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Universal Robot - Robot Configuration for MachineLogic Applications

Overview

Vention now offers Universal Robot Programming directly in MachineLogic alongside Vention actuators directly in Vention's pendant. With a few extra steps, you can deploy your robot enabled program in minutes.

This document describes the steps necessary to get up and running with **Robot Programming in MachineLogic for Universal Robots e-Series**, which enables the seamless integration of a UR six-axis robot arm alongside Vention motion components, all while staying in Vention's no-code environment. Applications like range extenders, cobot palletizers and other custom robot cells, are now possible within the Vention platform.

1. Connect your system

In order to program your UR e-Series Robot in MachineLogic, a Vention MachineMotion 2 Pendant V3 (CE-TP-014-0000) and a Vention Robot Safety Module (CE-SA-009-0000) is **required**, in addition to a MachineMotion v2 (CE-CL-010-0004 or CE-CL-010-0001) running firmware version **v2.9.0** or later.

1.1 Universal Robots Safety Configuration and Connection with MachineMotion V2

This section describes the connection of a MachineMotion V2 to a Universal Robot controller by way of the Robot Safety Module, in order to program the robot through MachineLogic. The Robot Safety Module acts a 3-port Ethernet switch to enable seamless communication between the MachineMotion, the pendant, and the robot controller (see Figure 1). A first step will also be done in order to properly configure the Safety of the Universal Robot Controller.

To properly perform the Safety Configuration of the Universal Robot controller with a MachineMotion V2, follow the steps detailed in this guide: Universal Robots Safety Configuration with MachineMotion V2.

Once the configuration is completed, make sure that the required safety components are properly connected.

Follow the steps detailed in the Robot Safety Module User Manual.
A typical installation (Figure 1) will require the following components:

- MachineMotion Pendant V3
  - *Firmware Version v3.0 or later*
- E-Stop Module with Reset
- Robot Safety Module
- UR Robot Controller
- MachineMotion 2 - Four Drive or MachineMotion2 - One Drive
  - *Firmware Version v2.9.0 or later*
- 3 x MachineMotion 2 Safety Extension Cable – 5m (CE-CA-102-5001)

NOTE: If your system has more than one controller set up in a Multi-Controller configuration, the safety chain which includes the Robot Safety Module and the Pendant must be connected to the **parent** controller.

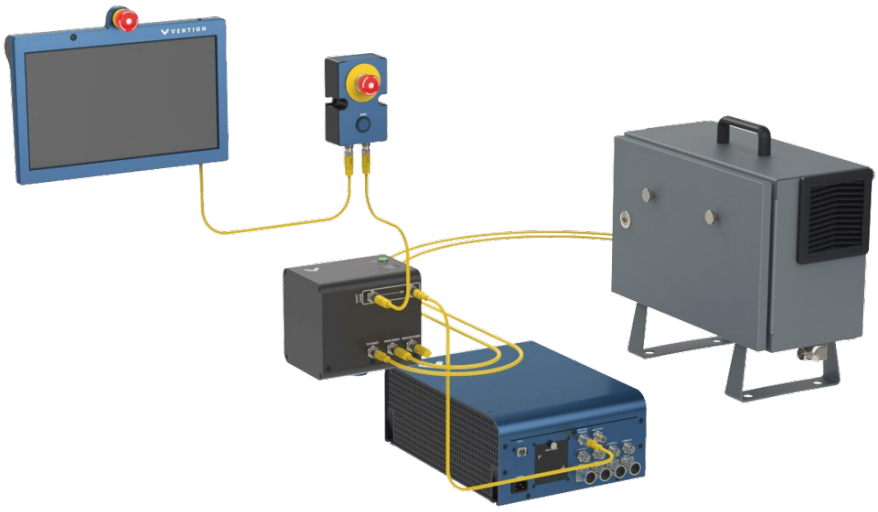

Figure 1: Robot Safety Module with Vention Pendant, E-Stop and Reset Module 2, Cobot Controller and MachineMotion 2

1.2 Configuring up the UR controller's Network

On the UR teach pendant home screen, select **Menu** > **Settings** > **System** > **Network**. Select **Static Address** as your network method & change the *IP address* to **192.168.5.3**, *Subnet mask* to **255.255.255.0**, and *Default Gateway* to **0.0.0.0** (see Figure 2a & 2b).
Preferred DNS server to **0.0.0.0** and Alternative DNS server **0.0.0.0**. Select **Apply** when done.

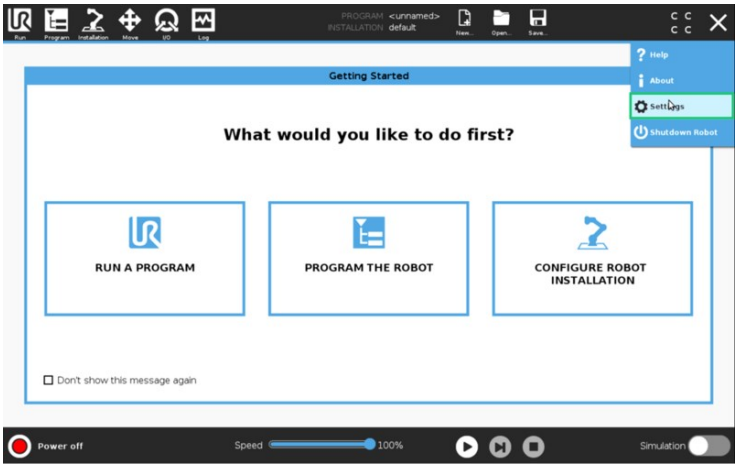

Figure 2a: Opening the settings screen

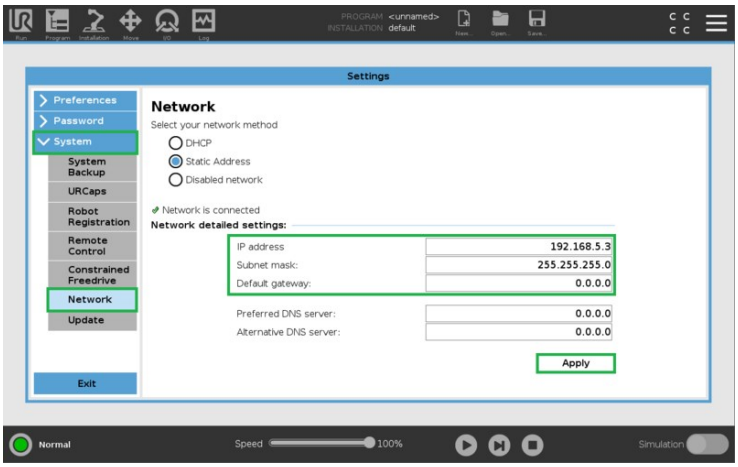

Figure 2b: Robot configuration with Robot Safety Module

2. Pre-connection Setup on UR controller

2.1 Installation of the External Control URCap on the UR controller

Step 1: Insert the USB drive

Vention's External Control URCap software is distributed on a USB flash drive and must be installed on the UR teach pendant before continuing onto working in the Vention pendant. To install the URCap, insert the USB drive into the UR teach pendant's USB port.

Note: You can also download the URCap via the following link and upload it to your own USB stick.

Download External Control URCap

Figure 3: Location of the UR teach pendant's USB port

Step 2: Add the External Control URCap to the UR environment

On the teach pendant home screen, select **Menu** > **Settings** (see Figure 4a).

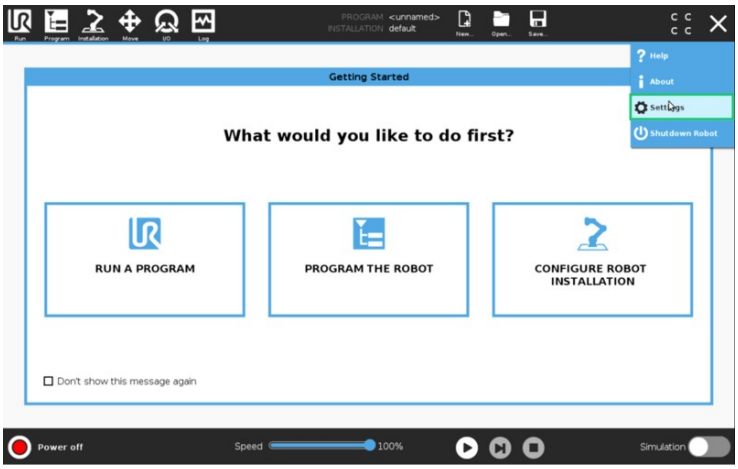

Figure 4a: Opening the settings screen

Select **System** > **URCaps**, then click the + icon at the bottom of the screen to add a new URCap to the UR teach pendant (see Figure 4b).

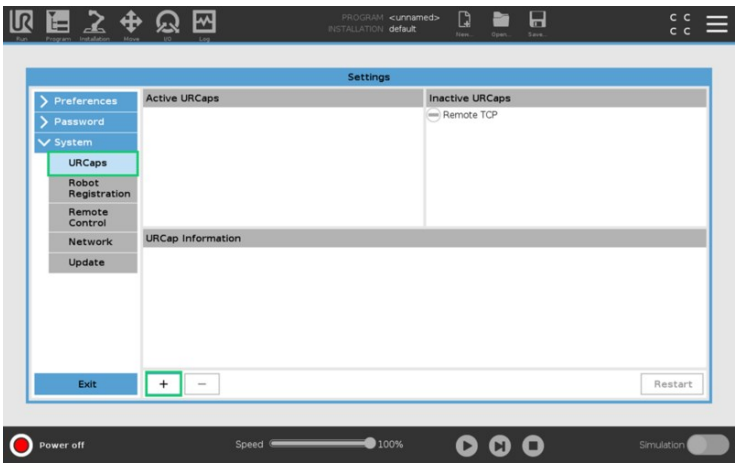

Figure 4b: Opening the URCaps installation screen

Select the **.urcap** file and click **Open** to install the URCap extension (see Figure 4c).

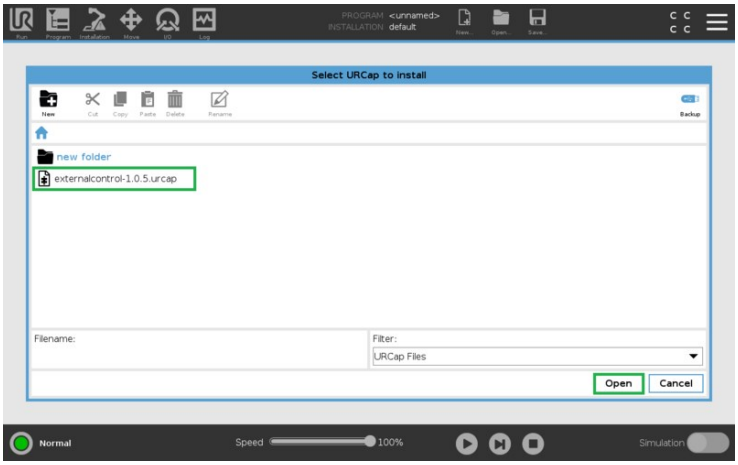

Figure 4c: Adding the URCap file

Step 3: Restart the UR controller

When prompted to do so, restart the UR controller to complete the installation (see Figure 5).

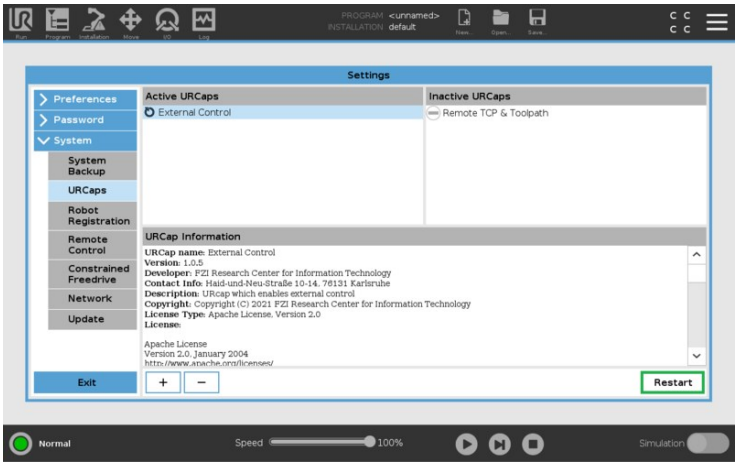

Figure 5: Restarting the system

2.2 Configuring the External Control URCap

Step 1: Navigate to URCaps Installation Page

On the teach pendant, select **Installation** > **URCaps** (see Figure 6).

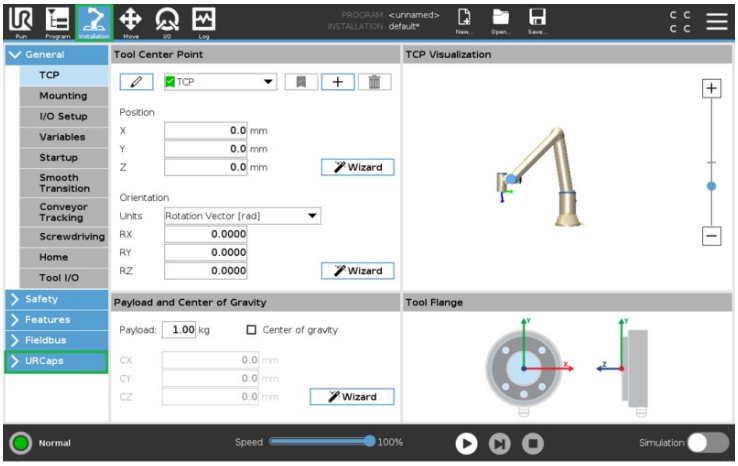

Figure 6: Opening the URCaps settings screen

Step 2: Set Host IP and Custom Port

Change the **Host IP** to **192.168.5.1** and the **Custom Port** to **50002** (see Figure 7). You may use any **Host name** desirable.

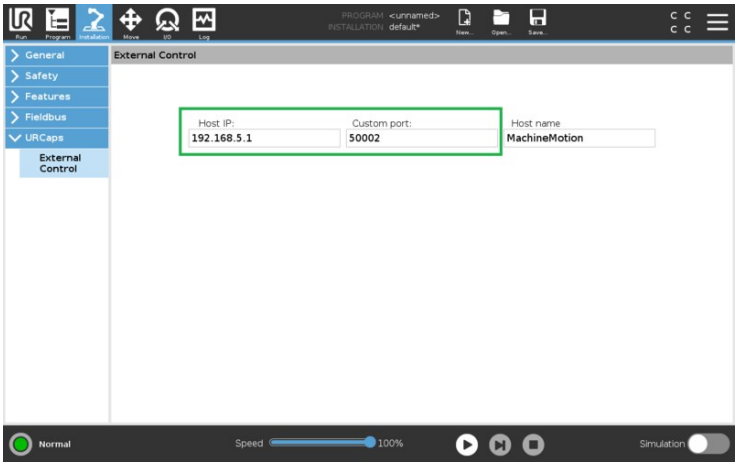

Figure 7: Setting URCap Host IP and Custom Port

2.3 Enabling Remote Control

On the teach pendant home screen, select **Menu** > **Settings** (see Figure 8a).

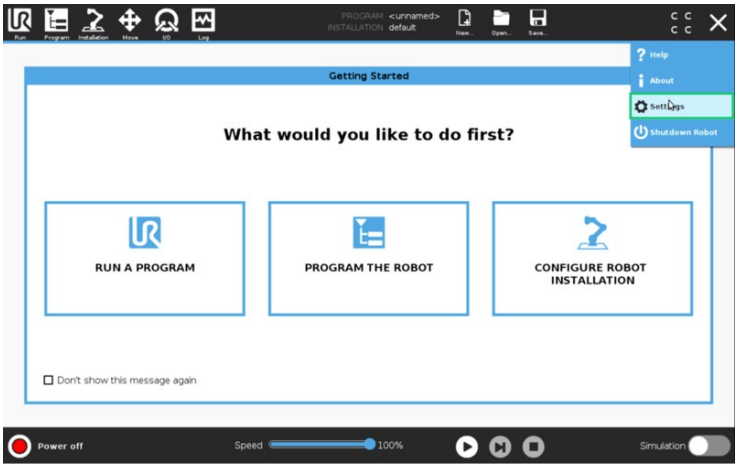

Figure 8a: Opening the settings screen

Select **System** > **Remote Control**, then click the **Enable** (see Figure 8b).

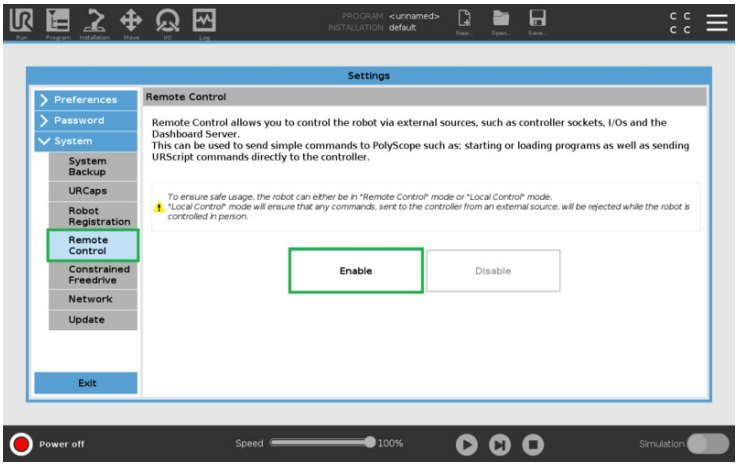

Figure 8b: Enable Remote Control

2.4 Verify Tool Center Point (TCP) is Zeroed

The Tool Center Point, or TCP, defines the coordinate system found at the end of the tool mounted to the robot. For **Robot Programming in MachineLogic**, the TCP, wether an end-of-arm tool is mounted or not, is located directly at the robot's flange, also known as position 0, 0, 0.

On the teach pendant, select **Installation** > **General** > **TCP**, and verify that all values associated to **X**, **Y**, and **Z**, as well as **RX**, **RY**, and **RZ**, are set to zero (**0**) (see Figure 9). If not, make the necessary changes.

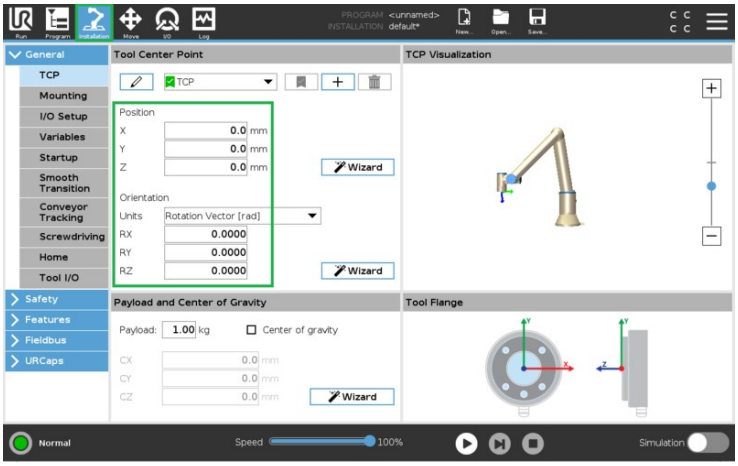

Figure 9: Opening the URCaps settings screen

2.5 Create and Run an External Control program

Step 1: Create a new program

On the navigation bar of the teach pendant, select **New...** > **Programs** (see Figure 10).

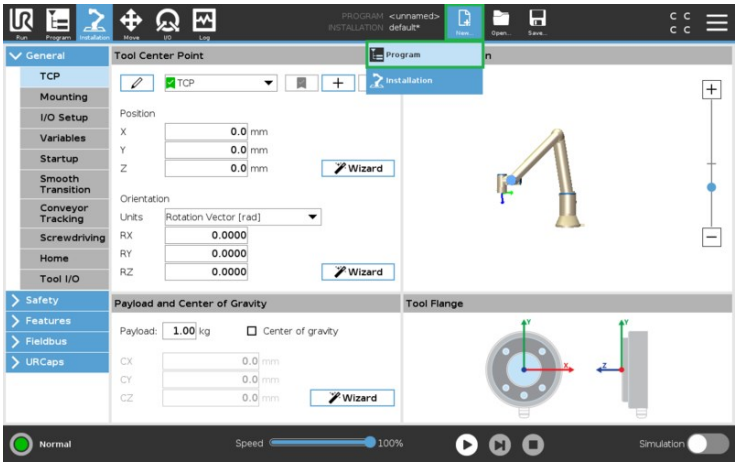

Figure 10: Creating a new program

Step 2: Add the External URCap to the program

On the left-hand side navigation tree, select **URCaps** > **External Control** (see Figure 11). You should see **Control by *Host name*** appear under the program tree view. Verify that the information found on the right-hand side (*Host IP* and *Custom port*)** match what was set in section **2.2 - Step 2**. The program needs to be saved to enable the MachineMotion to control the robot. **Save...** > **Save Program As...** vention_control.urp.

NOTE: This step is important and often forgotten. The program name must be exactly named **vention_control.urp**

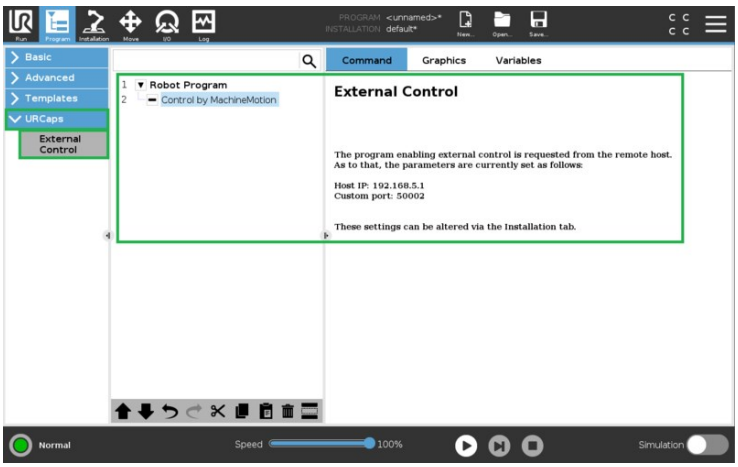

Figure 11: Adding External Control to program

Step 3: Change from Local to Remote Control

NOTE: This step is important and often forgotten. The robot controller must be in **Remote Control** mode for MachineLogic to properly connect.

At the right of the navigation bar of the teach pendant, select **Local** > **Remote Control** (see Figure 12).

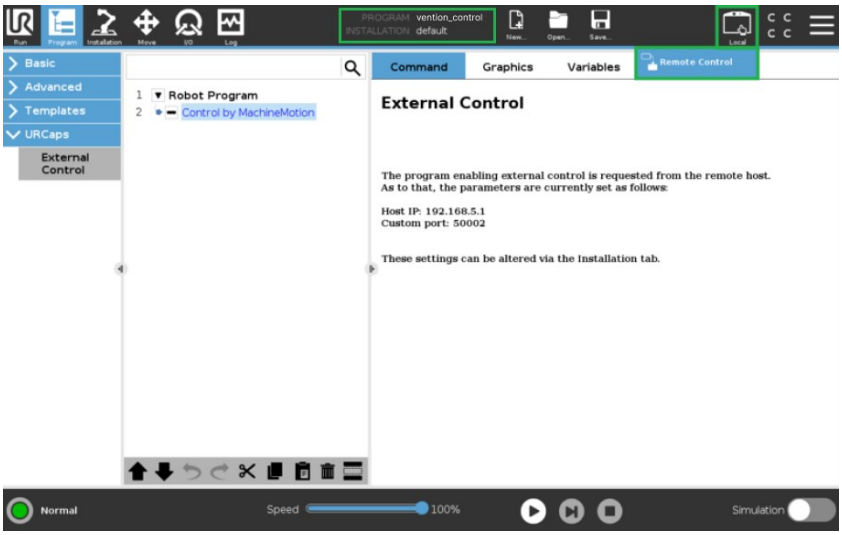

Figure 12: Turn on Remote Control

3. Connecting to the Robot Controller from MachineMotion

With the Universal Robot controller now configured to be externally controlled, you are now ready to deploy your application and configuration from you design on Vention.io.
Follow the steps detailed in the Deploy your Application and Configuration to Controller documentation.

3.2 Troubleshooting

If the robot connection fails (see Figure 16), there could be a few reasons that are the root cause:

- The robot controller is still in **Local** mode, and not in **Remote Control** - See **2.5 - Step 3** to enable **Remote Control**.
- The Universal Robot Program (.urp) is **not playing** on the robot controller - Make sure everything is properly connected, as the program should play immediately.
- The **IP addresses** set in **1.2** and **2.2 - Step 2** are incorrectly set. Verify that the correct **IP address** was entered for both the network and URCap host.
- The **Robot Safety Module** is not properly wired, not allowing proper communication. Verify your system wiring per section **1.1**.
- If a robot has been previously configured and connected, and any of the above occurs, follow the steps shown on the configuration page of the robot.