6 SESTO SENSO

robotic focusing motor

VERSION 2.0

Update 07-02-2018

This instrument is produced by PrimaLuceLab iSrl. For any questions regarding use, service, and warranty, please refer to the addresses provided in the relevant documents.

English

SESTO SENSO is the robotic focusing motor by of PrimaLuceLab for precision focus control and it allows to robotize most micrometric focusers for telescopes. It is the first robotic focusing motor that does not need an external handpad, but is controlled directly through an USB port, enabling you to make astrophotography even easier and more precision especially when combined with the EAGLE system.

The use of SESTO SENSO, unlike other motors, does not preclude manual use of the telescope focuser on which it is installed. For manual use it is sufficient not to power SESTO SENSO and use the normal focusing knob of the telescope. Be careful by manually shifting the telescope focus knob, you will lose the SESTO SENSO reference position, so you will need to repeat the positioning procedure. For best performance, it is recommended to use pinion and rack focusers.

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Technical specifications

Power	10-15V, suggested 12V 0.8A max
Maximum weight load (vertical position):	7Kg
Control:	USB port
Resolution:	0.7um/step +/-5% 3200step/turn
Working temperature	-15°C/+50°C
Max excursion with 1/10 transmission:	29m
PC control:	SESTO SENSO software and ASCOM driver
Temperature sensor	Optional

Scope of delivery and parts identification

1) SESTO SENSO robotic focusing motor

2) Power cable for cigarette plug

3) Micro USB cable

4) 3mm allen screw to install SESTO SENSO on focuser

5) 1.5mm allen screw to install bushings

6) Red bushing Ø2.5mm for AIRY refractors (ED72, APO80, ED90, ED100, APO104T, APO120, APO150T), OrionOpticsUK VX and CT, Baader Steeltrack® focusers, TS-Optics V-Power, Omegon V-Power

7) Black bushing Ø2.8mm for Feather Touch focusers

8) Blue bushing Ø3mm for Skywatcher and Vixen telescopes

9) Green bushing Ø3.5mm for Takahashi telescopes

10) Silver bushing Ø3.1mm for Moonlite focusers

11) Yellow bushing for AIRY refractors (APO 65F, BLACK 80T) and SharpStar telescopes with 2" focusers

11) 2x grubscrews M3 for bushings

12) USB pen with driver, control software and user manuals

13) Red led for status activity

14) Temperature sensor port

15) Micro USB port for PC connection

16) 12V 0.7A port with Ø5.5 ø2.5mm jack

17) Holes for bushings fixing

18) Grubscrews to fix the focuser

Installing SESTO SENSO on telescope

First, you need to locate the bushing (details 6-7-8-9-10) for use with the focuser you have, (figure 2) slightly screw the grubscrews (details 11A and 11B) into the bushing and insert the bushing within the SE-STO SENSO body (detail 1). Check that the crankshaft groove is facing upwards. The large hole of the bushing should point towards the motor pin, the bushing should be inserted until it engages with the motor pin. At this point you can use the small allen screw (detail 5) to screw the two grubscrews (detail 11A) by passing through the special hole on the aluminum body of SESTO SENSO.
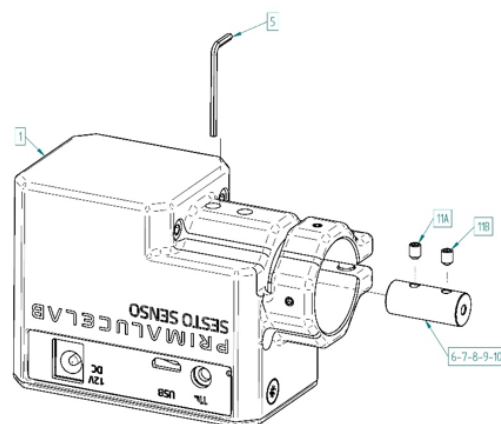
figure 2

In order to connect SESTO SENSO to the focuser (figure 3) of your telescope, you must 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 larger knob on the focuser, always 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.
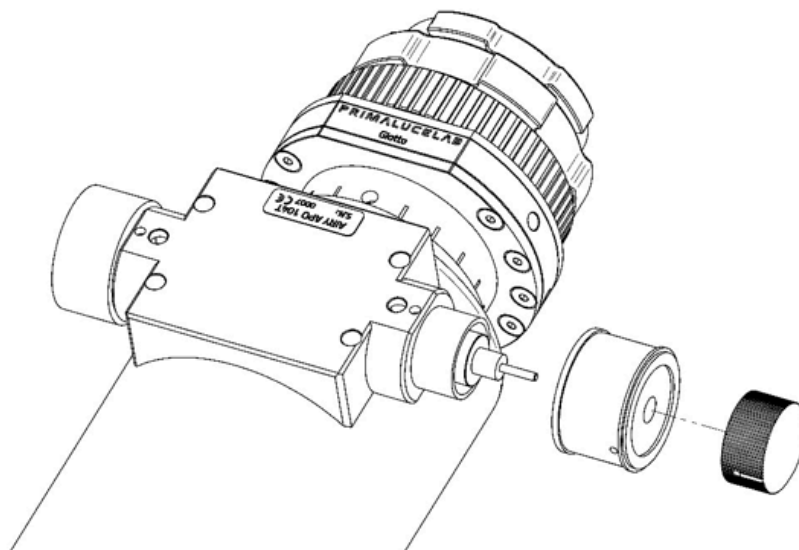
figure 3

Now you can insert SESTO SENSO (detail 1) on the focuser of your telescope by paying attention to centering the micro-metric pin with the pre-assembled bushing on SESTO SENSO, until it stops, and then close the outer ring of SESTO SENSO using the allen screw (Figure 4).
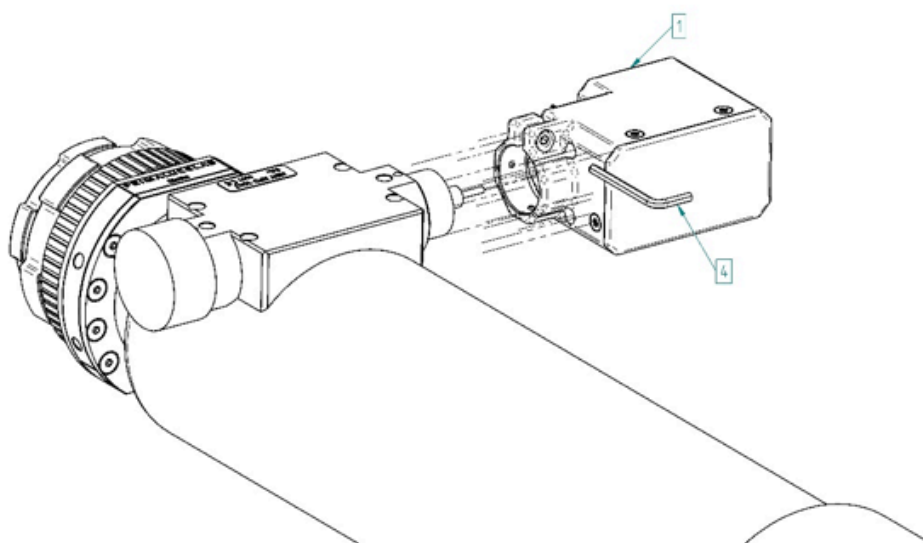

figure 4

Now use the supplied 1.5mm allen screw (Figure 5) to close the two 90° screws and the two bolt screws by passing through the special hole on SESTO SENSO body.
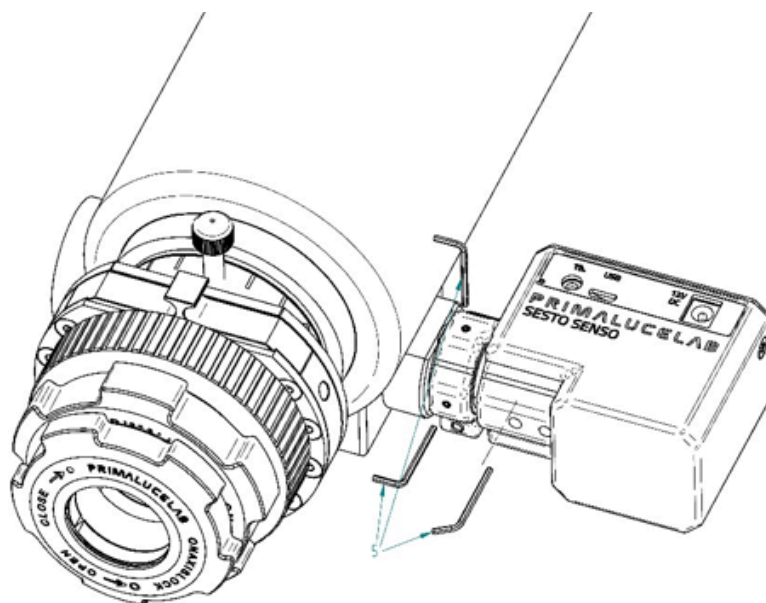

figure 5

We can proceed with the connections (figure 6), first the power cable (detail 2), then after powering SESTO SENSO, the micro USB cable (detail 3) to connect to the PC
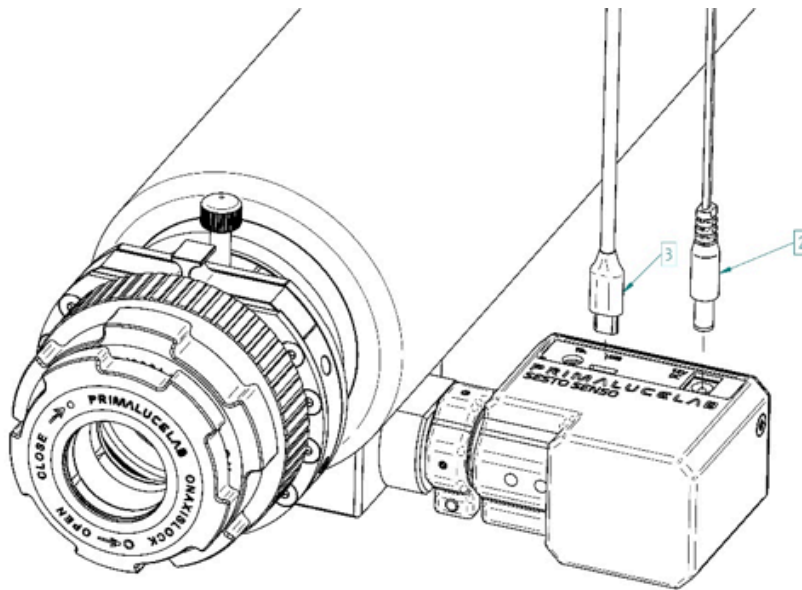

figure 6

NOTE: After installing SESTO SENSO on your focuser, check the smoothness of the movement keeping SESTO SENSO powered off and then manually moving the focus knob of your focuser. The presence of SESTO SENSO 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 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. If your focuser has an important backlash, you can adjust the **backlash** parameter in the ASCOM driver.
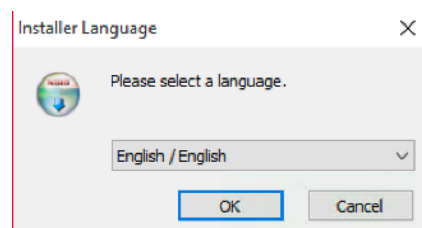
Software installation

Before connecting SESTO SENSO to computer, please install the software. Please insert the USB pen that comes in the SESTO SENSO box in one of the computer's USB ports, then opens Windows File Manager and proceed to the installation of SESTO SENSO software and ASCOM driver.

NOTA: if you're updating from a previous version of SESTO SENSO (please read page 16 for firmware update) you have first of all uninstall both the previous versions of SESTO SENSO software and ASCOM driver.

SESTO SENSO software installation

Please double click on SestoSensoSetup.exe file and you will see this window. Select English and click OK to proceed.
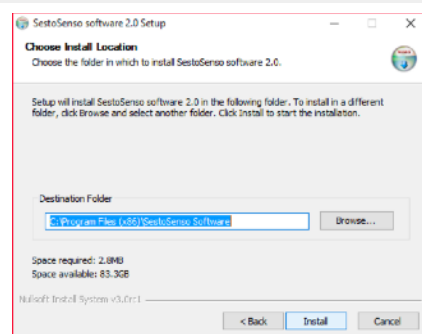
Verify that the option "SestoSenso Application" is active and click on Next button to proceed.
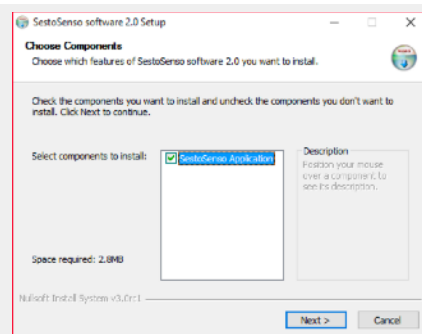
In this window you will see the installation directory for the SESTO SENSO software, default value is:

C:\Program Files (x86)\SestoSenso Software

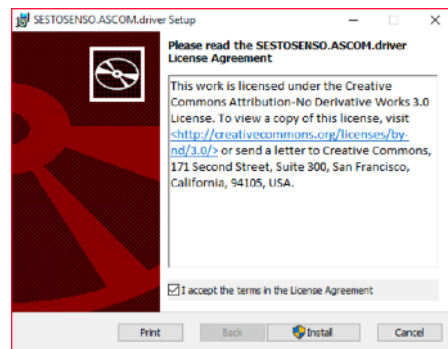Please click on Install to confirm or Browse to install in a different directory.

At the end of installation, you will see a confirmation message, click Close button to finish installation.
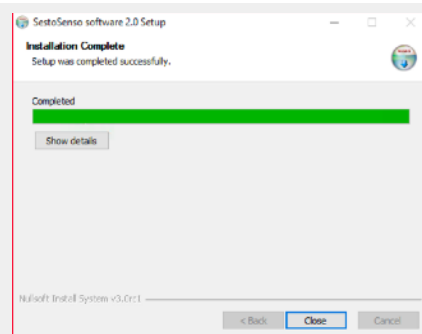
SESTO SENSO ASCOM driver installation

In the USB per, please select the "SESTO SENSO ASCOM driver" directory, select the directory for 32 (x86) or 64 (x64) bit installations and please double click on the included file. Note: In order to work properly, SESTO SENSO requires that you have the "ASCOM 6 Platform" installed and downloaded from http://www.ascom-standards.org/ (we suggest to install at least version 6.3).
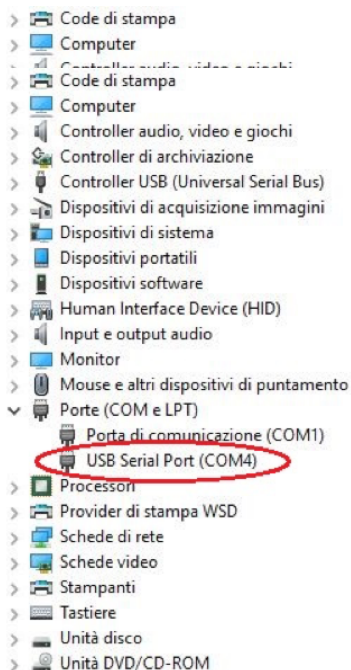
|	
Please select "I accept the terms in the Licence Agreement" and click on Install to proceed.	
The ASCOM driver will be installed, please press the Close button to finish installation.	
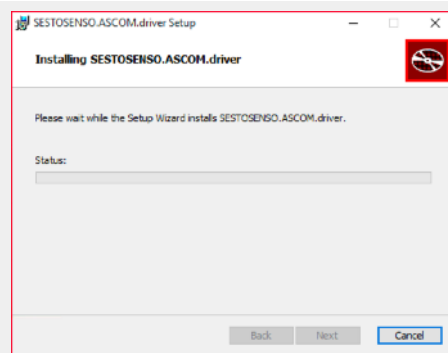
Computer connection

At the first connection with the PC, SESTO SENSO is automatically detected as a COM port (if SESTO SENSO is not automatically detected by Windows and you see a new window asking for drivers, just select the driver in SESTO SENSO DRIVER folder), just go to "Device manager" (click on Start button, then select System and Control Panel, clock on System and then Device manager) and look at the COM port number assigned, in the example here it's COM4. The status LED (detail 13) starts blinking to confirm connection. If the LED lights up and remains still, power is lost while the PC connection has been successfully performed.

Focuser control with SESTO SENSO software

SESTO SENSO comes with a complete software (included in the USB pen) that allows you to calibrate SESTO SENSO, move the focuser and set advanced parameters. After having connected SESTO SENSO to USB port of your computer and powered it, please launch the SESTO SENSO software and you will see the image you have here on the right.

SESTO SENSO software v. 2 shows, in the central part, different data like the firmware version, serial number, temperature reading (if connected to the opzionale temperature probe) and connection COM port. In the lower part you can find the control and calibration buttons for and calibration of SESTO SENSO. By clicking the arrow on the up-right part of the window, you will see advanced parameters.

Please click on the grey window, select the COM port of SESTO SENSO (or click on the symbol of the magnifier) and then click on "Open/Close" button. If this is the first time you use SESTO SENSO, a Wizard window will popup and, in a very easy way, this will allow you to correctly set SESTO SENSO for your telescope.
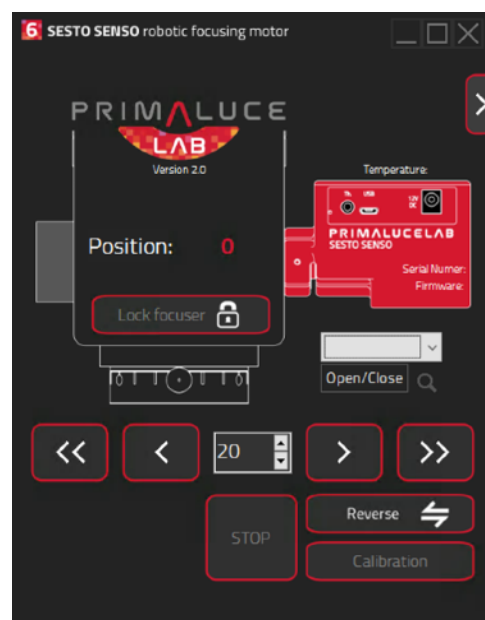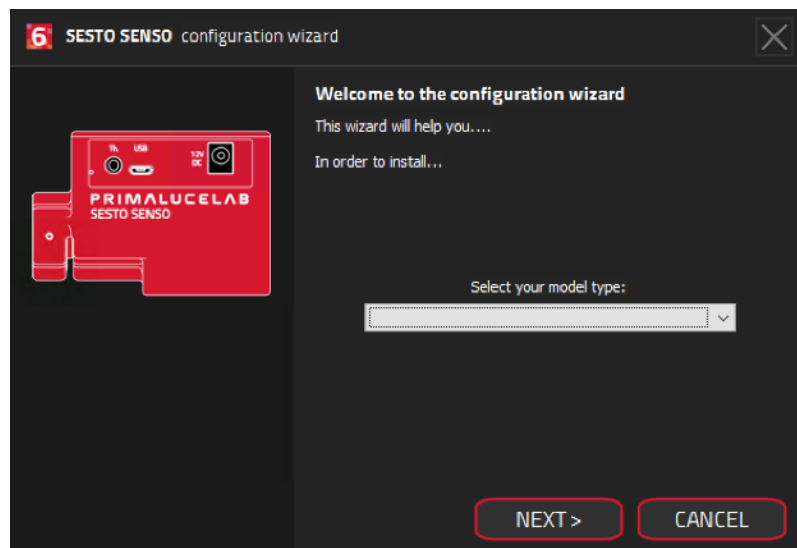
Here you can set:

1) "Telescope with external focuser (i.e. Crayford)" if you connect SESTO SENSO to a telescope (like a refractor, a Newton or a Ritchey-Chretien) that comes with an external focuser (for example a Crayford type)

2) "SCT telescope with MicroFocuser" if you connect SESTO SENSO to a Schmidt-Cassegrain or Aplanatic Schmidt-Cassegrain telescope that comes with a StarlightInstruments MicroFocuser.

In our example, we'll see how to set SESTO SENSO with an external focuser. In this example SESTO SENSO is already installed on the focuser and powered. Click on che NEXT button. This window will appear:
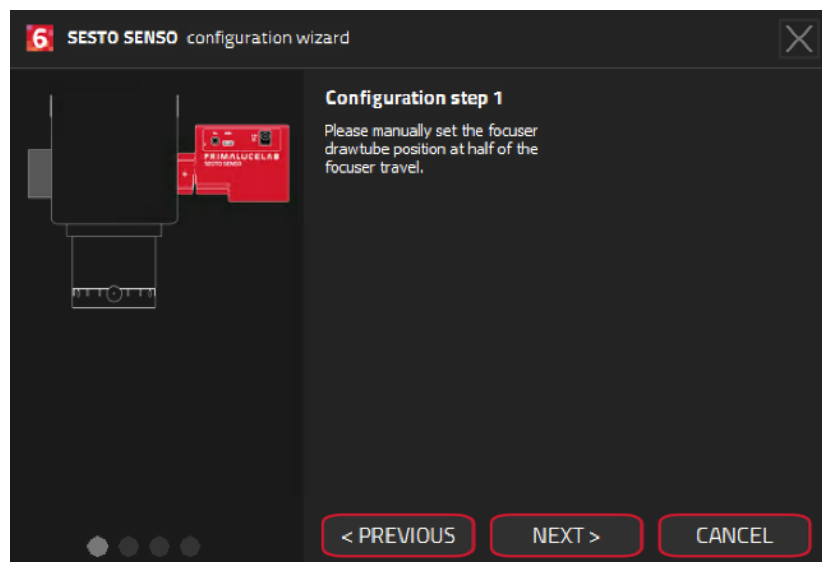

Please manually set the focuser (by using the focuser's knob) at half of the focuser travel. Then press the NEXT button and the following window will appear.
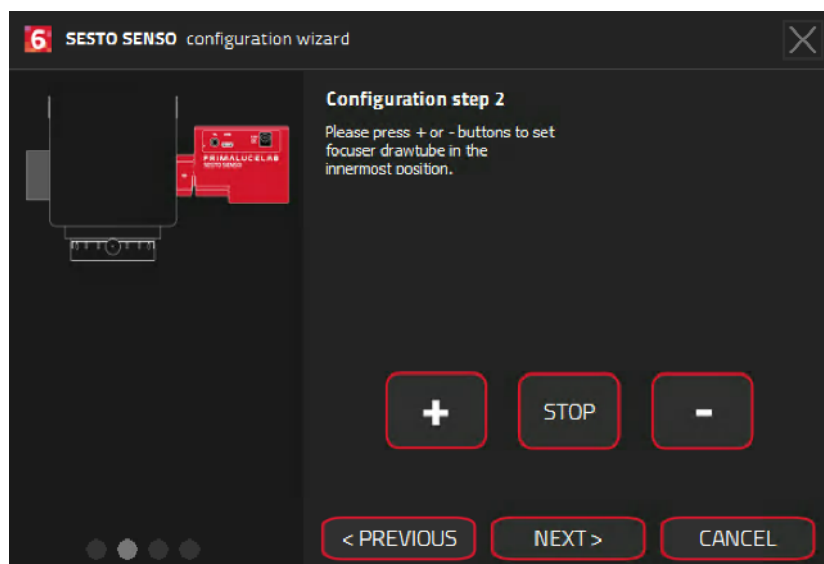
Press the + or - button to set the focuser drawtube in the innermost position and press the STOP button when you reach that position (you don't need to reach the end of the drawtube travel but you can stop 1 or 2 millimiters before the end) . Don't worry what button you use (+ or - is needed only to reach the position, only for calibration). **Attention: please remember to stop the motor (by pressing the Stop button) BEFORE it will reach the end of draw tube travel or you may cause problems to the focuser or to the SESTO SENSO motor.** Press NEXT button.

Press the + or - button (it will be the opposite of the previous step) to set the focuser drawtube in the outermost position and press the STOP button when you reach that position (you don't need to reach the end of the drawtube travel but you can stop 1 or 2 millimiters before the end) . Don't worry what button you use (+ or - is needed only to reach the position, only for calibration). **Attention: please remember to stop the motor (by pressing the Stop button) BEFORE it will reach the end of draw tube travel or you may cause problems to the focuser or to the SESTO SENSO motor.** Press NEXT button.
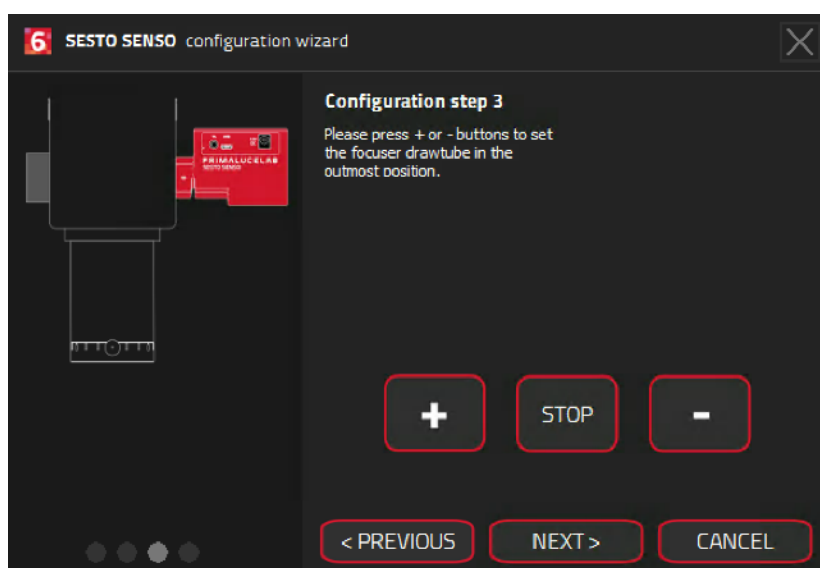
The new window confirms that the SESTO SENSO installation wizard is completed, you press CLOSE button to confirm.
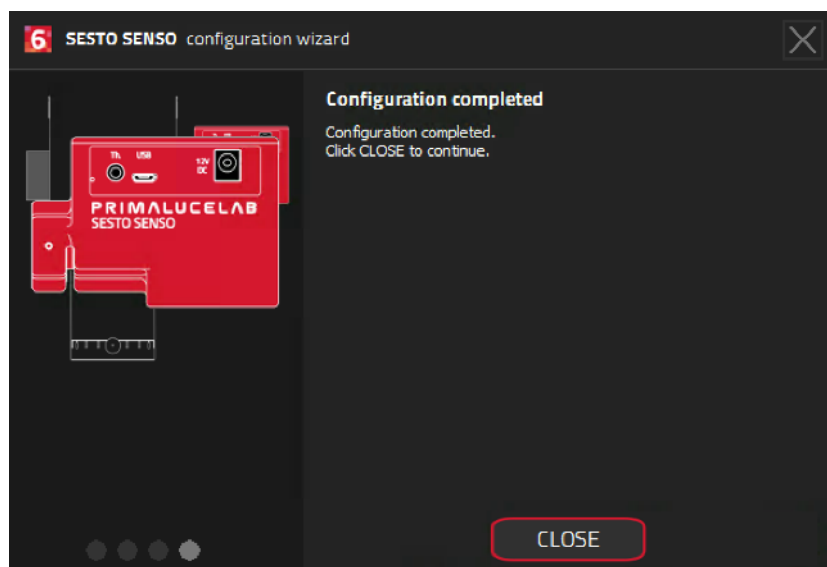
SESTO SENSO is nor ready to use. Main window shows, in red, the focuser position ("Position") and you can move the focuser (by a step number that is reported in the central number) by clicking the buttons   <   >

You can also fast moving (10 times the step number) by clicking the buttons   <<   >>

Other SESTO SENSO software features:

– **Lock focuser**: lock the focuser in position. This feature is very useful during long exposure astrophotography: after you define the perfect focus point, you can lock SESTO SENSO motor to avoid slippage during the exposition (please note, slippage doesn't up only to SESTO SENSO but also to mechanical quality of used focuser).

– **STOP**: stop the focuser movement during a Forward or Reverse

– **Reverse**: reverse the moving direction

– **Calibration**: start again the configuration wizard

SESTO SENSO advanced parameter settings

By clicking the upper right button on SESTO SENSO software, it will show 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.
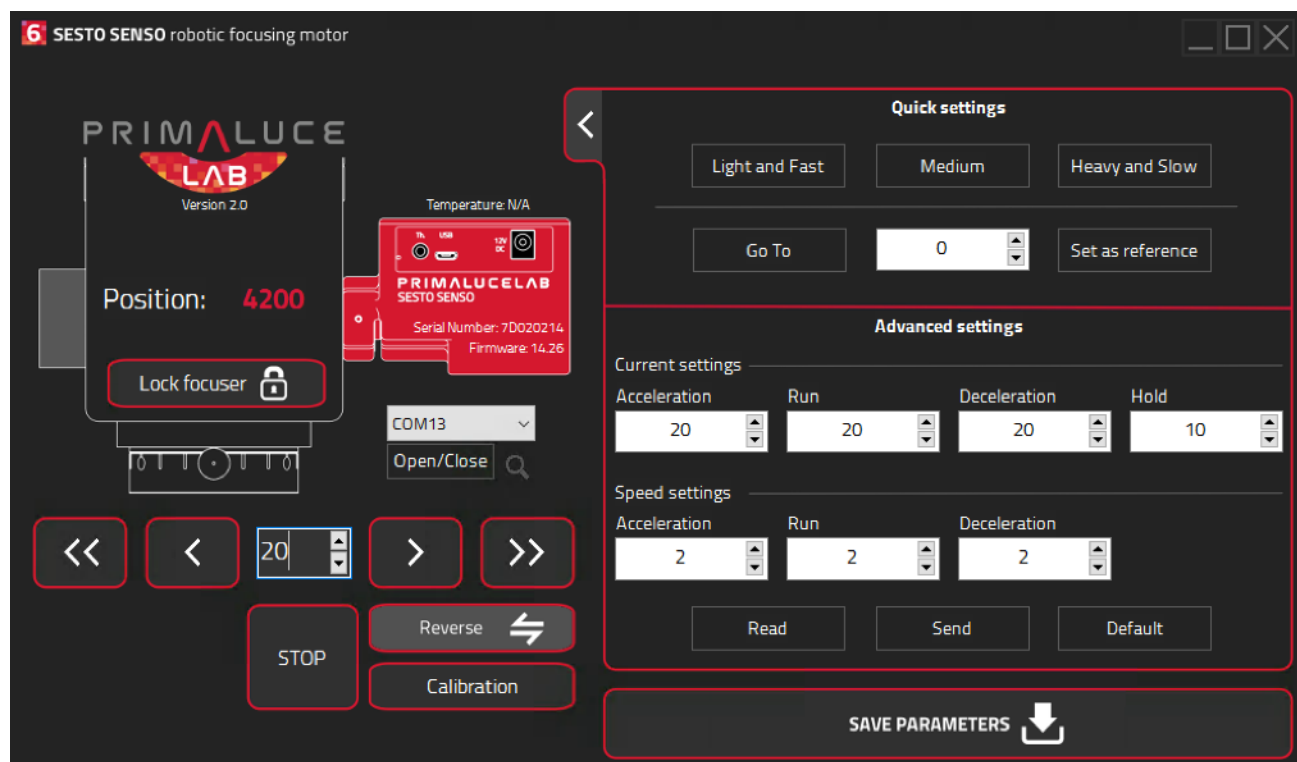
Quick Settings:

In order to simplify SESTO SENSO 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 and Fast button sets the current values all to 10, Acceleration values to 138, Run to 65 and Deceleration to 138, and is recommended for light loads.

Medium button sets the current values all to 15, Acceleration values to 70, Run to 40 and Deceleration to 70, and is recommended for medium loads.

Heavy and Slow button sets the current values all to 20, Acceleration values to 50, Run to 25 and Deceleration to 50, and is recommended for heavy loads.

Advanced Settings:

In the first set of commands ("Current settings"), the operating currents of the SESTO SENSO motor are reported, the values that can be set range from 0 to 24.

- **Acceleration**: set the current in acceleration ramp
- **Run**: set the current after acceleration ramp during RUN
- **Deceleration**: set the current in deceleration ramp
- **Hold**: set the hold current, when the motor is stopped

In the second set of commands ("Speed settings), the SESTO SENSO motor movement speed parameters are set.
- **Acceleration**: set the acceleration during starting ramp (Range from 0 to 4094)
- **Run**: set the speed value after acceleration ramp (Range from 0 to 1022)
- **Deceleration**: set deceleration value after slowdown ramp (Range from 0 to 4094)

In order to modify them, first please press the **Read** button to read the values that are currently set in SESTO SENSO, then modify the value you want and please press **Send** button to send the values to SESTO SENSO. **After sending and testing them, you must save them to the internal memory by pressing the SAVE PARAMETERS button**. **Default** button resets the values set up by PrimaLuceLab in laboratory.

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.

Using SESTO SENSO with third party softwares

NOTE: before using SESTO SENSO with third party softwares, you have to execute the configuration wizard in the SESTO SENSO software. Then please disconnect SESTO SENSO from its software and start the third party software you want to use. SESTO SENSO has not to be connected to its software.
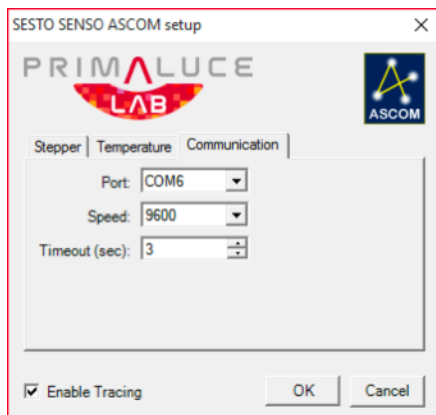
SESTO SENSO can be used with third party softwares that supports ASCOM drivers. Start the software you prefer and chose the focuser options, first select the newly installed ASCOM driver: "ASCOM Driver for SestoSenso", and then click on the proprieties button. If the driver is installed correctly, the SESTO SENSO control box will open. By clicking on the last *Communication* tab, set the communication port, in this case **Port**: COM4, the **Speed** of the port: 9600 and the **Timeout** (sec) value: 3.

In the *Stepper* tab, the **Backlash (steps)** parameter indicates the number of steps SENSO SENSO must use to compensate for the backlash of some focusers, it's a very useful parameter, for example if you mount SENSO SENSO on SchmidtCassegrain telescopes. **Set Park Position** parameter indicates the parking position of the focuser in steps, a parameter that should only be set if the focuser has been manually moved, or if you want to restart the initial connection procedure. The value of the steps set in this parameter is communicated to SESTO SENSO only if the Set button is pressed, otherwise the current position remains the last active position. The **Movement Locking** parameter, if activated, keeps the motor position locked even when the ASCOM driver is disconnected, only the 12V power supply is active. This function is very useful if, for example, in the observatory you park the telescope in a vertical position to avoid slippage.
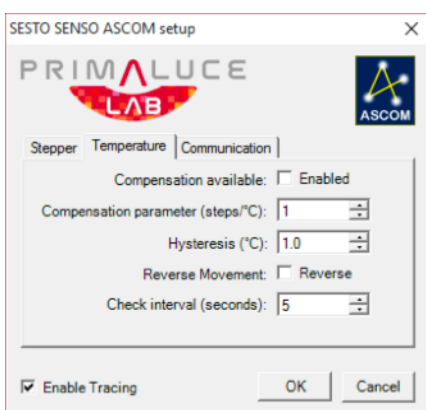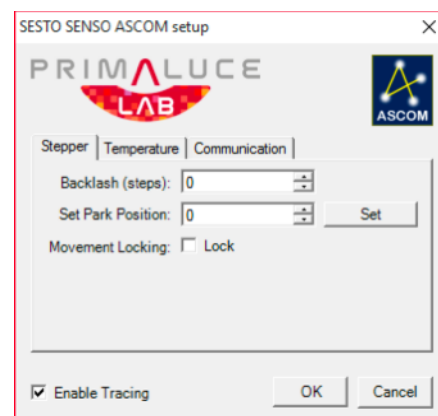
In *Temperature* tab you can find parante used to set automatic focus compensation based on temperature variations (this feature has to be supported by third party software you use and the optional temperature probe is requested). Here you can set these parameters, that you will set in order to fine tune the temperature compensation:
- **Compensation parameter**
- **Hysteresis**
- **Reverse Movement**
- **Check interval**

NOTE: SESTO SENSO comes with both 32 and 64 bit version of ASCOM drivers. You have to choose the version based on your Windows operative system and the third party software you want to use. For example, if you have Windows 64 bit we suggest 64 bit versions but some softwares, like MaximDL, request the use of 32 bit version ASCOM driver. If you have problems connecting SESTO SENSO to your third party software, please install the other version of ASCOM driver.

Firmware update

WARNING: If the power supply voltage of the PC or SESTO SENSO is missing during firmware update process and the procedure is interrupted, SESTO SENSO may no longer work.

If new features or errors fixes are added, you can update the internal SESTO SENSO firmware. To upgrade the firmware, download the latest version from PrimaLuceLab at: https://www.primalucelab.com/astronomy/downloads and then unzip the downloaded .zip file and open the SESTO SENSO FIRMWARE folder. Open the SestoSenso_FirmwareUpgrade.exe file in the SESTO SENSO FIRMWARE folder (firmware update is only possible from PCs running Windows®).

Select the COM port to which SESTO SENSO is connected, click the Select Firmware button, and through the File Manager select the sestosenso.bin file, now press the *Upload firmware* button.
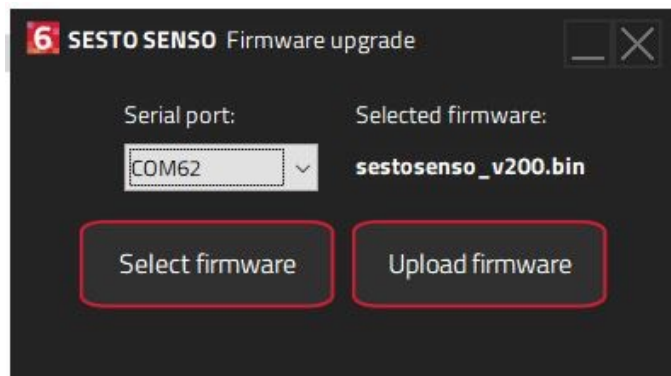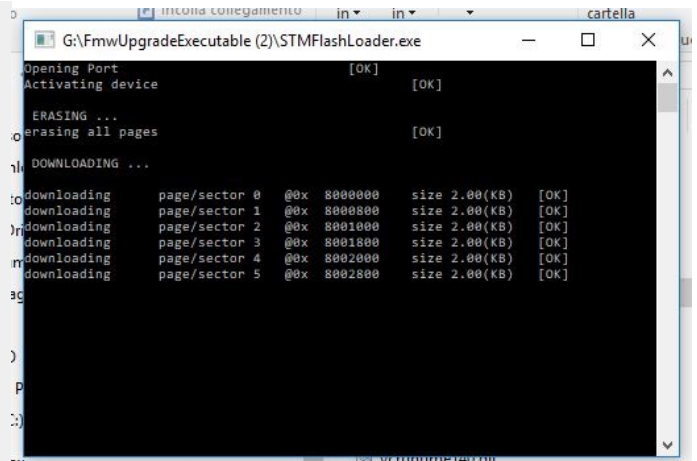

Now you have to disconnect **first** the USB cable to which you connected SESTO SENSO and **then** the 12V power cable.

After a few seconds you will see the text in green, reconnect **first** the 12V power cable and **then** the USB cable.
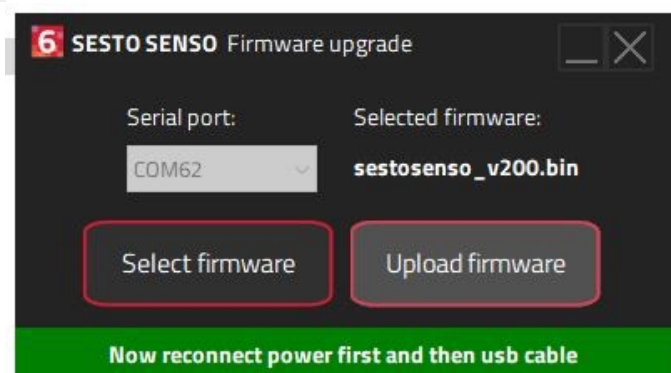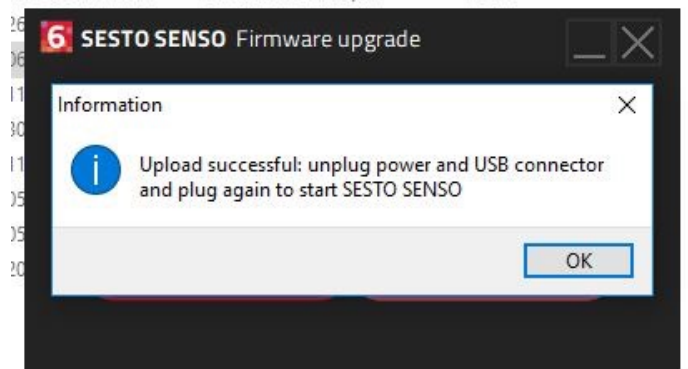
Now the software will upload the new firmware.

If the procedure is completed successfully, "Upload successful" will appear. Disconnect both the USB and the 12V power cable, reconnect them and press OK. Now you can use SESTO SENSO with the new firmware.

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.

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 authorized by PrimaLuceLab .
   - Invasive interventions or tampering with internal and/or external parts.
   - Missing of the invoice (or receipt) of purchase.

WARRANTY DURATION: 24 months

TERMS OF SERVICE

Technical assistance is performed exclusively by PrimaLuceLab or its authorized 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.