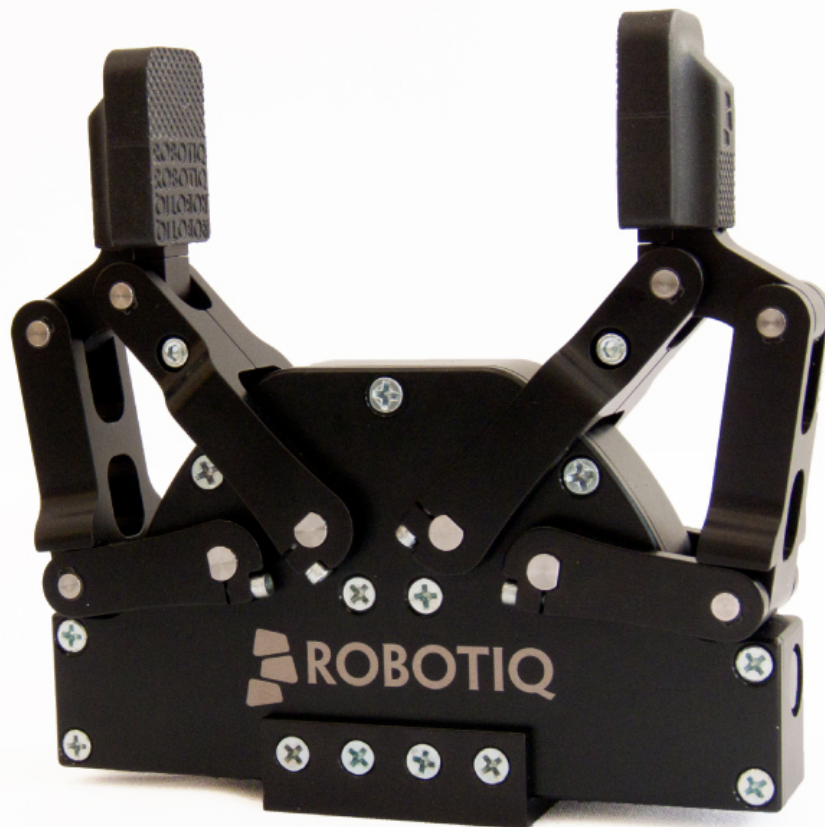

Robotiq 2-Finger Adaptive Robot Gripper - 85 Instruction Manual



© ROBOTIQ INC. 2014

Get the latest version of the manual at support.robotiq.com

Table of Contents

Revisions	3
1. General Presentation	3
2. Safety	8
2.1 Warning	8
2.2 Intended use	8
3. Installation	9
3.1 Scope of delivery	10
3.2 Environmental and operating conditions	11
3.3 Mechanical connections	12
3.4 Power supply specifications	13
3.5 Wiring	13
3.5.1 Power connection	15
3.5.2 Communication connection	15
4. Control	15
4.1 Overview	16
4.2 Status LED	19
4.3 Gripper register mapping	20
4.4 Robot output registers & functionalities	21
4.5 Robot input registers & status	26
4.6 Control logic - example	29
4.7 MODBUS RTU communication protocol	30
4.7.1 Connection setup	30
4.7.2 Read holding registers (FC03)	31
4.7.3 Preset single register (FC06)	32
4.7.4 Preset multiple registers (FC16)	33
4.7.5 Master read & write multiple registers (FC23)	34
4.7.6 Modbus RTU example	36
4.8 MODBUS TCP communication protocol	45
4.8.1 Connection setup	45
4.8.2 Read input registers (FC04)	46
4.8.3 Preset multiple registers (FC16)	46
4.8.4 Modbus TCP example	48
4.8.5 Application with Universal Robots	59
5. User Interface	59
6. Specifications	60
6.1 Technical dimensions	61
6.2 Mechanical specifications	62
6.3 Moment of inertia and center of mass	64
6.4 Electric ratings	65
6.5 Couplings	66
6.5.1 Blank coupling	66
6.5.2 ISO 9409-1-31.5-4-M5 Coupling	67
6.5.3 ISO 9409-1-40-4-M6 Coupling	68
6.5.4 ISO 9409-1-50-4-M6 Coupling	69
6.5.5 Baxter Coupling	70
6.6 Finger pad installation and customization	71
7. Maintenance	73
7.1 Gripper cleaning	74
7.2 Periodic inspection	75
7.3 Finger pad replacement	76
7.4 Overhaul	77
8. Spare Parts, Kits and Accessories	78
9. Troubleshooting	80
10. Warranty	82
11. Contact	83
EC Declaration of conformity	84

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: <http://support.robotiq.com/>.

Revision 2014/07/22

Modification for use on Robotiq Universal Controller

Minor modifications : User Interface section, maintenance section

Revision 2013/02/06

Section added : Couplings ISO models and Baxter robots

Minor modifications

Revision 2013/02/06

Section added : Communication with UR robots

Minor modifications

Revision 2012/10/18

Official release

Revision 2012/03/02

Beta release

Copyright

© 2008-2014 Robotiq Inc. All rights reserved.

This manual, and the product it describes, are protected by the Copyright Act of Canada, by laws of other countries, and by international treaties, and therefore may not be reproduced in whole or in part, whether for sale or not, without prior written consent from Robotiq. Under copyright law, copying includes translation into another language or format.

Information provided by Robotiq in this document is believed to be accurate and reliable. However, no responsibility is assumed by Robotiq for its use. There may be some differences between the manual and the product if the product has been modified after the edition date.

The information contained in this document is subject to change without notice.

1. General Presentation

The terms "Gripper", "Adaptive Gripper", "Robotiq Gripper", "Robotiq Adaptive Gripper", "C-Model" and "2-Finger - 85" used in the following manual all refer to the **Robotiq 2-Finger Adaptive Robot Gripper - 85**. The Robotiq Adaptive Gripper 2-Finger - 85mm is a robotic peripheral that is 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 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 appropriate sections of the manual. Safety guidelines must be read and understood before any operation is attempted with the Gripper.

The 2-Finger - 85 Gripper has two articulated fingers, i.e. finger A in front of finger B, that each have two joints (two phalanges per finger), as shown in Figure 1.1. The Gripper can engage up to five points of contact with objects (two on each of the phalanges plus the palm). The fingers are under-actuated, meaning they have fewer motors than the total number of joints. This configuration allows the fingers to automatically adapt to the shape of the object they grip and it also simplifies the control of the Gripper.

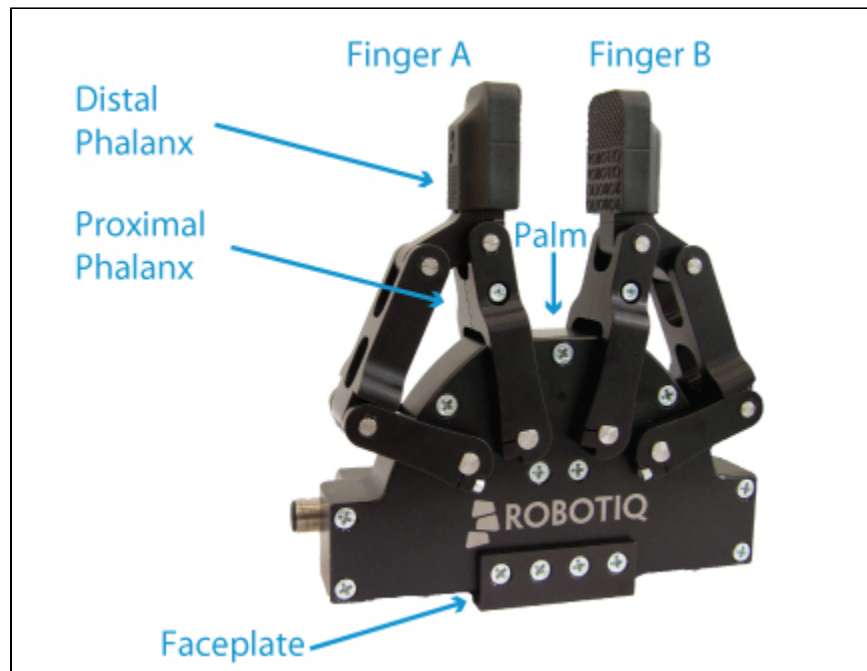


Figure 1.1 : The 2-Finger Adaptive Robot Gripper - 85.

The 2-Finger - 85 Gripper has a single actuator for opening and closing the fingers, the fingers automatically adapt to the shape of the object manipulated. Fingers will adopt either a parallel grip or encompassing grip as shown in figure 1.2.

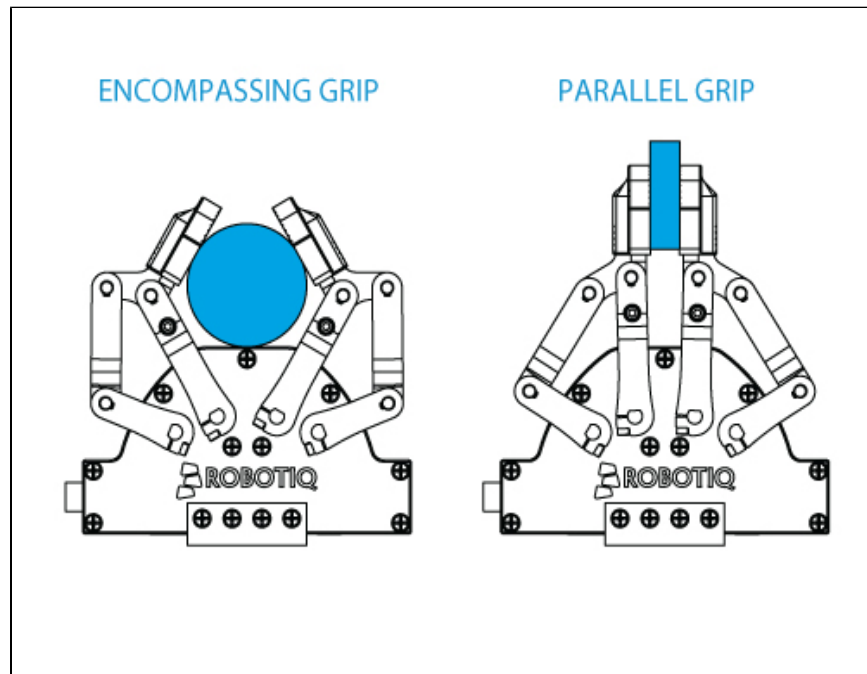


Figure 1.2 : The 2-Finger Adaptive Robot Gripper - 85.

It is important to note that a fingertip grip can only be performed when the fingers touch the object with the distal phalanges first. Inversely, for an encompassing grip, the fingers must touch the object with the proximal or the lower section of the distal phalanges first. Also, to ensure stability, the object should be held against the Gripper palm before performing an encompassing grip.

i Info

Closing or opening is done via the "Go to requested position" command and is input to the Gripper. **Whether the fingers close to produce an encompassing or fingertip grip is decided at the Gripper level automatically.** It will depend on:

- The part's geometry;
- The relative position of the part with respect to the Gripper.

In other words, picking the same part could result in either an encompassing or fingertip grip based on a part's position and geometry.

The 2-Finger Adaptive Robot Gripper - 85 also offers external gripping. The fingers can pick hollow parts by applying pressure with the outside of the fingers. See Figure 1.3 for a representation and see [section 4.6](#) for details on the possible position commands of your Gripper.

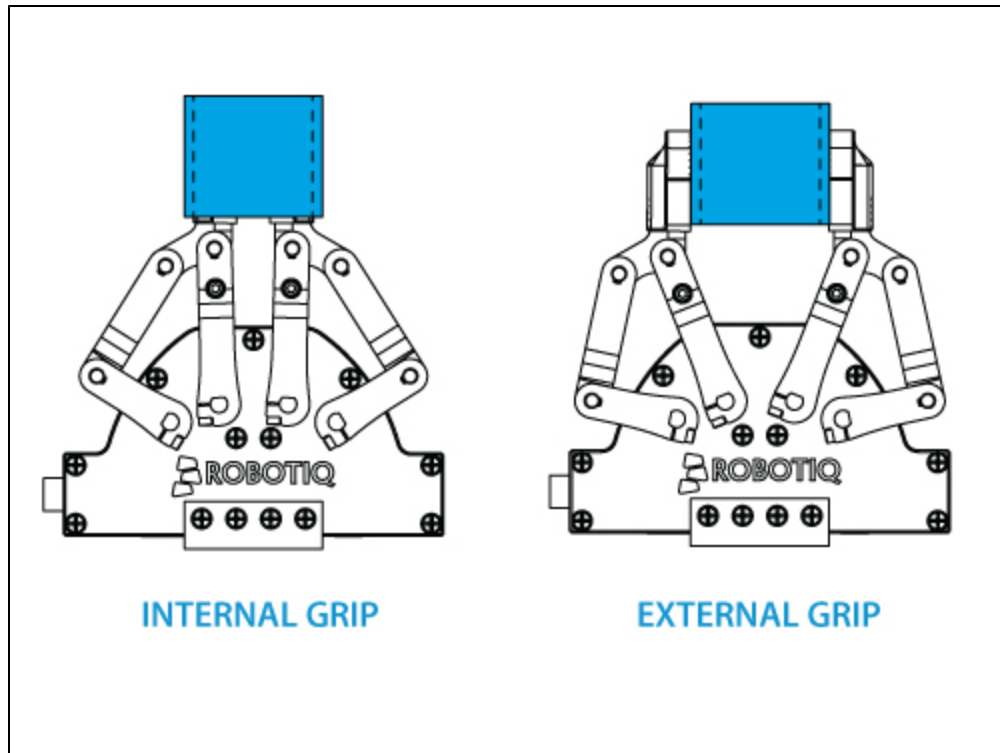


Figure 1.3 : The 2-Finger Adaptive Robot Gripper - 85 internal and external gripping.

The Gripper is powered and controlled via the Robotiq Universal Controller. (Figure 1.4) Upon delivery your controller will be set with the adequate communication option and ready to use. The details on the controller wiring and usage are described in the [Robotiq Universal Controller Instruction Manual](#).



Figure 1.4 : The Robotiq Universal Controller.

The Gripper equilibrium line is the gripping region that separates the encompassing grip from the parallel grip. When

gripping an object close enough to the inside (palm) of the Gripper, the encompassing grip will occur (unless the object size or shape is not adequate) and the fingers will close around the object. If gripped above the equilibrium line, the same object will be picked up in a parallel grip and the fingers will close with a parallel motion.

Info

The same pattern applies for an inside grip.

The following Figure 1.5 shows the **encompassing grip region**, the **equilibrium line**, and the **parallel grip region** on the 2-Finger Adaptive Robot Gripper - 85 finger pad.

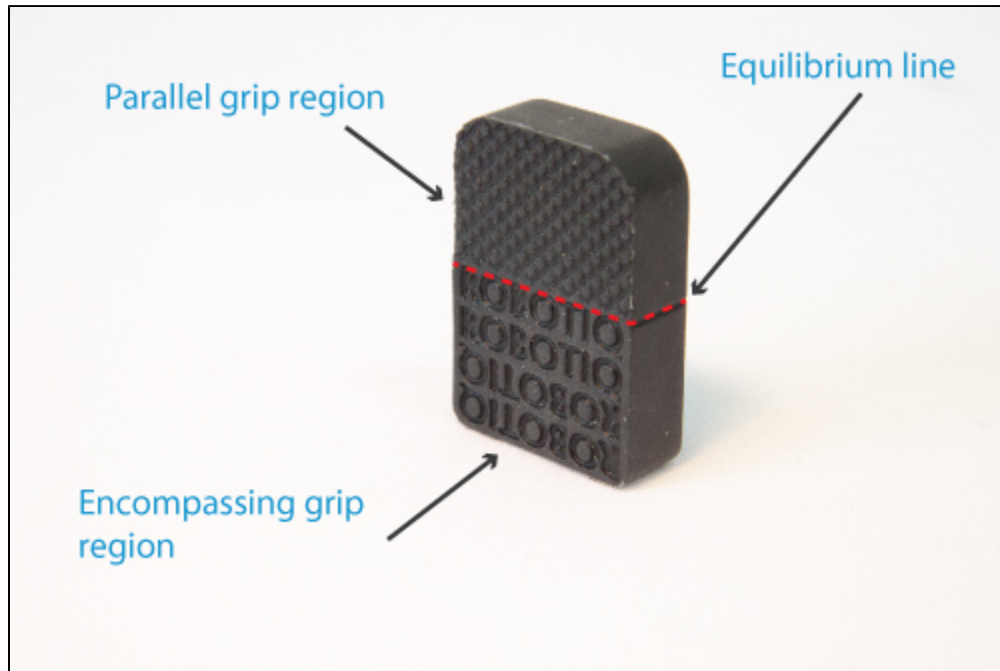



Figure 1.5 : Equilibrium line for the 2-Finger Adaptive Robot Gripper - 85 finger pad.

2. Safety

Warning

The operator must have read and understood all of the instructions in the following manual before handling the Robotiq 2-Finger Adaptive Robot Gripper – 85.

 The term "operator" refers to anyone responsible for any of the following operations on the 2-Finger Adaptive Robot Gripper – 85 :

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

This documentation explains the various components of the 2-Finger – 85 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 and differences may exist between them and the delivered product.

2.1 Warning

Note

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 respect the recommended keying for electrical connections.
- Be sure no one is in the robot and/or Gripper path before initializing the robot's routine.
- Always respect the Gripper payload.
- Set the Gripper 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.

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

2.2 Intended use

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

 **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.

 **Note**

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

The unit may be used only 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

Warning

Be sure to read and understand the [safety instructions](#) related to the 2-Finger Adaptive Robot Gripper - 85 prior to installation.

Warning

Do not operate the Gripper, or even turn on the power supply, before it is firmly anchored and the danger zone is cleared. The Gripper's fingers may move and cause injury or damage.

Note

The 2-Finger Adaptive Robot Gripper - 85 is meant to be used with the Robotiq Universal Controller, see the [Controller Manual](#) for details on its installation procedure.

3.1 Scope of delivery

Standard upon delivery :

- Robotiq 2-Finger Adaptive Robot Gripper – 85 unit (**AGC-GRP-001**)
 - Default fingertip (see [Technical dimensions](#))

Mandatory but not standardized :

- Robotiq Universal Controller unit (**UNI-CTR-001-XXXX**) with the choice of one communication protocol :
 - **ENIP** - Ethernet / IP communication protocol.
 - **MTCP** - Modbus TCP communication protocol.
 - **ECAT** - EtherCAT communication protocol.
 - **PNET** - ProfiNET communication protocol.
 - **DNET** - DeviceNet communication protocol.
 - **CANO** - CANopen communication protocol.
 - **PROFIBUS** - ProfiBUS communication protocol.
- Gripper cable **CBL-COM-2053** (between the 2-Finger Adaptive Gripper – 85 and its controller unit).
- USB cable **CBL-USB-2057** (for reconfiguration of the 2-Finger Adaptive Gripper – 85 controller).

Note

The following are not included in delivery :

- Options such as couplings and adapters for mounting on various industrial robots.
- Hardware required for any options; accessories or fixtures for the 2-Finger Adaptive Robot Gripper – 85 unless specified.
- Power supply units, power supply wiring or fuses.

See [Spare Parts, Kits and Accessories](#) section for a list of available parts.

3.2 Environmental and operating conditions

The Gripper is designed for industrial applications. Always respect the following specified storage and operating environmental conditions:

Minimum storage/transit temperature	-22°F [-30°C]
Maximum storage/transit temperature	140°F [60°C]
Minimum operating temperature	14°F [-10°C]
Maximum operating temperature	122°F [50°C]
Humidity (non-condensing)	20-80% RH
Vibration	< 0.5G
Others	<ul style="list-style-type: none"> • Free from dust, soot or water • Free from corrosive liquids or gases • Free from explosive liquids or gases • Free from powerful electromagnetic interference

3.3 Mechanical connections

You must use a coupling to attach the Gripper to the robot. Be sure to use the coupling related to your robot model. If there is no coupling for your robot, you can modify a blank coupling or Robotiq can create a custom version for you. Some couplings may require an additional adapter-plate. To create your own coupling or adapter plate you can refer to the [Coupling Specification Section](#). To see available couplings and adapter plates and for details on different couplings and adapters see the [Spare Parts, Kits and Accessories section](#).

Here are the steps to follow for the installation of the Gripper (see Figure 3.3.1). Note that all screws must be locked in place using medium strength thread locker (Loctite 248),

1. Screw the adapter plate to your robot arm (if your cables are running through the robot, be sure to use a plate with a groove). adapter plates are optional, screws for the robot side are not provided.
2. Attach the coupling to the adapter plate or directly onto the robot arm by aligning the indexing dowel pin with the associated hole. The indexing pin may or may not be present on the coupling, the adapter plate or the robot arm.
3. Screw the coupling to your robot arm or to the adapter plate if present.
4. Align the 2-Finger-85 Gripper to the coupling and secure the Gripper with radial screws.

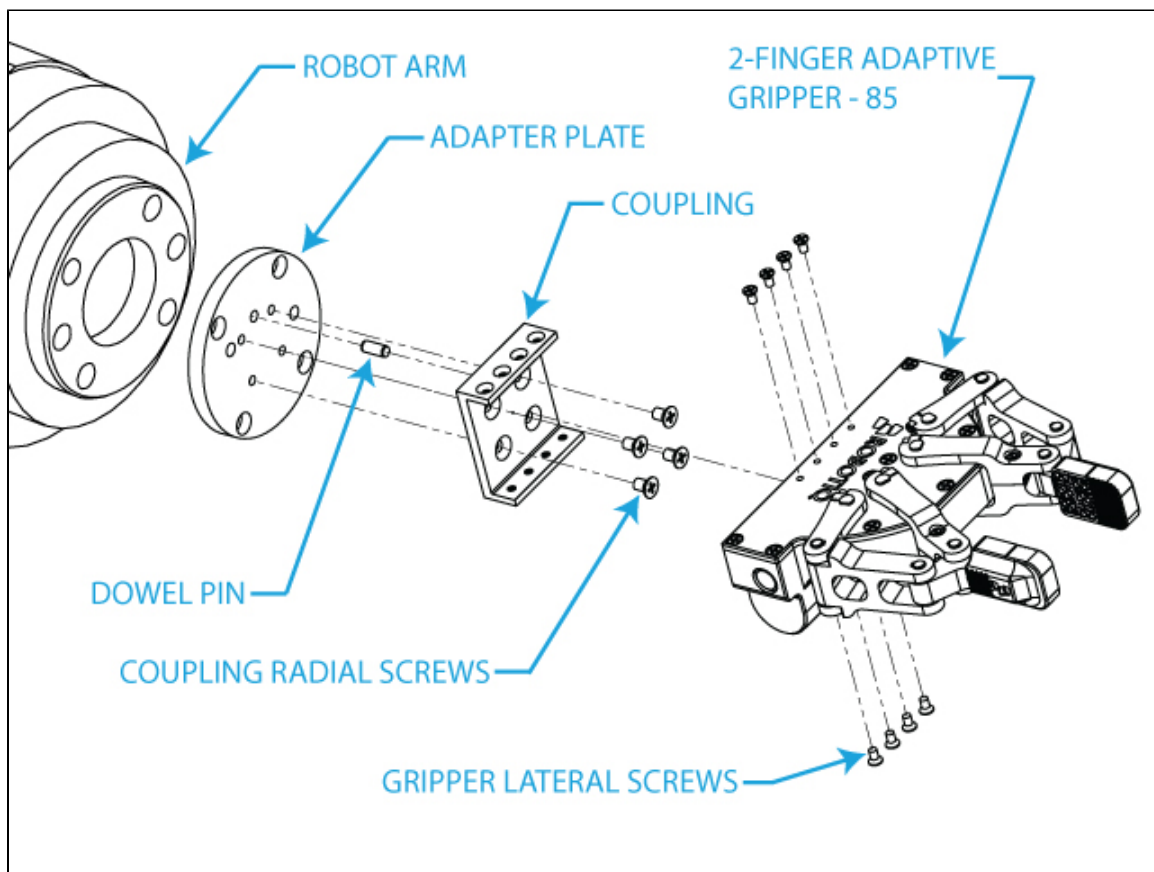


Figure 3.3.1 : Attaching the 2-Finger Adaptive Robot Gripper - 85 to a robot arm with an adapter plate and coupling.

3.4 Power supply specifications

See the appropriate section of the [Robotiq Universal Controller Instruction Manual](#).

3.5 Wiring

Power and communication are established between the 2-Finger Adaptive Robot Gripper - 85 and the Robotiq Universal Controller via a single Device Cable (shown in Figure 3.5.1).

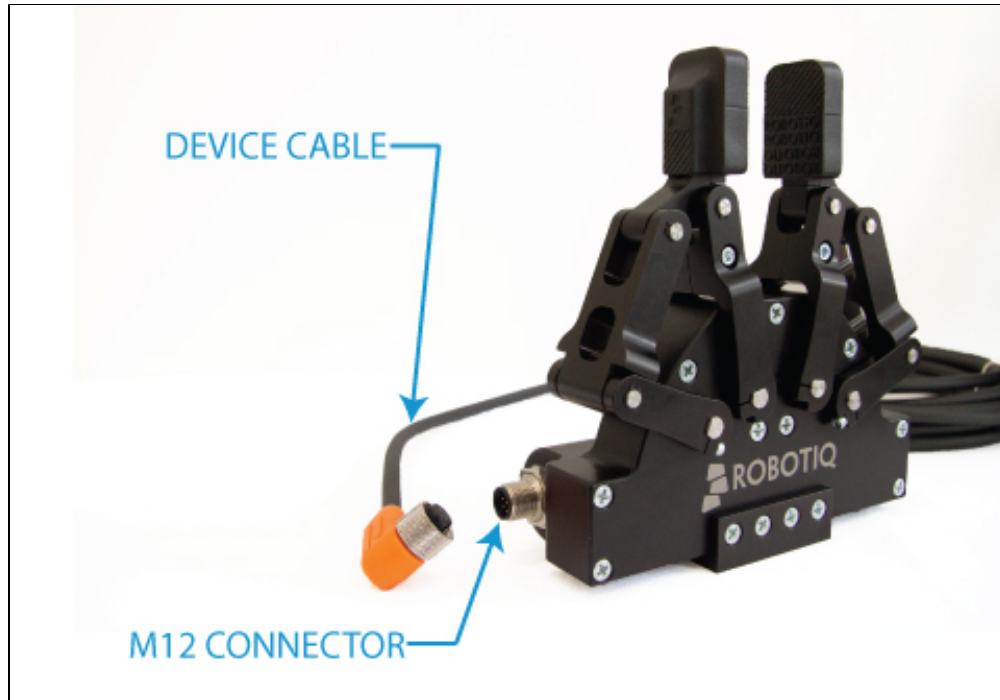


Figure 3.5.1 – Device Cable for the Robotiq 2-Finger Adaptive Robot Gripper - 85.

Warning

Use proper cabling management. Be sure to have enough forgiveness in the cabling to allow movement of the Gripper along all axes without pulling out the connectors. Always protect the controller-side connector of the cable with a strain relief cable clamp.

Figure 3.5.2 represent the 2-Finger-85 Device Cable connectors and the associated pinout. The M12 8-pin connector connects onto the Gripper while the 10 pin Combicon connector connects onto the Universal Controller.

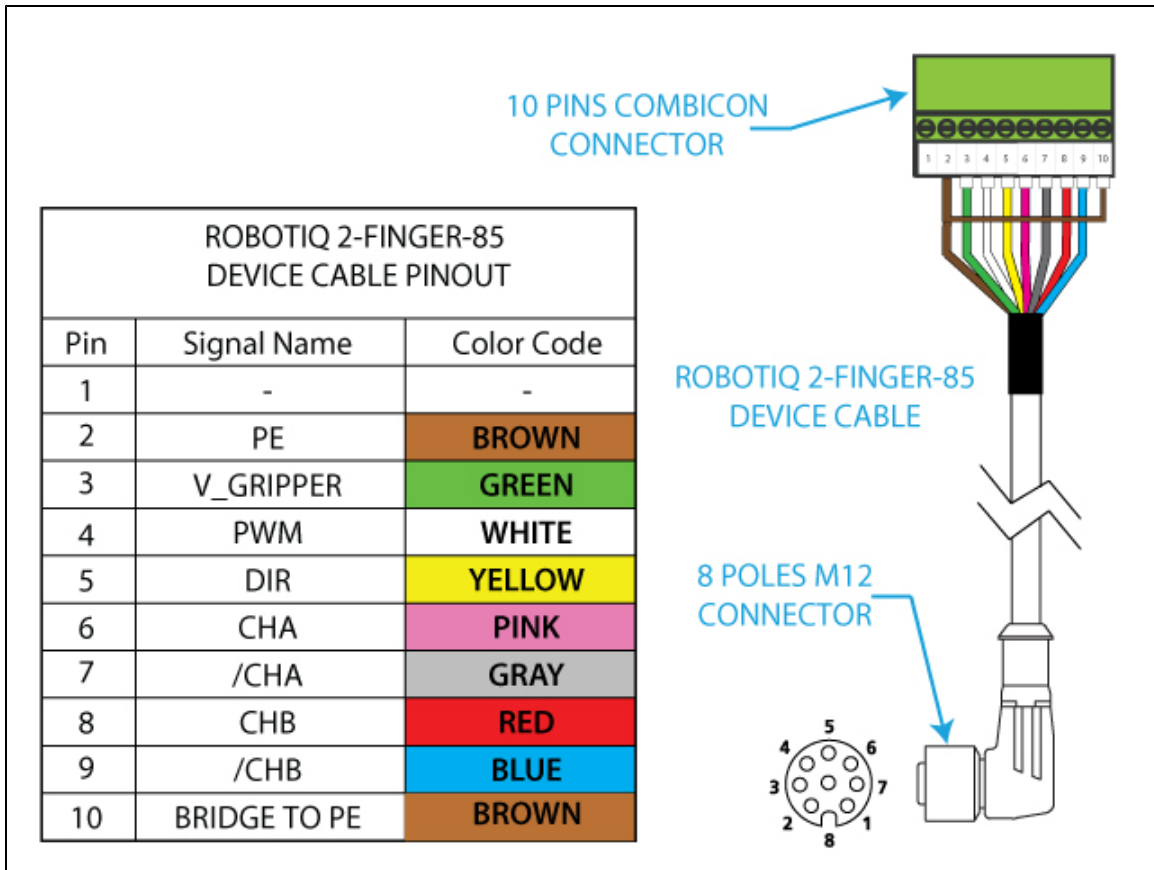


Figure 3.5.2 – Pinout of the Device Cable.

3.5.1 Power connection

Consult the Robotiq Universal Controller Instruction Manual for details on :

- [Power supply specifications](#)
- [Wiring](#)
- [Power connections and fusing](#)

Caution

Respect the Robotiq Universal Controller power supply recommendations for wiring and fusing at all times.

Warning

The 2-Finger Adaptive Robot Gripper -85 is not designed to be hot wired, never plug the Gripper into live power.
Motion may occur if the Gripper is hot wired.

3.5.2 Communication connection

Consult the Robotiq Universal Controller Instruction Manual for details on the various [Communication protocol setups](#) and configurations available :

- [Real-time Ethernet communication protocols](#)
 - Modbus TCP
 - EtherNet / IP
 - EtherCAT
 - ProfiNET
- [DeviceNet communication protocol](#)
- [CANopen communication protocol](#)
- [ProfiBUS communication protocol](#)

4. Control

Info

Unless specified, all values in Section 4 are hexadecimal values.

Info

Register format is Little Endian (Intel format), namely from LSB (Less Significant Bit) to MSB (Most Significant Bit). Meaning that bytes are written with the least significant byte in the smallest address. If Big-endian would be writing from left to right, Little-endian would be writing from right to left.

4.1 Overview

The Robotiq 2-Finger Adaptive Robot Gripper - 85 is controlled from the robot controller (see Figure 4.1.1) using an industrial protocol (Ethernet/IP, DeviceNet, CANopen, EtherCAT, etc.). The programming of the Gripper can be done with the *Teach Pendant* of the robot or by offline programming.

Info

- The operator can control the force and the speed of the fingers.
- The finger's movement is always synchronized, movement is done with a single "Go to requested position" command (the motion of each mechanical phalanx is done automatically).

Since the Robotiq 2-Finger Adaptive Robot Gripper - 85 has its own controller, high-level commands such as "Go to requested position" are used to control it. The Robotiq Universal Controller takes care of the regulation of the speed and the force prescribed, while the mechanical design of the fingers automatically adapt to the shape of object(s).

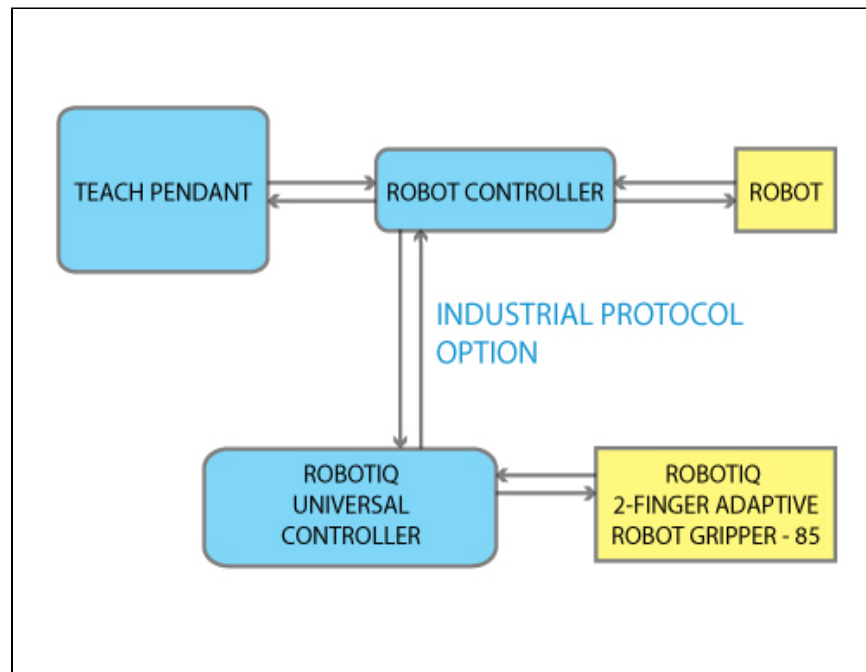


Figure 4.1.1 : Robotiq 2-Finger Adaptive Robot Gripper - 85 connections.

The Universal Controller for 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 done 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.

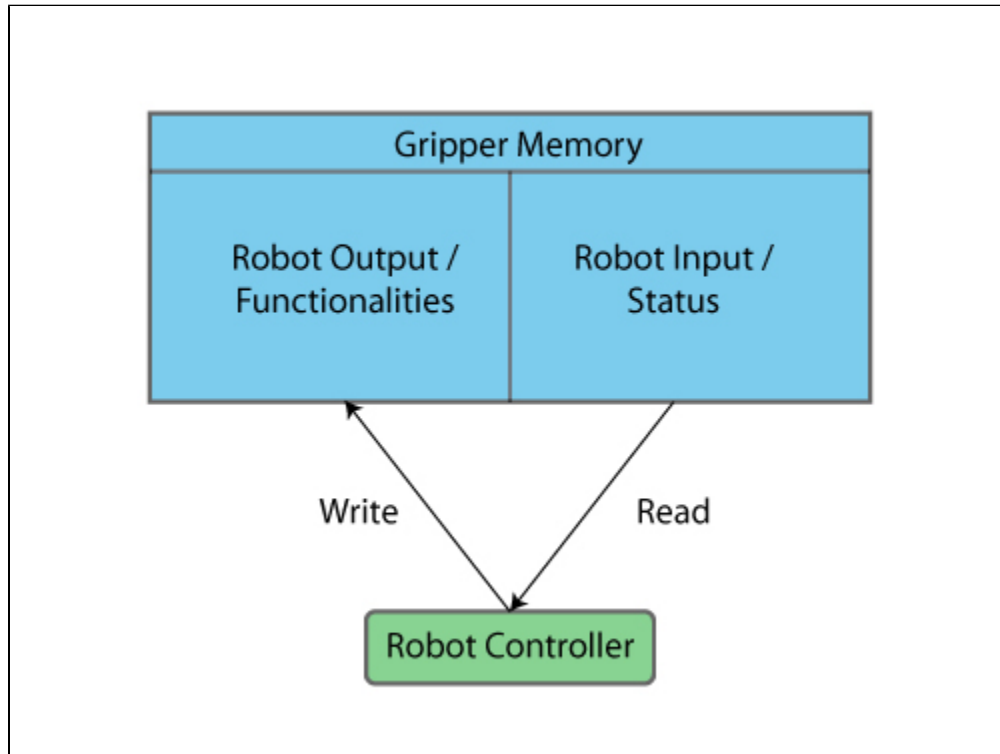


Figure 4.1.2 : Gripper memory overview from the robot controller.

To control the Robotiq 2-Finger Adaptive Gripper - 85 **Output Registers & Functionalities** must be written, the following is a summary of the various registers, see [Robot output registers & functionalities](#) for details :


- **Action request** - Will command the Gripper to activate, go to requested position or release its grip.
- **Position request** - Sets the desired position of the grip (but does not activate movement).
- **Speed** - Sets the desired speed of the grip.
- **Force** - Sets the desired force of the grip.

✓ **Hint**

- The Gripper must be initialized (activation bit) at power on. This procedure takes a few seconds and allows the Gripper to be calibrated against internal mechanical stops.
- The movement of the fingers is always synchronized, movement is done with a single "Go to requested position" command (the motion of each mechanical phalanx is done automatically).

The 2-Finger Gripper returns several registers of information to the robot controller to be read, this is called **Input Registers & Status**, see [Robot input registers & status](#) for details:

- **Gripper status** - A global Gripper status is available. This gives information such as if the Gripper is closed or open.
- **Object status** - Lets you know if there is an object in the Gripper.

 **Hint**

- Object status is a built in feature that allows for object pick-up detection, see [Robot input registers & status](#) for details.

- **Fault status** - The fault status gives additional details about the cause of a fault.
- **Position request echo** - The Gripper returns the position requested by the robot to make sure that the new command has been received correctly.
- **Position** - Information on the actual position of the Gripper from encoders of the motor is also available.
- **Finger current** - The current of the motor can also be known. Since the torque of the motor is a linear function of the current, this gives information about the force that is applied at the actuation linkage of the finger.

4.2 Status LED

The Gripper has a single LED next to the connector shown in Figure 4.2.1. A solid blue LED means the Gripper is powered. For information on the Controller LEDs, consult the Controller manual.

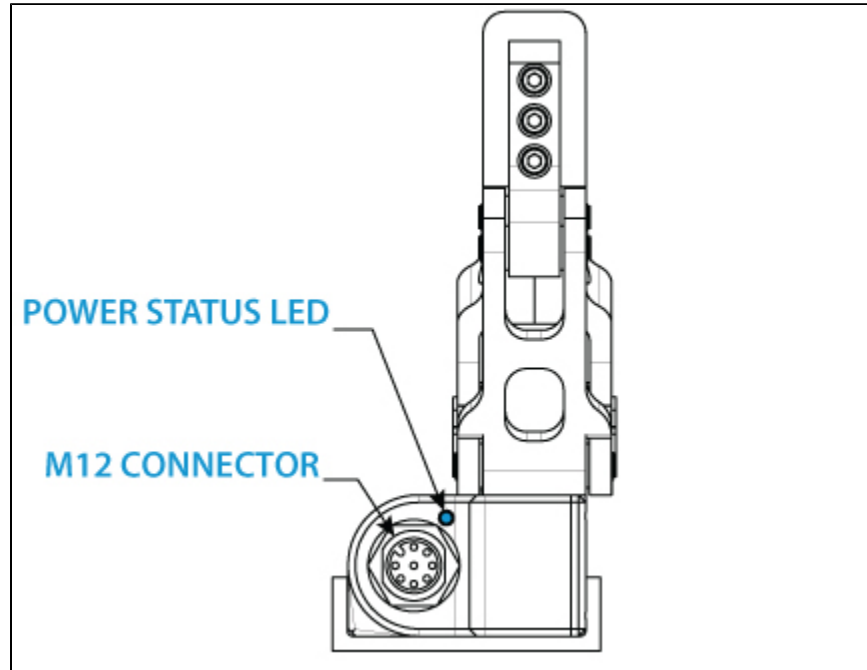


Figure 4.2.1 – Gripper status LED.

4.3 Gripper register mapping

Info

Register format is Little Endian (Intel format), namely from LSB (Less Significant Bit) to MSB (Most Significant Bit).

Register mapping:

Caution

Byte **numeration 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

4.4 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, **rACT** bit will initialize the Adaptive Gripper. Clear **rACT** to reset the Gripper and clear fault status.

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

Warning

When setting **rACT** to one, the Gripper will begin movement to complete its auto-calibration feature.

Caution

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. 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 motion is 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.

rADR : 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. Figure 4.6.1 represents the Position Request values and the corresponding distance between fingers (X axis) while Figure 4.6.2 represents the Position Request values and the corresponding height of the fingerpads (width and height measurements are valid for the reference axis Z as presented in [Section 6.1](#)).

- 0x00 - Minimum position (open).
- 0xFF - Maximum position (closed).

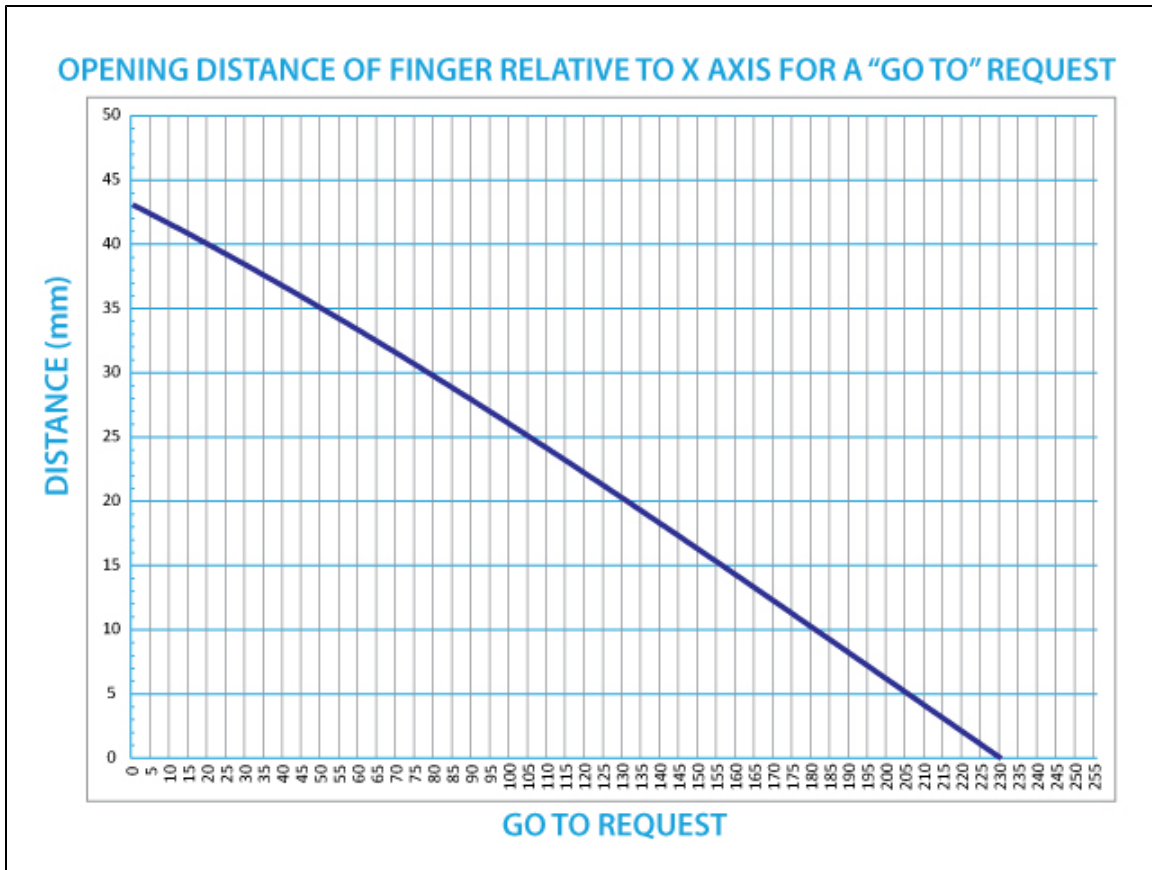


Figure 4.4.1 Horizontal (X axis) opening distance and corresponding position request command.

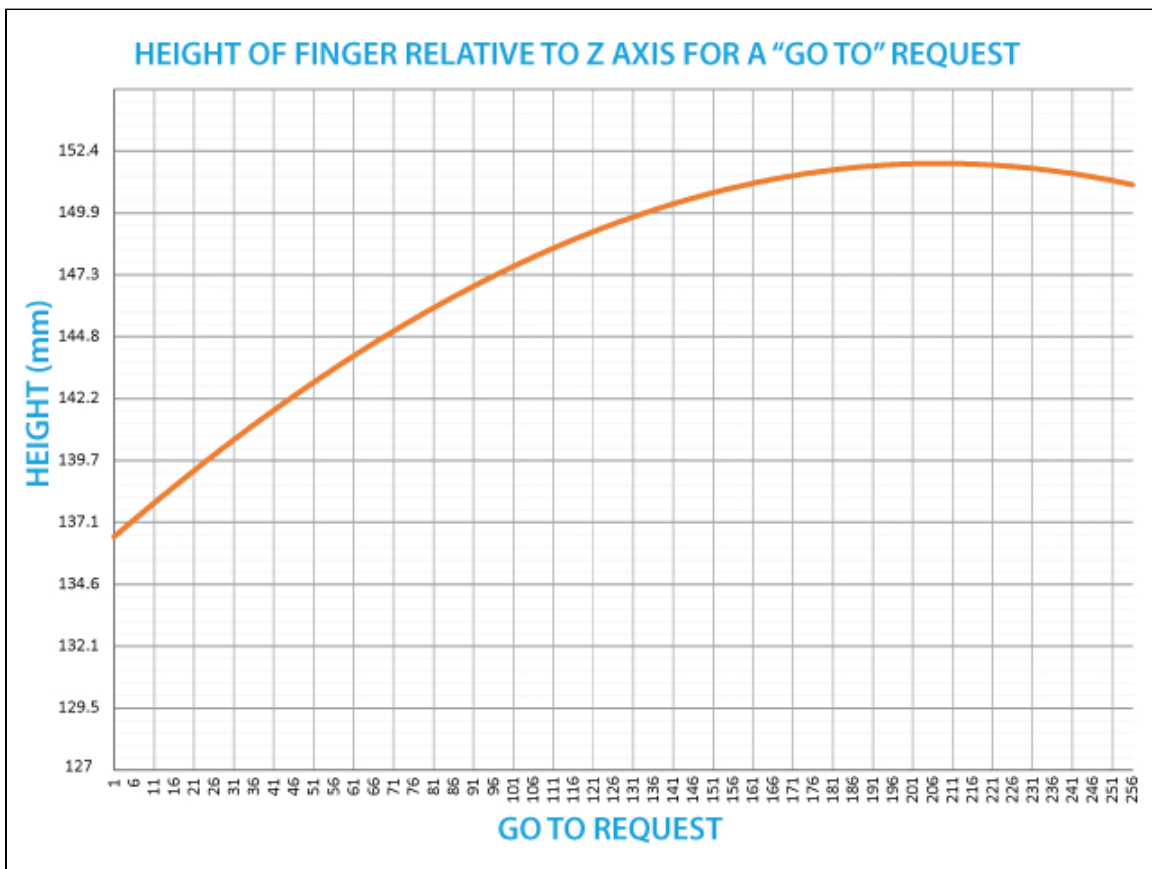


Figure 4.4.2 Maximum height (Z axis) of the standard fingerpads corresponding to position request command.

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.

i Info

0x00 speed does not mean absolute zero speed. It is the minimum speed of the Gripper.

- Minimum speed: 13 mm/s
- Maximum speed: 100 mm/s
- Speed / count : 0.34 mm/s (approximate value, non-linear relation)

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 maximum current sent to the motor while in motion. If the current limit is exceeded, the fingers stop and trigger an object detection notification.

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

i Info

Force setting is overridden for a small distance when the motion is initiated. Also, note that 0x00 force does not mean zero force; it is the minimum force that the Gripper can apply.

- Minimum force: 30 N
- Maximum force : 100 N
- Force / count: 0.27 N (approximate value, non-linear relation)

i Info

Register byte 6 to 15 are reserved and should be set to zero.

4.5 Robot input registers & status

Register: **GRIPPER STATUS**

Address: **Byte 0**

Bits	7	6	5	4	3	2	1	0
Symbols	gOBJ		gSTA		gGTO	Reserved		gACT

gACT : Initialization 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 / grasping mode change / automatic release).
- 0x1 - Go to Position Request.

gSTA : Motion status, returns the current 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.

- 0x00 - Fingers are in motion towards requested position (only meaningful if **gGTO** = 1) (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).

Caution

The object detection is precise only to the order of a few mm. In some circumstances object detection may not detect an object even if it is successfully gripped. For example, picking up a thin object in a fingertip grip may be successful without object detection occurring. For such reasons, use this feature with caution. In such applications when the "Fingers are at requested position" status of register **gOBJ**, this is sufficient to proceed to the next step of the routine.

Tip

Checking for the correct position of fingers (byte 4) **and** 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 fingers 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
Symbol	Reserved				gFLT			

gFLT : Fault status returns general error messages that are useful for troubleshooting. Fault LED (red) is present on the Robotiq Universal Controller.

- 0x00 - No fault (fault LED off)
- Priority faults (fault LED off)
 - 0x05 - Action delayed, activation (reactivation) must be completed prior to renewed action.
 - 0x07 - The activation bit must be set prior to action.
- Minor faults (fault LED continuous red)
 - 0x09 - The communication chip is not ready (may be booting).
 - 0x0B - Automatic release in progress.
- Major faults (fault LED blinking red) - Reset is required.
 - 0x0D - Activation fault, verify that no interference or other error occurred.
 - 0x0E - Changing mode fault, interference detected on Scissor Mode (for more than 20 sec).
 - 0x0F - Automatic release completed. Reset and activation is required.

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: **FINGER CURRENT**Address: **Byte 5**

Bits	7	6	5	4	3	2	1	0
Symbol	gCU							

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

 **Info**

Although the Gripper is associated to a 2A power supply, instantaneous readings may go over 2A.

4.6 Control logic - example

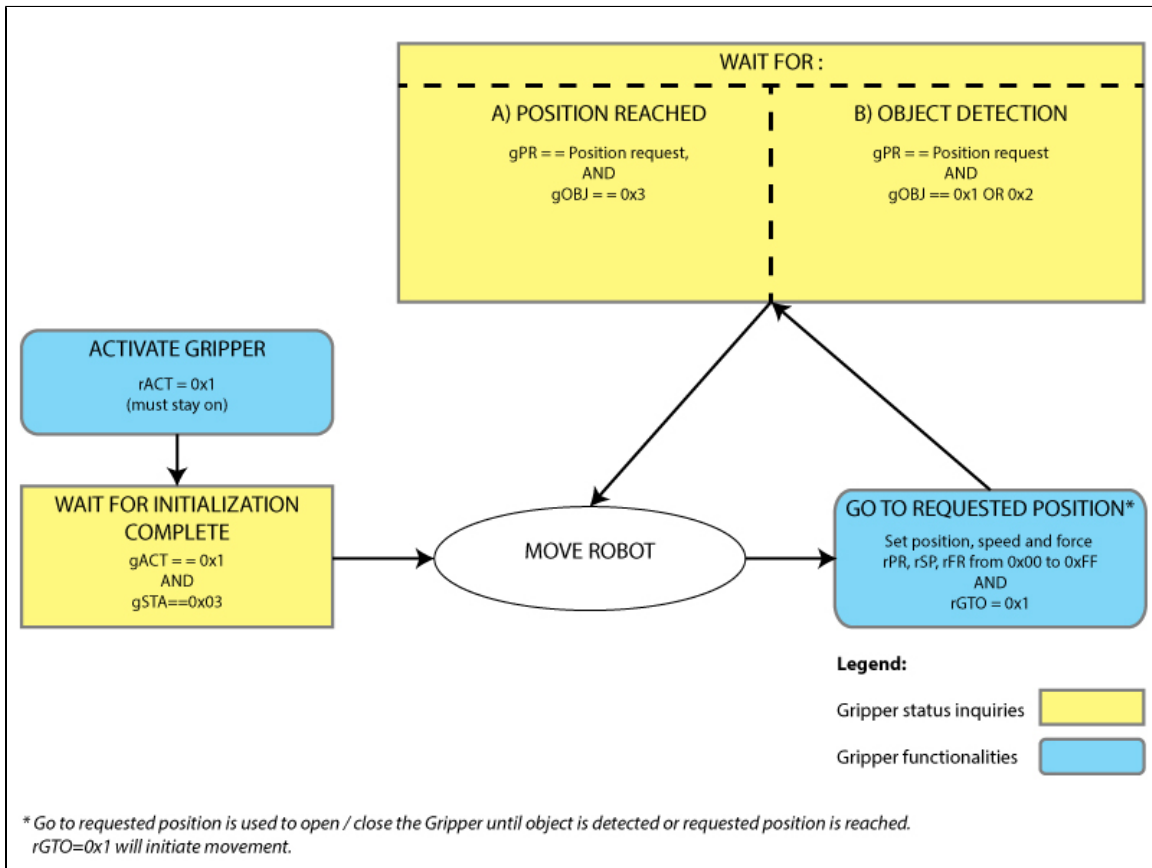


Figure 4.6.1 : Example of 2-Finger Adaptive Robot Gripper - 85 control logic with associated registers.

4.7 MODBUS RTU communication protocol

The Gripper can be controlled over USB using the Modbus RTU protocol on the mini-USB port. This section is intended to provide guidelines for setting up a Modbus scanner 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.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.chipkin.com/cas-modbus-scanner>.

4.7.1 Connection setup

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

PROPRIETY	VALUE
Physical Interface	USB (virtual serial connector) drivers can be found at ftdichip.com
Baud Rate	115,200 bps
Data Bits	8
Stop Bit	1
Parity	None
Number Notation	Hexadecimal
Supported Functions	Read Holding Registers (FC03) Preset Single Register (FC06) Preset Multiple Registers (FC16)
Exception Responses	Not supported
Slave ID	0x0009 (9)
Robot Output / Gripper Input First Register	0x03E8 (1000)
Robot Input / Gripper Output First Register	0x07D0 (2000)

Each register (word - 16 bits) of the Modbus RTU protocol is composed of **2** registers (bytes – 8 bits) from the Gripper. The first Gripper output Modbus register (0x07D0) is composed from the first **2** Robotiq Adaptive Gripper 2-Finger - 85 registers (byte 0 and byte 1).

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.

Ex: 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

where

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

where

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)

Note

The Adaptive Gripper 2-Finger - 85 register values are updated at a 200Hz frequency. It is therefore recommended to send FC03 commands with a minimum delay of 5ms between them.

4.7.3 Preset single register (FC06)

Function code 06 (FC06) is used to activate functionalities of the Gripper (robot output). Examples of such data are action request, speed, force, etc.

Ex: This message requests to initialize the Gripper by setting register 0x03E8 (1000), which contains Action Request and Gripper Options, to 0x0100.

Request is:

09 06 03 E8 01 00 09 62

where

Bits	Description
09	SlaveID
06	Function Code 06 (Preset Single Register)
03E8	Address of the register
0100	Value written to the register
0962	Cyclic Redundancy Check (CRC)

Response is an echo:

09 06 03 E8 01 00 09 62

where

Bits	Description
09	SlaveID
06	Function Code 06 (Preset Single Register)
03E8	Address of the register
0100	Value written to the register
0962	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.

Ex: This message requests to set position request, speed and force of the Gripper by setting register 0x03E9 (1001) and 0x03EA.

Request is:

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

where

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)
00E6	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

where

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.

Ex: This message asks for register 0x07D0 (2000) and register 0x07D1 (2001), which contains Gripper Status, Object Detection, Fault Status and Position Request Echo while setting position request, speed and force of the Gripper by setting register 0x03E9 (1001) and 0x03EA (1002).

Request is:

09 23 07 D0 00 02 03 E9 00 02 04 00 E6 3C C8 00 FF

where

Bits	Description
09	SlaveID
23	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 to write
0002	Number of registers to write (3) to
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
00FF	Cyclic Redundancy Check (CRC)

Response is:

09 23 04 E0 00 00 00 47 27

where

Bits	Description
09	SlaveID
23	Function Code 23 (read and write multiple 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
4727	Cyclic Redundancy Check (CRC)

 **Note**

The Adaptive Gripper 2-Finger - 85 register values are updated at a 200Hz frequency. It is therefore recommended to send FC23 commands with a minimum delay of 5ms between them.

4.7.6 Modbus RTU example

This section depicts the example given in [Section 4.8](#) 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

Request is:

09 10 03 E8 00 03 06 01 00 00 00 00 00 72 E1

where

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

where

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

where

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

where

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
02	Number of data bytes to follow (1 registers 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

where

Bits	Description
09	SlaveID
03	Function Code 03 (Read Holding Registers)
02	Number of data bytes to follow (1 registers 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

where

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 0x03E9 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
00FF	Value written to register 0x03EA (GRIPPER OPTIONS 2 = 0x00 and POSITION REQUEST = 0xFF): rPR = 255/255 for full closing of the Gripper
FFFF	Value written to register 0x03EB (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

where

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

where

Bits	Description
	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

where

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

where

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)
F78B	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

where

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 0x03E9 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
0000	Value written to register 0x03EA (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 0x03EB (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

where

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

where

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**

where

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

where

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 MODBUS TCP communication protocol

The Robotiq 2-Finger Adaptive Robot Gripper - 85 can be controlled using the Modbus TCP/IP protocol (note that this is an option). This section is intended to provide guidelines for setting up a Modbus TCP/IP communication to adequately send commands and read input from the Gripper.

For a general introduction to Modbus TCP/IP and to understand its differences from Modbus RTU, the reader is invited to read the information provided on the following website:

<http://www.simplymodbus.ca/TCP.htm>

Note

The Adaptive Gripper register values are updated at a 100Hz frequency. It is therefore recommended to send commands with a minimum interval delay of 10ms. Note that the updated frequency may drop under some conditions where the response time would be longer.

4.8.1 Connection setup

The following table describes the connection requirements for controlling the Gripper using the Modbus TCP/IP protocol.

Connection requirement	Value
Required protocol	Modbus TCP/IP
Port	502
Gripper IP address	Configurable (most Grippers are shipped with the 192.168.1.X address)
Supported Functions	Read Input Registers (FC04) Preset Multiple Registers (FC16)
UnitID	0x0002 (2)
Robot Output / Gripper Input First Register	0x0000 (0000)
Robot Input / Gripper Output First Register	0x0000 (0000)

Each register (word - 16 bits) of the Modbus TCP/IP protocol is composed of **2** registers (bytes – 8 bits) from the Gripper. The first Gripper output Modbus register (0x0000) is composed from the first **2** Robotiq 2-Finger Adaptive Robot Gripper - 85 registers (byte 0 and byte 1).

Caution

For safety reason, communication with the Gripper must stay open during operation, shutting down communication will stop the Gripper.

4.8.2 Read input registers (FC04)

Function code 04 (FC04) is used for reading the status of the Gripper (robot input). Examples of such data are Gripper status, object status, finger position, etc. For example, this message asks for registers 0x0000 (0000) to 0x0006 (0006) which contain all the robot input statuses.

Request is:

01 00 00 00 00 06 02 04 00 00 00 06

where

Bits	Description
01 00	Transaction identifier
00 00	Protocol identifier
00 06	Length
02	UnitID
04	Function 04 (Read input registers)
00 00	Address of the first register
00 06	Word count

Response is:

01 00 00 00 00 0f 02 04 0c e9 00 00 00 06 06 06 8a 00 00 00 00

where

Bits	Description
01 00	Transaction identifier
00 00	Protocol identifier
00 0f	Length
02	UnitID
04	Function 04 (Read input registers)
0c	The number of data bytes to follow
e9 00 00 00 06 06 06 8a 00 00 00 00	Data

Note

The Gripper register values are updated at a 200Hz frequency. It is therefore recommended to send FC04 commands with a minimum delay of 5ms between them.

4.8.3 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, position request, speed, force, etc.

Ex: This message requests to set several options for the Gripper by setting registers from 0x0000 (0000) to 0x0003.

Request is:

01 00 00 00 00 0d 02 10 00 00 00 03 06 09 00 64 64 00 ff

where

Bits	Description
01 00	Transaction identifier
00 00	Protocol identifier
00 0d	Length
02	UnitID
10	Function 16 (Preset multiple registers)
00 00	Address of the first register
00 03	The number of registers written to
06	The number of data bytes to follow
09 00 00 64 00 ff	Data

Response is:

01 00 00 00 00 06 02 10 00 00 00 03

where

Bits	Description
01 00	Transaction identifier
00 00	Protocol identifier
00 06	Length
02	UnitID
10	Function 16 (Preset multiple registers)
00 00	Address of the first register
00 03	The number of registers written to

4.8.4 Modbus TCP example

This section depicts the example given in [Section 4.8](#) when programmed using the Modbus TCP 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

Request is:

33 9A 00 00 00 0D 02 10 00 00 00 03 06 01 00 00 00 00

where

Bits	Description
339A	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
000D	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	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 0x0000 (ACTION REQUEST = 0x01 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper"
0000	Value written to register 0x0001
0000	Value written to register 0x0002

Response is:

33 9A 00 00 00 06 02 10 00 00 00 03

where

Bits	Description
339A	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	Address of the first register
0003	Number of written registers

Step 2: Read Gripper status until the activation is completed

Request is:

45 33 00 00 00 06 02 04 00 00 00 01

where

Bits	Description
4533	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
0000	Address of the first requested register
0001	Number of registers requested (1)

Response (if the activation IS NOT completed):

45 33 00 00 00 05 02 04 02 11 00

where

Bits	Description
4533	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0005	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
02	Number of data bytes to follow (1 registers x 2 bytes/register = 2 bytes)
1100	Content of register 0000 (GRIPPER STATUS = 0x11, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gSTA = 1 for "Activation in progress"

Response (if the activation IS completed):

45 33 00 00 00 05 02 04 02 31 00

where

Bits	Description
4533	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0005	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
02	Number of data bytes to follow (1 registers x 2 bytes/register = 2 bytes)
3100	Content of register 0000 (GRIPPER STATUS = 0x31, RESERVED = 0x00): gACT = 1 for "Gripper Activation", gSTA = 3 for "Activation is completed"

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

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

Request is:

71 EE 00 00 00 0D 02 10 00 00 00 03 06 09 00 00 FF FF FF

where

Bits	Description
71EE	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
000D	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	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 to write to register 0x0000 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
00FF	Value to write to register 0x0001 (GRIPPER OPTIONS 2 = 0x00 and POSITION REQUEST = 0xFF): rPR = 255/255 for full closing of the Gripper
FFFF	Value written to register 0x0002 (SPEED = 0xFF and FORCE = 0xFF): full speed and full force

Response is:

71 EE 00 00 00 06 02 10 00 00 00 03

where

Bits	Description
71EE	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	Address of the first register
0003	Number of written registers

Step 5: Read Gripper status until the grip is completed

Request is:

77 6B 00 00 00 06 02 04 00 00 00 03

where

Bits	Description
776B	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
0000	Address of the first requested register
0003	Number of registers requested (3)

Example of response if the grip is not completed:

77 6B 00 00 00 09 02 04 06 39 00 00 FF 0E 0A

where

Bits	Description
776B	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0009	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
3900	Content of register 0x0000 (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 0x0001 (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 0x0002 (POSITION = 0x0E, FINGER CURRENT = 0x0A): the position is 14/255 and the motor current is 100mA (these values will change during motion)

Example of response if the grip is completed:

77 6B 00 00 00 09 02 04 06 B9 00 00 FF BD 00

where

Bits	Description
776B	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0009	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
B900	Content of register 0x0000 (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 0x0001 (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 0x0002 (POSITION = 0xBD, FINGER CURRENT = 0x00): the position is 189/255 (can be used to validate the size of the seized object)

Step 6: Move the robot to the release location

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

Request is:

34 AB 00 00 00 0D 02 10 00 00 00 03 06 09 00 00 00 FF FF

where

Bits	Description
34AB	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
000D	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	Address of the first register
0003	Number of registers to write to
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
0900	Value to write to register 0x0000 (ACTION REQUEST = 0x09 and GRIPPER OPTIONS = 0x00): rACT = 1 for "Activate Gripper", rGTO = 1 for "Go to Requested Position"
0000	Value to write to register 0x0001 (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 to write to register 0x0002 (SPEED = 0xFF and FORCE = 0xFF): full speed and full force

Response is:

34 AB 00 00 00 06 02 10 00 00 00 03

where

Bits	Description
34AB	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
10	Function Code 16 (Preset Multiple Registers)
0000	Address of the first register
0003	Number of written registers

Step 8: Read Gripper status until the opening is completed

Request is:

D6 05 00 00 00 06 02 04 00 00 00 03

where

Bits	Description
D605	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0006	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
0000	Address of the first requested register
0003	Number of registers requested (3)

Example of response if the opening **is not completed**:

D6 05 00 00 00 09 02 04 06 39 00 00 00 BB 10

where

Bits	Description
D605	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0009	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
3900	Content of register 0x0000 (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 0x0001 (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 0x0002 (POSITION = 0xBB, FINGER CURRENT = 0x10): the position is 187/255 and the motor current is 160mA (these values will change during motion)

Example of response if the opening is completed:

D6 05 00 00 00 09 02 04 06 F9 00 00 00 0D 00

where

Bits	Description
D605	Unique transaction identifier (chosen randomly)
0000	Protocol Identifier (Modbus)
0009	Length
02	SlaveID
04	Function Code 04 (Read Input Registers)
06	Number of data bytes to follow (3 registers x 2 bytes/register = 6 bytes)
F900	Content of register 0x0000 (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 0x0001 (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 0x0002 (POSITION = 0x0D, FINGER CURRENT = 0x00): the position is 13/255 (the fingers have reached their software limit)

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

4.8.5 Application with Universal Robots

This section contains some additional information related to the communication between the Gripper and the **Universal Robots** model **UR-5** and **UR-10** using the **Modbus TCP** protocol.

Modbus TCP works with 16-bits registers, whereas the Adaptive Gripper is configured using 8-bit bytes. Therefore, it is required to compute the value of each 16-bits registers using two bytes. Also, the endianness is different for the Gripper than for the **UR** robots. This means that the first register is built using the following formula:

$$\text{REGISTER0} = \text{BYTE1} + 256 * \text{BYTE0}$$

✓ **Tip**

One thing to try first is to send the value 256 to REGISTER0. This command (1 on the activate bit) will trigger the initialization routine and therefore you should see the Gripper open and close to reach its mechanical stops.

Writing and reading other registers will be based on similar computations. Also, please note that the read/write registers are not the same.

As an example, writing to REGISTER0 will send a command to the Gripper, whereas reading REGISTER0 will give you the status of the Gripper.

5. User Interface

Visit <http://support.robotiq.com> to get the latest installer of the Robotiq User Interface along with appropriate documentation.

See the [Robotiq User Interface Instruction Manual](#) for details on usage of the RUI.

6. Specifications

6.1 Technical dimensions

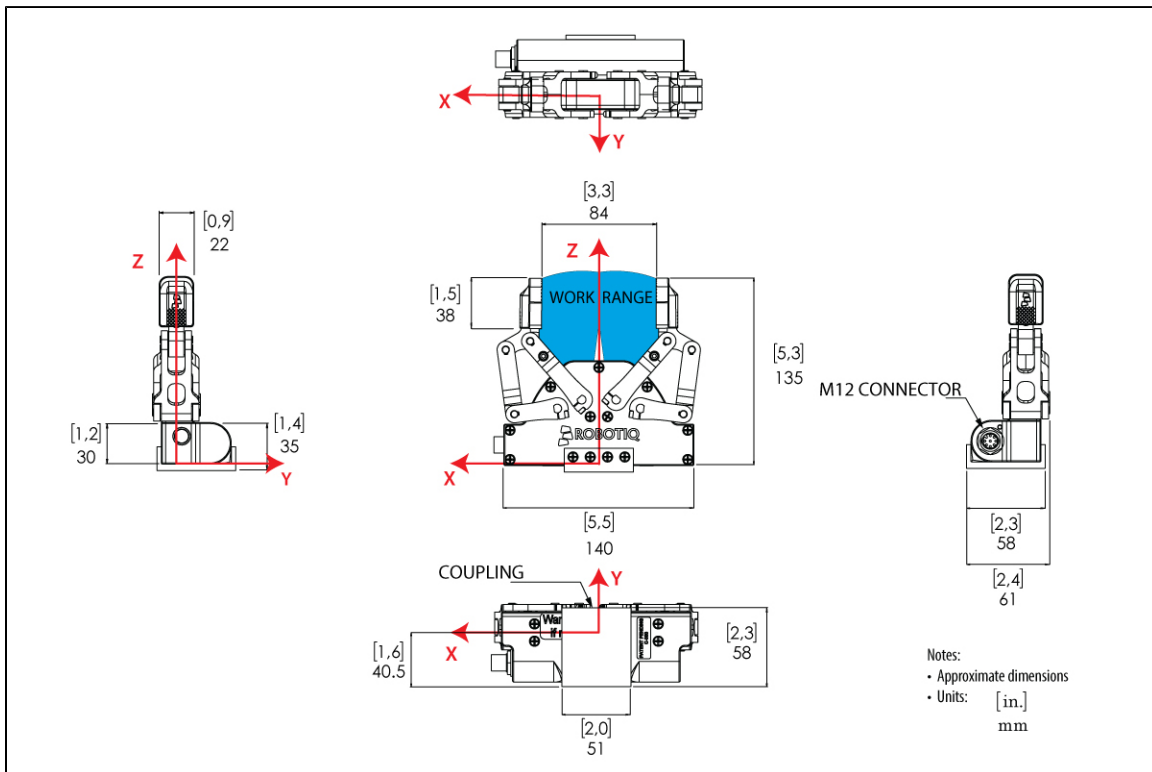


Figure 6.1.1 : Robotiq 2-Finger Adaptive Robot Gripper - 85 technical dimensions.

Gripper opening illustrated in figure 6.1. is detailed in [Section 4.4](#) with opening width (axis X) and height of the fingertip (axis Z).

6.2 Mechanical specifications

Specification	Imperial units	Metric units
Gripper Opening (see Figure 4.4.1)	0-3.34 in	[0-85 mm]
Gripper Approximate Weight	1.96 lbs	[890 g]
Recommended Payload ¹	8.8 lbs	[4 kg]
Maximum Grip Force	22 lbf	[100 N]
Maximum Closing Speed of one finger (Fingertip Grip)	3.94 in/sec	[100 mm/sec]
Finger position repeatability (Fingertip Grip)	0.002	[0.05 mm]

¹ Includes a friction coefficient of 0.4 between the fingertip rubber and a steel part, with a safety factor of 2.

Actuation force model used to calculate recommended payload is described in Figure 6.2.1 :

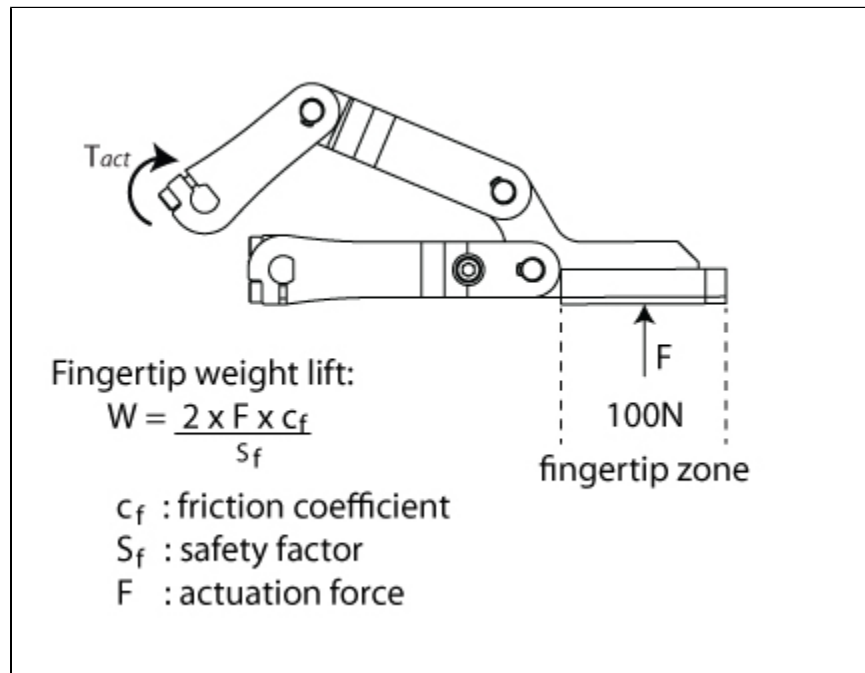


Figure 6.2.1 : Actuation force on the fingertip of the Adaptive Gripper 2-Finger - 85.

Info

- The "Actuation Force" is the force that can be applied to an object by the motors of the Gripper.
- The Gripper is self-locking.

The user of the Gripper must always ensure that the result of the forces against the finger is always lower than the maximum holding Force.

As defined in Figure 6.2.1, the weight that can be lifted is defined by :

- F is the force that is applied to the load by the Gripper.

- C_f is the coefficient of friction between the fingertip pads and the load.
- S_f is a safety factor to be determined by the robot integrator.

**Note**

The 2-Finger-85 Gripper also have a torque limit. Figure 6.2.2 represent maximum payload with distance between fingertip and payload center of mass.

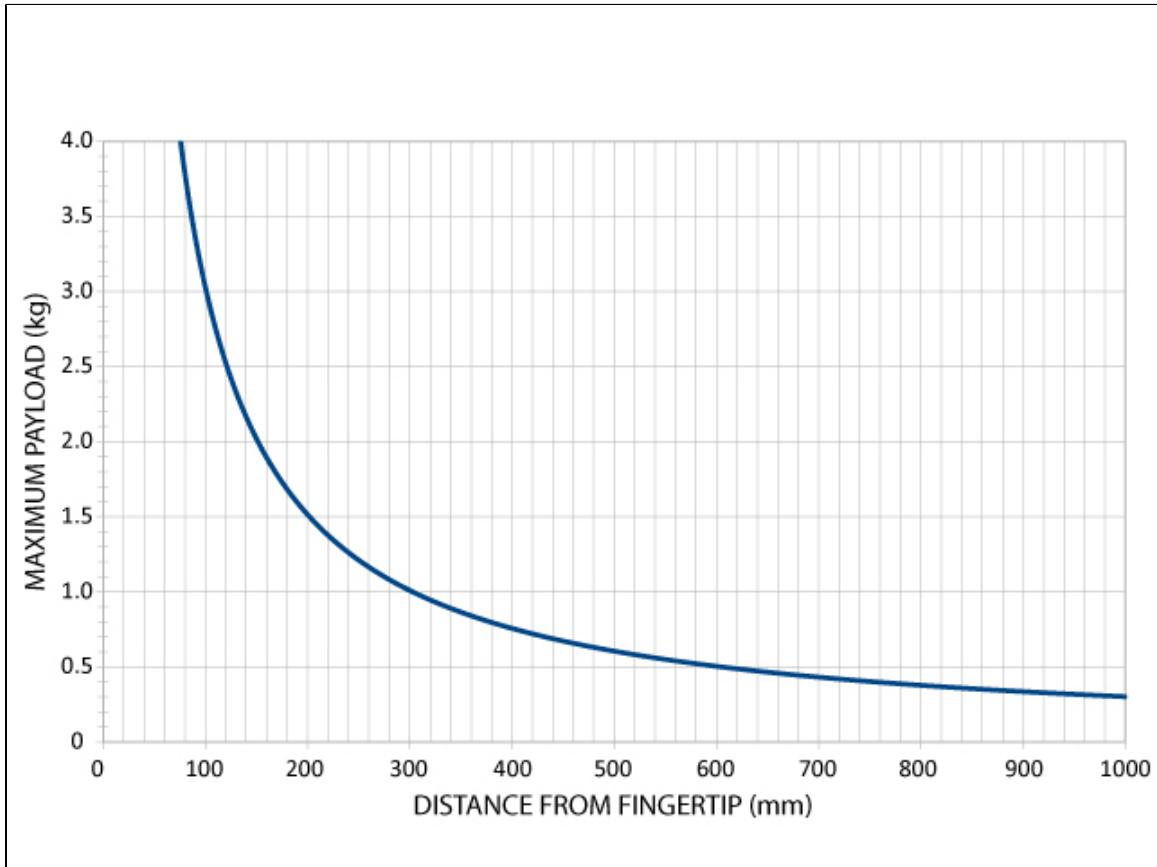


Figure 6.2.2 : Maximum payload center of mass distance from the fingertips to respect maximum torque.

From Figure 6.2.2 it can be understood that the maximum payload of 4kg can be used for objects with center of mass less than 80mm away from the finger tips, while 1 meter away from the fingertips maximum payload is approximately 250g.

6.3 Moment of inertia and center of mass

The coordinate system used for calculating the moment of inertia and center of mass of the Gripper is shown in [Figure 6.1.1](#). The center of mass and moment of inertia are calculated for a configuration where the fingers are fully open.

Here is the approximate moment of inertia matrix for the Gripper:

$$I = \begin{bmatrix} I_{xx} & I_{xy} & I_{xz} \\ I_{yx} & I_{yy} & I_{yz} \\ I_{zx} & I_{zy} & I_{zz} \end{bmatrix} = \begin{bmatrix} 2195 & 0 & 0 \\ 0 & 3457 & 258 \\ 0 & 258 & 1651 \end{bmatrix} \text{ kg} \cdot \text{mm}^2 = \begin{bmatrix} 3.59 & 0 & 0 \\ 0 & 7.92 & 0.6 \\ 0 & 0.6 & 5.62 \end{bmatrix} \text{ lb} \cdot \text{in}^2$$

Here is the approximate position for the center of mass:

$$G = \begin{bmatrix} G_x \\ G_y \\ G_z \end{bmatrix} = \begin{bmatrix} 0 \\ -8.6 \\ 35.3 \end{bmatrix} \text{ mm} = \begin{bmatrix} 0 \\ -.338 \\ 1.389 \end{bmatrix} \text{ in}$$

6.4 Electric ratings

Electrical Specification	Value
Operating Supply Voltage	24 V
Absolute Maximum Supply Voltage	28 V
Quiescent Power (minimum power consumption)	5 W
Peak Power (at maximum gripping force)	41 W
Maximum RMS Supply Current (supply voltage at 24V)	1.7 A

6.5 Couplings

For a detailed list of available Couplings and Adapter plates please consult [Section 8. Spare Parts, Kits and Accessories.](#)

The following sub-section contain the schematics for the 2-Finger-85 main Couplings along with details on blank couplings and required information for custom couplings.

6.5.1 Blank coupling

The 2-Finger Adaptive Robot Gripper - 85 blank coupling can be used to create a custom coupling between the Gripper and your robot. Provided screw clearance is meant for installation on the Gripper. Top face shown in Figure 6.5.1.1 is meant to be on the wrist side, while the bottom face is meant to be on the robot side.

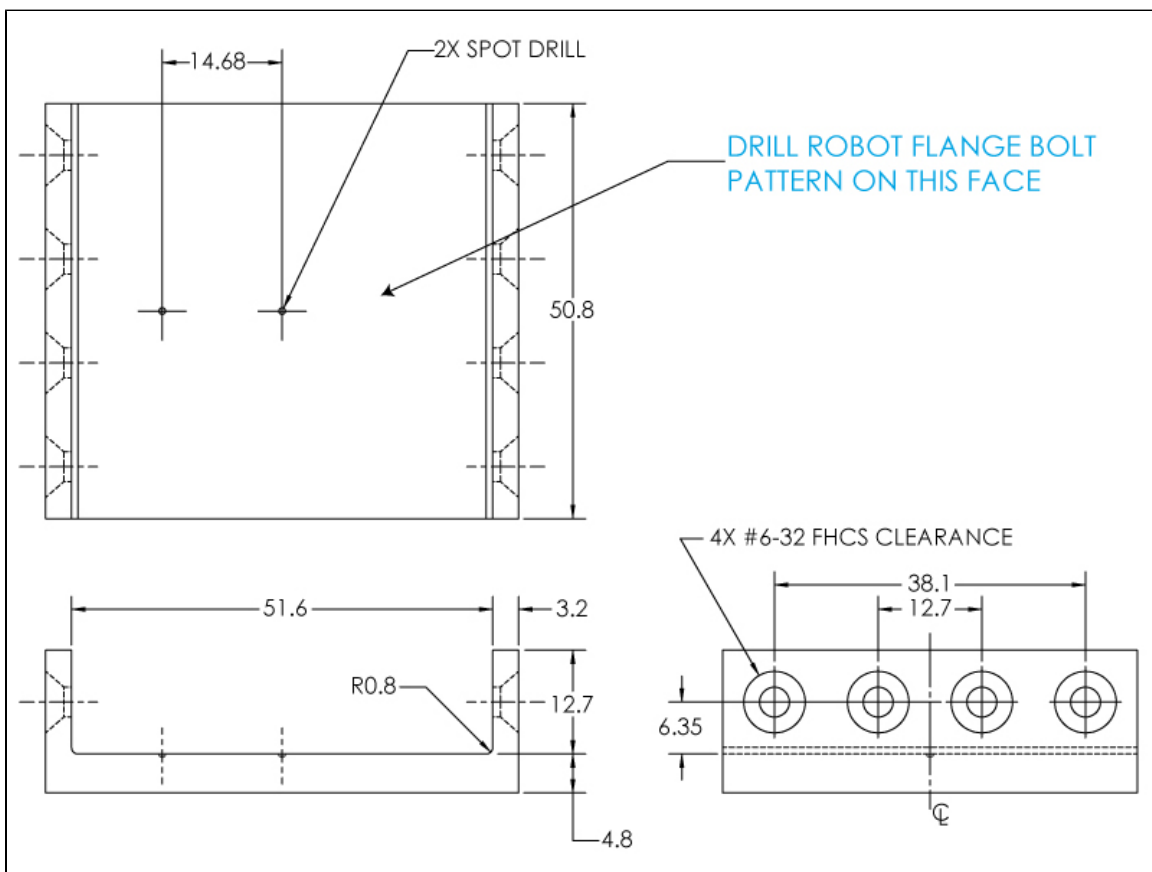


Figure 6.5.1.1 : Blank Coupling for the Adaptive Gripper 2-Finger - 85.

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

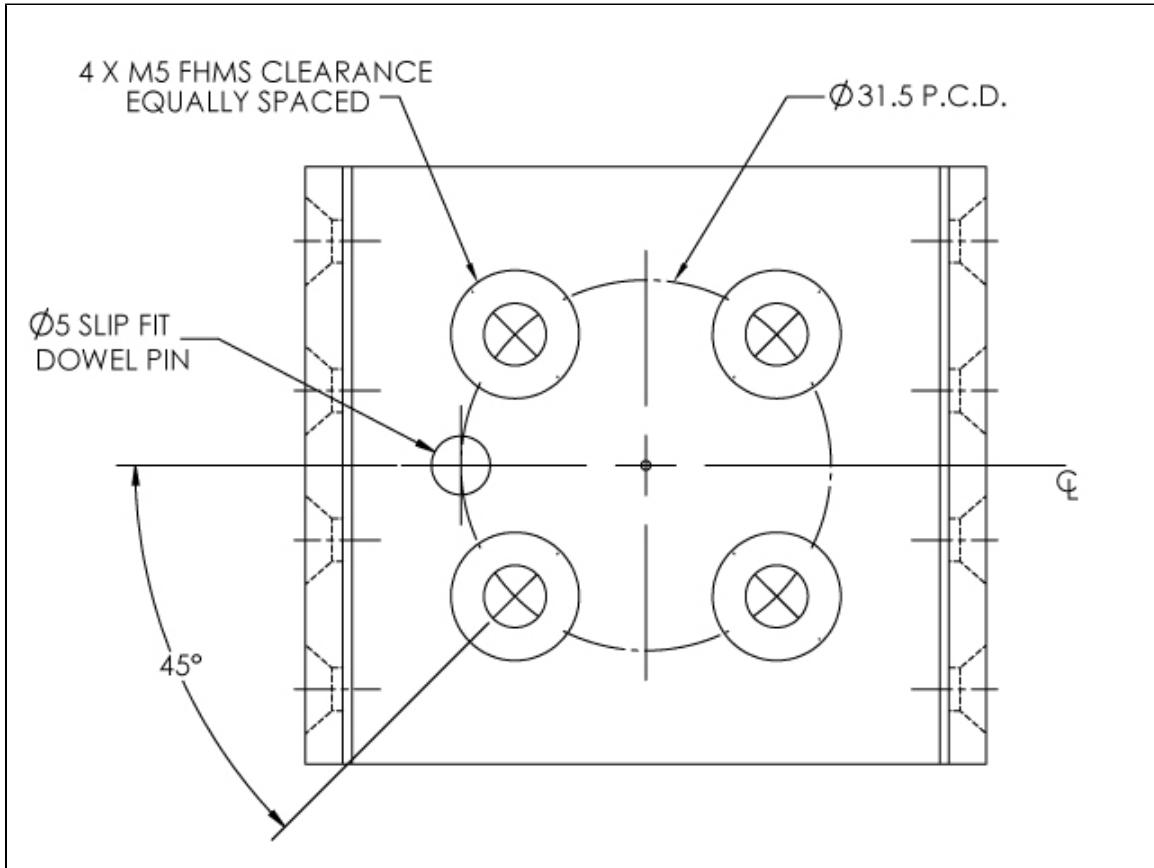


Figure 6.5.2.1 : ISO 9409-1-31.5-4-M5 Coupling for the Adaptive Gripper 2-Finger - 85.

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

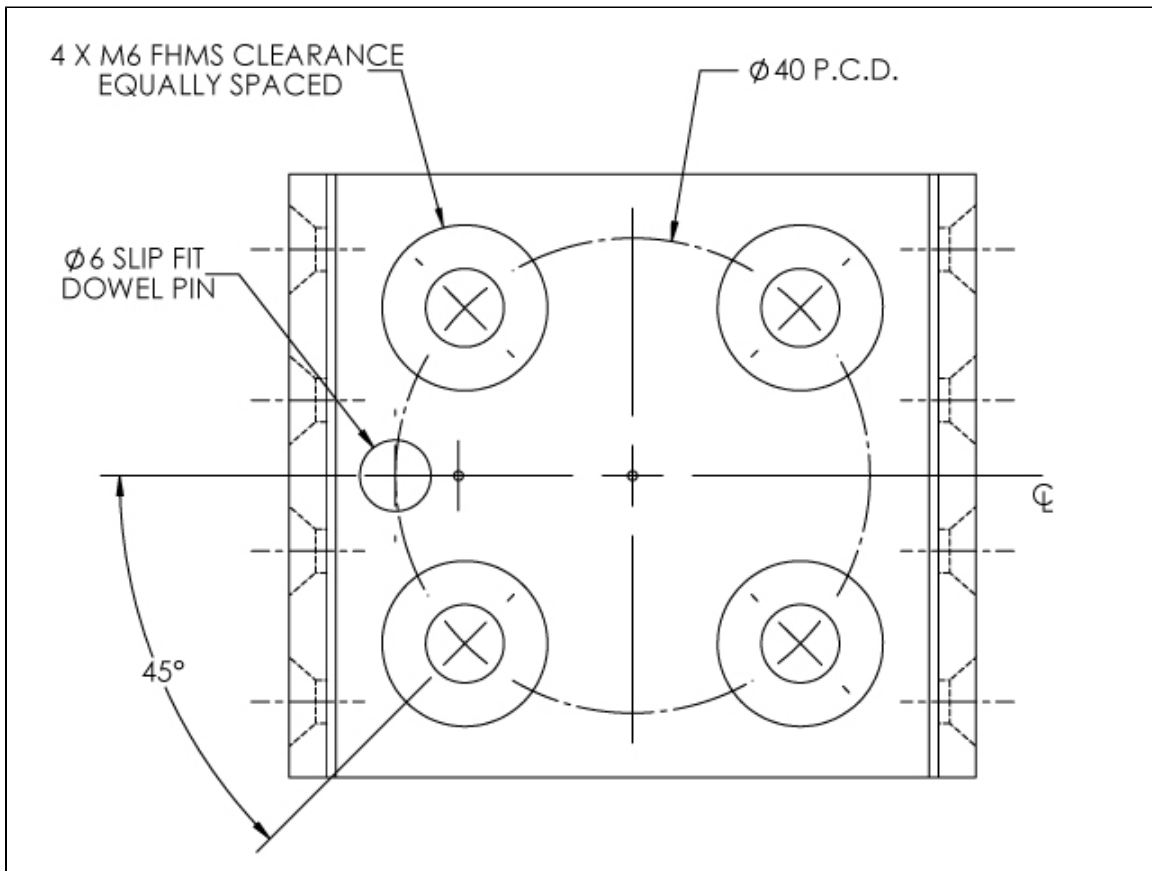


Figure 6.5.3.1 : ISO 9409-1-40-4-M6 Coupling for the Adaptive Gripper 2-Finger - 85.

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

ISO 9409-1-50-4-M6 Coupling is used on *Universal Robot UR5* and *UR10* (among others).

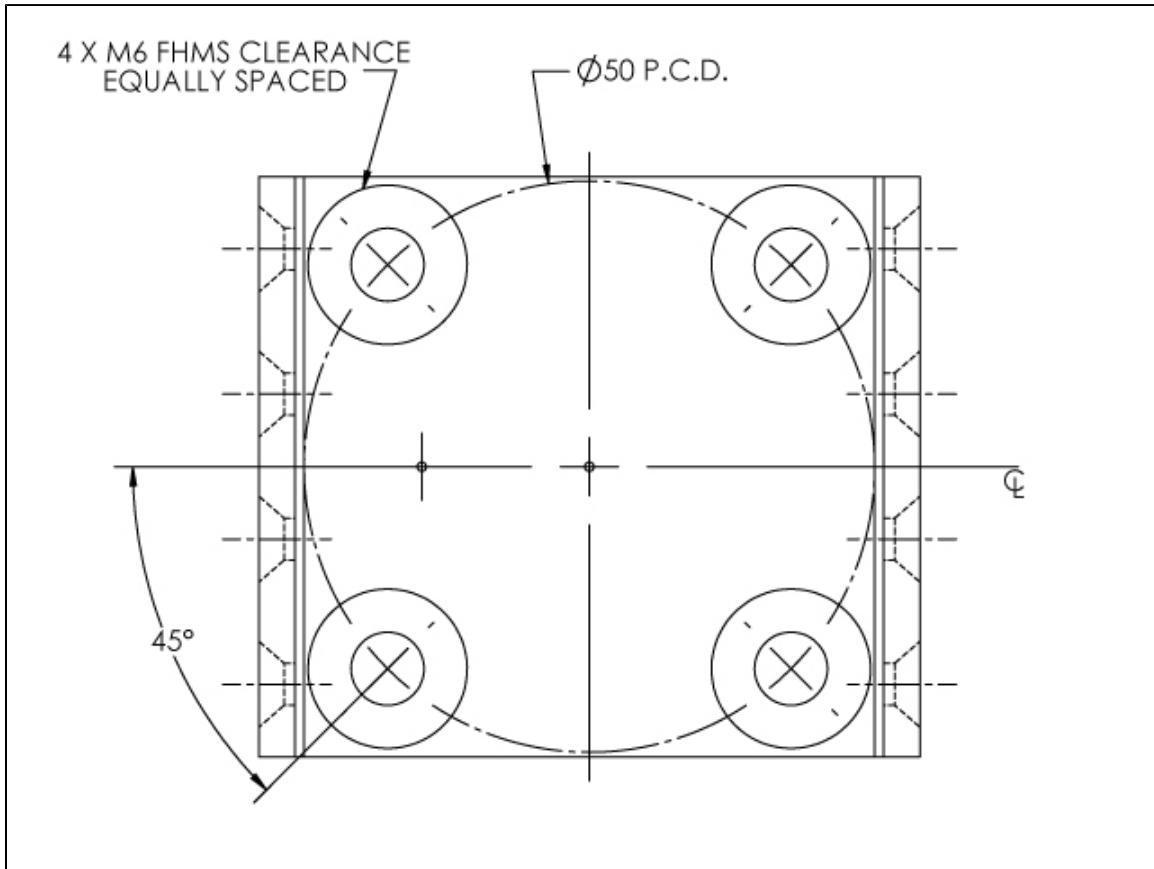


Figure 6.5.4.1 : ISO 9409-1-50-4-M6 Coupling for the Adaptive Gripper 2-Finger - 85.

Note that the dowel pin hole is outside of the permissible range, thus, if you need dowel pins for alignment the use of an Adapter plate is necessary.

6.5.5 Baxter Coupling

The following Coupling was created to fit the Robotiq 2-Finger-85 Gripper on a *Baxter* robot. Fixation on the robot is done via M4 Button Head Cap Screw (BHCS) while fixation on the Gripper is done with the usual #6-32 X 1/4 Flat Head Cap Screws. The top image in Figure 6.5.5.1 is the view from above, while the bottom image is the view from the front.

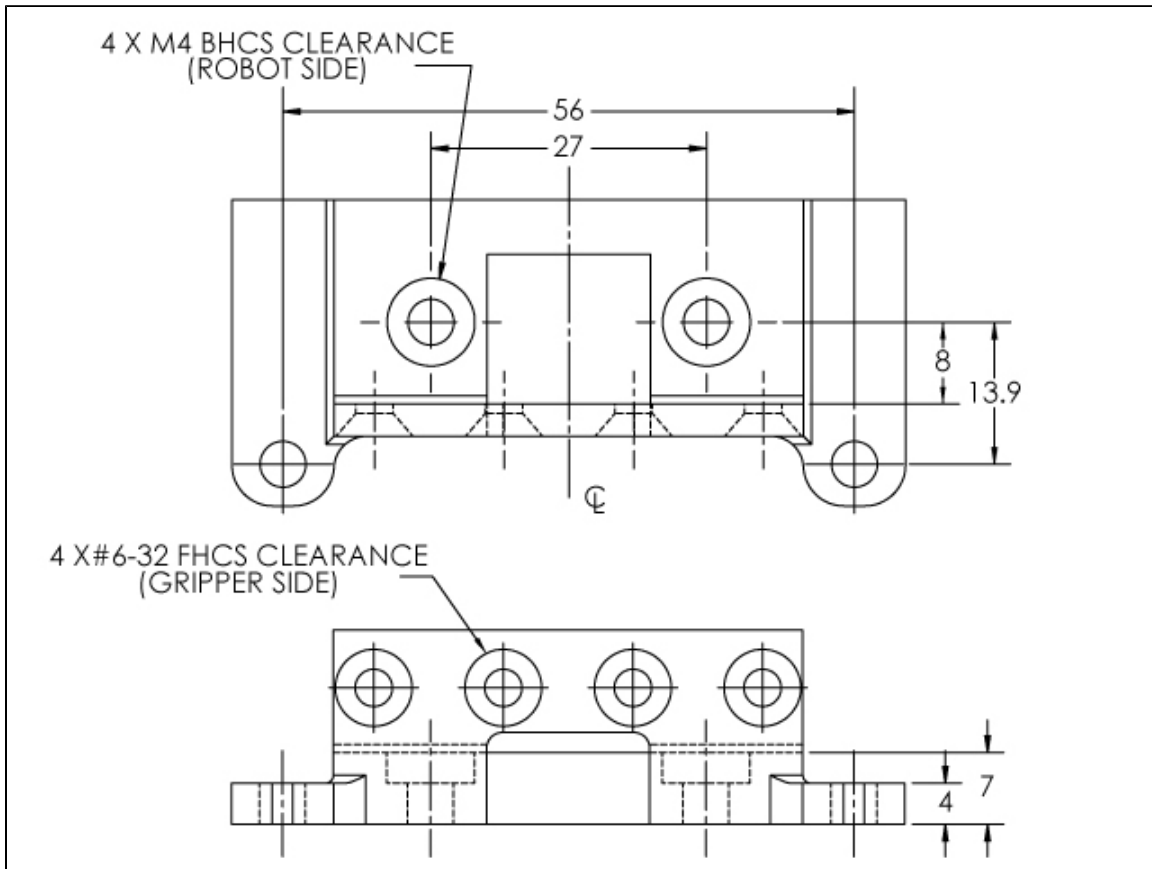


Figure 6.5.5.1 : *Baxter* robot Coupling for the Adaptive Gripper 2-Finger - 85.

6.6 Finger pad installation and customization

The Robotiq 2-Finger Adaptive Robot Gripper - 85 Finger pads can be customized to fit your gripping application. The Finger Pad C-015 is fixed to the Distal Phalanx of the Gripper as shown in Figure 6.6.1. For a list of available parts see [Section 8. Spare Parts, Kits and Accessories](#). For custom finger pads please contact your Robotiq distributor.

To assemble standard or custom Finger Pad :

1. Align the Finger Pad C-015 or your custom pad to the Distal Phalanx.
2. Fix with #6-32 SHCS provided using medium strength Loctite (248).
3. Insert the black polyurethane Finger Pad Cover (provided with standard finger pads).

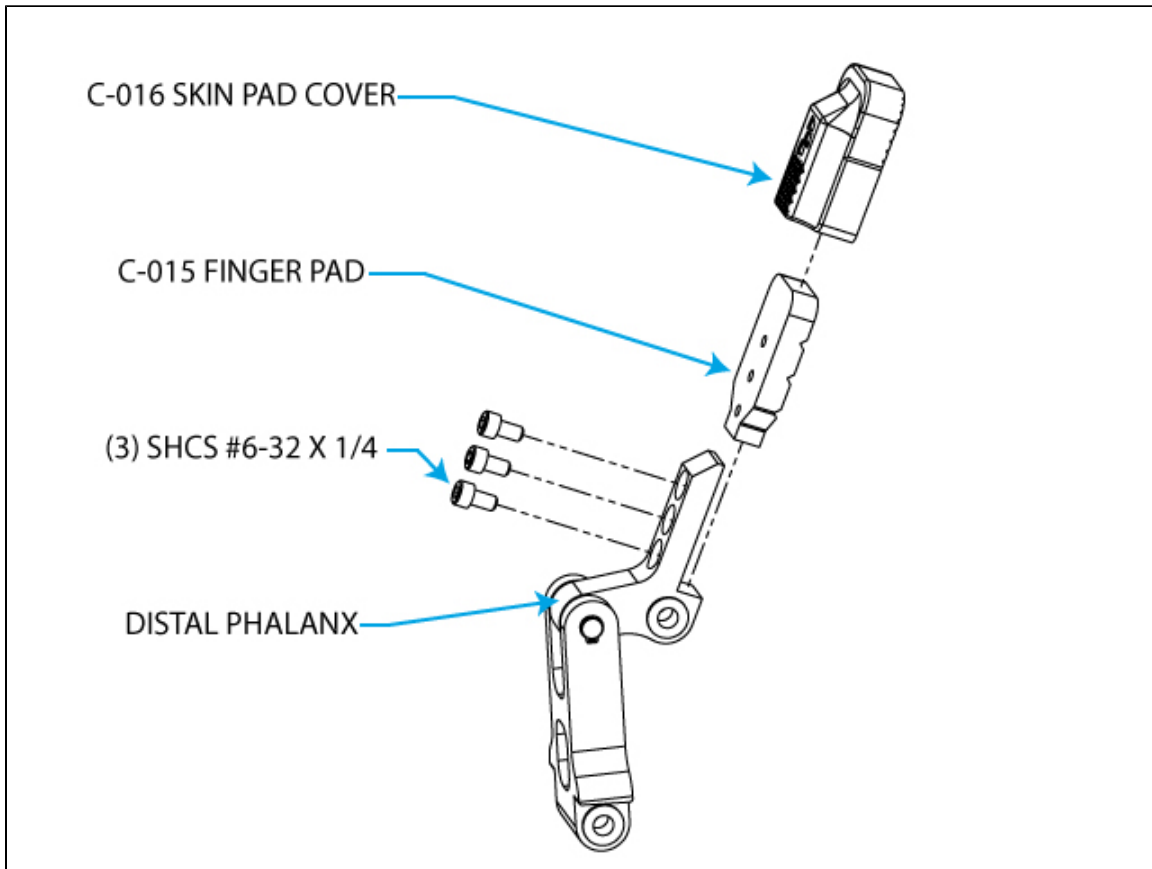


Figure 6.6.1 : Assembly of standard C-015 Finger Pad or custom pad to the Robotiq 2-Finger - 85 Gripper .

You can design your own custom finger pads to fit the Distal Phalanx detailed in Figure 6.6.2.

⚠ Design of your finger pads must respect :

- Maximum permissible weight :
- Maximum center of mass distance (mm):
(distance from the top of the Distal Phalanx, shown in Figure 6.6.2)

Warning

Modifying the Gripper fingers by any means (drilling holes, adding fixtures, etc.) without Robotiq Engineering Service approval does not respect safety measures and warranty conditions. Never modify the Gripper without consent from Robotiq.

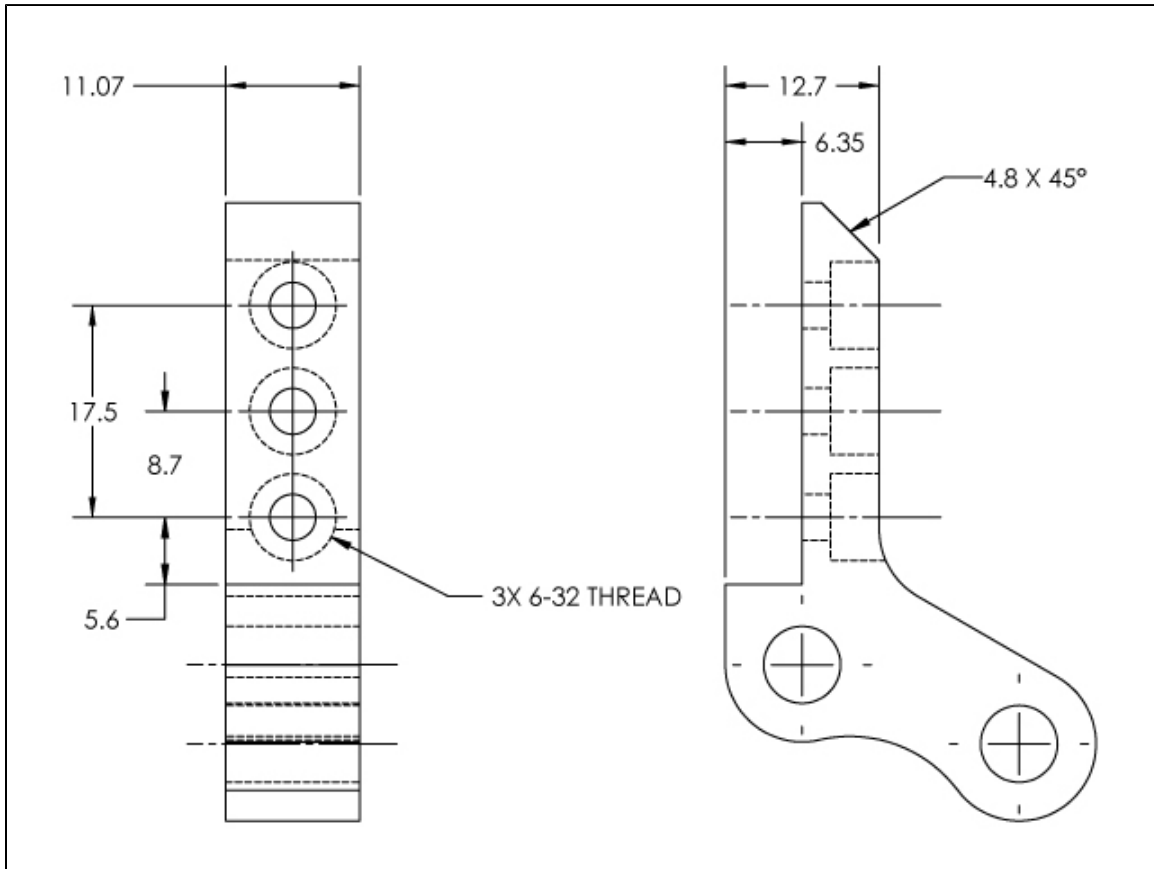


Figure 6.6.2 : Robotiq 2-Finger - 85 Distal Phalanx dimensions for standard Finger Pad design.

7. Maintenance

The Adaptive Gripper requires only external maintenance with limited downtime. Maintenance of the 2-Finger Adaptive Robot Gripper - 85 is required after specified usage, measured in time (normal 40h week) or in cycles (requesting an open and a close movement from the Gripper). Following the maintenance interval will ensure :

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

Please visit support.robotiq.com for details on the maintenance operation.

Warning

Unless specified, any repairs done on the Gripper or its Controller will be done by Robotiq.


Maintenance Intervals :

Operation	Daily	Weekly	Semiannually (or 1 M cycles)	Annually (or 2 M cycles)
Gripper Cleaning	Dirty conditions	Normal conditions		
Periodic Inspection			X	
Finger Pads Replacement ¹			X	
Overhaul ²				X

¹ Replace pads before if wear is visible.

² Overhaul is recommended after 2M cycles and is done by Robotiq at the user's expense, please contact Robotiq support.

Visit support.robotiq.com for details on the required maintenance operations.

 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"> Flat head screwdriver Dry tissue or towel 	None

Reminder

The Robotiq 2-Finger Adaptive Robot Gripper - 85 is not waterproof or water resistant without additional protection, only clean the Gripper with a dry towel.

Note

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

1. Remove the protective cap to access the finger opening mechanism.
2. Open the Gripper fingers for better access to the palm and pads using your flat head screwdriver.
3. Clean the Gripper with a dry towel, remove all debris, dirt and dust from the surface of the Gripper, clean all pads, dry thoroughly.
4. Visually inspect the Gripper and pay attention to any visible damage.
5. Put back the protective cap.

7.2 Periodic inspection

Maintenance interval	Tools you need	Parts you need
Monthly	<ul style="list-style-type: none"> Flat head screwdriver Dry tissue or towel 	None (unless damage is detected)

Note

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

1. Remove the Gripper from the robot following schematics in section [3.3 Mechanical connections](#).
2. Clean the Gripper following instructions in [7.1 Gripper cleaning](#).
3. Inspect the Gripper :
 - a. Finger movement must be symmetric and fluid:
 - i. Test the return movement by pushing fingers open, the fingers must come back to the initial starting position on its own.
 - ii. Test the general movement of the fingers by actuation using the screwdriver insertion hole in the chassis.
 - b. Finger pad wear must not affect gripping, if wear is visible and affects movement, change finger pad(s).
 - c. Check for any collision damage, if damage is visible, contact Robotiq support.
 - d. Check for any sign of wear on the Gripper chassis, if wear is present and may affect the Gripper, contact Robotiq support.
4. Put back protective cap on the screwdriver hole, put the Gripper back in place, make sure to keep the initial orientation of your Gripper.

7.3 Finger pad replacement

Maintenance interval	Tools you need	Parts you need
1 Mio. cycles or when wear is visible	<ul style="list-style-type: none"> Flat head screwdriver Dry tissue or towel 	<ul style="list-style-type: none"> (2) Robotiq 2-Finger Adaptive Robot Gripper - 85 polyurethane pads.

See [Spare parts and accessories](#) section to order Robotiq 2-Finger Adaptive Robot Gripper - 85 replacement parts.

Note

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

1. Remove the Gripper from the robot following schematics in section [3.3 Mechanical connections](#).
2. Clean the Gripper following instructions in [7.1 Gripper cleaning](#).
3. Remove the finger cover pad by pulling them upward.
4. Clean the finger pad holder and dry thoroughly.
5. Insert the new finger pads by gently stretching them and pulling downward following [Figure 6.6.1](#).
6. Make sure finger pads are correctly aligned by closing the Gripper fingers using the flat head screwdriver in the actuation hole.


7.4 Overhaul

Maintenance interval	Tools you need	Parts you need
2 Mio. cycles or at warranty expiration	None	None

Gripper overhaul is necessary when the Gripper reaches 2 Mio. cycles or when warranty is expired. Overhaul is done by Robotiq, please contact Robotiq support service.

8. Spare Parts, Kits and Accessories

Spare parts, kits and accessories list :

 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
Standard Gripper	2-Finger Adaptive Robot Gripper - 85 with black urethane finger pads	AGC-GRP-001
Kit for <i>Universal Robot</i>	Standard Gripper with included Universal Controller (Modbus TCP), cables and Couplings for <i>Universal Robots</i>	AGC-UR-KIT
Kit for <i>Baxter Robot</i>	Standard Gripper with included Universal Controller (Modbus TCP), cables and Couplings for <i>Baxter</i>	AGC-BAXTER-KIT
Controller	8. Spare Parts, Kits and Accessories See Robotiq Universal Controller Items	
Blank Coupling	Blank Coupling for 2-Finger Adaptive Robot Gripper - 85	AGC-CPL-061
31.5 mm ISO Coupling	Coupling for ISO 9409-1-31.5 bolt pattern 4-M5	AGC-CPL-601
40 mm ISO Coupling	Coupling for ISO 9409-1-40 bolt pattern 4-M6	AGC-CPL-603
50 mm ISO Coupling	Coupling for ISO 9409-1-50 bolt pattern 4-M6	AGC-CPL-604
C-607	Coupling with seven (7) M5 screw clearance and one (1) M5 Dowel Pin on 31.5 mm PCD	AGC-CPL-607
C-608	Coupling with eight (8) M5 screw clearance and one (1) M5 Dowel Pin on 31.5 mm PCD ¹	AGC-CPL-608
C-609	Coupling with three (3) M3 screw clearance and two (2) M3 Dowel Pin on 33 mm PCD	AGC-CPL-609

Baxter Coupling	Coupling for <i>Baxter</i> robot, screws included	AGC-CPL-610
C-611	Coupling with three (3) M3 screw clearance and one (1) M3 Dowel Pin on 23 mm PCD	AGC-CPL-611
C-612	Coupling with four (4) M4 screw clearance on 46 mm PCD	AGC-CPL-612
C-613	Coupling with four (4) M5 screw clearance and one (1) M3 Dowel Pin on 40 mm PCD	AGC-CPL-613
C-651	Adapter plate for four (4) M6 screws on 63 mm PCD and two (2) 6mm M6 dowel pins on 61.4 mm PCD	AGC-APL-651
C-652	Adapter plate for eight (8) M4 screws and one (1) 4mm M6 dowel pins on 56 mm PCD	AGC-APL-652
C-653	Adapter plate for six (6) M4 screws and one (1) 6mm M6 dowel pin on 56 mm PCD	AGC-APL-653
C-654	Adapter plate for six (6) M10 screws and one (1) 9mm M6 dowel pin on 92 mm PCD	AGC-APL-654
C-655	Adapter plate for six (6) M6 screw and two (2) 6mm M6 dowel pin on 63 mm PCD	AGC-APL-655
C-656	Adapter plate for four (4) M5 screw and two (2) 6mm M6 dowel pin on 45 X 52 rectangular pattern	AGC-APL-656
C-657	Adapter plate for four (4) M6 screw and one (1) 6mm M6 dowel pin on 50 mm PCD	AGC-APL-657
2-Finger-85 Device Cable (5M)	5 m communication cable (Gripper Signal Cable) for use between the Robotiq 2-Finger Adaptive Robot Gripper - 85 and its controller unit. Right angle M12 8-pin female and Combicon 10-pin.	CBL-COM-2063-05

<p>2-Finger-85 Device Cable (10M)</p>	<p>10 m communication cable (Gripper Signal Cable) for use between the Robotiq 2-Finger Adaptive Robot Gripper - 85 and its controller unit. Right angle M12 8-pin female and Combicon 10-pin.</p>	<p>CBL-COM-2063-10</p>
<p>2-Finger-85 Device Cable (5M) Legacy</p>	<p>5 m communication cable (Gripper Signal Cable) for use between the Robotiq 2-Finger Adaptive Robot Gripper - 85 and its controller unit. Right angle M12 8-pin female and Combicon 8-pin (Legacy version for Controller V.3, contact your distributor).</p>	<p>CBL-COM-2053-05</p>
<p>2-Finger-85 Device Cable (10M) Legacy</p>	<p>10 m communication cable (Gripper Signal Cable) for use between the Robotiq 2-Finger Adaptive Robot Gripper - 85 and its controller unit. Right angle M12 8-pin female and Combicon 8-pin (Legacy version for Controller V.3, contact your distributor).</p>	<p>CBL-COM-2053-140</p>
<p>Fingertip²</p>	<p>Standard Fingertip for the 2-Finger Adaptive Robot Gripper - 85, includes :</p> <ul style="list-style-type: none"> • one (1) C-015 Fingertip. • three (3) 6-32 x 1/4 Socket Head Cap Screws, Y-814. 	<p>AGC-TIP-015</p>
<p>Finger pad²</p>	<p>One (1) standard black urethane finger pad cover for 2-Finger Adaptive Robot Gripper - 85 (Fingertip not included)</p>	<p>AGC-PAD-001</p>

¹ Pitch Circle Diameter

² Part listed for a single unit, two are required per Gripper.

9. Troubleshooting

If your Gripper is not working, check the following :

1. Check the blue LED on the Gripper :

- a. It's ON : Check communications (step 2)
- b. It's OFF : Check the blue LED on the controller
 - i. It's ON : Gripper does not have power, but the controller does, check the integrity of the Gripper signal cable (shown in [Section 3.4](#)) (Figure 9.1).
 - ii. It's OFF : Gripper and controller are not supplied, check power supply (see specifications in [Section 3.3](#)).

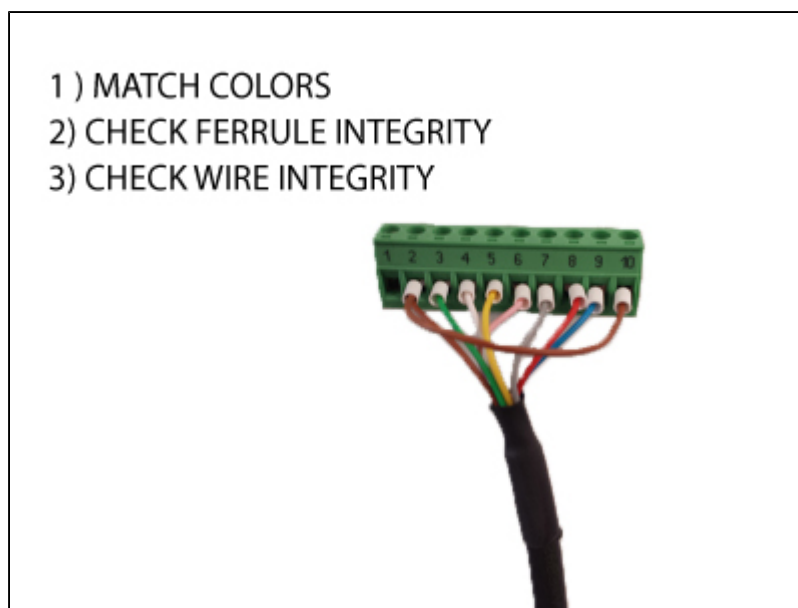


Figure 9.1 : Correct Gripper signal cable connector.

- ✓ Check Gripper signal cable and controller cable for damage, pay attention to the connectors.

2. Check the green LED on the Controller :

- a. It's OFF : No network detected, check communication cables and network infrastructure (see specific protocol in [Section 3.5.2](#) and the following).
- b. It's BLINKING : Network detected, no communication established, go to step 4.

- ⓘ Ethernet family protocol must be connected via a RJ45 port, while CanOpen and DeviceNet must be connected via a Combicon connector.

- c. It's ON : Network detected and communication is established, go to step 3.


3. Check the red LED on the Controller :

- a. It's OFF : No fault, go to step 5.
- b. It's BLINKING : Major fault occurred, reset (activate) the Gripper (see [Section 4.5](#) of 2-Finger-85 and [Section 4.5 of the Robotiq Universal Controller manual](#)).
- c. It's ON : Automatic release or booting in process, wait until it's off, if blinking, reset is needed.

4. Communication & Networking issues :

- a. Only use one connection at a time, either USB or the industrial protocol.
- b. Ethernet family : Use the proper Ethernet options, Modbus TCP/IP and EtherNet IP require fixed IP, EtherCAT requires DHCP.

- c. DeviceNet: Requires a separate power supply (see [DeviceNet section of the Robotiq Universal Controller manual](#)).

 Master communication device must use the same protocol and the same option settings as the controller for the Gripper.


- d. After reprogramming communication options, unplug the USB to update the configuration.

5. Other problems :

- a. If the system shuts down (blue LED goes off) when the Gripper activates, check the power supply, the power supply must meet the following [requirements](#).
- b. When attempting to move the Gripper, make sure "go to requested position" (rGTO) is active (set to 1), in the User Interface, the Go to Requested Position case must stay checked for the Gripper to move.

10. Warranty

Robotiq warrants the 2-Finger Adaptive Robot Gripper - 85 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.

 Warranty applies under the following conditions:

- Usage respects the operating and storage conditions specified in [Section 3.1](#)
- Proper installation of the Gripper specified in [Section 3](#) and the following subsections.
- Usage under normal one-shift operation (40h a week)
- Usage respect maintenance specified in [Section 7](#).
- Usage respect recommended payload and forces specified in [Section 6.2](#).

During the warranty period, Robotiq will repair or replace any defective 2-Finger Adaptive Robot Gripper - 85, 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 palm pads 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.
- Warranty sticker has been removed.
- Screws, other than as explained in this guide, have been removed.
- 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 Robotiq 2-Finger Adaptive Robot Gripper - 85, nor shall Robotiq be responsible for any failure in the performance of other items to which the 2-Finger Adaptive Robot Gripper - 85 is connected or the operation of any system of which the Gripper may be a part.

Exclusion

Robotiq reserves the right to make changes in the design or construction of any of its products at any time without incurring any obligation to make any changes whatsoever on units already purchased.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the Gripper or other factors beyond Robotiq's control.

11. Contact

www.robotiq.com

[Contact Us](#)

Phone

1-888-ROBOTIQ (762-6847)

1-418-800-0045 (outside US and Canada)

Fax

1-418-800-0046

Technical support and Engineering

1-866-508-1997, extension 207

Sales US

1-812-220-4578

Sales Canada, Europe and Asia

1-418-800-0045

Head office

Robotiq:

966, chemin Olivier

Suite 325

St-Nicolas, Québec

G7A 2N1

Canada

EC Declaration of conformity



Déclaration de conformité – Declaration of conformity

Nous,
we,

Robotiq inc.
966, Chemin Olivier, suite 325
St-Nicolas, Québec, Canada, G7A 1N1
(fournisseur, supplier)

déclarons sous notre seule responsabilité, que les produits:

declare under our sole responsibility that the products:

Main Robotiq à 3 doigts (Pince S, RAG, S)

3-Finger Adaptive Robot Gripper (Gripper S, RAG, S)

Main Robotiq à 2 doigts - 85 (Pince C, C)

2-Finger Adaptive Robot Gripper - 85 (Gripper C, C)

auxquels se réfère cette déclaration satisfont aux dispositions de la Directive du Conseil

to which this declaration relates satisfy the provisions of Directives

2006/42/CE	2006	Directive européenne relative aux machines
------------	------	--

et sont conformes aux normes ou autres documents normatifs:

and are in conformity with the following standards or other normative documents:

NF EN ISO 14539	2000	Robots manipulateurs industriels Manipulation des objets par préhenseurs à pince Vocabulaire et présentation des caractéristiques
NF EN ISO 12100	2012	Sécurité des machines Principes généraux de conception Appréciation du risque et réduction du risque

Cette quasi-machine ne doit pas être mise en service avant que la machine finale dans laquelle elle doit être incorporée ait été déclarée conforme aux dispositions pertinentes de la Directive 2006/42/CE.

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive 2006/42/EC.

St-Nicolas, le 15 décembre 2012

(lieu et date d'émission / place and date of issue)

Jean-Philippe Jobin
Vice-Président aux opérations
Robotiq inc.