



HAND-*E*

Original Notice

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Robotiq Hand-E
for TM Series Robots



Instruction Manual

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Revisions	6
1. General Presentation	9
1.1. Gripper nomenclature	10
1.2. Object picking	12
1.3. Setup and control	13
2. Safety	14
2.1. Warning	14
2.2. Intended Use	15
3. Installation	16
3.1. Scope of Delivery	17
3.1.1. Robotiq Hand-E TM Kit	17
3.2. Required Tools and Equipment	18
3.3. Environmental and Operating Conditions	19
3.4. Mechanical Installation	20
3.4.1. Installing the fingers/fingertips/holders on the Gripper	20
3.4.2. Installing the Gripper onto the robot	22
Single Gripper	22
Multiple Grippers	23
3.5. Electrical Setup	24
3.5.1. Pinout Interface	24
3.5.2. Coupling to controller	24
Single Gripper	27
Multiple Grippers	27
4. Control	29
4.1. Overview	29
4.2. Gripper Register Mapping	31
4.3. Robot Output Registers & Functionalities	32
4.4. Robot Input Registers & Status	35
4.5. Picking Features	38
4.5.1. Force control	38
4.5.2. Re-Grasp	39



4.5.3. Object detection	40
4.5.4. Brake engagement	40
4.6. Control Logic Example	41
4.7. Modbus RTU Communication	42
4.7.1. Connection Setup	43
4.7.2. Read holding registers (FC03)	44
4.7.3. Read input registers (FC04)	45
4.7.4. Preset multiple registers (FC16)	46
4.7.5. Master read & write multiple registers FC23	47
4.7.6. Modbus RTU example	49
4.8. Control over TM	58
4.8.1. TM Robots Compatibility with Robotiq Grippers	58
4.8.2. Getting Started	58
4.8.3. TM Gripper Components	62
Installation	62
Gripper Button	69
Programming	71
SET Component	71
GRIP Component	73
RELEASE Component	74
CHANGEGRIPPER Component	76
Changing the Modbus Slave ID	78
<hr/> 5. User Interface	<hr/> 80
6. Specifications	81
6.1. Technical dimensions	82
6.1.1. Couplings	83
6.1.2. Fingers and fingertips	91
Rack	91
Basic aluminum finger	92
Fingertip holder	92
Flat silicone fingertip	93
Grooved fingertip	94
6.2. Mechanical specifications	95



6.2.1. Specifications:	95
Payload and force	96
Maximum payload/External force vs. Custom finger design	97
Friction grasp and form-fit grasp	98
Maximum payload by grasp type	98
6.2.2. Center of mass and tool center point	99
6.2.3. Moment and force limits	101
6.3. Electrical specifications	102
7. Maintenance	103
7.1. Gripper cleaning	104
7.2. Periodic inspection	106
7.3. Rack & pinion mechanism cleaning	107
8. Spare Parts, Kits and Accessories	108
9. Troubleshooting	111
10. Warranty and Patent	112
11. Contact	113
12. Harmonized Standards, Declarations and Certificates	114
12.1. Translation of original EC declaration of incorporation	114
12.2. Applied standards	115
12.3. Ingress Protection Certificate	116



Revisions

Robotiq may modify this product without notice, when necessary, due to product improvements, modifications or changes in specifications. If such modification is made, the manual will also be revised, see revision information. See the latest version of this manual online at support.robotiq.com.

Revision 2019/03/13

- Updated mechanical specifications (Section 6.2)

Revision 2019/02/19

- Updated Sections 4 and 6 to modify the grip force

Revision 2018/12/10

- First publication of the Instruction Manual.



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1. General Presentation

The terms "Gripper", "Robotiq Gripper", "Hand-E Gripper" and "Hand-E" used in the following manual all refer to the Robotiq Hand-E Gripper. The Robotiq Hand-E Gripper is a robotic peripheral designed for industrial applications. Its design makes it a unique robotic end-of-arm tool to quickly pick, place and handle a large range of parts of varying sizes and shapes.

Note

The following manual uses the metric system. Unless otherwise specified, **all dimensions are in millimeters**.

Note

The following section presents the key features of the Gripper and must not be considered as appropriate to Gripper operation, each feature is detailed in the appropriate section of the manual. Safety guidelines must be read and understood before any operation is attempted with the Gripper.



1.1. Gripper nomenclature

The Hand-E Gripper is a parallel gripper. Its two fingers are actuated by a single motor.



Fig. 1-1: Robotiq Hand-E

Please refer to the **Scope of Delivery** section and **Spare Parts, Kits and Accessories** section for details on standard and optional parts. The Hand-E basic gripper unit includes aluminum fingers, as shown in the figure above.



The user can install fingers directly on the racks, or fasten fingertips to fingertip holders, which are in turn installed on the racks. Refer to the **Installing the Gripper onto the robot** section for more information on how to integrate custom fingers and fingertips to Hand-E.

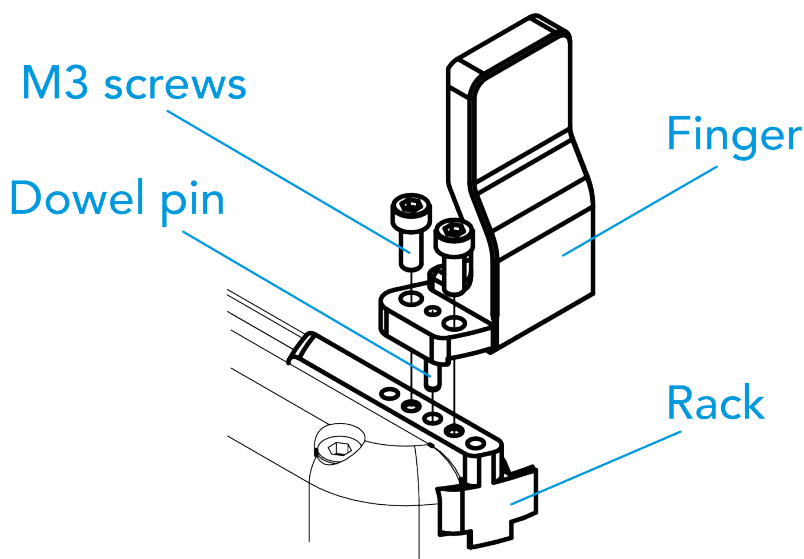


Fig. 1-2: Mounting of a finger on a rack

When ordered as a kit (please refer to the **Scope of Delivery** section), a fingertip starting kit is included (please refer to the **Spare Parts, Kits and Accessories** section). These fingertips should be mounted onto fingertip holders.

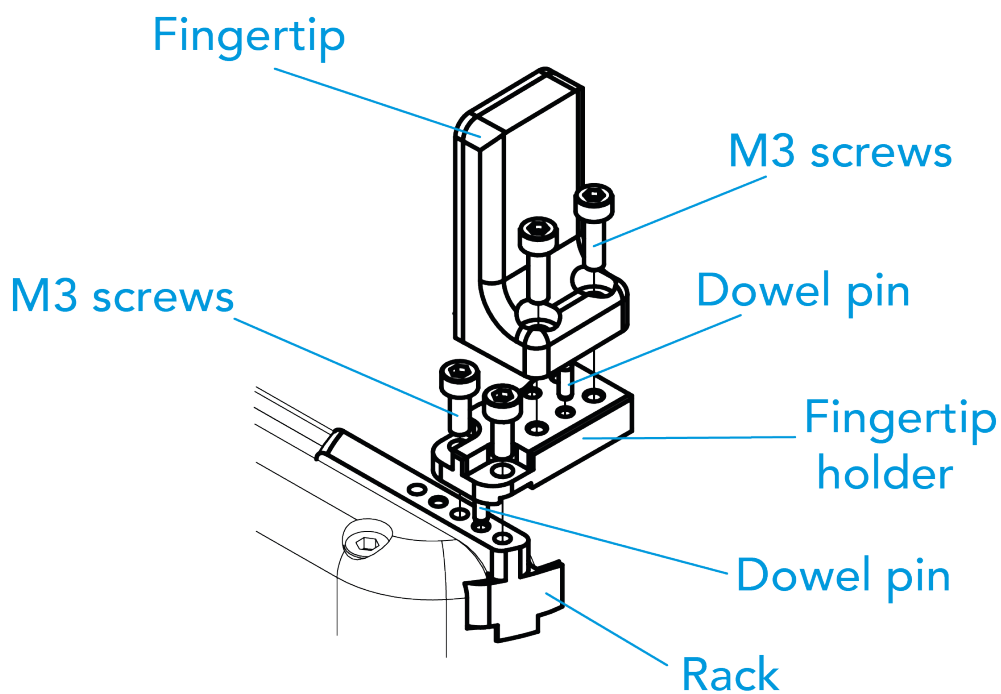


Fig. 1-3: Mounting of a fingertip on a fingertip holder (example)

Tip

It is possible to customize your own fingers or fingertips. You can install custom fingers directly on the racks and the fingertips on the fingertip holders.



1.2. Object picking

The Hand-E Gripper has a single actuator for opening and closing the fingers. It also allows internal gripping. The fingers can pick hollow parts from the inside by applying pressure with the outer surface of the fingers.

See the figure below for a representation and refer to the **Picking Features** section for details on the possible position commands of your Gripper.

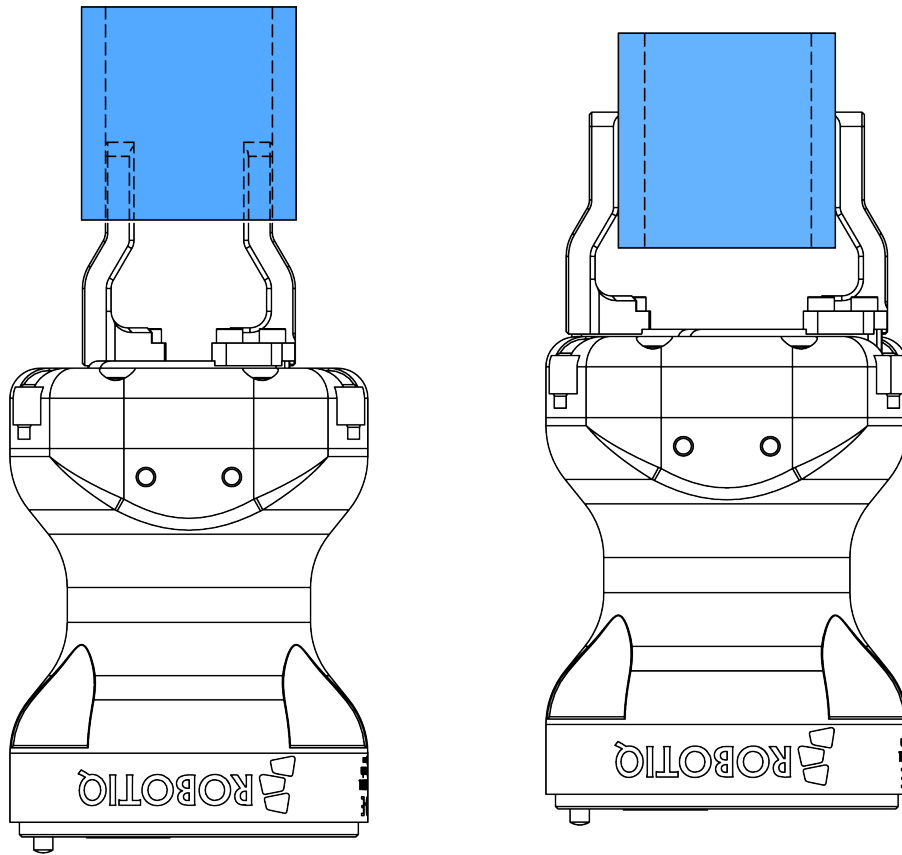


Fig. 1-4: Hand-E Gripper internal and external gripping.

1.3. Setup and control

The Gripper is powered and controlled directly via a single device cable that carries a 24V DC supply and Modbus RTU communication over RS-485. Please refer to the **Electrical Setup** section for wiring information and to the **Control** section for control of the Gripper (software packages are available for control via some types of robot controllers).

Info

Robotiq Universal Controller is available when industrial communication protocols are required (other than Modbus RTU over serial).

A gripper coupling is required for using Hand-E; the coupling will provide mechanical and electrical connectivity. Please refer to the **Mechanical Installation** section for installation of the coupling, to the **Technical dimensions** section for technical drawings, and to the **Spare Parts, Kits and Accessories** section for available couplings.

The Hand-E Gripper has an embedded object detection feature using indirect sensing methods. When picking an object with the "go to" command, the Gripper status will allow you to know if an object is picked or not via a simple object detection bit (0 or 1). When an object is detected, the Gripper will stop. If the object is being dropped, the Gripper will automatically close to keep the object until the object is detected or until the position target from the "go to command" is reached. For details on object detection, please refer to the **Control** section.



2. Safety

Warning

The operator must have read and understood all of the instructions in the following manual before handling the Robotiq Hand-E Gripper.

Info

The term "operator" refers to anyone responsible for any of the following operations on the Robotiq Hand-E Gripper:

- Installation
- Control
- Maintenance
- Inspection
- Calibration
- Programming
- Decommissioning

This documentation explains the various components of the Robotiq Hand-E Gripper and general operations regarding the whole lifecycle of the product from installation to operation and decommissioning.

The drawings and photos in this documentation are representative examples; nonetheless, discrepancies may be observed between those and the delivered product.

2.1. Warning

Info

Any use of the Gripper in noncompliance of these warnings is inappropriate and may cause injury or damage.

Warning

- The Gripper needs to be properly secured before operating the robot.
- Do not install or operate a Gripper that is damaged or lacking parts.
- Never supply the Gripper with an alternative current source.
- Make sure all cord sets are always secured at both ends, at the Gripper and at the robot.
- Always meet the recommended keying for electrical connections.
- Make sure no one is in the robot and/or Gripper path before initializing the robot's routine.
- Always meet the Gripper's payload specifications.
- Set the Gripper's pinch force and speed accordingly, based on your application.
- Keep fingers and clothes away from the Gripper while the power is on.



- Do not use the Gripper on people or animals.
- For welding applications, make sure there are no Gripper parts on the ground path of the welding power source.

Risk assessment and final application:

The Robotiq Hand-E Gripper is meant to be used on an industrial robot. The robot, the Gripper and any other equipment used in the final application must be evaluated via a thorough risk assessment. It is the robot integrator's duty to ensure that all local safety measures and regulations are met. Depending on the application, there may be risks that require additional protection/safety measures; for example, the work-piece the Gripper is manipulating might be inherently dangerous to the operator.

2.2. Intended Use

The Gripper unit is designed for gripping and temporarily securing or holding objects.

Caution

The Gripper is not intended for applying force against objects or surfaces.

The product is intended for installation on a robot or other automated machinery and equipment.

Info

Always comply with local and/or national laws, regulations and directives on automation safety and general machine safety.

The unit should be used exclusively within the range of its technical data. Any other use of the product is deemed improper and unintended use. Robotiq will not be liable for any damages resulting from any improper or unintended use.



3. Installation

The following subsections will guide you through the installation and general setup of your Robotiq Hand-E Gripper.

Warning

Before installing:

- Read and understand the safety instructions related to the Hand-E Gripper.
- Verify your package according to the scope of delivery and your order.
- Have the required parts, equipment and tools listed in the requirements readily available

Warning

When installing:

- Meet the recommended environmental conditions.
- Do not operate the Gripper, or even turn on the power supply, before it is firmly anchored and the danger zone is cleared. The fingers of the Gripper may move and cause injury or damage.



3.1. Scope of Delivery

3.1.1. Robotiq Hand-E TM Kit

Standard upon delivery

- Robotiq Hand-E Basic Gripper Unit: HND-GRP-001
 - Hand-E Aluminum Finger Kit
 - Screw kit
- RS485 to RS232 signal converter: ACC-ADT-RS232-RS485
- USB to RS485 signal converter: ACC-ADT-USB-RS485
- Robotiq device cable: **CBL-COM-1065-10-HF**
- Coupling for connection to the robot controller: GRP-CPL-062

Info

When bought as a kit, the Hand-E Gripper will come in a package with the appropriate coupling, fingers/fingertips and cabling. Please refer to the **Spare Parts, Kits and Accessories** section.



3.2. Required Tools and Equipment

The following tools are required to install the Hand-E Gripper:

- 4 mm hex key to mount the Gripper onto its coupling.
- Metric hex key according to your coupling to mount the coupling onto the robot.

Optional tools if installing fingertip/holder kits: HND-FIN-ALU-KIT, HND-TIP-RUB-KIT, HND-TIP-VGR-KIT, HND-TIP-HLD-KIT

- 2,5 mm hex key



3.3. Environmental and Operating Conditions

CONDITION	VALUE
Minimum storage/transit temperature	-30°C [-22°F]
Maximum storage/transit temperature	60°C [140°F]
Minimum operating temperature	-10°C [14°F]
Maximum operating temperature	50°C [122°F]
Humidity (non-condensing)	20-80% RH
Vibration	< 0.5G
Other	IP 67

Table 3-1: Environmental and operating conditions of the Hand-E Gripper.



3.4. Mechanical Installation

3.4.1. Installing the fingers/fingertips/holders on the Gripper

The figures below list the material and tools needed to mount fingers or fingertips/holders onto the racks of the Hand-E Gripper.

NO	ITEM
1	HAND-E ALUMINUM FLAT FINGER
2	SOCKET HEAD CAP SCREW M3-0.5 X 8mm
3	DOWEL PIN M2 X 6mm LG.

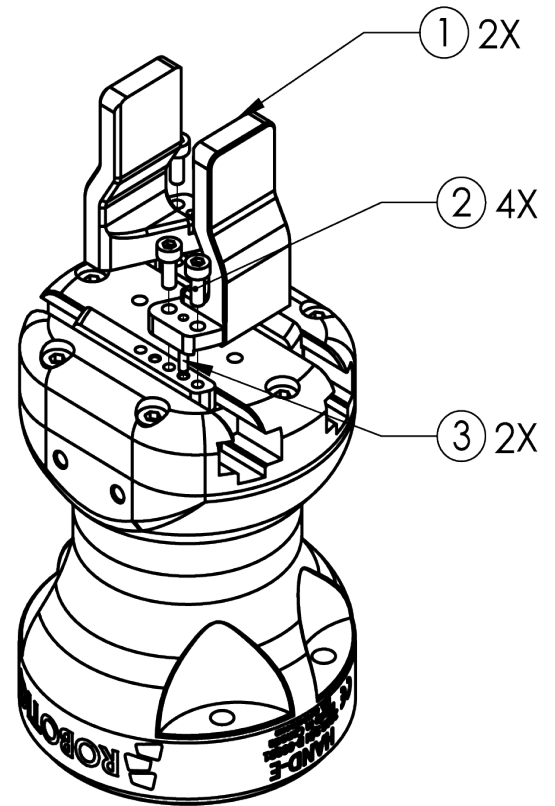


Fig. 3-1: Mounting the fingers on the racks

NO	ITEM
1	HAND-E RUBBER FLAT FINGERTIP
2	DOWEL PIN M2 X 6mm LG.
3	SOCKET HEAD CAP SCREW M3-0.5 X 8mm
4	FINGERTIP HOLDER
5	SOCKET HEAD CAP SCREW M3-0.5 X 8mm

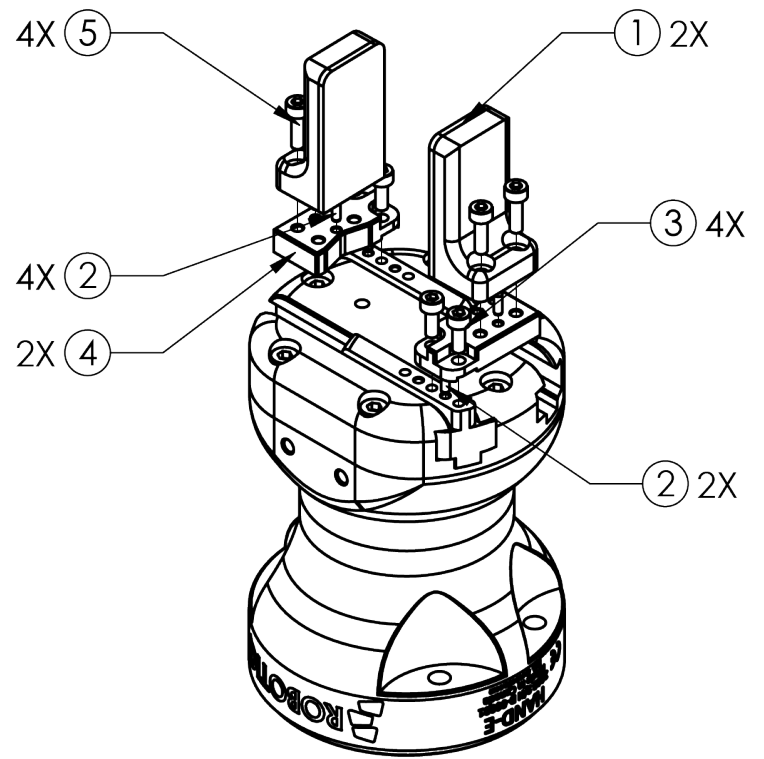


Fig. 3-2: Mounting fingertips on holders (and then on the racks)

3.4.2. Installing the Gripper onto the robot

Single Gripper

You must use a coupling to attach the Gripper to the robot.

Here are the steps to follow to mount the Gripper on the robot (exploded view in the figure below). Note that all screws should be locked using medium strength threadlocker.

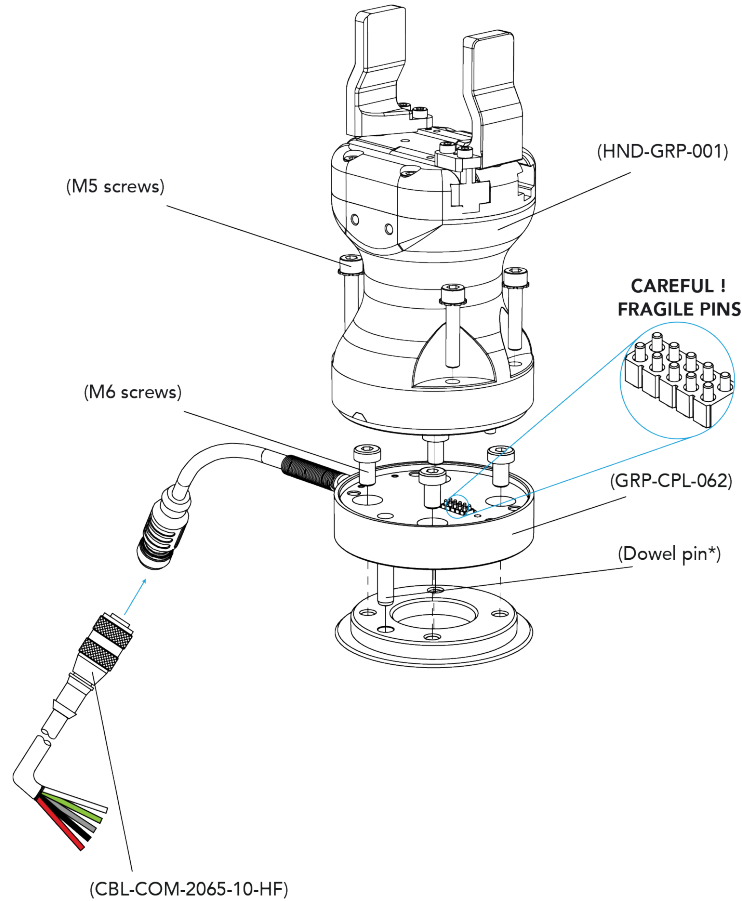


Fig. 3-3: Installing the Gripper onto the robot wrist



Multiple Grippers

When installing multiple grippers on one robot, every gripper must have its own coupling.

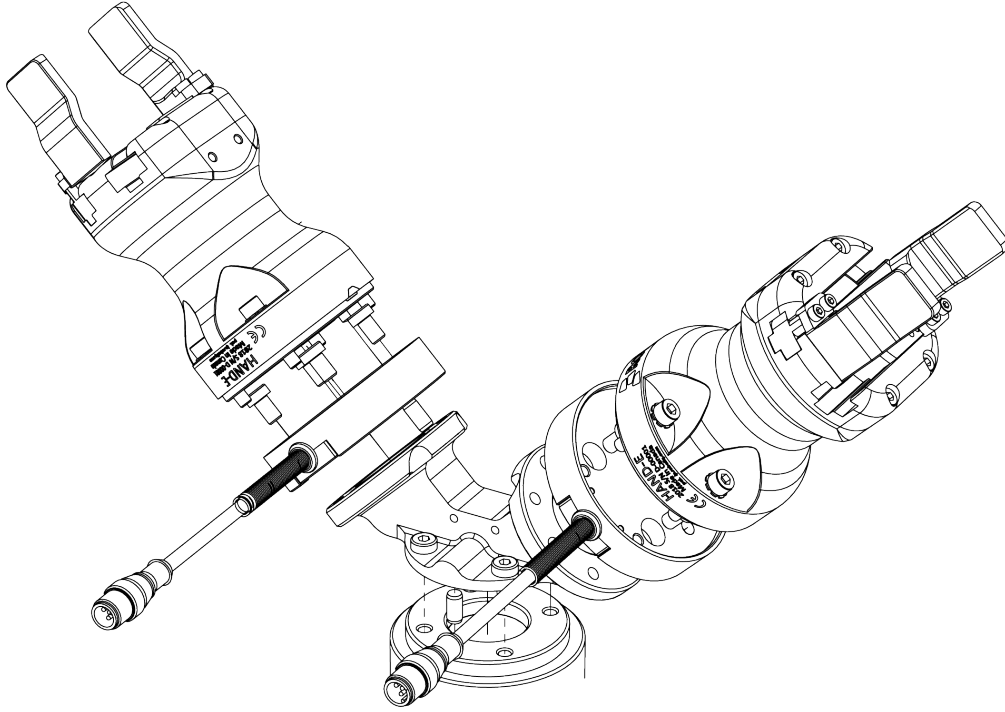


Fig. 3-4: Dual Hand-E Gripper Configuration

3.5. Electrical Setup

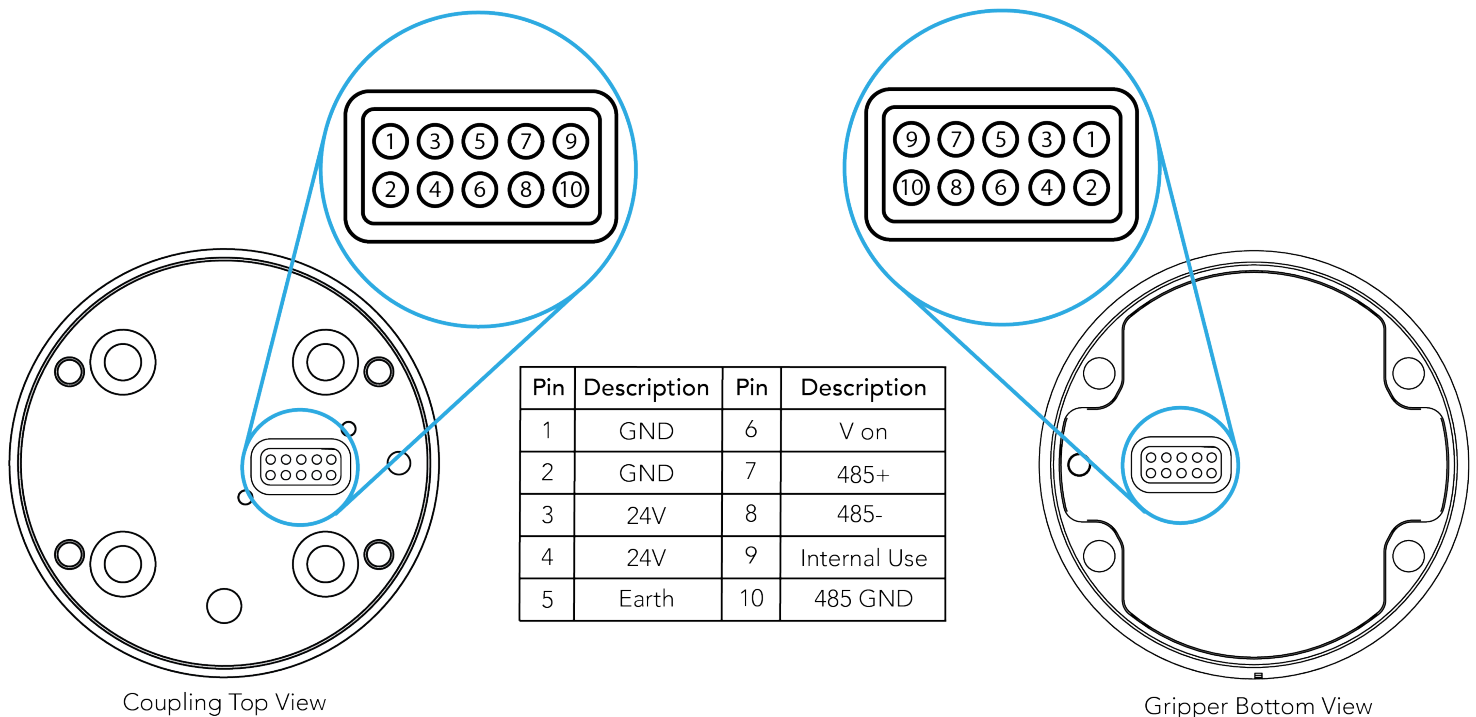
Power and communication are established with the Hand-E Gripper via a single device cable. The device cable provides a 24V power supply to the Gripper and enables serial RS485 communication to the robot controller.

Info

RS485 signals (485+, 485- and 485 GND) are isolated from the main 24V power supply. GND can be connected to any other ground reference as long as the voltage potential between the grounds does not exceed 250V. Grounding reference is at the user's discretion.

3.5.1. Pinout Interface

The Gripper interfaces with its coupling via a 10-spring pin connector located on its outer surface.



Info

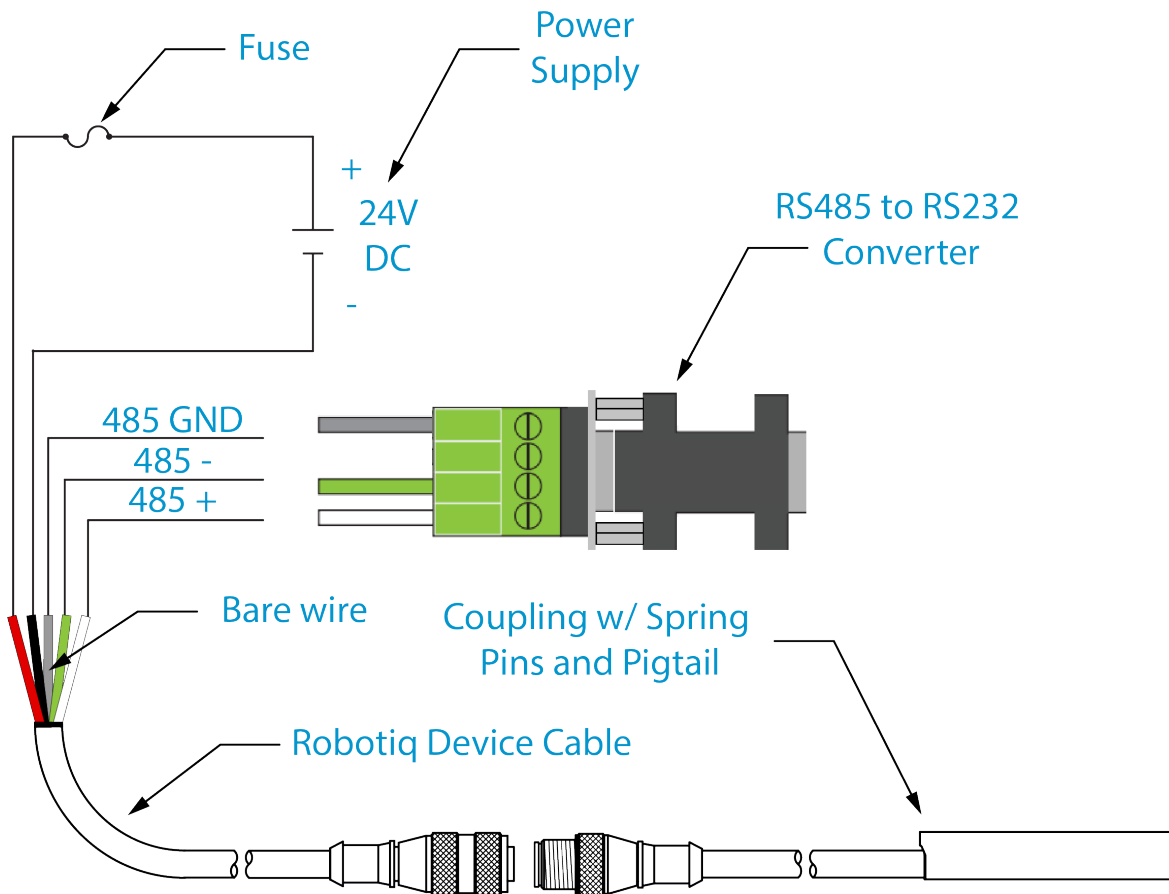
The coupling used in the figure above is used for reference only and corresponds to bolt pattern ISO 9409-1-50-4-M6.

3.5.2. Coupling to controller

An optional Robotiq Universal Controller may be used between the Gripper and the network/robot controller if fieldbus communication is required.

If a Robotiq Universal Controller is used, please refer to the instruction manual of the Robotiq Universal Controller. The figure below represents the wiring scheme of the Hand-E Gripper with device cable, power supply, fuse (refer to the **Required Tools and Equipment** section) and grounding.



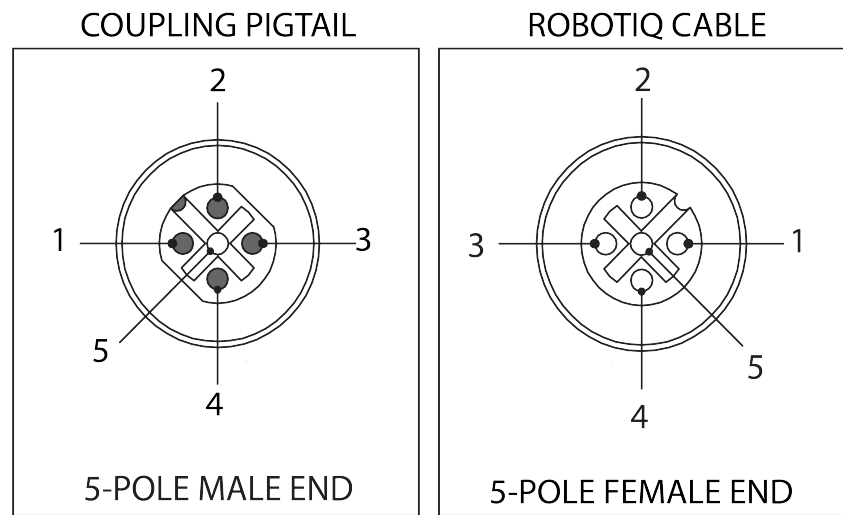


Caution

Use proper cabling management. Make sure to leave enough slack in the cabling to allow movement of the Gripper along all axes without pulling out the connectors. Always protect the controller side (robot side) connector of the cable with a strain relief cable clamp.

The figure below illustrates the Hand-E Gripper pigtail connector from the coupling (GRP-CPL-062 or AGC-CPL-XXX-002), the device cable on the robot side (CBL-COM-2065-10-HF) and their associated pinout.





PIN	END OF CABLE COLOR	SIGNAL
1.	(SHIELD)	RS485 GND
2.	RED	24 V
3.	BLACK	GND
4.	WHITE	RS485 +
5.	GREEN	RS485 -

Table 3-2: Pinout of the Hand-E Gripper pigtail and device cable.

If additional cables are used, suggested cable specifications are as follows:

Power supply, fusing

- minimum #22 AWG TEW, 300 V or 600 V



Single Gripper

Connect the white, green and bare wires to the Robotiq RS485 to RS232 signal converter (ACC-ADT-RS232-RS485) as shown in the figure below.

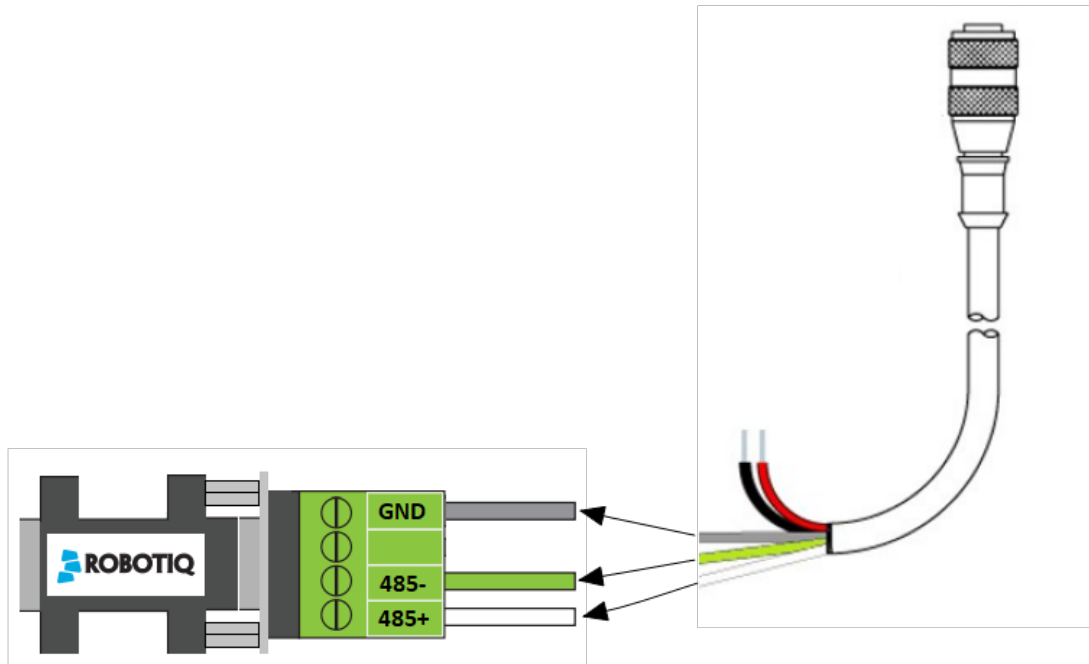


Fig. 3-5: Gripper Cable to RS485/RS232

Also connect the red (24V) and black (0V) wires in the controller according to the figure below.

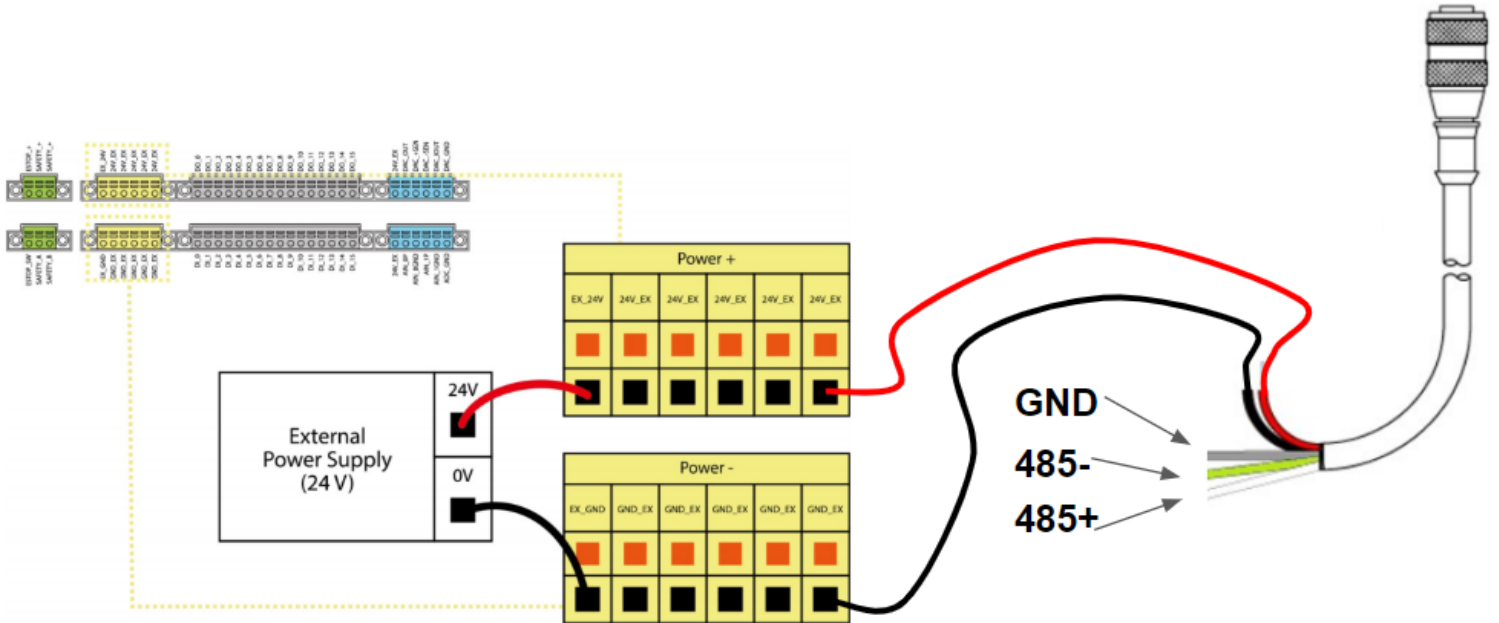


Fig. 3-6: Gripper Cable to Terminal Connector on the Controller

Multiple Grippers

It is possible to connect multiple grippers on the same robot. Only one RS485 to RS232 converter (ACC-ADT-RS232-RS485) should be used. Use M12 splitters (ACC-SPLIT-M12-2:1) to connect all the grippers pigtails to one 10 m cable (CBL-COM-2065-10-HF).



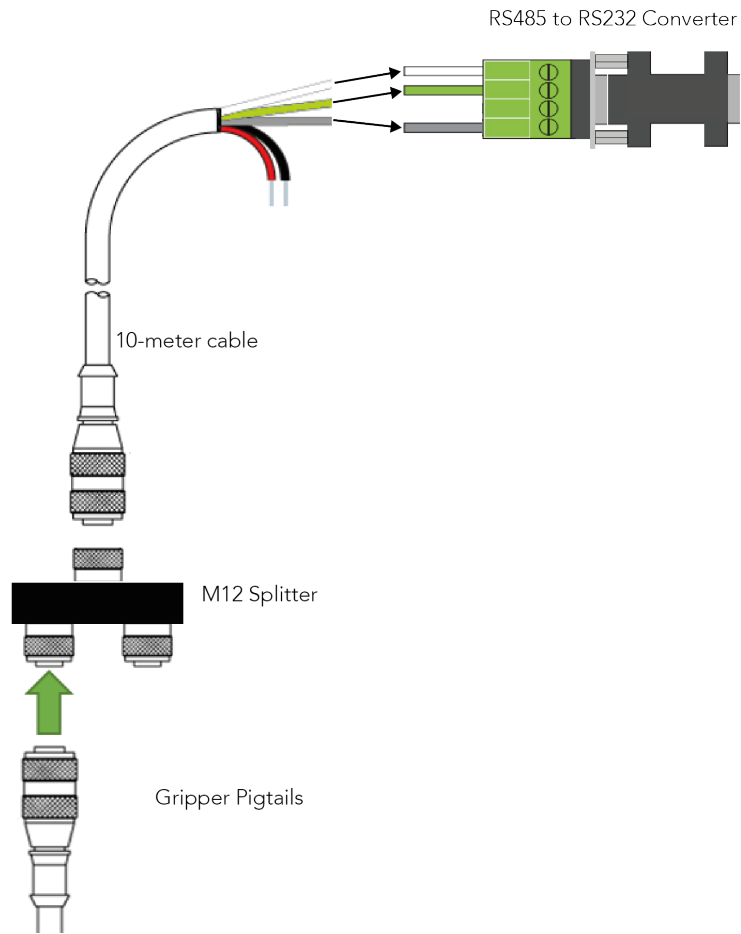


Fig. 3-7: Multiple grippers wiring



4. Control

Info

Unless specified, all values in this section are in hexadecimal values.

4.1. Overview

The Robotiq Hand-E Gripper is controlled directly via Modbus RTU using a RS485 signal. It can also be controlled via an optional Robotiq Universal Controller using an industrial protocol (refer to the [instruction manual of the Robotiq Universal controller](#)). The communication method used to control the Hand-E Gripper does not change the control logic or register setups described in the following subsections.

Tip

Robotiq suggests using the Robotiq User Interface test software to explore the various features of the Gripper, like object detection and force control.

Since the Robotiq Hand-E Gripper has its own embedded controller, high-level commands, such as "Go to requested position" are used to control it.

Info

The operator can:

- Control force, speed and position of the Gripper fingers.
- Finger movement is always synchronized, movement is initiated via a single "Go to requested position" command.
- Parallel or encompassing grip is performed automatically.
- A built-in object detection feature is available; the user can be notified after an object is picked once the "Go to" command has been initiated.
- Engage directional (open or close) auto-release for emergencies.

Control using registers

The Gripper has an internal memory that is shared with the robot controller. One part of the memory is for the robot output; **gripper functionalities**. The other part of the memory is for the robot input; **gripper status**. Two types of actions can then be performed by the robot controller :

1. Write in the **robot output** registers to activate **functionalities**;
2. Read in the **robot input** registers to get the **status** of the Gripper.

The **Gripper Register Mapping** section will map the different registers used to control the Gripper or to read its status while the **Robot Output Registers & Functionalities** section will detail the output (write) register functions, and the **Robot Input Registers & Status** section will detail the input (read) register status. The figure below is a representation of the memory and the control logic of the Gripper.



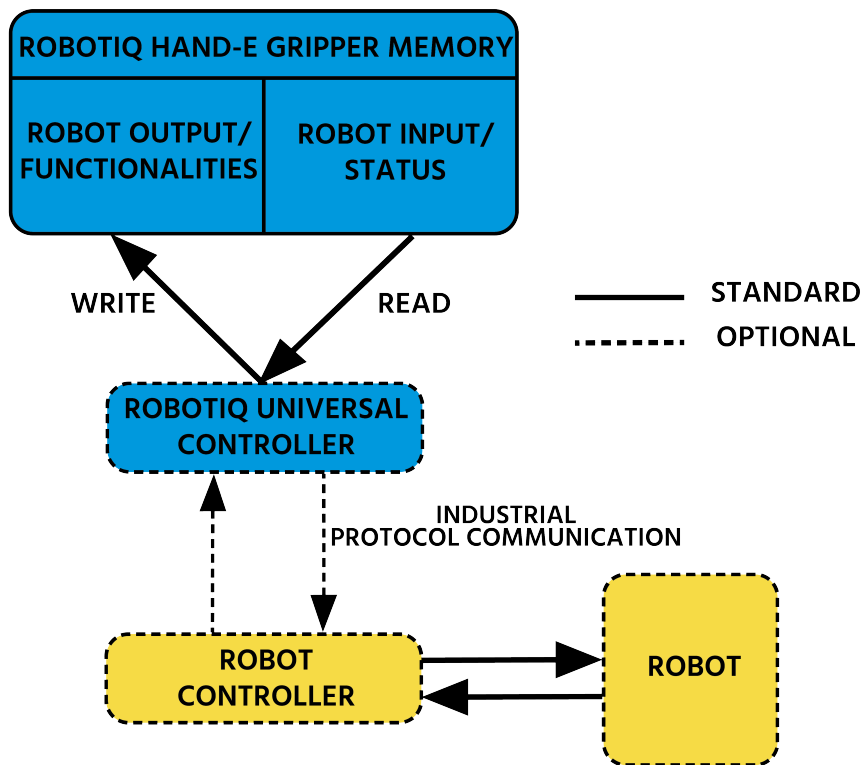


Fig. 4-1: Hand-E control logic overview

4.2. Gripper Register Mapping

Register mapping

Caution

Byte numbering starts at zero and not at 1 for the functionalities and status registers.

Register	Robot Output / Functionalities	Robot Input / Status
Byte 0	ACTION REQUEST	GRIPPER STATUS
Byte 1	RESERVED	RESERVED
Byte 2	RESERVED	FAULT STATUS
Byte 3	POSITION REQUEST	POS REQUEST ECHO
Byte 4	SPEED	POSITION
Byte 5	FORCE	CURRENT
Byte 6 to 15	RESERVED	RESERVED

Table 4-1: Registers of the Hand-E Gripper.



4.3. Robot Output Registers & Functionalities

Register: ACTION REQUEST

Address: Byte 0

Bits	7	6	5	4	3	2	1	0
Symbols	Reserved		rARD	rATR	rGTO	Reserved		rACT

rACT

First action to be made prior to any other actions; the **rACT** bit will activate the Gripper. Clear the **rACT** bit to reset the Gripper and clear any fault status.

- 0x0 - Deactivate Gripper.
- 0x1 - Activate Gripper (must stay on after activation routine is completed).

Warning

When setting **rACT** ($rACT == 1$), the Gripper will begin movement to complete its activation feature.

Info

Power loss will set **rACT** ($rACT == 1$); the **rACT** bit must then be cleared ($rACT == 0$), then set again to allow operation of the Gripper.

Caution

The **rACT** bit must stay on afterwards for any other action to be performed.

rGTO

The "Go To" action moves the Gripper fingers to the requested position using the configuration defined by the other registers, **rGTO** will engage motion while bytes 3, 4 and 5 will determine aimed position, force and speed. The only motions performed without the **rGTO** bit are activation and automatic release routines.

- 0x0 - Stop.
- 0x1 - Go to requested position.

rATR

Automatic Release routine action slowly opens the Gripper fingers until all motion axes reach their mechanical limits. After all motions are completed, the Gripper sends a fault signal and needs to be reinitialized before any other motion is performed. The **rATR** bit overrides all other commands excluding the activation bit (**rACT**).

- 0x0 - Normal.
- 0x1 - Emergency auto-release.

Caution



The automatic release is meant to disengage the Gripper after an emergency stop of the robot. The automatic release is not intended to be used under normal operating conditions. Automatic release requires the rACT to be cleared (rACT == 0) then set (rACT == 1).

rARD

Auto-release direction. When auto-releasing, **rARD** commands the direction of the movement. The **rARD** bit should be set prior to or at the same time as the **rATR** bit, as the motion direction is set when the auto-release is initiated.

- 0x0 - Closing auto-release
- 0x1 - Opening auto-release

Register: **GRIPPER OPTIONS**

Address: **Byte 1**

Bits	7	6	5	4	3	2	1	0
Symbol	Reserved							

Register: **GRIPPER OPTIONS 2**

Address: **Byte 2**

Bits	7	6	5	4	3	2	1	0
Symbol	Reserved							

Register: **POSITION REQUEST**

Address: **Byte 3**

Bits	7	6	5	4	3	2	1	0
Symbol	rPR							

This register is used to set the target position for the Gripper's fingers. The positions 0x00 and 0xFF correspond respectively to the fully opened and fully closed mechanical stops. For detailed finger trajectory, please refer to the **Specifications** section.

- 0x00 - Open position, with 50 mm opening
- 0xFF - Closed
- Opening / count: ≈ 0.2 mm for 50 mm stroke

Info



The activation will allow the Gripper to adjust to any fingers/fingertips. No matter what is the size and/or shape of the fingers/fingertips, 0 will always be fully opened and 245 fully closed, with a quasi-linear relationship between the two values.

Register: **SPEED**

Address: **Byte 4**

Bits	7	6	5	4	3	2	1	0
Symbol	rSP							

This register is used to set the Gripper closing or opening speed in real time, however, **setting a speed will not initiate a motion**.

- 0x00 - Minimum speed
- 0xFF - Maximum speed
-

Register: **FORCE**

Address: **Byte 5**

Bits	7	6	5	4	3	2	1	0
Symbol	rFR							

The force setting defines the final gripping force for the Gripper. The force will fix the maximum current sent to the motor . If the current limit is exceeded, the fingers stop and trigger an object detection notification. Please refer to the **Picking Features** section for details on force control.

- 0x00 - Minimum force
- 0xFF - Maximum force

Info

Register bytes 6 to 15 are reserved and should be set to 0.



4.4. Robot Input Registers & Status

Register: GRIPPER STATUS

Address: Byte 0

Bits	7	6	5	4	3	2	1	0
Symbols	gOBJ		gSTA		gGT O	Reserved		gAC T

gACT

Activation status, echo of the **rACT** bit (activation bit).

- 0x0 - Gripper reset.
- 0x1 - Gripper activation.

gGTO

Action status, echo of the **rGTO** bit (**go to** bit).

- 0x0 - Stopped (or performing activation / automatic release).
- 0x1 - Go to Position Request.

gSTA

Gripper status, returns the current status and motion of the Gripper fingers.

- 0x00 - Gripper is in reset (or automatic release) state. See Fault Status if Gripper is activated.
- 0x01 - Activation in progress.
- 0x02 - Not used.
- 0x03 - Activation is completed.

gOBJ

Object detection status, is a built-in feature that provides information on possible object pick-up. Ignore if **gGTO** == 0.

- 0x00 - Fingers are in motion towards requested position. No object detected.
- 0x01 - Fingers have stopped due to a contact while opening before requested position. Object detected opening.
- 0x02 - Fingers have stopped due to a contact while closing before requested position. Object detected closing.
- 0x03 - Fingers are at requested position. No object detected or object has been loss / dropped.

Caution

In some circumstances the object detection feature may not detect an object even if it is successfully grasped. For instance, picking up a thin object may be successful without the object detection status being triggered. In such applications, the "Fingers are at requested position" status of register gOBJ is sufficient to proceed to the next step of the routine.



Tip

Checking for the correct position of the fingers (byte 4), **as well as** object detection (byte 0, bit 6 & 7) before proceeding to the next step of a routine is a more reliable method than object detection or finger position alone.

Register: **RESERVED**

Address: **Byte 1**

Bits	7	6	5	4	3	2	1	0
Symbol	Reserved							

Register: **FAULT STATUS**

Address: **Byte 2**

Bits	7	6	5	4	3	2	1	0
Symbols	kFLT			gFLT				

gFLT

Fault status returns general error messages that are useful for troubleshooting. Fault LED (red) is present on the Gripper chassis, LED can be blue, red or both and be solid or blinking.

- 0x00 - No fault (solid blue LED)
- Priority faults (solid blue LED)
 - 0x05 - Action delayed; the activation (re-activation) must be completed prior to perform the action.
 - 0x07 - The activation bit must be set prior to performing the action.

Minor faults (solid red LED)

- 0x08 - Maximum operating temperature exceeded (≥ 85 °C internally); let cool down (below 80 °C).
- 0x09 - No communication during at least 1 second.

Major faults (LED blinking red/blue) - Reset is required (rising edge on activation bit (**rACT**) needed).

- 0x0A - Under minimum operating voltage.
- 0x0B - Automatic release in progress.
- 0x0C - Internal fault, contact support@robotiq.com
- 0x0D - Activation fault, verify that no interference or other error occurred.
- 0x0E - Overcurrent triggered.
- 0x0F - Automatic release completed.

Info

While booting, status LED will be solid blue/red.



kFLT

please refer to your optional controller manual (input registers and status).

Register: **POSITION REQUEST ECHO**

Address: **Byte 3**

Bits	7	6	5	4	3	2	1	0
Symbol	gPR							

gPR

Echo of the requested position for the Gripper, value between 0x00 and 0xFF.

- 0x00 - Full opening.
- 0xFF - Full closing.

Register: **POSITION**

Address: **Byte 4**

Bits	7	6	5	4	3	2	1	0
Symbol	gPO							

gPO

Actual position of the Gripper obtained via the encoders, value between 0x00 and 0xFF.

- 0x00 - Fully opened.
- 0xFF - Fully closed.

Register: **CURRENT**

Address: **Byte 5**

Bits	7	6	5	4	3	2	1	0
Symbol	gCU							

gCU

The current is read instantaneously from the motor drive, value between 0x00 and 0xFF, approximate current equivalent is 10 * value read in mA.

Tip

Built-in features like object detection and force control use the fingers' electrical current readings. The user does not need to create these features.



4.5. Picking Features

As stated in previous sections, object picking is done via a simple "Go To" command, **rGTO** bit calls for movement, while **rPR** byte is the aimed position, **rSP** and **rFR** will be the desired speed and force settings respectively. This section describes key features in object picking applications:

- Force control
- Re-grasp
- Object detection
- Object contact loss

4.5.1. Force control

The gripping force is controlled via the **rFR** byte (please refer to the **Robot Output Registers & Functionalities** section).The Gripper behavior will change according to the **rFR** force requested.

- **rFR = 0** : Very fragile objects or deformable objects mode
 - Lowest force
 - Re-grasp feature is off
- **1 rFR 255** : Solid & firm objects
 - High torque mode
 - Re-grasp feature is on



Measured grip force for steel of specific hardness (Vickers)

Coming soon

Measured grip force for silicone of specific hardness (Durometer)

Coming soon

4.5.2. Re-Grasp

Re-grasp feature is a built-in feature meant to prevent object lost due to slipping or inaccurate initial grip. The Re-grasp feature will allow the Gripper to initiate a movement when an object is slipping or dropped. When Re-grasping, the Gripper will attempt to close until it reaches the position request (**rPR**).

- This feature is automatically set according to the force request **rFR**.

Info

Feature is off at force request $rFR = 0$, otherwise it is on.

- Re-grasp will keep the position setting:
 - Finger motion will stop when **rPR** position is reached, even if there is no object.
- Force and speed settings are not used, Re-grasp force and speed will automatically adjust to keep the object from being lost / dropped.

Info

While your initial settings for force and speed are not used for Re-grasp, they will never be exceeded to prevent damaging the part.

Caution

The **rOBJ** status is cleared when a motion is detected.



4.5.3. Object detection

When the Gripper grabs an object, the **gOBJ** status will allow you to know if contact with the object was successful. This is a built-in feature for adaptive grippers meant to be used by the robot controller (or PLC) commanding the overall application. The Object detection feature will change the **gOBJ** status and can be used inside your robot program.

As stated in the previous section:

gOBJ: Only valid if **gGTO** = 1.

- 0x00 - Fingers are in motion towards requested position. No object detected.
- 0x01 - Fingers have stopped due to a contact while opening before requested position. Object detected.
- 0x02 - Fingers have stopped due to a contact while closing before requested position. Object detected.
- 0x03 - Fingers are at requested position. No object detected or object has been lost / dropped.

Example of contact detected with an object:

1. Set position, speed and force at maximum (full closing):
 - a. **rPR** == 0xFF, **rSP** == 0xFF, **rFR** == 0xFF,
2. Set "go to requested" will initiate movement :
 - a. **rGTO** == 0x01
3. Then object detection status will be "in motion"
 - a. **gOBJ** == 0x00
4. Until an object is picked, object detection status will then be "stopped due to contact while closing"
 - a. **gOBJ** == 0x02
5. The user can now assume it is holding the payload, and proceed to the next step.

Example of contact lost with an object:

1. From the previous example, after an object is picked
 - a. **gOBJ** == 0x02
2. If the **gOBJ** status displays 0x03 after it was 0x02, user can assume contact with the object has been lost.

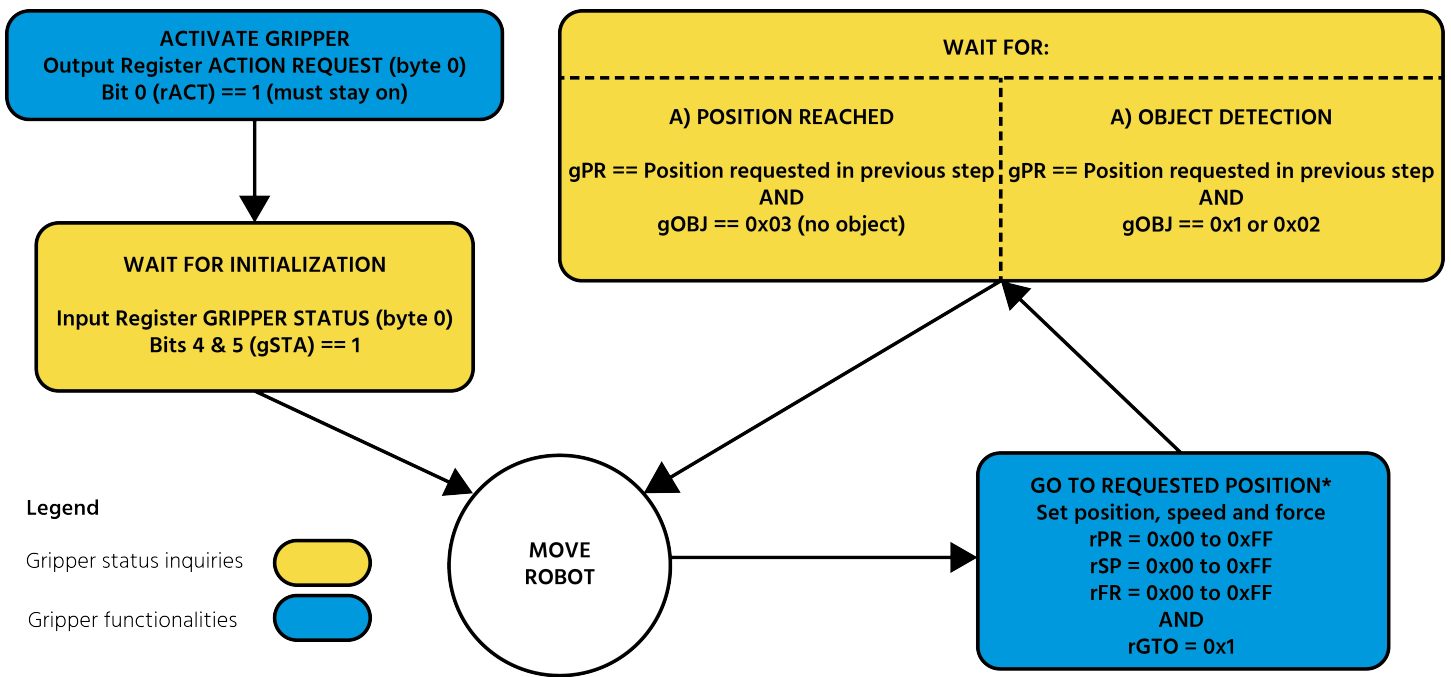
4.5.4. Brake engagement

The Hand-E Gripper is equipped with a brake that engages at the end of each and every Gripper move, and thus disengages between each of these moves.

For instance, when fully closing on an object, the Gripper makes contact with the surface of the object and activates the brake before sending the object detection signal to the robot.



4.6. Control Logic Example



Go to requested position is used to open/close the Gripper until a contact with the object is detected, or the requested position is reached.

Fig. 4-2: Example of Gripper control logic with corresponding registers.



4.7. Modbus RTU Communication

The Gripper can be controlled by Modbus RTU directly with RS485 or over USB using the ACC-ADT-USB-RS485. This section is intended to provide guidelines for setting up a Modbus master that will adequately communicate with the Gripper.

For a general introduction to Modbus RTU and for details regarding the CRC algorithm, the reader is invited to read the Modbus over serial line specification and implementation guide available at: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf.

For debugging purposes, the reader is also invited to download one of many free Modbus scanners such as the *CAS Modbus Scanner* from Chipkin Automation Systems available at: <http://www.store.chipkin.com/products/tools/cas-modbus-scanner>.

Info

Modbus RTU is a communication protocol based on a Big Endian byte order. Therefore, the 16-bit register addresses are transmitted with the most significant byte first. However, the data port is in the case of Robotiq products based on the Little Endian byte order. As such, the data parts of Modbus RTU messages are sent with the less significant byte first.

Tip

Modbus RTU specifications and details can be found at www.modbus.org.



4.7.1. Connection Setup

The following table describes the connection requirements for controlling the Gripper using the Modbus RTU protocol.

PROPRIETY	DEFAULT VALUE
Physical Interface	RS-485 ¹
Baud Rate ²	115,200 bps
Data Bits	8
Stop Bit ²	1
Parity ²	None
Supported Functions	Read Holding Registers (FC03) Read Input Registers (FC04) Preset Multiple Registers (FC16) Master read & write multiple registers (FC23)
Exception Responses	Not supported
Slave ID ²	0x0009 (9)
Robot Output / Gripper Input First Register	0x03E8 (1000)
Robot Input / Gripper Output First Register	0x07D0 (2000)
Termination Resistor ²	120 ohms

¹ Various converters are available in the **Spare Parts, Kits and Accessories** section.

² These parameters can be adjusted using the Robotiq User Interface.

Each register (word - 16 bits) of the Modbus RTU protocol is composed of **2** bytes (8 bits) from the Gripper. The first Gripper output Modbus register(0x07D0) is composed from the first **2** Robotiq Gripper bytes (byte 0 and byte 1).

Info

200 Hz is the maximum speed when commanding / reading from the Robotiq Gripper. It is therefore recommended to send commands with a minimum delay of 5 ms between them.

Info

120 Ohms termination resistor is already present on the converter and the Gripper. If multiple grippers are connected in parallel on the same RS485 cable, termination resistor must be set to OFF in communication parameters.



4.7.2. Read holding registers (FC03)

Function code 03 (FC03) is used for reading the status of the Gripper (robot input). Examples of such data are Gripper status, object status, finger position, etc.

Example of an FC03 read function:

This message asks for register 0x07D0 (2000) and register 0x07D1 (2001) which contains Gripper Status, Object Detection, Fault Status and Position Request Echo.

Request is: 09 03 07 D0 00 02 C5 CE

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
07D0	Address of the first requested register
0002	Number of registers requested (2)
C5CE	Cyclic Redundancy Check (CRC)

Response is: 09 03 04 E0 00 00 00 44 33

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
04	Number of data bytes to follow (2 registers x 2 bytes/register = 4 bytes)
E000	Content of register 07D0
0000	Content of register 07D1
4433	Cyclic Redundancy Check (CRC)



4.7.3. Read input registers (FC04)

Function code 04 (FC04) is used for requesting the status of the Gripper's analog input register. Examples of such data are Gripper status, object status, finger position, etc.

Example of an FC04 read function:

This message asks for register 0x07D0 (2000) and register 0x07D1 (2001) which contains Gripper Status, Object Detection, Fault Status and Position Request Echo.

Request is: 09 04 07 D0 00 02 70 0E

Bits	Description
09	SlaveID
04	Function Code 04 (Read Input Registers)
07D0	Address of the first requested register
0002	Number of registers requested (2)
700E	Cyclic Redundancy Check (CRC)

Response is: 09 04 04 E0 00 00 00 44 33

Bits	Description
09	SlaveID
04	Function Code 04 (Read Holding Registers)
04	Number of data bytes to follow (2 registers x 2 bytes/register = 4 bytes)
E000	Content of register 07D0
0000	Content of register 07D1
4584	Cyclic Redundancy Check (CRC)



4.7.4. Preset multiple registers (FC16)

Function code 06 (FC16) is used to activate functionalities of the Gripper (robot output). Examples of such data are action request, speed, force, etc.

Example of setting multiple registers FC16:

This message requests to set position request, speed and force of the Gripper by setting register 0x03E9 (1002) and 0x03EA.

Request is: 09 10 03 E9 00 02 04 60 E6 3C C8 EC 7C

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E9	Address of the first register
0002	Number of registers written to
04	Number of data bytes to follow (2 registers x 2 bytes/register = 4 bytes)
60E6	Value written to register 0x03E9
3CC8	Value written to register 0x03EA
EC7C	Cyclic Redundancy Check (CRC)

Response is: 09 10 03 E9 00 02 91 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E9	Address of the first register
0002	Number of written registers
9130	Cyclic Redundancy Check (CRC)



4.7.5. Master read & write multiple registers FC23

Function code 23 (FC23) is used for reading the status of the Gripper (robot input) and activating functionalities of the Gripper (robot output) simultaneously. Examples of such data are Gripper status, object status, finger position, etc. Action requests are speed, force, etc.

Example of reading and writing multiple registers FC23:

This message reads registers 0x07D0 (2000) and 0x07D1 (2001), which contains Gripper Status, Object Detection, Fault Status and Position Request Echo. It also sets the position request, speed and force of the Gripper by writing to registers 0x03E9 (1001) and 0x03EA (1002).

Request is: 09 17 07 D0 00 02 03 E9 00 02 04 00 E6 3C C8 2D 0C

Bits	Description
09	SlaveID
17	Function Code 23 (read and write multiple registers)
07D0	Address of the first requested register, read
0002	Number of registers requested (2), read
03E9	Address of the first register written to
0002	Number of registers written to (3)
04	Number of data bytes to follow (2 registers X 2 bytes/registers = 4 bytes)
00E6	Value written to register 0x03E9
3CC8	Value written to register 0x03EA
2D0C	Cyclic Redundancy Check (CRC)

Response is: 09 17 04 01 00 09 E6 F6 C1

Bits	Description
09	SlaveID
17	Function Code 23 (read and write multiple registers)
04	Number of data bytes to follow (2 registers x 2 bytes/register = 4 bytes)
1000	Content of register 07D0



Bits	Description
09E6	Content of register 07D1
F6C1	Cyclic Redundancy Check (CRC)

Note that the content of the response might change depending on the Gripper's status.

Info

The Gripper will execute the input command (i.e.: write), execute one cycle of motion, update the output, then return the Modbus response read.



4.7.6. Modbus RTU example

This section depicts the example from the **Control Logic Example** section, when programmed using the Modbus RTU protocol. The example is typical of a pick and place application. After activating the Gripper, the robot is moved to a pick-up location to grip an object. It moves again to a second location to release the gripped object.

Step 1: Activation Request (clear and set rACT)

Request is (clear rAct): 09 10 03 E8 00 03 06 00 00 00 00 00 00 73 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of registers written to
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
0000	Value to write to register 0x03E9 (ACTION REQUEST = 0x01 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper"
0000	Value written to register 0x03EA
0000	Value written to register 0x03EB
7330	Cyclic Redundancy Check (CRC)

Response is: 09 10 03 E8 00 03 01 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of written registers
0130	Cyclic Redundancy Check (CRC)



Request is (set rAct): 09 10 03 E8 00 03 06 01 00 00 00 00 00 72 E1

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of registers written to
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
0100	Value to write to register 0x03E9 (ACTION REQUEST = 0x01 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper"
0000	Value written to register 0x03EA
0000	Value written to register 0x03EB
72E1	Cyclic Redundancy Check (CRC)

Response is: 09 10 03 E8 00 03 01 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of written registers
0130	Cyclic Redundancy Check (CRC)



Step 2: Read Gripper status until the activation is completed

Request is: 09 03 07 D0 00 01 85 CF

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
07D0	Address of the first requested register
0001	Number of registers requested (1)
85CF	Cyclic Redundancy Check (CRC)

Response (if the activation IS NOT completed): 09 03 02 11 00 55 D5

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
02	Number of data bytes to follow (1 register x 2 bytes/register = 2 bytes)
1100	Content of register 07D0 (GRIPPER STATUS = 0x11, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gSTA = 1 for "Activation in progress"
55D5	Cyclic Redundancy Check (CRC)

Response (if the activation IS completed): 09 03 02 31 00 4C 15

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
02	Number of data bytes to follow (1 register x 2 bytes/register = 2 bytes)
3100	Content of register 07D0 (GRIPPER STATUS = 0x31, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gSTA = 3 for "Activation is completed"
4C15	Cyclic Redundancy Check (CRC)



Step 3: Move the robot to the pick-up location

Step 4: Close the Gripper at full speed and full force

Request is: 09 10 03 E8 00 03 06 09 00 00 FF FF FF 42 29

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of registers written to
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
0900	Value written to register 0x03E8 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
00FF	Value written to register 0x03E9 (GRIPPER OPTIONS 2 = 0x00 and POSITION REQUEST = 0xFF): rPR = 255/255 for full closing of the Gripper
FFFF	Value written to register 0x03EA (SPEED = 0xFF and FORCE = 0xFF): full speed and full force
4229	Cyclic Redundancy Check (CRC)

Response is: 09 10 03 E8 00 03 01 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of written registers
0130	Cyclic Redundancy Check (CRC)



Step 5: Read Gripper status until the grip is completed

Request is: 09 03 07 D0 00 03 04 0E

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
07D0	Address of the first requested register
0003	Number of registers requested (3)
040E	Cyclic Redundancy Check (CRC)

Example of response if the grip is **not completed**: 09 03 06 39 00 00 FF 0E 0A F7 8B

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
3900	Content of register 07D0 (GRIPPER STATUS = 0x39, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gGTO = 1 for "Go to Position Request" and gOBJ = 0 for "Fingers are in motion"
00FF	Content of register 07D1 (FAULT STATUS = 0x00, POSITION REQUEST ECHO = 0xFF): the position request echo tells that the command was well received and that the GRIPPER STATUS is valid.
0E0A	Content of register 07D2 (POSITION = 0x0E, FINGER CURRENT = 0x0A): the position is 14/255 and the motor current is 100mA (these values will change during motion)
F78B	Cyclic Redundancy Check (CRC)



Example of response if the grip is **completed**: 09 03 06 B9 00 00 FF BD 00 1D 7C

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
B900	Content of register 07D0 (GRIPPER STATUS = 0xB9, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gGTO = 1 for "Go to Position Request" and gOBJ = 2 for "Fingers have stopped due to a contact while closing"
00FF	Content of register 07D1 (FAULT STATUS = 0x00, POSITION REQUEST ECHO = 0xFF): the position request echo tells that the command was well received and that the GRIPPER STATUS is valid.
BD00	Content of register 07D2 (POSITION = 0xBD, FINGER CURRENT = 0x00): the position is 189/255 (can be used to validate the size of the seized object)
1D7C	Cyclic Redundancy Check (CRC)

Step 6: Move the robot to the release location



Step 7: Open the Gripper at full speed and full force

Request is: 09 10 03 E8 00 03 06 09 00 00 00 FF FF 72 19

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of registers written to
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
0900	Value written to register 0x03E8 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
0000	Value written to register 0x03E9 (GRIPPER OPTIONS 2 = 0x00 and POSITION REQUEST = 0x00): rPR = 0/255 for full opening of the Gripper (partial opening would also be possible)
FFFF	Value written to register 0x03EA (SPEED = 0xFF and FORCE = 0xFF): full speed and full force
7219	Cyclic Redundancy Check (CRC)

Response is: 09 10 03 E8 00 03 01 30

Bits	Description
09	SlaveID
10	Function Code 16 (Preset Multiple Registers)
03E8	Address of the first register
0003	Number of written registers
0130	Cyclic Redundancy Check (CRC)



Step 8: Read Gripper status until the opening is completed

Request is: 09 03 07 D0 00 03 04 0E

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
07D0	Address of the first requested register
0003	Number of registers requested (3)
040E	Cyclic Redundancy Check (CRC)

Example of response if the opening is **not completed**: 09 03 06 39 00 00 00 BB 10 30 E0

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
3900	Content of register 07D0 (GRIPPER STATUS = 0x39, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gGTO = 1 for "Go to Position Request" and gOBJ = 0 for "Fingers are in motion"
0000	Content of register 07D1 (FAULT STATUS = 0x00, POSITION REQUEST ECHO = 0x00): the position request echo tells that the command was well received and that the GRIPPER STATUS is valid.
BB10	Content of register 07D2 (POSITION = 0xBB, FINGER CURRENT = 0x10): the position is 187/255 and the motor current is 160mA (these values will change during motion)
30E0	Cyclic Redundancy Check (CRC)



Example of response if the opening is **completed**: 09 03 06 F9 00 00 00 0D 00 56 4C

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
F900	Content of register 07D0 (GRIPPER STATUS = 0xF9, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gGTO = 1 for "Go to Position Request" and gOBJ = 3 for "Fingers are at requested position"
0000	Content of register 07D1 (FAULT STATUS = 0x00, POSITION REQUEST ECHO = 0x00): the position request echo tells that the command was well received and that the GRIPPER STATUS is valid.
0D00	Content of register 07D2 (POSITION = 0x0D, FINGER CURRENT = 0x00): the position is 13/255 (the fingers have reached their software limit)
564C	Cyclic Redundancy Check (CRC)

Step 9: Loop back to step 3 if other objects have to be gripped.



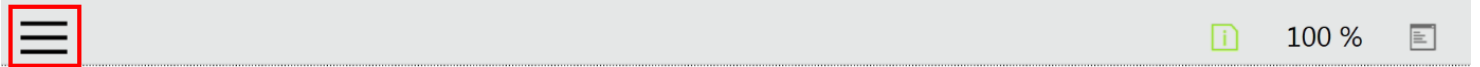
4.8. Control over TM

4.8.1. TM Robots Compatibility with Robotiq Grippers

Hardware Version	TM Flow Version	TM Gripper Component	Robotiq RS232 Converter
HW1, HW2, HW3	1.68 and later	HANDE_V002_XXX	Compatible

4.8.2. Getting Started

- 1 Power ON the robot
- 2 Tap the triple bar icon in the upper left corner of the screen



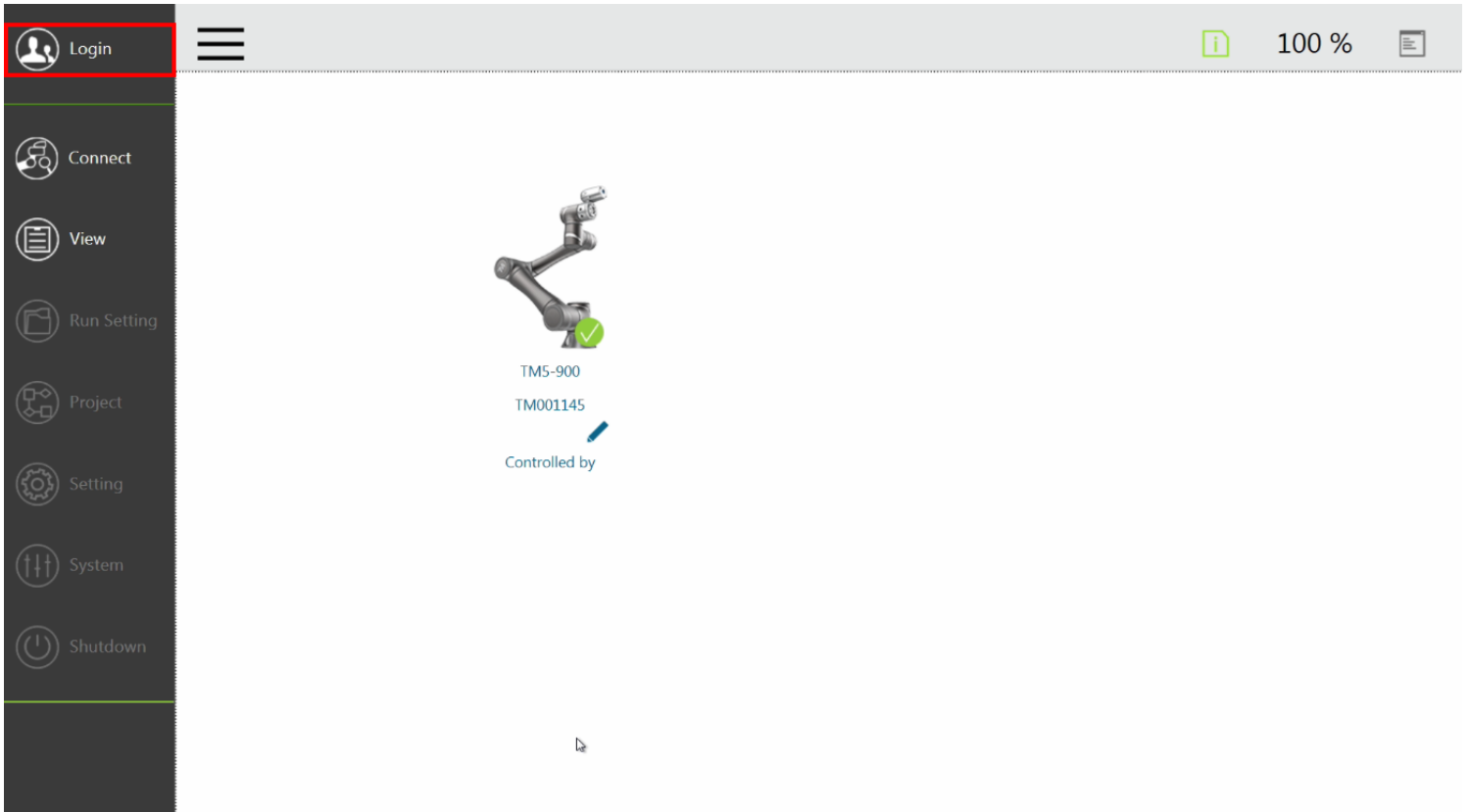
TM5-900

TM001145

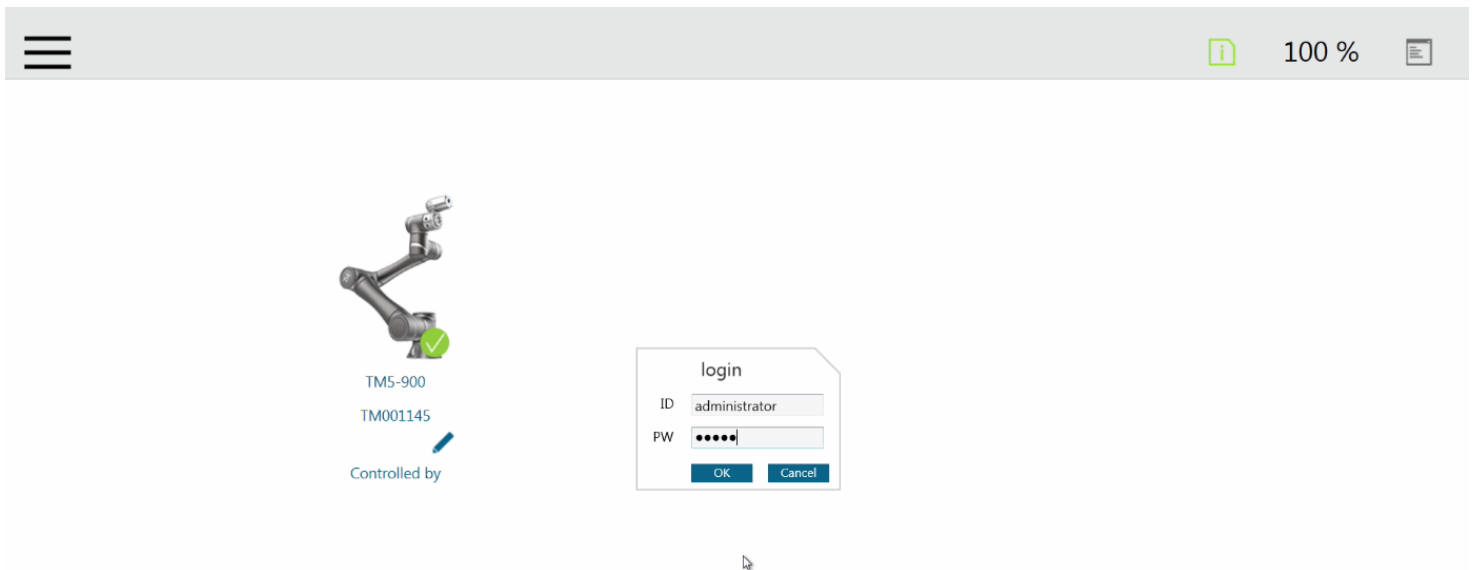
Controlled by 



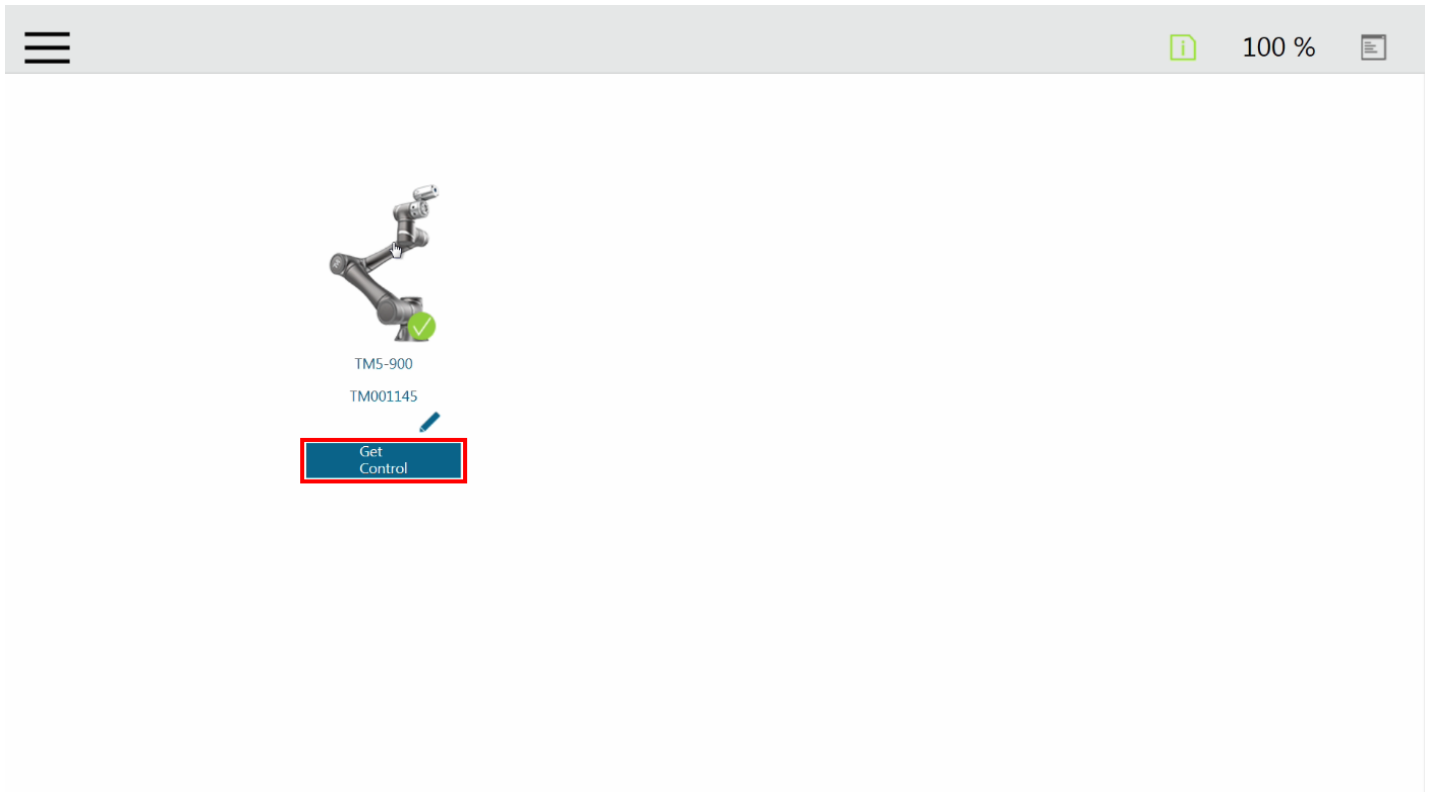
3 Click on the **Login** icon in the navigation pane on the left



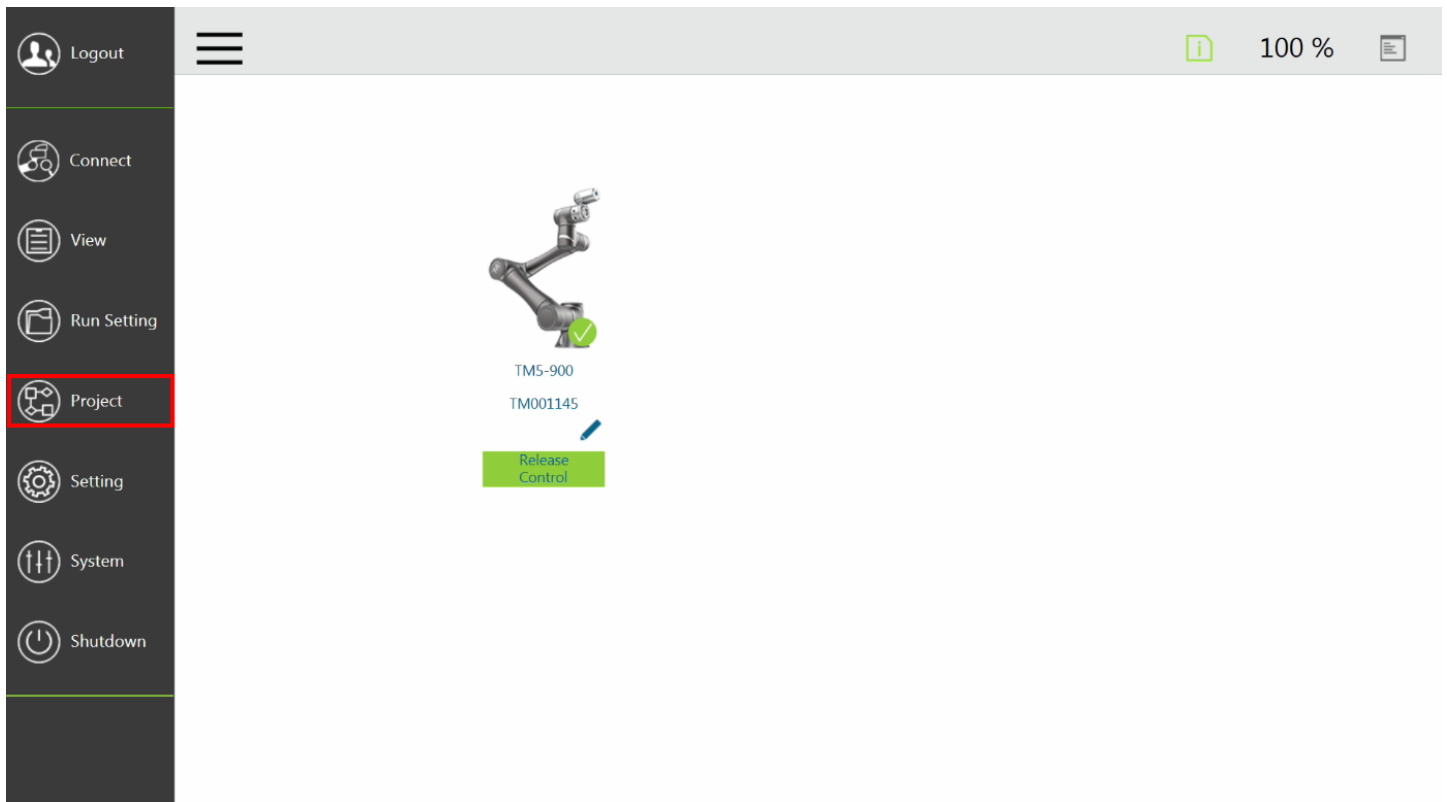
4 Enter your credentials and click on **OK**.



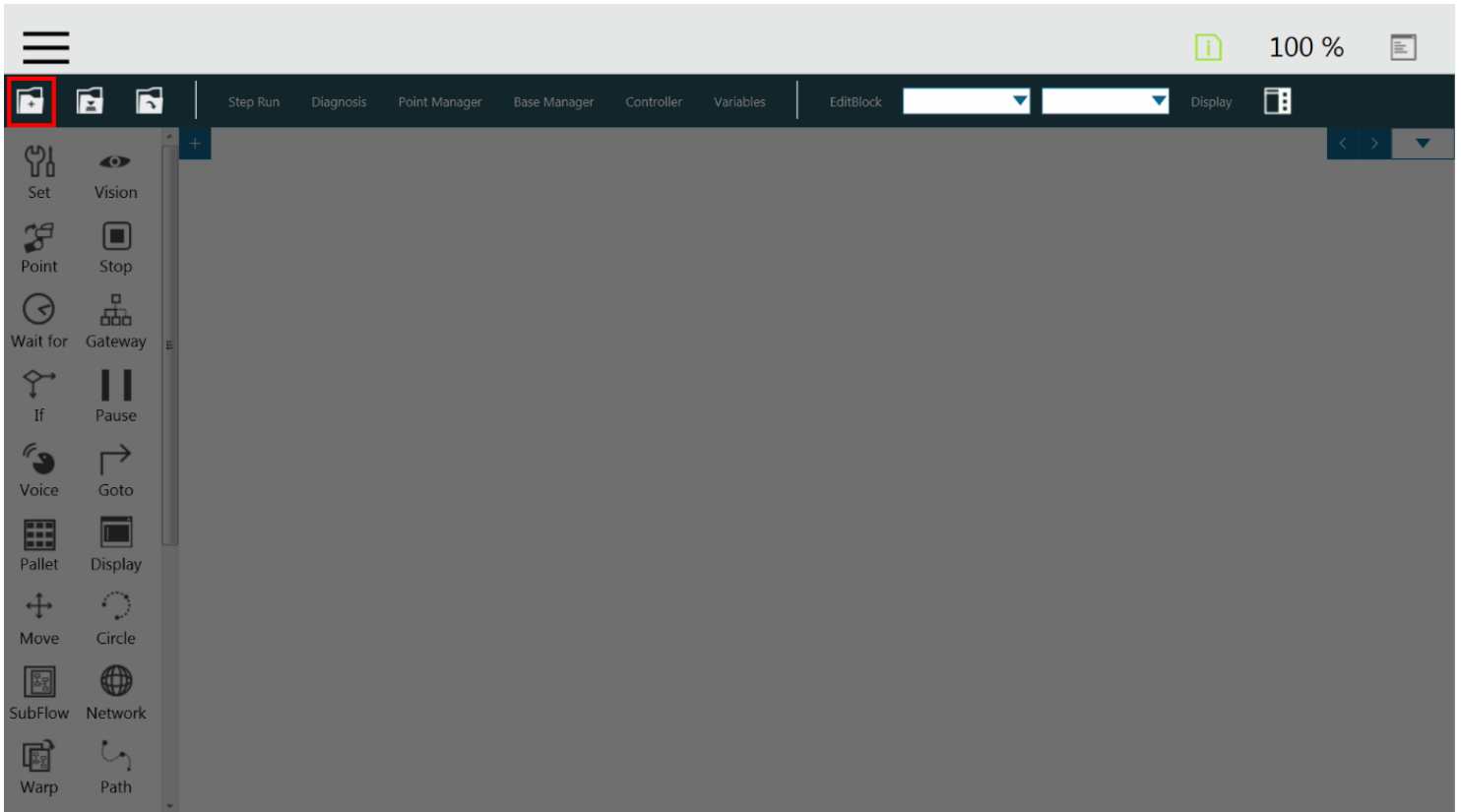
5 Click on Get Control



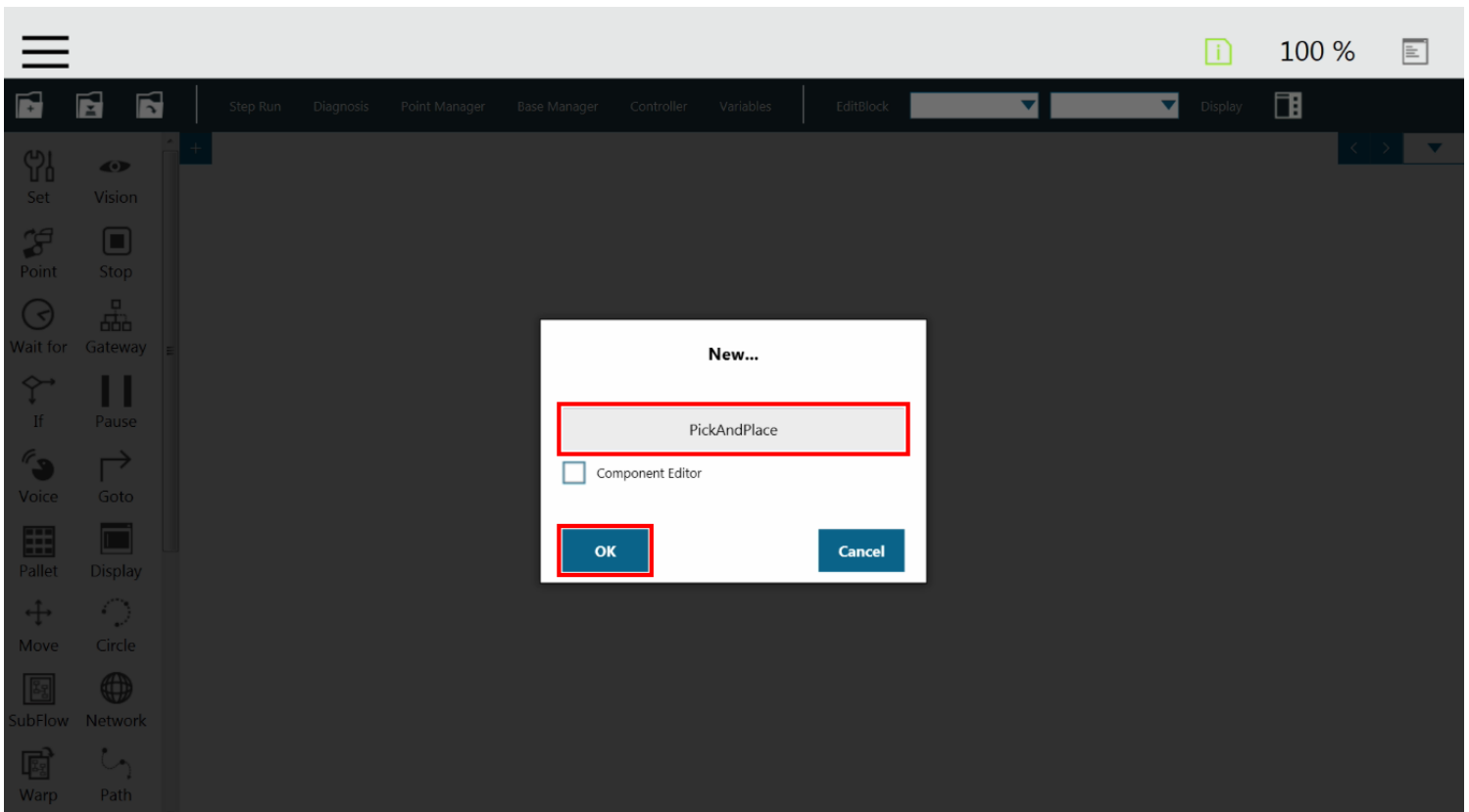
6 Click on the triple bar icon in the upper left corner of the screen and select Project



7 Click on the **New Project** icon in the upper left corner of the screen



8 Enter a name for your program and click on the **OK** button.



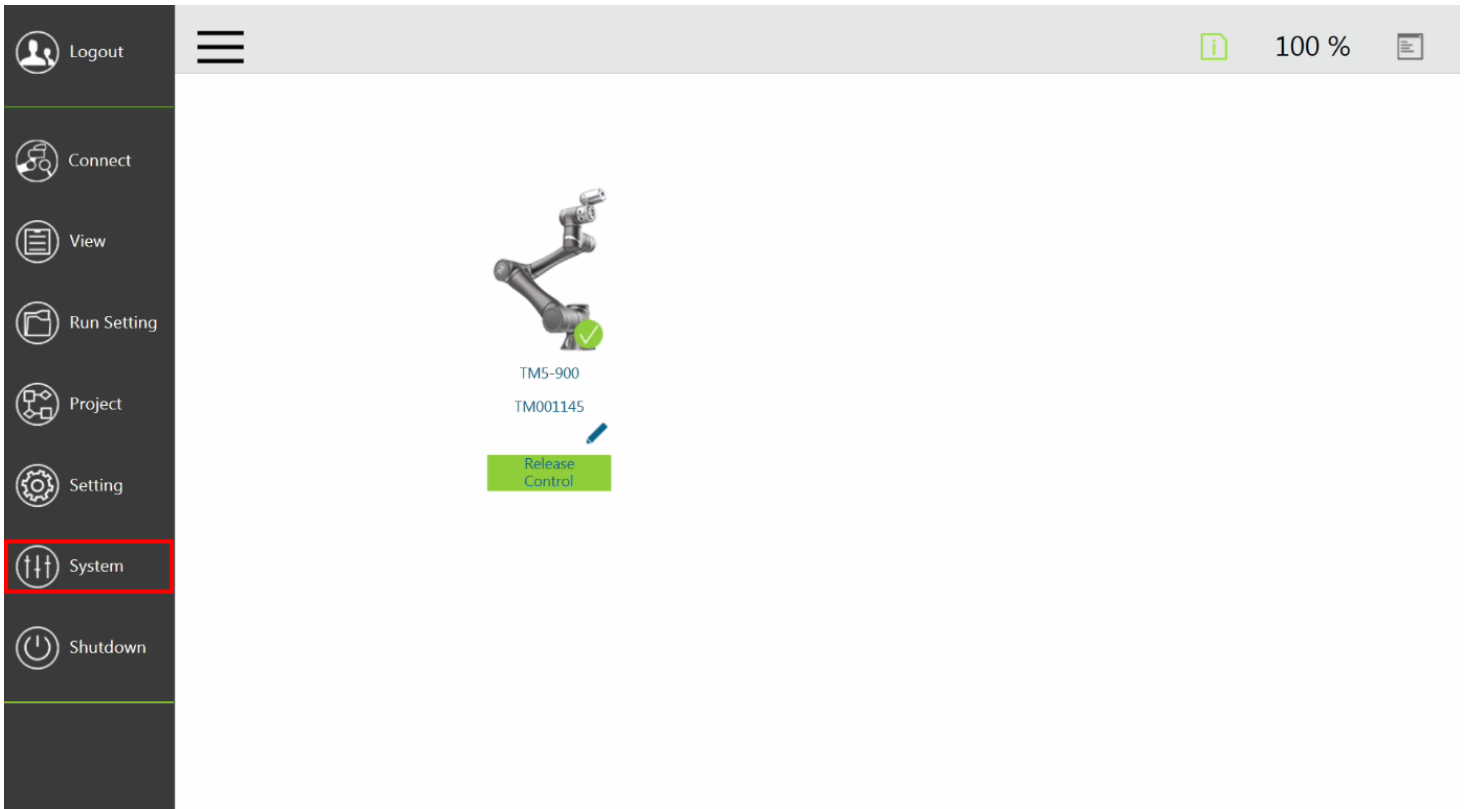
4.8.3. TM Gripper Components

Here is the list of the current Robotiq Gripper TM Components to install on TM Robots:

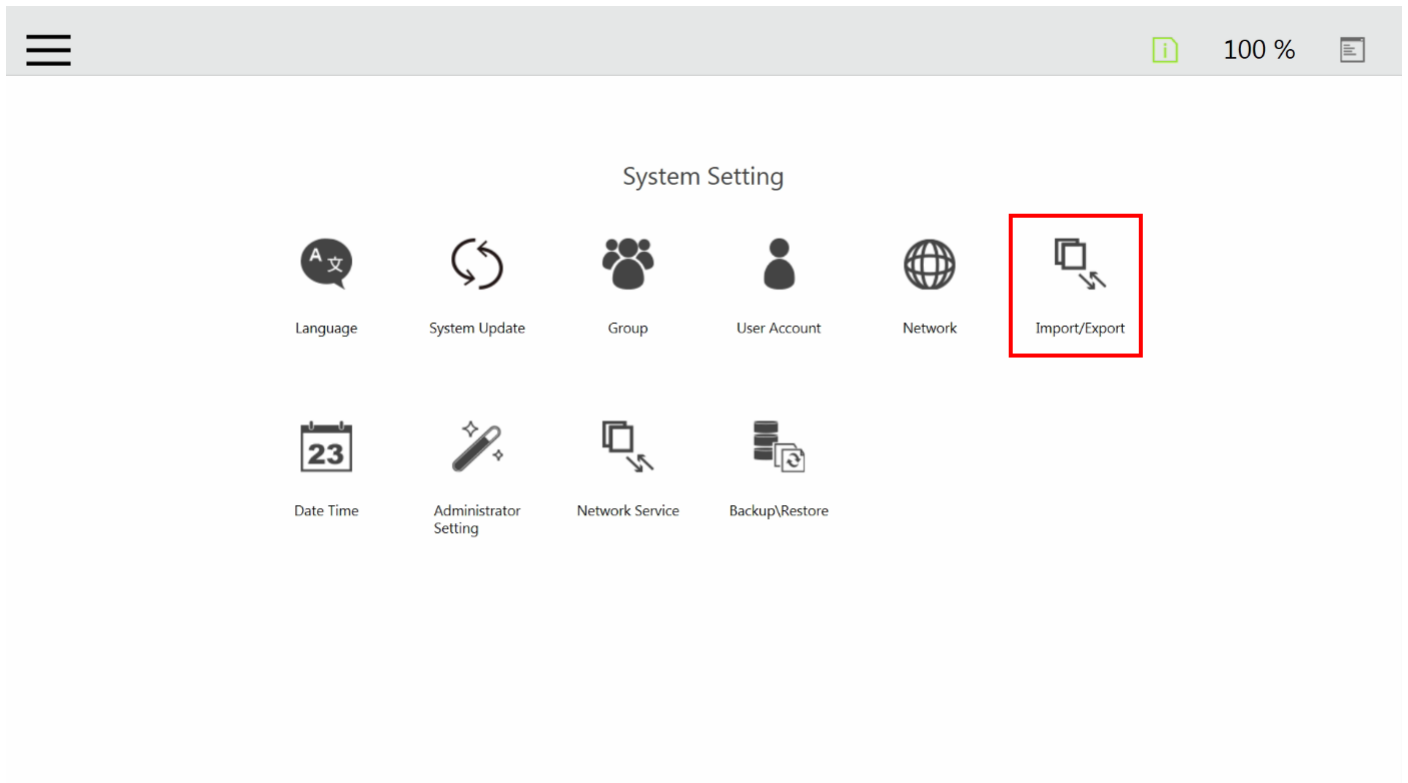
- GRIPPER_ROBOTIQ_HANDE_V002_SET.Component = SET the Gripper (Speed, Force, Position)
- GRIPPER_ROBOTIQ_HANDE_V002_GRIP.Component = CLOSE the Gripper (Action)
- GRIPPER_ROBOTIQ_HANDE_V002_RELEASE.Component = OPEN the Gripper (Action)
- GRIPPER_ROBOTIQ_HANDE_V002_CHANGEGRIPPER.Component = CHANGE the address of the Gripper/dual Gripper

Installation

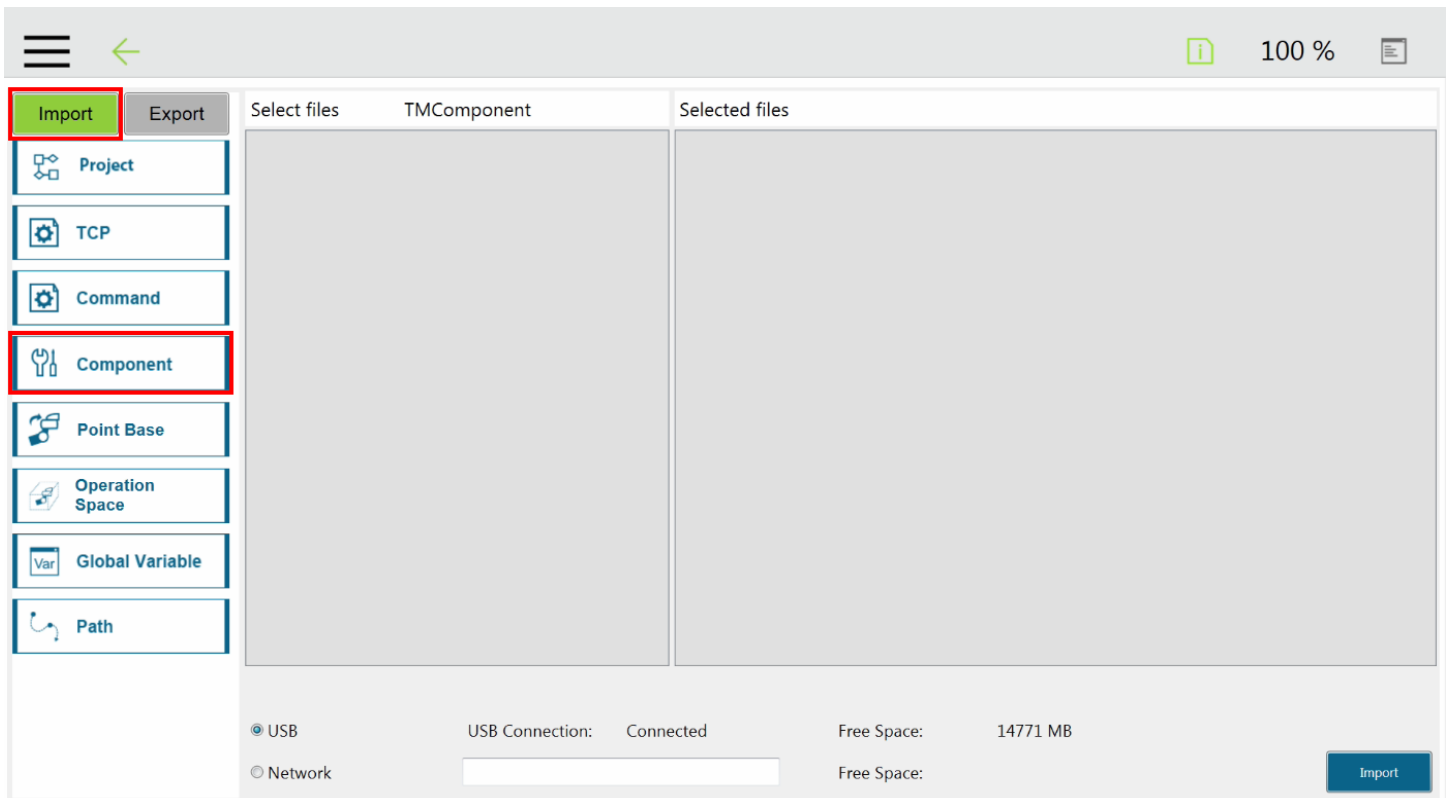
- 1 Download the TM Plug & Play Software Package compression files on the [official website](#)
- 2 Unzip the file at the root of a blank USB storage device
- 3 Rename the USB storage device "TMROBOT"
- 4 Insert the USB storage device in the robot controller
- 5 In TM Flow (robot software), tap the triple bar icon and select **System Setting**



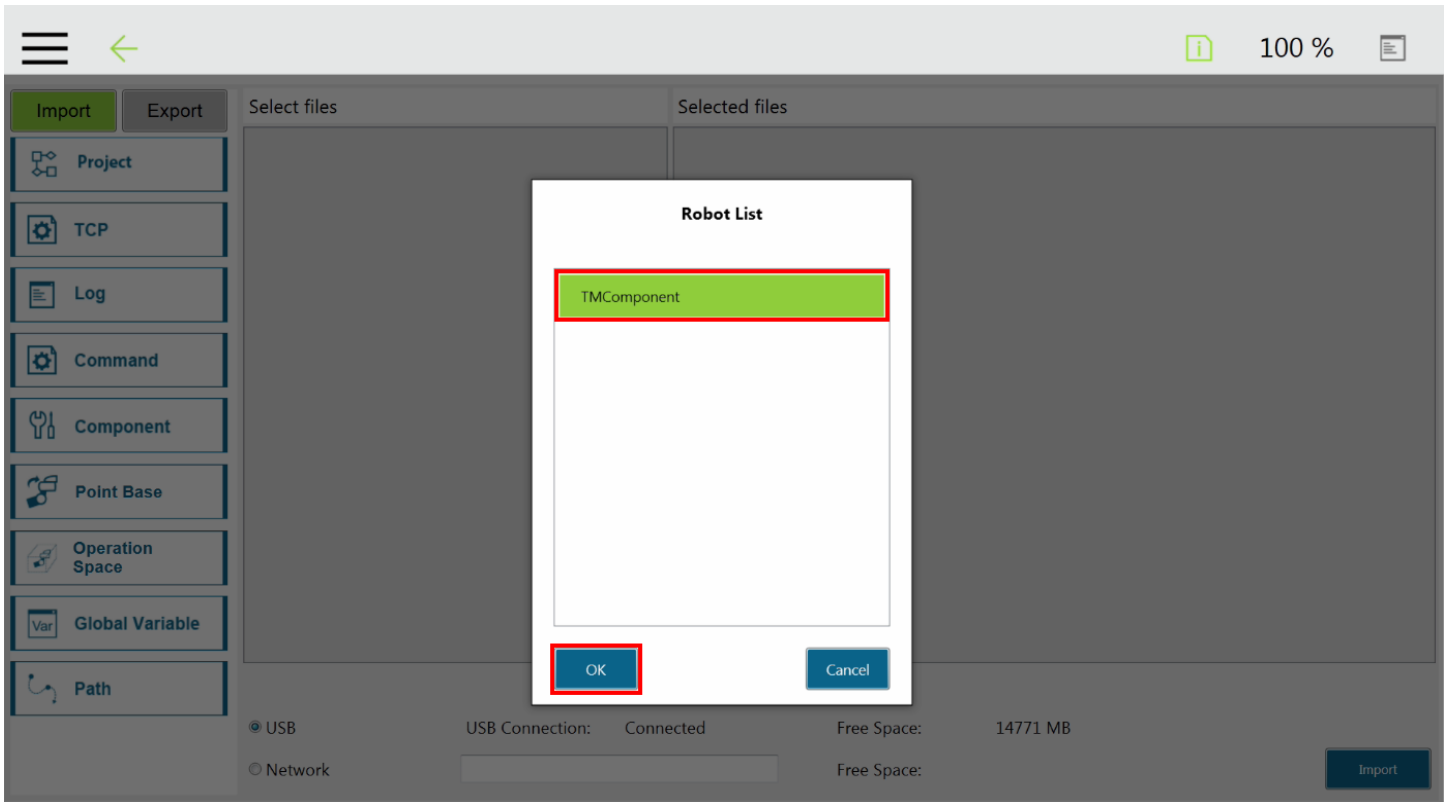
6 Select Import/Export



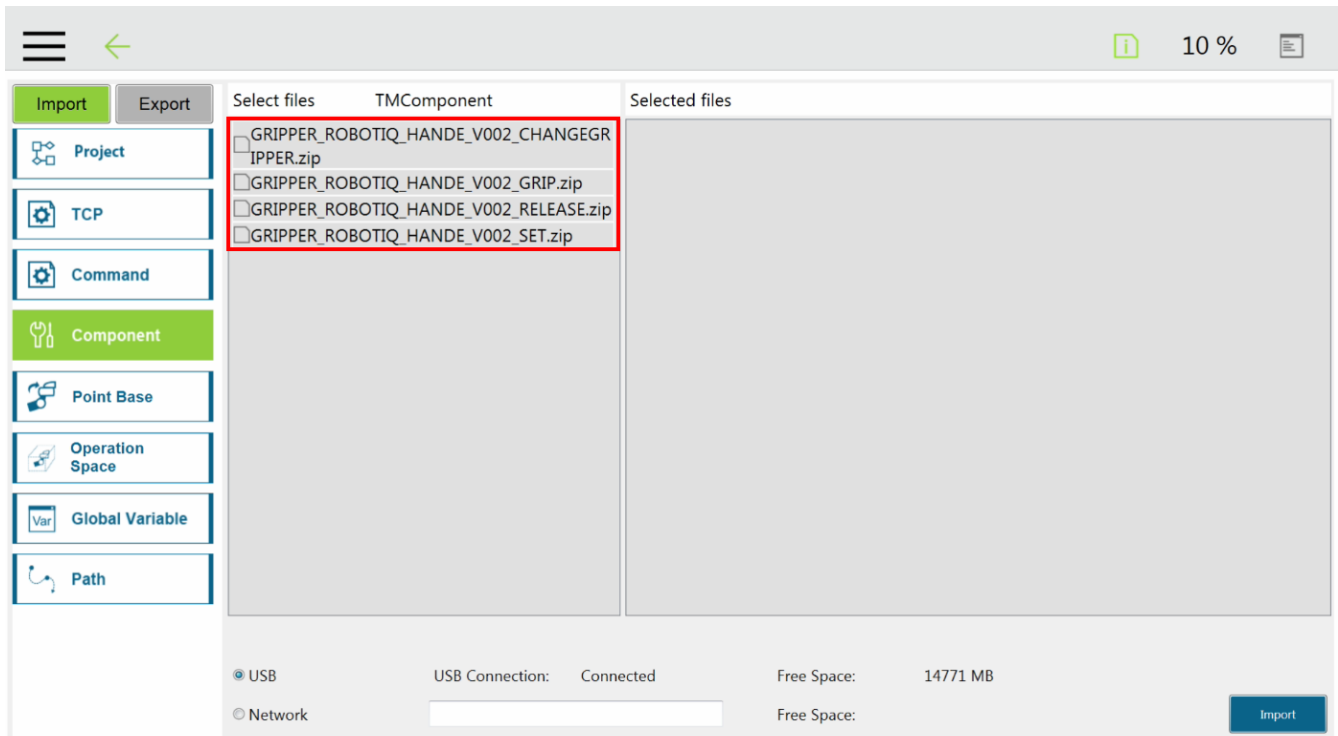
7 Click the Import button



8 Click on **TMComponent** in the Robot List window and click on **OK**



9 Click on the **Component** button of the **Import** navigation pane



10 Select the Components you want to import and click on the **Import** button

The screenshot shows the software interface with the following elements:

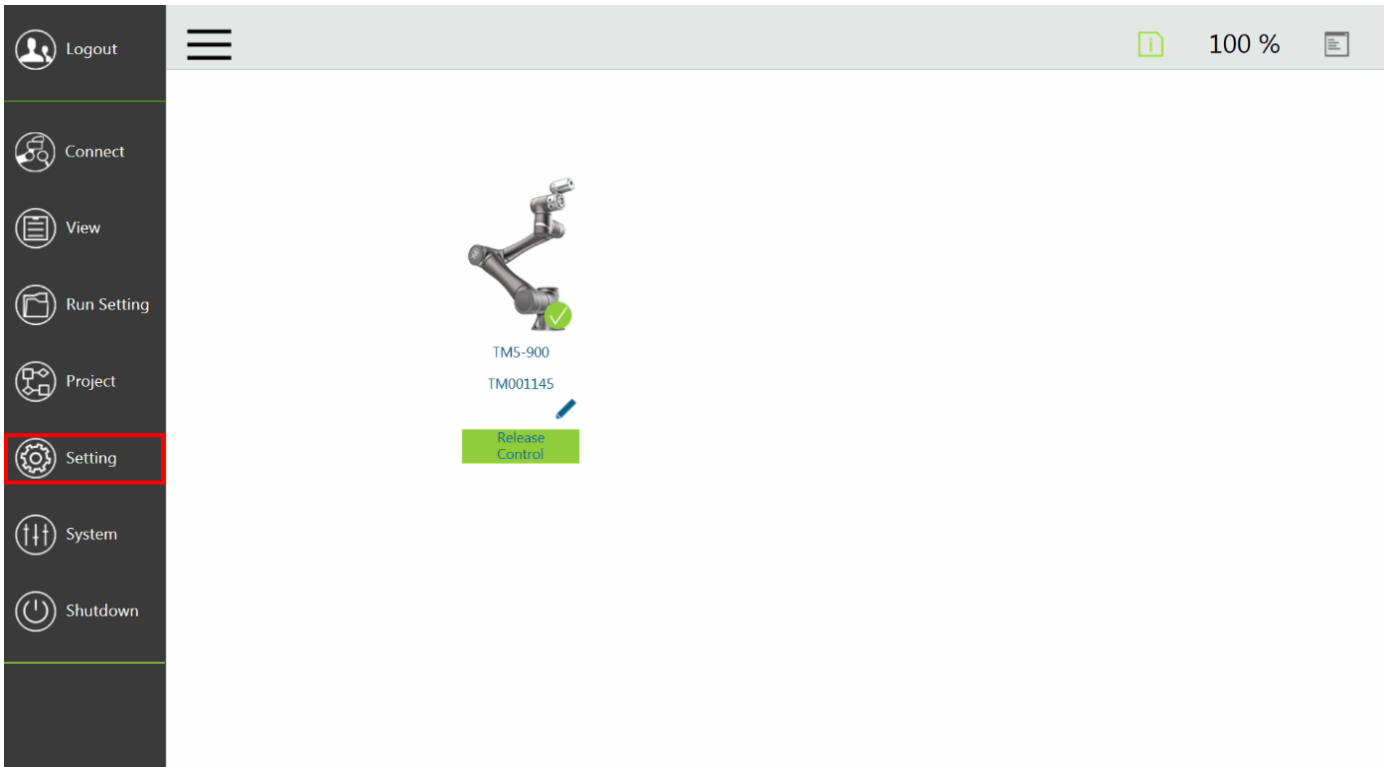
- Top Bar:** Includes a menu icon, a back arrow, an information icon, and a progress indicator showing 10%.
- Left Sidebar:** Contains buttons for 'Project', 'TCP', 'Command', 'Component' (highlighted in green), 'Point Base', 'Operation Space', 'Global Variable', and 'Path'.
- Main Area:** Divided into 'Select files' (labeled 'TMComponent') and 'Selected files'. The 'Selected files' list contains:
 - Component GRIPPER_ROBOTIQ_HANDE_V002_CHANGEGRIPP ER.zip
 - Component GRIPPER_ROBOTIQ_HANDE_V002_GRIP.zip
 - Component GRIPPER_ROBOTIQ_HANDE_V002_RELEASE.zip
 - Component GRIPPER_ROBOTIQ_HANDE_V002_SET.zip
- Bottom Bar:** Shows connection status:
 - USB: USB Connection: Connected Free Space: 14771 MB
 - Network: Free Space:
- Import Button:** A blue button labeled 'Import' is highlighted with a red rectangular box.

The screenshot shows the software interface after the import process is complete:

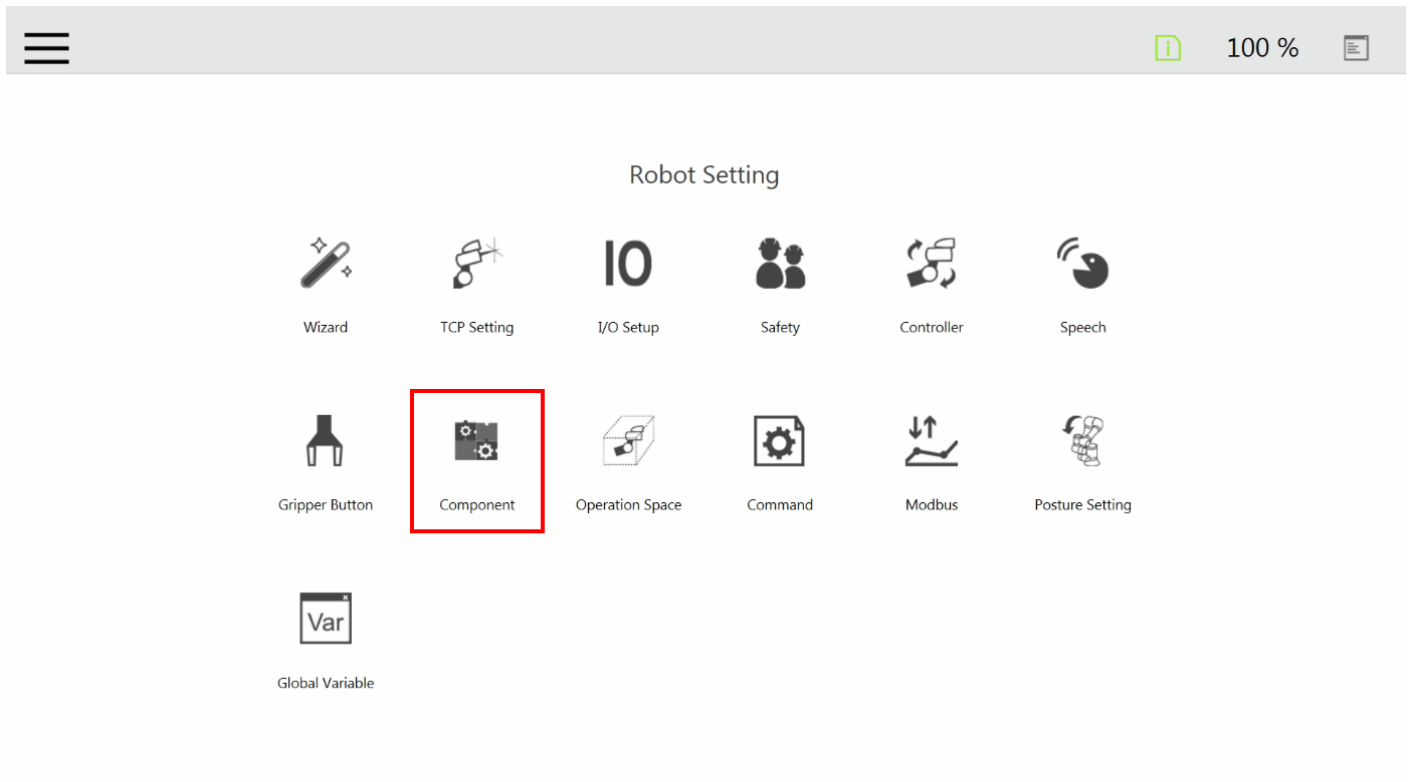
- Top Bar:** Similar to the previous screenshot, showing 10% progress.
- Left Sidebar:** The 'Component' category remains selected.
- Main Area:** The 'Selected files' list is still visible. A dialog box is centered over the main area with the text:
 - OK
 - Import complete
 - OK
- Bottom Bar:** Shows the same connection status as the previous screenshot.



- 11 Tap the **triple bar icon** and select **Setting** to display the **Robot Setting** window



- 12 Click on the **Component** icon



13 Enable required **Components** in the Components list by ticking the radio button beside each of them

☰ <
i 10 % 📄

Component List

Enable	Component Name	
<input type="radio"/>	GRIPPER_ROBOTIQ_HANDE_V002_CHANGEGRIPPER.Component	✘
<input type="radio"/>	GRIPPER_ROBOTIQ_HANDE_V002_GRIP.Component	✘
<input type="radio"/>	GRIPPER_ROBOTIQ_HANDE_V002_RELEASE.Component	✘
<input type="radio"/>	GRIPPER_ROBOTIQ_HANDE_V002_SET.Component	✘

Save

14 A Component that is enabled displays a green radio button; once the Components are enabled, click on the **Save** button

☰ <
i 10 % 📄

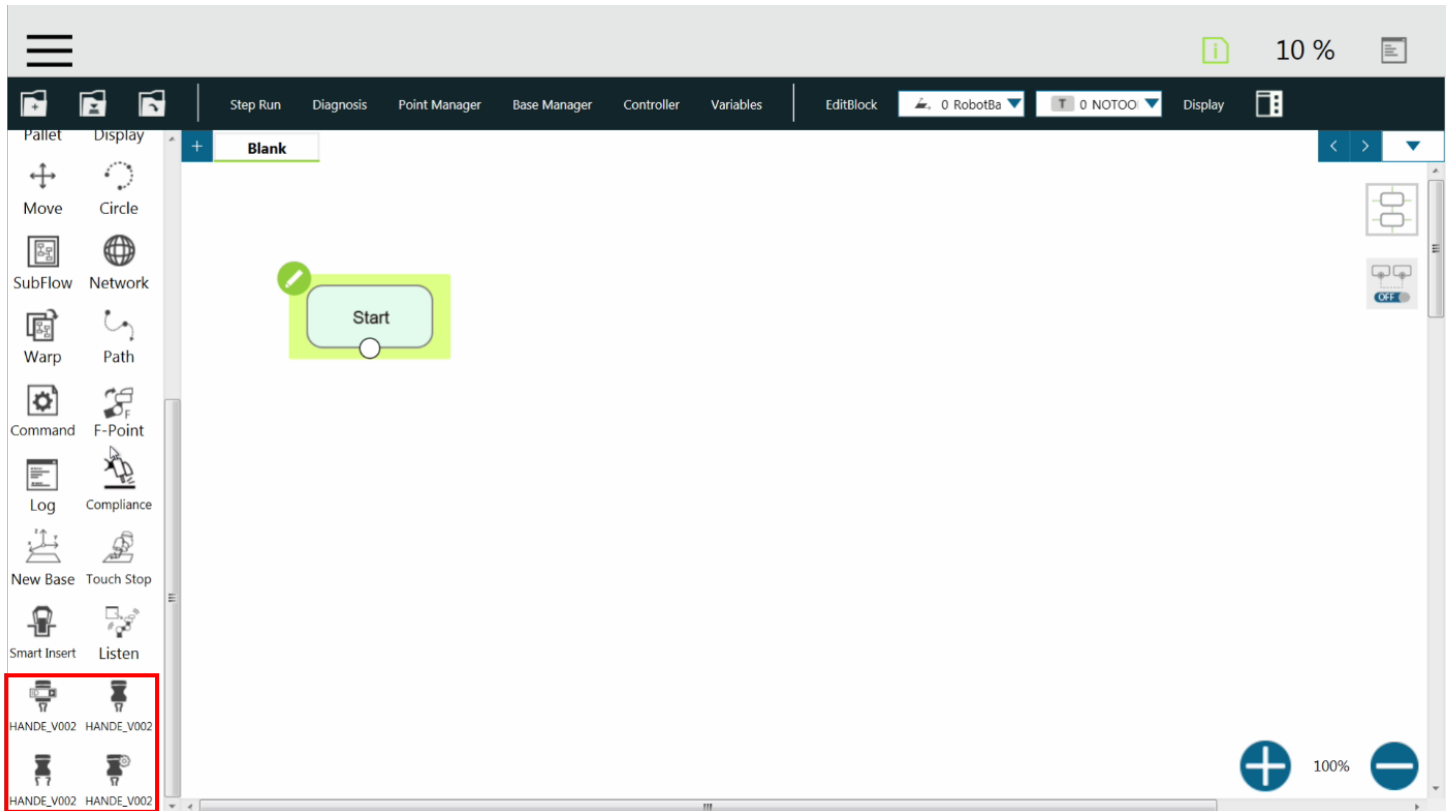
Component List

Enable	Component Name	
●	GRIPPER_ROBOTIQ_HANDE_V002_CHANGEGRIPPER.Component	✘
●	GRIPPER_ROBOTIQ_HANDE_V002_GRIP.Component	✘
●	GRIPPER_ROBOTIQ_HANDE_V002_RELEASE.Component	✘
●	GRIPPER_ROBOTIQ_HANDE_V002_SET.Component	✘

Save



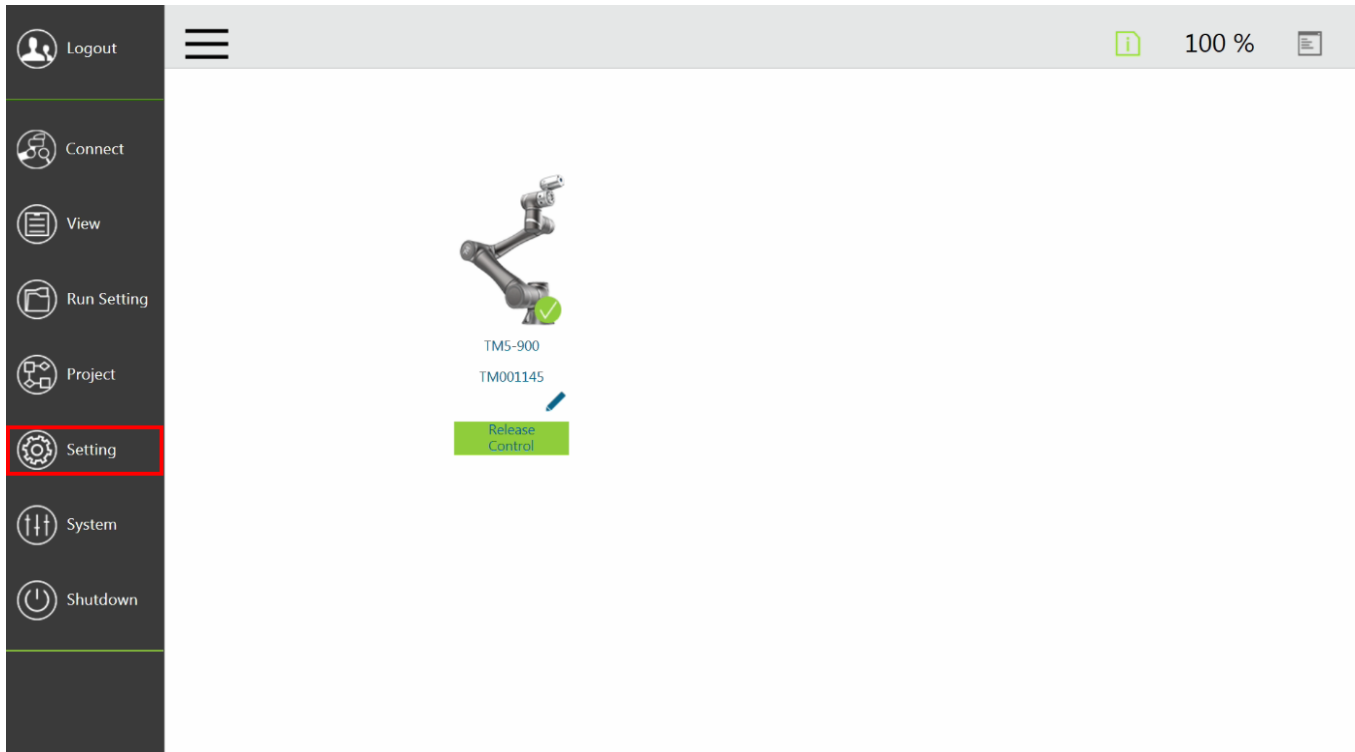
15 Create a new project or open an existing project, and locate the Gripper components in the navigation pane



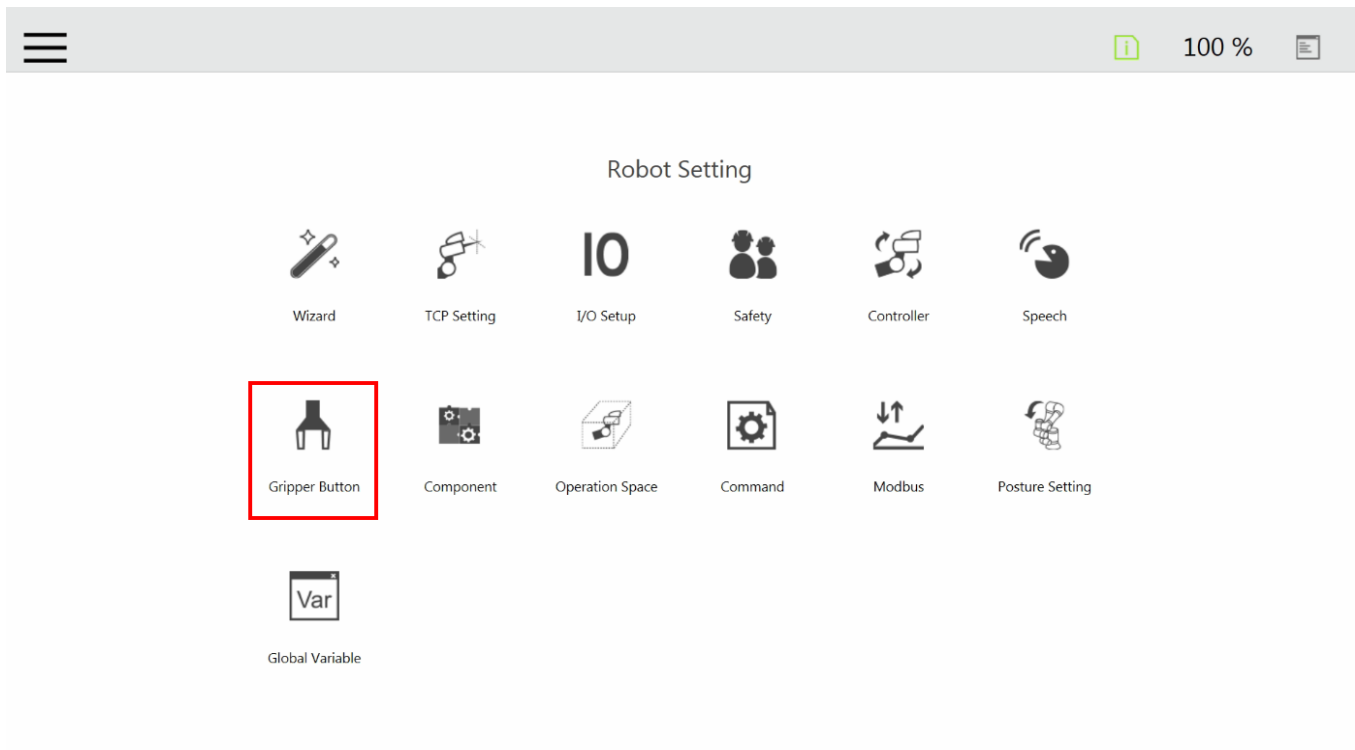
Gripper Button

The user can assign Gripper Components to the Gripper button and use the latter to open and close the fingers of the Robotiq Gripper.

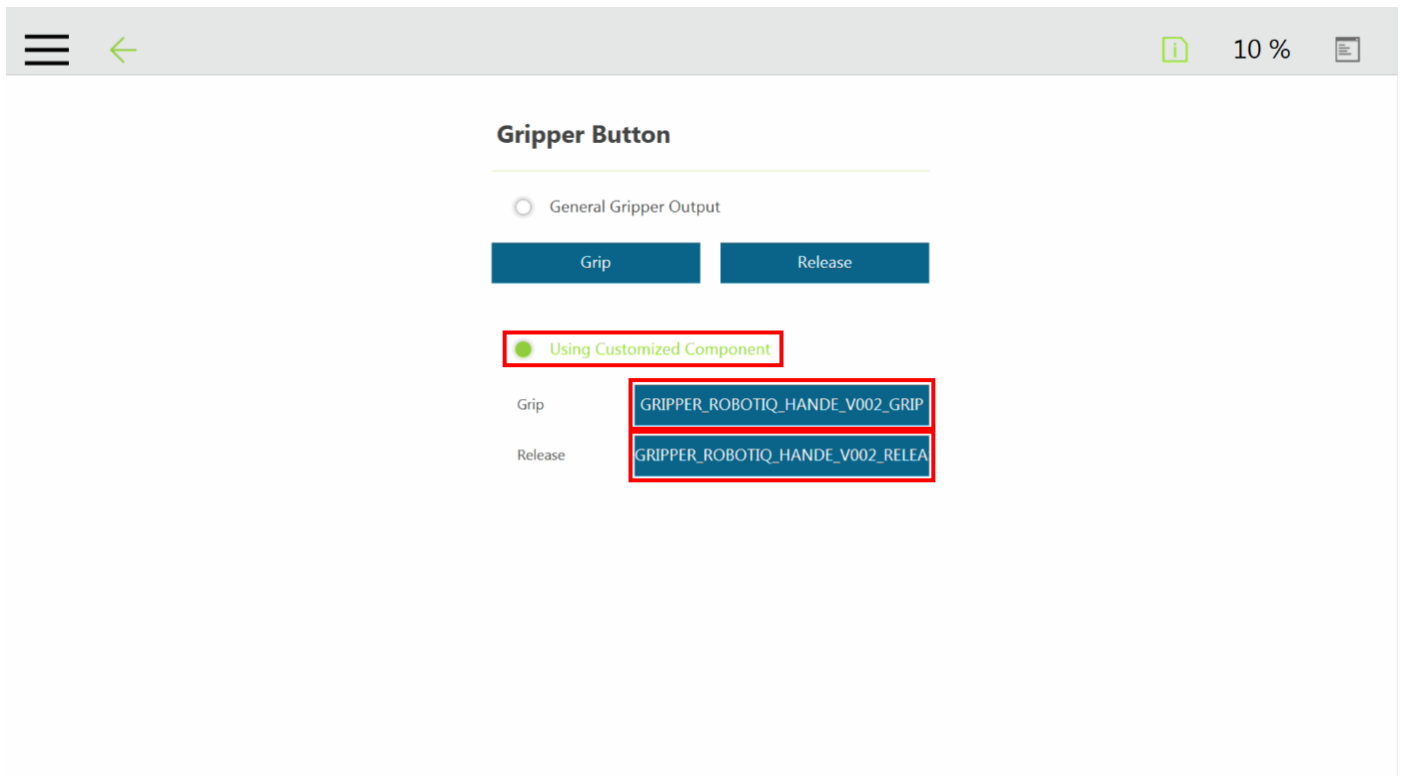
- 1 From the TM Flow homepage, tap the **triple bar icon** and select the **Setting** icon



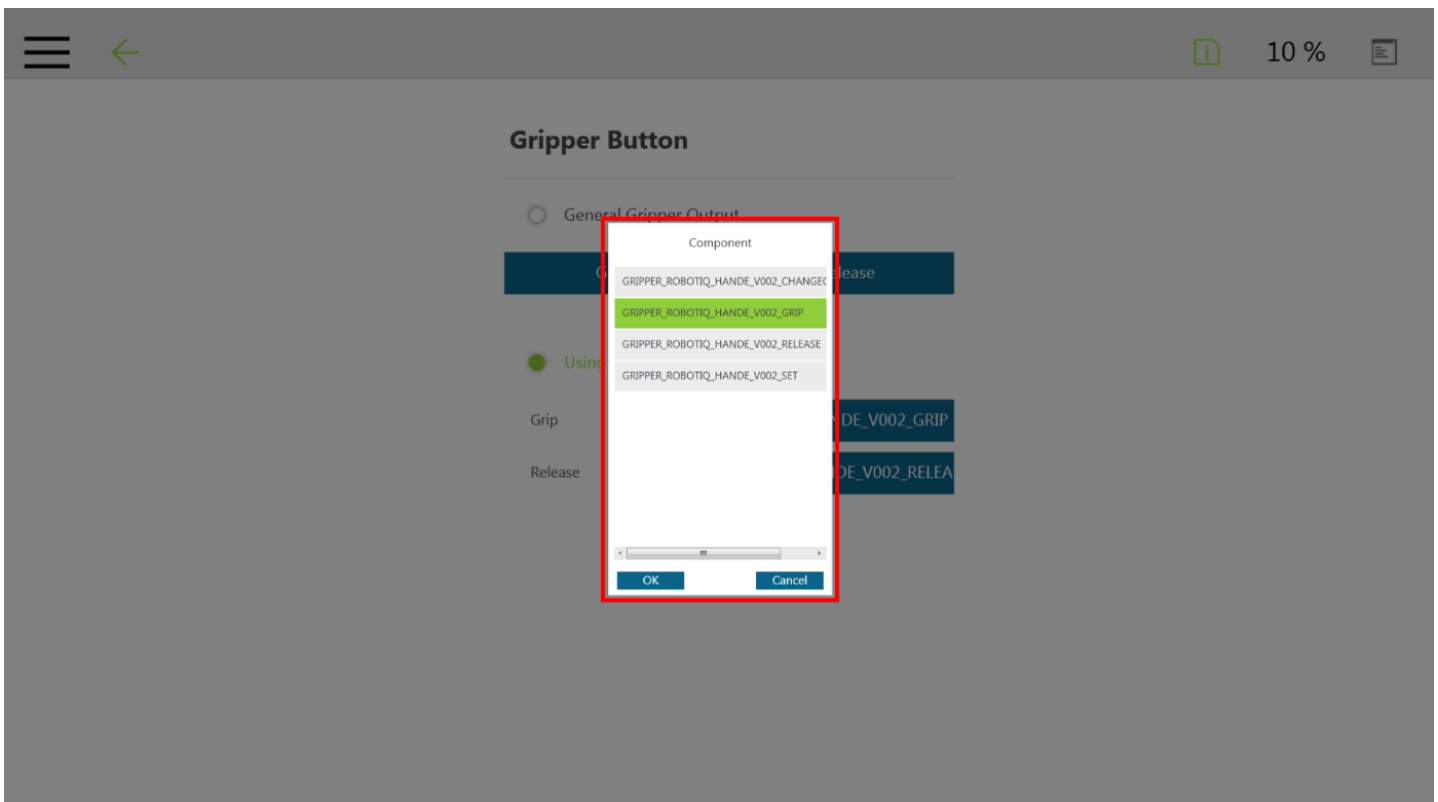
- 2 Click on **Gripper Button**



- 3 In the **Gripper Button** window, tick the **Using Customized Component** radio button and select the Component you want to assign to either one of the Gripper actions

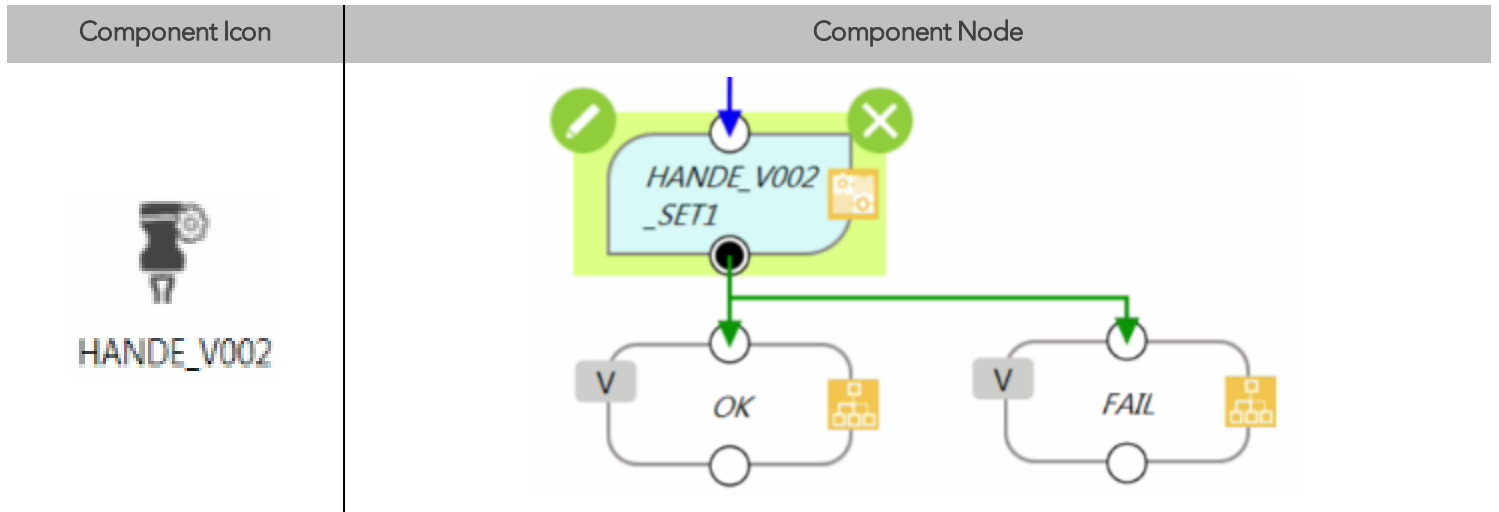


- 4 In the popup window, select or change the Component you wish to assign to the Gripper action/button, and click **OK**



Programming

SET Component



- 1 Drag and drop the SET Component icon after a program Gateway to place a SET program node (HANDE_V002_SET1)
- 2 Tap the SET node to highlight it and click on the pencil to edit the settings

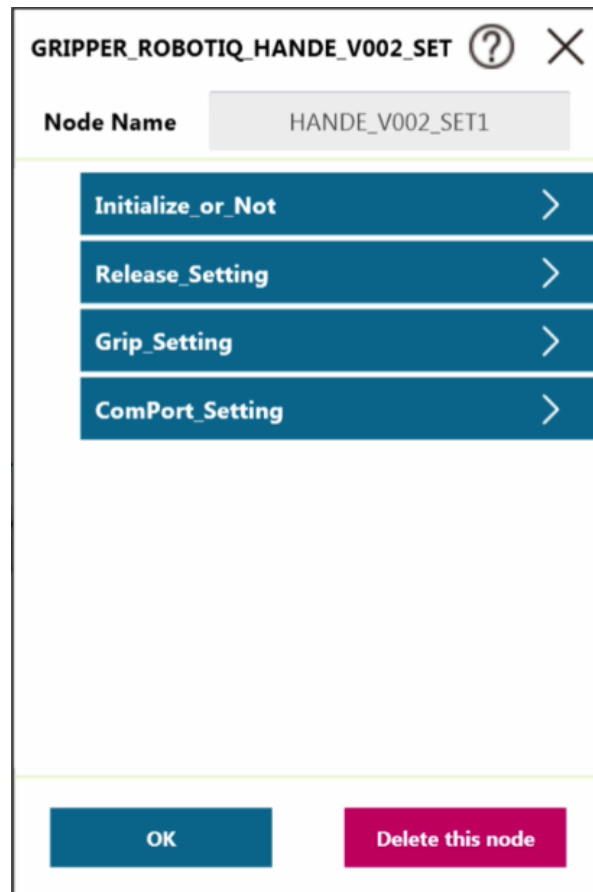


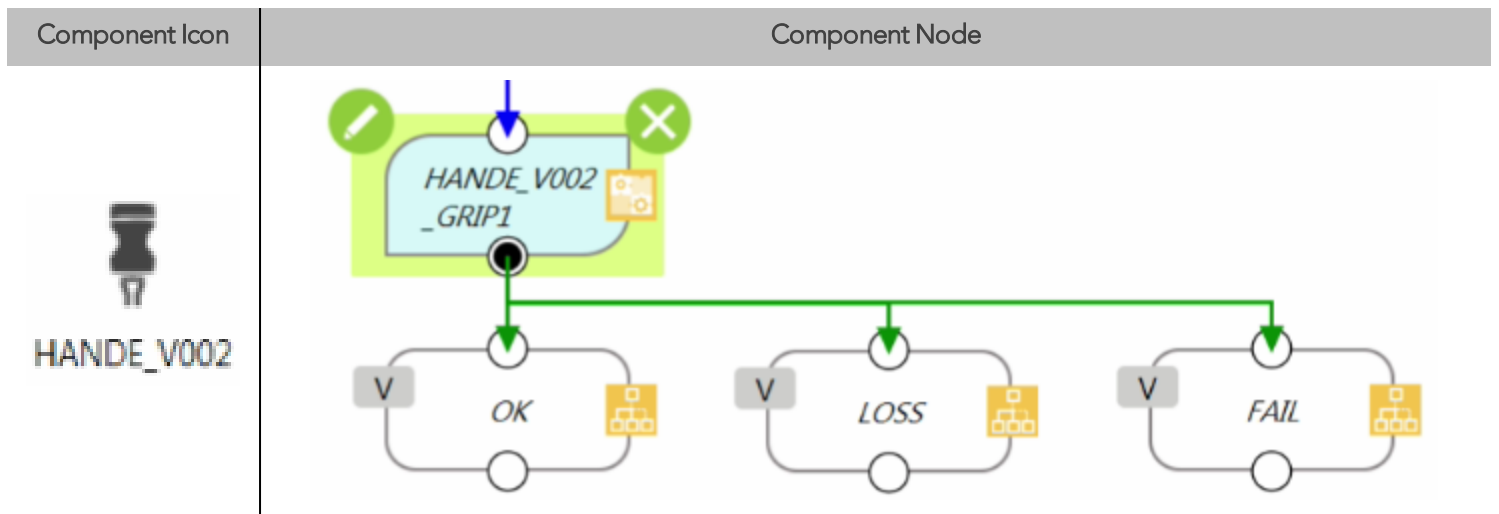
Fig. 4-3: SET Node Settings Menu



Setting	Variable	Type	Default	Description	
Initialize_or_Not	var_reset	bool	false	Set True if you want to initialize the gripper in this node. If you only want to change gripping force, position or speed, you don't need to initialize the gripper (please set false)	
Grip_Setting	var_grip_force	%	50%	Set gripping force	
				Hand-E	0~100%=20~130N
	var_grip_speed	%	50%	Set gripping speed	
				Hand-E	0~100%=20~150mm/s
	var_grip_pos	%	80%	Set gripping position	
				Hand-E	0~100%=0~50mm/s
Release_Setting	var_Release_force	%	50%	Set gripping force	
				Hand-E	0~100%=20~130N
	var_Release_speed	%	50%	Set gripping speed	
				Hand-E	0~100%=20~150mm/s
	var_Release_pos	%	80%	Set gripping position	
				Hand-E	0~100%=0~50mm/s
ComPort_Setting	var_ComPort	int	1	Please set as Com1, Com2, Com3, following the com port to which you connect the gripper.	



GRIP Component



- 1 Drag and drop the GRIP Component icon after a program Gateway to place a GRIP program node (HANDE_V002_GRIP1)
- 2 Tap the GRIP node to highlight it and click on the pencil to edit the settings

GRIPPER_ROBOTIQ_HANDE_V002_GRI ? X

P

Node Name

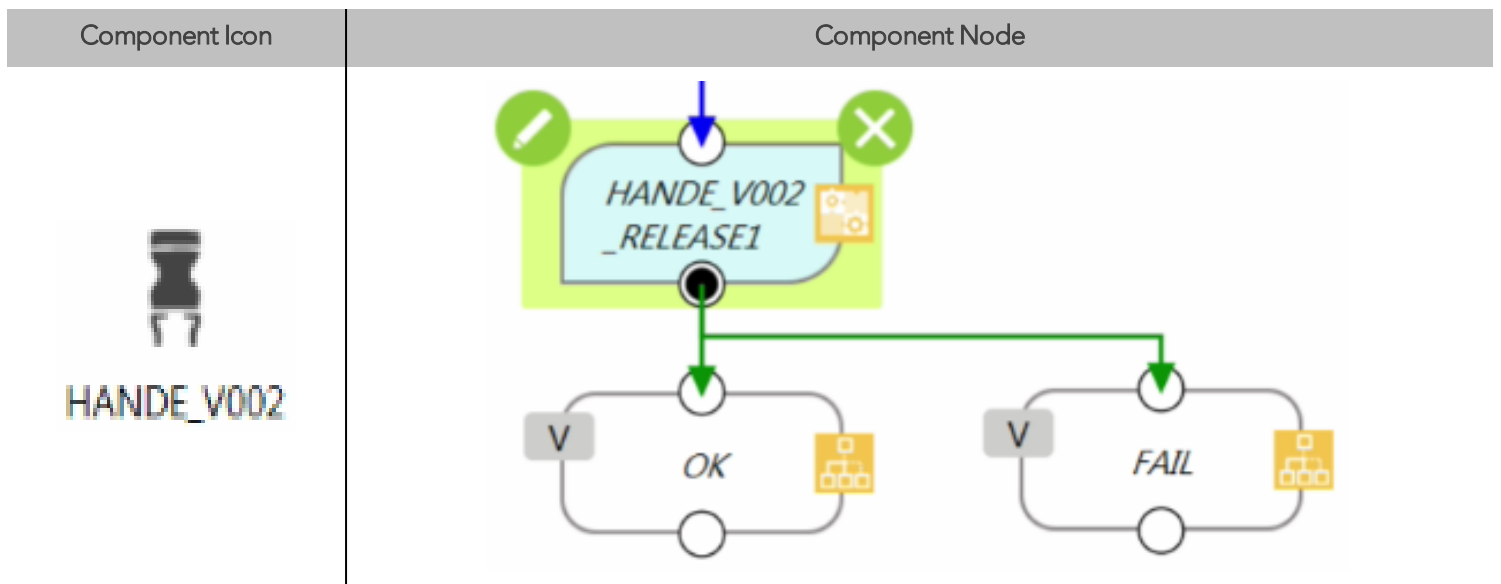
OK
Delete this node

Fig. 4-4: GRIP Node Settings Menu



Setting	Variable	Type	Default	Description	
Grip_Setting (SET Node)	var_grip_force	%	50%	Set gripping force	
				Hand-E	0~100%=20~130N
	var_grip_speed	%	50%	Set gripping speed	
				Hand-E	0~100%=20~150mm/s
	var_grip_pos	%	80%	Set gripping position	
				Hand-E	0~100%=0~50mm/s

RELEASE Component



- 1 Drag and drop the RELEASE Component icon after a program Gateway to place a RELEASE program node (HANDE_V002_RELEASE1)
- 2 Tap the RELEASE node to highlight it and click on the pencil to edit the settings

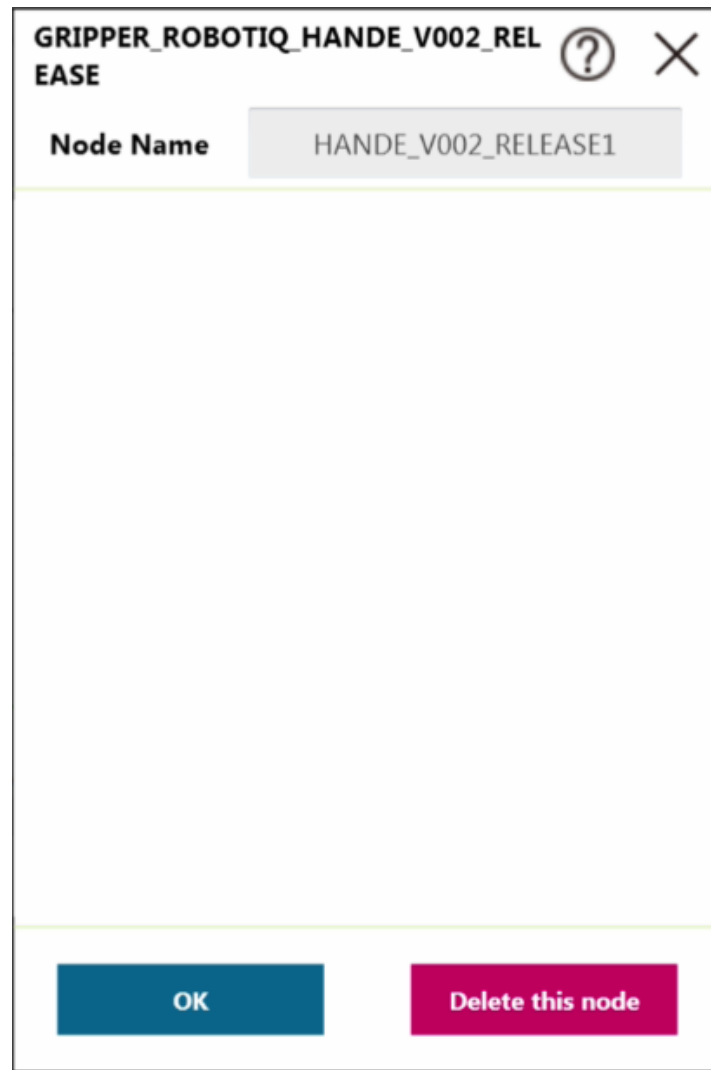
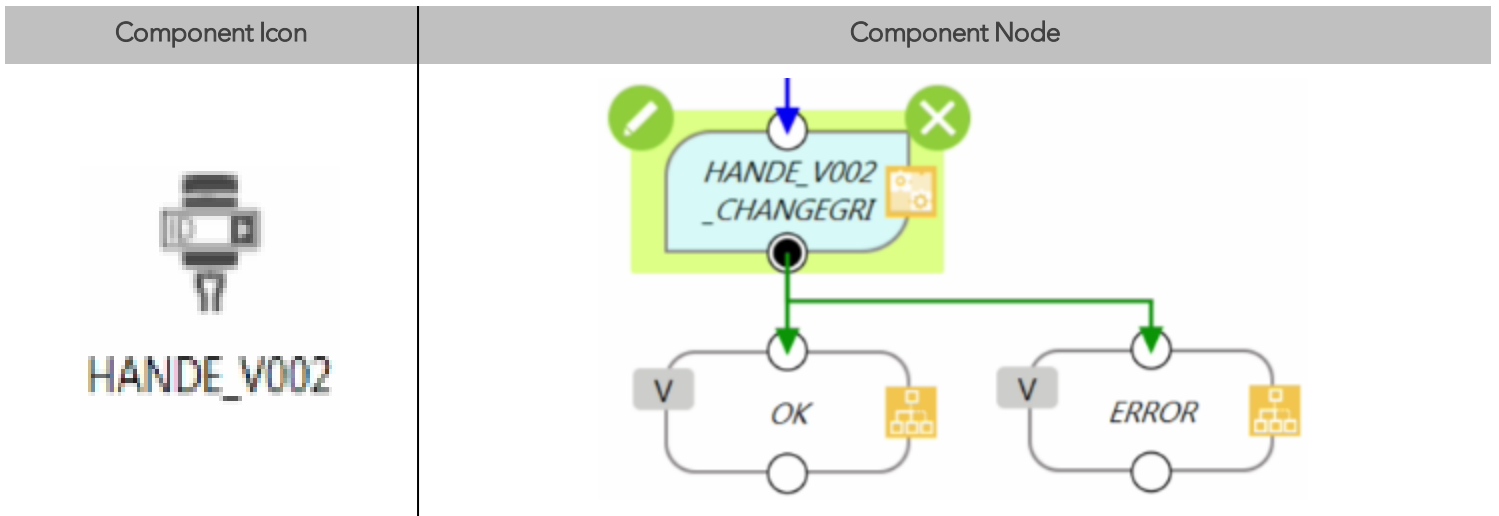


Fig. 4-5: RELEASE Node Settings Menu

Setting	Variable	Type	Default	Description	
Release_Setting (SET Node)	var_grip_force	%	50%	Set gripping force	
				Hand-E	0~100%=20~130N
	var_grip_speed	%	50%	Set gripping speed	
				Hand-E	0~100%=20~150mm/s
	var_grip_pos	%	80%	Set gripping position	
				Hand-E	0~100%=0~50mm/s



CHANGEGRIPPER Component



- 1 Drag and drop the CHANGEGRIPPER Component icon after a program Gateway to place a CHANGEGRIPPER program node (HANDE_V002_CHANGEGRIPPER)
- 2 Tap the CHANGEGRIPPER node to highlight it and click on the pencil to edit the settings

GRIPPER_ROBOTIQ_HANDE_V002_CHANGEGRIPPER ? ×

Node Name

Change_Gripper >

OK

Delete this node



Setting	Variable	Type	Default	Description
Change_Gripper	Var_Slave_ID	int	9	Select the Slave ID as the current gripper

Info

Use the Robotiq User Interface to change the Modbus Slave ID Address of the second gripper when using a dual gripper (Default = 9).



Changing the Modbus Slave ID

The user can change the Modbus Slave ID of a Robotiq Gripper via the Robotiq User Interface.

Installer

Browse to the [support page of the Gripper](#) in the Software section to download the RUI installer (.exe).

Robotiq User Interface

Browse to the support page of the Gripper, in the Documents section, to access or download the [instruction manual](#) of the Robotiq User Interface (RUI) for information on the installation and control of the RUI.

1 First, click on the Modbus RTU Parameters tab

Robotiq User Interface - 2-Finger Adaptive Robot Gripper

Connection View Help

Simple Control Device Information **Modbus RTU Parameters**

Initialization and Gripper Fault Status

Activate

Go to requested position

Auto-release : Direction Open

Interface Options

Control the Gripper using an Xbox Joystick

Demo Mode

Control Parameters

Pos. Request 100 /255

Speed 100 /255

Force 100 /255

Gripper Feedback

2-Finger-85

Object Detection ●

Position 204

Position

Encoder Count

Current

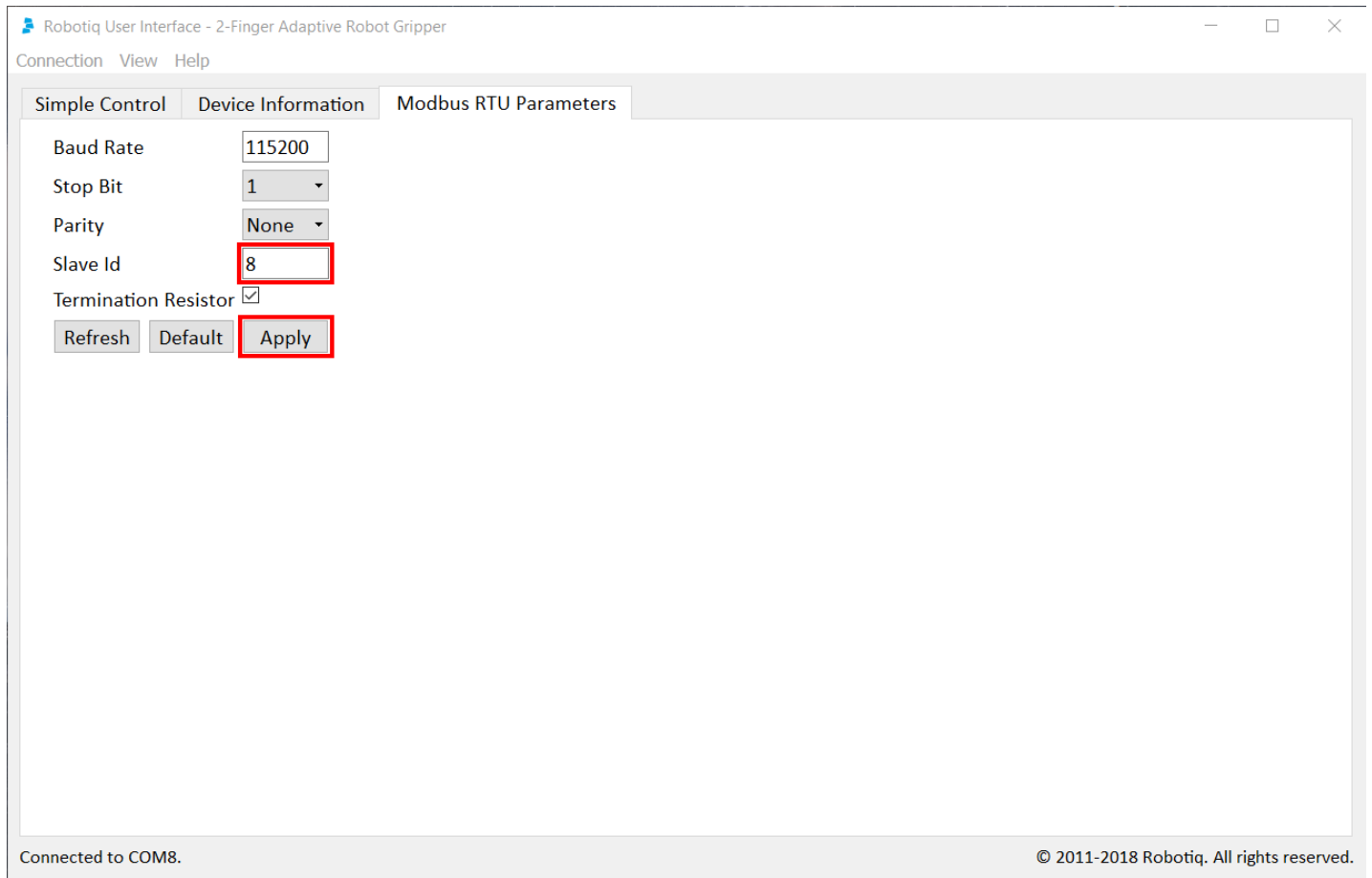
Current (mA)

Connected to COM8.

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- 2 Change the Slave ID of the Gripper by typing in the corresponding box
- 3 Click on the Apply button



- 4 Perform a power cycle (24 V) while the USB device remains connected.



5. User Interface

Visit the [product page of Hand-E](#) on support.robotiq.com to get the latest installer of the Robotiq User Interface along with appropriate documentation.

Please refer to the [instruction manual of the Robotiq User Interface](#) for more details.



6. Specifications

Info

The following manual uses the metric system, unless specified, **all dimensions are in millimeters**.

The following sub-sections provide data on the various specifications for Hand-E.

- Section 6.1: technical dimensions of Hand-E:
 - Dimensions for custom fingertips
 - Dimensions of available fingertips
- Section 6.2: mechanical specifications
- Section 6.3: electrical specifications



6.1. Technical dimensions

The figure below represents the Gripper's dimensions with axes X, Y, Z, and origin referenced for finger motion.

Info

All technical drawings in the present section are shown with the basic aluminum fingers.

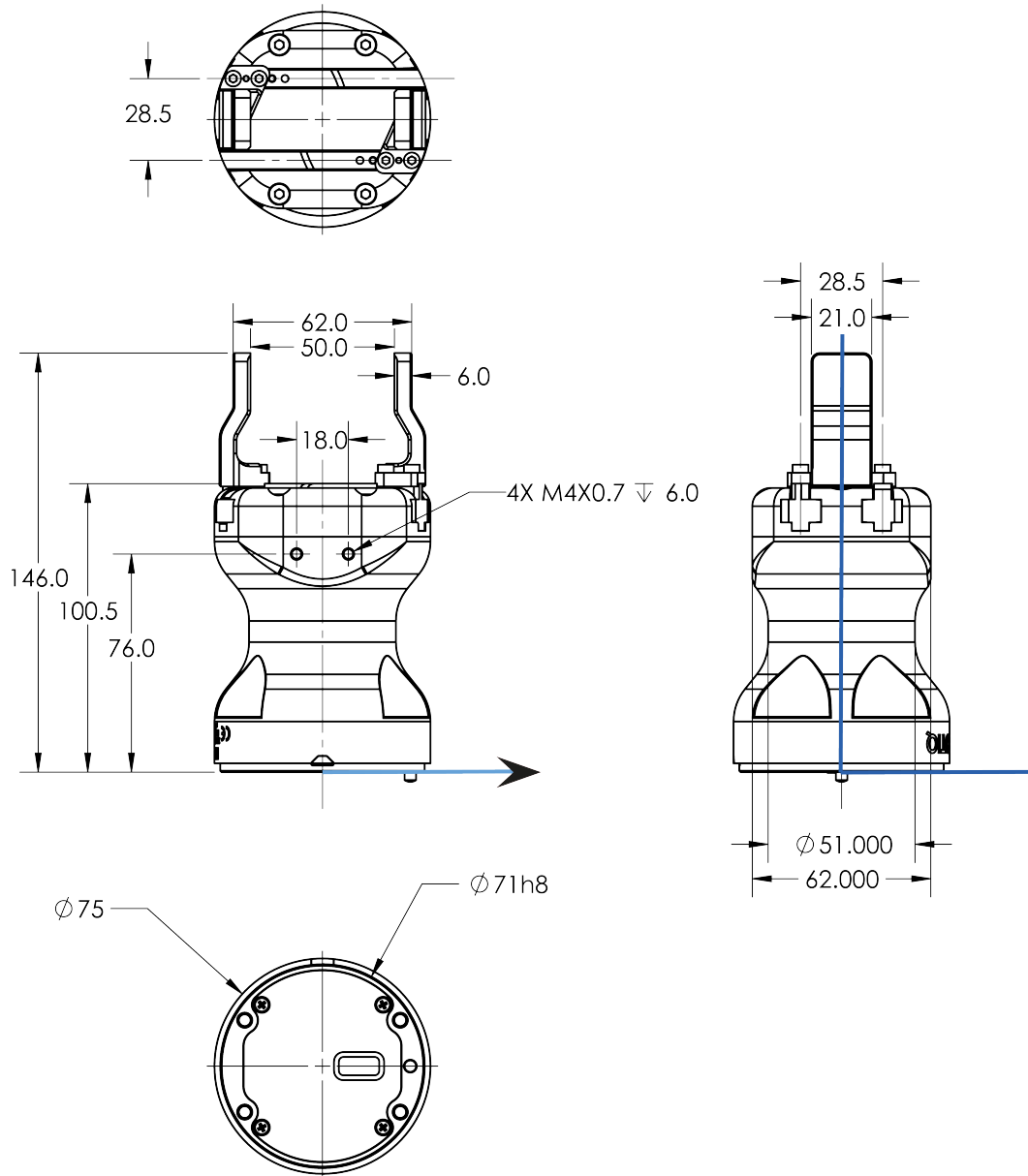


Fig. 6-1: General dimensions of Hand-E (open)



6.1.1. Couplings

Hand-E requires a coupling provided by Robotiq to operate.

The coupling is mandatory since it integrates electronics and electrical contacts.

Blank coupling

Below are the dimensions of the blank coupling, **AGC-CPL-BLANK-002** (please refer to the **Spare Parts, Kits and Accessories** section), available to create a custom bolt pattern. The blue section can be fully customized (holes can be placed in any part of this section) while the grey section can only be worked to a depth of 3 mm.

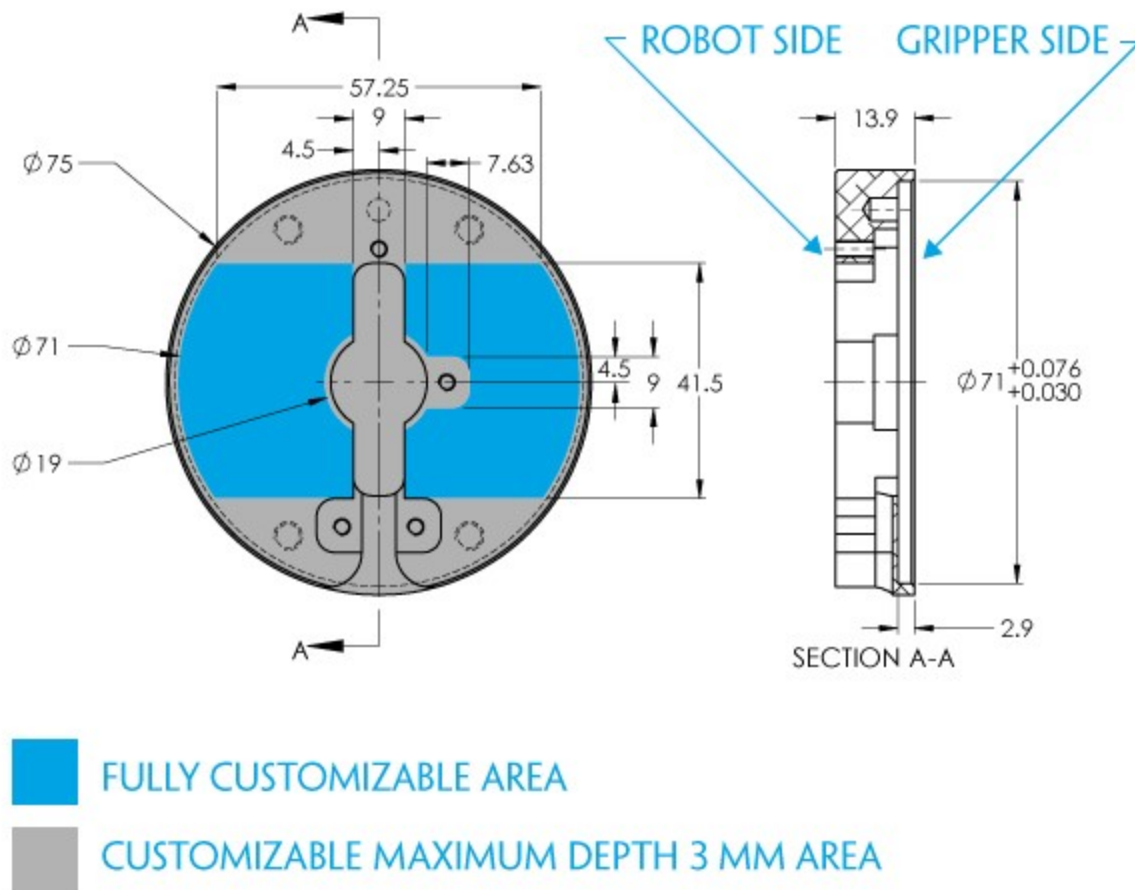


Fig. 6-2: Workable area dimensions of blank coupling AGC-CPL-BLANK-002



Coupling for ISO 9409-1-50-4-M6

Bolt pattern for coupling GRP-CPL-062 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 50 mm pitch circle diameter:
 - (4) M6-1.0 low head socket cap screw clearance
 - (1) M6 indexing pin
 - ISO 9409-1 standard 50-4-M6

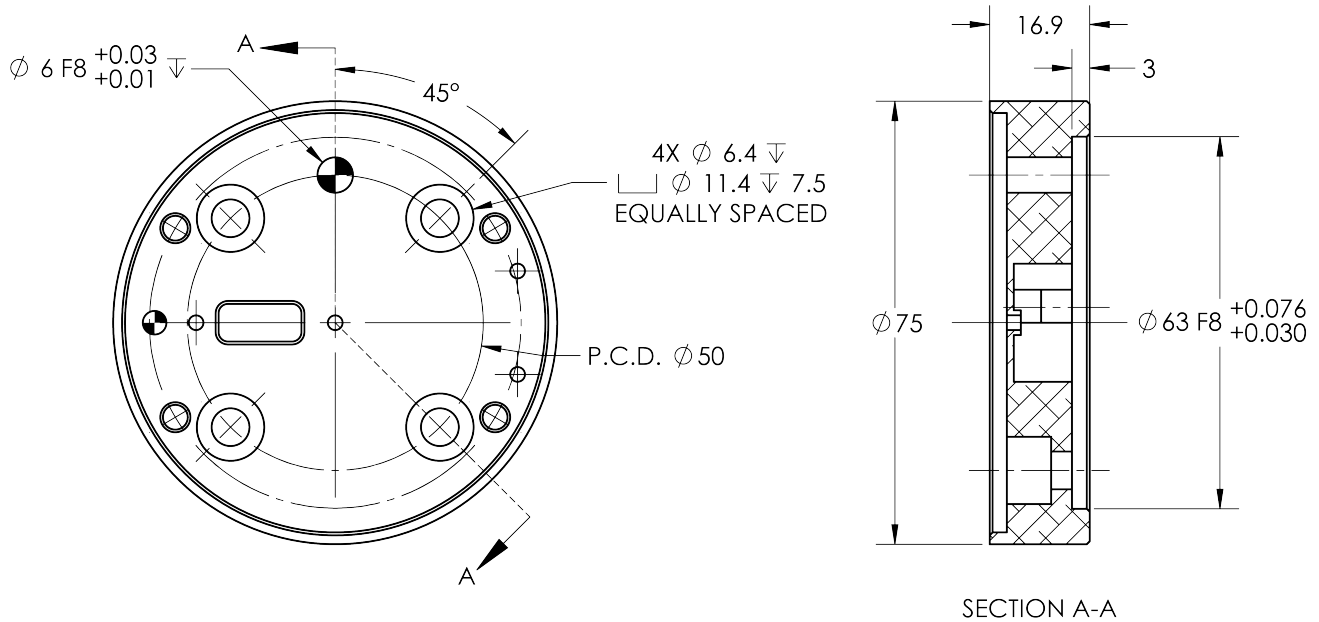


Fig. 6-3: Coupling for ISO 9409-1-50-4-M6.

Coupling for ISO 9409-1-31.5-4-M5

Bolt pattern for coupling AGC-CPL-063-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 31.5 mm pitch circle diameter:
 - (4) M5-0.8 low head socket cap screw clearance
 - (1) M5 indexing pin
 - ISO 9409-1 standard 31.5-4-M5

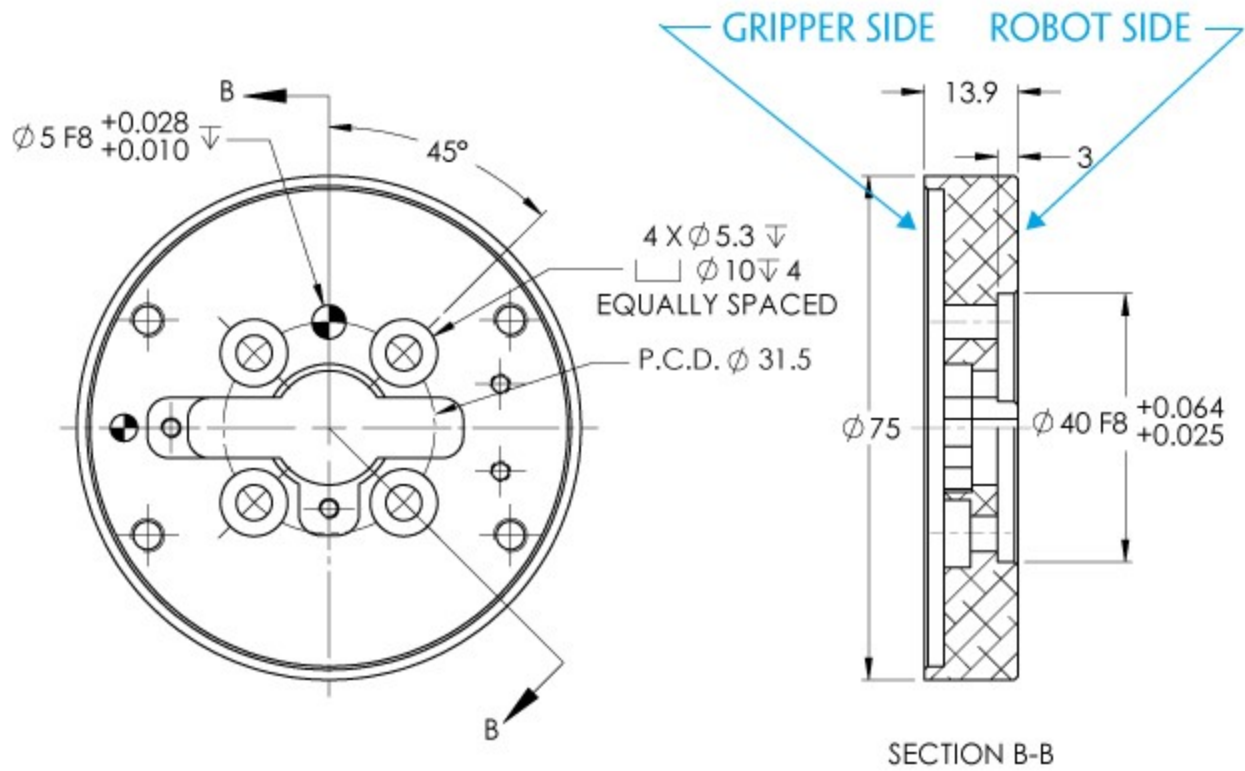


Fig. 6-4: Coupling for ISO 9409-1-31.5-4-M5.



Coupling for ISO 9409-1-40-4-M6

Bolt pattern for coupling AGC-CPL-064-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 40 mm pitch circle diameter:
 - (4) M6-1.0 low head socket cap screw clearance
 - (1) M6 indexing pin
 - ISO 9409-1 standard 40-4-M6

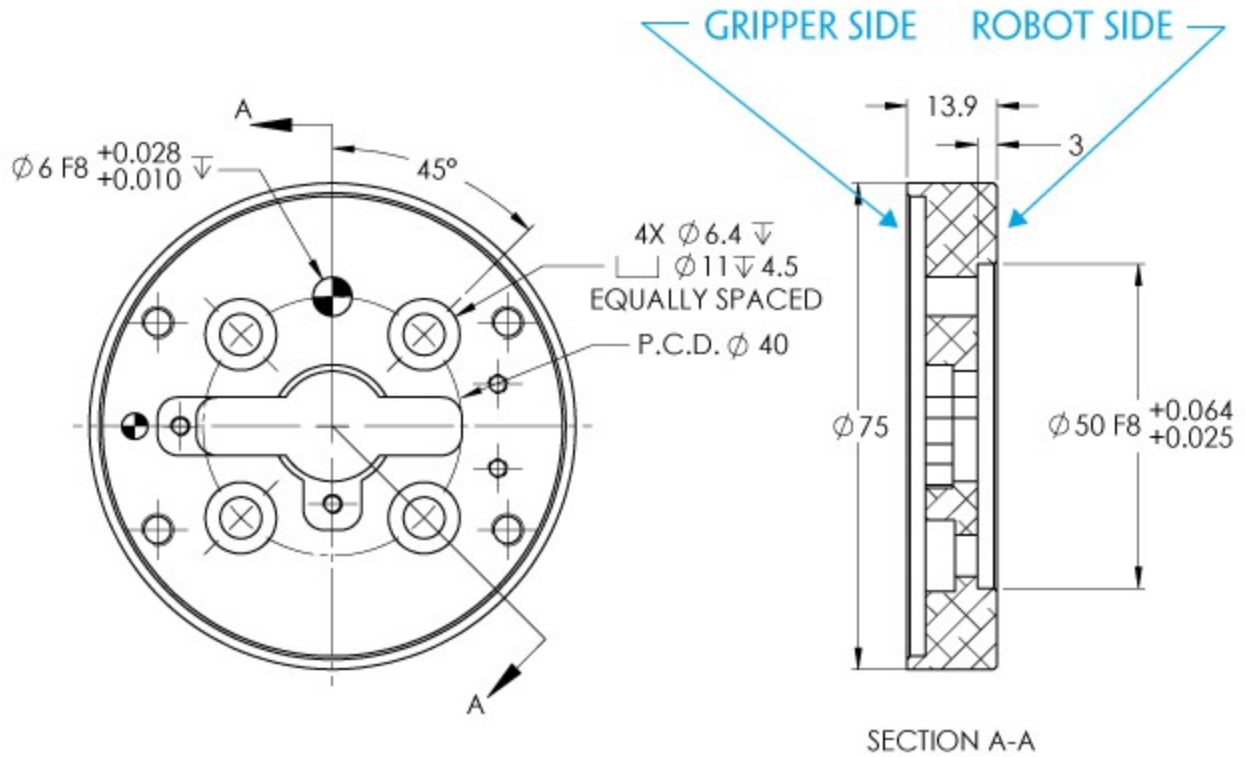


Fig. 6-5: Coupling for ISO 9409-1-40-4-M6.

Coupling for PCD 56 with 8 x M4

Bolt pattern for coupling AGC-CPL-065-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 56 mm pitch circle diameter:
 - (8) M4-0.7 low head socket cap screw clearance
 - (1) M4 indexing pin
 - 62 mm diameter internal insert

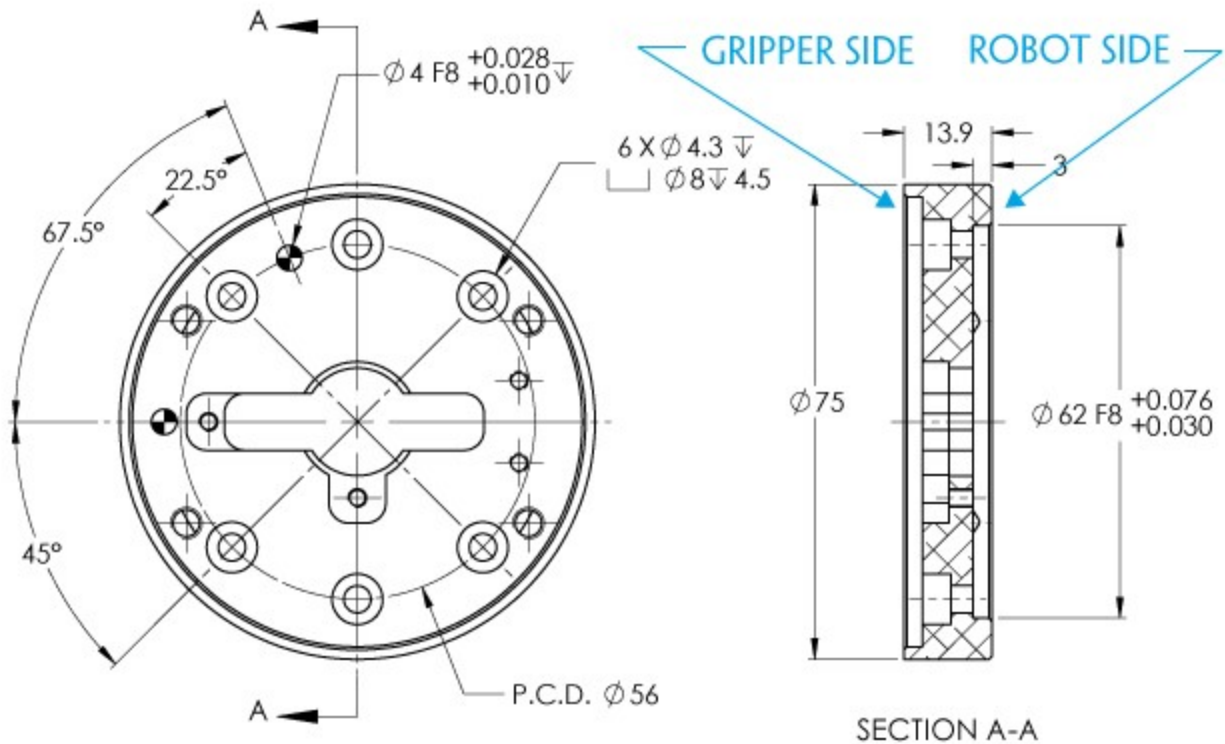


Fig. 6-6: Coupling for PCD 56 mm with 8 x M4 clearance.

Info

Although coupling AGC-CPL-065-002 is compatible with 8 x M4 threads on a 56 mm PCD it uses only 6 of the 8 normally present holes.



Coupling for PCD 56 with 6 x M4

Bolt pattern for coupling AGC-CPL-066-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 56 mm pitch circle diameter:
 - (6) M4-0.7 low head socket cap screw clearance
 - (1) M6 indexing pin
 - 42 mm diameter external insert

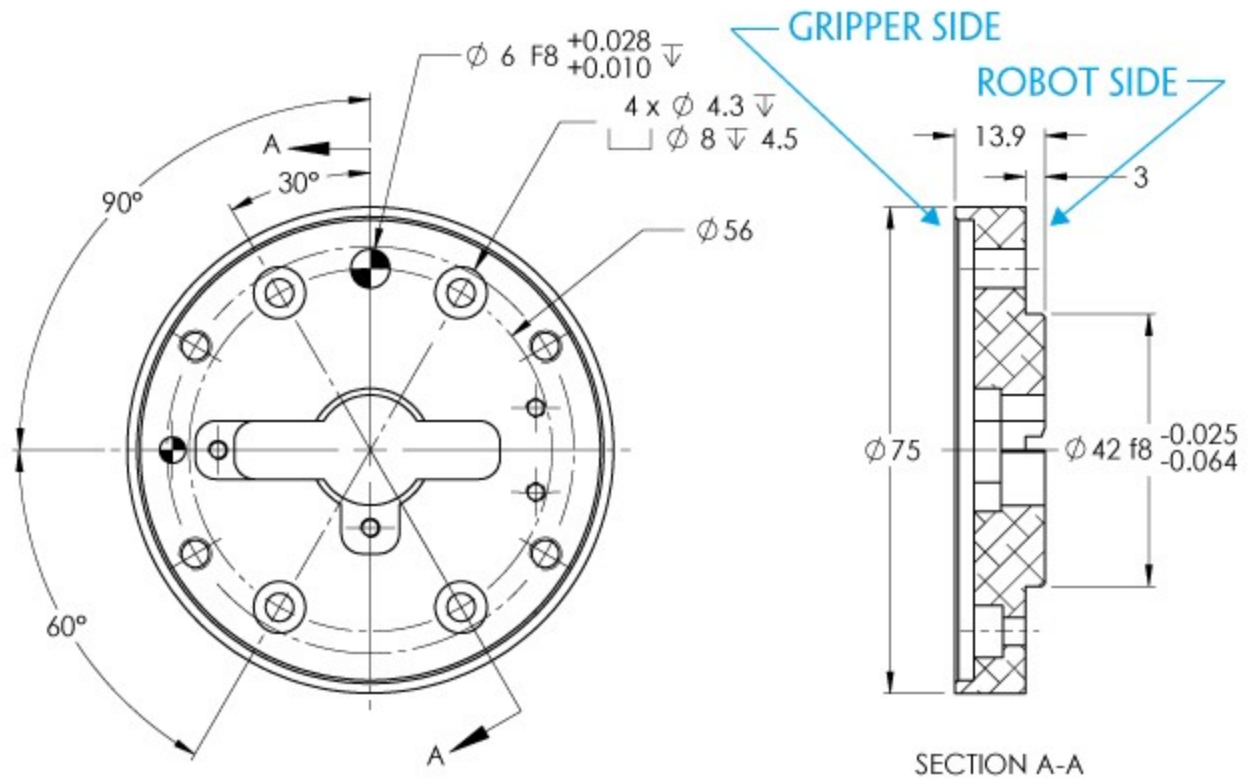


Fig. 6-7: Coupling for PCD 56 mm with 6 x M4 clearance.

Coupling for PCD 60 with 4 x M5

Bolt pattern for coupling AGC-CPL-067-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 60 mm pitch circle diameter:
 - (4) M5-0.8 low head socket cap screw clearance
 - (1) M5 indexing pin
 - 34 mm diameter external insert

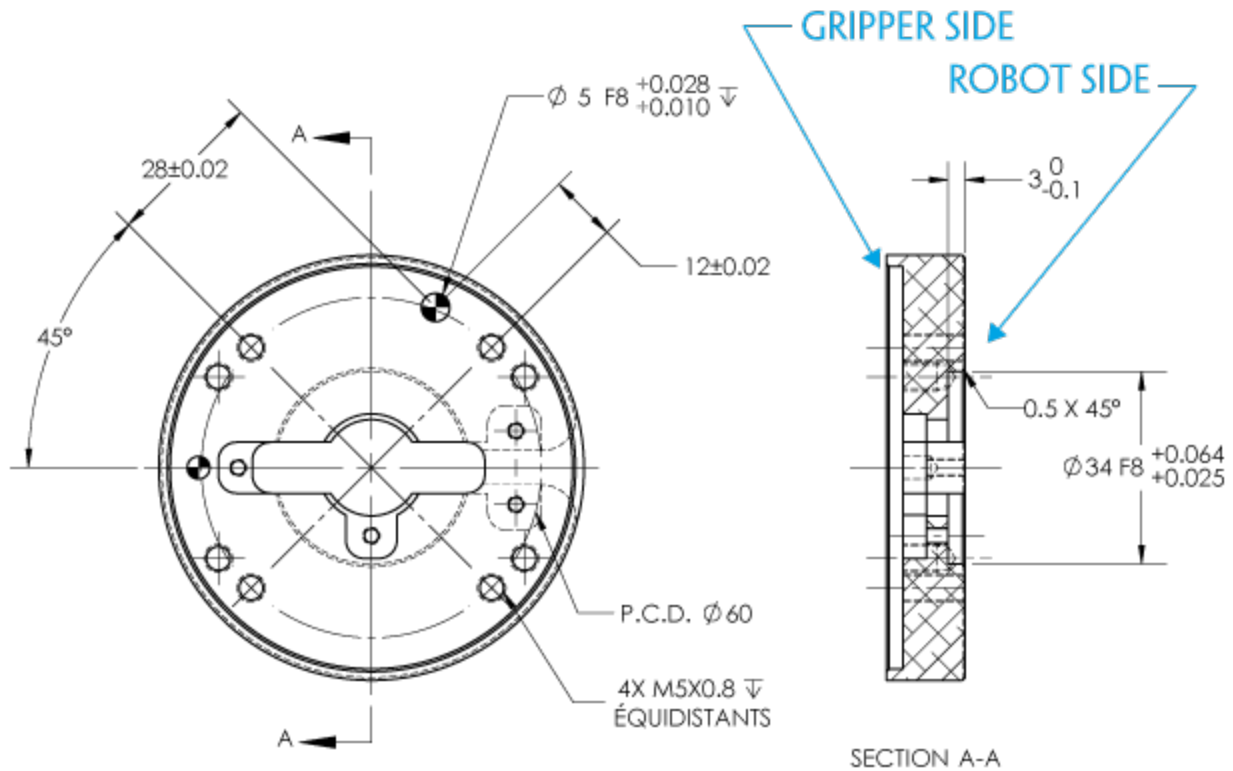


Fig. 6-8: Coupling for PCD 60 mm with 4 x M5 clearance.



Coupling for PCD 63 with 6 x M6

Bolt pattern for coupling AGC-CPL-068-002 (please refer to the **Spare Parts, Kits and Accessories** section) is compatible with:

- 63 mm pitch circle diameter:
 - (6) M6-1.0 low head socket cap screw clearance
 - (2) M6 indexing pins

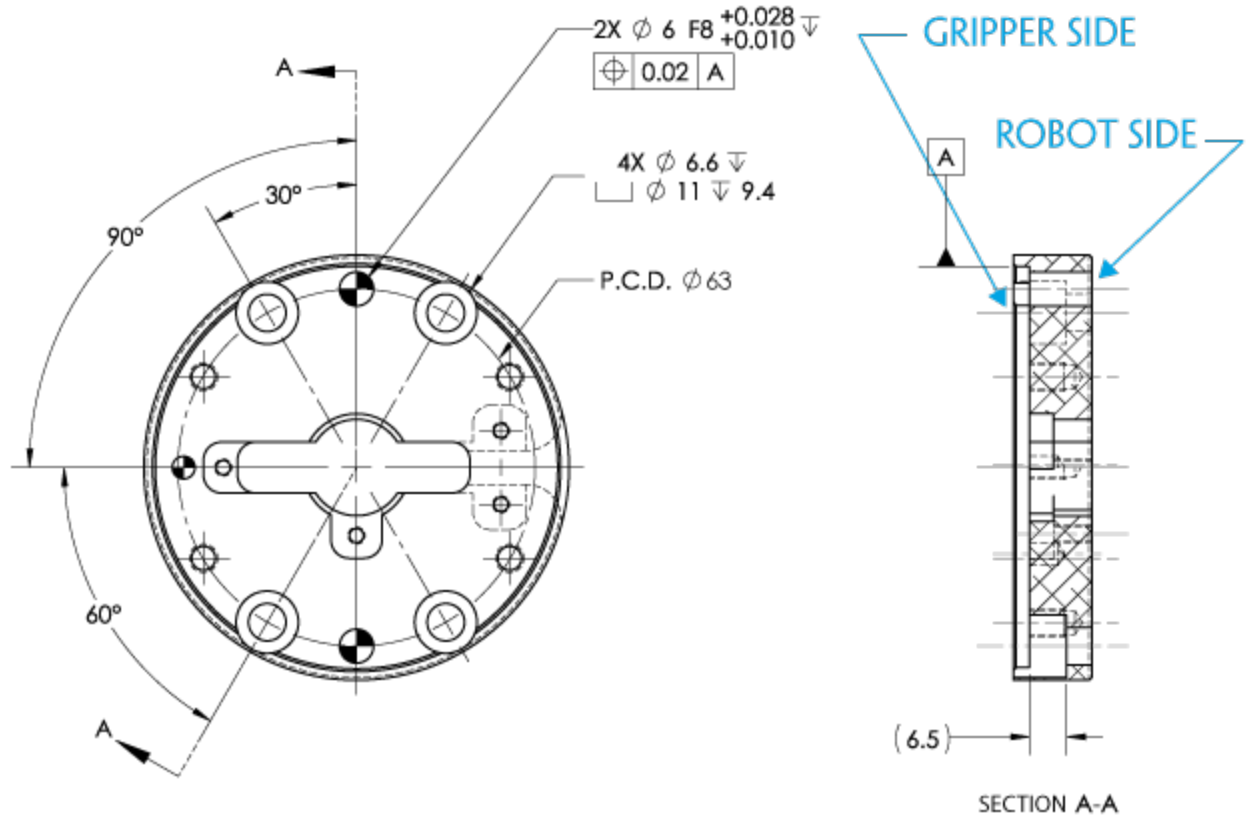


Fig. 6-9: Coupling for PCD 63 mm with 6 x M6 clearance.

6.1.2. Fingers and fingertips

The contact grip points for Hand-E are its two fingertip pads.

Fingertip options are supplied by Robotiq (please refer to the **Spare Parts, Kits and Accessories** section). Users can create their own fingertips from scratch. The figure below represents the fingertip holder, the permanent, non customizable part of the Gripper finger on which the fingertip must be mounted.

Custom fingertip design must meet the following specifications:

- Forces exerted at the end of the fingertips must not exceed 100 N , regardless of the direction. Please refer to the **Moment and force limits** section for more details.

Warning

The following limits must be respected at all times.
Calculation of maximum moment and force should include robot acceleration and safety factors.

- Refer to **Mechanical specifications** section to evaluate the grip force according to your fingertip design.

Info

You can install custom fingertips directly on the rack or on the fingertip holder.

Tip

Fingertips can be mounted directly on the racks or on fingertip holders.

Rack

A finger is installed directly on a rack. You may customize your own fingers that will mount on this part. The basic aluminum fingers (HND-FIN-ALU-KIT) are mounted directly onto it.

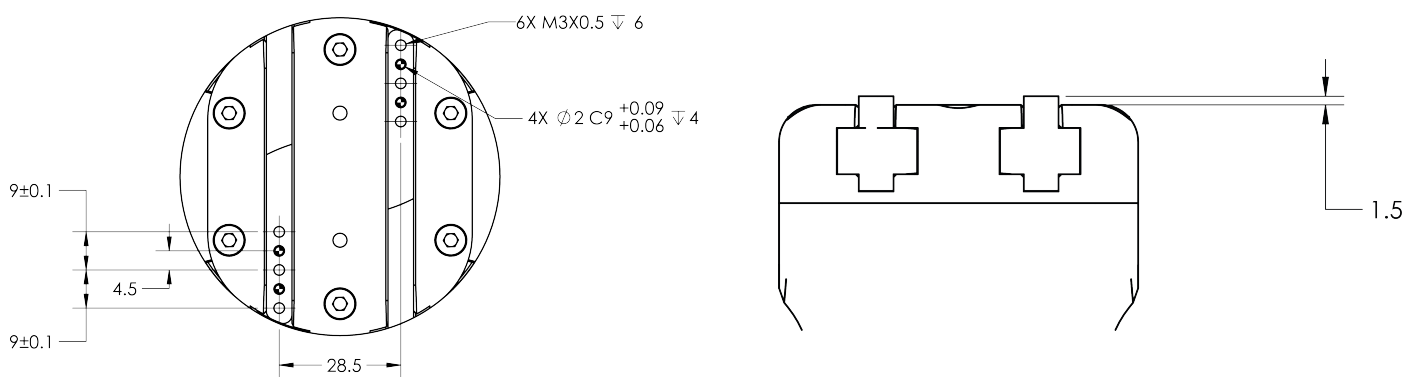


Fig. 6-10: Racks in rack housing



Basic aluminum finger

The figure below represents the basic aluminum fingertip (HND-FIN-ALU-KIT); please refer to the **Spare Parts, Kits and Accessories** section. This finger allows a 0-50 mm stroke.

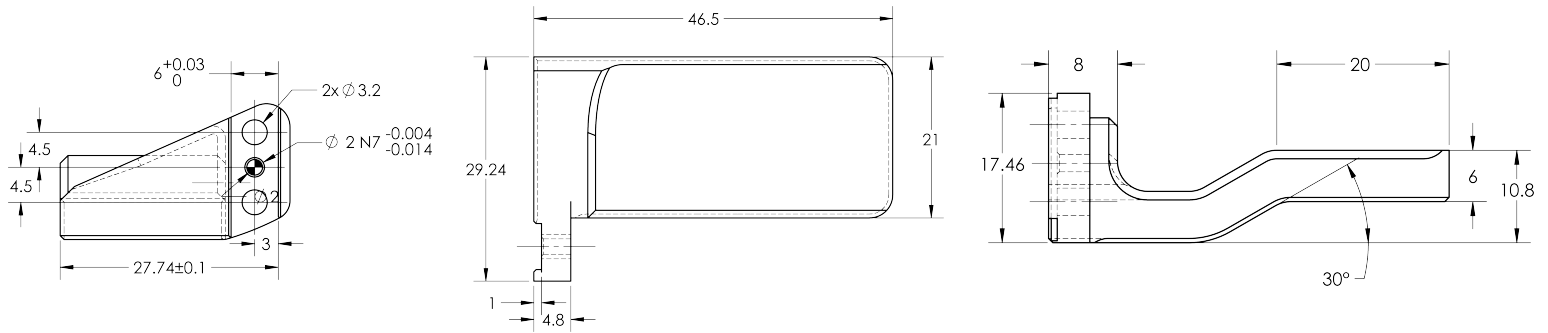


Fig. 6-11: Aluminum finger

Fingertip holder

In order to install fingertips on the racks, fingertip holders must be used (HND-TIP-HLD-KIT); please refer to the **Spare Parts, Kits and Accessories** section. You may customize fingertips to install directly on those. Both the flat silicone (HND-TIP-SLC-KIT) and V-groove fingertips, (HND-TIP-VGR-KIT) install on the fingertip holders.

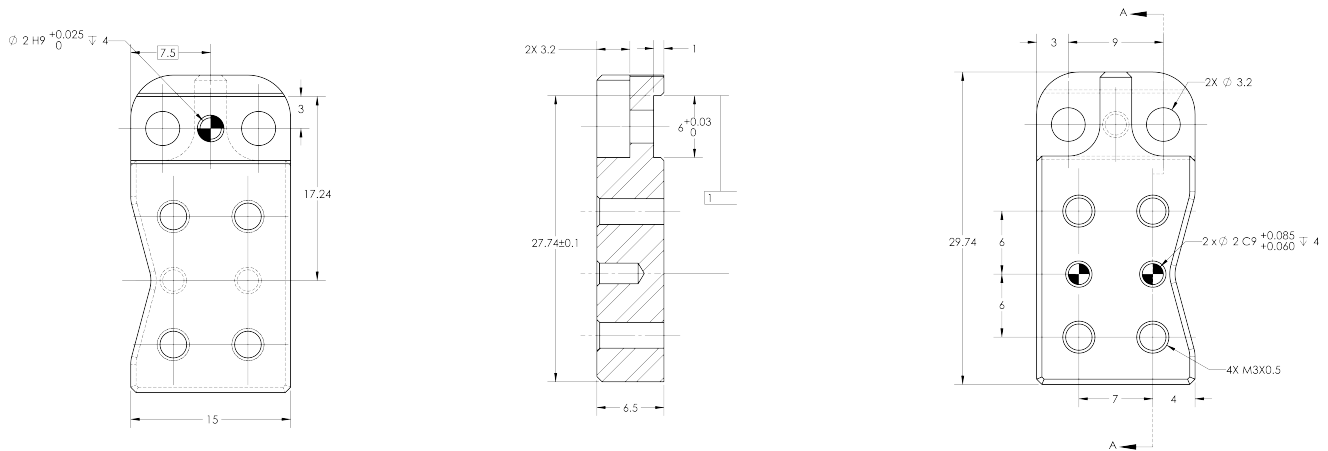


Fig. 6-12: Fingertip holder

Flat silicone fingertip

The figure below represents a flat silicone fingertip (HND-TIP-SLC-KIT); please refer to the **Spare Parts, Kits and Accessories** section. This fingertip has a flat silicone surface with an optimal friction coefficient for picking parts. This fingertip must be mounted on a rack using the fingertip holder (HND-TIP-HLD-KIT).

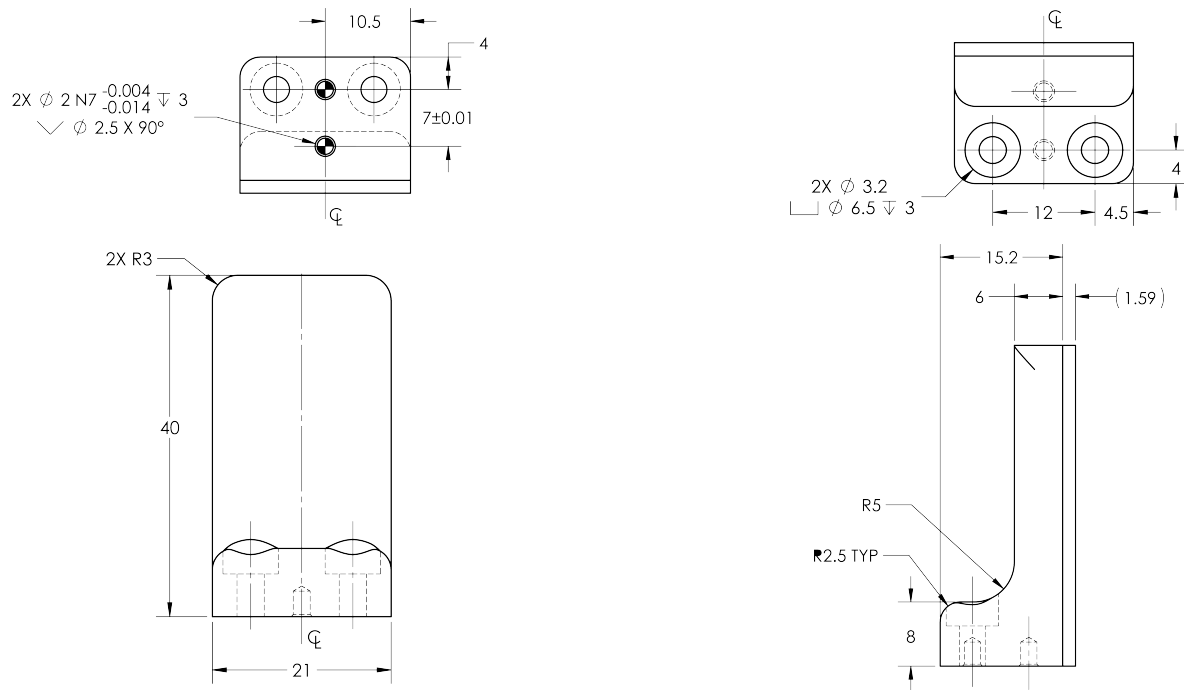


Fig. 6-13: Flat silicone fingertip



Grooved fingertip

The figure below the available grooved fingertip (HND-TIP-VGR-KIT); please refer to the **Spare Parts, Kits and Accessories** section. This fingertip has a grooved surface with an optimal shape for picking cylindrical parts (by its horizontal and vertical grooves). This fingertip must be mounted on the racks using the fingertip holder (HND-TIP-HLD-KIT).

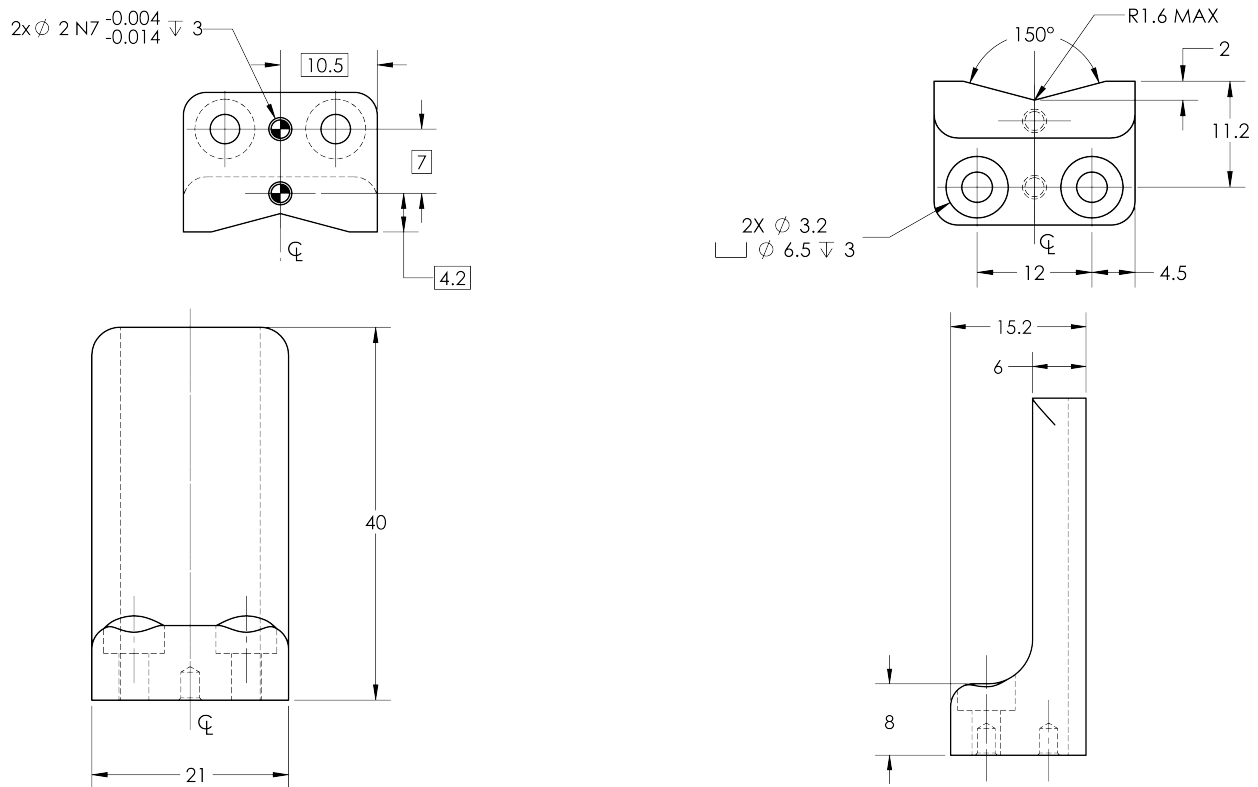


Fig. 6-14: Grooved fingertip

6.2. Mechanical specifications

6.2.1. Specifications:

Specification	Metric Units	Imperial Units
Gripper opening	0 - 50 mm	0 - 1.97 in.
Maximum recommended payload, Form-fit grasp	5 kg	11 lbs
Maximum recommended payload, Friction grasp	3 kg	6.6 lbs
Gripper height (without fingertips)	100.5 mm	3.94 in
Gripper diameter	75 mm	2.95 in
Gripper weight (including coupling)	1070 g	2.3 lbs
Grip force	20 - 130 N	4.5 - 27 lbf
Finger speed	20 to 150 mm/s	0.8 to 5.9 in/s

Info

All specs are measured with coupling GRP-CPL-062 and basic aluminum fingertips (HND-FIN-ALU-KIT).



Payload and force

Actuation force model used to calculate the recommended friction payload (W):

where:

- F is the force that is applied to the load by the Gripper.
- Cf is the friction coefficient between the fingertip and the part load.
- Sf is a safety factor to be determined by the robot integrator.

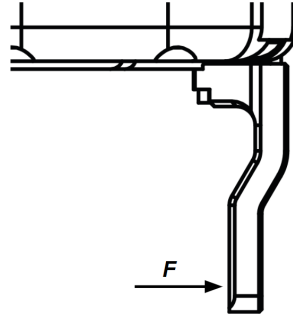


Fig. 6-15: Actuation force on the fingertip of the Hand-E Gripper

Info

- The Actuation Force is the force that can be applied to an object by the motor of the Gripper.
- The Gripper has a power off brake. This means that when no power goes to the Gripper, the fingers are blocked.

Info

For example, if the silicone fingertips (HND-TIP-SLC-KIT) are used to lift a lubricated steel part (machine tending with cutting oils), the friction coefficient would be 0.3 (tested static coefficient of friction).

Maximum weight with a safety factor of 2.4 and maximum force would be:

$$W = (2 \times 130 \text{ N} \times 0.3) / 2.4 = 32.5 \text{ N}$$

This calculation means that a 3.3 kg part will be held by the Gripper when not moving (standing still). When accelerating, the payload will decrease.

The biggest factor in such calculations will always be the **friction coefficient**, we recommend testing the coefficient.

Warning

You must consider the **robot acceleration** in your payload calculations.
Robot emergency stops will lead to major deceleration velocities.



Maximum payload/External force vs. Custom finger design

The maximum payload force recommended depends on the distance on the Z-axis at which the force/payload (F) is applied when using custom fingers on the Hand-E Gripper.

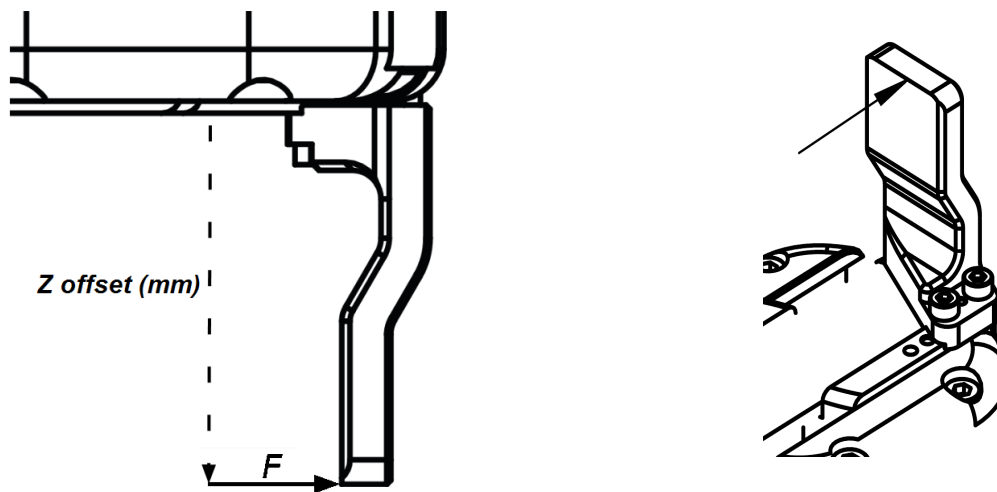


Fig. 6-16: Z-axis offset at which force/payload is applied (tip of the finger, in the middle of the inner surface)

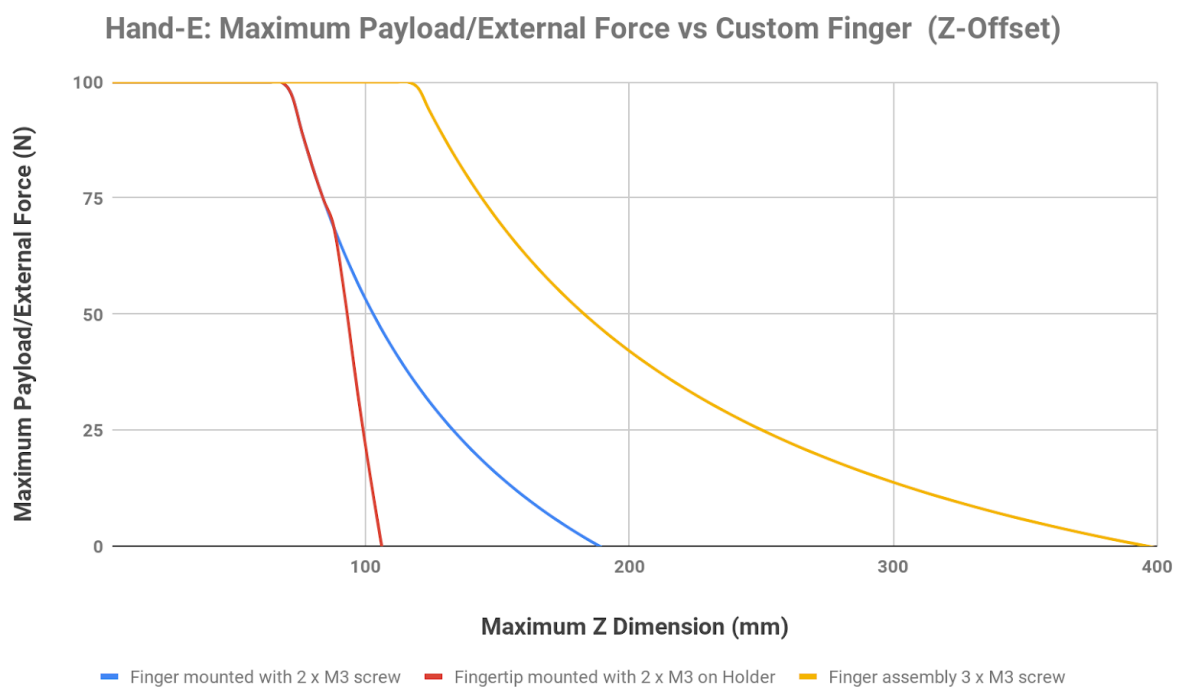


Fig. 6-17: Scheme Illustrating Maximum Payload/External Force vs. Z-Offset on Custom finger

- The **blue curve** in the graph represents the maximum force/payload (F) recommended at given Z offset for a custom finger design mounted directly on the rack with two (2) M3 screws.
- The **red curve** in the graph represents the maximum force/payload (F) recommended at given Z offset for a custom finger design mounted on a fingertip holder with two (2) M3 screws.
- The **yellow curve** in the graph represents the maximum force/payload (F) recommended at given Z offset for a custom finger design mounted directly on the rack with three (3) M3 screws.



Info

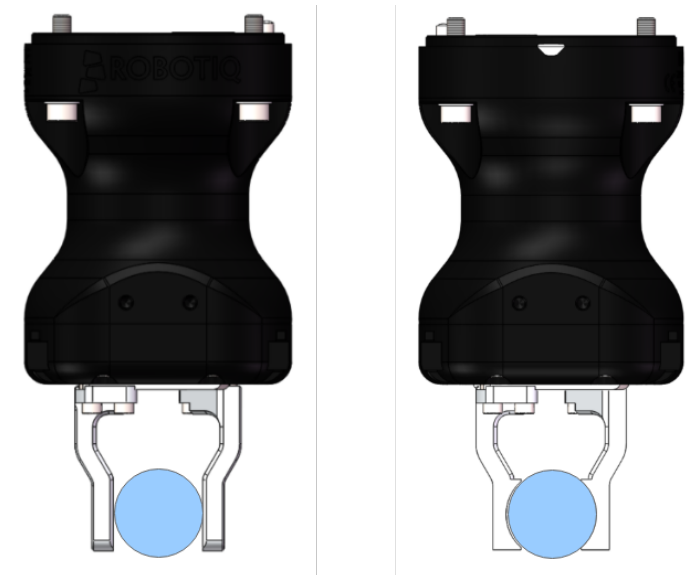
The data is calculated at the resulting position of the force applied, based on the strength of the M3 screws used. The maximum grasping force is included in the calculation; it represents the maximum force that can be added to the finger (payload force + external force).

Warning

- Fatigue stress has not been taken into consideration in the calculations.
- Robot acceleration and safety factor have not been taken into consideration in the calculations.

Caution

In order to address other custom specific cases with regards to your own application, the main item to address is the strength of the screws used for mounting the fingers.

Friction grasp and form-fit grasp**Maximum payload by grasp type**

Grasp Type	Maximum Payload
Friction grasp	3 kg
Form-fit grasp	5 kg



6.2.2. Center of mass and tool center point

Couplings are included when Grippers are not mounted on the Camera. Dual Gripper adapter plates are included where appropriate.

Products	Center of mass (mm)			TCP (mm)						Mass (g)
	X	Y	Z	Gripper 1			Gripper 2			
				X	Y	Z	X	Y	Z	
FT Sensor	-3.0	0.0	17.0	0.0	0.0	37.5	-	-	-	300.0
Camera	-3.0	4.5	9.0	0.0	0.0	23.5	-	-	-	245.0
2F-85	0.0	0.0	58.0	0.0	0.0	174.0	-	-	-	925.0
2F-140	0.0	0.0	73.0	0.0	0.0	244.0	-	-	-	1025.0
Hand-E	0.0	0.0	57.5	0.0	0.0	157.0	-	-	-	1090.0
Dual grippers plate	0.0	0.0	15.5	-	-	-	-	-	-	265.0
FT Sensor + 2F-85	-0.7	0.0	76.3	0.0	0.0	211.5	-	-	-	1225.0
FT Sensor + 2F-140	-0.7	0.0	89.3	0.0	0.0	281.5	-	-	-	1325.0
FT Sensor + Hand-E	-0.6	0.0	78.2	0.0	0.0	194.5	-	-	-	1390.0
Camera + 2F-85	-0.7	1.2	57.1	0.0	0.0	175.5	-	-	-	975.0
Camera + 2F-140	-0.7	1.1	72.4	0.0	0.0	246.5	-	-	-	1075.0
Camera + Hand-E	-0.6	1.0	57.4	0.0	0.0	159.5	-	-	-	1135.0
FT Sensor + Camera + 2F-85	-1.3	0.9	76.3	0.0	0.0	213.0	-	-	-	1275.0
FT Sensor + Camera + 2F-140	-1.2	0.8	89.6	0.0	0.0	284.0	-	-	-	1375.0
FT Sensor + Camera + Hand-E	-1.1	0.8	78.6	0.0	0.0	197.0	-	-	-	1435.0
Hand-E/Hand-E	0.0	0.0	62.0	154.0	0.0	138.0	-154.0	0.0	138.0	2445.0
Hand-E/2F-85	5.9	0.0	61.7	154.0	0.0	138.0	-166.0	0.0	150.0	2280.0
Hand-E/2F-140	-2.4	0.0	66.6	154.0	0.0	138.0	-215.5	0.0	199.5	2380.0
2F-85/2F-85	0.0	0.0	61.4	166.0	0.0	150.0	-166.0	0.0	150.0	2115.0
2F-85/2F-140	-8.7	0.0	66.6	166.0	0.0	150.0	-215.5	0.0	199.5	2215.0
2F-140/2F-140	0.0	0.0	71.4	215.5	0.0	199.5	-215.5	0.0	199.5	2315.0
Camera + Hand-E/Hand-E	-0.3	0.4	78.5	154.0	0.0	161.5	-154.0	0.0	161.5	2690.0
Camera + Hand-E/2F-85	5.0	0.4	77.8	154.0	0.0	161.5	-166.0	0.0	173.5	2525.0
Camera + Hand-E/2F-140	-2.5	0.4	82.5	154.0	0.0	161.5	-215.5	0.0	223.0	2625.0
Camera + 2F-85/2F-85	-0.3	0.5	77.0	166.0	0.0	173.5	-166.0	0.0	173.5	2360.0
Camera + 2F-85/2F-140	-8.1	0.4	82.1	166.0	0.0	173.5	-215.5	0.0	223.0	2460.0
Camera + 2F-140/2F-140	-0.3	0.4	86.7	215.5	0.0	223.0	-215.5	0.0	223.0	2560.0
FT Sensor + Hand-E/Hand-E	-0.3	0.0	90.5	154.0	0.0	175.5	-154.0	0.0	175.5	2745.0
FT Sensor + Hand-E/2F-85	4.9	0.0	89.7	154.0	0.0	175.5	-166.0	0.0	187.5	2580.0
FT Sensor + Hand-E/2F-140	-2.5	0.0	94.3	154.0	0.0	175.5	-215.5	0.0	237.0	2680.0
FT Sensor + 2F-85/2F-85	-0.4	0.0	88.8	166.0	0.0	187.5	-166.0	0.0	187.5	2415.0
FT Sensor + 2F-85/2F-140	-8.0	0.0	93.7	166.0	0.0	187.5	-215.5	0.0	237.0	2515.0
FT Sensor + 2F-140/2F-140	-0.3	0.0	98.4	215.5	0.0	237.0	-215.5	0.0	237.0	2615.0
FT Sensor + Camera + Hand-E/Hand-E	-0.5	0.4	106.1	154.0	0.0	199.0	-154.0	0.0	199.0	2990.0
FT Sensor + Camera + Hand-E/2F-85	4.2	0.4	104.9	154.0	0.0	199.0	-166.0	0.0	211.0	2825.0
FT Sensor + Camera + Hand-E/2F-140	-2.5	0.4	109.4	154.0	0.0	199.0	-215.5	0.0	260.5	2925.0
FT Sensor + Camera + 2F-85/2F-85	-0.6	0.4	103.5	166.0	0.0	211.0	-166.0	0.0	211.0	2660.0
FT Sensor + Camera + 2F-85/2F-140	-7.6	0.4	108.4	166.0	0.0	211.0	-215.5	0.0	260.5	2760.0
FT Sensor + Camera + 2F-140/2F-140	-0.6	0.4	112.9	215.5	0.0	260.5	-215.5	0.0	260.5	2860.0



Info

The angle to calculate the TCP for Grippers mounted on a dual gripper assembly is as follows:

- $R_x = 0$
- $R_{y+}/R_{y-} = 0.7854$
- $R_z = 0$

The coordinate system used to calculate the moment of inertia and center of mass of the Gripper is shown in the figure below.

$$I = \begin{bmatrix} I_{XX} & I_{XY} & I_{XZ} \\ I_{YX} & I_{YY} & I_{YZ} \\ I_{ZX} & I_{ZY} & I_{ZZ} \end{bmatrix} = \begin{bmatrix} 5341 & 0 & 0 \\ 0 & 5447 & 0 \\ 0 & 0 & 636 \end{bmatrix} = \begin{bmatrix} 18.3 & 0 & 0 \\ 0 & 18.6 & 0 \\ 0 & 0 & 2.2 \end{bmatrix}$$

$\text{kg} * \text{mm}^2$ $\text{lb} * \text{in}^2$

Fig. 6-18: Inertia matrix for Hand-E



6.2.3. Moment and force limits

The Hand-E Gripper has limits for moment and force values. The maximum moment and force values are independent of the grasp force applied by the Gripper on its payload. For payload calculation, please refer to the **Payload and force** section.

Warning

The following limits must be respected at all times.
Calculation of maximum moment and force should include robot acceleration and safety factors.

Parameter	Hand-E with Basic Aluminum Fingers
F_x, F_y, F_z	100 N
M_x^*	2.65 Nm
M_y^*	3.74 Nm
M_z^*	2.00 Nm

*Moments in x and y are calculated from the base of the fingers, as shown in the figure below.

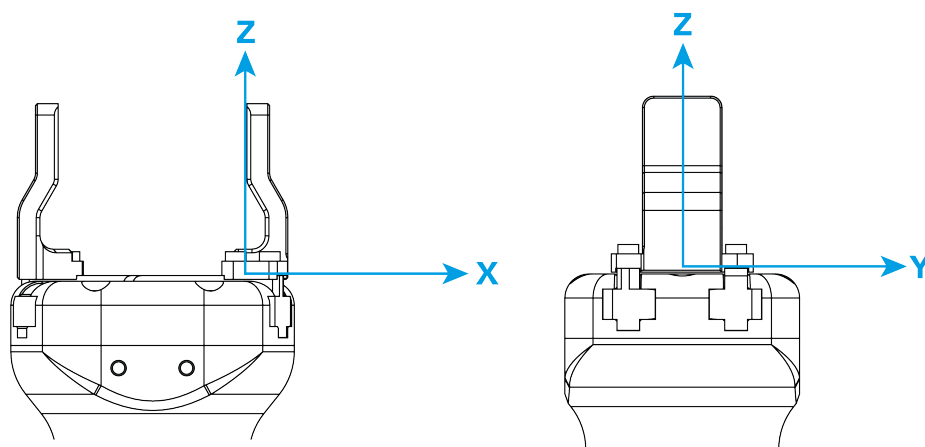


Fig. 6-19: Reference frame for maximum force and moment values applied to the fingers

Usage examples with listed limits:

- After picking its normal payload, the robot can use Hand-E to apply up to 100 N of force in any direction. Applying more than 100 N can damage the Gripper or result in payload loss.
- The Gripper can pick a screwdriver and apply 2 Nm of torque to screw (such a moment would be applied in the Z axis).



6.3. Electrical specifications

SPECIFICATION	VALUE
Operating supply voltage	24 V DC \pm 10%
Quiescent power (minimum power consumption)	1 W
Peak current	1.1 A



7. Maintenance

Hand-E requires only external maintenance with limited downtime.

Maintenance is required after specified usage, measured in cycles (open and close motion of the gripper).

Following the maintenance interval will ensure :

- Correct functioning of your Gripper.
- Validity of your warranty.
- Proper lifetime for your Gripper.

Warning

Unless otherwise indicated, any **repairs** done on the Gripper will be performed by Robotiq.

Info

A cycle is defined as a **go to requested position** command that results in grip force being applied (picking an object while opening or closing or closing the fingers on themselves).

Maintenance Intervals

Operation	Daily	Weekly	1 M cycles	2 M cycles
Gripper Cleaning	Dirty conditions	Normal conditions		
Periodic Inspection			X	
Rack and pinion mechanism cleaning				X

Maintenance operations are for the average normal usage of the Gripper, the maintenance intervals must be adjusted according to environmental conditions such as:

- Operating temperature
- Humidity
- Presence of chemical(s)
- Presence of physical parts (debris, scraps, dust, grease etc.)
- Interaction with operated parts (sharp or rough)
- Dynamics of the operation (accelerations)



7.1. Gripper cleaning

Maintenance Interval	Tools You Need	Parts You Need
Weekly or daily in dirty operating conditions	<ul style="list-style-type: none"> • 4 mm hex key • Dry tissue or towel • Medium strength thread locker 	None (unless damage is detected)

Info

Always turn off the robot and the Gripper power supply before performing any maintenance operations.

Caution

The maintenance operator must be grounded to prevent electrostatic discharge that could damage the Gripper electronics.

1. Remove the Gripper from its coupling using the 4 mm hex key to unscrew the four (4) M5-0.8 x 35mm socket head cap screws. Note that each screw uses a tooth lock washer, do not lose them.
2. Clean the Gripper with a dry towel, remove all debris, dirt and dust from the surface of the Gripper, clean all pads, dry thoroughly.
3. Clean the coupling with a dry towel, pay particular attention to the electrical contact.
4. Visually inspect the Gripper and pay attention to any visible damage.
5. Put the coupling back on and fix it with the four (4) M5-0.8 x 35mm socket head cap screws, use the tooth lock washers, apply medium strength thread locker to the M5 screws.



When cleaning the Gripper, verify that the fingers or fingertips are still intact. If there is wear visible, you can change the fingers or fingertips, using the ones provided by Robotiq or custom ones. See Spare parts and accessories section to order Hand-E replacement parts.

In order to replace a finger:

- Remove the worn finger by removing the M3 screws.
- Clean the rack and dry thoroughly.
- Insert the new finger on the rack.
- Fix the finger using the provided M3 screws, apply low strength thread locker to the M3 screw threads.
- Repeat for remaining finger.

In order to replace a fingertip:

- Remove the worn fingertip by removing the M3 screws.
- Clean the fingertip holder and dry thoroughly.
- Insert the new fingertip in the fingertip holder.
- Fix the fingertip using the provided M3 screws, apply low strength thread locker to the M3 screw threads.
- Repeat for remaining fingertip.



7.2. Periodic inspection

Maintenance Interval	Tools You Need	Parts You Need
Monthly	<ul style="list-style-type: none"> • 4 mm hex key • Dry tissue or towel • Medium strength thread locker 	None (unless damage is detected)

Info

Always turn off robot and Gripper power supply before performing maintenance operations on the Gripper.

1. Remove and clean the Gripper following instructions in the **Gripper cleaning** section
2. Inspect the Gripper
 - Finger movement must be symmetric and fluid; test opening and closing of the Gripper:
 - Finger or fingertip wear must not affect gripping, if wear is visible and affects movement, change accordingly (refer to the **Gripper cleaning** section)
 - Check for any collision damage, if damage is visible, contact support@robotiq.com
 - Check for any sign of wear on the Gripper chassis; if wear is present and may affect the Gripper, contact support@robotiq.com
3. Put back in place according to the instructions from the **Gripper cleaning** section



7.3. Rack & pinion mechanism cleaning

Maintenance Interval	Tools You Need	Parts You Need
Every 2M cycles or more frequently in dirty operating conditions	<ul style="list-style-type: none">• 4 mm hex key• Dry tissue or towel• Medium strength thread locker	<ul style="list-style-type: none">• Grease (Mobilith SHC1500 or equivalent)• Degreaser

Info

Always turn off robot and Gripper power supply before doing maintenance operations on the Gripper.

- Open the Gripper to an intermediate position, so you do not hide the 6 M5 screws holding the rack housing in place.
- Remove the Gripper from its coupling using the 4 mm hex key to unscrew the four (4) M5-0.8 x 25mm screws. Note that each screw uses a toothed lock washer, do not lose them.
- Remove the 6 M5 screws holding the rack housing.
- Gently pull the rack housing away from the body of the Gripper.
- Remove the pinion and key from the drive shaft, make sure you keep them in a safe space.
- The finger's racks will slide off freely from the rack housing. Clean the rack housing, the racks and the pinion using a degreaser. Dry thoroughly. Clean the fingers (finger holders and fingertips if that is the case) with a dry towel. Remove all debris, dirt and dust.
- Also clean the Gripper itself with a dry towel. Dry thoroughly.
- Clean the coupling with a dry towel, pay particular attention to the electrical contact.
- You can clean the Gripper according to the procedure described in the **Gripper cleaning** section.
- Visually inspect the Gripper and pay attention to any visible damage.
- Apply grease on the racks. Put it on **all surfaces except the face with the tapped holes**.

Info

Use Mobilith SHC1500 grease or an equivalent.

- Insert the pinion with the key in the keyhole on the shaft.
- Slide the racks back in the rack housing.
- Reinsert the rack housing with racks on the Gripper. Make sure the racks go in symmetrically compared to the center of the gripper.
- Fix the 6 M5 screws to secure the rack housing.
- Put the gripper back on the coupling and fix it with the four (4) M5-0.8 x 25mm screws, use the tooth lock washers, apply medium strength thread locker to the M5 screws.



8. Spare Parts, Kits and Accessories

The following list is up-to-date at print time and is subject to change, check online for updates.

Info

Unless specified, screws, dowel pins and other hardware are included only for the Gripper side, never for the robot side.

Item	Description	Ordering Number
Hand-E Basic Gripper Unit	Hand-E basic gripper unit, includes aluminum fingers (HND-FIN-ALU-KIT)	HND-GRP-001
Kit for TM robot	<ul style="list-style-type: none"> • Gripper basic unit (HND-GRP-001) • Fingertip starting kit (HND-TIP-START-KIT) • End-effector coupling kit (GRP-CPL-062) • 10-meter Robotiq device cable • RS485 to RS232 converter • RS485 to USB converter • Screw kit • USB storage device 	HND-TM-KIT
Controller	Optional controller for industrial communications see Robotiq Universal Controller Items	UNI-CTR-XXXX
Aluminum Finger Kit	Aluminum finger kit, includes: <ul style="list-style-type: none"> • 2 x basic aluminum finger • 1 x screw kit 	HND-FIN-ALU-KIT
Fingertip Starting Kit	Fingertip Starting Kit includes: <ul style="list-style-type: none"> • 1 x Fingertip Holder Kit • 1 x V-Groove Fingertip Kit • 1 x Flat Rubber Fingertip Kit • 1 x hex head key 	HND-TIP-START-KIT
Flat Silicone Fingertip Kit	Flat Silicone Fingertip Kit* includes: <ul style="list-style-type: none"> • 2 x flat rubber fingertip • 1 x screw kit *Silicone fingertips must be mounted on fingertip holders (HND-TIP-HLD-KIT)	HND-TIP-SLC-KIT
V-Groove Fingertip Kit	V-Groove Fingertip Kit* includes: <ul style="list-style-type: none"> • 2 x V-groove aluminum fingertip 	HND-TIP-VGR-KIT



Item	Description	Ordering Number
	<ul style="list-style-type: none"> 1 x screw kit *V-Groove fingertips must be mounted on fingertip holders (HND-TIP-HLD-KIT)	
Fingertip Holder Kit	Hand-E Fingertip Holder Kit includes: <ul style="list-style-type: none"> 2 x fingertip holder 1 x screw kit 	HND-TIP-HLD-KIT
10m Device Cable	10 m Robotiq device cable for power and communication. Straight M12 5-pins female on one side, single ended on the other, shielded	CBL-COM-2065-10-HF
USB to RS485 adapter	USB to RS485 adapter, can be used with device cable for USB connection	ACC-ADT-USB-RS485
Hand-E Screw Kit	The screw kit contains: <ul style="list-style-type: none"> 4 x M5 screws 4 x Lock washer 	HND-SCREW-KIT
16G USB Stick	USB stick to install the UR software package	ACC-USB-16G
End-Effector Coupling Kit	ISO 9409-1-50-4-M6 coupling for Adaptive Robot Grippers, with screws and tools for Gripper fixation and 1 m pigtail cable	GRP-CPL-062
Adapter plate to 63-4M6-61_4-2D6	Wrist adapter plate for use with AGC-CPL-064-002. Interface to 63 mm PCD ¹ with (4) M6 screws and 61.4 mm PCD 1 with (2) M6 indexing pins	AGC-APL-152-002
Adapter plate to 80-6M8-2D82D8	Wrist adapter plate for use with AGC-CPL-064-002. Interface to 80 mm PCD ¹ with (6) M8 screws and (2) M8 indexing pins	AGC-APL-153-002

¹Pitch Circle Diameter

To install Hand-E on a robot that has a different bolt pattern than part GRP-CPL-062 (ISO 9409-1-50-4-M6), you can use one of the following. The couplings listed below fit with both Hand-E and the 2-Finger Gripper.

Item	Description	Ordering Number
Blank coupling	Blank coupling for Adaptive Robot Grippers, with screws for Gripper fixation and 1 m pigtail cable	AGC-CPL-BLANK-002
ISO 9409-1-50-4-M6 (cable-to-controller)	ISO 9409-1-50-4-M6 coupling for Robot Grippers with screws for Gripper fixation and 1 m pigtail cable	GRP-CPL-062
ISO 9409-1-50-4-M6 (cable-to-wrist)	ISO 9409-1-50-4-M6 coupling for Robot Grippers with screws for Gripper fixation	GRP-ES-CPL-062
ISO 9409-1-31.5-4-M5 coupling	ISO 9409-1-31.5-4-M5 coupling for Adaptive Robot Grippers, with screws for Gripper fixation and 1 m pigtail cable	AGC-CPL-063-002
ISO 9409-1-40-4-M6 coupling	ISO 9409-1-40-4-M6 coupling for Adaptive Robot Grippers, with screws for Gripper fixation and 1 m pigtail cable	AGC-CPL-064-002
56-8M4-1D4 coupling	Coupling for 56 mm PCD ¹ with (8) M4 and (1) 4mm indexing pin, with	AGC-CPL-065-002



Item	Description	Ordering Number
	screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	
56-6M4-1D6 coupling	Coupling for 56 mm PCD ¹ with (6) M4 and (1) 6mm indexing pin, with screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	AGC-CPL-066-002
60-4Ø5-1D5 coupling	Coupling for 60 mmPCD ¹ with (4) M5 thread and (1) 5mm indexing pin, with screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	AGC-CPL-067-002
63-6M6-2D6 coupling	Coupling for 63 mm PCD ¹ with (6) M6 and (2) 6mm indexing pins, with screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	AGC-CPL-068-002
40-4M5-1D3 coupling	Coupling for 40 mm PCD ¹ with (4) M5 and (1) 3mm indexing pins, with screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	AGC-CPL-070-002
31.5-4M4 coupling	Coupling for 31.5 mm PCD ¹ with (4) M4, with screws for Adaptive Robot Grippers fixation and 1 m pigtail cable	AGC-CPL-071-002
Adapter plate to 63-4M6-71-2D3	Wrist adapter plate for use with AGC-CPL-064-002. Interface to 63 mm PCD ¹ with (4) M6 screws and 71 mm PCD ¹ with (2) M3 indexing pins	AGC-APL-151-002
Adapter plate to 63-4M6-61_4-2D6	Wrist adapter plate for use with AGC-CPL-064-002. Interface to 63 mm PCD ¹ with (4) M6 screws and 61.4 mm PCD ¹ with (2) M6 indexing pins	AGC-APL-152-002
Adapter plate to 80-6M8-2D82D8	Wrist adapter plate for use with AGC-CPL-064-002. Interface to 80 mm PCD ¹ with (6) M8 screws and (2) M8 indexing pins	AGC-APL-153-002

¹Pitch Circle Diameter



9. Troubleshooting

Section to be populated soon.



10. Warranty and Patent

Robotiq warrants Hand-E against defects in material and workmanship for a period of one year from the date of reception when utilized as intended. Robotiq also warrants that this equipment will meet applicable specifications under normal use.

The warranty applies under the following conditions:

- Usage respects the operating and storage conditions specified in the **Environmental and Operating Conditions** section
- Proper installation of the Gripper specified in the **Installation** section and following subsections.
- Until a 2 000 000 cycle count¹ has been reached.
- Usage respects maintenance specified in the **Maintenance** section.
- Usage respects recommended payload and forces specified in the **Mechanical specifications** section.

¹Cycle count: One (1) cycle is defined as an object picking attempt, successful or not (open or closing onto an object, or closing on itself). It is calculated in the internal memory of the Hand-E Gripper.

During the warranty period, Robotiq will repair or replace any defective Hand-E, as well as verify and adjust the Gripper free of charge if the equipment should need to be repaired or if the original adjustment is erroneous. If the equipment is sent back for verification during the warranty period and found to meet all published specifications, Robotiq will charge standard verification fees.

The unit is considered defective when at least one of the following conditions occurs:

- The Gripper fingers cannot close or open;
- The Gripper feedback necessary for the robot program is not accessible.

Parts that come into contact with the work piece and wearing parts such as the finger and fingertips are not covered by the warranty.

Caution

The warranty will become null and void if:

- The unit has been tampered with, repaired or worked on by unauthorized individuals.
- The warranty sticker has been removed.
- The screws, other than as explained in this guide, have been removed.
- The unit has been opened other than as explained in this guide.
- Unit serial number has been altered, erased, or removed.
- Unit has been misused, neglected, or damaged by accident.

This warranty is in lieu of all other warranties expressed, implied, or statutory, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. In no event shall Robotiq be liable for special, incidental, or consequential damages.

Robotiq shall not be liable for damages resulting from the use of the Hand-E, nor shall Robotiq be responsible for any failure in the performance of other items to which Hand-E is connected or the operation of any system of which the Gripper may be a part.



11. Contact

www.robotiq.com

Contact Us

Phone

1-888-ROBOTIQ (762-6847)
(+1) 418-380-2788 Outside US and Canada

Fax

1-418-800-0046

Technical support

option 3

Sales

option 2

Head office

Robotiq
966, chemin Olivier
Suite 500
Lévis, Québec
G7A 2N1
Canada



Where automation Pros come to share their know-how and get answers.

dof.robotiq.com



12. Harmonized Standards, Declarations and Certificates

12.1. Translation of original EC declaration of incorporation



Translation of Original Declaration of Incorporation

In terms of the Directive 2006/42/EC, Annex II, part B of the European Parliament and of the Council on machinery, we, the manufacturer,

Robotiq Inc.
966, Chemin Olivier, suite 500
Lévis, Québec, Canada, G7A 2N1

hereby declares that the following product:

Robotiq Hand-E Gripper

meets the applicable requirements of the **Machinery Directive 2006/42/EC** of the European Parliament and of the Council. The incomplete machine may not be operated until the machine in which it is integrated has been declared compliant with the relevant provisions of the 2006/42/CE Machinery Directive.

The manufacturer agrees to forward upon request of national competent authorities the relevant technical documents specified by Annex VII, part B, within the required time.

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

2011/65/EU Restriction of the use of certain hazardous substances (RoHS)

Person responsible for documentation: Annick Mottard, Jr. Eng., address: see manufacturer address

Lévis, May 2018

Jean-Philippe Jobin
Vice President Research and Development
Robotiq Inc.

The following standards have been applied:

NF EN ISO 12100	2010	Safety of machinery — General principles for design — Risk assessment and risk reduction
CEI 60204-1 Ed6.0	2016	Safety of machinery — Electrical equipment of machines — Part 1: General requirements
NF EN ISO 14539	2000	Manipulating industrial robots — Object handling with grasp-type grippers — Vocabulary and presentation of characteristics
NF EN ISO 9409-1 2004	2004	Manipulating industrial robots — Mechanical interfaces — Part 1: Plates



12.2. Applied standards

This section describes all applied harmonized standards for the design and production of the Robotiq Hand-E Gripper. Standards that were applicable, some points may not be applied if not applicable to this specific product. Conformity is not enforced by any laws, it is self-applied and the aim is to define normal safety and performance requirements for similar products.

Caution

Conformity of the product is only met if all instructions of this manual are followed. Among others: installation, safety measures and normal usage must be met.

The following standards have been applied:

NF EN ISO 12100	2010	Safety of machinery — General principles for design — Risk assessment and risk reduction
CEI 60204-1 Ed6.0	2016	Safety of machinery — Electrical equipment of machines — Part 1: General requirements
NF EN ISO 14539	2000	Manipulating industrial robots — Object handling with grasp-type grippers — Vocabulary and presentation of characteristics
NF EN ISO 9409-1 2004	2004	Manipulating industrial robots — Mechanical interfaces — Part 1: Plates



12.3. Ingress Protection Certificate



October 12th 2018

Purpose: Ingress Protection (IP67) – Hand-E Test Certificate

To whom it may concern,

This certificate is to attest that Ingress Protection (IP) tests were carried out by NTS Canada in the months of June and July 2018 on Hand-E units manufactured by Robotiq. No ingress of dust or water was observed inside the units after the tests. No insertion of the rod or induced damage was observed. No functional anomaly was noticed or reported by the Robotiq engineering representative on-site during the tests. This test certificate does not supersede the test report FTR0201898 Rev 00 issued by NTS Canada.

The acceptance status for the units tested is "PASS" for the following tests;

- Ingress protection against access to hazardous parts – Rod (code IP6X)
- Ingress protection against solid foreign objects - Dust (code IP6X)
- Ingress protection against immersion in water (code IPX7)

Sincerely yours,

Jean-Pierre
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