VIM-303
Unboxing and
Hardware Assembly Manual

For Firmware Release 2.6.1

Scope and other documentation

This manual covers the process of connecting the VIM-303 to a robot. Other relevant manuals include:

- User Interface Manual
- Blockly Programming Manual
- Settings Manual
- First Picks with VIM-303 Manual

Unboxing VIM-303

The VIM-303 vision guidance system comes packaged in a cardboard box (Figure 1). Under the flap is an information label indicating that the assembly instructions are on the flash drive (Figure 2). The camera and flash drive are underneath the top layer of foam (Figure 3). It is recommended that you keep the cardboard box, as it will be a useful test object for your first picking experience (Figure 4). The back of the camera displays the camera's hostname, published on the network via mDNS, which you will need later (Figure 5).

Figure 1 - VIM-303 Packaging

Figure 2 - Information Label

Figure 3 - Camera and Flash Drive

Figure 4 - Camera, Flash Drive, and Box

Figure 5 - Camera's Hostname on Nameplate

Attaching the Gripper and VIM-303 Camera

The mounting procedure depends on the type of gripper you are using. See Appendix A for attaching the gripper and VIM-303 for the type of gripper you are using. After the gripper and camera have been attached, continue the instructions from here.

See Appendix A for Gripper and Camera Mounting Instructions

Plugging Everything In

Obtain a PoE switch capable of delivering at least 15W and prepare to plug the VIM-303 cable into it, but wait until the Powering Up step on the next page to plug it in. Plug the Universal Robots controller into the switch and power on the robot. Connect the switch to a network or connect a PC or tablet for isolated operation (Figure 18).
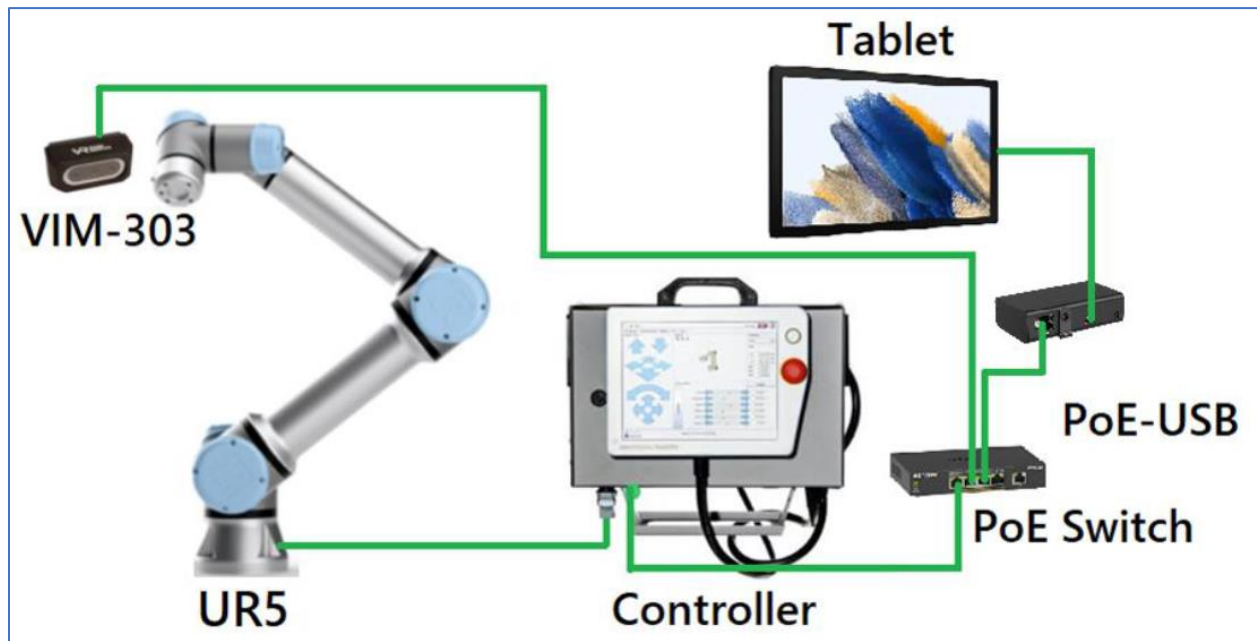
Figure 18 - Network Connections

Powering Up

Plug the camera into the PoE switch. Immediately the status lights should show solid blue on the left and blinking or solid orange on the right, indicating that the camera is booting (Figure 19). The orange light is the Ethernet activity light, while the blue light is a boot status light. After about 45 seconds, the left boot status light should alternate between white and green about once per second and the right Ethernet activity light should blink green if connected to a high-speed (Gigabit) network or orange otherwise.

| Blue / Orange Booting | White / Green alternate with Green / Green Running |

Figure 19 - Power Up Indications

Network Connection

The camera can connect to a network in several ways. Figure 20 indicates the factory default network configuration of the camera. If it is connected to a network supporting DHCP, it will receive an address from the DHCP server. If it is connected to an isolated network, it will generate a static address at 192.168.1.47. The camera broadcasts its hostname over mDNS as indicated on the label on the back of the camera, for example **vrobotics8771.local** (Figure 5). The camera can be set to a static IP address from the camera's web interface. First connect to the camera in its default configuration as indicated in Figure 20 and then change the camera's network address to static by following the instructions on **Static Network Configuration** later in this manual.

Network Type	IP address
mDNS (static or DHCP)	vrobotics8771.local (whatever is on nameplate)
DHCP	IP address leased from router
Isolated network	192.168.1.47

Figure 20 - Factory Default Network Configuration

Connect to the Camera

Connect to the camera via http (standard port 80) as follows. Let's assume the camera is on a DHCP network, has been leased an address of 192.168.0.100, and that its hostname (printed on the nameplate on the back of the camera) is vrobotics8771. Below are the two methods of connecting to the camera (using a web browser such as Google Chrome):

http://192.168.0.100
http://vrobotics8771.local

If you are using an isolated network (such as in Figure 18) with no DHCP server, the camera's default address will be 192.168.1.47 and you can access the camera using a web browser as follows:

http://192.168.1.47

When you have connected to the web interface, you will see a screen that looks like this (Figure 21). A brand new camera has no programs created, so the Home screen is blank. Programs are created by pressing the Configure button as indicated in the User Interface manual.
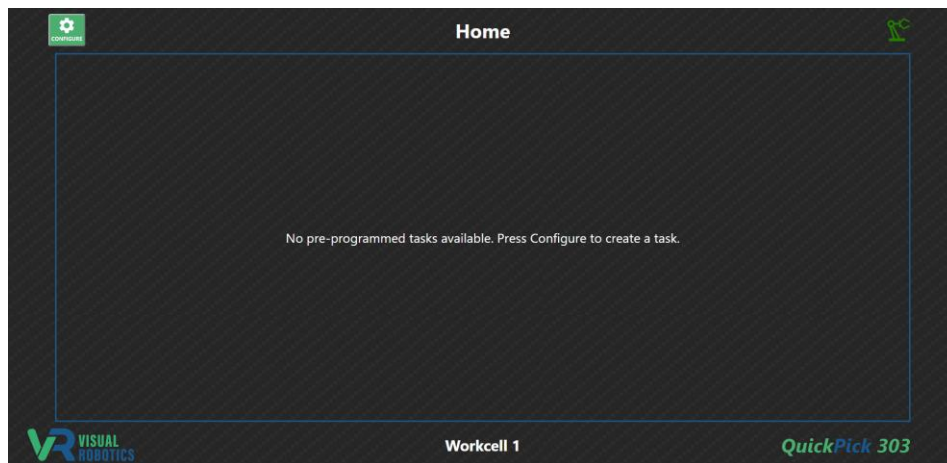
Figure 21 - QuickPick303 Home Screen (Task Menu)

Familiarity with the User Interface

You are encouraged to read the User Interface Manual at this point in order to become familiar with navigating the camera's web interface. You will need to navigate to the settings page in the programming menu in order connect the camera to the robot.

Changing Camera's IP Address

You will need to navigate to the settings page in the programming menu in order to change the camera to a static IP address. Figure 22 shows the IP address options available. See the User Interface Manual for instructions on how to set a static IP address.

IP Address Setting	DHCP Server?	DHCP Subnet	Static Address	DHCP Address
auto	Yes	192.168.1.xx	disabled	Yes
auto	Yes	not 192.168.1.xx	disabled	Yes
auto	No	N/A	192.168.1.47	No
static address	Yes	same as address	static address	Yes
static address	Yes	different from address	disabled	Yes
static address	No	N/A	statis address	No

Figure 22 - Camera IP Address Options

Connecting to the Robot

The camera needs to be connected to the robot in order to control it. The procedure is different between a UR CB-series robot and UR e-series robot, described in separate sections as follows.

Connecting to UR e-series

Press the green On button (Figure 23). Follow steps in Figures 24A - 24D to prepare the robot.
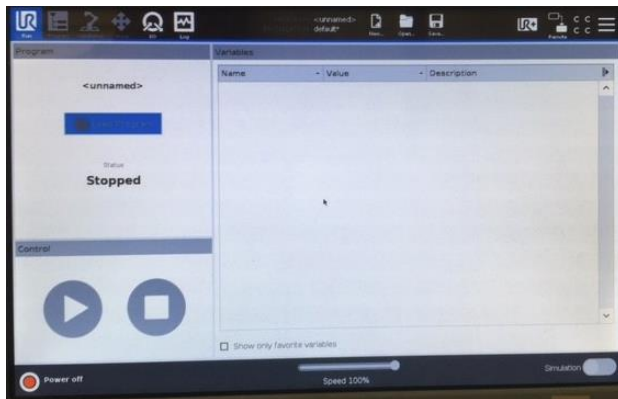

Figure 23 - Pendant "ON" Button

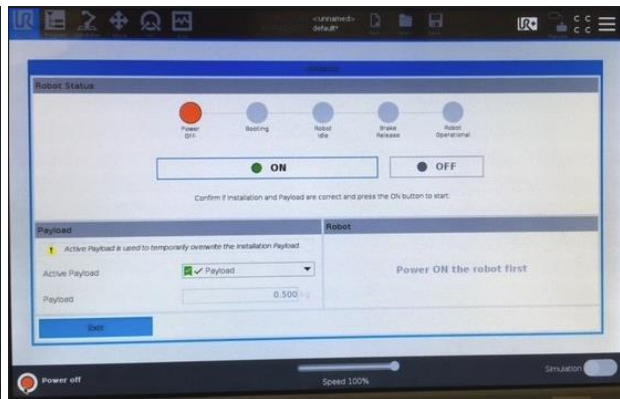
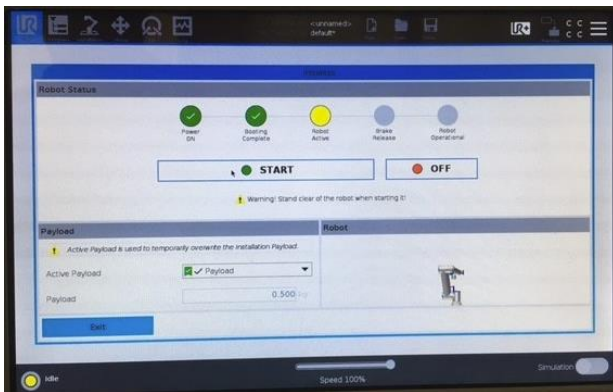**Figure 24A - Press Red "Power Off" Button**

Figure 24B - Press "ON"

Figure 24C - Press "START"
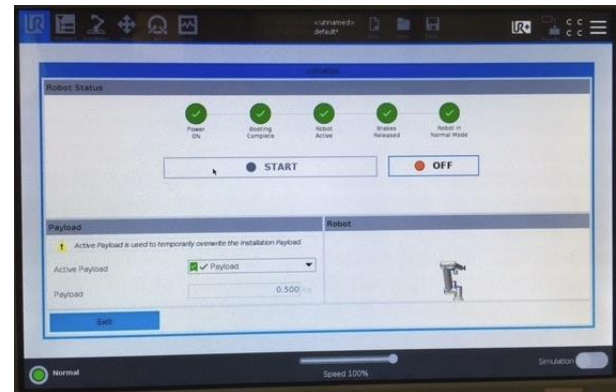
Figure 24D - Press "Exit"

Recovery after Power Cycling

If the robot is power cycled, follow the steps of Figure 24A - 24D.

Local vs Remote Mode

The e-Series robots allow the operator to operate the pendant when the robot is in **Local Mode**. The robot can be controlled by another system (such as the VIM-303 camera) when it is in **Remote Mode**. Figure 25 shows the icon to press to change between Local and Remote modes.
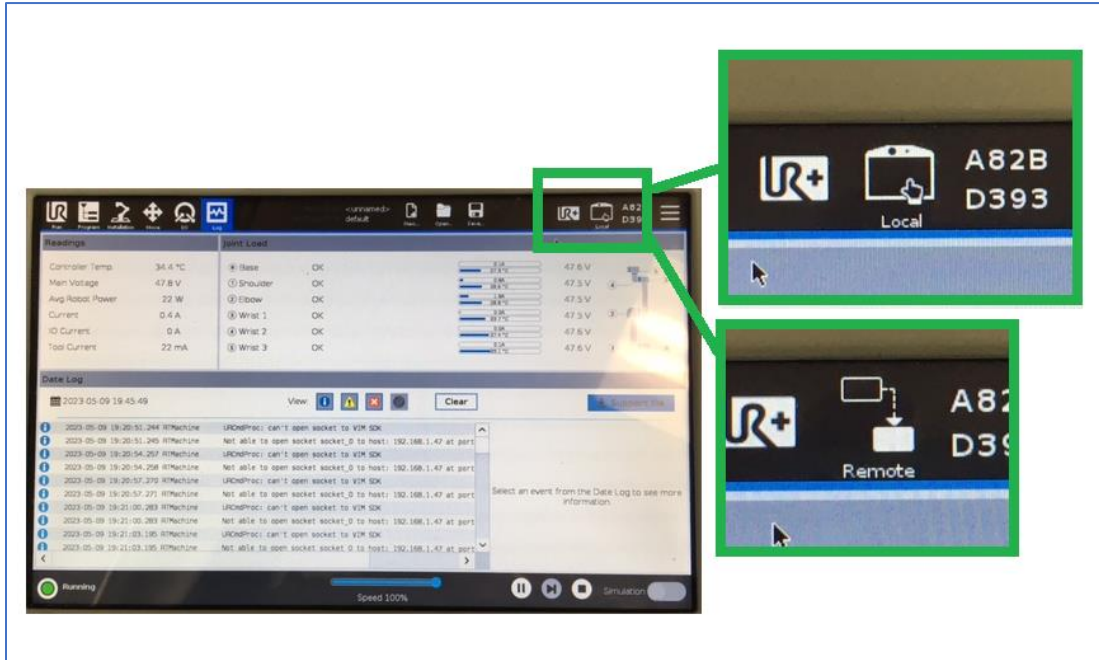

Figure 25 - Local vs Remote Mode

Confirming Program Status

The VIM-303 camera runs a program on the robot in order to control it. The status of this program can be monitored by viewing the program status screen (pressing UR button in upper left) as shown in Figure 26. The program **vrobotics_main*** will show as running. No program will be running until the robot's network interface has been configured and the camera configured to talk to the robot.
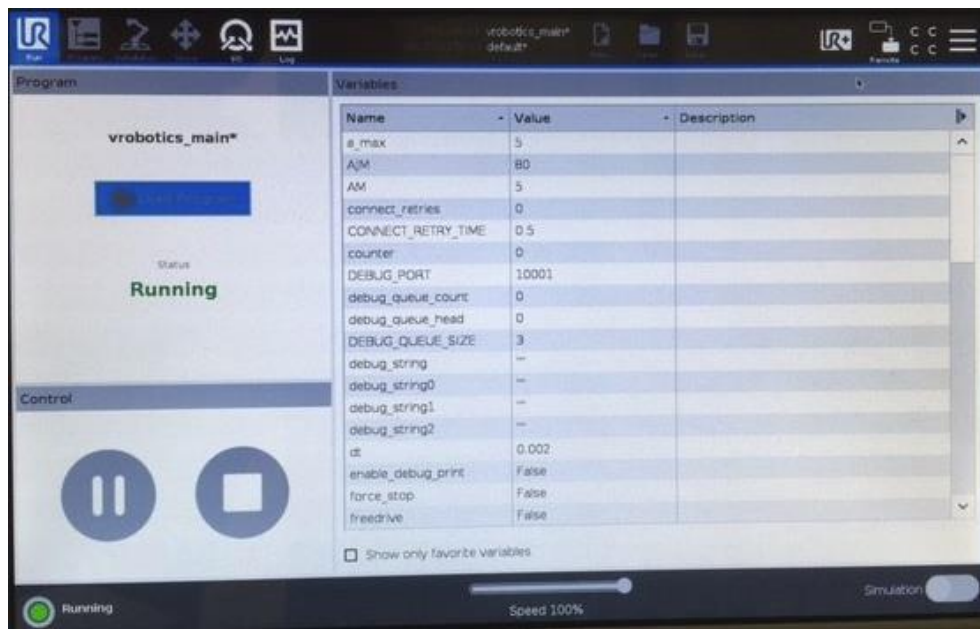

Figure 26 - Indication that VIM-303 is controlling the robot

Configuring the Network Address

The VIM-303 camera communicates with the robot over Ethernet. To configure the robot's network address, the robot must be in **Local** mode. Configure the robot's network address by following the steps in Figure 27A - 27D (this only needs to be done once as part of initial setup). The robot must be set to a static network address (or a static DHCP address lease), which is entered in the step of Figure 27E. Remember this address in order to enter it into the VIM-303 camera's user interface.
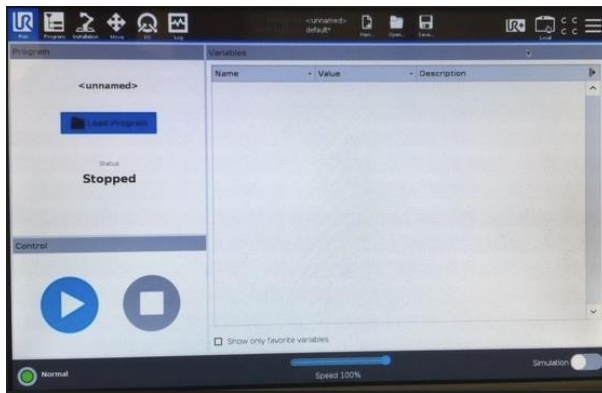
Figure 27A - Press Hamburger Menu (upper right)
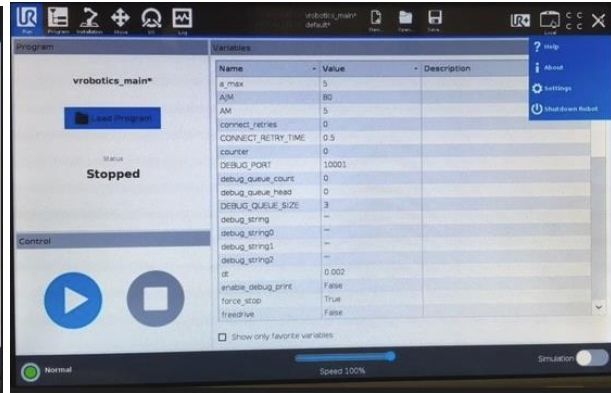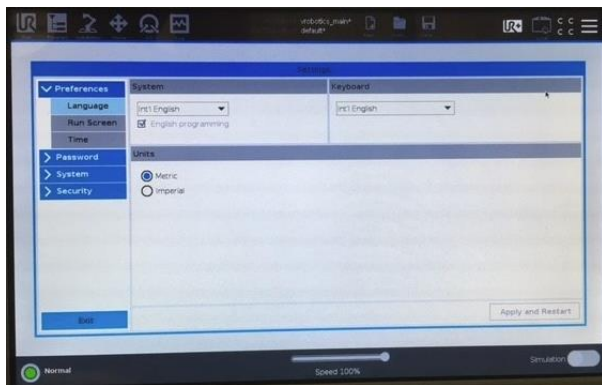

Figure 27B - Press Settings Gear
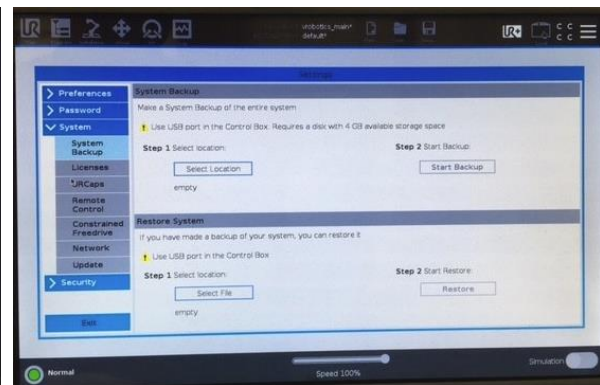

Figure 27C - Press "System"
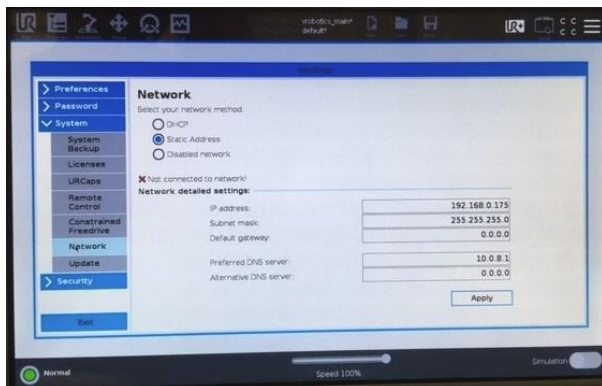

Figure 27D - Press "Network"

Figure 27E - Enter Static Address Parameters and press "Apply"
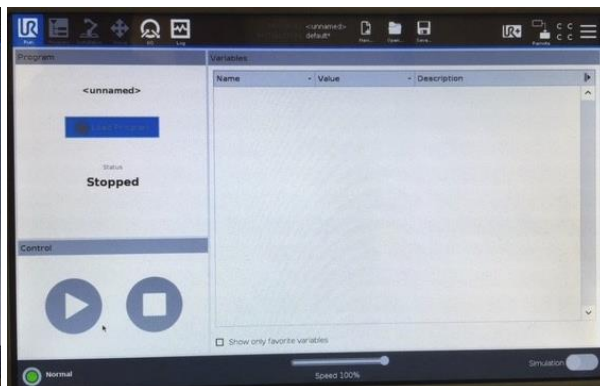

Figure 27F - Press "Remote"

Connecting to UR CB-series

Press the green On button (Figure 28). Follow steps in Figures 29A - 29D to prepare the robot.
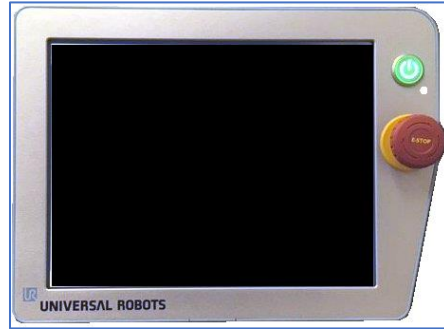

Figure 28 - Pendant "ON" Button

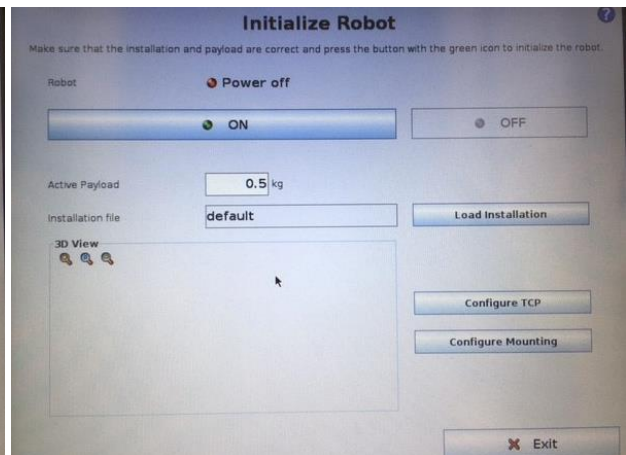**Figure 29A - Press "Go to Initialization Screen"**

Figure 29B - Press "ON"

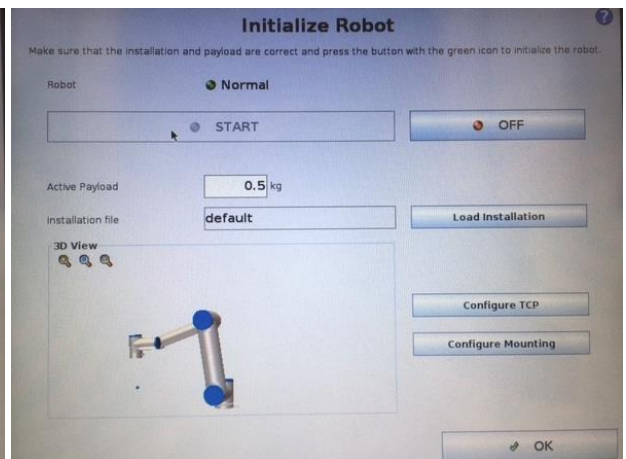**Figure 29C - Press "START"**

Figure 29D - Press "OK"

Recovery after Power Cycling

If the robot is power cycled, follow the steps of Figure 29A - 29D.

Configuring the Network Address

The VIM-303 camera communicates with the robot over Ethernet. Configure the robot's network address by following the steps in Figure 30A - 30D. The robot must be set to a static network address (or a static DHCP address lease), which is entered in the step of Figure 30C. Remember this address in order to enter it into the VIM-303 camera's user interface.

Figure 30A - Press "Setup Robot"

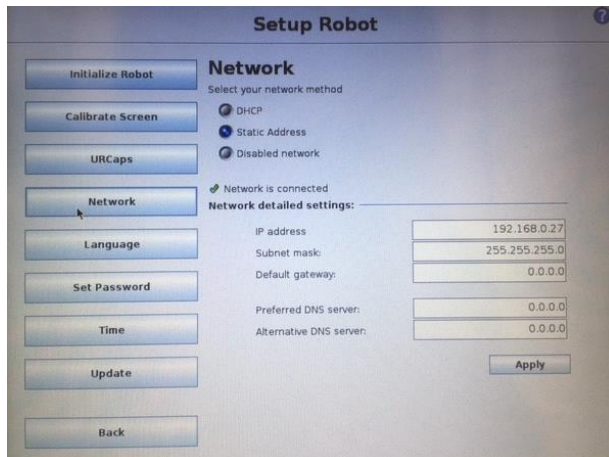**Figure 30B - Press "Network"**

Figure 30C - Enter Static Address Parameters and press "Apply"

Figure 30D - After Pressing "Apply"

Confirming Program Status

The VIM-303 camera runs a program on the robot in order to control it. The status of this program can be monitored by following the steps in Figure 31A - 31B. The program will run after the robot's network interface has been configured and after the camera has been configured.
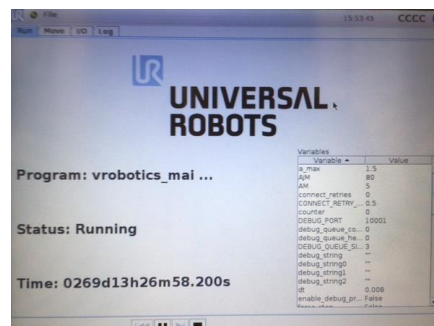

Figure 31A - Press "Run Program"

Figure 31B - Program Status Screen

Getting to the VIM-303 Settings Page to Configure the Camera to Talk to the Robot

To change settings to configure the camera to talk to the robot, press the **Configure** gear at the Home screen (Figure 32), which leads you to the Configuration screen (Figure 33). Then press the **Settings Tab** to be able to change settings (Figure 34).
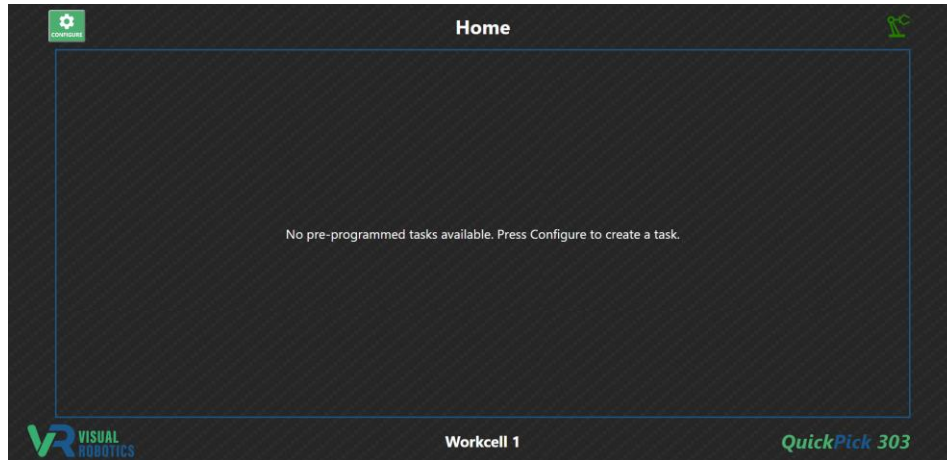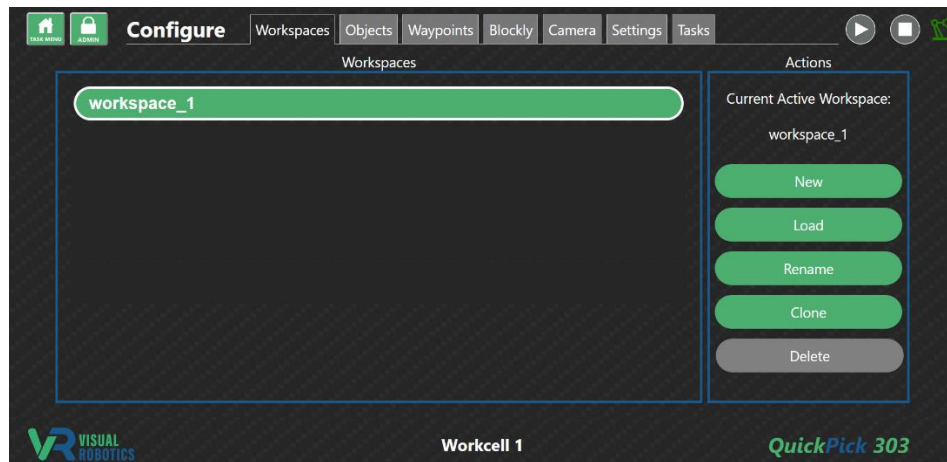

Figure 32 - Press Configure Gear

Figure 33 - Press Settings Tab

Figure 34 - Settings Tab

Configuring the Camera to talk to the Robot

On the **Settings Tab**, select the **robot** module and select **ip** (Figure 35). Change the value to match the robot's IP address. Press **Set Value** and **Save**. In the **robot** module select **type** (Figure 36). Set to a value that is not **NONE**. Set the robot type to match the type of robot being used, either **UR3** or **UR5**. In this software release, it doesn't matter what type of robot it is set to, either **UR3** or **UR5**, as long as it is not **NONE**. Press **Set Value** and **Save**. The robot status icon in the upper right of the screen should change from red to green after a few seconds.
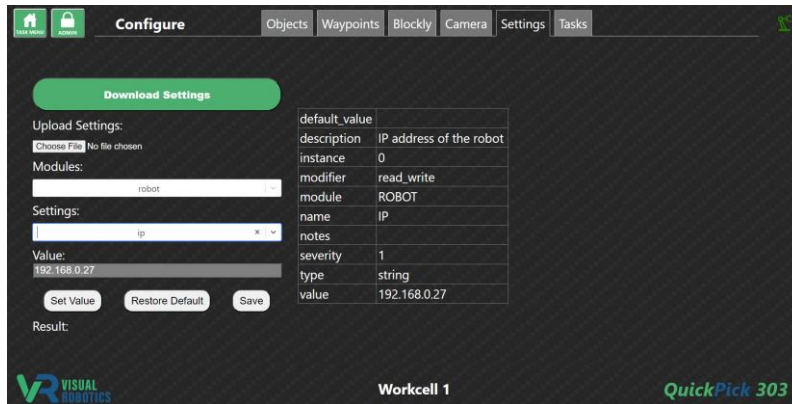

Figure 35 - Setting Robot's IP Address
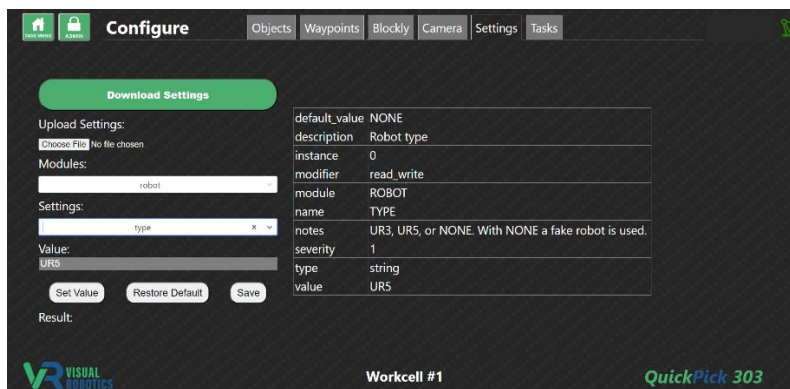
Figure 36 - Setting Robot Type

Reinitializing connection to robot

If the robot status icon (upper right) doesn't change to green after 30 seconds, reinitialize the connection to the robot Select the **robot** module, select **reinit** and set the value to 1 (Figure 37). Press **Set Value**. The camera's robot driver will reinitialize and connect to the robot and the robot status icon should turn green.
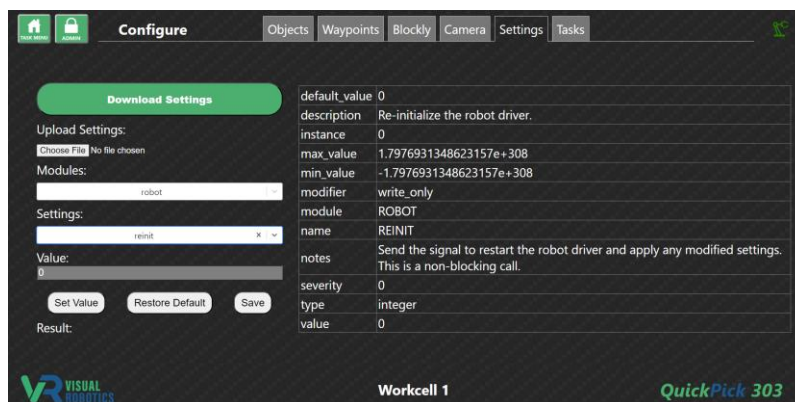

Figure 37 - Reinitializing Connection to Robot

Confirm Camera can Control Robot

Navigate to the **Waypoints Tab**. Press one of the jog buttons a few times until the robot moves. After the first press, the camera loads a program (called the **UR command processor**) that interfaces with the camera. Movement should be observed, and the coordinate readout should change. The camera is now connected to the robot (Figure 38).
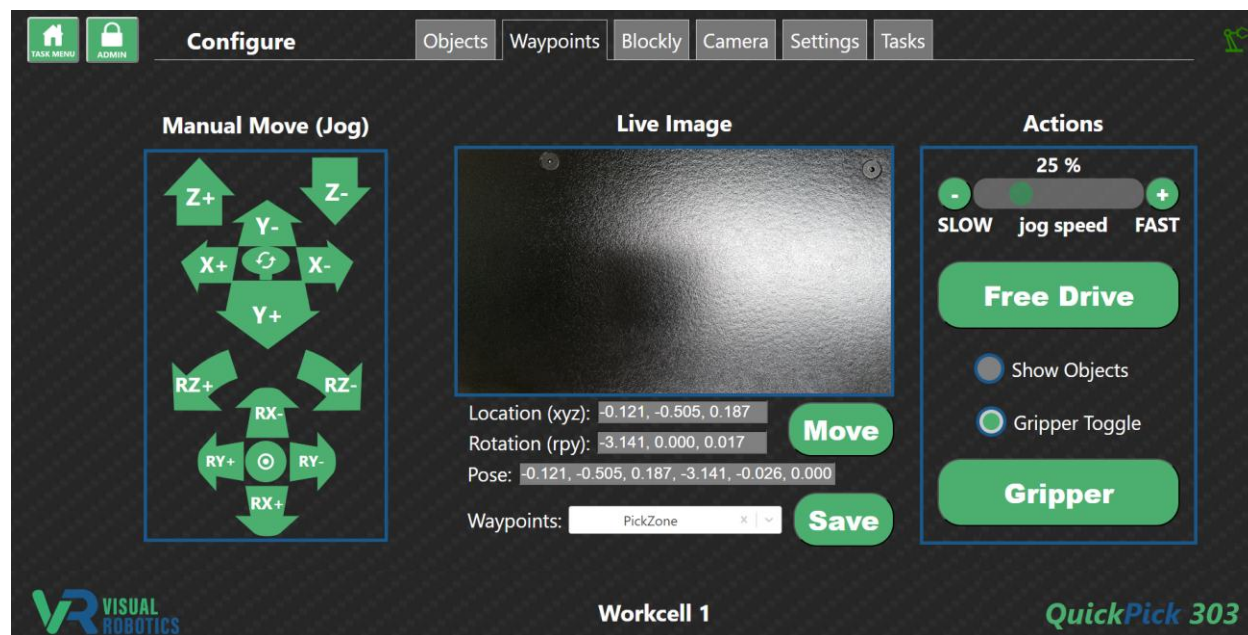

Figure 38 - Waypoints Tab

Troubleshooting Camera Connection to Robot

If you are not able to successfully jog the robot from the **Waypoints Tab**, consult Figure 39 for troubleshooting procedures.

Symptom	Remedy
Can't see camera's web page	See "Connect to Camera" (page 5) Check IP address (Figure 22)
Robot doesn't move when jogging	Is robot status icon not green? (see below)
Robot status icon is gray	Is robot type set to something other than NONE? (page 12)
Robot status icon is red	Is network cable connected? Are camera's and robot's IP address on same subnet? Can you **ping** both the camera and robot?
Robot status icon is yellow	Camera's **command processor** program is not running on robot - reinitialize (page 12)

Figure 39 - Troubleshooting Camera Connection to Robot

Contact Visual Robotics if these troubleshooting procedures are not effective.

Configuring Grippers

The VIM-303 camera must be configured to properly operate the gripper. Figures 40 through 42 show the different gripper types and the settings that must be set for each gripper type. Note: the robot's TCP (Tool Center Position) offset is being set by the VIM-303 camera. The value of the TCP on the robot's pendant is overridden by the VIM-303 camera. The pendant will not show the value that the VIM-303 camera has set the robot's TCP to. This software release requires these three settings to be changed when the gripper is changed. It is suggested that the Programmer creates different **Workspaces** for each gripper type, so that these values can be common to all Tasks using the same gripper type. Future software versions will have a more streamlined approach for setting gripper types and even changing them during program operation, which would be needed if a tool changer were used with the robot.

Module	Setting	Value
ROBOT	GRIPPER	generic
ROBOT	TCP_OFFSET	0, 0, 0.210, 0, 0, 0
TRACKER	TCP_CAMERA_OFFSET	-0.027, 0.077, -0.155, 0, 0, 3.14159

Figure 40 - Settings for Visual Robotics Suction Gripper

Module	Setting	Value
ROBOT	GRIPPER	robotiq_vacuum
ROBOT	TCP_OFFSET	0, 0, 0.155, 0, 0, 0
TRACKER	TCP_CAMERA_OFFSET	-0.027, 0.077, -0.095, 0, 0, 3.14159

Figure 41 - Settings for Robotiq E-Pick Suction Gripper

Module	Setting	Value
ROBOT	GRIPPER	robotiq_2finger
ROBOT	TCP_OFFSET	0, 0, 0.180, 0, 0, 0
TRACKER	TCP_CAMERA_OFFSET	-0.027, 0.077, -0.105, 0, 0, 3.14159

Settings result in a 5mm finger engagement when picking up a 50mm object

Figure 42 - Settings for Robotiq 2F-85 and 2F-140 Two Finger Grippers

Robotiq Configuration

The Robotiq Grippers require additional configuration on the Universal Robot Pendant. For detailed instructions, refer to the respective Robotiq E-Pick, 2F-85 and 2F-140 Gripper manuals. Here is an overview of the steps to configure the gripper (for an e-Series robot):

1. Put robot in **Local Mode**
2. Install the Robotiq UR-Cap
3. Go to **Installation -> General - Tool I/O** and select **Controlled by Robotiq Grippers** (Figure 43)
4. Go to **Installation -> URCaps -> Vacuum** and press **Scan** and it shows **Epick** (Figure 44) or choose **Gripper** when using the 2F-85 or 2F-140 grippers
5. Put robot in **Remote Mode**

If the gripper cannot be actuated from the Waypoints Tab, the gripper settings may need to be reset using instructions in this section.
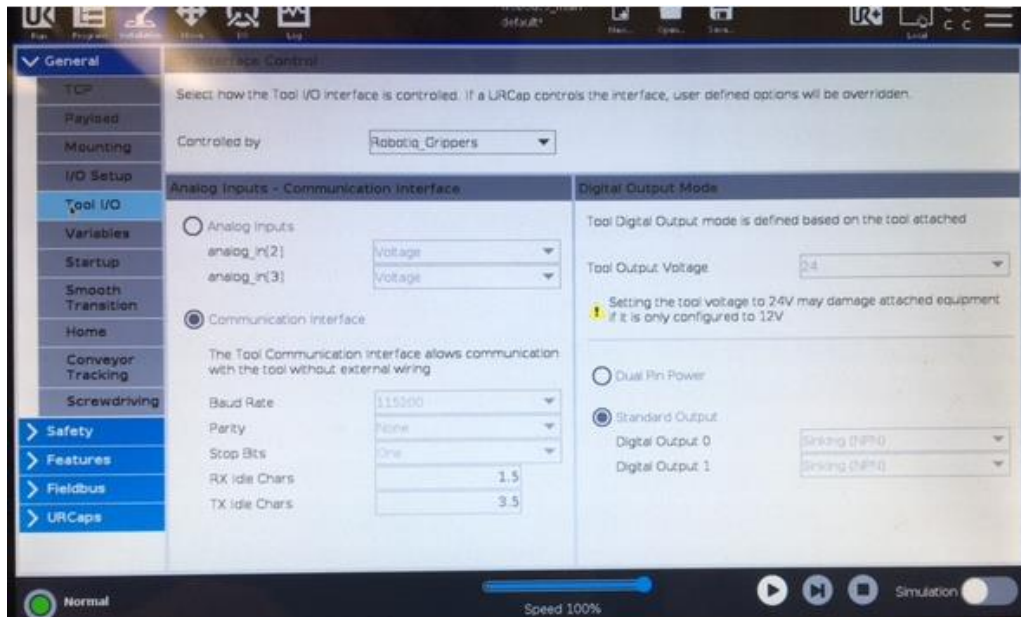

Figure 43 - Allow Robotiq E-Pick Gripper to control Tool IO
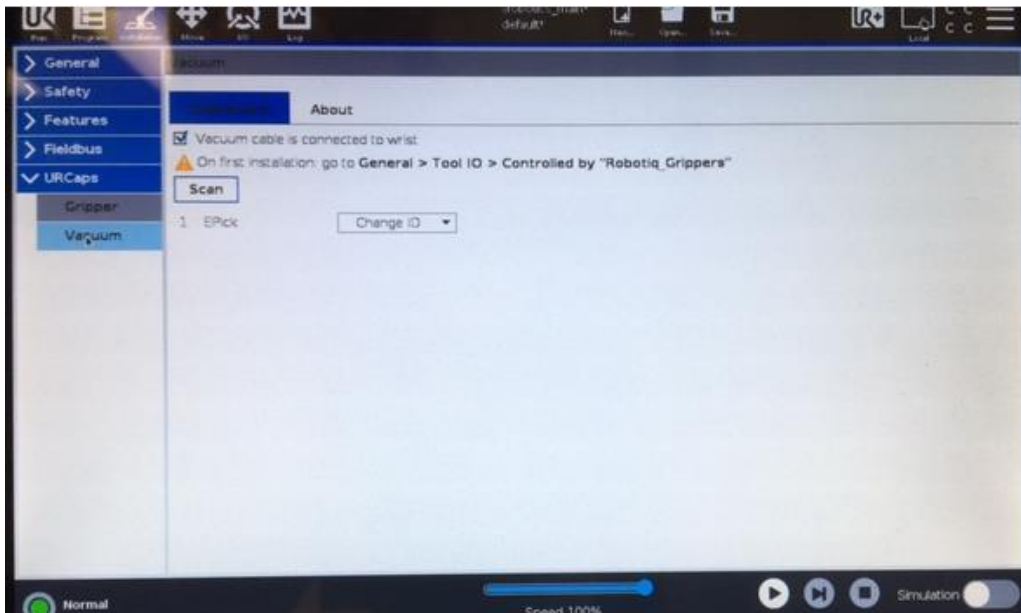

Figure 44 - Scan for Robotiq E-Pick Gripper

Verifying Gripper Operation

On the **Waypoints Tab**, press the **Gripper** button to actuate the gripper and then press it again to release it (Figure 45).
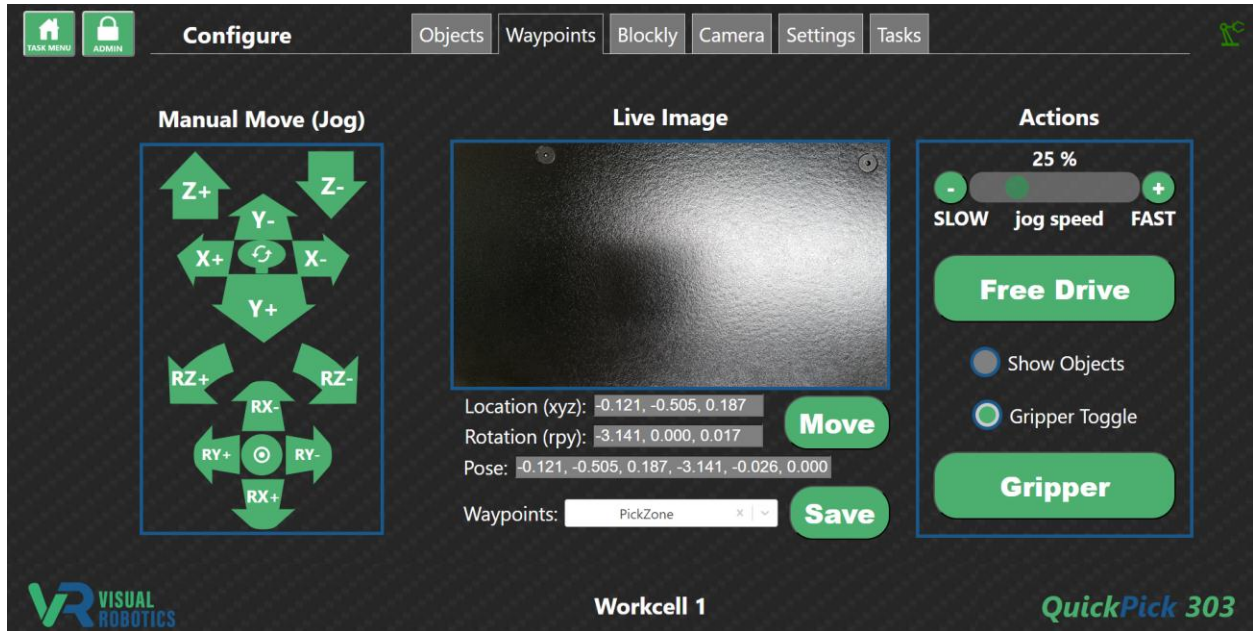

Figure 45 - Waypoints Tab to verify gripper operation

Next Steps

The robot, gripper, and VIM-303 camera are now configured. See the User Interface manual to learn how to create tasks using the QuickPick-303 software.
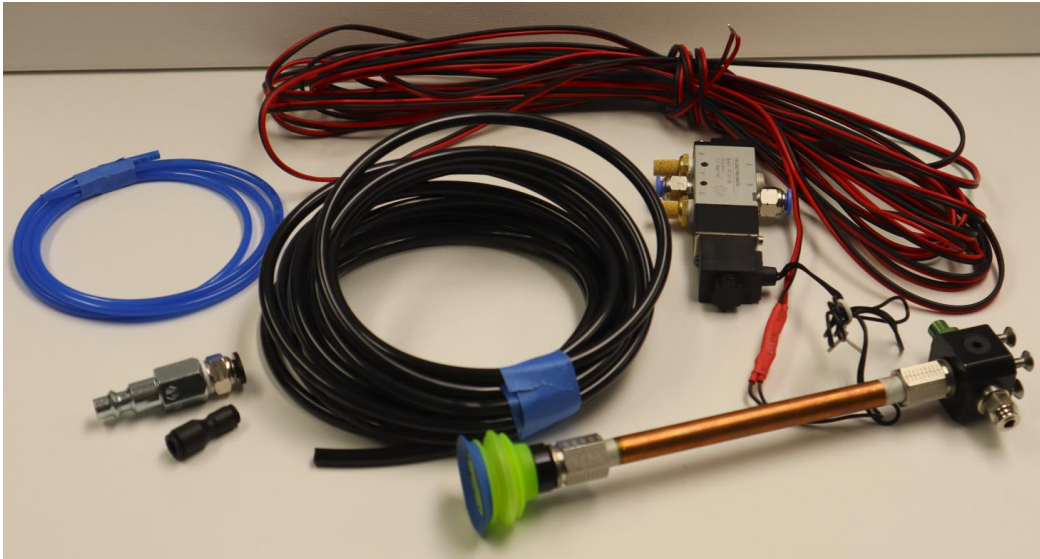
Appendix A

Attaching Grippers
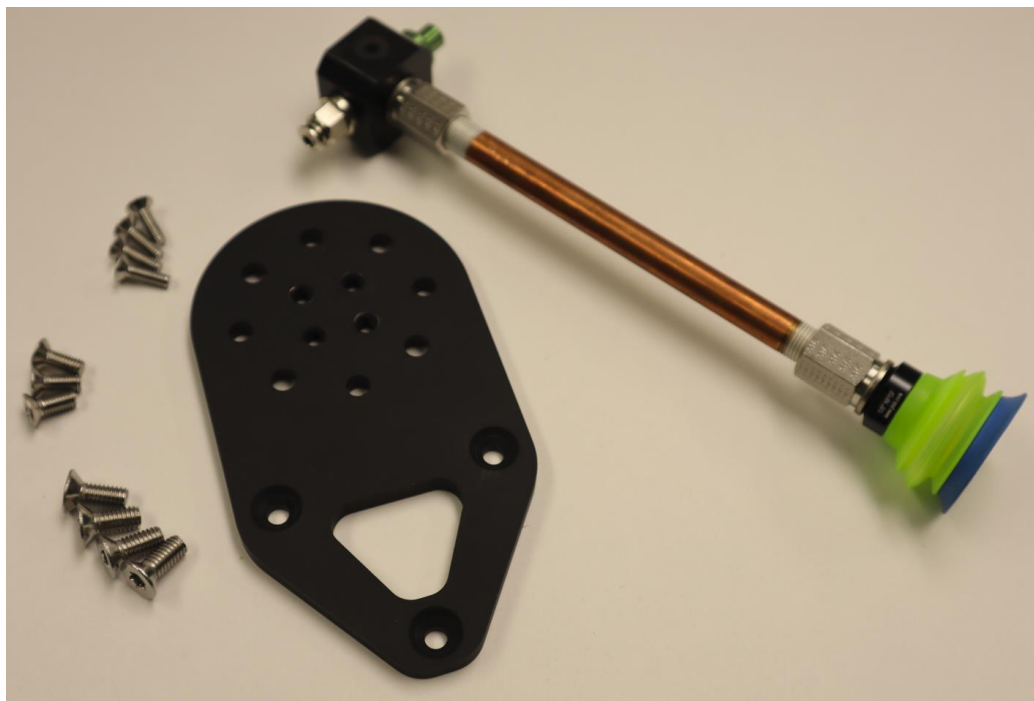# and VIM-303 Camera

Visual Robotics Suction Gripper Kit

Kit Contents

Figure A1 shows the Visual Robotics gripper kit components. Figure A2 shows the Mount and the suction end effector from the gripper kit.

Figure A1 - Visual Robotics Suction Gripper Kit Components

Figure A2 - Mount and Suction End Effector

Assemble the suction end effector to the mount (Figure A3), ensuring that the green exhaust port faces toward the triangular face of the mount and the gripper is on the side of the mount with the circular ridge. The end effector is fastened to the mount with the four included M4 flathead screws (Figure A4). Attach the mount assembly to the wrist of a Universal Robots UR3, UR5, or UR10, ensuring that the air inlet port is aimed in the same direction as the wrist connector using the four included M6 screws (Figure A5).
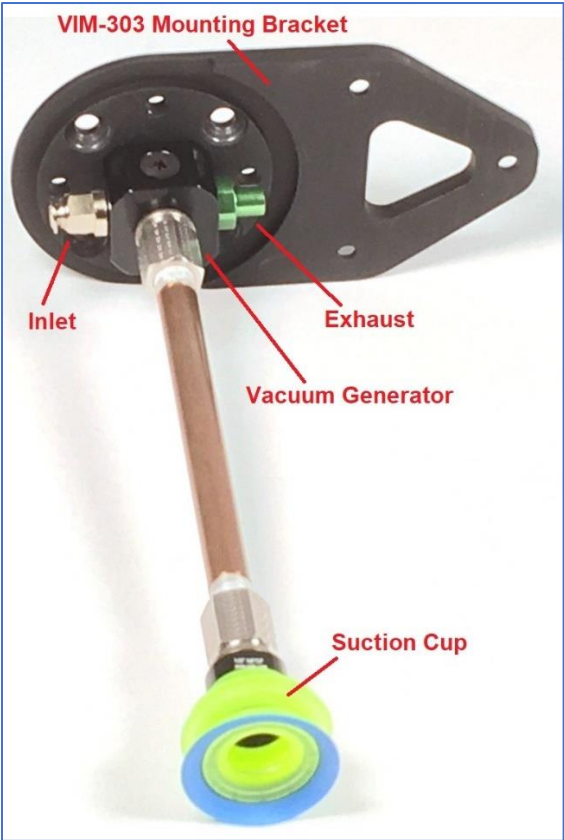

Figure A3 - Assembling Gripper to Mount

**Figure A4 - Gripper Mounting Screws**

Figure A5 - Orientation for Mounting on Robot Wrist

Assembling the Pneumatic Valve

Connect the wires from the valve to DO0 and 0V on the Universal Robots controller (Figure A6). Polarity isn't critical, but for convention hook the black wire to 0V. Cut the black 6mm tubing to length as desired and connect the air inlet tubing to port P and the controlled air outlet to the gripper to B (Figure A7). Attach the compressor coupling to the tubing connected to port P (Figure A8) and connect the 6mm to 4mm adapter to the tubing connected to port B (Figure A9). Connect the 4mm tubing to the gripper (Figure A10).
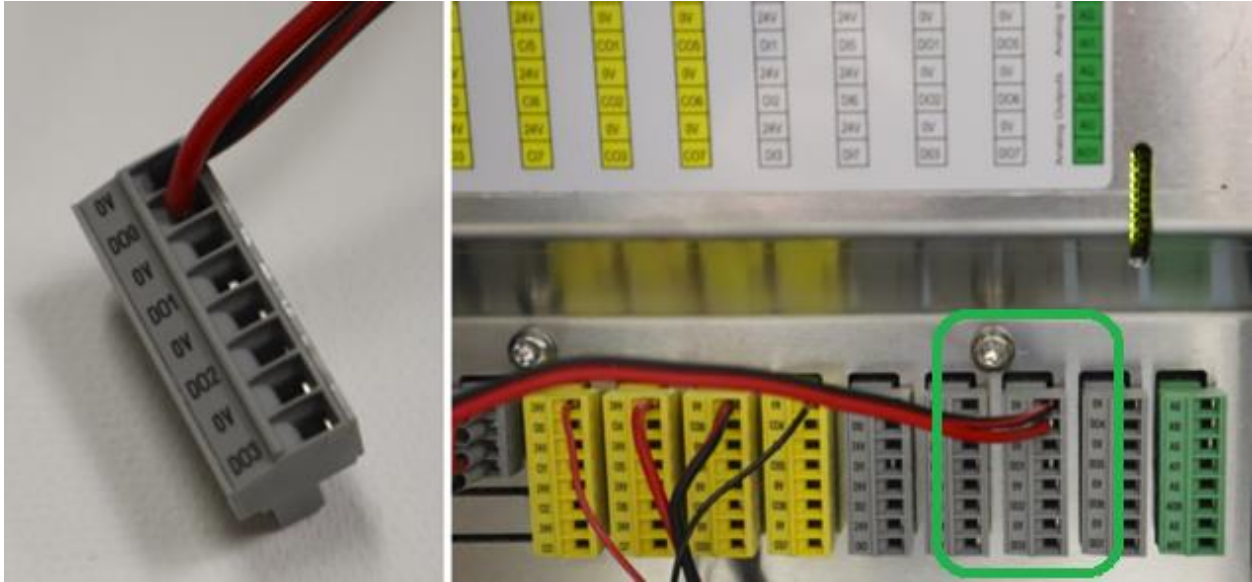
Figure A6 - Electrical Connection of Valve to Universal Robots Controller
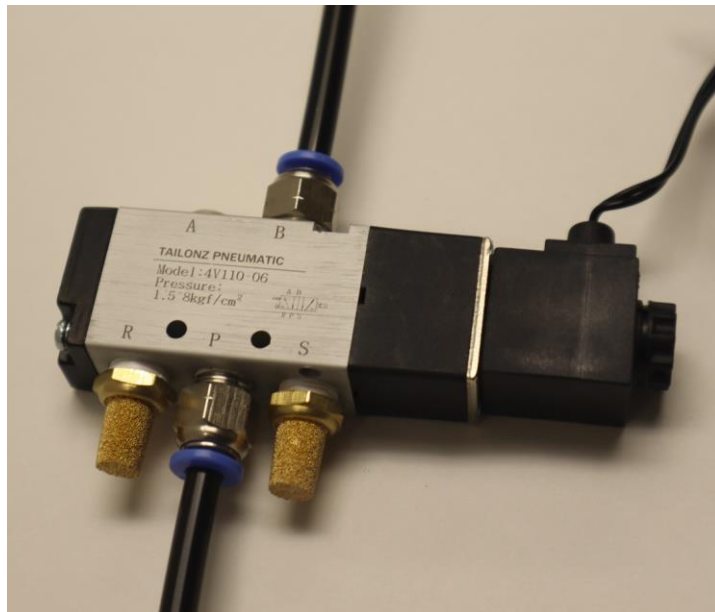
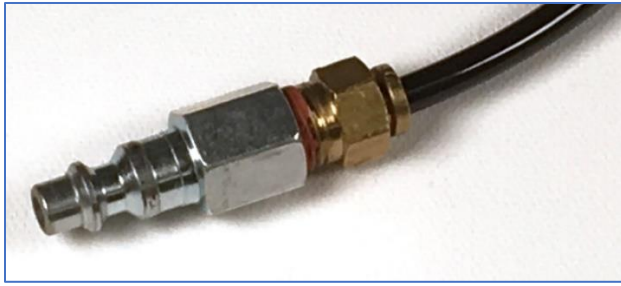**Figure A7 - Pneumatic Hose Connections to Valve**

Figure A8 - Compressor Connection

Figure A9 - 6mm to 4mm adapter
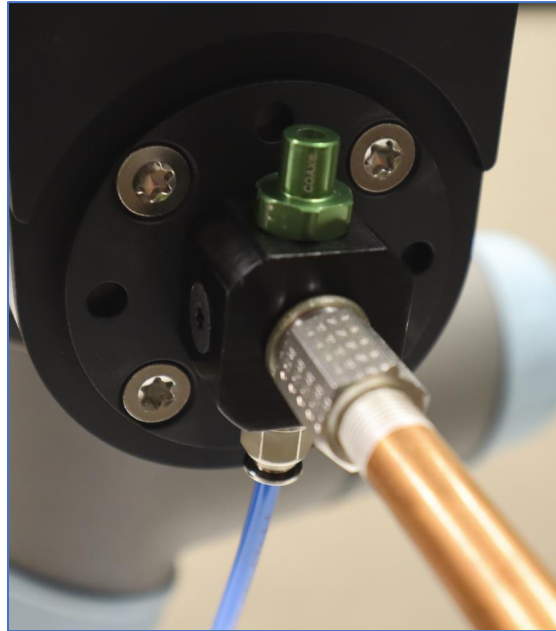
Figure A10 - 4mm Tubing Connection to Gripper

Assembling the Camera to the Mount and Attaching the Cable

Attach the camera onto the mount using the three included M5 screws (Figure A11). Loosely place the screws in first and then tighten in order to maximize the mounting accuracy. Carefully screw the Ethernet cable into the camera with the cable oriented as shown (Figure A11).

Figure A11 - Camera Attachment to Mount and Cable Orientation

Robotiq E-Pick Suction Gripper

Figure A12 shows the components for the Robotq E-Pick Suction Gripper Kit. The Robotiq Coupling Interface and Robotiq E-Pick Gripper are manufactured by Robotiq. The VIM-303 Mounting Bracket and screws are manufactured by Visual Robotics. Figure A12 is shown for the Universal Robots e-Series. Cable attachment for the Universal Robots CB-Series is different, described in the CB-Series section at the end.

Figure A12 - Robotiq E-Pick Suction Gripper Kit components

Attaching VIM-303 Mounting Bracket and Robotiq Coupling Interface

As shown in Figure A13, place the VIM-303 Mounting Bracket with the circular ridge side away from the robot's wrist and with the triangular portion aimed opposite of the wrist connector. Place the Robotiq Coupling Interface on top of the VIM-303 Mounting Bracket and orient its cable so it points toward the wrist connector. The contact pins of the Coupling Interface should be oriented as shown in Figure A13. Screw the Coupling Interface and Mounting Bracket into the robot's wrist using the four M6x16 screws. Loosely place the screws in first and then tighten in a diagonal pattern in order to maximize the mounting accuracy.
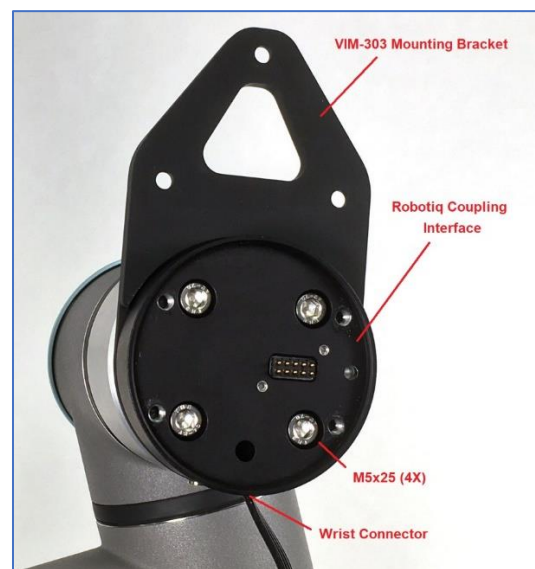
Figure A13 - Attaching VIM-303 Mounting Bracket and Robotiq Coupling Interface

Attaching the Robotiq E-Pick Gripper

As shown in Figure A14, attach the Robotiq E-Pick Gripper to the Robotiq Coupling Interface using the four M5x25 screws, ensuring that the gripper contacts are oriented properly with respect to the Robotiq Coupling Interface contacts. Loosely place the screws in first and then tighten in a diagonal pattern in order to maximize the mounting accuracy.

Figure A14 - Attaching the Robotiq E-Pick Gripper

Attaching the VIM-303 Camera

Attach the camera onto the mount using the three included M5x12 screws (Figure A15). Loosely place the screws in first and then tighten in order to maximize the mounting accuracy.

Figure A15 - Attaching VIM-303 Camera

Attaching the Cables

Carefully screw the Ethernet cable into the camera with the cable oriented as shown (Figure A16). Attach the Robotiq Cable to the robot wrist connector as shown (Figure A16).


Figure A16 - Attaching Cables

Universal Robots CB-Series

The Universal Robots CB-Series does not have digital communication to the wrist. A different Robotiq Coupling Interface is required to connect to a CB-Series robot (Figure A17). Attach this Coupling Interface so that the contact pins are oriented with respect to the robot wrist as shown in Figure A13. The cable will be sticking out the side instead of downward. Follow the rest of the steps through the step of attaching the Ethernet cable to the VIM-303 camera. Attach the Robotiq extension cable to the Coupling Interface cable and connect it to the Robotiq Communication Adapter (Figure A18) as directed in the Robotiq manual.

Figure A17 - CB Series Robotiq Coupling Interface
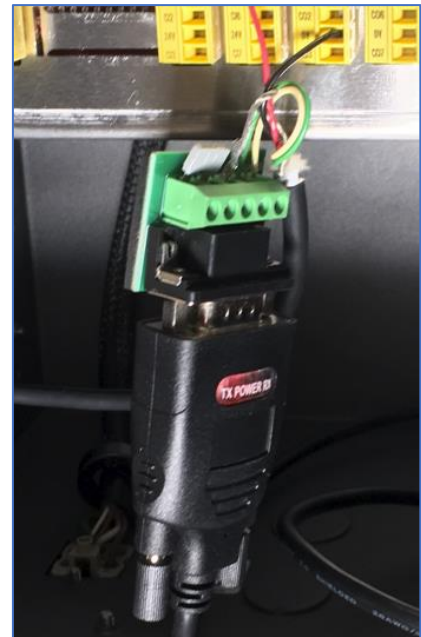
**Figure A18
Robotiq Communication Adapter**

Robotiq 2F-85 and 2F-140
Two Finger Grippers

Kit Cntents

Figure A19 shows the components for the Robotq 2F-85 or 2F-140 Two Finger Gripper Kit. The Robotiq Coupling Interface and Robotiq 2F-85 and 2F-140 Grippers are manufactured by Robotiq. The VIM-303 Mounting Bracket and screws are manufactured by Visual Robotics. Figure A19 is shown for the Universal Robots e-Series. Cable attachment for the Universal Robots CB-Series is different, described in the CB-Series section at the end.

Figure A19 - Robotiq E-Pick Suction Gripper Kit components

## Attaching VIM-303 Mounting Bracket and Robotiq Coupling Interface

As shown in Figure A20, place the VIM-303 Mounting Bracket with the circular ridge side away from the robot's wrist and with the triangular portion aimed opposite of the wrist connector. Place the Robotiq Coupling Interface on top of the VIM-303 Mounting Bracket and orient its cable so it points toward the wrist connector. The contact pins of the Coupling Interface should be oriented as shown in Figure A20. Screw the Coupling Interface and Mounting Bracket into the robot's wrist using the four M6x16 screws. Loosely place the screws in first and then tighten in a diagonal pattern in order to maximize the mounting accuracy.

Figure A20 - Attaching VIM-303 Mounting Bracket and Robotiq Coupling Interface

## Attaching the Robotiq 2F-85 or 2F-140 Two Finger Gripper

As shown in Figure A21, attach the Robotiq 2F-85 or 2F-140 Two Finger Gripper to the Robotiq Coupling Interface using the four M5x25 screws, ensuring that the gripper contacts are oriented properly with respect to the Robotiq Coupling Interface contacts. Loosely place the screws in first and then tighten in a diagonal pattern in order to maximize the mounting accuracy.
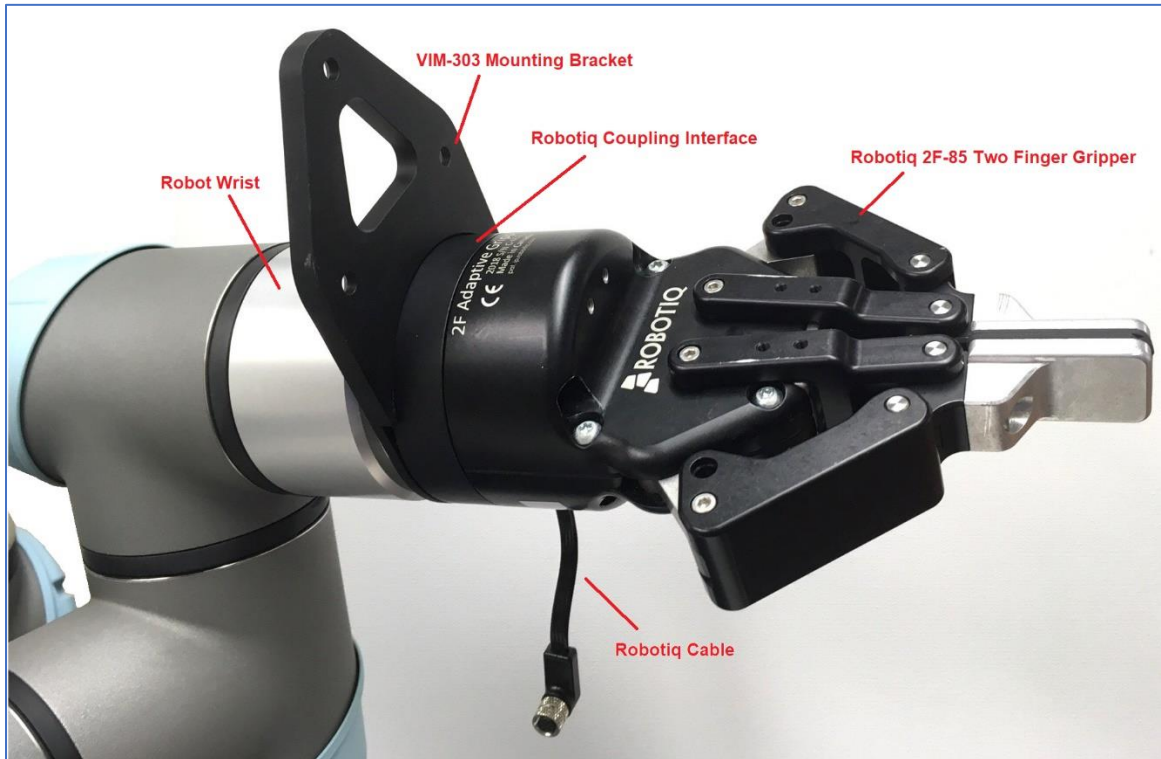
Figure A21 - Attaching the Robotiq 2F-85 (or 2F-140) Two Finger Gripper

Attaching the VIM-303 Camera

Attach the camera onto the mount using the three included M5x12 screws (Figure A22). Loosely place the screws in first and then tighten in order to maximize the mounting accuracy.
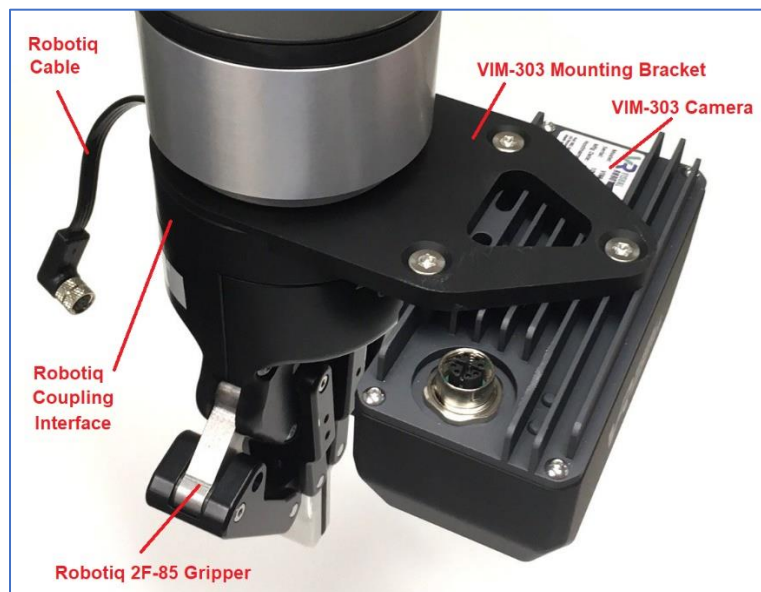
Figure A22 - Attaching VIM-303 Camera

Attaching the Cables

Carefully screw the Ethernet cable into the camera with the cable oriented as shown (Figure A23). Attach the Robotiq Cable to the robot wrist connector as shown (Figure A23).


Figure A23 - Attaching Cables

Universal Robots CB-Series

The Universal Robots CB-Series does not have digital communication to the wrist. A different Robotiq Coupling Interface is required to connect to a CB-Series robot (Figure A24). Attach this Coupling Interface so that the contact pins are oriented with respect to the robot wrist as shown in Figure A20. The cable will be sticking out the side instead of downward. Follow the rest of the steps through the step of attaching the Ethernet cable to the VIM-303 camera. Attach the Robotiq extension cable to the Coupling Interface cable and connect it to the Robotiq Communication Adapter (Figure A25) as directed in the Robotiq manual.

Figure A24 - CB Series Robotiq Coupling Interface
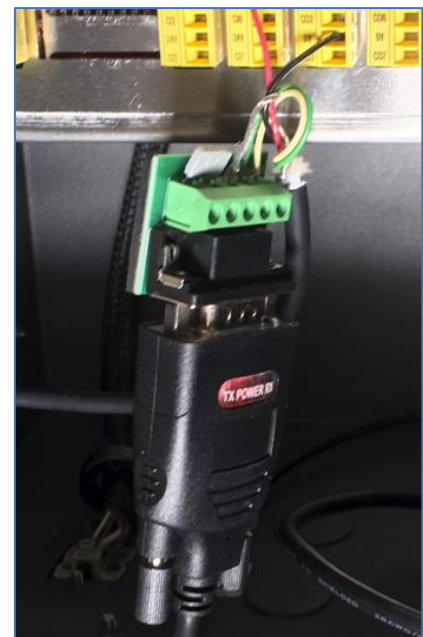
Figure A25
Robotiq Communication Adapter