CEM70 Firmware Upgrade

The firmware of a CEM70 mount and 8407 hand controller (HC) can be upgraded. The upgrading is only supported by Windows. Please check iOptron's website, www.iOptron.com, under **Support**, for the most up to date firmware.

The firmware upgrade will be done via:

- Mount: USB port on the mount.
- Hand controller: RS232 serial port on hand controller.

To upgrade the firmware, you need some or all of the following software/hardware, depends on the upgrading you are performing:

- iOptron Upgrade Utility Program (*Version 2.x*)
- CEM70 mount firmware package
- FTDI VCP (Virtual COM Port) driver (https://www.ftdichip.com/Drivers/VCP.htm)
- 8407 hand controller firmware
- A USB cable (for mount)
- iOptron RS232 to RJ9 serial cable #8412 (for HC)
- USB to RS232 converter and driver. If your computer does not equip a RS232 port (9-pin D-shape connector) except the USB port, you need to buy a USB to RS232 converter, form a computer hardware store or on-line. *We recommend using a converter.*

1. Download software and firmware from iOptron website

Go to any CEM70 product page. Click on **Support Documents** tab to download related firmware. Or go to iOptron website to locate **CEM70** firmware under **Support > Firmware/Software**.
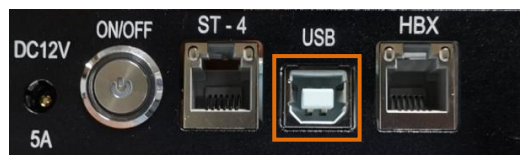
Download and save **iOptronUpgradeUtility** program, Hand Controller firmware and CEM70 mount firmware. Run FTDI VCP installer.

2. CEM70 mount firmware upgrade

Upgrade mount firmware is straight forward.

(1) Connect the mount to a computer via a USB cable through mount USB port. Turn the mount power on.

For a **CEM70** or **CEM70EC** mount, connect the USB cable to the USB port on the main control panel (it may change in the future).
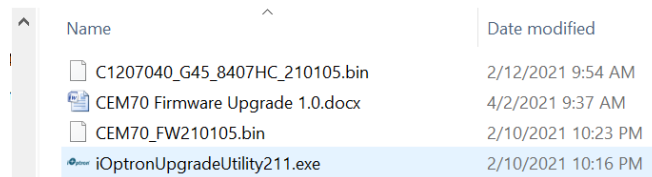

For a **CEM70G** mount, connect the USB cable to either the USB3.0 port on base
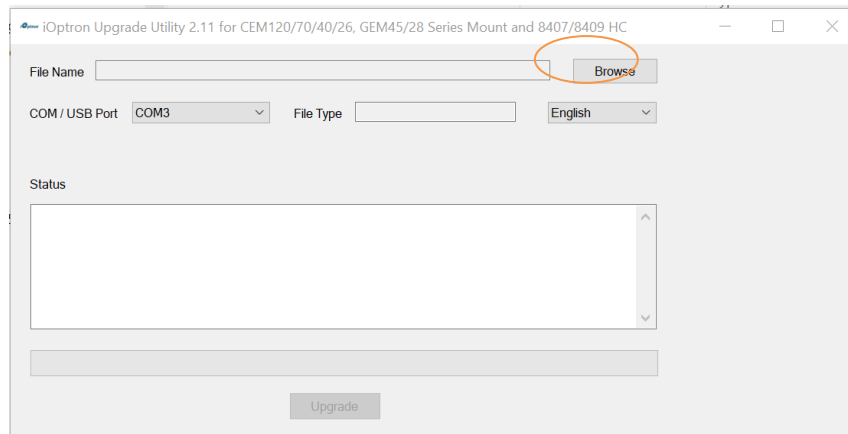
OR the USB3.0 port on the rear end of the RA axis.

(2) Locate downloaded software and click on ***iOptronUpgradeUtility211.exe***:

Name	Date modified
C1207040_G45_8407HC_210105.bin	2/12/2021 9:54 AM
CEM70 Firmware Upgrade 1.0.docx	4/2/2021 9:37 AM
CEM70_FW210105.bin	2/10/2021 10:23 PM
iOptronUpgradeUtility211.exe	2/10/2021 10:16 PM

(3) Click on **Browse** in iOptron Upgrade Utility window.

(4) Select the mount firmware package CEM70_FWyymmdd.bin, and click **Open;**

| Name |
|---|
| C1207040_G45_8407HC_210105.bin |
| CEM70_FW210105.bin |
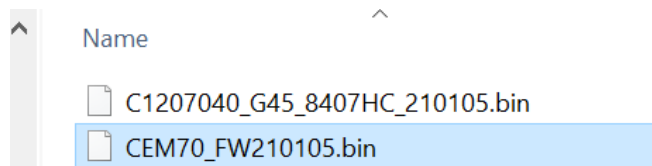
(5) The **File Type** and **Version** will be verified and displayed. Select the correct COM port from ***COM/USB Port*** pull down menu. Here is COM10. You can find the assigned COM port from Windows Device Manager.
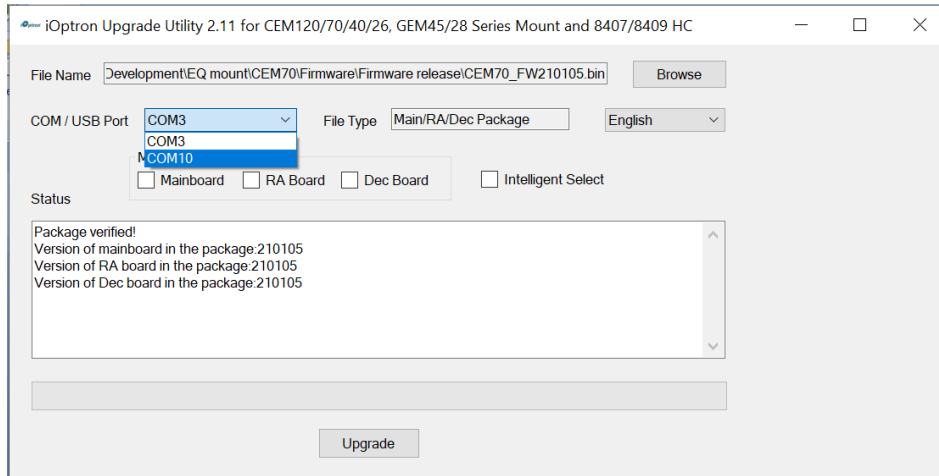
(6) Now you can choose "**Intelligent Select**" to let the software decided which part of mount firmware needs upgraded, or use "**Manually Select**" to select which firmware you want to upgrade.

If chose "**Intelligent Select**", check the small box in front of it and click on **Upgrade** button. If any part of the software Is not up to date, it will be upgraded. You should see following windows:
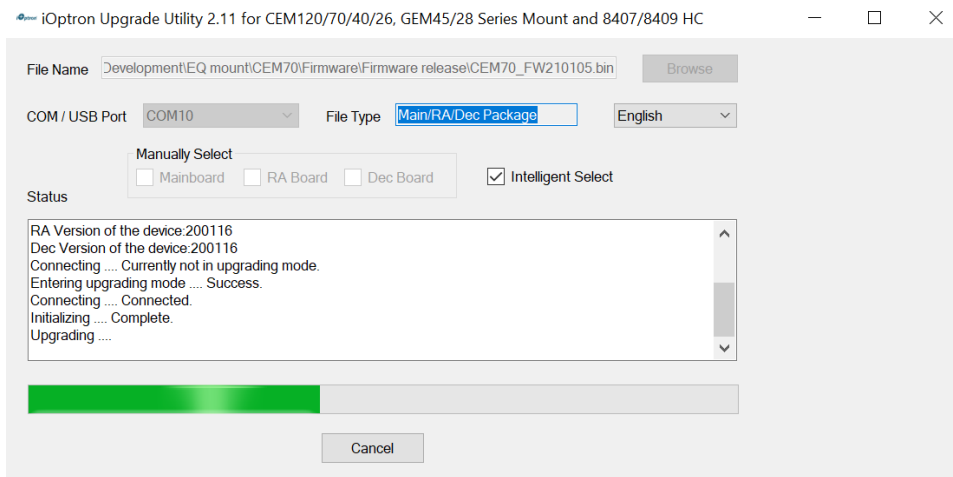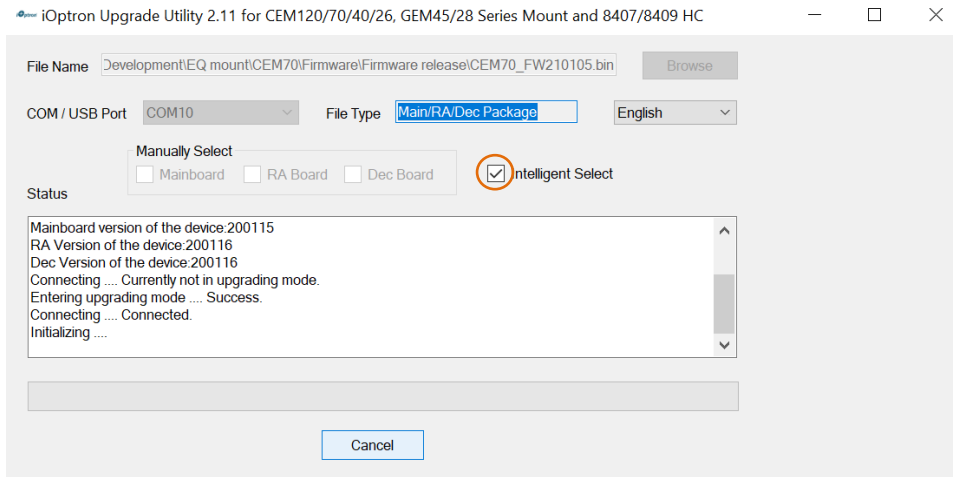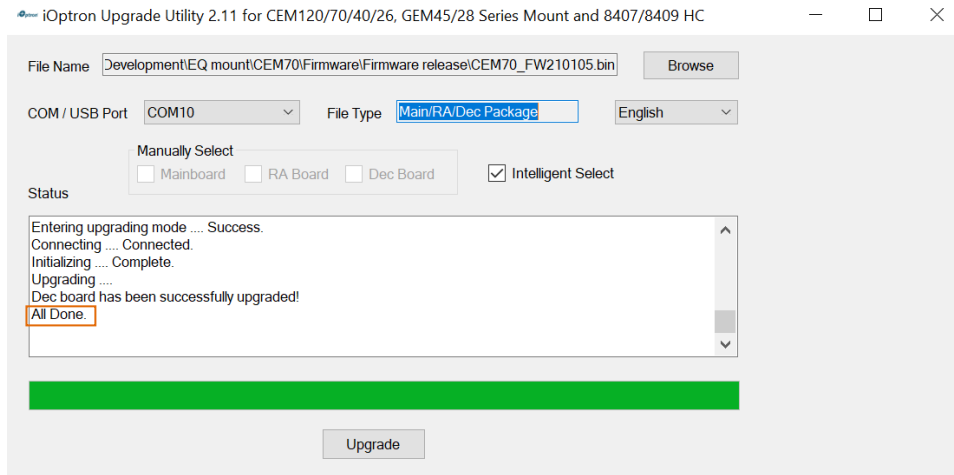
After firmware upgrade is done, move the cursor up to take a record of the previous firmware version.
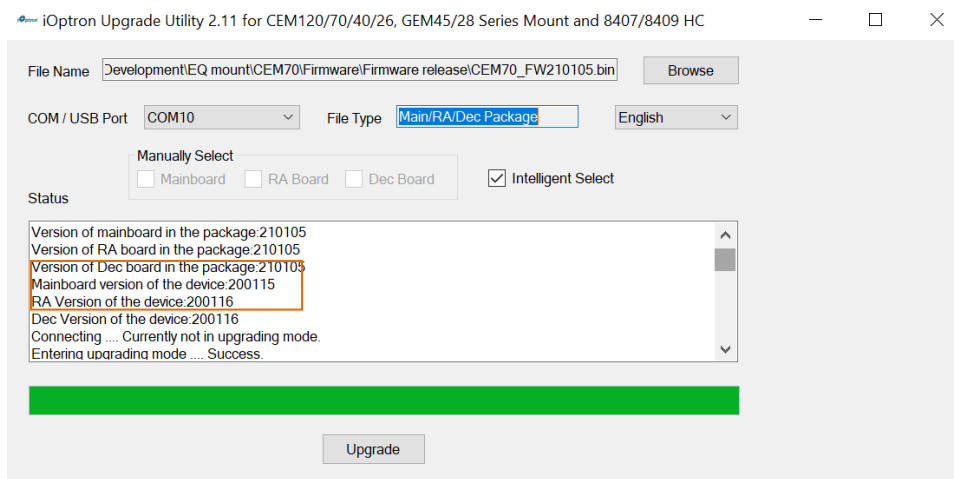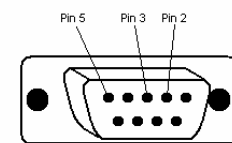

(7) Power cycling the mount. You can check the firmware version via Commander or hand controller.
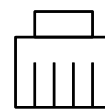
(8) Exit the **Upgrade Utility** program.

3. 8407 hand controller firmware upgrade

8407 hand controller firmware upgrade is via RS232 port on the hand controller. It needs an iOptron RS232 cable (#8412). Here is the cable and a wiring instruction if you want a DIY.

Wiring	
RS232	RJ9
2	4
3	3
5	1

RS232 connector (female)   RJ9 plug

Most new computers, especially laptops, do not have a native D9 serial port anymore. A USB to COM/RS232 port converter is need to convert a USB port to a virtual COM port. Here are two examples of USB2COM converters.

We *recommend* use a USB to RS232 converter even your computer has a native RS232 port. A converter with FTDI chipset is preferred to ensure a reliable operation. Install the VCP (Virtual COM Port) driver come with the converter. Plug the USB to RS232 converter into one available computer USB port.


Use your mouse' right button to click on *Windows* sign located on the left bottom corner of your computer's screen (Windows 10 as an example). This will bring up a list of tasks as shown in the screen shot below. Move the mouse to **Device Manager** and click onto it.
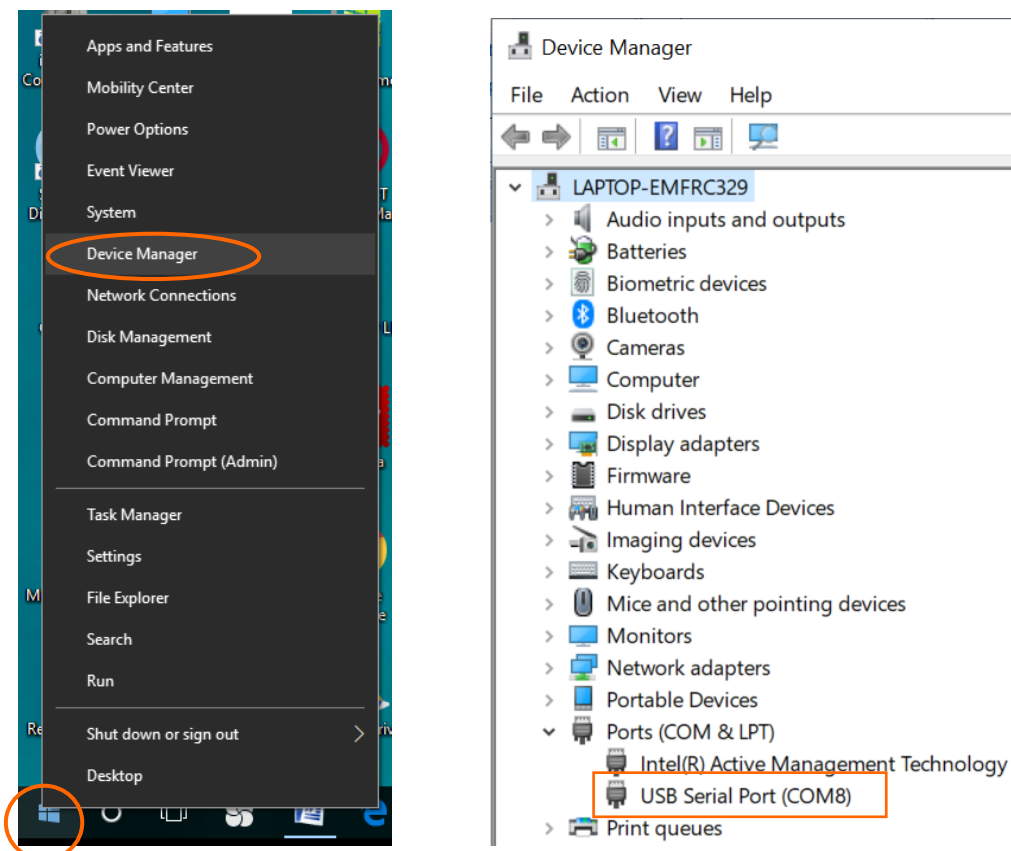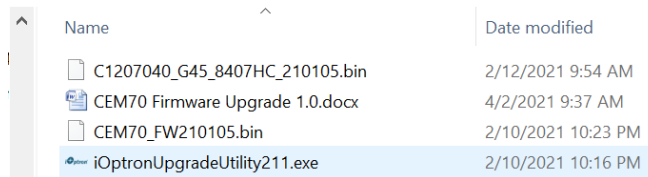

Click on **Ports (COM & LPT)** to find the assigned COM port number and write it down. Here is **COM8.**
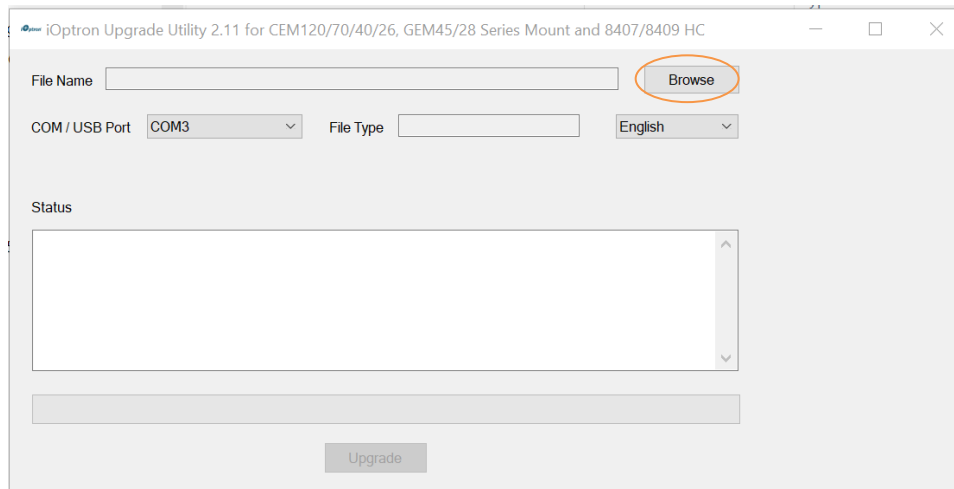
To upgrade the HC firmware

(1) Connect the 8407 hand controller to the HBX port on CEM70 mount. Make sure the mount power is OFF;

(2) Connect 4-pin RJ9 plug into the serial port of a 8407 hand controller and the 9-pin RS232 connector to converter
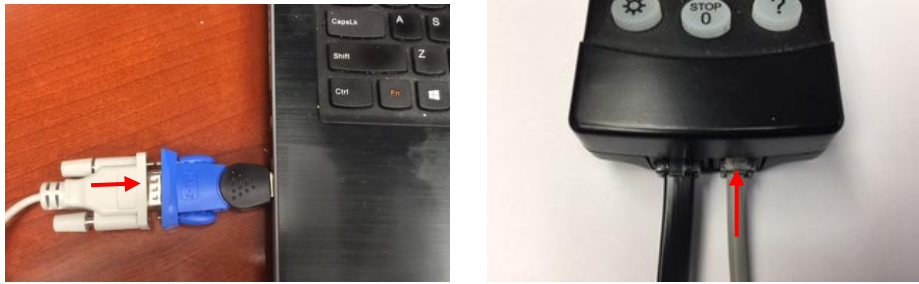
(3) Hold **ENTER** button of the hand controller while switch the ON/OFF button to turn the mount power on. The HC will enter **Upgrading Mode.**

(4) Locate downloaded software and click on **iOptronUpgradeUtility211.exe**

| Name	Date modified
C1207040_G45_8407HC_210105.bin	2/12/2021 9:54 AM
CEM70 Firmware Upgrade 1.0.docx	4/2/2021 9:37 AM
CEM70_FW210105.bin	2/10/2021 10:23 PM
iOptronUpgradeUtility211.exe	2/10/2021 10:16 PM

(5) Click on **Browse** in iOptron Upgrade Utility window

(6) Select the hand controller firmware C1207040_G45_8407HC_210105.bin, and click **Open**

Name
C1207040_G45_8407HC_210105.bin
CEM70_FW210105.bin
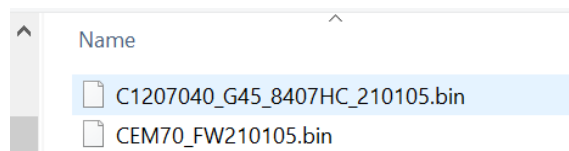
(7) The **File Type** and **Version** will be verified and displayed. Select the correct COM port from **COM/USB Port** pull down menu. Here is COM8
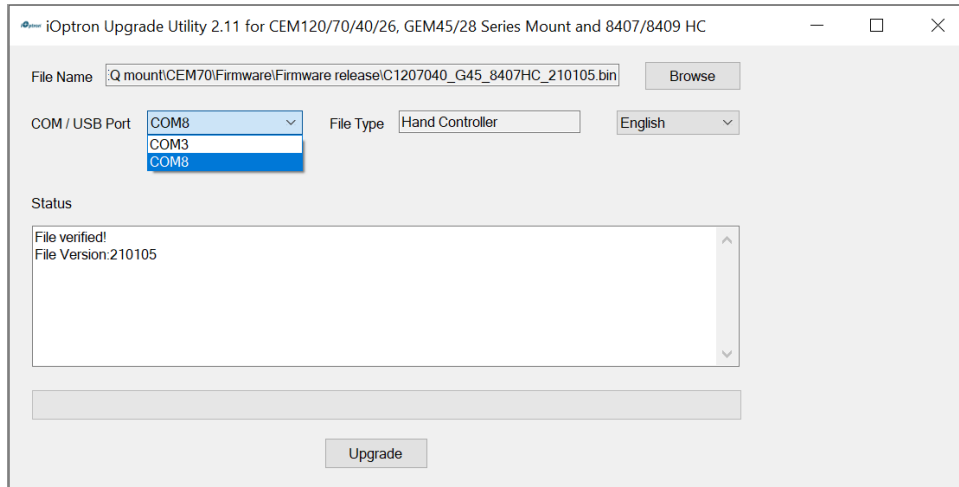
(8) Click on **Upgrade** button to start the process
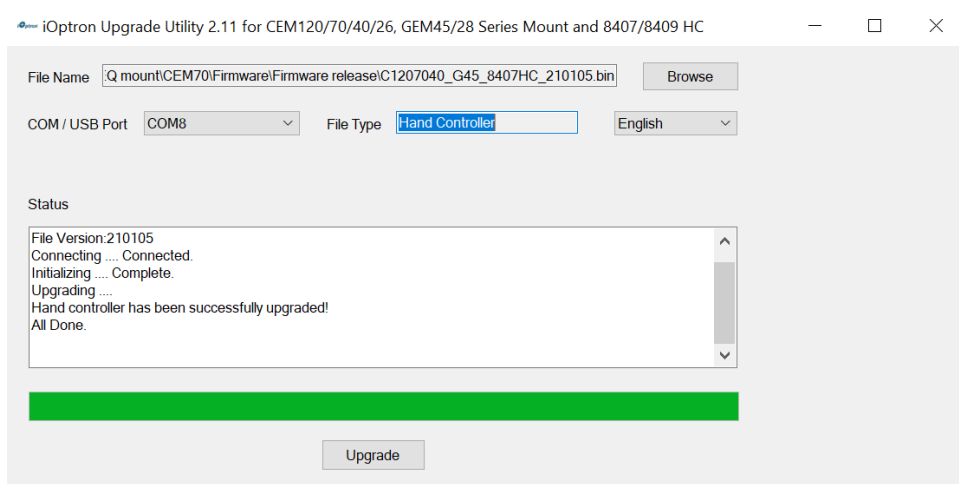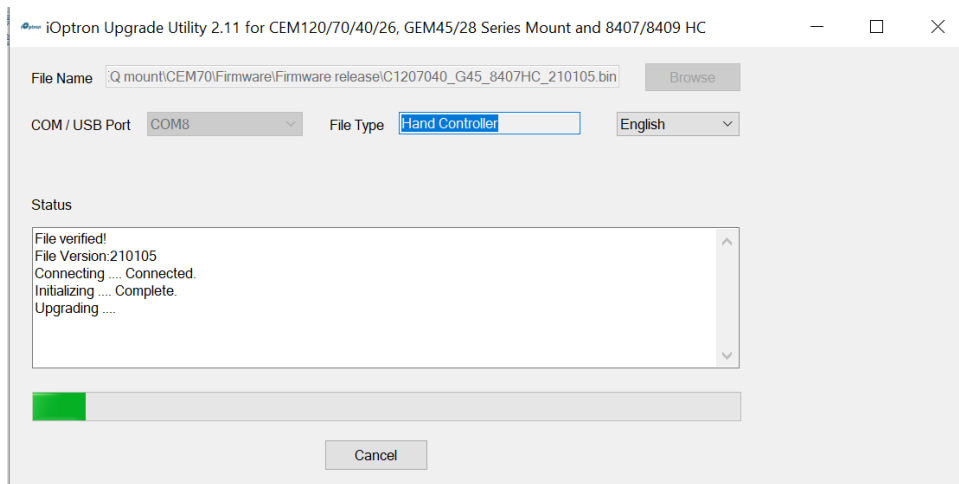
(9) After the firmware upgraded successfully, power cycle the mount.

4. Calibration CEM70 EC high precision encoder

CEM70EC version needs to perform encoder calibration after the firmware upgrade to ensure precise tracking.

To calibrate the encoder:

1) Turn off the mount;

2) Hold number "2" on the hand controller, then turn the mount power on. Keep holding the #2 key until the calibration started automatically;

The calibration mode will search the mount zero position first. Next the mount will swing to the eastern side quickly. Then the mount will slowly move from eastern side to western side to calibrate the encoder. It will return to Zero Position after the calibration is finished. The total procedure may take a few minutes.

3) After the mount stopped, turn off the mount, and turn on again.

6) Perform **Search Zero Position** or **Set Zero Position**.

5. Common errors during firmware upgrade:

(1) Cannot open COM port:

- Broken cable
- Wrong COM port is selected;
- A mount is not connected;
- A USB to RS232 converter driver is not installed or corrupted;
- A USB to RS232 converter does not work properly.

(2) Connection failed:

- Cable plugged into a wrong port;
- Mount power is not turned on;
- Cable is not plugged in firmly;
- Broken RS232 or USB cable;
- A USB to RS232 converter does not work properly;
- Malfunctioned control board.

(3) Upgrade stopped in the middle or failed:

- Cable is not plugged in firmly;
- Cable is moved during process;
- Broken RJ9 or RS232 cable;
- A USB to RS232 converter does not work properly,
- Wrong firmware selected.