant status (teaching pendant has control / DRAStudio has control). Click this button to switch control to the teaching pendant. See Section 3.5 Set Teaching Pendant Status (Teaching Pendant) (DRS/DRV Series).
	Operation status button; shows the current operating mode (T1 mode / T2 mode / Auto mode). This button has no other function. See Section 3.6 View Operation Mode Status (Status) (DRS/DRV Series).
	Auxiliary screen button. Click the button to show and hide the Auxiliary screen in the DRAStudio window. See Section 2.4 Auxiliary Screen Tabs.
	Alarm status button; shows the current alarms status (alarm / warning / no alarm). This button has no other function.
	Alarm reset button; shows the alarm status (alarm / no alarm). Click this button to reset an alarm. Note that clicking the Alarm Reset button does not eliminate the cause of a warning, such as robot temperature too high or a safety signal. You must resolve the problem to clear a warning. When a warning occurs, you can still JOG the robot. See the Alarm Descriptions Manual for more information on alarms and warnings.

2.4 Auxiliary Screen Tabs

The Auxiliary screen tabs at the top of the screen. The number and name of the Auxiliary screen tabs depends on the selected Main screen tab and function.

Table 2.4-1 Auxiliary Screen Tabs

Auxiliary Screen Tab	Description and Function
Output	Displays output information from the software, such as connection, status, and program information. The information depends on the selected Main screen tab.
Alarm	Displays alarm information
Project	Displays project information. See Section 3.7 Manage Projects (project management) (DRS/DRV series).
Point	Displays point information. See Section3.8 Enter Point Information (Points) (DRS/DRV Series).
Work Space	Displays workspace information. See Section3.8 Enter Point Information (Points) (DRS/DRV Series).
JOG	Displays JOG information. See Section 3.11 Specify JOG Settings（JOG） (DRS/DRV series).
Function	Displays Function information.
External Axis	Displays external axis information. See Section3.15
RL	Displays robot language information. See Section3.9 Edit Robot Language (DRL) (DRS/DRV Series).

3. Using DRAStudio

3.1 Select the Robot Type

The first step in using DRAStudio is to select the correct robot type for your system.

1. On the Main screen, click the **Robot Type** button ( ).
2. In the Robot Select dialog box, select the robot by clicking the **Robot Type**, and then select the **Robot Model**. You can also select VA for the Virtual Robot. See Chapter 4 Virtual Robot.
3. Click **OK** to close the dialog box. The selected Robot Type name appears below the Robot Type button.

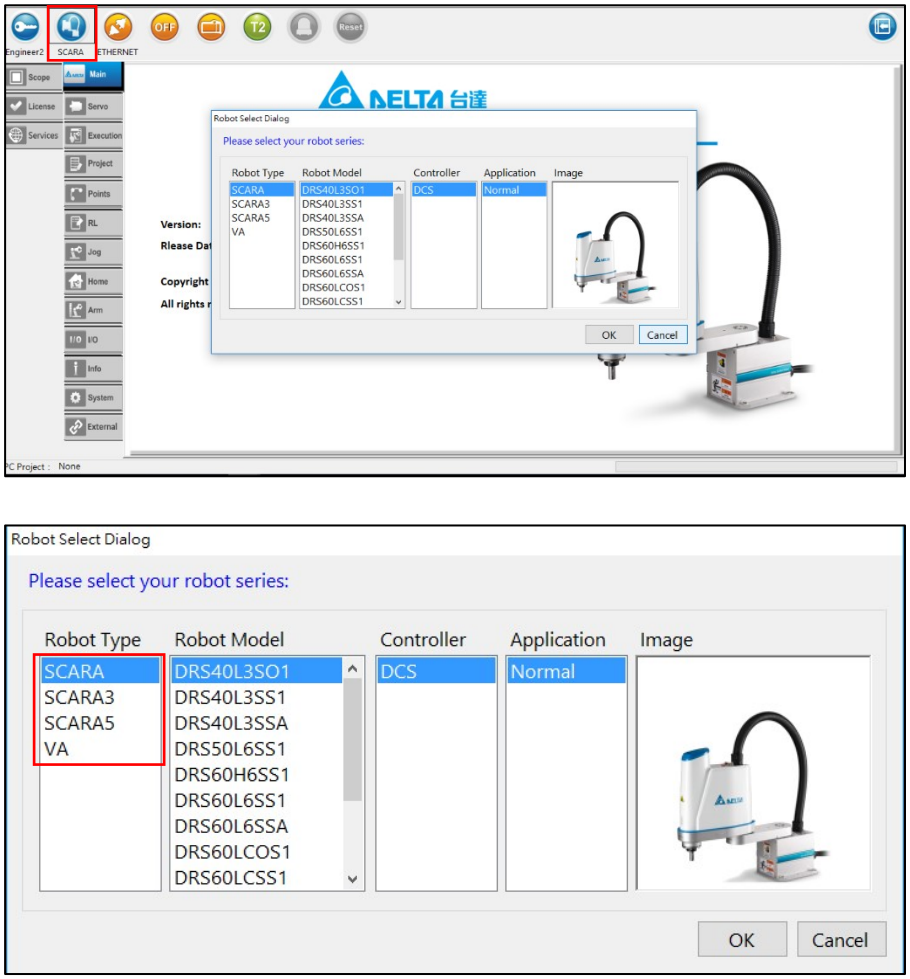


Figure 3.1-1 Select the robot type and model

3.2 Select the Controller Connection (Connect) (DRS/DRV Series)

This section shows you how to select the connection to the robot DCS controller.

1. On the Main screen, click the **Connect** button ( ).
2. In the Connect dialog box, select the connection type: **Ethernet, USB** or **Virtual Robot**.
3. Click **Connect**. DRAStudio tries to communicate with the robot controller through the selected connection. If successful, the **Status** changes from Disconnected to Connected.

If you select USB, and the device connected to your computer's USB port does not support Ethernet, DRAStudio displays a warning message. If the device connected through USB is the robot controller, a message with the controller IP address appears.

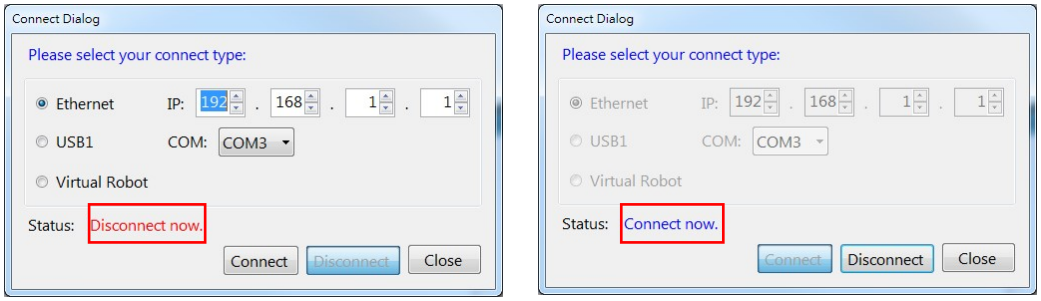


Figure 3.2-1 Connection setting dialog

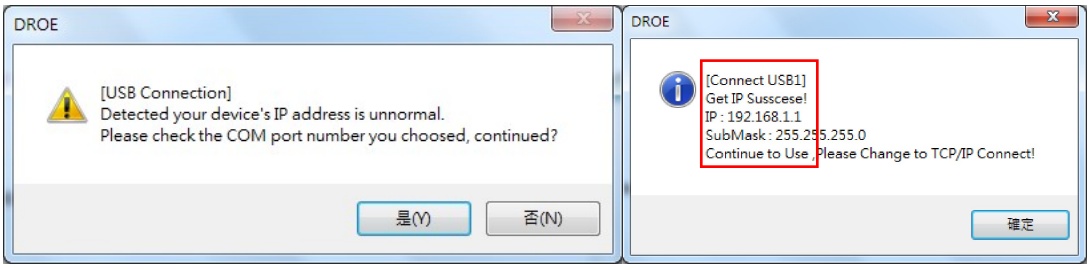


Figure 3.2-2 USB connection messages

3.3 Set Servos and Dynamic Brakes (Servo) (DRS/DRV Series)

Use the Servo Setting screen (Servo tab on the Main screen as shown in Figure 3 5) to start and shut down the servo motors and control the dynamic brake.

1. On the Main screen, click the Servo tab.
2. In the Servo Setting screen, click the arrow buttons to start and shut down individual servos or all servos. Clicking an arrow button switches the servo status between OFF (red) and ON (green).
   After the servo starts successfully, the background color of the servo button turns green.
   After the servo shuts down, the background color of the servo button turns red.
3. If the robot and controller use dynamic braking, click the arrow buttons to switch the dynamic brake for each axis between OFF (red) and ON (green).
4.

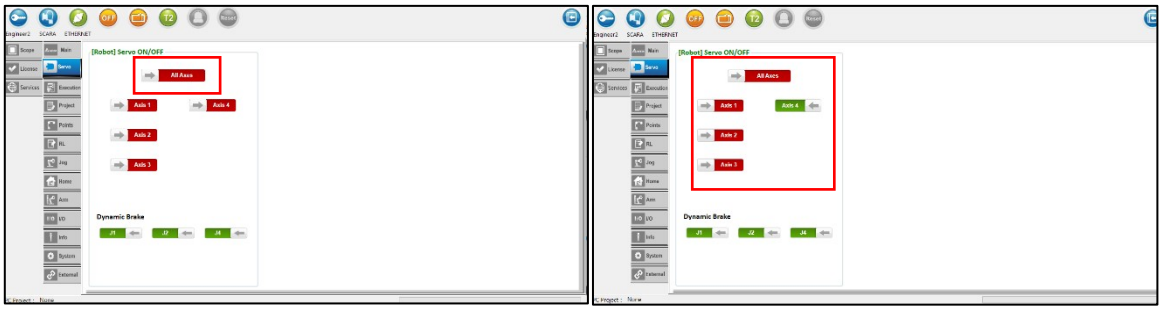


Figure 3.3-1 DRS Series Servo Setting (one servo)

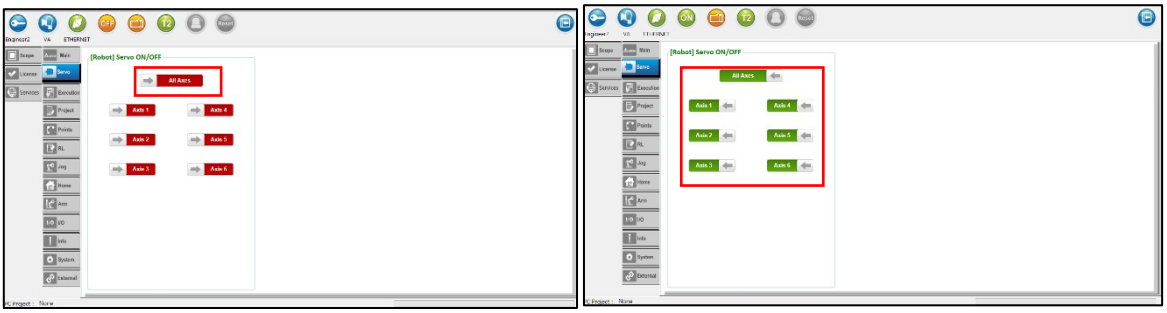


Figure 3.3-2 DRV Series Servo Setting (all servos)

Figure 3.3-3 DRS Series Servo Setting (one servo)

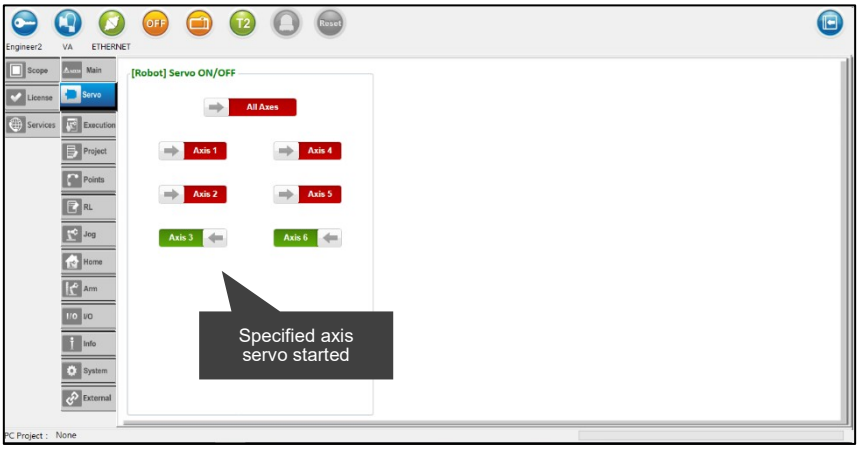


Figure 3.3-4 DRV Series Servo Setting (one servo)

3.4 Set Teaching Pendant Status (Teaching Pendant) (DRS/DRV Series)

If you connect a Teaching Pendant (TP) to your robot controller, you can use the Teaching Pendant button to change the TP status between ON and OFF.

1. Teaching pendant is OFF.

You cannot use the teaching pendant to operate the robot in this mode, but you can use DRAStudio to operate the robot.

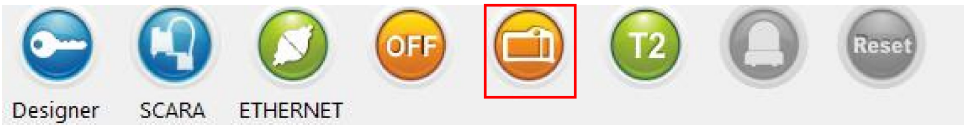


Figure 3.4-1 Teaching pendant OFF

2. Teaching pendant is ON.

You use the teaching pendant to operate the robot in this mode, but you cannot use DRAStudio to operate the robot.

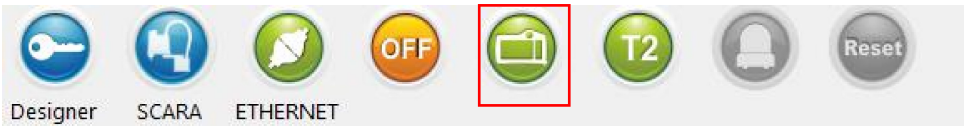


Figure 3.4-2 Teaching pendant ON

3.5 View Operation Mode Status (Status) (DRS/DRV Series)

The Operating Status button shows the current operation mode (T1, T2, or Auto). You can use system I/O to change the operation mode. When DRAStudio connects to the DCS controller, is automatically changes the operation mode.

1. Operation in T1 mode

In T1 mode, the maximum JOG synthetic speed is 250 millimeters/second (mm/s). In this mode, you can use the Teaching Pendant or DRAStudio to control the robot, but you cannot use System I/O to control the project execution status. Safety device signals and the Reset button are disabled in T1 mode, as shown in Figure 3.5-1.

Figure 3.5-1 T1 operation mode

2. Operation in T2 mode

In T2 mode, the maximum JOG synthetic speed is 2000 millimeters/second (mm/s). In this mode, you can use the Teaching Pendant or DRAStudio to control the robot, but you cannot use System I/O to control the project execution status. Safety device signals and the Reset button are enabled in T2 mode.

Figure 3.5-2 T2 operation mode

3. Operation is in Auto Mode

In Auto mode, you cannot use the Teaching Pendant to control the robot, but you can use both DRAStudio and System I/O to control the project execution status. Safety device signals and the Reset button are enabled in Auto mode.

Figure 3.5-3 Auto operation mode

3.6 Execute a Project (Execution) (DRS/DRV series)

Use the Execution screen (**Execution** tab on the Main screen as shown in Figure 3.6-1) to open, run, pause, and stop projects on the DCS controller.

1. In the Execution screen, click Open Project to open a controller project.
2. In the Execute Controller Project dialog box, select a project. The dialog box lists all the projects stored on both the DCS controller and the PC.
3. Click OK to open the selected project. DRAStudio displays the open project name in Controller Project.
4. Click Run to run the open project. DRAStudio displays the project status.
5. Click Pause to pause the running project, or click Stop to stop the running project.

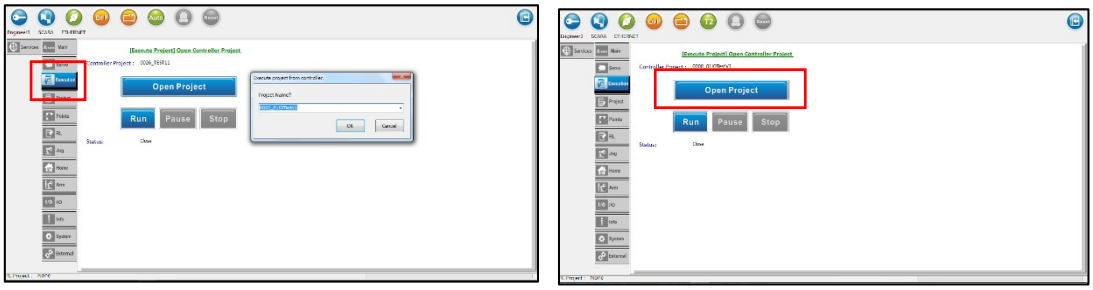


Figure 3.6-1 Execute a project in the controller.

3.7 Manage Projects (Project) (DRS/DRV series)

Use the Project screen (**Project** tab on the Main screen as shown in Figure 3.7-1) to move projects between the DCS controller and the PC, create new projects on the PC, and delete projects from the PC.

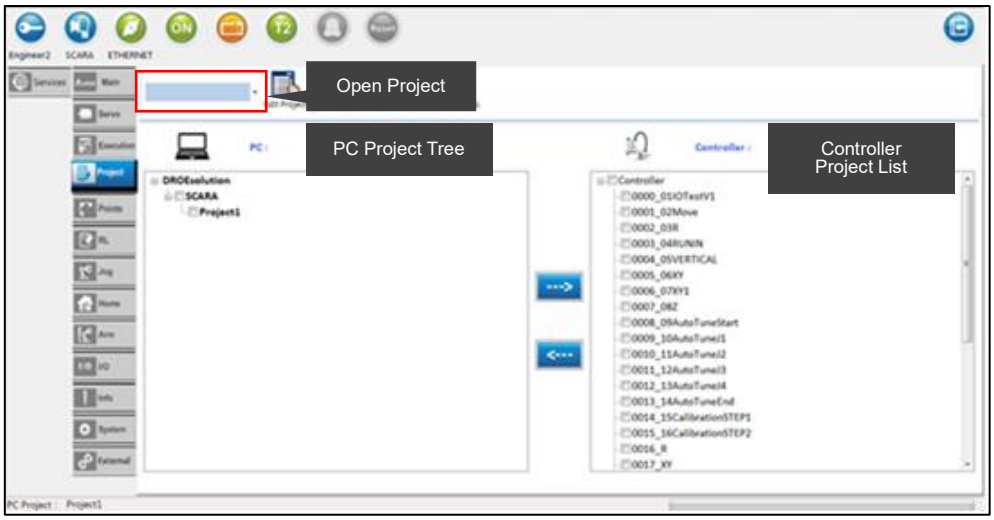
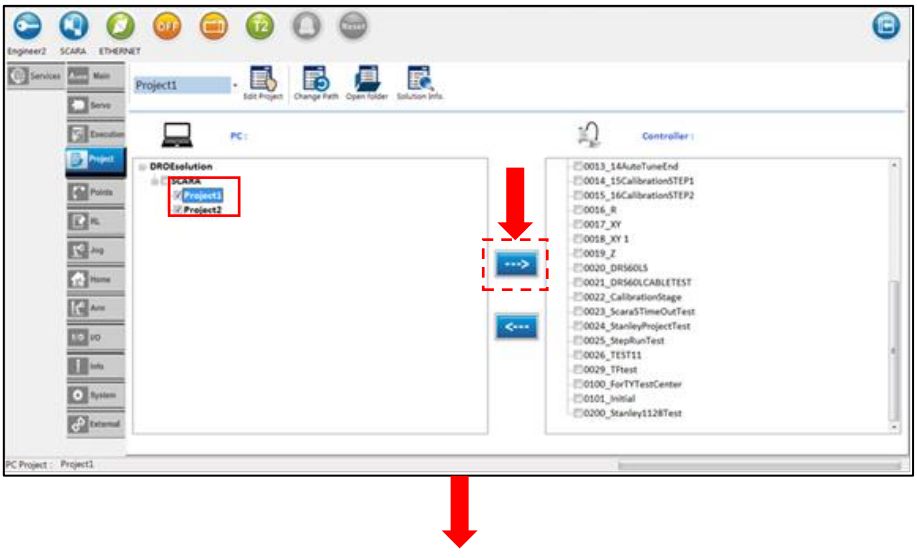


Figure 3.7-1 Project screen

The Project screen lists the projects on the PC and the projects on the connected DCS controller. DRAStudio organizes projects on the PC into folders, and the folder structure is the same as the tree structure in the Project screen. The project tree displays the projects alphabetically by project name. The Project tab on the Auxiliary screen shows the projects in the DCS controller's memory.

To download a project from the PC to the DCS controller

1. Click the checkbox next to one or more project names on the PC to select the projects.
2. Click the → button between the PC and the controller to download the selected projects to the DCS controller.



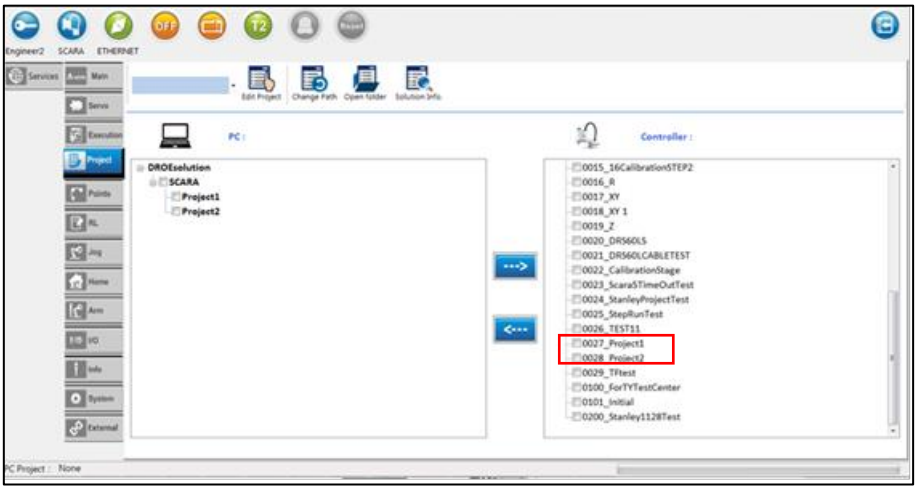


Figure 3.7-2 Download PC project to the DCS controller

To upload a project from the DCS controller to the PC

1. Click the checkbox next to one or more project names on the DCS controller to select the projects.
2. Click the ← button between the PC and the controller to upload the selected projects to the PC.

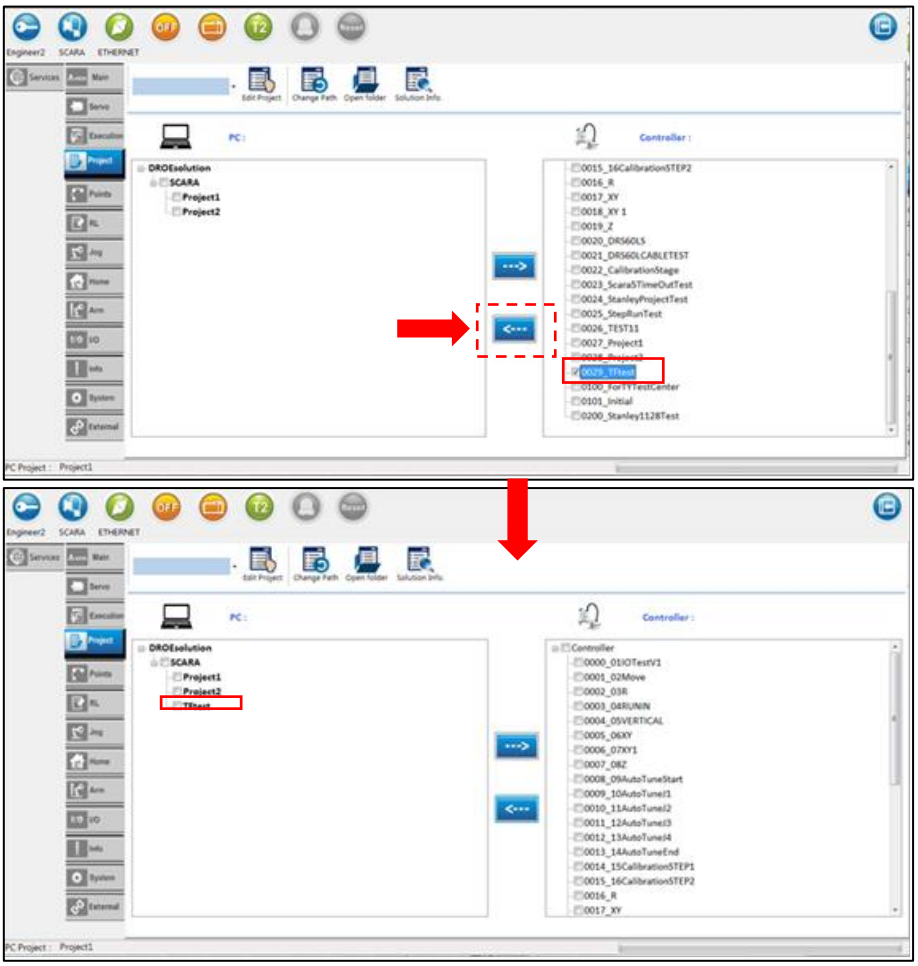


Figure 3.7-3 Upload controller project to the PC

To add a new Robot Language project on the PC

1. Right-click the project folder and then click Add New RL Project. For the Add New Block Project command, see 3.11 Edit Visual Delta Intuitive Language (vDRL) (DRS/DRV Series).
2. In the PC Project dialog box, enter the name for the new project and then click OK. The new project appears in the project tree.

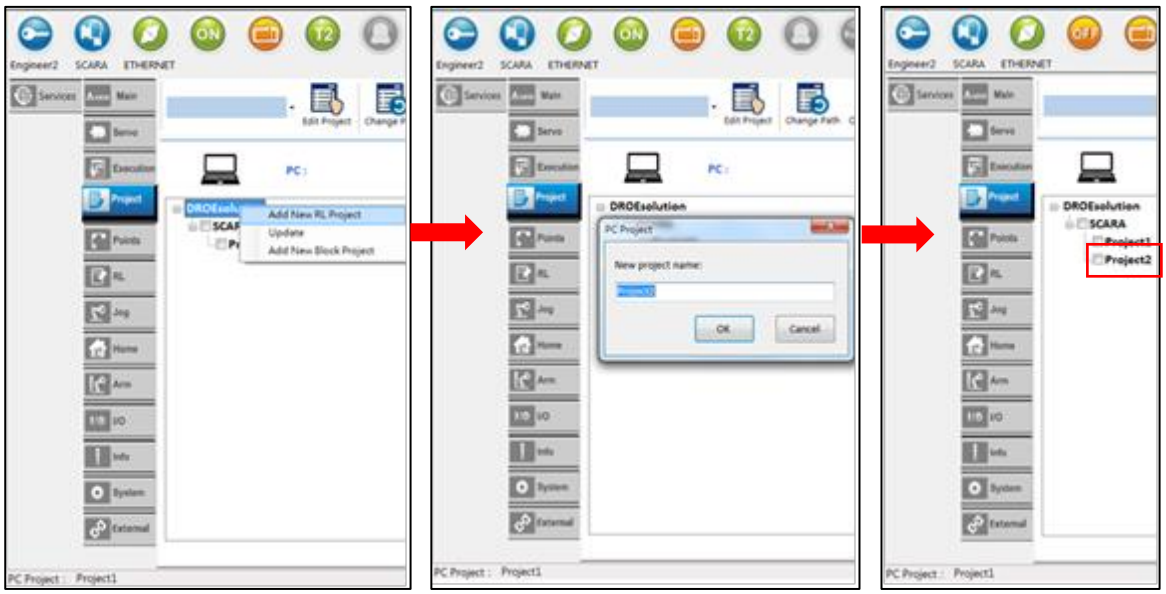


Figure 3.7-4 Add a new project

To open an existing Robot Language project on the PC

Click the project in the project tree and then on the Project toolbar click Edit Project. You can also choose the project from the list of project names to the left of the Edit Project button, and then click Edit Project. The name of the current project appears in the lower-left of the DRAStudio window.

To rename a project on the PC

1. Right-click the project name and then click Rename.
2. In the PC Project dialog box, enter the new name for the project and then click OK. The renamed project appears in the project tree.

To change the number for a project on the DCS controller

1. Right-click the project name in the DCS controller and then click Change Number.
2. In the Controller Project dialog box, enter the new number for the project and then click OK. The renumbered project appears in the controller project list. Note that the project number must be between 1–1000 and each project number must be unique.

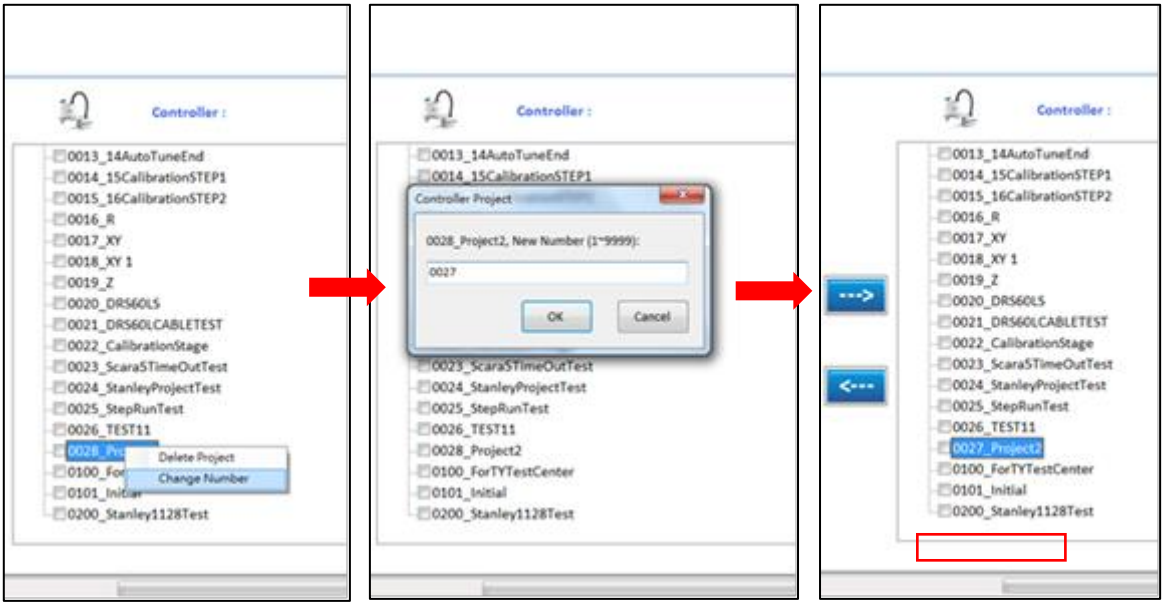


Figure 3.7-5 Change DCS controller project number

To edit a project on the PC

1. Click a project to select it, then click the Edit Project button on the toolbar.
2. In the Main window, click the RL tab to open the RL Editor screen for the project. See Section 3.10 Edit Robot Language (DRL) (DRS/DRV Series). If the project is an RL block project, see Section 3.11 Edit Visual Delta Intuitive Language (vDRL) (DRS/DRV Series).

To copy a project on the PC

1. Right-click the project name and then click Copy.
2. In the PC Project dialog box, enter the name for the new project and then click OK. The new project appears in the project tree.

To delete a project from the PC

Right-click the project name and then click Delete. Note that you cannot delete the current project.

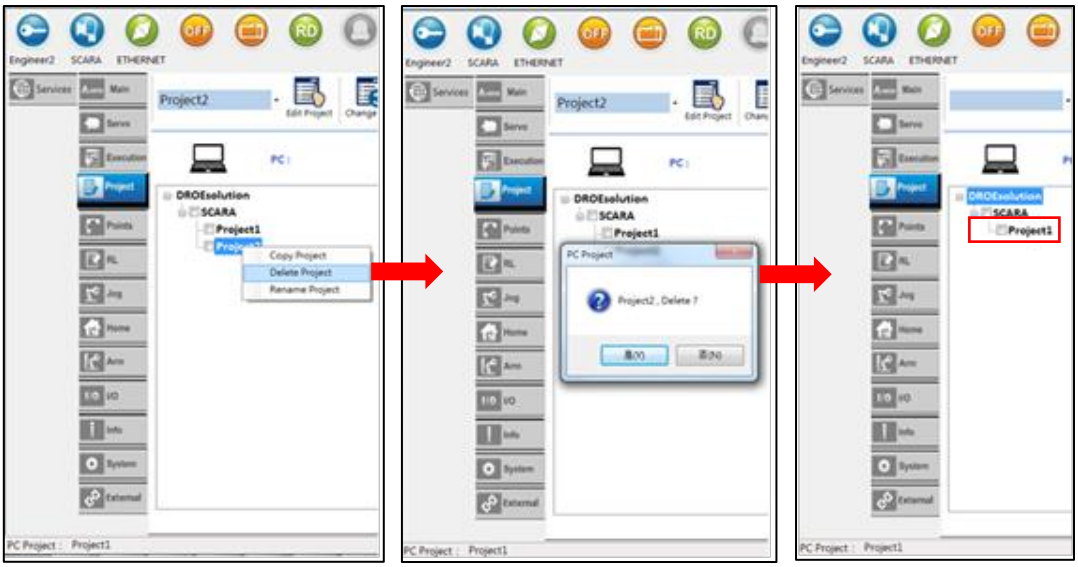


Figure 3.7-6 Delete project from the PC

To delete a project from the DCS controller

Right-click the project name and then click Delete. Note that you cannot delete the current project.

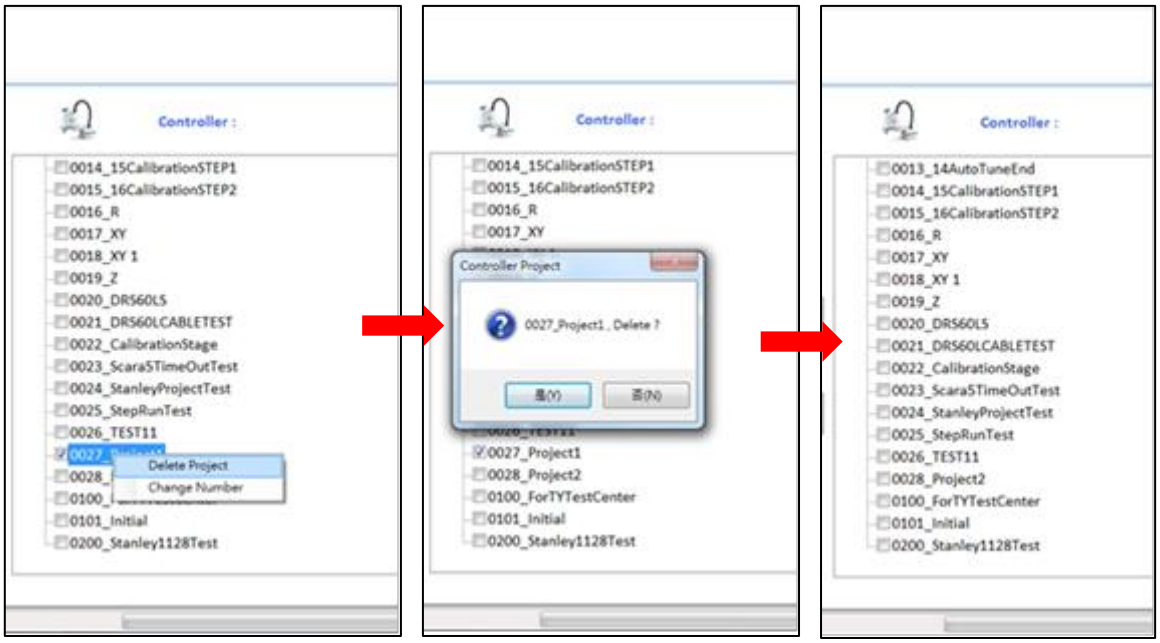


Figure 3.7-7 Delete project from the controller

To refresh the project list on the PC or the DCS Controller

Right-click the project folder (for the PC) or Controller (for the DCS controller) and then click Update.

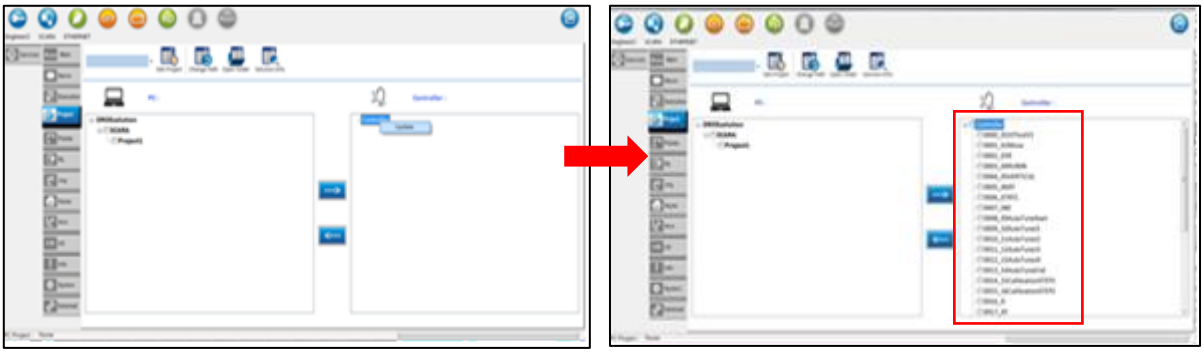


Figure 3.7-8 Update project list

To change the path to the project folder on the PC

1. On the toolbar, click the Change Path button.
2. In the Set Solution Path dialog box, enter the new path, or click Change Path to open the Browse For Folder dialog box.
3. Click Default Path to reset the path to the default folder.
4. Click Apply to save the new path. When you click Apply, DRAStudio asks you to choose a project to be the current project.

To open the project folder on the PC in Windows File Explorer

On the toolbar, click the Open Folder button.

3.8 Set Point, Frame, and Work Space Information (Points) (DRS/DRV Series)

Use the Point screen (**Point** tab on the Main screen) **Local** and **Global** tabs to set the values for local points and global points, including point offsets, Lift motion, and accuracy. You can also set the user frame coordinates (**User Frame** tab), tool coordinates (**Tool Frame** tab), and work space coordinates (**Work Space** tab). You can directly enter the values, or upload point values from the DCS controller. You can also use the GO function to move the robot arm to a point.

3.8.1 Set Point Information

Local and Global point position files

Figure 3.9-1 shows the Local and Global Point screens.

- The local point file can store up to 30000 points for each project.
- The global point file can save 1000 points that are shared by all projects and saved in the DCS controller.

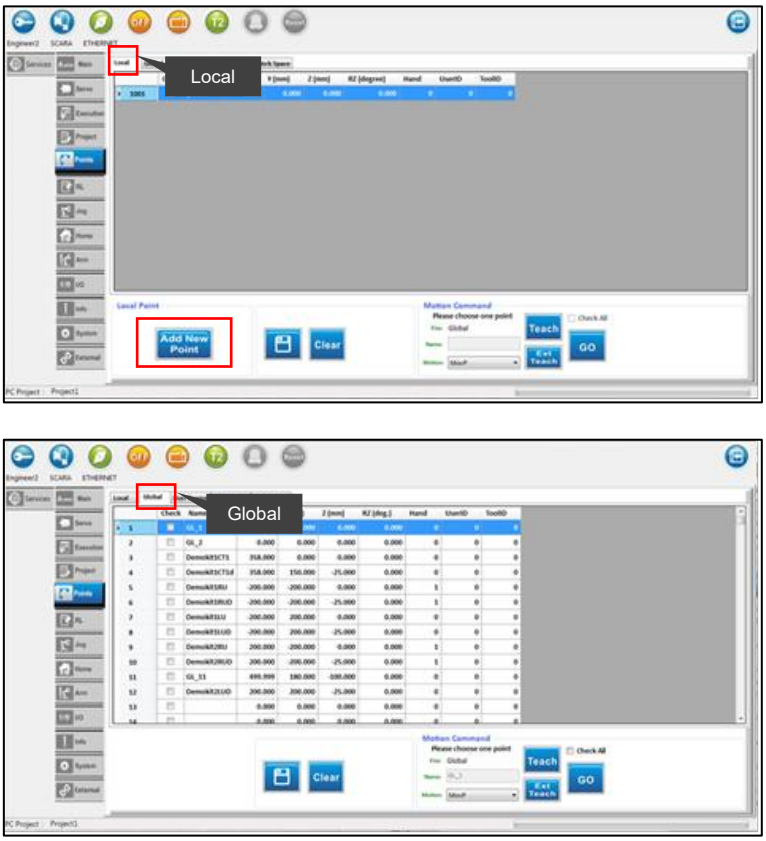


Figure 3.8-1 Point position file (Global/Local)

To add a local point (add a new point position, not available for global points)

1. On the Points screen, click the Local tab to display the Local Points table.
2. Click Add Point to add a new row in the table.
3. Click in a column in the new row and enter the values for the new point. You can also double-click in a column to edit the values.

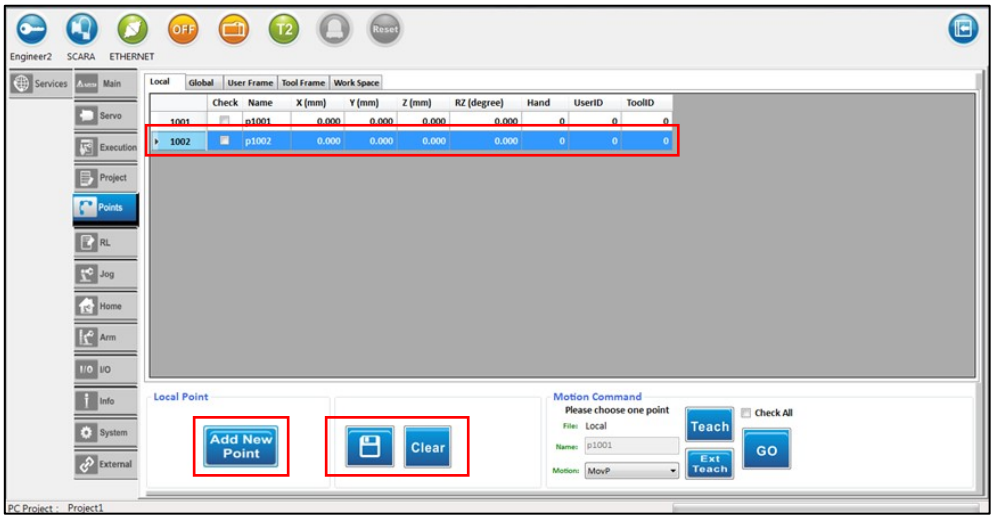


Figure 3.8-2 Add/clear/save local points

To delete local points (not available for global points)

1. Select one or more rows by clicking the checkbox in the Check column.
2. Click Delete to delete the points in the selected rows.

To teach local or global points

1. Use the JOG function on the Auxiliary screen to move the robot arm to the correct position.
2. Select one or more local points (Local tab) or global points (Global tab) by clicking the checkbox in the Check column.
3. Click Teach to copy the current arm position to the selected local or global points.

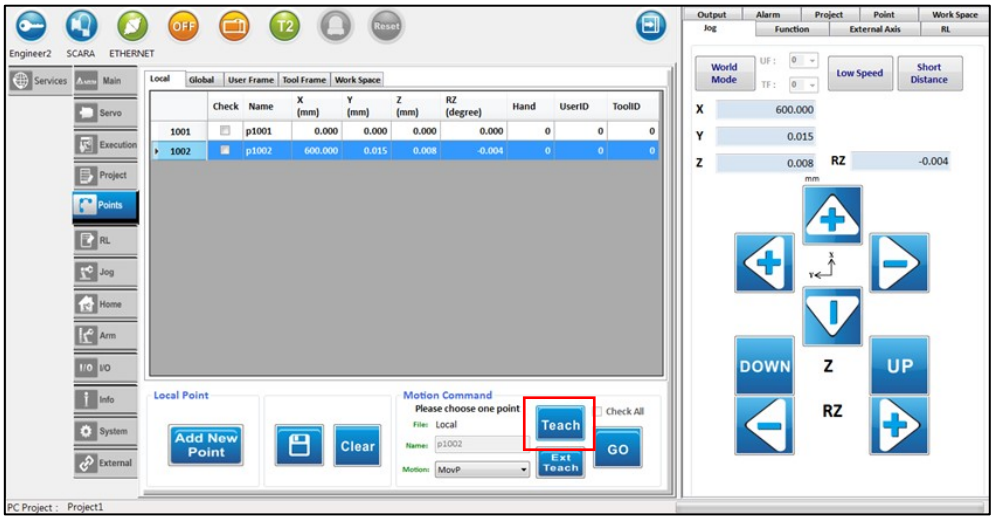


Figure 3.8-3 Teach point using JOG

To move to a local or global point position using the GO function

1. Select a local or global point by clicking the checkbox in the Check column on the Local tab or the Global tab.
2. Select the movement mode from the Motion list.
3. Click the GO button and hold down the mouse button to move to the selected point position. Release the mouse button to stop the robot arm movement.

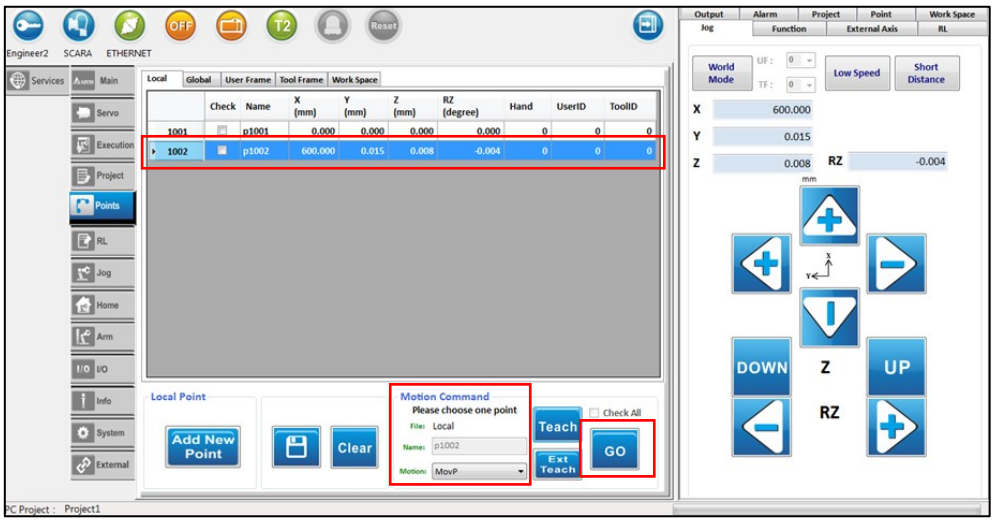


Figure 3.8-4 Move to point position (GO)

To save points to the points file

When you change the values for a point, the changed row is highlighted in orange color. Click the Disk icon button to the left of the Clear button to save the changed points to the points file. Saving the points clears the orange highlighting.

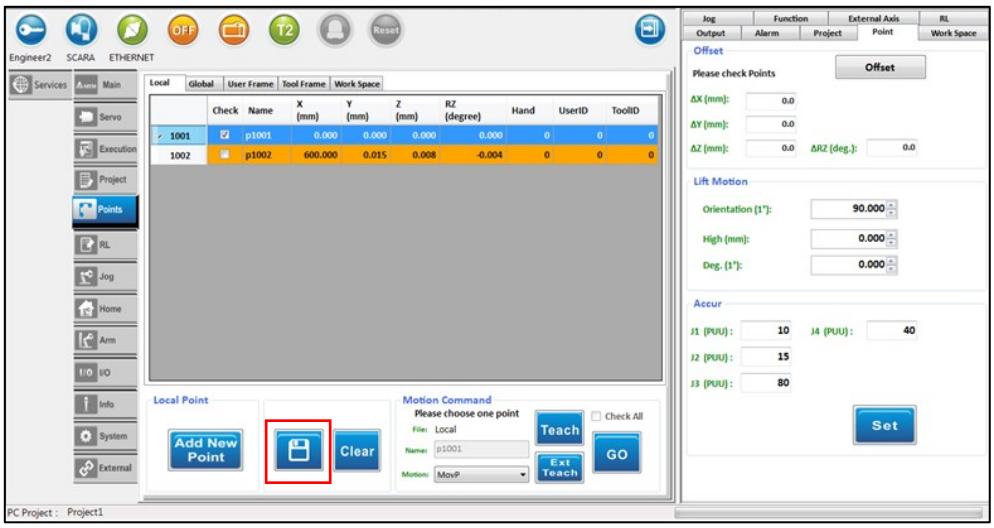


Figure 3.8-5 Save point to point file

To set the point offset (coordinates data offset)

1. Select one or more local or global points by clicking the checkbox in the Check column on the Local tab or Global tab.
2. In the Auxiliary screen, under Offset, set the offset corrections for the selected points. ΔX is the X axis offset, ΔY is the Y axis offset, ΔZ is the Z axis offset, and ΔRz is the Rz axis offset.
3. Click Offset to modify the point data.

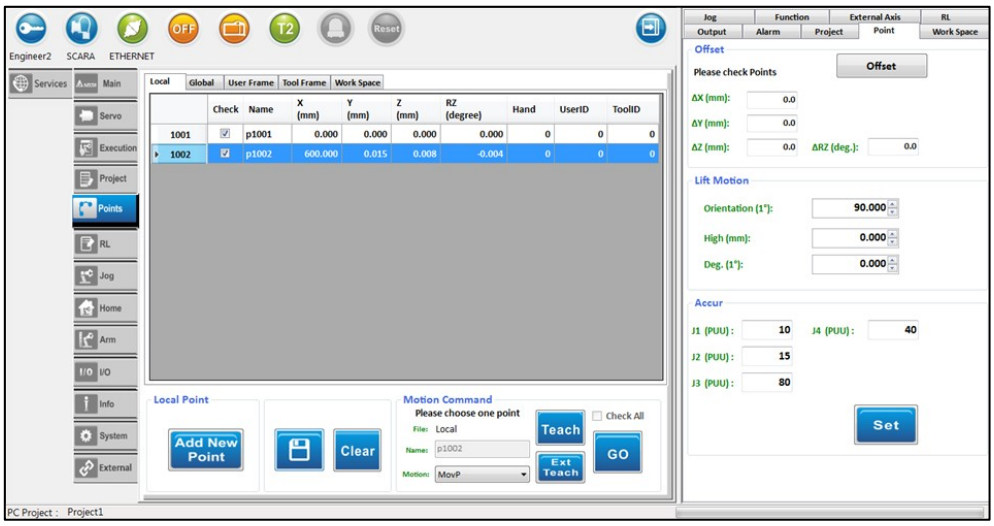


Figure 3.8-6 Set offset for a point

To set the Lift motion for a point

You can use the GO function to set the Lift motion. Note that this is like the JOG function in that you use it to move the robot, but the coordinates are not automatically saved.

1. In the Local or Global point screen, set the Motion type to Lift .
2. Move an object along the tool device at the end of the robot or move it to a certain level toward the opposite direction.
3. Select one local or global point by clicking the checkbox in the Check column.
4. Click the GO button to execute the Lift motion.

You can also use the Lift Motion settings on the Auxiliary screen.

1. Select one or more local or global points by clicking the checkbox in the Check column on the Local tab or Global tab.
2. In the Auxiliary screen, under Lift Motion, set the Lift motion for the selected points. Orientation is the rising direction, High is the rising height, and Deg. is the rising angle.

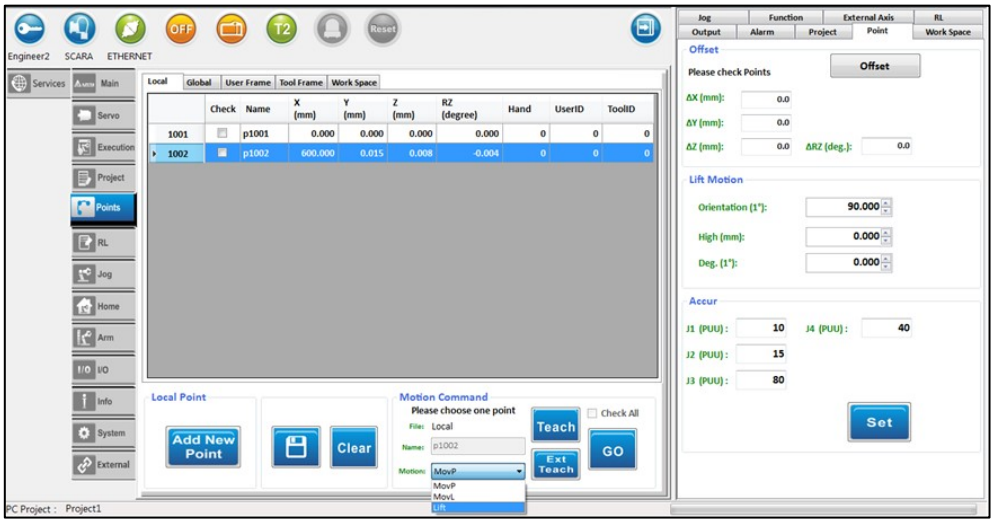


Figure 3.8-7 Set Lift motion for a point

To set the point accuracy

1. Select one or more local or global points by clicking the checkbox in the Check column on the Local tab or Global tab.
2. In the Auxiliary screen, under Accuracy, set the accuracy for the selected points.
3. Click Set to modify the point data.
   When the difference between the target point and the actual position is less than the Accuracy values, the system outputs the position reached signal to the controller.

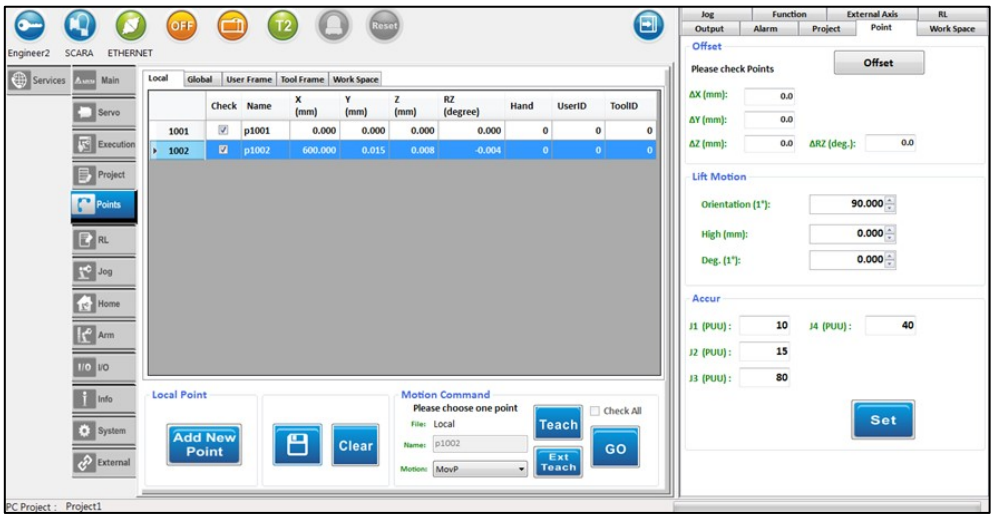


Figure 3.8-8 Set accuracy for a point

To export and import points from a file

This function exports the entire points table to a comma separated values file (CSV format) that you can then open in Microsoft Excel. After you edit the points table in Excel, you can save the file in CSV format and import it into DRAStudio.

1. Display the Points tab and the Auxiliary screen.
2. In the Auxiliary screen on the Point tab in the File Operate group, click Export, to export the points table to a CSV file.
3. You can then open the file in Excel, edit the values, and save the file in CSV format.
4. Click Import to import the CSV file back into DRAStudio.
   <Add screen capture for Export/Import points>

To clear values for local or global points

1. Select one or more local or global points by clicking the checkbox in the Check column.
2. Click Clear to clear the values for the selected points. This resets the values to zero but does not delete the points.

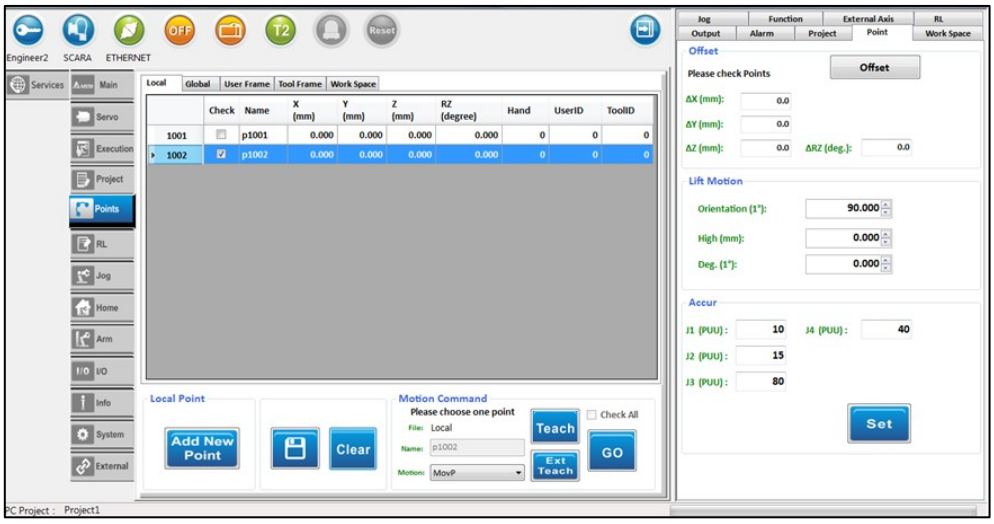


Figure 3.8-9 Clear value for a point

3.8.2 Set User Frame Information

Use the Point screen (Point tab on the Main screen) User Frame tab to set the User Frame coordinates. This includes directly entering the values, as well as uploading values from the DCS controller. The User Frame coordinates system is a user-defined coordinate system. You can define the coordinate system at any position; for example on the work piece or on the workbench.

To set User Frame coordinates

1. Select the User Frame ID. You can use up to nine sets of user coordinates (1–9) . If you set ID to 0, it means to use the system's geodetic coordinate system, which you cannot change.
2. Select the coordinate Type.
   - Set the User Frame orientation (Orthogonal, NonOrthogonal)
   - Set the User Frame inclination (Inclined, NonInclined.z).
3. Set the User Frame coordinate values (Input) for the Origin , and the +X and +Y axis points. You can manually enter the values or you can upload the values from the current robot arm position.

   A. Directly enter the coordinate values.
   1. Set the Type to Orthogonal or NonOrthogonal.
   2. Set the User Frame ID to 1–9.
   3. Click in each cell in the Input table and enter the coordinate values.

   B. Use the JOG function to move the robot arm then upload the position values.
   1. Set the Type to Orthogonal, and the ID to 0.
   2. Use the JOG function (Auxiliary screen, JOG tab) to move the arm to the correct position.
   3. Click one of the rows in the Input table (Origin, +X axis, or XY for Orthogonal; or Origin, +X axis, or +Y axis for NonOrthogonal).
   4. Click the Teach button to record the current arm position value into the selected row.

The system uses the coordinate of these three points to calculate the conversion between the geodetic coordinate system (ID = 0) and the specified user-defined coordinate system.

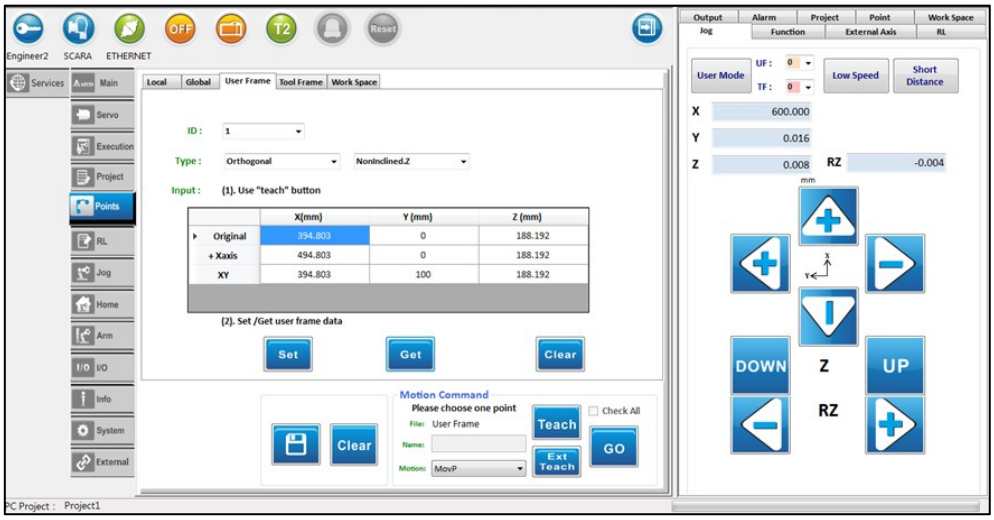


Figure 3.8-10 User Frame screen

To download User Frame coordinates from the PC to the DCS controller

1. Select the User Frame ID that you want to download to the DCS controller (1–9) .
2. Click Set.

To upload User Frame coordinates from the DCS controller to the PC

1. Select the User Frame ID where you want to store the uploaded coordinates from the DCS controller (1–9) .
2. Click Get.

To clear User Frame coordinates

1. Select the User Frame ID that you want to clear (1–9) . This only clears the current User Frame coordinates in DRAStudio.
2. Click Clear.

3.8.3 Set Tool Frame Information

Use the Point screen (**Point** tab on the Main screen) **Tool Frame** tab to set the Tool Frame coordinates. This includes directly entering the values, as well as uploading values from the DCS controller. A tool frame coordinate system is based on the relationship between a tool and the robot. It is user-defined, and the origin is usually the endpoint of the tool.

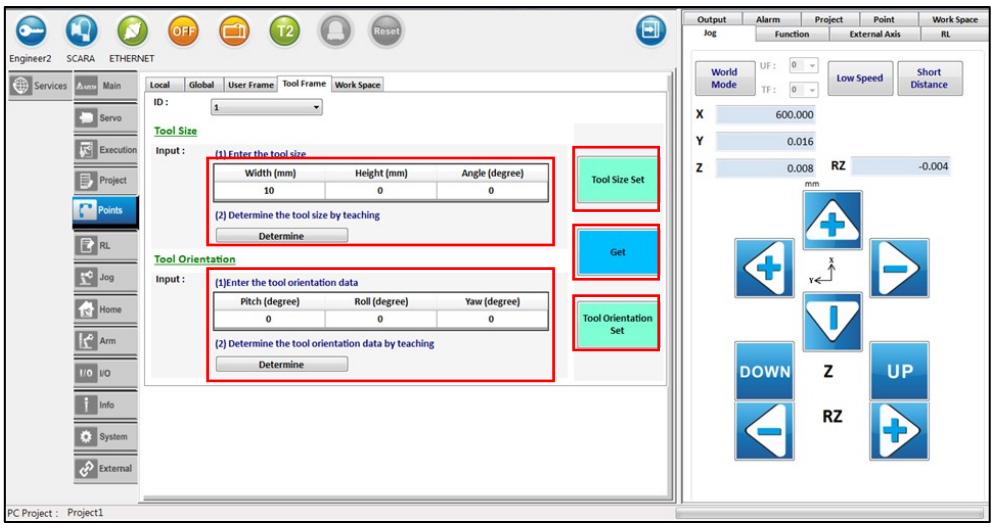


Figure 3.8-11 Tool Frame screen

To set Tool Frame coordinates

1. Select the Tool Frame ID. You can use up to nine sets of tool coordinates (1–9) . If you set ID to 0, it means to use the system's geodetic coordinate system, which you cannot change.
2. Set the Tool Size (Width, Height, Angle). You can manually enter the values, or you determine the tool coordinates by teaching with up to eight robot arm positions.

   A. Directly enter the tool size coordinates

   1. Set the Tool Frame ID to 1–9.
   2. Click in each cell in the Tool Size Input table and enter the tool size coordinates.

   B. Teach the tool size coordinates (open calibration)

   In this method, you teach the robot the same position using different postures, up to eight postures. The system calculates the tool width and angle from the postures. You must still manually enter the tool height.

   1. Set the Tool Frame ID to 1–9.
   2. Under Determine the tool size by teaching, click Determine. This opens the Tool Size Calculation screen.
   3. Click in a row in the Input table. You can manually enter the values, or move the robot to the position and click Teach.
   4. Click Calculate to calculate the tool height, width, and angle from the values in the table.
   5. Click Tool Size Set to save the calculated values for the Tool Frame ID and download them to

the DCS controller.

6. Click Back to return to the Tool Frame screen.

3. Set the Tool Orientation (Pitch, Roll, Yaw). Tool Frame orientation refers to defining new XYZ faces for the end position for the robot. You can define it for different tools. You can manually enter the values, or you determine the tool orientation by teaching with the robot.

A. Directly enter the tool orientation coordinates

Set the Tool Frame ID to 1–9.

Click in each cell in the Tool Orientation Input table and enter the tool orientation coordinates.

B. Teach the tool orientation coordinates (open calibration)

In this method, you teach the orientation coordinates using the robot. The system calculates the tool orientation from the robot.

Set the Tool Frame ID to 1–9.

Under Determine the tool orientation data by teaching, click Determine. This opens the Tool Orientation Calculation screen.

Click in the Origin row in the Input table. You can manually enter the values, or use the JOG function (Auxiliary screen, JOG tab) to move the arm to the correct position and then click Teach.

Repeat the previous step for the +X axis and +Y axis rows.

Click Tool Orientation Set to calculate the tool orientation coordinates and save the calculated values for the Tool Frame ID and download them to the DCS controller.

Click Get to upload the rotation information for the Tool Orientation from the DCS controller.

Click Back to return to the Tool Frame screen.

To download Tool Size coordinates from the PC to the DCS controller

1. Select the Tool Frame ID that you want to download to the DCS controller (1–9) .
2. Click Tool Size Set.

To download Tool Orientation coordinates from the PC to the DCS controller

1. Select the Tool Frame ID that you want to download to the DCS controller (1–9) .
2. Click Tool Orientation Set.

To upload Tool Frame coordinates from the DCS controller to the PC

1. Select the Tool Frame ID that you want to download to the DCS controller (1–9) .
2. Click Get.

3.8.4 Set Work Space Information

Use the Point screen (Point tab on the Main screen) Work Space tab to set the Work Space coordinates. This includes directly entering the values, as well as uploading values from the DCS controller. The Work Space refers the working area and restricted area in the robot movement space. You define the restricted area to protect the robot and other equipment. You define the working area so that you can enter the position of the object or its related parameters to define the position of the object in the Work Space. The Auxiliary screen lists the Type and Area for the 10 Work Spaces.

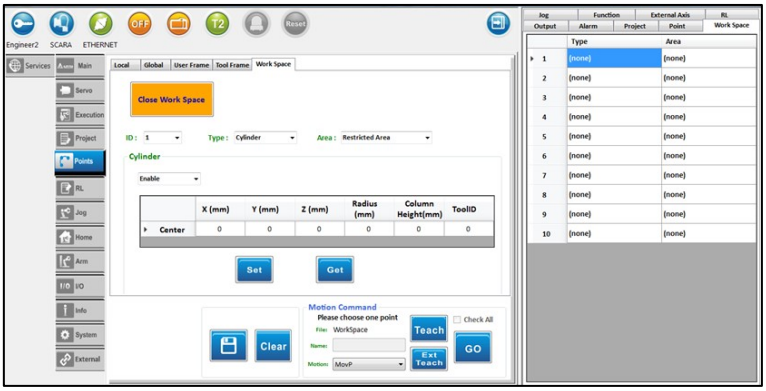


Figure 3.8-12 Work Space screen

To set Work Space coordinates

1. Select the Work Space ID. You can use up to 10 sets of Work Space coordinates (1–10) .
2. Select the Type (shape) (Cylinder, Rectangle). Note that changing the Type also changes the coordinates that define the Work Space.
3. Select the Area (Restricted, Working).
4. Select Enable or Disable for the Work Space.
5. Click in each cell in the input table to manually enter the Work Space coordinates. You can also upload the coordinates from the DCS controller if you are connected to the DCS controller.
6. Click the Open Work Space button to switch between Open Work Space and Close Work Space for the current work space

To upload the Work Space coordinates from the DCS controller to the PC

You must be connected to the DCS controller.

1. Select the Work Space ID where you want to store the uploaded coordinates from the DCS controller (1–10) .
2. Click Set. The Type and Area for the Work Space appear in the Auxiliary screen.

To download Work Space coordinates from the PC to the DCS controller

You must be connected to the DCS controller.

1. Select the Work Space ID that you want to download to the DCS controller (1–10) .
2. Click Set.

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

3.8.5 Joint Index Function

Use the Point screen (**Point** tab on the Main screen) Auxiliary screen **Local** and **Global** tabs to set the joint index function for local points and global points. The rotation range of the end axis of the DRS model is -360–360 degrees (which is two full circles, one in each direction). The robot can reach the same position by clockwise or counterclockwise rotation. The number displayed on the Joint Index (**J4_JRC**) tells you the amount of rotation while teaching points, as shown in Figure 3.8-13.

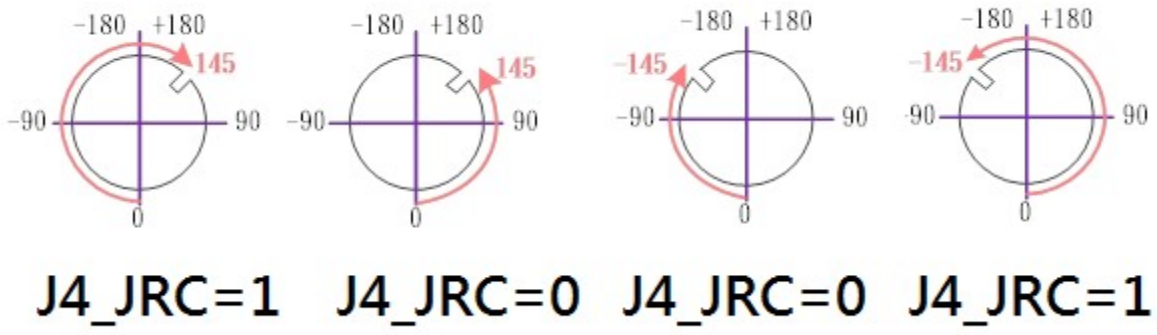


Figure 3.8-13 Using the Joint Index to determine the amount of rotation of the end axis

If J4_JRC equals 1, it means that the end axis rotates more than 180 degrees. Enter 1 or 0 in the **JRC_Active** column to enable or disable the Joint Index function, as shown in Figure 3.8-14.

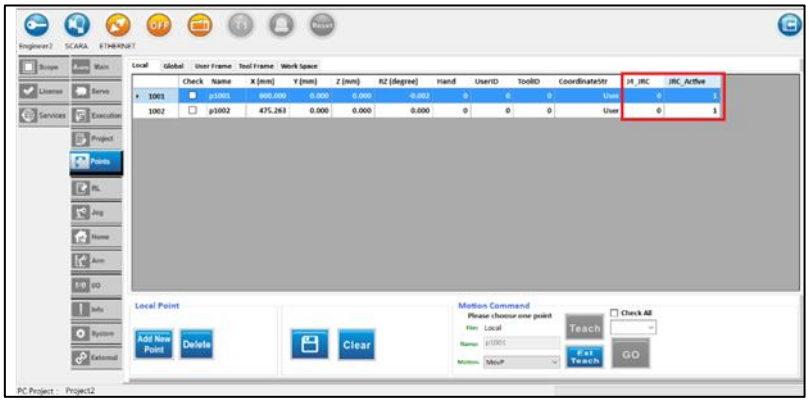


Figure 3.8-14 Joint Index Function columns on the Point screen

The Joint Index function for the DRV model is enabled automatically, and the rotation range of the fourth and sixth axes exceeds 180°. Use J4_JRC and J6_JRC in the Local Point and Global Point screens to determine if the rotation of these two axes exceeds 180°, as shown in Figure 3.8-15

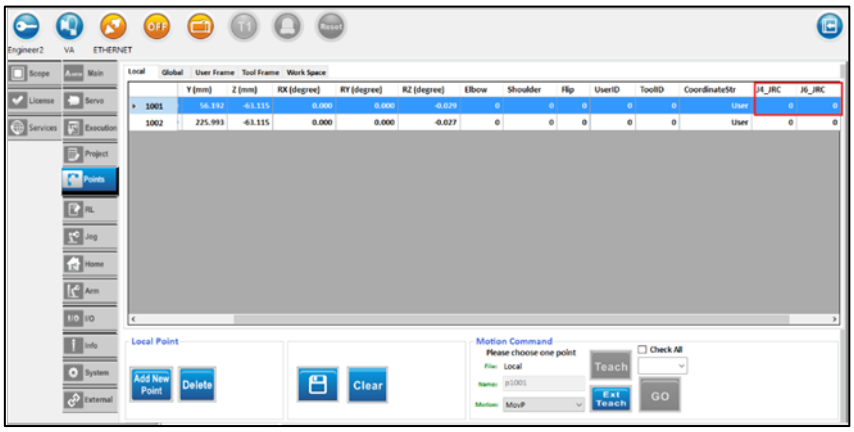


Figure 3.8-15 DRS Model Joint Index Function columns

To change the JRC operating mode

You can use different modes by selecting the JRC mode.

Select an option and click Active.

1. In the Local or Global point screen, select the points for the JRC operating mode.
2. On Points tab on the Main screen, then on the Auxiliary screen, click the Point tab. The options are:

- 1: JRC Active
- 2: Select Near Path
- 3: Select Near Path & Avoid Joint Limit

3. Click Active to assign the JRC operation to the selected points.

3.9 Edit a Delta Robot Language File (DRL) (DRS/DRV Series)

Use the Delta Robot Language (DRL) Editor screen (**RL** tab on the Main screen) to write, edit, save, build, and execute the Delta Robot Language file for the open project. The Auxiliary screen contains the DRL commands and descriptions, buttons that insert commands into the Editor screen, and the DRL Output tab. The name of the open project appears at the bottom-left of the DRAStudio window.

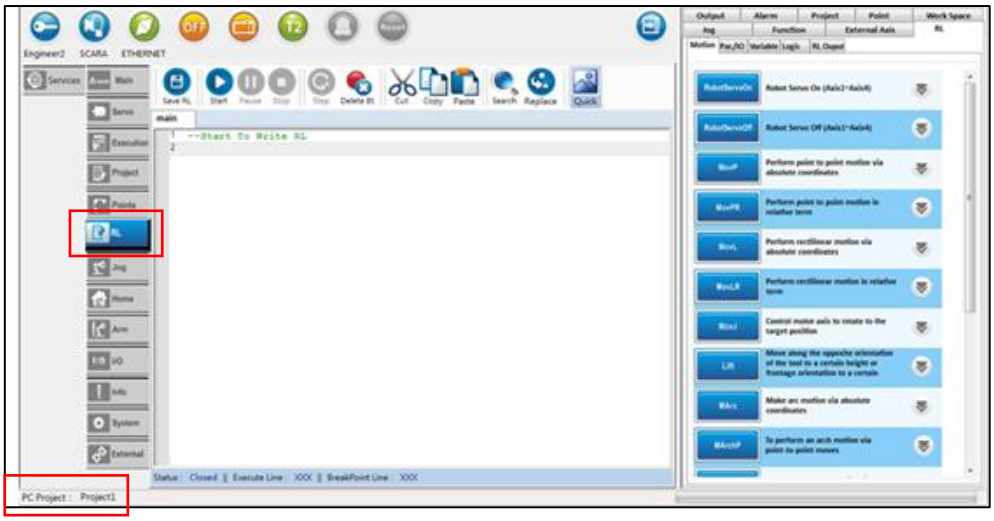


Figure 3.9-1 Robot Language Editor screen (DRL)

For more information on the Delta Robot Language, refer to the Robot Language manual.

To edit the Robot Language file

The DRL Editor screen opens the RL file for the current project. You can add commands to the program in two ways:

- Type the command directly into the DRL Editor screen.
- On the Auxiliary screen, click the RL tab, then click the sub-tab for the type of command (**Motion, Par./IO, Variable, Logic**). Scroll through the list of commands to find the correct command, then click the button to insert the command into the DRL Editor screen.

Figure 3.9-2 Auxiliary screen tabs with Robot Language commands

The buttons on the DRL Editor toolbar perform the following editing functions .

Cut	Click **Cut** to cut the selected text in the robot language file.
Copy	Click **Copy** to copy the selected text in the robot language file.
Paste	Click **Paste** to paste the cut or copied text at the cursor in the robot language file.
Search	Click **Search** to open a Search dialog box. Enter the text to find, select the options, and then click **Find Next** to search for the text in the robot language file. Click **Mark All** to bookmark every line containing the find text. To work with bookmarks, right-click the text, and then click **Bookmarks**.
Replace	Click **Replace** to open a Replace dialog box. Enter the text to find, the text to replace, select the options, and then click **Find Next** to search for the text in the robot language file. Click **Replace** to replace the find text with the replace text. Click Replace All to replace the find text with the replace text everywhere in the robot language file. Click **Mark All** to bookmark every line containing the find text. To work with bookmarks, right-click the text, and then click **Bookmarks**.

To add a command using Quick Teach

Use **Quick** to enter a MovP or MovL command using the current position of the robot.

1. Make sure the robot is at the position you want to teach.
2. Click in the Robot Language file to put the cursor at the location for the MovP or MovL command.
3. On the DRL Editor toobar, click **Quick**.
4. In the Quick window that appears, choose the command (MovP or MovL) and the movement speed.
5. Click **Qteach**. This writes the current robot position into a new point, and adds the MovP or MovL command to the Robot Language file. It also adds the robot position data to the Local tab on the Points tab.

To add a breakpoint

Click in the area to the left of the line number. When you click here, a red dot appears, indicating a break point. Click the red dot to remove the break point.

To remove all breakpoints

On the Editor screen toolbar, click **Delete Bt** to clear all breakpoints in the file.

To save the DRL file (Save DRL)

Click **Save RL** to save the file data.

To execute the DRL file

On the Editor screen toolbar, click **Run** to execute the commands in the file. The status bar below the DRL Editor window lists the execution status, the current line, and the break point line.

- The green pointer indicates the row number the robot is currently executing.
- The red dot indicates a break point.
- The yellow dot indicates that the program is paused at a break point, and the line is highlighted.
- In the Auxiliary screen, the **RD Output** tab displays the current DRL execution status information.

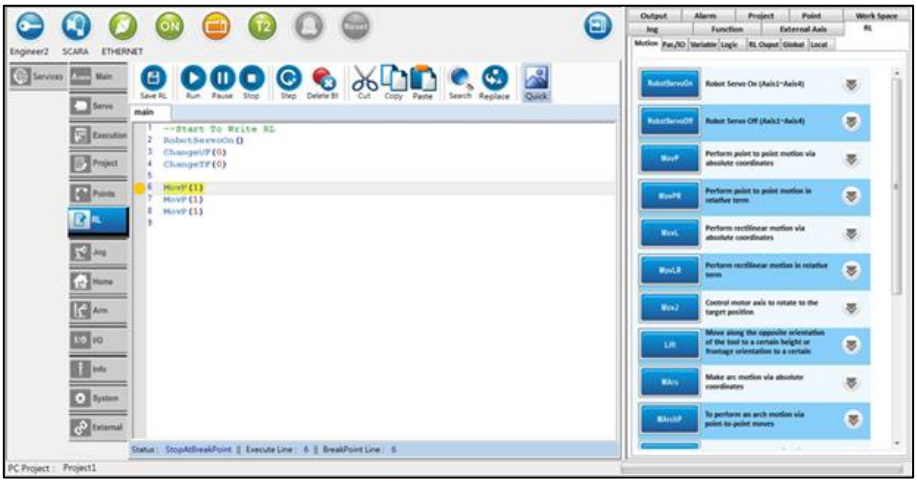


Figure 3.9-3 DRL execution status

To find the value of a Local or Global variable at a break point

When program execution is paused at a break point, you can find the value of a variable by entering the name of the variable in **Local** or **Global** tab on the **RL** tab on the Auxiliary screen. This function only works when stepping through the program and does not work if you pause execution with the **Pause** button.

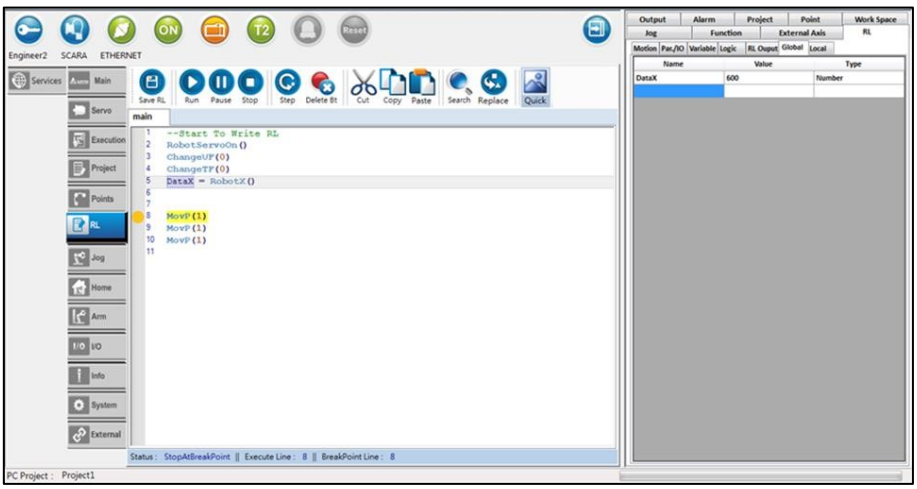


Figure 3.9-4 Execute Robot Language Editing (DRL)

To pause DRL file execution

On the DRL Editor screen toolbar, click **Pause** to pause program execution.

To step through the DRL file

You can step through the lines in the file after the program pauses at a break point. On the Editor screen toolbar, click **Step** to step to execute the next line in the program. The Editor marks the current line with a yellow dot and yellow highlighting.

To stop DRL file execution

On the Editor screen toolbar, click **Stop** to stop program execution

3.10 Edit a DRL Block file with the Delta Visual Intuitive Language (vDRL) (DRS/DRV Series)

The Delta Visual Robot Intuitive Language (vDRL) allows you to create Robot Language files using an intuitive drag-and-drop process. You simply drag the command you want onto the vDRL Block Editor screen, and drop the command in the correct location in the program. The vDRL Block Editor shows the Robot Language commands as block-shaped “puzzle pieces” that you select and then fit together to create the Robot Language file. You must first create a new Robot Language block project; you cannot edit a regular DRL project in the vDRL Block Editor. For more on project management, see 3.8 Manage Projects (project management) (DRS/DRV series).

To create a new Robot Language block project file

1. On the Main screen, click the **Project** tab.
2. Right-click the project folder and then click **Add New Block Project**.
3. In the PC Project dialog box, enter the name for the new block project and then click **OK**. The new project appears in the project tree.

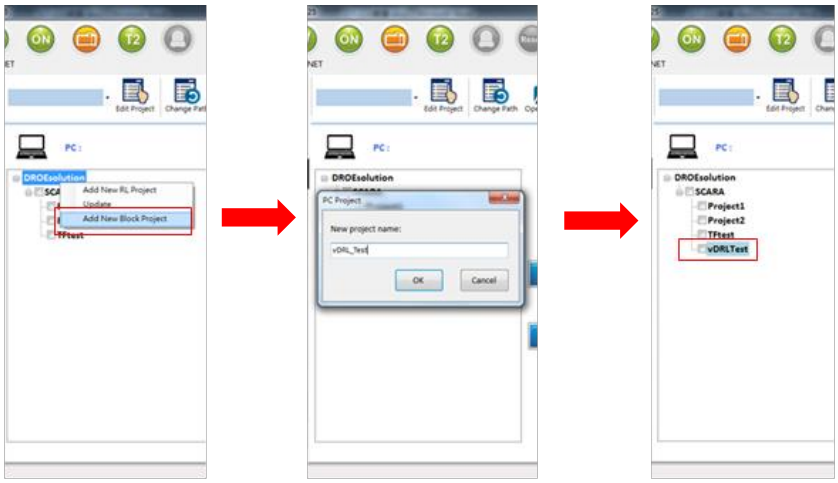


Figure 3.10-1 Add a Robot Language block project

To open an existing Robot Language block project

Click the block project in the project tree and then on the Project toolbar, click Edit Project. You can also choose the block project from the list of project names to the left of the Edit Project button, and then click Edit Project. The name of the current project appears in the lower-left of the DRAStudio window.

To edit a Robot Language block project

1. Click the block project in the project tree and then on the Project toolbar, click Edit Project to make it the current project. You can also choose the block project from the list of project names to the left of the Edit Project button, and then click Edit Project. The name of the current project appears in the lower-left of the DRAStudio window.
2. In the Main window, click the RL tab to open the project vDRL file in the vDRL Block Editor.

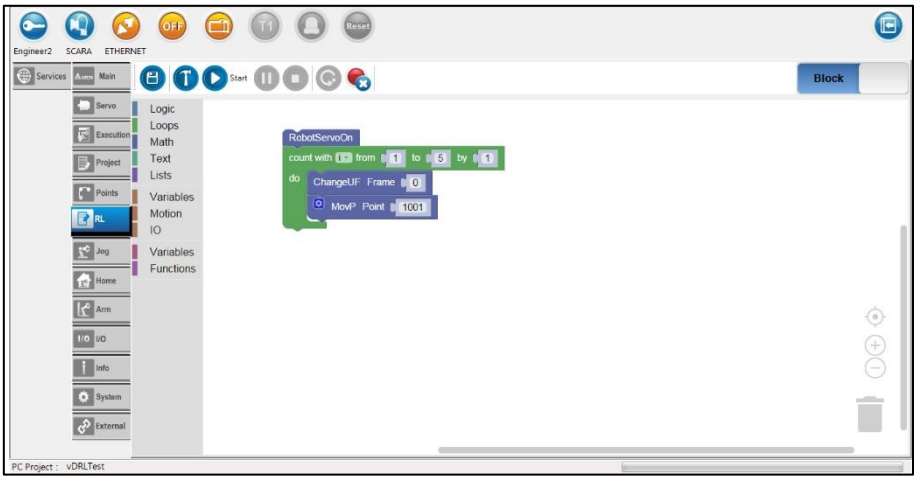


Figure 3.10-2 Robot Language Block Editor screen (vDRL)

<remove blocks to show only a blank screen>

3. Click a command category (Motion) to display a list of the commands in that category.
   <add screen capture showing Motion commands>
4. Drag a command (RobotServoOn) onto the RL Visual Editing screen.
   <add screen capture showing RobotServoOn block>
5. Drag the next command (Loops category, count with command) onto the RL Block Editor screen.
6. Drag the count with command until the piece is touching the bottom of the RobotServoOn piece. The two commands “click” together.
   <add screen capture showing RobotServoOn and count with blocks together>
7. Continue to drag commands onto the RL Block Editor screen and joining the blocks together.
   <add screen capture showing several blocks together>

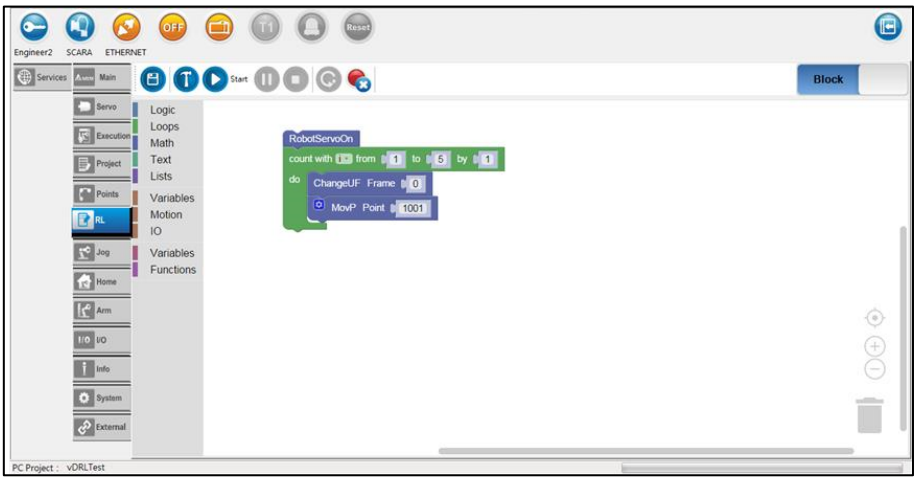


Figure 3.10-3 Create a program from command pieces

Delta Visual Intuitive Robot Language commands

The following picture shows the command types available in the Delta Visual Intuitive Language in the vDRL Block Editor.

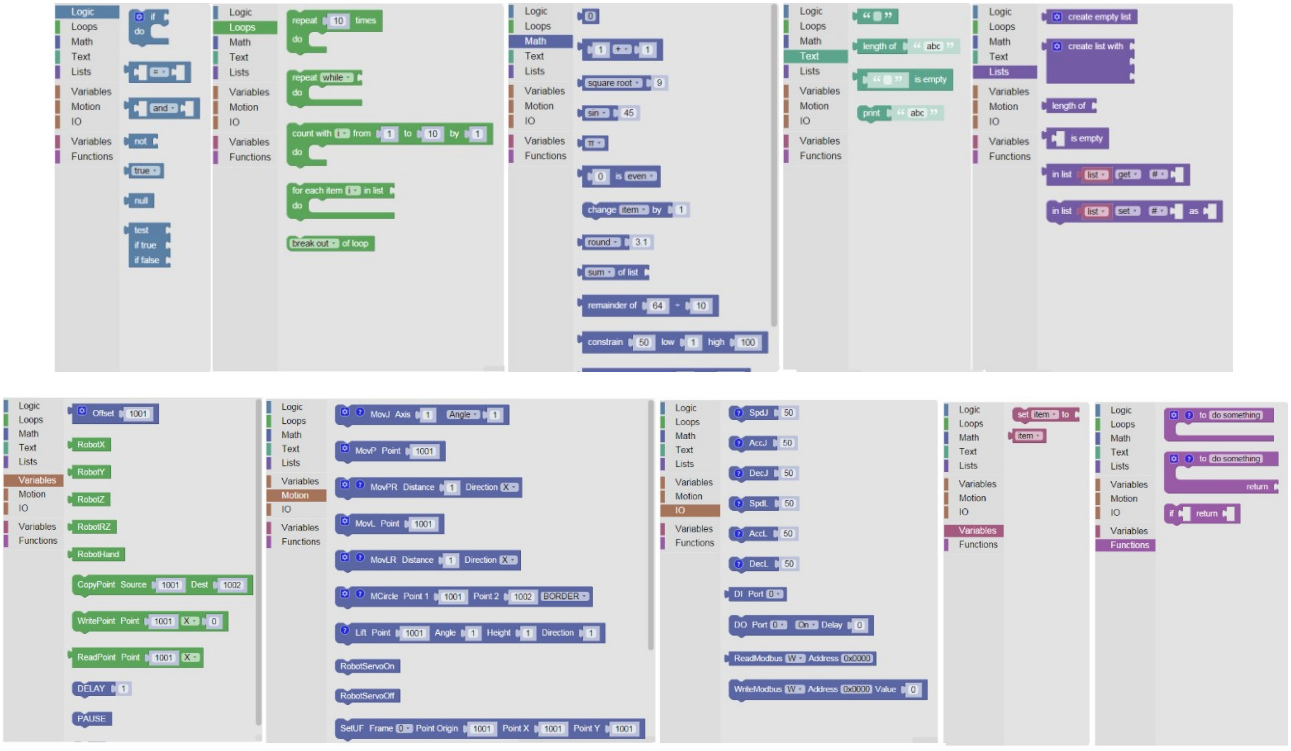


Figure 3.10-4 vDRL Block Editor commands

To view the vDRL Block file as text

Click the **Block** switch in the upper-right corner of the RL Block Editor screen. The switch changes to **RL** and the vDRL Editor displays the program in regular text (DRL mode). Note that you cannot edit the program in DRL mode. You must click **RL** to switch back to **Block** mode.

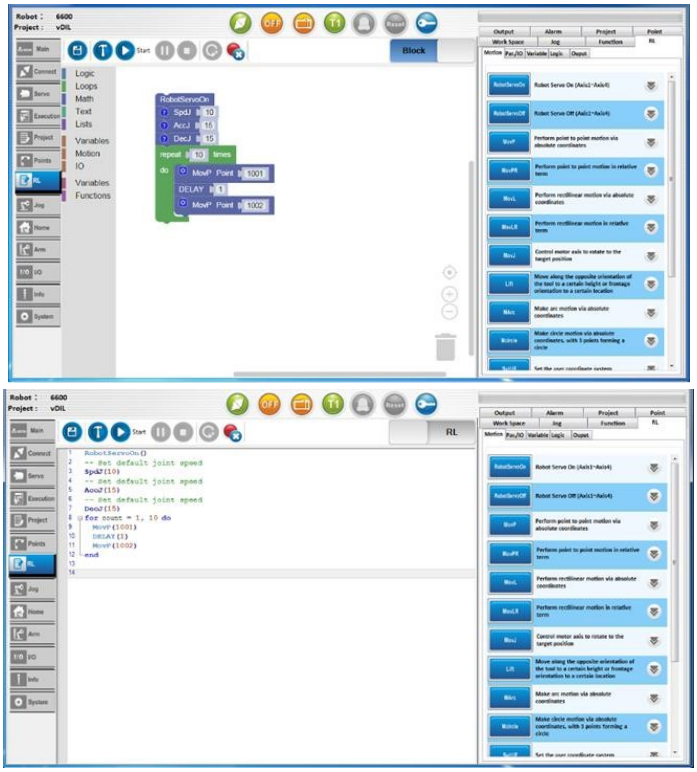


Figure 3.10-5 Switch between Block and RL modes

To add and remove a breakpoint

Right-click a command block in the Editor and then click **Set Breakpoint**. When you click Set Breakpoint, a red dot appears in the command piece, indicating a break point. Right-click the command block and then click **Unset Breakpoint** to remove the break point.

To remove all breakpoints

On the Editor screen toolbar, click **Delete All Break Points** to clear all breakpoints in the file.

To save the RL block file

On the vDRL Block Editor screen toolbar, click **Save** to save the file data.

To execute the RL block file

On the RL Block Editor screen toolbar, click **Run** to execute the commands in the file.

To pause RL block file execution

On the RL Block Editor screen toolbar, click **Pause** to pause program execution. Note that Pause only works if you do not set any breakpoints.

To step through the RL block file

You can step through the lines in the file after the program pauses at a break point. On the RL Block Editor screen toolbar, click **Step** to step to execute the next line in the program. The Editor marks the current line with a yellow dot and yellow highlighting.

To stop RL block file execution

On the vDRL Block Editor screen toolbar, click **Stop** to stop program execution.

3.11 Specify JOG Settings (JOG) (DRS/DRV Series)

Use the JOG screen (**Jog** tab on the Main screen as shown in Figure 3.11-1) to define the JOG movement, including the mode (coordinate system), the speed, and the distance. DRAStudio updates the settings on the **JOG** tab on the Auxiliary screen to match the settings on the **JOG** screen.

To set the mode (coordinate system)

The coordinate system mode includes the **Joint, World, User**, and **Tool** coordinate systems. You can set the **User Frame ID** and **Tool Frame ID**. See Section 3.9 Set Point, Frame, and Work Space Information (Points) (DRS/DRV Series).

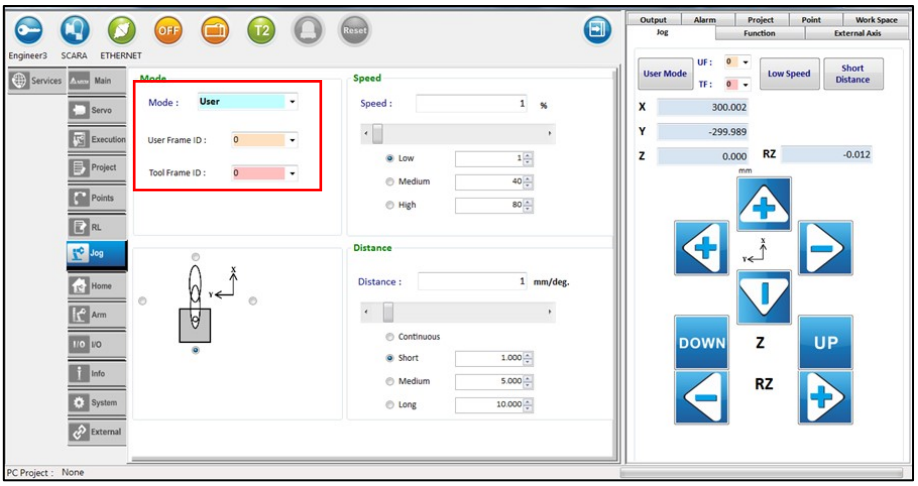


Figure 3.11-1 JOG mode using Joint coordinates

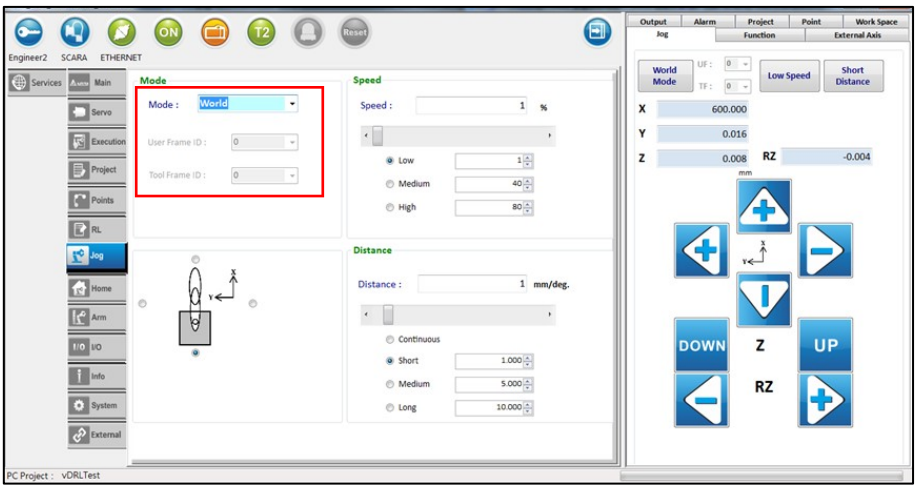


Figure 3.11-2 JOG mode using World coordinates

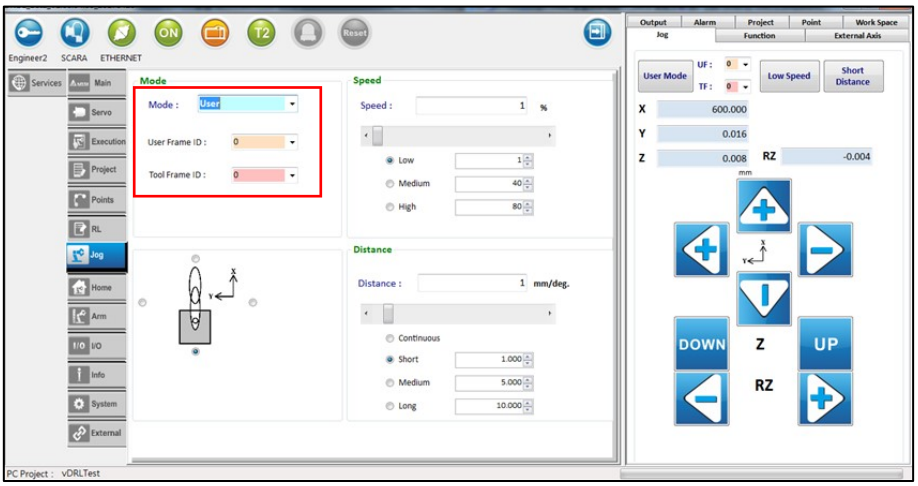


Figure 3.11-3 JOG mode using User coordinates

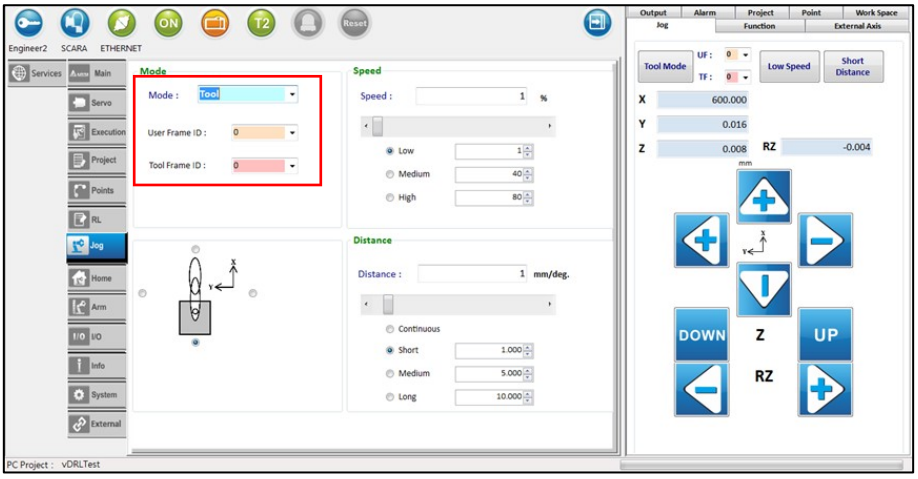


Figure 3.11-4 JOG mode using Tool coordinates

To set the speed

Select the JOG speed (**Low, Medium, High**) or drag the slider to set the speed. The unit for speed is %.

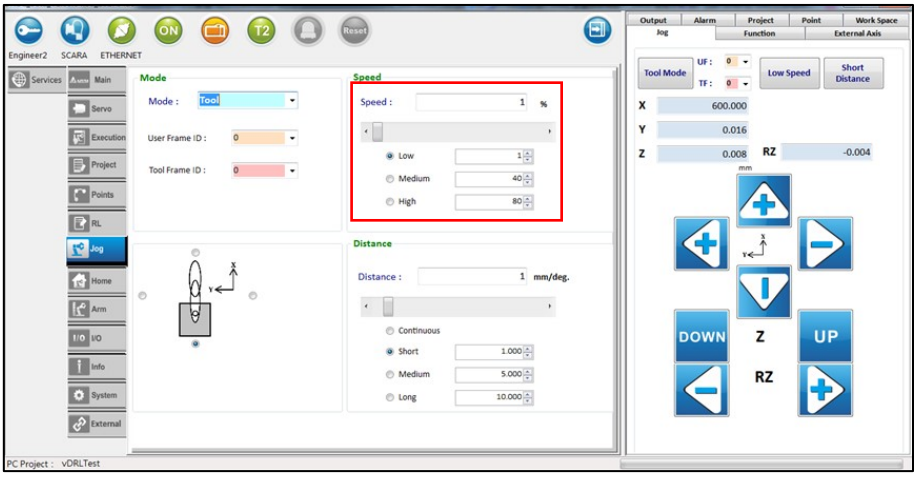


Figure 3.11-5 JOG Speed setting

To set the distance

1. Enter the JOG distance or drag the slider to set the distance. The unit for speed is mm/deg.
2. If you set Mode = Joint, you can change the angle for each joint (unit is PUU). For the other modes (World, User, Tool), you can change the endpoint location (unit is um).
3. The Distance options are Continuous, Short, Medium, and Long. You can also enter the distance.

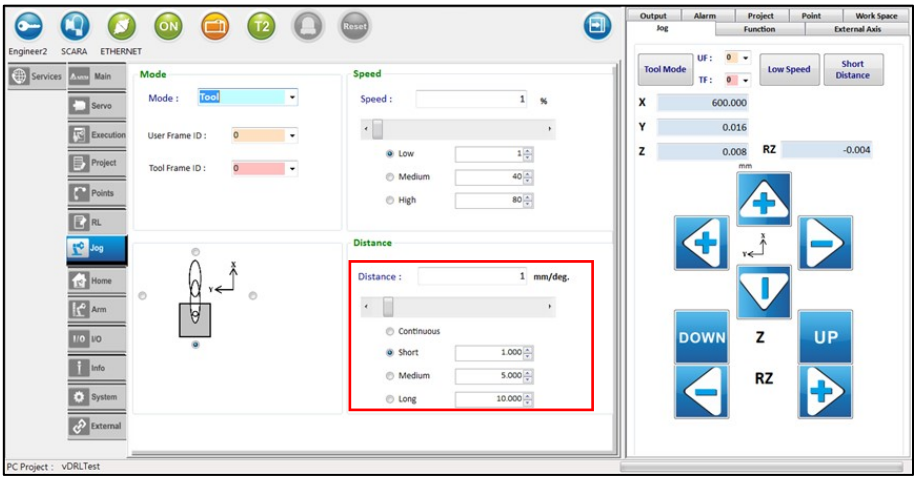


Figure 3.11-6 Jog Distance setting

To set the relative direction

Set the relative JOG direction by clicking one of the radio buttons around the diagram shown in Figure 3.11-7. This example shows the worker standing behind the robot and facing the robot, and the JOG direction is marked by the coordinates.

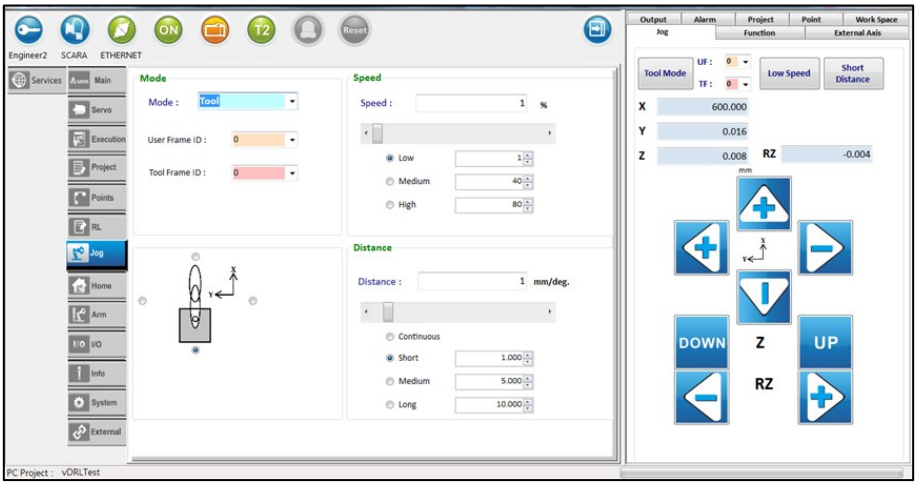


Figure 3.11-7 User and robot relative direction setting

To use the JOG tab on the Auxiliary screen

1. In the Auxiliary screen, click the JOG tab.
2. Click the Mode button until it displays the correct mode.
3. Set the JOG options by entering the values or clicking the buttons.

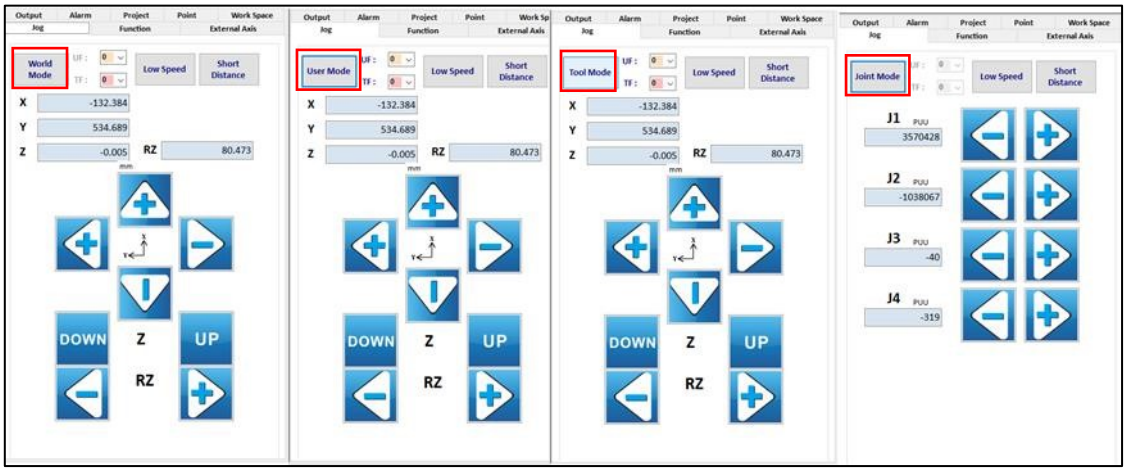


Figure 3.11-8 DRS model JOG tab on the Auxiliary screen

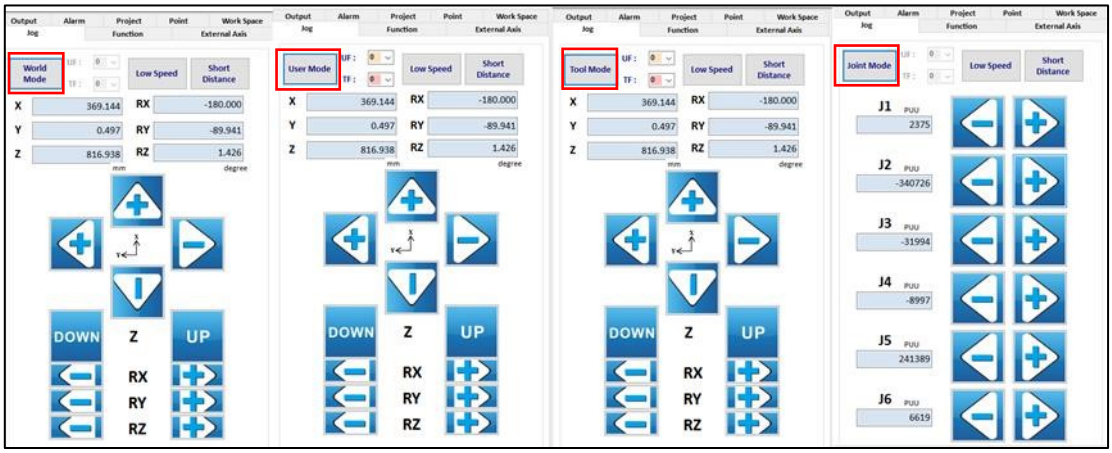


Figure 3.11-9 DRV model JOG tab on the Auxiliary screen

3.12 Specify Home Settings (Home) (DRS/DRV series)

Use the Home screen (**Home** tab on the Main screen as shown in Figure 3-56) to define the Home point (**Set Home**) and Return to Home Point (**Go Home**).

To return to the Home point (**Go Home**)

For All Axes, click Go Home.

For an individual axis, click the button for the axis (**Joint**).

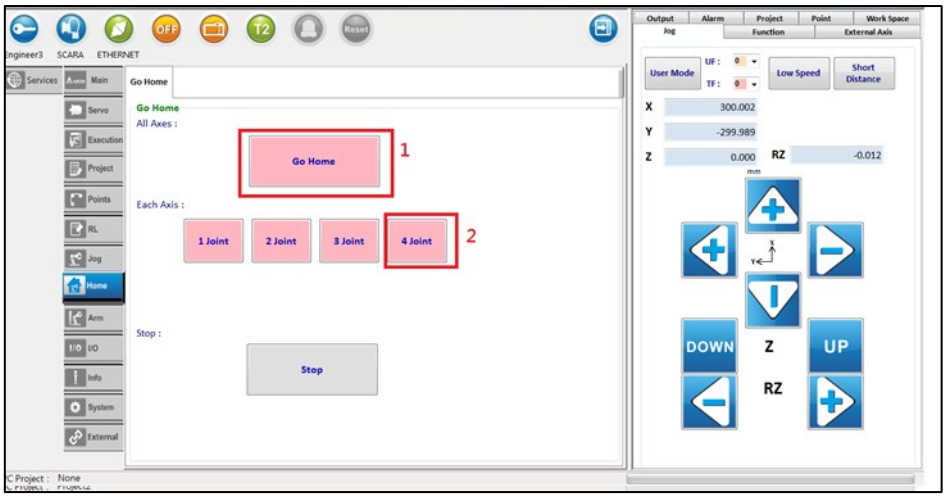


Figure 3.12-1 Home setting

3.13 Monitor I/O (I/O) (DRS/DRV Series)

Use the **I/O** tab on the Main screen to monitor the system DI (digital inputs) and DO (digital outputs). A green light means ON and an orange light means OFF.

To display System or User-defined DI/DO

Click the System IO or User IO buttons at the top of the I/O screen, as shown in Figure 3.13-1.

System I/O description

The digital inputs and outputs are defined by the controller.

- **DI**

Monitors the current System DI (input) status. For example, the state of a connected external physical knob or button.

- **DO**

Monitors the controller DO (output) status. These are read-only and you cannot change the state between ON and OFF.

Figure 3.13-1 Monitoring System I/O

User I/O description

These digital inputs and outputs are user-defined, as shown in Figure 3.13-2.

- **DI**

Monitors the current User DI status.

- **DO**

Monitors the current User DO status. You can click a User DO button to switch it between ON and OFF.

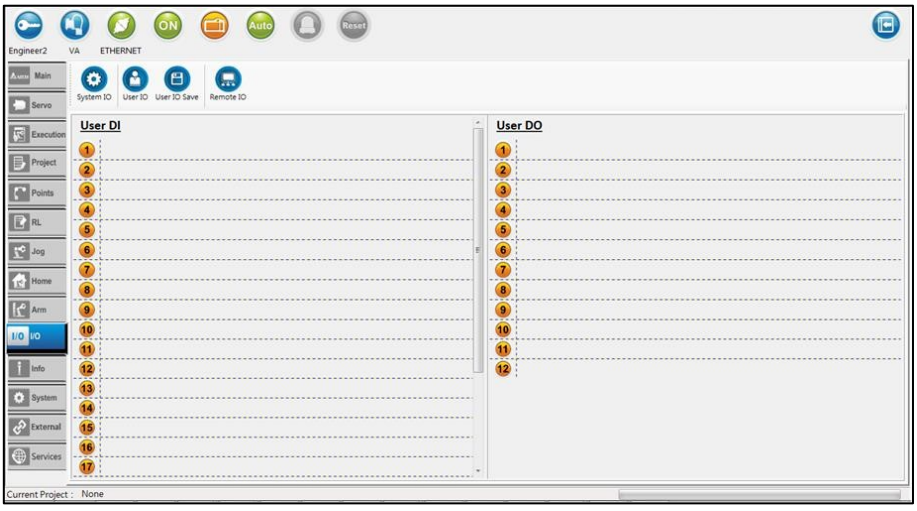


Figure 3.13-2 IO Monitoring user-defined I/O

To change the User IO description

During project editing, you can change the user-defined IO descriptions that appear in the table for User IO. Click **User IO Save** to save the descriptions, as shown in Figure 3.13-3.

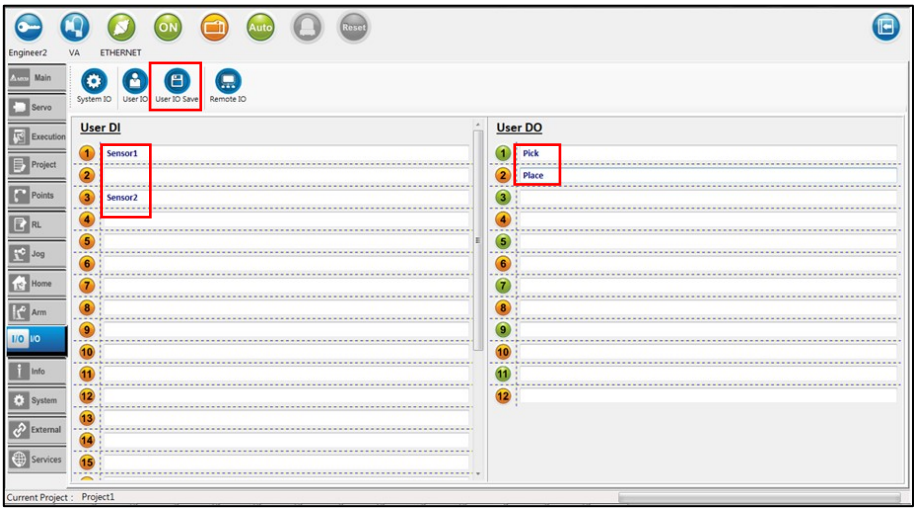


Figure 3.13-3 User-defined IO descriptions

To display remote I/O for expansion modules

1. Connect the I/O expansion modules to the controller through DMCNET.
2. On the Main screen, click the **External** tab, and then click **Scan** to detect the I/O expansion modules, as shown in Figure 3.13-4.

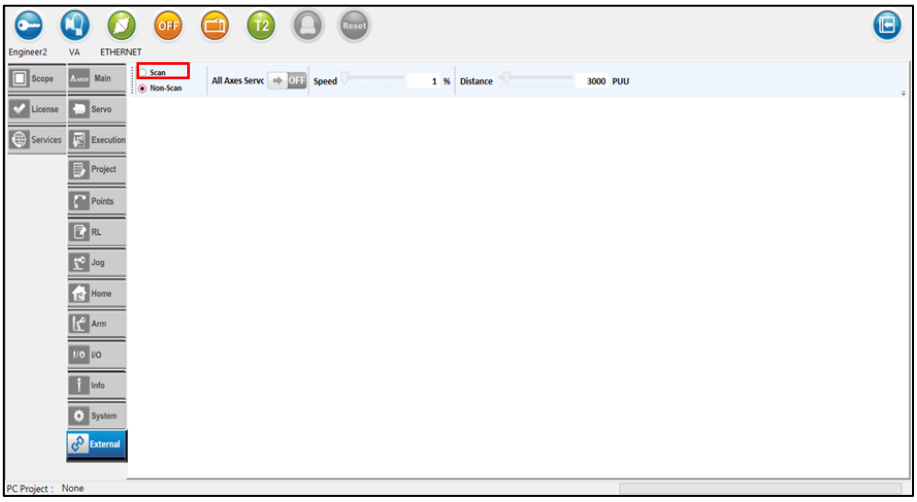


Figure 3.13-4 Detect remote expansion modules

3. Click the **I/O** tab on the Main screen, and then in the I/O screen, click **Remote IO**.

- **DI**

Monitor the current remote DI status.

- **DO**

Monitor the remote IO status. You can click a Remote DO button to switch it between ON and OFF.

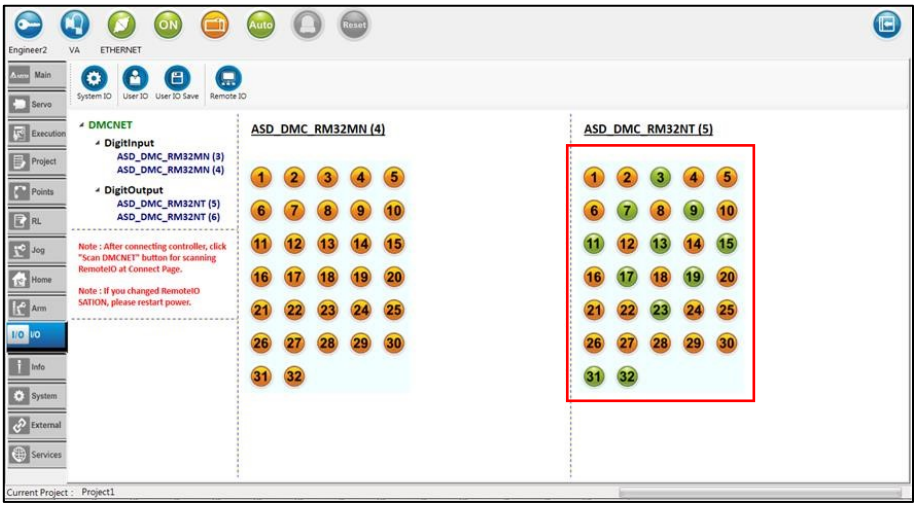


Figure 3.13-5 Monitor remote I/O

If you are using multiple sets of I/O modules simultaneously, the I/O screen shows the remote modules in the DMCNET tree structure. Click a module to select it and display the I/O values for that module.

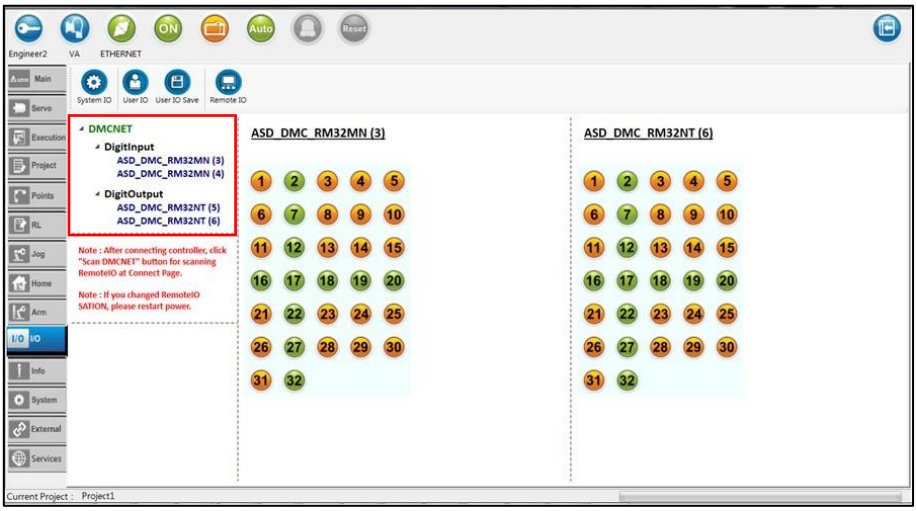


Figure 3.13-6 Monitor remote I/O, using multiple modules

3.14 View Information (Info) (DRS/DRV series)

Use the Info tab on the Main screen to display information about the robot and controller. This includes the robot position, motion, alarm and temperature information; the controller information; the alarm history; and the robot and controller model-related information.

To display the robot position, motion, and alarm information

On the Info screen, click the **Info** tab. On the Auxiliary screen, click the **Alarm** tab to display the alarm history in English or Chinese, along with the alarm number, cause, and resolution, as shown in Figure 3.14-1.

Figure 3.14-1 Robot Information Display (Info tab)

To display the robot temperature information

On the Info screen, click the Temperature Info tab to display the temperature of each axis motor and set the temperature Alert level, as shown in Figure 3.14-2.

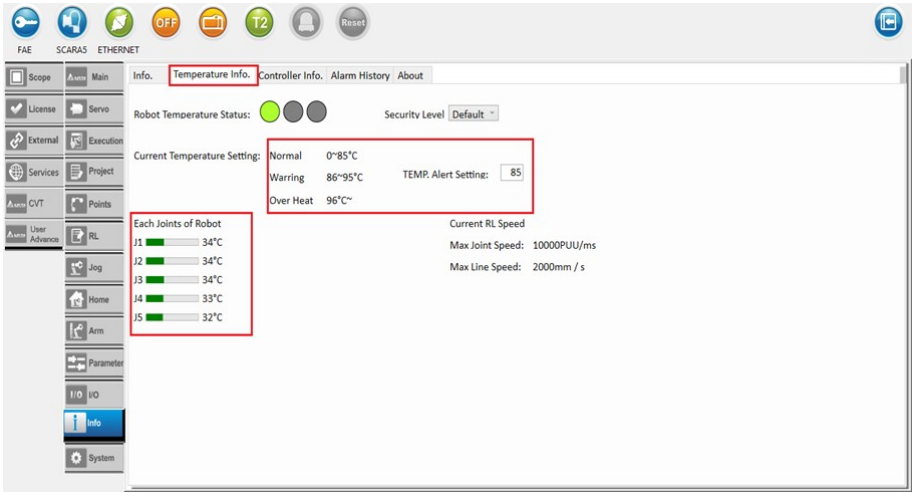


Figure 3.14-2 Current temperature of each axis motor

To display DCS controller information

On the Info screen, click the Controller Info tab to display the DCS controller information, as shown in Figure 3.14-3

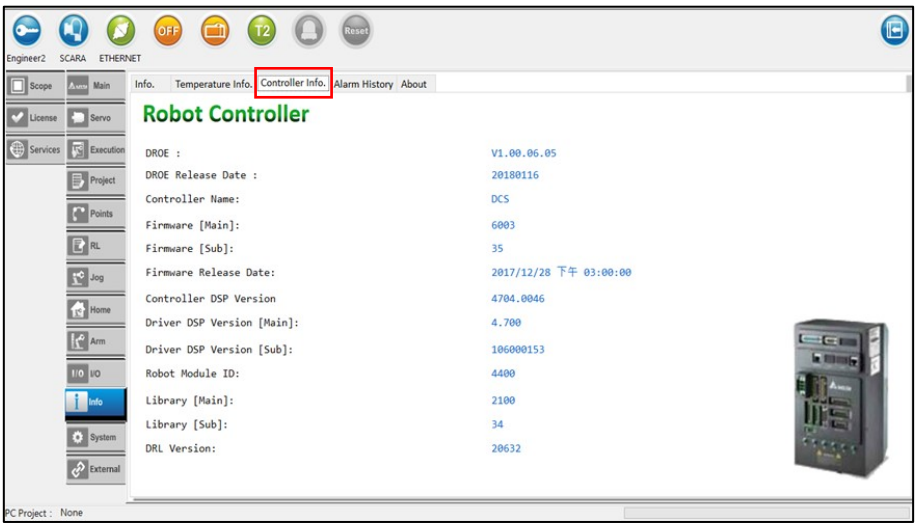


Figure 3.14-3 DCS controller information

To display the DCS controller error log

On the Info screen, click the **Alarm History** tab to display the DCS controller error log, as shown in Figure 3.14-4. Click **Update** to retrieve the most recent error record from the controller (maximum of 1024 error records).

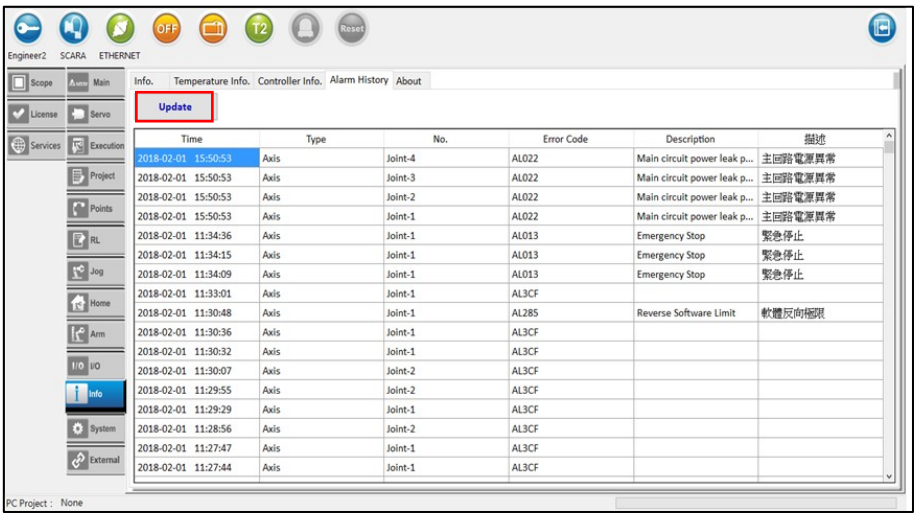


Figure 3.14-4 DCS controller error log

To display the robot and controller model-related information

On the Info screen, click the About tab to display the robot and controller information, as shown in Figure 3.14-5

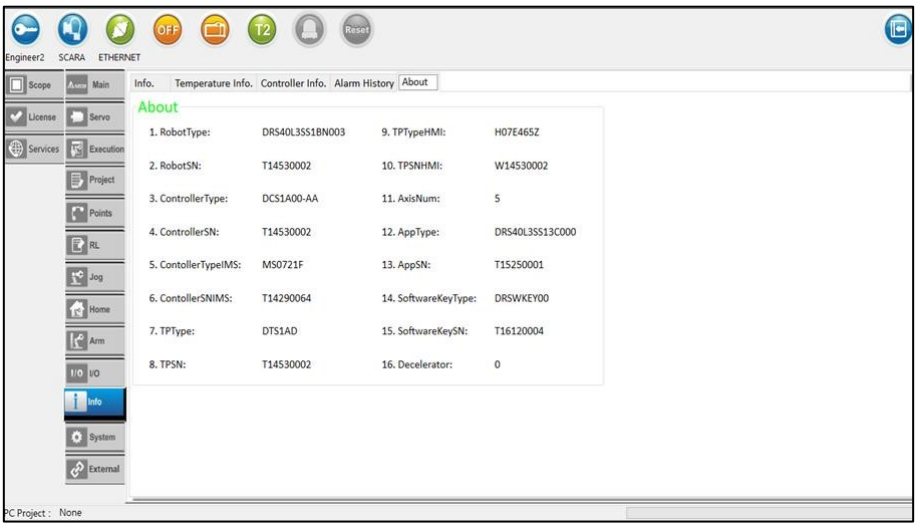


Figure 3.14-5 Robot and controller model-related information

3.15 Set the External Devices (External) (DRS/DRV Series)

Use the **External** tab on the Main screen to identify external devices.

1. On the Main screen, click the **External** tab to display the External Devices screen.
2. Select **Scan** to scan for connected external devices.
3. Enter the moving **Soft Limit** ranges in **Negative** and **Positive**.
4. Click the **Servo Status** button to start the external axis.
5. Click **Go** to move to the specified position, as shown in Figure 3.15-1

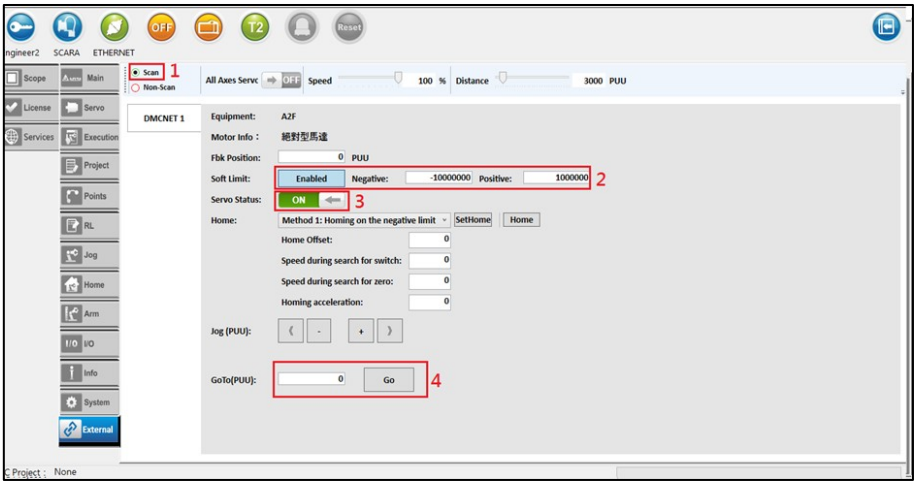


Figure 3.15-1 External devices setting

3.16 Specify System Setting (System) (DRS/DRV series)

Use the **System** tab on the Main screen to set the set the RS232/485 parameters (**RS232/485** tab), the DCS controller Ethernet address (**Ethernet IP** tab), the language (**Language** tab), and the settings for backing up DRAStudio (**Backup** tab).

To set the RS232/485 communication parameters

On the System screen, click the **RS232/485** tab as shown in Figure 3.16-1.

1. Set Communications: Set the **Transmission Mode** (RS232 / RS485), the **Transmission Rate** (4800 / 9600 / 19200 / 38400 / 57600 /115200) and the **Protocol** parameters, and then click **Set**.
2. **Get Communications:** Click **Get** to upload the **Transmission Mode**, **Transmission Rate** and the **Protocol** parameters.

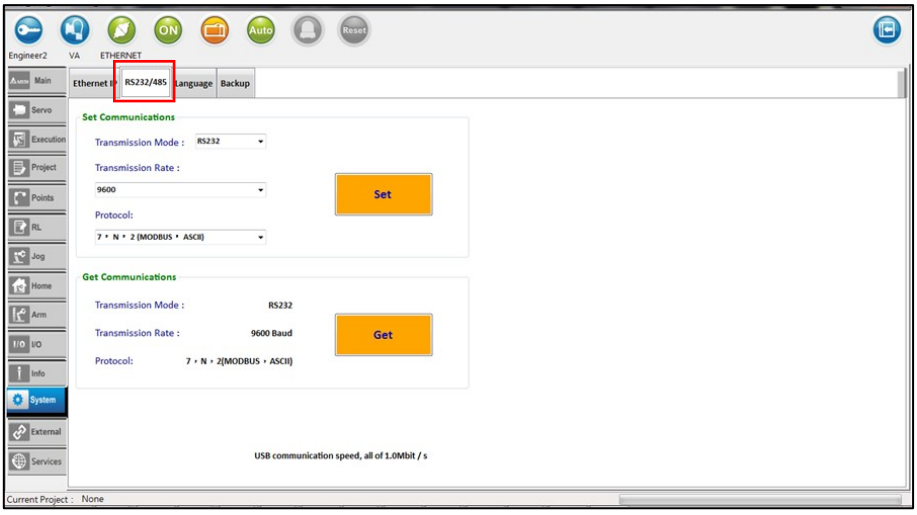


Figure 3.16-1 System communication setting

To set the DCS controller IP address

On the System screen, click the **Ethernet IP** tab as shown in Figure 3.16-2.

1. Connect to the controller, enter the IP address, and then click **Set**.
2. DRAStudio displays a message asking if you want to set the controller IP address. Click **Yes**.
3. In the Auxiliary screen, click the **Output** tab to display the successfully updated information.

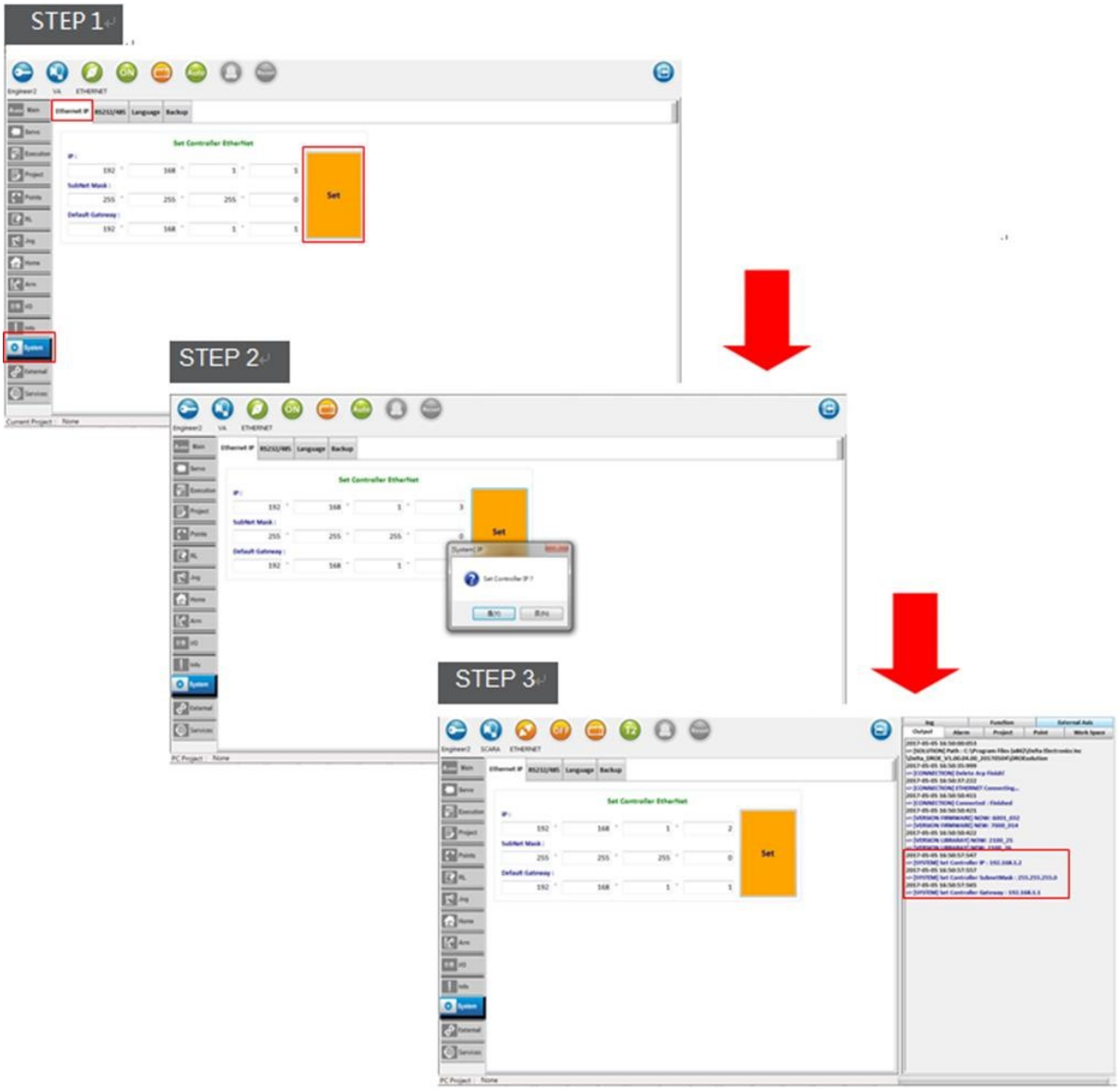


Figure 3.16-2 Change the controller IP address

To set the language

On the System screen, click the **Language** tab as shown in Figure 3.16-3. Supported languages include English, Traditional Chinese and Simplified Chinese.

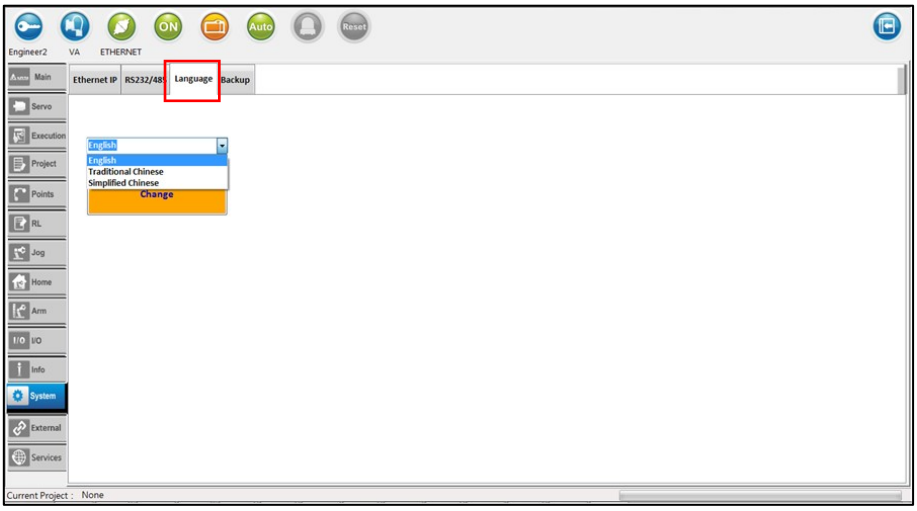


Figure 3.16-3 Change language

To set data backup

On the System screen, click the **Backup** tab as shown in Figure 3.16-4.

1. Enter the **Backup Folder Name** where DRAStudio stores the backup. DRAStudio automatically adds the current date and time.
2. **Backup Path** displays the path to the backup folder.
3. You can enter **Backup Notes** (optional).
4. **List/Status** displays the backup items and backup status. As items are backed up, their status changes to Done.
5. Click **Start Backup** to start the backup.
6. The **Output** tab on the Auxiliary screen displays the back information; the backup path is as shown in Figure 3.16-5.

Make sure you keep the PC connected to the DCS controller until the backup is completed to ensure a successful backup. If you disconnect the controller before the backup completes, the backup may fail.

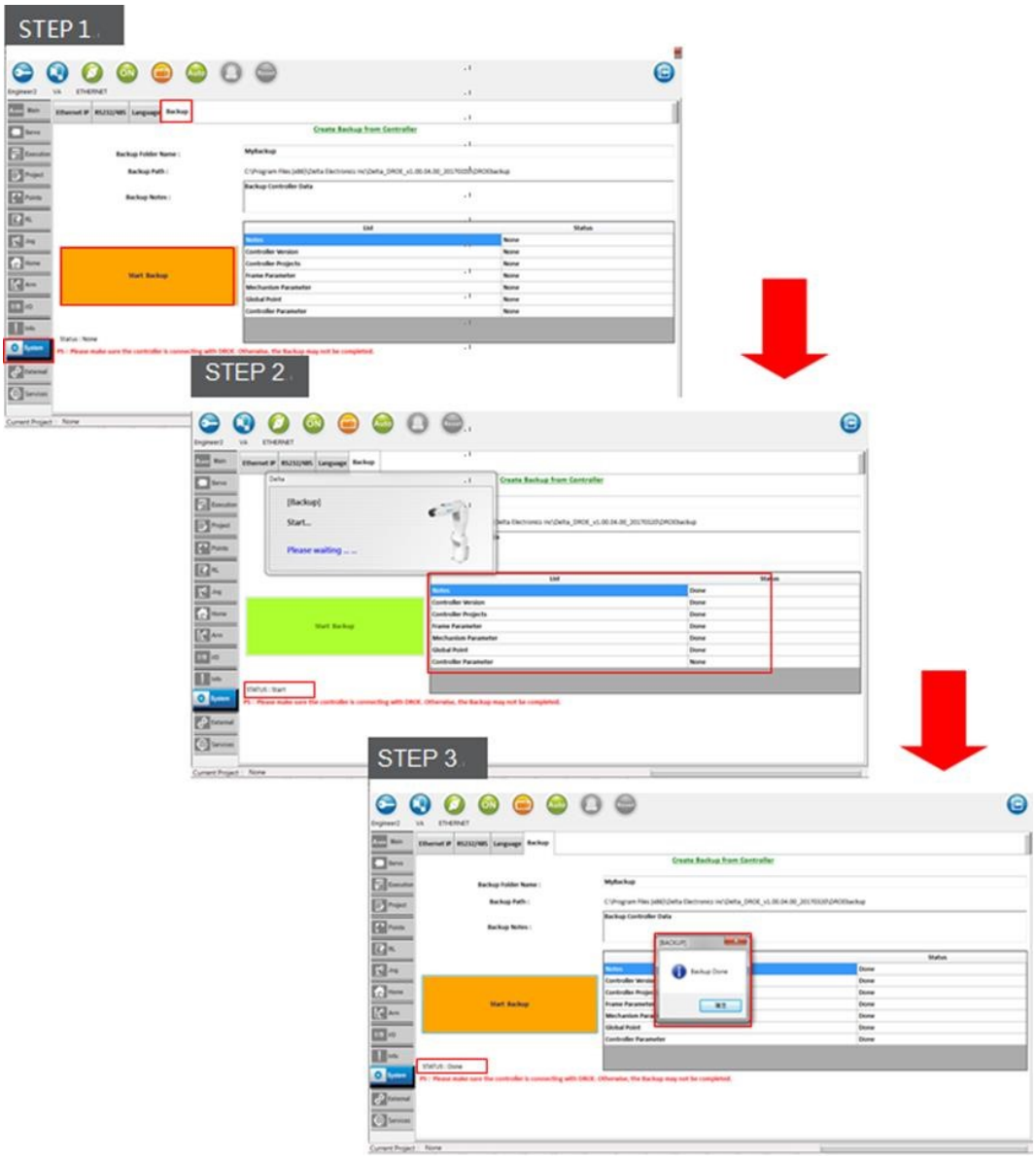


Figure 3.16-4 Back up data

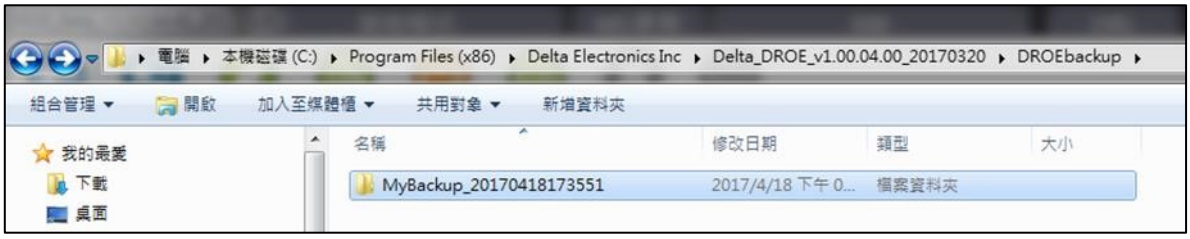


Figure 3.16-5 Back up file path

3.17 Specify Robot Arm Information (ARM) (DRS/DRV Series)

Use the Arm screen (**Arm** tab on the Main screen as shown in Figure 3.17-1) to define the robot arm information, or to read that information from the DCS controller, including the software positive limit (PositiveLimit, PUU and degree/mm) and software negative limit (NegativeLimit, PUU and degree/mm) of each axis.

To upload and download parameters

In the Arm screen, click the **Arm** tab and then click the download or upload button.

[→] downloads all parameters to the DCS controller.

[←] reads the parameters from the DCS controller and displays them on the screen.

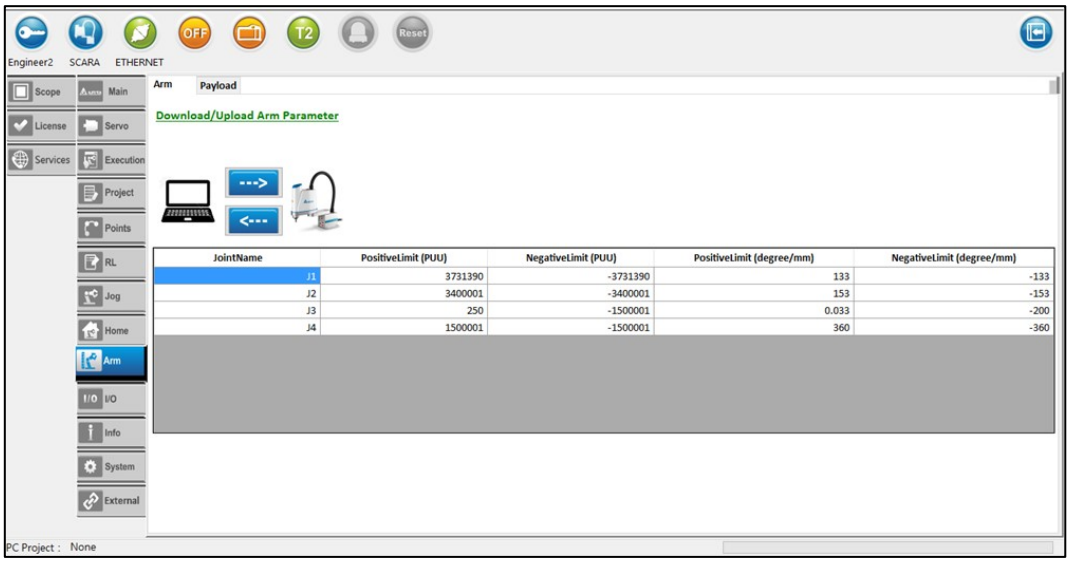


Figure 3.17-1 Uploading and downloading robot arm parameters

To set the load parameters

Specify the Payload value for the load weight mounted at the front of the arm, as shown in Figures 3.17-2 and 17-3.

1. Select the robot arm model to use and then click **Set Payload Parameter**.
2. Enter the load mounted to the robot arm and related parameters, and then click **Set** to set the Payload, or click **Get** to upload the Payload values from the DCS controller.

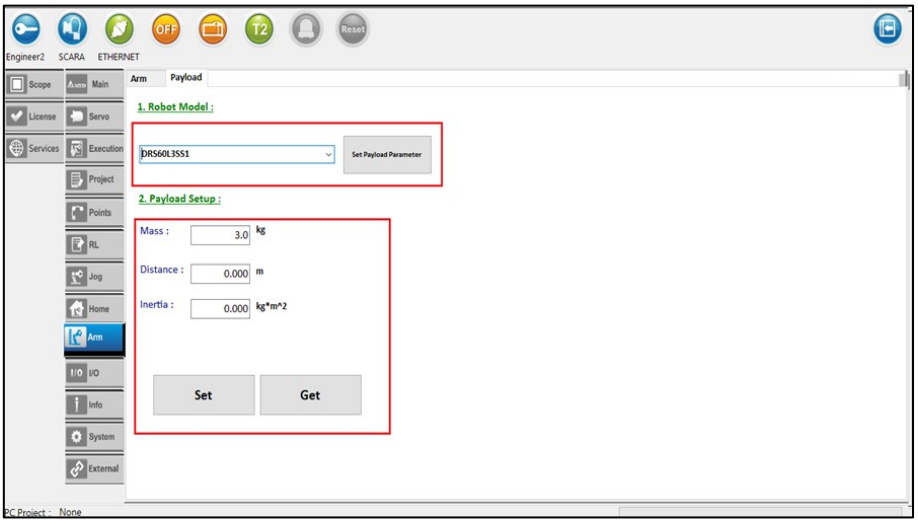


Figure 3.17-2 DRS model Payload setting

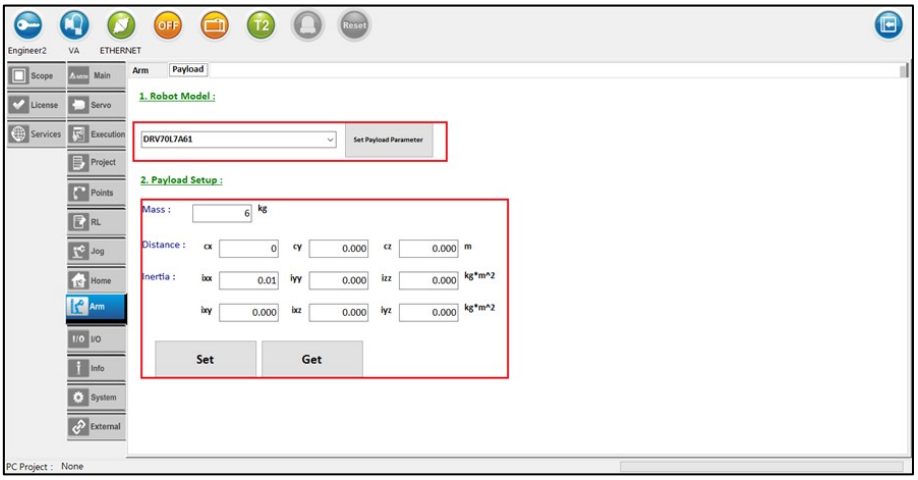
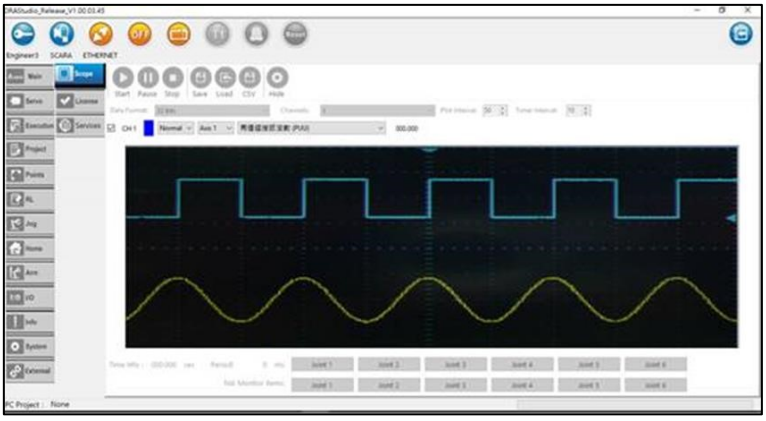


Figure 3.17-3 DRV model Payload setting

3.18 Set the Scope (Scope) (DRS/DRV Series)

Use the **Scope** tab on the Main screen to monitor a signal while the robot is moving. You must purchase a seperate Scope license to activate the Scope function.



3.19 View License and Module Status (License) (DRS/DRV Series)

Use the **License** tab on the Main screen to enter the license numbers that you purchased to activate specific functions, such as CVT (conveyor tracking).

3.20 Contact Customer Service (Services) (DRS/DRV Series)

Use the **Services** tab on the Main screen to contact Customer Service about problems or to provide feedback. You can also as perform a backup for the robot or software currently having problems, and send the backup to the Customer Service Staff for analysis.

Information of Customer Service area

Select your region in **Location** and enter your email address in **E-Mail**.

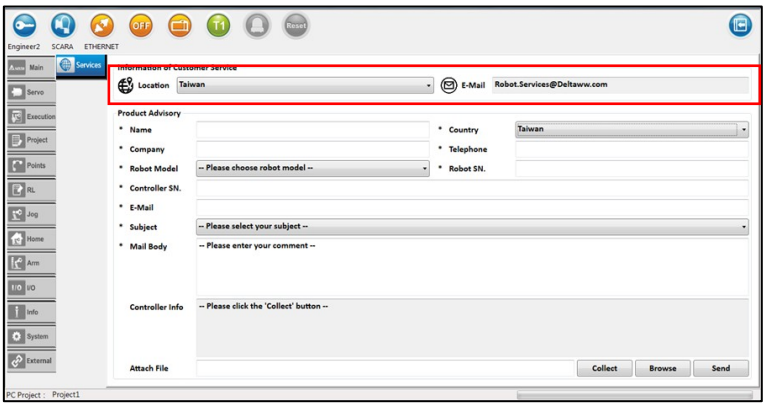


Figure 3.20-1 Information of Customer Service area

Product Advisory area

Enter your related information and then click **Send** to send your message to the Customer Service Staff for advice.

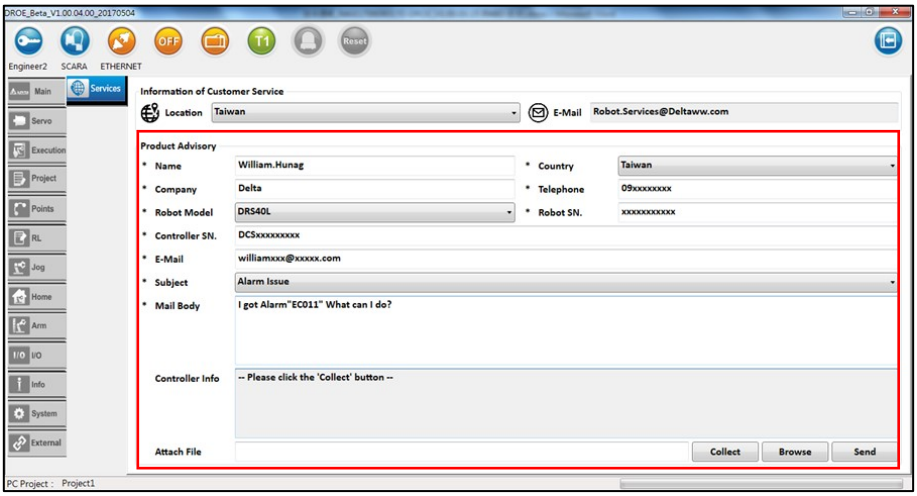


Figure 3.20-2 Product Advisory area

If you have Outlook installed on your PC, you can click **Send** to send an email. You can include related information in the email. Otherwise, you must manually send your email using your email program.

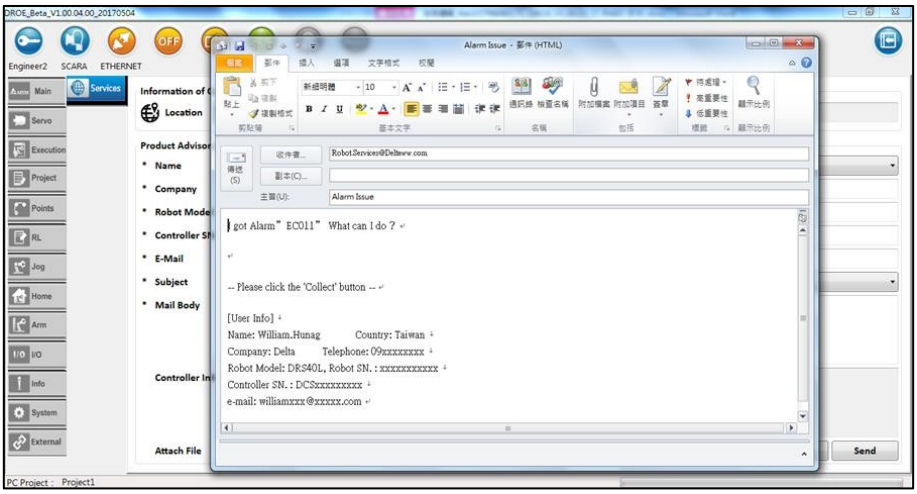


Figure 3.20-3 Send an email to Customer Service

You must enter the required information (marked with an *) before you send a message. If you leave any required field blank, DRAStudio displays red frames around the required information to remind you.

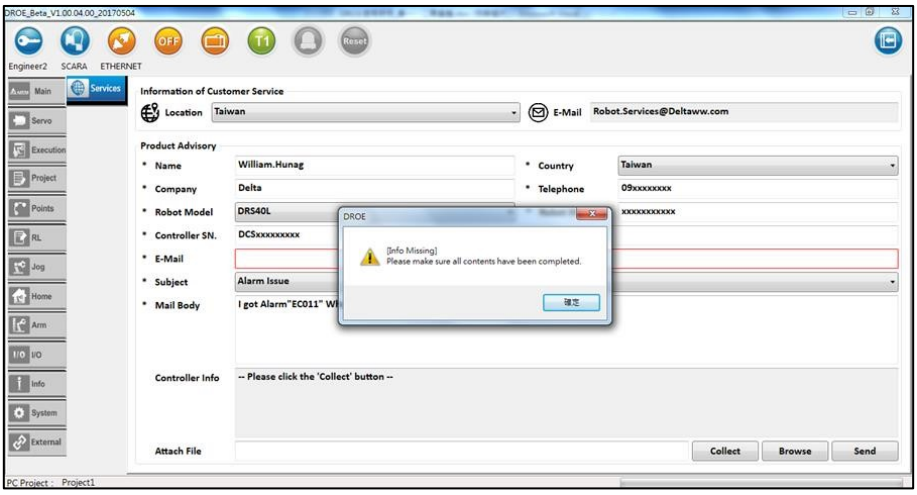


Figure 3.20-4 Required information (*) missing

If your PC is connected to a robot, click **Collect** to include the robot and controller information. This creates a compressed file containing information such as the analysis parameters and abnormality logs for the Customer Service Staff to perform further analysis.

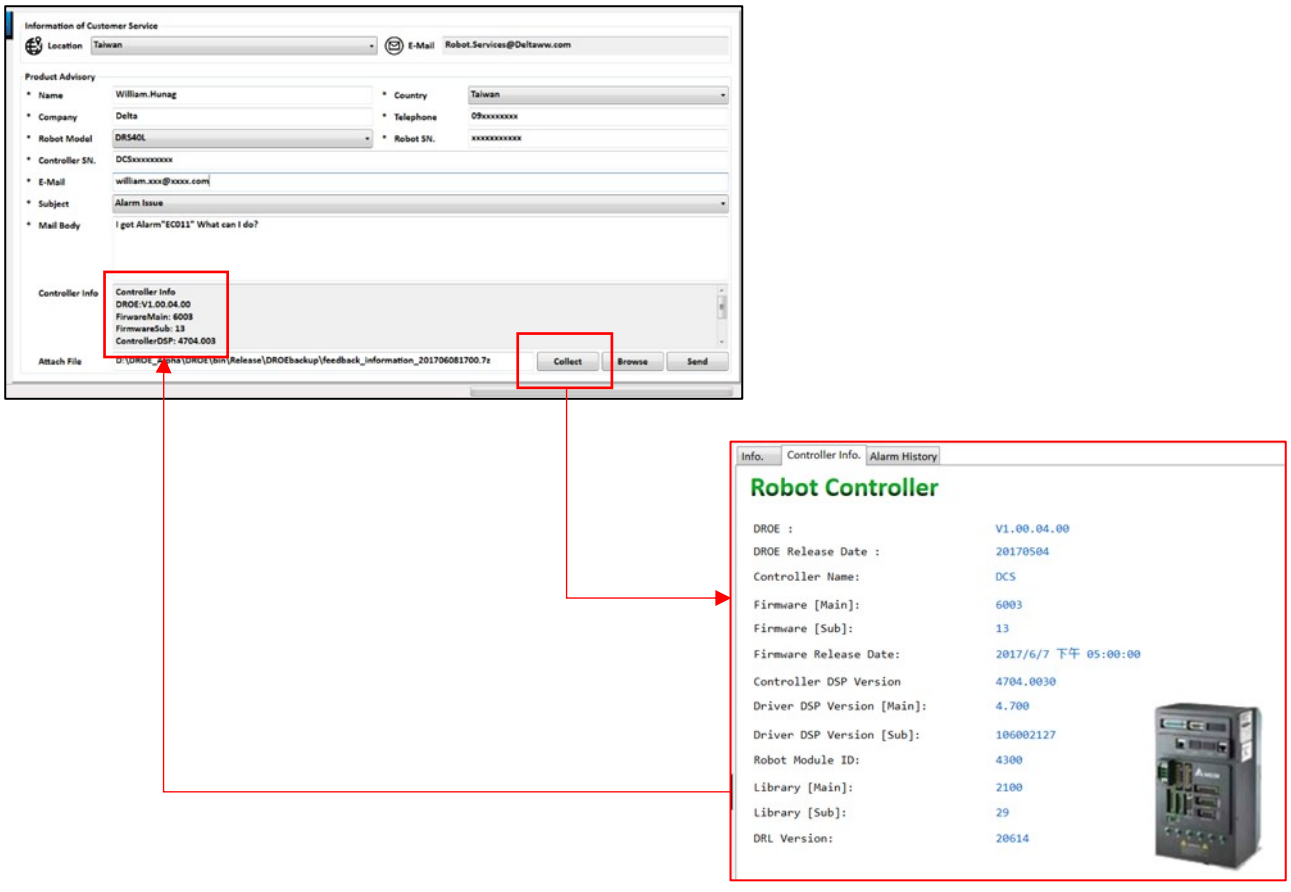


Figure 3.20-5 Including robot and controller model-related information

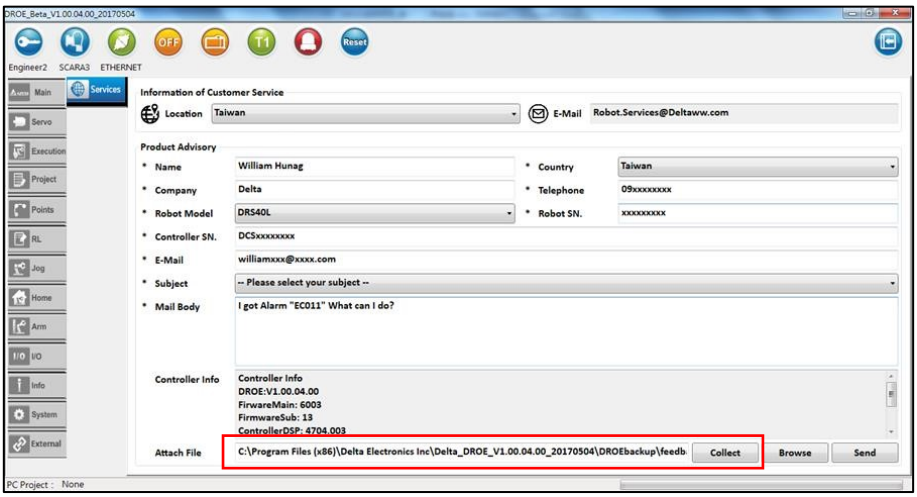


Figure 3.20-6 Collect robot and controller information for Customer Support

4. Virtual Robot

4.1 Start the Virtual Robot

Use the following steps to start the Virtual Robot.

1. Open DRAStudio. Click the **Login** button and enter the login password, as shown in Figure 4.1-1. See Section 2.1 Log in to DRAStudio (DRS/DRV Series).

Figure 4.1-1 DRAStudio Login button

2. Click the **Robot Type** button, and then select **VA** for the **Robot Type** and the **Robot Model Series**. Click **OK**. **VA** appears under the **Robot Type** button, and **Virtual** appears under the **Connect** button.
3. Click the **Connect** button, as shown in Figure 4.1-2.

Figure 4.1-2 Robot Type and Connect buttons

4. In the Connect dialog box, select **Virtual Robot** and then click **Connect** to start the Virtual Robot, as shown in Figure 4.1-3.

Figure 4.1-3 DRAStudio Connect dialog box

1. The simulation screen appears when the Virtual Robot starts, as shown in Figure 4.1-4, and the **Status** displays Connected (Connected) with a green background color, which means that simulation screen activation is complete. The Robot Connection button also turns green (VIRTUAL). Once the Virtual Robot has started, you can use the DRAStudio operation screen to perform operations with the Virtual Robot, or drag the mouse to move the Virtual Robot (described below).

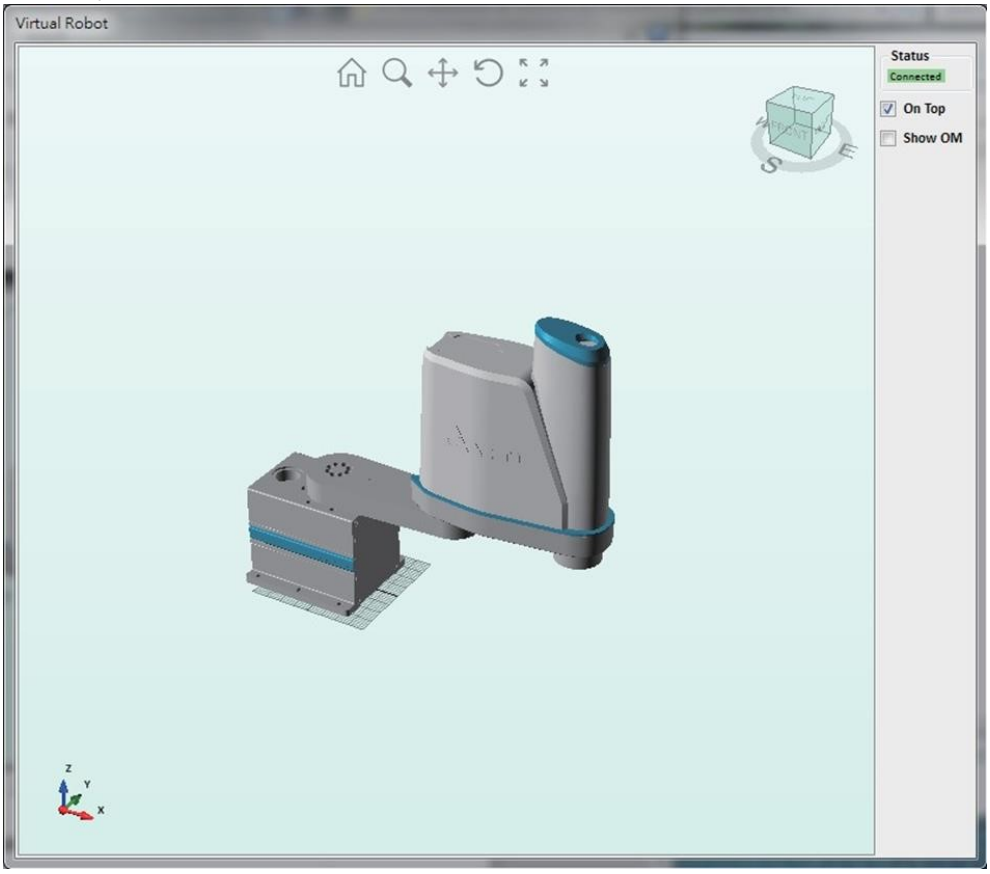
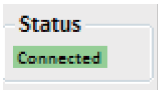
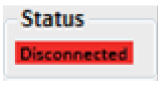
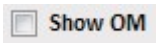


Figure 4.1-4 Virtual Robot simulation screen

4.2 Virtual Robot Simulation Screen Instructions

The Robot Simulation screen allows you to perform actions such as zoom the screen, move the view, move the robot end point, and switch operation mode. The following table describes the functions of the various buttons.

Icon	Function Description
	Places the robot at the center of the screen.
	Zooms the screen; you can also scroll the mouse wheel to zoom the screen.
	Pans the screen.
	Rotates the screen angle.
	Automatically adjusts the screen to an appropriate size.
	Switches the viewing angle.
	Status of current screen; you can operate the Virtual Robot if Connected is displayed.
	Status of current screen; you cannot operate the Virtual Robot if Disconnected is displayed; you must wait until it changes to Connected and then you can operate it.
	Select the check box to keep the VR simulation on the top of other windows.
	Select the check box to enable the Virtual Robot mouse drag function.

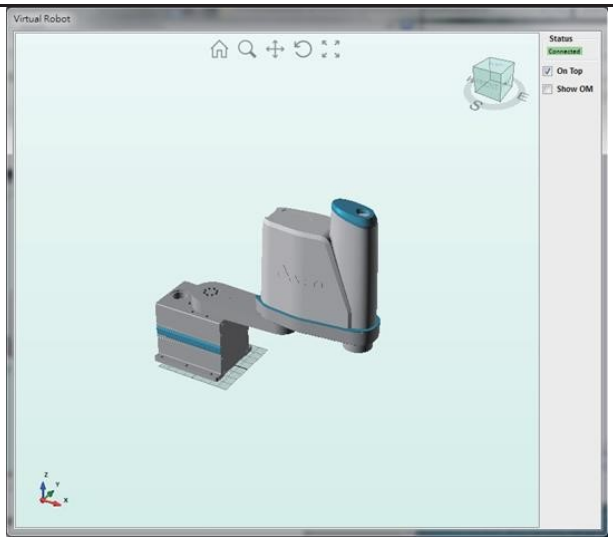


Figure 4.2-1 Virtual Robot operation screen

4.3 Use Mouse Drag to Operate the Virtual Robot

Select the **Show OM** check box (Show OM). The Virtual Robot drag arrow appears, as shown in Figure 4.3-1. You can then use the mouse to drag the end point of the Virtual Robot. Drag the red, blue, green or yellow arrows on the screen, as shown in Figure 4.3-2, to move the end point of the Virtual Robot. After moving to the target position, you can use the **Teach** button on the **Point** screen to teach the point. To disable dragging the Virtual Robot and to hide the dragging arrows, clear the **Show OM** check box (Show OM).

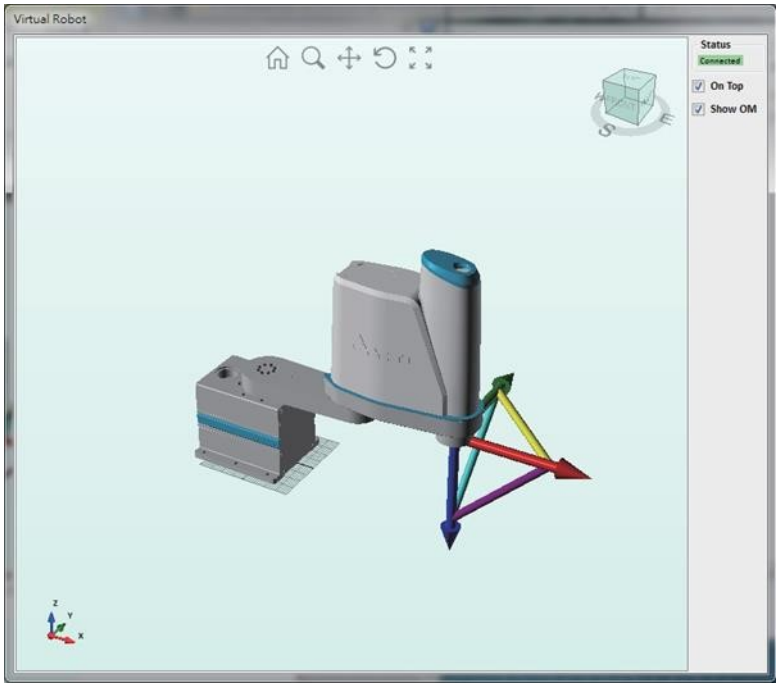


Figure 4.3-1 Drag the Virtual Robot with the mouse

Figure 4.3-2 Mouse drag lead direction

Operating the Virtual Robot with DRAStudio is the same as operating a physical robot. Take the JOG operation for example. Display the Auxiliary page in DRAStudio and click the JOG tab, as shown in Figure 4.3-3. You can use this JOG screen to perform JOG operations on the Virtual Robot.

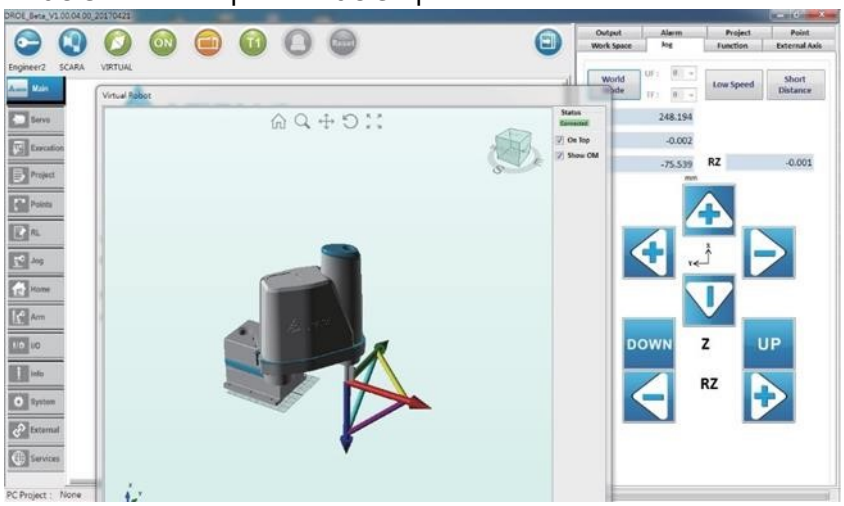


Figure 4.3-3 Operate the Virtual Robot with the DRAStudio JOG screen

4.4 Virtual Robot Functions

The following table lists the Virtual Robot Version v 0.00.09.00 functions.

Program	Function Description
DRAStudio	1. Cartesian, Joint jog, Auto function. 2. Cartesian, Joint coordinates display. 3. [Connect Tab] SCARA (DRS40L) Simulation function. 4. [Execution Tab] Open project, run, stop running function. 5. [Project Tab] Create and edit projects on the PC terminal. 6. [Points Tab] Local point teaching function, Go point (MovL, MovP). 7. [RL Tab] Update row number function when editing Robot Language, Run, Stop and Pause during project execution. 8. [Home Tab] GoHome and Stop for all axes and individual axes.
Virtual Robot Simulation Screen	1. Mouse drag Virtual Robot end point 2. Zoom, pan, rotate the screen 3. Keep the Virtual Robot screen on top
Robot Language	DELAY, CopyPoint, ReadPoint, WritePoint, RobotX, RobotY, RobotZ, RobotRZ, Robothand, AccJ, DecJ, SpdJ, AccL, DecL, SpdL, MovP, MovPR, MovL, MovLR, MovJ, Lift, MArchL, MArchP, if…end, if…elseif…end, while…do,end, for(type1), for(type2), repeat…until, function…end, DI, DO

Smarter. Greener. Together.

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