
SESTO SENSO 2 robotic focusing motor

USER MANUAL

VERSION 3.3

Update 10-09-2025



SESTO SENSO 2 is made by PrimaLuceLab SpA (Italy). For any matters relating to the use, service and warranty, please refer to the addresses given in the relevant documents.

English

WARNING

If improperly handled, SESTO SENSO 2 may damage. So please follow the instructions below:

- Do not disassemble
- Do not open, damage or subject to electric shock or excessive impact any part of SESTO SENSO 2. Do not drop.
- Do not short the electronic elements
- Do not expose at temperatures below -20°C and above +60°C
- Do not burn or incinerate any component.
- Do not expose to rain or other atmospheric effect related to water
- Do not bend, modify or force any part of SESTO SENSO 2

QUALITY CONTROL

Each SESTO SENSO 2 unit, after created in our laboratories, it's tested by PrimaLuceLab technical experts to check all components. We verify mechanics and electronics. In case you check any malfunction, please contact us immediately (+ 39-0434-1696106 or support@primalucelab.com). Do not try to disassemble, repair or modify yourself SESTO SENSO 2, without our written approval, in order not to loose the Producer Warrantee.

Index

Components Identification	2
Contents of the package	2
Technical specifications	3
Install SESTO SENSO 2 on the telescope's focuser	4
Install SESTO SENSO 2 in EAGLE or Windows 7/8/10/11 computer	6
Control SESTO SENSO 2 with PLAY software	9
Update SESTO SENSO 2 firmware with PLAY software	13
Calibrate SESTO SENSO 2 with PLAY software	14
SESTO SENSO 2 Advanced Settings in PLAY software	15
Controlling SESTO SENSO 2 with Virtual HandPad	16
Control SESTO SENSO 2 with ASCOM drivers and third party softwares	21
Using SESTO SENSO with NINA	25
Installing 26mm, 33mm or 37mm adapters for SESTO SENSO 2	29
Troubleshooting	30
INFORMATION TO USERS	31
FCC COMPLIANCE STATEMENT	32

Components Identification



Contents of the package

- SESTO SENSO 2 robotic focusing motor
- 5 bushings
- Allen keys with grub screws
- Power cable for cigarette plug
- USB-C to USB cable
- Quick Start guide



CAUTION

In order to correctly use SESTO SENSO 2, you have to connect it to your telescope's focuser. The installation procedure changes based on the telescope's focuser so please refer to the next paragraphs. But if you want, you can proceed with the SESTO SENSO 2 first use also without having the focuser not installed on the telescope's focuser.

Technical specifications

Power	12V - 5.5/2.5 connector - positive tip polarity
Power consumption @ 12V	800mA max
Working temperature	-20°C / +60°C
Control with:	USB WiFi
Resolution	0,7 microns per step
Temperature probe	Internal to read motor temperature (in the package) External for focus temperature compensation (optional)
Provided software	Driver for Windows 64 bit (compatible with Windows 7, 8, 10, 11) PLAY for control with Windows 10/11 operative system ASCOT driver for control from external software (tested with ASCOT platform 6.4) Virtual HandPad for WiFi control
Weight	380 grams

NOTE

In order to proceed with installation you have to download the SESTO SENSO 2 software package from the

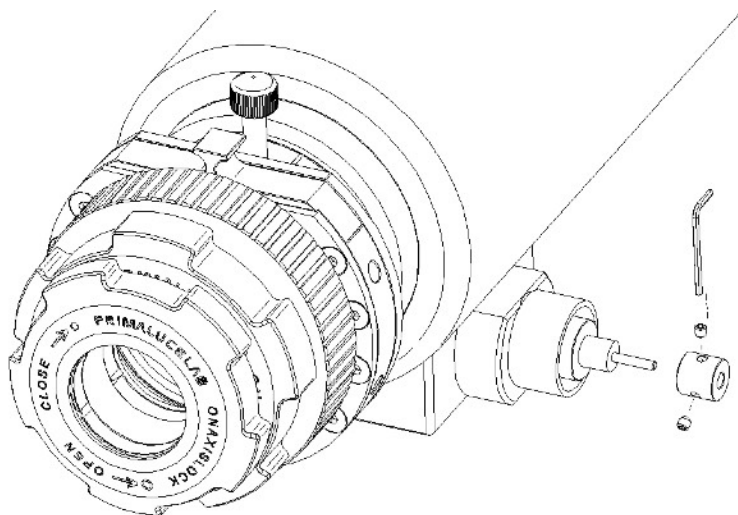
DOWNLOAD

section of our www.primalucelab.com website.

Save the package (it's in zip format) onto the EAGLE or computer you want to use to control the SESTO SENSO 2 and unzip it with the proper unzip software (You can right-click and select "Expand" or you can use software from <https://www.winzip.com>).

Install SESTO SENSO 2 on the telescope's focuser

In order to connect SESTO SENSO2 to the focuser of your telescope, remove the manual focus micrometric knob by unscrewing the screw normally present on the knurled knob. After pulling it out, you also need to disconnect the coarse focuser knob, by means of an Allen screw on the knob. On some plastic-covered focusers, you need to remove the plastic to access the disassembly screw. Connect one of the bushings you find in the SESTO SENSO 2 box (based on the diameter that fits your focuser) to the small focuser shaft of your focuser.



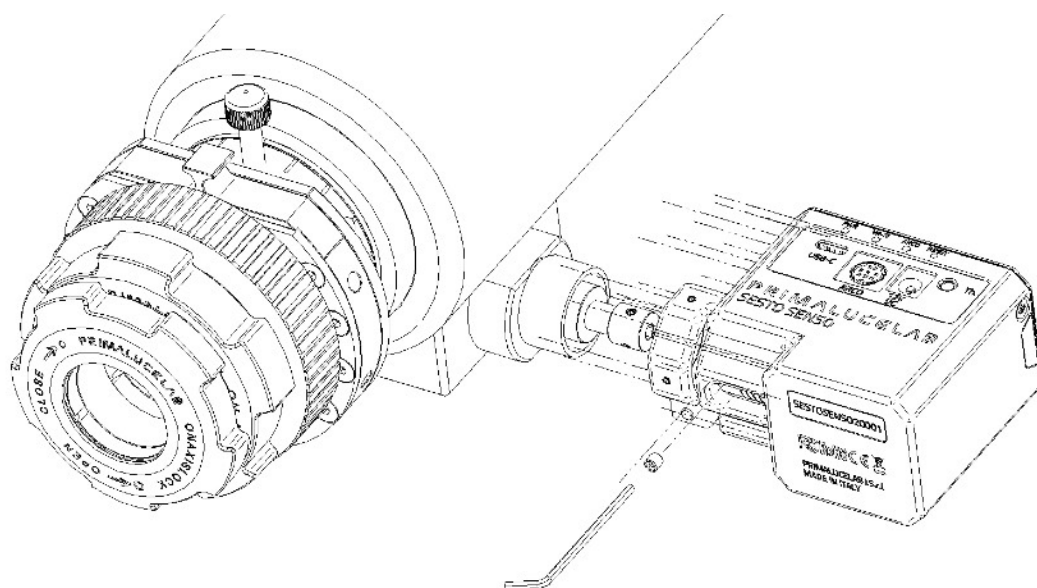
NOTE

in order to work, SESTO SENSO 2 requires your focuser to have the micro metric knob.

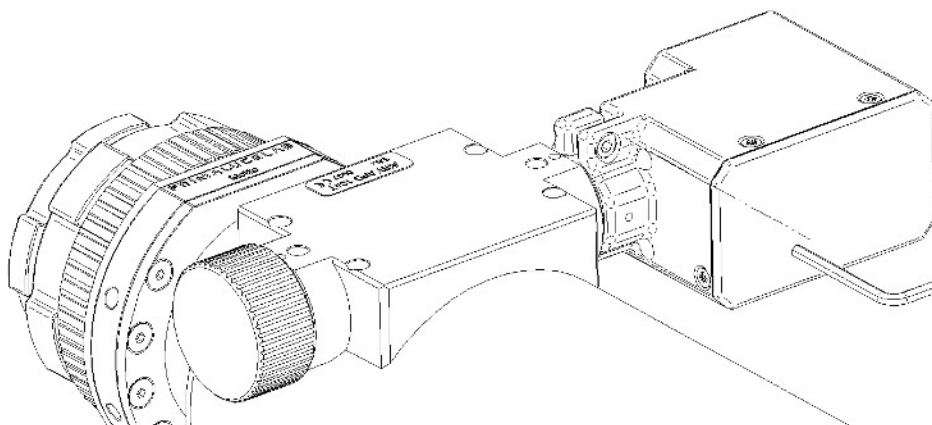
NOTE

SESTO SENSO 2 is designed to be connected to 25mm shaft. If you have another diameter, you may add the optional 26, 33 or 37mm adapters. Please refer to page 25 in order to know how to install the adapters.

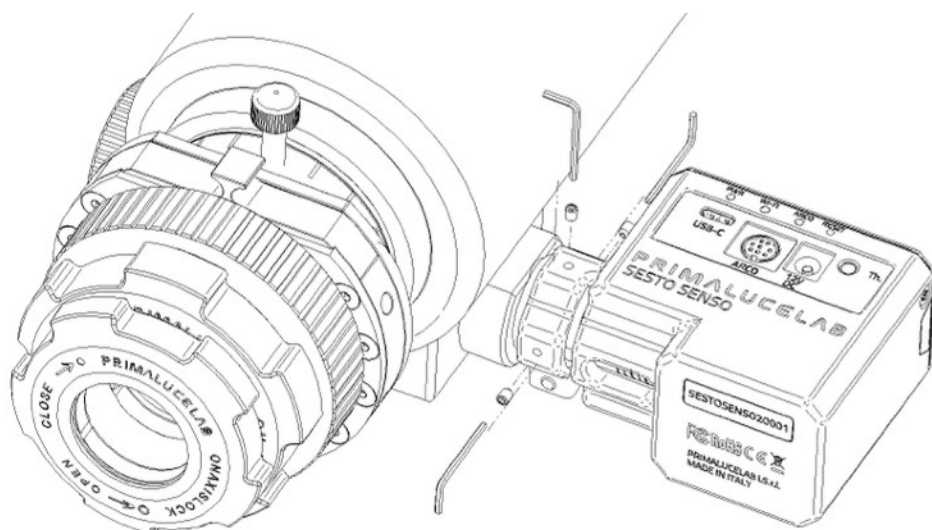
Now you can connect SESTO SENSO 2 to your focuser by paying attention to centering the micrometric pin with the pre-assembled bushing on SESTO SENSO 2, until it stops. By using the provided Allen screw, lock the 2 grub screws that fix the pre-assembled bushing on SESTO SENSO 2 to the bushing you just installed on your focuser's shaft.



Then, by using the provided Allen screw, please fix the screws that fix the outer ring of SESTO SENSO 2 to your focuser.



Finally, use the Allen screw to lock the 3 small grub screws fix the outer ring of SESTO SENSO 2 to your focuser.

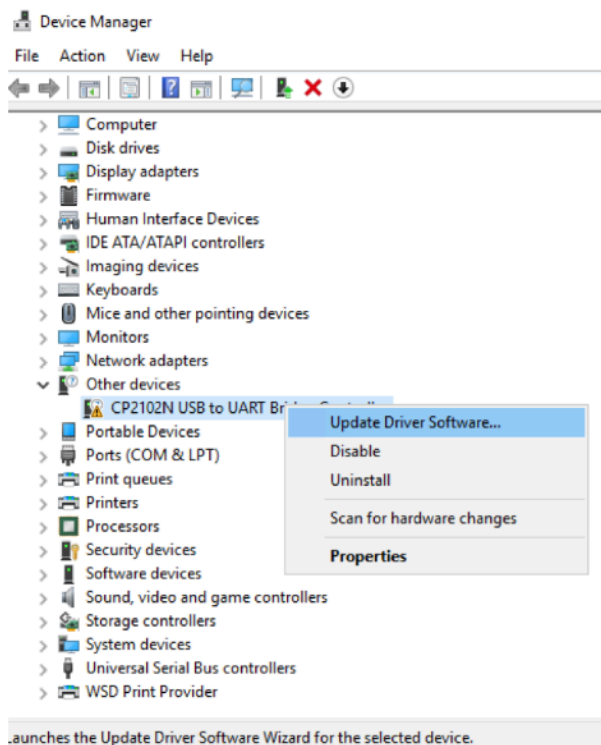


NOTE: After installing SESTO SENSO 2 on your focuser, check the smoothness of the movement keeping SESTO SENSO 2 powered off and then manually moving the focus knob of your focuser. The presence of SESTO SENSO 2 will make the movement harder (since the motor is connected) but the motion must still be uniform. If you notice an uneven movement, repeat the installation procedure.

NOTE: SESTO SENSO 2 connects to several focusers that may have different machining and tolerances precisions. Focusing accuracy, especially when using automatic focusing procedures, depends on the focuser mechanics and not only strictly on SESTO SENSO 2. If your focuser has an important backlash, you can adjust the **backlash** parameter in the software.

Install SESTO SENSO 2 in EAGLE or Windows 7/8/10/11 computer

SESTO SENSO 2 can be installed in the EAGLE or an external computer running Windows 7, 8, 10 or 11 operating system. In the SESTO SENSO 2 package you can find a 12V power cable with cigarette plug and a PC connection cable for USB port.



Connect SESTO SENSO 2 power cable to a power source (SESTO SENSO 2 power port is Ø5.5 ø2.5mm with center positive) and then connect the USB-C cable to the USB port of your EAGLE or standard computer. You will see the PWR LED on (this means SESTO SENSO 2 is powered) and, after a few seconds the Wi-Fi LED will also be become lit - This means that the SESTO SENSO 2 is online and the WiFi connection is ready to be used.

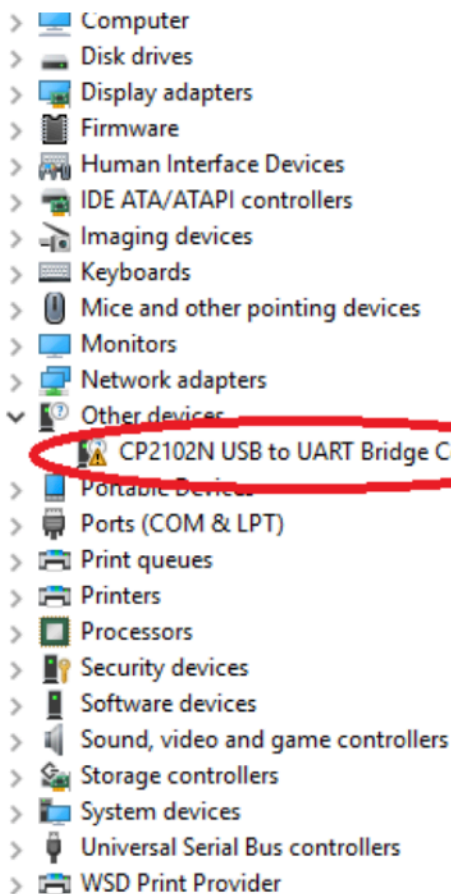
Once connected the SESTO SENSO 2 should be automatically detected and Windows should automatically install the new driver. To verify this this, please go to Control Panel and then choose Device Manager. You should see the SESTO SENSO 2 listed under "Ports (COM & LPT)" and described as "Silicon Labs CP210x" (in order to check, you can disconnect and then reconnect the SESTO SENSO 2 USB cable and see how Windows lists it).

If you can't find it, Windows is not able to automatically install the SESTO SENSO 2 driver. In order to do this, please follow this procedure:

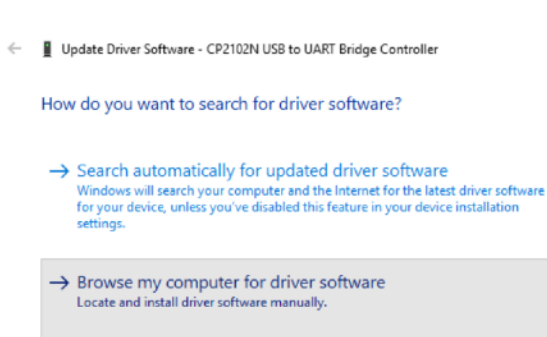
- 1) go to "Device Manager"
- 2) locate "CP2102N USB to UART Bridge Controller" under "Other devices"

PLEASE NOTE

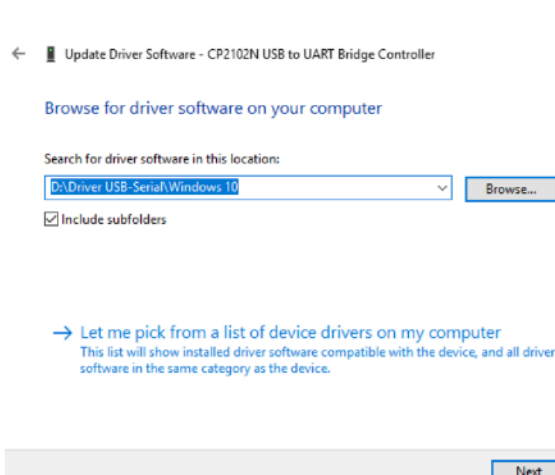
In order to correctly work, SESTO SENSO 2 requires an external 12V power supply and by connecting it to the USB port of a computer is not enough. Always connect an AC power unit or a 12V battery to the SESTO SENSO 2 12V power port before connecting the USB cable to the computer.



3) Right-click on the device and select "Update Driver Software"

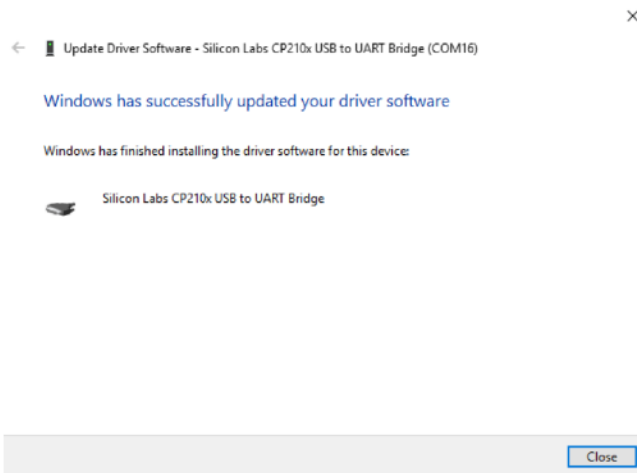


4) select the second option "Browse my computer for driver software" in order to specify the location of the downloaded driver.

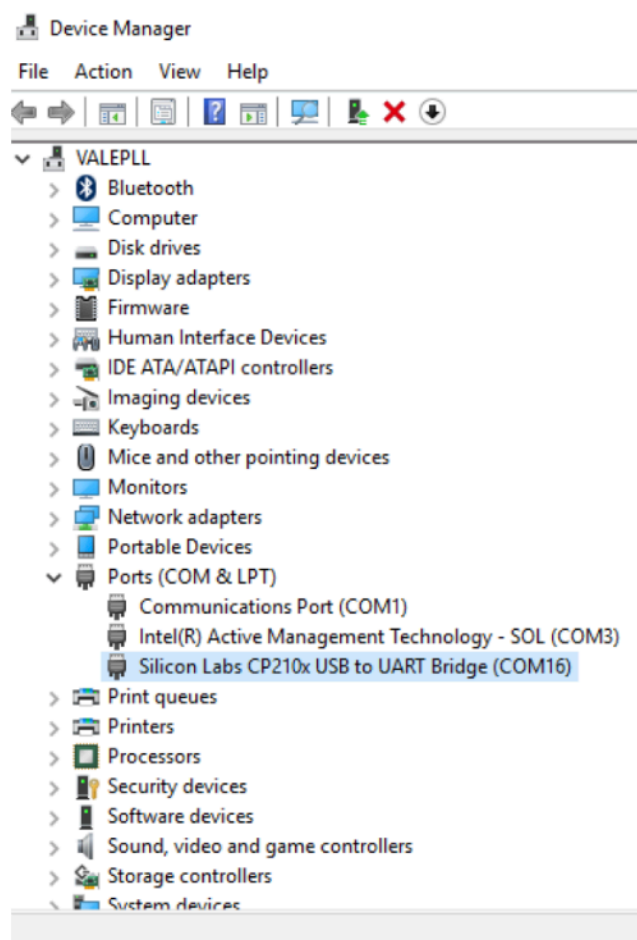


5) Select the folder where you saved and expanded the SESTO SENSO 2 software package you downloaded from our website, click "Next" and complete the installation procedure.

(Please remember to unzip/expand the file you downloaded before starting the installation of the SESTO SENSO 2)



6) at the end of the procedure, a message will appear indicating successful installation.



Now, under COM and LPT devices, you will see a new COM port (in this example COM16) which is the one used by your computer to communicate with SESTO SENSO 2.

NOTE

If the driver is not correctly installed in your Windows operative system, SESTO SENSO 2 won't be able to connect to your EAGLE or external computer and it won't work. So please check that the COM driver is correctly installed before proceeding to the next step.

Control SESTO SENSO 2 with PLAY software

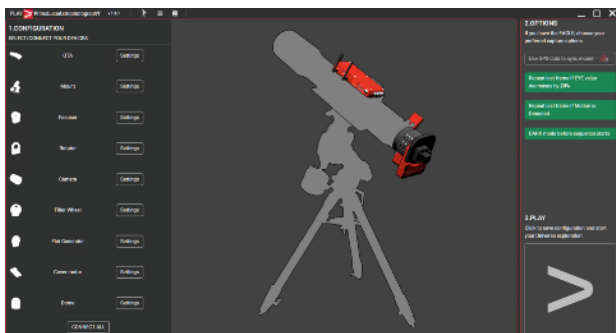
If you want to control SESTO SENSO 2 with the EAGLE or a Windows 10/11 computer, you can use our PLAY software you can download from the DOWNLOAD section of our website. **In order to use SESTO SENSO 2 with PLAY, you have to use the SESTO SENSO 2 firmware at least version 3.0. Please refer to the “Update SESTO SENSO 2 firmware with PLAY software” paragraph in order to read how to update SESTO SENSO 2 firmware.**



Double click on PLAY-setup.exe file to start installation, you will see an animation during the installation procedure.



Installation process automatically creates a shortcut on the operative system Desktop.



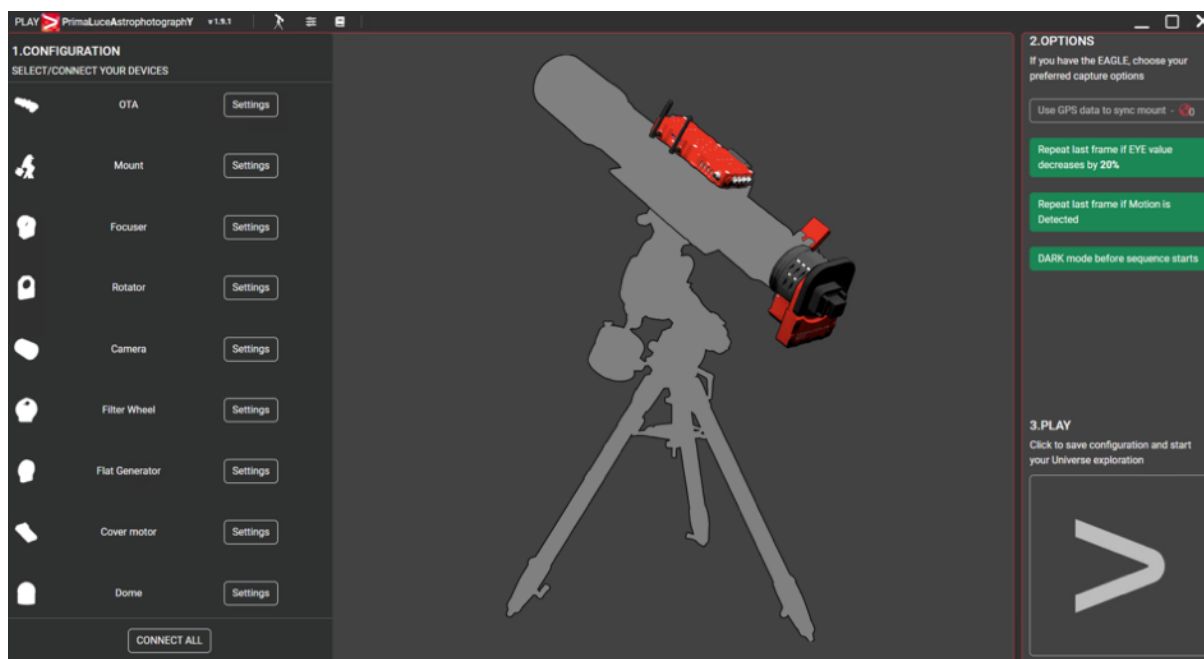
At the end of the installation process, PLAY is automatically launched.

PLAY software allows you to control not only SESTO SENSO 2 focusing motors but also other devices that may compose your telescope. For this reason, PLAY starts with the CONFIGURATOR section where you have to connect your devices first, and then you can proceed to the CAPTURE section that allows you to control the connected devices.

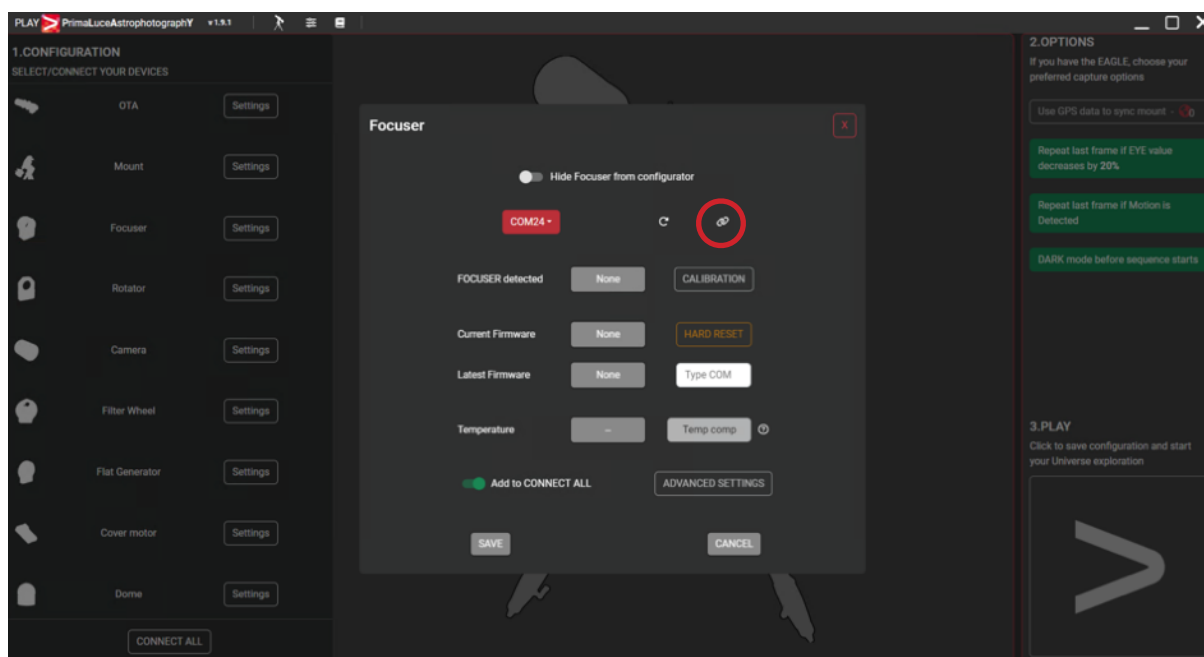
ATTENTION

In the event you need to manually reset SESTO SENSO 2 please proceed this way: with the SESTO SENSO 2 not connected to USB port and without power, press the “RST” reset button (keep it pressed for 10 seconds) and, at the same time, connect to power. The SESTO SENSO 2 will reboot and it will be reset to factory settings.

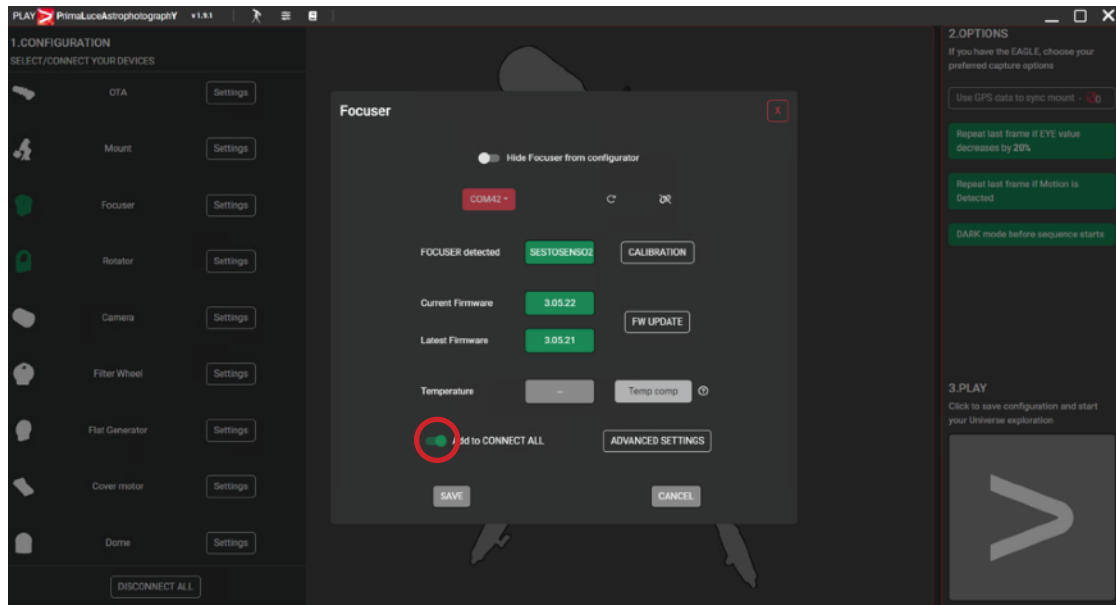
- 1) Launch PLAY software and you will see the **CONFIGURATOR** section where you have to connect your devices.



- 2) Click on the **Focuser** section (you can click both on the Focuser shape of the central image or on the Focuser text in the left column). This will open a popup window where you can set the COM port number associated to your SESTO SENSO 2 focusing motor. If you don't know what is the COM port associated to your SESTO SENSO 2, you can enter in Windows Device Manager and check what COM port number Windows creates when you plug the USB cable of your SESTO SENSO 2 focusing motor. In order to better identify it, you can also connect and disconnect the USB cable since this will update the Device Manager list. The press the **Connect** icon in order to start the connection to your focuser.

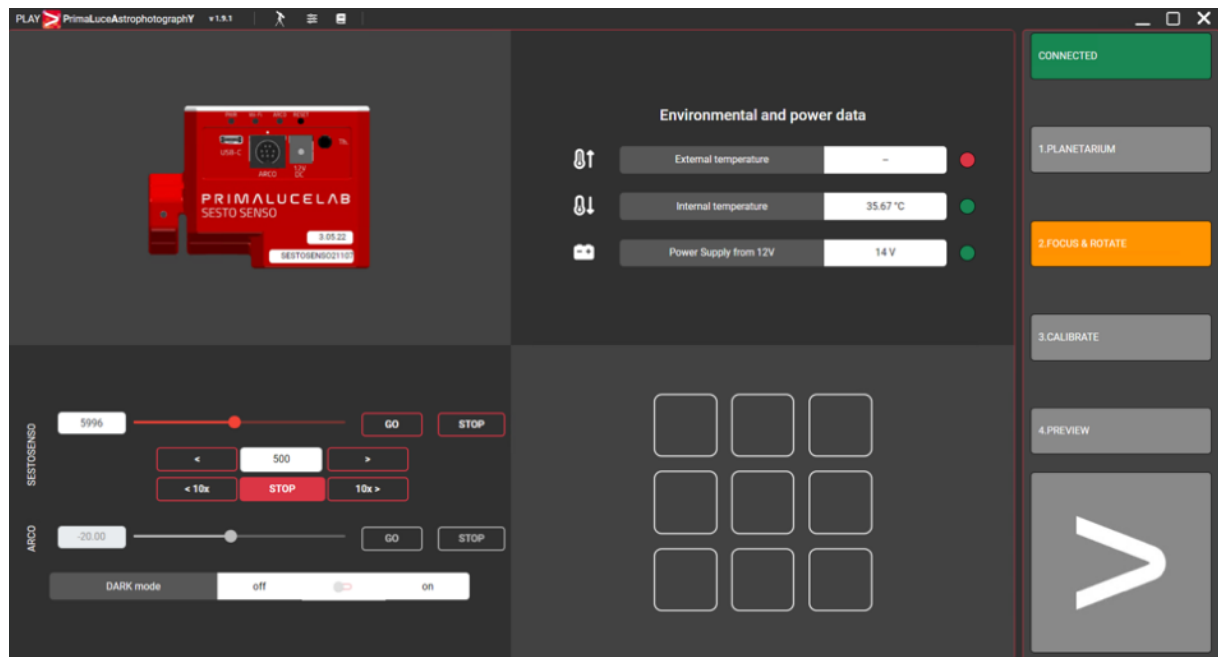


- 3) If the connection is correctly set, the button to the right of “FOCUSER detected” will become green. You can now press the **SAVE** button to confirm and exit. The “Current Firmware” shows the actual firmware version you’re using in your SESTO SENSO 2. The “Latest Firmware” shows the latest SESTO SENSO 2 firmware available. If there is a “Latest Firmware” newer than the “Current Firmware” please click the “FW UPDATE” button to start the update procedure. Please refer to the “Update SESTO SENSO 2 firmware with PLAY software” paragraph and follow the instructions and update firmware. If you want to automatically connect to SESTO SENSO 2 the next time you will use PLAY, please select the “Add to CONNECT ALL” option.



- 4) Before moving SESTO SENSO 2, you have to start the calibration. Please refer to the next paragraph “Calibrate SESTO SENSO 2 with PLAY software” and follow the instructions to calibrate SESTO SENSO 2 focusing motor. Then press the SAVE button to save your focuser configuration.
- 5) Now that the connection to your devices is confirmed, please click on the large **PLAY** button (bottom-right) to proceed to the **CAPTURE** section of PLAY software where you will be able to control your devices and start astrophotography.

- 6) At the top-right part of the screen you can see the green **CONNECTED** notification that shows you that the devices, the you set in the previous steps, are connected. The **FOCUS & ROTATE** tab is now selected and here you can see the connection to SESTO SENSO 2 focusing motor.



Under the “**Environmental and power data**” you will see the lights on the right side of the window become green:

- I. if you connect SESTO SENSO 2 to your computer only with the USB cable, you will see a green light illuminated in the right of the “Internal temperature” row
- II. If you have connected an optional temperature sensor, you will also get the green light in to the right of “External temperature” row
- III. since SESTO SENSO 2 requires also 12V power (a 12V battery by using the supplied cigarette plug cable, a 12V AC adapter with at least 1A and Ø5.5/2.5mm connector or the EAGLE power cable to power it through the EAGLE), you will get the green light to the right of the “Power supply from 12V” row.

Moving the SESTO SENSO 2 focusing motor is very easy. You can do this in different ways:

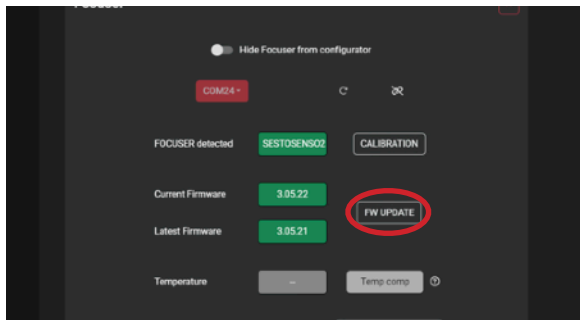
- I. Move the slider until you reach the desired position and press the **GO** button
- II. Click on the area to the left of the slider, enter the number you prefer and then press the **GO** button
- III. Click on the area with “step” label, insert the number you wish and press the **<** or **>** buttons to move the focuser by the number you entered. Press the **<<** or **>>** buttons to move the focuser by 10 times the number you entered.

You will see the focuser moving. At any moment you need to stop the movement of the focuser, press the **STOP** button in the lower part of the window.

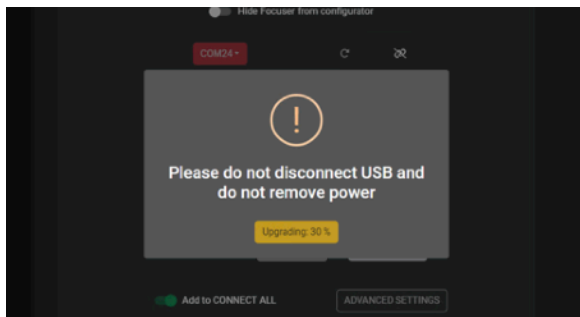
- 7) In the bottom-left area of PLAY window, you can find the settings of the focuser. Here you can set:
- **DARK mode**: it allows you to activate DARK mode that will turn off focuser’s LED lights (please note that, if you turn them off, you won’t be able to check the SESTO SENSO 2 status without controlling it via the provided software).



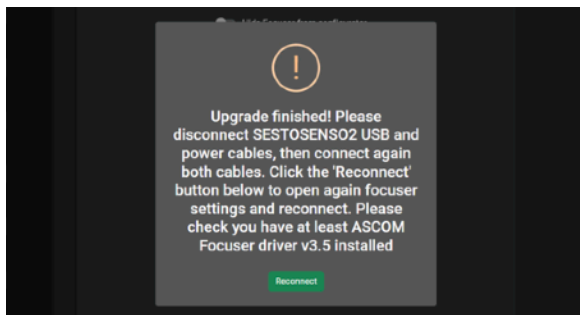
Update SESTO SENSO 2 firmware with PLAY software



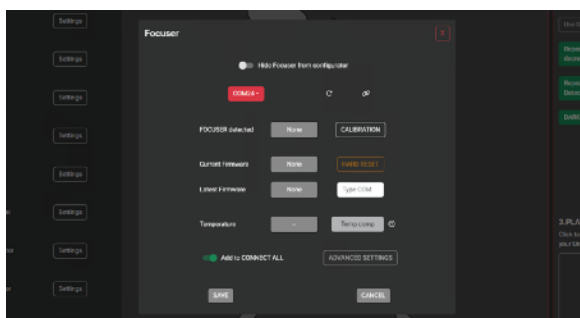
In order to update the SESTO SENSO 2 firmware, first of all please check you're using the latest version of PLAY (if you find a new version available to download on our website, please uninstall the older version of the PLAY and then install the latest PLAY version). Start PLAY and connect to SESTO SENSO 2 focusing motor. The "Current Firmware" shows the actual firmware version you're using in your SESTO SENSO 2. The "Latest Firmware" shows the latest SESTO SENSO 2 firmware available. If there is a "Latest Firmware" newer than the "Current Firmware" please click the **"FW UPDATE"** button to start the update procedure.



The process will start updating SESTO SENSO 2 firmware. Please do not disconnect USB or power cable until the process is completed.



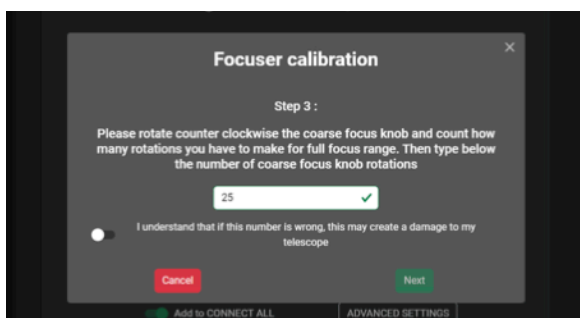
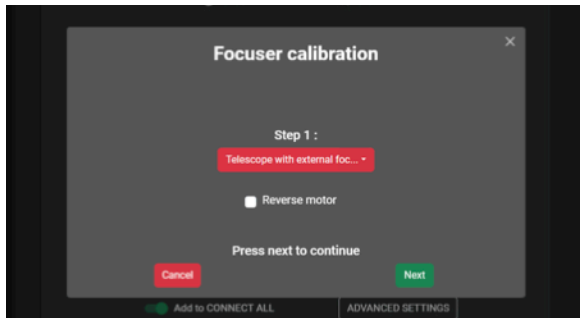
At the end of the update procedure, please disconnect SESTO SENSO 2 USB and power cables, then connect again power and USB cable to your computer. Click the **"Reconnect"** button.



This will open again the FOCUSER settings window. Here please select the COM port of your SESTO SENSO 2 focusing motor and click on the connect icon to reconnect.

Calibrate SESTO SENSO 2 with PLAY software

In order to properly work, SESTO SENSO 2 requires a calibration after you install it to the focuser (or if you manually move the focuser know on the other focuser's side than SESTO SENSO 2). In order to do this, after you connected to SESTO SENSO 2 focusing motor, in the Focuser section of the CONFIGURATOR, please click on the CALIBRATION button and you will see a new window.



If you installed SESTO SENSO 2 on an external focuser (for example a Crayford or Rack and Pinion focuser):

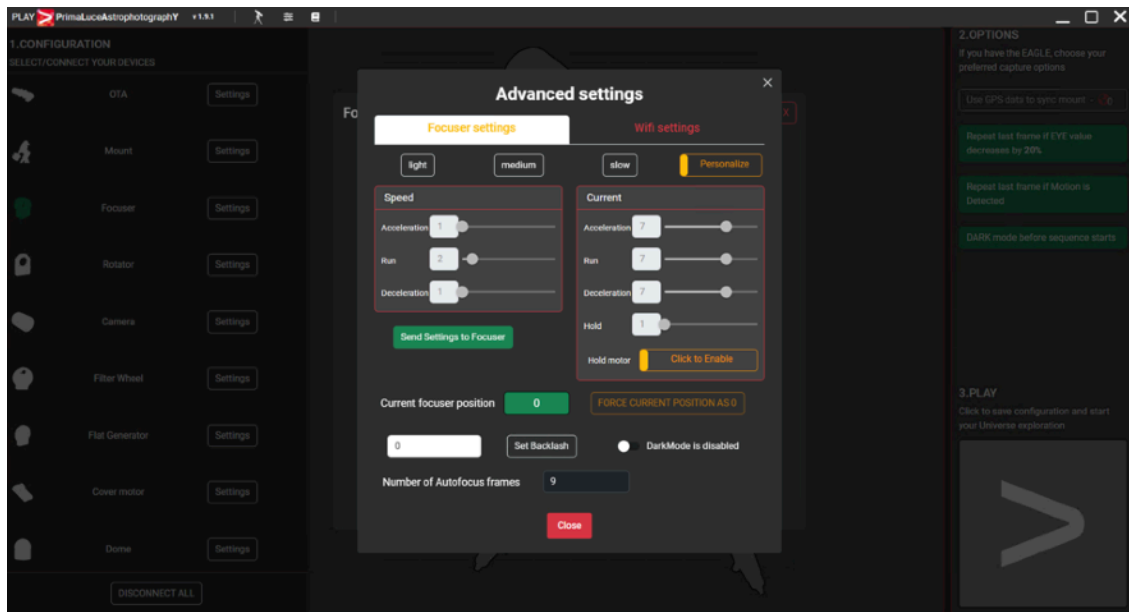
- *Step 1:* please select "**Telescope with external focuser**" and press **Next** button.
- *Step 2:* Manually move your focuser to the innermost position and then press the button "**Confirm ZERO position**".
- *Step 3:* Press "**START**" button to start moving focuser outward. You will see SESTO SENSO 2 motor that will start moving. Then you will have to press "**STOP**" button before focuser drawtube reaches ALL-OUT position. Attention: please remember to stop the motor **BEFORE** it will reach the end of draw tube travel or you may cause problems to the focuser or to the SESTO SENSO 2 motor. Press **NEXT** button to continue.
- *Step 4:* You will see a notification, that confirms that calibration is completed, press **Close** button to complete the process.

If you want to SESTO SENSO 2 on an SC type telescope with internal focuser and microfocuser:

- *Step 1:* please select "**SCT telescopes with Microfocuser**" and press **Next** button.
- *Step 2:* with SESTO SENSO not installed on your telescope, count how many rotations you have to make for full focus range and then please manually turn the coarse knob of the focuser clockwise until it stops (do not force the focuser when it reaches the hard stop). Then press the button "**Confirm ZERO position**".
- *Step 3:* type the number of coarse focus knob rotations you had on previous step and select the "I understand that if this number is wrong, this may create a damage to my telescope" to confirm that you correctly calculated and typed the number of rotations. Now install SESTO SENSO 2 on the microfocuser of your telescope. When SESTO SENSO 2 is installed, press **Installed** button.
- *Step 4:* You will see a notification, that confirms that calibration is completed, press **Close** button to complete the process.

SESTO SENSO 2 Advanced Settings in PLAY software

By clicking the ADVANCED SETTINGS button in the Focuser configurator, you will see the advanced parameters that may be used, for example, to have a perfect match of SESTO SENSO with your telescope's focuser, to better support the weight of the imaging accessories you use (camera, off axis guider, filter wheel, etc.) used in astrophotography.



Quick Settings:

In order to simplify SESTO SENSO 2 settings, we created some preset profiles from which you can start to create the ideal configuration based on the weight load applied to the focuser and the moving speeds you want.

Light button is recommended for light loads.

Medium button is recommended for medium loads.

Slow button is recommended for heavy loads.

The 3 buttons “User 1”, “User 2” and “User 3” allow you to save up to 3 quick settings based on your personalised values of Speed and Current.

Advanced Settings:

In the first set of commands, the operating currents of the SESTO SENSO 2 motor are reported, the values that can be set range from 0 to 10.

- **Acceleration:** set the current in acceleration ramp
- **Run:** set the current after acceleration ramp during RUN
- **Deceleration:** set the current in deceleration ramp

In the second set of commands (“Speed settings”), the SESTO SENSO 2 motor movement speed parameters are set.

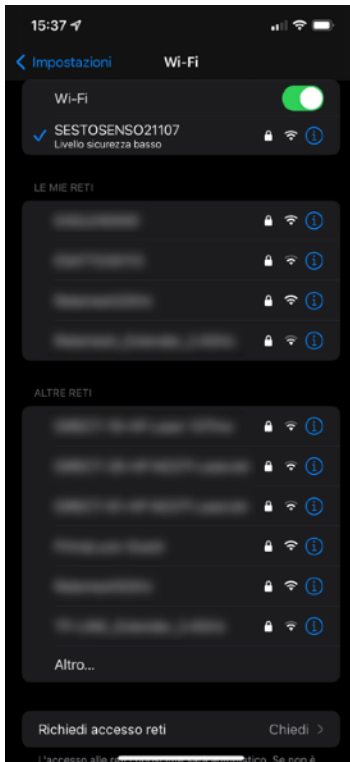
- **Acceleration:** set the acceleration during starting ramp (Range from 0 to 10)
- **Run:** set the speed value after acceleration ramp (Range from 0 to 10)
- **Deceleration:** set deceleration value after slowdown ramp (Range from 0 to 10)
- **Hold:** set the hold current, when the motor is stopped

The third option allows you to activate the Hold current.

NOTE: if the focus micrometer reduction system has slippages between the micrometer pin and focuser shaft, you can solve this problem by setting the Acceleration, Run, and Deceleration (in Speed Settings) to 1.

Controlling SESTO SENSO 2 with Virtual HandPad

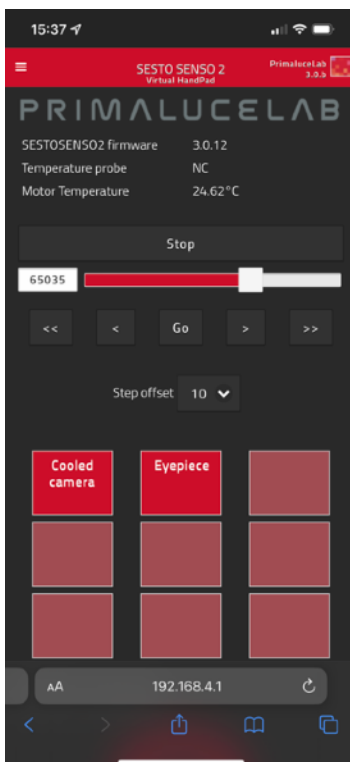
SESTO SENSO 2 can be controlled also without EAGLE or a computer, by connecting from any smartphone or tablet (also a computer) with WiFi and using the included Virtual HandPad. In order to set the WiFi control, please follow this guide (that has been created on a smartphone with iOS operative system but it's similar for Android devices).



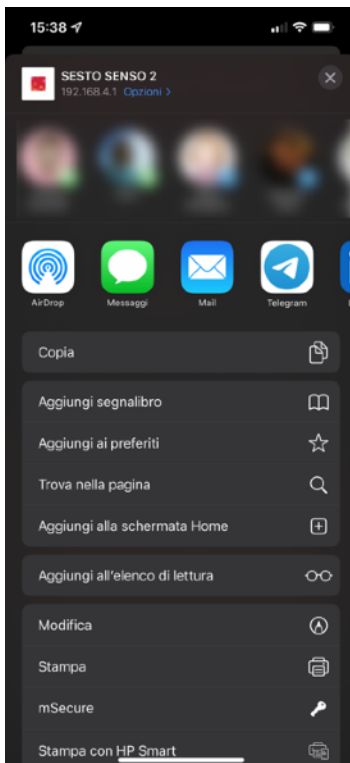
After you power up the SESTO SENSO 2, turn on the WiFi of your device (that can be a smartphone or a tablet).

Please note that you can't control SESTO SENSO 2 with WiFi (Virtual HandPad) and USB (PLAY) at the same time. If you want to control it with WiFi through the Virtual HandPad, please make sure it's disconnected from PLAY.

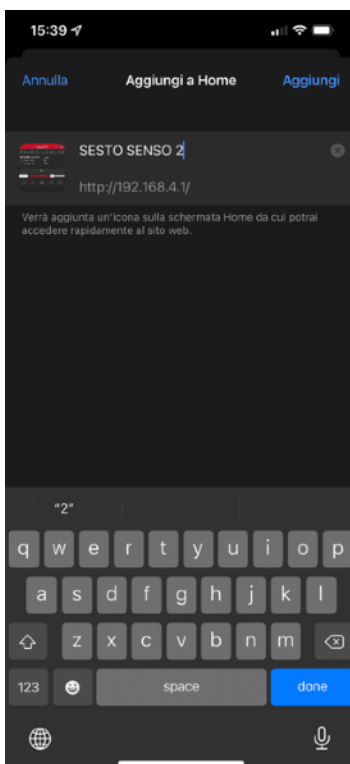
You will see the SESTOSENSO2xxxxx network created by your SESTO SENSO 2, the network name corresponds to your SESTO SENSO 2 serial number. Select the SESTOSENSO2xxxxx network. Using the keyboard (virtual or physical) of your device insert "primalucelab" as the default password (or the password you choose if you changed with the FOCUSER Manager software as described in the previous paragraph) and then press the "Login" button. The next time you want to access SESTO SENSO 2, you will no longer have to enter your password: your device will automatically connect when you select the network created by SESTO SENSO 2 unless you change the login password. Wait for a few seconds until you get confirmation that your device is connected to the SESTOSENSO2xxx-xx network.



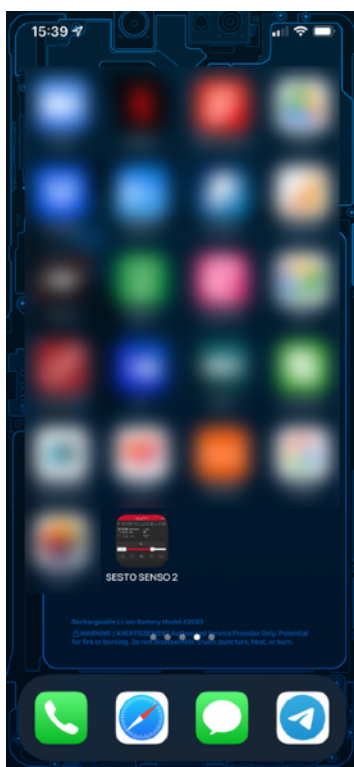
Now you can open the browser of the device (for example Chrome or Safari), in the url area (in the field where you usually write the url like www.primalucelab.com), type the address 192.168.4.1 and press the button RETURN: you will see the SESTO SENSO 2 Virtual HandPad on your screen.



To create a link directly to your device desktop, simply press the "share" button and then "Add to Home".



You can personalize the name, or just leave "SESTO SENSO 2". Press Add button to confirm.



The SESTO SENSO 2 connection will be created and you will have a direct and immediate connection to SESTO SENSO 2 in your device.

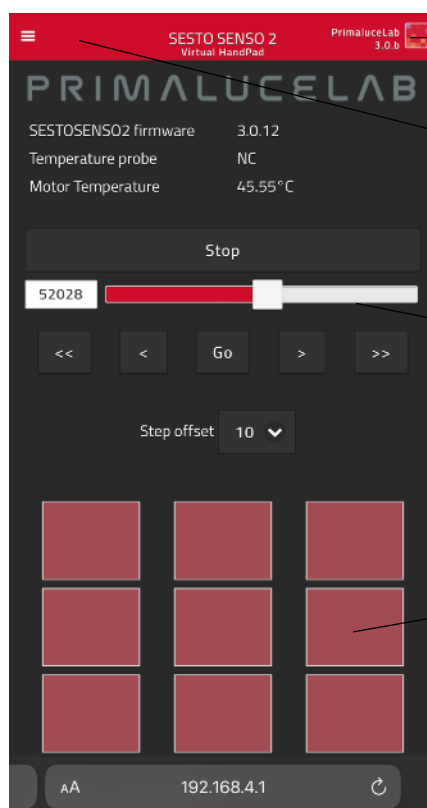
Press the SESTO SENSO 2 button to start the Virtual HandPad.

The Virtual HandPad allows you to control and use SESTO SENSO 2 focusing motor without the need of an EAGLE or of a computer.

On the top-right of your screen you can find the Virtual HandPad version. Then you can read the SESTO SENSO 2 firmware version, the external temperature (if you connected the optional temperature sensor) and the internal motor temperature.

Below you can find the slider and the button to move the SESTO SENSO 2, together with the step selector.

In the lower part you can find the 9 programmable buttons that allow you to save up to 9 different focus positions, name them and easily recall focus position with just the push of a button.



Virtual HandPad version

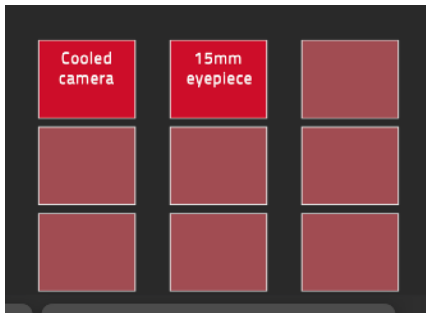
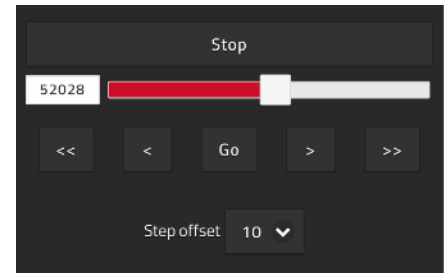
Settings

SESTO SENSO 2 controls

Presets buttons

Moving the SESTO SENSO 2 focuser with the Virtual HandPad is very easy. You can do this in different ways:

1. move the slider until you reach the desired position and tap on the **GO** button
2. make a double tap on the left field (where you can read the number in step of your focuser), write the number you prefer with the virtual keyboard of your device and then press the **GO** button
3. select a value in the "Step offset" selector (from 100 to 2000 steps) and tap the **<** or **>** buttons to move the focuser by the number you selected. Tap the **<<** or **>>** buttons to move the focuser by 10 times the number you selected.

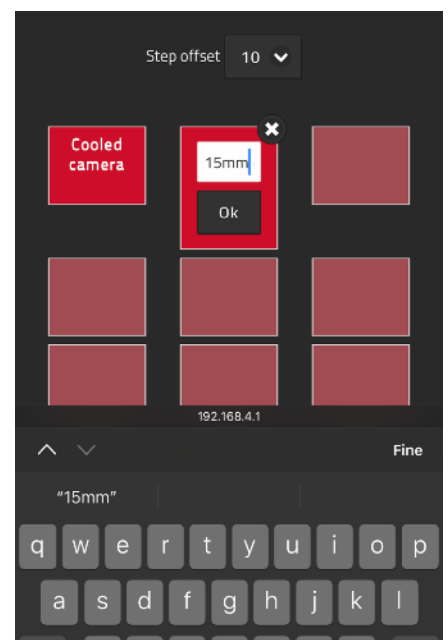


In any moment, if you need to immediately stop the movement, press the **STOP** button in the upper part.

In order to save a new position in the Virtual HandPad, first of all you have to move the SESTO SENSO 2 to a position where your telescope is in perfect focus (you will need an optical accessory or a camera in order to do this) and then follow this procedure:

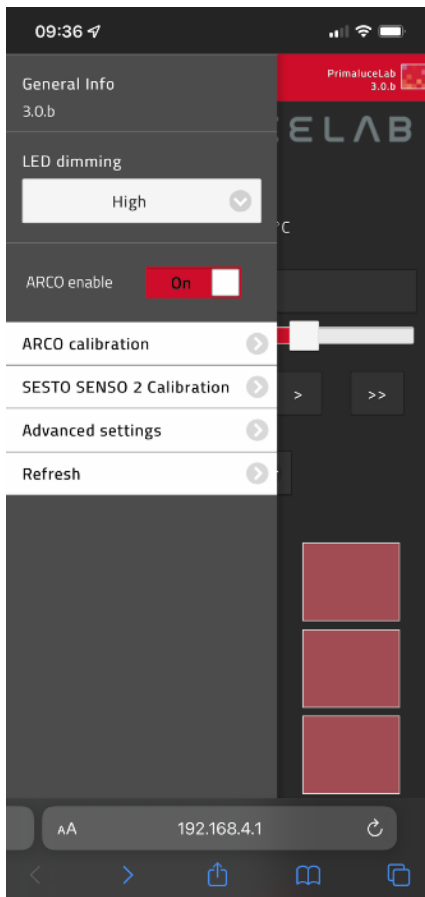
Tap and keep your finger on one of the empty buttons: the position will be automatically saved with a "Preset" name.


Tap on the name of the button and you will be able to change it by using the virtual keyboard of your device. Press **ENTER** button to confirm the new name.



NOTE

When you save the focus position in the SESTO SENSO 2 Virtual HandPad, you will find the same positions when you will control the SESTO SENSO 2 with USB from your EAGLE or external computer.



By pressing the top-left button  in the Virtual HandPad main screen, the option menu will appear. Here you will be able to set:

- 1) *LED dimming*: you can change the SESTO SENSO 2 LED lights intensity to the value you prefer. LED status will be automatically stored in the SESTO SENSO 2 electronics.
- 2) *ARCO enable*: this switcher allows you to activate the optional ARCO rotator (that has to be connected to ESATTO with the ARCO cable).
- 3) *SESTO SENSO 2 Calibration*: if you want to redo the calibration, by pressing this button you will re calibrate SESTO SENSO 2 again.
- 4) *Advanced settings*: here you can set the advanced settings of your SESTO SENSO 2 unit, please refer to the previous paragraphs to understand the use of the advanced settings.

Control SESTO SENSO 2 with ASCOM drivers and third party softwares

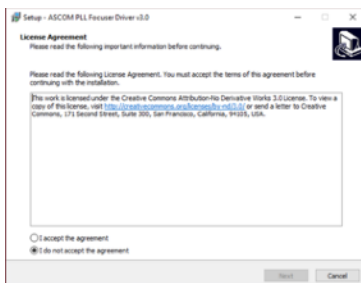
In order to control your telescope focus with SESTO SENSO 2 you can also use third party softwares instead of the PLAY described in the previous paragraphs. In order to do this, you can use SESTO SENSO 2 ASCOM drivers.

NOTE: the “PLL ASCOM Focuser” drivers described in this manual are version 3 and they require the use of firmware 3 in the SESTO SENSO 2.

NOTE

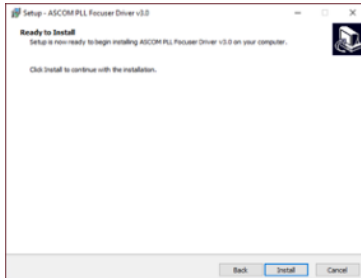
ASCOM is an open platform that allows an integration between astronomy softwares and devices. In order to use SESTO SENSO 2 with ASCOM drivers, first all you have to download the ASCOM platform (from <https://ascom-standards.org> website, SESTO SENSO 2 has been tested with ASCOM platform 6.4) and install it in the Windows computer you use to control SESTO SENSO 2.

In order to install SESTO SENSO 2 ASCOM driver in the EAGLE or Windows computer you use to control SESTO SENSO 2, please follow these steps:

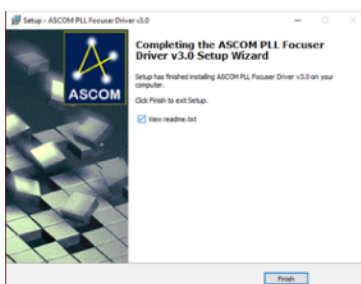


Make a double click on the **PLL ASCOM Focuser.exe** file that is part of the SESTO SENSO 2 software package you downloaded from our website.

A new window will appear, select “I accept the agreement” and press **Next** button to proceed.



In the next window, press the **Install** button to proceed with installation.



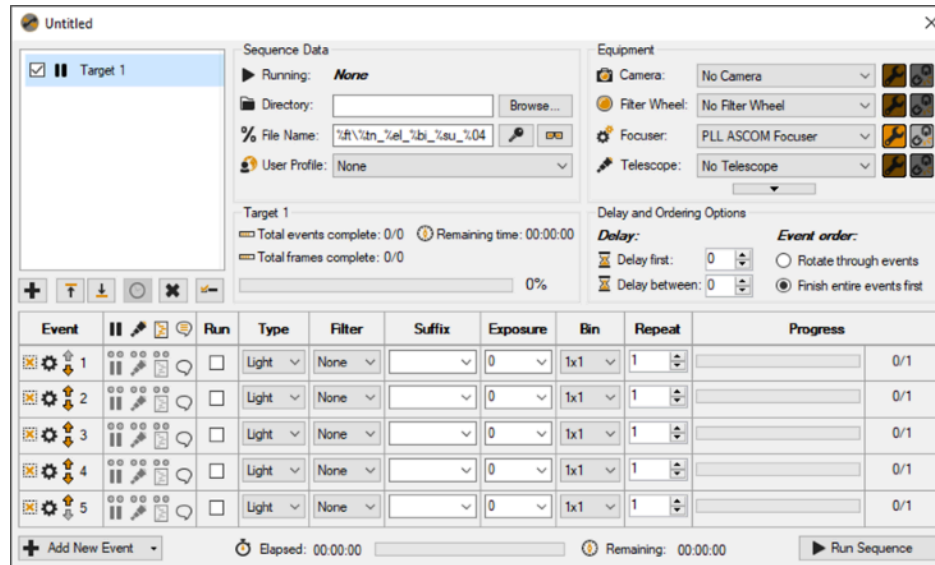
When the installation is completed, press the **Finish** button


NOTE

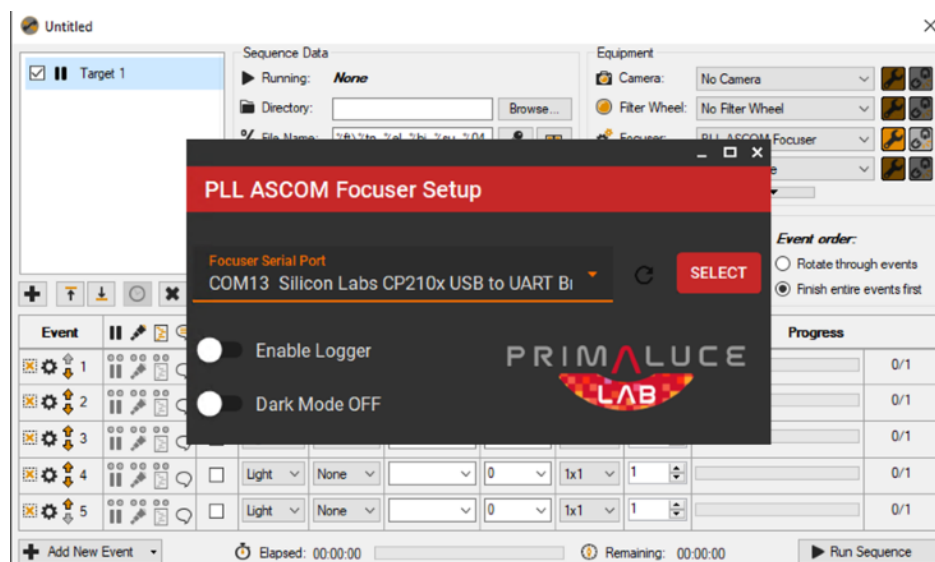
The SESTO SENSO 2 ASCOM driver included a log file record feature that allows your computer to save a file with all the events related to the use of SESTO SENSO 2 with ASCOM and third party software. If you find any problem with your astrophotography software, enable the “Log communication” option in the SESTO SENSO 2 ASCOM properties and send us with an email to support@primalucelab.com the log files you will find under C:/Documents/ASCOM

Now you can control SESTO SENSO 2 focusing motor by using third party softwares for Windows and that supports ASCOM platform. In this guide we'll show two examples with 3 softwares commonly used in astrophotography:

1) **Sequence Generator Pro:** <http://mainsequencesoftware.com>

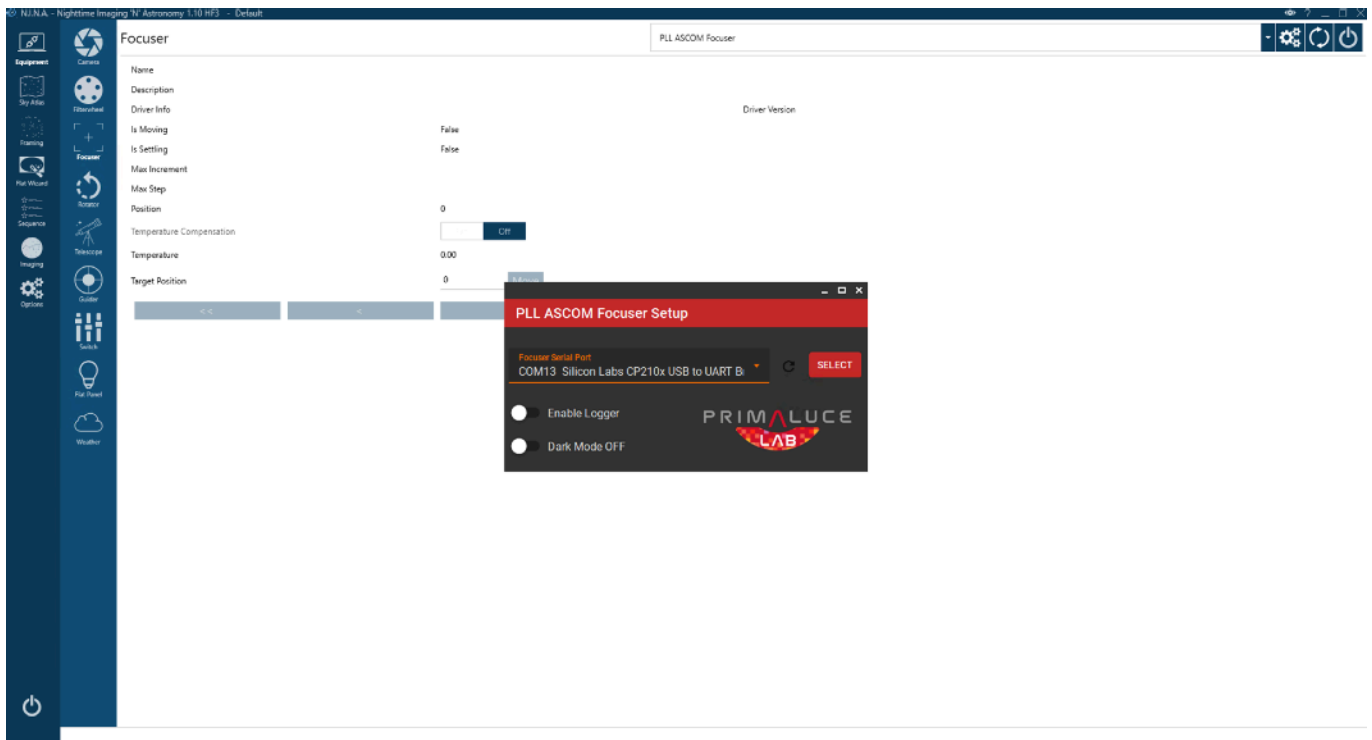




Start Sequence Generator Pro and, in the Equipment profiler, select “**PLL ASCOM Focuser**” then click on the first icon  to the right. This will open a new window asking for the COM port number. Select the COM port related to SESTO SENSO 2 and press the **SELECT** button.



This will start the connection to the SESTO SENSO 2 and you will see position, temperature (if you connect the optional temperature probe) and movement buttons in the “Focus Control” tab.

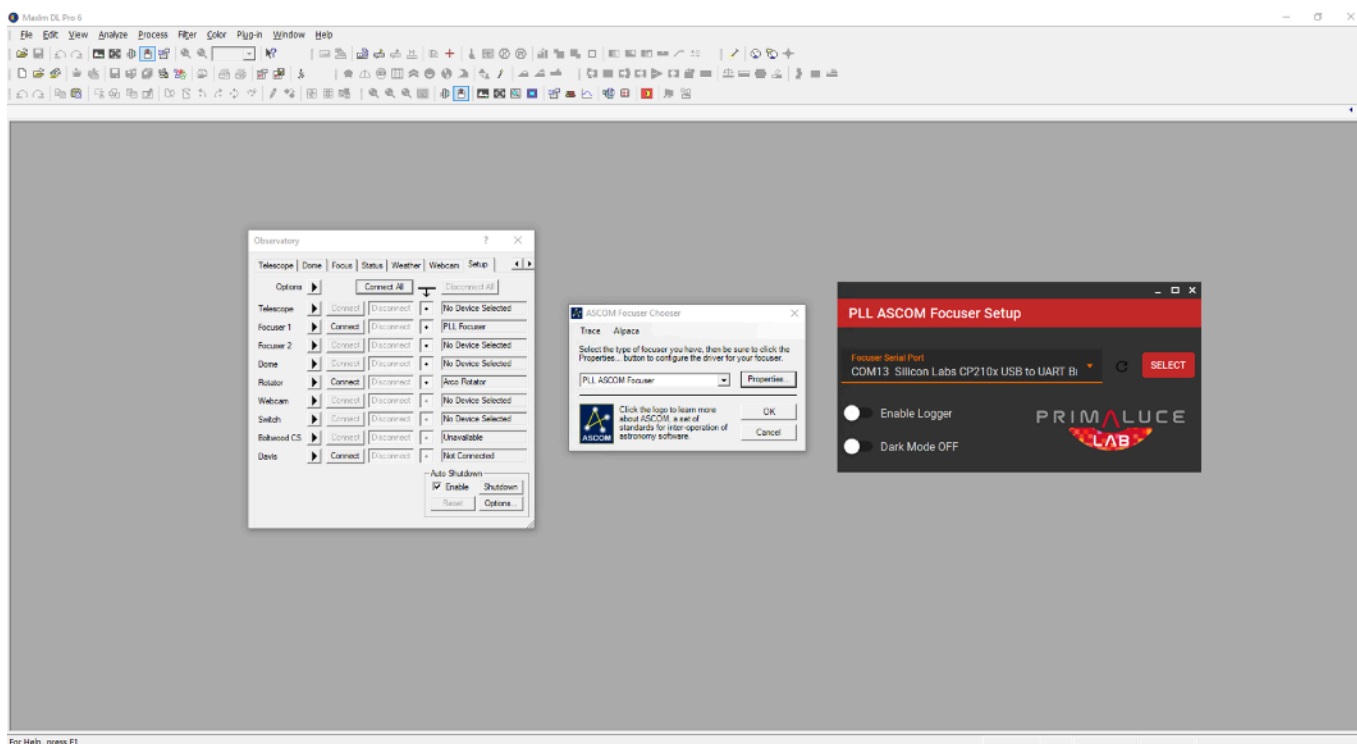
2) **N.I.N.A.:** <https://nighttime-imaging.eu>




Select the “**Equipment**” tab, select “PLL ASCOM Focuser” then click on the  button to the right of the “Focuser” area. This will open a new window asking for the COM port number. Select the COM port related to SESTO SENSO 2 and press the **SELECT** button. Finally, press the connect icon in N.I.N.A.  to start the connection to the SESTO SENSO 2 and you will see position and temperature (if you connect the optional temperature probe).



3) **MaximDL**: <http://diffractionlimited.com/product/maxim-dl/>



Select “**Observatory**”, click on the  button to the right of “**Focuser**” and select “**Choose**”. In the new window select “**PLL ASCOM Driver**” and click on “**Properties**”. This will open a new window asking for the COM port number. Select the COM port related to SESTO SENSO 2 and press the **SELECT** button and then press OK button in the “ASCOM Focuser Chooser” window. Finally, press the “**Connect**” button in the Observatory window to start the connection to the SESTO SENSO 2.

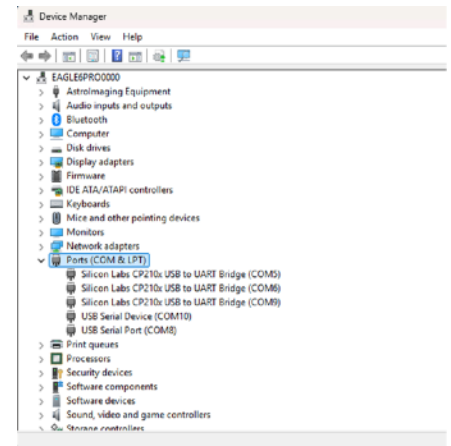
Using SESTO SENSO with NINA

(this guide has been written with the collaboration of Ronald Brecher - <https://astrodoc.ca/>)

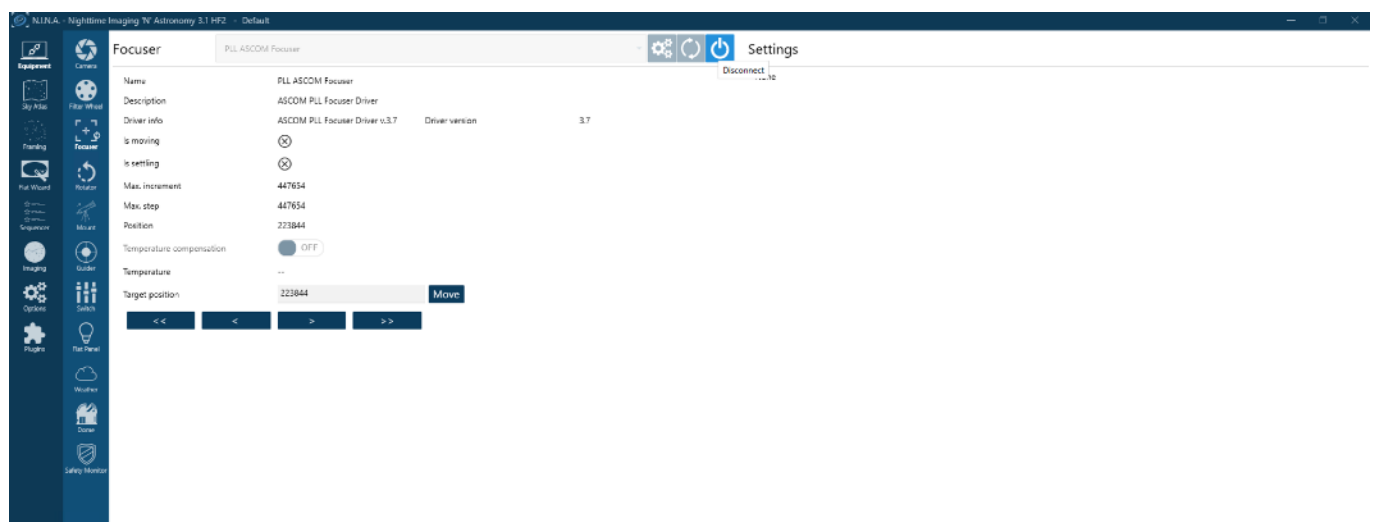
N.I.N.A. (Nighttime Imaging 'N' Astronomy - nighttime-imaging.eu) is a powerful, free, open-source astrophotography suite known for its broad ASCOM hardware compatibility, advanced automation, and deep customization, making it ideal for users who want full control of complex imaging sessions but are comfortable with a steeper learning curve. N.I.N.A. is easy to install, it excels in flexibility, and it supports a very wide range of equipment and options. It works with all PrimaLuceLab equipment, and it is one of the most used astrophotography softwares among advanced users. In this paragraph you will find the main steps for controlling your SESTO SENSO with N.I.N.A.

Connecting SESTO SENSO to N.I.N.A

1. Install the latest stable version of N.I.N.A. from the link above. Setup your SESTO SENSO as directed in the user manual.
2. Disconnect the SESTO SENSO USB cable from the EAGLE or other PC.
3. Click the Windows Start button and begin typing 'Device Manager.' When you see the Device Manager, launch it and expand the PORTS section.
4. Connect your SESTO SENSO via USB and take note of which COM port appears in the device manager. Jot it down as you will need it later.
5. In N.I.N.A., go to the Equipment tab and select Focuser.
6. Choose the 'PLL Focuser vx.x (ASCOM)' from the drop-down list.
7. Click on the gear icon and the ASCOM settings window will open. From the dropdown list choose the COM port to the one you wrote down in step 4 and press SELECT.
8. Click the Connect button for the focuser.



Once N.I.N.A. connects to the focuser, information about the focuser will be displayed. Next, verify that N.I.N.A. can control the focuser. Use the focuser controls on the Focuser tab to verify that the SESTO SENSO moves in and out as expected.



Troubleshooting Your Connection

You'll get an error message if SESTO SENSO fails to connect to your PC. The most common causes of failure to connect are no power, no USB connection, or wrong COM port selected during setup.

1. Ensure that focuser is connected to power (red power light indicates power).
2. Ensure USB is connecting. With Windows Device Manager open and the PORTS section expanded, confirm that the focuser connection appears and disappears when you plug in and unplug the USB cable. Write down the COM port number for the next step.
3. Ensure you have selected the correct COM port in N.I.N.A. In the Equipment tab, select the Focuser tab. Highlight the PLL ASCOM driver, and click on the gear icon. Make sure that the COM port matches the COM port that appeared in Device Manager in the preceding step.

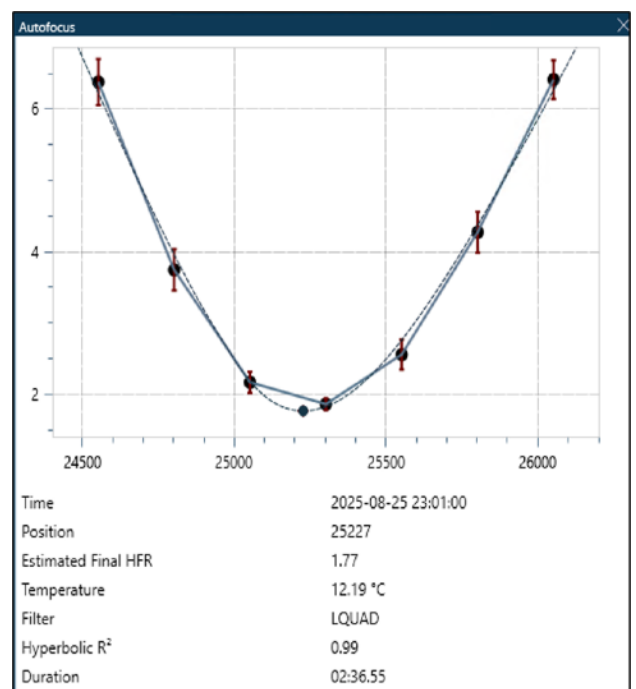
Setting Up Autofocus

Before you can use the triggers and instructions, you'll need to set up Autofocus for your imaging system. Two of the most important parameters for reliable autofocusing are the Autofocus Initial Offset Steps and the Autofocus Step Size. Autofocus Initial Offset Steps should be set at 3 or 4. The Autofocus Step Size is specific to your system. To determine a good starting point for the Autofocus Step Size, begin by focusing the telescope using a Bahtinov mask. Remove the Bahtinov mask and note the position of the focuser. Then, zoom in to see the stars well, and begin looping short (1-2s) exposures.



Move the focuser position out far enough that you can see that the stars are very slightly out of focus. Note the focus position. Use the difference between focused and unfocused positions as your Autofocus Step Size. For SESTO SENSO, try an Autofocus Step Size of 500. Suggested starting values for other parameters are shown in the figure, but they should be optimized for your system by experimenting.

A successful autofocus run looks like a 'V' and the shape of the autofocus curve is sometimes called a V-curve. Please see the detailed instructions from N.I.N.A. on optimizing autofocus parameters. Most parameters on the Autofocus Options tab have tool tips that appear when you hover over them.



Triggers and Instructions for SESTO SENSO

Triggers are conditional instructions that are executed only if a condition is true. They appear with a lighting bolt icon in the Instructions pane of the Sequencer tab. Triggers are evaluated after every exposure. There are five focuser triggers:

- autofocus after # exposures
- autofocus after filter change
- autofocus after HFR (i.e. star size) increase
- autofocus after temperature change
- autofocus after time

Triggers make it convenient to periodically autofocus only when needed, depending on your system and imaging environment. For example, Autofocus After Temperature Change checks the temperature after each exposure. Once it has fallen by the specified amount, an autofocus is performed. For example, if it is set to 3C, an autofocus is triggered only when the temperature has fallen 3C since the time of the last autofocus. You can use more than one autofocus trigger in the same imaging sequence. For example, you may wish to focus once every hour and after a filter change, or you may want to focus whenever the average size of stars has increased by 5%.

There are also four focuser instructions that can be placed anywhere in a sequence.

- Move Focuser
- Move Focuser by Temp.
- Move Focuser Relative
- Run Autofocus

The Move Focuser command will move to the specified focus position. The Move Focuser Relative command will move the specified number of steps in or out. The Move Focuser by Temp instruction can be used to get an approximate initial focus, based upon the temperature, and to adjust focus periodically as the temperature changes during an imaging run. To use this instruction, you will need to establish the relationship between focus position and temperature. This will require a temperature probe connected to the SESTO SENSO so that it reports temperature along with focus position. There is a plugin for N.I.N.A. called Autofocus Report Analysis that can be used to determine the best values to use for the Move Focuser by Temp instruction. Run Autofocus can be inserted anywhere in a sequence to autofocus using the settings established in Options/Autofocus.

Tables 1 and 2 summarize the autofocus triggers and instructions, respectively.

Additional Resources

See the N.I.N.A. Plugins tab for many useful plugins that can be used with various equipment. Check regularly for additions and updates.

Detailed documentation for N.I.N.A. is available at <https://nighttime-imaging.eu/docs/master/site/>

An introduction to N.I.N.A. is available in Sky & Telescope, September 2023, p. 28-33

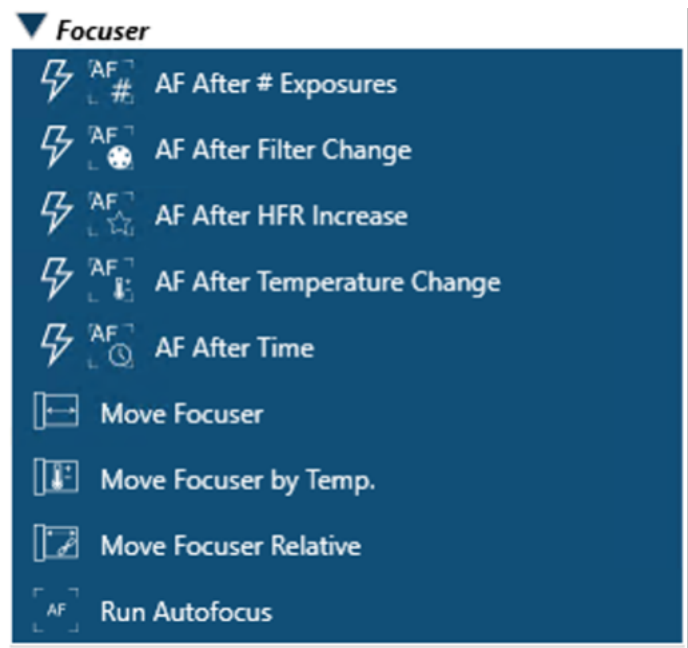


Table 1: Summary of N.I.N.A. Focuser Triggers

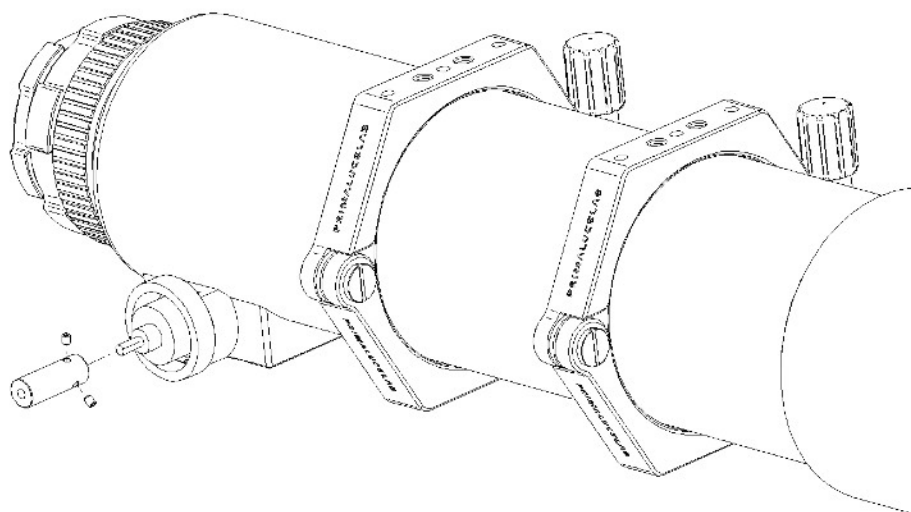
Autofocus after...	Use it to focus ...	Benefit
Number of exposures	At regular intervals	Maintains good focus through changing conditions
Filter Change	When a filter is changed	Accounts for slight differences in focus of different filters
HFR (star size) increase	As focus worsens over time	Maintains good focus through changing conditions
Temperature Change	After temperature changes by a specified amount	Maintains focus as temperature changes
Time	At regular intervals	Maintains good focus through changing conditions

Table 2: Summary of N.I.N.A. Focuser instructions

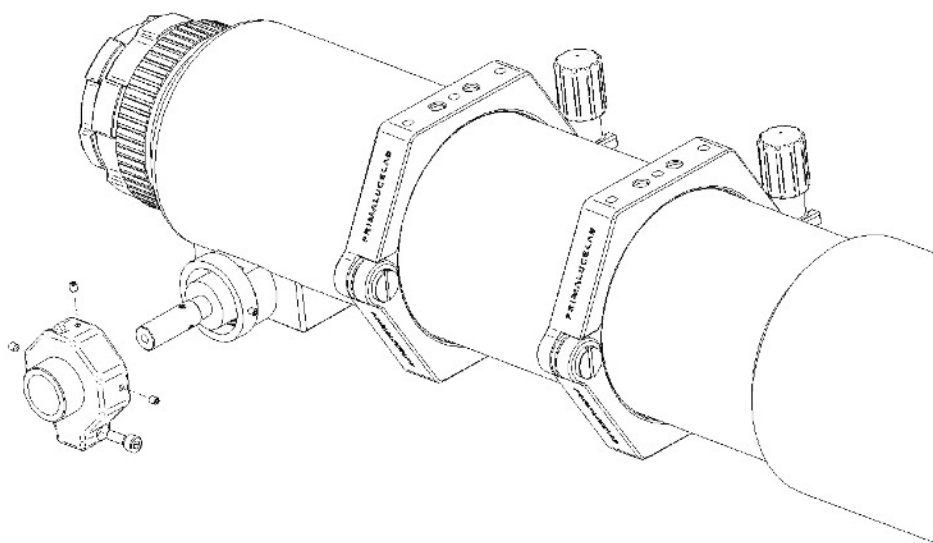
Focuser Instruction	Use it to ...	Example of Use
Move Focuser	Move the focuser in or out to a specified absolute position	Set approximate focus position prior to Autofocus
Move Focuser by Temp.	Move the focus position by an amount that depends on the temperature change since the last Autofocus	Place in between Take Image commands to automatically move the focuser as temperature changes
Move Focuser Relative	Move the focuser in or out by the specified amount from its current position	Set approximate focus position prior to Autofocus
Run Autofocus	Execute N.I.N.A. autofocus routine	Establish focus at the beginning of an imaging session.
Time	At regular intervals	Maintains good focus through changing conditions

Installing 26mm, 33mm or 37mm adapters for SESTO SENSO 2

SESTO SENSO 2 is designed to be connected to focusers that comes with 25mm diameter shaft (that you can see by removing fine and coarse knobs of your focuser) because most of the focusers come with 25mm diameter shaft. If your focuser have another diameter, you can add the 26mm (SESTOSENSO-AD26II), 33mm (SESTOSENSO-AD33II) or 37mm (SESTOSENSO-AD37II) adapters. Any other diameter won't work. Please note that these adapters are compatible only with SESTO SENSO 2 and not with SESTO SENSO first generation. In order to install the adapter, first of all please connect the long bushing (the one that comes within the adapter box) to your focuser's shaft and lock it by using the 2 grub screws. Please note, it's normal that the other side of the bushing has no threaded holes.



Then take the red adapter and connect to your focuser, by fixing it with the provided screws.



Then you will be able to connect the SESTO SENSO 2 main body, by following the instructions you at page 4.

Troubleshooting

Q: I connect SESTO SENSO 2 to my computer and 12V power, but when I start PLAY it doesn't connect.

A: Please check that, after selecting the COM port of your SESTO SENSO 2 focusing motor, you press the "Open/Close" button. If the SESTO SENSO 2 doesn't still connect, this may be related to the USB-C cable that is not working. Please try to change the USB-C cable with another one and connect SESTO SENSO 2 to the same computer. Please enter in Windows Device Manager and check that the "Silicon Labs CP210x" driver (under "Ports (COM & LPT)") is correctly loaded. If the USB-C cable works correctly, the driver will be loaded and you will be able to connect with PLAY software.

Q: I connect SESTO SENSO 2 to computer but it doesn't move and PWR LED blinks.

A: If the PWR LED light blinks, it means that SESTO SENSO 2 is not 12V powered (you can't use SESTO SENSO 2 without 12V power) so please connect to 12V power source.

Q: My SESTO SENSO 2 is connected and correctly powered but the PWR LED still blinks.

A: PWR LED light also blinks when the SESTO SENSO 2 is not calibrated. Please use the CALIBRATION button in the control software to start the calibration of SESTO SENSO 2 connected to your focuser.

Q: Focus point position in steps changes over time.

A: PLAY and ASCOM driver shows the focuser position in steps. If you move the SESTO SENSO 2 focusing motor to reach the perfect focus position, then move the focuser in another position and recall the previous focus position, your image should be in perfect focus again. If this is not happening, this means that your focuser has some mechanical slippage (that can't be automatically detected by SESTO SENSO 2 since it's an external focusing motor), and this may be a normal limitation in inexpensive focusers. In order to minimise this effect, you can set your SESTO SENSO 2 to move with lower speed: in PLAY software please click on "ADV SETTINGS" button. Here please set the Acceleration, Run, and Deceleration values (in Speed Settings) to 1.

Q: My SESTO SENSO 2 focuser doesn't connect with ASCOM drivers.

A: SESTO SENSO 2 focusing motor has been tested with ASCOM Platform 6.4 and later. By using third party softwares to control SESTO SENSO 2 through ASCOM platform, please check you are using ASCOM Platform at least version 6.4.

Q: When I connect external temperature sensor to my SESTO SENSO 2 I get wrong temperature readings.

A: External temperature probes are tested in our laboratory before shipment. If you get a strange value in the "External temperature" field of PLAY software, the temperature probe may have a hardware issue and has to be fixed or changed.

Q: When I connect SESTO SENSO 2 to PLAY, I can't connect to another software.

A: This is normal. In fact, when you connect SESTO SENSO 2 to any software, it can't be used from another software, until you disconnect it from the first software, because the serial connection can be done only once. If you want to use SESTO SENSO 2 with more softwares, please remember to disconnect it from the first software before moving to the other one.

Q: When I start my autofocus routine, focusing graph looks flat instead of creating the V-curve.

A: This happens when, in the autofocus routing of the software you choose, the step size is too small. Correct step size may depend also on your focuser so you may have to try different values, but, by considering the SESTO SENSO 2 resolution of 0.7 microns per step, you can start with 200.

INFORMATION TO USERS



According to art. 26 of Decreto Legislativo 14 marzo 2014, n. 49 "Attuazione della Direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche", the symbol of the barrel placed on the equipment or its packaging indicates that the product at the end of its useful life must be collected separately from other waste.

The user will therefore have to give the end-of-life equipment to the appropriate separate collection centers for electronic and electrotechnical waste or to return it to the reseller upon the purchase of a new type of equivalent equipment, one by one.

Properly differentiated collection for the subsequent start of dismantled equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible adverse effects on the environment and health and favors the reuse and / or recycling of the materials contained in the equipment.

The abusive disposal of the product by the user implies the application of the administrative sanctions as per D.Lgs. 152/2006.

Compliance with the RAEE legislation (D.Lgs. 49/2014)

PrimaLuceLab is registered to AEE Register with number IT17030000009790

PrimaLuceLab adheres to Sistema Collettivo ERP Italia for the compliance to RAEE legislation.



**European
Recycling
Platform**

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm (8 inches) between the radiator and your body.

Wireless Module Compliance

This device contains an ESP32 Wi-Fi module, which has been certified by the manufacturer to comply with FCC regulations. Any modifications or changes to this device not expressly approved by PrimaLuceLab could void the user's authority to operate the equipment.

WARRANTY

- 1) The PrimaLuceLab product warranty is effective from the date of purchase and is valid only if it is with the invoice (or receipt) of purchase.
- 2) The warranty covers the product against defects in workmanship and includes the cost of the replaced material and labor.
- 3) The warranty does not cover any damage caused to the product or defects or failures that occur due to improper installation , improper use and/or deterioration due to normal wear.
- 4) THE GUARANTEE DOES NOT APPLY IN THE FOLLOWING CASES:
 - Repair by anyone not authorised by PrimaLuceLab .
 - Invasive interventions or tampering with internal and/or external parts.
 - Missing of the invoice (or receipt) of purchase.

TERMS OF SERVICE

Technical assistance is performed exclusively by PrimaLuceLab or its authorised resellers. All returns must be received with our permission (to be asked writing an email to support@primalucelab.com) . YOU HAVE TO add to the shipping the invoice (or receipt) of purchase and the detailed description of the defect. For products without the invoice (or receipt) of purchase, repair and shipping costs are always paid by the customer.