



## CEM40/GEM45 w/8407HC Firmware Upgrade

This firmware upgrade instruction is for CEM40/GEM45 mounts with an 8407 hand controller. The upgrading is only supported by **Windows**. Please check product page on iOptron's website for the most up to date firmware. You may also check [www.iOptron.com](http://www.iOptron.com), under **Support** for it.

The firmware upgrade will be done via:

- Mount: USB port on mount.
- 8407 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 (*Check the Firmware Upgrade page*)
- Mount firmware upgrade:
  - CEM40/GEM45 mount firmware package
  - 8407 HC firmware
  - USB cable #8416 (included)
  - FTDI VCP (Virtual COM Port) driver for CEM40/GEM45 mount USB port. It can be downloaded from firmware upgrade page or from manufacture: <https://ftdichip.com/drivers/vcp-drivers/>
- Hand controller firmware upgrade:
  - 8407 hand controller firmware
  - iOptron RS232 to RJ9 serial cable #8412
  - 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 with FIDI chipset.**

### **1. Download software and firmware from iOptron website**

- Go to the **CEM40 Firmware** or **GEM45 Firmware** page under the **Support Documents** directory on a CEM40/GEM45 product page.
- Download and save **iOptronUpgradeUtility.exe** program, 8407 Hand Controller firmware and CEM40/GEM45 mount firmware.
- Download and install FTDI VCP driver, if this is the first time for firmware upgrade

### **2. CEM40/GEM45 mount firmware upgrade**

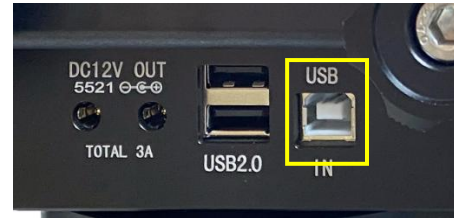
**For mount firmware upgrading, it does not need a hand controller is plugged in. If the HC is plugged in, please ignore any error message shown on the HC screen during upgrading process.**

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



USB port on the main board

(CGEM4x mount with a universal dovetail saddle)



USB port on dovetail saddle  
(CGEM4X-NUC)



USB port on back of RA axis (CMS input)

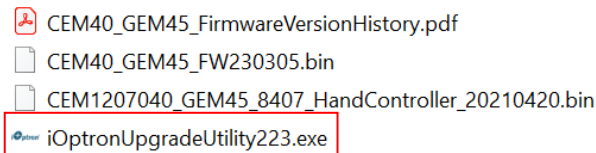
Later version of CEM40 (Left) and GEM45 (right)



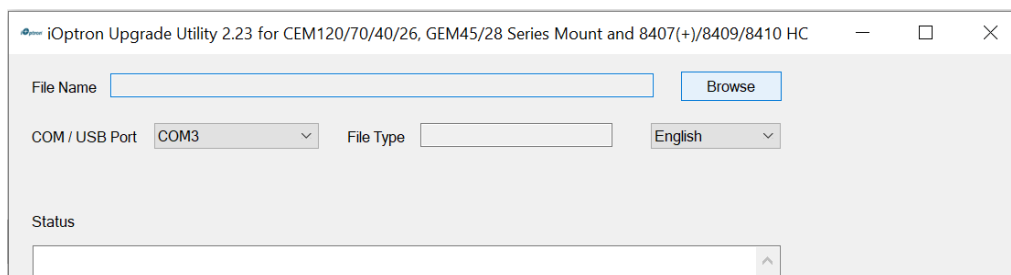
(2) Turn the mount power on. Go to Windows Device Manager=>Port (COM & LPT) to find the COM Port assigned to the mount.



(3) Locate downloaded software and click on **iOptronUpgradeUtility.exe**:



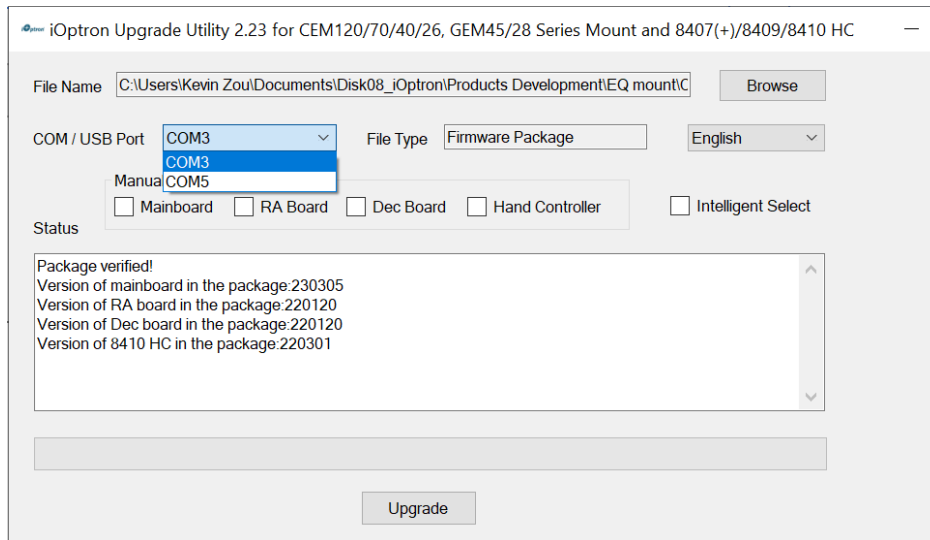
(4) Click on **Browse** in iOptron Upgrade Utility window. Select the mount firmware package, such as CEM40\_GEM45\_FWYYMMDD.bin, and click **Open**;



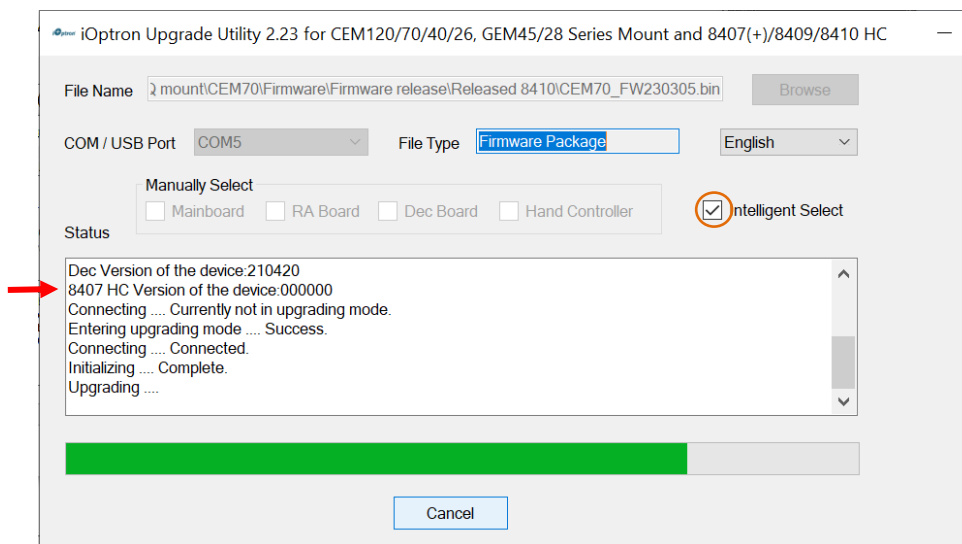
CEM40\_GEM45\_FW230305.bin

CEM1207040\_GEM45\_8407\_HandController\_20210420.bin

- (5) The **File Type** and **Version** will be verified and displayed. Click on the pull down menu of the **COM/USB Port** and select the COM5 port.

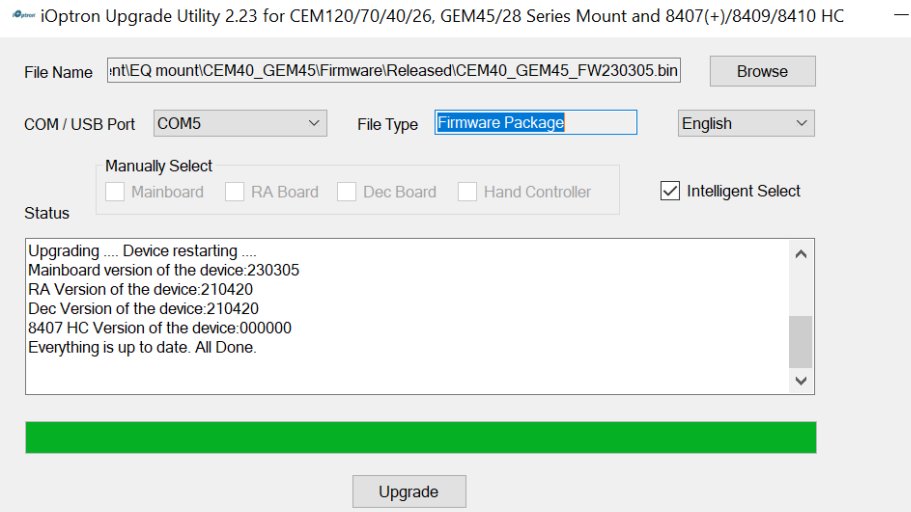


- (6) Now you can choose “**Intelligent Select**” to let the software decided which board firmware needs be upgraded, or use “**Manually Select**” to select which firmware you want to upgrade.



Click on **Upgrade** button. The **Upgrade Utility** will

- Check current firmware version. Since the mount uses an 8407 HC which can't be read by the **Upgrade Utility**, it will display 000000;
- Try to connect to the board that needs firmware upgrading and perform the firmware upgrade;



- (7) Power cycling the mount. Check your firmware version after all four firmware upgrade is finished by press **MENU**→**Firmware Information**.
- (8) Exit the **Upgrade Utility** program.

### **3. 8407 hand controller firmware upgrade**

The 8407 hand controller firmware upgrade is via the RS232 port (RJ9 4P4C).



If you are using a computer built-in COM port, please connect the iOptron RS232 cable (#8412) between the HC RS232 port and a computer DB9 COM port directly. The port # is COM1 by default.



Since most modern computer only has USB ports, you'll need the iOptron RS232 cable (other brand may not work) and a USB-RS232 converter, as shown below for the firmware upgrade.



We are only considering perform the firmware upgrade via a USB port.

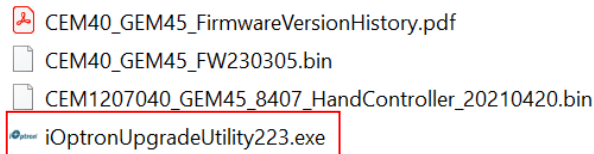
- (1) Connect the 8407 hand controller to the HBX port on CEM40/GEM45 mount. Make sure the mount power is **OFF**;
- (2) Connect 4-pin RJ9 plug of an iOptron RS232 cable into the serial port of a 8407 hand controller and the 9-pin RS232 connector of the USB to RS232 converter;



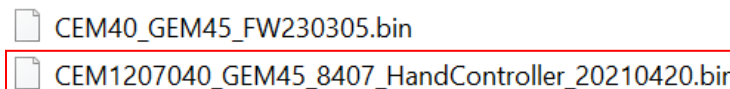
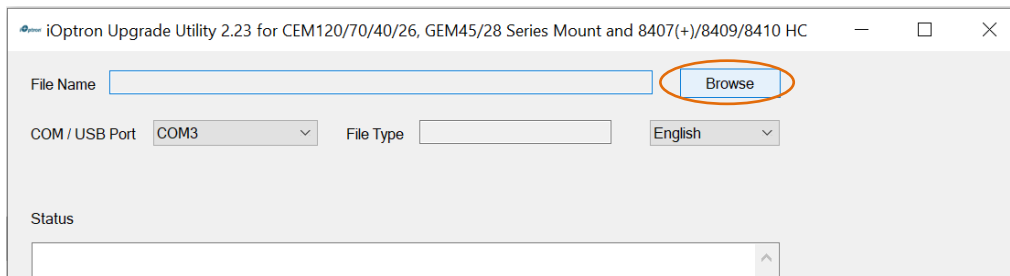
- (3) Go to Windows Device Manager=>Port (COM & LPT) to find the COM Port assigned to the USB-RS232 converter;



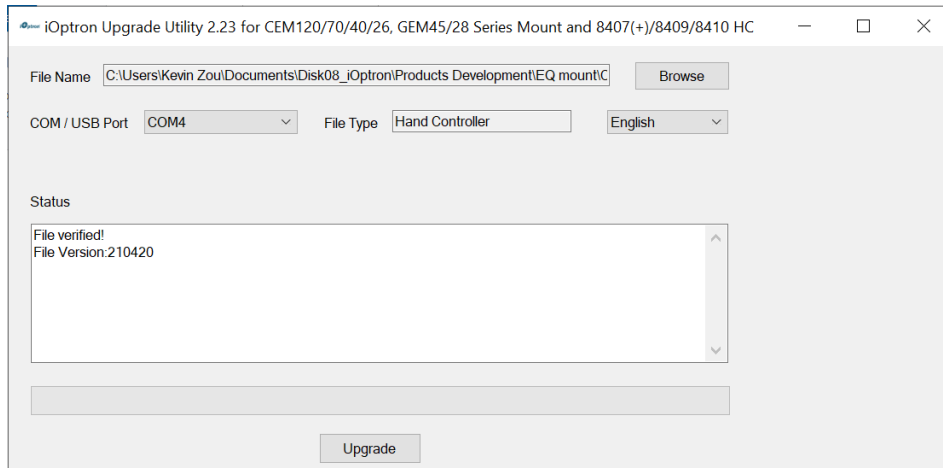
- (4) Hold **ENTER** button of the hand controller while switch the ON/OFF button to turn the mount power on. The HC will enter **upgrading mode**.
- (5) Locate downloaded software and click on **iOptronUpgradeUtility.exe**. If you just did mount firmware upgrade, close the program and restart it.



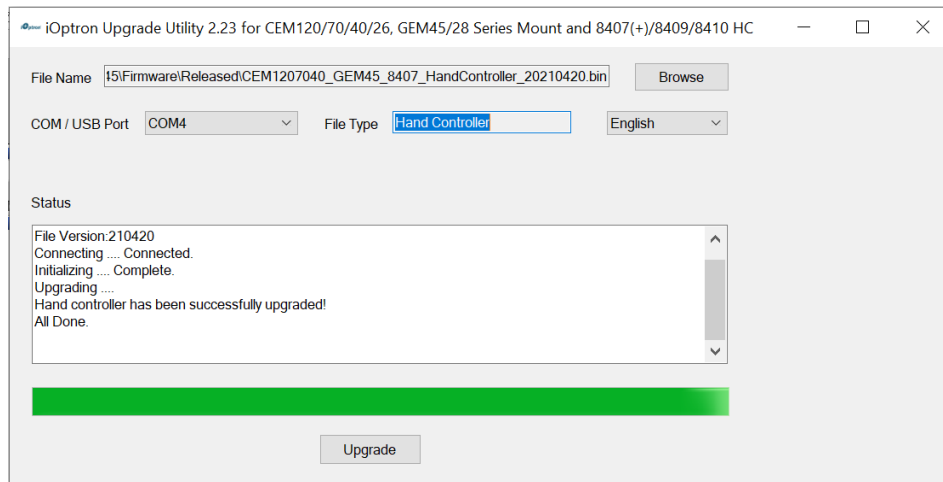
- (6) Click on **Browse** in iOptron Upgrade Utility window. Select the 8407 hand controller firmware, and click **Open**;




- (7) The **File Type** and **Version** will be verified and displayed. Click on the pull down menu of the **COM/USB Port** and select the COM4 port.



(8) Click on **Upgrade** button to start the process;



(9) After the firmware upgraded successfully, exit the Upgrade Utility program by click on . Power cycle the mount.

#### **4. Calibration CEM40/GEM45 EC version high precision encoder**

**CEM40EC/GEM45EC version needs to perform encoder calibration after the firmware upgrade to ensure precise tracking.**

To calibrate the encoder:

- 1) Turn off the mount;
- 2) Press and hold number "2" button on the hand controller when power on the mount. The calibration process will start automatically;
- 3) 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.
- 4) After the mount stopped, turn off the mount, and turn on again.
- 5) Perform **Search Zero Position** or **Set Zero Position**.

## **5. Common errors during firmware upgrade**

(1) COM port cannot be opened:

- Wrong COM port is selected;
- A mount is not connected;
- Cable is not plugged in firmly
- A USB to RS232 converter driver is not installed or corrupted;
- A USB to RS232 converter does not work properly.

(2) Connection failed:

- A non-iOptron RS232 cable is used;
- Mount power is not turned on;
- Cable is not plugged in firmly;
- Broken RJ9 to RS232/USB cable;
- A USB to RS232 converter does not work properly;
- Malfunctioned control board;
- Wrong firmware selected.

(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.

Contact [support@ioptron.com](mailto:support@ioptron.com) for technical support.