REV Hardware Client

REV Hardware Client Overview

The REV Hardware Client is software designed to make managing REV devices easier for the user. This Client automatically detects connected device(s), downloads the latest software for those device(s), and allows for seamless updating of the device(s).

REV Hardware Client - Version 1.3.0
Download Latest REV Hardware Client

Feature Summary

- Automatically detect supported devices when connected via USB
- Connect a REV Control Hub via WiFi
- One Click update of all software on connected devices
- Pre-download software updates without a connected device
- Back up and restore user data from supported devices (Control Hub and SPARK MAX)
- Install and switch between DS and RC applications on Android Devices
- Access the Robot Control Console on the Control Hub
- Auto-update to latest version of the REV Hardware Client
- Display devices connected via RS485

Supported Devices

- REV Control Hub (REV-31-1595)
- REV Expansion Hub (REV-31-1153)
- REV Driver Hub (REV-31-1596)
- Android Device via ADB
- REV SPARK MAX (REV-11-2158)
- Generic CAN Devices

Change Log

Version 1.3.0

- General updates:

    - Adds FTC log viewer utility
        - Can load log files directly from supported devices, or from anywhere on the user's computer
        - Allows users to easily filter, search, and sort events parsed from log files
        - Graphs the occurrence of important robot issues, and their corresponding timestamps
        - Supports match, robot controller, driver station, Wi-Fi, and updater logs
    - Shows release notes for client even when an update is not available
    - Scales telemetry graph ranges automatically when using default ranges
    - Fixes issue with devices showing up multiple times when changing CAN IDs
    - Shows update progress for all devices that are updating simultaneously
    - Updates users to the latest available client version when removing a software channel
    - Other minor bug fixes
- Control Hub specific updates:
    - Improves stability of the connection to a Control Hub
    - Includes program and manage logs with Control Hub diagnostic data sent to REV
- SPARK MAX specific updates:
    - Fixes issue with SPARK MAX analog telemetry
    - Improves SPARK MAX parameter fields
    - Fixes issue where a SPARK MAX in recovery mode could not be updated on some computers
    - Adds interface to run multiple SPARK MAX devices
    - Adds simplified support for configuring follower mode (currently limited to following another SPARK MAX)
    - Shows a dropdown for the `Alternate Encoder -> kDataPortConfig` parameter

Version 1.2.0

- General updates:
    - Allow installing previous versions of software
    - Show client updates are available more subtly
    - Reconnect to ADB if it resets
    - Show manufacturer names for generic android devices
    - Fixes issues with Control Hub and Expansion Hub firmware falsely saying out of date
    - Other minor bug fixes
- Control Hub specific updates:
    - Shows warning when the Control Hub internal communication is not responding
    - Shows warning when Control Hub webserver is not running
    - Full screen mode for Program and Manage Tab
    - Prompts to backup Control Hub data if backup on file is over a week old

    - Confirmation now required to restore backed up files
    - Fix issues with not all files being restored
- SPARK MAX specific updates:
    - Fixed bug where Alternate Encoder telemetry data was displaying incorrectly
    - Allow for complete Factory Reset of all parameters on SPARK MAX
    - Disabled setting of parameters that have no effect in current configuration
    - Fixed bug where the Client would turn white on selecting SPARK MAX

Version 1.1.0

- Adds support for SPARK MAX and other CAN devices
- Allows for updating SPARK MAX devices, installing APIs, running motors, and viewing data from the SPARK MAX and its motor.
- Shows all recognized devices on a CAN bus, and the data that is sent on the bus

Version 1.0.0

- Original Release

Getting Started

Installation

Before starting downlead the latest version of the REV Hardware Client

Latest REV Hardware Client - Version 1.3.0
Download Latest REV Hardware Client

System Requirements

- Operating System: Windows 7 (64-bit) or newer
- Processor: 64-bit

Installation Instructions

-

Download the REV Hardware Client Installer above.
- Run the Installer
- Run the REV Hardware Client from the Windows Start Menu or a desktop shortcut

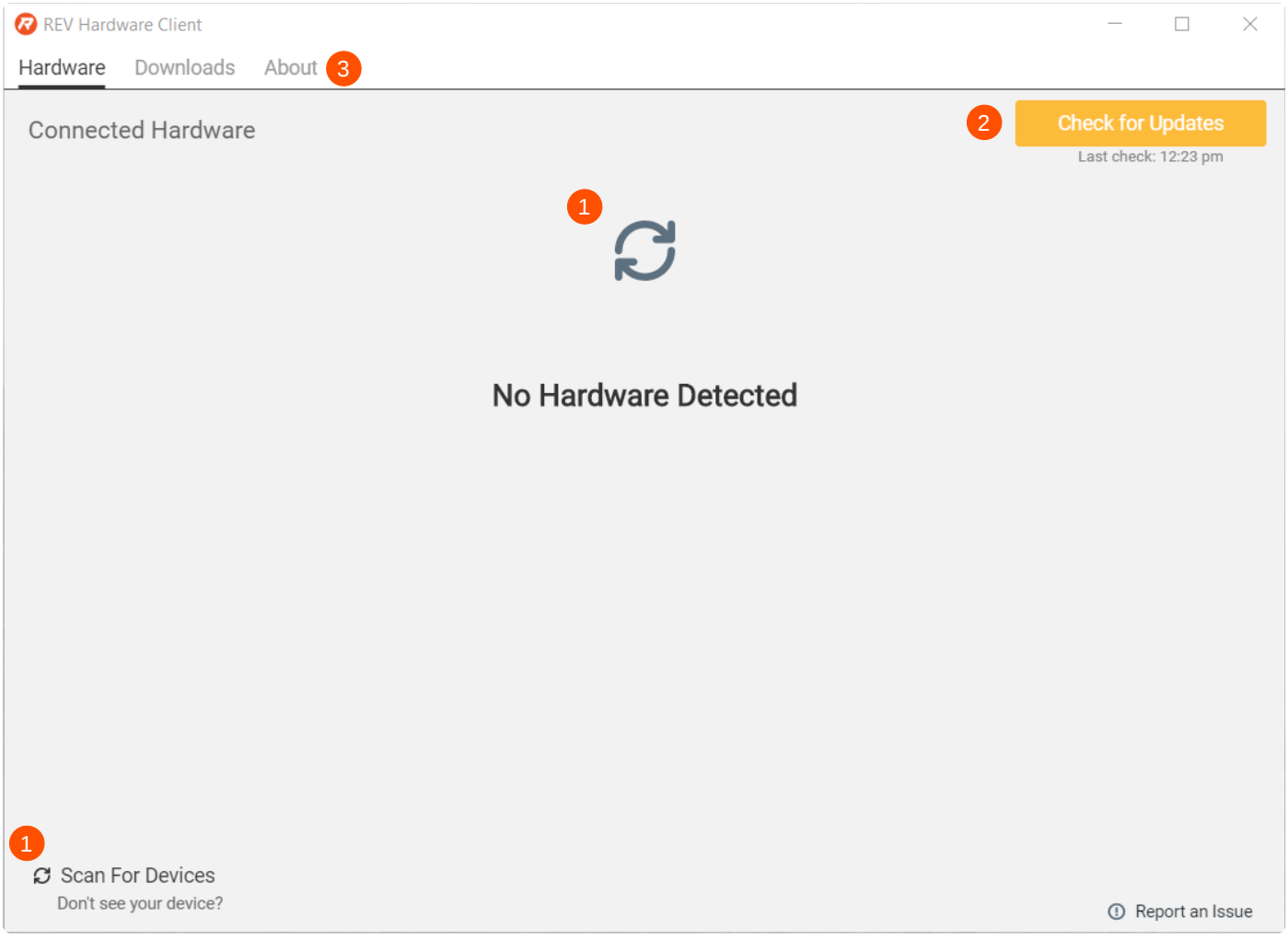
Navigating the Client

The REV Hardware Client has three tabs to manage different features of the Client. The Hardware Tab is where supported hardware devices are managed. The Downloads Tab allows for the downloading of supported device software for updating when offline. The About Tab has information on what devices are supported, updating the REV Hardware Client, and having issue reporting.

Hardware Tab

The Hardware Tab is where supported hardware devices are managed in the REV Hardware Client. When opening the REV Hardware Client the Hardware Tab is displayed.

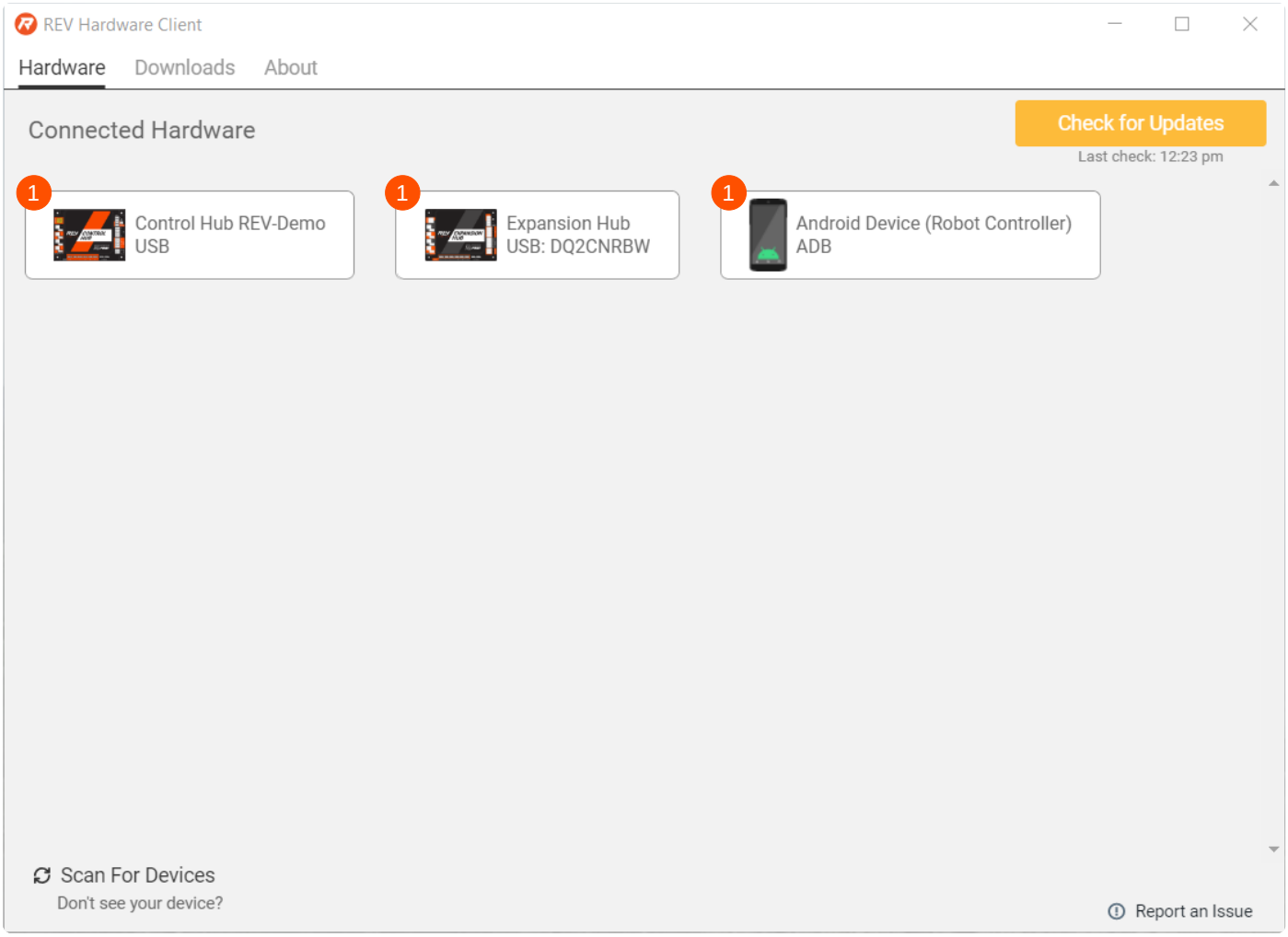
No Hardware Detected



1. **Scan for Devices** - When supported REV hardware is connected to a Windows PC the Client will auto scan for new devices. You can Scan for Devices if the device did not automatically populate.
2. **Check for Updates** - This checks for any updates available for the REV Hardware Client
3. **Navigation** - Three tabs are at the top of REV Hardware Client allowing

Hardware Detected

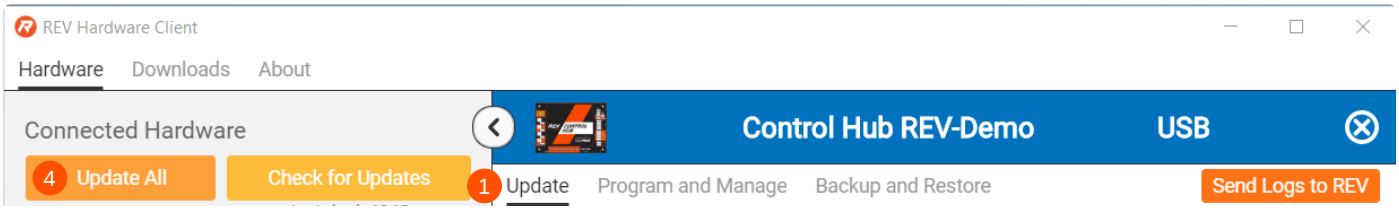
Connecting supported hardware to a Windows PC with the REV Hardware Client running will automatically scan and add the devices to the Hardware Tab.

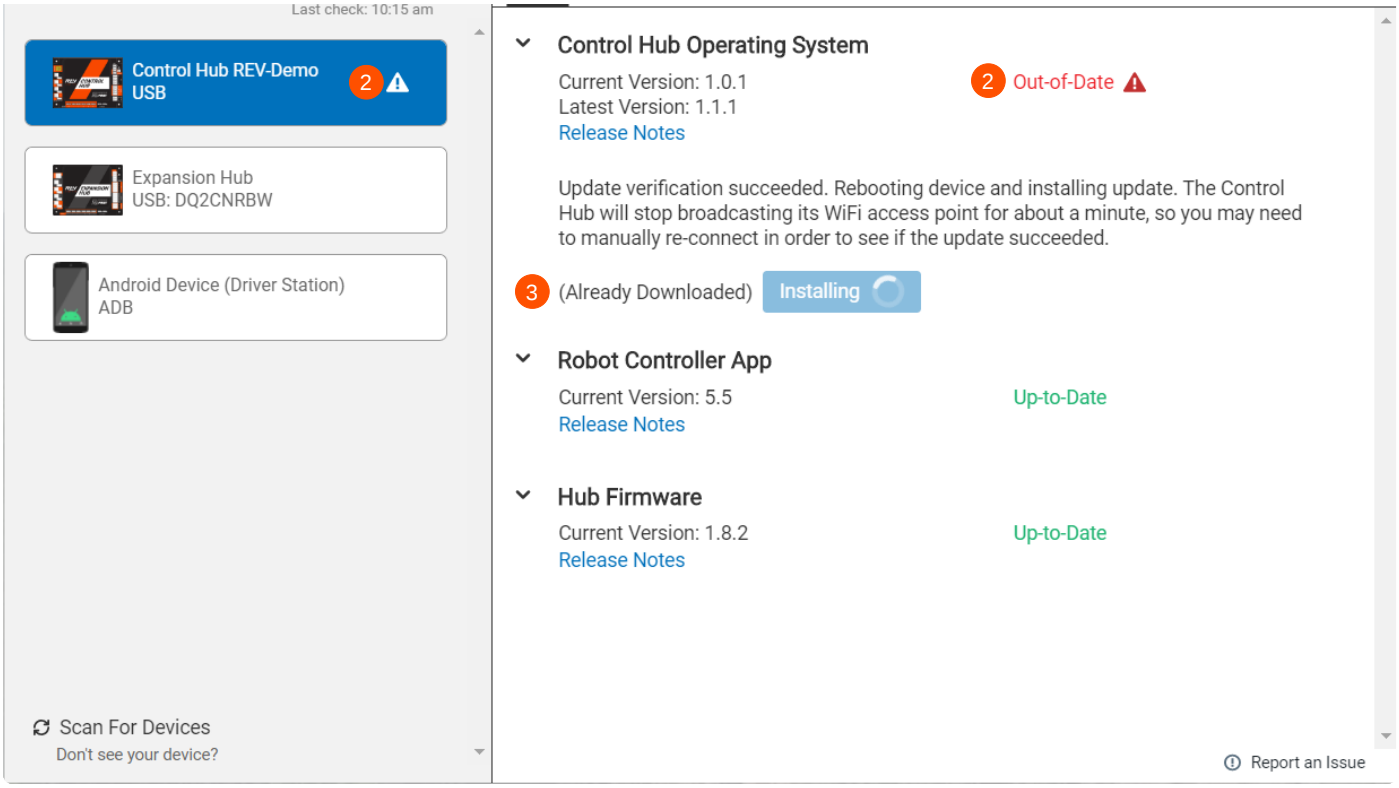


1. **Supported Hardware** - Each type of supported hardware will appear. Clicking on the Hardware will bring up each units Device Menu

Device Menu

Selecting a Device will bring up that device's menu. Below is a screenshot of the Control Hub's Device Menu.

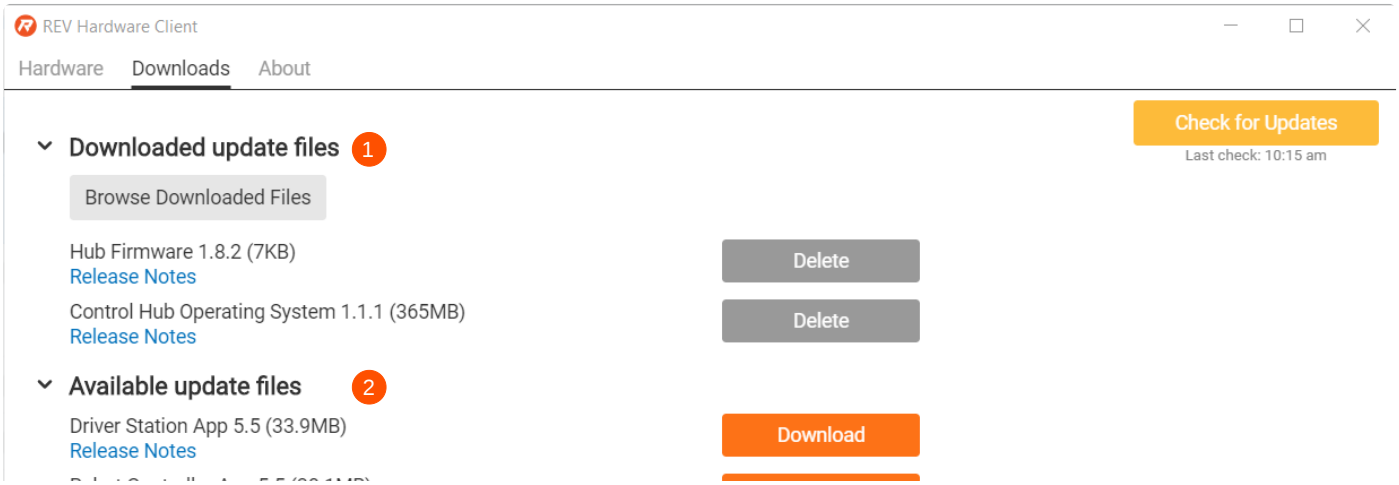


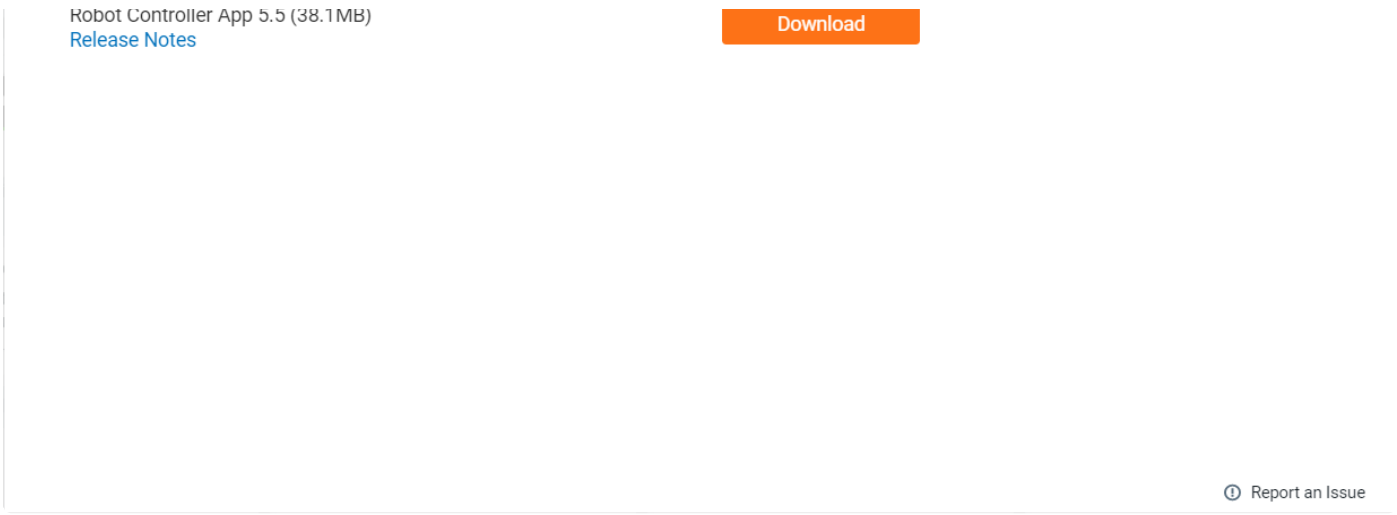


1. **Device Menu Tabs** - Different devices will have various supported tabs. All devices have an Updates Tab handling software updates for for device. The Control Hub has a Program and Manage Tab giving access to the Robot Control Console. The Control Hub also has a Backup and Restore Tab allowing for the back up and restoration of configuration files as well as blocks and java code.
2. **Out of Date Warning** - There are two indicators that a part of the software on the device is out of date.
3. **Download and Install** - Under each update type are buttons to download and install that update.
4. **Update All** - This button will update all software items for all connected devices. This type of update can take a while depending on the number of devices connected and the type of update.

Downloads Tab

The Downloads Tab is where download software files are managed. The latest software updates are able to be downloaded without a hardware device connected to the REV Hardware Client.

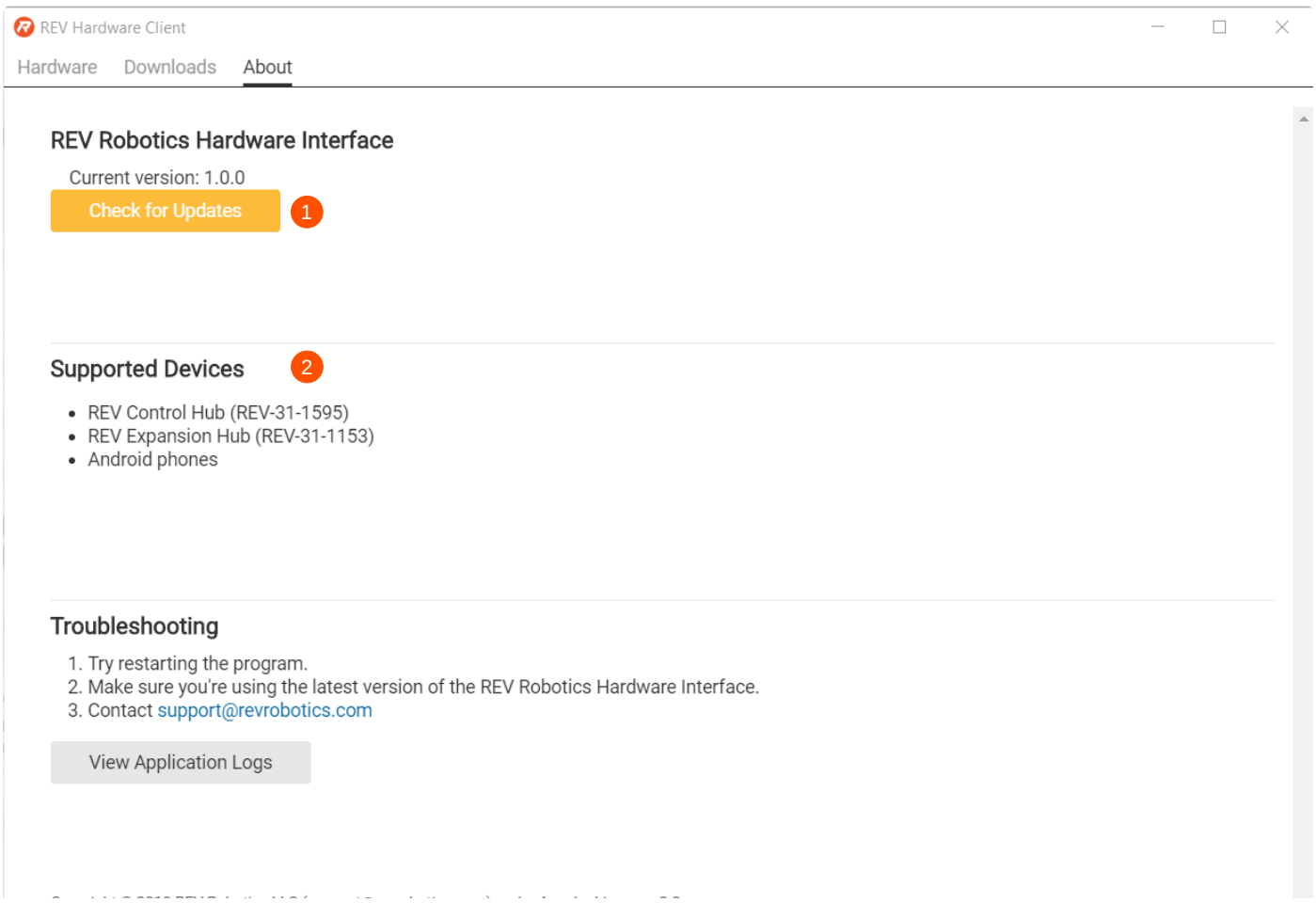




1. **Downloaded Update Files -** This section allows for each version of software already downloaded to be viewed, released notes checked, and deleting the files from the local machine.
2. **Available Update Files -** This section displays the latest version of software to download, release notes for that software, and a button to initiate the download.

About Tab

The About Tab is where the REV Hardware Client is managed. Here updates for the REV Hardware Client are checked, downloaded, and installed.



1. **Check for Updates -** This section displays the current version of the REV Hardware Client and allows for checking for software updates to the REV Hardware Client.
2. **Supported Devices -** This section lists all of the currently supported devices for the version of the REV Hardware Client installed on the user's device.

Troubleshooting

Device is not visible

If you don't see all of the devices that you expect to see, follow these steps:

- Make sure that you are connected to the Internet, so that Windows can download the necessary drivers
- Disconnect the device from the computer and then re-connect it
- Click the "Scan for Devices" link in the bottom-right corner of the Hardware tab

If that doesn't work, follow the steps for the type of device that is missing.

Control Hubs connected via USB

- Make sure that the Control Hub is plugged in via USB-C, not Mini USB
- Make sure the Control Hub has had a chance to finish starting up, and that its light is green
- Unplug the Control Hub from the computer and plug it back in

Control Hubs connected via WiFi

- Make sure that the Control Hub is running version 5.5 or later of the Robot Controller app
- Make sure the Control Hub has had a chance to finish starting up, and that its light is green

- Make sure that you are currently connected to the Control Hub's WiFi network
- Try rebooting the Control Hub. Re-connect to its WiFi network after its light turns green
- Plug the Control Hub in via USB instead

Expansion Hubs connected to a Control Hub

- Make sure that the Expansion Hub is in the active configuration file
- Make sure that the Control Hub is running version 5.5 or later of the Robot Controller app

Android phones

- Make sure that USB debugging is enabled in the Developer Options
  - If you can't find Developer Options anywhere in the Settings app (it may be listed on a System screen or similar), make sure it is enabled by tapping on the Build number 7 times on the About screen of the Settings app.
- Unplug the phone from the computer and plug it back in. Look for a prompt to allow USB debugging, and click OK when it comes up.
- Make sure that the ADB driver for your Android phone is installed. For Motorola phones, do this by installing Motorola Device Manager.

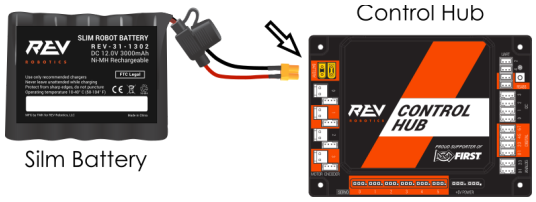
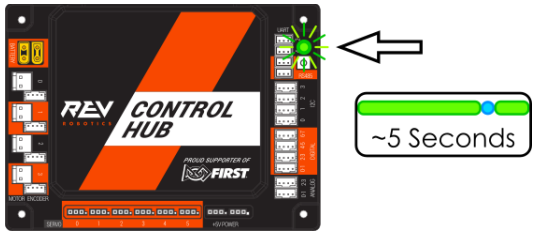
SPARK MAX Motor Controller

- Make sure that the SPARK MAX is not being used by another application, such as the REV SPARK MAX Client
- Unplug the SPARK MAX from the computer and plug it back in

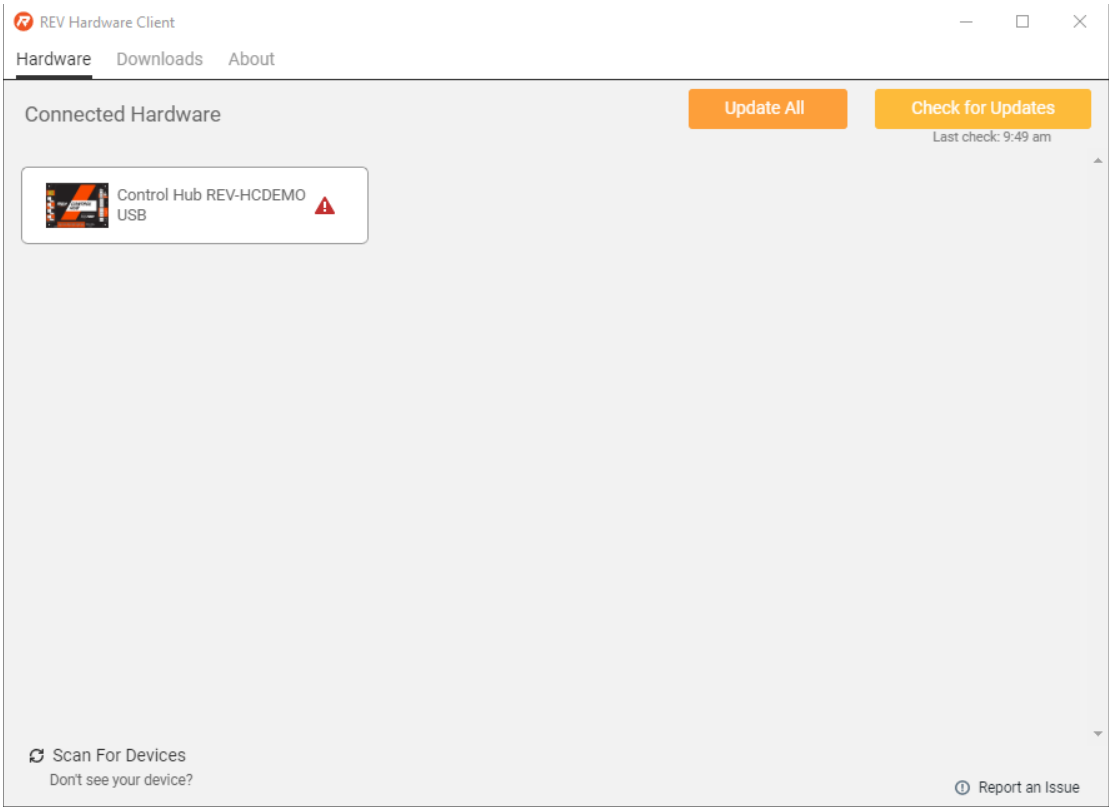
Control Hub

Connecting a Control Hub

Via USB

Steps	
Power on the Control Hub, by plugging the 12V Slim Battery (REV-31-1302) into the XT30 connector labeled “BATTERY” on the Control Hub.	
The Control Hub is ready to connect with a PC when the LED turns green. Note: the light blinks blue every ~5 seconds to indicate that the Control Hub is healthy.	
Plug the Control Hub into the PC using a USB-A to USB-C Cable (REV-11-1232)	

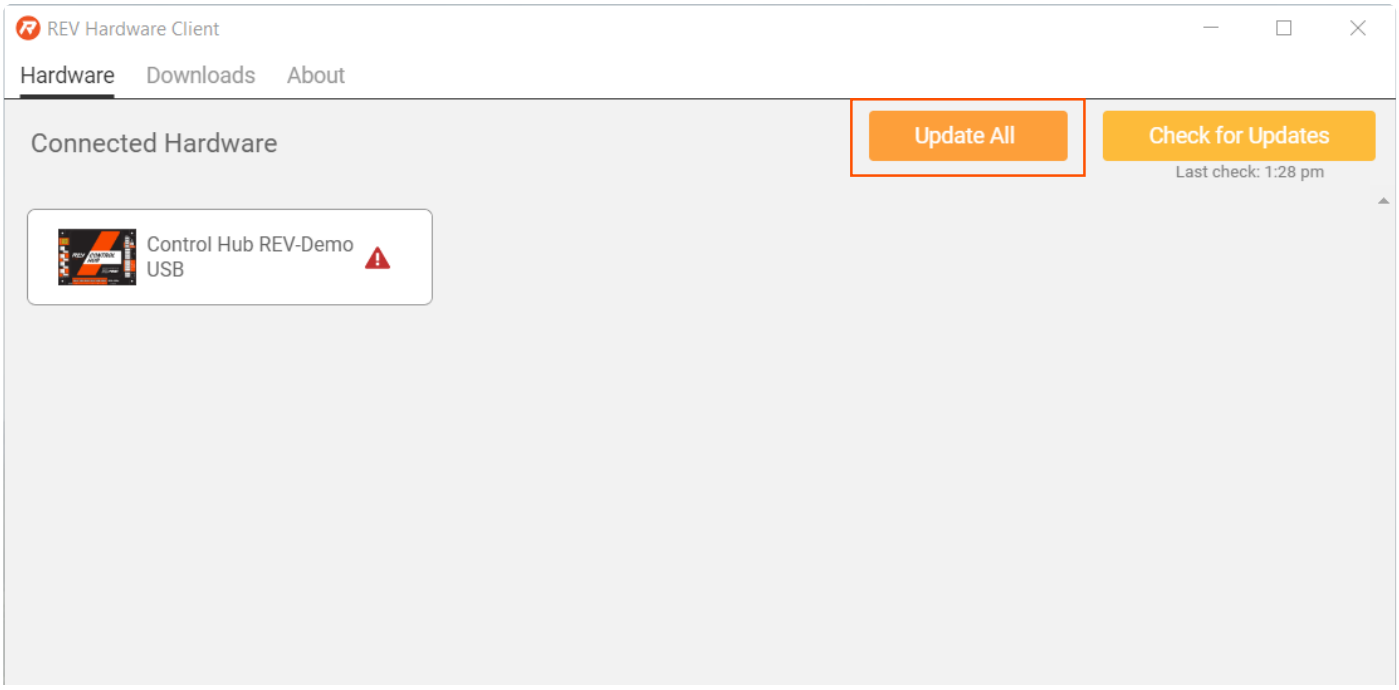
Startup the REV Hardware Client. Once the Hub is fully connected it will show up on the front page of the UI under the Hardware Tab. Select the Control Hub.

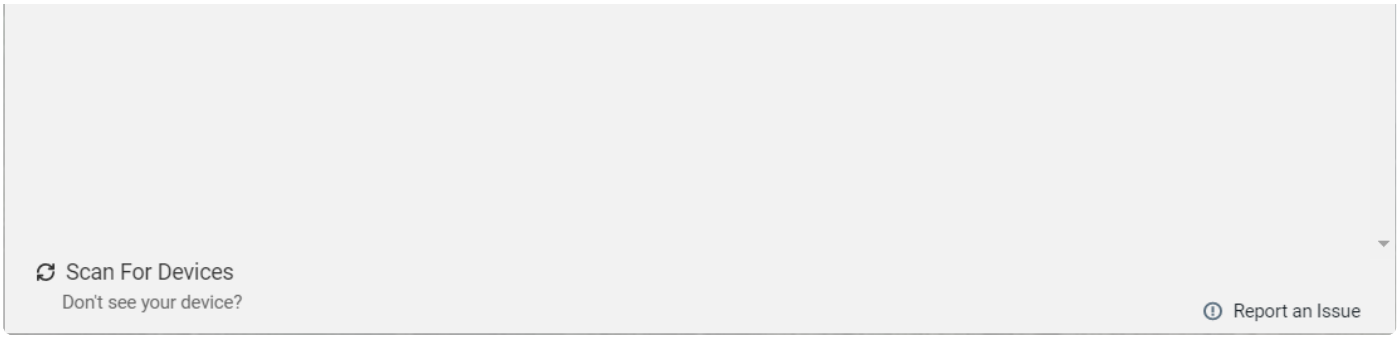


Updating Control Hub

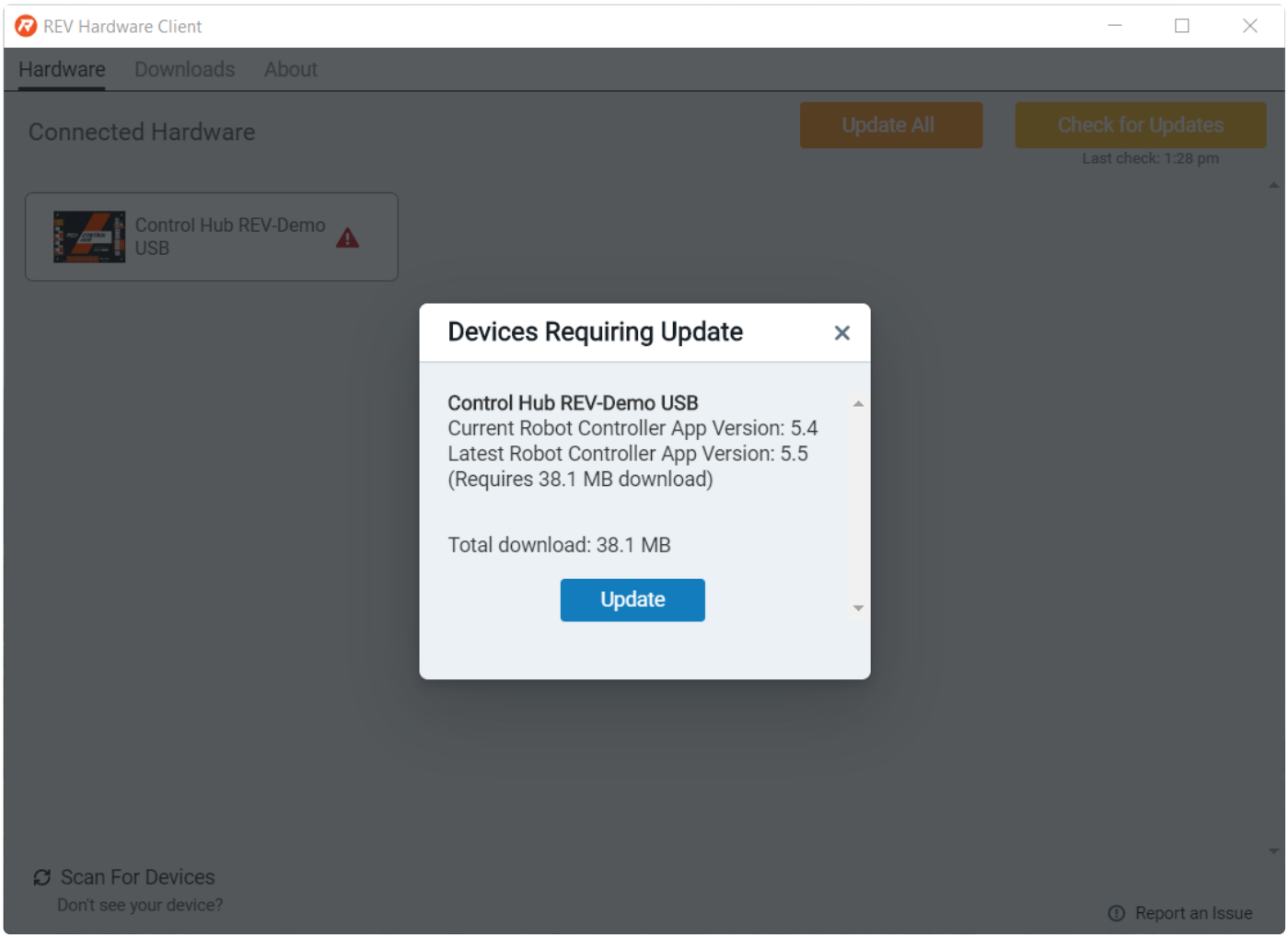
Update All

Once one or more supported REV Hardware devices are connected that require updates, the **Update All** button will appear.





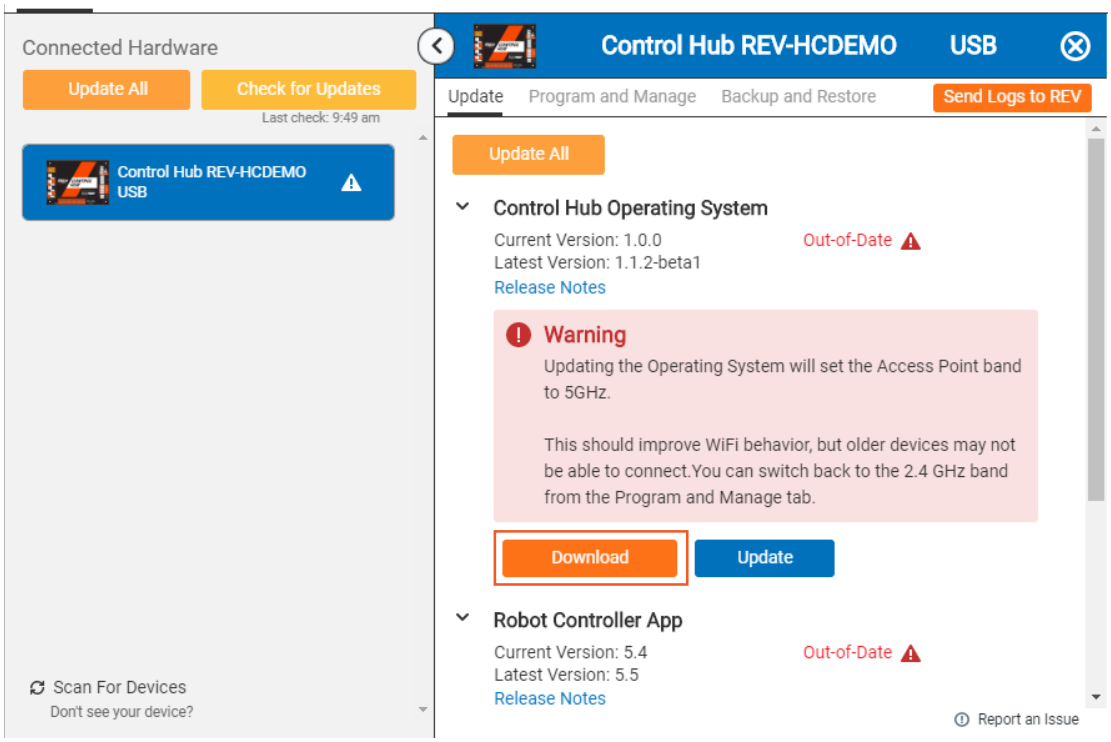
Once Update All is selected the REV Hardware Client will confirm the updates for all connected devices. Select Update to download and update all devices.



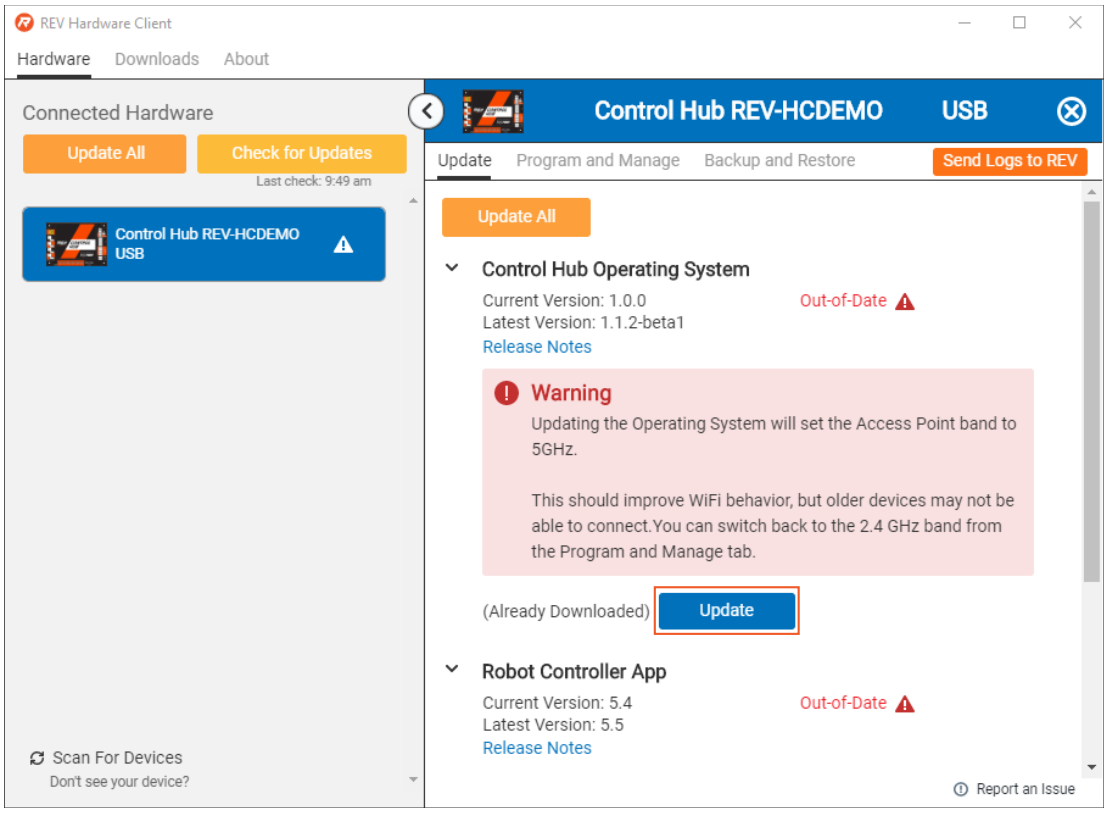
Individual Updates

Operating System

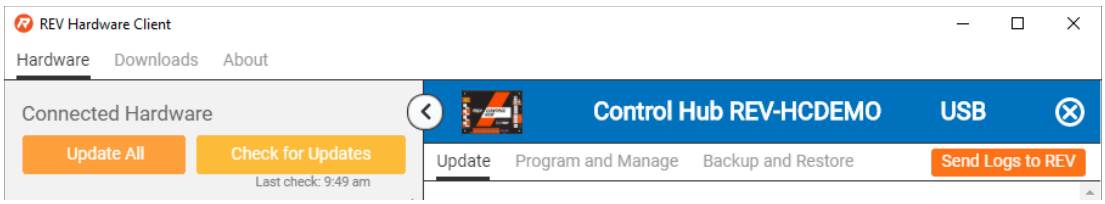
After selecting the Connected Hardware the Update tab will pop up. Under **Control Hub Operating System** select Download.

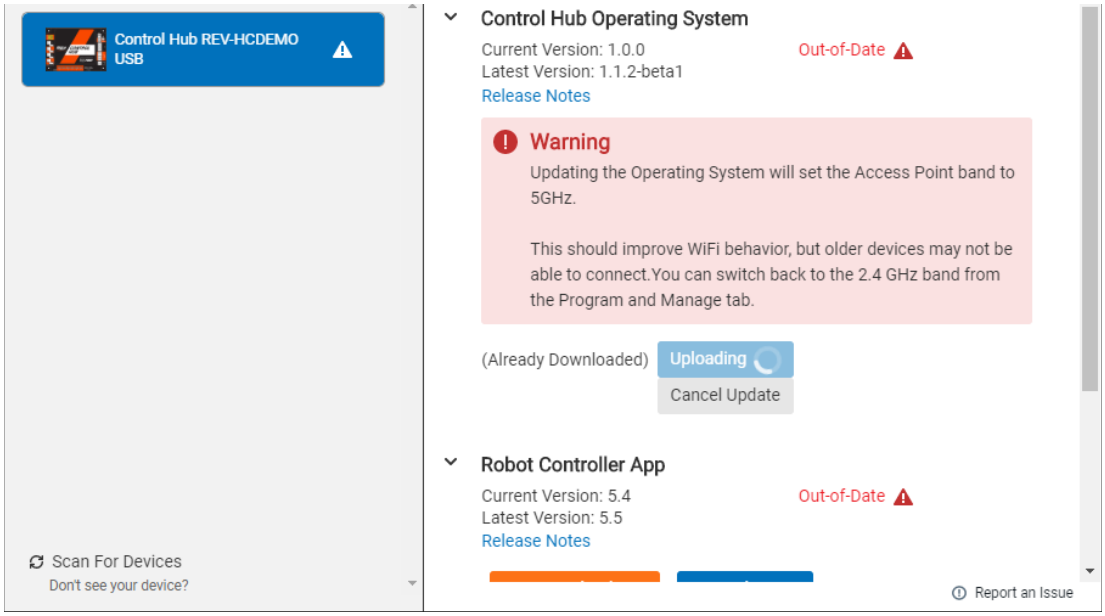


Once the OS has downloaded, select Update.



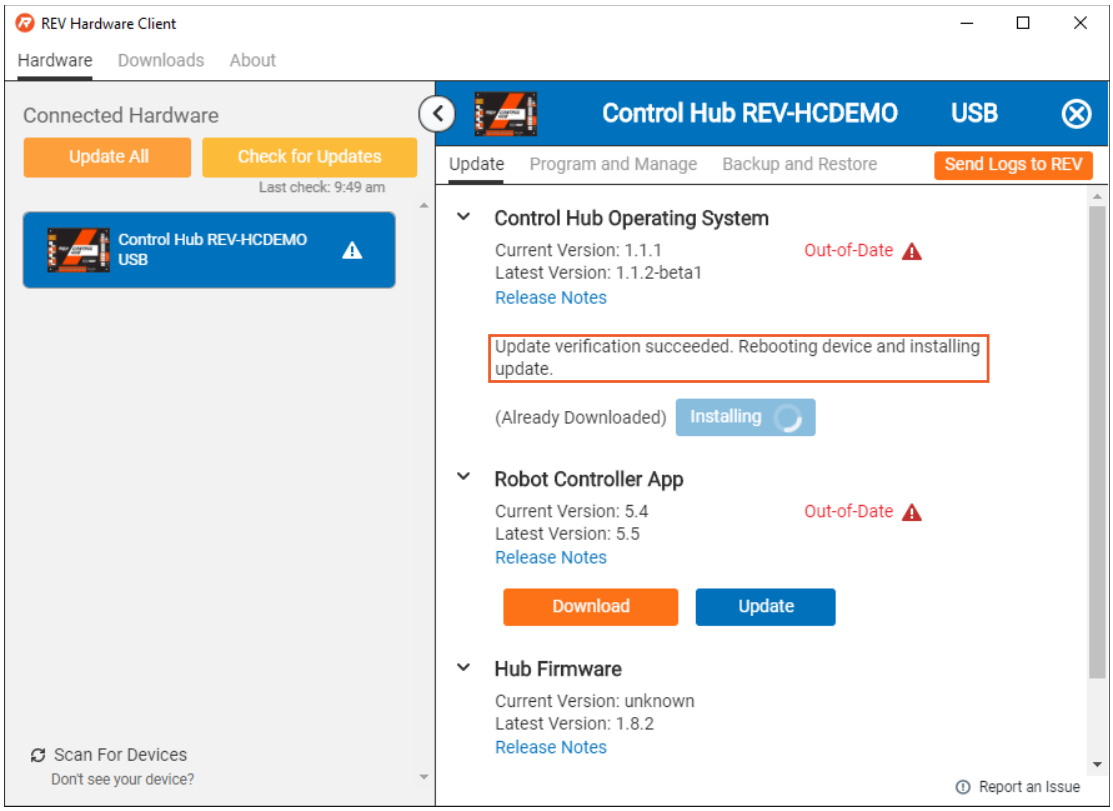
Keep the Control Hub powered while the upload finishes.



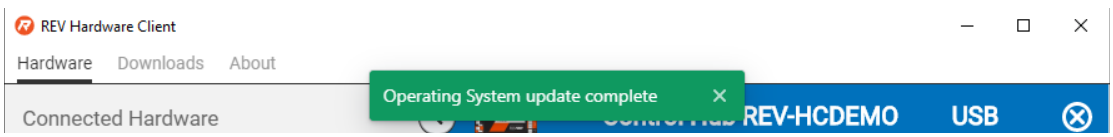


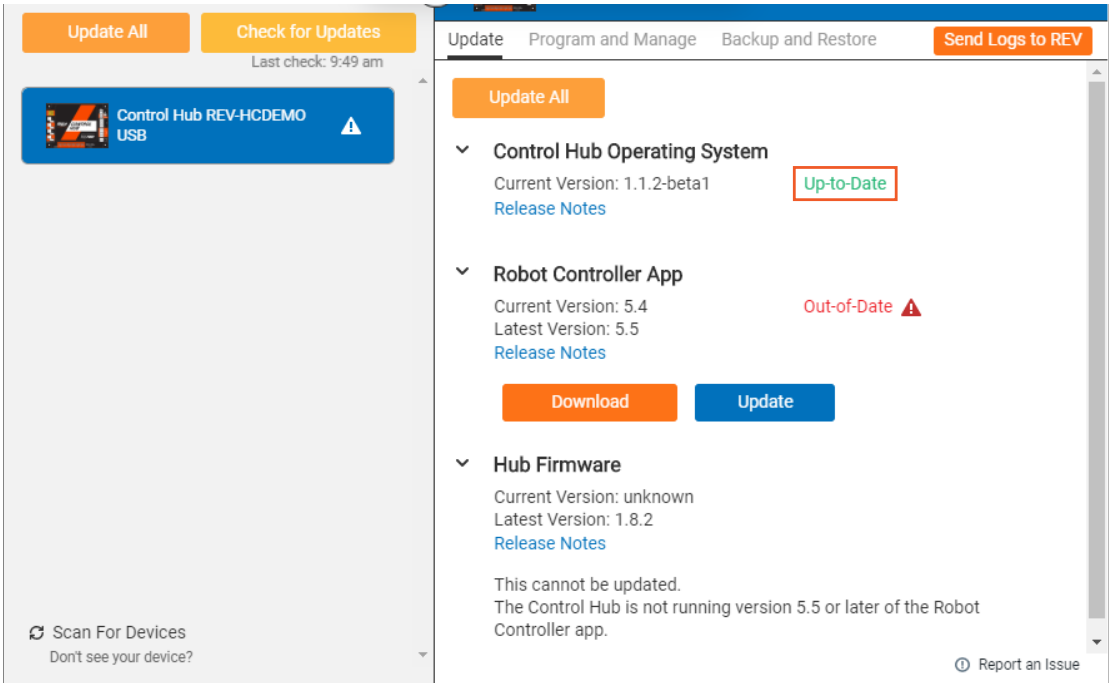
A successful upload will be denoted by the "Update Verification Succeeded" message highlighted in the image below. Once the upload is successful the install will begin.

Keep the Control Hub powered while the update is installed. The Control Hub will reboot to complete the update.



When the OS update has completed a status message "Operating System update complete." The status for the Control Hub Operation System will also change to "Up-to-Date."



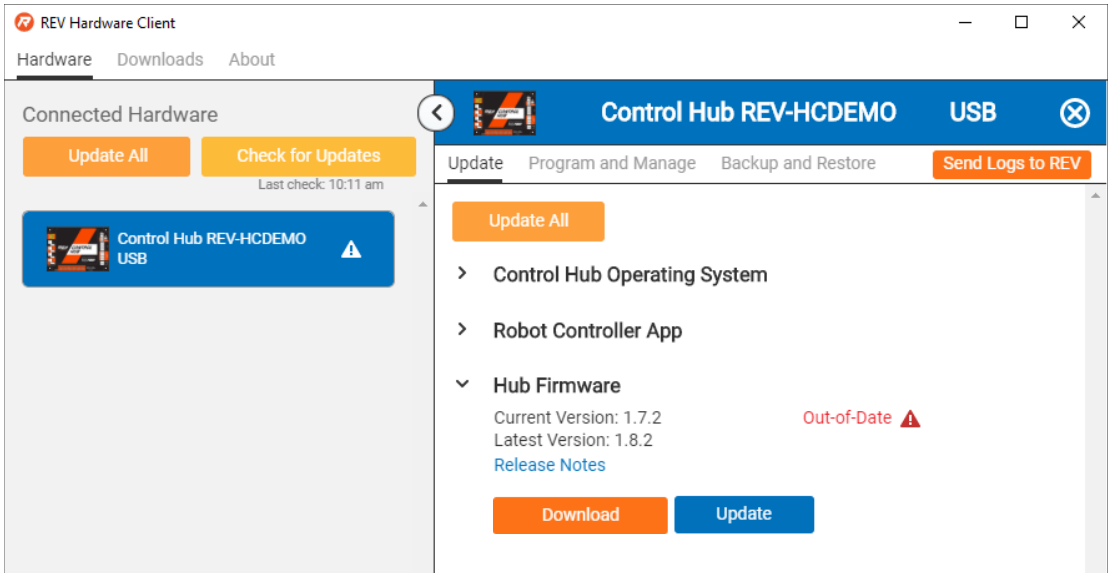


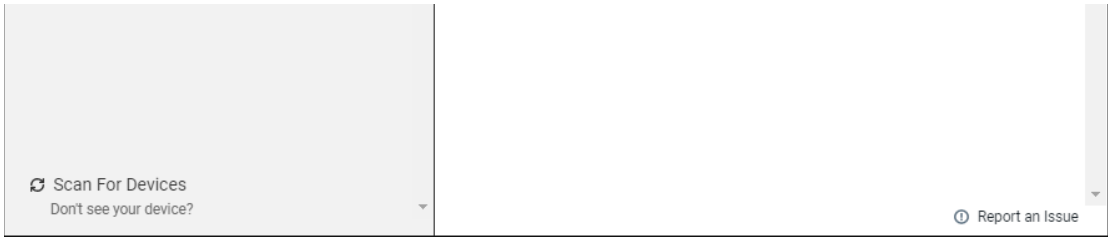
Firmware

There are two boards within the Control Hub: an Expansion Hub and an Android controller. The Expansion Hub board built into the Control Hub, facilitates a line of communication between the built in Robot Controller and the motors, servos, and sensors. In order to improve the quality of the Hubs, REV Robotics will release firmware updates for the Expansion Hub. When a firmware release occurs, both Control Hub and Expansion Hub users will need to update their Expansion Hub firmware to the newest version.

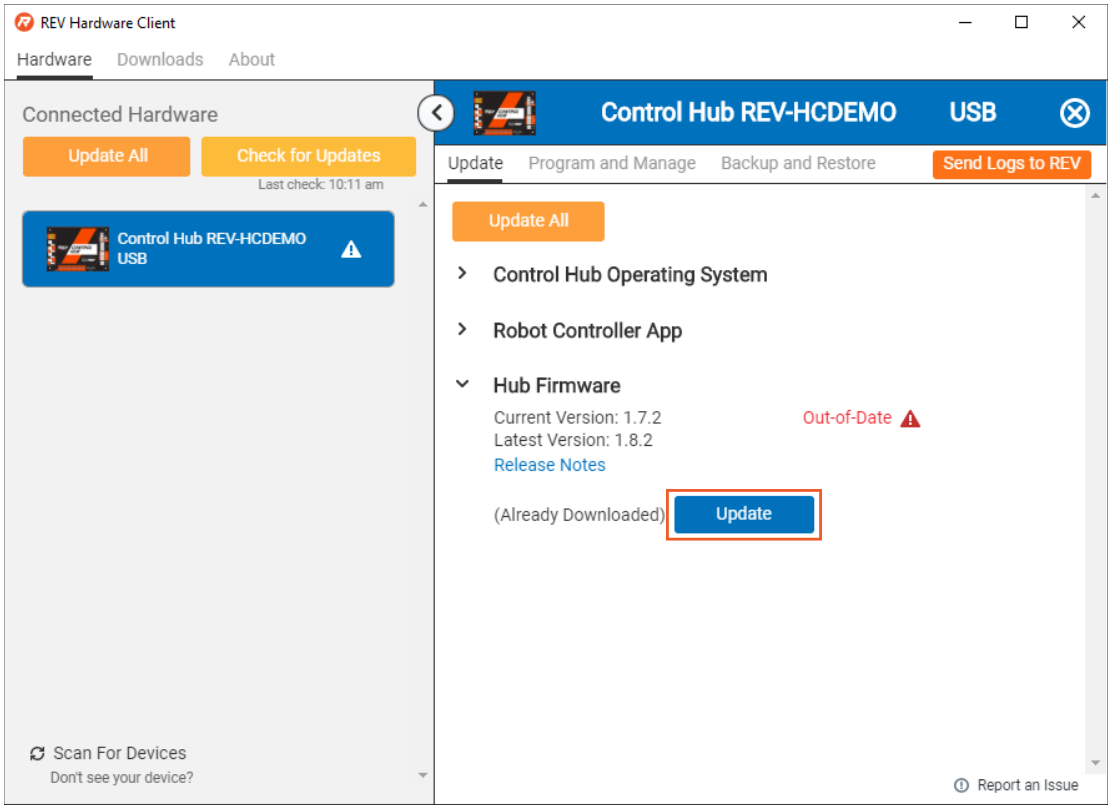
> In order to use the REV Hardware Client for firmware updates, the Robot Controller Application must first be updated to version 5.5. After updating the application you may need to close out of the REV Hardware Client in order for the firmware update to be available.

After selecting the Connected Hardware the Update tab will pop up. Under **Hub Firmware** select Download.

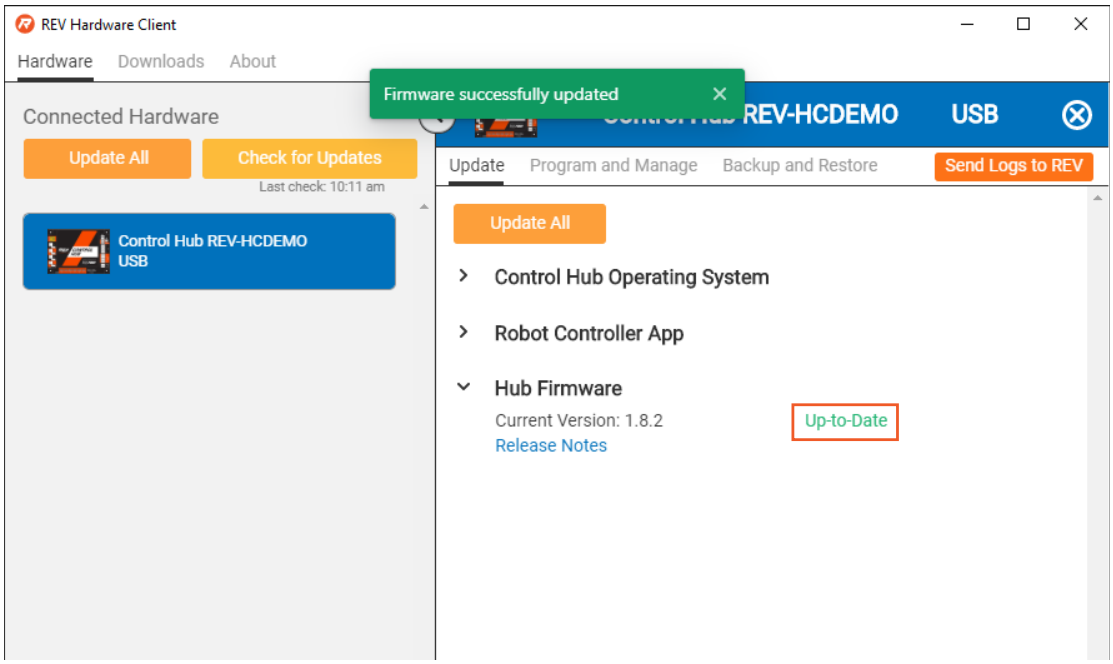




Once the firmware has downloaded, select Update.



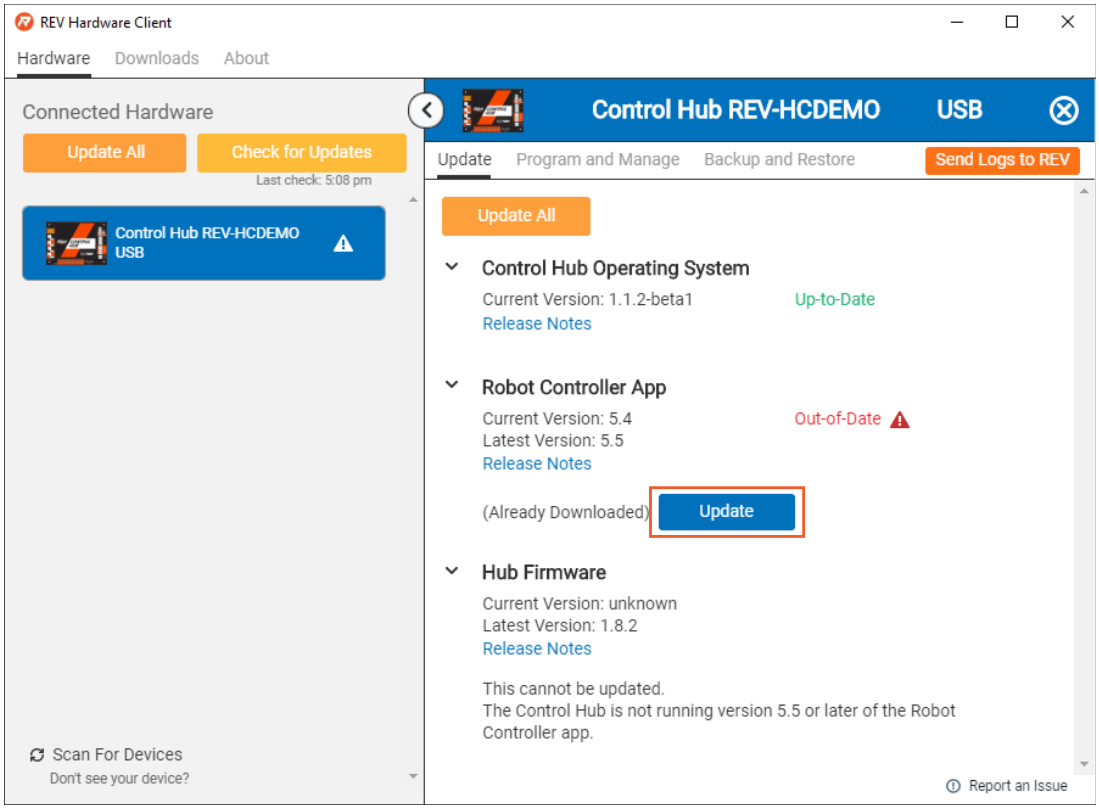
When the firmware update has completed a status message "Firmware successfully updated" The status for the Hub Firmware will also change to "Up-to-Date."



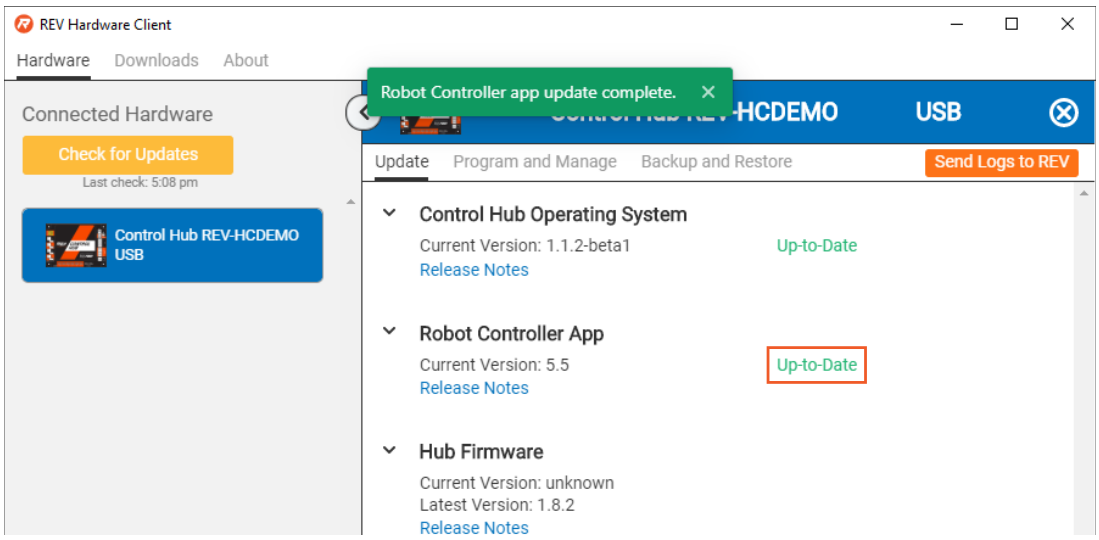
Robot Controller Application

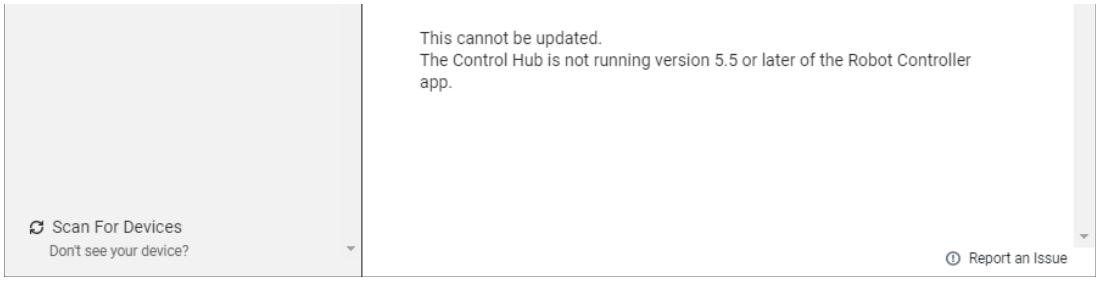
After selecting the Connected Hardware the Update tab will pop up. Under **Robot Controller App** select Download.

Once the app has downloaded, select Update.



When the Robot Controller Application update has completed a status message "Robot Controller app update complete." The status of the **Robot Controller App** will also change to "Up-to-Date."

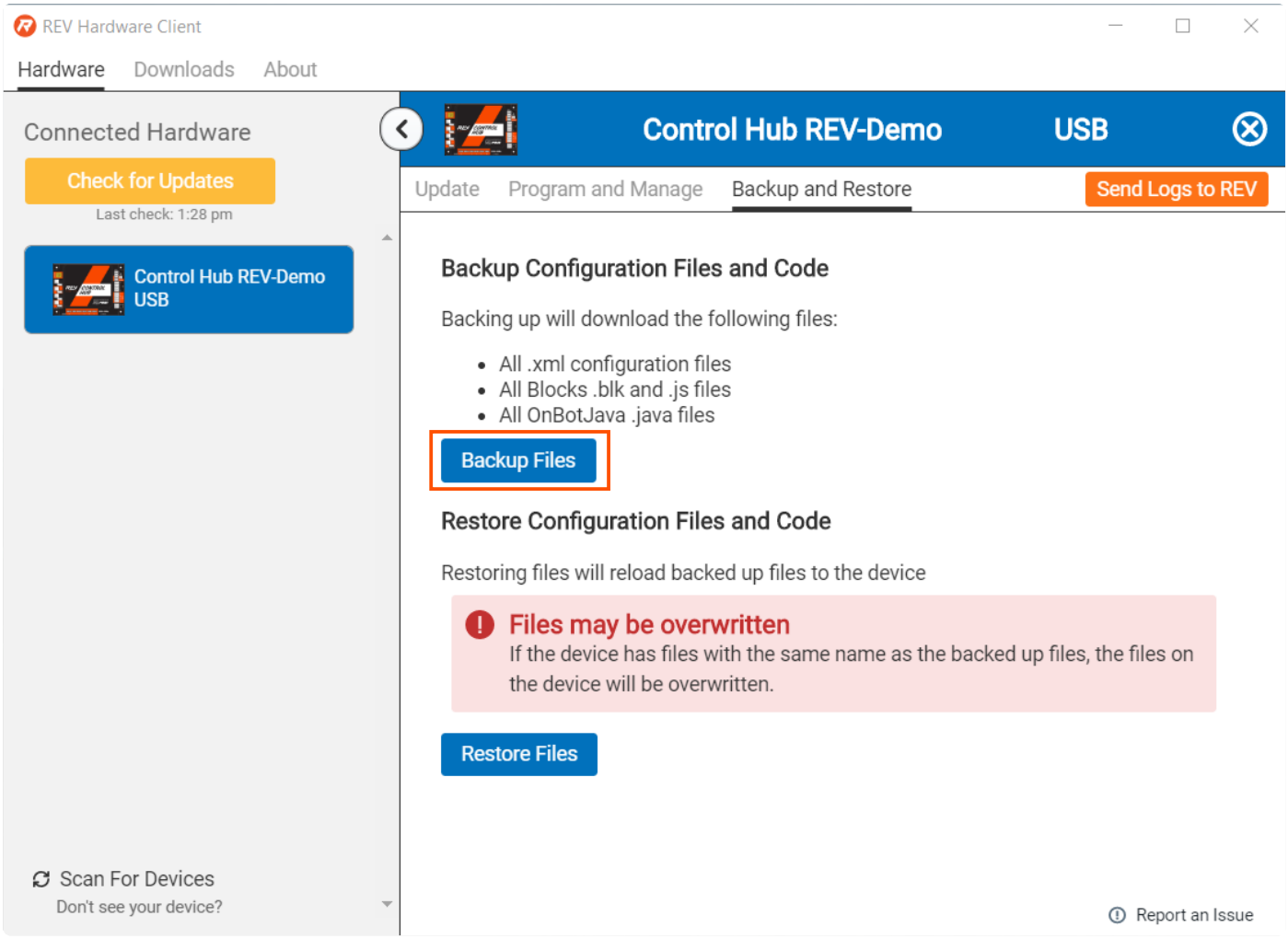




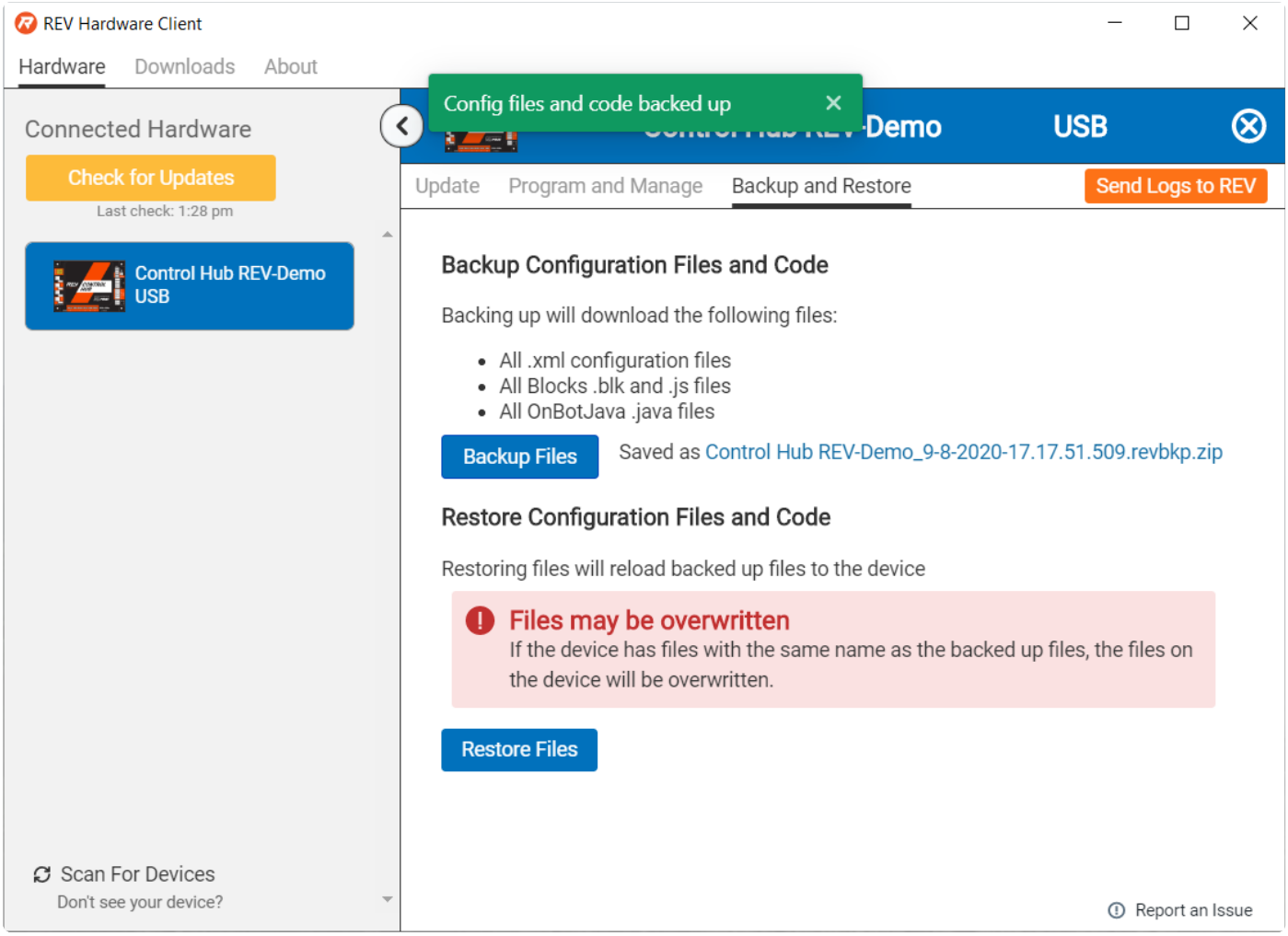
Restoring User Data

Backup Files

Once on the Backup and Restore Tab, select the Backup Files button.

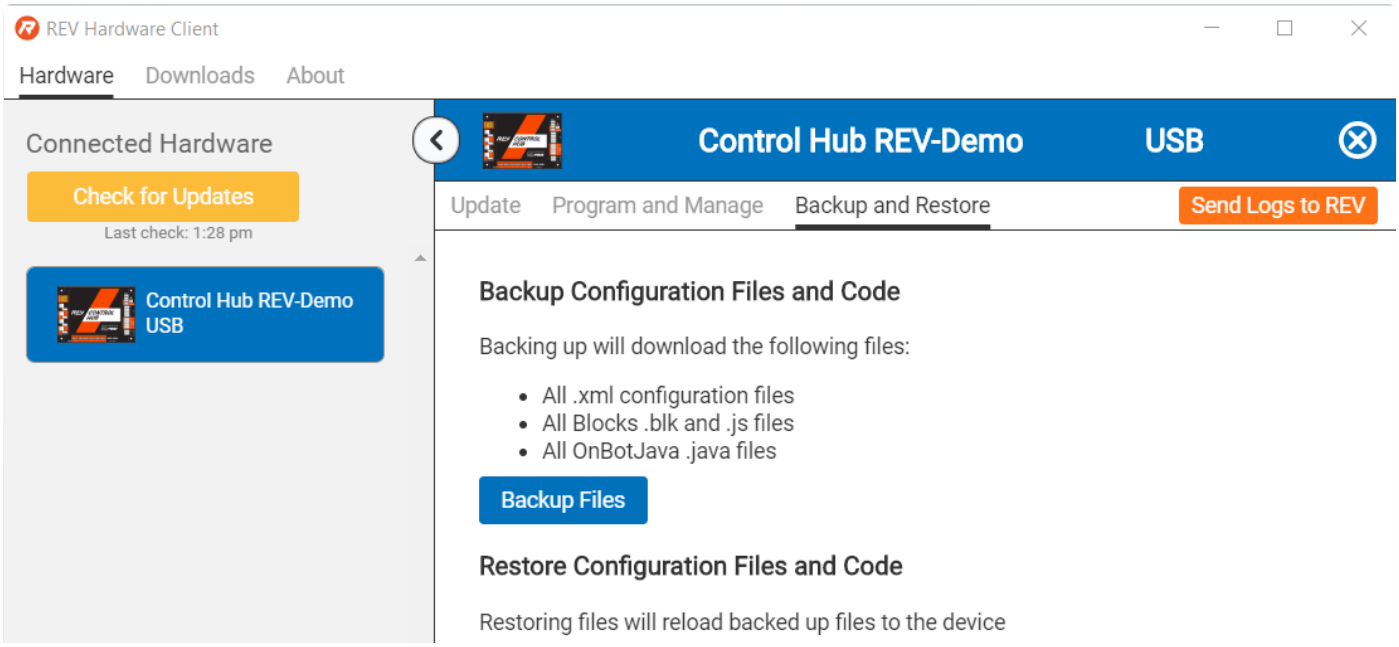


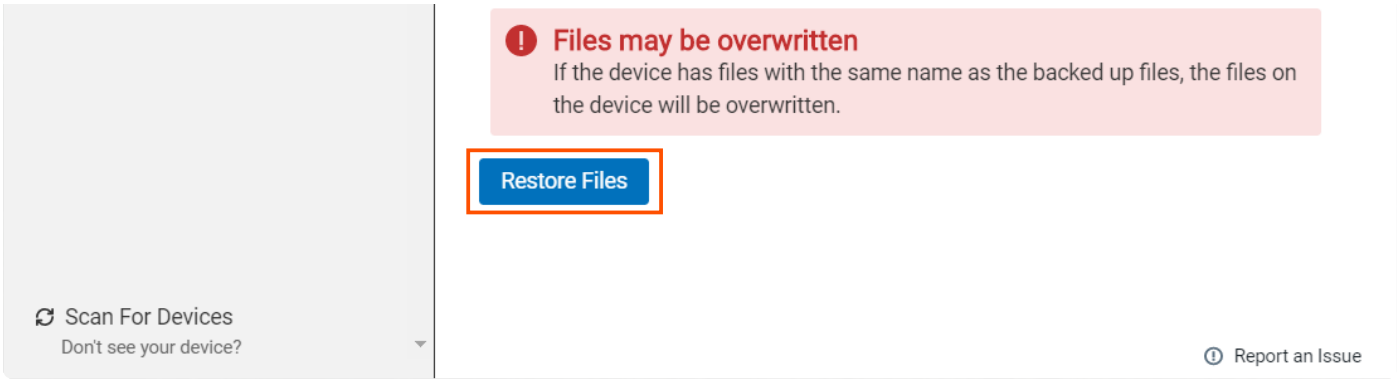
Once selected a prompt will display confirming Configuration Files and Robot Code are backed up. Also, the zip file name is visible.



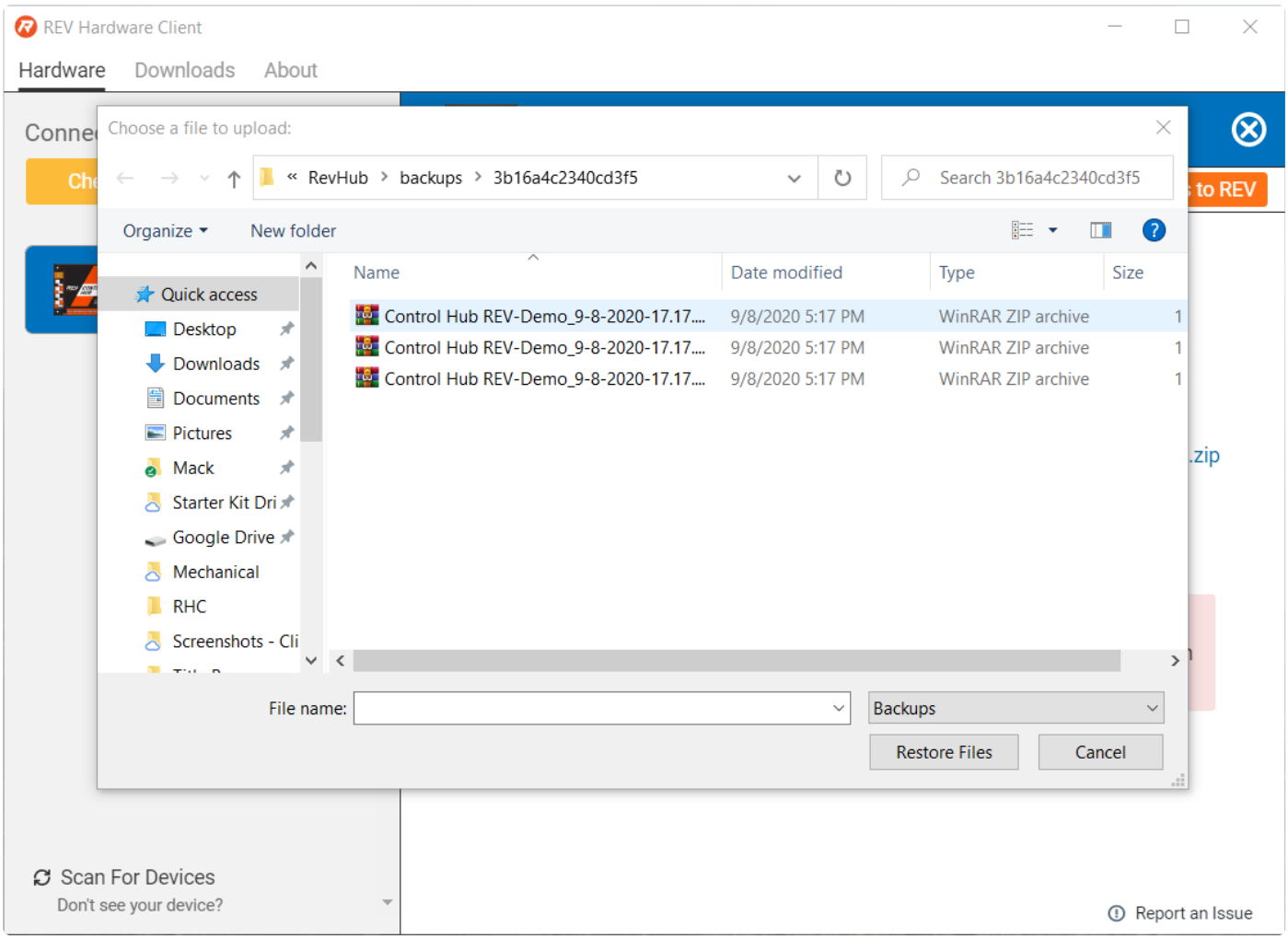
Restoring Files

To Restore Files, select the Restore Files button.

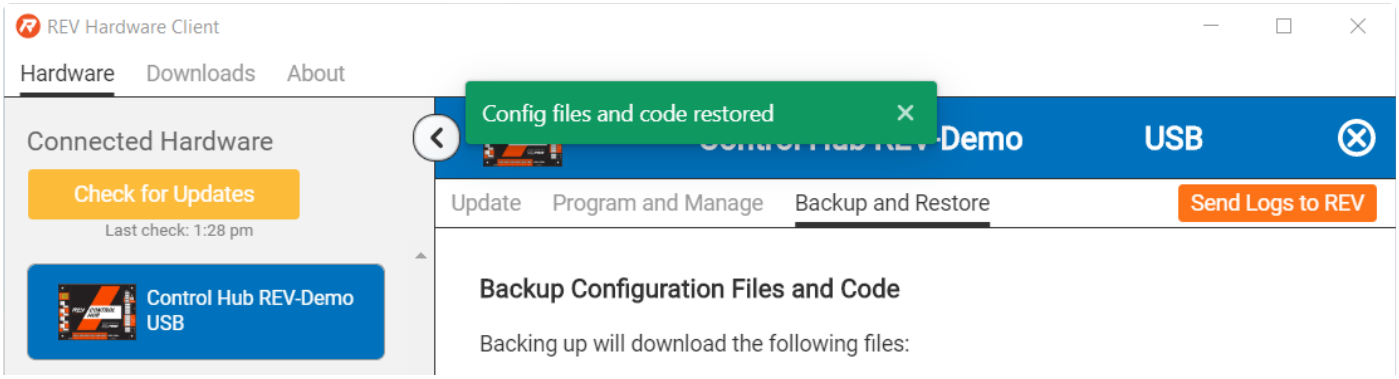


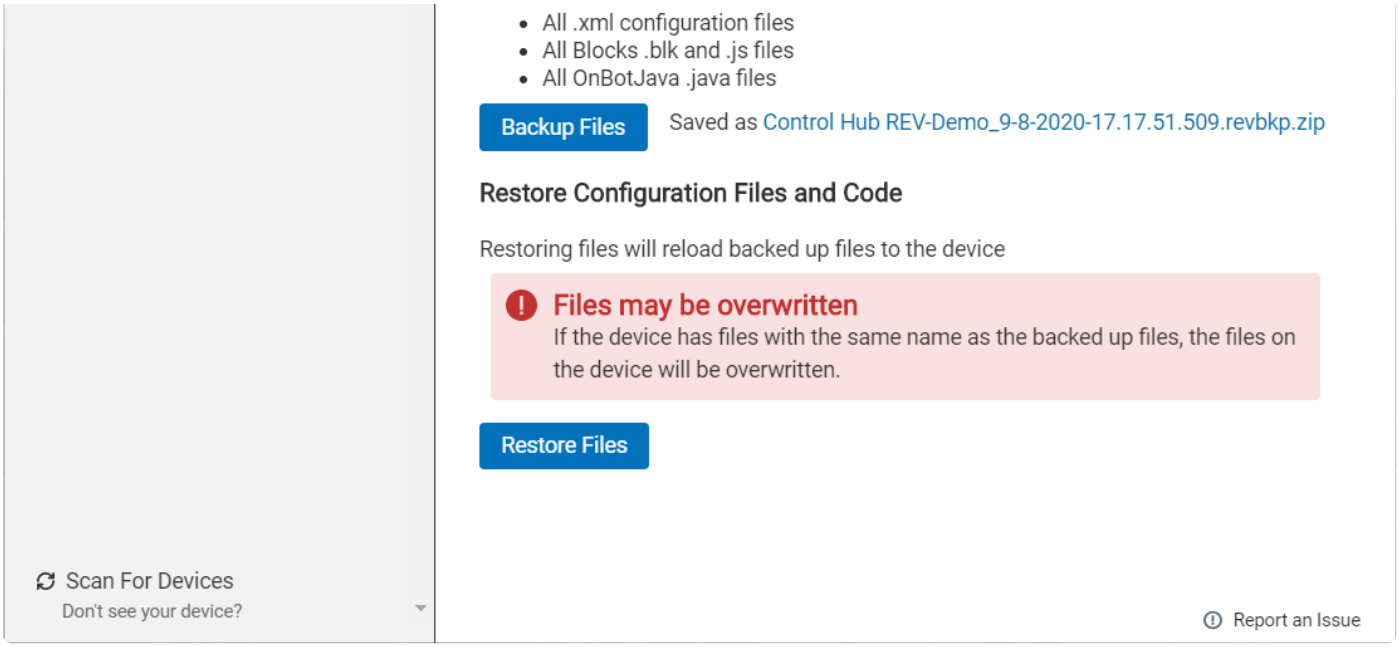


Once selected, a window opens prompting you to select the zip file to restore. Select the zip file and press Restore Files.



Once selected the Client will prompt with the Configuration Files and Robot Code are restored.





Using the Log Viewer

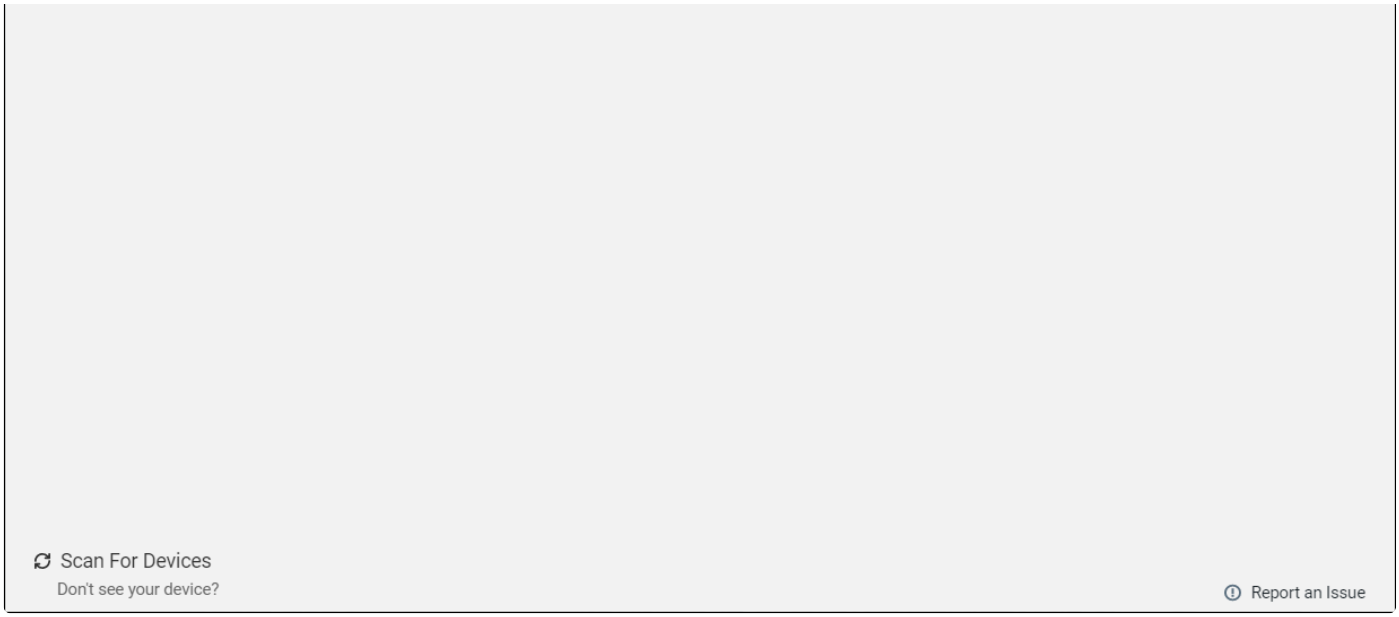
When troubleshooting problems with the REV Control System log files provide indicators of what the status of the Control Hub or Expansion Hub were during an event. A look at the Robot Controller, WiFi log, or Updater log may help you better understand the root cause of the issue.

However the logs document all activities that the Control System performs, not just issues, but normal startup procedures or op mode runs. The means that logs often contain more information than can be reasonably sifted through. To make the content in the logs more palatable to sort through, the logs need to be parsed.

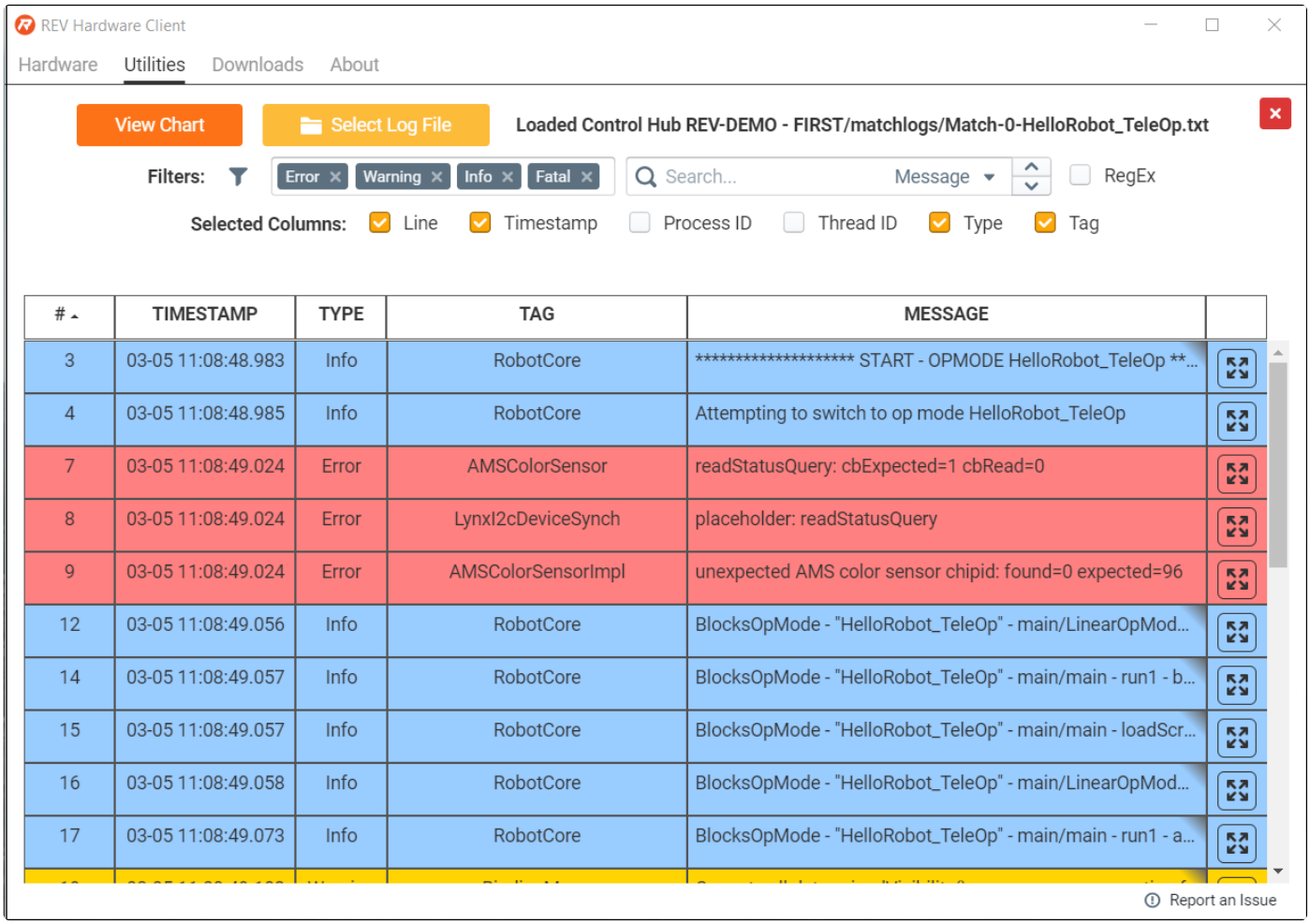
The REV Hardware Client has a Log Viewer that makes it easier to parse overall log files. Through a series of filters, tags, and a search function makes it easy to see what is happening on the Control Hub or Driver Hub during any opmode run.

Accessing the Log Viewer

To access the Log Viewer, head to the Utilities Tab.



From there you can select and open log files for connected devices or for ones downloaded onto the computer.



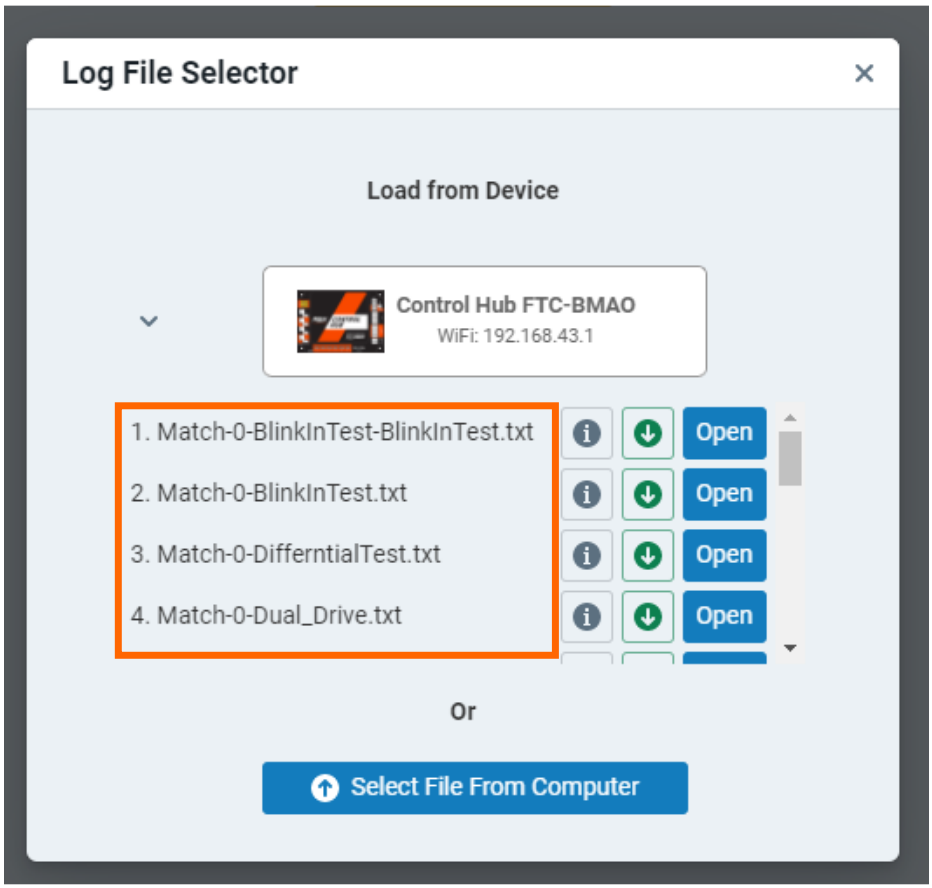
Parsing the Logs

One of the most common issues that arises when trying to interpret logs is the wrong time and date on the

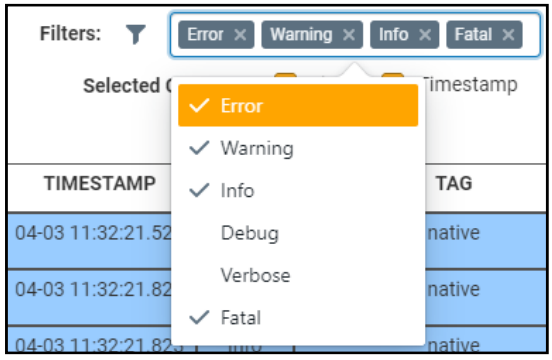
Driver Hub or Driver Station phones. Ensuring that your Driver Station is set to the right time before observing or sending a log can help make data between the Robot Controller Log and Driver Station more interpretable. It also helps when observing a unique issue to pay attention to the time of the incident. If a problem or an indicator of a problem starts occurring at 4:38:57 PM then that time can be tracked in the logs to help determine what happened that initiated the issues.

Once you have confirmed the correct date and time you can use the Log Viewer to try to track the problem within the logs.

If you select a connected device, such as a Control Hub, the Log viewer will give you an option to select standard logs or matches. Matches are segments of the robot controller log where a particular op mode is running. This is helpful to parse the data further by limiting the content to particular op mode runs that you know a system failure occurred during.



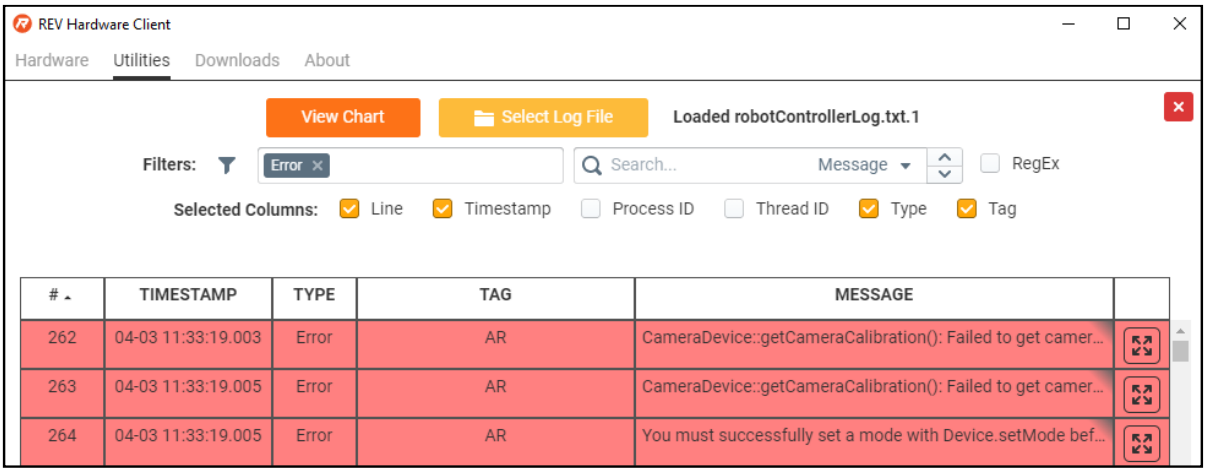
Interpreting Filters



Aside from helping parse data down to specific time intervals the Log Viewer offers filters to select narrow

down data in the logs to a particular type of data. The Log Viewer splits the data from the logs into six types: error, warning, info, fatal, debug, and verbose.

Errors

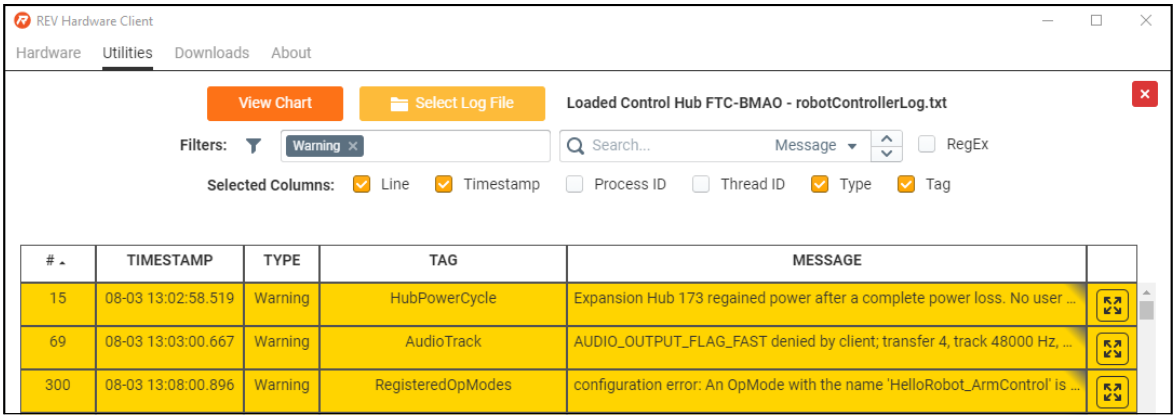


Errors occur when system actions do not execute properly. These log lines are typically indicative of a user created issues, such as errors in code, configuration, or wiring. For instance, in the image above the error is stating that it failed to calibrate the camera, which could be a sign that the USB Camera was detached from the Control Hub.

Another common error you might see are compilation errors. These particular errors are the same error messages you receive in OnBot Java when you attempt to Build code and it fails.

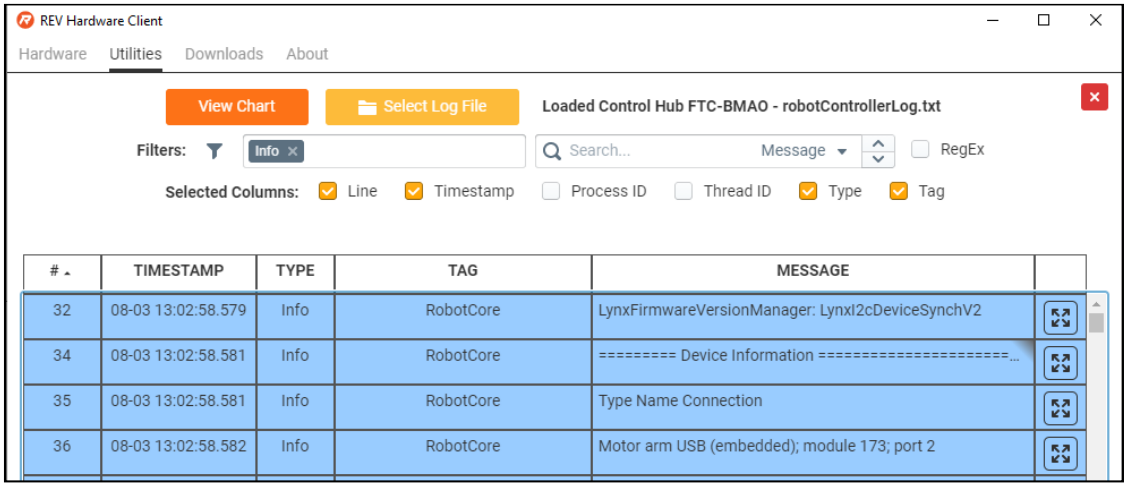
10315	08-05 12:08:55.874	Error	OnBotJava	org/firstinspires/ftc/teamcode/CodeTest.java(73:16): ERROR...
10316	08-05 12:08:55.875	Error	OnBotJava	symbol: variable centerPowerleft
10317	08-05 12:08:55.875	Error	OnBotJava	location: class org.firstinspires.ftc.teamcode.CodeTest

Warnings



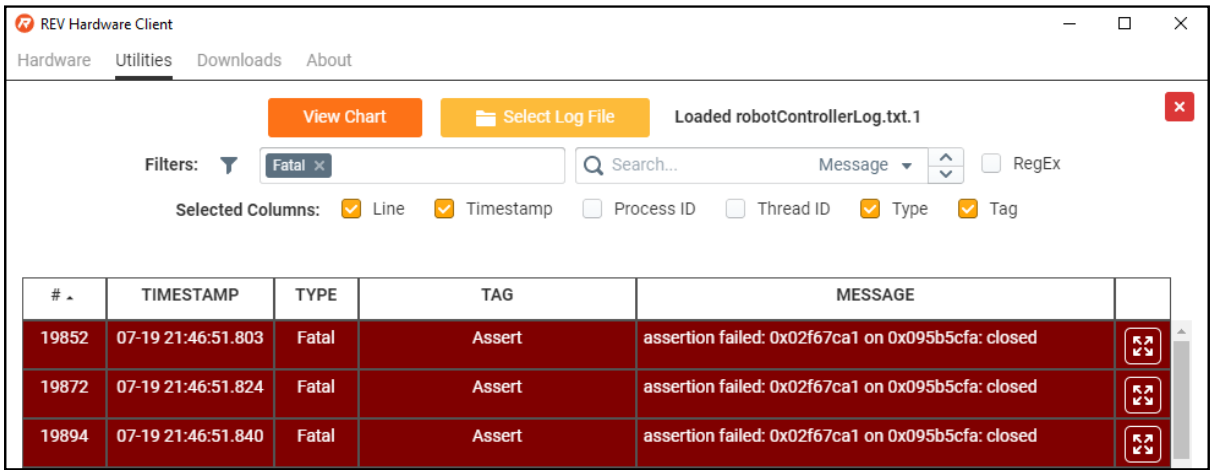
When something none fatal occurs in the system, the system sends warning messages. Instances that warrant a warning message, do not cause the Control System to fail, but may cause unexpected behavior. This could be a warning about mismatched versions between the Robot Controller and Driver Station applications, or a warning that your Control System is not receiving enough power to function.

Info



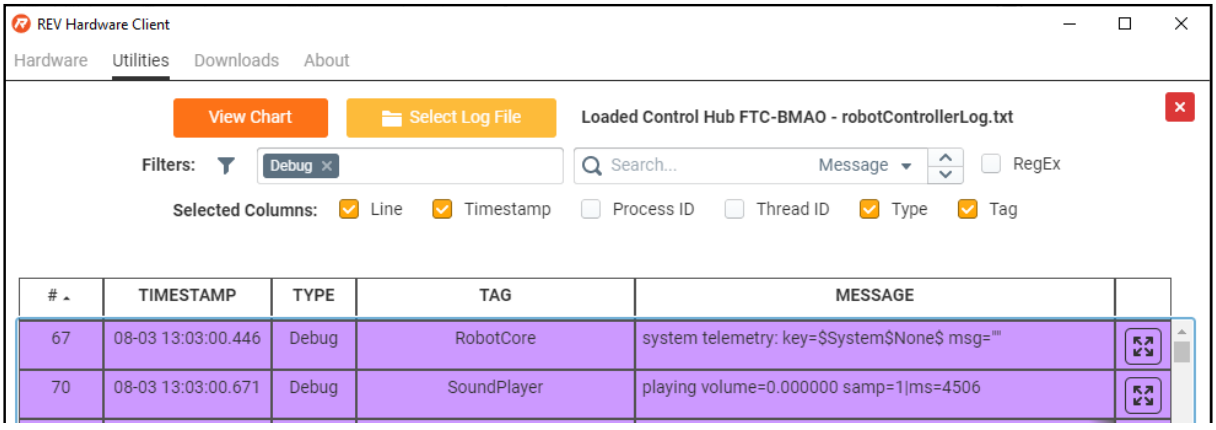
Info messages communication information that my be worthwhile to know for troubleshooting but not necessarily indicative of an issue. This is information like, when a program is initialized, started, or stopped.

Fatal



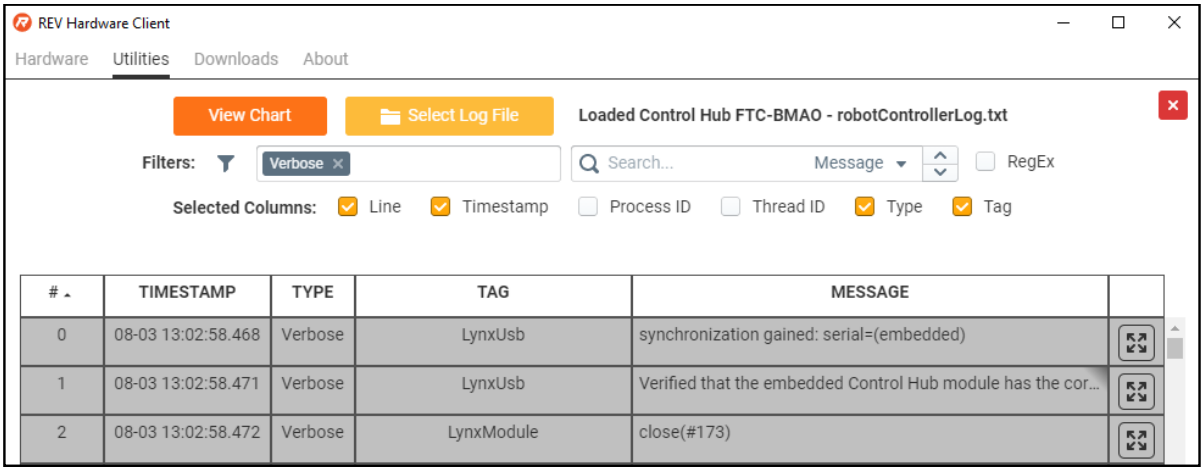
Like Errors, Fatal actions occur when something within the system does not execute properly. However, fatal actions are indicative that something more severe is happening in a system. If you are having an issues and notice a lot of instances of the fatal data type, please send your diagnostic data to REV, with information on the issue you are having and the status LED behavior.

Debug



The debug filter, showcases instances within the logs where debugging functions built into the SDK are performing their jobs. The Log Viewer defaults to filtering out debug information, as the information is typically not needed for troubleshooting.

Verbose



Many of the log types we have discussed thus far provide the insight needed to troubleshoot an issue. However, the logs track much more information than what falls in the other categories. The verbose log type covers the rest of the information included in the logs. This information is typically recording normal system behaviors that do not provide much insight to a problem.

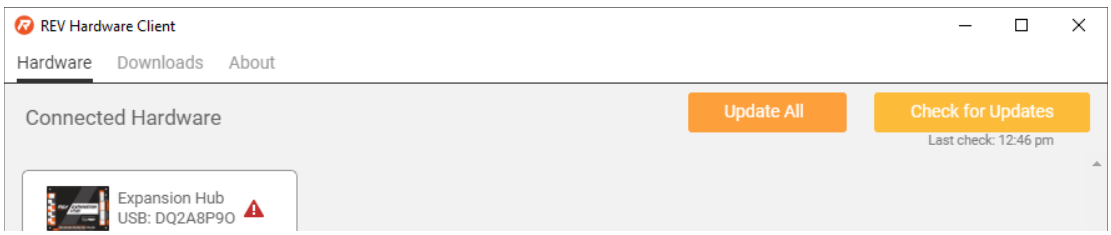
Expansion Hub

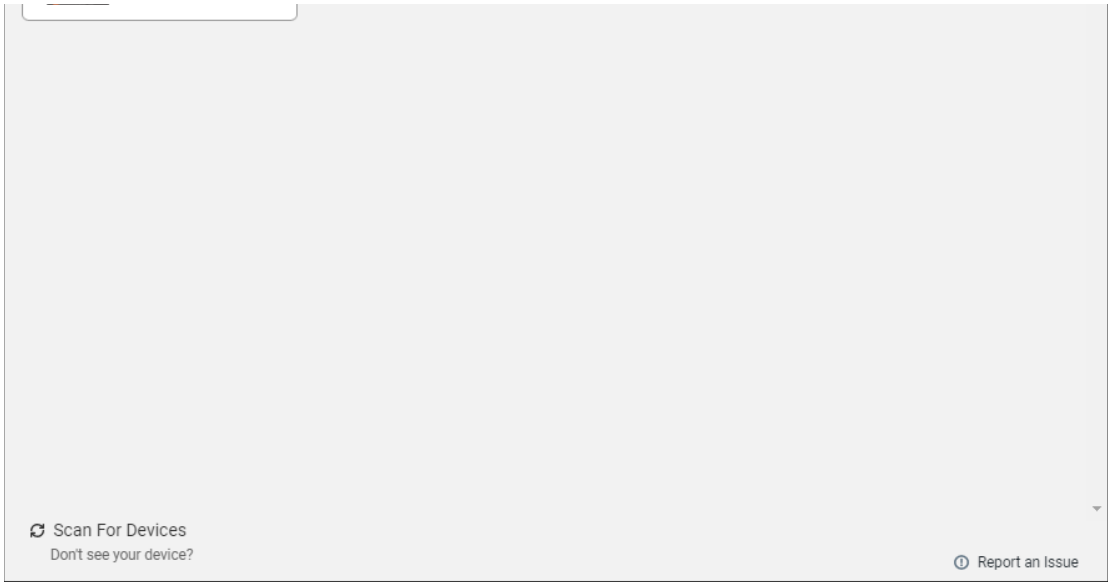
Updating Expansion Hub

The Expansion Hub facilitates a line of communication between a connected Robot Controller and the motors, servos, and sensors. In order to improve the quality of the Hub, REV Robotics will release firmware updates for the Expansion Hub. When a firmware release occurs, both Control Hub and Expansion Hub users will need to update their Expansion Hub firmware to the newest version. Expansion Hub

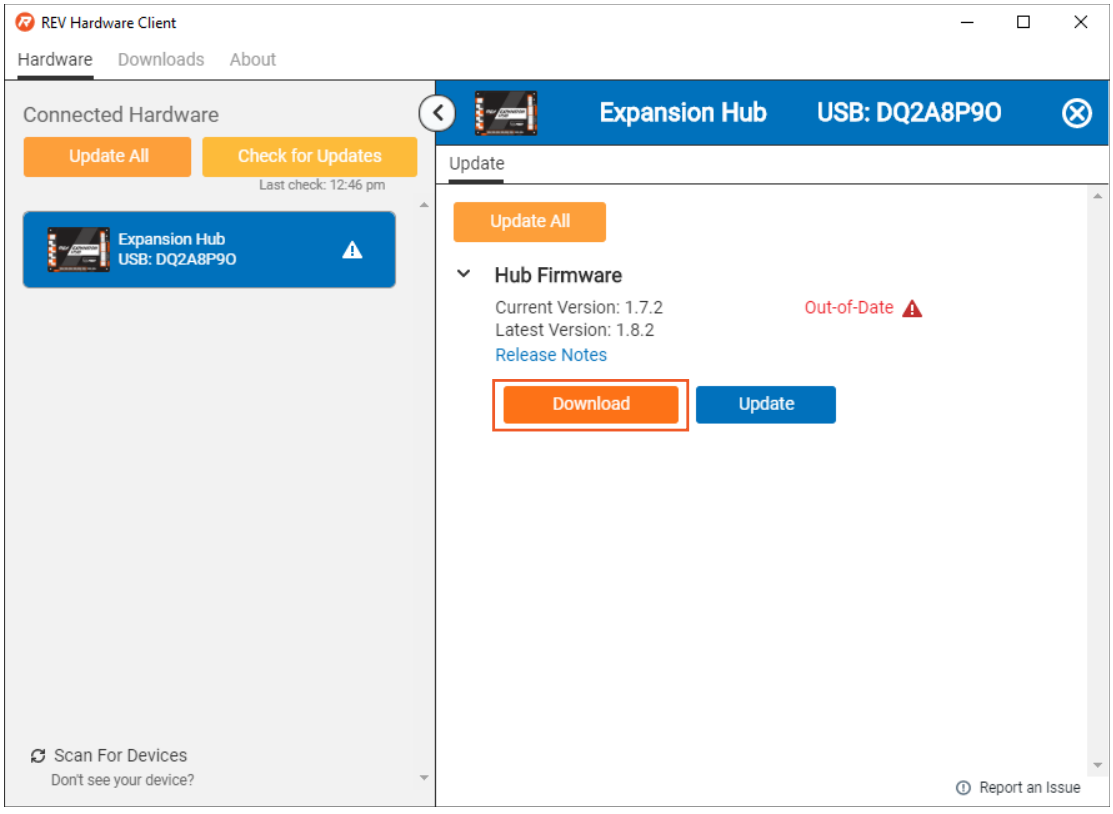
To get started with the updating process, plug the Expansion Hub into a PC using a USB-A to Mini USB Cable.

Startup the REV Hardware Client. Once the hub is fully connected it will show up on the front page of the UI under the **Hardware Tab**. Select the Expansion Hub.

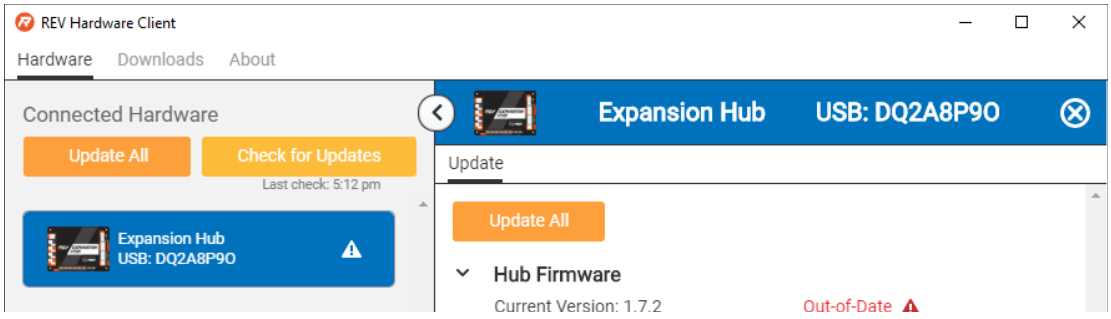


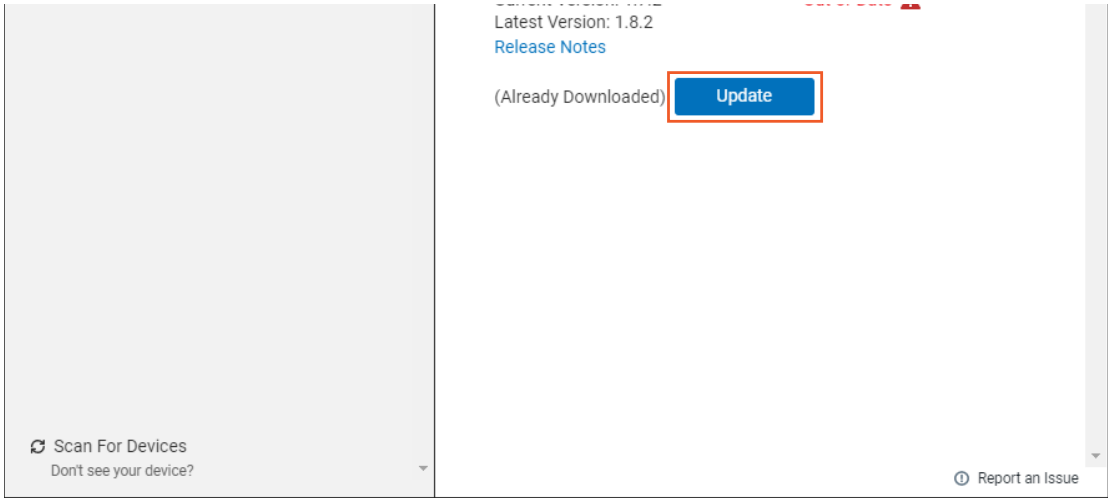


After selecting the Connected Hardware the Update tab will pop up. Under **Hub Firmware** select Download.

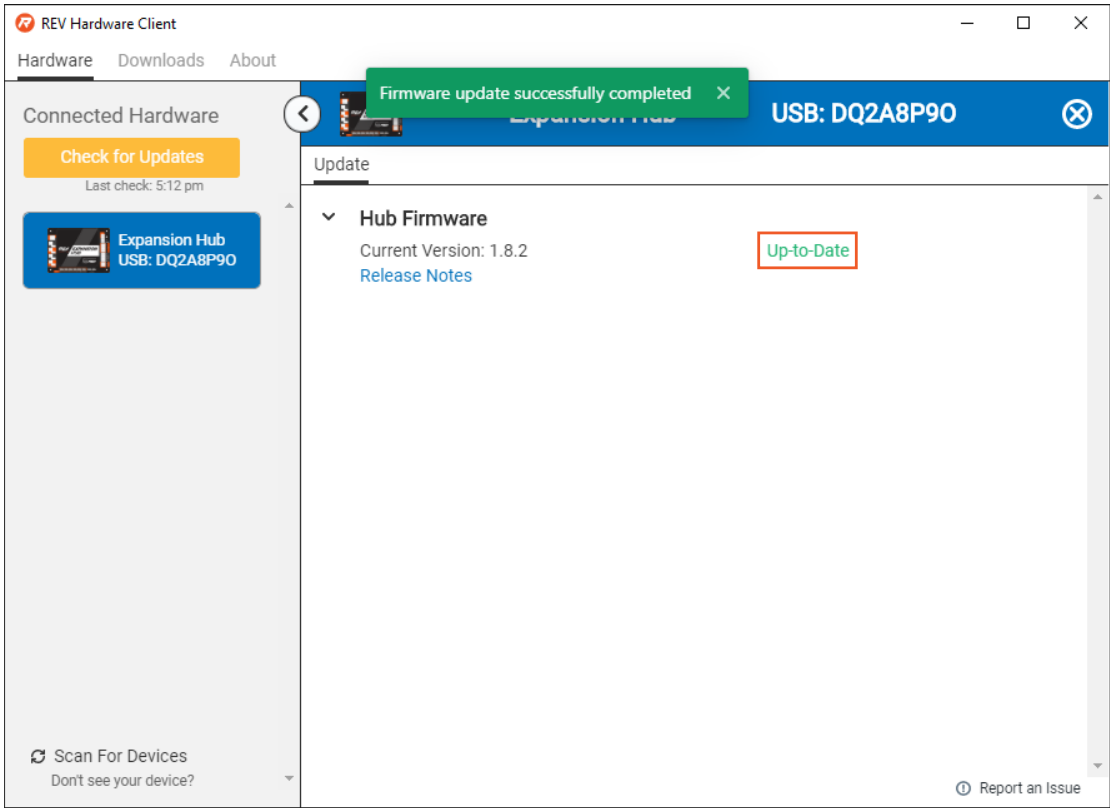


Once the firmware has downloaded, select Update.





When the firmware update has completed a status message "Firmware successfully updated" The status for the Hub Firmware will also change to "Up-to-Date."



DRIVER HUB

Connecting a Driver Hub

Connect the Battery

Before we connect to your Driver Hub we need to make sure the internal battery is installed correctly.

Battery Installation

To install the battery, place it with the REV Logo out and the -/+ located near the contacts for the device. Add on the rear door and screw in using the included M3 hardware.

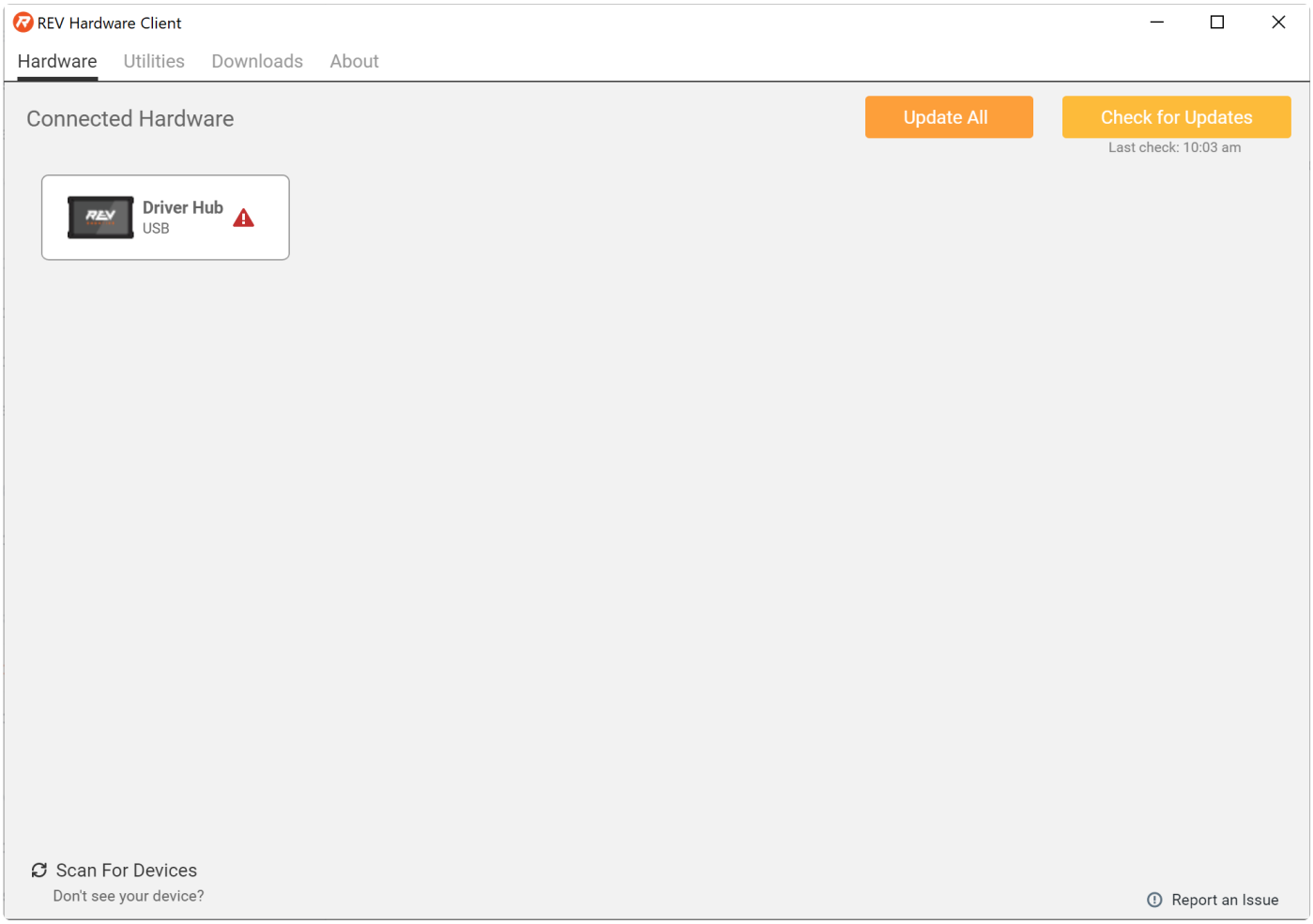
REV Driver Hub battery view.

Connect Via USB-C

Steps	
Turn on the Driver Hub.	
Wait for the status LED to show solid green	
Plug the Driver Hub into your PC using a USB-A to	

USB-C Cable. (REV-11-1232)	
Startup the REV Hardware Client. Once the Driver Hub is on and fully connected it will show up on the front page of the UI under the Hardware Tab.	

> If your Driver Hub is showing a battery charging symbol when plugged in via USB it is not turned on and will be unable connect to the REV Hardware Client.

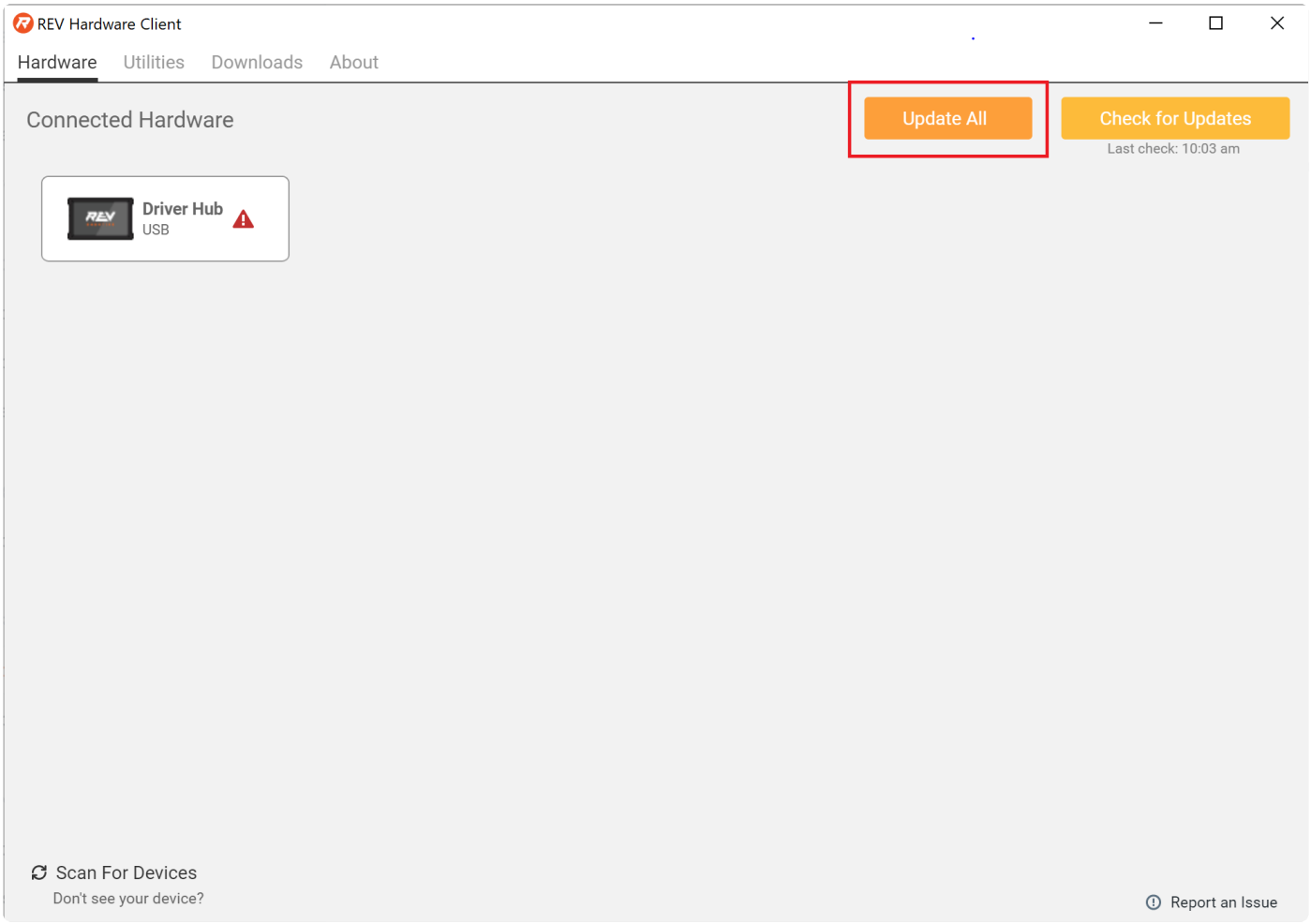


REV Hardware Client hardware tab showing a connected Driver Hub.

Updating a Driver Hub

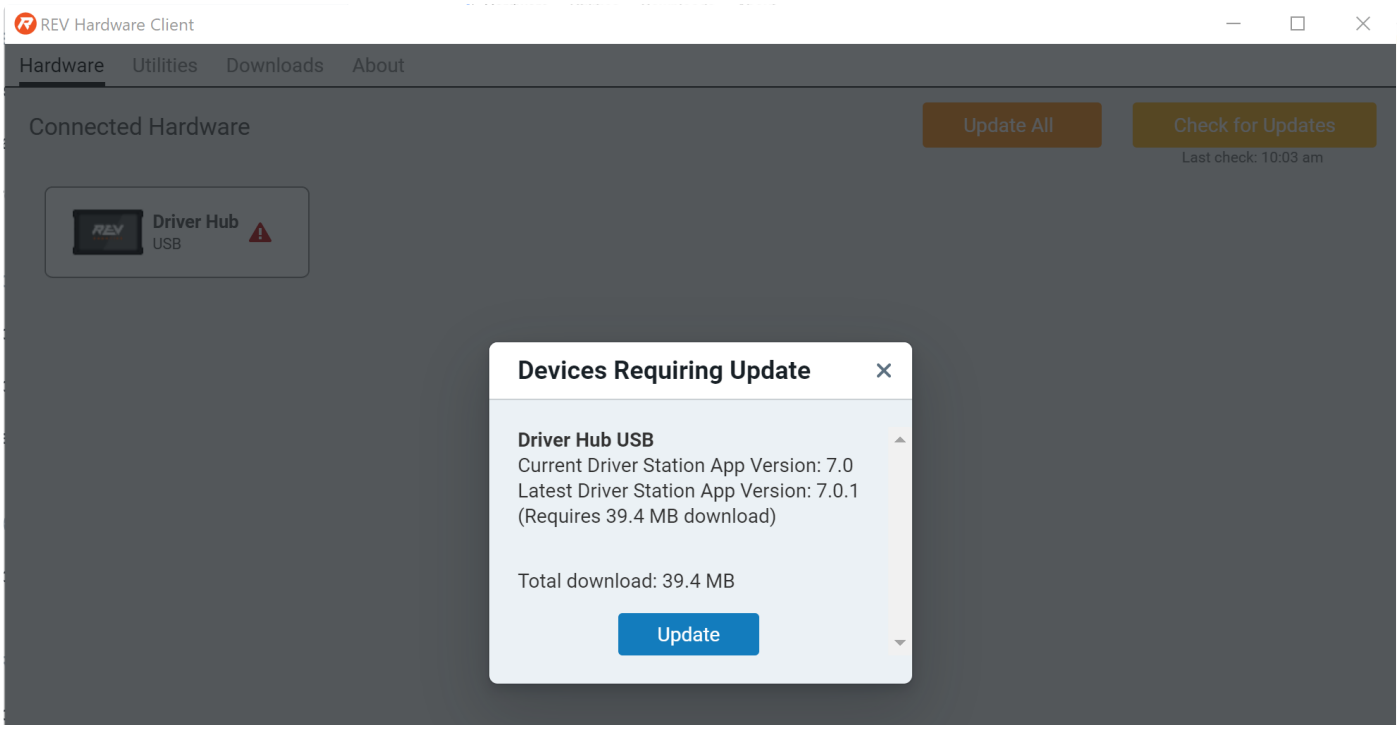
Update All

When the Driver Hub and any other supported REV Hardware devices that require updates are connected the Update All button will appear.



REV Hardware Client Update All button in upper right corner.

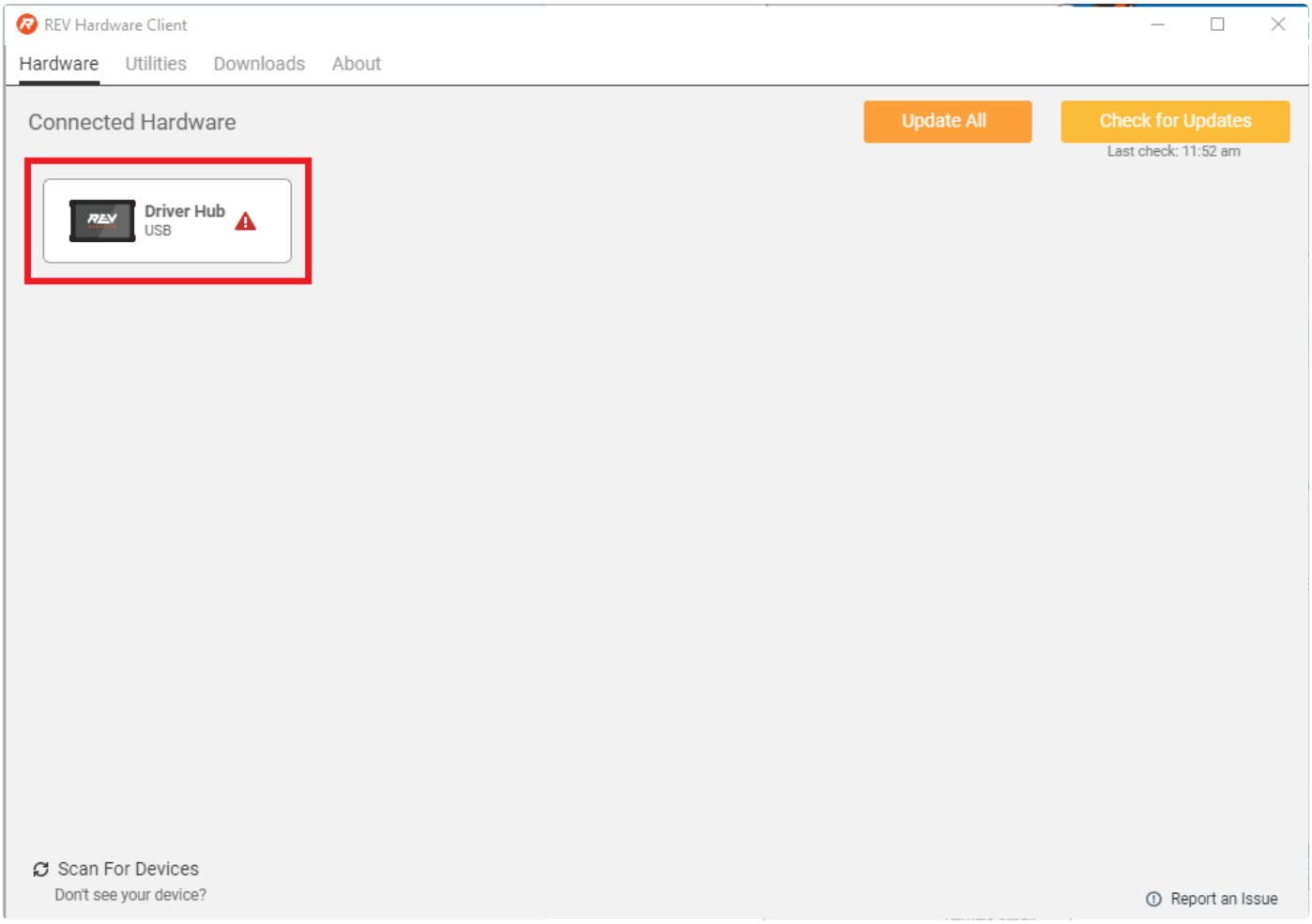
Once Update All is is selected the REV Hardware Client will confirm the updates for all connected devices. Select Update to download and update all devices.



Update button in the middle of the REV Hardware Client Window.

Individual Updates

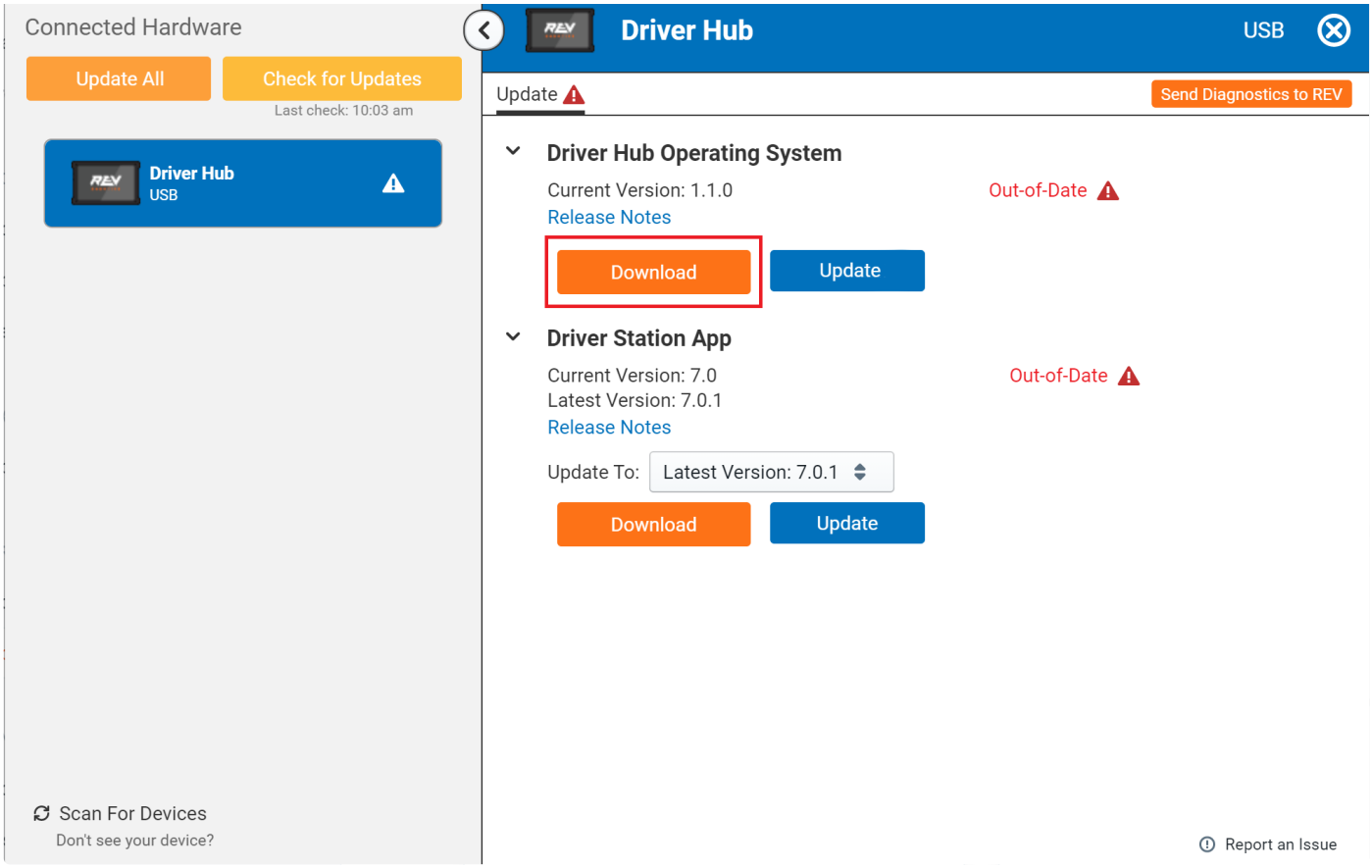
To install individual updates to you Driver Hub select the Driver Hub from the list of devices on the Hardware Tab. This will bring up the Update Tab.



Select Driver Hub from the list of devices.

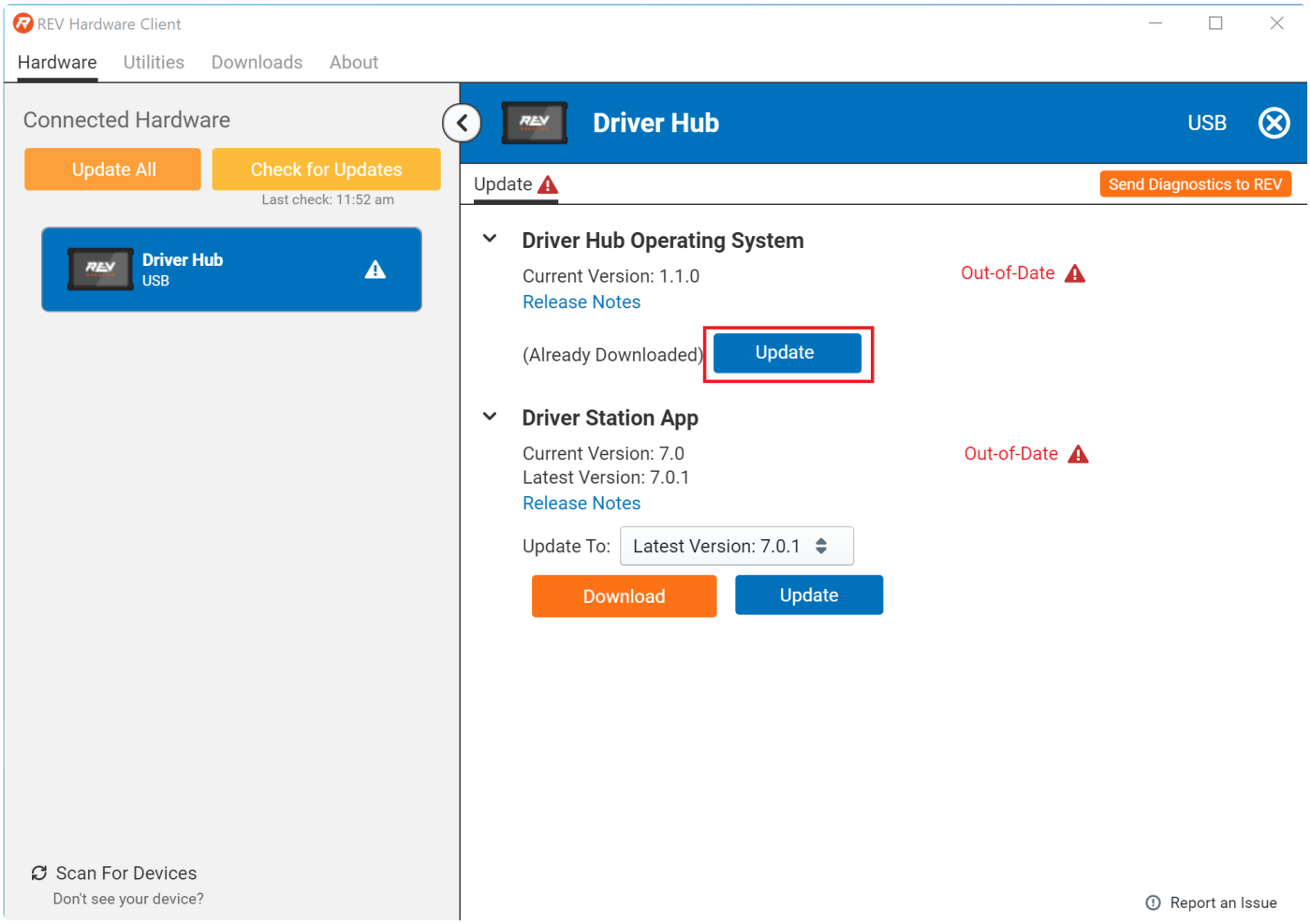
Driver Hub Operating System

After the Update Tab opens, select Download under Driver Hub Operating System (OS) to begin downloading the update.

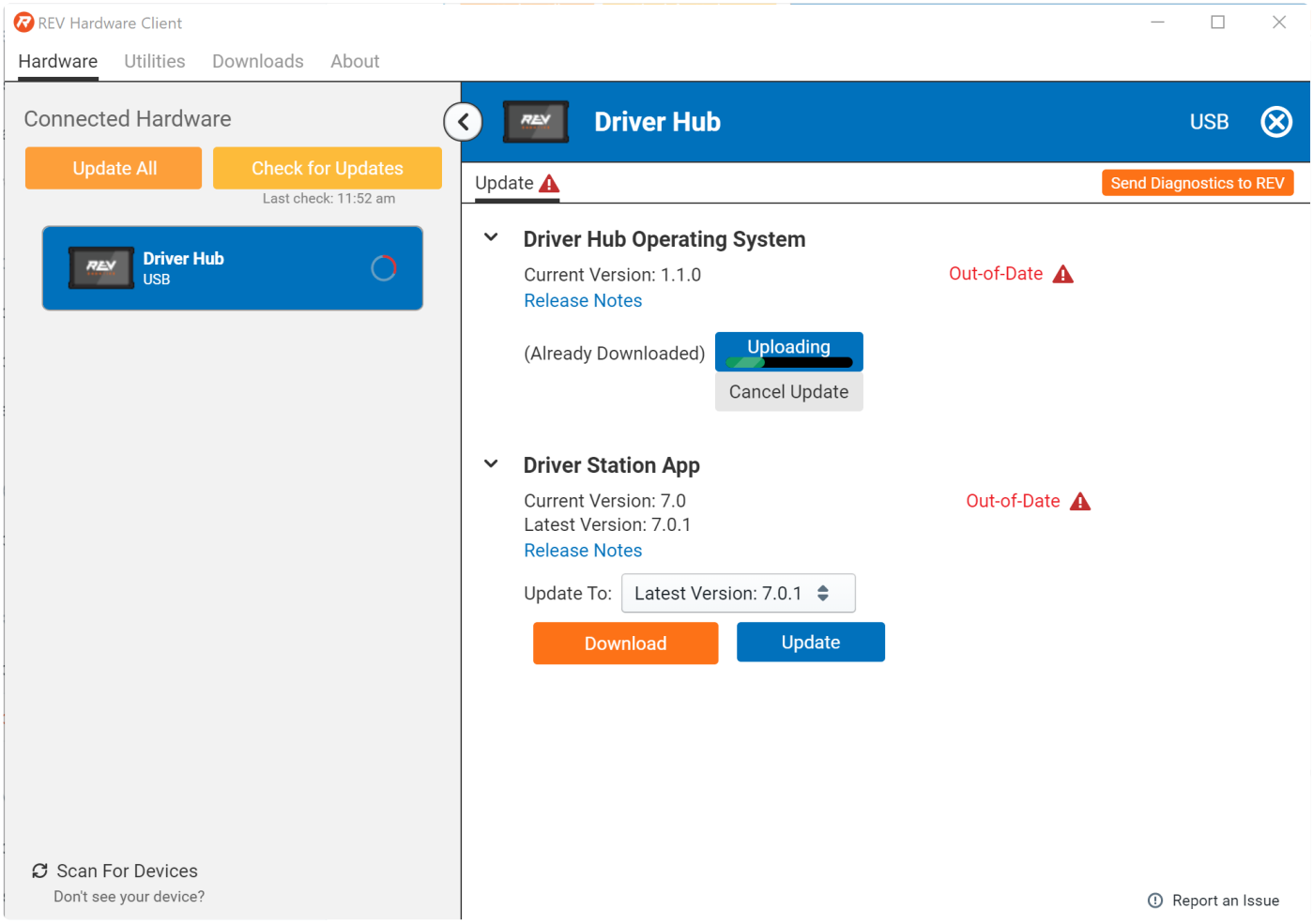


Download OS

Once the OS update has downloaded select Update.

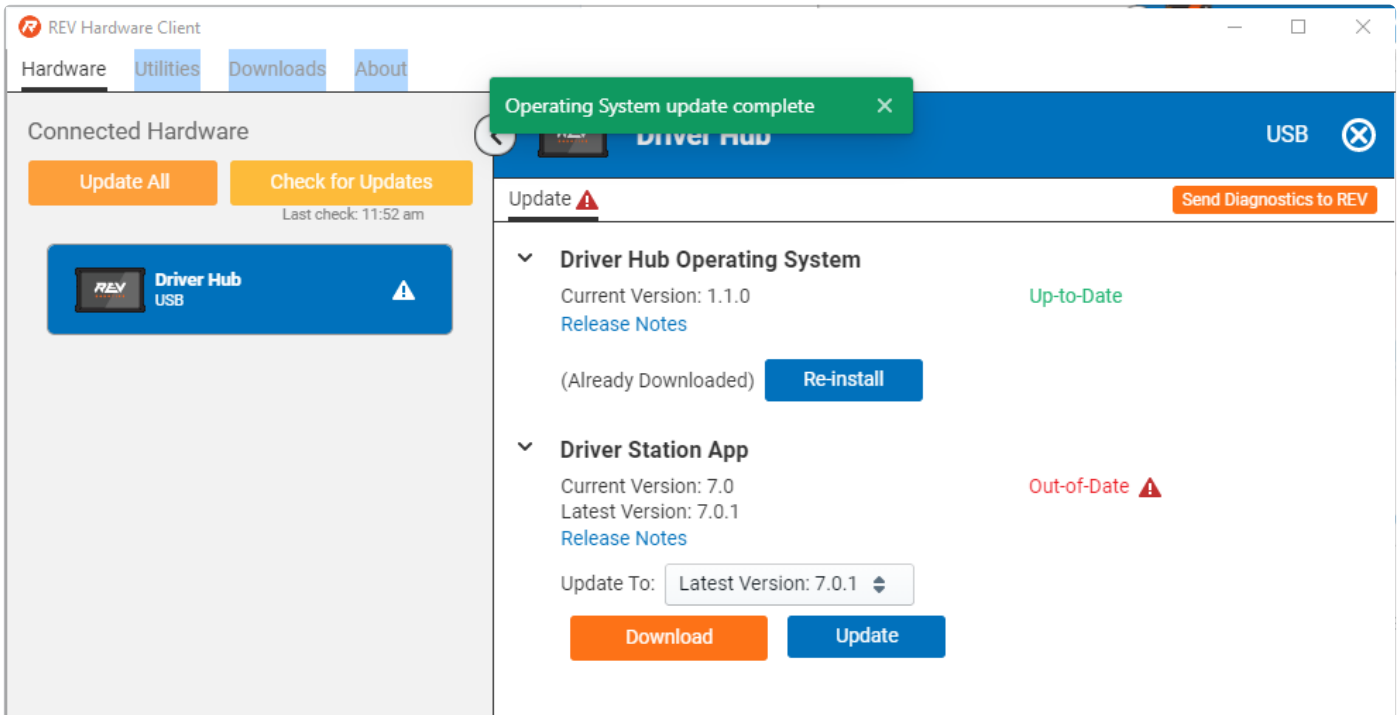


Keep the Driver Hub powered on and connected to the PC while the update finishes.



Driver Hub OS install uploading.

When the Driver Station Operating System update has completed a status message "Operating System update complete." The status of the Driver Station OS will also change to "Up-to-Date."

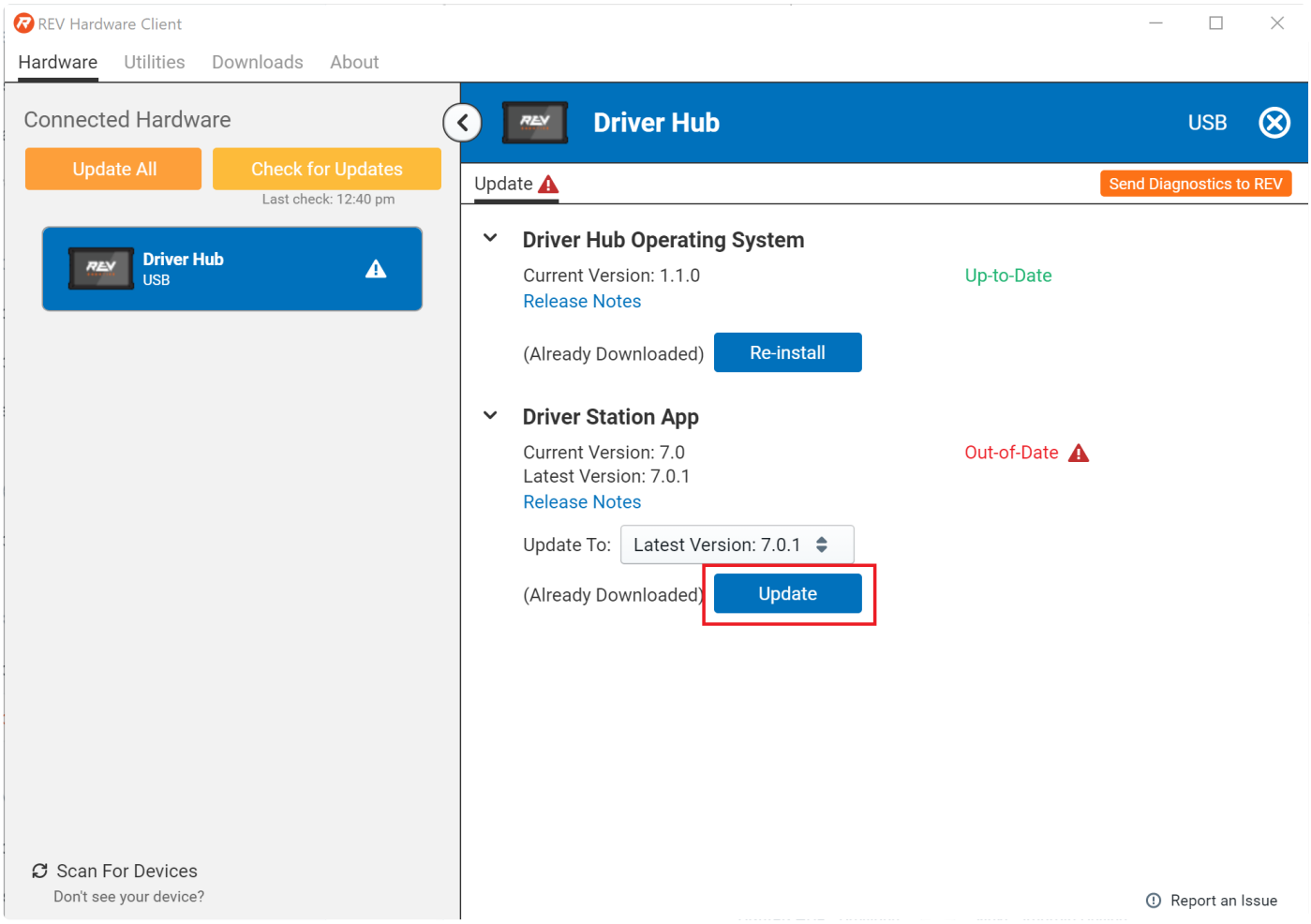


OS Update is complete!

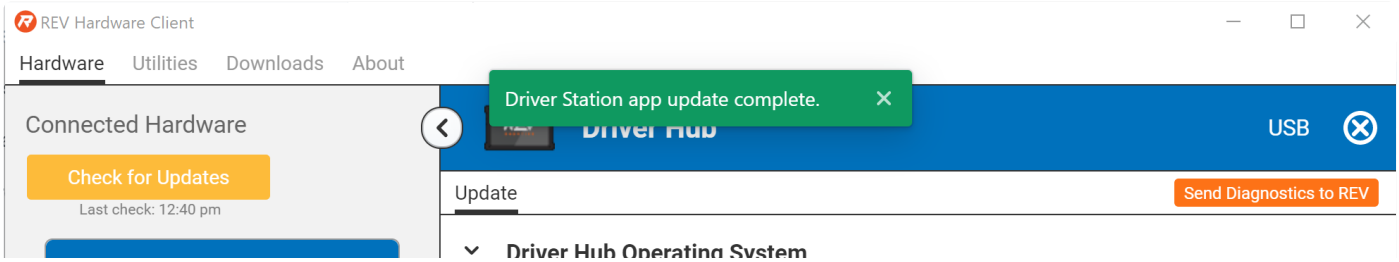
Driver Station Application

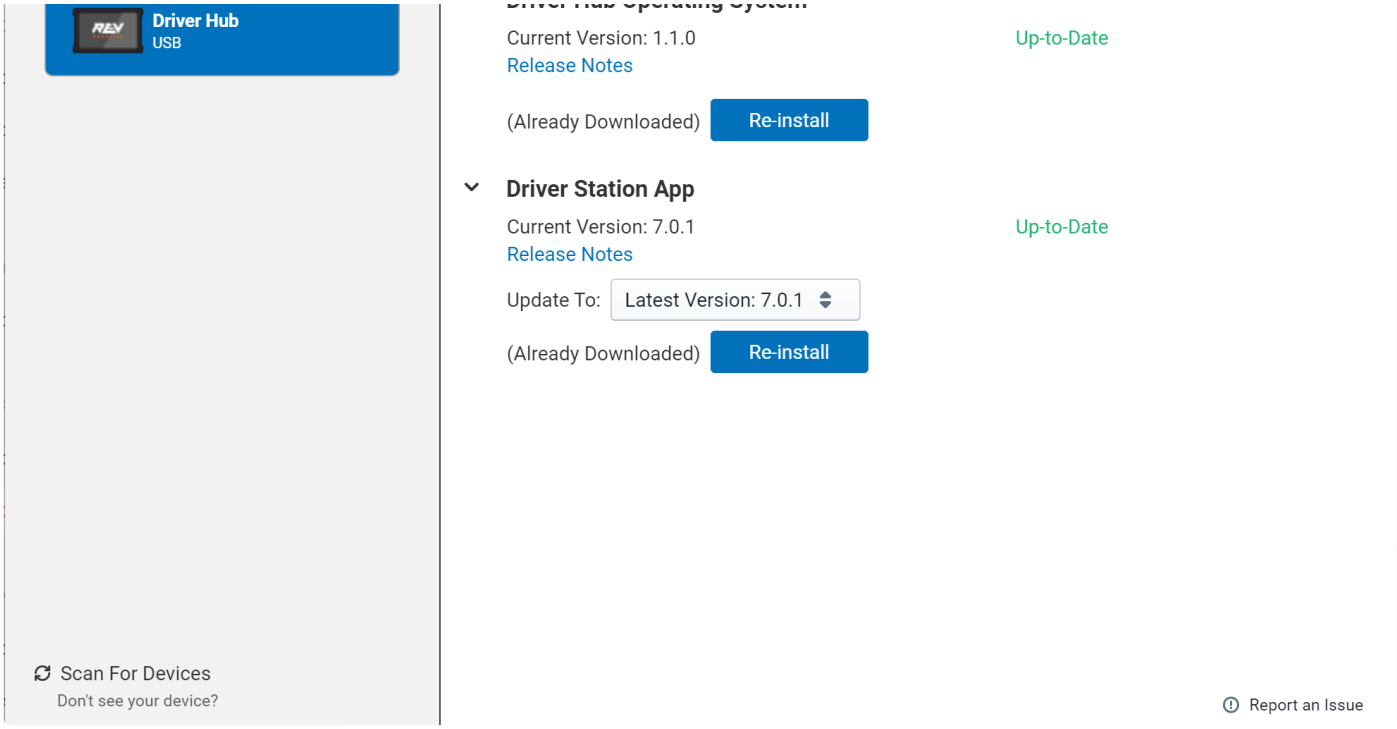
After selecting the Connected Hardware the Update tab will pop up. Under Driver Station App select Download.

Once the app has downloaded, select Update.



When the Driver Station Application update has completed a status message "Driver Station App update complete." The status of the Driver Station App will also change to "Up-to-Date."





Driver Station App Complete!

Android Device

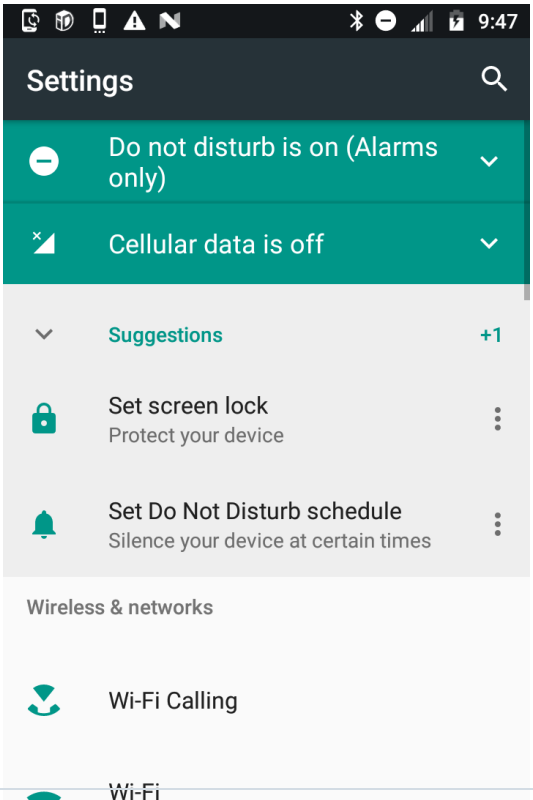
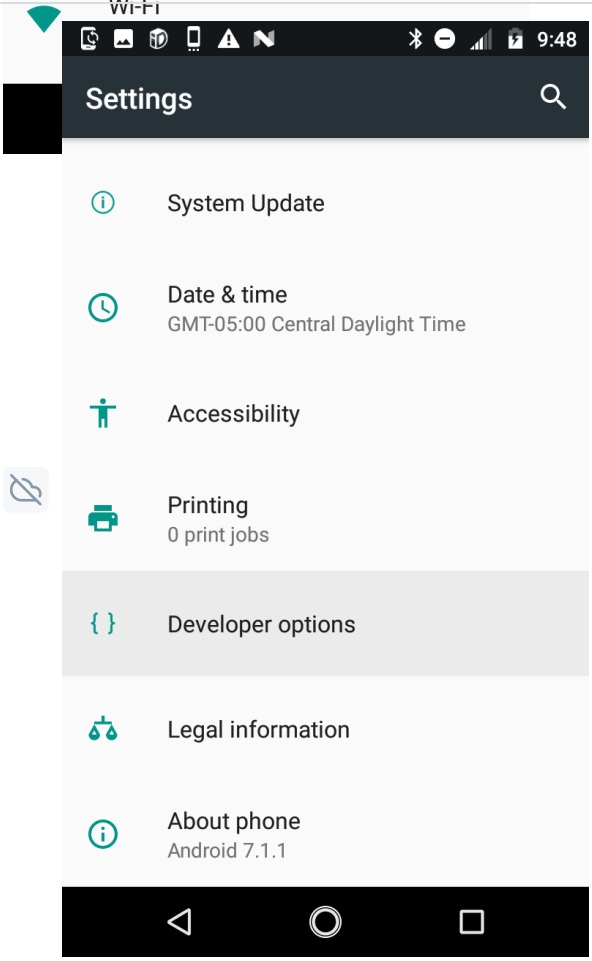
Connecting an Android Device

Android Developer Options

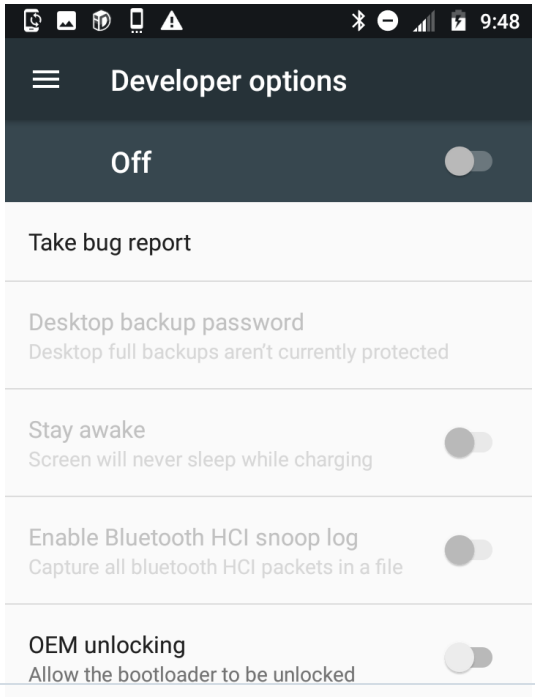
In order to use the REV Hardware Client the phone's developer settings and USB debugging options need to be turned on.

The developer options on Android Devices are hidden within the phone as a default. Different phone manufactures have different ways of accessing the developer options. However, once the developer options are available in the phone's settings, the steps for activating USB debugging and development settings are similar.

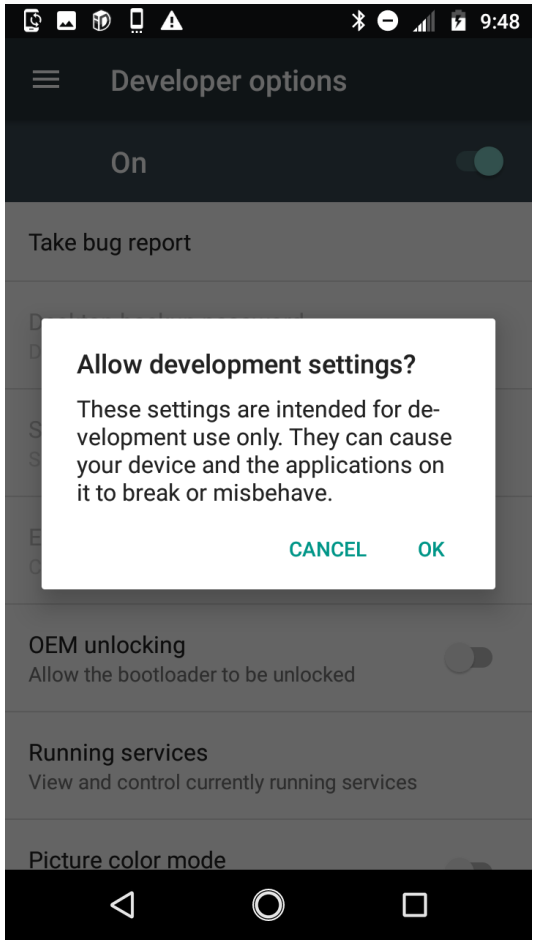
> ⚠ Before moving forward it is advised to look up where the developer options on your Android Device are located. For Motorola users, the Motorola Support Page has information on how to unlock the developer options.

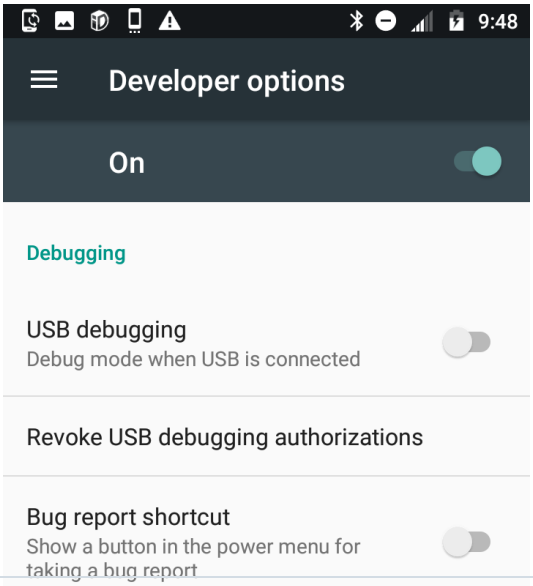
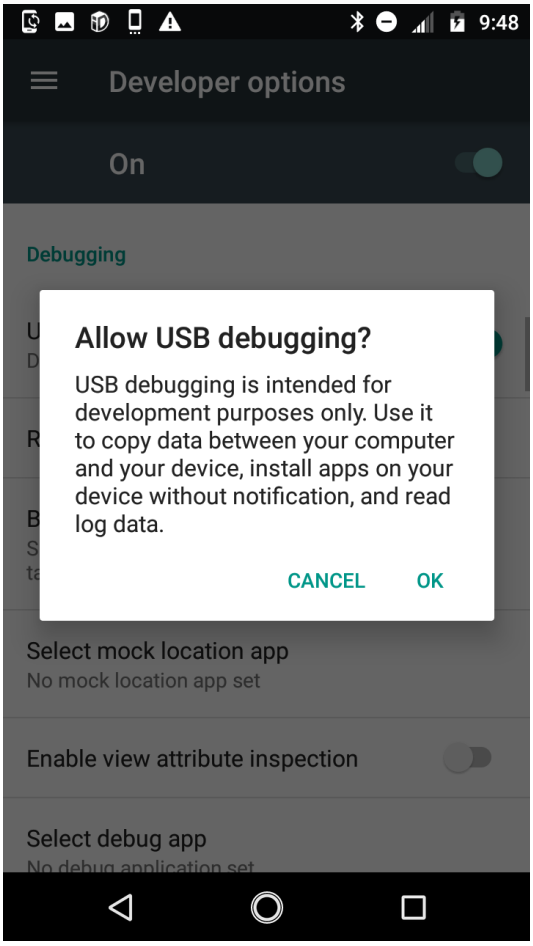
Open the Android Devices settings	
Scroll to the bottom of the settings, where the unlocked developer options are available. Open the developer options	

At the top of the developer options page is an on/off switch. Turn the developer options on.



The device will open a confirmation message. Select 'OK.'

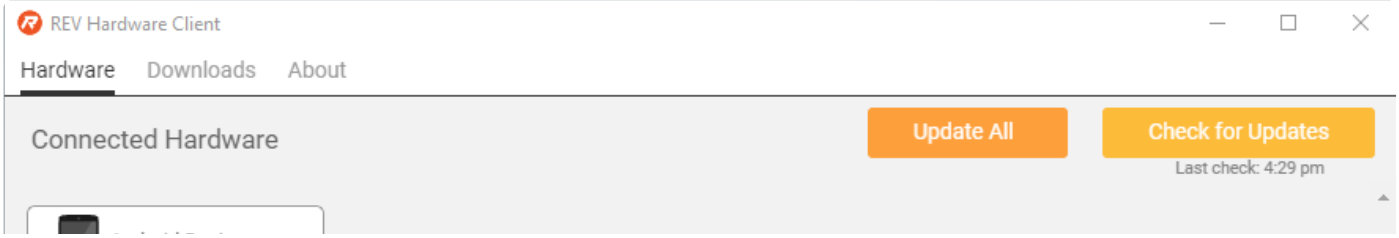


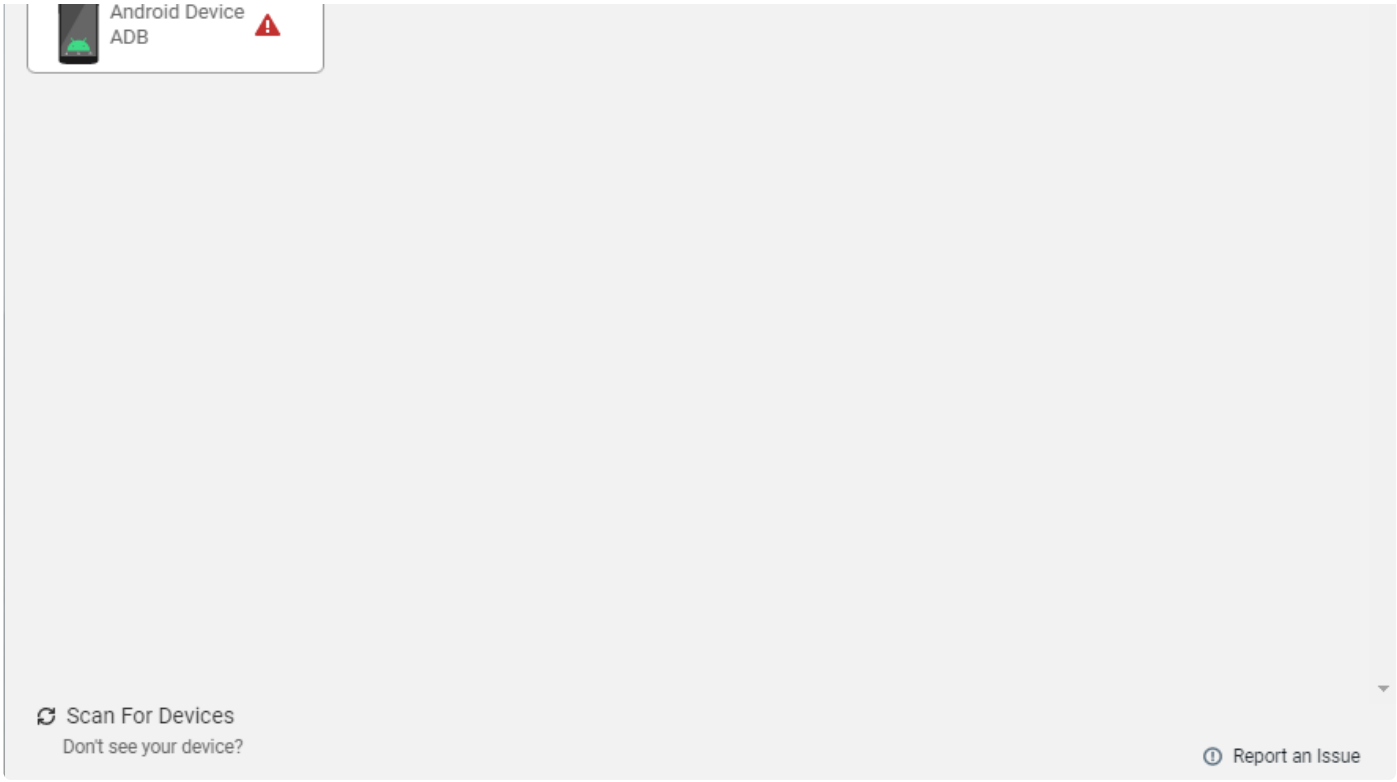
Scroll through the developer options until you find the Debugging section. Turn USB Debugging on.	
Another confirmation message will appear, click 'OK.'	

USB debugging is now on! You can move on to the steps for installing the application.

Depending on the device you may need to change the USB Settings from "Charging only" to "File Transfer".

Plug the Android Device with USB Debugging into the Windows PC running the REV Hardware Client.



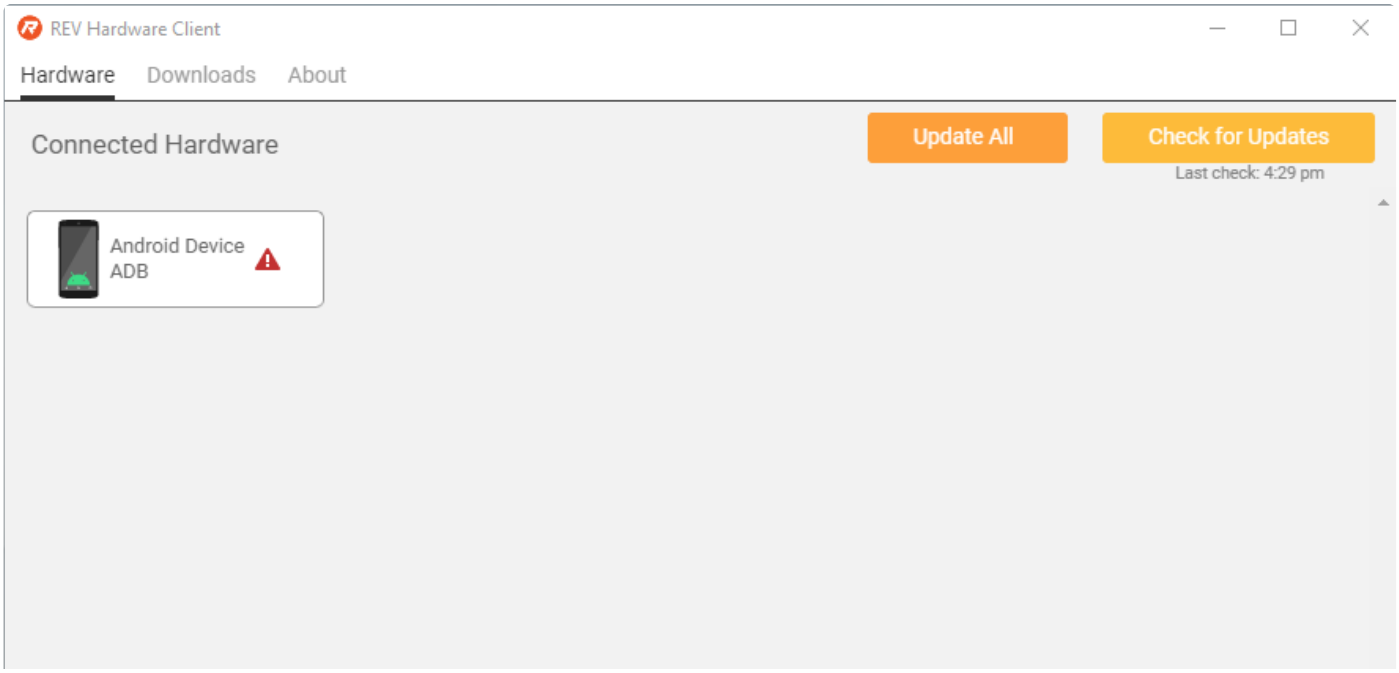


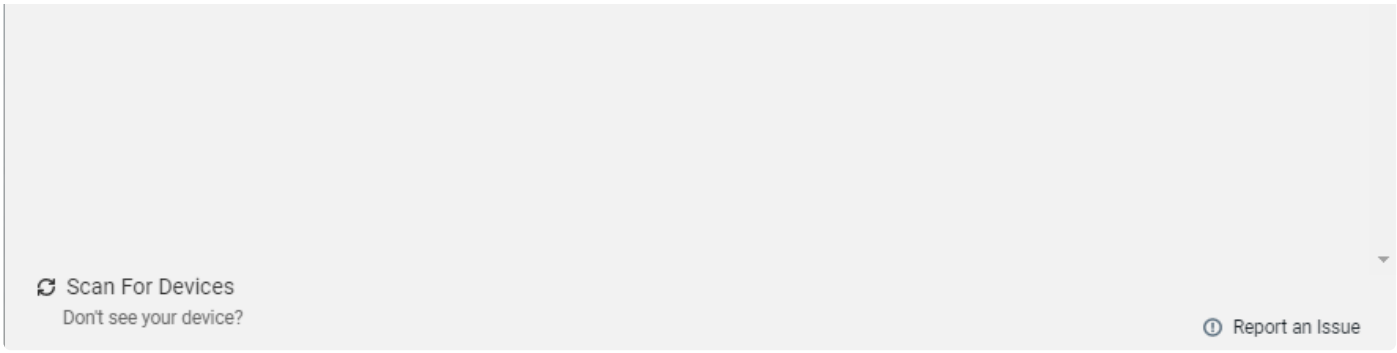
Installing RC/DS Applications

> ⓘ The steps below show installing the Driver Station Application. Follow the same steps, except for the Robot Controller

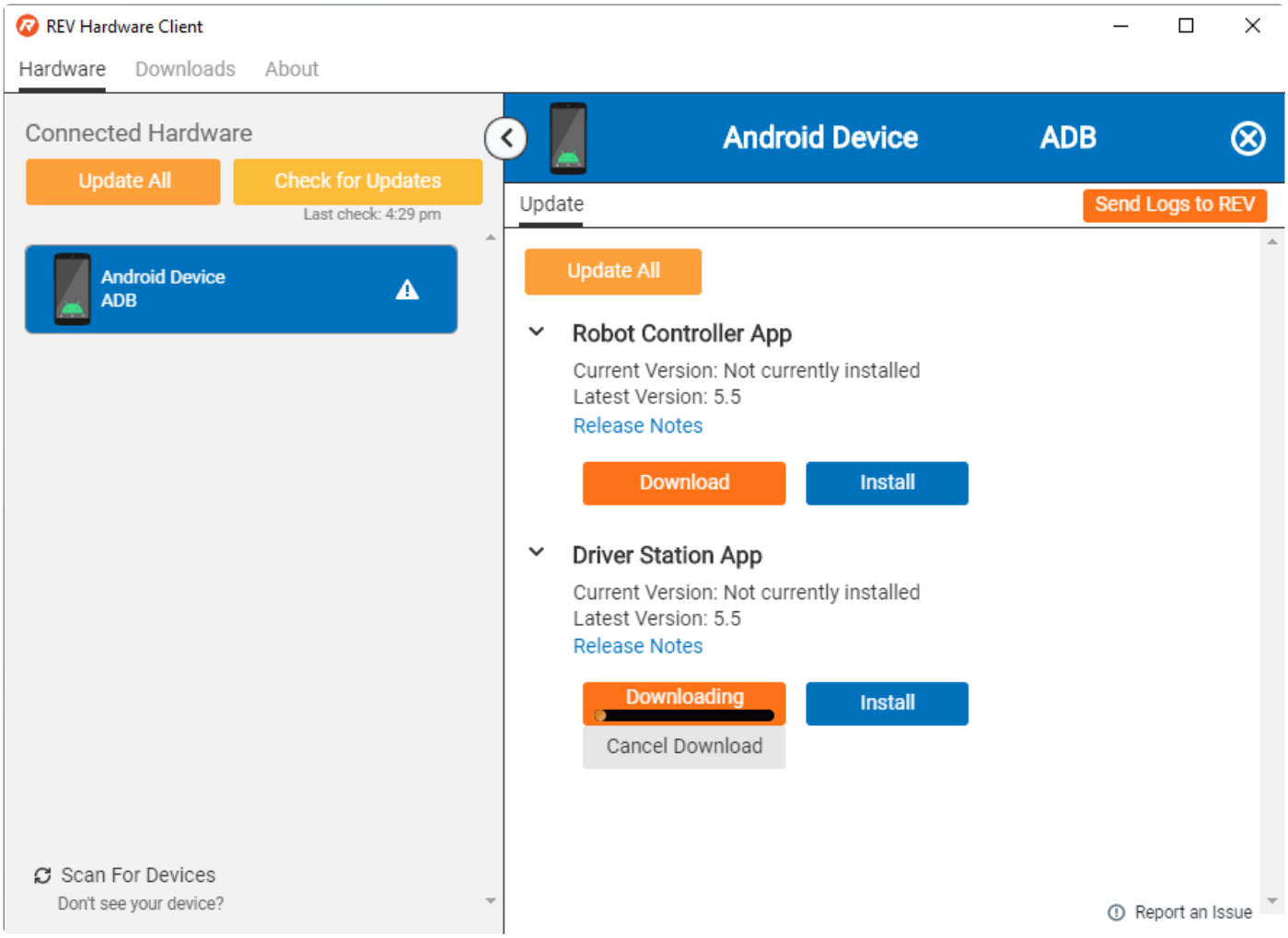
Connect the Android Device to a PC with the REV Hardware Client installed.

Startup the REV Hardware Client. Once the Android Device is fully connected it will show up on the front page of the UI under the **Hardware Tab**. Select the Android Device.

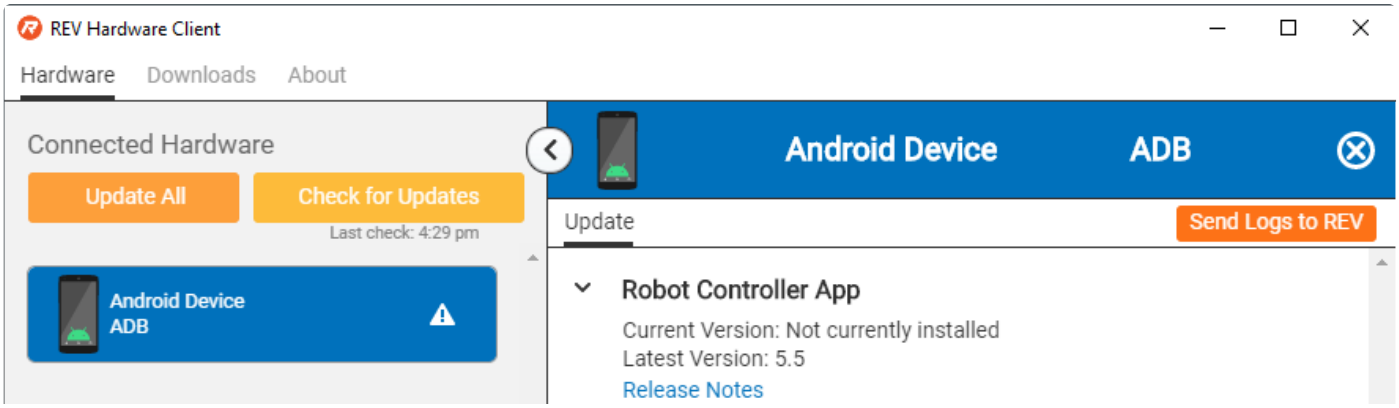


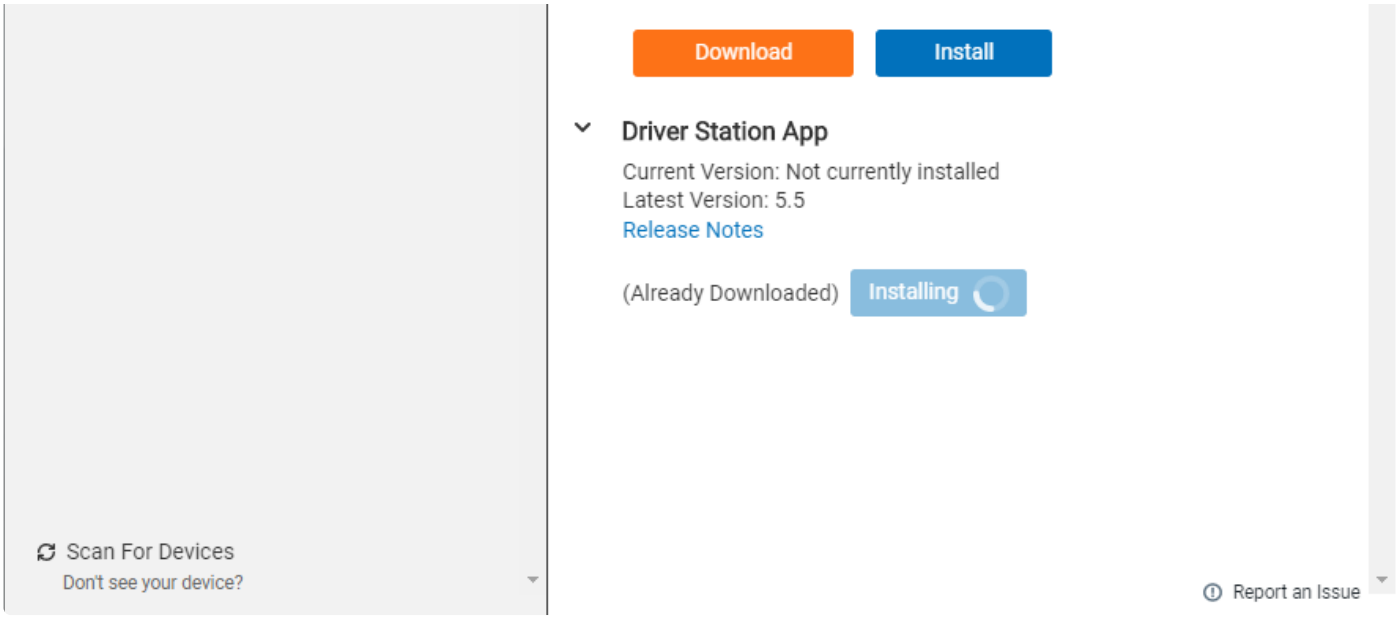


After selecting the Connected Hardware the Update tab will pop up. Under **Driver Station App** select Download.

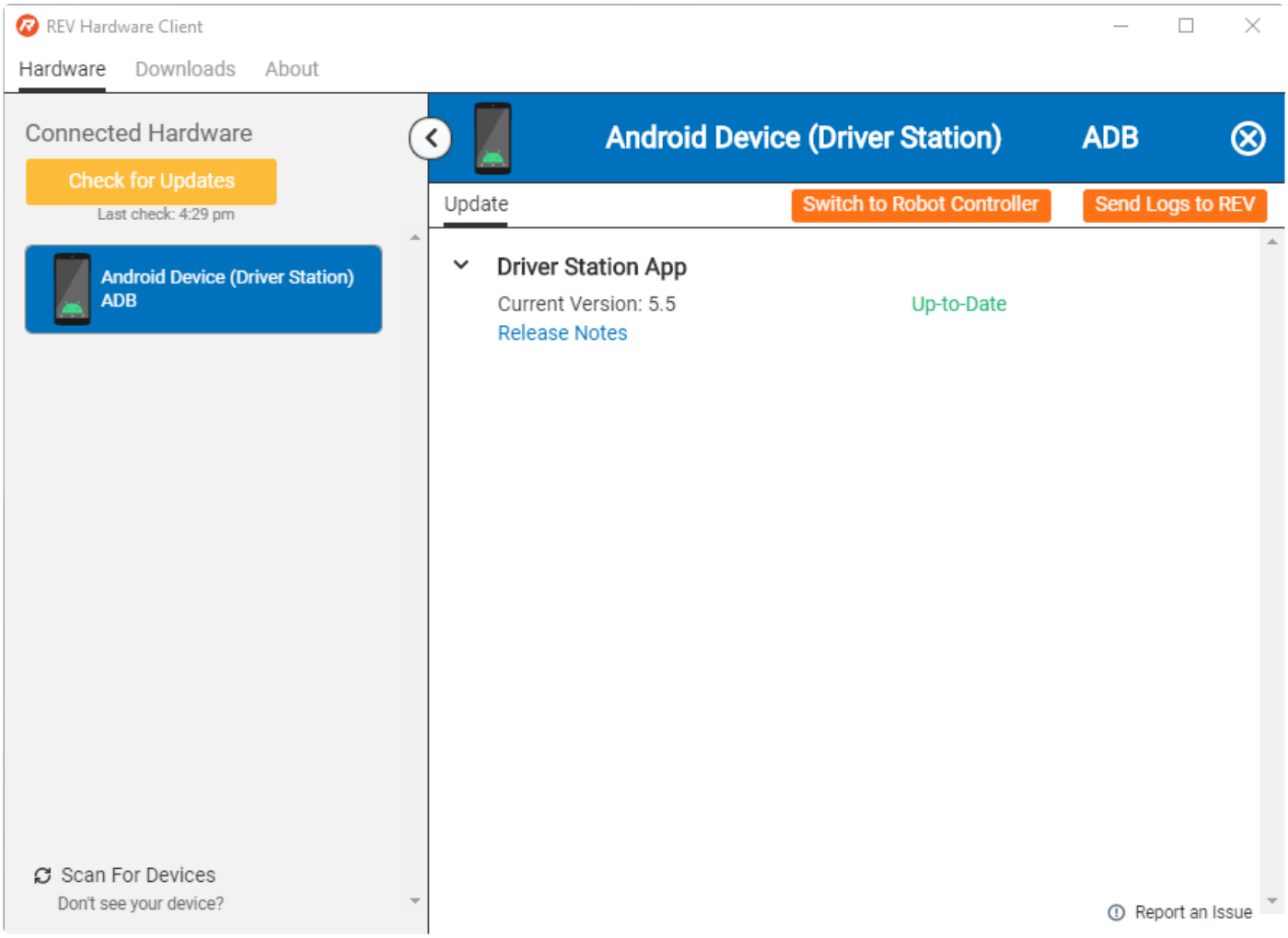


Once the Driver Station App has downloaded, select Install.





When the application installation has completed the status for the Driver Station App will change to "Up-to-Date."



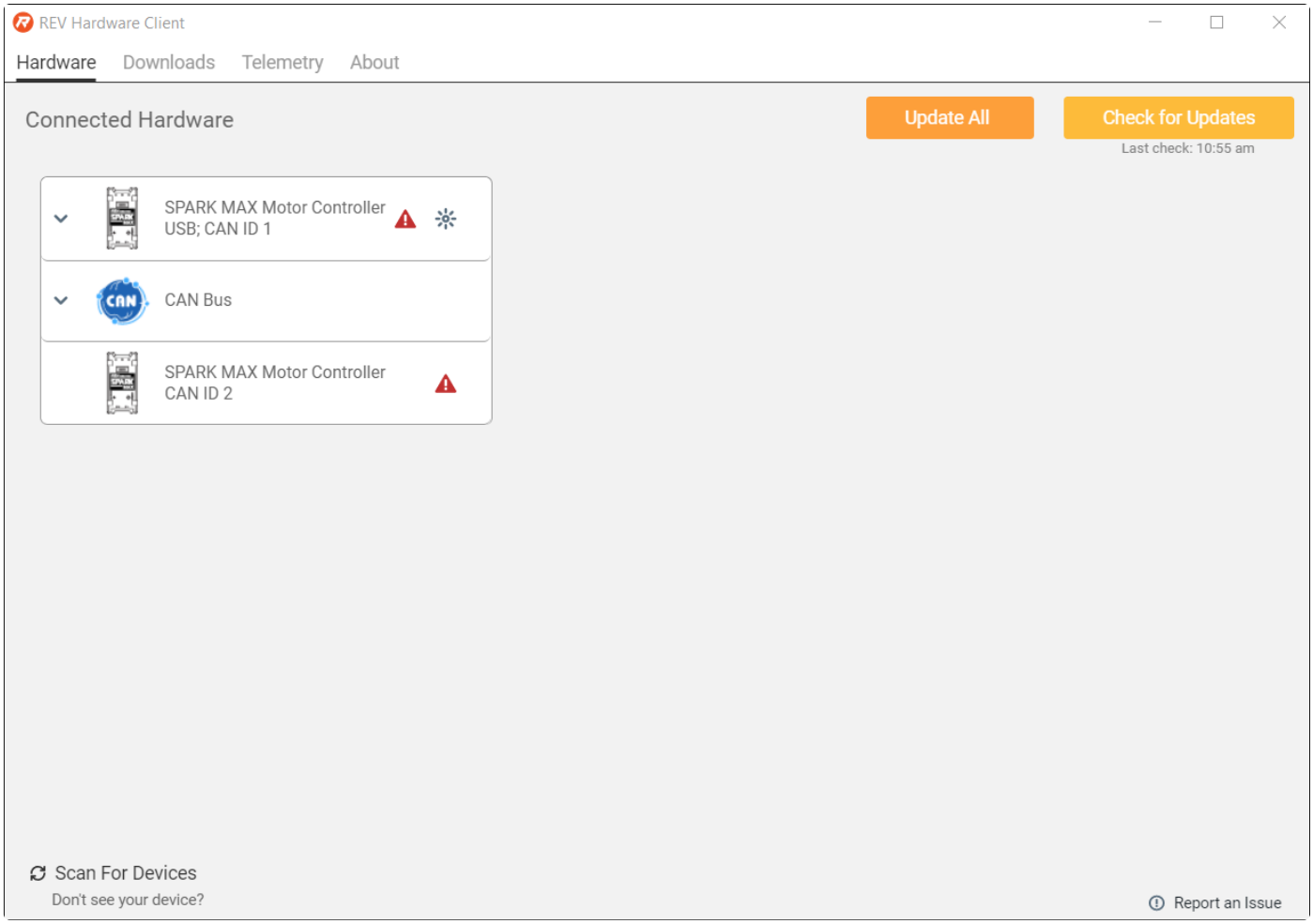
SPARK MAX

Connecting a SPARK MAX

Via USB

- Connect your SPARK MAX Motor Controller to your computer with a USB C cable.
- Open the REV Hardware Client application.
- The Client should automatically scan and connect to your SPARK MAX

> All SPARK MAX Motor Controllers comes with a USB C to USB A cable.



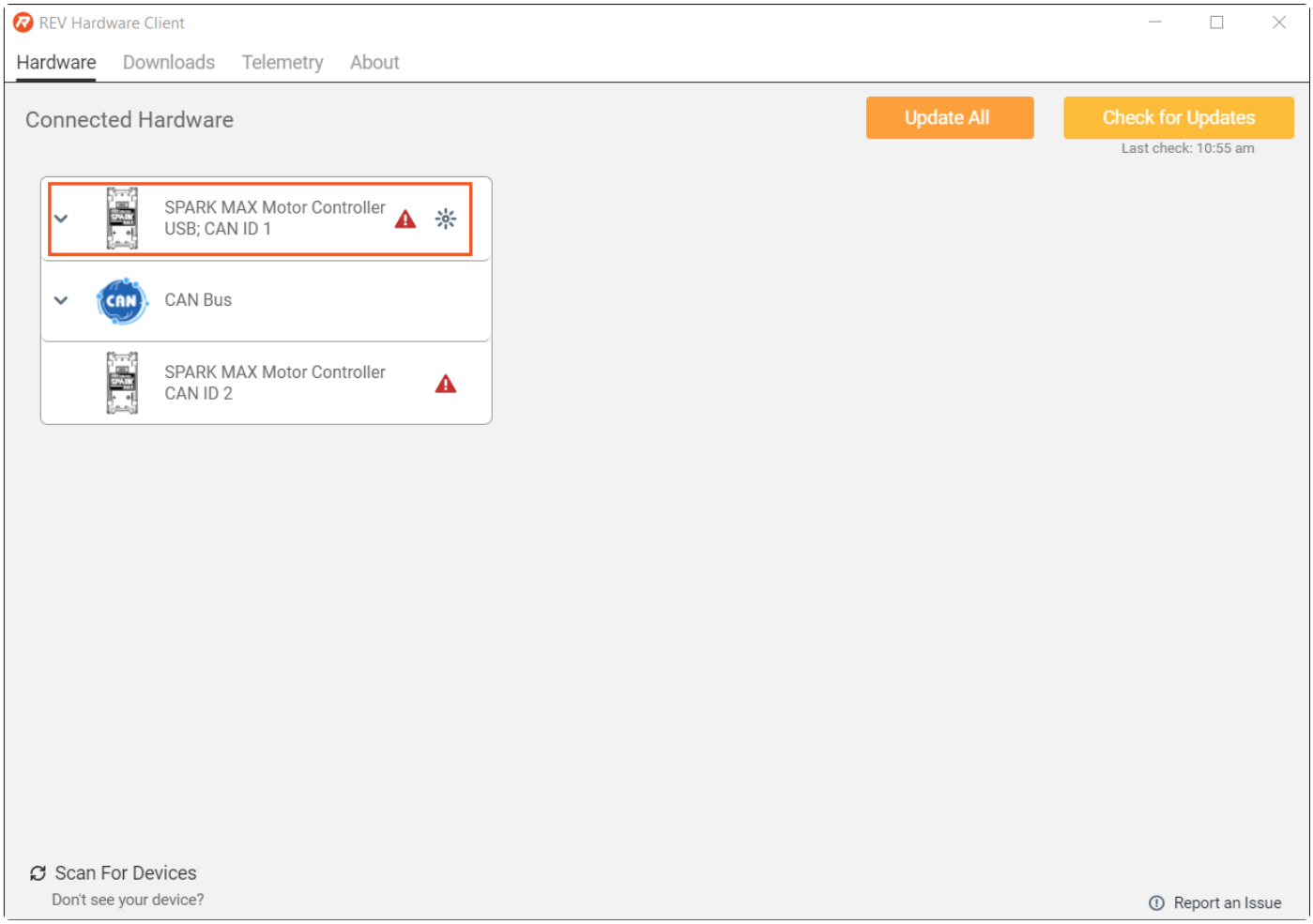
> Additional SPARK MAX devices connected via CAN to the USB Host SPARK MAX are visible when using the latest firmware. For more information see the SPARK MAX User's Manual.

Updating SPARK MAX Software

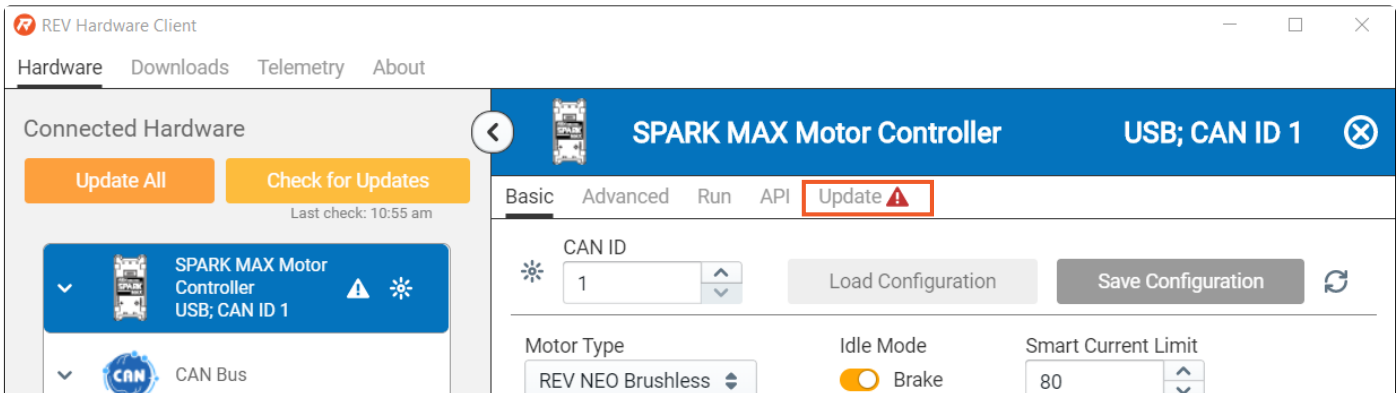
The SPARK MAX has two main software components, the firmware and the API to control SPARK MAX via CAN. Installing the latest version of each is possible with the REV Hardware Client.

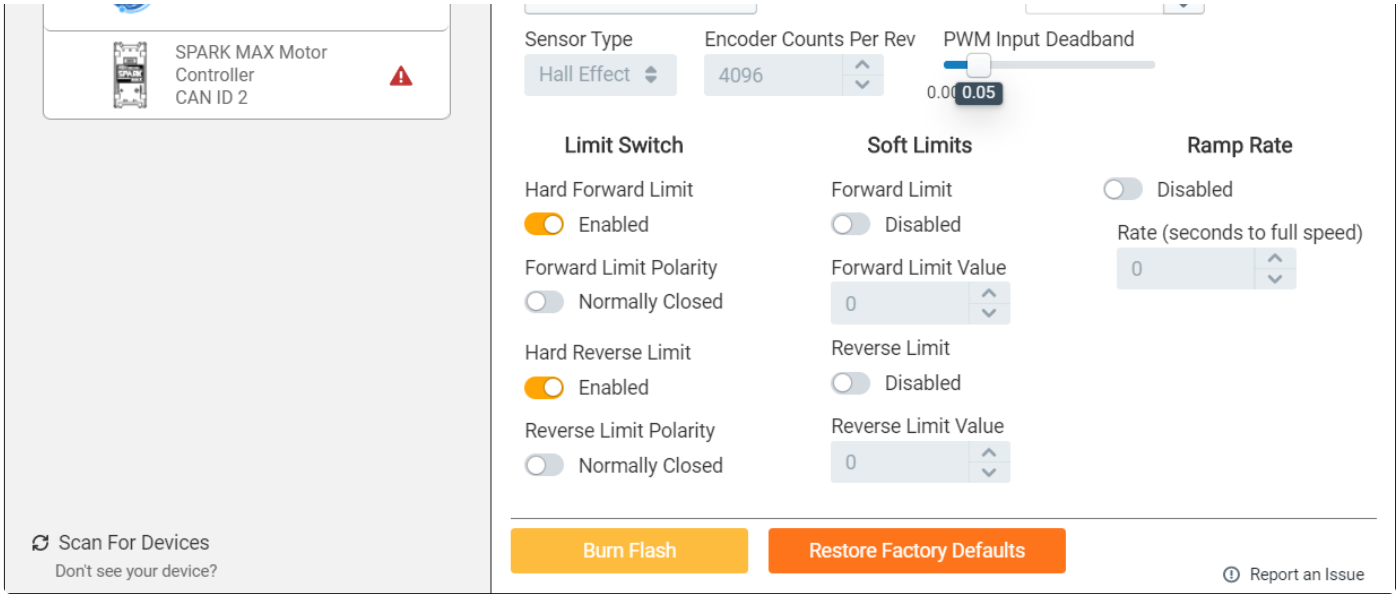
Updating Firmware

Once the SPARK MAX is connected via USB-C select it within the **Connected Hardware.**

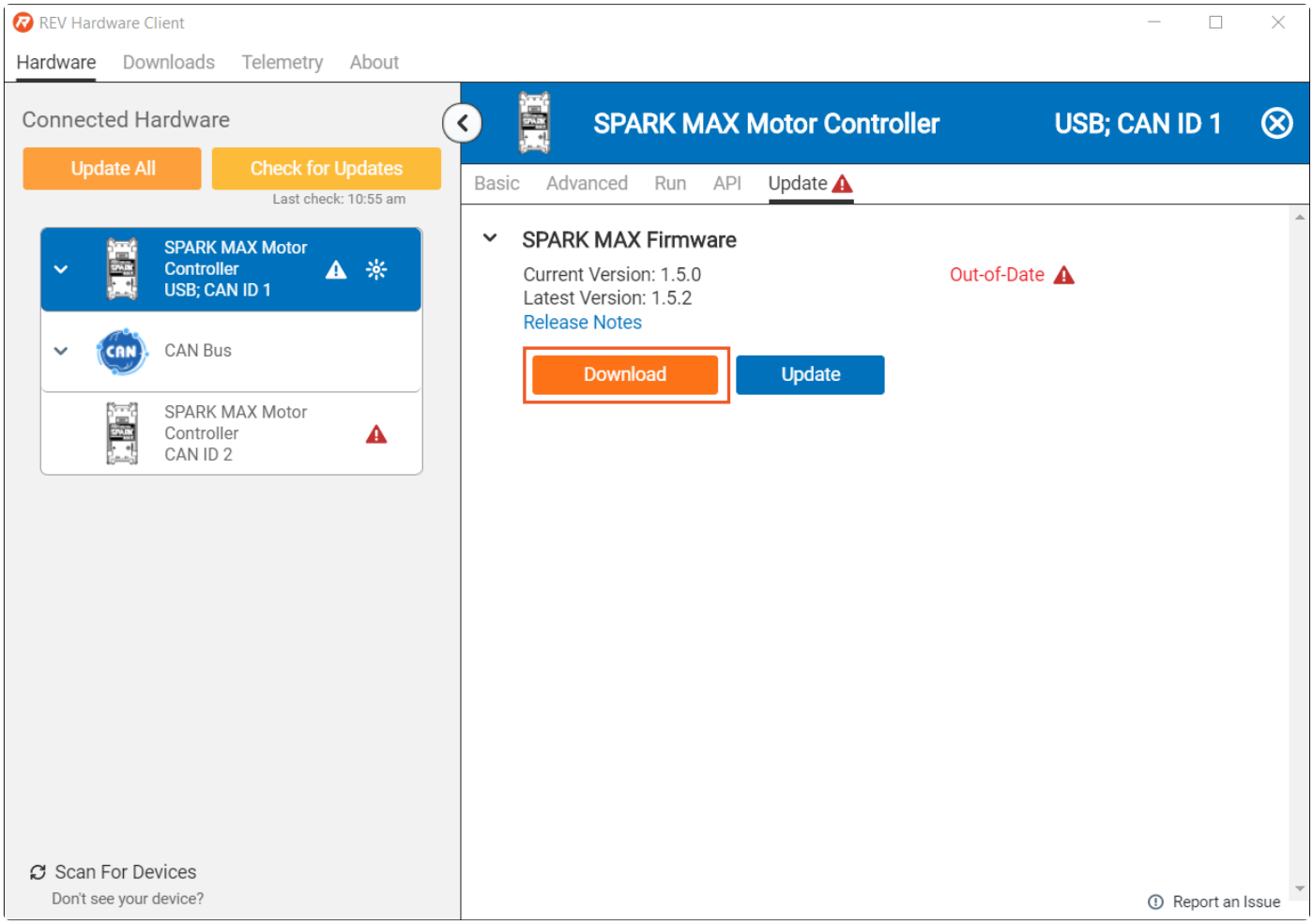


Within the Hardware Client, for the SPARK MAX, there are 5 tabs. The Hardware Client will open up on the **Basic** tab. To update firmware select the **Update** tab.

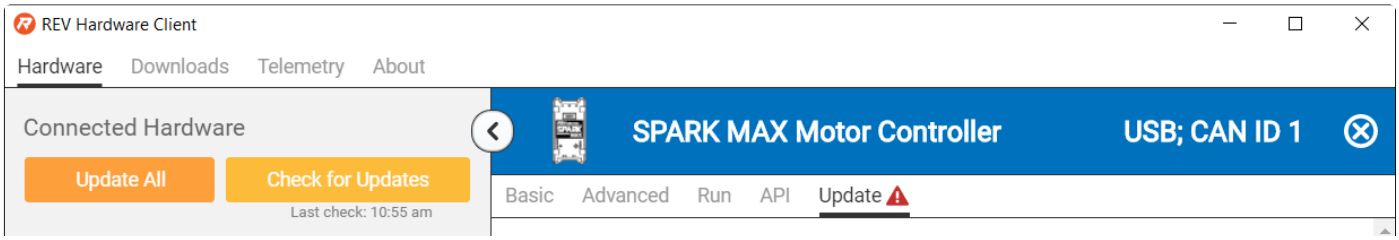


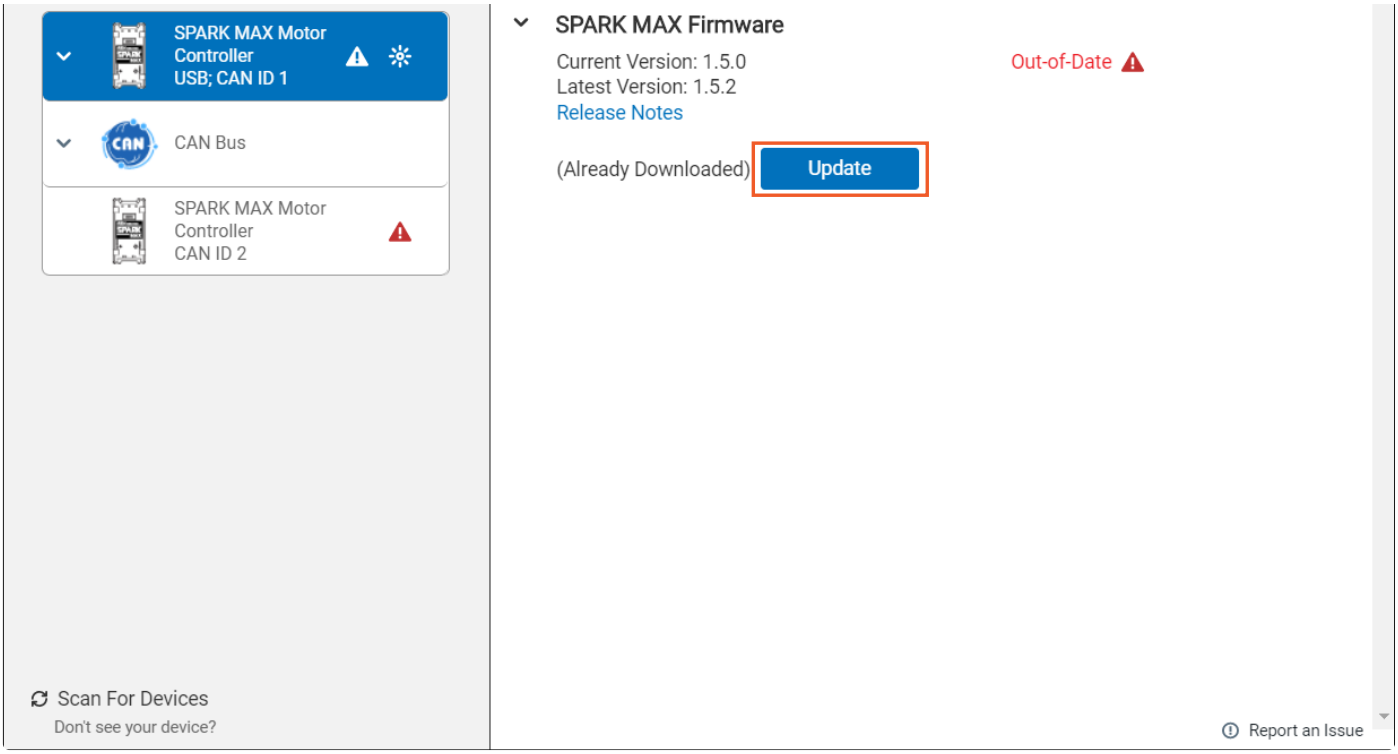


Under **SPARK MAX Firmware**, select download to download the latest version of the firmware.

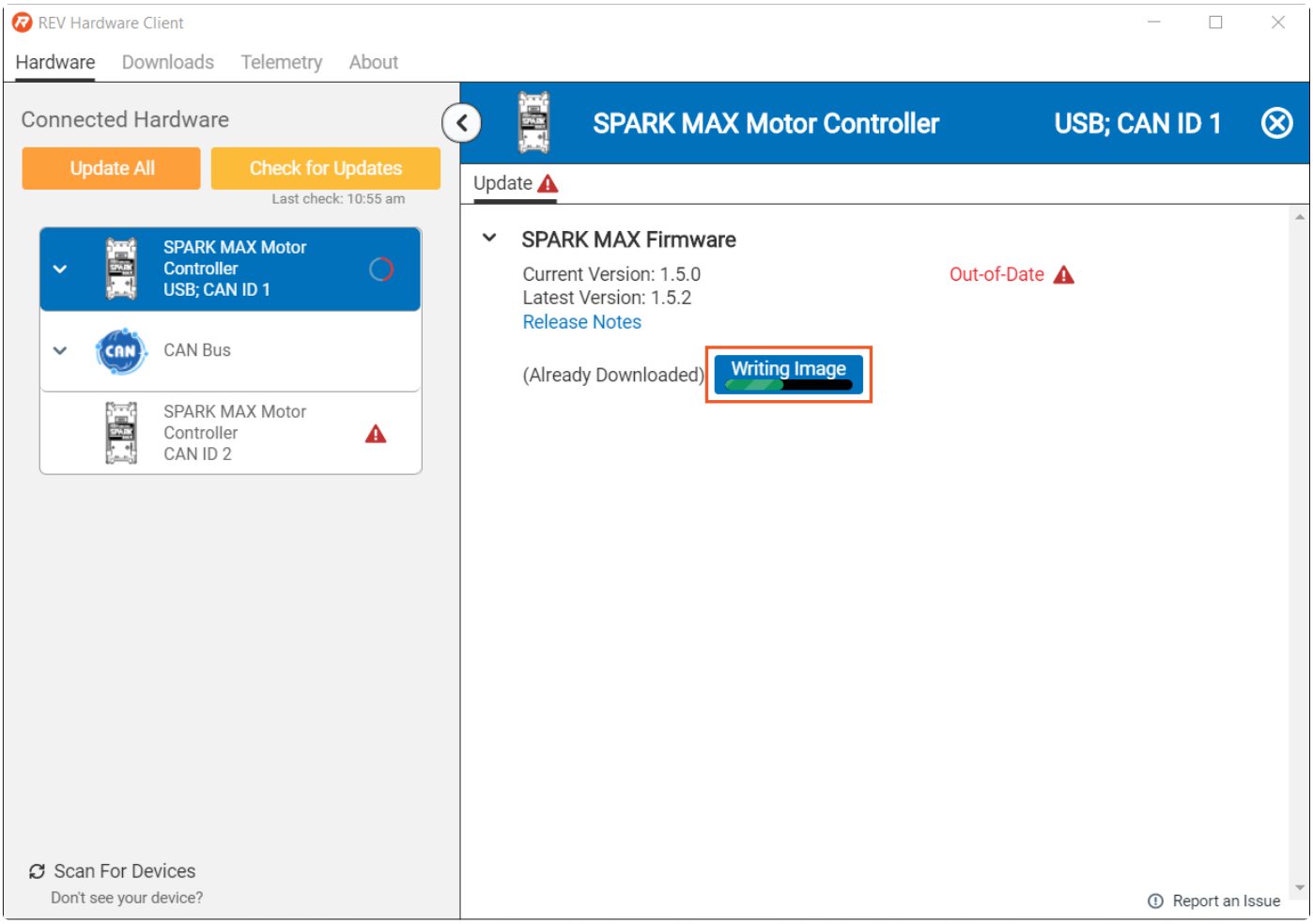


Once the firmware has downloaded select update.

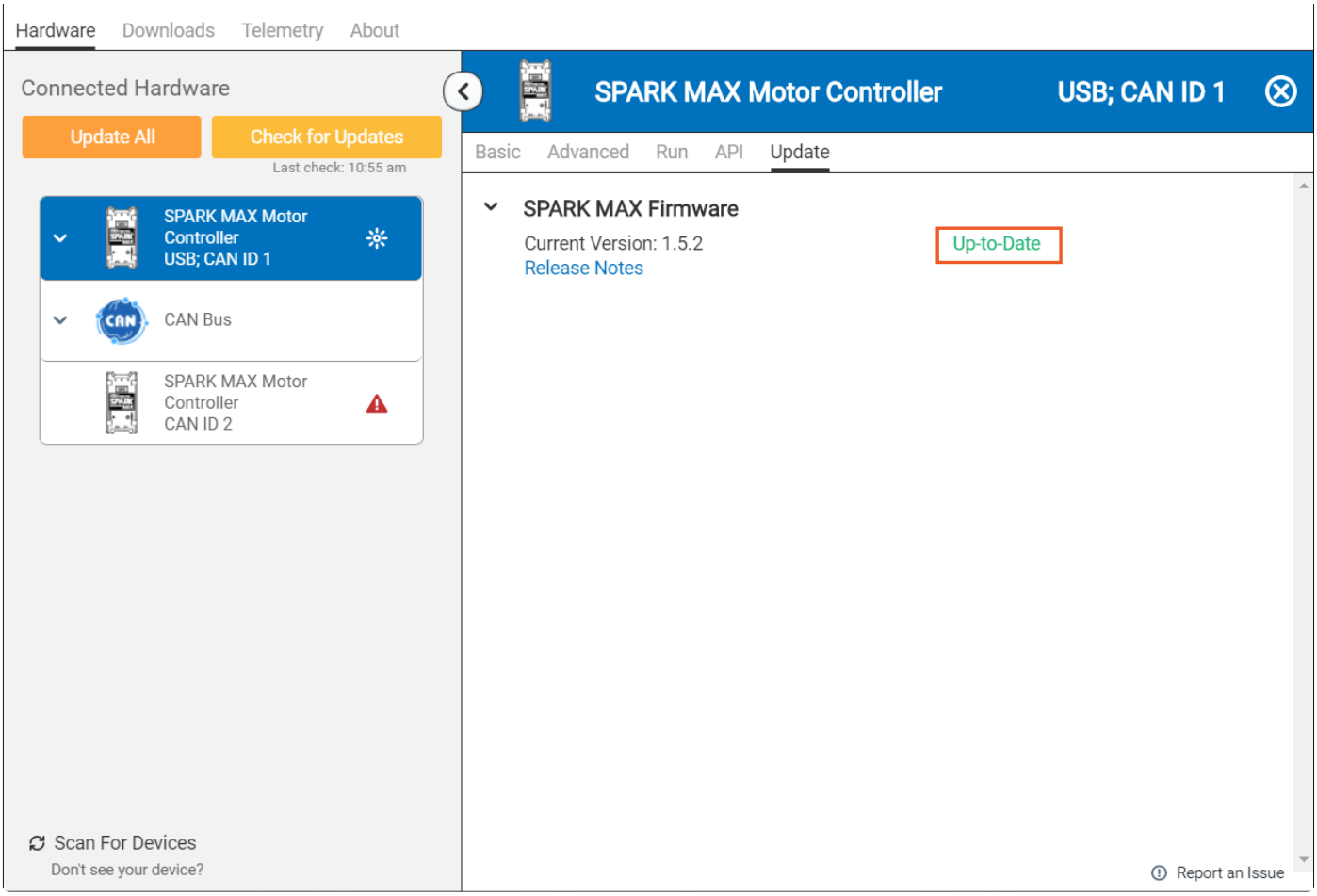




The update process will flash the firmware image onto the SPARK MAX. The status bar will show the progress of the process.

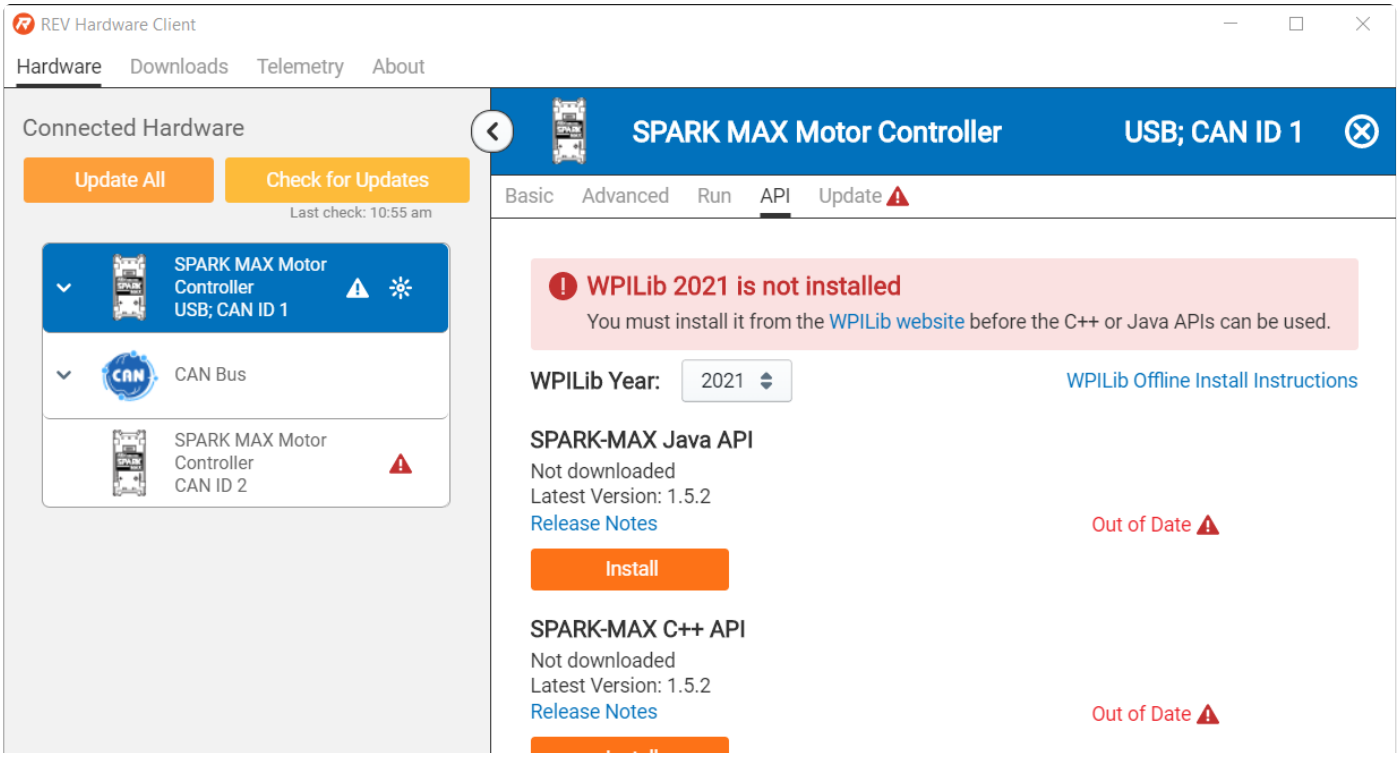


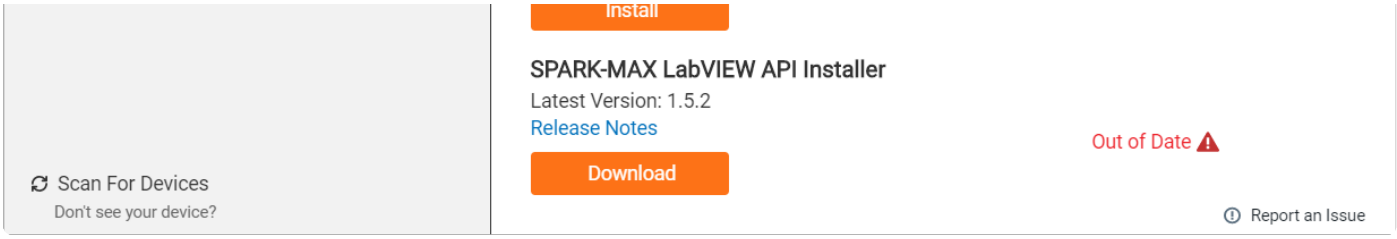
Once the firmware update is done your SPARK MAX will show a new status of **Up-to-Date.**



Installing API Libraries

In order to install C++ of Java APIs you must first install the most recent version of WPILib. Click the link for **WPILib Offline Install Instructions** and follow the steps to install WPILib.





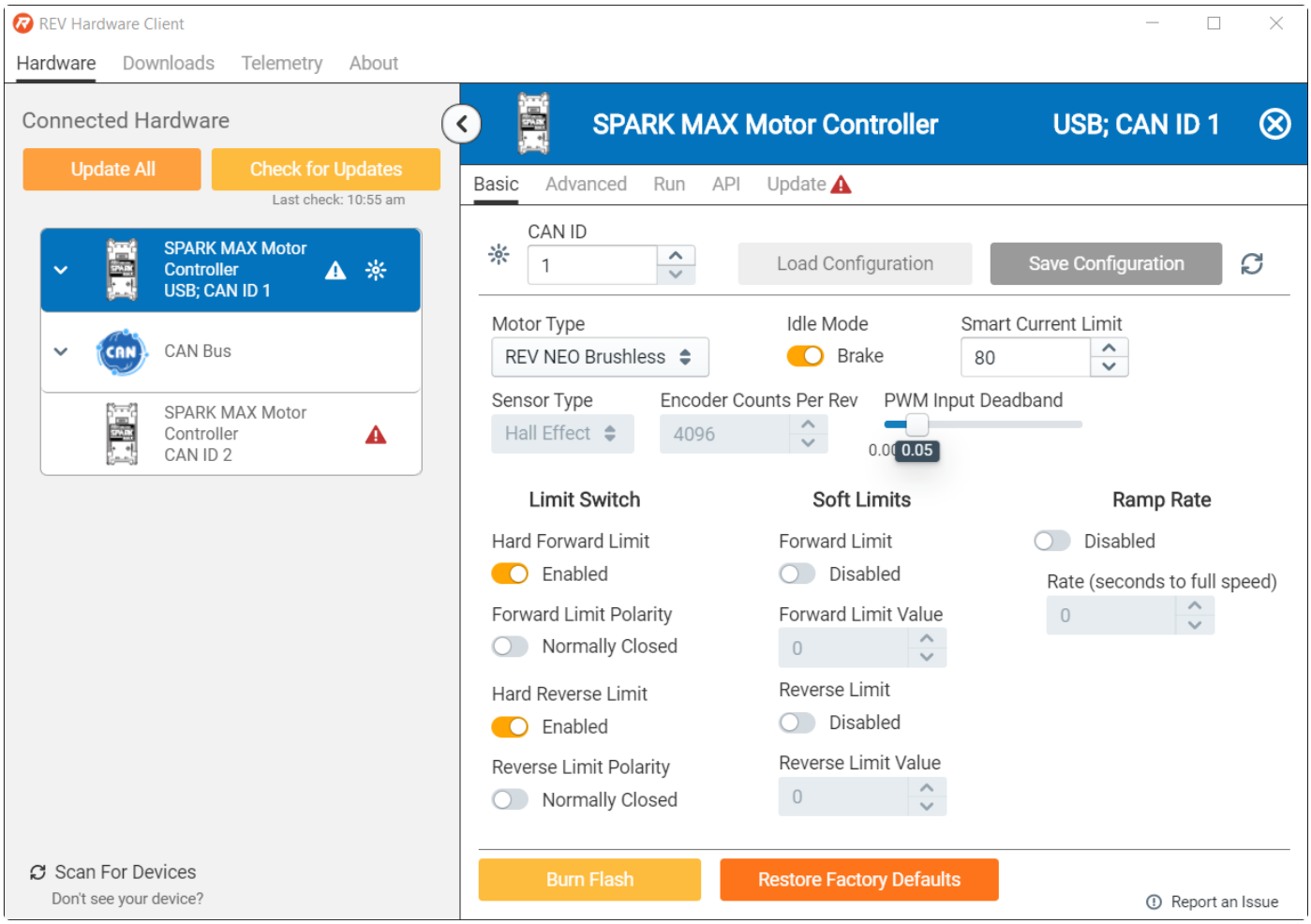
Navigating the Client - SPARK MAX

When a SPARK MAX is connected to the Hardware Client there are multiple Device Menu Tabs. When a SPARK MAX is selected the Hardware Client will open on the Basic Tab. Follow through this section to learn more about the various Device Menu Tabs.

> The API and Update tabs are discussed in the Updating SPARK MAX Software article.

Basic Tab

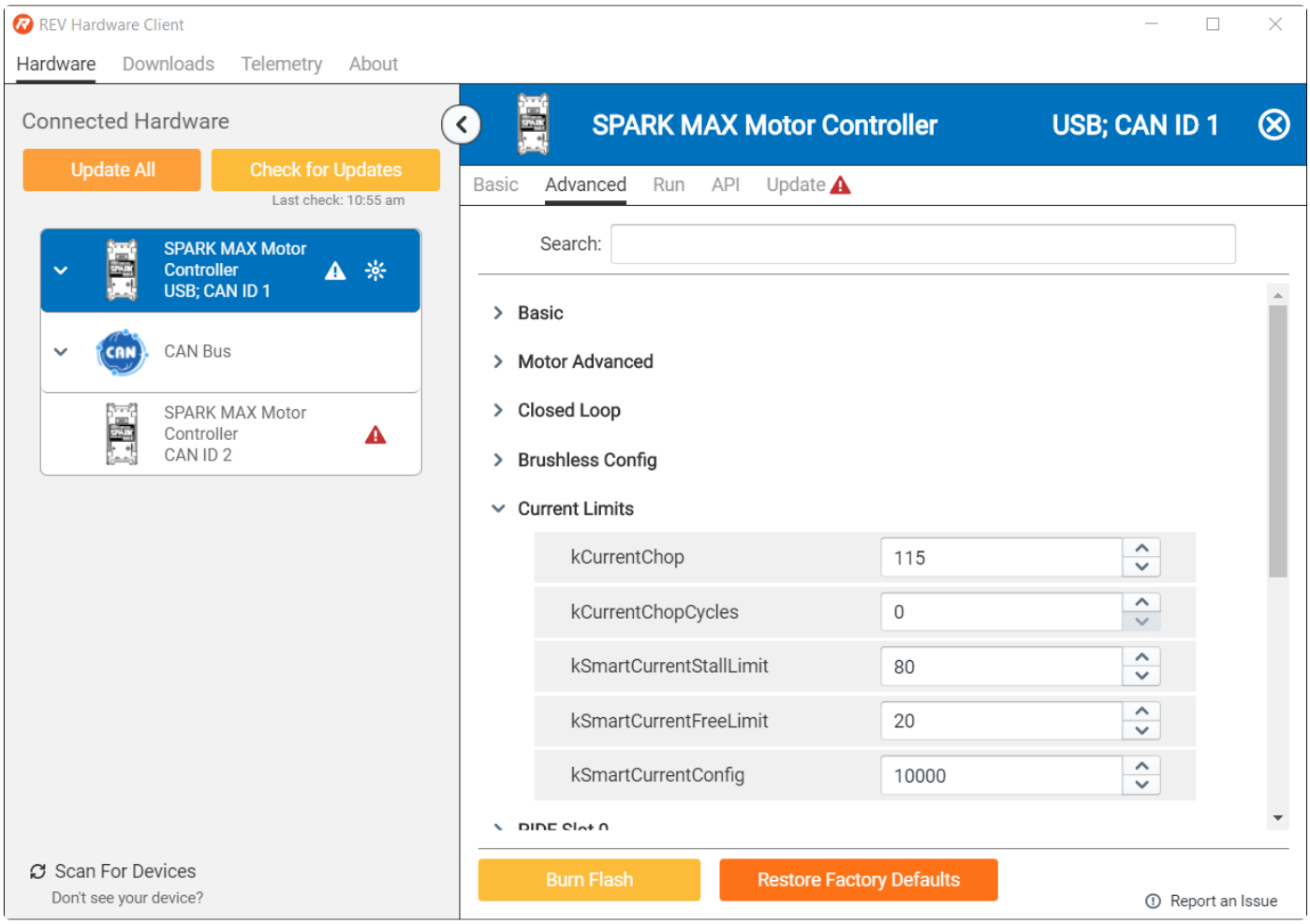
The Basic Tab is used to set the most common parameters for the SPARK MAX



For more information the Basic Tab check out the SPARK MAX's User Manual.

Advanced Tab

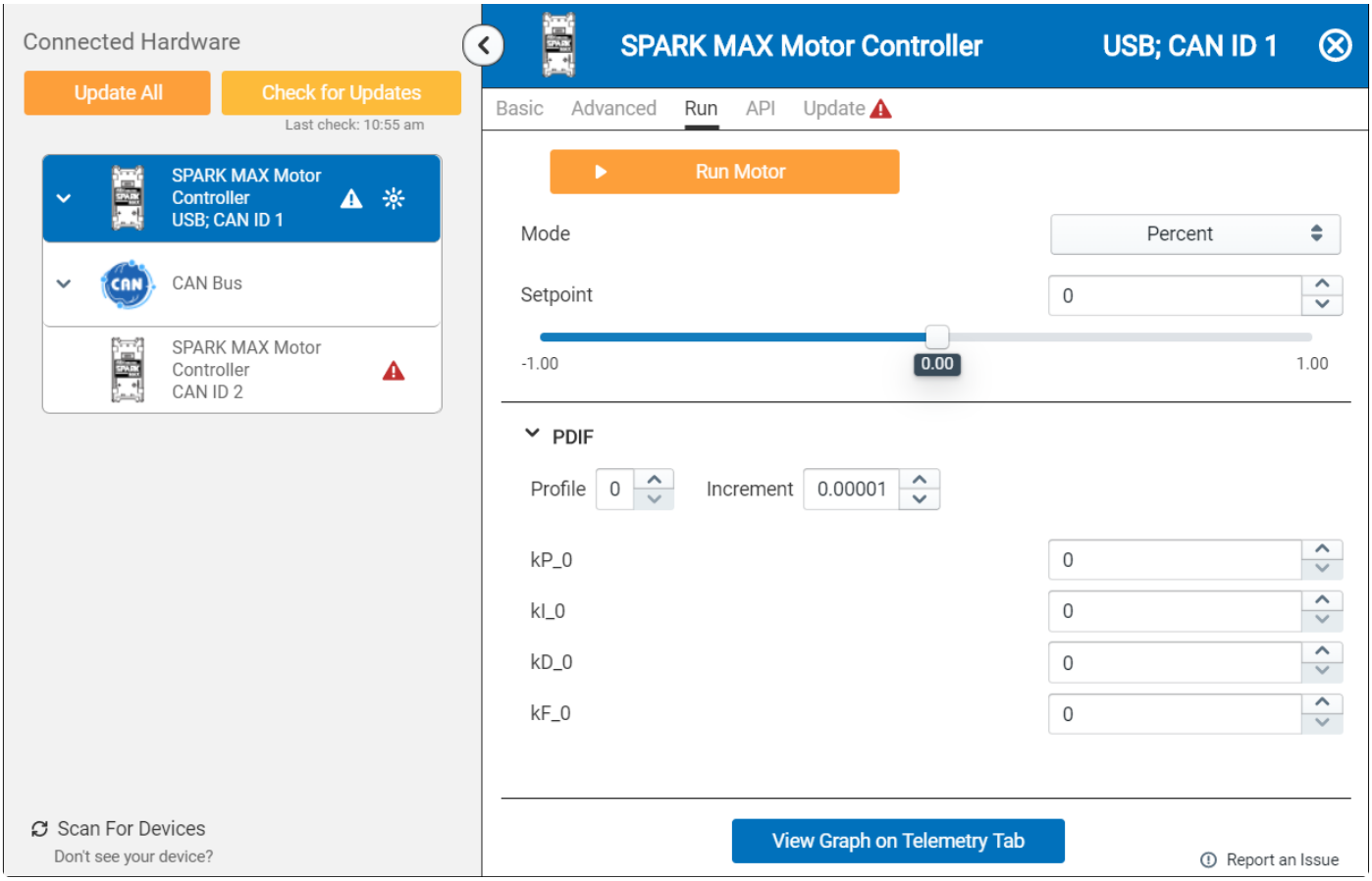
The Advanced Tab allows for changing all configurable parameters of the SPARK MAX without needing to set them in code.



For more information on the Advanced Tab check out the SPARK MAX's User Manual.

Run Tab

The Run Tab allows for the SPARK MAX to operate over USB or a USB to CAN Bridge without the need for a full control system. This is helpful for testing mechanisms and tuning their control loops.



For more information on the Run Tab check out the SPARK MAX's User Manual.