



CONTROL HUB

GETTING STARTED GUIDE

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1 CONTROL HUB OVERVIEW

The REV Robotics Control Hub is an affordable all in one education robotics control providing the interfaces required for building robots and other mechatronics. The Control Hub is purposely built to stand up to the rigors of the classroom and competition field. It features an Android operating system and a mature software packaged designed for basic and advanced use cases with the ability to be field upgraded in the future.

The Control Hub is the approved device for use in **FIRST** Global and limited regions for **FIRST** Tech Challenge.

1.1 FEATURES

- **Physical Dimensions**
 - 143mm X 103mm X 29.5 mm
 - Mounting holes on a 16mm spacing
- **Input Voltage:**
 - 12V Nominal (8-15VDC)
- **Processors**
 - RK3328 Quad-core ARM® Cortex-A53
 - Texas Instruments ARM® Cortex-M4
- **3.3V Ports**
 - **8x Digital I/O:** 1A Source Max
 - **4x I2C 100kHz/400kHz Busses:** 500mA Max
 - **4x 12-bit Analog Inputs:** 500mA Max
 - **4x Quadrature Encoder Inputs:** 500mA Max
- **5V Ports**
 - **5V Aux Power:** 2A Max
 - **Servos:** 2A Maximum per Pair
 - **USB 2.0:** 1.5A Max



2 QUICK START

2.1 REQUIRED MATERIALS



Control Hub
REV-31-1595



12V NiMH Slim Battery *
REV-31-1302



Properly Configured Driver Station (DS) *



USB Game Pad *



USB A Female to Micro USB *
REV-31-1426

Optional Additional Materials needed to [Connect the Expansion Hub](#):

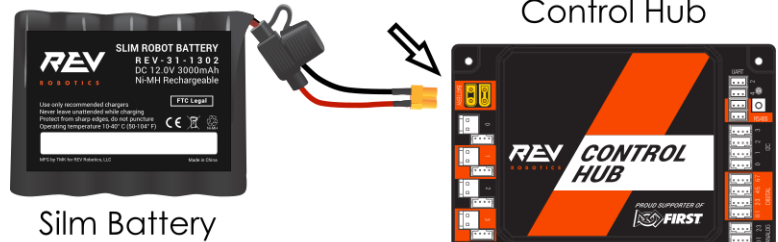
- Expansion Hub (REV-31-1153)
- XT30 Extension Cable
- Communication Cable (RS-485)

2.2 DRIVER STATION AND CONTROL HUB PAIRING

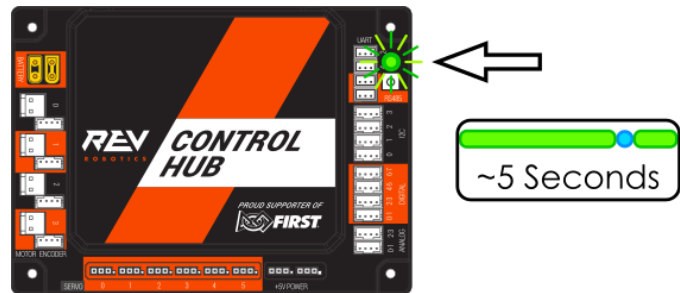
When you first receive your kit, you will have to pair (link) your Driver Station (Android Device) to your Control Hub. This procedure only needs to be performed once for each set of hardware. If you exchange (replace) your Driver Station or Control Hub, this procedure will need to be repeated.

Pairing the Driver Station with the Control Hub

1. Power on the Control Hub, by plugging the 12V Slim Battery into the orange XT30 connector labeled "BATTERY" on the Control Hub.



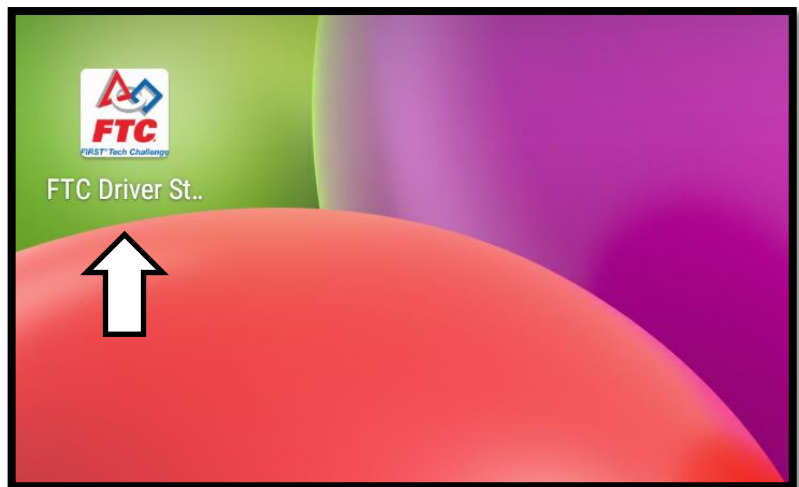
2. The Control Hub is ready to pair with the Kindle Fire when the LED turns green. Note: the light blinks blue every ~5 seconds to indicate that the control hub is healthy.



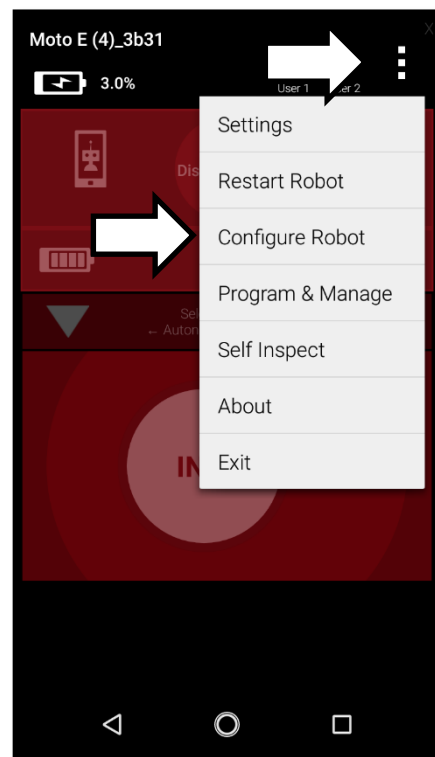
3. Power on your Android Device by holding down the power button.



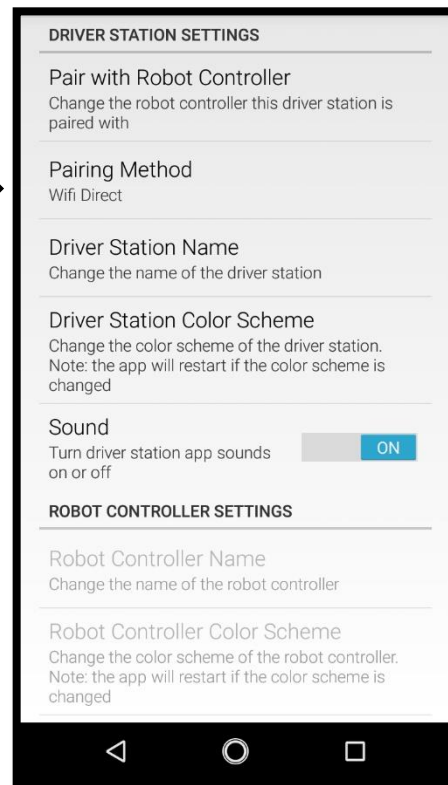
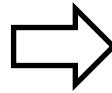
4. Open the Driver Station application from the HOME Screen.



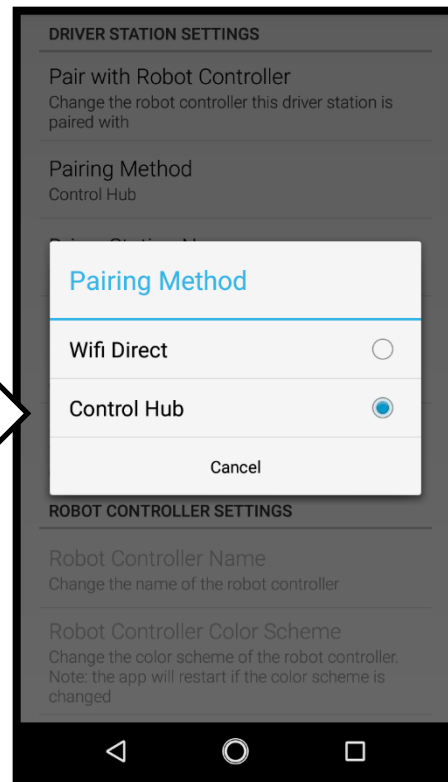
5. On the Driver Station page, open the menu from the top right corner, then select "Settings".



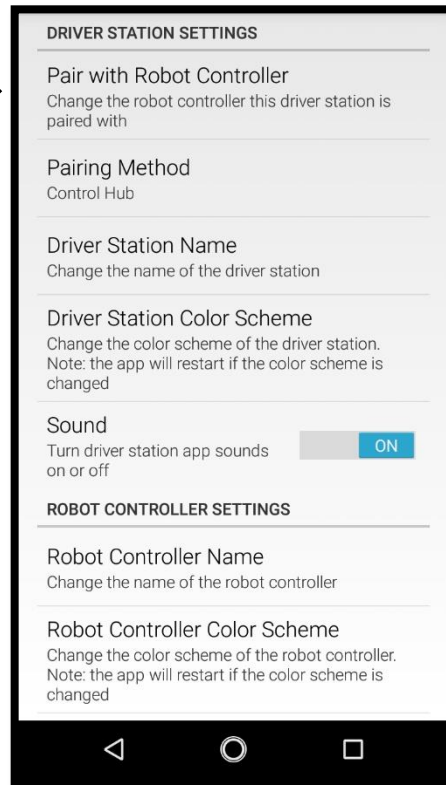
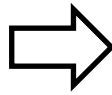
6. Select, "Pairing Method"



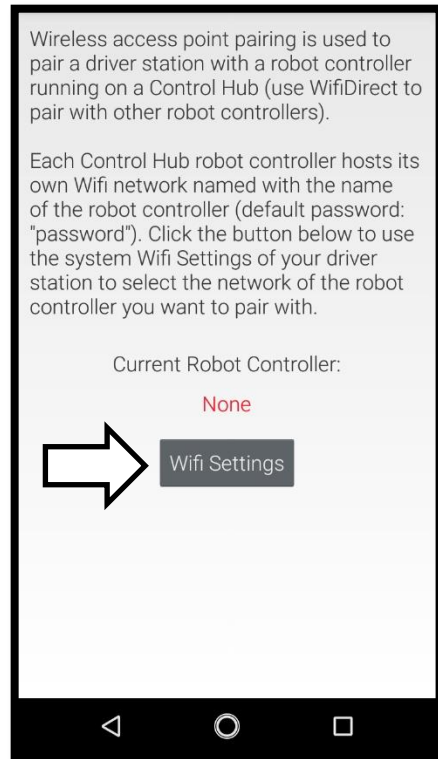
7. Select, "Control Hub"



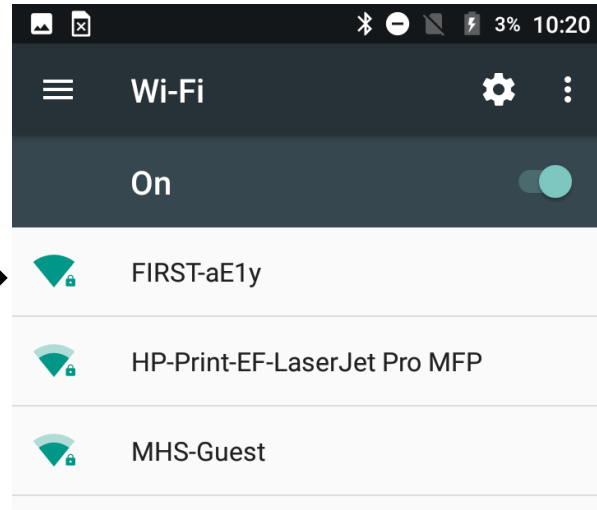
8. Select, "Pair with Robot Controller".



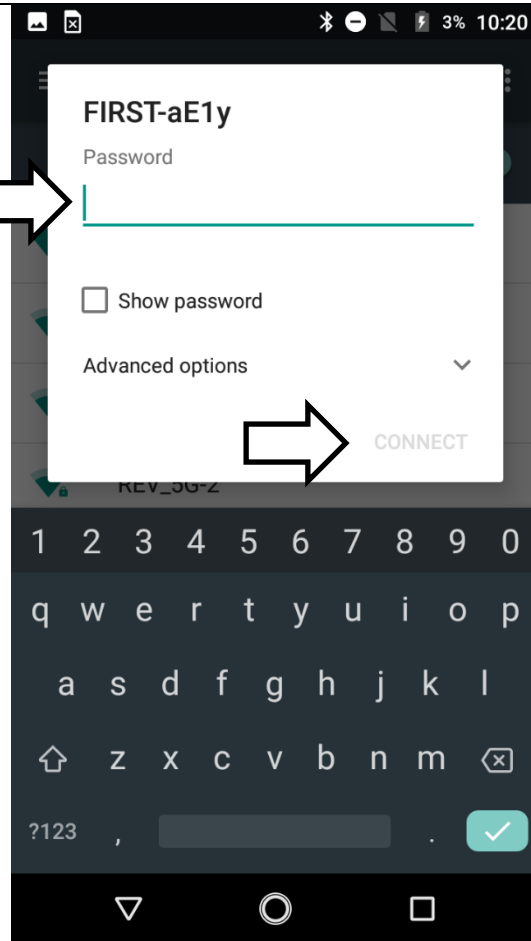
9. Select "Wifi Settings"



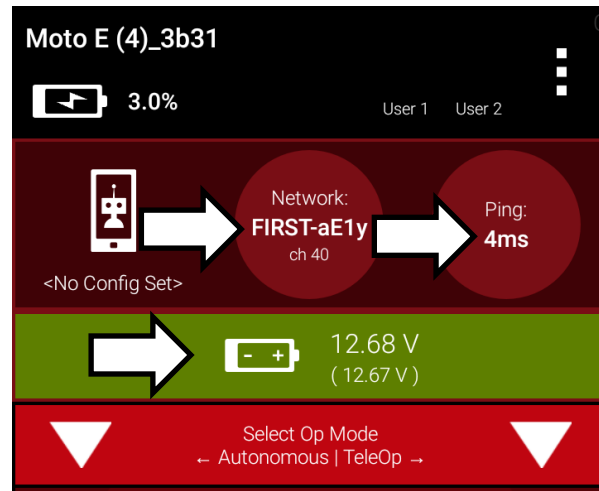
10. Select the name of the Wifi network that matches the name of the network printed on your control hub. This should start with "FIRST-".



11. Enter the password to the Wifi network in the password field. This defaults to "password". Press "CONNECT".
12. After pressing connect, press the back arrow at the bottom of the display until you return to the main driver station screen.



13. After a couple of seconds, the Driver Station page will indicate the network name, a ping time, and battery voltage.

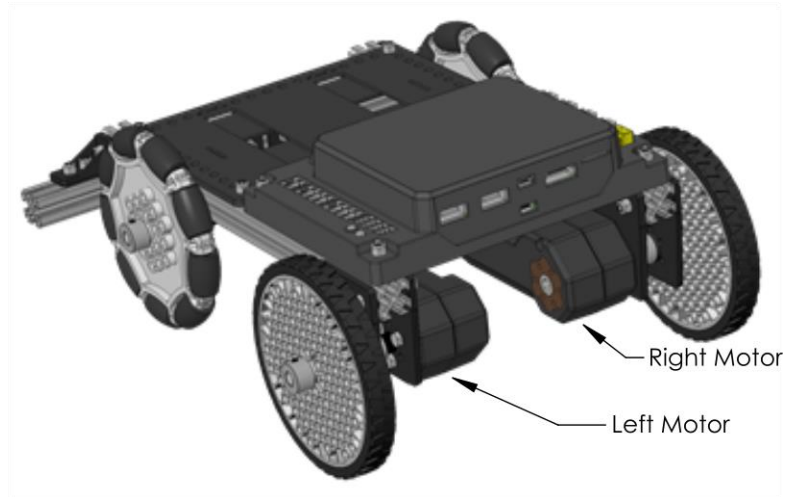
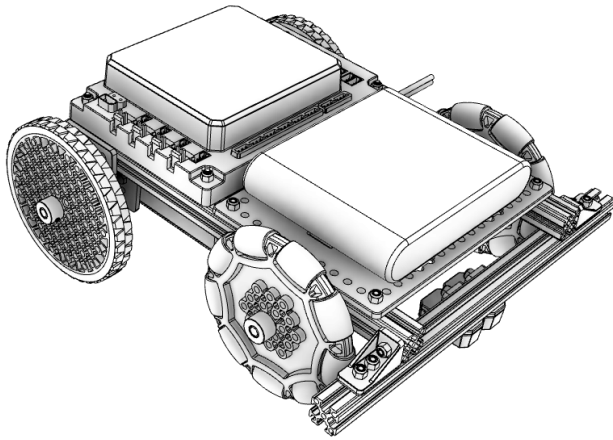


Your Driver Station is now paired with your Control Hub!

2.3 CONFIGURE YOUR ROBOT

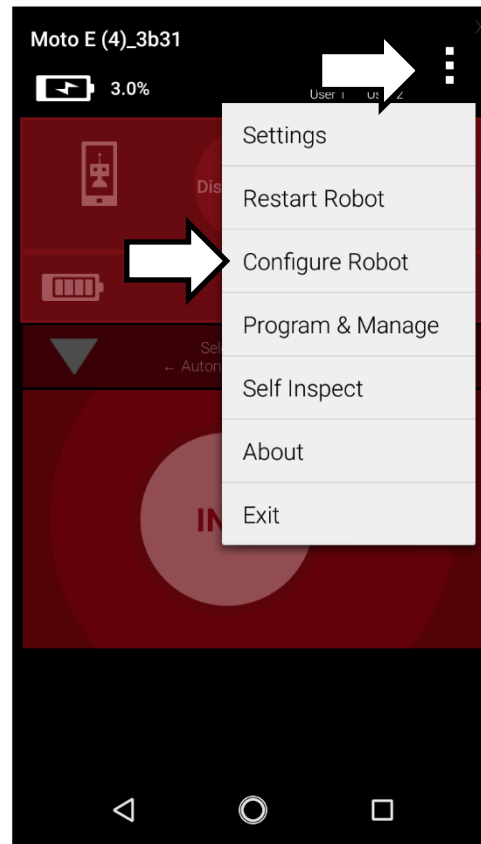
When you build your robot, you will need to configure it before you can program it. This will allow you to give your sensors and actuators meaningful names that you can reference while programming.

For this example we will use the Mini-Bot (REV-45-1171)

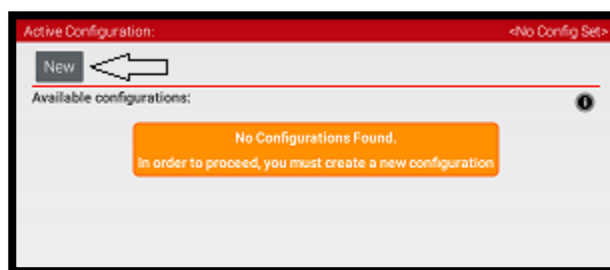


Configuring Your Robot for the First Time

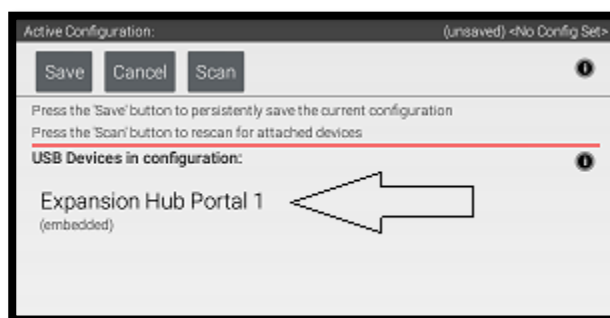
1. Select the menu on the Driver Station page. Then select "Configure Robot".



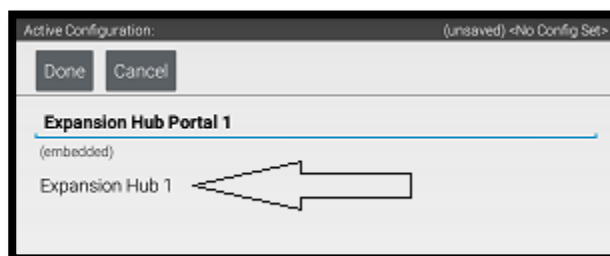
2. Select "New" in the top left hand corner.



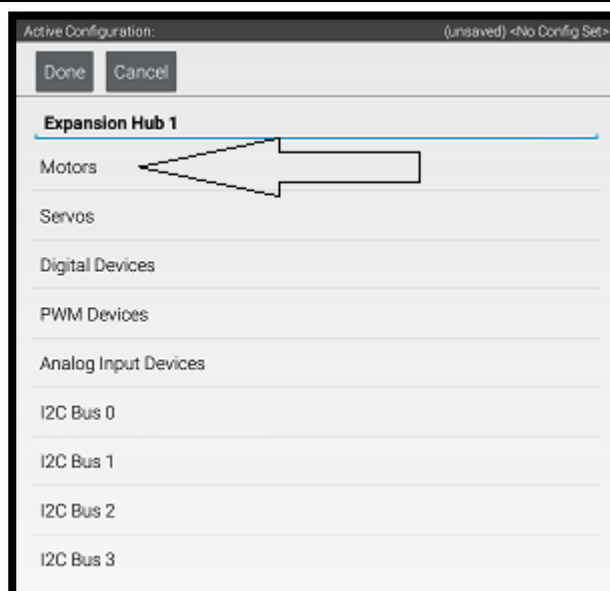
3. Select "Expansion Hub Portal 1".



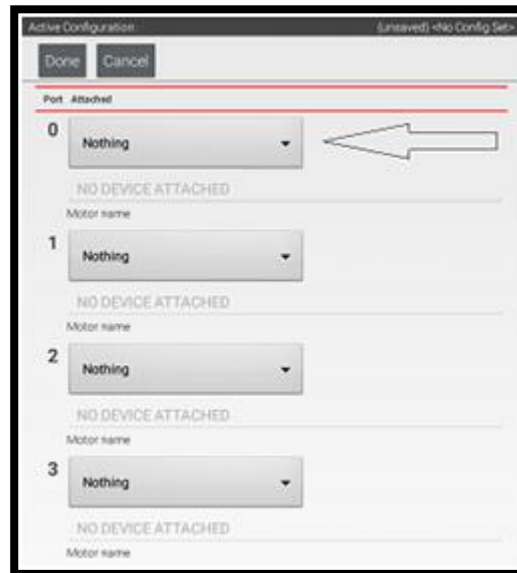
4. Select "Expansion Hub 1".



5. Select "Motors".

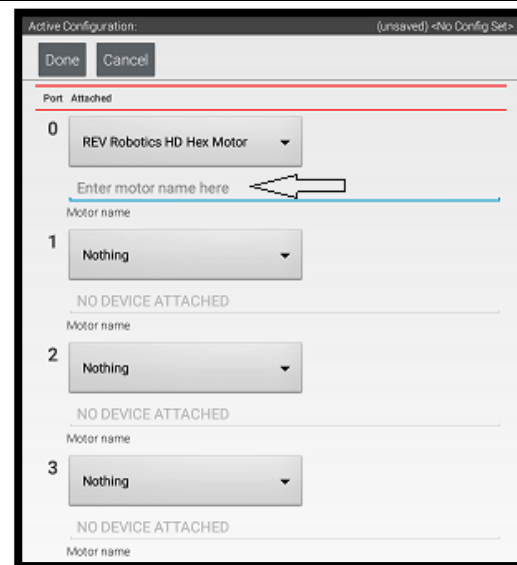


6. Select the Drop Down menu for "Port 0" then select "Rev Robotics Core Hex Motor".

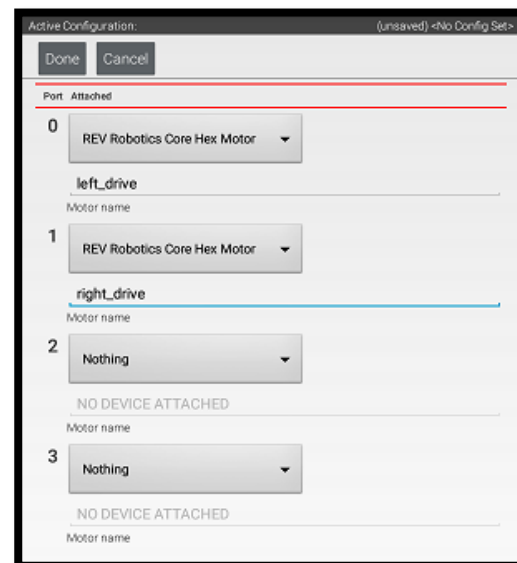


7. Press "Enter motor name here" and name the motor "left_drive".

This is the name that you will use when you are programming your robot to control this motor. Always give things descriptive names so that you can remember what they do when you are programming.



8. Repeat the process for "Port 1" and name the motor "right_drive".

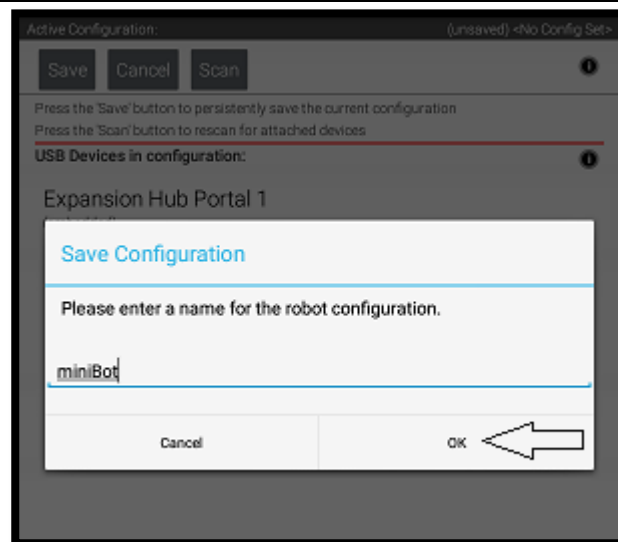


9. Press the “Done” button (at the top left corner of the page) 3 times.

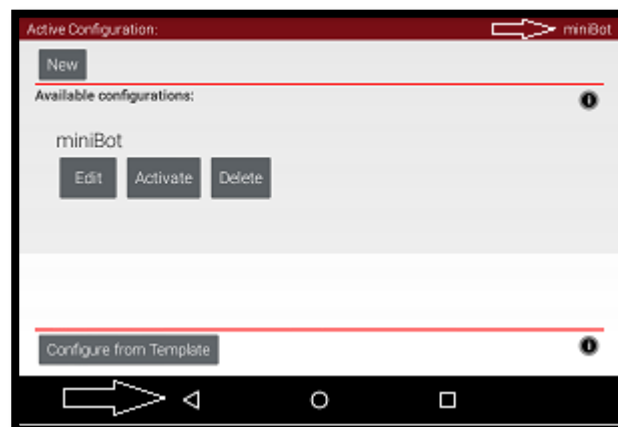


10. Press “Save”.

11. Enter “miniBot” as your configuration name, then select “OK”.



12. You now have an active configuration called “miniBot”. Press the Android back button to return to the Driver Station page.

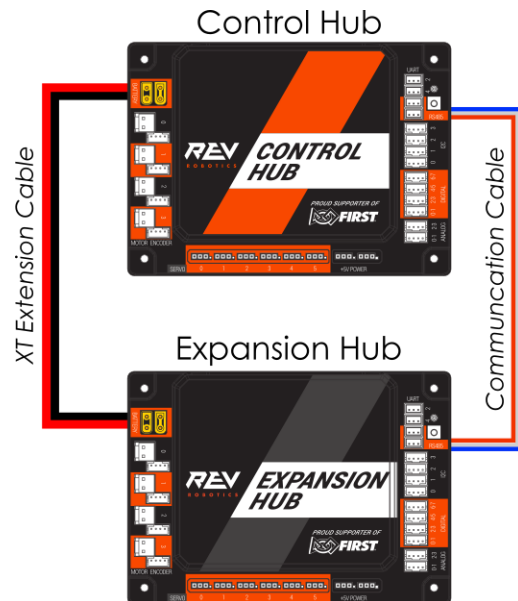


2.4 CONNECT AN EXPANSION HUB

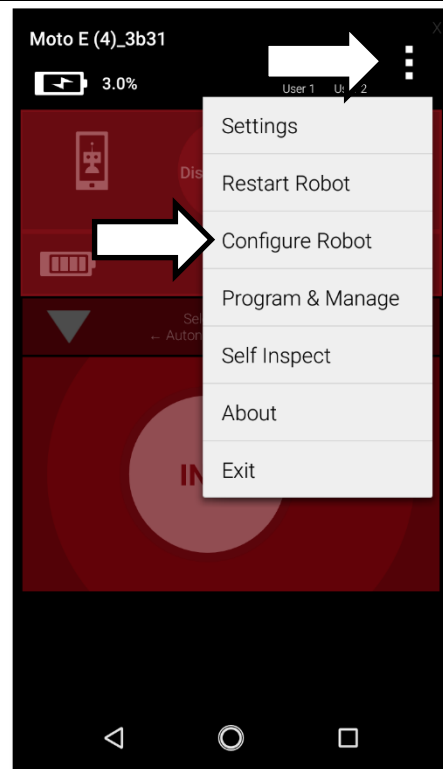
If you want to use more than 4 motors or 6 servos, you will need to add the expansion hub to your robot. The Expansion Hub has almost all the same ports as the Control Hub but doesn't have any wireless capability. Every robot must use the Control Hub to pair with the driver station, but not all robots will need to use an Expansion Hub.

Adding an Expansion Hub to your Robot

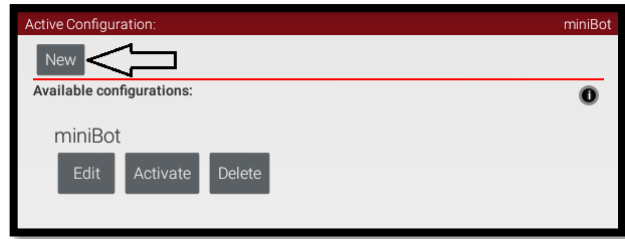
1. Use the battery extension cable to connect power between the Control Hub and the Expansion Hub.
2. Use the RS485 cable and a 3-pin JST PH connector, to connect the RS485 port on the Control Hub to the Expansion Hub.



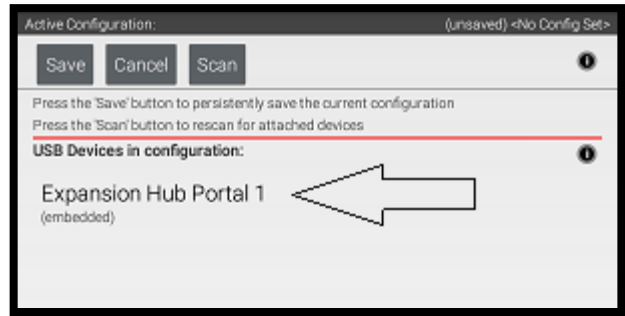
3. From the Driver Station choose "Configure Robot"



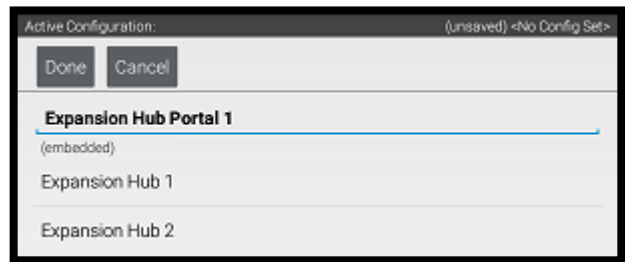
4. Select "New" in the top left hand corner.



5. Select "Expansion Hub Portal 1"



6. Now you have 2 Hubs to choose from. Configure and program as necessary. Please see the "Configure your robot" section of this document for an overview of configuration.



2.5 SWITCHING WIFI CHANNELS

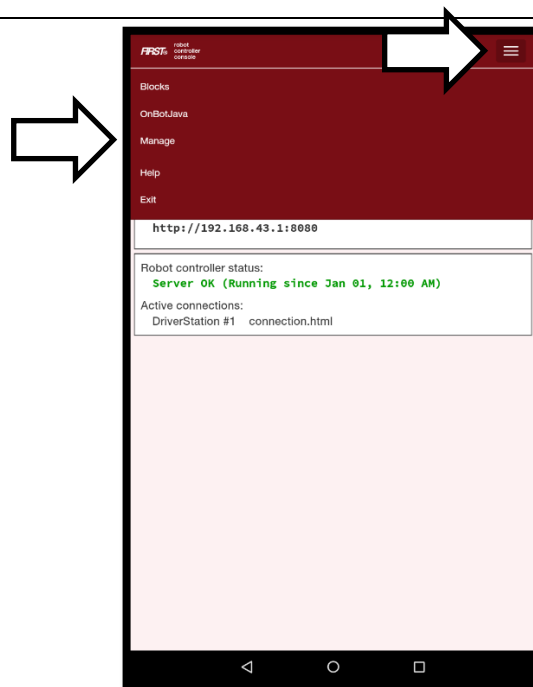
The Control Hub can utilize either the 2.4 GHz or 5 GHz WiFi band. By default the Control Hub is set to a channel on the 2.4 GHz band. REV Robotics advises that during competition teams utilize a 5 GHz channel for robot communication. Consulting with the FTA/CSA at a tournament for the channel to utilize is advised. The following steps will show how to switch the Control Hub to a 5 GHz channel.

Changing WiFi Channel on your Robot

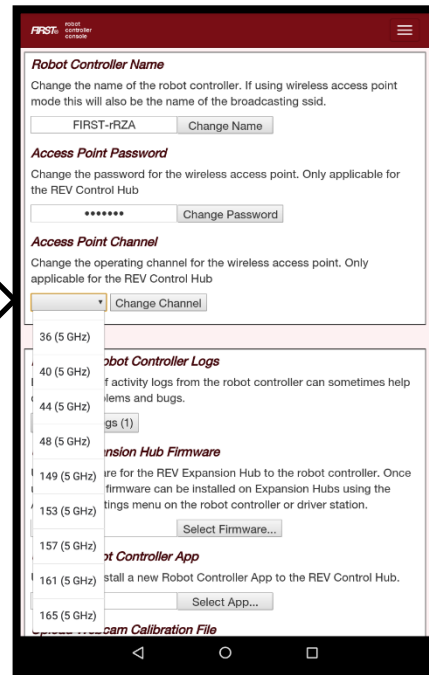
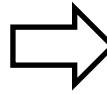
1. Press the triple dots in the upper right. Then select "Program & Manage" from the Driver Station Menu.



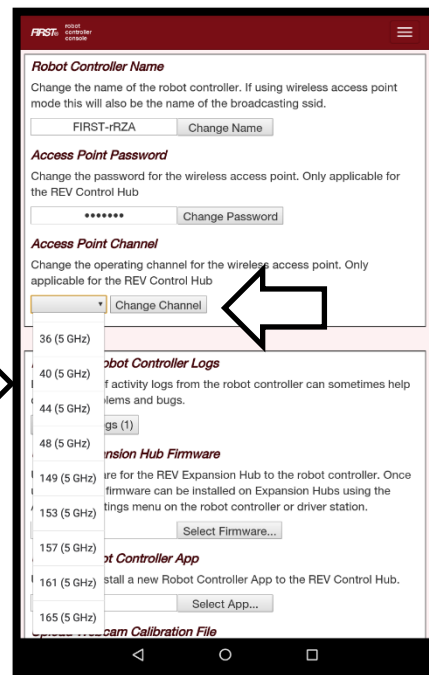
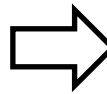
2. Select the menu button in the top right. Then select "Manage".



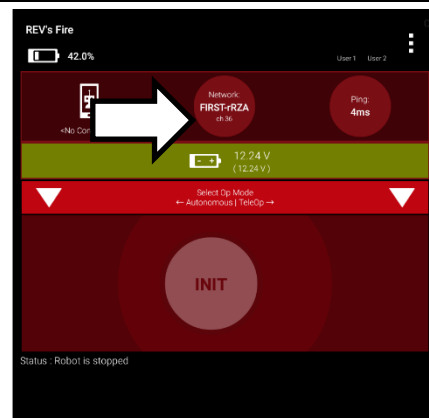
3. Select the drop down menu under "Access Point Channel".



4. Select a 5 GHz channel noted in the () next to the channel number. Then select the "Change Channel" button next to the drop down.

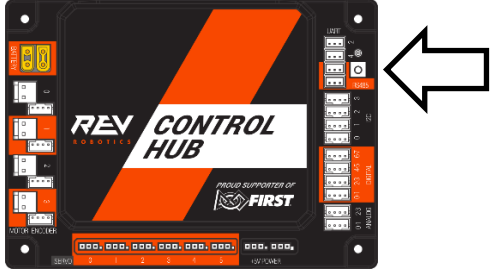
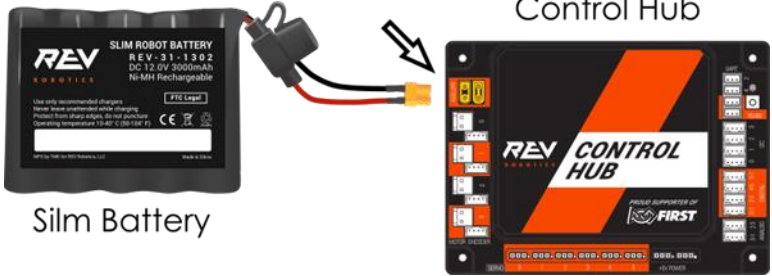


5. At the main screen, confirm the channel is changed under "Network".



2.6 FACTORY RESET

The Control Hub can reset to factory settings. This will replace the reset the password and SSID name while keeping the Robot Controller application installed on the Control Hub.

Factory Reset Procedure	
1. Press and hold the button on the front of the Control Hub.	
2. While pressing the button, power on the Control Hub.	
3. Release button when Control Hub LED flashes PINK. When Control Hub flashes BLUE then GREEN it has completed the reset and is ready to connect.	