



FocusLock Software Quick Start Guide

Thank you for purchasing FocusLock, the most advanced auto-focus software available for off-axis guiders and the ONAG On-Axis Guider developed by Innovations Foresight.

The purpose of this document is to get you up and running with continuous auto-focus quickly.

Introducing a New Way to Auto-Focus

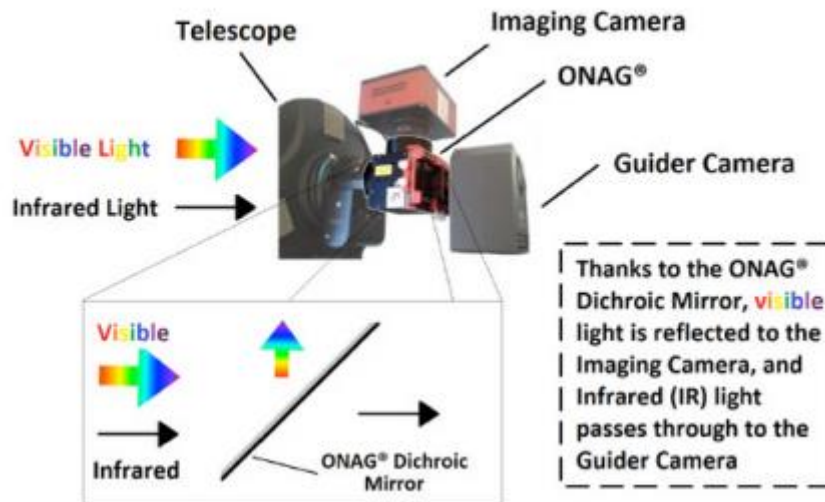
FocusLock is based upon SharpLock technology developed by Innovations Foresight, LLC and is covered under U.S. utility patent #14470935. Titled "Closed-Loop System for Auto-Focusing in Photography and a Method of Use Thereof", Optec has licensed this technology to develop FocusLock auto-focus software.



Theory of Operation:

FocusLock takes advantage of the slight astigmatism introduced by the cold-mirror used in Innovations Foresight's On-Axis Guider, or ONAG. The ONAG was developed to provide an alternative to off-axis guiding by using a dichroic beam splitter whereby the visible light is reflected to a primary imaging camera above, and the near infrared (NIR) light is passed straight through to a guide camera.

ONAG CONCEPT



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Using the ONAG with a full-frame guide camera makes locating a guide star much easier than using an Off-Axis Guider or OAG.

Use with Off-Axis Guiders:



Off-axis guiders do not provide the slight astigmatism required for FocusLock operation by default. Optec engineers have developed the **Lacerta for Lodestar** optical device which adds a small tilt-window to the imaging path of any Starlight Xpress Lodestar or Lodestar X2 auto guider without adding significant back-focus.

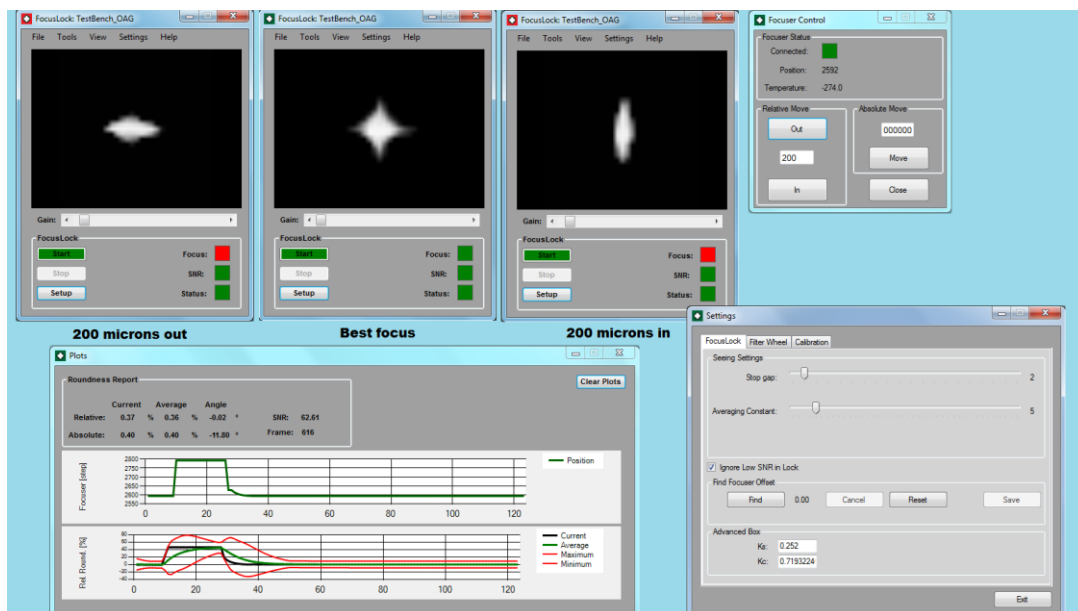


<http://optecinc.com/astronomy/catalog/focuslock/lacerta.htm>

How FocusLock Works:

FocusLock operates by continually analyzing the guide camera image for relative roundness of the guide star. The relative roundness is a measure of focus with signed information showing which side of focus the camera is currently positioned. By setting the imaging camera and guide camera parfocal, FocusLock can drive any ASCOM focuser to the ideal focus in real-time without leaving the imaging target.

The diagram below shows the shape of a guide star inside focus, at perfect focus, and outside focus.



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Designed as an ASCOM local server application with a pass-through methodology, FocusLock operates seamlessly and transparently to all other guide and imaging applications. Similar to Optec's Alt-Az Derotation Server software, the ASCOM shim is part of the magic behind FocusLock. As long as the telescope is guiding, the focus remains locked.

Allowance for Filter Offsets

FocusLock works with most any imaging workflow when an ONAG or OAG is utilized. Filter focus offsets can be determined once and then stored for automatic focus adjustment when a new filter is moved into the imaging camera's light path. Even if the guide camera is not located behind the filter wheel, focuser offsets can still move the imaging camera to the precise, optimal focal point.

Licensed Software

FocusLock is licensed software and requires a valid license key for continued use. The software package can be downloaded from Optec's website at:

<https://optecinc.com/astronomy/downloads/focuslock.htm>



The software can be used on any Windows 7, 8.1, or 10 computer with ASCOM Platform version 6.1 or higher installed. The license agreement allows a 60-day trial of the software before a license key must be purchased. The only way to purchase a valid FocusLock license key is through the Optec website and PayPal portal.

Visit the webpage below to purchase a license key.

<https://optecinc.com/astronomy/catalog/focuslock/19685.htm>



Installation and License – Step by Step

Step 1 - Installation:

1. Download the latest version of FocusLock from the webpage above.
2. Check to ensure the ASCOM platform version 6.1 or newer is already installed,
3. Visit www.ascom-standards.org to download and install the latest platform if necessary,
4. Extract the zipped folder to a temporary location on your hard drive,
5. Right-click the Setup.exe file and select "Run as Administrator" to install.

Step 2 - Licensing:

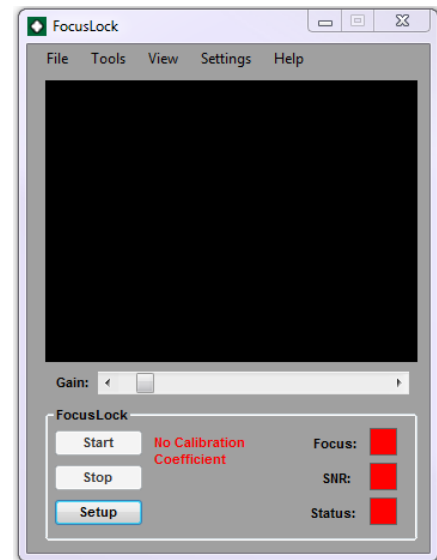
1. After installation, double click the FocusLock desktop icon or type "focuslock" into the Start box,
2. Wait up to a minute for FocusLock to initialize and the main FocusLock window will appear.



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3. FocusLock requires a license to function. Upon initial operation the licensing window will appear. The licensing function must be done in Administrator mode so the software will close and elevate itself when required. You must say “Yes” to the Permissions prompt to continue.
4. In the License Form, click “Start 60-Day Trial”. The software will send a unique hardware identifier to the Optec licensing server. An internet connection is recommended for this step.
5. Once the licensing server returns a valid trial license key you will be able to continue with your 60-day trial. These steps must be completed for each computer you intend to use with the FocusLock trial software.



Step 3 – Permanent License:

1. After the 60-day trial is finished, you must purchase a valid license for continued use. Click **Help-License** on the main FocusLock form to bring up the License Form again. The License Form must be elevated to Administrator privilege level to function.
2. After purchasing a valid license, the final step is activating the software.
3. Click on “Activate License” and fill out the form. If connected to the internet, you do not need to enter the Activation Code to Register Online.
4. Offline Activation is also available. Contact Optec Support (support@optecinc.com) for details.
5. When all five boxes on the right of the Online Activation form turn green, click the “Activate” button. You will not need to go through these steps again.
6. Refer to the current licensing agreement for additional details:
<https://optecinc.com/astronomy/catalog/focuslock/resources/FocusLockLicense.pdf>

System Setup and Use

To setup FocusLock for your various hardware connections, click **File → Connection Settings**. In this window you can select your hardware you will be using with FocusLock. You can mix connection methods. For example, you can guide using PhD2 and focus through ASCOM. FocusLock only needs a connection to the Filter Wheel if you intend to use Filter Offsets. Click each “Connect” button to test the various connections.

Once you have set up your hardware connections, you can click Exit. From this point forward, you can use **File → Connect All** to connect to the selected hardware in subsequent sessions.



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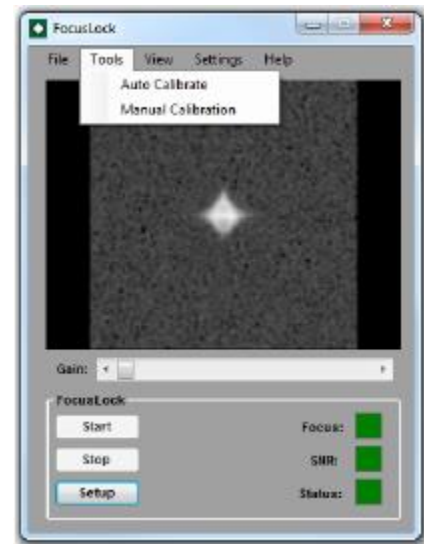
FocusLock Profiles:

FocusLock allows you to save and load several system profiles in XML format. These profiles include all calibration data and most of your user settings. By saving and loading profiles you can easily switch between different hardware setups. You can also reset and reload your settings if FocusLock encounters any unexpected issues or if you wish to start over. Also, if you need to switch computers you can reload FocusLock settings on the second computer. It is highly recommended that you backup your profiles.

Click **File** → **Save Profile** to save your current hardware connection profile. You may have several different profiles if you wish and load each using **File** → **Load Profile** to activate different profiles.

Calibrating FocusLock:

FocusLock allows for calibration either through Automatic Calibration (**Tools->Auto Calibrate**) or through Manual Calibration (**Tools->Manual Calibration**). It is recommended that you use a relatively bright non-saturated star for calibration. You may need to adjust the Automatic Calibration settings (**Setup->Calibration**) and Seeing Settings (**Setup->FocusLock**) to get a proper calibration. The default settings are for a f/6 scope with a TCF-S focuser in medium seeing. Poor seeing would require longer rest time and a larger averaging constant (note that the averaging constant should be equal to or larger than the rest time). For an F11 scope with the same focuser a Steps per Autocal between 50 and 100 is more typical. See the instruction manual for detailed instructions on Calibration.



You can monitor the Calibration progress through the Plots Window (**View->Plots**). Calibration is completed once a sufficient change in the Focus of the system has been measured. Once a change in the Absolute Average Roundness of at least 15 has been measured you can abort the auto calibration although it is recommended to let it finish (it will automatically abort once a change of 20 has been reached).

Focusing and Saving Calibrations:

Once the calibration is complete you can test the system. Simply hit the Start button on the main screen and watch FocusLock bring the stars into focus. Once you have confirmed that the system is properly focusing you should backup your settings. To save simply go to **File->Save Profile** and save out your settings. You can then restore your settings if they are erased or if you switch computers by loading the profile file (**File->Load Settings**).

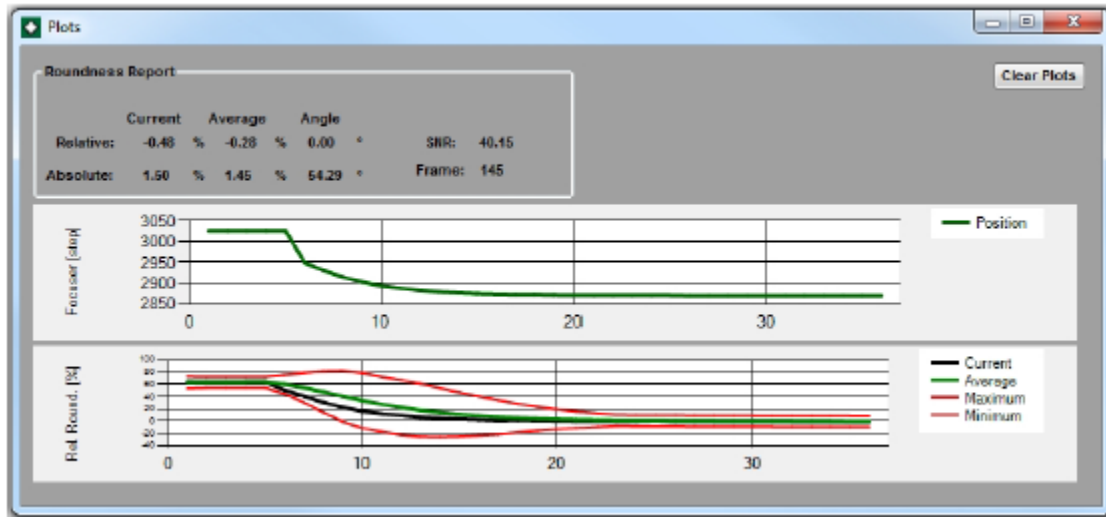


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Plot Window

Click **View** -> **View Plots** to open the plot window to follow the progress of the auto-focus function over time. Note the Relative and Absolute Roundness values and especially the Signal-to-Noise ratio (SNR:) which is a function of the quality of your guider image data.



Consult the FocusLock Help file for additional details regarding the Plots window.

Additional Resources:

Within the FocusLock main form, click **Help** -> **Help** at any time for more detailed information for setup and use of the auto-focus software. There are many other features included in FocusLock including FilterWheel offsets and Scripting. For a complete description consult the help manual.

Visit <http://video.optecinc.com> for FocusLock related videos and tutorials. Contact support@optecinc.com with any configuration questions, issues, comments or bug-fixes.

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