

TOGETHER IN ROBOTICS

ONROBOT PLUGIN

Contents

Copyright notice.....	1
Disclaimers.....	2
Abbreviations.....	3
Plugins.....	4
OnRobot plugin.....	4
Getting the plugins for the robot.....	4
Installing plugins.....	5
Updating plugins.....	8
Overview of working with plugins.....	10
Configurations of the OnRobot Plugin.....	12
OnRobot RG2 and RG6 grippers.....	13
Installing OnRobot grippers.....	13
Configuring tools.....	15
Tool configuration fields.....	18
OnRobot plugin actions.....	21
Variables.....	24
Changes since the last release.....	27
Changes made in version 1.2.....	27
Glossary.....	28
C.....	28
E.....	28
F.....	28

G.....	28
K.....	28
N.....	29
P.....	29
T.....	29
U.....	29
W.....	30

Copyright notice

The information in the OnRobot Plugin user guide contains proprietary information and, as such, no part may be reproduced, in part or in whole, or transmitted in any form or by any means, electronically or mechanically, including photocopying, recording, or any information or storage retrieval system, without prior permission in writing from Kinova.

Disclaimers

Kinova[®] and the Kinova logo are registered trademarks of Kinova inc., herein referred to as Kinova.

Kortex[™] is a trademark of Kinova inc.

All other brand and product names are trademarks or registered trademarks of their respective owners.

The OnRobot Plugin is an evolving product. Kinova continually works towards improving the reliability and performance of its products. Kinova does its best to ensure the content of the OnRobot Plugin user guide is accurate and precise with respect to the latest version of the robot. However, Kinova does not take responsibility for any erroneous, inaccurate, or missing information.



Note: The user guide may be updated from time to time. Please make sure to look at the latest version on our website.

The version of this document is in the header of the pages of the document.

The perspective of the OnRobot Plugin user guide is of Kinova and Link 6. To acquire more information about OnRobot hardware used in conjunction with Link 6, please refer to the OnRobot documentation.

Any questions or comments concerning this document, the information it contains or the product it describes may be addressed through support@kinova.ca.

Abbreviations

TCP

Tool Center Point

USB

Universal Serial Bus

Plugins

The modular design of Link 6 makes it a robot with expanding capabilities. The expanding capabilities are added on as [plugins](#).

All plugins start to run right after they are installed. However, they can be stopped so the settings can be modified. All plugins that are running are, by default, active. They can be deactivated to stop their functionality.

Many plugins contain actions that the user can use when programming the robot with the visual programming interface in Kortex Web App. Each plugin also contains the parameters that can be modified in Kortex Web App from the corresponding plugin page.

All plugins have two pages: **Configurations** and **About**.

OnRobot plugin

The OnRobot [plugin](#) works with the OnRobot RG2 and RG6 grippers. Install the plugin to configure the behavior of the gripper.

The plugin declares all of its variables within the [namespace](#) `onrobot_gripper_plugin`.

The plugin contains different configuration roles.

- Configure and establish communication between the OnRobot RG2 or RG6 gripper, and Link 6.
- Configure and define the tools on the **Tools** page.
- Configure the actions that the tool can perform for visual programming.

Getting the plugins for the robot

Upload and installation must be done from a computer and a [USB](#) storage device.

Before you begin

All plugins have dependencies on different aspects of the robot.

Make sure to verify all dependencies before installing the plugin.

Table 1: Plugin dependencies and expected issues when dependencies not met

About this task

The plugin installation file is named `onrobot_plugin_<version>.kp`, where `<version>` is the version of the plugin. Contact Kinova to get the appropriate plugin file if you are unsure which files you need.

A computer or USB device is needed to upload and install the plugin installation file.



Note: Plugins are updated from time to time. Always make sure you have the latest plugin for your installation.

Procedure

1. Download the plugin installation file `onrobot_plugin_<version>.kp`.
2. Save the plugin installation file in the root directory of the USB storage device.
3. Eject the USB after the transfer of the plugin installation file is complete.
4. Plug the USB storage device on the [controller](#).
5. Switch on the [teach pendant](#).
6. Enter the administrator credentials.
7. Tap **CONNECT**.
8. Tap **POWER ON**.

The arm is switched on.

What to do next

Install the required plugins from the **Plugins** page in [Kortex Web App](#).

Related topics

[Installing plugins](#) on page 5

Installing plugins

To use an end effector, its associated plugin must be installed.

Before you begin

The plugin files must be on a USB storage device. The USB must be plugged into the controller

About this task

Access all installed plugins by tapping **Systems > Plugins**.

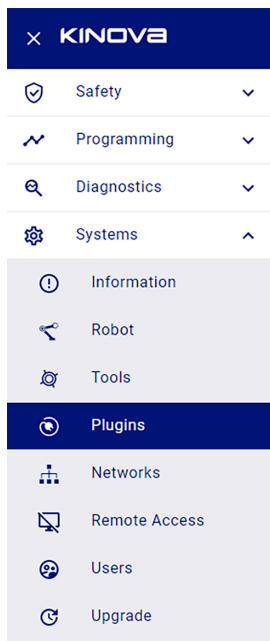
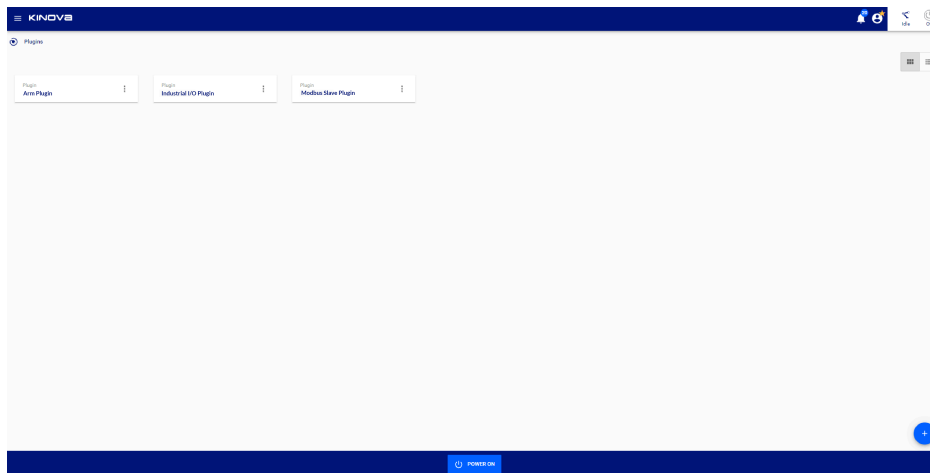


Figure 1: Accessing the plugins

Procedure

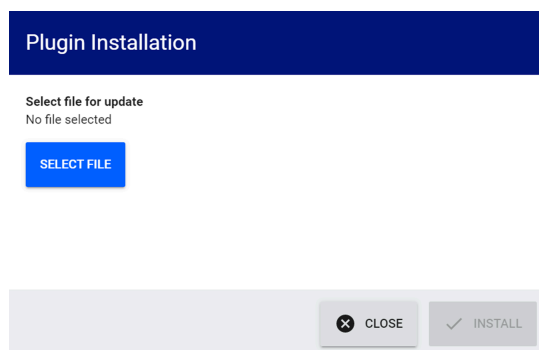
1. Tap **Systems > Plugins**.

The **Plugins** page launches.



2. Tap +.

A **Plugin Installation** dialog launches.



3. Tap **SELECT FILE**.

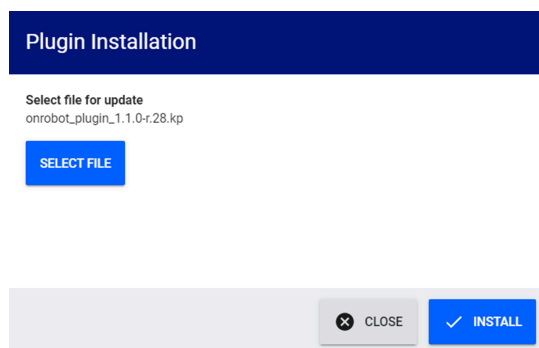
A file browse window launches.

4. Browse to the plugin installation files.

5. Select a plugin installation file.

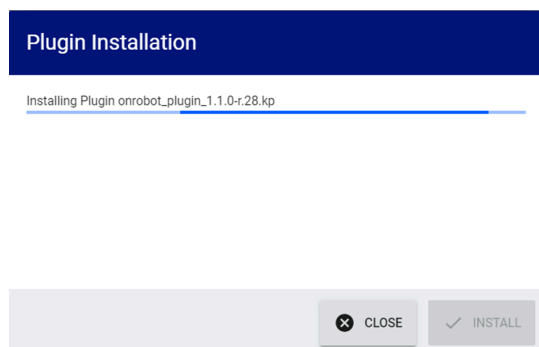
6. Tap **Open**.

The **Plugin Installation** dialog shows the name of the selected file.

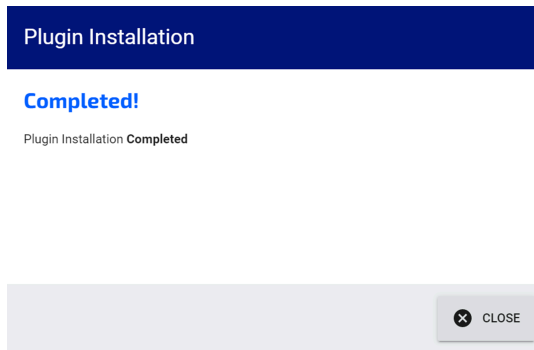


7. Tap **INSTALL**.

The **Plugin Installation** dialog shows that the plugin installation is in progress.



8. Tap **CLOSE** when installation is complete.



Results

The installed plugin appears on the **Plugins** page. A running icon (), displayed near the plugin name on the **Plugins** page, indicates the plugin is running.

What to do next

Install the OnRobot device.

Related topics

[Installing OnRobot grippers](#) on page 13

Updating plugins

Integrate improvements to the plugins by updating them.

Before you begin

Download the latest version of the plugin from the Contact Kinova to get the appropriate plugin file if you are unsure which files you need.

About this task

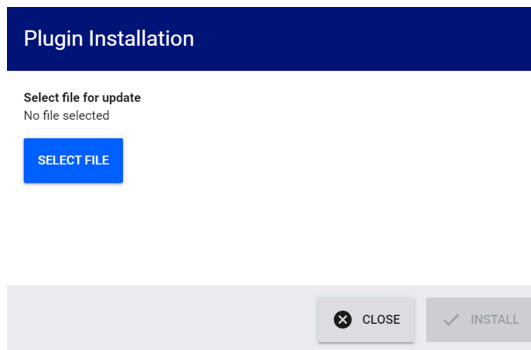
Updating plugins is similar to installing them. Use a computer or USB device.

Procedure

1. Get the latest version of the plugin.
2. Tap **Systems > Plugins**.
3. Tap the plugin that you want to update.
4. Tap **Stop** ().
5. Tap **Deactivate**.
6. Navigate back to the **Plugins** page.
7. Tap the kebab menu () of the plugin that you want to update.
8. Tap **Delete**.

9. Tap **+**.

A **Plugin Installation** dialog launches.



10. Tap **SELECT FILE**.

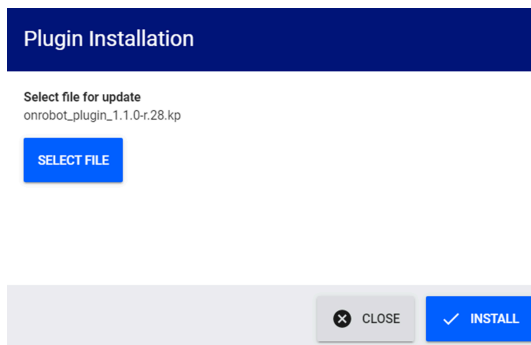
A file browse window launches.

11. Browse to the plugin installation files.

12. Select a plugin installation file.

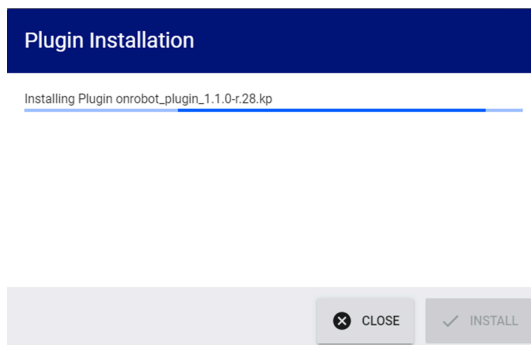
13. Tap **Open**.

The **Plugin Installation** dialog shows the name of the selected file.

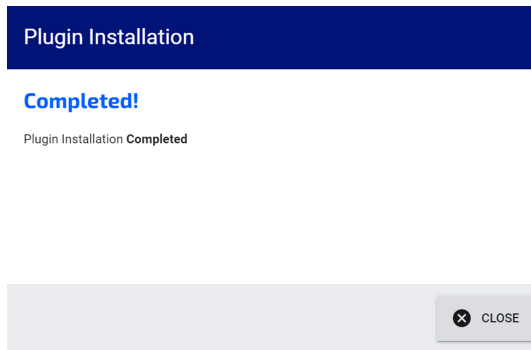


14. Tap **INSTALL**.

The **Plugin Installation** dialog shows that the plugin installation is in progress.



15. Tap **CLOSE** when installation is complete.



Results

The installed plugin appears on the **Plugins** page. A running icon (Plugin ) displayed near the plugin name on the **Plugins** page, indicates the plugin is running.

What to do next

Install the OnRobot device.

Related topics

[Getting the plugins for the robot](#) on page 4

Overview of working with plugins

Tapping a plugin from the **Plugins** page launches the page of that plugin.

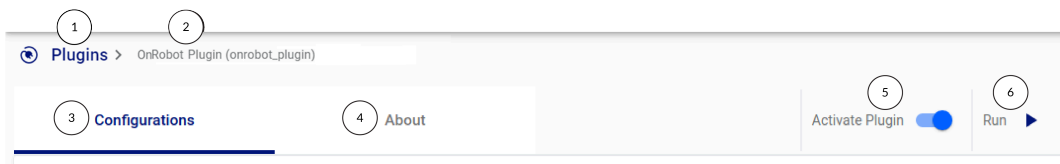


Figure 2: Example of a plugin page of a plugin that is stopped

- 1 Tap **Plugins** to return to the list of plugins.
- 2 Name of the selected plugin with the name of the namespace associated with the selected plugin in parentheses.

3 Tap **Configurations** to view and modify the current configurations of the selected plugin.



Important: Tap **Stop** (Stop ■) before you attempt to modify the current configurations.



Important: Tap **Run** (Run ►) after you modify the configurations. The plugin runs with the latest configuration values.

When there are no modifiable configurations in the plugin, a message is displayed.

This plugin does not expose any configuration.

4 Tap **About** to view important information about the selected plugin.

- Name
- Package Name
- Version
- Installation Type
- Description

5 Tap **Deactivate** to deactivate plugins that need to be installed but are not being used.

Tap **Activate Plugin** to activate a deactivated plugin.

6 The current operating state of the plugin.

Tap **Stop** (Stop ■) to stop the plugin from running. The button changes to **Run** (Run ►).

Tap **Run** to restart the plugin after modifying its settings. The button changes to **Stop**.

Configurations of the OnRobot Plugin

The parameters in the OnRobot [plugin](#) that have an overall affect on the [wrist](#) and the gripper are configured on the **Configurations** page of the OnRobot plugin.

To access the **Configurations** page of the OnRobot plugin, tap **Systems > Plugins > OnRobot Plugin**.

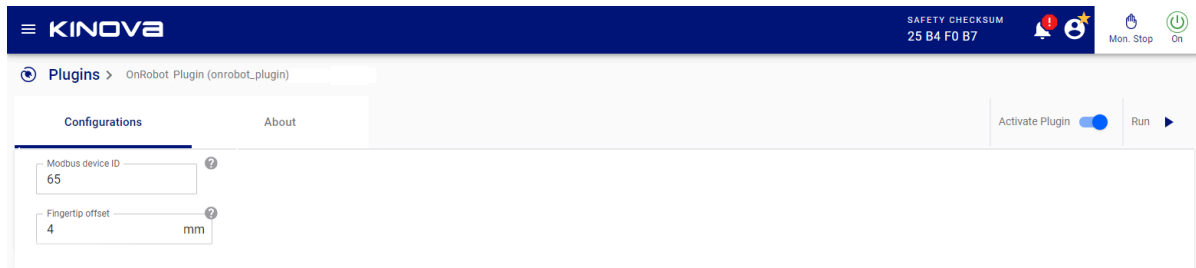


Figure 3: Configuration page for the OnRobot plugin

The exposed parameters are configurable.

Modbus device ID

The modbus server ID is the default value of the OnRobot grippers. Change this value only when the device ID of the OnRobot Grippers has changed.

Fingertip offset

Specify the distance from the inside of the gripper fingertip to the reference point on the fingertip in mm.

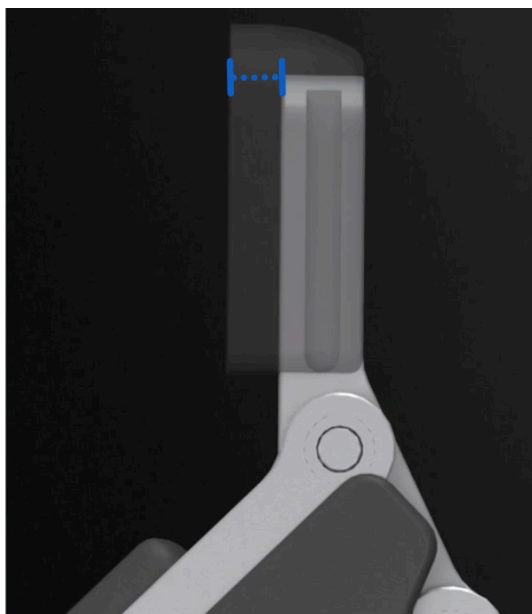


Figure 4: Fingertip offset shown by the blue lines

OnRobot RG2 and RG6 grippers

The OnRobot RG2 grippers connect to the *wrist* of Link 6 with the OnRobot Quick Changer and an external cable.

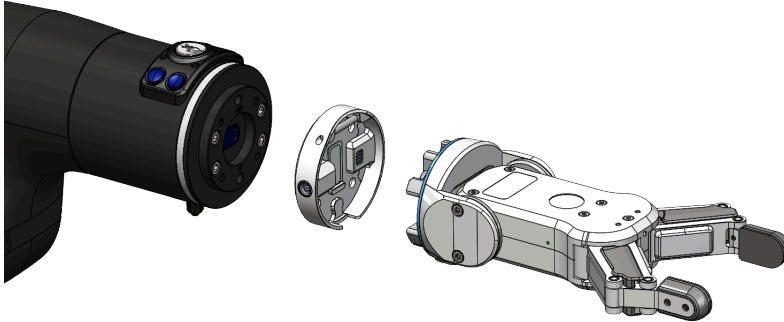


Figure 5: Wrist, flange, OnRobot Quick Changer, and OnRobot gripper

Photo: OnRobot



Figure 6: OnRobot RG2

Photo: OnRobot



Figure 7: OnRobot RG6

Photo: OnRobot



Figure 8: OnRobot Quick Changer

Installing OnRobot grippers

The OnRobot RG2 and RG6 grippers connect to Link 6.

Before you begin

1. Make sure the robot is off.
2. Make sure you have all tools and equipment nearby.

Personnel:

- **Number of Workers:** 1

Supplies

- 4 mm hex key
- screws that come with the OnRobot tool

About this task

Installation of the OnRobot grippers is done in a stacking fashion. That is, the OnRobot Quick Connect must be fixed to the [wrist](#). Then the OnRobot gripper is fixed to the OnRobot Quick Connect.

Procedure

1. Secure the OnRobot Quick Connect to the wrist of Link 6 end effector.
2. Remove the end cap on the OnRobot connector cable.
3. Connect the OnRobot connector cable to connector A on the wrist of Link 6.
4. Wait for a light on the OnRobot gripper.

When communication is established between the robot and the OnRobot gripper, the light on the OnRobot device is green.

What to do next

Configure the tool from **Tools** in [Kortex Web App](#).

Related topics

[Configuring tools](#) on page 15

Configuring tools

An *end effector* tool *plugin* can be installed even if the corresponding tool is not mounted on the robot.

About this task

A single plugin can communicate with multiple end effector models. Therefore, it is necessary to configure the properties of the tool currently installed on the robot. The associated tool plugin may populate the **Tools** page with tools.

All tool configuration tasks are accessed by tapping **Systems > Tools**.



Tip: Before you can edit the active tools, the robot must be switched on and it must be in Monitored Stop.

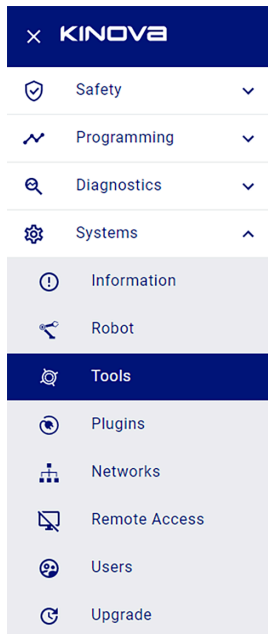


Figure 9: Accessing tool configuration operations

Procedure

1. Tap **Systems > Tools**.

The **Tools** page launches.

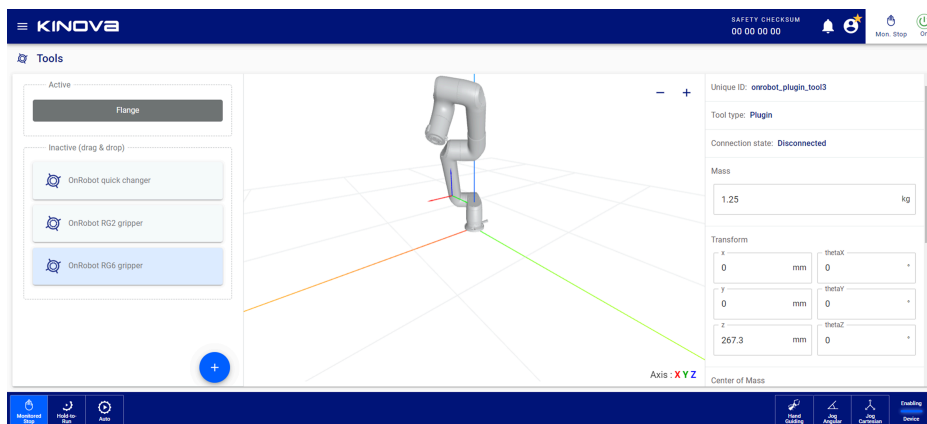


The tools are listed on the left side in two groupings: **Active** and **Inactive**. The *flange* is always listed in the **Inactive (drag & drop)** tools list because all tools are attached to it.

The center is a 3D view of the arm that can be moved around to help you visualize the tool reference frame. Tap **+** or **-** to zoom in or out. Hold and move the view around to have different viewpoints of the robot.

2. Select a tool in the **Inactive (drag & drop)** pane.

The properties of the selected tool are displayed on the right.



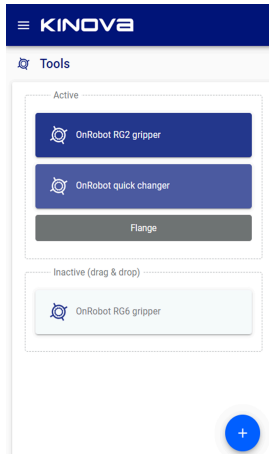
3. Modify the values in the **Properties** panel.



Note: Configure the tools only when they are still in the **Inactive** pane.

4. Drag each tool in the order they are assembled onto the flange of the [wrist](#).

Example: The OnRobot Quick Connector is already on the wrist when you physically add a OnRobot tool. Drag the OnRobot gripper from the **Inactive** pane to the **Inactive (drag & drop)** pane, placing it above the flange.



Related topics

[Tool configuration fields](#) on page 18

Tool configuration fields

There may be times when the default configuration of a OnRobot tool needs to be modified.

Unique ID: **onrobot_plugin_tool1**

Tool type: **Plugin**

Connection state: **Disconnected**

Mass

0.06 kg

Transform

x

0 mm

thetaX

0 °

y

0 mm

thetaY

0 °

z

13.6 mm

thetaZ

0 °

Center of Mass

x

0 mm

y

0 mm

z

6.8 mm

Inertia Matrix

ixx

0 kg/m²

iyy

0 kg/m²

ixy

0 kg/m²

iyz

0 kg/m²

ixz

0 kg/m²

izz

0 kg/m²

Figure 10: Configuration settings for the selected tool

Table 2: Configurable fields on the Tools page for OnRobot

Field name	Description	Modifiable
Unique ID	Unique identifier assigned by the plugin to the tool The plugin assigns the unique identifier for all OnRobot tools. Examples: - onrobot_gripper_plugin_tool1 - onrobot_gripper_plugin_tool2 - onrobot_gripper_plugin_tool3	No

Field name	Description	Modifiable
Tool type	Type of tool being used There are two types of tools. • Custom • Plugin When you create a tool by tapping the +, the type is Custom. When the OnRobot plugin is installed, the plugin creates and adds the OnRobot tools to the Tools page. The type is Plugin.	No
Connection state	State of the connection between the robot and the device • Connected • Disconnected • Unknown	No
Mass	Mass of OnRobot tool, measured in kg	Yes
Transform	Position and orientation of the TCP, relative to the reference frame of the previous element in the tool stack Position is measured as x,y,z in mm. Orientation is measured as thetaX, thetaY, thetaZ in °.	Yes
Center of mass	Position of the center of mass of the tool, relative to the flange of the robot Position is measured as x,y,z in mm.	Yes

Field name	Description	Modifiable
Inertia matrix	Specific three-dimensional positions measured as ixx , iyx , ixy , iyz , ixz , izz in kg/m^2 , relative to the center of mass	Yes

OnRobot plugin actions

The OnRobot gripper has its own set of actions available for further configuration when programming Link 6.

All actions associated with the OnRobot Plugin are available as tiles that can be dragged into the **Sequence editor** pane of the current program.

The OnRobot *plugin* has three actions that are available. Some actions have their own set of parameters to make them configurable. All of the actions can have a specific name assigned to them, output results to variables, and can set the action as *non-blocking*.

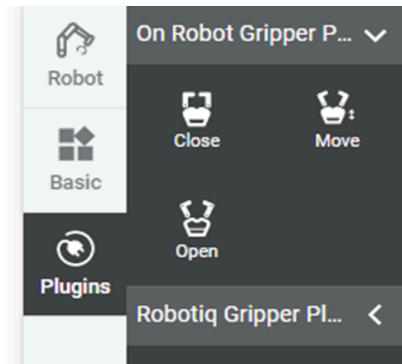
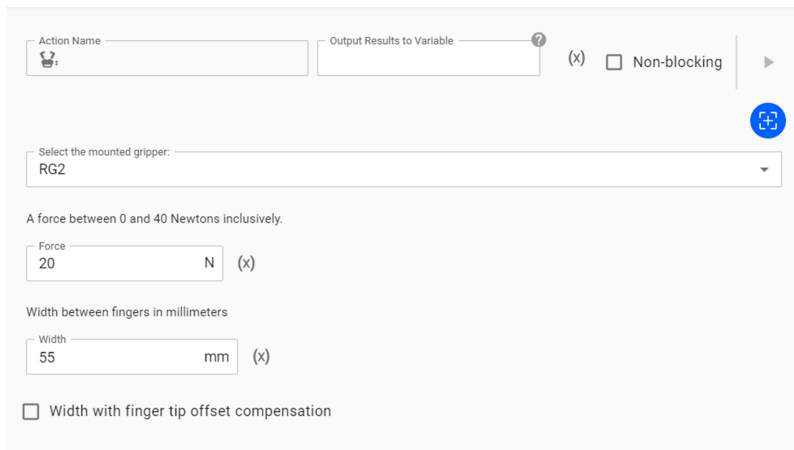
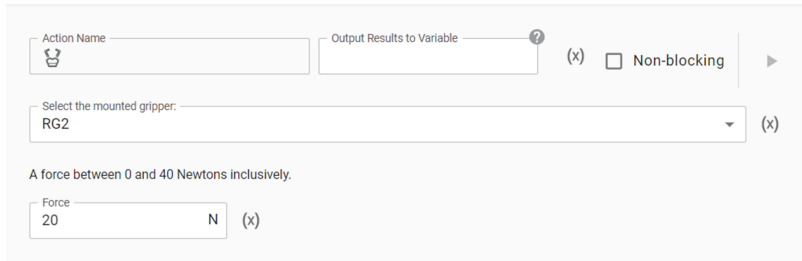


Figure 11: Actions available from the OnRobot plugin

Table 3: Parameters of OnRobot plugin actions

Action	Icon	Parameter
Close		Closes the gripper Action Name Output Results to Variable (x) ☐ Non-blocking Select the mounted gripper: RG2 (x) A force between 0 and 40 Newtons inclusively. Force 20 N (x)

Action	Icon	Parameter
		Select the mounted gripper Select either RG2 or RG6 from the menu, according to what you have physically installed on Link 6. Force The higher the value, the greater amount of force is needed before the closing movement stops. The higher the value, the faster the gripper closes. Maximum on RG2: 40 N Maximum on RG6: 140 N
Move		Moves the gripper to a specific location 

Action	Icon	Parameter
		Select the mounted gripper Select either RG2 or RG6 from the menu, according to what you have physically installed on Link 6. Force The higher the value, the greater amount of force is needed before it stops moving. The higher the value, the faster the gripper moves before it stops moving. Maximum on RG2: 40 N Maximum on RG6: 140 N Width The gripper must be at this width when it stops moving. Maximum and minimum values depend upon the gripper type, the current fingertip offset, and whether Fingertip offset compensation is selected. Fingertip offset compensation When selected, the width of the gripper compensates for the fingertip offset.
Open		Opens the gripper 

Action	Icon	Parameter
		Select the mounted gripper
		Select either RG2 or RG6 from the menu, according to what you have physically installed on Link 6.
		Force
		The higher the value, the greater amount of force is needed before the opening movement stops.
		The higher the value, the faster the gripper opens.
		Maximum on RG2: 40 N
		Maximum on RG6: 140 N

Variables

It is possible to create variables that are based on the output values of the actions from the plugin.

Program variables can be one of several types, one of which is **Object**. The **Object** type can take on one of many different schemas related to the pose and angles of the robot, as well as output values coming from the pre-installed Arm plugin. The schema must match the selected action.

In the case of the OnRobot plugin, the variable can be set to return the data that is found in the data structure that is output by the OnRobot actions.

- **Close**
- **Move**
- **Open**

Name	Type	Schema	Unit	Value	Actions
onrobot_close_output # fingertip_offset # current_depth # current_relative_depth # current_width # current_width_with_offset grip_detected	Object	OnRobot Plugin - Close - Output	N/A	Value {}	

Figure 12: Example of data structure returned by action



Note: Use `grip_detected` as the title of a **Condition** to confirm an object is grasped.

You can use the output variable of the action when you are programming with the visual programming interface.

Each of the actions expose the same type of information. Modify the values in the **JSON Object Editor** that launches after you tap the {} of the variable.

JSON Object Editor

onrobot_gripper_output

Indicates the current fingertip offset in millimeters.

Fingertip offset feedback

mm

Indicates the current depth of the gripper, to be used for depth compensation. The depth is relative to the fully closed position, provided in millimeters.

Current depth

mm

Indicates the current depth of the gripper, to be used for depth compensation. The depth is relative to the position at which the latest motion was initiated and is provided in millimeters.

Current relative depth

mm

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

Current width

mm

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

Current width with offset

mm

☐ Grip detected

✕ CANCEL

✓ SAVE

Figure 13: Example of JSON Object Editor of an action

Table 4: Information in each OnRobot action

Data element	Description
Fingertip offset feedback	Current fingertip offset in millimeters
Current depth	Current depth of the gripper in millimeters
	Used for depth compensation
	Relative to the fully closed position
Current relative depth	Current depth of the gripper in millimeters
	Used for depth compensation
	Relative to the position at which the last motion is initiated
Current width	Current width between the insides of the aluminum gripper fingers in millimeters

Data element	Description
Current width with offset	Current width between the gripper fingers in millimeters, taking the fingertip offset into consideration
Grip detected	Sends a signal when the grip is detected if the option is selected

Changes since the last release

Modifications were made from the previous version to the current version.

Changes made in version 1.2

Version 1.2 of the OnRobot Plugin benefits from minor bug fixes, increased robustness, and compatibility with the latest Kortex v3.2.0.

Glossary

C

controller

the part of the robot from where the software operates

E

end effector

the end of the arm of a robot; also, a tool or [flange](#) connected to the end of the arm of the robot

F

flange

a rim used for attaching another object

G

GUI

a way of interacting with a program of a computer that involves windows, dialogs, icons, and menus

Graphical User Interface (GUI)

synonym: human machine interface (HMI)

K

Kortex Web App

the [GUI](#) that runs on a web server on the [controller](#) and is accessed on the [teach pendant](#) or on an external computer

synonym: Web App

N

namespace

a way in computer science of grouping together all objects that work together such that each object has a unique name

non-blocking

the ability for a robotic program to proceed to its next step even when the current, non-blocking, action is not finished

P

pendant

a device used to configure and control the movements of a robot

synonym: teach pendant

plugin

software that is added to an pre-existing base software so as to give the application additional capabilities

T

TCP

the position and orientation of the tool

Tool Center Point (TCP)

teach pendant

a device used to configure and control the movements of a robot

synonym: pendant

U

USB

industry computer bus standard that makes it easier to transfer data between computers

Universal Serial Bus (USB)

W

wrist

the part found at the end of the robot arm to which end effectors may be attached

TOGETHER IN ROBOTICS



PROUDLY MADE IN

📍 QUEBEC, CANADA

EN-UG-023-r1.1-202301

KINOVA

kinovarobotics.com | info@kinovarobotics.com | +1 (855) 654-6682

© Kinova inc 2022. All rights reserved.

¹Intel, the Intel logo, and Intel Core are trademarks of Intel Corporation or its subsidiaries.