OnRobot

USER MANUAL

FOR UR ROBOTS

v1.17.1

Original Instructions

Contents

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. 2FGP20

Tool	Version
2FGP20	v1

1.2.2. Software and Firmware

1.2.2.1. URCap Software

The manual covers the following software versions:

Software	Version
URCap	v5.17.1

1.2.2.2. Compute Box Software

The manual covers the following Compute Box software version:

Software	Version
Compute Box	v5.17.1

ℹ️ **NOTE:**

When the used Compute Box has lower software/firmware version, update the Compute Box. For detailed instructions, see **7.1.4. 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

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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 **8.1. 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. 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 IS0/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. Differnet 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

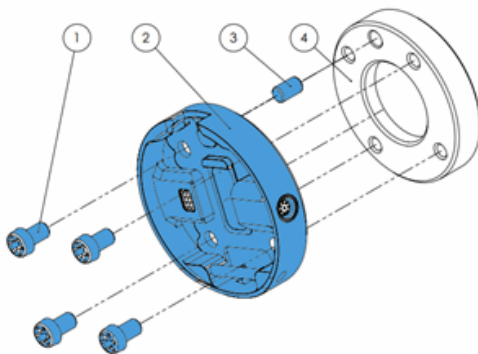For a successful installation the following steps will be required:

*   Mount the components
*   Setup the software

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

4.2. Robot Mount

4.2.1. Quick Changer Mounting

4.2.1.1. 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.

4.2.1.2. 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.

4.2.2. Tools

4.2.2.1. Finger and Vacuum Cup System Mounting

Finger Mounting

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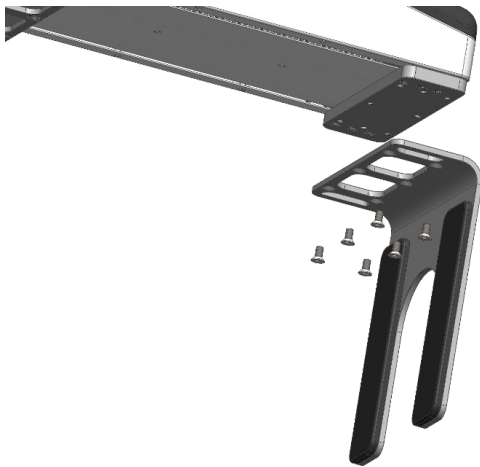

Vacuum Cup System Mounting

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.
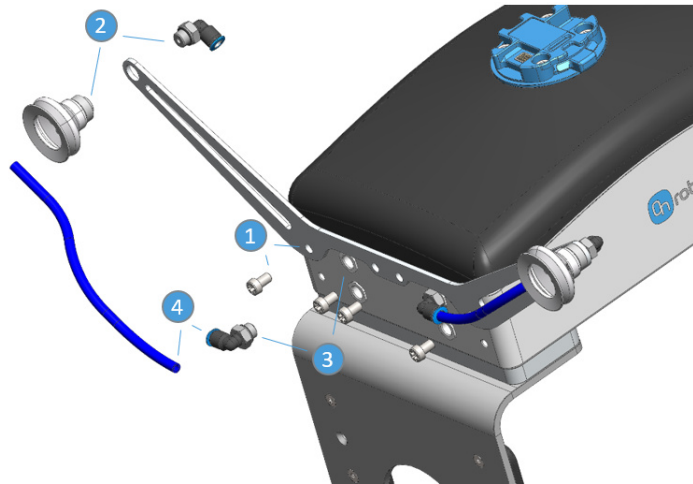
For more information about the vacuum cups customization, go to the Vacuum cups section in the **Technical Sheet**.

4.2.2.2. 2FGP20
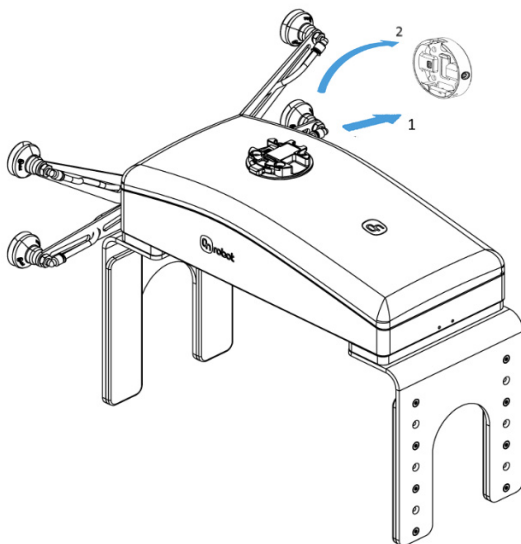
Step 1:

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.
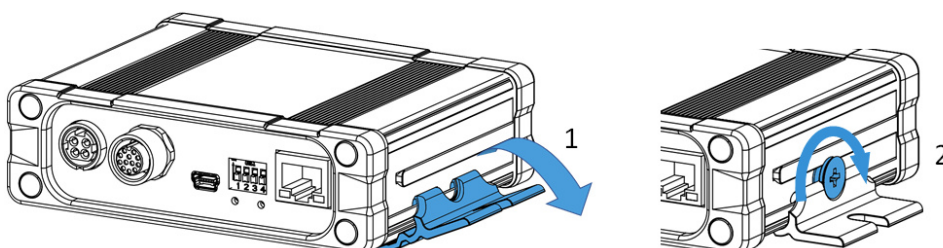
Step 2:

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.

4.3. Compute Box Mount

4.3.1. 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 srew.

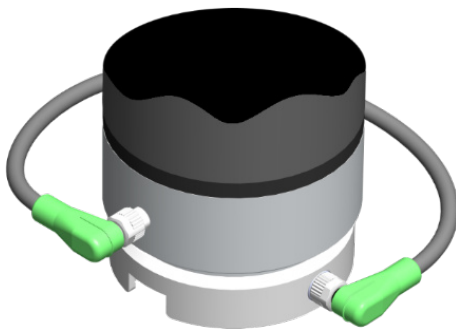## 4.4. Wiring via Tool Connector

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.
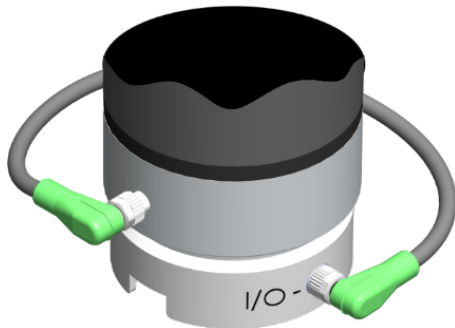
CAUTION:

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.
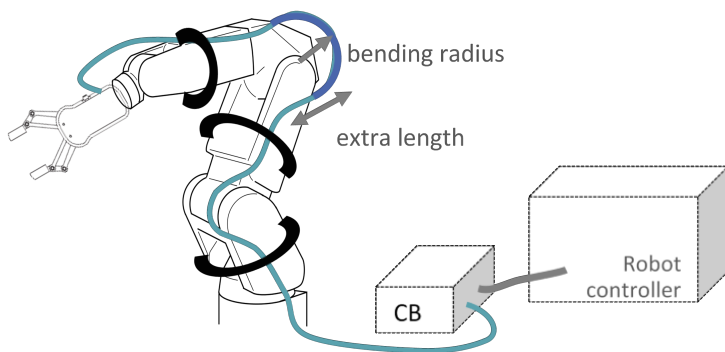
4.5. Wiring via Compute Box

DANGER:

Use only original OnRobot tool data cables.

Connect the following cables to wire the system:

- Tool data cable between the tool(s) and the Compute Box
- Ethernet cable between the robot controller and the Compute Box
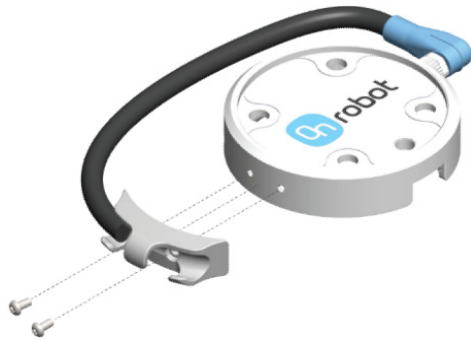- Power supply of the Compute Box

NOTE:

For the Quick Changer - Robot Side no cable is needed to be connected.

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4.5.1. Tool Data Cable

4.5.1.1. 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.

4.5.1.2. Cable to Compute Box

Then route the Tool data cable to the Compute Box (CB) and use the supplied Velcro tape (black) to fix it.

NOTE:

Make sure that during the routing some extra length is used at the joints so that cable is not pulled when the robot moves.

Also make sure that the cable bending radius is minimum 40mm (for the HEX-E/H QC it is 70mm).

Finally, connect the other end of the Tool data cable to the Compute Box's DEVICES connector.
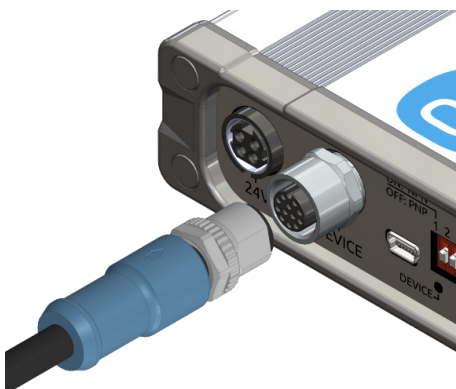
CAUTION:

Quick Changer and Dual Quick Changer can only be used to power OnRobot tools.

4.5.2. 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.

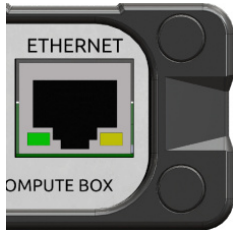Connect the other end of the supplied cable to the Compute Box's ETHERNET connector.

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).

4.5.3. Compute Box DIP Switch Settings

Set the DIP switches of the Compute Box as follows:
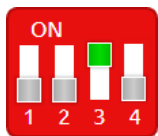
Set the DIP switch 3 to ON and the DIP switch 4 to OFF position.

For more information about the Ethernet interface settings, see **Ethernet Interface Setup**.

4.5.4. Power Supply: Compute Box

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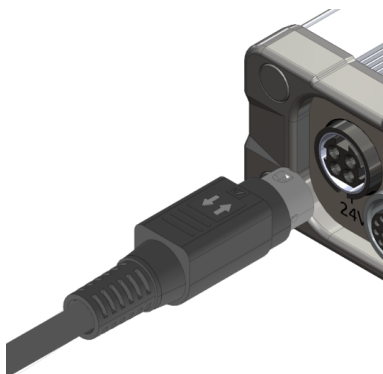
NOTE:

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.

Finally, power up the power supply that will power the Compute Box and the connected Tool(s).

4.5.4.1. 2FGP20

Power Supply	
1.5 A	✓
5 A	✓
6.25 A	✓

NOTE:

For the 1.5 A power supply, the force is limited. For more information, see the Force vs Current Graph in the **Technical Sheet**.

5. SW Installation

5.1. Robot Software Setup

5.1.1. URCap Setup

UR CB3

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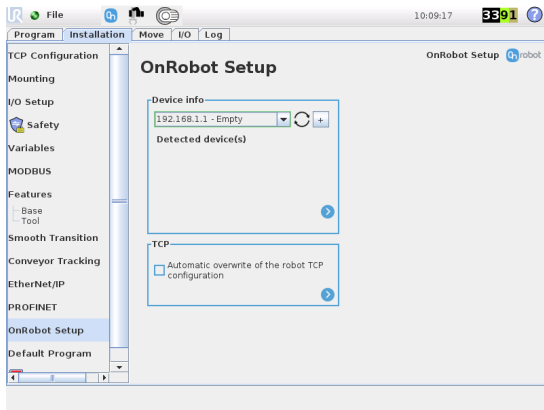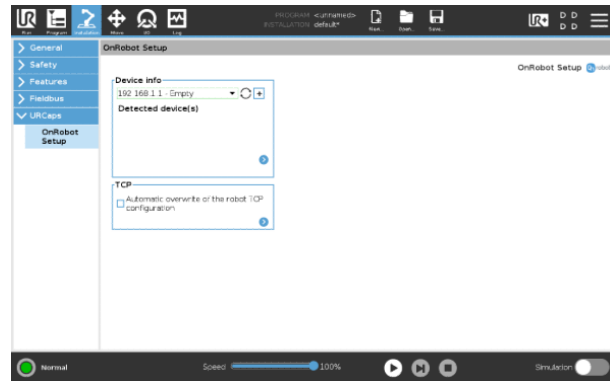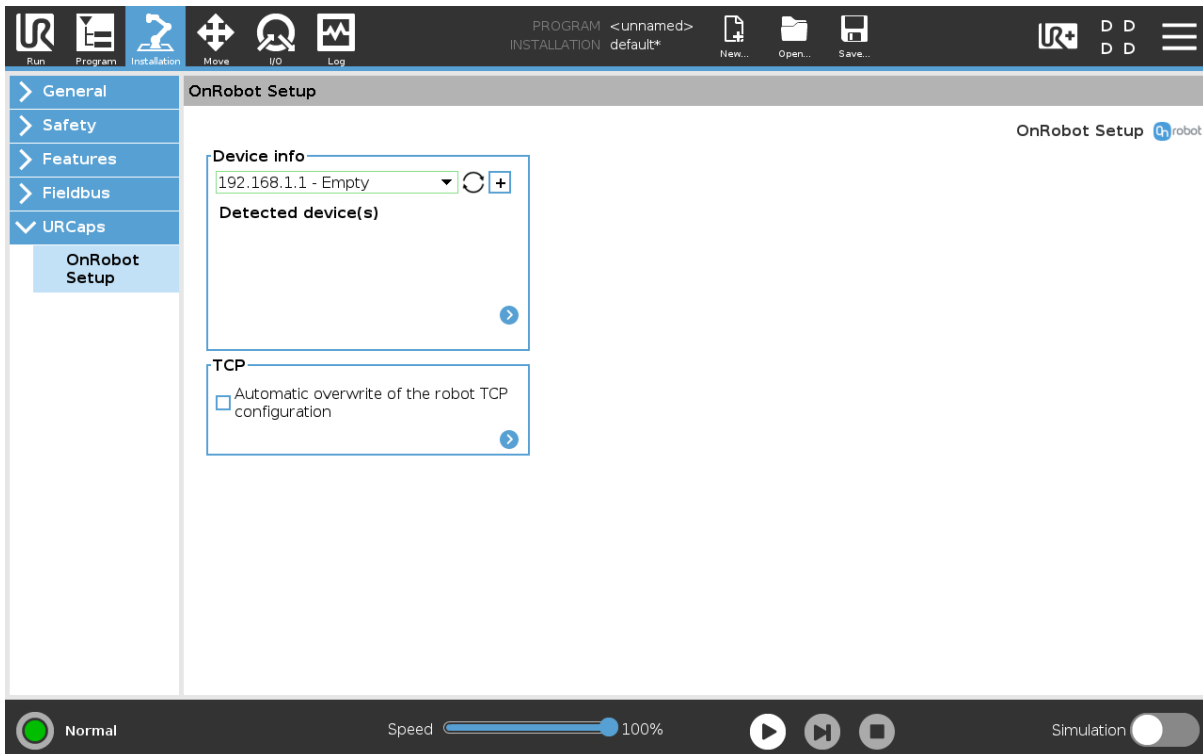

UR e-Series

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

5.1.1.1. 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
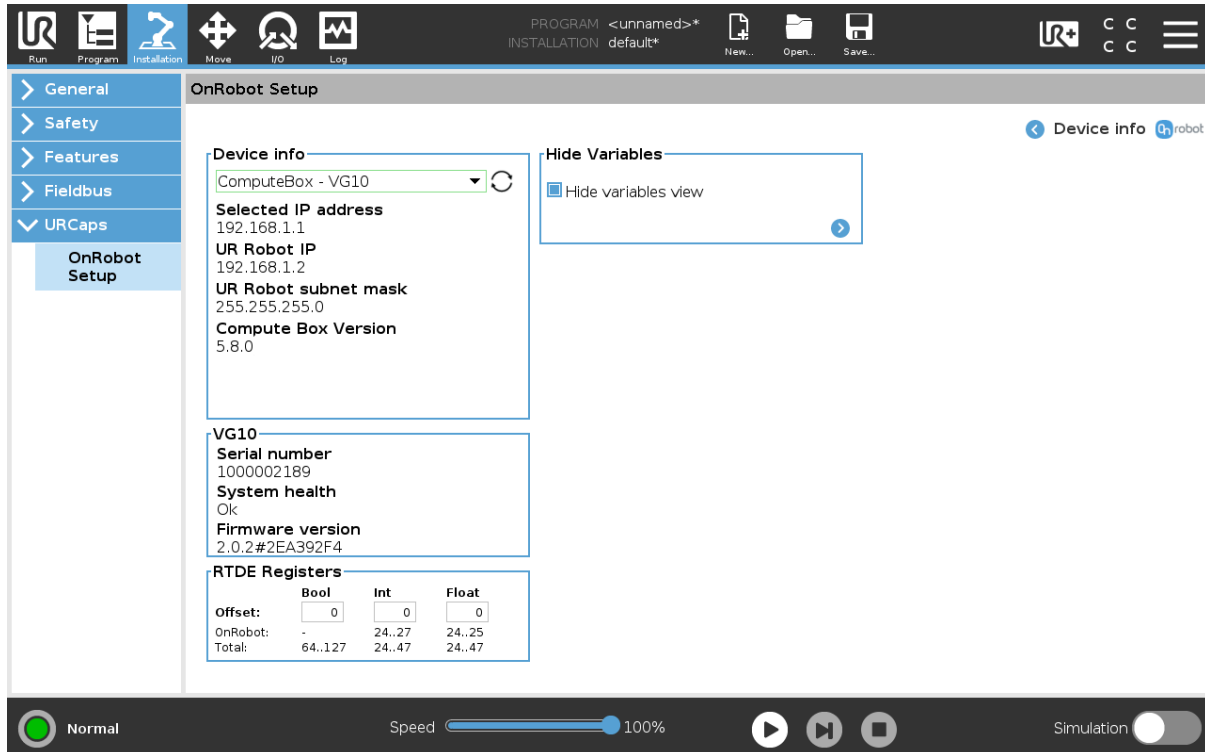
The **Selected IP address**, **Compute Box Version**, **UR Robot IP** and **UR Robot subnet mask** are shown.

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 **6.4. 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.

5.1.1.2. 2FGP20

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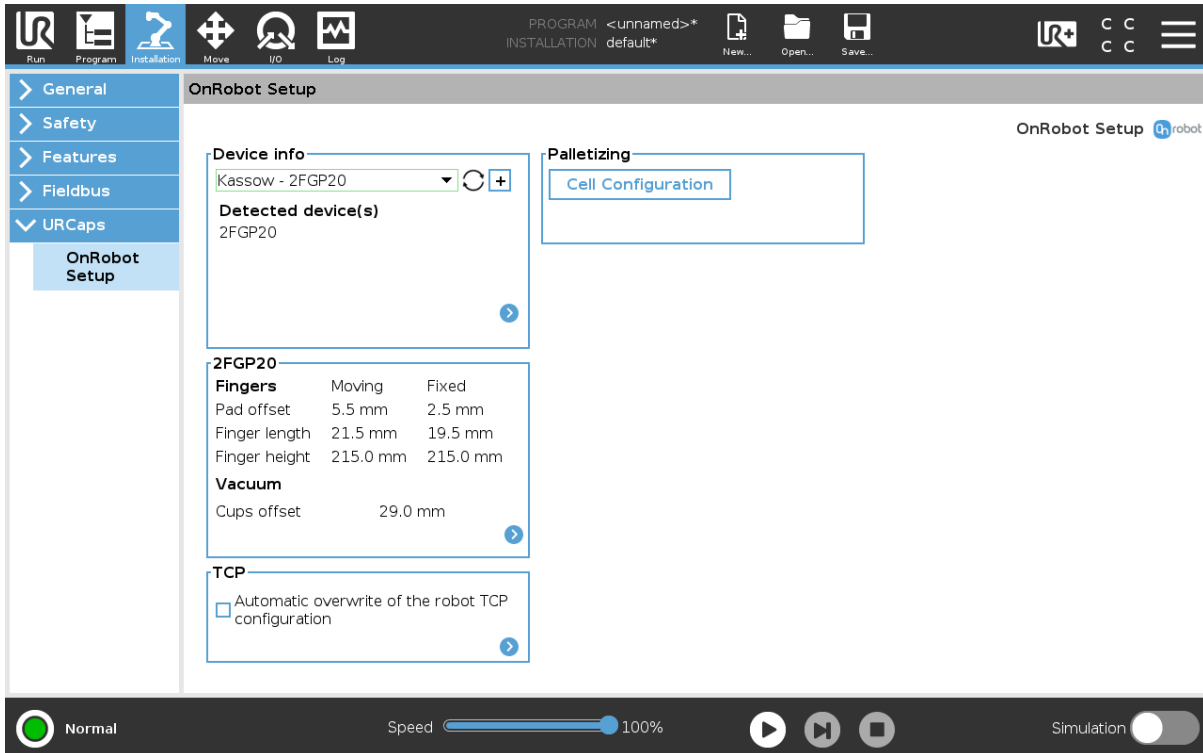
2FGP20

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.

KLT Finger set setup

- **Pad offset** - No pads
- **Finger length** - Standard
- **Finger height** - Custom: 9 mm

For more information about the KLT finger set, see the **8.1.1. Technical sheet**.

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 **6.4. TCP Configuration** section.

TCP offset

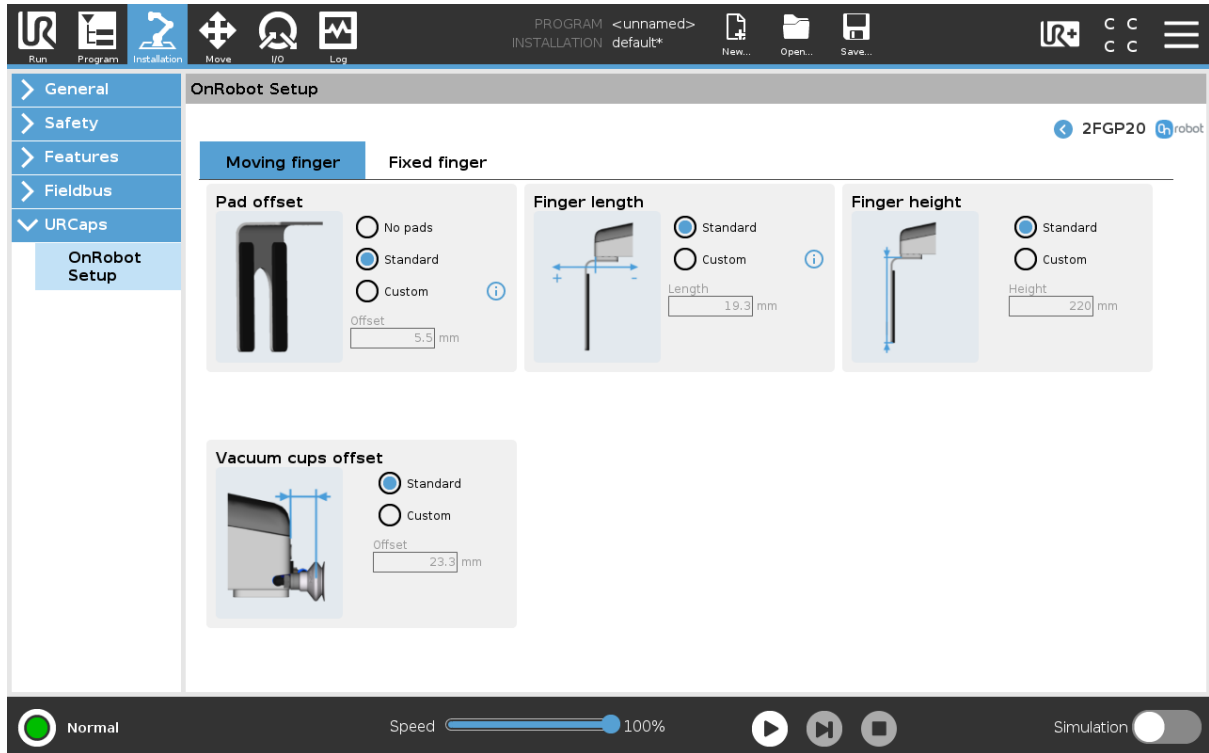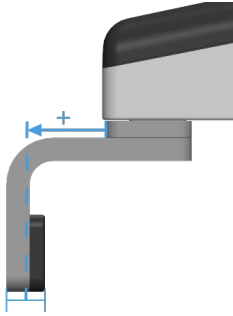> Set the **Linear offset** (X,Y,Z) and the **Rotation in RPY** (Roll-Pitch-Yaw) values to adjust the OnRobot device dependent calculated TCP.

6. Operation

NOTE:

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

6.1. URCap Commands

URCap commands provide an easy way to program an application.

6.1.1. 2FGP20

6.1.1.1. 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.
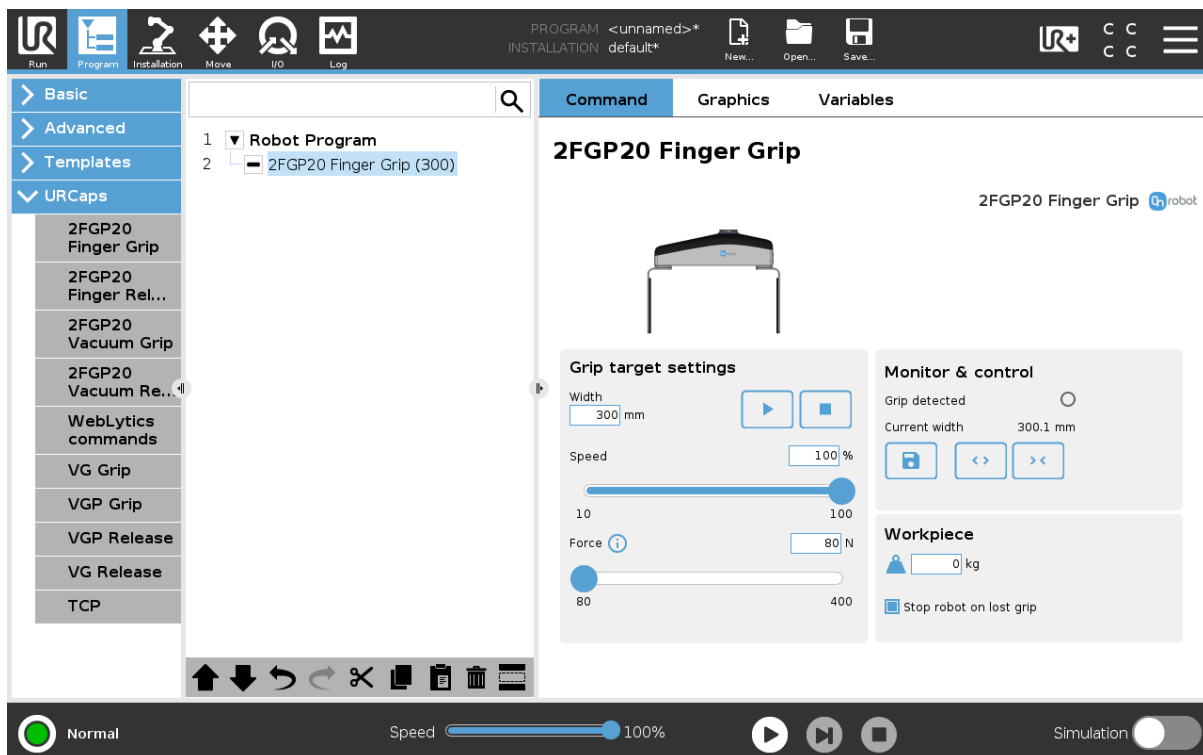
Grip target settings

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.
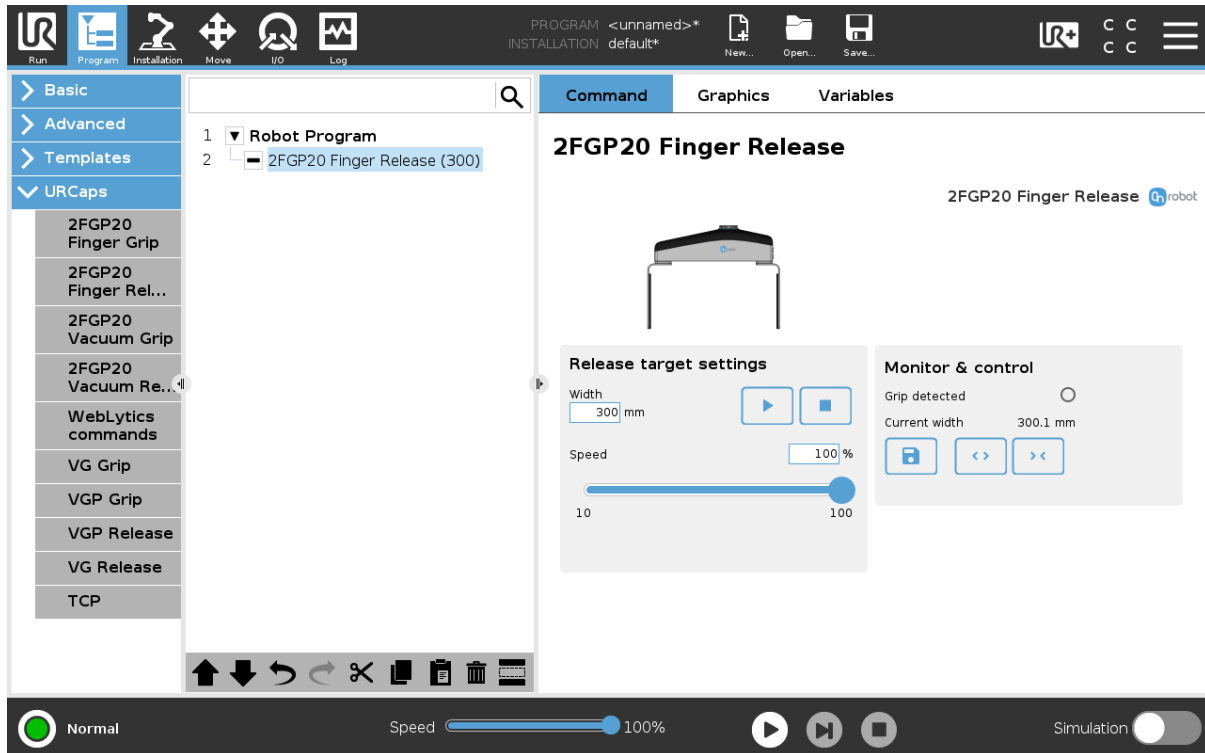
OPERATION

6.1.1.2. 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.
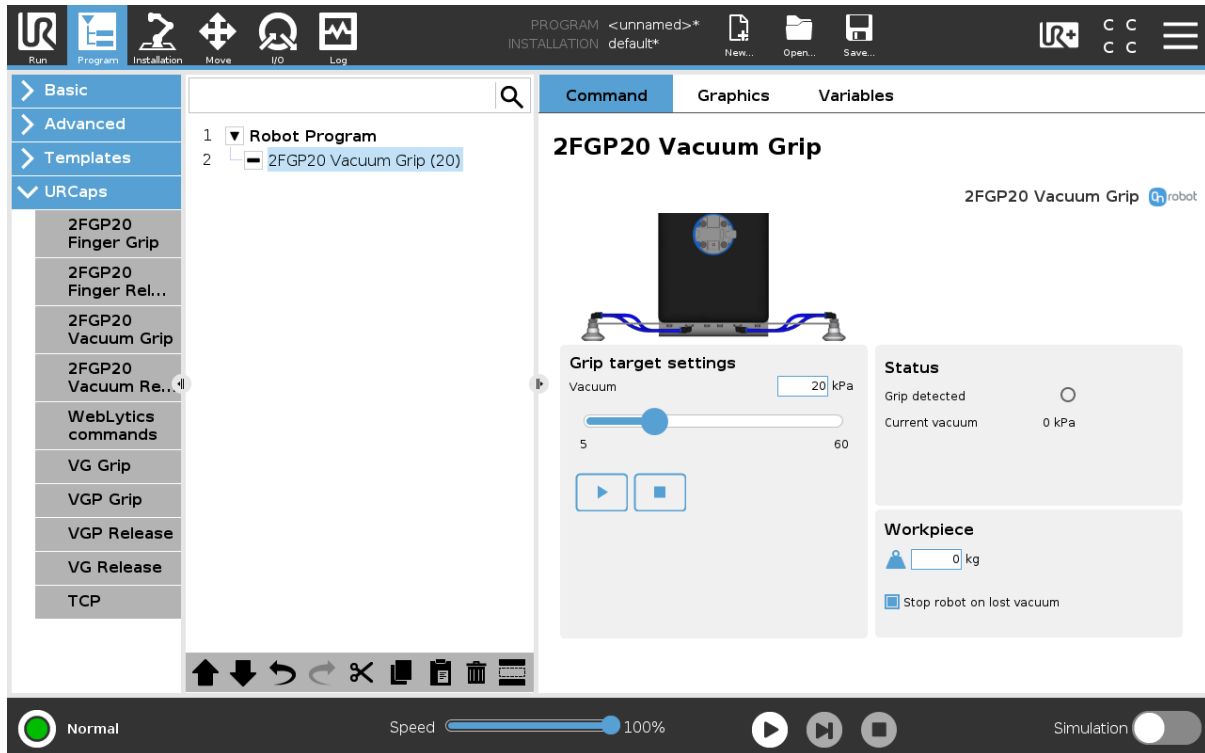
Will set the **Current width** as **Target width**.

Buttons to open and close the gripper.

6.1.1.3. 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.

6.1.1.4. 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.

6.2. 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.
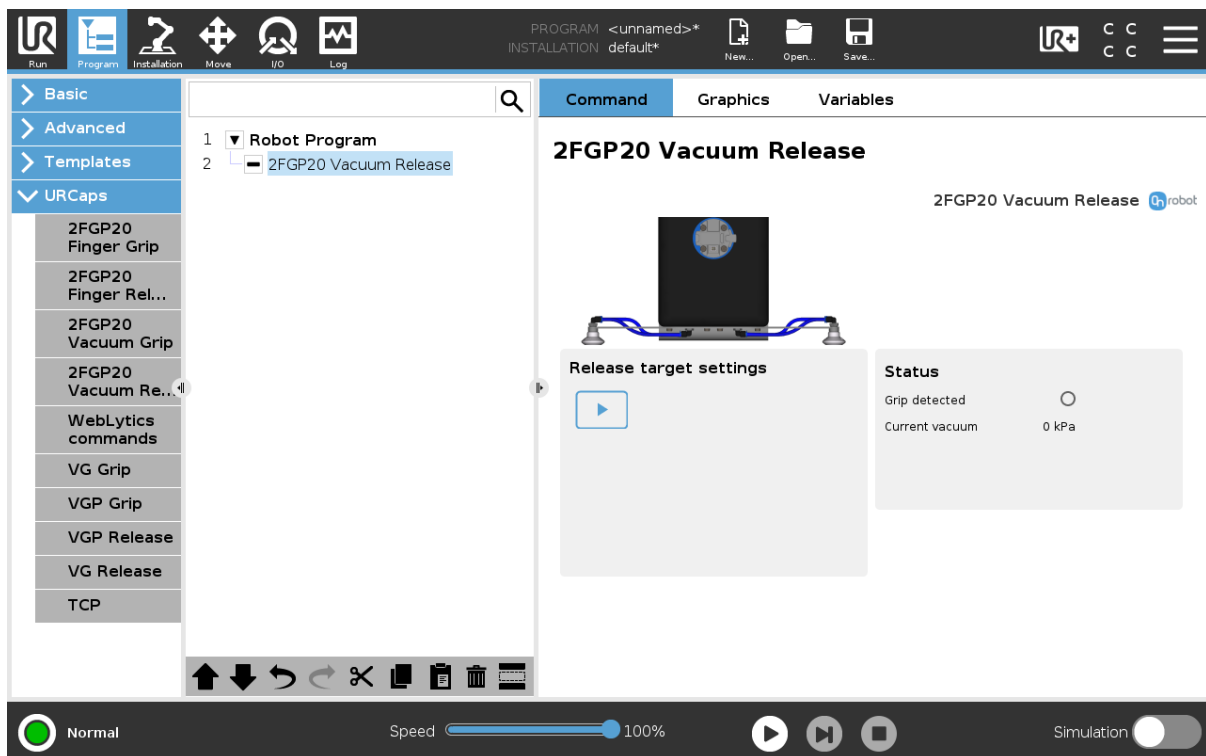
To open up the toolbar in the e-Series, press on the UR+ icon [UR+] on the top right side. Then press on the OnRobot icon [On].
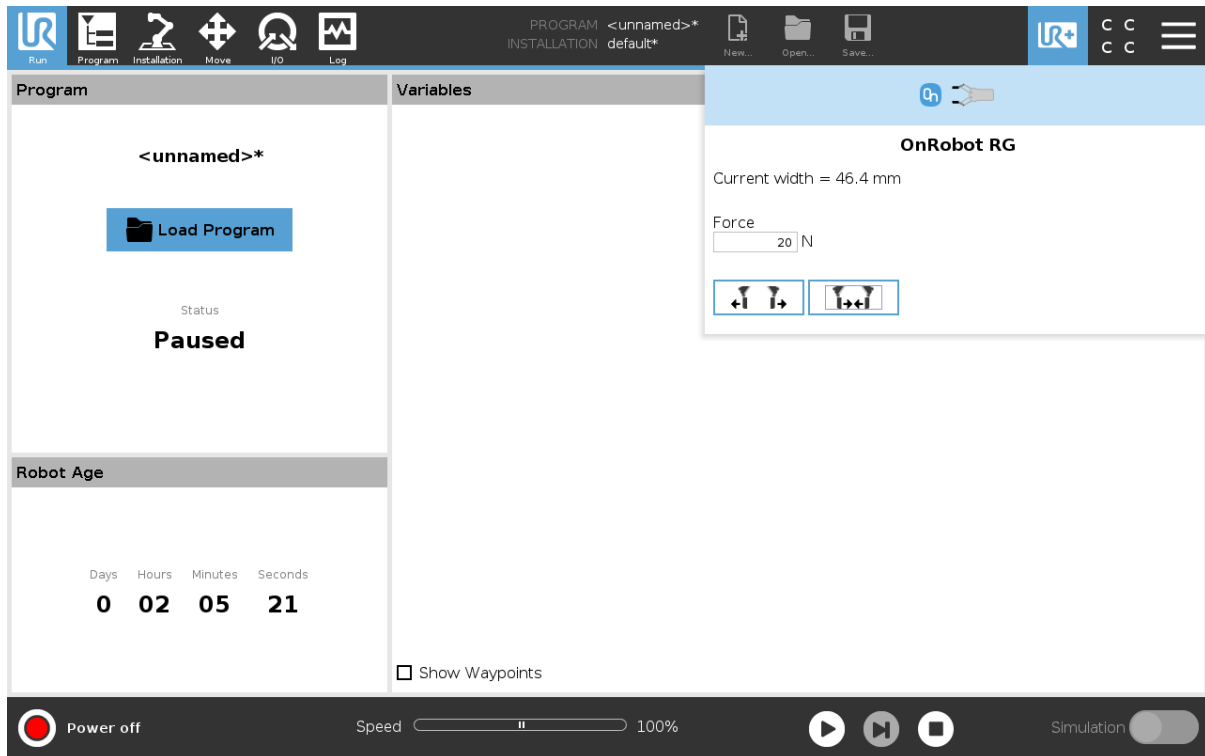
Each OnRobot End of Arm Tooling has its own functionality and that is explained in the sections below.

To open up the toolbar in the CB3, press on the OnRobot icon [On] 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.
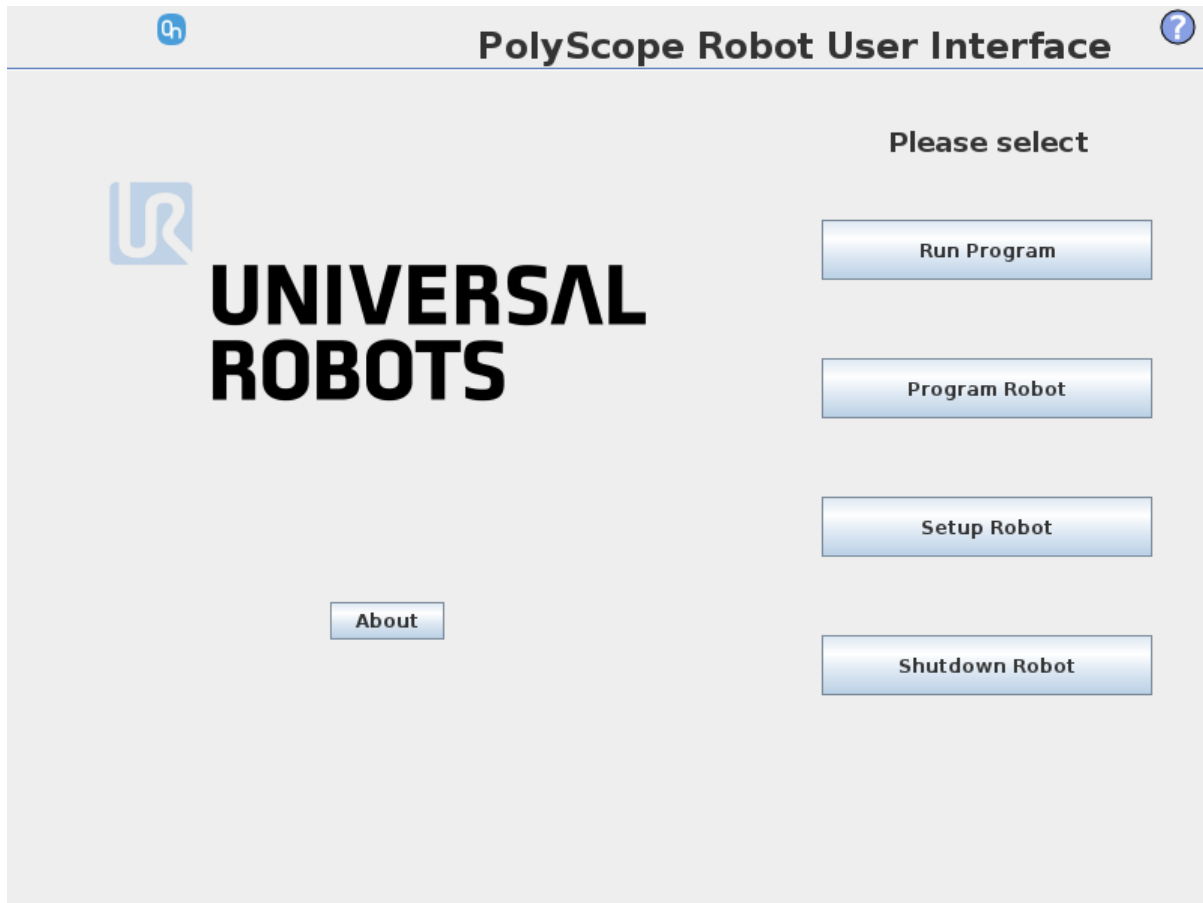
To enable/disable the toolbar, press on the OnRobot logo on the top right corner and check/uncheck the **Enable toolbar** checkbox.
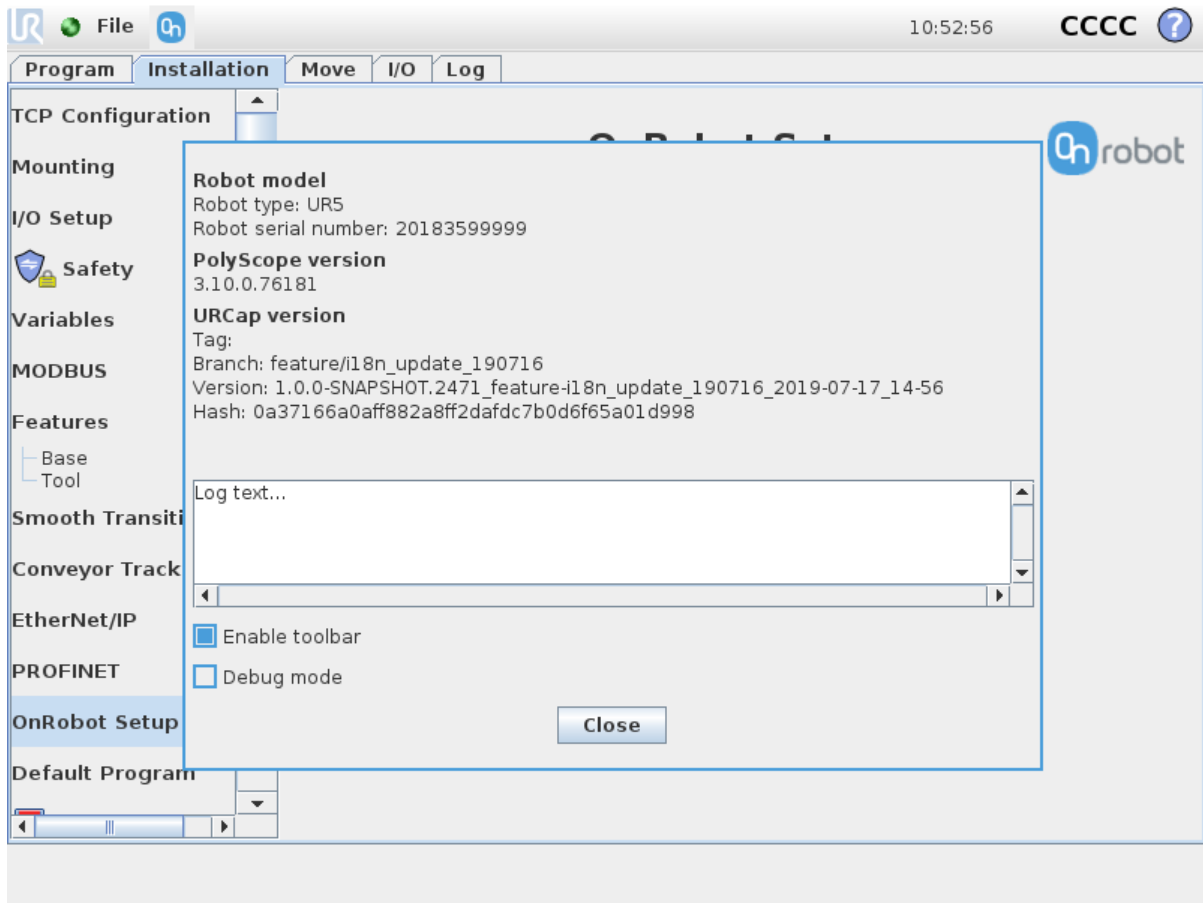
6.2.1. 2FGP20

To open up the toolbar, follow the instructions under **How to Access the Toolbar** in the **6.2. URCap Toolbar** section.

The toolbar for the 2FGP20 gripper is shown below.

OPERATION
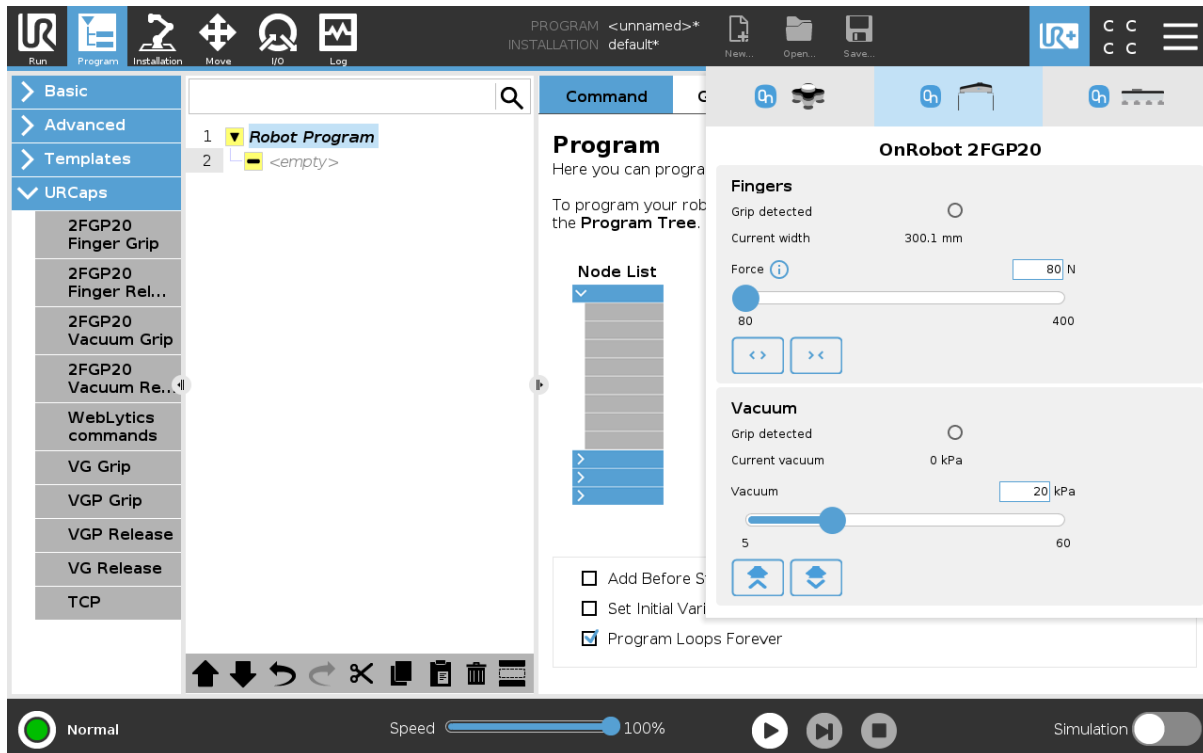
Fingers

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.

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6.3. URScript Commands

URScript commands can be used alongside other scripts.

6.3.1. 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.

6.4. TCP Configuration

TCP is the abbreviation of the Tool Center Point.


TCP is a point that is in the beginning (by default) located at the middle point of the UR's tool flange. This is an important point during robot programming since UR's Move commands are always referenced to a given TCP point and rotations could only be carried out about these points.

If a tool is attached to the robot, it makes easier for the user to change that point to the tool's "end" point (see illustration on the left).

In this way it is easy to rotate the tool while the workpiece is being stationary in space (see illustration on the right).
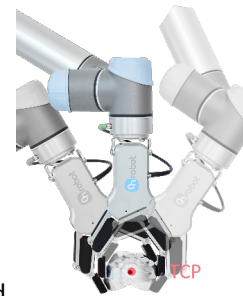
More than one TCP point could be defined but at a given time only one TCP can be active. In UR, it is called the Active TCP.

By default, UR's Move commands are always recording the Waypoints according to the Active TCP.

For further info about the UR's TCP handling read the UR's Manual.

How "far" the TCP needs to be moved to be at the "end" of the OnRobot tools could be found in the **TCP, COG** section.

Since, it could be hard to enter these values by hand, OnRobot provides two ways to get these parameters configured for you:

- Static TCP mode - Recommended to be used
- Dynamic TCP mode

The mode could be selected on the TCP panel in the OnRobot Installation (see in the **5.1.1. URCap Setup** setup section).

In the following these two modes will be described.

Static TCP Mode

In this mode the user can manually change the Active TCP based on the predefined OnRobot TCP options:

- **OnRobot_Single**
  If no Dual Quick Changer is detected, so only one tool is used.
- **OnRobot_Dual_1** and **OnRobot_Dual_2**
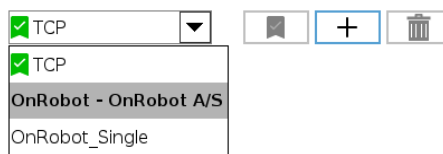
If a Dual Quick Changer is detected, so two tools are used.

NOTE:

OnRobot_Dual_1 belongs to the tool that is attached to the Primary side of the Dual Quick Changer.

The TCP values are created and precalculated based on the detected tool(s). So, if the RG2 is mounted in 30° (with the built-in tilting mechanism) the precise TCP is defined accordingly.

The calculation is only carried out when a new device is detected or when the mounting angle is changed (only for RG2/6 and RG2-FT).

The calculated values are static parameters and do not change during program execution.

> **NOTE:**
>
> For the RG2, RG6 and RG2-FT grippers the TCP is calculated always assuming that the gripper is fully closed.

It is a good practice to set the used TCP option as the Default TCP (✅) in the UR's TCP Configuration, but it is not mandatory.

However, it is highly recommended to create the Waypoints in the UR's Move command in a way that the referencing TCP is set first.

So, if only a single OnRobot device is used, before the Waypoints are defined, set the UR's Move command's TCP to use the **OnRobot_Single**.
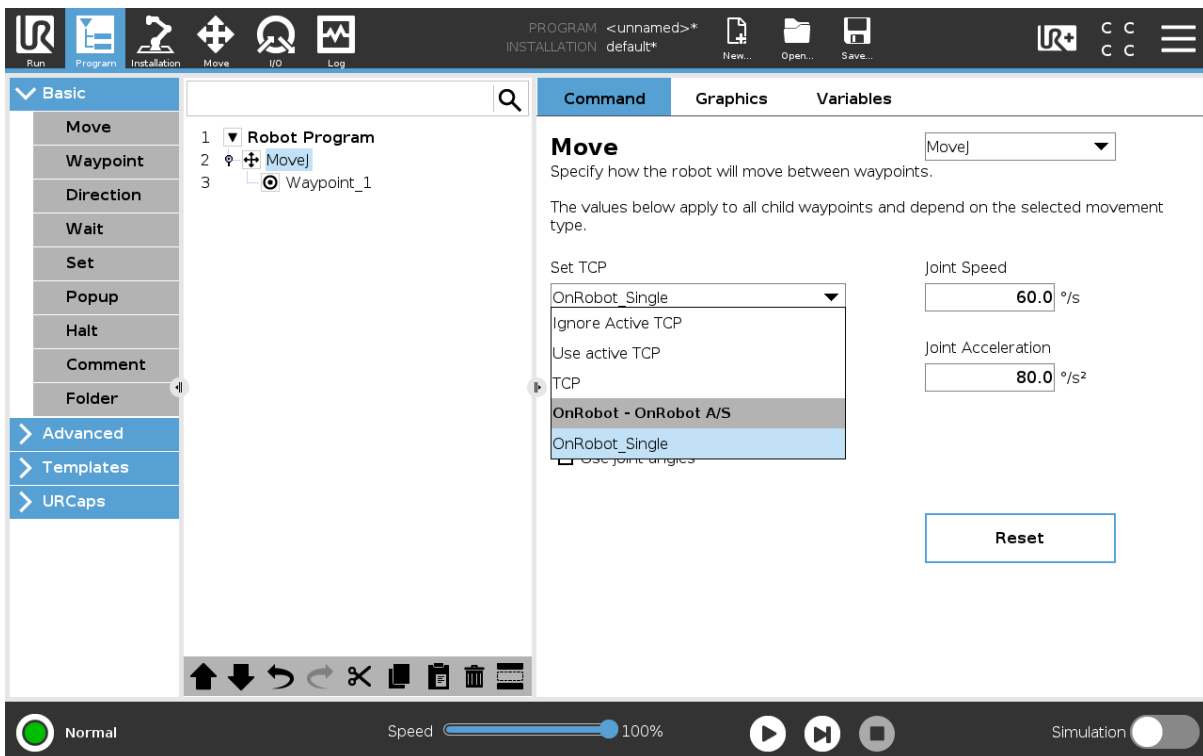
If two OnRobot devices are used, select **OnRobot_Dual_1** or **OnRobot_Dual_2** accordingly.

If not the UR's Move command but the OnRobot `F/T Move` command is used (for HEX-E/H QC or RG2-FT only):

- Use the OnRobot TCP command just before the `F/T Move` to set the Active TCP to the right value

As summary here is a code example:

Single	Dual
Not mandatory to set OnRobot TCP as Default TCP	Not mandatory to set OnRobot TCP as Default TCP

Single	Dual

``
Robot program
 	
    MoveJ (Set TCP = OnRobot_Single)
 	
    #Alternatively
    TCP
    F/T Move
``
	``
	Robot program
	
	    MoveJ (Set TCP = OnRobot_Dual_1)
	
	    MoveJ (Set TCP = OnRobot_Dual_2)
	``

Dynamic TCP Mode

In this mode the UR's Active TCP is set automatically according to the detected OnRobot device.

This mode is useful when the TCP effect of the width value of the gripper (RG2, RG6 or RG2-FT only) is needed to be considered.

During the robot program execution if the `RG Grip` commands are used to open or close the gripper TCP is automatically set accordingly.

Furthermore, if the OnRobot Toolbar is used to open or close the gripper the Active TCP is adjusted immediately.

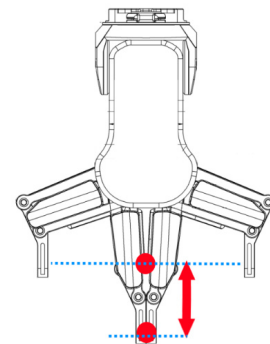However, the Active TCP is overwritten directly, there is also an OnRobot defined TCP, that is called:

- **OnRobot_Default**
  This is the name in both the Single and Dual device case.

It is recommended to set the **OnRobot_Default** option as the Default TCP ( ) in the UR's TCP Configuration.

To let the system to automatically update the TCP during the program execution the UR's Move commands needs to be left at its default setting of **Set as Active TCP**. (Compared to the Static TCP mode where it is needed to be changed to a predefined TCP).

In case when two grippers are used, the Active TCP needs to be selected to which gripper to belong to:

- first use an OnRobot `TCP` command and select from Gripper 1 and Gripper 2 which one to be used
- then the UR's Move will have an updated Active TCP that could be used for multiple Move commands
- when it will be necessary to change to the other gripper just use another TCP and select the other gripper.

Before you teach any Waypoint make sure to set the Active TCP beforehand:

- for Single device go to the OnRobot Installation panel
- for Dual devices go to the OnRobot Installation panel and Select the Device (1 or 2) that you are using at the time of the teaching

As summary here is a code example:

Single	Dual
Recommended to set **OnRobot_Default** TCP as the UR's Default TCP	Recommended to set **OnRobot_Default** TCP as the UR's Default TCP
	Before each program execution make sure to select on the OnRobot Installation panel the right gripper that will be the first used in the program
```Robot program TCP (Optional) MoveJ (Set TCP = Active TCP)```	```Robot program TCP (Select Gripper 1) MoveJ (Set TCP = Active TCP) TCP (Select Gripper 2) MoveJ (Set TCP = OnRobot_Dual_2)```

6.5. Feedback Variables

6.5.1. 2FGP20

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

7.1. Compute Box/Eye Box

7.1.1. 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 **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:
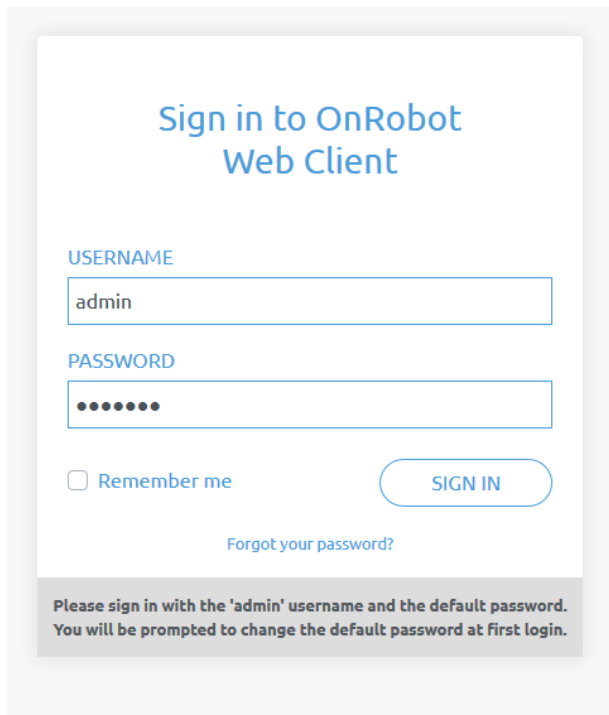
The factory default administrator login is:

Username: admin
Password: OnRobot

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

Once signed in the following menus will appear on the left side of the screen:
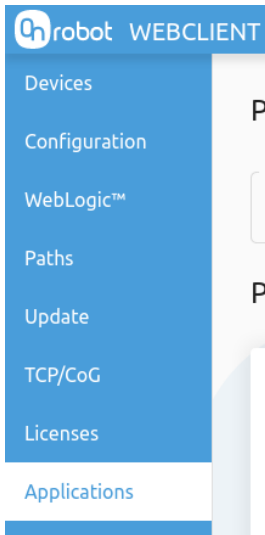
- **Devices** - Monitor and control the connected devices (e.g.: grippers)
- **Configuration** - Change the Compute Box's settings
- **WebLogic™** - Program the Digital I/O interface through OnRobot WebLogic™
- **Paths** - Import/export the recorded Paths (not available to all robots)
- **Update** - 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 menus 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.

7.1.2. Web Client: Devices Menu

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

Please select from the detected device(s):

Compute Box	HEX-E/H QC	RG2
SELECT	SELECT	SELECT

7.1.2.1. 2FGP20

Monitor and control
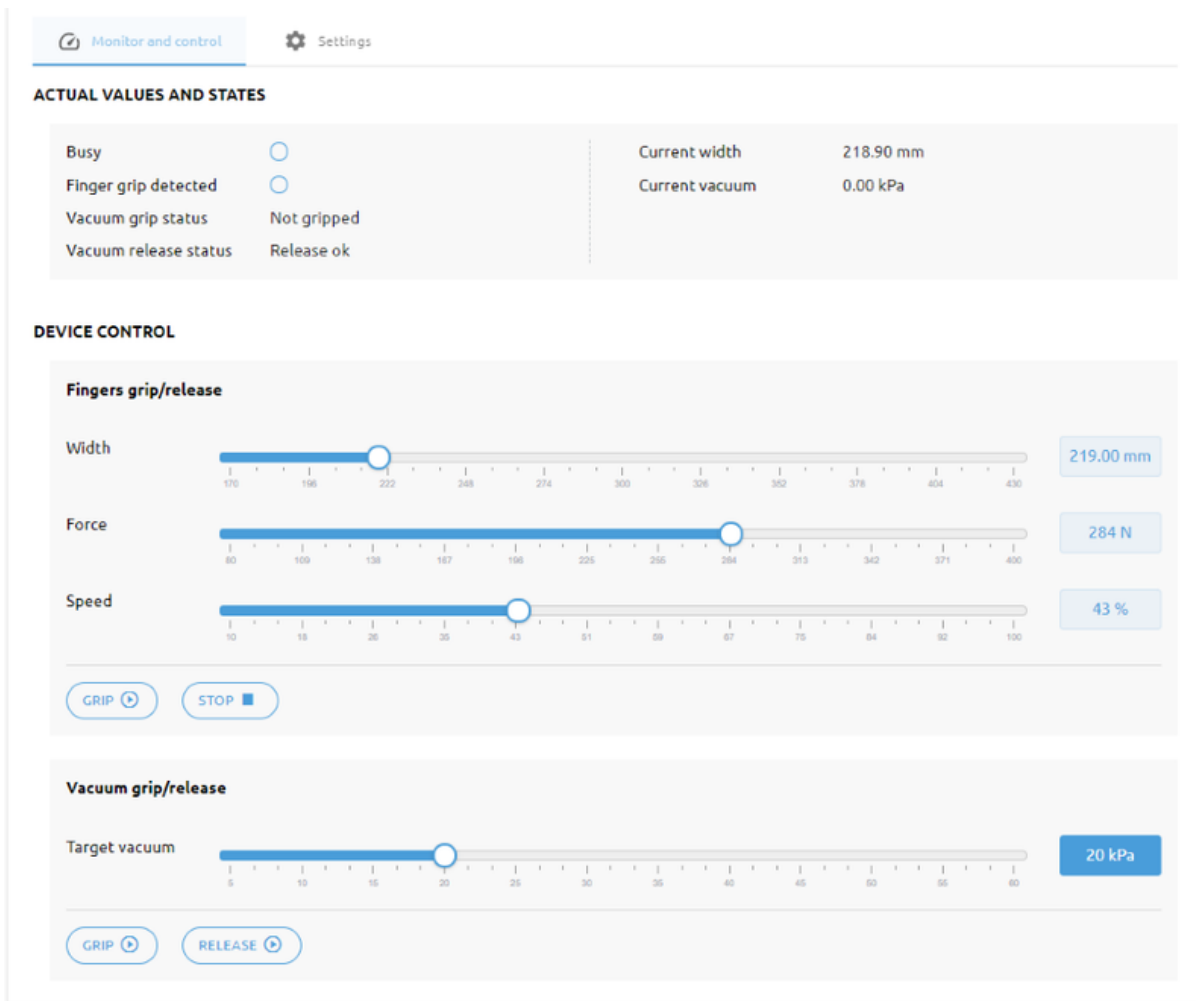
Actual Values and States

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
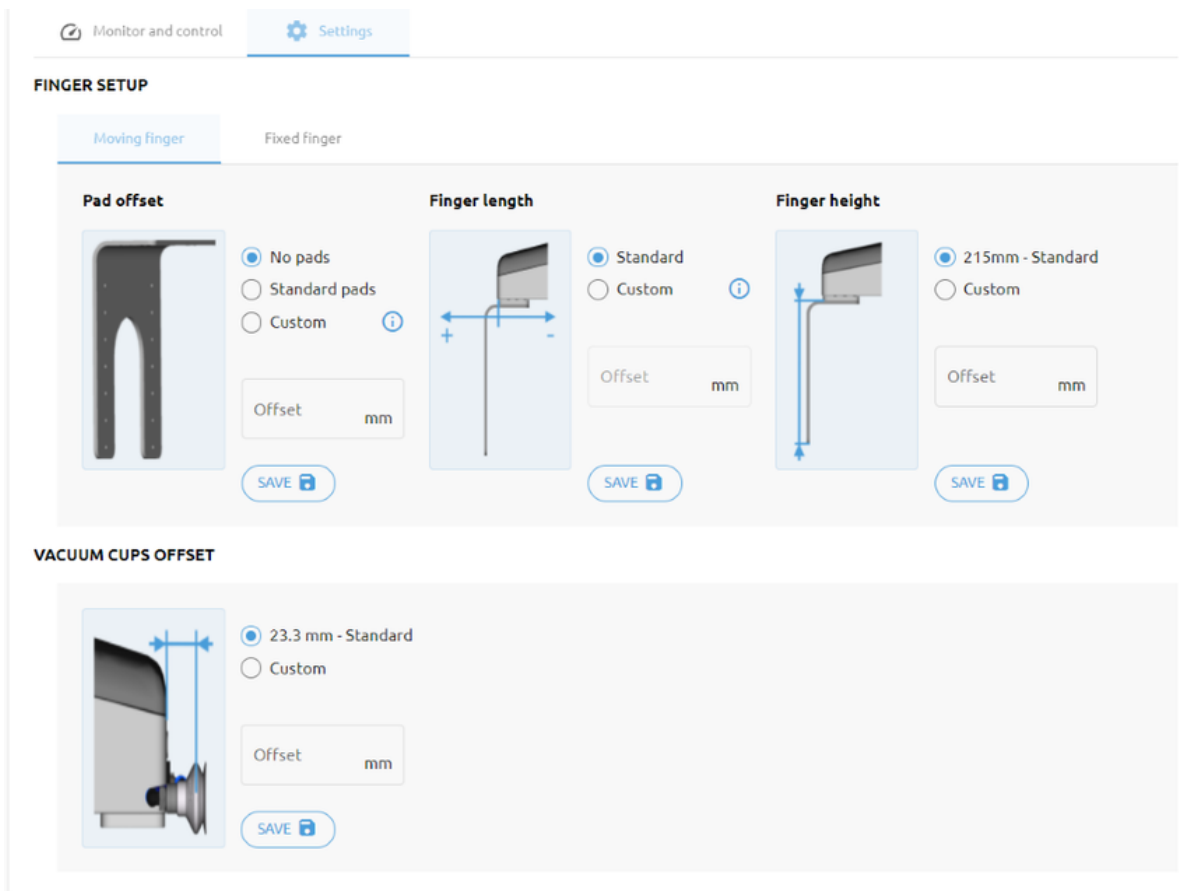
Finger setup

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.

KLT Finger set setup

- **Pad offset** - No pads
- **Finger length** - Standard
- **Finger height** - Custom: 9 mm

For more information about the KLT finger set, see the **8.1.1. Technical sheet**.

7.1.3. 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.

7.1.4. Web Client: Update Menu

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

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.
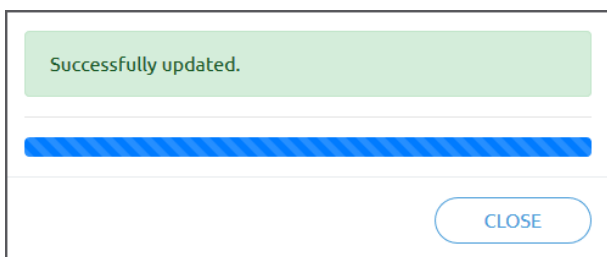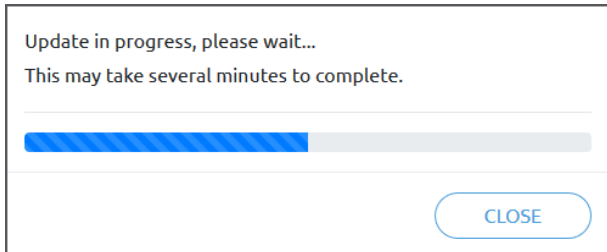
7.1.5. Web Client: TCP/CoG

Use the TCP/CoG calculator to calculate the TCP (Tool Center Point) and CoG (Center of Gravity) values for your OnRobot product combination.
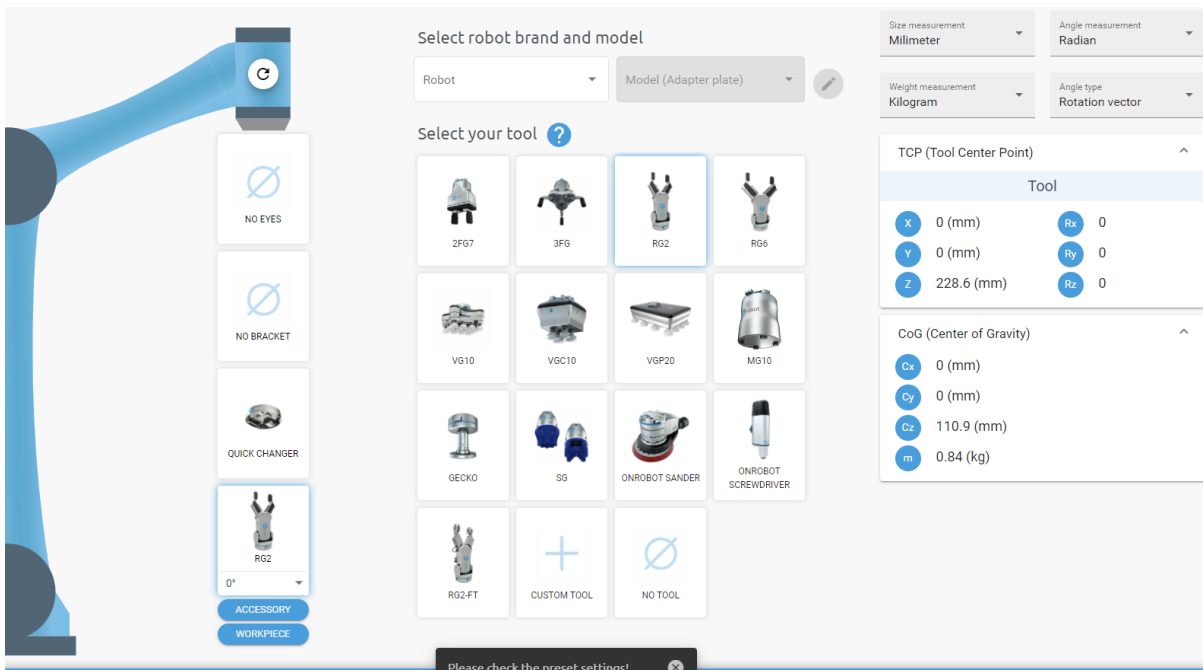
The TCP/CoG calculator will show the automatically detected settings.

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.

7.1.6. Web Client: Account Settings

This menu can be used to:

- See the currently sign-id user
- Go to **Account settings**
- Sign-out
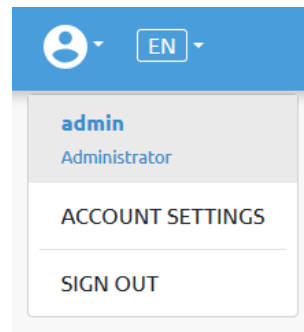
Account settings:
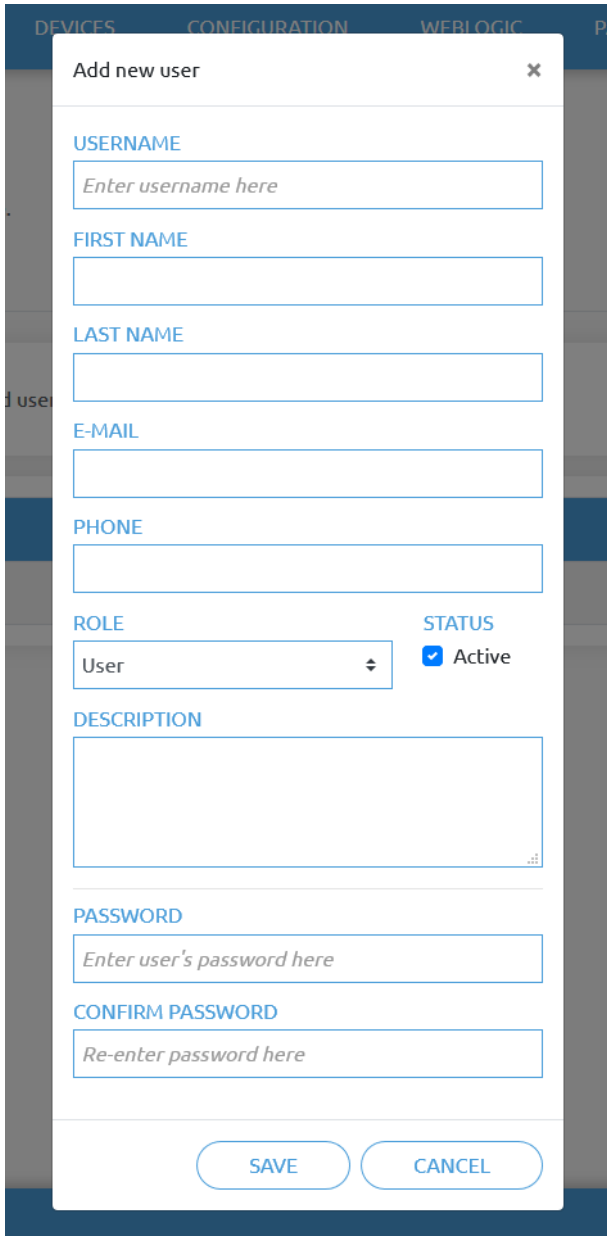
This page has two tabs:

- **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.

Account settings

This page allows modifying your user profile.

My profile   Users

admin
Administrator

First name
Last name
E-mail
Phone
Description

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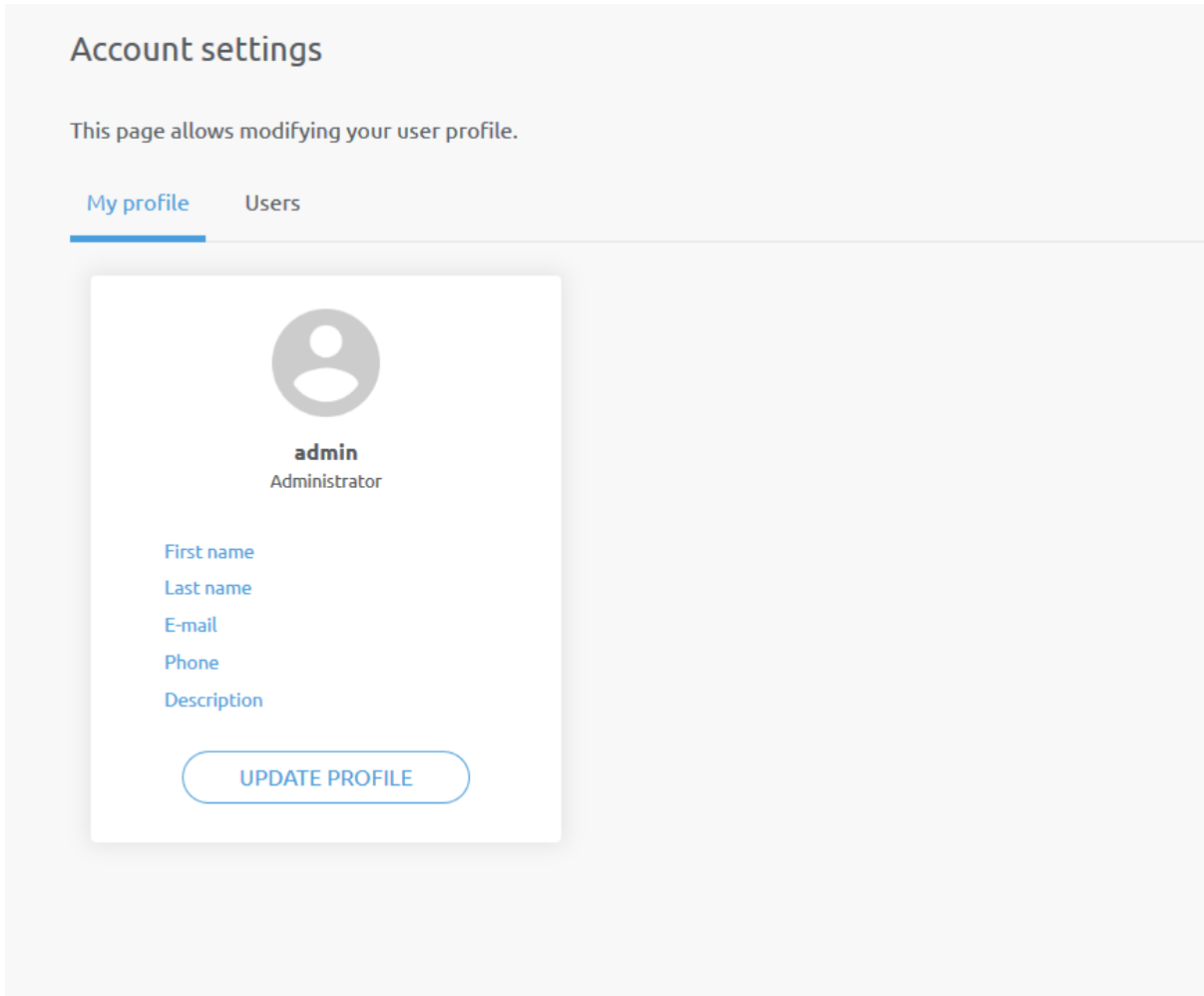
On the **Users** tab click on the **Add new user** button to add more users:

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					☑	✏	
operator		User					☑	✏	⊗

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.

8. Hardware Specification

8.1. Technical Sheets

8.1.1. 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 - 0.05 1.5	- - -	60 - 0.607 17.95	[%Vacuum] [Bar] [inHg]
Air flow	0		12	[L/min]
Payload (with delivered attachments)		- -	2.5 5.51	[kg] [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 32	- -	60 140	[°C] [°F]
IP Classification	54			
Dimensions [L x W x D]	400 x 121.6 x 188 15.75 x 4.79 x 7.4			[mm] [inch]

Gripper combination	Base unit	Standard fingers including four pads	Vacuum equipment	KLT Finger set	Total weight	Unit
Base unit with Standard fingers including all pads	3.7 8.16	1.37 3.02	-	-	5.07 11.18	[kg] [lb]
Base unit with Standard fingers including all pads and all vacuum equipment	3.7 8.16	1.37 3.02	0.27 0.60	-	5.34 11.77	[kg] [lb]
Base unit with KLT Finger set	3.7 8.16	-	-	0.43 0.95	4.13 9.11	[kg] [lb]
Base unit with KLT Finger set and all vacuum equipment	3.7 8.16	-	0.27 0.60	0.43 0.95	4.4 9.7	[kg] [lb]
Base unit with custom fingers	3.7 8.16	-	-	-	User defined	[kg] [lb]

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

Force vs Current Graph
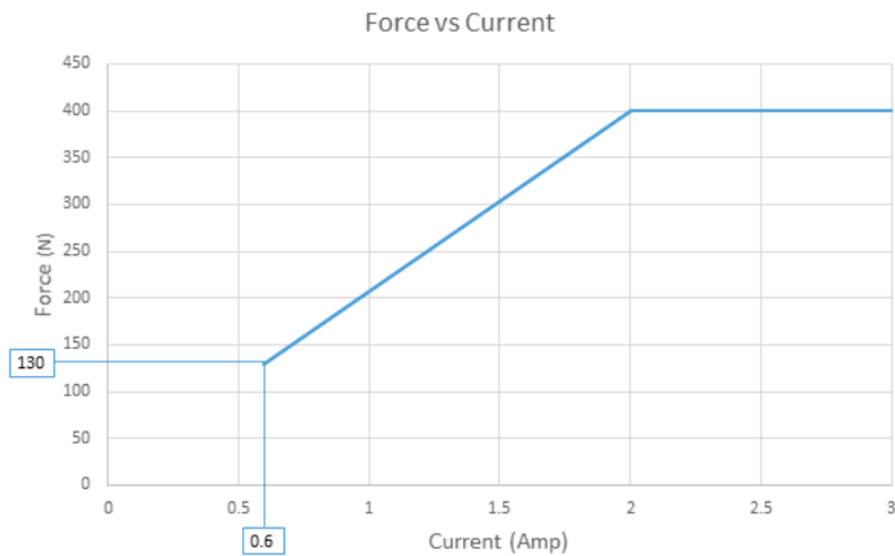
Noise Level

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 vaccum 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.
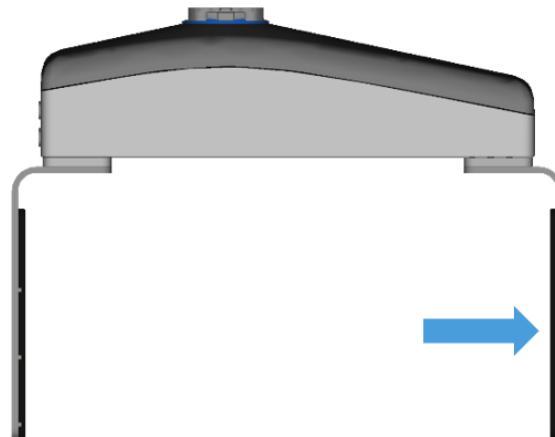
Consider the presence of the force sensor when the workpiece is aligned by using the fingers of the gripper or when the workpiece is picked sideways since the gravity can affect the force measurement.
If the workpiece is picked sideways, make sure to orient the gripper with the moving finger on top, as shown in the image below. Also ensure that the bottom finger makes contact with the workpiece before the top finger.
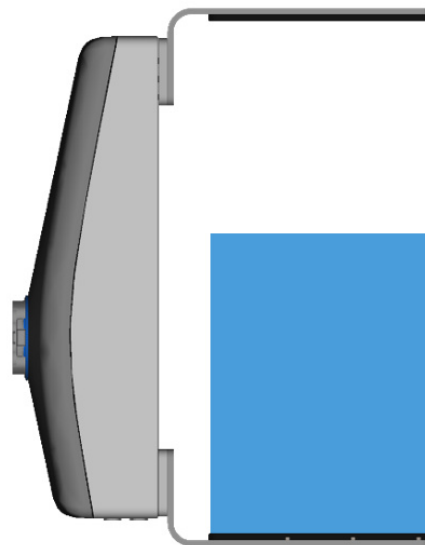
Finger pads

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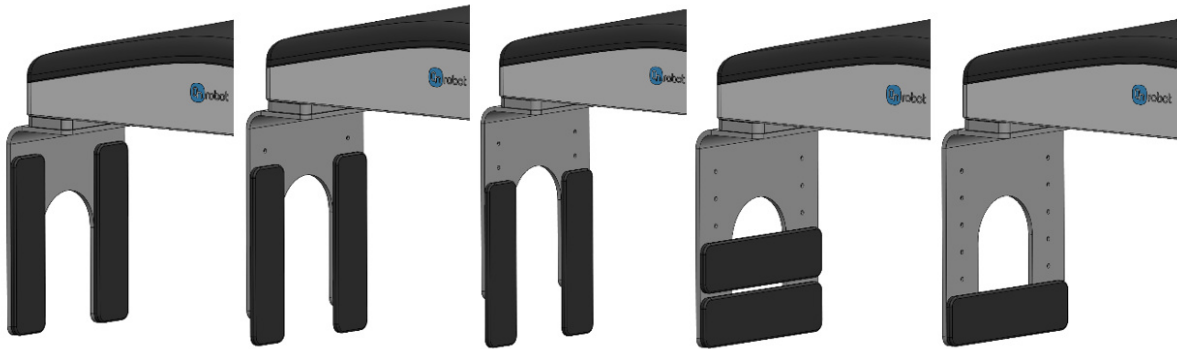
The pads are made of aluminum with a cover of silicone. The maximum force (equally distributed in the blue area of the images below) that can be applied to the finger pads is shown in the table below.

Illustration	Pad position	Maximum force (N)
	0	400
	1	300
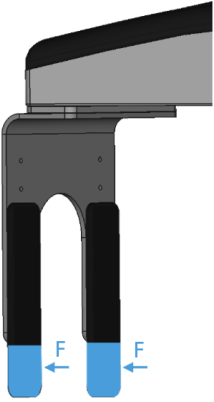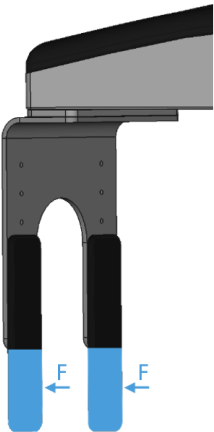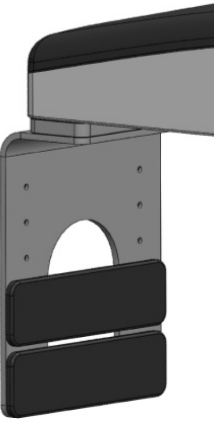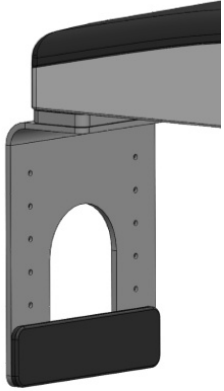
Illustration	Pad position	Maximum force (N)
	2	200
	3	100
	4	400

Illustration	Pad position	Maximum force (N)
	5	400

Finger set for KLT boxes

The Finger set for KLT boxes enhances the grip stability for KLT containers and other open box types with groove. The fingertips can be adjusted to the open slots on the large variants of boxes.
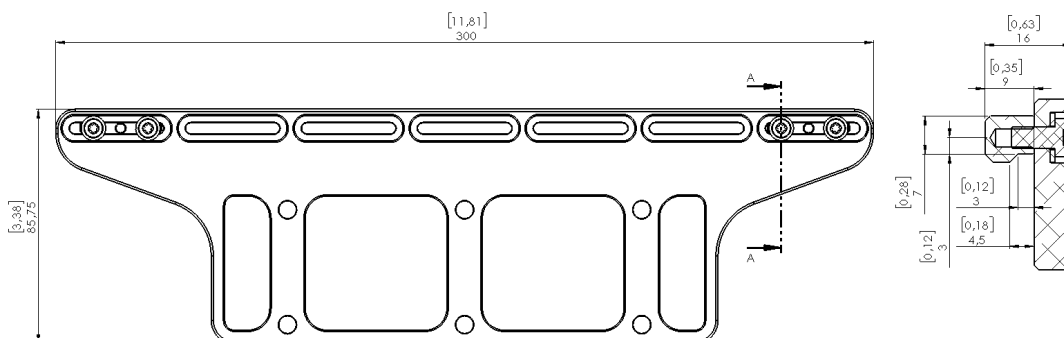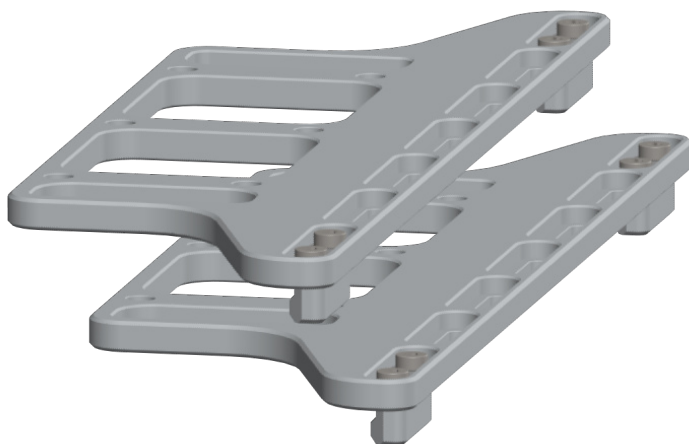
These fingers are accessories and need to be purchased separately. To purchase these fingers, please contact the vendor from where the gripper has been purchased.

• 2FGP20 - Finger set for KLT boxes PN 113294

See examples with 400 x 300 mm and 600 x 400 KLT boxes:
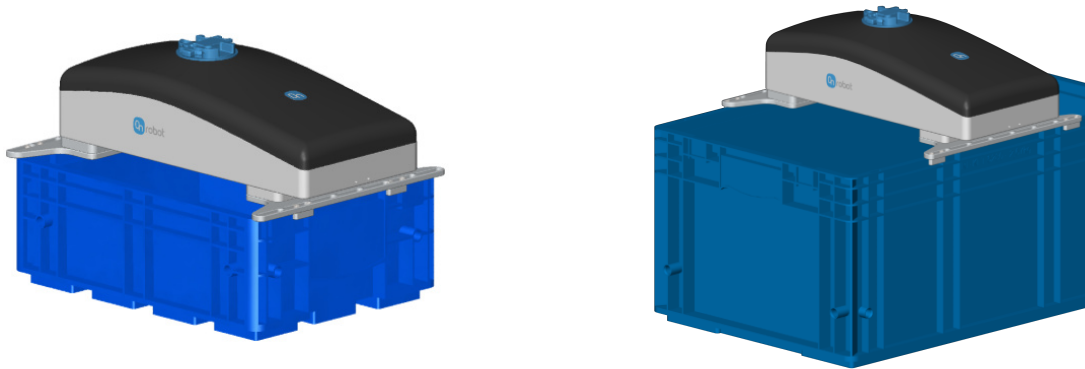
It is recommended to use KLT boxes using the VDA standard 4500. Because of the variance of stiffness in the different KLT boxes, the application needs to be tested in regards to payload and robot speed/acceleration.

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.
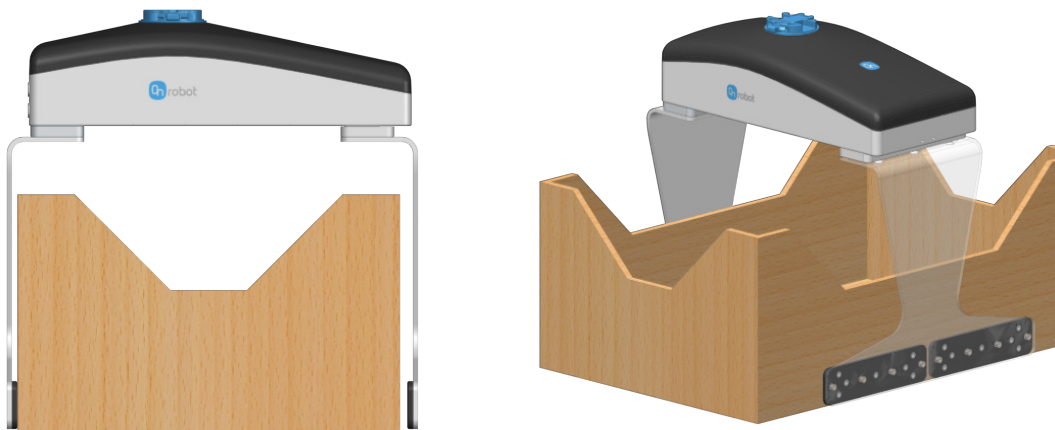
By increasing the finger height, the allowed torque might be reduced as shown in the **Moments in the finger base** section.

Another example is shown in the image below 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.
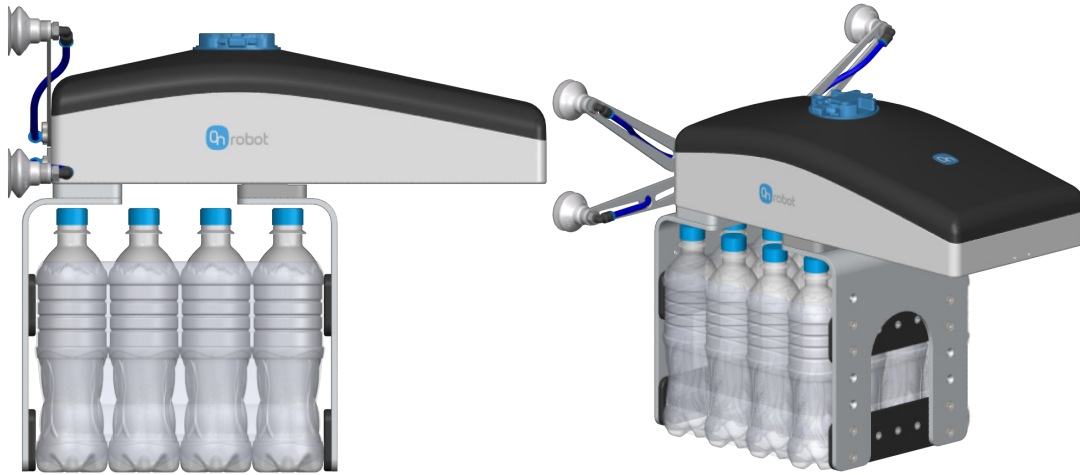
If custom fingers are required, they can be made to fit the gripper according to the dimensions (mm) [inch] shown below. Use M6x10mm screws to attach the fingers.
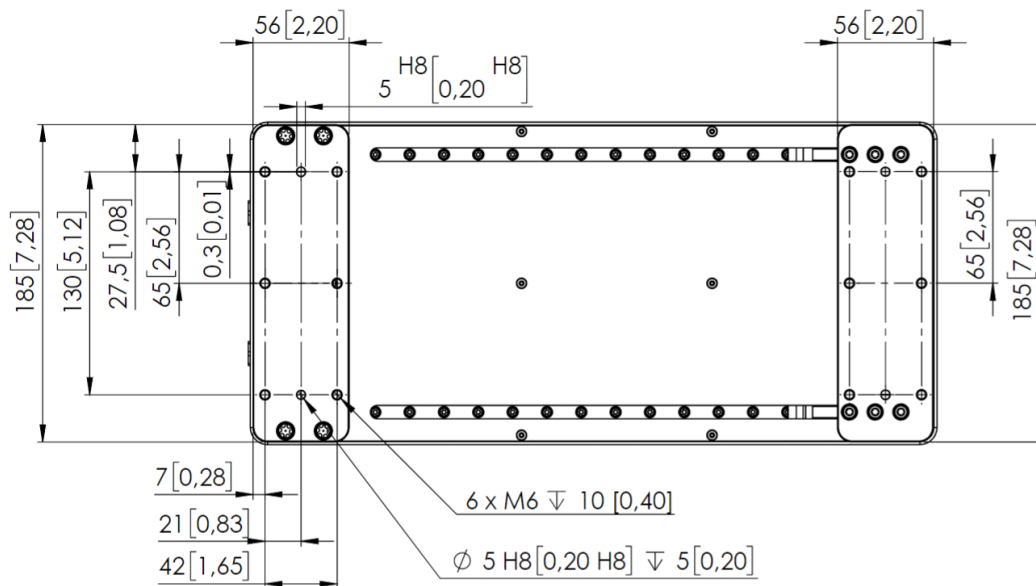
Moments in the finger base

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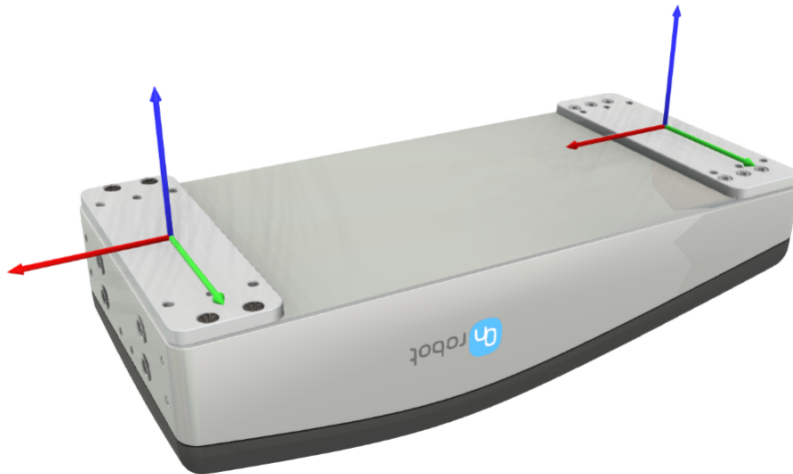
Vacuum cups

The vacuum solution has been designed to handle slip sheets and similar items. The two most common configurations with the delivered bracket and vacuum 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.
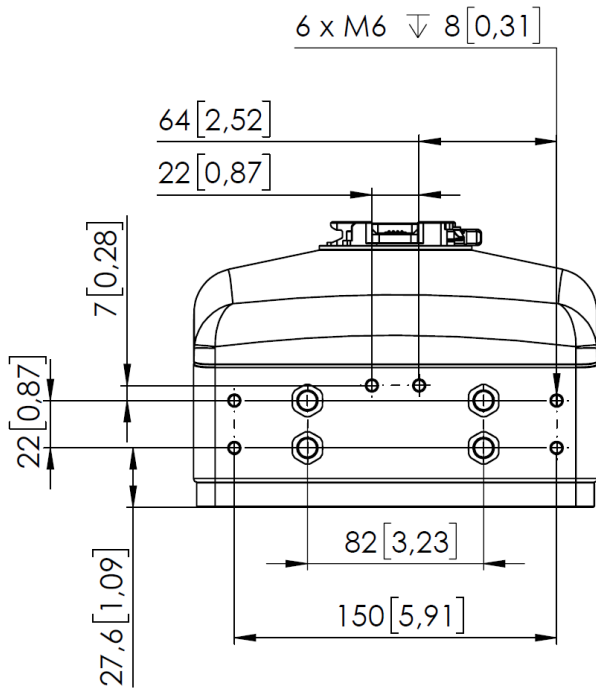
8.1.2. Quick Changers

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

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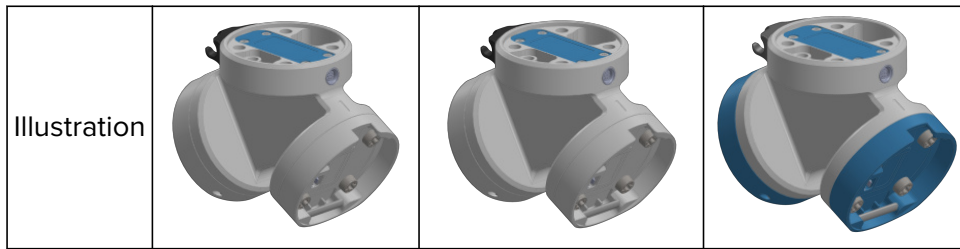
If not specified, the data represent the combination of the different Quick Changer types/ sides.

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.

Static Load capacity
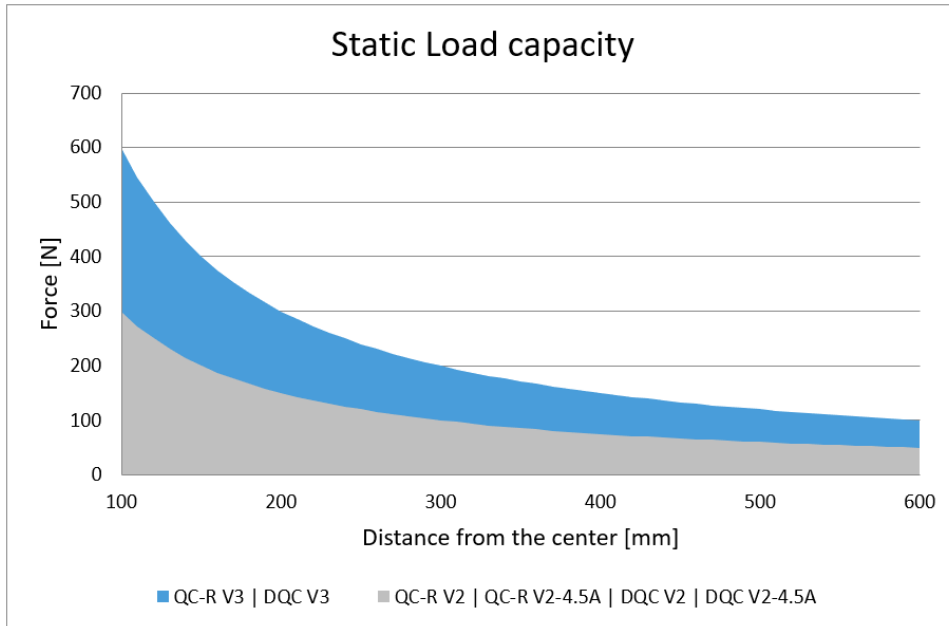
8.1.3. Compute Box

8.1.3.1. 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

8.1.3.2. 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	-	[kΩ]

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	-	[kΩ]

8.2. Mechanical Drawings

8.2.1. Mountings

8.2.1.1. Quick Changer - Robot Side
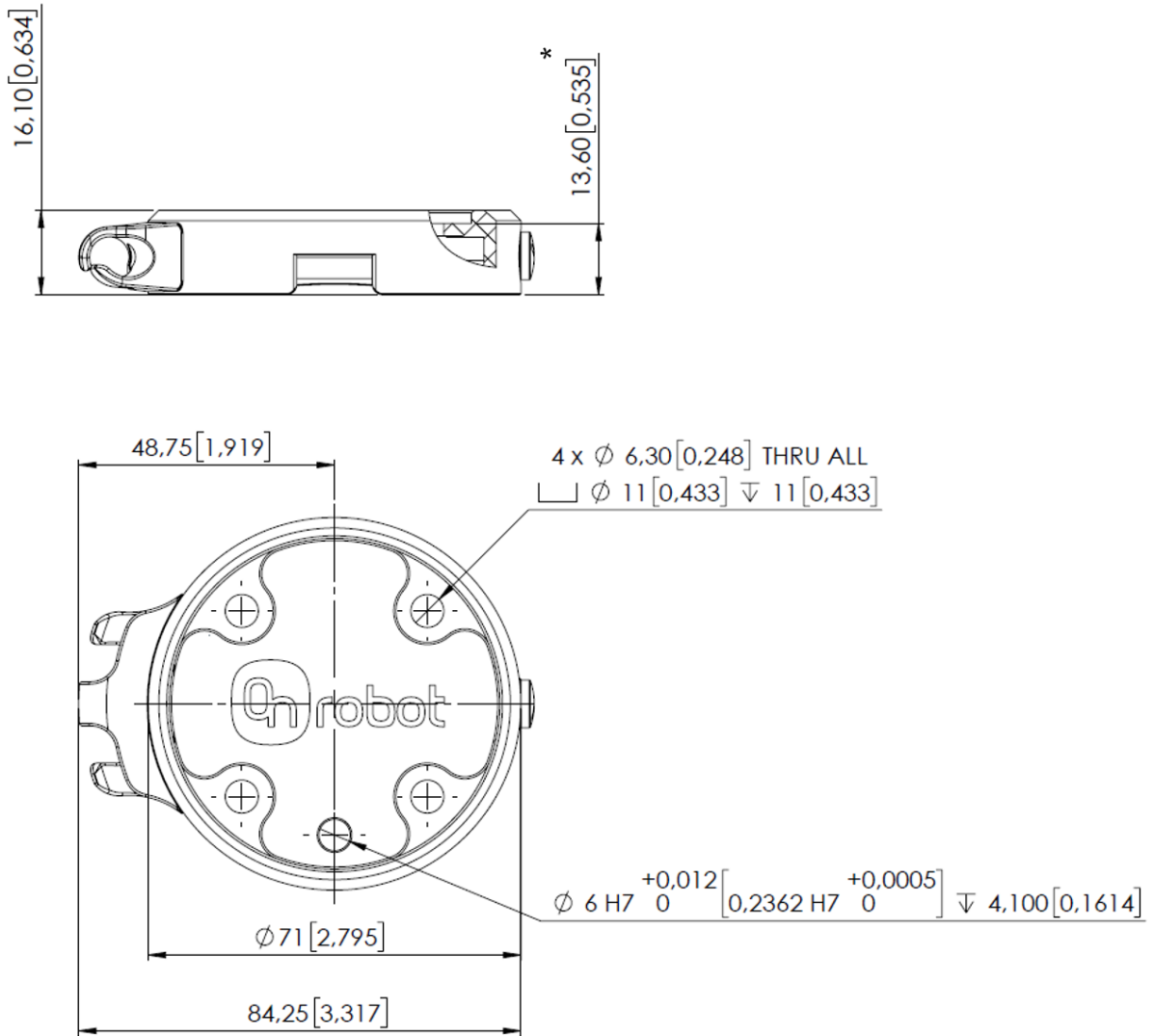
* Distance from Robot flange interface to OnRobot tool.

All dimensions are in mm and [inches].

NOTE:

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

8.2.2. Tools

8.2.2.1. 2FGP20
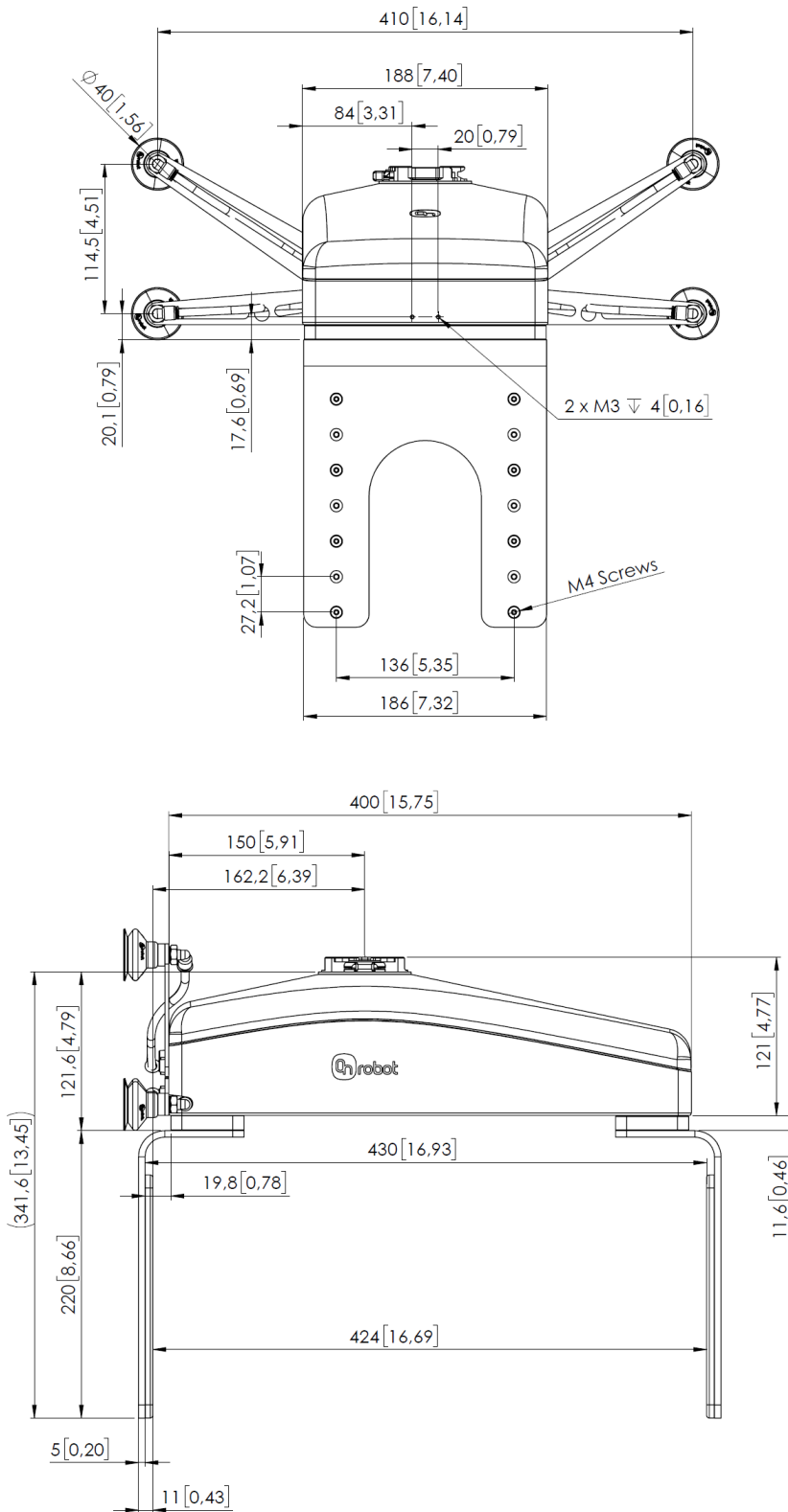
All dimensions are in mm and [inches].

8.2.2.2. Compute Box

Compute Box
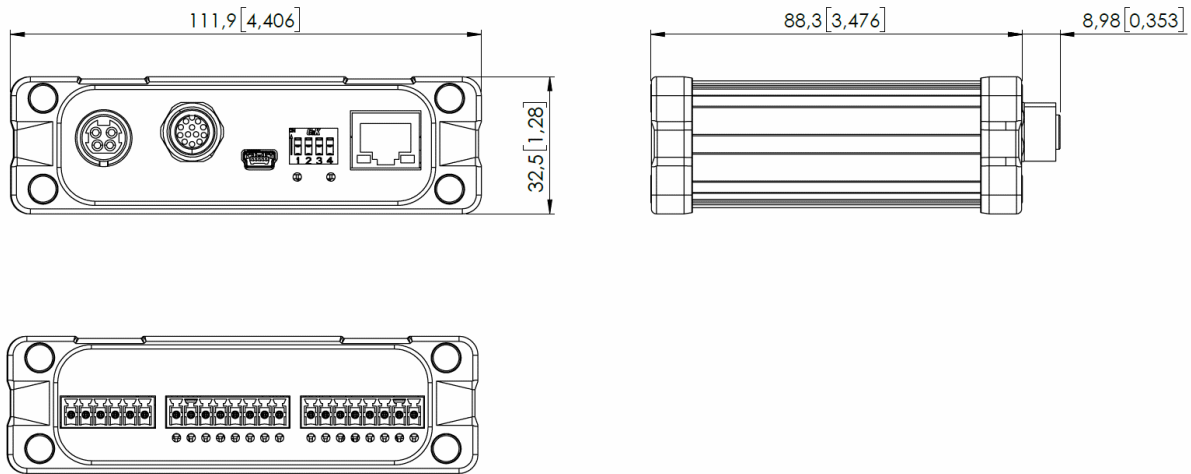
Clip-on Bracket (optional)
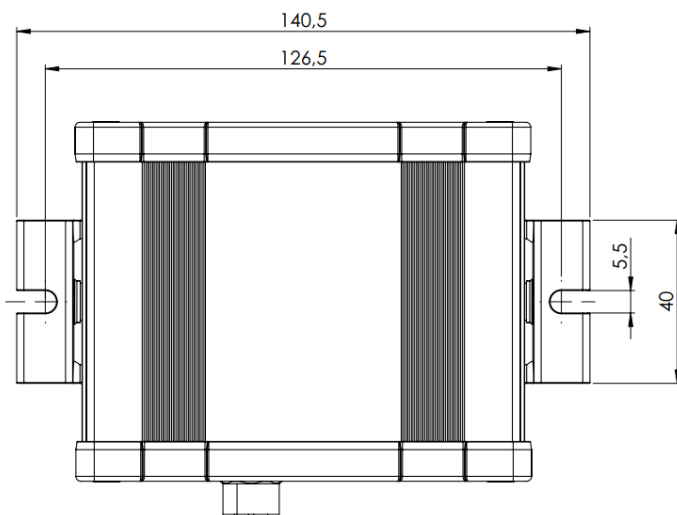
All dimensions are in mm and [inches].

8.3. 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 **7.1.5. Web Client: TCP, CoG** section.

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

8.3.1. 2FGP20

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

* 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.
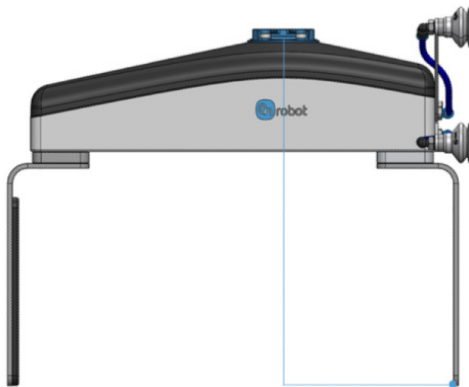
9. Maintenance

> ⚠️ **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.

9.1. 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 bracked 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

Accessories

Finger set for KLT boxes - PN 113294

- 2x Fingers for KLT boxes

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. Troubleshooting

10.1. 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

10.2. 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.

10.3. 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.

10.4. 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.

10.5. 2FGP20 Error Codes

10.5.1. 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.

10.5.2. 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. Warranties

11.1. 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.

11.2. 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.

11.3. 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.

12. Certifications

intertek
Total Quality. Assured.

CERTIFICATE
OF REGISTRATION

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

ISO 9001:2015

Intertek

Accred. no. 1639
Certification of
Management
Systems
ISO/IEC 17021-1

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.

12.1. 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.

12.2. EMC

FORCE TECHNOLOGY

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. Baltsen
Digitally signed by Knud A. Baltsen
Date: 2022.03.23 17:16:22 +01'00'
Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance

12.3. 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.

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	

12.4. Declaration of Incorporation

12.4.1. 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