

Palletizing *Solution*

QUICK START GUIDE

For installation on
Universal Robots



THANK YOU FOR CHOOSING ROBOTIQ

This step-by-step guide will allow you to install and test your Robotiq Palletizing Solution on Universal Robots. Visit the elearning.robotiq.com to see the video installation steps.



1. WHAT IS SUPPLIED?

Standard upon delivery of **SOL-PAL-UR-VAC-1500** and **SOL-PAL-UR-1500***:

- **Palletizing Hardware** including:
 - Box and Pallet sensors
 - Anchors
 - Cable management system
- **Palletizing Vacuum Gripper**
- **Copilot for Palletizing on UR**

*SOL-PAL-UR-1500 does not contain the gripper, and as such the gripper installation steps do not apply.



2. SAFETY & WARNINGS

- ⚠ The Robotiq Palletizing Solution must go through a comprehensive risk assessment process before it can be used.
- ⚠ Do not operate the Palletizing Solution, or even turn on the power supply, before the device is firmly anchored and the machine area is cleared. Make sure the air supply is secured.
- ⚠ Failure to properly secure and install the equipment can result in material damage and serious injuries.
- ⚠ Make sure to follow all safety rules and regulations of your workplace while using the Palletizing Solution.
- ⚠ Always wear all recommended personal protective equipment in accordance with your workplace's safety standards such as: safety glasses, steel-toe boots, etc.



3. TOOLS NEEDED

Included

- 12.7 mm concrete drill bit (1/2 in) (for use with a rotary hammer)
- 19mm Socket (10 mm drive size)
- 17mm Socket (10 mm drive size)
- 3 mm hex key
- 4 mm hex key
- 5 mm hex key
- 6 mm hex key
- 10 mm hex key

Not included

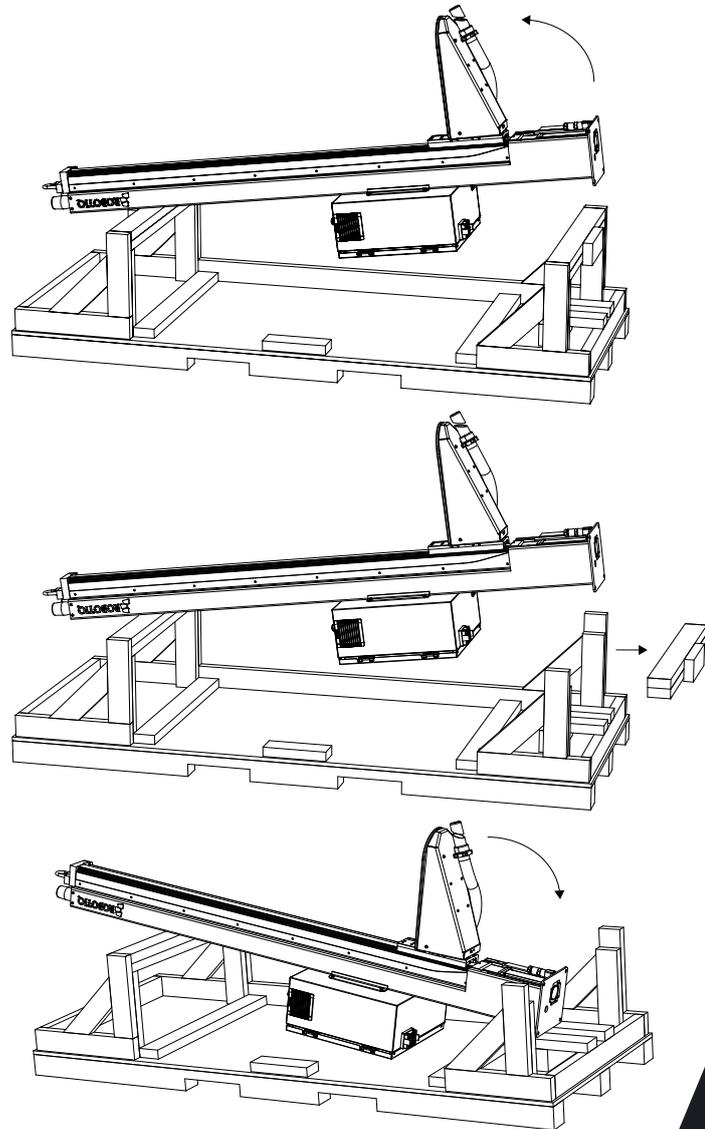
- Lifting equipment (min. capacity of 200 kg)
- Drill with a No.2 Phillips bit
- 2 mm slotted screwdriver
- Utility knife
- Ratchet with 10 mm drive
- Torque wrench with 10 mm drive
- Rotary hammer and hammer to install the provided anchors



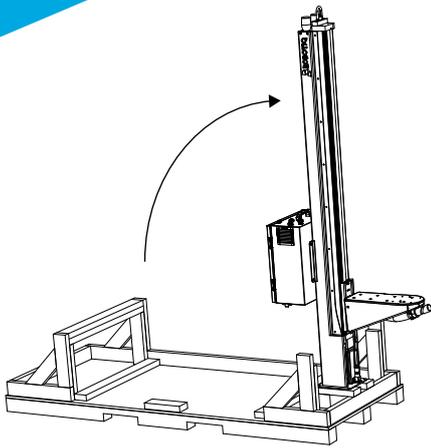
4. UNBOXING

- ⚠ **The transport, lifting and moving** of the Palletizing Solution should be done by qualified professionals. Failure to do so may result to machine damage, serious injuries or death.
- ⚠ **Crush hazard:** Keep your hands and body parts clear when lowering the column onto the base. Failure to do so could result in serious injuries or death.

1. Open the crate by removing the top and the four (4) sides using a drill.
2. Cut all straps that retain the components and remove all cardboard boxes out of the crate.
3. Unscrew the four (4) bolts that retain the base into the crate.
4. Bring out the base from the crate, using a forklift or manually.
5. Unscrew the two (2) bolts that retain the column into the crate.
6. Lift the foot base, unscrew the piece of wood under the foot base. Remove the piece of wood and descend the Solution slowly and carefully (see the picture below).



7. Position the column vertically. Use the lift point to rotate the column.



8. Lift and place the column onto the base. A hook is present at the top of the column. Use it to lift the column.
9. Secure the base with the column using the four (4) M10 screws. **Tighten to a torque of 50Nm.**

To securely move and position the unit, there are two possibilities:

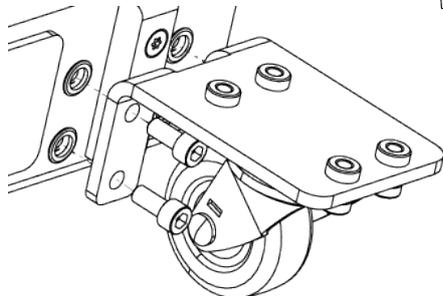
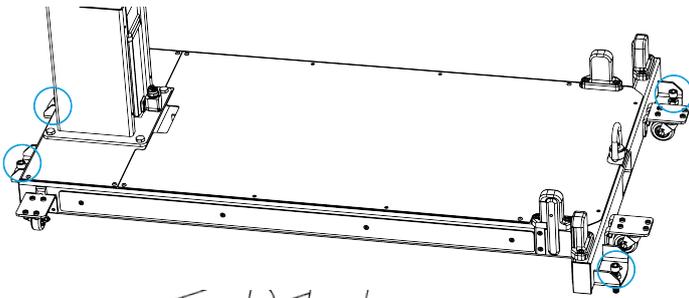
Using a forklift



Pay attention to the center of gravity to prevent the equipment from falling. Make sure to secure and stabilize the Solution before any move.

Using the set of wheels provided with the Solution

1. Screw the four (4) provided leveling bolts to lift the solution (about 1 centimeter high).
2. Secure the four (4) wheels using the provided screws.
3. Unscrew the four (4) bolts to get the solution down on its wheels.



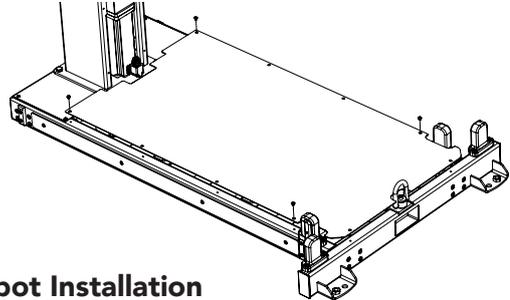
Do not work on the Solution while it is on its wheels as it is not stable. To return the Solution on its feet, simply screw the four bolts, remove the wheels and unscrew the bolts.



5. MECHANICAL & ELECTRICAL INSTALLATION

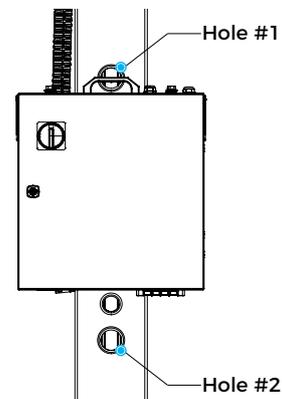
Base Cover

1. Remove the cover that will allow the cable management.

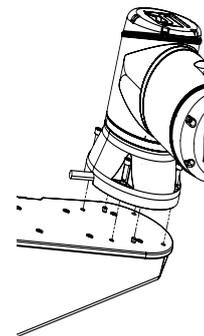


Robot Installation

For the installation, a few cables need to be wired. The figure below resumes the identification of the column holes.



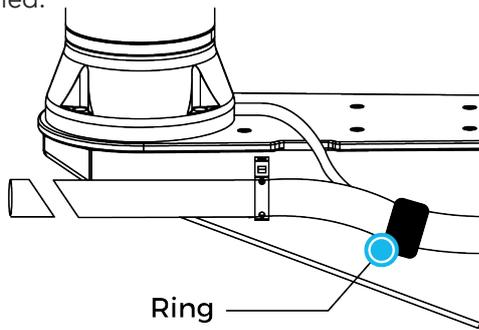
1. Place the robot on the plate so its power cable is directed towards the linear axis. Align properly with the two dowel pins (already installed on the robot base) and secure the robot using four (4) M8 screws. **Torque required : 20 Nm.**



Depending on your cobot, make sure to install the right size of screw:

- **For CB-Series:** use screws M8 x 22mm
- **For e-Series:** use screws M8 x 25mm

- Unclip the mounting bracket of the cable management system that is right beside the column.
- Press the robot power cable into the cable carrier up to the column. There are two separate raceways. You must use the same section as the coupling cable. Push the cable into the column (via the side hole) and bring it out by the hole #1.
- Install the cable management system ring on the B sticker present on the cable carrier (near the carriage). The robot cable must emerge towards the top of the ring so it can be maintained.



Ring

- Install the Igus R-Lock at the extremity of the cable carrier before clipping it in the bracket. It will ensure the good functionality of the cable management system.
- Reclip the mounting bracket of the cable management system.

UR Controller Installation

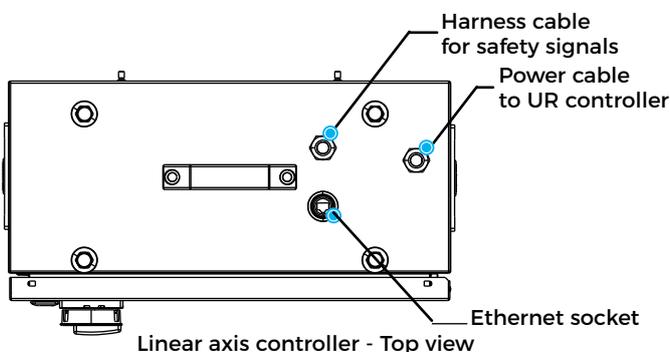
- Remove the four (4) screws on the top of the linear axis controller.
- Place the UR controller on the top of the linear axis controller and secure it with the four (4) screws you previously removed.



Do not plug the UR controller power cable into the UR controller.

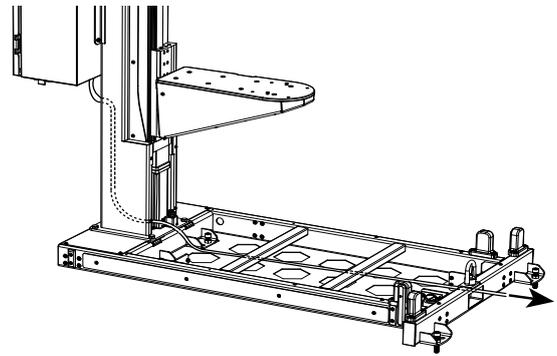
Power Cables Connection

- Plug the power cable output of the linear axis controller into the UR controller.
- Plug the robot power cable into the UR controller.
- Connect the Teach Pendant to the UR controller.



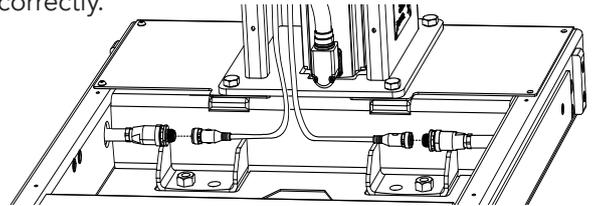
Linear axis controller - Top view

- Plug the UR controller power cable (which is supplied with the UR robot) into the plug under the linear axis controller. Pass the cable through the hole #2. Then, continue to channel the cable through the column and the base and bring it out from the other extremity of the base (refer to the image on the top right of the page).



Pallet Sensors and Base Cables Routing

- Connect the pallet sensors. The cables are identified for each side. Make sure to connect each pair of cables correctly.



- Bring out the air tube and the box sensor cable from the bottom of the column and continue to channel it until you bring it out from the other extremity of the base (through the rectangle hole).
- Plug the power cable into the wall outlet.

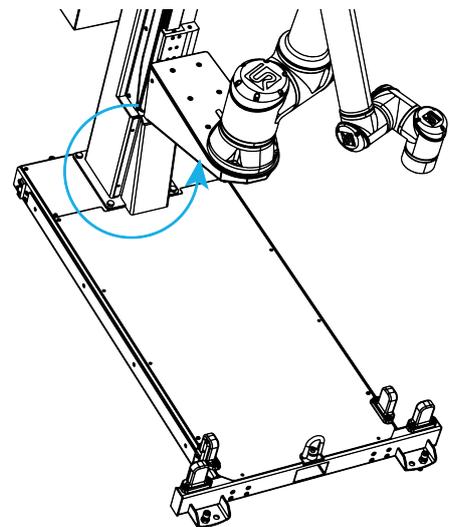
Centering the Solution

- Unscrew half a turn the four (4) screws that secure the column onto the base.

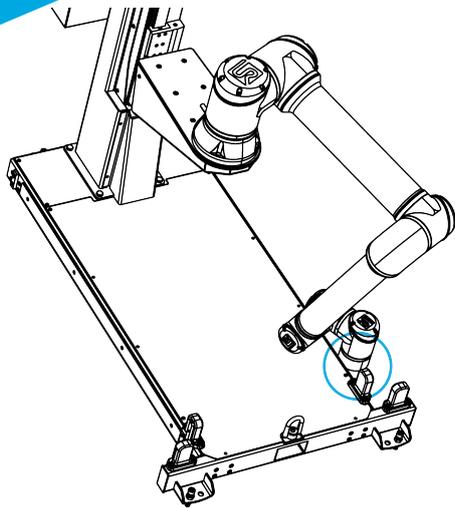


Do not unscrew completely to avoid risks of falling, serious injury and material damages. Unscrew only half a turn to be able to change the orientation of the column.

- Rotate the column counterclockwise as much as possible.



- Position the robot so that the wrist is on the outside left side of the base like shown in the figure below.



1. **If** additional reach is needed, install the extra reach gripper bracket on the robot tool flange using four (4) M6 screws and tooth lock washers.

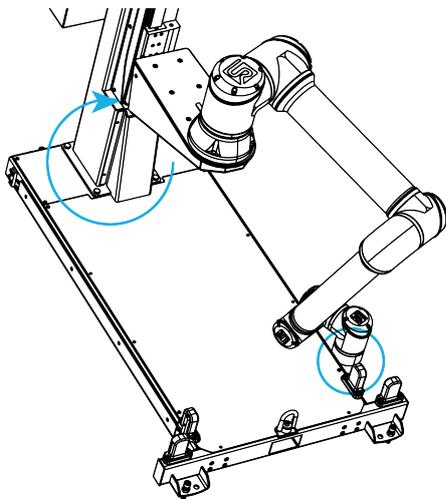
 Install the bracket only if necessary. Consult the Configurator to find out if it is needed in your case. Available at designer.suite.robotiq.com

2. Using four (4) M6 screws and tooth lock washers, secure the coupling on the robot tool flange or on the extra reach gripper bracket.
3. Mount the Vacuum Gripper on the gripper coupling. Align with the dowel pin.
4. Secure by inserting the M5 screws and tooth lock washers.

4. Move the robot so the robot tool flange is parallel to the ground: change the feature reference to Base and modify the tool position like the following: $RX=0^\circ$, $RY=180^\circ$, $RZ=0^\circ$.
5. Modify the Tool Position X value (base reference) to 333.35 mm (TCP must be 0).

 Move the robot slowly and watch the movement to avoid collisions.

6. Rotate the column clockwise so that the side of the robot wrist touches the side of the base.

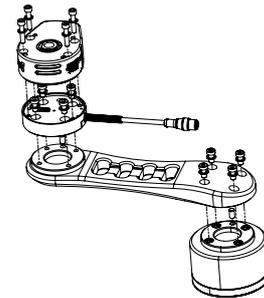


7. Tighten the four (4) screws to secure the column onto the base. **Torque must be 50 Nm.**
8. On the teach pendant, validate that the X value is still 333.35 mm.
9. Put the robot back in position of use.

AirPick Gripper Installation

To mount the Vacuum Gripper, its accessories and the cable routing system, power on the robot and rotate the joints, as described in the table below.

| Joint | Position |
|----------|----------|
| Base | -180 |
| Shoulder | -155 |
| Elbow | -60° |
| Wrist 1 | -80° |
| Wrist 2 | 270° |
| Wrist 3 | -180 |



If the two (2) or four (4) suction cups bracket is needed:

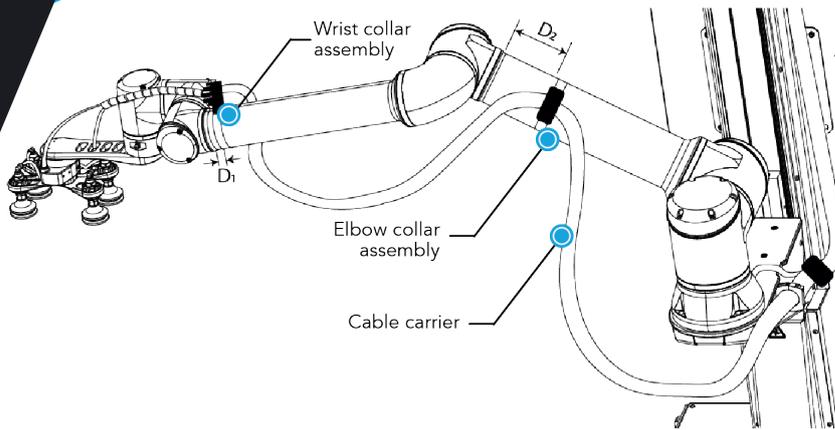
1. Align the flat surface on the manifold with the shoulder of the vacuum generator.
2. Secure the manifold by inserting screws and tooth lock washers in a cross pattern to properly compress the O-ring of the generator.
3. Insert each suction cup, with an O-ring, into an air node. Tighten cups by hands.

To finish the installation, change the robot position. Refer to the table below:

| Joint | Position |
|----------|----------|
| Base | -180 |
| Shoulder | -155 |
| Elbow | -60° |
| Wrist 1 | -80° |
| Wrist 2 | 90° |
| Wrist 3 | -90° |

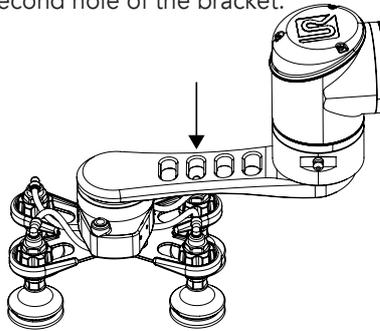
1. Attach the cable routing system onto the robot, as illustrated in the next figure:

- Using a 5 mm hex key, secure the elbow collar assembly (larger collar) to the arm. Observe the orientation and distance from the elbow (D_2).
- Clip the mounting bracket of the elbow collar assembly on the cable carrier (align the bracket with the sticker mentioned in the chart on the next page).
- Using a 5 mm hex key, secure the wrist collar assembly (smaller collar) to the arm. Observe the orientation and distance from the wrist (D_1).



| Robot model | Elbow bracket sticker | D ₂ | Wrist bracket sticker | D ₁ |
|-------------|-----------------------|----------------|-----------------------|----------------|
| UR10 | D | 180 mm | E | 10 mm |

2. If you use the extra reach bracket, run the coupling cable through the second hole of the bracket.



3. Connect the coupling cable to the connector visible at the end of the cable carrier.
4. Install the Igus R-Lock at the extremity of the cable carrier. It will ensure the good functionality of the cable management.
5. Clip the mounting bracket of the wrist collar assembly on the cable carrier (align the bracket with the sticker mentioned in the chart above).
6. Use tie wraps to tie the tubing and cable to the strain relief part of the mounting bracket.

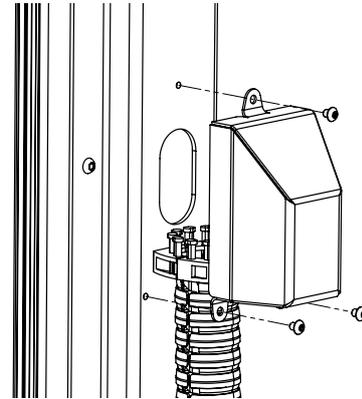
 Beware not to crush the tubing or the cable with the tie wraps.

7. Cut the air tube from the plastic strain relief at the right length: 815 mm (32 in).
8. Connect the 8 mm air tube to the vacuum generator. Ensure the safety clip is properly installed.
9. Use the spiral cable sleeve to keep the air tube and the coupling cable together.
10. Plug the other extremity of the air tube to your local air supply devices.



- Maximum pressure allowed is 7 bar (100 psi).
- Recommended pressure is 7 bar (100 psi).
- Dry and filtered air only; Follow ISO 8573-1, class 3.4.3 Standard.
- Use of a local pressure regulator with a filter and air dryer is recommended.

11. Install the small cover on the side of the column with the provided screws.



12. Shutdown the robot and power off the linear axis controller.

 You have to shutdown the robot BEFORE starting the inter-controller and safety signal connections.

Inter-controller Connections

1. Open the UR controller. Plug the USB hub into a USB port.
2. Plug the Ethernet/USB converter cable into a USB port.
3. Plug the Ethernet cable into the Ethernet socket on the top of the linear axis controller.
4. Pass the other extremity of the cable through the hole under the UR controller and plug it into the Ethernet/USB converter cable that is already plugged.

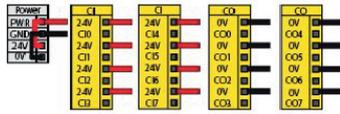
Safety Signal Connections

1. Take the signal safety cable and pass it through an opening under the UR controller.
2. Wire the cable by following the schema available at the end of this document or in the instruction manual.

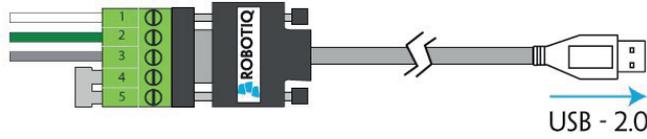
AirPick Gripper and Copilot Connections

1. Connect the Copilot license dongle into the USB hub in the UR controller. It must be connected at all times.
2. Pass the coupling cable through the UR controller.
3. Connect the white, green and bare wires to the Robotiq RS-485 signal converter. Also connect the red (24V) and black (0V) wires in the terminal blocks of the UR controller.
4. Connect the USB cable into a USB port of the UR controller.

24 V
GND



COMMUNICATION WIRING



485+
485-
485 GND

* Jumper on pins 4 & 5 is the 120 Ohms terminating resistor.



Make sure to do a risk assessment before starting to use the Solution.



The column cover must be properly installed to achieve maximum structure rigidity.



6. SOFTWARE & OTHER INFOS

To complete the installation and for all additional information about the Robotiq Palletizing Solution and its software, please refer to the corresponding sections of the instruction manual at robotiq.com/support

Box Sensor

Via a hole under the UR controller, run the box sensor cable in and connect the brown (24V), blue (0V) and black (digital input) wires.

Anchoring the Palletizing Solution



Make sure to follow all safety rules and regulations of your workplace while working on / with the Solution.

1. Position the Solution at its final position. (Refer to the Anchoring schema available at the end of this document or in the instruction manual)
2. Drill the six (6) holes with the provided drill bit.
3. If necessary, level the Solution using shims.
4. Place the anchors into the holes and fasten the nuts flush to the screws.
5. Bang the anchors in place.
6. Secure the Solution by screwing the six (6) nuts.

Torque required: 54 Nm

Finalization and Power On

1. Install the box sensor on the bracket that fits your setup with the provided screws.
2. Install the sensor box bracket so it can detect the box to be picked.
3. Plug the M8 connector into the sensor.
4. Install the base cover using the provided screws.
5. Install the column cover using the provided screws.
6. Plug the power cable into the wall outlet.
7. Power on the linear axis controller and the robot.



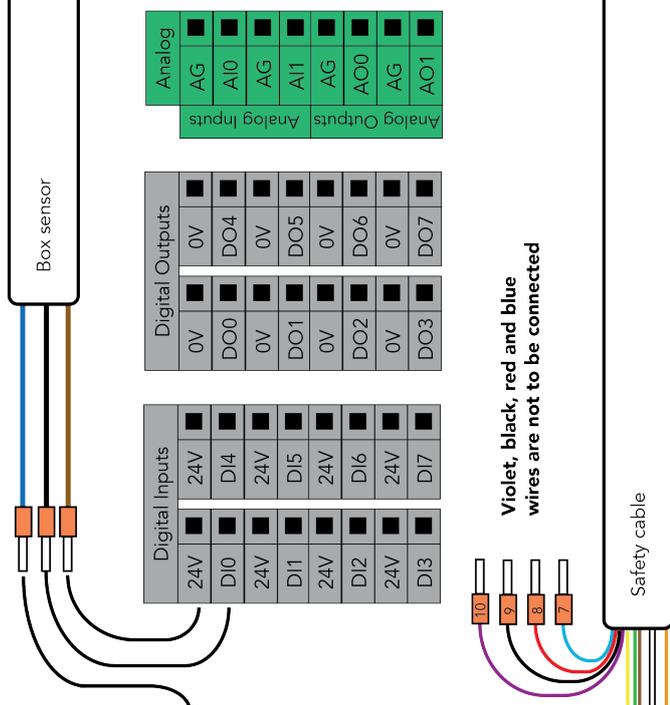
Safety Connections

UNIVERSAL ROBOTS CB AND eSERIES SAFETY CONNECTIONS

Follow installation guidelines in UR manual for Emergency stop or Safeguard connections.

OSSD signals are not managed by the Robotiq safety equipment. A OSSD to Digital Safety Converter is necessary. We recommend the PSR-MS60-2NO-24DC-SC by Phoenix Contact.

If safeguard is not used, add jumpers between pin 1-2 and 3-4.



| Configurable Outputs | |
|----------------------|-----|
| 0V | 0V |
| CO0 | CO4 |
| 0V | 0V |
| CO1 | CO5 |
| 0V | 0V |
| CO2 | CO6 |
| 0V | 0V |
| CO3 | CO7 |

| Configurable Inputs | |
|---------------------|-----|
| 24V | 24V |
| CI0 | CI4 |
| 24V | 24V |
| CI1 | CI5 |
| 24V | 24V |
| CI2 | CI6 |
| 24V | 24V |
| CI3 | CI7 |

| Remote | | Power | |
|--------|-----|-------|-----|
| 12V | GND | PWR | GND |
| ON | OFF | 24V | 0V |

| Safety | |
|--------|-----|
| 24V | E10 |
| 24V | E11 |
| 24V | S10 |
| 24V | S11 |

| | |
|-----|-----|
| 0V | D8 |
| 24V | D9 |
| 0V | D10 |
| 0V | D11 |

Safeguard in auto-reset mode. See Table below for other options.

This terminal block is only available on UR eSeries controllers.

- 1: 24V
- 2: S10
- 3: 24V
- 4: S11

USE THIS CONNECTOR FOR SAFEGUARD CONNECTIONS



Safety Wires Description

| Wire # | Color | Function | Description |
|--------|--------|----------------------|---|
| 1 | White | Safety-Reset | <ul style="list-style-type: none"> • When using area scanner: Connect wire #1 to available 24V in UR controller. The system will auto-start when you step out of the protected area. • When using light curtain: Connect wire #1 to normally-open (NO) reset switch. Connect switch's second pole to available 24V in UR controller. Place reset switch outside of the protected area. |
| 2 | Brown | 0V | 0V link between both electrical enclosures. |
| 3 | Green | UR E-Stop Status 1 | E-Stop status signal when a emergency signal is applied to EI0. |
| 4 | Yellow | UR E-Stop Status 2 | E-Stop status signal when a emergency signal is applied to EI1. |
| 5 | Grey | UR Safeguard input 1 | UR does not support a safeguard status in configurable outputs. Connect this pin to the regular safeguard input SI0 for status. |
| 6 | Orange | UR Safeguard input 2 | UR does not support a safeguard status in configurable outputs. Connect this pin to the regular safeguard input SI1 for status. |

Anchoring Pattern

