

## CEM40/GEM45 Firmware Upgrade

This firmware upgrade instruction is for CEM40/GEM45 mounts with a 8407 hand controller, include:

- #74xx CEM40/CEM40G/CEM40EC
- #C40xx CEM40/CEM40G/CEM40EC
- #7600 GEM45/GEM45G/GEM45EC

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.
- 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 for matching one*)
- Mount firmware upgrade:
  - CEM40/GEM45 mount firmware package
  - USB cable #8416 (included)
  - FTDI VCP (Virtual COM Port) driver for CEM40/GEM45 mount USB port. It can be downloaded here: <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. Prepare the hardware

#### CEM40/GEM45 Mount Firmware

- (1) Connect the USB cable to the mount USB port on main board, NOT the one next to polar scope.
- (2) Download and install FTDI VCP driver

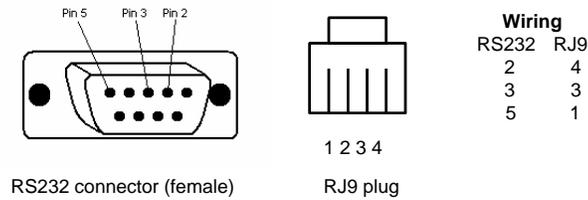
#### Hand Controller Firmware

##### (1) RS232 to RJ9 serial cable

**Please do not use a cable other than iOptron one. They may look exactly same but wired differently.**



If you are making your own cable, here is the wiring instruction:



## (2) Serial (RS232) Port on a Computer

The first step is to find if your computer has a serial port (or RS232 port). The following photos show a native (built-in) serial port on a laptop (left) and a desk top (right). It is a 9-pin D-shaped (DB9) connector. The assigned port number usually is COM1. Minimum 5.0VDC output power at serial connector is needed to ensure reliable data transmission.



## (3) USB to RS232 converter

If your computer only has USB ports, like most late PC and laptops do, or the native RS232 port does not perform, you need a USB to COM (RS232) converter to convert one USB port to a RS232 port. Here are two examples of USB2COM converters.



Download and install FTDI VCP driver.

**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.

## **2. Find the serial port (COM port) number**

The Upgrade Utility for CEM40/GEM45 should detect the COM port number automatically, after USB VCP driver is installed. **You may skip this step**, unless the Upgrade Utility could not find the COM port #.

### **CEM40/GEM45 Mount Firmware**

Direct connect the USB cable between the mount USB port and the computer.

### **Hand Controller Firmware**

The default assigned number is COM1 if your computer has a serial port (9-pin D-shape male connector on the back,

If you are using a USB to COM converter or direct USB connection, you can find the computer assigned COM port number as described below.

Set up you mount. Connect the hand controller to the HBX socket, **NOT** the iPORT socket, on the CEM40/GEM45 mount.

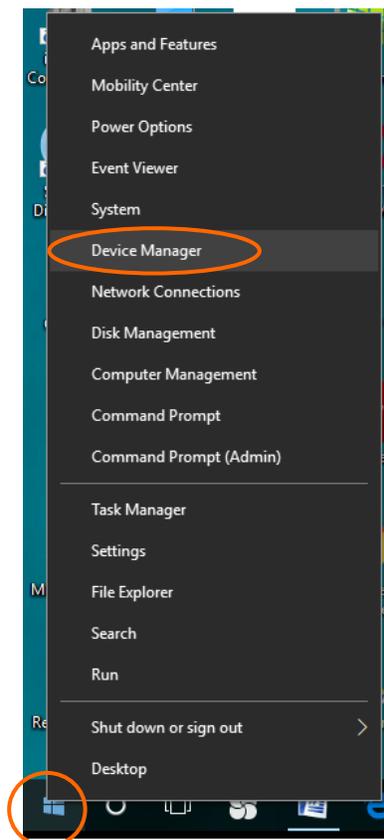
Plug the USB to RS232 converter into one of available USB port on your computer and connect the RS232-RJ9 serial cable onto the serial port (D-shaped) of the converter.

Connect the RJ9 telephone jacket into RS232 port of 8407 HC for hand controller firmware upgrade.

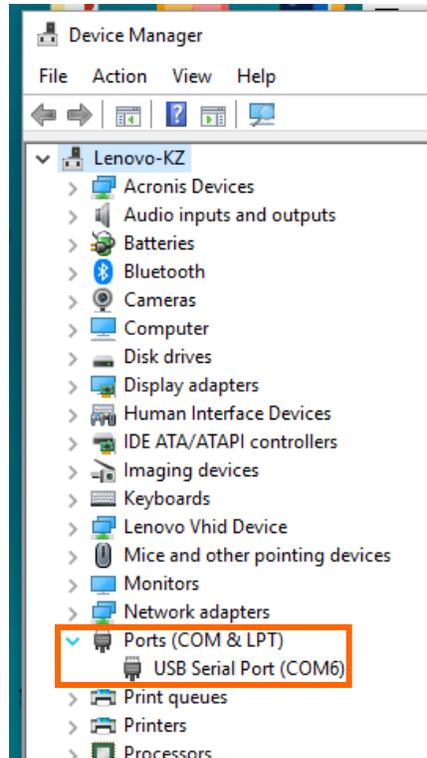


### Find the COM port number

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)**, find out the COM number and write it down (in the following screen shot, the assigned port number is **COM6**)



### **3. Download software and firmware from iOptron website:**

Go to a CEM40/GEM45 product page on iOptron website, [www.iOptron.com](http://www.iOptron.com), click on **Support Documents** tab.

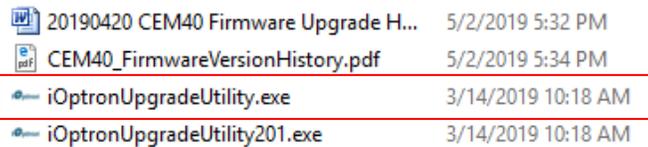
Download and save **iOptronUpgradeUtility.exe** program, Hand Controller firmware and CEM40/GEM45 mount firmware.

### **4. 8407 hand controller firmware upgrade:**

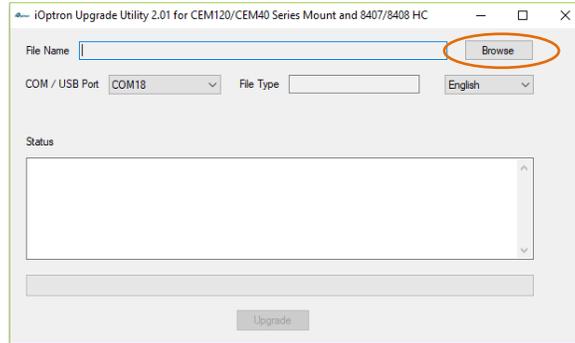
- (1) Connect the 8407 hand controller to the HBX port on CEM40/GEM45 mount. Make sure the mount power is **OFF**;
- (2) Connect 4-pin RJ9 plug into the serial port of a 8407 hand controller and the 9-pin RS232 connector to your computer's RS232 port (or RS232 port of the USB2COM converter);



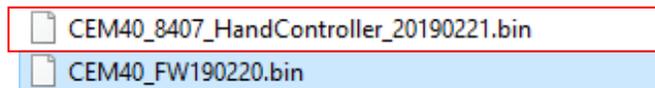
- (3) Hold **ENTER** button of the hand controller while switch the ON/OFF button to turn the mount power on. The HC will enter **upgrading mode**.
- (4) Locate downloaded software and click on **iOptronUpgradeUtility.exe**:



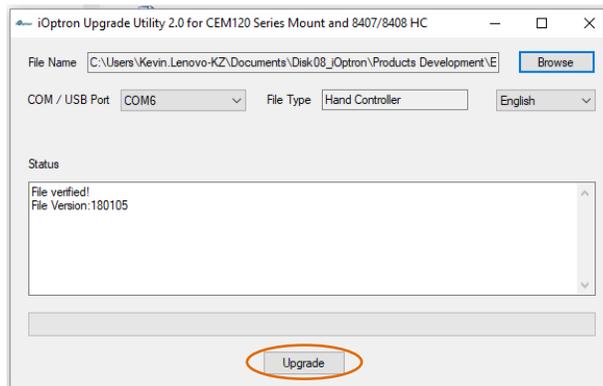
- (5) An iOptron Upgrade Utility window will display. Click on **Browse**:



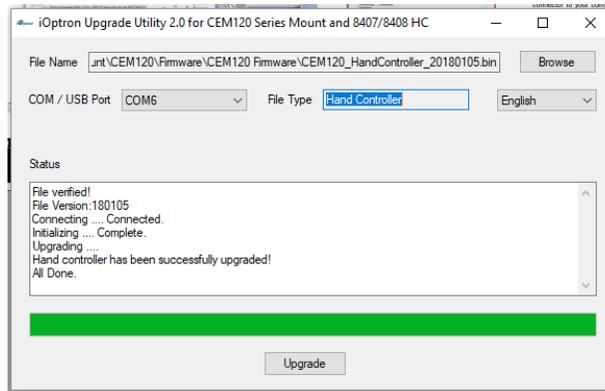
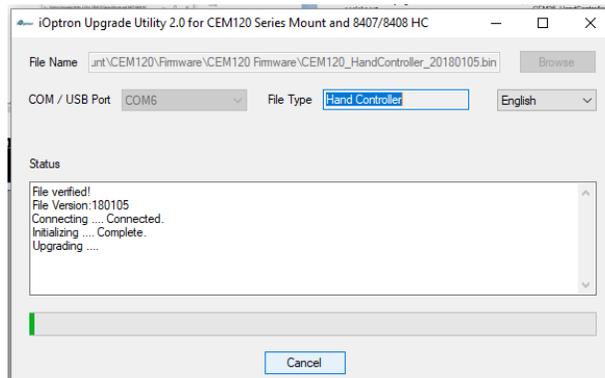
- (5) Select 8407 hand controller firmware, such as CEM40\_HandController\_YYYYMMDD.bin and click **Open**.



- (6) The **FileType** and **Version** will be verified and displayed. The COM port will be detected (here is COM6). If it does not show, click on pull down menu of the **COM/USB Port** and select the COM port number.



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



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

### **5. CEM40/GEM45 mount firmware upgrade:**

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



CEM40/GEM45 USB Port on main board

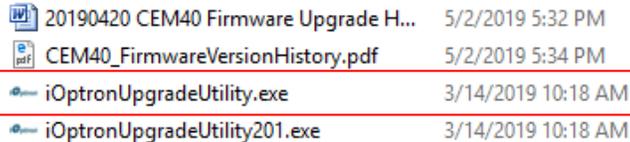


CEM40/CEM40G

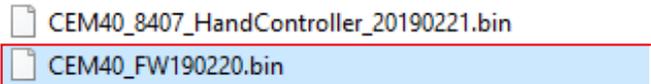


GEM45/GEM45GG

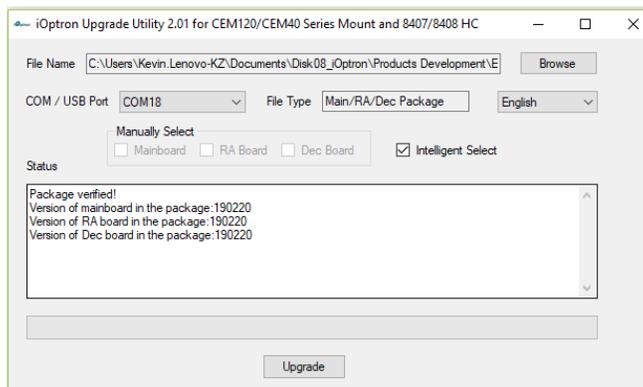
(2) Locate downloaded software and click on **iOptronUpgradeUtility.exe**:



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

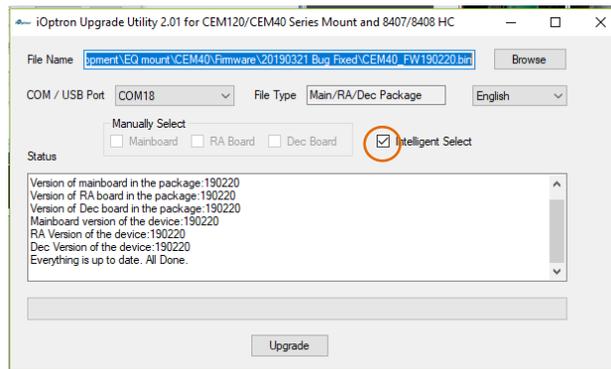


(9) The **FileType** and **Version** will be verified and displayed. The COM port will be detected (here is COM18). If it does not show, click on pull down menu of the **COM/USB Port** and select the COM port number.



- (4) Now you can choose “**Intelligent Select**” to let the software decided which part of mount firmware needs be 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 the software is up to date, you’ll see the following window.



If any or all firmware needs be upgraded, or “Manually Select” is chosen, the software will do so.

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

## **6. 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;

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.
- 4) Perform **Search Zero Position** or **Set Zero Position**.

## **7. 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.