



USER MANUAL

FOR UR ROBOTS

v6.0.5

Original Instructions

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1. Introduction

1.1. Important Safety Notice

**DANGER:**

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

1.2. Scope of the Manual

The manual covers the following OnRobot products and their components:

1.2.1. Screwdriver

Tool	Version
Screwdriver	v1

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

1.2.2. Software and Firmware

1.2.2.1. URCap Software

The manual covers the following software versions:

Software	Version
URCap	v6.0.3

1.2.2.2. Compute Box Software

The manual covers the following Compute Box software version:

Software	Version
Compute Box	v6.0.5

**NOTE:**

When the used Compute Box has lower software/firmware version, update the Compute Box. For detailed instructions, see [7.1.4. Web Client: Update Menu](#).

1.3. Naming Convention

1.3.1. Compute Box/Eye Box

Eye Box and Compute Box are used interchangeably.

1.4. Copyright

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

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2. Safety

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

2.1. Intended Use

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

The end-of-arm tooling and the accessories should only operate under conditions noted in **8.1. Technical Sheets** section.

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

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

2.2. General Safety Instructions

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

**DANGER:**

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

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

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

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

**WARNING:**

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

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

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

**WARNING:**

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

2.3. Risk Assessment

The robot integrator must perform a risk assessment on the complete robot application. OnRobot tools are partly completed machinery. The integrator must consider safety aspects of the completed machine so it can be operated in a safe way. 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 loosened bolts
- Consequences if OnRobot tools cable gets stuck to something
- Hazards created by the workpiece itself

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. Screwdriver Protective Features

2.5.1. Screw-bit System Always Hidden

The Screw-bit System can always be hidden inside the housing to enhance safety.

The `Move Shank` command allows the user to hide the Screw-bit System inside the housing at any time.

After running a `Tighten`, `Loosen` or `Pick Screw` command, the Screw-bit System will be automatically hidden inside the housing.



NOTE:

This protective functionality will be achieved if the screw length is equal or less than 35 mm and no bit extender is used.

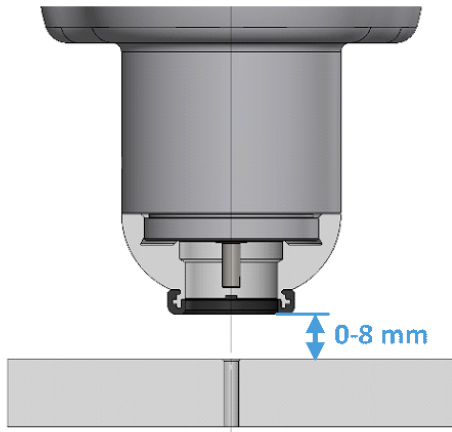


For further information about the Screw-bit System, see the [Screw-bit System](#) section.

For further information about the bit extender, see the [Bit Extender](#) section.

2.5.2. Operational Safety

The Screwdriver's operations must be executed when the distance between the Screwdriver's bottom part and the surface where the action takes place is within the range of 0 - 8 mm (see image below). If the distance is higher than this, the Screwdriver operations will not be successful, and the system will generate an error.



This ensures that nothing larger than 8 mm is exposed to be harmed by the Screw-bit System while executing a Screwdriver operation.

For instance, if a hand is located on the workpiece when the robot moves towards the recorded waypoint, the robot in a collaborative installation will have a protective stop when hitting the hand as it does not reach the recorded waypoint. If the robot reaches the recorded waypoint and starts the screwing operation, the < 8 mm distance prevents the user from placing a hand/finger underneath during a Screwdriver operation.

**NOTE:**

This protective functionality will be achieved if the screw length is up to 35 mm and no bit extender is used.

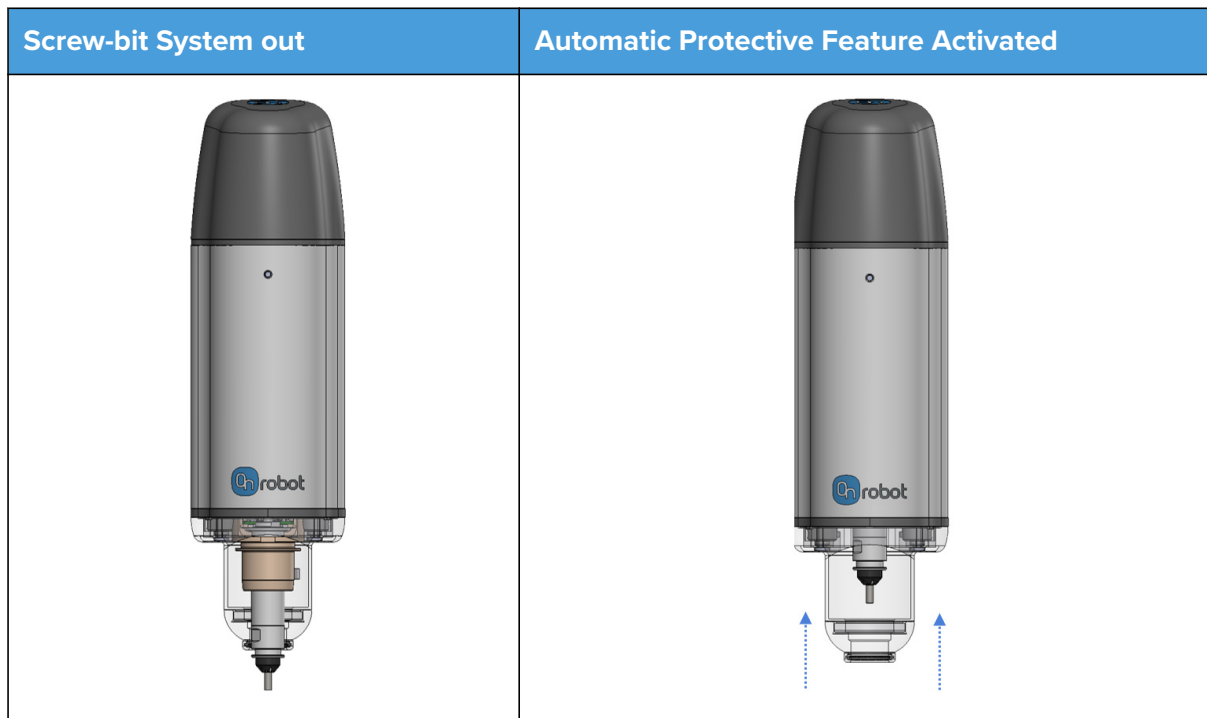
**WARNING:**

- Keep fingers and hands away from the end of the Screwdriver.
- Always disconnect the power source while cleaning or performing maintenance.
- When Bit extenders are used, safe guarding might be needed depending on the risk assessment.
- When the screw length is longer than 35 mm, safe guarding is needed to prevent pinching hazards.
- After tightening or pre-mounting, safe guarding is needed to prevent pinching hazards from screw tips sticking out.
- Do not perform any troubleshooting with a screw or a bit attached.
- Do not use the Screwdriver for drilling or deburring.
- Do not operate the Screwdriver without the protective end cup.

2.5.3. Automatic Protective Feature

An automatic protective feature has been implemented to reduce the possibility of the users to be in danger.

This protective feature is activated if the Screw-bit System detects a force above 40 N during operation. In such a case, a mechanical appliance will immediately retract the shank and hide it (up to 35 mm screw length).



If this happens, the safety state becomes triggered.

To reset from this state, command the shank to a new position.

Additionally, if the bottom part of the Screw-bit System detects an unexpected force above 20 N while not in operation, the Screw-bit System will retract and be temporarily hidden into the housing (up to 35 mm screw length). This will not stop the robot program, only temporarily hide the Screw-bit System.



CAUTION:

This retract functionality does not work if the power is interrupted. Further actions may be required to eliminate the risk, identified by the risk assessment.

3. Operation Mode(s)

This document covers installation and operation for both:

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

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

- CB3 series
- e-Series.

3.1. Operation via Compute Box

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

4. HW Installation

4.1. Overview

For a successful installation the following steps will be required:

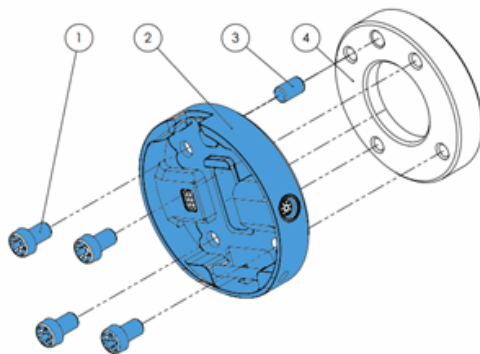
- Mount the components
- Setup the software

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

4.2. Robot Mount

4.2.1. Quick Changer Mounting

4.2.1.1. Quick Changer - Robot Side



Quick Changer - Robot Side

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

Use 10 Nm tightening torque.

4.2.1.2. Screwdriver

Tool	QC-R v2	QC-R v2-4.5 A
Screwdriver	X	✓

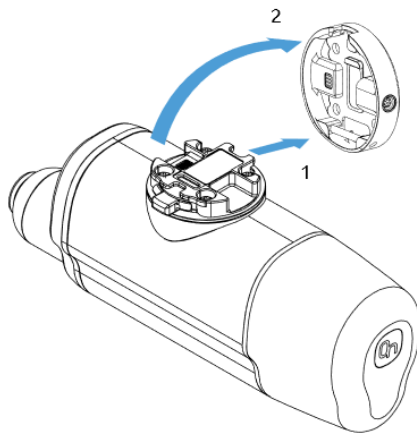
4.2.2. Adapters for UR Robots

For UR3, UR5, UR10, UR3e, UR5e, UR10e, UR16e no adapter is needed.

For UR20 mount the adapter provided by Universal Robots with the robot.

4.2.3. Tools

4.2.3.1. Screwdriver



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.



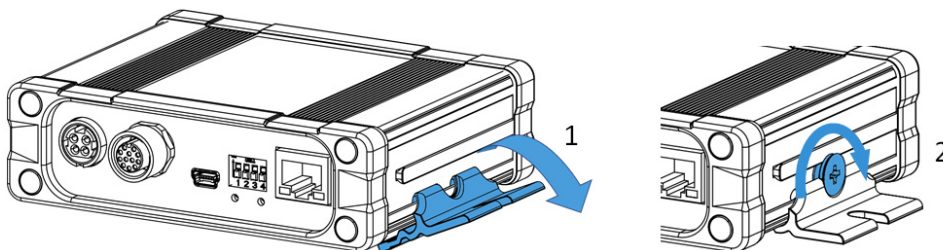
CAUTION:

Make sure to use the 4.5A version of the Quick Changers.

4.3. Compute Box Mount

4.3.1. Optional - Clip-on Bracket

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



Do the following on both sides of the Compute Box:

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

4.4. Wiring via Compute Box

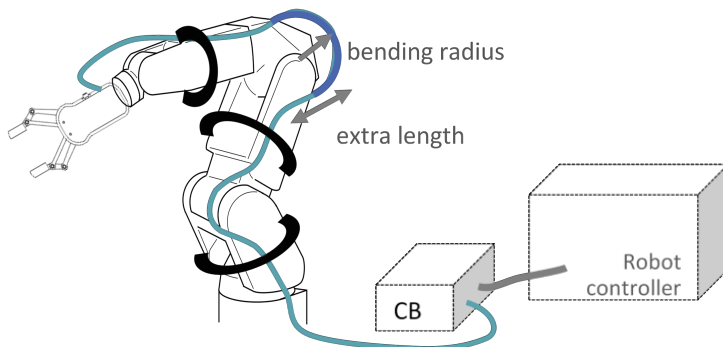


DANGER:

Use only original OnRobot tool data cables.

Connect the following cables to wire the system:

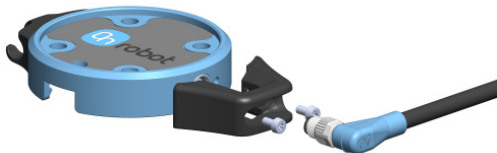
- Tool data cable between the tool(s) and the Compute Box
- Ethernet cable between the robot controller and the Compute Box
- Power supply of the Compute Box

**NOTE:**

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

4.4.1. Tool Data Cable

4.4.1.1. Cable to Screwdriver

**Step 1**

Mount the cable protector to the Quick Changer to keep safe the data cable as illustrated on the left.

**Step 2**

Connect the data cable to the tool.

**Step 3**

Route the cable through the cable holder on the other side of the Quick Changer.

**CAUTION:**

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

4.4.1.2. Cable to Compute Box

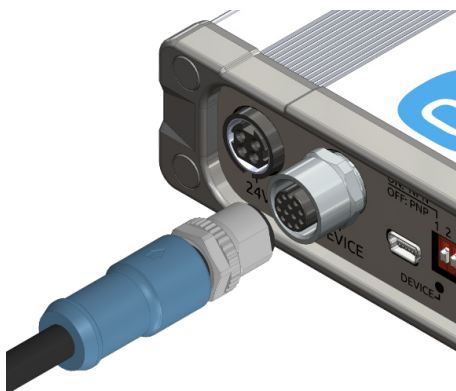
Then route the Tool data cable to the Compute Box (CB) and use the supplied Velcro tape (black) to fix it.

**NOTE:**

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

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

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

**CAUTION:**

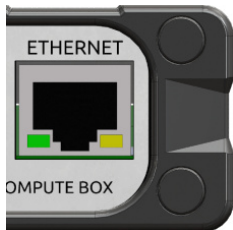
Quick Changer and Dual Quick Changer can only be used to power OnRobot tools.

4.4.2. Ethernet Cable

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

**NOTE:**

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



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

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

4.4.3. Recommended Grounding

**WARNING:**

Incorrect grounding can result in device damage. Please follow the recommendations below.



1. Connect all metal devices* to a central point. Use 4mm ground wires.
2. Connect the central point to the factory ground. Use a 6mm ground wire.
3. Check grounding by moving a Grounding Tester** throughout the setup. Confirm the device reads close to 0.

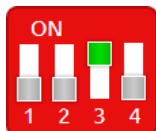
To learn more about grounding checking, watch the tutorial on <https://learn.onrobot.com/en/how-test-grounding>.

* We refer to metal devices as OnRobot devices, robot, fences, conveyor belts, machines, etc, that are in the application.

** Can be purchased at OnRobot with the Item Number #114040.

4.4.4. Compute Box DIP Switch Settings

Set the DIP switches of the Compute Box as follows:

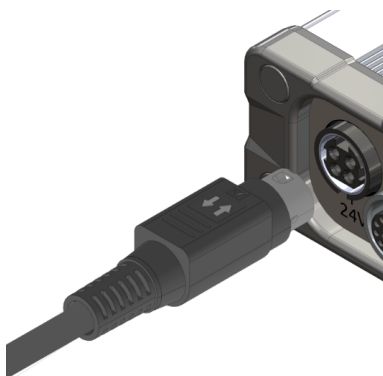


Set the DIP switch 3 to ON and the DIP switch 4 to OFF position.

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

4.4.5. Power Supply: Compute Box

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



NOTE:

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



CAUTION:

Use only original OnRobot power supplies.

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

4.4.5.1. Screwdriver

Power Supply	
1.5 A	✗
5 A	✓
6.25 A	✓

5. SW Installation

5.1. Robot Software Setup

5.1.1. Install URCap

UR CB3

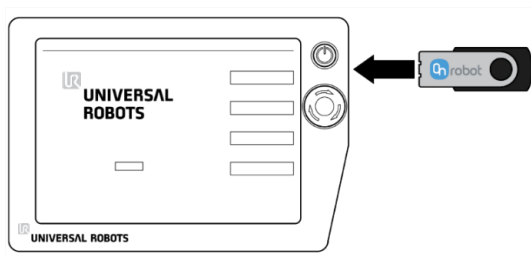



NOTE:

The minimum UR PolyScope version is **3.11**. Please remove all previous OnRobot URCap version(s) before the installation. The controller version must be CB3.1.

For the HEX-E/H QC products the **3.12** is not recommended.

1. Insert the OnRobot USB drive in the USB slot on the right side of the Teach Pendant.



2. Select the **Setup Robot** option from the main menu, then the **URCaps** option.
3. Tap on the + sign to browse for the OnRobot URCap file. It can be found in the  usbdisk/UR/URCAP folder. Tap on **Open**.

UR e-Series





NOTE:

The minimum UR PolyScope version is **5.5**. Please remove all previous OnRobot URCap version(s) before the installation.

For the HEX-E/H QC products the **5.6** is not recommended, instead please use the **5.7**.

1. Insert the OnRobot USB drive in the USB slot on the top right side of the Teach Pendant.



2. Then tap on the  menu (top right corner of the screen), then from the **System** section tap on the **URCaps** menu.
3. Tap on the + sign to browse for the OnRobot URCap file. It can be found in the  usbdisk/UR/URCAP folder. Tap on **Open**.

- The system needs to be restarted for the changes to take effect. Tap on the **Restart** button and then wait for the system to be restarted.



- Initialize the robot.



NOTE:

For more information on the URCap installation please refer to UR documentation.

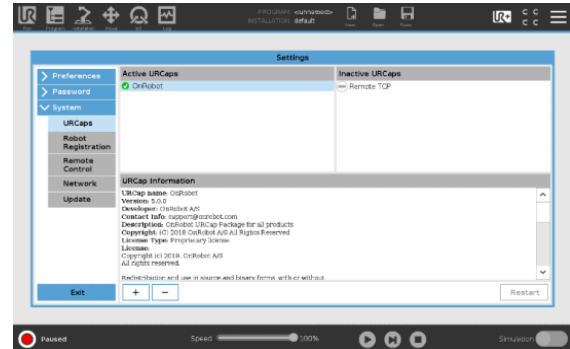
5.1.2. Uninstall Software

UR CB3

- Select the **Setup Robot** option from the main menu, then the **URCaps** option.
- Select the OnRobot URCap file.
- Tap on the - sign.
- Then the system needs to be restarted for the changes to take effect. Tap on the **Restart** button and then wait for the system to be restarted.




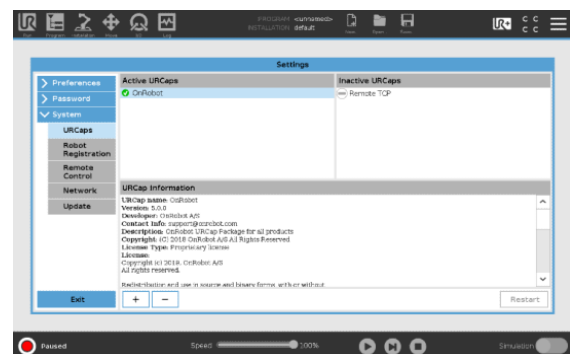
- Then the system needs to be restarted for the changes to take effect. Tap on the **Restart** button and then wait for the system to be restarted.



- Initialize the robot.

UR e-Series

- Tap on the  menu (top right corner of the screen), then from the **System** section tap on the **URCaps** menu.
- Select the OnRobot URCap file.
- Tap on the - sign.
- Then the system needs to be restarted for the changes to take effect. Tap on the **Restart** button and then wait for the system to be restarted.



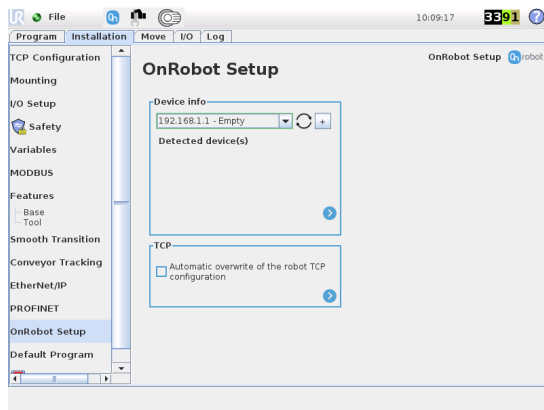
5. Initialize the robot.

5. Initialize the robot.

5.1.3. URCap Setup

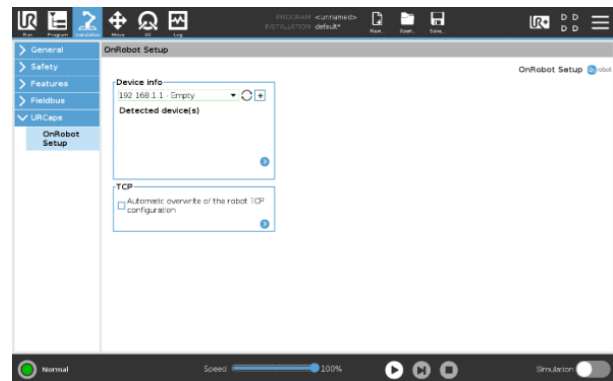
UR CB3

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



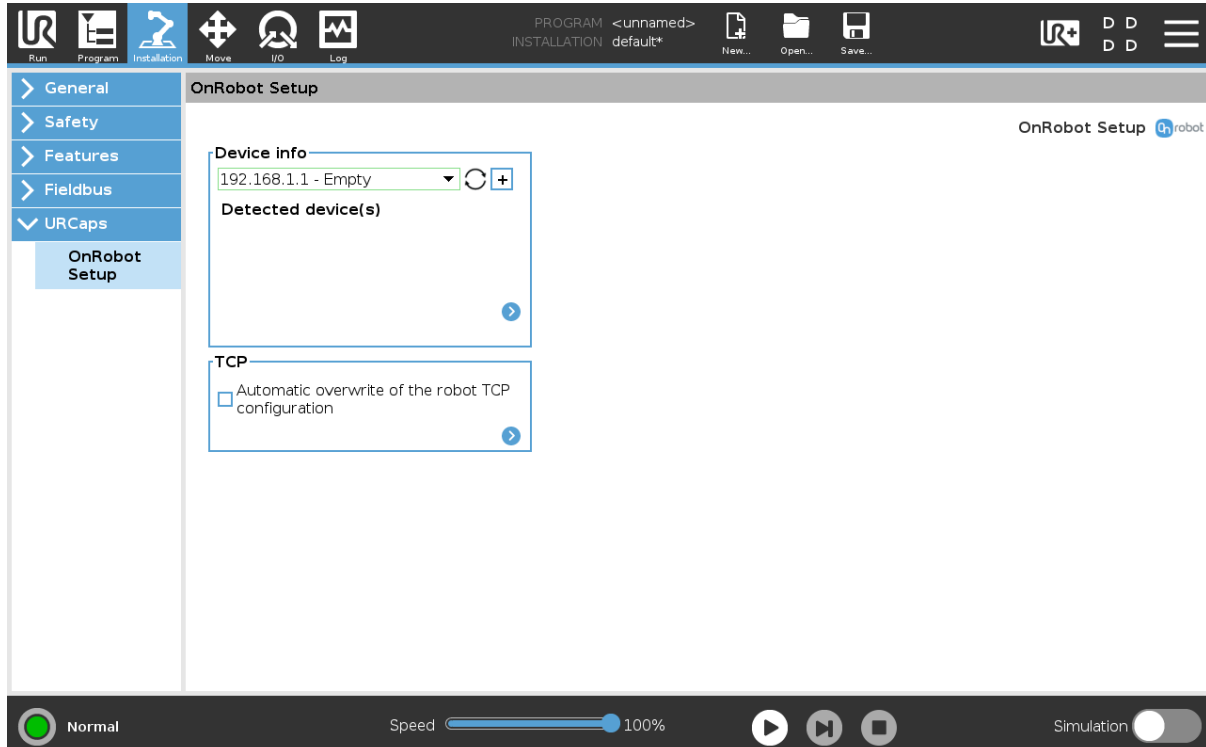
UR e-Series

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




5.1.3.1. Device Info

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



Device info

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

Use the reload button  to find new available devices.

**NOTE:**

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

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

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

**NOTE:**

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



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

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

**CAUTION:**

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

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

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

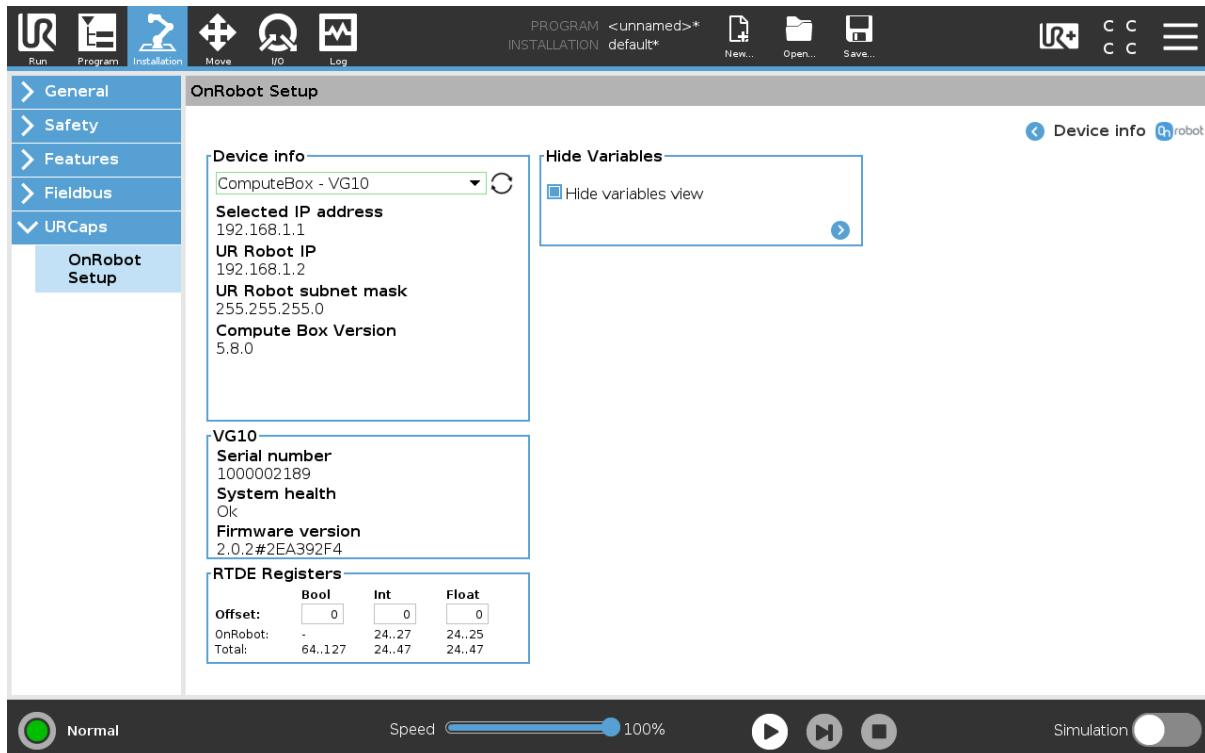
**WARNING:**

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

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

Detailed parameters of the Device Info

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



Device info

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

Errors

This displays information about the errors if there is any.

Device name

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

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

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

RTDE Registers

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

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

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

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

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

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

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

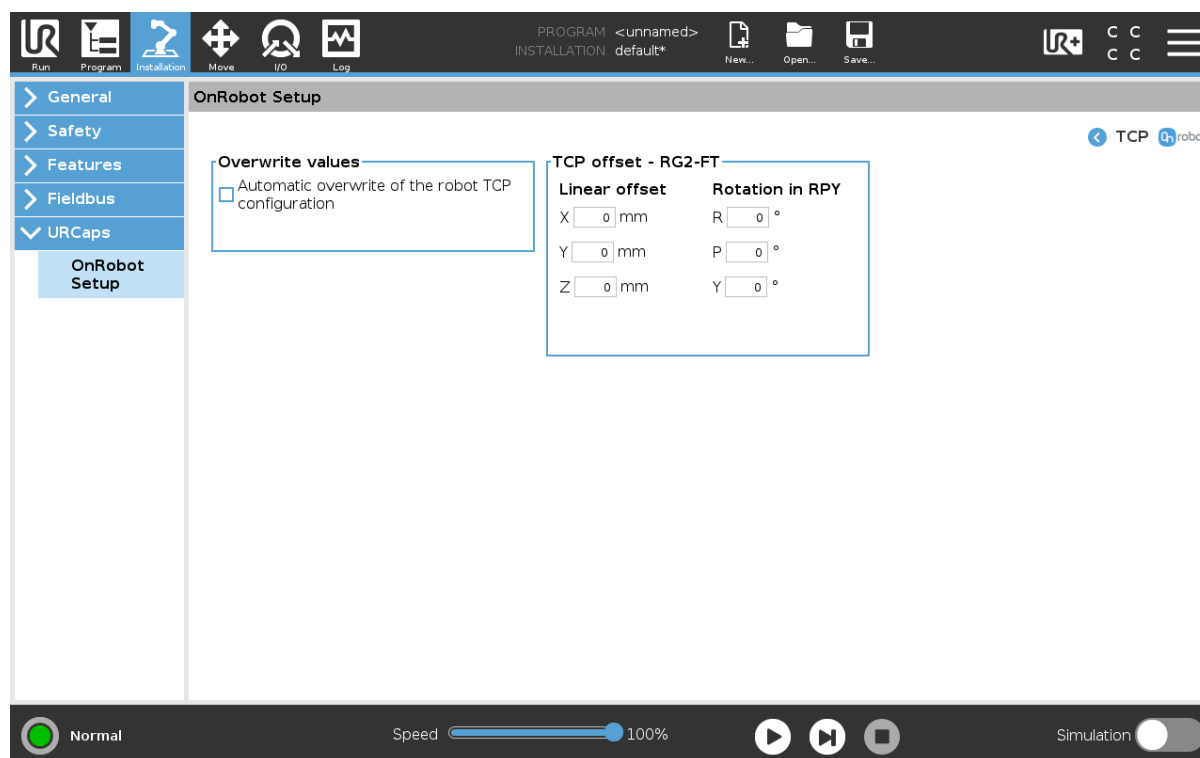
Hide Variables

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

TCP

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

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



Overwrite values

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

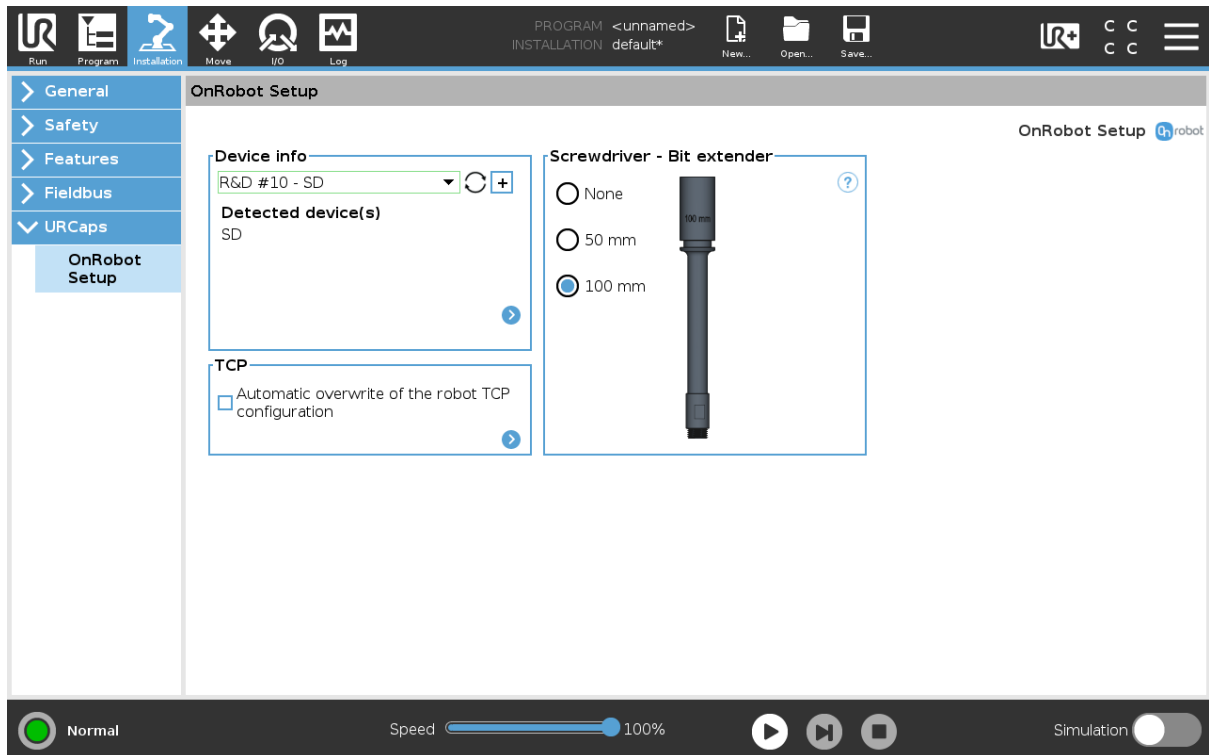
For further information and best practices on the TCP setting see [6.4. TCP Configuration](#) section.

TCP offset

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

5.1.3.2. Screwdriver

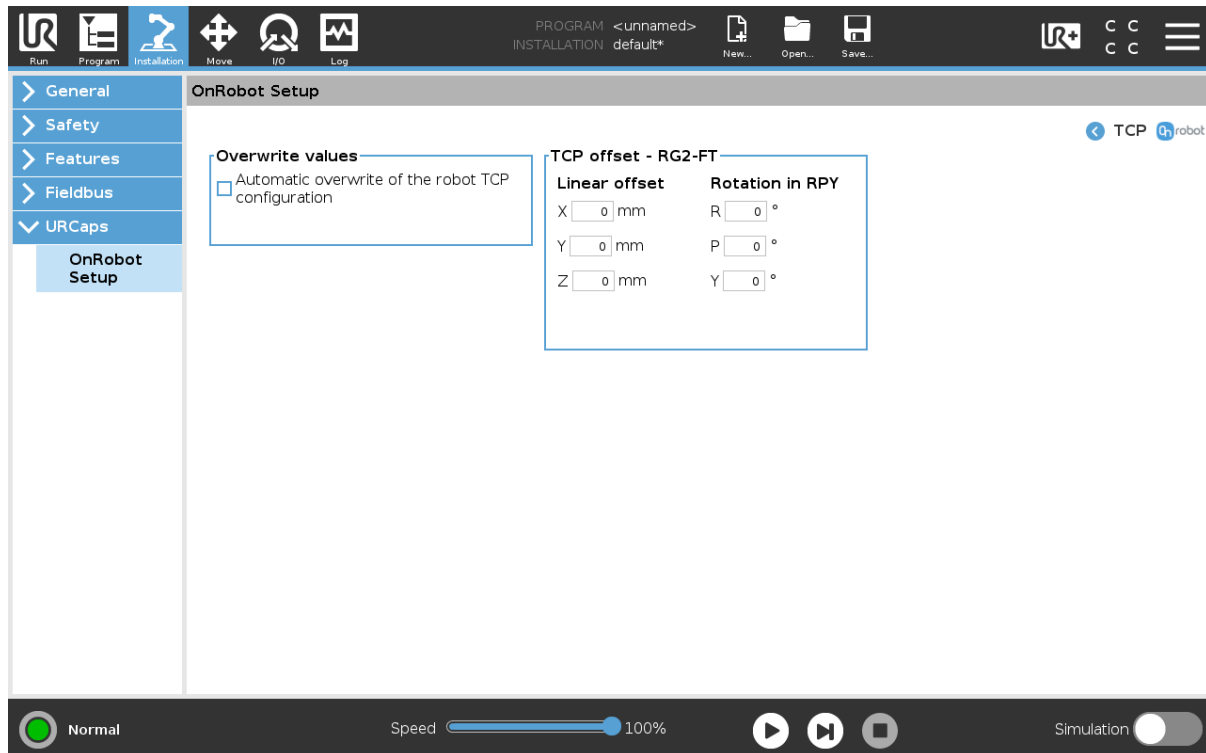
The configuration panels for the Screwdriver are shown in the image below:



TCP

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

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



Overwrite values

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

For further information and best practices on the TCP setting see [6.4. TCP Configuration](#) section.

TCP offset

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

Screwdriver - Bit extender

When a bit extender is selected, the TCP will be offset by the bit extender's length and the shank position range will change as described:

- None: 0 – 55 mm
- 50 mm: 50 – 105 mm
- 100 mm: 100 – 155 mm

The bit extenders can be purchased as accessories. For more information about the accessories, go to the [9.1. Spare Parts](#) section.

6. Operation



NOTE:

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

6.1. URCap Commands

URCap commands provide an easy way to program an application.

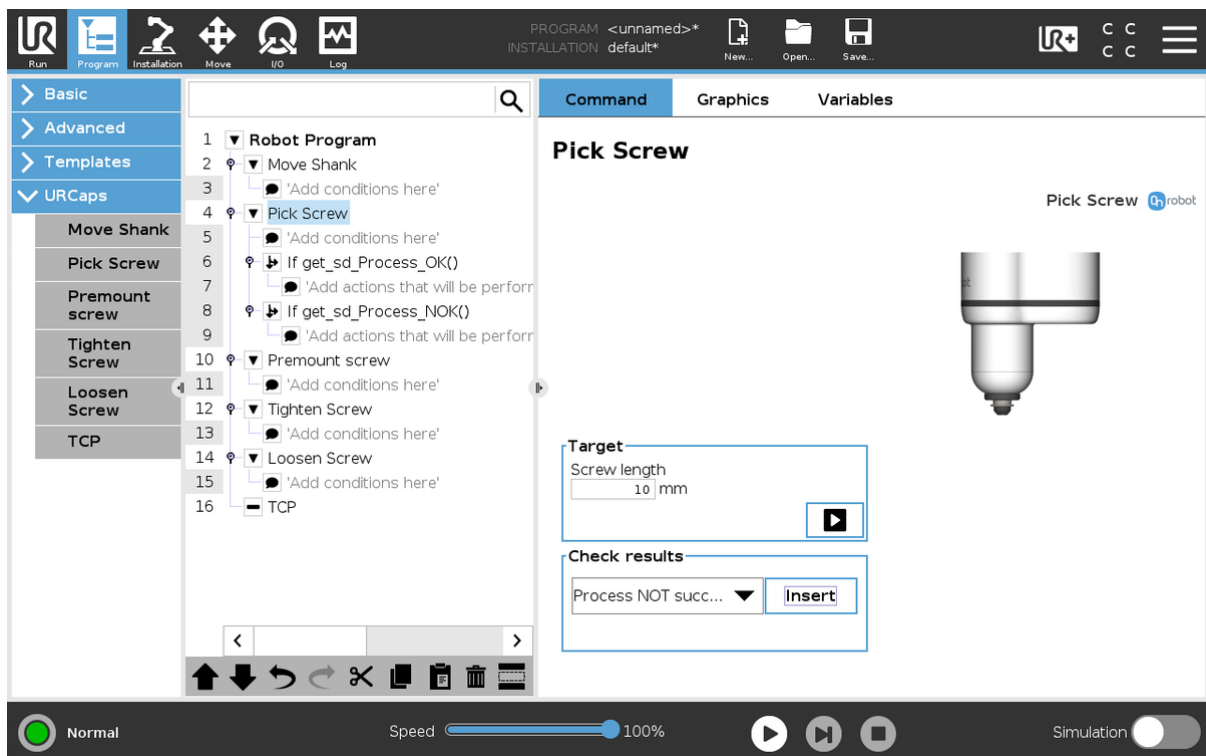
6.1.1. Screwdriver

6.1.1.1. Pick Screw

When the `Pick Screw` command is executed, the Screwdriver will move and rotate the bit to align it with the screw head, then it will pick up the screw and hide it inside the housing.

In the [6.5.1. Feedback Variables](#) section, the variables that provide information about the result of the command are explained.

The different functions are explained below.



Target

Screw length: Input the length of the screw.



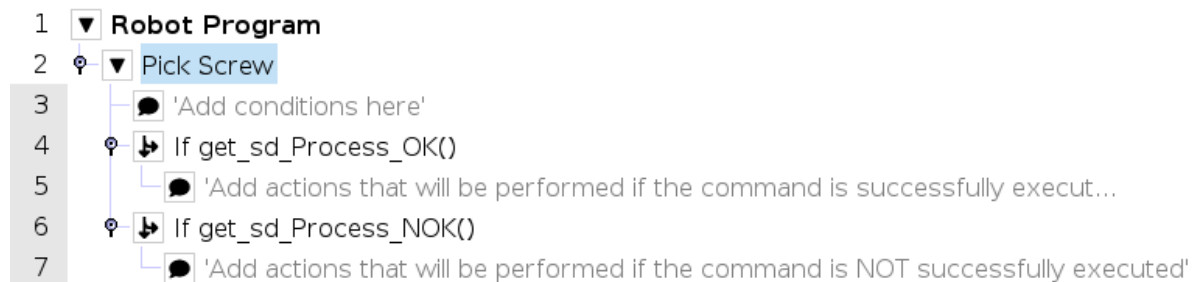
When pressed, the screwdriver will act as if the command is executed.

Check results

Selecting one of the two options from the dropdown list and pressing **Insert** will add an if statement in the robot program based on the selected option as shown in the screenshot below.

The dropdown list options are:

- **Process successful:** Uses the function `get_sd_Process_OK()` and returns true if the command is executed correctly.
- **Process NOT successful:** Uses the function `get_sd_Process_NOK()` and returns true if the command is not executed correctly.



NOTE:

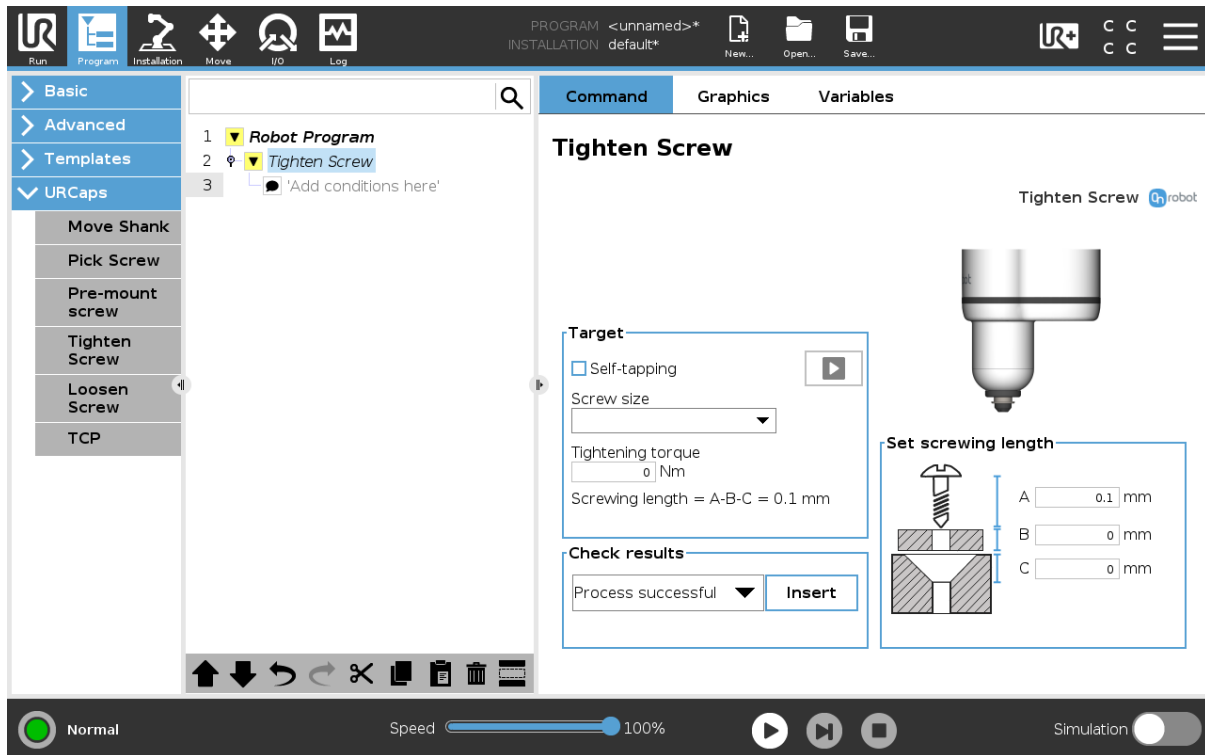
The Screwdriver's bit should be at least 50 mm away from the picking point until the screw is waiting in place. Otherwise, the magnetic force of the Screw-bit System will attract the screw sidewise and it might cause a misalignment between the screw and the bit.

6.1.1.2. Tighten Screw

When the `Tighten Screw` command is executed, the Screwdriver will move and rotate the Screw-bit System until it reaches the thread. Then it will start to screw in the screw until 90% of the **Screwing length** is inside. During the rest 10% of the **Screwing length**, the Screwdriver will tighten the screw applying the **Target Torque**.

In the [6.5.1. Feedback variables](#) section, the variables that provide information about the result of the command are explained.

The different functions are explained below.



Target

Self-tapping: When selected, the Screwdriver will use 85% of the final torque and up to 3 Nm during the self-tapping phase. Then it will apply the set tightening torque for the final tightening phase.



NOTE:

For self-tapping screws, a hole is needed according to the screw manufacturer, as the Screwdriver can only create a thread in the hole but not the hole itself.

Screw size: The different supported screw sizes can be selected. This selection will autofill a suggested torque value for that particular screw type.

Torque: Input the target tightening torque.

Tightening Torque: When the **Using self-tapping screws** checkbox is selected, **Torque** changes to **Tightening torque**. Input the set tightening torque for the final tightening phase.

Screwing length = A-B-C: The resulting screwing length is shown here. This is the amount of the screw that will be screwed into the thread. To set the value, use the **Set screwing length** card and the resulting amount will be the **A** (screw length) - **B** (Washer thickness) - **C** (Chamfer deepness).



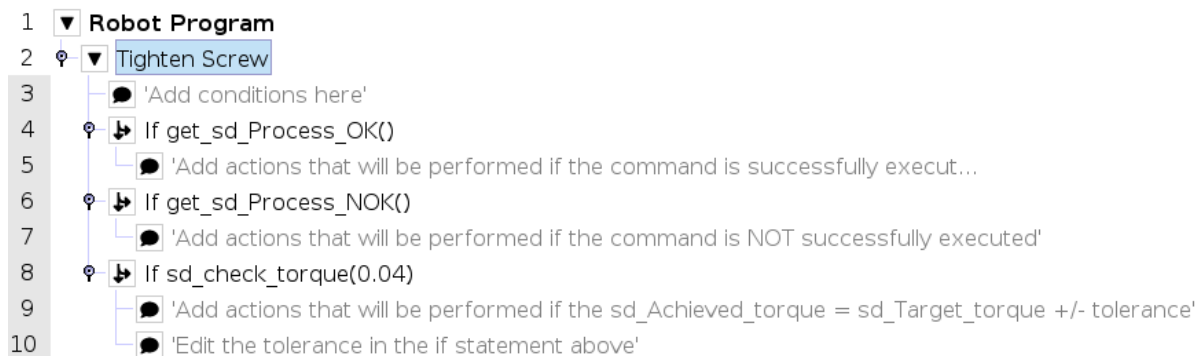
When pressed, the Screwdriver will act as if the command is executed.

Check results

Selecting one of the three options from the dropdown list and pressing **Insert** will add an if statement in the robot program based on the selected option.

The dropdown list options are:

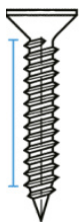
- **Process successful:** Uses the function **get_sd_Process_OK()** and returns true if the command is executed correctly.
- **Process NOT successful:** Uses the function **get_sd_Process_NOK()** and returns true if the command is not executed correctly.
- **Torque:** Uses the function **sd_check_torque(0.04)** and returns true if the **sd_Achieved_torque** is within the range of the **sd_Target_torque** +/- the tolerance. This tolerance is the number in brackets and can be edited by pressing on the if statement in the robot program and then pressing on the if input field in the command.



Set screwing length

The image shows three different lengths:

A = This is the screw length, distance from the screw bit to the bottom part of the screw head.



When using pointing screws, measure the screw length from the head of the screw to the bottom where the pointing part begins.

B = This is the washer thickness (or piece in between screw and thread), if no piece is used set it as 0. This amount will be subtracted from the Screw length to provide the resulting **Screwing length**.

C = This is the chamfer deepness. This amount will be subtracted from the Screw length to provide the resulting **Screwing length**.

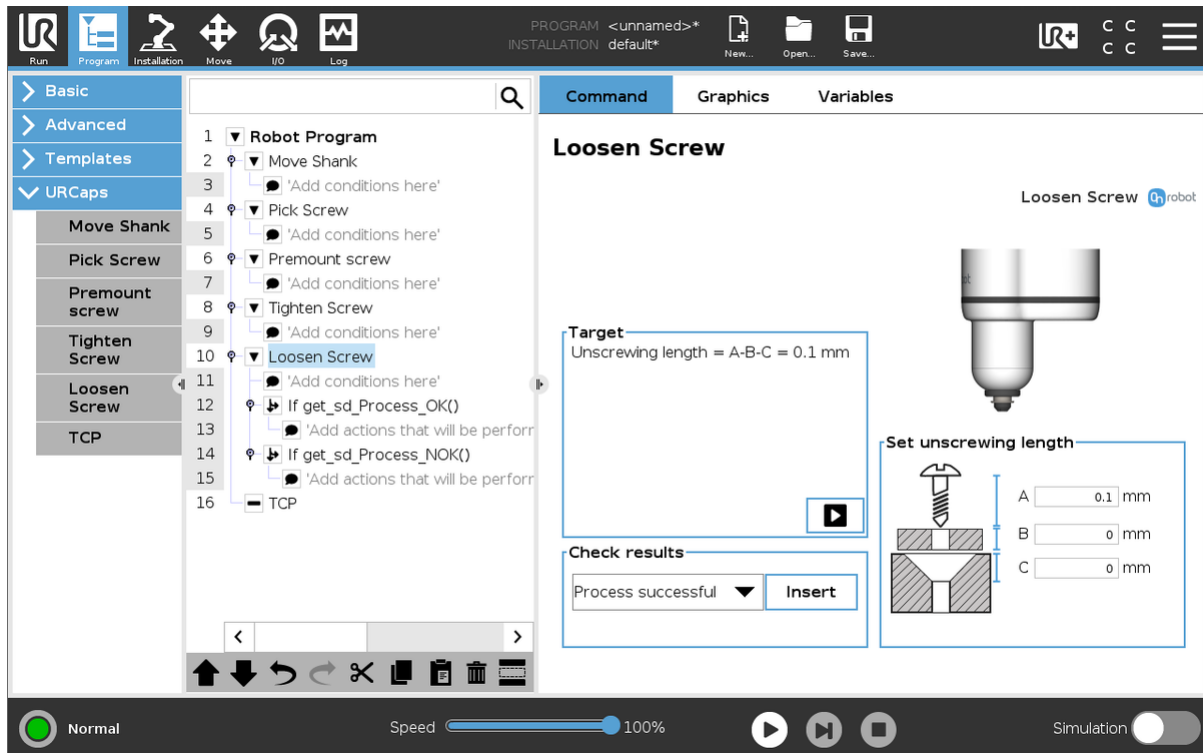
The background of the **A**, **B**, and **C** fields becomes yellow, respectively, when the **Screwing length** is out of range.

6.1.1.3. Loosen Screw

When the **Loosen Screw** command is executed, the Screwdriver will move and rotate the bit to align it with the screw head. Then, it will loosen and unscrew the screw until it is out the thread (specified **Unscrewing length**). Afterwards, it will hide the Screw-bit System inside the housing.

In the **6.5.1. Feedback variables** section, the variables that provide information about the result of the command are explained.

The different functions are explained below.



Target

Unscrewing length = A-B-C: The resulting unscrewing length is shown here. This is the amount of the screw that will be unscrewed from the thread. To set the value, use the **Set unscrewing length** card and the resulting amount will be the **A** (screw length) - **B** (Washer thickness) - **C** (Chamfer deepness).



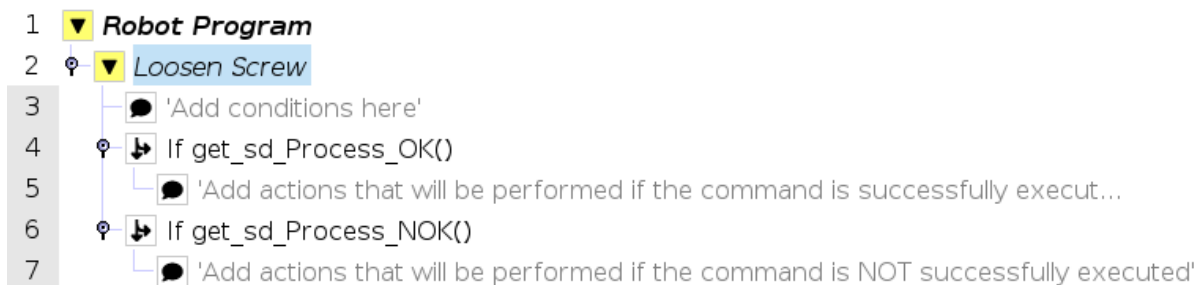
When pressed, the Screwdriver will act as if the command is executed.

Check results

Selecting one of the two options from the dropdown list and pressing **Insert** will add an if statement in the robot program based on the selected option as shown in the screenshot below.

The dropdown list options are:

- **Process successful:** Uses the function `get_sd_Process_OK()` and returns true if the command is executed correctly.
- **Process NOT successful:** Uses the function `get_sd_Process_NOK()` and returns true if the command is not executed correctly.



Set unscrewing length

The image shows three different lengths:

A = This is the screw length, distance from the screw bit to the bottom part of the screw head.

B = This is the washer thickness (or piece in between screw and thread), if no piece is used set it as 0. This amount will be subtracted from the Screw length to provide the resulting **Unscrewing length**.

C = This is the chamfer deepness. This amount will be subtracted from the Screw length to provide the resulting **Unscrewing length**.

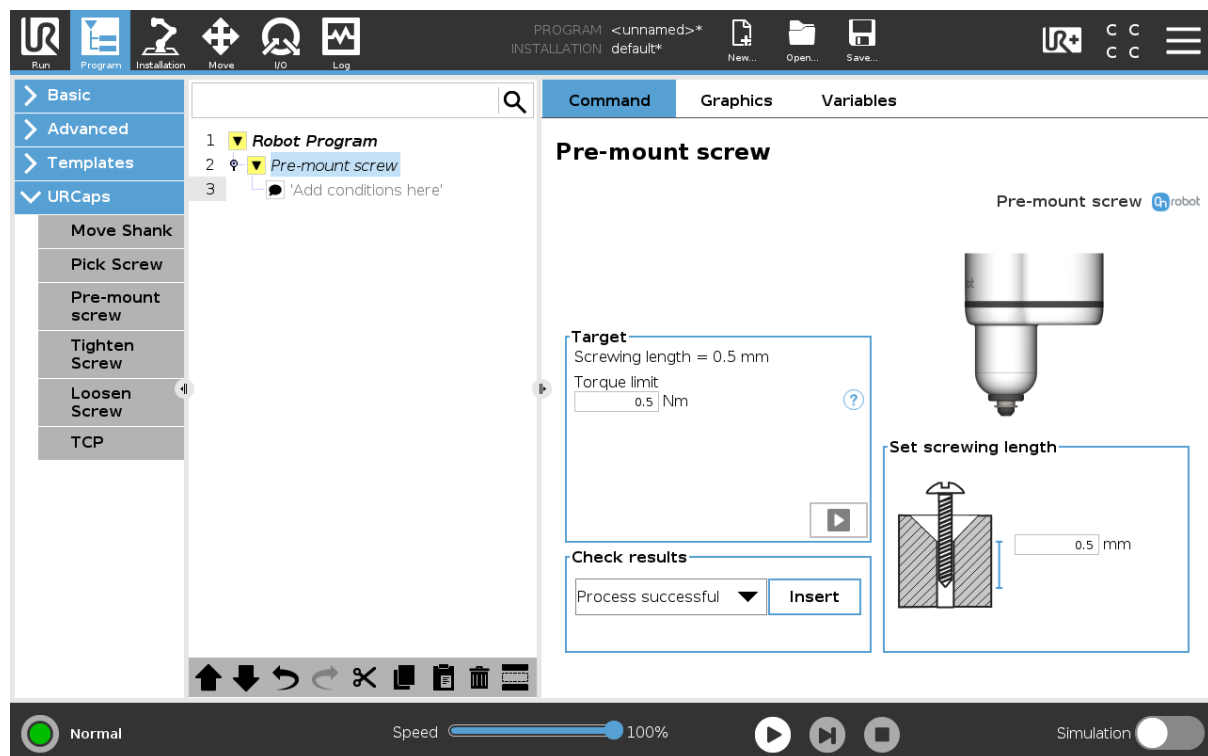
The background of the **A**, **B**, and **C** fields becomes yellow, respectively, when the **Unscrewing length** is out of range.

6.1.1.4. Pre-mount Screw

When the `Pre-mount screw` command is executed, the Screwdriver will insert the screws to the given length without tightening the screw.

In the [6.5.1. Feedback variables](#) section, the variables that provide information about the result of the command are explained.

The different functions are explained below.



NOTE:

Pre-mount can only be used with machine screws and not with self-tapping screws.

Target

Screwing length: Shows the target screwing length that has been set in the **Set screwing length** field.

Torque limit: Input the target tightening torque. The torque limit defines the maximum torque the Screwdriver can reach during the pre-mounting action.



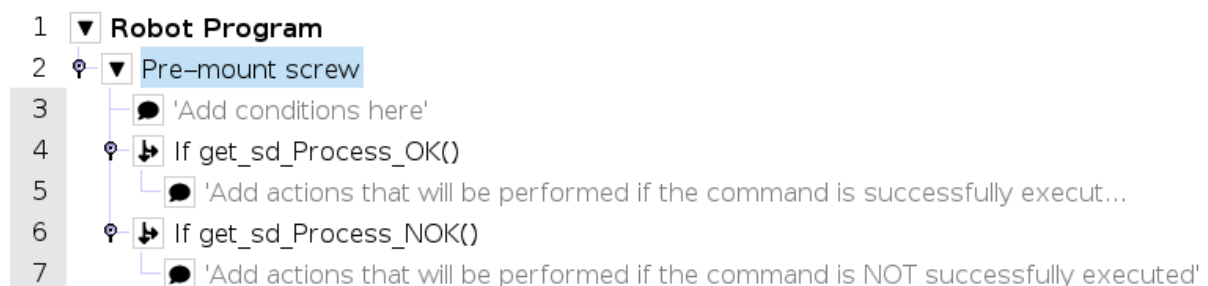
When pressed, the Screwdriver will act as if the command is executed.

Check results

Selecting one of the two options from the dropdown list and pressing **Insert** will add an if statement in the robot program based on the selected option.

The dropdown list options are:

- **Process successful:** Uses the function **get_sd_Process_OK()** and returns true if the command is executed correctly.
- **Process NOT successful:** Uses the function **get_sd_Process_NOK()** and returns true if the command is not executed correctly.



Set screwing length

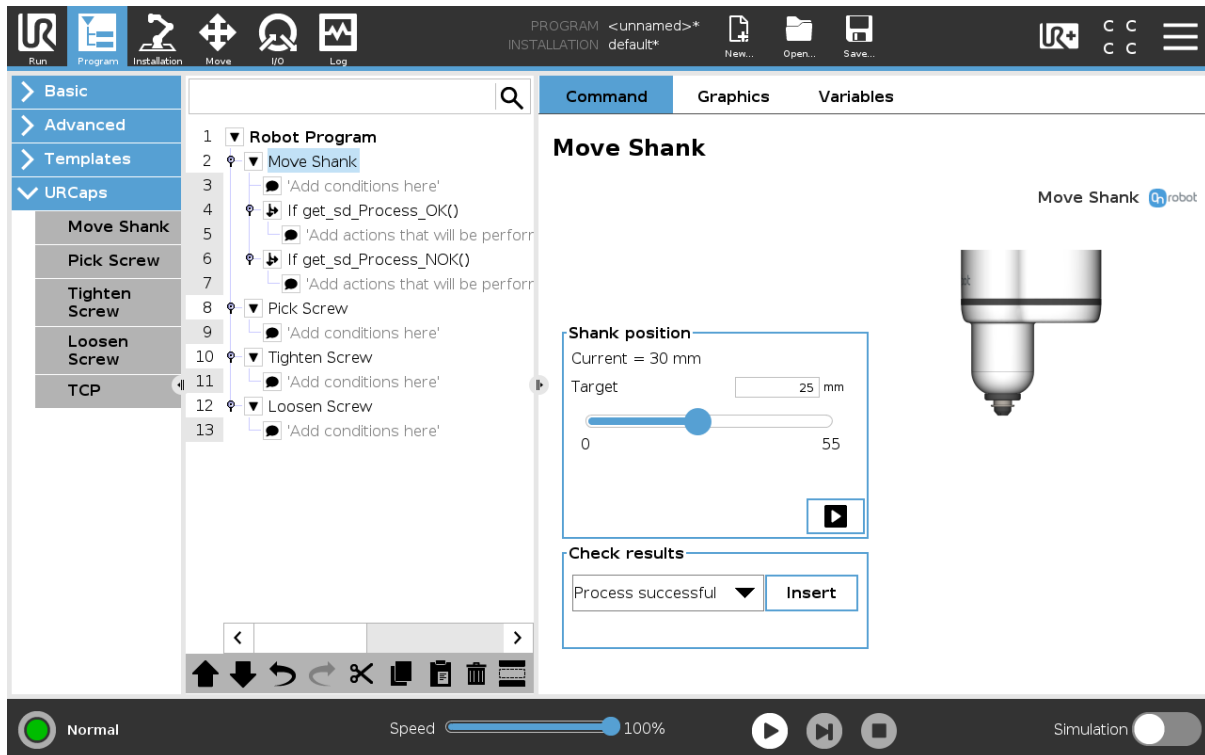
Input the target screwing length.

6.1.1.5. Move Shank

When the **Move Shank** command is executed, the Screwdriver will move the shank showing the Screw-bit System or hiding it inside the housing.

In the **6.5.1. Feedback variables** section, the variables that provide information about the result of the command are explained.

The different functions are explained below.



Shank position

Current: Shows the current position of the shank.

Target: Selects the target shank position. The target position can also be set by using the input field above the slider.

If a Bit extender is used, the shank range is changed accordingly:

- No Bit extender: 0 - 55 mm
- 50 mm Bit extender: 50 - 105 mm
- 100 mm Bit extender: 100 - 155 mm



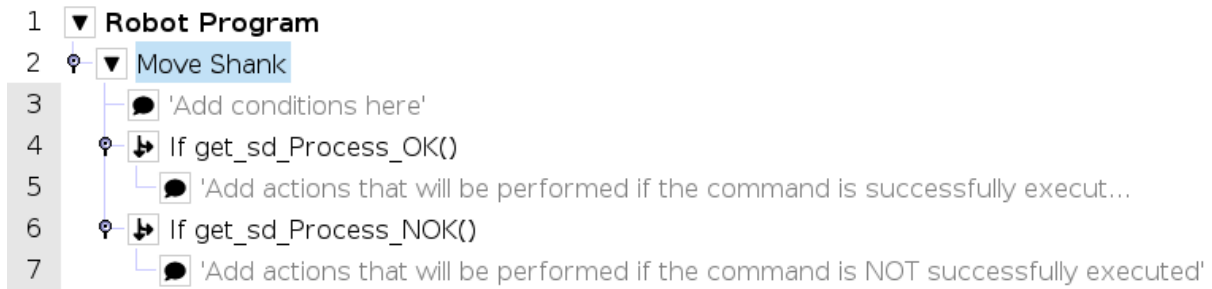
When pressed, the Screwdriver will act as if the command is executed.

Check results

Selecting one of the two options from the dropdown list and pressing **Insert** will add an if statement in the robot program based on the selected option as shown in the screenshot below.

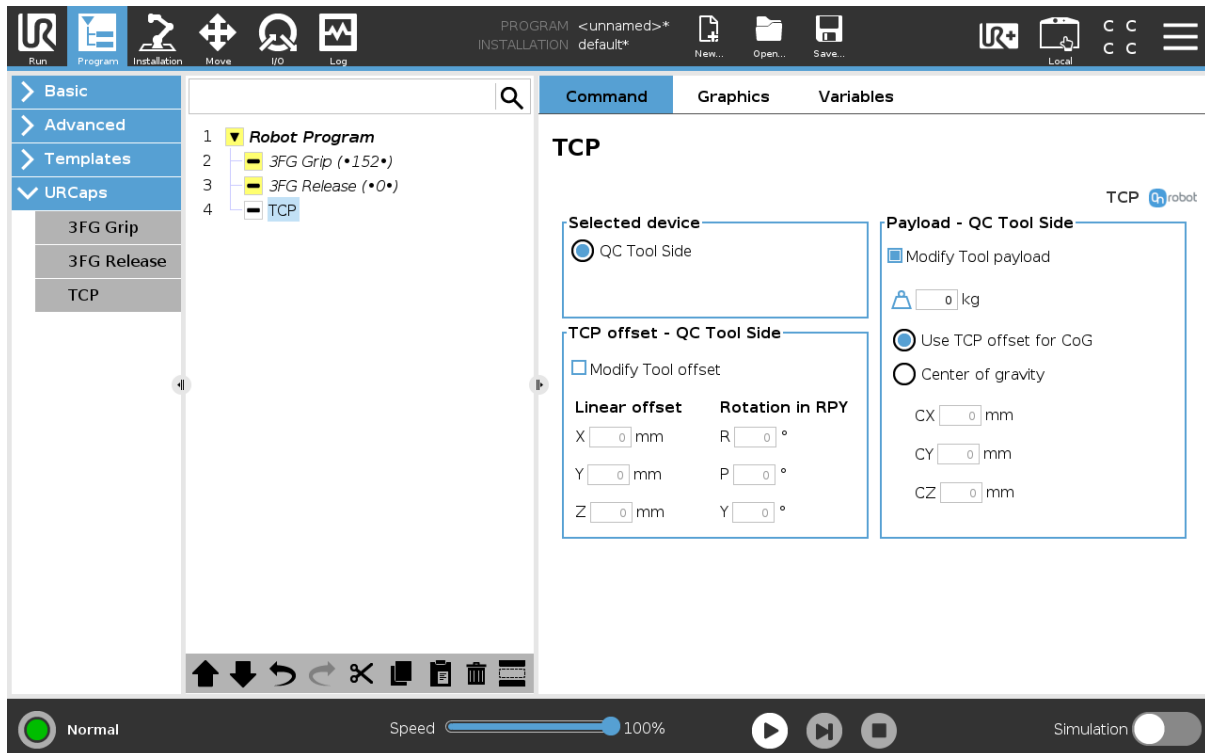
The Dropdown list options are:

- **Process successful:** Uses the function **get_sd_Process_OK()** and returns true if the command is executed correctly.
- **Process NOT successful:** Uses the function **get_sd_Process_NOK()** and returns true if the command is not executed correctly.



6.1.1.6. TCP

The TCP command is used to set the current TCP and/or payload for the robot.




TCP offset

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

Payload

Modify Tool payload: If enabled the UR's payload will be overwritten.

 enter the workpiece mass that is attached to the device. The device own mass is added automatically.

Use TCP offset for CoG: set the center of gravity of the workpiece at the active TCP position.



Center of gravity CX, CY, CZ: set the location of the center of gravity of the workpiece.

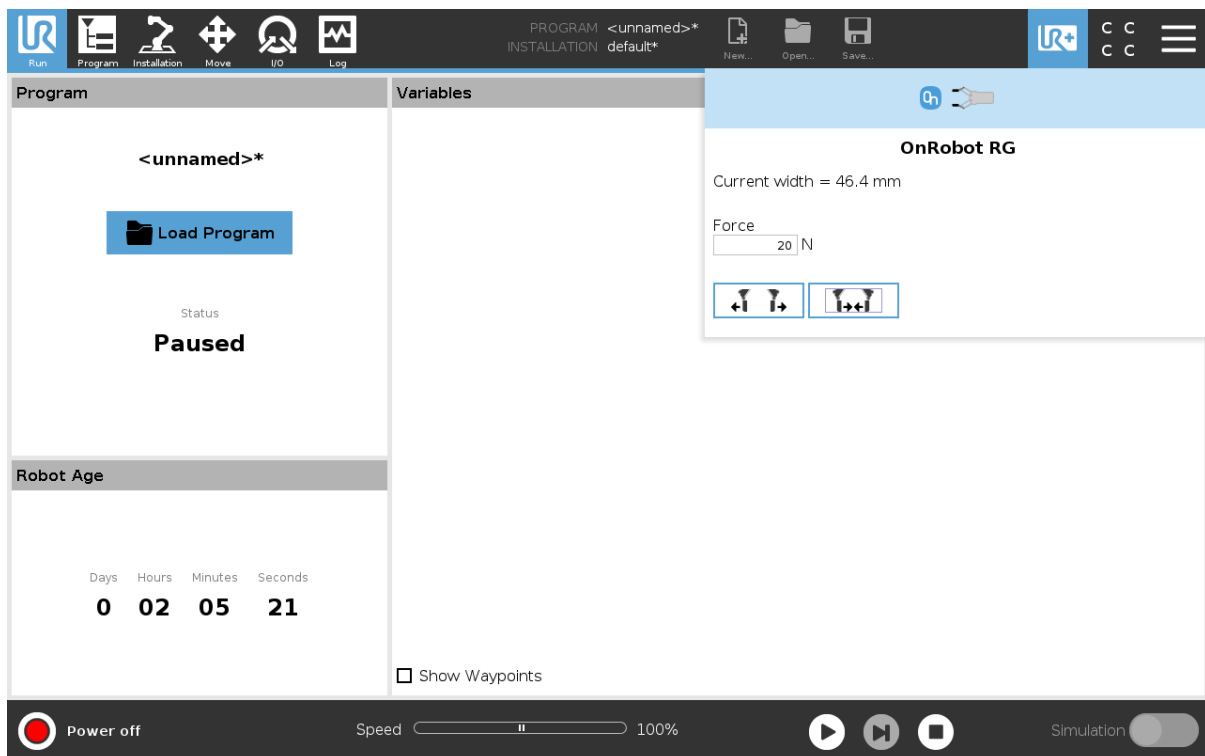
6.2. URCap Toolbar

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


How to Access the Toolbar

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

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



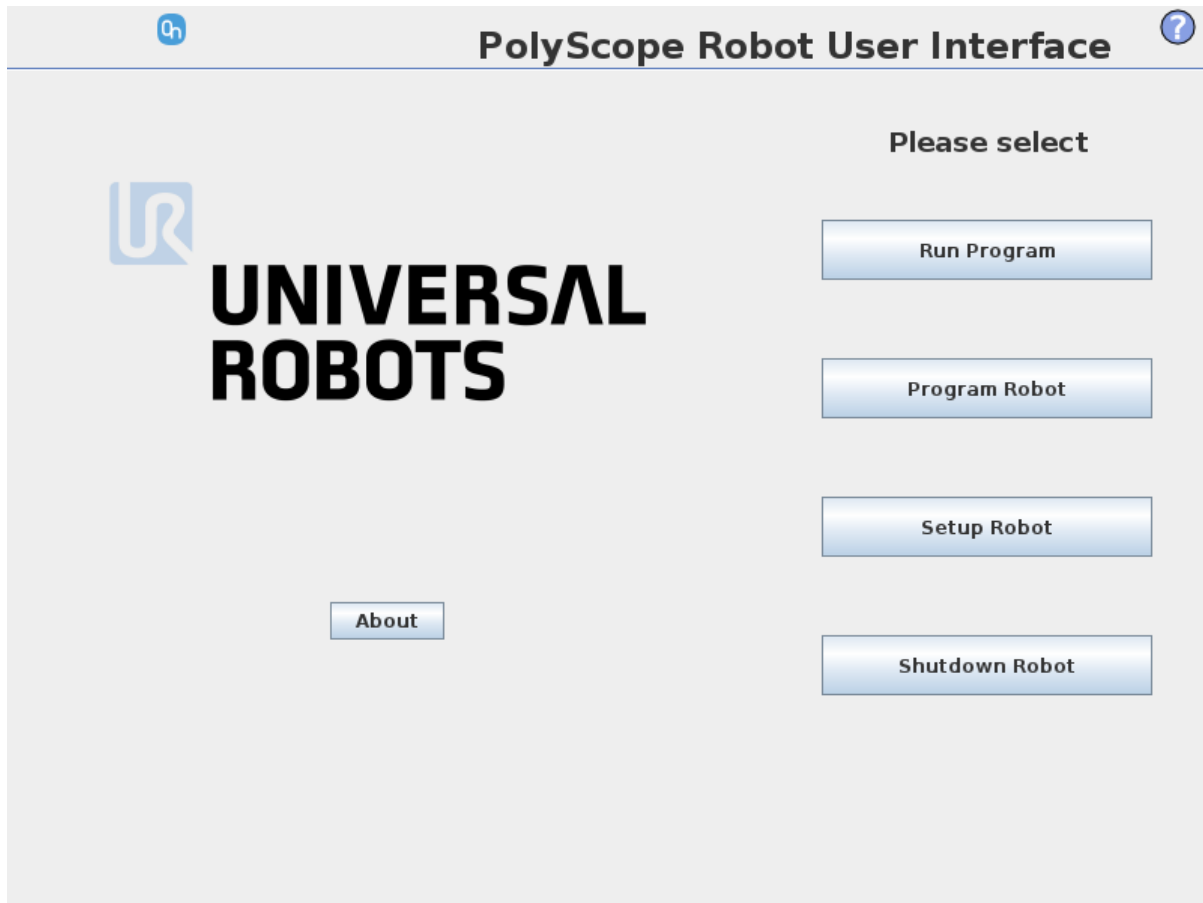
Each OnRobot End of Arm Tooling has its own functionality and that is explained in the sections below.


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

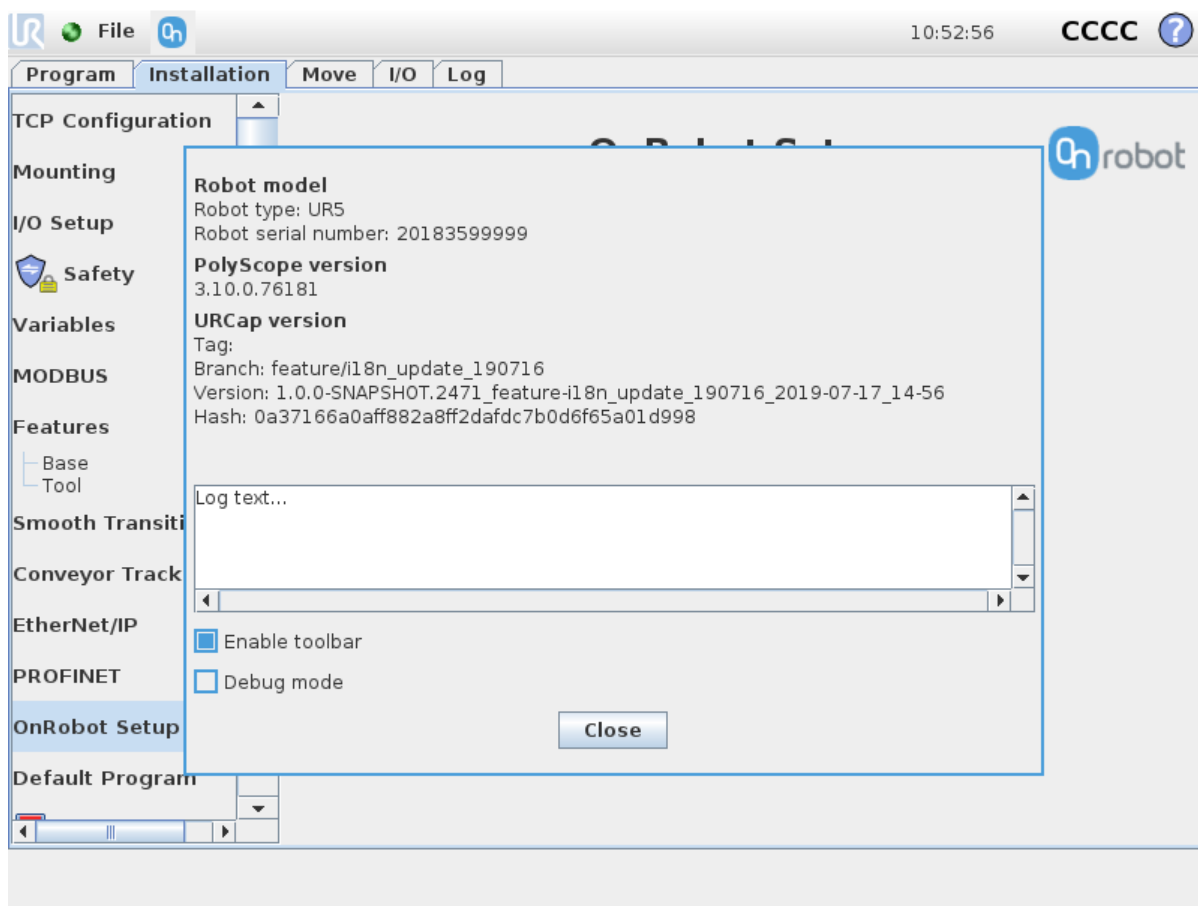


NOTE:

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



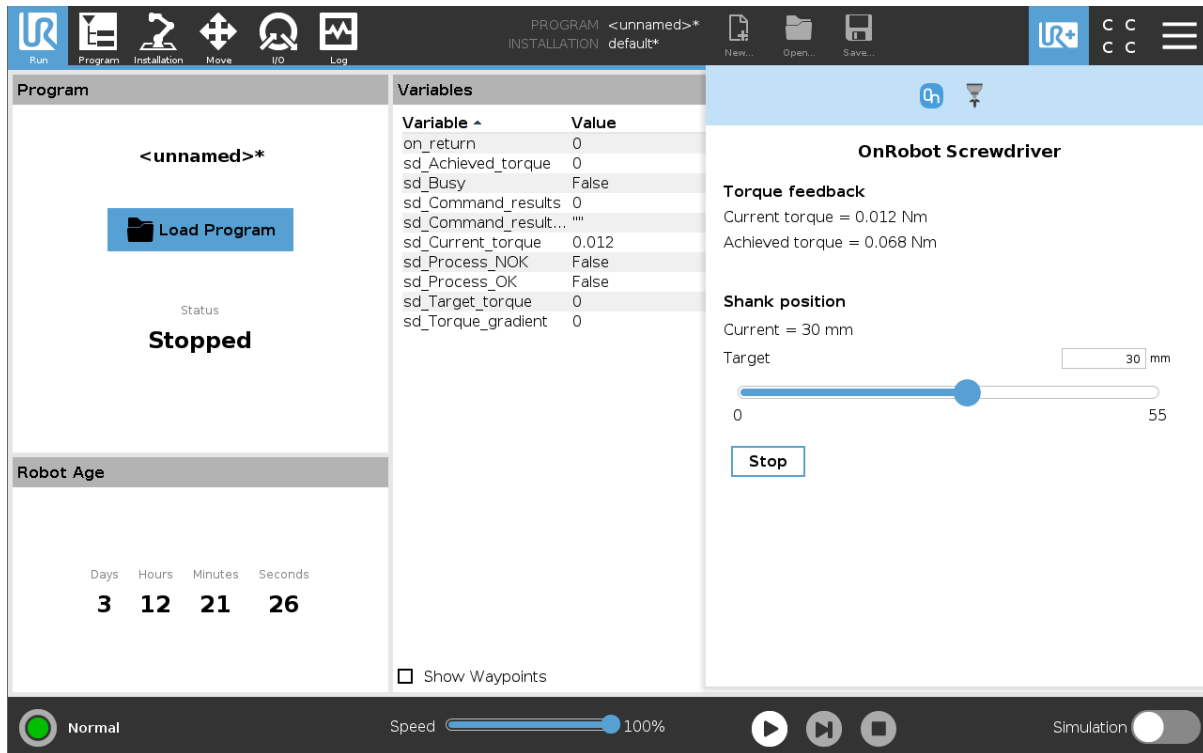
To enable/disable the toolbar, press on the OnRobot logo  on the top right corner and check/uncheck the **Enable toolbar** checkbox.



6.2.1. Screwdriver

To open up the toolbar, follow the instructions under [How to Access the Toolbar](#) in the [6.2. URCap Toolbar](#) section.

The toolbar for the Screwdriver is shown below.



Torque feedback

Current torque: Shows the current torque the Screwdriver is applying at the moment.

Achieved torque: Shows the achieved torque on the last `Tighten` command executed.

Shank position

Current: Shows the current position of the shank.

Target: Changes the position of the shank immediately. The target position can also be set by using the input field above the slider.

If a Bit extender is used, the shank range is changed accordingly:

- No Bit extender: 0 - 55 mm
- 50 mm Bit extender: 50 - 105 mm
- 100 mm Bit extender: 100 - 155 mm

Stop: Will stop the Screwdriver command that is being executed at that time.



If the mechanical safety is activated, this button will show up. Pressing this button will enable the Screwdriver back from the safety state.

6.3. URScript Commands

URScript commands can be used alongside other scripts.

6.3.1. Screwdriver

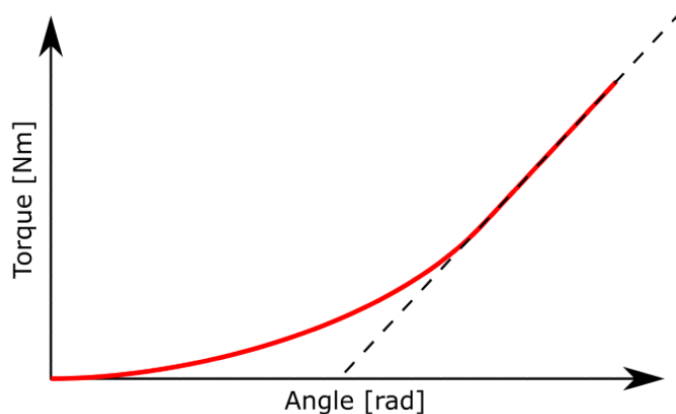
When the OnRobot URCap is enabled, there will be several Screwdriver script functions available:

- `get_sd_Process_OK()`: True if the command is executed correctly.

- `get_sd_Process_NOK()`: True if the command is not executed correctly.
- `get_sd_Achieved_torque()`: Achieved torque in Nm after a `Tighten` command has been executed.
- `get_sd_Torque_gradient()`: Achieved torque gradient in Nm/rad after a `Tighten` command has been executed.

**NOTE:**

When using self-tapping screws, if the tapping torque is very close to the target torque, the torque gradient might provide an invalid value.



- `get_sd_Command_results()`: The possible values are:
 - 0 - No additional result data
 - 1 - Command unknown
 - 2 - Not screwing in
 - 3 - Timeout waiting for correct torque (4 sec)
 - 4 - Torque exceeded unexpected (premature)
 - 5 - Unable to loosen screw (maximum torque exceeded)
 - 6 - Shank reached the 55 mm position
 - 7 - Shank obstructed during move
- `get_sd_Target_torque()`: Last `Tighten` command target torque in Nm after it has been executed.
- `sd_check_torque(tolerance_nm)`: This will return true if the `sd_Achieved_torque` is within the range of the `sd_Target_torque` +/- the `Tolerance_nm`.
 - `Tolerance_nm`: The torque error allowed.
- `sd_move(shank_pos_mm, tool_index)`
 - `shank_pos_mm`: The position the shank will move to.
 - `tool_index`: Select which Screwdriver performs the action. 0 for when only one Screwdriver is connected, 1 for Screwdriver in position 1 and 2 for Screwdriver position 2. The positions are the positions of the Dual Quick Changer.
- `sd_pick(shank_force_n, screw_length_mm, tool_index, timeout_ms)`
 - `shank_force_n`: The force the shank is going to apply. Default value is 20 N.
 - `Screw_length_mm`: The length of the screw.

- `tool_index`: Select which Screwdriver performs the action. 0 for when only one Screwdriver is connected, 1 for Screwdriver in position 1 and 2 for Screwdriver position 2. The positions are the positions of the Dual Quick Changer.
- `timeout_ms`: The time the command will keep trying to be executed. If it is not executed in the given time, a return variable will show an error.
- `sd_tighten(shank_force_n, screwing_l_mm, torque_nm, tool_index, timeout_ms)`:
 - `shank_force_n`: The force the shank is going to apply. Default value is 20 N.
 - `screwing_l_mm`: The length the screw will be screwed into the thread.
 - `torque_nm`: The target torque the screw will be tightened with.
 - `tool_index`: Select which Screwdriver performs the action. 0 for when only one Screwdriver is connected, 1 for Screwdriver in position 1 and 2 for Screwdriver position 2. The positions are the positions of the Dual Quick Changer.
 - `timeout_ms`: The time the command will keep trying to be executed. If it is not executed in the given time, a return variable will show an error.
- `sd_loosen(shank_force_n, unscrewing_lenght_mm, tool_index, timeout_ms)`:
 - `shank_force_n`: The force the shank is going to apply. Default value is 20 N.
 - `unscrewing_l_mm`: The length the screw will be screwed out from the thread.
 - `tool_index`: Select which Screwdriver performs the action. 0 for when only one Screwdriver is connected, 1 for Screwdriver in position 1 and 2 for Screwdriver position 2. The positions are the positions of the Dual Quick Changer.
 - `timeout_ms`: The time the command will keep trying to be executed. If it is not executed in the given time, a return variable will show an error.
- `sd_premount(shank_force, screwing_l_mm, torque_nm, tool_index, timeout_ms)`:
 - `shank_force_n`: The force the shank is going to apply. Default value 20 N.
 - `screwing_l_mm`: The length the screw will be screwed into the thread.
 - `torque_nm`: The maximum torque the Screwdriver will use to perform this action.
 - `tool_index`: Select which Screwdriver performs the action. 0 for when only one Screwdriver is connected, 1 for Screwdriver in position 1 and 2 for Screwdriver position 2. The positions are the positions of the Dual Quick Changer.
 - `timeout_ms`: The time the command will keep trying to be executed. If it is not executed in the given time, a return variable will show an error.
- `sd_stop(tool_index)`: The Screwdriver will stop the running command.
- `get_sd_Busy()`: True if the Screwdriver is executing a command.
- `get_sd_Current_torque()`: Provides the current measured torque.

6.4. TCP Configuration

TCP is the abbreviation of the Tool Center Point.

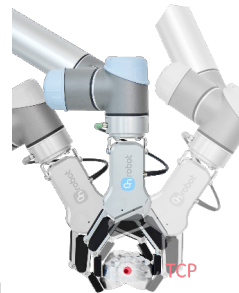


TCP is a point that is in the beginning (by default) located at the middle point of the UR's tool flange. This is an important point during robot programming since UR's Move commands are always referenced to a given TCP point and rotations could only be carried out about these points.



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

In this way it is easy to rotate the tool while the workpiece is being stationary in space (see illustration on the right).



More than one TCP point could be defined but at a given time only one TCP can be active. In UR, it is called the Active TCP.

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

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

How "far" the TCP needs to be moved to be at the "end" of the OnRobot tools could be found in the [8.3. TCP CoG](#) section.

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

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

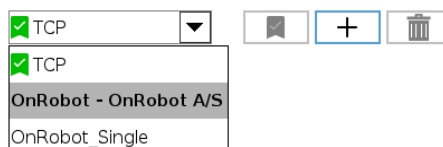
The mode could be selected on the TCP panel in the OnRobot Installation (see in the [5.1.3. URCap Setup](#) setup section).

In the following these two modes will be described.

Static TCP Mode

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

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



If a Dual Quick Changer is detected, so two tools are used.

**NOTE:**

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


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

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

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

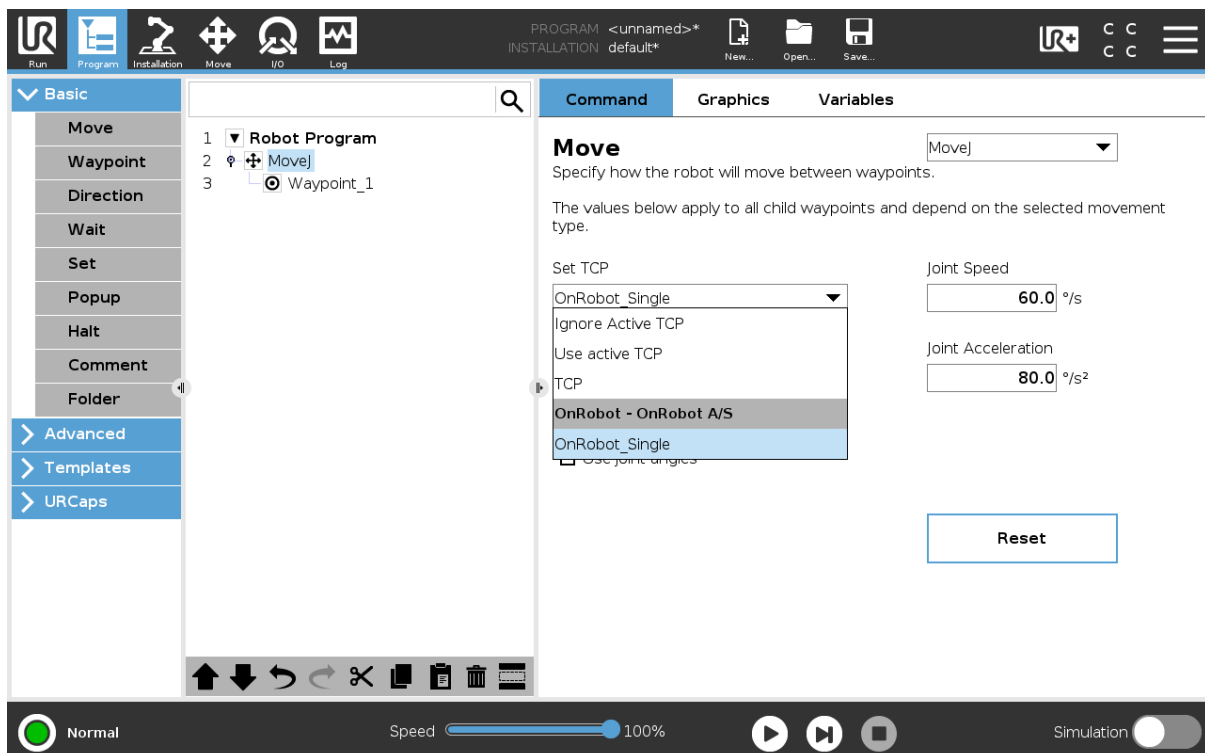
**NOTE:**

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

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

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

So, if only a single OnRobot device is used, before the Waypoints are defined, set the UR's Move command's TCP to use the **OnRobot_Single**.



If two OnRobot devices are used, select **OnRobot_Dual_1** or **OnRobot_Dual_2** accordingly.

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

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

As summary here is a code example:

Single	Dual
Not mandatory to set OnRobot TCP as Default TCP	Not mandatory to set OnRobot TCP as Default TCP
<pre> Robot program MoveJ (Set TCP = OnRobot_Single) #Alternatively TCP F/T Move </pre>	<pre> Robot program MoveJ (Set TCP = OnRobot_Dual_1) MoveJ (Set TCP = OnRobot_Dual_2) </pre>

Dynamic TCP Mode

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

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

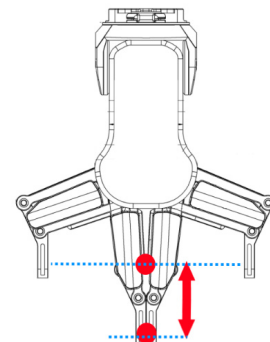
During the robot program execution if the RG Grip commands are used to open or close the gripper TCP is automatically set accordingly.

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

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

- **OnRobot_Default**

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



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

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

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

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

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

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

As summary here is a code example:

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

6.5. Feedback Variables

6.5.1. Screwdriver

Feedback Variable	Unit	Description
on_return		-1 xmlrpc command failed
d_Achieved_torque	Nm	Achieved torque after a Tighten command has been executed
sd_Busy	True/ False	True if the Screwdriver is active

Feedback Variable	Unit	Description
sd_Command_results		0 - No additional result data 1 - Unknown command 2 - Not screwing in 3 - Timeout waiting for torque 4 - Torque exceeded prematurely 5 - Unable to loosen screw 6 - Shank reached the end 7 - Shank obstructed during move
sd_Command_res_msg		Shows a short description of the error if any occurred during the operation
sd_Current_torque	Nm	Current torque the Screwdriver is applying at the moment
sd_Process_NOK	True/ False	True if the command was not executed correctly
sd_Process_OK	True/ False	True if the command was executed correctly
sd_Target_torque	Nm	Last Tighten command Target torque after it has been executed
sd_Torque_gradient	Nm/rad	Achieved torque gradient after a Tighten command has been executed
sd_Error_code		8 - Error: not calibrated 16 - Initialize: Shank stall current not reached 32 - Initialize: No shank index mark found 48 - Initialize: Unable to home shank 64 - Initialize: Invalid shank index mark found 80 - Initialize: No torque index mark found 96 - Initialize: Torque difference overflow 112 - Initialize: Index mark value has changed 256 - Wrong Quick Changer type 512 - Wrong power supply type
sd_Error_code_msg		Shows a short description of the error if any occurred during the operation

6.6. Application Examples

6.6.1. Screwdriver

Below a simple **Screw in application** is explained:

Lines 2 - 7: the robot moves to the screw feeder and wait for a digital input signal from the screw feeder saying that the screw is ready to be picked up.



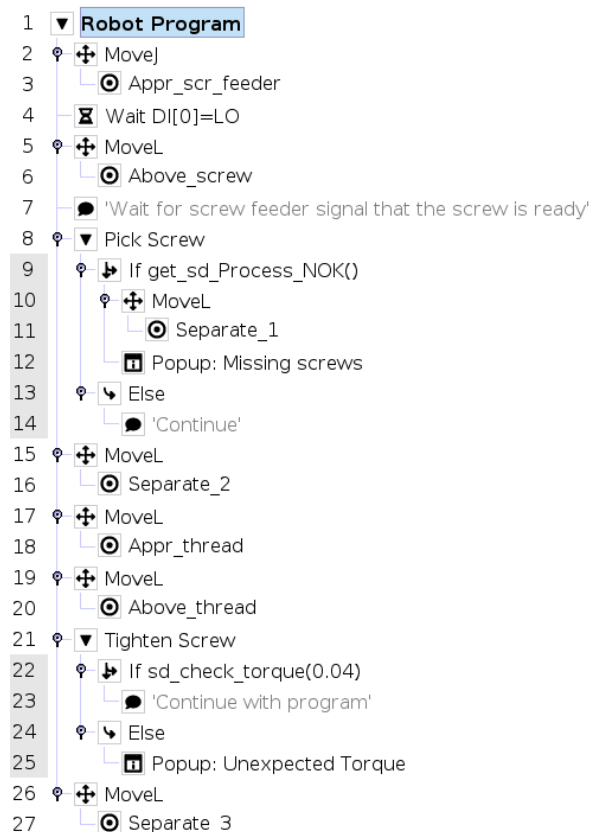
NOTE:

The screwdriver's bit should be at least 50 mm away from the picking point until the screw is waiting in place. Otherwise, the magnetic force of the Screw-bit system will attract the screw sidewise and it might cause a misalignment between the screw and the bit.

Lines 8 -14: the `Pick Screw` command is executed. If the command is not successful, the robot will move to separate from the screw feeder and a popup will be displayed saying "Missing screws". Else the robot program will continue.

Lines 15 - 22: the robot moves from the screw feeder to the thread

Lines 21 - 27: the `Tighten Screw` command is executed. An if statement will check that the achieved torque is within the range of the target torque +/- the tolerances. The tolerances in this case are 0.04 Nm. If the achieved torque is within range, the condition will return true and the program will continue. Else a popup will be displayed saying "Unexpected Torque".



7. Additional Software Options

7.1. Compute Box/Eye Box

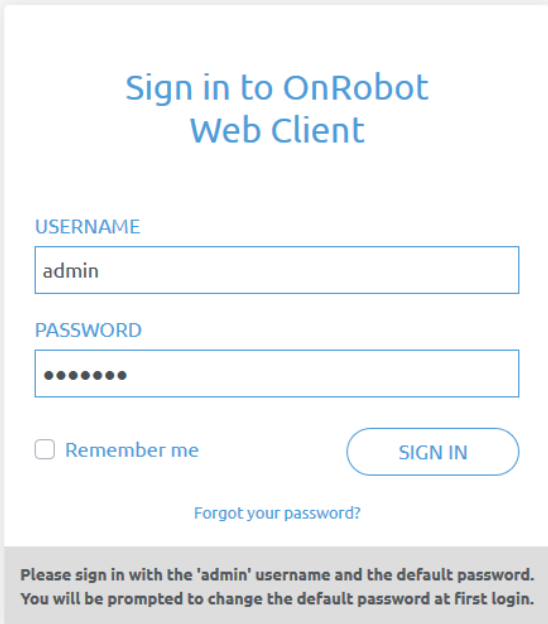
7.1.1. Web Client

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

Then do the following steps:

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

The Sign-in page opens:



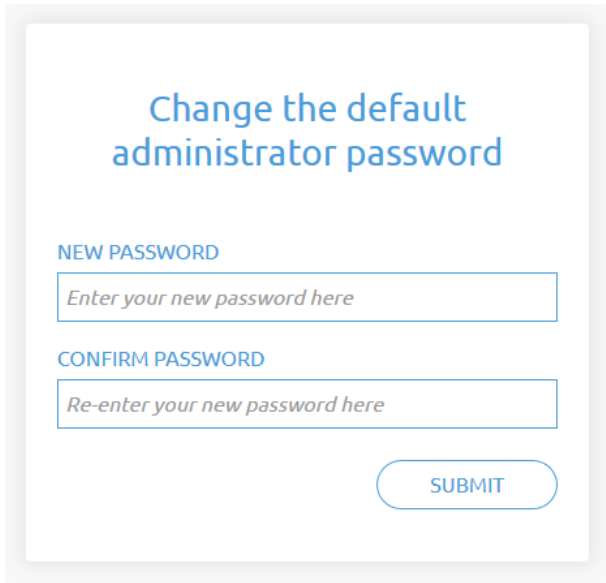
The screenshot shows the 'Sign in to OnRobot Web Client' page. It features a title, two input fields for 'USERNAME' (containing 'admin') and 'PASSWORD' (masked with dots), a 'Remember me' checkbox, and a 'SIGN IN' button. Below the button is a link for 'Forgot your password?'. At the bottom, a grey box contains the text: '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:

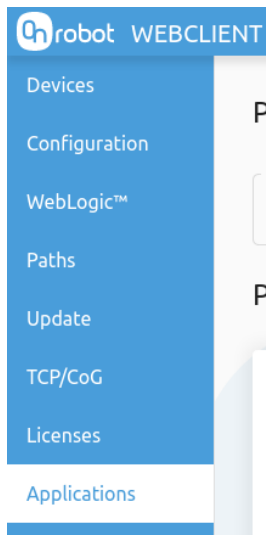
Username: admin

Password: OnRobot

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



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




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

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






-  Select the language of the Web Client

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

7.1.2. Web Client: Devices Menu

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

Please select from the detected device(s):

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

7.1.2.1. Screwdriver

Monitor and control

Monitor and control
Settings
Device info

States

Current torque	0.051 Nm
Shank position	0.11 mm
Busy	<input type="radio"/>
Safety triggered	<input type="radio"/> ENABLE
Last screwing result	-
Current extender length	0 mm

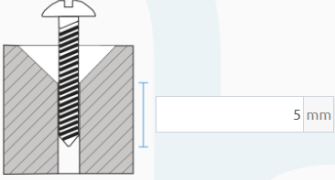
Pick screw

SCREW LENGTH

mm

Pre-mount screw

Screwing length= 5 mm



TORQUE LIMIT

Nm ?

Tighten / Loosen screw

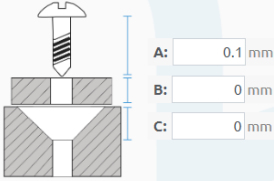
☐ Self-tapping

SCREW TYPE

TIGHTENING TORQUE

Nm

Screwing length = A-B-C: 0.1 mm



Move shank

SHANK POSITION

mm

States

- **Current torque:** Shows the current torque.
- **Shank position:** Shows the current shank position.
- **Busy:** The Screwdriver is in motion.
- **Safety triggered:** Shows if the mechanical protective feature has been triggered.
 - **Enable:** Press to enable the Screwdriver after the mechanical protective feature has been triggered.
- **Last screwing result:** Will show additional results such as:
 - - (no error)
 - Not screwing in
 - Timeout waiting for torque
 - Torque exceeded prematurely
 - Unable to loosen screw
 - Shank reached the end
 - Shank obstructed during move
- **Current extender length:** Shows the length of the bit extender when it is used.

Pick Screw

- **Screw length:** Input the length of the screw that will be picked up.
- **Run:** Press to execute the Screwdriver command.
- **Stop:** Press to stop the Screwdriver command that is executed at that time.

Pre-mount screw



NOTE:

Pre-mount can only be used with machine screws and not with self-tapping screws.

- **Screwing length:** Input the target screwing length.
- **Torque limit:** Input the target tightening torque. The torque limit defines the maximum torque the Screwdriver can reach during the pre-mounting action.
- **Run:** Press to execute the Screwdriver command.
- **Stop:** Press to stop the Screwdriver command that is executed at that time.

Tighten / Loosen screw

- **Self-tapping:** When selected, the Screwdriver will use 85% of the final torque and up to 3 Nm during the self-tapping phase. Then it will apply the set tightening torque for the final tightening phase.



NOTE:

For self-tapping screws, a hole is needed according to the screw manufacturer, as the Screwdriver can only create a thread in the hole but not the hole itself.

- **Screw type:** The screw sizes can be selected from the list. This selection will autofill the standard torque value for that particular screw type.

- **Tightening Torque:** Input the set tightening torque.

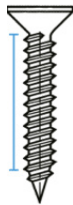
**NOTE:**

Use a chamfer for better reliability when making the screw hole.

- **Screwing length = A-B-C:** The resulting screwing length is shown here. This is the amount of the screw that will be screwed into/unscrewed from the thread. To set the value use input fields below and the resulting amount will be **A** (screw length) - **B** (Washer thickness) - **C** (Chamfer deepness).

The image shows 3 different lengths:

- **A** = This is the screw length, distance from the bottom to the head of the screw.



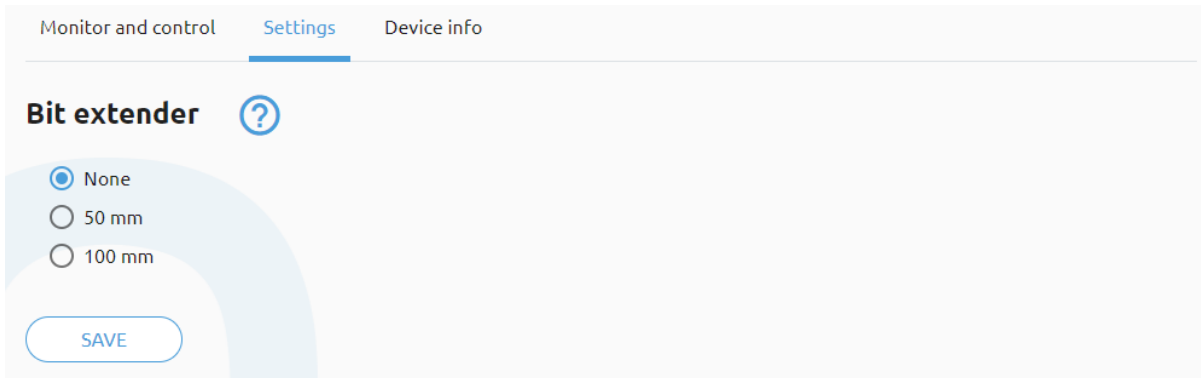
When using pointing screws, measure the screw length from the head of the screw to the bottom where the pointing part begins.

- **B** = This is the washer thickness (or piece in between screw and thread), if no piece is used, set it as 0. This amount will be subtracted from the Screw length to provide the resulting Screwing length.
- **C** = This is the chamfer deepness. This amount will be subtracted from the Screw length to provide the resulting Screwing length.
- **Tighten:** When this command is executed, the Screwdriver will move and rotate the Screw-bit System until it reaches the thread. Then, it will start to screw in the screw until 90% of the Screwing length is inside the thread. During the rest 10% of the Screwing length, the Screwdriver will tighten the screw applying the Target torque. If **Self-tapping** is selected, the Screwdriver will behave as described above in the **Self-tapping** description.
- **Loosen:** When this command is executed, the Screwdriver will move and rotate the bit to align it with the screw head. Then, it will loosen and unscrew the screw until it is out the thread (specified screwing length). Afterwards, it will hide the Screw-bit System inside the housing.
- **Stop:** This will stop the Screwdriver command that is executed at that time.

Move Shank

- **Shank position:** Changes the position of the shank immediately.

Settings



Monitor and control **Settings** Device info

Bit extender ?

☒ None
☐ 50 mm
☐ 100 mm

SAVE

Bit extender

When a Bit extender is selected, the shank position range will change accordingly:

- **None:** 0 - 55 mm
- **50 mm:** 50 - 105 mm
- **100 mm:** 100 - 155 mm

Saving any parameters on the **Settings** tab automatically applies the changes to the device.

Device info

By navigating to this page, the device status is shown.

The possible error codes are the following:

- ERROR_SD_STATUS_8 - Not calibrated
- ERROR_SD_STATUS_16 - Init: Shank stall current not reached
- ERROR_SD_STATUS_32 - Init: No shank index mark found
- ERROR_SD_STATUS_48 - Init: Unable to home shank
- ERROR_SD_STATUS_64 - Init: Invalid shank index placement
- ERROR_SD_STATUS_80 - Init: No torque index mark found
- ERROR_SD_STATUS_96 - Init: Torque difference overflow
- ERROR_SD_STATUS_112 - Init: Index mark value has changed
- ERROR_SD_STATUS_256 - Wrong Quick Changer type
- ERROR_SD_STATUS_512 - Wrong power supply type
- ERROR_SD_STATUS_768 - ERROR_SD_STATUS_256 and ERROR_SD_STATUS_512 show up at the same time.


7.1.3. Web Client: Configuration Menu

Configuration

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

CAUTION

Incorrect settings may cause the device to lose network connectivity.



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

NETWORK SETTINGS

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

[SAVE](#)

☐ **ETHERNET/IP SCANNER SETTINGS**

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

[SAVE](#)

COMPUTE BOX / EYE BOX SETTINGS

Display name
✎

[SAVE](#)

Clock delay
0 sec
✓

[SYNCHRONIZE CLOCK](#)

ROBOT SETTINGS

Robot type	None
Robot ID	
Robot IP address	_____

[SAVE](#)

WEBLYTICS SETTINGS

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

[SAVE](#)

Network settings:

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

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

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

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

Compute Box / Eye Box settings:

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

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

EtherNet/IP scanner settings:



NOTE:

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

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

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

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

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

7.1.4. Web Client: Update Menu

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

Update

This page allows updating the software and firmware.



CAUTION

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

SOFTWARE

No update file selected yet...




BROWSE

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

FIRMWARE

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

UPDATE

 Up-to-date
  Update required
  Downgrade not supported



CAUTION:

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

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

Software Update

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

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

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

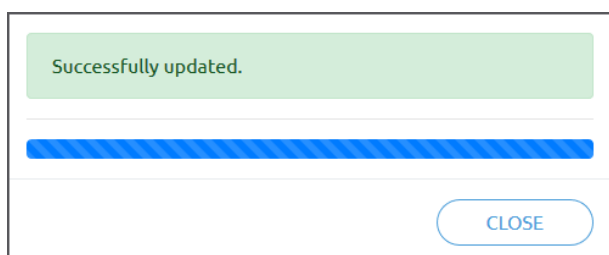
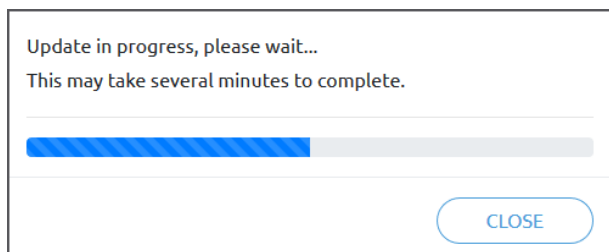
If the update is finished and was successful, the message below is shown.

Firmware Update

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

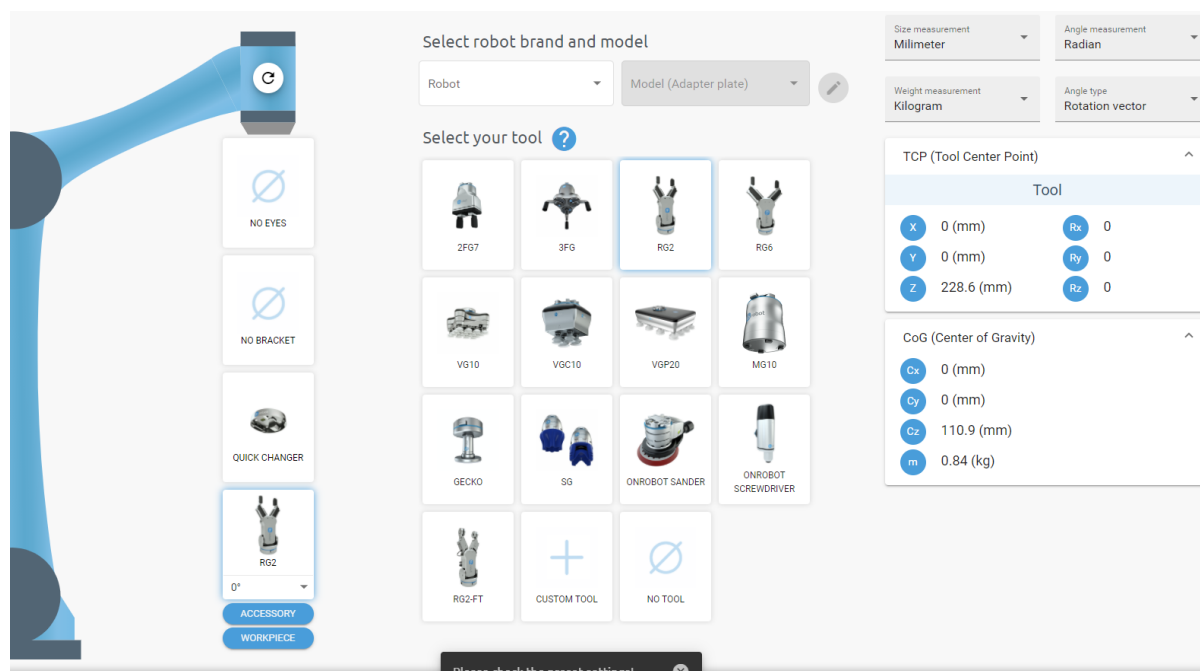
Click on **Update** in the firmware section of the page to start the firmware update process.

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



7.1.5. Web Client: TCP/CoG

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




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

**NOTE:**

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

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

Click on  to set custom Adapter plate settings.

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

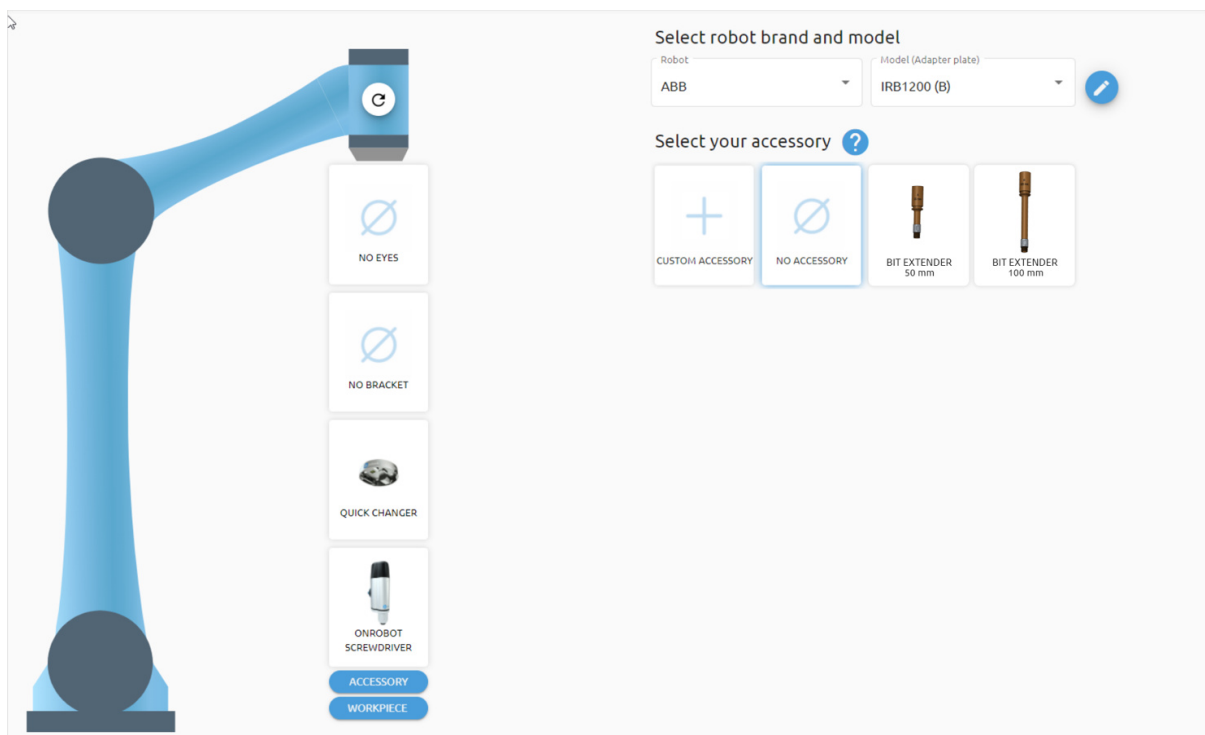
Click on  to get help about how to enter the values.

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

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

7.1.5.1. Screwdriver

By clicking on **Accessory** you can select the Screwdriver Bit extenders. There are two options to select from: 50 mm and 100 mm Bit extender.



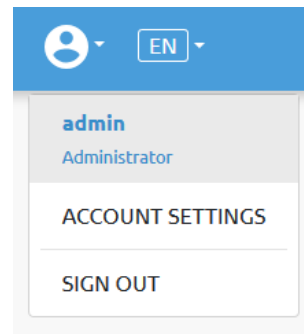
When a Bit extender is selected, the TCP will be offset by the Bit extender's length and the shank position range will change accordingly:

- None: 0 - 55 mm
- Bit extender 50mm: 50 - 105 mm
- Bit extender 100mm: 100 - 155 mm

7.1.6. Web Client: Account Settings

This menu can be used to:

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



Account settings:

This page has two tabs:

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

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

Account settings

This page allows modifying your user profile.

[My profile](#)

[Users](#)



admin

Administrator

First name

Last name

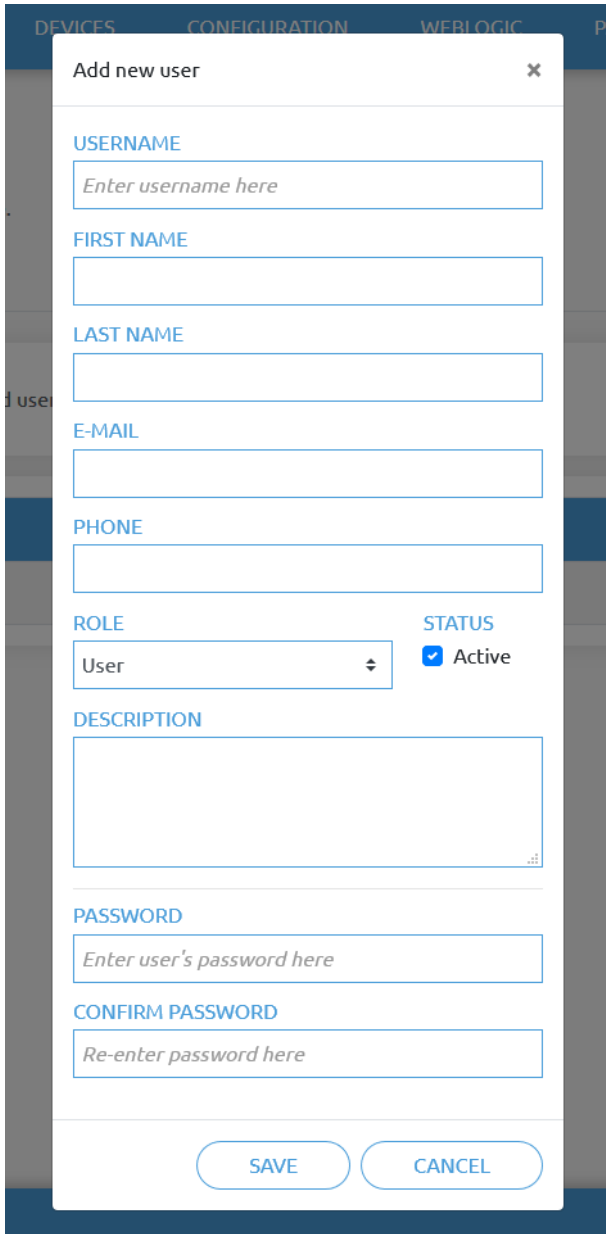
E-mail

Phone

Description

UPDATE PROFILE


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



There are three user levels:

- Administrator
- Operator
- User

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

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




Account settings

This page allows modifying your user profile.


My profile [Users](#)

ADD NEW USER

You can add user on your network to monitor and control the devices.

USERNAME	ROLE	FIRST NAME	LAST NAME	E-MAIL	PHONE	ACTIVE	
admin	Administrator					<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.

8. Hardware Specification



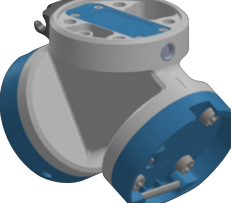
8.1. Technical Sheets

8.1.1. Quick Changers

Quick Changer

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

Dual Quick Changer

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

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

Technical data	Min	Typical	Max	Units
Permissible force *	-	-	600*	[N]
Permissible torque *	-	-	40*	[Nm]
Rated payload *	-	-	20*	[kg]
	-	-	44	[lbs]
Repeatability	-	-	±0.02	[mm]
IP Classification	67			
Operating life (Tool change)	-	5.000	-	[cycles]

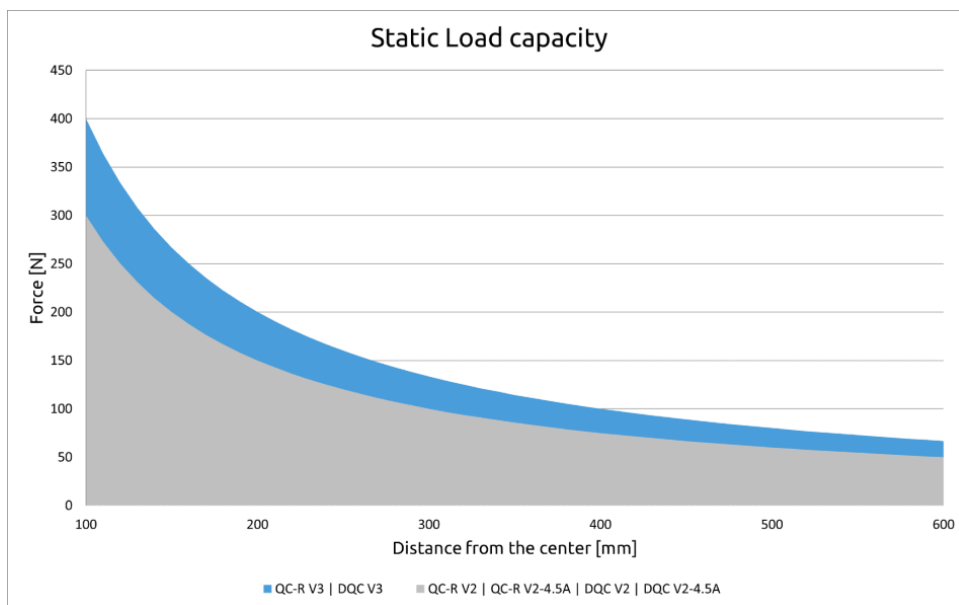
Technical data	Min	Typical	Max	Units
Operating temperature	5	-	50	[°C]
	41	-	122	[°F]

* See static load capacity graph below.

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

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

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



8.1.2. Screwdriver

General Properties		Minimum	Typical	Maximum	Unit
Tightening torque range		0.15	-	5	[Nm]
		0.11		3.68	[lbft]
Tightening torque accuracy*	If torque < 1.33 Nm/ 0.98 lbft	-	0.04 0.03	-	[Nm] [lbft]
	If torque > 1.33 Nm/ 0.98 lbft	-	3	-	[%]

General Properties	Minimum	Typical	Maximum	Unit
Self-tapping torque	-	85% of the tightening torque	3	[Nm]
Pre-mount accuracy error**	-	-	0.5	[mm]
Output speed	-	-	340	[RPM]
Screw length within full safety	-	-	35	[mm]
			1.37	[inch]
Shank stroke (screw axis)	-	-	55	[mm]
			2.16	[inch]
Shank preload (adjustable)	0	10	25	[N]
Protective feature force	35	40	45	[N]
Storage temperature	0	-	60	[°C]
	32	-	140	[°F]
Motor (x2)	Integrated, electric BLDC			
IP Classification	IP54			
ESD Safe	Yes			
Dimensions	308 x 86 x 114			[mm]
	12.1 x 3.4 x 4.5			[inch]
Weight	2.5			[kg]
	5.51			[lb]











* See [Torque Accuracy Graph](#) for further information.











** The pitch of the screw might contribute to the total pre-mount accuracy error.

Operating Conditions	Minimum	Typical	Maximum	Unit
Power supply	20	24	25	[V]
Current consumption	75	-	4500	[mA]
Operating temperature	5	-	50	[°C]
	41	-	122	[°F]
Relative humidity (non-condensing)	0	-	95	[%]
Calculated operation life	30 000	-	-	[Hours]

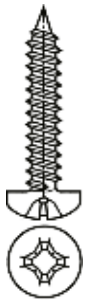
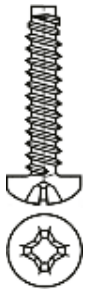

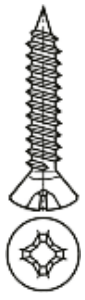
Supported Screws

Supported Screws Metric			
Material type	Magnetic		
Screw length	Up to 50 mm (35 mm thread length)		
Head type	Cylinder	Counter sunk	Button head

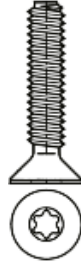
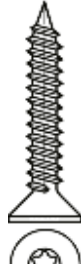
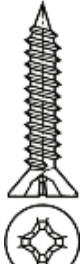
Supported Screws Metric						
Appearance						
Standard		Din 912 / ISO 4762 	ISO 14579 	ISO 14580 	ISO 14581 	DIN 7985A 
Supported Thread Size	M1.6	✓	N/A	N/A	N/A	N/A
	M2	✓	✓	N/A	✓	✓
	M2.5	✓	✓	N/A	✓	✓
	M3	✓	✓	✓	✓	✓
	M4	✓	✓	✓	✓	✓
	M5	✓	✓	✓	✓	✓
	M6	✓	✓	✓	✓	✓

Supported Screws US Standard					
Material type	Magnetic				
Screw length	Up to 1.96 inches (1.37 inches thread length)				
Head type	Cylinder	Button head		Counter sunk	
Appearance					
Standard	ASME B18.3 	ASME B18.6.3 	ASME B18.6.3 	ASME B18.3 	ASME B18.6.3 




Supported Screws US Standard						
Supported Thread Size	1#	✓	N/A	N/A	N/A	N/A
	2#	✓	✓	✓	N/A	✓
	4#	✓	✓	✓	✓	✓
	6#	✓	✓	✓	✓	✓
	8#	✓	✓	✓	✓	✓
	10#	✓	✓	✓	✓	✓
	12#	N/A	✓	✓	N/A	N/A
	1/4"	✓	N/A	N/A	✓	N/A

Supported Self-tapping Screws for Aluminium 1/2				
Material type	Magnetic			
Screw length	Up to 50 mm (35 mm thread length)			
Head type	Pan head		Flat round with flange	Lens head
Appearance				
Standard	DIN 7981 C/ ISO 7049	DIN 7981 F/ ISO 7049	WN 5251	DIN 7983 C
Thread size and Bit holder/ Bit extender	Bit, screw carrier and screw fix needed			
ST2.2 / 2.2 / KB22 / K22	✓	✓	N/A	✓
ST 2.9	✓	✓	N/A	✓
3 / M3 / KB30 / K30	N/A	N/A	✓	N/A
ST3.5.3 / 3.5 / KB35 / K35	✓	✓	✓	✓
ST 3.9	N/A	✓	N/A	N/A
4 / M4 / KB40 / K40	N/A	N/A	✓	N/A

Supported Self-tapping Screws for Aluminium 1/2				
ST 4.2	✓	✓	N/A	✓
ST 4.8	✓	N/A	N/A	✓
50 / M5 / KB50 / K50	N/A	N/A	✓	N/A
ST 5.5	✓	N/A	N/A	N/A
ST 6.3	✓	N/A	N/A	N/A

Supported Self-tapping Screws for Aluminium 2/2			
Material type	Magnetic		
Screw length	Up to 50 mm (35 mm thread length)		
Head type	Counter sunk		
Appearance			
Standard	DIN 7500 M	DIN 14586 C	DIN 7982 C
Thread size and Bit holder/ Bit extender	Bit, screw carrier and screw fix needed		
20 / M2 / K20	✓	N/A	N/A
ST2.2 / 2.2 / KB22 / K22	N/A	✓	✓
2.5 / M2.5 / KB25 / K25	✓	N/A	N/A
ST 2.9	N/A	✓	✓
3 / M3 / KB30 / K30	✓	N/A	N/A
ST3.5.3 / 3.5 / KB35 / K35	N/A	✓	✓
ST 3.9	N/A	✓	✓
4 / M4 / KB40 / K40	✓	N/A	N/A
ST 4.2	N/A	✓	✓
ST 4.8	N/A	✓	✓
50 / M5 / KB50 / K50	✓	N/A	N/A

Supported Self-tapping Screws for Aluminium 2/2			
ST 5.5	N/A	✓	✓
60 / M6	✓	N/A	N/A
ST 6.3	N/A	✓	✓

Supported Self-tapping Screws for Plastic			
Material type	Magnetic		
Screw length	Up to 50 mm (35 mm thread length)		
Head type	Counter sunk	Flat round with flange	
Appearance			
Standard	ISO 4042	WN 1411	WN 5451
Thread size and Bit holder/ Bit extender	Bit, screw carrier and screw fix needed		
20 / M2 / K20	N/A	N/A	✓
ST2.2 / 2.2 / KB22 / K22	✓	N/A	✓
2.5 / M2.5 / KB25 / K25	✓	✓	✓
3 / M3 / KB30 / K30	✓	✓	✓
ST3.5.3 / 3.5 / KB35 / K35	✓	✓	N/A
4 / M4 / KB40 / K40	✓	✓	✓
50 / M5 / KB50 / K50	N/A	✓	✓
60 / M6	N/A	N/A	✓

Guidance on Achievable Depth for Self-tapping Screws

How deep a screw can be self-tapped highly depends on the screw material and the workpiece material. There are three examples below of what the maximum depth is for a specific screw to go into a specific material.

Example of WN 1411 in POM

Screw Size	Depth
K18x10	10
K20x10	10
K22x16	16
K25x16	16
K30x20	20
K35x30	30
K40x30	30
K50x30	30

Example of WN 1411 in NYLON PA Type 6

Screw Size	Depth
K18x10	10
K20x10	10
K22x16	16
K25x16	16
K30x20	20
K35x30	30
K40x30	30
K50x30	30

Example of DIN 7500 M in Aluminium EN AW-5754

Screw Size	Depth
M2x12	12
M2.5x20	20
M3x30	25
M4x30	30

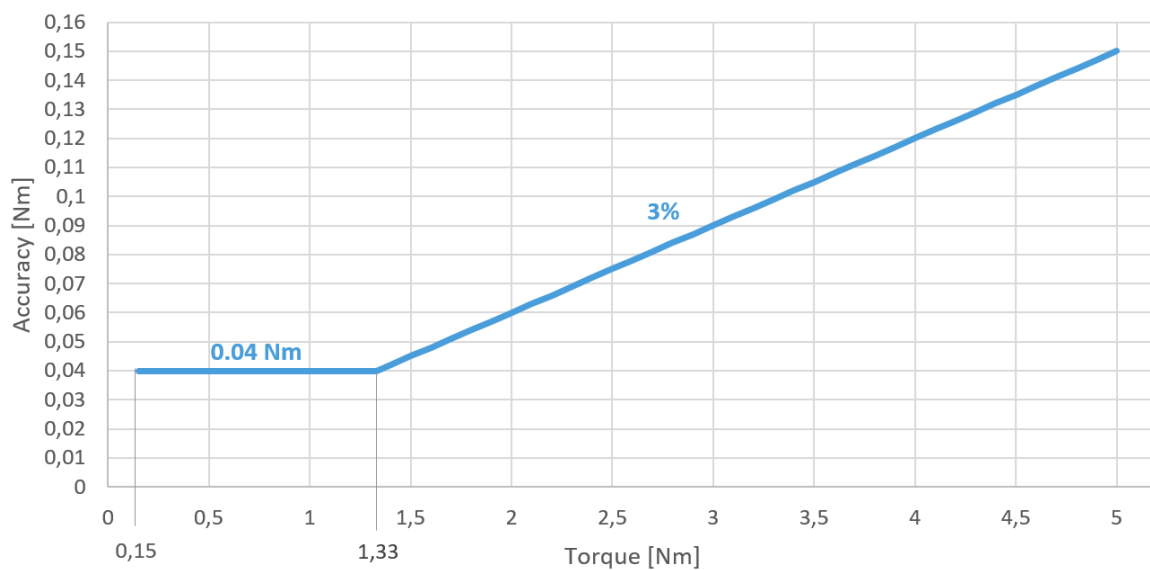
Screw Size	Depth
M5x30	30
M6x30	11

There are three potential outcomes when testing a self-tapping screw:

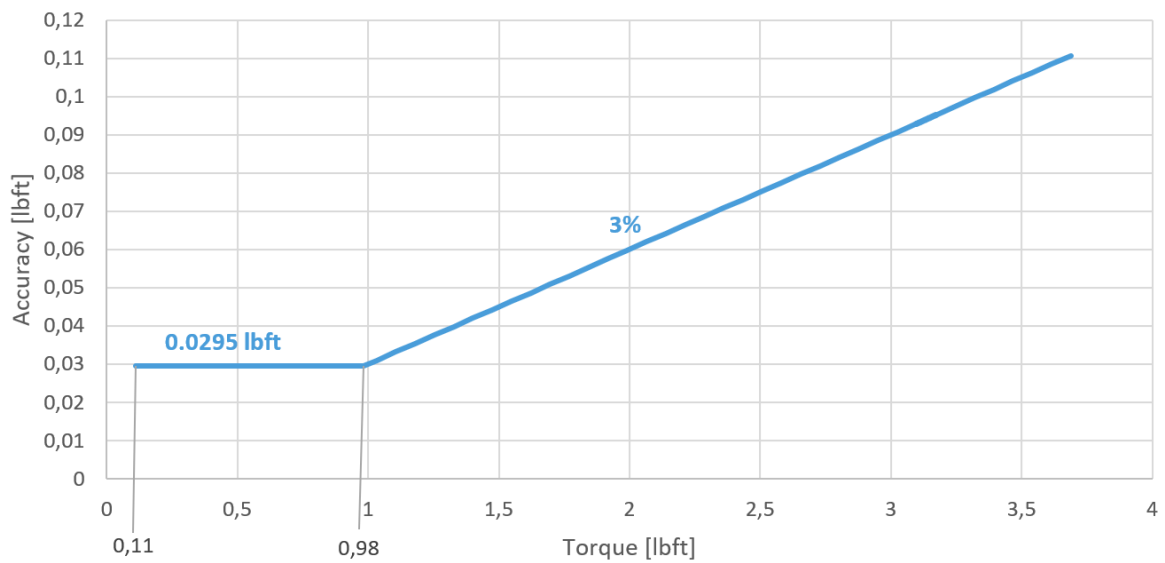
1. The screw goes all the way in and is tightened with the set target torque. This is successful operation.
2. The screw breaks while screwing in and the Screwdriver returns a result code / runtime error: 10 - "Torque dropped unexpectedly". This means that the screw cannot handle such high torque on a material that hard.
3. The Screwdriver stops halfway through and returns a result code / runtime error: 4 - "Torque exceeded prematurely". This means that a higher torque is needed to go through that material with that screw. A solution could be to set a higher tightening torque.

For a successful tapping, ensure that the hole is made according to the screw manufacturer specifications.

Torque accuracy Metric



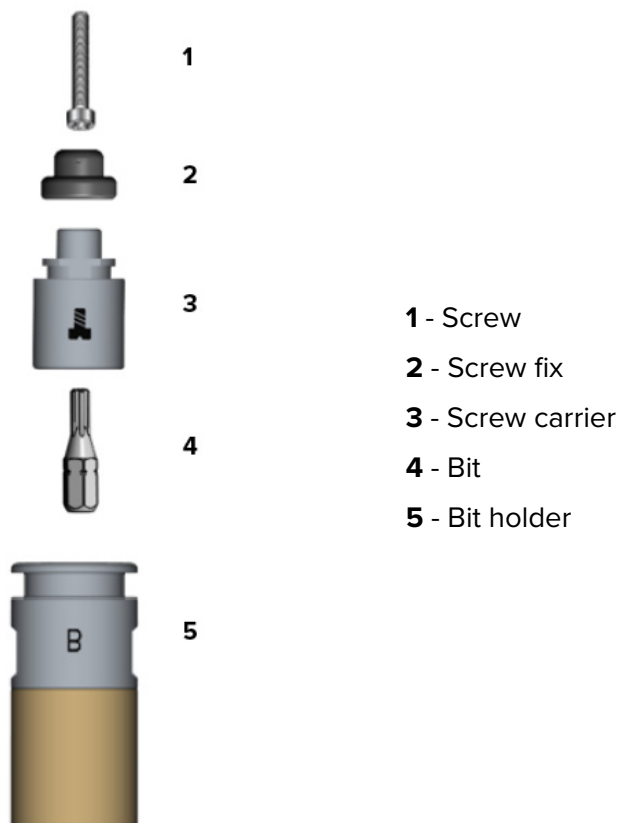
Torque accuracy US Standard



Screw-bit System

This system will highly increase the efficacy of the screws to be picked up, aligned with the bit, moved around with the Screwdriver and screwed in/out. Therefore, it is highly recommended to set up the Screw-bit System correctly to keep a high success rate.

Example of the Screw-bit System for an ISO 14579, M2 screw.



The following sections explain the different components of the Screw-bit System and how to set it up correctly.

Screws

The first step is to know what type of screw is going to be used. The screw type will define what type of screw fix (in any), screw carrier, bit, and bit holder shall be used.



NOTE:

Use a chamfer for better reliability when making the screw hole.




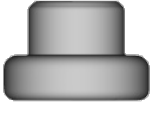


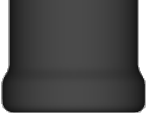
The recommended screw types for the Screwdriver are the ones that have the properties mentioned previously in the [Supported Screws](#) tables.








Screw Fix and Screw Carrier

Select the right screw fix and screw carrier depending on the screw type and the size to maximize the efficacy of the Screw-bit System based on the table in section:



- [Metric Screws](#)
- [US Standard Screws](#)
- [Self-tapping Screws for Aluminium](#)
- [Self-tapping Screws for Plastic](#)

The screw fixes are needed for the DIN 912, ISO 4762, ISO 14579, ISO 14580, DIN 7981C / ISO 7049, DIN 7981F / ISO 7049, WN 5251, WN 1411, WN 5451 and ASME B18.3 HEX Cylinder screw types. The screw fixes have signifiers to show what size of screw they support.

Screw fixes for Metric - DIN 912, ISO 4762, ISO 14579, ISO 14580, DIN 7981C / ISO 7049, DIN 7981F / ISO 7049, WN 5251, WN 1411, WN 5451						
M1.6	M2	M2.5	M3	M4	M5	M6
						

Screw fixes for US Standard - ASME B18.3 HEX Cylinder, DIN 7981C / ISO 7049, DIN 7981F / ISO 7049, WN 5251, WN 5451						
1#	2#	4#	6#	8#	10#	1/4"
						

The screw carriers also have signifiers to help identifying what screw type and size they can be used with.


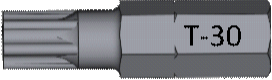
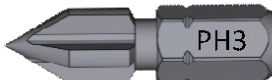
Screw thread size	Screw type illustration
	

Bits

Select the right bit depending on the screw type and size to maximize the efficacy of the Screw-bit System based on the table in section:

- [Metric Screws](#)
- [US Standard Screws](#)
- [Self-tapping Screws for Aluminium](#)
- [Self-tapping Screws for Plastic](#)

The bits have signifiers to help identifying what bit type and size they are.

Screw type standard	Shows bit size and type
Din 912 / ISO 4762 ASME B18.3 HEX Cylinder	
ISO 14579 ISO 14580 ISO 14581 DIN 7500 M DIN 14586 C WN 5251 ISO 4042 WN 5451 ASME B18.6.3 Torx Button head ASME B18.6.3 Torx Counter sunk	
DIN 7985A DIN 7981C / ISO 7049 DIN 7981F / ISO 7049 DIN 7982 C DIN 7983 C WN 1411 ASME B18.6.3 Cross recessed Button head	

Supported bit shank properties:

- Type 1/4" HEX
- Length 25 mm



NOTE:

Bits longer than 25 mm could be used. However, the screw carrier and the screw fix might not hold the screw properly in place.

Bit Holder

Select the right bit holder depending on the screw type and size to maximize the efficacy of the Screw-bit System based on the table in section:

- [Metric Screws](#)
- [US Standard Screws](#)
- [Self-tapping Screws for Aluminium](#)
- [Self-tapping Screws for Plastic](#)

The bit holder generates a magnetic force that will keep the screw attached and aligned to the bit.

There are two types of bit holders:

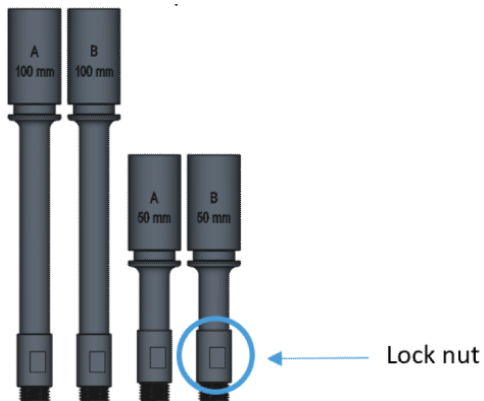
- **Bit Holder A:** Generates a higher magnetic force. It is commonly used for the bigger and heavier screws.
- **Bit Holder B:** Generates a lower magnetic force. It is commonly used for the smaller and lighter screws.

**WARNING:**

If Bit Holder A is used for smaller and lighter screws instead of Bit Holder B, the screws can jump from the Screw Feeder to the Screwdriver because of the higher magnetic force.

Bit Extenders 50 and 100 mm

The bit extenders are a long version of the previously described bit holders. Bit extenders are useful to reach narrow spaces.



The bit extenders have a lock nut to tighten against the screw carrier to ensure that the screw carrier does not move out of position over time.

When the bit extenders are mounted on the Screwdriver, the maximum total radial runout can be up to 0.5 mm (measured below the thread as shown in the following picture).



The bit extenders need to be purchased separately by contacting your vendor where the Screwdriver was purchased.

- Bit extender type A 50 mm - PN 109301
- Bit extender type B 50 mm - PN 109289
- Bit extender type A 100 mm - PN 109290
- Bit extender type B 100 mm - PN 109298

For more information on the mechanical dimensions, go to the [8.2.2.1. Mechanical Drawings](#) section.

Set up the Screw-bit System

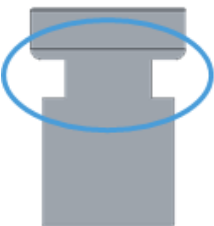
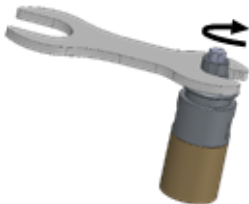
1. Place the bit into the bit holder.

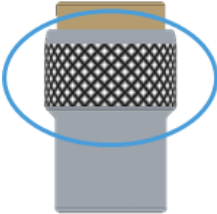
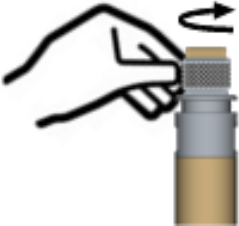







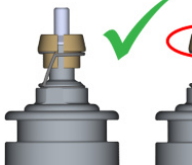
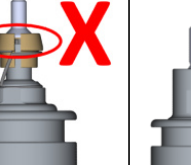
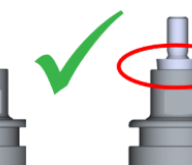

2. Place the screw carrier on the bit holder.



3. All screw carriers must be adjusted so that the screw head sits stable on the screw carrier avoiding a gap in between. This needs to be done to ensure high performance of the Screw-bit System.
See the pictures below as reference.

Appearance	Adjustment method
	





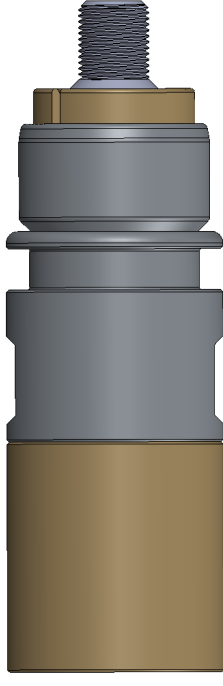

Appearance	Adjustment method
	

Din 912 / ISO 4762 / ISO 14579 / ISO 14580 / ASME B18.3 Hex Cylinder		ISO 14581 / ASME B18.6 HEX Counter sunk / ASME B18.6.3 Torx Counter sunk		DIN 7985A / ASME B18.6.3 Cross recessed Button head / ASME B18.6.3 Torx Button head	
 	 	 			

4. When this is achieved, remove the screw and push in the screw fix (only Din 912, ISO 4762, ISO 14579, ISO 14580 and ASME B18.3 HEX Cylinder screw types).



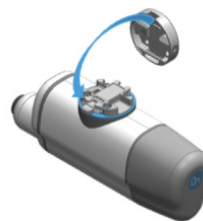
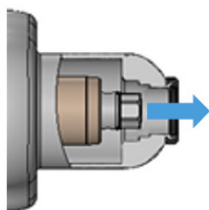
The final setup of the Screw-bit System with the screw in place should look like in the pictures below.

Screw standard	Din 912 / ISO 4762 / ISO 14579 / ISO 14580 / ASME B18.3 Hex Cylinder		ISO 14581 / ASME B18.6 HEX Counter sunk / ASME B18.6.3 Torx Counter sunk		DIN 7985A / ASME B18.6.3 Cross recessed Button head / ASME B18.6.3 Torx Button head	
Screw-bit System appearance						

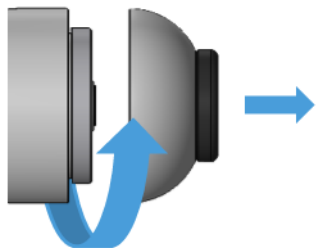
Attaching the Screw-bit System to the Screwdriver

To attach the Screw-bit System to the Screwdriver, follow the instructions below.

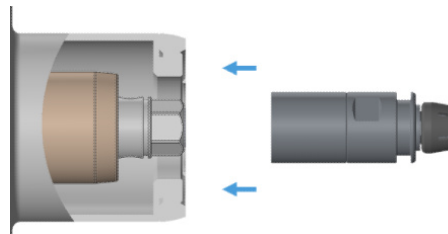
1. Move the shank to the highest possible value by using the user interface in the robot or in the Web Client.
2. Detach the Screwdriver from the Quick Changer.



3. Remove the lid.



4. Place the hex shape of the bit holder inside of the end of the Screwdriver's shank. The system will be attached to the Screwdriver by a magnetic force.

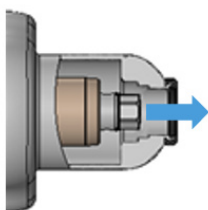


5. Ensure that the bit holder is perfectly attached by gently shaking it to make sure it is not loose.

Detaching the Screw-bit System from the Screwdriver

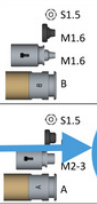
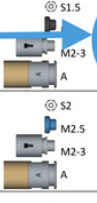
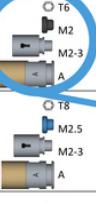
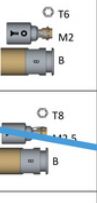
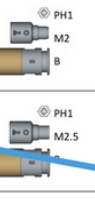
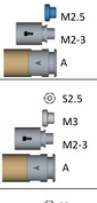
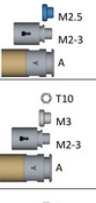
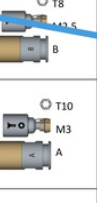
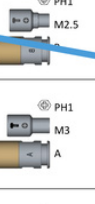
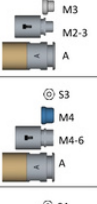
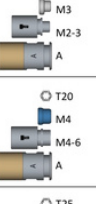
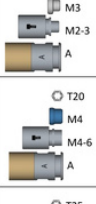
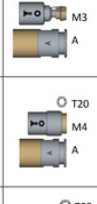
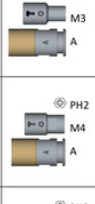
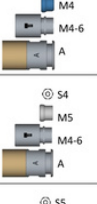
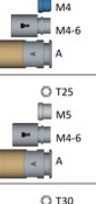
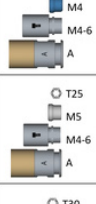
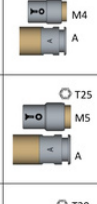
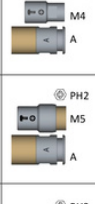
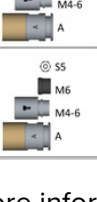
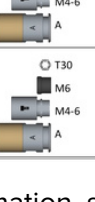
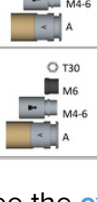
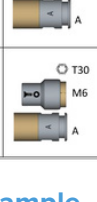
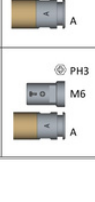
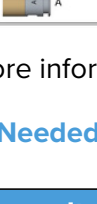
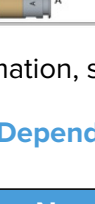
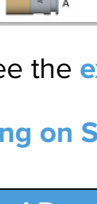
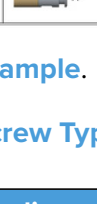

To remove the Screw-bit System from the Screwdriver's shank, follow the instructions below.

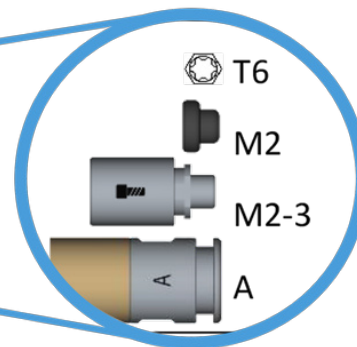
1. Move the shank all the way out to the highest possible value by operating the user interface in the robot or in the Web Client.
2. Use the provided key to grab the bit holder. While holding the key, move the shank inwards (to a lower value) by operating the user interface in the robot or in the Web Client.



Overview of the Items Needed Depending on the Screw Type and Size






In the following tables, an overview is shown of the items needed depending on the screw type and size. Based on what screw type and size you have, search for the screw standard and the thread size and find what kind of bit, screw fix, screw carrier and bit holder you will need.

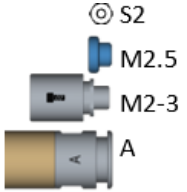
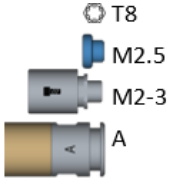
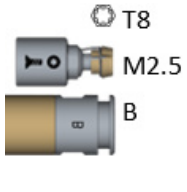
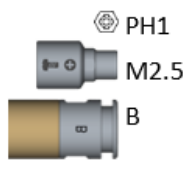
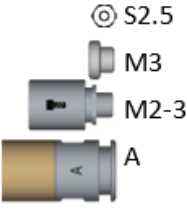
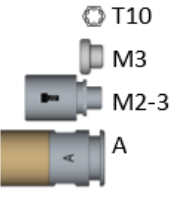
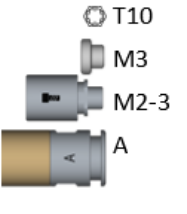
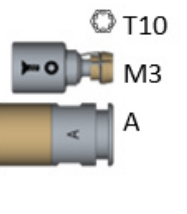
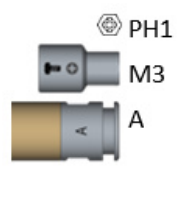
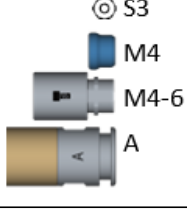
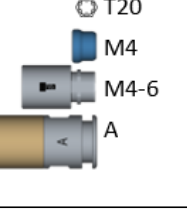
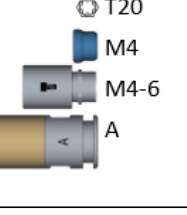
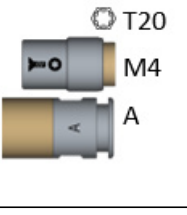
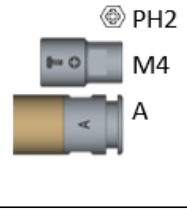
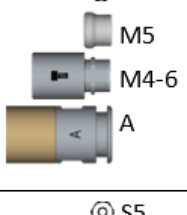
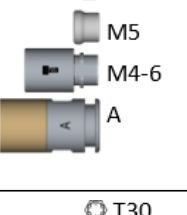
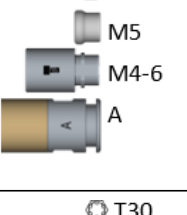
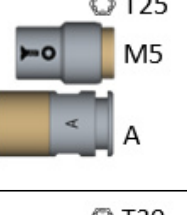
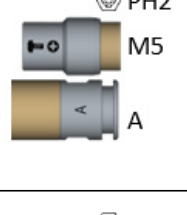
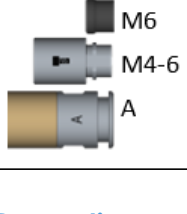
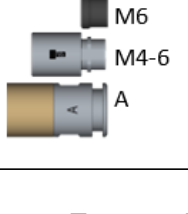
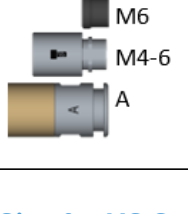
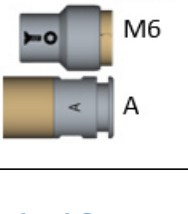
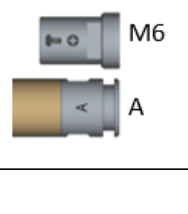
Items Needed Depending on Screw Type and Size for Metric Screws					
Head type	Cylinder			Counter sunk	Button head
Screw Standard	Din 912 / ISO 4762	ISO 14579	ISO 14580	ISO 14581	DIN 7985A
Thread Size	Bit holder, bit, screw carrier and screw fix needed				
M1.6		N/A	N/A	N/A	N/A
M2			N/A		
M2.5			N/A		
M3					
M4					
M5					
M6					








For more information, see the [example](#).



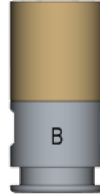




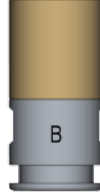



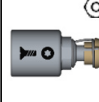
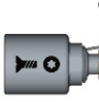




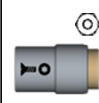





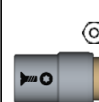


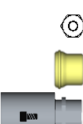


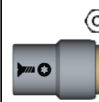




Items Needed Depending on Screw Type and Size for Metric Screws

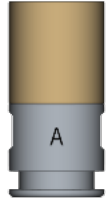



Items Needed Depending on Screw Type and Size for Metric Screws					
Head type	Cylinder			Counter sunk	Button head
Screw standard	Din 912 / ISO 4762	ISO 14579	ISO 14580	ISO 14581	DIN 7985A
Thread Size	Bit holder, bit, screw carrier and screw fix needed				
M1.6		N/A	N/A	N/A	N/A
M2			N/A		

Items Needed Depending on Screw Type and Size for Metric Screws					
M2.5	 S2 M2.5 M2-3 A	 T8 M2.5 M2-3 A	N/A	 T8 M2.5 B	 PH1 M2.5 B
M3	 S2.5 M3 M2-3 A	 T10 M3 M2-3 A	 T10 M3 M2-3 A	 T10 M3 A	 PH1 M3 A
M4	 S3 M4 M4-6 A	 T20 M4 M4-6 A	 T20 M4 M4-6 A	 T20 M4 A	 PH2 M4 A
M5	 S4 M5 M4-6 A	 T25 M5 M4-6 A	 T25 M5 M4-6 A	 T25 M5 A	 PH2 M5 A
M6	 S5 M6 M4-6 A	 T30 M6 M4-6 A	 T30 M6 M4-6 A	 T30 M6 A	 PH3 M6 A

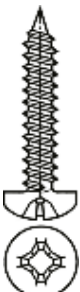
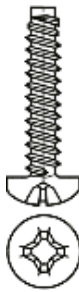

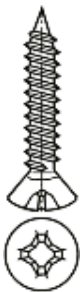
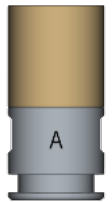







Items Needed Depending on Screw Type and Size for US Standard Screws











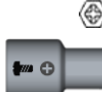











Items Needed Depending on Screw Type and Size for US Standard Screws					
Head type	Cylinder	Button head		Counter sunk	
Screw standard	ASME B18.3 	ASME B18.6.3 	ASME B18.6.3 	ASME B18.3 	ASME B18.6.3 
	HEX	Cross recessed	Torx	HEX	Torx
Thread Size	Bit holder, bit, screw carrier and screw fix needed				


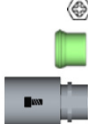













Items Needed Depending on Screw Type and Size for US Standard Screws					
1# 	 H1/16" 1#	N/A	N/A	N/A	N/A
2# 	 H5/64" 2#-6#	 PH1 2#	 T8 2#	N/A	 T6 2#
4# 	 H3/32" 2#-6#	 PH1 4#	 T10 4#	 H1/16" 4#	 T8 4#
6# 	 H7/64" 2#-6#	 PH1 6#	 T15 6#	 H5/64" 6#	 T10 6#
8# 	 H9/64" 8#-1/4"	 PH2 8#	 T20 8#	 H3/32" 8#	 T15 8#
10# 	 H5/32" 8#-1/4"	 PH2 10#	 T25 10#	 H1/8" 10#	 T20 10#
12# 	N/A	 PH3 12#	 T27 12#	N/A	N/A

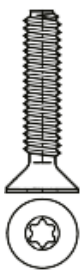
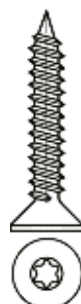
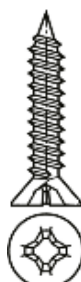
Items Needed Depending on Screw Type and Size for US Standard Screws					
 1/4"	 H3/16"  8#-1/4"	N/A	N/A	 T30 1/4"	N/A


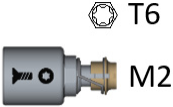


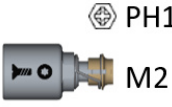

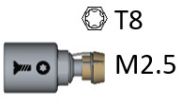




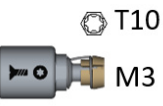


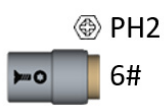
Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium

















Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 1/2				
Head type	Pan head		Flat round with flange	Lens head
Appearance				
Standard	DIN 7981 C/ ISO 7049	DIN 7981 F/ ISO 7049	WN 5251	DIN 7983 C
Thread Size	Bit, screw carrier and screw fix needed			
ST2.2 / 2.2 / KB22 / K22 	 PH1 M2	 PH1 M2	N/A	 PH1 M2
ST 2.9 	 PH1 4#	 PH1 4#	N/A	 PH1 4#






Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 1/2				
3 / M3 / KB30 / K30 	N/A	N/A	 T10  M4  M4-6	N/A
ST3.5.3 / 3.5 / KB35 / K35 	 PH2 6#	 PH2 6#	 T10  M4  M4-6	 PH2 6#
ST 3.9 	N/A	 PH2  M4-6	N/A	N/A
4 / M4 / KB40 / K40 	N/A	N/A	 T20  M5  M4-6	N/A
ST 4.2 	 PH2 8#	 PH2 8#	N/A	 PH2 M4

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 1/2				
ST 4.8 	 PH2  8#-1/4"	N/A	N/A	 PH2  10#
50 / M5 / KB50 / K50 	N/A	N/A	 T25  M6  M4-6	N/A
ST 5.5 	 PH3  12#	N/A	N/A	N/A
ST 6.3 	 PH3  M6	N/A	N/A	N/A





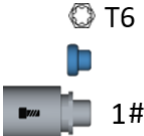


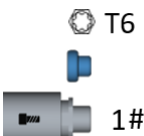
Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 2/2			
Head type	Counter sunk		
Appearance			
Standard	DIN 7500 M	DIN 14586 C	DIN 7982 C






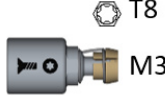








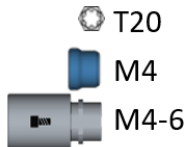


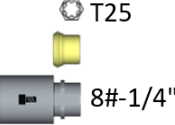


Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 2/2			
Thread Size	Bit, screw carrier and screw fix needed		
20 / M2 / K20 		N/A	N/A
ST2.2 / 2.2 / KB22 / K22 	N/A		
2.5 / M2.5 / KB25 / K25 		N/A	N/A
ST 2.9 	N/A		
3 / M3 / KB30 / K30 		N/A	N/A
ST3.5.3 / 3.5 / KB35 / K35 	N/A		

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 2/2			
ST 3.9 	N/A		
4 / M4 / KB40 / K40 		N/A	N/A
ST 4.2 	N/A		
ST 4.8 	N/A		
50 / M5 / KB50 / K50 		N/A	N/A
ST 5.5 	N/A		

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 2/2			
60 / M6 		N/A	N/A
ST 6.3 	N/A		

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Plastic

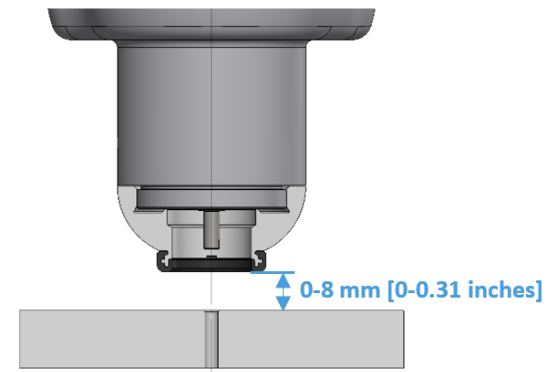
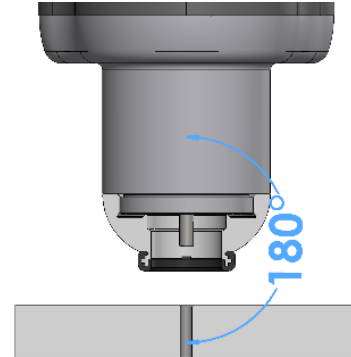
Items Needed Depending on Screw Type and Size for Self-tapping Screws for Plastic			
Head type	Counter sunk		Flat round with flange
Appearance			
Standard	ISO 4042	WN 1411	WN 5451
Thread size and Bit holder/ Bit extender	Bit, screw carrier and screw fix needed		
20 / M2 / K20 	N/A	N/A	
ST2.2 / 2.2 / KB22 / K22 		N/A	

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Plastic			
2.5 / M2.5 / KB25 / K25 			
3 / M3 / KB30 / K30 			
ST3.5.3 / 3.5 / KB35 / K35 			N/A
4 / M4 / KB40 / K40 			
50 / M5 / KB50 / K50 	N/A		
60 / M6 	N/A	N/A	

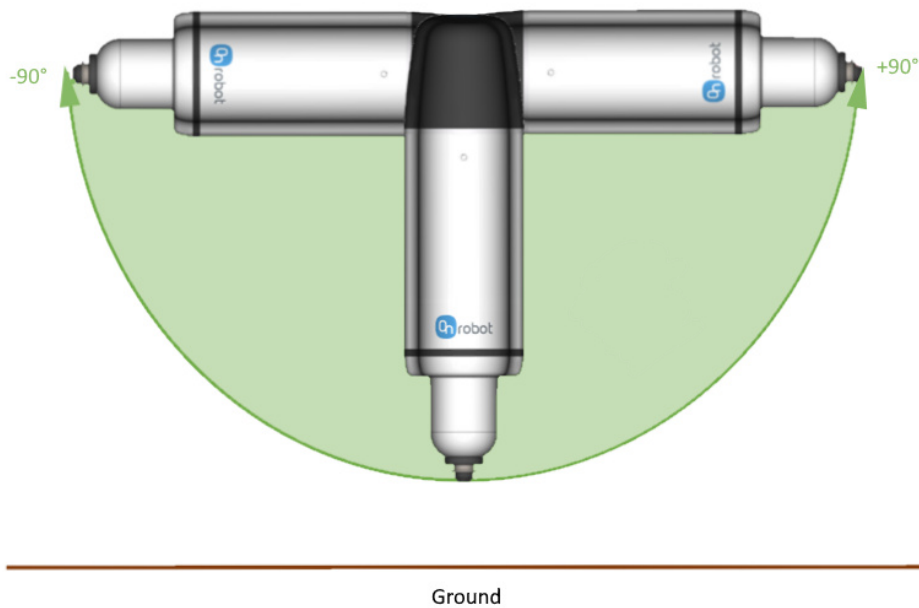
Screwdriver Position to Execute Commands

To successfully execute the Screwdriver commands, it is fundamental to position the Screwdriver correctly. This is achieved if the following two conditions are met:

1. The Screw-bit System must be perfectly aligned to the screw or thread.
2. The distance between the Screwdriver's bottom part and the surface where the action takes place must be within the range of 0-8 mm [0-0.31 inches].










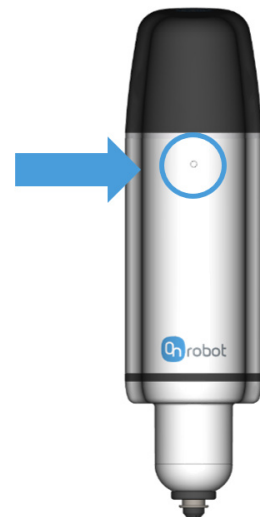
To successfully execute the Screwdriver commands, it is fundamental to operate the Screwdriver downwards or maximum sideways. The Screwdriver should not be operated upwards or with an angle higher than 90° orientate with respect to the ground, since this will trigger the protective feature.



LED - Device Status

The screwdriver has a LED that shows the device status.

Color	Device Status
 No light	Power missing
 Steady green	Ready to work - Idle - Static
 Blinking green	Initializing
 Steady orange	Busy – Moving/rotating shank
 Blinking orange	Operational malfunction
 Steady red	Not working – Hardware problem
 Blinking red	Safety – Emergency stop



Torque Angle Curve and Torque Gradient

The torque gradient shows how the torque is applied in the last phase of the Tightening screw command. This could be used as an indicator to detect if a Tightening command is performed correctly.

**NOTE:**

When using self-tapping screws, if the tapping torque is very close to the target torque, the torque gradient might provide an invalid value.

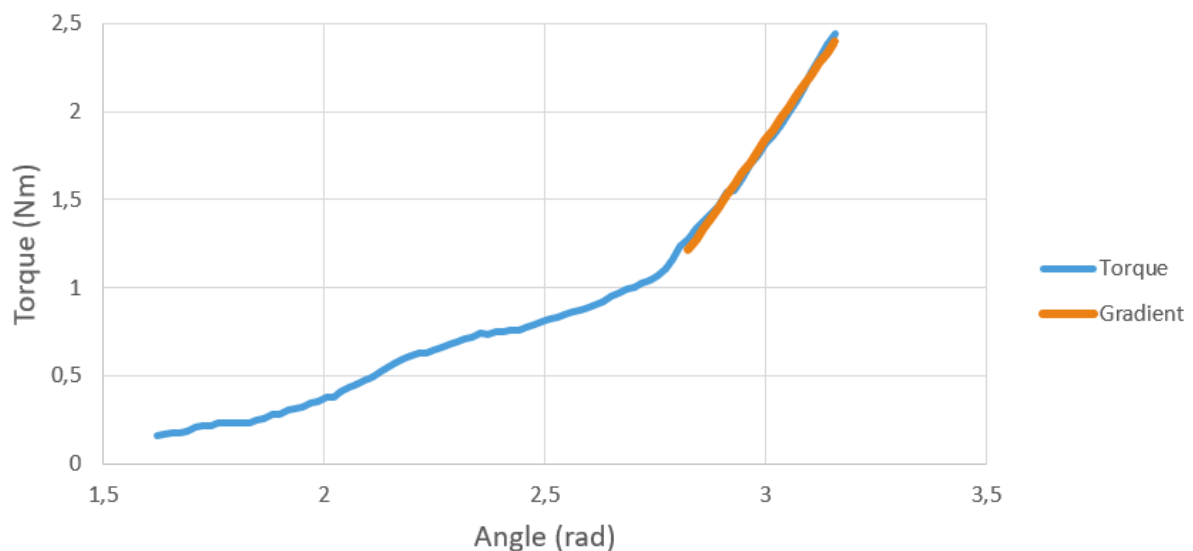
For instance, the torque gradient could be different if:

- The hole thread is not long enough
- The hole thread is different from the screw thread
- The hole thread is not clean (for instance by deburrs from CNC machining)
- The friction between the screw thread and the hole thread is too low or too high
- The friction between the screw head and the tighten part is too low or too high

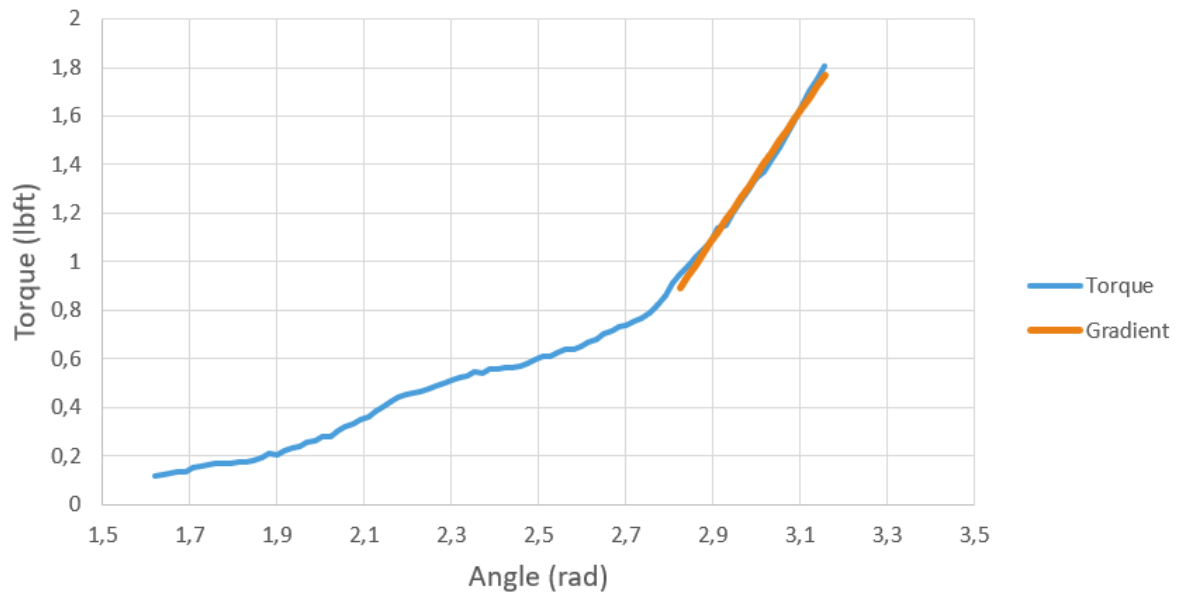
A torque gradient variable is made available to be checked in the robot program.

The graph below shows a normal Torque/Angle curve. In this case has been made with an M4 screw and 2.4 Nm as target torque.

Torque angle curve Metric



Torque angle curve US Standard

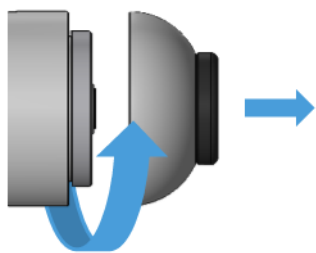


Adjusting the Bellow back in Place

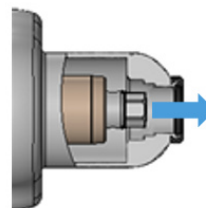
**NOTE:**

Initially, the bellow should not come out of place, but if it does, follow the instructions below to adjust it back in place.

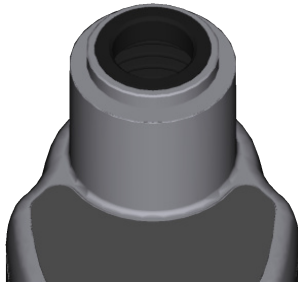
1. Remove the lid.



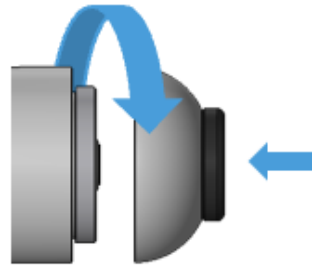
2. Move the shank to the highest possible value by using the user interface in the robot or in the Web Client.



3. Adjust the bellow back in place.



4. Place the lid back on.



8.1.3. Compute Box

8.1.3.1. With 5A Wall Adapter (120W)

Supplied Wall Adapter	Minimum	Typical	Maximum	Unit
Input voltage (AC)	100	-	240	[V]
Input current	-	-	2	[A]
Output voltage	-	24	-	[V]
Output current	-	5	-	[A]

Compute Box Power input (24V connector)	Minimum	Typical	Maximum	Unit
Supply voltage	-	24	25	[V]
Supply current	-	5	-	[A]

Compute Box Power output (Device connector)	Minimum	Typical	Maximum	Unit
Output voltage	-	24	25	[V]
Output current (CB HW v3.4)	-	5	5.5*	[A]
Output current (CB HW v3.1)	-	4.5	4.5*	[A]

* Peak currents.

8.1.3.2. With 6.25A Wall Adapter (150W)

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

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

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

* Peak currents

8.1.3.3. Compute Box I/O interface

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

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

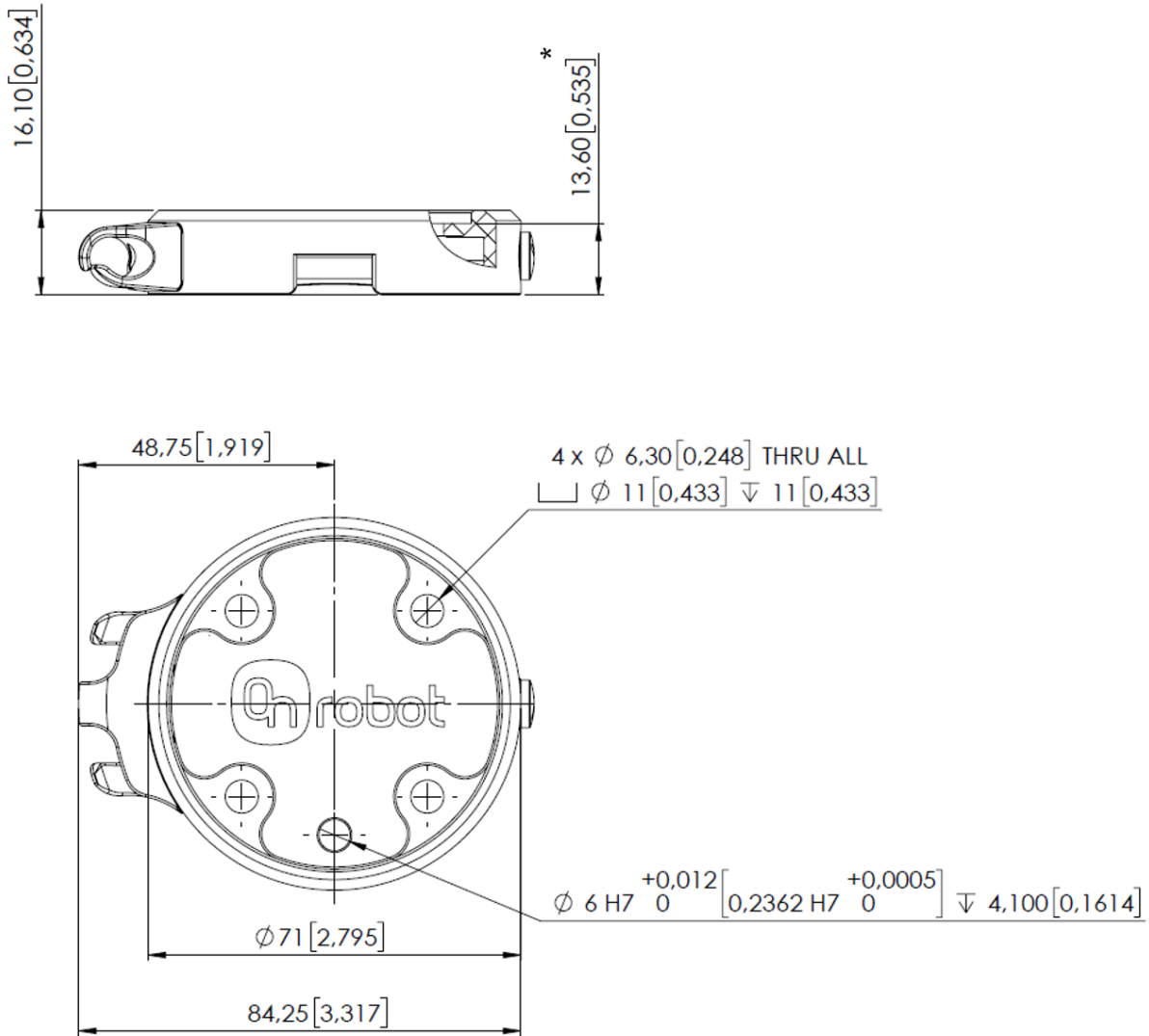
Input (DI1-DI8) as PNP	Minimum	Typical	Maximum	Unit
Voltage level - TRUE	18	24	30	[V]
Voltage level - FALSE	-0.5	0	2.5	[V]
Input current	-	-	6	[mA]
Input resistance	-	5	-	[kΩ]

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

8.2. Mechanical Drawings

8.2.1. Mountings

8.2.1.1. Quick Changer - Robot Side



* Distance from Robot flange interface to OnRobot tool.

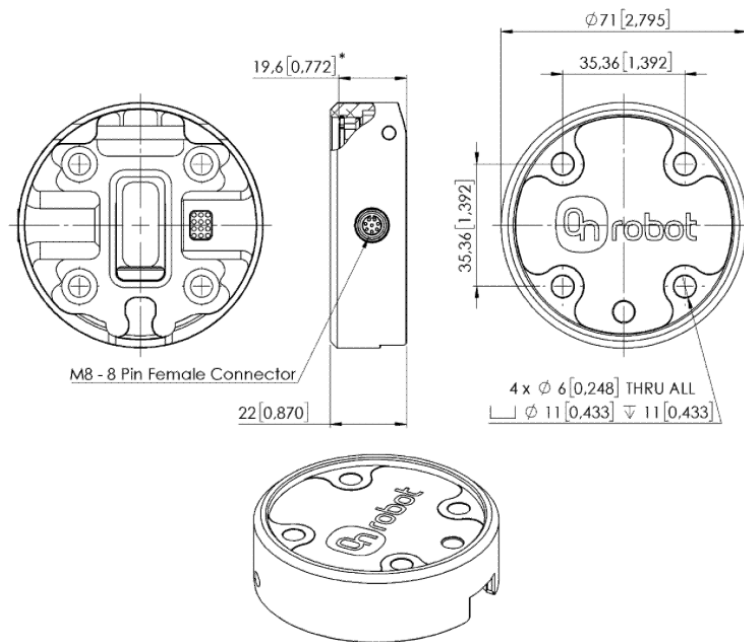
All dimensions are in mm and [inches].



NOTE:

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

8.2.1.2. Quick Changer for I/O - Robot Side

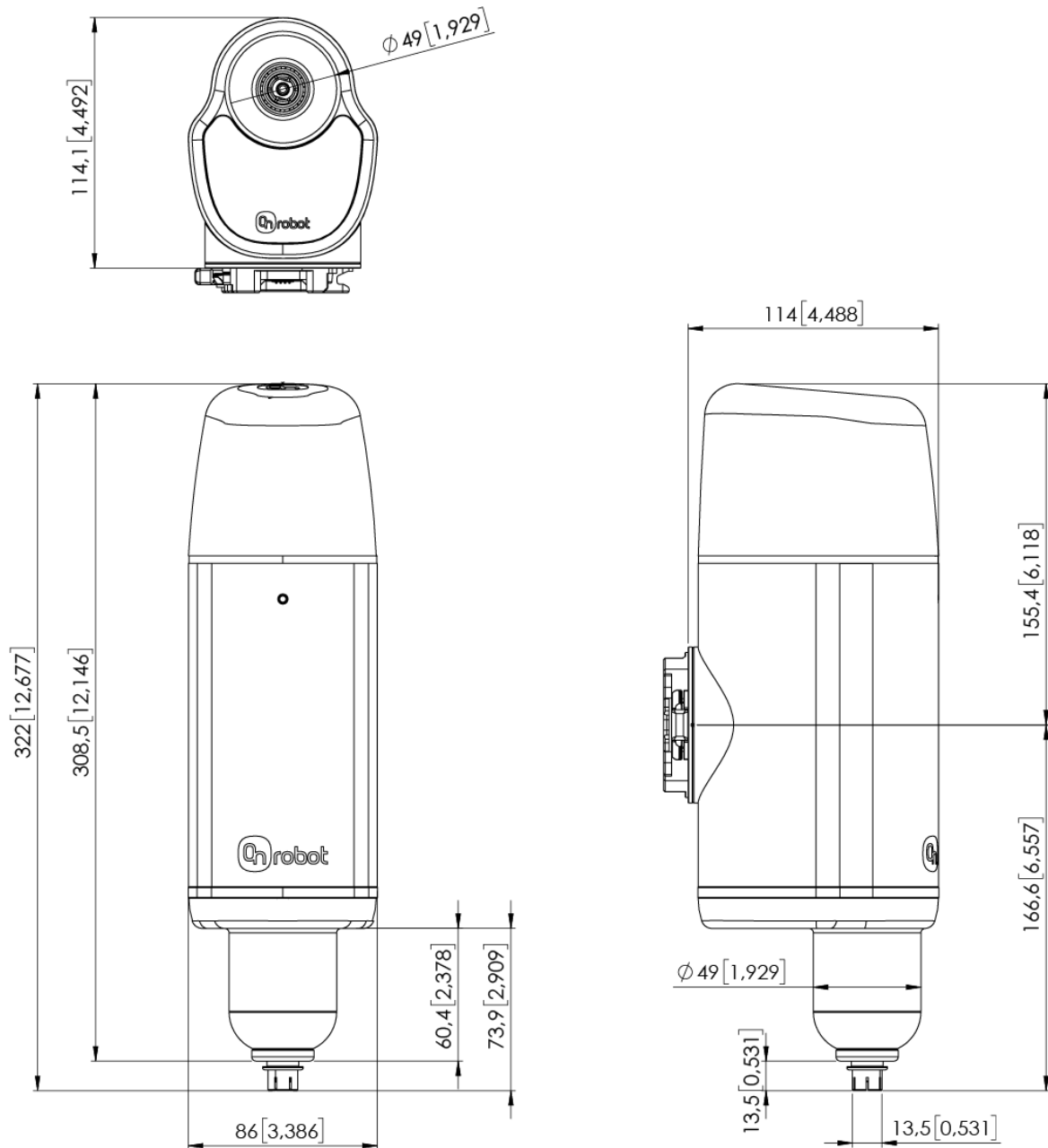


* Distance from Robot flange interface to OnRobot tool

All dimensions are in mm and [inches].

8.2.2. Tools

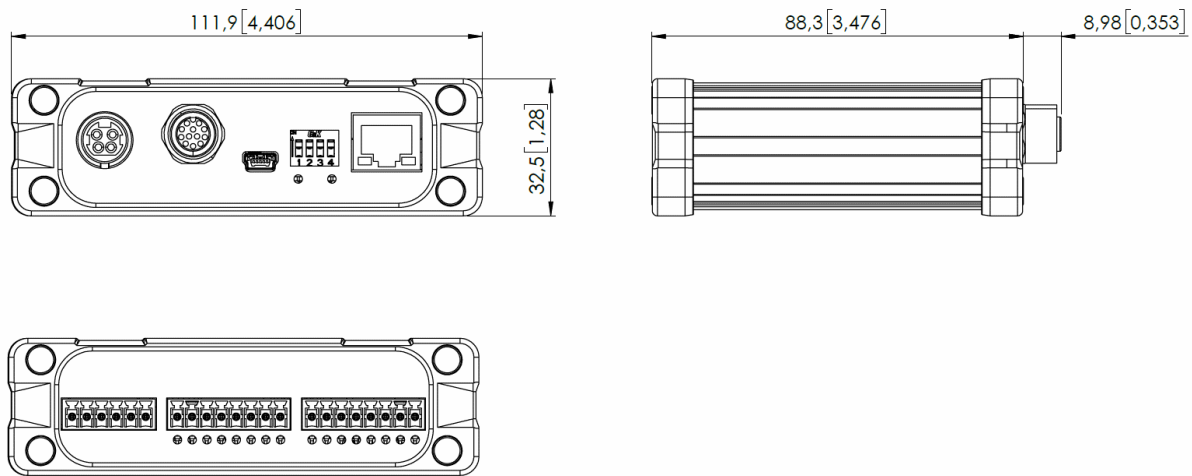
8.2.2.1. Screwdriver



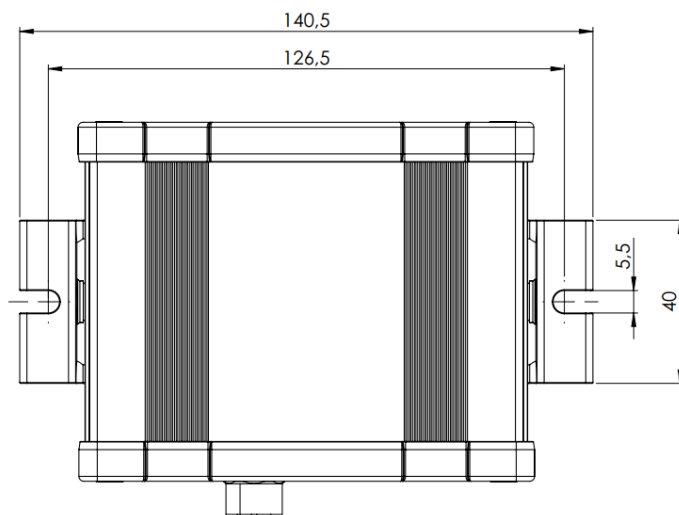
All dimensions are in mm and [inches].

8.2.2.2. Compute Box

Compute Box



Clip-on Bracket (optional)



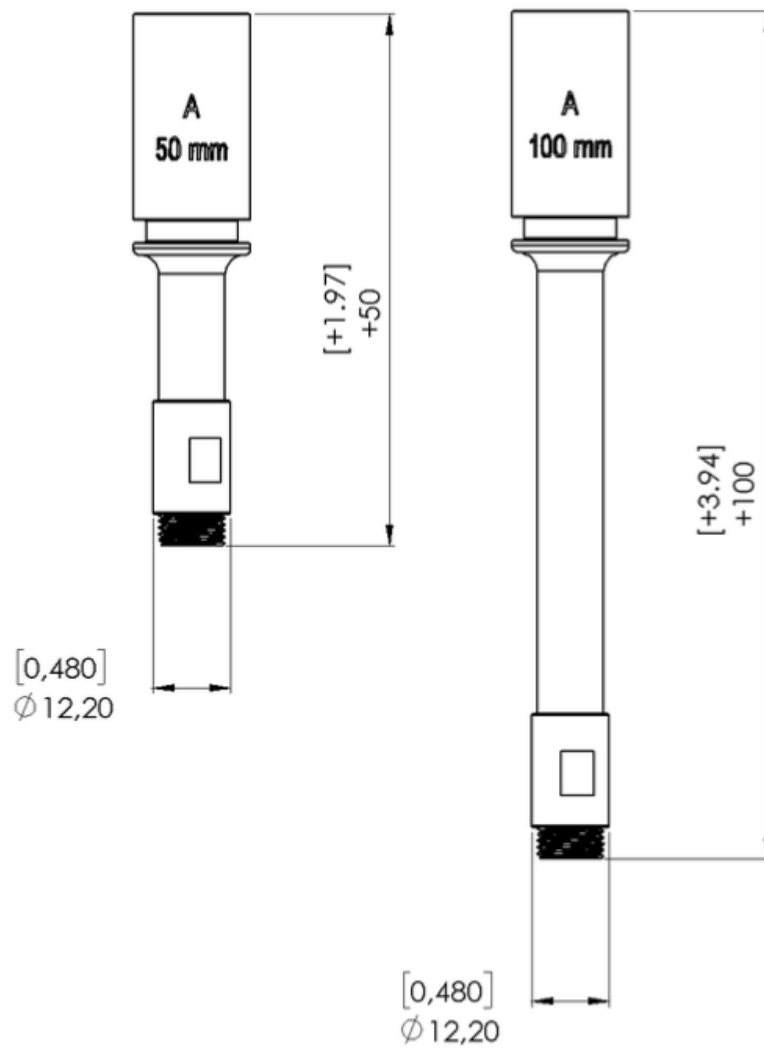
All dimensions are in mm and [inches].

8.2.3. Bit Extender



CAUTION:

When attached to the Screwdriver, always make sure that the Bit extender does not hit the table, workpiece or any heavy parts as it could damage the inner parts of the Screwdriver.



All dimensions are in mm and [inches].

8.3. TCP, CoG

Using Tool Connection

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

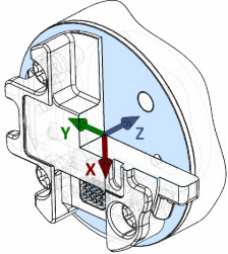
The TCP/CoG calculator can be downloaded from www.onrobot.com/downloads.

Using Compute Box/Eye Box

For more information, see the [7.1.5. Web Client: TCP, CoG](#) section.

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

8.3.1. Screwdriver

Coordinate system	TCP [mm]	Center of Gravity [mm]	Weight
	X=153 Y=0 Z=81	cX=0 cY=4 cZ=50	2.5 kg 5.51 lb

9. Maintenance

**WARNING:**

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

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

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

9.1. Screwdriver

Screw Fix and Bit

**NOTE:**

The screw fixes and bits are wear and tear parts, therefore they must be inspected regularly.

These parts must be inspected minimum once a week or after 60.000 cycles.

If a screw fix is damaged due to misuse, it must be replaced.

If the `Pick Screw` process is failing, it might be an indicator that the screw fix is worn or has been damaged.

**WARNING:**

The Screw-bit System should be visually inspected every time the robot is reset or once per week, depending on application and use.

**WARNING:**

Check the inside of the screw bit holder regularly for debris. Make sure that the magnetic interface is clear from metal shavings and dirt.

**WARNING:**

Always detach the Screwdriver from the Quick Changer to perform cleaning or maintenance.

O-Ring Replacement



NOTE:

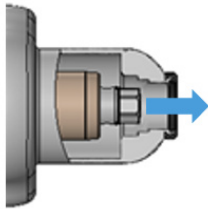
The O-Rings are wear and tear parts, therefore they must be inspected regularly.

This part must be inspected minimum once a month. To inspect the O-Ring, attach a bit holder to the shank and check if it is straight and kept in place.

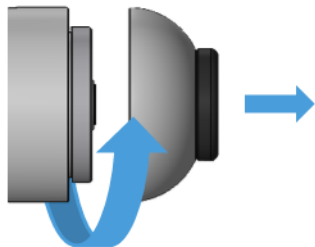
In case the O-Ring needs to be replaced, an O-Ring replacement kit or a set of O-Rings can be purchased. For purchasing, contact your vendor where the Screwdriver has been purchased.

To replace the O-Ring, follow the instructions below.

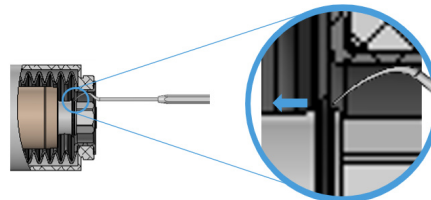
1. Move the shank to the highest possible value by using the user interface in the robot or in the [7.1.2.1. Web Client](#).
2. Detach the Screwdriver from the Quick Changer.



3. Remove the lid.



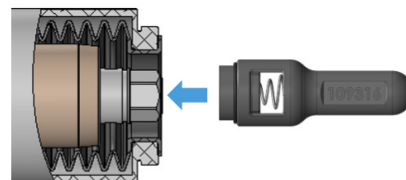
4. If needed, break or remove the O-Ring by pushing it down with the tool until it is out of place. Then pull the O-Ring out.



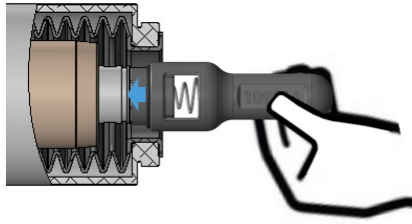
5. Place the new O-Ring in the placement tool.



6. Insert the placement tool at the end of the shank.



7. Push the placement tool to place the O-Ring in the shank's slot.



8. Attach a bit holder and gently shake it to make sure it is not loose.



Calibration

The Screwdriver has been calibrated at the factory to comply with the specifications stated in the technical sheet. A calibration report has been provided in the Screwdriver packaging.

If used according to recommended guidelines and conditions and maintained correctly, the Screwdriver performs according to these specifications across its lifetime.

In case an updated calibration report is required, contact the vendor from where the Screwdriver has been purchased.

Spare Parts

- Bit holder A - Spare part kit 1 - PN 104197 (1 unit)
- Bit holder B - Spare part kit 2 - PN 104991 (1 unit)
- Bit extender type A 50 mm - PN 109301
- Bit extender type B 50 mm - PN 109289
- Bit extender type A 100 mm - PN 109290
- Bit extender type B 100 mm - PN 109298
- O-Ring replacement kit - PN 109430
 - Detaching tool
 - Attaching tool
 - 5x O-Rings
 - Replacement instructions
- 5x O-Ring - PN 109429

The table below shows the Kit number and the Part Number of the spare part kits. These are composed of:

- Screw carrier (1 unit)
- Screw fixes (10 units and only for Din 912 / ISO 4762 / ASME B18.3 Hex Cylinder screws)
- Bits (10 units)

For example, the kit 3 - PN 105150 contains the following:

- 1x Screw carrier M1.6 for Din 912 / ISO 4762 screws
- 10x Screw fixes M1.6
- 10x H1.5 Bits

Screw carrier, (screw fix) and bit spare part kits Metric					
Screw Standard	Din 912 / ISO 4762	ISO 14579	ISO 14580	ISO 14581	DIN 7985A
Thread Size	Spare part kit number Part Number				
M1.6	Kit 3 PN 105150	N/A	N/A	N/A	N/A
M2	Kit 4 PN 105151	Kit 10 PN 105157	N/A	Kit 16 PN 105163	Kit 22 PN 105169
M2.5	Kit 5 PN 105152	Kit 11 PN 105158	N/A	Kit 17 PN 105164	Kit 23 PN 105170
M3	Kit 6 PN 105153	Kit 12 PN 105159	Kit 12 PN 105159	Kit 18 PN 105165	Kit 24 PN 105171
M4	Kit 7 PN 105154	Kit 13 PN 105160	Kit 13 PN 105160	Kit 19 PN 105166	Kit 25 PN 105172
M5	Kit 8 PN 105155	Kit 14 PN 105161	Kit 14 PN 105161	Kit 20 PN 105167	Kit 26 PN 105173
M6	Kit 9 PN 105156	Kit 15 PN 105162	Kit 15 PN 105162	Kit 21 PN 105168	Kit 27 PN 105174

Screw carrier, (screw fix) and bit spare part kits US Standard					
Screw Standard	ASME B18.3 Hex Cylinder	ASME B18.6.3 Cross recessed Button head	ASME B18.6.3 Torx Button head	ASME B18.3 Hex Counter sunk	ASME B18.6.3 Torx Counter sunk
Thread Size	Spare part - Part Number				
1#	PN 106310	N/A	N/A	N/A	N/A
2#	PN 106311	PN 106324	PN 106324	N/A	PN 106318
4#	PN 106313	PN 106329	PN 106329	PN 106319	PN 106319
6#	PN 106314	PN 106330	PN 106330	PN 106320	PN 106320
8#	PN 106315	PN 106331	PN 106331	PN 106321	PN 106321
10#	PN 106316	PN 106333	PN 106333	PN 106322	PN 106322
12#	N/A	PN 106334	PN 106334	N/A	N/A
1/4"	PN 106317	N/A	N/A	PN 106323	N/A

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 1/2				
Standard	DIN 7981 C/ ISO 7049	DIN 7981 F/ ISO 7049	WN 5251	DIN 7983 C
Thread Size	Spare part - Part Number			
ST2.2 / 2.2 / KB22 / K22	PN 109695	PN 109695	N/A	PN 109695
ST 2.9	PN 109696	PN 109696	N/A	PN 109696
3 / M3 / KB30 / K30	N/A	N/A	PN 109711	N/A
ST3.5.3 / 3.5 / KB35 / K35	PN 109697	PN 109697	PN 109690	PN 109697
ST 3.9	N/A	PN 109698	N/A	N/A
4 / M4 / KB40 / K40	N/A	N/A	PN 109712	N/A
ST 4.2	PN 109699	PN 109699	N/A	PN 105172
ST 4.8	PN 109700	N/A	N/A	PN 106333
50 / M5 / KB50 / K50	N/A	N/A	PN 109686	N/A
ST 5.5	PN 106334	N/A	N/A	N/A
ST 6.3	PN 105174	N/A	N/A	N/A

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Aluminium 2/2			
Standard	DIN 7500 M	DIN 14586 C	DIN 7982 C
Thread Size	Spare part - Part Number		
20 / M2 / K20	PN 106318	N/A	N/A
ST2.2 / 2.2 / KB22 / K22	N/A	PN 106318	PN 109705
2.5 / M2.5 / KB25 / K25	PN 105164	N/A	N/A
ST 2.9	N/A	PN 109702	PN 109706
3 / M3 / KB30 / K30	PN 105165	N/A	N/A
ST3.5.3 / 3.5 / KB35 / K35	N/A	PN 109703	PN 109697
ST 3.9	N/A	PN 109703	PN 109697
4 / M4 / KB40 / K40	PN 109701	N/A	N/A
ST 4.2	N/A	PN 105166	PN 109707
ST 4.8	N/A	PN 109692	PN 109708
50 / M5 / KB50 / K50	PN 105167	N/A	N/A
ST 5.5	N/A	PN 109704	PN 109709
60 / M6	PN 105168	N/A	N/A
ST 6.3	N/A	PN 105168	PN 109710

Items Needed Depending on Screw Type and Size for Self-tapping Screws for Plastic			
Standard	ISO 4042	WN 1411	WN 5451
Thread size	Spare part - Part Number		
20 / M2 / K20	N/A	N/A	PN 109857
ST2.2 / 2.2 / KB22 / K22	PN 109713	N/A	PN 109857
2.5 / M2.5 / KB25 / K25	PN 105164	PN 105169	PN 109854
3 / M3 / KB30 / K30	PN 109702	PN 105170	PN 106329
ST3.5.3 / 3.5 / KB35 / K35	PN 109714	PN 105171	N/A
4 / M4 / KB40 / K40	PN 105166	PN 109715	PN 109693
50 / M5 / KB50 / K50	N/A	PN 105172	PN 109858
60 / M6	N/A	N/A	PN 109859

Accessories

- Bit extender A 50 mm - PN 109301
- Bit extender A 100 mm - PN 109290
- Bit extender B 50 mm - PN 109289
- Bit extender B 100 mm - PN 109298



CAUTION:

When attached to the Screwdriver, always make sure that the bit extender does not hit the table, workpiece or any heavy parts as it could damage the inner parts of the Screwdriver.

Cleaning Recommendations

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

- Isopropyl 70% alcohol
- Peroxide



NOTE:

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

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

Cleaning the Chips Inside the Bit Holder/ Bit Extender

The bit holder/ bit extender is attached to the Screwdriver by a magnetic force. Due to metal particles sticking to the surface, the bit holder/ bit extender will not be attached correctly. The

chips inside the bit holder/ bit extender must be cleaned regularly by using a flat magnetic hand screwdriver for instance.

10. Troubleshooting

10.1. Robot Has Not Obtained an IP Address

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

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



NOTE:

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

Example

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

- IP address: 192.168.1.2
- Subnet Mask: 255.255.255.0

10.2. Changing the DIP Switch Does Not Take Effect

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

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

10.3. URCap Operation



CAUTION:

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

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

10.4. Tool Functions Are Not Available

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

10.5. Screwdriver Error Codes

10.5.1. Z-axis (Or General Init) Busy

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

Description: Z-axis (or general init) is busy.

Suggestion(s) to solve the error:

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

10.5.2. Z-axis Safety Activated

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

Description: Z-axis safety is activated.

Suggestion(s) to solve the error:

- Move shank to 0 position.
- Correct the setup that has caused the safety being activated.
- Power cycle the tool.
- Ensure that the Compute Box software and the tool firmware are updated.
- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

10.5.3. Tool Is Not Calibrated

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

Description: Tool is not calibrated.

Suggestion(s) to solve the error:

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

10.5.4. Initialize: Z Stall Current Not Reached

Error code (on the Web Client and in the robot scripts): 16

Description: Initialize: Z stall current not reached.

Suggestion(s) to solve the error:

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

10.5.5. Initialize: No Z Index Mark Found

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

Description: Initialize: No Z index mark found.

Suggestion(s) to solve the error:

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

10.5.6. Initialize: Unable to Home Z-axis/ Run Time: Too Much Current Is Drawn

Error code (on the Web Client and in the robot scripts): 48

Description: Initialize: Unable to home Z-axis/ Run time: Too much current is drawn.

Suggestion(s) to solve the error:

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

10.5.7. Initialize: Z Index Placement Not Ok

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

Description: Initialize: Z index placement not ok.

Suggestion(s) to solve the error:

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

10.5.8. Initialize: No Index Mark Found on Torque Encoders

Error code (on the Web Client and in the robot scripts): 80

Description: Initialize: No index mark found on torque encoders.

Suggestion(s) to solve the error:

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

10.5.9. Initialize: Too Big Torque Difference During Initialization

Error code (on the Web Client and in the robot scripts): 96

Description: Initialize: Too big torque difference during initialization.

Suggestion(s) to solve the error:

- Power cycle the tool.
- Ensure that the Compute Box software and the tool firmware are updated.

- If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

10.5.10. Index Mark Value Has Changed

Error code (on the Web Client and in the robot scripts): 112

Description: Index mark value has changed.

Suggestion(s) to solve the error:

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

10.5.11. Quick Changer Error

Error code (on the Web Client and in the robot scripts): 256

Description: Quick Changer error.

Suggestion(s) to solve the error: The Quick Changer robot side 4.5A must be used.

10.5.12. Power Supply Error

Error code (on the Web Client and in the robot scripts): 512

Description: Power supply error.

Suggestion(s) to solve the error: The Compute Box power supply 5A or higher must be used.

10.5.13. Additional Codes

Additional code	Description	How to solve
0	No result data	The operation is successful. No action is needed.
1	Screwdriver: command unknown	Power cycle the tool. Ensure that the Compute Box software and the tool firmware are updated. If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.
2	Screwdriver: not screwing in	Ensure that the Screwdriver has the screw. Ensure that the thread/hole is in the right position so the Screwdriver is not trying to screw in a flat surface.
3	Screwdriver: timeout waiting for correct torque (4 sec)	Ensure that the thread/hole is in the right position so the Screwdriver is not trying to screw in a flat surface. Input a lower value for the Screwing length.

Additional code	Description	How to solve
4	Screwdriver: torque exceeded unexpected (premature)	Input a higher value for the Screwing length. Lower the material to screw in (only for self-tapping).
5	Screwdriver: unable to loosen screw (max torque exceeded)	Try loosening the screw again. If the error is still present, the screw was tightened with a torque higher than 5 Nm so the Screwdriver is not capable of loosening it.
6	Screwdriver: Z-axis reached the end	Place the Screwdriver tip closer to the screw, thread or hole.
7	Screwdriver: Z-axis obstructed during move	Check and make sure that the end of the Screwdriver's shank did not crash into anything. Check and make sure there is nothing inside the Screwdriver.
9	Screwdriver: Z-axis overload	Power cycle the tool. Ensure that the Compute Box software and the tool firmware are updated. If the error is still present, return the tool to OnRobot for repair. Contact your local distributor for more information.

11. Warranties

11.1. Patents

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

11.2. Product Warranty

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

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

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

11.3. Disclaimer

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

12. Certifications



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 sites:
Hobrovej 317A, 9200 Aalborg SV, Denmark
Aradi u 16., 1043 Budapest, Hungary (Magyarország)

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:
21 November 2022

Issuing Date:
21 November 2022

Valid Until:
25 November 2025




intertek



Torbjörn Rudqvist

MD, Business Assurance Nordics

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



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

The certificate remains the property of Intertek, to whom it must be returned upon request.



12.1. Manufacturer Test Certificate



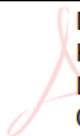
All OnRobot products are tested according to OnRobot test specification for the individual product that follows the ISO 9001 standard procedure. OnRobot testing procedure undergoes continuous review and improvement.

12.2. EMC



Attestation of Conformity no. 122-28268-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.

Attestation holder OnRobot A/S, Teglværksvej 47H, 5220 Odense SØ, Denmark																	
Product identification - Name (Part no.) Power Supplies: PSU (104788), VER36U240-JA, VES120PS24, VES150PS24 (106034). Controllers: OR:BASE (113073), OR:COM (113088), OR:MACHINE (113090), UR Kit with Compute Box (102344), Doosan Robot kit (102345), Techman/OMRON TM Robot Kit (102359), KUKA-A Robot kit (102360), KUKA-B Robot kit (102361), FANUC Robot kit (102362), Kawasaki-B Robot kit (102363), Kawasaki-C Robot kit (102364), Kawasaki-D Robot kit (102365), Kawasaki-E Robot kit (102366), Yaskawa-F Robot kit (102367), Yaskawa-G Robot kit (102368), Yaskawa-H Robot kit (102369), NACHI-I Robot kit (102370), NACHI-J Robot kit (102371), Hanwha Robot Kit (103208), Eye Box (103707). Mountings: Dual Quick Changer (101788), Dual Quick Changer 4,5A (104293), Dual Quick Changer v2 4,5A (109878), HEX-E QC (102111), HEX-H QC (102376), Quick Changer I/O (102326), Quick Changer Kit (102277), Quick Changer Kit 4,5A (104388), Quick Changer Robot side (102037), Quick Changer Robot side 4,5A (104277). Tools: 2FG7 (106376), 3FG15 (103666), 2FGP20 (108585), Eyes Lighting Kit (107080), Gecko Gripper (104086/104087/104088), Lift100 (108800), Lift100V2 (109000), MG10 (105202), Eyes (103903), Pallet Station (109401), RG2 (102012), RG2-FT (102075), RG6 (102021), Sander (104876), Screwdriver (103961), SG (103546), VG10 (101661), VGC10 (102844), VGP20 (107242).																	
Manufacturer OnRobot A/S																	
Technical documentation FORCE Technology Assessment no. 122-28268-A1 and 122-28268-A2.																	
Standards/Normative documents <table border="0"> <tr> <td>IEC 61000-3-2:2018</td> <td>EN 61000-3-3:2013</td> </tr> <tr> <td>IEC 61000-3-3:2013</td> <td>EN 61000-3-3:2013/A1:2019</td> </tr> <tr> <td>IEC 61000-3-3:2013/AMD1:2017</td> <td>EN 61000-6-2:2005</td> </tr> <tr> <td>IEC 61000-6-2:2016</td> <td>EN 61000-6-2:2005/AC:2005</td> </tr> <tr> <td>IEC 61000-6-4:2018</td> <td>EN IEC 61000-6-2:2019</td> </tr> <tr> <td>EMC Directive 2014/30/EU, Article 6</td> <td>EN 61000-6-4:2007</td> </tr> <tr> <td>EN 61000-3-2:2014</td> <td>EN 61000-6-4:2007/A1:2011</td> </tr> <tr> <td>EN IEC 61000-3-2:2019</td> <td>EN IEC 61000-6-4:2019</td> </tr> </table> <p>Additionally, for RG2 (102012), RG6 (102021), Lift100 (108800) and Lift100V2 (109000): IEC 61326-3-1:2017, Industry locations, SIL 2 EN 61326-3-1:2017, Industry locations, SIL 2</p> <p>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.</p>		IEC 61000-3-2:2018	EN 61000-3-3:2013	IEC 61000-3-3:2013	EN 61000-3-3:2013/A1:2019	IEC 61000-3-3:2013/AMD1:2017	EN 61000-6-2:2005	IEC 61000-6-2:2016	EN 61000-6-2:2005/AC:2005	IEC 61000-6-4:2018	EN IEC 61000-6-2:2019	EMC Directive 2014/30/EU, Article 6	EN 61000-6-4:2007	EN 61000-3-2:2014	EN 61000-6-4:2007/A1:2011	EN IEC 61000-3-2:2019	EN IEC 61000-6-4:2019
IEC 61000-3-2:2018	EN 61000-3-3:2013																
IEC 61000-3-3:2013	EN 61000-3-3:2013/A1:2019																
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EMC Directive 2014/30/EU, Article 6	EN 61000-6-4:2007																
EN 61000-3-2:2014	EN 61000-6-4:2007/A1:2011																
EN IEC 61000-3-2:2019	EN IEC 61000-6-4:2019																
Signature  Knud A. Baltsen Signed by: Knud A. Baltsen, Senior Specialist, Product Compliance	Digitally signed by Knud A. Baltsen Date: 2023.11.17 09:43:00 +01'00'																

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12.3. Screwdriver - Environment



Attestation of Conformity no. 120-23336

Assessment holder OnRobot A/S Teglværksvej 47H 5220 Odense SØ Denmark													
Product identification OnRobot Screwdriver													
FORCE Technology test reports Environmental tests of Screwdriver, report no.: 120-23336-1 dated 24 April 2020													
Other technical documentation													
Conclusion <p>The Screwdriver have been tested according to the standards listed below. The test results are given in the Force report listed above. All tests were carried out as specified in the relevant specifications including special test criteria's stated by the client.</p> <table> <tr> <td>IP 6X</td> <td>IEC 60529:2013</td> </tr> <tr> <td>IP X7</td> <td>IEC 60529:2013</td> </tr> <tr> <td>Dry heat</td> <td>IEC 60068-2-2:2007</td> </tr> <tr> <td>Low temperature (cold)</td> <td>IEC 60068-2-1:2007</td> </tr> <tr> <td>Vibration - Endurance random</td> <td>IEC 60068-2-64:2008</td> </tr> <tr> <td>Shock test</td> <td>IEC 60068-2-27:2008</td> </tr> </table>		IP 6X	IEC 60529:2013	IP X7	IEC 60529:2013	Dry heat	IEC 60068-2-2:2007	Low temperature (cold)	IEC 60068-2-1:2007	Vibration - Endurance random	IEC 60068-2-64:2008	Shock test	IEC 60068-2-27:2008
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Low temperature (cold)	IEC 60068-2-1:2007												
Vibration - Endurance random	IEC 60068-2-64:2008												
Shock test	IEC 60068-2-27:2008												
Date Signature	2020.24.04 												



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12.4. Declaration of Incorporation

12.4.1. Screwdriver

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:	Robotic Screwdriver
Model:	OnRobot Screwdriver
Generation:	V1
Serial:	100000000-1009999999

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

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

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

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

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

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

2014/35/EU — Low Voltage Directive (LVD)
2012/19/EU — Waste of Electrical and Electronic Equipment (WEEE)
2014/53/EU — Radio Equipment Directive (RED). This reference is only valid for the products OR:BASE and OR:COM.

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

Budapest, December 16th, 2022



Group Management

Vilmos Beskid, CTO

UK Declaration of Incorporation (Original)

According to British Supply of Machinery Regulations 2008 (S.I. 2008 No. 1597).

The manufacturer:

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

declare under our sole responsibility that the following products: