

CEM120 Firmware Upgrade

The firmware of both 8407 hand controller (HC) and mount 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:

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

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 2.0*)
- 8407 hand controller firmware
- CEm120 mount firmware package
- iOptron RS232 to RJ9 serial cable #8412 (included)
- 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, from a computer hardware store or on-line. **We recommend using a converter.**
- Optional USB cable (#8416), if you want to upgrade the mount firmware via USB port.

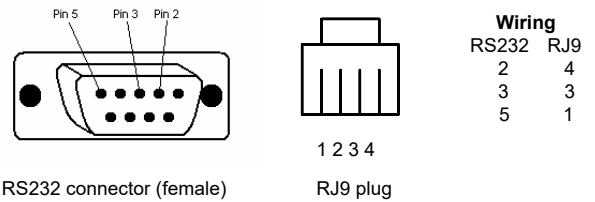
1. Prepare the hardware

RS232 to RJ9 serial cable

The mount comes with a RS232 cable. **Please do not use a cable other than iOptron. They may look exactly same but wired differently.**



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

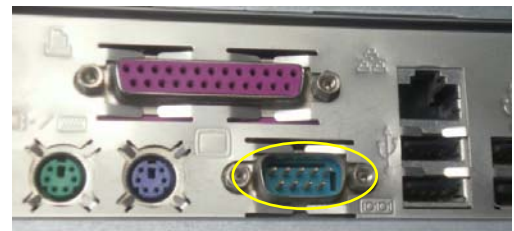
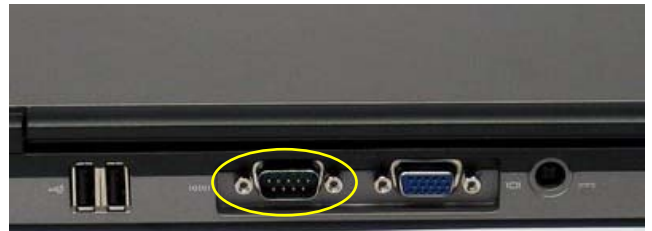


RS232 connector (female)

RJ9 plug

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.



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. 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.

2. Find the serial port (COM port) number

The Upgrade Utility for CEM120 should detect the COM port number automatically. **You may skip this step**, unless the Upgrade Utility could not find the COM port #.

Otherwise 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.

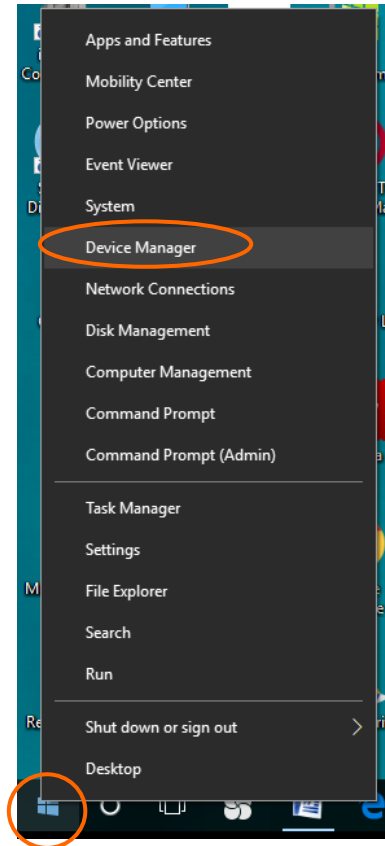
Set up you mount. Connect the hand controller to the HBX socket on the CEM120 mount (**NOT the iPORT socket!**)

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.

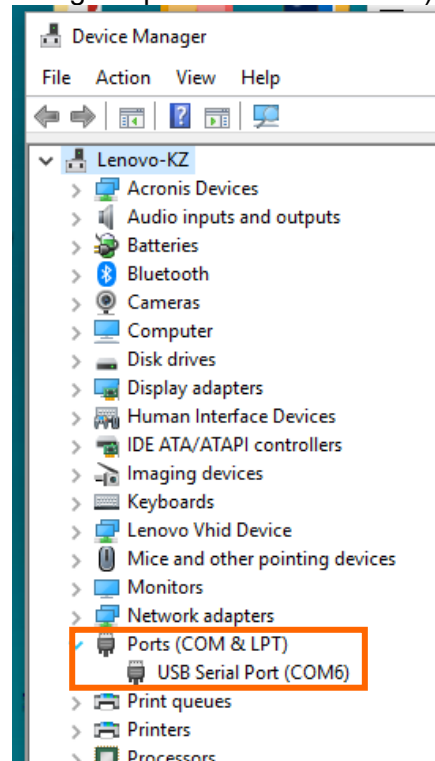


Connect the RJ9 telephone jacket into RS232 port of 8407 HC for hand controller firmware upgrade, or to mount RS232 port (on the base) for mount firmware upgrade.

After install the USB2COM driver that comes with the device, 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 **COM3**)



3. Download software and firmware from iOptron website:

Go to iOptron website, www.iOptron.com, click on **Support** tab. Locate **CEM120** under **Firmware/Software** catalog and click on it. You may also find the information in CEM120 product page.

Download and save **iOptronUpgradeUtility.exe** program, Hand Controller firmware and CEM120 mount firmware.

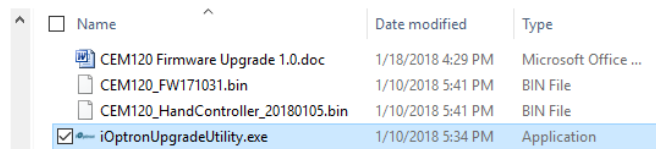
4. 8407 hand controller firmware upgrade:

- (1) Connect the 8407 hand controller to the HBX port on CEM120 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);

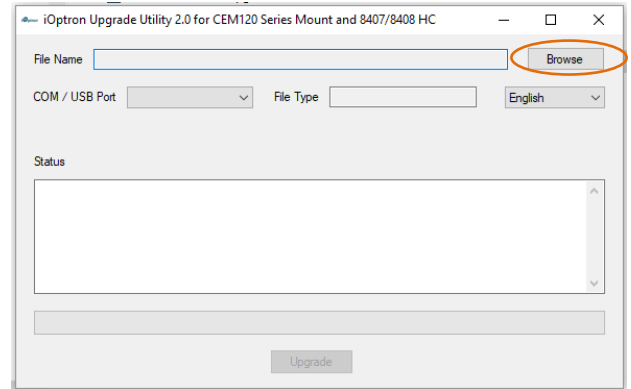


- (3) Hold **ENTER** button of the hand controller while switch the ON/OFF button to turn the mount power on. The HC will enter **upgrading mode**.

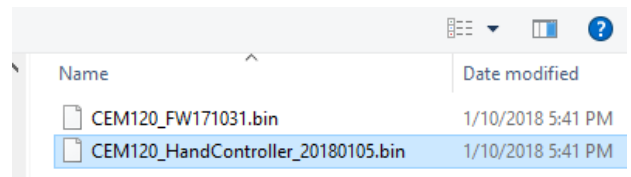
- (4) Locate downloaded software and click on **iOptronUpgradeUtility.exe**:



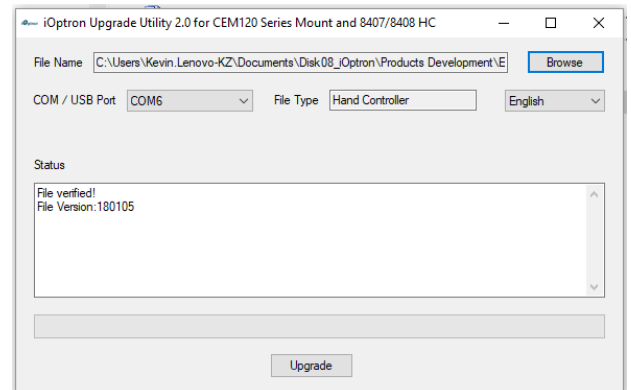
- (5) An iOptron Upgrade Utility window will display. Click on **Browse**:



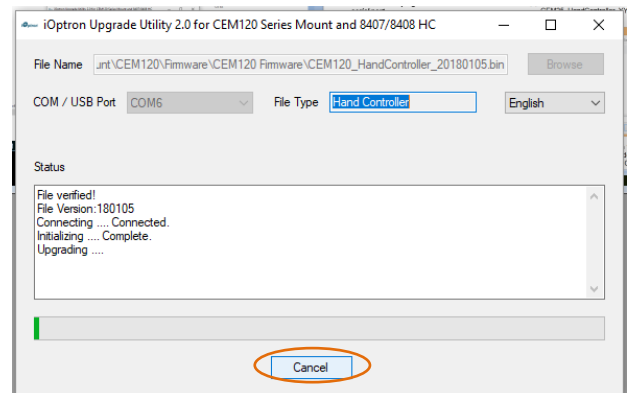
- (5) Select 8407 hand controller firmware CEM120_HandController_YYYYMMDD.bin and click **Open**.

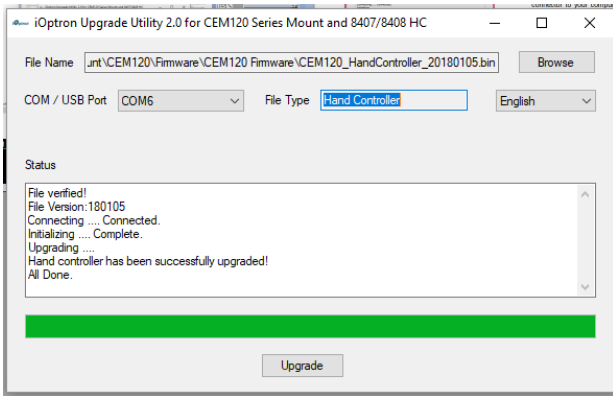



- (6) The **FileType** and **Version** will be verified and displayed. The COM port will be detected (here is COM6). If it does not show, click on pull down menu of the **COM/USB Port** and select the COM port number.



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





- (8) After the firmware upgraded successfully, power cycle the mount. If no other firmware upgrade is needed, exit the Upgrade Utility program by click on .

5. CEM120 mount firmware upgrade:

- (1) Connect the mount to a computer via a #8412 serial cable through mount RS232 port, or a USB cable through mount USB port. Turn the mount power on.



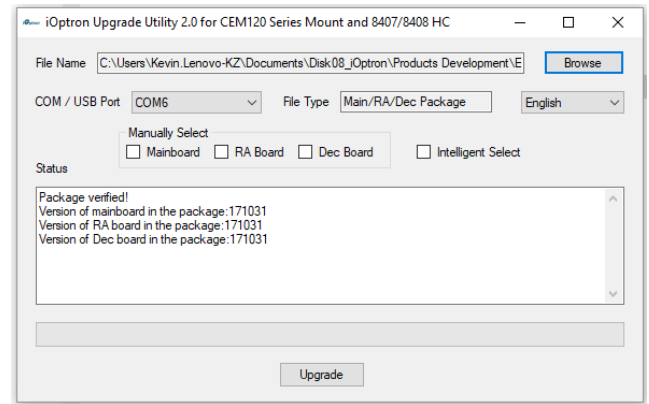
- (2) Locate downloaded software and click on **iOptronUpgradeUtility.exe**:

Name	Date modified	Type
CEM120 Firmware Upgrade 1.0.doc	1/18/2018 4:29 PM	Microsoft Office ...
CEM120_FW171031.bin	1/10/2018 5:41 PM	BIN File
CEM120_HandController_20180105.bin	1/10/2018 5:41 PM	BIN File
iOptronUpgradeUtility.exe	1/10/2018 5:34 PM	Application

- (3) Click on **Browse** in iOptron Upgrade Utility window. Select the mount firmware package CEM120_FWYYMMDD.bin, and click **Open**;

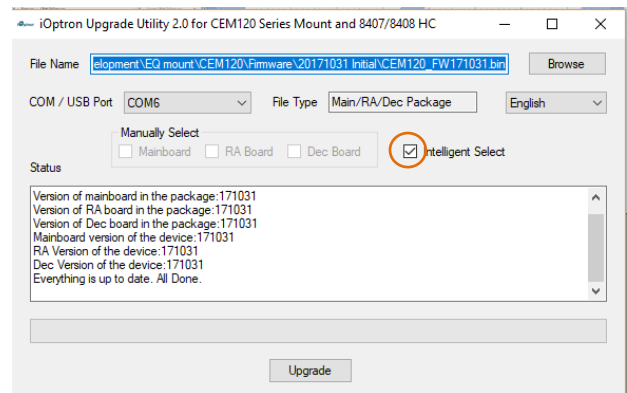
Name	Date modified
CEM120_FW171031.bin	1/10/2018 5:41 PM
CEM120_HandController_20180105.bin	1/10/2018 5:41 PM

- (9) 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.

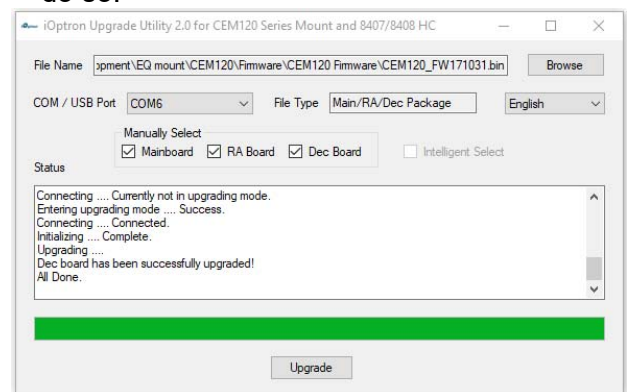


- (4) Now you can choose **“Intelligent Select”** to let the software decided which part of mount firmware needs be upgraded, or use **“Manually Select”** to select which firmware you want to upgrade.

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 CEM120 EC version high precision encoder:

CEM120EC/EC2 version needs to perform encoder calibration after the firmware upgrade to ensure precise tracking.

To calibrate the encoder:

- 1) Turn off the mount;
- 2) For RA encoder calibration, 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.

- 4) For CEM120EC2 DEC encoder calibration, hold number "4" on the hand controller, then turn the mount power on. Keep holding the #4 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.

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

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

6. Common errors during firmware upgrade:

(1) Can not open COM port:

- 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:

- 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;

(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.