User Manual (V1.0)

0 Preface

Thank you for choosing CNC Tender. This manual is designed for operating the CNC Tender module. Before using the module, we advise you to carefully review this manual and follow the instructions provided for each process. The information included here is accurate as of the date of publication.

1. Start Up

1.1 Cobot and Tooling Installation

Refer to Doosan User Manual Ver 3.2.0, section 3.2 - 4.2.3

1.2 Launching Module

1. To launch the module you must be on the home screen. Located at the bottom of the display, there will be a 'house' icon 🏠 Clicking on this will take you to the home screen if you're not already there.
2. Clicking on the CNC Tender module 📱 will open up the correct module needed to set up your system.

1.3 Set User Authority

1. Upon completion of section 1.2, the default user authority is set to "operator."
2. Change to Supervisor: Go to the bottom left of the screen. Click on the box that says "operator." Select "supervisor" from the drop-down menu.
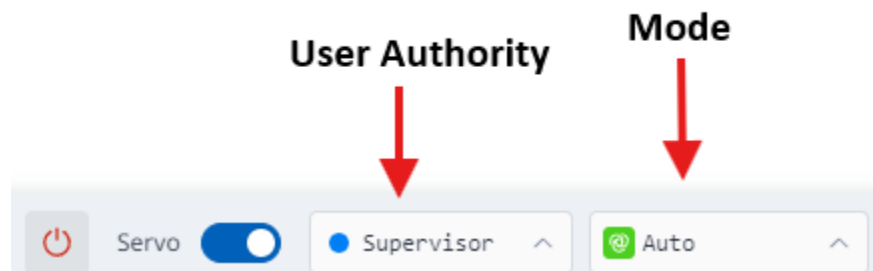
3. Enter the default password: admin (all lowercase). Click "confirm" to change the user authority to "supervisor".
4. Check the current setting: The box to the right of the "supervisor" button will show either "Manual" or "Auto."
5. Set to Manual: If it shows "Manual," no action is needed. If it shows "Auto," click on the box. Select "Manual" from the drop-down menu.

These steps will guide you through the process of setting the User Authority

1.4 Servo On/Off

1. Navigate to the bottom left corner of the screen.
2. Find the toggle button next to the word "Servo."
3. Click the toggle button to turn the servo on.
4. To turn the servo off, click the toggle button again.
5. Check the color of the toggle button:
    ➢ Blue means the server is on.
   ➢ White means the server is off.

1.5 Real Mode

1. Navigate to the bottom right corner of the screen.
2. Locate the toggle button next to the word "real."
3. Click the toggle button to turn real mode on.
4. To turn real mode off, click the toggle button again.
5. Check the color of the toggle button:
    ➢ Blue means real mode is on.
    ➢ White means real mode is off.

2. Initial Setup

2.1 General Setup

1. Access General Setup: From the home screen, locate and click on the 3 line icon in the upper left-hand corner.
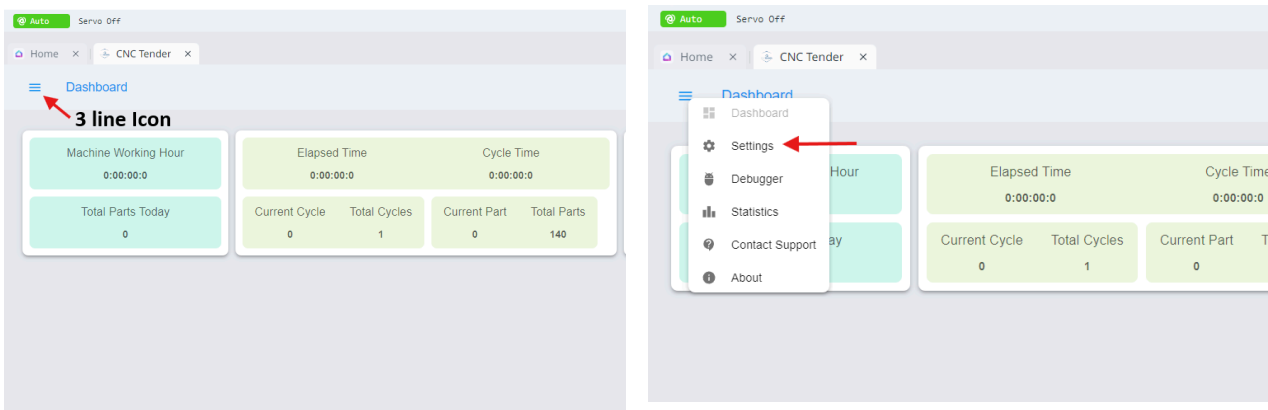
2. In the menu that appears, click on "Settings."
3. Navigate to the General Setup Tab: The first tab that opens in the Settings menu will be the "General Setup" tab.
4. Input Basic Job Information: Input information, ensuring to specify the correct gripper selection, and the correct cobot model selection.

These steps guide you through accessing the general setup tab from the CNC Tender home screen by navigating through the menu options.

2.2 Get Position/Move To Function

Get Pose:

1. Position the Cobot: Manually move the cobot to the desired location.

2. Register the Position: Once the cobot is in the correct location, click "Get POS(J)." This button is located on the right side of the box and is highlighted in blue. Clicking "Get POS(J)" will register and save the waypoint for the current position of the cobot.

This will ensure that the location is accurately recorded and associated with the specified waypoint.

Move To:

1. Navigate to the Location Box: Locate the box that contains the variable location you want to check.

X	Y	Z	MOVE TO
0 mm	0 mm	0 mm	GET POS

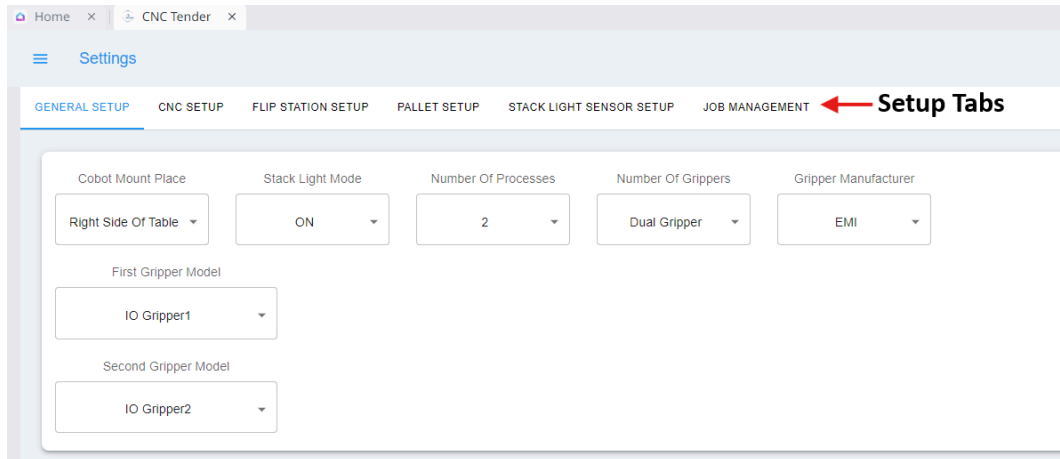| Rz	Ry	Rx
0 °	0 °	0 °

2. Move To Safe Location: Manually move the cobot to a safe location away from others and potential hazards.
3. Confirm the Location: Click and hold the "MOVE TO" button MOVE TO , which is located on the right side of the variable location box and highlighted in blue. Press and continue to hold the button until the cobot reaches the set location. The cobot will stop moving once it arrives at the stored position. This confirms the location that has been set within the variable location box.
4. Modify the Location (if needed): If the location is not correct, manually move the cobot to the desired position. Follow steps in section 2.2 under "Get POS" to update and save the new position for that location.
5. Verify the Position: Repeat step 3 to ensure the cobot reaches the correct position as intended. This will verify the updated location.

By following these steps, you can effectively check and modify the locations for your CNC door setup.

2.3 CNC Setup

1. Navigate to the CNC Setup Tab: Locate and click on the CNC Setup tab, which is located beside the General Setup tab.

2. Fill Out Parameters: Upon clicking the CNC Setup tab, a page containing parameters that the cobot needs to know for picking from the CNC will appear. Fill out all the required information in the respective boxes located at the top of this page.

2.3.1 CNC and Button Waypoints

1. Open the Setup CNC Menu: Locate the "Setup CNC" box in the middle of the page. Click on this box to reveal a drop-down menu that includes key locations for the CNC.
2. Set Up Locations: Start with "CNC WayPoint." Move the cobot to the desired CNC waypoint position.
3. Follow section 2.2 under 'Get Pose' to set position. Repeat this process for all required points.
4. Verify All Points: Place the cobot in a safe position away from any obstacles. Follow steps in section 2.2 under 'Move to'

2.3.2 CNC Door Waypoints

1. Open the Setup Doors Menu: Navigate to the middle of the page. Locate and click on the box labeled "Setup Doors" to reveal a drop-down menu.

2. Set Up Open Door Location: In the drop-down menu, start with the "Open Door Location" box. Move the cobot to the desired position where it can open the door of the CNC machine. Follow steps in section 2.2 under 'Get Pose'.

3. Set Up Other Door Points: Repeat the process for each box related to different door points in the drop-down menu. Follow steps in section 2.2 under 'Get Pose'

4. Set Up Door 2 Locations: After setting all locations for Door 1, click on "Door 2" in the drop-down menu, located directly underneath "Setup Doors." Follow the same steps as above to set all locations for Door 2.

5. Verify All Locations: To check the accuracy of the set locations, move the cobot to a safe position away from any obstacles. Follow steps in section 2.2 under 'Move To'.

By following these steps, you will be able to accurately set up and verify the locations for both CNC doors.

2.3.3 Vise Place and Pick Locations

1. Open the Setup Vises Menu: Start from the CNC Setup tab at the top of the interface. Click on the box labeled "Setup Vises."

2. Fill Out Generic Information: A drop-down menu will appear. Fill out all the information about the specific vise highlighted at the top of the drop-down menu.

3. Set Vise Place Location for Vise 1: Navigate to the bottom half of the drop-down menu. Set Vise Place Location first. Move the cobot to the desired vise place location. Follow the steps outlined in section 2.2 under "Get Pose" to register this location.

4. Set Vise Pick Location: Move the cobot to the desired vise pick location. Repeat the steps from section 2.2 under "Get Pose" to register this location.
5. Set Up Additional Vises: After setting up Vise 1, configure all other vises being used. To Switch to a Different Vise Setting: Navigate to the top of the drop-down menu. Click on the next vise button (i.e. Vise 2, Vise 3, Vise 4).The selected vise button will be highlighted in purple.
6. Fill Out Fields for Each Vise: Complete the fields at the top with the relevant information for the selected vise. Note that the basic information can vary for each vise. Follow the same steps as for Vise 1 to set the place and pick locations for each additional vise.
7. Verify All Positions: Once each vise is set up, verify the positions. Follow the steps in section 2.2 under "Move To" to check that each location is correctly set for each vise.

This process will ensure that all vises are accurately configured and their locations are properly registered.

2.4 Flip Station Setup

1. Click on the "Flip Station Setup" Tab: From the settings menu navigate to the top where the setup tabs are. Click on the "Flip Station Setup" tab.

2. Locate Offset Boxes: Find the boxes at the top of the page representing positions offsets. Enter the necessary values for the cobot's operation.
3. Click on "Place Station Setup": Locate and click the box labeled "Place Station Setup" at the bottom of the setup screen. A drop-down menu will appear.
4. Prepare the Cobot: Ensure the part to be flipped is in the gripper of the Cobot.

5. Set the Place Location: Starting with the "Place Location" box, move the cobot to the desired place location. Follow the steps in Section 2.2 under "Get Pose" to set this position.

6. Set the Place Waypoint: Move the cobot to the "Place Waypoint." Follow the steps in Section 2.2 to set up the waypoint box.

7. Determine Pick Type: Choose the required pick station setup (90-degree, 180-degree, or both) based on the operations being performed. An illustration of both types are below.

8. Click on the Appropriate Pick Station Box: Click on the pick station box corresponding to your pick type. A drop-down menu will appear.

9. Prepare the Gripper: Ensure the gripper has released the part at the place location for better visibility of the pick location.

10. Set the Pick Location: Navigate to the appropriate pick station setup drop-down menu. Move the cobot to the desired pick location. Follow the steps in Section 2.2 under "Get Pose" to set this location.

11. Set the Pick Waypoint: Move the cobot to a safe location above the part. Follow the steps in Section 2.2 under "Get Pose" to set the pick waypoint.

12. Move the Cobot to a Safe Location: Position the cobot away from any hazards in the area.

13. Verify All Locations: Follow the steps in Section 2.2 under "Move To" to check all set locations. Ensure all positions and waypoints are correctly set and operational.

By following these steps, you will ensure the proper setup of the Flip Station, including positions, offsets, and both place and pick stations.

2.5 Creating Pick and Place Pallets

1. Navigate to Pallet Setup: Locate and click on the "Pallet Setup" tab in the middle of the top screen.
2. Configure the Pick Pallet: By default, the "Pick Pallet" will be selected. Input the following information into the provided fields: Parts in row, Number of stacks, Parts in column, Center-to-Center (CTC) X, Center-to-Center (CTC) Y. Ensure all fields are filled out accurately.
3. Set Location A (Pick Point): Define the position where the cobot will first pick parts from the Pick Pallet. Move the cobot to this position. Follow the steps in Section 2.2 under "Get Pose" to record this pick point.
4. Set Waypoint: Determine a safe position where the cobot will move after picking parts from the pallet. Ensure this position is clear of obstructions. Move the cobot to this waypoint. Follow the steps in Section 2.2 under "Get Pose" to record this safe position.
5. Set Up the Place Pallet: At the top of the drop-down menu, click on "Place Pallet." Follow the same steps outlined in steps 2-4 to configure the place pallet: Input necessary information for the place pallet. Set the location where the cobot will place parts. Define and record the safe waypoint for the place pallet.
6. Verify All Positions: After setting up both the pick and place pallets, verify all positions. Follow the steps in Section 2.2 under "Move To" to check that all positions are set correctly.

These steps guide you through setting up both the pick and place pallets, establishing pick points and safe waypoints for the cobot, ensuring smooth operation and safety during the process.

2.6 Stack Light Sensor Setup

1. Select Stack Light Sensor Setup Tab: Navigate to the tab labeled "Stack Light Sensor Setup."
2. Navigate to the Stack Light Type Menu: At the top left of the page, locate the drop-down box labeled "Stacklight Type." Click on this drop-down box to reveal a menu.

3. Choose Stack Light Type: From the menu, select the type of stack light sensor that is installed on the machine (see below).

4. Fill Out Color Information: Look for the section labeled "Color Tag." Click on the box under "Color Tag" to open a drop-down menu. Choose the color that you want to set up first from the dropdown list.

5. Specify Steady Light Action: Find the box labeled "Steady" next to the color you selected. Click on this box to open a drop-down menu. Select the action that the machine will perform when the chosen color light is steady (lit).
6. Specify Pulsing Light Action: Next to the "Steady" box, locate the "Pulsing" box. Click on the "Pulsing" box to open a drop-down menu. Select the action that the machine will

perform when the color you chose is pulsing (if applicable). If the stack light does not pulse, select "N/A" for this field.

7. Define ON and OFF States: Fill out the boxes under "ON" and "OFF" to specify what the machine will do when the selected color light is on or off.

8. Set Up Additional Colors (if applicable): If you are using a multicolor stack light sensor, repeat the above steps for each additional color. Set up the information for each color in the same manner as described.

By following these steps, you will configure the stack light sensor correctly for your machine.

3. Job Management

All Operations below start from the 'Job Management' tab

3.1 Creating a New Job

1. Click on 'New Job': Locate and click on 'New Job' in the upper left corner.
2. Enter Job Name: A box will appear. Type the name of the job being created under 'Job Name'.
3. Select Data Type: Choose between two options:
   - ➢ Default Machine Data: Loads basic default data.
   - ➢ Current Machine Data: Loads data currently stored in the settings.
4. Click 'Create New'

3.2 Delete a job

1. Locate the Job: Find the job you want to delete in the job table.
2. Select the Job: Click the square box next to the job you want to delete. This will mark the job for deletion.
3. Select All Jobs (Optional): To delete all jobs, click the box located beside the "Job Name" heading. This will select all jobs in the table.
4. Click the Trash Can Icon: Locate the trash can icon in the upper right corner of the menu and click it.

5. Confirm Deletion: A warning prompt will appear, asking you to confirm the deletion. Review the list of jobs to be deleted to ensure they are correct.
6. Proceed with Deletion: If the jobs listed for deletion are correct, click the "Proceed" button to permanently delete the selected jobs from the job table.

These steps will guide you through the process of deleting a job from the job table.

3.4 Edit a job

1. Select the Job: Choose the job you wish to edit by selecting it.
2. Access Edit Job Tab: At the top of the screen, locate and click on the tab labeled "Edit Job."
3. Navigate Through Tabs: Toggle through each tab to make the desired edits.
4. Make Edits: Edit the job details as needed across the tabs.
5. Save Changes: After completing all edits, go to the upper right-hand corner and click on "Save." This action will save all the updated data to the job.

3.5 Loading a Job for a Run

1. Select the Job: Review the list of saved jobs under the 'Job Table' section. Click on the specific job that will be used for the upcoming task or run. (This action typically highlights or selects the job)
2. Load the Job: Once the desired job is highlighted or selected, look towards the top middle of the screen for the "Load Job" option.
3. Click on Load Job: Click on the "Load Job" button or link. This action initiates the process of loading the selected job into the system.

These steps guide you through selecting and loading a specific job from the list of saved jobs, ensuring it's ready for use in the upcoming task or run within the module.

3.6 Save Parameters to a Job

1. Navigate to the Job Management tab.
2. Locate the Job Table on the left side of the screen.
3. Select the desired job by clicking the box beside the job name.

4. Click the 'Save To Job' button that appears towards the top of the screen.
5. This action will save all current settings to the selected job.

This process is useful for setups involving similar parts or processes that share the same cobot locations.

3.7 Import Jobs

1. Open Job Data Import: Under the Settings menu, go to the Job Management tab. Navigate to the top middle of the screen and click on the button labeled 'Import All Job Data'.
2. Select the File: File Explorer will open. Ensure that a USB with the desired file is plugged into the controller. Navigate to the USB drive location in File Explorer and select the job file that needs to be imported.
3. Import the Job: Click 'Open' to import the selected job to the job table.

The selected jobs will now be imported to the job table.

3.7 Export Jobs

1. Select Jobs for Export: Under Settings, go to the Job Management tab. Choose the job(s) that need to be exported to an external device.
2. Prepare for Export: Ensure the USB drive is plugged into the controller.
3. Initiate Export Process: Navigate to the top middle of the screen. Click on the button labeled 'Export All Job Data'.
4. Save the File: File Explorer will open. Navigate to the desired location where the job will be saved. Rename the file if necessary. Click 'Save' in the bottom corner of the File Explorer window to complete the export.

The selected jobs will now be exported and saved to the chosen location on the USB drive.

4. Program

4.1 Start Run

1. Load Job: Prior to running a job be sure to load the correct job. To do so follows steps in section 3.5.
2. Set User Authority: Follow steps in section 1.3. Select the user and be sure to have the system in 'Auto Mode'. Manual mode will not allow the program to run.
3. Access the Dashboard: Navigate to the three-line icon located in the top left corner of the screen. Click on this icon to reveal the menu options. From the menu that appears after clicking the three-line icon, choose "Dashboard." This action will take you to the main screen or dashboard view of the module.
4. Find the Start Button: Once you are on the main screen or dashboard, locate the "Start" button. This button is situated in the top right-hand corner of the screen in green.
5. Click on Start: Click on the "Start" button. Follow any additional prompts or steps as required by your module to proceed with starting the run associated with the job. This might involve confirming settings, selecting parameters, or verifying details before initiating the run.

These steps guide you through the process of beginning the run for either a newly created job or an existing job within the module.

4.2 Stop/Reset a job

1. Open the Dashboard: Navigate to the three-line icon in the upper right corner of the screen. Click on the icon to open a dropdown menu. Select "Dashboard" from the menu.
2. Stop a Job: In the Dashboard, locate the red button labeled "Stop" on the right side of the screen. Click the "Stop" button to stop the job.
3. Resume a Job: Click the button labeled "Resume" to continue the job from where it left off.

4. Reset a Job: If the program is running, first click the "Stop" button to halt the job. Then click the button labeled "Reset" to reset the program from the beginning.

# 5. Basic Functions

5.1 Adjusting speed

1. Locate the Speed Box: Go to the bottom right corner of the screen. Look for a box labeled "Speed" displaying a percentage value.
2. Click the Box: Click inside the "Speed" box to make it active.
3. Adjust the Speed:
    ➢ Option 1: Drag the blue line left to decrease the speed or right to increase it.
    ➢ Option 2: Type the desired percentage directly into the box.
4. Exit Menu: Once the speed is set to your preference, double tap on any blank area of the screen to apply the changes and exit the speed menu

5.2 Simulator

Refer to Doosan User Manual Ver 3.2.0, section 3.2 - 4.2.3

5.3 Jog Plus

1. Set the System to Manual Mode: Refer to Section 1.3 and follow the instructions to switch the system to manual mode.
2. Open Jog Plus: Go to the bottom middle of the screen. Click on the Jog Plus icon to open it in a new tab.
3. Confirm Mode: Check the illustration provided below to ensure that the mode is correct for using Jog Plus.
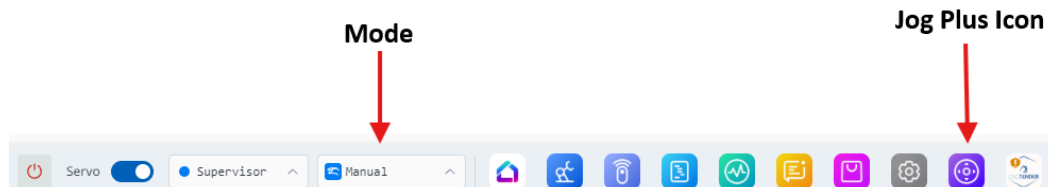
Refer to Doosan User Manual Ver 3.2.0, section 5.14 for detailed instructions on usage and functionality

5.4 Software Recovery

1. Enter Software Recovery Mode: Navigate to the top right corner of the screen. Click on the Backdrive & Recovery button. From the drop-down menu, select Recovery. Confirm the selection when prompted to proceed to the recovery screen.
2. Activate Servo: Ensure the servo is turned on. Click the blue button in the upper right corner labeled 'Servo On to Start Recovery'.
3. View and Adjust Robot Model: Observe the robot model on the left, displaying real-time movement and current orientation. Choose different views by clicking on orientation buttons located at the bottom left of the screen. Adjust the movement speed by entering a percentage in the box at the bottom of the model view or by dragging the cursor. See image below for more information.
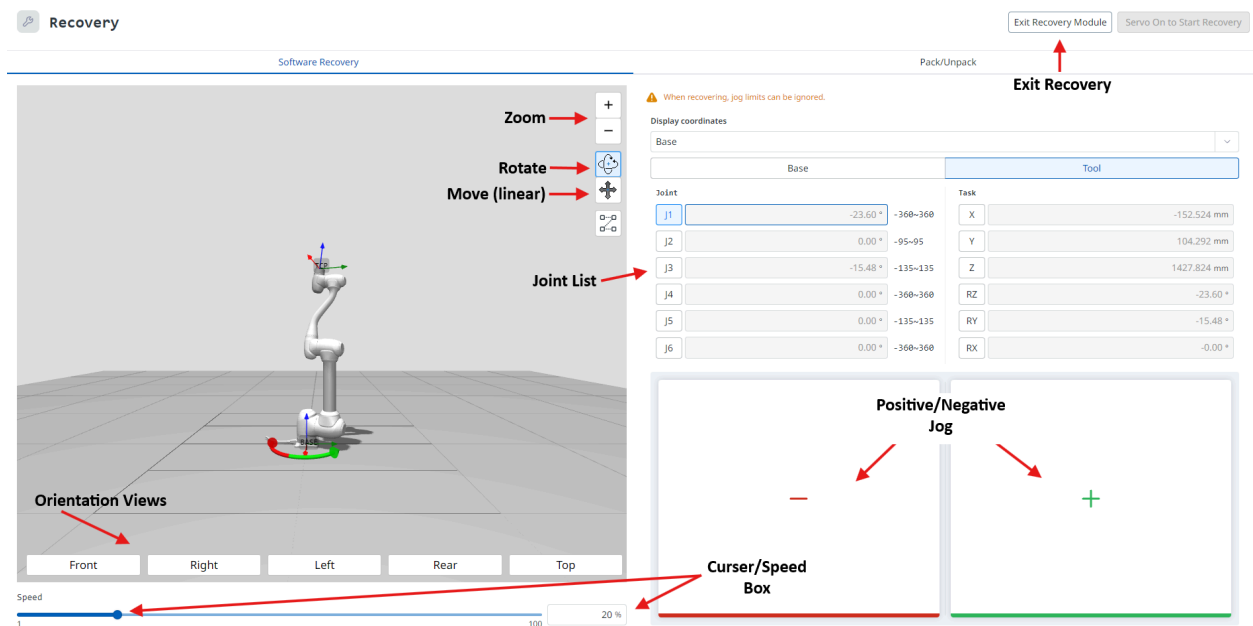
4. Move the Cobot: Select the joint to be moved from the list on the right side of the screen. Hold down the '+' or '-' button on the right side (highlighted in red or green) to move the cobot in the desired direction.
5. Exit Recovery Mode: Once the cobot has been successfully recovered, navigate to the top right corner of the screen. Click on 'Exit Recovery Module' to exit recovery mode.

These steps will walk through using the recovery function after a fault has occurred

5.5 Pack/Unpack

1. Enter Software Recovery Mode: Navigate to the top right corner of the screen. Click on the Backdrive & Recovery button. From the drop-down menu, select Recovery. Confirm the selection when prompted to proceed to the recovery screen.
2. Activate Servo: Ensure the servo is turned on. Click the blue button in the upper right corner labeled 'Servo On to Start Recovery'.
3. Access Packing/Unpacking Controls: Click on the 'Pack/Unpack' tab located at the top of the screen.
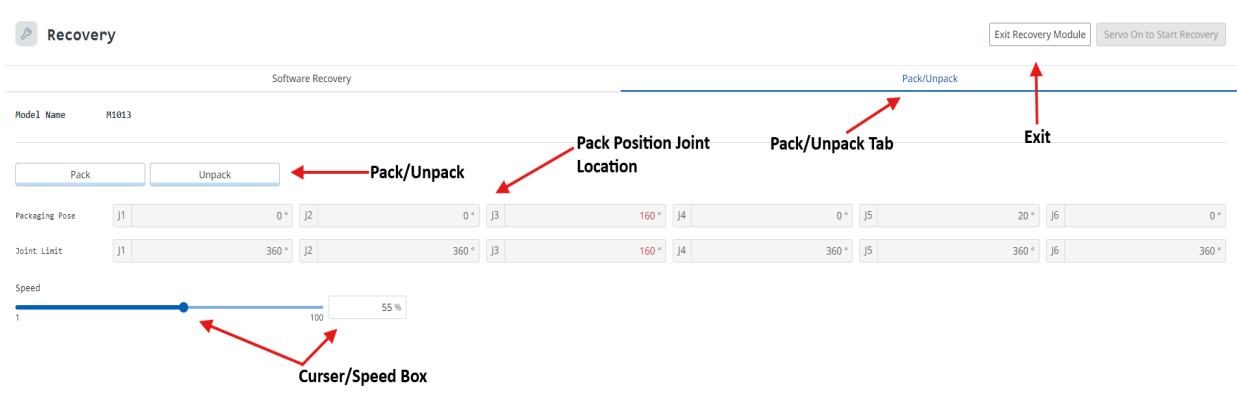
4. Control Cobot Position:
   ➢ If the cobot is in the pack position, hold down the 'Unpack' button located at the top left corner of the screen. Wait until the cobot has stopped moving, indicating it has finished unpacking.
   ➢ To return the cobot to the pack position, hold down the 'Pack' button, following the same procedure.

5. Adjust Speed: Modify the speed by entering a percentage into the box at the bottom left of the screen or by moving the cursor to the desired speed.
6. Exit Recovery Mode: Once the cobot has been successfully packed or unpacked, navigate to the top right corner of the screen. Click on 'Exit Recovery Module' to exit back to the main screen.

5.5 View Statistics

1. Access the Statistics Screen: Start from the home screen. Click on the three-line icon in the upper left corner of the screen to open a drop-down menu. Select 'Statistics' from the drop-down menu.
2. View Statistics: A statistics screen will appear, displaying various features.

3. Adjust Statistics Display: Change Number of Days: Drag the cursor at the bottom of the screen under the 'Number of Days' heading to select the desired range. Adjust Number of Users: Drag the cursor under the 'Number of Users' heading to choose how many users will be displayed at one time.
4. Analyze Production Rates: Use the screen to view and compare production rates for different users.