VERSA BUILT ROBOTICS

Lathe Automation System UR10e Robot & Gripper Installation, Configuration and Operation

Table of Contents

UR10e Robot Installation

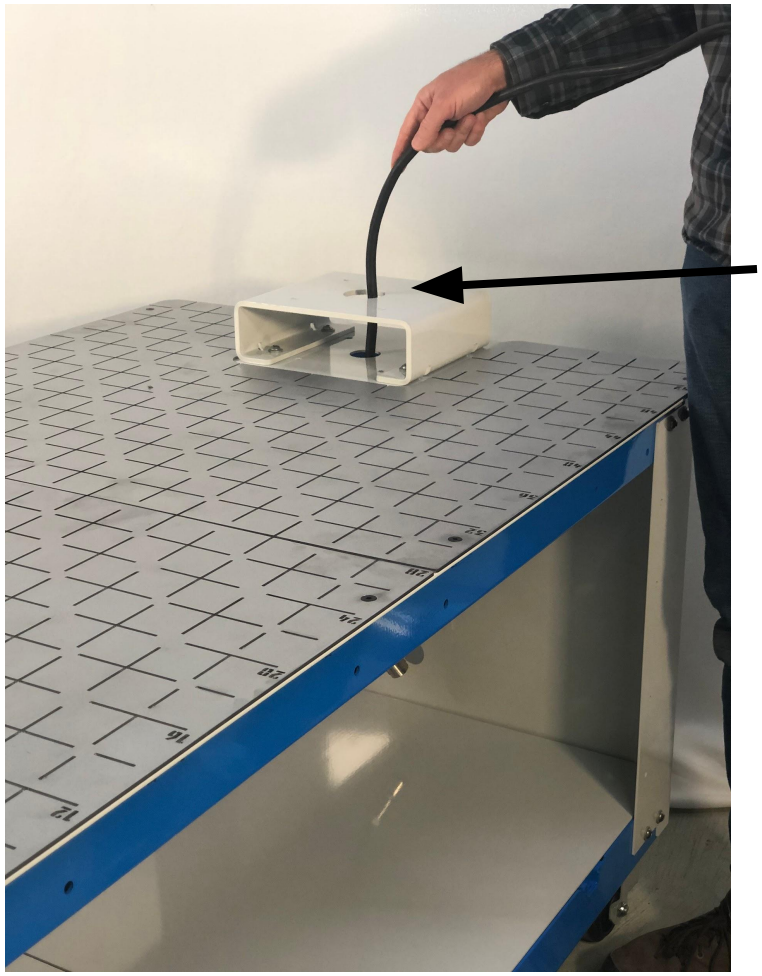
Section 1

Install UR10e Robot onto VersaCart 1300

- Tools:
  - 6mm hex key
  - 13mm open-ended wrench

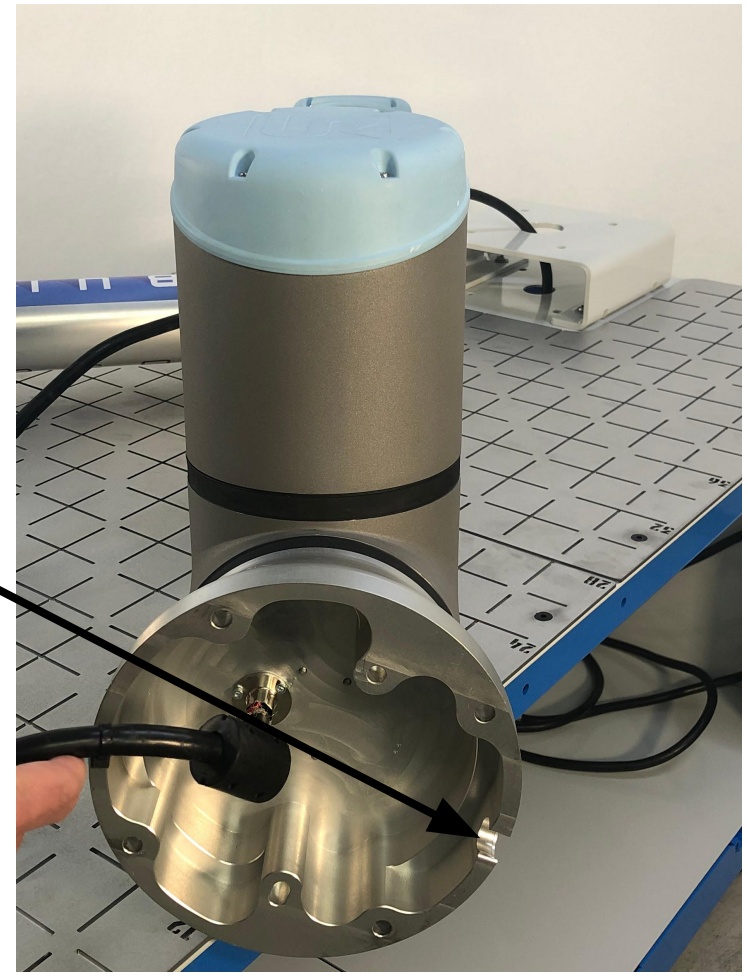
- Parts:
  - UR10e Robot
  - VersaCart 1300
  - 4 x M8 Socket Head Screws x 30mm L
  - 4 x M8 Hex Nuts

Route UR10e Cable



ROBOT POWER DISCONNECTED

- Place robot on VersaCart table top
- Route robot cable through hole in VersaCart robot stand and table top
- Pull robot cable out of slot in robot base so the cable can pass through the bottom of the robot

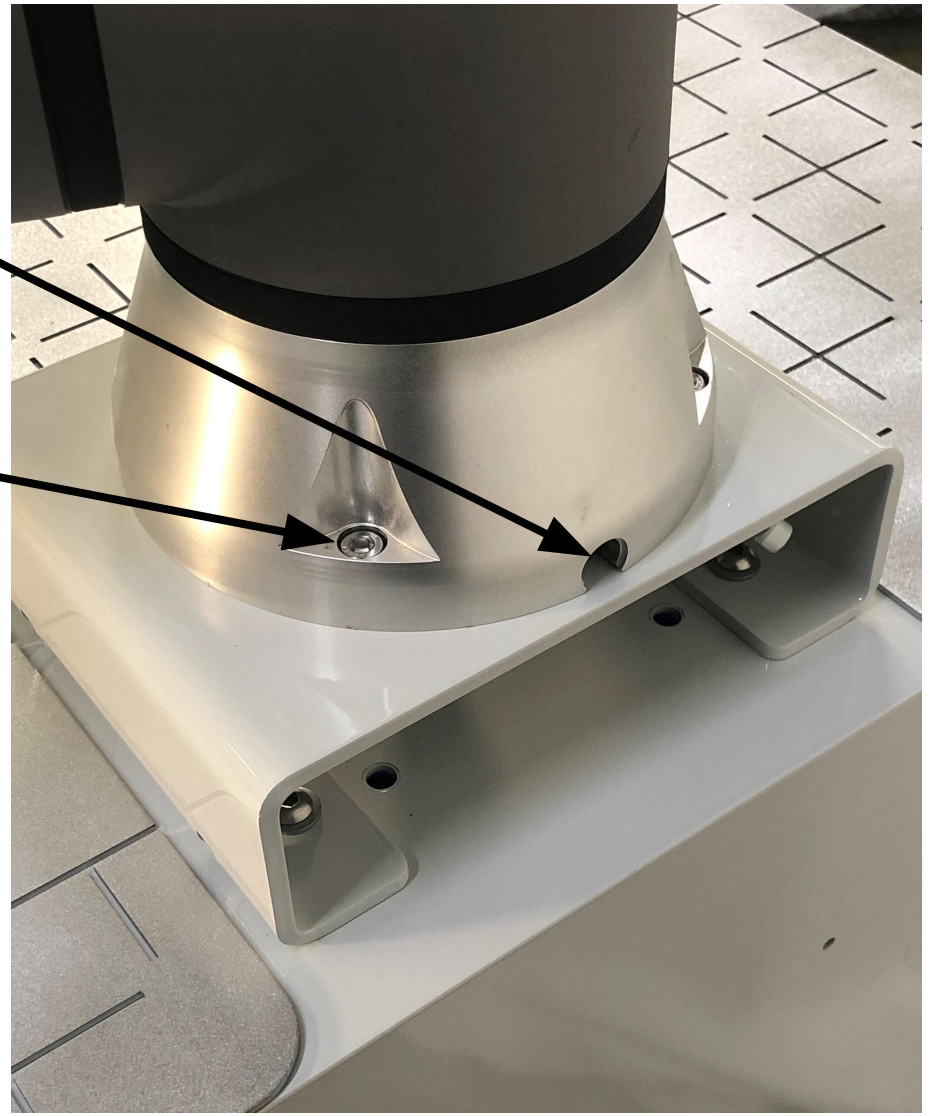


Locate and Secure UR10e Robot on VersaCart 1300

- Position UR10e robot on VersaCart pedestal, with the robot's cable slot in the base positioned to the back of the VersaCart

- Secure the UR10e robot to the VersaCart robot pedestal with 4 x M8 Socket Head Screw x 30mm Length - Apply a small drop of medium strength threadlocker to each fastener

Note: *Screws are attached with captive hex nuts press-fit into the bottom side of the pedestal. If necessary, use a 13mm wrench on the captive hex nut while tighten screw into place.*



Route Teach Pendant Cable

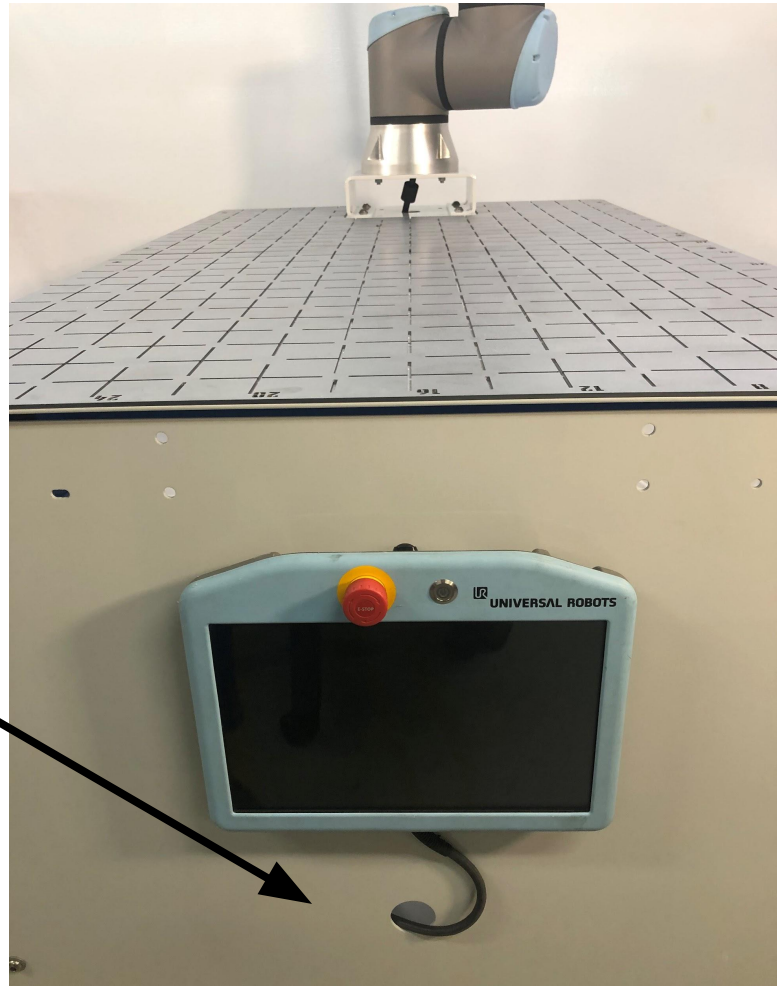
- Tools:
  - Adjustable wrench

- Parts:
  - Controller
  - Teach Pendant

2 types of sheet metal are in use for the VersaCart. End panels with thru holes for routing the Teach Pendant cable and end panels with open slots. Thru hole end panels require disconnecting the cable inside the UR Controller, shown on the following page. Open slot end panels allow the teach pendant to be routed under the panel by removing a support plate behind the panel.

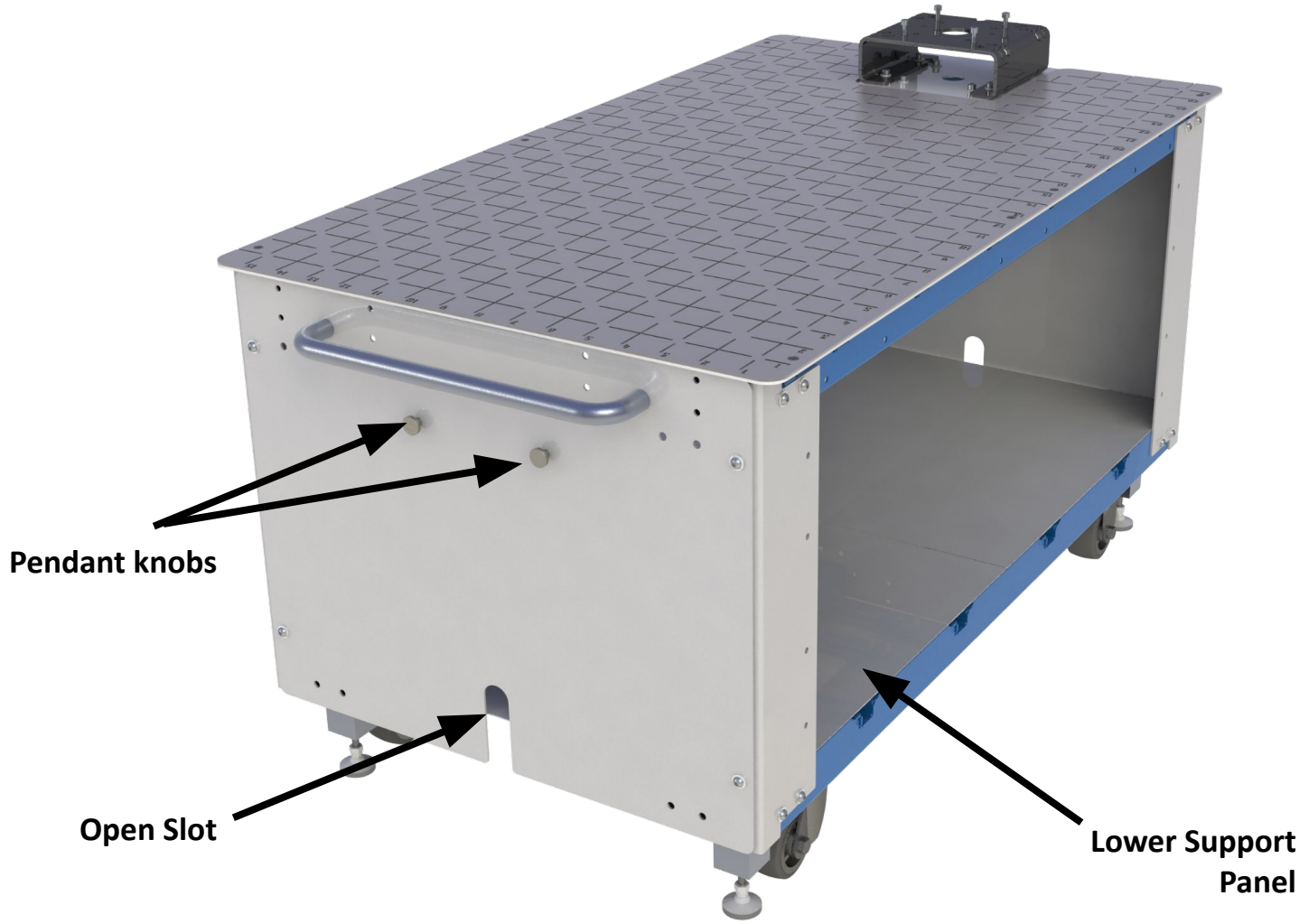
Route Teach Pendant Cable (thru hole end panel)

- Lay the controller on the top of the cart and open the access door
- Disconnect the teach pendant connector by pressing the sides and pulling down
- With adjustable wrench, loosen and remove the teach pendant bulkhead fitting at the bottom of the controller
- Route the teach pendant cable through the hole in the VersaCart and hang the teach pendant as shown
- Reinstall the teach pendant bulkhead fitting and plug in the teach pendant connector in the controller



Route Teach Pendant (open slot end panel)

- Lay the controller on the top of the cart
- Slide lower support panel, on opposite side of the robot pedestal, on top of the lower support panel under the robot pedestal
- Route Teach Pendant under end panel, and hang pendant on knobs
- Replace lower support panel and place controller on a lower support panel



Connect Robot Power and Signal Cables

- Attach the robot cable to the robot controller
- Position robot controller in the VersaCart underneath the robot as shown
- **Do not power-up the robot yet**

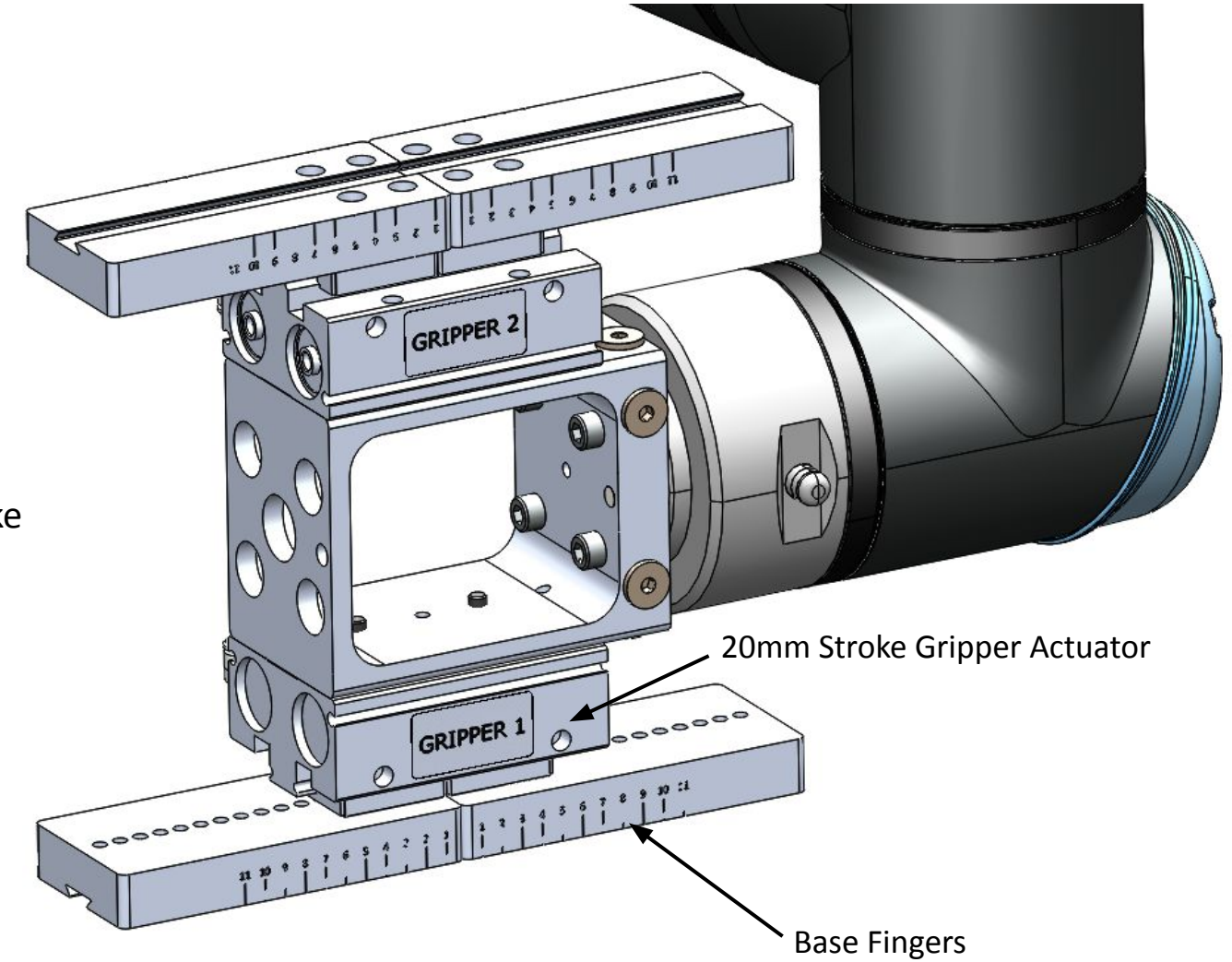
Double Headed Gripper Installation

Section 2

Install Double Headed Gripper

- Tools:
  - 5mm hex key
  - 2 x Lineman's Pliers
  - Side cutting pliers
  - Medium Strength Threadlocker

- Parts:
  - Double Headed Gripper assembly, with 2x 20mm stroke centering gripper actuators
  - 4 x M6x1.0 SHCS x 22mm L
  - 1 x M6 dowel pin x 22mm L
  - 1 x 15-foot length of Red 5/32" tubing
  - 1 x 15-foot length of Blue 5/32" tubing
  - 1 x 15-foot length of White 5/32" tubing
  - 1 x 15-foot length of Black 5/32" tubing
  - 8 x 16" Long Cable Ties (Zip ties)



Install DouGrip Gripper

1. **Power up the robot** and position the end of arm in a convenient location for Gripper assembly

Base	**+10°**
Shoulder	**-80°**
Elbow	**+90°**
Wrist 1	**-10°**
Wrist 2	**+90°**
Wrist 3	**-180°**

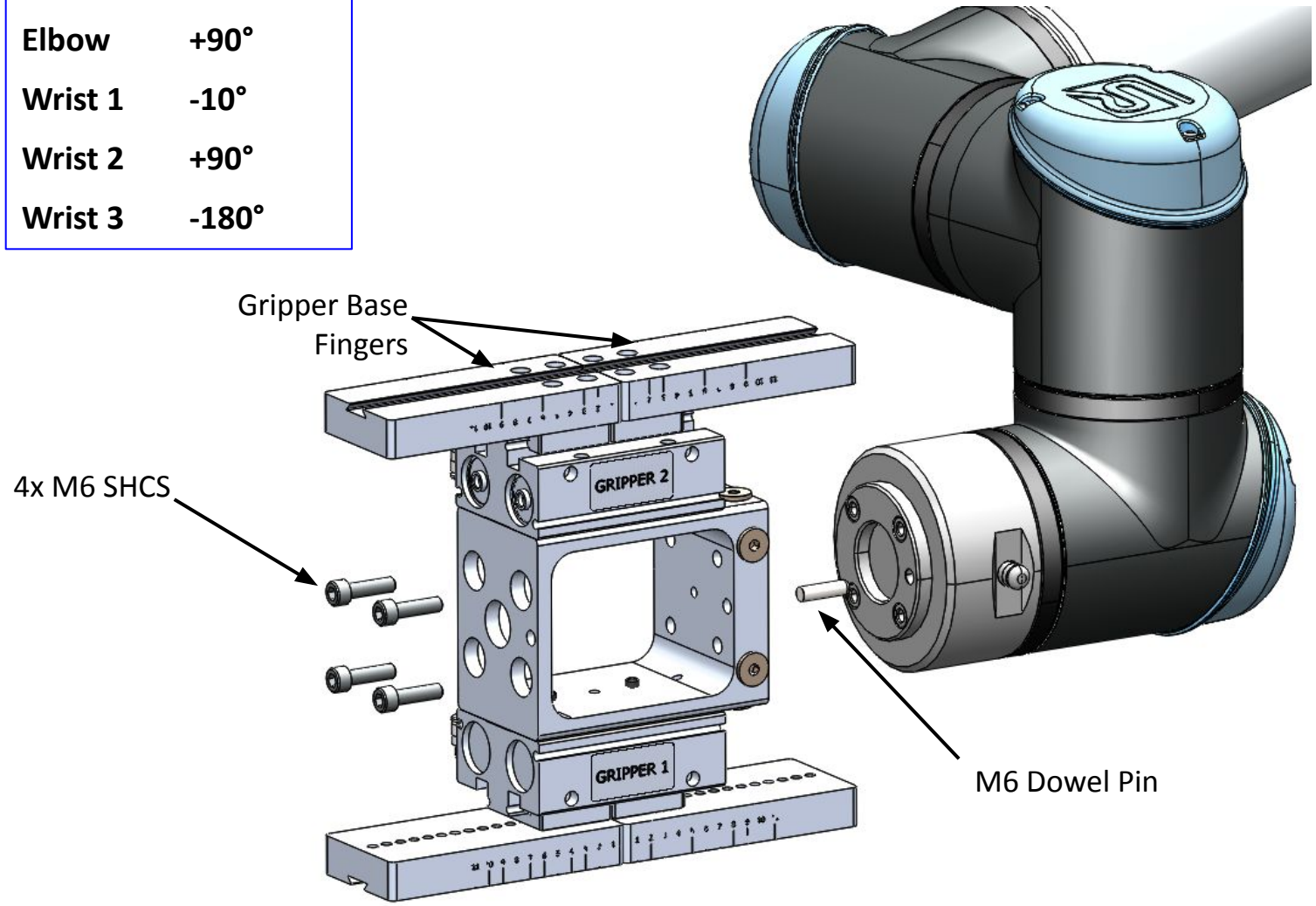
2. Place a small drop of thread locker onto each bolt in the Double Headed Gripper Fasteners package

3. Attach the Gripper Assembly to the robot:

   Align the assembly with the M6 dowel pin to mating features on the robot end of arm

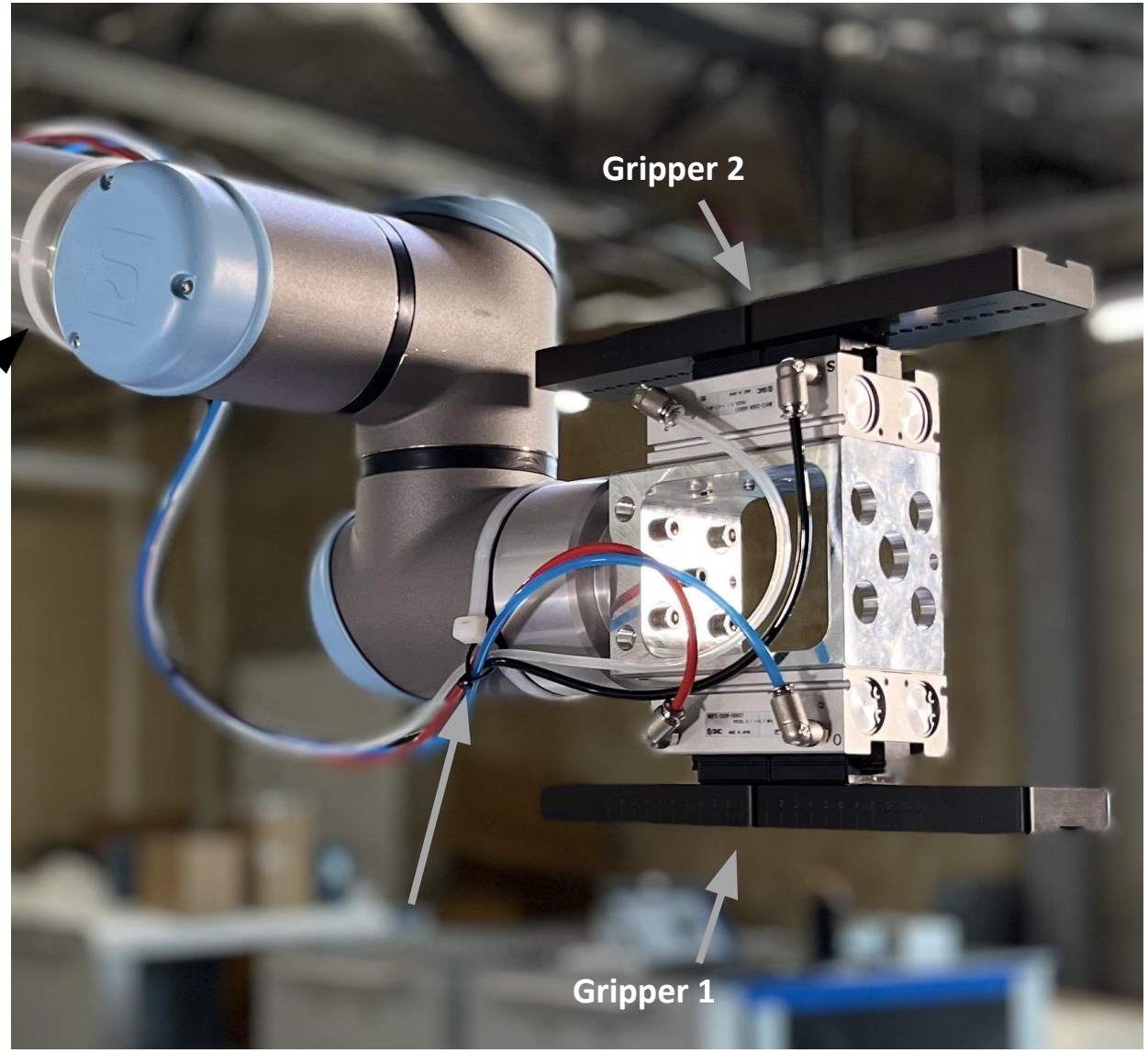
   Secure the assembly with 4 x M6 Socket Head Screws

4. The Gripper Assembly, as shown in the image to the right, is the configuration for calibrating the VersaCart. Puck or Shaft picking components are added to this assembly and are shown in the following pages

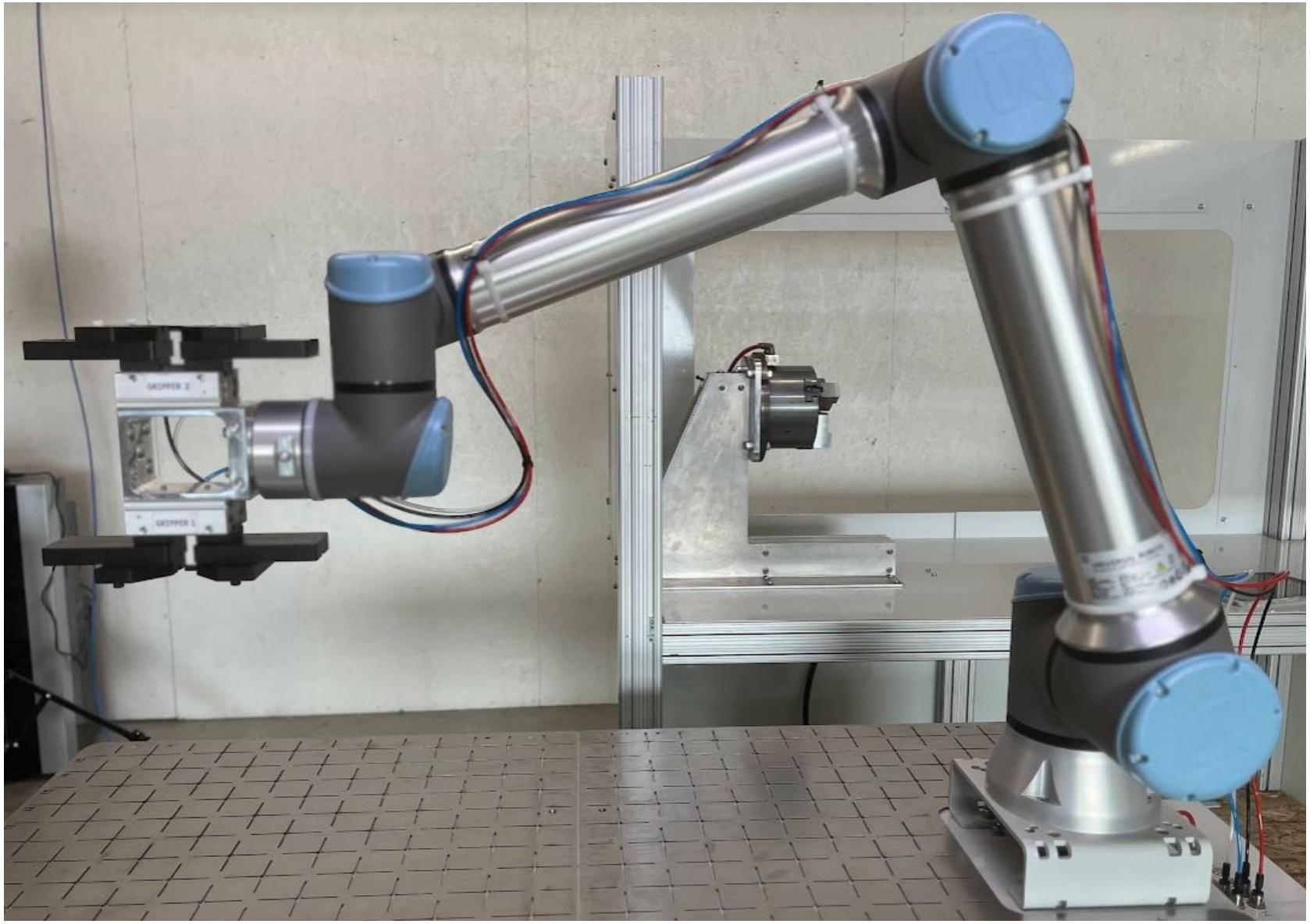


Route Double Headed Gripper Air Lines

- Insert the Gripper Air Lines into the gripper air fittings as shown
  - Blue tubing is Gripper 1 Open
  - Red tubing is Gripper 1 Close
  - White tubing is Gripper 2 Open
  - Black tubing is Gripper 2 Close
- See image to the right and on the following page, for line routing along the robot arm.
- Tubing attachment points use a large cable tie around the robot arm and a small cable tie attached to the large cable tie. Route all air lines through the small cable-tie.
- Attach tubing with cable ties (leave loose until the end), from the end of arm to the base. Start by connecting lines near the tool flange, then the elbow joint, then shoulder joint.
- Route tubing down to the base of the robot, then down through the hole under the robot base.
- Connect tubing to tubing from the VSC gripper lines, matching colors, with provided push-to-connection union fitting
- Tighten the cable ties and trim.



Route Double Headed Gripper Air Lines

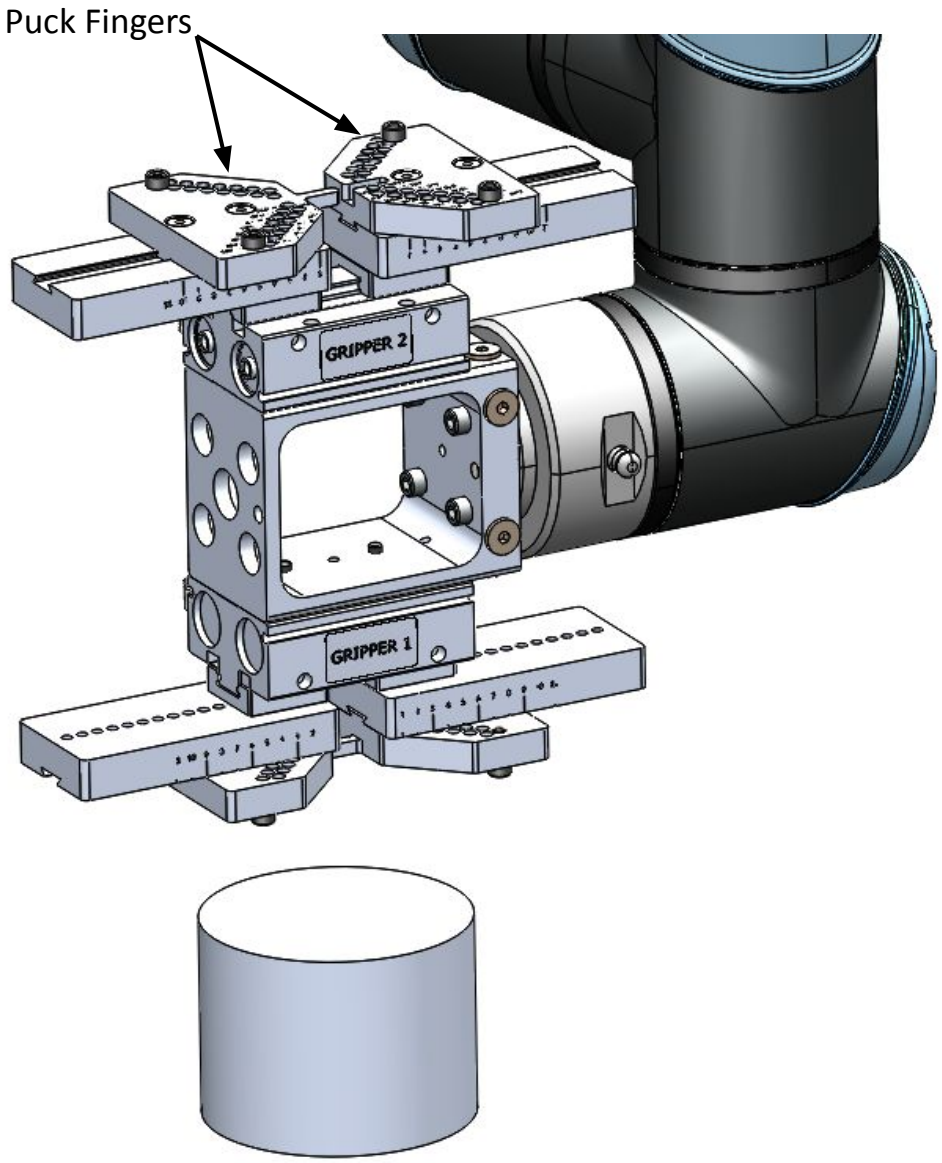


Double Headed Gripper, setup for **Puck** Picking

- Pucks are typically parts that are picked and placed with the flat face placed on the pick surface, see image to the right (z-axis of part is perpendicular to the table surface)

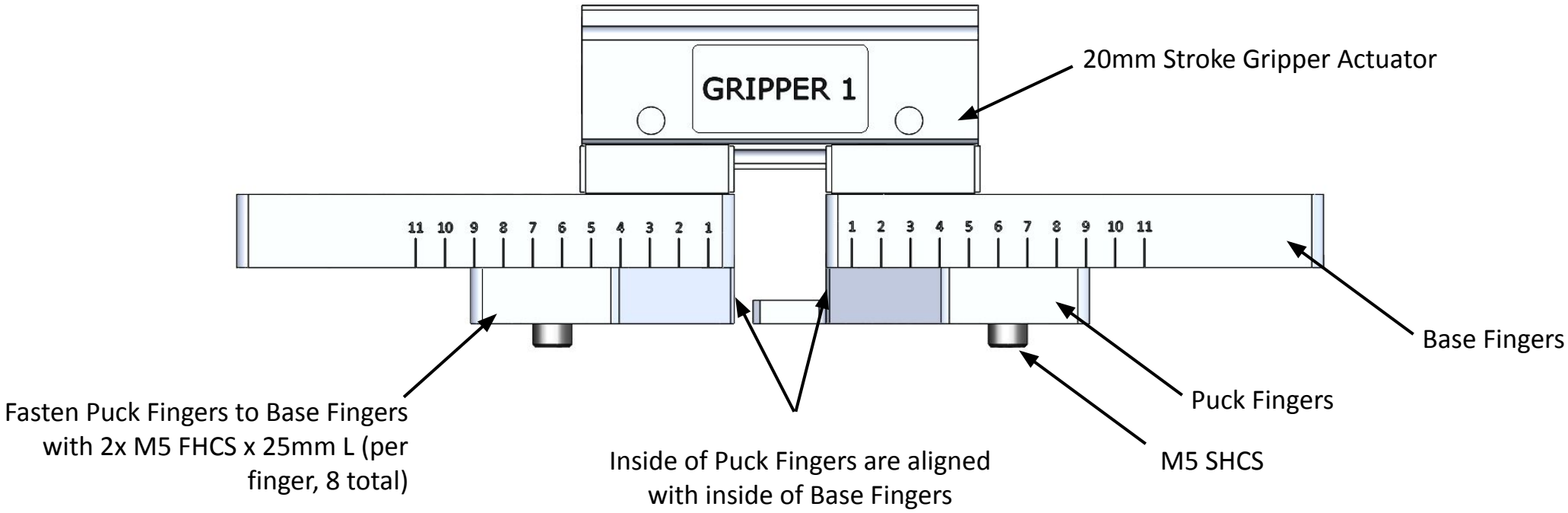
- Puck material can be located on the Versacart visual grid or positioned in a 3D locator to be picked with the Puck Fingers in the orientation shown on the right.

- Parts:
  - Puck Fingers (left and right) for each gripper
  - 8 x M5 FHCS x 25mm Length **connecting Puck Fingers to Base Fingers*
  - 4 x M5 SHCS x 12mm Length (steel) *picking interface
  - 4 x M5 SHCS x 12mm Length (plastic) *picking interface
  - M5 Headless Shoulder Bolt (steel) *picking interface
  - Location of M5 SHCS to pick part ranges is shown in the **Machinist Manual**

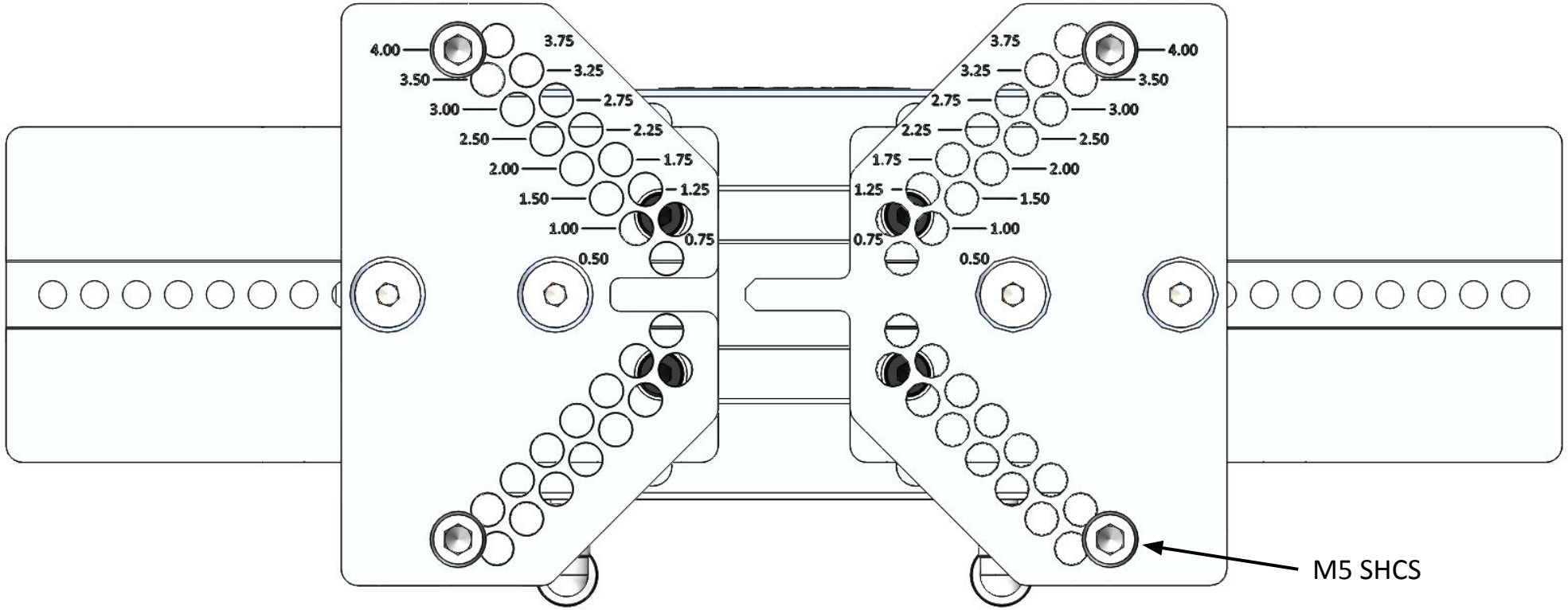


Double Headed Gripper, setup for **Puck** Picking

Puck Finger Assembly



Double Headed Gripper, setup for **Puck** Picking



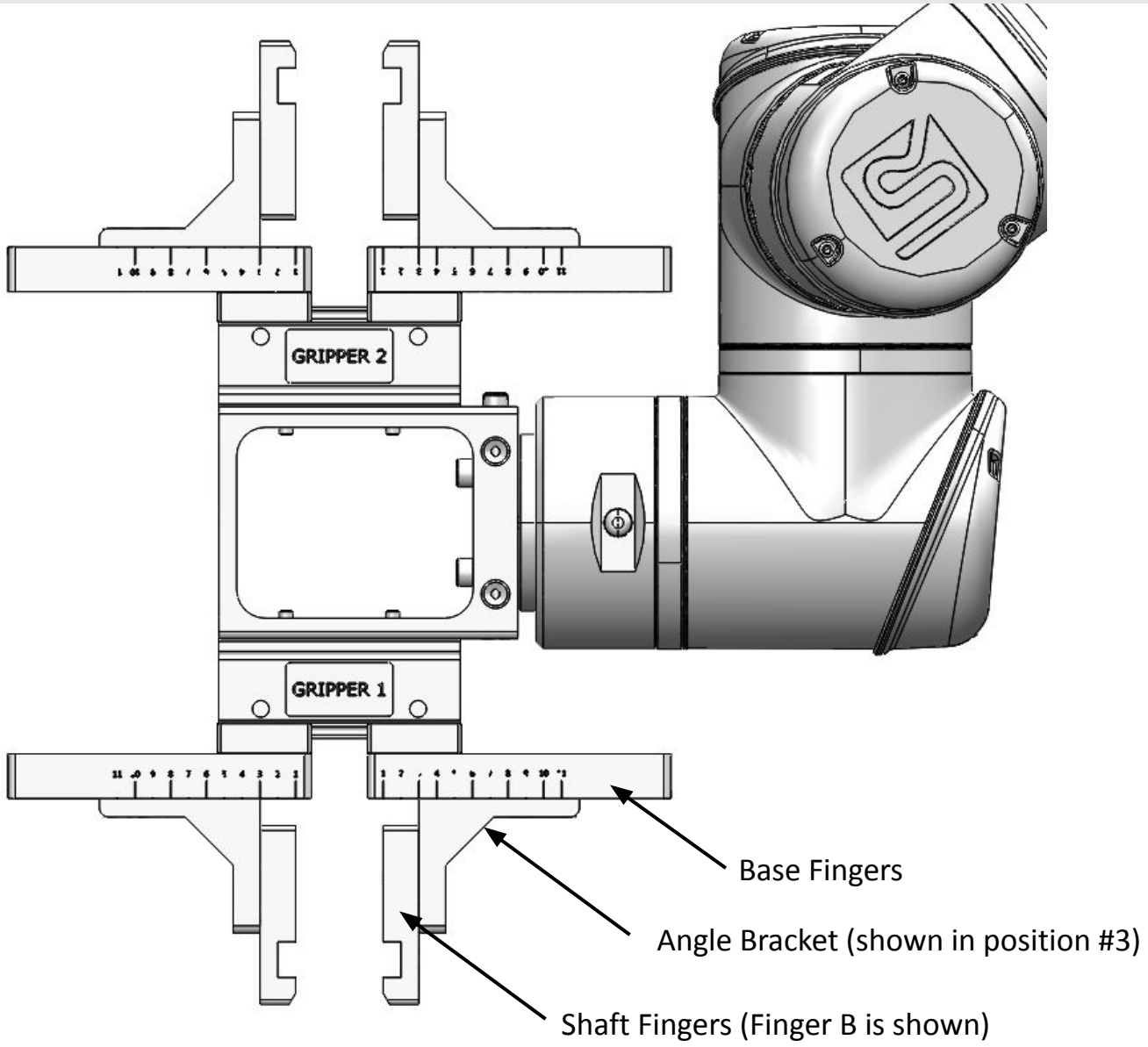
- Refer to the **Machinist Manual** for position of M5 Socket Head Cap Screws or Headless Shoulder Bolts.
- 3D Models of the Gripper are available on the VersaBuilt website for attaching custom fingers or part interfaces.
- For non-round material picking, Rectangular Puck Picking parts can be provided or Machinable Puck Fingers are available.
- Standard Puck Fingers allow for material from 0.50-inches to 4.25-inches. For larger material, oversized puck fingers are available.

Double Headed Gripper, setup for **Shaft** Picking

- Shafts are parts that are picked and placed with the round/radius tangent to the pick surface, see image to the right (z-axis of part is parallel to the table surface)

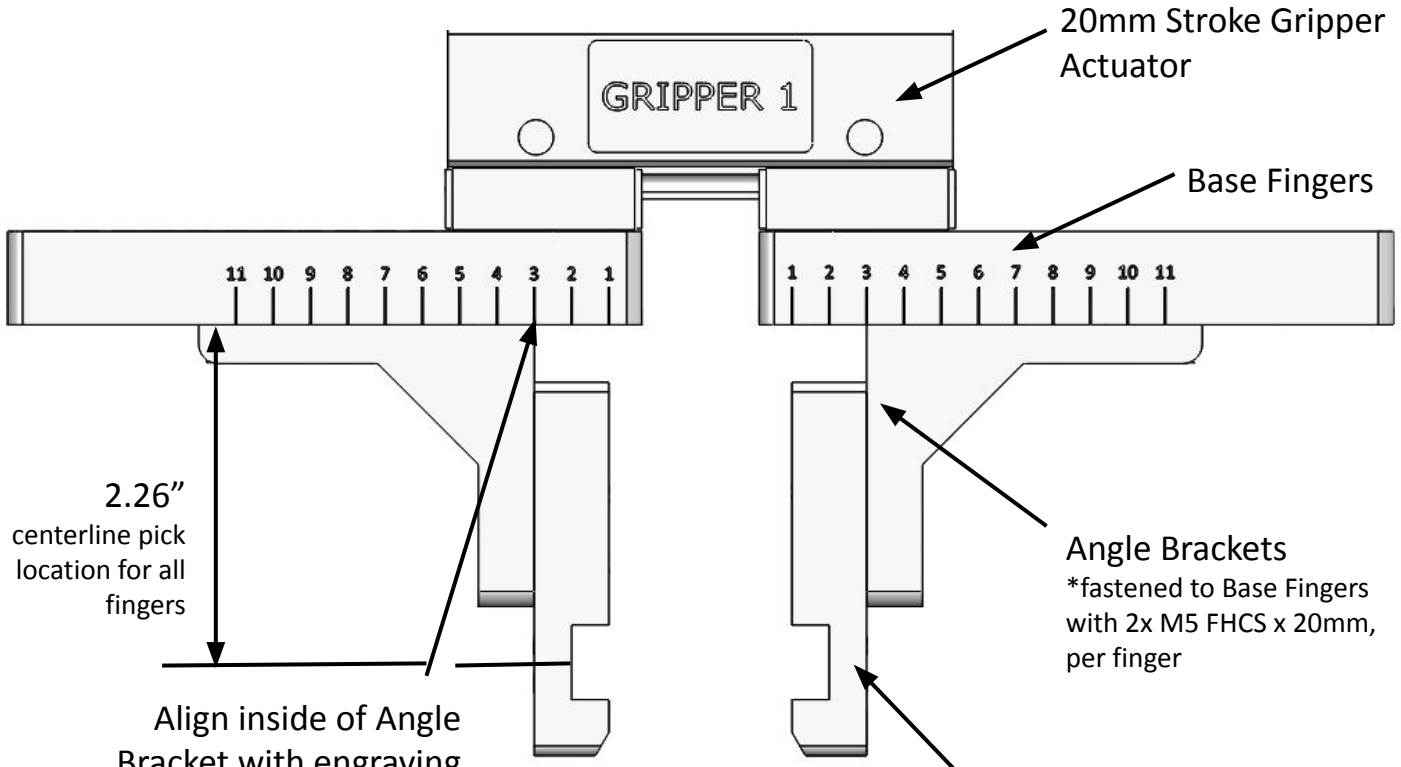
- Shafts are equivalent to round rod or shaft material that is typically too long or too unstable to be placed on the flat side on the infeed surface

- Parts:
  - 4 x Shaft Angle Brackets (2x for each gripper)
  - 2 x Shaft Fingers per gripper (type depends on material size, refer to guide on the following page)
  - 8 x M5 FHCS x 20mm Length (connecting Angle Bracket to Base Fingers)
  - Location of Shaft Angle Brackets is determined by part diameter, with guide showing location on the following page



Double Headed Gripper, setup for **Shaft** Picking

- Location of The L-Bracket relative to the Base fingers is shown in the **Machinist Manual**



Example Gripper setup for B3 Shaft Fingers
***Diameter range from 0.72-1.12”**

Double Headed Gripper

Note for Assembly of Fingers:

For both Puck and Shaft picking setup, the positional accuracy of the fingers is determined by the proper assembly with provided screws. To position with best accuracy, lightly tighten each screw, such that the head of the screw just touches the countersink. Then fully tighten each screw.

- Shaft Fingers are secured with M4 FHCS with 2.5mm Hex key
- Puck Fingers and Angle Brackets are secured with M5 FHCS with 3mm Hex Key

Network Configuration and Remote Mode

Section 3

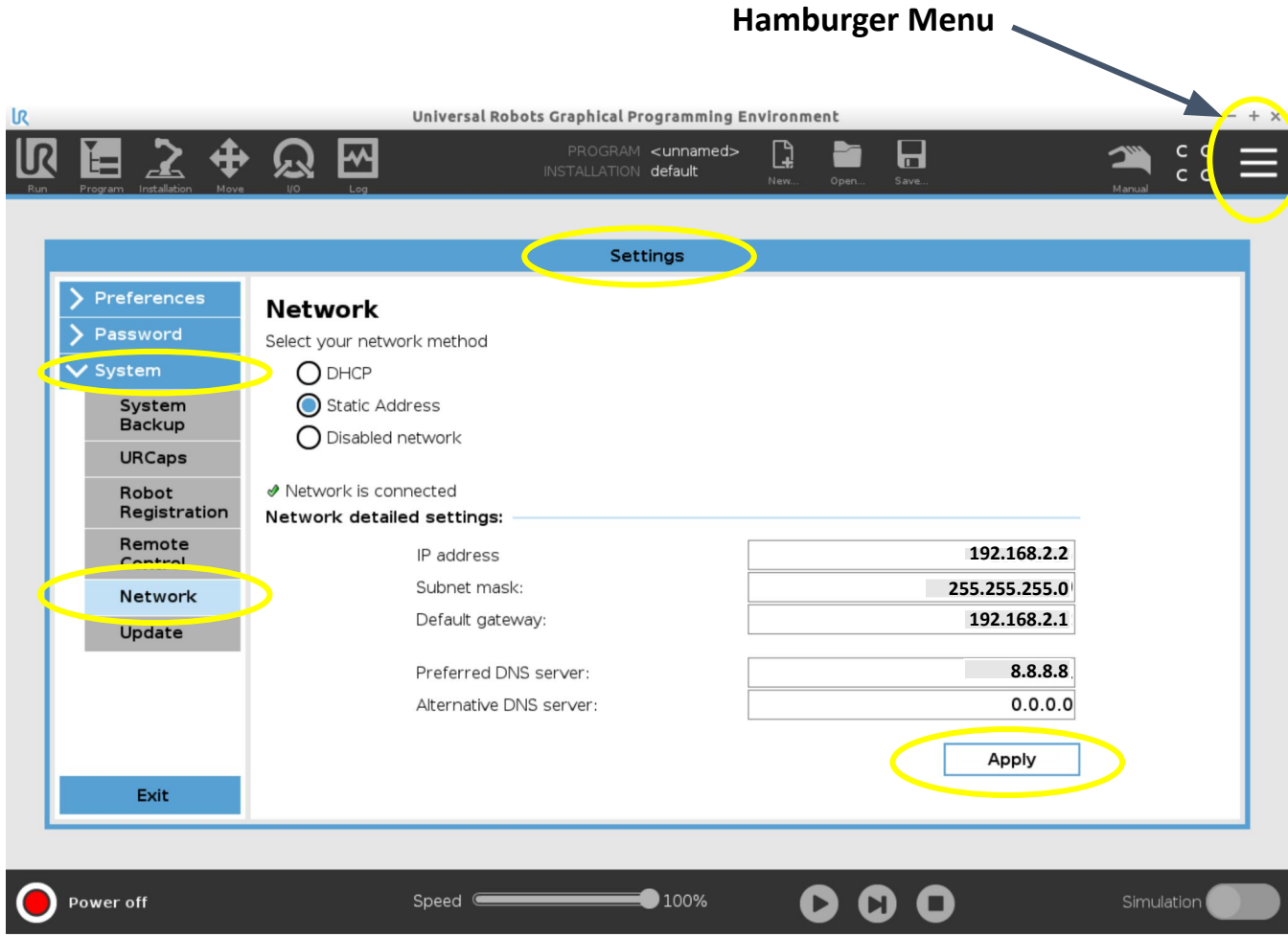
UR10e Network Settings

On UR Teach Pendant

- Navigate to the **Settings** page by clicking on the "Hamburger" menu (three horizontal bars in the upper right corner of the screen)
- Select **System**, then **Network**.
- Select **Static Address** for the network method. Enter the following Network detailed settings:

IP Address:	192.168.2.2
Subnet Mask:	255.255.255.0
Default Gateway:	192.168.2.1
Preferred DNS Server:	8.8.8.8
Alternate DNS Server:	0.0.0.0

Press the **Apply** button to save the changes.



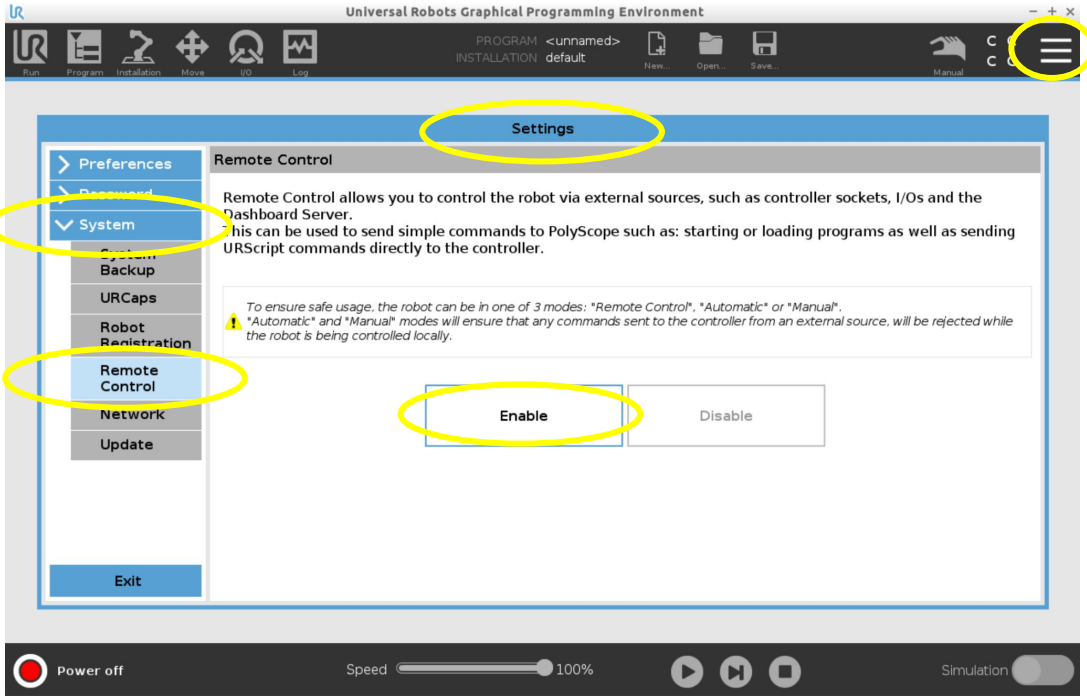
Enable Remote Control

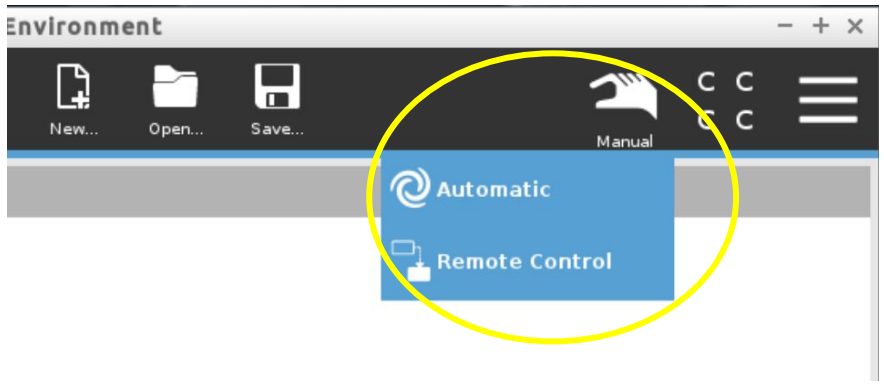
Enable Remote Control Option

- Navigate to the Settings page by clicking on the “Hamburger” menu (three horizontal bars in the upper right corner of the screen)
- Select System
- Select Remote Control.
- Press the **Enable** button, enabling ***the option*** to put the UR robot into remote control mode (*required for VSC to Robot communication*).

Enable Remote Control by the VSC

- When the Remote Control option is enabled, an icon will appear next to the “safety checksum”.
- Click on the icon and select the **Remote Control** option to allow the VSC to control the robot. To shift control back to the UR robot teach pendant, click on the icon and select Manual or Automatic mode.





Entering and Exiting Freedrive Mode

Section 4

UR10e Freedrive Mode

Freedrive:

Freedrive mode allows users to “drag-to-teach” the robot for calibration.

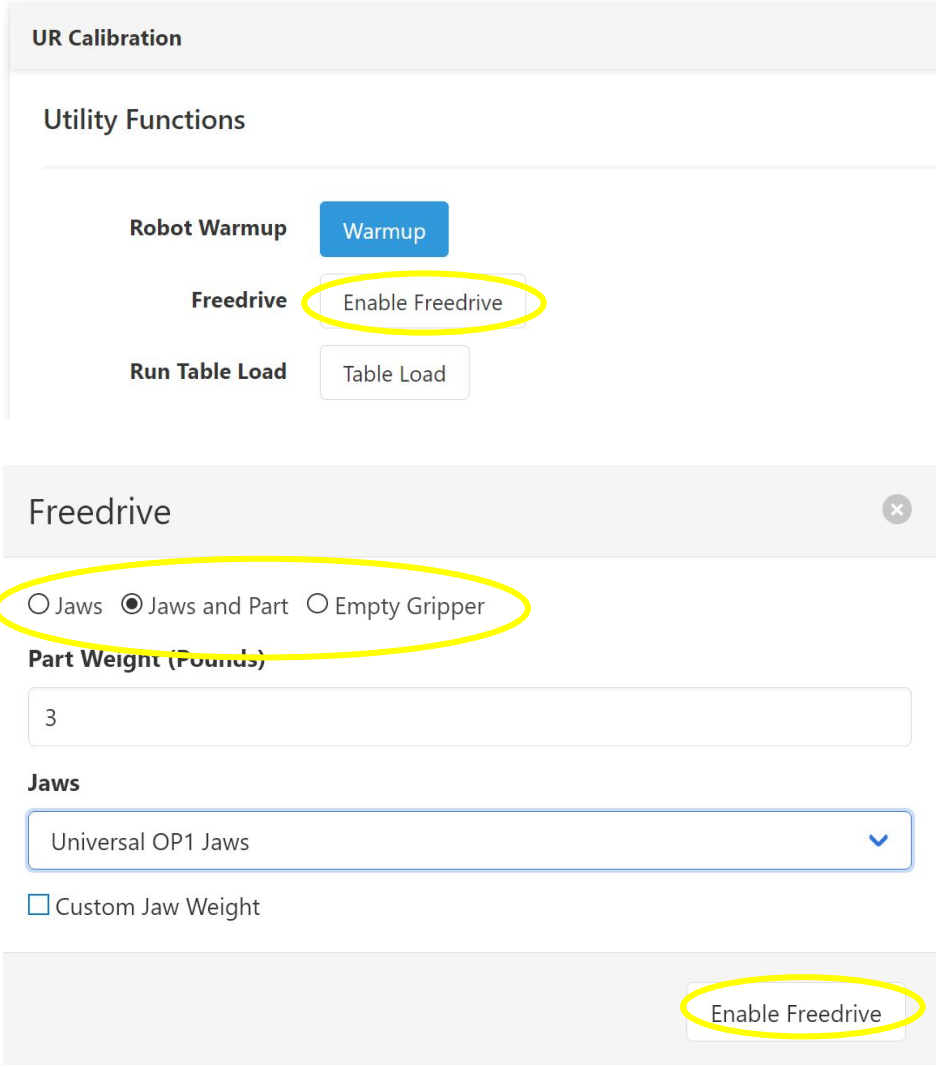
Calibration of the VersaCart table and the vises requires the robot to be placed into Freedrive mode. Additionally, Freedrive mode is sometimes useful when recovering from collision errors. The Enable Freedrive button is also available in the Extended Recovery panel.

Enable Freedrive:

1. Press the “Enable Freedrive” button
2. A popup will appear. Select the jaws the robot is holding from the drop-down menu:
   a. If the robot is holding the Calibration Plate or configured jaws, select the Calibration Plate or Jaws from the drop-down jaw menu.
   b. If the robot is also holding a part, enter the part weight.
   c. If the robot is not holding a part or jaws, select Empty Gripper
3. Select “Enable Freedrive”

Exiting Freedrive Mode

When finished with Freedrive mode, press the **Stop Program or Continue button** on the **UR Teach Pendant** to properly exit Freedrive mode. **Don’t dismiss the pop-up message on the VSC.** The pop-up message will disappear after the Stop Program button is pressed on the UR Teach Pendant.



Appendices

Cleaning and Maintenance

Daily Maintenance

Using a clean lightly-dampened cloth, wipe down robot arm and gripper removing any oil or chips.

Monthly Maintenance:

- Remove UR control cabinet air filter by pulling where the red arrows are shown
- Inspect and replace when air filter becomes visibly dirty

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