Pally Software Tutorial

This Tutorial is based on Pally version 2.4.2.1. Other versions may have different steps or different looking screens.

Pally is compatible with all UR models, 3-16. The UR controller must be running a minimum version of Polyscope as summarized below:

CB-series: Polyscope version 3.8 or higher.

E-series: Polyscope version 5.2 or higher.

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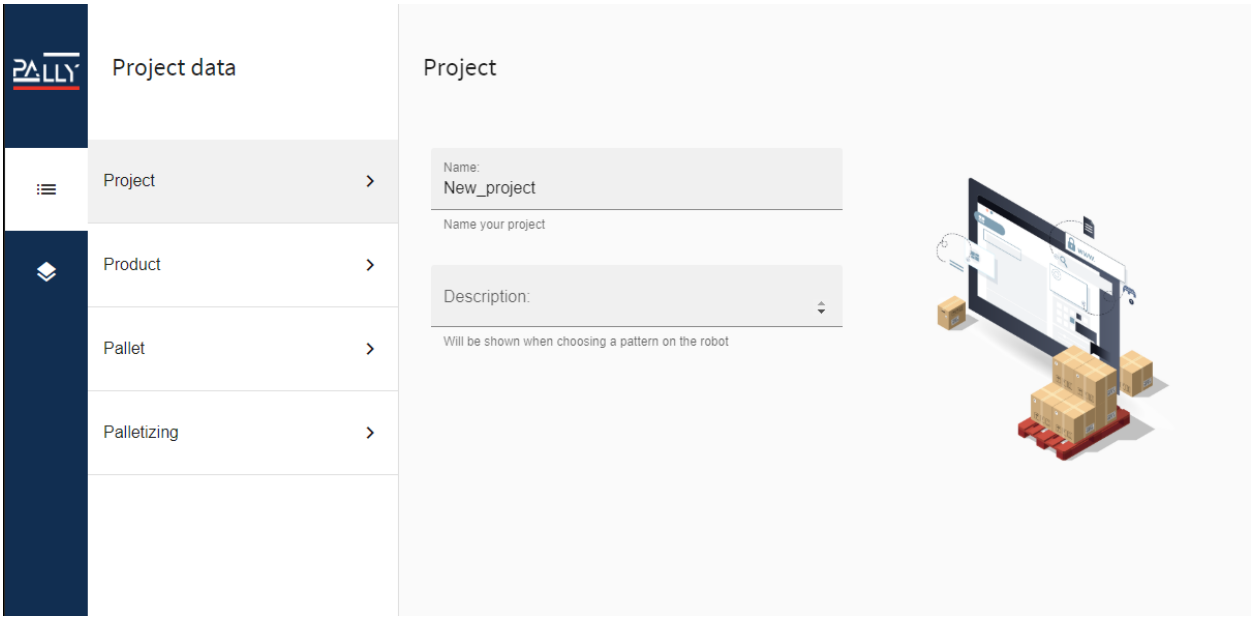
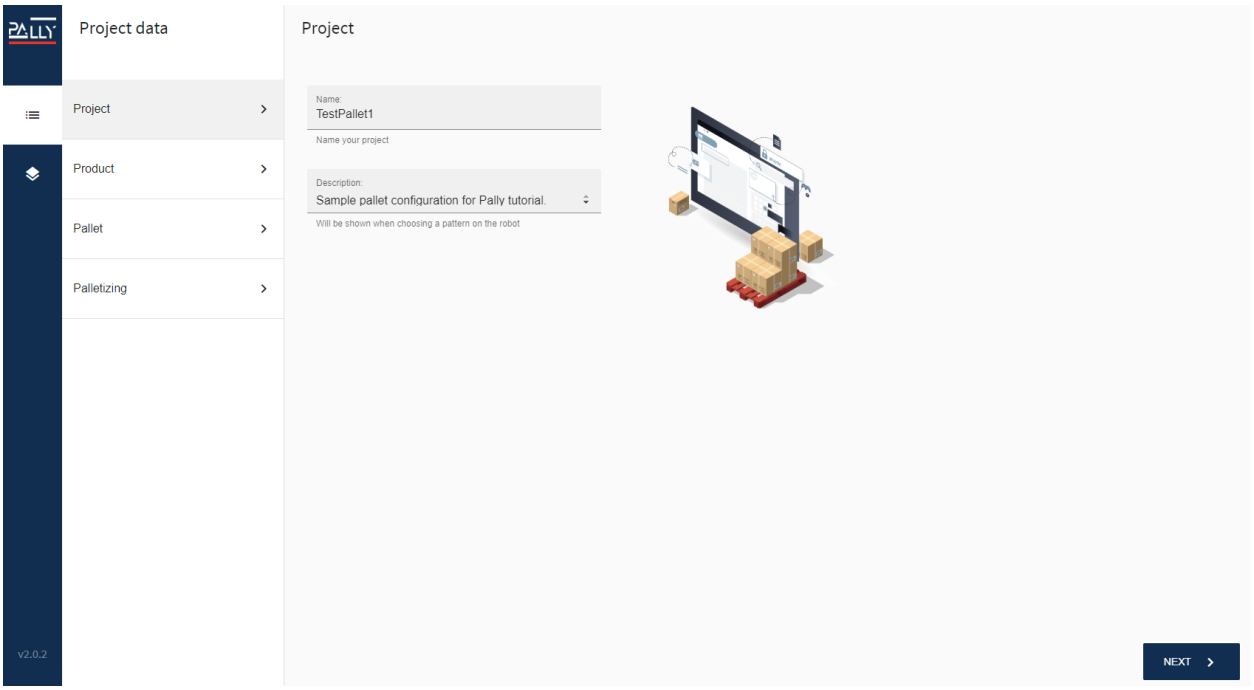
Pally - cloud based software start up and configuration

Step 1 – This tutorial is for configuring Pally and the UR controller to work with the Palletron 3000 hardware. It assumes the Pally and Ewellix UR caps are already installed. If not, see the following links for Pally and Ewellix installation instructions.

Step 2 – Open the Pally software – it should bring you to the Project Data Tab, if not navigate to that tab as shown below.



Step 3 – Give the project a unique name, for this tutorial it's called "TestPallet1". Enter a description if desired.



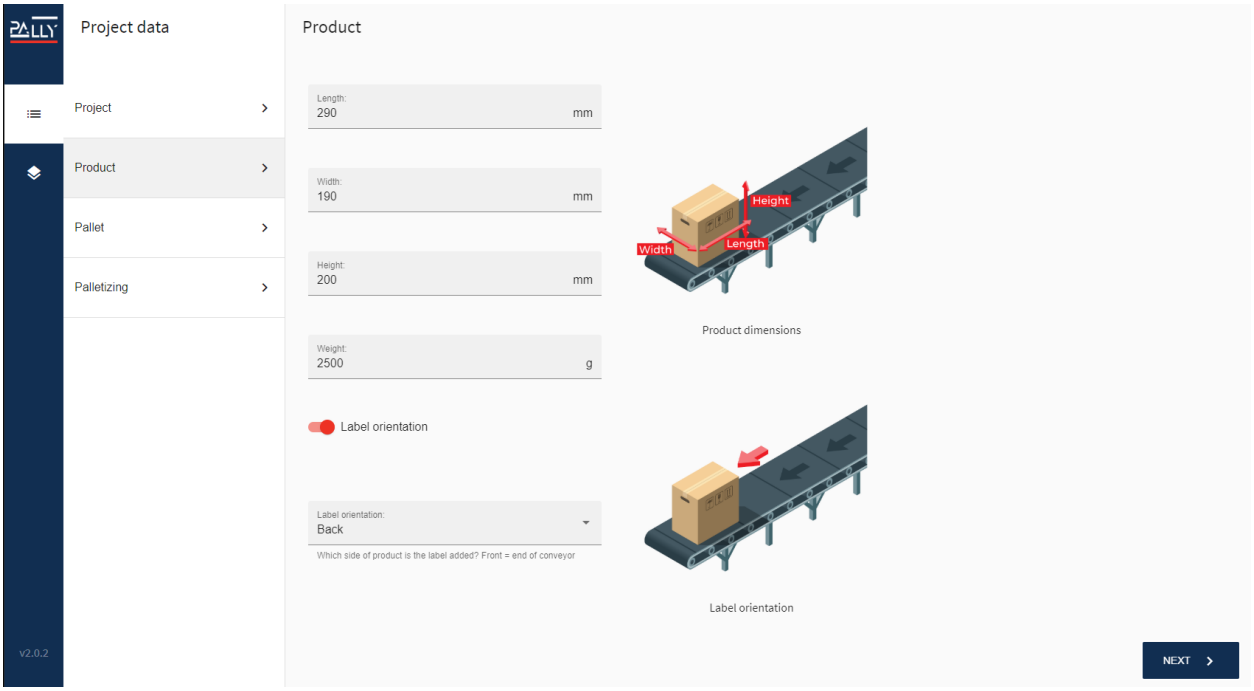
Step 4 – Go to the Product Tab or press next

.

Step 5 – Measure the box being palletized and enter the dimensions in the corresponding length, width, and height field. Make note of the orientation of the dimensions as it sits on the conveyor. It's critical that the dimensions match this orientation as the product is coming down the conveyor. Note: the dimensions are in millimeters

Step 6 – Weigh the box and enter the weight in the corresponding field. NOTE: the weight is in grams.

Step 7 - OPTIONAL: If the label orientation is of interest, move the Label Orientation slider and select the location of the label from the drop down.



Step 9 – If the pallet being used is a standard pallet, select it from the drop down. This will populate the length and width dimensions. If the pallet is non-standard or doesn't show in the dropdown, fill in the length and width manually. NOTE: these dimensions are in millimeters.

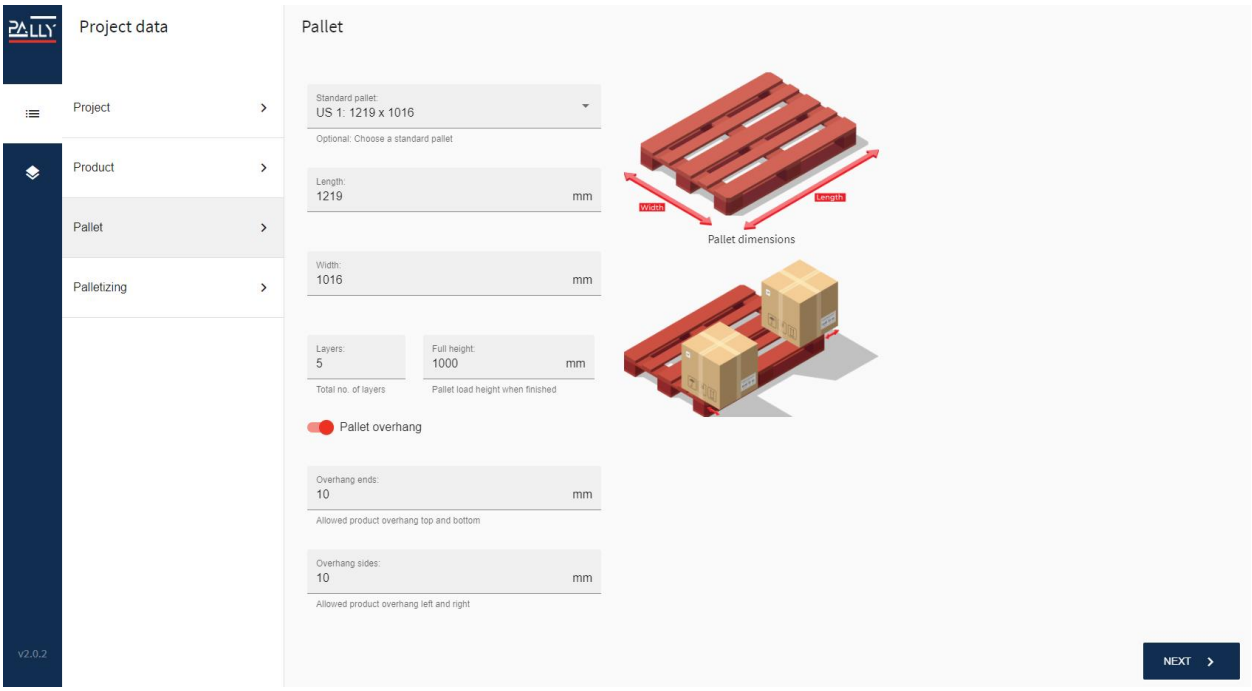
Step 10 – Select the number of layers being palletized, this is the number of boxes in the vertical direction.

Step 11 – Fill in the full pallet height or the number of boxes in the vertical direction (layers). If entering the height, this is only the height of the boxes and does not include the height of the pallet off the floor. If the number of layers is filled in, the full height will automatically be populated. If the full height is entered, then the number of layers is automatically populated.

NOTE: the full height dimension is in millimeters

Step 12 – OPTIONAL: if the boxes are going to overhang the edges of the pallet, select the pallet overhang slider. Enter the overhand amount on the sides and ends as shown in the picture. The software will not detect if the overhand value entered will cause the box to fall. For example, if the length of the box is 200 mm and the overhand value in this direction is entered as 150 mm, the box will fall off the pallet. Make sure the value entered makes the box stable when palletized.

NOTE: These dimensions are in millimeters.



Step 13 – Select the Palletizing tab or press next

.

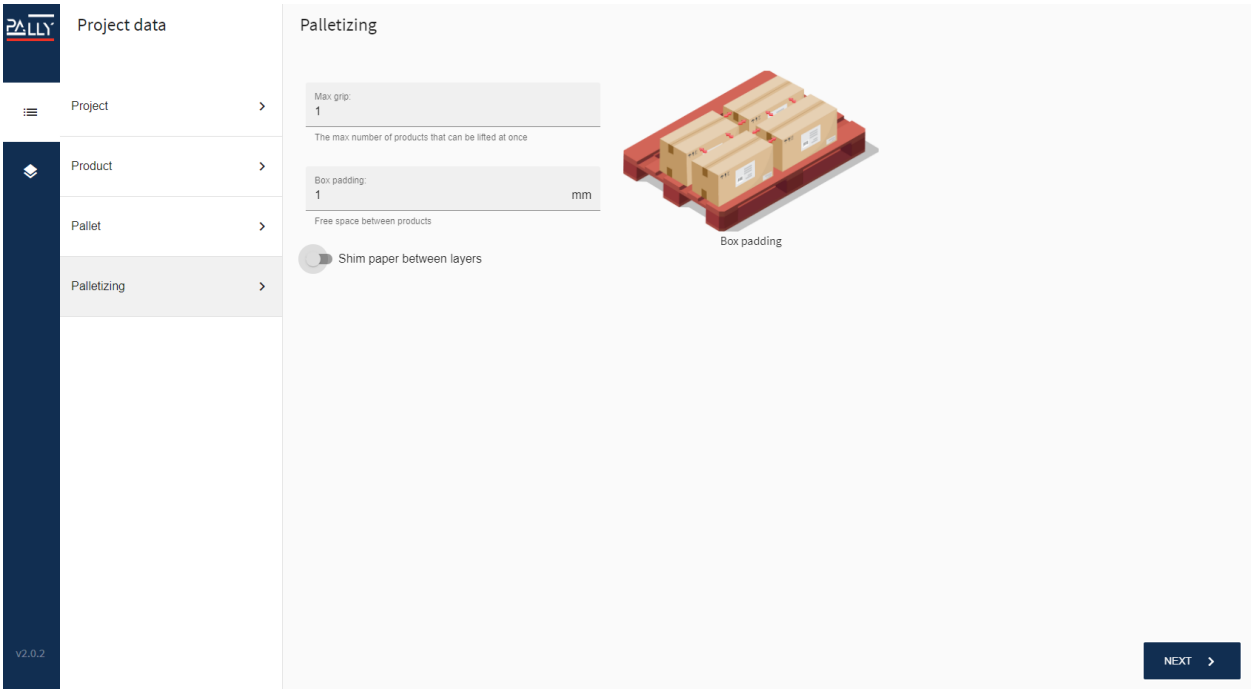
Step 14 – Select the maximum number of boxes to be gripped at once – for this example it is 1.

Step 15 – Enter the value for box padding. Box padding is the amount of space to be left between boxes. It's recommended to leave a little space, so for this example we will leave 1 mm. This value can be increased if needed or desired.

NOTE: This dimension is in millimeters.

Step 16 – OPTIONAL: Select whether or not there are shim papers between layers. If there are, enter the height of the paper in mm. For this tutorial there is no shim paper.

NOTE: This dimension is in millimeters.



Step 18 – This will bring up the pallet stacking method and provide a visualization of what the pallet stack looks like. On the left will be the different options for stacking methods. If using a simple stacking method, select a preconfigured method.

Column Stack – all of the boxes are right on top of one another in the vertical (column) direction.

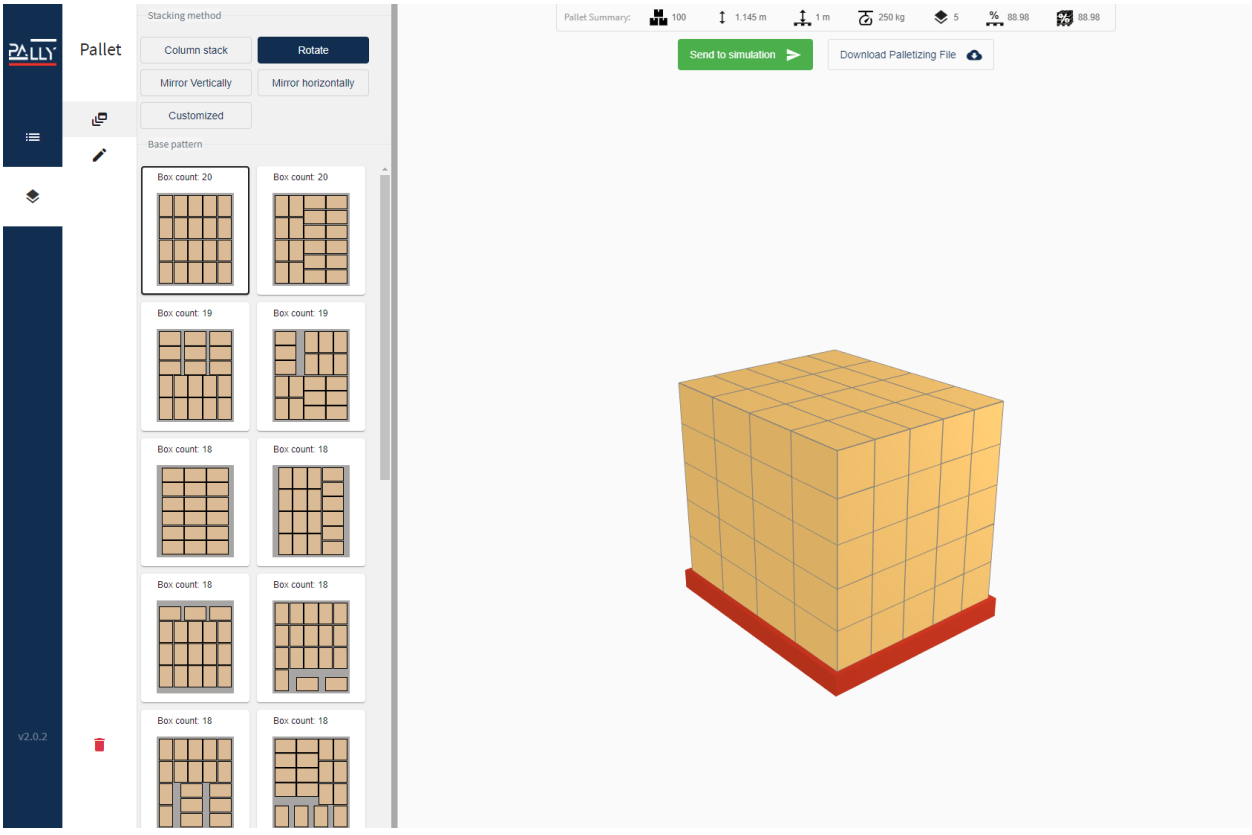
Rotate – each layer is rotated 180 degrees from the previous layer

Mirror Vertically – every other layer is mirrored on the width side of the pallet.

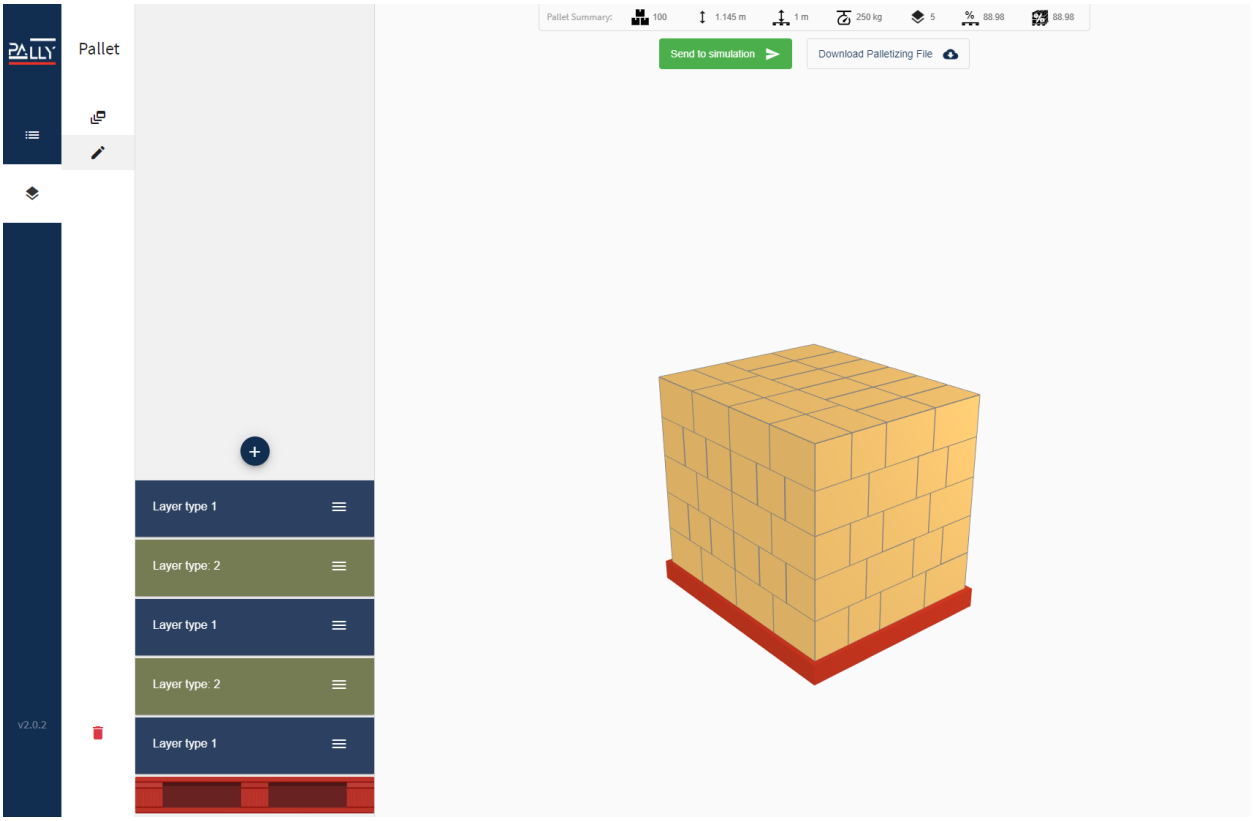
Mirror Horizontally – every other layer is mirrored on the length side of the pallet.

Customized – edit each layer individually (skip to step 19a)

Except for the custom option, each stacking method will present base pattern options that will work with the given box dimensions. For each different stacking method and base pattern combinations, the software will show the pallet summary which includes the number of boxes, the pallet height (this includes the height of the pallet itself, the load height (height of just the boxes), total pallet weight, the number of layers in the vertical direction, the layer efficiency (ratio of boxes to empty space), and the cube efficiency (ratio of the boxes to empty space for the entire stack).

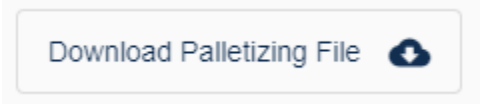


Step 19 – Once a preconfigured method and base pattern is selected, click on the reorder sub tab, shown with the pencil icon .



Step 20 – On this tab each layer can be moved (drag and drop), layers can be added (+ sign), or individual layer configurations and patterns can be edited. Modify each layer if needed.

Step 21 – Once the pallet has been configured and customized as needed, press Download Palletizing File.



This will download the JSON file the directory the web browser stores downloaded files. The file will have the naming convention projectName.json. In this case it is TestPallet1.json.

Step 22 – Retrieve this file and save it to a USB flash drive. The flash drive needs to be configured such that the main directory has the .json file and the "urmagic_upload_pattern.sh" file. Do not put either of these files into a folder. Once this USB stick is plugged into the UR controller, the files will be created and stored in a folder named "patterns on the controller.

Using the Pally output on the Palletron3000

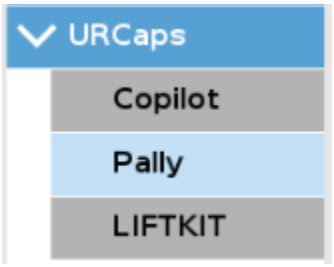
This section of the tutorial begins the instructions for palletizing on the UR controller. It will require a calibration box of known length, width, height, and weight.

Step 23 – On the UR pendant, start a new, empty program.

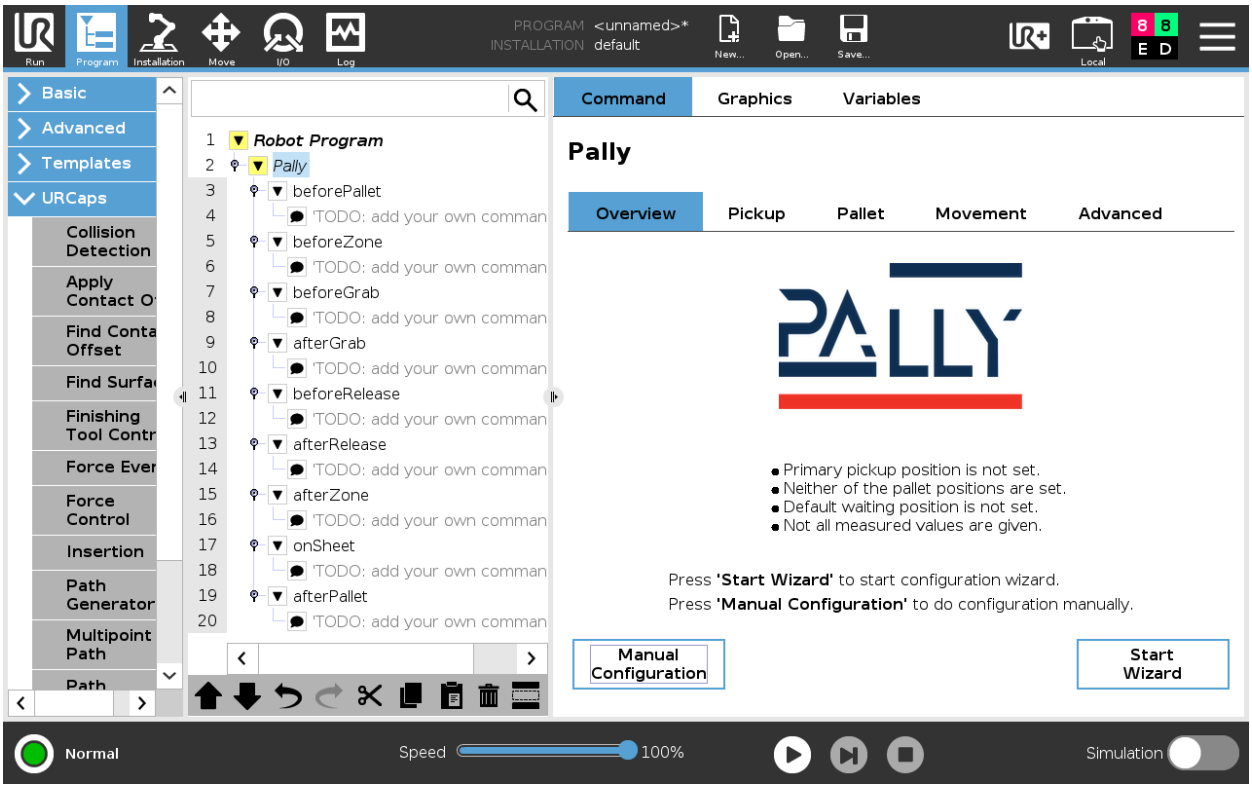
Step 24 - Select Program

in the upper left.

Step 25 – On the left-hand side, expand UR Caps and select Pally



Step 26 – Make sure the command and overview tabs are selected, and the screen should look like this.

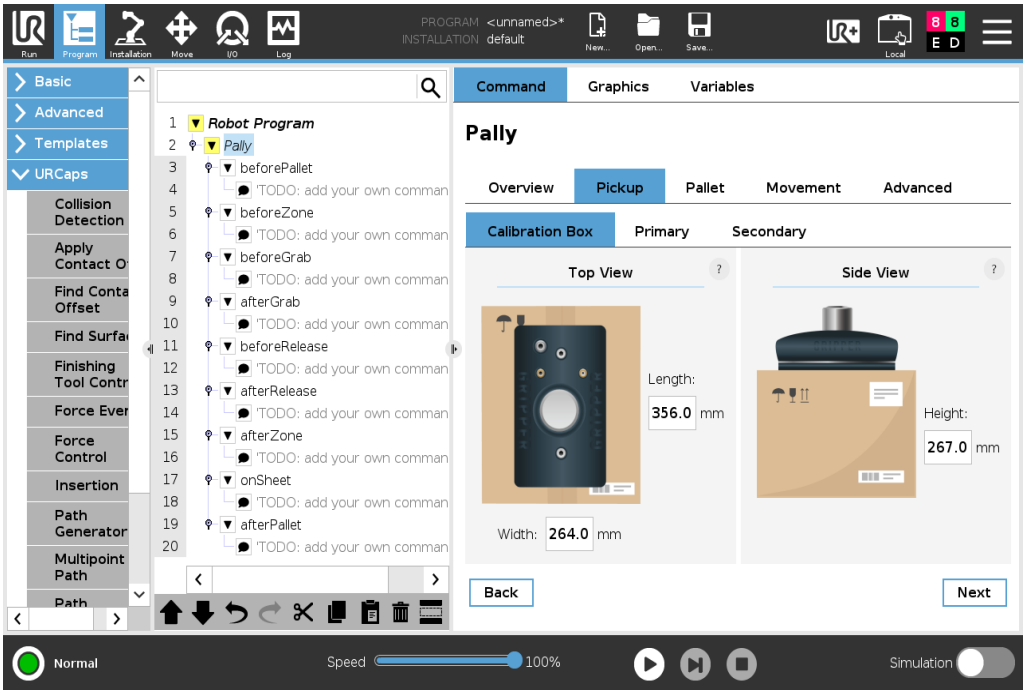


Step 27 – Select start wizard

in the lower right-hand corner of the screen.

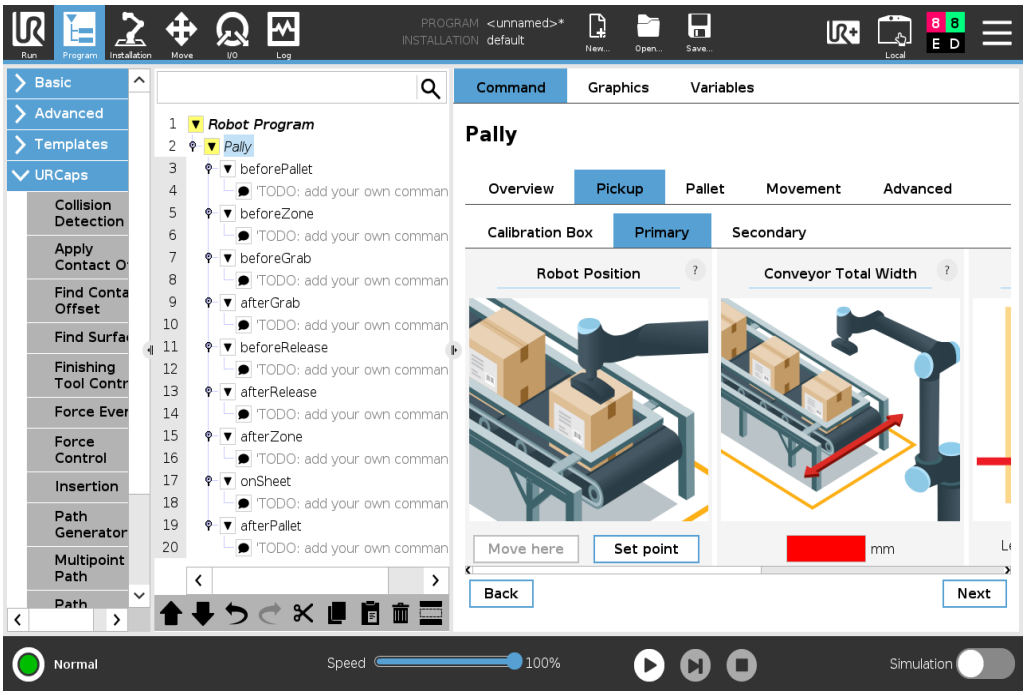
Step 28 – Enter the Length and Width as viewed from the top and the height as viewed from the side.

NOTE: these units are in millimeters. Press next



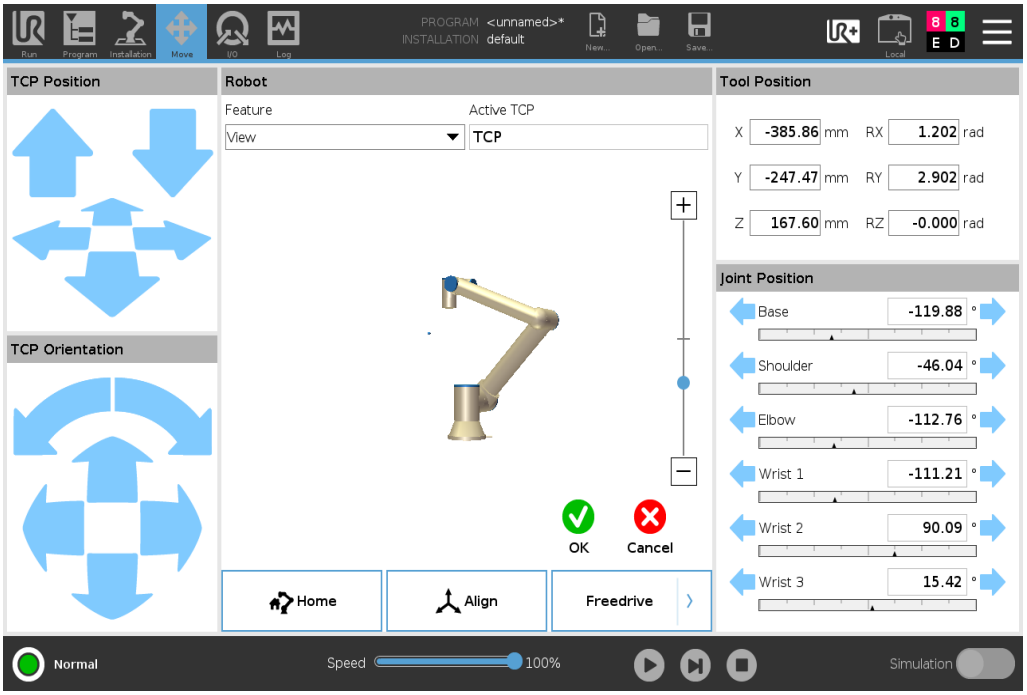
Step 29 – Now the location of the box on the primary conveyor will be configured. First, select set

point to set the position of the arm when picking a box from the conveyor.

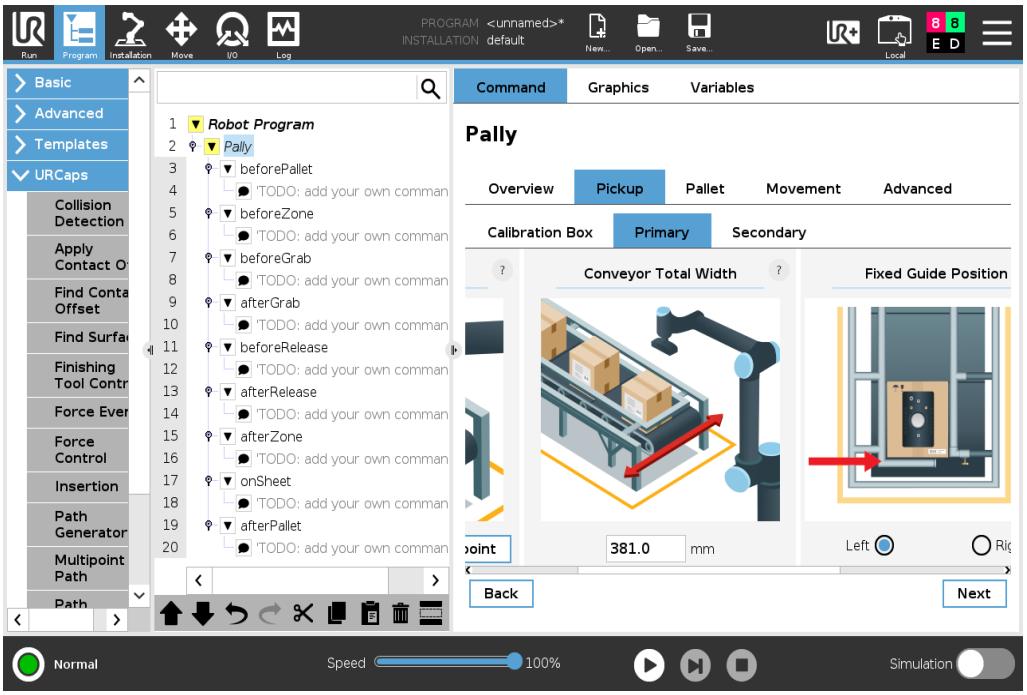


Step 30 – Either use free drive or the manual controls to position the arm and gripper. Once the robot is in position, press ok

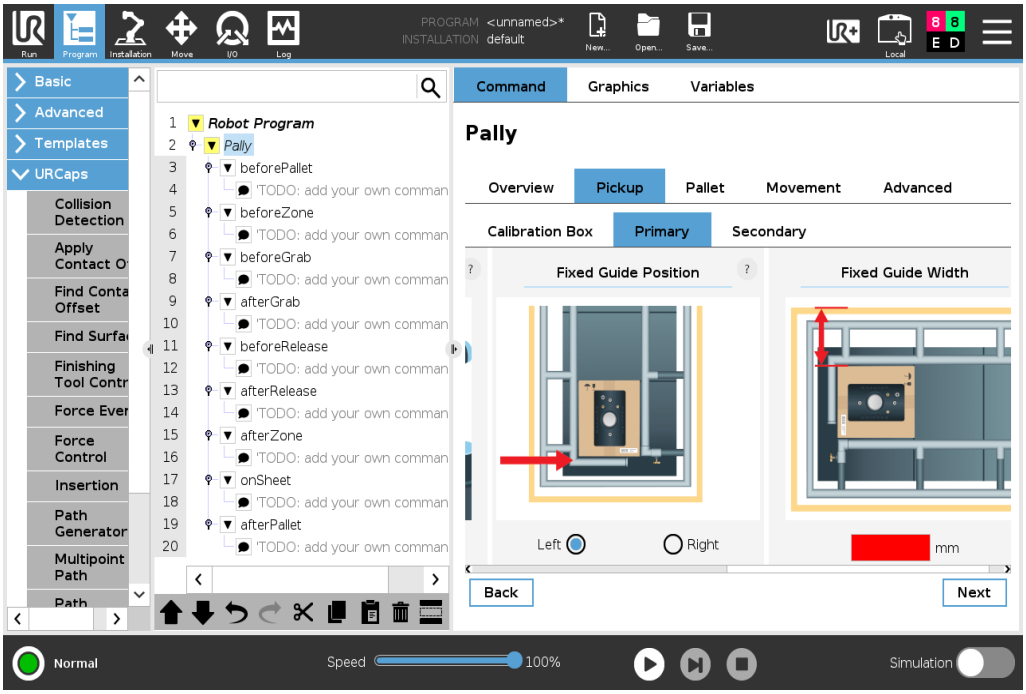
to save the location.



Step 31 – Next, enter the total width of the conveyor. This is the width of the conveyor outside to outside, including the supports, not just the part that moves.

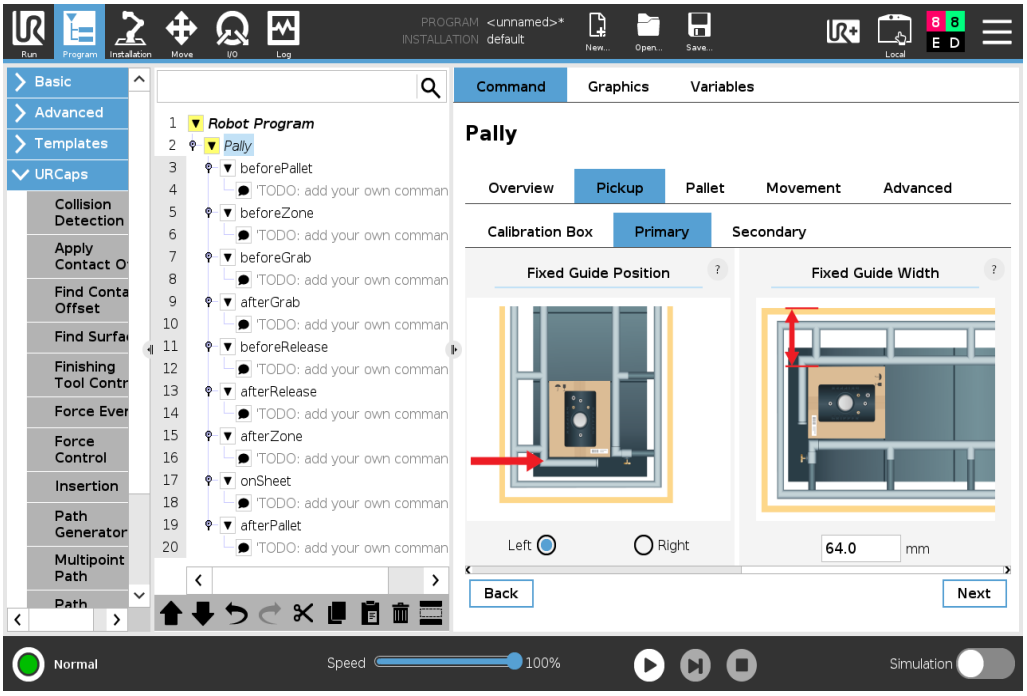


Step 32 – Select if the fixed guide is on the left or right side of the conveyor.



Step 33 – Measure and enter the distance from the outside of the conveyor to the edge of the box when it hits the guide.

NOTE: These dimensions are in millimeters.



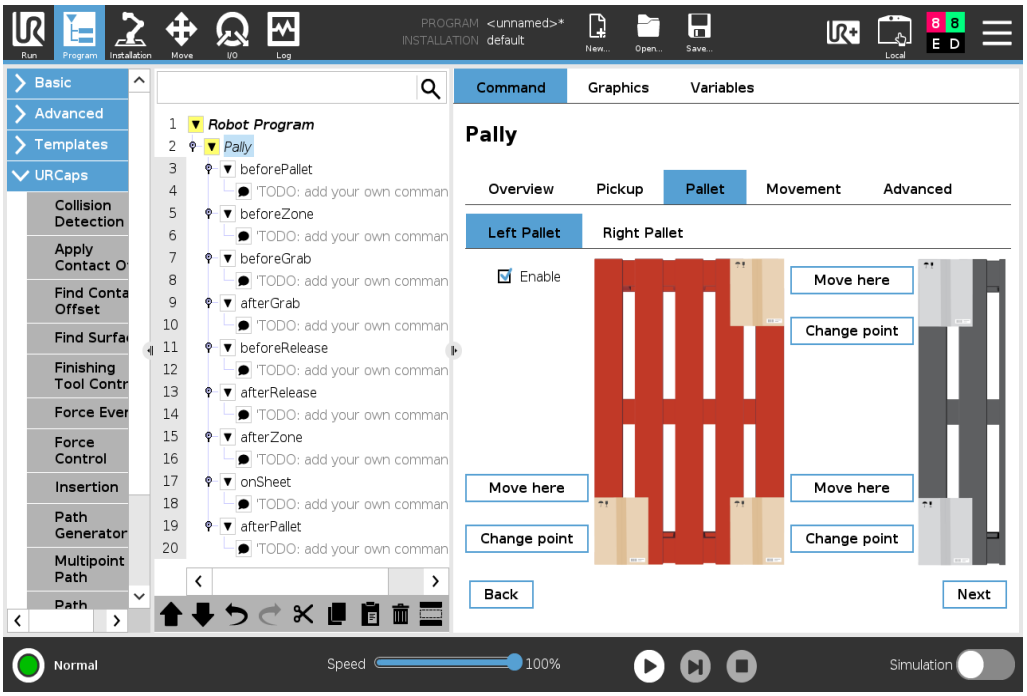
Step 34 – Press next

.

Step 35 – If using a secondary conveyor, repeat steps 29-34 for the second conveyor. Otherwise click next

. Now the location of the left and right pallets will be calibrated.

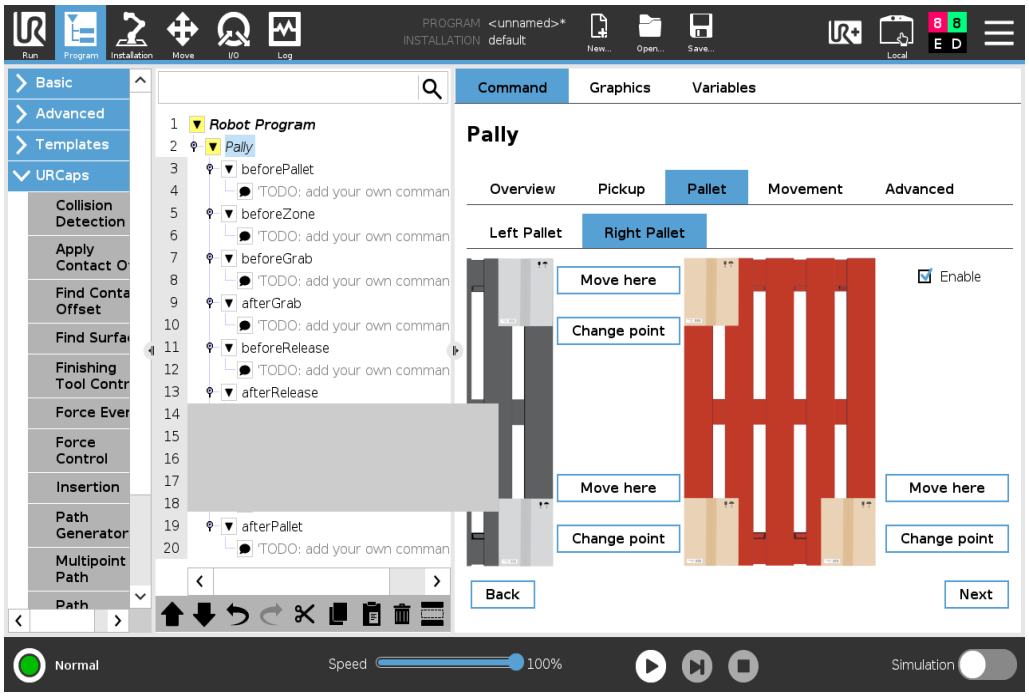
Step 36 – Use the diagram on the screen and teach the three locations shown using the set point button and the UR controls (same as step 30) for each location. Note that with the Palletron 3000, the side with two boxes is the side closest to the robot.



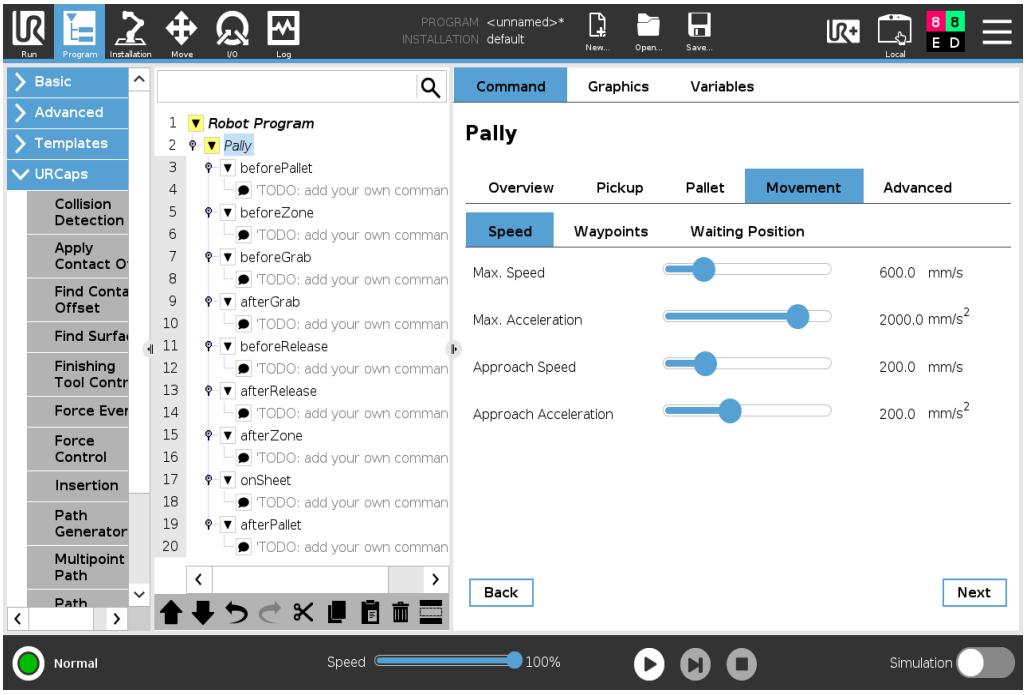
Step 37 – Once the left pallet is configured, press next Next .

Step 38 – Repeat step 36 for the right pallet.

Step 39 – Once done, press next Next .

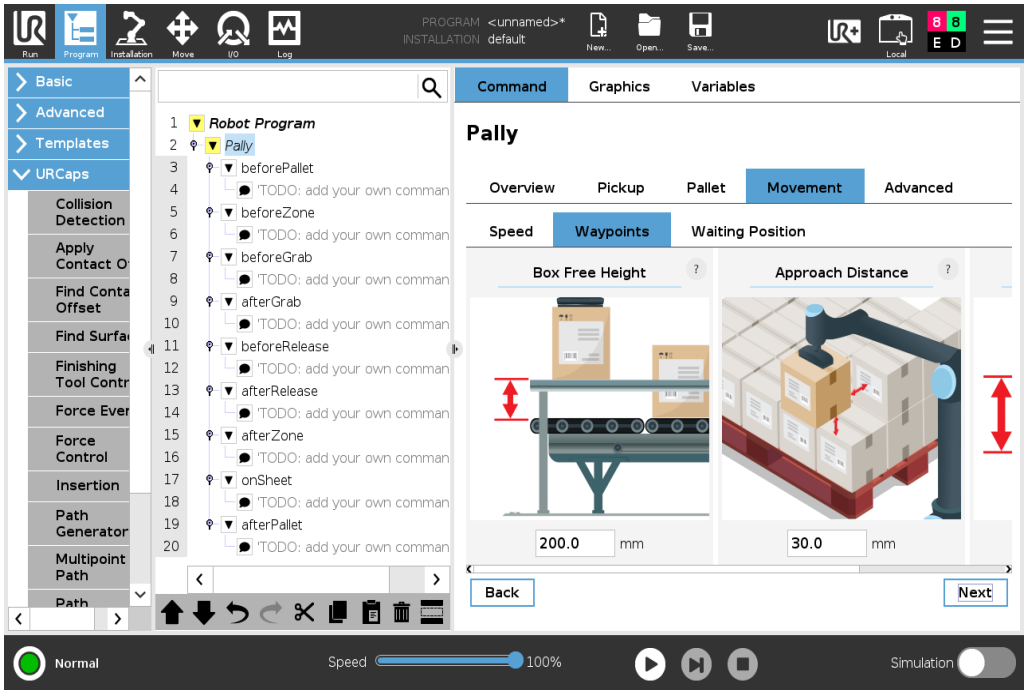


Step 40 – This will bring up the movement tab. The first sub tab is speed, this where the acceleration and speeds can be set for general movements and approach speeds. These can be changed later, so if unsure, leave them at the default values. Press next Next .



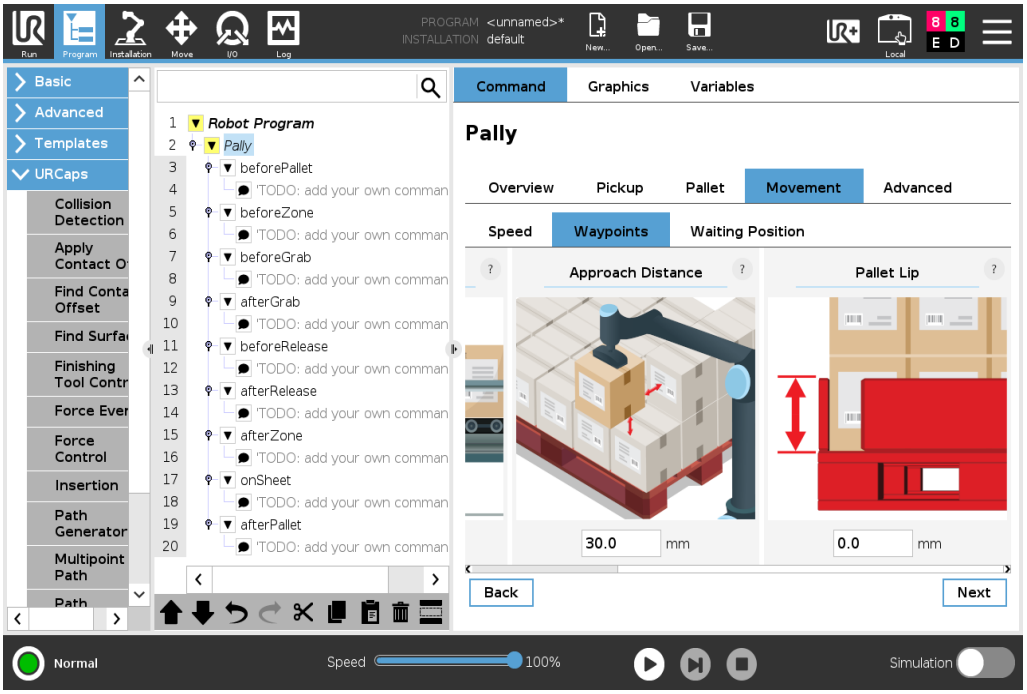
Step 41 – Now, the waypoints for each box movement will be set. First enter the box free height. This is how far the box must be moved vertical before it is free of the conveyor and guide rails.

NOTE: These dimensions are in mm.



Step 42 – Next, enter the approach distance offset. This is how far from the already palletized boxes the new box will move to before moving into its final location. The default value of 30mm is a good starting point and can be tweaked as needed.

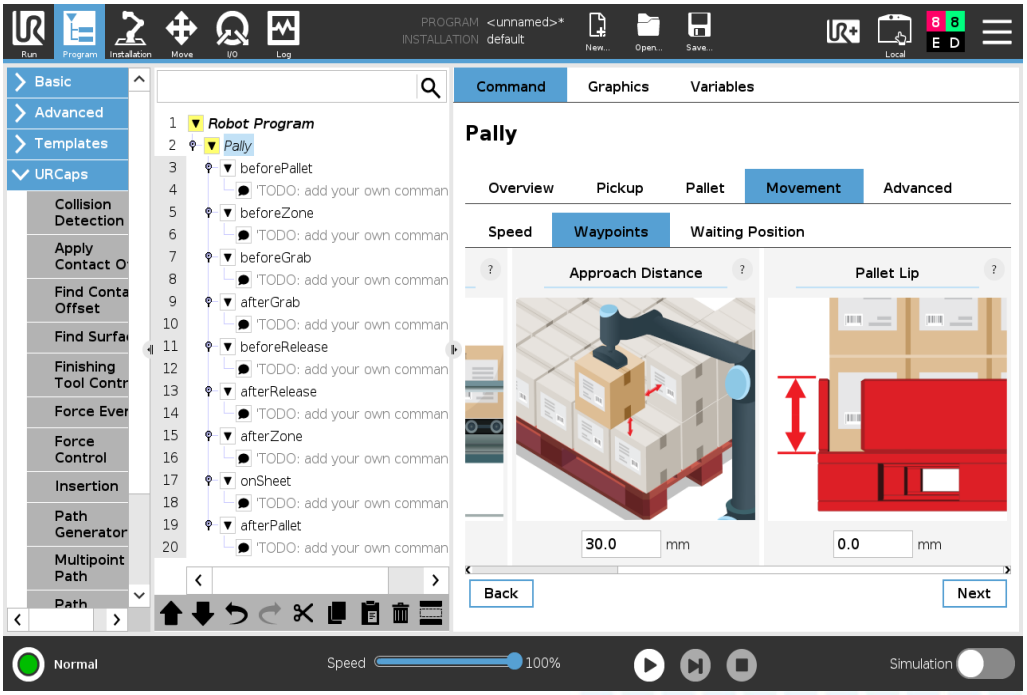
NOTE: These dimensions are in mm.



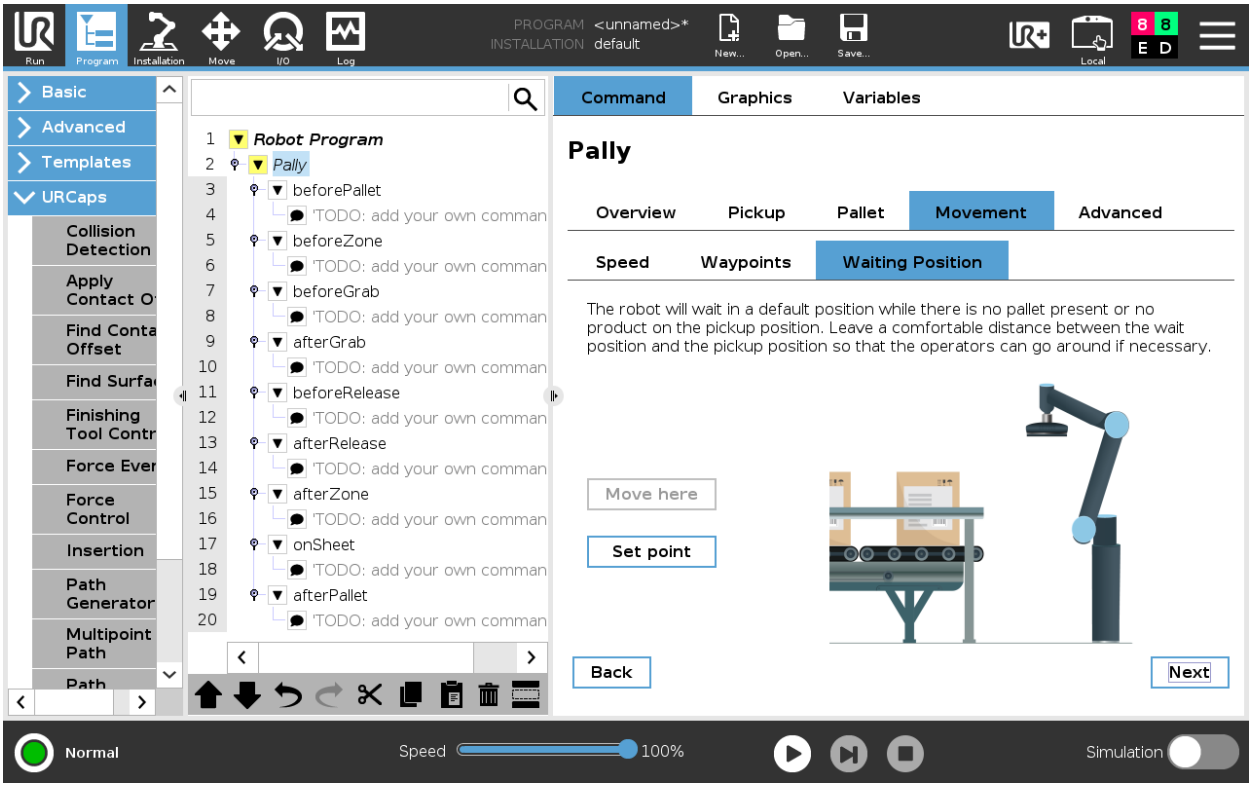
Step 43 – Lastly is the pallet lip. This defines how tall the lip on the pallet is (there may not be one). Once entered, press next

.

NOTE: These dimensions are in millimeters.



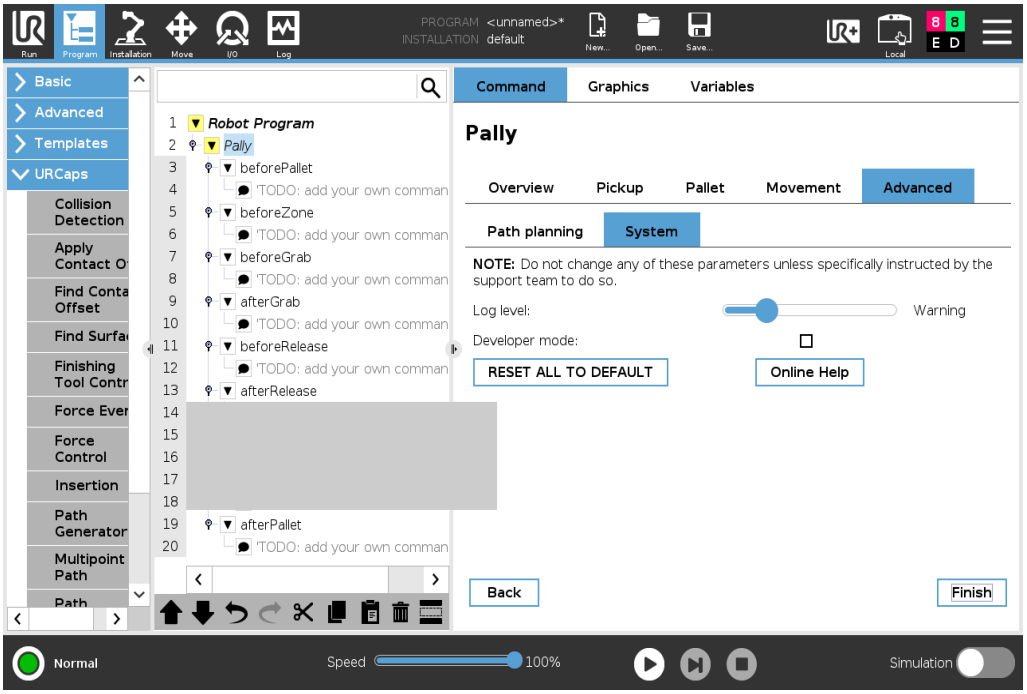
Step 44 – This brings up the waiting position set point. This is the location the robot arm will go to and wait if there is no pallet present or if the pallets are full and have not been changed yet. Press set point and use the UR controls (same as step 30) to set this location. Press next Next when done.



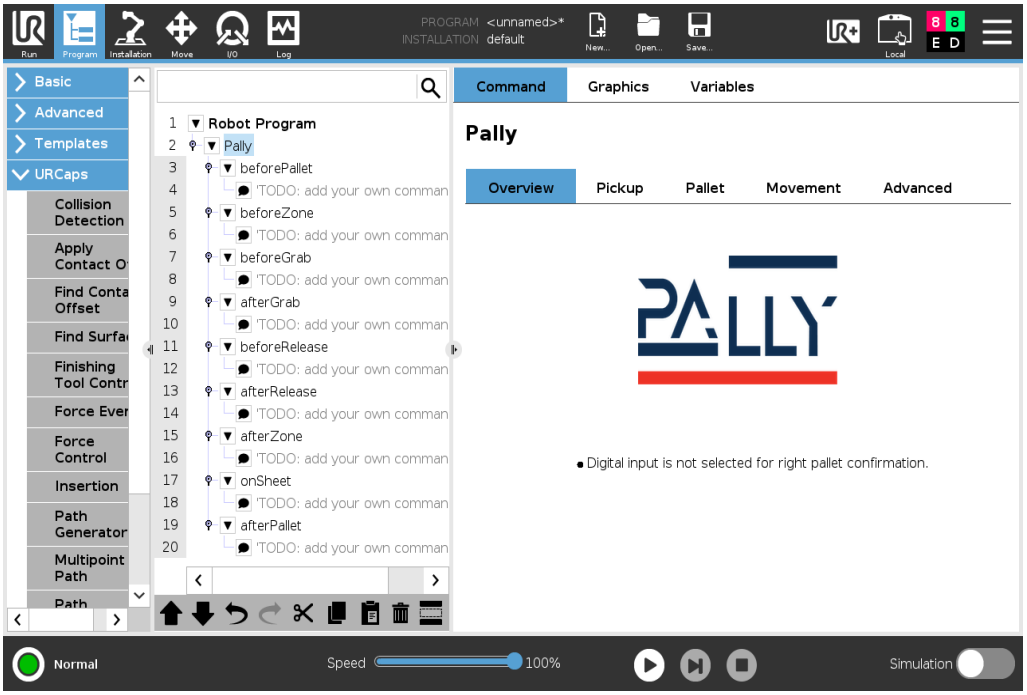
Step 45 – This will bring up the advanced tab that has path planning and system settings. Do not change any of these unless instructed to by Cross Technical Support. Press Next Next twice.

Step 46 – Press finish

.



Step 47 – This should the program back to the screen similar to below (note: note the bullet points below the Pally logo may be different depending on what has already been configured). If the Palletron 3000 is new, the installation parameters should already be complete and the system is ready to palletize. Press play to begin the program. If this system was reset or there are bullet points below the Pally logo, then go on to step 48..

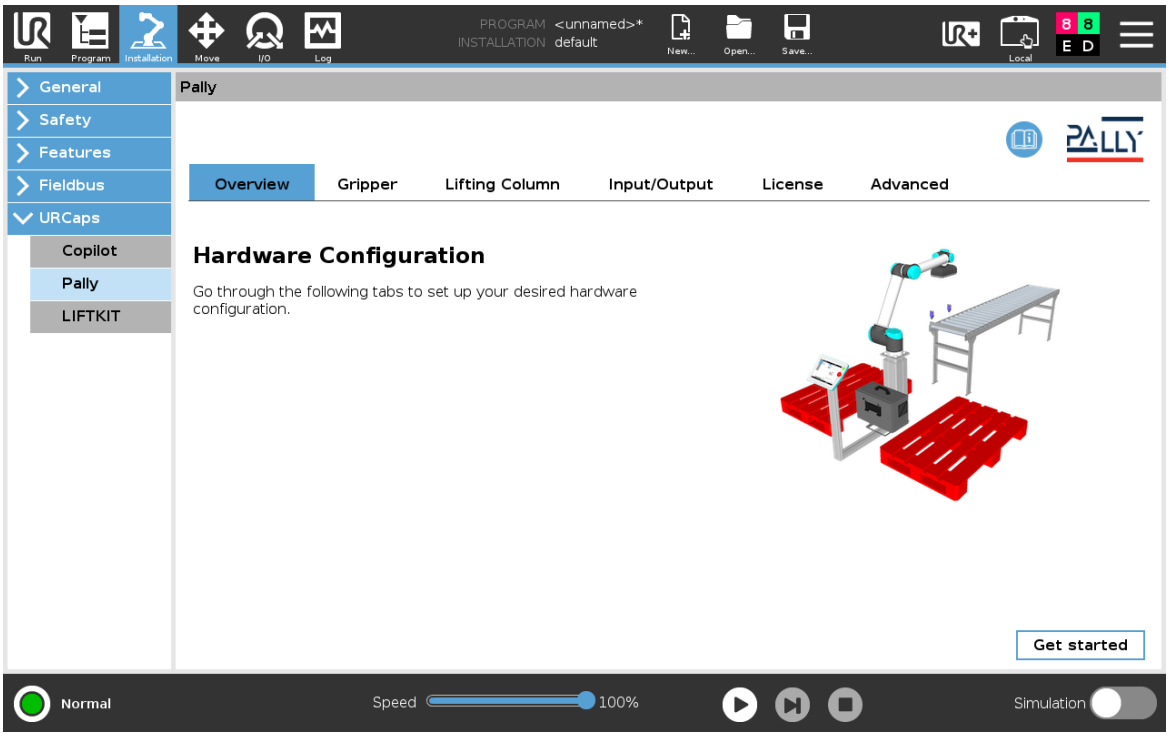


Configuring the Pally Installation for first time use

The hardware configuration is already configured for the Palletron3000. Only use these steps if the system was reset or something in the hardware configuration needs to be changed.

Step 48 – Next press the installation tab

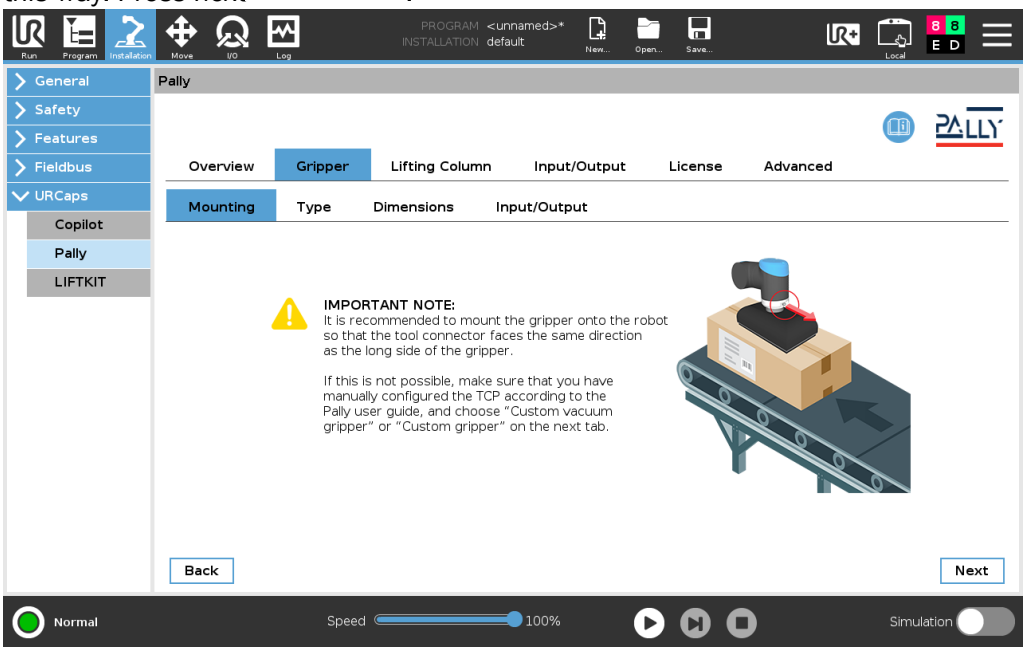
in the upper left of the UR pendant. Make sure Pally under UR Caps is selected and the screen should look similar to below



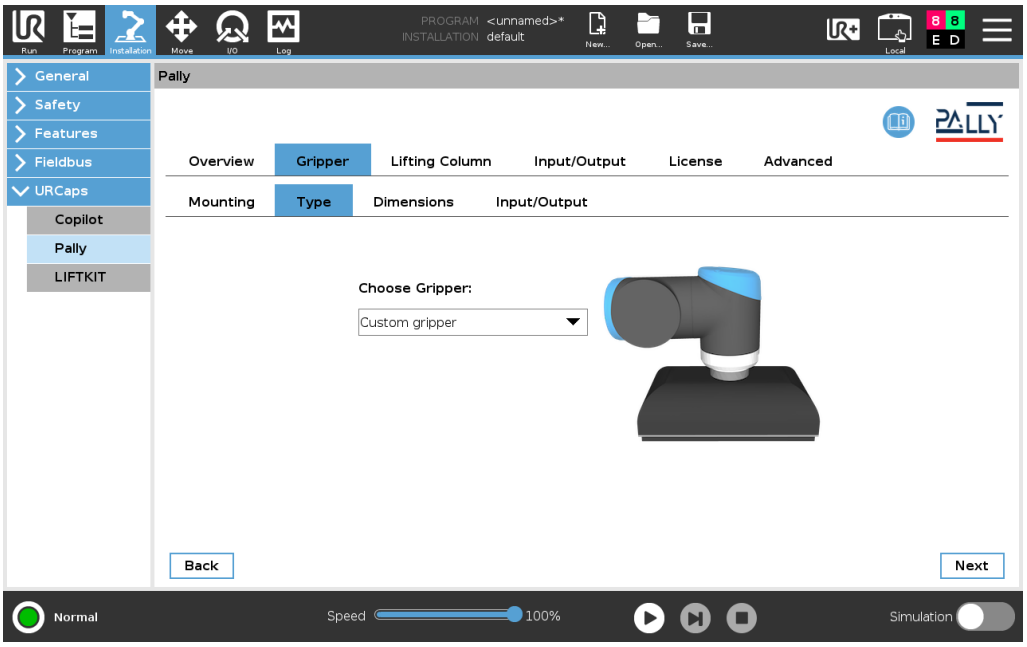
Step 49 – Press Get started

.

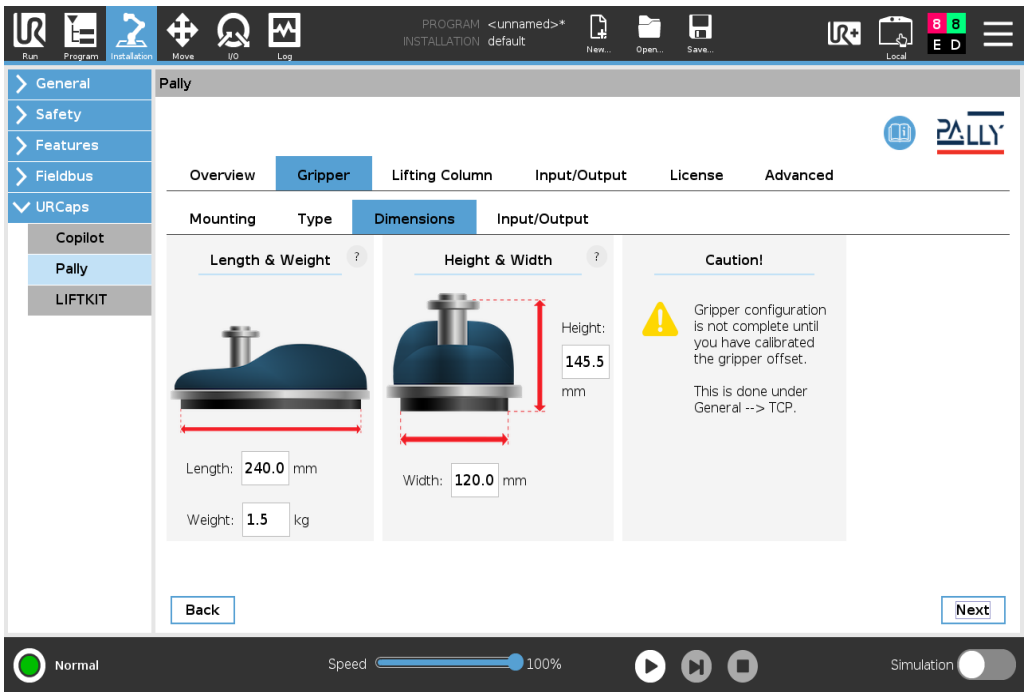
Step 50 – Make note of the gripping mount Important notice. This tutorial assumes the gripper is mounted this way. Press next Next.



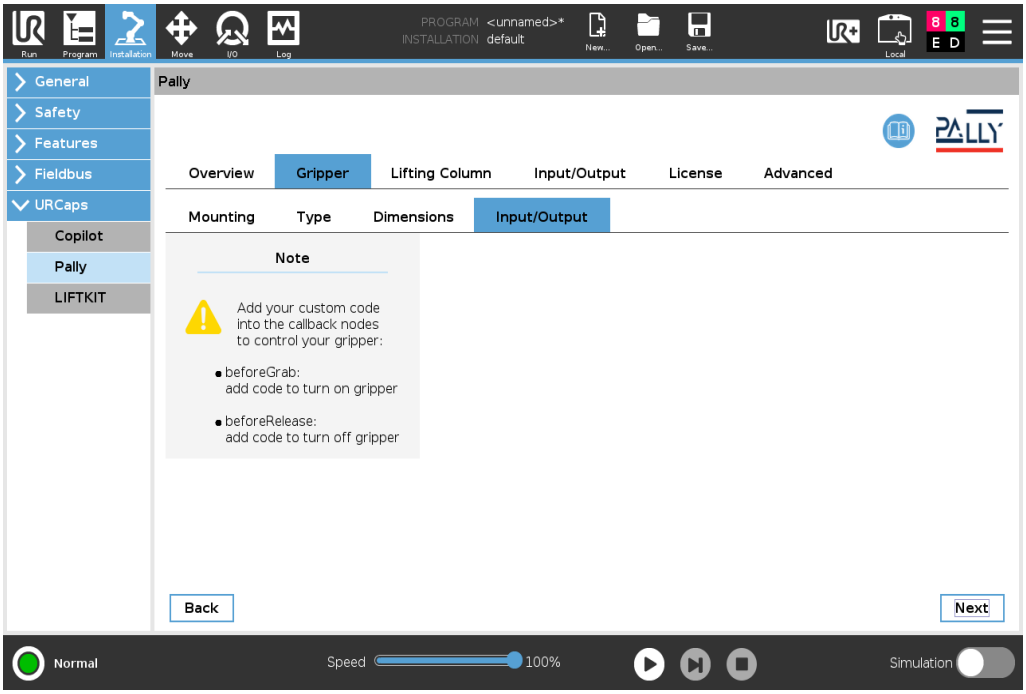
Step 51 – Choose the gripper from the dropdown. For the Palletron 3000, it is a customer gripper. Press next Next.



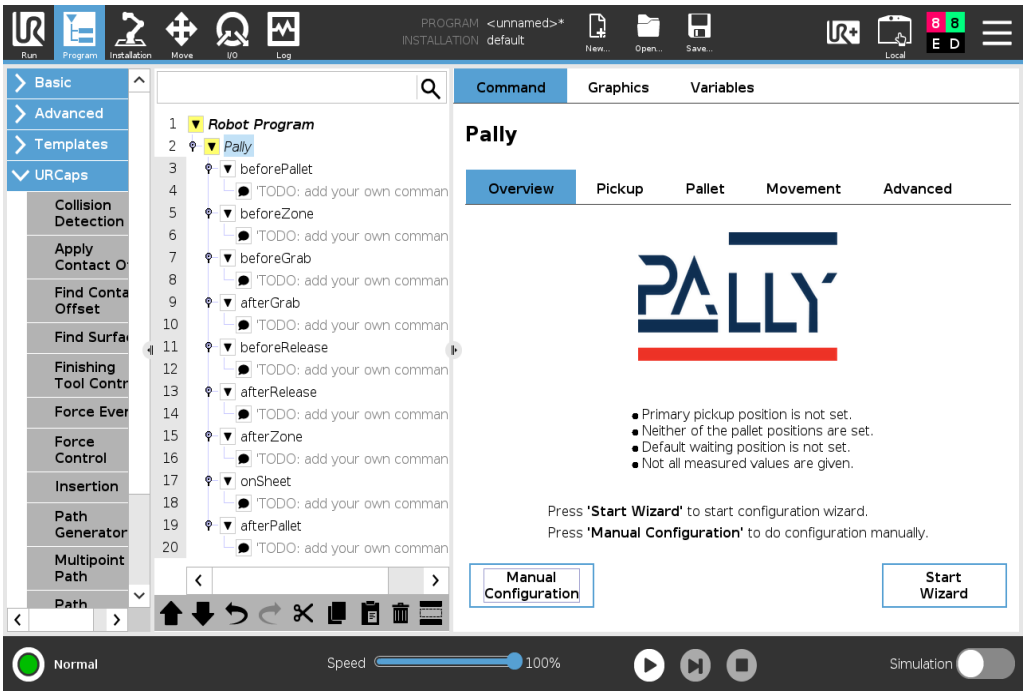
Step 52 – Enter the dimensions and weight of the gripper. The dimensions for the standard vacuum gripper on the Palletron 3000 are shown below. Press next Next when done.



Step 53 – Since using a custom gripper, the command for activating the gripper need to be manually programmed. As noted in the screen below, this is done in the callback nodes of the program.

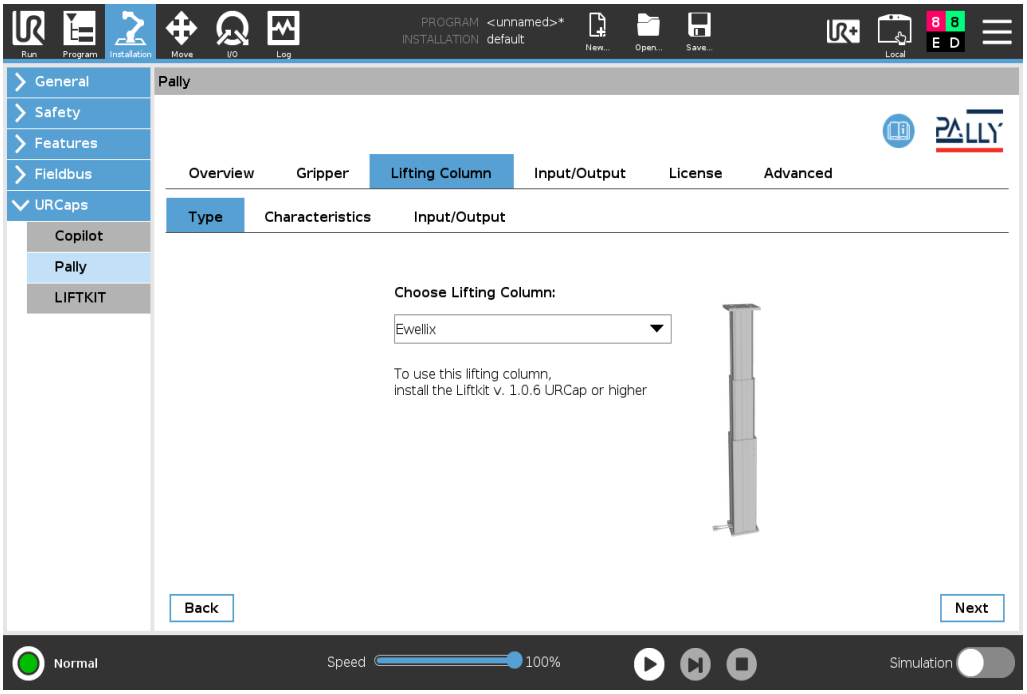


To see these nodes, press the program tab in the upper left. The code to the turn on the gripper should be added in the before Grab section. The code to release the box or turn off the gripper should be added to the before Release section. This code should already be entered on the Palletron 3000.



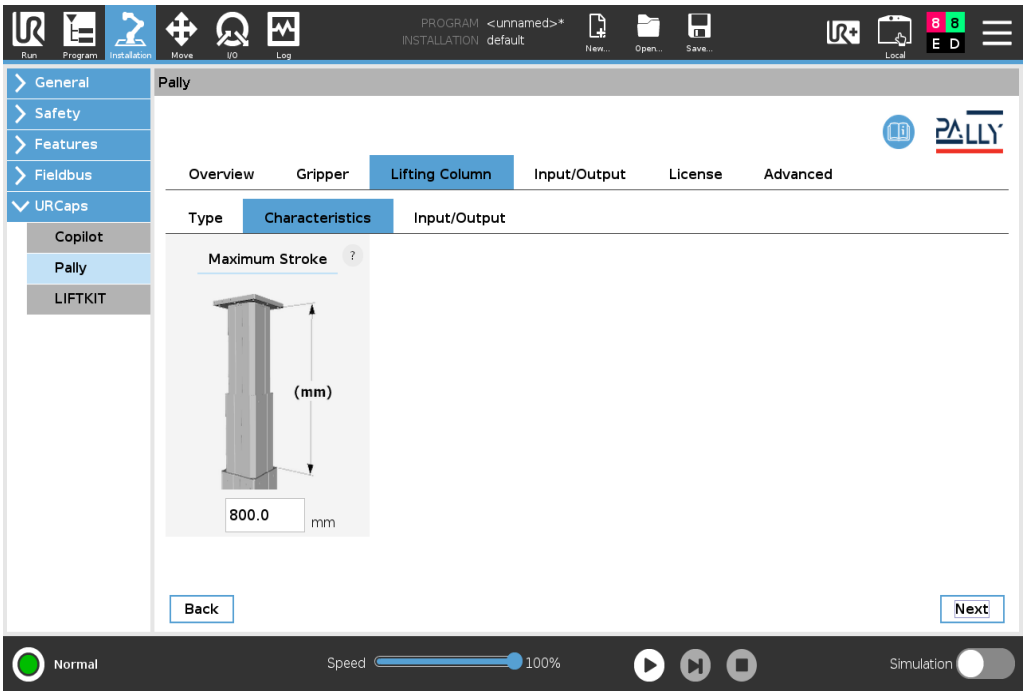
Step 54 – Press next on the installation gripper input/output tab.

Step 55 – Next is the lifting column. For the Palletron 3000, the Ewellix lift is used. The UR cap should have come installed. If the UR Cap is not installed, go to step 1. Press next Next.

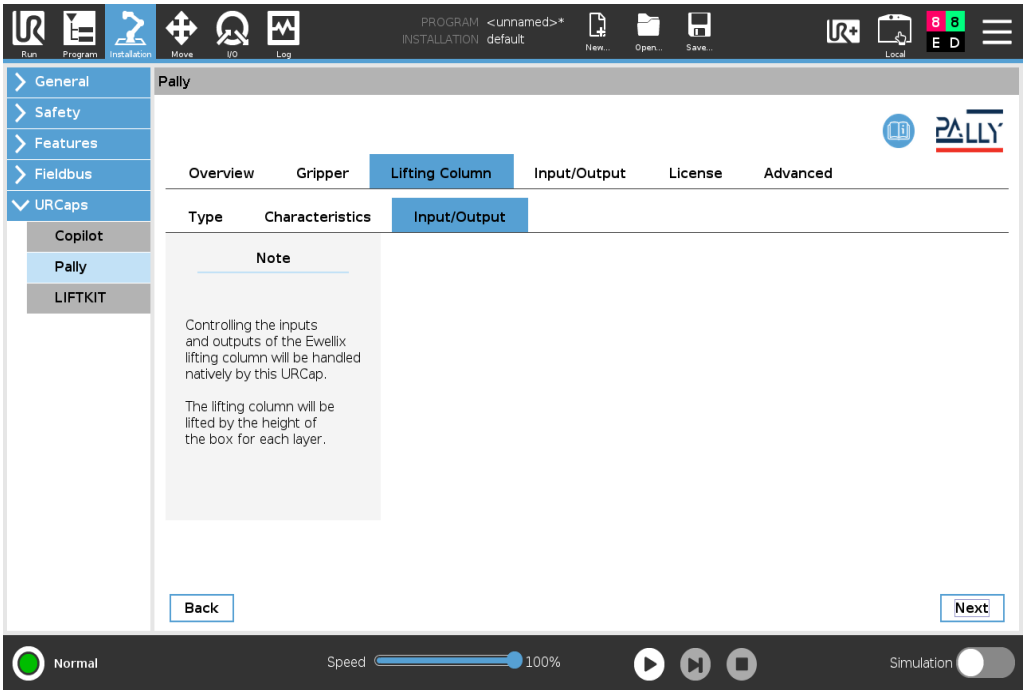


Step 56 – Enter the maximum stroke. On the Palletron 3000, it is 800mm. Press next Next.

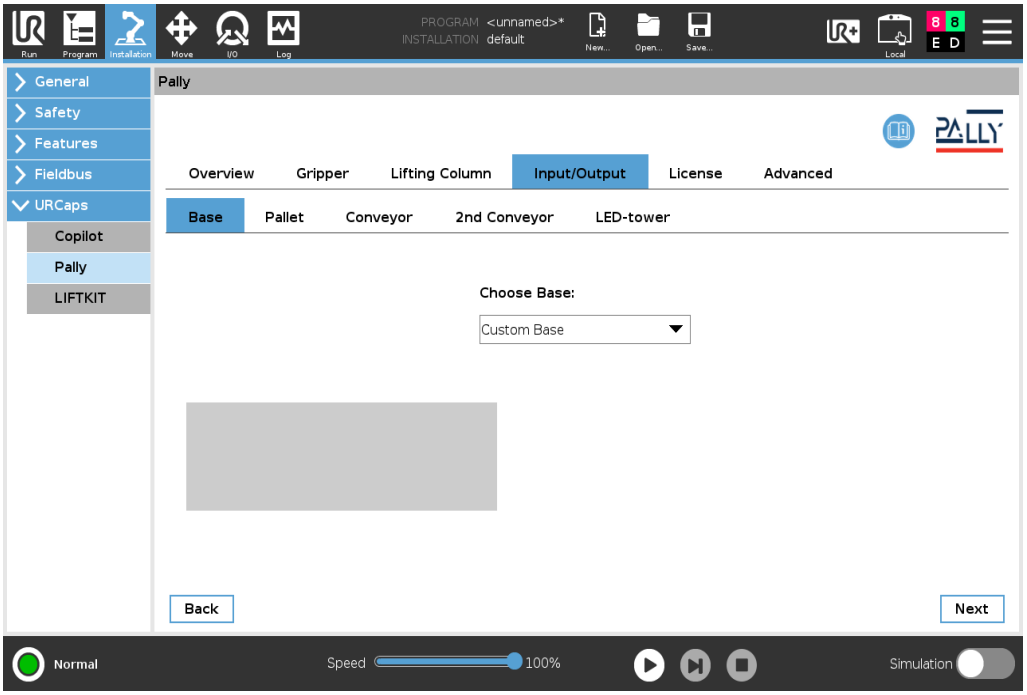
NOTE: this dimension is in millimeters.



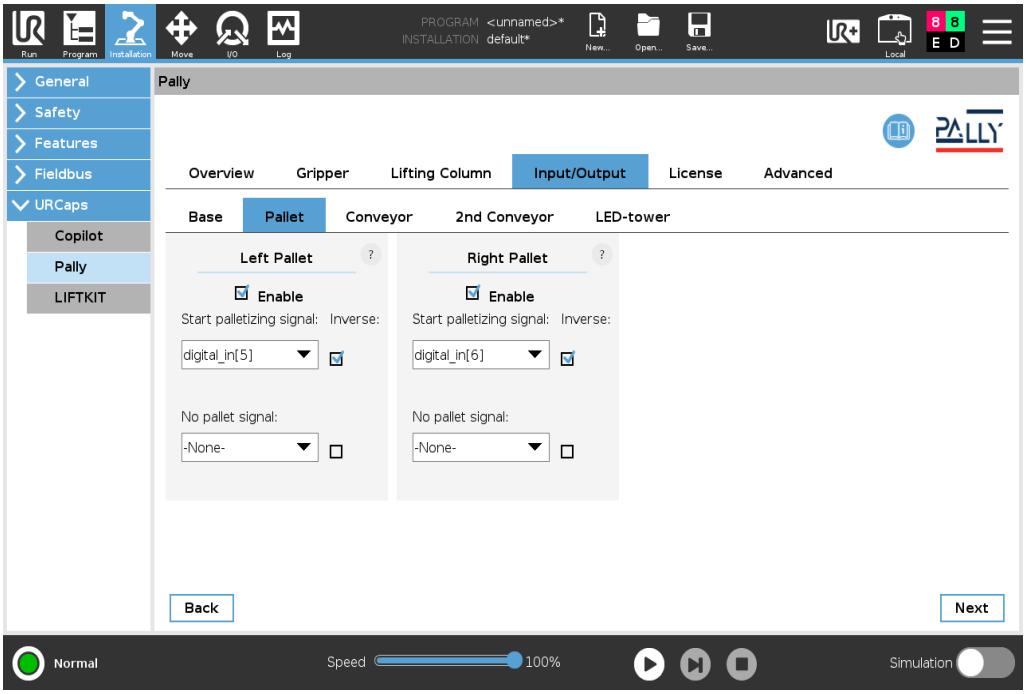
Step 57 – The control of the column is done through the UR cap so no custom code is needed here. Press next Next .



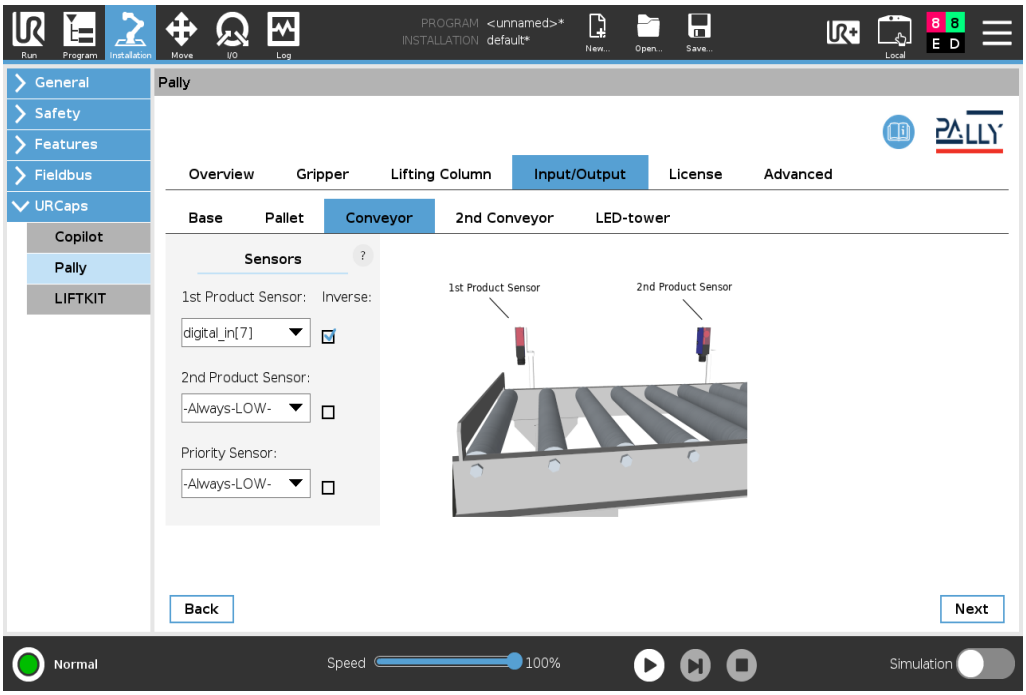
Step 58 – For the Palletron 3000, the base is custom. Make sure custom base is selected in the drop down and press next Next .



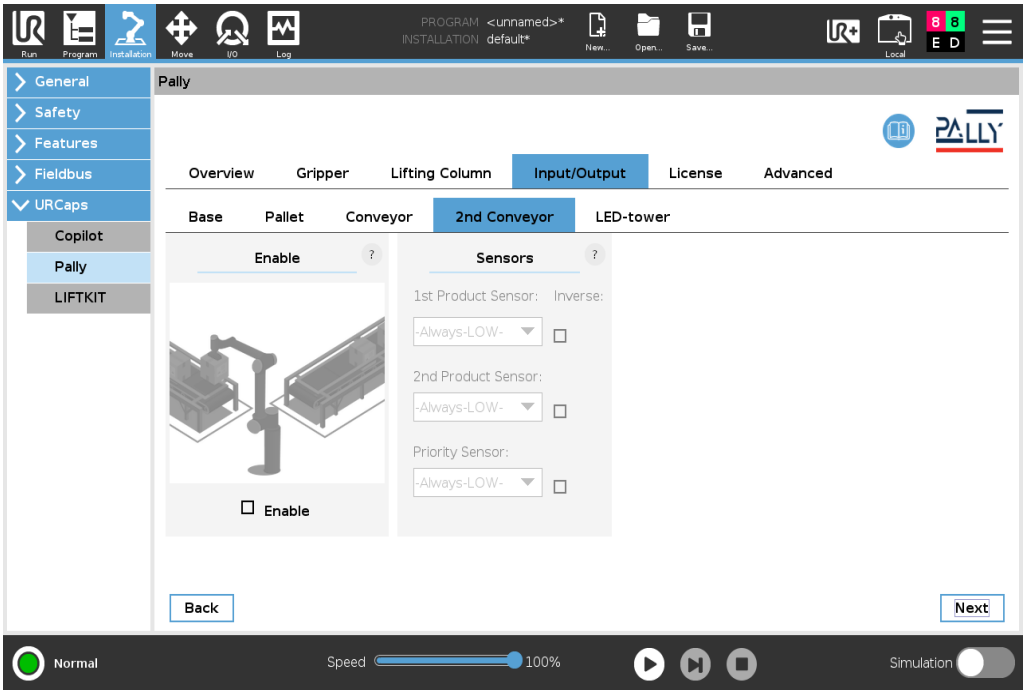
Step 59 – Configure the pallet sensors as shown in the image below. This is the setup for the Palletron 3000. Then press next Next .



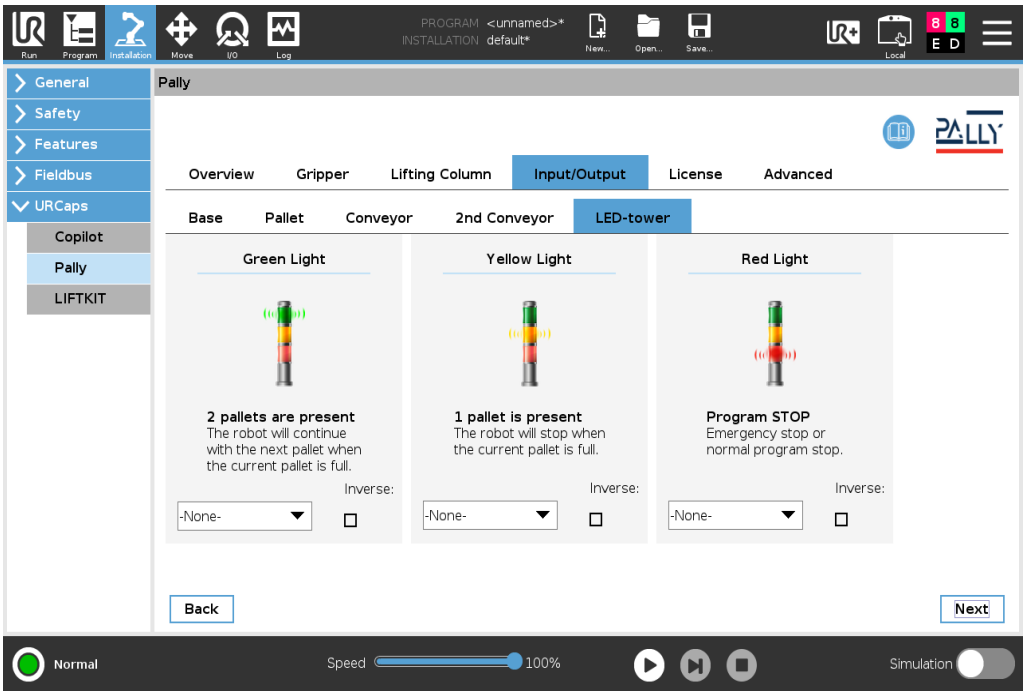
Step 60 – The Palletron 3000 only uses one product sensor. Configure the screen as shown below and press next Next .



Step 61 – For this tutorial there is only one conveyor. If a second conveyor is used, then it would be configured the same as step 60 except using this conveyors I/O. Press next **Next**.

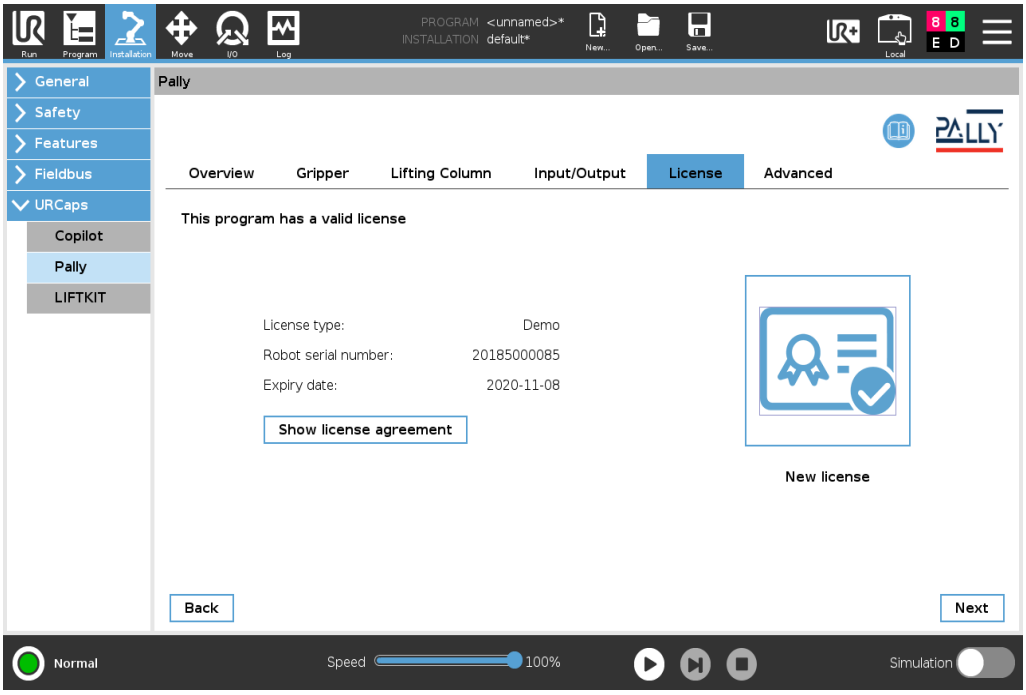


Step 62 – There is no LED tower on the Palletron 3000 so leave everything as it and press next **Next**.

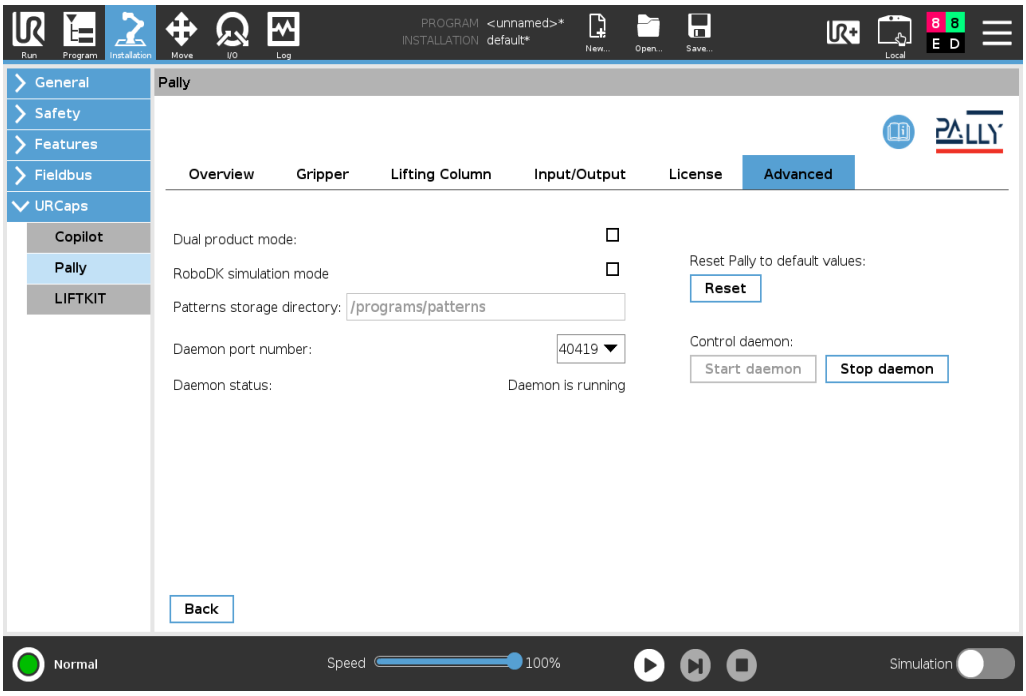


Step 63 – The license was installed on the UR controller prior to shipment and the details are shown here.

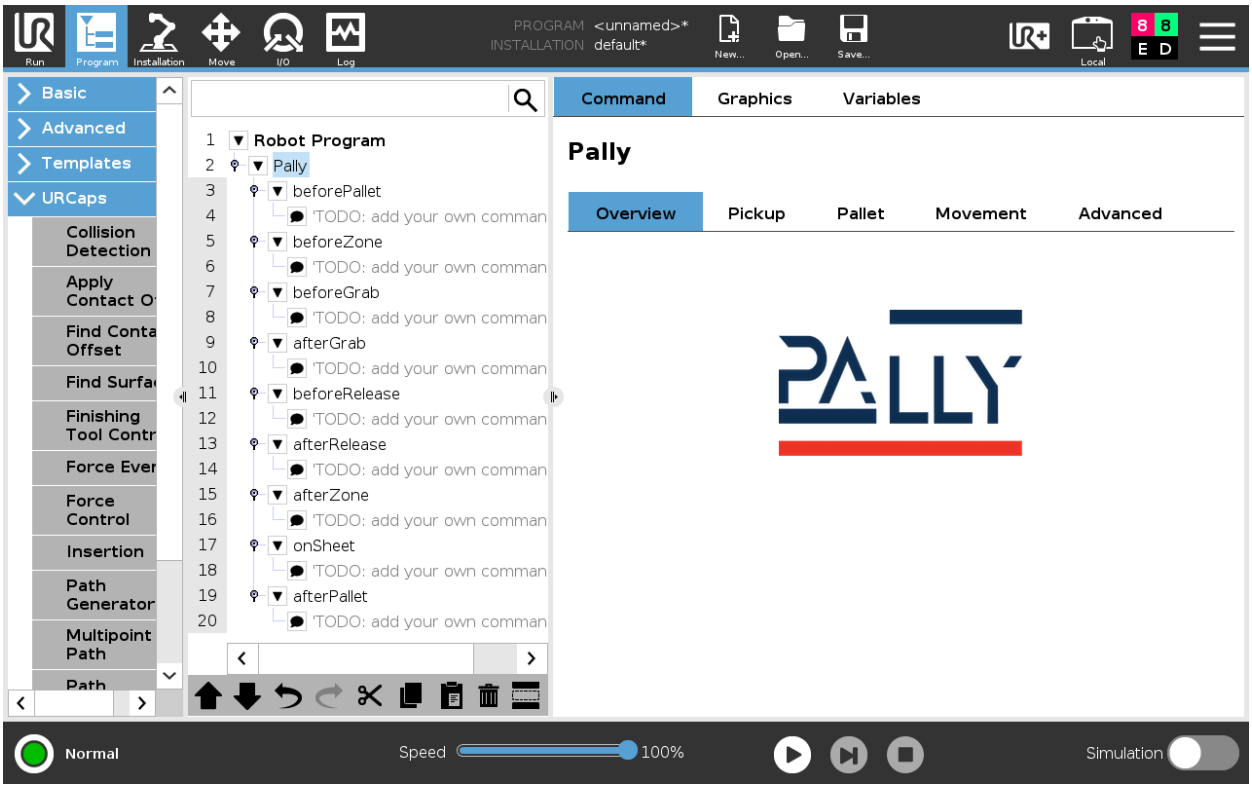
Press next **Next** .



Step 64 – None of the advanced controls need to be changes, press next **Next** .



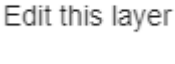
Step 65 – Press the program tab in the upper left and the screen should be the same as shown below. If there are any bullet points below the Pally Logo, this indicates something wasn't configured correctly. Address any of these using the steps above. Otherwise, the system is ready to palletize. Press the Play button to started the program.



This completes the tutorial. If anything is not working correctly, please contact Cross Technical support.

Optional Steps for configuring a custom pallet pattern.

Step 19a. – If a custom stacking method is desired, select this method and then go to the reorder subtab .

Step 19b. – Here is will show the 5 layers. For each layer, select the three bars icon and select edit this layer  .

Step 19c. – This will bring up a graphic of the individual layer where boxes can be moved via drag and drop, rotated, added/deleted, and multiselected, and patterned. The following shows what each command does.

add a new box

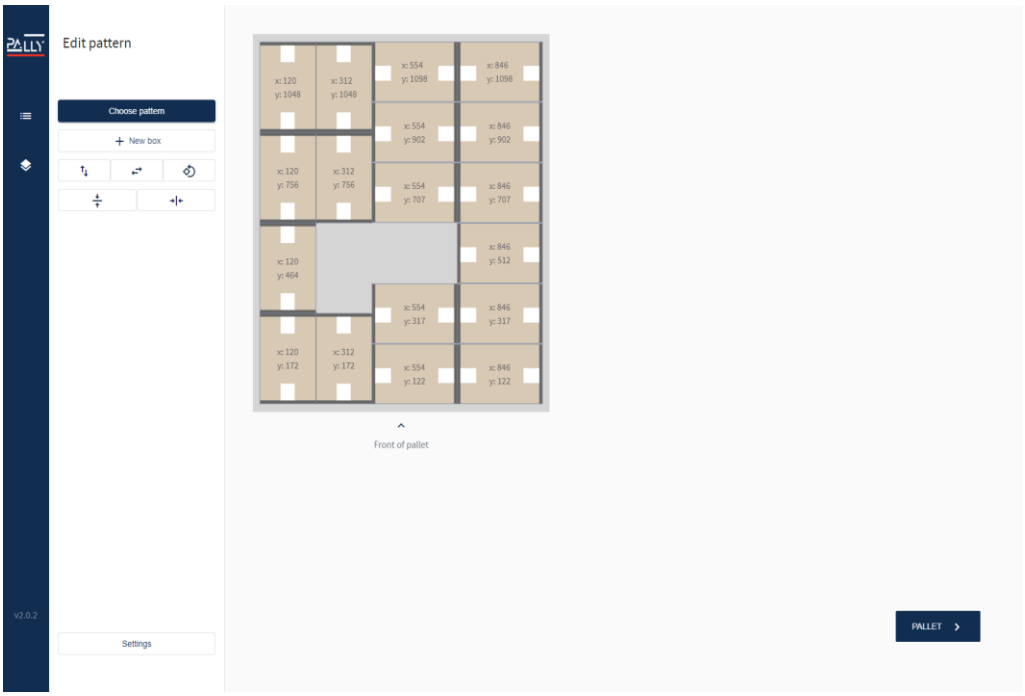
Mirror pattern vertically

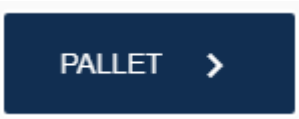
Mirror pattern horizontally

Rotate pattern

Align Pattern Vertically

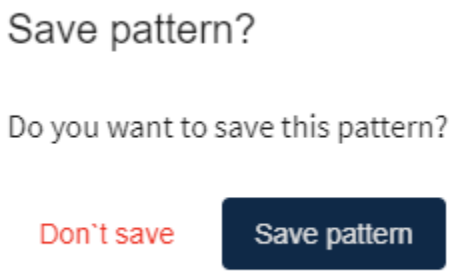
Align Pattern Horizontally



Step 19d. - Once a layer pattern is configured, select pallet 

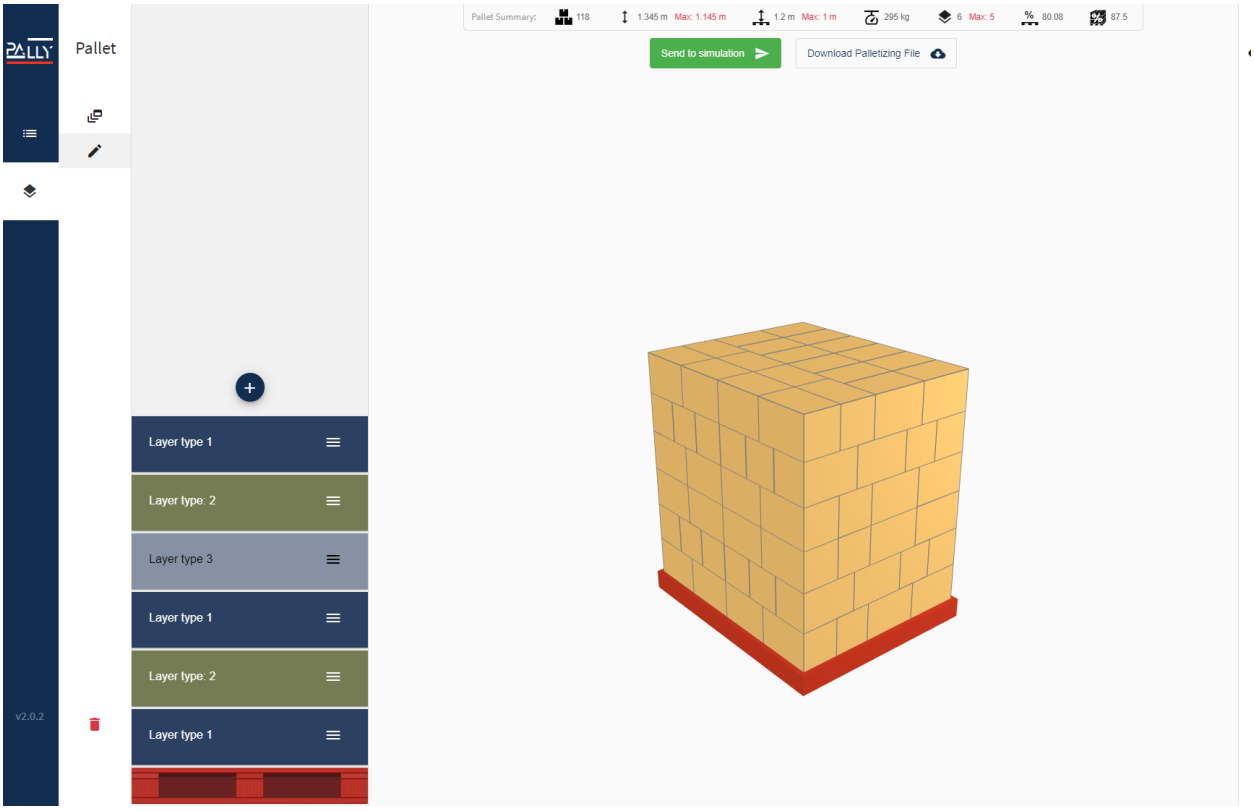
to go back to the pallet visualization.

Step 19e. – If changes were made to the pattern, a prompt will pop up to save the changes, select save pattern.



Select Pattern again to go back to the visualization.

Step 19f. – This will have created a new pattern. Each unique layer pattern will be given a name in the convention of Layer Type # where the "#" is replaced sequentially for each unique pattern. Once the pattern types are configured, they can be deleted, drag and drop to a particular order, and duplicated as needed. These options are all found in the same drop down from step 19b.



Step 19g. – When the unique custom stack has been configured, return to step 21.