

GENTLE DUO MINI

USER MANUAL



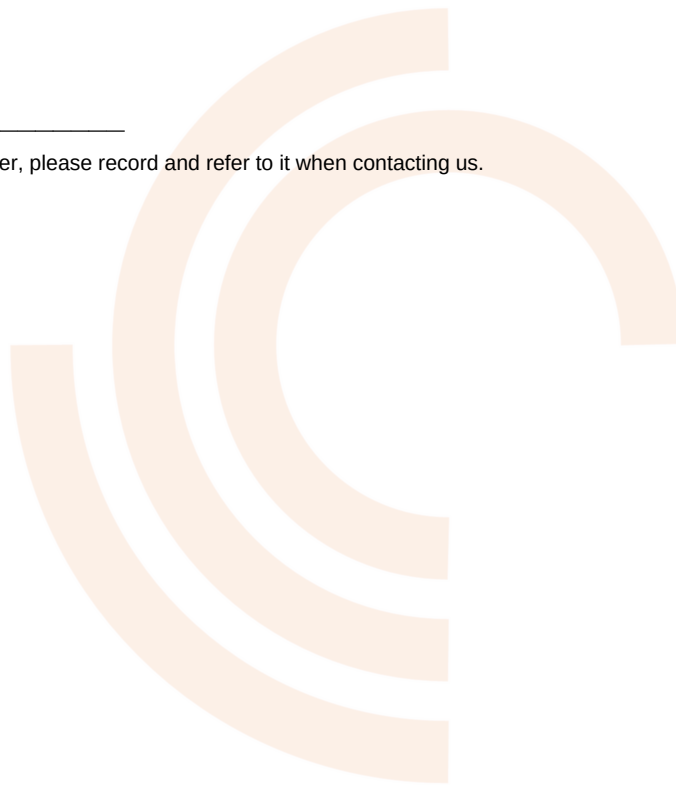
October 2020

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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TECHNICAL SPECIFICATIONS

Gripper Dimensions (diameter, height)	100 / 172 mm (3.9 / 6.8 in)
Enclosure Dimensions (diameter, height)	100 / 84 mm (3.9 / 3.3 in)
Finger dimensions (Length / Width / Depth)	75 / 20 / 40 mm (3.0 / 0.8 / 1.6 in)
Number of fingers	2
Max finger opening (tip)	175 mm (6.9 in)
Finger distance (base)	28 mm (1.1 in)
Weight	800 g (1.8 lbs)
Payload	1,500 g (3.3 lbs)
Grasping time	100 ms / 50 mm (100 ms / 2 in)
Maximum cycle	500,000
Input Voltage	15 V - 25 V
Max. Current (idle / load / instantaneous)	0.03 A / 2 A / 3 A
Control Interface	1 or 2* Digital Inputs
Part Confirmation	Digital Output*, Adjustable Threshold
Finger material	Silicone, FDA Approved**
Enclosure material	Anodized Aluminum
Flange	ISO 31.5-63
Individual finger actuation	Enabled**
Water Proofing	Sealed, Not certified

* Touch model only

** Available upon request

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

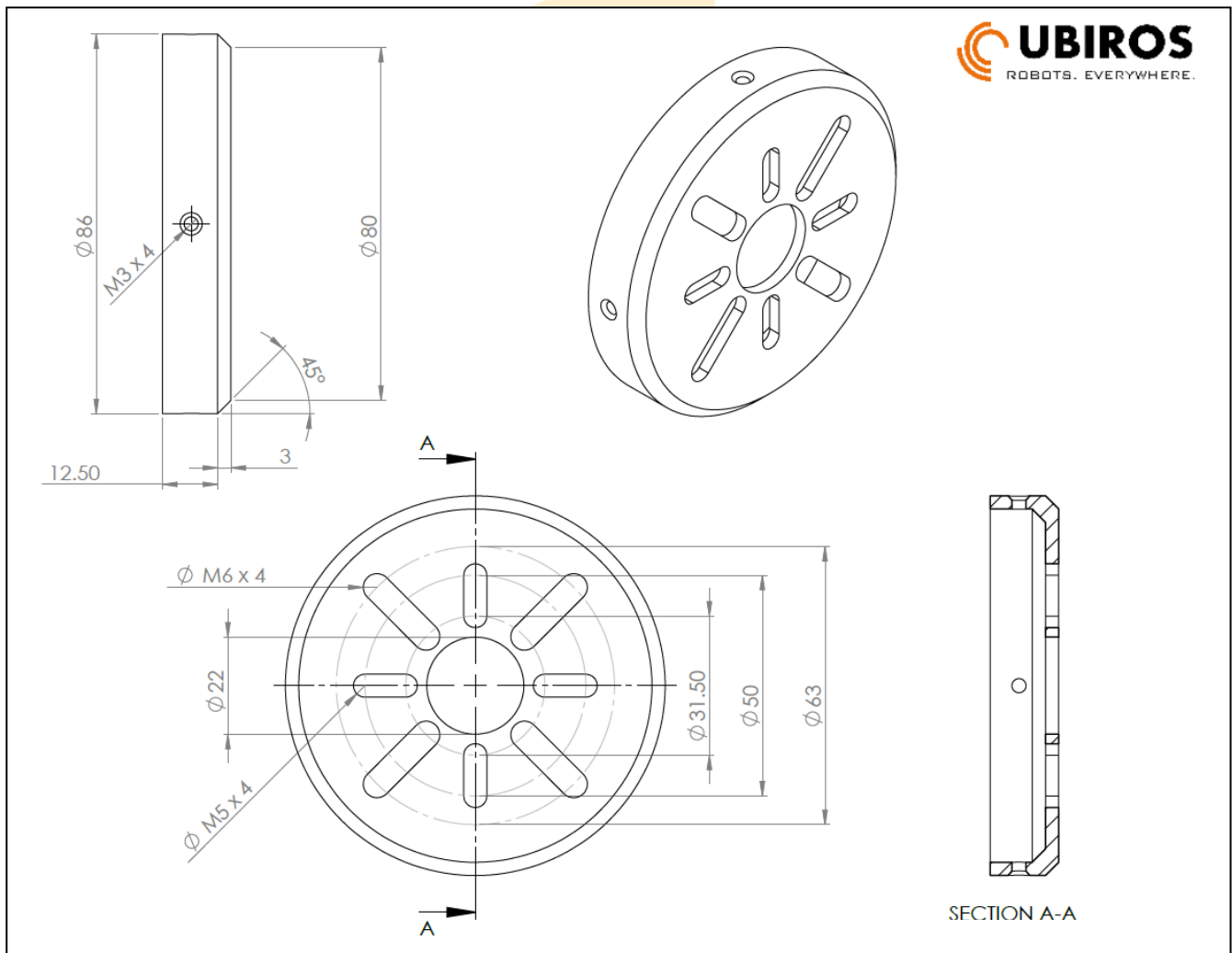


Figure 1 Universal mounting adapter

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. Please note Gentle Duo Mini's digital input requires at least 13V to turn HIGH. For the full list of specifications, see page 4.

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 a DO 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 UBIROS Gentle URCap from <https://www.ubiros.com/urcap.html> for easy operation. Refer to the URCap manual at the end of this manual to learn more about its usage. You can also use the SET function to set the Tool Output 1 (TO1) or the appropriate Digital Output (DOx) to 1 (HIGH - Open) or 0 (LOW - Close) to operate. Refer to the URCap manual at the end of this manual to learn more about its usage.

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.

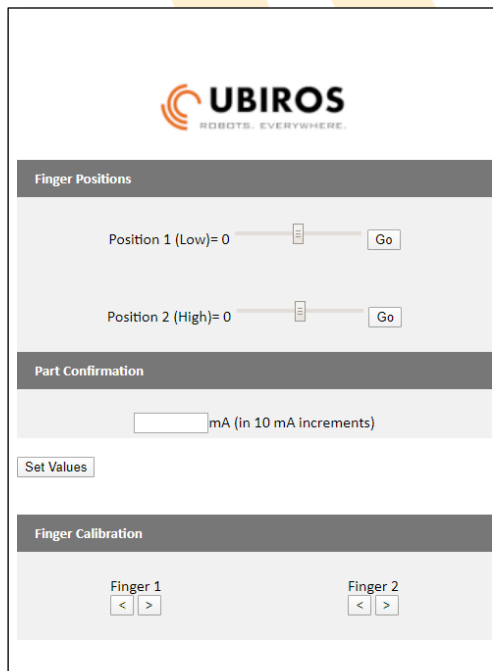
33 [1] JointMove Speed=100.00(%)	Move to the drop position
34 DigitalOut Output#(5) ON	Open the UBIROS gripper
35 Timer Time=0.500(seconds)	Wait for the gripper to finish opening

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:



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, open any web browser and go to: <http://192.168.4.1/> to access the control panel.
4. 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. Click "Go" and Gentle will show the new position.
5. Enter the current threshold for part confirmation signal.
6. Click "Save Values" to make positions permanent (will survive a power cycle). When fingers are misaligned use offset buttons to fix.
7. Enter the current threshold for part confirmation signal.
8. Click "Save Values" to makes positions permanent (will survive a power cycle).
9. When fingers are misaligned, use calibration buttons to fix.



WARNING: setting these sliders above 7 and gripping large objects may cause damage to the gripper

Figure 3 Gentle Duo Mini Control Panel

URCAP USAGE

URCap Feature Overview & Compatibility

Our URCap adds a tool center point installation node, a gripper configuration installation node, a gripper actuation program node and a toolbar for actuating the gripper outside of program execution (e-Series only). Available for PolyScope 5.2+ (e-Series) and PolyScope 3.8+ (CB-series).

Universal Robots e-Series

Installation

Copy the URCap downloaded from <https://www.ubiros.com/urcap.html> to a blank USB drive. Insert the USB drive into the teach pendant or controller. Press the hamburger menu button in the top right (Figure 4) and choose “Settings → System → URCaps → +” (Figure 5). Navigate the available drives to find and select the .urcap file. Restart PolyScope to finish installation. To add a TCP configuration, see the TCP Configuration section.

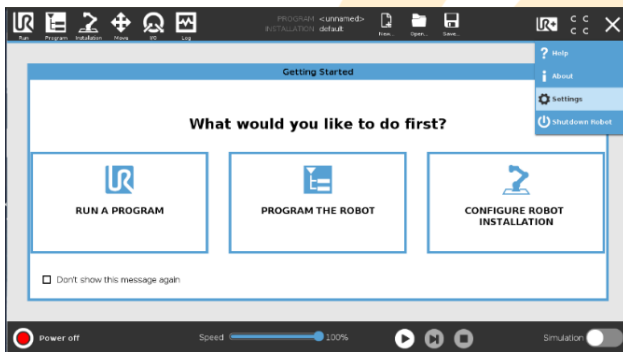


Figure 4 Settings, e-Series

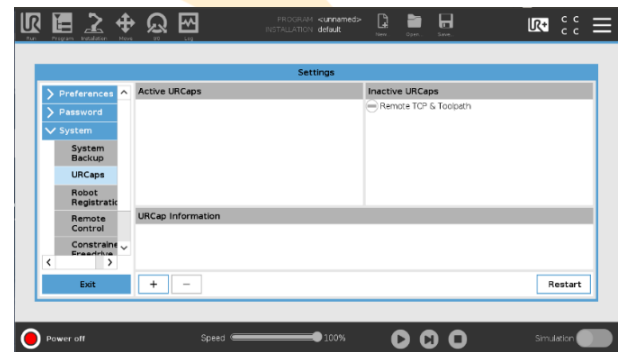


Figure 5 Installation, e-Series

Uninstallation

To uninstall this URCap, navigate back to the screen shown in Figure 5, select the URCap and press the “-” button.

Tool Center Point (TCP) Configuration

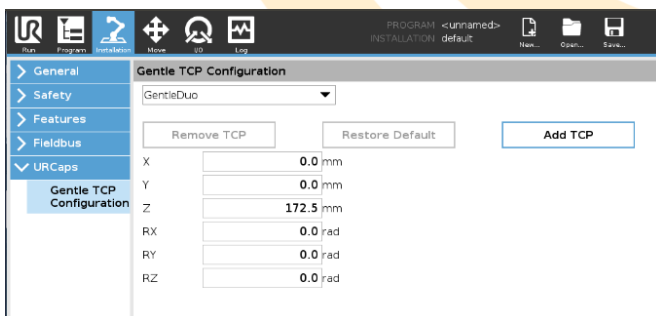


Figure 6 TCP Configuration, e-Series

To install the Tool Center Point (TCP), choose your Gentle product from the dropdown menu found at “Installation → URCaps → Gentle TCP Configuration” (Figure 6) and press the “Add TCP” button. To change TCP values, select the text field, enter a new value and press the “Save Changes” button.

To activate this configuration, navigate to “Installation → TCP”, select the added configuration from the dropdown menu and set it as default (Figure 8).

Gripper Configuration Node

Confirm that the pink wire is connected to the an output port or confirm wrist connection for e-series.

This node is available at “Installation → URCaps → Gentle Gripper”. Select the output port connected to the gripper from the dropdown menu (Figure 7).

The button below the dropdown menu will set the output to true (releasing) or false (gripping). If the button displays “Initialize” and/or “Start”, click on the button and it will attempt to access the digital IO. The button and dropdown disable themselves if the attempt fails.

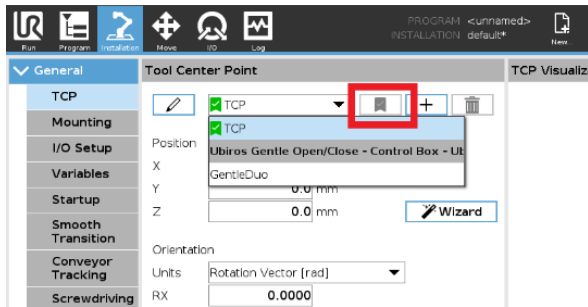


Figure 8 PolyScope TCP Window, e-Series

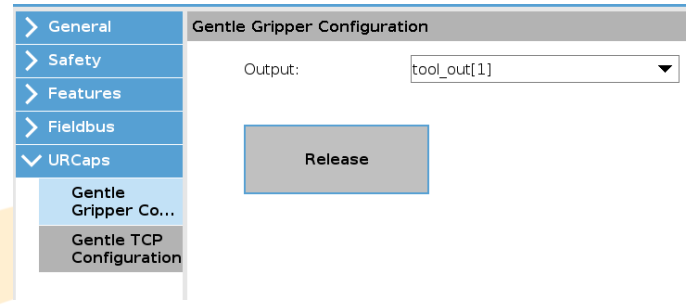


Figure 7 Gripper Configuration, e-Series

Gripper Actuation in Program

To add the gripper actuation node, go to “Program → URCaps” and select “Gentle Open or Close”. Select the “Gentle Open or Close” item from the program structure and switch to the “Command” tab. On the gripper actuation node screen, select either “Open” to open the gripper, or “Close” to close the gripper. Alternatively, you can use the SET function to set the gripper’s digital or tool output to 1 (HIGH - Open) or 0 (LOW - Close) to operate the gripper if you choose not to use the actuation program node.

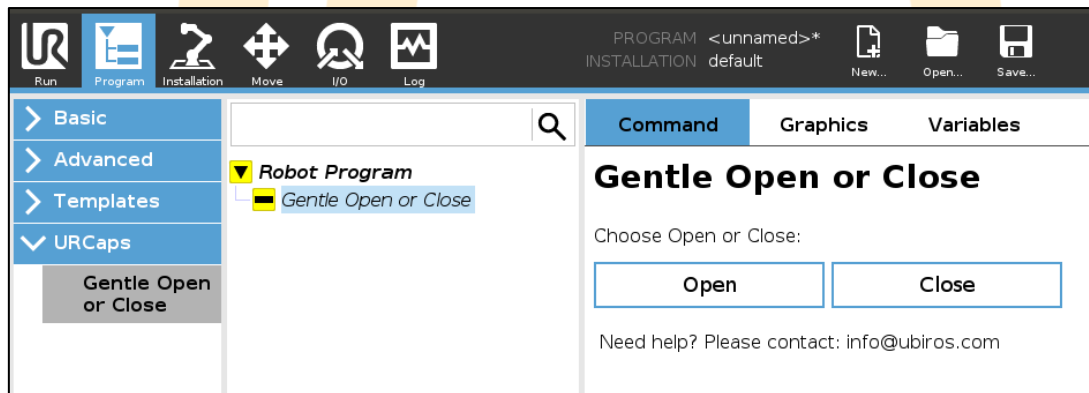


Figure 9 Gripper Actuation in Program, e-Series

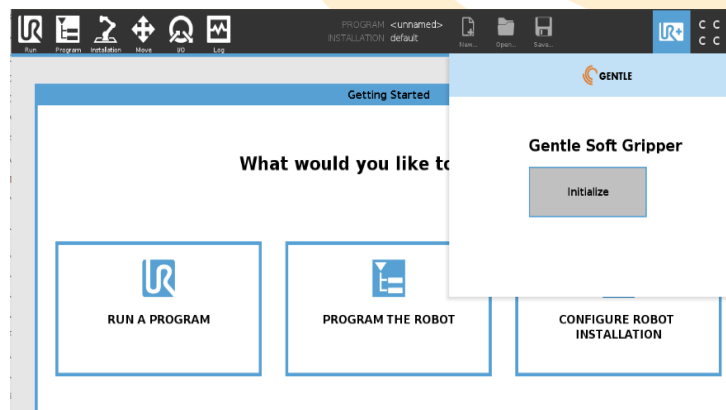


Figure 10 Toolbar, e-Series

Toolbar (e-Series only)

To use the toolbar, select the UR+ icon and the UBIROS - Gentle logo in the toolbar (Figure 10). Pressing the button will toggle the gripper between an opened and closed state. If the button displays “Release” it is in a gripping state and vice versa. If “Initialize” and/or “Start” are displayed, select the button to attempt IO access.

Universal Robots CB-Series

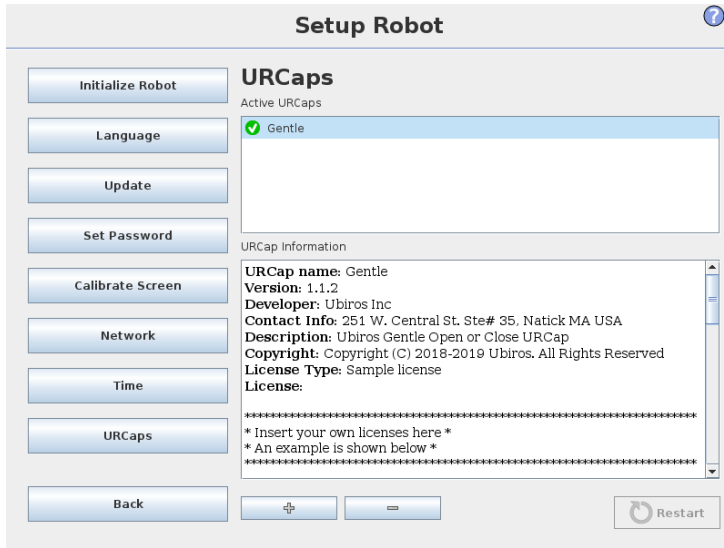


Figure 11 URCap Installation, CB-Series

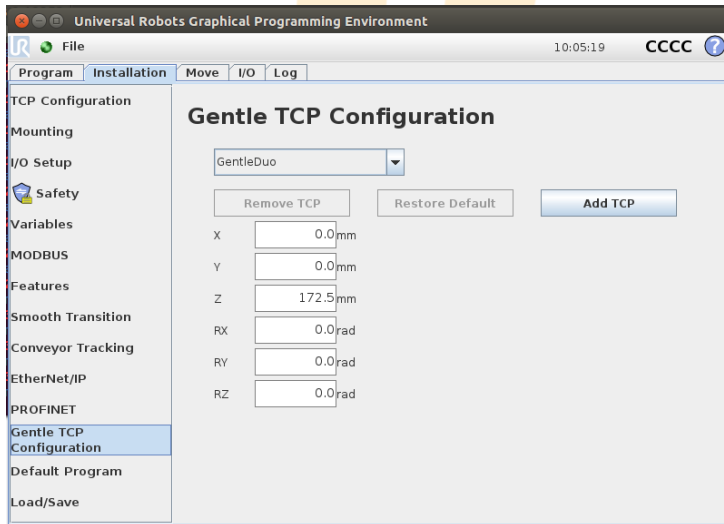


Figure 12 Gentle TCP Configuration, CB-Series

Gripper Actuation in Program

To add the gripper actuation node, go to “Program Robot → Program → Structure → URCaps” and select “Gentle Open or Close” (Figure 13). Select the “Gentle Open or Close” item from the program structure and switch to the “Command” tab (Figure 14). On the gripper actuation node screen, select either “Open” to open the gripper, or “Close” to close the gripper. Alternatively, you can use the SET function to set the gripper’s digital output to 1 (HIGH - Open) or 0 (LOW - Close) to operate the gripper if you choose not to use the actuation program node.

Installation

Copy the URCap downloaded from <https://www.ubiros.com/urcap.html> to a blank USB drive. Insert the USB drive into the teach pendant or controller.

Select “Setup Robot” on the main screen and choose “URCaps → +” (Figure 11). Navigate the available drives to find and select the .urcap file.

Restart PolyScope to finish installation. To add a TCP configuration, see the TCP Configuration section.

Uninstallation

To uninstall this URCap, navigate back to the screen shown in Figure 11 for e-Series, select the URCap and press the “-” button.

TCP Configuration

The window in Figure 12 is available at “Program Robot → Installation → Gentle TCP Configuration”.

To install the tool center point, choose your Gentle product from the dropdown menu and press the “Add TCP” button. To change the TCP values, select the text field, enter the new value and press the “Save Changes” button.

The “Remove TCP” button will remove the displayed configuration, and the “Restore Default” button will restore the default tool center point settings.

To set the added TCP configuration as active, navigate to “Program Robot → Installation → TCP Configuration”, select the added configuration from the dropdown menu and set it as default.

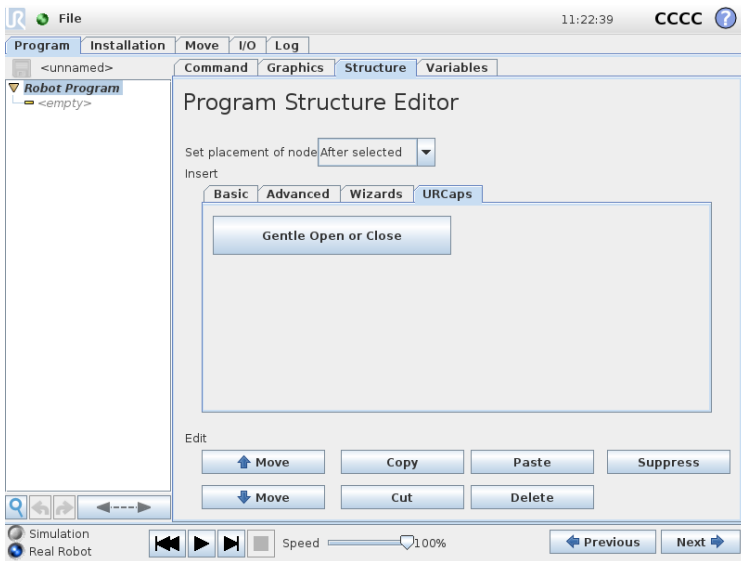


Figure 13 Add Program Node, CB-Series

Gripper Configuration Node

Confirm that the pink wire is connected to the correct output port.

This node in Figure 15 is available at "Installation → Gentle Gripper". Select the output port connected to the gripper from the dropdown menu. Tool outputs are not available on CB series.

The button below the dropdown menu will set the output to true (releasing) or false (gripping). If the button displays "Initialize" and/or "Start", click on the button and it will attempt to access the digital IO. The button and dropdown disable themselves if the attempt fails.

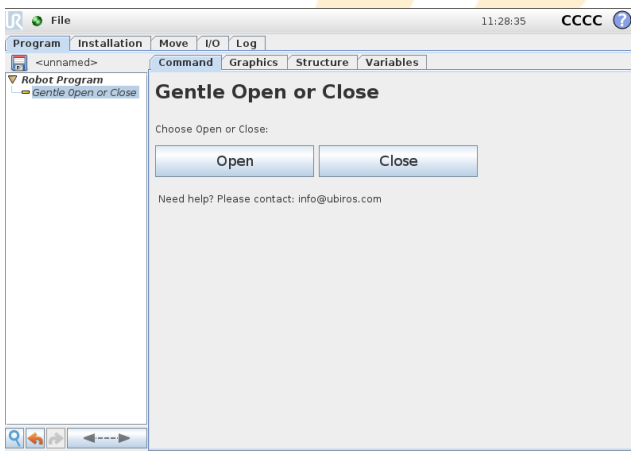


Figure 14 Gripper Actuation Node, CB-Series

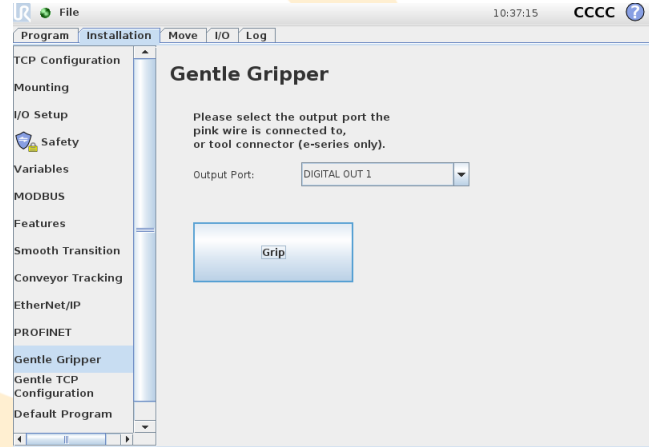


Figure 15 Gripper Configuration Node, CB-Series