

GENTLE DUO

First fully electrically actuated soft robotic gripper

USER MANUAL

September 2019

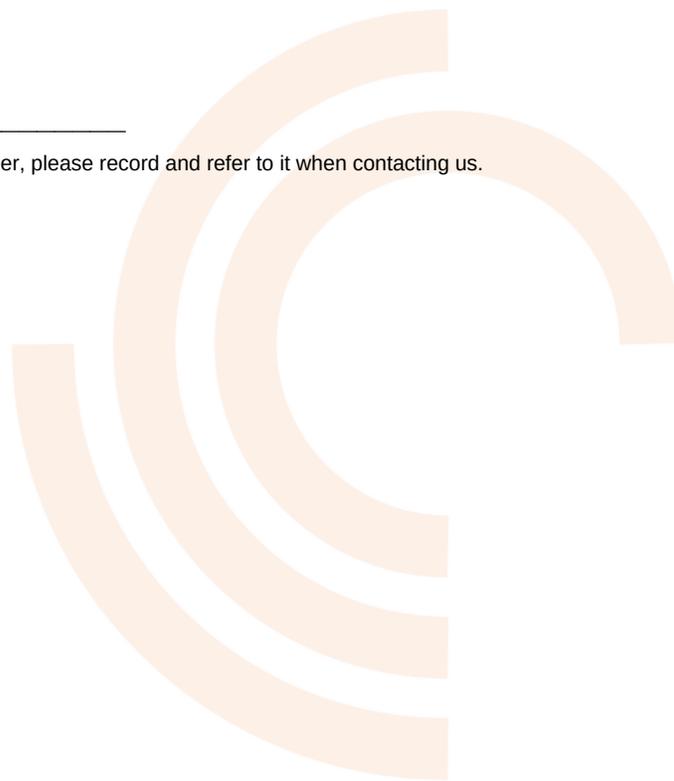


Congratulations on your purchase of **Gentle Duo**: A patent pending, **mechanically intelligent robotic hand** that automatically conforms around a large range of object sizes and shapes to pick them up, gently. Gentle Duo is the first electrically actuated soft robotic gripper and it offers individual finger actuation!

Your product ID:

GNT _____ - _____

It can also be found on your gripper, please record and refer to it when contacting us.



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TABLE OF CONTENTS

MOUNTING	4
Mounting steps.....	4
ELECTRICAL CONNECTION	5
Universal Robots e-Series.....	5
Universal Robots CB-series.....	5
KUKA IIVA	5
Yaskawa Motoman HC10 w/YRC1000micro controller.....	5
OPERATION	6
Universal Robots e- and CB-Series	6
KUKA IIVA	6
Yaskawa Motoman HC10 w/YRC1000micro controller.....	6
GRIPPER SETUP	7
TECHNICAL SPECIFICATIONS.....	7

MOUNTING

Your package includes a universal mechanical adapter to mount Gentle Duo Mini on your robotic arm. It allows Gentle Duo Mini to be mounted on all ISO flanges between 31.5 mm and 63 mm. See the dimensions of the universal mounting plate below (Figure 1).

Mounting steps

1. Attach the universal mounting adapter to your robot's tool flange using 4 screws (provided)
2. Insert UBIROS Gentle Duo Mini inside the Universal Mounting Plate
3. Put the provided M3 screws through the holes on the side wall and tighten gently

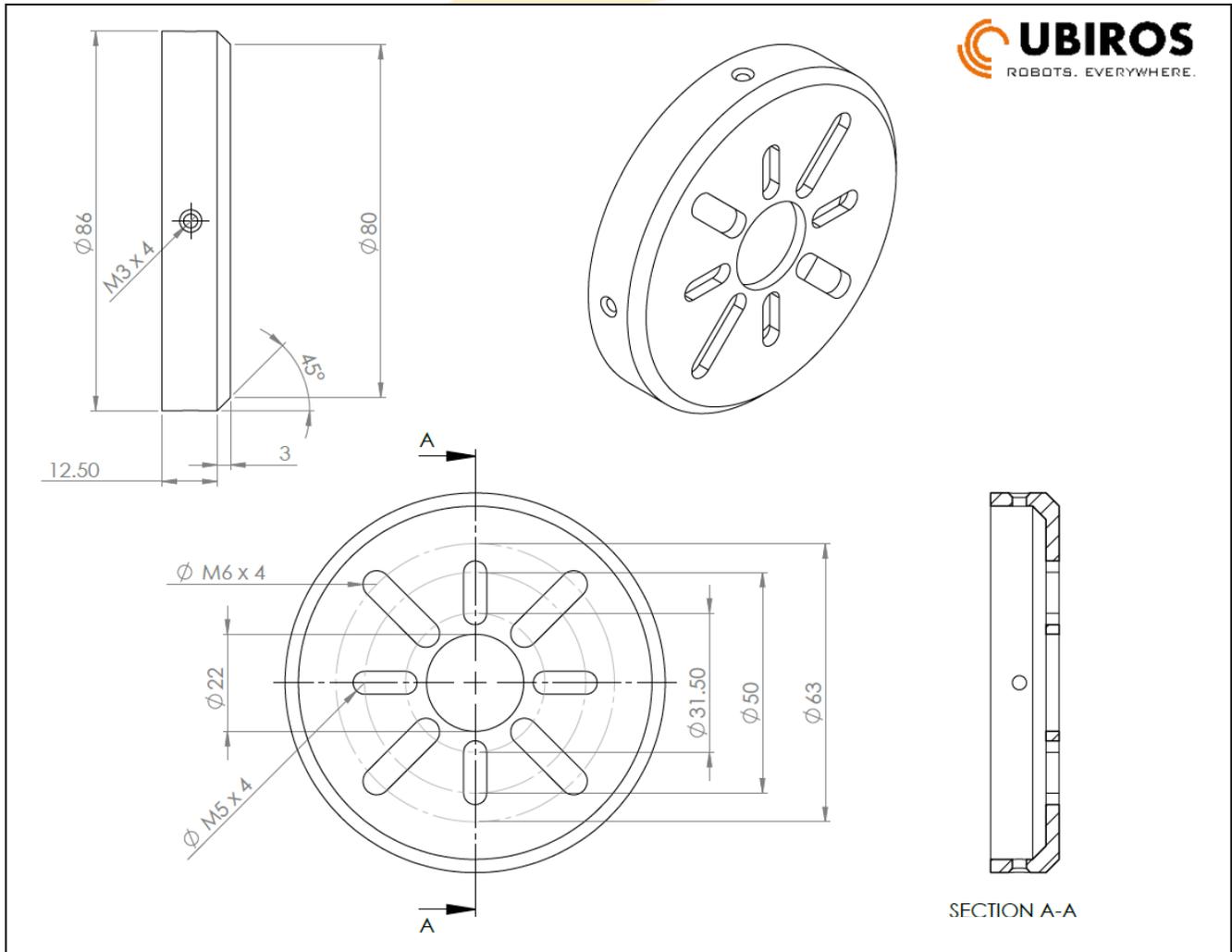


Figure 1. Universal mounting adapter

ELECTRICAL CONNECTION

Gentle Duo Mini requires 24V power and takes in a digital input signal of up to 24V to open and close the fingers to predefined positions (see GRIPPER SETUP). Please note Gentle Duo Mini's digital input requires at least 13V to turn HIGH.

Universal Robots e-Series

1. Connect the short cable to the connector at the wrist
2. Turn Tool Output 1 power to 24V (sourcing) using the teach pendant

Universal Robots CB-series

Provided connection cable comprises 3 flying leads:

1. Attach the flying leads in appropriate pins in the control box as follows:
 - a. The RED lead to any 0V pin
 - b. The GREY lead to any 24V pin
 - c. The PINK lead to the DO1 pin

KUKA IIVA



Flanges: media flange IO pneumatic (X11-X12), media flange IO electrical (X41, 42), media flange IO valve pneumatic (X91, X92)

1. Connect the short cable to one of the 8-pin connectors at the wrist
2. Turn on the power (24V)

Yaskawa Motoman HC10 w/YRC1000micro controller

1. Provide a separate 24VDC power supply for connection through the "S" connector at the base of the robot and through to connector S-2 (0.3mm² pins 9 – 16) at the wrist exit. Two of the wires will supply Gentle Duo Mini with power from the auxiliary power supply. The PINK Gentle Duo Mini lead is signal where +24V is gripper open and 0V is gripper closed. Select a third wire from S-2 for the signal that will pass through the S connector at the base.
2. Apply a low current coil relay similar to the Relco C10-A10X (Coil draws 32mA @ 24VDC) to the din rail with the CN4 breakout board. Pass the +24V from the aux power supply through the normally open contact and out to the robot wrist via the third wire selected (in step 1) passing to the wire in the S-2 connector. That will be used as the digital input to Gentle Duo Mini as follows:
 - a. Attach to one side of the relay coil a digital output pin on the CN4 (OUT 5 is pin #16) This is an NPN output so if the coil is polarity sensitive connect it to the negative.
 - b. Attach a +24V for Output Load terminal to the other side of the coil (Pin 15 on the CN4 is one such pin)

OPERATION

Universal Robots e- and CB-Series

Download free URCAPS from ubiros.com/buy-now for simple operation. You can also use the SET function to set Tool Output 1 (TO1) or Digital Output 1 (DO1) to 1 (HIGH - Open) or 0 (LOW - Close) to operate.

KUKA IIVA



Flanges: media flange IO pneumatic (X11-X12), media flange IO electrical (X41, 42), media flange IO valve pneumatic (X91, X92)

If you plugged your cable in X11, X41, or X91, set MF_Output_0 to 1 (HIGH - Open) or 0 (LOW - Close) to operate, otherwise Set MF_Output_2 appropriately.

Yaskawa Motoman HC10 w/YRC1000micro controller

Just add a DigitalOut command in your program to open or close the UBIROS. In the wiring example from earlier in this document it would be a DigitalOut #5 ON (see Figure 2) to open it and a DigitalOut #5 OFF to close it, be sure to add a timer to allow the gripper time to open or close before your next action.

33 [1] JointMove Speed=100.00(%)	Move to the drop position
34 DigitalOut Output#(5) ON	Open the UBIROS gripper
35 Timer Time=0.500(seconds)	Wait for the gripper to finish opening

Figure 2 Sample Code for Yaskawa HC10

On the DT versions of the HC10 you can also tie the wrist button 2 to the output you are using and in hand jogging mode that button will toggle the gripper open/closed.

GRIPPER SETUP

Gentle Duo Mini is pre-programmed to host its own WiFi Access Point. You can adjust Gentle Duo Mini's settings by following the steps below:

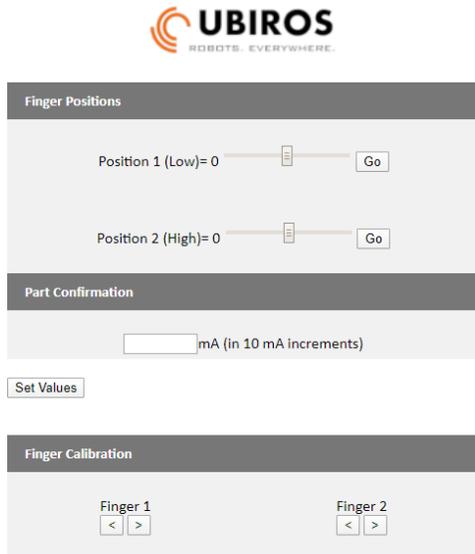


Figure 3. Gentle Duo Mini Control Panel

1. Connect any WiFi-enabled device to the WiFi network named "Ubiros-<Product ID>". (Please note that this network is not connected to the Internet)
2. Enter the WiFi password: GentleUbiros
3. After the connection is established, your device should automatically open a web page. If this doesn't happen in a few seconds, open any web browser and go to: <http://192.168.4.1/> to access the control panel. See below (Click "Go", Gentle Pro will show the new position.
4. Enter the current threshold for part confirmation signal.
5. Click "Save Values" to makes positions permanent (will survive a power cycle).
6. When fingers are misaligned, use calibration buttons to fix.
7.)
8. Using the sliders on the page adjust the finger stroke to the best level for your application. 0 indicates straight fingers. Positive numbers move fingers towards the palm.



WARNING: setting these sliders above 85% and gripping large objects may cause damage to the gripper. If you need high values, adjust in smaller steps.

9. Click "Go", Gentle Pro will show the new position.
10. Enter the current threshold for part confirmation signal.
11. Click "Save Values" to makes positions permanent (will survive a power cycle).
12. When fingers are misaligned, use calibration buttons to fix.

TECHNICAL SPECIFICATIONS

	<i>Metric</i>	<i>Imperial</i>
Weight	800 g	1.8 lbs
Gripper Dimensions	100 / 172 mm	3.9 / 6.8 in
Enclosure Dimensions	100 / 84 mm	3.9 / 3.3 in
Finger dimensions	75 / 20 / 40 mm	3.0 / 0.8 / 1.6 in
Number of fingers	2	2
Grasp type	Pinch	Pinch
Payload	1,500 g	3.3 lbs
Max finger opening (tip)	175 mm	6.9 in
Finger distance (base)	28 mm	1.1 in
Grasping speed	200 ms	200 ms
Maximum cycle	500,000	500,000
Power	24 V, 1 A	24 V, 1 A
Control Interface	Digital I/O	Digital I/O
Finger material	Silicone	Silicone
Enclosure material	Anodized Aluminum	Anodized Aluminum

Flange
Individual finger actuation
Water Proofing

ISO 31.5-63	ISO 31.5-63
Enabled	Enabled
Sealed, Not tested	Sealed, Not tested

