



# USER MANUAL

FOR TECHMAN/OMRON ROBOTS

*ORIGINAL INSTRUCTION (EN)*

v1.1.2

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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 death or serious injury.

### 1.2 Scope of the Manual

The manual covers the following OnRobot products and its components:

Grippers	Version
3FG15	v1
Gecko Gripper	v2
RG2	v2
RG2-FT	v2
RG6	v2
SG	v1
VG10	v2
VGC10	v1

Sensors	Version
HEX-E QC	v3
HEX-H QC	v3

Where applicable the combination of the products is also covered in the manual.



**NOTE:**

Generally, the products without the Quick Changer v2 interface, are not in the scope of this manual.

The manual covers the following Compute Box software version:

Software	Version
Compute Box	v5.1.2



**NOTE:**

In case when the used Compute Box has lower software version, please update the Compute Box. For detailed instructions refer to WebClient description at the end of this Manual.

### 1.3 Naming convention

In the user manual Gecko Gripper is called Gecko only.

The 3FG15 product sometimes will be called TFG as Three-Finger Gripper.

The RG2 and RG6 names as model variants are used separately or together as RG2/6 if the information is relevant for both variants.

## Introduction

The HEX-E QC and HEX-H QC names as model variants are used separately or together as HEX-E/H QC if the information is relevant for both variants.

### 1.4 How to read the Manual

---

The manual covers all OnRobot products and its components that is available for your robot.

To make it easy to follow what type of product (or combination) or component is the given information is relevant for, the following visual highlights are used:

**RG2**

This is an instruction relevant for the RG2 product only.

**RG2-FT**

This is an instruction relevant for the RG2-FT product only.

**VG10**

This is an instruction relevant for the VG10 product.

All text without these visual marks are relevant for all products or components.

For convenience, in each part that contains visual highlights (that span across pages) a table is provided in the beginning, to guide you which page contains the relevant information for your product or component:

	<b>RG2 .....</b>	<b>6</b>
	<b>RG2-FT.....</b>	<b>6</b>
	<b>VG10 .....</b>	<b>6</b>

## 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 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 are normally used in pick-and-place, palletizing, machine tending, assembly, quality testing and inspection and surface finishing applications.

The end-of-arm tooling should only operate under conditions noted in **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

## 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:

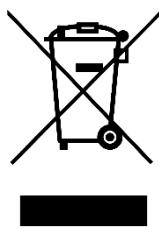
- Objects flying from OnRobot tools due to loss of grip
- Objects falling down from OnRobot tools due to loss of grip
- Injuries due to collisions between humans and workpieces, OnRobot tools tooling, robot or other obstacles
- Consequences due to loosen of bolts
- Consequences if OnRobot tools cable 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 PLd CAT3 Safety Function

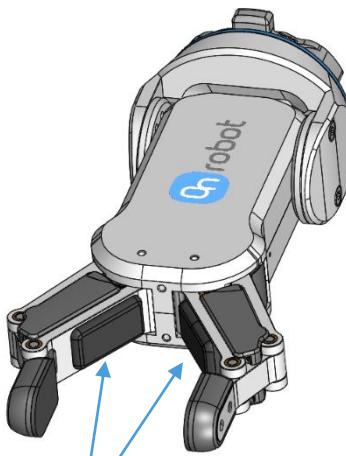
RG2  
RG6

A safety-rated function has been designed as two buttons at the two arms of the product, conforming to ISO 13849-1 PLd CAT3.

This Safety Function has a max response time of 100 ms and a MTTF of 2883 years.

The behavior of the safety system is described below:

If something activates the two Safety Buttons, see picture below, the safety control system stops motion of the two arms of the product. Motion is then prevented as long as one or both of the two buttons are activated.



PLd CAT3 Safety Buttons

If this happens while running the robot program, the provided RGx components can be used to detect and execute any necessary steps via the Safety stop gate.

To come back to normal operation with the gripper the Safety reset condition parameter can be used.



**CAUTION:**

Before resetting the gripper always make sure that no part will be dropped due to the loss of gripper power. If Dual Quick Changer is used it will cycle the power for both sides.

For further details refer to the Operation section.

## 3 Installation

### 3.1 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.

### 3.2 Mounting

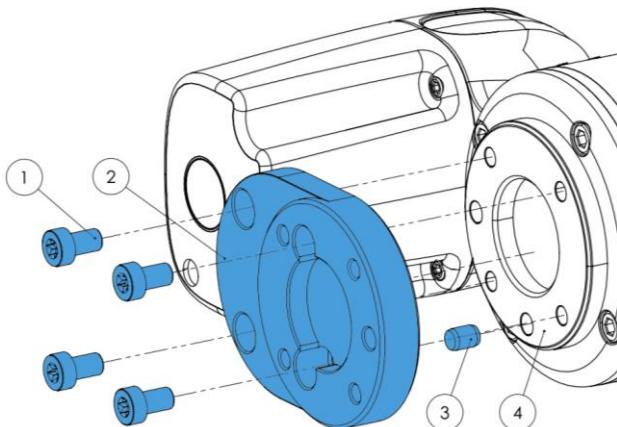
Required steps:

- Mount the robot dependent adapter
- Mount the Quick Changer option
- Mount the tool(s)

In the following three subsections these three mounting steps will be described.

#### 3.2.1 Adapter(s)

Adapter is only required when single VG10 or single Gecko Gripper (not Gecko SP1/3/5 ) is used.



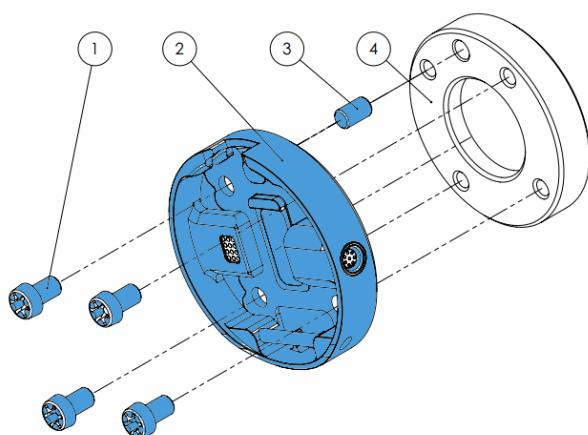
#### Adapter K

- 1 M6x10 screws (ISO14580 A4-70)
- 2 OnRobot adapter flange (ISO9409-1-50-4-M6 compatible)
- 3 Dowel pin Ø6x8 (ISO2338 h8)
- 4 Robot tool flange (ISO 9409-1-50-4-M6)

Use 10 Nm tightening torque.

### 3.2.2 Quick Changer options

**Quick Changer -  
Robot Side**

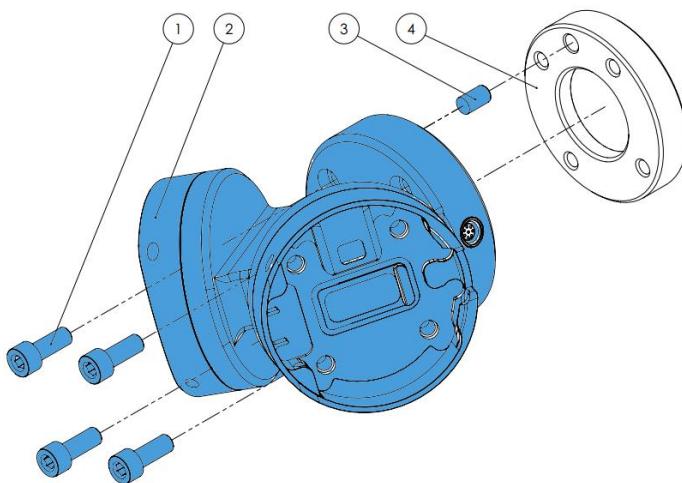


**Quick Changer - Robot Side**

- 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.

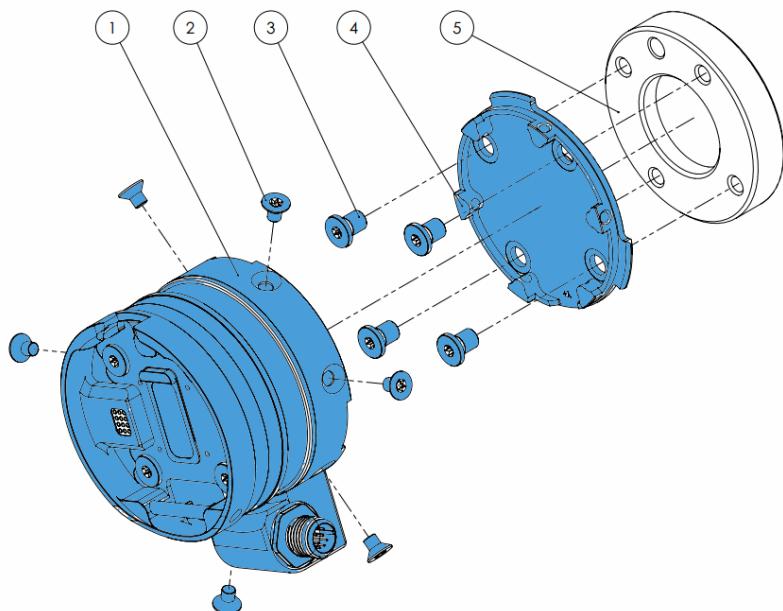
**Dual Quick Changer**



**Dual Quick Changer**

- 1 M6x20mm (ISO14580 8.8)
- 2 Dual Quick Changer
- 3 Dowel pin Ø6x10 (ISO2338 h8)
- 4 Adapter/ Robot tool flange (ISO 9409-1-50-4-M6)

Use 10 Nm tightening torque.

**HEX-E/H QC****HEX-E/H QC**

- 1 HEX-E/H QC sensor
- 2 M4x6mm (ISO14581 A4-70)
- 3 M6x8mm (NCN20146 A4-70)
- 4 HEX-E/H QC adapter
- 5 Adapter/ Robot tool flange (ISO 9409-1-50-4-M6)

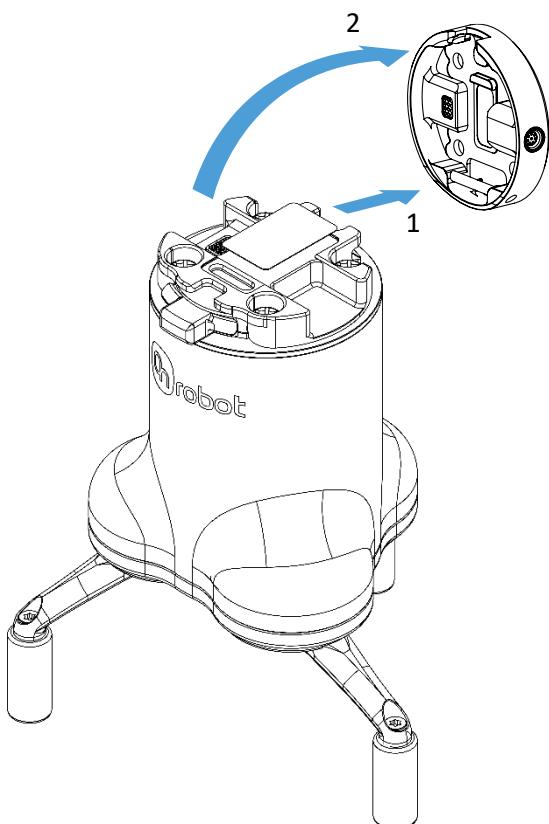
Use 1.5 Nm tightening torque.  
for M4x6mm

Use 10 Nm tightening torque.  
for M6x8mm

### 3.2.3 Tools

3FG15 .....	14
Gecko .....	15
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RG6 .....	18
SG .....	19
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VGC10 .....	20
Quick Changer - Tool side .....	20

#### 3FG15



##### Step 1:

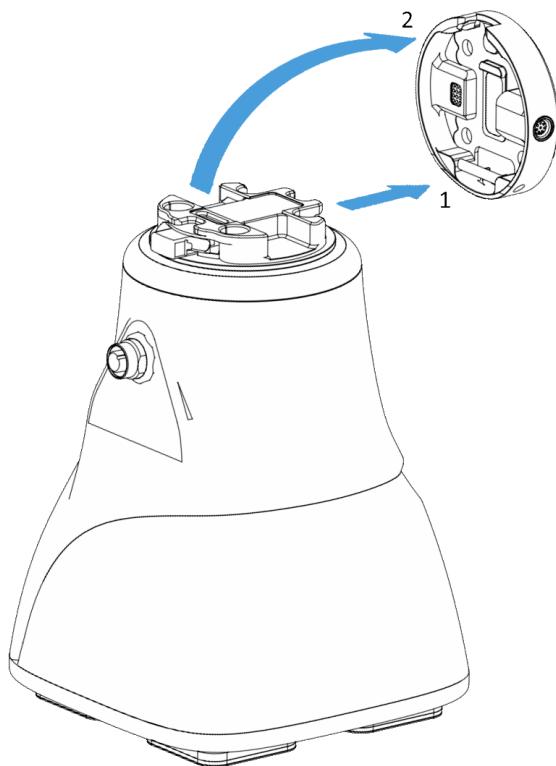
Move the tool close to the Quick Changer as illustrated.

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.

**Gecko****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.

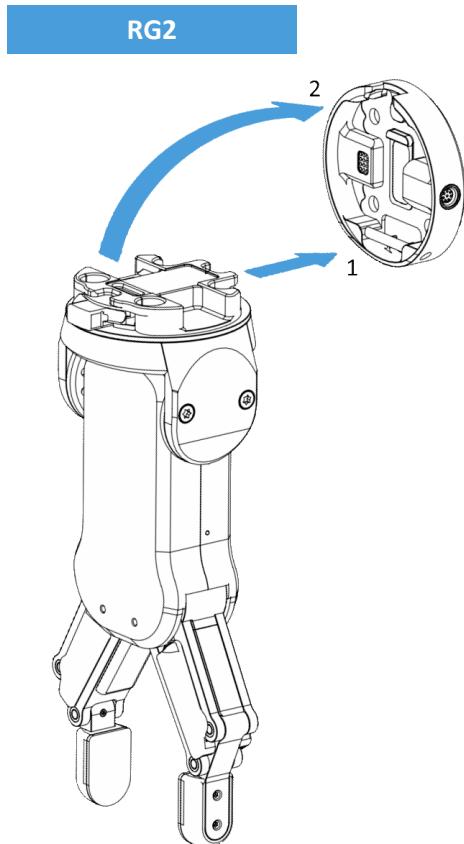
**Step 2:**

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.

**CAUTION:**

With a Dual Quick Changer the Gecko Gripper can only be mounted on the Secondary (2) side. Mounting on the Primary (1) side will prevent the devices to function correctly.

**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.

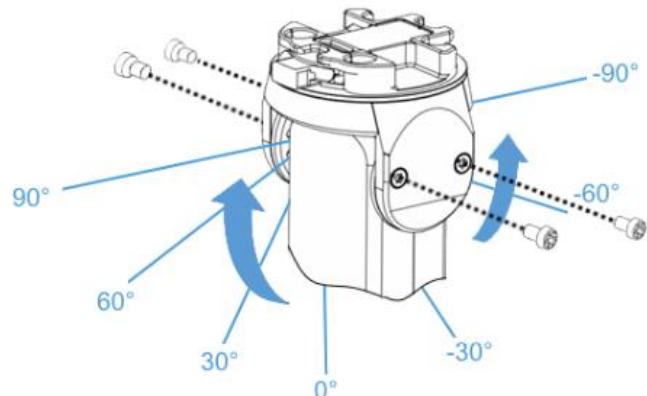
**Step 2:**

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

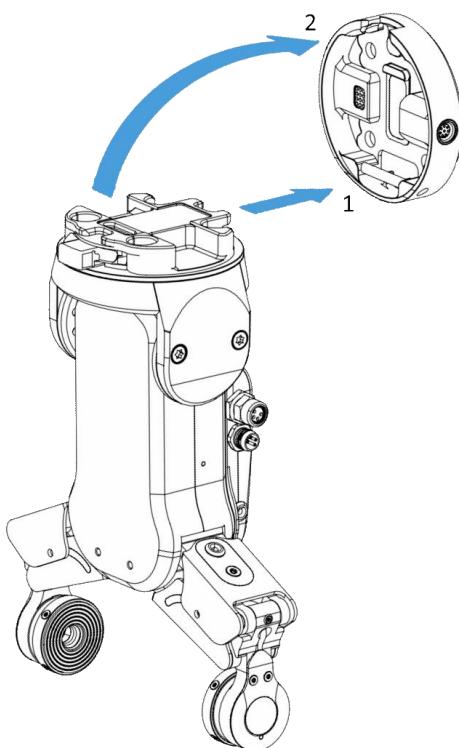
To unmount the tool, press the aluminum button on the Quick Changer and repeat the steps in the reverse order.

To change the relative angle of the gripper to the Quick Changer:

- first remove the four M4x6 screws
- tilt the gripper between -90° and 90°
- then put the four M4x6 screws back and use 1.35 Nm tightening torque to fix it.

**WARNING:**

Never use the device while any of the four M4x6 screws are removed.

**RG2-FT**

**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.

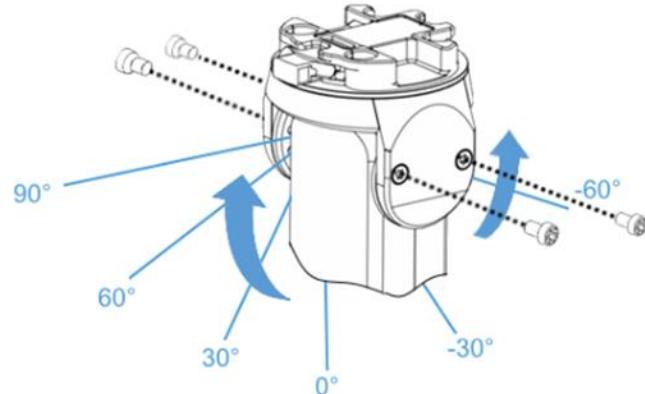
**Step 2:**

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.

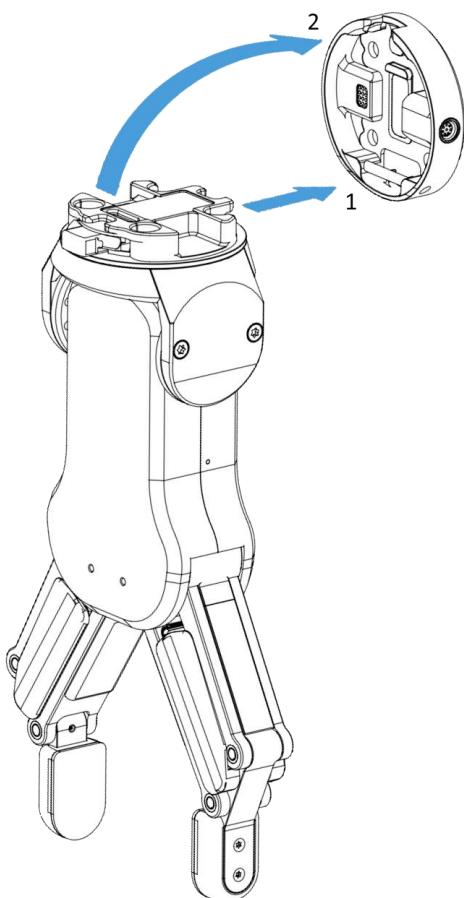
To change the relative angle of the gripper to the Quick Changer:

- first remove the four M4x6 screws
- tilt the gripper between -60° and 90°
- then put the four M4x6 screws back and use 1.35 Nm tightening torque to fix it.


**WARNING:**

Never use the device while any of the four M4x6 screws are removed.



**RG6****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.

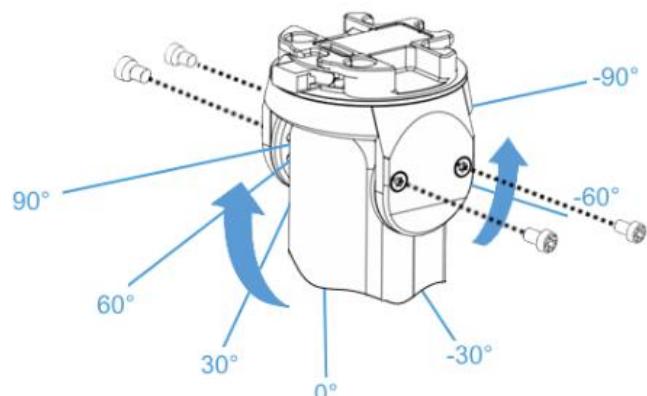
**Step 2:**

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

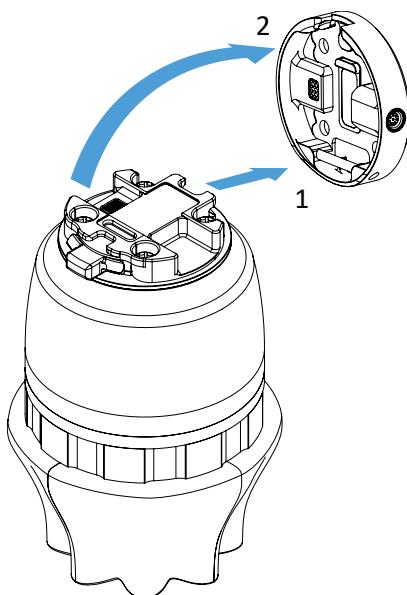
To unmount the tool, press the aluminum button on the Quick Changer and repeat the steps in the reverse order.

To change the relative angle of the gripper to the Quick Changer:

- first remove the four M4x6 screws
- tilt the gripper between -90° and 90°
- then put the four M4x6 screws back and use 1.35 Nm tightening torque to fix it.

**WARNING:**

Never use the device while any of the four M4x6 screws are removed.

**SG****Step 1:**

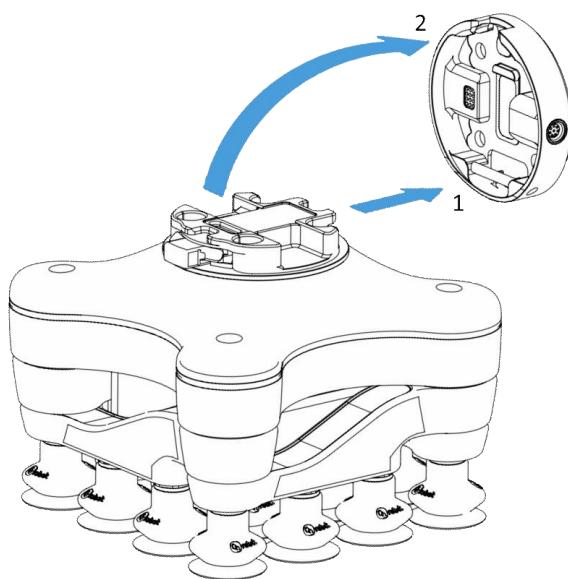
Move the tool close to the Quick Changer as illustrated.

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.

**VG10****Step 1:**

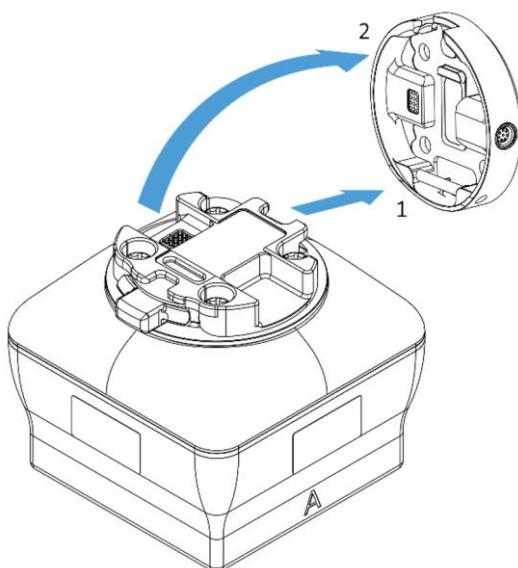
Move the tool close to the Quick Changer as illustrated.

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.

**VGC10****Step 1:**

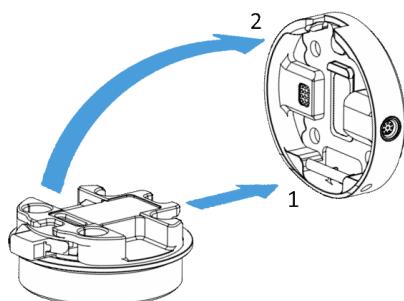
Move the tool close to the Quick Changer as illustrated.

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.

**Quick Changer - Tool side****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:**

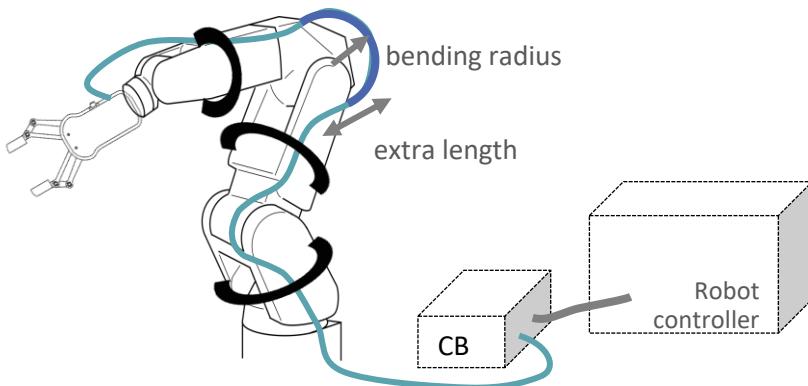
Flip the tool until it is fully mated, and you hear a clicking sound.

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

### 3.3 Wiring

Three cables need to be connected to wire the system properly:

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



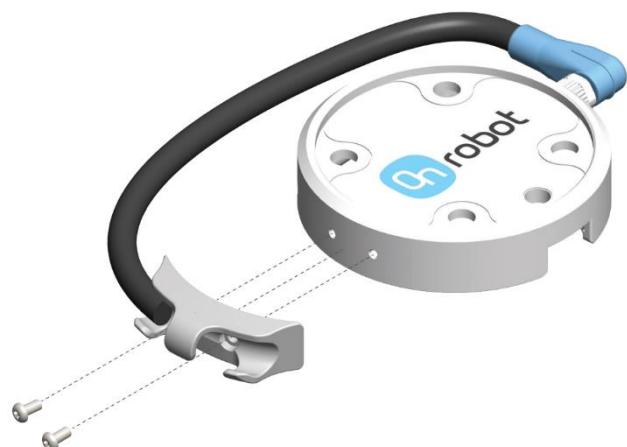
**NOTE:**

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

#### 3.3.1 Tool data cable

First connect the data cable to the tool.

**For Single or Dual 3FG15, RG2, RG6, SG, VG10, VGC10 or Gecko Gripper**



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

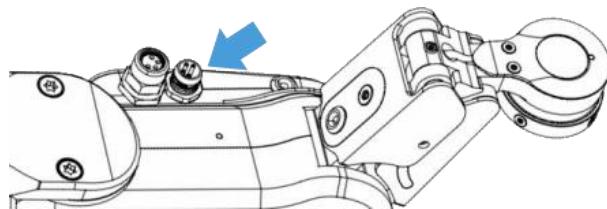
Use the cable holder as illustrated on the left.



**CAUTION:**

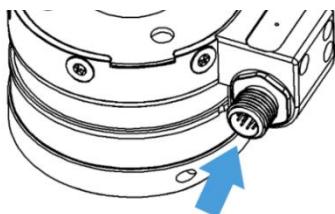
Make sure to use the supplied cable holder to prevent any excessive strain on the 90-degree M8 connector caused by the rotation of the cable.

**For RG2-FT**



For RG2-FT the Quick Changer tool data connector cannot be used. Instead use the marked M8-4pin connector

#### For HEX-E/H QC



Use the marked M12-12pin connector on the HEX-E/H QC.

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:

Use only original OnRobot tool data cables.  
Do not cut or extend these cables.



#### CAUTION:

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

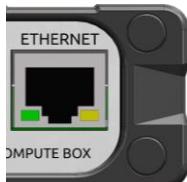
### 3.3.2 Ethernet cable

Connect one end of the supplied Ethernet (UTP) 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.

**CAUTION:**

Use only shielded, maximum 3m long Ethernet cables.

**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).

### 3.3.3 Power supply



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.

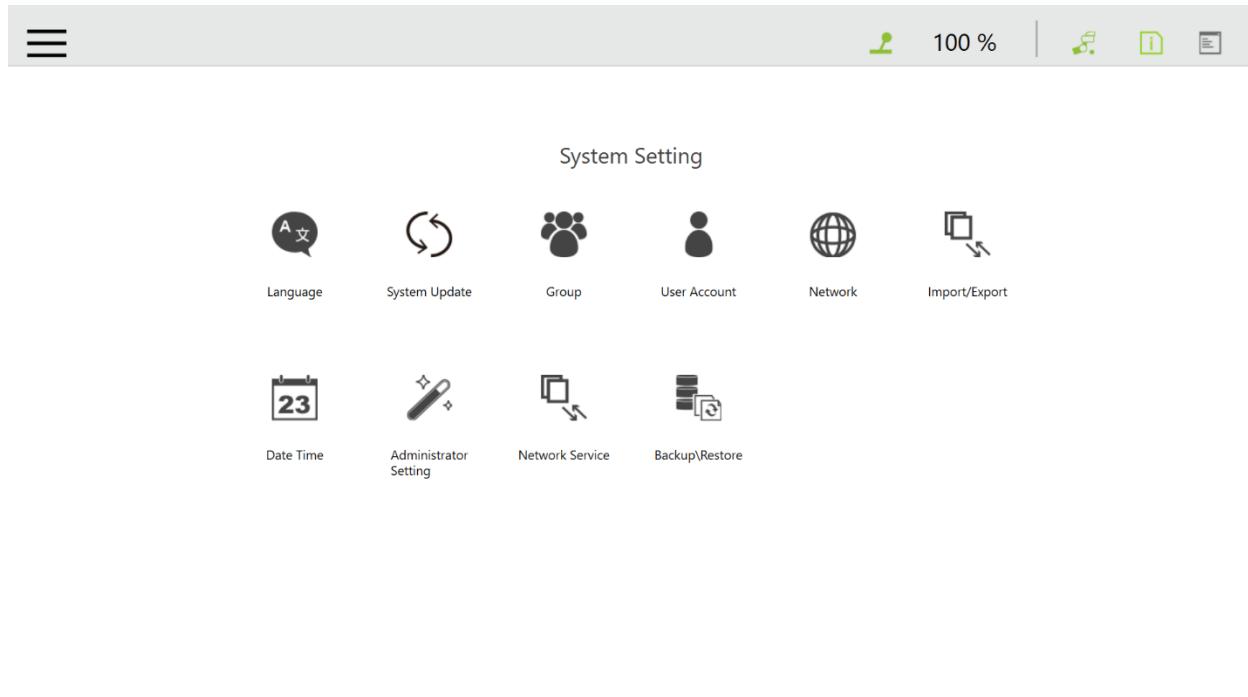
Finally, power up the power supply that will power the Compute Box and the connected Tool(s).

## 3.4 Software setup

### 3.4.1 Import Component

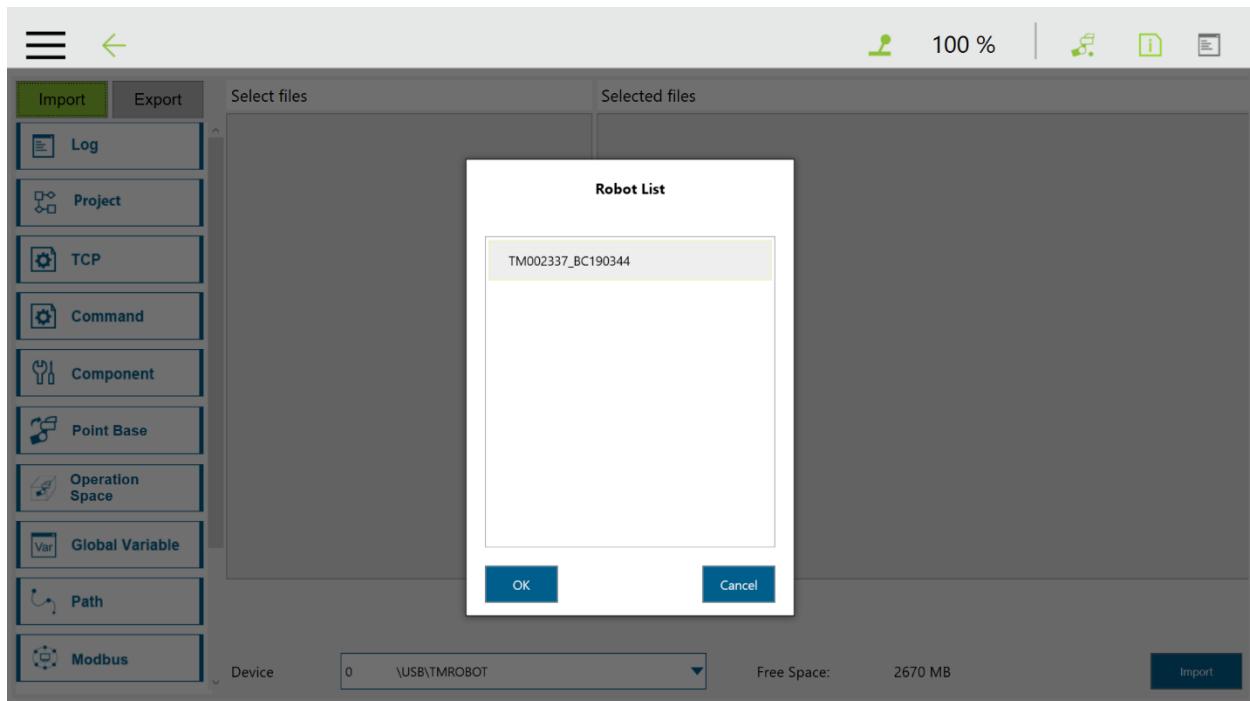
Prepare the supplied OnRobot USB stick and plug it into the robot controller.

Click on the main menu  icon and go to  System menu.

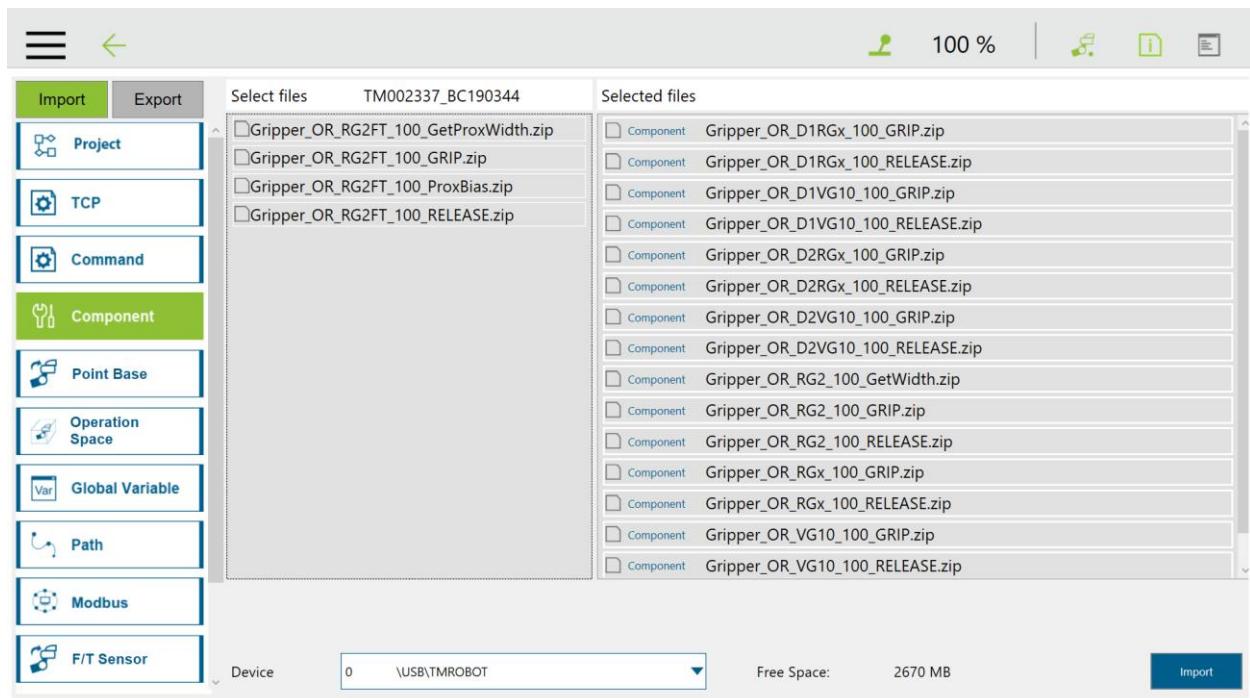


## Installation

Go to **Import/Export** and click **Import** (upper left corner). Then select your robot from the list and click **OK**.

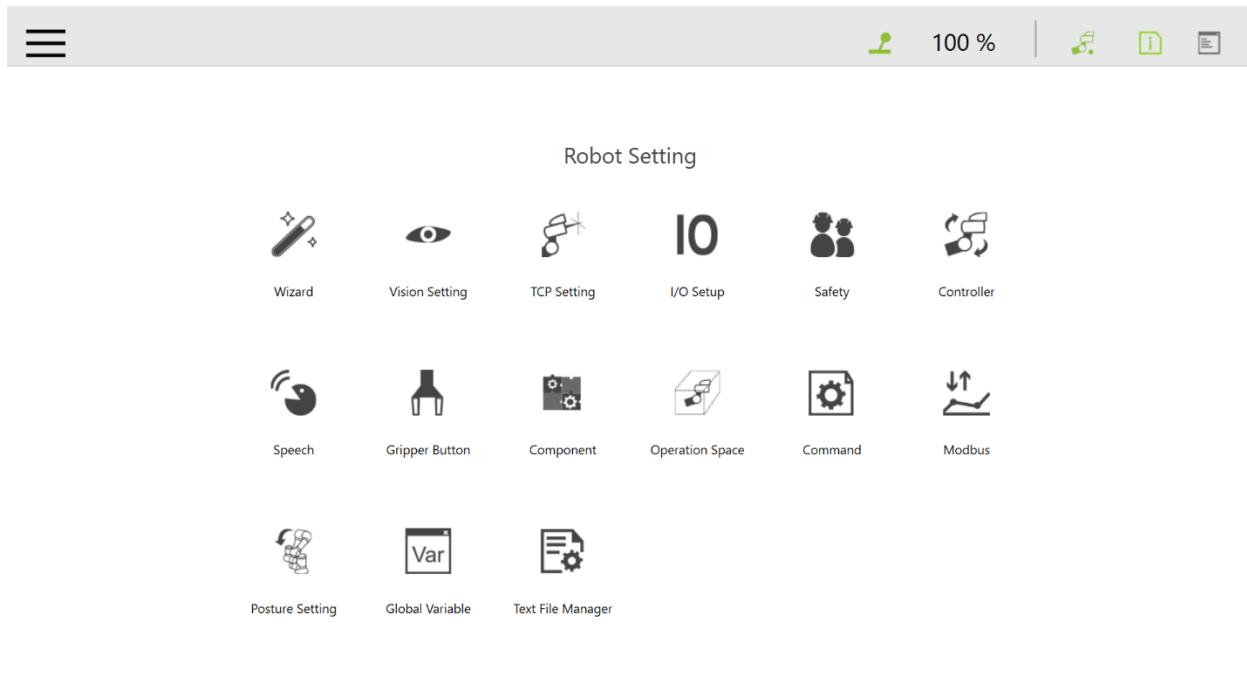


Select the relevant OnRobot components to be added and click **Import**.



## Installation

Go back to the main menu (  ) and go to  **Settings**.

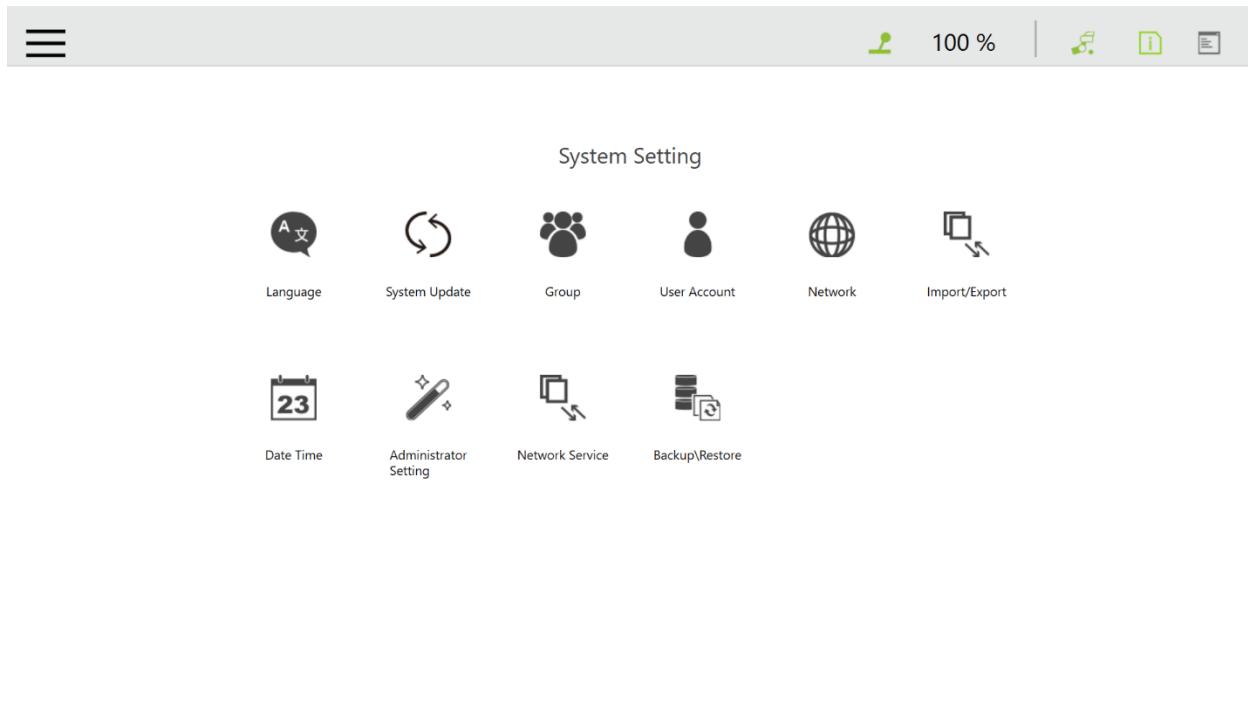


Click **Component** and make sure that all components are enabled that you would like to use.

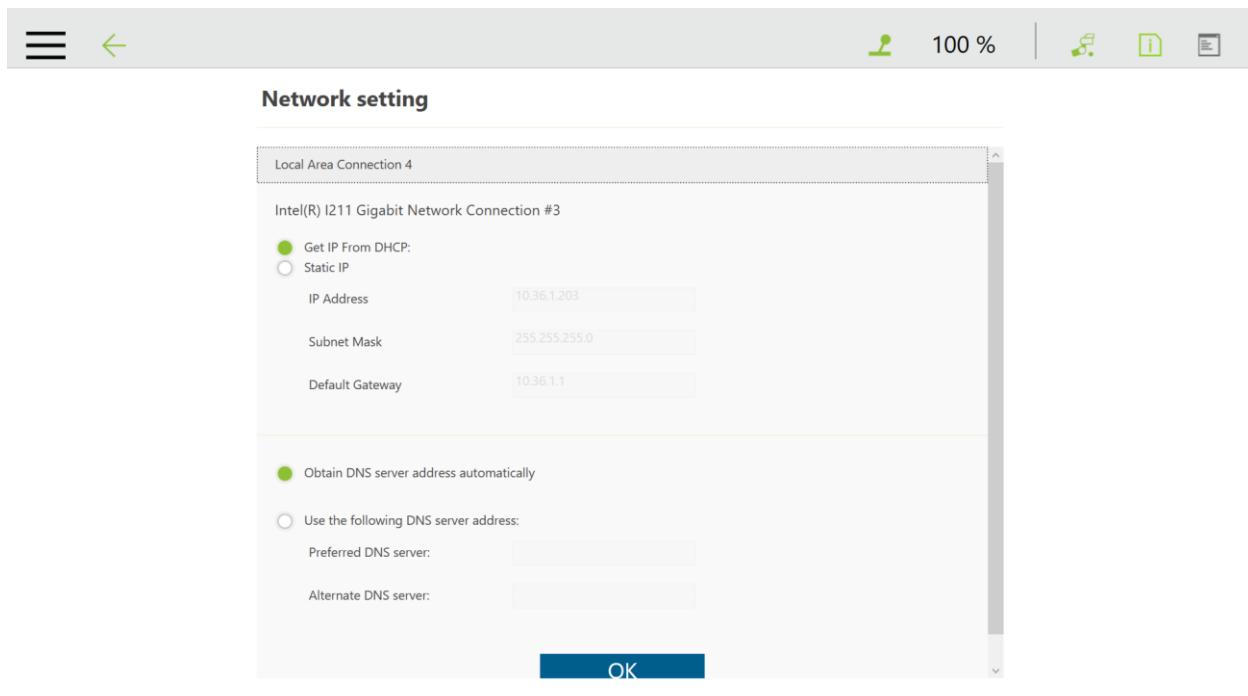
Enable	Component Name
●	Gripper_OR_VG10_100_GRIP.Component
●	Gripper_OR_VG10_100_RELEASE.Component
●	Gripper_OR_RG2FT_100_GetProxWidth.Component
●	Gripper_OR_RG2FT_100_GetWidth.Component
●	Gripper_OR_RG2FT_100_ProxBias.Component
●	Gripper_OR_RG2FT_100_RELEASE.Component
●	Gripper_OR_RG2FT_100_GRIP.Component
●	Gripper_OR_D1RGx_100_GRIP.Component
●	Gripper_OR_D1RGx_100_RELEASE.Component
●	Gripper_OR_D1VG10_100_GRIP.Component
●	Gripper_OR_D1VG10_100_RELEASE.Component
●	Gripper_OR_D2RGx_100_GRIP.Component
●	Gripper_OR_D2RGx_100_RELEASE.Component
●	Gripper_OR_D2VG10_100_GRIP.Component
●	Gripper_OR_D2VG10_100_RELEASE.Component
●	Gripper_OR_RGx_100_GRIP.Component
●	Gripper_OR_RGx_100_RELEASE.Component

### 3.4.2 Set robot network settings

Go to the main menu () and go to  **Settings**.



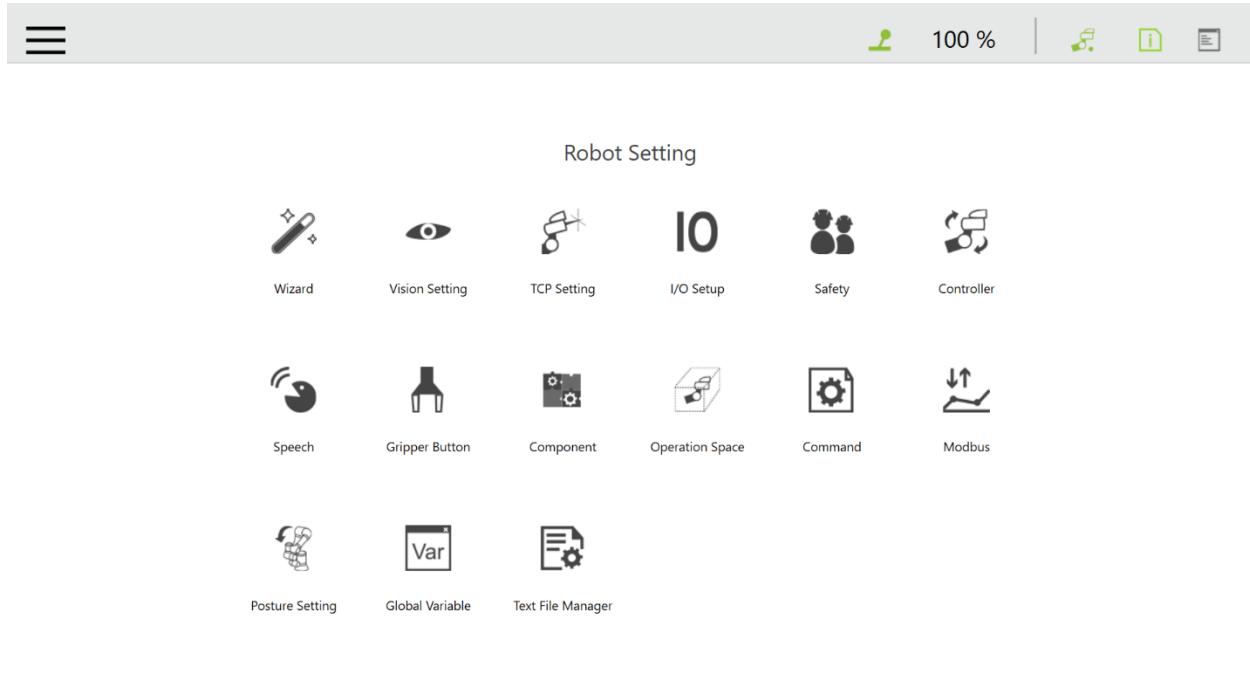
Go to **Network** and setup the IP address of the robot.



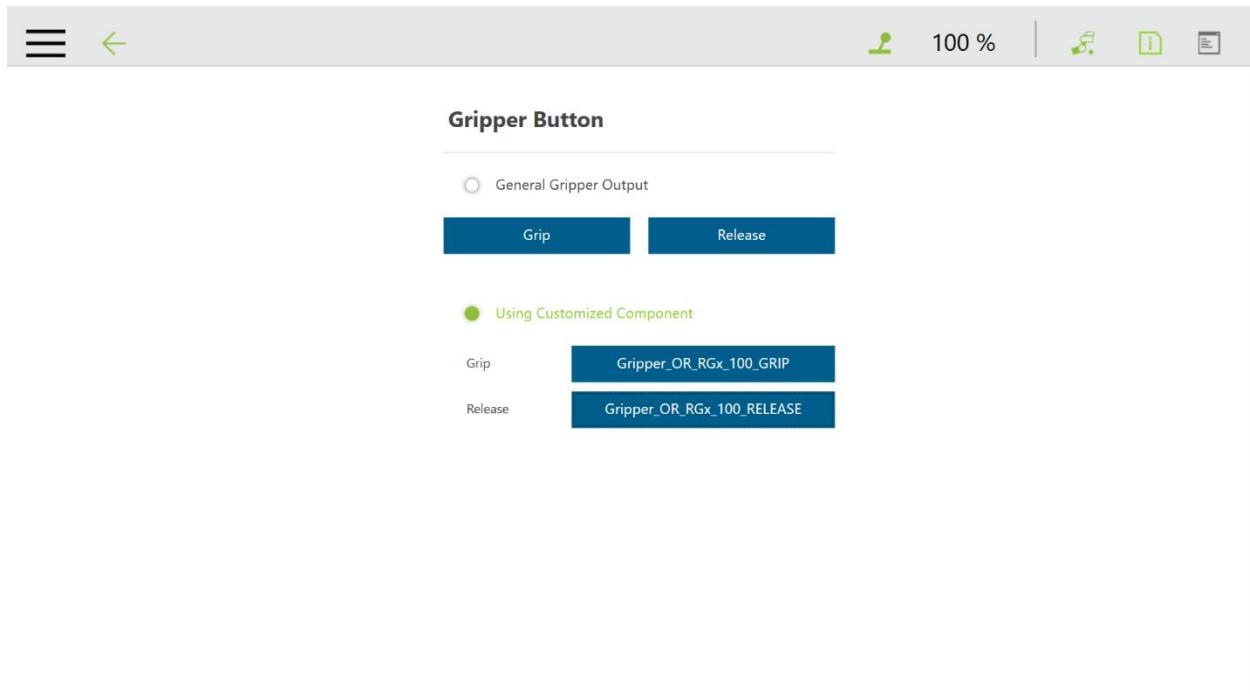
It is recommended to leave the options in automatic configuration.

### 3.4.3 Configure gripper buttons

Go to the main menu (  ) and go to  **Settings**.



Click on the **Gripper Button** and configure as shown below.



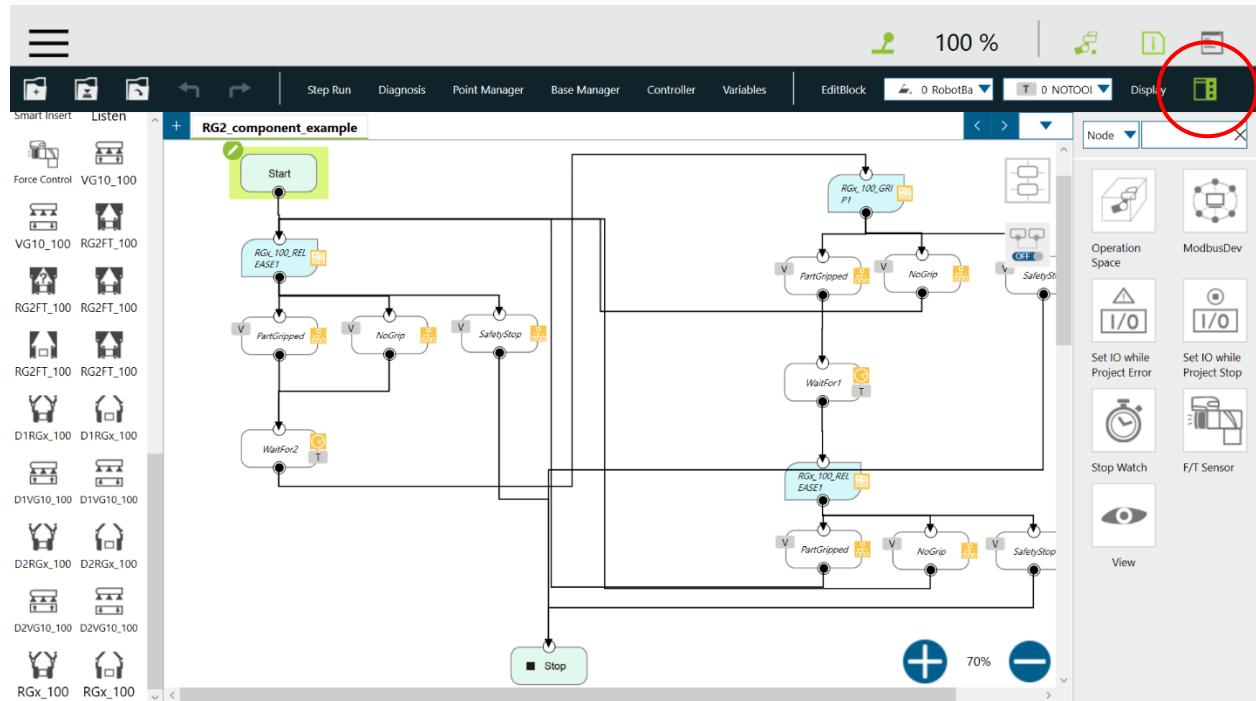
### 3.4.4 Configuring Modbus TCP for the components

You can open the `RG2_component_example` project or create a new project.

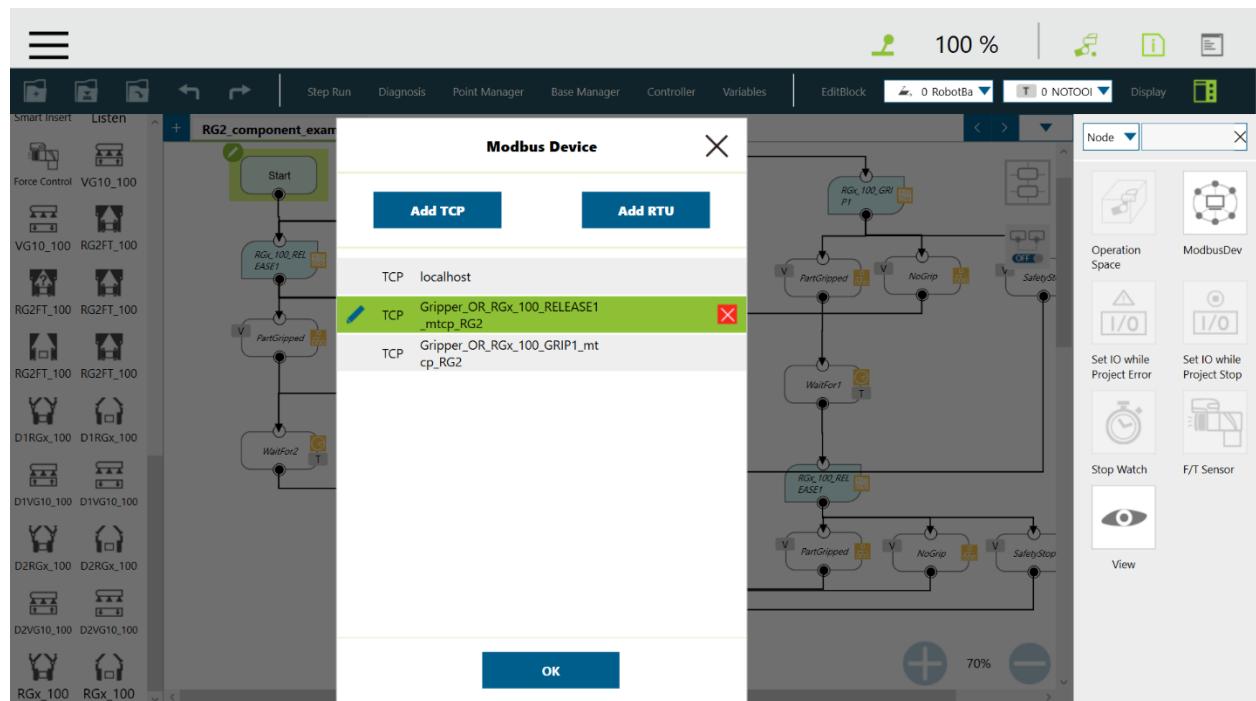
## Installation

Add the RGx\_100\_GRIP1 component from the left side. Note that not the full component name is shown only the RGx\_100. You can use the icons to select the right action.

If you are not using the default Compute Box IP (192.168.1.1) then you need to set it. Click on the icon on the right side of **Display** in the upper right corner.

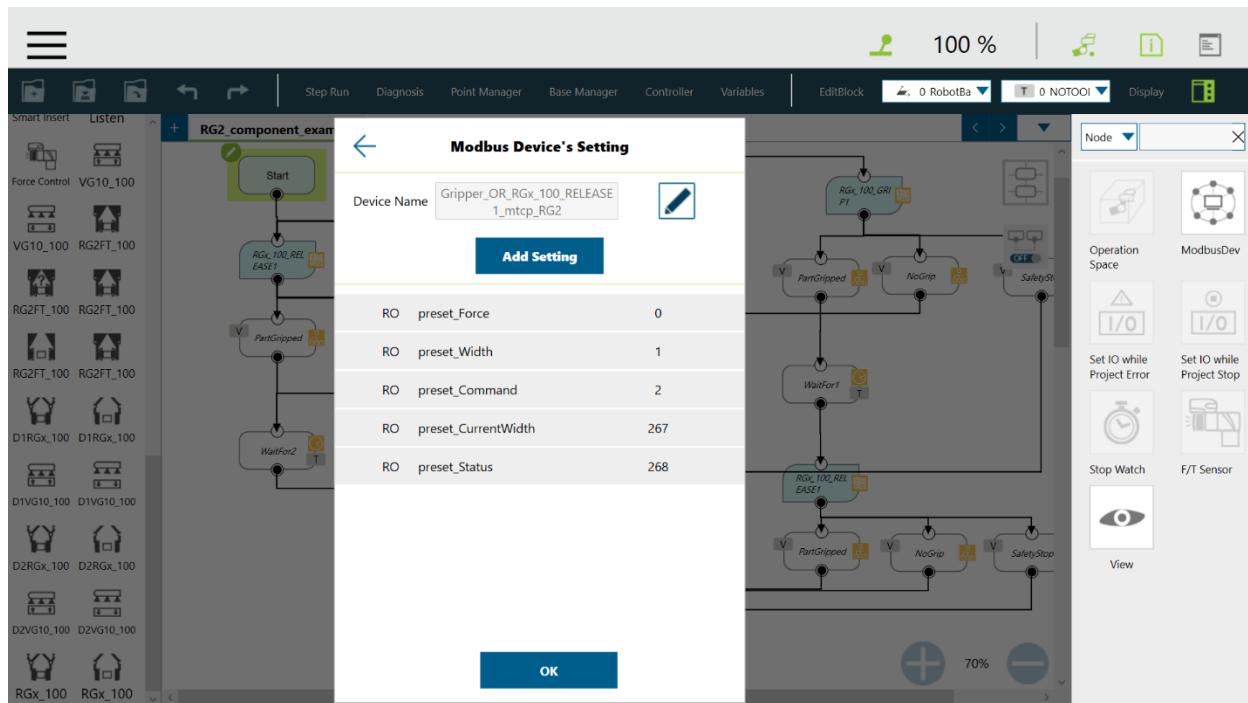


Then click on **ModbusDev**. Select **Gripper\_OR\_RGx\_100\_Grip1\_mtcp\_RG2** and click on the Pencil icon.

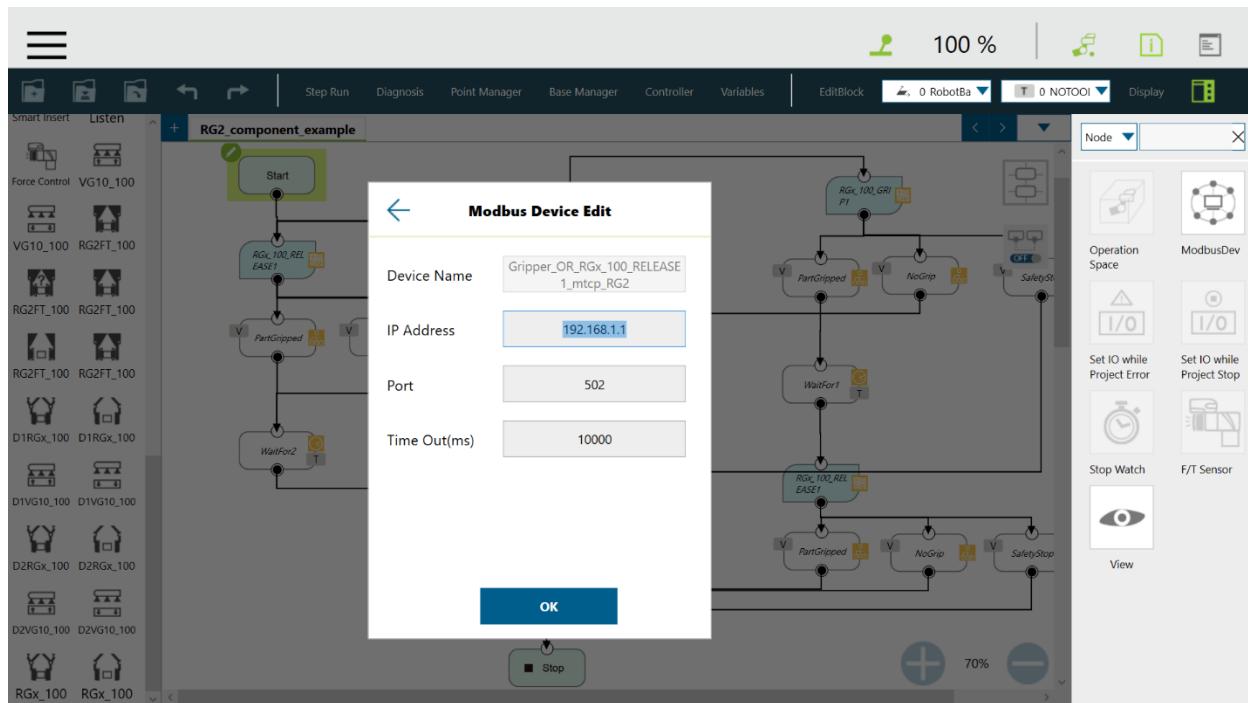


## Installation

Click on the pencil icon again in the upper right corner.



Make sure that the IP address is set correctly.



Repeat the same for the other Modbus device if needed.

Software setup is finished.

## 4 Operation

**NOTE:**

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

### 4.1 Overview

You can use the previously installed OnRobot components to operate the OnRobot devices from the robot.

The following OnRobot components are available:

- 3FG15 Components
- Gecko Components
- HEX Components
- RGx Components
- RG2-FT Components
- SG Components
- VG10 / VG10 Components

In the following subsections these components will be described.

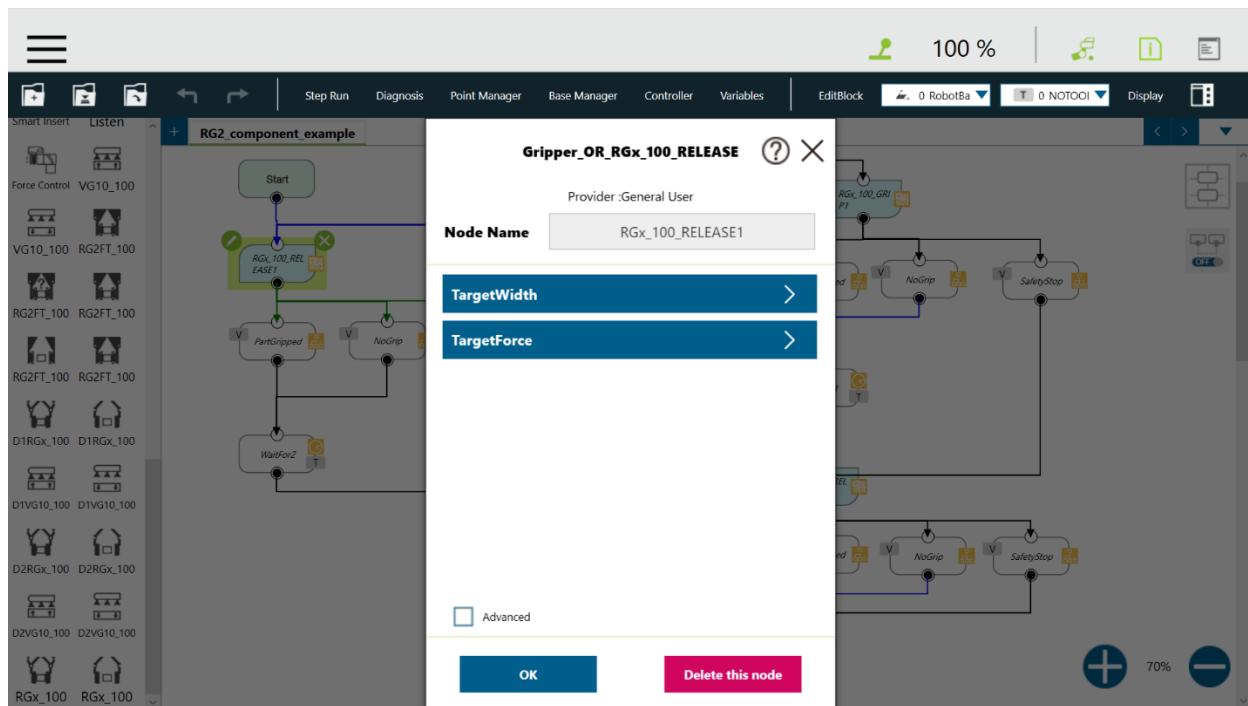
Before that, here is one example how to use generally these components:

For example, `RGx_100_Grip1` is capable of opening and closing the gripper. The `RGx_100_Release1` is only added so that the Gripper Button can work as well.

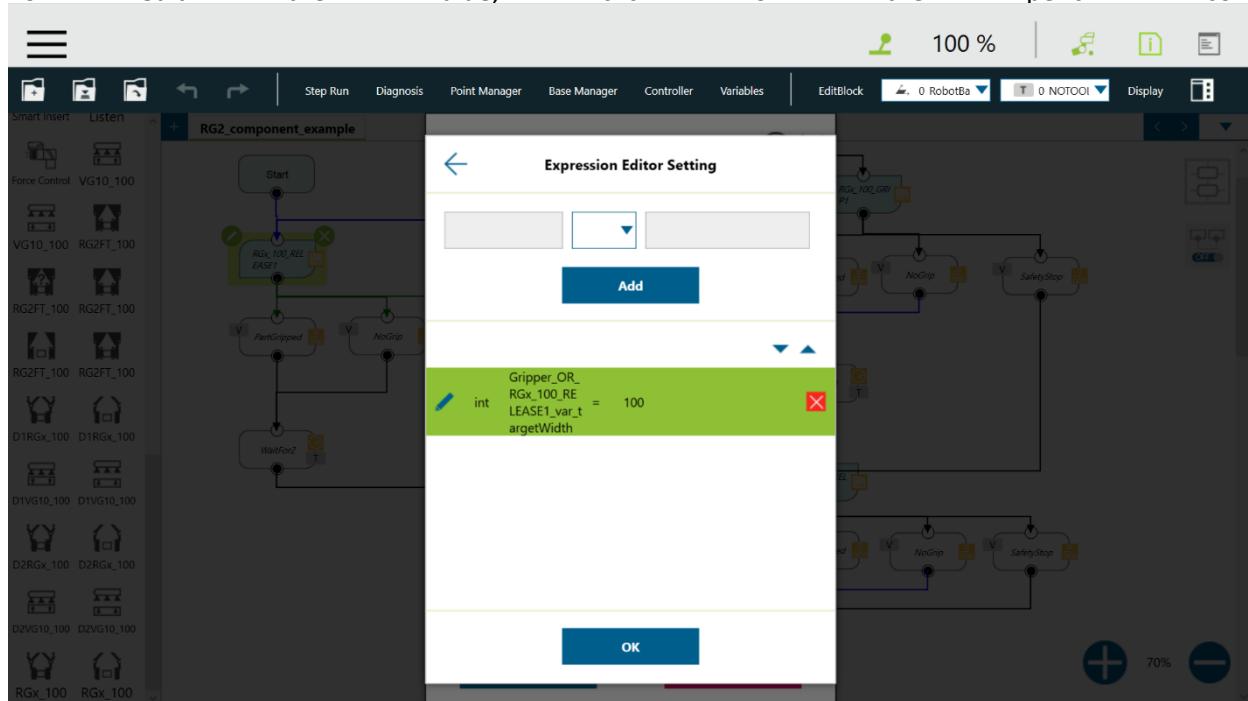
**NOTE:**

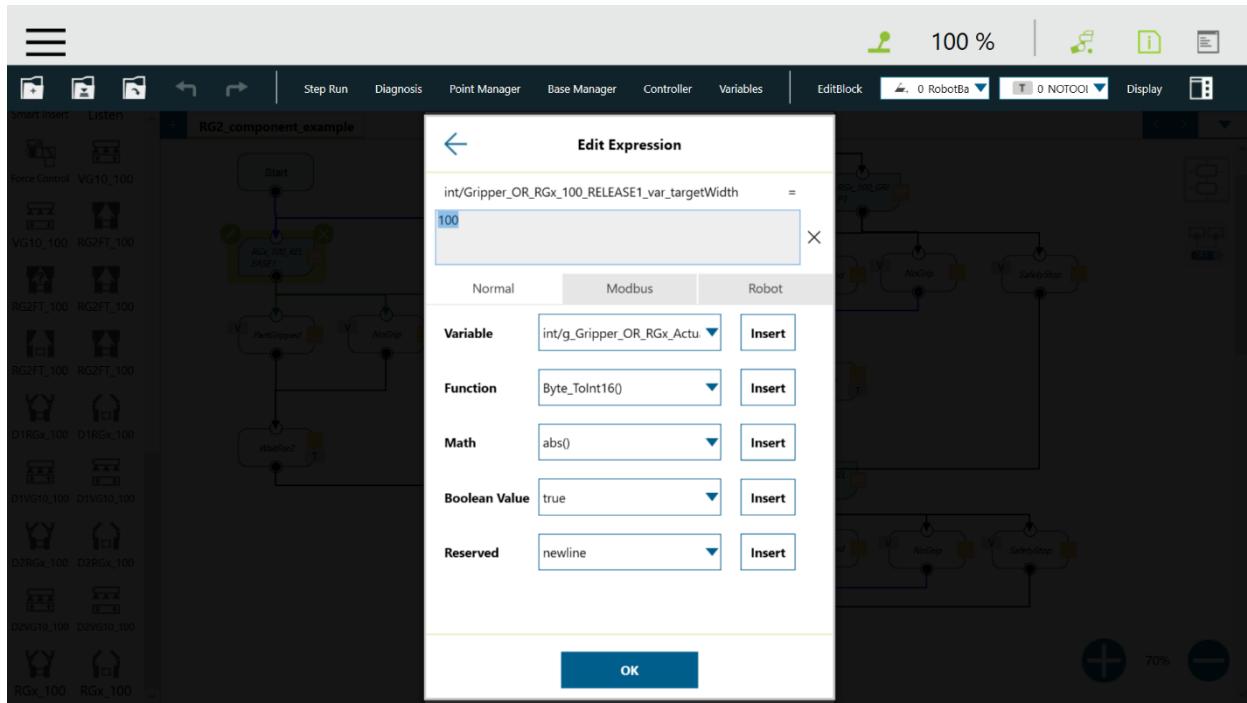
The 100 in the component name corresponds to the actual component version (100=1.00).

You can change Target width and Target force variables by clicking on the arrow icon on the component.



To edit the value, click on the pencil icon.



**NOTE:**

The components with D1 and D2 prefix can be used only with Dual Quick Changer and the given device needs to be connected to 1 - primary or 2 - secondary side.

## 4.2 3FG15 Components

**Quick Changer**

**HEX-E/H QC**

### 4.2.1 Gripper\_OR\_3FG\_100\_GRIP

The gripping action has two phases:

- Move with low force close to the target diameter
- Move with target force to reach target diameter and engage mechanical lock

More information in the [Technical sheet](#).

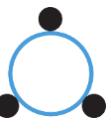
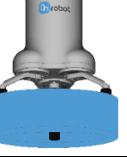
- Target diameter: Defines what the final diameter of the gripper should be. If this diameter is smaller than the workpiece diameter, the gripper will stop when it reaches the Target force. The diameter range is shown on the table below:

Finger Position	Fingertip (mm)	External Gripping range (mm)	Internal Gripping range (mm)
1	Ø10	10 - 117	35 - 135
	Ø13	7 - 114	38 - 138
	Ø16.5	4 - 111	41 - 140
2	Ø10	26 - 134	49 - 153
	Ø13	23 - 131	52 - 156
	Ø16.5	20 - 128	55 - 158
3	Ø10	44 - 152	65 - 172
	Ø13	41 - 149	68 - 174
	Ø16.5	38 - 146	71 - 176


**NOTE:**

To ensure a grip, set the target diameter as the workpiece diameter - 3 mm for an external grip and + 3 mm for an internal grip.

- **Target force:** Sets the target force in percentage 1-100, defining the closing speed and gripping force of the gripper when grabbing an object. The actual force can be found in the [Technical sheet](#).
- **GripType:** Sets the gripping method to use.

Type	Method	Side view	Bottom view
0	Extern		
1	Intern		

The output has four gates:

- **ForceGripped:** Force grip detected; workpiece is gripped close to the target diameter; target force was detected and mechanical lock is engaged. Part was gripped with the expected force.
- **PartGripped:** Grip detected; target force was applied before reaching target diameter force is continually being applied mechanical lock is not engaged. Part grip detected early or gripper is obstructed.
- **NoGrip:** No grip detected; target diameter was reached without reaching target force. Nothing was gripped.
- **Error:** Gripper is in an error state.

#### 4.2.2 Gripper\_OR\_3FG\_100\_RELEASE

Moves the gripper to a position with a low force without grip detection. If the gripper does not reach the target diameter within 5 seconds a timeout is triggered.

TargetDiameter: Sets the target diameter of the gripper in mm without fingertip offset

The output has two gates:

- Success - Target diameter was reached
- Timeout - Target diameter was not reached within 5 seconds

#### 4.2.3 Gripper\_OR\_D13FG\_100\_CONFIG

Configuration component for 3FG, allowing changes to fingertip diameter, finger position and finger length. This is typically done once on program initialization.

See more information in [Technical sheet](#).

- FingertipDiameter: Sets the fingertip diameter of the 3FG gripper in [mm] - default: 10.0
- FingerPosition: Sets the finger position of the 3FG gripper, [1-3] matching hole markings on underside of the gripper.
- FingerLength: Sets the arm length of the 3FG gripper in [mm]; This parameter should only be modified if using custom fingers - default: 49.0

The output has two gates:

- Success: Configuration was successfully updated
- Fail: Failed to update configuration

### Dual Quick Changer

These components can be used with Dual Quick Changer mounting option.

#### 1 - Primary side

##### 4.2.4 Gripper\_OR\_D13FG\_100\_GRIP

##### 4.2.5 Gripper\_OR\_D13FG\_100\_RELEASE

#### 2 - Secondary side

##### 4.2.6 Gripper\_OR\_D23FG\_100\_GRIP

##### 4.2.7 Gripper\_OR\_D23FG\_100\_RELEASE

The components work exactly the same way as the single device components above.

## 4.3 Gecko Components

---

### Quick Changer

#### HEX-E/H QC

##### 4.3.1 Gripper\_OR\_Gecko\_110\_GRIP

Push the pads of the Gecko gripper OUT.

##### 4.3.2 Gripper\_OR\_Gecko\_110\_RELEASE

Pulls the pads of the Gecko gripper IN.

##### 4.3.3 Gripper\_OR\_Gecko\_110\_DistanceRead

Returns the measured value of the Ultrasonic distance sensor as the global variable g\_Gripper\_OR\_Gecko\_DistanceValue.

### Dual Quick Changer

These components can be used with Dual Quick Changer mounting option.



#### NOTE:

For Gecko Gripper use only the 2- secondary side of the Dual Quick Changer.

##### 4.3.4 Gripper\_OR\_D2Gecko\_110\_GRIP

##### 4.3.5 Gripper\_OR\_D2Gecko\_110\_RELEASE

##### 4.3.6 Gripper\_OR\_D2Gecko\_110\_DistanceRead

The components work exactly the same way as the single device components above.

## 4.4 HEX Components

---

### 4.4.1 SENSOR\_OR\_HEX\_100\_Read

Reads the HEX sensor force/torque values and writes them to the following global variables:

- g\_SENSOR\_OR\_HEX\_FX
- g\_SENSOR\_OR\_HEX\_FY
- g\_SENSOR\_OR\_HEX\_FZ
- g\_SENSOR\_OR\_HEX\_TX
- g\_SENSOR\_OR\_HEX TY
- g\_SENSOR\_OR\_HEX\_TZ

### 4.4.2 SENSOR\_OR\_HEX\_100\_Set

Zeroes out the sensor and sets the filter.

This component has two parameters:

- Bias: Boolean variable telling the sensor to use the current value as a bias (true) to zero the reading or disable biasing (false).
- Filter: Sets the filter to be used with the sensor.

Value	Cut-off frequency
0	No filtering
1	500 Hz
2	150 Hz
3	50 Hz
4	15 Hz
5	5 Hz
6	1.5 Hz

## 4.5 RG2-FT Components

---

This component can be used for RG2-FT only.

### 4.5.1 Gripper\_OR\_RG2FT\_100\_GRIP

Completely closes (default) a single RG2-FT gripper.

This component has two parameters:

- Target width: What the final width of the gripper should be. If this width is smaller than the part width, the gripper will stop when it reaches Target force.
- Target force: Defines the closing speed and gripping force of the gripper when grabbing an object.

The output has two gates:

- Part gripped: The gripper is stopped by hitting an object.

- No grip: The gripper reached its target width without hitting an object.

This component also writes the global variable `g_Gripper_OR_RGx_ActualWidth` which represents the final width of the gripper after stopping.

#### 4.5.2 Gripper\_OR\_RG2FT\_100\_RELEASE

Completely opens (default) a single RG2-FT gripper.

This component has two parameters:

- Target width: What the final width of the gripper should be. If this width is smaller than the part width, the gripper will stop when it reaches Target force.
- Target force: Defines the closing speed and gripping force of the gripper when grabbing an object.

The output has three gates:

- Part gripped: The gripper is stopped by hitting an object.
- No grip: The gripper reached its target width without hitting an object.

This component also writes the global variable `g_Gripper_OR_RGx_ActualWidth` which represents the final width of the gripper after stopping.

The difference between this and the GRIP component is the default values. Can be useful when using the Gripper button on the robot arm.

#### 4.5.3 Gripper\_OR\_RG2FT\_100\_GetProxWidth

Read the proximity sensor values as Part width, which is:

Left proximity value + Right proximity value – Current gripper width.

This value is returned as a global variable, called `g_Gripper_OR_RG2FT_proxValue`.

#### 4.5.4 Gripper\_OR\_RG2FT\_100\_ProxBias

Sets the current proximity sensor values to zero. This component should be used when the gripper is completely closed, thus GetProxWidth will return the detected part width. This component has no parameters and a single gate.

## 4.6 RGx Components

**Quick Changer**

**HEX-E/H QC**

These components can be used for RG2 or RG6.

### 4.6.1 Gripper\_OR\_RGx\_110\_GRIP

Closes the gripper all the way, if a part is present between the fingertips the gripper stops at the prescribed grip force. Returns the current gripper width as the global variable g\_Gripper\_OR\_RGx\_ActualWidth.

This component has three parameters:

- Target width: What the final width of the gripper should be. If this width is smaller than the part width, the gripper will stop when it reaches Target force. Width range: RG2: 0-110 [mm], RG6: 0-160 [mm].
- Target force: Defines the closing speed and gripping force of the gripper when grabbing an object. Force range: RG2: 3-40 [N], RG6: 0-120 [N].
- Safety reset condition: You can choose what action should reset the safety trigger (e.g. a digital input). Note that if a part is stuck between the arms by the time this condition is met, the safety switch will be re-triggered, and the component won't attempt another reset.

The output has three gates:

- Part gripped: The gripper is stopped by hitting an object.
- No grip: The gripper reached its target width without hitting an object.
- Safety stop: The gripper was stopped mid-movement by the safety switches on the gripper arm.

This component also writes the global variable g\_Gripper\_OR\_RGx\_ActualWidth which represents the final width of the gripper after stopping.

### 4.6.2 Gripper\_OR\_RGx\_110\_RELEASE

Opens to 100mm (default) a single RG2/6 gripper.

This component has three parameters:

- Target width: What the final width of the gripper should be. If this width is smaller than the part width, the gripper will stop when it reaches Target force. Width range: RG2: 0-110 [mm], RG6: 0-160 [mm].
- Target force: Defines the closing speed and gripping force of the gripper when grabbing an object. Force range: RG2: 0-40 [N], RG6: 0-120 [N].
- Safety reset condition: You can choose what action should reset the safety trigger (e.g. a digital input). Note that if a part is stuck between the arms by the time this condition is met, the safety switch will be re-triggered, and the component won't attempt another reset.



#### CAUTION:

Before resetting the gripper always make sure that no part will be dropped due to the loss of gripper power. If Dual Quick Changer is used it will cycle the power for both sides.

The output has three gates:

- Part gripped: The gripper is stopped by hitting an object.
- No grip: The gripper reached its target width without hitting an object.
- Safety stop: The gripper was stopped mid-movement by the safety switches on the gripper arm.

This component also writes the global variable `g_Gripper_OR_RGx_ActualWidth` which represents the final width of the gripper after stopping.

The difference between this and the GRIP component is the default values. Can be useful when using the Gripper button on the robot arm.

### Dual Quick Changer

These components can be used with Dual Quick Changer mounting option.

#### 1 - Primary side

[4.6.3 Gripper\\_OR\\_D1RGx\\_110\\_GRIP](#)

[4.6.4 Gripper\\_OR\\_D1RGx\\_110\\_RELEASE](#)

#### 2 - Secondary side

[4.6.5 Gripper\\_OR\\_D2RGx\\_110\\_GRIP](#)

[4.6.6 Gripper\\_OR\\_D2RGx\\_110\\_RELEASE](#)

The components work exactly the same way as the single device components above.

## 4.7 SG Components

---

**Quick Changer**

**HEX-E/H QC**

### 4.7.1 Gripper\_OR\_SG\_100\_INIT

Initializes the gripper to its home position, with the selected tool type.

This component has one parameter:

- SGToolType: Sets the tool type.

ID.	Tool type
1	None
2	SG-a-H
3	SG-a-S
4	SG-b-H

The output has three gates:

- Success: Gripper is initialized with the set tool type
- Fail: Gripper is in an error state.
- Timeout: Grip function did not complete within time limit

This component writes no global variables.

### 4.7.2 Gripper\_OR\_SG\_100\_GRIP

Closes the gripper to the set target width.

This component has two parameters:

- TargetWidth: Sets the target width of the gripper.
- GentleGrip: If on, the gripper will break, and reduce the speed when getting within 10mm of the target width.

The output has three gates:

- Success: Grip completed
- Fail: Gripper is in an error state.
- Timeout: Grip function did not complete within time limit

This component writes no global variables.

### 4.7.3 Gripper\_OR\_SG\_100\_RELEASE

Opens the gripper to the set target width.

## Operation

This component has one parameter:

- TargetWidth: Sets the target width of the gripper.

The output has three gates:

- Success: Release completed
- Fail: Gripper is in an error state.
- Timeout: Grip function did not complete within time limit

This component writes no global variables.

### Dual Quick Changer

These components can be used with Dual Quick Changer mounting option.

#### 1 - Primary side

[4.7.4 Gripper\\_OR\\_D1SG\\_100\\_INIT](#)

[4.7.5 Gripper\\_OR\\_D1SG\\_100\\_GRIP](#)

[4.7.6 Gripper\\_OR\\_D1SG\\_100\\_RELEASE](#)

#### 2 - Secondary side

[4.7.7 Gripper\\_OR\\_D2SG\\_100\\_INIT](#)

[4.7.8 Gripper\\_OR\\_D2SG\\_100\\_GRIP](#)

[4.7.9 Gripper\\_OR\\_D2SG\\_100\\_RELEASE](#)

The components work exactly the same way as the single device components above.

## 4.8 VG10 / VGC10 Components

Quick Changer

HEX-E/H QC

### 4.8.1 Gripper\_OR\_VG10\_110\_GRIP

Applies the chosen amount of vacuum to a specific side of the gripper.

This component has two parameters:

- Target vacuum A: The target vacuum in [%] of the A-side of the gripper. A value of 0 opens the valve in the gripper and releases all vacuum on this side.
- Target vacuum B: The target vacuum in [%] of the B-side of the gripper. A value of 0 opens the valve in the gripper and releases all vacuum on this side.
- No grip timeout: Amount of time to wait in [ms] until the component returns with no grip detected.

The output has two gates:

- Part gripped: The gripper reached the target vacuum level and the part is secured to the gripper.
- Timeout: The gripper couldn't reach the desired level of vacuum (no part, or partial contact) within the timeframe specified by No grip timeout.

This component writes no global variables.

### 4.8.2 Gripper\_OR\_VG10\_110\_RELEASE

Releases the vacuum from the chosen side of the gripper.

This component has two parameters:

- Release A: Boolean variable, if set to true, the vacuum on side A will be released.
- Release B: Boolean variable, if set to true, the vacuum on side B will be released.

The output has a single gate and the component always returns on this branch.

This component writes no global variables.

Dual Quick Changer

These components can be used with Dual Quick Changer mounting option.

1 - Primary side

### 4.8.3 Gripper\_OR\_D1VG10\_110\_GRIP

### 4.8.4 Gripper\_OR\_D1VG10\_110\_RELEASE

**2 - Secondary side**

[\*\*4.8.5 Gripper\\_OR\\_D2VG10\\_110\\_GRIP\*\*](#)

[\*\*4.8.6 Gripper\\_OR\\_D2VG10\\_110\\_RELEASE\*\*](#)

The components work exactly the same way as the single device components above.

## 5 Additional Software Options

### 5.1 Compute Box

#### 5.1.1 Interfaces

There are two interface types that could be used:

- **Ethernet interface**

This interface can be used to access the Web Client that can be used to monitor, control, and update the grippers/devices. Furthermore, via this interface the OnRobot WebLogic™ can also be accessed to program the Digital I/O Interface.

- **Digital I/O interface**

This interface could be used to communicate via simple digital I/O lines with the robots. There are 8 digital input and 8 digital output that could be used. These inputs and outputs can be programmed through the OnRobot WebLogic™ that requires the Ethernet interface to be used (only for programming time).

#### 5.1.2 Web Client

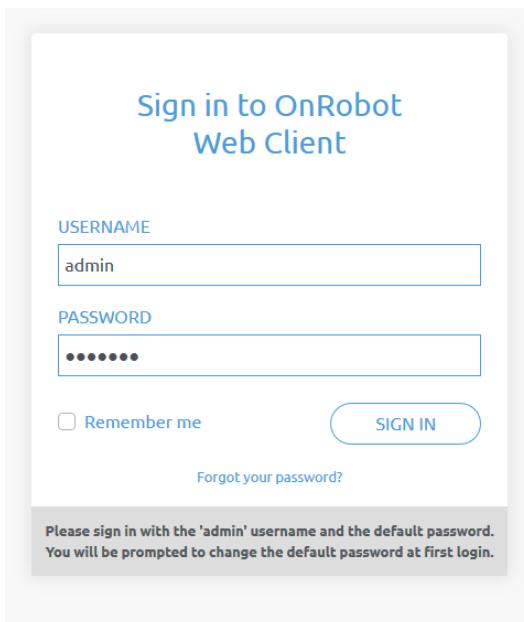
To access the Web Client on your computer first the Ethernet interface needs to be set up to have a proper communication between your computer and the Compute Box. It is recommended to use Auto mode (for further details see section **Ethernet Interface Setup**).

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.
- Open a web browser on your computer and type in the IP address of the Compute Box (factory default is 192.168.1.1).

## Additional Software Options

The Sign-in page opens:

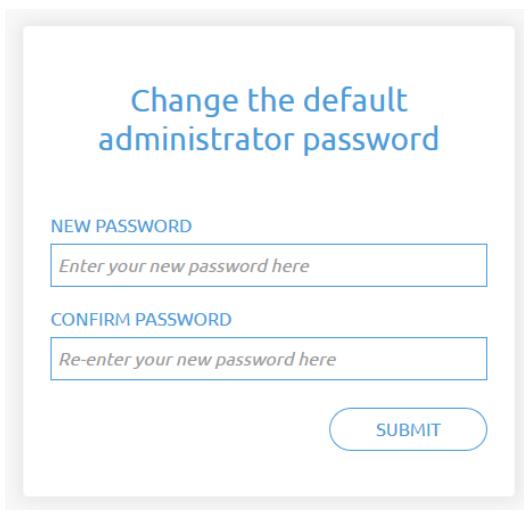


The sign-in page features a title "Sign in to OnRobot Web Client". It has fields for "USERNAME" (admin) and "PASSWORD" (represented by six dots). There is a "Remember me" checkbox and a "SIGN IN" button. Below the form is a note: "Please sign in with the 'admin' username and the default password. You will be prompted to change the default password at first login."

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)



The form title is "Change the default administrator password". It contains fields for "NEW PASSWORD" (placeholder: Enter your new password here) and "CONFIRM PASSWORD" (placeholder: Re-enter your new password here). A "SUBMIT" button is at the bottom.

Once signed in the following top menus appear:



- **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

## Additional Software Options

-  - Account settings (e.g.: change password, add new user)
-  - Select the language of the Web Client

In the following, these menus will be described.

### Devices menu

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

Please select from the detected device(s):



Compute Box

[SELECT](#)



HEX-E/H QC

[SELECT](#)



RG2

[SELECT](#)

	<a href="#">3FG15</a>	49
	<a href="#">Gecko</a>	52
	<a href="#">HEX-E/H QC</a>	54
	<a href="#">RG2/6</a>	55
	<a href="#">RG2-FT</a>	57
	<a href="#">SG</a>	59
	<a href="#">VG10 / VGC10</a>	61

**3FG15**

Monitor and control    Settings    Device info

States

- Busy
- Grip detected
- Force grip detected

Move

**TARGET RAW DIAMETER**

54 mm

Current raw diameter: 72.8 mm

Grip

- External grip
- Internal grip

Current calculated target: 56.3 mm

**CALCULATE TARGET**

TARGET DIAMETER:	56.3	mm
TARGET FORCE:	10	%

**GRIP**    **STOP**

The state of the gripper could be:

- **Busy** - the gripper is in motion
- **Grip detected** - the gripper has detected a workpiece
- **Force grip detected** - the gripper has applied the target force to a workpiece. This also activates a break. See more info in section [Finger movement and force on page 93](#).

The gripper can be controlled in two modes:

- **Move mode** - The easiest way to move the gripper but the gripping force is limited (<50N). This should be used to release a part and open the gripper.
- **Grip mode** - This should be used to properly grip a part with a given target force. If the part is properly gripped (target force is reached) the break will engage to make sure the part will not be dropped in case of a power loss.

In **Move mode**:

The gripper can be controlled by adjusting the **Target raw diameter** slider. The actual values of the fingers are shown by the **Current raw diameter**. The raw diameter is considered to be without the finger tip offset.

In **Grip** mode:

First set how to grip the part:

- Externally or
- Internally

To grip on a part set the **Target Diameter** and **Target force** and click on the **Grip** button.

There are two ways how the target diameter can be given:

- Enter manually - make sure to add 3mm to the part diameter if it is gripped internally and subtract 3mm if it is gripped externally
- Use the **Calculate target** button:

Move the fingers with the slider to touch the part and activate the **grip detected** (open fully for an internal grip or close fully for an external grip).

Based on whether it will be external or internal the **Current calculated target** (diameter) for the grip is shown. The fingertip offset is either added or subtracted to compensate for the set fingertip.

Grip type	Current calculated target value
External Grip	Current raw diameter - fingertip offset - 3 mm
Internal Grip	Current raw diameter + fingertip offset + 3 mm

Click on the **Calculate target** button to load the calculated value to the **Target diameter**.

- If the grip was successful, the **Force grip detected** signal should be activated and the engaged brake should make a clicking sound.
- During the gripping the motion of the finger can be terminated by clicking on the **Stop** button.
- To release the part from a gripped status, move the gripper:
  - Outward in case of an external grip
  - Inward in case of an internal grip.

## Additional Software Options

The default finger setting can be changed on the **Settings** tab:

The screenshot shows the OnRobot software interface with the **Settings** tab selected. The interface is divided into three main sections:

- Select finger position:** Three options are shown: **1**, **2** (selected), and **3**. Each option shows a gripper icon with a finger at a different position. Below these are **SAVE** and **Cancel** buttons.
- Set finger length:** A checkbox labeled **Override standard (49 mm)** is followed by a text input field containing **49 mm**. To the right is a gripper icon with a vertical dimension line indicating the finger length. Below are **SAVE** and **Cancel** buttons.
- Set fingertip offset:** A list of options: **Ø 10 Steel**, **Ø 13 Steel**, **Ø 13.5 Silicone** (selected), **Ø 16.5 Silicone**, and **Custom**. Below is a text input field containing **13.5 mm**. To the right is a gripper icon with a horizontal dimension line indicating the fingertip offset. Below are **SAVE** and **Cancel** buttons.

- **Select finger position** - Select the mounted finger position and **Save**.
- **Set finger length** - If customized fingers are needed, the checkbox can be enabled, and the new finger length can be entered.
- **Set fingertip offset** - The 4 different types that are delivered with the gripper can be selected by pressing the radio button. If customized fingertips are made, the custom option can be selected.

Saving any of these 3 settings will automatically apply the changes. Different finger positions, fingertip diameters and finger lengths will allow to achieve different diameters and forces. Find more information in sections Gripping Forces and Gripping Diameters

## Gecko

### Gecko Gripper

This page allows the device to be monitored and controlled. By navigating to the Device info tab the device status is shown. (Some functions might not be accessible without Admin permission.)

[Monitor and control](#)   [Device info](#)

**Actual values**

Preload force	0 N
Object distance	1.76 mm
Pad position	Pads are out
Part detected	<input checked="" type="radio"/>
Busy	<input type="radio"/>

[RESET ERRORS](#)

**Set values**

**PAD POSITION**

[PADS OUT](#)   [PADS IN](#)

**PRELOAD THRESHOLD**

50 N  50   90   120

There is a force and an ultrasonic distance sensor in the gripper. The actual values of these sensors are:

- **Preload** - the current forces acting on the pads (below 50N it displays ON)
- **Object distance** - how far the object is from the bottom of the gripper

The state of the gripper could be:

- **Pad position**- Pads are either In or Out (out means ready for gripping)
- **Part detected** - the set preload force limit is reached, and object distance is < 18mm
- **Busy** - the pads are moving

The pads can be controlled by clicking on the **Out** and **In** buttons.

The **Preload threshold** value can be changed if higher preload force is required for a proper grip.

This value is only used to generate a proper **Part detected** signal.

**NOTE:**

**Preload threshold** value set on this page is not stored permanently and are restored to the default value (90N) on power reset.

If a part was detected and the object distance becomes > 18mm (part is lost) BEFORE the pads are set to be IN (normal release) the **Pads worn** warning is displayed in the **Device info** tab.

To reset the warning:

- either click on the **RESET ERRORS** button
- or click on the **Out** button.

## HEX-E/H QC

### HEX-E/H QC

This page allows the device to be monitored and controlled. By navigating to the Device info tab the device status is shown.  
(Some functions might not be accessible without Admin permission.)

Monitor and control      Device info

#### Force/Torque values

HEXHC001	
Fx (N)	-0.31
Fy (N)	0.16
Fz (N)	-1.00
Tx (Nm)	-0.008
Ty (Nm)	0.060
Tz (Nm)	0.003

ZERO

The force and torque values (**Fx,Fy,Fz** and **Tx,Ty,Tz**) are shown in N/Nm.

The **Zero** toggle switch can be used to zero the force and torque reading.



#### NOTE:

**Zero** value set on this page is not stored permanently and are restored to the default values on power reset.

## Additional Software Options

### RG2/6

#### RG2

This page allows the device to be monitored and controlled. By navigating to the Device info tab the device status is shown. (Some functions might not be accessible without Admin permission.)

[Monitor and control](#) [Device info](#)

#### States

- Busy
- Grip detected

#### Safety

RG2 GRIPPER	SWITCH 1	SWITCH 2
Pushed	<input type="radio"/>	<input type="radio"/>
Triggered	<input type="radio"/>	<input type="radio"/>

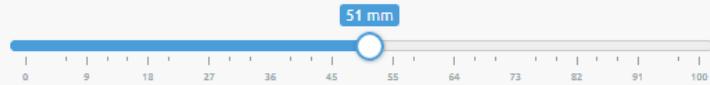
[POWER CYCLE](#)

#### Set width and force

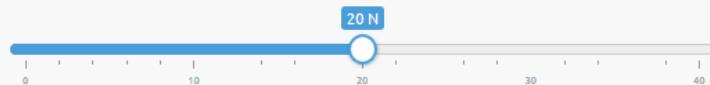
##### FINGERTIP OFFSET

 [SAVE](#)

##### WIDTH



##### FORCE



Current width: 51 mm

The state of the gripper could be:

- **Busy** - the gripper is moving
- **Grip detected** - the set force limit is reached but the set width is not.

The status of the two safety switch shows:

- **Pushed** - the safety switch 1/2 is still being pushed
- **Triggered** - the safety switch 1/2 has been activated and gripper is stopped.

To recover from a Triggered state:

- Check if any of the safety switch is being pushed
- If yes, remove the object pushing the switch

## Additional Software Options

- Click on **Power cycle** to power all devices off and then on to recover.

**Fingertip offset** must be set according to the current fingertips attached to the gripper. Offset is measured from the inner mating face of the bar metal fingertips. To save the value to the gripper permanently click **Save**.

The gripper can be controlled by adjusting the **Force** and **Width** value. First set the required gripping force and then adjust the width slider that will immediately control the gripper.

## RG2-FT

## RG2-FT

This page allows the device to be monitored and controlled. By navigating to the Device info tab the device status is shown. (Some functions might not be accessible without Admin permission.)

[Monitor and control](#)    [Device info](#)

## Force/Torque and Proximity sensor values

LEFT / HEXSD329		HEXSD356 / RIGHT	
22 mm	<input type="text"/>	Proximity	<input type="text"/> 29 mm
-0.53		Fx (N)	-0.88
0.29		Fy (N)	-0.28
-4.31		Fz (N)	-1.58
-0.014		Tx (Nm)	-0.029
-0.019		Ty (Nm)	-0.160
-0.007		Tz (Nm)	0.003

[ZERO](#) 

## PROXIMITY OFFSET

[LEFT](#)
[RIGHT](#)

<input type="text"/> 0 mm	<input type="text"/> 0 mm	<a href="#">SAVE</a>
---------------------------	---------------------------	----------------------

## Set width and force

## WIDTH

[0 mm](#)


## FORCE

[20 N](#)


Current width: 0 mm

The force and torque values (**Fx,Fy,Fz** and **Tx,Ty,Tz**) are shown in N/Nm along with the Proximity sensor values (optical distance sensor built in the fingertip) are show in mm for the left and right fingertip sensor.

The **Zero** toggle switch can be used to zero the force and torque reading.

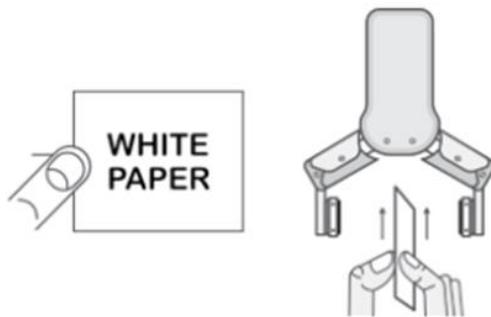
**NOTE:**

**Zero** value set on this page is not stored permanently and are restored to the default values on power reset.



The **Proximity offset** can be used to calibrate the proximity reading. The calibration requires the following steps to be done:

- Write 0 mm to the **Left** and **Right** edit box and click on the **Save** button.
- Close the gripper fully (set the **Width** to 0) while you hold a white paper between the fingertips.



- Read the actual **Left** and **Right Proximity** values (e.g.: 19mm and 25mm)
- Write these values to the **Left** and **Right** edit boxes and click on the **Save** button to store it permanently.
- Open the gripper and the calibration is finished.



**NOTE:**

Setting the offsets too high may clip the proximity reading at 0 mm (negative distance is not shown). In case of clipping (reading 0 mm), try to decrease the offset values.

The gripper can be controlled by adjusting the **Force** and **Width** value. First set the required gripping force and then adjust the width slider that will immediately control the gripper.

**SG**

Monitor and control    Device info

---

States

Busy  
 Initialized

---

Select tool type

Current tool: Not selected

None

 SG-a-H

 SG-a-S

 SG-b-H

---

**INITIALIZE**

---

Set grip mode and width

**GENTLE GRIP**

**TARGET WIDTH**

0 mm

Current width: 0 mm

**STOP** **HOME**

## Additional Software Options

The **state** of the gripper could be:

- **Busy** - the gripper is moving
- **Initialized** - the gripper has been initialized.

### Select tool type

- **Current tool** - Shows the currently selected SG tool. Select the desired SG tool, by clicking the adjacent radio button.
- Click on **Initialize** to initialize the selected SG tool

The state of the gripper could be:

- **Busy** - the gripper is moving
- **Initialized** - the gripper is initialized

### Set grip mode and width

The default gripping speed is set as **Gentle Grip**, the gripping speed is reduced at 12.5mm before the specified target width, this results in a gentler grip, compared to normal grip settings.

The gripper can be controlled by adjusting the **Target Width** slider, this will immediately control the gripper.

- **Current Width** - shows the current width of the gripper.
- **Stop** button - stops the ongoing procedure.
- **Home** button - moves the gripper to its home position.

## VG10 / VGC10

VG10

This page allows the device to be monitored and controlled. By navigating to the Device info tab the device status is shown. (Some functions might not be accessible without Admin permission.)

[Monitor and control](#) [Device info](#)

Actual values

Power limit	500 mA
Channel A	0 kPa
Channel B	0 kPa

Set values

**POWER LIMIT**



500 mA

**CHANNEL A**



0%

**CHANNEL B**



0%

**RELEASE**

Lock

The actual vacuum level for **Channel A** and **Channel B** can be seen in percentage (in the range of 0...80 kPa vacuum). The actual value of the **Power limit** is shown in mA.

The **Power limit** can be adjusted in the range of 0...1000mA with the slider.



**NOTE:**

The power limit set in this page is not stored permanently and always restored to the default value on power reset.

Higher power limit value means the required vacuum level is reached faster (higher airflow), but if it is set too fast overshoot may occur.

Low power limit may not be enough for higher percentage of vacuum and the target vacuum level may not be reached.

The **Channel A** and **Channel B** vacuum level can be set individually or in tandem by checking the **Lock** checkbox.

Make sure to set high enough vacuum before you grip and lift any object.

To release the gripped object, click on the **Release** button.

## Configuration menu

### Configuration

This page allows the configuration of the Compute 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 IP setting is configured on this page.
4. DHCP server enabled: Compute Box tries to assign IP to the robot.

**NETWORK SETTINGS**

MAC address	b8:27:eb:0e:c9:a3
Network mode	Static IP
IP address	192.168.1.1
Subnet mask	255.255.255.0

 **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

**COMPUTE BOX SETTINGS**

Display name	<input type="text"/>	
--------------	----------------------	--

**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, then the fixed 192.168.1.1 IP is used for the device (after 60 seconds of timeout).
- 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 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**.

**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).

## Paths menu

**NOTE:**

The Path feature may not be available to your robot type.

This page can be used to import, export, and delete the previously recorded paths. In this way a Path can be copied to a different Compute Box.

### Manage paths

This page allows uploading and downloading path files.

**IMPORT**

You can import a path file from your computer.

PATH NAME	SIZE (IN BYTES)	DOWNLOADED	DELETE
1539	1,692		
3923	1,972		
3924	1,972		

To import a previously exported Path (.ofp file) click on **Import** and browse for the file.

The available Paths are listed at the end of the page. Any paths can be exported and downloaded as a .ofp file or permanently deleted to free up the list if a path is not needed anymore.

**NOTE:**

Always make sure that you do not delete any path that is currently in use in any of your robot programs. Otherwise the path will need to be re-recorded, since the delete operation cannot be undone.

The Compute Box can store up to 100 Mbytes of paths that is roughly equal to 1000 hours of recordings.

## Additional Software Options

### 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	
<b>Compute Box (CBOX_RPT)</b>			
Firmware	150	150	
<b>HEX-E/H QC (HEXHC001)</b>			
Firmware	208	208	
			<a href="#">UPDATE</a>

 Up-to-date    Update required    Downgrade not supported

Start the software update by clicking on the **Browse** button to browse for the .cbu software update file.

Then the **Browse** button will turn to **Update**.

Click on that **Update** button to start the software update process:

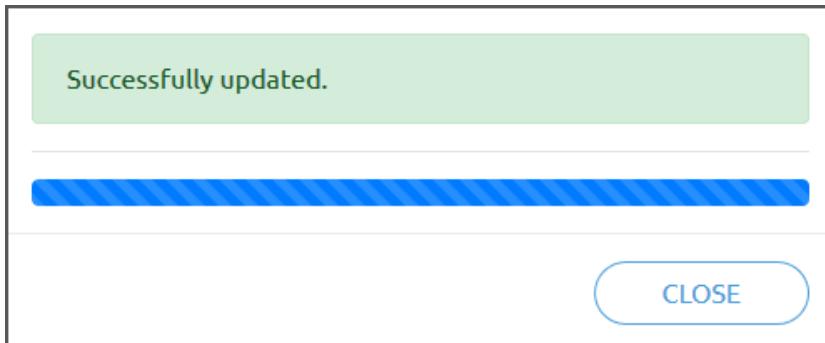
Update in progress, please wait...  
This may take several minutes to complete.

[CLOSE](#)

**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.

If the update is finished and was successful, the following message is shown:



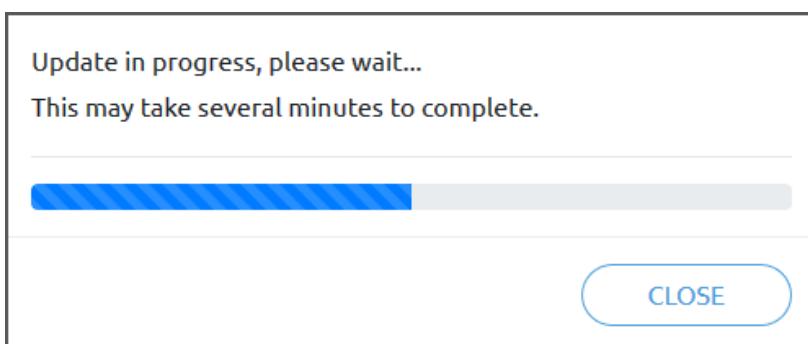
Now disconnect the device and use it as usual.

**NOTE:**

If the software update failed, please contact your distributor.

The firmware update is only required when any of the components  is out of date.

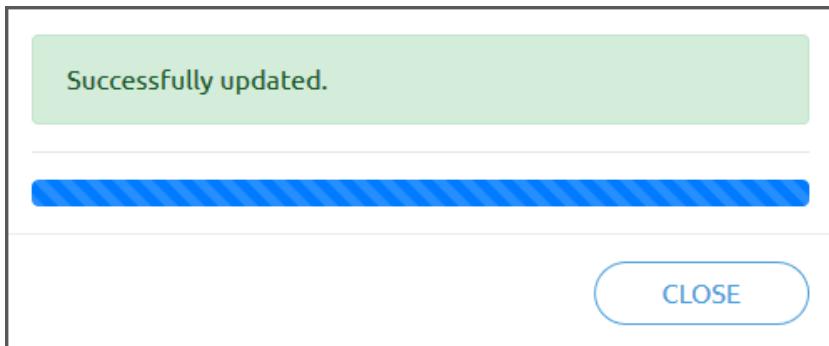
To start the firmware update, click on **Update** button in the firmware section of the page.

**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.

If the update is finished and was successful, the following message is shown:

## Additional Software Options



Now disconnect the device and use it as usual.

**NOTE:**

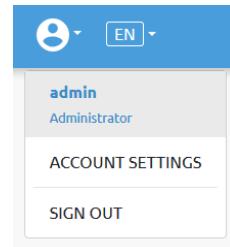
If the update is failed, please contact your distributor.

## Additional Software Options

### 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](#)



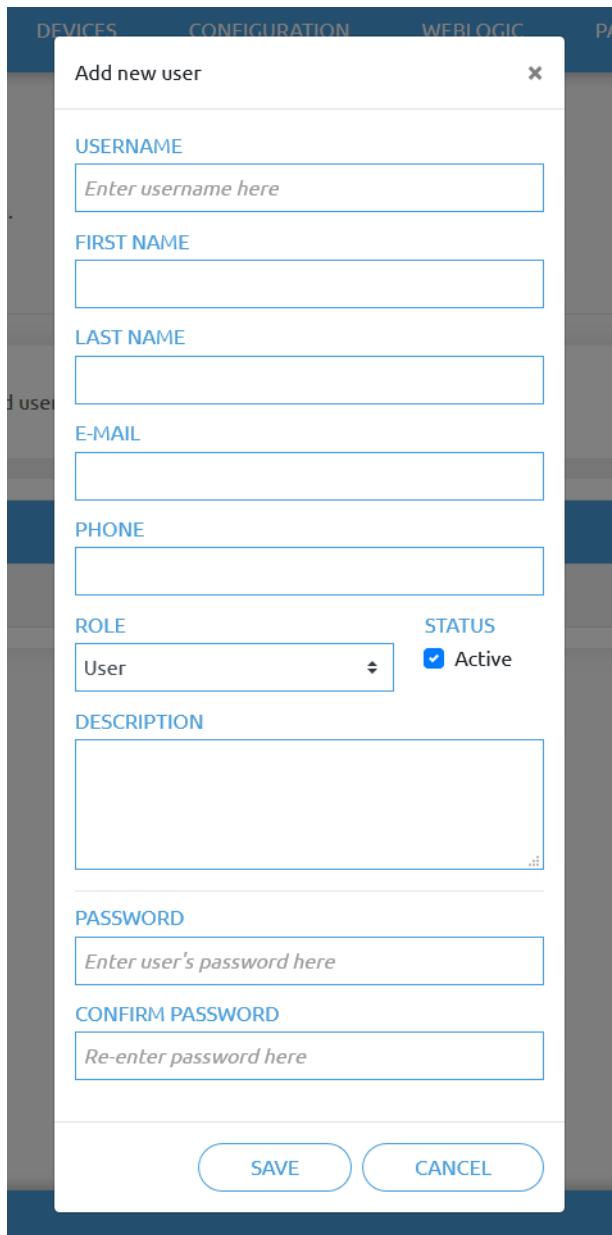
admin  
Administrator

First name  
Last name  
E-mail  
Phone  
Description

[UPDATE PROFILE](#)

## Additional Software Options

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



The screenshot shows a modal dialog titled "Add new user". It contains the following fields:

- USERNAME:** A text input field with placeholder text "Enter username here".
- FIRST NAME:** An empty text input field.
- LAST NAME:** An empty text input field.
- E-MAIL:** An empty text input field.
- PHONE:** An empty text input field.
- ROLE:** A dropdown menu showing "User".
- STATUS:** A checkbox labeled "Active" which is checked.
- DESCRIPTION:** A large empty text area with a scroll bar.
- PASSWORD:** A text input field with placeholder text "Enter user's password here".
- CONFIRM PASSWORD:** A text input field with placeholder text "Re-enter password here".

At the bottom of the dialog 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.

## Additional Software Options

### 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.

## 5.2 Modbus TCP

MODBUS TCP uses Ethernet as the physical layer, otherwise it is very similar to Modbus RTU. For further details on the protocol, please refer to [modbus.org's MODBUS Application Protocol Specification](http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf) ([http://www.modbus.org/docs/Modbus\\_Application\\_Protocol\\_V1\\_1b3.pdf](http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf)).



### NOTE:

In this section the address and register values are written in the following format:

- DD (HH) where the DD is in decimal and the HH is in hexadecimal format.

### 5.2.1 Settings

The table below shows the required settings to be used when communicating with the OnRobot's products over MODBUS TCP.

Settings	
Modbus TCP server IP address	Compute Box IP address (default is 192.168.1.1)
Port number	502
Number of concurrent connections	1

For the Gecko gripper, RG2, RG6 and VG10 the Device address depends only on the mounting option and not on the gripper type:

	via Quick Changer	via HEX-E/H QC	via Dual Quick Changer
Device address	65 (0x41)	65 (0x41)	Primary side (1) - 66 (0x42) Secondary side (2) - 67 (0x43)

For HEX-E/H QC and RG2-FT the Device address is fixed:

	HEX-E/H QC	RG2-FT
Device address	64 (0x40)	65 (0x41)

For the Compute Box the Device address is fixed (it has only one functionality to reset the tool power):

	Compute Box
Device address	63 (0x3F)

### 5.2.2 Function codes

OnRobot products currently support the function codes listed below. The products will respond with an appropriate exception code, if the function is not executed correctly. Please refer to MODBUS Application Protocol page 48 for detailed description of the different exception codes. Note that the product will provide no response if the settings are not correct.

#### 3 (0x03) Read Holding Registers

Use this function code to read out one or multiple consecutive registers. Please refer to MODBUS Application Protocol page 15 for frame and response details.

#### 6 (0x06) Write Single Register

Use this function code to set the value of a single register. Please refer to MODBUS Application Protocol page 19 for frame and response details.

### 16 (0x10) Write Multiple Registers

Use this function code to set the values of multiple consecutive registers. Please refer to MODBUS Application Protocol page 19 for frame and response details.

### 23 (0x17) Read/Write Multiple Registers

Use this function code to set the values and read out one or multiple consecutive registers. Note that the registers to be set are set before the registers to be read are read. Please refer to MODBUS Application Protocol page 38 for frame and response details.

### 5.2.3 Registers

3FG15 .....	73
Gecko .....	76
HEX-E/H QC .....	78
RG2/6 .....	79
RG2-FT .....	81
SG .....	84
VG10 / VGC10 .....	86
Compute Box .....	87

### 3FG15

The table below provides an overview of the available MODBUS registers in the 3FG.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Target force
1	0x0001	Target diameter
2	0x0002	Grip type
3	0x0003	Control
256	0x0100	Status
257	0x0101	Raw diameter
258	0x0102	Diameter with fingertip offset
259	0x0103	Force applied
261	0x0105	Finger angle
270	0x010E	Finger length
272	0x0110	Finger position
273	0x0111	Fingertip offset
513	0x0201	Minimum diameter
514	0x0202	Maximum diameter
1025	0x0401	Set finger length
1027	0x0403	Set finger position
1028	0x0404	Set fingertip offset

#### 0 (0x0000) Target force (Write)

This field sets the target force to be reached when gripping and holding a workpiece. It must be provided in %. The valid range is 0 to 1000.

#### 1 (0x0001) Target diameter (Write)

This field sets the target diameter to achieve. It must be provided in 1/10th millimeters. The valid range depends on the finger position, finger length and fingertip diameter. For more information see the [Technical sheet section](#).

#### 2 (0x0002) Grip type (Write)

This field sets whether the grip will be external 0 or internal 1. It also sets the if the diameter is measured from the inside of the fingertips (external grip) or from the outside of the fingertips (internal grip).

#### 3 (0x0003) Control (Write)

The control field is used to start and stop gripper motion. Only one option should be set at a time. Please note that the gripper will not start a new motion before the one currently being executed is done (see busy flag in the Status field). The valid commands are:

Value	Name	Description
1 (0x0001)	grip	Start the motion, with the preset target force and diameter. Please note that the gripper will ignore this command if the busy flag is set in the status field.
2 (0x0002)	move	Start the motion without applying the target force
4 (0x0004)	stop	Stop the current motion.

### 256 (0x0100) Status (Read only)

This status field indicates the status of the gripper and its motion. It is composed of 7 flags, described in the table below.

Bit	Name	Description
0 (LSB)	busy	High (1) when a motion is ongoing, low (0) when not. The gripper will only accept new commands when this flag is low.
1	grip detected	High (1) when an internal- or external grip is detected.
2	Force grip detected	High (1) when an internal- or external grip with the target force is detected.
3	calibration	Whether calibration is OK or not.
4-16	Reserved	Not used

### 257 (0x0101) Raw diameter (Read only)

Indicates the current diameter measured from the center of the fingertips.

### 258 (0x0102) Diameter with fingertip offset (Read only)

Indicates the current diameter considering the fingertip offset in 1/10 millimeters. Please note that the value is a signed two's complement number.

### 259 (0x0103) Force applied (Read only)

Indicates the force applied in 1/10 %.

### 261 (0x0105) Finger angle (Read only)

Indicates the current angular position of the finger 1/1000 rad with origin in the finger joint (0 = fully open).

### 270 (0x010E) Finger length (Read only)

Indicates the length of the finger in 1/10 mm

### 272 (0x0110) Finger position (Read only)

Indicates how the finger is mounted. Positions available are 1, 2 and 3.

### 273 (0x0111) Fingertip offset (Read only)

This field sets the Fingertip offset in 1/100 mm.

### 275 (0x0113) Actual width with offset (Read only)

Indicates the current width between the gripper fingers in 1/10 millimeters. The set fingertip offset is considered.

**513 (0x0201) Minimum diameter (Read only)**

Indicates the minimum reachable diameter depending on the finger position, finger length and fingertip diameter. For more information see the [Technical sheet section](#).

**514 (0x0202) Maximum diameter (Read only)**

Indicates the maximum reachable diameter depending on the finger position, finger length and fingertip diameter. For more information see the [Technical sheet section](#).

**1025 (0x0401) Set Finger length (Read/Write)**

This field sets the finger length in 1/10 mm.

**1027 (0x0403) Set Finger position (Read/Write)**

This field sets the finger position 1, 2 or 3.

**1028 (0x0404) Set Fingertip offset (Read/Write)**

This field sets the fingertip offset diameter in 1/100 mm.

## Gecko

The table below provides an overview of the available MODBUS registers in the Gecko Gripper.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Pad Control
4	0x0004	Preload force threshold
256	0x0100	Part detected
257	0x0101	Pads worn
260	0x0104	Busy
261	0x0105	Actual preload force
262	0x0106	Actual ultrasonic range
263	0x0107	Pad position

### 0 (0x0000) Pad Control (Read + Write)

Controls the pad position.

Value	Description
0x0000	Pull Pads IN
0x0001	Push Pads OUT

### 4 (0x0004) Preload force threshold (Read + Write)

Sets the threshold for the preload force signal (Preloaded). Available options are:

Value	Description
0x0000	50N
0x0001	90N
0x0002	120N (default)

### 256 (0x0100) Part detected (Read only)

Reads high (0x0001) when the pads are OUT, the preset preload force has been reached and the Actual ultrasonic range is lower than 18mm, otherwise low (0x0000). It is cleared when the pads are pulled IN.

### 257 (0x0101) Pads worn (Read only)

Reads high (0x0001) when the pads need to be replaced.

### 260 (0x0104) Busy (Read only)

Reads high (0x0001) when pads are in motion otherwise reads low (0x0000).

### 261 (0x0105 ) Actual preload force (Read only)

Reads the actual preload force in 1/100 N.

## Additional Software Options

**262 (0x0106) Actual ultrasonic range (Read only)**

Reads the actual preload force in 1/100 mm.

**263 (0x0107) Pad position (Read only)**

Reads the actual position of the pads:

Value	Description
0x0000	Pads IN
0x0001	Pads OUT

## HEX-E/H QC

The table below provides an overview of the available MODBUS registers in the HEX-E/H QC.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Zero
257	0x0101	Status
259	0x0103	Fx
260	0x0104	Fy
261	0x0105	Fz
262	0x0106	Tx
263	0x0107	Ty
264	0x0108	Tz

### 0 (0x0000) Bias (Read + Write)

Zero the force and torque values to cancel any offset.

Value	Description
0x0000	Un-Zero
0x0001	Zero

### 256 (0x0100) Status (Read only)

Reads low (0x0000) when there is no error.

### 259 (0x0103) Fx (Read only)

Force value along the X axis (in the sensor coordinate system) in 1/10 N. The value is signed INT.

### 260 (0x0104) Fy (Read only)

Force value along the Y axis (in the sensor coordinate system) in 1/10 N. The value is signed INT.

### 261 (0x0105) Fz (Read only)

Force value along the Z axis (in the sensor coordinate system) in 1/10 N. The value is signed INT.

### 262 (0x0106) Tx (Read only)

Torque value about the X axis (in the sensor coordinate system) in 1/100 Nm. The value is signed INT.

### 263 (0x0107) Ty (Read only)

Torque value about the Y axis (in the sensor coordinate system) in 1/100 Nm. The value is signed INT.

### 264 (0x0108) Tz (Read only)

Torque value about the Z axis (in the sensor coordinate system) in 1/100 Nm. The value is signed INT.

## RG2/6

The table below provides an overview of the available MODBUS registers in the RG2/6.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Target force
1	0x0001	Target width
2	0x0002	Control
258	0x0102	Fingertip offset
263	0x0107	Actual depth
264	0x0108	Actual relative depth
267	0x010B	Actual width
268	0x010C	Status
275	0x0113	Actual width with offset
1031	0x0407	Set Fingertip offset
		Write only

### 0 (0x0000) Target force (Write)

This field sets the target force to be reached when gripping and holding a workpiece. It must be provided in 1/10th Newtons. The valid range is 0 to 400 for the RG2 and 0 to 1200 for the RG6.

### 1 (0x0001) Target width (Write)

This field sets the target width between the finger to be moved to and maintained. It must be provided in 1/10th millimeters. The valid range is 0 to 1100 for the RG2 and 0 to 1600 for the RG6. Please note that the target width should be provided corrected for any fingertip offset, as it is measured between the insides of the aluminum fingers.

### 2 (0x0002) Control (Write)

The control field is used to start and stop gripper motion. Only one option should be set at a time. Please note that the gripper will not start a new motion before the one currently being executed is done (see busy flag in the Status field). The valid flags are:

Value	Name	Description
1 (0x0001)	grip	Start the motion, with the preset target force and width. Width is calculated without the fingertip offset. Please note that the gripper will ignore this command if the busy flag is set in the status field.
8 (0x0008)	stop	Stop the current motion.
16 (0x0010)	grip_w_offset	Same as grip, but width is calculated with the set fingertip offset.

### 258 (0x0102) Fingertip offset (Read only)

Indicates the current fingertip offset in 1/10 millimeters. Please note that the value is a signed two's complement number.

### 263 (0x0107) Actual depth (Read only)

Indicates the current depth of the gripper, to be used for depth compensation. The depth is relative to the fully closed position, provided in 1/10 millimeters. Please note that the value is a signed two's complement number.

### 264 (0x0108) Actual relative depth (Read only)

Indicates the current depth of the gripper, to be used for depth compensation. The depth is relative to the position at which the latest motion was initiated and is provided in 1/10 millimeters. Please note that the value is a signed two's complement number.

### 267 (0x010B) Actual width (Read only)

Indicates the current width between the gripper fingers in 1/10 millimeters. Please note that the width is provided without any fingertip offset, as it is measured between the insides of the aluminum fingers.

### 268 (0x010C) Status (Read only)

This status field indicates the status of the gripper and its motion. It is composed of 7 flags, described in the table below.

Bit	Name	Description
0 (LSB)	busy	High (1) when a motion is ongoing, low (0) when not. The gripper will only accept new commands when this flag is low.
1	grip detected	High (1) when an internal- or external grip is detected.
2	S1 pushed	High (1) when safety switch 1 is pushed.
3	S1 triggered	High (1) when safety circuit 1 is activated. The gripper will not move while this flag is high; can only be reset by power cycling the gripper.
4	S2 pushed	High (1) when safety switch 2 is pushed.
5	S2 triggered	High (1) when safety circuit 2 is activated. The gripper will not move while this flag is high; can only be reset by power cycling the gripper.
6	Safety error	High (1) when on power on any of the safety switch is pushed.
10-16	Reserved	Not used

### 275 (0x0113) Actual width with offset (Read only)

Indicates the current width between the gripper fingers in 1/10 millimeters. The set fingertip offset is considered.

### 1031 (0x0407) Set Fingertip offset (Write only)

This field sets the Fingertip offset in 1/10 mm. Positive number means an inward offset (decreases how much the gripper can be closed).

**RG2-FT**

The table below provides an overview of the available MODBUS registers in the RG2-FT.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Zero
2	0x0002	Target force
3	0x0003	Target width
4	0x0004	Control
5	0x0005	Proximity Offset (L)
6	0x0006	Proximity Offset (R)
257	0x0101	Status (L)
259	0x0103	Fx (L)
260	0x0104	Fy (L)
261	0x0105	Fz (L)
262	0x0106	Tx (L)
263	0x0107	Ty (L)
264	0x0108	Tz (L)
266	0x010A	Status (L)
268	0x010C	Fx (L)
269	0x010D	Fy (L)
270	0x010E	Fz (L)
271	0x010F	Tx (L)
272	0x0110	Ty (L)
273	0x0111	Tz (L)
274	0x0112	Proximity Status (L)
275	0x0113	Proximity Value (L)
277	0x0115	Proximity Status (R)
278	0x0116	Proximity Value (R)
280	0x0118	Actual gripper width
281	0x0119	Gripper Busy
282	0x011A	Grip detected

**0 (0x0000) Bias (Read + Write)**

Zero the force and torque values to cancel any offset.

Value	Description
0x0000	Un-Zero
0x0001	Zero

## 2 (0x0002) Target force (Write)

This field sets the target force to be reached when gripping and holding a workpiece. It must be provided in 1/10 Newtons. The valid range is 0 to 400.

## 3 (0x0003) Target width (Write)

This field sets the target width between the finger to be moved to and maintained. It must be provided in 1/10th millimeters. The valid range is 0 to 1000. Please note that the target width should be provided corrected for any fingertip offset, as it is measured between the insides of the aluminum fingers.

## 4 (0x0004) Control (Write)

The control field is used to start and stop gripper motion. Only one bit should be set at a time. Please note that the gripper will not start a new motion before the one currently being executed is done (see busy flag in the Status field). The valid flags are:

Value	Name	Description
0x0000	stop	Stop the current motion.
0x0001	grip	Start the motion, with the preset target force and width. Please note that the gripper will ignore this flag if the busy flag is set in the status field.

## 5 (0x0005) Proximity Offset L (Read + Write)

This field sets the offset of the left proximity sensor that is subtracted from the raw signal. It must be provided in 1/10 millimeters.

## 6 (0x0006) Proximity Offset R (Read + Write)

Same as the left above.

## 256 (0x0100) Status (L) (Read only)

Reads low (0x0000) when there is no error with the left finger sensor.

## 259 (0x0103) Fx (L) (Read only)

Left finger sensor's force value along the X axis (in the sensor coordinate system) in 1/10N. The value is signed INT.

## 260 (0x0104) Fy (L) (Read only)

Left finger sensor's force value along the Y axis (in the sensor coordinate system) in 1/10N. The value is signed INT.

## 261 (0x0105) Fz (L) (Read only)

Left finger sensor's force value along the Z axis (in the sensor coordinate system) in 1/10N. The value is signed INT.

## 262 (0x0106) Tx (L) (Read only)

Left finger sensor's torque value about the X axis (in the sensor coordinate system) in 1/100 Nm. The value is signed INT.

## 263 (0x0107) Ty (L) (Read only)

Left finger sensor's torque value about the Y axis (in the sensor coordinate system) in 1/100 Nm. The value is signed INT.

**264 (0x0108) Tz (L) (Read only)**

Left finger sensor's torque value about the Z axis (in the sensor coordinate system) in 1/100 Nm. The value is signed int.

**266 (0x010A) Status (R) (Read only)**

Same as the left above.

**268 (0x010C) Fx (R) (Read only)**

Same as the left above.

**269 (0x010D) Fy (R) (Read only)**

Same as the left above.

**270 (0x010E) Fz (R) (Read only)**

Same as the left above.

**271 (0x010F) Tx (R) (Read only)**

Same as the left above.

**272 (0x0110) Ty (R) (Read only)**

Same as the left above.

**273 (0x0111) Tz (R) (Read only)**

Same as the left above.

**274 (0x0112) Proximity Status (L) (Read only)**

Reads low (0x0000) when there is no error with the left proximity sensor.

**275 (0x0113) Proximity Value (L) (Read only)**

Reads the current distance from the left proximity sensor in 1/10 mm. The value is signed INT.

**277 (0x0115) Proximity Status (R) (Read only)**

Same as the left above.

**278 (0x0116) Proximity Value (R) (Read only)**

Same as the left above.

**280 (0x0118) Actual gripper width (Read only)**

Indicates the current width between the gripper fingers in 1/10 millimeters. Please note that the width is provided without any fingertip offset, as it is measured between the insides of the aluminum fingers.

**281 (0x0119) Gripper busy (Read only)**

High (1) when a motion is ongoing, low (0) when not. The gripper will only accept new commands when this flag is low.

**282 (0x011A) Grip detected (Read only)**

High (1) when an internal- or external grip is detected.

## SG

The table below provides an overview of the available MODBUS registers in the SG.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Target width
1	0x0001	Command
2	0x0002	Set Gentle grip
3	0x0003	Gripper model ID
256	0x0100	Gripper width
259	0x0103	Status
261	0x0105	Max width
262	0x0106	Min width

### 0 (0x0000) Target width (Write)

This field sets the target width between the finger to be moved to and maintained. It must be provided in 1/10th millimeters.

### 1 (0x000a) Command (Write)

This field sets the command.



#### NOTE:

Gripper model id must be set before Init and Init must be called before Move.

Address	Type
0x1	Move
0x2	Stop
0x3	Init

### 2 (0x0002) Gentle grip (Write)

1 set it as true and 0 as false. If true the gripping speed is reduced at 12.5mm before the specified target width, this results in a gentler grip, compared to normal grip settings.

### 3 (0x0003) Gripper model ID (Write)

This field sets the model ID (silicone tool attached).

id	Type
1	None
2	a-H
3	a-S
4	b-H

### 256 (0x0100) Gripper Width (Read only)

Indicates the gripper current width in 1/10 millimeters.

### 259 (0x0103) Status (Read only)

This status field indicates the status of the gripper and its motion. It is composed of 7 flags (bits), described in the table below.

Bit	Name	Description
0 (LSB)	busy	High (1) when a motion is ongoing, low (0) when not. The gripper will only accept new commands when this flag is low.
1	initialized	High (1) when the gripper is initialized.
2-3	-	Reserved
4-6	error	High (1) any of these bits when there is an error

### 262 (0x0106) Max width (Read only)

Indicates maximum open width in mm.

### 261 (0x0105) Min width (Read only)

Indicates minimum close width in mm.

## VG10 / VGC10

The table below provides an overview of the available MODBUS registers in the VG grippers.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Channel A Control
1	0x0001	Channel B Control
2	0x0002	Current limit
258	0x0102	Channel A actual vacuum
259	0x0103	Channel B actual vacuum

### 0 (0x0000) Channel A Control (Read + Write)

This register allows for control of channel A. The register is split into two 8-bit fields:

Bits 15-8	Bits 7-0
Control mode	Target vacuum

The Control mode field must contain one of these three values:

Value	Name	Description
0 (0x00)	Release	Commands the channel to release any work item and stop the pump, if not required by the other channel.
1 (0x01)	Grip	Commands the channel to build up and maintain vacuum on this channel.
2 (0x02)	Idle	Commands the channel to neither release nor grip. Workpieces may "stick" to the channel if physically pressed towards its vacuum cups, but the VG will use slightly less power.

The Target vacuum field sets the level of vacuum to be build up and maintained by the channel. It is used only when the control mode is 1 (0x01) / Grip. The target vacuum should be provided in % vacuum. It should never exceed 80.

Examples:

Setting the register value 0 (0x0000) will command the VG to release the work item.

Setting the register value 276 (0x0114) will command the VG to grip at 20 % vacuum.

Setting the register value 296 (0x0128) will command the VG to grip at 40 % vacuum.

Setting the register value 331 (0x014B) will command the VG to grip at 75 % vacuum.

Setting the register value 512 (0x0200) will command the VG to idle the channel.

### 1 (0x0001) Channel B Control (Read + Write)

Same as in channel A above.

### 2 (0x0002) Current limit (Read + Write)

Set and read the current limit. The limit is provided and must be given in mA (milli-amperes). The limit is 500mA per default and should never be set above 1000 mA.

## Additional Software Options

**258 (0x0102) Channel A actual vacuum (Read only)**

Reads the actual vacuum on Channel A. The vacuum is provided in (1/1000 of relative vacuum. Please note that this differs from the setpoint given in percent, as extra accuracy is desirable on the actual vacuum.

**259 (0x0103) Channel B actual vacuum (Read only)**

Same as in channel A above.

**Compute Box**

The table below provides an overview of the available MODBUS registers for the Compute Box.

All writable registers can be accessed using function codes 6, 16 or 23 and all readable registers can be accessed using function codes 3 or 23.

Address	Register	Access
0	0x0000	Reset tool power

**0 (0x0000) Reset tool power (Write)**

Writing 2 to this field powers the tool off for a short amount of time and then powers them back. This can be used to reset the RG2 or RG6 after the safety switch is triggered. It could take 1-2 seconds.

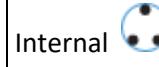
## 6 Hardware Specification

### 6.1 Technical sheets

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## 3FG15

General Properties		Minimum	Typical	Maximum	Unit
Payload Force Fit		-	-	10 22	[kg] [lb]
Payload Form Fit		-	-	15 33	[kg] [lb]
Grip Diameter*	External 	4 0.16		152 5.98	[mm] [inch]
	Internal 	35 1.38	-	176 6.93	[mm] [inch]
Finger position resolution		-	0.1 0.004	-	[mm] [inch]
Diameter repetition accuracy		-	0.1 0.004	0.2 0.007	[mm] [inch]
Gripping force		10	-	240	[N]
Gripping force (adjustable)		1	-	100	[%]
Gripping speed (diameter change)		-	-	125	[mm/s]
Gripping time (including brake activation)**		-	500	-	[ms]
Hold workpiece if power loss?		Yes			
Storage temperature		0 32	-	60 122	[°C] [°F]
Motor		Integrated, electric BLDC			
IP Classification		IP67			
Dimensions [L, W, Ø]		156 x 158 x 180 6.14 x 6.22 x 7.08			[mm] [inch]
Weight		1.15 2.5			[kg] [lb]

\* With the scope of delivery

\*\* 10 mm diameter distance. Also see section [Finger movement and force on page 88](#)

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20	24	25	[V]
Current consumption	43	-	1500*	[mA]
Operating temperature	5 41	-	50 122	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

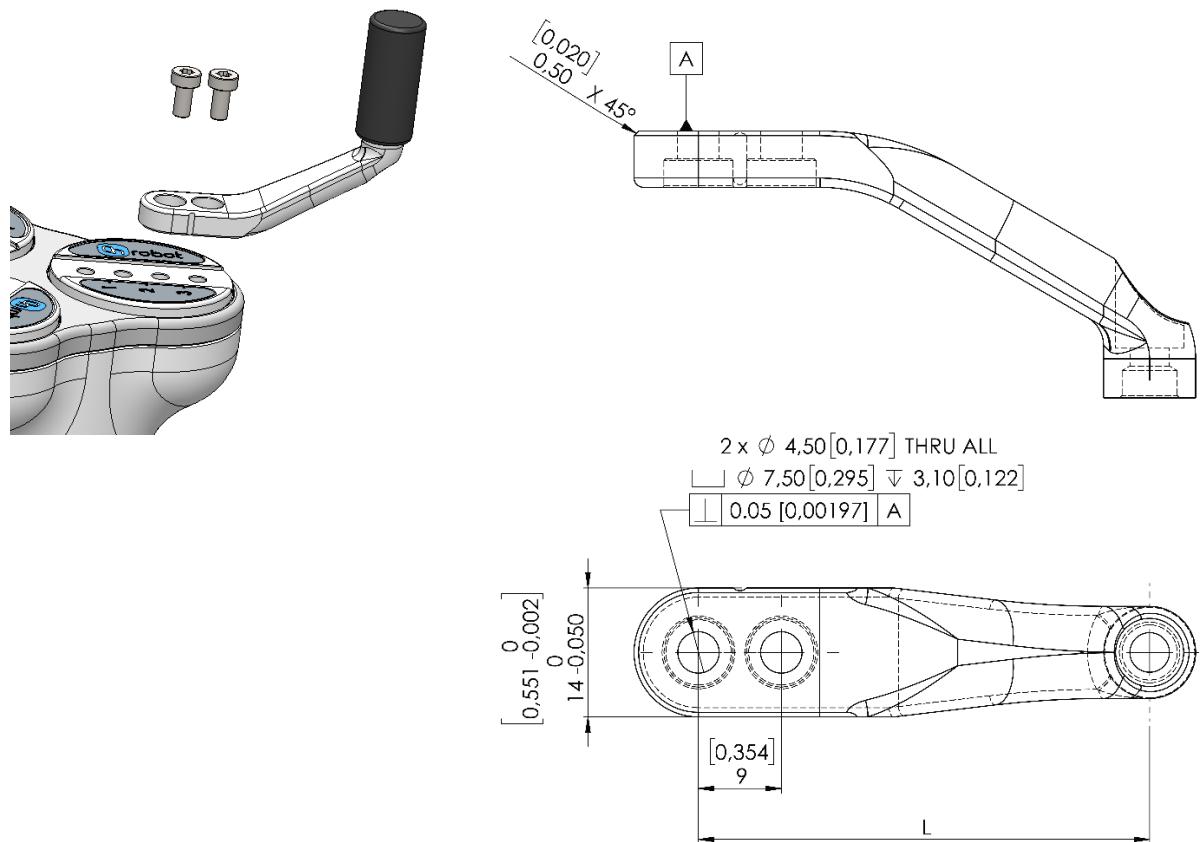
\*600 mA set as default.

### Fingers

The supplied fingers can be mounted in 3 different positions to achieve different [Gripping Forces below](#) and different [Gripping Diameters below](#).



The delivered finger length is 49 mm (L in the drawing below). If custom fingers are required, they can be made to fit the Gripper according to the dimensions (mm)[inch] shown below. The needed screws are M4x8mm:

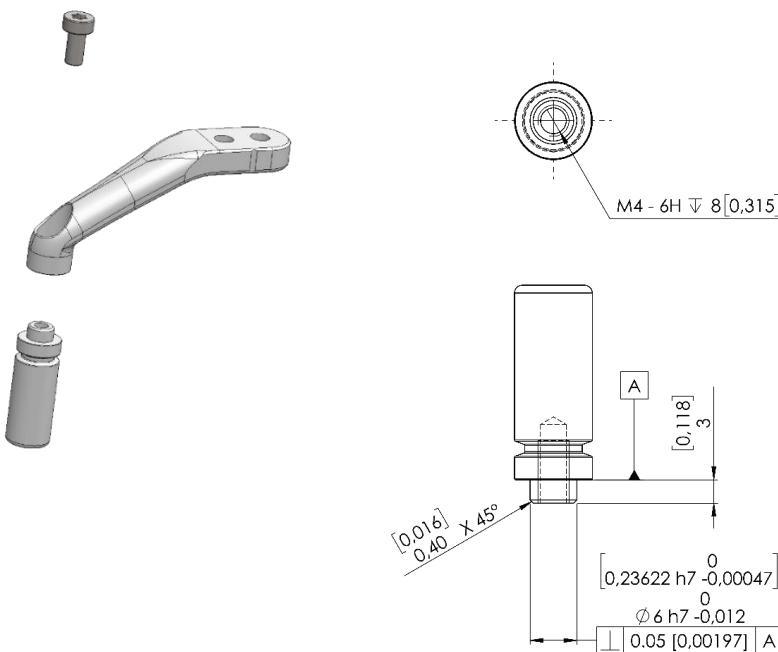


### Fingertips

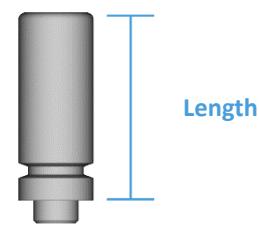
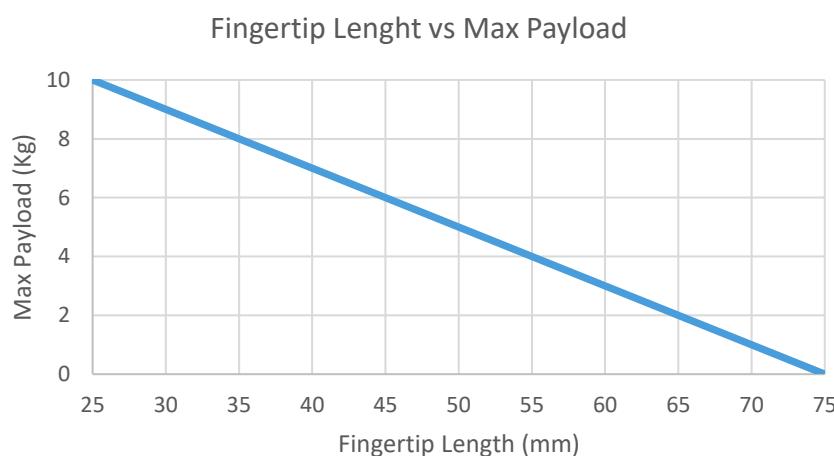
The supplied fingertips are listed below. Different fingertips will allow to achieve different [Gripping Forces below](#) and different [Gripping Diameters below](#).

- Ø10 mm steel
- Ø13 mm steel
- Ø13.5 mm silicone
- Ø16.5 mm silicone

If custom fingertips are required, they can be made to fit the Gripper's fingers according to the dimensions (mm)[inch] shown below. The needed screws are M4x8mm:

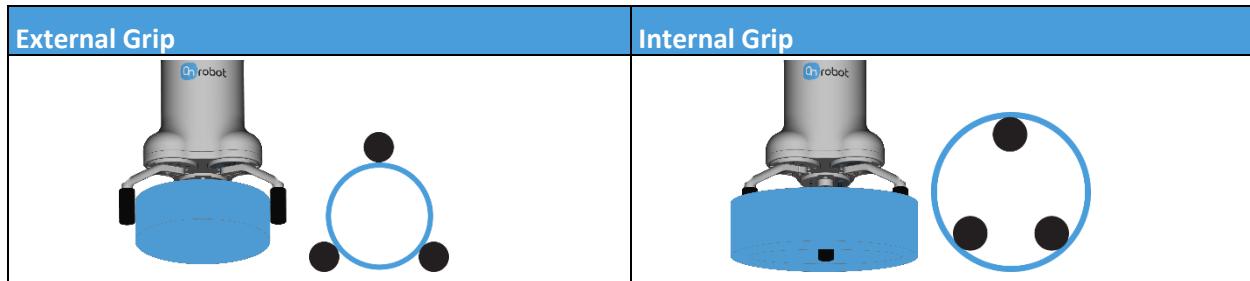


In the graph below, the maximum payload allowed for customized fingertip given a length is shown.



### Types of Grips

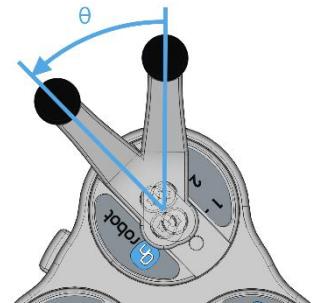
In the document the internal and external grip terms are used. These grips are related to how the workpiece is gripped.



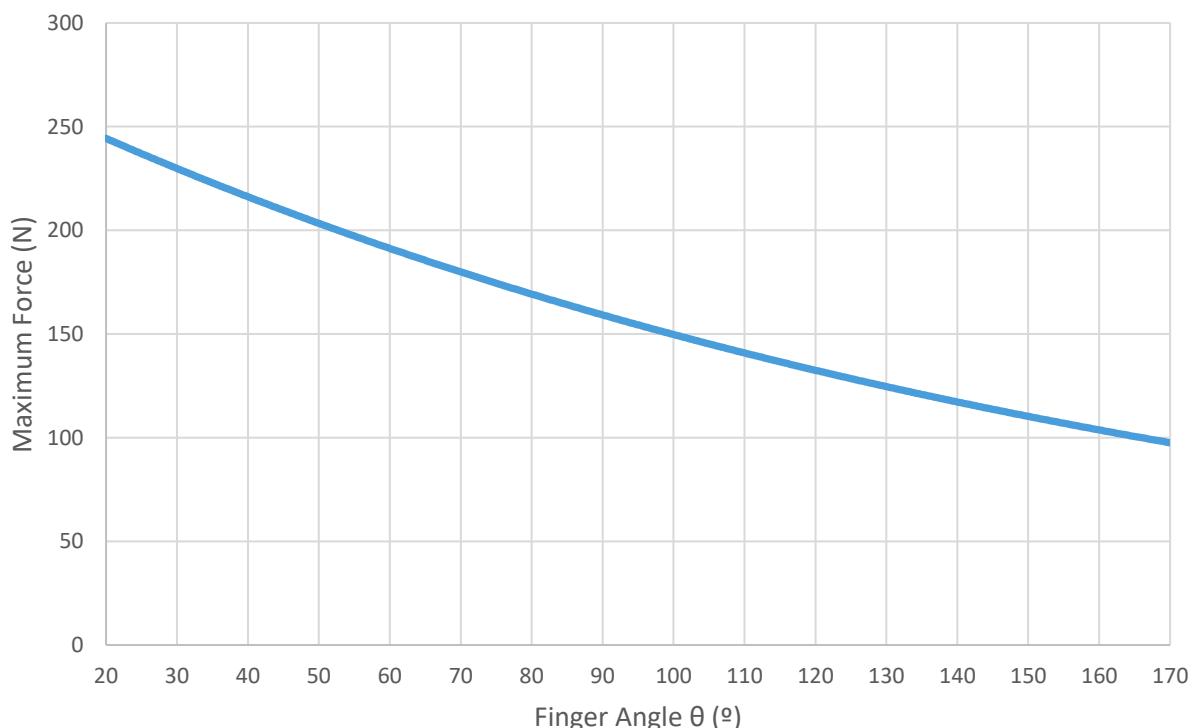
### Gripping Force

The total gripping force highly depends on the finger angle  $\theta$ . For both internal and external grip, the lower the finger angle, the higher the force that will be applied as shown in the graph below.

Although the fingers can move from 0 to 180, the angle range of an external grip is 30°-165° and for an internal grip 20°-160°



Maximum Force and Finger Angle  $\theta$



Graph plotted using measurements with 1 A current, silicone fingertips and a metal workpiece.

**NOTE:**

The total force applied depends on the finger angle, the input current (limited in some robots' tool flange connection) and the friction coefficient between the materials of the fingertips and the workpiece.

**Finger movement and force**

The gripping action has two phases:

Phase 1: For a safety reason, the fingers will start moving with a low force (maximum ~50 N) to avoid damaging anything that could get clamped between the gripper fingers and the workpiece.

Phase 2: When the gripper diameter is very close to the programmed target diameter, the gripper will increase the force to grip with the programmed target force. After the grip, a break will be activated (tic sound). The activation of the brake, also known as, Force grip detected, can be verified in the GUI. This brake will hold the workpiece with the applied force, with no power consumption and holding the workpiece in case of power loss. This brake will automatically be deactivated when the gripper performs a release or a new grip command. While programming the gripper, the brake can be deactivated by using the features in the GUI.

**Gripping Diameter**

The different configurations of the delivered finger and fingertips allow to achieve a wide range of diameters.

Finger Position	Fingertip (mm)	External Gripping range (mm)	Internal Gripping range (mm)
1	Ø10	10 - 117	35 - 135
	Ø13	7 - 114	38 - 138
	Ø16.5	4 - 111	41 - 140
2	Ø10	26 - 134	49 - 153
	Ø13	23 - 131	52 - 156
	Ø16.5	20 - 128	55 - 158
3	Ø10	44 - 152	65 - 172
	Ø13	41 - 149	68 - 174
	Ø16.5	38 - 146	71 - 176

Based on:

- Angle for external gripping min 165° (Pos 1), 163 ° (Pos 2), 161 ° (Pos 3) and max 30° (all 3 positions)
- Angle for internal gripping min 160° and max 30°

The closer to the maximum diameter range, the lower the angle and, therefore, the higher the force.

**Gecko**

<b>General Properties</b>					<b>Unit</b>		
<b>Gripper</b>							
Workpiece Material	<b>Polished Steel</b>	<b>Acrylic</b>	<b>Glass</b>	<b>Sheet Metal</b>			
Maximum payload (x2 safety factor)	6.5 14.3	6.5 14.3	5.5 12.1	5.5 12.1	[kg] [lb]		
Preload required for max adhesion	140				[N]		
Detachment time	300				[msec]		
Holds workpiece on power loss?	yes						
<b>Pads</b>							
Change-out interval	150 000 to 200 000 cycles for HIGH preload 200 000 to 250 000 cycles for LOW preload			[cycles]			
Manual Cleaning	Isopropyl alcohol and lint free cloth						
Robotic cleaning system	Cleaning Station						
Robotic cleaning interval and % recovery	Refer to Cleaning Station User Guide						
<b>Sensors</b>							
	Pre-load sensor		Ultrasonic Range sensor				
Range	45 [N] 9 [lb]	140 [N] 31 [lb]	0	260 [mm] 10 [inch]	[N][mm] [lb][inch]		
Error	7%		2%				
IP Classification	42						
Dimensions (HxW)	187 x 146 7.3 x 5.7			[mm] [inch]			
Weight	2.85 6.3			[kg] [lb]			

**NOTE:**

Avoid preloading the gripper with an inverted robot or in non-vertical loading conditions. If preloaded whilst inverted, preload sensor will not meet typical performance standards.

<b>Operating Conditions</b>	<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Temperature	0 32	- -	50 122	[°C] [°F]
Surface Characteristics*	Matte finish	Highly polished	-	

\* Smoother surfaces require less preload force for a desired payload force.

Specification or Feature	Target value
Parts Presence Sensing	Yes (Ultrasonic)
Pad Material	Proprietary silicone blend
Wear Properties	Depends on surface roughness and preload
Pad Attachment Mechanism	Magnetic
Change-out interval	150000 – 200000 for HIGH PRELOAD 200000 – 250000 for LOW PRELOAD
Cleaning system	Cleaning station
Cleaning interval and % recovery	See Cleaning Station Manual

### Effectiveness on Different Materials

The Gecko Gripper is best suited for smooth, low surface roughness substrates that are generally flat, stiff, and rigid. For other materials, the Gecko Gripper's effectiveness drops depending the stiffness and roughness of the picking surface. The table below shows a relationship between rigid and flexible substrates, surface finish, payload and the required preload to pick up said substrate. For example, if the customer knows that their part/substrate is rigid, with a mirror-like finish and weighs 2kg, the preload required to pick up the part/substrate is a medium-level preload.

Flexibility	Surface finish	Payload (kg)	Required Preload
Rigid	Mirror-like finish	0 to 2	Low
		2 to 4	Medium
		4 to 6	High
	Smooth	0 to 2	Medium
		2 to 4	High
		4 to 6	N/A
	Matte	0 to 2	High
		2 to 4	N/A
		4 to 6	N/A
Flexible	Mirror-like finish	0 to 2	Medium
		2 to 4	High
		4 to 6	N/A
	Smooth	0 to 2	High
		2 to 4	N/A
		4 to 6	N/A
	Matte	0 to 2	N/A
		2 to 4	N/A
		4 to 6	N/A

To further elaborate the significance between preload and payload, the table below shows visual matrix that displays the capability of the gecko gripper to pick up different materials with varying stiffness and roughness, at three different preload values (low 40N, medium 90N, high 140N).

Stiffness	Roughness	Example of material	Preload - 140N						Preload - 90N						Preload - 40N					
			Payload [kg]						Payload [kg]						Payload [kg]					
			0.1	0.5	1	2	4	6	0.1	0.5	1	2	4	6	0.1	0.5	1	2	4	6
1	1	Mylar	✓	✓	✓	*			✓	✓	*				✓	*				
5	1	Transparency sheet	✓	✓	✓	✓	*		✓	✓	*				✓	*				
10	1	Polished mirror-like steel, solar panel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*	✓	✓	✓	✓	*	
1	5	Cling film, ziploc bags	✓	✓	*				✓	*					✓	*				
5	5	Glossy cardboard (cereal box)	✓	✓	*				✓	*					✓	*				
10	5	Printed circuit board	✓	✓	✓	✓	*		✓	✓	*				✓	*				
1	10	Laminating plastic / film	*																	
5	10	Corrugated cardboard																		
10	10	Sandblasted aluminum																		

✓ the gripper can easily pick up the material

\* the gripper can pick up the material in some cases (requires caution and testing to verify)

**Nothing** the gripper cannot pick up this type of material.



#### NOTE:

This table is to be utilized as a guide to better understand the payload capacity and substrate type for the Gecko Gripper.

The criteria for stiffness and roughness is a basic scale from 1-10, here are the benchmarks used to determine the values.

Stiffness	Description	Example
1	Flexible	Fabric
5	Semi-flexible	Cardboard
10	Stiff	Metal

Roughness	Description	Example	RMS Value
1	Polished/Smooth	Polished Metal	0.1 micron
5	Textured	Cardboard	7 microns
10	Rough	Sandblasted Metal	28 microns

**HEX-E QC**

General Properties	6-Axis Force/Torque Sensor				Unit
	Fxy	Fz	Txy	Tz	
Nominal Capacity (N.C)	200	200	10	6.5	[N] [Nm]
Single axis deformation at N.C (typical)	± 1.7 ± 0.067	± 0.3 ± 0.011	± 2.5 ± 2.5	± 5 ± 5	[mm] [°] [inch] [°]
Single axis overload	500	500	500	500	[%]
Signal noise* (typical)	0.035	0.15	0.002	0.001	[N] [Nm]
Noise-free resolution (typical)	0.2	0.8	0.01	0.002	[N] [Nm]
Full scale nonlinearity	< 2	< 2	< 2	< 2	[%]
Hysteresis (measured on Fz axis , typical)	< 2	< 2	< 2	< 2	[%]
Crosstalk (typical)	< 5	< 5	< 5	< 5	[%]
IP Classification	67				
Dimensions (H x W x L)	50 x 71 x 93 1.97 x 2.79 x 3.66				[mm] [inch]
Weight (with built-in adapter plates)	0.347 0.76				[kg] [lb]

\* Signal noise is defined as the standard deviation ( $1\sigma$ ) of a typical one second no-load signal.

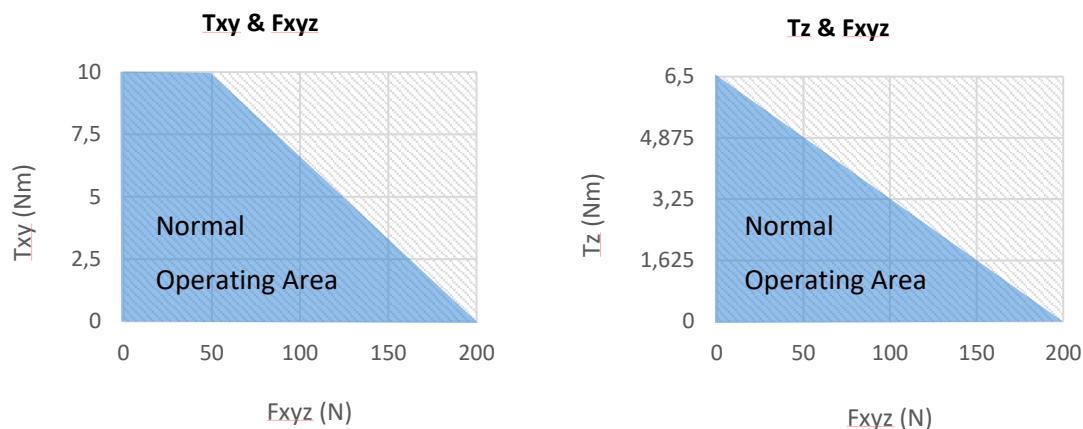
Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	7	-	24	[V]
Power consumption	-	-	0.8	[W]
Operating temperature	0 32	-	55 131	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

**Complex loading**

During single-axis loading, the sensor can be operated up to its nominal capacity. Above the nominal capacity the reading is inaccurate and invalid.

During complex loading (when more than one axis is loaded) the nominal capacities are reduced. The following diagrams show the complex loading scenarios.

The sensor cannot be operated outside of the Normal Operating Area.



### HEX-H QC

General Properties	6-Axis Force/Torque Sensor				Unit
	Fxy	Fz	Txy	Tz	
Nominal Capacity (N.C)	200	200	20	13	[N] [Nm]
Single axis deformation at N.C (typical)	± 0.6 ± 0.023	± 0.25 ± 0.009	± 2 ± 2	± 3.5 ± 3.5	[mm] [°] [inch] [°]
Single axis overload	500	400	300	300	[%]
Signal noise* (typical)	0.1	0.2	0.006	0.002	[N] [Nm]
Noise-free resolution (typical)	0.5	1	0.036	0.008	[N] [Nm]
Full scale nonlinearity	< 2	< 2	< 2	< 2	[%]
Hysteresis (measured on Fz axis , typical)	< 2	< 2	< 2	< 2	[%]
Crosstalk (typical)	< 5	< 5	< 5	< 5	[%]
IP Classification	67				
Dimensions (H x W x L)	50 x 71 x 93 1.97 x 2.79 x 3.66				[mm] [inch]
Weight (with built-in adapter plates)	0.35 0.77				[kg] [lb]

\* Signal noise is defined as the standard deviation ( $1\ \sigma$ ) of a typical one second no-load signal.

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	7	-	24	[V]
Power consumption	-	-	0.8	[W]
Operating temperature	0 32	-	55 131	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

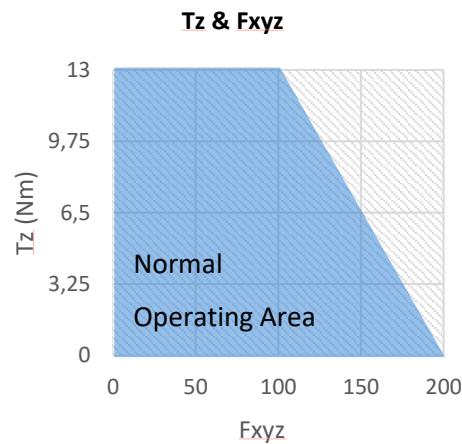
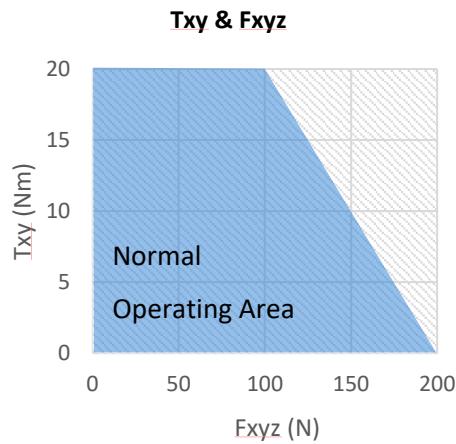
### Complex loading

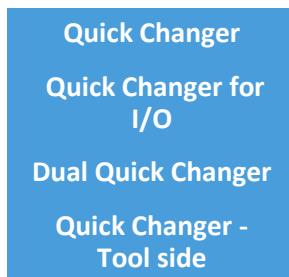
During single-axis loading, the sensor can be operated up to its nominal capacity. Above the nominal capacity the reading is inaccurate and invalid.

During complex loading (when more than one axis is loaded) the nominal capacities are reduced. The following diagrams show the complex loading scenarios.

## Hardware Specification

The sensor cannot be operated outside of the Normal Operating Area.





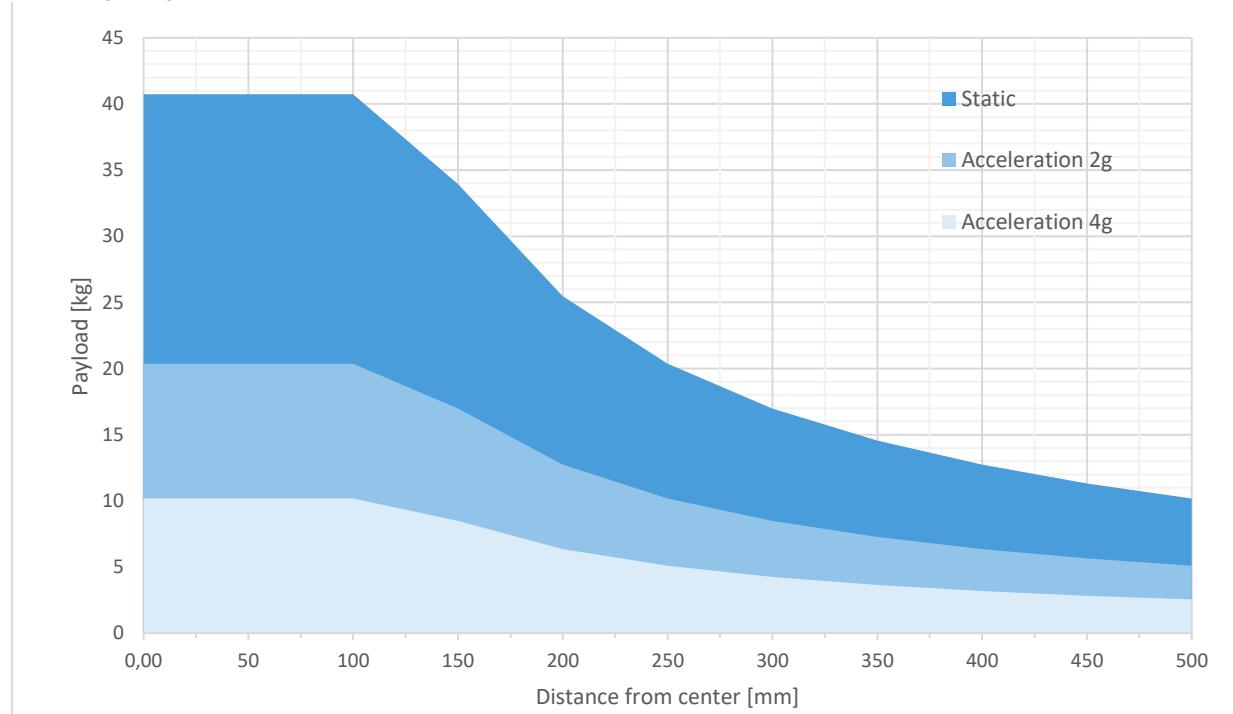
If not specified, the data represent the combination of the different Quick Changer types/sides.

Technical data	Min	Typical	Max	Units
Permissible force*	-	-	400*	[N]
Permissible torque*	-	-	50*	[Nm]
Rated payload*	-	-	20*	[kg]
	-	-	44	[lbs]
Repeatability	-	-	±0.02	[mm]
IP Classification	64			
Operating life (Tool change)	-	5.000	-	[cycles]
Operating life (Robot operation)	10	-	-	[M cycles]

\* See load capacity graph below.

	Quick Changer	Quick Changer for I/O	Dual Quick Changer	Quick Changer - Tool Side	Units
Weight	0.06 13.22	0.093 2.05	0.41 90.39	0.14 30.86	[kg] [lb]
Dimensions	See Mechanical dimension section				

### Load capacity



## RG2-FT

General Properties	Min	Typical	Max	Units
Payload Force Fit	- -	- -	2 4.4	[kg] [lb]
Payload Form Fit	- -	- -	4 8.8	[Kg] [lb]
Total stroke (adjustable)	0 0	- -	100 3.93	[mm] [inch]
Finger position resolution	- -	0.1 0.004	- -	[mm] [inch]
Repetition accuracy	- -	0.1 0.004	0.2 0.007	[mm] [inch]
Reversing backlash	0.2 0.007	0.4 0.015	0.6 0.023	[mm] [inch]
Gripping force (adjustable)	3	-	40	[N]
Gripping speed*	55	110	184	[mm/s]
Gripping time**	0.04	0.07	0.11	[s]
Adjustable bracket tilting accuracy	-	< 1	-	°
Ambient operating temperature	5	-	50	[°C]
Storage temperature	0	-	60	[°C]
Motor	Integrated, electric BLDC			
IP Classification	IP54			
Dimensions	219 x 149 x 49 8.6 x 5.9 x 1.9			[mm] [inch]
Product weight	0.98 2.16			[kg] [lb]

\* see speed table 101

\*\* based on 8mm total movement between fingers. The speed is linearly proportional to the force. For more details see speed table on page 101.

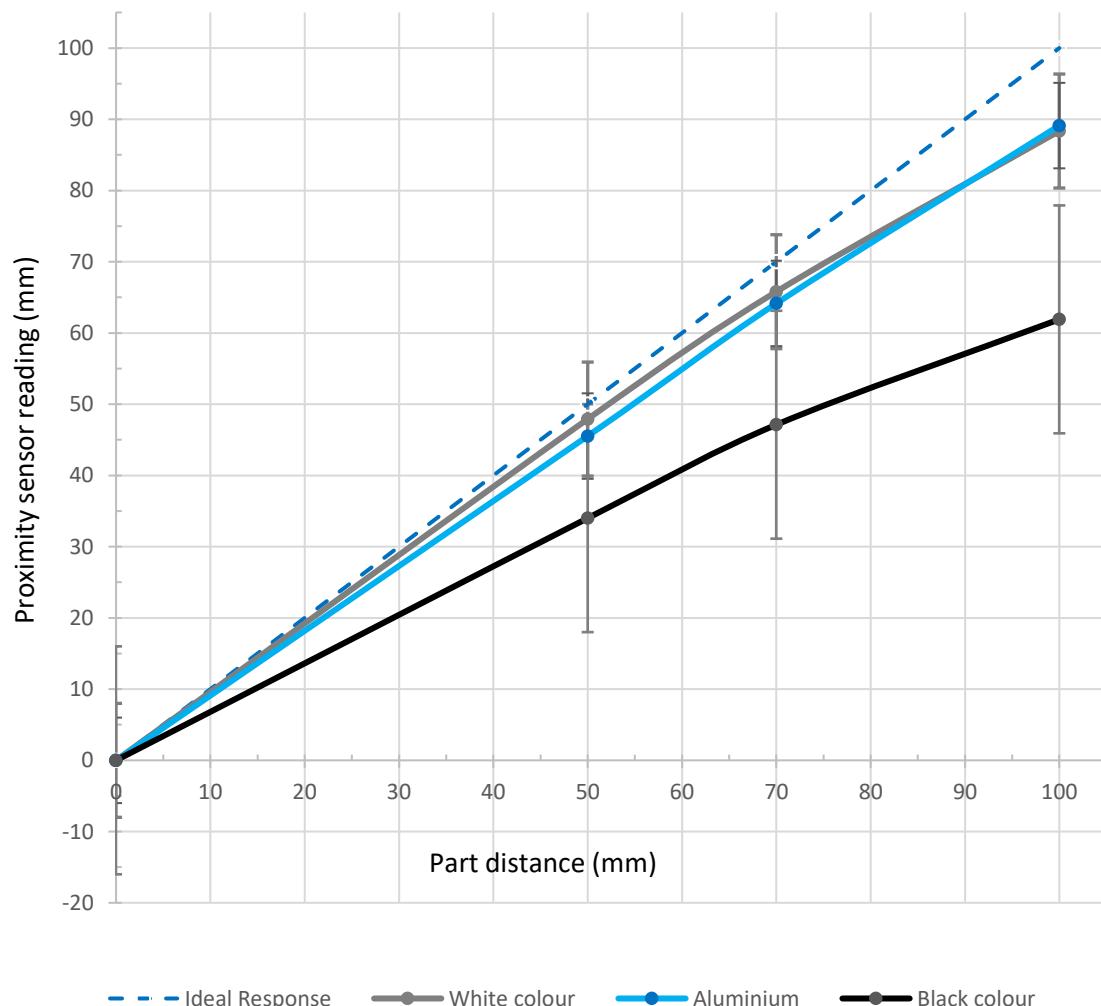
Force Sensor Properties	Fxy	Fz	Txy	Tz	Units
Nominal capacity (N.C.)	20	40	0.7	0.5	[N] [Nm]
Single axis overload	200	200	200	200	[%]
Noise free resolution	0.1	0.4	0.008	0.005	[N] [Nm]
Single axis deformation at N.C.	0.4 0.015	0.1 0.04	2	5	[mm] [°] [inch] [°]
Full scale nonlinearity Temperature compensation	< 2				[%]

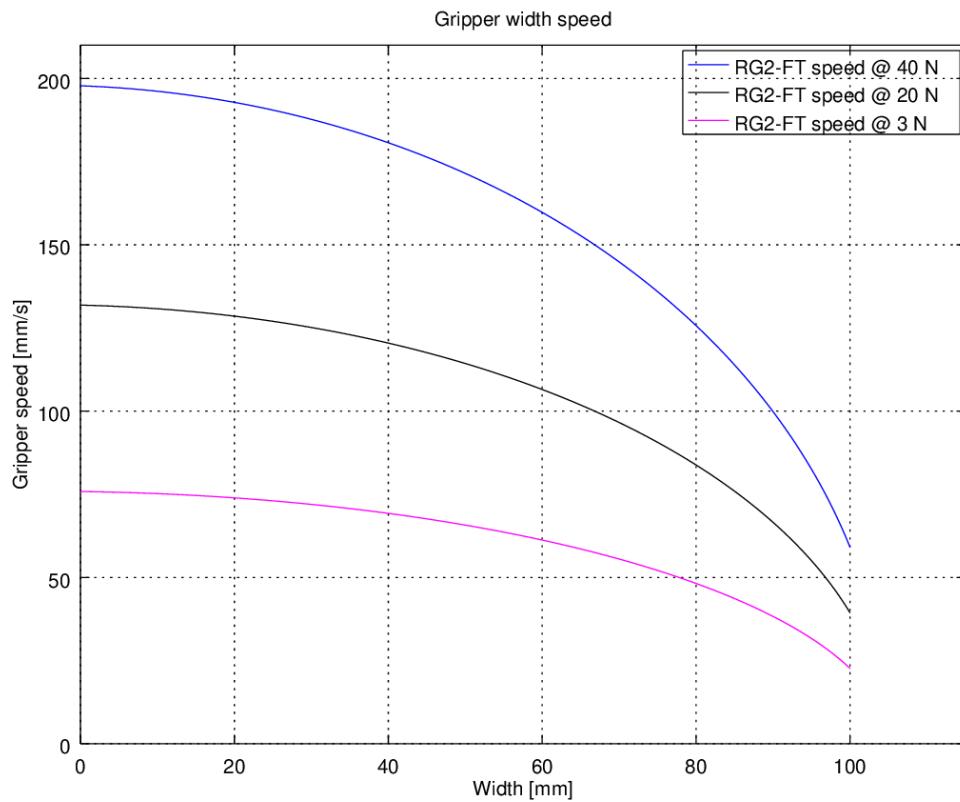
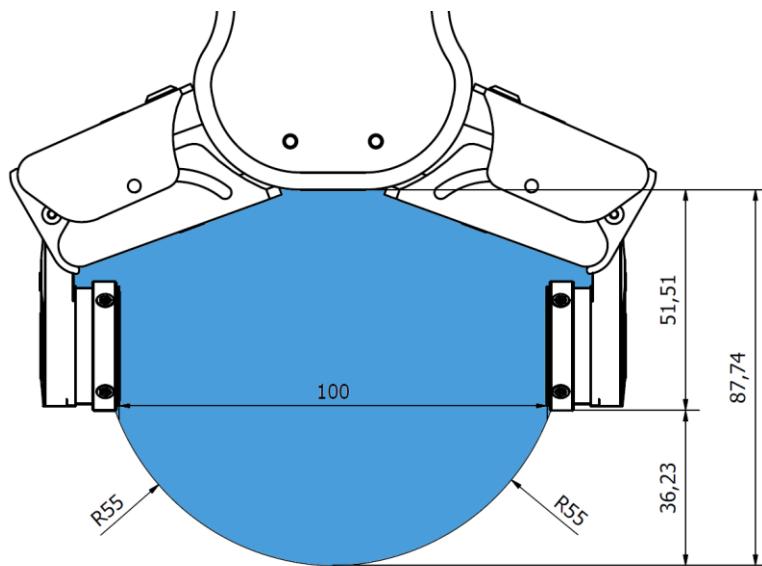
Proximity Sensor Properties	Min	Typical	Max	Units
Sensing range	0	-	100	[mm]
	0	-	3.93	[inch]
Precision	-	2	-	[mm]
	-	0.078	-	[inch]
Non-linearity*	-	12	-	[%]

\* the non-linearity refers to the max value and depends on the object properties (e.g. surface type and color)

Operating Conditions	Minimum	Typical	Maximum	Unit
Power requirement (PELV)	24	-	24	[V]
Power consumption	6.5	-	22	[W]
Operating temperature	0	-	55	[°C]
	32	-	131	[°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

### Proximity sensor typical accuracy

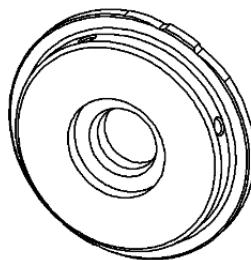
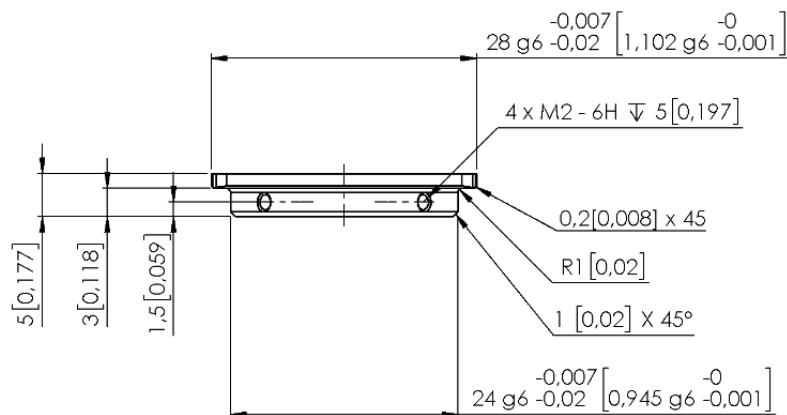
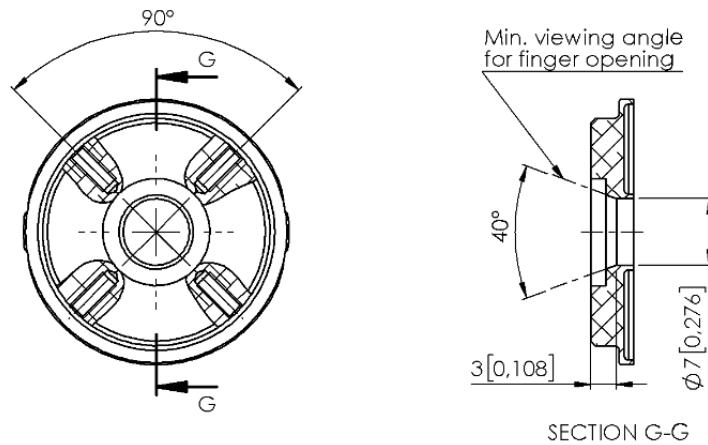


**RG2-FT Gripping Speed Graph**

**Gripper Working Range**


The dimensions are in millimeters.

### Fingertips

The standard fingertips can be used for many different workpieces. If custom fingertips are required, they can be made to fit the Gripper fingers.



Dimensions of the Gripper's finger, in millimeters.

**NOTE:**

During the fingertip design, the following shall be considered to maintain optimal performance:

Clear optical path for the proximity sensors

Protect the proximity sensors from direct sunlight or strong light source

Avoid dust and liquid penetration

**WARNING:**

The proximity sensors are sensitive parts and shall be protected against:

Direct strong light (such as directional laser sources)

Direct high temperature

Mechanical contacts in any case

Expose to any liquid or fine conductive dust

**NOTE:**

Please clean regularly the proximity sensor surface with low pressure compressed air (<5 bar) from a 5 cm distance. For stronger contamination use isopropyl alcohol with a soft cotton swab to keep it clean.

### Finger Thickness

The default fingertips are considered while the finger thickness has been set and could not be changed in the software. In case when custom fingertips are used, the user should manually compensate for the difference in the finger thickness.

## RG2

General Properties	Minimum	Typical	Maximum	Unit
Payload Force Fit 	- -	- -	2 4.4	[kg] [lb]
Payload Form Fit 	- -	- -	5 11	[kg] [lb]
Total stroke (adjustable)	0 0	- -	110 4.33	[mm] [inch]
Finger position resolution	- -	0.1 0.004	- -	[mm] [inch]
Repetition accuracy	- -	0.1 0.004	0.2 0.007	[mm] [inch]
Reversing backlash	0.1 0.004	- -	0.3 0.011	[mm] [inch]
Gripping force (adjustable)	3	-	40	[N]
Gripping force deviation		±25		%
Gripping speed*	38	-	127	[mm/s]
Gripping time**	0.06	-	0.21	[s]
Adjustable bracket tilting accuracy	-	< 1	-	°
Storage temperature	0 32	- -	60 140	[°C] [°F]
Motor	Integrated, electric BLDC			
IP Classification	IP54			
Dimensions	213 x 149 x 36 8.3 x 5.9 x 1.4			[mm] [inch]
Weight	0.78 1.72			[kg] [lb]

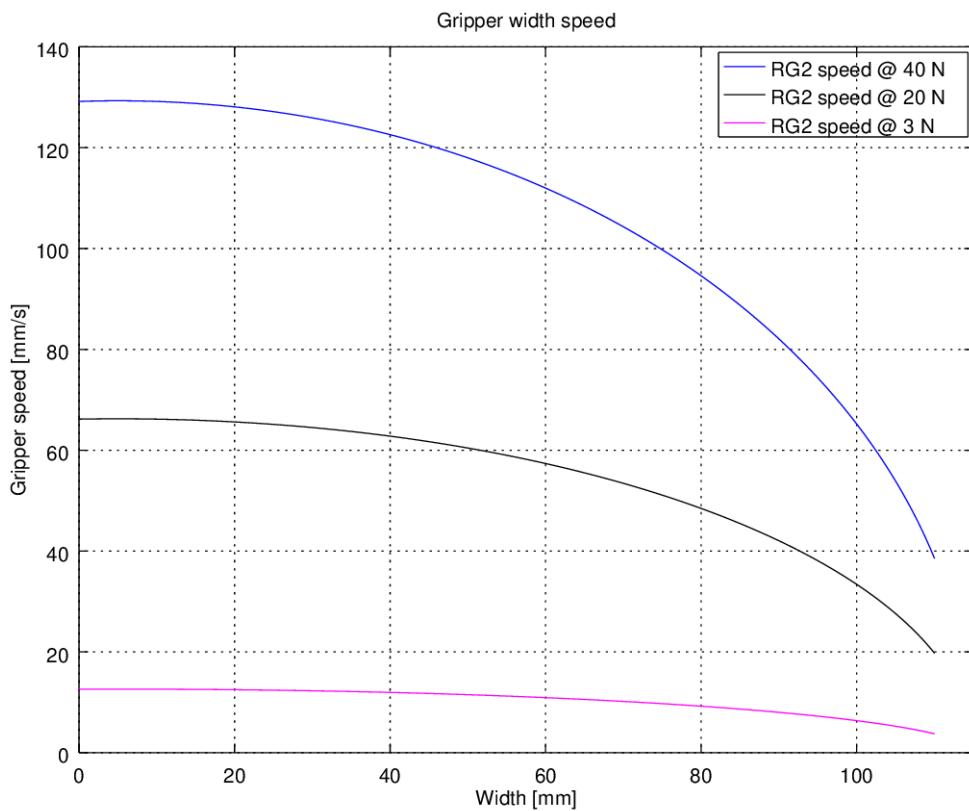
\*See table on the next page

\*\* based on 8mm total movement between fingers. The speed is linearly proportional to the force. For more details see speed table on next page.

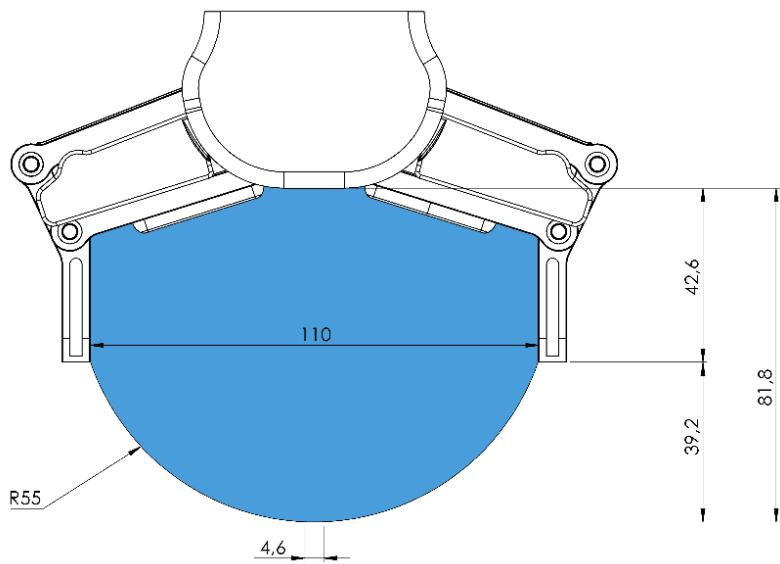
Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20	24	25	[V]
Current consumption	70	-	600*	[mA]
Operating temperature	5 41	- -	50 122	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

\*Current spikes up to 3A (max 6mS) may occur during the release action.

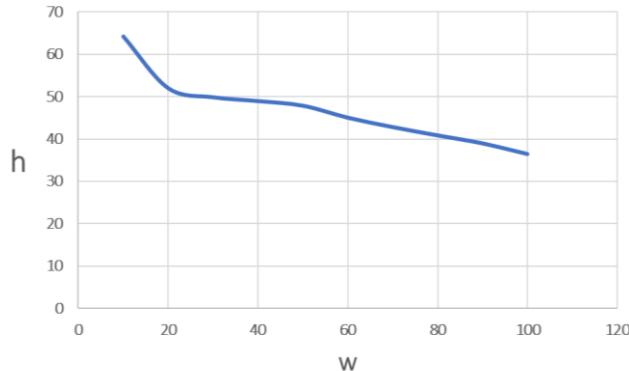
### RG2 Gripping Speed Graph



### RG2 Work Range

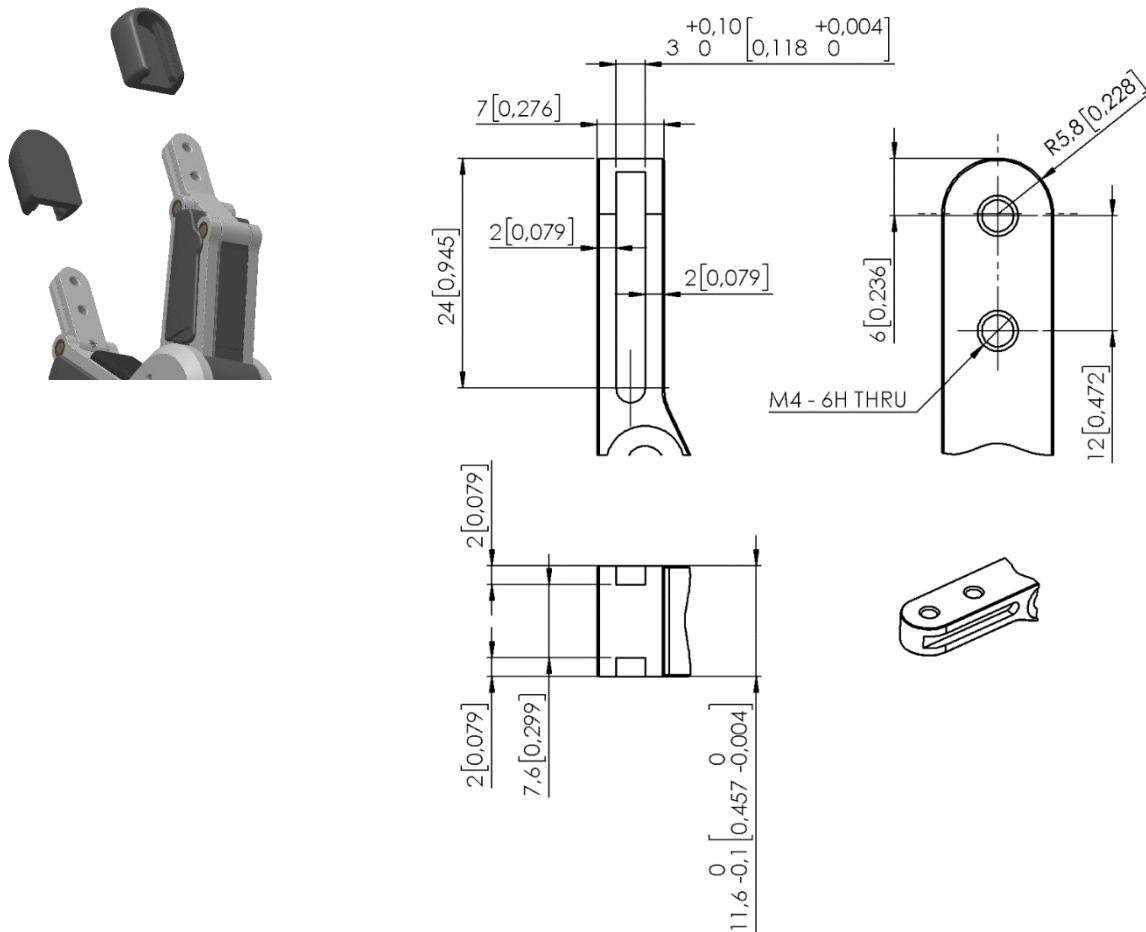


Gripping on long objects can unintentionally activate the Safety switches. The maximum workpiece height (calculated from the end of the fingertips) is dependent on the gripping width (w). For various width values the height (h) limit is given below:



### Fingertips

The standard fingertips can be used for many different workpieces. If custom fingertips are required, they can be made to fit the Gripper's fingers according to the dimensions (mm) shown below:



## RG6

General Properties	Minimum	Typical	Maximum	Unit
Payload Force Fit	- -	- -	6 13.2	[kg] [lb]
Payload Form Fit	- -	- -	10 22.04	[Kg] [lb]
Total stroke (adjustable)	0 -	- -	160 6.3	[mm] [inch]
Finger position resolution	- -	0.1 0.004	- -	[mm] [inch]
Repetition accuracy	- -	0.1 0.004	0.2 0.007	[mm] [inch]
Reversing backlash	0.1 0.004	- -	0.3 0.011	[mm] [inch]
Gripping force (adjustable)	25	-	120	[N]
Gripping force deviation		±25		%
Gripping speed*	51	-	160	[mm/s]
Gripping time**	0.05	-	0.15	
Adjustable bracket tilting accuracy		< 1		°
Storage temperature	0 32		60 140	[°C] [°F]
Motor	Integrated, electric BLDC			
IP Classification	54			
Dimensions	262 x 212 x 42 10.3 x 8.3 x 1.6			[mm] [inch]
Weight	1.25 2.76			[kg] [lb]

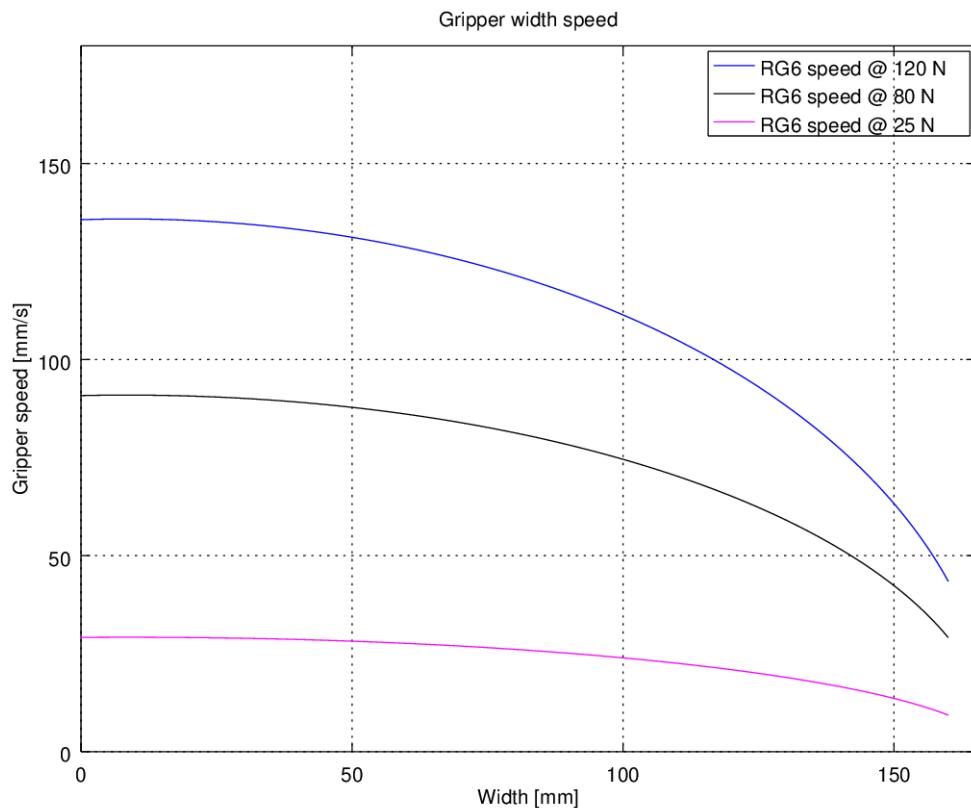
\*See table on the next page

\*\* based on 8mm total movement between fingers. The speed is linearly proportional to the force. For more details see speed table on next page.

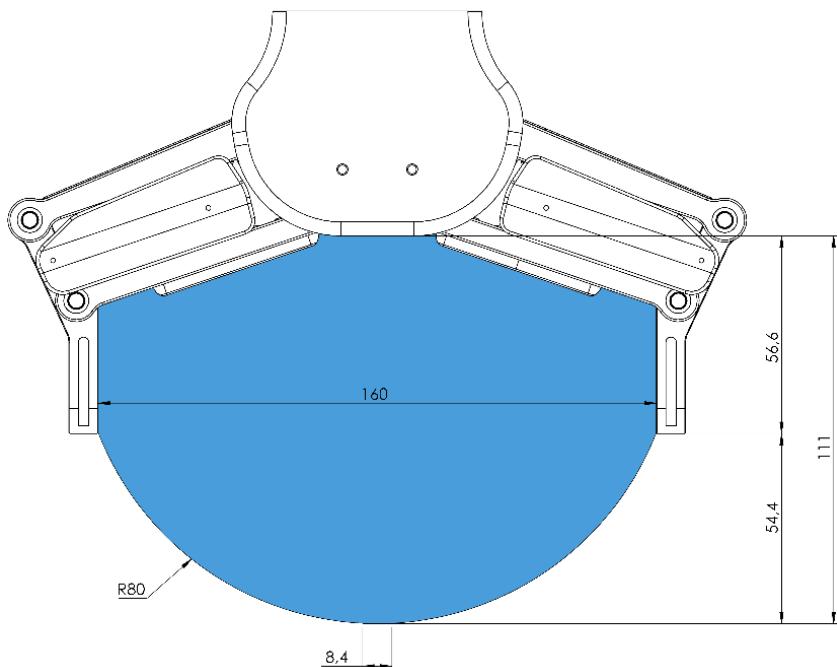
Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20	24	25	[V]
Current consumption	70	-	600*	[mA]
Operating temperature	5 41	- -	50 122	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]

\*Current spikes up to 3A (max 6mS) may occur during the release action.

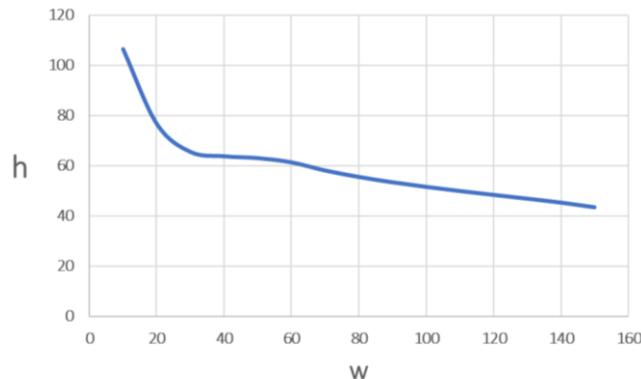
### RG6 Gripping Speed Graph



### RG6 Work Range

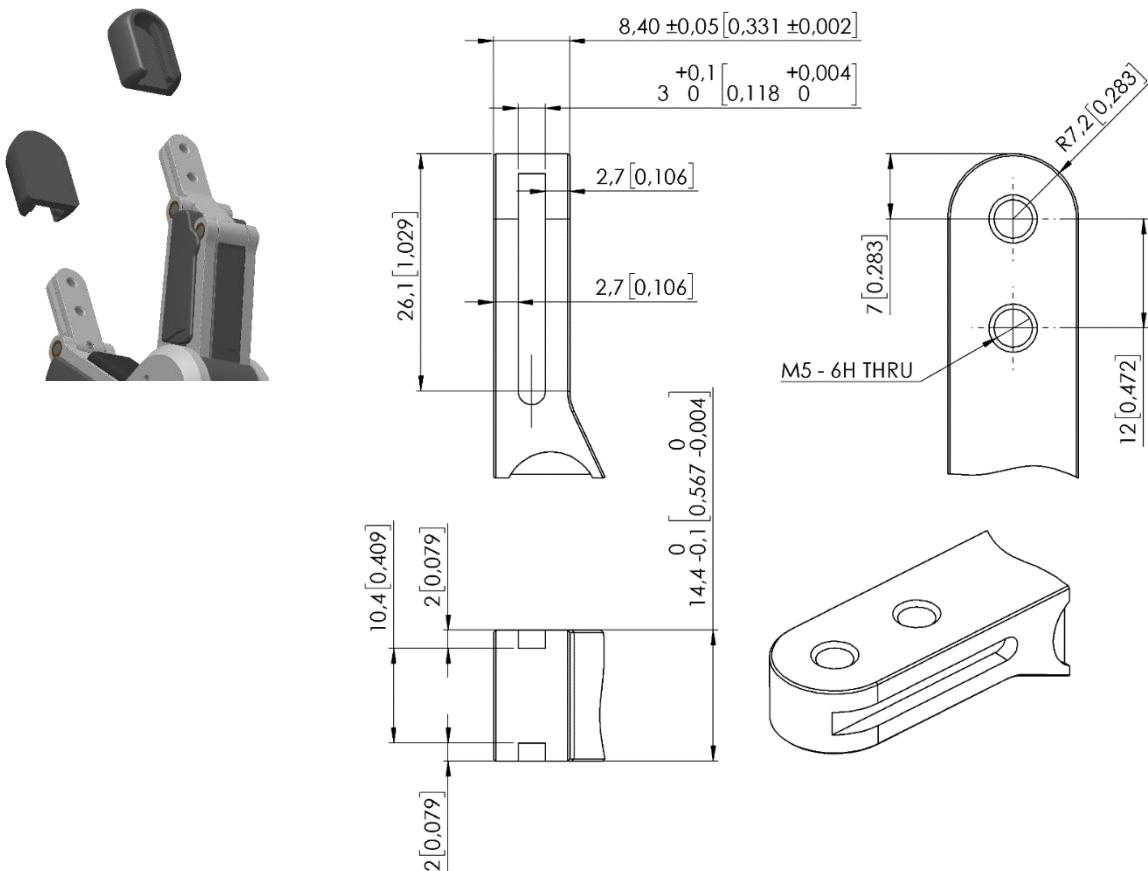


Gripping on long objects can unintentionally activate the Safety switches. The maximum workpiece height (calculated from the end of the fingertips) is dependent on the gripping width (w). For various width values the height (h) limit is given below:



### Fingertips

The standard fingertips can be used for many different workpieces. If custom fingertips are required, they can be made to fit the Gripper's fingers according to the dimensions (mm) shown below:



**SG**

<b>General Properties</b>	<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Total spindle stroke	11 0.43	-	40 1.57	[mm] [inch]
Spindle position resolution	-	0.1 0.0039	-	[mm] [inch]
Spindle force	-	-	380	[N]
Spindle speed	-	-	37 1.46	[mm/s] [inch/s]
Gripping time* (SG-a-H)	-	-	32	[grip/min]
SG-tool attachment mechanism	Smart lock			
Motor	Integrated, electric BLDC			
IP Classification	IP67			
Dimensions (H x Ø)	84 x 98 3.3 x 3.85			[mm] [inch]
Weight	0.77 1.69			[kg] [lb]

\*Gripping time is tool depended. See the separate SG Datasheet for the tool specific gripping time.

<b>Operating Conditions</b>	<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Power supply	20	24	25	[V]
Current consumption	45	-	600	[mA]
Operating temperature	0 32	- -	50 122	[°C] [°F]
Storage temperature	0 32	- -	60 140	[C] [F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[Hours]


**NOTE:**

For technical specification for the SG-tools, see the separate SG Datasheet.

### How to handle a workpiece

With the elastic silicone SG tools, the gripper can handle a wide range of workpieces, for a high number of applications. Different tool designs have some overlap in capability when handling the same workpiece, but the tools have different characteristics and do have individual effectiveness on a given workpiece.

#### Soft silicone

Some SG tool designs has a soft silicone part in the top of the gripper. These tools are better suited for handling fragile workpieces and/or workpieces with a high variance in size, compared to the hard silicone tools. This is due to the more "forgiving" nature of the soft part. The user may experience a reduced payload compared to the hard silicone tools.

To handle a workpiece properly, the user must know some parameters that are defined by the general conditions of the workpiece and its presentation in the application. This helps to define which tool to choose and the actual grip width on it.

A general overview of such parameters is listed below:

- Shape
- Dimension
- Weight
- Roughness
- Fragility
- Orientation of pick/placement

For a better understanding of how to handle workpieces with different parameters, tests were conducted with a SG-a-H tool, see table below.

Example of material	Workpiece	Dimension	Weight	Roughness	Shape	Actual gripping width
Smooth wood (Sanded)	Round stick	27mm	32g	5	Cylinder	20mm
Polished metal	Aluminum cube	35x25mm	512g	1	Square	15mm
Rough metal	Aluminum cylinder	60mm	490g	8	Cylinder	55mm
Plastic	PET Bottle	65mm	431g	1	Cylinder	50mm
	POM-C	50mm	221g	2	Cylinder	42mm
	POM-C	50mm	1410g	2	Cylinder	15mm
Glass	Drinking glass	68mm	238g	1	Cylinder	50mm
Organic material	Tomato	54mm	92g	2	Round	53mm
	Mushroom	40mm	8g	10	Round	39mm
	Grape	20mm	7g	10	Oval	16mm
Carbonfiber	Carbonfiber cylinder	38mm	48g	7	Cylinder	29mm

Notice objects with high weight needs higher force asserted upon them, therefor the small gripping width.

**NOTE:**

The results shown in the table above, should be considered as indicative and may vary. The actual grip width always require testing, for verification.

It is often a good idea to set a target width smaller, than actual workpiece width, to reach a higher surface contact area and to accommodate for vibrations and other unexpected conditions.

For heavy and large workpieces test at low velocity and with caution.

**NOTE:**

For individual SG-tool examples. See the separate SG-tool manual.

The criteria for roughness are a basic scale from 1-10, here are the benchmarks used to determine the values.

Roughness	Description	Example
1	Polished/Smooth	Polished Metal
5	Textured	Cardboard
10	Rough	Sandblasted Metal

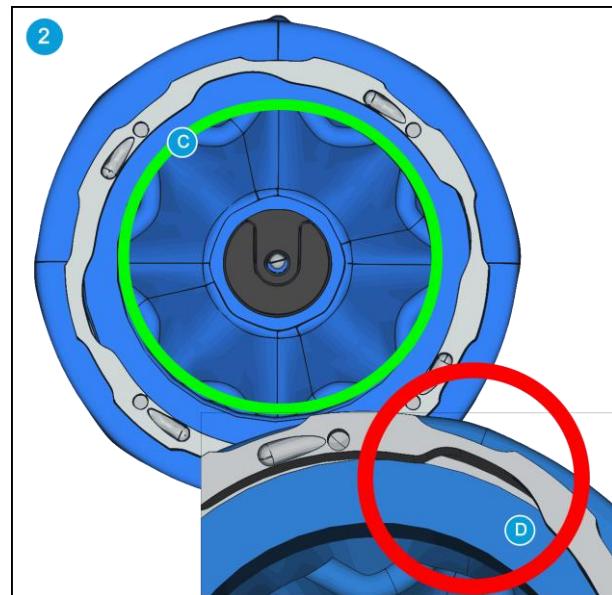
**WARNING:**

Sharp edges, on a workpiece, may damage the silicone and reduce lifetime of the tool.

### SG Tool Mounting Guide



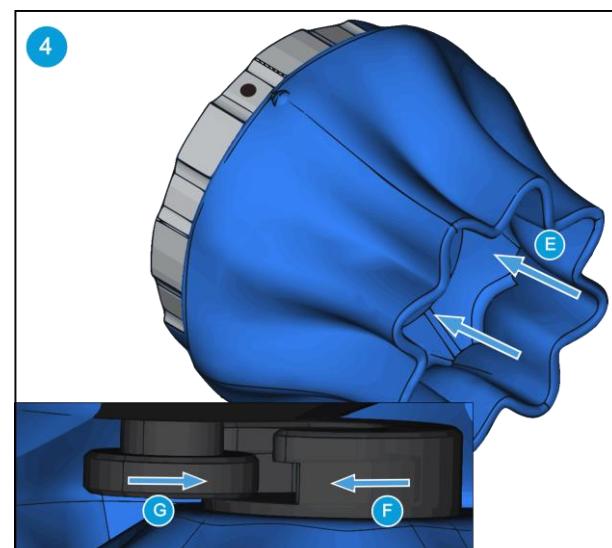
Rotate the ring so marking (A) facing you. Align the dot on the SG tool (B) with marking (A). Make them fit together and mount the ring onto the SG tool.



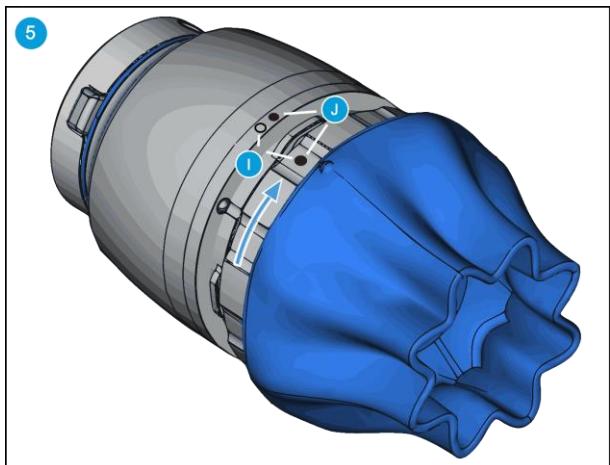
Press the SG tool up against the ring until it fits perfectly (C). Make sure there is no gap between the SG tool and the ring (D).



It is highly recommended to install the SG Base Part on the robot before installing the SG tool. Make sure the SG Base Part is in home position or initialized.



Use your thumbs to press the inside of the SG tool (E). This will make the smart lock female (F) visible. Locate the marking on the ring as described in step 1. Slide the SG tool smart lock female (F) and the smart lock male (G) together.



Scan for mounting guide video.



Align the markings **(I)**. Press the SG tool into the SG Base Part and rotate CW to align the two markings **(J)**.



**WARNING:**

When working with the SG, please make sure that the grippers inward/outward motion is not obstructed, otherwise the positioning system may get out of sync. If that were to happen, move the grip/release point away from the workpiece, and reinitialize the gripper.

## VG10

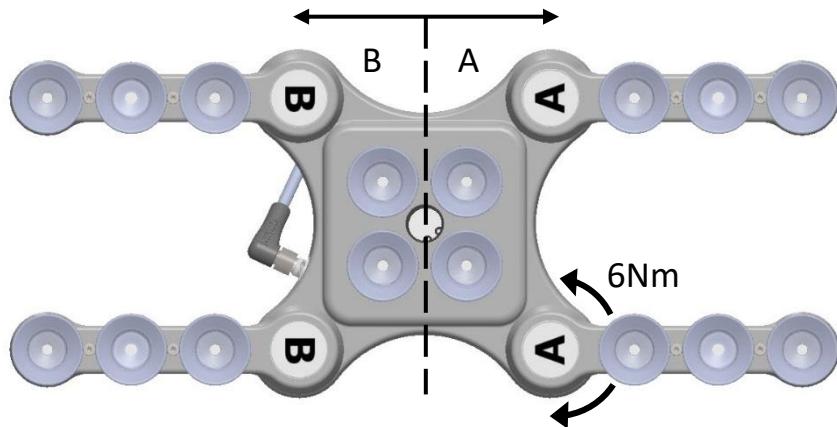
General Properties		Minimum	Typical	Maximum	Unit
Vacuum		5 % -0.05 1.5	- -	80 % -0.810 24	[Vacuum] [Bar] [inHg]
Air flow		0	-	12	[L/min]
Arms adjustment		0	-	270	[°]
Arm holding torque		-	6	-	[Nm]
Payload	Rated	10 22			
	Maximum	15 33			
Vacuum cups		1	-	16	[pcs.]
Gripping time		-	0.35	-	[s]
Releasing time		-	0.20	-	[s]
Foot-inch-foot		-	1.40	-	[s]
Vacuum pump	Integrated, electric BLDC				
Arms	4, adjustable by hand				
Dust filters	Integrated 50µm, field replaceable				
IP Classification	IP54				
Dimensions (folded)	105 x 146 x 146 4.13 x 5.75 x 5.75		[mm] [inch]		
Dimensions (unfolded)	105 x 390 x 390 4.13 x 15.35 x 15.35		[mm] [inch]		
Weight	1.62 3.57		[kg] [lb]		

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20.4	24	28.8	[V]
Current consumption	50	600	1500	[mA]
Operating temperature	0 32	- -	50 122	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[hours]

**Positioning the VG10 arms and channels**

The arms can be folded to the preferred position simply by pulling in the arms. The torque needed to overcome the friction in the rotatable joints of the arm is high (6 N/m) to ensure that the arms do not move when handling 15 kg payloads.

The VG10 suction cups are grouped into two independent channels.



When the four arms are adjusted to preferred angles, it is recommended to add the accompanied arrow stickers. This allows for easy realignment and exchanging between different work items.



## Payload

The lifting capacity of the VG grippers depends primarily on the following parameters:

- Vacuum cups
- Vacuum
- Air flow

## Vacuum Cups

Choosing the right vacuum cups for your application is essential. The VG grippers come with common 15, 30 and 40 mm silicone vacuum cups (see table below) which are good for hard and flat surfaces, but not good for uneven surfaces and it might leave microscopic traces of silicone on the workpiece which can cause issues with some types of painting processes afterwards.

Image	External Diameter [mm]	Internal Diameter [mm]	Gripping Area [mm <sup>2</sup> ]
	15	6	29
	30	16	200
	40	24	450

For non-porous materials, the OnRobot suction cups are highly recommended. Some of the most common non-porous materials are listed below:

- Composites
- Glass
- High density cardboard
- High density paper
- Metals
- Plastic
- Porous materials with a sealed surface
- Varnished wood

In an ideal case, working with non-porous material workpieces where there are no air flow going through the workpiece, the table below shows the number of cups and the cup size needed depending on the payload (workpiece mass) and the vacuum used.

**Number of Cups needed for non-porous materials depending on payload and vacuum:**

Payload (kg)	15mm				30mm				40mm					
	Vacuum (kPa)				Vacuum (kPa)				Vacuum (kPa)					
	20	40	60	75		20	40	60	75		20	40	60	75
0.1	3	2	1	1		1	1	1	1		1	1	1	1
0.5	13	7	5	4		2	1	1	1		1	1	1	1
1	-	13	9	7		4	2	2	1		2	1	1	1
2	-	-	-	14		8	4	3	2		4	2	2	1
3	-	-	-	-		12	6	4	3		5	3	2	2
4	-	-	-	-		15	8	5	4		7	4	3	2
5	-	-	-	-		-	10	7	5		9	5	3	3
6	-	-	-	-		-	12	8	6		10	5	4	3
7	-	-	-	-		-	13	9	7		12	6	4	4
8	-	-	-	-		-	15	10	8		14	7	5	4
9	-	-	-	-		-	-	12	9		15	8	5	4
10	-	-	-	-		-	-	13	10		-	9	6	5
11	-	-	-	-		-	-	14	11		-	9	6	5
12	-	-	-	-		-	-	15	12		-	10	7	6
13	-	-	-	-		-	-	16	13		-	11	8	6
14	-	-	-	-		-	-	-	14		-	12	8	7
15	-	-	-	-		-	-	-	15		-	13	9	7


**NOTE:**

To use more than 7 (15mm), 4 (30mm) or 3 (40mm) vacuum cups with the VGC10 a customized adaptor plate is needed.

The table above is created with the following formula that equalizes the lifting force with the payload considering 1.5G of acceleration.

$$\text{Amount}_{\text{Cups}} * \text{Area}_{\text{Cup}}[\text{mm}] = 14700 \frac{\text{Payload} [\text{kg}]}{\text{Vacuum} [\text{kPa}]}$$

It is often a good idea to use more vacuum cups than needed, to accommodate for vibrations, leaks and other unexpected conditions. However, the more vacuum cups, the more air leakage (air flow) is expected and the more air is moved in a grip resulting in longer gripping times.

When using porous materials, the vacuum that can be achieved by using the OnRobot suction cups will depend on the material itself and will be between the range stated in the specifications. Some of the most common non-porous materials are listed below:

- Fabrics
- Foam
- Foam with open cells
- Low density cardboard

- Low density paper
- Perforated materials
- Untreated wood

See the table below with general recommendations, in case other suction cups are needed for specific materials.

Workpiece surface	Vacuum cup shape	Vacuum cup material
Hard and flat	Normal or dual lip	Silicone or NBR
Soft plastic or plastic bag	Special plastic bag type	Special plastic bag type
Hard but curved or uneven	Thin dual lip	Silicone or soft NBR
To be painted afterwards	Any type	NBR only
Varying heights	1.5 or more bevels	Any type

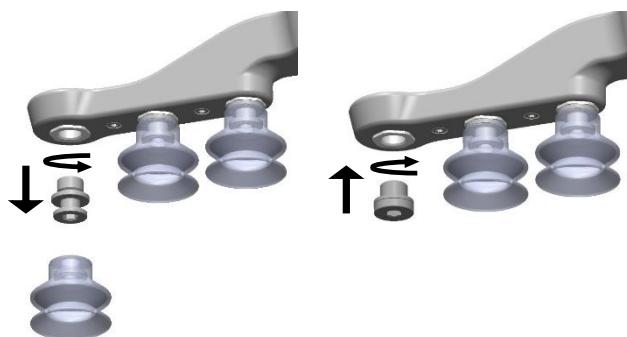

**NOTE:**

It is recommended to consult a vacuum cup specialist to find the optimal vacuum cup where the standard types are insufficient.

### Fittings and Blind Screws.

It is possible to change suction cups simply by pulling them off the fittings. It might be a bit challenging to remove the 15 mm Diameter vacuum cups. As suggestion try to stretch the silicon to one of the sides and then pull it out.

Unused holes can be blinded using a blind screw, and each fitting can be changed to a different type to match the desired suction cup. The fittings and the blinding screws are mounted or dismounted by screwing (2Nm tightening torque) or unscrewing them with the provided 3 mm Allen key.



The thread size is the commonly used G1/8"; allowing for standard fittings, blinders and extenders to be fitted directly to the VG grippers.

### Vacuum

Vacuum is defined as the percentage of absolute vacuum achieved relative to atmospheric pressure, i.e.:

% vacuum	Bar	kPa	inHg	Typically used for
0%	0.00rel. 1.01 abs.	0.00rel. 101.3 abs.	0.0rel. 29.9 abs.	No vacuum / No lifting capacity
20%	0.20rel. 0.81 abs.	20.3rel. 81.1 abs.	6.0rel. 23.9 abs.	Cardboard and thin plastics
40%	0.41rel. 0.61 abs.	40.5rel. 60.8 abs.	12.0rel. 18.0 abs.	Light workpieces and long suction cup life span
60%	0.61rel. 0.41 abs.	60.8rel. 40.5 abs.	18.0rel. 12.0 abs.	Heavy workpieces and strongly secured grips
80%	0.81rel. 0.20 abs.	81.1rel. 20.3 abs	23.9rel. 6.0 abs.	Max. vacuum. Not recommended

The vacuum in kPa setting is the target vacuum. The pump will run at full speed until the target vacuum is achieved, and then run at a lower speed necessary to maintain the target vacuum.

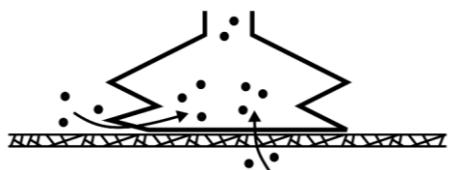
The pressure in the atmosphere varies with weather, temperature and altitude. The VG grippers automatically compensate for altitudes up to 2km, where the pressure is about 80% of sea level.

### Air flow

Air flow is the amount of air that must be pumped to maintain the target vacuum. A completely tight system will not have any air flow, whereas real life applications have some smaller air leakages from two different sources:

- Leaking vacuum cup lips
- Leaking workpieces

The smallest leak under a vacuum cup can be hard to find (see picture below).



Leaking workpieces can be even harder to identify. Things that look completely tight might not be tight at all. A typical example is coarse cardboard boxes. The thin outer layer is often requiring a lot of air flow to create a pressure difference over it (see figure below).

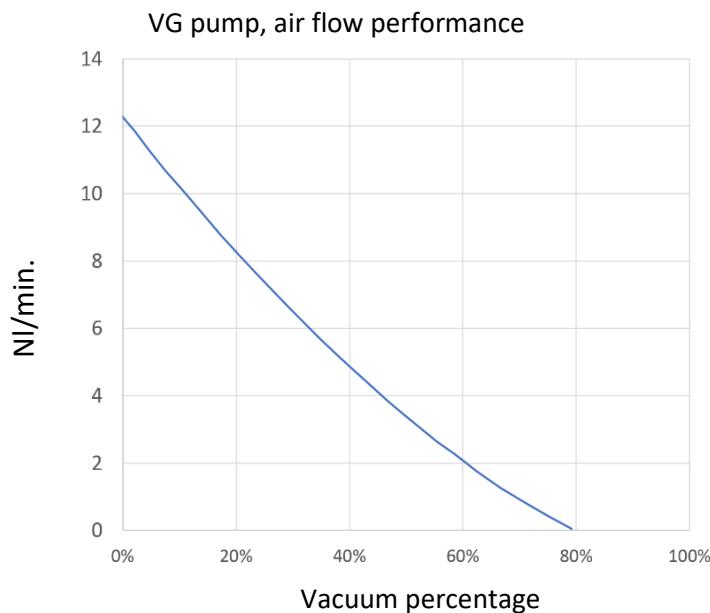


Therefore, the users must be aware of the following:

- VG grippers are not suitable for most uncoated, coarse cardboard boxes.

- Extra attention must be paid to leakages, e.g. vacuum cup shape and surface roughness

The air flow capability of a VG grippers is shown in the graph below:

**NOTE:**

The easiest way to check if a cardboard box is sufficiently tight is simply to test it using the VG grippers.

A high vacuum percentage setting does not give a higher lifting capacity on corrugated cardboard. In fact, a lower setting is recommended, e.g. 20%.

A low vacuum setting results in less air flow and less friction below the vacuum cups. This means VG gripper filters and vacuum cups will last longer.

**VGC10**

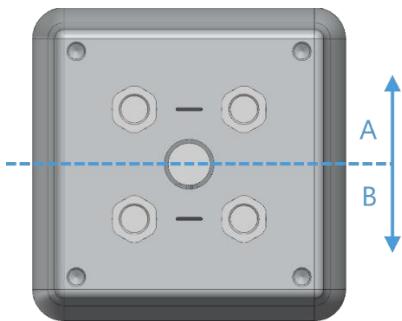
<b>General Properties</b>		<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Vacuum		5 % -0.05 1.5	- -	80 % -0.810 24	[Vacuum] [Bar] [inHg]
Air flow		0	-	12	[L/min]
Payload	With default attachments	- -	- -	6 * 13.2 *	[kg] [lb]
	With customized attachments	- -	10 22	15 33.1	[kg] [lb]
Vacuum cups		1	-	7	[pcs.]
Gripping time		-	0.35	-	[s]
Releasing time		-	0.20	-	[s]
Vacuum pump	Integrated, electric BLDC				
Dust filters	Integrated 50µm, field replaceable				
IP Classification	IP54				
Dimensions	101 x 100 x 100 3.97 x 3.94 x 3.94		[mm] [inch]		
Weight	0.814 1.79		[kg] [lb]		

\* By using three 40mm cups. More info in the table **Number of Cups needed for non-porous materials depending on payload and vacuum.**

<b>Operating Conditions</b>	<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Power supply	20.4	24	28.8	[V]
Current consumption	50	600	1500	[mA]
Operating temperature	0 32	- -	50 122	[°C] [°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated MTBF (operating life)	30.000	-	-	[hours]

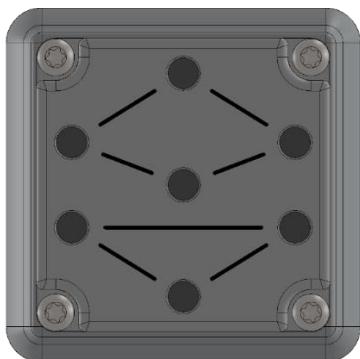
## 2 channels

The VGC10 has 4 holes to use fittings with vacuum cups or blinding screws as needed. It also has lines which show the holes that are communicated together. This is useful when using channels A and B independently for vacuum.

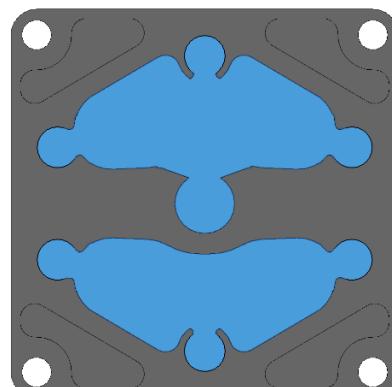
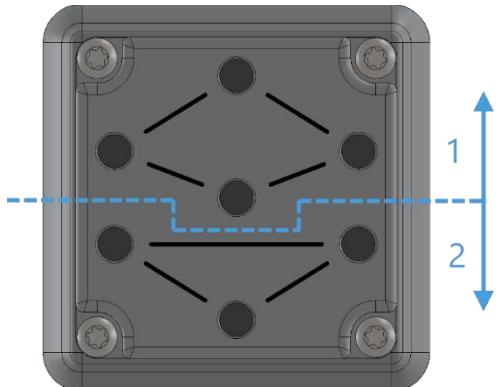


### Adaptor Plate

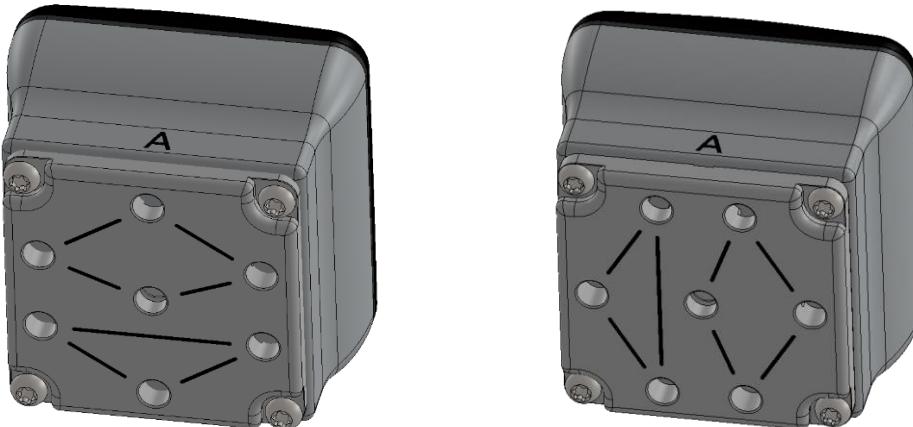
The VGC10 comes with an Adaptor Plate which provides extra flexibility to locate the vacuum cups in different configurations.



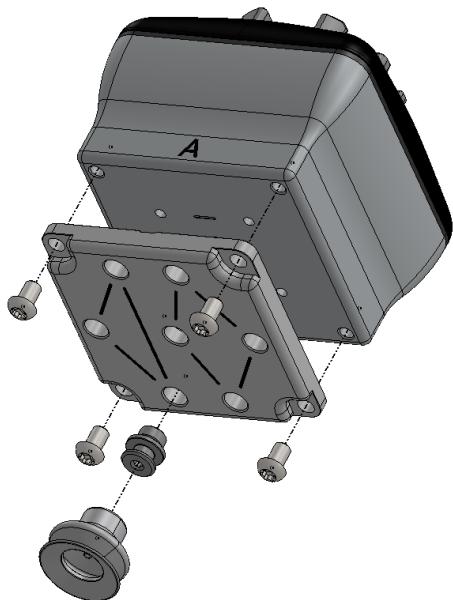
The Adaptor Plate has 7 holes to use fittings with vacuum cups or blinding screws as needed. It also has lines which show the holes that are communicated together. This is useful when using channel A and B independently for vacuum.



The Adaptor Plate can be placed in different positions by rotating it 90°. Having as reference the letters A and B written on the gripper housing, the Adaptor Plate can be placed to separate both channels or to communicate them. If the Adaptor Plate is placed as in picture below on the left, both channels will be separated, and they can be used independently or combined. If the Adaptor Plate is placed as in picture below on the right, both channels will be communicated and a higher air flow can be achieved, although both channels will have to be used combined.



To mount the Adaptor Plate simply remove the 4 fittings or blinding screws from the gripper, place the Adaptor Plate by choosing the right angle according to the desired configuration, and tighten the 4 screws with 4 Nm tighten torque.



#### NOTE:

Please, note that the O-Ring in the Adaptor Plate is not glued therefore it can be pulled out. If that happens simply put it back in place and the gripper will work as before.

### Extension Pipe

The Extension Pipe provides an extra length of 50 mm to reach narrow spaces.



#### NOTE:

Remember to use the Adaptor Plate rotated to achieve a higher air flow when using both channels together.

The Extension Pipe can be mounted in any of the holes by simply screwing it in and adding a fitting on top as shown in the image below.

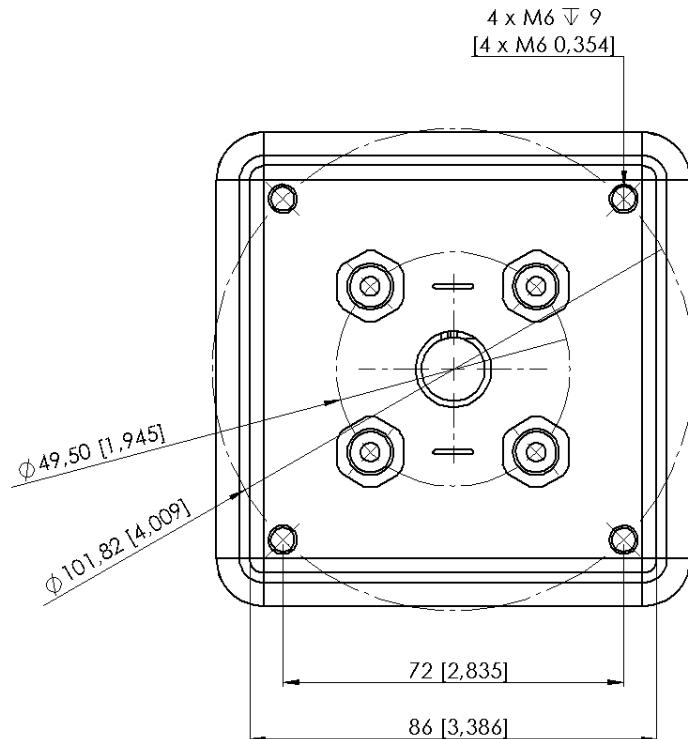


Below different mounting configurations with the provided attachments are shown.



#### Customized Adaptor Plates and Push-in Fittings

The design of the VGC10 is meant to facilitate the users to make their own adaptor plates to create different kinds of configurations. The dimensions needed to create a customized adaptor plate are shown in the image below.

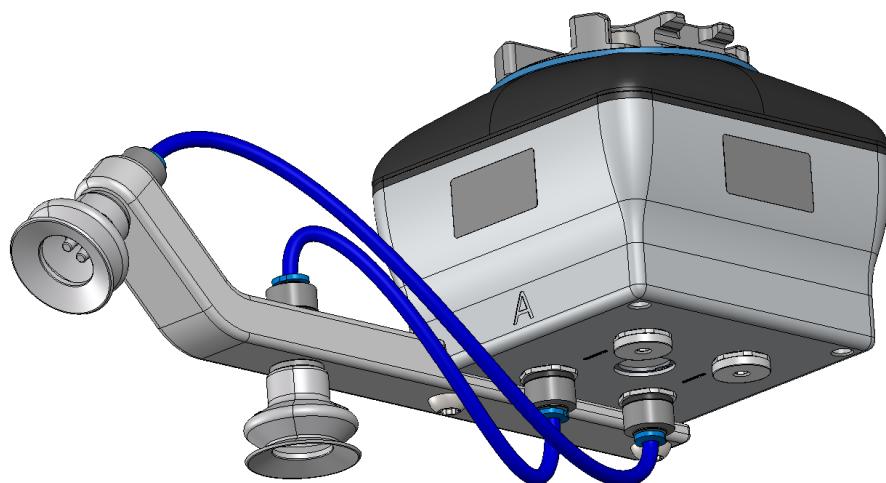


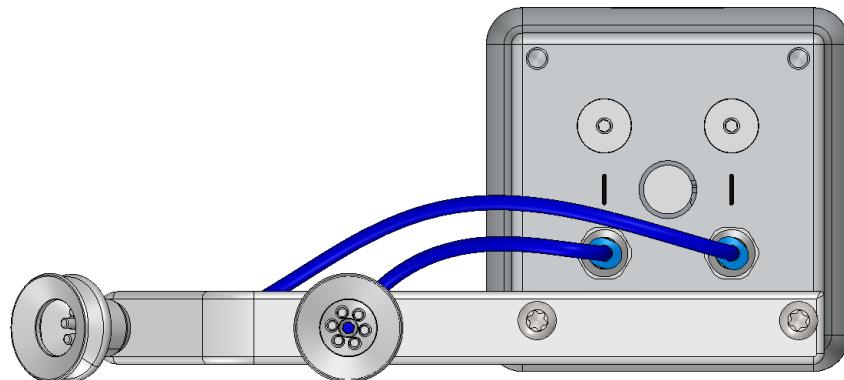
The Push-in Fittings are used to attach 4 mm vacuum tubes to create customized configuration that required remote vacuum. In most cases, this size is enough for generating the needed vacuum from the pump in the gripper.



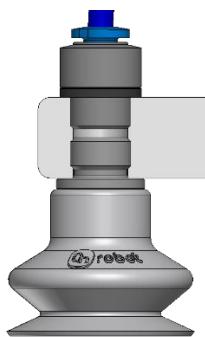
The commercial name of the Push-in Fittings is Fitting QSM-G1/8-4-I-R in case some more units need to be purchased.

An example of a customized configuration with a homemade adaptor plate and remote vacuum is shown below.





The image below shows how the push-in fittings and the normal fittings are communicated.



## Payload

The lifting capacity of the VG grippers depends primarily on the following parameters:

- Vacuum cups
- Vacuum
- Air flow

## Vacuum Cups

Choosing the right vacuum cups for your application is essential. The VG grippers come with common 15, 30 and 40 mm silicone vacuum cups (see table below) which are good for hard and flat surfaces, but not good for uneven surfaces and it might leave microscopic traces of silicone on the workpiece which can cause issues with some types of painting processes afterwards.

Image	External Diameter [mm]	Internal Diameter [mm]	Gripping Area [mm <sup>2</sup> ]
	15	6	29
	30	16	200
	40	24	450

For non-porous materials, the OnRobot suction cups are highly recommended. Some of the most common non-porous materials are listed below:

- Composites
- Glass
- High density cardboard
- High density paper
- Metals
- Plastic
- Porous materials with a sealed surface
- Varnished wood

In an ideal case, working with non-porous material workpieces where there are no air flow going through the workpiece, the table below shows the number of cups and the cup size needed depending on the payload (workpiece mass) and the vacuum used.

**Number of Cups needed for non-porous materials depending on payload and vacuum:**

Payload (kg)	15mm				30mm				40mm			
	Vacuum (kPa)				Vacuum (kPa)				Vacuum (kPa)			
	20	40	60	75	20	40	60	75	20	40	60	75
0.1	3	2	1	1	1	1	1	1	1	1	1	1
0.5	13	7	5	4	2	1	1	1	1	1	1	1
1	-	13	9	7	4	2	2	1	2	1	1	1
2	-	-	-	14	8	4	3	2	4	2	2	1
3	-	-	-	-	12	6	4	3	5	3	2	2
4	-	-	-	-	15	8	5	4	7	4	3	2
5	-	-	-	-	-	10	7	5	9	5	3	3
6	-	-	-	-	-	12	8	6	10	5	4	3
7	-	-	-	-	-	13	9	7	12	6	4	4
8	-	-	-	-	-	15	10	8	14	7	5	4
9	-	-	-	-	-	-	12	9	15	8	5	4
10	-	-	-	-	-	-	13	10	-	9	6	5
11	-	-	-	-	-	-	14	11	-	9	6	5
12	-	-	-	-	-	-	15	12	-	10	7	6
13	-	-	-	-	-	-	16	13	-	11	8	6
14	-	-	-	-	-	-	-	14	-	12	8	7
15	-	-	-	-	-	-	-	15	-	13	9	7



**NOTE:**

To use more than 7 (15mm), 4 (30mm) or 3 (40mm) vacuum cups with the VGC10 a customized adaptor plate is needed.

The table above is created with the following formula that equalizes the lifting force with the payload considering 1.5G of acceleration.

$$\text{Amount}_{\text{Cups}} * \text{Area}_{\text{Cup}} [\text{mm}] = 14700 \frac{\text{Payload} [\text{kg}]}{\text{Vacuum} [\text{kPa}]}$$

It is often a good idea to use more vacuum cups than needed, to accommodate for vibrations, leaks and other unexpected conditions. However, the more vacuum cups, the more air leakage (air flow) is expected and the more air is moved in a grip resulting in longer gripping times.

When using porous materials, the vacuum that can be achieved by using the OnRobot suction cups will depend on the material itself and will be between the range stated in the specifications. Some of the most common non-porous materials are listed below:

- Fabrics
- Foam
- Foam with open cells
- Low density cardboard
- Low density paper
- Perforated materials
- Untreated wood

See the table below with general recommendations, in case other suction cups are needed for specific materials.

Workpiece surface	Vacuum cup shape	Vacuum cup material
Hard and flat	Normal or dual lip	Silicone or NBR
Soft plastic or plastic bag	Special plastic bag type	Special plastic bag type
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To be painted afterwards	Any type	NBR only
Varying heights	1.5 or more bevels	Any type



#### NOTE:

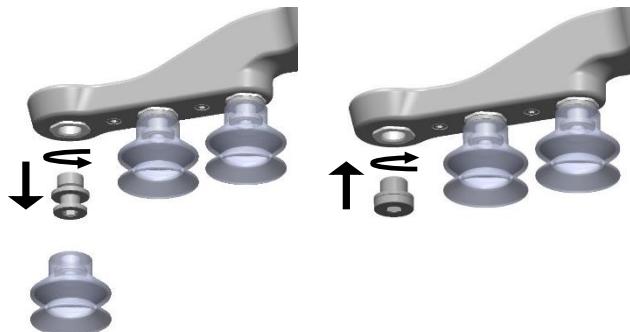
It is recommended to consult a vacuum cup specialist to find the optimal vacuum cup where the standard types are insufficient.

#### Fittings and Blind Screws.

It is possible to change suction cups simply by pulling them off the fittings. It might be a bit challenging to remove the 15 mm Diameter vacuum cups. As suggestion try to stretch the silicon to one of the sides and then pull it out.

## Hardware Specification

Unused holes can be blinded using a blind screw, and each fitting can be changed to a different type to match the desired suction cup. The fittings and the blinding screws are mounted or dismounted by screwing (2Nm tightening torque) or unscrewing them with the provided 3 mm Allen key.



The thread size is the commonly used G1/8"; allowing for standard fittings, blinders and extenders to be fitted directly to the VG grippers.

### Vacuum

Vacuum is defined as the percentage of absolute vacuum achieved relative to atmospheric pressure, i.e.:

% vacuum	Bar	kPa	inHg	Typically used for
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40%	0.41rel. 0.61 abs.	40.5rel. 60.8 abs.	12.0rel. 18.0 abs.	Light workpieces and long suction cup life span
60%	0.61rel. 0.41 abs.	60.8rel. 40.5 abs.	18.0rel. 12.0 abs.	Heavy workpieces and strongly secured grips
80%	0.81rel. 0.20 abs.	81.1rel. 20.3 abs	23.9rel. 6.0 abs.	Max. vacuum. Not recommended

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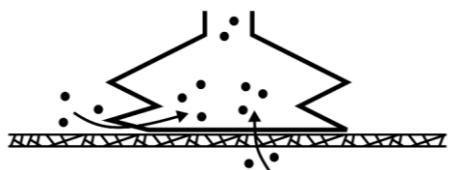
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Air flow is the amount of air that must be pumped to maintain the target vacuum. A completely tight system will not have any air flow, whereas real life applications have some smaller air leakages from two different sources:

- Leaking vacuum cup lips
- Leaking workpieces

The smallest leak under a vacuum cup can be hard to find (see picture below).



Leaking workpieces can be even harder to identify. Things that look completely tight might not be tight at all. A typical example is coarse cardboard boxes. The thin outer layer is often requiring a lot of air flow to create a pressure difference over it (see figure below).

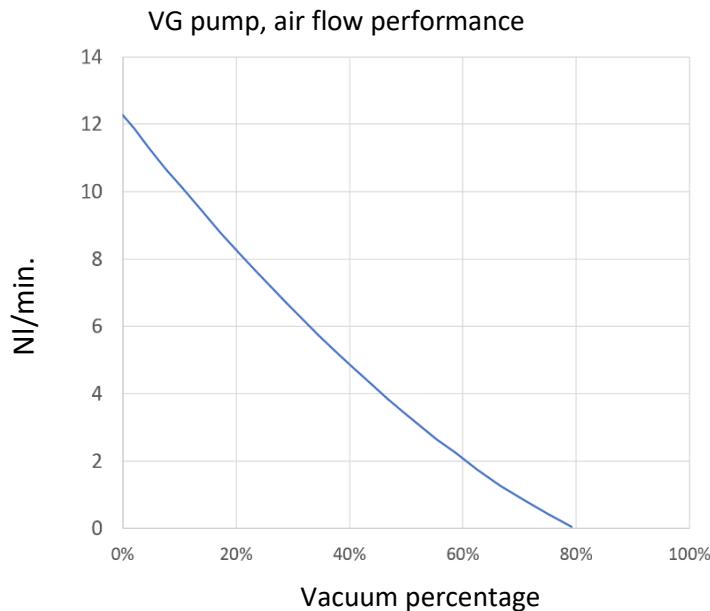


Therefore, the users must be aware of the following:

- VG grippers are not suitable for most uncoated, coarse cardboard boxes.

- Extra attention must be paid to leakages, e.g. vacuum cup shape and surface roughness

The air flow capability of a VG grippers is shown in the graph below:



**NOTE:**

The easiest way to check if a cardboard box is sufficiently tight is simply to test it using the VG grippers.

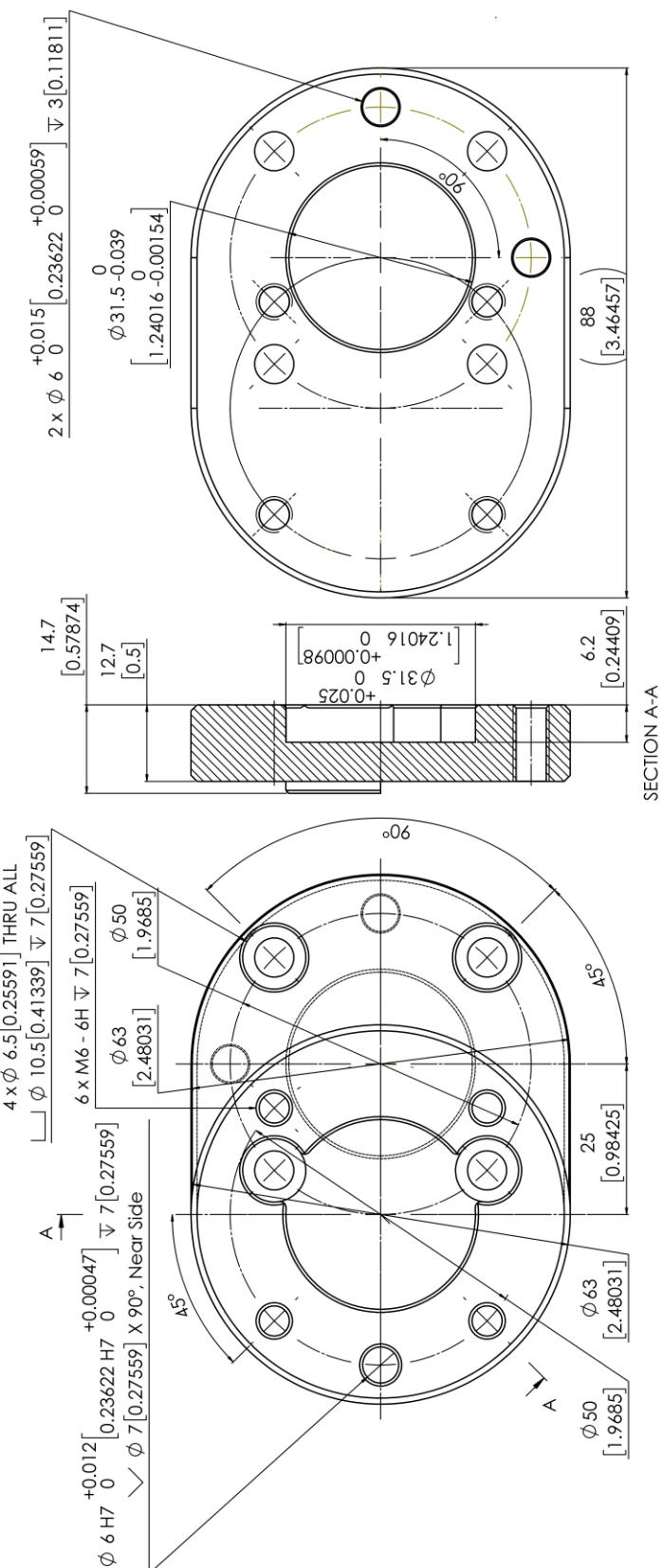
A high vacuum percentage setting does not give a higher lifting capacity on corrugated cardboard. In fact, a lower setting is recommended, e.g. 20%.

A low vacuum setting results in less air flow and less friction below the vacuum cups. This means VG gripper filters and vacuum cups will last longer.

## 6.2 Mechanical Drawings

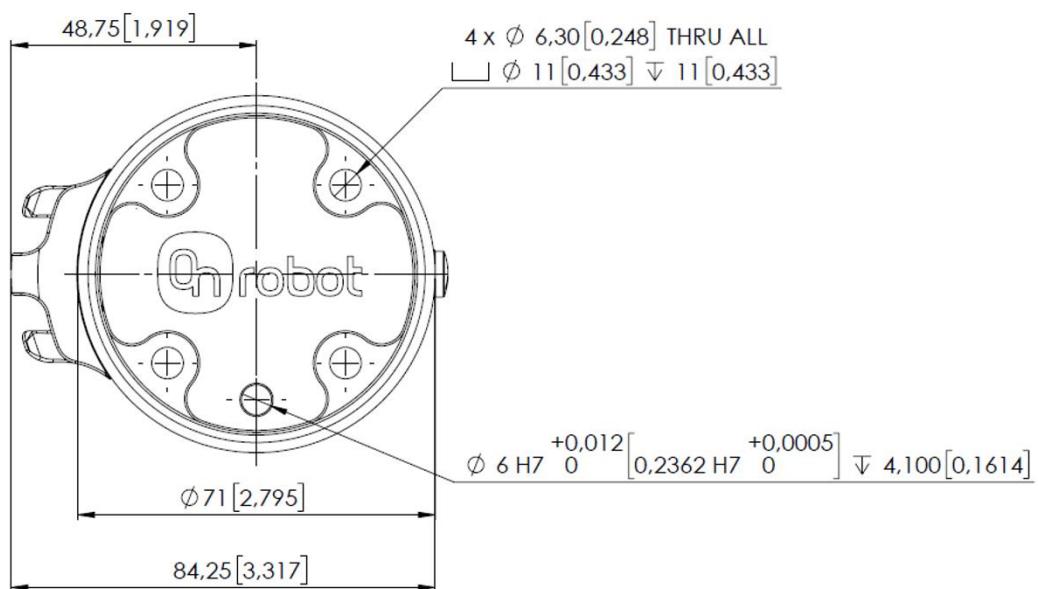
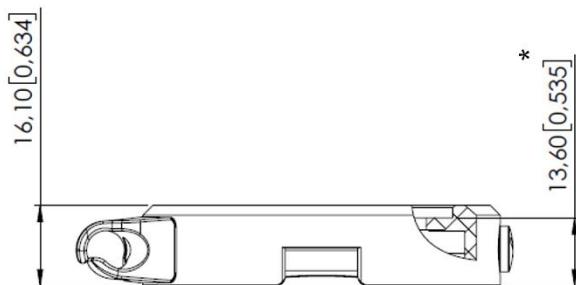
### 6.2.1 Adapter plate(s)

**Adapter K**



## 6.2.2 Mountings

- Quick Changer - Robot side ..... 138
- Dual Quick Changer..... 139
- HEX-E/H QC ..... 140

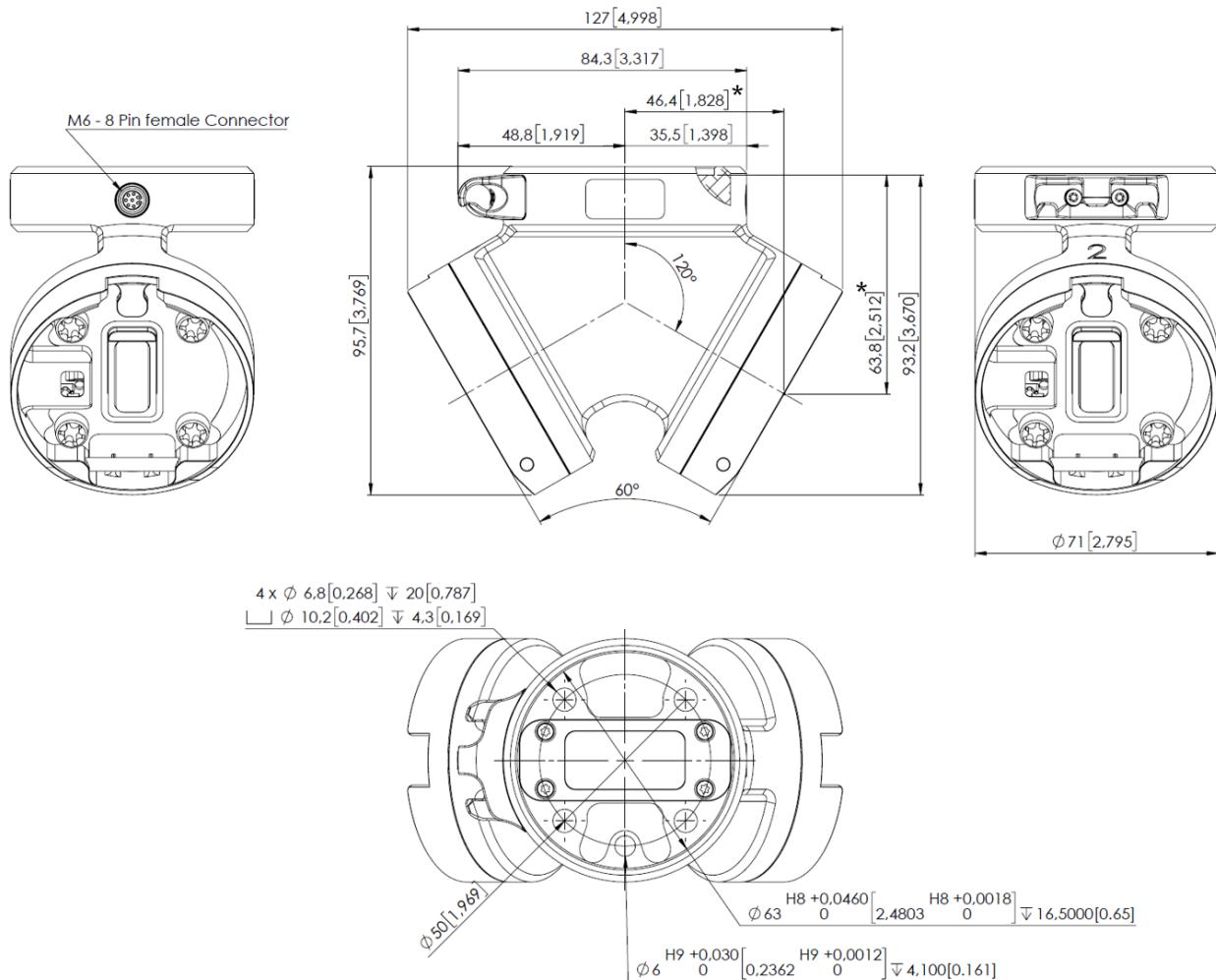
**Quick Changer -  
Robot side**


\* Distance from Robot flange interface to OnRobot tool.

All dimensions are in mm and [inches].


**NOTE:**

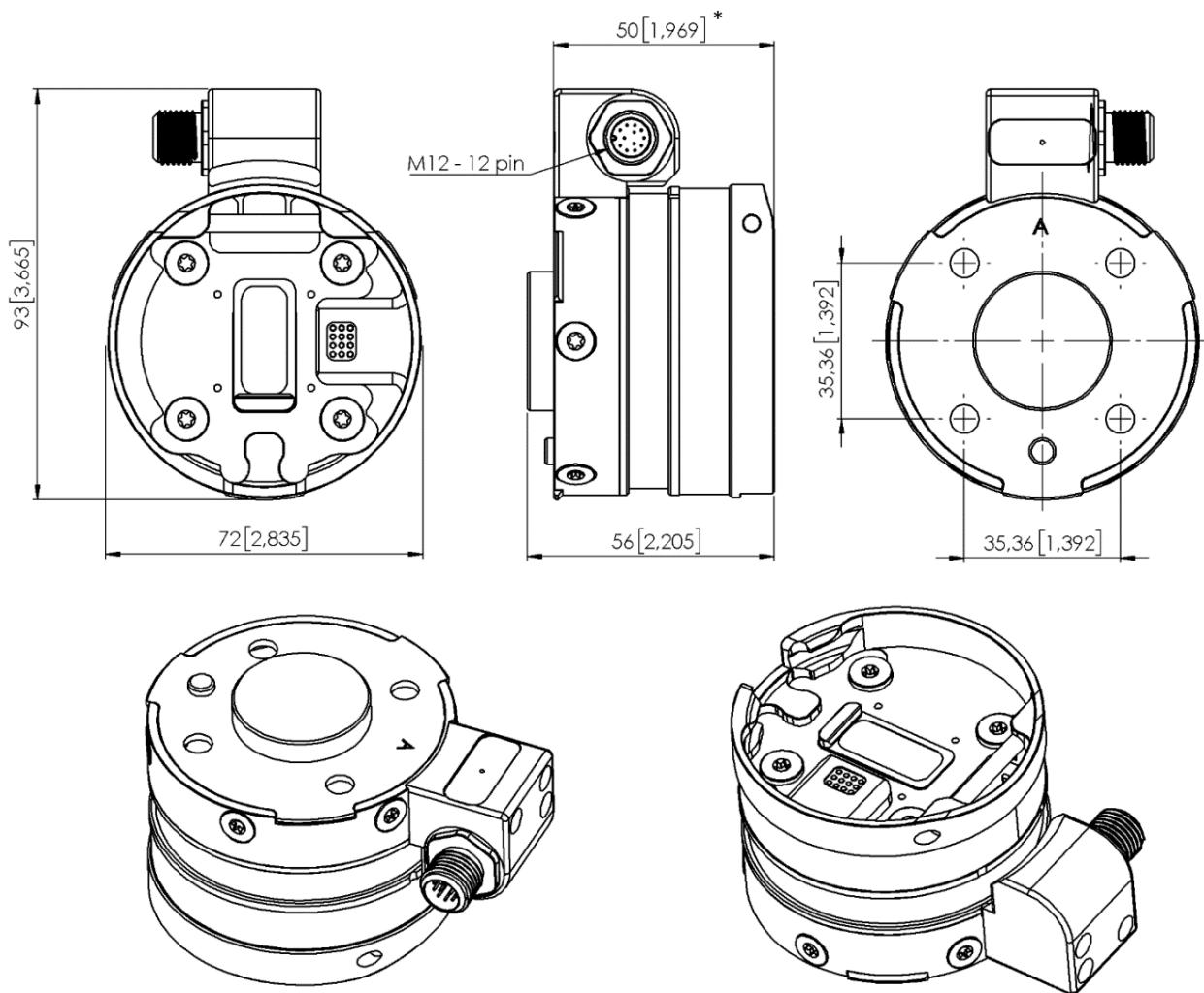
The cable holder (on the left side) is only required with the long (5 meter) cable.

**Dual Quick Changer**


\* Distance from Robot flange interface to OnRobot tool

All dimensions are in mm and [inches].

## HEX-E/H QC

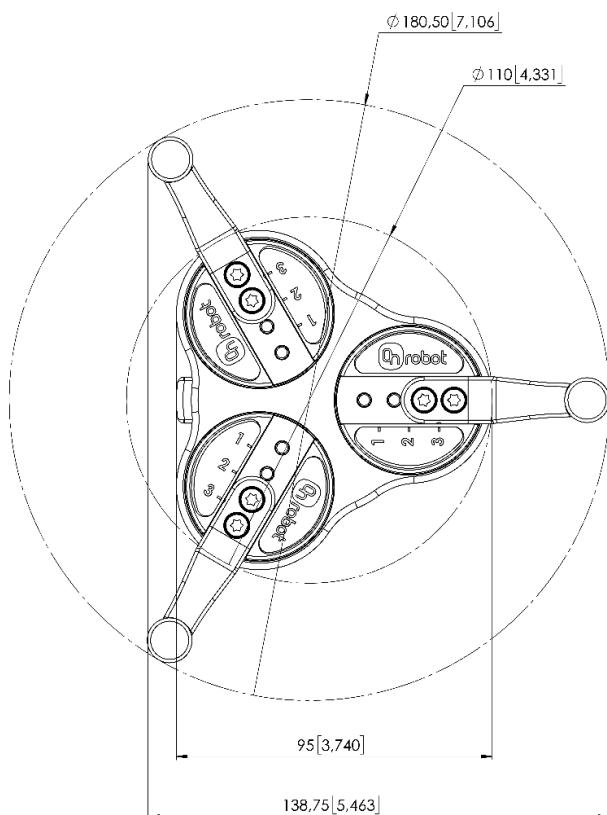
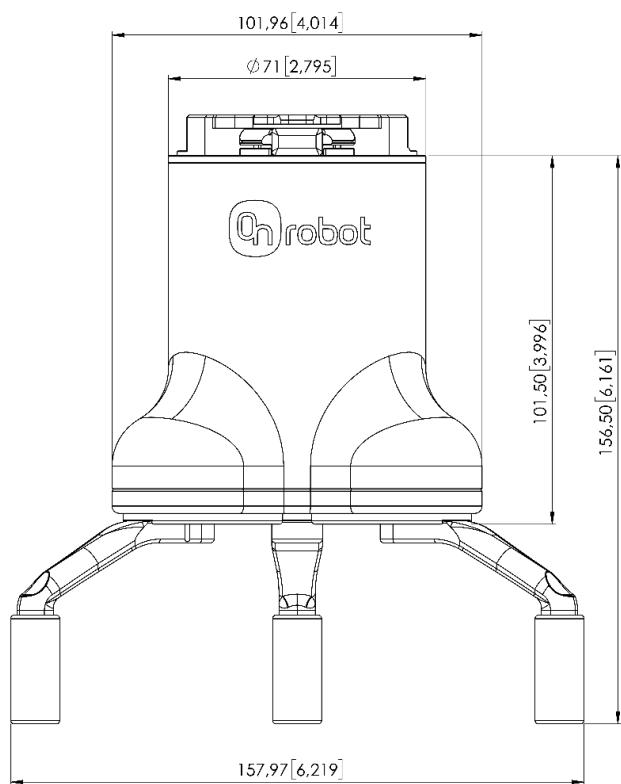


\* Distance from Robot flange interface to OnRobot tool

All dimensions are in mm and [inches].

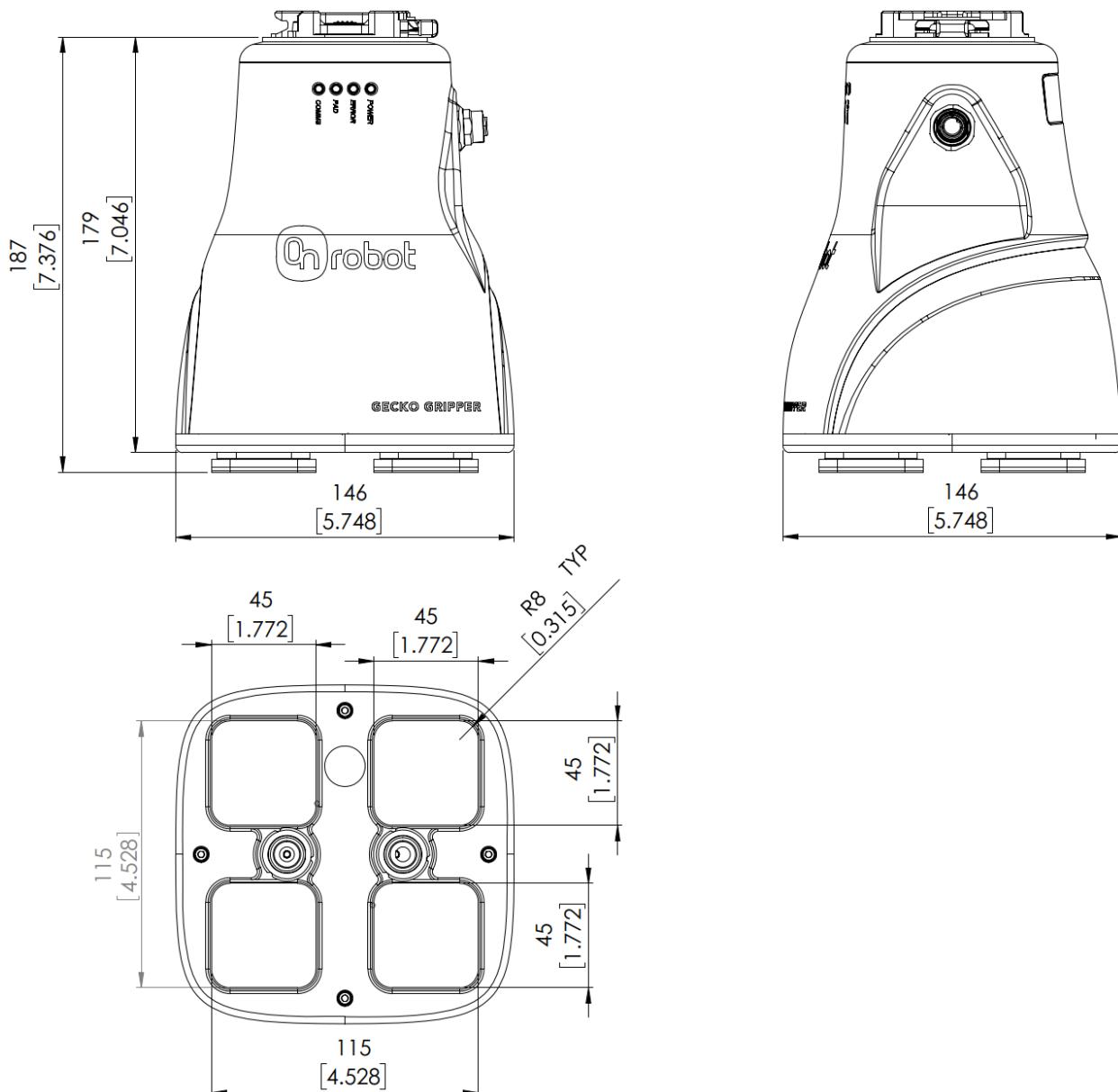
### 6.2.3 Tools

□ 3FG15 .....	142
□ Gecko .....	143
□ RG2-FT.....	144
□ RG2 .....	145
□ RG6 .....	146
□ SG .....	147
□ VG10 .....	148
□ VGC10 .....	150
□ Quick Changer - Tool side .....	152

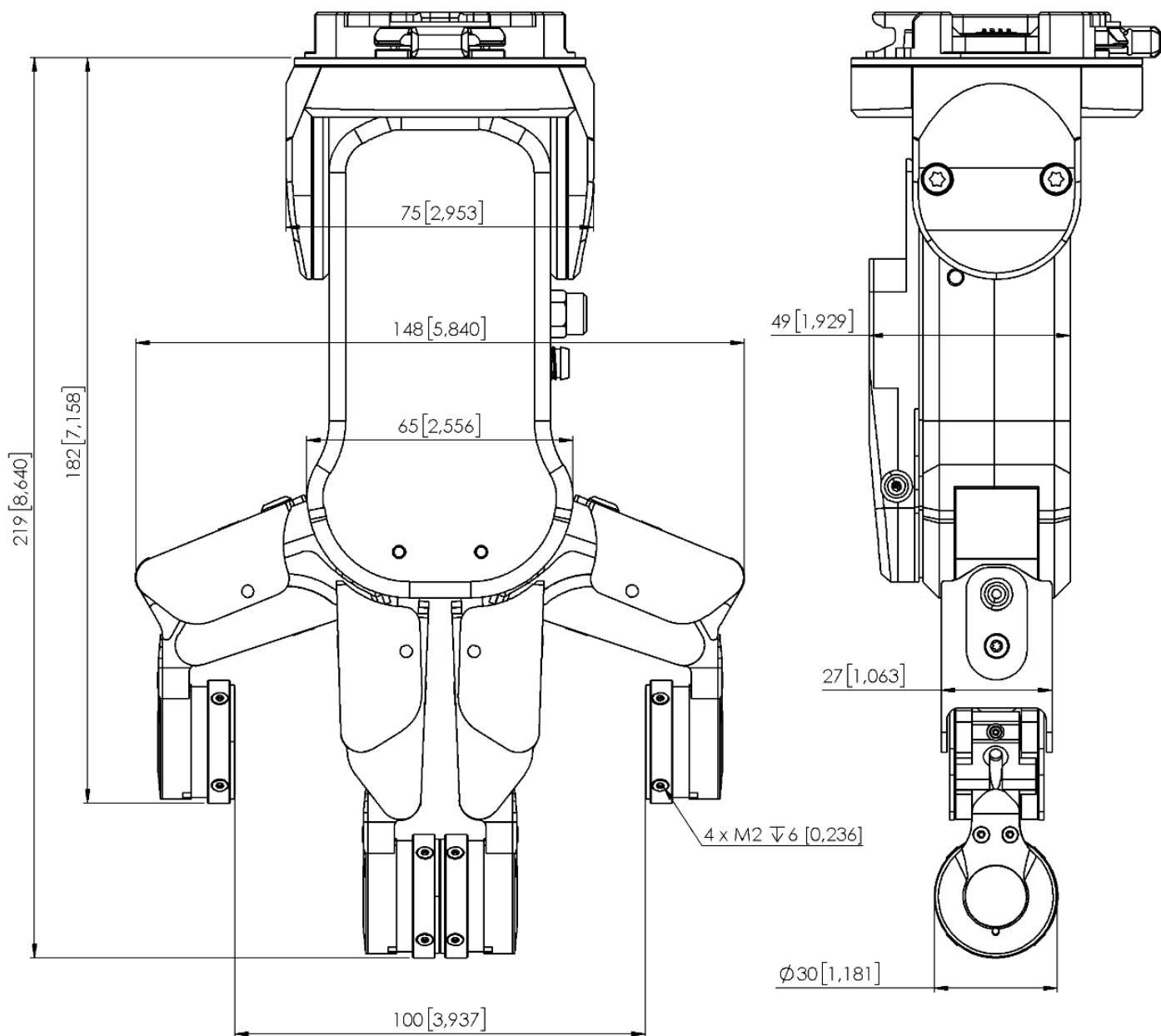
**3FG15**

All dimensions are in mm and [inches].

Gecko

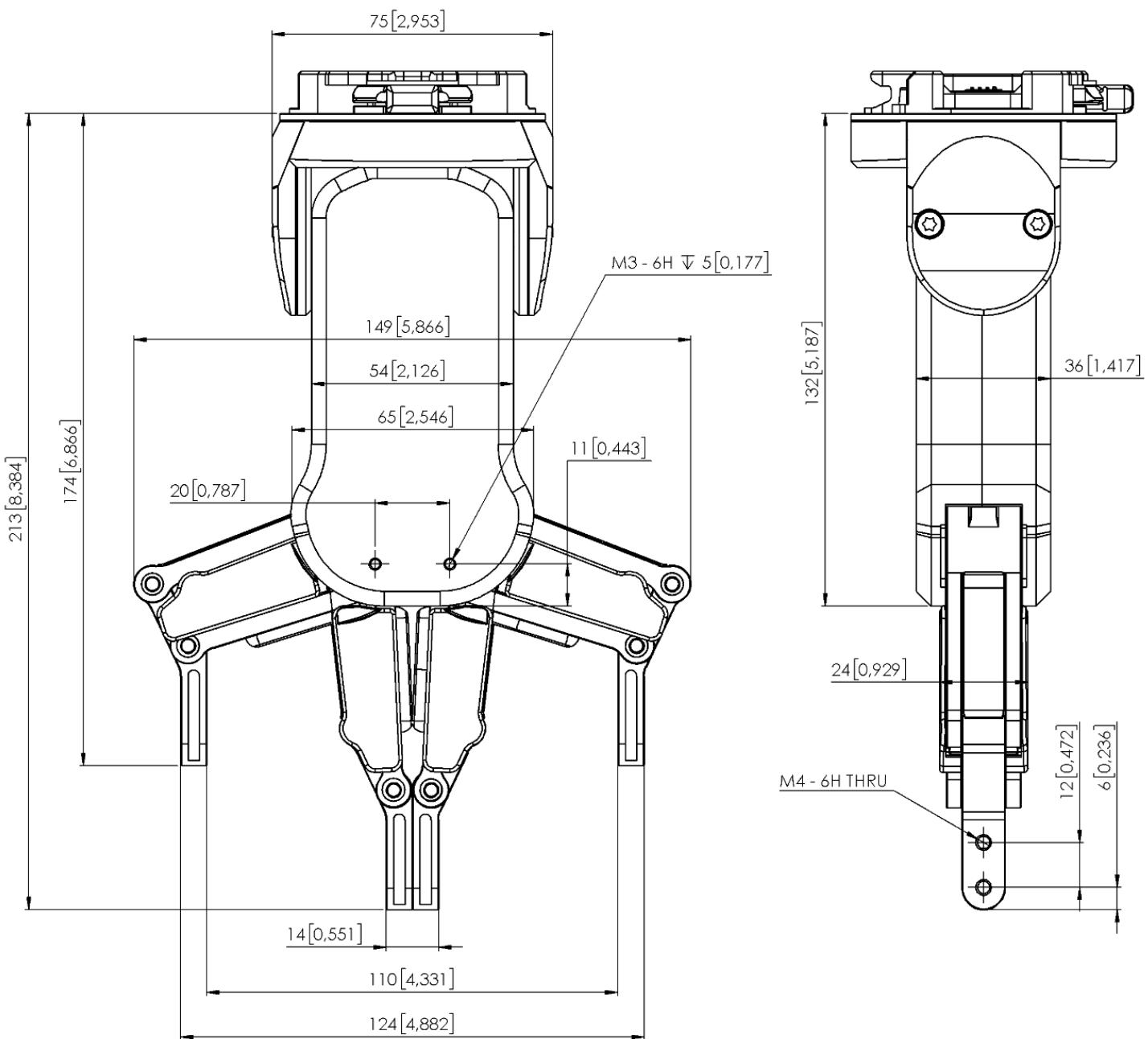


All dimensions are in mm and [inches].

**RG2-FT**


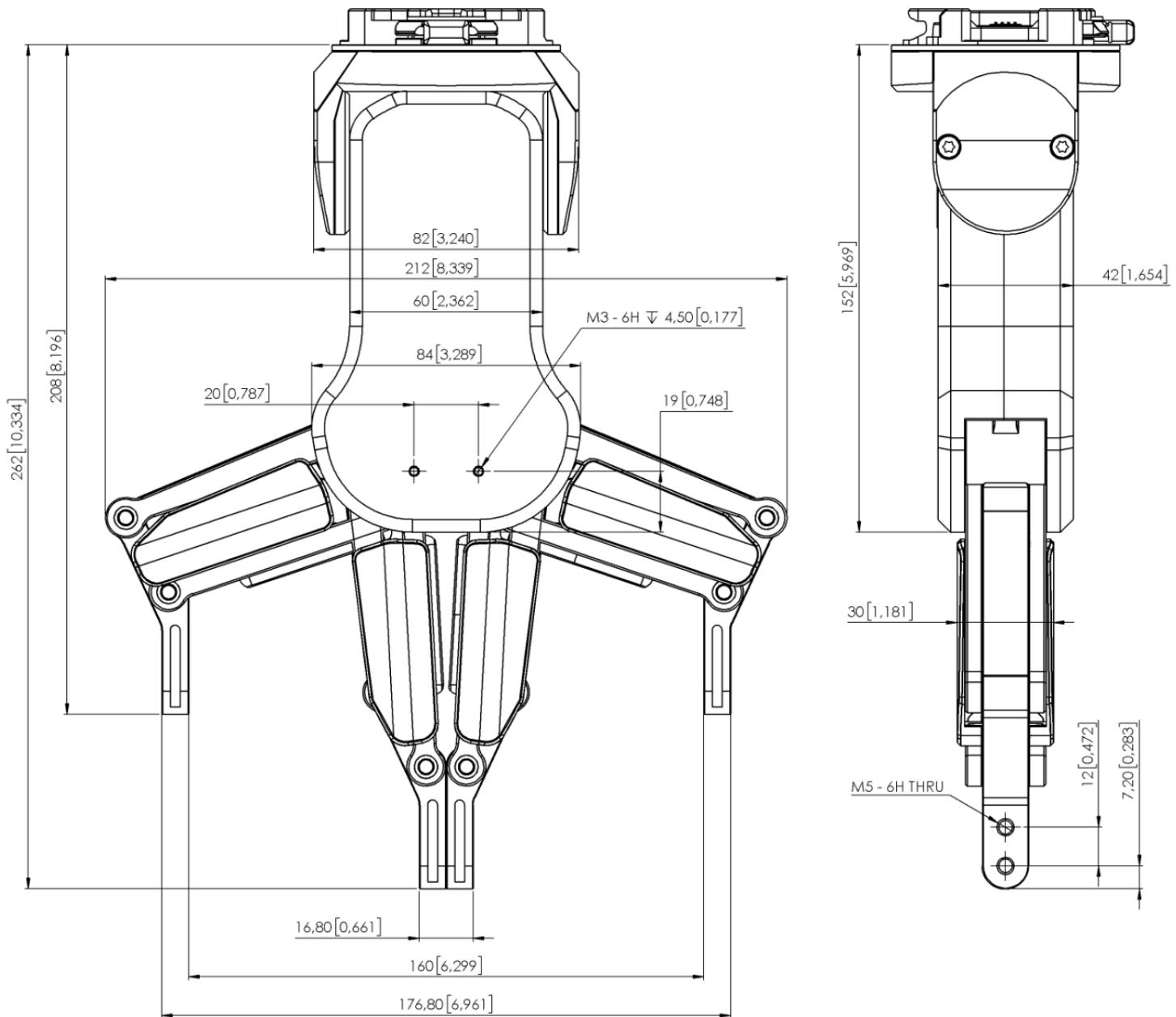
All dimensions are in mm and [inches].

RG2

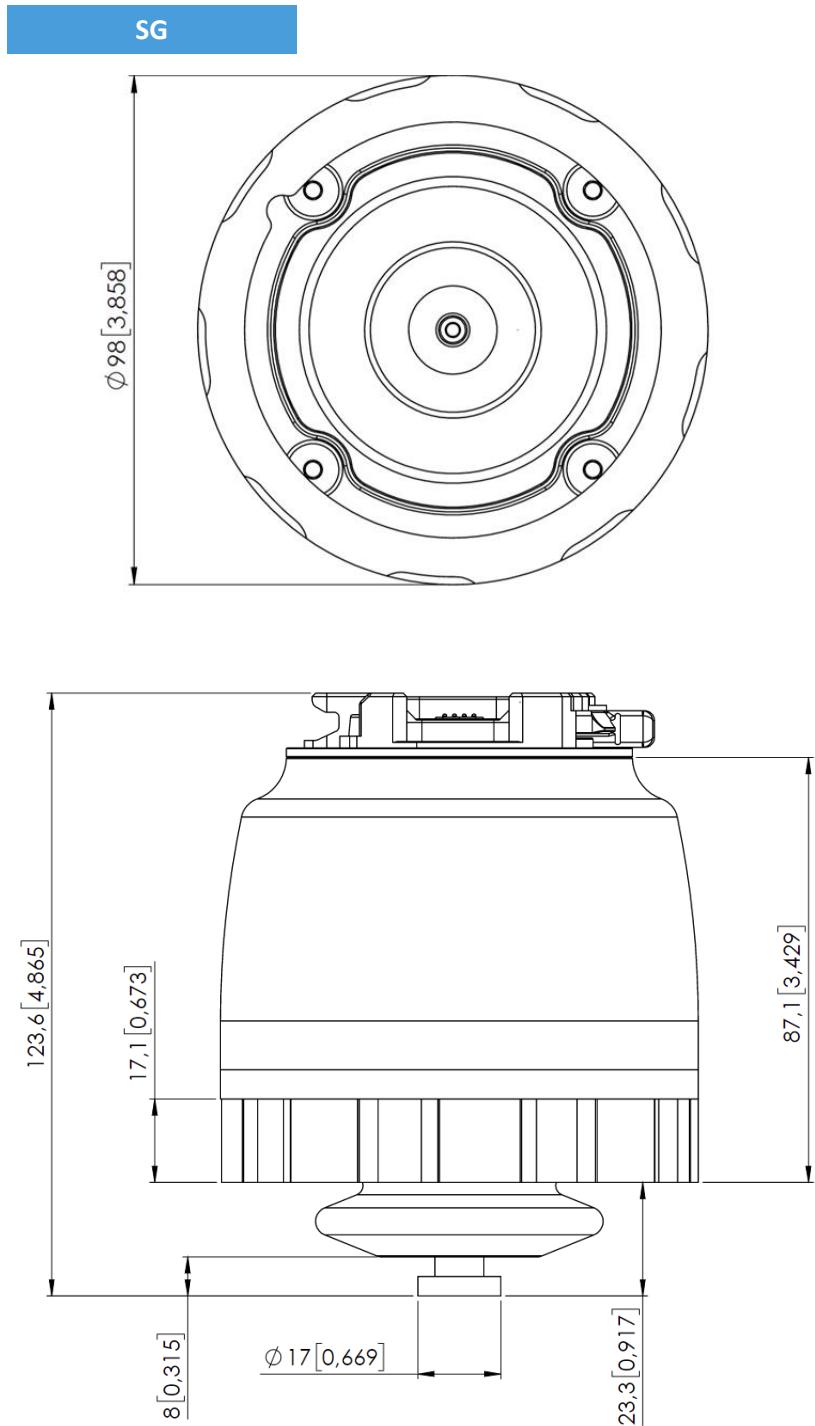


All dimensions are in mm and [inches].

## RG6



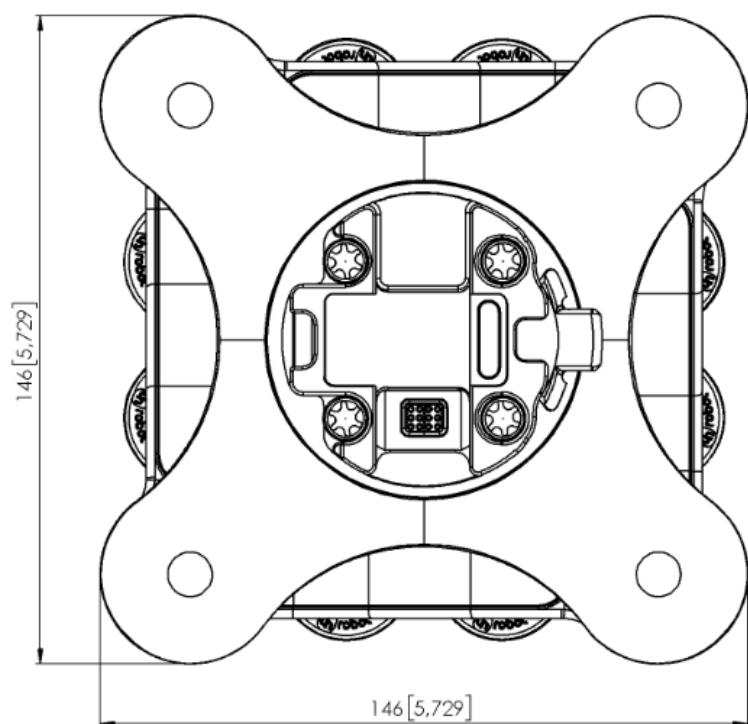
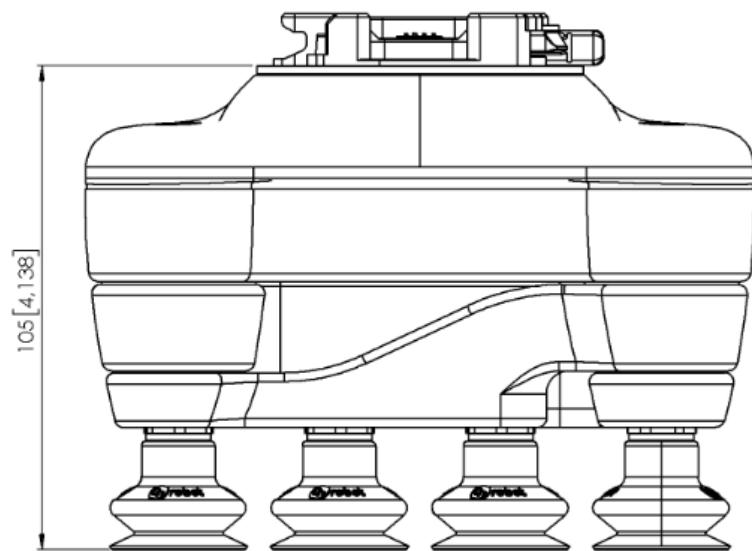
All dimensions are in mm and [inches].



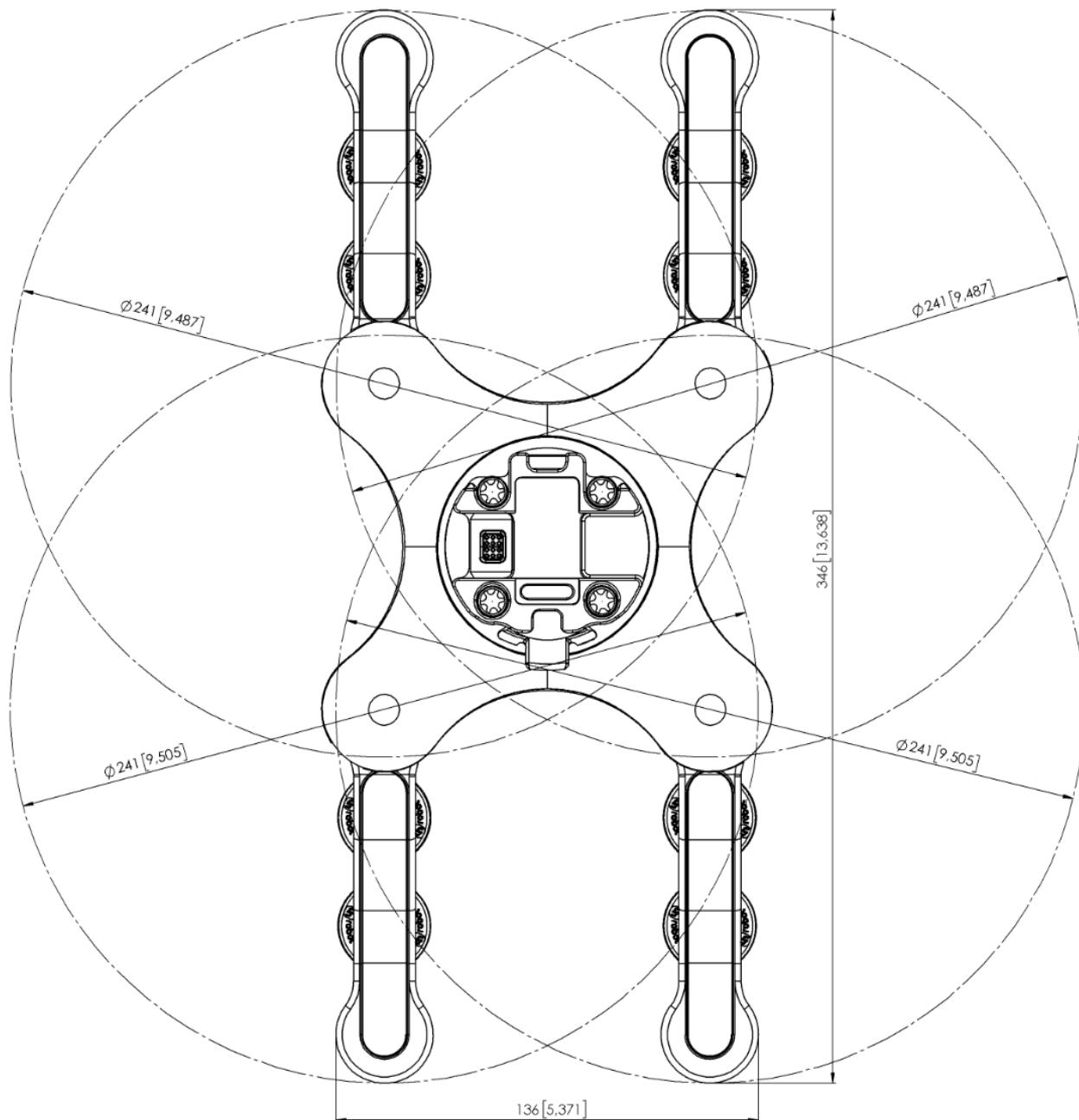
All dimensions are in mm and [inches].

The Silicone Tool parts - that are attached to the SG base part - , are described in the SG Datasheet.

VG10

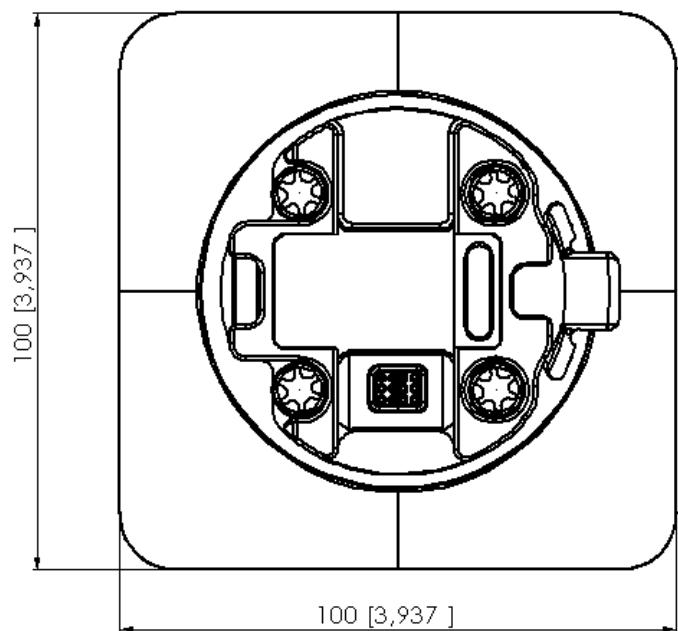
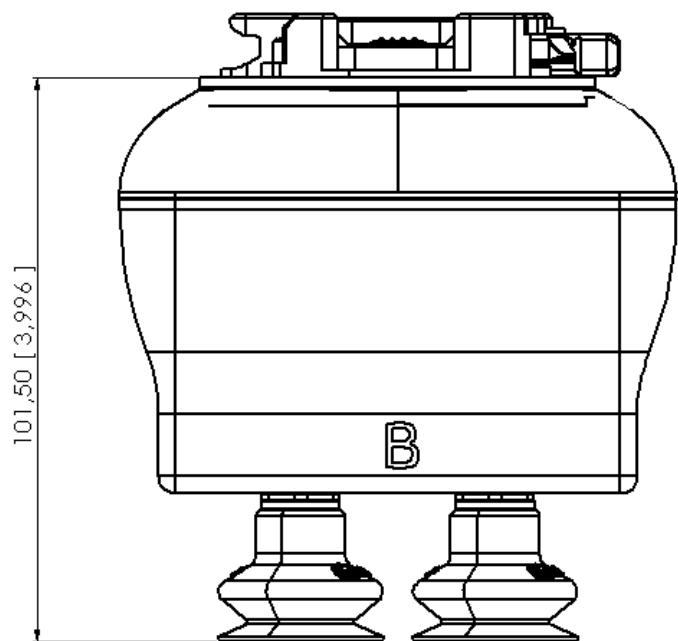


All dimensions are in mm and [inches].

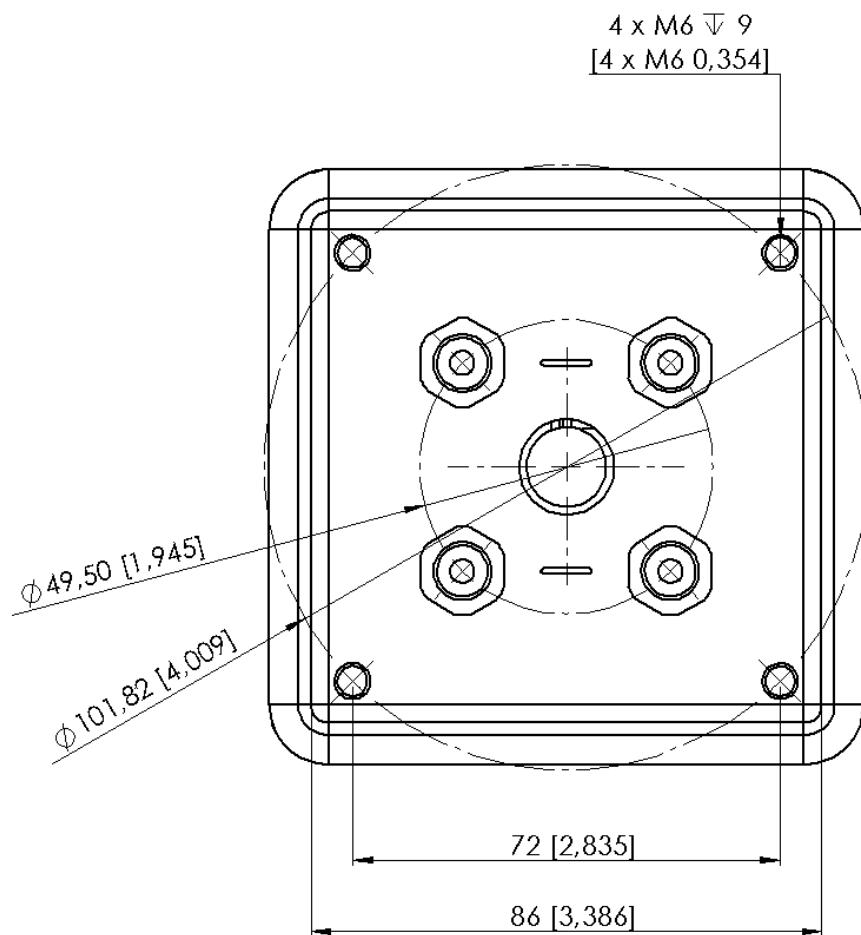


All dimensions are in mm and [inches].

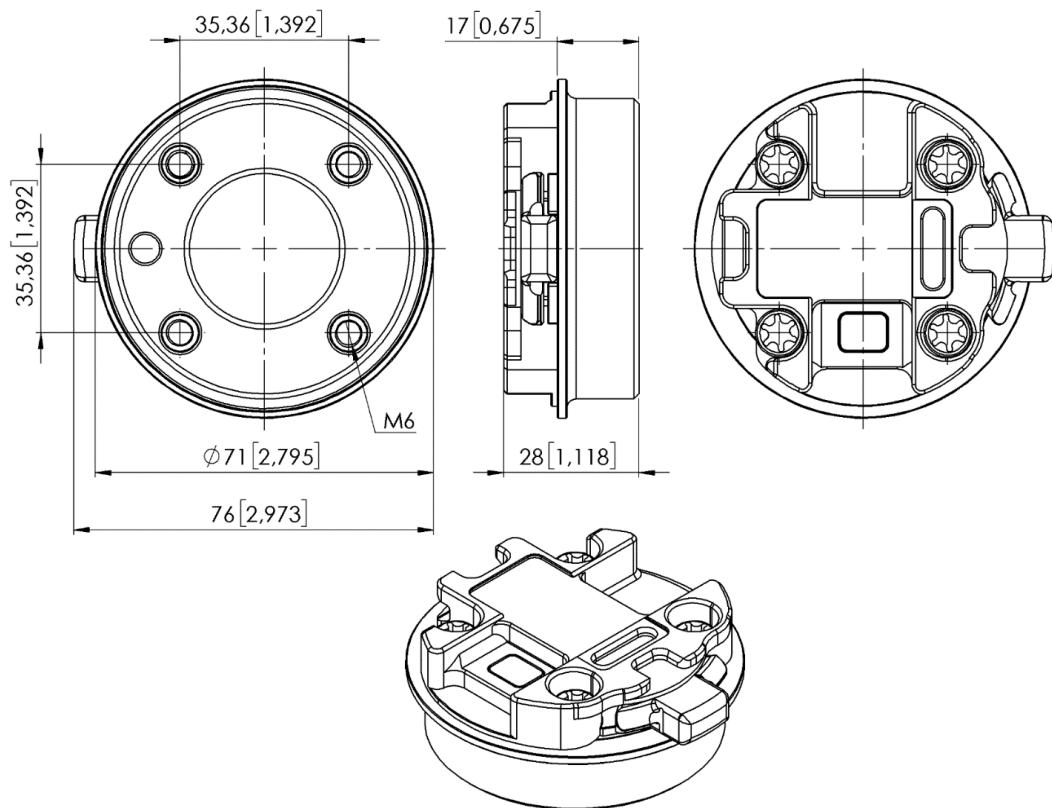
VGC10



All dimensions are in mm and [inches].



All dimensions are in mm and [inches].

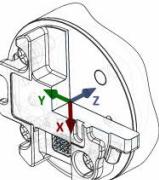
**Quick Changer -  
Tool side**

All dimensions are in mm and [inches].

### 6.3 Center of Gravity

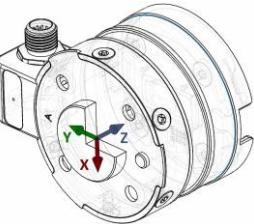
COG, TCP, and weight parameters of the single devices (without any mounting/adapter):

#### 3FG15

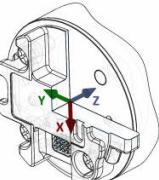
Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=156	cX= 0 cY= 0 cZ= 83	1.15 kg 2.5 lb

\* With delivered fingers and 13.5 silicone fingertips on.

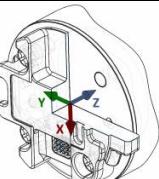
#### HEX-E/H QC

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=50	cX=0 cY=5 cZ=20	0.35 kg 0.77 lb

#### Gecko

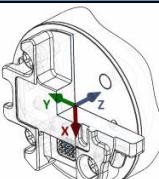
Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=187	cX=0 cY=0 cZ=113	2.83 kg 6.10 lb

#### RG2-FT

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=205	cX=0 cY=0 cZ=65	0.98 kg 2.16 lb

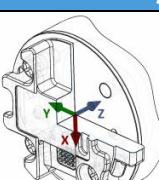
\* Mounted at 0°

**RG2**

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=200	cX=0 cY=0 cZ=64	0.78 kg 1.72 lb

\* Mounted at 0°

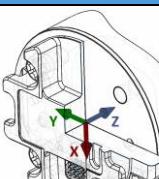
**RG6**

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=250	cX=0 cY=0 cZ=90	1.25 kg 2.76 lb

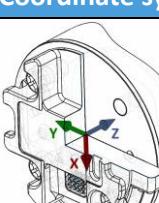
\* Mounted at 0°

**SG**

Without any Silicone Tool, only the SG Base Part with spindle in.

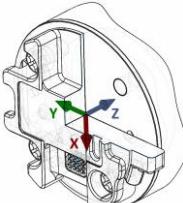
Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=113	cX=-13 cY=-5 cZ=31	0.77 kg 1.69 lb

With Silicone Tool Type A on (SG-a-S/H).

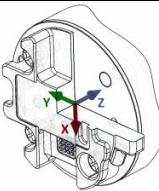
Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=154	cX=-12 cY=-5 cZ=45	0.932 kg 2.05 lb

## Hardware Specification

With Silicone Tool Type B on (SG-b-H).

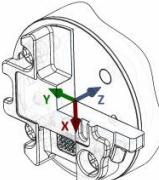
Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=155	cX=-12 cY=-5 cZ=46	0.937 kg 2.06 lb

### VG10

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=105	cX=15 cY=0 cZ=54	1.62 kg 3.57 lb

\* With arms folded back

### VGC10

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=0 Y=0 Z=75	cX=-1 cY=-1 cZ=37	0.814 kg 1.79 lb

\* With no attachments

## 7 Maintenance

**WARNING:**

An overall inspection of the OnRobot's End of Arm Tooling 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 the OnRobot's End of Arm Tooling 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](http://www.onrobot.com) to contact us.

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### 3FG15

**WARNING:**

Please check regularly the silicon fingertips since these parts can wear out.

If the fingertip is worn out , it can be ordered as spare part:

- Ø10 mm steel, PN 104160
- Ø13 mm steel, PN 104241
- Ø13.5 mm silicone, PN 104162
- Ø16.5 mm silicone, PN 104240

## Gecko

Gecko Gripper pads are made from a precision cast silicone or polyurethane film with a gecko microstructure. Contact with sharp objects may damage the pad surface and impair function. The Gecko Gripper performance is maximized when the pads are clean and dry. The pads can collect dust, so it is best to use the Gecko Gripper in a clean environment and/or establish a routine cleaning schedule.

Part	Description of Maintenance	Frequency
Pad Cleaning	Routine cleaning: Cleaning Station	Dependent on operating conditions. Guidelines are: See Cleaning Station User Guide
Pad Wear	Replacement due to wear	150000 – 200000 for HIGH preload operation 200000 – 250000 for LOW preload operation

### Replacing the Gripper Pads

Gecko Gripper pads are designed to last for 200,000-300,000 cycles under typical operating conditions. If the pads do not seem to be gripping properly, even with routine cleaning (see table in the previous page), we recommend fully replacing the gripper pads.

To replace the gripper pads, use the provided pad removal tool.

Step 1: Move gripper pads to the maximum extruded setting such that the pads are maximally exposed/visible.

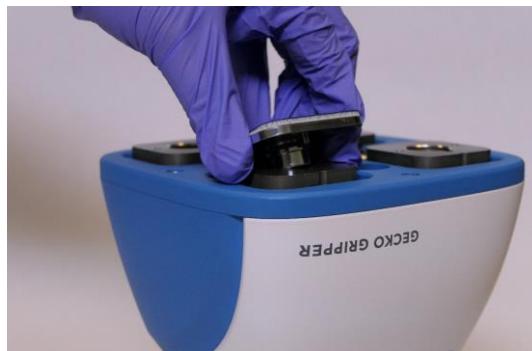


## Maintenance

Step 2: Insert the edge of the pad removal tool between the shiny silver plate of the pads and the dull backing plate. Leverage the pad removal tool against the gripper housing to pry off the used pad. Repeat for all pads.



Step 3: To install new replacement pads, align the notch of the pad with the tab in the mounting hole. Push the pad into the gripper until there are no gaps between the shiny silver pad plate and backing plate.



## RG2/6



### **WARNING:**

An overall inspection of the PLd CAT3 Safety Buttons must be performed regularly and at least once every 6 months.

## RG2-FT



### **WARNING:**

Please clean the proximity sensor surface regularly with low pressure compressed air (<5 bar) from a 5 cm distance. For stronger contamination use isopropyl alcohol with a soft cotton swab to keep it clean.

## SG

### For the SG Base Part



### **WARNING:**

Please, clean the SG Base Part regularly by using a cloth and a cleaning agent with a pH value between 6-8.

When cleaning the SG Base Part please keep it mounted on the robot to prevent water getting into the connector.

After cleaning, use a cloth and clean water, to rinse of any leftover cleaning agent.

Please ensure that the used cleaning agent does not contain chlorine as this can lead to corrosion.



### **WARNING:**

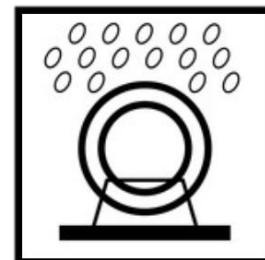
On a regular basis, check that the silicone bellow has not come loose from neither the aluminum base nor the Smart Lock male. If the bellow is not sitting correctly, this can lead to water seeping into the SG base part.

### For the SG Tools:

The silicone part and the smart lock female are dishwasher safe, at temperatures <= 80°C (176°F).

Various cleaners can be used for cleaning the silicone part. Dish soap. Alcohol, regular ethanol, isopropanol and acetone works as well for cleaning.

Do not use concentrated acids and alkalis, since these can potentially damage the silicone, in particularly oxidizing acids such as sulfuric or nitric acid. It is recommended to use cleaning agent with a pH value between 2 and 13.



On a regular basis, please do a visual inspection of the smart-lock female and the ball spring. If needed clean it with a brush or cloth.

**NOTE:**

In the cleaning process please make sure the smart-lock female is placed upside down to prevent water being caught inside the ball spring.

**VG10 / VGC10**

The VG grippers are 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 work piece and the working environment. The VG grippers automatically de-dust the filters every time a grip is released. However, particles can eventually get stuck and build up inside the filter, lowering the VG grippers performance.

A filter service kit is available, which include both new filters and tools needed.

- Filter service kit for VG10, PN 100064
- Filter service kit for VGC10, PN 103757

Neither use nor power on the VG grippers without filters. Dust, hair and larger particles can get stuck in pump membranes and valve seats, causing permanent damage to the VG grippers.

**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 VG grippers must be performed regularly and at least once every 6 months.

Never power the VG grippers without filters or with filters mounted incorrectly. Failure to comply with this precaution can cause irreversible failure of pump or valves.

## 8 Warranties

### 8.1 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.

### 8.2 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.

### 8.3 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.

## 9 Certifications




  
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




**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](mailto: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.





Report Number: **B91115V1**  
EN 61000-6-2 and EN 55011 Test Report  
*Gecko Gripper*  
*Model: GEN2*

## GENERAL REPORT SUMMARY

This electromagnetic emission and immunity test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

Device Tested: Gecko Gripper  
Model: GEN2  
S/N: RAPUNZEL

Product Description: The equipment under test is a robotic attachment that makes it possible to lift flat, smooth, and level surfaces.

Modifications: The EUT was not modified in order to comply with specifications.

Customer: OnRobot Los Angeles  
8928 Ellis Avenue  
Los Angeles, California 90034

Test Dates: October 4; November 12, 13, 14 and 15, 2019

Test Specifications covered by Accreditation:

Emissions and Immunity Requirements European Standards:

EN 61000-6-2 (2005), EN 55011 (2016) + A1 (2017); IEC 61000-3-2 (2014); and IEC 61000-3-3 (2013)



EN 61000-6-2 (2005) is a product family immunity standard that references the following specifications:

EN 61000-4-2 (2009)  
EN 61000-4-3 (2006) + A1 (2008) + A2: 2010  
EN 61000-4-4 (2004) + A1 (2010)  
EN 61000-4-5 (2006)  
EN 61000-4-6 (2009)  
EN 61000-4-8 (2009)  
EN 61000-4-11 (2004)

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Newbury Park Division**  
1050 Lawrence Drive  
Newbury Park, CA 91320  
(805) 480-4044

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## Attestation of Conformity no. 119-29901-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

Compute box with Power Supply Unit (PSU) VER36U240-JA.  
Mountings: HEX-E QC V3 (101904), QC – R v2 (102037), Dual QC v2 (101788).  
Tools: VG10 v2 (101661), RG2 v2 (102012), RG2-FT v2 (102075), RG6 v2 (102021).

### Manufacturer

On Robot A/S

### Technical documentation

Assessment no. 119-29901-A1

### Standards list no. 1:

IEC 61000-3-2:2014	EMC Directive 2014/30/EU, Article 6
IEC 61000-3-3:2013	EN 61000-3-2:2014
IEC 61000-6-2:2016	EN 61000-3-3:2013
IEC 61000-6-4:2018	EN 61000-6-2:2005
	EN 61000-6-2:2019
	EN 61000-6-4:2007 + A1:2011

### Standard list no. 2: (applicable specifically to RG2 v2 (102012) and RG6 v2 (102021))

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: 2019.11.15  
19:38:04 +01'00'

Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance

## Attestation of Conformity no. 118-33022-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.

<b>Attestation holder</b>	
OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark	
<b>Product identification</b>	
Gripper RG2 2.0	
<b>Manufacturer</b>	
OnRobot A/S	
<b>Technical documentation</b>	
FORCE Technology Test Report 117-29737, dated 01 September 2017 FORCE Technology Assessment Sheet 1668, dated 17 October 2017 FORCE Technology Test Report 118-33022-2 Rev. 1, dated 06 February 2019 FORCE Technology Assessment 118-33022-A1, dated 21 February 2019	
<b>Standards/Normative documents</b>	
IEC 61000-6-2:2005 IEC 61000-6-4:2006 + A1:2010 IEC 61326-3-1:2017, Industrial locations, SIL 2 FCC Part 15B, Class A	EMC Directive 2014/30/EU, Article 6 EN 61000-6-2:2005 + AC:2005 EN 61000-6-4:2007 + A1:2011 EN 61326-3-1:2017, Industrial locations, SIL 2
<b>Signature</b>	<p><b>Knud A. Baltsen</b> 2019-02-21</p> <p>Digitally signed by Knud A. Baltsen kab@force.dk Senior Specialist</p> <p>Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance</p>

## Attestation of Conformity no. 118-33022-A2

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.

<b>Attestation holder</b>	
OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark	
<b>Product identification</b>	
Gripper RG6 2.0	
<b>Manufacturer</b>	
OnRobot A/S	
<b>Technical documentation</b>	
FORCE Technology Test Report 117-29737, dated 01 September 2017 FORCE Technology Assessment Sheet 1668, dated 17 October 2017 FORCE Technology Test Report 118-33022-2 Rev. 1, dated 06 February 2019 FORCE Technology Assessment 118-33022-A1, dated 21 February 2019	
<b>Standards/Normative documents</b>	
IEC 61000-6-2:2005 IEC 61000-6-4:2006 + A1:2010 IEC 61326-3-1:2017, Industrial locations, SIL 2 FCC Part 15B, Class A	EMC Directive 2014/30/EU, Article 6 EN 61000-6-2:2005 + AC:2005 EN 61000-6-4:2007 + A1:2011 EN 61326-3-1:2017, Industrial locations, SIL 2
<b>Signature</b>	Knud A. Baltsen 2019-02-21 Digitally signed by Knud A. Baltsen kab@force.dk Senior Specialist
Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance	

## Attestation of Conformity no. 119-31690-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

Compute box with Power Supply Unit (PSU) VER36U240-JA.  
Mounting: Quick Changer HEX-E QC V3 (101904).  
Robot Tool: Soft Gripper (103546).

### Manufacturer

OnRobot A/S

### Technical documentation

Test report. 119-31690-1

### Standards/Normative documents

IEC 61000-3-2:2014	EMC Directive 2014/30/EU, Article 6
IEC 61000-3-3:2013	EN 61000-3-2:2014
IEC 61000-6-2:2016	EN 61000-3-3:2013
IEC 61000-6-4:2018	EN 61000-6-2:2005
	EN 61000-6-2:2019
	EN 61000-6-4:2007 + A1:2011

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

Johan Weisbjerg  
2020-01-24

Digitally signed by Johan Weisbjerg  
jow@force.dk  
Technician

Signed by: Johan Weisbjerg, Specialist, Product Compliance

## Attestation of Conformity no. 120-21521-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

Robot tool: Three finger gripping tool 3FG15 (103666).

### Manufacturer

OnRobot A/S

### Technical documentation

FORCE Technology test report 120-21521-1.

### Standards/Normative documents

IEC 61000-3-2:2014	EMC Directive 2014/30/EU, Article 6
IEC 61000-3-3:2013	EN 61000-3-2:2014
IEC 61000-6-2:2016	EN 61000-3-3:2013
IEC 61000-6-4:2006/AMD1:2010	EN 61000-6-2:2005/Corr.:2005 EN 61000-6-4:2007/A1:2011

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: 2020.03.30  
19:48:21 +02'00'

Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance

## SG-x-H

**DECLARATION OF CONFORMITY**

According to Regulation (EC/EU) No.1935/2004 Article 3, it is required that food contact articles “*must be sufficient inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the food or a deterioration in its organoleptic properties*”.

This document stands to certify that all OnRobot SG-x-H materials, intended for food contact complies with:

## 1. Europe:

Regulation (EC/EU) No. 1935/2004 and national provisions (Article 6). The materials of SG Tools are suitable for food contact, materials and articles under article 3 of the before mentioned regulation. Compliance with the requirements of Regulation (EC/EU) No.1935/2004 for the food contact material or article, concerning any limitations in particular max. use limits or limits on migration or extraction, the effect on taste and smell of the food and the suitability of the article for the specific use must be in compliance with the recommendations of the BfR.

*See results next page.*

## 2. USA:

FDA 21 CFR 177.2600 “*Rubber articles intended for repeated use in contact with food*”.

*Tested and approved for use on non-fatty food objects.*

*See results next page.*

The above product is also produced according to EC regulation 2023/2006 “*Good manufacturing practice for materials and articles intended to come into contact with food*” and is subject to control by the Danish food and health authorities.

To the best knowledge of the manufacturer, that the information presented in this certificate, is correct as of date of the declaration. It is the responsibility of the end-user to ensure that the status of the regulation is still in effect at the date of use.

Odense, April 6th, 2020

Group Management



Vilmos  
CTO

Beskid

## Results

The materials and color additive have been tested for extraction and migration limits by an independent testing organization (Eurofins Product Testing A/S. Accreditation number 522)

Sensory Analysis:

Parameter:	Food Simulant:	Median Grade:	Limit Value*
Odour	Water	1.5 (Just recognizable to slight deviation, chemical)	2.5
Taste	Water	2.5 (Slight to intense deviation, chemical and flavoured)	2.5

\* From 61. Statement of BfR, Bundesgesundheitsbl. 46, 2003, 362-5.

Analysis - BfR recommendation XV on silicone:

Parameter:	Result:	Limit value **
Extractable components in water	< 0.2 %	0.5 %
Extractable components in 3% acetic acid	< 0.3 %	0.5 %
Extractable components in 10% ethanol	< 0.2 %	0.5 %
Volatile Compounds	< 0.1 %	0.5 %
Platinum	5 mg/kg	50 mg/kg

\*\* According to BfR recommendation XV on silicone

Extraction Analysis:

Parameter:	Single determinations [mg/inch <sup>2</sup> ]	Limit Value[mg/inch <sup>2</sup> ]
Water-extracted residue after 7 hours	0.19	< 20
Water-extracted residue after +2 hours	< 0.1	< 1

## SG-x-S

**DECLARATION OF CONFORMITY**

According to Regulation (EC/EU) No.1935/2004 Article 3, it is required that food contact articles "*must be sufficient inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the food or a deterioration in its organoleptic properties*".

This document stands to certify that all OnRobot SG-x-S materials, intended for food contact complies with:

**1. Europe:**

Regulation (EC/EU) No. 1935/2004 and national provisions (Article 6). The materials of SG Tools are suitable for food contact, materials and articles under article 3 of the before mentioned regulation. Compliance with the requirements of Regulation (EC/EU) No.1935/2004 for the food contact material or article, concerning any limitations in particular max. use limits or limits on migration or extraction, the effect on taste and smell of the food and the suitability of the article for the specific use must be in compliance with the recommendations of the BfR.

*See results next page.*

**2. USA:**

FDA 21 CFR 177.2600 "*Rubber articles intended for repeated use in contact with food*".

*Tested and approved for use on non-fatty food objects.*

*See results next page.*

The above product is also produced according to EC regulation 2023/2006 "*Good manufacturing practice for materials and articles intended to come into contact with food*" and is subject to control by the Danish food and health authorities.

To the best knowledge of the manufacturer, that the information presented in this certificate, is correct as of date of the declaration. It is the responsibility of the end-user to ensure that the status of the regulation is still in effect at the date of use.

Odense, April 6th, 2020

Group Management



Vilmos  
CTO

Beskid

## Results

The materials and color additive have been tested for extraction and migration limits by an independent testing organization (Eurofins Product Testing A/S. Accreditation number 522)

### For the Hard part

Sensory Analysis:

Parameter:	Food Simulant:	Median Grade:	Limit Value*
Odour	Water	1.5  (Just recognizable to slight deviation, chemical)	2.5
Taste	Water	2.5  (Slight to intense deviation, chemical and flavoured)	2.5

\* From 61. Statement of BfR, Bundesgesundheitsbl. 46, 2003, 362-5.

Analysis - BfR recommendation XV on silicone:

Parameter:	Result:	Limit value **
Extractable components in water	< 0.2 %	0.5 %
Extractable components in 3% acetic acid	< 0.3 %	0.5 %
Extractable components in 10% ethanol	< 0.2 %	0.5 %
Volatile Compounds	< 0.1 %	0.5 %
Platinum	5 mg/kg	50 mg/kg

\*\* According to BfR recommendation XV on silicone

Extraction Analysis:

Parameter:	Single determinations [mg/inch <sup>2</sup> ]	Limit Value[mg/inch <sup>2</sup> ]
Water-extracted residue after 7 hours	0.19	< 20
Water-extracted residue after +2 hours	< 0.1	< 1

**For the Soft part**

Sensory Analysis:

Parameter:	Food Simulant:	Median Grade:	Limit Value*
Odour	Water	1 (Just noticeable deviation)	2.5
Taste	Water	1 (Just noticeable deviation)	2.5

\* From 61. Statement of BfR, Bundesgesundheitsbl. 46, 2003, 362-5.

Analysis - BfR recommendation XV on silicone:

Parameter:	Result:	Limit value **
Extractable components in water	< 0.2 %	0.5 %
Extractable components in 3% acetic acid	< 0.3 %	0.5 %
Extractable components in 10% ethanol	< 0.2 %	0.5 %
Volatile Compounds	< 0.1 %	0.5 %
Platinum	10 mg/kg	50 mg/kg

\*\* According to BfR recommendation XV on silicone

Extraction Analysis:

Parameter:	Single determinations [mg/inch <sup>2</sup> ]	Limit Value[mg/inch <sup>2</sup> ]
Water-extracted residue after 7 hours	1.5	< 20
Water-extracted residue after +2 hours	< 0.1	< 1

## 9.1 Declaration of Incorporation

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## 3FG15

**CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: 3FG15  
Generation: V1  
Serial: 1000000000-1009999999

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. 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)

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, February 14th, 2020

Group Management



Vilmos Beskid  
CTO

**Gecko****CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: Gecko Gripper  
Generation: V2  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

## HEX-E

**CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Force/Torque Sensor  
Model: HEX-E QC  
Generation: V3  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

**HEX-H****CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Force/Torque Sensor  
Model: HEX-H QC  
Generation: V3  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

**RG2-FT****CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: RG2-FT  
Generation: V2  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

## RG2

**CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: RG2  
Generation: V2  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

**RG6****CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: RG6  
Generation: V2  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO

SG

**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:	SG
Generation:	V1
Serial:	1000000000-1009999999

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. 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)

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.

Odense, April 6th, 2020

Group Management



Vilmos Beskid  
 CTO

**VG10**
**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:	VG10
Generation:	V2
Serial:	1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
 CTO

**VGC10****CE/EU Declaration of Incorporation (Original)**

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

The manufacturer:

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

declares that the product:

Type: Industrial Robot Gripper  
Model: VGC10  
Generation: V1  
Serial: 1000000000-1009999999

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. 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)

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 16th, 2019

Group Management



Vilmos Beskid  
CTO