VERSA BUILT ROBOTICS

VersaBuilt Robotics with Universal Robots

Robot2CNC URCap

Product No. 5006717

Why Robot2CNC

VersaBuilt Robotics Robot2CNC provides a simple and easy way to communicate with CNCs.

This communication kit provides the ability to run any program on a CNC, cycle start the CNC, and check to see if the program completed successfully.

The Robot2CNC allows testing robot and CNC independently to enable easy proving out of automated processes.

The value this kit provides to programmer:

- Enables creating robot programs based on a part number to easily change between different types of parts
- Enables running multiple operations on a single part
- Allows for other programs to be run as commanded by the robot (wash program or table load program)

The value this kit provides to installer:

- Simple installation
- Isolated testing
- Defined API
- Compatible across multiple brands of CNCs

Overview

The purpose of this document is to detail the installation steps and usage of the Robot2CNC Communication Kit as it relates to Universal Robots

The Robot2CNC URCap allows Universal Robots to:

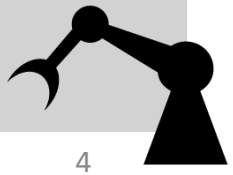
- Select CNC programs on CNC Controllers
- Cycle Start the CNC
- Receive results back from the CNC to indicate successful CNC program completion

Functionality of the Robot2CNC URCap is completed by:

- Sending TCP/IP packets between the UR Control Box and Robot2CNC appliance through an Ethernet cable
- The CNC is started through signal from the Robot2CNC appliance energize the CNC cycle start button
- Signaling the completion of CNC programs from the CNC to the Robot2CNC and then to the UR Control Box is completed with software running on the CNC and/or the Robot2CNC
- Depending on the CNC; different setups are required, see the VersaBuilt Robot2CNC Manual for the CNC

Requirements

UR Requirements



UR Requirements

Universal Robots OS Requirements

- E Series requires 5.2.0.61336 or newer
- CB Series requires 3.8.0.61336 or newer

Note: The following instructions are specific to the E Series, the steps should be the same for the CB Series, but the buttons might be in different places.

Steps

Connect

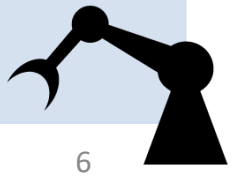
- Ethernet Cable from UR Control Box to Robot2CNC appliance
- Connect Robot2CNC to the CNC per CNC specific manual

Install

- Software on CNC Controller and configure settings on the CNC per CNC specific manual
- Setup Robot2CNC to match specific CNC and network
- Software on UR Teach Pendant

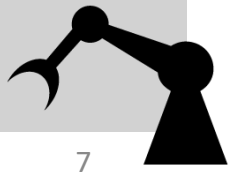
Operate

- Send programs from the UR Control Box to the Robot2CNC
- Receive job complete signals from Robot2CNC to the UR Control Box



Connect

Ethernet Cable and Cycle Start Relay



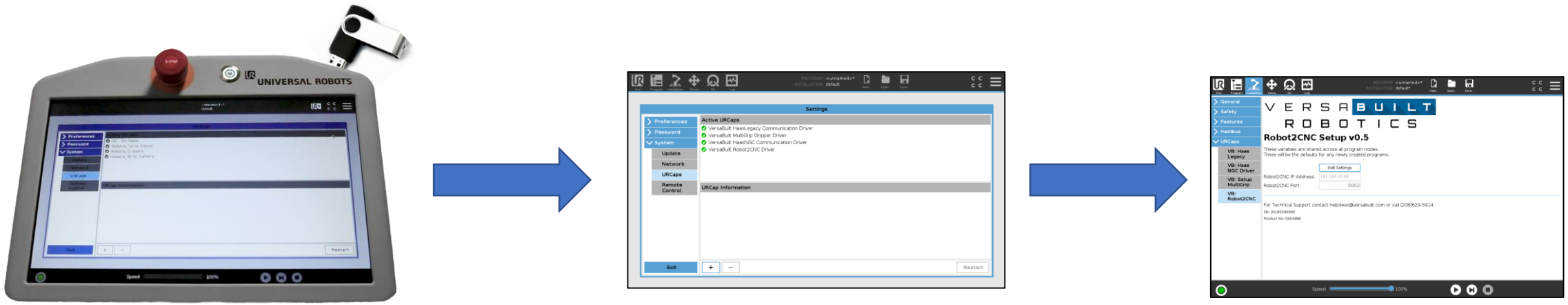
Installation of Network Cable

- Connect an Ethernet cable from the UR Control Box to the Robot2CNC appliance

Install

Software on UR Teach Pendant

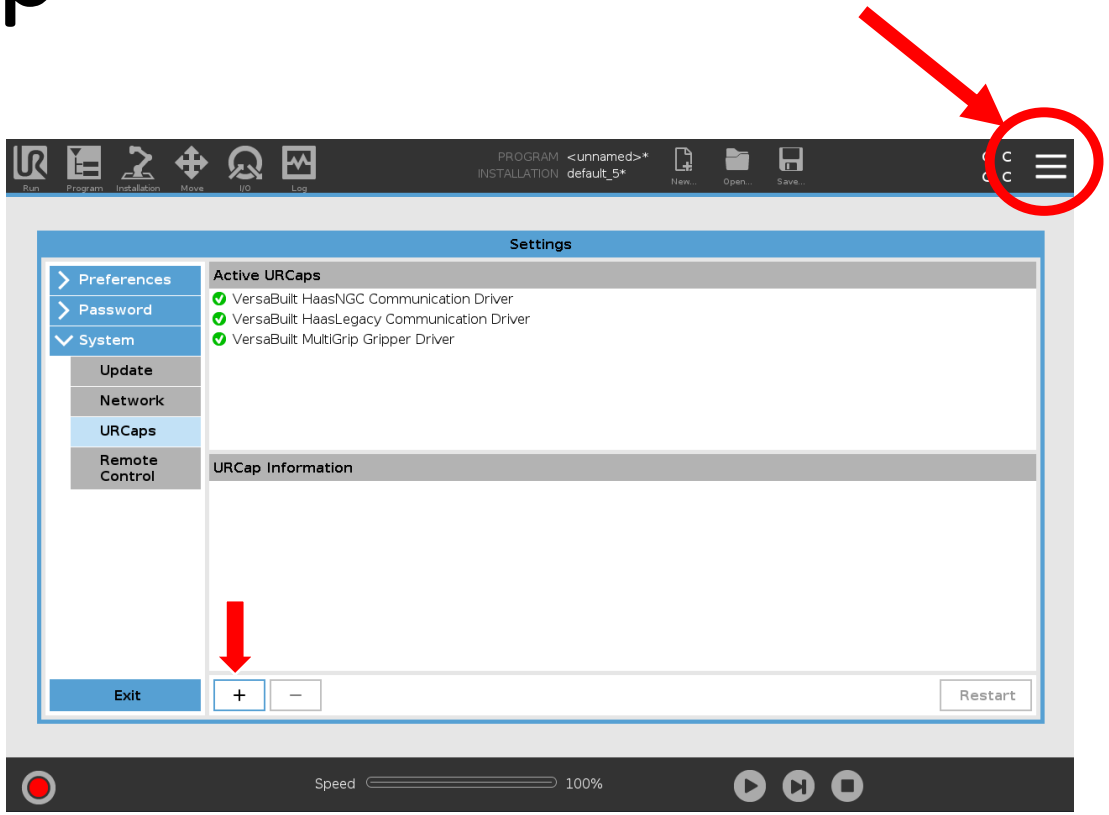
Install UR Software – URCap



All of the following Install instructions require the UR Teach Pendant be in *manual mode*.

Install UR Software – URCap

1. Insert the supplied VersaBuilt Robotics USB flash drive into the UR Teach Pendant
2. Choose *Settings* from the menu in the upper right corner then navigate to *System > URCaps > +* to add a new *URCap*
3. Browse to the USB flash drive, choose the appropriate folder *Robot2CNC* and select *VersaBuiltRobot2CNC-1.0.urcap* (note: version number may be higher)
4. *Restart the UR Teach Pendant*

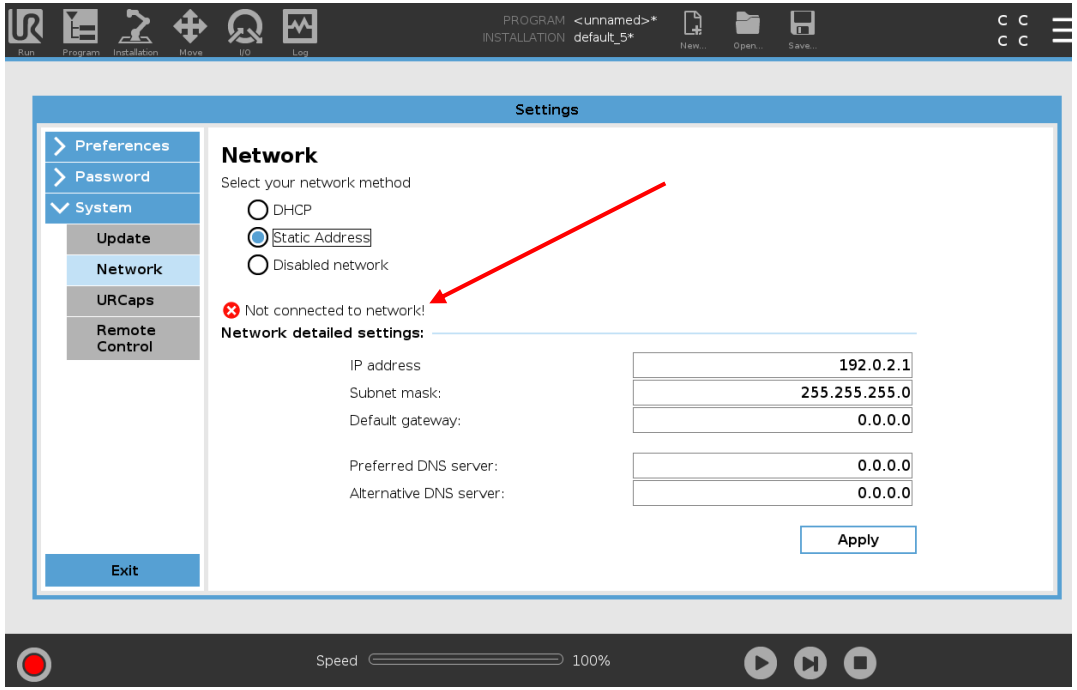


Install UR Software – URCap

5. Setup Robot Network Settings
6. VersaBuilt Robotics recommends using the following settings for your robot:
   - Static Address
   - IP Address: 192.168.2.2
   - Subnet Mask: 255.255.255.0
7. Press *Apply* and validate that Network connection is successful. Then *Exit* this page

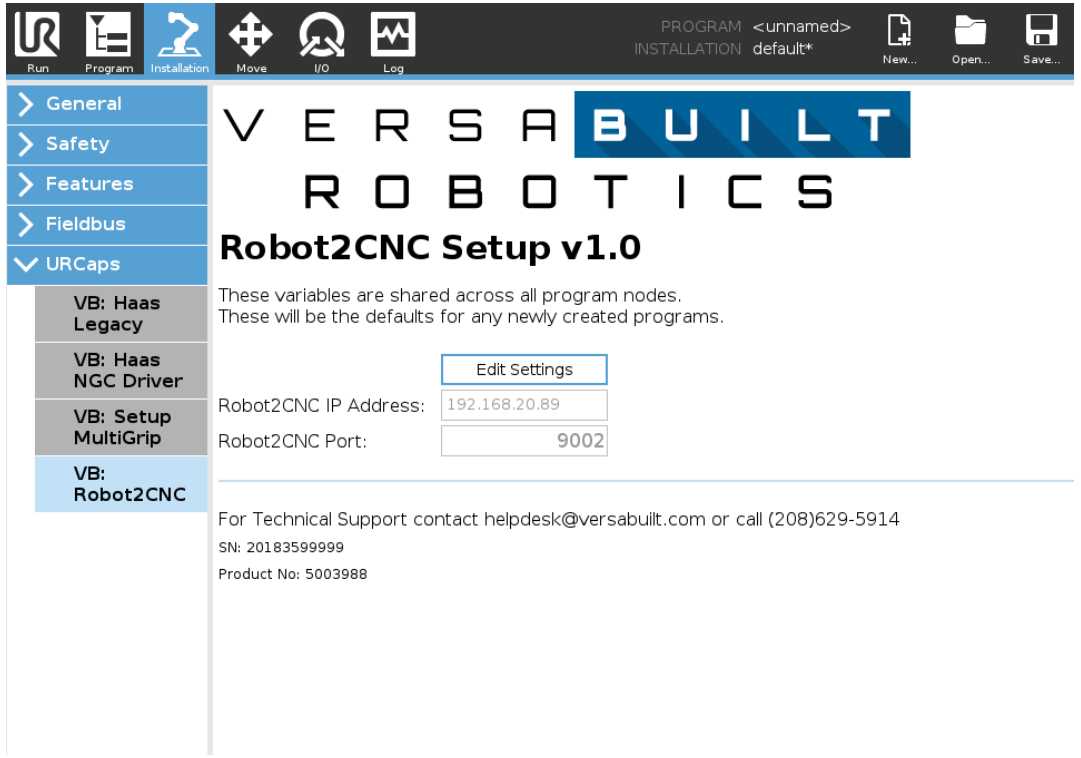
These settings match the recommended settings for Robot2CNC Settings

For more advanced network setups please see Appendix A



Install UR Software – URCap

8. Default Settings
   - From the *Installation* tab select *URCaps* and *VB: Robot2CNC*
   - Verify Default Settings *Robot2CNC IP Address* and *Robot2CNC Port*. IP Address should match the Robot2CNC
   - See Appendix A on instructions on how and why to modify default settings

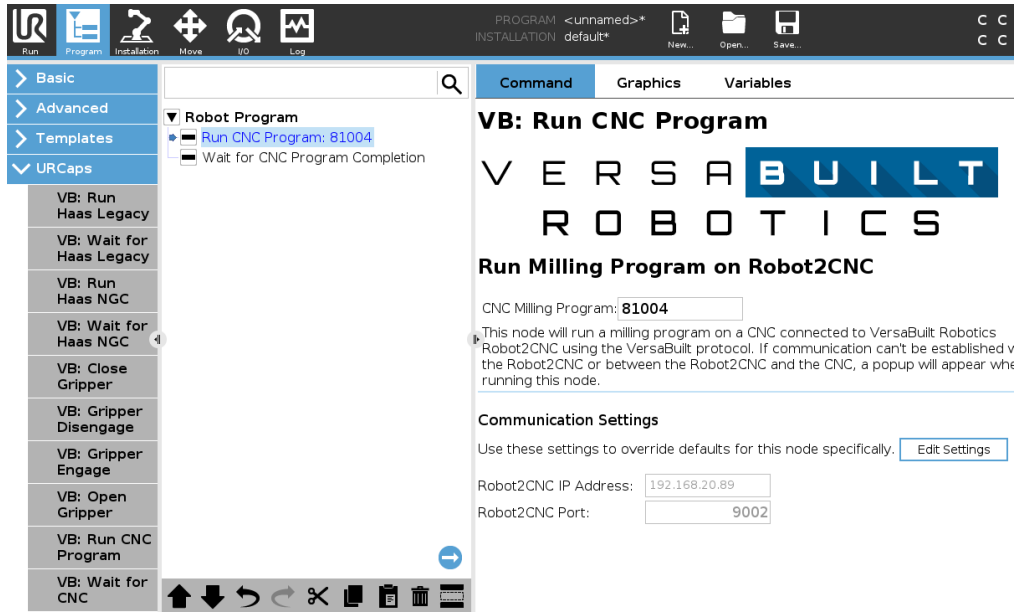


Operate

Using the Teach Pendant
Commands to run CNC programs

Operating URCap and Running CNC Programs

- This URCap comes with two nodes:
  - VB: Run CNC Program
  - VB: Wait for CNC
- The two nodes are used together but do not need to be placed consecutively
- After selecting the *VB: Run CNC Program* node a new line will appear in the Robot Program called *Run CNC Program: 0*
  - Enter a valid *CNC Milling Program*. Zero is not an allowed program, and the node will not be marked complete until a valid program is entered
  - Communication Settings can be ignored as long as default values are acceptable. See Appendix A on how and why to use other values

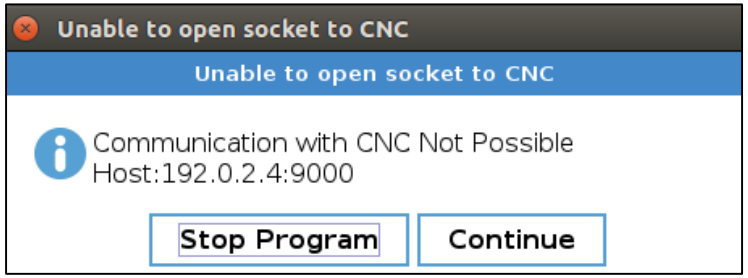


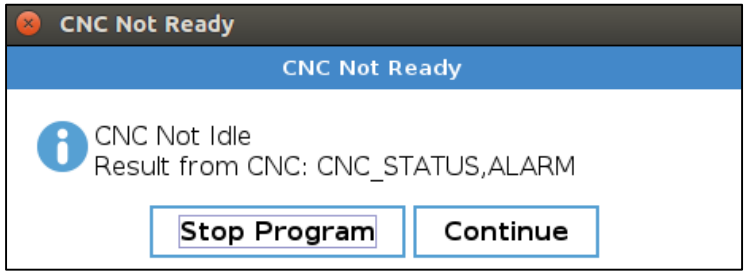
Operating URCap and Running CNC Programs

Running the *VB: Run CNC Program* node

- This node should be run after the robot has completely exited the CNC and the CNC door has closed. (Unless using a factory autodoor where the door closes upon receiving a cycle start signal.) The CNC should be ready to run. See the CNC specific manual for how to validate this on specific CNCs.

1. This node will attempt to open communication with the Robot2CNC, if this fails a popup will appear on the screen. Refer to Appendix B to troubleshoot this issue.
2. Next the node will validate that the status of the CNC via the Robot2CNC. The status of the CNC will need to be COMPLETED or IDLE or a popup will appear.
3. The node will then select the CNC Milling Program number via the Robot2CNC. The result of this select varies based on CNC.
4. Lastly the node will Cycle Start the CNC.





Operating URCap and Running CNC Programs

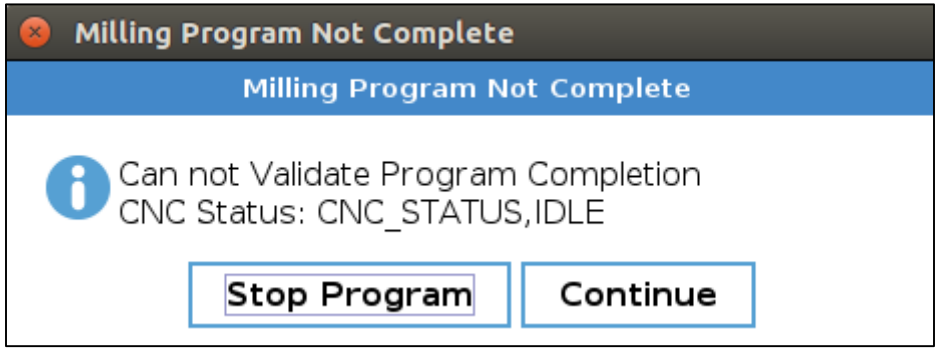
Running the *VB: Wait for CNC* node

- This node should be run after the robot has completed all movement and when the Robot Program is ready to interact with the CNC again
- This node polls the Robot2CNC every 2 seconds (by default) for the current CNC_STATUS. As long as it receives a response of RUNNING it will continue to poll
- Then when the CNC is no longer RUNNING, the node validates that the CNC_STATUS is COMPLETE, if not a popup will appear
- This popup provides a few options:
  - Stop the Robot Program – This will require you to restart the robot program from the beginning
  - Continue the Robot Program – This will move forward with the next item on the robot program
  - If the CNC halted for any reason, then after the CNC is restarted manually and the milling program completes, press Continue to move forward on the Robot Program

Milling Program Not Complete

If this Popup appears, please follow these troubleshooting steps:

- Run CNC Program node must run before Wait for CNC Program Completion node
- Cycle Start must successfully fire from the Robot2CNC, cycle start beeping during testing is useful for validation
- Depending on the CNC the milling program that runs might require special G-code to be run after program completion – Check CNC specific manual

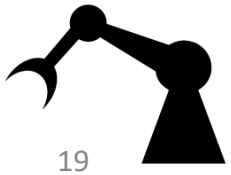


Appendix A

If your CNC is connected to your company network, please speak with your IT Administrator for correct setup and communication between VersaBuilt Robotics Robot2CNC URCap / the UR Controller, the Robot2CNC appliance, and the CNC.

Reference the Robot2CNC Manual to configure the Robot2CNC for different network options.

- The Robot2CNC will need a static IP address, the IT Administrator will provide:
  - Robot2CNC IP Address: This value will be entered into the URCap and onto the Robot2CNC
  - Robot2CNC Subnet Mask and Gateway will be entered in the Robot2CNC.
- The CNC will need a static IP address, the IT Administrator will provide:
  - CNC IP Address: This value will be entered into the CNC and the Robot2CNC
- The robot can use a dynamic or a static IP address
  - If Static a System Administrator should provide Static IP address and valid Subnet Mask that should be setup on the UR Teach Pendant – See the Install section in this manual



Appendix B

- Troubleshooting Connectivity:
  - The VersaBuilt Robotics Robot2CNC Driver URCap uses built-in UR procedures to communicate to the Robot2CNC appliance
  - Verify the network cable is connected at each end to the appropriate controller
  - Test in isolated mode using the Robot2CNC – The Robot2CNC appliance can isolate and test Robot2CNC <-> CNC and Robot2CNC <-> UR without interacting with the 3rd device. See the Robot2CNC manual for details
  - Verify the IP Address in the URCap is on the same network as the IP Address in the UR Teach Pendant Network Settings and that the IP Address in the URCap is exactly the same as that on the Robot2CNC appliance
  - For further help troubleshooting connectivity, please contact helpdesk@versabuilt.com or 208-629-5914