



USER MANUAL

FOR UR ROBOTS

v1.17.0

Original Instructions

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1. Introduction

1.1. Important Safety Notice



DANGER:

You must read, understand, and follow all safety information in this manual, and the robot manual and all associated equipment before initiating robot motion. Failure to comply with safety information could result in serious injury or death.

1.2. Scope of the Manual

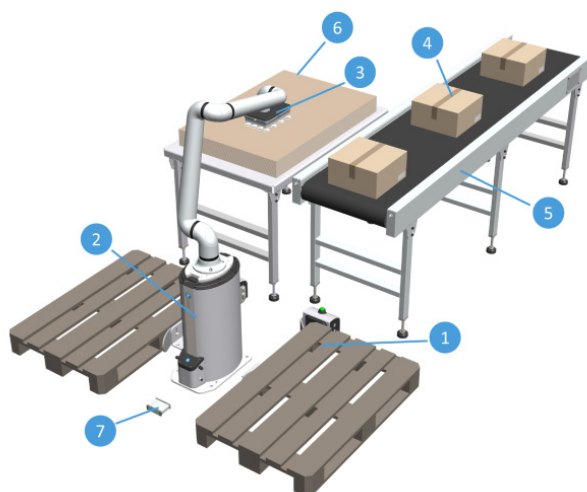
The manual covers the following OnRobot products and their components:

1.2.1. OnRobot Palletizer

The manual covers how to create a Palletizing Application by using the OnRobot Palletizing Software.

OnRobot's intuitive palletizing software ensures fast setup and changeovers of palletizing applications. The software can be used with a wide range of supported robot brands, and its step-by-step wizard includes hardware and application configurations. The software generates automatic path optimization and alerts for potential program issues to reduce cycle time, extend equipment life, and lower electricity bills.

Below is the recommended configuration when using a dual pallet setup with slip sheets (both are optional and are not required to create a palletizing application).



1. Pallet Station or pallet infeed
2. Lift100 or fixed pedestal (optional)
3. Gripper
4. Boxes
5. Box infeed
6. Slip sheet infeed
7. Compute Box - OnRobot Palletizing Software

1. **Pallet Station** or pallet infeed:

Pallet Station: OnRobot floor-mounted pallet fixtures that automatically detect the presence of a pallet. The OnRobot Palletizer can be used with one or two Pallet Stations, or with other pallet infeeds.

Pallet infeed: Other pallet infeeds can be used with the OnRobot Palletizer, such as custom fixtures with sensor or pallet conveyors. The pallet infeed needs to provide a digital input to the Compute Box, to signal when the pallet is ready. This is not provided by OnRobot.

2. **Lift100** or fixed pedestal (both are optional):

Lift100: OnRobot floor-mounted telescopic column that extends the vertical range of the robot, enabling palletizing up to heights that are otherwise not possible.

Fixed pedestal: A fixed pedestal that offsets the vertical range of the robot. This is not provided by OnRobot.

3. **Gripper:** **2FGP20** or **VGP20**, **VG10** or **VGC10** are used to handle boxes and potentially slip sheets.
4. **Boxes:** Boxes to be palletized.
5. **Box infeed:** Place where the boxes are presented.
6. **Slip sheet infeed:** Place where the slip sheets are presented. The usage of slip sheets is optional and will depend on the application.

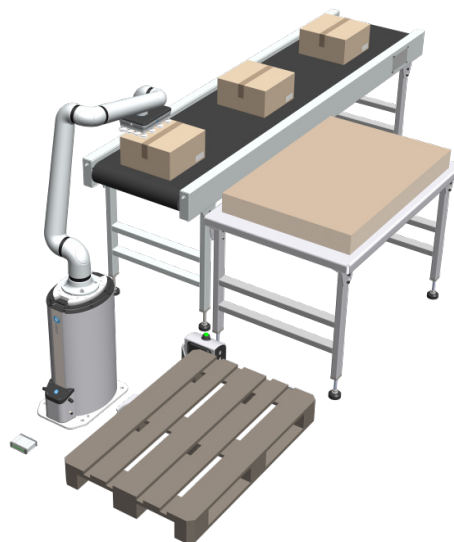


NOTE:

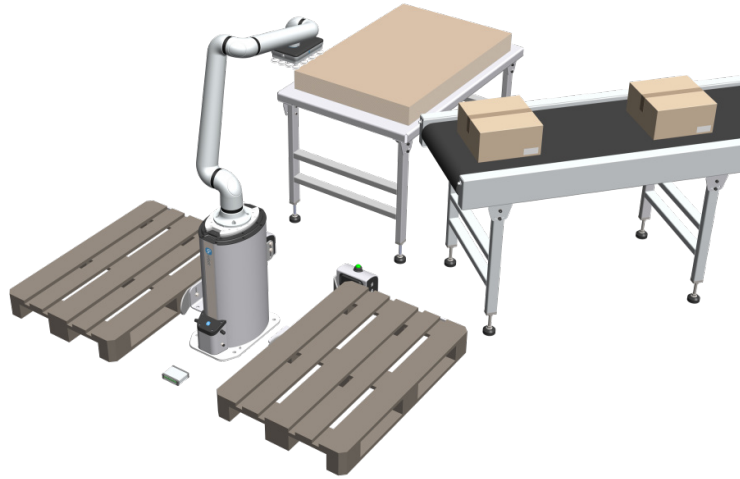
The layout of the OnRobot Palletizer is flexible and can be mounted in other configurations based on the components used, the reach of the robot and the workspace.

When setting up a palletizing application, any of the following layouts are recommended for a successful OnRobot Palletizing Application.

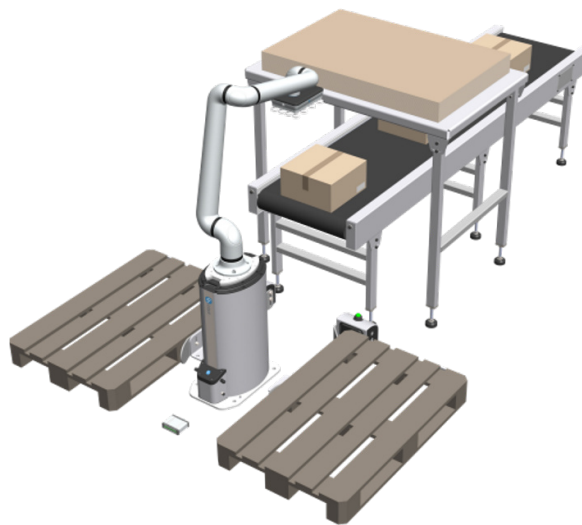
Example A:

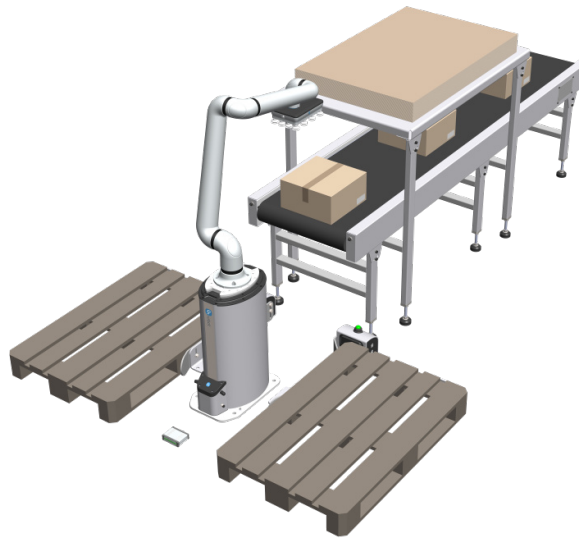
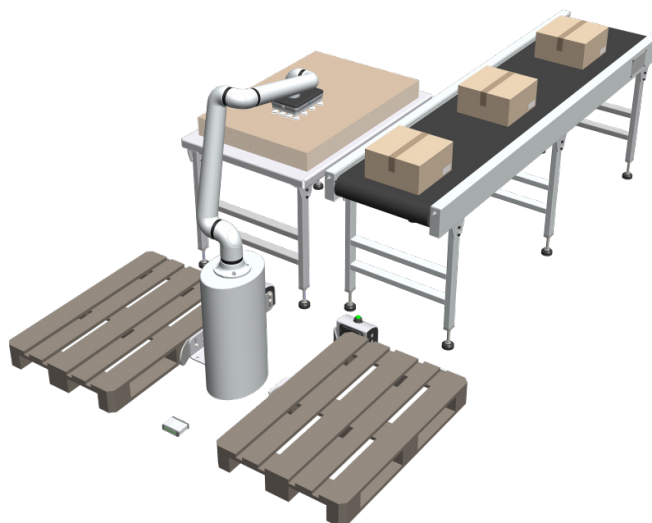


Example B:



Example C:



Example D:**Example E:**

To successfully deploy a palletizing application, follow the steps below. See the referred sections of the user manual for more details.

- Plan the cell layout.
- Optimal placement of the box infeed. For more information, go to the [6.1.1.3. Infeed Setup](#) section.
- Mount the Lift100 or the fixed pedestal. For more information, go to the [4.3. Floor Mounting - Lift100](#) section.
- Mount the robot. For more information, go to the [4.4.2. Mounting the Robot to the Lift100](#) section.
- Mount the gripper and the tool extender (if used).

- Mount the Pallet Station(s) and the pallet(s). For the exact placement of the Pallet Station, go to the [4.5.1. Mounting the Pallet Station](#) section.
- Optimal placement of slip-sheet infeed (if used). For more information, go to the [6.1.1.3. Slip Sheet Setup](#) section.
- Wire the different components to the Compute Box. For more information, go to the [4.8. Wiring](#) section.
- Test the independent devices and signals.
- Test if the pallet(s), the box infeed, and the slip sheet infeed (if used) are within the reach of the robot. If not, a tool extender is recommended.
- Activate the OnRobot Palletizing Software License. For more information, go to the [5. Software License](#) section.
- Program the application.
- Run the application.

Supported Elements

The following elements are supported by the OnRobot Palletizing Software:

- Supported box types: cardboard, open, display and plastic (KLT)



NOTE:

For KLT boxes to stack properly, the minimum tolerance needed is +5 mm.

- Minimum box size: The minimum recommended box size is 200 x 200 x 100 mm (7.87 x 7.87 x 3.94 inches).
- Minimum box weight: The minimum recommended weight for the box is 0.5 kg (1.1 lb) for the default speed and acceleration.
- Supported slip sheet types: cardboard and slip sheet
- Supported pallet types and sizes (L x W x H):

Pallet type	Size	Unit
North America/US 1/ISO3	1016 x 1219 x 127 40 x 47.99 x 5	[mm] [inch]
North America/Drums/US 3	1219 x 1219 x 127 47.99 x 47.99 x 5	[mm] [inch]
Australia/US 2/ISO4	1165 x 1165 x 150 45.87 x 45.87 x 5.91	[mm] [inch]
EUR 1/ISO1	1200 x 800 x 144 47.24 x 31.50 x 5.67	[mm] [inch]
EUR 6/ISO0	600 x 800 x 144 23.62 x 31.51 x 5.67	[mm] [inch]
EUR 2/ISO2	1200 x 1000 x 145 47.24 x 39.37 x 5.71	[mm] [inch]
Asia/ISO5	1100 x 1100 x 135 43.31 x 43.31 x 5.31	[mm] [inch]

Pallet type	Size	Unit
Custom	Min.: 600 x 800 Max.: 1250 x 1250	[mm]
	Min.: 23.62 x 31.50 Max.: 49.21 x 49.21	[inch]

1.2.2. 2FGP20

Tool	Version
2FGP20	v1

1.2.3. Lift100

Tool	Version
Lift100	v1

For the Lift100, a Compute Box with hardware version of at least v3.4 is required. To check the HW version of the Compute Box, refer to the sticker on the device. Or check the HW version in the Web Client software.

1.2.4. Pallet Station

Tool	Version
Pallet Station	v1

1.2.5. Software and Firmware

1.2.5.1. URCap Software

The manual covers the following software versions:

Software	Version
URCap	v5.17.0

1.2.5.2. Compute Box Software

The manual covers the following Compute Box software version:

Software	Version
Compute Box	v5.17.0

**NOTE:**

When the used Compute Box has lower software/firmware version, update the Compute Box. For detailed instructions, see [8.1.5. Web Client: Update Menu](#).

1.3. Naming Convention

1.3.1. Compute Box/Eye Box

Eye Box and Compute Box are used interchangeably.

1.4. Copyright

The information contained herein is property of OnRobot A/S and shall not be reproduced in whole or in part without prior written approval of OnRobot A/S. The information herein is subject to change without notice and should not be construed as a commitment by OnRobot A/S. This manual is periodically reviewed and revised.

OnRobot A/S assumes no responsibility for any errors or omissions in this document.

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2. Safety

The robot integrators are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that any significant hazards in the complete robot application are eliminated. This includes, but is not limited to:

- Performing a risk assessment for the complete robot system
- Interfacing other machines and additional safety devices if defined by the risk assessment
- Setting up the appropriate safety settings in the robot software
- Ensuring that the user will not modify any safety measures
- Validating that the total robot system is designed and installed correctly
- Specifying instructions for use
- Marking the robot installation with relevant signs and contact information of the integrator
- Collecting all documentation in a technical file; including the risk assessment and this manual

2.1. Intended Use

OnRobot tools and accessories are intended to be used on collaborative robots and light industrial robots with different payloads depending on the end-of-arm tooling specifications. OnRobot tools and accessories are normally used in pick-and-place, palletizing, machine tending, assembly, quality testing and inspection and surface finishing applications.

The end-of-arm tooling and the accessories should only operate under conditions noted in [9.1. Technical Sheets](#) section.

Any use or application deviating from intended use is deemed to be impermissible misuse. This includes, but is not limited to:

- Use in potentially explosive atmospheres
- Use in medical and life critical applications
- Use before performing a risk assessment
- Use outside the permissible operational conditions and specifications
- Use close to a human's head, face and eye area
- Use as a climbing aid

2.2. General Safety Instructions

Generally, all national regulations, legislations and laws in the country of installation must be observed. Integration and use of the product must be done in compliance with precautions in this manual. Particular attention must be paid to the following warnings:

**DANGER:**

You must read, understand, and follow all safety information in this manual, and the robot manual and all associated equipment before initiating robot motion. Failure to comply with safety information could result in death or serious injury.

The information in this manual does not cover designing, installing, and operating a complete robot application, nor does it cover other peripheral equipment that can influence the safety of the complete system. The complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the robot is installed.

Any safety information provided in this manual must not be construed as a warranty, by OnRobot A/S, that the robot application will not cause injury or damage, even if robot application complies with all safety instructions.

OnRobot A/S disclaims any and all liability if any of OnRobot tools tooling are damaged, changed or modified in any way. OnRobot A/S cannot be held responsible for any damages caused to any of OnRobot tools tooling, the robot, or any other equipment due to programming errors or malfunctioning of any of OnRobot tools.

**WARNING:**

OnRobot tools are not allowed to be exposed to condensing conditions when power is on or when connected to a robot. If condensing conditions appear during transport or storage, the product must be placed between 20 and 40 Celsius degrees for 24 hours before power is applied or before connected to a robot.

It is recommended that OnRobot tools are integrated in compliance with the following guides and standards:

- ISO 10218-2
- ISO 12100
- ISO/TR 20218-1
- ISO/TS 15066

**WARNING:**

- The tools have to be properly secured before operating the robot.
- Keep fingers, clothes and hair away from the tool while the power is on.
- Always use protective glasses when working with sharp objects.
- Always ensure complete shutdown of the robot when working on the system for maintenance or inspection.
- Do not use the tools on people or animals.
- Do not perform any modification to the tooling.
- If the robot supports a bounded workspace/ speed/ force limit, make sure to use those features.
- Select robot trajectories that minimize risks of internal clamping between robot joints and tooling.

2.3. Risk Assessment

The robot integrator must perform a risk assessment on the complete robot application. OnRobot tools are only components in a robot application and therefore they can be only safely operated if the integrator has considered the safety aspects of the whole application. OnRobot tools are designed with relatively smooth and round design with a limited amount of sharp edges and pinch points

In collaborative applications, the trajectory of the robot can play a significant safety role. The integrator must consider the angle of contact with a human body, e.g. orientate OnRobot tools and workpieces so that the contact surface in the direction of movement is as large as possible. It is recommended that the tool connectors are pointed in the direction opposite to the movement.

OnRobot A/S have identified the potential hazards listed below as significant hazards that must be considered by the integrator:

- Objects flying from OnRobot tools due to loss of grip
- Objects falling down from OnRobot tools due to loss of grip
- Injuries due to collisions between humans and workpieces, OnRobot tools tooling, robot or other obstacles
- Consequences due to loosen of bolts
- Consequences if OnRobot tools cable gets stuck to something
- Workpiece itself represents a hazard

2.4. Environmental Safety

OnRobot A/S products must be disposed of in accordance with the applicable national laws, regulations and standards.

The product is produced with restricted use of hazardous substances to protect the environment; as defined by the EU RoHS Directive 2011/65/EU. These substances include mercury, cadmium, lead, chromium VI, polybrominated biphenyls and polybrominated diphenyl ethers.

Observe national **registration** requirements for importers according to EU WEEE Directive 2012/19/EU.



2.5. Lift100 Safety Function

Read the instructions carefully before mounting and operating the system. OnRobot A/S disclaims any and all liability if the installation does not meet the guidelines below.

The Lift100 is to be used with a robotic arm and must be properly safeguarded.



DANGER:

The Lift100 has been designed for floor mounting and must not be mounted on a wall or ceiling.



DANGER:

Only power on the Lift100 if it is bolted to the floor.



DANGER:

The Lift100 must be protected with proper safeguarding that stops the Lift100 and the robot before approaching them.



WARNING:

Do not use the Lift100 in operation before safeguarding it properly. Use proper safeguarding around the Lift100 and have it in Category 1 stop before approaching it.



WARNING:

The Lift100 must be connected to protective earth.



NOTE:

The Lift100 brakes and stops when the power supply is withdrawn.

The Lift100 has an emergency stop safety function. When an emergency stop signal is received, the drive power is removed and the brake is engaged. For information about wiring the safety function, go to the [4.8.7. Lift100 Safety Interface](#) section.

Safety Function	ISO13849-1 architecture	ISO13849-1 performance level	Stop time (reaction and braking time)	Stopping distance	MTTFd
Category 1 stop (EN/ISO 13850), time controlled	Category 3	D	0.4 s	20 mm	316 years

2.6. 2FGP20 Safety

When setting the target force, be aware that the maximum permissible force on quasi-static contacts for collaborative applications is 140 N. For further details, please check the ISO/TS 15066 standard.

3. Operation Mode(s)

This document covers installation and operation for both:

- UR CB3 series robot controllers
- and UR e-Series robot controllers.

Since the two controllers have similar installation and operation screens in these cases only the e-Series screens are shown. Where the two requires different steps or screens it is highlighted and referred as:

- CB3 series
- e-Series.

3.1. Operation via Compute Box

The product(s) could be used on both UR series via Compute Box, which works with all products and product combinations. Different modes of operation require the same installation/operation steps. Where the via Compute Box mode requires different steps, it is highlighted and referred as via Compute Box.

3.2. Operation via UR's Tool Connector

The product(s) could be used on both UR series via UR's Tool Connector, which works with the following products:

- *2FG7 or*
- *2FGP20 or*
- *3FG15 (Only on e-Series) or*
- *MG10 ⁽¹⁾ or*
- *RG2 ⁽²⁾ or*
- *RG6 ⁽²⁾ or*
- *SG or*
- *VG10 or*
- *VGC10*

Different modes of operation require the same installation/operation steps. Where the via Tool Connector mode requires different steps, it is highlighted and referred as via Tool Connector.

(1) When you use the CB3 tool connector, the following limitations apply to the MG10:

- The Smart grip feature is not available
- The Set finger offset feature is not available

(2) When you use the CB3 tool connector, the following limitations apply to the RG2 and RG6:

- The shown value of the read width (used as Current width and `rg_Width`) could be up to +/- 1 mm of the actual value. However, the repetition accuracy is still as specified.
- The Set finger offset feature is not available. The zero reference is set with the standard fingertips placed on the inner side.

4. HW Installation

4.1. Overview

For a successful installation the following steps will be required:

- Unbox the Lift100
- Mount the Lift100 to the floor
- Mount the robot adapter plate to the Lift100 output flange
- Mount the robotic arm to the adapter plate
- Mount any optional accessories
- Mount the Quick Changer option
- Mount the tool
- Mount the Pallet Station

In the following sections, these installation steps will be described.

4.2. Unboxing - Lift100



WARNING:

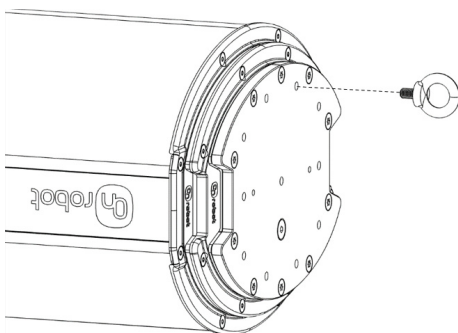
Use proper lifting equipment to move the Lift100.

For unboxing the Lift100 you will need the following tools:

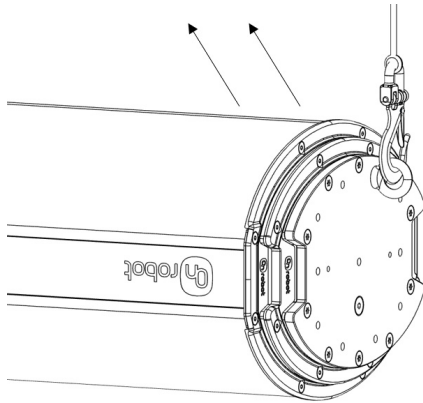
- Torx 20 screw bit
- Eye nut with two washers (included)

Unbox the Lift100 as follows:

1. Remove a total of 20 screws from the transportation box. Four screws are placed on five sides of the box.
2. Remove the wooden side protectors.
3. Fasten the included eye nut with washers to the Lift100 output flange.



4. Use a workshop crane with an end hook or similar to connect to the eye nut and carefully raise the Lift100 into an upright position.



4.3. Floor Mounting - Lift100



NOTE:

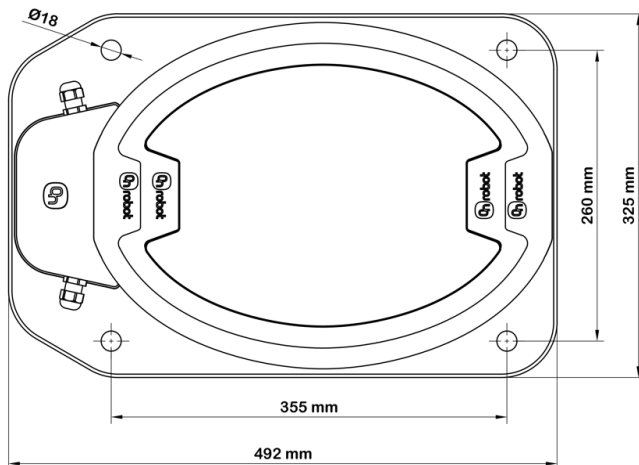
The Lift100 must be mounted to a plain surface and in a horizontal plane.

For mounting the Lift100 to the floor, you will need the following tools:

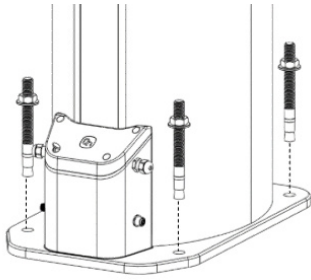
- 4 pieces of M16 anchor bolts with a grade loading capacity of 8.8

Mounting on Concrete Floor

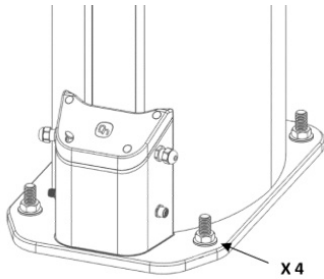
1. Find the desired location for the Lift100.
2. Mark four holes on the ground based on the plate dimensioning.



3. Drill four holes with an M16 masonry drill for concrete.
4. Place the Lift100 so it matches the four drilled holes.
5. Place the four bolt anchors.



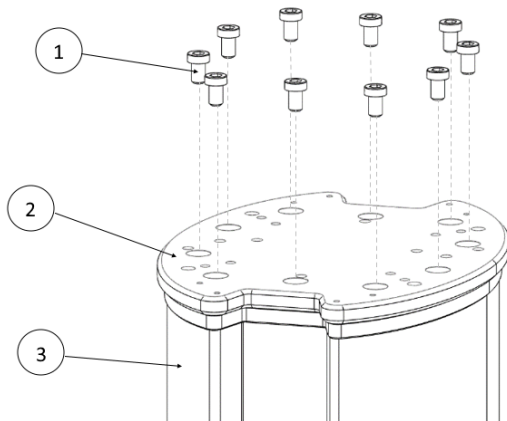
6. Tighten the four anchor nuts. Use a tightening torque of 100 Nm.



4.4. Robot Mount

4.4.1. Adapter Plate for UR Robots

For UR10, UR10e, UR16e



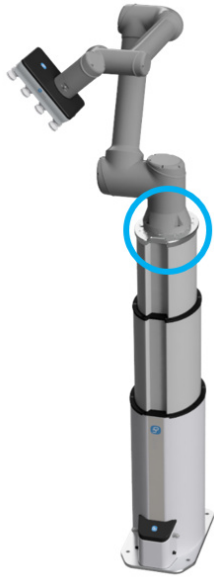
Adapter Plate A

1. 10 pieces of M10 bolts
2. OnRobot adapter plate
3. Lift100

Use 10 Nm tightening torque.

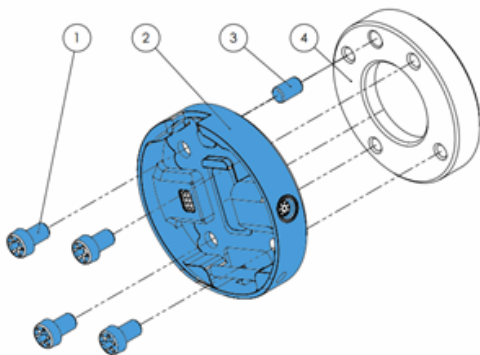
4.4.2. Mounting the Robot to the Lift100

Mount the robot arm to the Lift100 output flange.



4.4.3. Quick Changer Mounting

4.4.3.1. Quick Changer - Robot Side



Quick Changer - Robot Side

1. M6x8mm (ISO14580 8.8)
2. Quick Changer (ISO 9409-1-50-4-M6)
3. Dowel pin Ø6x10 (ISO2338 h8)
4. Adapter/ Robot tool flange (ISO 9409-1-50-4-M6)

Use 10 Nm tightening torque.

4.4.3.2. 2FGP20

When using the tool connector:

Name	Quick Changer I/O support – Robot Side	Quick Changer - Robot Side	Quick Changer - Robot Side 4.5A	Quick Changer - Robot Side
Item #	102326	102037	104277	109498
Version	QC-R – I/O	QC-R v2	QC-R v2-4.5	QC-R v3
Illustration				
Compatibility	✓ *	✓ **	✓ **	✓

* See gripper force and QC payload limitations in the [Technical Sheets](#) section.

** See QC payload limitations in the [Technical Sheets](#) section.

When using the Compute Box:

Name	Quick Changer - Robot Side	Quick Changer - Robot Side 4.5A	Quick Changer - Robot Side
Item #	102037	104277	109498
Version	QC-R v2	QC-R v2-4.5	QC-R v3
Illustration			
Compatibility	✓ *	✓ *	✓

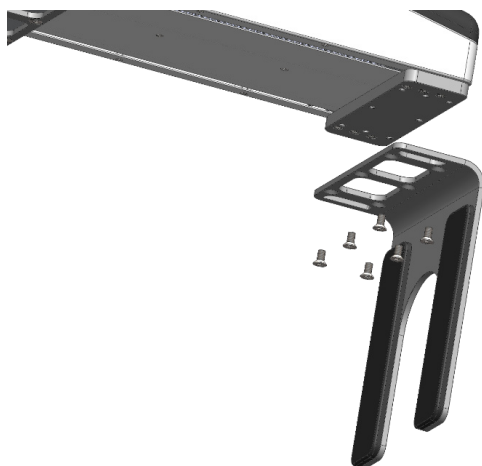
* See QC payload limitations in the [Technical Sheets](#) section.

4.4.4. Tools

4.4.4.1. Finger and Vacuum Cup System Mounting

Finger Mounting

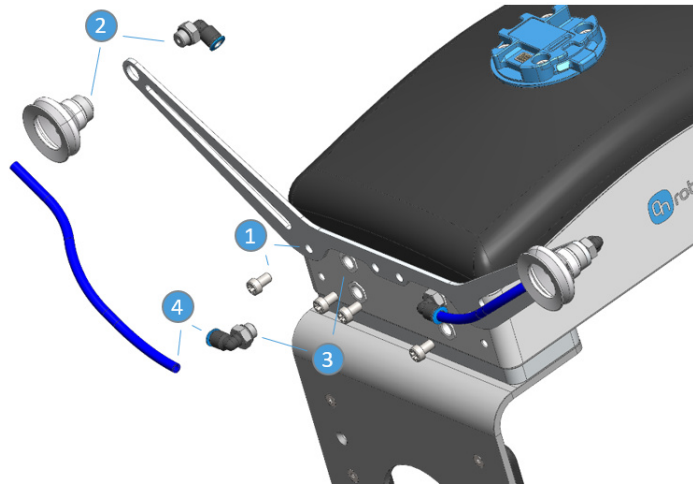
Mount the fingers by tightening the six M6x12 screws (per finger) with 3 Nm torque.



Vacuum Cup System Mounting

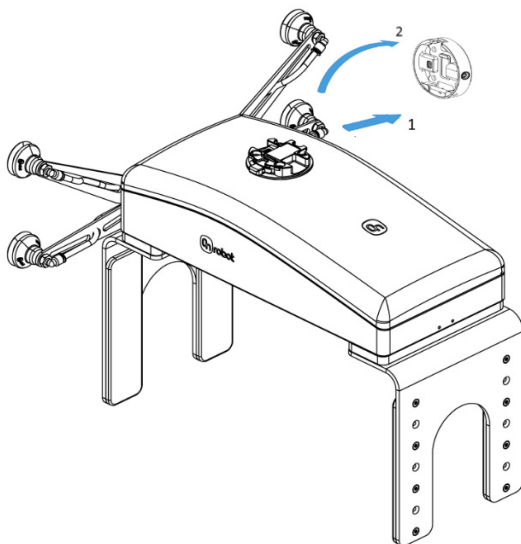
To mount the vacuum cup bracket, the vacuum cups and the tubes, follow the steps below:

1. Tighten four angle fittings to the gripper’s air sources.
2. Tighten the vacuum cups to the angle fittings through the holes of the bracket with 0.4 Nm torque.
3. Place the desired bracket on the side of the gripper and tighten the six (2 if only row shape will be used) M6x12 screws with 1 Nm torque.
4. Connect the tubes to the angle fittings by pushing them inside. To ensure that the tubes are completely attached try to gently pull the tubes out. If a tube needs to be removed, simply press the blue part of the angle fitting and pull the tube.



For more information about the vacuum cups customization, go to the Vacuum cups section in the [Technical Sheet](#).

4.4.4.2. 2FGP20



Step 1:

Move the tool close to the Quick Changer as illustrated.

The hook mechanism (rod and hook tongue) will keep the lower part locked once mounted.

Step 2:

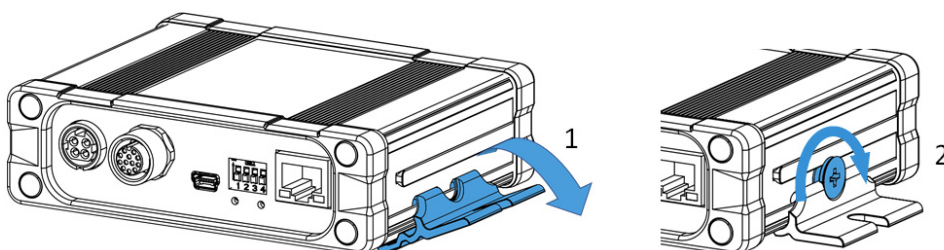
Flip the tool until it is fully mated, and you hear a clicking sound.

To unmount the tool, press the aluminum button on the Quick Changer and repeat the steps in the reverse order.

4.5. Compute Box Mount

4.5.1. Optional - Clip-on Bracket

Optionally, fix the Compute Box to a surface using the provided Clip-on Brackets (included only from 17th December 2020).

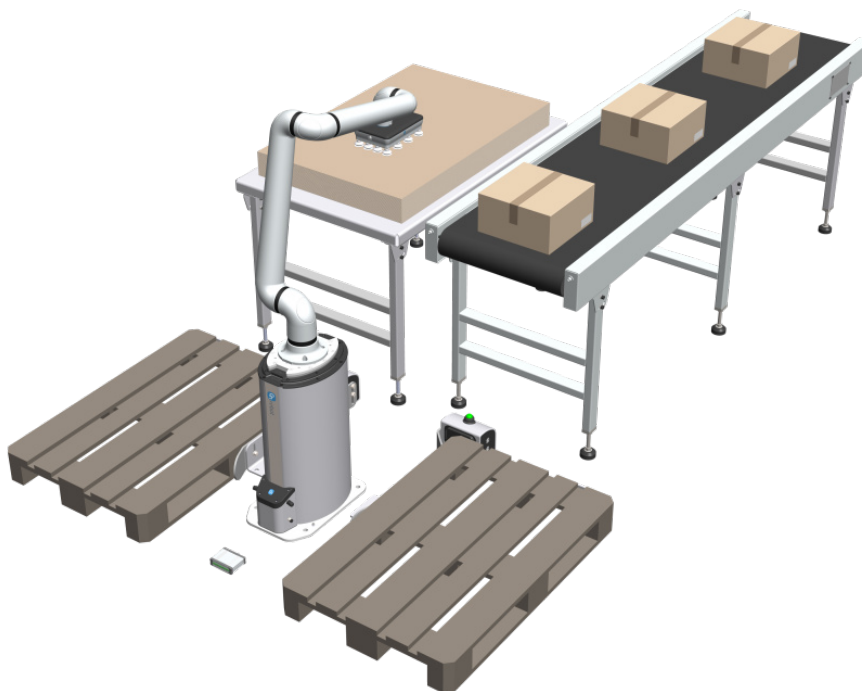


Do the following on both sides of the Compute Box:

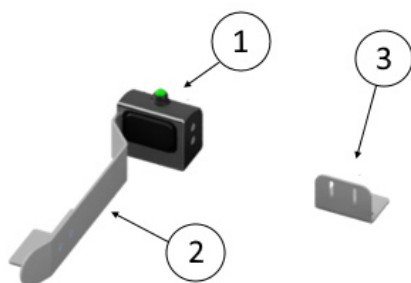
1. Hook the Clip-on Bracket to the rail on the side of the Compute Box and then flip it down.
2. Fasten the Clip-on Bracket with the plastic screw.

4.6. Mounting the Pallet Station

The OnRobot Palletizing supports placing the pallets in any position and orientation. To optimize the reach of the robot and the application cycle time, it is recommended to place them beside the robot, as seen below:



The Pallet Station consists of the following parts:



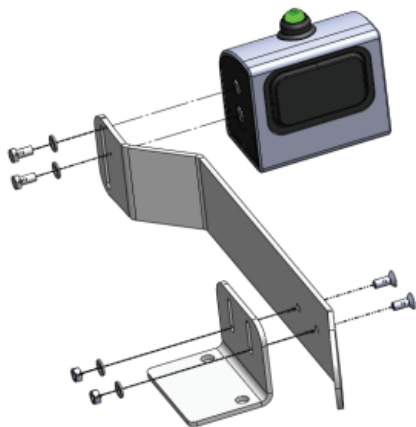
1. A sensor box which detects when a pallet is present. When the sensor detects a pallet, a green light will turn on at the top of the sensor box.
2. A guiding rail for the pallet which is attached to the sensor box and mounted to the surface with an angle bracket.
3. A second angle bracket that keeps the pallet in place and prevents it from rotating.

**NOTE:**

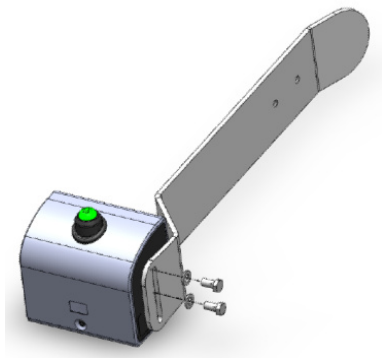
The Pallet Station must be mounted on a plain surface and in a horizontal plane.

The optimal distance between the pallet(s) and the robot depends on the robot model, pallet size, box size and use of tool extender. Follow the steps below to place the Pallet Station:

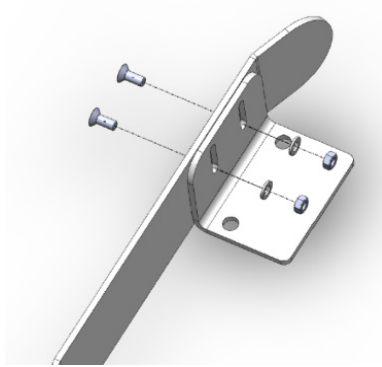
The Pallet Station can be mounted in a single or a dual setup.

Single Pallet Station Setup

1. Assemble the guiding rail and the sensor box. The Pallet Station can be placed on either side of the robot. Keep in mind that the guiding rail should be assembled bending towards the pallet, away from the robot. Use two M12 bolts and two M12 washers to fasten the guiding rail to the sensor box.



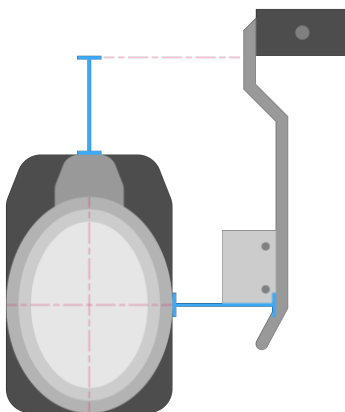
2. Fasten the angle bracket to the guiding rail with two M12 bolts, two M12 washers and two M12 nuts.



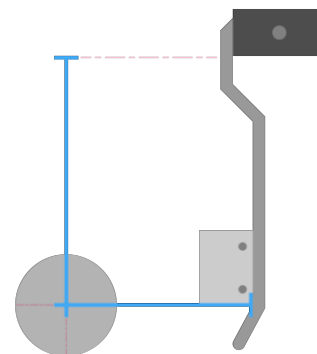
- The placement of the Pallet Station depends on the robot model, pallet size, box size and use of tool extender. The pallet should be placed as close to the robot as possible to maximize the robot reach, but not too close for the robotic arm to potentially collide with the box(es) closest to it.

The following distances are recommended for your robot:

Distance with Lift100



Distance without Lift100

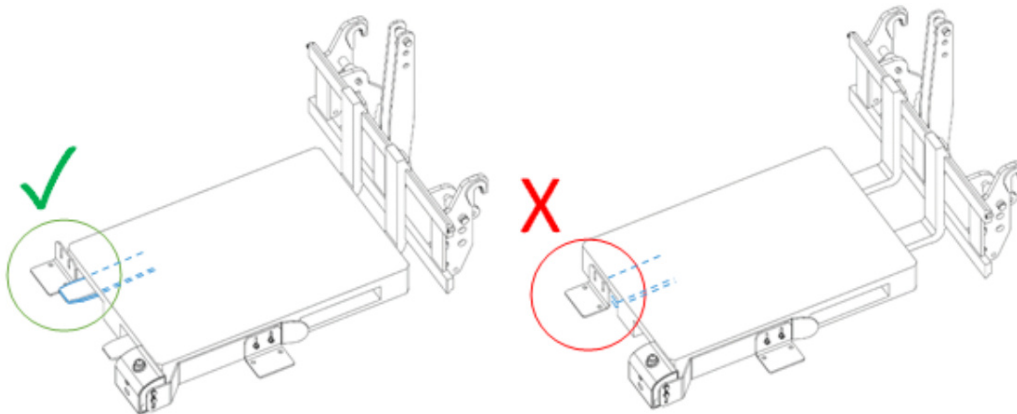


The distance from the top of the Lift100 and the sensor of the pallet station is 354 mm for all robot models and pallet sizes.

The distance between the Pallet Station and the robot/Lift100 on either side where the pallet station is placed, depends on the robot model. See the table below for the distances.

Robot Model	Distance to the side				Distance to the top			
	With Lift100		Without Lift100		With Lift100		Without Lift100	
	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
UR10	152.5	6	315	12.40	354	13.94	600	23.62
UR10e	152.5	6	315	12.40	354	13.94	600	23.62
UR16e	152.5	6	315	12.40	354	13.94	600	23.62

- The second angle bracket should be placed making sure it will not block the forks of the forklift or pallet jack. Fasten the second angle bracket to the ground using two M16 washers and two M16 bolts.



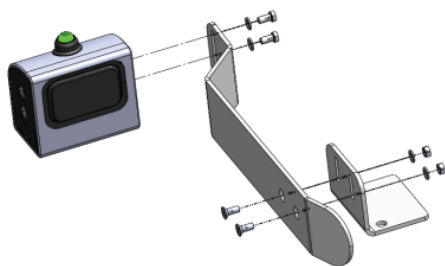
NOTE:

The placement of the second angle bracket is pallet dependent.

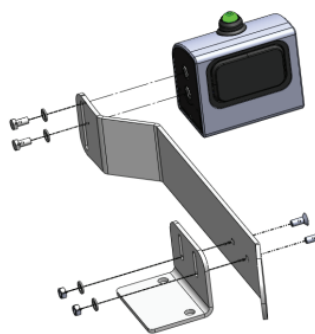
- Mark six holes for the floor mounting (two for the sensor box, two for the guiding rail and two for the angle bracket) based on the steps above.
- Remove the Pallet station hardware and drill the six holes with an M16 masonry drill for concrete.
- Hammer six pieces of M16 anchor bolts into the drilled holes, and be careful not to damage the thread. To determine the tightening torque, look at the datasheet of the used anchor bolts.
- Place the Pallet Station hardware on the anchor bolts and fasten with M16 washers and M16 bolts.
- Place the pallet in its position.

Dual Pallet Station Setup

Left-sided mounting



Right-sided mounting



- Repeat the previous steps to mount the second Pallet Station. The top of the Pallet Station should not exceed the top of the pallet.



4.7. Wiring via Tool Connector



DANGER:

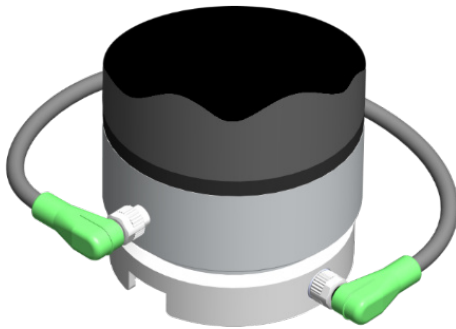
Use only original OnRobot tool data cables.

The following devices are supported in the operation mode via tool connector:

- 2FG7
- 2FGP20
- 3FG15 (Only for e-Series)
- MG10
- RG2 / RG6
- SG
- VG10 / VGC10

For e-Series

Connect the Quick Changer to the UR's tool connector.



DANGER:

Never connect the Quick Changer for I/O to an e-Series UR robot's Tool Connector.



NOTE:

VG10 / VGC10 can only be attached when the UR controller is started (not in IDLE mode) and no program is running or completely powered off.

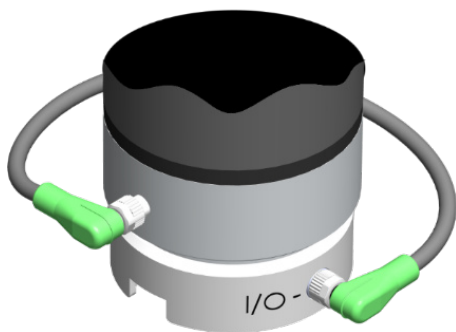


CAUTION:

Dual Quick Changer cannot be connected to the Tool Connector, it must be used via Compute Box.

For CB3

Connect the Quick Changer for I/O to the UR's tool connector.



DANGER:

Never connect the Quick Changer or Dual Quick Changer to a CB3 UR robot's tool connector.

Wiring via Tool Connector is finished.

4.8. Wiring the OnRobot Palletizer

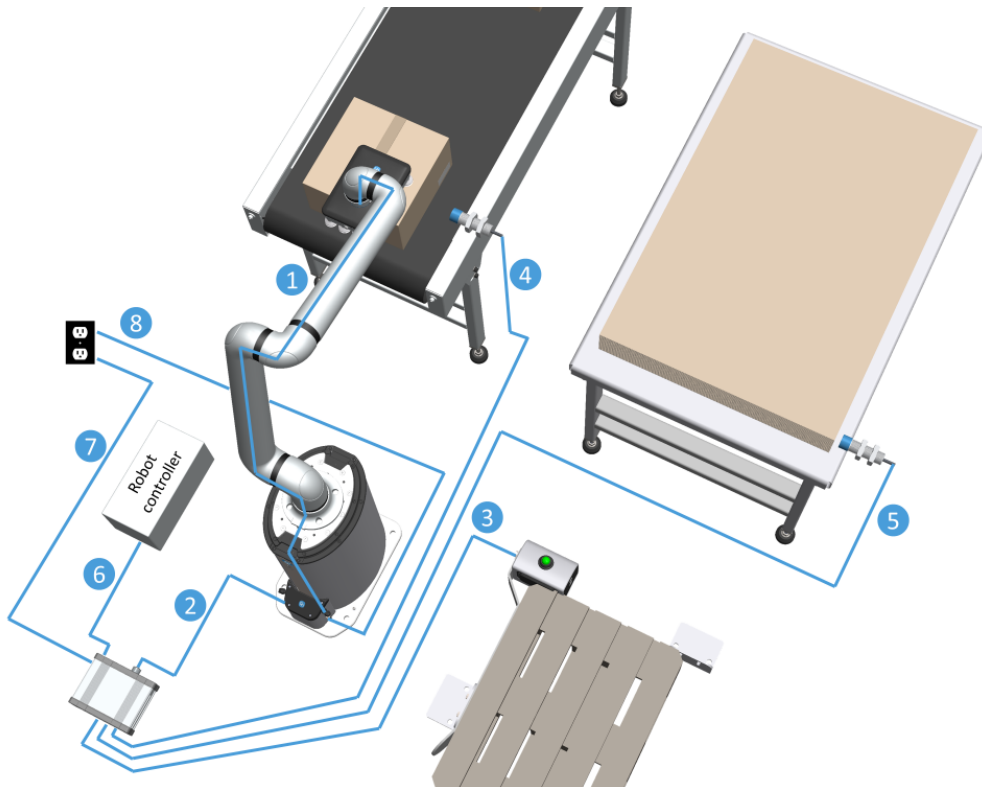


DANGER:

Use only original OnRobot tool data cables.

The following cables are required to wire the system:

1. Tool data cable between the Lift100 and the Tool.
2. Tool data cable between the Compute Box and the Lift100.
3. Digital signal cable between the Pallet Station and the Compute Box.
4. Digital signal cable between the Infeed Sensor and the Compute Box.
5. Digital signal cable between the Slip Sheet Sensor and the Compute Box.
6. Ethernet cable between the Compute Box and the Robot Controller.
7. Power cable between the Compute Box and the power outlet.
8. Power cable between the Lift100 and the power outlet.

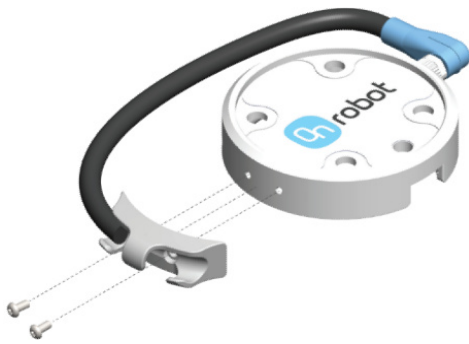


The specific installation steps will be described in the following sections.

4.8.1. Tool Data Cable

4.8.1.1. Cable to 2FGP20

First connect the data cable to the tool.



Use the M8-8pin connector on the Quick Changer or on the Dual Quick Changer.

Use the cable holder as illustrated on the left.

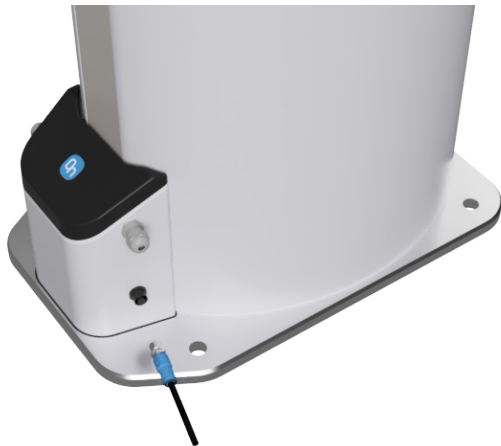


CAUTION:

Make sure to use the supplied cable holder to prevent any excessive strain on the 90-degree M8 connector caused by the rotation of the cable.

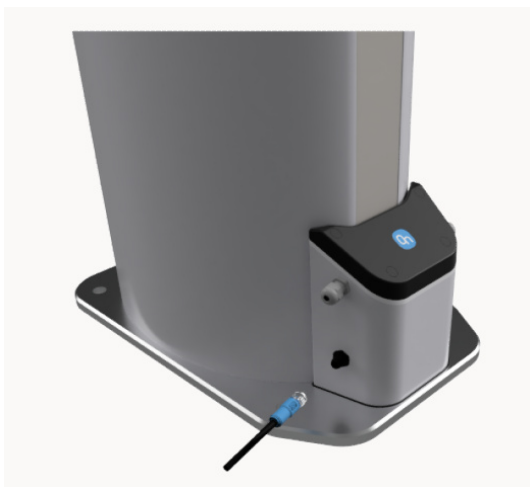
4.8.1.2. Cable from Tool to Lift100

Then route the Tool data cable from the end-of-arm tool to the Lift100's connector.



4.8.1.3. Cable from Compute Box to Lift100

Connect one end of the Tool data cable to the Lift100's connector.



Then route the Tool data cable to the Compute Box's DEVICES connector.

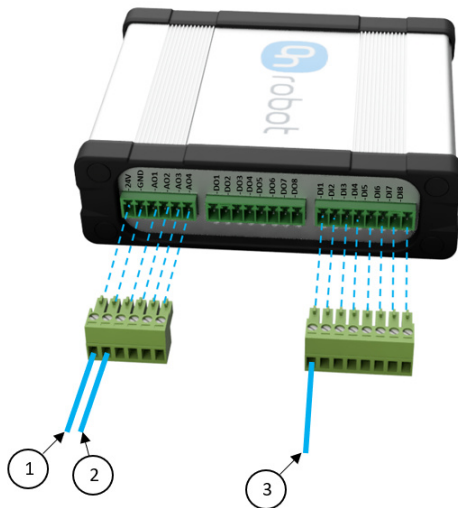


4.8.2. Digital Signal Cable

4.8.2.1. Cable to Compute Box

One Pallet Station

Connect the Pallet Station's 24V (1) and ground (2) to the Compute Box. Connect the digital input from the Pallet Station to any of the input ports on the Compute Box (3).

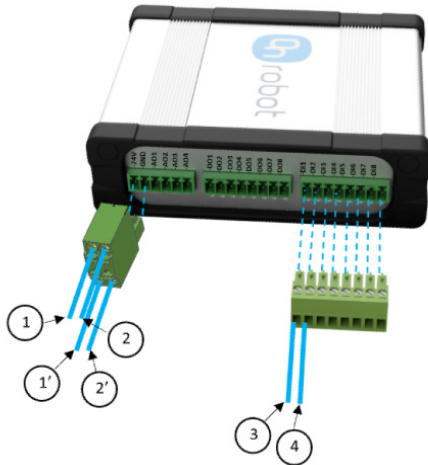


Two Pallet Stations

When using two Pallet Stations, the provided splitter terminal block can be used to have two 24V and two ground connections instead of one of each.

Firstly, connect one Pallet Station 24V (1) and ground (2) to the to the splitter terminal block. Then connect the other Pallet Station 24V (1') and ground (2') to the to the splitter terminal block. Then connect the splitter terminal block to the Compute Box's 24V and ground ports.

Secondly, connect the two digital inputs (3 and 4), one from each Pallet Station, to the 8 ports terminal block. Then connect the 8 ports terminal block to the Compute Box.



The supply cables need to be installed as shown below depending on whether the system is running PNP or NPN:

Mode	GND	+24V	Digital in
PNP	Black	Brown	Gray
NPN	Brown	Black	Gray



NOTE:

Use the 24V or GND ports as reference voltage for your sensor.



WARNING:

The Compute Box's outputs can only supply up to 100 mA. Each Pallet Station consumes 20 mA, therefore only 80 mA or 60 mA can be used. If your sensor requires more current, it must be supplied separately.

4.8.3. Ethernet Cable

Connect one end of the supplied Ethernet Cat 5e cable to the robot controller's Ethernet (LAN) port.

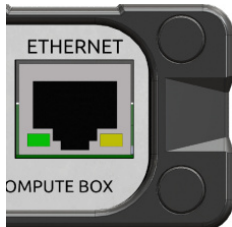


NOTE:

If the robot controller's Ethernet port is in use, use a standard 4-port Ethernet switch to be able to use two network devices at the same time.

**NOTE:**

For the Palletizing Application configuration, it is necessary to have the laptop, the robot and the Compute Box connected to the same network. This can be achieved by using a standard 4-port Ethernet switch.



Connect the other end of the supplied cable to the Compute Box's ETHERNET connector.

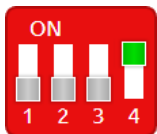
It is recommended to use Ethernet cables that are shorter than 3 m.

**WARNING:**

Check and make sure that the Compute Box enclosure (metal) and the robot controller enclosure (metal) are not connected (no galvanic connection between the two).

4.8.4. Compute Box DIP Switch Settings

Set the DIP switches of the Compute Box as follows:



Set the DIP switch 3 to OFF and the DIP switch 4 to ON position.

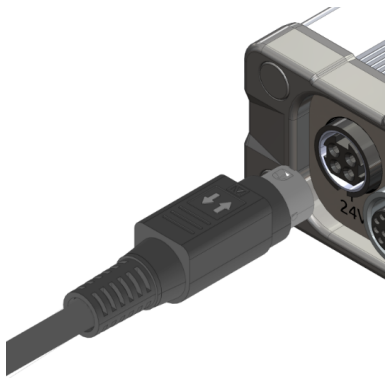
**NOTE:**

To find the IP address of the Compute Box, open the OnRobot Discovery Tool.

For more information about the Ethernet interface settings, see [8.1.1. Ethernet Interface Setup](#).

4.8.5. Power Supply: Compute Box

Connect the supplied power supply to the Compute Box 24V connector.



NOTE:

To disconnect the power connector, make sure to pull the connector housing (where the arrows are shown) and not the cable.



CAUTION:

Use only original OnRobot power supplies.

4.8.6. Power Supply: Lift100

Plug in the Lift100 power cable. In case a custom cable is used, follow the instructions below:

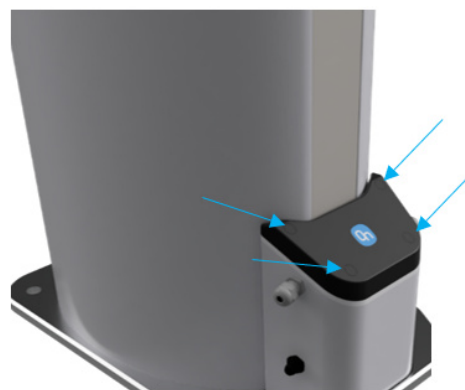


WARNING:

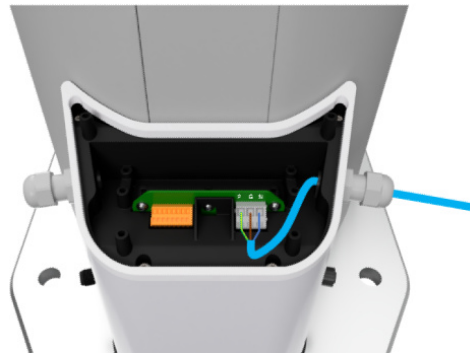
Make sure that the used cable complies with the following electrical requirements:

- 90V-264V AC
- Phases 1
- Frequency 47-63Hz
- Current 10.2A @ 115V AC / 4.9A @ 230V AC

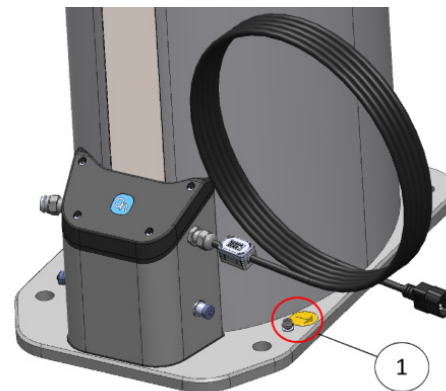
Remove the top cover from the Lift100 by removing the four rubber plugs and unscrewing the four Torx 10 screws.



Connect neutral, ground and PE.



Connect the Lift100 Grounding Terminal (1) to protective bonding circuit.



WARNING:

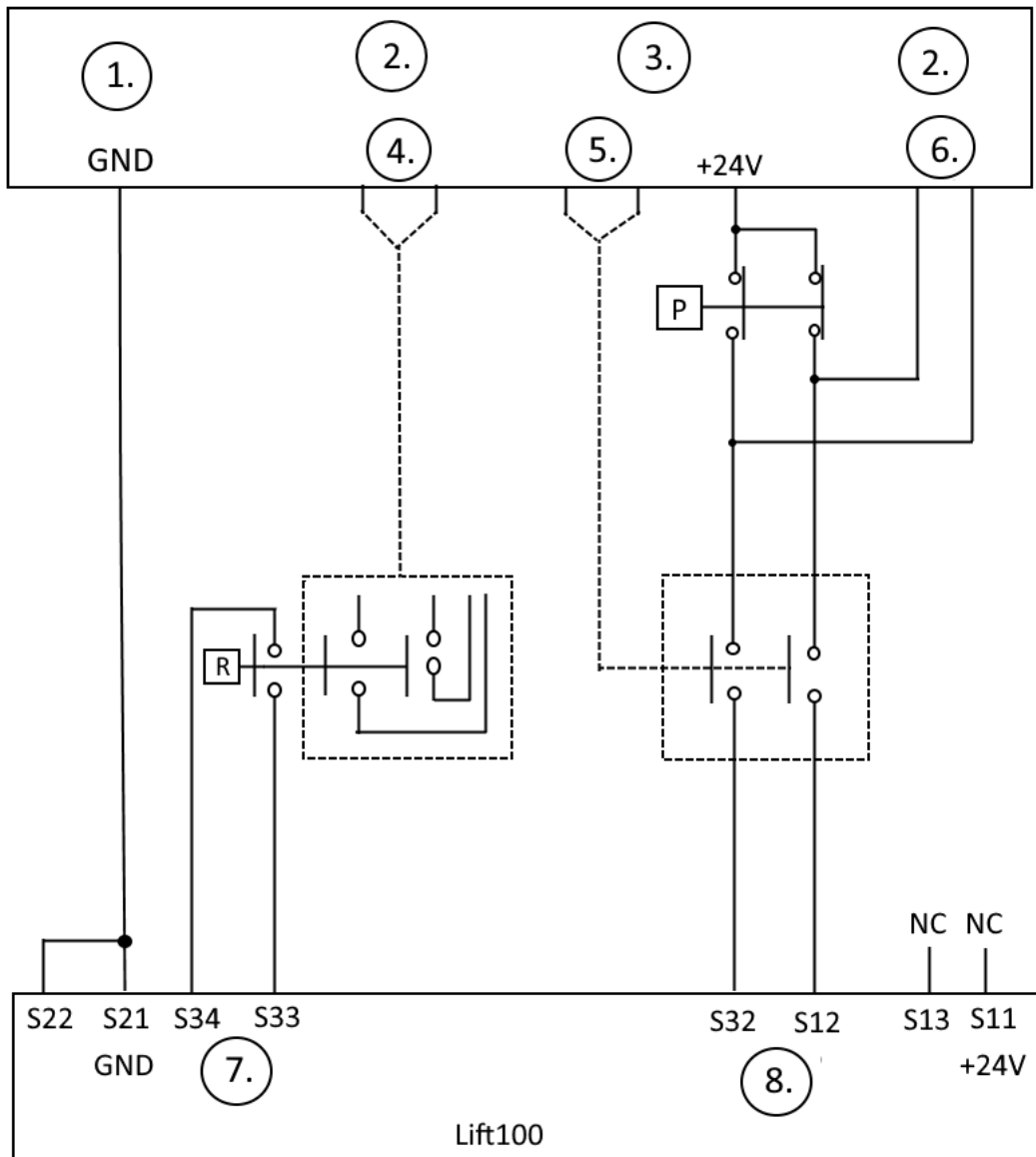
Make sure to connect the Lift100 Safety Interface described in the following section before powering up the power supply.

4.8.7. Lift100 Safety Interface

Applications where a robot is mounted on the Lift100, it is recommended to implement a manual reset after any safety stop. For example, in a palletizing application it is not possible to distinguish between boxes and people on the pallet. That is why the reset signal must be given manually.

It is recommended to trigger the E-stop signal to the Lift100 both on a protective stop from external safeguards and from the robot E-stop.

The schematic figure gives an example of how to integrate a robot and the Lift100 with external safeguards. The example shows wiring of common ground, manual reset, an external safeguard, and robot E-stop.



- R: Reset Button
- P: Protective Stop Device
- 1.: Robot Controller
- 2.: Safety Input
- 3.: Safety Output
- 4.: Reset and Resume
- 5.: Robot in E-Stop
- 6.: Protective Stop
- 7.: Reset Input
- 8.: E-Stop Input

The signal S34 is monitored by the firmware and it will not execute any commands while the relay is E-stopped. A high flange on S34 is the signal to re-activate the Lift100.

4.8.7.1. Robot Specific Safety

In the following section there are safety examples of connecting the Lift100 to specific robot controllers.

The example only shows the wiring of the E-stop and the reset signal is given automatically.

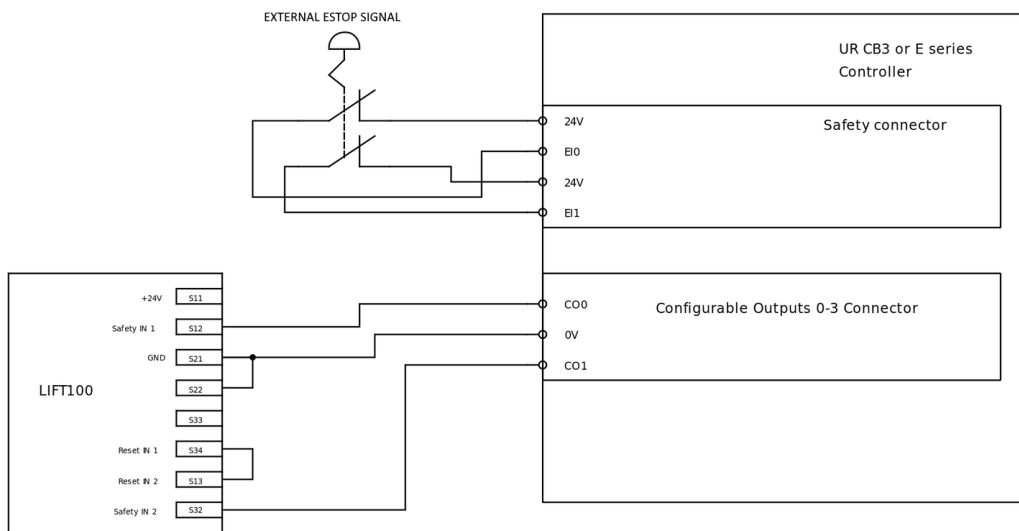


DANGER:

The risk assessment and mitigation of the final integration must ensure that automatic restart does not pose significant hazards to the operator. The control system in connection with automatic restart must comply with a high safety-related performance.

Lift100 Connection with UR CB3 or E-series Controllers

Example setup for the Lift100 safety connection



4.9. Best Practices - OnRobot Palletizer

Lift100:

- The Lift100 must be mounted to a plain surface and in a horizontal plane.

Pallet Station(s):

- Pallet Stations must be mounted with enough space from the center of the Lift100 or the robot to prevent collision of boxes with the robot shoulder.

5. Software License

The OnRobot Palletizing Software can only be used after activating the license, using the license key provided in the e-mail after purchasing the OnRobot Palletizing Software.

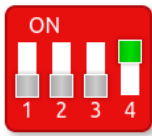


NOTE:

The Compute Box must be connected to the internet to activate the license.

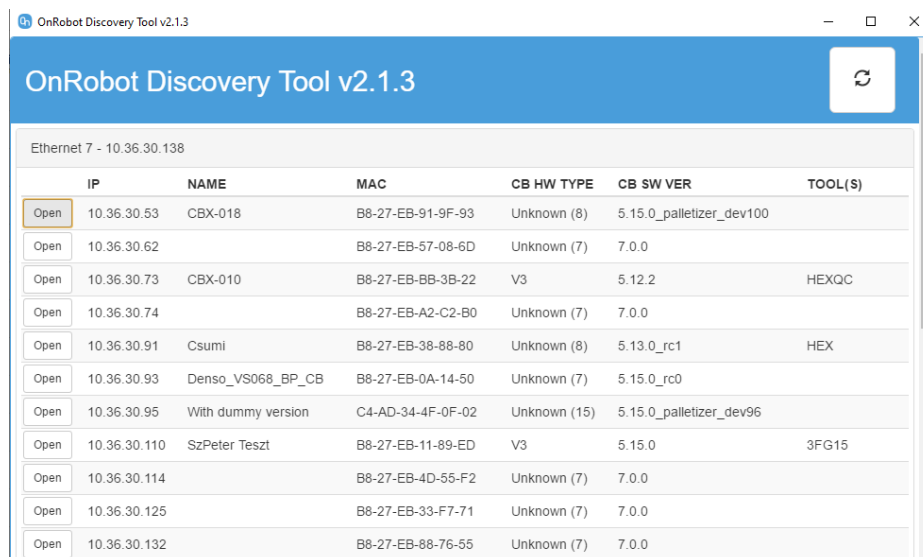
To activate the OnRobot Palletizing Software License, follow the steps below:

1. Set the DIP switch 3 to OFF and the DIP switch 4 to ON position. Connect the Compute Box to the internet network, and power on the Compute Box.



1. Digital input mode: PNP
2. Digital output mode: PNP
3. Compute Box / Eye Box IP setting is configured on this page.
4. DHCP server disabled: Compute Box / Eye Box does not assign IP to the robot.

2. Use the OnRobot Discovery Tool (provided on the supplied USB drive or found on the OnRobot website) to find the IP address of the Compute Box. The OnRobot Discovery Tool scans the network to find the IP address of the Compute Box.



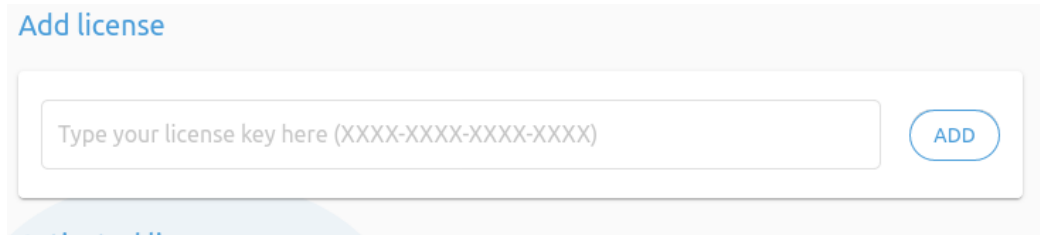
	IP	NAME	MAC	CB HW TYPE	CB SW VER	TOOL(S)
Open	10.36.30.53	CBX-018	B8-27-EB-91-9F-93	Unknown (8)	5.15.0_palletizer_dev100	
Open	10.36.30.62		B8-27-EB-57-08-6D	Unknown (7)	7.0.0	
Open	10.36.30.73	CBX-010	B8-27-EB-BB-3B-22	V3	5.12.2	HEXQC
Open	10.36.30.74		B8-27-EB-A2-C2-B0	Unknown (7)	7.0.0	
Open	10.36.30.91	Csumi	B8-27-EB-38-88-80	Unknown (8)	5.13.0_rc1	HEX
Open	10.36.30.93	Denso_VS068_BP_CB	B8-27-EB-0A-14-50	Unknown (7)	5.15.0_rc0	
Open	10.36.30.95	With dummy version	C4-AD-34-4F-0F-02	Unknown (15)	5.15.0_palletizer_dev96	
Open	10.36.30.110	SzPeter Teszt	B8-27-EB-11-89-ED	V3	5.15.0	3FG15
Open	10.36.30.114		B8-27-EB-4D-55-F2	Unknown (7)	7.0.0	
Open	10.36.30.125		B8-27-EB-33-F7-71	Unknown (7)	7.0.0	
Open	10.36.30.132		B8-27-EB-88-76-55	Unknown (7)	7.0.0	

3. The IP address of the Compute Box will be displayed. Click **Open** to open a browser instance to log into the Web Client. For more information go to the [8.1.2. Web Client](#) section.

**NOTE:**

If the IP address cannot be found, check your network connection and reset the DIP switches. To change between modes, first change the DIP switches and then cycle the Compute Box power so the changes will take effect.

4. In the Menu section, go to the **Licenses** tab and add the License Key received by e-mail when the OnRobot Palletizing was purchased.

**NOTE:**

The license cannot be deactivated nor transferred to another Compute Box. Contact the regional technical support in case the Compute Box is damaged, and the license needs to be transferred.

If there is an error while activating the license, a popup will appear indicating the reason for the error, and how to resolve it.

5. Accept the Software License Agreement.

Now the license is activated.

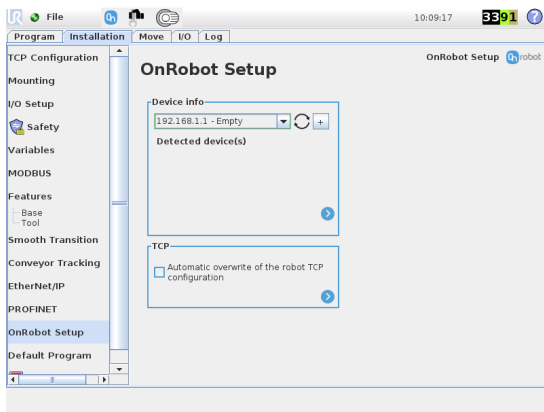
6. SW Installation

6.1. Robot Software Setup

6.1.1. URCap Setup

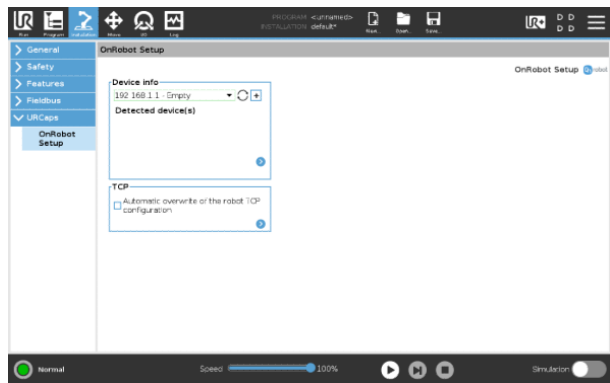
UR CB3

Select the **Installation** tab, then select **OnRobot Setup**. The following screen is shown:



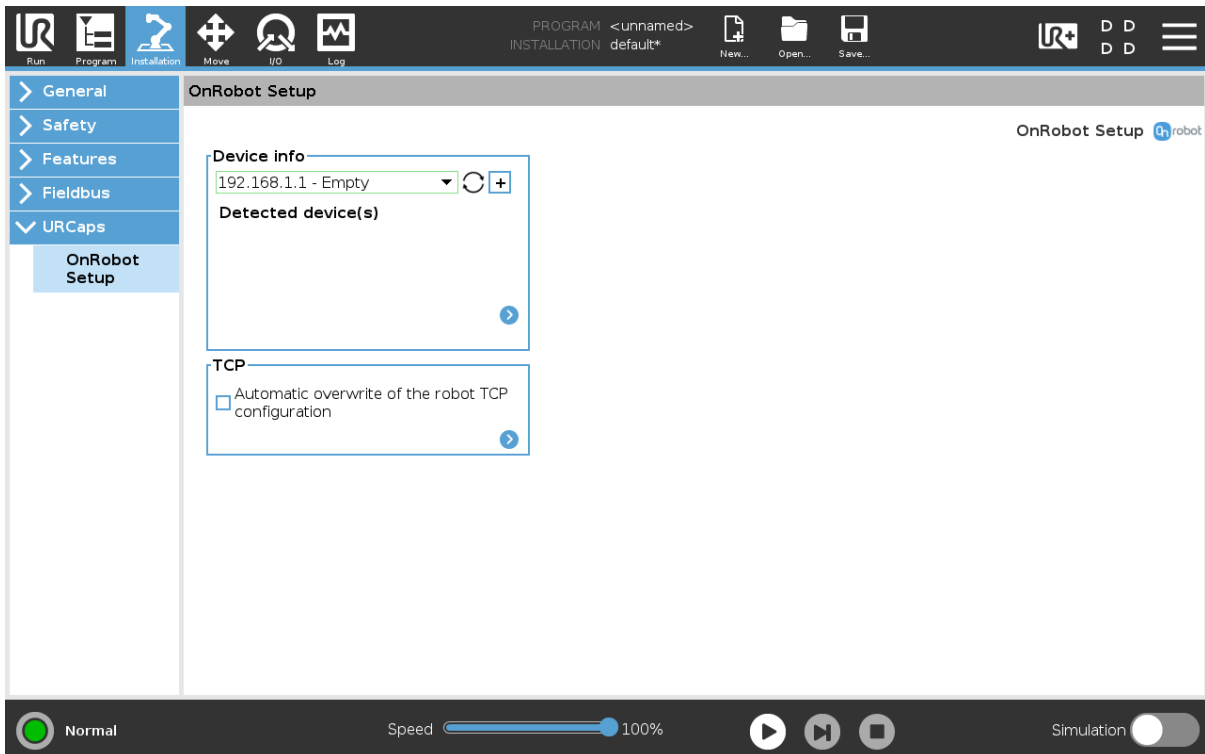
UR e-Series

Tap on the **Installation** tab in the top menu. Then tap on the **URCaps**.




6.1.1.1. Device Info

In the normal view of the panel, the available functions are shown below:



Device info

Dropdown menu to select a device-robot communication channel: Discover the connected devices.

Use the reload button  to find new available devices.



NOTE:

After setting up the device the changes need to be saved to be part of the current installation.

For the e-Series UR robots tap on the **Save** button  (from the top menu and use the **Save Installation** button .

For the CB3 UR robots use the **Save** button .



NOTE:

To use the newly discovered devices you might need to restart PolyScope. To do that simply press the **Restart now** button. Remember to save it before, if there are any unsaved changes in your program or settings.

OnRobot products are checked after the robot is restarted and the saved settings are restored while loading a program. That check could take up to 5 seconds via the Quick Changer for I/O. Therefore make sure to wait at least 5 seconds before you start your program. To make sure that the device is connected check the **Device info**.



If the connected OnRobot product is changed, always go to the **Device info** to check if the change was successful.



CAUTION:

After any error message is shown that is related to the connection to our devices, please go to the **Device info** to make sure that the right settings (e.g.: TCP) are used.

No connection: If you want to use OnRobot URcap and there are no connected devices, select **No connection** from the dropdown menu and no error message will show up.

Load multiple devices: The  automatically loads the selected devices to the UR environment, even if the device is not connected to the robot. When you change between loaded devices, the robot does not require a restart but you should press the reload button  to refresh the detected devices.



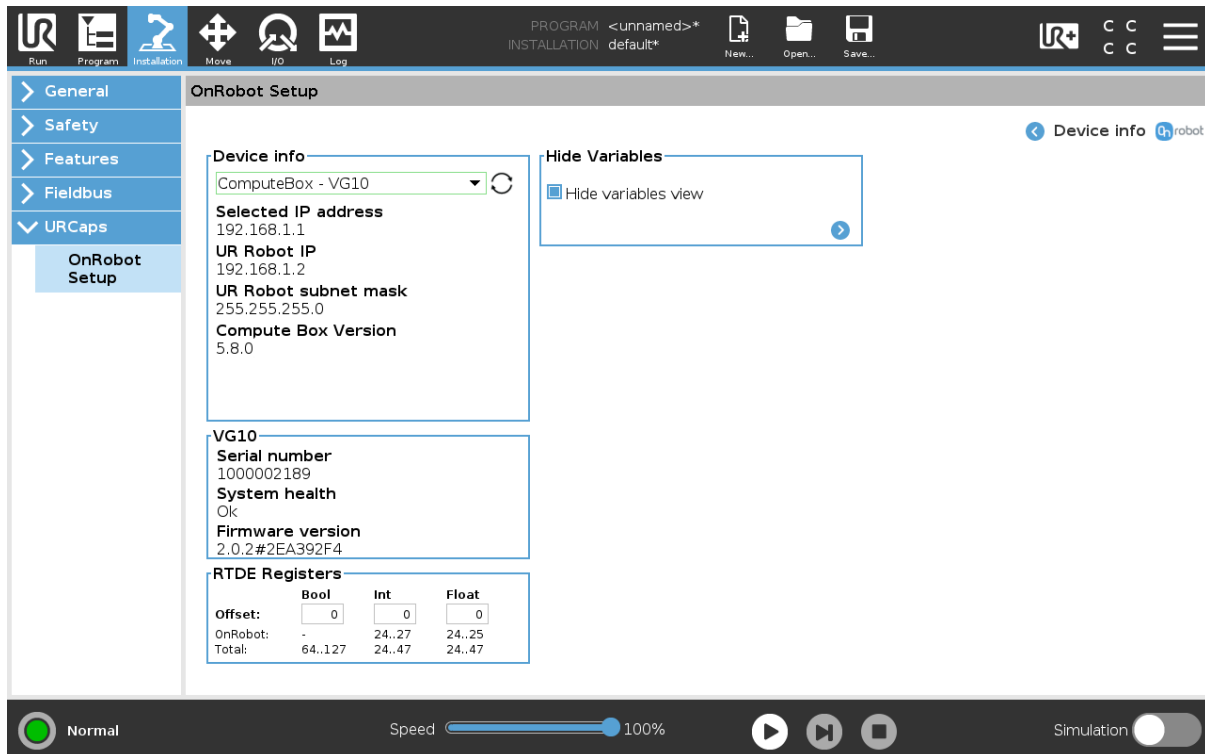
WARNING:

When multiple devices are activated, you may experience slow URcap operation. In this case, activate only the devices that you use. It is recommended to activate up to two devices at the same time.

For each loaded device, the appropriate URCaps commands and Toolbar will be visible, hence load only the devices that you will change frequently.

Detailed parameters of the Device Info

To get more information about the devices press on  and the following screen will show:



Device info

The **Selected IP address**, **Compute Box Version**, **UR Robot IP** and **UR Robot subnet mask** are shown.

Errors

This displays information about the errors if there is any.

Device name

The **Serial number**, **System health** and **Firmware version** are shown.

Update: this will update the firmware if an update is available.

Depending on the selected devices, different panels will become available to configure the devices.

RTDE Registers

OnRobot uses RTDE registers to communicate with UR. Real-Time Data Exchange (RTDE) is an interface that can be used to send data for the robots through registers. For more information about RTDE registers, see UR's [Real-Time Data Exchange \(RTDE\) Guide](#).

You need this option if you use OnRobot devices with other vendors' devices and OnRobot registers might overlap other vendors' registers.

OnRobot uses three different types of registers: **Bool**, **Int** and **Float**.

Offset: Offsets the registers by the amount that is written in the certain field.

OnRobot: Shows the number of registers that OnRobot uses of the certain type.

Total: Shows the maximum number of registers of the certain type that is available in UR.

Check other vendors' registers to make sure that the registers that you are using are not used by other vendors. If your registers overlap other vendors' registers, offset them by writing a certain value in the **Offset** fields. If the offset value is too high, the number of OnRobot registers can exceed the number of **Total** registers. In this case the values will turn red in the **OnRobot** row.

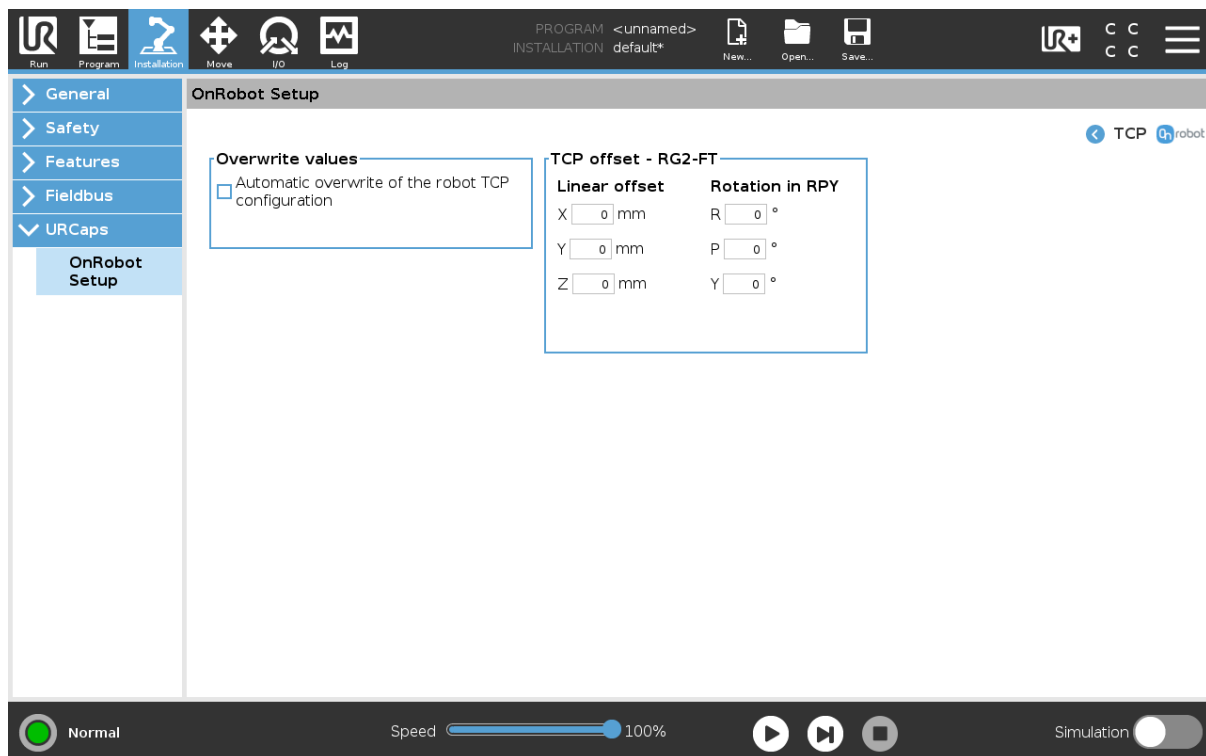
Hide Variables

A list of selectable variables. When a variable is selected to hide, it will not appear on the configuration panel.

TCP

In the normal view of the panel the TCP of the robot can be overwritten by the TCP of the tool by pressing the **Automatic overwrite of the robot TCP configuration** checkbox.

To see more options press on  and the following screen will show:



Overwrite values

Automatic overwrite of the robot TCP configuration: when checked, the UR's TCP configuration is automatically overwritten (Dynamic TCP mode). When unchecked the TCP is left unchanged (Static TCP mode).

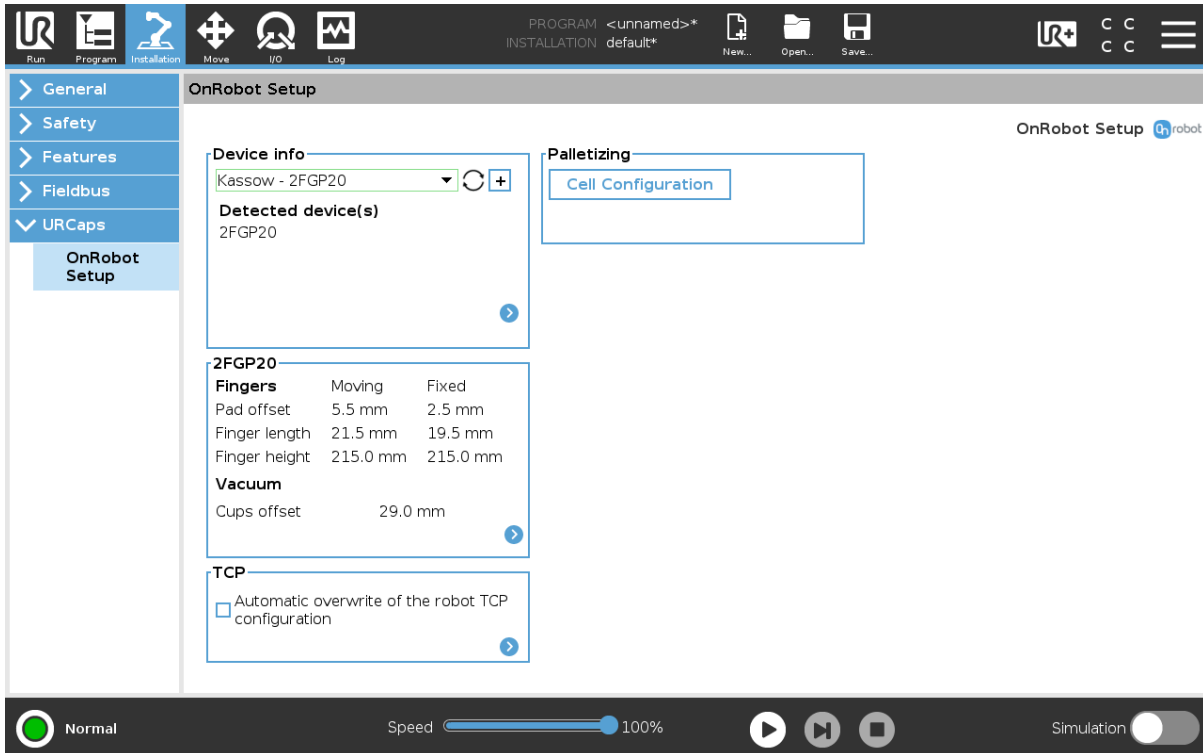
For further information and best practices on the TCP setting see [TCP Configuration](#) section.

TCP offset

Set the **Linear offset (X,Y,Z)** and the **Rotation in RPY** (Roll-Pitch-Yaw) values to adjust the OnRobot device dependent calculated TCP.

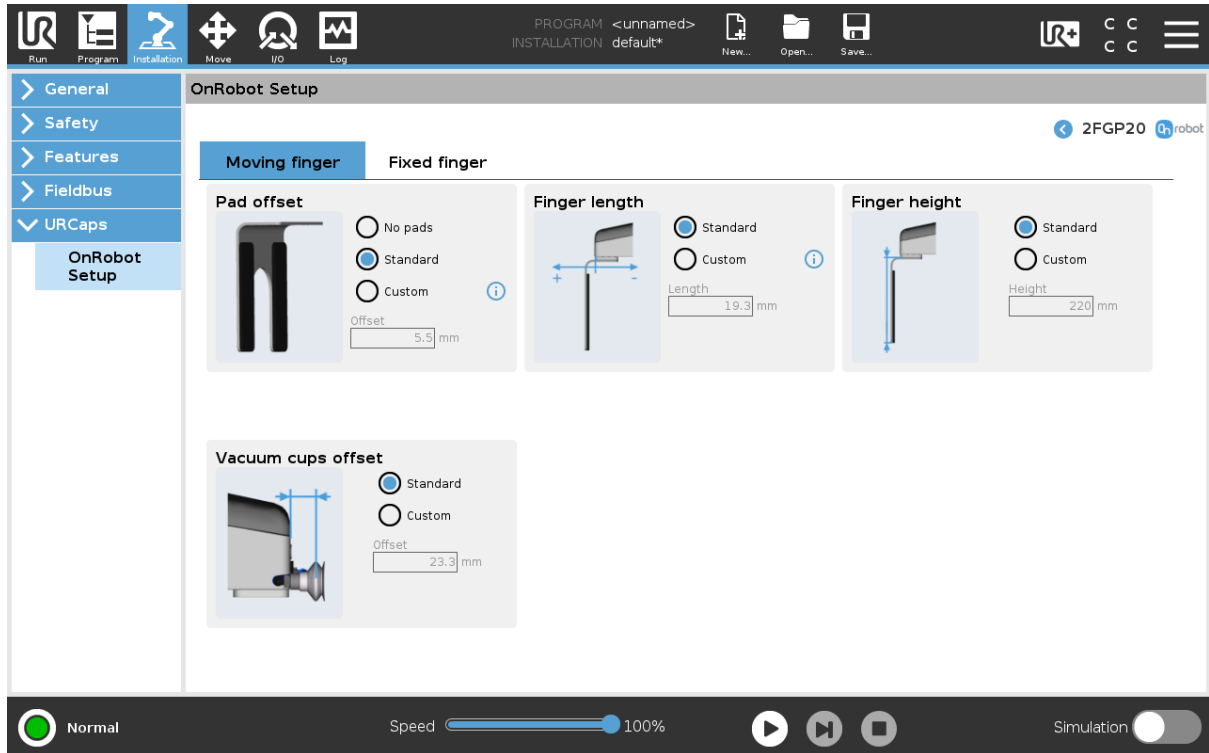
6.1.1.2. 2FGP20

The configuration panels for the 2FGP20 are shown in the images below:



2FGP20

In the normal view of the panel, the selected **Pad offset**, **Finger length**, **Finger height** and **Vacuum cups offset** are shown. These values can be set for both the Moving finger and the Fixed finger.

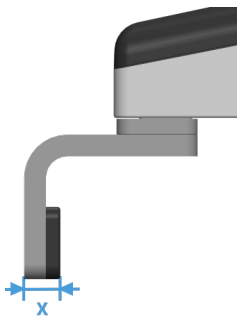


Pad offset

Select one of the pad offsets:

- No pads
- Standard pads
- Custom pads

To input the right custom pad offset value, measure the width of the finger and the pad together and divide that value by two. Custom pad offset value = $x/2$.

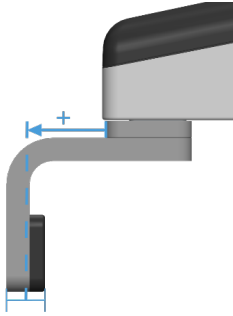


Finger length

Select one of the finger lengths:

- Standard finger
- Custom finger

To input the right custom finger length value, measure the distance from the outer part of the finger base to the pad offset position (middle between the outer part of the finger and the outer part of the pad).



Finger height

Select one of the finger heights:

- Standard finger
- Custom finger
Add the custom finger height value to the input field.

Vacuum cups offset

Select one of the vacuum cup offsets:

- Standard vacuum cups
Shows the value when the OnRobot vacuum cups and brackets are used.
- Custom vacuum cups
Add the custom vacuum cups offset value to the input field.



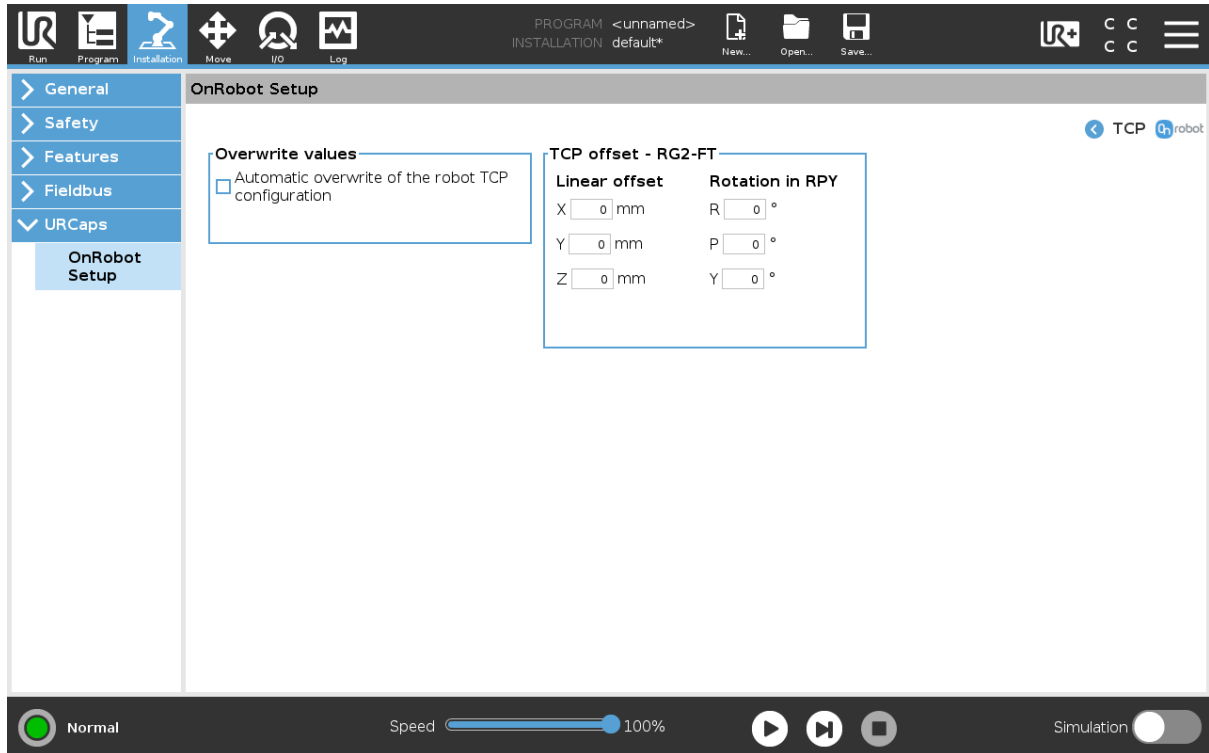
NOTE:

The changes in the 2FGP20 Setup settings are saved to the gripper and not to the installation file. Therefore, if the gripper is moved to another robot, the settings will remain the same. However, if another gripper is used in the same robot, the settings might need to be reset again.

TCP

In the normal view of the panel the TCP of the robot can be overwritten by the TCP of the tool by pressing the **Automatic overwrite of the robot TCP configuration** checkbox.

To see more options press on  and the following screen will show:



Overwrite values

Automatic overwrite of the robot TCP configuration: when checked, the UR's TCP configuration is automatically overwritten (Dynamic TCP mode). When unchecked the TCP is left unchanged (Static TCP mode).

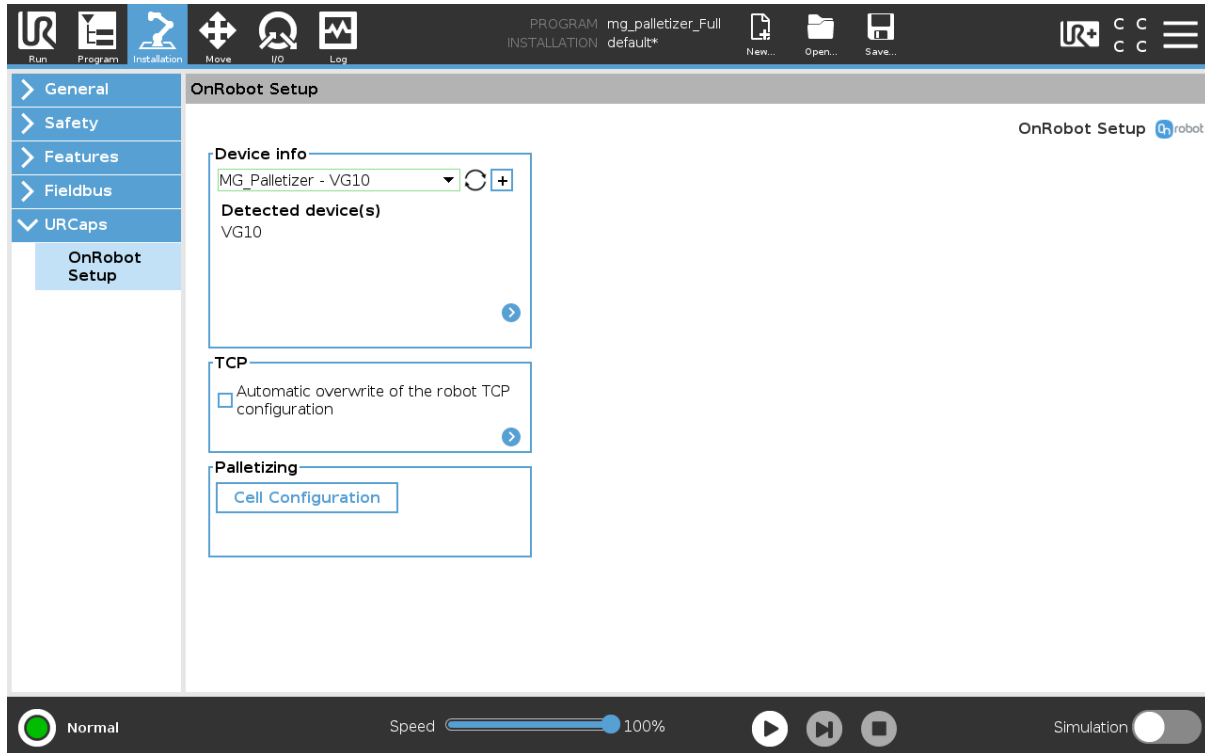
For further information and best practices on the TCP setting see [TCP Configuration](#) section.

TCP offset

Set the **Linear offset** (X,Y,Z) and the **Rotation in RPY** (Roll-Pitch-Yaw) values to adjust the OnRobot device dependent calculated TCP.

6.1.1.3. Palletizing Application

The configuration panels for the Palletizing Application are shown in the images below:



Palletizing

This section provides information about how to configure a cell using the OnRobot Palletizing via the URcap. The cell configuration is only done once and can be used to create and run different palletizing applications. Therefore, during the cell configuration, make sure that all signals that could be used in future palletizing applications are set up.



NOTE:

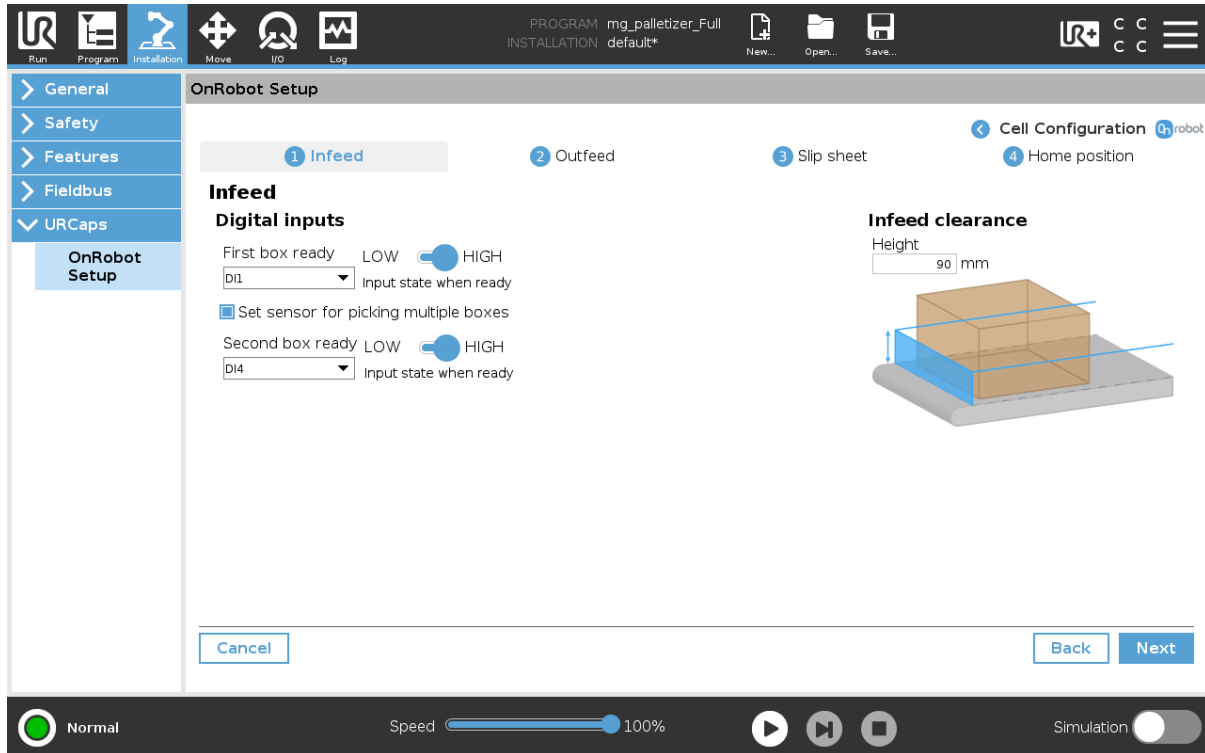
If a setting in the cell configuration is changed after a palletizing application is created, some settings in the palletizing application might need to be changed as well.

To create a cell configuration, the following steps have to be completed:

1. Infeed setup
2. Outfeed setup
3. Slip sheet setup
4. Home position

To start the cell configuration, press **Cell Configuration**.

Infeed



Digital inputs

- First box ready:** This signal is used to communicate to the system that a box is ready to be picked up at the pickup position. This is identified by a sensor. The sensor needs to be installed so it only detects the box when the box is ready to be picked up. Connect the **First box ready** sensor to one of the Compute Box's digital inputs and select the **Digital input** from the dropdown menu. Then select if the input state is **High** or **Low** when the box is ready.
- Set sensor for picking multiple boxes:** In case of multiple boxes, the gripper will pick up two boxes at the same time. This option is used to decrease the cycle time. A second sensor needs to be installed for the second box. The robot will only move to the picking position if the sensors detect that both the first and the second box are ready to be picked up. Connect the **Second box ready** sensor to one of the Compute Box's digital inputs and select the **Digital input** from the dropdown menu. Then select if the input state is **High** or **Low** when the second box is ready.



NOTE:

The multiple boxes signal is optional but if one of the palletizing applications will use the multiple boxes option, it must be set during the Infeed Setup. If an other palletizing application will not use the multiple boxes option, it will ignore this signal.

Infeed clearance

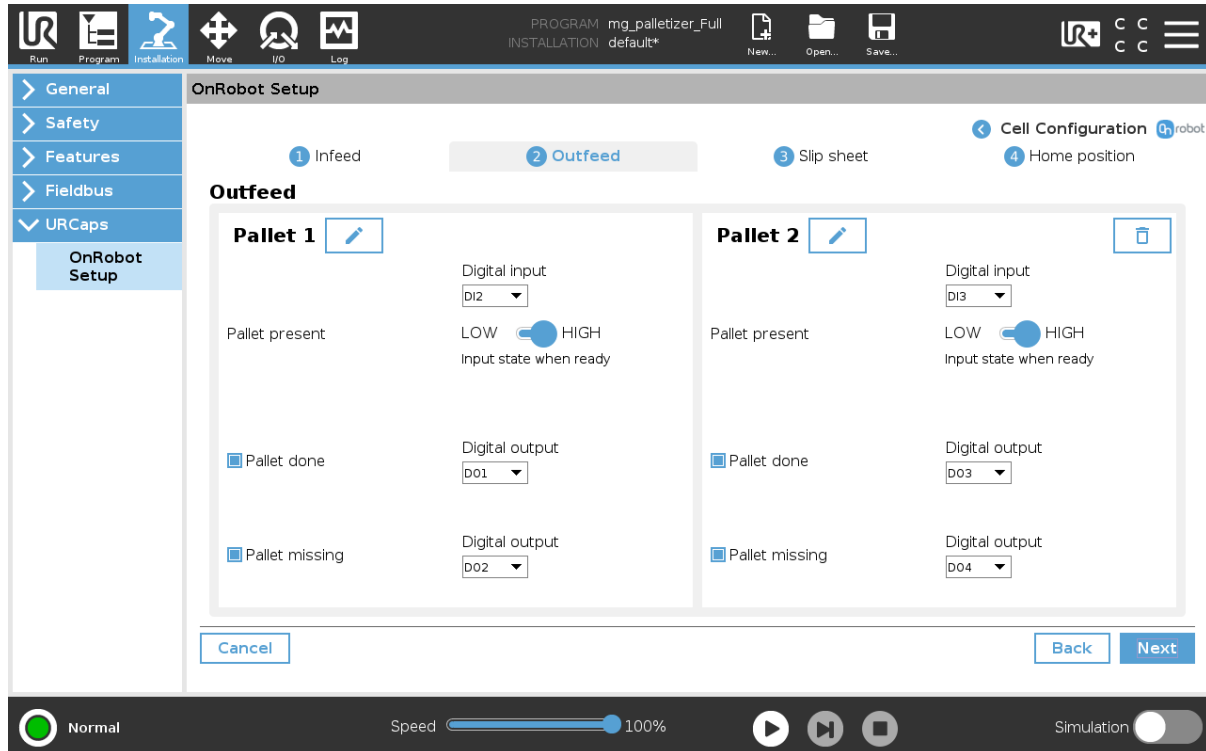
The height of the infeed clearance is used to modify the robot movements to avoid collisions with the infeed elements.

- Height:** Enter the height measured from the surface where the box is placed, to the top of the highest element around the box (consider front and sides).


Press **Next** to continue with the Outfeed Setup.

Outfeed

The outfeed represents the pallet position(s) where the boxes will be placed. The positions are normally defined by the Pallet Station. The Pallet Station contains sensors to identify when a pallet is present (mandatory). Additionally, the OnRobot Palletizing can set a digital output **High** when a pallet is done or missing (optional). See more details about the signals below.



Pallet 1

Press  to edit the pallet position name.

- **Pallet present:** This signal is used to communicate to the system that a pallet is present in the pallet position. This is identified by a sensor. The sensor needs to be installed so it will only detect the pallet when it is in the right position. Connect the **Pallet present** sensor to one of the Compute Box's digital inputs and select the **Digital input** from the dropdown menu. Then select if the input state is **High** or **Low** when the pallet is present.




NOTE:

If the Pallet Station is used, go to the Installation section to see how this should be installed.

- **Pallet done:** This optional signal allows the system to communicate that a pallet is fully palletized. The signal can be used to inform the operator by light, sound or other that the pallet can be taken away from the Pallet Station.
- **Pallet missing:** This optional signal allows the system to communicate that a pallet is missing. The signal can be used to inform the operator by light, sound or other that the pallet shall be placed on the Pallet Station.

Pallet 2

If a second pallet is used for any of the applications, press **Add** and set the second pallet position signals.

Press  to delete the second pallet.

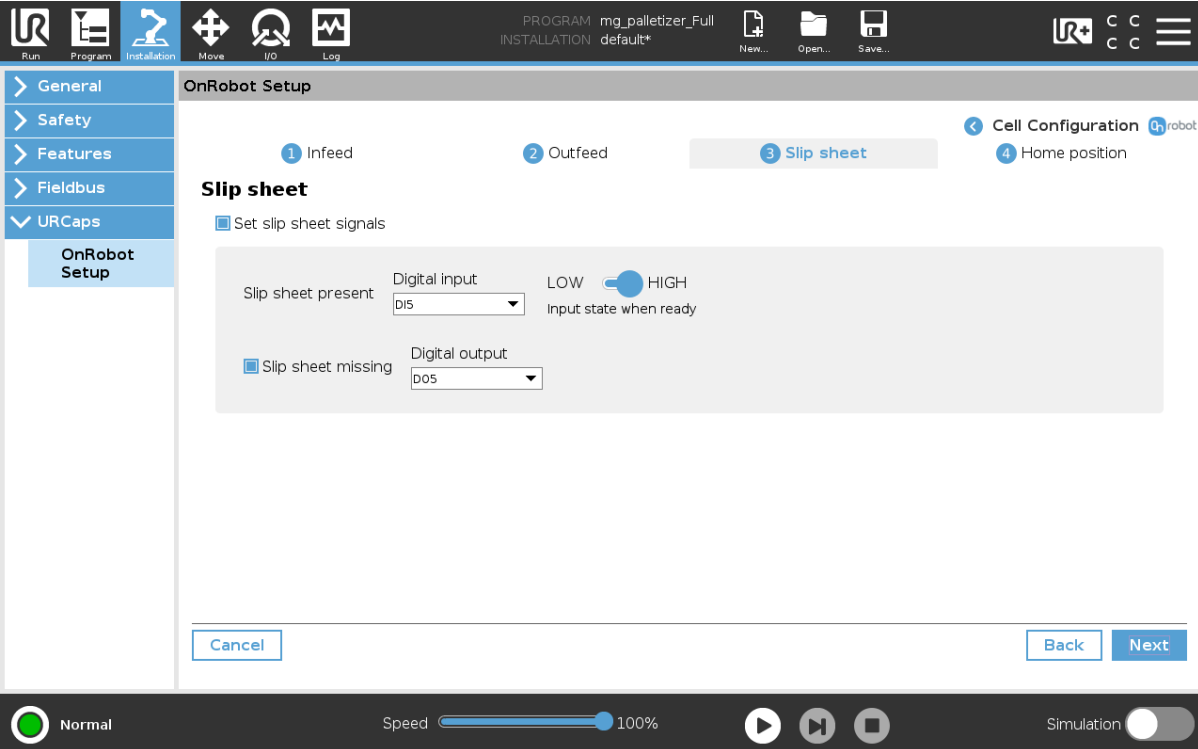
Press **Next** to continue with the Slip Sheet Setup.

Slip sheet

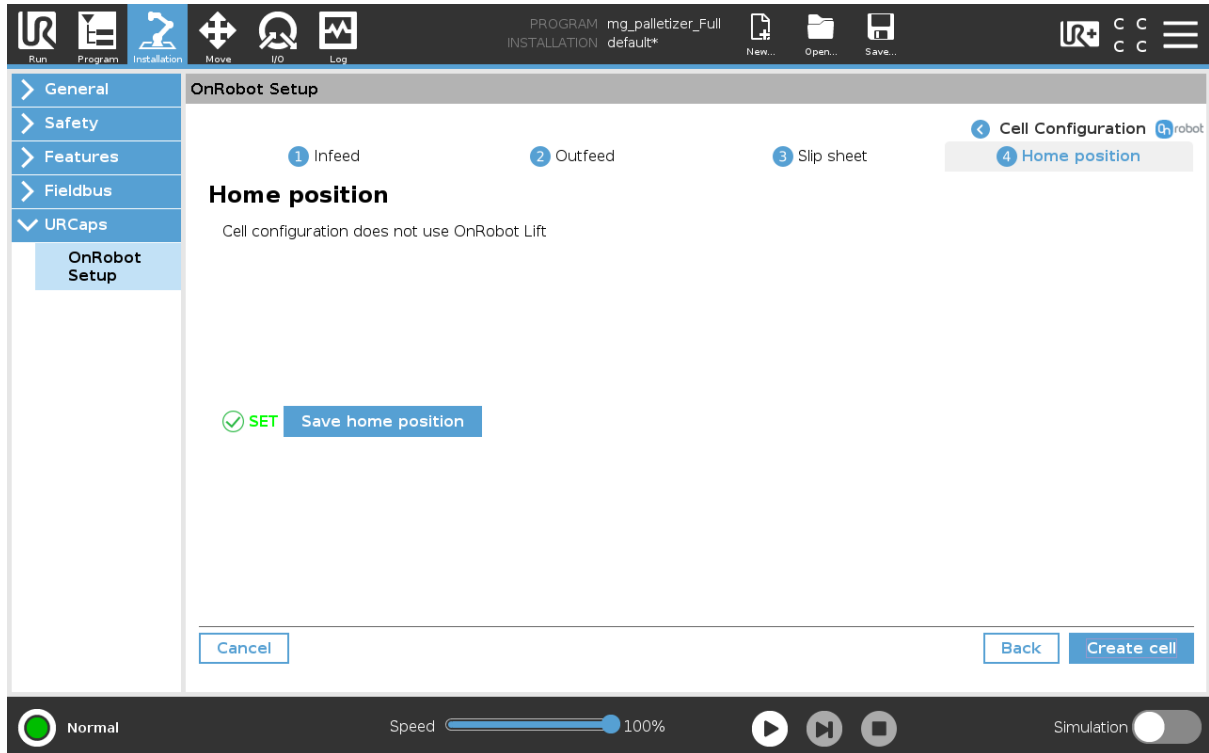


NOTE:

The slip sheet configuration is optional but if one of the palletizing applications will use the slip sheets, the signal for the **Slip sheet present** must be set. If an other palletizing application will not use the slip sheets, it will ignore this signal.



- **Slip sheet present:** This signal is used to communicate to the system that a slip sheet is present in the slip sheet pick position. This is identified by a sensor. The sensor needs to be installed so it will detect the slip sheet only if it is placed in the right position. Connect the **Slip sheet present** sensor to one of the Compute Box' digital inputs and select the **Digital input** from the dropdown menu. Then select if the input state is **High** or **Low** when the slip sheet is present.
- **Slip sheet missing:** This optional signal allows the system to communicate that a slip sheet is missing. The signal can be used to inform the operator by light, sound or other that a slip sheet can be placed on the slip sheet feeder position.



Home position

Home position is the starting position for the robot program. In addition, the robot will move to home position every time a pallet is completed. It is recommended to choose a home position that the robot can reach easily, and it results in short moves from infeed and outfeed positions.

To set the robot **Home position**, press **Save home position**, move the robot to the right position and set the position. This position will be common for all applications.

Press **Create cell** to complete the cell configuration.

7. Operation

**NOTE:**

It is assumed that the Installation has finished successfully. If not, first do the installation steps in the previous section.

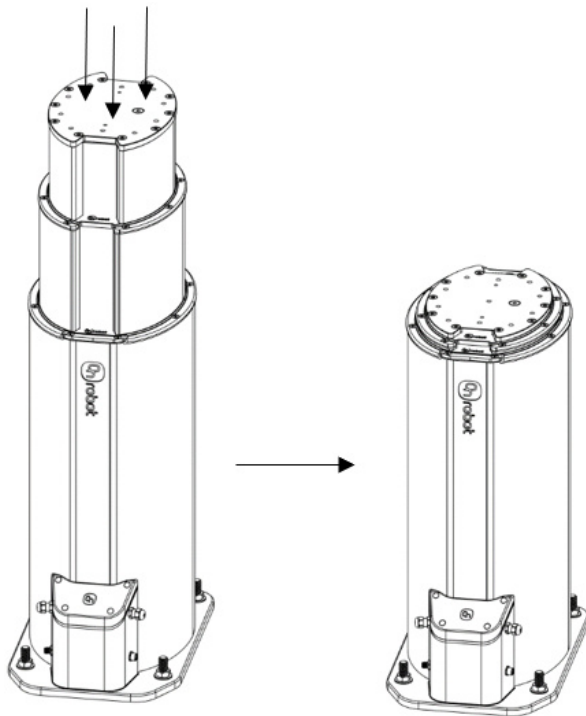
7.1. Initializing the Lift100

After the Lift100 has been mounted, it needs to be initialized before it can be operated.

**WARNING:**

Make sure to connect the safety interface described in the [4.8.7. Lift100 Safety Interface](#) section before powering up the power supply.

The Lift100 must be moved to the lowest possible position, if it is not already there. To initialize the Lift100, run the initialization command.



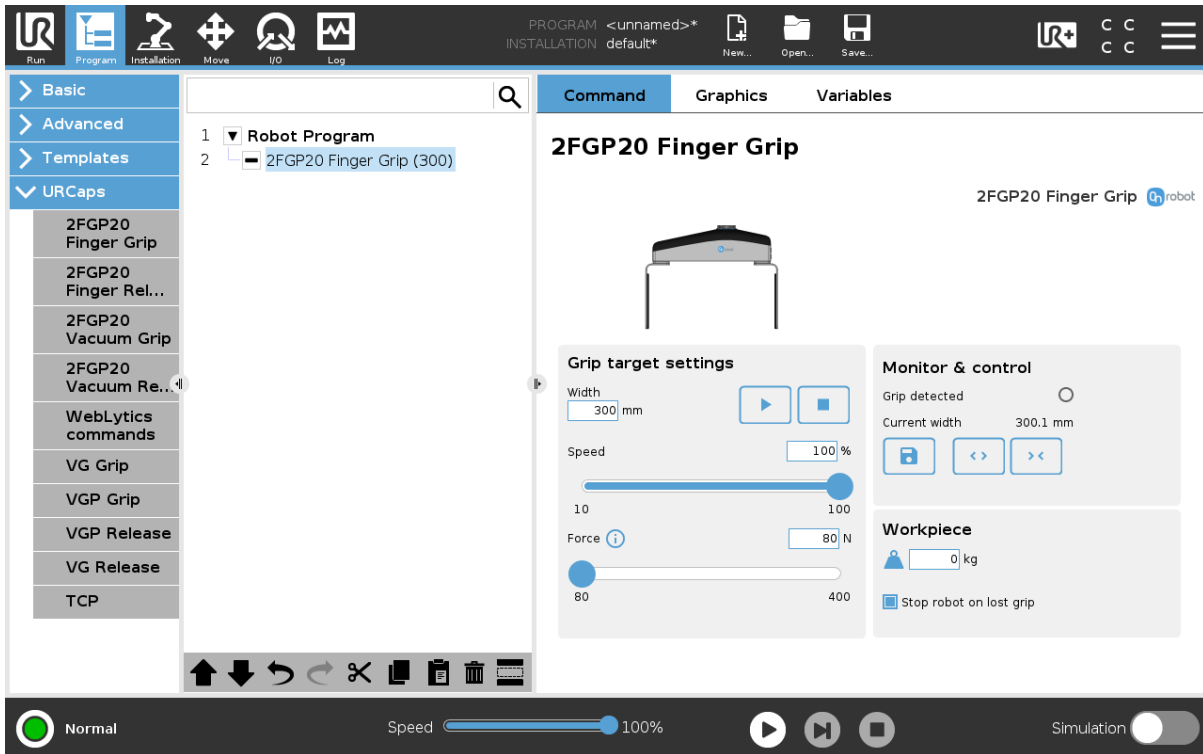
7.2. URCap Commands

URCap commands provide an easy way to program an application.

7.2.1. 2FGP20

7.2.1.1. 2FGP20 Finger Grip

When the 2FGP20 Finger Grip command is executed, the gripper tries to reach the specified target parameters (**Width**, **Force**, and **Speed**). The different functions are explained below.



Grip target settings

Width: Sets the target gripping width. The width can be set by using the Save as Target button (recommended) or by typing it manually.

Speed: Sets the target gripping speed.

Robot Type	Speed Range	Speed Resolution
eSeries robots or CB3 robots that are connected to a Compute Box	10-100%	1%
CB3 robots that are connected to the tool connector	10-100%	10%

Force: Sets the target gripping force.

Robot Type	Force Range	Force Resolution
eSeries robots or CB3 robots that are connected to a Compute Box	80-400 N	1 N
CB3 robots that are connected to the tool connector	80-130 N	5 N



Executes the command.

Monitor & Control

Grip detected: The gripper detects that a workpiece is gripped with the fingers.

Current width: Shows the current width value.



NOTE:

When the tool is connected to a CB3 robot via the tool connector, the precision of the displayed **Current width** value is valid up to 1 mm resolution.



Will set the **Target width** = **Current width** – 5 mm, when the workpiece is gripped and grip detection occurs.



Buttons to open and close the gripper.



NOTE:

To enhance **Width** precision, the **Target force** is not applied when you use the buttons under **Current width**.

Workpiece

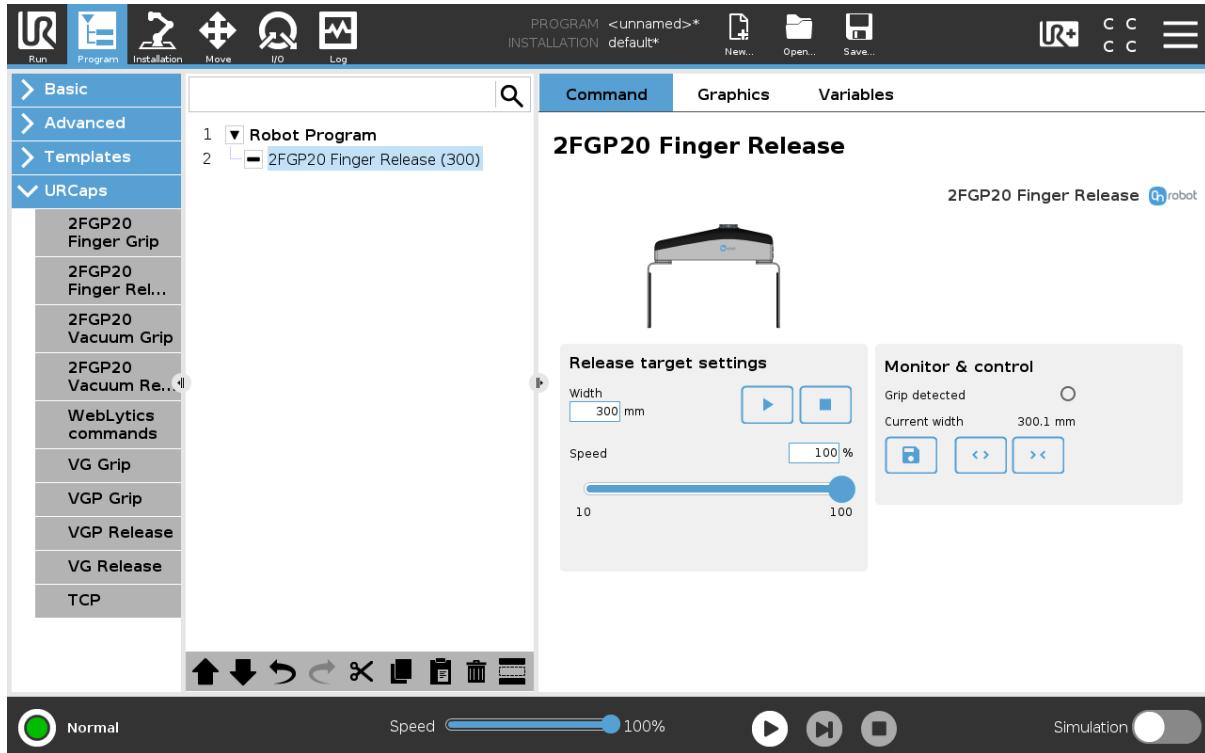


Sets the workpiece weight. Then the URcap software calculates the resulting payload mass considering the gripper, the Quick Changer, and the workpiece mass.


Stop robot on lost grip: When this option is selected, the vacuum is monitored continuously. If the vacuum disappears unexpectedly, the robot will stop the movement and displays a popup window.

7.2.1.2. 2FGP20 Finger Release


When the 2FGP20 `Finger Release` command is executed, the gripper tries to reach the specified target parameters (**Width** and **Speed**). The different functions are explained below.



Release target settings

Width: Sets the target release width. The width can be set by using the Save as Target  button (recommended) or by typing it manually.

Speed: Sets the target release speed.

 Executes the command.

Monitor & Control

Grip detected: The gripper detects that a workpiece is gripped with the fingers.

Current width: The number shows the current width value.



NOTE:

When the tool is connected to a CB3 robot via the tool connector, the precision of the displayed **Current width** value is valid up to 1 mm resolution.



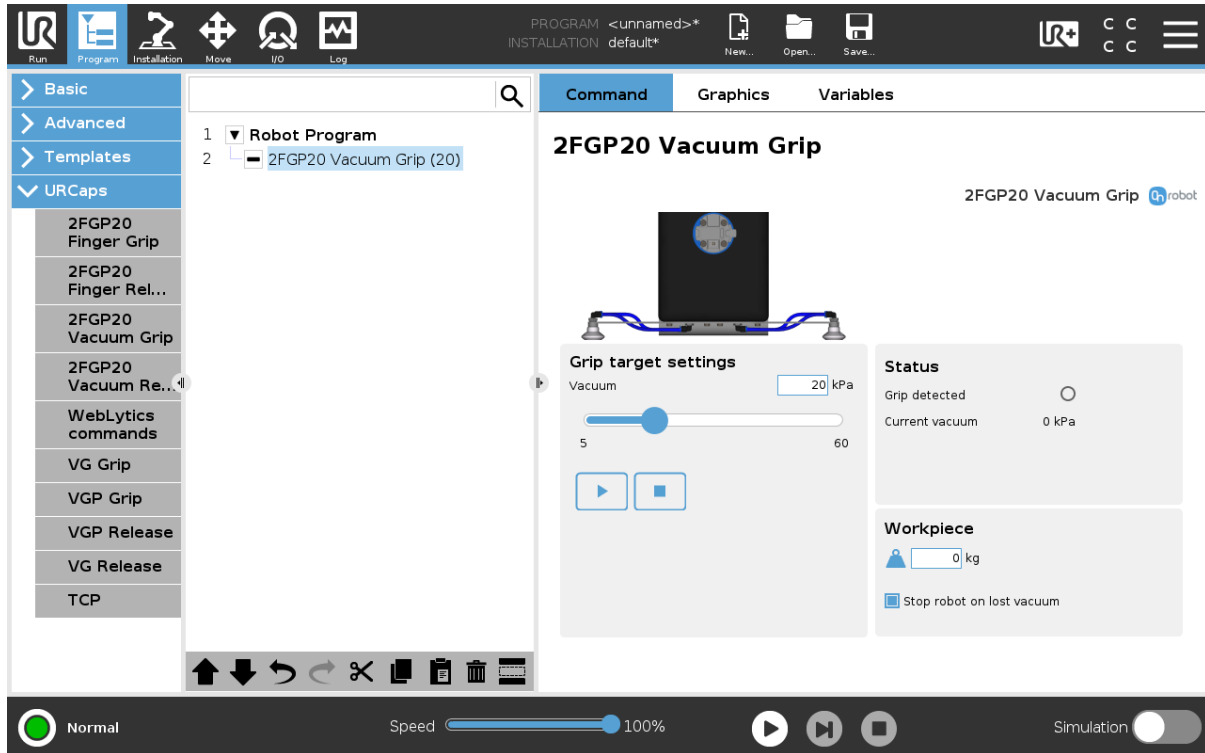
Will set the **Current width** as **Target width**.



Buttons to open and close the gripper.

7.2.1.3. 2FGP20 Vacuum Grip

The `2FGP20 Vacuum Grip` command is used to activate the pump and generate vacuum to grip a workpiece.



Grip target settings

Vacuum: Use the slider to set the target vacuum level. The default value is 20 kPa. The higher the achieved vacuum (from 5 kPa up to 60 kPa), the more the lifting power is. This is dependent of the surface of the workpiece, see [Technical Sheets](#) section for more guidance on vacuum settings.



Executes the command.



Releases the vacuum.



NOTE:

Setting a lower vacuum gives a faster grip with less wear on the vacuum cups. It also reduces the risk of leaving suction marks on delicate workpieces.


It can take a few seconds when pressing **Play** or **Test** before the robot program starts.

Status

Grip detected: The gripper detects that a workpiece is gripped with the vacuum cups.

Current vacuum: Displays the current vacuum level.

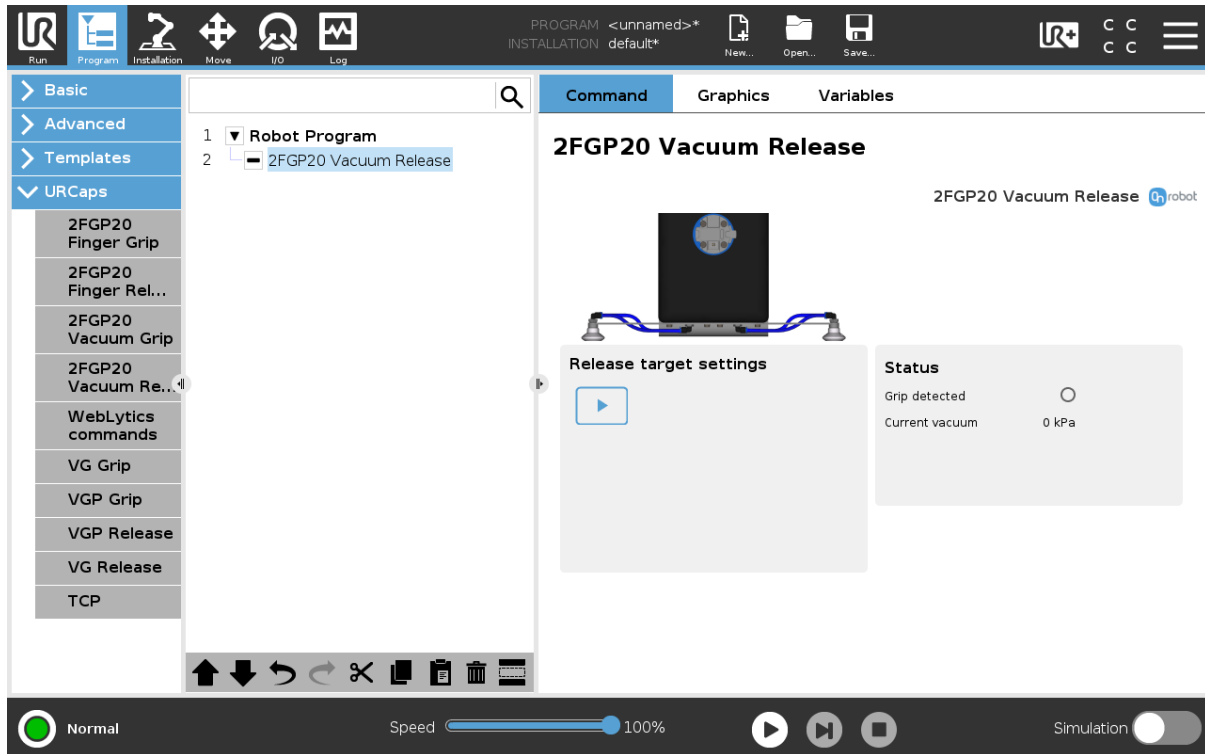
Workpiece

 Enter the workpiece weight. Then the URCap software calculates the resulting payload mass considering the gripper, the Quick Changer, and the workpiece mass.

Stop robot on lost vacuum: When this option is selected, the vacuum is monitored continuously. If the vacuum disappears unexpectedly, the robot will stop the movement and displays a popup window.

7.2.1.4. 2FGP20 Vacuum Release

The `2FGP20 Vacuum Release` command is used to release the grip of the workpiece by removing the vacuum.



Release target settings



Executes the command.

Status

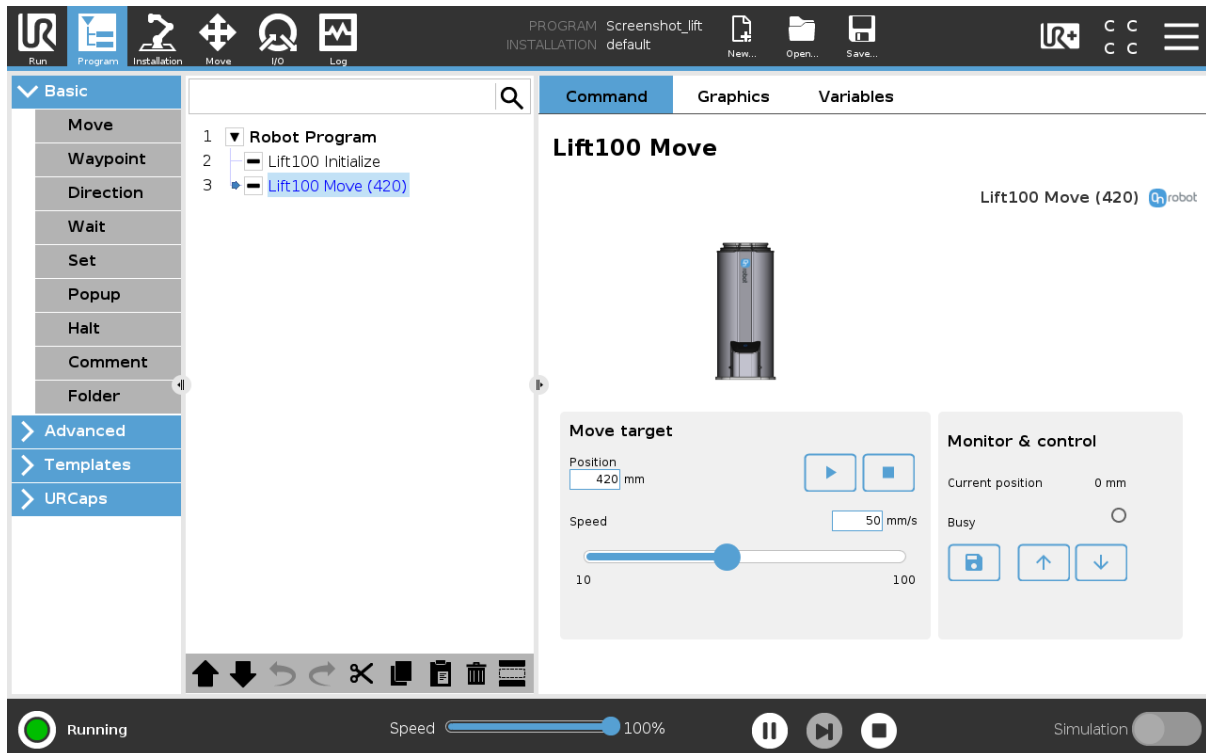
Grip detected: The gripper detects that a workpiece is gripped with the vacuum cups.

Current vacuum: Displays the current vacuum level.


7.2.2. Lift100

7.2.2.1. Lift100 Move


When the `Lift100 Move` command is executed, the Lift100 will try to reach the specified target **Position** by moving at the target **Speed**. The different functions are explained below.



Move target

Position: Sets the target position. The position can be set by using the Save as Target  button (recommended) or by typing it manually.

Speed: Sets the target moving speed.



 When pressed, the Lift100 will act as if the command is executed.

 Stops the movement of the Lift100.

Monitor & control

Current position: Shows the current position of the Lift100.

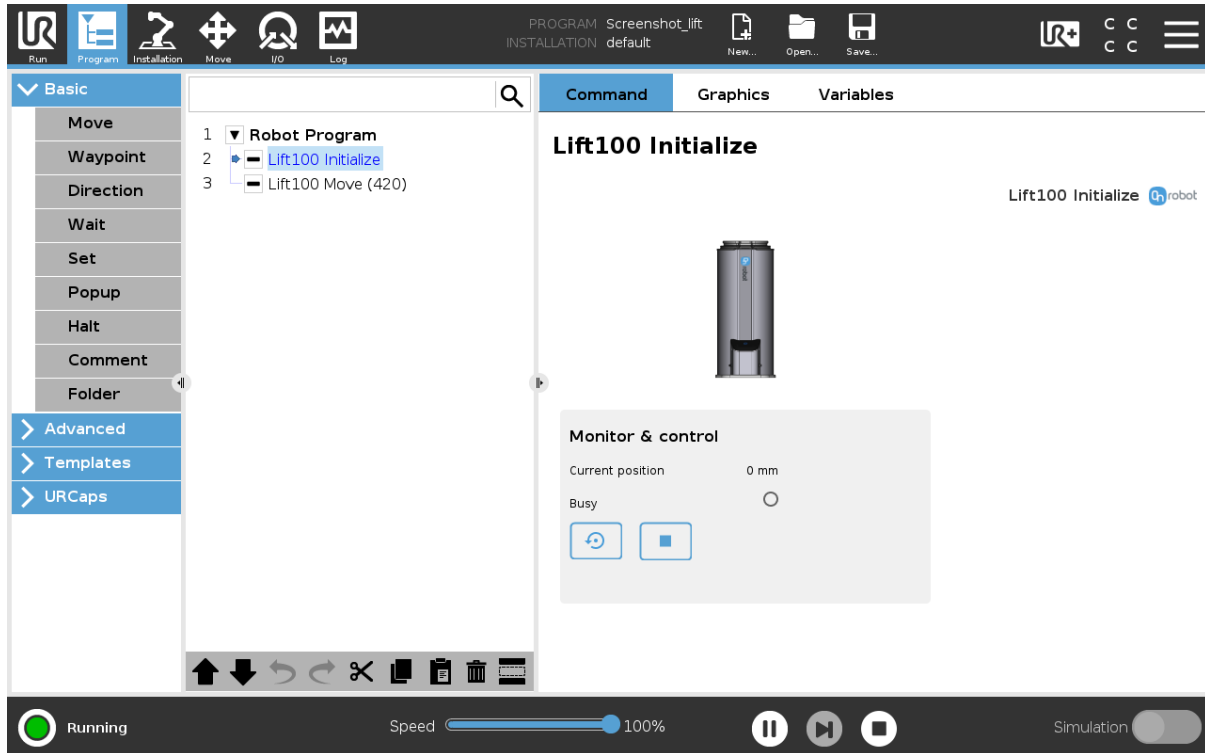
Busy: Shows whether the device is performing an operation.

  These are move up and down hold-to-run buttons.

 When pressed, the Current position will be saved as target Position.

7.2.2.2. Lift100 Initialize

When the `Lift100 Initialize` command is executed, the initialization sequence will start and the Lift100 will move all the way down. The different functions are explained below.



Monitor & Control

Current position: Shows the current position of the Lift100.

Busy: Shows whether the device is performing an operation.



Press this button to initialize the Lift100. The initialization sequence will start and the Lift100 will move all the way down.





Press this button to stop the movement of the Lift100.

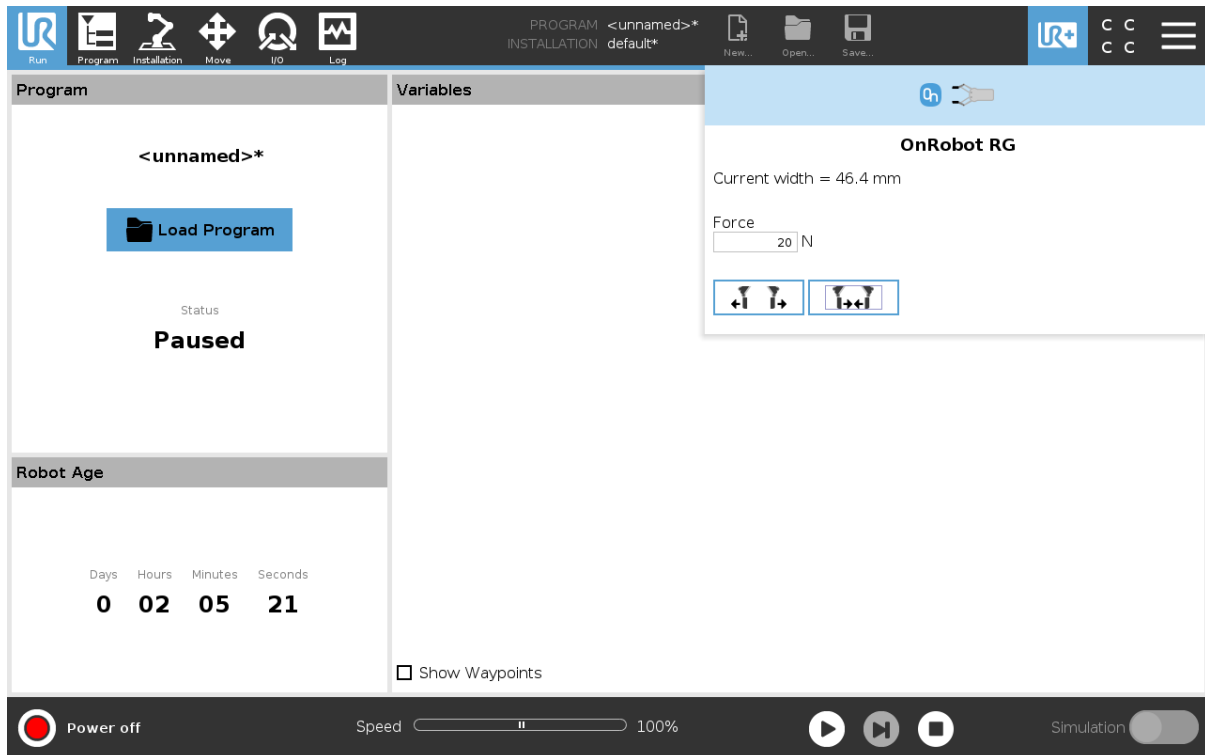
7.3. URCap Toolbar

The Toolbar makes it simple to operate the tools while you are programming or during runtime.


How to Access the Toolbar

The way how the toolbar can be accessed is different on the e-Series and the CB3 UR robots, but the functionality is the same.

To open up the toolbar in the e-Series, press on the UR+ icon  on the top right side. Then press on the OnRobot icon .



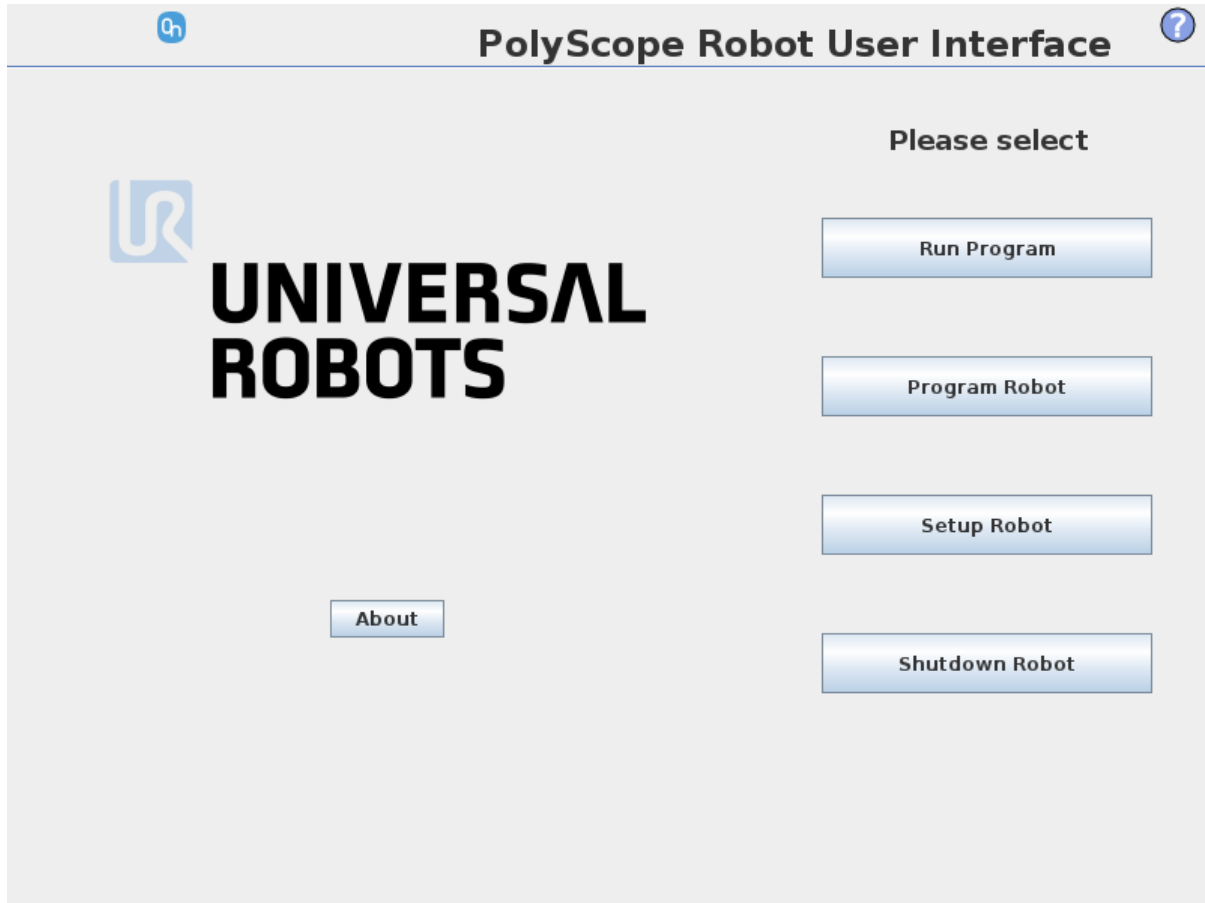
Each OnRobot End of Arm Tooling has its own functionality and that is explained in the sections below.


To open up the toolbar in the CB3, press on the OnRobot icon  on the top left side. The icon might take around 20 seconds to appear after robot power up.

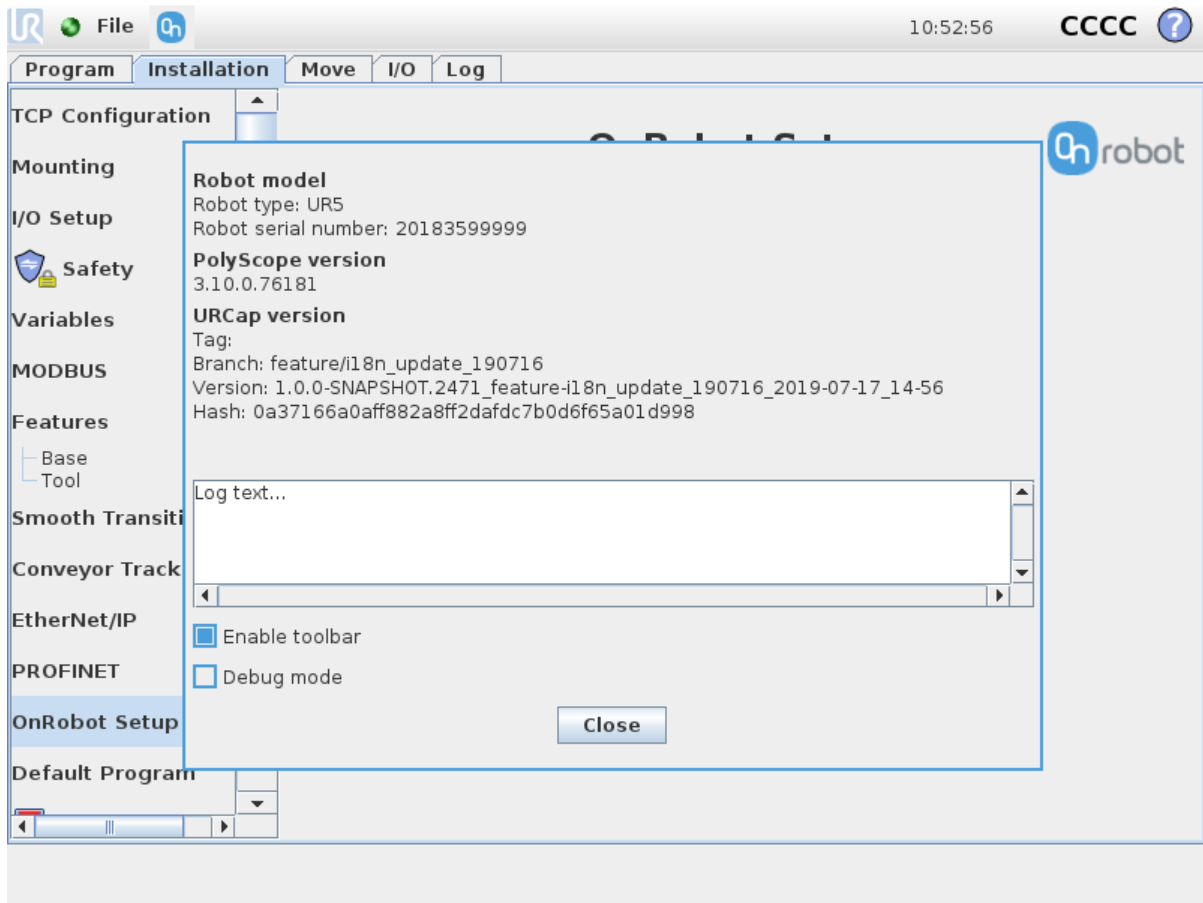


NOTE:

All toolbars are disabled while any robot program is running. Some toolbars are also disabled and cannot be used while the robot is not initialized.



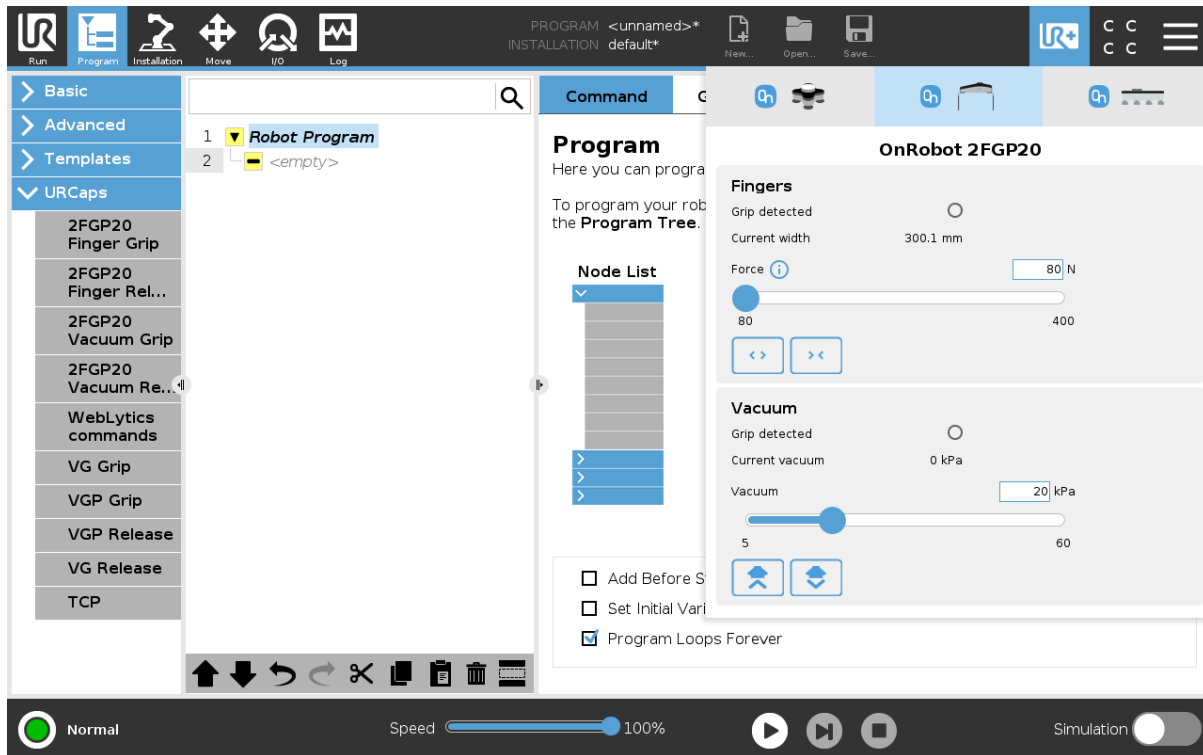
To enable/disable the toolbar, press on the OnRobot logo  on the top right corner and check/uncheck the **Enable toolbar** checkbox.



7.3.1. 2FGP20

To open up the toolbar, follow the instructions under [How to Access the Toolbar](#) in the [7.3. URCap Toolbar](#) section.

The toolbar for the 2FGP20 gripper is shown below.



Fingers

Grip detected: The gripper detects that a workpiece is gripped with the fingers.

Current width: Shows the current width value.



NOTE:

When the tool is connected to a CB3 robot via the tool connector, the precision of the displayed **Current width** value is valid up to 1 mm resolution.

Force: Sets the target gripping force.



Buttons to open or close the gripper.

Vacuum

Grip detected: The gripper detects that a workpiece is gripped with the vacuum cups.

Current vacuum: Displays the current vacuum level.

Vacuum: Sets the target vacuum.



(Grip button): when pressed, the pump will start to generate vacuum at the selected level on the selected channel(s).

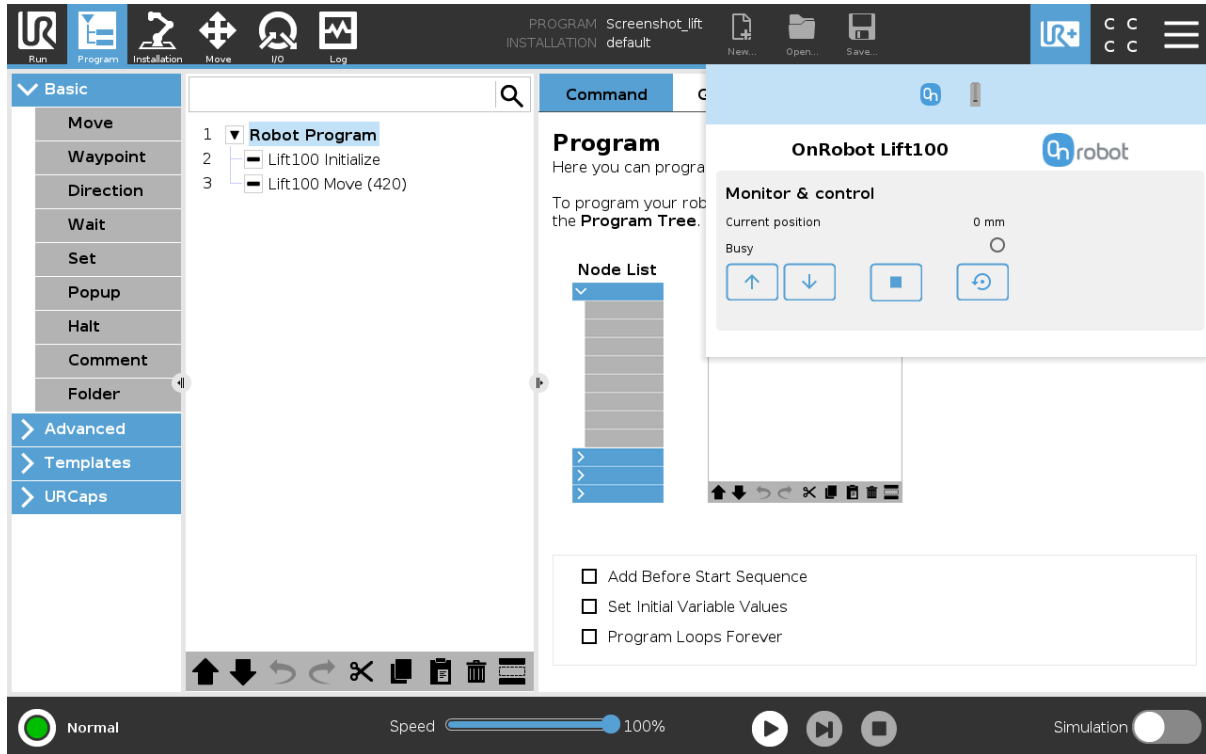


(Release button): when pressed, the test-grip will terminate and release any workpieces that may be held by the selected channel.

7.3.2. Lift100

To open up the toolbar, follow the instructions under [How to Access the Toolbar](#) in the [7.3. URCap Toolbar](#) section.



The toolbar for the Lift100 is shown below.





Monitor & control

Current position: Shows the current position of the Lift100.

Busy: Shows whether the device is performing an operation.

  These are move up and down hold-to-run buttons.

 Press this button to stop the movement of the Lift100.

 Press this button to initialize the Lift100. The initialization sequence will start and the Lift100 will move all the way down.

7.4. URScript Commands

URScript commands can be used alongside other scripts.

7.4.1. 2FGP20

When the OnRobot URCap is enabled, the following 2FGP script functions are available:

- `fgp_grip(width, force, speed)`: Commands the 2FGP20 fingers to move to a specific width with a specific force and speed.
width: The width that the gripper will open or close to. [mm]

`force`: The force that the gripper will try to reach. [N]

`speed`: The speed that the gripper will try to reach. [%]

- `fgp_release(width, speed)`: Commands the 2FGP20 fingers to move to a specific width with a specific speed.

`width`: The width that the gripper will open or close to. [mm]

`speed`: The speed that the gripper will try to reach. [%]

- `fgp_vg_grip(vacuum=20)`: Commands the 2FGP20 to turn on the vacuum to grip the workpiece.

`vacuum`: Sets the target vacuum level. The value range is 5 – 60%.

- `fgp_vg_release()`: Commands the 2FGP20 to turn off the vacuum to release the workpiece.

7.4.2. Lift100

When the OnRobot URCap is enabled, the following Lift100 script functions are available:

```
lift_move(position, speed)
```

`position`: Position of the Lift100 range [mm]. The value range is 0-900 mm.

`speed`: The speed that the Lift100 will try to reach [mm/s]. The value range is 10-100 mm/s.

```
lift_initialize()
```

The initialization sequence will start and the Lift100 will move all the way down.

7.5. Feedback Variables

7.5.1. 2FGP20

Feedback Variable	Unit	Description
<code>fgp_Busy</code>	True/False	Whether the 2FGP20 is busy or not.
<code>fgp_Grip_Detected</code>	True/False	The gripper detects that a workpiece is gripped with the fingers.
<code>fgp_vg_Release_Status</code>	Int	0 - Not released 1 - Release ok 2 - Release failed
<code>fgp_vg_Status</code>	Int	0 - Not gripped 1 - Grip detected 2 - Required grip timeout 3 - Grip lost

Feedback Variable	Unit	Description
fgp_vg_Vacuum	%Vacuum	Returns the %Vacuum achieved. The value range is 0 - 60%.
fgp_Width_int	[mm]	Width between the inner side of the fingers of the gripper.
on_return		The return value of the OnRobot commands.

7.5.2. Lift100

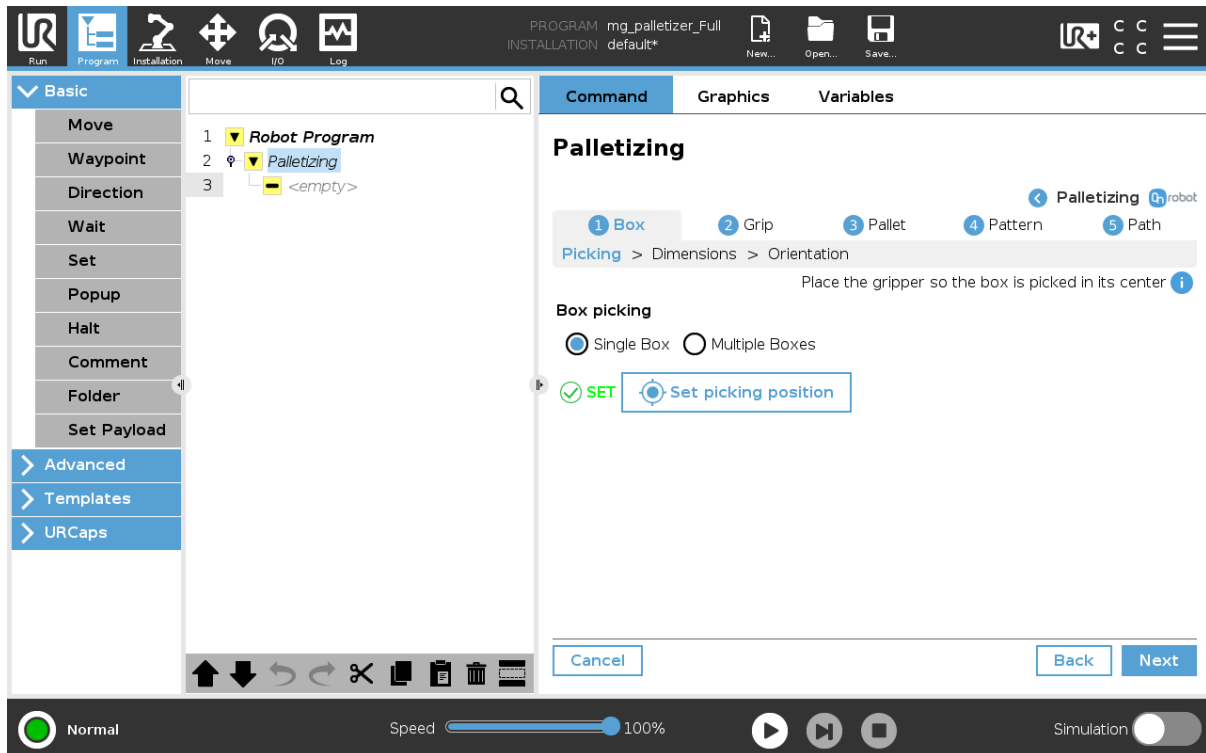
Feedback Variable	Unit	Description
lift_busy	True/False	Whether the Lift100 is busy or not.
lift_error		0 - No error 1 - eStop 2 - Error moving or cannot move
lift_movingDown	True/False	True if the Lift100 is moving down.
lift_movingUp	True/False	True if the Lift100 is moving up.
lift_position	[mm]	The current position of the Lift100. The value range is 0 - 900 mm.
lift_speed	[mm/s]	The speed the Lift100 is moving with. The value range is 10 - 100 mm/s.
on_return		The return value of the OnRobot commands.

7.6. Palletizing

When the `Palletizing` command is executed, palletizing applications can be created and managed.

Press **Create new** to create a palletizing application.

7.6.1. Box Setup



Box picking



NOTE:

When setting the picking position, make sure that the gripper is placed so the box is picked in its center.



WARNING:

An inaccurate picking position will impact how the boxes are placed on the pallet.

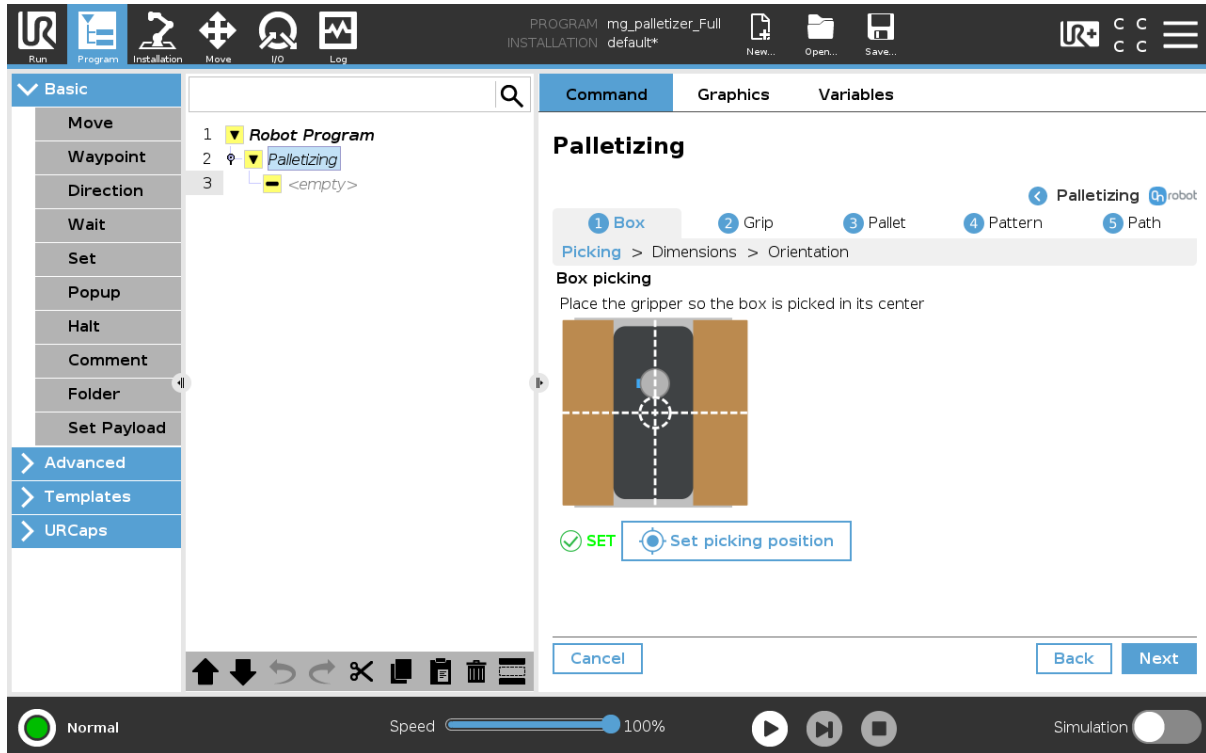


NOTE:

If the infeed is wider than the box, a waypoint between the infeed and the pallet, and a waypoint between the pallet and the infeed is needed to avoid any collisions of the box/robot links with the infeed. The waypoint can be added in the last step after the path is generated. For more information go to the [7.6.5. Path Setup](#) section.

Select the picking method. **Multiple boxes** will only be an option if a second sensor was set during the cell configuration.

Press **Next** to move forward.



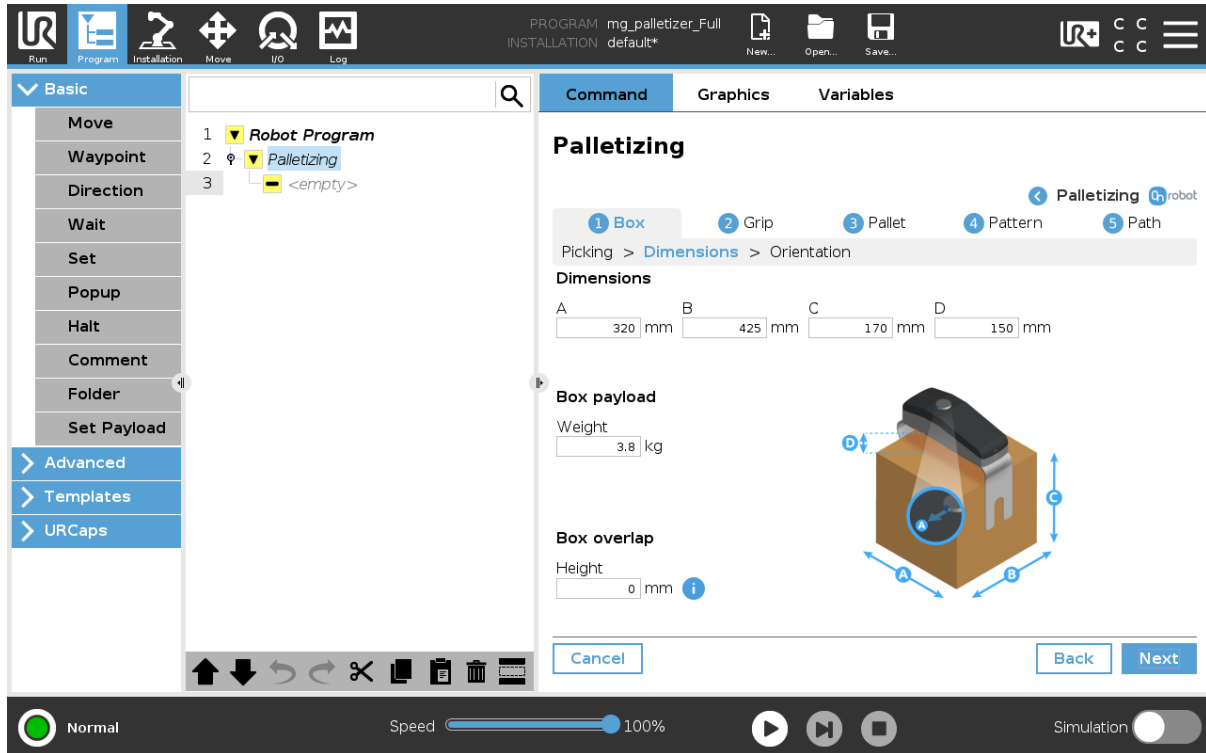
To set the picking position, press **Set picking position**, go to the robot interface, move the robot to the right position and execute the robot program to send the position to the OnRobot Palletizing.



NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.

Press **Next** to move forward.



Dimensions

Type the dimensions of the box into the input fields based on the image below the dimensions. Side “A” is the side of the box where the Quick Changer's release button is facing.



NOTE:

The minimum recommended box size is 200 x 200 x 100 mm.

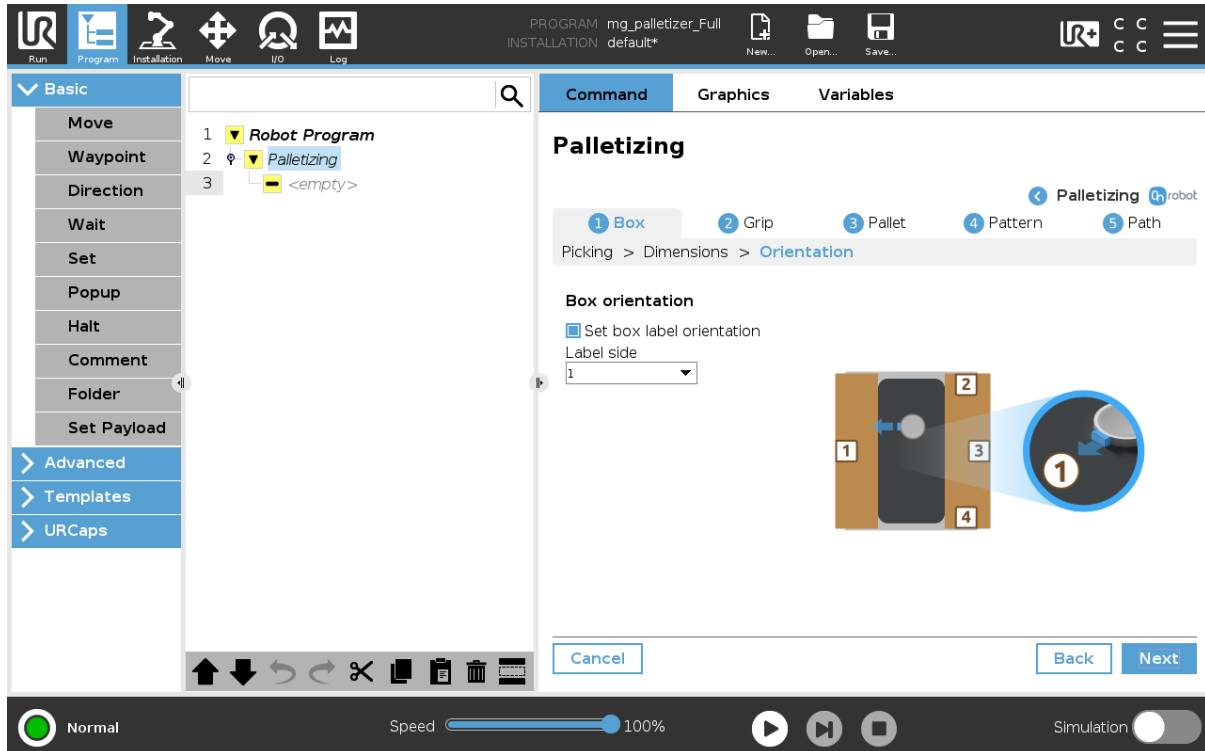
Box payload

Type the weight of the box.

Box overlap

Type the height of the overlapping part of the boxes. The box overlap is used for stackable boxes, such as KLT boxes.

Click **Next** to move forward.



Box orientation

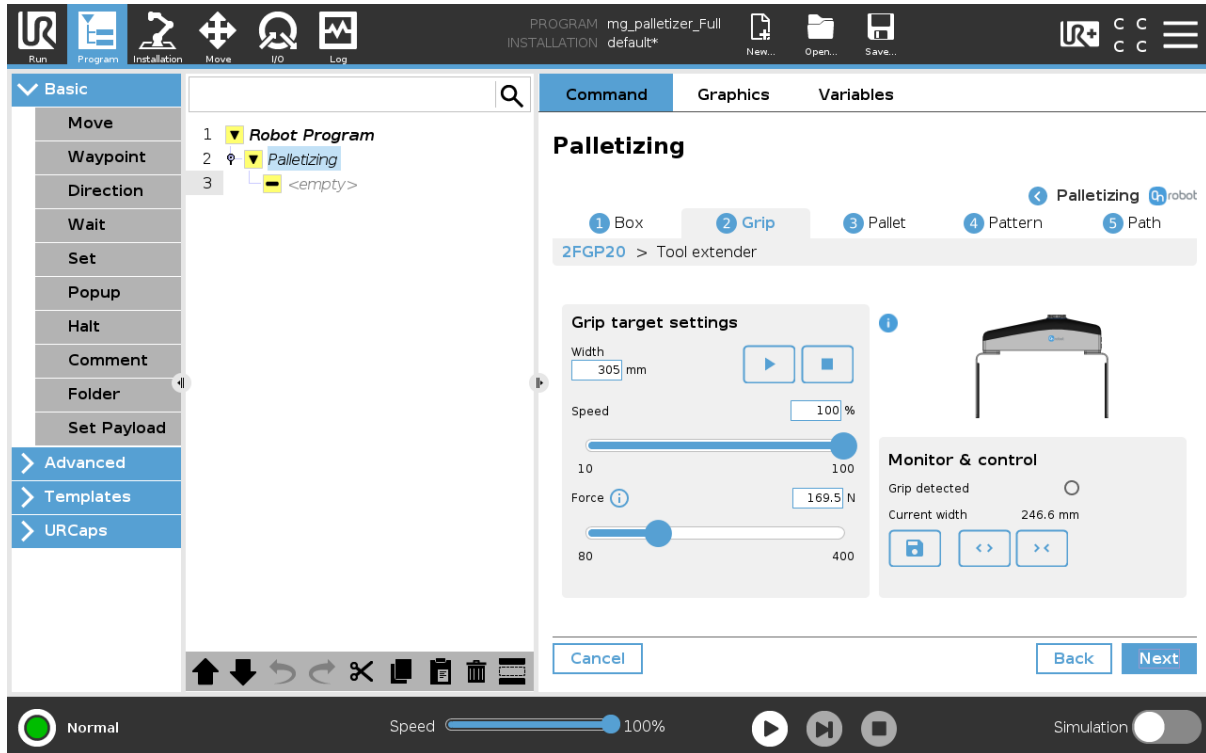
Select **Set box label orientation** if a specific label orientation is necessary. From the dropdown menu, select the **Label side**. Label side “1” is the side of the box where the Quick Changer's release button is facing.

Press **Next** to move forward.

7.6.2. Grip Setup

In this step, the gripper needs to be configured to reliably pick the boxes and move them from the infeed to the outfeed. To achieve this, follow the steps below:

1. Adjust the settings.
2. Press **Execute**.
3. Go to the robot user interface.
4. Move the robot up to ensure that the box is held.
5. If needed, move the robot to the picking position taught in the previous step, press **Open/Release**, adjust the settings and repeat the process.




Grip target settings

Width: Sets the target gripping width. The width can be set by using the **Save** button (recommended) or by typing it manually.

Speed: Sets the target gripping speed.



Force: Sets the target gripping force.

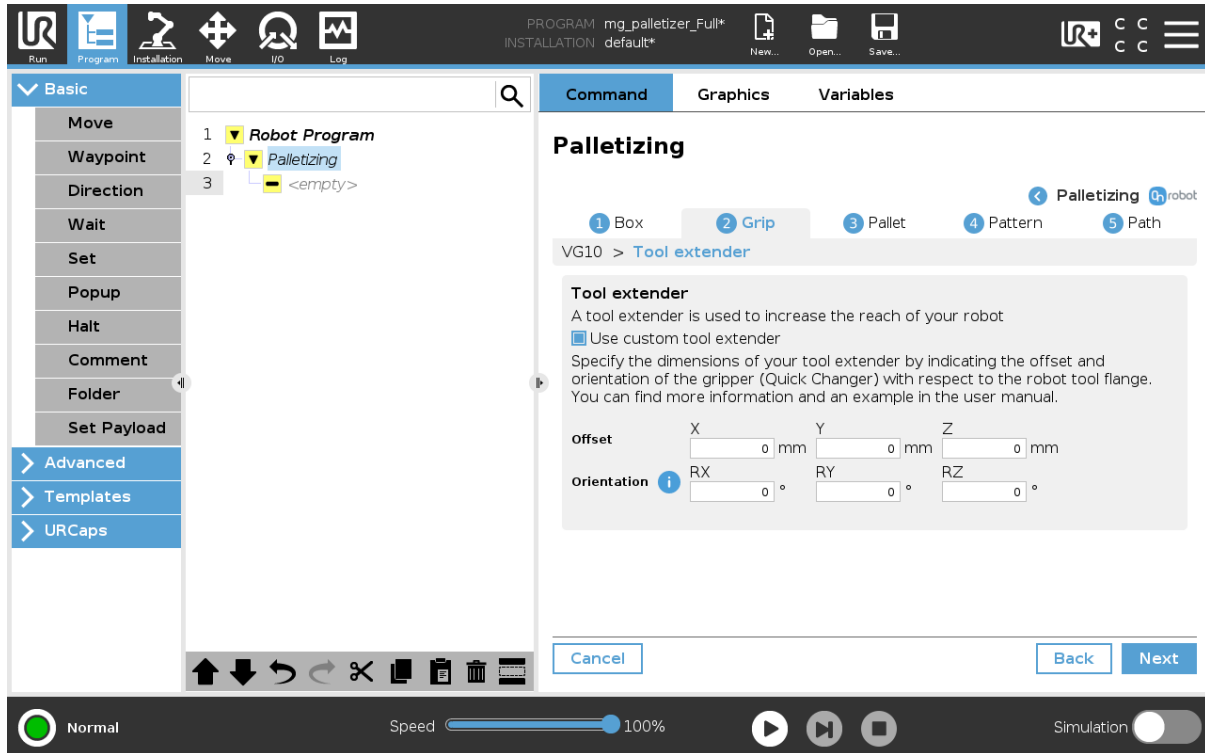
Press  to execute the command with the set values.

Monitor & Control

Grip detected: The gripper detects that a workpiece is gripped.

Current width: Shows the current width value.

  Buttons to open and close the gripper.



After executing the command with the set values make sure to test the grip process by going to the robot interface. Move the robot to ensure that the box is held. If needed, move the robot to the picking position taught in the previous step, press **Open**, adjust the settings and repeat the process.



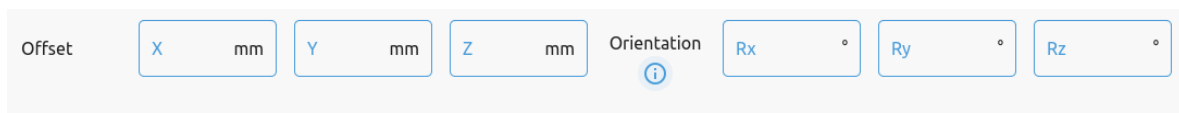
WARNING:

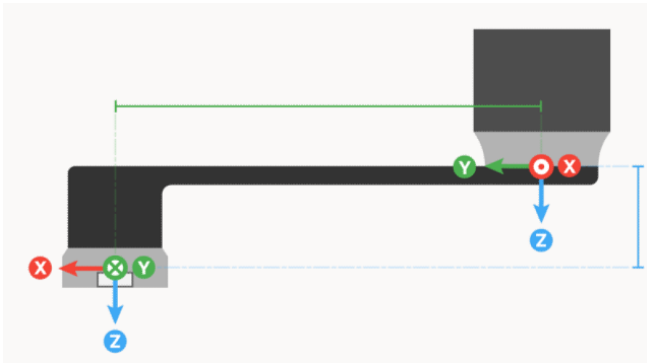
Make sure that the box is gripped before pressing **Next**.

Tool extender

Use custom tool extender: Select to increase the reach of the robot.

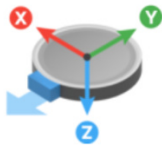
Specify the dimensions of the tool extender by indicating the **Offset** and the **Orientation** of the gripper (Quick Changer) with respect to the robot tool flange. See an example below with the following **Offset** and **Orientation** values:





- ⊗ Going into the page, away from you.
- ⊙ Going out of the page, towards you.

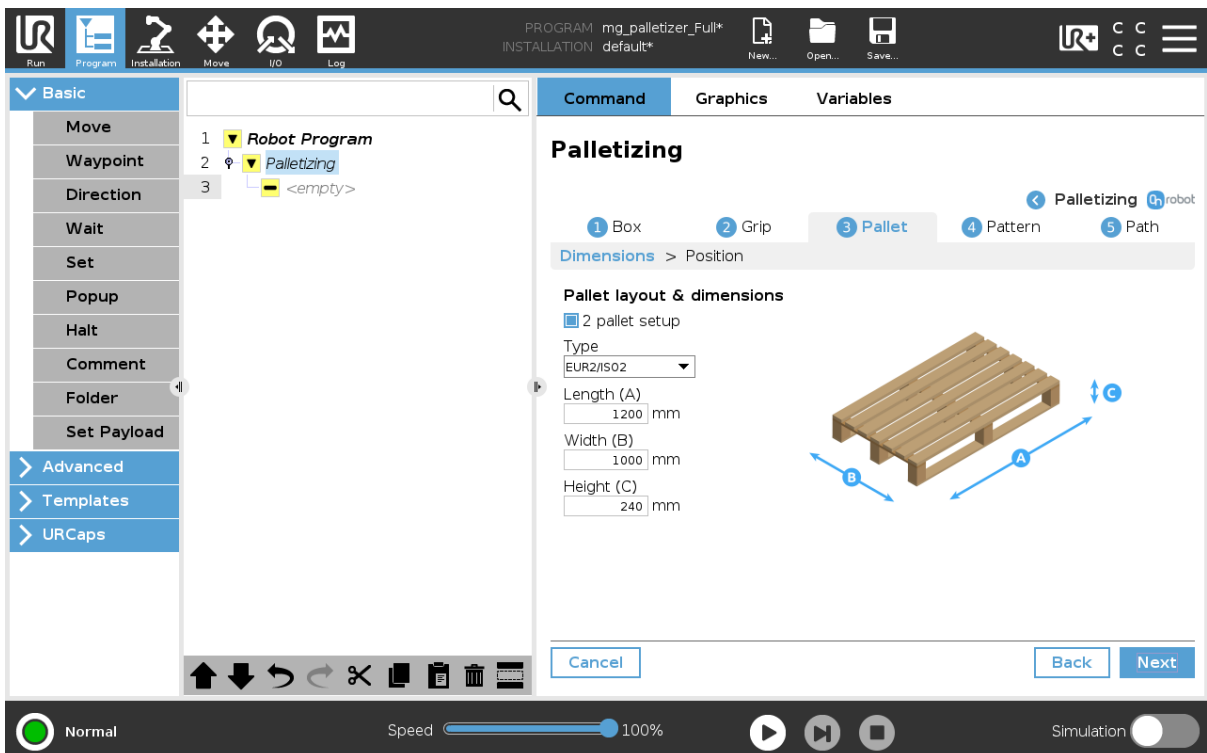
Rotation: Indicate how the gripper axes are oriented with respect to the **robot tool flange**. Use right hand rule (first rotation around Z-axis, then rotated Y-axis, and finally rotated X-axis). The image below shows the positive X, Y, Z axes of the gripper in relation to the Quick Changer.



NOTE:

Jogging the robot in the tool coordinate system will help to figure out the values.

7.6.3. Pallet Setup



Pallet layout & dimensions

2 pallet setup: Select if you want to create and application with two pallets in different positions. This is only possible if two pallets have been configured in the output setup during the cell configuration.

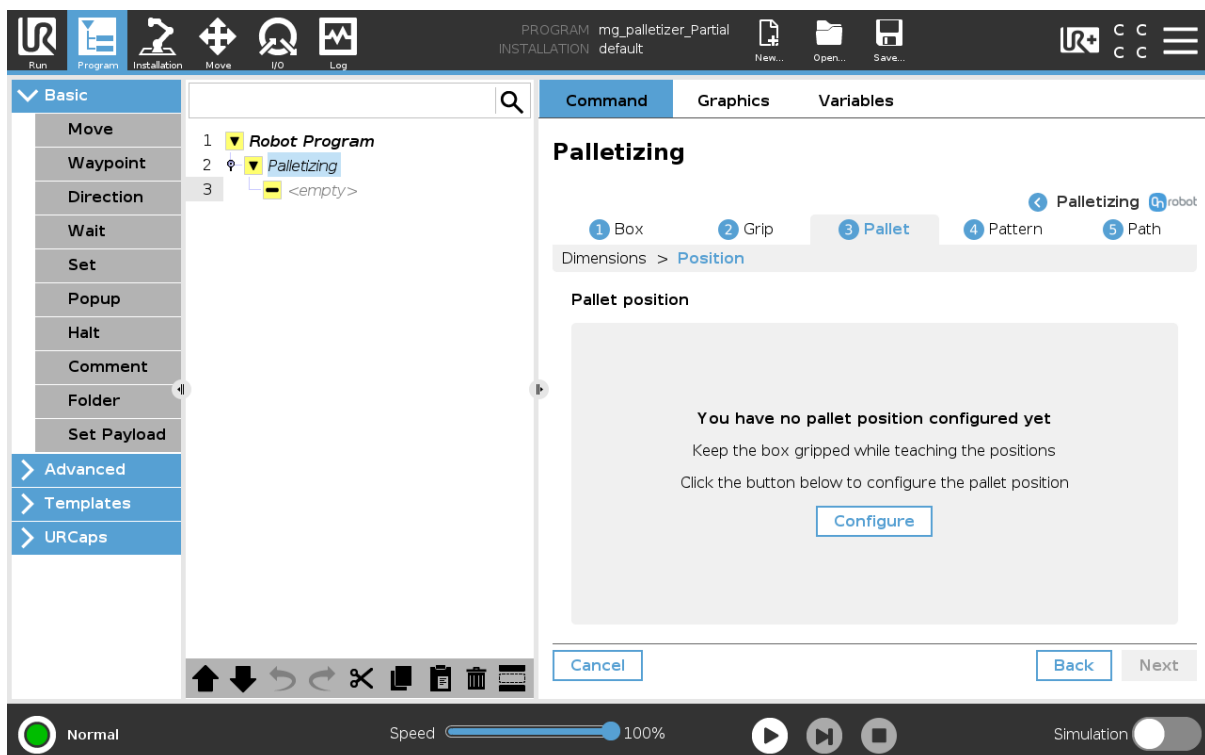


NOTE:

Only two pallets of the same kind can be used.

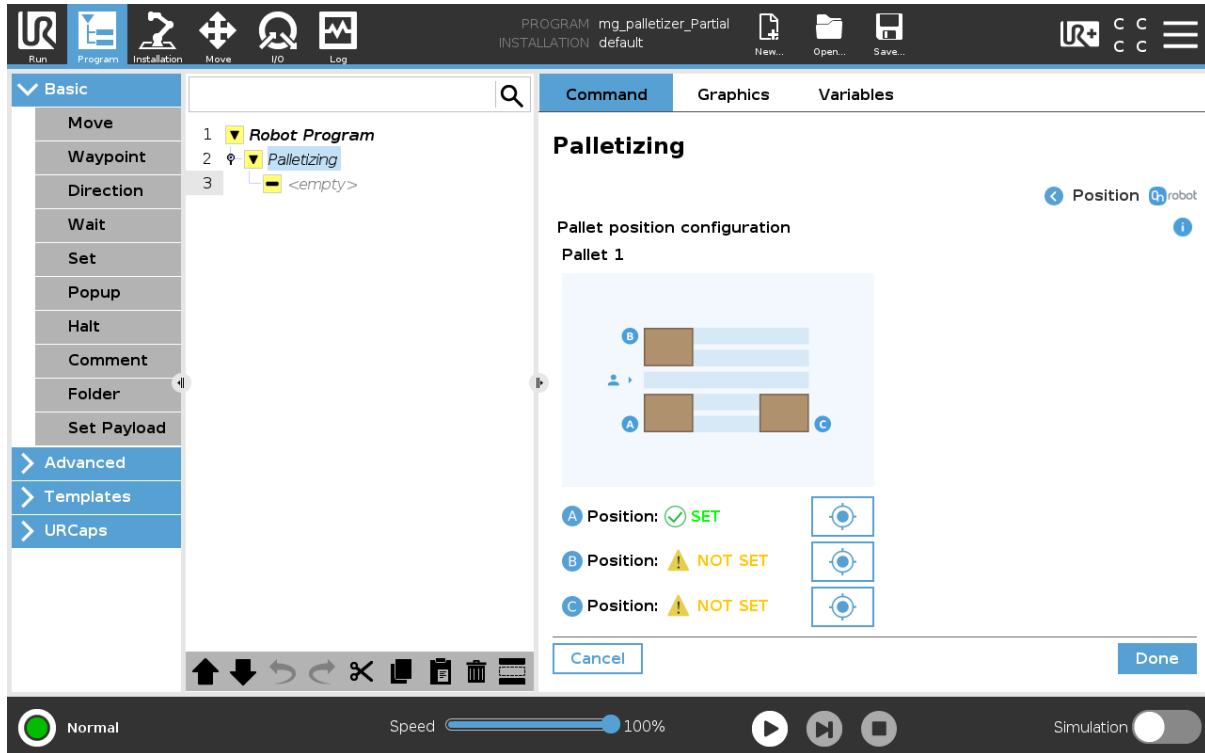
Type: From the dropdown list, select the type of the pallet. If selecting a standard pallet type, the **Length (A)** and **Width (B)** input fields will be automatically filled out. Type the **Height (C)** to the input field.

If selecting a custom pallet type, fill out the input fields with the pallet dimensions.



Pallet position

Press **Configure** to configure the pallet position.



Pallet position configuration



WARNING:

Make sure that the box is gripped before starting the pallet position configuration.

With the box picked, move the robot to the corners of each pallet and teach the points. Do the process in the following order:

1. Start the process from the first corner. The first corner is the bottom right corner when looking at the pallet on one of its short sides.
2. The second corner is along the short side of the pallet, going from the first corner.
3. The third corner is along the long side of the pallet, going from the first corner.



NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.




NOTE:

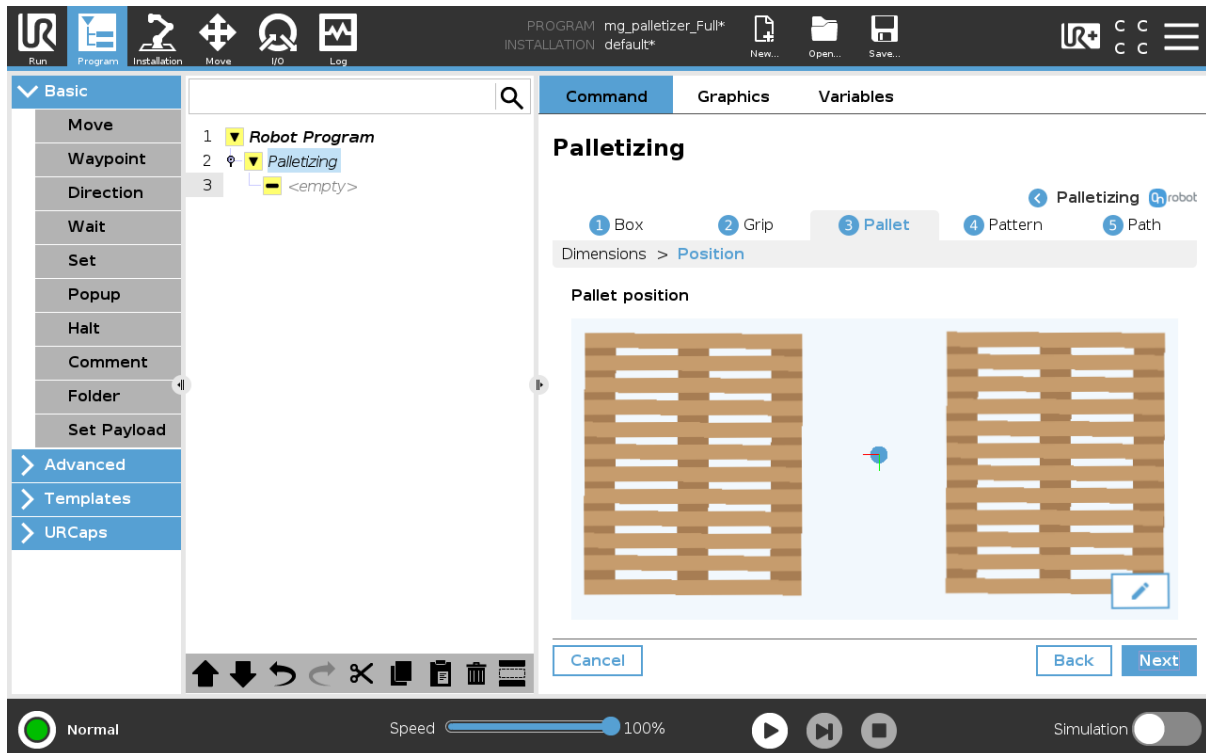
There are two possible ways to configure the pallet positions, looking at either of the short sides of the pallet. Both ways are valid and have no impact to the final result.


**WARNING:**

The box should be oriented so that the longer side of the box is parallel to the length of the pallet.

 **NOT SET** Shows that the certain position is not set. Press the target icon and go to the robot interface to save the position.

After all the positions are set, press **Done**.

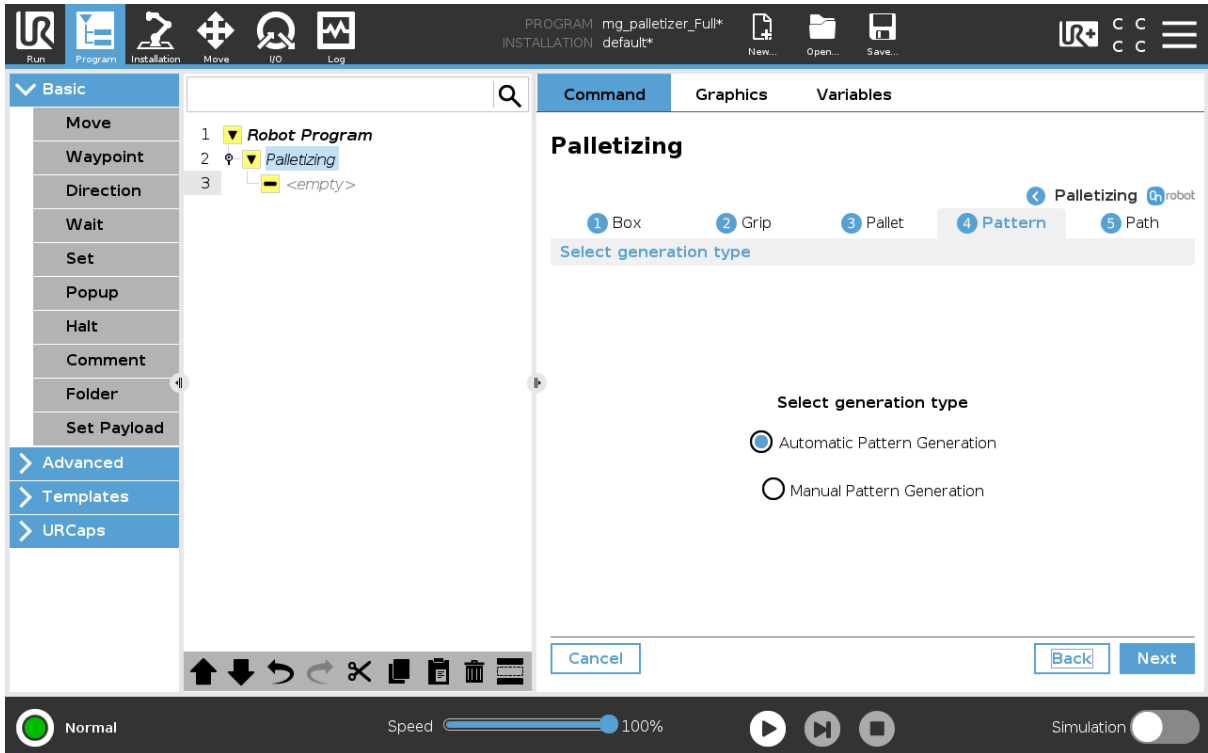


After the pallet position configuration, there will be an overview of the pallet position. Press , to modify the position settings.

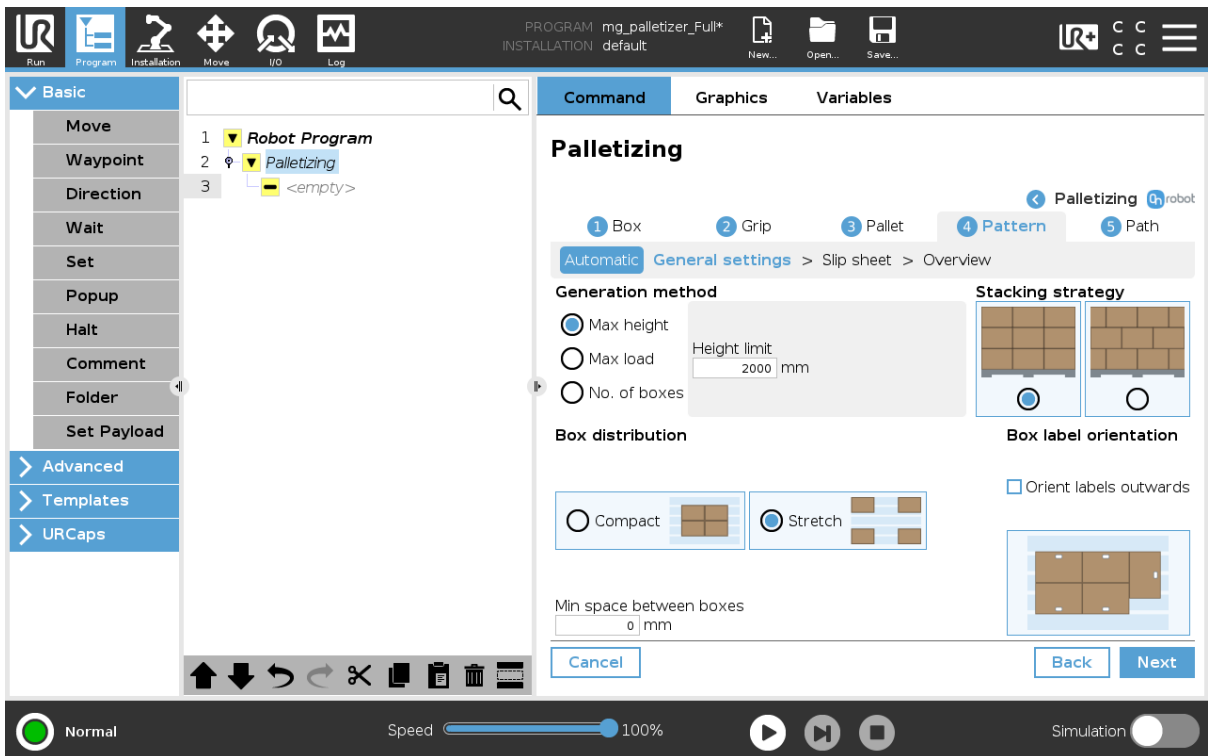
Press **Next**.

7.6.4. Pattern Setup

The pattern setup can be created automatically or manually.



Automatic Pattern Generation



The system will generate the pattern automatically based on the settings.

Automatic pattern generation is recommended since it eases the creation of a pallet layout.

Generation method

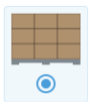
Select which generation method to use. Only the selected method is taken into account.

Max height: Set the desired maximum height of the complete pallet. The maximum height includes the pallet itself.

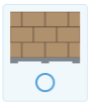
Max load: Set the desired maximum load of the complete pallet. The maximum load does not include the pallet itself.

Number of boxes: Set the desired number of boxes.

Stacking strategy



Column (normal) stacking



Interlock (brick) stacking

Column (normal) stacking has the boxes oriented the same way, and generates a more predictable layout.

Interlock (brick) stacking is used to increase stability.

Box distribution

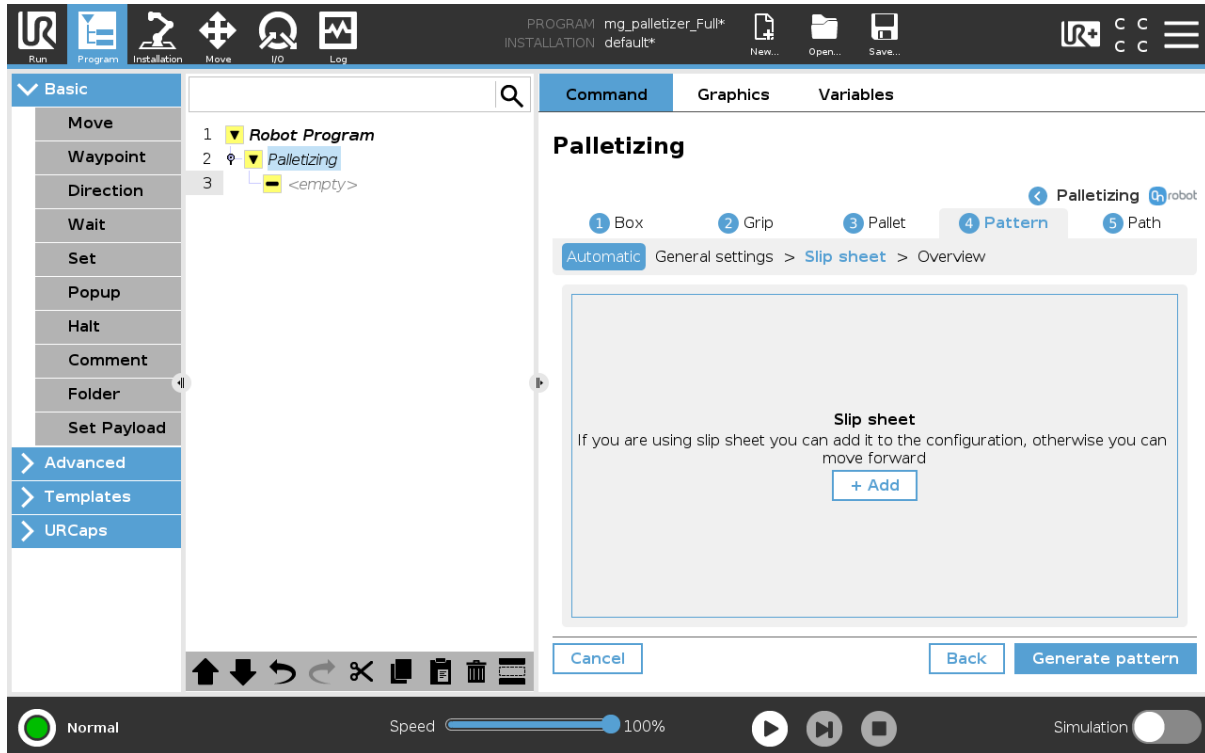
Compact: When selected, the boxes will be placed next to each other in the center of the pallet.

Stretch: When selected, the boxes will be placed around the sides of the pallet.

Min space between boxes: Set the minimum space between the boxes. This is useful if the 2FGP20 gripper is used to ensure that the fingers of the gripper fit between the boxes.

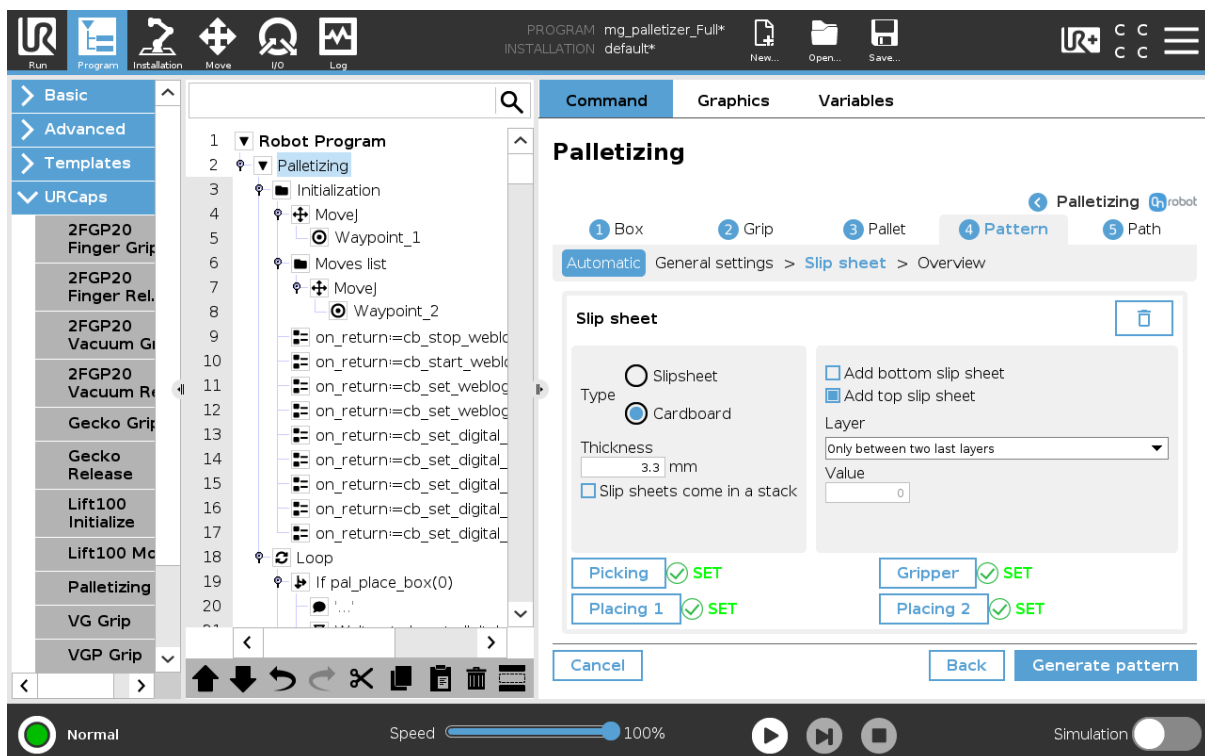
Box label orientation

Orient labels outwards: Select if you want all the labels to face outwards.



Slip sheet

Press **Add** if slip sheets are used.



Type: Select whether a slip sheet or a cardboard is used.

Thickness: Type the thickness of the slip sheet in the input field. If measuring the thickness of the slip sheet is not possible, take a pack of 10 or 20 slip sheets, measure the thickness of the pack and divide by the number of sheets.

Slip sheets come in a stack: Select if the slip sheets come in a stack.

Add bottom slip sheet: When selected, a slip sheet will be added between the pallet and the first layer of boxes.

Add top slip sheet: When selected, a slip sheet will be added on top of the last layer of boxes.

Layer: From the dropdown menu, select where the slip sheets will be placed.

- In between every layer
- Only between two last layers
- Only (X) slip sheets Per pallet: When selected, type the number of slip sheets (X) in the **Value** input field. The slip sheets will be evenly distributed.

Press **Picking** and go to the robot user interface to move the robot and save the position.



NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.



NOTE:

If paper slip sheets are used, it is recommended to pick them up close to the sides or in the corner to avoid bending while placing them on the boxes.

Press **Gripper** and set the right values to reliably pick the slip sheet and move them from the slip sheet pick position to the outfeed. To achieve this, follow these steps below:

1. Adjust the settings.
2. Press **Execute**.
3. Go to the robot user interface.
4. Move the robot up to ensure that the slip sheet is held.
5. If needed, move the robot to the picking position taught in the previous step, press **Open/Release**, adjust the settings and repeat the process.

Press **Placing** and go to the robot user interface to move the robot and save the position.



NOTE:

When using two pallets, one placing position must be taught for each pallet.



NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.

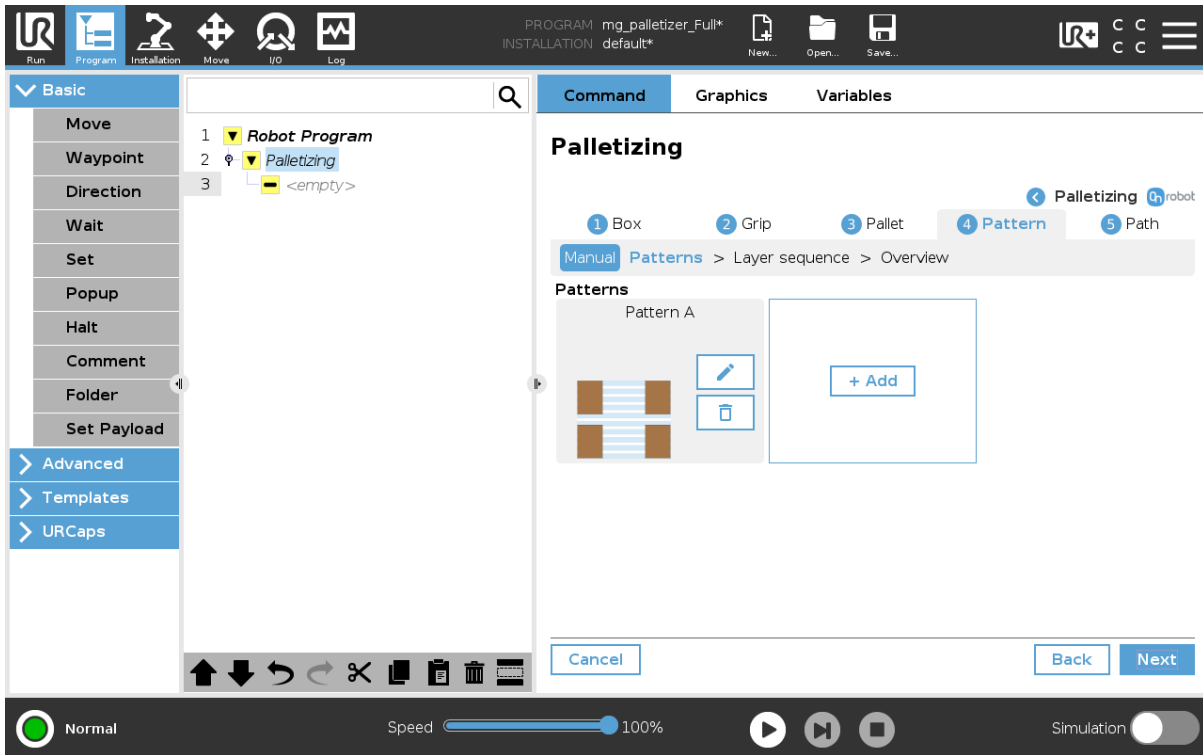


WARNING:

The pattern editor might not give a stable pattern e.g. in case of picking multiple boxes simultaneously. Update and change the pattern accordingly.

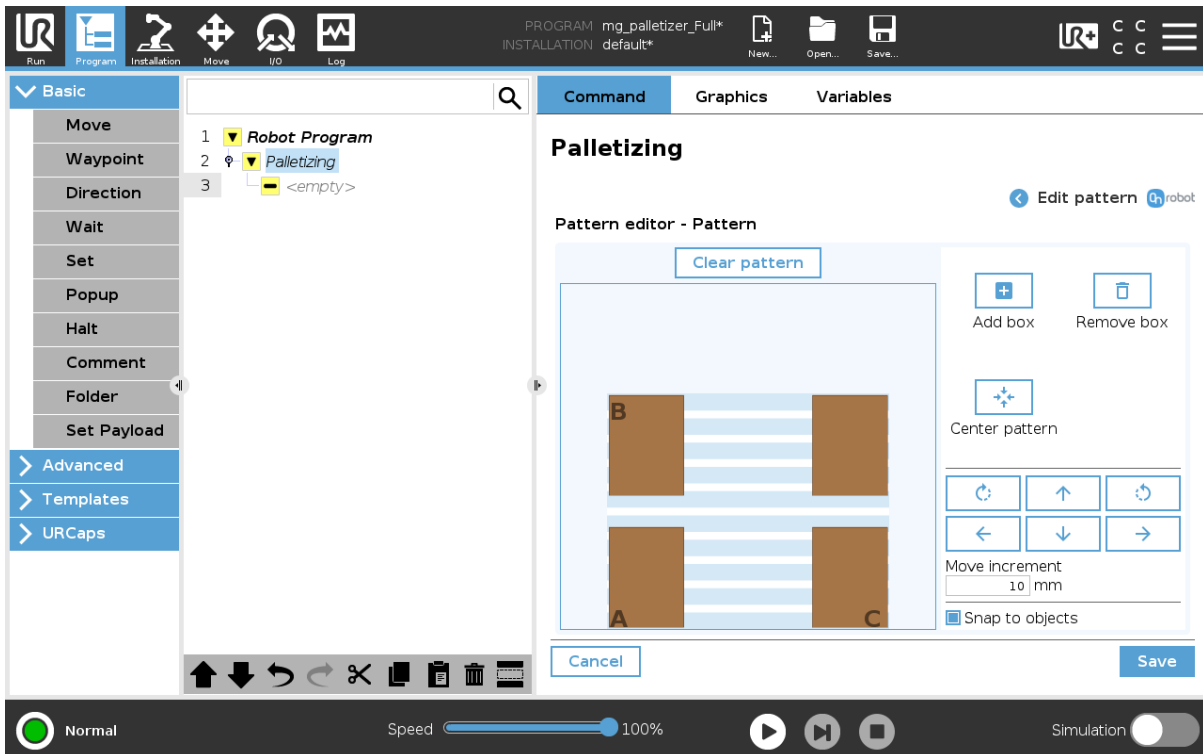
Press **Generate pattern** to move on to the Pattern Overview.

Manual Pattern Generation



Patterns

Press **Add** to create a new pattern manually.



By pressing **Add box**, a box will appear on the image. Place the box in the desired position by dragging and dropping it or by using the arrows in the left side of the toolbar as explained below.

If **Multiple boxes** was selected during the Box Setup, the **Add boxes** option will appear instead of **Add box**. This will allow to place a group of two boxes in the desired position as if they were one item.

By pressing **Remove box**, the selected box can be deleted.

Press **Center pattern** to move the entire pattern to the center of the pallet.

The arrows can also be used to move the boxes and to turn the boxes clockwise or counter-clockwise. How much the boxes will move can be set in the **Move increment** input field.

Press **Clear pattern** to delete all the boxes.

Snap to objects: If selected when moving the boxes around, the moving box will snap to other boxes' sides, to the side of the pallet or will be aligned to other boxes.

Press **Save** to save the created pattern. The created pattern(s) will show under **Patterns**.

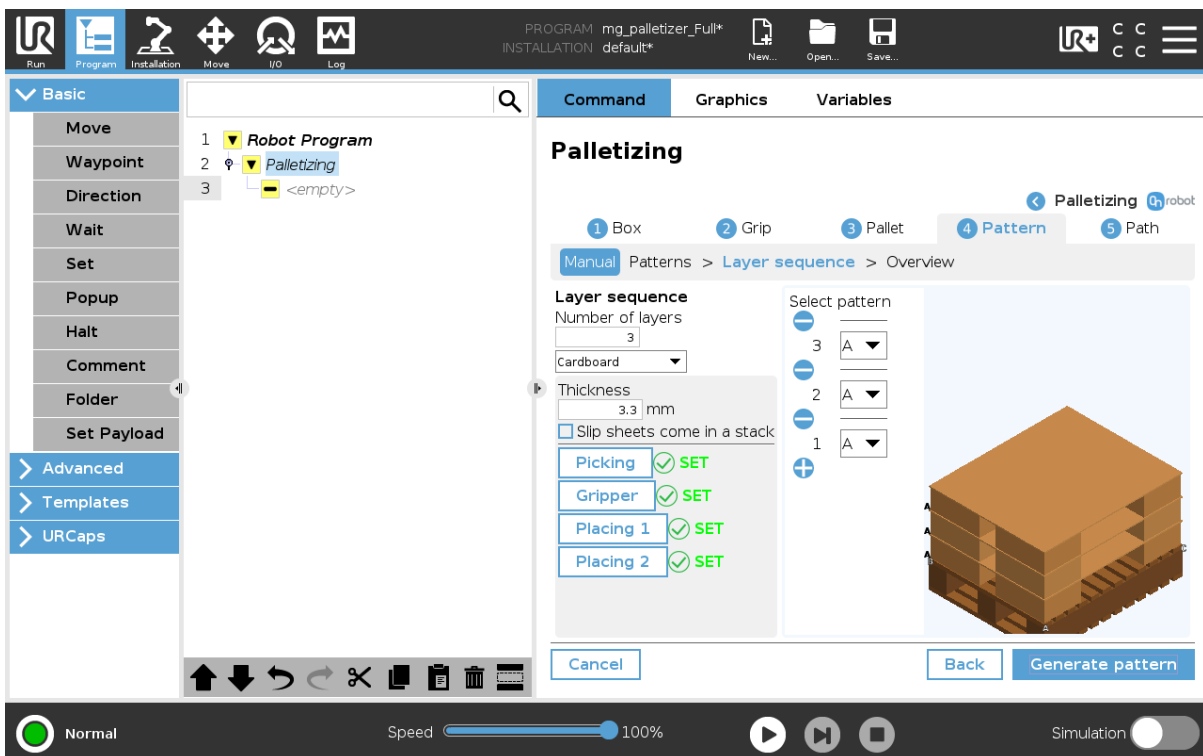


NOTE:

The order in which the boxes are added to the pattern does not represent the final placing order. The palletizing software will later calculate the placing order of the boxes on the pallet.

Press to edit the pattern.

Press to delete the pattern.



Layer sequence

Number of layers: From the dropdown menu choose the number of layers of boxes that will be placed on the pallet.

From the dropdown menu, select whether a slip sheet or a cardboard is used.

Thickness: Type the thickness of the slip sheet in the input field. If measuring the thickness of the slip sheet is not possible, take a pack of 10 or 20 slip sheets, measure the thickness of the pack and divide by the number of sheets.

Slip sheets come in a stack: Select if the slip sheets come in a stack.

Press **Picking** and go to the robot user interface to move the robot and save the position.



NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.



NOTE:

If paper slip sheets are used, it is recommended to pick them up close to the sides or in the corner to avoid bending while placing them on the boxes.

Press **Gripper** and set the right values to reliably pick the slip sheet and move them from the slip sheet pick position to the outfeed. To achieve this, follow these steps below:

1. Adjust the settings.
2. Press **Execute**.
3. Go to the robot user interface.
4. Move the robot up to ensure that the box is held.
5. If needed, move the robot to the picking position taught in the previous step, press **Open/Release**, adjust the settings and repeat the process.

Press **Placing** and go to the robot user interface to move the robot and save the position.



NOTE:


When using two pallets, one placing position must be taught for each pallet.



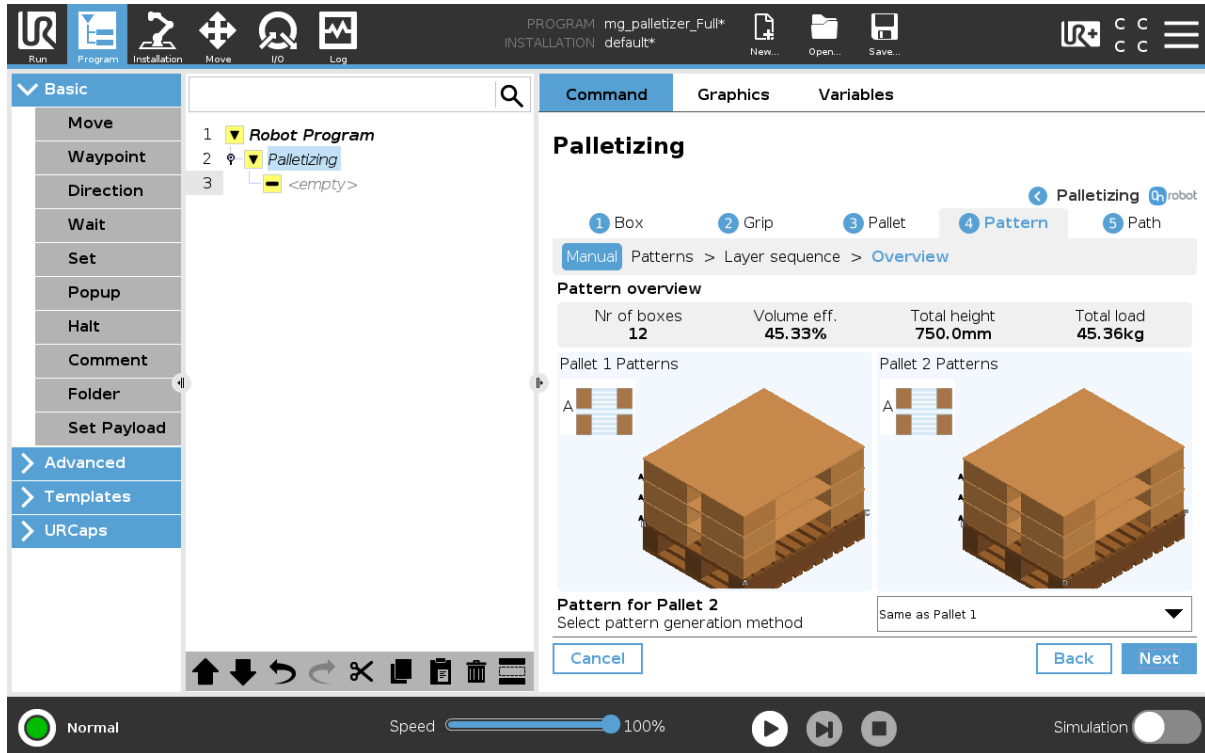
NOTE:

When teaching the points, ensure that the joint rotations are as close to the middle value as possible.

The image provides an overview of the layers and patterns selected.

Select pattern: The set number of layers will show. Use the arrows to define which pattern will be used on the different layers. Press  to add a slip sheet between the desired layers.

Press **Generate pattern** to move on to the Pattern Overview.



Pattern overview

In the overview, different properties of the pallet pattern are shown.

Number of boxes: Shows the total number of boxes in the pallet.

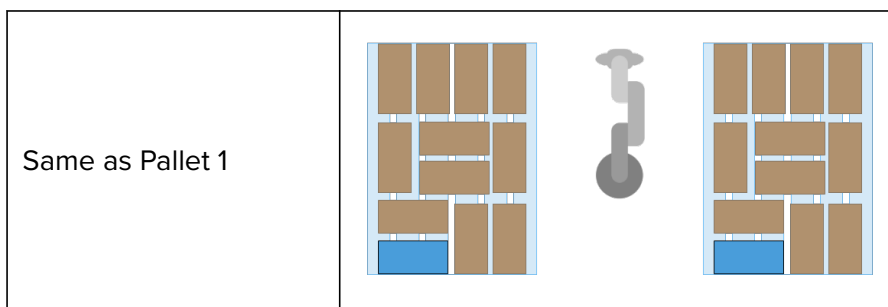
Volume efficiency: Shows the total volume of the pallet that is used by boxes.

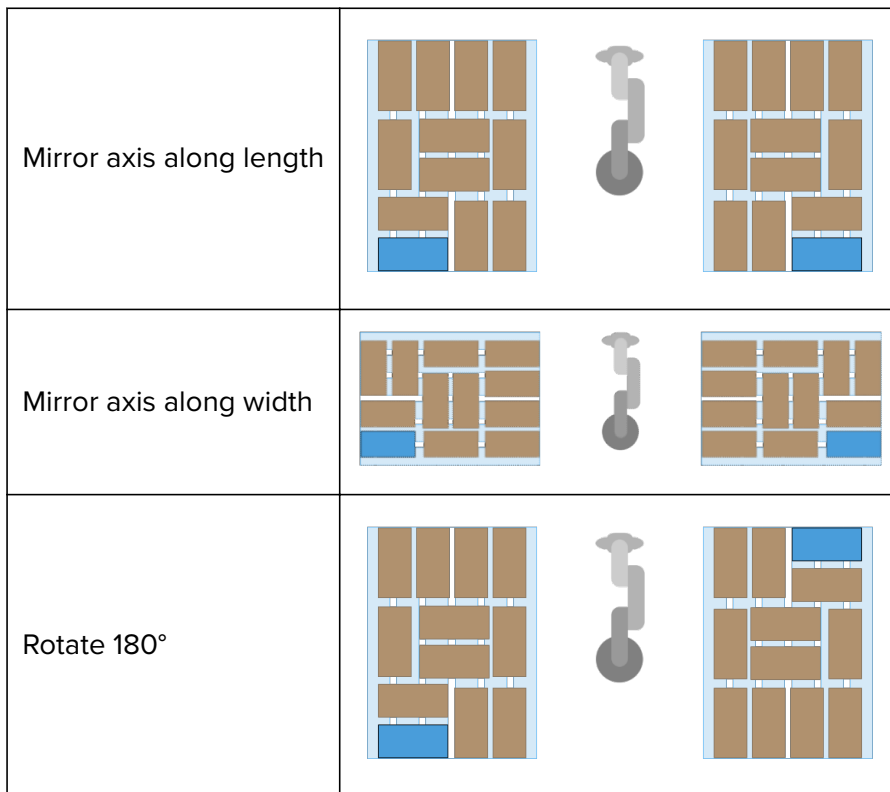
Total height: Shows the height from the bottom of the pallet to the top of the top layer of boxes.

Total load: Shows the weight of the boxes on the pallet.

Pallet 2 Patterns

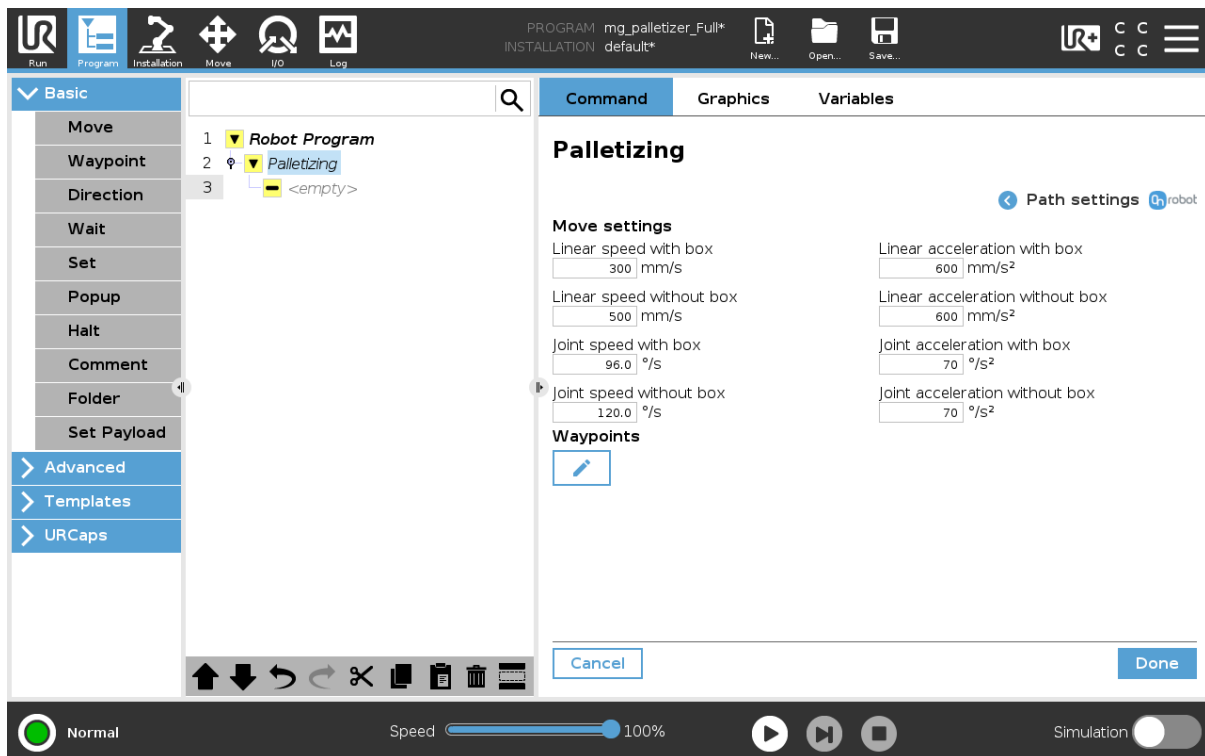
The Pallet 2 Patterns can be generated with different generation methods, based on Pallet 1. See the different generation methods below.





Press **Next**.

7.6.5. Path Setup



Move settings: There are default values for the settings that can be changed.

Waypoints: Waypoints can be used to make the robot go through points in order to avoid obstacles and potential collisions.

The following waypoints can be used in a palletizing application:

- Infeed to Pallet 1
- Pallet 1 to Infeed
- Slipsheet to Pallet 1
- Pallet 1 to Slipsheet
- Infeed to Pallet 2
- Pallet 2 to Infeed

Press **Next**.

Status

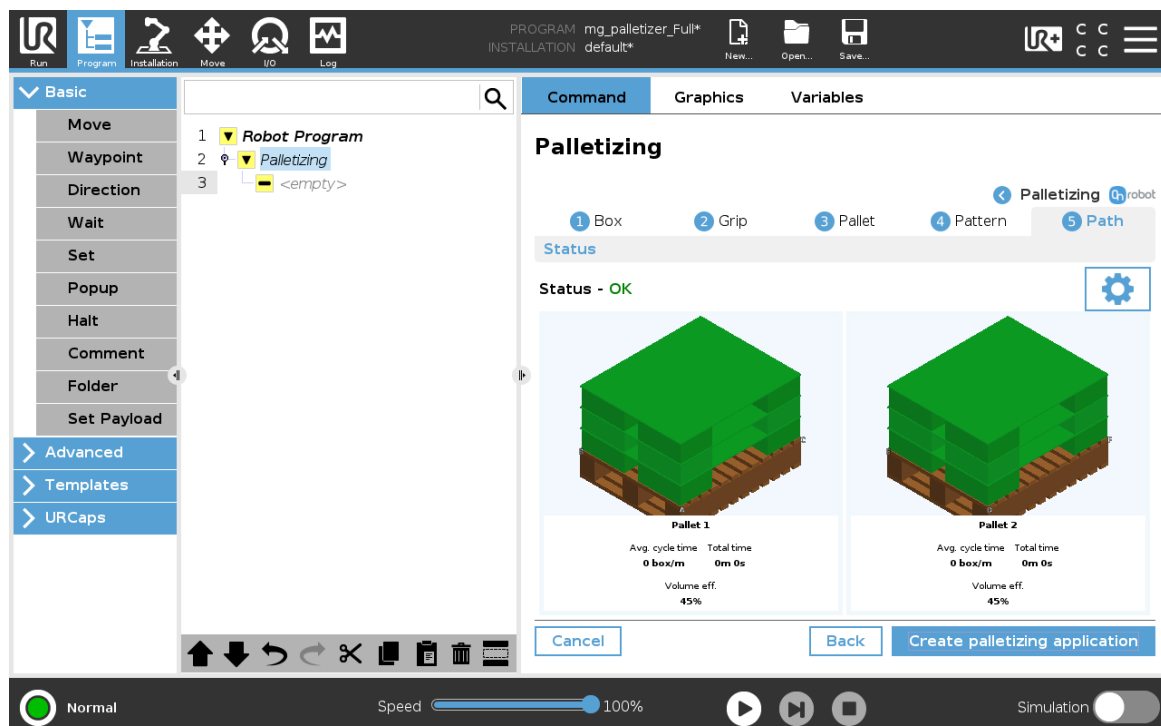
The status will display if the path was successfully created or if there were any problems in the path planning.

- **Green:** Path created successfully.

If the Path is created without error, click on **Create palletizing application**.

The calculation time for the path generation varies based on the configuration and complexity of the setup.

When the path is ready, and everything is set up correctly, move the robot to home position, remove the box, and make sure that everything is in place before executing the robot program.



The screenshot displays the Chrobot software interface for configuring a palletizing application. The main window is titled "Palletizing" and shows a status of "Status - OK". The interface includes a left sidebar with a menu of actions (Move, Waypoint, Direction, Wait, Set, Popup, Halt, Comment, Folder, Set Payload, Advanced, Templates, URcaps) and a central workspace with a search bar and tabs for Command, Graphics, and Variables. The workspace shows a 3D visualization of two pallets, Pallet 1 and Pallet 2, each with a green box structure. Below the visualization, the status for each pallet is displayed:

Pallet	Avg. cycle time	Total time	Volume eff.
Pallet 1	0 box/m	0m 0s	45%
Pallet 2	0 box/m	0m 0s	45%

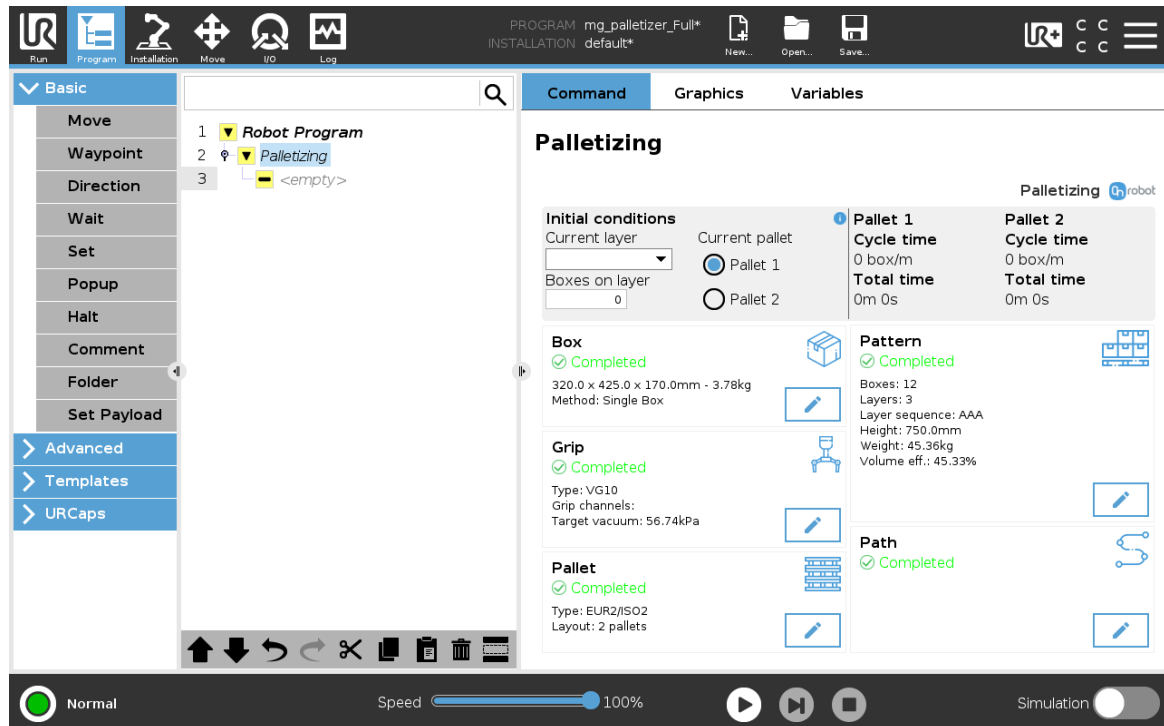
At the bottom of the interface, there is a control bar with a speed slider set to 100%, a simulation toggle, and buttons for "Cancel", "Back", and "Create palletizing application".

Different properties of the pallet are shown below.

Average cycle time: The number of boxes per minute that will be placed on the pallet.

Total time: The amount of time that takes to do a full pallet.

Volume efficiency: Shows the total volume of the pallet that is used by the boxes on the pallet.




An overview of the created palletizing application is displayed.

Initial conditions

- **Current pallet:** Select which pallet will be palletized.
- **Current layer:** Select the layer where last box was placed.
- **Boxes on layer:** Select the number of boxes already placed on the current layer.

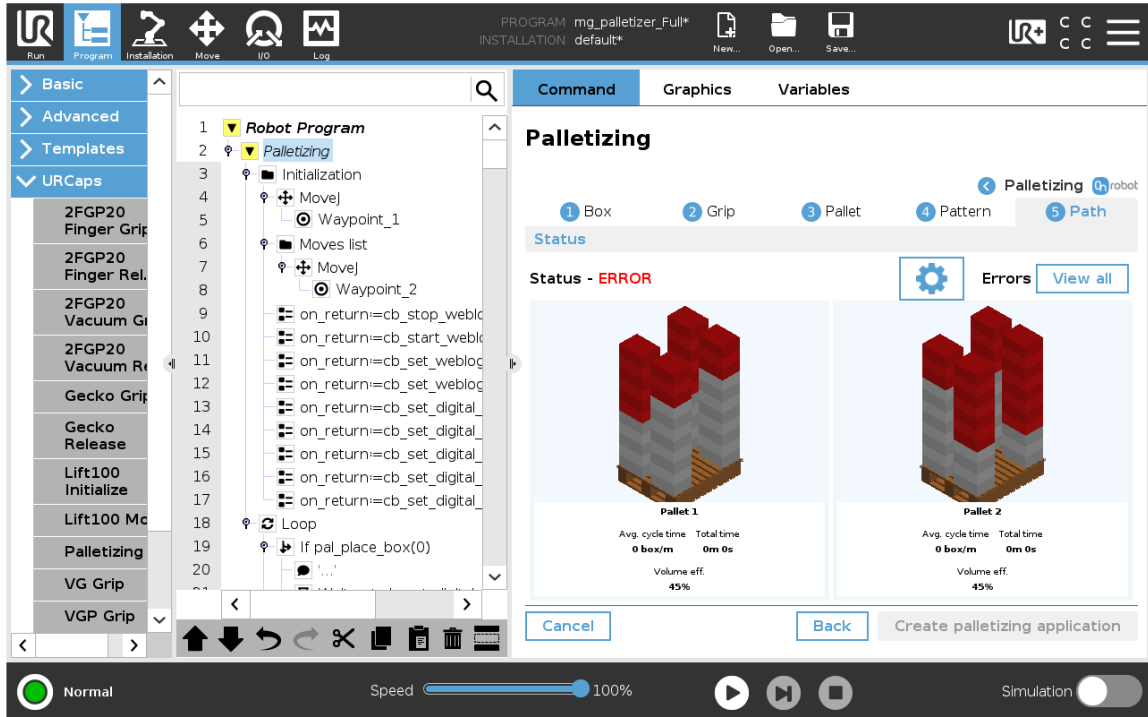
Pallet 1 / Pallet 2

- **Cycle time:** The number of boxes per minute that will be placed on the pallet.
- **Total time:** The amount of time that takes to do a full pallet.

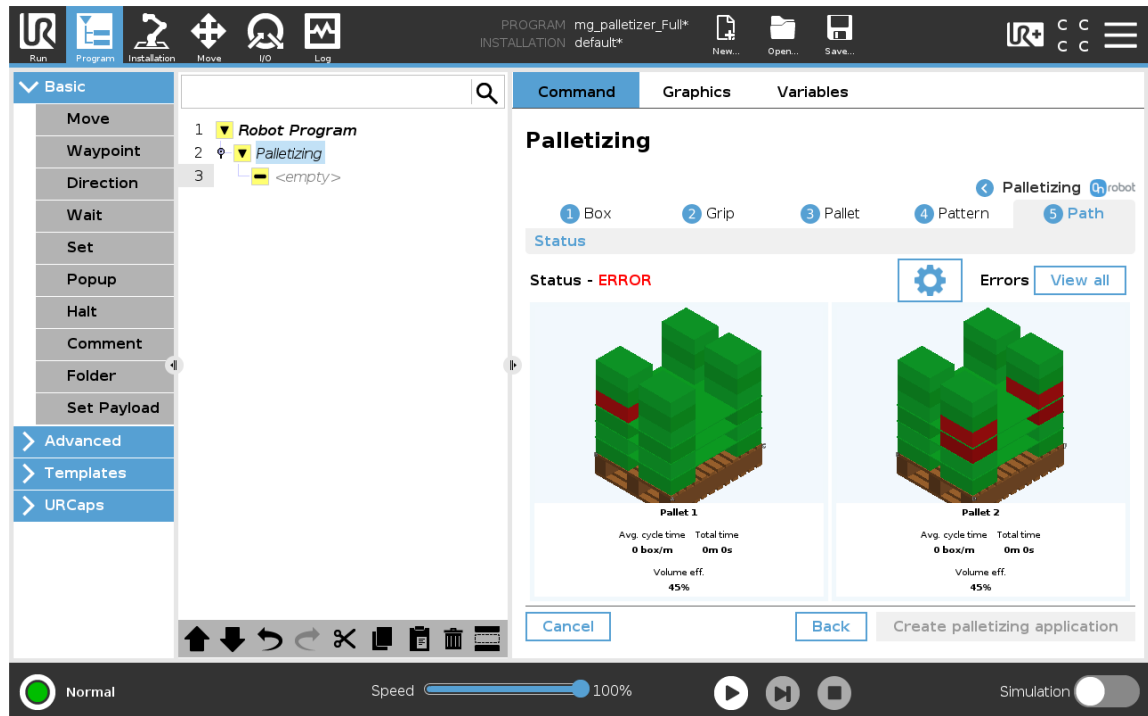
An overview of the different sections is shown. Press , to change the settings for the different sections. If a setting is changed in one section and it affects the settings in another section, the affected section will indicate that it is unfinished and the affected section will have to be edited to have a completed application.

If the status is not successful:

- **Grey:** Planning error. Planning failed and the boxes or slip sheets that are shown in grey were not calculated.



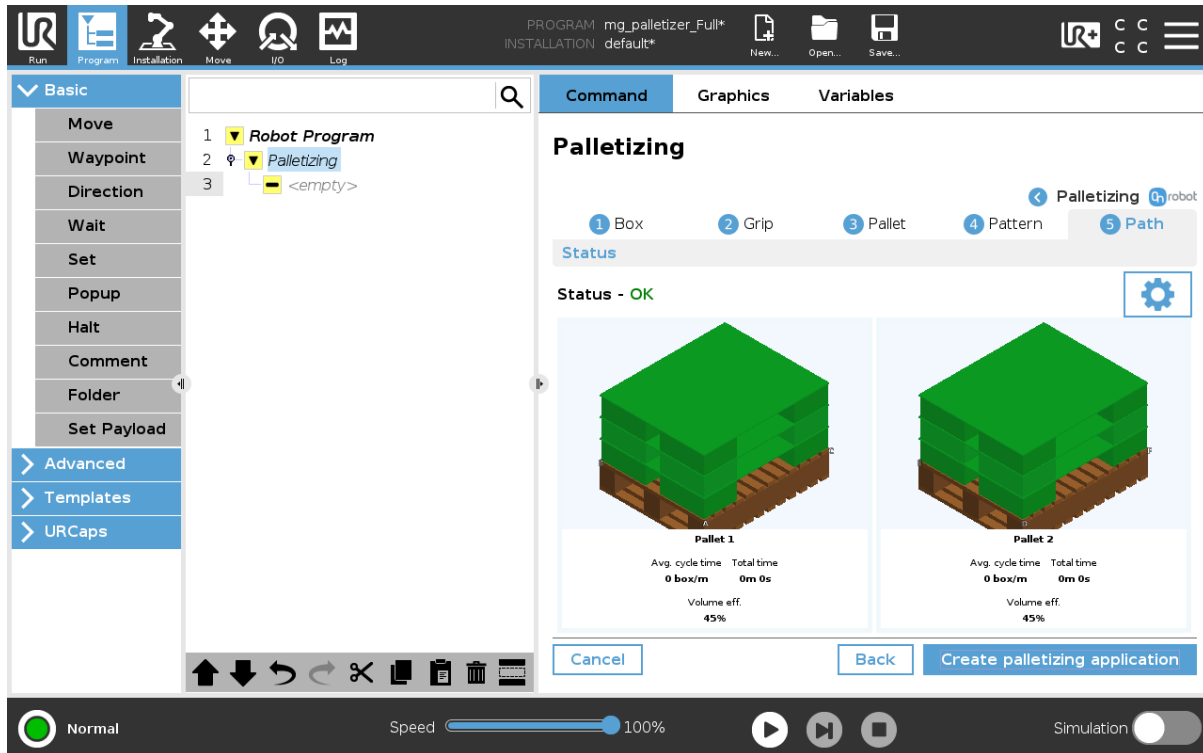
- **Red:** Path planning failed. Errors were found.



The red boxes indicate that something is wrong with the specific box. If an issue occurs while calculating the path, follow the instructions on the user interface. The user interface will give information about the reason of the error, details about the root cause and the solution of the specific error.

7.7. Run the Software

Click on the **Create palletizing application** button to generate the program tree. Save the program and press **Play** to start the robot program.



The screenshot displays the Chrobot software interface. The top menu bar includes icons for Run, Program, Installation, Move, I/O, and Log. The main window is divided into several sections:

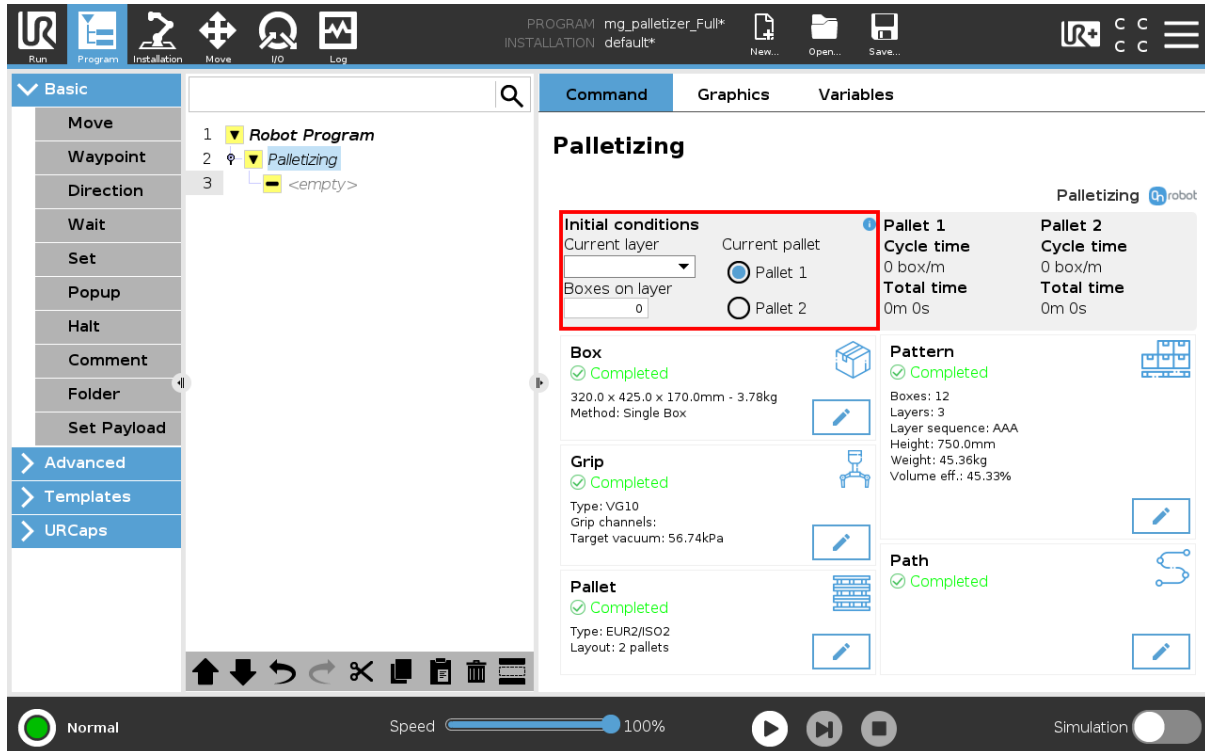
- Left Panel:** A sidebar with a search bar and a list of functions: Move, Waypoint, Direction, Wait, Set, Popup, Halt, Comment, Folder, Set Payload, Advanced, Templates, and URCaps.
- Program Tree:** A tree view showing the hierarchy: 1 Robot Program, 2 Palletizing, and 3 <empty>.
- Command Panel:** Tabs for Command, Graphics, and Variables.
- Palletizing Overview:** A central area titled "Palletizing" with a status indicator "Status - OK". It features a navigation bar with steps: 1 Box, 2 Grip, 3 Pallet, 4 Pattern, and 5 Path. Below this, two 3D isometric views of a pallet are shown, labeled "Pallet 1" and "Pallet 2". Each view includes performance metrics:

Metric	Pallet 1	Pallet 2
Avg. cycle time	0 box/m	0 box/m
Total time	0m 0s	0m 0s
Volume eff.	45%	45%
- Bottom Panel:** A control bar with a "Normal" status indicator, a "Speed" slider set to 100%, and buttons for Play, Stop, and Simulation (which is currently turned off).

7.8. How to Restart

The palletizing program can be stopped from the teach pendant or as a result of an external stop.

If you would like to restart the palletizing program from a specific point, edit the palletizing **Initial conditions** in the overview page.



The screenshot displays the OnRobot software interface for configuring a palletizing application. The main window is titled 'Palletizing' and contains several configuration sections:

- Initial conditions:** A red box highlights this section, which includes a 'Current layer' dropdown menu and a 'Boxes on layer' input field set to 0.
- Current pallet:** Two radio buttons are present, with 'Pallet 1' selected.
- Pallet 1 and Pallet 2:** Each has a 'Cycle time' and 'Total time' field, both currently showing 0.
- Box:** Status 'Completed', dimensions 320.0 x 425.0 x 170.0mm, weight 3.78kg, method 'Single Box'.
- Grip:** Status 'Completed', Type: VG10, Grip channels, Target vacuum: 56.74kPa.
- Pattern:** Status 'Completed', Boxes: 12, Layers: 3, Layer sequence: AAA, Height: 750.0mm, Weight: 45.36kg, Volume eff.: 45.33%.
- Path:** Status 'Completed'.
- Pallet:** Status 'Completed', Type: EUR2/ISO2, Layout: 2 pallets.

The interface also shows a left-hand menu with options like 'Move', 'Waypoint', 'Direction', 'Wait', 'Set', 'Popup', 'Halt', 'Comment', 'Folder', 'Set Payload', 'Advanced', 'Templates', and 'URCaps'. At the bottom, there is a speed control slider set to 100% and a simulation toggle.

**NOTE:**

For a two-pallet setup, if a pallet has been completed and the program gets stopped while executing the other pallet, the completed pallet must be either removed or replaced before resuming the program.

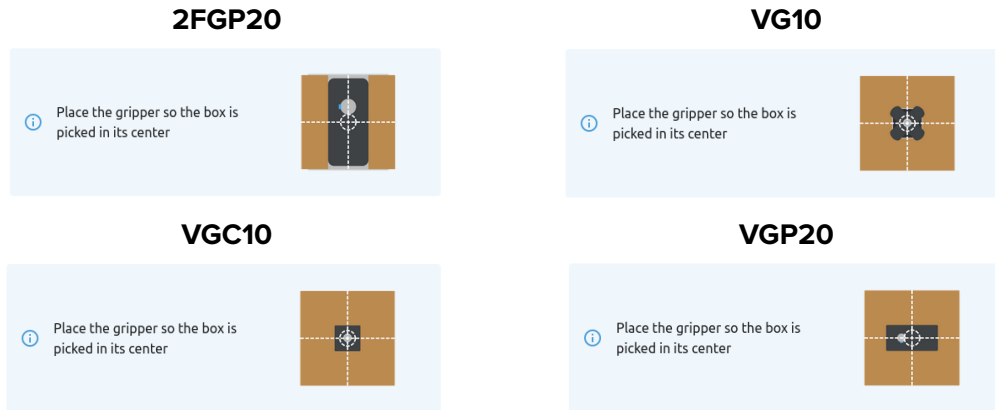
7.9. Best Practices - OnRobot Palletizer

Cell Configuration:

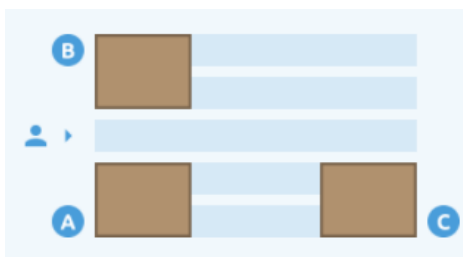
- The same cell configuration can be used for multiple palletizing applications if there is enough clearance between the gripper and its surroundings (i.e., infeed, box, and robot).
- Do not open more than one application at a time as it might cause issues in the application you are trying to create.
- If a setting in the cell configuration is changed after a palletizing application is created, some settings in the palletizing application might need to be changed as well.
- When using the VG10, VGC10 or the VGP20 the *Multiple boxes* signal is optional, but if one of the palletizing applications will use the *Multiple boxes* option, it must be set during the Infeed Setup.
- Plan the cell area as suggested in the examples in the [Introduction](#) section and make sure that the pallet, infeed, and slip sheet pick positions are in a well-reachable area. Closeness to the edges of reach areas or singularities will slow down the robot and yield to longer cycle time. In extreme cases, it might result in an unsuccessful path planning.

Palletizing Application:

- **Pick:**
 - When setting the picking position, make sure that the gripper is placed so the box is picked in its center.



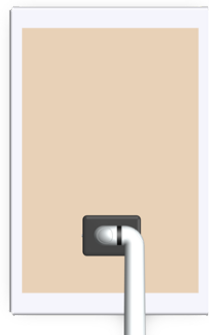
- Inaccuracy of the picking position will double as boxes are rotated for correct placement and might accumulate on the z direction with every layer.
- If the infeed is wider than the box, a waypoint between the infeed and the pallet, and a waypoint between the pallet and the infeed is needed to avoid any collisions of the box/robot links with the infeed. The waypoint can be added in the last step after the path is generated.
- When using the 2FGP20, align the 2FGP20 fixed finger to the side of the box against where you are gripping to prevent the box from moving.
- The minimum recommended box size is 200 x 200 x 100 mm.
- When using the VGP20, the minimum recommended weight for the box is 0.5 kg for the default speed and acceleration.
- When mounting the angle bracket for the Pallet Station, consider how the boxes and slip sheets will be picked up.
- **Pallet Definition:**
 - The pallet(s) should be placed on a plane surface.
 - Make sure that the box is gripped before starting the pallet position configuration.
 - The box should be oriented so that the longer side of the box is parallel to the longer side of the pallet.
 - When teaching the points, ensure that the joint rotations are as close to the middle value as possible.
 - Only two pallets of the same kind can be used.
 - There are two possible ways to configure the pallet positions, looking at either of the short sides of the pallet. Both ways are valid and have no impact to the result.



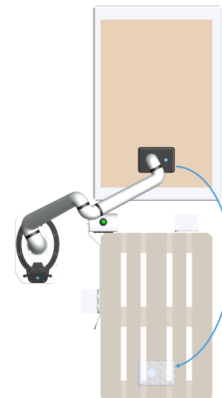
- If the pallet(s) are not defined parallel to the surface, the generated layout will not be perpendicular to the surface, and the pallet will have accumulated errors on the top layers.
- The pallet plane is calculated from the corner positions. Corner positions should be thought with care, including z direction. The box should be placed **exactly** on the corners of the pallet.

- The use of the tool extender is recommended if the robot can not reach the four corners of the pallet with the box gripped.
- In a palletizing application, it is common to experience singularities when placing boxes below the base of the robot. Singularities arise due to a limitation in the robot kinematic structure that makes certain linear motions (while placing the box) not possible. The palletizing software takes care of these singularities when executing the generated program, but they will be present when teaching the different positions in the application. A 90-degree angle bracket could help in this regard.
- In a palletizing application, it is common to experience singularities when placing boxes below the base of the robot. Singularities arise due to a limitation in the robot kinematic structure that makes certain linear motions (while placing the box) not possible. The palletizing software takes care of these singularities when executing the generated program, but they will be present when teaching the different positions in the application. A tool extender could help in this regard.
- **Slip Sheet:**
 - If the slip sheets come in a stack, teach the position at the top of the stack.
 - When using two pallets, one placing position must to be taught for each pallet.
 - The slip sheet placement position can be taught at any height on the pallet.
 - If paper slip sheets are used, it is recommended to pick them up close to the sides or in the corner to avoid bending while placing them on the pallet.

Paper Slip Sheet Pick Position



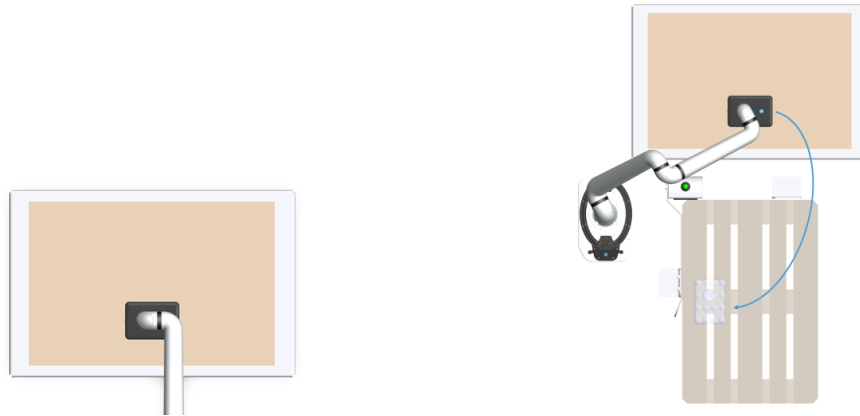
Paper Slip Sheet Place Position



- If cardboard slip sheets are used, it is recommended to pick them up close to the longest side or to avoid bending or breaking while placing them on the boxes.

Cardboard Slip Sheet Pick Position

Cardboard Slip Sheet Place Position



- **Pattern:**
 - The order in which the boxes are added to the pattern does not represent the final placing order.
 - The OnRobot Palletizing Software will later calculate the placing order of the boxes on the pallet to optimize efficiency, cycle time or reliability.
- **Path:**
 - In case path planning fails, adjust the position of the failing box or slip sheet to resolve eventual reachability or singularity issues.
 - Fine tune robot acceleration to have smooth release with VGx products when using boxes that weigh less than 1 kg.

8. Additional Software Options

8.1. Compute Box/Eye Box

8.1.1. Ethernet Interface Setup

A proper IP address must be set for the Compute Box/Eye Box and the robot/computer to be able to use the Ethernet interface. The IP address can be configured using DIP switches 3 and 4.



WARNING:

Stop the robot program before you change any Ethernet interface settings.



NOTE:

Configuring DIP switch 3 will remove any previously set static IP address.

To change between modes, first change the DIP switches and then cycle the Compute Box/Eye Box power so the changes will take effect.

DIP 3 - sets the Compute Box / Eye Box IP address

- **ON:** Fixed IP (192.168.1.1)
- **OFF:** Dynamic or Static IP (*can be configured via the Web Client*)

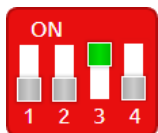
DIP 4 - sets whether the connected robot or laptop will receive IP address from the Compute Box / Eye Box

- **ON:** DHCP server is disabled
- **OFF:** DHCP server is enabled

We recommend to set the DIP switches according to either of the two options below:

- **Fix IP/Auto mode** - in simple installations (no external network and/or no PLC connected)
- **Advanced mode** - in more complex installations (external network and/or PLC are used)

Fix IP/Auto mode (factory default)

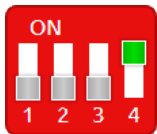


Set the DIP switch 3 to ON and the DIP switch 4 to OFF position and cycle the power so the changes will take effect.

IP Address of the Compute Box/Eye Box	IP Address of the Robot/Computer
<p>The IP address of the Compute Box/Eye Box is fixed 192.168.1.1. This IP address cannot be changed.</p>	<p>The Compute Box/Eye Box will automatically assign an IP address to the connected robot/computer if it was configured to obtain an IP address automatically.</p> <div data-bbox="719 524 817 613" style="display: inline-block; vertical-align: middle;"> </div> <p>NOTE: The assigned IP address range is 192.168.1.100-105 (with subnet mask 255.255.255.0). If the Compute Box/Eye Box is used in a company network where a DHCP server is already in use, it is recommended to use Advanced mode.</p>

In this mode, the DHCP server of the Compute Box/Eye Box is enabled.

Advanced mode (any static or dynamic IP/subnet mask)



Set the DIP switch 3 to OFF and the DIP switch 4 to ON position and cycle the power so the changes will take effect.

IP Address of the Compute Box/Eye box	IP Address of the Robot/Computer
<p>Case 1: Static IP address The IP address 192.168.1.1 is already in use in your network or a different subnet needs to be configured.</p>	<p>The Compute Box/Eye Box will not assign an IP address to the robot/computer. Set the IP address of the robot/computer manually. Make sure to have a matching IP setting to your robot/computer network for a proper communication. Use the same subnet but different IP address.</p>
<p>Case 2: Dynamic IP address *</p>	<p>The IP address of the robot/computer is set dynamically. An external DHCP server assigns the IP address to the robot/computer.</p>

* By default, the IP address of the Compute Box/Eye Box is set to Dynamic IP.

The IP address of the Compute Box/Eye Box can be set to any value by using the Web Client. For more details, see section Web Client: Configuration Menu. Under **Network settings**, set the **Network mode** to either **Static IP** or **Dynamic IP**.

In this mode, the DHCP server of the Compute Box/Eye Box is disabled.



NOTE:

In this mode, use the OnRobot Discovery Tool in order to find the IP address of the Compute Box.

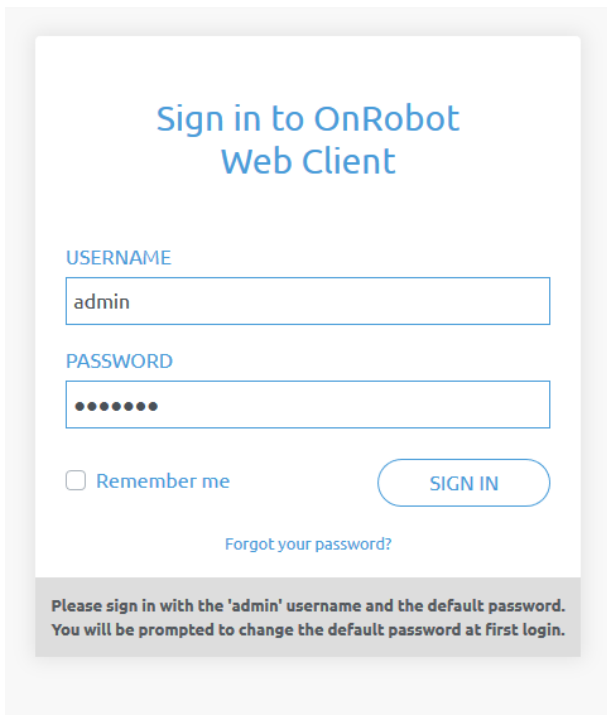
8.1.2. Web Client

To access the Web Client on your computer first the Ethernet interface needs to be set up to have a proper communication between your computer and the Compute Box. It is recommended to use the factory default DIP switch settings (DIP 3 On and DIP 4 Off) (for further details see section **8.1.1. Ethernet Interface Setup**).

Then do the following steps:

- Connect the Compute Box to your computer with the supplied UTP cable.
- Power the Compute Box with the supplied power supply.
- Wait one minute for the Compute Box LED to turn from blue to green.
- To find the IP address of the Compute Box, open the OnRobot Discovery Tool.
- Open a web browser on your computer and type in the IP address of the Compute Box (factory default is 192.168.1.1).

The Sign-in page opens:



The factory default administrator login is:

Username: admin

Password: OnRobot

For the first login a new password needs to be entered: (password must be at least 8 characters long)

Change the default administrator password

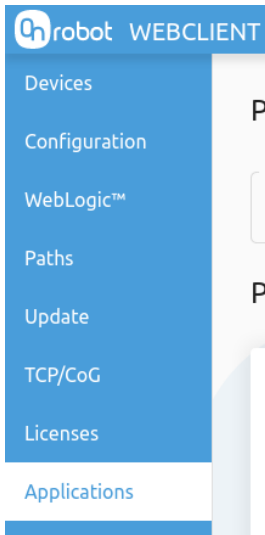
NEW PASSWORD

Enter your new password here

CONFIRM PASSWORD

Re-enter your new password here

Once signed in the following menu will appear on the left side of the screen:




- **Devices** - Monitor and control the connected devices (e.g.: grippers)
- **Configuration** - Change the Compute Box's settings
- **WebLogic™** - Program the Digital I/O interface through OnRobot WebLogic™
- **Paths** - Import/export the recorded Paths (not available to all robots)
- **Update** - Update the Compute Box and the devices
- **TCP/CoG** - Calculate the TCP (Tool Center Point) and CoG (Center of Gravity) values for your OnRobot product combination
- **Licenses** - Activate the licenses for a software product
- **Applications** - Create and manage applications

The following menu will appear in the top right corner of the screen:






- Select the language of the Web Client

-  Account settings (e.g.: change password, add new user)
In the following, these menus will be described.

8.1.3. Web Client: Devices Menu

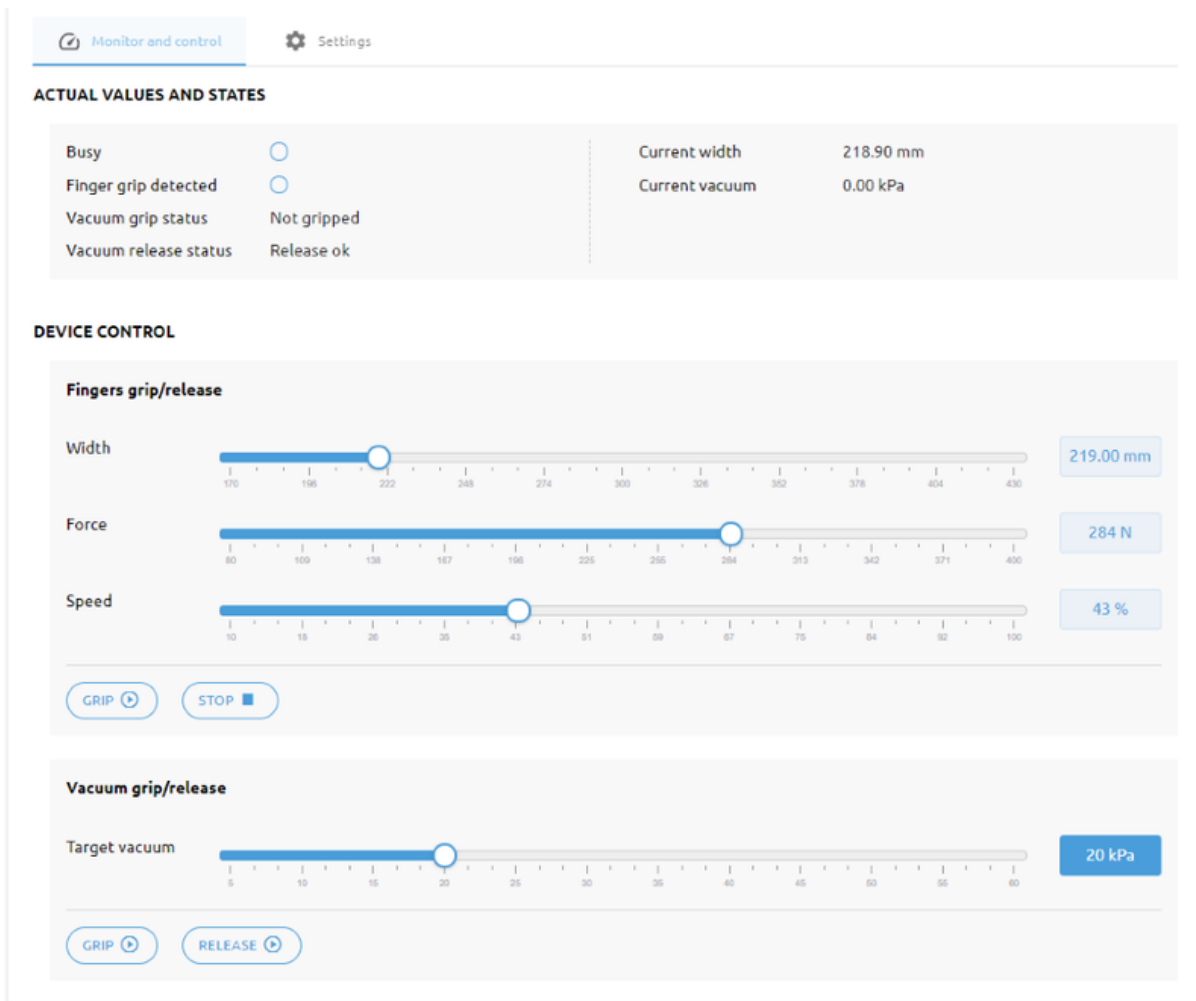
To control/monitor a device click on the **Select** button.

Please select from the detected device(s):

 Compute Box <input type="button" value="SELECT"/>	 HEX-E/H QC <input type="button" value="SELECT"/>	 RG2 <input type="button" value="SELECT"/>
---	--	---

8.1.3.1. 2FGP20

Monitor and control



Actual Values and States

This section displays information about the status of the gripper.

- **Busy:** The gripper is in motion or the gripper is generating vacuum.
- **Finger grip detected:** The gripper detects that a workpiece is gripped with the fingers.
- **Vacuum grip status:** The gripper detects that a workpiece is gripped with the vacuum cups.
- **Vacuum release status:** The gripper detects that a workpiece is released.
- **Current Width:** Shows the current width value.
- **Current vacuum:** Shows the current vacuum level.

Device control

Control the gripper as described below.

- **Fingers grip/release**
To grip on a part, set the **Width**, the **Force** and the **Speed** sliders.
Click on **Grip** to execute the command with the set values.

Click on **Stop** to stop the command.

- **Vacuum grip/release**

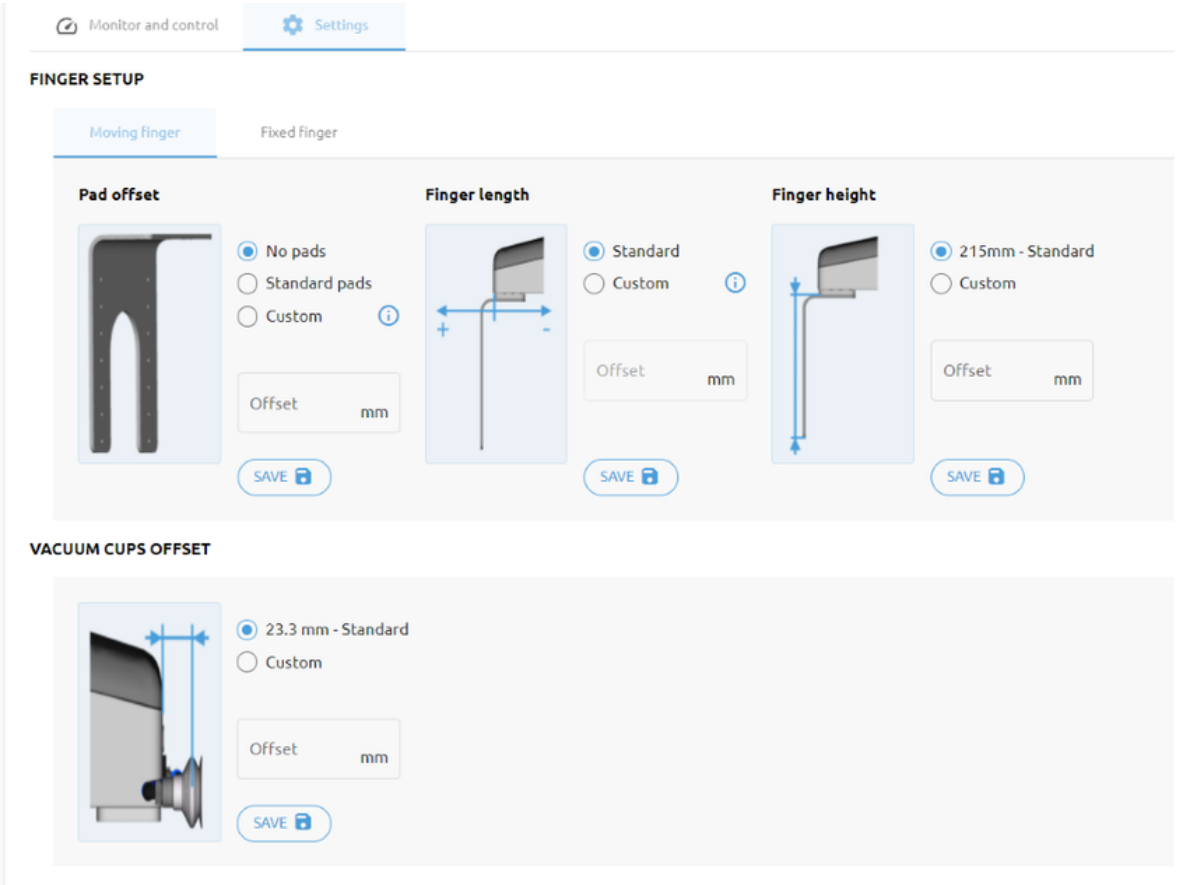
Use the slider to set the **Target vacuum** level.

Click on **Grip** to execute the command with the set values.

Click on **Release** to release the vacuum.

The default settings can be changed on the **Settings** tab.

Settings



The screenshot shows the 'Settings' tab in the software interface. It is divided into two main sections: 'FINGER SETUP' and 'VACUUM CUPS OFFSET'.

FINGER SETUP is further divided into 'Moving Finger' (selected) and 'Fixed Finger'.

Pad offset settings include:

- Radio buttons for 'No pads', 'Standard pads', and 'Custom'.
- An 'Offset' input field in millimeters.
- A 'SAVE' button with a lock icon.

Finger length settings include:

- Radio buttons for 'Standard' and 'Custom'.
- An 'Offset' input field in millimeters.
- A 'SAVE' button with a lock icon.

Finger height settings include:

- Radio buttons for '215mm - Standard' and 'Custom'.
- An 'Offset' input field in millimeters.
- A 'SAVE' button with a lock icon.

VACUUM CUPS OFFSET settings include:

- Radio buttons for '23.3 mm - Standard' and 'Custom'.
- An 'Offset' input field in millimeters.
- A 'SAVE' button with a lock icon.

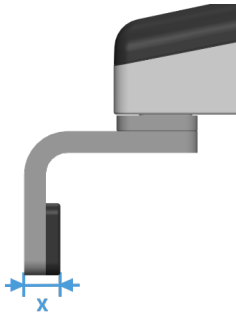
Finger setup

Pad offset

Select one of the pad offsets:

- No pads
- Standard pads
- Custom pads

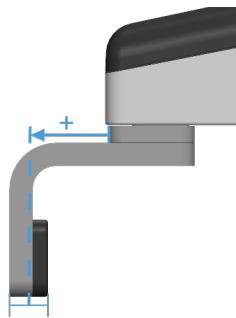
To input the right custom pad offset value, measure the width of the finger and the pad together and divide that value by two. Custom pad offset value = $x/2$.



Finger length

Select one of the finger lengths:

- Standard finger
- Custom finger
 To input the right custom finger length value, measure the distance from the outer part of the finger base to the pad offset position (middle between the outer part of the finger and the outer part of the pad).



Finger height

Select one of the finger heights:

- Standard finger
- Custom finger
 Add the custom finger height value to the input field.

Vacuum cups offset

Select one of the vacuum cup offsets:

- Standard vacuum cups
 Shows the value when the OnRobot vacuum cups and brackets are used.
- Custom vacuum cups
 Add the custom vacuum cups offset value to the input field.



NOTE:

The changes in the 2FGP20 Setup settings are saved to the gripper and not to the installation file. Therefore, if the gripper is moved to another robot, the settings will remain the same. However, if another gripper is used in the same robot, the settings might need to be reset again.

8.1.3.2. Lift100

Monitor and control

Lift100

This page allows the device to be monitored and controlled. (Some functions might not be accessible without Admin permission.)

Status ✔ Good

Serial number 0.2.4#4039F802

Firmware version 0.2.4#4039F802

[Monitor and control](#)

ACTUAL VALUES AND STATES

Busy	<input type="checkbox"/>
Current speed	0 mm/s
Current position	107.2 mm

DEVICE CONTROL

Move

Position: mm

Speed: 10 mm/s

Actual Values and States

This section displays information about the status of the Lift100.

- **Busy:** The Lift100 is in motion or is initializing.
- **Current speed:** Shows the current speed of the Lift100.
- **Current position:** Shows the current position of the Lift100.

Device control

- **Move**
 - **Position:** Sets the target position.
 - **Speed:** Use the slider to set the target moving speed.

Click on **Execute** to execute the command with the set values.

Click on **Stop** to stop the movement of the Lift100.


Click on **Initialize** to initialize the Lift100 and wait until the **Busy** signal is off again. An initialization must be done the first time the Lift100 is installed on the robot and also after each power cycle.

8.1.4. Web Client: Configuration Menu

Configuration

This page allows the configuration of the Compute Box / Eye Box.

CAUTION
Incorrect settings may cause the device to lose network connectivity.



1. Digital input mode: NPN
2. Digital output mode: NPN
3. Compute Box / Eye Box IP setting is configured on this page.
4. DHCP server enabled: Compute Box / Eye Box tries to assign IP to the robot.

NETWORK SETTINGS

MAC address	B8:27:EB:0E:C9:A3
Network mode	Default Static IP
IP address	192.168.1.1
Subnet mask	255.255.255.0
Gateway	192.168.1.1

[SAVE](#)

ETHERNET/IP SCANNER SETTINGS

IP address to connect to	_____
Origin-to-target instance id	1
Target-to-origin instance id	1
Configuration instance id	0
Requested packet interval (ms)	8

[SAVE](#)

COMPUTE BOX / EYE BOX SETTINGS

Display name _____ [✎](#)

[SAVE](#)

Clock delay 0 sec ✔

[SYNCHRONIZE CLOCK](#)

ROBOT SETTINGS

Robot type	None
Robot ID	_____
Robot IP address	_____

[SAVE](#)

WEBLYTICS SETTINGS

WebLytics support	Disabled, discoverable
WebLytics IP address	_____
Connected to server	Disconnected

[SAVE](#)

Network settings:

The **MAC address** is a world-wide unique identifier that is fixed for the device.

The **Network mode** drop-down menu can be used to decide if the Compute Box will have a static or a dynamic IP address:

- If it is set to **Dynamic IP**, the Compute Box expects an IP address from a DHCP server. If the network that the device is connected to has no DHCP server, the Compute Box will not obtain an IP address and its LED is lighting in blue.
- If it is set to **Static IP**, then a fixed IP address and subnet mask must be set.
- If it is set to **Default Static IP**, the fixed IP revert to the factory default and cannot be changed.

After all parameters are set, click on the **Save** button to store the new values permanently. Wait 1 minute and reconnect to the device using the new settings.

Compute Box / Eye Box settings:

In case, more than one Compute Box is used within the same network, for identification purpose any user specific name can be entered to the **Display name**.

If the **Clock delay** field shows a difference, click **Synchronize clock** to synchronize the Compute Box's time with your computer.

EtherNet/IP scanner settings:



NOTE:

This is a special option of the EtherNet/IP connection for some robots.

In case when the robot is the Adapter and the Compute Box needs to be the Scanner the following addition information is required for the communication:

- **IP address to connect to** - the robot IP address
- **Origin-to-target instance id** - refer to the robot's EtherNet/IP manual (Scanner mode)
- **Target-to-origin instance id** - refer to the robot's EtherNet/IP manual (Scanner mode)
- **Configuration instance id** - refer to the robot's EtherNet/IP manual (Scanner mode)
- **Requested packet interval (ms)** - RPI value in ms (minimum 4)

Check the checkbox and the Compute Box will try to automatically connect to the robot (via the given IP address).

For information on the **Robot settings** and the **WebLytics settings**, see the WebLytics Manual.

8.1.5. Web Client: Update Menu

This page can be used to update the software on the Compute Box and the firmware on the devices.

Update

This page allows updating the software and firmware.

CAUTION
Installing updates may take several minutes to complete. Please do not power off or unplug your Compute Box or any of the connected devices during the update process.

SOFTWARE

No update file selected yet...

BROWSE

[Click here to download the result of the last update.](#)

FIRMWARE

COMPONENTS	CURRENT VERSION	REQUIRED VERSION	
Compute Box (CBOX_RPT)			
Firmware	150	150	✓
HEX-E/H QC (HEXHC001)			
Firmware	208	208	✓

UPDATE

✓ Up-to-date
 ↻ Update required
 ✗ Downgrade not supported



CAUTION:

During the update process (takes about 5-10 minutes) DO NOT unplug any device or close the browser window. Otherwise the updated device could be damaged.

The loading screens during the update process are the same for the software and the firmware updates.

Software Update

Download the latest .cbu file from the **Downloads** menu on the website.

Click on **Browse** to search for the .cbu software update file. The **Browse** button will turn to **Update**.

Click on **Update** to start the software update process.

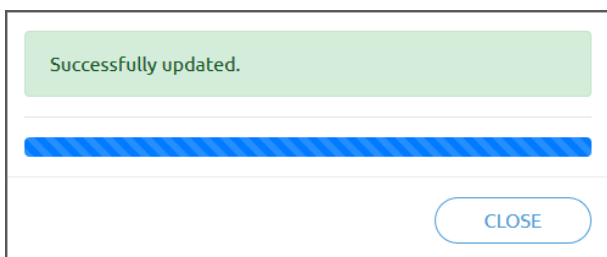
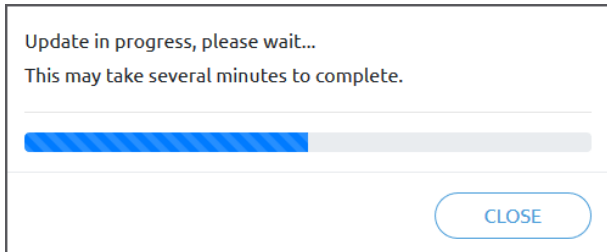
If the update is finished and was successful, the message below is shown.

Firmware Update

Update required: A firmware update is required because one of the components is out of date.

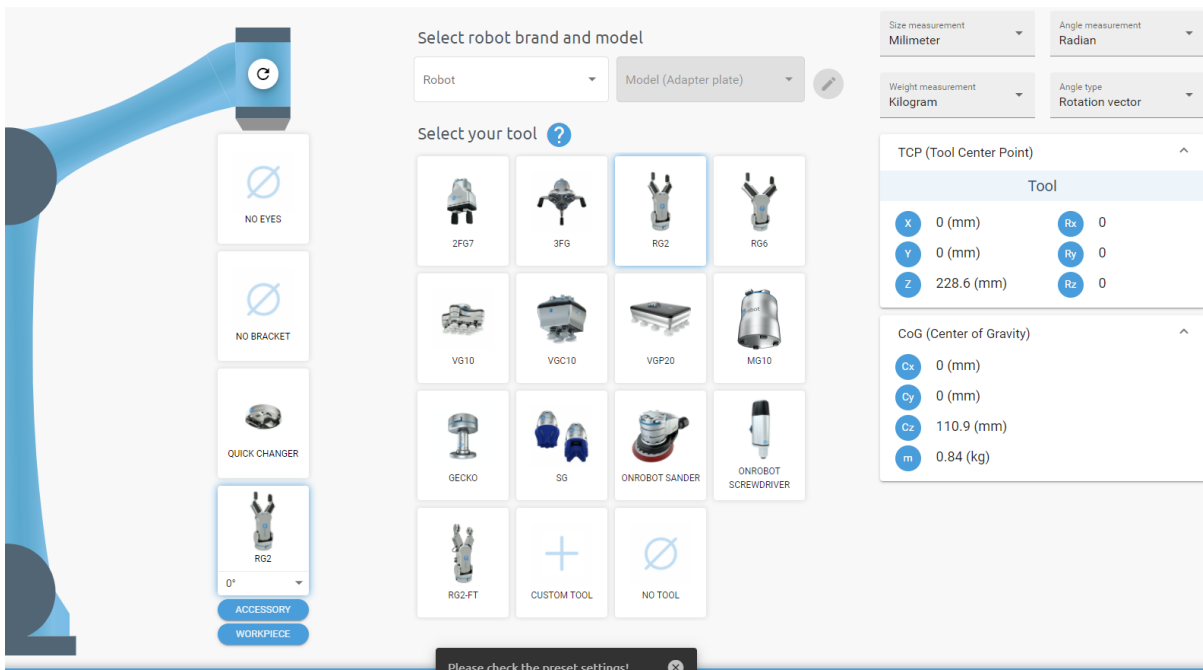
Click on **Update** in the firmware section of the page to start the firmware update process.

If the update is finished and was successful, the message below is shown.



8.1.6. Web Client: TCP/CoG

Use the TCP/CoG calculator to calculate the TCP (Tool Center Point) and CoG (Center of Gravity) values for your OnRobot product combination.




The TCP/CoG calculator will show the automatically detected settings.


**NOTE:**

Make sure to check the preset settings before calculating the TCP and CoG values.

1. Select the robot brand and the model you are using from the **Robot** and **Model (Adapter plate)** dropdown menus.

Click on  to set custom Adapter plate settings.

2. Click on the **No eyes** card to modify the Eyes preset settings.
3. Click on the **No bracket** card to modify the Angle Bracket preset settings.
4. Select mounting type.
5. Select tool.

Click on  to get help about how to enter the values.

6. Click on **Accessory** to select any OnRobot accessories.
7. Click on **Workpiece** to enter the workpiece weight. Then the calculator calculates the resulting payload mass considering the gripper, the mounting, and the workpiece mass.
8. Choose the unit of measure for the values you want to enter from the **Size measurement**, **Angle measurement**, **Weight measurement** and **Angle type** dropdown menus.

The calculator calculates the values which you can see in the **TCP (Tool Center Point)** and **CoG (Center of Gravity)** boxes. These values can be entered into the robot.

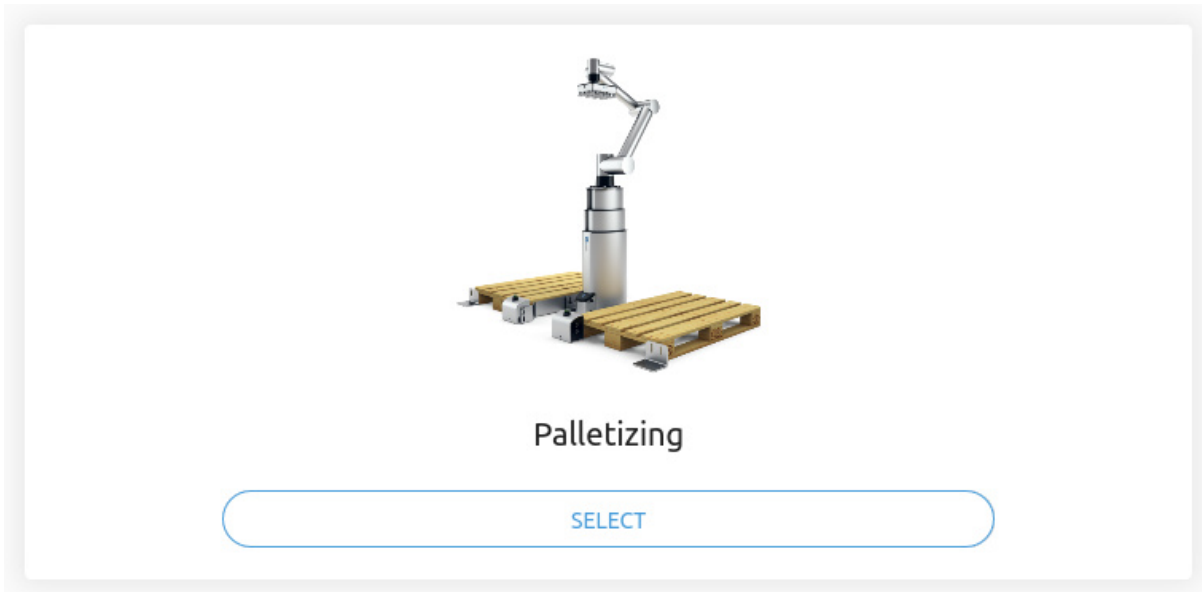
8.1.7. Web Client: Licenses Menu

This page can be used to activate the licenses for a software product.

Go to the [5. Software License](#) section to see how to activate the license for the OnRobot Palletizing.

8.1.8. Web Client: Applications Menu

In the Applications Menu, click on **Select** to access the Palletizing Application.



NOTE:

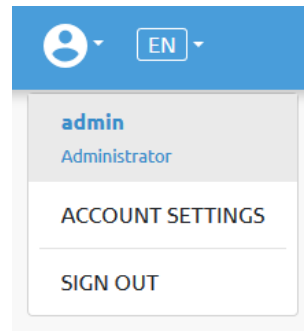
The Palletizing Application requires the Palletizing Software License to be active.

For information on how to activate the license, go to the [5. Software License](#) section.

8.1.9. Web Client: Account Settings

This menu can be used to:

- See the currently sign-id user
- Go to **Account settings**
- Sign-out

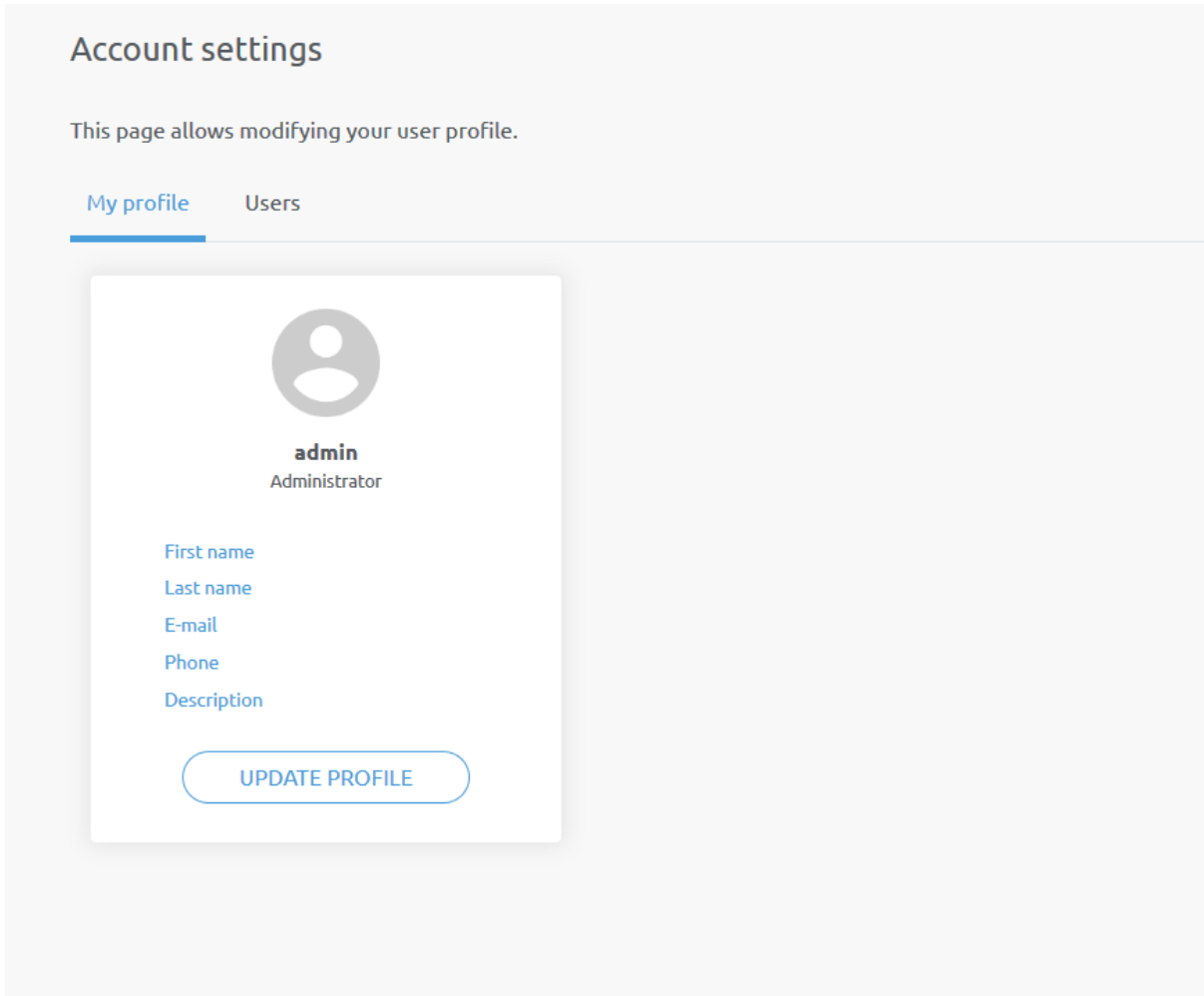


Account settings:

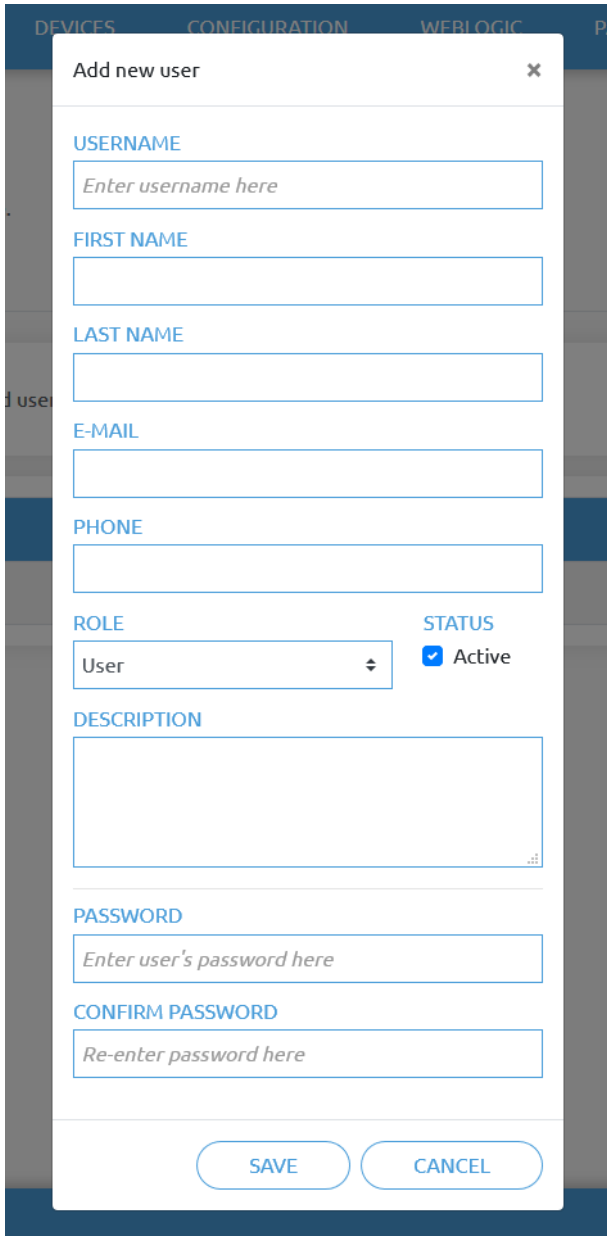
This page has two tabs:

- **My profile** - to see and update the currently logged in users' profile (e.g.: change password)
- **Users** - to manage users (e.g.: add/remove/edit)

On the **My profile** tab to change any profile data (e.g.: password) click on the **Update profile** button.



On the **Users** tab click on the **Add new user** button to add more users:



The screenshot shows a modal window titled "Add new user" with a close button (X) in the top right corner. The form contains the following fields and controls:


- USERNAME:** A text input field with the placeholder text "Enter username here".
- FIRST NAME:** A text input field.
- LAST NAME:** A text input field.
- E-MAIL:** A text input field.
- PHONE:** A text input field.
- ROLE:** A dropdown menu currently showing "User".
- STATUS:** A checkbox labeled "Active" which is checked.
- DESCRIPTION:** A text area with a small grid icon in the bottom right corner.
- PASSWORD:** A text input field with the placeholder text "Enter user's password here".
- CONFIRM PASSWORD:** A text input field with the placeholder text "Re-enter password here".

At the bottom of the form are two buttons: "SAVE" and "CANCEL".

There are three user levels:

- Administrator
- Operator
- User

Fill in the user information and click **Save**.




Later on to change any user information just click on the edit  icon.

Account settings


This page allows modifying your user profile.

My profile **Users**

[ADD NEW USER](#) You can add user on your network to monitor and control the devices.

USERNAME	ROLE	FIRST NAME	LAST NAME	E-MAIL	PHONE	ACTIVE	
admin	Administrator					<input checked="" type="checkbox"/>	
operator	User					<input checked="" type="checkbox"/>	 

To prevent a user to sign-in either could be:

- deactivated by changing its **Active** status in the edit mode
- or removed by clicking the delete  icon.

9. Hardware Specification

9.1. Technical Sheets

9.1.1. 2FGP20

Finger Grip Properties		Minimum	Typical	Maximum	Unit
Payload		- -	- -	20 44.1	[kg] [lb]
Total stroke		- -	260 10.24		[mm] [inch]
Grip width range ⁽¹⁾		170 6.69	-	430 16.93	[mm] [inch]
Gripping repeatability		- -	+/- 0.5 +/- 0.0197	- -	[mm] [inch]
Gripping force ⁽²⁾		80	-	400	[N]
Gripping force tolerance		-	-	+/- 30	[N]
Gripping speed ⁽³⁾		16	-	180	[mm/s]
Gripping time (including brake activation)		-	600	-	[ms]
Noise level ⁽⁴⁾	Finger gripper	-	-	58 63	[dB(A)] _{Leq} [dB(A)] _{Max}
	Vacuum gripper	-	-	72 74	[dB(A)] _{Leq} [dB(A)] _{Max}
Hold workpiece in case of power loss?		Yes			
Motor		Integrated, electric BLDC			

⁽¹⁾ When pads are mounted, the minimum value is 158 mm and the maximum value is 418 mm.

⁽²⁾ See [Force vs Current Graph](#)

⁽³⁾ At 6 mm stroke and 150 N. The typical value is 900 ms at 20 mm and 200 N.

⁽⁴⁾ For more information, see the [Noise level](#) section.

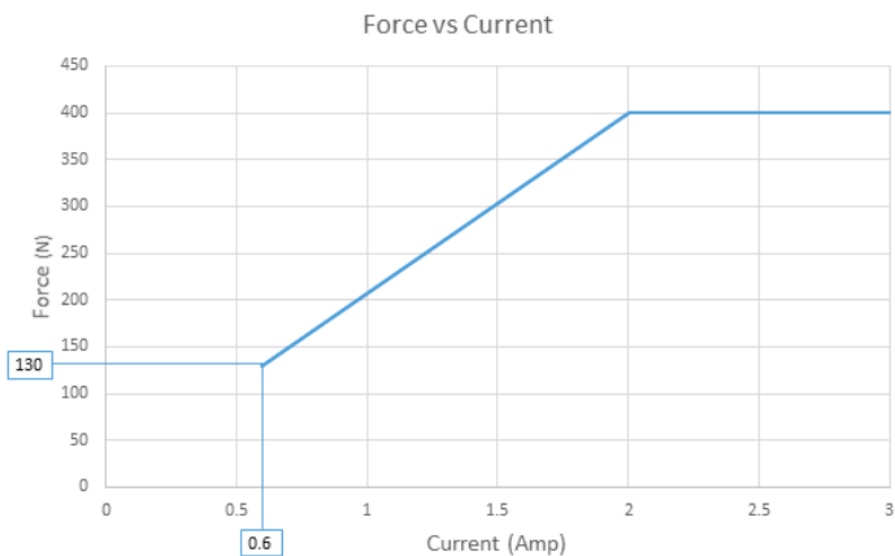
Vacuum grip properties	Minimum	Typical	Maximum	Unit
Vacuum	5	-	60	[%Vacuum]
	- 0.05	-	- 0.607	[Bar]
	1.5	-	17.95	[inHg]
Air flow	0		12	[L/min]
Payload (with delivered attachments)		-	2.5	[kg]
		-	5.51	[lb]
Vacuum cups	1		4	[pcs]

Vacuum grip properties	Minimum	Typical	Maximum	Unit
Gripping time (measured with vacuum target 40 %)		0.25		[s]
Release time		0.4		[s]
Vacuum pump	Integrated, electric BLDC			
Dust filters	Integrated 50 µm, field replaceable			

General properties	Minimum	Typical	Maximum	Unit
Storage temperature	0	-	60	[°C]
	32	-	140	[°F]
IP Classification	54			
Dimensions [L x W x D]	400 x 121.6 x 188			[mm]
	15.75 x 4.79 x 7.4			[inch]
Weight - Base unit without fingers or cups	3.7			[kg]
	8.16			[lb]
Weight - With fingers, pads on one finger, bracket for cups and cups	5.2			[kg]
	11.46			[lb]

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20	24	25	[V]
Current consumption	-	-	2000	[mA]
Operation temperature	5	-	50	[°C]
	41	-	122	[°F]
Relative humidity (non-condensing)	0	-	95	[%]

Force vs Current Graph



Noise Level

The noise level of the 2FGP20 depends on whether the finger or vacuum gripping part is used. Vacuum gripping noise depends on the set vacuum level and whether an object is picked up or not. Higher speed and stroke increase the noise. The noise level also depends on the surroundings and other equipment.

To measure the 2FGP20's noise level, a test has been carried out by an external company.

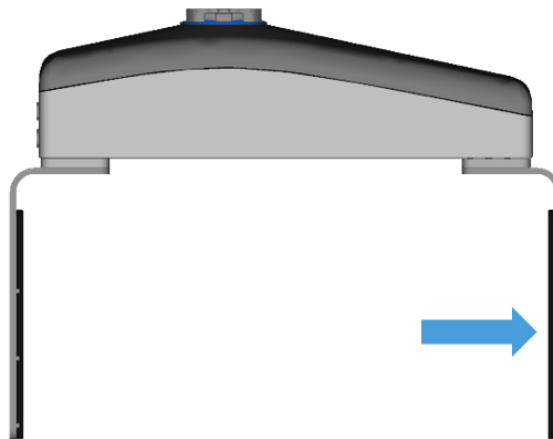
The test setup was the following:

- The test took place in a normal indoor production area.
- The finger gripping test ran 4 cycles full stroke, 100 % speed and with no pause in between the cycles.
- The vacuum gripping test was made with fully activated pump and with no pause.
- The noise measurement equipment was located in 1 m distance away from the 2FGP20.

The test concludes that the average measured noise level was below 58 dB(A)_{Leq} for the finger gripper and 72 dB(A)_{Leq} for the vacuum. The maximum noise level was measured below 63 dB(A)_{Max} for the finger gripper and 74 dB(A)_{Max} for the vacuum, which is below the maximum allowed noise level of (80 dB(A)). The 2FGP20 will not run continuously in an application which means that the average noise level will decrease significantly.

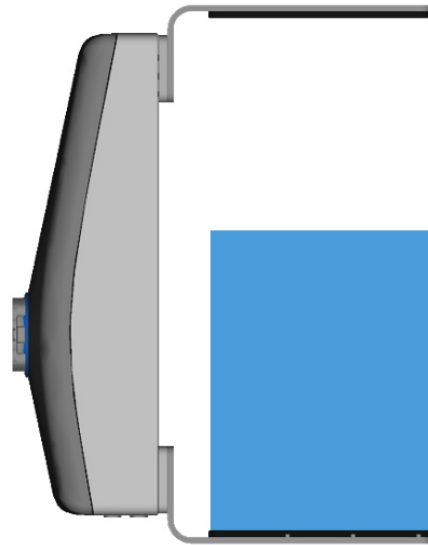
Force Sensor

The gripper has a force sensor in the moving finger as shown in the figure below.



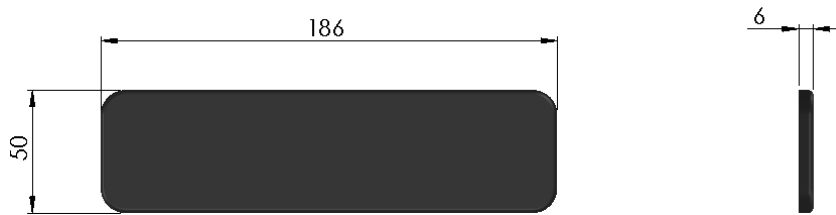
Consider the presence of the force sensor when the workpiece is aligned by using the fingers of the gripper or when the workpiece is picked sideways since the gravity can affect the force measurement.

If the workpiece is picked sideways, make sure to orient the gripper with the moving finger on top, as shown in the image below. Also ensure that the bottom finger makes contact with the workpiece before the top finger.

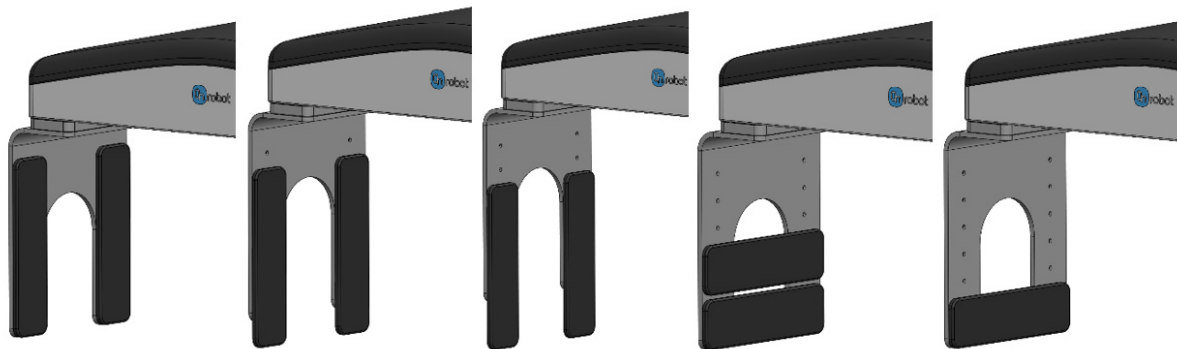


Finger pads

Four finger pads are provided with the gripper and can be mounted in different configurations to achieve the best grip for your workpiece.



Some examples of how the pads can be mounted are shown below.



The pads are made of aluminum with a cover of silicone. The maximum force (equally distributed in the blue area of the images below) that can be applied to the finger pads is shown in the table below.

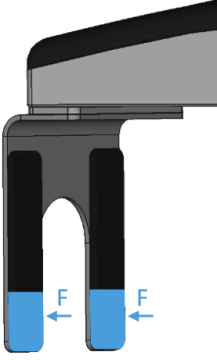
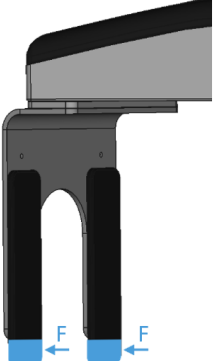
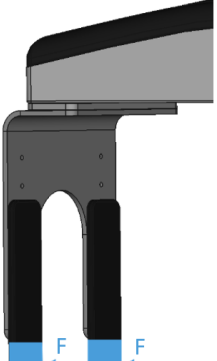
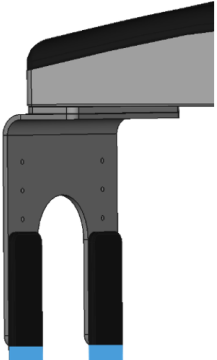
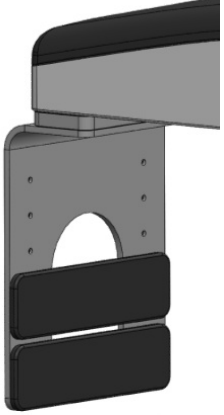
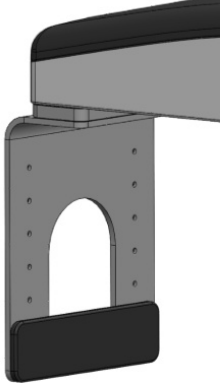
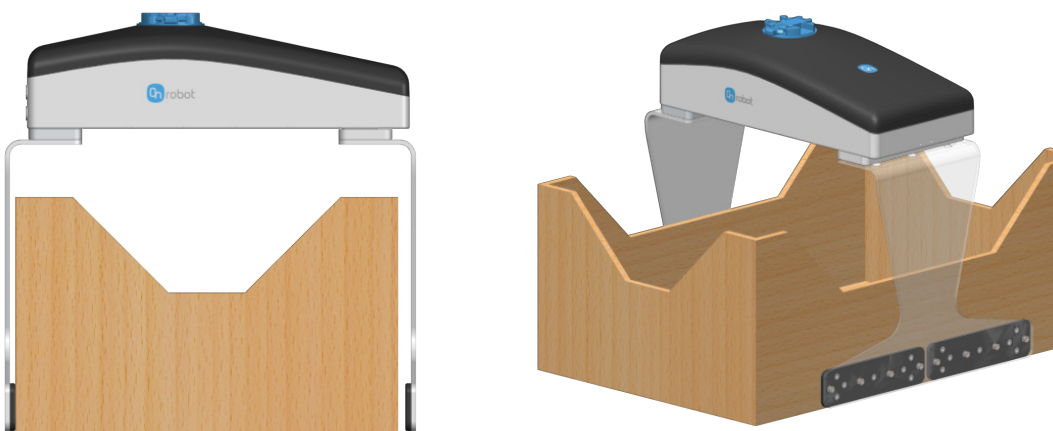
Illustration	Pad position	Maximum force (N)
	0	400
	1	300
	2	200
	3	100

Illustration	Pad position	Maximum force (N)
	4	400
	5	400

Custom fingers

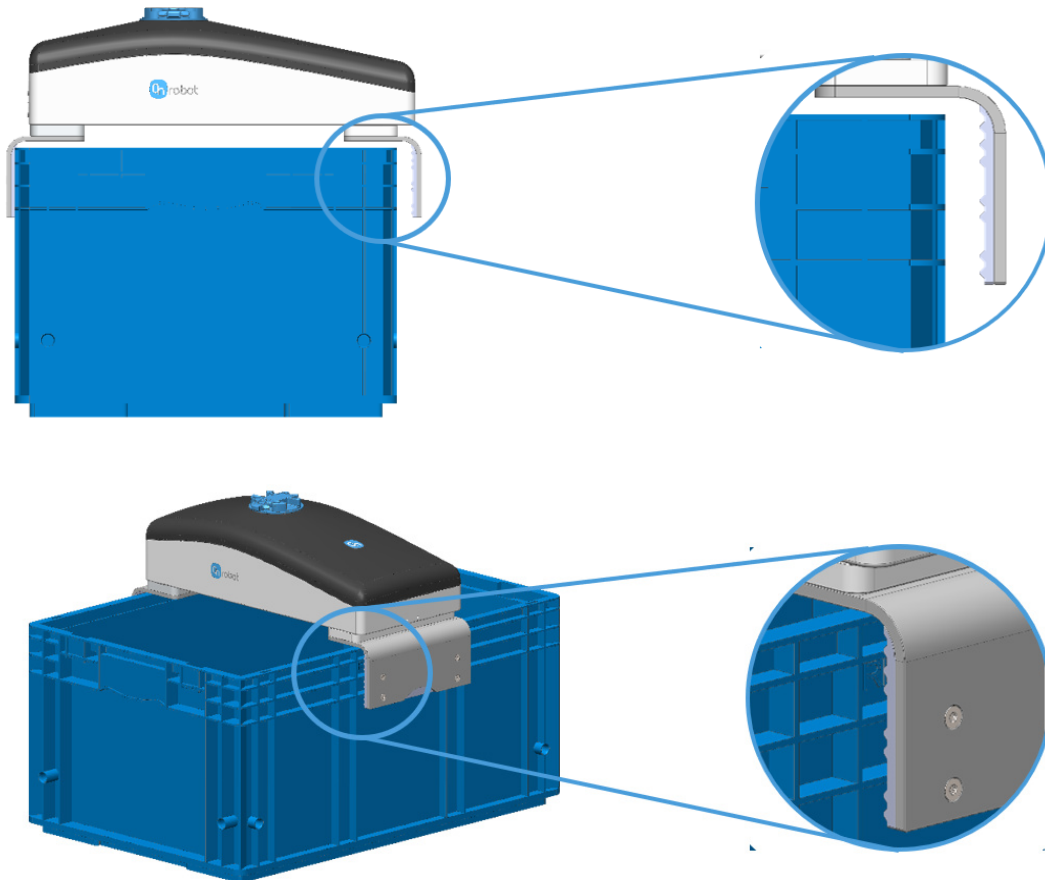
The standard fingers provided with the gripper have a height of 220 mm. For workpieces taller than 220 mm, it is recommended to customize the fingers.

An example is shown in the picture below where the pressure is recommended to be applied at the bottom of the workpiece. To achieve this, custom longer fingers are used, and the fingerpads are attached horizontally. This is the best way to get a firm grip.

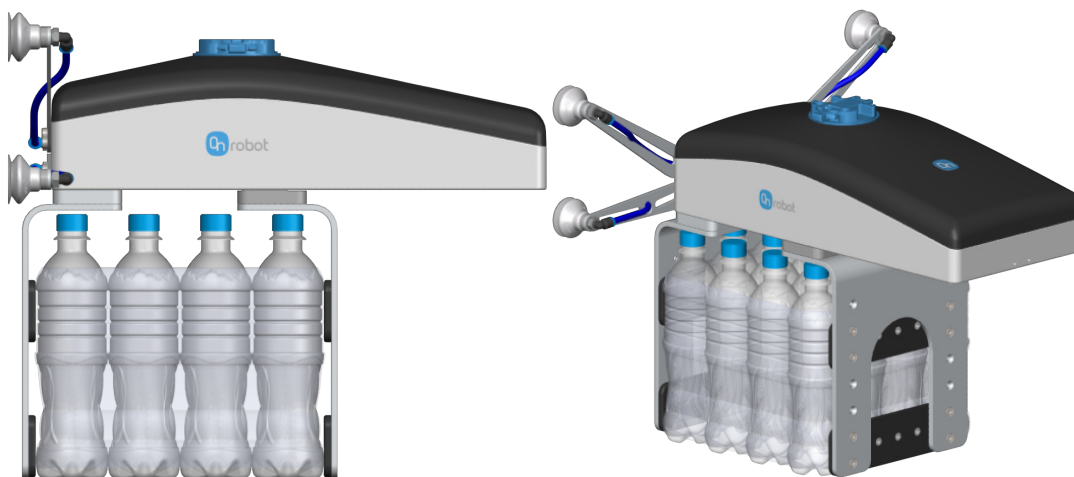


By increasing the finger height, the allowed torque might be reduced as shown in the [Moments in the finger base](#) section.

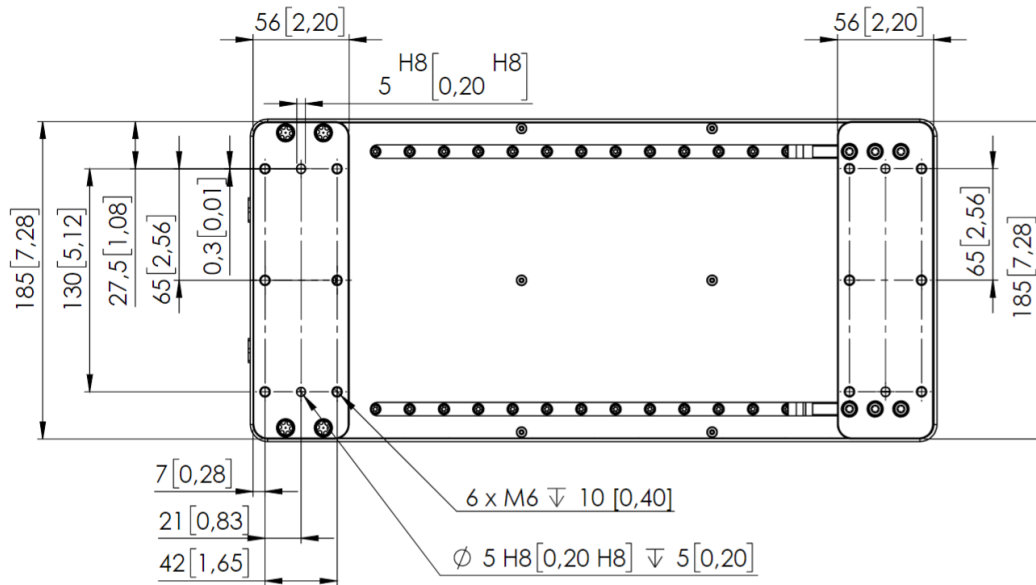
Another example is shown in the image below with custom fingers and fingerpads that are made to achieve a form fit. These kinds of fingers and fingerpads are helpful with KLT boxes.



Another example is shown in the image below for picking wrapped foil bottles. For this workpiece type, it is recommended to mount the pads horizontally to have as many contact points as possible. By doing so, the applied force can be increased and a firmer grip is achieved. Place the pads as close to the bottom of the workpiece as possible, so the workpiece structure is stronger and can resist more force.

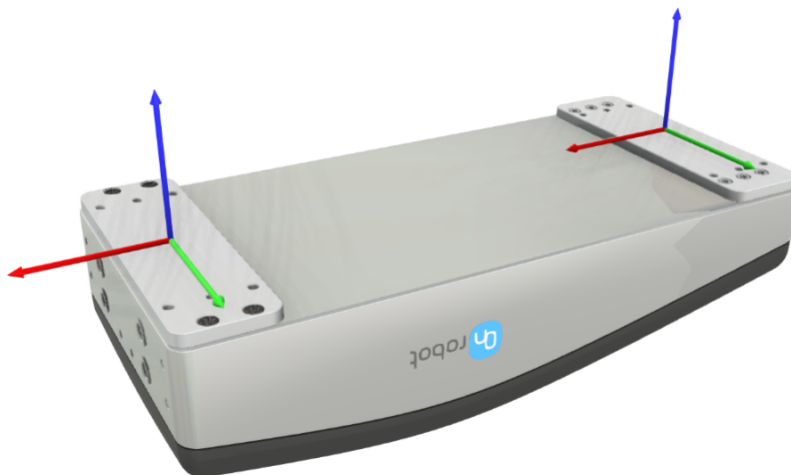


If custom fingers are required, they can be made to fit the gripper according to the dimensions (mm) [inch] shown below. Use M6x10mm screws to attach the fingers.



Moments in the finger base

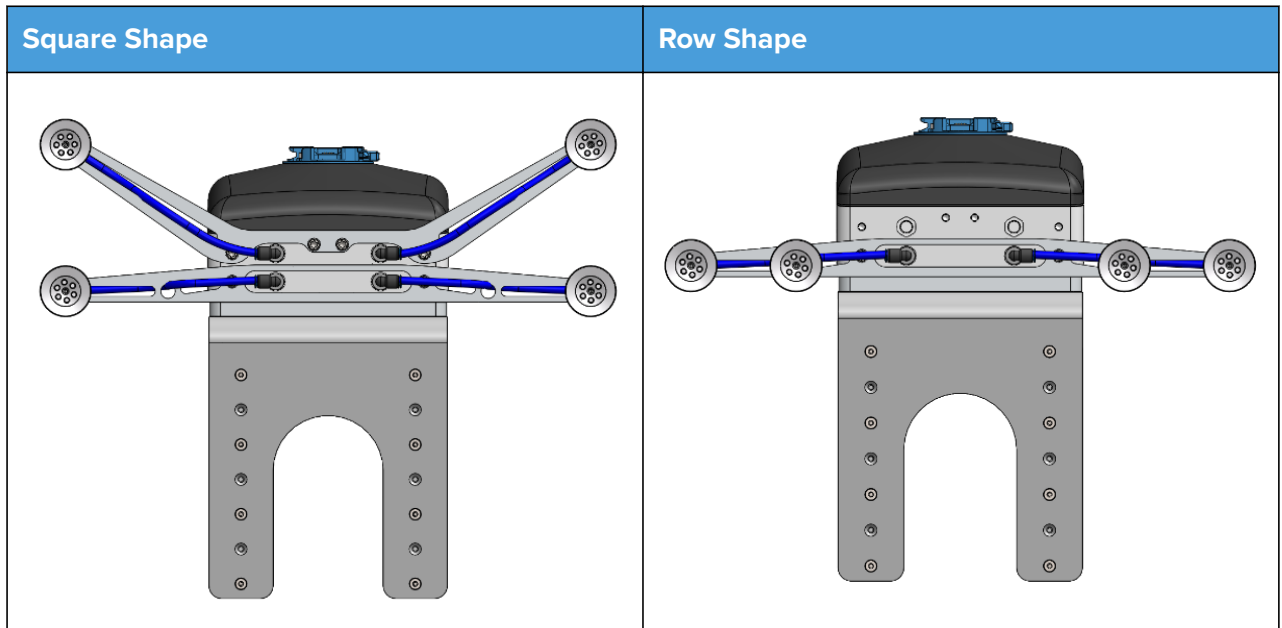
A maximum moment 80 Nm is allowed on each direction of the finger base.



Vacuum cups

The vacuum solution has been designed to handle slip sheets and similar items. The two most common configurations with the delivered bracket and cups are shown below.

Square Shape	Row Shape
Better for cardboard slip sheets or multiple layer paper	Better for paper or similar slip sheets



The provided tube length is adequate for the Square Shape. For using the Row Shape, please cut two of the tubes to 83 mm length.

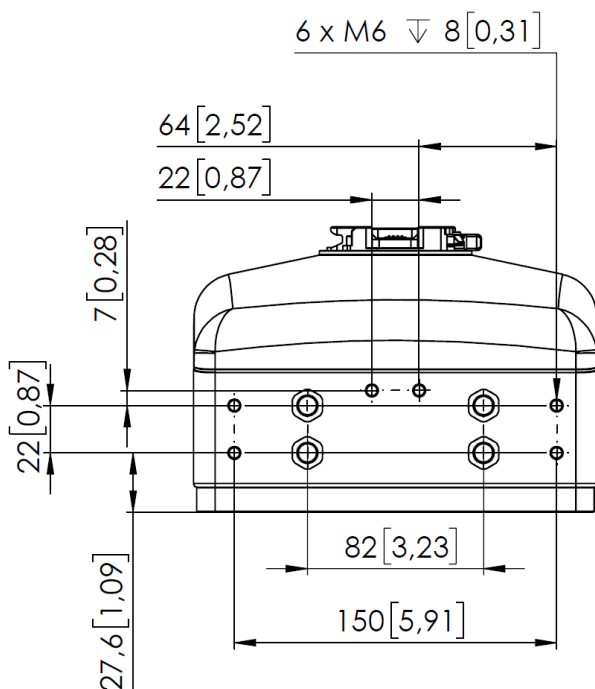


NOTE:

It is important to always use the four air sources together.

Custom Vacuum Bracket

If a custom bracket is required, it can be made to fit the gripper according to the dimensions (mm) [inch] shown below. Use M6x6mm screws to attach the fingers.



9.1.2. Lift100

General Properties		Minimum	Typical	Maximum	Unit
Allowed torque between the Lift100 and the robot	Static (Lift100 is not moving)	-	-	3400	[Nm]
	Dynamic (Lift100 is moving)	-	-	1900	[Nm]
Payload		0	-	100	[kg]
		0	-	220	[lb]
Height above floor		730	-	1630	[mm]
		28.74	-	64.17	[inch]
Stroke of the Lift100		0	-	900	[mm]
		0	-	35.43	[inch]
Lift100 speed		10	-	100	[mm/s]
		0.34	-	3.39	[in/s]
Positioning accuracy *		-	+/- 3	-	[mm]
		-	+/- 0.12	-	[inch]
Positioning repeatability *		-	+/- 0.5	-	[mm]
		-	+/- 0.02	-	[inch]
Noise level **		-	-	75	[dB(A)] _{Leq}
		-	-	78	[dB(A)] _{Max}
Duty cycle ***		0	-	100	[%]
Weight		86			[kg]
		189.6			[lb]
Dimensions [L x W x D]		730 x 325 x 492	-	1630 x 325 x 492	[mm]
		28.74 x 12.8 x 19.37	-	64.17 x 12.8 x 19.37	[inch]
Storage temperature		0	-	60	[°C]
		32	-	140	[°F]
IP Classification	IP54				

* Along the driven axis.

** For more information, see the [Noise level](#) section.

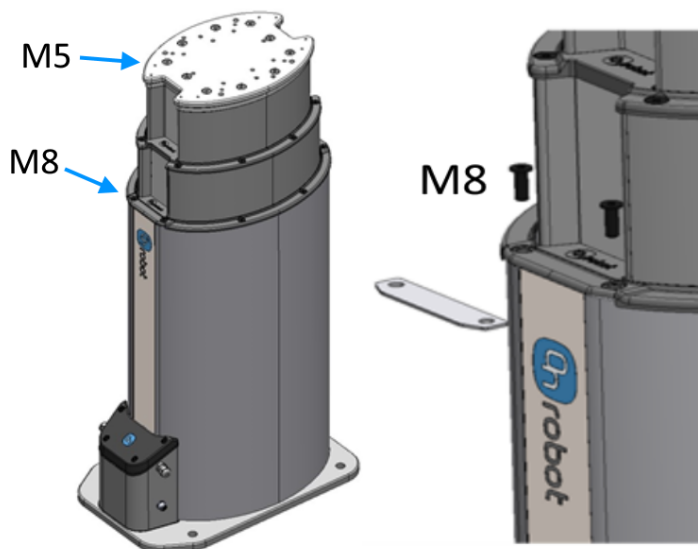
*** For more information on the duty cycle, see the [Operational Limits](#) section.

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	90	-	264	[V]
Current consumption	0	-	10.2	[A]
Frequency	47	-	63	[Hz]
Operating temperature	0	-	50	[°C]
	32	-	122	[°F]

Operating Conditions	Minimum	Typical	Maximum	Unit
Relative humidity (non-condensing)	0	-	95	[%]
Calculated operation life	1 000 000	-	-	[cycles]

Interface for Mounting an Energy Chain

The Lift100 has been designed with a mechanical interface to mount an energy chain. The brackets for the energy chain can be mounted on the screw holes M5 and M8 shown below. For the bottom holes (M8), the plate can be removed to install the energy chain bracket.



Noise Level

The noise level of the Lift100 depends on the speed and the stroke position. Higher speed and stroke increase the noise. The noise level also depends on the surroundings and other equipment.

To measure the Lift100's noise level, a test has been carried out by an external company.

The test setup was the following:

- The test took place in a normal indoor production area.
- The Lift100 was bolted to the floor and had a 74 kg robot mounted.
- The test ran 4 cycles, full stroke up and down, 100 % speed and with no pause in between the cycles.
- The noise measurement equipment was located in 2 m distance away from the Lift100.

The test concludes that the average measured noise level was 75 dB(A)_{Leq} and the maximum noise level was 78 dB(A)_{Max} which is below the maximum allowed noise level of (80 dB(A)).

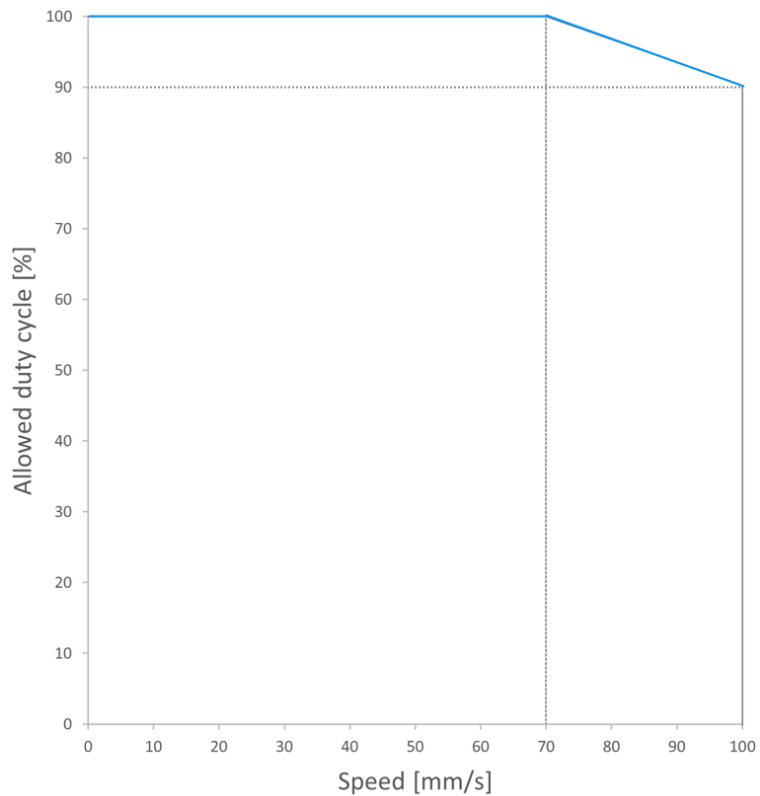
The Lift100 will run about 5-15 % of the time in a normal palletizing application, which means that the average noise level will decrease significantly.

Operational Limits

At speeds above 70 mm/s a reduced duty cycle is required. Above 70 mm/s the Lift100 can run continuously for maximum 10 minutes.

The graph shows that at 100 mm/s speed, 90% of the time is the running phase and 10% of the time is the pause.

Within the period of 10 minutes of continuous running at 100 mm/s speed, a total of a one-minute pause is required.



9.1.3. Pallet Station

General Properties	Minimum	Typical	Maximum	Unit
Sensor activation zone	0 0	- -	6 0.236	[mm] [inch]
Weight	17 34.5			[kg] [lb]
Dimensions [L x W x D]	828 x 428.5 x 207.5 32.6 x 16.87 x 8.17	- -	828 x ∞ x 207.5 32.6 x ∞ x 8.17	[mm] [inch]
Pallet sizes	All sizes *			
Storage temperature	0 32	- -	60 140	[°C] [°F]
IP Classification	IP54			

* The actual maximum pallet size depends on the robot reach, the robot mounting height, the box size and EOAT size.

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	19.2	24	26.4	[V]
Current consumption	0	-	20	[mA]

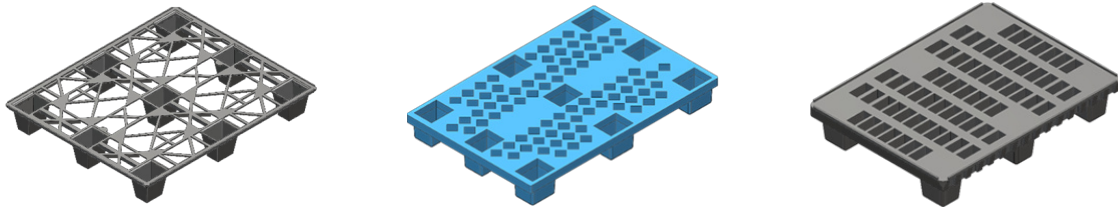
Operating Conditions	Minimum	Typical	Maximum	Unit
Operating temperature	0	-	50	[°C]
	32	-	122	[°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated operation life	200 000	-	-	[cycles]

Supported Pallet Types

Pallet Name	Dimensions (L x W x H) in [mm]	Illustration
North America	1016 x 1219 x 127	
Australia	1165 x 1165 x 150	
EUR 1	1200 x 800 x 144	
EUR 6	600 x 800 x 144	
UK	1200 x 1000 x 145	

Pallet Name	Dimensions (L x W x H) in [mm]	Illustration
Asia	1100 x 1100 x 135	
Custom	Maximum 1250 x 1250 Min 600 x 800	

Some plastic pallets are also supported as long as they are within the maximum and minimum dimensions. See examples in the images below:



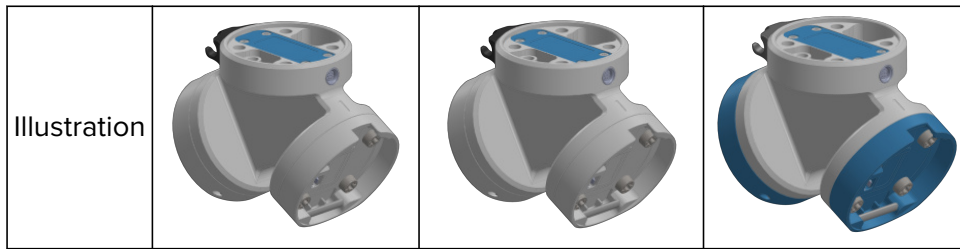
9.1.4. Quick Changers

Quick Changer

Name	Quick Changer I/O support – Robot Side	Quick Changer - Robot Side	Quick Changer - Robot Side 4.5A	Quick Changer - Robot Side
Item #	102326	102037	104277	109498
Version	QC-R – I/O	QC-R v2	QC-R v2-4.5	QC-R v3
Illustration				

Dual Quick Changer

Name	Dual Quick Changer	Dual Quick Changer 4.5A	Dual Quick Changer
Item #	101788	104293	109878
Version	Dual QC v2	Dual QC v2-4.5	Dual QC v3



If not specified, the data represent the combination of the different Quick Changer types/sides.

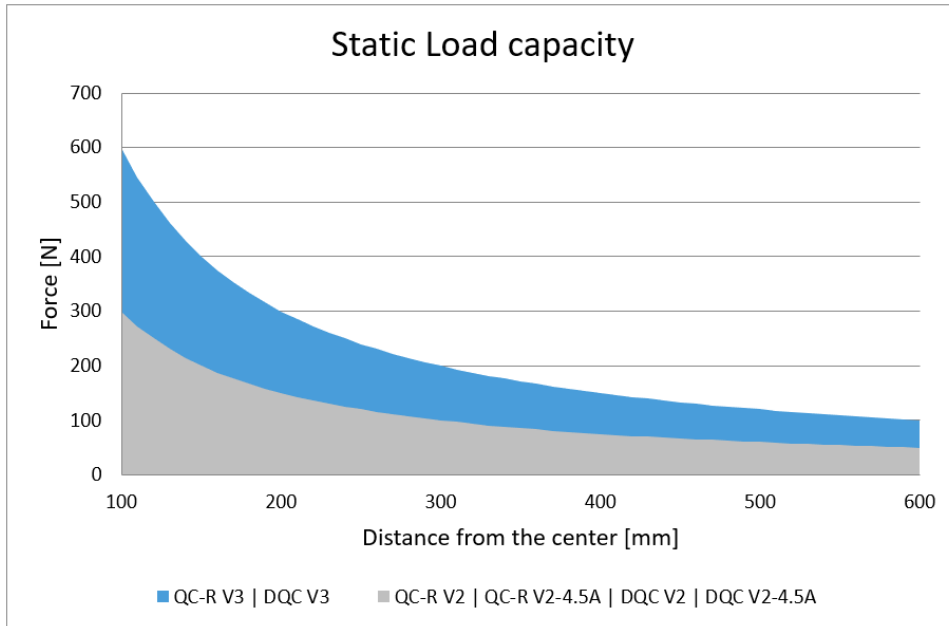
Technical data	Min	Typical	Max	Units
Permissible force *	-	-	600*	[N]
Permissible torque *	-	-	60*	[Nm]
Rated payload *	-	-	20*	[kg]
	-	-	44	[lbs]
Repeatability	-	-	±0.02	[mm]
IP Classification	67			
Operating life (Tool change)	-	5.000	-	[cycles]
Operating life (Robot operation)	-	10	-	[M cycles]
Operating temperature	5	-	50	[°C]
	41	-	122	[°F]

* See static load capacity graph below.

	Quick Changer	Quick Changer for I/O	Dual Quick Changer	Quick Changer - Tool Side	Units
Weight	0.06	0.093	0.41	0.14	[kg]
	0.13	0.21	0.9	0.31	[lb]
Dimensions	See Mechanical dimension section				

QC-R V3 | DQC V3 and the QC-R V2 | QC-R V2-4.5A | DQC V2 | DQC V2-4.5A

The following graph shows the load capacity that the QC-R V3 | DQC V3 and the QC-R V2 | QC-R V2-4.5A | DQC V2 | DQC V2-4.5A can handle in a static situation. The values for a situation with an acceleration of 2g are half of the static values.



9.1.5. Compute Box

9.1.5.1. With 6.25A Wall Adapter (150W)

Supplied Wall Adapter	Minimum	Typical	Maximum	Unit
Input voltage (AC)	100	-	240	[V]
Input current	-	-	2.1	[A]
Output voltage	-	24	-	[V]
Output current	-	6.25	-	[A]

Compute Box Power input (24V connector)	Minimum	Typical	Maximum	Unit
Supply voltage	-	24	25	[V]
Supply current	-	6.25	-	[A]

Compute Box Power output (Device connector)	Minimum	Typical	Maximum	Unit
Output voltage	-	24	25	[V]
Output current	-	4.5	4.5*	[A]

* Peak currents

9.1.5.2. Compute Box I/O interface

Power Reference (24V, GND)	Minimum	Typical	Maximum	Unit
Reference output voltage	-	24	25	[V]
Reference output current	-	-	100	[mA]

Output (DO1-DO8)	Minimum	Typical	Maximum	Unit
Output current - altogether	-	-	100	[mA]
Output resistance (active state)	-	24	-	[Ω]

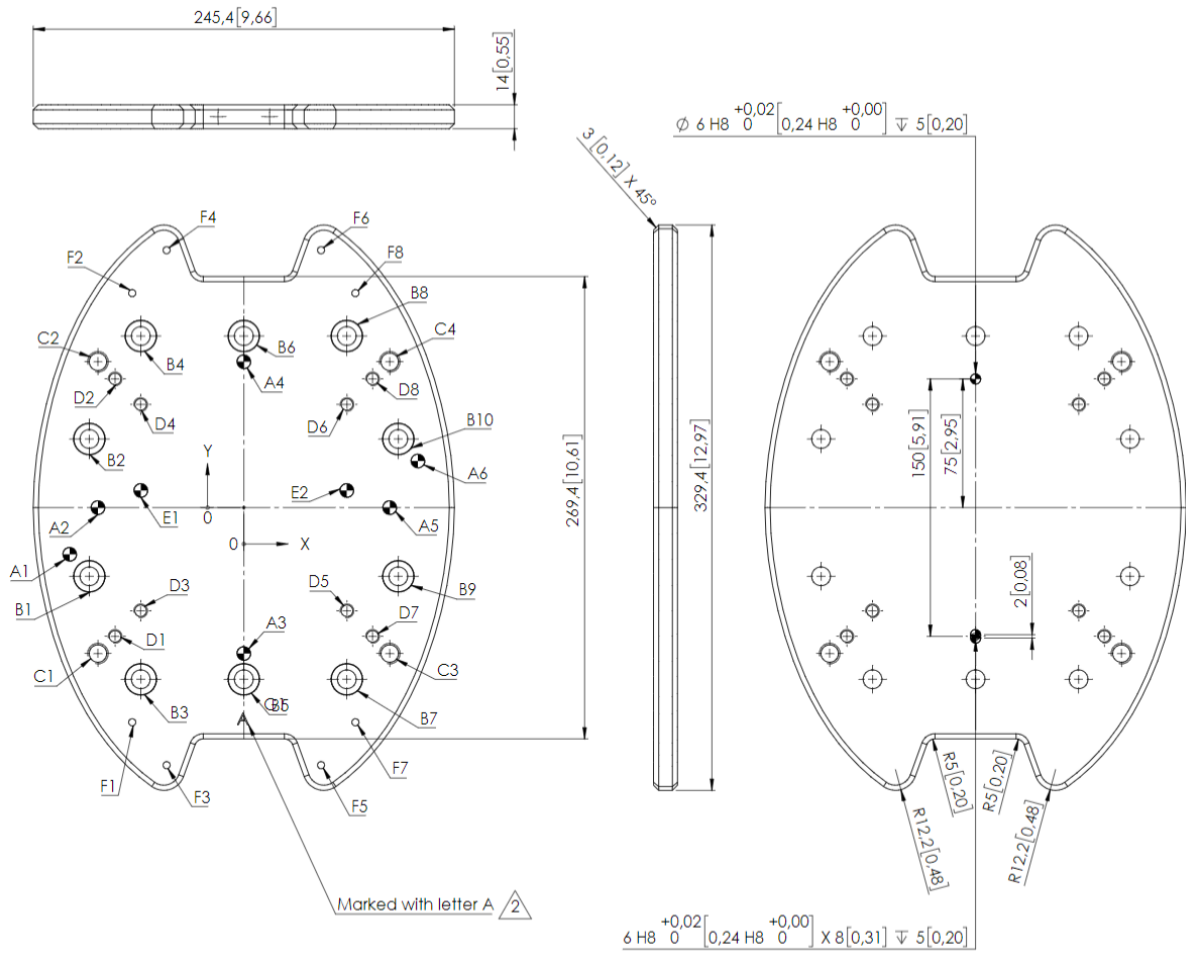
Input (DI1-DI8) as PNP	Minimum	Typical	Maximum	Unit
Voltage level - TRUE	18	24	30	[V]
Voltage level - FALSE	-0.5	0	2.5	[V]
Input current	-	-	6	[mA]
Input resistance	-	5	-	[k Ω]

Input (DI1-DI8) as NPN	Minimum	Typical	Maximum	Unit
Voltage level - TRUE	-0.5	0	5	[V]
Voltage level - FALSE	18	24	30	[V]
Input current	-	-	6	[mA]
Input resistance	-	5	-	[k Ω]

9.2. Mechanical Drawings

9.2.1. Adapter Plate

9.2.1.1. Adapter Plate A

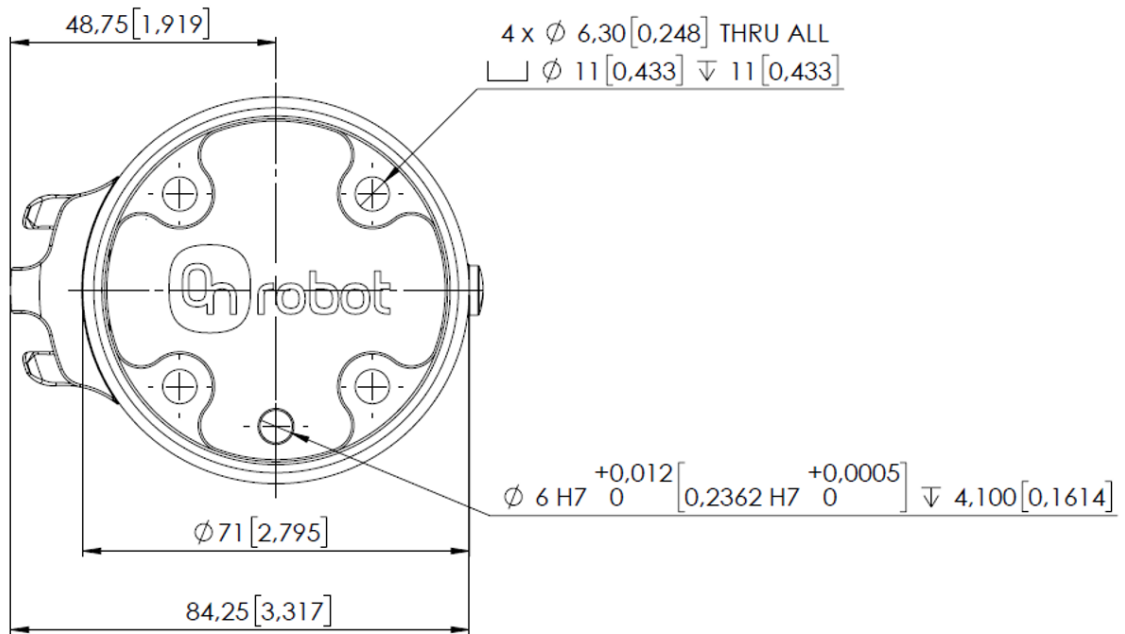
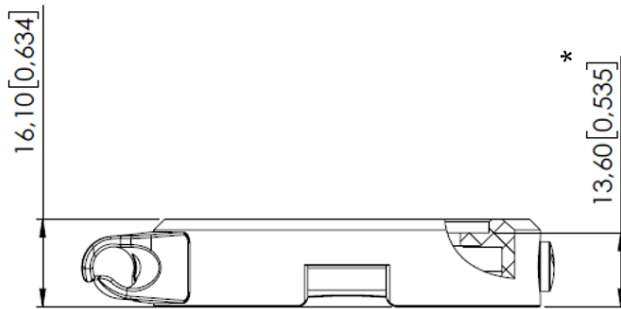


All dimensions are in mm and [inches].

TAG	X.LOC	Y.LOC	SIZE	TAG	X.LOC	Y.LOC	SIZE
A1	[-3.99] -101.42	[-1.07] -27.18	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	D8	[2.95] 75	[2.95] 75	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$
A2	[-3.35] -85	0	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	E1	[-2.36] -60	[0.39] 10	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.24] 6
A3	0	[-3.35] -85	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	E2	[2.36] 60	[0.39] 10	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.24] 6
A4	0	[3.35] 85	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	F1	[-2.56] -65	[4.92] -125	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
A5	[3.35] 85	0	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	F2	[-2.56] -65	[4.92] 125	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
A6	[3.99] 101.42	[1.07] 27.18	$\begin{bmatrix} +0.00 \\ 0.31 \text{ HB } 0 \\ +0.02 \\ \varnothing 8 \text{ HB } 0 \end{bmatrix}$ [0.20] 5	F3	[-1.77] -45	[-5.91] -150	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B1	[-3.54] -90	[-1.57] 40	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	F4	[-1.77] -45	[5.91] 150	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B2	[-3.54] -90	[1.57] 40	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	F5	[1.77] 45	[-5.91] -150	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B3	[-2.36] -60	[-3.94] -100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	F6	[1.77] 45	[5.91] 150	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B4	[-2.36] -60	[3.94] 100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	F7	[2.56] 65	[-4.92] -125	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B5	0	[-3.94] -100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	F8	[2.56] 65	[4.92] 125	$\begin{bmatrix} 0.17 \\ \varnothing 4.20 \\ 10 \\ \text{M5 - 6H } \varnothing 8 \end{bmatrix}$ [0.31]
B6	0	[3.94] 100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$	G1	-0.51	-122.94	
B7	[2.36] 60	[-3.94] -100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$				
B8	[2.36] 60	[3.94] 100	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$				
B9	[3.54] 90	[-1.57] -40	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$				
B10	[3.54] 90	[1.57] 40	$\begin{bmatrix} 0.43 \\ \varnothing 11 \text{ THRU ALL} \\ [0.71] [0.26] \\ \varnothing 18 \varnothing 6.60 \\ [0.72] \\ \varnothing 18.40 \text{ X } 90^\circ \text{ Near Side} \end{bmatrix}$				
C1	[-3.35] -85	[-3.35] -85	$\begin{bmatrix} 0.40 \\ \varnothing 10.20 \text{ THRU ALL} \\ \text{M12 - 6H THRU ALL} \end{bmatrix}$				
C2	[-3.35] -85	[3.35] 85	$\begin{bmatrix} 0.40 \\ \varnothing 10.20 \text{ THRU ALL} \\ \text{M12 - 6H THRU ALL} \end{bmatrix}$				
C3	[3.35] 85	[-3.35] -85	$\begin{bmatrix} 0.40 \\ \varnothing 10.20 \text{ THRU ALL} \\ \text{M12 - 6H THRU ALL} \end{bmatrix}$				
C4	[3.35] 85	[3.35] 85	$\begin{bmatrix} 0.40 \\ \varnothing 10.20 \text{ THRU ALL} \\ \text{M12 - 6H THRU ALL} \end{bmatrix}$				
D1	[-2.95] -75	[-2.95] -75	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D2	[-2.95] -75	[2.95] 75	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D3	[-2.37] -60.10	[-2.37] -60.10	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D4	[-2.37] -60.10	[2.37] 60.10	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D5	[2.37] 60.10	[-2.37] -60.10	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D6	[2.37] 60.10	[2.37] 60.10	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				
D7	[-2.95] -75	[-2.95] -75	$\begin{bmatrix} 0.27 \\ \varnothing 6.80 \text{ THRU ALL} \\ \text{M8 - 6H THRU ALL} \end{bmatrix}$				

9.2.2. Mountings

9.2.2.1. Quick Changer - Robot Side



* Distance from Robot flange interface to OnRobot tool.

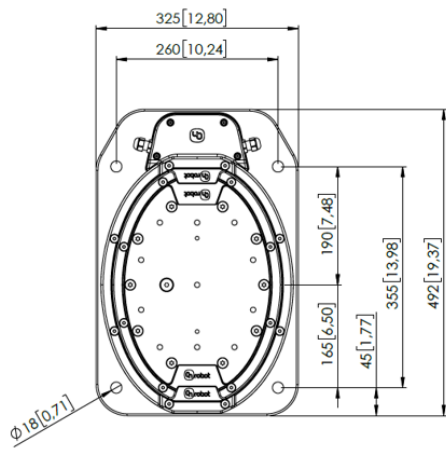
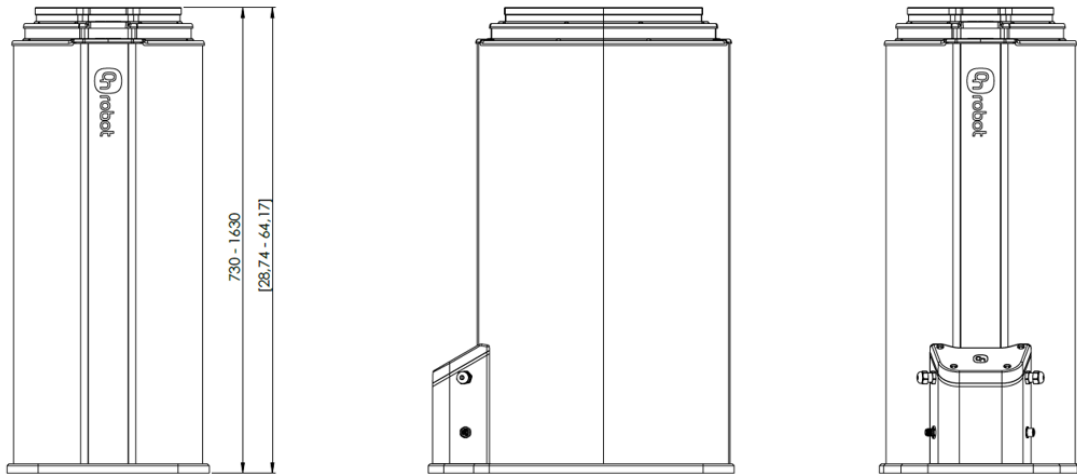
All dimensions are in mm and [inches].



NOTE:

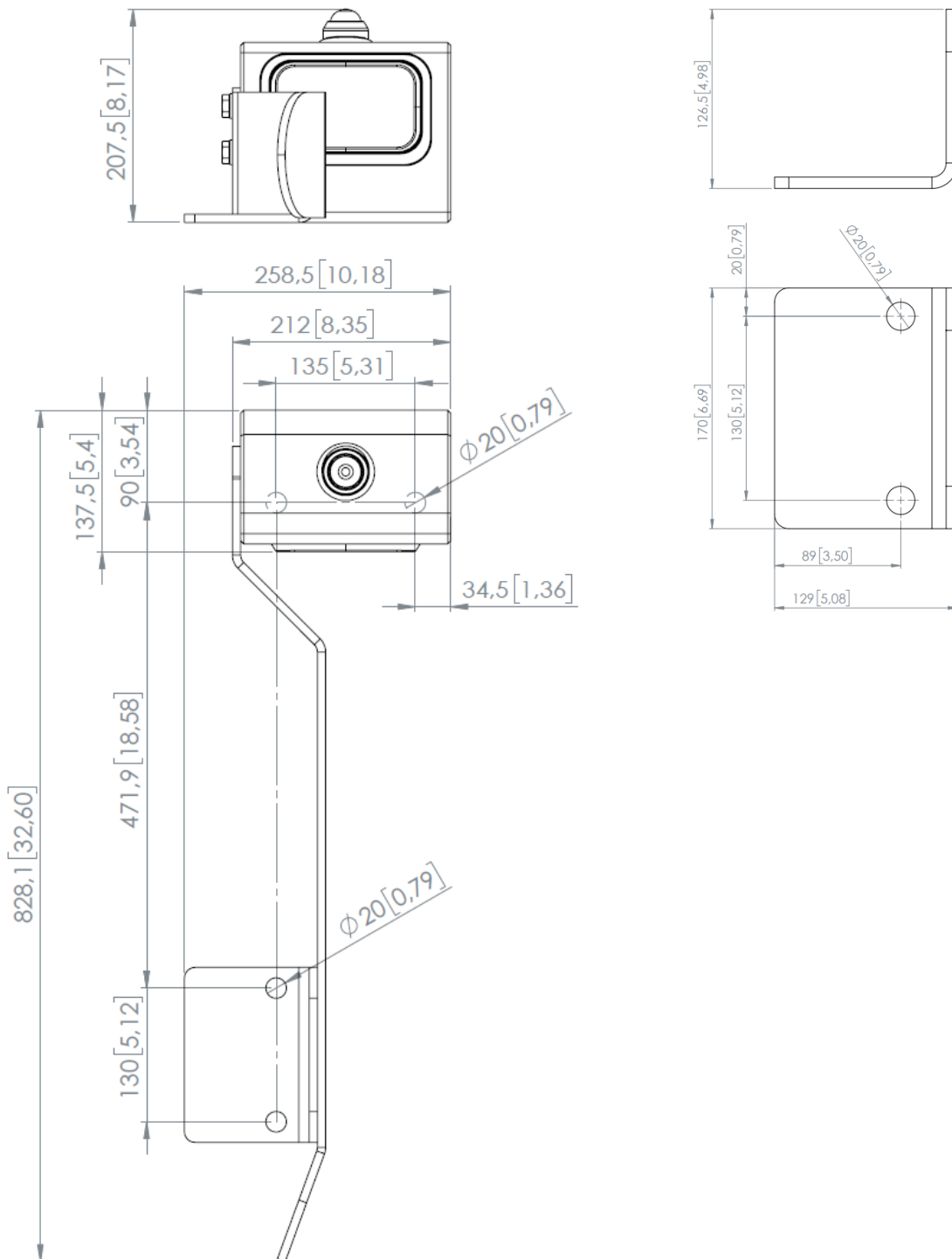
The cable holder (on the left side) is only required with the long (5 meter) cable.

9.2.3. Lift100



All dimensions are in mm and [inches].

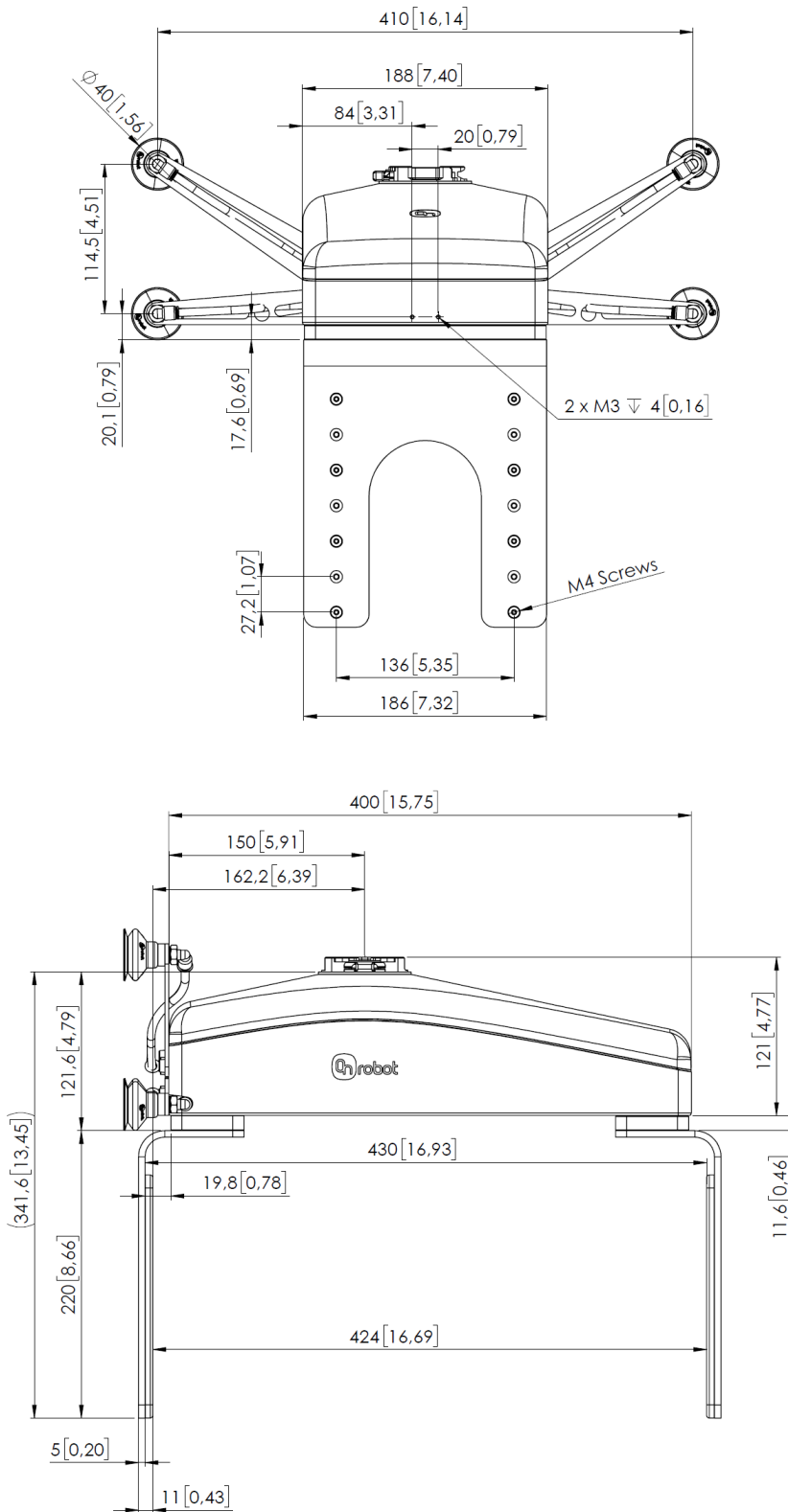
9.2.4. Pallet Station



All dimensions are in mm and [inches].

9.2.5. Tools

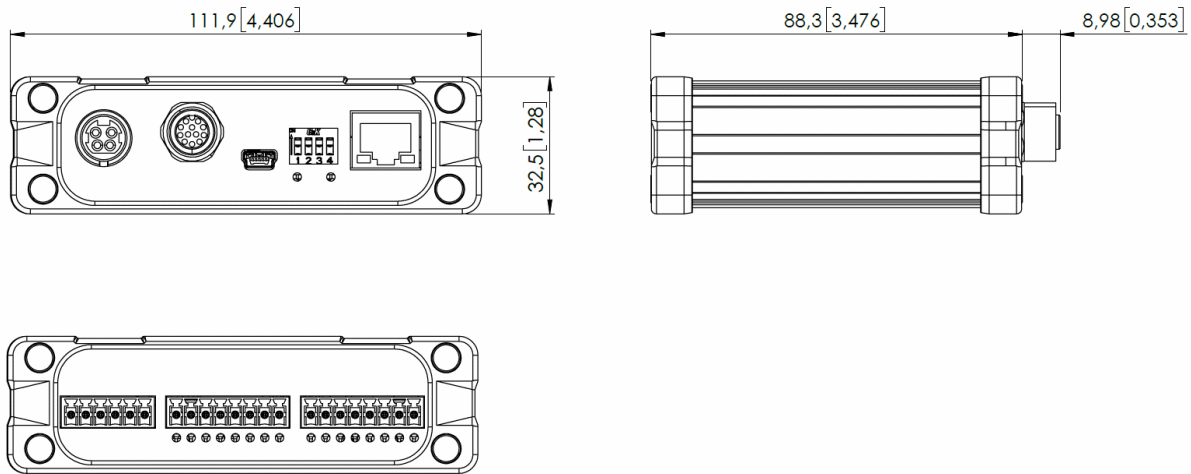
9.2.5.1. 2FGP20



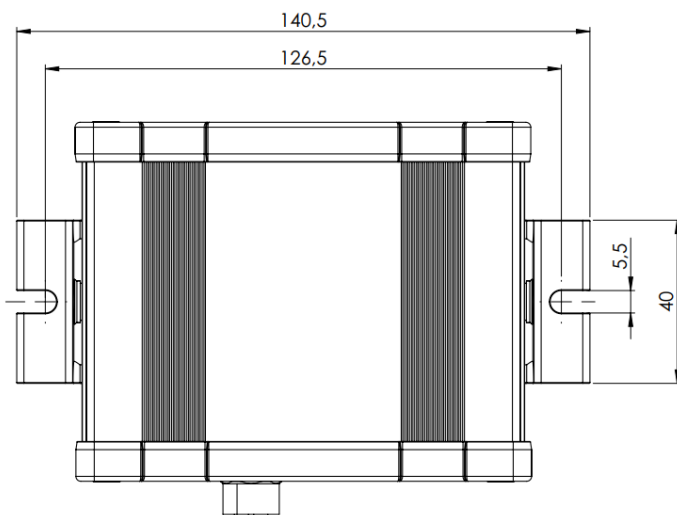
All dimensions are in mm and [inches].

9.2.5.2. Compute Box

Compute Box



Clip-on Bracket (optional)



All dimensions are in mm and [inches].

9.3. TCP, CoG

Using Tool Connection

Use the TCP/CoG calculator to calculate the TCP and CoG values for your OnRobot product combination.

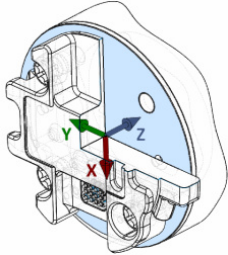
The TCP/CoG calculator can be downloaded from www.onrobot.com/downloads.

Using Compute Box/Eye Box

For more information, see the [8.1.6. Web Client: TCP, CoG](#) section.

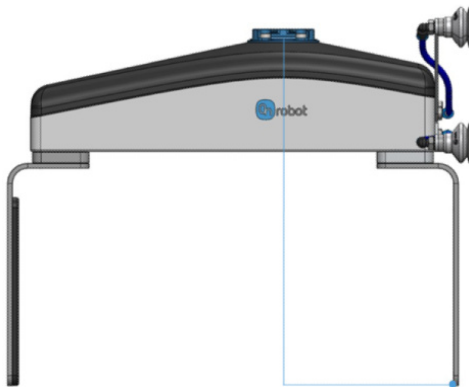
TCP, CoG, and weight parameters of the single devices (without any mounting/adapter):

9.3.1. 2FGP20

Coordinate system	TCP [mm] *	Center of Gravity [mm] **	Weight **
	<p>X=168</p> <p>Y=0</p> <p>Z=341</p>	<p>cX=1.6</p> <p>cY=-6</p> <p>cZ=110</p>	<p>5.2 kg</p> <p>11.46 lb</p>

* TCP at the end of the fixed finger (marked with the blue dot on the image below).

** Suction cups and two pads on the moving finger as shown in the image below.



10. Maintenance

**WARNING:**

An overall inspection of OnRobot's end-of-arm tooling and accessories must be performed regularly and at least once every 6 months. This inspection must include but is not limited to check for defective material and clean gripping surfaces.

Use original spare parts, and original service instructions for OnRobot's end-of-arm tooling, accessories and the robot. Failure to comply with this precaution can cause unexpected risks, resulting in severe injury.

If you have questions regarding spare parts and repair, please visit our website www.onrobot.com to contact us.

10.1. 2FGP20

Vacuum Cups

The gripper is equipped with one filter for each suction cup socket, and one filter for the exhaust. How often the filters need to be changed depends on the nature of the workpiece and the working environment. The gripper automatically de-dusts the filters every time a grip is released. However, particles can eventually get stuck and build up inside the filter, lowering the performance of the gripper.

**DANGER:**

Identify how often the filters need service and schedule maintenance with a fixed period short enough to ensure a firm grip at all times. An overall inspection of the gripper must be performed regularly and at least once every 6 months. Neither use nor power on the gripper without filters or with filters mounted incorrectly. Dust, hair and larger particles can get stuck in pump membranes and valve seats, causing permanent damage to the gripper.

Spare Parts

Vacuum

Suction cup kit - PN 109538

- 4x Ø40 mm cups

I-shape bracket kit - PN 109539

- 1x I-shape bracket
- 2x M6x10 screws

V-shape bracketed kit - PN 109540

- 1x V-shape bracket
- 4x M6x10 screws

Fingers

Finger kit - PN 109536

- 1x Finger
- 6x M6x12 screws

Finger pad kit - PN 109537

- 2x Finger pad
- 8x M4x8 screws

Cleaning Recommendations

The following cleaning aids can be used to clean the product:

- Isopropyl 70% alcohol
- Peroxide



NOTE:

Long time exposure and high temperatures can have a negative effect on the materials, especially on the sealings.

Use a dry cloth to wipe the product dry of the cleaning aids used. For optimum product care, use a cloth with water to do the final cleaning of the product. In this way the exposure of chemical aids is minimized on the product.

10.2. Lift100



WARNING:

Always disconnect the power source while performing maintenance or cleaning.

The Lift100 is maintenance free but an overall inspection must be performed regularly and at least once every 6 months. This inspection must include but is not limited to checking for defective material and moving parts.

Cleaning Recommendations

The following cleaning aids can be used to clean the product:

- Isopropyl 70% alcohol
- Peroxide



NOTE:

Long time exposure and high temperatures can have a negative effect on the materials, especially on the sealings.

Use a dry cloth to wipe the product dry of the cleaning aids used. For optimum product care, use a cloth with water to do the final cleaning of the product. In this way the exposure of chemical aids is minimized on the product.

10.3. Pallet Station

The Pallet Station is maintenance free but an overall inspection must be performed regularly and at least once every 6 months. This inspection must include but is not limited to check for defective material and moving parts. In case of any malfunction, contact the vendor from where the Pallet Station has been purchased.

Cleaning Recommendations

The following cleaning aids can be used to clean the product:

- Isopropyl 70% alcohol
- Peroxide



NOTE:

Long time exposure and high temperatures can have a negative effect on the materials, especially on the sealings.

Use a dry cloth to wipe the product dry of the cleaning aids used. For optimum product care, use a cloth with water to do the final cleaning of the product. In this way the exposure of chemical aids is minimized on the product.

11. Troubleshooting

11.1. Robot Has Not Obtained an IP Address

If the Compute Box has not assigned an IP address to the robot, do the following:

Assign a static IP address to the robot that matches your current IP settings on your Compute Box. The default IP address of the Compute Box is 192.168.1.1.

**NOTE:**

Change the last number in the IP address (if using 255.255.255.0 subnet mask) to avoid an IP conflict with the Compute Box.

Example

If the default fixed (192.168.1.1) IP address is used on the Compute Box, then use the following values:

- IP address: 192.168.1.2
- Subnet Mask: 255.255.255.0

11.2. Changing the DIP Switch Does Not Take Effect

To change the DIP switch network settings, first change the DIP switches and then cycle the Compute Box/Eye Box power so the changes will take effect.

If the changes still do not take effect, wait one minute and then cycle the Compute Box/Eye Box power once again.

11.3. Joint Limit Error

If any of the robot joint limits have been edited, an error might occur when running the palletizing application.

Make sure that the robot joint limits are the default ones.

See the list of the robot model joint limits below:

ur_ur16e

```
base -360 360
shoulder -360 360
elbow -360 360
wrist_1 -360 360
wrist_2 -360 360
wrist_3 -360 360
```

ur_ur10e

```
base -359.995 359.995
```

shoulder -359.995 359.995
elbow -359.995 359.995
wrist_1 -359.995 359.995
wrist_2 -359.995 359.995
wrist_3 -359.995 359.995

ur_ur5e

base -359.995 359.995
shoulder -359.995 359.995
elbow -359.995 359.995
wrist_1 -359.995 359.995
wrist_2 -359.995 359.995
wrist_3 -359.995 359.995

ur_ur3e

base -359.995 359.995
shoulder -359.995 359.995
elbow -359.995 359.995
wrist_1 -359.995 359.995
wrist_2 -359.995 359.995
wrist_3 -359.995 359.995

ur_ur10

base -360 360
shoulder -360 360
elbow -360 360
wrist_1 -360 360
wrist_2 -360 360
wrist_3 -360 360

11.4. URCap Operation



CAUTION:

Installed URCaps from different vendors may affect the OnRobot URCaps operation.

If you experience slow GUI response, performance issue, slow program start, error pop-ups, or function loss, make sure that only the OnRobot URCap is installed on the robot.

11.5. Tool Functions Are Not Available

If the tool functions are not available (grayed out) in the program, return to the **Installation** tab > **URCaps** > **Device info** and then back to the program.

11.6. 2FGP20 Error Codes

11.6.1. Motor Not Calibrated

Error code (on the Web Client and in the robot scripts): 64

Description: Motor is not calibrated.

Suggestion(s) to solve the error:

- Power cycle the tool.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair/calibration. Contact your local distributor for more information.

11.6.2. Solenoid Brake Not Calibrated

Error code (on the Web Client and in the robot scripts): 128

Description: Solenoid brake is not calibrated.

Suggestion(s) to solve the error:

- Power cycle the tool.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

11.7. Lift100 Error Codes

11.7.1. E-stop

Error code (on the Web Client and in the robot scripts): 1

Description: The emergency stop button has been pressed.

Suggestion(s) to solve the error:

- Ensure that there is no more danger and the safety hazard has been removed. Then reset the safety stop input.
- Initialize the Lift100.
- Power cycle the Lift100.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

11.7.2. Error Moving/ Can Not Move

Error code (on the Web Client and in the robot scripts): 2

Description: The movement of the Lift100 is physically prevented.

Suggestion(s) to solve the error:

- Ensure that nothing is blocking the Lift100 and preventing it from moving, and send a new `move` command.
- Initialize the Lift100.
- Power cycle the Lift100.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

11.7.3. Move Command Out of Range

Error code (on the Web Client and in the robot scripts): 4

Description: The speed or the target height is wrong. Speed values below 10 mm/s will return the error. Move commands below 0 mm or above 900 mm will return the error.

Suggestion(s) to solve the error:

- Set the correct values for the speed and the target height.
- Initialize the Lift100.
- Power cycle the Lift100.

11.7.4. Mismatch Between Position

Error code (on the Web Client and in the robot scripts): 8

Description: Due to power cycle or another external factor, the Lift100 is at an unknown height, or a height that cannot be guaranteed.

Suggestion(s) to solve the error:

- Initialize the Lift100.
- Power cycle the Lift100.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

11.7.5. Hardware Error

Error code (on the Web Client and in the robot scripts): 32

Description: The motor draws too much current for a given speed with a given weight.

Suggestion(s) to solve the error:

- Resend the command and reduce the weight and/or the speed.
- Initialize the Lift100.
- Power cycle the Lift100.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

12. Warranties

12.1. Patents

Products of OnRobot A/S are protected by several patents; some still in global publication process (Patents pending). All manufacturers of copies and similar products violating any patent claims will be prosecuted.

12.2. Product Warranty

Without prejudice to any claim the user (customer) may have in relation to the dealer or retailer, the customer shall be granted a manufacturer's warranty under the conditions set out below:

In the case of new devices and their components exhibiting defects resulting from manufacturing and/or material faults within 12 months of entry into service (maximum of 15 months from shipment), OnRobot A/S shall provide the necessary spare parts, while the customer (user) shall provide working hours to replace the spare parts, either replace the part with another part reflecting the current state of the art, or repair the said part. This warranty shall be invalid if the device defect is attributable to improper treatment and/or failure to comply with information contained in the user guides. This warranty shall not apply to or extend to services performed by the authorized dealer or the customer themselves (e.g. installation, configuration, software downloads). The purchase receipt, together with the date of purchase, shall be required as evidence for invoking the warranty. Claims under the warranty must be submitted within two months of the warranty default becoming evident. Ownership of devices or components replaced by and returned to OnRobot A/S shall vest in OnRobot A/S. Any other claims resulting out of or in connection with the device shall be excluded from this warranty. Nothing in this warranty shall attempt to limit or exclude a customer's statutory rights nor the manufacturer's liability for death or personal injury resulting from its negligence. The duration of the warranty shall not be extended by services rendered under the terms of the warranty. Insofar as no warranty default exists, OnRobot A/S reserves the right to charge the customer for replacement or repair. The above provisions do not imply a change in the burden of proof to the detriment of the customer. In case of a device exhibiting defects, OnRobot A/S shall not be liable for any indirect, incidental, special or consequential damages, including but not limited to, lost profits, loss of use, loss of production or damage to other production equipment.

In case of a device exhibiting defects, OnRobot A/S shall not cover any consequential damage or loss, such as loss of production or damage to other production equipment.

12.3. Disclaimer

OnRobot A/S continues to improve reliability and performance of its products, and therefore reserves the right to upgrade the product without prior warning. OnRobot A/S ensures that the content of this manual is precise and correct but takes no responsibility for any errors or missing information.

13. Certifications



This is to certify that the management system of:

OnRobot A/S

Main Site: Teglværksvej 47 H, 5220 Odense SØ, Denmark
 Chamber of Commerce: 36492449
 Additional Site: OnRobot A/S, Cikorievej 44, 5220 Odense SØ, Denmark

has been registered by Intertek as conforming to the requirements of

ISO 9001:2015

The management system is applicable to:

Development and sales of End-of-Arms tools for industrial customers worldwide.

Certificate Number:
0096721

Initial Certification Date:
26 November 2019

Date of Certification Decision:
26 November 2019

Issuing Date:
26 November 2019

Valid Until:
25 November 2022



Intertek

Carl-Johan von Plomgren
MD, Business Assurance Nordics

Intertek Certification AB
 P.O. Box 1103, SE-164 22 Kista, Sweden



In the issuance of this certificate, Intertek assumes no liability to any party other than to the Client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organization maintaining their system in accordance with Intertek's requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone. The certificate remains the property of Intertek, to whom it must be returned upon request.



13.1. Manufacturer Test Certificate



All OnRobot products are tested according to OnRobot test specification for the individual product that follows the ISO 9001 standard procedure. OnRobot testing procedure undergoes continuous review and improvement.

13.2. EMC



Attestation of Conformity no. 121-31033-A1

FORCE Technology has performed compliance testing on electrical products since 1967. FORCE Technology is an accredited test house according to EN17025 and participates in international standardization with organizations such as CEN/CENELEC, IEC/CISPR and ETSI. This attestation of conformity with the below mentioned standards and/or normative documents is based on accredited tests and/or technical assessments carried out at FORCE Technology.

Attestation holder OnRobot A/S, Teglværksvej 47H, 5220 Odense SØ, Denmark	
Product identification - Name (Part no.) Power Supplies: PSU (104788), VER36U240-JA, VES120PS24, VES150PS24 (106034). Controllers: UR Kit with Compute Box (102344), Doosan Robot kit (102345), Techman/OMRON TM Robot Kit (102359), KUKA-A Robot kit (102360), KUKA-B Robot kit (102361), FANUC Robot kit (102362), Kawasaki-B Robot kit (102363), Kawasaki-C Robot kit (102364), Kawasaki-D Robot kit (102365), Kawasaki-E Robot kit (102366), Yaskawa-F Robot kit (102367), Yaskawa-G Robot kit (102368), Yaskawa-H Robot kit (102369), NACHI-I Robot kit (102370), NACHI-J Robot kit (102371), Hanwha Robot Kit (103208), Eye Box (103707). Mountings: Dual Quick Changer (101788), Quick Changer Robot side (102037), HEX-E QC (102111), Quick Changer Kit (102277), HEX-H QC (102376), Quick Changer Robot side 4,5A (104277), Dual Quick Changer 4,5A (104293), Quick Changer Kit 4,5A (104388). Tools: 2FG7 (106376), 3FG15 (103666), 2FGP20 Palettizing Gripper (108585), Dispense Tool (106816), Eyes Lighting Kit (107080), Lift100 Lifting robot (108800), MG10 (105202), OnRobot Eyes (103903), Pallet Station (109401), RG2 (102012), RG2-FT (102075), RG6 (102021), Sander (106376), Screwdriver (103961), SG Base Part (103546), VG10 (101661), VGC10 (102844), VGP20 (107242).	
Manufacturer OnRobot A/S	
Technical documentation FORCE Technology Assessment no. 121-31033-A1	
Standards/Normative documents	
IEC 61000-3-2:2018	EMC Directive 2014/30/EU, Article 6
IEC 61000-3-3:2013/AMD1:2017	EN 61000-3-2:2014
IEC 61000-6-2:2016	EN IEC 61000-3-2:2019
IEC 61000-6-4:2018	EN 61000-3-3:2013/A1:2019
	EN 61000-6-2:2005/AC:2005
	EN IEC 61000-6-2:2019
	EN 61000-6-4:2007/A1:2011
	EN IEC 61000-6-4:2019
Additionally, for RG2 (102012), RG6 (102021), 2FGP20 Palettizing Gripper (108585) and Lift100 Lifting robot (108800): IEC 61326-3-1:2017, Industry locations, SIL 2	
The product identified above has been assessed and complies with the specified standards/normative documents. The attestation does not include any market surveillance. It is the responsibility of the manufacturer that mass-produced apparatus have the same properties and quality. This attestation does not contain any statements pertaining to the requirements pursuant to other standards, directives or laws other than the above mentioned.	
Signature Knud A. Baltzen	Digitally signed by Knud A. Baltzen Date: 2022.03.23 17:16:22 +01'00'
Signed by: Knud A. Baltzen, Senior Specialist, Product Compliance	



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13.3. 2FGP20 - Environment



Attestation of Conformity no. 121-33855

Assessment holder OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark													
Product identification OnRobot Gripper 2FGP20													
FORCE Technology test reports Environmental tests of Gripper 2FGP20, report no.: 121-33855-1 dated 03 January 2022													
Other technical documentation													
Conclusion The Gripper 2FGP20 have been tested according to the standards listed below. The test results are given in the Force report listed above. All tests were carried out as specified in the relevant specifications including special test criteria stated by the client.													
<table> <tr> <td>IP 5X</td> <td>IEC 60529:2013</td> </tr> <tr> <td>IP X4</td> <td>IEC 60529:2013</td> </tr> <tr> <td>Dry heat</td> <td>IEC 60068-2-2:2007</td> </tr> <tr> <td>Low temperature (cold)</td> <td>IEC 60068-2-1:2007</td> </tr> <tr> <td>Vibration - Endurance random</td> <td>IEC 60068-2-64:2008</td> </tr> <tr> <td>Shock test</td> <td>IEC 60068-2-27:2008</td> </tr> </table>		IP 5X	IEC 60529:2013	IP X4	IEC 60529:2013	Dry heat	IEC 60068-2-2:2007	Low temperature (cold)	IEC 60068-2-1:2007	Vibration - Endurance random	IEC 60068-2-64:2008	Shock test	IEC 60068-2-27:2008
IP 5X	IEC 60529:2013												
IP X4	IEC 60529:2013												
Dry heat	IEC 60068-2-2:2007												
Low temperature (cold)	IEC 60068-2-1:2007												
Vibration - Endurance random	IEC 60068-2-64:2008												
Shock test	IEC 60068-2-27:2008												
Date	2022.01.03												
Signature													



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13.4. Lift100 - Environment



Attestation of Conformity no. 121-32128

<p>Assessment holder</p> <p>OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark</p>													
<p>Product identification</p> <p>OnRobot Lift100</p>													
<p>FORCE Technology test reports</p> <p>Environmental tests of Lift100, report no.: 121-32128-1 dated 06 December 2021</p>													
<p>Other technical documentation</p>													
<p>Conclusion</p> <p>The Lift100 have been tested according to the standards listed below. The test results are given in the Force report listed above. All tests were carried out as specified in the relevant specifications including special test criteria stated by the client.</p> <table border="0"> <tr> <td>IP 5X</td> <td>IEC 60529:2013</td> </tr> <tr> <td>IP X4</td> <td>IEC 60529:2013</td> </tr> <tr> <td>Dry heat</td> <td>IEC 60068-2-2:2007</td> </tr> <tr> <td>Low temperature (cold)</td> <td>IEC 60068-2-1:2007</td> </tr> <tr> <td>Vibration - Endurance random</td> <td>IEC 60068-2-64:2008</td> </tr> <tr> <td>Shock test</td> <td>IEC 60068-2-27:2008</td> </tr> </table>		IP 5X	IEC 60529:2013	IP X4	IEC 60529:2013	Dry heat	IEC 60068-2-2:2007	Low temperature (cold)	IEC 60068-2-1:2007	Vibration - Endurance random	IEC 60068-2-64:2008	Shock test	IEC 60068-2-27:2008
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Vibration - Endurance random	IEC 60068-2-64:2008												
Shock test	IEC 60068-2-27:2008												
<p>Date</p>	<p>2021.06.12</p>												
<p>Signature</p>													



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13.5. Pallet Station - Environment



Attestation of Conformity no. 121-32129

<p>Assessment holder</p> <p>OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark</p>													
<p>Product identification</p> <p>OnRobot Pallet Station</p>													
<p>FORCE Technology test reports</p> <p>Environmental tests of Pallet Station, report no.: 121-32129-1 dated 03 January 2022</p>													
<p>Other technical documentation</p>													
<p>Conclusion</p> <p>The Pallet Station have been tested according to the standards listed below. The test results are given in the Force report listed above. All tests were carried out as specified in the relevant specifications including special test criteria stated by the client.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">IP 5X</td> <td>IEC 60529:2013</td> </tr> <tr> <td>IP X4</td> <td>IEC 60529:2013</td> </tr> <tr> <td>Dry heat</td> <td>IEC 60068-2-2:2007</td> </tr> <tr> <td>Low temperature (cold)</td> <td>IEC 60068-2-1:2007</td> </tr> <tr> <td>Vibration - Endurance random</td> <td>IEC 60068-2-64:2008</td> </tr> <tr> <td>Shock test</td> <td>IEC 60068-2-27:2008</td> </tr> </table>		IP 5X	IEC 60529:2013	IP X4	IEC 60529:2013	Dry heat	IEC 60068-2-2:2007	Low temperature (cold)	IEC 60068-2-1:2007	Vibration - Endurance random	IEC 60068-2-64:2008	Shock test	IEC 60068-2-27:2008
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13.6. Declaration of Incorporation

13.6.1. 2FGP20

CE/EU Declaration of Incorporation (Original)

According to European Machinery Directive 2006/42/EC annex II 1.B.

The manufacturer:

OnRobot A/S
 Teglværskvej 47H
 DK-5220, Odense SØ
 DENMARK

declares that the product:

Type:	Industrial robot gripper
Model:	2FGP20
Generation:	V1
Serial:	100000000-1009999999

may not be put into service before the machinery in which it will be incorporated is declared in conformity with the provisions of Directive 2006/42/EC, including amendments, and with the regulations transposing it into national law.

The product is prepared for compliance with all essential requirements of Directive 2006/42/EC under the correct incorporation conditions, see instructions and guidance in this manual. The following essential requirements of Directive 2006/42/EC, Annex I, are fulfilled: 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.10, 1.5.11, 1.6.1, 1.6.3, 1.7.2, 1.7.4. Compliance with all essential requirements of Directive 2006/42/EC relies on the specific robot installation and the final risk assessment.

Technical documentation is compiled according to Directive 2006/42/EC annex VII part B and available in electronic form to national authorities upon legitimate request. Undersigned is based on the manufacturer address and authorized to compile this documentation.

Additionally, the product declares in conformity with the following directives, according to which the product is CE marked:

2014/30/EU — Electromagnetic Compatibility Directive (EMC)
 2011/65/EU — Restriction of the use of certain hazardous substances (RoHS)
 2015/863/EU — Amendment directive (RoHS3)

Relevant essential health and safety requirements of the following EU directives are also applied:

2014/35/EU — Low Voltage Directive (LVD)
 2012/19/EU — Waste of Electrical and Electronic Equipment (WEEE)

A list of applied harmonized standards, including associated specifications, is provided in this manual.

Budapest, December 12th, 2021



Group Management

Vilmos Beskid, CTO

13.6.2. Lift100

CE/EU Declaration of Incorporation (Original)

According to European Machinery Directive 2006/42/EC annex II 1.B.

The manufacturer:

OnRobot A/S
 Teglværskvej 47H
 DK-5220, Odense SØ
 DENMARK

declares that the product:

Type:	Industrial Vertical Rail
Model:	Lift100
Generation:	V1
Serial:	100000000-1009999999

may not be put into service before the machinery in which it will be incorporated is declared in conformity with the provisions of Directive 2006/42/EC, including amendments, and with the regulations transposing it into national law.

The product is prepared for compliance with all essential requirements of Directive 2006/42/EC under the correct incorporation conditions, see instructions and guidance in this manual. The following essential requirements of Directive 2006/42/EC, Annex I, are fulfilled: 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.2, 1.3.4, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.10, 1.5.11, 1.6.3, 1.7.2, 1.7.4, 4.1.2.3. Compliance with all essential requirements of Directive 2006/42/EC relies on the specific robot installation and the final risk assessment.

Technical documentation is compiled according to Directive 2006/42/EC annex VII part B and available in electronic form to national authorities upon legitimate request. Undersigned is based on the manufacturer address and authorized to compile this documentation.

Additionally, the product declares in conformity with the following directives, according to which the product is CE marked:

2014/30/EU — Electromagnetic Compatibility Directive (EMC)
 2011/65/EU — Restriction of the use of certain hazardous substances (RoHS)
 2015/863/EU — Amendment directive (RoHS3)

Relevant essential health and safety requirements of the following EU directives are also applied:

2014/35/EU — Low Voltage Directive (LVD)
 2012/19/EU — Waste of Electrical and Electronic Equipment (WEEE)

A list of applied harmonized standards, including associated specifications, is provided in this manual.

Budapest, March 8th, 2021



Group Management

Vilmos Beskid, CTO

13.6.3. Pallet Station

CE/EU Declaration of Incorporation (Original)

According to European Machinery Directive 2006/42/EC annex II 1.B.

The manufacturer:

OnRobot A/S
 Teglværskvej 47H
 DK-5220, Odense SØ
 DENMARK

declares that the product:

Type:	Industrial Pallet Station
Model:	Pallet Station
Generation:	V1
Serial:	100000000-1009999999

may not be put into service before the machinery in which it will be incorporated is declared in conformity with the provisions of Directive 2006/42/EC, including amendments, and with the regulations transposing it into national law.

The product is prepared for compliance with all essential requirements of Directive 2006/42/EC under the correct incorporation conditions, see instructions and guidance in this manual. The following essential requirements of Directive 2006/42/EC, Annex I, are fulfilled: 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.2, 1.3.4, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.10, 1.5.11, 1.6.3, 1.7.2, 1.7.4, 4.1.2.3. Compliance with all essential requirements of Directive 2006/42/EC relies on the specific robot installation and the final risk assessment.

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Budapest, March 8th, 2021



Group Management

Vilmos Beskid, CTO