DirectSync SWX30 Installation

Step-by-Step Instructions for Installing the DirectSync SWX30 Motor Assembly to your Sky-Watcher® dual-speed focuser.

Optec's #19988 DirectSync SWX30 motor provides a complete digital focusing solution for Sky-Watcher Esprit 100, 120, and 150mm telescopes equipped with the Sky-Watcher brand 3-inch focuser. The SWX30 motor includes Optec's new **ThirdLynx** embedded control circuit for direct connection to any Windows, Mac, or Linux based control computer. The motor assembly replaces the coarse focus knob on the focuser pinion block for Sky-Watcher refracting telescopes.

When properly mounted, the DirectSync SWX30 motor yields approximately 1.9 micron per step resolution, superior repeatability, and an impressive load carrying capacity. A digital temperature sensor and internal electronics electronic noise suppression circuitry are integrated into the DirectSync motor assembly. Connection to the observatory or telescope control computer can be made using any standard USB A-B cable. A separate 12VDC power connection provides sufficient power to vertically lift cameras or instrument packages exceeding 10 kg. Optec's new ASCOM Alpaca driver and field-proven FocusLynx Commander software round out the package for complete remote telescope focusing solution.

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DirectSync SWX30 Package Contents

Confirm the contents of your DirectSync SWX30 motor package. The package should contain the following:

- DirectSync SWX30 motor assembly,
- 60-tooth drive shaft gear with 0.92" (23.4mm) long brass hub,
- 1/16" Allen hex key,
- 2mm hex key,
- 2.5mm hex key,
- Button-head M4x0.7mm, 6mm long screw,
- Two flat-point M5x 4mm setscrews (pre-installed),
- Short and Long USB A-B cables,
- 12VDC power supply with 2.5 x 5.5mm power plug and IEC power cord.

Many telescope mounted power distribution systems can deliver the 12-volt DC input for the DirectSync motors and some users prefer a cleaner installation without excessive wires. Because the ThirdLynx 5-volt USB logic circuit is isolated from the 12VDC power circuit, input voltages up to 15VDC can be used without damaging the internal circuitry. Be sure to wire any custom made power cables with the center pin positive and plan for up to 1 Amp of current at 12VDC during high-speed focuser moves.

Optec's #17063 molded 2.5 x 5.5 power plug with 6-ft. tinned leads is available at a nominal cost for those wishing to use Rig Runner or Power Pole type distribution systems. Contact sales@optecinc.com to order.

Installation Procedure: Step-by-Step

Step 1 – Remove Access Screw

To install the DirectSync SWX30 motor, you will first remove the existing coarse focus knob on the left side of the focuser. The coarse knob is fixed to the shaft with a metric hex set screw (also known as a grub screw).

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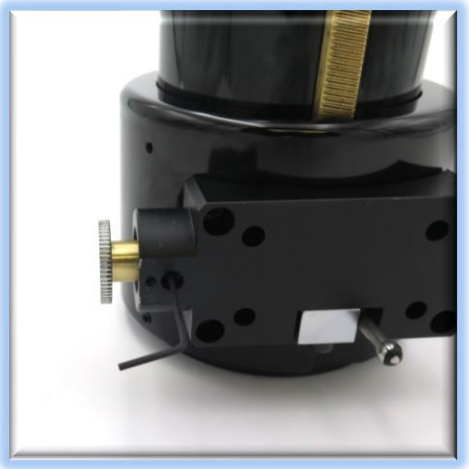
For some focusers, there are two setscrews attaching the knob which may be 90-degrees apart. Often, the setscrew holding the knob onto the pinion shaft can only be accessed through a small threaded port on the main pinion block. A second setscrew in the same hole may act as a plug. You will need to first remove the access plug setscrew using the included 2mm hex head L-key. Look through the access hole and rotate the focuser shaft using the knob on the opposite side to look for any additional setscrews that may be securing the coarse knob to the shaft.

Step 2 – Remove Coarse Knob

Use the 2mm hex key to loosen the setscrew holding the focuser knob to the shaft. Rotate the focus knob until you can see the setscrew holding the coarse knob in place through the threaded access hole. Use the 2mm hex key to loosen the setscrew and then rotate the knob until the second setscrew (if a second setscrew is present) is accessible. No need to remove these setscrews, just loosen them until the coarse knob can be easily slid off the pinion shaft.

Step 3 – Install Gear

Slide the 60-tooth gear hub-end first onto the pinion shaft. Rotate the gear so that the setscrew falls upon the flat section of the pinion shaft. Rotate the pinion shaft so the gear-hub setscrew can be seen through the access hole.



Adjust the gear position so the hub setscrew can be tightened. Insert the 1/16” hex key into the access port to tighten the gear to the pinion shaft. Be sure it is fully secured before continuing.

IMPORTANT: Tighten this setscrew securely to avoid any backlash introduced by a loose fitting gear.

Test the focuser function by moving the coarse and fine focus knobs on the right side of the focuser up and down ensuring smooth free movement. Next, you will attach the motor assembly.

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Step 4 – Attach Focus Motor

The DirectSync SWX30 motor is secured to the pinion block using the included button head M4 screw. Look carefully at the clamp and clutch mechanism inside the motor assembly. You will notice two flat point setscrews on opposite sides of the motor clamp. These are included to allow some top-to-bottom (front-to-back in relation to the telescope tube) adjustment of the motor assembly.

Disengage the motor by rolling the motor cap counter clockwise as viewed from the connector end. Note the small motor gear will disengage from the idler cluster gear. Slide the DirectSync SWX30 motor onto the focuser pinion block. Wiggle the motor body until the clamp is tight against the pinion block. You may need to loosen the one or both of the centering screws using the 2.5mm hex key. Insert the button head screw into the countersunk hole on the motor clamp body and thread it into the threaded hole on the pinion block.

Adjust the centering setscrews before tightening down the button head screw. Now test the mesh of the gears by re-engaging the motor (turn the cap clockwise). Be sure the gears do not rub when the motor is disengaged. Use the right-side coarse knob to test the fit. With the motor adjusted for good gear mesh when engaged, and clearance when the motor is disengaged, tighten down the button head and setscrews.

Step 5 – Connect Power and USB

Insert the 12VDC power plug into the power socket on your DirectSync motor. 12-volt DC voltage is required to operate the motor. Next, insert either the short or long USB cable into the USB socket on the motor endcap and the opposite end into your Windows PC, Mac, or Linux computer. Note the LED will illuminate indicating the 5VDC USB line is connected.

Your DirectSync SWX30 is now ready for FocusLynx Software Setup. Contact Optec Support if you have any questions or concerns when installing your DirectSync SW.

In the next section, you will download and configure your control computer with drivers and interface software.

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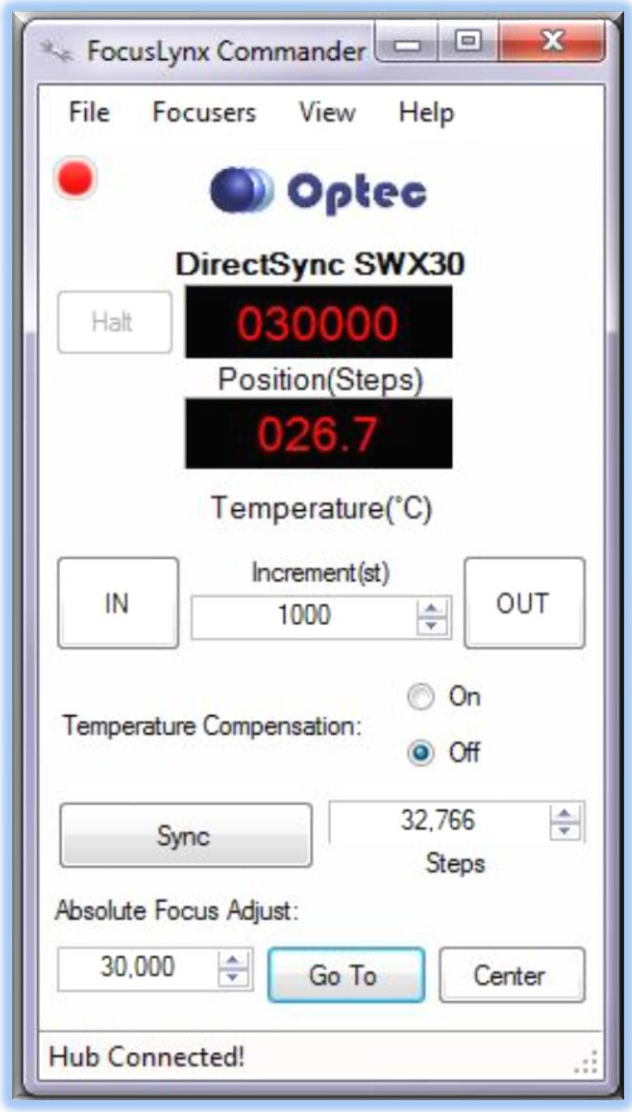
Download FocusLynx Commander Software

Visit Optec's download page to obtain the latest version of the FocusLynx Commander ASCOM driver and software package. FocusLynx Commander runs on any Windows 7 or higher operating system. Be sure to download version 3.1 or higher to operate the ThirdLynx control circuit. Separate installer packages for Mac and Linux will be available soon.

http://www.optecinc.com/astronomy/downloads/focuslynx.htm



FocusLynx Commander will function as an ASCOM local server. Therefore, the full ASCOM platform is also required for Windows installations. Visit the ASCOM webpages for the latest version.

https://ascom-standards.org/

On non-Windows computers, there is no need to install the ASCOM platform. Optec's driver includes a built-in Alpaca standard server that will provide the required interface for any client –level software displaying the Alpaca logo.

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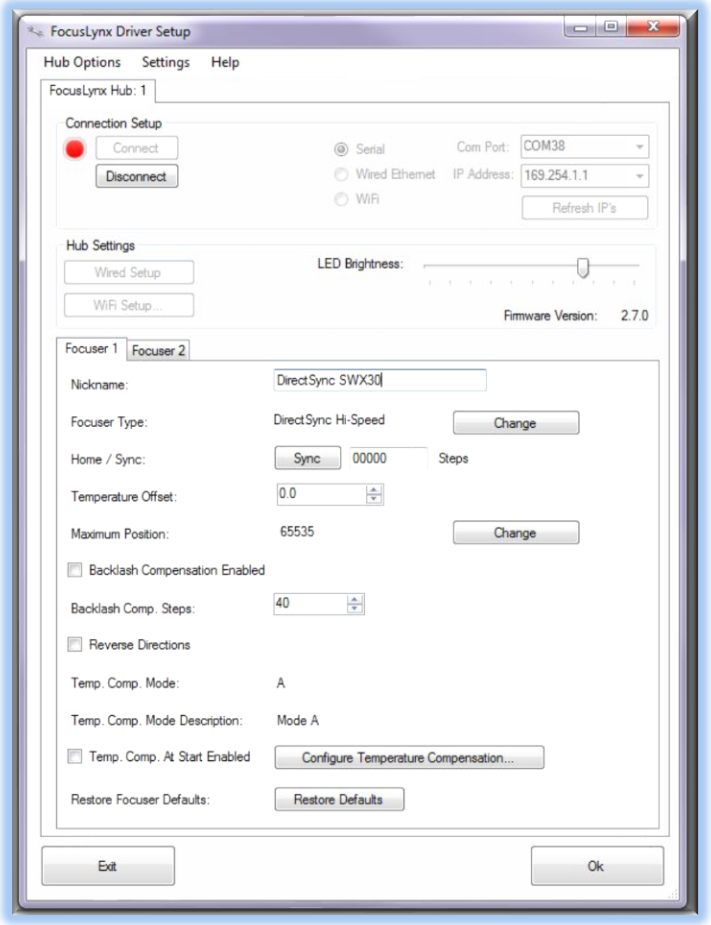
Windows Software Setup



Consult the ***FocusLynx Quick Start Guide*** to install FocusLynx Commander for Windows. Once installed, you will need to configure FocusLynx Commander for your new DirectSync motor. Configuration within FocusLynx Commander will also configure the ASCOM driver so that the same settings will apply when using auto-focusing software such as Maxim D/L, FocusMax, Sequence Generator Pro, or TheSky X for Windows. Control of FocusLynx or ThirdLynx focusers within TheSky X Windows version can be accomplished through either the ASCOM chooser or with the native X2 drivers for FocusLynx.

Focuser Type Selection

In FocusLynx Commander, click **Focusers – Setup** to open the FocusLynx Driver Setup dialog. The ThirdLynx USB-CDC controller will be automatically assigned a virtual COM port by Windows. (note the Wired Ethernet and WiFi connection types will be greyed out). Select the assigned COM port and click Connect. In the Focuser 1 section below, type in a Nickname for your telescope and click Change for the Focuser Type. Choose the **DirectSync** option and select either the Hi-Torque or Hi-Speed option using the slide bar near the bottom. With stepper motors speed and torque typically work inversely. That is, higher speeds will usually result in lower torque. The DirectSync Hi-Speed Focuser Type option coupled with the **DirectSync SWX30** motor assembly can reliably handle payloads of 10kg (22 lbs.) or more.

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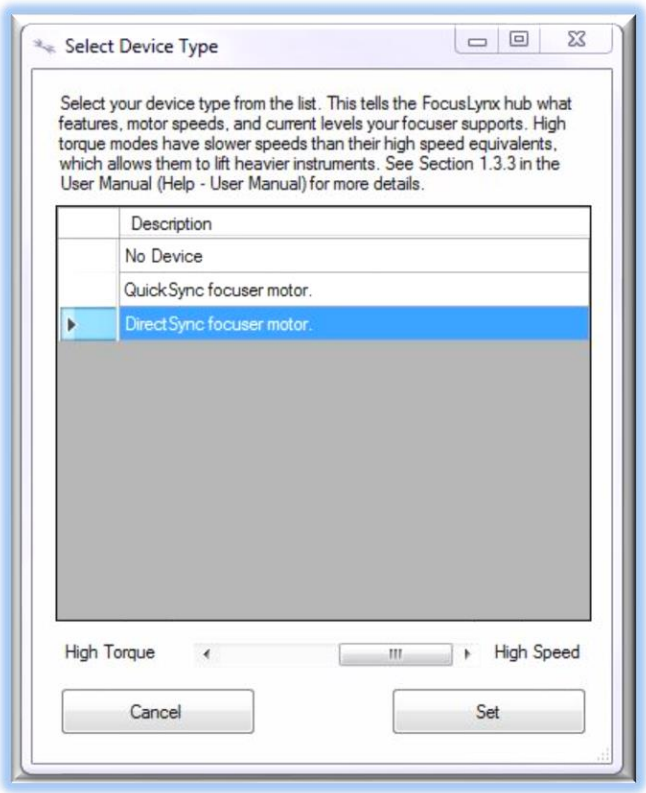

Click OK to exit the setup form and return to the main FocusLynx window. Click Focusers – **Connect**. Test the focuser movement by engaging the motor (roll the endcap clockwise as viewed from the cable end). Test both IN and OUT functionality with 1000 step increments. You should see the coarse and fine focus knobs move on the opposite side of the pinion block. All movements should be smooth. Disengage the motor to return to manual focus.

Contact Optec support (support@optecinc.com) if your focus motor cannot be adjusted without slippage or stalling. Some focusers present unique challenges with internal slipping.

Optional Setup Steps

Set the Position Units

The iFocuserV2 standard for ASCOM absolute focusers relates all focuser movements to actual step counts with the higher level client responsible for making the conversions to real-world measurements. FocusLynx Commander acts as a client and extends the property to easily convert the units to mm and microns. In the main form of the FocusLynx Commander window, you may left-click directly on the red Position digital read-out to toggle units between Steps, Microns, and Millimeters. Note that only the step count is passed through to the ASCOM driver.

Step Size and Focuser Range

The Sky-Watcher 3-inch focuser drawtube has a travel range of approximately 88 mm. DirectSync SWX30 stepper motor has a step-size of approximately 1.9 microns so the default maximum position of 65,535 steps should reach the end of travel for the drawtube. However, some focusers may have a smaller step size and greater travel. To take advantage of the full focuser travel, you may wish to

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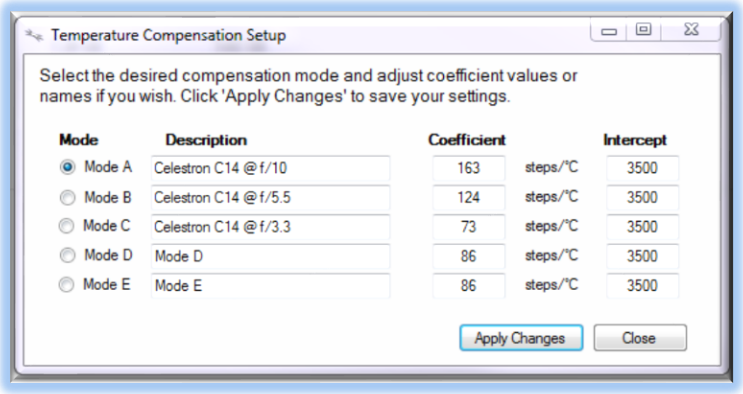
change the Maximum Position value in setup to allow more steps for full travel. Click File- **Step Size Wizard** in FocusLynx Commander to calculate the exact step size and set the MaxStep values for your focuser and motor.

Recommended Sync Procedure

For most auto-focus routines, the required range of movement for the focuser is quite small compared to the total range of travel. The default 16-bit digital range of 65,535 steps is always more than adequate to allow successful auto-focusing. For best results, we recommend the focuser be manually moved to a rough focus and the position be synced to the center position of 32,767. The FocusLynx Hand Control offers an easy push-button method of accomplishing this "sync to center" operation. To "sync to center" with FocusLynx Commander, enter 32,767 (or simply round to 33,000) in the box immediately right of the Sync button. Press **Sync** and wait a few seconds. Test the IN and OUT button movements to ensure proper operation and function.

Alternatively, you can manually move the focuser drawtube all the way IN and Sync to 0. Then, use the hand control or FocusLynx Commander interface to move the drawtube outward to the end of travel. Note the step position and enter this value in the Maximum Position within setup. Subsequent connection to the focuser will automatically calculate the new center position (half of MaxPos) and display it as the new default Sync position on the main form and in the hand control "sync to center" feature.

Temperature Compensation



The DirectSync motor includes a built-in temperature sensor for temperature compensation. Within FocusLynx Commander click File – **Temp Comp Wizard** to let the software step you through the process and automatically calculate the "TC" or Temperature Coefficient for your particular telescope configuration. After completing the wizard, save the new TC value in any of the five available TC modes. Click the adjacent radio button next to Mode A through E to select that TempComp Mode for the current session.

Turn on temperature compensation by selecting "On" just above the Sync button on the main FocusLynx Commander form. The FocusLynx controller will automatically adjust the focus for changing temperatures.

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Linux and Mac Software Setup

Optec is developing a Linux based Commander program to provide much of the same functionality and features available with Windows FocusLynx Commander. Check the Optec website for the latest developments.

INDI Support

A group of dedicated volunteer programmers has developed the INDI Library which is a collection of programs designed to control astronomical equipment. Full details are available at the INDI Library website: https://www.indilib.org/

ThirdLynx uses the same low-level commands as FocusLynx and will function with the INDI FocusLynx driver developed by Mr. Philippe Besson and Jasem Mutlaq. Complete instructions and the INDI Linux driver are available for download here: https://www.indilib.org/devices/focusers/focuslynx.html

A special thanks to both developers.

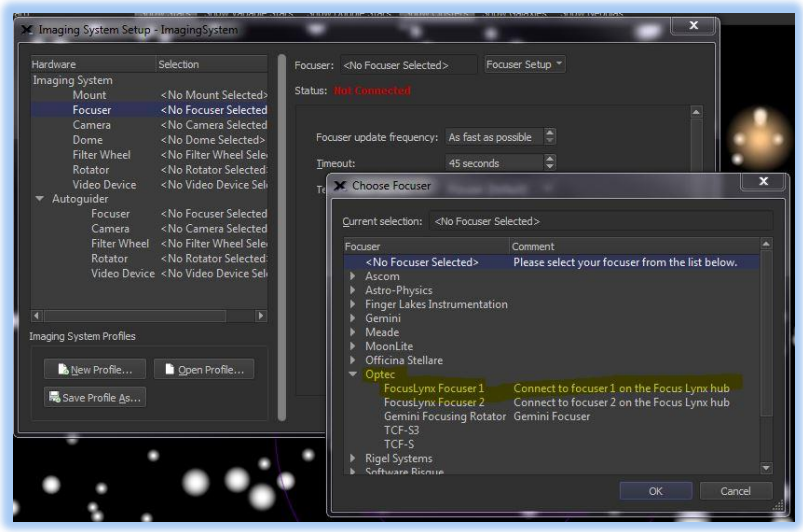
Third-Party Software

Visit the Optec website for the additional information describing FocusLynx configurations for ASCOM clients such as **FocusMax** and **Maxim D/L**, as well as non-ASCOM software such as Software Bisque's **TheSky X** native X2 drivers for FocusLynx.

TheSky X Pro

Many users have asked for specific instructions to configure the DirectSync ThirdLynx controllers with TheSky X native X2 drivers. Currently, you should configure ThirdLynx as FocusLynx Focuser 1.

We expect a future daily build to offer the ThirdLynx as a separate option. Under settings, look for the COM port labeled **Optec ThirdLynx USB CDC**.



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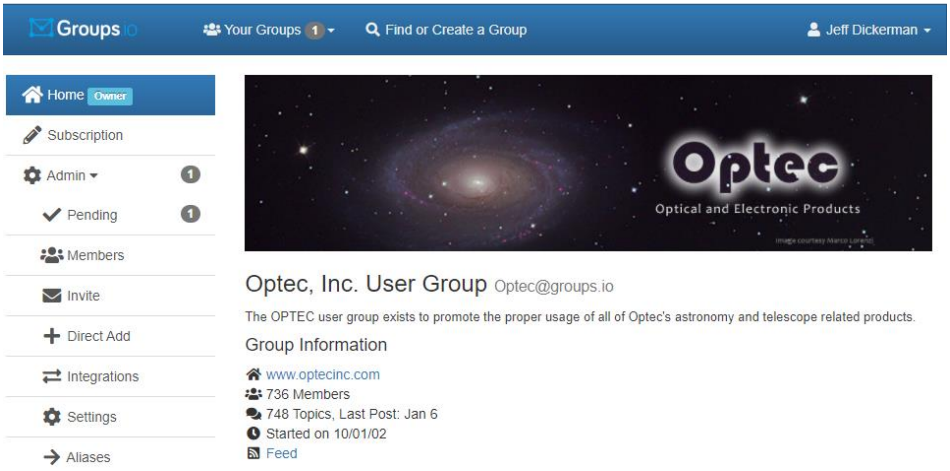
YouTube Channel

Optec is developing videos for installation and configuration of our many products for various software packages. Visit our YouTube channel by searching "Optec Inc" or clicking the link below.

https://www.youtube.com/channel/UCLOJ43G-q2SQfZfqeoaLiLA

Optec User Group

The Optec User Group is now located at Groups.io which provides a forum to communicate with other users of Optec instruments. Other end-users can often provide answers to specific configuration questions and Optec staff routinely follow and answer many questions as well. Click the banner below to subscribe.



Or visit the Groups.io Optec User Group here: https://groups.io/g/Optec.

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