

# 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 download 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

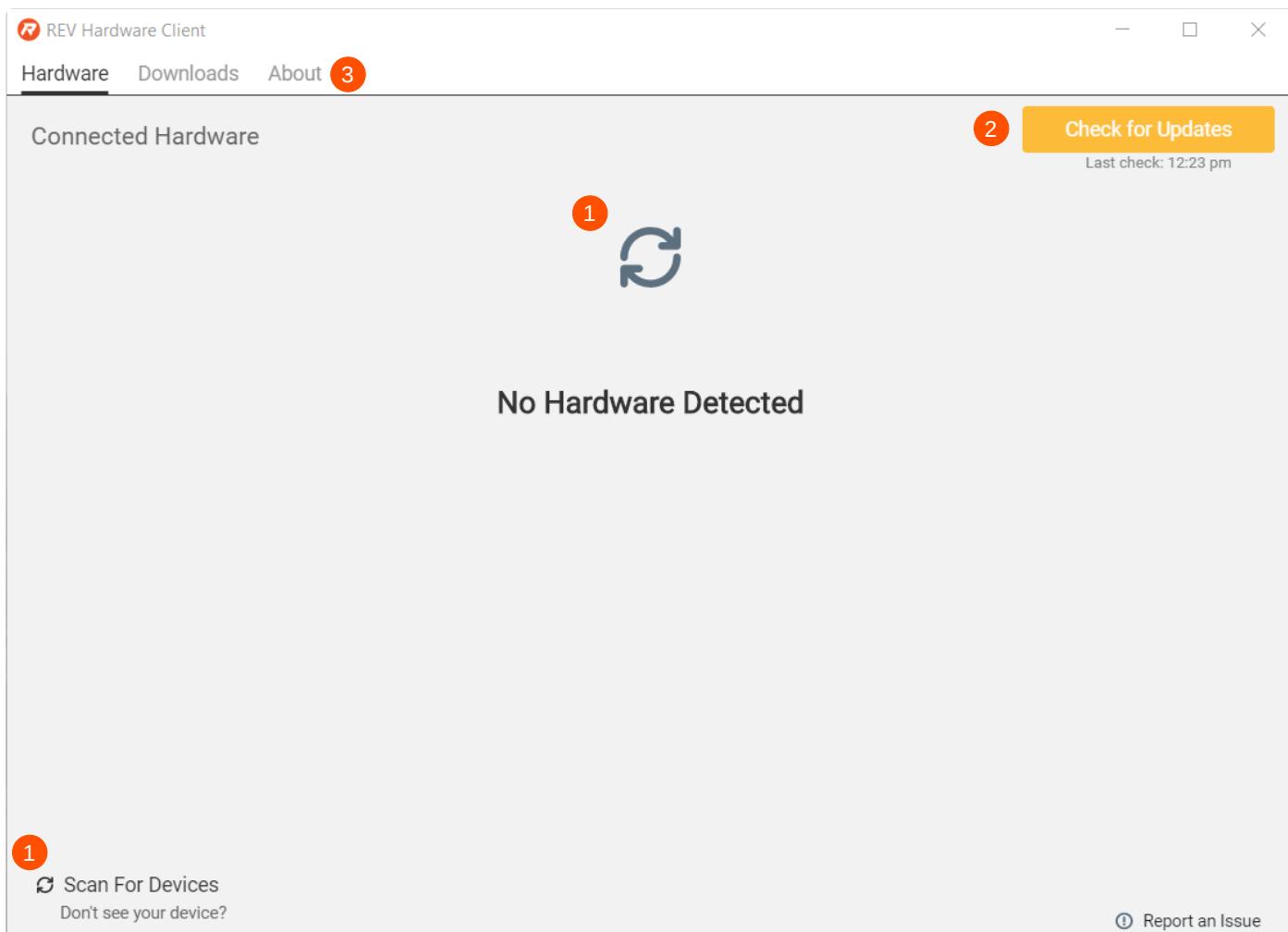
## Navigating the Client

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 automatically 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.

REV Hardware Client

Hardware Downloads About

Connected Hardware

Check for Updates  
Last check: 12:23 pm

1 Control Hub REV-Demo USB

1 Expansion Hub USB: DQ2CNRBW

1 Android Device (Robot Controller) ADB

Scan For Devices  
Don't see your device?

Report an Issue

1. **Supported Hardware** - Each type of supported hardware will appear. Clicking on the Hardware will bring up each unit's 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.

REV Hardware Client

Hardware Downloads About

Connected Hardware

Control Hub REV-Demo

USB

X

4 Update All

Check for Updates

1 Update

Program and Manage

Backup and Restore

Send Logs to REV

Last check: 10:15 am


**Control Hub REV-Demo  
USB**
2 ⚠

**Control Hub Operating System**

Current Version: 1.0.1      Latest Version: 1.1.1

[Release Notes](#)

Update verification succeeded. Rebooting device and installing update. The Control Hub will stop broadcasting its WiFi access point for about a minute, so you may need to manually re-connect in order to see if the update succeeded.

3 (Already Downloaded) Installing ( )

**Robot Controller App**

Current Version: 5.5

[Release Notes](#)

**Hub Firmware**

Current Version: 1.8.2

[Release Notes](#)

⌚ Scan For Devices

Don't see your device?

Report an Issue

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.

⟳ REV Hardware Client

Hardware   Downloads   About

Check for Updates

Last check: 10:15 am

**Downloaded update files** 1

[Browse Downloaded Files](#)

Hub Firmware 1.8.2 (7KB)

[Release Notes](#)

Control Hub Operating System 1.1.1 (365MB)

[Release Notes](#)

**Available update files** 2

Driver Station App 5.5 (33.9MB)

[Release Notes](#)

Delete

Delete

Download

Robot Controller App 5.5 (38.1MB)  
[Release Notes](#)

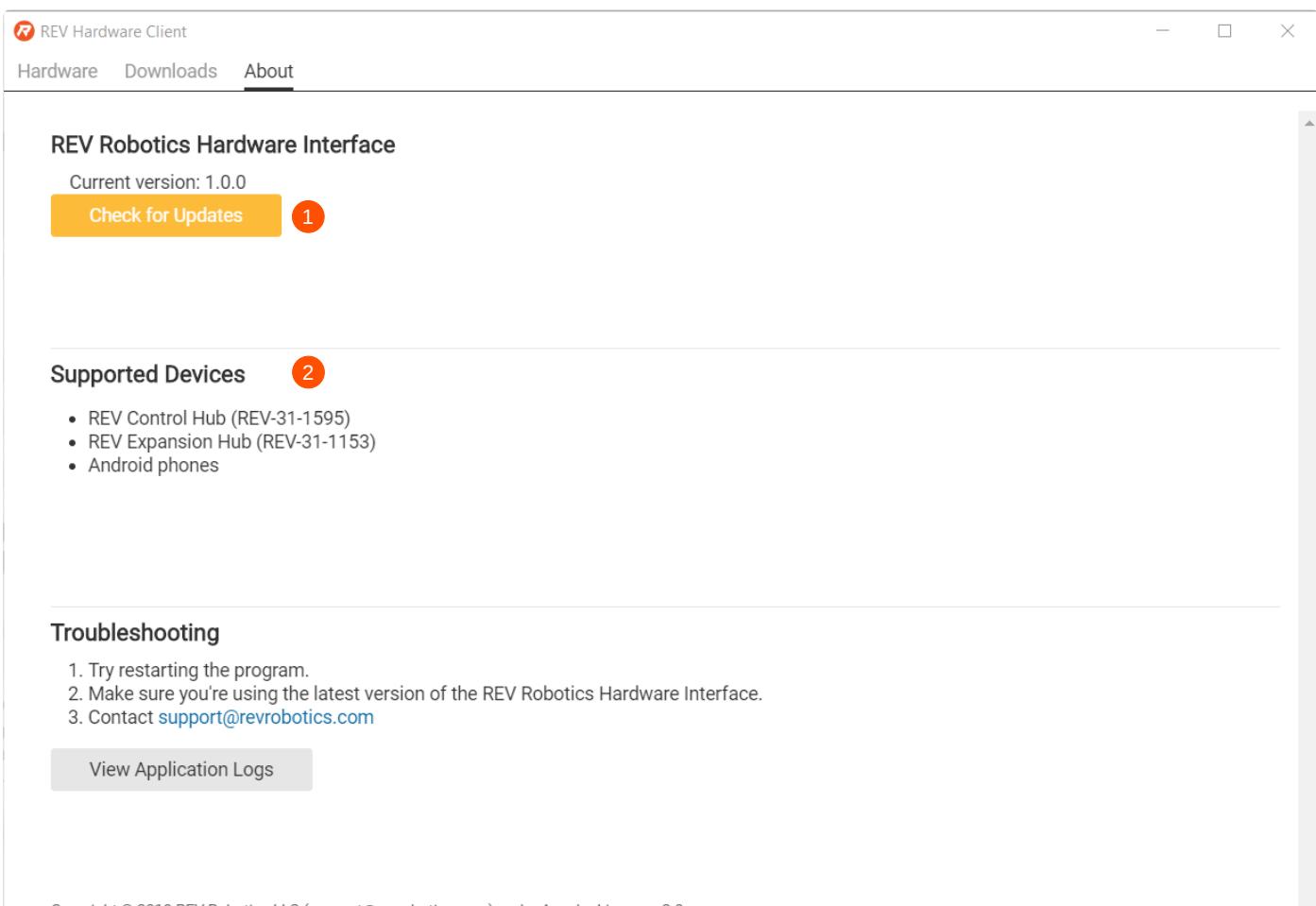
[Download](#)

[Report an Issue](#)

- 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.
- 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.



The screenshot shows the 'About' tab of the REV Robotics Hardware Interface. At the top, there's a navigation bar with tabs for 'Hardware', 'Downloads', and 'About'. The 'About' tab is currently selected. Below the navigation bar, the title 'REV Robotics Hardware Interface' is displayed, followed by 'Current version: 1.0.0'. A prominent orange button labeled 'Check for Updates' has a red badge with the number '1' indicating an update is available. In the main content area, there's a section titled 'Supported Devices' which lists three items: 'REV Control Hub (REV-31-1595)', 'REV Expansion Hub (REV-31-1153)', and 'Android phones'. At the bottom of the page, under the heading 'Troubleshooting', there are three numbered steps: '1. Try restarting the program.', '2. Make sure you're using the latest version of the REV Robotics Hardware Interface.', and '3. Contact [support@revrobotics.com](mailto:support@revrobotics.com)'. A grey button labeled 'View Application Logs' is located at the very bottom.

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.

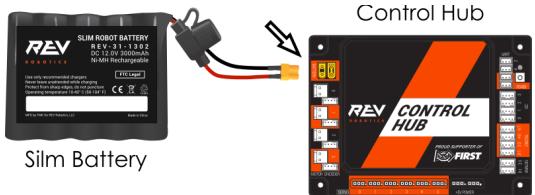
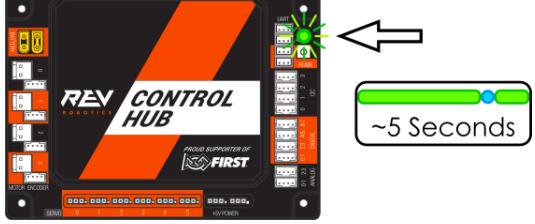
## SPARK MAX Motor Controller

- 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

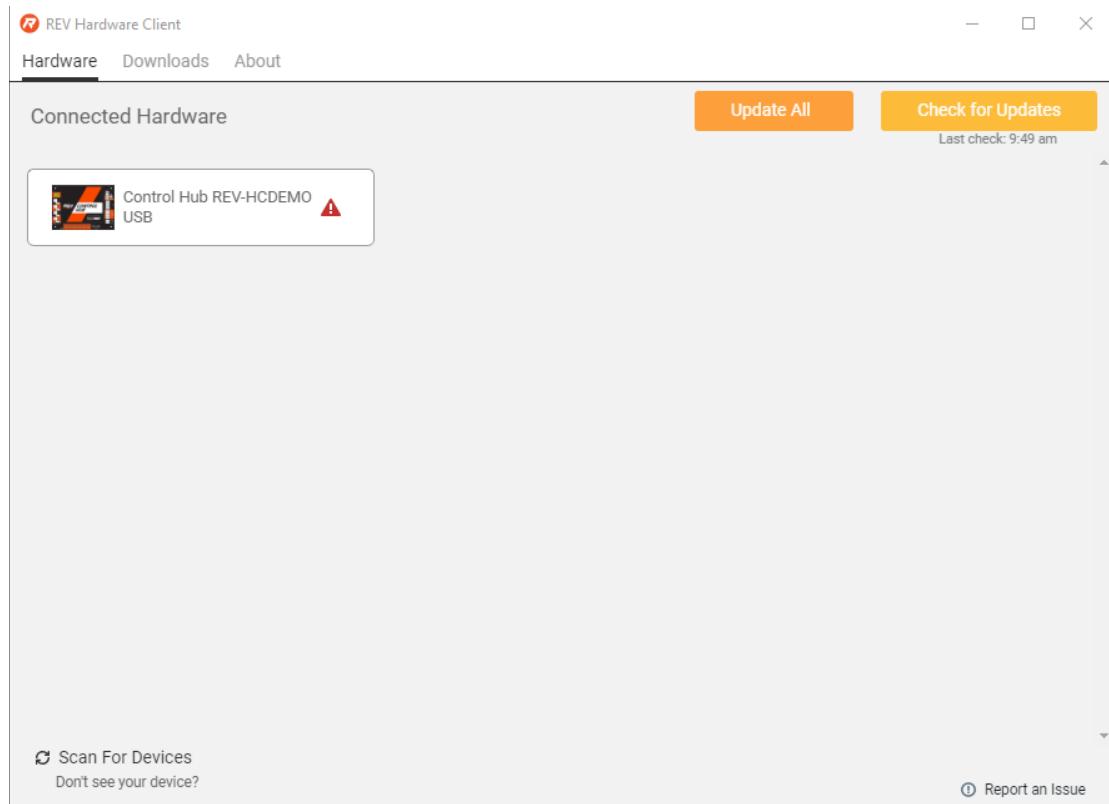
# Control Hub

## Connecting a Control Hub

### Via USB

Steps	
Power on the Control Hub, by plugging the 12V Slim Battery ( <a href="#">REV-31-1302</a> ) into the XT30 connector labeled "BATTERY" on the Control Hub.	 <p>The diagram shows a black rectangular battery labeled "REV SLIM ROBOT BATTERY REV-31-1302 Ni-Mh Rechargeable" connected to a black rectangular Control Hub. An XT30 connector is shown being inserted into the "BATTERY" port on the Control Hub. The Control Hub has several other ports and connectors visible.</p>
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.	 <p>The diagram shows the front panel of the REV Control Hub. It features a central orange and white graphic with the text "REV CONTROL HUB" and "PROUD SUPPORTER OF FIRST". On the left, there are several digital input and output pins labeled D0 through D15. On the right, there are analog input and output pins labeled A0 through A15. A green LED is located near the center of the board. A callout box indicates that the LED blinks green every ~5 seconds when the hub is healthy.</p>
Plug the Control Hub into the PC using a USB-A to USB-C Cable ( <a href="#">REV-11-1232</a> )	

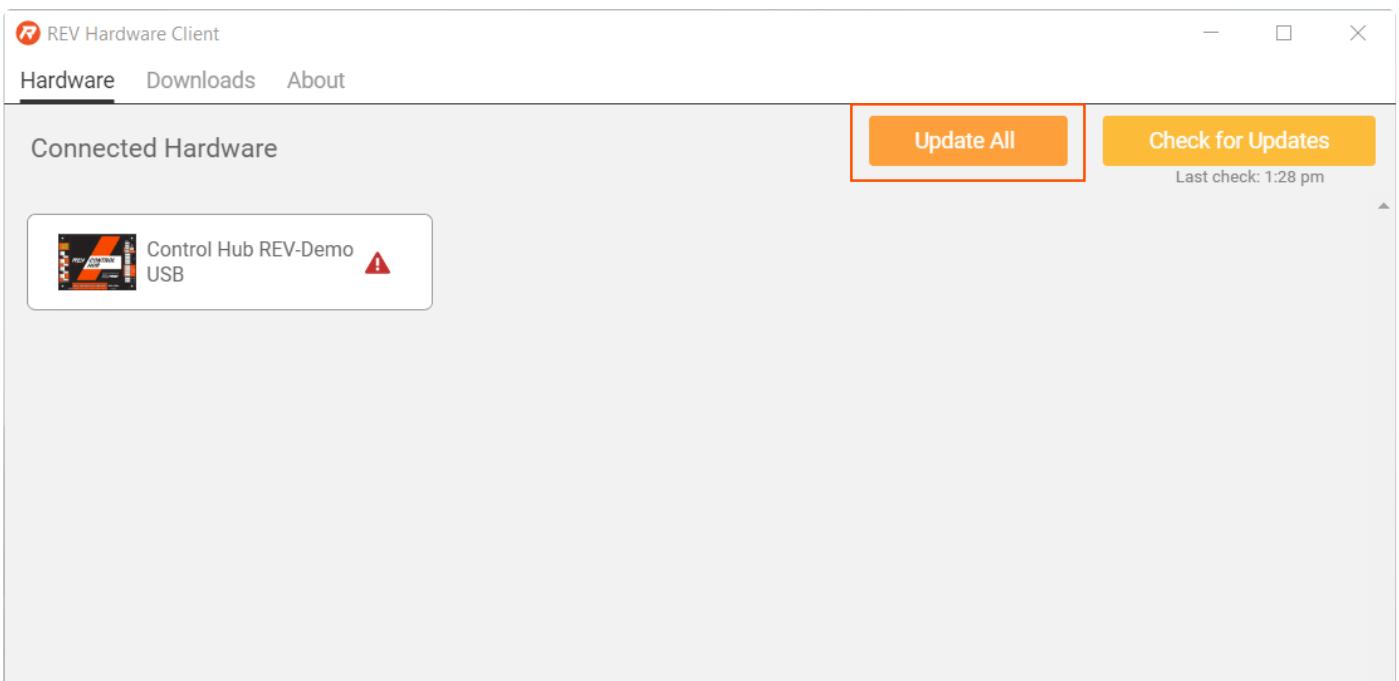
Startup the REV Hardware Client. Once the Hub is fully connected it will show up on the front page of the UI under the Hardware Tab. Select the Control Hub.

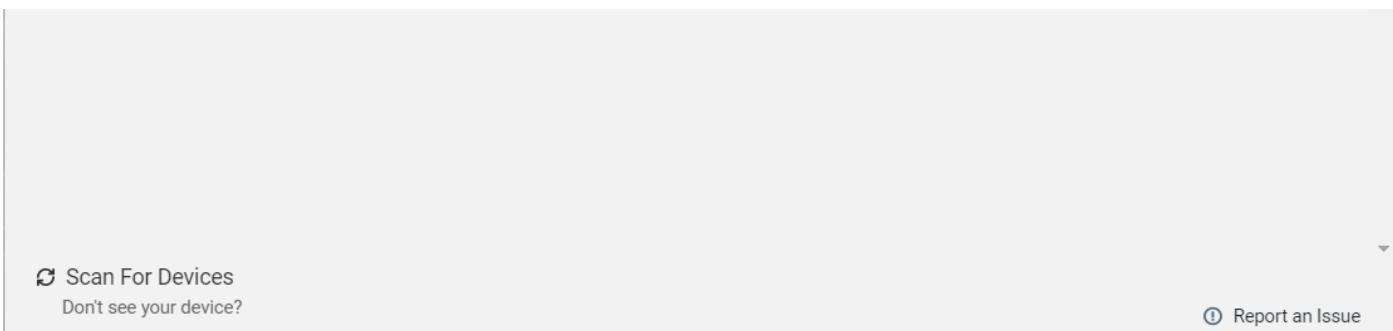


## Updating Control Hub

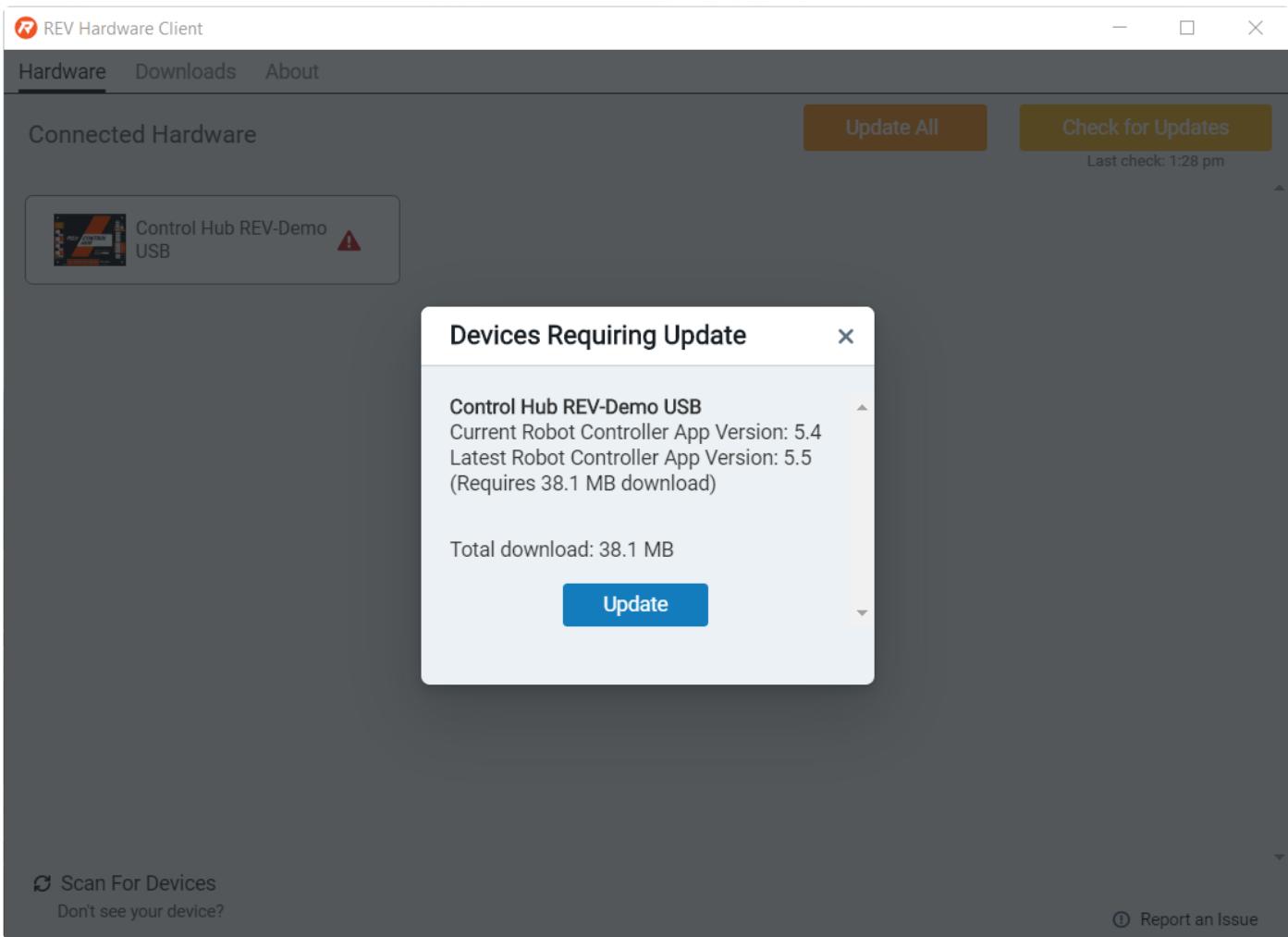
### Update All

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.

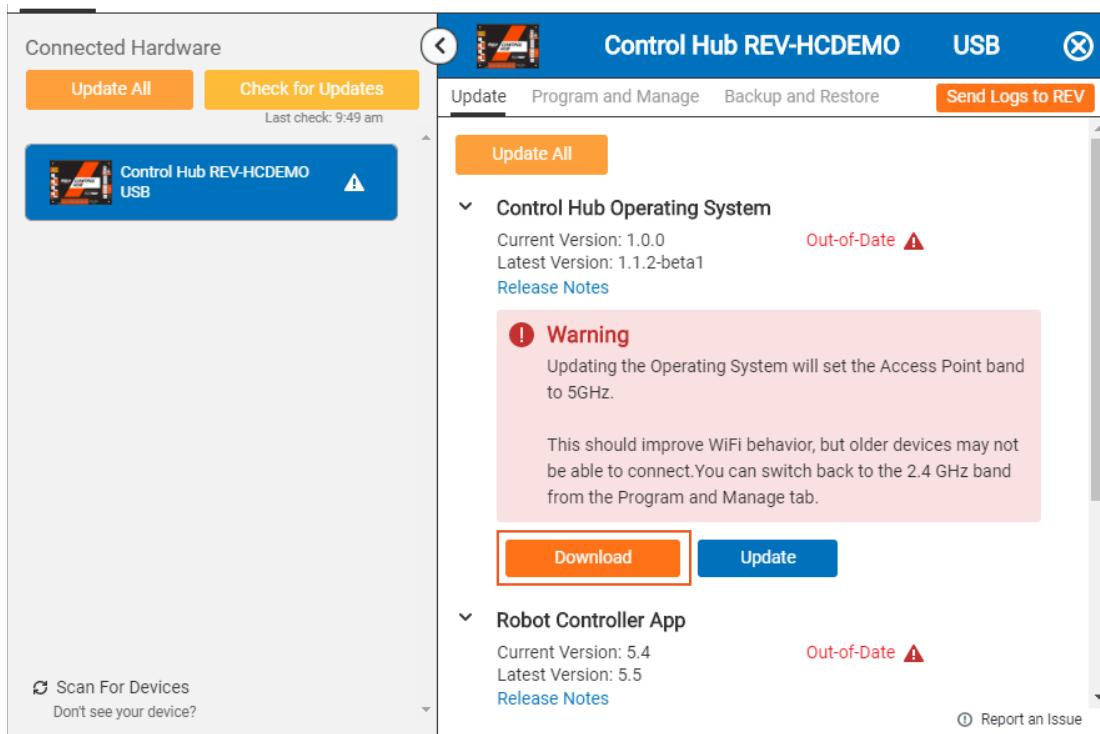


## Individual Updates

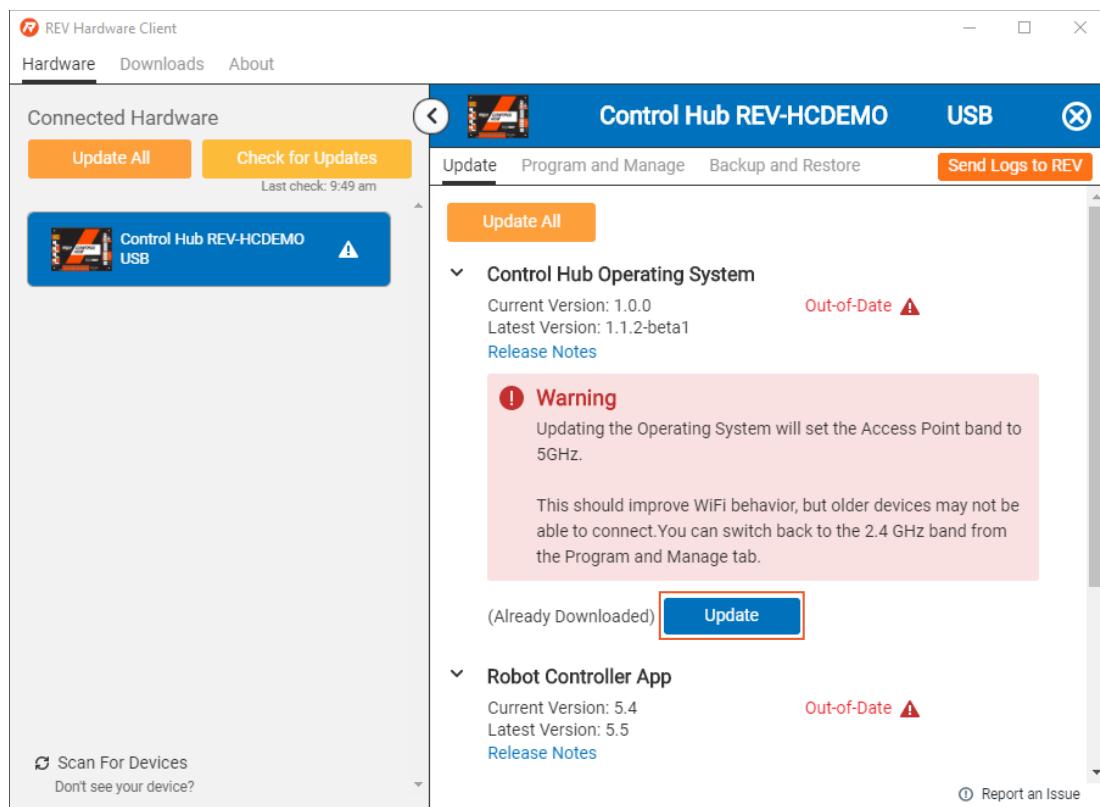
### Operating System

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

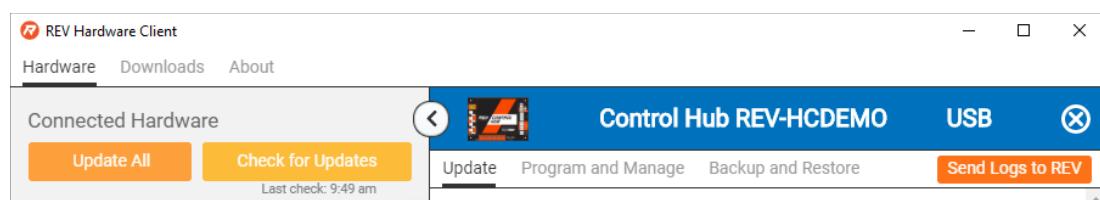




Once the OS has downloaded, select Update.



Keep the Control Hub powered while the upload finishes.



The screenshot shows the REV Hardware Client interface. On the left, there's a sidebar with a search bar and a 'Scan For Devices' button. The main area has two sections: 'Control Hub Operating System' and 'Robot Controller App'. Under 'Control Hub Operating System', it says 'Current Version: 1.0.0' and 'Latest Version: 1.1.2-beta1'. A red warning box contains the text: 'Updating the Operating System will set the Access Point band to 5GHz. This should improve WiFi behavior, but older devices may not be able to connect. You can switch back to the 2.4 GHz band from the Program and Manage tab.' Below this is a progress bar with the status '(Already Downloaded) Uploading' and a 'Cancel Update' button. Under 'Robot Controller App', it says 'Current Version: 5.4' and 'Latest Version: 5.5'. There's a 'Release Notes' link and a progress bar with a blue bar. At the bottom right is a 'Report an Issue' link.

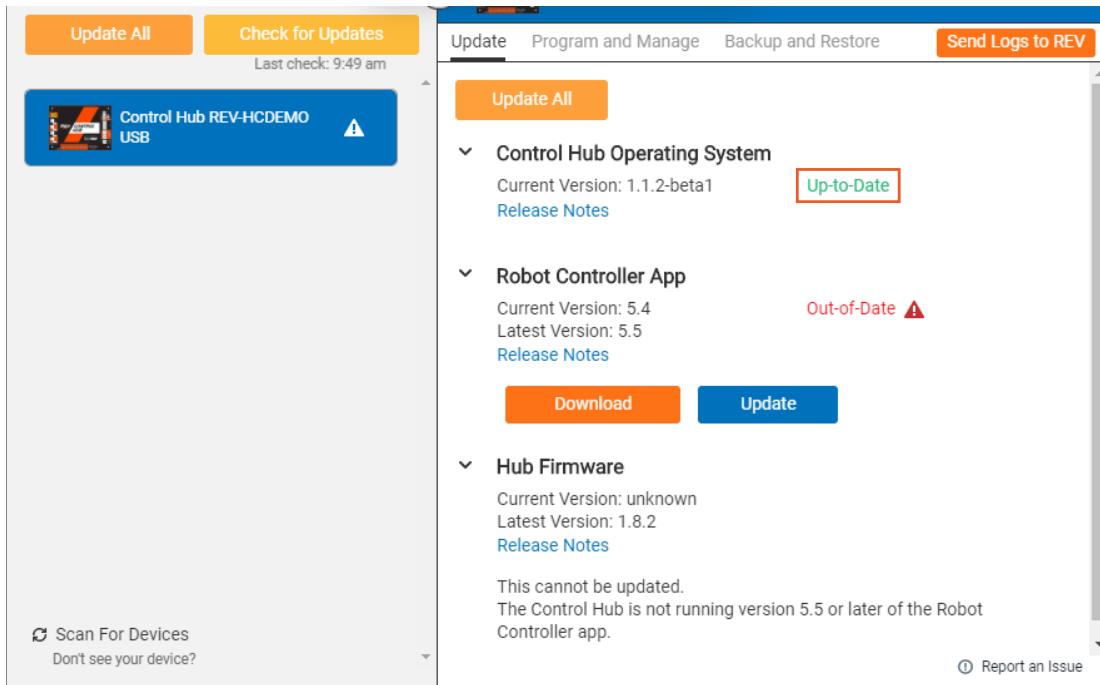
A successful upload will be denoted by the "Update Verification Succeeded" message highlighted in the image below. Once the upload is successful the install will begin.

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

This screenshot shows the same interface as above, but with a different status for the OS update. The 'Control Hub Operating System' section now displays a green box containing the message 'Update verification succeeded. Rebooting device and installing update.' The rest of the interface remains the same, including the sidebar, other app sections, and the bottom 'Report an Issue' link.

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."

This screenshot shows the final state after the update. The 'Control Hub Operating System' section now has a green status bar at the top with the message 'Operating System update complete'. The rest of the interface is identical to the previous screenshots, including the sidebar and other app sections.

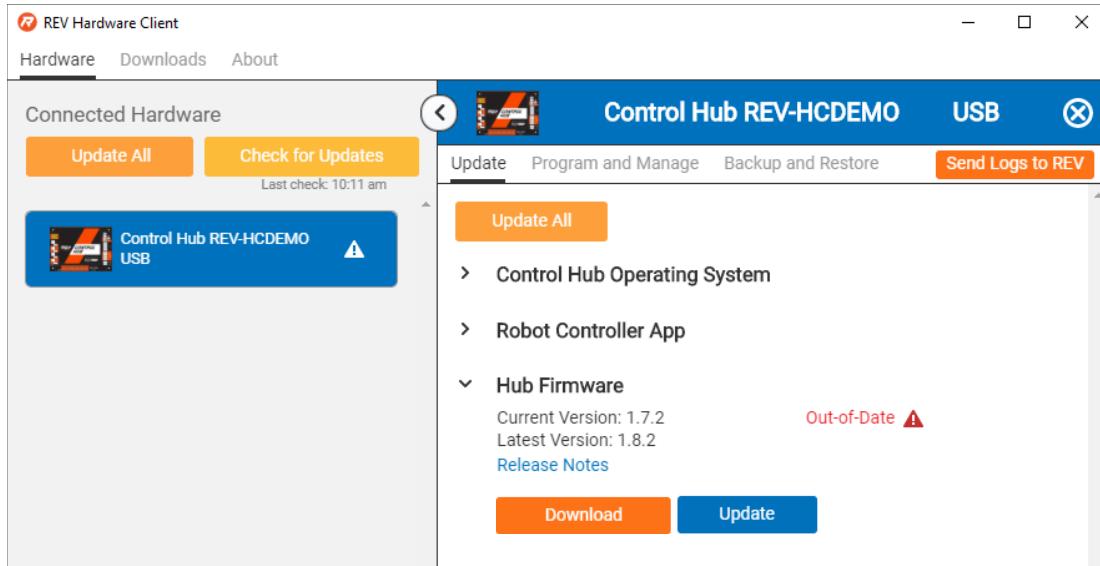


## Firmware

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.

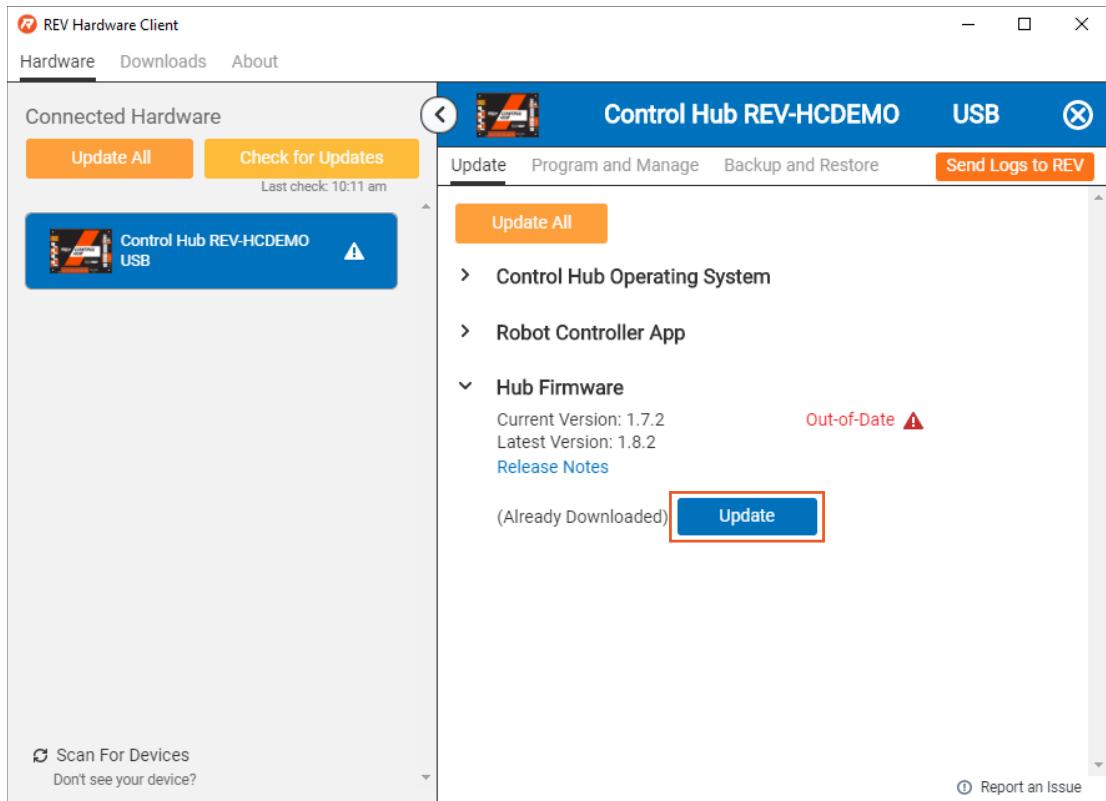
**!** In order to use the REV Hardware Client for firmware updates, the Robot Controller Application must first be updated to version 5.5. After updating the application you may need to close out of the REV Hardware Client in order for the firmware update to be available.

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

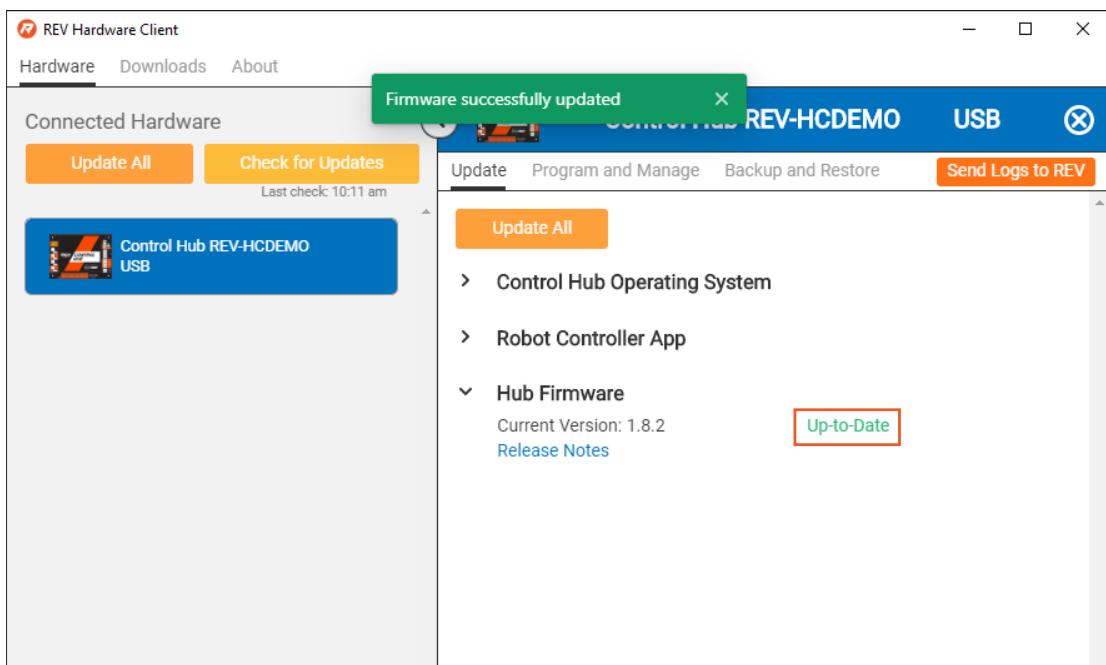




Once the firmware has downloaded, select Update.



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."

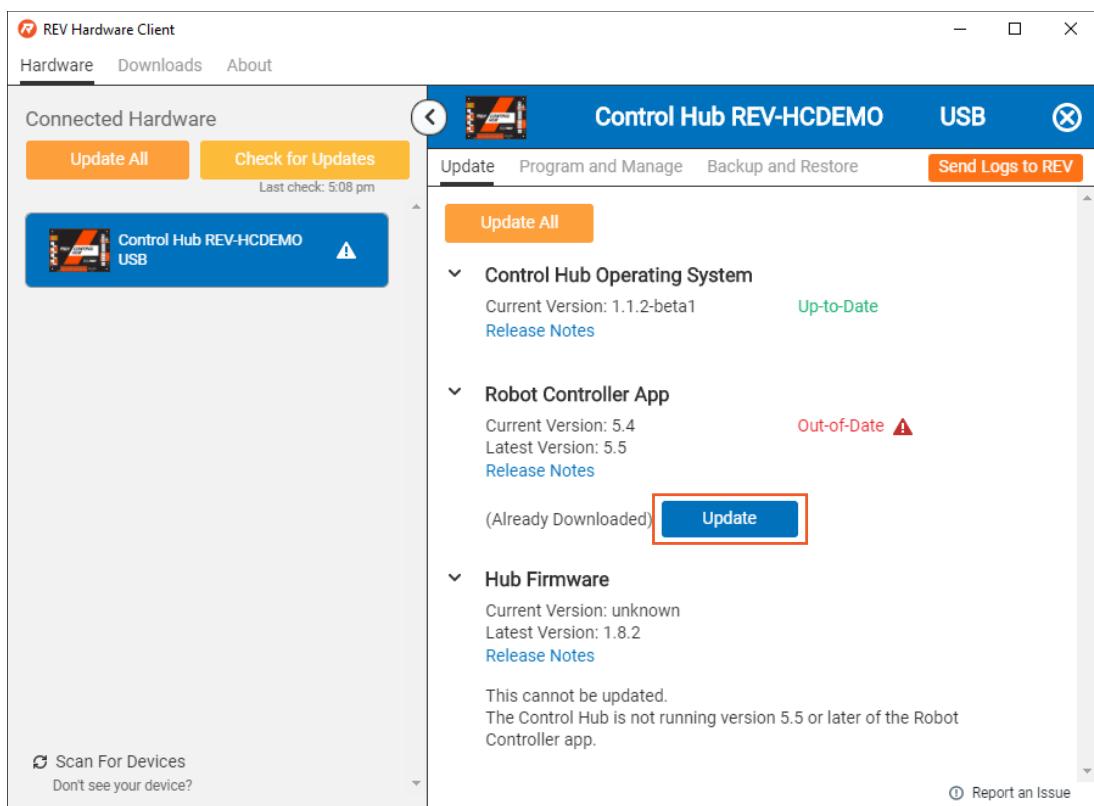




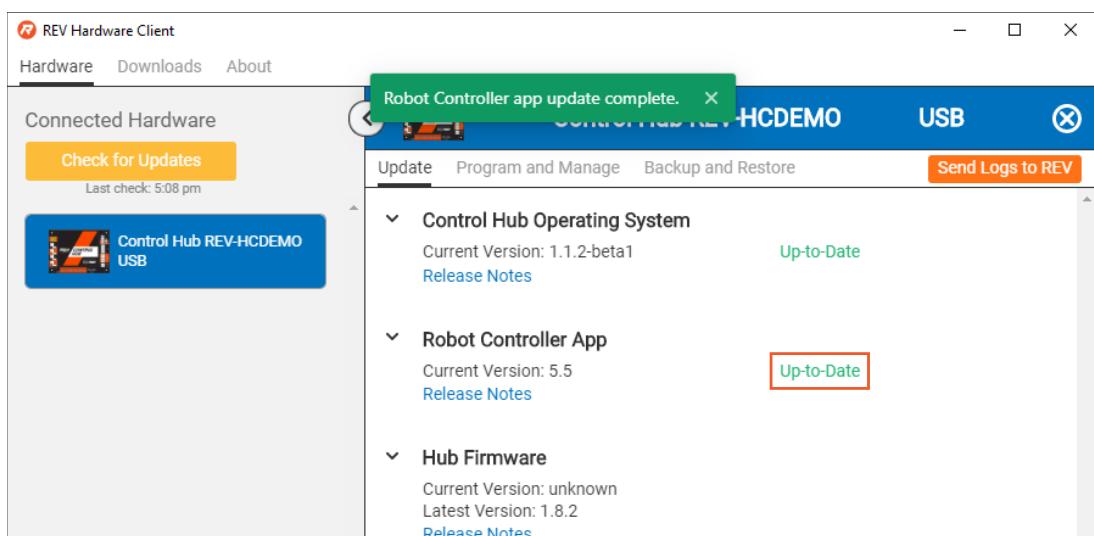
## Robot Controller Application

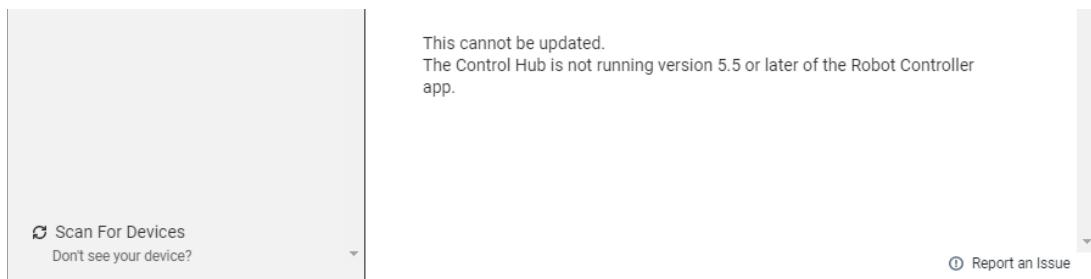
After selecting the Connected Hardware the Update tab will pop up. Under **Robot Controller App** select Download.

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."

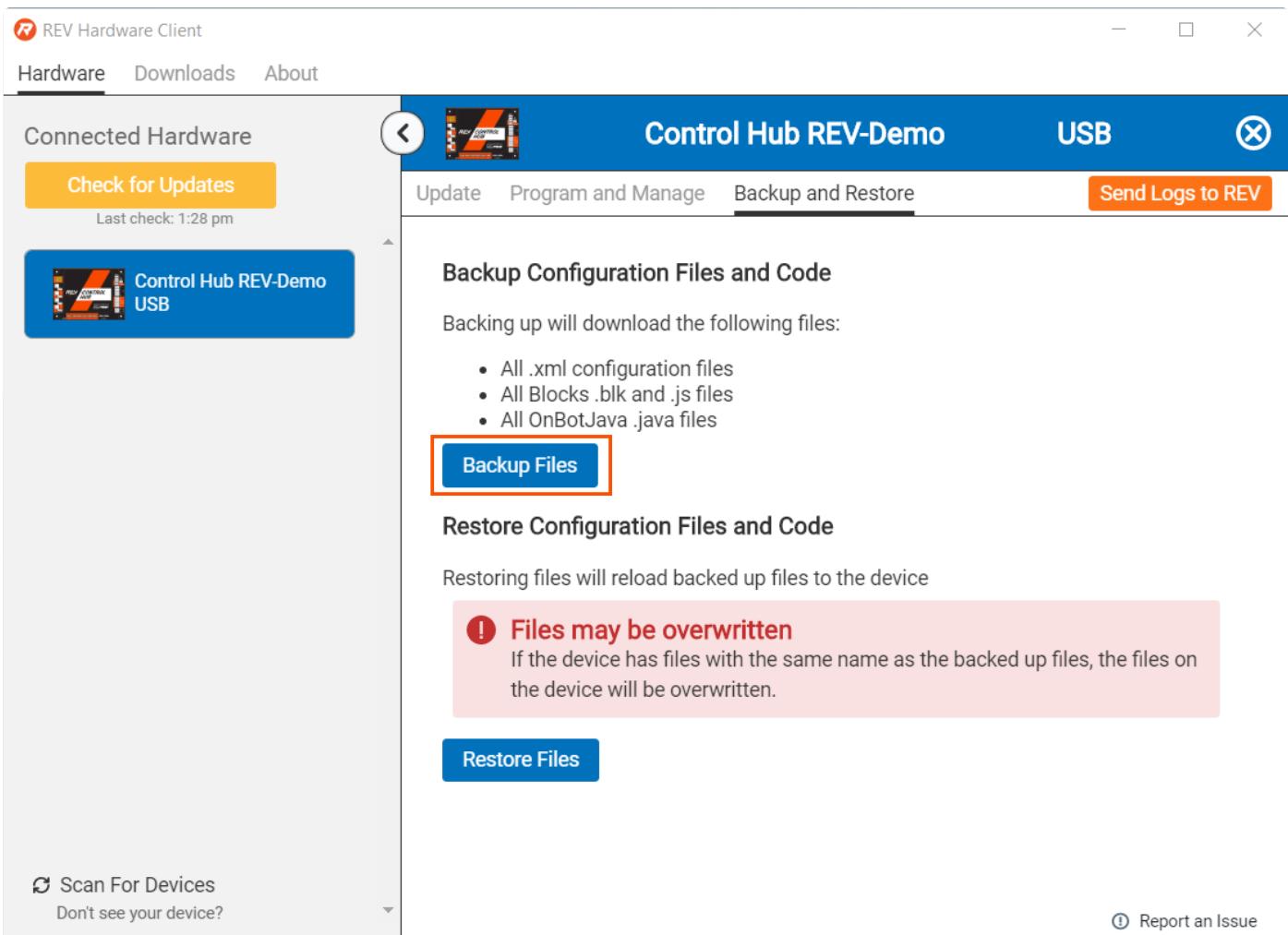




## Restoring User Data

### 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.

REV Hardware Client

Hardware Downloads About

Connected Hardware

Check for Updates  
Last check: 1:28 pm

Control Hub REV-Demo USB

Config files and code backed up X

Control Hub REV-Demo USB X

Update Program and Manage Backup and Restore Send Logs to REV

**Backup Configuration Files and Code**

Backing up will download the following files:

- All .xml configuration files
- All Blocks .blk and .js files
- All OnBotJava .java files

**Backup Files** Saved as [Control Hub REV-Demo\\_9-8-2020-17.17.51.509.revbkp.zip](#)

**Restore Configuration Files and Code**

Restoring files will reload backed up files to the device

**Files may be overwritten**  
If the device has files with the same name as the backed up files, the files on the device will be overwritten.

**Restore Files**

Scan For Devices  
Don't see your device? Report an Issue

## Restoring Files

To Restore Files, select the Restore Files button.

REV Hardware Client

Hardware Downloads About

Connected Hardware

Check for Updates  
Last check: 1:28 pm

Control Hub REV-Demo USB

Control Hub REV-Demo USB X

Update Program and Manage Backup and Restore Send Logs to REV

**Backup Configuration Files and Code**

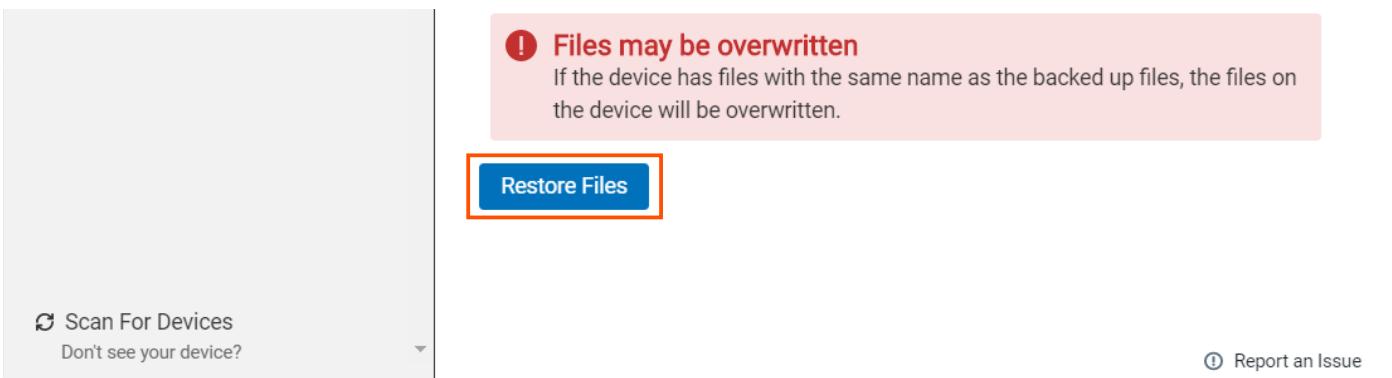
Backing up will download the following files:

- All .xml configuration files
- All Blocks .blk and .js files
- All OnBotJava .java files

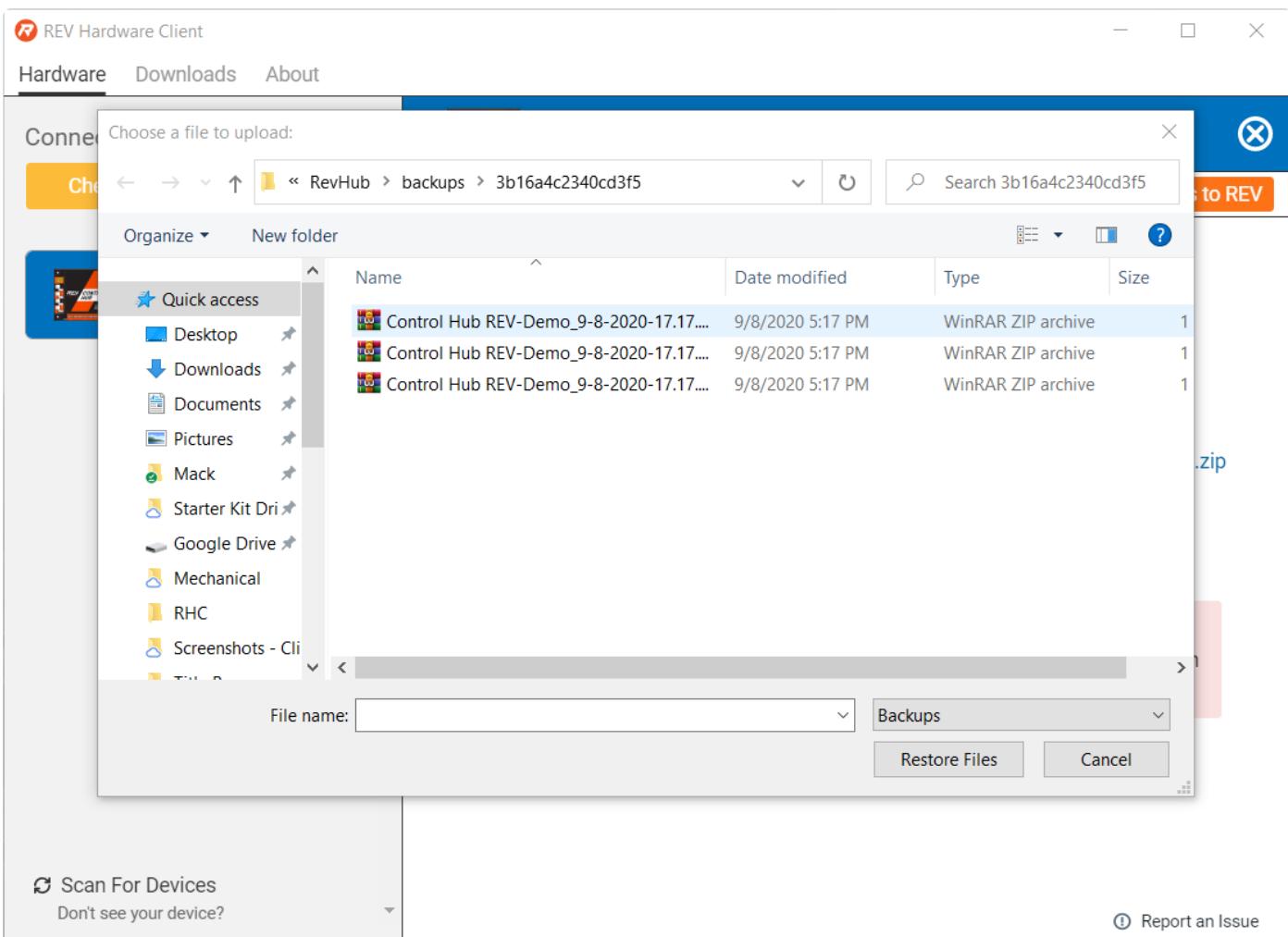
**Backup Files**

**Restore Configuration Files and Code**

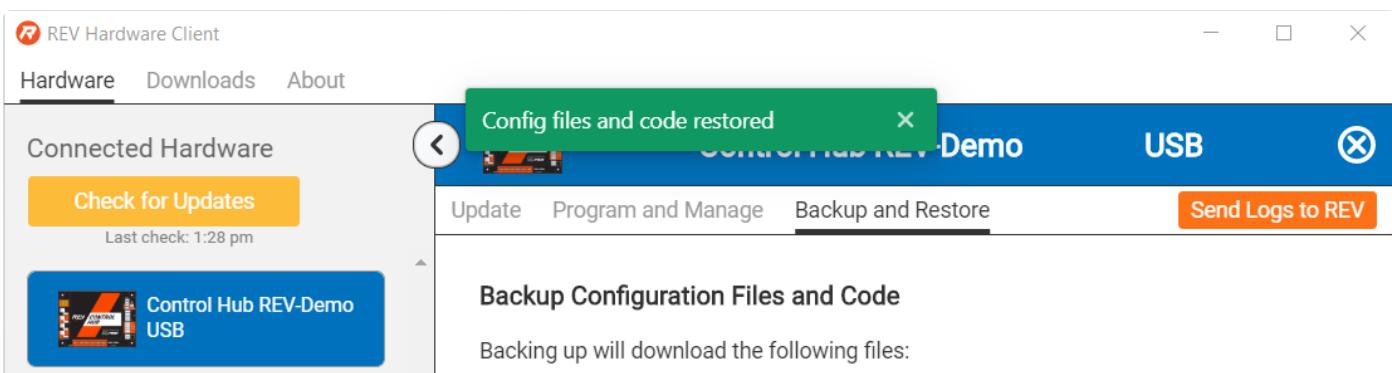
Restoring files will reload backed up files to the device



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.



The screenshot shows the 'Backup & Restore' section of the REV Hardware Client. It lists backed up files: All .xml configuration files, All Blocks .blk and .js files, and All OnBotJava .java files. A blue button labeled 'Backup Files' is shown, with a message above it stating 'Saved as Control Hub REV-Demo\_9-8-2020-17.17.51.509.revbkp.zip'. Below this is a section titled 'Restore Configuration Files and Code' with a note: 'Restoring files will reload backed up files to the device'. A red warning box contains the text 'Files may be overwritten' and a note: 'If the device has files with the same name as the backed up files, the files on the device will be overwritten.' A blue 'Restore Files' button is present. At the bottom left, there's a 'Scan For Devices' button and a 'Report an Issue' link.

- All .xml configuration files
- All Blocks .blk and .js files
- All OnBotJava .java files

**Backup Files** Saved as [Control Hub REV-Demo\\_9-8-2020-17.17.51.509.revbkp.zip](#)

**Restore Configuration Files and Code**

Restoring files will reload backed up files to the device

**!** **Files may be overwritten**

If the device has files with the same name as the backed up files, the files on the device will be overwritten.

**Restore Files**

Scan For Devices

Report an Issue

## 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. This 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.

The screenshot shows the Utilities tab of the REV Hardware Client. The top navigation bar includes 'Hardware' (selected), 'Utilities' (highlighted with a red box), 'Downloads', and 'About'. The main area displays 'Connected Hardware' with a single entry: 'Control Hub REV-DEMO USB' with a small icon. To the right is a yellow 'Check for Updates' button and the text 'Last check: 12:53 pm'.

REV Hardware Client

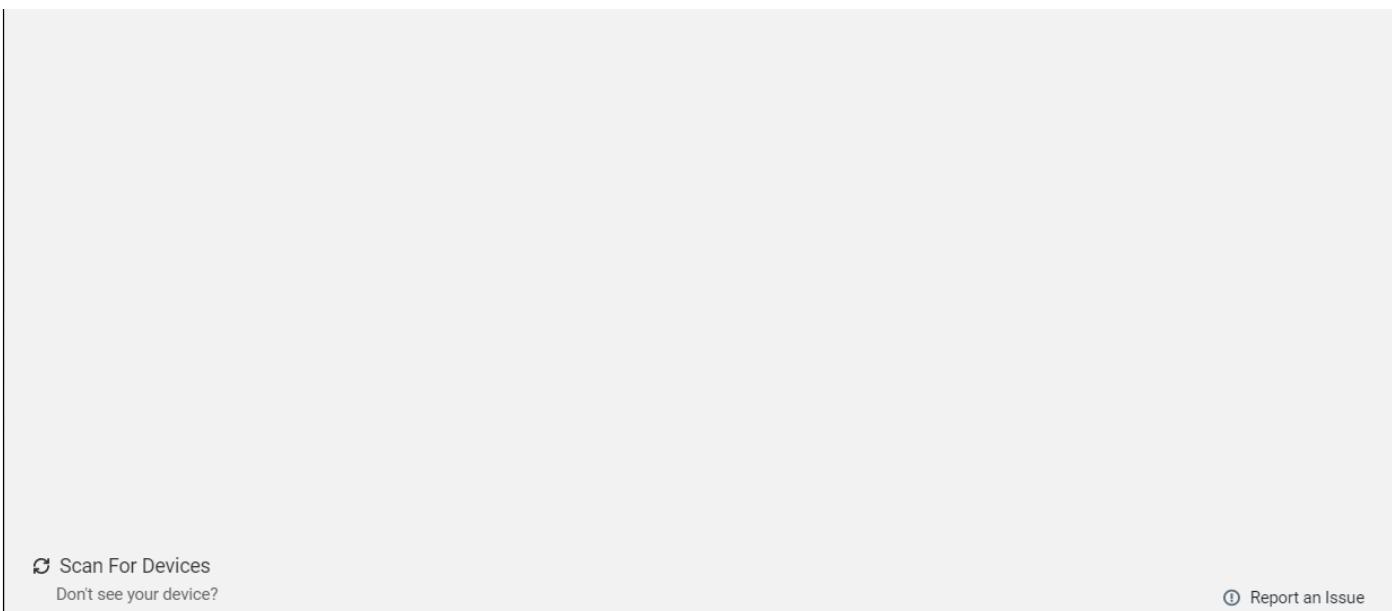
Hardware Utilities Downloads About

Connected Hardware

Control Hub REV-DEMO USB

Check for Updates

Last check: 12:53 pm



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

The screenshot shows the REV Hardware Client log viewer. The top navigation bar includes "REV Hardware Client", "Hardware", "Utilities" (which is selected), "Downloads", and "About". Below the navigation is a toolbar with "View Chart" (orange button), "Select Log File" (yellow button), and a file path "Loaded Control Hub REV-DEMO - FIRST/matchlogs/Match-0-HelloRobot\_TeleOp.txt". The toolbar also features "Filters:" dropdown (set to Error, Warning, Info, Fatal) and search fields for "Search..." and "Message" (with "RegEx" checkbox). A section for "Selected Columns:" lists "Line" (checked), "Timestamp" (checked), "Process ID" (unchecked), "Thread ID" (unchecked), "Type" (checked), and "Tag" (checked). The main area is a table with columns: #, TIMESTAMP, TYPE, TAG, and MESSAGE. The table contains 14 rows of log entries. Each row has a yellow "Copy" icon at the end. The bottom right of the table has a "Report an Issue" link.

#	TIMESTAMP	TYPE	TAG	MESSAGE	
3	03-05 11:08:48.983	Info	RobotCore	***** START - OPMODE HelloRobot_TeleOp **...	
4	03-05 11:08:48.985	Info	RobotCore	Attempting to switch to op mode HelloRobot_TeleOp	
7	03-05 11:08:49.024	Error	AMSColorSensor	readStatusQuery: cbExpected=1 cbRead=0	
8	03-05 11:08:49.024	Error	Lynxl2cDeviceSynch	placeholder: readStatusQuery	
9	03-05 11:08:49.024	Error	AMSColorSensorImpl	unexpected AMS color sensor chipid: found=0 expected=96	
12	03-05 11:08:49.056	Info	RobotCore	BlocksOpMode - "HelloRobot_TeleOp" - main/LinearOpMod...	
14	03-05 11:08:49.057	Info	RobotCore	BlocksOpMode - "HelloRobot_TeleOp" - main/main - run1 - b...	
15	03-05 11:08:49.057	Info	RobotCore	BlocksOpMode - "HelloRobot_TeleOp" - main/main - loadScr...	
16	03-05 11:08:49.058	Info	RobotCore	BlocksOpMode - "HelloRobot_TeleOp" - main/LinearOpMod...	
17	03-05 11:08:49.073	Info	RobotCore	BlocksOpMode - "HelloRobot_TeleOp" - main/main - run1 - a...	

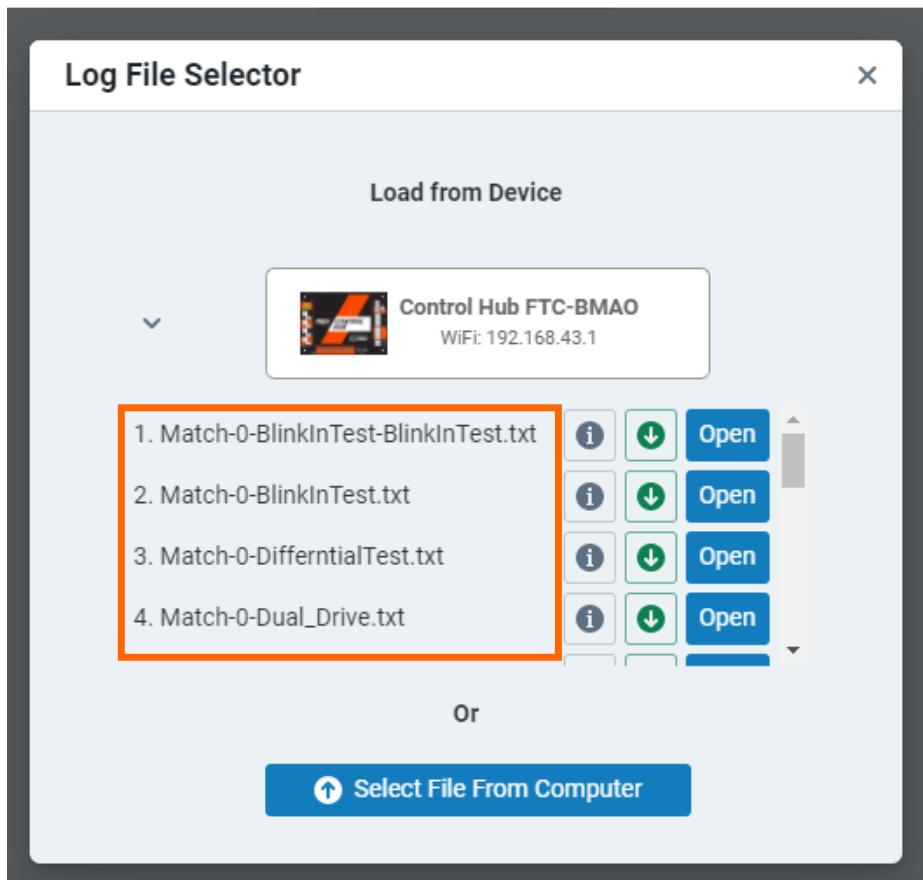
## Parsing the Logs

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.



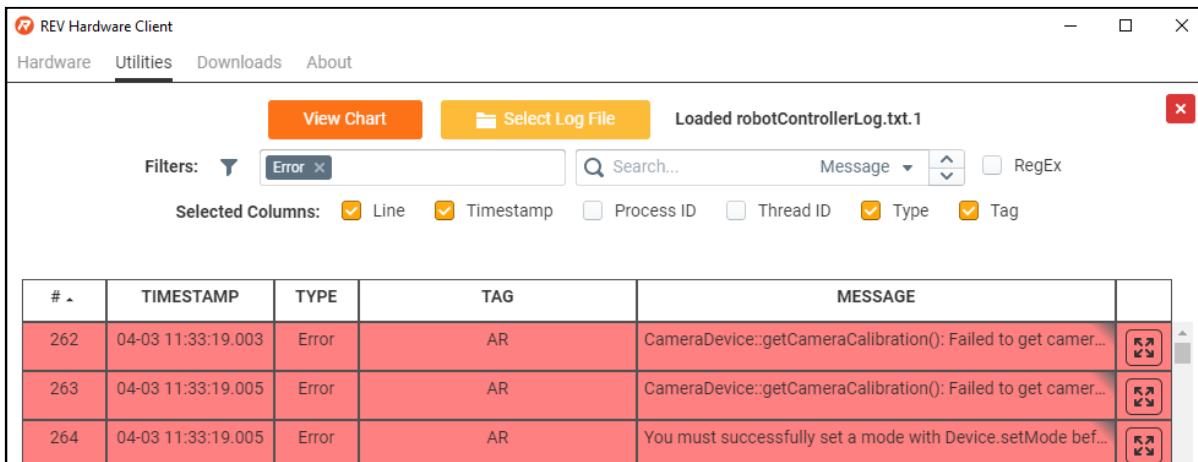
## Interpreting Filters

A screenshot of the Log Viewer interface. At the top, there are four filter buttons: "Error", "Warning", "Info", and "Fatal", each with a close "X" button. Below these is a "Selected" column header and a timestamp column header. In the timestamp column, there are several entries: "04-03 11:32:21.52", "04-03 11:32:21.82", and "04-03 11:32:21.82". To the right of the timestamp column, a context menu is open over the first timestamp entry. The menu items are: "Error" (with a checked checkmark), "Warning" (with a checked checkmark), "Info" (with a checked checkmark), "Debug" (unchecked), "Verbose" (unchecked), and "Fatal" (with a checked checkmark). The "native" label is visible next to the "Info", "Debug", "Verbose", and "Fatal" menu items.

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



The screenshot shows the REV Hardware Client interface with the 'Utilities' tab selected. A log file named 'robotControllerLog.txt.1' is loaded. The 'Filters' dropdown is set to 'Error'. The log table displays three error messages:

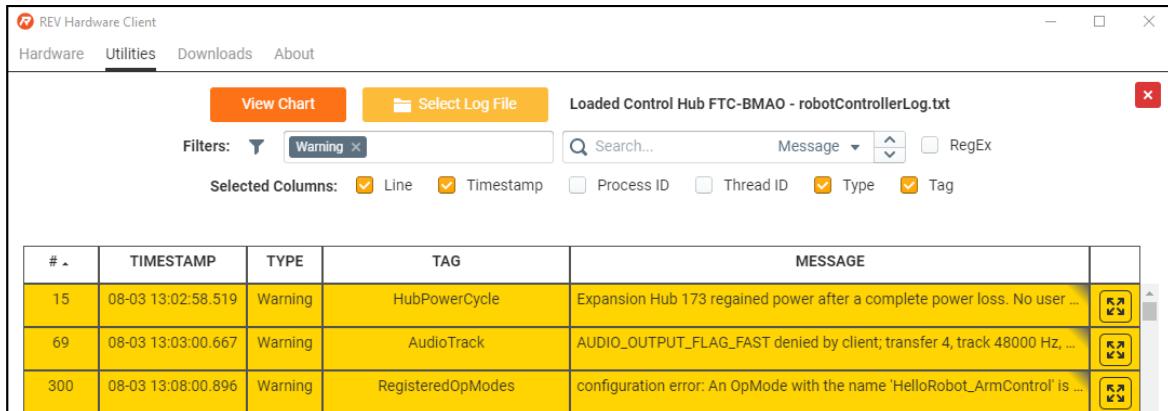
#	TIMESTAMP	TYPE	TAG	MESSAGE
262	04-03 11:33:19.003	Error	AR	CameraDevice::getCameraCalibration(): Failed to get camera...
263	04-03 11:33:19.005	Error	AR	CameraDevice::getCameraCalibration(): Failed to get camera...
264	04-03 11:33:19.005	Error	AR	You must successfully set a mode with Device.setMode bef...

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



The screenshot shows the REV Hardware Client interface with the 'Utilities' tab selected. A log file named 'robotControllerLog.txt' is loaded. The 'Filters' dropdown is set to 'Warning'. The log table displays three warning messages:

#	TIMESTAMP	TYPE	TAG	MESSAGE
15	08-03 13:02:58.519	Warning	HubPowerCycle	Expansion Hub 173 regained power after a complete power loss. No user ...
69	08-03 13:03:00.667	Warning	AudioTrack	AUDIO_OUTPUT_FLAG_FAST denied by client; transfer 4, track 48000 Hz, ...
300	08-03 13:08:00.896	Warning	RegisteredOpModes	configuration error: An OpMode with the name 'HelloRobot_ArmControl' is ...

When something non-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

The screenshot shows the REV Hardware Client interface with the 'Utilities' tab selected. A log file named 'robotControllerLog.txt' is loaded. The 'Filters' dropdown is set to 'Info'. The log table displays several entries:

#	TIMESTAMP	TYPE	TAG	MESSAGE	
32	08-03 13:02:58.579	Info	RobotCore	LynxFirmwareVersionManager: LynxI2cDeviceSyncHV2	
34	08-03 13:02:58.581	Info	RobotCore	===== Device Information =====	
35	08-03 13:02:58.581	Info	RobotCore	Type Name Connection	
36	08-03 13:02:58.582	Info	RobotCore	Motor arm USB (embedded); module 173; port 2	

Info messages communicate information that may 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

The screenshot shows the REV Hardware Client interface with the 'Utilities' tab selected. A log file named 'robotControllerLog.txt' is loaded. The 'Filters' dropdown is set to 'Fatal'. The log table displays three entries:

#	TIMESTAMP	TYPE	TAG	MESSAGE	
19852	07-19 21:46:51.803	Fatal	Assert	assertion failed: 0x02f67ca1 on 0x095b5cf8: closed	
19872	07-19 21:46:51.824	Fatal	Assert	assertion failed: 0x02f67ca1 on 0x095b5cf8: closed	
19894	07-19 21:46:51.840	Fatal	Assert	assertion failed: 0x02f67ca1 on 0x095b5cf8: closed	

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 screenshot shows the REV Hardware Client interface with the 'Utilities' tab selected. A log file named 'robotControllerLog.txt' is loaded. The 'Filters' dropdown is set to 'Debug'. The log table displays two entries:

#	TIMESTAMP	TYPE	TAG	MESSAGE	
67	08-03 13:03:00.446	Debug	RobotCore	system telemetry: key=\$System\$None\$ msg=""	
70	08-03 13:03:00.671	Debug	SoundPlayer	playing volume=0.000000 samp=1 ms=4506	



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

#	TIMESTAMP	TYPE	TAG	MESSAGE
0	08-03 13:02:58.468	Verbose	LynxUsb	synchronization gained: serial=(embedded)
1	08-03 13:02:58.471	Verbose	LynxUsb	Verified that the embedded Control Hub module has the cor...
2	08-03 13:02:58.472	Verbose	LynxModule	close(#173)

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.

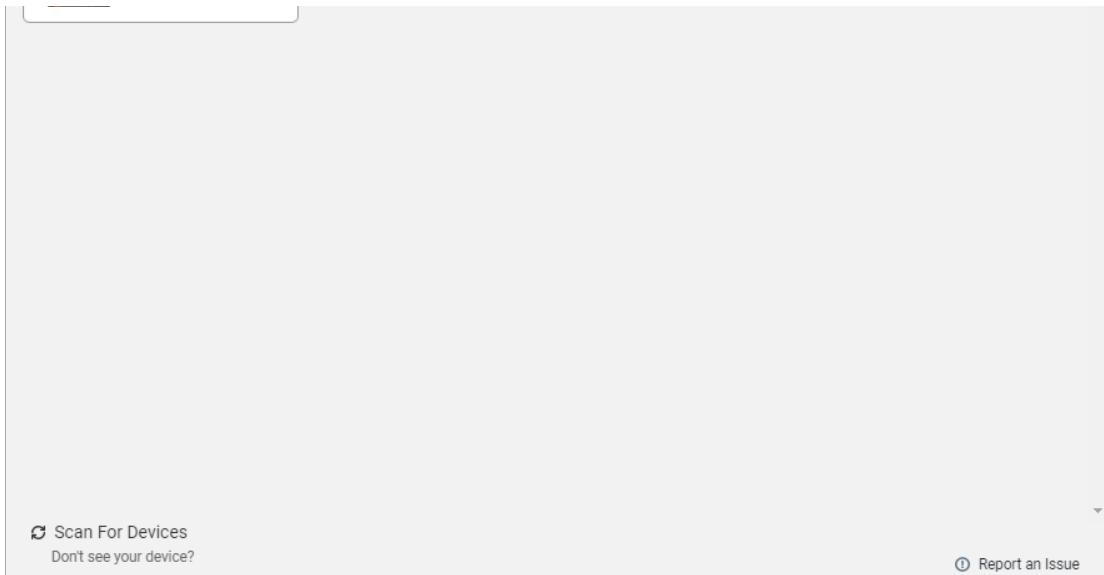
# Expansion Hub

## Updating Expansion Hub

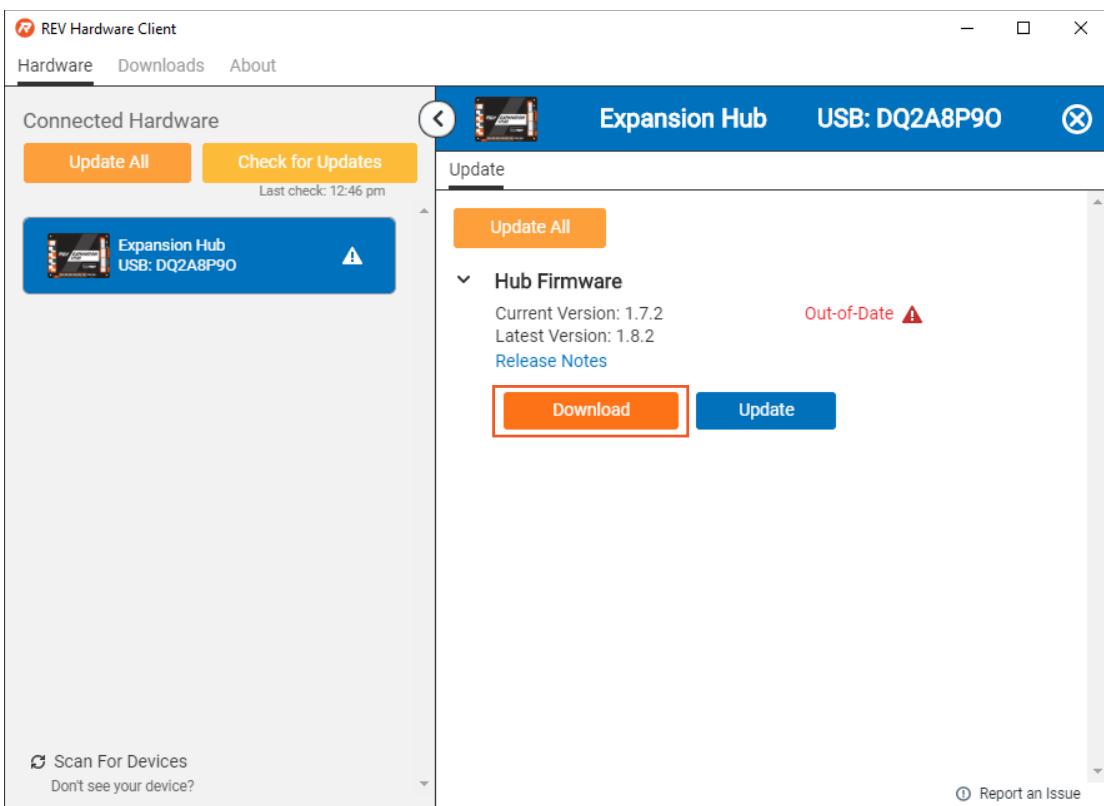
The Expansion Hub facilitates a line of communication between a connected Robot Controller and the motors, servos, and sensors. In order to improve the quality of the Hub, REV Robotics will release firmware updates for the Expansion Hub. When a firmware release occurs, both Control Hub and Expansion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

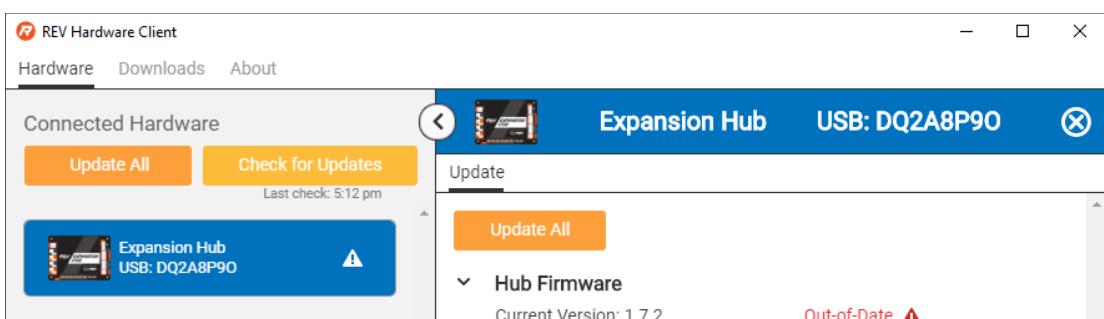
Startup the REV Hardware Client. Once the hub is fully connected it will show up on the front page of the UI under the **Hardware Tab**. Select the Expansion Hub.

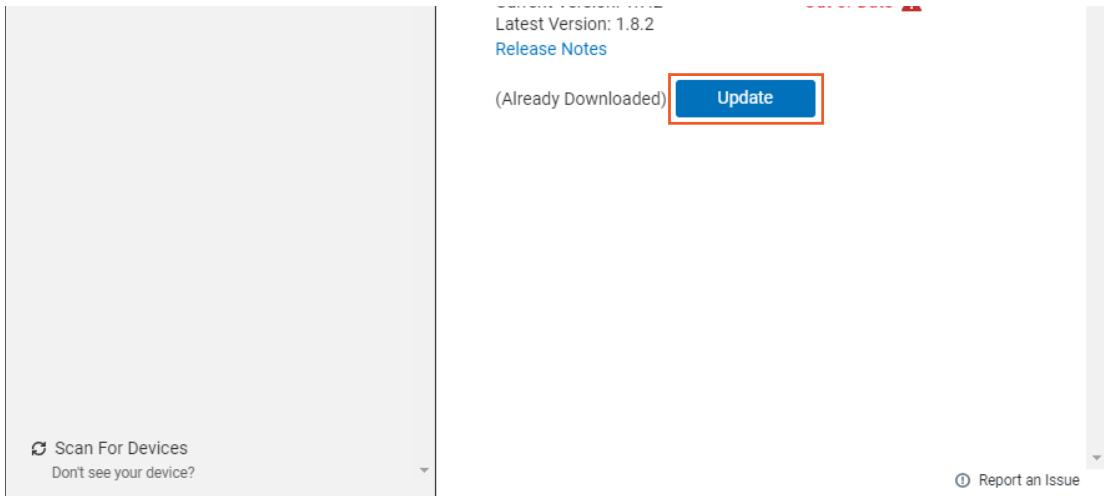


After selecting the Connected Hardware the Update tab will pop up. Under **Hub Firmware** select Download.

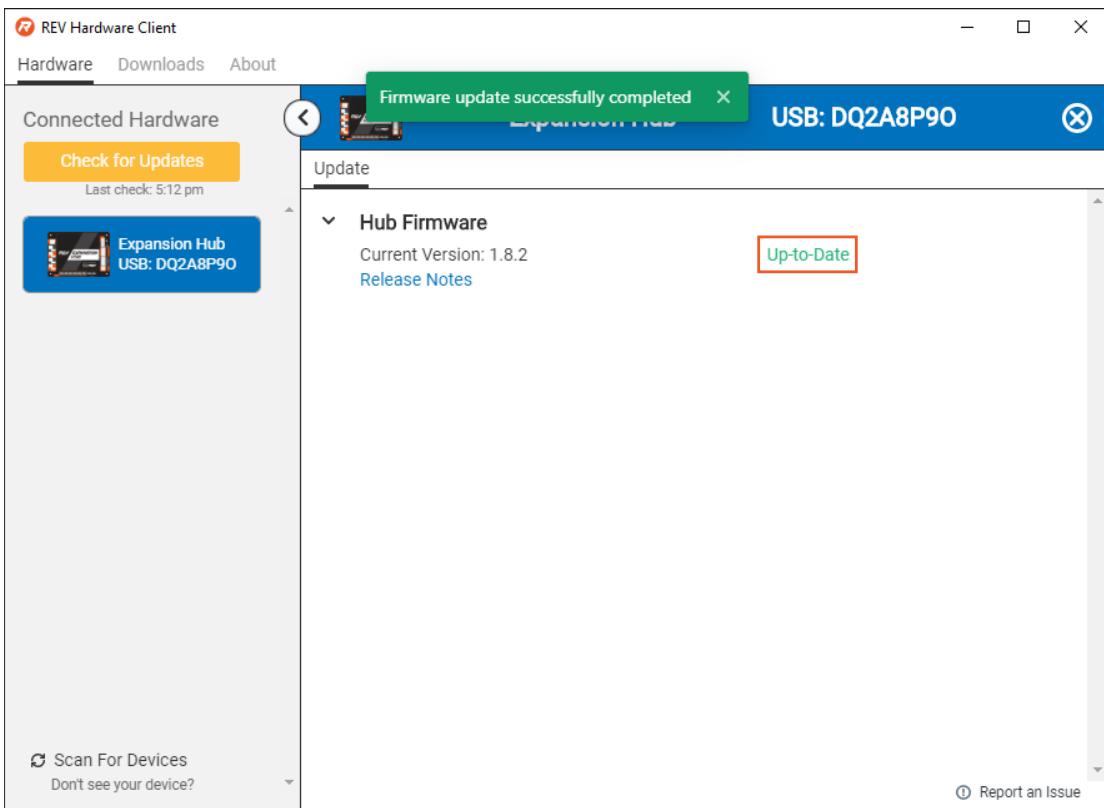


Once the firmware has downloaded, select Update.





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

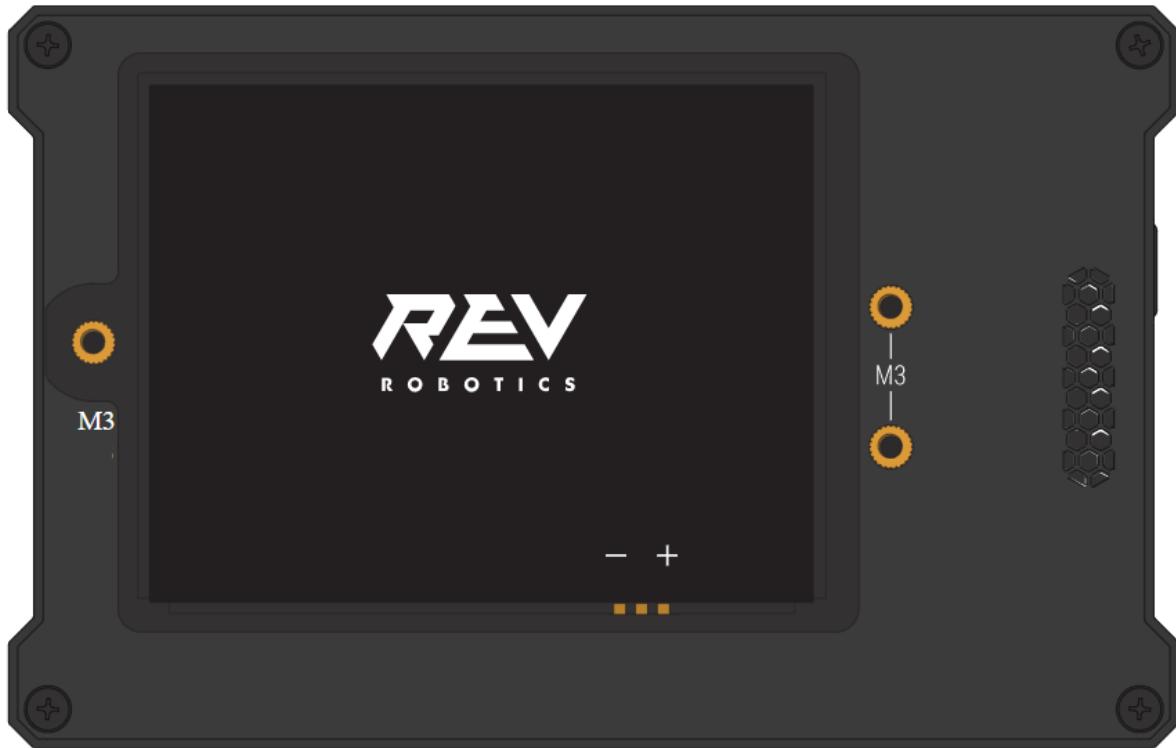
## Connecting a Driver Hub

### 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.	The image shows the rear panel of the Driver Hub. It has several ports: NETWORK, USB 2.0, USB C (labeled CHARGE/UPnP), and two more USB 2.0 ports. A red box highlights the "POWER" button, which is a small circular switch located to the right of the USB 2.0 port.
Wait for the status LED to show solid green	The image shows the rear panel of the Driver Hub. The same set of ports are visible. A green circle highlights the status LED, which is located next to the POWER button. An arrow points upwards towards the LED.
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.



- i** 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 Utilities Downloads About

Connected Hardware

Driver Hub ⚠

Update All Check for Updates  
Last check: 10:03 am

Scan For Devices  
Don't see your device?

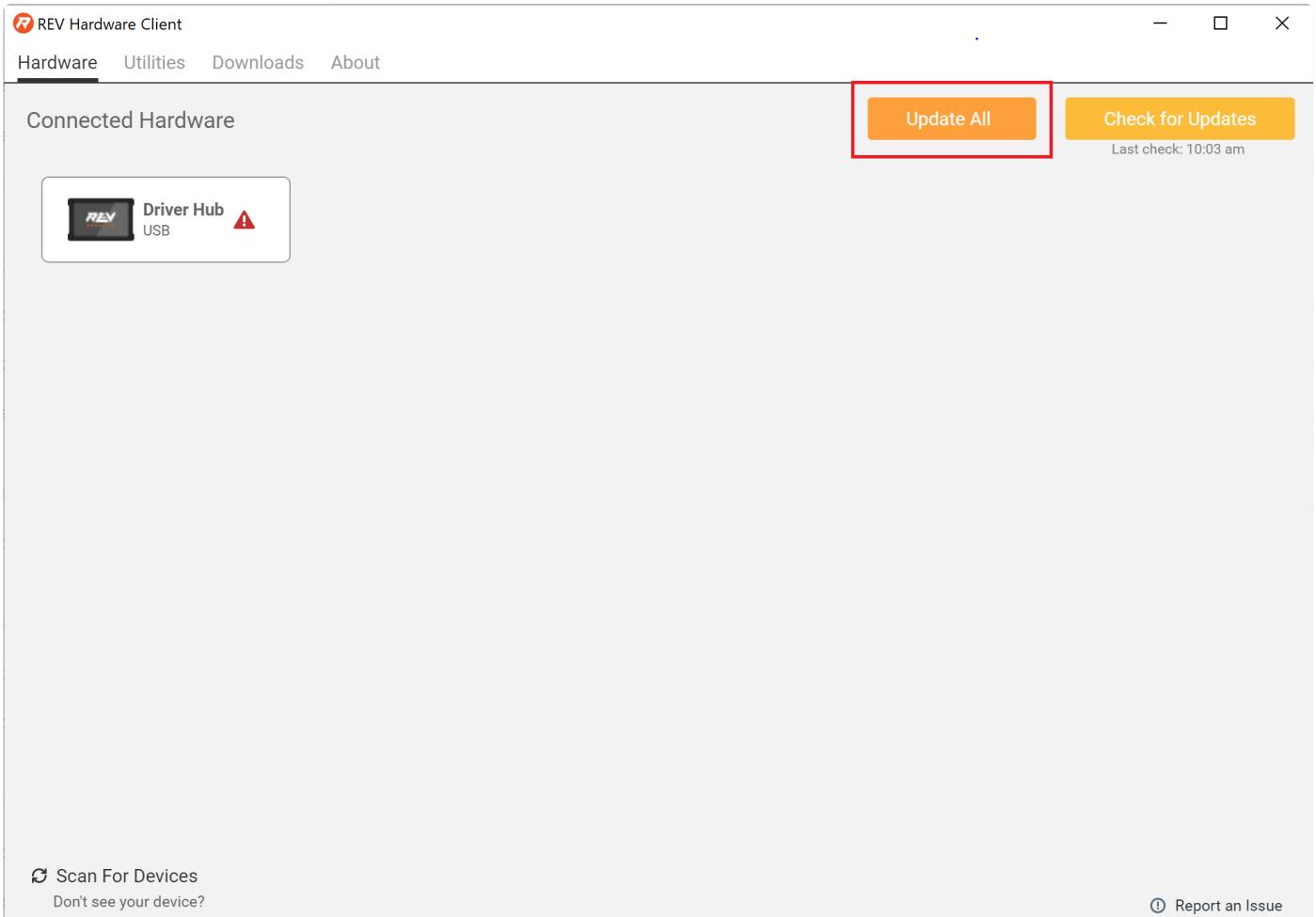
Report an Issue

REV Hardware Client hardware tab showing a connected Driver Hub.

## Updating a Driver Hub

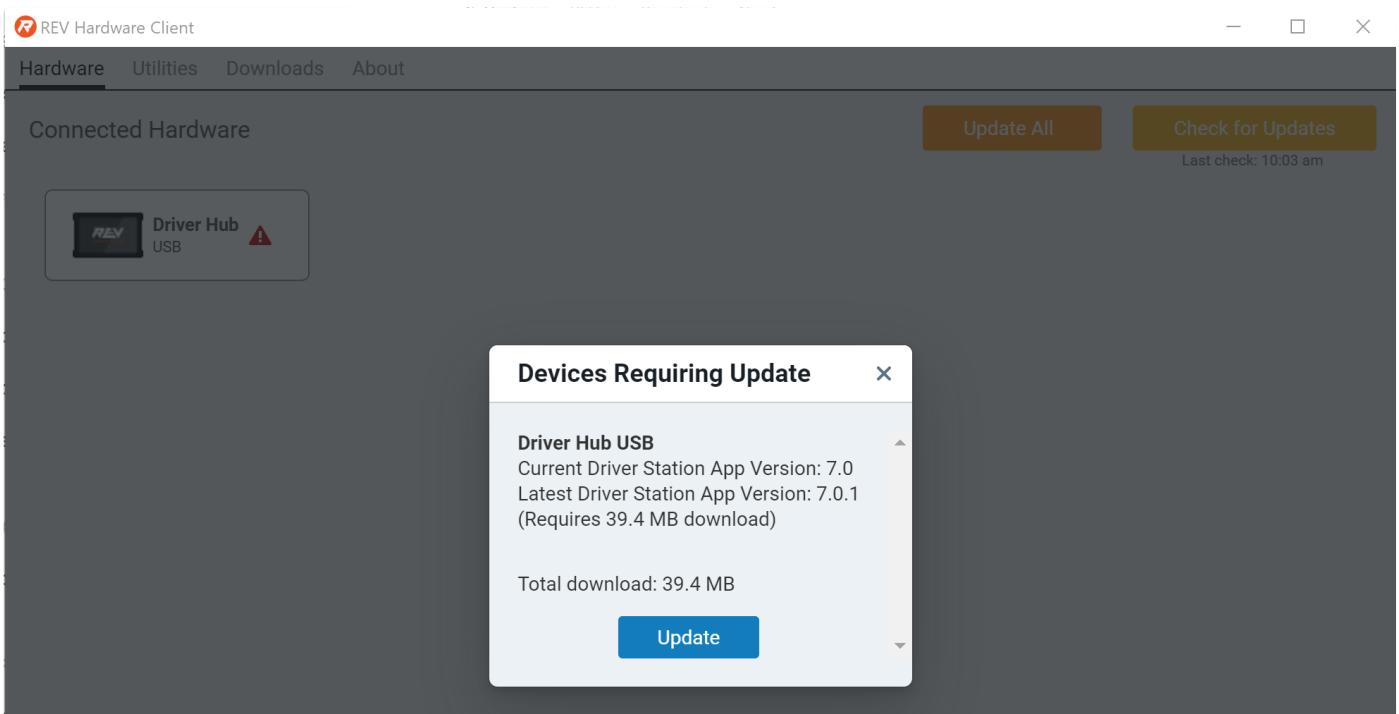
### Update All

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

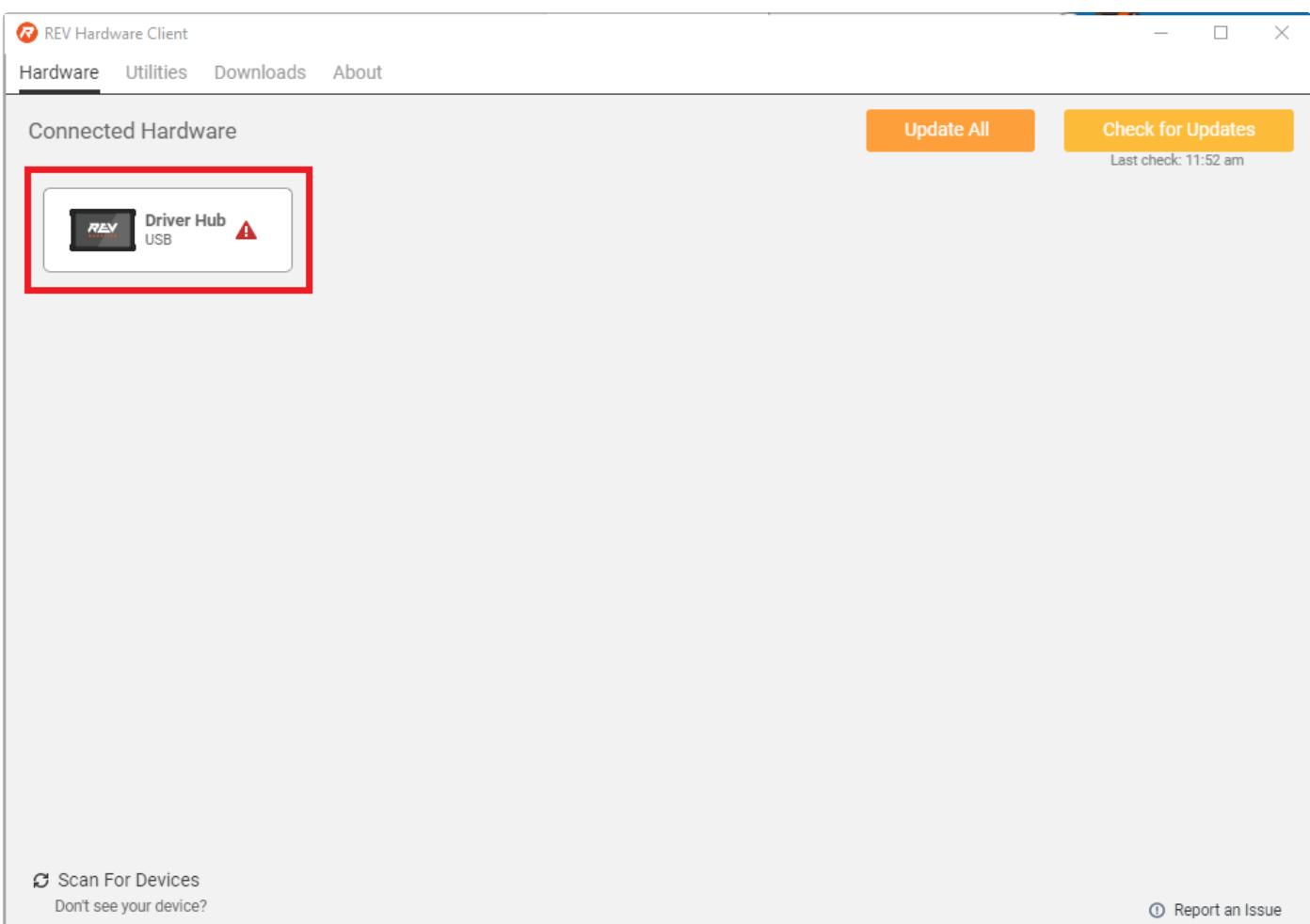




Update button in the middle of the REV Hardware Client Window.

## Individual Updates

To install individual updates to your 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.



The screenshot shows the REV Driver Hub software interface. On the left, there's a sidebar with 'Connected Hardware' at the top, followed by 'Update All' and 'Check for Updates' buttons, and a note 'Last check: 10:03 am'. Below this is a blue box labeled 'Driver Hub USB' with an exclamation mark icon. At the bottom of the sidebar are 'Scan For Devices' and 'Report an Issue' buttons.

The main area is titled 'Driver Hub' with a 'USB' connection indicator. It has a 'Send Diagnostics to REV' button. A red box highlights the 'Update' button under the 'Driver Hub Operating System' section, which shows 'Current Version: 1.1.0' and 'Out-of-Date' status with a warning icon. There are also 'Release Notes' and 'Download' buttons. The 'Driver Station App' section shows 'Current Version: 7.0' and 'Latest Version: 7.0.1', with 'Out-of-Date' status and 'Release Notes' links. A dropdown menu shows 'Latest Version: 7.0.1'. Buttons for 'Download' and 'Update' are present here as well.

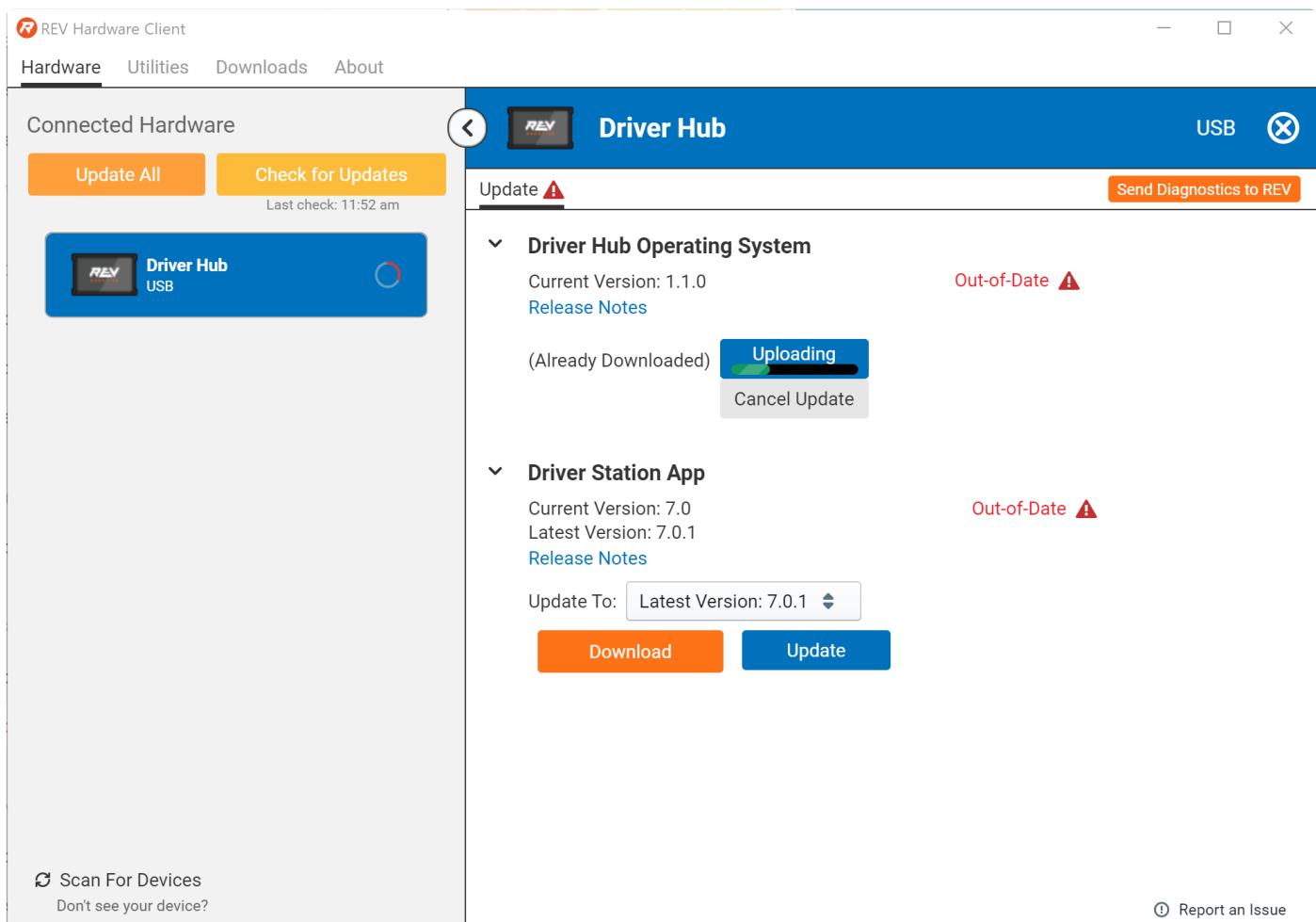
[Download OS](#)

Once the OS update has downloaded select Update.

This screenshot shows the same software interface as above, but the 'Update' button for the 'Driver Hub Operating System' is now highlighted with a red box. This indicates that the update has been downloaded successfully. The 'Driver Station App' section remains unchanged, showing it is still out of date.

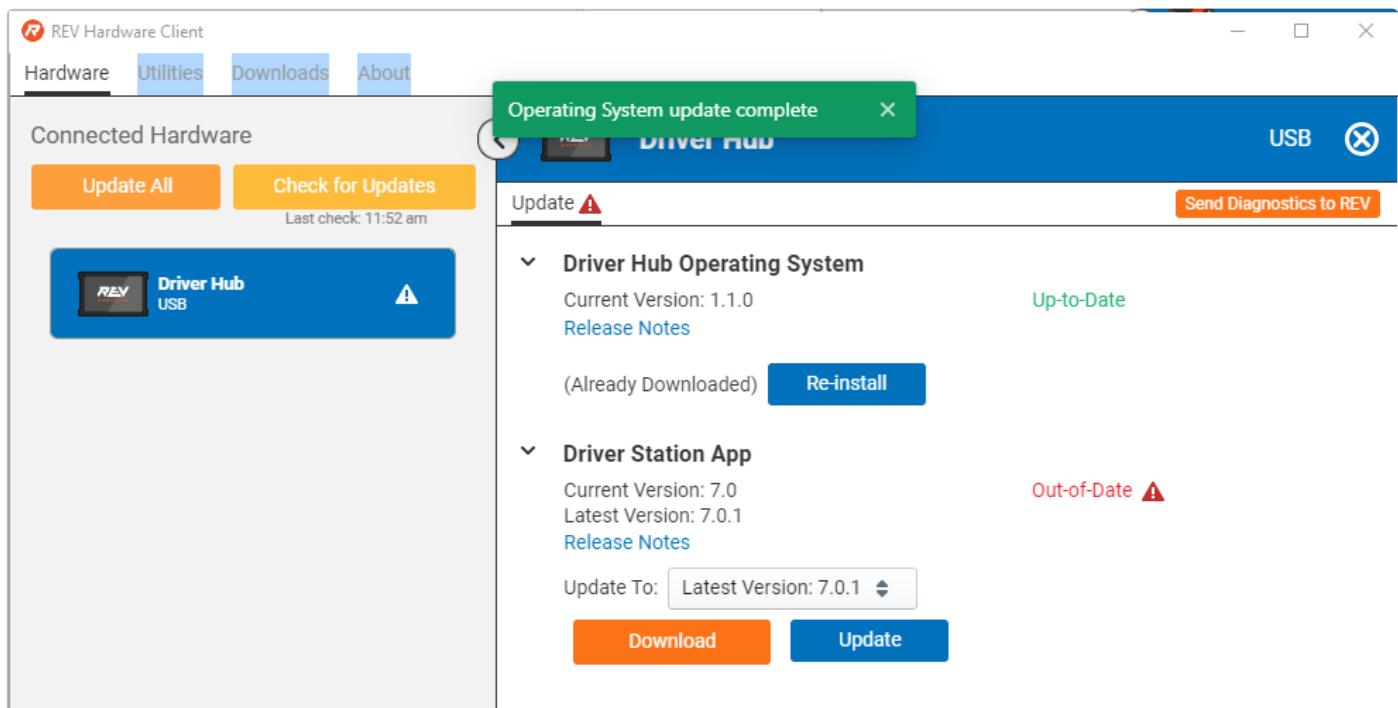
Update OS

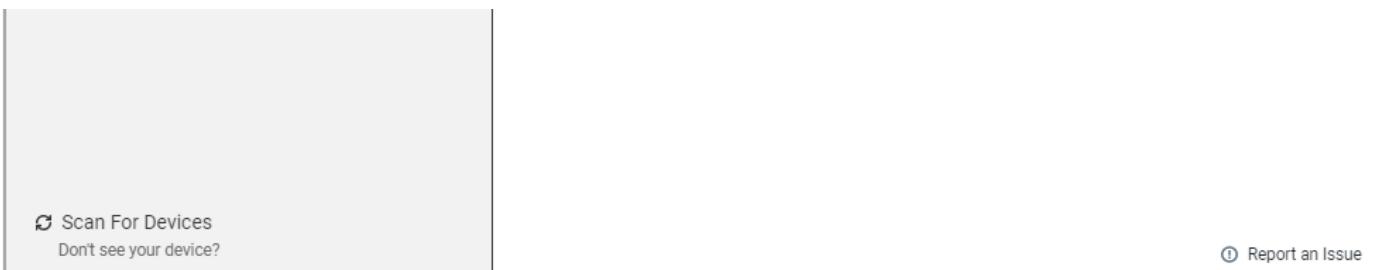
Keep the Driver Hub powered on and connected to the PC while the update finishes.



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."





## 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.

A screenshot of the REV Hardware Client interface, specifically the 'Driver Hub' section. The title bar says 'Driver Hub'. Below it, a 'Update' section shows an alert icon. The 'Driver Hub Operating System' section indicates it is 'Up-to-Date'. The 'Driver Station App' section shows it is 'Out-of-Date' (indicated by a red exclamation mark). A dropdown menu 'Update To:' is set to 'Latest Version: 7.0.1'. An 'Update' button is visible, with a red box drawn around it. The bottom of the screen shows the same 'Scan For Devices' and 'Report an Issue' buttons as the previous screenshot.

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."

A screenshot of the REV Hardware Client interface after the update. A green notification bar at the top center says 'Driver Station app update complete.' with a close button 'X'. The rest of the interface looks similar to the previous screenshot, with the 'Driver Hub' title bar and the 'Driver Station App' section showing it is now 'Up-to-Date'.

The screenshot shows the REV Driver Hub USB software interface. At the top, there's a blue header bar with the REV logo and the text "Driver Hub USB". Below this, the main content area has a light gray background. On the left side, there's a sidebar with a "Scan For Devices" button and a "Don't see your device?" link. The main content area is titled "Driver Station App" and shows the following details:

- Current Version: 1.1.0
- Status: Up-to-Date
- Release Notes: [Release Notes](#)
- Action buttons: "(Already Downloaded)" and "Re-install"

Below this section, there's a dropdown menu labeled "Update To:" with "Latest Version: 7.0.1" selected. Underneath it are two more buttons: "(Already Downloaded)" and "Re-install".

At the bottom right of the main content area, there's a "Report an Issue" link.

Driver Station App Complete!

# Android Device

## Connecting an Android Device

### Android Developer Options

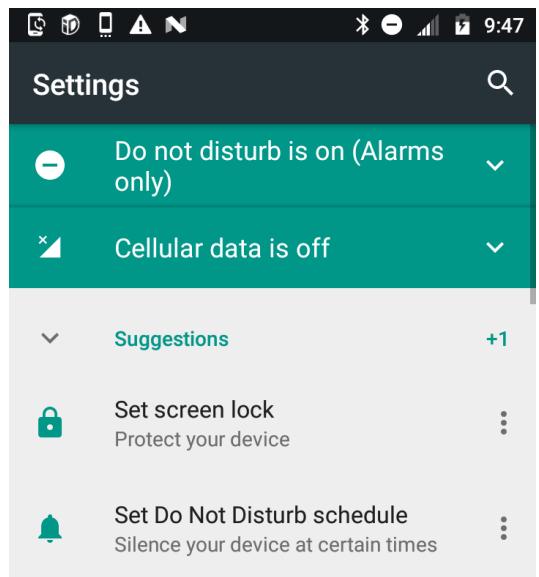
In order to use the REV Hardware Client the phone's developer settings and USB debugging options need to be turned on.

The developer options on Android Devices are hidden within the phone as a default. Different phone manufacturers 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.

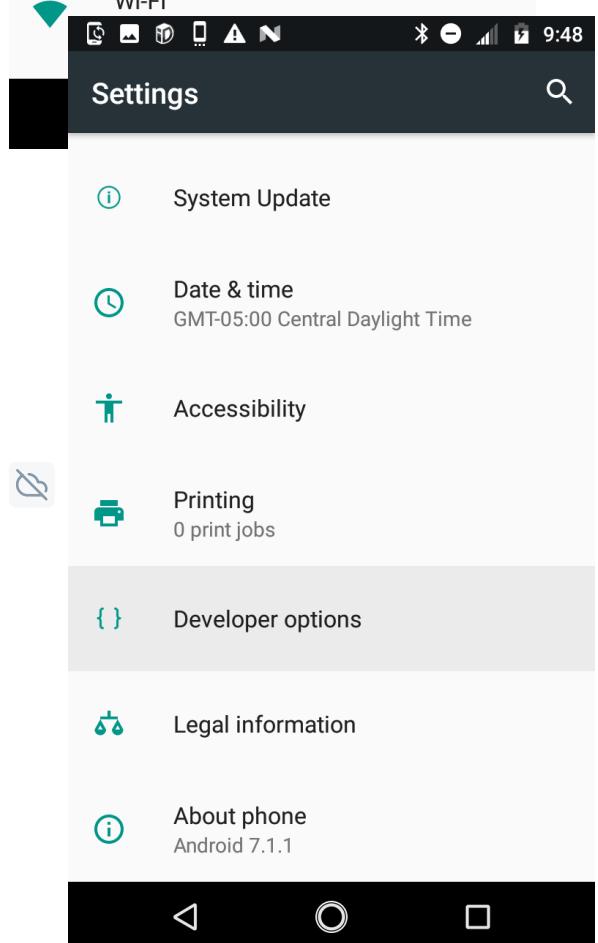
**⚠️** Before moving forward it is advised to look up where the developer options on your Android Device are located. For Motorola users, the [Motorola Support Page](#) has information on how to unlock the developer options.



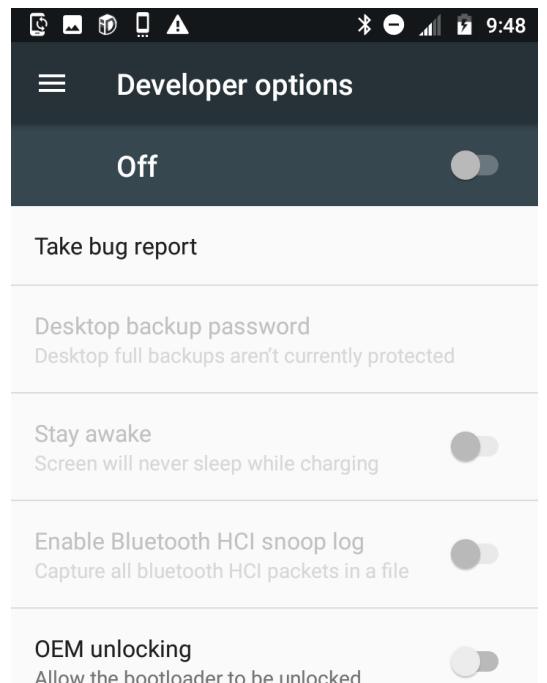
Open the Android Devices settings



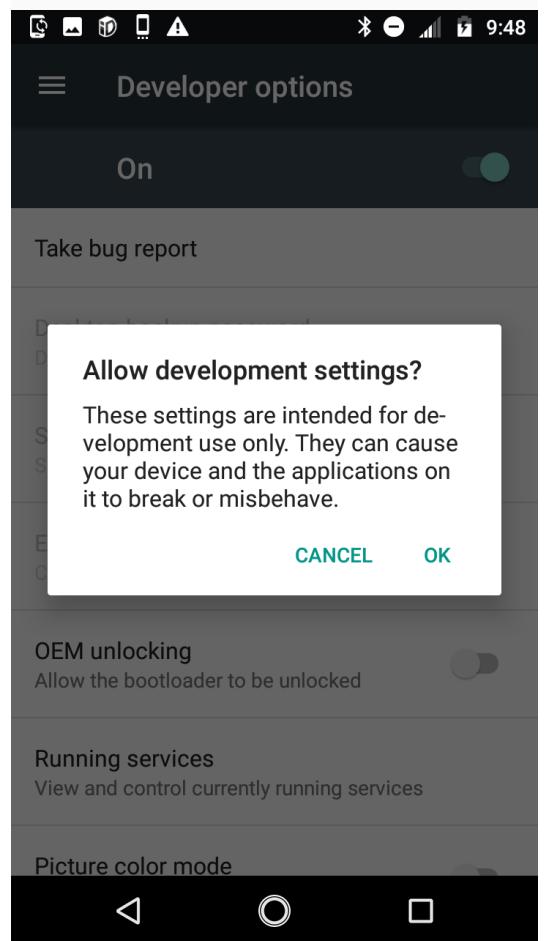
Scroll to the bottom of the settings, where the unlocked developer options are available. Open the developer options



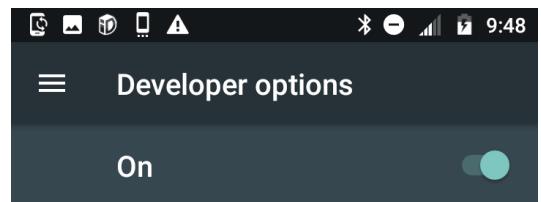
At the top of the developer options page is an on/off switch. Turn the developer options on.



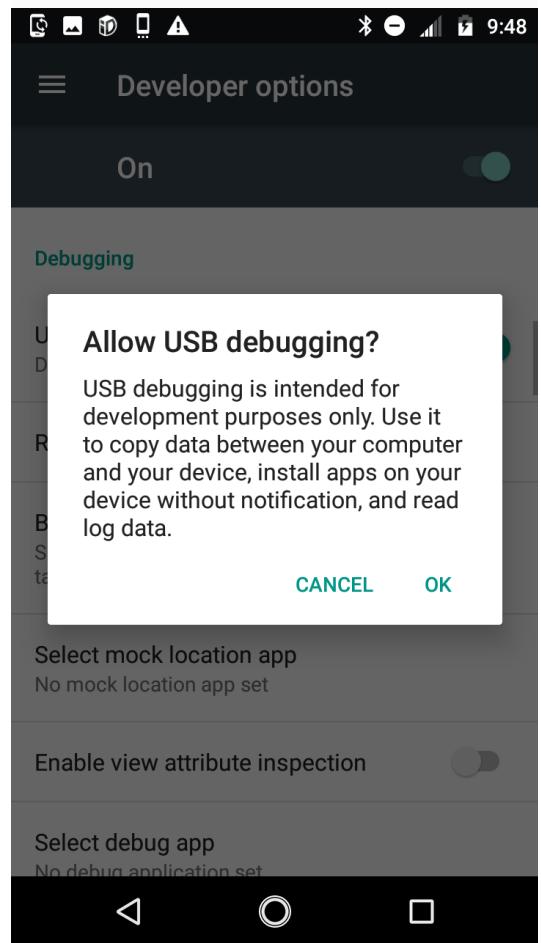
The device will open a confirmation message. Select 'OK.'



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.

A screenshot of the REV Hardware Client software. At the top, there is a header bar with the logo and menu options. Below the header is a navigation bar with tabs for "Hardware", "Downloads", and "About". The main area is titled "Connected Hardware" and shows a list of connected devices. At the bottom right of the main area are two buttons: "Update All" and "Check for Updates". Below these buttons is a small note "Last check: 4:29 pm".

The screenshot shows the REV Hardware Client software interface. At the top left, there is a status bar with an icon of a smartphone, the text "Android Device ADB", and a red warning icon. Below this is a large, mostly empty central area. At the bottom left, there is a "Scan For Devices" button with a gear icon and the text "Don't see your device?", followed by a "Report an Issue" link. On the right side of the bottom bar, there is a small circular icon with a question mark.

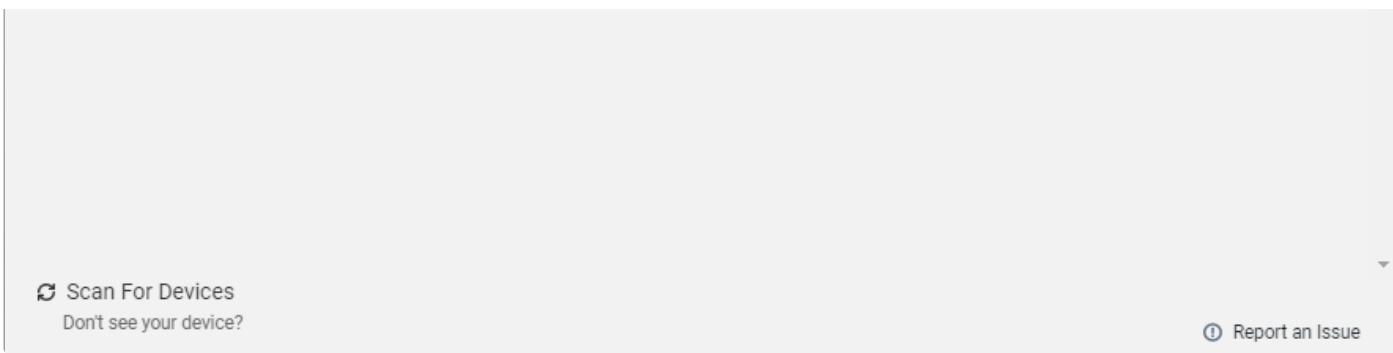
## Installing RC/DS Applications

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.

The screenshot shows the REV Hardware Client software interface. At the top left, there is a logo with a red 'R' and the text "REV Hardware Client". At the top right, there are window control buttons for minimize, maximize, and close. Below the logo is a navigation bar with three tabs: "Hardware" (which is underlined), "Downloads", and "About". In the main area, there is a section titled "Connected Hardware" containing a list item for "Android Device ADB", which is marked with a red warning icon. To the right of this list are two orange buttons: "Update All" and "Check for Updates". Below the "Check for Updates" button, the text "Last check: 4:29 pm" is displayed. The rest of the interface is mostly blank.



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

This screenshot shows the "Update" tab for the "Android Device" under the "ADB" tab. On the left, the "Connected Hardware" section shows an "Android Device ADB" entry with a warning icon. The main panel displays the "Driver Station App" update details: Current Version: Not currently installed, Latest Version: 5.5, with "Release Notes" available. Below this, a progress bar shows "Downloading" with an orange "Download" button and a blue "Install" button. At the bottom of the download panel is a "Cancel Download" button.

Once the Driver Station App has downloaded, select Install.

This screenshot shows the same "Update" tab as the previous one, but the "Install" button for the "Driver Station App" is now highlighted in blue, indicating it is selected.

[Download](#) [Install](#)

▼ **Driver Station App**

Current Version: Not currently installed  
Latest Version: 5.5  
[Release Notes](#)

(Already Downloaded) Installing

Scan For Devices Report an Issue ▾

Don't see your device?

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

REV Hardware Client

Hardware Downloads About

Connected Hardware

[Check for Updates](#) Last check: 4:29 pm

**Android Device (Driver Station)** ADB

[Update](#) [Switch to Robot Controller](#) [Send Logs to REV](#)

▼ **Driver Station App**

Current Version: 5.5 Up-to-Date

[Release Notes](#)

Scan For Devices Report an Issue ▾

Don't see your device?

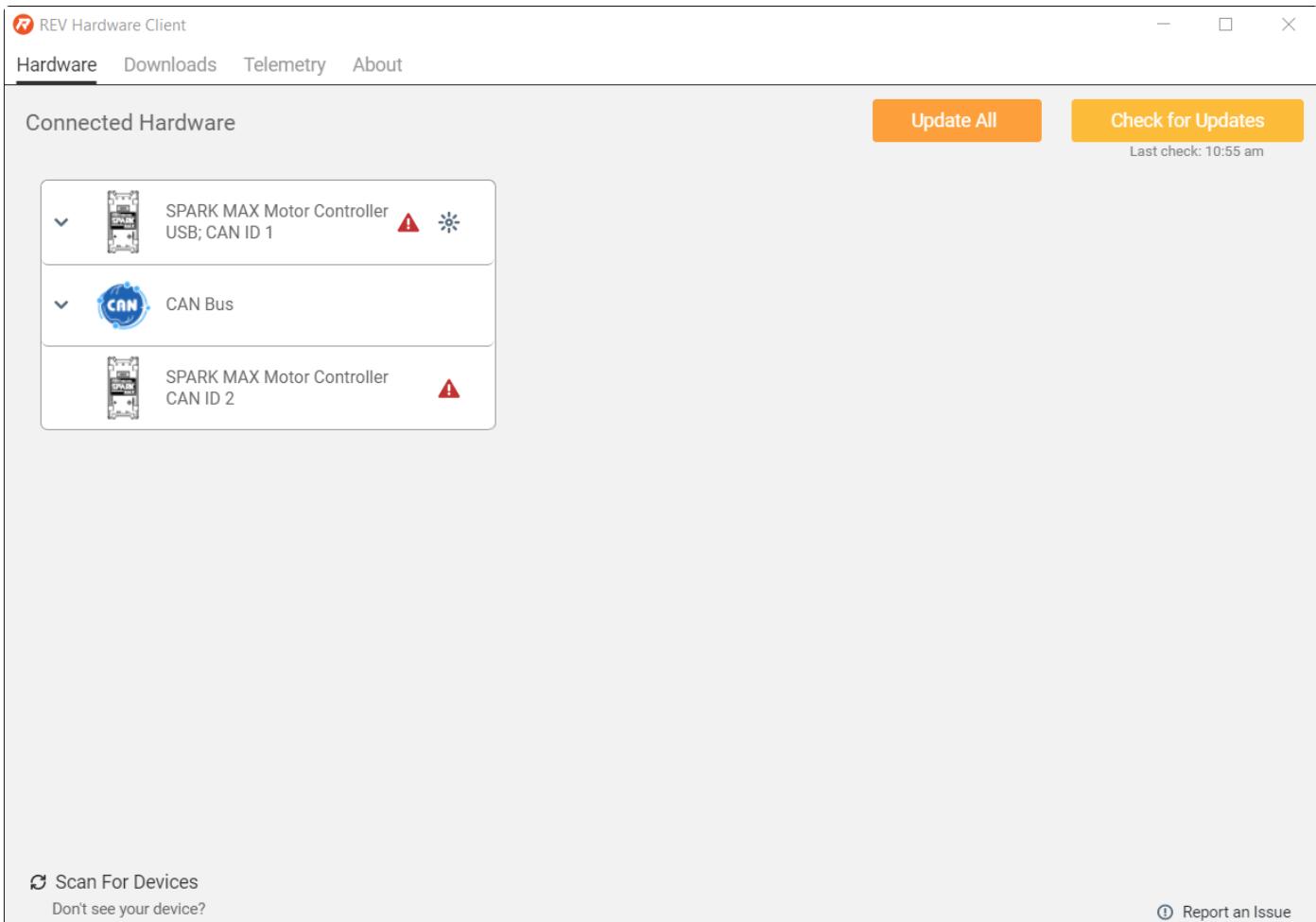
# SPARK MAX

## 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.



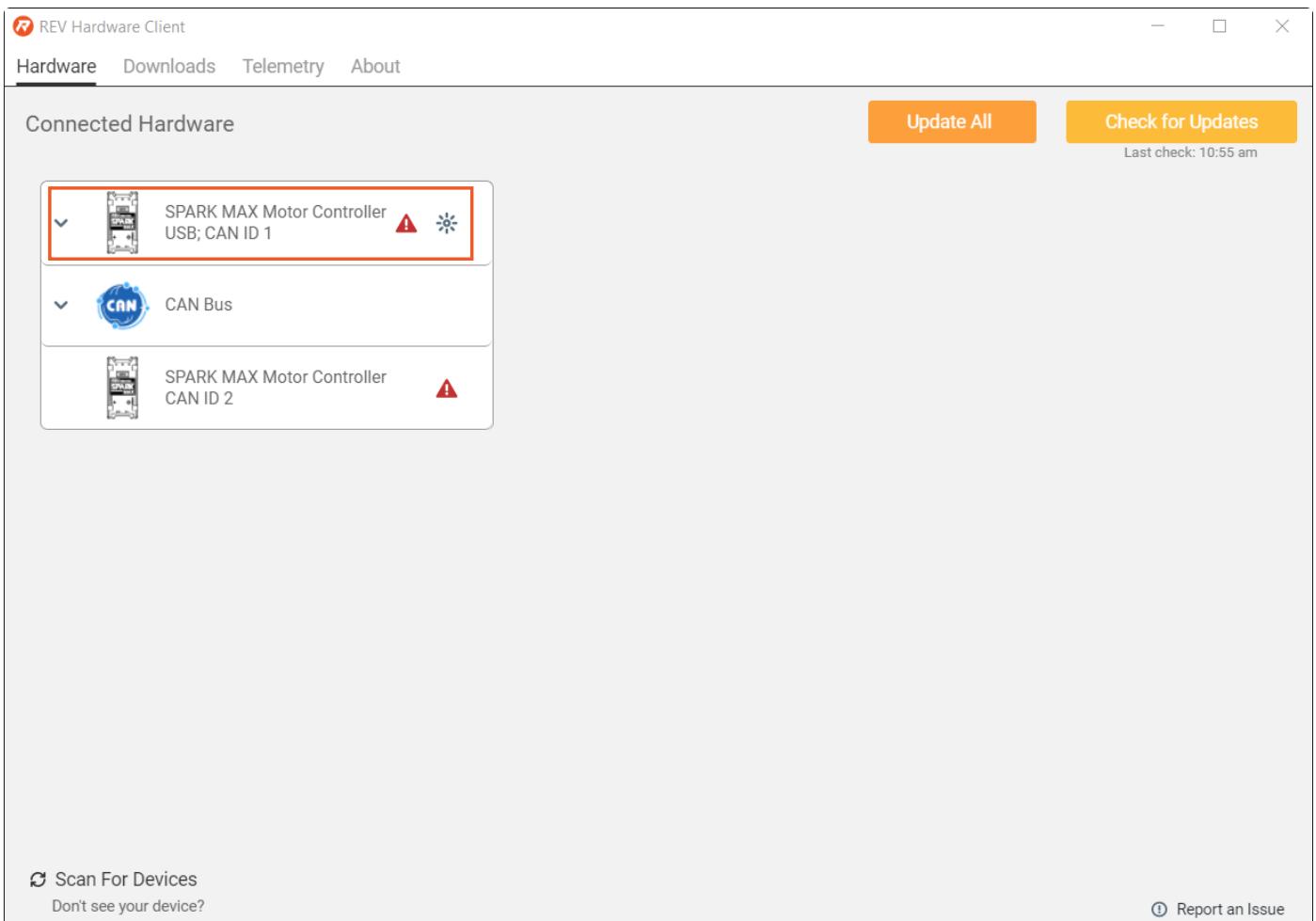
 Additional SPARK MAX devices connected via CAN to the USB Host SPARK MAX are visible when using the latest firmware. For more information see the [SPARK MAX User's Manual](#).

# Updating SPARK MAX Software

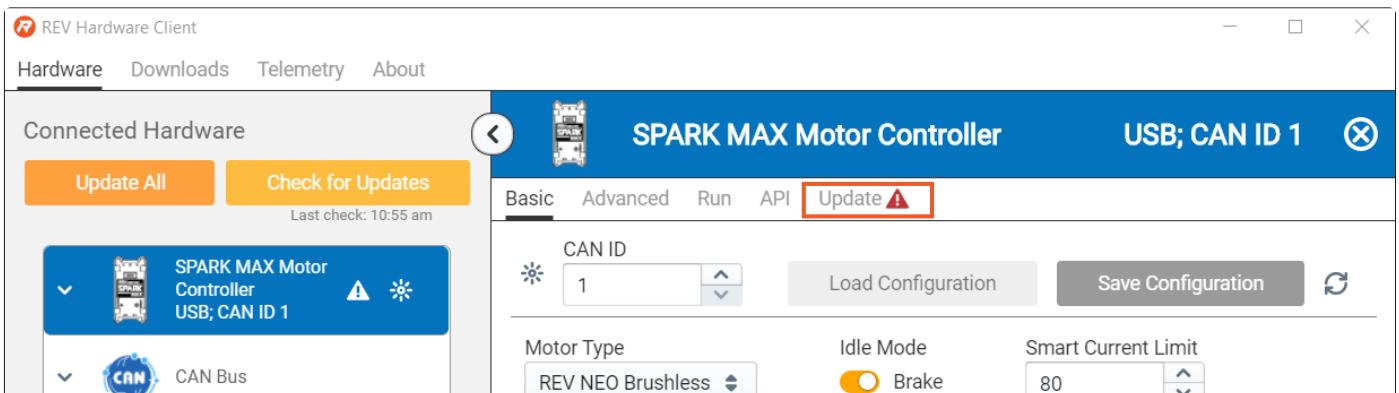
The SPARK MAX has two main software components, the firmware and the API to control SPARK MAX via CAN. Installing the latest version of each is possible with the REV Hardware Client.

## 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.



The screenshot shows the configuration page for a SPARK MAX Motor Controller. At the top left, there's a device icon and the text "SPARK MAX Motor Controller CAN ID 2" with a red warning icon. On the right, there are settings for "Sensor Type" (Hall Effect), "Encoder Counts Per Rev" (4096), and "PWM Input Deadband" (0.00 to 0.05). Below these are sections for "Limit Switch" and "Soft Limits" with various enable/disable switches and value inputs. A "Ramp Rate" section includes a switch for "Disabled" and a slider for "Rate (seconds to full speed)" set to 0. At the bottom are "Burn Flash" and "Restore Factory Defaults" buttons, and a "Report an Issue" link.

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

The screenshot shows the "Update" tab for the SPARK MAX Motor Controller. It displays the current version (1.5.0) and latest version (1.5.2), along with a "Release Notes" link. Two buttons are present: "Download" (highlighted in orange) and "Update". The left sidebar shows connected hardware: "SPARK MAX Motor Controller USB; CAN ID 1" (warning icon), "CAN Bus", and "SPARK MAX Motor Controller CAN ID 2" (warning icon).

Once the firmware has downloaded select update.

The screenshot shows the "Update" tab for the SPARK MAX Motor Controller. The "Download" button is now blue, indicating the process is complete. The left sidebar remains the same, showing connected hardware: "SPARK MAX Motor Controller USB; CAN ID 1" (warning icon), "CAN Bus", and "SPARK MAX Motor Controller CAN ID 2" (warning icon).

The screenshot shows the REV Hardware Client software interface. On the left, there's a sidebar with a 'Scan For Devices' button and a 'Report an Issue' link. The main area displays a list of connected hardware:

- SPARK MAX Motor Controller USB; CAN ID 1 (Status: Out-of-Date, warning icon)
- CAN Bus
- SPARK MAX Motor Controller CAN ID 2 (Status: Out-of-Date, warning icon)

A dropdown menu for the first item is open, showing its details:

**SPARK MAX Firmware**

Current Version: 1.5.0  
Latest Version: 1.5.2  
[Release Notes](#)

(Already Downloaded) **Update**

At the bottom right of the main window, there's a 'Report an Issue' link.

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

The screenshot shows the REV Hardware Client software interface. The main area displays a list of connected hardware:

- SPARK MAX Motor Controller USB; CAN ID 1
- CAN Bus
- SPARK MAX Motor Controller CAN ID 2 (Status: Out-of-Date, warning icon)

A dropdown menu for the first item is open, showing its details:

**SPARK MAX Motor Controller** **USB; CAN ID 1**

**Update** **Out-of-Date**

**SPARK MAX Firmware**

Current Version: 1.5.0  
Latest Version: 1.5.2  
[Release Notes](#)

(Already Downloaded) **Writing Image**

At the bottom right of the main window, there's a 'Report an Issue' link.

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

The screenshot shows the REV Hardware Client software interface. The main area displays a list of connected hardware:

- SPARK MAX Motor Controller USB; CAN ID 1
- CAN Bus
- SPARK MAX Motor Controller CAN ID 2 (Status: Up-to-Date, green checkmark icon)

Connected Hardware

**Update All** **Check for Updates**

Last check: 10:55 am

- SPARK MAX Motor Controller USB; CAN ID 1
- CAN Bus
- SPARK MAX Motor Controller CAN ID 2

Scan For Devices  
Don't see your device?

SPARK MAX Motor Controller **USB; CAN ID 1**

Basic Advanced Run API Update

**SPARK MAX Firmware**  
Current Version: 1.5.2   
[Release Notes](#)

## Installing API Libraries

In order to install C++ or 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.

REV Hardware Client

Hardware Downloads Telemetry About

Connected Hardware

**Update All** **Check for Updates**

Last check: 10:55 am

- SPARK MAX Motor Controller USB; CAN ID 1
- CAN Bus
- SPARK MAX Motor Controller CAN ID 2

SPARK MAX Motor Controller **USB; CAN ID 1**

Basic Advanced Run API Update

**! WPILib 2021 is not installed**  
You must install it from the [WPILib website](#) before the C++ or Java APIs can be used.

WPILib Year: **2021** [WPILib Offline Install Instructions](#)

**SPARK-MAX Java API**  
Not downloaded  
Latest Version: 1.5.2  
[Release Notes](#)

**Install**

**SPARK-MAX C++ API**  
Not downloaded  
Latest Version: 1.5.2  
[Release Notes](#)

**Install**

The screenshot shows the SPARK-MAX LabVIEW API Installer page. At the top right is an orange "Install" button. Below it is the title "SPARK-MAX LabVIEW API Installer" and the text "Latest Version: 1.5.2". There are links for "Release Notes" and "Download". A red "Out of Date" warning with an exclamation mark is displayed. On the left, there's a "Scan For Devices" section with the message "Don't see your device?". At the bottom right is a link to "Report an Issue".

## 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

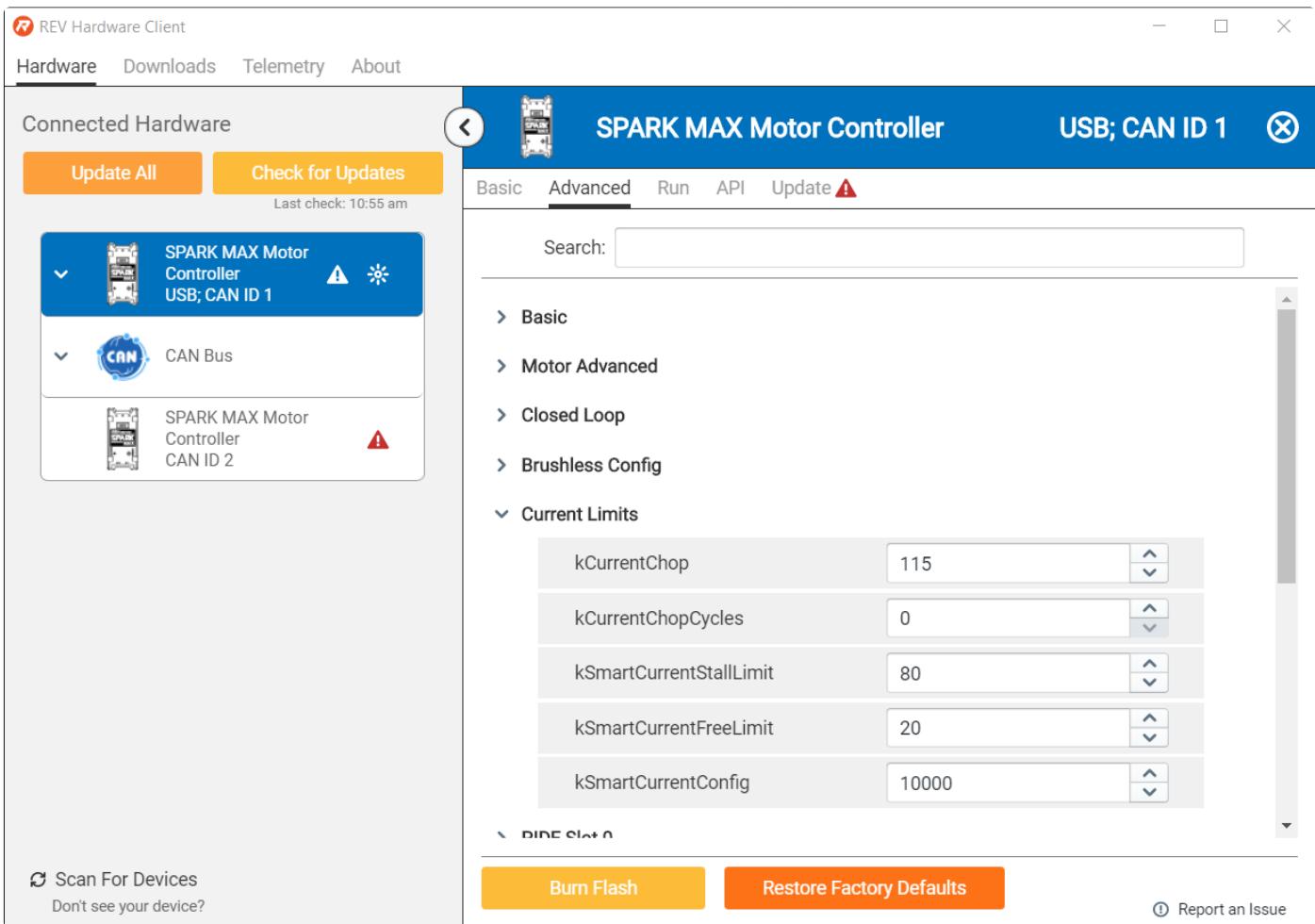
The Basic Tab is used to set the most common parameters for the SPARK MAX

The screenshot shows the REV Hardware Client interface. The top navigation bar includes "REV Hardware Client", "Hardware" (selected), "Downloads", "Telemetry", and "About". The main area is titled "Connected Hardware" and lists three devices: "SPARK MAX Motor Controller USB; CAN ID 1" (selected), "CAN Bus", and "SPARK MAX Motor Controller CAN ID 2". The "SPARK MAX Motor Controller" card shows a warning icon. The right side of the screen is the "SPARK MAX Motor Controller" configuration window. It has tabs for "Basic", "Advanced", "Run", "API", and "Update" (with a warning). The "Basic" tab is active. It contains settings for "CAN ID" (set to 1), "Motor Type" (REV NEO Brushless), "Idle Mode" (Brake), "Smart Current Limit" (80), "Sensor Type" (Hall Effect), "Encoder Counts Per Rev" (4096), and "PWM Input Deadband" (0.00 to 0.05). It also includes sections for "Limit Switch" (Forward and Reverse limits enabled, polarity normally closed), "Soft Limits" (Forward and Reverse limits disabled, value 0), and "Ramp Rate" (disabled). At the bottom are "Burn Flash" and "Restore Factory Defaults" buttons, and a "Report an Issue" link.

*(i)* 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.



*(i)* 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.



Connected Hardware

Update All Check for Updates

Last check: 10:55 am

SPARK MAX Motor Controller USB; CAN ID 1

CAN Bus

SPARK MAX Motor Controller CAN ID 2

Scan For Devices

Don't see your device?

View Graph on Telemetry Tab

Report an Issue

# SPARK MAX Motor Controller

USB; CAN ID 1 (X)

Basic Advanced Run API Update ⚠

▶ Run Motor

Mode: Percent 0.00

Setpoint: 0

-1.00 0.00 1.00

PDIF

Profile: 0 Increment: 0.00001

kP\_0: 0

kI\_0: 0

kD\_0: 0

kF\_0: 0

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