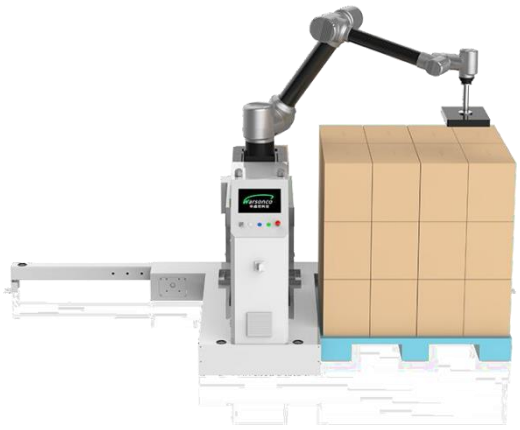
2024

Palletizing Robot Manual



Shenzhen Warsonco Technology Co.,Ltd.

2024/06/01

Contents

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Introduction

Thank you for purchasing robot products from Shenzhen Huashengkong Technology Co., LTD. In order to ensure that the product has been correctly set, please be sure to read this operation manual carefully before using this product. If you do not follow or follow the instructions and warnings in this manual, you may cause personal injury to you and those around you. This manual is the latest version of this batch of products before the delivery. Please visit the official website www.warsonco.com for subsequent updates.

This manual is only used as a guide for the normal operation of the product. During the use of the product, Shenzhen Huasheng Technology Co., Ltd. will not be liable for personal injury and financial loss caused by other reasons other than product defects.

Version number of this manual: V2.0

For robots version number: V4.2

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1. Safety

1.1. Introduction

This chapter focuses on safety information that must be read and understood before a cobot is powered on for the first time. The design and installation of safety barriers and docking equipment related to the periphery of the collaborative robot are not covered by the description, please contact your supplier.

1.2. Notice

- Ensure that the arms of the cobot have enough space to move freely without obstructions.
- When operating the cobot, please do not wear loose clothing, do not wear jewelry, and make sure that long hair is tied back.
- Do not use the robot for work beyond its rated capacity. Such as load, working range, speed, etc.
- Do not use if the cobot is damaged.
- If an alarm occurs during the operation of the cobot, please press the emergency stop button immediately, check the software alarm code and servo driver alarm code, and find the corresponding alarm cause in the alarm list. If you cannot find it, please contact the vendor.
- Ensure that the installation position of the cobot is level.
- Make sure people stay out of reach of the cobots that are operating or are about to begin operating.
- If the risk assessment has determined, do not enter the work area of the Cobot or touch the Cobot while the system is in operation.
- Connecting different machinery may aggravate the hazard or introduce new ones. Always carry out a comprehensive risk assessment of the entire installation. Depending on the risk assessment, different functional safety levels may apply; Therefore, when different safety and emergency stop performance levels are required, always select the highest performance level.
- Do not tamper with the cobot. Changes to cobots can create unforeseen dangers.
- Ensure that users are informed of the location of the cobot emergency stop button and are directed to activate the emergency stop in case of an emergency or abnormal situation.
- If there is a warning label affixed to the robot or peripheral equipment, please strictly observe the safety information represented by the label and protect the warning label from contamination or damage. If the label cannot be distinguished, please contact the supplier.
- Do not step on or climb the robot arm or electrical cabinet. This may cause irreversible damage to some of the equipment, affect the accuracy of the robot and cause potential safety hazards.
- Please mark the dangerous area on the ground to ensure that the robot will not accidentally injure the staff when working.
- Before starting the machine, please confirm the circuit connection in the robot electric box to ensure your own safety and normal operation of the machine.
- It is forbidden to use the robot in combustible, explosive, large amount of radiation, water or high humidity environment, otherwise it will not only cause adverse effects on the robot and peripheral equipment, but also may cause injury to users.

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- Do not directly cut off the power supply when the robot is running.

1.3. Pre-use evaluation

Because the user's site environment is not the same, it is necessary to do a site assessment before importing the collaborative robot, including site safety assessment, space size, ambient temperature, humidity, product size, product weight, plate size and palletizing height, to ensure that it meets the scope of the collaborative robot.

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2. Maintenance and repair

2.1. Safety instructions

After the cobot is serviced, it must be checked to ensure the level of safety required by the service. Verification must comply with valid national or regional security regulations. At the same time, check whether all safety functions are normal.

The purpose of maintenance is to ensure the normal operation of the system, or to help the system return to normal operation in the event of a failure. Maintenance includes fault diagnosis and actual maintenance.

The following safety procedures and warnings must be followed when operating a robot arm or control box:

1、The power cable must be disconnected to ensure a safe power outage when the cobot is being serviced. Take necessary precautions to prevent others from reconnecting the power supply during maintenance.
2、Before restarting the system, check that the ground cable is properly connected.
3、Avoid splitting the power supply system in the control box. The power supply system remains high voltage after the control box is closed.
4、keep the electric control box inside dry state to avoid dust into the electric control box.
5、Make written records and save maintenance content for inquiry.

2.2. Daily cleaning and inspection

Any dust, dirt, oil, etc. visible on the arm and base of the robot can be wiped with cloth and detergent or ethanol during routine cleaning of the robot.

If vacuum or pneumatic grippers are used, check whether the filter is clean, whether the air pipe is worn or broken, and whether the sponge suction cup is broken.

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2.3. Daily inspection plan

2.3.1. Robot arm visual inspection

Figure 1

Every joint must be checked, and if there is a collision, it must be checked and recorded.

2.3.2. Robot control electrical box inspection

- Disconnect the power cable from the control box.
- Check the control box for dirt or dust, if there is a vacuum cleaner clean.
- Check whether the switch button is sensitive.

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3. Operating Instructions

3.1. Introduction to the interface

3.1.1 Main interface introduction

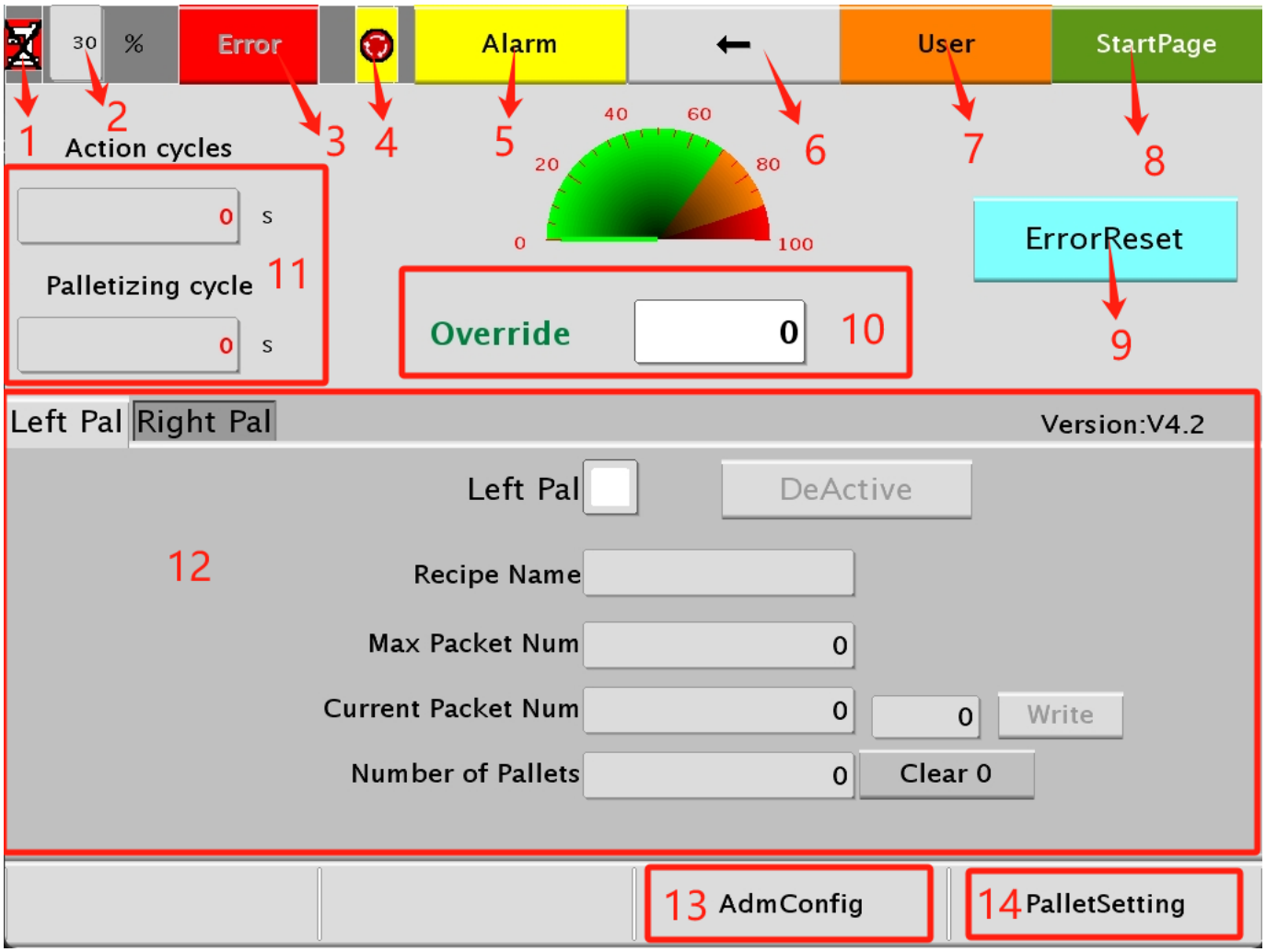

Figure 2

①Enable status: Indicates whether the current status is enabled. Red indicates that the status is not enabled (**Figure 2, area 1**).

②Speed display: Display the current speed of the robot (**Figure 2, area 2**).

③Alarm status: indicates whether there is an alarm at present (**Figure 2, area 3**).

④Emergency stop state: When the emergency stop button is pressed, this state is red (**Figure 2, area 4**).

⑤**Alarm**: Here you can check the alarm information of the equipment and find the cause of the alarm according to the information. As shown in **Figure 3** below.

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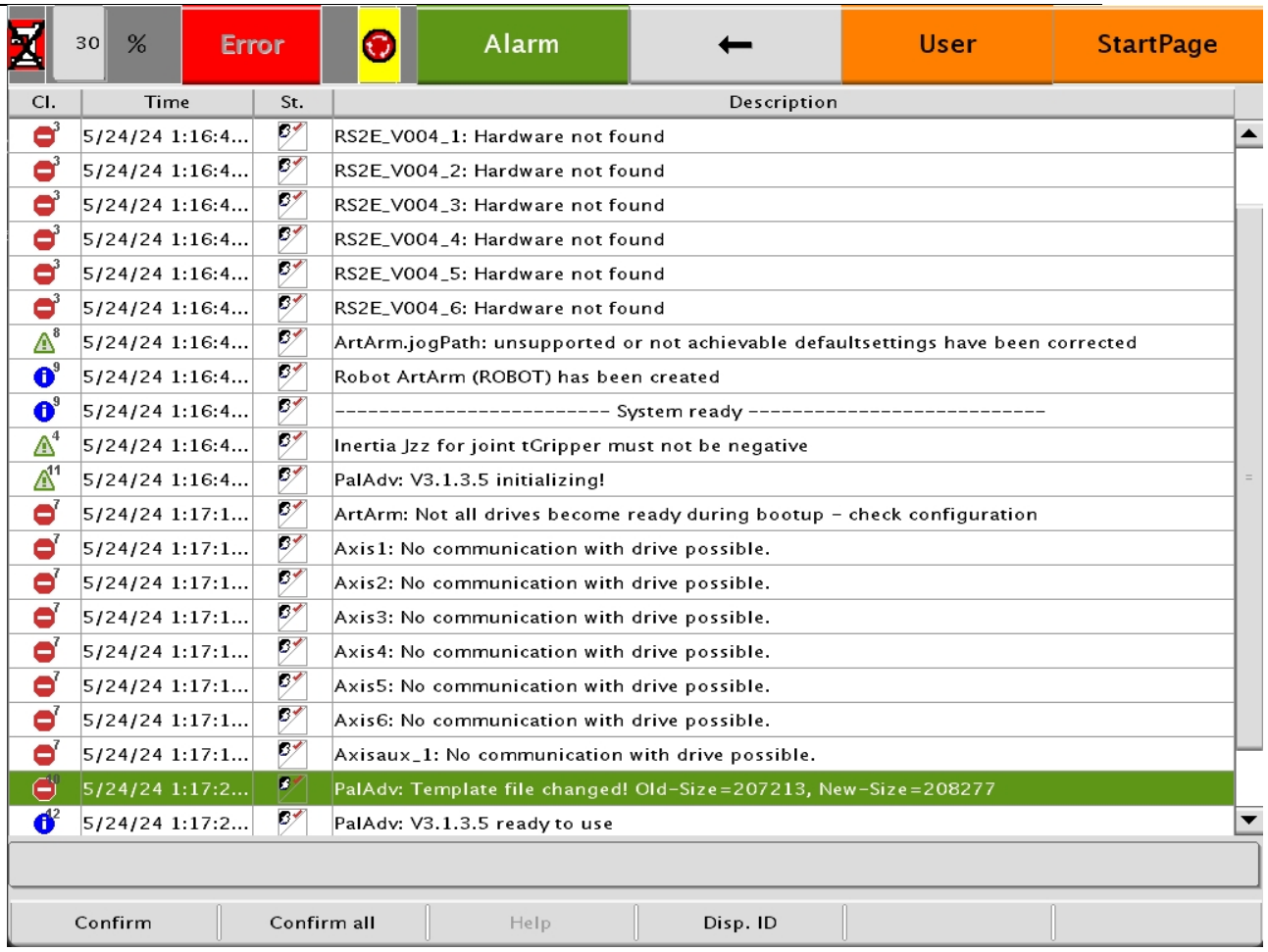

Figure 3

⑥**Return**: Return to the previous interface **(Figure 2, area 6)**.

⑦**User**: (1) You can view the current privilege level or switch the privilege level, such as switching the highest level of administrator "**Administrator**", in **Figure 5**, bottom left click on **User** pop-up window in **Figure 4** below, you need to enter the password, the password is pass.(2) You can change the language settings, as shown in **Figure 5** below.

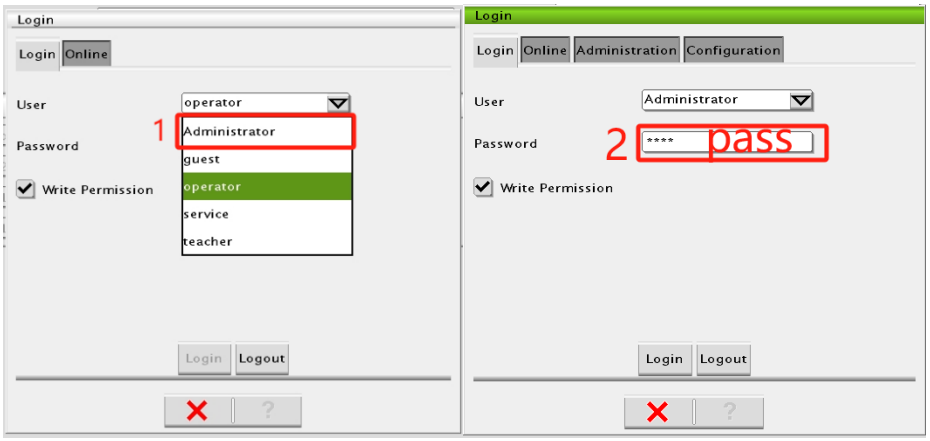

Figure 4

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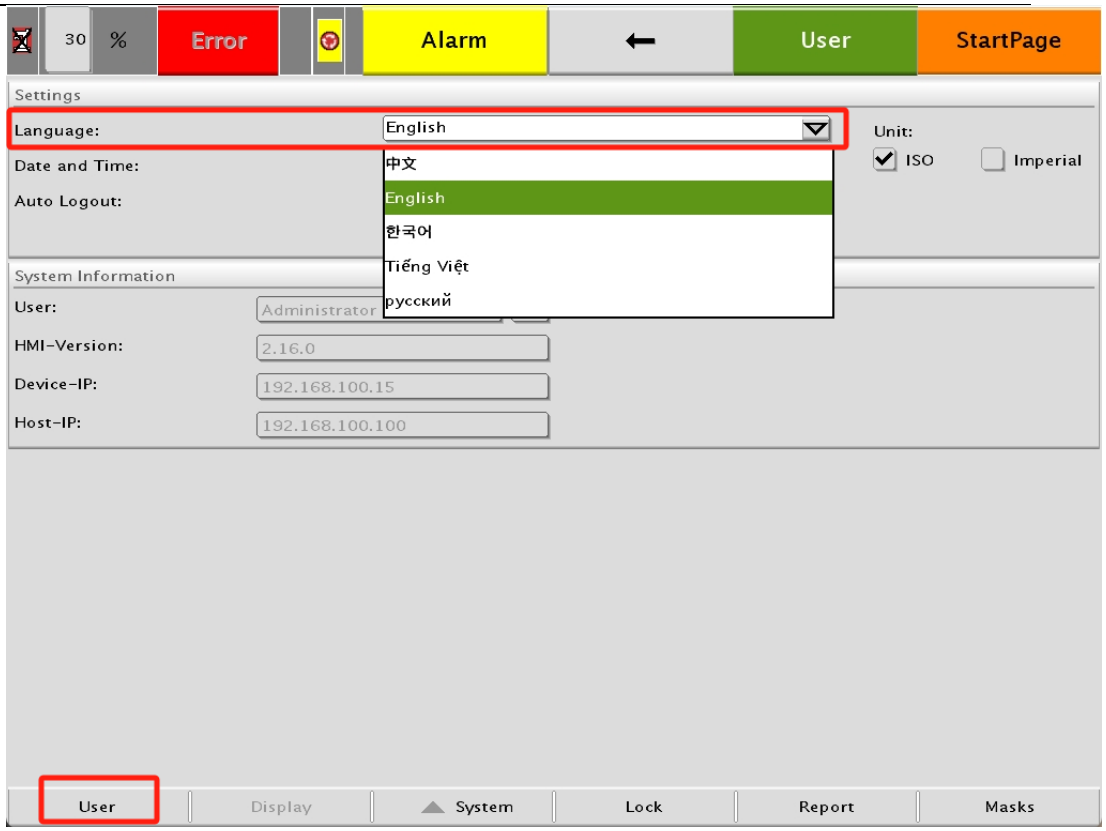

Figure 5

⑧**Start Page**: The screen after the device starts up, also the normal production status page.

⑨**Error Reset**: Click here to clear the alarm after confirming the alarm content.

⑩Robot speed : The current speed setting of the palletiser operation, up to 100. can be modified directly by clicking on the (**Fig. 2, area 10**).

⑪Action cycle time: Monitors the time it takes from gripping to finishing.

Palletizing completion time: Monitor the time it takes for the robot to stack all the items.

⑫Left and right side palletizing status display: indicates the current recipe and palletizing progress when the robot is palletizing on the left and right side, and the number of pallets can also be modified. (The palletizing recipe cannot be modified while it is in use; it needs to be stopped and clicked to close the palletizing before it can be modified.)

Current Packet Num: indicates the number of pallets completed by the robot on that side.

Write: If the palletiser is stopped or restarted by clicking on the reset button, and the number of coded boxes shown here does not match the number of coded boxes on the actual pallet, you need to set the current number of completed boxes if you want to continue coding on the basis of the coded boxes, otherwise you need to clear the coded boxes from the pallet. (Note: When there is already an object on the pallet, if it is not removed, writing the wrong number will cause a collision.)

Number of Pallets: indicates the number of boards that have been completed by the robot while palletizing on that side.

Clear 0: clears the robot of the number of completed boards palletized on that side, bringing it to zero.

⑬**Adm Config:** You can access advanced privileges to modify internal parameters or view internal data.

⑭**Palletizing setting**: you can create new product recipe and modify palletizing method.

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3.2. Adm Config

Click "**Adm Config**" in the main interface, and the screen shown in **Figure 6** below will pop up.

Administrator password: 0000

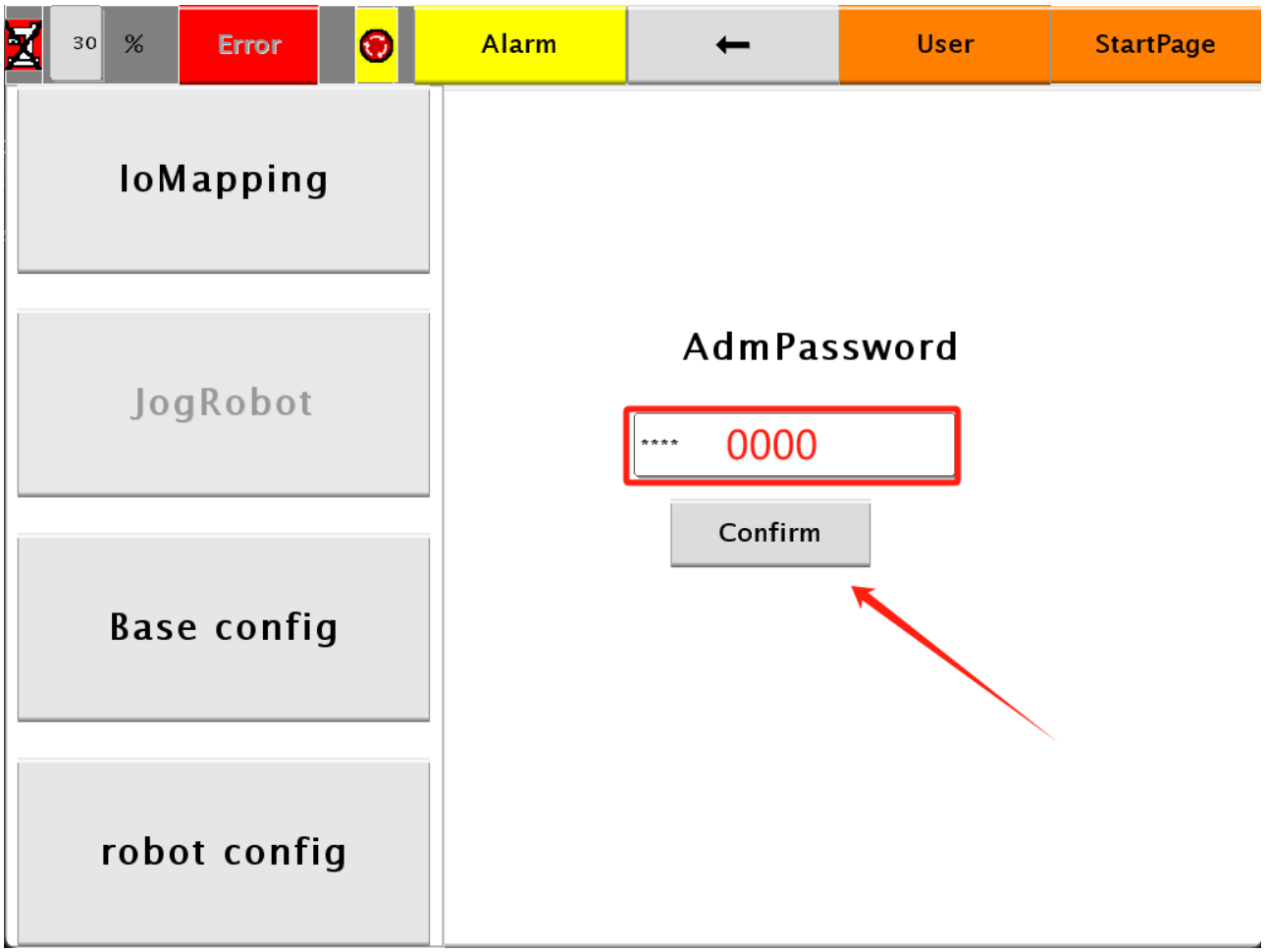

Figure 6

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3.2.1 Io Mapping

In the " **Adm Config** " screen, click " **Io Mapping** " to bring up the screen shown in **Figure 7** and **8** below. Control the input and output status of each port.

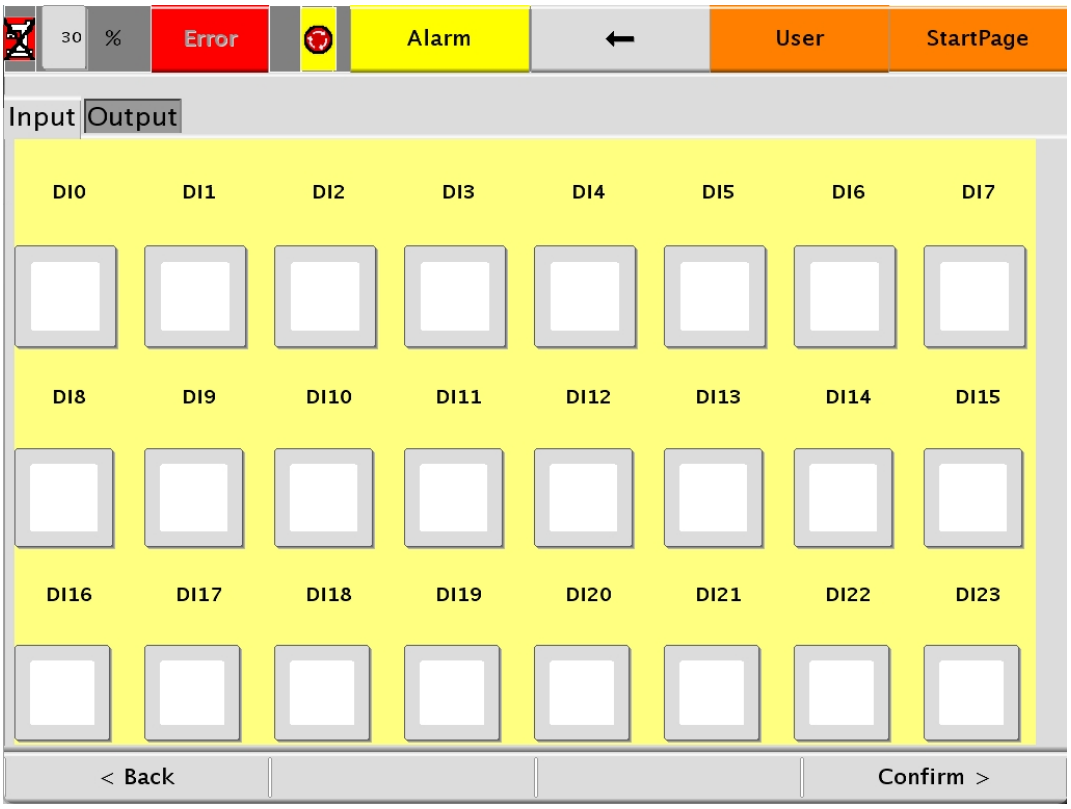

Figure 7

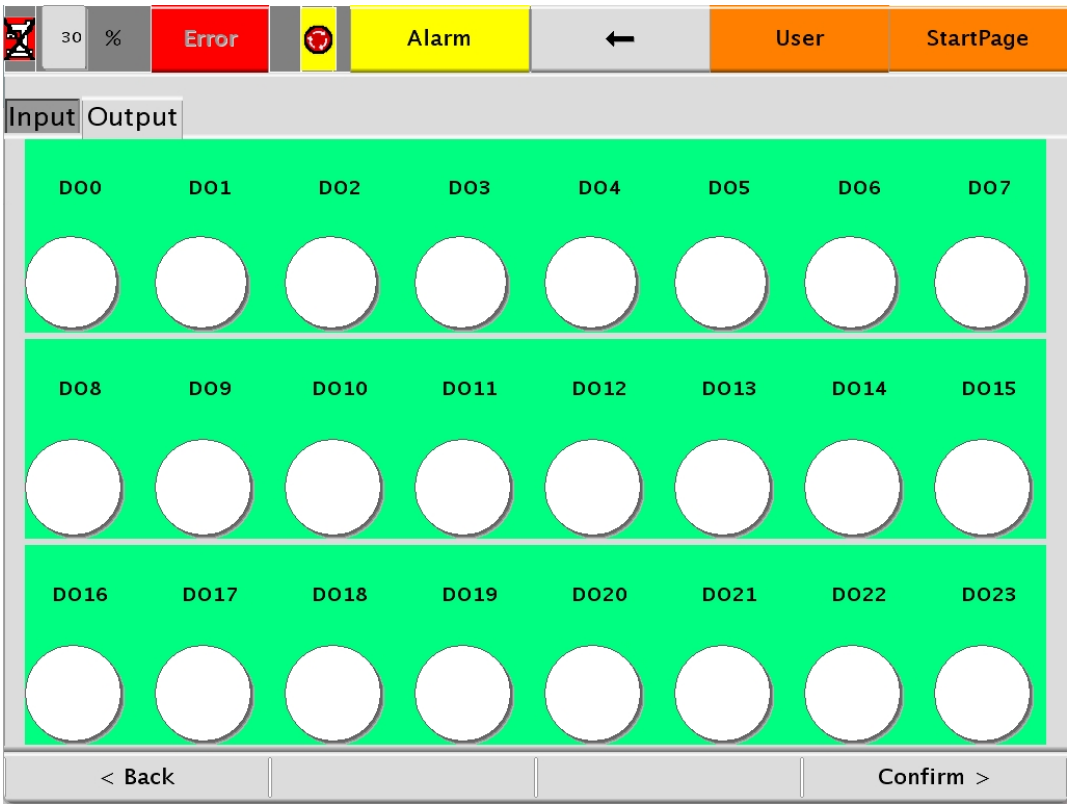

Figure 8

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3.2.2 Jog Robot

In the " **Adm Config** " screen, click on "**Jog Robot**" to bring up the screen shown in **Figure 9** below. "**Jog Robot**" have two modes, " **Axes Jog** " and " **Cart Jog** ". " **Axes Jog** " is to control the movement of a single axis of the robot; " **Cart Jog** " is to control the linear movement of the robot, that is, the robot moves in a straight line direction.

Figure 9

Click "**Axes Jog**" to bring up the screen shown in **Figure 10** below. " **Axes Jog** " is to control the movement of a single axis by clicking the corresponding "**Jog-**" "**Jog +**" of each axis.

1、 first set the " **Jog Velocity** ", in order to ensure safety, the speed should not be too large, it is recommended that the " **Jog Velocity** " is set below 30 and (**Fig. 2, area 10**) speed is also below 30.

2、 Click "**Power** ".

3、 by clicking on the "**Jog -**" "**Jog +**" can be moved to the specified position of the joint axis of the robotic arm, when the commissioning officer is facing the operating screen, the machine forward, left, up for the " **Jog +**", backward, right, up for the "**Jog -**" (**Fig. 10, area 1**).

4、Display the current position value of the joint axis of the robotic arm (**Fig. 10, area 2**).

5、 the robot arm joint axis can be adjusted parameter range (**Fig. 10, area 3**).

After setting, click on "Close Jog".

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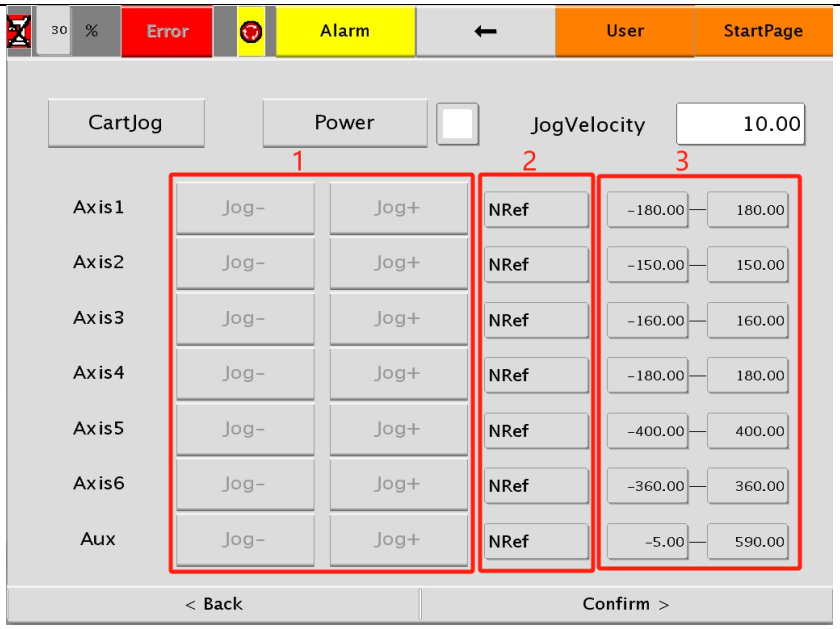

Figure 10

Clicking on the " **Cart Jog**" will bring up the interface as shown in **Figure 11**. " **Cart Jog** " is to control the linear movement of the robot by clicking the "**Jog -**" " **Jog +**" corresponding to each action, to realize the robot in the X-axis, Y-axis, Z-axis direction.

1, first set the " **Jog Velocity** ", in order to ensure safety, the speed should not be too large click, it is recommended that the " **Jog Velocity** " is set at 30 or less and the speed of(**Fig. 2, area 10**) is also below 30.

2. Click "**Power** ".

3, by clicking on the " **Jog -**" " **Jog +**" can move the robot arm, end and lifting axis to the specified position, when the commissioning officer is facing the operating screen, the machine forward, left, up for the " **Jog +**", backward, right, up for the " **Jog -**"（**Fig. 11, area 1**）.

4、Display the current position value of the robot arm（**Fig. 11, area 2**）.

Click "**Close Jog** " after setting.

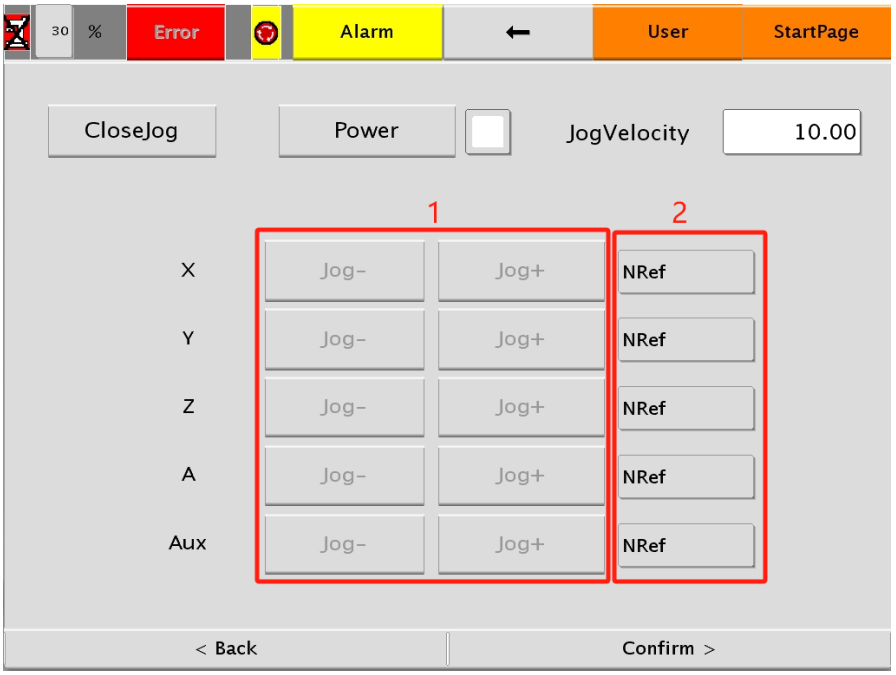

Figure 11

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3.2.3 Base Config

In "**Adm Config**", click " **Base config** ".

A、 Tool Data

Click " **Tool Data** ", and then enter the tool-related parameters according to the actual situation. As shown in **Figure 12** below.

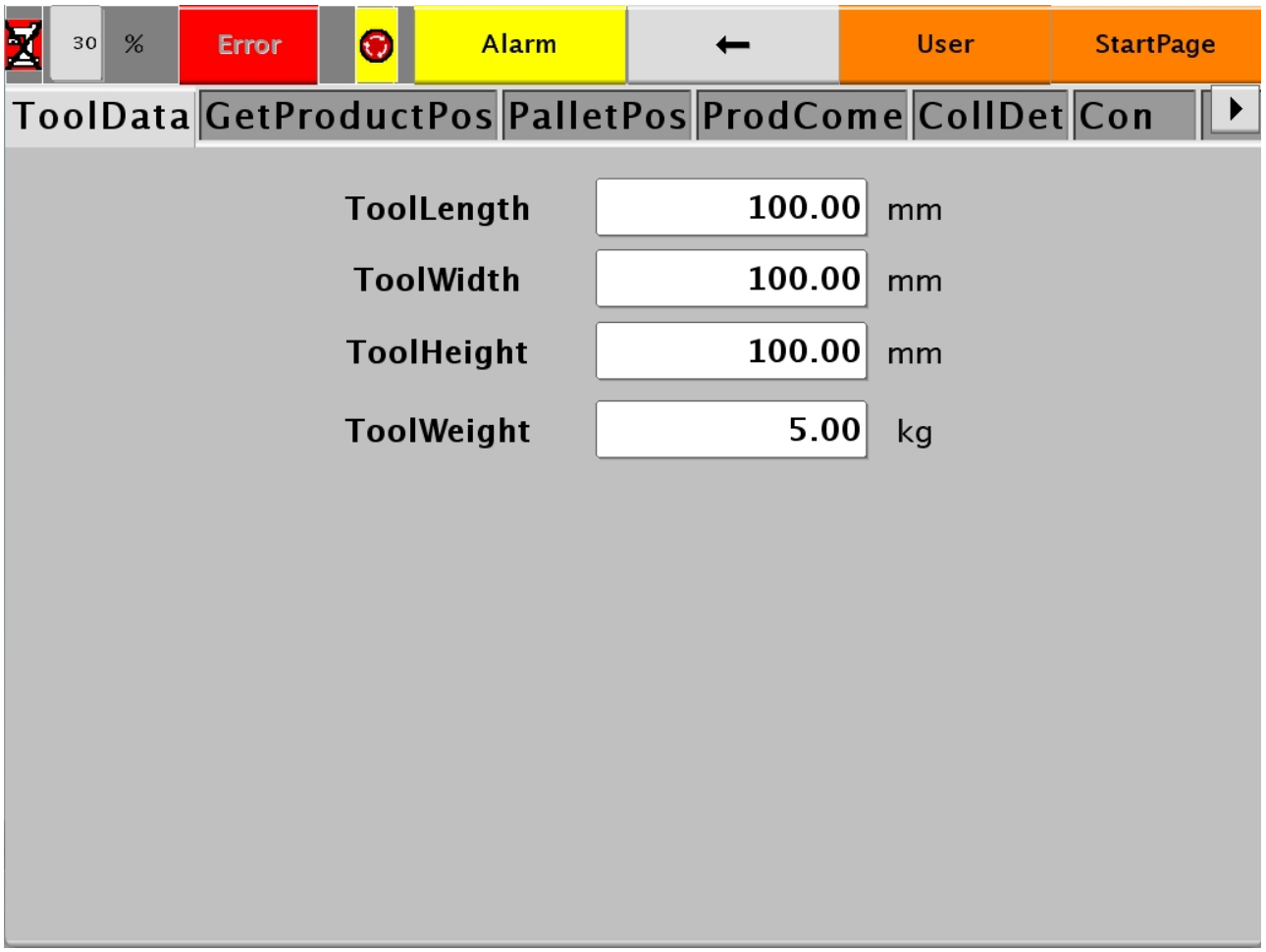

Figure 12

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B、Prod Come

Click **" Prod Come"**, you can set the number of conveyor lines and the direction of incoming boxes, the meaning of the parameters is shown in **Table 1**, as shown in **Figure 13, 14** below.

Table 1

Come Line	Product model
Single-line incoming material	The box is incoming transversely
	The box comes vertically
Double-line incoming material	The boxes are all transversely incoming
	The boxes are all vertically incoming
	Box left vertical right horizontal incoming material
	Boxes come in left horizontal and right vertical

Figure 13

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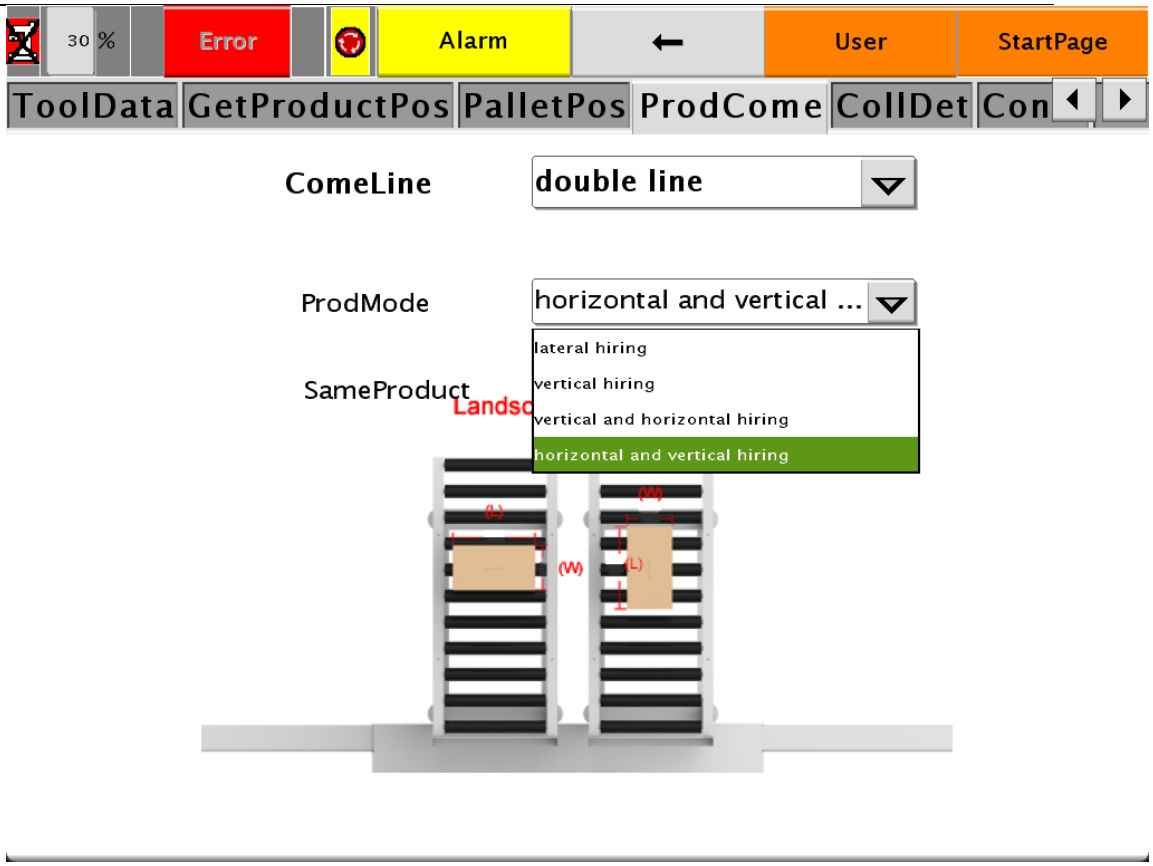

Figure 14

If the two-line incoming material is the same product, pick it, as shown in **Figure 15**.

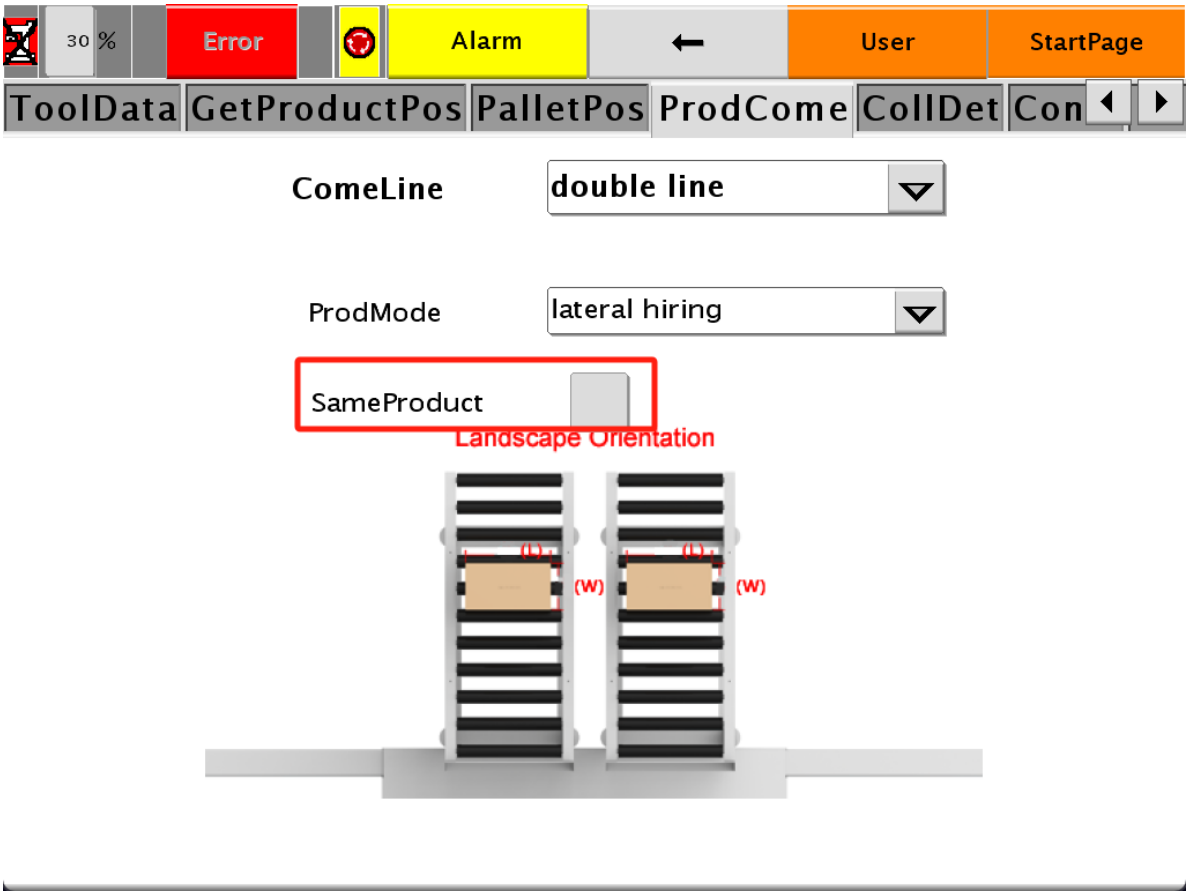

Figure 15

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C、Get Product Pos

Click on " **Get Product Pos** " to modify the location of the grab point, as shown in **Figure 16** below.

If you want the robot to grab the box in the conveyor line position **"A"** in **Figure 16**, you can choose to place it in the lower left corner of the conveyor line by selecting **"Lower Left Corner"** in **Figure 16.** Then, use the moving tool **" Cart Jog "** to move the suction cup to the **"A"** position of the conveyor line, and control the end-effector to place one side of the gripping tool close to the X-axis of the conveyor line near the **"A"** point, and the other side close to the Y-axis of the conveyor line. After adjusting, click "Teach" to complete the positioning of the gripping point.

If you want the robot to grab the box in the conveyor line position **"B"** in **Figure 16**, you can choose to place it in the lower left corner of the conveyor line by selecting **"Lower Left Corner"** in **Figure 16.** Then, use the moving tool **" Cart Jog "** to move the suction cup to the **"B"** position of the conveyor line, and control the end-effector to place one side of the gripping tool close to the X-axis of the conveyor line near the **"B"** point, and the other side close to the Y-axis of the conveyor line. After adjusting, click "Teach" to complete the positioning of the gripping point.

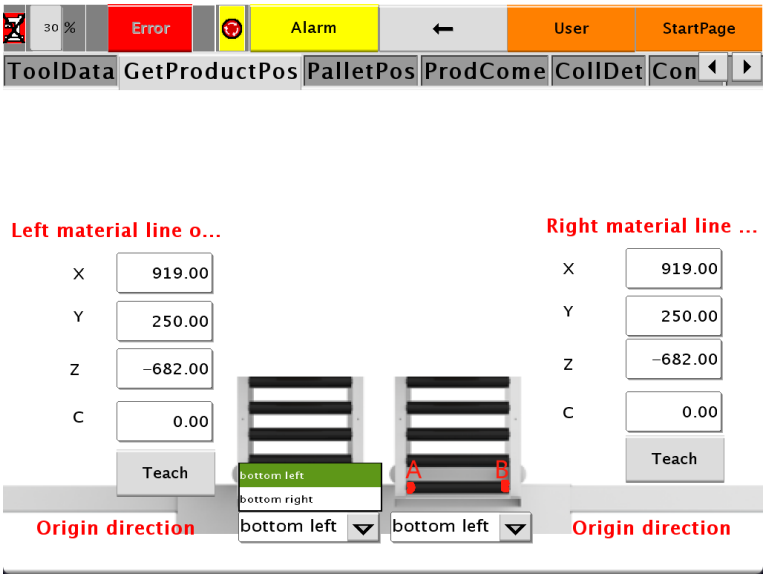

Figure 16

If you select the two-line incoming material in **" Prod Come"**, click **" Get Product Pos "** as shown in **Figure 17**.

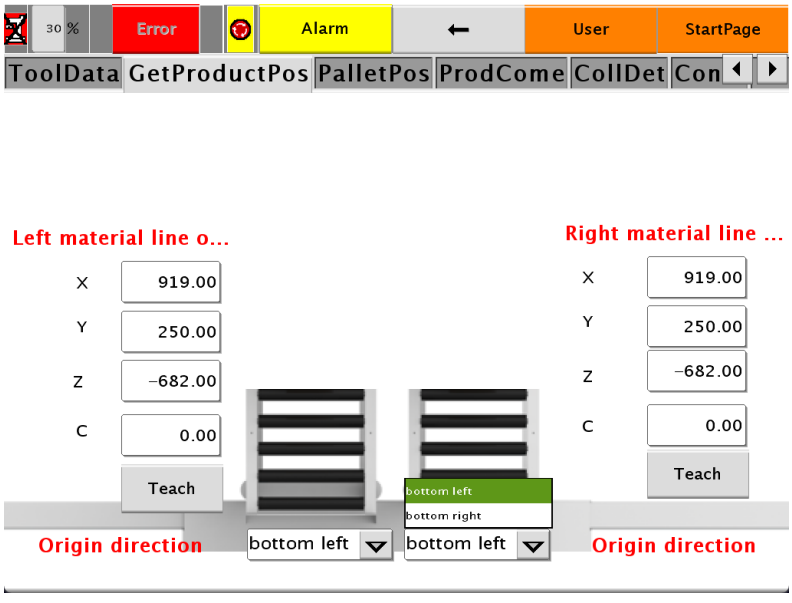

Figure 17

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D、Pallet Pos

Click on **" Pallet Pos "**， when the product is not in the specified position on the left or right pallet, it can be fine-tuned by modifying the values of **"X, Y, Z, C"** for the left or right pallet (Z value is the height adjustment and C is the rotation angle adjustment). This is shown in **Figure 18** below.

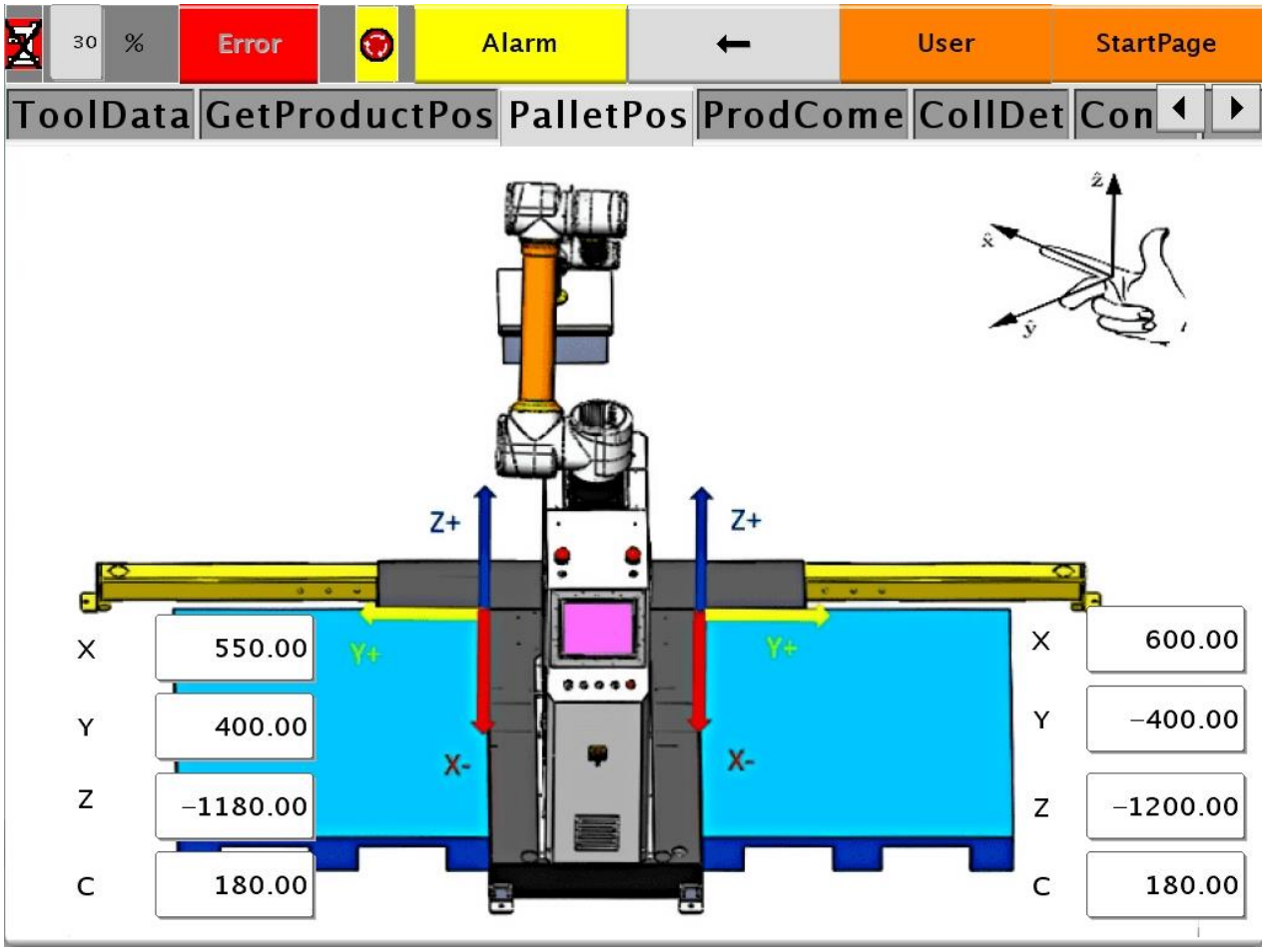

Figure 18

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E、 Coll Det

Click " **Coll Det** " to bring up the interface shown in **Figure 19** below. The collision sensitivity is used to set the collision protection to reduce the risk of collision, but not to avoid the risk completely, the smaller the value the more sensitive, the maximum setting is 50. **Note that the 4th axis cannot be set too large.**

You need to click **"Write"** after modifying.

Note: Please do not change the collision value at will, the business will be set before delivery.

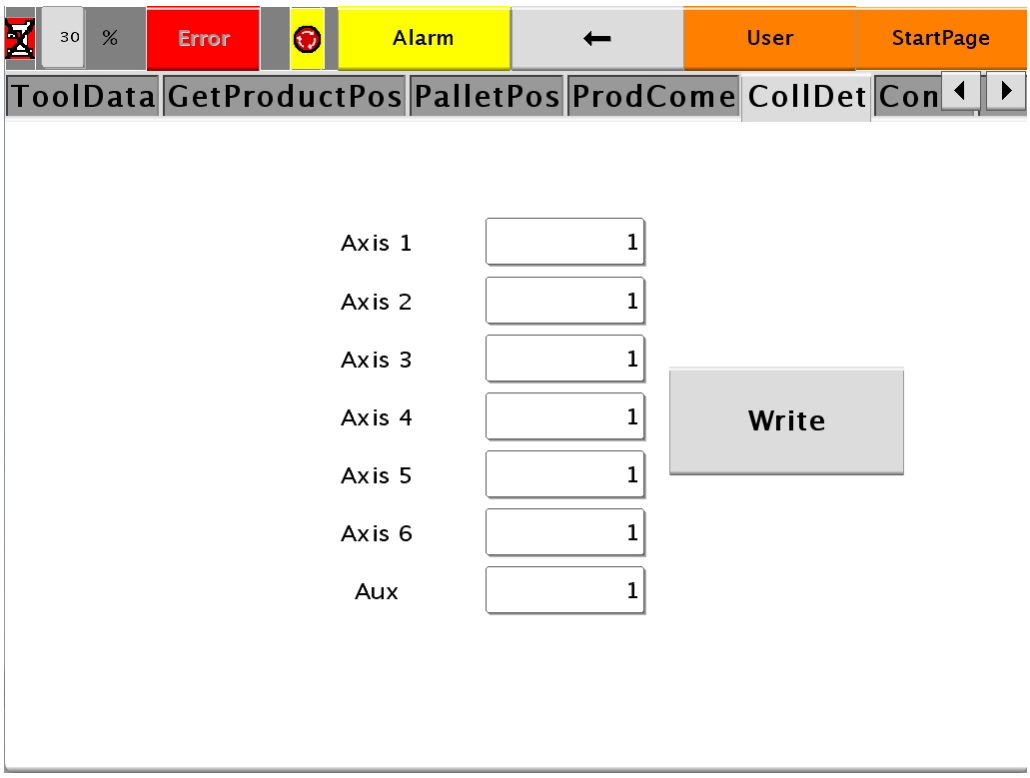

Figure 19

F、 Comp

Click " **Comp**" to bring up the interface shown in **Figure 20** below. If there is an error in the distance of the box from the specified position, you can modify the adjustment by the position compensation.

1、 The position of the robot grabbing the box on the conveyor line is compensated for the setting. " **PrePickCompZ_1** " is the height compensation of the robot's end-effector at the previous point of the box gripping point to allow for a safe distance. " **Wait Time**" is the delay time when the robot end-effector executes the grab command to ensure that it can fully grab the box. " **PostPickCompZ_1**" is the height compensation performed by the robot end-effector at the next point from the box grab point to allow for a safe distance.

2、 The position of the robot to place the case on the left pallet is compensated for the setting. " **EntryPosCompY_1**" is the process when the robot end effector grabs the box and places the box on the left pallet, and the box compensates left and right positions at the entry point from the left pallet to prevent the box from being too close or too far away from the robot body. " **EntryPosCompX_1**" is the process of the robot end effector grabbing the box and placing the box on the left pallet tray, and the box is compensated before and after the entry point from the left pallet to prevent the box from exceeding the front and rear edges of the pallet. " **EntryPosUnderBoxCompZ_1**" means that when the robot places the box on the pallet, it finds that the bottom of the box is lower than expected, and the height compensation is performed at

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the entrance of the left pallet, and the robot will move up to prevent the case from colliding with the pallet. " **EntryPosOverBoxCompZ_1**" means that when the robot places the box on the disc, it finds that the bottom of the box is higher than the expected position, and the height compensation is carried out at the entrance of the left disc, and the robot will move down to ensure that the bottom of the box is in contact with the surface of the disc, and is placed stably, so that the box will not be suspended or tilted. " **PostPlaceCompZ_1**" is the height compensation of the robot at the next point of the box placement point to reserve a safe distance and ensure that the robot will not collide when returning. "**Place delay**" is when the robot places the box on the code tray to place the delay to prevent the product from flying.

3、The robot compensates for the position of the box placed on the right pallet tray. " **EntryPosCompY_2**" is the process when the robot end effector grabs the box and places the box on the right palletizing tray, and the box compensates left and right positions at the entry point from the right pallet to prevent the box from being too close or too far away from the robot body. " **EntryPosCompX_2**" is the process when the robot end effector grabs the box and places the box on the right pallet tray, and the box is forward and backward position compensation from the entry point of the right pallet to prevent the box from exceeding the front and rear edges of the pallet. " **EntryPosUnderBoxCompZ_2**" means that when the robot places the box on the pallet, it finds that the bottom of the box is lower than expected, and the height compensation is performed at the entrance of the right pallet, and the robot will move up to prevent the case from colliding with the pallet. " **EntryPosOverBoxCompZ_2**" means that when the robot places the box on the pallet, it finds that the bottom of the box is higher than expected, and the height compensation is carried out at the entrance of the right pallet, and the robot will move down to ensure that the bottom of the box is in contact with the surface of the pallet and is placed stably, so that the box will not hang or tilt. " **PostPlaceCompZ_2**" is the height compensation of the robot at the next point of the point where the box is placed to reserve a safe distance and ensure that the robot will not collide when returning. "**Place delay**" is when the robot places the box on the code tray to place the delay to prevent the product from flying.

4、Lift height setting for the robot's lift axis. The robot's lift axis has a height limit, and the movement height interval is generally set from 0 to 500.

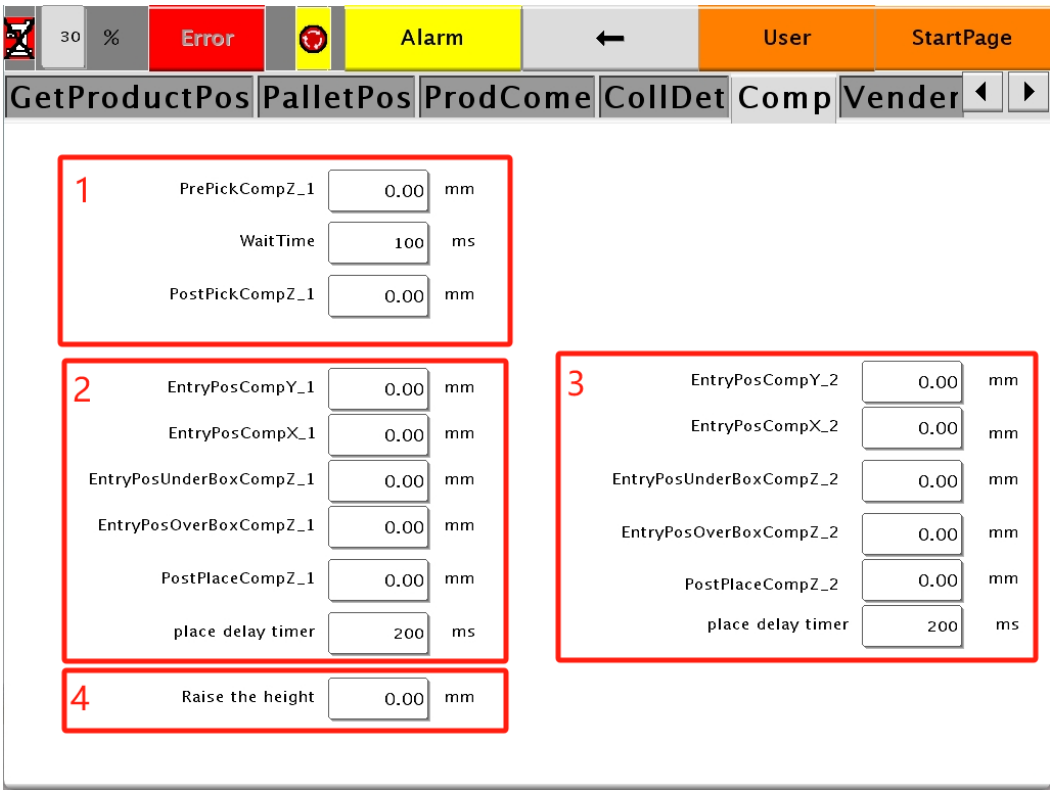

Figure 20

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G、 Vender

Click **"Vender"** to bring up the screen shown in **Figure 21** below.

Manufacturer password: pass

If the palletizing fails to load, the recipe is abnormal, and pressing the button will restart the controller. If it still doesn't work, click "Delete Abnormal Recipe" to create a new recipe.

Please contact the merchant for the registration code.

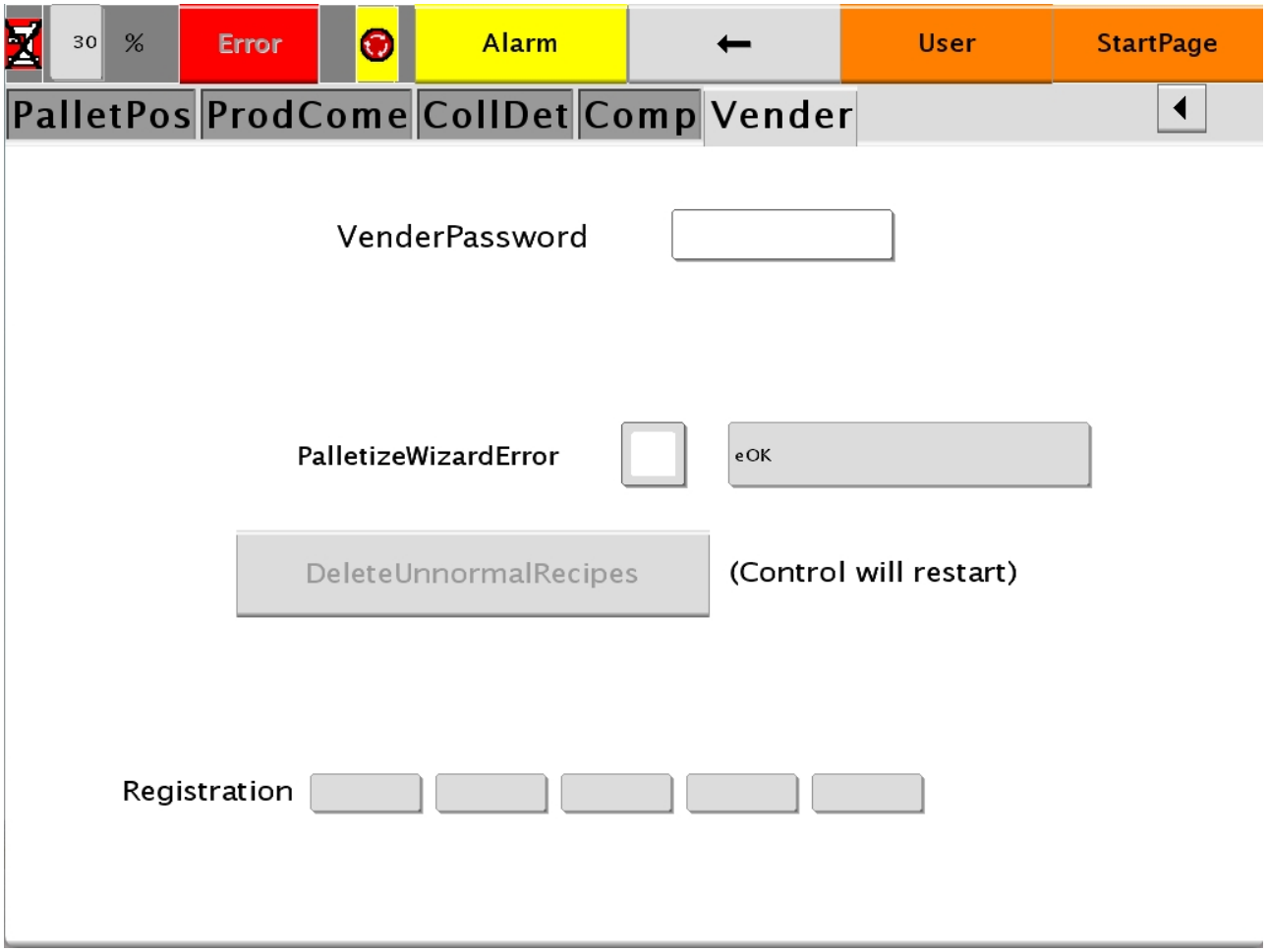

Figure 21

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3.2.4 Robot Config

Click **“Robot config”** in **“Adm Config”**, and the interface shown in **Figure 22** below pops up.

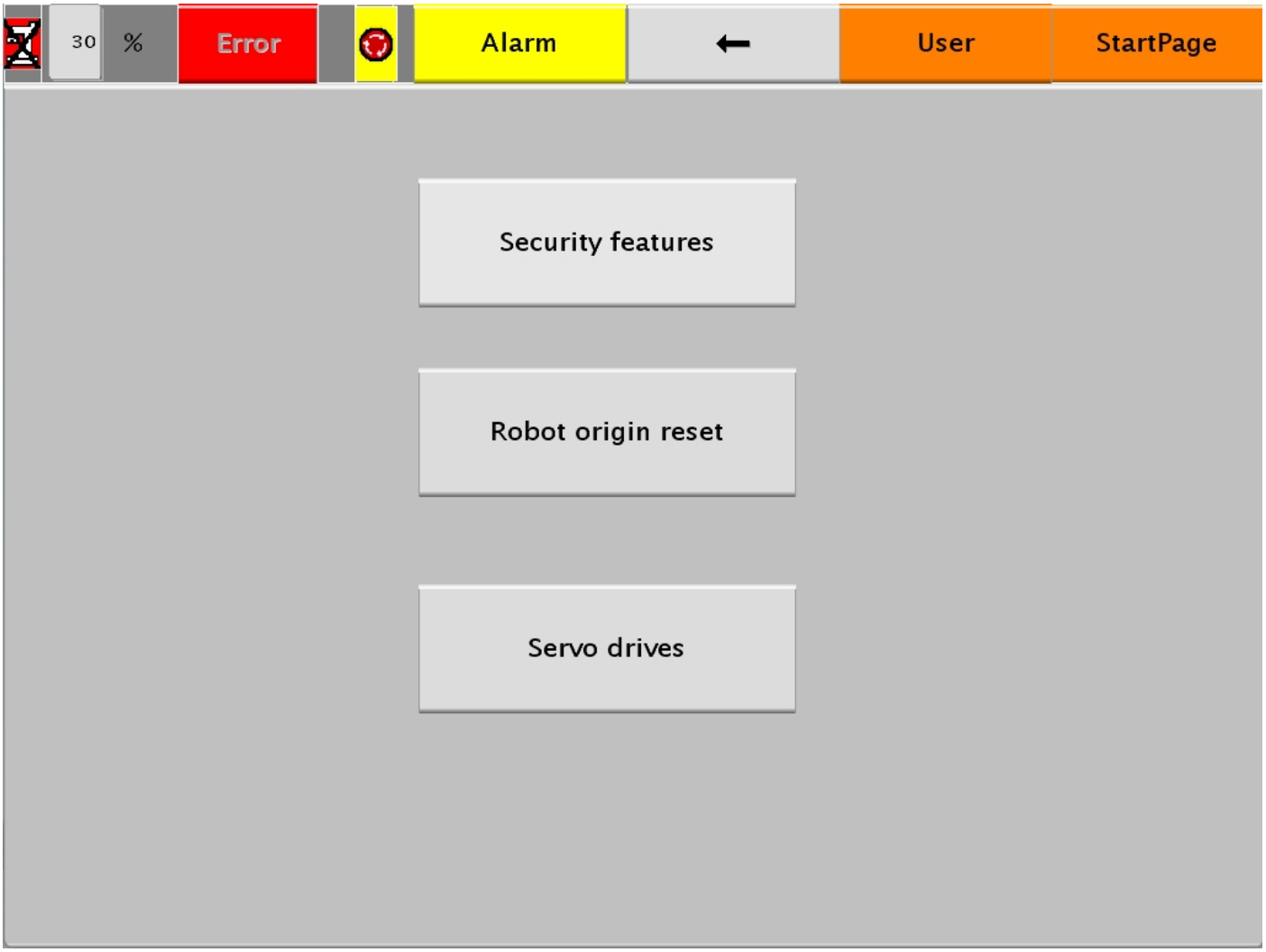

Figure 22

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A、 Security features

Click " **Security features** " and check the required settings according to the actual situation. This is shown in **Figure 23** below.

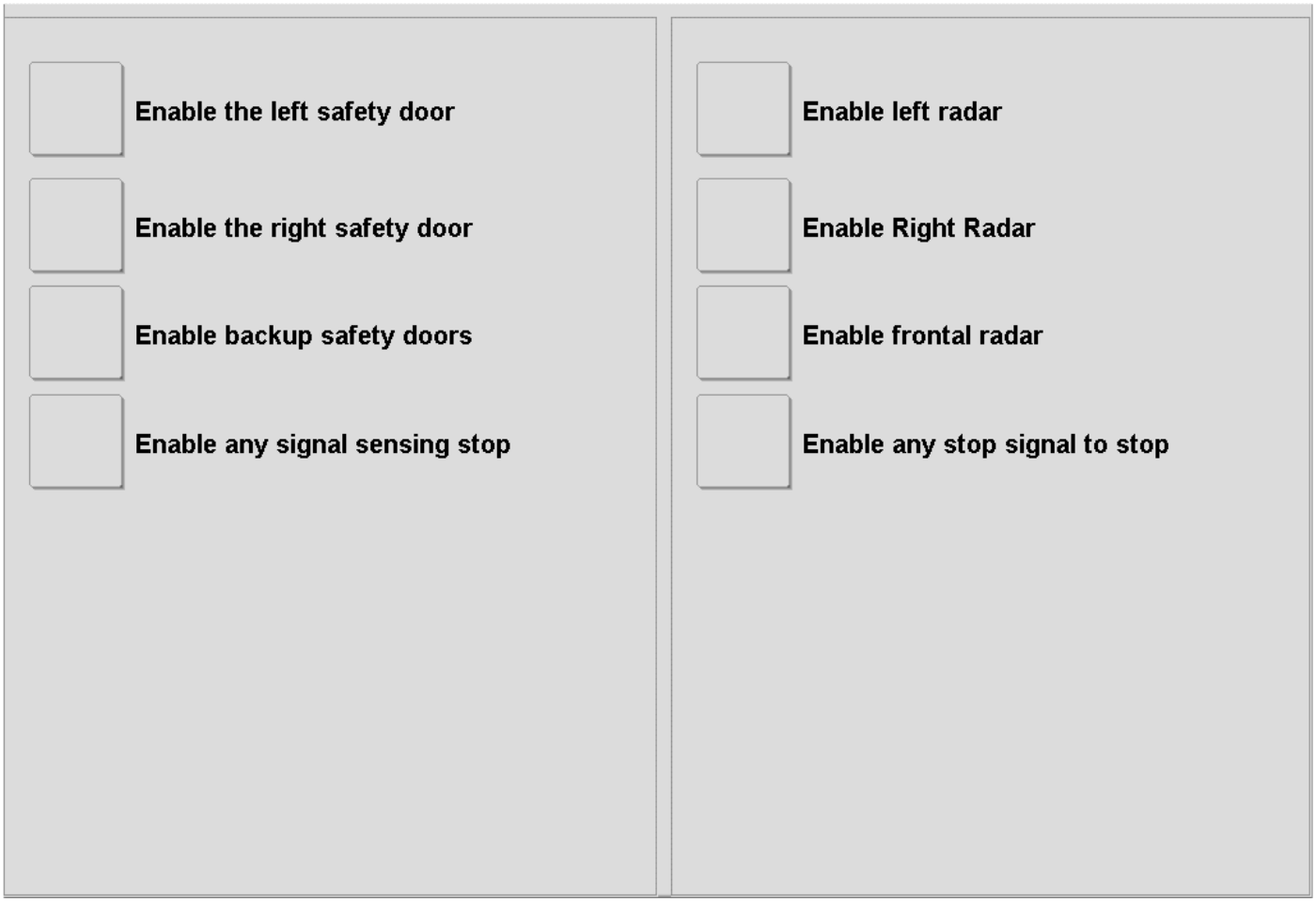

Figure 23

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B、Robot origin reset

Click " **Robot origin reset** " to bring up the screen shown in **Figure 24** below.

Enter the password: pass1.

Select the corresponding joint axis to **"clear"** the operation.

There are five-axis robot and six-axis robot. If it is a 6-axis robot, axis 1, 2, 4 and 6 are shown in **Figure 25 and 27**, use the moving tool " **Axes Jog** " to align the grooves corresponding to the upper axis and click clear. For axis 3 and 5, as shown in **Figure 26 and 27**, it is necessary to click clear on the grooves corresponding to the axis first, then rotate the grooves of the corresponding axis and click clear again at -90 degrees (you can view the rotation Angle at the point robot (**Figure 10, Area 2**)).

Note: Please check with the merchant before applying this operation.

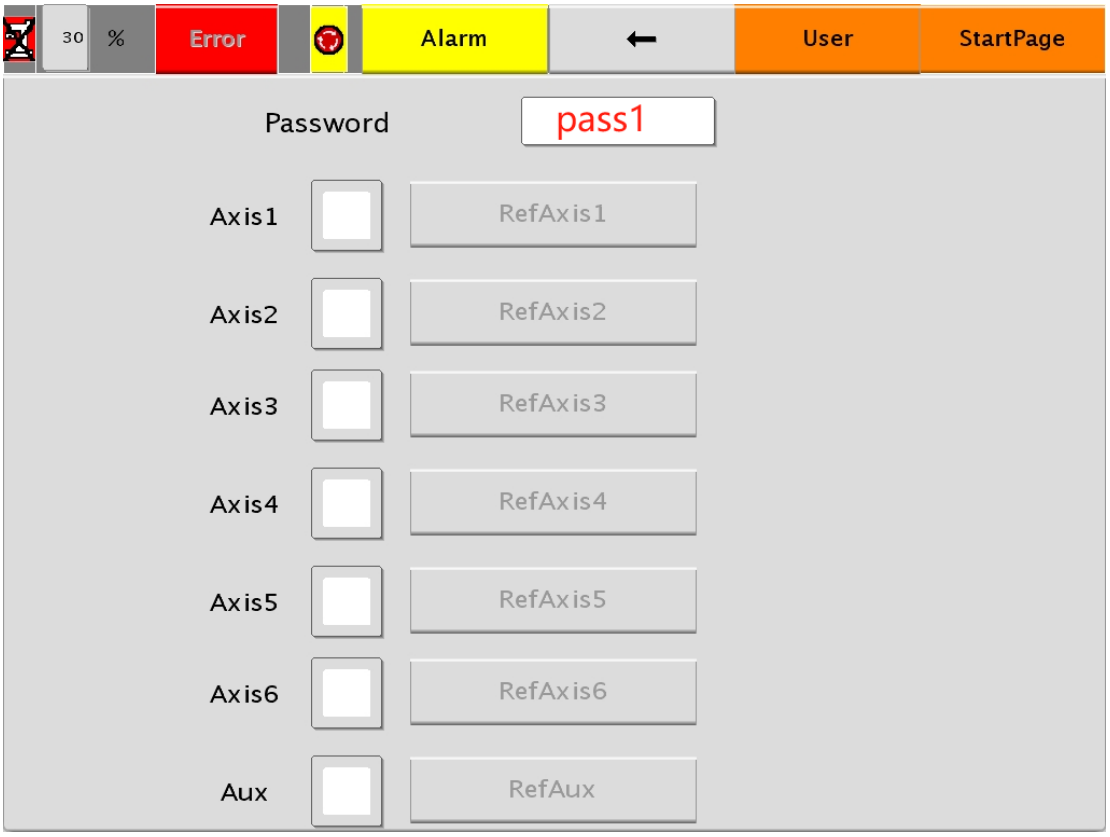

Figure 24

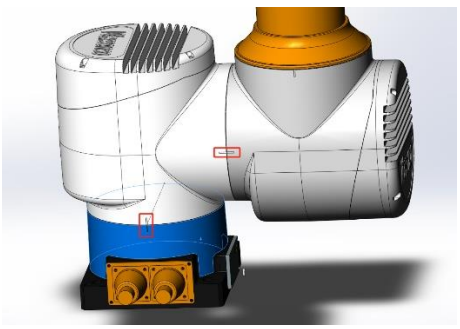

Figure 25 Axes 1 and 2

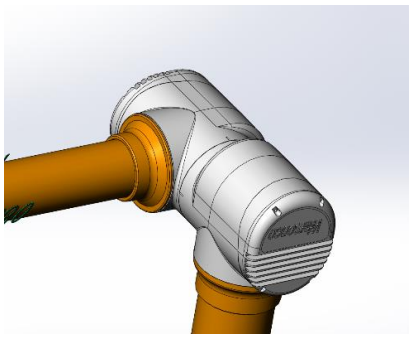

Figure 26 3-axis

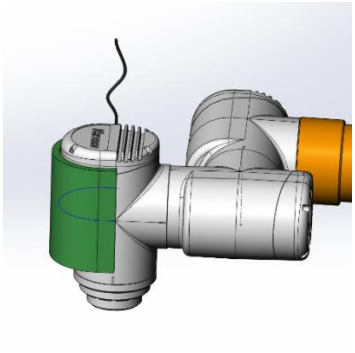

Figure 27 Axes 4 and 5

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C、 Servo drives

Click " **Servo drives**" to bring up the screen shown in **Figure 28** below.

Note: Please check with the merchant before using this option.

Figure 28

Figure 29

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3.3. Pallet Setting

（1）Click " **Pallet Setting**" in the main interface, and the screen shown in **Figure 30** below will pop up.

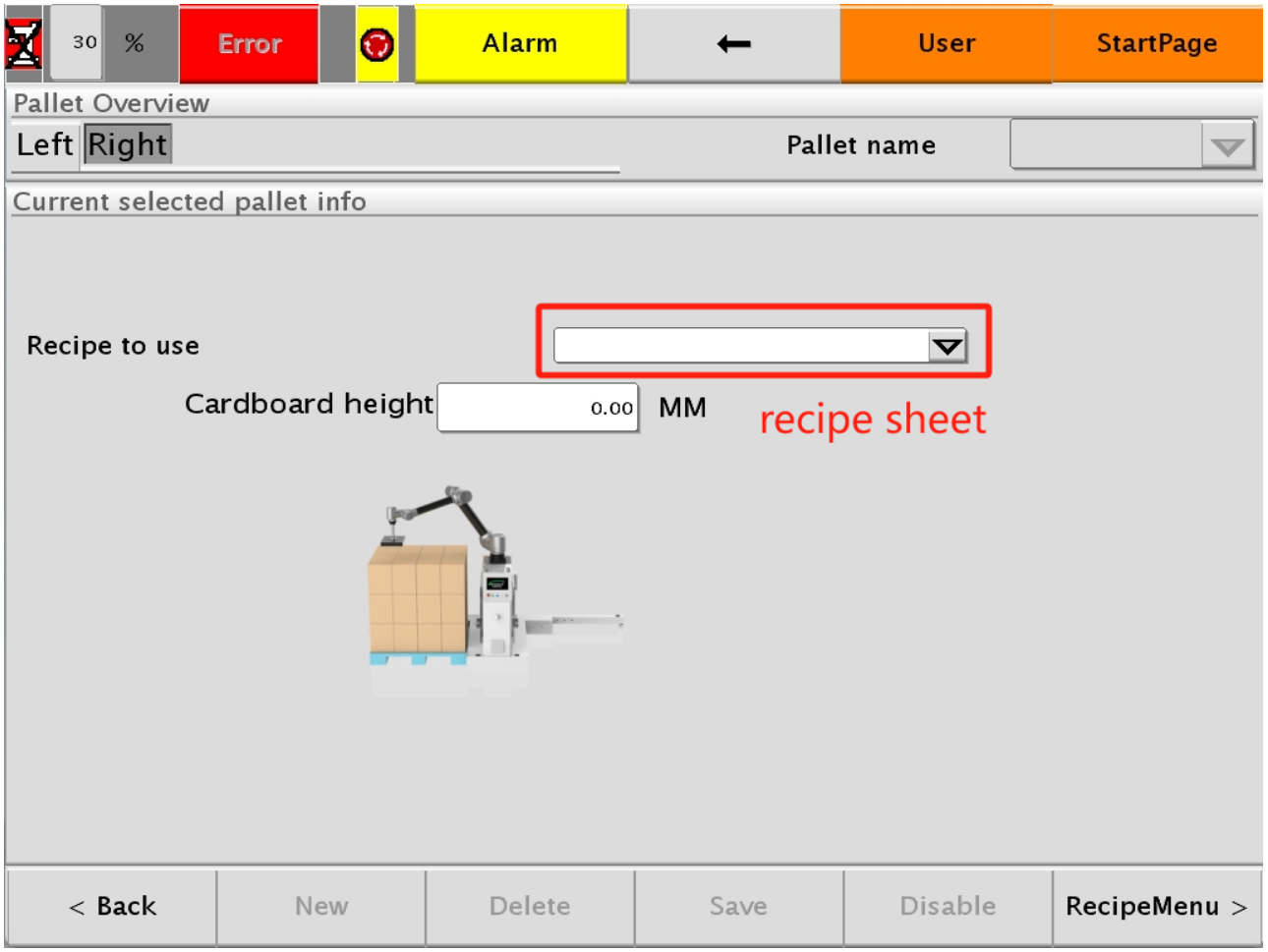

Figure 30

Set the " **Cardboard height**" according to the actual pallet thickness.

If a recipe already exists, you can select the desired recipe in the recipe table.

The left and right pallets can choose the same recipe or different recipes, and if you need to return to the previous interface, you can directly "**Back**".

If a recipe already exists and you want to modify it, go to " **Recipe Menu**" to modify and create a recipe.

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（2）Click " **Recipe Menu** " to enter the following **figure 31.**

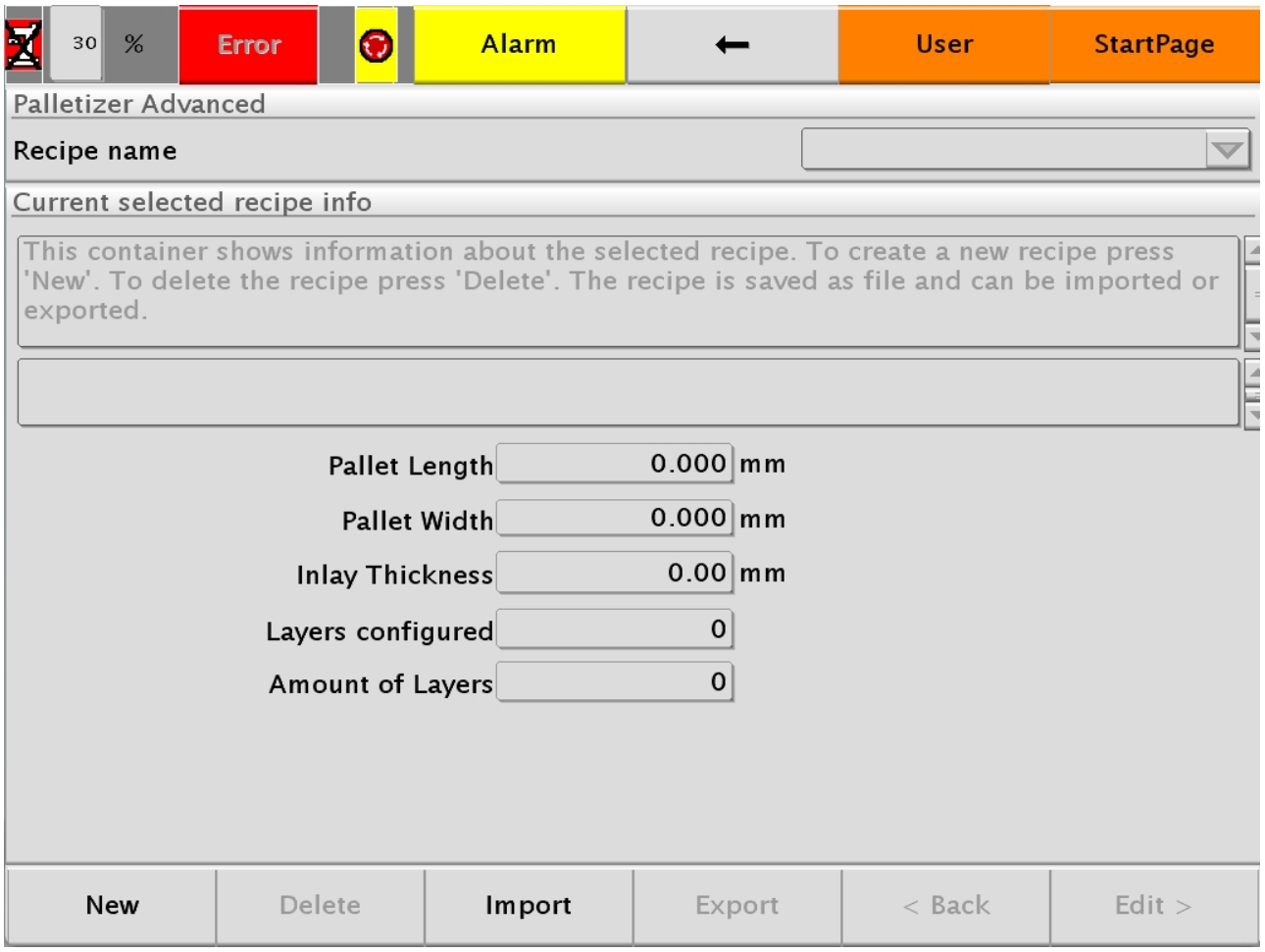

Figure 31

1、On this page, the user can see the information of " **Pallet Length, Pallet Width, Inlay Thickness, Layers configured, and Amount of Layers ".** Users can set and modify these parameters through **"Edit"**.

2、The user can select the recipe name in the current recipe information list to **"edit, delete, import, export"** action.

3、If you need to create a new recipe, you can click **"New"**, and then click "Edit" to finish the recipe setting.

4、Import: Users can import recipes from USB flash drive.

5、Export: Export the system recipe to USB flash drive.

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（3）Click **"Edit"** to bring up the pop-up shown in **Figure 32** below.

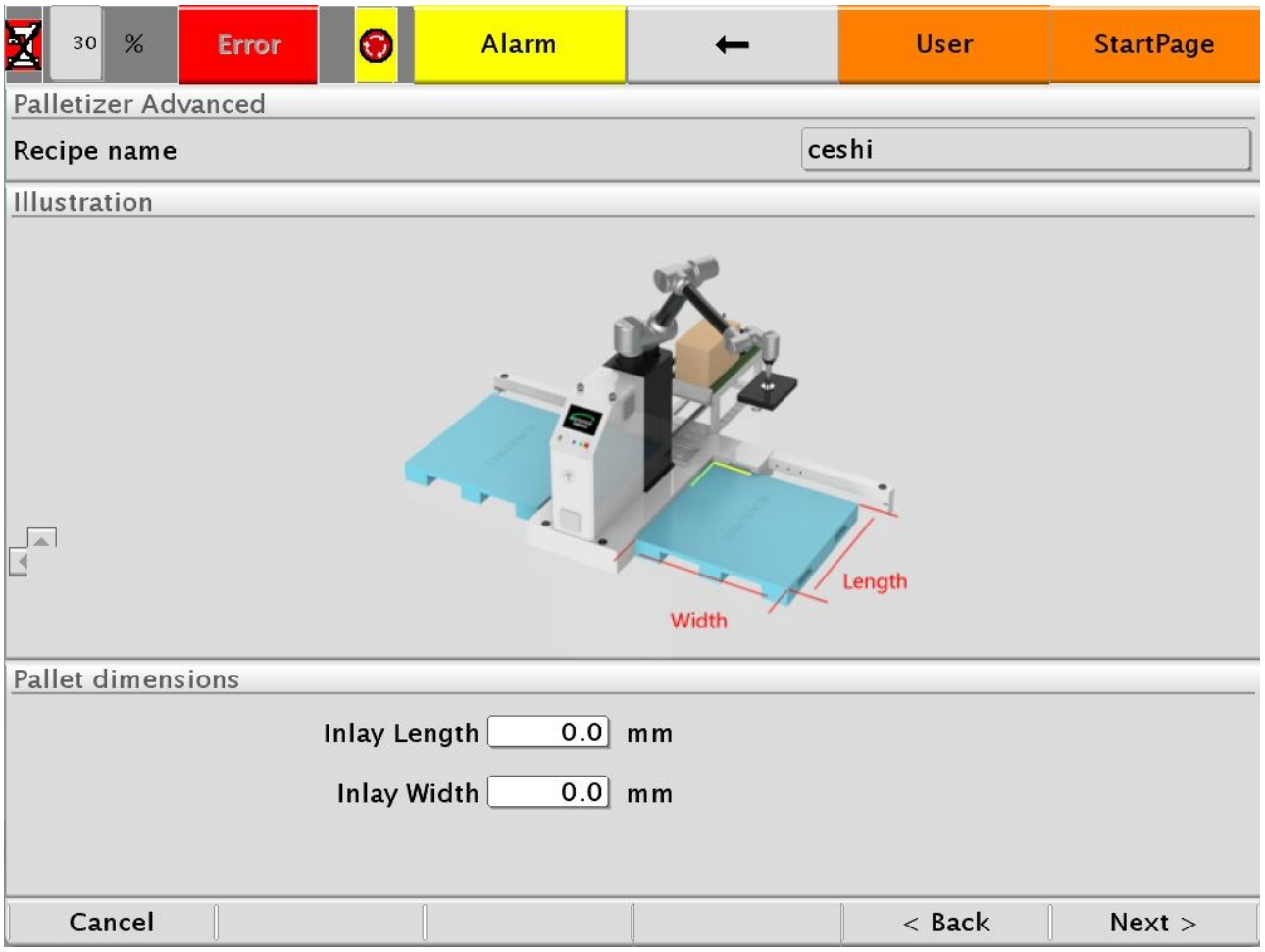

Figure 32

According to the above figure, according to the current use of the actual cardboard size of the code plate length and width are entered into the corresponding size data.

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（4）Click **"Next"** pop-up as shown in **Figure 33** below.

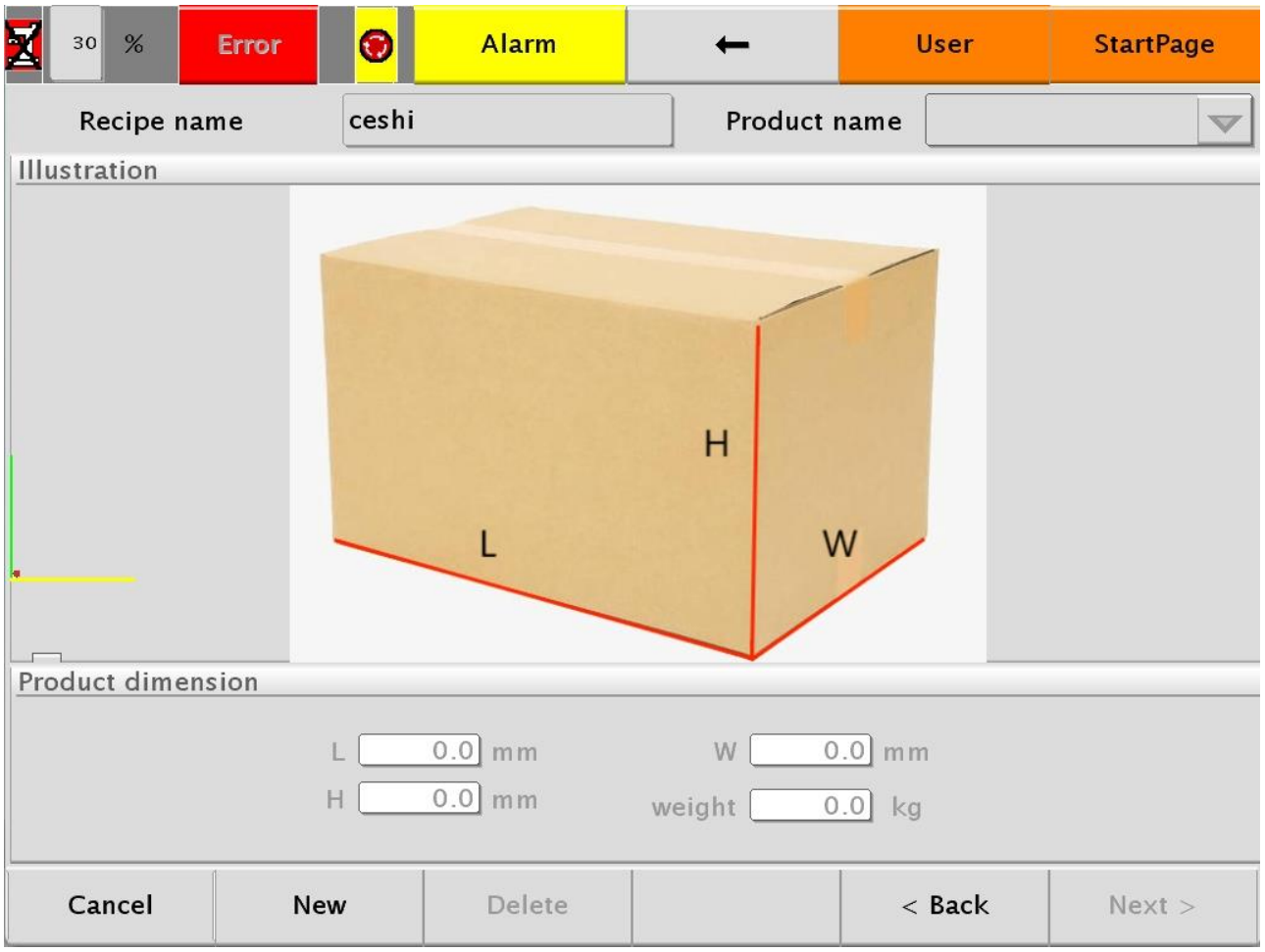

Figure 33

A recipe name corresponds to a box name, if there is no box click **"New"** to create a new box name and enter the box size into the corresponding location. **Note: The weight of the box must be filled in according to the actual situation and cannot be zero.**

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（5）Click **"Next"** pop-up as shown in **Figure 34** below.

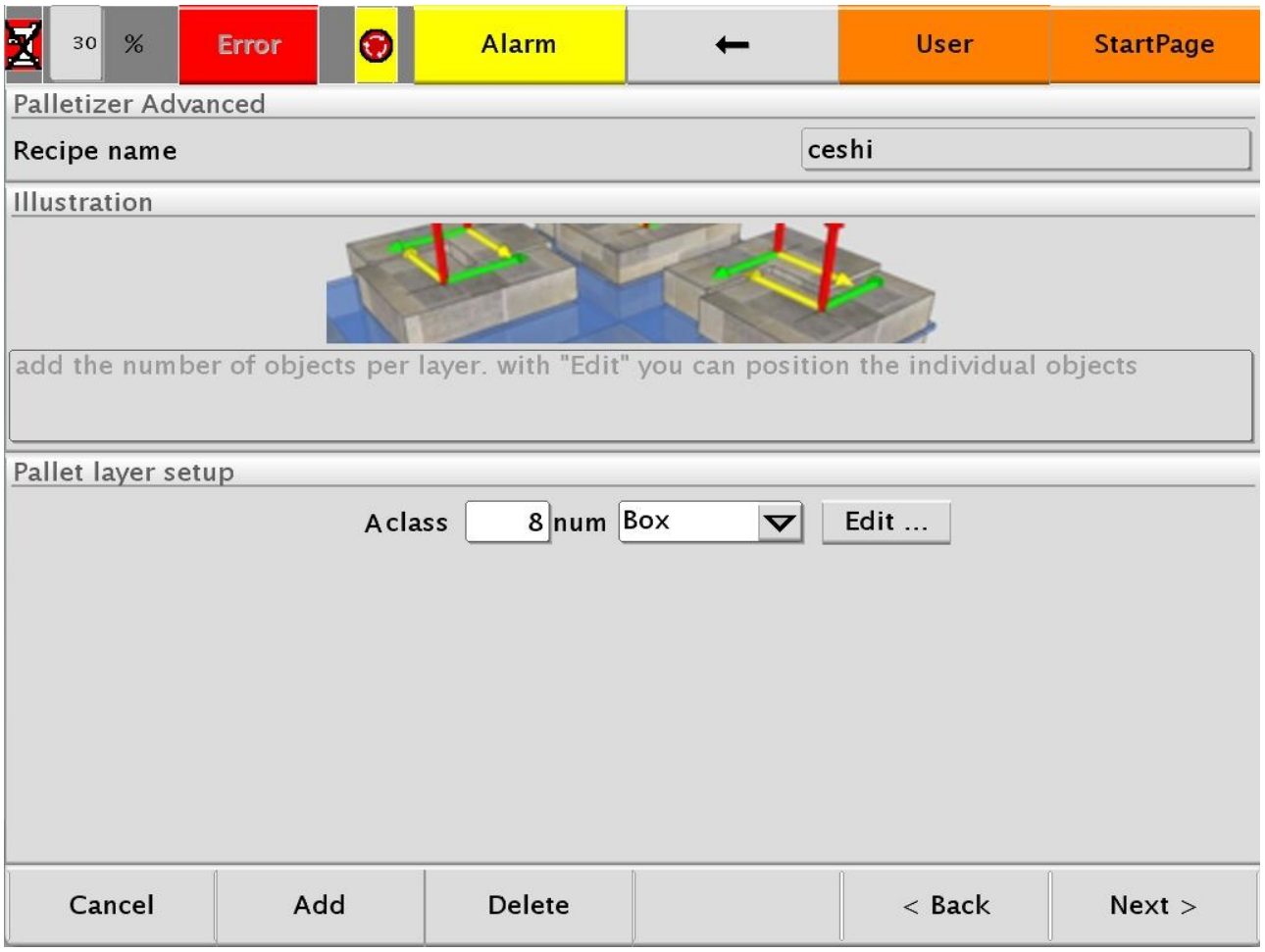

Figure 34

This page allows you to set the number of pallets in a single layer and the palletizing method in a single layer. The user can create multiple types according to the actual needs, by clicking on **"Add"** and then on **"Edit"** the current type can be laid out. The following **figure 34** shows this.

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（6）Click **"Edit"** to pop up as shown in **Figure 35** below.

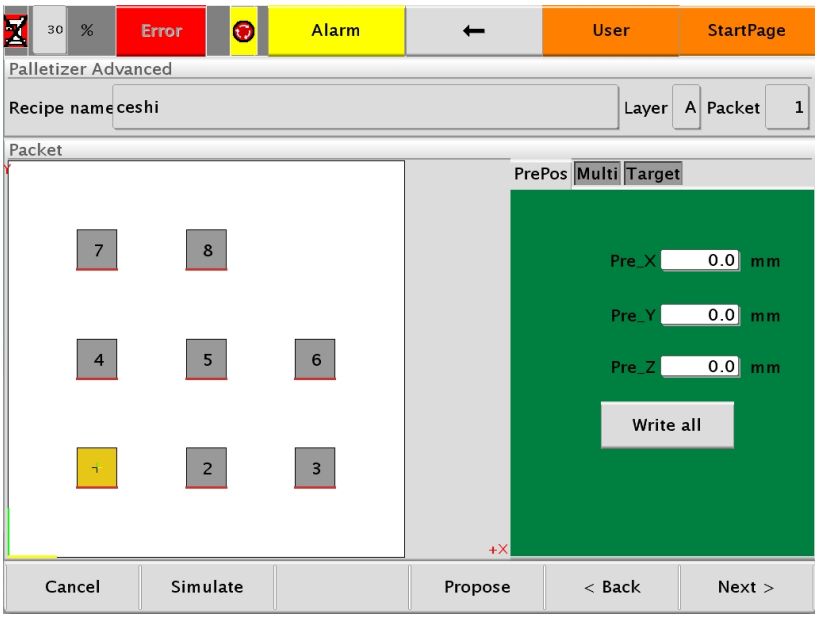

Figure 35

As shown in **Figure 33** above, the white area is the code disc area we are currently using, and the gray rectangular box represents the box. We can manually drag the box to achieve the position we want to place the box to avoid overlapping and exceeding the white area, or we can click **" Propose "** to quickly sort, and we can also select the box to modify the values of **" Pre_X "**, **" Pre_Y "** and **" Pre_Z "** through **"PrePos"** to optimize the placement of the box.

" PrePos " refers to the previous point of the placement point, the purpose of setting the **" PrePos "** is to avoid the box from colliding with adjacent boxes when it is placed, so it is adjusted at the previous point of the placement point, **" Pre_X "** is to adjust and move in the direction of the X axis, **" Pre_Y "** is to adjust and move in the direction of the Y axis, and **" Pre_Z "** is to increase the height in the positive direction of the Z axis.

After the boxes are placed, you can use **"Simulate"** to simulate the actual placement and order of the boxes.

Can also click **"Multi "** to place the boxes for specific needs, as shown in **Figure 36** below.

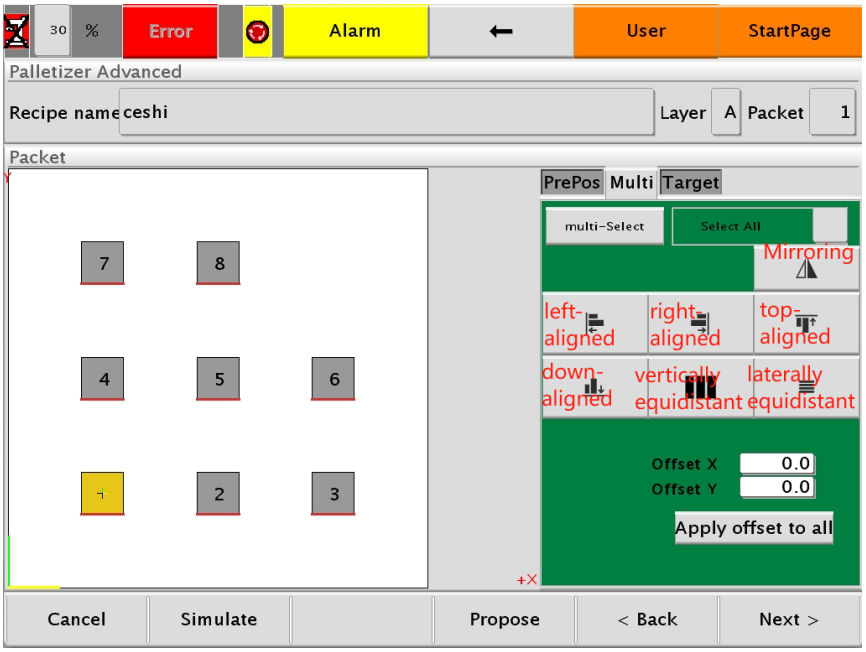

Figure 36

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Can also select **"Target "** to view the coordinates corresponding to the box, as shown in **Figure 37** below.

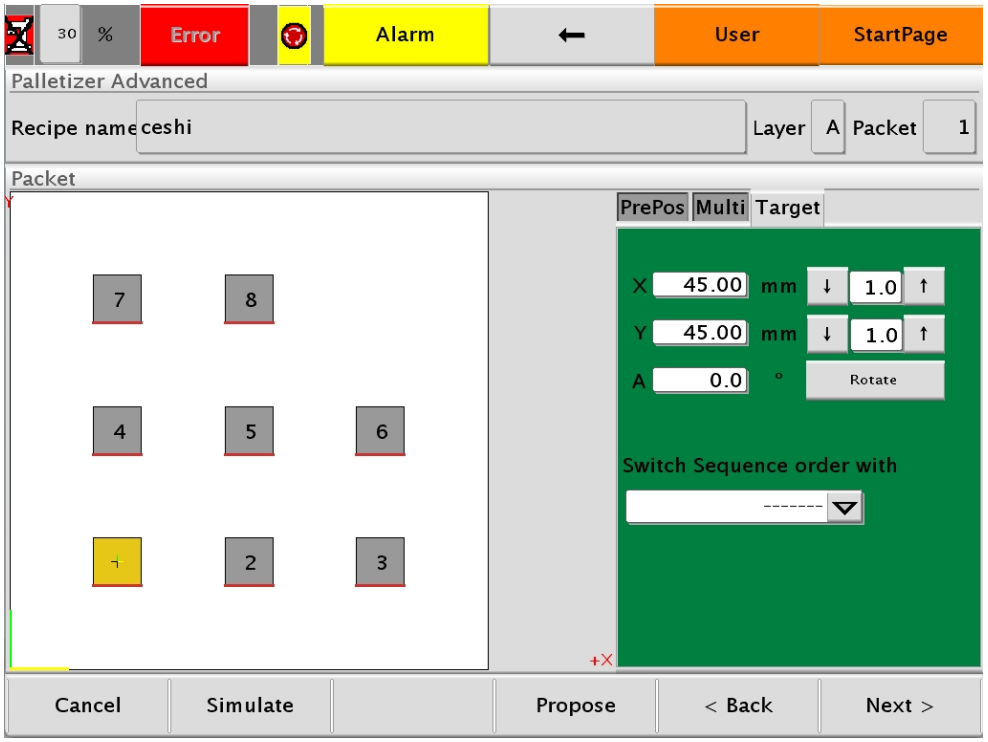

Figure 37

After the above figure is arranged, if you need to arrange another type, click **"Back"**, create a new one, and repeat the previous operation; If you do not need to continue clicking **"Next"** as shown in **Figure 38** below, select the palletizing recipe for each layer.

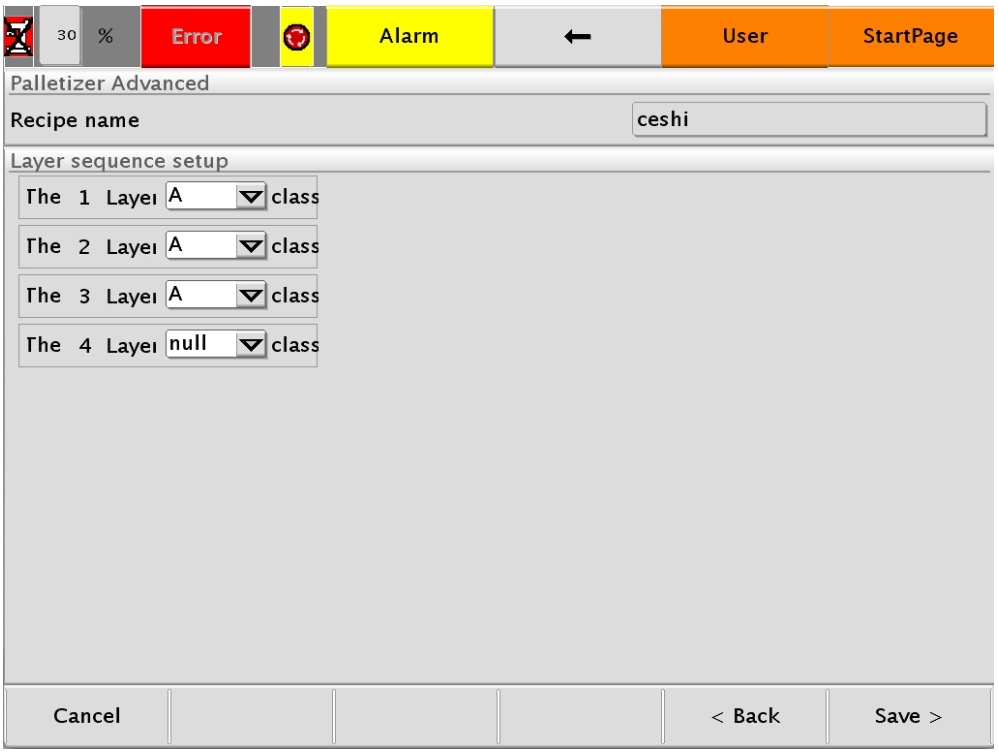

Figure 38

Click **"Save"** to complete the current recipe settings.

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