AWP Series Collaborative Robot Palletizing Workstation User Manual V2.0

Guangzhou Auctech Automation Technology Ltd.

Preface

Thank you very much for using our products.

The AWP series collaborative robot palletizing workstation is a fully automatic collaborative palletizing equipment developed by Guangzhou Auctech Automation Technology Ltd. for the packaging back-end market. The product adopts KEBA robot controller, integrates left and right palletizing workstation, collaborative robot and negative pressure suction cups, supports double palletizing work at the same time, and supports a variety of pallet formulas.

This manual is the operation and use manual for the AWP series collaborative robot palletizing workstation, which provides the operating environment, operation instructions, common problems, and treatments for this equipment. For first-time users, please read this manual carefully. If you have any doubts about some functions and performance, please consult our technical support staff for help.

The final interpretation of this operation manual belongs to Guangzhou Auctech Automation Technology Ltd.

If you have any questions, please consult with the technical department of Guangzhou Auctech Automation Technology Ltd.

Content

1. Robotic workstation installation

1.1. Returning the robot to the zero position

This is the factory robot posture [Figure 1-1], to install it in a suitable position, power on the robot and set the speed to approximately 30%, the robot back to zero position [Figure 1-2]

Figure 1-1

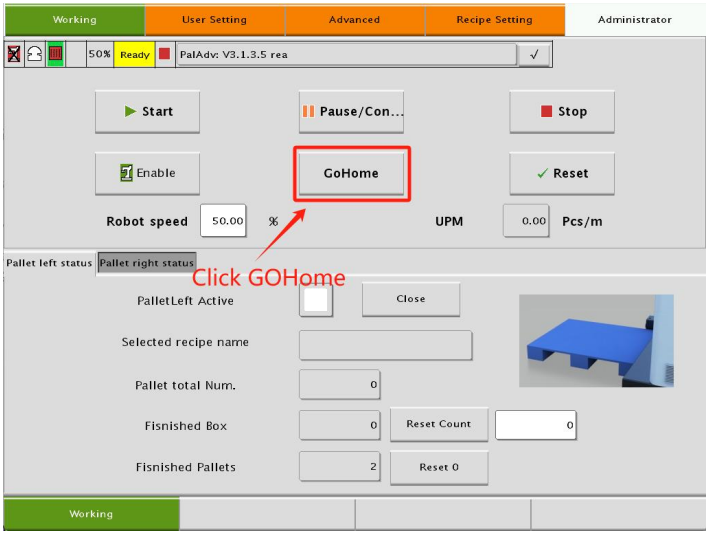


Figure 1-2

1.2. Check the robot zero scale and parts for damage

This is the robot's attitude in the zero position, check whether the robot joint surface is damaged, and check if the reference markings align with the robot’ s standard zero-position posture (the chapter of the robot's pointing motion) [Figure 1-3].

Figure 1-3

1.3. Installation of pallet

Place the left or right pallet, place the pallet directly at the lower corner of the robot base [Figure 1-4]

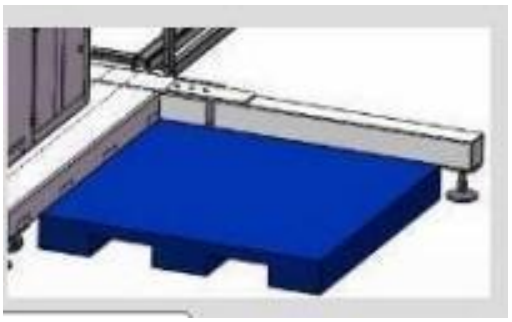


Figure 1-4

1.4. Installation of photoelectric sensors

Install the photoelectric sensors along the conveyor line, adjust the left line incoming and right line incoming electric eye sensing sensitivity and roller line [Figure 1-5].

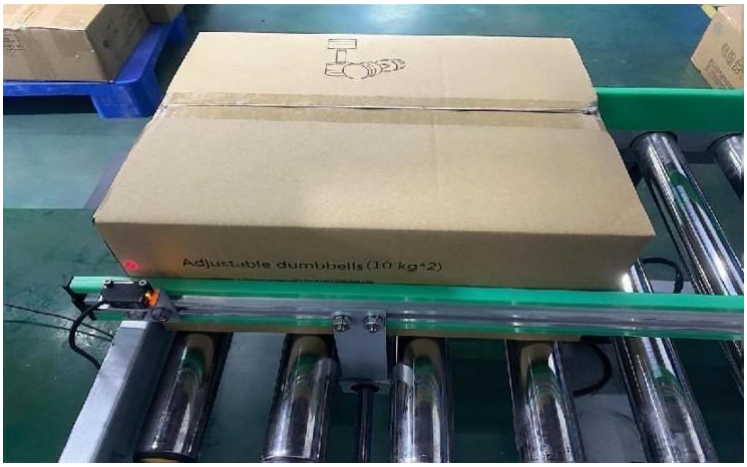


Figure 1-5

1.5. Installation of suction cups

By hand, move the fifth axis of the robot to the proper position, then install the suction cups and air tubes, and return the robot to the zero position when the installation is complete [Figure 1-6].

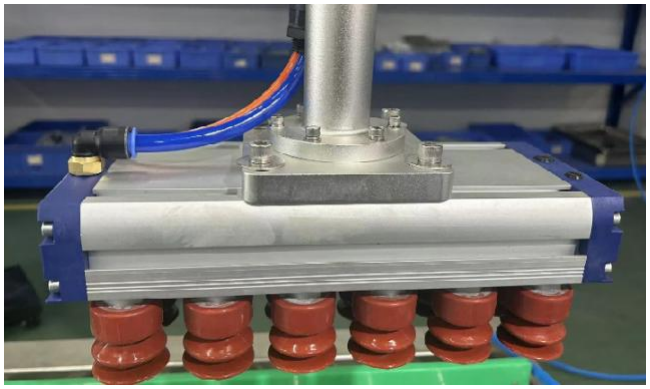


Figure 1-6

2. Equipment operating instructions

2.1. Equipment and system introduction

The AWP series collaborative robot palletizing workstation is a fully automatic collaborative palletizing equipment developed by Guangzhou Auctech Automation Technology Ltd. for the packaging back-end market. This product uses KEBA robot controller, which integrates left and right palletizing stations, collaborative robots, and negative pressure suction cups. It supports dual pallets working at the same time and supports multiple palletizing recipes, as shown in the figure below.

Figure 2-1

According to collaborative palletizing needs, this equipment supports a variety of box palletizing specifications. Users can configure different picking type and placement plan according to different product needs.

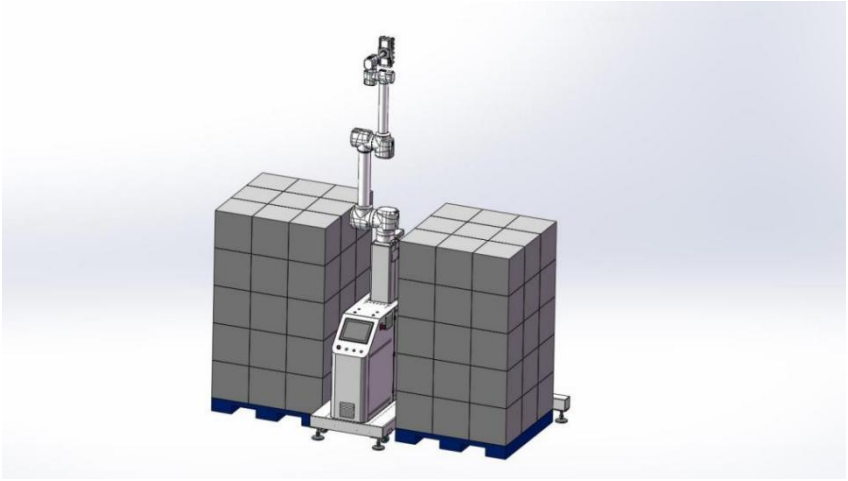


Figure 2-2

2.2. Start the system.

Check whether the power supply and air source of the equipment are connected. When the power supply and air source are connected, turn on the main power supply of the equipment.

After the equipment is started, the startup time of the robot system is about 60 seconds.

After the collaborative palletizing robot is powered on and started, the equipment will be in standby mode, waiting for the operator to turn on the equipment.

Figure 2-3

The collaborative robot palletizing workstation is a fully automatic intelligent device. When the power supply and air source are connected, the equipment can be started with one click. The front panel of the equipment is equipped with "start", "stop" and "pause/continue". , "Emergency Stop" four physical buttons, when the corresponding program recipe is selected (the recipe is saved when the power is turned off by default), press the "Start" button, and the equipment can start running. In addition to the physical buttons on the rack, the start and stop of the equipment can also be controlled through the "Start", "Stop", "Pause/Continue" and other buttons on the touch screen console page.

Figure 2-4

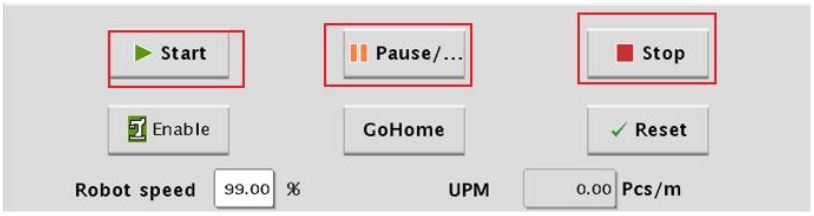


Figure 2-5

2.3. The status bar

As shown in the figure below. The control status bar of the collaborative robot palletizing workstation mainly displays some current status information of the robot. At the same time, you can also quickly return to the console, alarm information and other pages from this page.

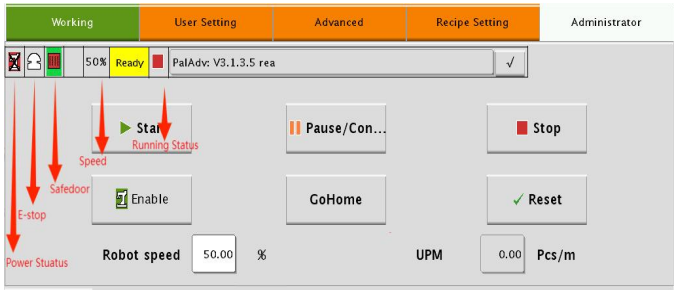


Figure 2-6

2.4. Tri-color lights

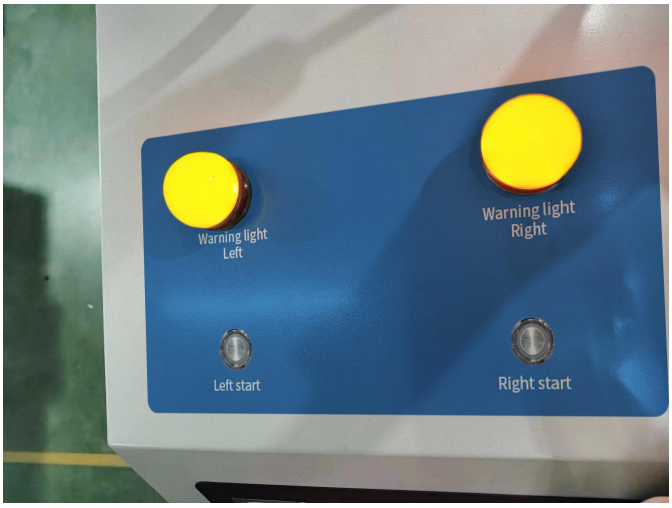


Figure 2-7

As shown in the figure, the equipment is equipped with three-color lights and a buzzer to display the operating status of the robot, as follows:

Standby status: Yellow lights on both left and right;

Operating status: When the left side is running, the left side lights up green, and when the right side is running, the right side lights up green light;

Alarm state: In the alarm state, the left and right red lights flash and light up at the same time, on for 500ms and off for 500ms. At the same time, the buzzer also sounds for 500ms and stops for 500ms, with a higher frequency;

When the pallet is full during operation: when the left pallet is full, the left The palletizing yellow light and the left palletizing buzzer flash at a frequency of 1s on and 1s off to remind the user that the pallet is full and the pallet needs to be replaced; when the right palletizing is full, the right palletizing yellow light and the right palletizing buzzer flash at a frequency of 1s open The 1s off frequency flashes to remind the user that the pallet is full and the pallet needs to be replaced.

2.5. Console page

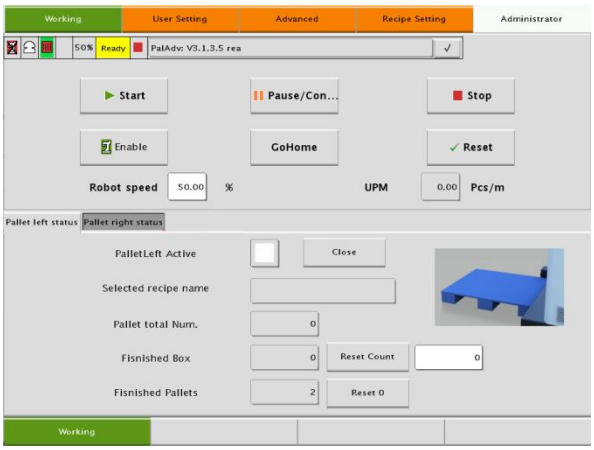


Figure 2-8

This page is used for daily production operations on site. It sets the switching of two product specifications. When switching products, the parameters will change automatically switches to the parameter group of the currently selected product, and will be automatically saved to the current parameter group after the parameters are modified.

Press the "Console" button on the status bar to bring up the console. Its page is divided into the operation console and the left and right palletizing status pages. The details are as follows:

2.5.1. Operation console

1. The "Start" button

It has the same function as the physical "Start" button. Start the device and run the program. The robot will rise safely first, and then return to the zero position, and then return to the standby state, waiting for the palletizing start signal.

2. The "Pause/Continue" button

It has the same function as the physical button "Pause/Continue". When the robot is running, you can pause the robot and press it again to continue running.

3. The "Stop" button

It has the same function as the physical "Stop" button. It stops the robot. It is different from the pause function. The stop function will uninstall the program, but it will not reset the number of pallets. It needs to be restarted next time. In addition, the stop button also has a reset function. When the device is in alarm state, pressing the stop button can reset the alarm.

4."Power on" button.

Powering up means enabling the robot. By default, the device is enabled when it is powered on. However, it can also be canceled on the user settings page.

Check "PowerOnAutoEnable".

5."Return to Zero" button

When the machine is not running, the robot returns to the zero position, that is, it controls the robot to move to the zero position. The zero position status is as follows.

Figure 2-9

6."Reset" button

When the robot is in alarm mode, if a collision occurs, the robot alarm can be reset by pressing the "Reset" button.

7.Robot speed

Set the robot speed according to the actual cartons incoming speed,you can set the robot's working speed. The maximum speed is set to 100%.

8.The single-tap

System will record the time taken for a single product, thereby calculating and displaying the single-tap of palletizing.

2.5.2. Left and right palletizing status bar

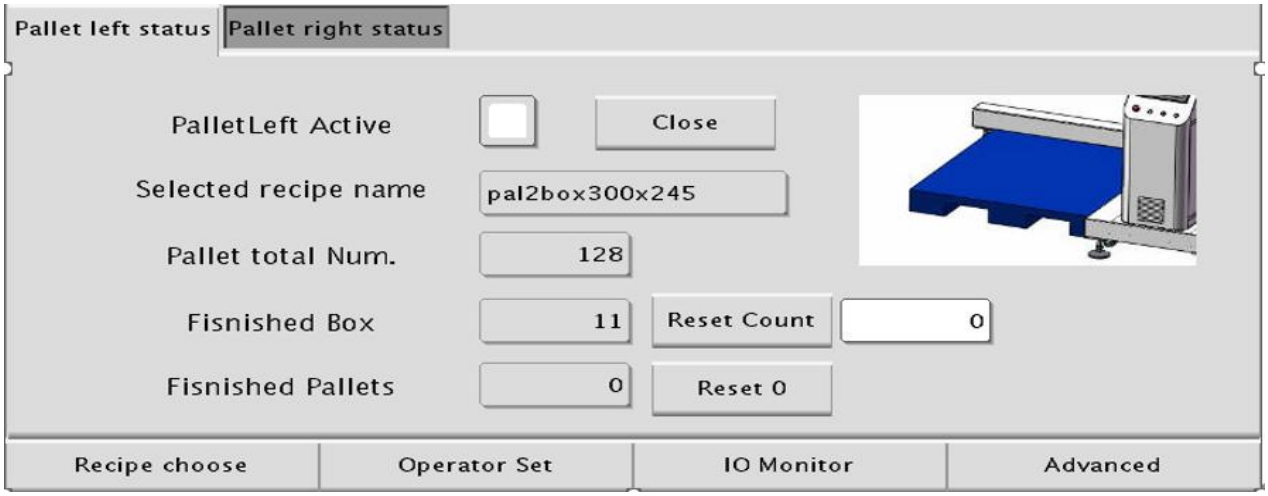


Figure 2-10

As shown in the figure, The lower part of the console shows the left and right palletizing status, including:

whether palletizing is activated (can be turned off manually);

the name of the recipe being called;

the total quantity of palletizing;

the number of items which is palletized currently. (when palletizing is not activated, the number can be manually reset to facilitate starting palletizing from the middle);

the total number of boards which is palletized, to facilitate statistics of the day's production.

2.6. Alarm page

Click the exclamation to mark button on the page and enter the system alarm page, view the system startup and alarm information. When a fault or alarm occurs, you can use this page to understand the specific situation of the alarm to facilitate troubleshooting.

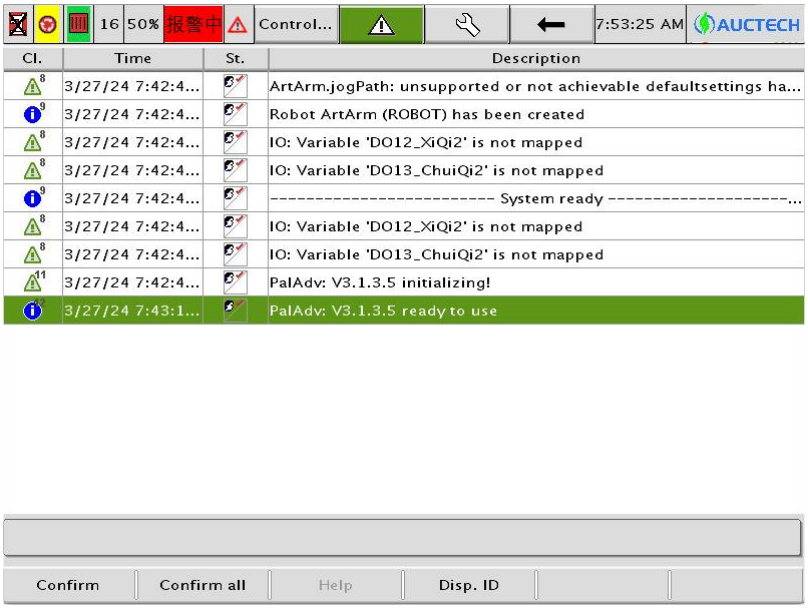


Figure 2-11

The information on the alarm page is mainly divided into two parts. The first is the alarm at the robot system level, and the second is the automatic operation of the robot alarms that may occur during the execution status process.

The specific alarm situations and solutions are as follows:

1.EtherCAT communication error. The main reason may be that the EtherCAT network cable between the controller and the driver is loose or unplugged. Please check whether the EtherCAT network cable between the controller and the servo and the direct servo is plugged in properly, if the alarm still occurs after plugging it in, and the network port light does not flash, please replace the network cable;

2. The robot servo axis alarms. The reason is that the server motion overload alarm, or the motor encoder line power line is loose, causing the servo to be unable to move and then have alarm. Please check the servo cable connection, and open the driver electrical cabinet to see if the driver has an alarm and a red light. If it still cannot be eliminated, you need to contact the manufacturer's engineer to help troubleshoot the problem.

3. The robot fails to power on and the alarm occurs. The possible reason is that the robot axis is in an alarm state, or the 380V power supply to the driver is not connected and cannot be powered on. Please troubleshoot the servo alarm problem, as shown in the second alarm.

4. Warning for failure to load or run the program. The robot is not ready (not powered on, not returned to zero) or the program name is wrong or has been deleted. Please check whether the robot running program is normal. If it is deleted or the name is changed accidentally , it needs to be restored the robot program.

5. A collision alarm is detected. The possible reason is that a collision occurs during the operation of the robot, resulting in abnormal torque of the servo axis and an alarm occurs. If the parameter settings are incorrect and the box is pressed, please set the correct parameters, remove the pressed box, and reset it again. It can run normally; in addition, if the robot does not actually encounter a box or foreign object, the robot also falsely reports a collision alarm. Please re-learn the anti-collision detection parameters and refer to the subsequent chapter 7.

2.7. Permission management page

The control permissions of the collaborative palletizing robot are divided into 4 levels, and their operating permissions from high to low are: Level 16 permissions: Administrator, password reserved by the manufacturer;

Level 15 permissions:service, password :service;

Level 7 permissions: teacher, password 888888 (if not, try the password is also teacher);

Level 1 authority: operator, password 8888 (If it is incorrect, try the password is also operator.);

Note: This permission may be changed before leaving the factory according to different customer requirements. If the above password is incorrect, please contact the manufacturer's engineer.

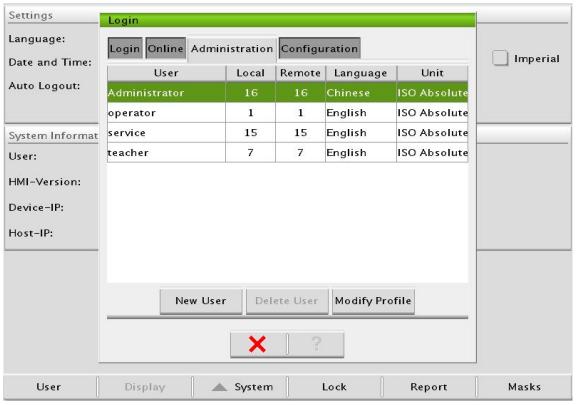


Figure2-12

Operator: Operator permissions, can start and stop the robot, modify the robot speed, clear output records, cannot jog the robot, corresponding to the password "8888".

Teacher: Reserved.

Service: Reserved.

Administrator: Administrator rights, the password is set by the manufacturer, has the highest authority, can modify all programs and parameters, and can manage other users, including changing passwords, setting the default display language, etc.

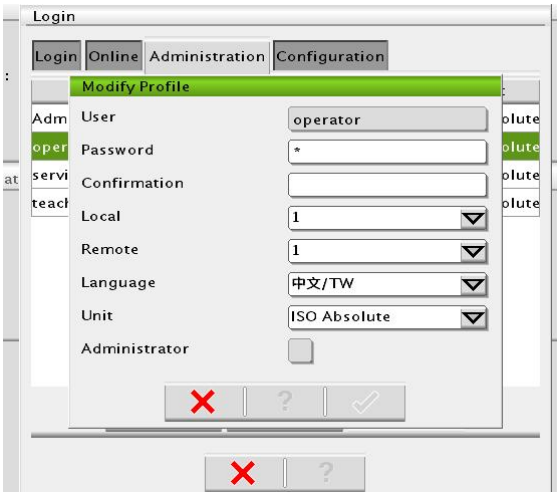


Figure 2-13

3. Switching administrator mode

3.1. Setting the administrator mode

Click "Recipe Setting", such as the interface and [Figure 3-1] the same, that the current mode for the operator mode, to be switched to administrator mode, because operator mode does not allow creating new recipes or teaching grab points, the role of the operator mode is to maintain the original recipe power outages, switching to administrator mode as follows

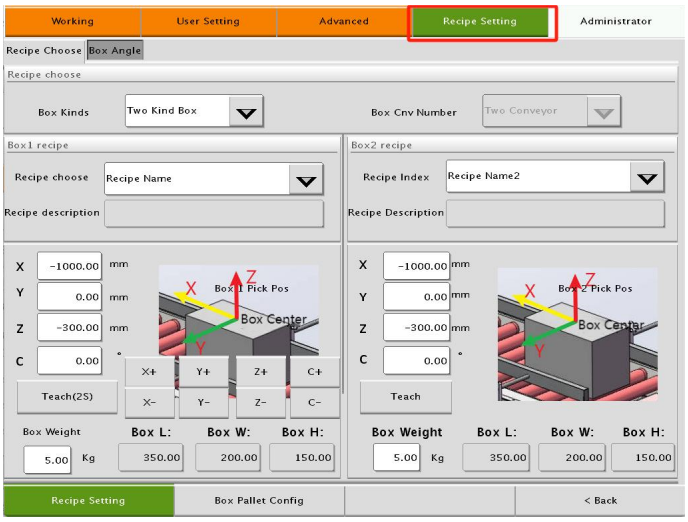


Figure 3-1

Click "Commissioning Maintenance" to enter the interface, and then click "Administrator" for the next step [Figure 3-2].

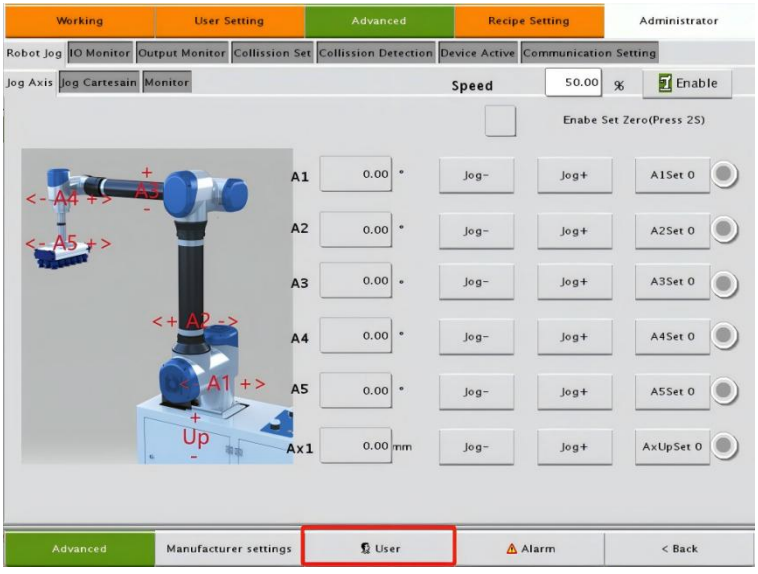


Figure 3-2

Click "User" [Figure 3-3].

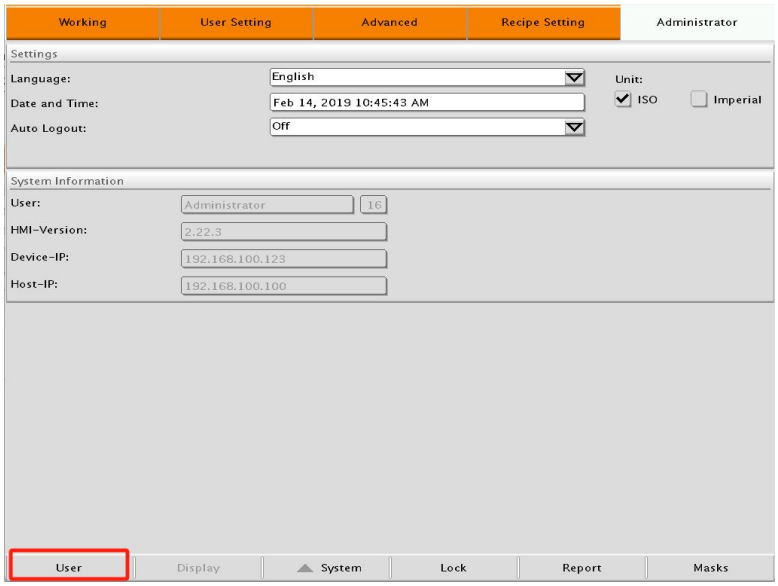


Figure 3-3

In the "Login" screen, click the drop-down arrow and select "Administrator" [Figure 3-4].

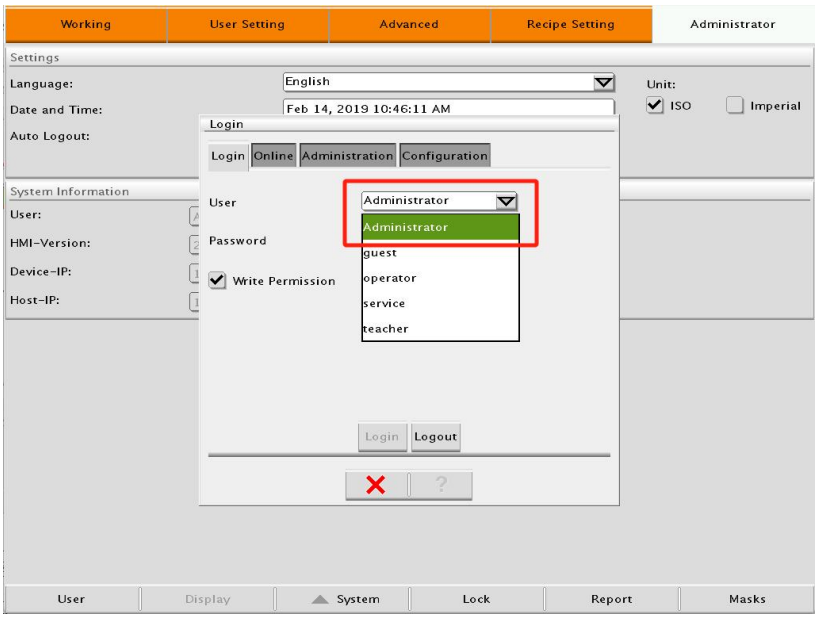


Figure 3-4

Enter the password: pass, and then click "Login" to log in, the administrator mode switching success [Figure 3-5].

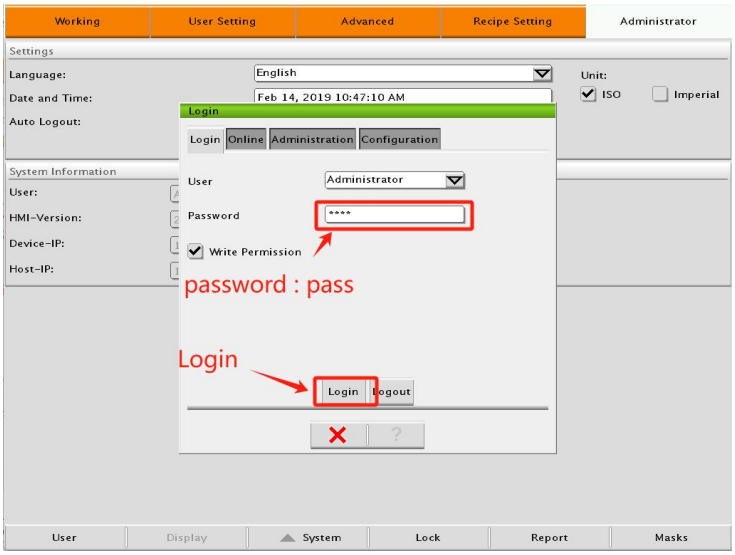


Figure 3-5

Switch the language to "English" [Figure 3-6].

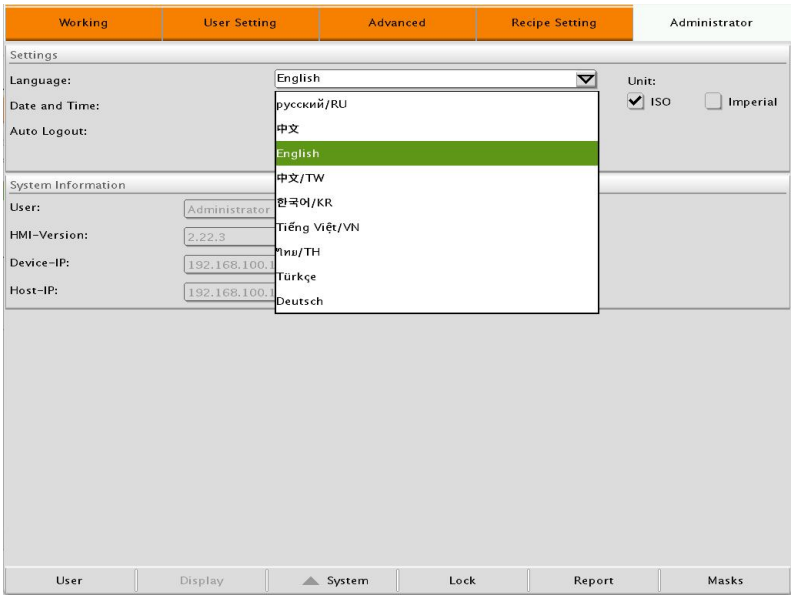


Figure 3-6

4. Create a new recipe

4.1. Box Pallet configuration

Click "Recipe Setting" to enter the interface [Figure 4-1].

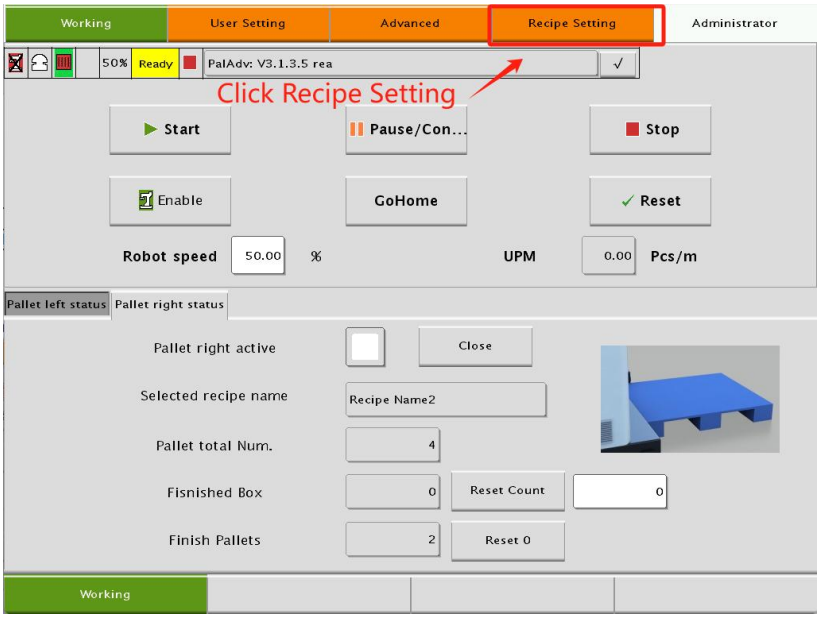


Figure 4-1

Click on "Box Pallet Configuration" to enter the interface [Figure 4-2].

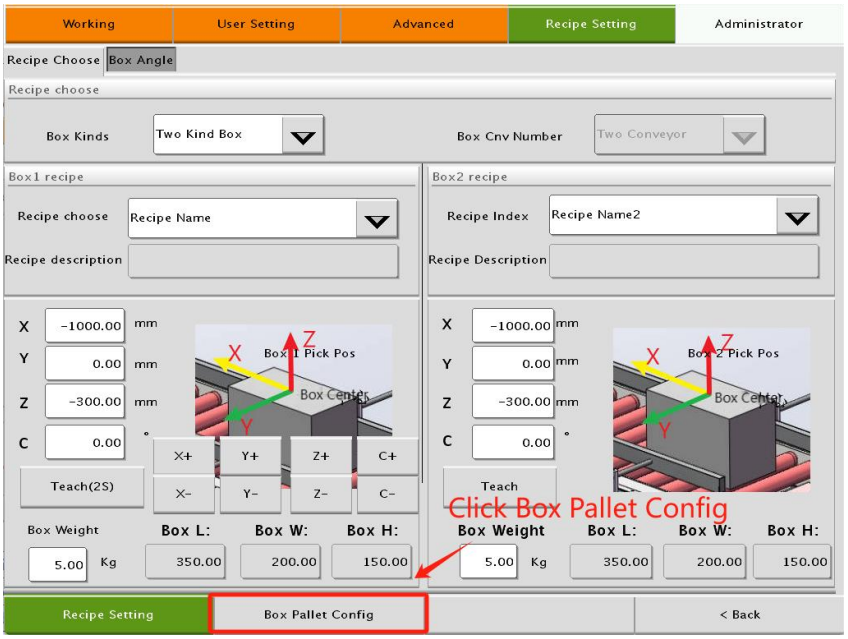


Figure 4-2

4.2. New formulation

Click on "New" recipe [Figure 4-3].

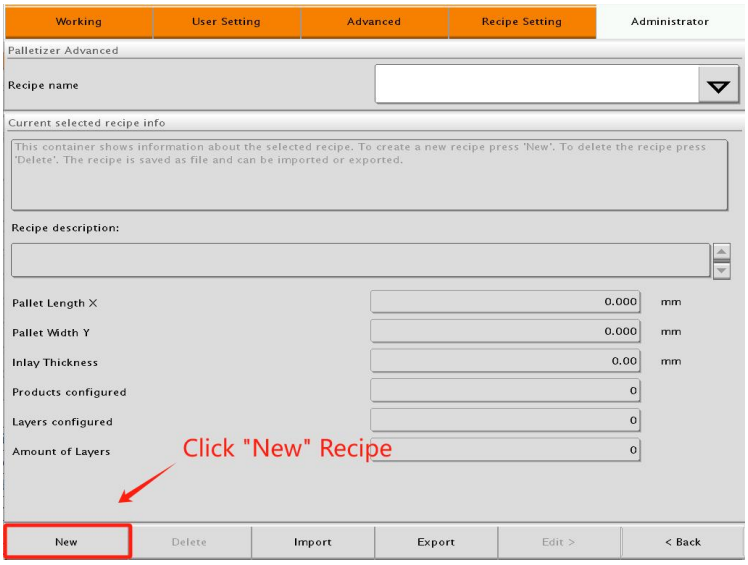


Figure 4-3

Enter the recipe name and click "✔" [Figure 4-4].

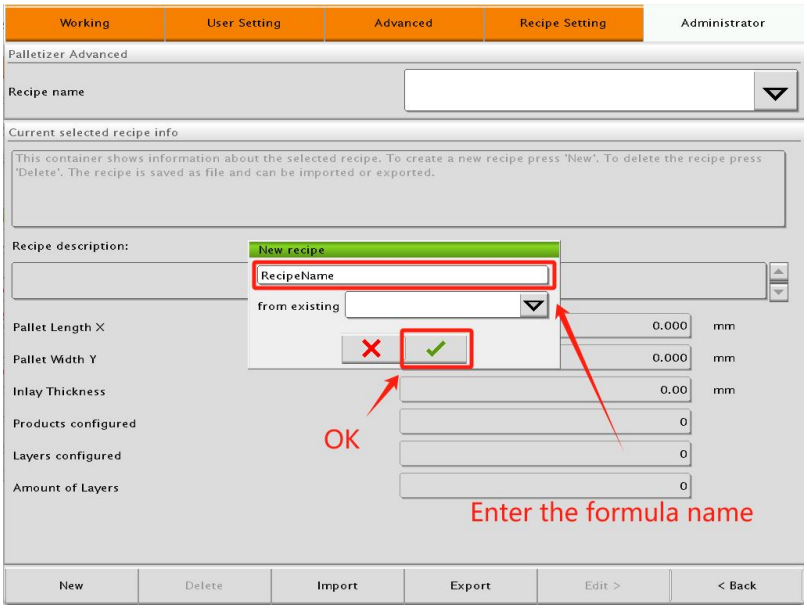


Figure 4-4

Click on "Edit" recipe [Figure 4-5].

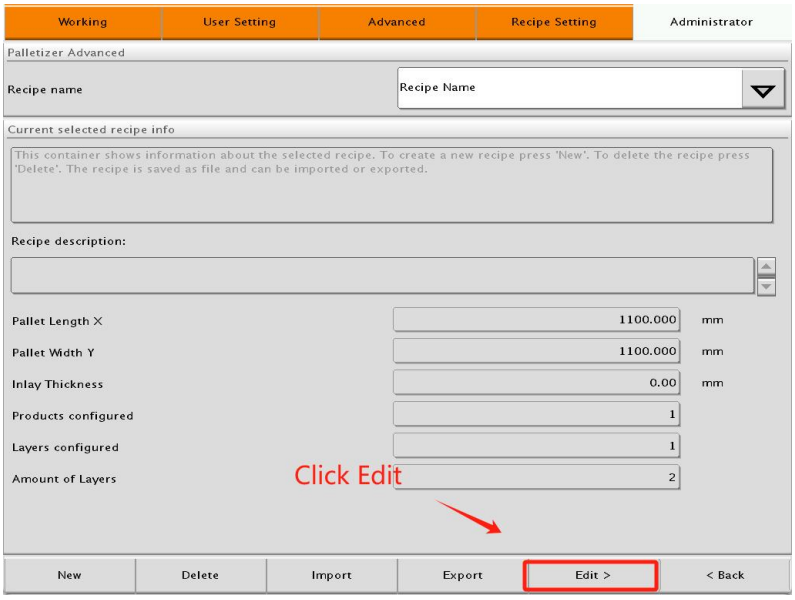


Figure 4-5

Click on the "drop-down arrow" to select the length (X) and width (Y) of the customized pallet size [Figure 4-6] or manually enter the length (X) and width (Y) of the pallet [Figure 4-7], after entering the pallet dimensions, click on the "Next Page" to enter the interface.

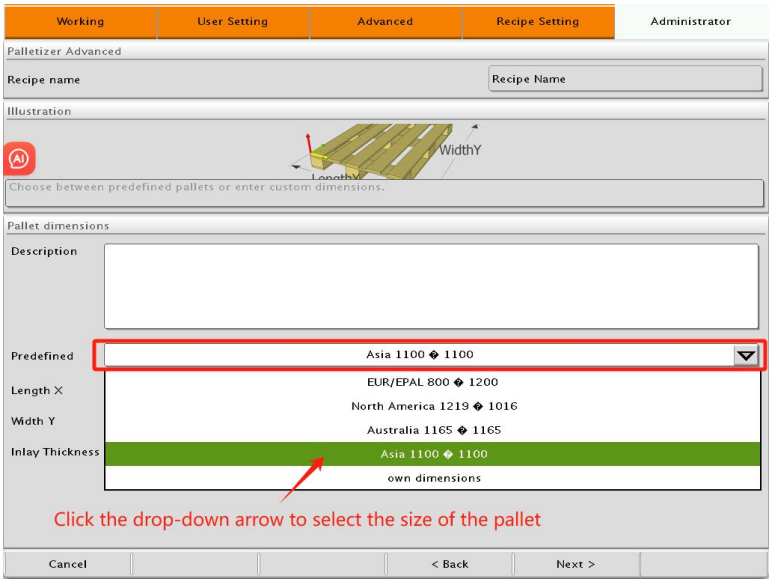


Figure 4-6

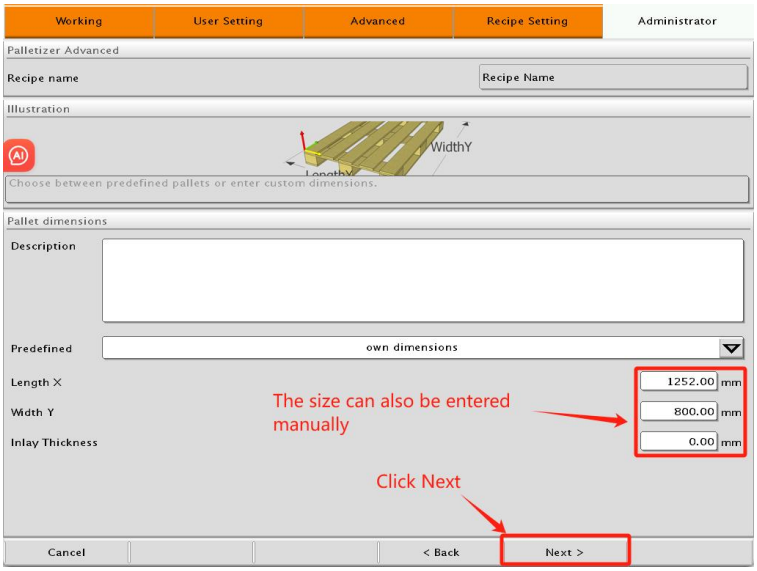


Figure 4-7

Click 'New' product name (name can be customized) [Figure 4-8], in the product parameters need to enter the size of the box length (X), width (Y), height [Figure 4-9], enter the size of the box, click on the "next page" to enter the interface

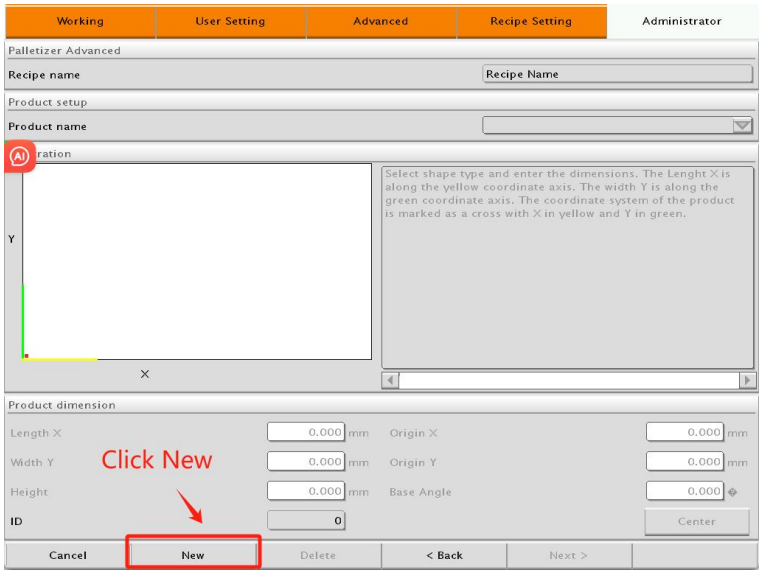


Figure 4-8

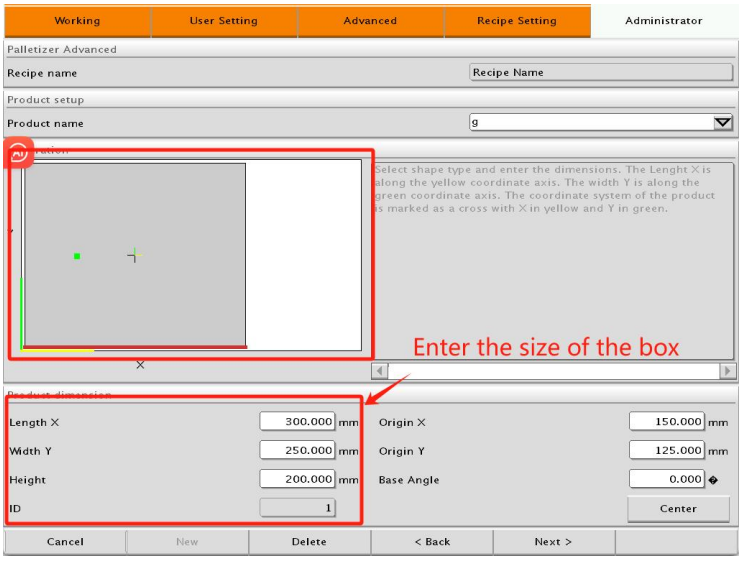


Figure 4-9

Click on "Add" to add up to four new Pallets [Figure 4-10].

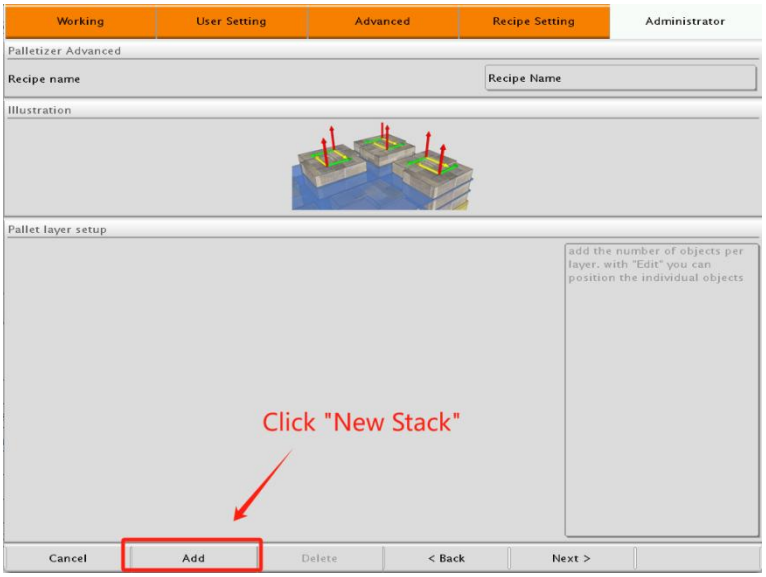


Figure 4-10.

First, enter the number of boxes to be palletized for the pallet type A, and the same for type B [Figure 4-11], then click "Edit" [4-12].

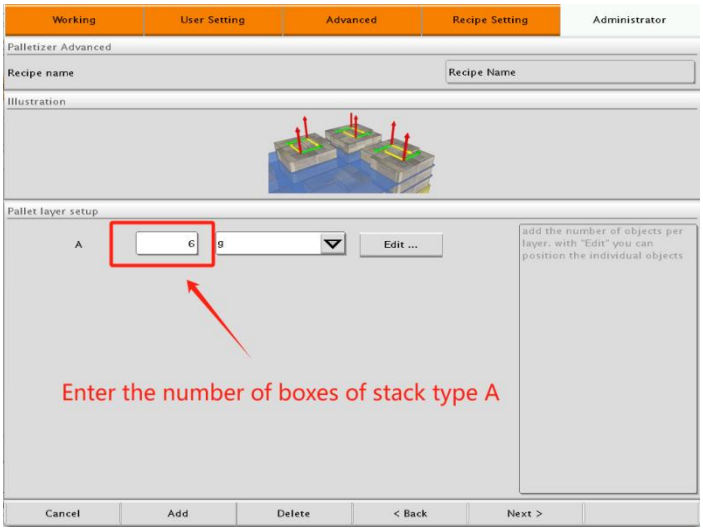


Figure 4-11.

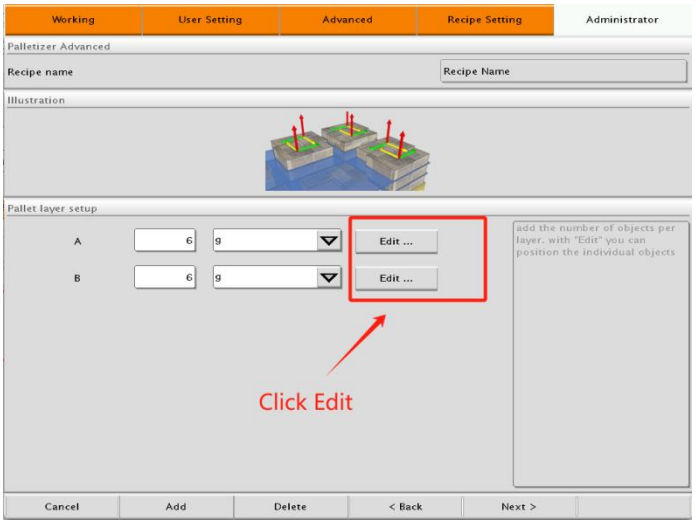


Figure 4-12.

Select the "Pallet template" to see if there is a desired pallet pattern [4-13].

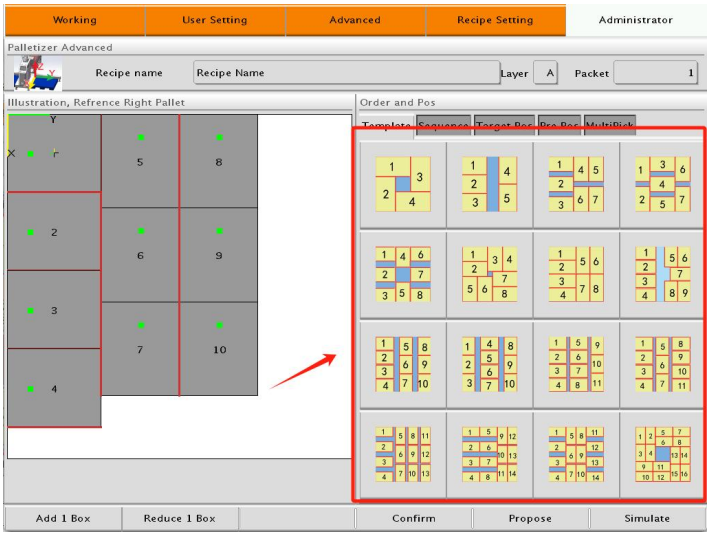


Figure 4-13.

If the pallet template does not have the desired pallet, refer to [Figure 4-14] to adjust the position of the box, you can manually move the box as well as the functions in the following table to create the desired pallet

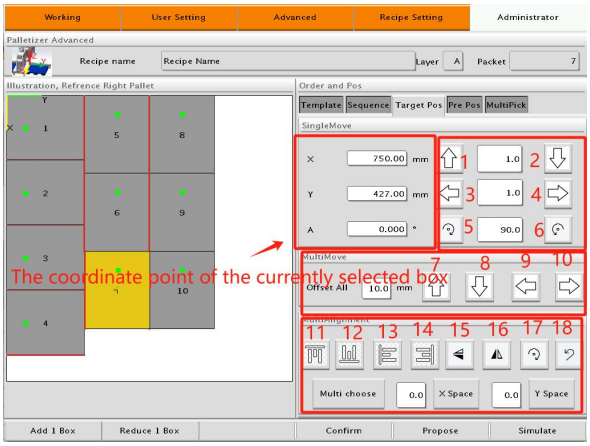


Figure 4-14.

	1. Move up: you can move a single box, you can also multi-select multiple boxes for upward movement
	2. Move down: you can move a single box, you can also multi-select multiple boxes for downward movement
	3. Left move: you can move a single box, you can also multi-select multiple boxes for the left move
	4. Move Right: You can move a single box, or you can select multiple boxes to move right.
	5. Clockwise rotation: enter the angle of rotation, you can rotate a single box, you can also multi-select multiple boxes for rotation
	6. Counterclockwise rotation: input the angle of rotation, you can rotate a single box, you can also multi-select multiple boxes for rotation
	7. Overall upward movement: The overall upward movement of the pallet enables the robot to place the overall boxes in the appropriate position on the pallet more accurately when palletizing.
	8. Integral downward movement: the pallet is moved downward to enable the robot to place the boxes in the appropriate position on the pallet more accurately when palletizing.
	9. Overall left shift: The overall left shift of the pallet enables the robot to place the overall boxes more accurately in the right position on the pallet when palletizing.
	10. Overall right shift: the overall right shift of the pallet enables the robot to accurately place the boxes in the right position on the pallet when palletizing.
	11. Align: the function of aligning the boxes, for example: to align box 4 to box 3, first select the "Multi-select" function in the interface, select box 4 and then box 3. "Then you can click the "Align Up" tab.
	12. Align: the function of aligning boxes, for example: to align box 4 to box 3, first select the "Multi-select" function in the interface, select box 4 and then select box 3. "Then you can click the "Down Align" tab.

	13. Left Align: the function of aligning the boxes, for example: to align box 2 to box 1, first select the "Multi-select" function in the interface, select box 2 and then select box 1. "Then you can click the "Left Align" tab.
	14. Left Align: the function of aligning the boxes, for example: to align box 7 to box 8, first select the "Multi-select" function in the interface, select box 7 and then box 8. "Then you can click the "Left Align" tab.
	15. Overall up and down mirroring: make the Palleter board overall box to be up and down mirroring
	16. Overall left and right mirroring: make the palletized board overall box for left and right mirroring
	17. Clockwise rotation of the whole pallet: rotation of the whole box of the pallet.

For example: set the class A palletizing type as the first layer, to start palletizing the target position of the first box in the diagonal of the base, so the coordinates of the target point of the first box placement refer to the center of [Figure 4-16], write the center coordinates of [Figure 4-17] into the target position of the first box of the first layer [Figure 3-16], and the pallets to be placed should be close to the diagonal of the robot's base [Figure 4-15].

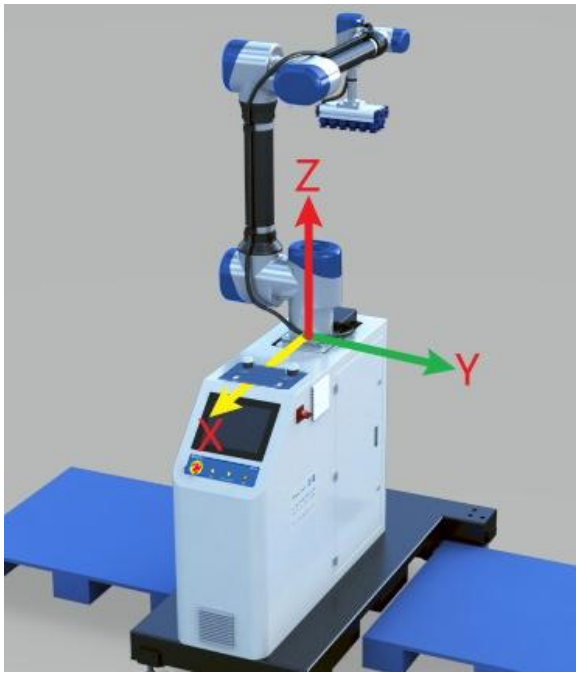


Figure 4-15.

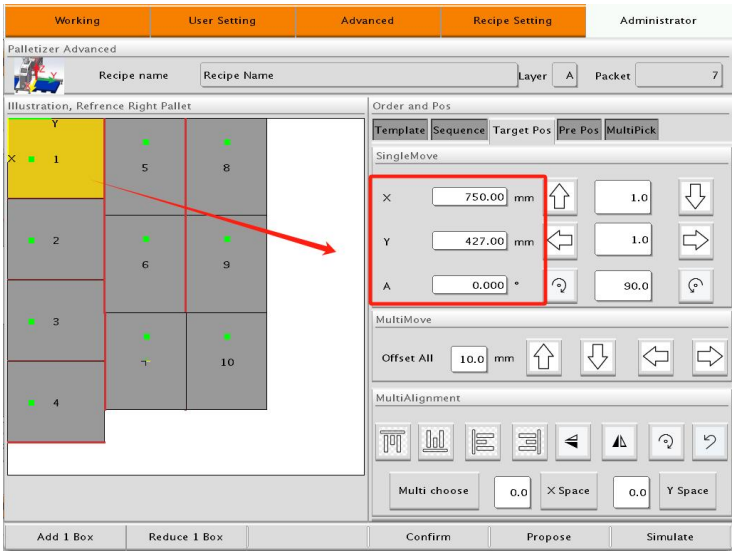


Figure 4-16.

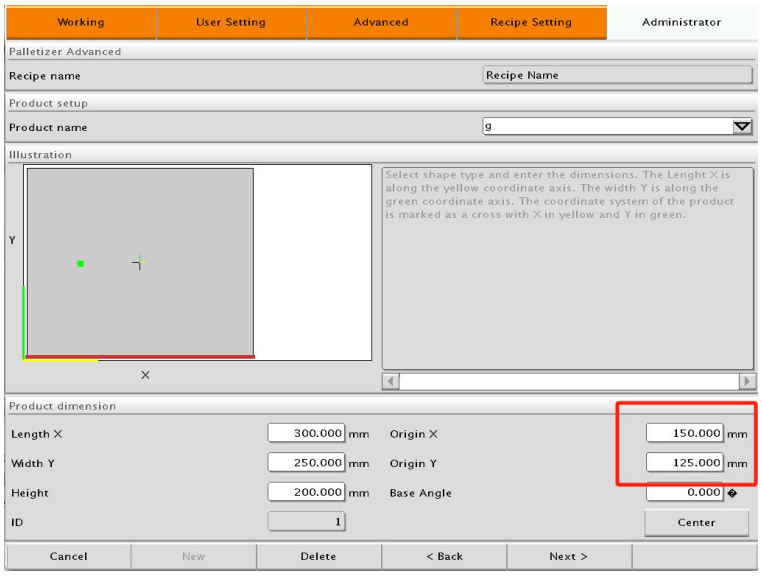


Figure 4-17.

If you need to switch the box sorting, set the box sorting in the order that the palletizing serial number is getting bigger from left to right, and the palletizing serial number is also getting bigger from bottom to top, because the palletized boxes have heights, and generally you need to enter the palletizing from the outer side to avoid the box collision. [Figure 4-18]

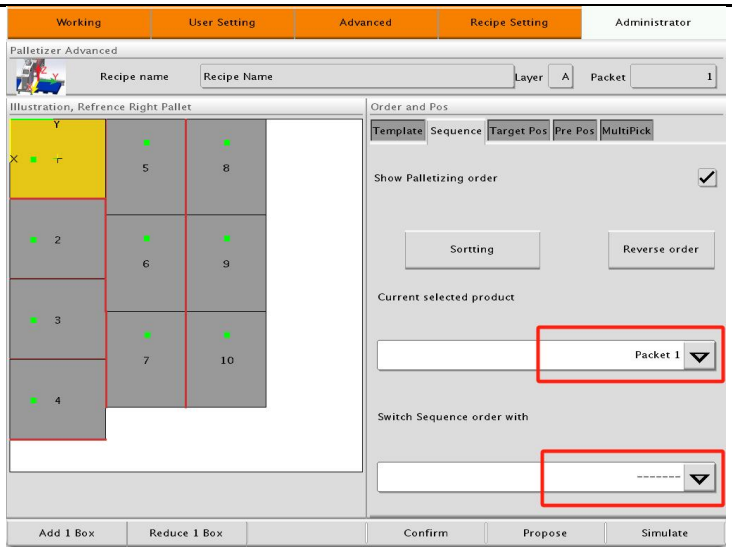


Figure 4-18.

For example, select the product that needs to be switched 5, and then in the switching serial number point drop-down arrow, select the product to be switched serial number 6 [Figure 4-19], showing that the box 5 and the box 6 has been switched location successfully [Figure 4-20]

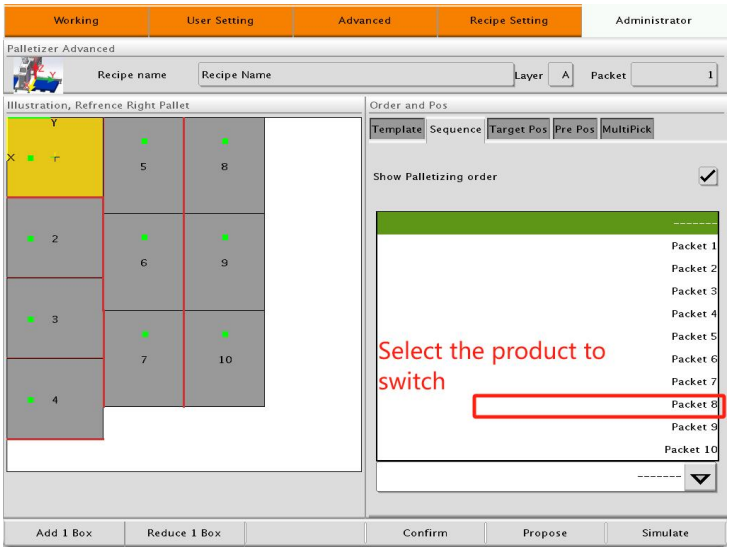


Figure 4-19.

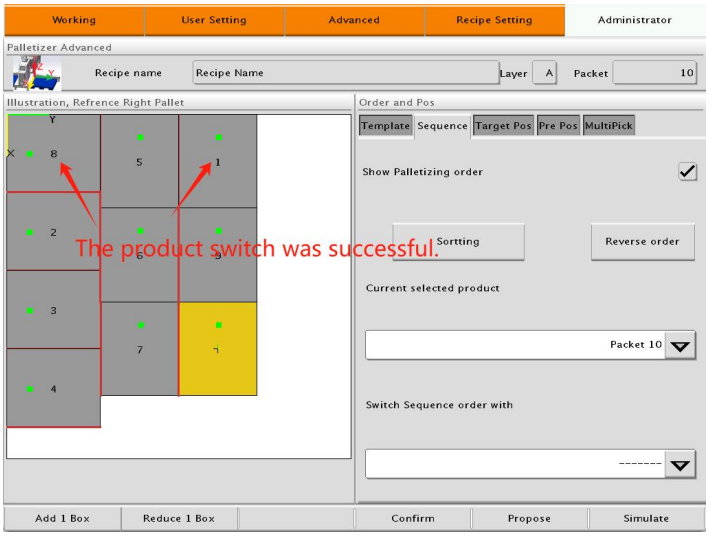
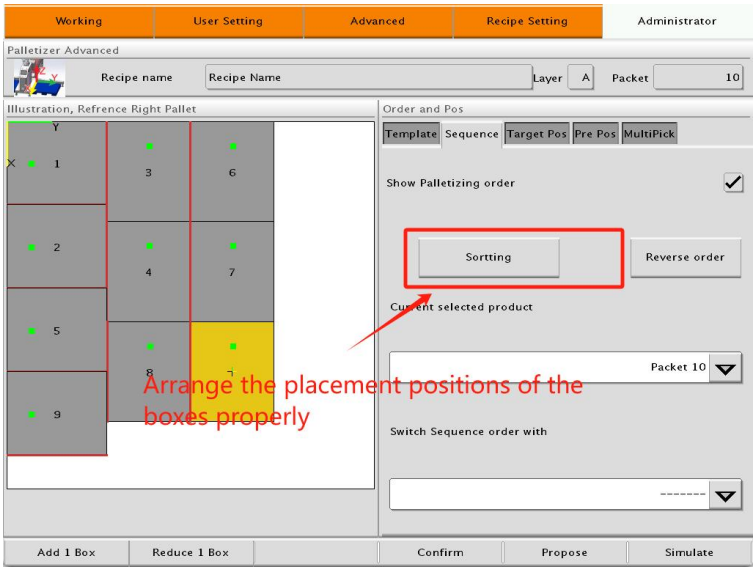


Figure 4-20.

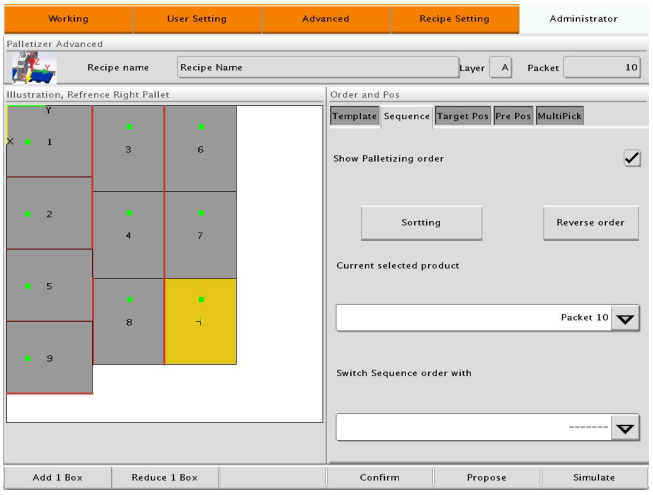
Select one-click sorting

The function is that when the robot is palletizing, due to the wrong order of placing the boxes, the robot will press other boxes during the process of placing the boxes.

In the box sorting interface, click "one-click sorting" to set the order of boxes (using one-click sorting, you can omit the above step of manually switching the "box serial number").

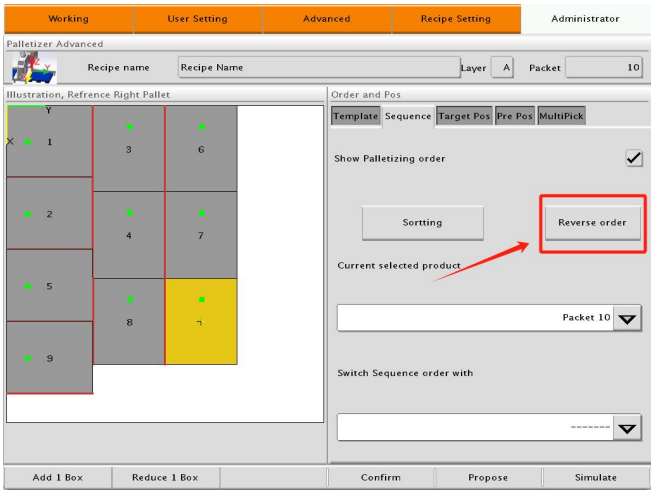


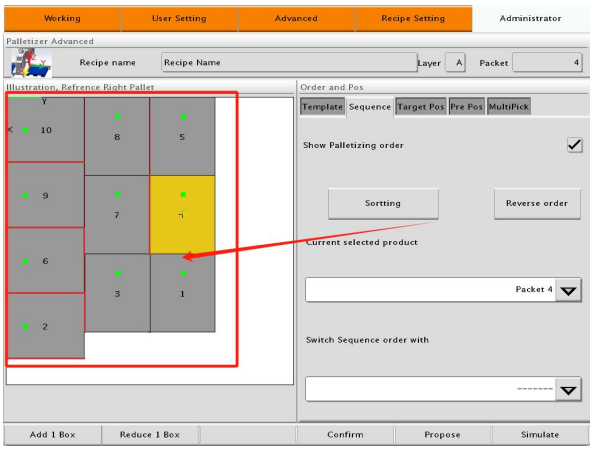
After clicking on the "One Click Sort" function, you can carefully observe that the order of the boxes has changed.



"Reverse order" function" ("Reverse order" is usually used for pallet type B and "one-click sort" is usually used for pallet type A)

After clicking the "Reverse Order" function, the order of the boxes will be reversed, please refer to the picture for specific changes.



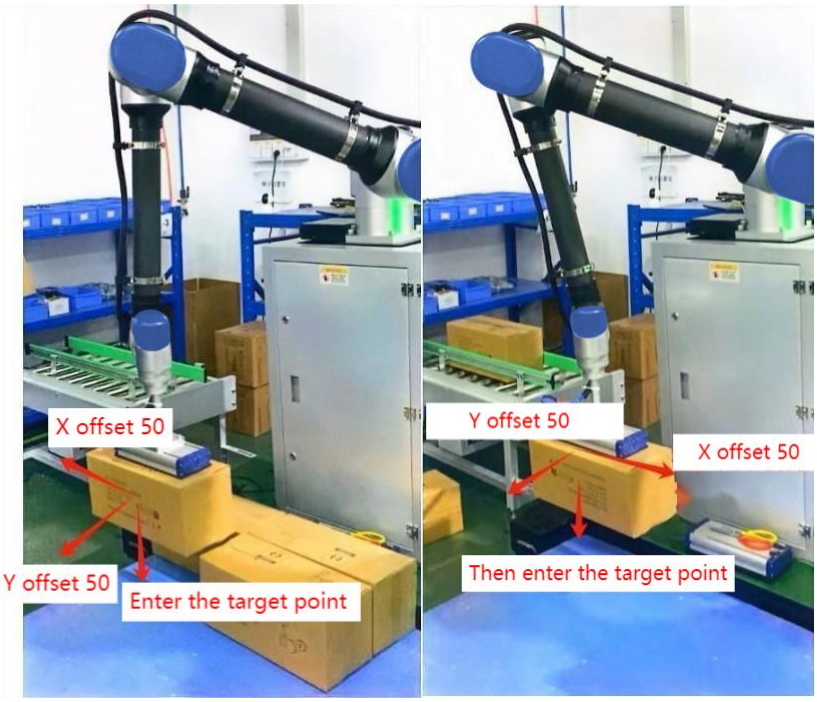


Setting up the "entry position" function (an indispensable step for recipe creation)

1. The entry position, which is understood as the offset point when placing the box
2. Set the palletized coordinate system of the main reference interface of the entry point offset  [Figure 4-21].

3. For example, if you need to avoid the placed boxes (to prevent pressure on the boxes) when placing, but the direction of offset is the positive direction of X or Y of the coordinate system of the palletizing interface, then the value of the offset will be "positive", and if the offset is in the opposite direction, then the value of X or Y will be "negative" (the value of the X and Y offset is between "positive" or "negative" 50-100%). (X and Y offsets are approximately "positive" or "negative" between 50 and 100).
4. The "Z" value of the entry position needs to be higher than the "height of the box" (e.g. if the box height is 200, then the "Z" value is 250).
5. The following is the procedure for entering the location

For example: the coordinate system of the box in [4-21] is the diagonal (X and Y) of the reference robot base, the entry point offset is to refer to this coordinate system to offset the box to be offset in the opposite direction of the coordinate system, that is, set the offset value to "-", and the box to be offset in the positive direction of the coordinate system, that is, set the offset value to "+". If the box to be offset is in the opposite direction of the coordinate system, then the offset value is set to "-", and if the box to be offset is in the positive direction of the coordinate system, then the offset value is set to "+". How to set the entry point offset, please refer to the following picture to understand it



Access point location settings.

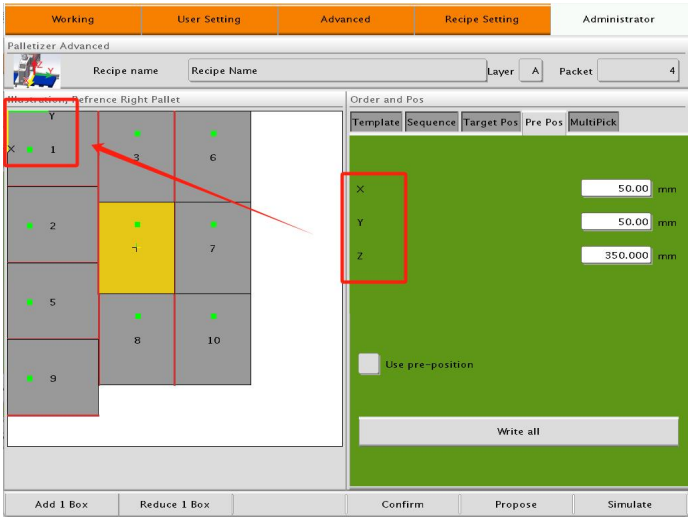


Figure 4-21.

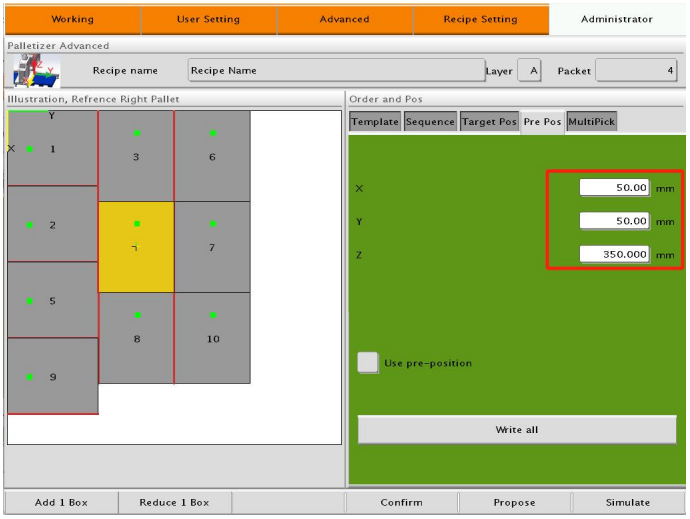


Figure 4-22.

After creating a good Pallet, click "Confirm" to go to the next step [Figure 4-23].

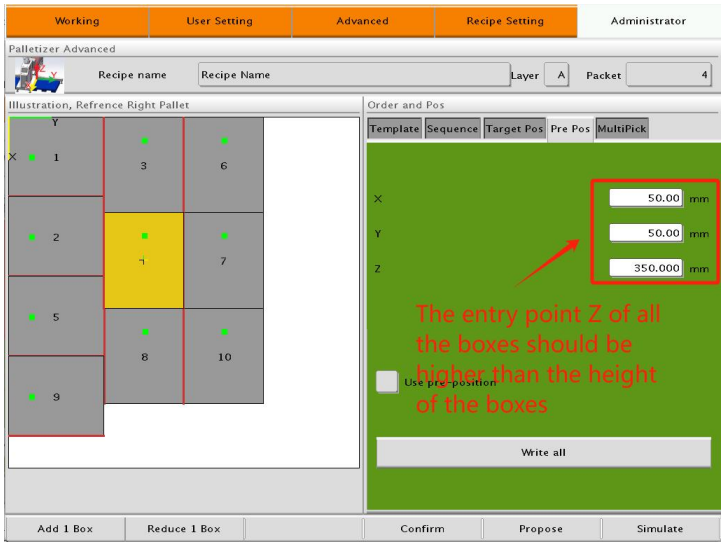


Figure 4-23.

Click on "Next Page" [Figure 4-24].

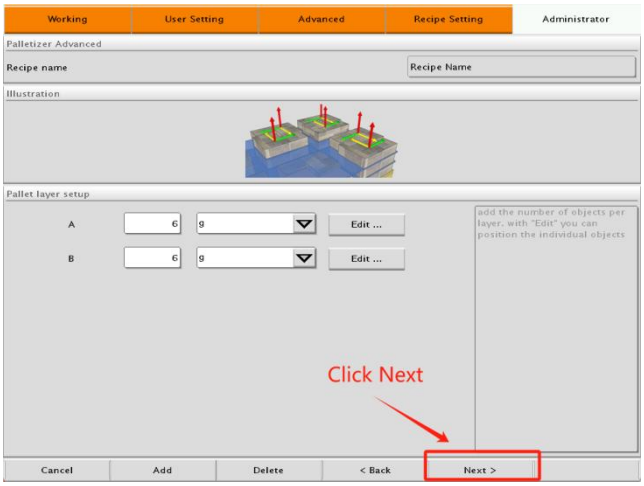


Figure 4-24.

After editing the A and B Pallets, select the number of layers and click "Save" to create the recipe.

If the recipe saving is not successful, click "Daily Recipe", because the code pallet activation there shows red, click "Close", and then go back to the [Figure 4-25] interface to save again, you can!

If you want to reduce the number of layers from 5, then select "empty".

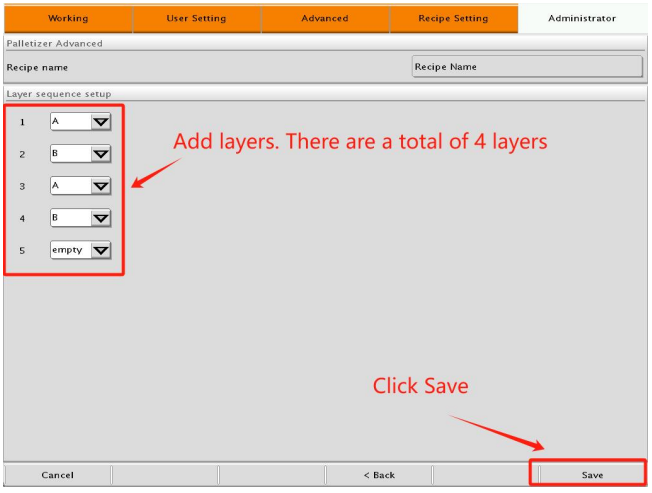


Figure 4-25

5. “Multiple Capture and Deployment” Establishment

5.1. Multiple Capture and Deployment configurations

Multiple Capture and Deployment Settings Text Description
1. Firstly, check the option to use the “multi capture” function;
2. Set the number of multi capture suction cups. Note that the set number must match the actual number of suction cups, and each suction cup should be controlled by an independent solenoid valve for suction.
3. Suction cups are installed in the X direction of the robot, arranged in a sequence of 1/2/3/4, with 1 near the robot base and 4 away from the base; 4. In the mode of grabbing once and placing once, the program determines the number of boxes to be grabbed based on the properties of the boxes to be stacked. If the boxes to be stacked are composed of three independent boxes, then grab three boxes at once, open the suction cups 1, 2, and 3, suck up three boxes at the back of the roller line at once, and then place three boxes at once;
5. The stacking configuration of boxes is on the “Multiple Capture and Deployment” page of the stacking formula. Multi capture boxes must be added through the "Add Box" button on the multi capture page. Note that the selection of horizontal or vertical incoming materials should be based on the actual incoming situation.

5.2. Single drum line setting

Click on "Production Settings" and then click on "Multiple Capture and Deployment" to enter the interface shown in Figure 5-1

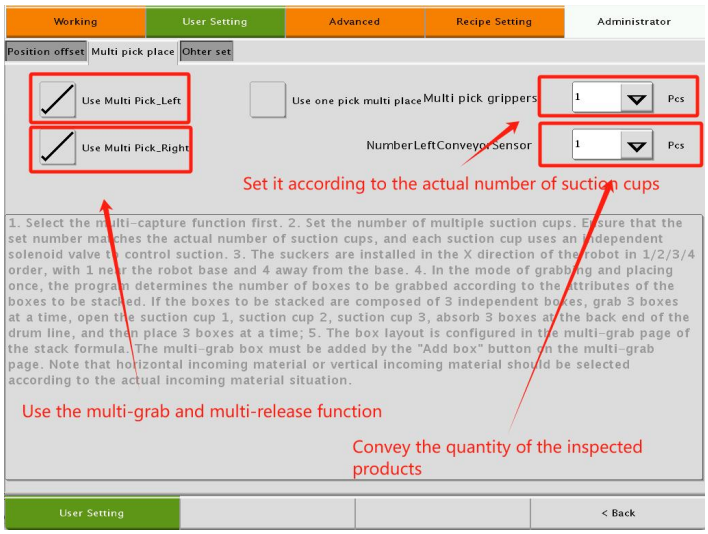


Figure 5-1

Firstly, check the option to use the multi capture function; 2. Set the number of multi capture suction cups to match the actual number of suction cups, and each suction cup

must use an independent solenoid valve to control suction; 3. Suction cups are installed in the X direction of the robot, arranged in a sequence of 1/2/3/4, with 1 near the robot base and 4 away from the base; 4. In the mode of grabbing once and placing once, the program determines the number of boxes to be grabbed based on the properties of the boxes to be stacked. If the boxes to be stacked are composed of three independent boxes, then grab three boxes at once, open the suction cups 1, 2, and 3, suck up three boxes at the back of the roller line at once, and then place three boxes at once; 5. The stacking configuration of boxes is on the multiple capture and deployment page of the stacking formula. Boxes with multiple claws must be added through the "Add Box" button on the multiple capture page. Note that the selection of horizontal or vertical materials should be based on the actual incoming situation.

5.3. Double drum line setting

Click on "Formula Settings" and then click on "Formula Selection" to enter the interface shown in Figure 5-2

First, select the type of box, then choose the number of conveyor lines, and finally choose the formula that was built first

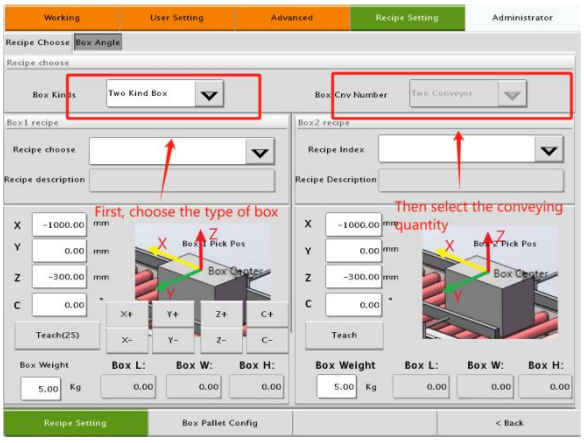


Figure 5-2

Click on "Production Settings" and then click on "Multiple Capture and Deployment" to enter the interface shown in Figure 5-3

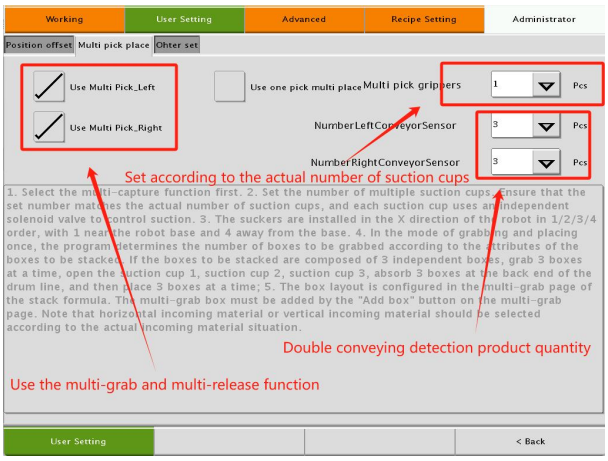


Figure 5-3

5.4. Box incoming material selection

Click on 'Formula Settings' and select' Box Incoming '. There are two types of boxes, vertical and horizontal, depending on the actual direction of the box

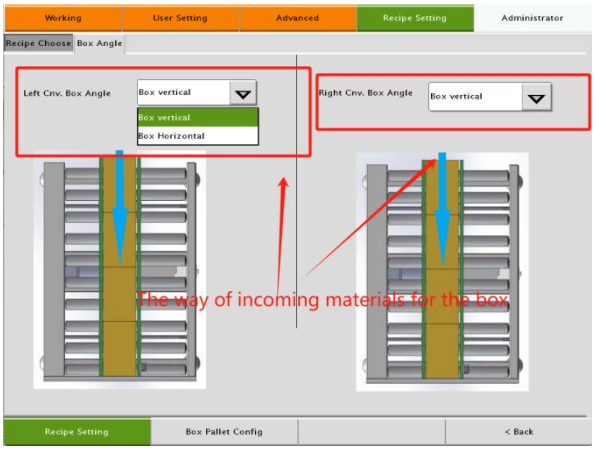


Figure 5-4

5.5. Establishment of formula for multiple capture and deployment

The incoming direction mode should be consistent with the box incoming method, and then select the number of boxes to be grabbed each time to confirm the addition of boxes. If you choose to grab and place multiple boxes at once, for example, grab 4 boxes, place 3 boxes first, and then place 1 box, but pay attention to the rotation direction of the boxes to avoid pressing them.

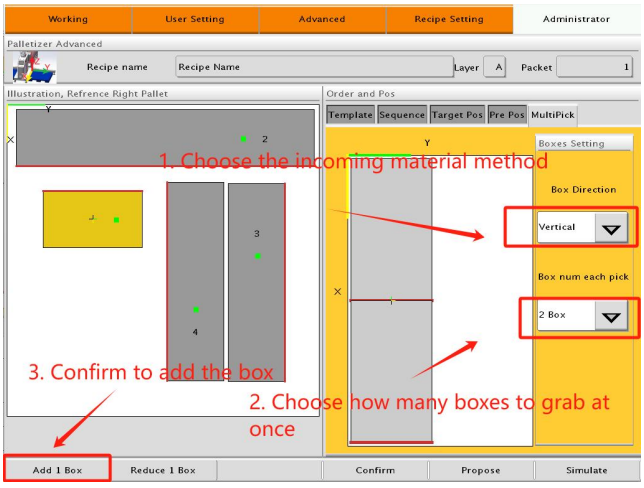


Figure 5-5

6. Demonstrate the teaching of grabbing points

6.1. Box grabbing configuration

Click "Power On", then click "Recipe Settings" to enter the interface [Figure 6-1].

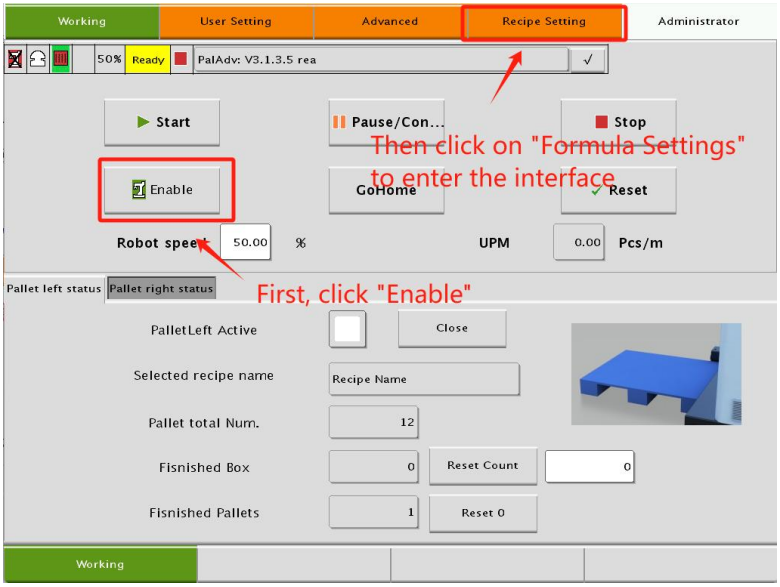


Figure 6-1

Refer to the following text and to [Figure 6-2].

Selection of the number of box types and the number of incoming conveyor lines

If there is only a single model box single roller line, then select the corresponding recipe, move the robot to the point above the box [Figure 6-4], and then teach the grab point (press for 2 seconds) grab point

If there is a double box, select the double box, refer to [Figure 6-2] will appear left and right two grab point teaching function, but the left and right grabbing recipe to select the corresponding two boxes of the recipe, and then grab point teaching, move the robot to the left side of the box above the point [Figure 6-4], the left side of the demonstration of the teaching (press 2s) the left side of the incoming roller, the right side is also the robot to move to the right side of the box above the point [Figure 6-4], and then schematic teaching (press 2s) the right side of the incoming roller [Figure 6-3]

If there is only a single box, but the incoming material for the double roller, and 2 the same reason, select the double roller line, there will be left and right two demonstration of the function of the gripping point, select the corresponding recipe, the left demonstration (press 2s) left incoming roller, the right demonstration (press 2s) right incoming roller [Fig. 6-3]

4, the recipe for the left: the grab point is the left, palletizing is also the left

5, the right side of the recipe: the grab point is the right side, palletizing is also the right side

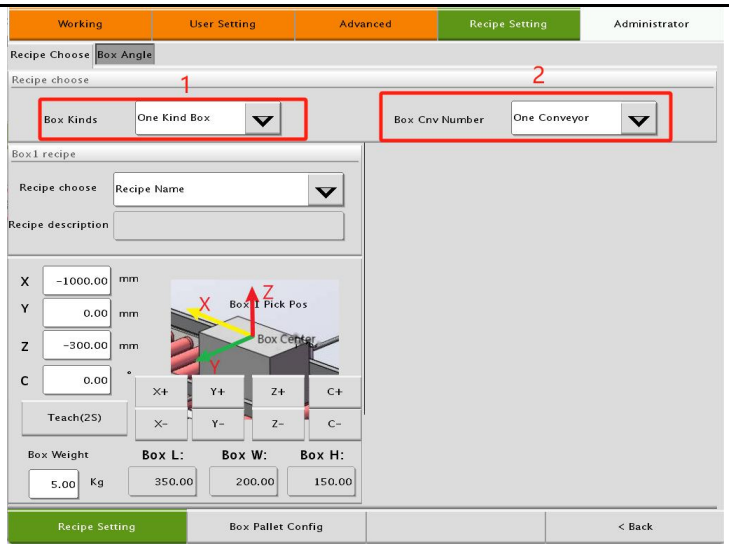


Figure 6-2

According to the arrow at 3 in [Figure 6-3], first select the corresponding recipe, power up the robot, adjust the speed to between 25%-50%, you can tap the coordinates of the arrow at 3 to move the robot to the teaching grasping point position, for example: X+ is to move forward, X- to move backward, Y+ to move to the left, Y- to move to the right, Z+ to move up, Z- to move down, move the robot to the box directly above the teaching, teaching (press the 2s)

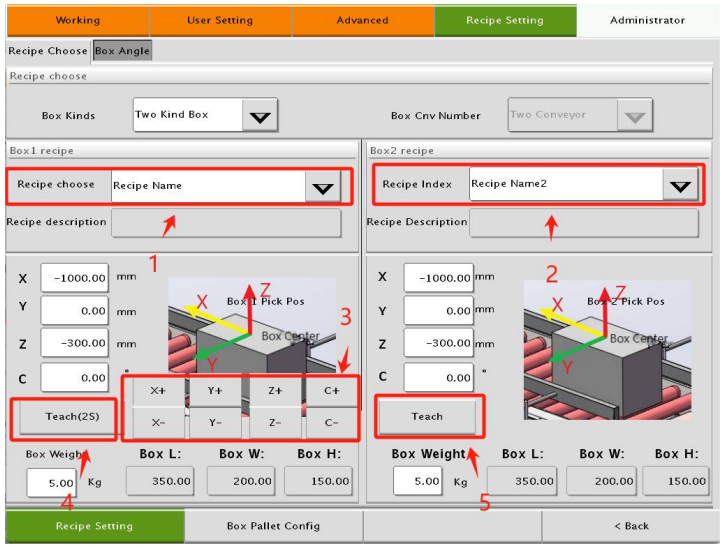


Figure 6-3

Figure 6-4.

After the successful teaching of the gripping point, go back to the "Daily Production" interface and click on "Return to Zero [Figure 6-5]".

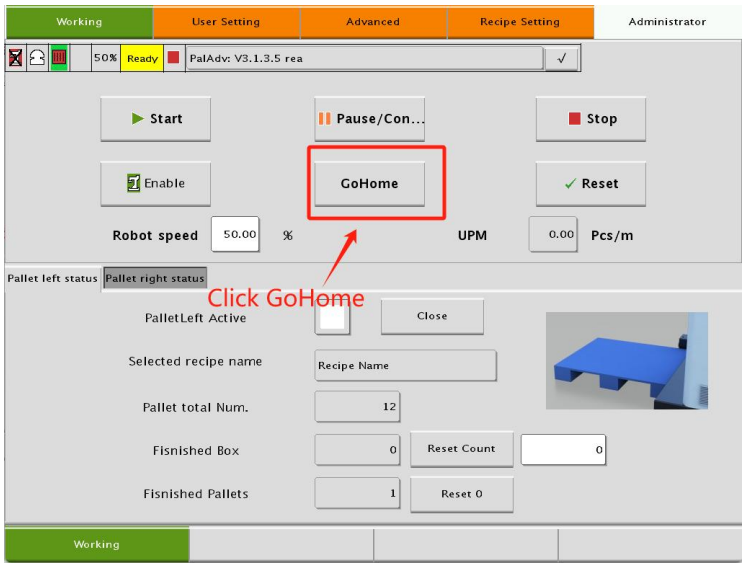


Figure 6-5

7. Pallets coordinate system setting

7.1. Setting the pallet height difference

Manufacturer settings, you only need to modify the "left pallet height difference" and "right pallet height difference", meaning the height of the pallet, you need to use a tape measure to measure the height of the pallet is how much, and then fill in the measured value into the "left or right of the value of the pallet height difference" [Figure 5-1]. The measured value is then entered into the "left or right value of the difference in height of the pallet"

[Figure 7-1]

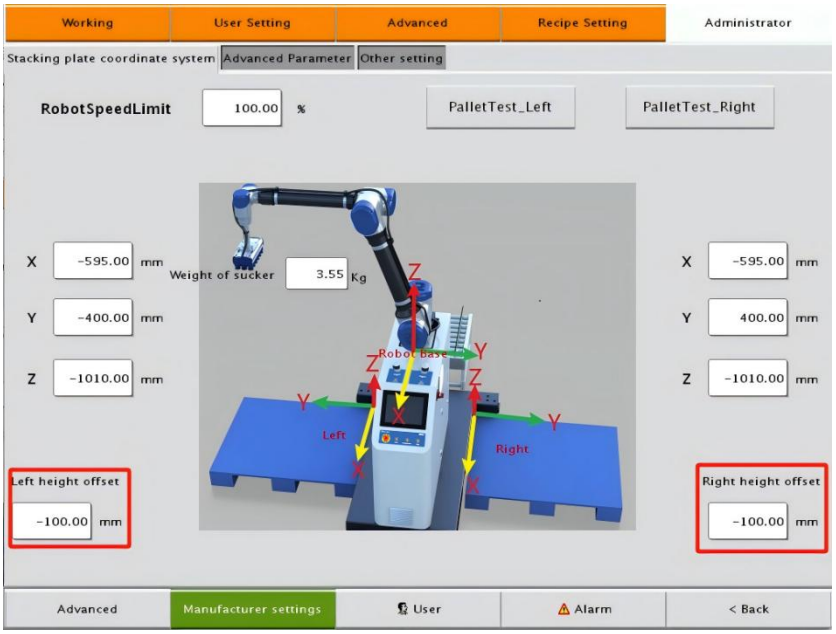


Figure 7-1

8. Setting the anti-collision function

Anti-collision settings are divided into 2 pages, one page is anti-collision detection, before the robot is shipped from the factory it will be tested for anti-collision, learn the robot dynamics parameters, and after the learning is complete add a redundancy amount and set it to the anti-collision settings parameters.

8.1. Detection of anti-collision

First of all, "Start Detection", the robot is about to palletize a pallet [Figure 8-1].

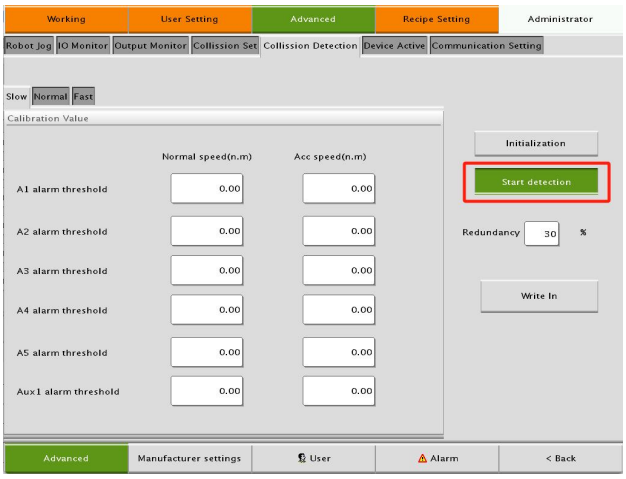


Figure 8-1

Then set the recommended redundancy value of 10-30%, and then click "Write Setting Value", the redundancy value is too low, the robot is easy to false alarm impact, too high detection sensitivity will not be enough, hit a person may cause injury, hit the box may cause damage to the product. Figure 8-2

Note: The above anti-collision function can only be used as an auxiliary safety protection to a certain extent, and cannot completely replace safety equipment such as safety gates, safety gratings, etc. In some cases (such as gripping a larger load and setting a larger anti-collision redundancy value), collision with personnel, especially collision with more fragile parts of the human body such as the head, etc., can still cause injuries, so when using the collaborative palletizing robot, a safe distance should still be maintained. Therefore, when using the collaborative palletizing robot, a safe distance should be maintained, and if necessary, auxiliary safety equipment such as safety gates, safety gratings, and human detection equipment can also be installed.

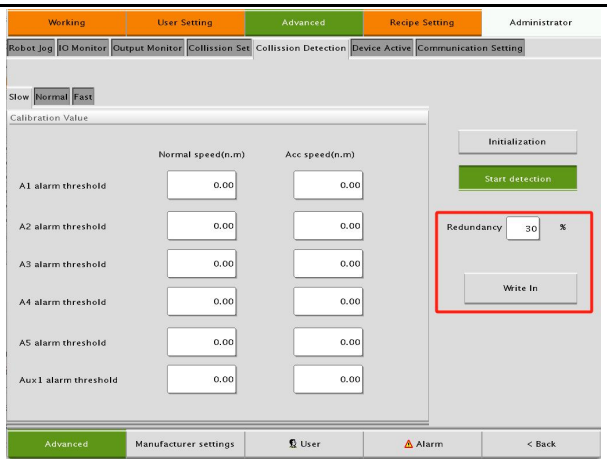


Figure 8-2

8.2. Enable anti-collision function

Enter "Anti-collision Settings", check "Enable Anti-collision" [Figure 8-3], as shown in the figure, check "Enable" to enable the anti-collision, the alarm thresholds below represent the error torque between the commanded torque value and the actual torque value of each axis in the low speed section (within 33% of the maximum speed of a single axis), medium speed (34%-66%) and high speed section (67%-100%). The alarm thresholds below represent the error torque between the commanded torque value and the actual torque value of each axis in the low-speed section (within 33% of the maximum speed of a single axis), the medium-speed section (34%-66%), and the high-speed section (67%-100%), the uniform-speed section and the axis reaching the target speed, and the variable-speed section and the axis during acceleration and deceleration. The cycle time is set to 5 cycles, i.e., the robot's commanded and actual values differ by 5 cycles.

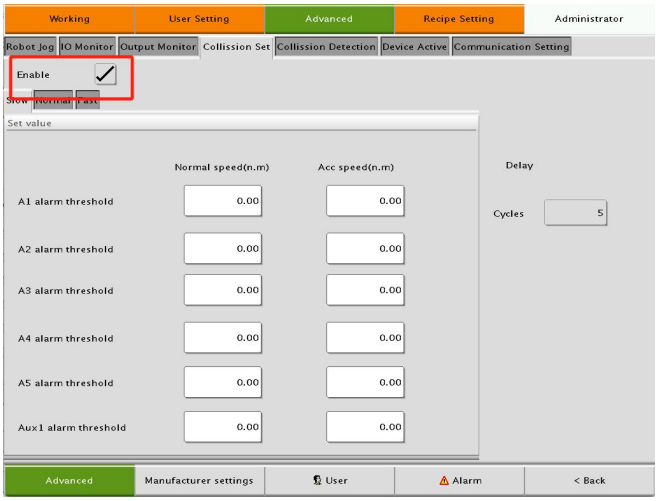
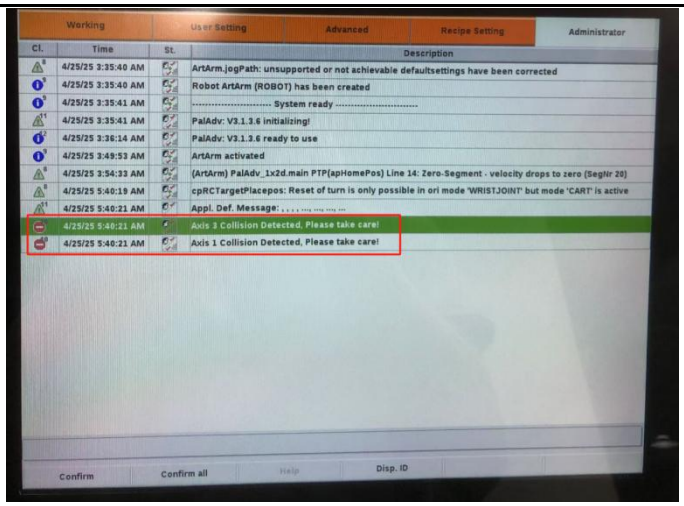
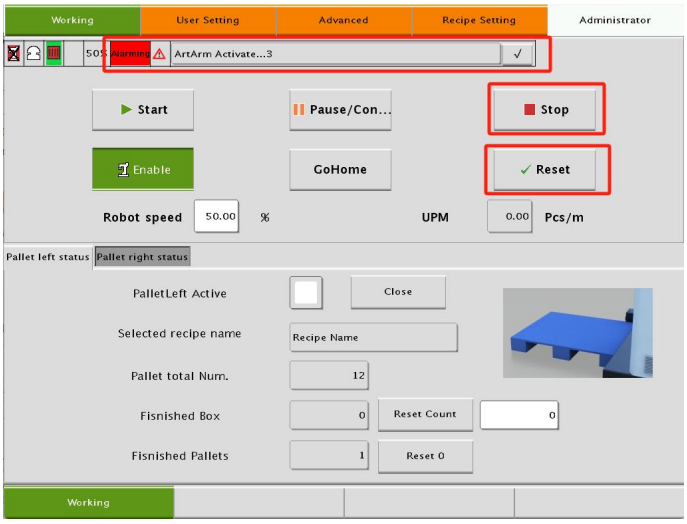


Figure 8-3

The following figure shows the collision or crushing of a box during the operation of the robot, axis 2 detects the collision and displays an alarm indication



When the anti-collision alarm appears, first stop the robot and click "Reset", the alarm will be cleared, then click "Return to Zero" (but make sure that there is no obstacle in the working range of the robot, if there is, remove the obstacle or manually move the robot to a safe area, then "Return to Zero". (But make sure that there is no obstacle in the working range of the robot to return to zero position, if there is any obstacle, take it away or manually move the robot to a safe area, then "return to zero position", and pay attention to the number of yards and the number on the palletized board are the same, to prevent secondary collision of the box).



9. Production setup

The user setting page mainly sets some compensation and delay parameters, as shown in the following figure. [Figure 9-1]

The understanding of "placement compensation" is as follows: compensation for the front and back (X) of the left entry point is understood according to the coordinate system in Figure 9-2. When the left entry point (X) is -200, the entry point will be offset by 200 in the opposite direction of the x direction. Other placement compensation points are also understood according to the coordinate system

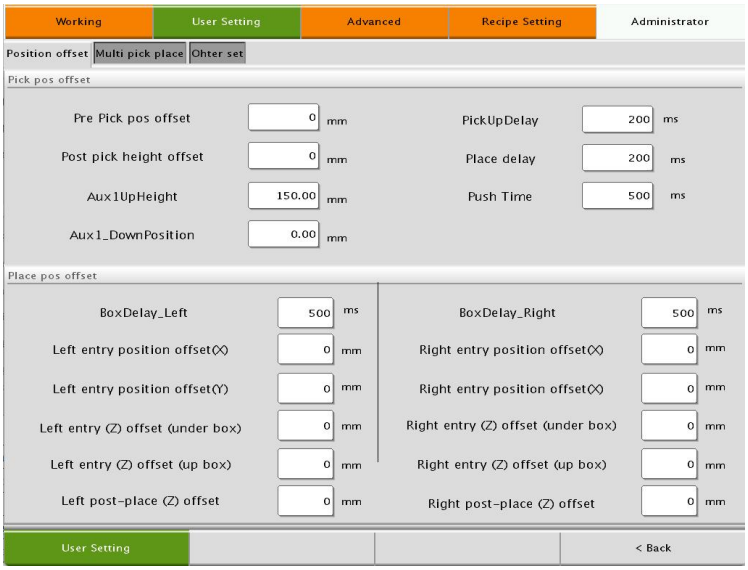


Figure 9-1

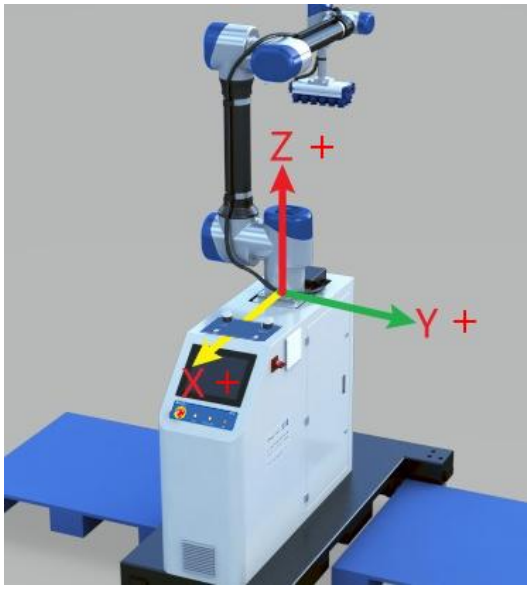


Figure 9-2

10. Robot jogging

10.1. Robot-Axis point motion

Click on "Debugging and Maintenance" to enter the interface, and then click on "Power On" to perform manual jog, world coordinate jog, and zero point calibration. Refer to [Figure 10-1] and [Figure 10-2] (Note: Zero point calibration needs to be long pressed for 2 seconds to prevent misoperation. Unless the robot motor encoder battery is out of power or the motor has been replaced, generally do not set zero, otherwise it may cause robot position errors)

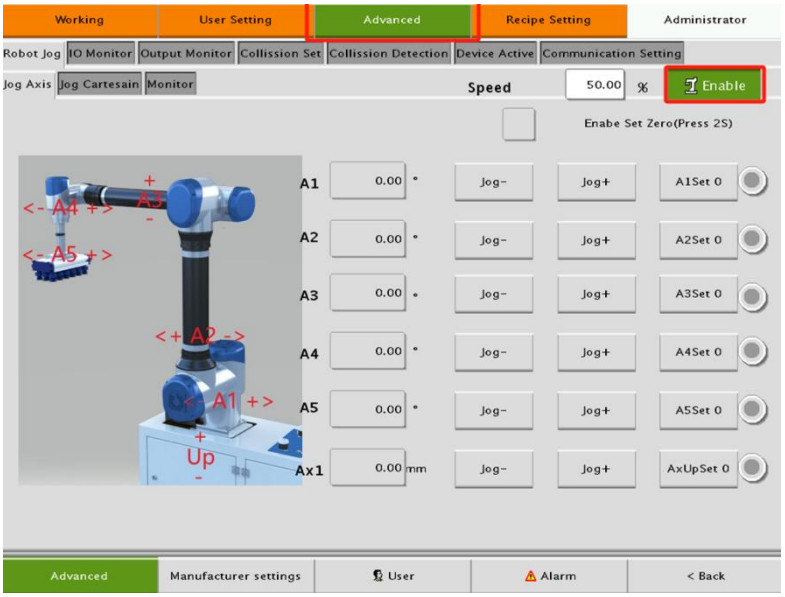


Figure 10-1.

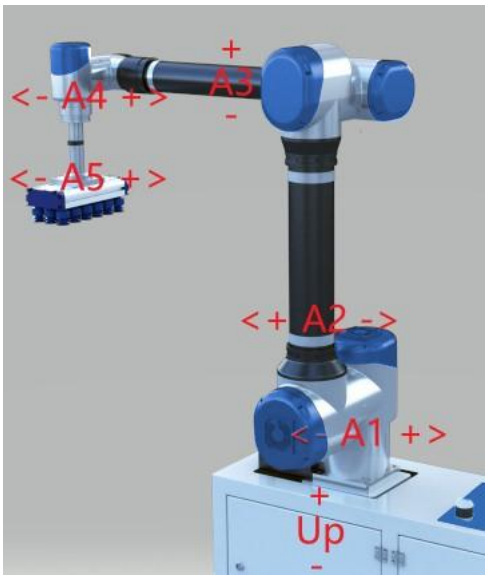


Figure 10-2.

Jogging operation {Note: When the lifting shaft is at the zero position, it is recommended not to jog (jog -), as this will cause the shaft limit alarm}

10.2. Robot-World coordinate point motion

Robot pointing, pointing coordinate system reference [Figure 10-3]

Pressing the buttons "+" or "-" corresponding to the X/Y/Z direction can control the robot's movement in the X/Y/Z direction and the rotation of the C-end.

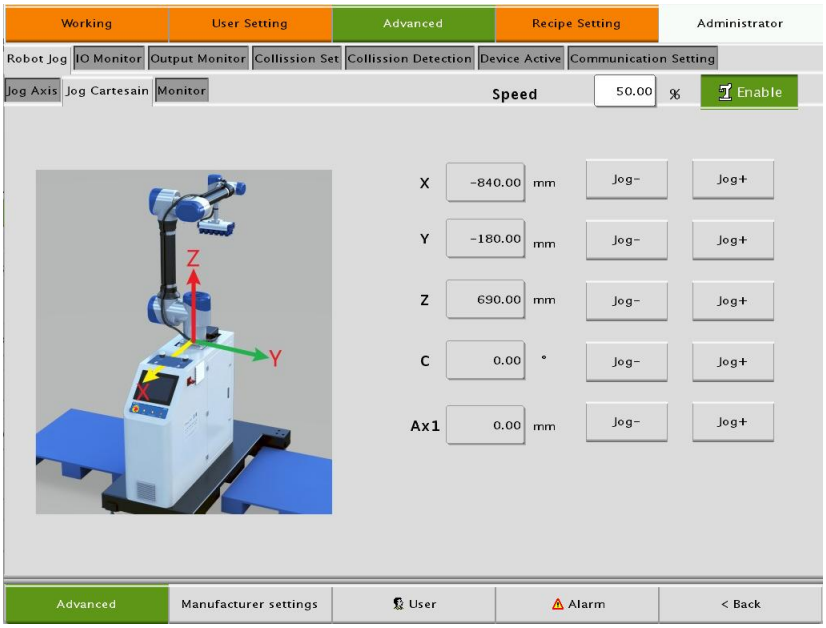


Figure 10-3.

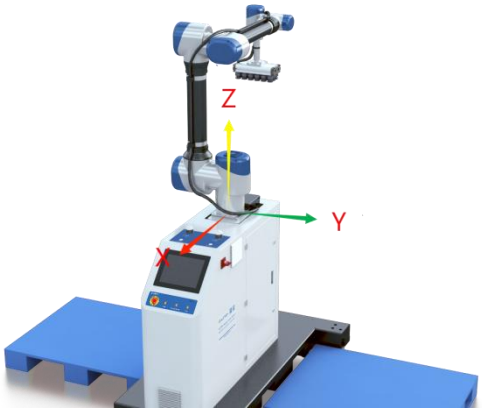


Figure 10-4.

10.3. Robot mechanical scale zeroing

If the replacement of batteries and motors leads to the loss of the zero point of the robot axis, the operation is as follows (remember: do not set the zero point by yourself without the loss of the zero point, as it will lead to the robot position error)

First, turn on "Allow robot to set zero point" [Figure 10-5].

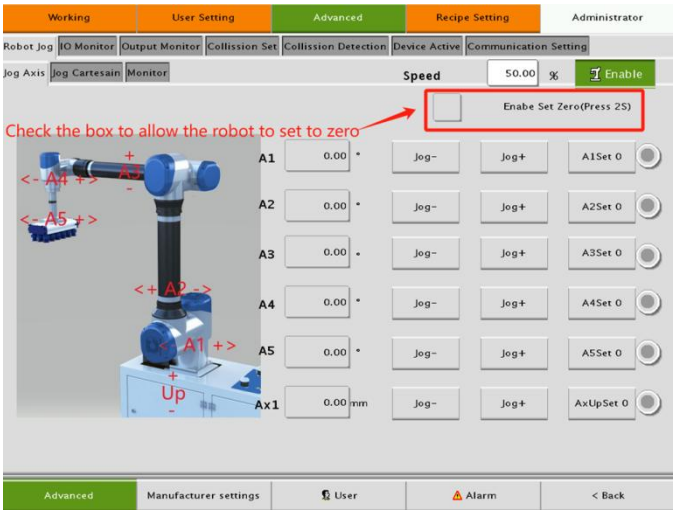


Figure 10-5.

To return axis 1 to zero, manually move axis 1 to the mechanical zero point, align the scale [Figure 10-6] (if you return to zero point without aligning the scale, it will lead to positional deviation), and then press and hold down "Axis 1 Zeroing" for 2s, and 

displays 0 degrees, indicating that the zeroing has been successful [Figure 10-7].

Figure 10-6.

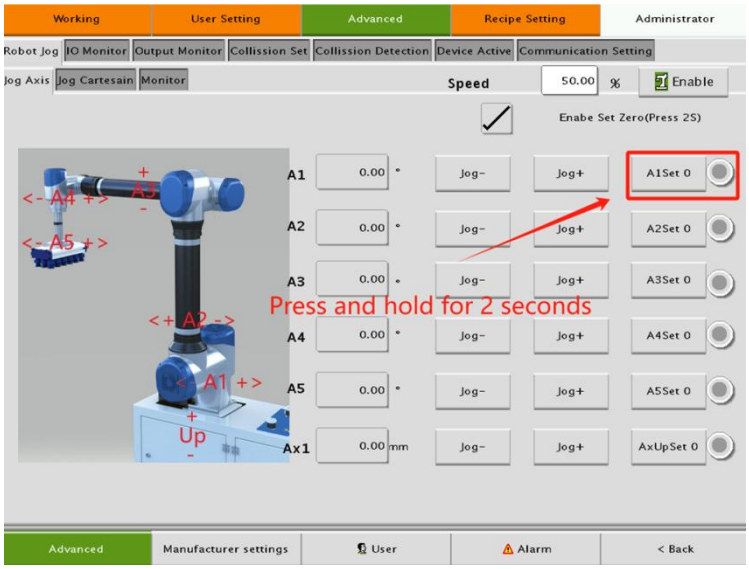


Figure 10-7.

To return axis 2 to zero, manually move axis 2 to the mechanical zero point, align the scale [Figure 10-8] (if you return to zero point without aligning the scale, it will lead to positional deviation), and then press and hold down "Axis 2 Zero Setting" for 2s, A2 0.00 ° will show 0 degrees, indicating that the zero setting is successful [Figure 10-9].

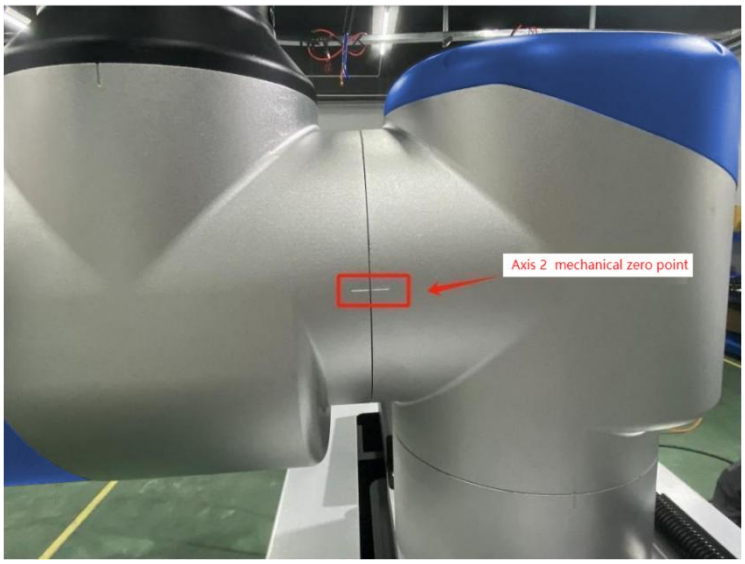
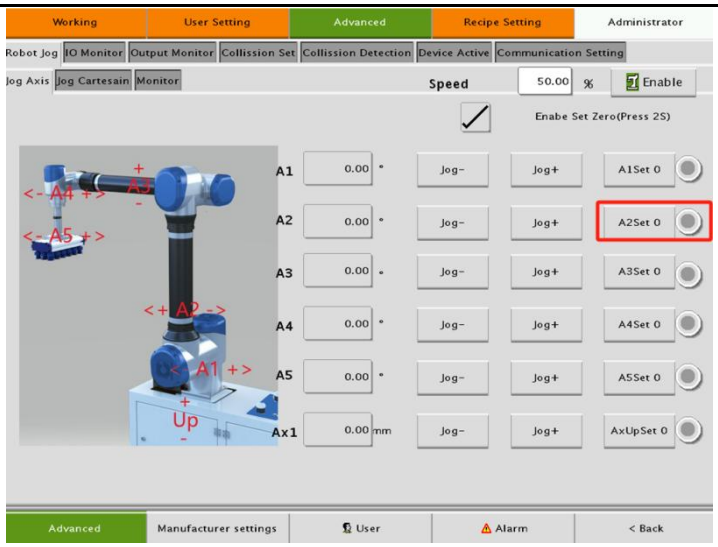
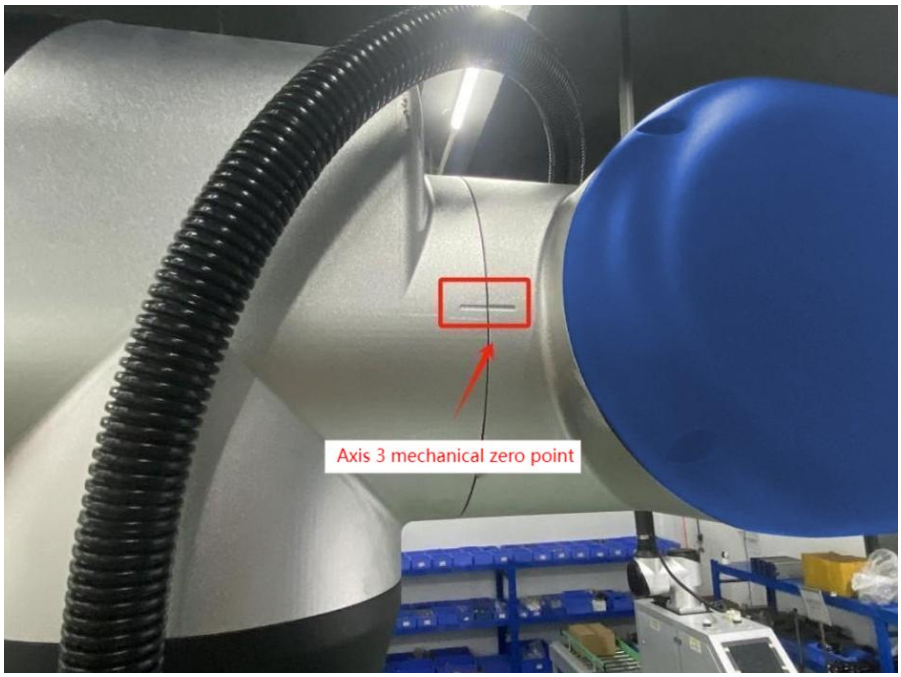


Figure 10-8.



Figures 10-9

To return axis 3 to zero, manually move axis 3 to the mechanical zero point, align the scale [Figure 10-10] (if you return to zero point without aligning the scale, it will lead to positional deviation), and then press and hold down "Axis 3 Zeroing" for 2s, and A3 0.00 ° will show 0 degree, which indicates that the zeroing has been successful [Figure 10-11].



Figures 8-10

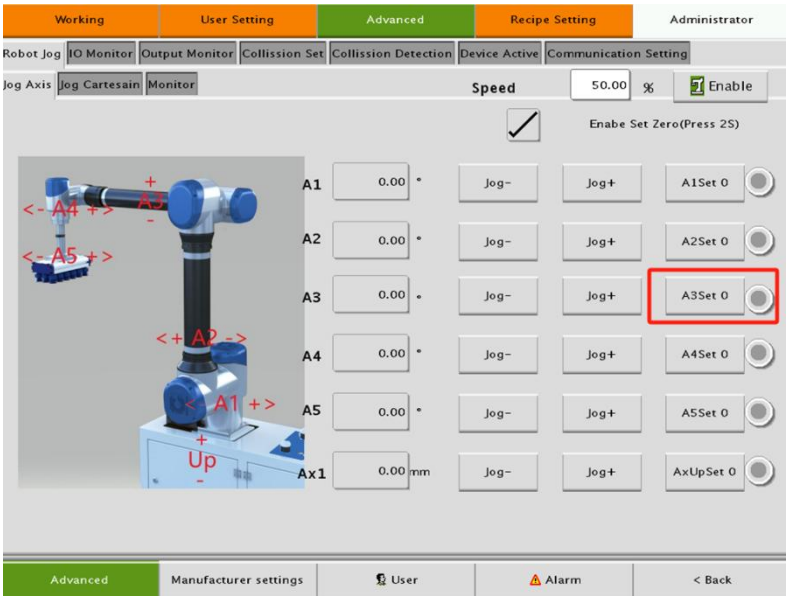


Figure 8-11.

To return axis 4 to zero, manually move axis 4 to the mechanical zero point, align the scale [Figure 10-12] (if you return to zero point without aligning the scale, it will lead to positional deviation), and then press and hold down "Axis 4 Zeroing" for 2s, A4 0.00 ° shows 0 degrees, indicating that the zeroing is successful [Figure 10-13].

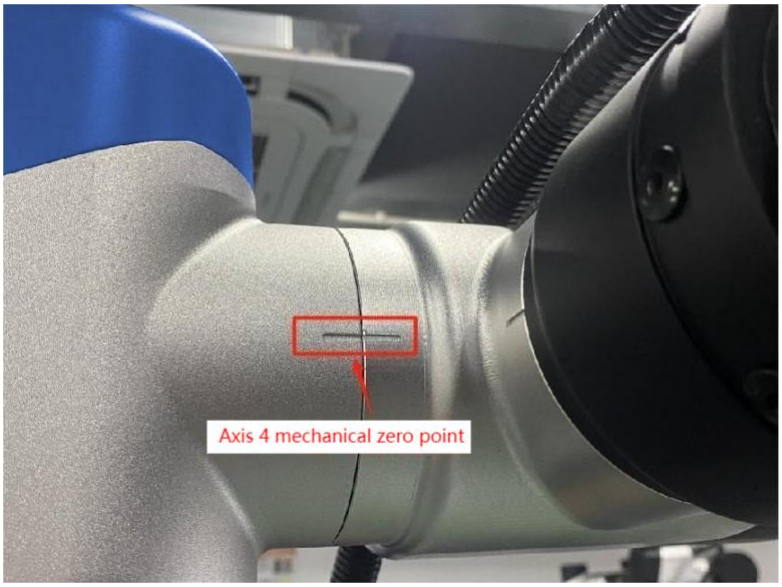


Figure 10-12.

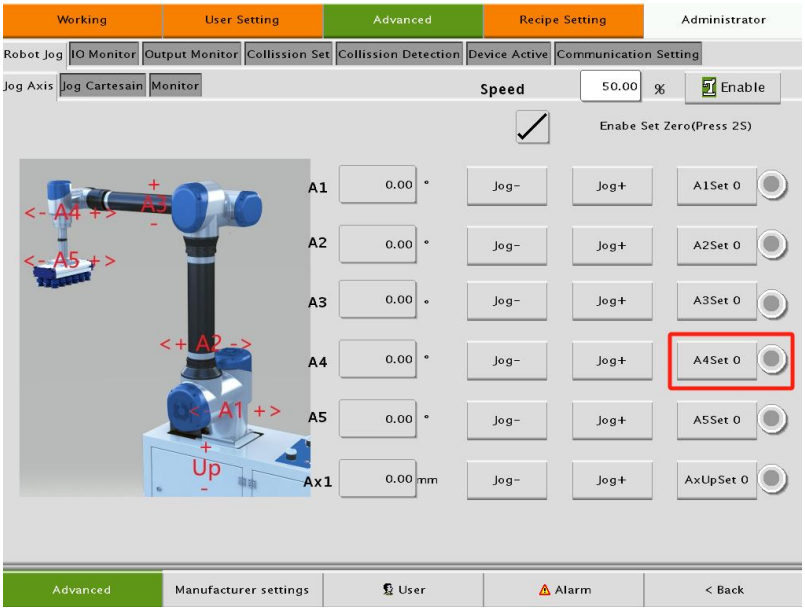


Figure 10-13.

To return axis 5 to zero, manually move axis 5 to the mechanical zero point, align the scale [Figure 10-14] (if you return to zero point without aligning the scale, it will lead to position deviation), then long press "axis 5 zero" for 2s, A5 0.00 ° shows 0 degrees, indicating that the zero is set successfully [Figure 10-15].

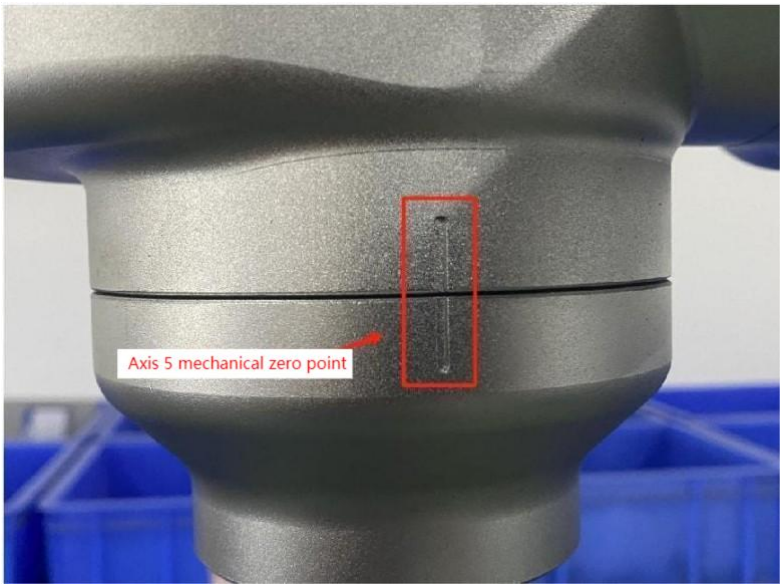


Figure 10-14.

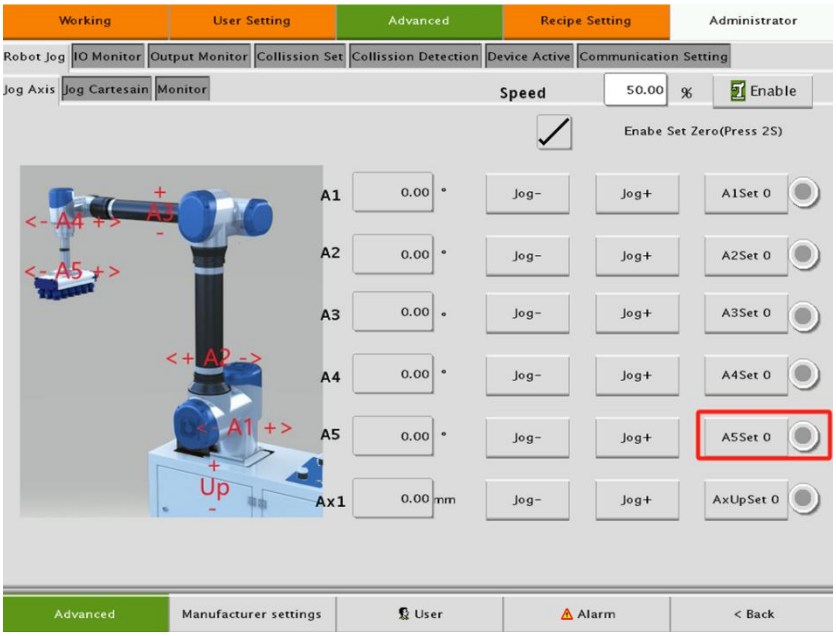


Figure 10-15.

To return the lifting axis to zero, manually move the lifting axis to the [Figure 10-16] position, and then long press "Ax1 Zero" for 2s, 

is displayed as 0 degrees, indicating that the zero is set successfully [Figure 10-17].

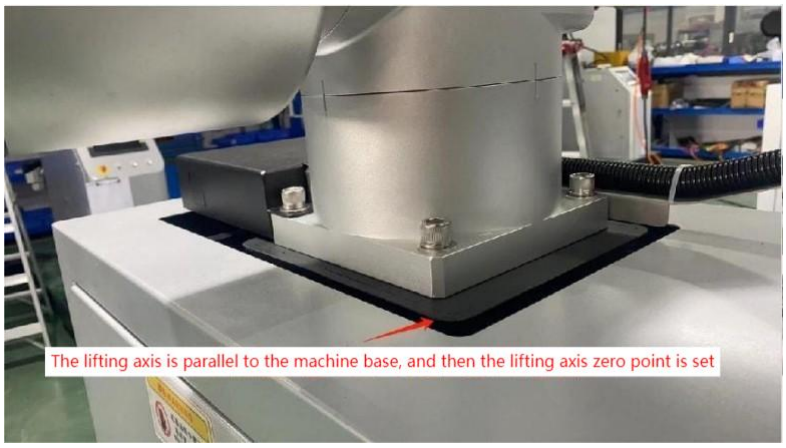


Figure 10-16.

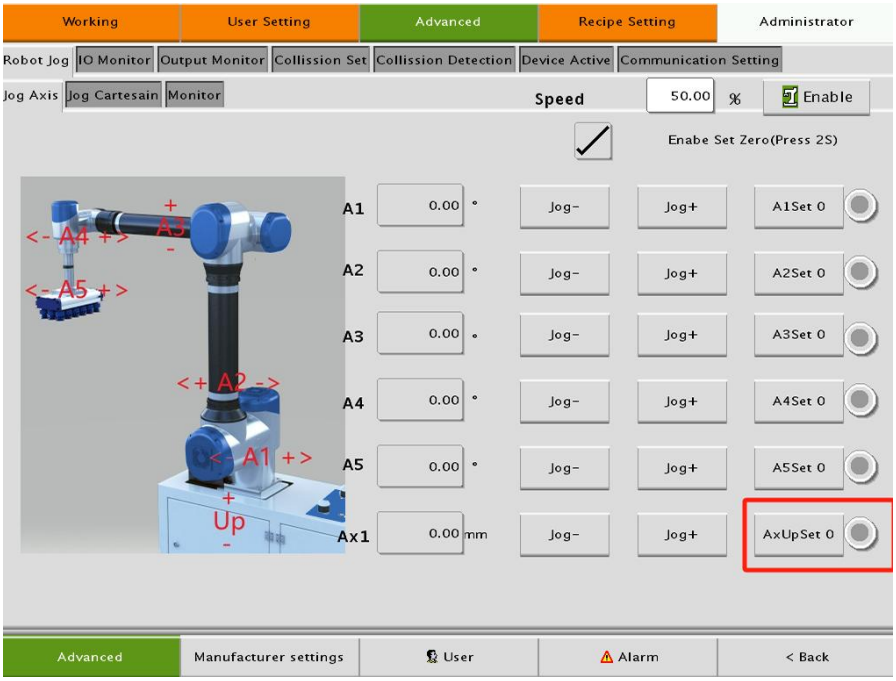


Figure 10-17.

The robot's posture after returning to zero is shown below [Figure 10-18].

Figure 8-18.

11. Robot activation

11.1. Precautions for robot startup and operation

Precautions before starting the robot [Figure 11-1]

First: Check that the number of coded units on the interface and the number of boxes on the palletized board are the same;

Second: Check that the name of the recipe to be used for the left and right pallets is correct.

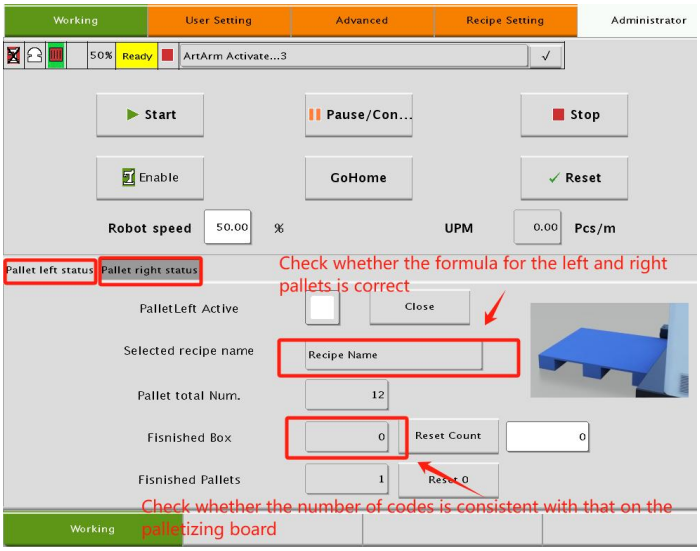


Figure 11-1

Check whether the input signal is normal, e.g., the often used DI7 and DI8 photoelectric signals [Figure 11-2].

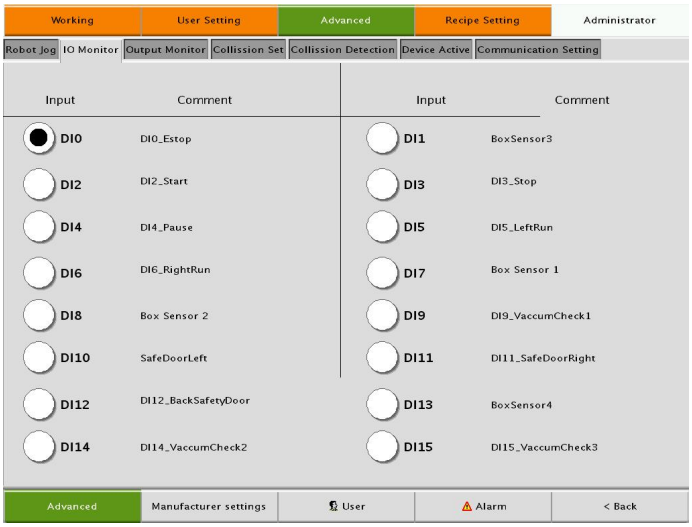


Figure 11-2

Check whether the output signal to be used is normal [Figure 11-3].

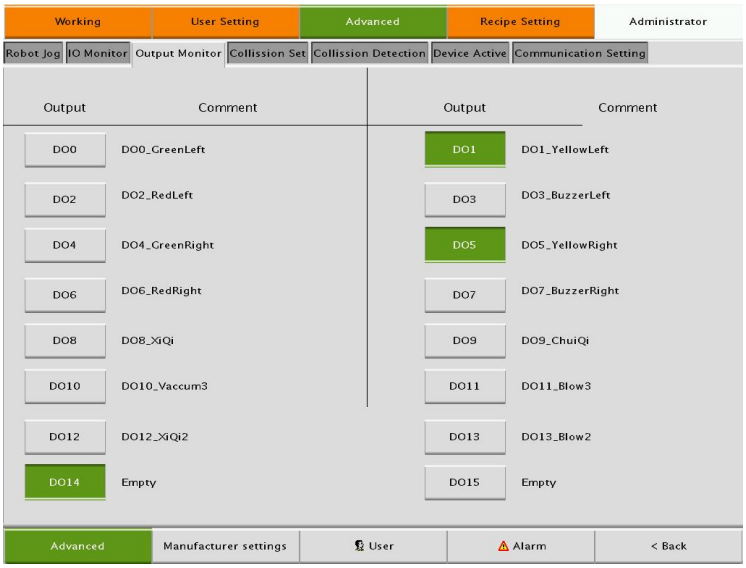


Figure 11-3

Check that the left and right "pallet heights" are correct [Figure 11-4].

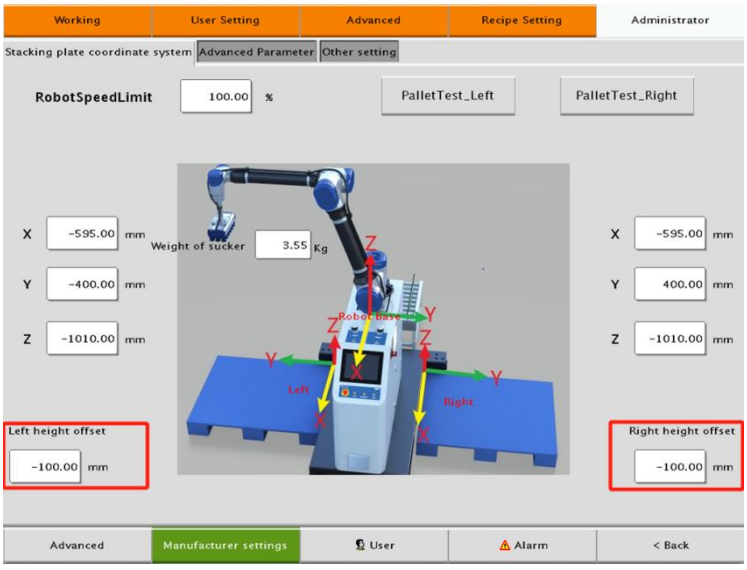


Figure 11-4

After checking to make sure they are correct, click "Start" [Figure 11-5].

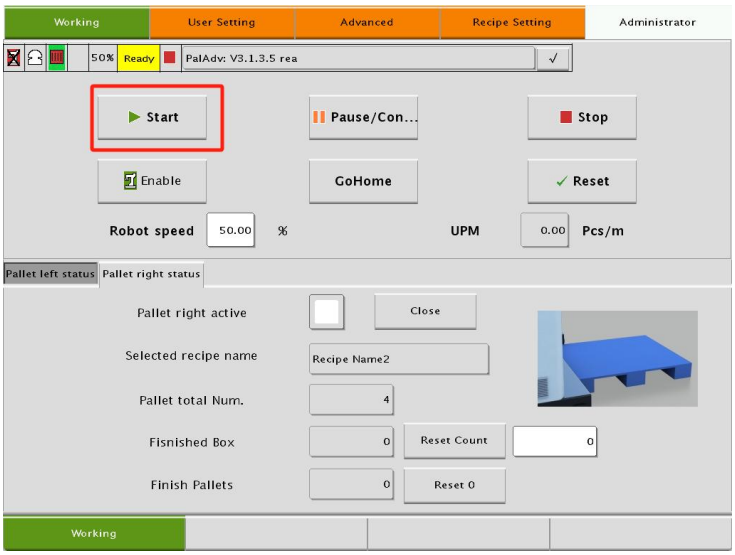


Figure 11-5

After clicking the ‘Start’ button, wait for the robot to initialize, press the "Left Start Button" and "Left Start Button" and the green light will be displayed and the robot will enter the working state.

Note: After clicking the "Start" button, only press the "Right Start Button", the robot will only palletize the right side, and the same for the left side, if both press the "Left and Right Palletizing Start Buttons", the robot will work on both left and right sides at the same time. If both "left and right palletizing start button" are pressed, the robot will work on the left and right side at the same time [Figure 11-6].

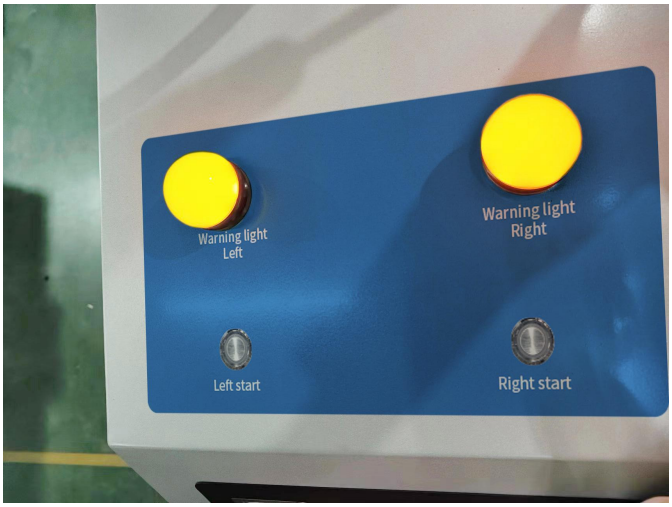


Figure 11-6

12. Equipment maintenance

Introduction to Equipment Maintenance

AWP series collaboration palletizing robot uses servo electric cylinder lifting platform, harmonic reducer, servo motor, flexible cable, sponge/octopus suction cup and other executive components. During use, some parts require regular inspection and maintenance. .

12.1. Frequently asked questions and solutions

Problem 1: The device cannot be powered on, and there is no response when turning on the main power knob switch.

Answer:If the collaborative palletizing robot cannot be powered on, please check whether the power supply of the front-end host is normal. If the power supply is normal, please open the robot's electrical cabinet and check whether the circuit breaker has been turned on.

Problem 2: The robot's suction cup has no vacuum and cannot grab boxes normally.

Answer: The robot's suction cup is driven by compressed air. If the robot moves normally but cannot suck the box, please check whether the air source is turned on. At the same time, make

sure the air pressure is sufficient. It is recommended that the air pressure be above 0.6Mpa.

Problem 3: After the device was pressed to start, the robot performed a zero return action and then stopped moving.

Answer: Starting up the equipment requires at least 2 steps. One is to start the machine, and the other is after placing the pallet, you need to press the left start or right start of the corresponding pallet. If these two steps are performed, please check the program. Whether the recipe is loaded normally and successfully.

Problem 4: The robot keeps stopping above the box conveyor belt and does not grab it.

Answer: The robot waits above the box, mainly waiting for the incoming electric eye signal from the left line or the incoming electric eye signal from the right line. If the right box has actually come over, please check whether the electric eye is normal. You can also check whether the input signal is received on the IO monitoring page.

Problem 5: Boxes collide when the robot is palletizing.

Answer: First, confirm that the recipe is loaded normally,and the box specifications should not be selected incorrectly. Then confirm whether the entry position in the box stacking configuration is configured normally, such as the offset in the XY direction and the height offset. It is recommended that the offset in the height direction be larger than that of the box. The height should be slightly higher or the same.

12.2. Robot maintenance

The palletizing robot adopts a servo motor + harmonic reducer + carbon fiber rod arm structure. The maintenance instructions for each component are as follows.

1. Motor encoder battery

The motor encoder battery has a life span of 3-5 years. Depending on the usage and environment, the battery may be exhausted early. Therefore, the battery needs to be replaced in advance before the battery is exhausted. The replacement steps are:

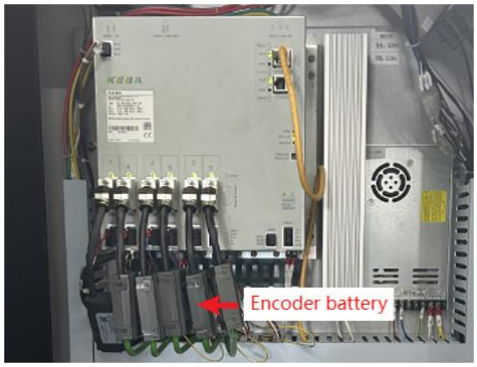


Figure 5.2-1

battery alarms for low voltage. Stop the robot at this time and run the robot to the zero position;

In the power-on state, open the old battery box, remove the old battery and replace it with a new one;

■ E731.0: Coder Battery Failure

Production mechanism:

The absolute value of the coder battery voltage is less than 2.8V.

Reason	Confirmation method	Treatment measures
Unconnected battery during power outage	Verify if the connection is connected during a	Set 200 D-15h = 1 to clear the fault.
Encoder battery voltage below level.	Measure the battery voltage.	Replace a new voltage-matched battery

■ Removal of battery box

It is recommended to replace the battery once every two years, and the battery box should be disassembled according to the reverse steps above.

When closing the battery case cover, avoid clamping the connector cable:

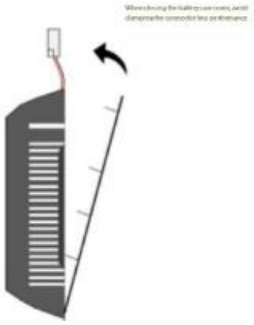


Figure 5.2-2

2. Controller battery

battery life of the controller is 3-5 years. Depending on the usage and environment, the battery may be exhausted early. Therefore, the battery needs to be replaced in advance before the battery is exhausted. The replacement steps are:

Replace the battery

warning

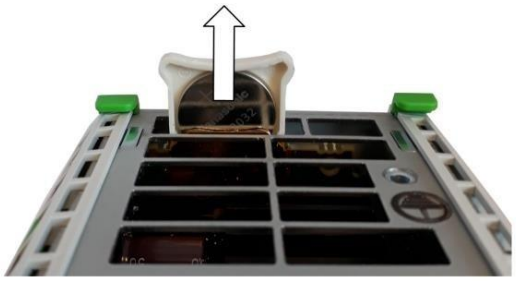
- Do not use force!
- Incorrect replacement of the battery or replacement of a different type of battery may cause irreparable damage to the battery.
- New batteries should not be touched with bare fingers as this may cause contact problems due to oxidation.
- If the battery is not replaced when the warning message appears, data and real-time clock settings in the SRAM may be lost in the event of a power outage.

To prevent data loss, the power of the CP50x / x may not be switched off when replacing the battery.

informatic

If it is necessary to disconnect the power supply voltage, the retention data of the module must be backed up before replacing the battery to prevent data loss (see "Creating a backup" and "Restoring a backup / updating firmware"). In addition, after replacing the battery, the real-time clock on the controller must be reset.

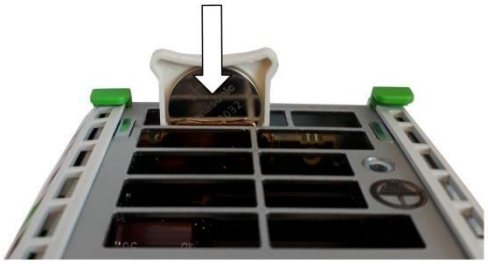
The battery is located at CP50x / x.



Remove the old battery from the battery tray

Insert new battery into battery tray, paying attention to polarity

Insert battery into CP 50x/x



Replace battery

Figure 5.2-3

3. Robot reducer

The AWP Series collaborative palletizing robot uses a harmonic reducer. The reducer has a service life of 15,000 hours within the rated torque range. If it works 10 hours a day, it can work continuously for 1,500 days, which is about 4.1 years; if it works 20 hours a day , it can work continuously for 750 days, that is, about 2 years(actually it often exceeds this life value).

12.3. Lifting platform maintenance

The lifting platform adopts the structure of servo motor + linear module and servo electric cylinder. The maintenance instructions for each component are as follows.

1. Guide rail slider

The guide rail slider adopts a guide rail + slider structure. There are 4 guide rails and 8 sliders in total. There is lubricating oil in the slider. If After long-term operation, it is recommended to add lubricating oil for lubrication. Regularly check whether there are foreign objects, dust, etc., and if so, clean them in time.

Figure 5.3-1

2. Servo electric cylinder

The servo electric cylinder uses a pulley and screw rod transmission structure. The pulley is subject to wear and the screw rod also needs lubrication. During use, you need to pay more attention to whether the torque parameters of the pick-up servo are normal. If the servo torque suddenly increases, then There may be a foreign object stuck. If you continue to use the belt, there is a risk of breakage. Please check and eliminate it in time.

If the pulley of the electric cylinder is damaged, please contact the manufacturer for after-sales parts for replacement.

Figure 5.3-2

In addition, the servo electric cylinder has a ball screw structure inside.

If there is abnormal noise when the electric cylinder is lifted or lowered or the torque of the pick-up servo is abnormally large during the production process, the electric cylinder needs to be lubricated and maintained. , if there is no abnormal noise or abnormal torque, lubrication should be done every six months to one year. For equipment lubrication, please use the type of lubricant shown below.

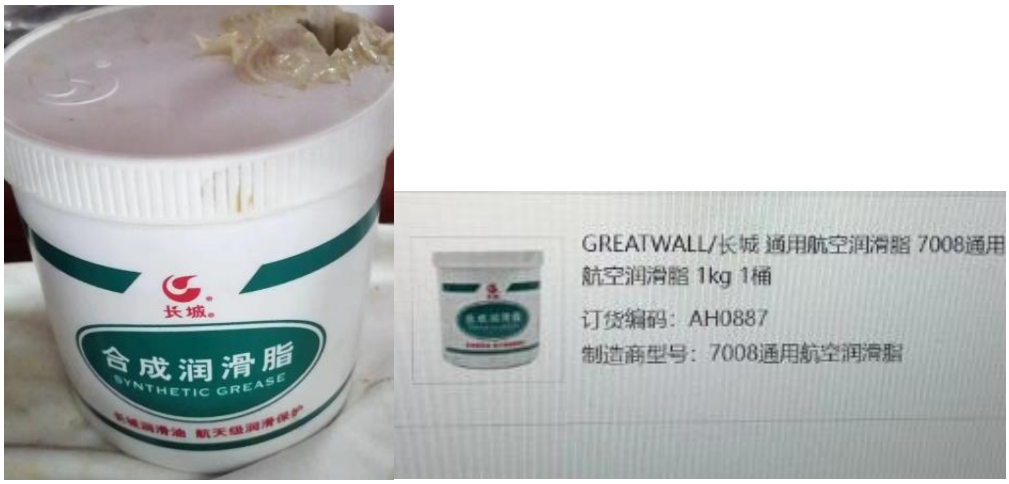


Figure 5.3-3

12.4. Suction cup maintenance

The suction cup of the collaborative palletizing robot is equipped with an octopus suction cup or a sponge suction cup. The suction principle is that the vacuum generator generates negative pressure, so the suction cup is equipped with a vacuum generator inside. The maintenance of the suction cup mainly focuses on the vacuum generator and the suction cup contact surface. It is necessary to regularly check whether the vacuum generator is blocked. If it is blocked, it will affect the suction power and needs to be cleaned in time. In addition, it is necessary to regularly check whether the octopus nozzle or sponge of the suction cup is damaged. If it is damaged, please replace it in time.

Figure 5.4-1

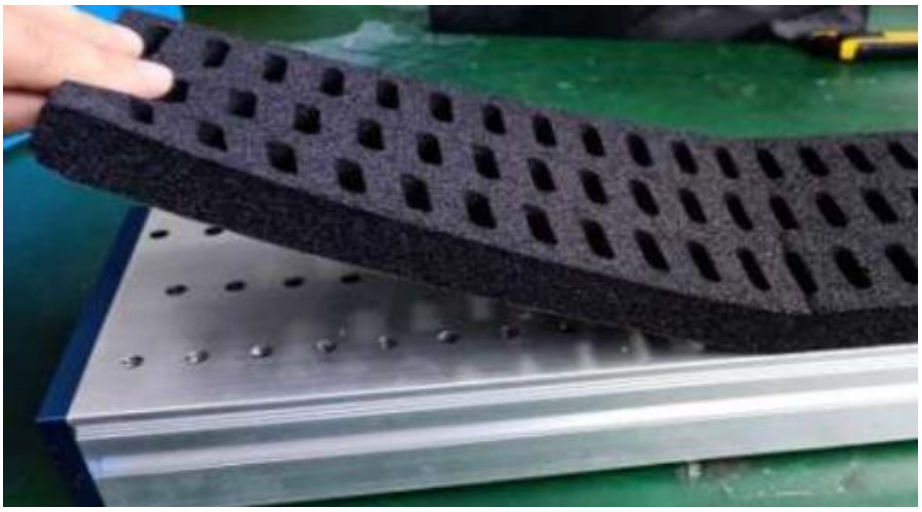


Figure 5.4-2 S

Concluding remarks

Thank you for using our products!

This product warranty period of twelve months, the warranty period in accordance with the instructions for normal use, product failure or damage, my company is responsible for free maintenance.

During the warranty period, a repair fee will be charged for damages caused by

a) Damage to the machine caused by errors in use and unauthorized disassembly, repair, or modification;

b) Damage to machinery due to fire, flood, abnormal voltage, other acts of God and secondary disasters;

c) Hardware damage due to human drop and transportation after purchase;

d) Damage to the machine caused by operation not in accordance with the user manual provided by our company;

e) Malfunctions and damages caused by obstacles other than machines (e.g. external equipment factors)

f) the machine caused by improper commissioning operations.

Precautions during commissioning

a) During the commissioning process, do not have people close to the robot's working range, so as to avoid unnecessary safety accidents.

b) During commissioning, hold on to the emergency stop button

c) During the commissioning process, the speed should be controlled at 10~30 percent

d) Turn the anti-collision function on when the robot is running

e) To stop production, stop and reset the robot, disconnect the power supply

f) If there is any abnormal noise or disorder during the production process, the machine should be stopped immediately for inspection.

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