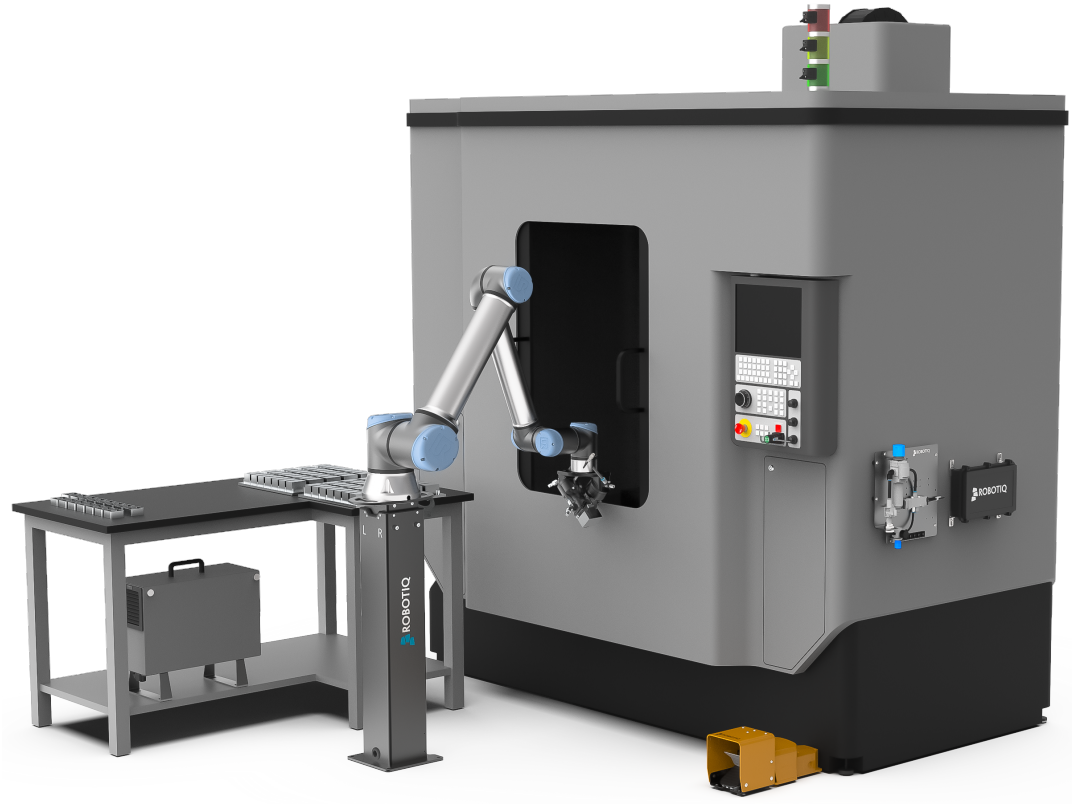
ROBOTIQ



ROBOTIQ MACHINE TENDING SOLUTION

Original Notice

Robotiq Machine Tending Solution for Universal Robots

Instruction Manual

LEAN ROBOTICS

robotiq.com | leanrobotics.org

Table of Contents

Revisions

Robotiq may modify this product without notice, when necessary, due to product improvements, modifications or changes in specifications. If such modification is made, the manual will also be revised, see revision information. See the latest version of this manual online at support.robotiq.com.

Revision 2022/07/25

- Updated Robotiq Controller Electrical Setup section

Revision 2022/07/22

- Initial release

1 General Presentation

The terms "Robotiq Machine Tending Solution" and "Machine Tending Solution" used in the following manual all refer to the Robotiq Machine Tending Solution and its pertaining components.

The Machine Tending Solution is a complete automation tool, made for industrial applications. It is compatible with most brands of milling machines, CNC machines and lathes.

Its design, flexibility and ease of use makes it a unique solution to automate several machine tending tasks, including, but not limited to: activate machine cycles, handle workpieces, raw, blank and finished parts, open and close the machine door, blow compressed air, open and close chucks, vise or other workholding device, and read the machine statuses in a manner to continue the manufacturing process.

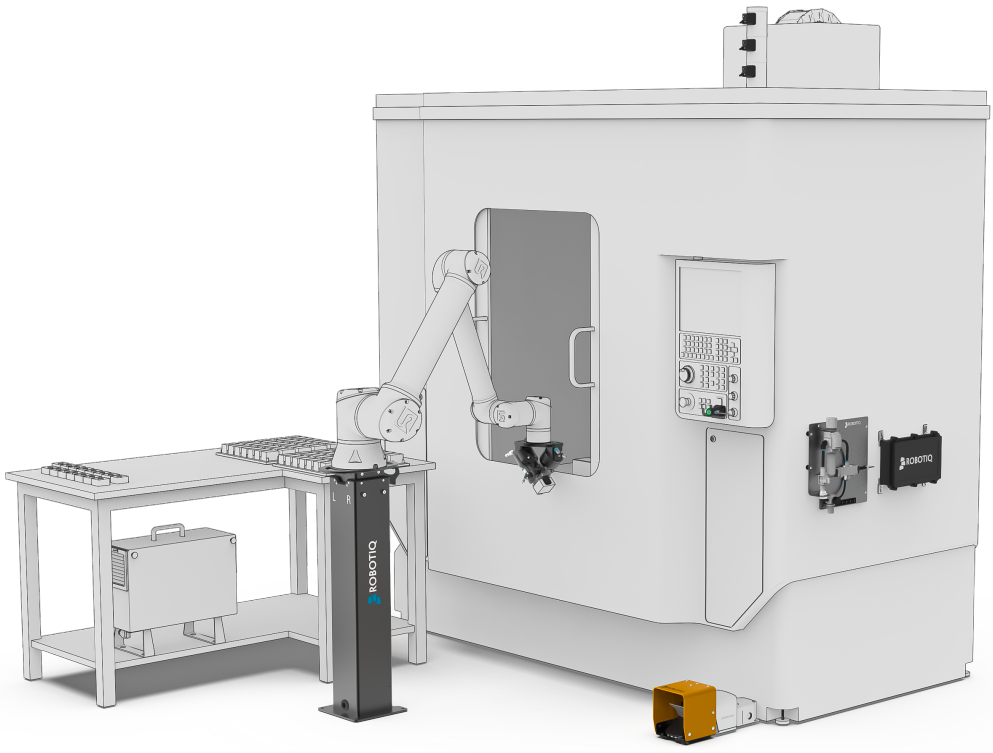


Fig. 1-1: Robotiq Machine Tending Solution

The standard Machine Tending Solution is composed of:

- 1x Button Activator
- 1x Hand-E Gripper
- 3 x Fingertip kits
- 1x Air Nozzle
- 3 x Stacklight Monitoring Sensors
- 1x Pneumatic Panel
- 1x Robotiq Controller

The following components are optional:

- 1x additional Button Activator
- 2 x additional Fingertip Kits
- 1x Foot Switch Activator
- 1x additional Hand-E Gripper
- 2 x mounting brackets and hardware for Dual Gripper configuration
- 1x Cable Management System

> **Info**
>
> The following manual uses the metric system. Unless specified, **all dimensions are in millimeters**.

> **Info**
>
> The following section presents the key features of the Machine Tending Solution and must not be considered as appropriate to the operation of the Solution. Each feature is detailed in the appropriate section of the manual.

11 Machine Tending Components

111 Button Activator

The Button Activator is a pneumatic actuator whose mechanical motion can activate different types of control components. It is typically installed on the control panel "Start Cycle" button in order to start the machine cycles, or on any other button activating a device.

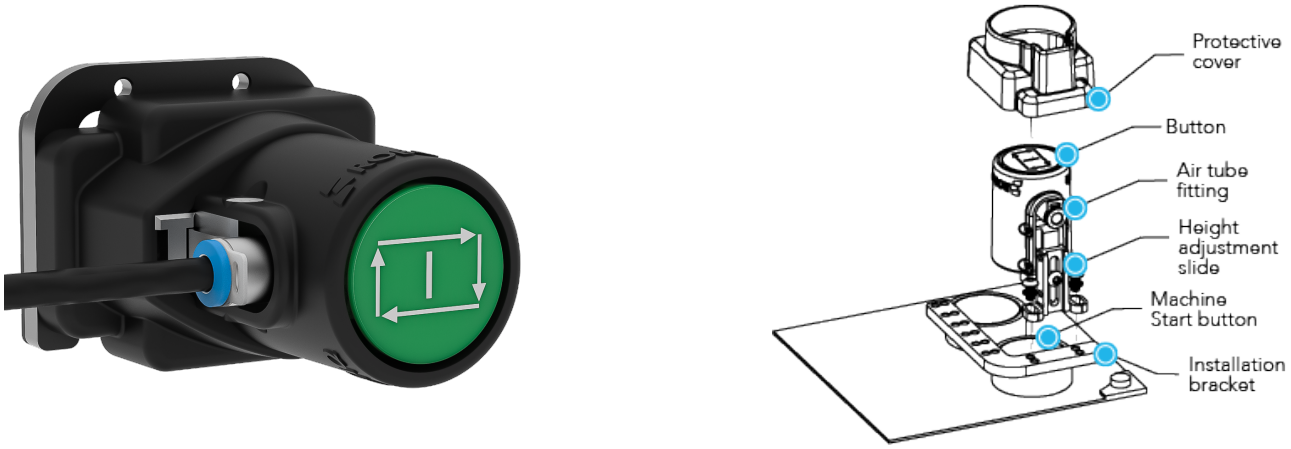


Fig. 1-2: Button Activator

> **Info**
>
> Even after the installation of the Button Activator, the machine can still be activated manually by pushing the Button Activator.

112. Hand-E Gripper

The Hand-E Gripper is a parallel gripper whose two fingers are actuated by a single motor. It is the end-of-arm tool of the robot. It can execute several machine tending tasks, such as handling parts, positioning parts in the workholding device and opening and closing the machine door. For more information about the Hand-E Gripper, refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

Fig. 1-3: Hand-E Gripper

113. Fingertips

Fingertips are mechanical assemblies installed to the Hand-E, making them the ends of the gripper. They move with the parallel mechanism of the Hand-E, allowing the fingertips to handle parts with a stable and strong grip.

The Flat nitrile butadiene rubber (NBR) Overmolded fingertips (as shown on the image above) are already installed on the Hand-E Gripper. See below for all the fingertip kits (standard and optional) and their typical use.

Item		Typical use	Standard or Optional
Flat NBR Overmolded Fingertips (already installed)		Square and rectangular parts	Standard

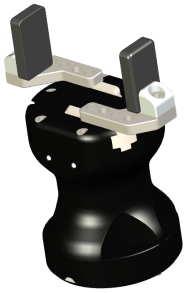
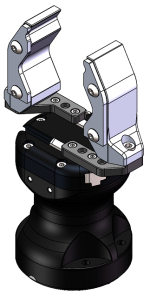
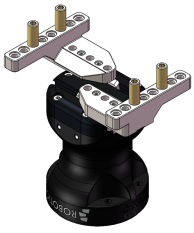
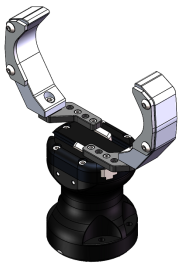
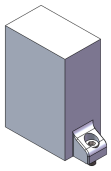
Flat NBR Overmolded Fingertips (on Adjustable Holders)		Larger square and rectangular parts	Standard
Small Radial Fingertips		Long and thin cylindrical parts	Standard
4 Stop Fingertips		Flat parts and small cylindrical parts	Standard
Large Radial Fingertips		Long and large cylindrical parts	Optional
Blank Fingertips		To customize	Optional

Table 1 - 1: Fingertips

114. Air Nozzle

The Air Nozzle is a mechanical assembly designed to conduct compressed air. It is the drying, blowing and cleaning tool of the Solution. It is attached to a Hand-E Gripper or the Compact Dual Hand-E Bracket (applicable for Dual Gripper only) and can be positioned in various angles and locations.

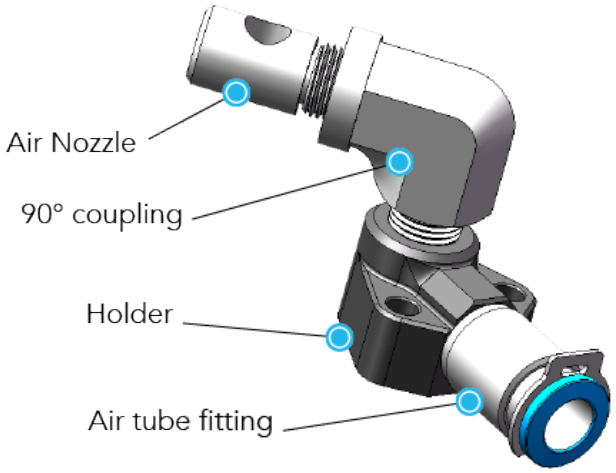
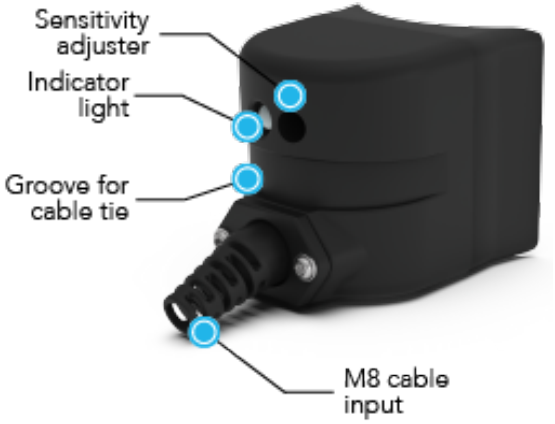


Fig. 1-4: Air Nozzle

115. Stacklight Monitoring Sensors

The Stacklight Monitoring Sensors are mechanical and electrical assemblies meant to read the statuses of the stacklight (using photodiode sensors). The Stacklight Monitoring sensors are designed to fit the shape of a stacklight (typically cylindrical), be attached to it and send the converted electrical signals through electrical cables. The sensors light sensitivity can be adjusted mechanically.



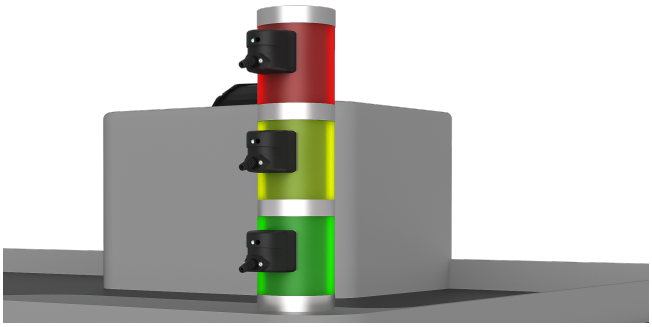


Fig. 1-5: Stacklight Monitoring Sensors

116. Pneumatic Panel

The Pneumatic Panel is composed of pneumatic and electrical components. In the standard scope of delivery, the Button Activator and the Air Nozzle are integrated and controlled via the Pneumatic Panel.

> **Info**
>
> An additional solenoid valve and additional fittings are included in the panel if an additional Button Activator and/or the Foot Switch Activator are part of the scope of delivery.

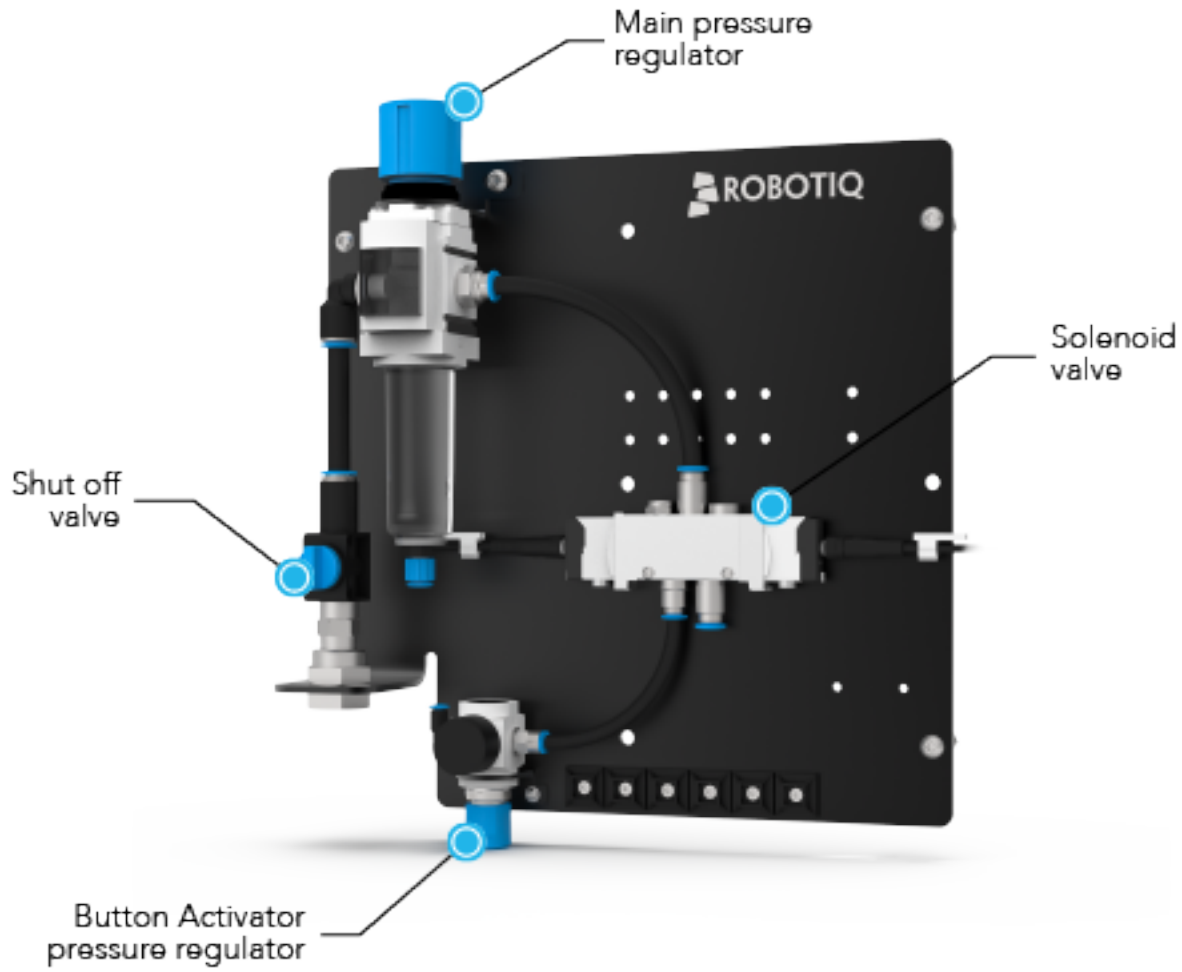


Fig. 1-6: Pneumatic Panel - single solenoid valve

117. Robotiq Controller

The Robotiq Controller is an electrical device used to send and receive electrical signals. It is an intermediate controller between electrical components and the robot controller. The Stacklight Monitoring Sensors and the solenoid valves are connected to it.

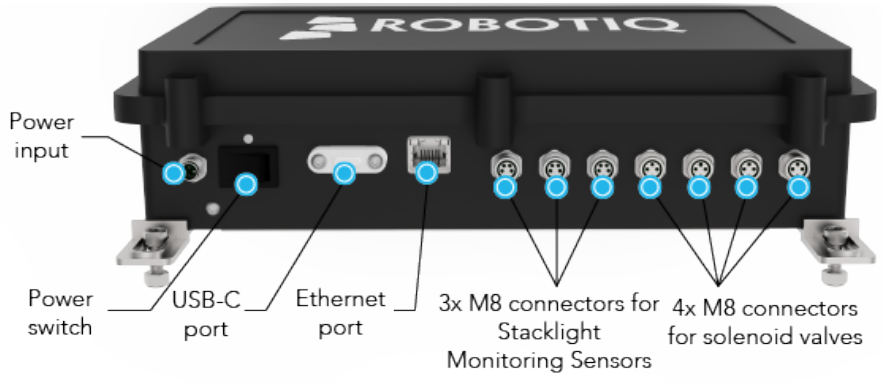


Fig. 1-7: Robotiq Controller

118. Foot Switch Activator (optional)

The Foot Switch Activator is a pneumatic actuator whose mechanical motion can activate different types of control components. It can be assembled to many types of foot switches, with or without an anti-trip safety latch, in order to activate the targeted component (such as chucks).

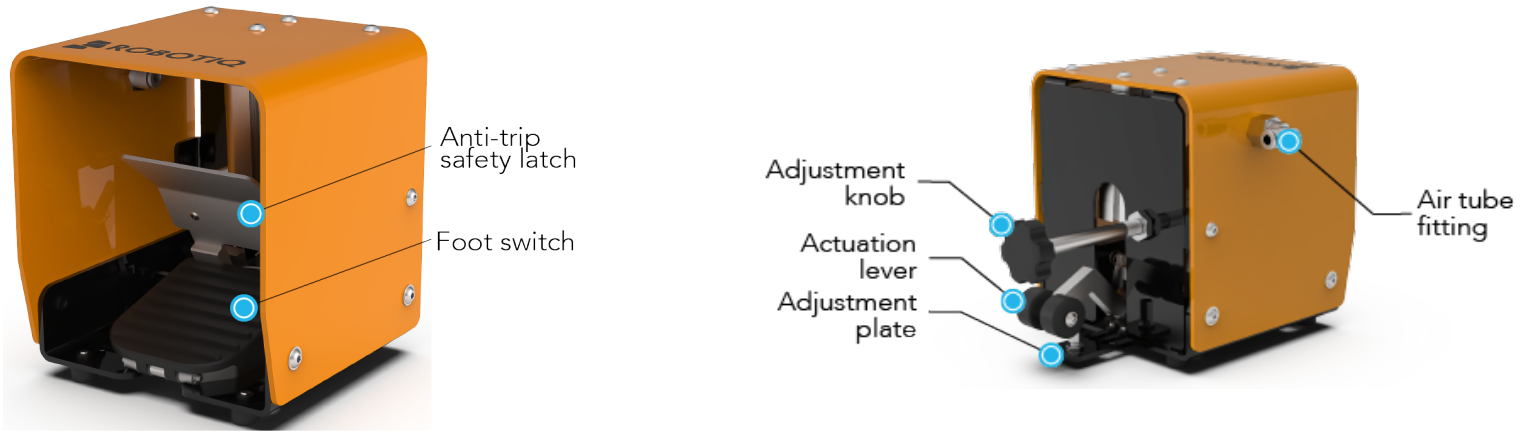


Fig. 1-8: Foot Switch Activator

Info

Even after the installation of the Foot Switch Activator, your foot switch can still be activated manually by pushing the Foot Switch Activator.

Dual Hand-E Gripper (optional)

The Dual Hand-E Gripper is an assembly of two Hand-E Grippers on a mounting bracket. The Dual Hand-E Gripper allows handling two parts simultaneously and therefore saves time.

> **Info**
>
> With the additional Hand-E Gripper, for each Fingertip Kit being part of the scope of delivery, an additional Fingertip Kit is included.

Fig. 1-9: Dual Hand-E Gripper on Compact Dual Hand-E Bracket

Fig. 1-10: Dual Hand-E Gripper on Dual Bracket

119. Cable Management Sleeve Kit (optional)

The Cable Management Sleeve Kit is a set of two solid sleeves with a hook-and-loop closure system (Velcro®) on each of them. The Cable Management Sleeve Kit is designed to hold wires and cables all together. It is typically wrapped around the robot arm and the cables that run along it.

2. Safety

Info

The term "operator" refers to anyone responsible for any of the following operations on the Robotiq Machine Tending Solution:

- Installation
- Control
- Maintenance
- Inspection
- Calibration
- Programming
- Decommissioning

Warning

The operator must have read and understood all of the instructions in the following manual before handling any parts of the Machine Tending Solution.

2.1 Disclaimer

The intent of this section is to provide general guidelines for the safe use and operation of the Robotiq Machine Tending Solution. Always follow local regulations.

This documentation explains the various components of the Robotiq Machine Tending Solution and general operations regarding the whole lifecycle of the product from installation to operation and decommissioning.

Robotiq accepts no liability for damage, injury or any legal responsibility incurred directly or indirectly from the use of this product.

The operator shall observe safe and lawful practices including but not limited to those set forth in this document.

The drawings and photos in this documentation are representative examples; nonetheless, discrepancies may be observed between those and the delivered product.

2.2. Warnings, Risk Assessment and Final Application

Caution

Any use of the Machine Tending Solution in non-compliance of these warnings and/or outside the intended use is inappropriate and may cause injury or damage.

Caution

It is the cobot integrator's duty to ensure that all local safety measures and regulations are met.

Warning

- Air supply must be dry and filtered according to ISO 8573-1 class 7.4.4.
- Air supply pressure should optimally be set between 6 bar and 8 bar (87 psi and 116 psi).
- The tubing should be properly secured before pressurizing the equipment.
- Always bring the air pressure back to 0 psi before removing any tubing.
- Never operate the equipment with leaking or worn tubing.
- All components need to be properly secured before operating the robot.
- Do not install or operate any equipment that is damaged or lacking parts.
- Never supply the equipment with an alternative current source.
- Make sure all cord sets are always secured at both ends, the Hand-E gripper’s or other end effector and the robot’s.
- Always meet the recommended keying for electrical connections.
- Make sure no one is in the robot’s or Hand-E Gripper’s / end effector vicinity before initializing the robot's routine.
- Always meet the Gripper's payload specifications.
- Keep body parts and garments away from the equipment while the device is powered on.
- Do not use the equipment on people or animals.
- Always wear all recommended personal protective equipment in accordance with your workplace's safety standards, including:
  - Safety glasses;
  - Steel-toe boots
- At a pressure of 6 bar and a distance of 1 m, the Air Nozzle emits noise at 110 dB. Please enforce the appropriate workplace, local, state, or federal regulations in terms of hearing PPE.

The Robotiq Machine Tending Solution is meant to be used with Universal Robots collaborative robots. The robot, Hand-E Gripper(s) or other end effector, Button Activator, Air Nozzle, Stacklight Monitoring Sensors, Pneumatic Panel, Robotiq Controller, Foot Switch Activator (when applicable) and any other equipment used in the final application must be evaluated via a thorough risk assessment.

The following non-exhaustive list presents risks that must be assessed during the integration process:

- Risk of pinching between the end effector and the processed objects or the surrounding environment.
- Risk of pinching between the moving and stationary parts of the robot.
- Risk of pinching by the machine door when operated by the robot.

Depending on the application, there may be hazards that require additional protection and/or safety measures. For instance, the part handled by the end effector could be inherently dangerous to the operator.

2.3. Intended Use

The Robotiq Machine Tending Solution is designed to load and unload parts to or from a machine. For example, blank parts or machined parts to or from milling or lathe machines.

> **Info**
>
> The Solution is intended to be used with a UR3e, UR5e, UR10e or UR16e from Universal Robots with Polyscope software version 5.12.2 or greater as of the release date of this document.

The unit should be used exclusively within the range of its technical data. Any other use of the product is deemed improper and unintended use. Robotiq will not be liable for any damages resulting from any improper or unintended use.

3. Installation

The following subsections will guide you through the installation and general setup of your Robotiq Machine Tending Solution.

Warning

Before installing:

- Read and understand the **Safety** section
- Verify your package according to the Scope of delivery and your order. Make sure you have the required parts, equipment and tools.

Warning

When installing:

- Meet the recommended **Environmental and Operating Conditions**.
- Do not operate the Machine Tending Solution, or even turn on the power supply, before it is firmly anchored or mounted, and the danger zone is clear.
- Make sure the air supply is secured.

Warning

- Failure to properly secure and install the equipment can result in material damage and serious bodily injuries. In addition, note that in situations where the installation is not compliant, the warranty is void.
- Make sure to follow all the safety rules and regulations of your workplace while using the Machine Tending Solution. Always wear all recommended personal protective equipment in accordance with your workplace's safety standards.
- Always lift heavy objects with your legs, not your back. If you can not lift an object alone, ask for help or find another method to move it.

3.1 Scope of Delivery

The Machine Tending Solution - Single Hand-E is composed of:

- 1x Button Activator
- 1x Hand-E Gripper
- 1x Fingertip Starting Kit, including:
  - 1x Flat NBR Overmolded Fingertip kit (already installed)
  - 1x Flat NBR Overmolded Fingertip kit (on Adjustable Holders)
  - 1x Small Radial Fingertip kit
  - 1x 4 Stops Fingertip kit
- 1x Air Nozzle
- 3 x Stacklight Monitoring Sensors
- 1x Pneumatic Panel
- 1x Robotiq Controller
- 1x Robotiq Machine Tending Copilot license dongle

The Machine Tending Solution - Dual Hand-E has the same components than the Single Hand-E Solution but it also includes:

- 1x additional Hand-E Gripper
- 1x Dual Bracket (V configuration) for Dual Gripper configuration
- 1x Compact Dual Hand-E Bracket (X configuration) for Dual Gripper configuration

The following components are optional:

- 1x additional Button Activator
- 1x Foot Switch Activator
- The following Fingertip kits:
  - 1x Large Radial Fingertip kit
  - 1x Blank Fingertip kit
- 1x Cable Management Sleeve Kit

> **Info**
>
> Each Hand-E gripper has its own Fingertip Starting kit.

3.2. Environmental and Operating Conditions

Condition	Robotiq Controller	Stacklight Monitoring Sensors	Button Activator	Air Nozzle	Pneumatic Panel	Foot Switch Activator
Min. storage temperature	-20°C (-4°F)	-20°C (-4°F)	-20°C (-4°F)	-20°C (-4°F)	-20°C (-4°F)	-20°C (-4°F)
Max. storage temperature	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)
Minimum operating temperature	5°C (41°F)	5°C (41°F)	5°C (41°F)	5°C (41°F)	5°C (41°F)	5°C (41°F)
Max. operating temperature	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)
Humidity (non-condensing)	20-80%	20-80%	20-80%	20-80%	20-80%	20-80%
IP rating	IP42	IP50	IP42	IP66	IP65	IP52
Environment	• Free from corrosive liquids or gases • Free from explosive liquids or gases					

Table 3 - 1: Environmental and operating conditions

Info

For the environmental and operating of the Hand-E Gripper, refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

3.3. Air Supply

Caution

- The incoming air supply must deliver a minimal flow of 300L/min and a pressure of 6 to 8 bar (87 to 116 psi).
- Use dry and filtered air only. Follow the ISO 8573-1, class 7.4.4 standard. We recommend using a local pressure regulator with a filter and air dryer.

3.3.1 Connecting the Compressed Air Supply Line

1. Compressed air must be supplied to the Pneumatic Panel according to the **Pneumatic Panel** mechanical specifications.
2. The air supply tubing must be connected and disconnected to, or from, the inlet port, only when the line is depressurized.
3. To protect against whipping hazard, the air supply tubing must be securely attached to the robot arm. An air fuse can also be installed.

3.3.2. Depressurizing the Supply Line

In order to safely depressurize the supply line, turn off the shut off valve on the Pneumatic Panel. Refer to the **Pneumatic Panel** section to locate the shut off valve.

3.3.3. Disconnecting the air tubes

In this section is indicated, for each pneumatic component, how and where to connect the air tubes. To remove an air tube, follow the indications below (all the air tube fittings are push-in fittings):

Caution

The compressed air supply line must be depressured before performing the following steps.

1. Remove the safety clip.
2. Push the blue ring to the bottom and, while the ring is still to the bottom, pull the air tube.

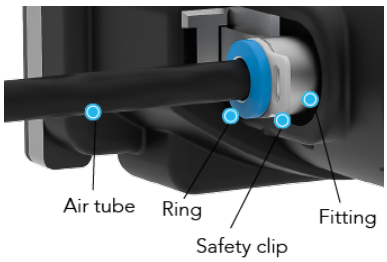


Fig. 3-1: Air tube removal from push-in fitting

Caution

Always put back in place the safety clip once the air tube is removed.

3.4. Reception of the Solution

3.4.1 Visual Inspection

Before and after opening the packages, inspect them to make sure there is no damage or defect. If damage or defects are discovered, please contact the Robotiq support team at support@robotiq.com.

3.5. Mechanical Installation

Warning

Failure to properly secure and install the equipment can result in material damage and bodily injury. In addition, note that the warranty will not cover material damage resulting from an installation that did not comply with the instructions found in this manual.

3.5.1 Robot

Caution

It is the user responsibility to correctly install the robot at the right place. This section serves only as a guideline.

Tip

A minimum of two people is recommended to perform the following steps.

1. The distances from the center of the robot to each key waypoint should be within the values shown in the table below:

UR cobot	Minimal distance (mm) [1]	Maximal distance (mm) [2]
UR3	300	500
UR5		850
UR16		900
UR10		1300

Table 3 - 2: Minimum and maximum distances from robot's center

[1] Respect minimum distance guidelines to avoid robot collisions.

[2] The maximum distance represents the maximum usable distance of the robot arm.

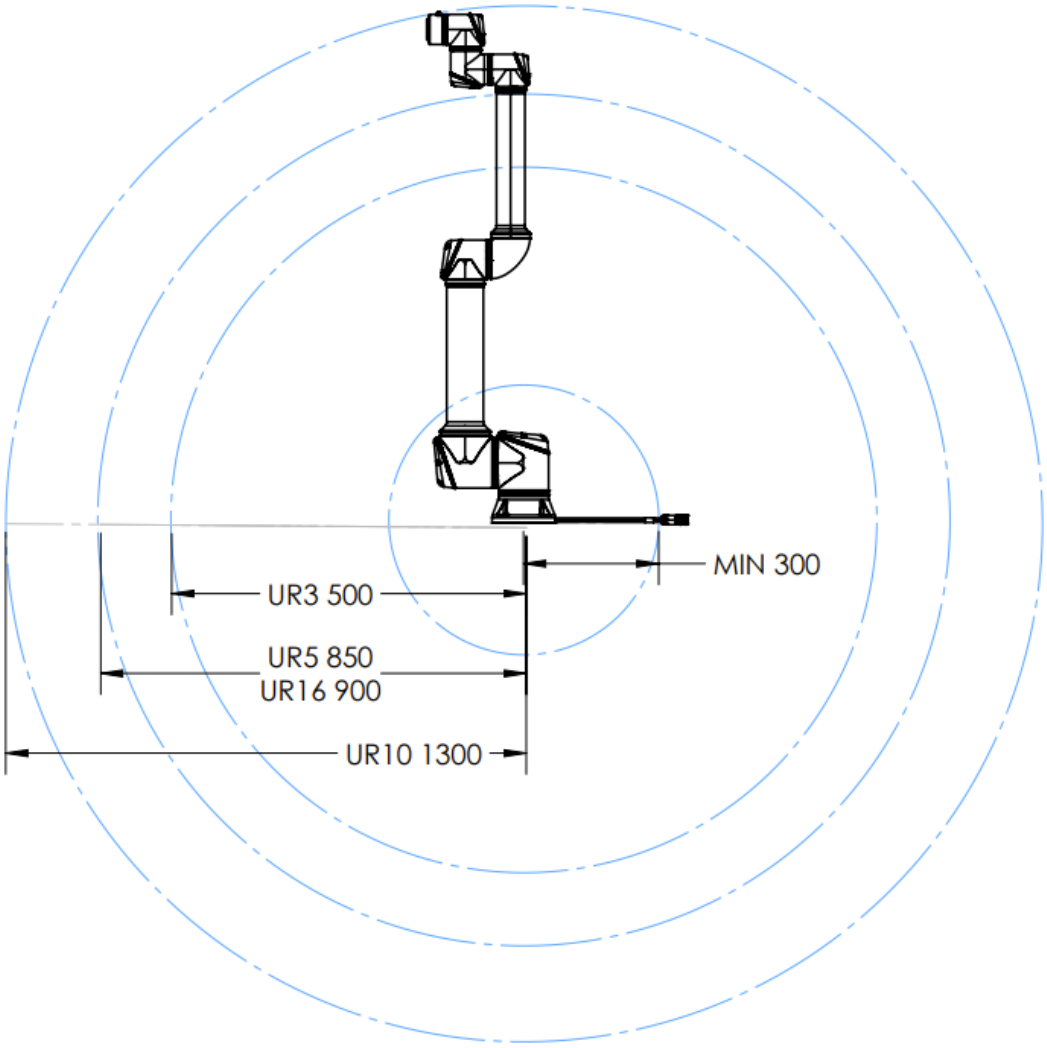


Fig. 3-2: Minimum and maximum distances from robot's center

2. Using a tape measure (not provided), test various locations to verify the minimal and maximal distances. Go through all the key waypoints of your process, such as:
    - Infeed zone
    - Workholding
    - Opened door
    - Closed door
    - Outfeed zone
    - Any other necessary key waypoint.

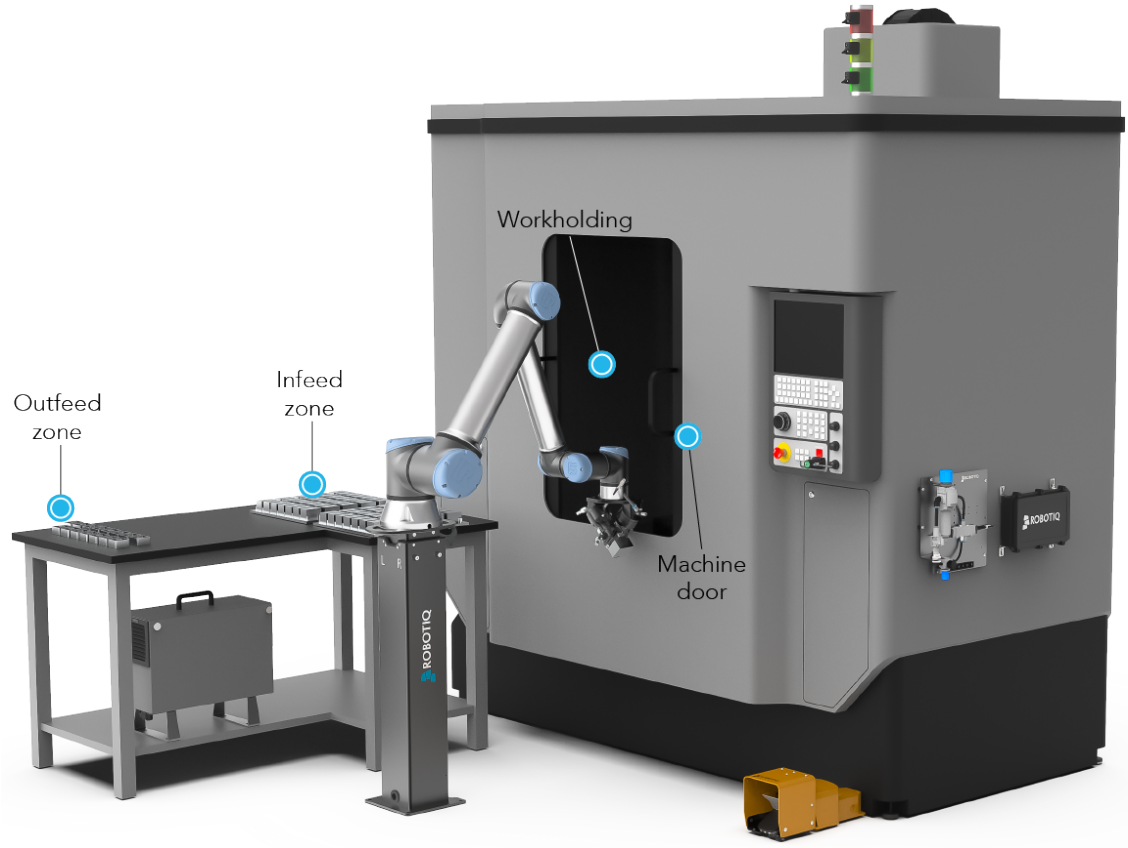


Fig. 3-3: Typical working environment - example only

3. Determine the height of the robot according to your work environment. For optimal results, the robot's second joint should be at the same height as the workholding.

Fig. 3-4: Set the height of the robot

4. Refer to Universal Robots instructions to mount the robot. You can go to www.universal-robots.com.

3.5.2. Robotiq Controller

Required Tools and Equipment

Included:

- 1x Robotiq Controller
- 1x 10 m power cable
- 1x 10 m protective earth cable
- 1x 9.14 m (30 ft) Ethernet cable (RJ45 cable)
- 1x USB/Ethernet adapter
- 4 x brackets
- 4 x Phillips head screws
- 4 x M5 screws
- 4 x M5 nuts
- 1x M6 nut (for earth screw connection)
- 1x 2 mm hex key
- 1x 4 mm hex key
- 1x 8 mm wrench

Not Included:

- Drill
- Phillips screwdriver # 2
- Terminal block screwdriver

> **Info**
>
> Only the Stacklight Monitoring Sensors (three c) and the solenoid valves from the pneumatic panel (two to four cables) are connected to the Robotiq Controller.

Installation

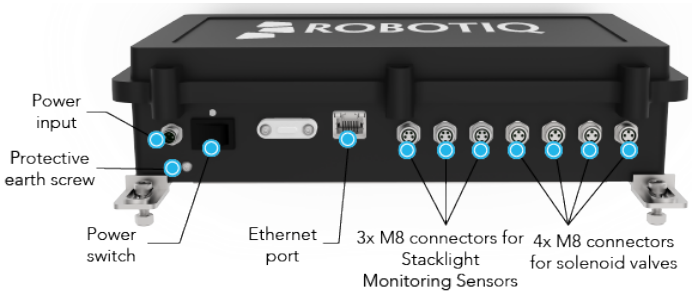


Fig. 3-5: Robotiq Controller

1. Identify the location where the Robotiq controller will be installed: it should be positioned so electrical cables will not encumber the working environment.

2. There are two options to install the Robotiq Controller: with the double face tape (already applied under the controller) or with brackets.

With double face tape:

a. With isopropyl alcohol, clean the zone where the double face tape will be applied.

b. Remove the protective film from the double face tape under the Robotiq Controller. Install the Robotiq Controller at its final location.

c. Hold pressure for 60 seconds.

> **Warning**
>
> The double face tape is really hard to remove once installed. Be certain of the Robotiq Controller location before installing it.

With brackets:

a. Using the four Phillips head screws and a Phillips screwdriver # 2 (not provided), install the four brackets at the four corners, under the Robotiq Controller.

b. Using the four M5 screws, the four M5 nuts, the 8 mm wrench (to hold the nuts) and the 4 mm hex key, install the Robotiq Controller at its final location.

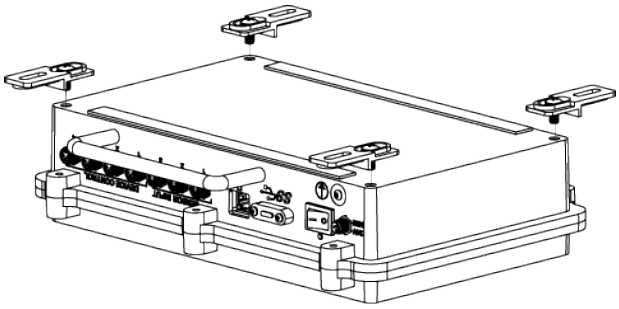


Fig. 3-6: Installing the brackets under the Robotiq controller

> **Warning**
>
> Make sure installing the Robotiq Controller on your machine does not alter any type of warranty or certification.

3. Earth screw connection:

a. Using the 2 mm hex key, remove the protective earth screw on the Robotiq Controller.

b. Insert the screw in one end of the protective earth cable (protective earth ring terminal) and, using the 2 mm hex key, put the screw back in place.

c. Connect the other end of the protective earth cable inside the robot controller, to the screw marked with earth symbols ("Protective earth for application"). The M6 nut for the screw connection on the robot side is in the provided kit.

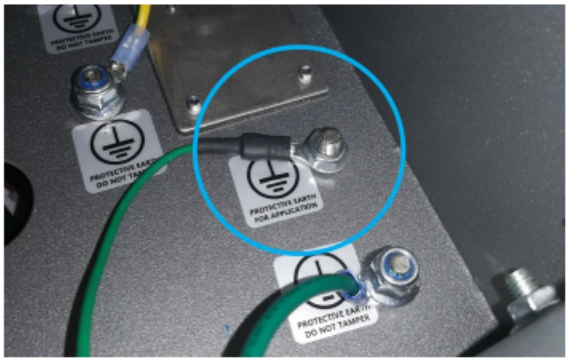


Fig. 3-7: Connecting the protective earth cable in the robot controller

4. For the electrical setup, refer to the **Installation** section.

3.5.3. Pneumatic Panel

Required Tools and Equipment

Included:

- 1x Pneumatic Panel
- 1x Thread adapter G3/8 to NPT 3/8
- 2 x Solenoid valve cables
- 2 x 10 m M8 cables
- 4 x M6 screws
- 4 x M6 nuts
- 4 x 12.7 mm plastic spacers
- 1x 4 mm hex key
- 1x 10 mm wrench

Not included:

- Drill

Caution

- The incoming air supply must deliver a minimal debit of 300L/min and a pressure of 6 to 8 bar (87 to 116 psi).
- Use dry and filtered air only. Follow the ISO 8573-1, class 7.4.4 standard. We recommend using a local pressure regulator with a filter and air dryer.

Installation

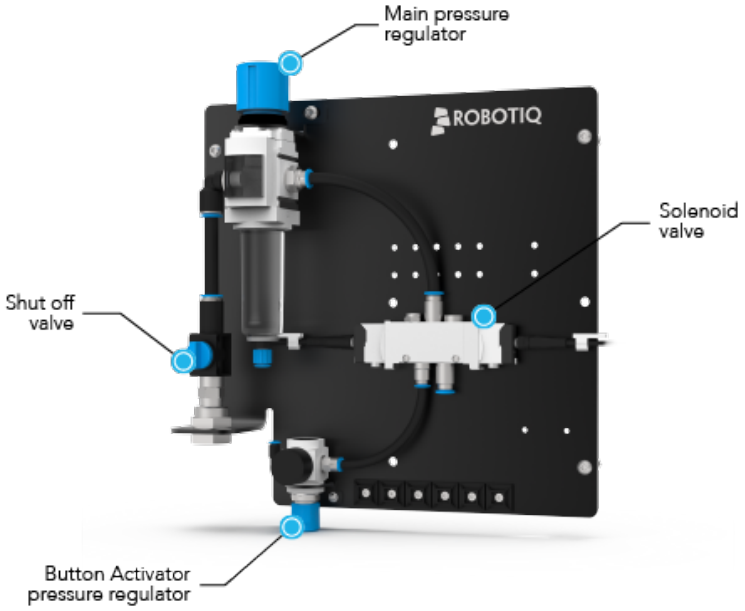


Fig. 3-8: Pneumatic Panel

1. The standard Machine Tending Solution comes with a single solenoid valve that feeds the Button Activator and the Air Nozzle. If you ordered the Foot Switch Activator, additional components are included but are not assembled to the Pneumatic Panel. Refer to the **Foot Switch Activator** section to assemble the additional components.
2. Identify the location where the Pneumatic Panel will be installed. Keep in mind the length of the air tubes:
   - 5 m long for the Button Activator
   - 8 m long for the Air Nozzle
   - 5 m long for the Foot Switch Activator (optional)
3. Using the four M6 screws, the four M6 nuts, the four 12.7 mm plastic spacers, the 10 mm wrench and the 4 mm hex key, install the Pneumatic Panel at its final location.
   - The nuts are installed behind the surface where the Pneumatic Panel is installed.
   - The plastic spacers are installed between the Pneumatic Panel and the surface where it is installed.

> **Warning**
>
> Make sure installing the Robotiq Controller on your machine does not alter any type of warranty or certification.

4. Install the provided thread adapter and connect the air supply.
5. Open the shut off valve.
6. Connect the solenoid valve cables (from two to four, depending on your scope of delivery): connect the male ends to the Robotiq Controller. Tighten the rings.

Fig. 3-9: Connectors for solenoid valves

3.5.4. Button Activator

Required Tools and Equipment (for each Button Activator)

Included:

- 1x Button Activator
- 1x protective cover
- 1x "L" shaped Installation Bracket
- 1x "U" shaped Installation Bracket
- 1x "L" shaped double face tape
- 1x Button Activator Cover
- 1x Cycle Start sticker
- 2 x M3 screws
- 2 x M3 washers
- 2 mm hex key
- 1x 4 mm air tube (5 m long)

Not included:

- Isopropyl alcohol.

Installation

1. Each Button Activator is installed on the control panel with a "L" or "U" shaped bracket and double face tape. Choose the shape of the bracket according to the following points.
   - the location of the Start button
   - the space around the Start button
   - the shape of the Start button.

If both brackets can fit, select the "U" shaped bracket as it frames the button better.

Info

There are printable templates of the brackets (on a 1:1 scale) in the **Appendix**.

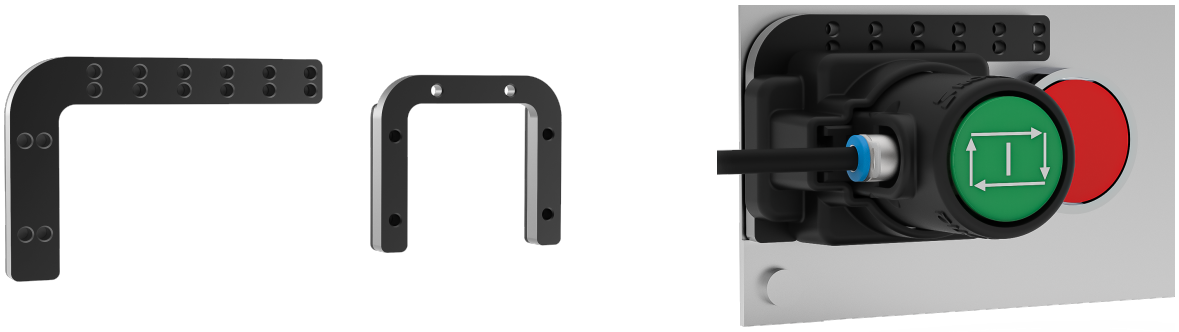


Fig. 3-10: "L" and "U" shaped brackets

Caution

- If the "L" shaped bracket must be used, position the Button Activator (when possible) in the corner of the "L".
- Do not forget to consider the air tube that will come out of the Button Activator.
- Whether it is "L" or "U" shaped, the bracket should be opened at the bottom so that dust and other particles do not accumulate under the Button Activator(s).

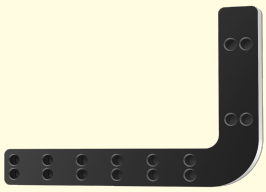


Fig. 3-11: "L" bracket closed at the bottom

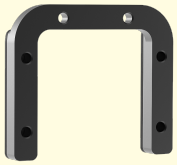


Fig. 3-12: "U" bracket opened at the bottom

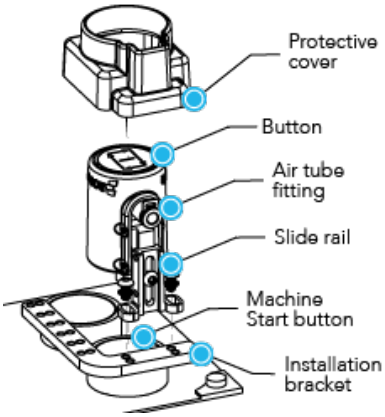


Fig. 3-13: Installing the Button Activator

2. Without applying the double face tape now, make some tests to identify the position of the bracket:
    a. Remove the protective cover.
    b. The Button Activator must be centered over the Start Button: position the bracket accordingly.
    c. Align the Button Activator et with the holes on the bracket. The "L" bracket offers more flexibility in terms of the holes positioning.
    d. If space is really tight on the panel, the slide rail can be turned over to gain a few millimeters. With the 2 mm hex key, loosen the slide rail screw, turn over the slide rail and put the screw back without tightening it.
    e. Push slowly the Button Activator to see if the cylinder hits the center of the Start button.
    f. Note or mark the final position of the bracket on the panel.
    g. The double face tape is already applied on the "U" bracket, but not on the "L" bracket (as it is reversible). If the "L" bracket is selected:
        a. Clean it with isopropyl alcohol.
        b. Remove the protective film of one face of the "L" double face tape and apply it on the bracket.
        c. Hold pressure for 60 seconds.
    h. With isopropyl alcohol, clean the zone on the panel where the bracket tape will be applied.
    i. Remove the protective film of the double face tape on the bracket and install the bracket on the panel.
    j. Hold pressure for 60 seconds.

Warning

The double face tape is really hard to remove once installed. Be careful when applying it.

Caution

Wait 24 hours after application before using the Button Activator.

3. Install the Button Activator on the selected holes of the bracket using the two M3 screws, the two Belleville washers (with the convex side upward) and the 2 mm hex key.

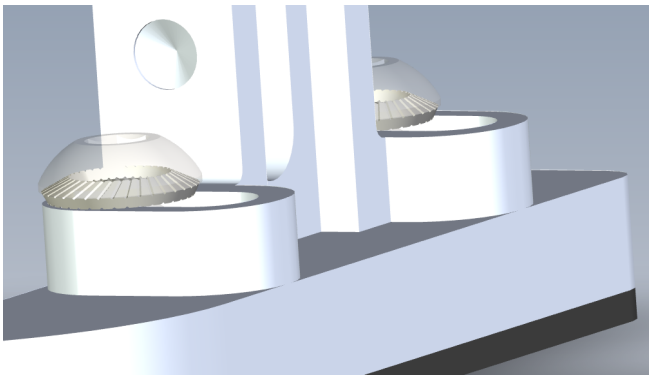


Fig. 3-14: Orientation of the M3 washers

> **Caution**
>
> Do not overtighten the screws as it would strip them: stop as soon as the screws block.

4. At rest, the Button Activator's cylinder should barely touch the Start button. To modify the height, adjust the slide rail until the cylinder is in a range of 1mm from the Start button. Then with the 2 mm hex key tighten the slide rail screw.

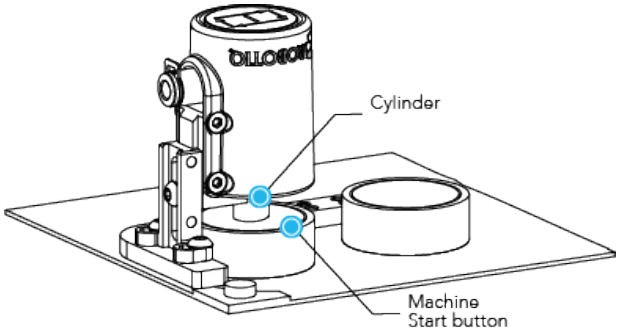


Fig. 3-15: Adjusting the height

5. Test manually the Button Activator to see if it does activate the machine.
6. Install the protective cover (optional, but recommended). Do not install it if one or more of these situations are encountered:

- the protective cover blocks a light signal
- the protective cover obstructs other buttons
- the bracket ("L" or "U" shaped) is closed at the bottom. Dust and other particles would accumulate under the Button Activator and be trapped by the protective cover.

7. Once the Button Activator is installed, the Cycle Start icon should display horizontally. If the orientation of the Button Activator causes the icon to display vertically, apply horizontally the provided Cycle Start sticker on the existing one.

Fig. 3-16: Cycle Start sticker

8. Connect the 4 mm air tube to the Button Activator. Push it until it can not go further, then ensure the safety clip is properly installed.
9. Cut the 4 mm air tube to the right length and connect the other end to the pneumatic panel, to the 4 mm fitting just aside the Button Activator pressure regulator. Push it until it can not go further.

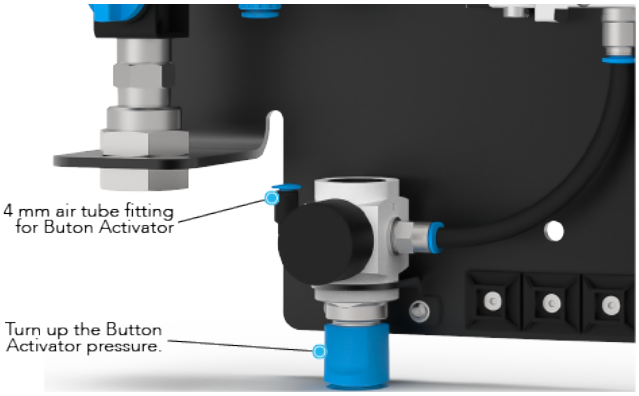


Fig. 3-17: Air tube fitting for Button Activator on pneumatic panel

10. On the Pneumatic Panel:
    a. Slowly turn up the Button Activator pressure until the Activator Button is pushed to the bottom.
    b. Check manually if you can push it any further: if you can, repeat the previous step. If not, go to next step.
    c. Add another bar to the Button Activator pressure regulator than lock the pressure.

3.5.5. Single Hand-E gripper

Required Tools and Equipment

Included:

- 1x Hand-E Gripper
- 1x Coupling
- 1x Wrist Camera (optional)
  - 1x tool plate
  - 1 x 4-port USB hub.
  - 1 x USB license dongle
- 2 x M4 screws
- 4 x M5 screws
- 4 x M5 washers
- 4 x M6 screws
- 4 x M6 washers
- 1x 3 mm hex key
- 1x 4 mm hex key
- 1x connection protector

Installation on the Robot Tool Flange

1. Mount the coupling on the robot arm, using the coupling dowel pin to align the parts. Then fasten the coupling with the 4 mm hex key, the four M6 screws and the four M6 washers.
2. Secure the gripper to the coupling using the four M5 screws, the four M5 washers and the 4 mm hex key. Carefully align the small fragile pins.
3. Connect the coupling cable.
4. Install the connection protector using the two M4 screws and the 3 mm hex key.
5. To activate the gripper, refer to the **Activating the Gripper(s)** section.

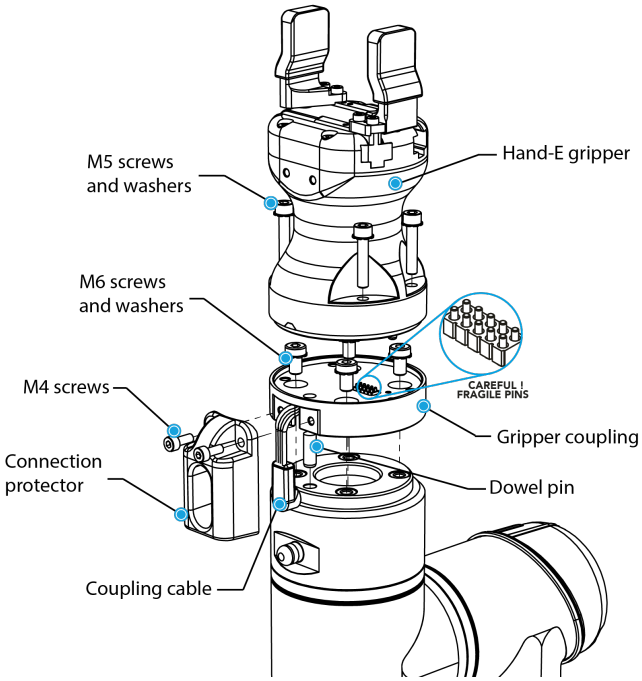


Fig. 3-18: Installing the Hand-E on the robot tool flange

Installation with the Wrist Camera (optional)

> **Caution**
>
> With a single Gripper, the Wrist Camera replaces the coupling.

1. Place the Wrist Camera on the robot arm. Align the Wrist Camera dowel pin with the tool flange.
2. Using the 4 mm hex key, fasten the Wrist Camera with the four M6 screws and the four M6 washers.
3. Run the Wrist Camera's cable along the robot arm and secure it.
4. Secure the Gripper to the Wrist Camera using the four M5 screws, the four M5 washers and the 4 mm hex key. Carefully align the small fragile pins.
5. Refer to the **Connecting the Wrist Camera** section to connect the Wrist Camera.
6. To activate the gripper, refer to the **Activating the Gripper(s)** section.

3.5.6. Dual Hand-E gripper

Required Tools and Equipment

Included:

- 1x additional Hand-E Gripper
- 1x additional coupling
- 1x Dual Bracket
- 1x Compact Dual Hand-E Bracket
- 1x Wrist Camera (optional)
  - 1x tool plate
  - 1 x 4-port USB hub.
  - 1 x USB license dongle
- 1x M8 splitter
- 1x connection protector
- 4 x M4 screws
- 2 x M4 washers
- 4 x M5 screws
- 4 x M5 washers
- 8 x M6 screws
- 8 x M6 washers
- 1x 3 mm hex key
- 1x 4 mm hex key

Installation of the Wrist Camera (optional)

> **Caution**
>
> The Wrist camera and the tool plate can only be installed on the Dual Bracket (V configuration), not on the Compact Dual Hand-E Bracket (X configuration).

1. Place the Wrist Camera on the tool flange. Align with the dowel pin already installed on the Wrist Camera.
2. Insert a dowel pin into the top part of the Wrist Camera. Then, using the dowel pin to aligh the parts, place the tool plate unto the Wrist Camera.
3. Insert a dowel pin into the tool plate.

4. Run the Wrist Camera's cable along the robot arm and secure it.
5. Refer to the **Connecting the Wrist Camera** section to connect the Wrist Camera.

Dual Bracket and Grippers Installation

When installing multiple grippers on a robot, every gripper must have its own coupling .

1 Using the dowel pins to align parts, mount the chosen Dual Bracket on the tool flange (or the tool plate, if you use the Dual Bracket with the Wrist Camera). With the 4 mm hex key, fasten the Dual Bracket using the four M6 screws and the four M6 washers.

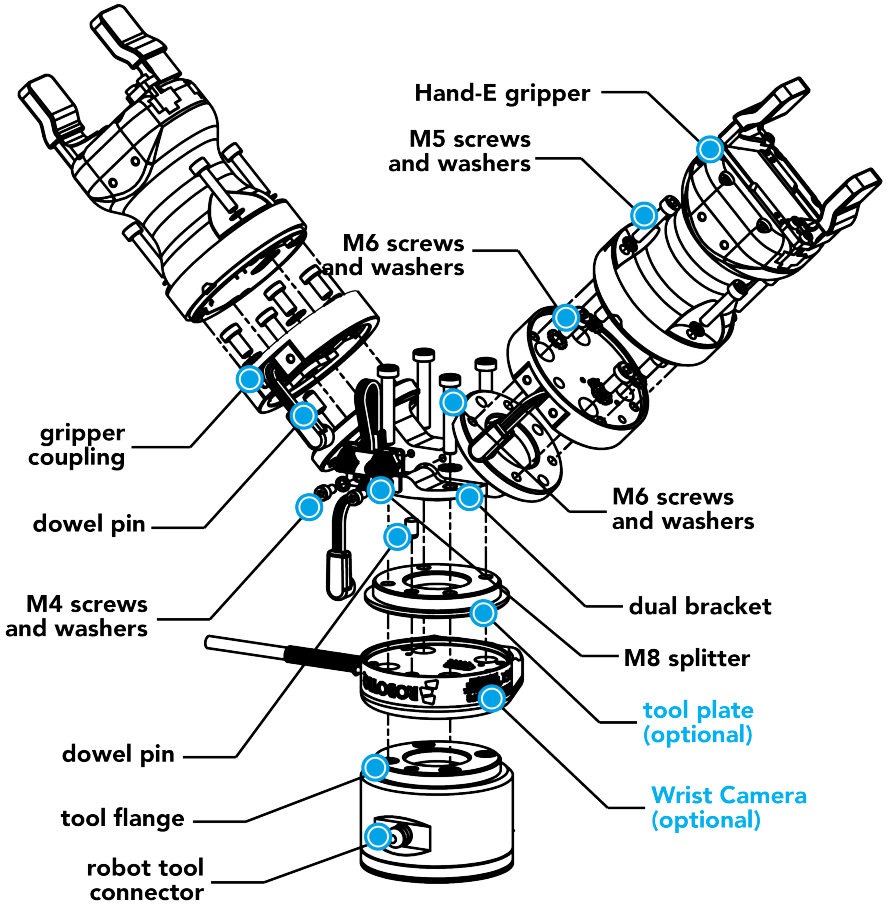


Fig. 3-19: Installing Dual Hand-E Gripper on Dual Bracket

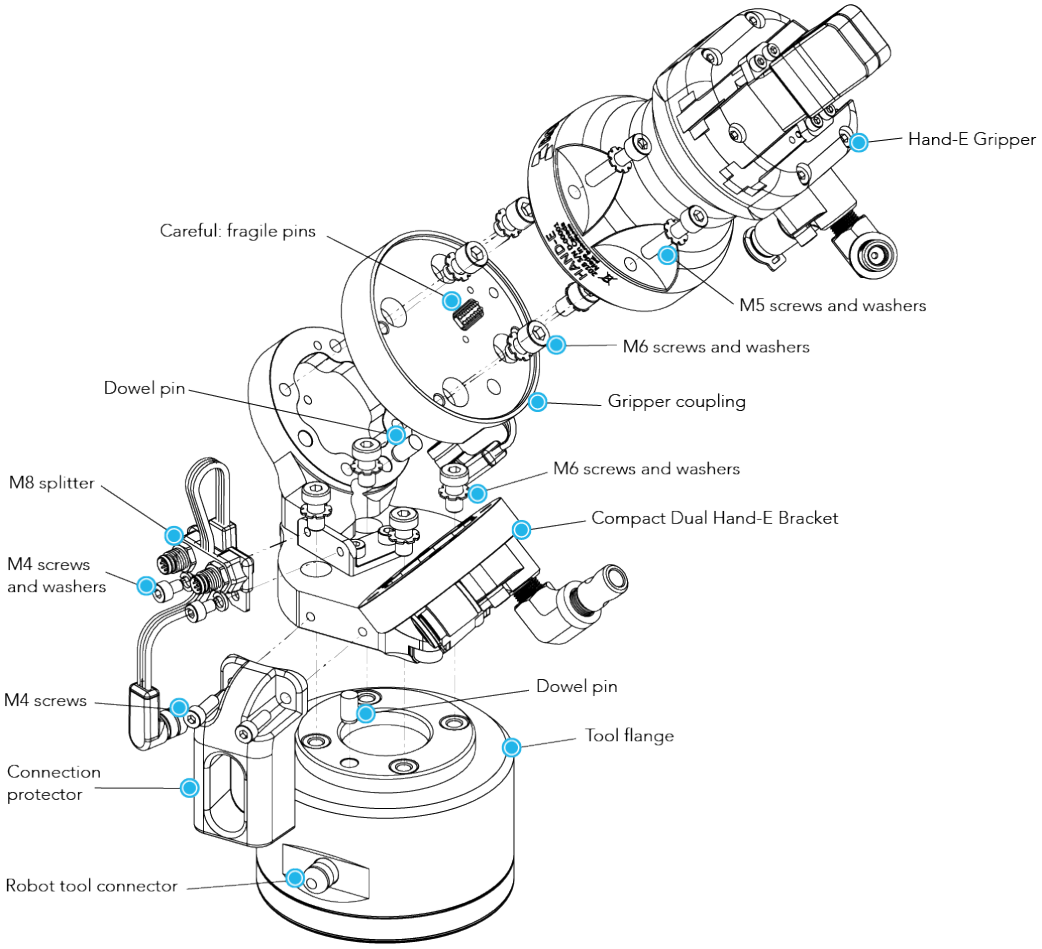


Fig. 3-20: Installing Dual Hand-E Gripper on Compact Dual Hand-E Bracket (only one Gripper shown)

2. Mount both gripper couplings on the Bracket using the dowel pins to align parts. With the 4 mm hex key, fasten the Bracket using the four M6 screws and the four M6 washers (for each coupling).

3. Mount both grippers on the couplings (carefully align the small fragile pins) and, with the 4 mm hex key, fasten them using the four M5 screws and the four M5 washers (for each coupling).

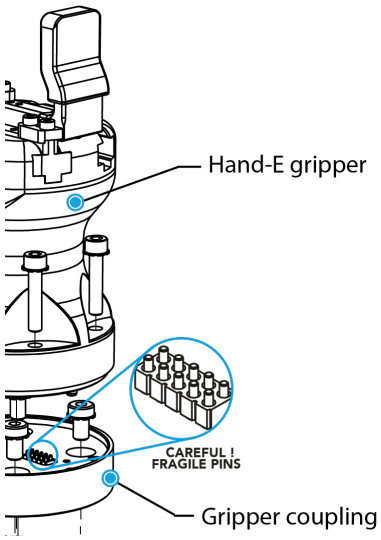


Fig. 3-21: Carefully align the small fragile pins

4. Install the M8 splitter and, with the 3 mm hex key, fasten it to the Bracket with the two M4 screws and the two M4 washers. Make sure the splitter is fastened on the side of the Dual Bracket that receives the dowel pin.

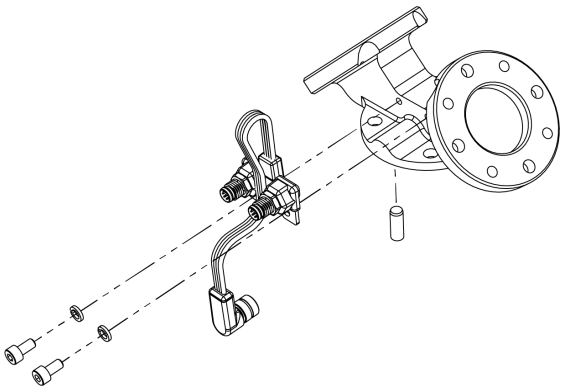


Fig. 3-22: Fastening the M8 splitter to the Bracket

5. Connect the M8 splitter to the robot tool connector.
6. To connect the couplings to the M8 splitter and to activate the grippers, refer to the **Activating the Gripper(s)** section.
7. Install the connection protector using the two M4 screws and the 3 mm hex key.

3.5.7. Fingertips Installation

Flat NBR Overmolded Fingertips (not on Adjustable Holders)

Required Tools and Equipment

Included:

- 2 x Flat NBR Overmolded Fingertips
- 4 x M3 screws
- 1 x 2.5 mm hex key

Installation

The Flat NBR Overmolded Fingertips are already installed on the grippers upon the reception of the Machine Tending Solution. Follow these steps to remove or install them.

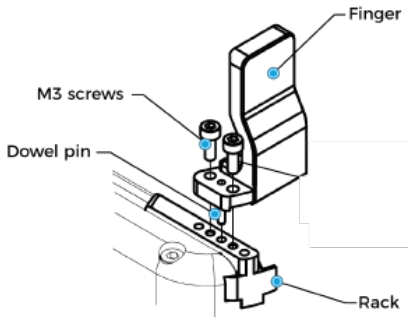


Fig. 3-23: Installing the Flat Overmolded Fingertips on the racks

1. These fingertips are mounted directly on the racks. For each fingertip, there are two possible positions: align the fingertip dowel pin with one of the two dowel pin holes.
2. Apply low strength threadlocker on the provided screws (two M3 screws) and secure the finger to the rack.
3. Repeat for the other finger.

Adjustable Fingertip Holders

Required Tools and Equipment

Included:

- 2 x Adjustable Fingertip Holders
- 4 x M3 screws
- 1 x 2.5 mm hex key

Installation

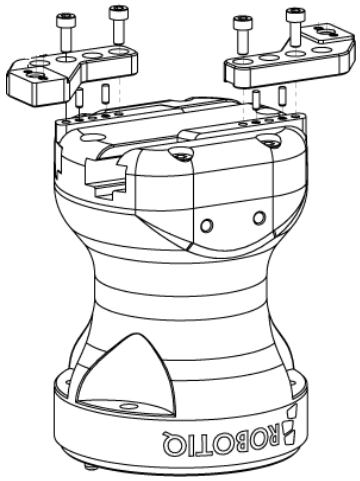


Fig. 3-24: Installing the Adjustable Fingertip Holders

Caution

- Always install the holders with the two M3 screws (never use only one).
- When possible, install the holders with the two dowel pins. If not, always use a minimum of one dowel pin.

1. The holders are installed directly on the racks. There are three possible positions:

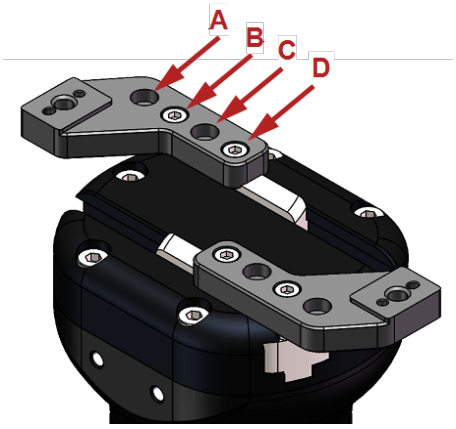


Fig. 3-25: Holes 1-2-3 on the racks

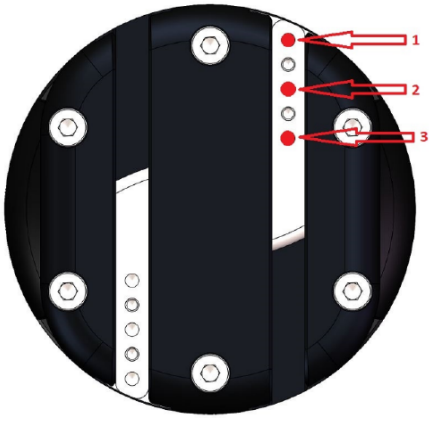


Fig. 3-26: Holes A-B-C-D on the holders

Screws on	Number of dowel pins	Configuration
A-1 C-3	2	Narrowest
B-1 D-3	2	Middle
C-1 D-2	1	Largest

Table 3 - 3: Adjustable Fingertip Holder configurations

2. Apply low strength threadlocker on the provided screws (four M3 screws) and secure the holder to the rack.
3. Repeat for the other holder.

Flat NBR Overmolded Fingertips (on Adjustable Holders)

Required Tools and Equipment

Included:

- 2 x Flat NBR Overmolded Fingertips
- 2 x M5 screws
- 1 x 4 mm hex key

Installation

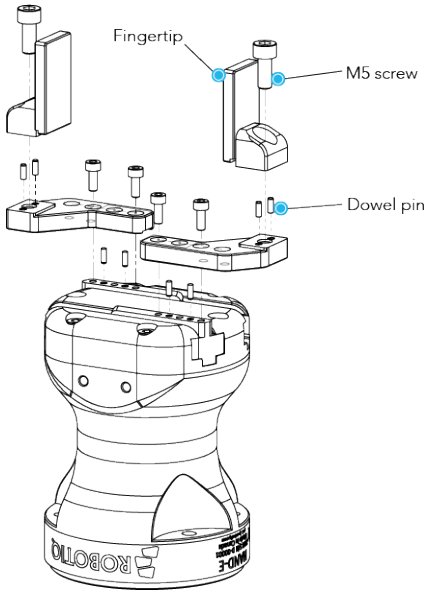


Fig. 3-27: Installing the Flat Overmolded Fingertips on the Adjustable Holders

1. Install the Adjustable Fingertip Holders. Refer to the **Adjustable Fingertip Holders** section.
2. Install the fingertips on the extremities of the holders. Align the two dowel pins under with the two dowel pin holes in the holders.
3. Tighten a fingertip with one the two M5 screws and the 4 mm hex key.
4. Repeat for the other fingertip.

Small and Large Radial Fingertips

Required Tools and Equipment

Included (same for Small and Large Radial Fingertips):

- 2 x Small/Large Radial Fingertips
- 2 x stops
- 6 x M5 screws
- 1 x 4 mm hex key

Installation

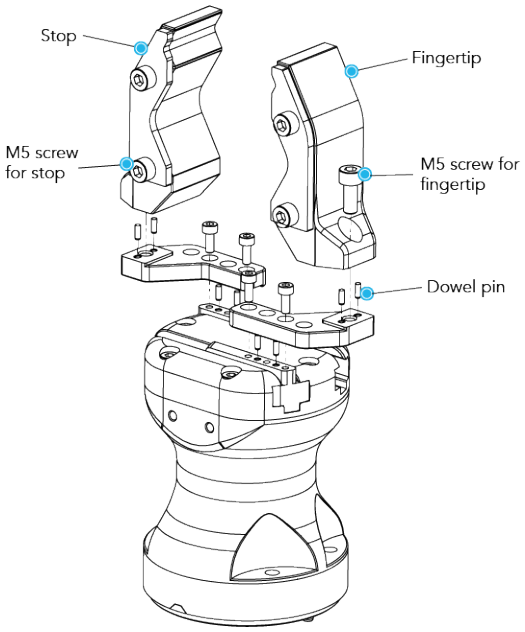
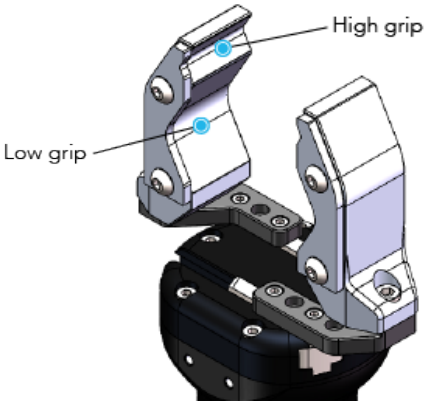
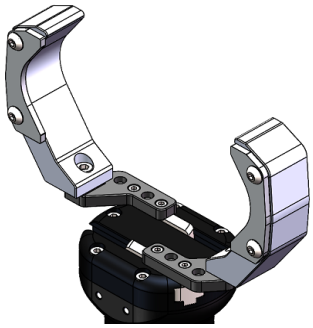


Fig. 3-28: Installing the Small Radial Fingertips

1. Install the Adjustable Fingertip Holders. Refer to the **Adjustable Fingertip Holders** section.
2. You can install stops on the fingertips to help the positioning of parts (example in chuck). Align the two holes of a stop with the two holes on the side of the fingertip. Tighten the stop with two M5 screws and the 4 mm hex key. Repeat for the other fingertip.
3. Install the fingertips on the extremities of the holders. Align the two dowel pins under the fingertips with the two dowel pin holes in the holders.
4. With the 4 mm hex key, insert two M5 screws in the fingertips (one screw per fingertip), but do not tighten them completely.
5. Insert a flat metal piece between the two fingertips and close the gripper. Make sure the metal piece and the two fingertips are all parallel.
6. Tighten partially one screw, then the other one. Go back and forth between the two screws until they are completely tightened. This will ensure parallelism between the fingertips.

Item		Optimal part dimensions	
		Minimum	Maximum
	Small Radial Fingertips **High grip**	8 mm	24 mm
	Small Radial Fingertips **Low grip**	23 mm	76 mm

	Large Radial Fingertips	67 mm	100 mm

4 Stop Fingertips

Required Tools and Equipment

Included:

- 2 x 4 Stop Fingertips
- 4 x M3 screws
- 4 x 12 mm stops (M6 headless shoulder screws)
- 4 x 20 mm stops (M6 headless shoulder screws)
- 1 x 2.5 mm hex key
- 1 x 4 mm hex key

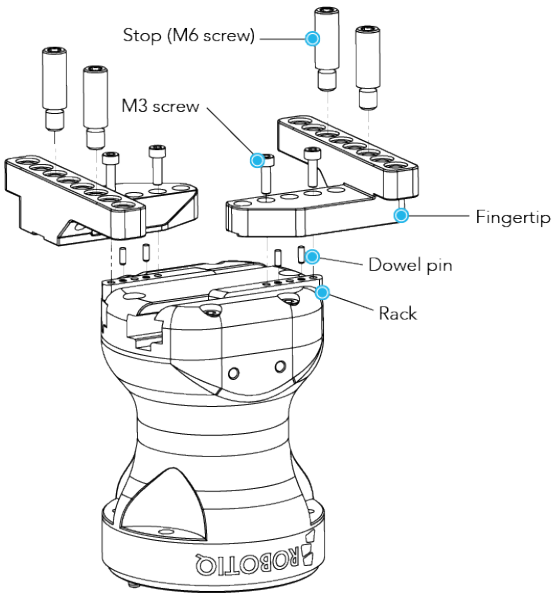


Fig. 3-29: Installing the 4 Stop Fingertips

1. These fingertips are installed directly on the racks and offer many positions.
   - On the positioning section of each fingertip there are five positioning holes, here named A to E.
   - On each rack there are three positioning holes, here named 1 to 3. The two others holes are for the dowel pins.
   - On the moving section of each fingertip there are eight holes for the two stops.

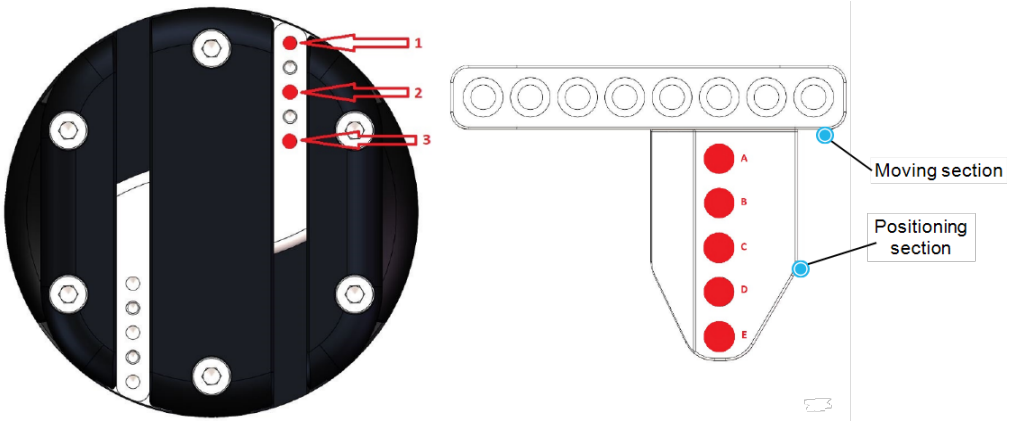
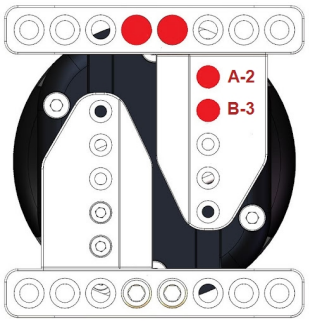
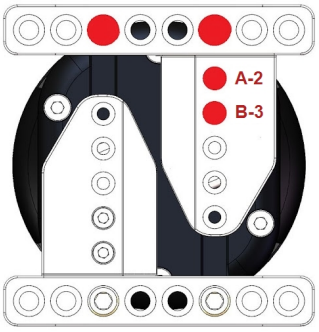
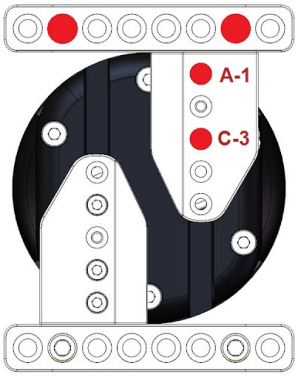
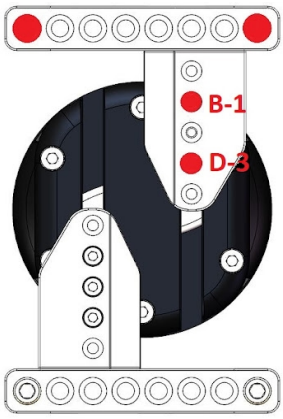


Fig. 3-30: 4 Stop Fingertip nomenclature

2. Below are some of the possibilities along with their application. You can also try other positions that suit your process.

Configuration	Optimal part dimensions		Positioning on gripper	
	Minimum	Maximum	Positioning section	Moving Section
	Ø10 mm	Ø25 mm	A on 2 B on 3	Holes 4 and 5
	Ø25 mm	Ø50 mm	A on 2 B on 3	Holes 3 and 6
	Ø50 mm	Ø80 mm	A on 1 C on 3	Holes 2 and 7
	Ø80 mm	Ø100 mm	B on 1 D on 3	Holes 1 and 8

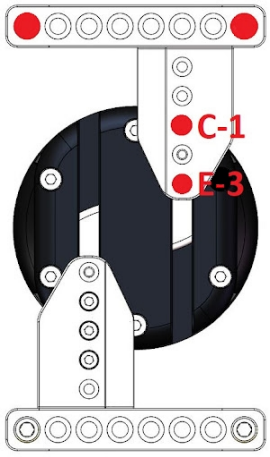
	Ø 100 mm	Ø 127 mm	C on 1 E on 3	Holes 1 and 8

Table 3 - 4: 4 Stop Fingertip configurations

Caution

- Always install the fingertips with the two M3 screws.
- When possible, install the fingertips with the two dowel pins. If not, always use a minimum of one dowel pin.

3. Once the configuration is chosen, align a fingertip with one or two dowel pin(s). Apply low strength threadlocker on the provided screws (two M3 screws) and secure the finger to the rack.
4. The stops are the M6 screws. There are two sets of stops: 12 mm stops and 20 mm stops. The 20 mm stops can be practical for larger parts, while the 12 mm stops can be useful for smaller or radial parts. Tighten the stops in the selected holes of the moving section. Use the 4 mm hex key.
5. Repeat for the other finger.

Info

Once installed, the usable length of the stops is reduced by 1 mm. So the 12 mm stops are reduced to 11 mm and the 20 mm stops are reduced to 19 mm.

Blank Fingertips

Required Tools and Equipment

Included:

- 2 x Blank Fingertips
- 2 x M5 screws
- 1 x 4 mm hex key

Installation

Some object and parts may not fit in any of the available fingertips. The blank fingertips can be customized to pick and hold those objects and parts.

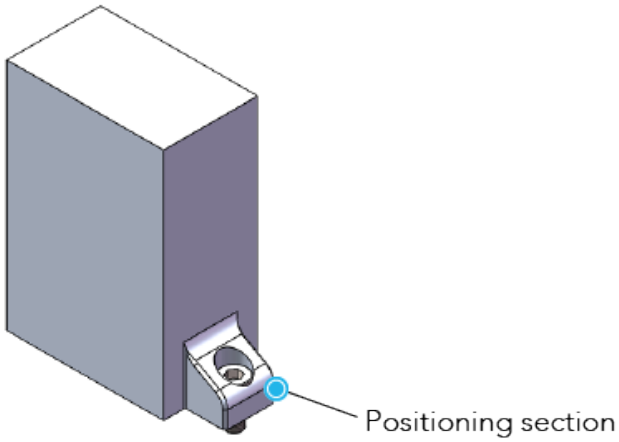


Fig. 3-31: Blank Fingertip

> **Caution**
>
> Do not modify the positioning section of the fingertips, as it is needed for the installation on the gripper.

1. Install the Adjustable Fingertip Holders. Refer to the **Adjustable Fingertip Holders** section.
2. Install the fingertips on the extremities of the holders. Align the two dowel pins under the fingertips with the two dowel pin holes in the holders.
3. With the 4 mm hex key, insert the two M5 screws in the fingertips, but do not tighten them completely.
4. Insert a flat metal piece between the two fingertips and close the gripper. Make sure the metal piece and the two fingertips are all parallel.
5. Tighten partially one screw, then the other one. Go back and forth between the two screws until they are completely tightened. This will ensure parallelism between the fingertips.

3.5.8. Air Nozzle

Required Tools and Equipment

Included:

- 1x Air Nozzle assembly
- 2 x M4 screws
- 3 mm hex key
- 8 mm air tube (8 m long)

Installation

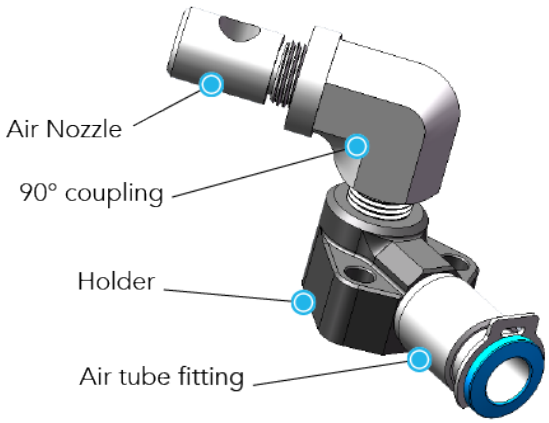


Fig. 3-32: Air Nozzle assembly

1. Choose the location of the Air Nozzle.

- **Single and Dual Hand-E Gripper on Dual Bracket**: the air nozzle assembly can be installed on either side of the gripper(s).

Fig. 3-33: Air Nozzle on Single Gripper and Dual Hand-E Gripper - Dual Bracket

- **Dual Hand-E Gripper on Compact Dual Hand-E Bracket**: the air nozzle assembly can be installed on either side of the grippers or on either side of the bracket.

Fig. 3-34: Air Nozzle on Dual Hand-E Gripper - Compact Dual Hand-E Bracket

2. Choose the orientation of the Air Nozzle: straight or 90°. If the straight orientation is selected, remove the 90° coupling and the Air Nozzle and then reinstall only the Air Nozzle.
3. Install the Air Nozzle assembly and tighten it using the two M4 screws and the 3 mm hex key.
4. Connect the 8 mm air tube to the Air Nozzle and push it until it can not go further. Ensure the safety clip is properly installed.
5. Run the air tube along the robot arm and install the cable management system.
6. Cut the 8 mm air tube to the right length and connect the other end to the pneumatic panel, to the 8 mm fitting on the pressure valve. Push it until it can not go further.

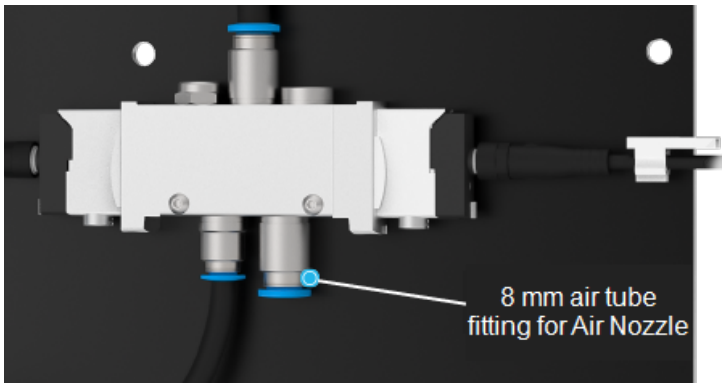


Fig. 3-35: Air tube fitting for Air Nozzle on pneumatic panel

3.5.9. Stacklight Monitoring Sensors

Required Tools and Equipment

Included:

- 3 x Stacklight Monitoring Sensors
- 3 x 2.5 m M8 cables extensions
- 3 x sensor covers
- 1x 2 mm terminal block screwdriver
- Cable ties

Installation

Fig. 3-36: Stacklight Monitoring Sensors

Info

A small M8 cable is already connected to the M8 cable input of each Stacklight Monitoring Sensor (not shown on the image above).

1. Mount one of the sensors on a status light. Wrap the cable tie around the sensor: position it in the groove.
2. Optionally, if your working environment is very bright or directly exposed to the sun light, you can install the sensor covers to block a part of the light. In this case, follow the instructions below. If not, go to next step.
    a. Insert the cable tie in the openings of one of the sensor covers.
    b. Mount the sensor cover with the cable tie on the status light, on the opposite side of the sensor.

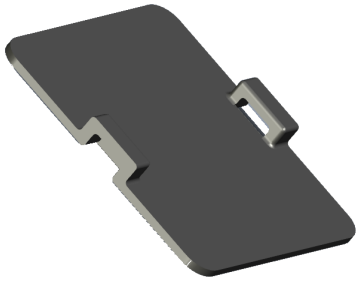


Fig. 3-37: Sensor cover

3. Tighten the cable tie and cut off the excess.
4. Repeat for the other status lights.
5. Connect three M8 cable extensions:
    a. Connect the female ends to the sensors. Tighten the rings.
    b. Connect the male ends to the Robotiq Controller. Tighten the rings.

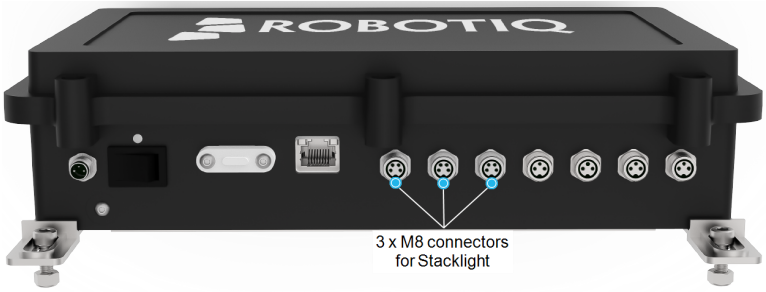


Fig. 3-38: Connectors for Stacklight Monitoring Sensors

6. For each sensor, adjust the indicator lights:
    a. Adjust the stacklight detector when the machine status light is ON. Operate the machine to trigger the right light signal.
    b. Using the terminal block screwdriver, turn the sensitivity adjuster until the indicator light turns on: turn clockwise to increase the detection threshold value, turn counter clockwise to reduce it.
    c. Test the sensor: the indicator light must turn off when the stacklight is turned off and turn on when the stacklight is turned on. If not, repeat the steps above until it does.

Warning

Be careful when using the terminal block screwdriver on the sensitivity adjuster as it is very fragile.

3.5.10. Foot Switch Activator

Required Tools and Equipment

Included:

- 1x Foot Switch Activator
- Kit for Pneumatic Panel
  - 1x "Y" air tube fitting
  - 1x additional solenoid valve
  - 1x 2 mm hex key
  - 1x 5.5 mm wrench
  - 1x 17 mm wrench
  - 2 x 40 mm M3 screws
  - 2 x 8 mm air tubes
- 3 x adjustment plates
  - 1x 19 mm thick
  - 1x 3 mm thick
  - 1x 4.8 mm thick
- 2 x M5 x 10 mm low head cap screws
- 3 x M5 socket head cap screws
  - 1x 8 mm long
  - 1x 12 mm long
  - 1x 16 mm long
- 1x washer
- 1x 3 mm hex key
- 1x 4 mm hex key
- 1x 6 mm air tube (5 m long)
- 1x Cable sleeve (2 m long)

1 This section covers basic foot switches with and without anti-trip safety latch. For any help with a foot switch that differs from what is presented below, you can contact robotiq.com/support.

2. This section is also based on foot switches that have a hole on their front edge. If your foot switch does not have this hole (or does not even have a base plate), you can build your own base plate:

- With a 3 mm hex key remove the four Foot Switch Activator feet.
- Use the bolt pattern underneath the Foot Switch Activator.
- Build your base plate to assemble your foot switch and the Foot Switch Activator together.

Fig. 3-39: Foot switch with a hole on their front edge

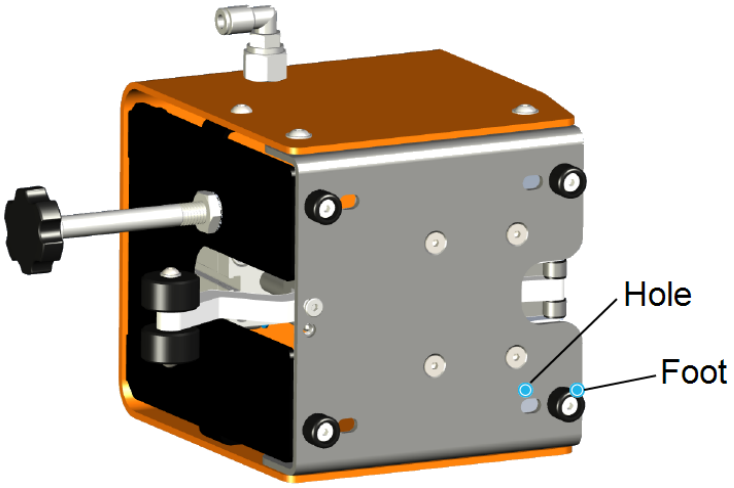


Fig. 3-40: Foot Switch Activator feet and bolt pattern

Tip

Go through all this section before working on the customized plate in order to have all the necessary information.

Installation

Fig. 3-41: Foot Switch Activator components

Warning

Before working on the foot switch, it must be first turned off and de-energized. The electrical power on the foot switch can cause severe bodily injuries.

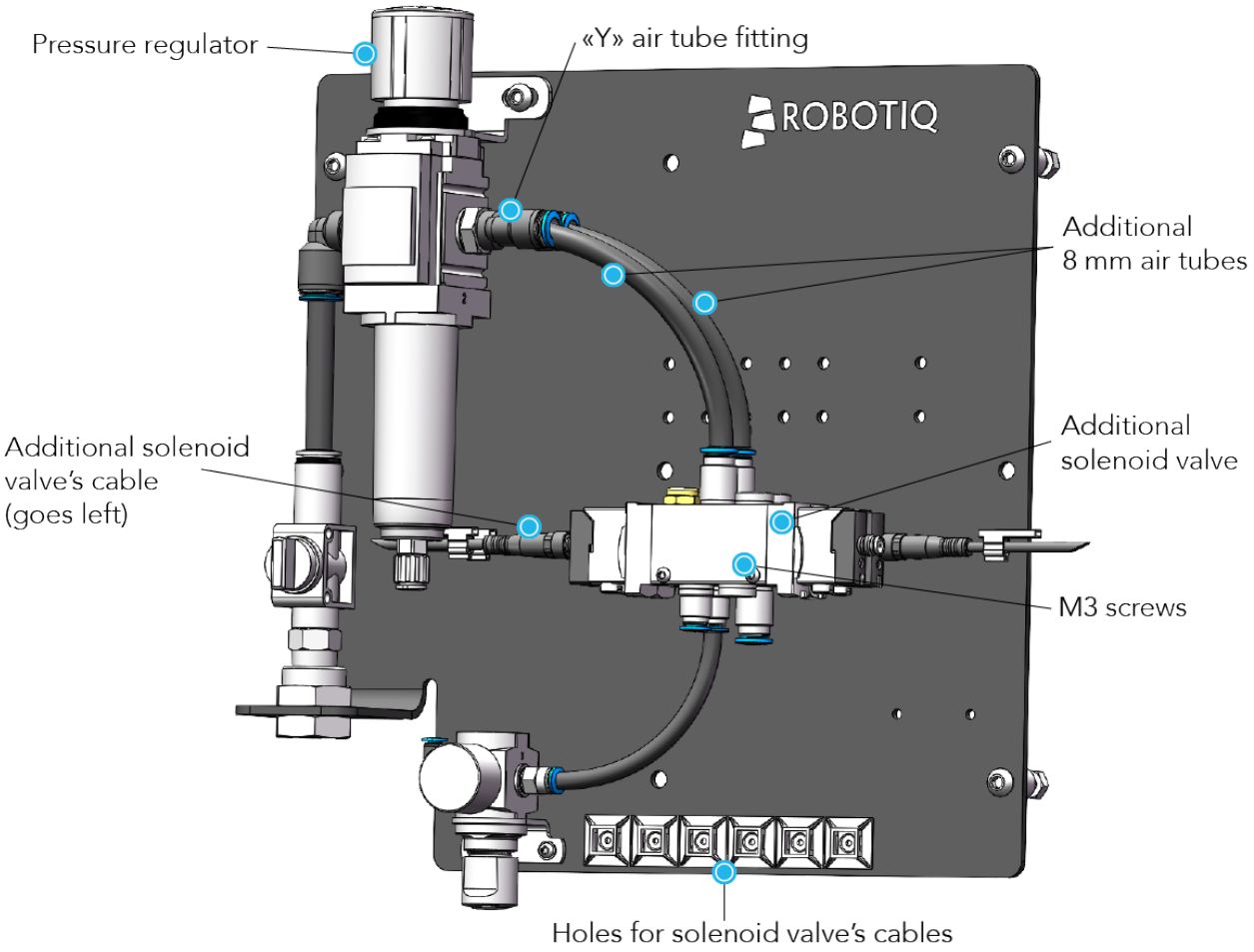


Fig. 3-42: Assembling the pneumatic components for the Foot Switch Activator 1

1 Assemble the additional components to the Pneumatic Panel:

a. Disconnect at both ends the air tube connecting the pressure regulator's fitting and the solenoid valve. Then discard it. Refer to the **Disconnecting the air tubes** section to see how to disconnect the air tube (note that there is no safety clip on the fittings of the Pneumatic Panel).

b. Using the 17 mm wrench, remove the single air tube fitting from the pressure regulator. Then install the "Y" air tube fitting.

c. Using the 2 mm hex key and the 5.5 mm wrench, remove the two M3 screws from the solenoid valve. Do not disconnect the solenoid valve cables, but be careful when handling them.

d. Superimpose the additional solenoid valve on the other one. The additional solenoid valve has only one cable: **make sure that the cable goes left**.

e. Insert the two (2) M3 x 40 mm screws in both solenoid valves. Then, using the 2 mm hex key, the 5.5 mm wrench and the two M3 nuts , install the solenoid valves on the Pneumatic Panel.

f. Connect the two new 8 mm air tubes to the "Y" fitting and to the solenoid valves. Push the air tubes until they can not go further.

g. Insert the additional solenoid valve's cable in one of the available holes at the bottom of the Pneumatic Panel.

2. To secure the foot switch activator to the machine's foot switch, an adjustment plate must be used. Three (3) different sizes are provided in the kit. Choose the one that best fits with your foot switch.

3. With the two M5 x 10 mm low head cap screws and the 4 mm hex key, install the chosen adjustment plate under the Foot Switch Activator. Do not tighten the screws as the plate still needs to be adjusted. Do not install the third screw yet.

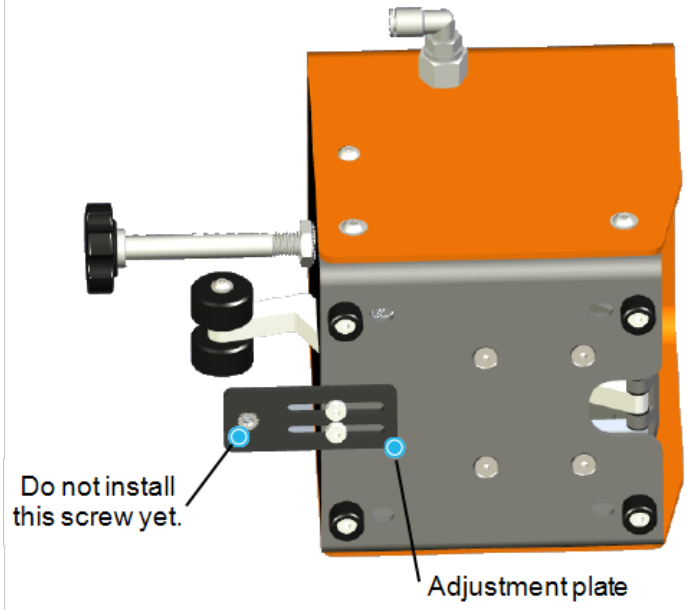


Fig. 3-43: Installing the adjustment plate

4. Put the edge of your foot switch on the adjustment plate. Turn the assembly on its side and adjust the position of your foot switch until it touches the Foot Switch Activator. This will avoid movement in the assembly.

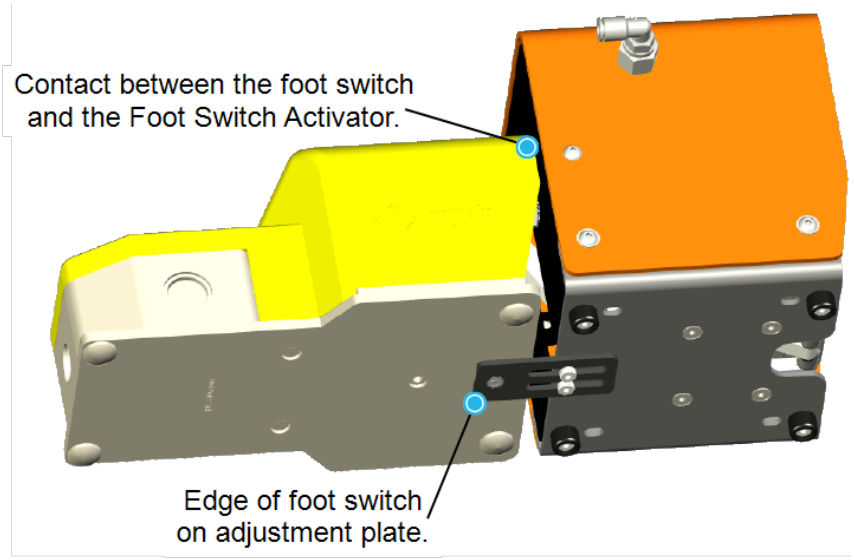


Fig. 3-44: Adjusting the position of your foot switch

5. Align the hole on the edge of your foot switch with the third hole on the adjustment plate. Then with the 4 mm hex key, tighten the two M5 x 10 mm low head cap screws already in place.

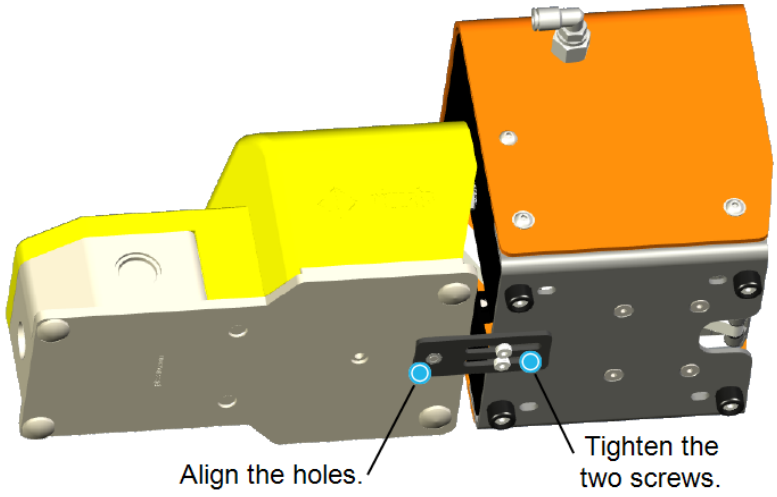


Fig. 3-45: Adjusting the position of the adjustment plate

6. Put back the assembly straight and remove the cover of your foot switch.

Warning

Before working on the foot switch, it must be first turned off and de-energized. The electrical power on the foot switch can cause severe bodily injuries.

7. There are three M5 socket head cap screws provided with the kit, each of a different length (8, 12 and 16 mm): choose the appropriate one for your assembly.
8. Insert the washer in the chosen M5 socket head cap screw and, using the 4 mm hex key, tighten the screw in the hole going through your foot switch and the adjustment plate.
9. If your foot switch does not have an anti-trip safety latch, go to next step. If it does, adjust the adjustment bolt until it pushes the anti-trip safety latch to the bottom. This will allow the Foot Switch Activator to work freely.

Info

The foot switch in the image below does not have an anti-trip safety latch.

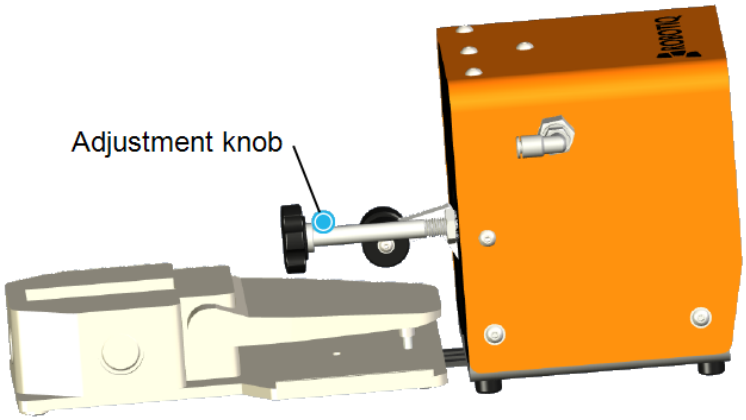


Fig. 3-46: Adjusting with the knob

10. Test the assembly manually to make sure everything works fine, then put back the cover of your foot switch.
11. Connect the 6 mm air tube to the Foot Switch Activator. Push it until it can not go further, then ensure the safety clip is properly installed.

> **Warning**
>
> Always complete the assembly before connecting the air supply to the device to avoid bodily injuries.

12. Cut the 6 mm air tube to the right length and connect the other end to the pneumatic panel, to the 6 mm fitting on the additional pressure valve. Push it until it can not go further.
13. Reconnect your foot switch.

> **Tip**
>
> Follow the good practices of cable management. Use the provided cable sleeving to secure the Foot Switch Activator air tube and your foot switch cable.

3.6. Electrical Installation

3.6.1 Robotiq Controller Electrical Setup

1. Connect the power cable in the power input of the Robotiq Controller. Then connect the two wires at the other end of the power cable to available Configurable I/O terminal blocks in the robot controller. See configuration below. Then secure each connection using a terminal block screwdriver (not provided with the Robotiq Controller).
   - the brown wire in a 24 V Configurable Input;
   - the black wire in a 0 V Configurable Output.

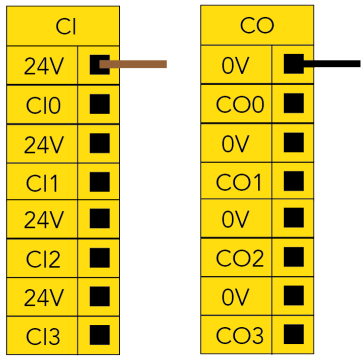


Fig. 3-47: Connecting Robotiq Controller's power cable to the robot controller

> **Tip**
>
> To secure the connections of the two wires, you can use the terminal block screwdriver that is provided with the Stacklight Monitoring Sensors.

2. Connect one end of the Ethernet cable in the Robotiq controller. Connect the other end of the Ethernet cable in the provided USB/Ethernet adapter, then connect the USB connector to a USB port in the robot controller.

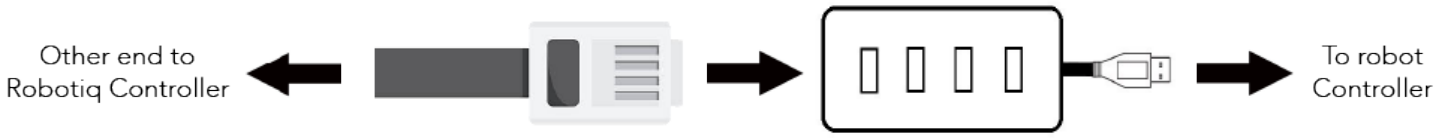


Fig. 3-48: Connecting Robotiq Controller's Ethernet cable to the robot controller

> **Caution**
>
> Do not try to connect the Ethernet cable to the robot Controller.

3. Once the Ethernet cable is connected, reboot the robot to establish the connection.

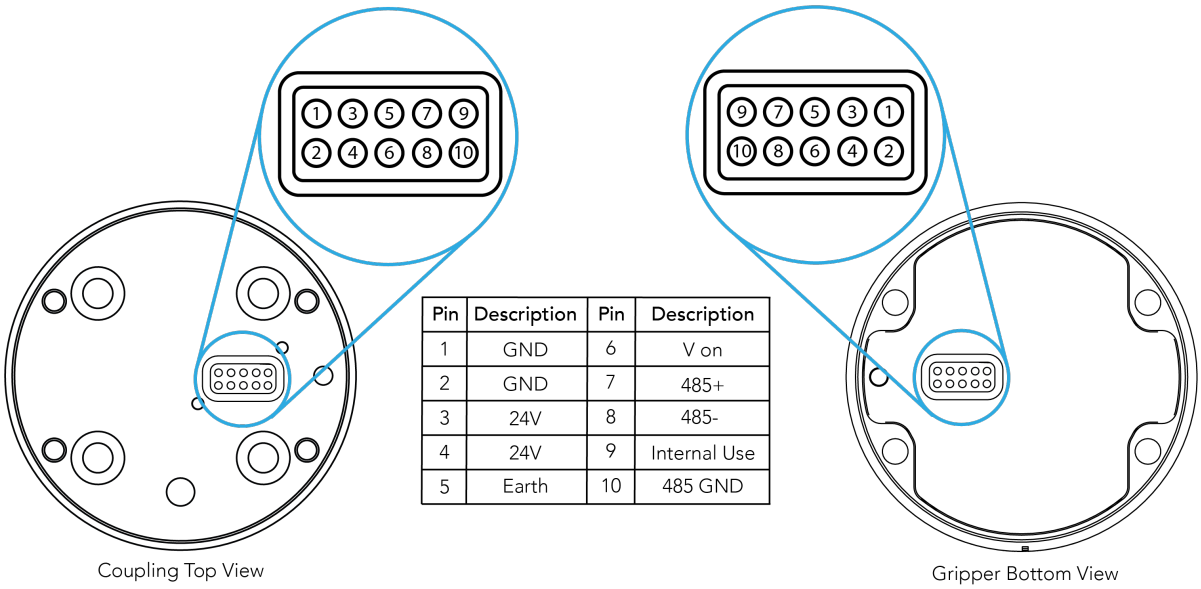
3.6.2. Hand-E Gripper(s) Electrical Setup

Power and communication are established with the Hand-E Gripper via a single device cable. The device cable provides a 24V power supply to the gripper and enables serial RS485 communication to the robot controller.

> **Info**
>
> RS485 signals (485+, 485- and 485 GND) are isolated from the main 24V power supply. GND can be connected to any other ground reference as long as the voltage potential between the grounds does not exceed 250V. Grounding reference is at the user's discretion.

Pinout Interface

The gripper interfaces with its coupling via a 10-spring pin connector located on its outer surface.



Pin	Description	Pin	Description
1	GND	6	V on
2	GND	7	485+
3	24V	8	485-
4	24V	9	Internal Use
5	Earth	10	485 GND

Fig. 3-49: Pinout to the Hand-E Gripper cable-to-wrist coupling.

Coupling(s) to Wrist

The figure below represents the wiring schematic of Hand-E with a coupling connecting directly to the robot wrist.

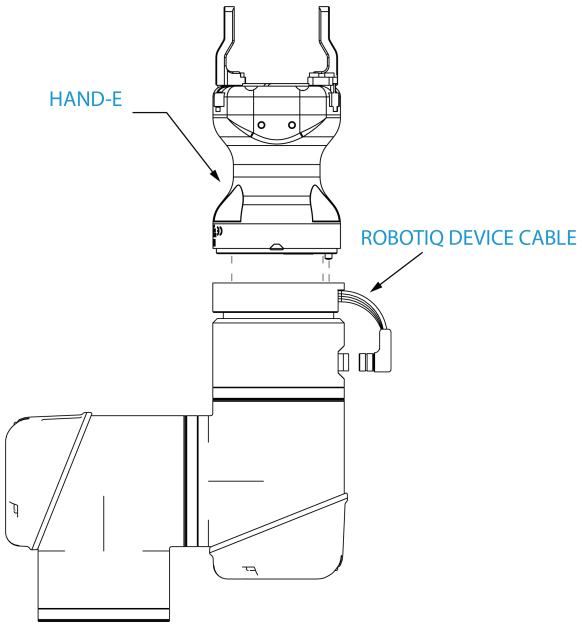
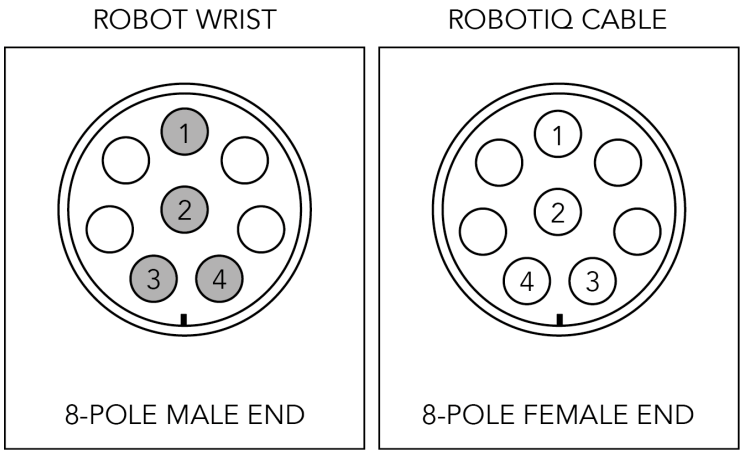


Fig. 3-50: Robotiq Hand-E with device cable wiring scheme



PIN	SIGNAL
1	24V
2	GND
3	RS485 +
4	RS485 -

Fig. 3-51: Pinout of the Hand-E cable-to-wrist coupling

Info

Power supply, communication signals, grounding, electrical resistance and fusing are managed by the robot itself.

Connecting the Wrist Camera

Power and communication are established with the Wrist Camera via the 5-m high flex cable. It provides 24V power supply to the Wrist Camera and enables USB 2.0 communication with the robot controller.

1. Turn off the robot controller.
2. Connect the 5-m high flex cable to the robot controller. Use any available 24 V and 0 V slots.

- Connect the red wire (24V).
- Connect the black wire (0V).

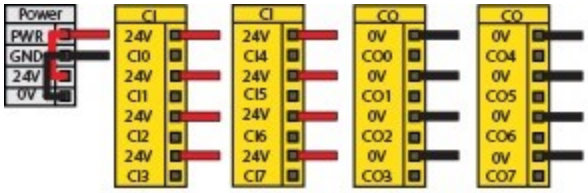


Fig. 3-52: Connecting the Wrist Camera to the robot controller

3. Connect the 4-port USB hub to the robot controller.
4. Connect the Wrist Camera USB cable to the 4-port USB hub.
5. Connect the USB license dongle to the 4-port USB hub.

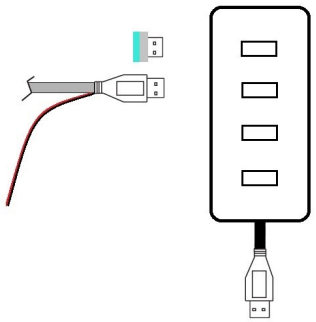


Fig. 3-53: Connecting to the 4-port USB hub

Info

Wrist Camera grounding is done via the robot ground. The Wrist Camera screws act as ground connectors when properly installed.

Warning

Use proper cabling management. Remember to leave enough mobile cable to allow for robot movement along all axes without pulling out connectors. Always protect the controller side of the cable connection with a strain relief cable clamp.

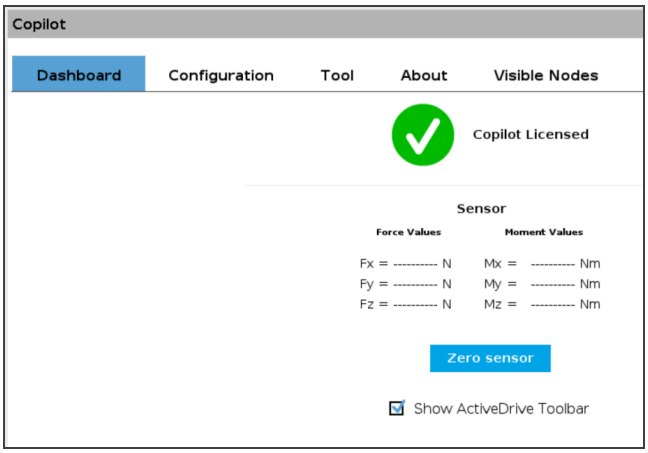
3.7. Software Installation

3.7.1 Copilot License

Operating the Machine Tending on Universal Robots requires the use of the Machine Tending Copilot software.

> **Caution**
>
> The License Dongle should stay connected to ensure the continuous functioning of the force features.

1. Connect your Machine TendingCopilot License Dongle to a available USB port of the Robot controller.
2. Make sure your Copilot license is activated.
   a. Tap the **Installation** button in the top ribbon.
   b. Select **URCaps** > **Copilot**.
   c. On the **Dashboard** sub-menu, the Copilot License activation will display.
   d. Tap **Configuration** to set up the Copilot software based on your configuration and application.



3.7.2. URCaps

Robotiq provides the user with a Universal Robots URCap package that offers a graphical user interface and enables direct serial communication to your robot controller.

Compatibility

The table below shows which Robotiq software to use with your Universal Robots' controller. Please refer to the URCap Package section for the installation of the URsoftware packages for the Machine Tending Solution.

Robotiq Software	Compatible Version
Robotiq Adaptive Gripper Software	Version 16 and later
Robotiq Copilot Software	Version 1272 and later

Table 3 - 5: Compatibility of the Robotiq software with the Solution

Caution

Please refer to the **Installation** section to configure the Machine Tending Solution before operating and programming the device.

Caution

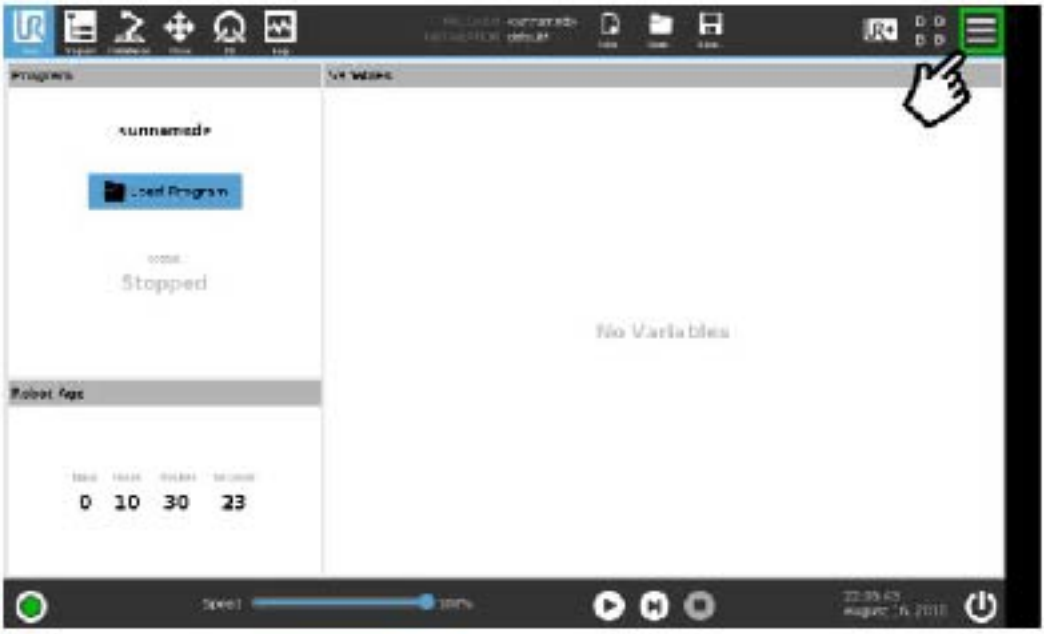
To ensure normal operation, make sure the Copilot license dongle remains connected at all times.

Installation

Make sure the Robotiq Machine Tending solution is well installed. Refer to the **Installation** section for detailed information.

Tip

Tap the **triple bar icon** and select the **About** button to view the UR software version.



a. Make sure that your PolyScope version is up-to-date and that your Universal Robots controller is compatible with the Machine Tending solution URCap package.

b. Go to support.robotiq.com, and select the Universal Robots brand.

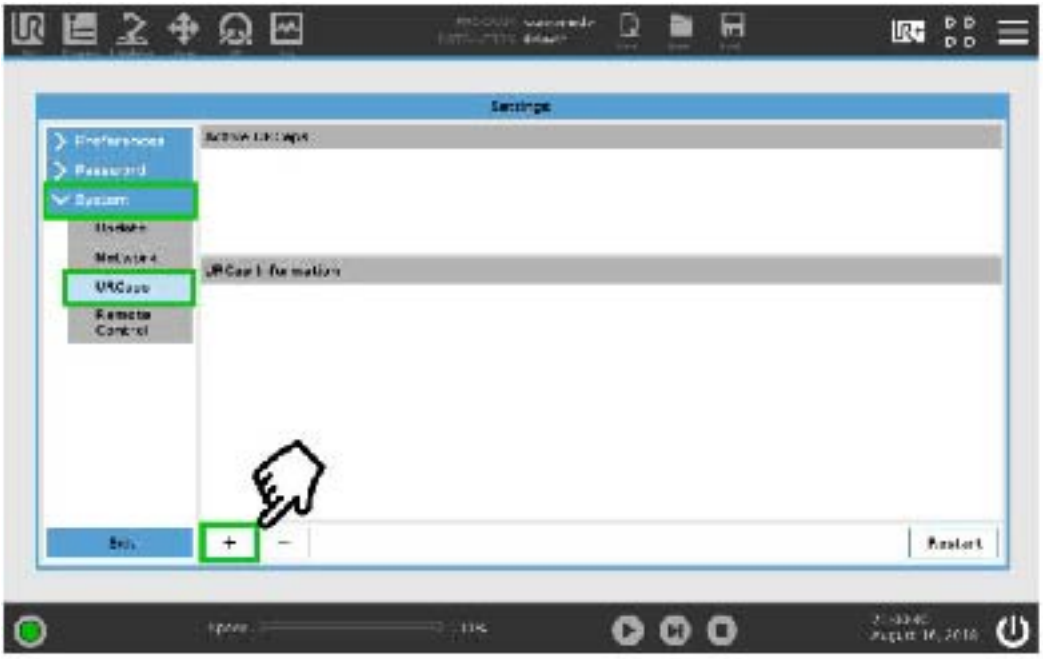
c. Select **Machine Tending Solution**.

d. Click on **Software** → **Machine Tending Solution URCap**, download the URCaps and extract them on the root of a blank USB stick.

e. Insert the USB stick in the UR teach pendant or robot controller.

f. On the teach pendant, tap the **triple bar icon** in the upper right corner of the screen.

g. Tap **Settings**.



h. Tap the **System** button in the navigation pane on the left.

i. Select either the Gripper URCap (UCG-X.X.X.) or the Copilot URCap (UCS-X.X.X.) to install a URCap on your Teach Pendant.

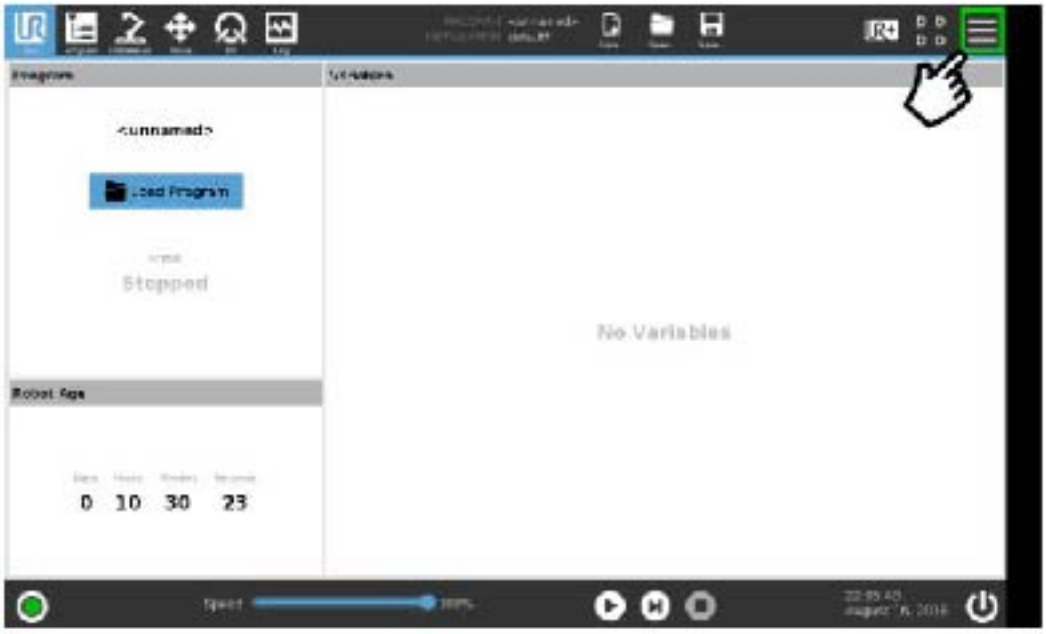
j. Repeat the previous step and install the second URCap.

k. Tap the **plus (+)** button to look for the **.urcap files** in the available drives.

l. Once the files are selected, tap the **Open** button.

m. Tap the **Restart** button to complete the URCap installation. By doing so, you accept the **license agreement** detailed in the URCap information textbox.

Uninstallation



a. On the teach pendant, tap the **triple bar icon.**

b. Tap **Settings.**

c. Select **System** in the navigation pane on the left.

d. Select **URCaps**.

e. In the **Active URCaps box**, select the URCap to uninstall.

f. Tap the **minus (-) button** to uninstall the URCap.

g. Restart Polyscope to complete the uninstallation process.

3.8. License Agreement

END-USER LICENSE AGREEMENT

YOU SHOULD CAREFULLY READ THE FOLLOWING AGREEMENT BEFORE USING THE Software (as this term is hereinafter defined). Using the Software indicates your acceptance of the agreement. If you do not agree with it, you are not authorized to use the Software.

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    2. This Agreement shall be governed and construed in accordance with the laws of the province of Quebec and the federal laws of Canada applicable therein. Any legal action or proceeding between the Licensor and the End-User for any purpose concerning this Agreement or the parties' obligations hereunder shall be brought exclusively in a court of competent jurisdiction sitting in the judicial district of Trois-Rivières, Quebec.
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    7. Any rights not expressly granted herein are reserved.
    8. The parties confirm that they have agreed that this Agreement and all related documents be drafted in English only. Les parties aux présentes confirment qu'elles ont accepté que la présente convention et tous les documents y afférents soient rédigés en anglais seulement.

4. Software

4.1 Overview

The URCap package contains several features to program and control the Machine Tending Solution.

1. **Machine Tending** node: Main node in the program, which is separated in two. It is already in the program tree and can not be deleted or renamed.
   - **Configuration**: To select options that will be used to generate automatically the program tree and the key waypoints in the Smart move menu.
   - **Smart Move**: To teach the route to go through the steps of the process, usually from the infeed zone to the outfeed zone.
2. **Macro List** and **Program** are the basic commands. They are already in the program tree and can not be deleted or renamed.
   - Macro List: to teach a new action to the robot.
   - Program: to call the taught actions so the robot execute them.

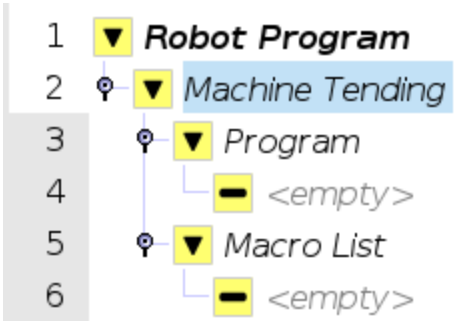


Fig. 4-1: ***Program*** *and* ***Macro List***

3. The other nodes represent the main actions taught to the robot and then executed by the robot. Refer to the **Software** section to locate the nodes.
   - **Activate Button**: To set when the Button Activator will be pressed in order to start the process.
   - **Smart Move**: To move the robot to a precise location, prior to another action. The trail must be configured before.
   - **Monitor Lights**: To set when the robot should wait, based on the stacklight. Example: while the machine is cutting, the robot can wait until it is idle.
   - **Part Feeding**: To teach the robot to pick up parts.
   - **Cleaning**: To teach the robot to clean with compressed air the parts, the workholding device or the machine itself. Four cleaning patterns are available.
   - **Load Part**: To teach the robot to load parts in the workholding device, whether it is a chuck or a vise.
   - **Open/ Close door**: To teach the robot to open and close the machine door.

- **Gripper**: To open or close the gripper, prior to another action.
- **Unload Part** : To teach the robot to unload the part from the workholding device, wether it is a chuck or a vise.

4.2. Installation Menu

4.2.1 Activating the Gripper(s)

Single Gripper

When connecting a gripper to the robot wrist connector, you need to manually set it up in PolyScope. Otherwise, your gripper will not be activated. Follow these instructions.

1. Mechanically mount your gripper on your robot. For details, see the **Single Hand-E gripper** installation section.
2. Go to **Installation > URCaps > Gripper > Dashboard**.
3. Check the box **Gripper cable is connected to the wrist**.

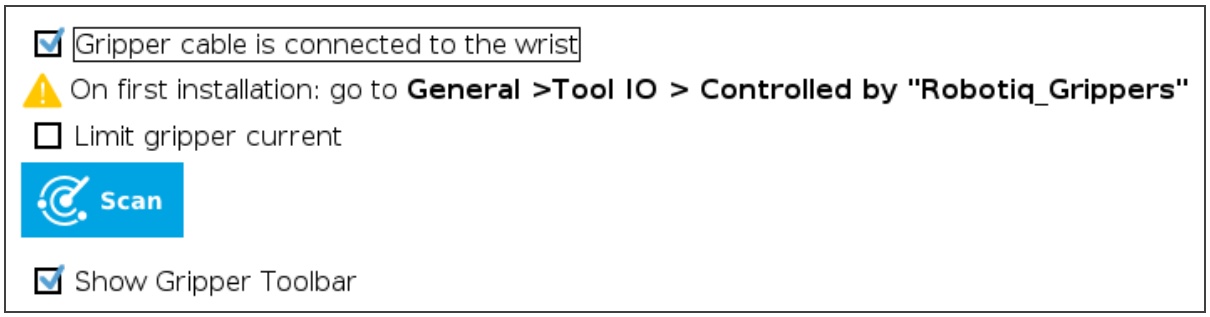


Fig. 4-2: ***Gripper cable is connected to the wrist*** *check Box.*

4. Go to **Installation > General > Tool I/O**.
5. Go to section **I/O Interface Control** and select **Robotiq_Grippers** in the drop down list of **Controlled by**.

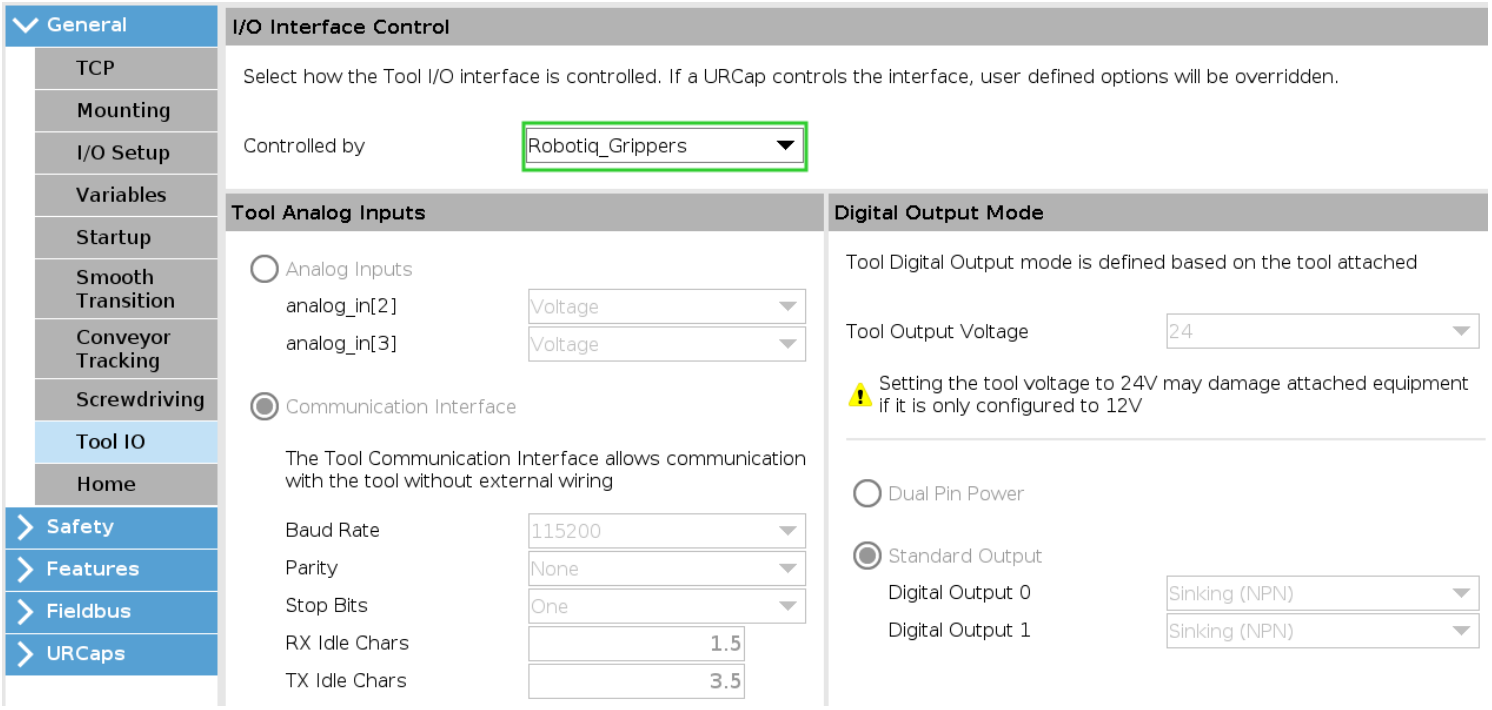


Fig. 4-3: I/O Interface Control.

Tip

To reload these settings when you restart your robot, save the **Installation** file.

6. Go back to the gripper **Dashboard** and tap **Scan**: an icon should confirm your gripper is connected.
7. To activate it, tap **Activate**. You can now use your gripper.
8. Tap **E-Open** or **E-Close** to test it.

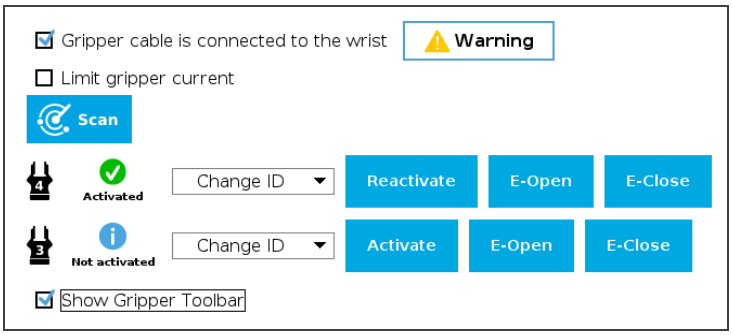


Fig. 4-4: Testing the Grippers

Info

The number written in the gripper icon corresponds to the gripper ID.

Dual Gripper

When installing multiple grippers on a UR robot, and ID has to be set for each gripper. To do so, perform the following steps.

1. Mechanically mount the grippers on your robot. For details, see the **Dual Hand-E gripper** installation section.
2. Connect only one gripper at a time using the splitter.

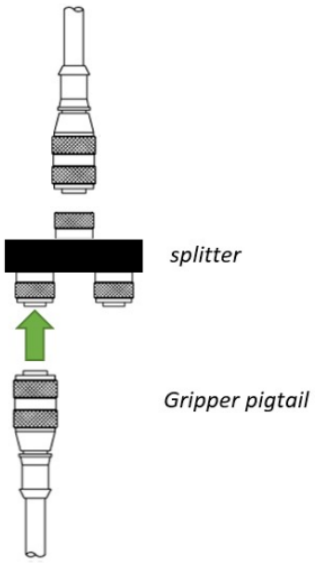


Fig. 4-5: Connecting with the splitter

3. Perform steps 2 to 7 in the **Single Gripper** activating section.
4. Check that gripper ID is different from other grippers that will be connected to the robot. If required, select a different ID from the **Change ID** dropdown list.

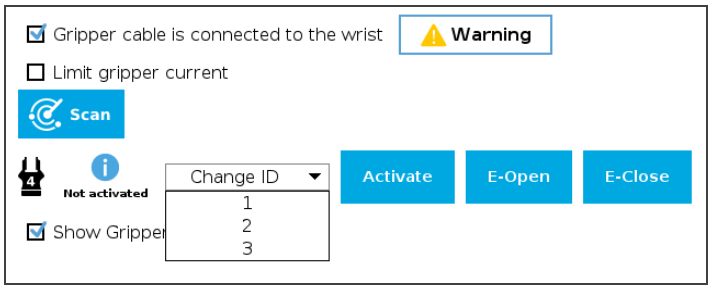


Fig. 4-6: Verifying each Gripper has a different ID

Caution

Make sure that each gripper has a ID different from other grippers to the robot. Otherwise, communication issues will occur.

By default, Gripper ID is set to 1 in all grippers internal memory. When you change gripper ID through PolyScope, that change is committed to gripper memory.

5. Perform the same routine for all grippers, connecting only one at the time.
6. Once all grippers ID have been set, connect them all to the M8 splitter.
7. Go back to the **Dashboard** tab, and confirm that all grippers are recognized and can be controlled. Tap **E-Open** and **E-Close** to test each gripper.

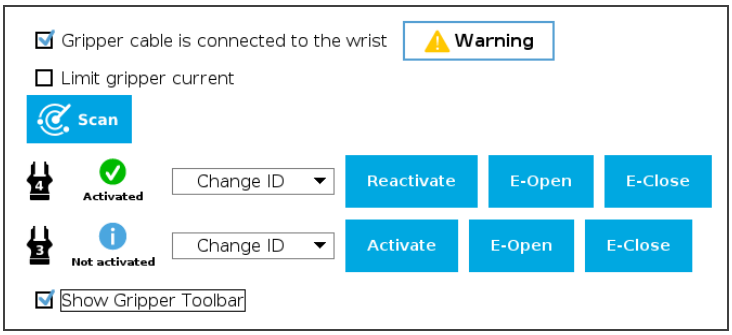


Fig. 4-7: Testing the Grippers

4.2.2. Setting the Centers of Mass and Tool Center Points (TCP)

Prior to using the Robotiq Machine Tending Solution over Universal Robots, adjust the payload and tool center point (TCP).

> **Info**
>
> If you use other equipment and configurations that best correspond to your application (e.g., dual configuration, Wrist Camera), the payload and TCP values will differ from the following values.
>
> Make sure you take all parameters, dimensions and measurements into account when setting a different payload and TCP.

TCP

1. In the PolyScope interface, go to **Installation**->**General**->**TCP.**

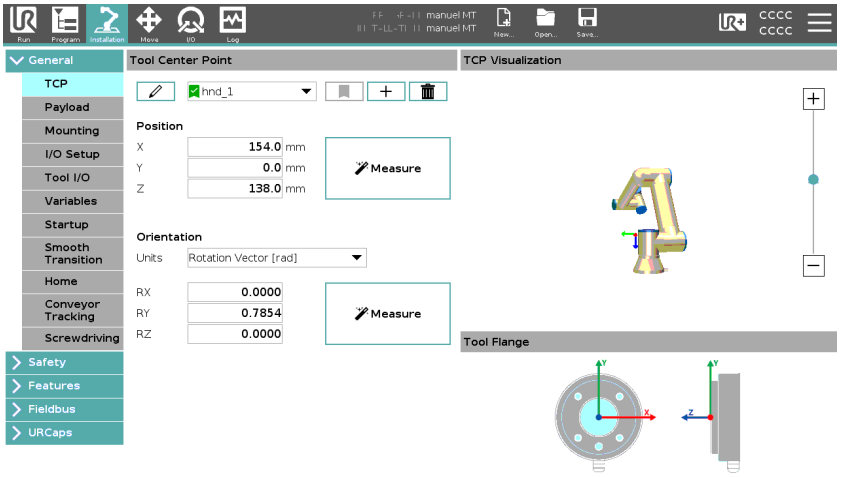


Fig. 4-8: TCP Menu in the PolyScope Interface

2. Tap the **+** button to add a TCP if you have the Dual Gripper option. You can rename the TCPs: select a TCP and tap the pencil icon.
3. Select a TCP for a gripper. Refer to the **Centers of Mass and Tool Center Points (TCP) of Grippers and Fingertips** section for the **Position** and **Orientation** values.

Info

The orientation (Rx, Ry and Rz) is applicable only for the Dual Gripper.

Caution

If you can not find the right TCP for your configuration, you can contact Robotiq support at robotiq.com/support.

4.2.3. Robotiq Controller Configuration

1 Go to **Installation->Fieldbus->MODBUS**. Tap **Add MODBUS unit**: one signal will be added by default.

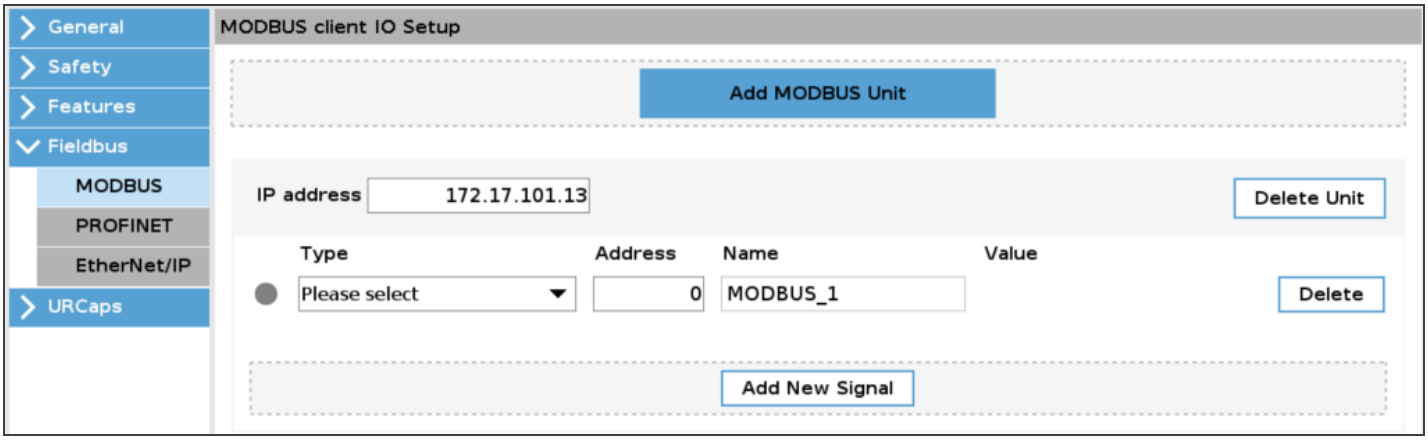


Fig. 4-9: Adding a MODBUS unit

2. Then enter the **IP address** of the Robotiq Controller.

Stacklight Monitoring Sensors

1 Tap **Add New Signal** twice so there are three signals (for the three Stacklight Monitoring Sensors).

Fig. 4-10: Configuration of the Stacklight Monitoring Sensors

2. Then follow these steps:
    a. Select **Register Input** in the drop down menu on the left for each signal.
    b. Enter the address of each sensor. Rename the signal according to the stacklight color. Select between address 1to 3
        - "yellow" = 1
        - "green" = 2
        - "red" = 3

> **Info**
>
> When a sensor is activated the **Value** is 1 when activated, 2 when blinking, 0 when off.

3. Go to **Installation->URCaps->Machine Tending** to associate the machine states to the stacklight signals. Enter **==** between the sensor name and its state.
    - Example: is_idle = yellow==ON means that when the machine is idle, the yellow light is on

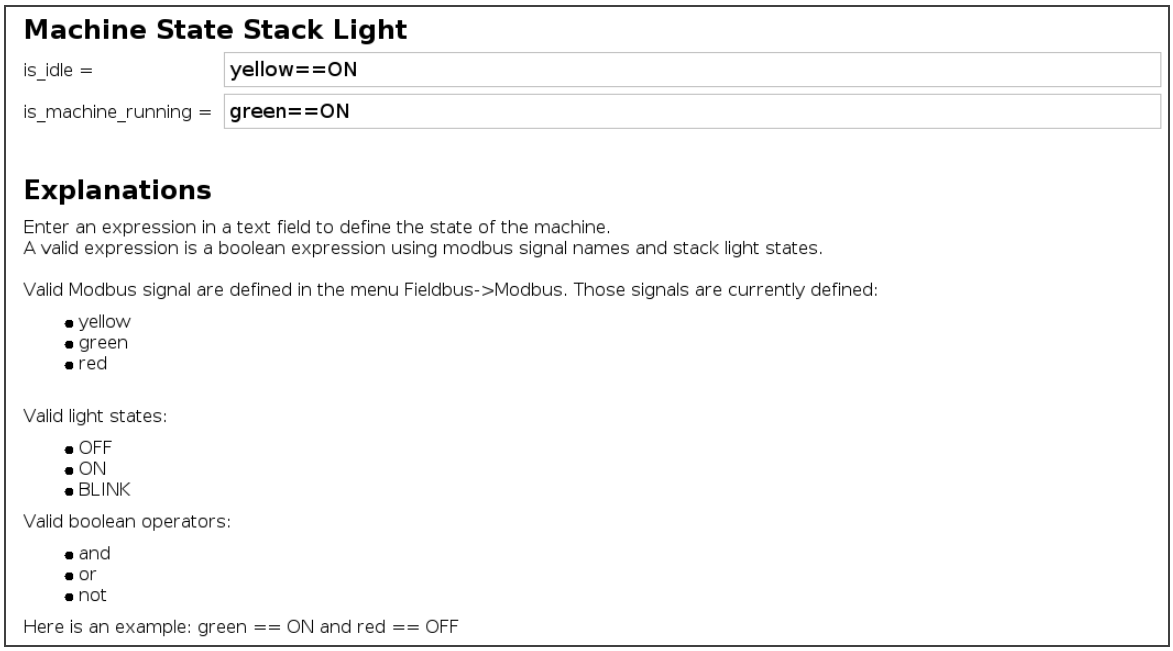


Fig. 4-11: Setting the Stacklight Monitoring Sensor's states

Output Signals

1. Go to **Installation->Fieldbus->MODBUS**. Under the already created signals, tap **Add New Signal**.

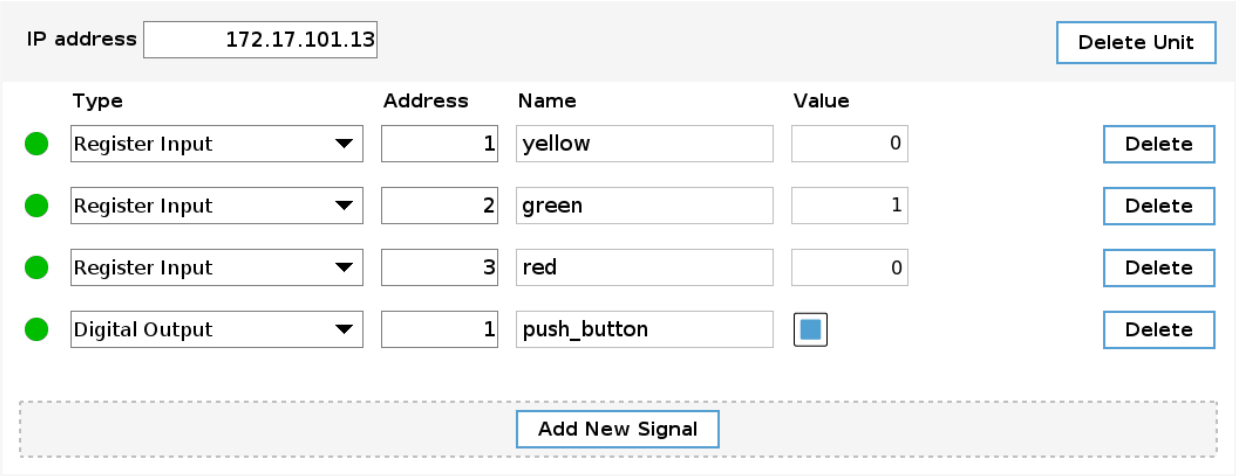


Fig. 4-12: Configuration of the Button Activator

2. Then follow these steps:
    a. Select **Digital Output** in the scrolling menu on the left.
    b. Select the right signal of the device. Try to trigger the device by pressing on the square on the right side of the screen.
    c. Rename the signal. Thefollowing names will be used to auto-configure the digital output selection in the appropriate program nodes.
        i. For the Button Activator, rename the signal to "push_button".
        ii. For the Foot Switch Activator, rename the signal that close the workholding "work_close" and the signal that open the workholding "work_open".
        iii. For the air nozzle, rename the signal "air_blower".

> **Tip**
>
> To recognize which **Digital Ouput** is associated to the Button Activator of the Foot Switch Activator, you can tap on the square in the **Value** column to activate and deactivate the component. When the component is activated the square is blue.

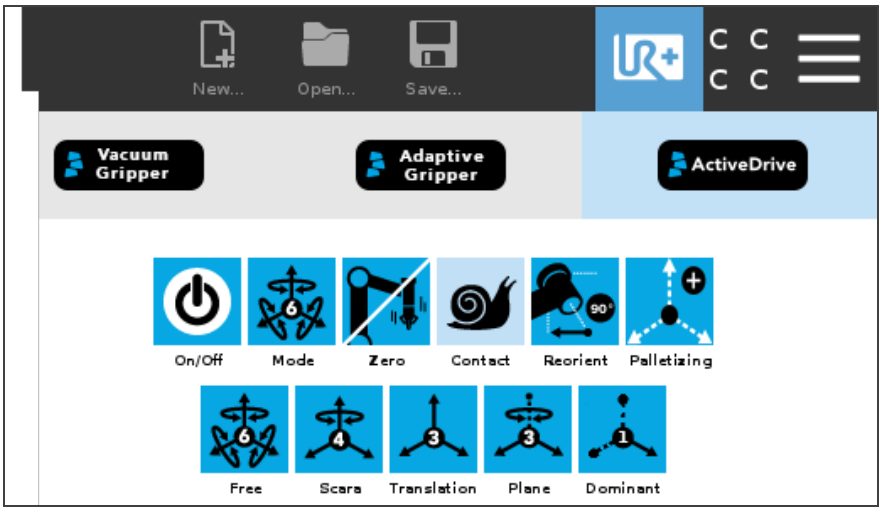
4.3. Controlling the Robot

4.3.1 Moving the Robot

ActiveDrive Feature

> **Info**
>
> To move the robot using active drive, the user should apply force on the gripper.

To move the robot manually you will need the ActiveDrive feature. Tap the **URCap** toolbar button in the top ribbon, then tap **ActiveDrive**.



- **Mode**: Determines the type of movement. There five various movements:
  - **Free**: the robot wrist moves freely in every direction.
  - **Scara**: the robot wrist can only rotate. This function is useful for moving precisely from to a point to another.
  - **Translation**: the robot wrist is totally locked in its position.
  - **Plane**: the robot wrist can only rotate and the arm can only move on one horizontal plane (can not move vertically).
  - **Dominant**: the robot wrist is totally locked in its position and the robot arm can move only one joint at the time.
  - **Palletizing**: do not apply to the machine tending solution.
- **Zero**: Resets the forces applied to the robot. The robot can be zeroed anytime, after or before any movement. If the robot appears to be struggling or vibrating, try zeroing the force values.
- **Contact**: Determines the speed of the robot while in the ActiveDrive function. Rabbit for faster, snail for slower.
- **Reorient**: Reorients the tool at 90 degrees and locks the motion in 4 degrees of freedom.

Tips

- Before picking a part or setting a waypoint, tap **Zero** to reset the forces then hold **Reorient** to reorient the tool at 90 degrees.
- Use the **Contact** feature and the **Scara** mode to move the tool slowly and precisely.

4.3.2. Opening and Closing the Gripper(s)

Whenever the gripper(s) need to be opened or closed, refer to this section.

- Once the **Gripper** node is inserted, tap it and then tap **Edit action.**

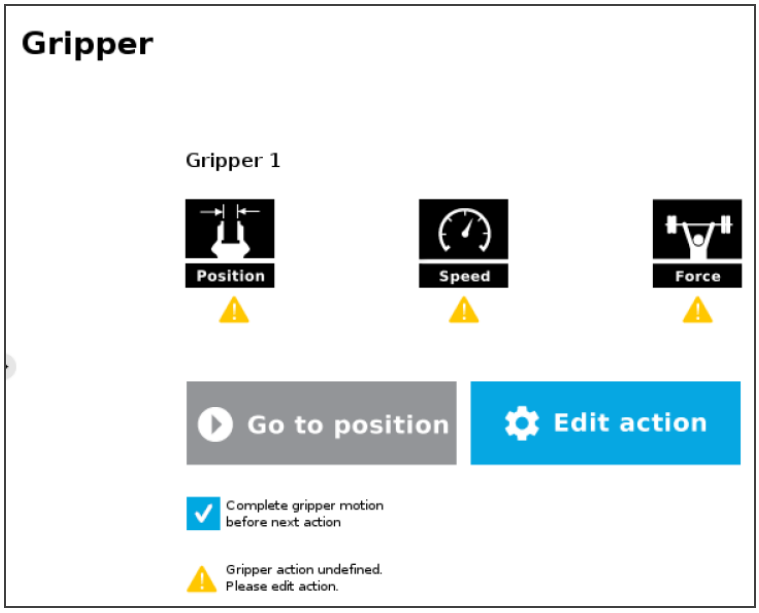


Fig. 4-13: Gripper node

- If you have the Dual Gripper, select Gripper 1or Gripper 2 in the upper left corner.

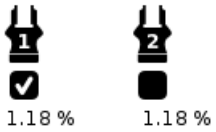


Fig. 4-14: Selecting the Gripper

- **To open**: Tap **Open** and then **Save action**. This will open the gripper.

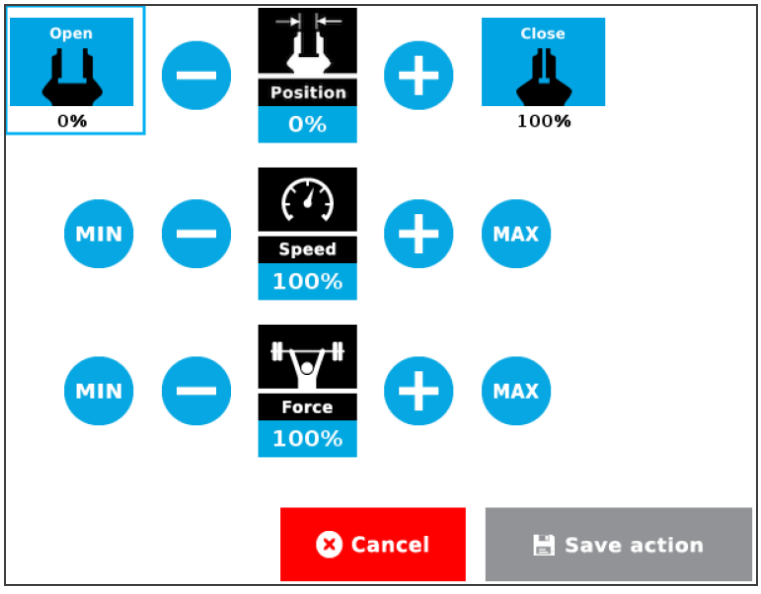


Fig. 4-15: Opening the gripper

- **To close**: Tap **Close** and then **Save action**. This will close the gripper.

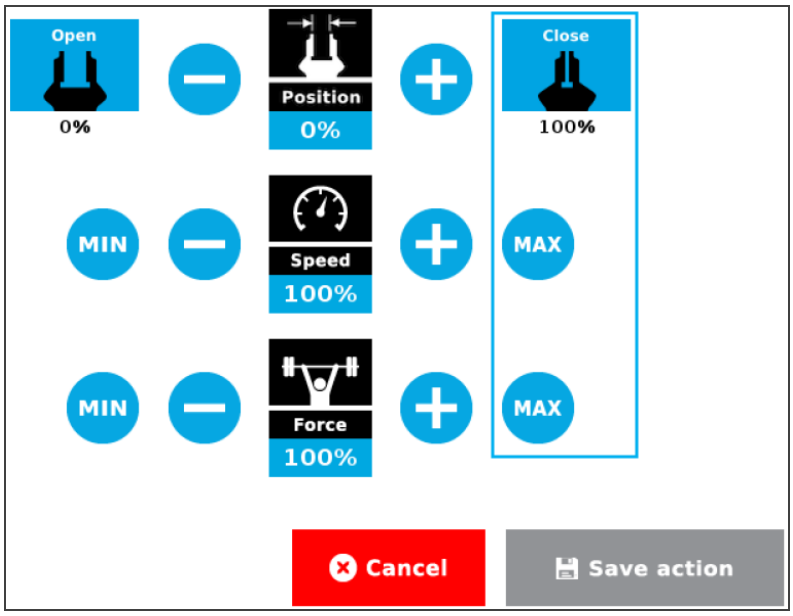


Fig. 4-16: Closing the gripper

Tip

For the closing action, you can modify Speed and Force in order to assure the right grip.

4.4. Machine Tending Node

1. In the top ribbon of the PolyScope interface, tap **New** to create a program or **Open** to load an existing program.
2. Back to the PolyScope interface, tap **Program** in the top ribbon.
3. Select the **URCaps** dropdown menu in the navigation pane on the left.
4. Tap the **Machine Tending** node in the program tree.

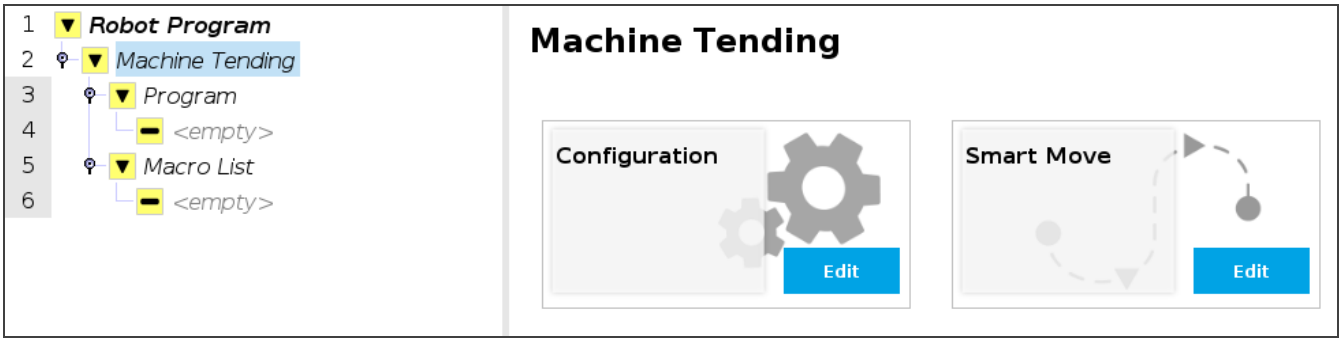


Fig. 4-17: Machine Tending node

4.4.1 Configuration

1. In the **Machine Tending** node, tap **Configuration**.
2. Choose your configuration.

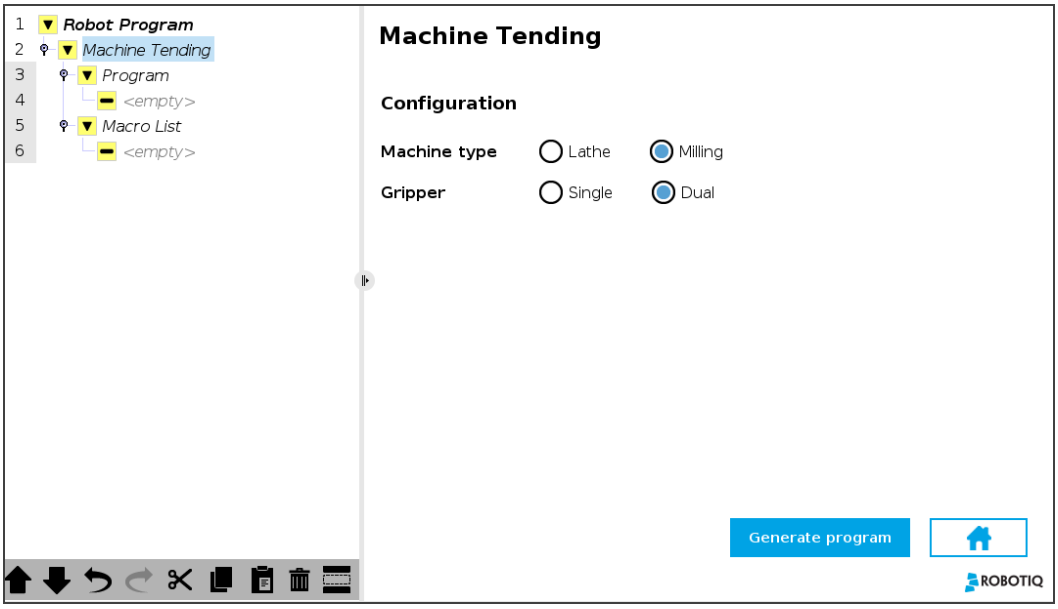


Fig. 4-18: Machine Tending configuration

3. Then tap **Generate program** at the bottom. This will generate all the nodes in the program tree and the key waypoints in the Smart move menu.

4.4.2. Smart Move

> **Tip**
>
> Remember to use the ActiveDrive feature. Refer to the **ActiveDrive Feature** section.

1. In the **Machine Tending** node, tap now **Smart Move**. This function teaches the robot your process route while avoiding any collision.

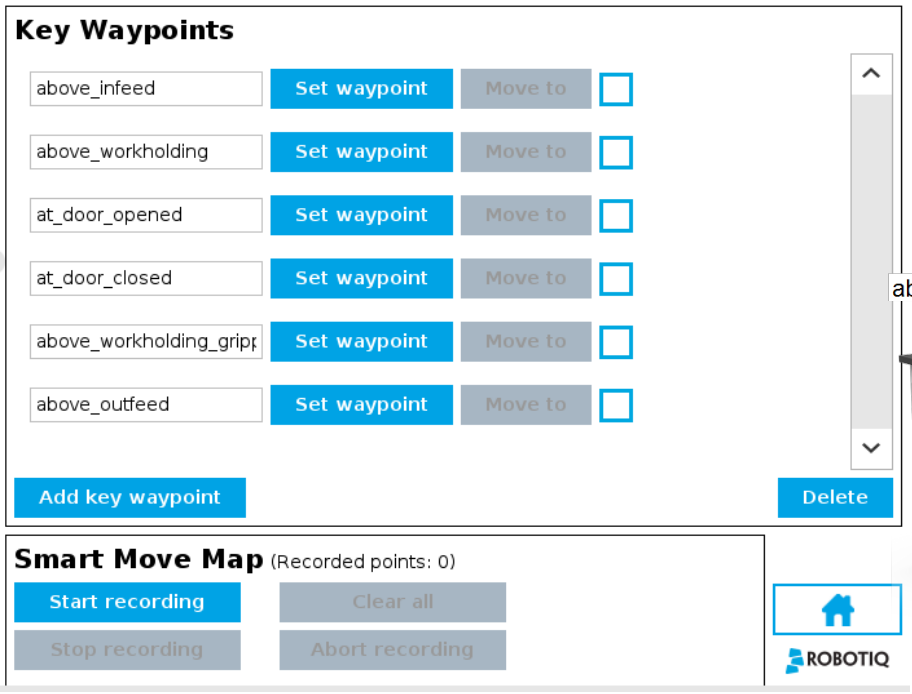


*Fig. 4-19: Recording the **Smart Move Map***

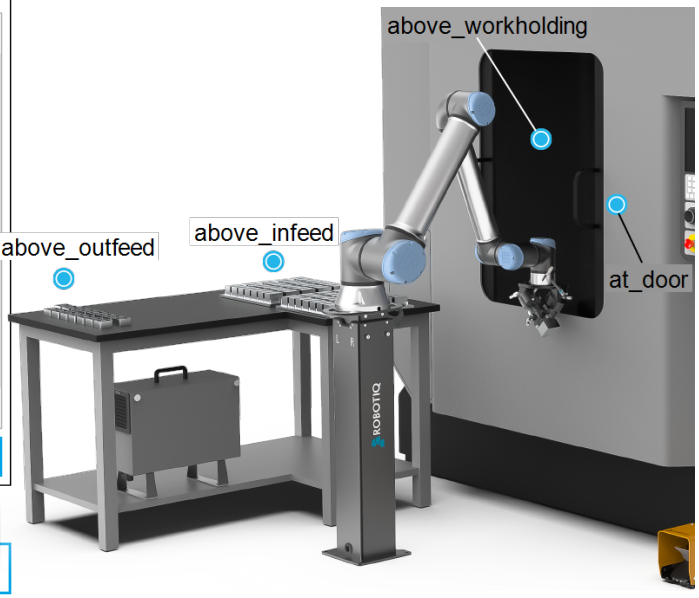


*Fig. 4-20: Example of **Smart Move Map***

2. Key waypoint names can be edited. Key waypoints can be added by tapping on **Add key waypoint** button.
3. To teach the Smart Move Map:
    a. Move the robot manually to the desired key waypoint (it should be the first waypoint). Stop approximately three inches above the waypoint. Tap **Set Waypoint**.
    b. Tap **Start recording** in the **Smart Move Map** section. You can append new points to the map once it have been recorded.
    c. Repeat for the others key waypoints.
    d. After setting the last waypoint, move the robot back to the first key waypoint. This teaches the robot the optimal path before starting the process again. You do not need to set another waypoint for this.
    e. Tap **Stop recording**.
    f. To edit or add point on the smart move map, tap on **append to trail** and record the desired smart move map. Tap **Clear all** if you want to start again.

4.5. Macro List

> **Tip**
>
> Remember to use the ActiveDrive feature. Refer to the **ActiveDrive Feature** section.

In the program tree, the **Macro List** contains the macros that can be taught to the robot. Other Macros can be added by tapping on **Add Macro** in the Macro List node.

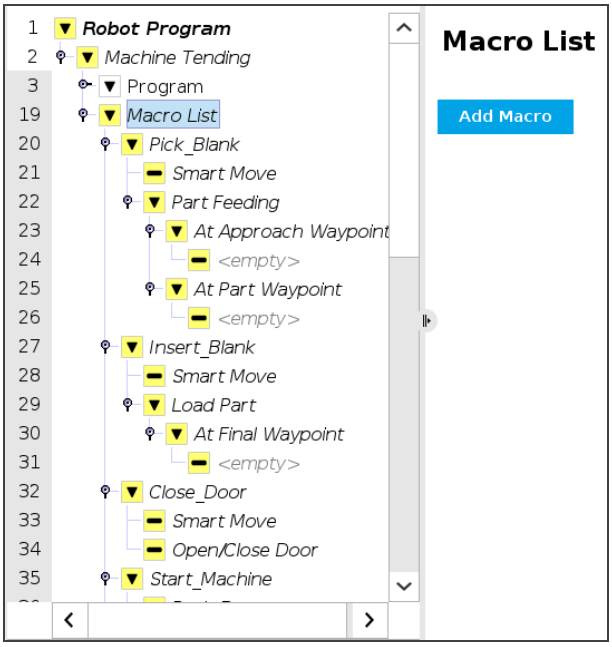


*Fig. 4-21: **Macro List** in the program tree*

4.5.1 Pick_Blank macro

1. In the program tree, tap **Smart Move** under the **Pick_Blank** macro.
   a. The associated key waypoint is set by default according to the Macro that contains it. When running, this will lead the robot above the infeed zone as taught in the recorded **Smart Move Map**.
   b. If needed, you can change the waypoint via the scrolling menu or by setting a new waypoint.

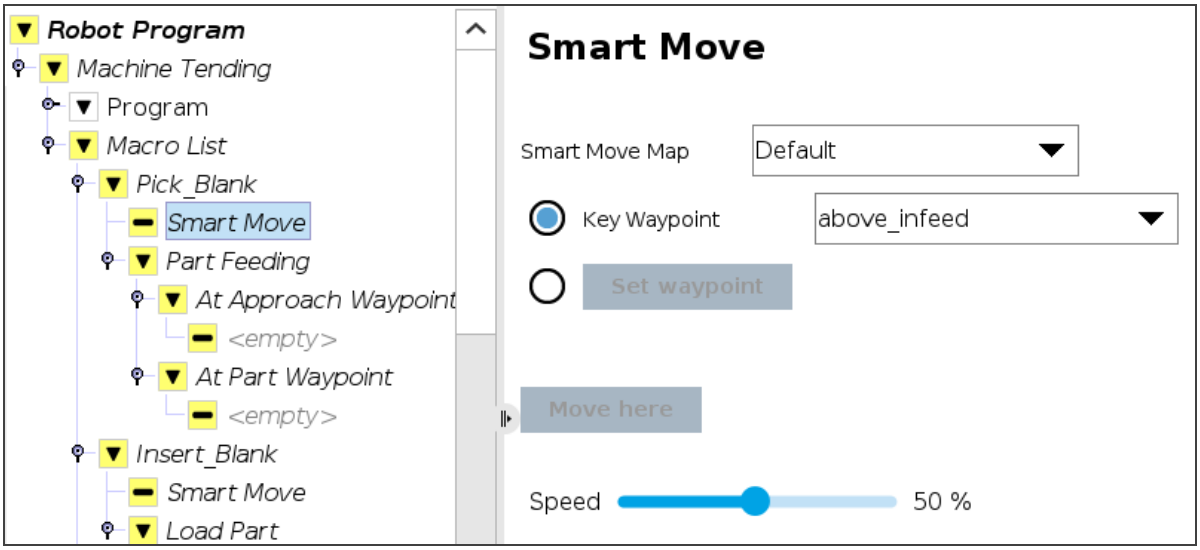


*Fig. 4-22: **Pick_Blank** macro - **Smart Move***

2. In the program tree, tap **Part Feeding** and choose a Part Feeding pattern.

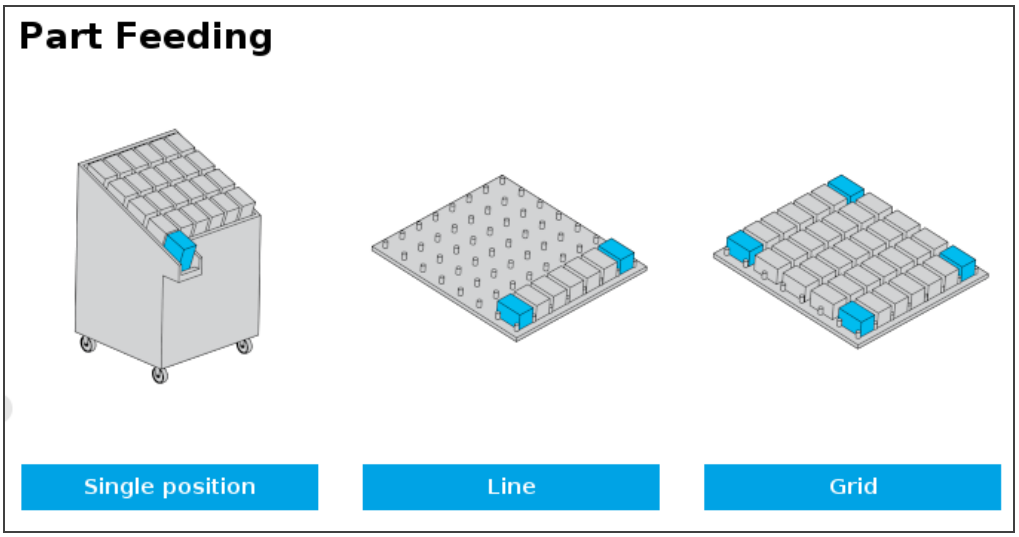


*Fig. 4-23: **Part Feeding** node*

Info

In all three feeding patterns, the picking waypoint(s) are set before the approach waypoint. This eases setting the approach waypoint as the gripper is already aligned with the part.

Single position pattern

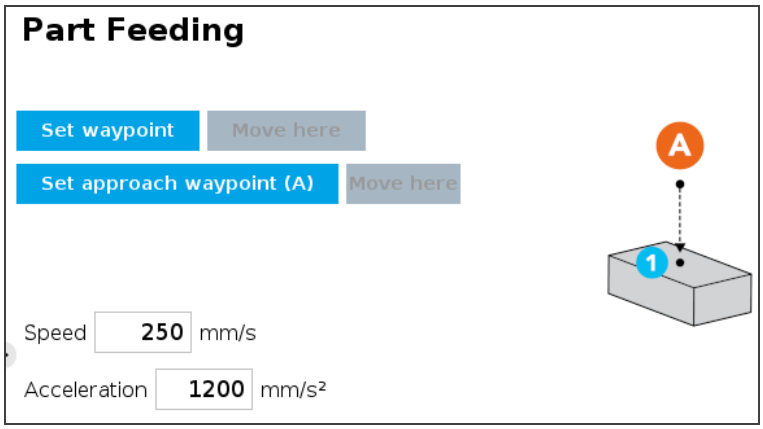


*Fig. 4-24: **Single Position** pattern*

a. Move the gripper (opened) to pick a part. Close the gripper on the part. Tap **Set waypoint** and confirm.

b. Move the gripper up just to clear the infeed zone. Make sure the gripper is still oriented properly. Tap **Set approach waypoint (A)** and confirm.

c. You can modify the robot **Speed** and **Acceleration**.

Line Pattern

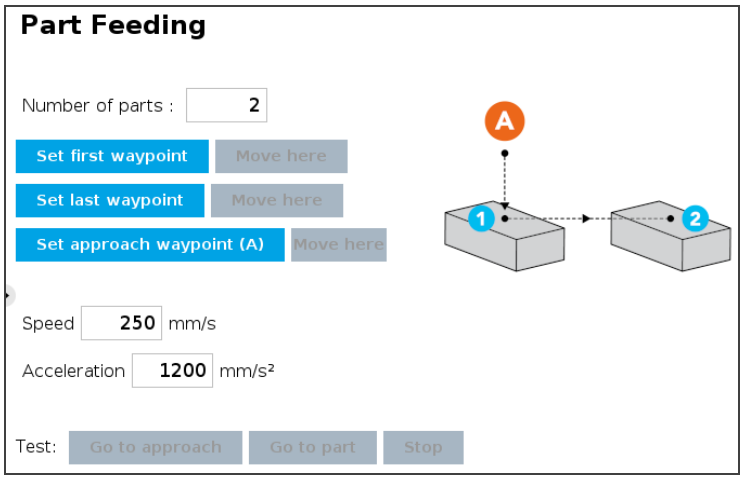


*Fig. 4-25: **Line** pattern*

a. Enter the **Number of parts** in the line.

b. Move the gripper (opened) to pick the first part. Close the gripper on the part. Tap **Set first waypoint** and confirm.

c. Move the gripper up just to clear the infeed zone. Make sure the gripper is still oriented properly. Tap **Set approach waypoint (A)** and confirm.

d. Move the gripper (closed with the part) to the last pick-up position. Tap **Set last waypoint** and confirm.

e. Robot Speed and Acceleration can be modified in the interface.

Grid Pattern

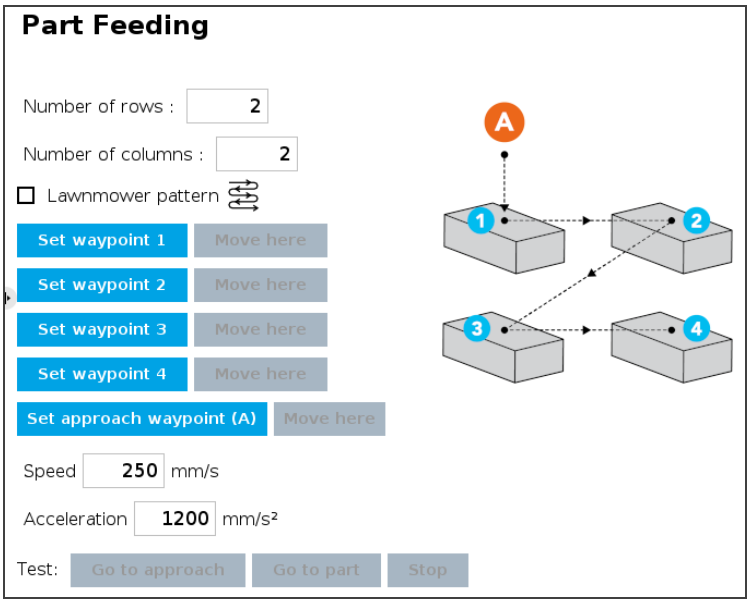


*Fig. 4-26: **Grid** pattern*

a. Enter the **Number of rows** and the **Number of columns** in the grid.

b. Check the **Lawnmower pattern** box if you want the robot to follow this pattern when picking the parts. If not the robot will follow a unidirectional back and forth pattern.

c. Move the gripper (opened) to a corner of the grid and pick the first part. Close the gripper on the part. Tap **Set waypoint 1** and confirm.

d. Move the gripper up just to clear the infeed zone. Make sure the gripper is still oriented properly. Tap **Set approach waypoint (A)** and confirm.

e. Move the gripper (closed with the part) to the second corner of the grid and pick the part. Tap **Set waypoint 2** and confirm.

f. Repeat for corner 3 and 4 of the grid pattern.

g. Robot Speed and Acceleration can be modified in the interface.

3. In the program tree, tap **<empty>** in the **At Approach Waypoint** node.

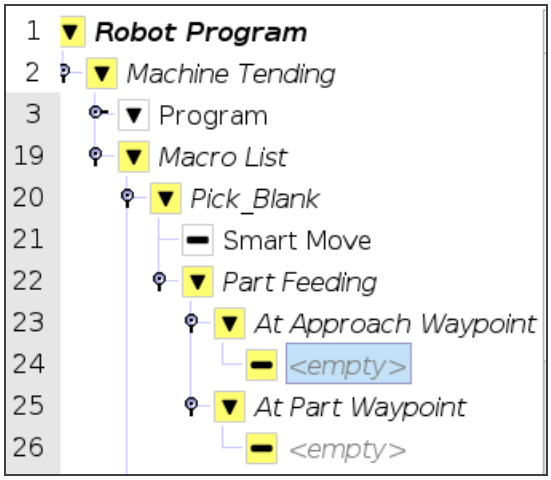


*Fig. 4-27: **At Approach Waypoint** node*

4. Insert the **Gripper** node from the left menu (**Program**->**URCaps**).

5. In the **Gripper** node, open the gripper. Refer to the **Opening and Closing the Gripper(s)** section. This will open the gripper before picking the part.

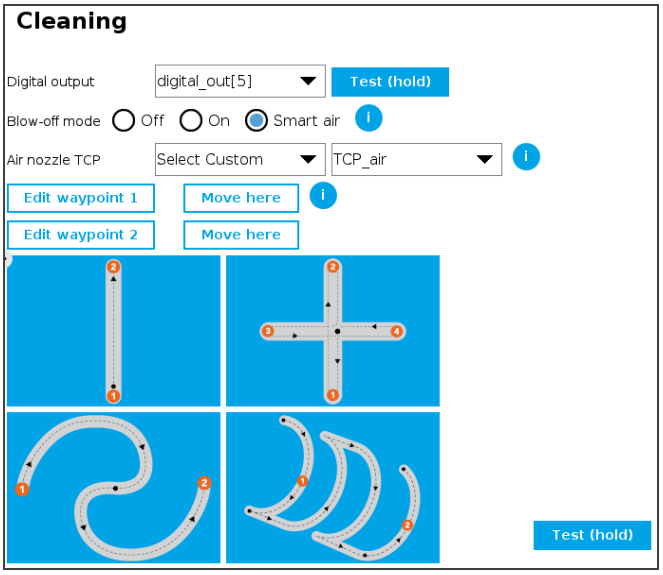
6. In the program tree, tap **<empty>** in the **At Part Waypoint** node.

7. In the Gripper node, close the gripper. Refer to the **Opening and Closing the Gripper(s)** section. This will close the gripper on the part.

4.5.2. Part_Cleaning Macro

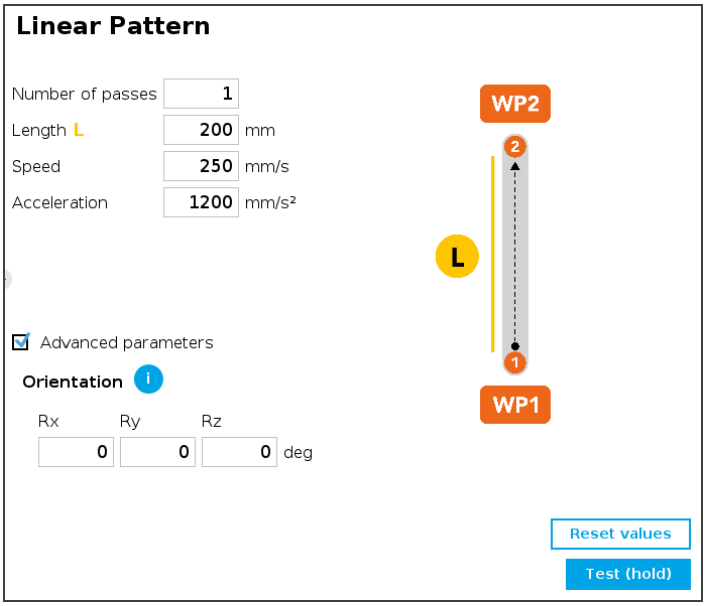
1. In the program tree, tap **Smart Move** under the **Part_Cleaning** macro.
   a. The associated key waypoint is set by default according to the Macro that contains it. When running, this will lead the robot above the infeed zone as taught in the recorded **Smart Move Map**.
   b. If needed, you can change the waypoint via the scrolling menu or by setting a new waypoint.

2. In the program tree, tap **Part Feeding** and choose a Part Feeding pattern.
3. In the **Cleaning** node:
    a. select the output to activate the Air Nozzle. This might be already configured if you named the Digital output air_blower in **Robotiq Controller Configuration** section.
    b. select the Blow-off mode.
        - **Off**: Always off
        - **On**: Always on
        - **Smart Air**: When selected, the air will be turned off between cleaning passes.
    c. Select the Air Nozzle TCP according to the Gripper Setup. See **Centers of Mass Tool Center Points (TCP) of Air Nozzle** section.



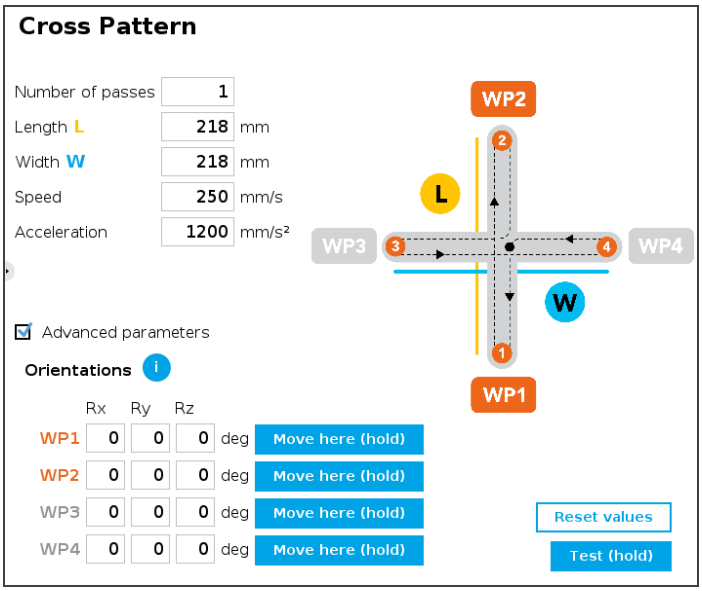
4. Set **waypoint 1** and **waypoint 2**. Those two waypoints will be set for any cleaning pattern you will select. The air nozzle must be perpendicular to the workholding and at the same distance from it when setting the waypoints.
5. Select a cleaning pattern.

Linear pattern



1. Select the **Number of passes**.
2. Enter the **Length** of the pattern. By default, the length is the distance between the two waypoints set earlier.
3. Robot Speed and Acceleration can be modified in the interface.
4. By checking the **Advanced Parameters** box, you can modify the air nozzle orientation (modifications will apply to this pattern only).

Cross pattern

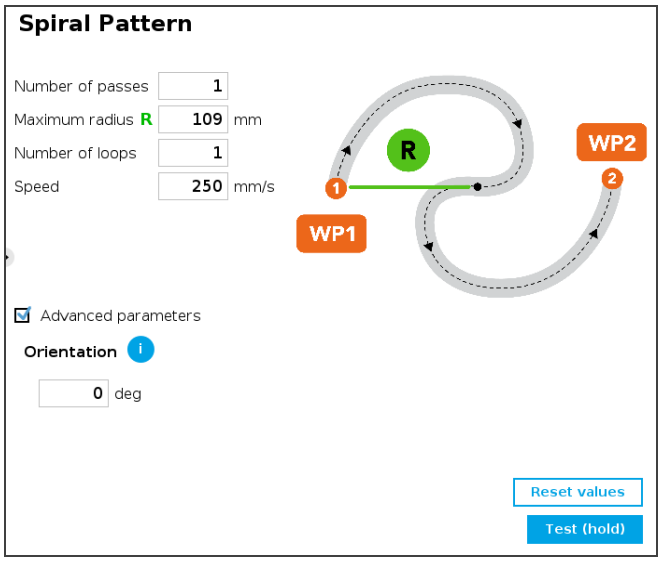


1. Enter the **Number of passes**. The lines and arrows indicate what is the pattern of one pass.
2. Enter the **Length** and the **Width** of the pattern. By default, the length and the width are the distance between the two waypoints set earlier.

3. Robot Speed and Acceleration can be modified in the interface.
4. By checking the **Advanced Parameters** box, you can modify the air nozzle orientation for each of the four waypoints (modifications will apply to this pattern only).

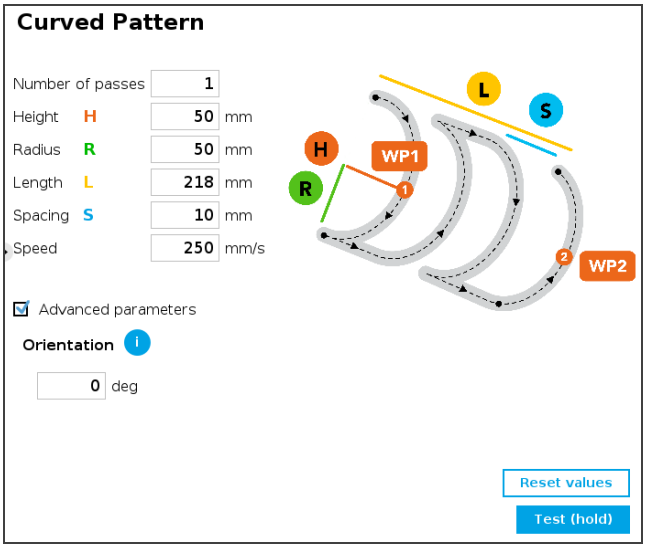
> **Info**
>
> **WP3** and **WP4** are set automatically when you set **WP1** and **WP2**.

Spiral pattern



1. Enter the **Number of passes**. The lines and arrows indicate what is the pattern of one pass.
2. Enter the **Maximum radius** of the pattern. By default, the maximum radius is half of the distance between the two waypoints set earlier.
3. Enter the Number of loops. The example beside is composed of one loop.
4. Robot Speed can be modified in the interface.
5. By checking the **Advanced Parameters** box, the air nozzle orientation can be modified only in one direction (modifications will apply to this pattern only).

Curved pattern

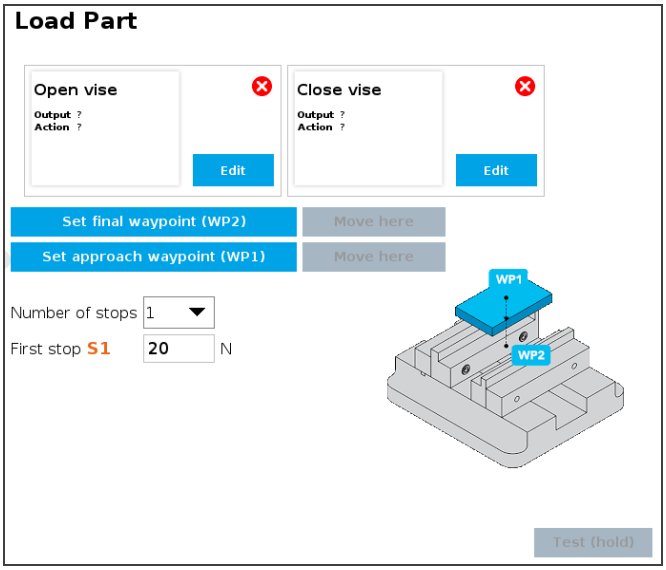


1. Enter the **Number of passes**.
2. Enter the **Height** of each curve, the **Radius** of each curve, the **Length** of the pattern and the **Spacing** between each curve. Note that the length and the spacing will determine the number of curves. By default, the length is the distance between the two waypoints set earlier.
3. You can modify the robot **Speed**.
4. By checking the **Advanced Parameters** box, you can modify the air nozzle orientation only in one direction (modifications will apply to this pattern only). Note that the entered value(s) are added to or subtracted from the default TCP.

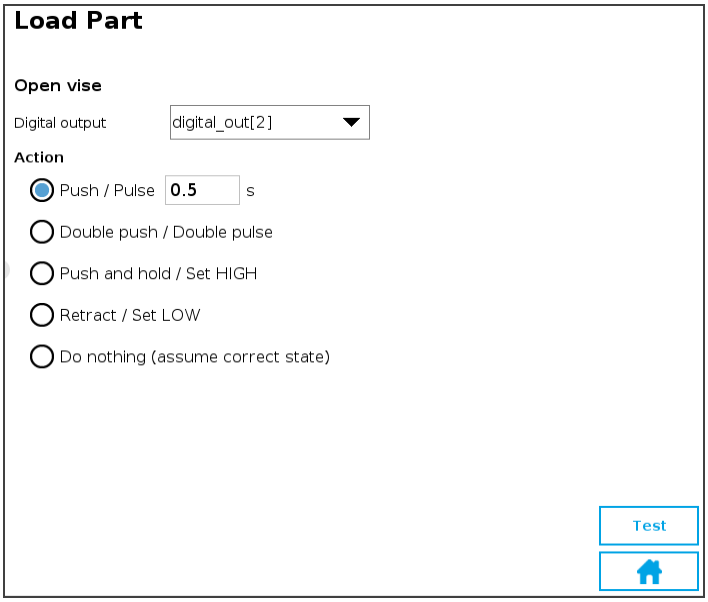
4.5.3. Load_Part Macro

1. In the program tree, tap **Smart Move** under the **Load_Part** macro.
   a. The associated key waypoint is set by default according to the Macro that contains it. When running, this will lead the robot above the infeed zone as taught in the recorded **Smart Move Map**.
   b. If needed, you can change the waypoint via the scrolling menu or by setting a new waypoint. In the program tree, tap **Part Feeding** and choose a Part Feeding pattern.
2. Insert the **Gripper** node in **At Insertion Waypoint**.
3. In the **Gripper** node, open the gripper as per the **Opening and Closing the Gripper(s)** section. This will release the part in the work-holding device.

With Vise



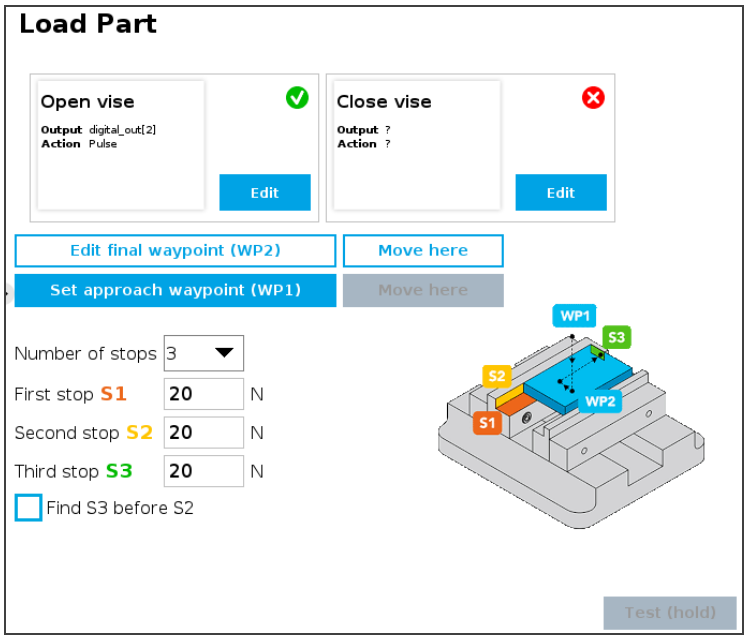
1. Tap **Open vise**. Select the according **Digital output** and the **Action** to open the vise. Tap the home icon to go back to the Load Part node. This might be already configured if you named the Digital output work_open in **Robotiq Controller Configuration** section



2. Tap **Close vise**. Select the according **Digital ouput** and the **Action** to close the vise. Tap the home icon to go back to the previous screen. This might be already configured if you named the Digital output work_close in **Robotiq Controller Configuration** section .

3. Tap **Set final waypoint (WP2)**. Setting the final waypoint first eases setting of the approach waypoint afterward, as the gripper is aligned with the vise. Move down the part in the vise and lock its position, making sure a maximum of faces are supported. Confirm the waypoint.

4. Back in the **Load Part** node, at the bottom choose the vise **Number of stops** in the scrolling menu and enter the force applied for each stop. Check **Find S3 before S2** if it suits better your vise.



5. Set the approach waypoint as follow. Use the **TCP Position** feature as per **Software** section to move the robot, as the alignment with the final waypoint must not be lost.
   - Move the gripper up to clear the vise.
   - Move the gripper away but still aligned between the jaws.
   - These steps will avoid the part to hit the edge of the vise and cause a misalignment. Tap **Set approach waypoint (WP1)** and confirm.

With Chuck

1. Tap **Open chuck**.Select the according **Digital ouput** and the **Action** to open the chuck.Tap the home icon to go back to the LoadPart node. This might be already configured if you named the Digital output work_open in **Robotiq Controller Configuration** section
2. Tap **Close chuck**.Select the according **Digital ouput** and the **Action** to close the chuck.Tap the home icon to go back to the previous screen. This might be already configured if you named the Digital output work_close in **Robotiq Controller Configuration** section .
3. Tap **Set final waypoint (WP2)**. Setting the final waypoint first eases setting of the approach waypoint afterward, as the gripper is aligned with the chuck. Push down the part in the chuck and lock its position. Confirm the waypoint.
4. Set the approach waypoint as follow.Use the **TCP Position** feature as per **TCP movements** section to move the robot, as the alignment with the final waypoint must not be lost.
   - Move the gripper away to clear the chuck.
   - These steps will avoid the part to hit the edge of the chuck and cause a misalignment.Tap **Set approach waypoint (WP1)** and confirm.
5. Optional Push part feature : If part needs to be pushed after the insertion, set a waypoint at the end of the inserted part so that after the insertion, the robot will push the part further in the chuck until it detects a contact.

4.5.4. Open/ Close Door Macro

Open Door

1. In the program tree, tap **Smart Move** under the **Open_Door** node.
    a. The associated key waypoint is set by default according to the Macro that contains it. When running, this will lead the robot above the infeed zone as taught in the recorded **Smart Move Map**.
    b. If needed, you can change the waypoint via the scrolling menu or by setting a new waypoint.In the program tree, tap **Part Feeding** and choose a Part Feeding pattern.
2. While the cursor is still on the **Smart Move** node, insert the **Gripper** node in the program tree and tap it.
3. In the **Gripper** node, close the gripper as per the **Opening and Closing the Gripper(s)** section.

> **Info**
>
> To reduce impact on the gripper mecanism, make sure to close the gripper fingers before opening or closing the machine door.

*Fig. 4-28: **Open/ Close Door** macro in the program tree*

4. Tap on the **Open/ Close Door** node.Move the gripper in position to close the door. Position it so it barely touches the handle. Tap **Set Start Waypoint** and confirm.

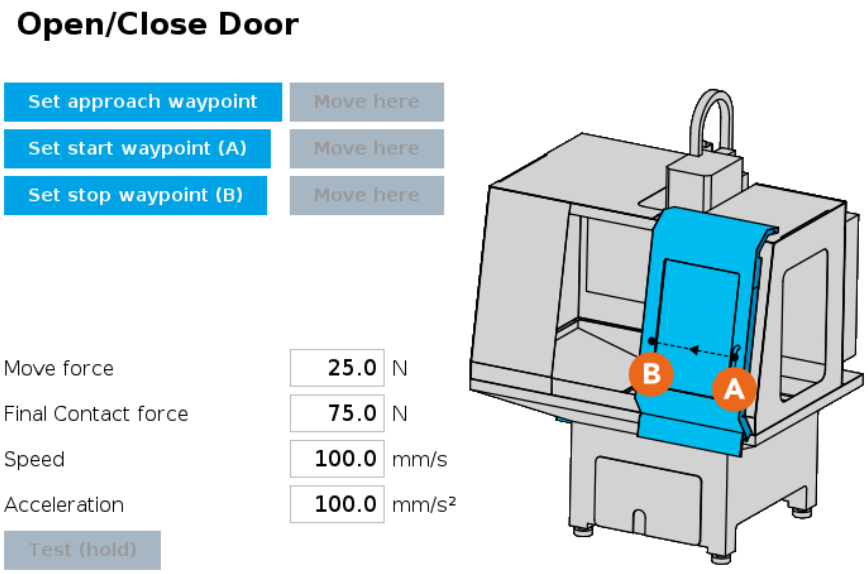


*Fig. 4-29: **Open/Close Door** macro*

5. Close completely the door with the robot. Tap **Set Stop Waypoint** and confirm.
6. Forces applied on the machine door, speed and acceleration of the robot can be set in the interface.

Close Door

> **Info**
>
> To use the Close Door macro, follow the same instructions as per the Open Door while interchanging the "close" and "open" .

4.5.5. Monitor Lights Node

1 Choose the state the robot has to wait before resuming. In this case, the robot would wait until the machine is idle to be unloaded, select **Is idle**

*Fig. 4-30: **Monitor Light** node*

4.5.6. Unload Part Node

1. Insert a **Gripper** node in **At Approach Waypoint**.
2. In the **Gripper** node, open the gripper as per the **Opening and Closing the Gripper(s)** section. This will open the gripper before picking the part.
3. Back to the program tree, insert the **Gripper** node in **At Pick Waypoint**.
4. In the **Gripper** node, close the gripper as per the **Opening and Closing the Gripper(s)** section. This will close the gripper on the part.

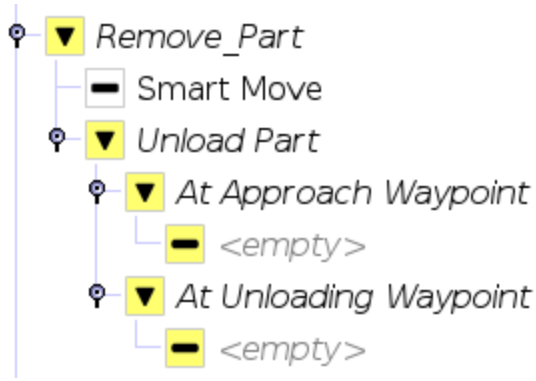


Fig. 4-31: unload_part node in program tree

With Vise

1. Tap **Open vise**. Select the according **Digital ouput** and the **Action** to open the vise. Tap the home icon to go back to the **UnLoad Part** node. This might be already configured if you named the Digital output work_open in **Robotiq Controller Configuration** section

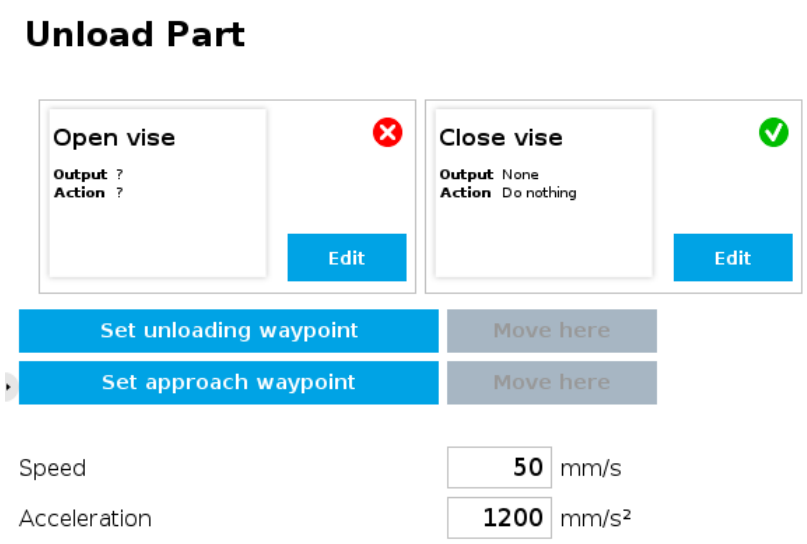


Fig. 4-32: Unloading vise

2. Tap **Set unloading waypoint**. Setting the unloading waypoint first eases setting the approach waypoint afterward, as the gripper is aligned with the vise. Move down the gripper in position and confirm the waypoint.

3. Move the gripper a little up and away to clear the vise. You can use the **TCP Position** feature as per **Software** section to keep the alignment with the final waypoint. Tap **Set approach waypoint** and confirm.

Tip

To set the two waypoints in the **Unload Part** node, you can:

- Go to the **Load Part** node in the program tree.
- Move the robot to the final waypoint (WP2) by tapping **Move here**.
- Go back to the **Unload Part** node and set the the unloading waypoint.
- Repeat for the approach waypoint.

This method can save time and ensure the right positioning of the waypoints.

4.5.7. Drop Part Macro

Info

To use the Drop Part macro, follow the same instructions as per the Pick Part macro while interchanging the "drop" and "pick".

4.5.8. Activate Button

1. Enter the Digital output associated to the Button Activator. This might be already configured if you named the Digital output push_button in **Robotiq Controller Configuration** section
2. Select the functioning of the Button: Push / Pulse, Push and hold / Set HIGH or Retract / Set LOW.
3. If required, enter the time (in seconds) of the action.
4. Enter the required delay (in seconds) after the action.

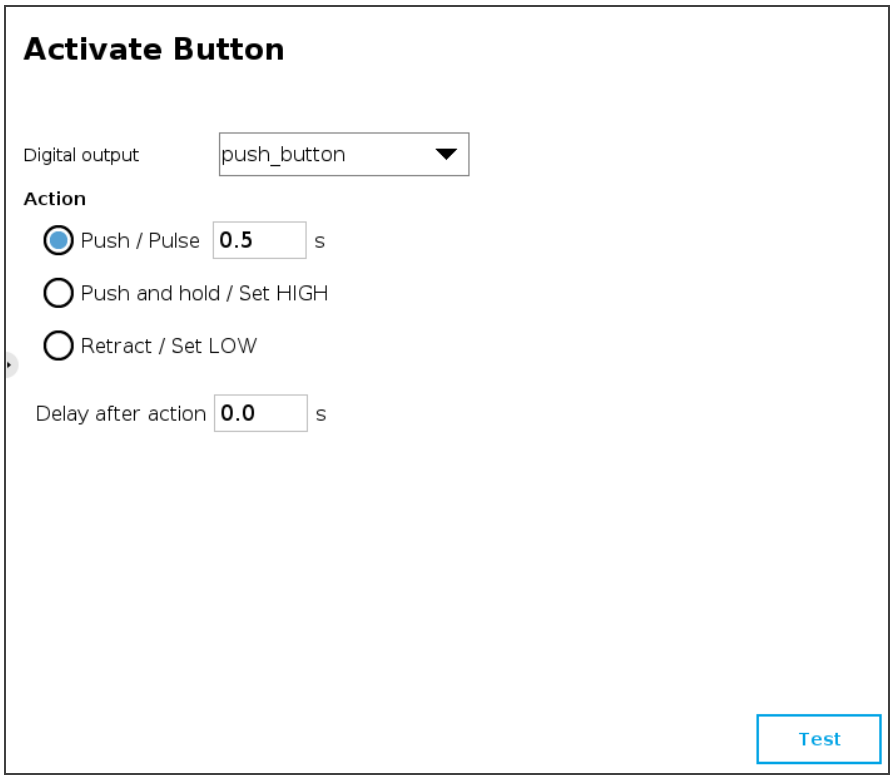


Fig. 4-33: Activate Button node

5. Specifications

Info

The following manual uses the metric system. Unless specified, **all dimensions are in millimeters**.

Caution

For all the specifications of the Hand-E Gripper, please refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

5.1 Technical Dimensions

5.11 Button Activator

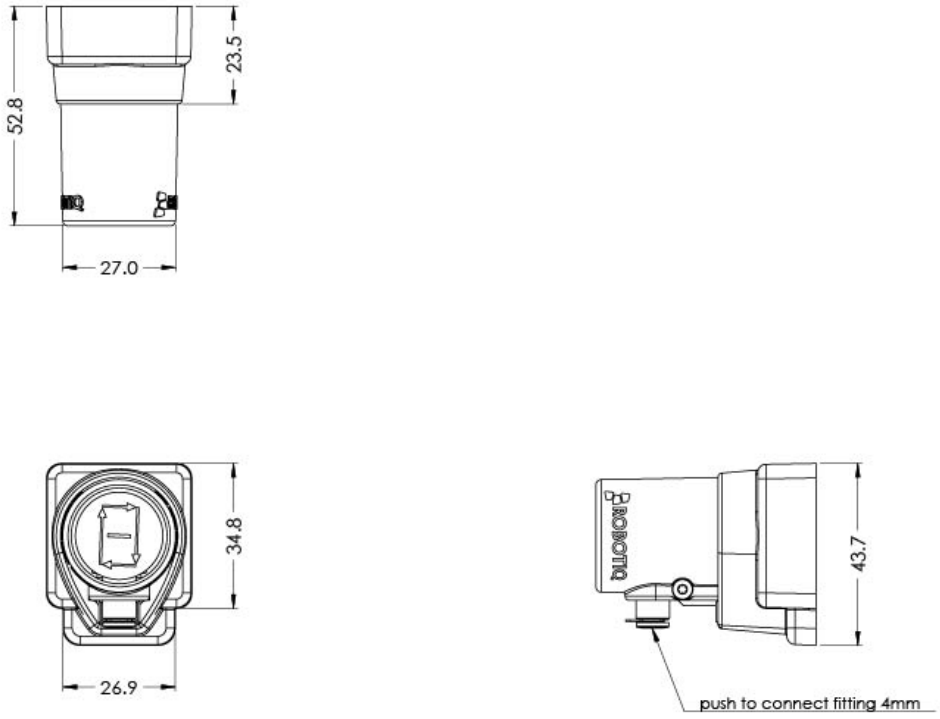


Fig. 5-1: Button Activator technical dimensions

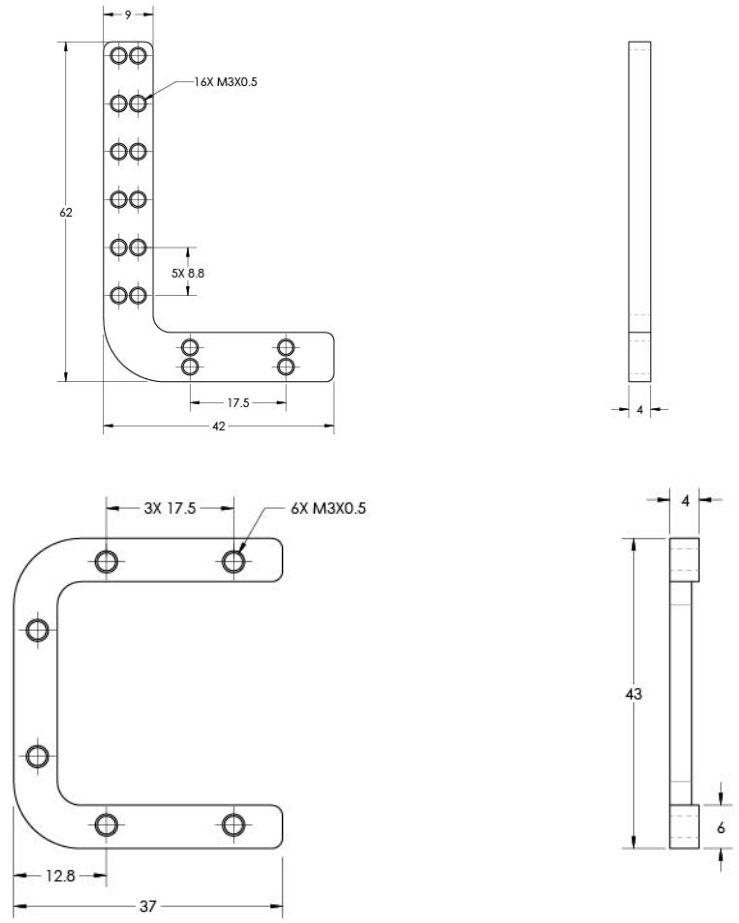


Fig. 5-2: Button Activator brackets technical dimensions

5.12. Fingertips

Flat NBR Overmolded Fingertips (already installed)

Caution

For the technical dimensions of these Flat NBR Overmolded Fingertips, please refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

Flat NBR Overmolded Fingertips (on Adjustable Holders)

Caution

For the technical dimensions of these Flat NBR Overmolded Fingertips, please refer to the **Robotiq 2F-85 & 2F-140 Instruction Manual** at robotiq.com/support.

Small Radial Fingertips

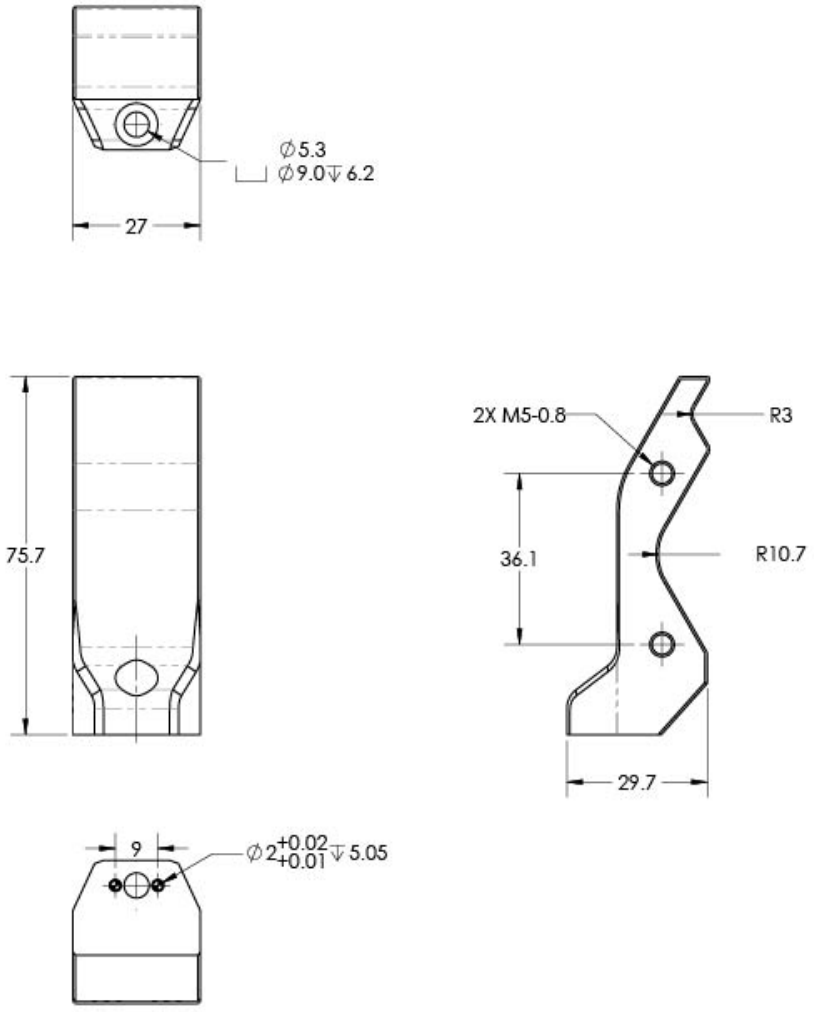


Fig. 5-3: Small Radial Fingertips technical dimensions

4 Stops Fingertips

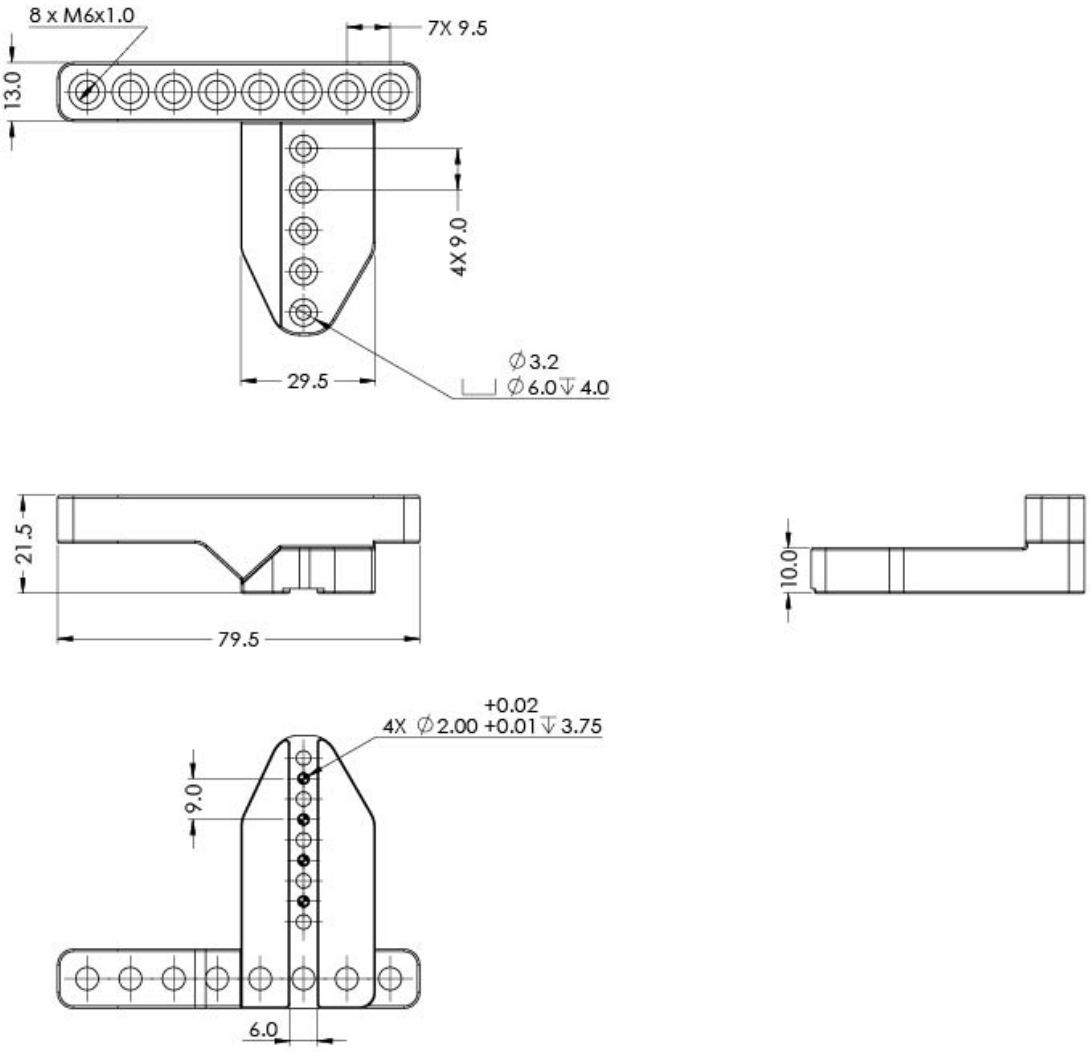


Fig. 5-4: 4 Stops Fingertips technical dimensions

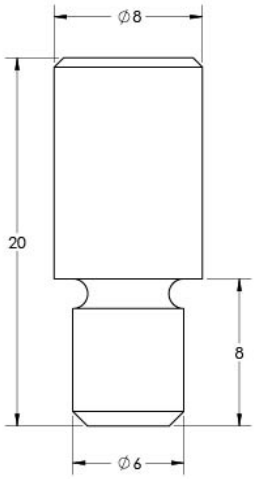


Fig. 5-5: Small Pin technical dimensions

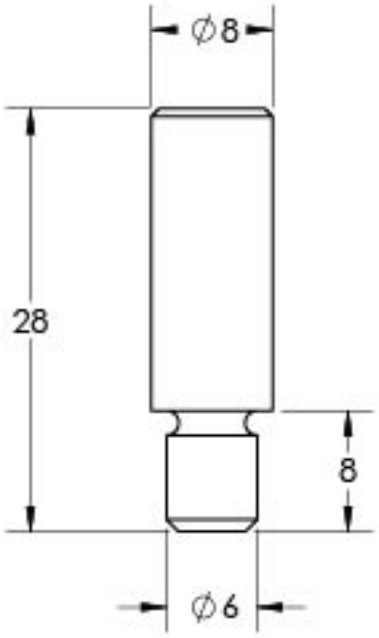


Fig. 5-6: Large Pin technical dimensions

Large Radial Fingertips

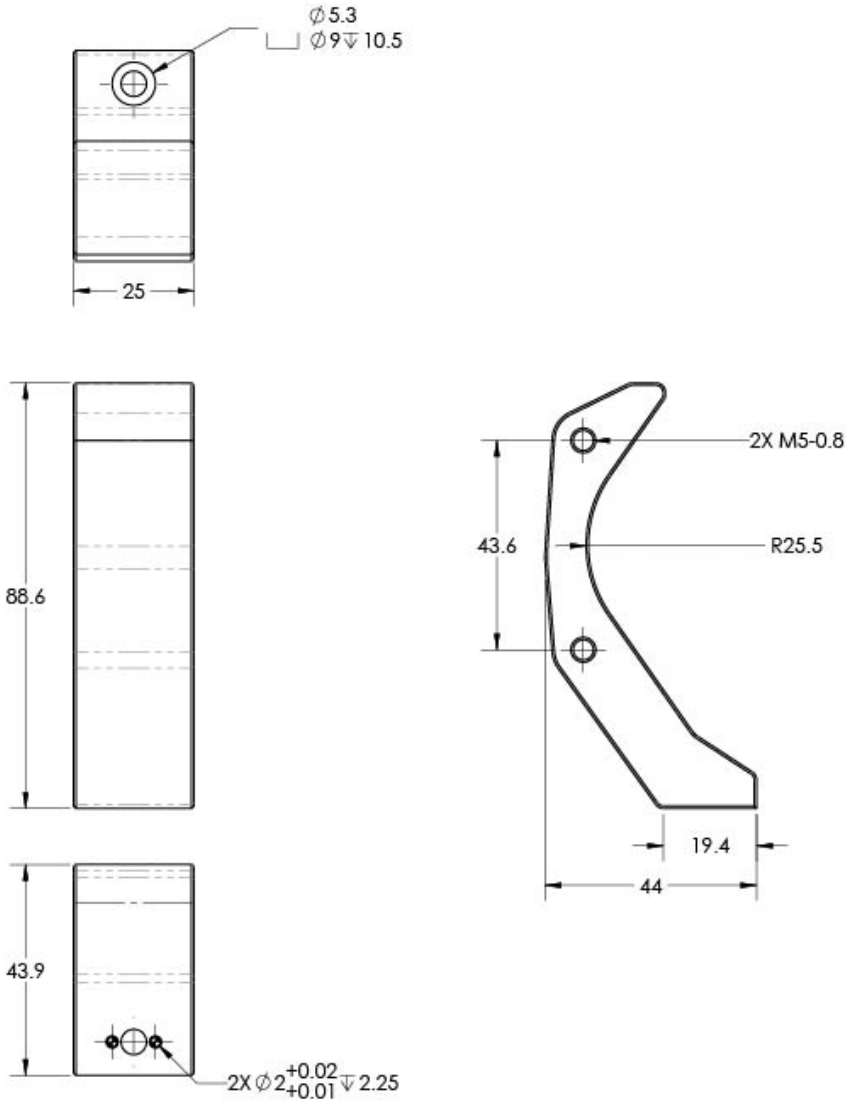


Fig. 5-7: Large Radial Fingertips technical dimensions

Blank Fingertips

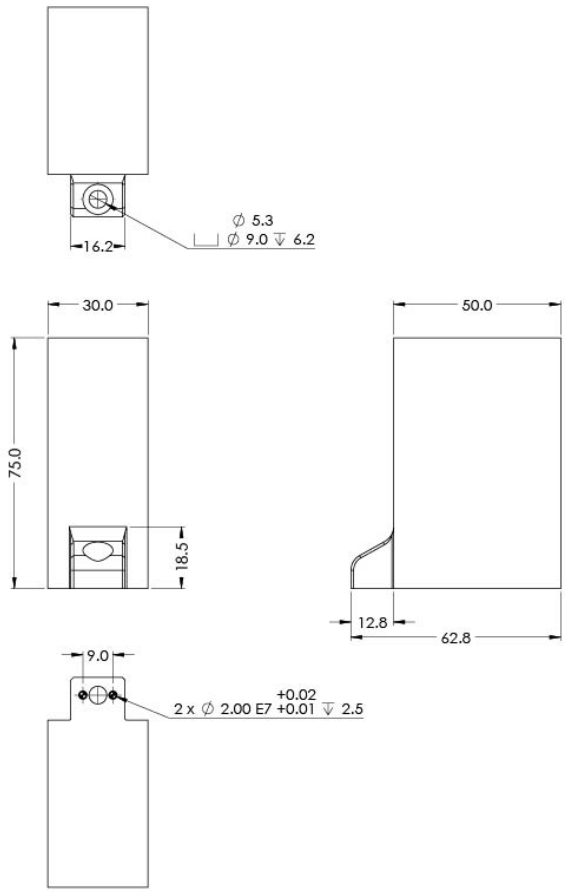


Fig. 5-8: Blank Fingertips technical dimensions

Adjustable Fingertip Holders

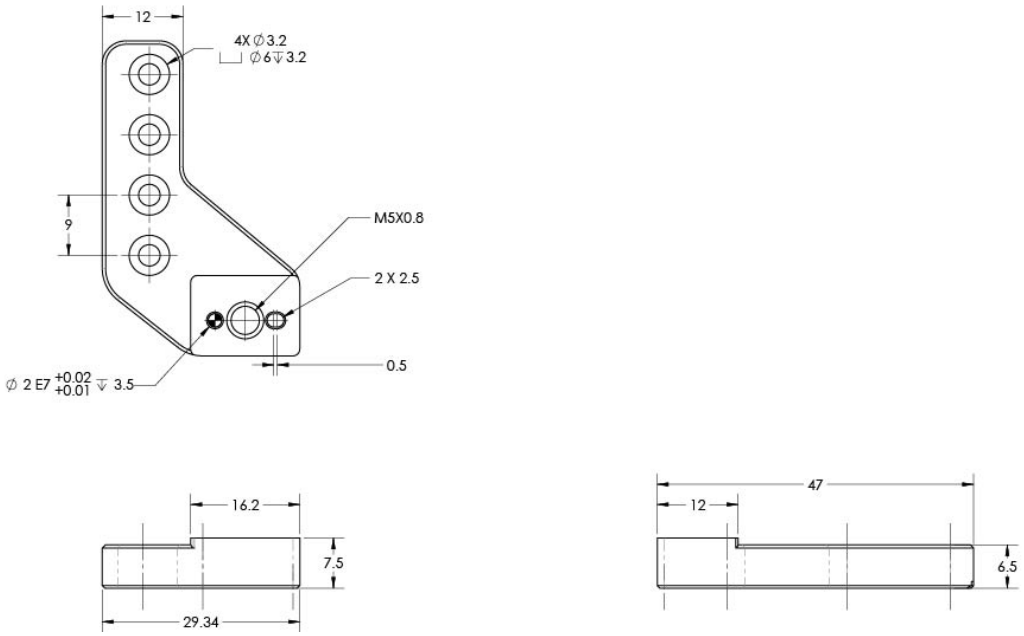


Fig. 5-9: Adjustable Fingertip Holders technical dimensions

5.13. Air Nozzle

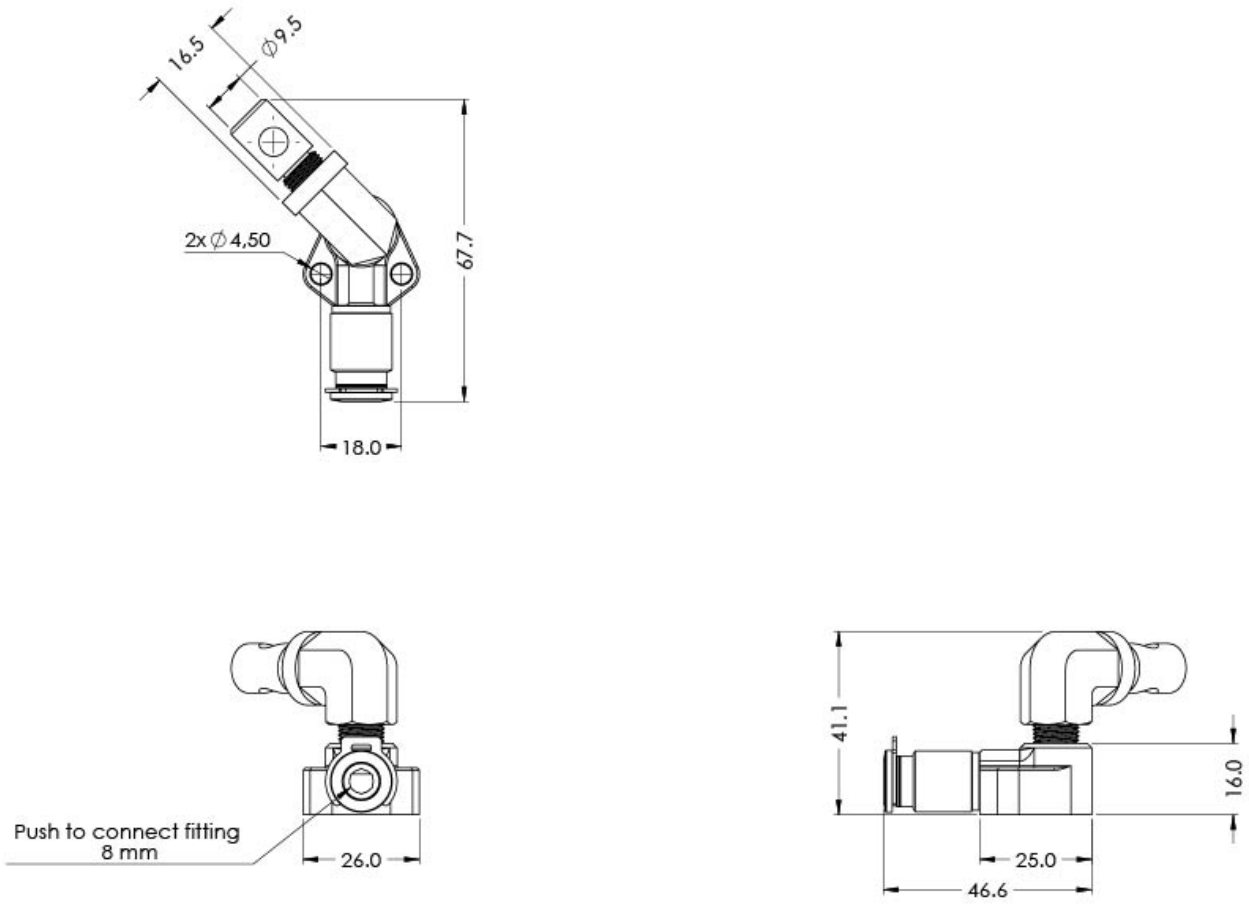


Fig. 5-10: Air Nozzle technical dimensions

5.14. Pneumatic Panel

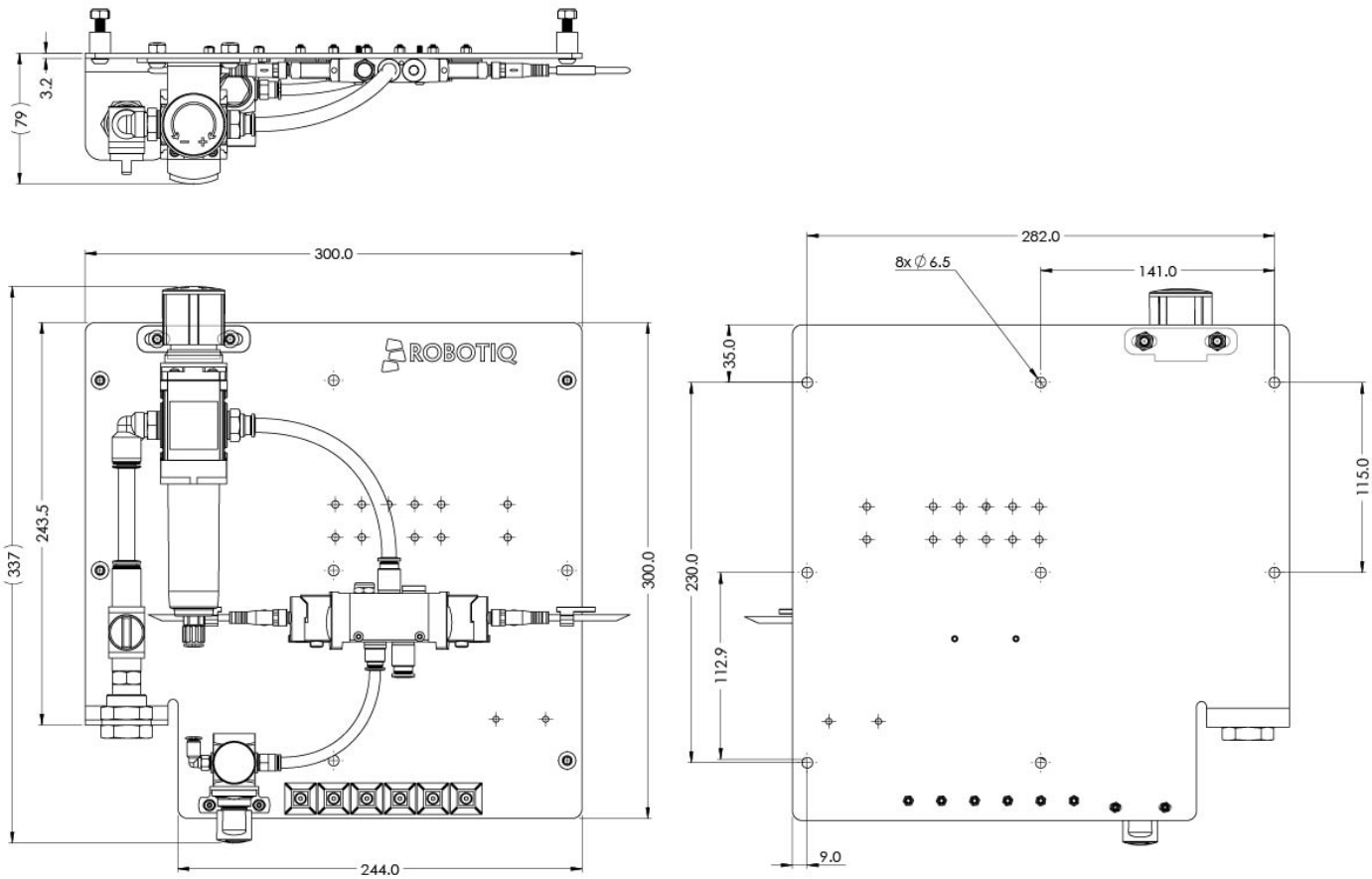


Fig. 5-11: Pneumatic Panel technical dimensions

5.15. Robotiq Controller

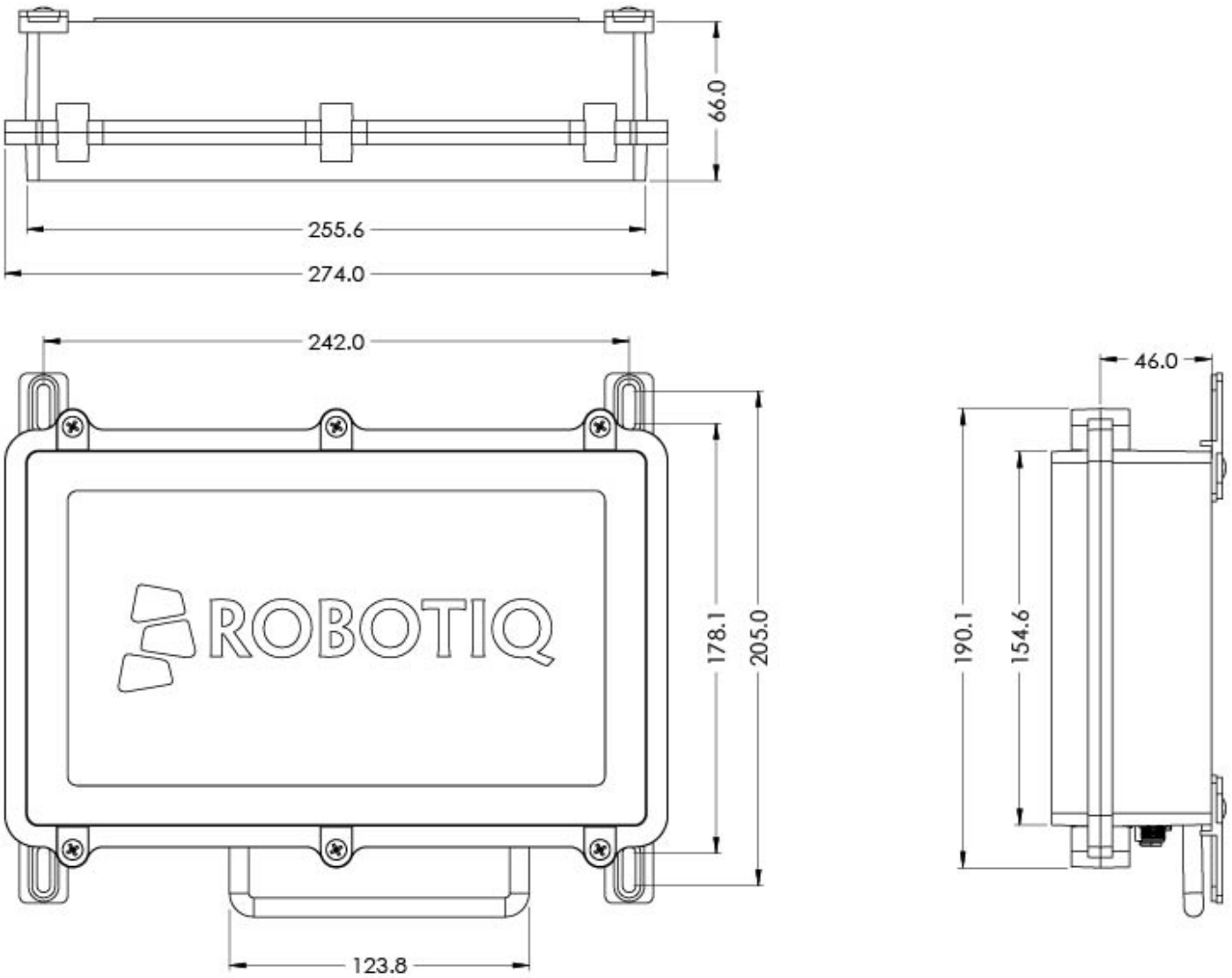


Fig. 5-12: Robotiq Controller technical dimensions

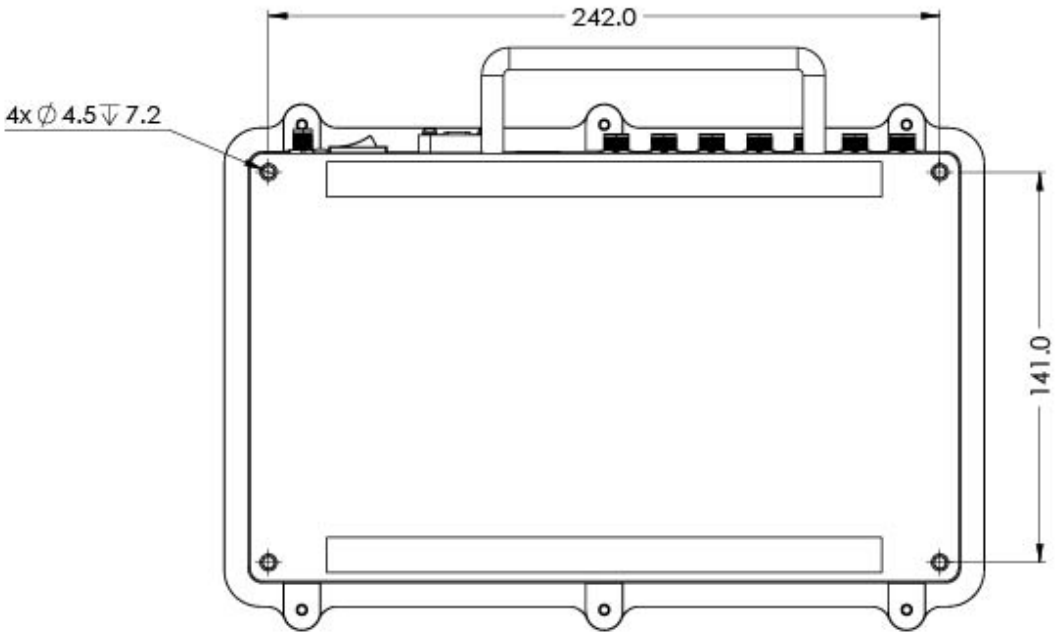


Fig. 5-13: Robotiq Controller technical dimensions - bottom view

5.16. Stacklight Monitoring Sensors

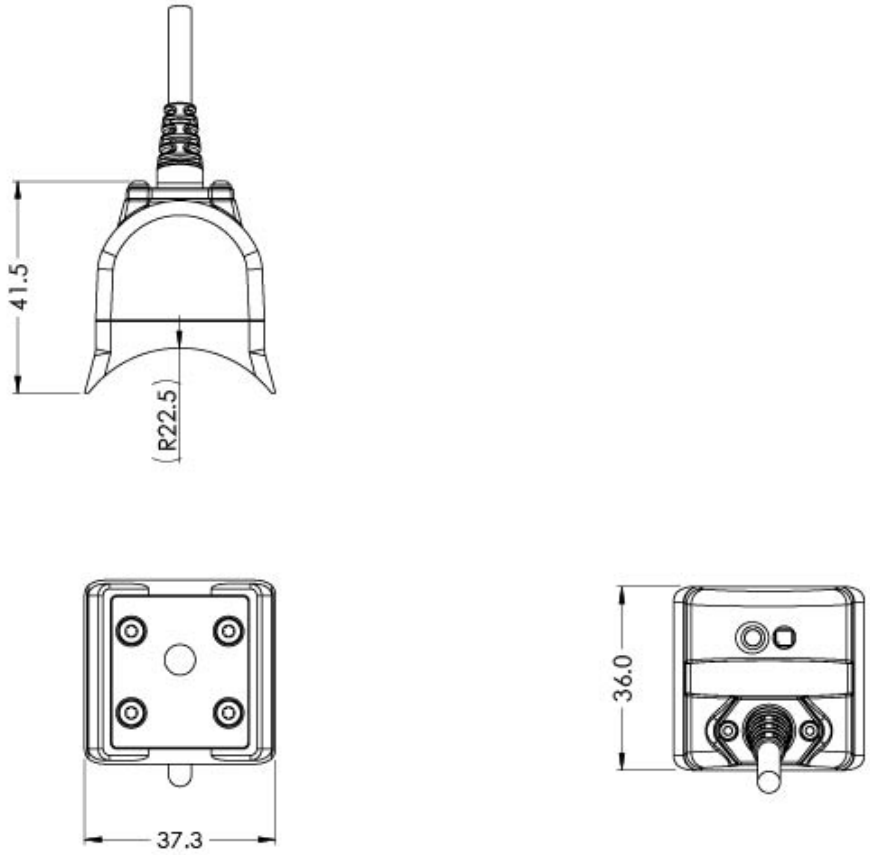


Fig. 5-14: Stacklight Monitoring Sensors technical dimensions

5.17. Foot Switch Activator

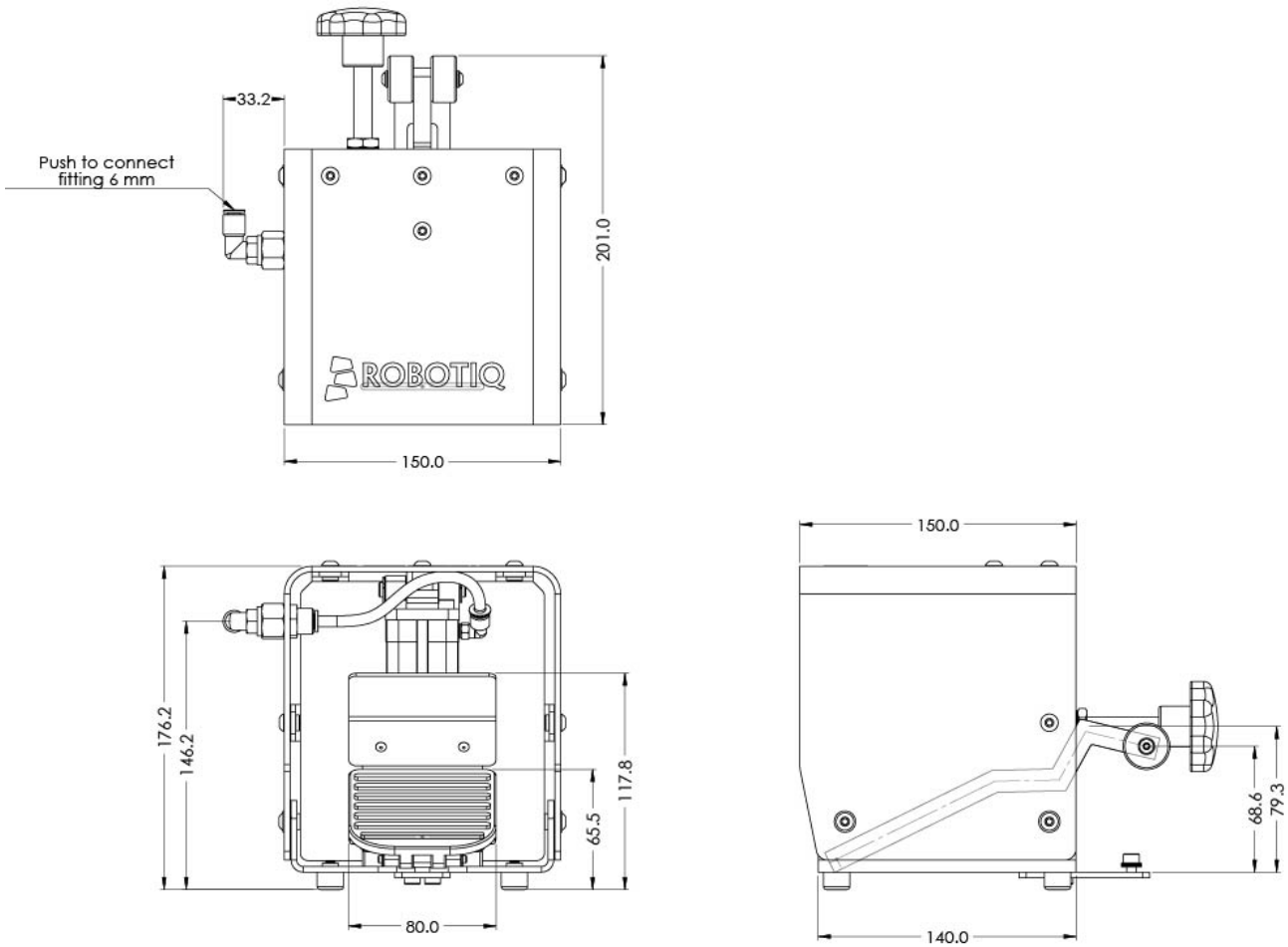


Fig. 5-15: Foot Switch Activator technical dimensions

5.18. Brackets for Dual Hand-E Gripper

Compact Dual Hand-E Bracket (X configuration)

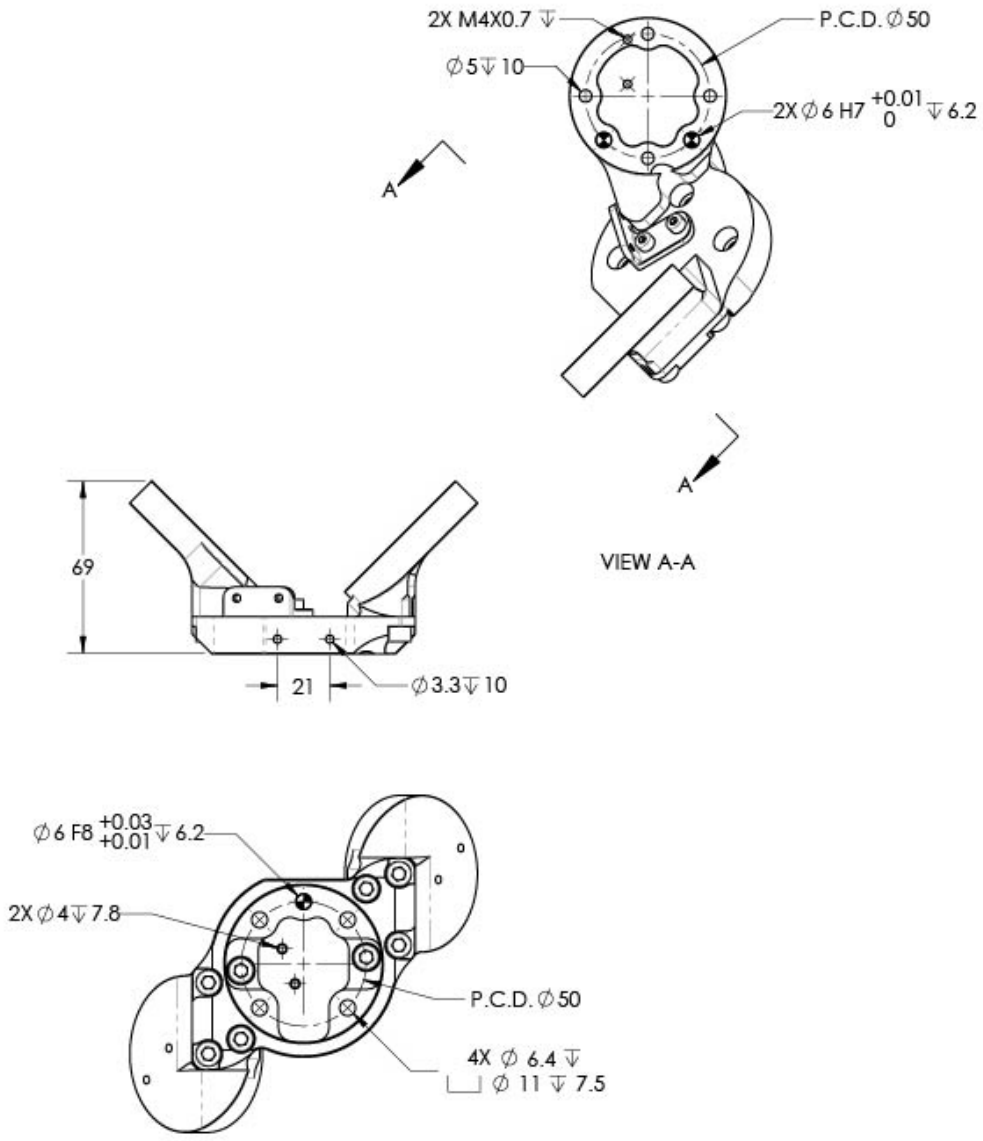


Fig. 5-16: Compact Dual Hand-E Bracket technical dimensions

Dual Bracket (V configuration)

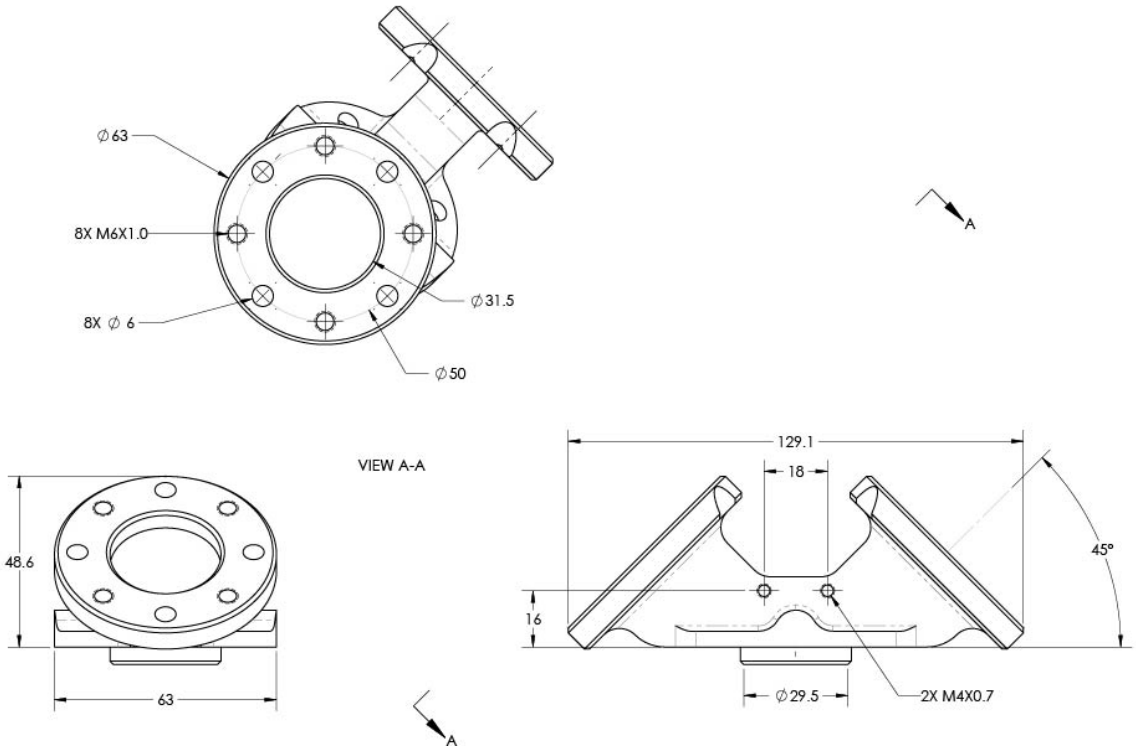


Fig. 5-17: Dual Bracket technical dimensions

5.2. Mechanical Specifications

5.2.1 Button Activator

MECHANICAL SPECIFICATION	VALUE	
	MIN	MAX
Energy source	Compressed air	
Air supply connection type	4 mm OD Tube	
Feed pressure at the tool	2 bar (29 psi)	6 bar (87 psi)
Air consumption	Negligible	
Noise level [1]	Less than 70 dB	
Applicable button height range	0	16 mm
Applicable button stroke	0	7 mm
Applicable button diameter or width	8 mm	31 mm
Applicable required force	3 N	13 N

Table 5 - 1: Button Activator mechanical specifications

[1] At a distance of 1 m and with a pressure of 6 bar.

5.2.2. Air Nozzle

MECHANICAL SPECIFICATION	VALUE
Energy source	Compressed air
Air supply connection type	8 mm (5/16 in) OD Tube
Feed pressure at the tool	6 bar (87 psi)
Air consumption	320 L/min (11.3 cfm) at 6 bar
Noise Level [1]	110 dB
Mass	0.03 kg (0.07 lb)

Table 5 - 2: Air Nozzle mechanical specifications

[1] At a distance of 1 m and with a pressure of 6 bar.

5.2.3. Pneumatic Panel

MECHANICAL SPECIFICATION	VALUE	
	MIN	MAX
Energy source	Compressed air	
Air supply connection type	BSPP 3/8 in female (adapter to NPT 3/8 male provided)	
Required feed pressure	6 bar (87 psi)	8 bar (116 psi)
Minimal required air flow	400 L/min (14.1 cfm) at 6 bar	
Required media (compressed air)	ISO 8573-1 class 7.4.4 [1]	

Table 5 - 3: Pneumatic Panel mechanical specifications

[1] Dry and filtered air that complies with standard ISO 8573-1 class 7.4.4

5.2.4. Foot Switch Activator

MECHANICAL SPECIFICATION	VALUE
Energy source	Compressed air
Air supply connection type	6 mm OD Tube
Feed pressure at the tool	6 bar (87 psi)
Air consumption at optimal pressure	Negligible
Noise level [1]	Less than 70 dB
Mass	4.03 kg (8.88 lb)

Table 5 - 4: Foot Switch Activator mechanical specifications

[1] At a distance of 1 m and with a pressure of 6 bar.

5.2.5. Centers of Mass and Tool Center Points (TCP) of Grippers and Fingertips

Single Gripper

Product	Center of mass (mm) [1]			TCP position (mm)			Mass (g) [1]
	X	Y	Z	X	Y	Z	
Gripper with Flat NBR Overmolded Fingertips	0.0	0.0	59.0	0.0	0.0	157.0	1068
Gripper with Flat NBR Overmolded Fingertips (on Adjustable Holders)	0.0	0.0	62.8	0.0	0.0	156.0	1153
Gripper with Small Radial Fingertips - low grip	0.0	0.0	73.0	0.0	0.0	156.1	1292
Gripper with Small Radial Fingertips - high grip	0.0	0.0	73.0	0.0	0.0	185.7	
Gripper with 4 Stop Fingertips	0.0	0.0	72.5	0.0	0.0	150.5	1385
Gripper with Large Radial Fingertips	0.0	0.0	76.2	0.0	0.0	172.8	1322

Table 5 - 5: Center of mass and TCP - Single Gripper

[1] All mass and center of mass values include the coupling and the fasteners.

If the Wrist Camera is installed, the center of mass and the TCP of the assembly must be adjusted. The values of the center of mass and the TCP of the Wrist Camera when used with a single Gripper are as below.

Product	Center of mass (mm)			TCP position (mm)			Mass (g)
	X	Y	Z	X	Y	Z	
Wrist Camera on single Gripper	-6.5	6.6	4.0	0.0	0.0	13.5	195

Table 5 - 6: Wrist Camera on Single Gripper

Dual Gripper on Compact Dual Hand-E Bracket (X configuration)

Product [1]	Center of mass (mm)[2]			TCP position (mm)[3]						TCP orientation (°)[3]						Mass (g)[2]
				Gripper 1			Gripper 2			Gripper 1			Gripper 2			
	X	Y	Z	X	Y	Z	X	Y	Z	Rx	Ry	Rz	Rx	Ry	Rz	
Bracket only (without Grippers)	0.0	0.0	20.2	-	-	-	-	-	-	-	-	-	-	-	-	456
Dual Gripper with Flat NBR Overmolded Fingertips (already installed)	0.0	0.0	73.8	-72.3	-36.2	155.3	72.3	36.2	155.3	-68.9	0.0	166.3	0.0	45.0	0.0	2561
Dual Gripper with Flat NBR Overmolded Fingertips (on Adjustable Holders)	0.0	0.0	77.1	-71.6	-36.2	154.6	71.6	36.2	154.6	-68.9	0.0	166.3	0.0	45.0	0.0	2730
Dual Gripper with Small Radial Fingertips - low grip	0.0	0.0	84.4	-71.7	-36.2	154.7	71.7	36.2	154.7	-68.9	0.0	166.3	0.0	45.0	0.0	3010
Dual Gripper with Small Radial Fingertips - high grip	0.0	0.0	84.4	-92.6	-36.2	175.6	92.6	36.2	175.6	-68.9	0.0	166.3	0.0	45.0	0.0	
Dual Gripper with 4 Stop Fingertips	0.0	0.0	84.8	-67.8	-36.2	150.8	67.8	36.2	150.8	-68.9	0.0	166.3	0.0	45.0	0.0	3195
Dual Gripper with Large Radial Fingertips	0.0	0.0	86.6	-83.5	-36.2	166.5	83.5	36.2	166.5	-68.9	0.0	166.3	0.0	45.0	0.0	3069

Table 5 - 7: Center of mass and TCP - Dual Gripper on Compact Dual Hand-E Bracket

1 For each product, the values are for the following configuration: same fingertips on both grippers.

2 All mass and center of mass values include the couplings and the fasteners.

3 Gripper 1 was identified as follow: with the Grippers upward, Gripper 1 is installed on the right of the wrist connection.

Dual Gripper on Dual Bracket (V configuration)

Product [1]	Center of mass (mm)[2]			TCP position (mm)[3]						TCP orientation (°)[3]						Mass (g)[2]
				Gripper 1			Gripper 2			Gripper 1			Gripper 2			
	X	Y	Z	X	Y	Z	X	Y	Z	Rx	Ry	Rz	Rx	Ry	Rz	
Bracket only (without Grippers)	0.0	0.0	15.5	-	-	-	-	-	-	-	-	-	-	-	-	265
Dual Gripper with Flat NBR Overmolded Fingertips (already installed)	0.0	0.0	62.8	154.0	0.0	138.0	-154.0	0.0	138.0	0.0	45.0	0.0	0.0	-45.0	0.0	2401
Dual Gripper with Flat NBR Overmolded Fingertips (on Adjustable Holders)	0.0	0.0	65.1	153.3	0.0	137.3	-153.3	0.0	137.3	0.0	45.0	0.0	0.0	-45.0	0.0	2570
Dual Gripper with Small Radial Fingertips - low grip	0.0	0.0	72.3	153.4	0.0	137.4	-153.4	0.0	137.4	0.0	45.0	0.0	0.0	-45.0	0.0	2850
Dual Gripper with Small Radial Fingertips - high grip	0.0	0.0	72.3	174.3	0.0	158.3	-174.3	0.0	158.3	0.0	45.0	0.0	0.0	-45.0	0.0	
Dual Gripper with 4 Stop Fingertips	0.0	0.0	72.3	149.4	0.0	133.4	-149.4	0.0	133.4	0.0	45.0	0.0	0.0	-45.0	0.0	3035
Dual Gripper with Large Radial Fingertips	0.0	0.0	74.4	165.2	0.0	149.2	-165.2	0.0	149.2	0.0	45.0	0.0	0.0	-45.0	0.0	2909

Table 5 - 8: Center of mass and TCP - Dual Gripper on Dual Bracket

1 For each product, the values are for the following configuration: same fingertips on both grippers.

2 All mass and center of mass values include the couplings and the fasteners.

3 Gripper 1was identified as follow: with the Grippers upward, Gripper 1is installed on the right of the wrist connection.

If the Wrist Camera is installed, the center of mass and the TCP of the assembly must be adjusted. The values of the center of mass and the TCP of the Wrist Camera when used with the Dual Gripper on the Dual Bracket are as below.

Product	Center of mass (mm)			TCP position (mm)			Mass (g)
	X	Y	Z	X	Y	Z	
Wrist Camera with Dual Bracket	-4.3	4.0	8.5	0.0	0.0	23.5	245

Table 5 - 9: Wrist camera with Dual Bracket - values to adjust

5.2.6. Centers of Mass Tool Center Points (TCP) of Air Nozzle

Single Gripper

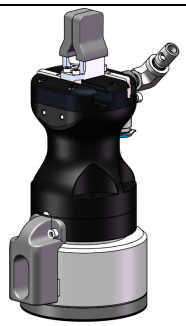
Air Nozzle configuration			Image[1]
TCP names	**Location**	**With or without 90° coupling**	
cleaning_A	Same side as coupling cable	With	
cleaning_B		Without	
cleaning_C	Opposite side of coupling cable	With	
cleaning_D		Without	

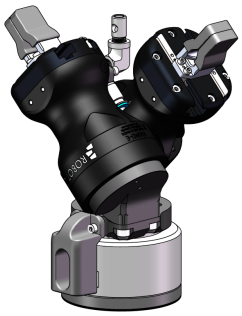
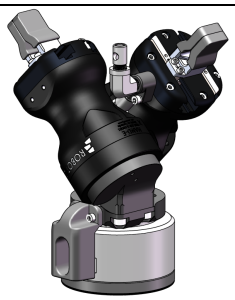
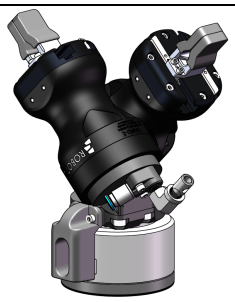
Table 5 - 10: Air Nozzle TCPs for single Gripper

[1]When an image covers two different TCPs, it shows the configuration **with the 90° coupling**.

TCP name	TCP position (mm)			TCP orientation (°)		
	X	Y	Z	X	Y	Z
cleaning_A	-25.0	-62.6	122.0	0.0	-45.0	0.0
cleaning_B	0.0	-65.6	97.0	90.0	0.0	0.0
cleaning_C	25.0	62.6	122.0	68.9	0.0	166.3
cleaning_D	0.0	65.6	97.0	0.0	127.3	127.3

Table 5 - 11: Detailed Air Nozzle TCPs for single Gripper

Dual Gripper on Compact Dual Hand-E Bracket (X configuration)

Air Nozzle configuration			Image[2]
TCP names	**Location[1]**	**With or without 90° coupling**	
cleaning_E	On Gripper 1, outside of assembly	With	
cleaning_F		Without	
cleaning_G	On Gripper 2, outside of assembly	With	
cleaning_H		Without	
cleaning_I	On Gripper 1, between the Grippers	With	
cleaning_J	On Gripper 2, between the Grippers	With	
cleaning_K	On Bracket, under Gripper 1	With	

cleaning_L	On Bracket, under Gripper 2	With	

Table 5 - 12: Air Nozzle TCPs for Dual Gripper on Compact Dual Hand-E Bracket

[1] Gripper 1 was identified as follow: with the Grippers upward, Gripper 1 is installed on the right of the wrist connection.

[2] When an image covers two different TCPs, it shows the configuration **with the 90° coupling**.

TCP name	TCP position (mm)			TCP orientation (°)		
	X	Y	Z	X	Y	Z
cleaning_E	-65.3	-98.8	112.9	0.0	-90.0	0.0
cleaning_F	-29.9	-101.8	112.9	84.9	-35.2	35.2
cleaning_G	65.3	98.8	112.9	127.3	0.0	127.3
cleaning_H	29.9	101.8	112.9	59.4	143.5	143.5
cleaning_I	-29.9	26.4	148.3	0.0	0	180.0
cleaning_J	29.9	-26.4	148.3	0.0	0.0	0.0
cleaning_K	111.0	-33.1	54.0	35.2	35.2	84.9
cleaning_L	-111.0	33.1	54.0	35.2	-35.2	-84.9

Table 5 - 13: Detailed Air Nozzle TCPs for Dual Gripper on Compact Dual Hand-E Bracket

Dual Gripper on Dual Bracket (V configuration)

Air Nozzle configuration			Image[2]
TCP names	Location[1]	With or without 90° coupling	
cleaning_M	On Gripper 1, same side as wrist connection	With	
cleaning_N		Without	

cleaning_O	On Gripper 2, same side as wrist connection	With	
cleaning_P		Without	
cleaning_Q	On Gripper 1, opposite side of wrist connection	With	
cleaning_R		Without	
cleaning_S	On Gripper 2, opposite side of wrist connection	With	
cleaning_T		Without	

Table 5 - 14: Air Nozzle TCPs for Dual Gripper on Dual Bracket

[1] Gripper 1 was identified as follow: with the Grippers upward, Gripper 1 is installed on the right of the wrist connection.

[2] When an image covers two different TCPs, it shows the configuration **with the 90° coupling**.

TCP name	TCP position (mm)			TCP orientation (°)		
	X	Y	Z	X	Y	Z
cleaning_M	111.6	-62.6	131.0	0.0	0.0	0.0
cleaning_N	111.6	-65.6	95.6	84.9	35.2	-35.2
cleaning_O	-147.0	-62.6	95.6	0.0	-90.0	0.0
cleaning_P	-111.6	-65.6	95.6	84.9	-35.2	35.2
cleaning_Q	147.0	62.6	95.6	127.3	0.0	127.3
cleaning_R	111.6	65.6	95.6	59.4	143.5	143.5
cleaning_S	-111.6	62.6	131.0	0.0	0.0	180.0
cleaning_T	-111.6	65.6	95.6	-41.8	100.8	100.8

Table 5 - 15: Detailed Air Nozzle TCPs for Dual Gripper on Dual Bracket

5.3. Electrical Specifications

5.3.1 Stacklight Monitoring Sensors

ELECTRICAL SPECIFICATION	VALUE
Nominal supply voltage	3.3 V
Nominal power consumption	165 mW (5 mA)
Hot swappable	Yes
Type of source	DC
Suggested power supply	From Robotiq Controller
ESD safe	Yes (for robotic applications)

Table 5 - 16: Stacklight Monitoring Sensors electrical specifications

5.3.2. Pneumatic Panel solenoid valves

ELECTRICAL SPECIFICATION	VALUE
Nominal supply voltage	24 V
Nominal power consumption	0.8 W (33 mA)
Hot swappable	Yes
Type of source	DC
Suggested power supply	From Robotiq Controller
ESD safe	Yes

Table 5 - 17: Solenoid valves electrical specifications

5.3.3. Robotiq Controller

ELECTRICAL SPECIFICATION	VALUE
Nominal supply voltage	24 V
Nominal power consumption	2.4 W (100 mA)
Peak current (when all peripherals activated)	15.12 W (630 mA)
Hot swappable	Yes
Type of source	DC
Suggested power supply	From robot controller
ESD safe	Yes (for robotic applications)

Table 5 - 18: Robotiq Controller electrical specifications

6. Maintenance

The Machine Tending Solution only requires external maintenance with limited downtime. Maintenance is required after specified usage, measured in cycles or use time (hours).

Following the maintenance interval will ensure:

- Adequate functioning of the equipment
- Validity of the warranty
- Proper lifetime of the equipment

Warning

Unless specified, any repairs done on the Machine Tending Solution will be performed by Robotiq.

Caution

Maintenance operations are for the average normal usage of the Machine Tending Solution, the maintenance intervals must be adjusted according to the environmental conditions such as:

- Operating temperature
- Humidity
- Presence of chemical(s)
- Presence of physical objects (debris, scraps, dust, grease etc.)
- Interaction with operated parts (sharp or rough)
- Dynamics of the operation (accelerations)

Caution

Maintenance operator must be grounded to prevent electrostatic discharge, which could damage the electronic components.

Caution

Always turn off the robot and depressurize the air supply before performing any maintenance operation on it. For more details about the depressurization, please refer to the **Depressurizing the Supply Line** section.

Caution

Except for the Hand-E Gripper whose IP rating is 67, other components of the Machine Tending Solution is not waterproof or water resistant without additional protection. Only clean the equipment with a dry cloth or towel.

6.1 Button Activator

Clean the Button Activator with a clean dry cloth and compressed air to remove the accumulation of dust and other particles.

- Clean monthly if the working environment is dirty.
- Clean every six months if the working environment is normal.

> **Caution**
>
> Always wear all recommended personal protective equipment in accordance with your workplace's safety standards when cleaning with compressed air, including safety glasses.

6.2. Hand-E Gripper and Fingertips

Clean the Hand-E Gripper (or Dual Hand-E Gripper) and the fingertips with a clean dry cloth to remove lubricant, metal chips and other particles:

- After each lot of parts
- Before a change of fingertips
- After a change of fingertips.

> **Info**
>
> For other details on the required maintenance for the Hand-E Gripper, please refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

6.3. Air Nozzle

Verify daily if the air tube of the Air Nozzle is crushed or kinked. If it is, replace it.

6.4. Stacklight Monitoring Sensors

Turn off the robot, then clean the Stacklight Monitoring Sensors with a clean dry cloth to remove the accumulation of dust and other particles.

- Clean monthly if the working environment is dirty.
- Clean every six months if the working environment is normal.

6.5. Pneumatic Panel

1. Clean the components of the Pneumatic Panel with a clean dry cloth to remove the accumulation of dust and other particles.
   - Clean monthly if the working environment is dirty.
   - Clean every six months if the working environment is normal.
2. Replace the filter cartridge if the flow rate is reduced even though the pressure setting is unchanged. Refer to the Festo maintenance procedure:
   a. Go to festo.com.
   b. In the search bar, enter "MS4-LFR-1/4-D6-C-P-M-AG-BAR-B" (or "8098257", which is the model number).
   c. Find the user documentation, open it and see the Maintenance section.

6.6. Robotiq Controler

6.6.1 Cleaning

Clean the Robotiq Controller with a clean dry cloth to remove the accumulation of dust and other particles.

- Clean monthly if the working environment is dirty.
- Clean every six months if the working environment is normal.

6.6.2. Firmware Updates

Required Tools and Equipment

Included:

- 1x USB-A/USB-C adapter

Updating the Firmware

Fig. 6-1: Status light and USB-C port

1. Download the file:
    a. Go to robotiq.com/support and select **Machine Tending Solution**.
    b. Click on **Universal Robots**.
    c. Click on **Software** → **Firmware Update**, download the **Robotiq Universal Upgrader** and extract it on the root of a USB-A (standard) key.
2. Connect your key to the provided USB-A/USB-C adapter.
3. Connect the adapter connector to the USB-C port of the Robotiq Controller.
4. The status light on the Robotiq Controller is normally blue: once you connect the adapter to the USB-C port, the status light turns purple. Wait for the status light to turn back blue, then remove the adapter connector.

> **Caution**
>
> If the status light does not turn back blue within two minutes after the connection, the update did not work. Remove the key and try again. If it still does not work, contact Robotiq support at support@robotiq.com.

6.7. Foot Switch Activator

Clean your foot switch and the Foot Switch Activator with compressed air to remove the accumulation of dust and other particles.

- Clean monthly if the working environment is dirty.
- Clean every six months if the working environment is normal.

> **Caution**
>
> Always wear all recommended personal protective equipment in accordance with your workplace's safety standards when cleaning with compressed air, including safety glasses.

7. Spare Parts, Kits and Accessories

This section is coming soon.

Info

For any question or problem, contact Robotiq support at support@robotiq.com.

8. Warranty

Robotiq warrants the Machine Tending Solution against defects in material and workmanship for a period of one year from the date of reception when utilized as intended. Robotiq also warrants that this equipment will meet applicable specifications under normal use.

Warning

Warranty applies under the following conditions:

- Usage respects the operating and storage conditions specified in the **Environmental and Operating Conditions** section.
- Proper installation of the Machine Tending Solution specified in the **Installation** section and the following subsections.
- Usage respects maintenance specified in the **Maintenance** section.
- Usage respects recommended values specified in the **Mechanical Specifications** section and in the **Electrical Specifications** section.

Warning

- Warranty applies until 1 year is reached for the following components:
  - Air Nozzle
  - Stacklight Monitoring Sensors
  - Pneumatic Panel
  - Robotiq Controller
  - Compact Dual Hand-E Bracket and Dual Bracket
- Warranty applies until 1 year or 2 000 000 cycle counts[1] is reached for the following components:
  - Button Activator
  - Foot Switch Activator
- For the warranty of the Hand-E Gripper(s), refer to the **Robotiq Hand-E Instruction Manual** at robotiq.com/support.

[1] One (1) cycle count is defined as the activation of the component, which in this is case is pushing the button of the Button Activator and pushing the foot switch of the Foot Switch Activator.

During the warranty period, Robotiq will repair or replace any defective component of the Machine Tending Solution, as well as verify and adjust the component(s) free of charge if the equipment should need to be repaired or if the original adjustment is erroneous. If the equipment is sent back for verification during the warranty period and found to meet all pertaining specifications, Robotiq will charge standard verification fees. The unit is considered defective if the Machine Tending Solution feedback necessary for the robot program is not accessible.

Caution

The warranty will become null and void if the:

- Unit has been tampered with, repaired or worked on by unauthorized individuals.
- Unit has been opened other than as explained in this guide.
- Unit serial number has been altered, erased, or removed.
- Unit has been misused, neglected, or damaged by accident.

This warranty is in lieu of all other warranties expressed, implied, or statutory, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. In no event shall Robotiq be liable for special, incidental, or consequential damages.

Robotiq shall not be liable for damages resulting from the use of the Machine Tending Solution, nor shall Robotiq be responsible for any failure in the performance of other items to which the Machine Tending Solution is connected or the operation of any system of which the Machine Tending Solution may be a part.

Exclusions

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the Machine Tending Solution or other factors beyond Robotiq's control. It also excludes all consumable parts, such as fingertips, and their normal wear. Robotiq reserves the right to make changes in the design or construction of any of its products at any time without incurring any obligation to make any changes whatsoever on units already purchased.

9. Harmonized Standards and Declarations

The standards listed in the table below were followed, as far as applicable, for the design and production of the Robotiq Machine Tending Solution.

ISO 12100:2010	Safety of machinery — General principles for design — Risk assessment and risk reduction
ISO 4414:2010	Pneumatic fluid power — General rules and safety requirements for systems and their components
ISO 9409-1:2004	Manipulating industrial robots — Mechanical interfaces — Part 1: Plates
EN 61000-6-2:2016	Generic Standards – Immunity for industrial environments
EN 61000-6-4:2007 + A1:2011	Generic Standards – Emission for industrial environments

10. Appendix

Print and cut the templates below to validate the configuration and the position of the bracket. **Use US letter size with 100% scaling.**

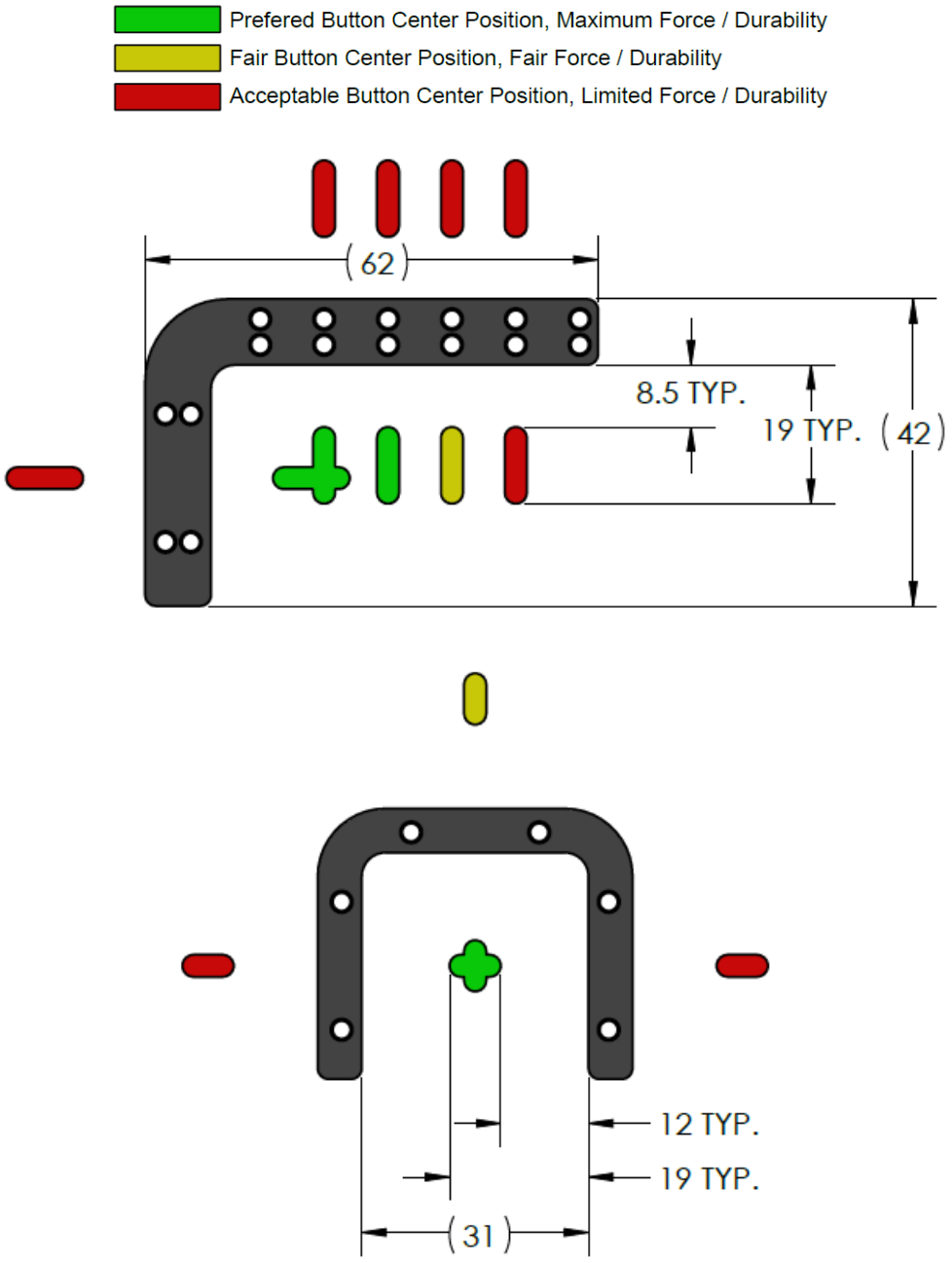


Fig. 10-1: Printable templates of the brackets

11 Contact

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