DirectSync AT25 Motor Installation

Step-by-Step Instructions for Installing the DirectSync AT25 Motor Assembly to your Astro-Tech, TS, or William Optics dual-speed focuser.

Introduction

Optec's #19781 DirectSync AT25 motor fits directly in place of the coarse focus knob on the left side of several popular dual-speed focusers featuring an integrated one-piece cast pinion block.

Available alone or in kit form with the FocusLynx dual-focuser control hub, DirectSync AT25 provides a complete digital focusing solution for William Optics, Astro-Tech, Teleskop Services and other refractor telescopes produced after late 2019. The right-side coarse and fine focus knobs are left intact on the focuser while the DirectSync clutch mechanism offers easy engagement and disengagement of the stepper motor for manual focus.

Specifically, the DirectSync AT25 motor will fit the following telescope:

- Astro-Tech AT80ED f/7 refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT80EDT f/6 Triplet refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT92 f/5.5 Triplet refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT102ED f/7 refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT115EDT f/7 Triplet refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT130 EDT f/7 Triplet refractor with silver focuser having an integrated pinion block,
- Astro-Tech AT152EDT f/8 Triplet refractor with silver focuser having an integrated pinion block,
- Teleskop Service TS-Optics Photoline Series APO refractors with white focuser having an integrated pinion block,
- William Optics Gran Turismo series with black focuser having an integrated pinion block,
- Many telescopes using the integrated pinion block focuser produced after late 2019 (see below)

Optec

Integrated Pinion Block

To determine if this is the right motor for your focuser, turn the telescope over to examine the bottom of the focuser. Look for the single piece focuser body with integrated cast pinion block to confirm compatibility with the DirectSync AT25 motor. Older Astro-Tech, William Optics, and Teleskop Service focusers may have a separate pinion block which has been bolted on to the focuser body. For these telescopes, consider the Optec DirectSync AP25 motor (stock no. 19776) instead.

When properly mounted, the

DirectSync AT25 motor provides approximately 1.4 micron per step resolution and superior repeatability and load carrying capacity. A precision digital temperature sensor and electronic noise suppression circuitry are integrated into the DirectSync motor assembly.

Connection to the FocusLynx hub is via the included Cat-5e or better ethernet cable. Note, however, that

#19781 - DirectSync AT25 Installation Instructions - Revision 1

the FocusLynx or FocusBoss II hub is REQUIRED for operation of the DirectSync AT25 motor. Optec's new ASCOM Alpaca driver and field-proven FocusLynx Commander software round out the package for complete remote telescope focusing solution.

DirectSync AT25 Package Contents

Confirm the contents of your DirectSync AT25 motor package. The package should contain the following:

- DirectSync AT25 motor assembly,
- 60-tooth drive shaft gear with 1.04" (26.5mm) long brass hub,
- 1/16" Allen hex key,
- 2mm and 2.5mm hex key tools,
- Two M4 X 8mm length button head screw,
- 7-ft. Cat-5e or better ethernet cable.

FocusLynx / DirectSync AT25 Kit Package Contents

The DirectSync AT25 motor can be purchased as part of a complete kit including the FocusLynx controller hub. See http://optecinc.com/astronomy/downloads/focuslynx.htm for the latest FocusLynx Quick Start Guide available in pdf format.

If you purchased the full FocusLynx DirectSync APO package you will also have the following items:

- FocusLynx control hub
- 12VDC power supply with cord
- USB/Serial cable
- Cat-5e or Cat-6 Ethernet cable

The second Cat-5e Ethernet cable is for a network connection using the Network port on the bottom of the hub. This cable and the Ethernet cable included with the DirectSync APO are interchangeable with any Cat-5e or better cable.

ThirdLynx vs. FocusLynx

All DirectSync and QuickSync motors are offered in two different versions with control electronics provided by the FocusLynx or FocusBoss II hub or with the integrated ThirdLynx control circuit.

Optec's original QuickSync and DirectSync motors feature a single RJ45 socket which allows connection to either the Focuser 1 or Focuser 2 port of a FocusLynx hub. **Note that a FocusLynx hub is required for these motors.** Connection to an observatory control computer can be made via USB using the Optec USB/Serial cable, Ethernet, or WiFi using the optional WiFi add-on board.

The **ThirdLynx** motors are designated with an "X" and feature a square USB-B square connector and 2.5 x 5.5mm power socket. **No additional controller is required.** Connection to the observatory control computer is through any available USB port.

Installation Procedure: Step-by-Step

Step 1 – Remove Focus Knob, Tension Knob, and Setscrew

To install the DirectSync AT25 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 one or two metric hex set screws (also known as grub screws). In most cases the setscrews are easily seen, but you may find that they can only be accessed through a small threaded port on the main pinion block.   You will use the 2mm hex head L-key to loosen the setscrew(s) to remove the knob. Loosen only, do not remove.

Next, remove the tension screw (if present) and the innermost setscrew on the coarse knob side of the pinion block.

See red arrows at left indicating the two screws to be removed. The motor bracket will be held in place with the two M4 button head screws.

Step 2 – 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.   Use the 1/16" hex key to tighten the gear to the pinion shaft. Be sure it is fully secured before continuing. 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.

NOTE: Be sure to tighten gear setscrew tightly to avoid introducing backlash.

#19781 - DirectSync AT25 Installation Instructions - Revision 1

Step 3 – Slip Motor over Gear

Disengage the motor by rolling the motor cap counter clockwise (looking from the connector end).

Note the slot in the DirectSync AT25 motor housing. Slip the motor over the 60-tooth gear and slide it to the right to line up the bracket slots to match the two threaded holes. Loosely thread the two M4 button head screws into the holes using the 2.5mm hex key.

Step 4 – Adjust and Tighten

Now re-engage the motor by rolling the motor cap clockwise. Shift the DirectSync AT25 motor to the right and upward keeping the motor bracket parallel with the pinion assembly. Tighten the two M4 hex drive button head screws to secure the motor in place.
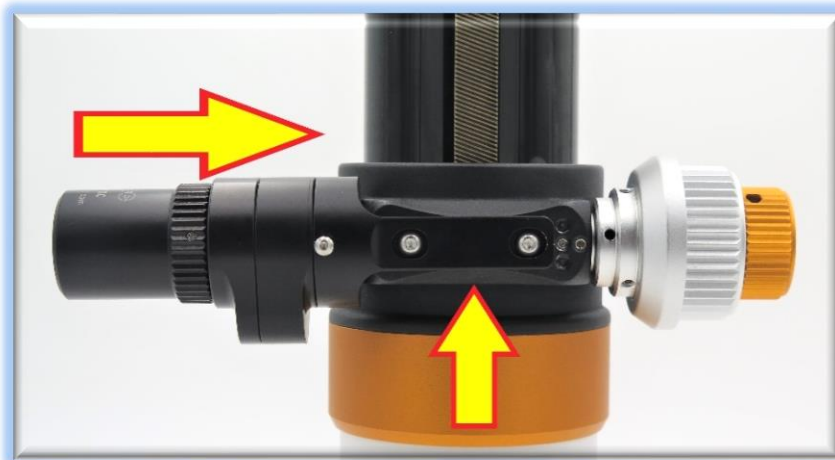
Test the mesh of the gears by engaging the motor. The coarse knob on the right side should not move when the motor is engaged. Disengage the motor (turn the motor cap counter-clockwise) and be sure the gears do not rub when the motor is disengaged. Adjust as necessary and re-tighten the M4 button head screws.

Your DirectSync AT25 motor is now ready for FocusLynx Software Setup. Contact Optec Support if you have any questions or concerns when installing your DirectSync motor.

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. Separate installer packages for Mac and Linux will be available soon.

http://www.optecinc.com/astronomy/downloads/focuslynx.htm
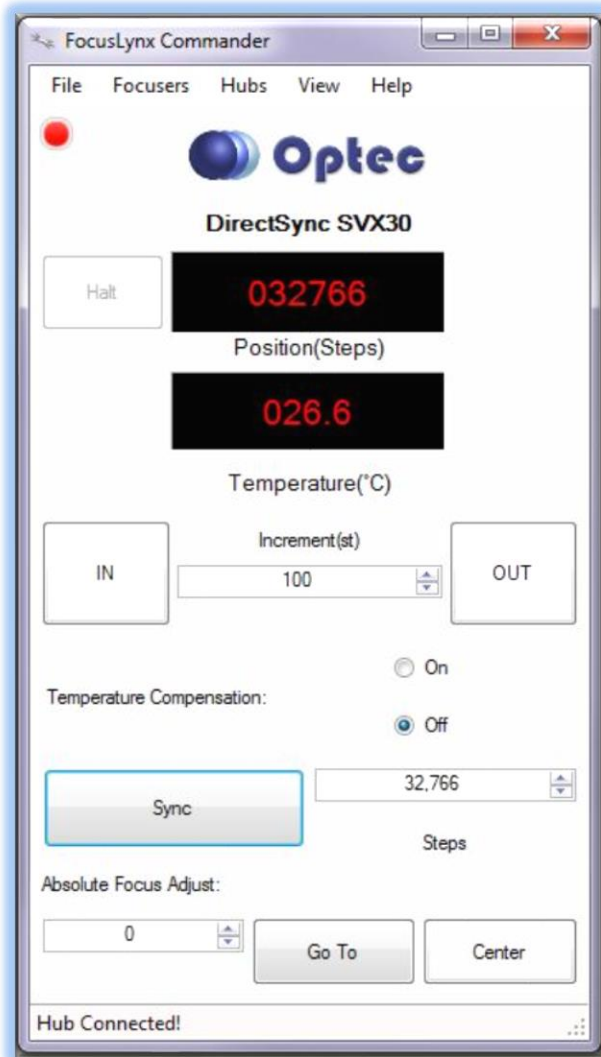
Because FocusLynx Commander is an ASCOM client, you will need ASCOM Platform 6.4 or higher to configure the focuser. The FocusLynx controller is an iFocuser3 type device. Visit the ASCOM webpages for the latest version.

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.
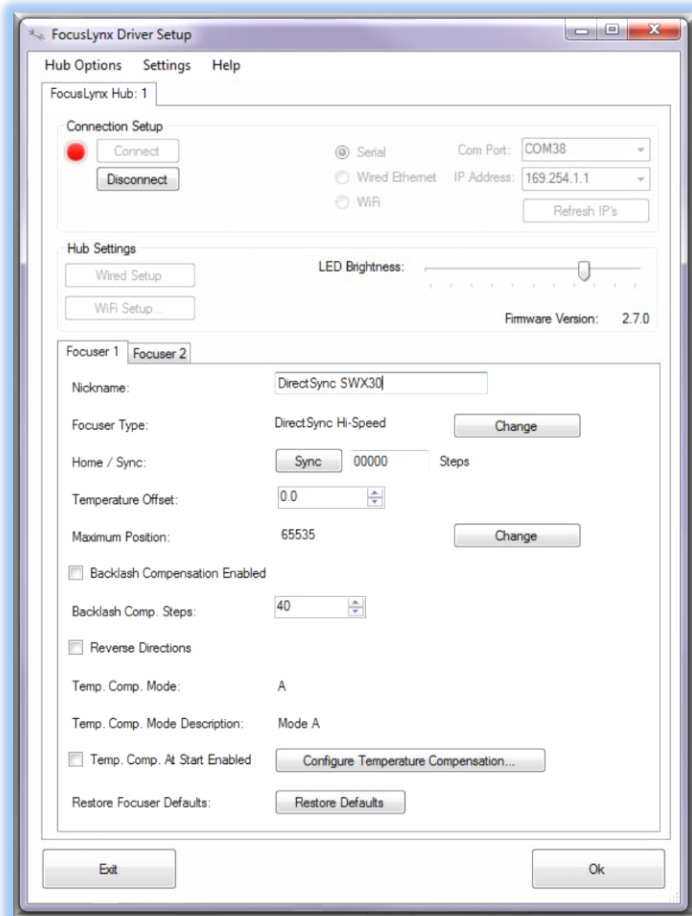
Windows Software Setup

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 Optec FocusLynx.

Focuser Type Selection

In FocusLynx Commander, click **Focusers – Setup** to open the FocusLynx Driver Setup dialog. The Optec USB/Serial cable will be automatically assigned a virtual COM port by Windows. (Alternatively, you may use the Wired Ethernet or WiFi connection types to make the connection to your PC.)

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-Torque Focuser Type option coupled with the **DirectSync AT25** motor assembly can reliably handle payloads of 10kg (22 lbs.) or more.
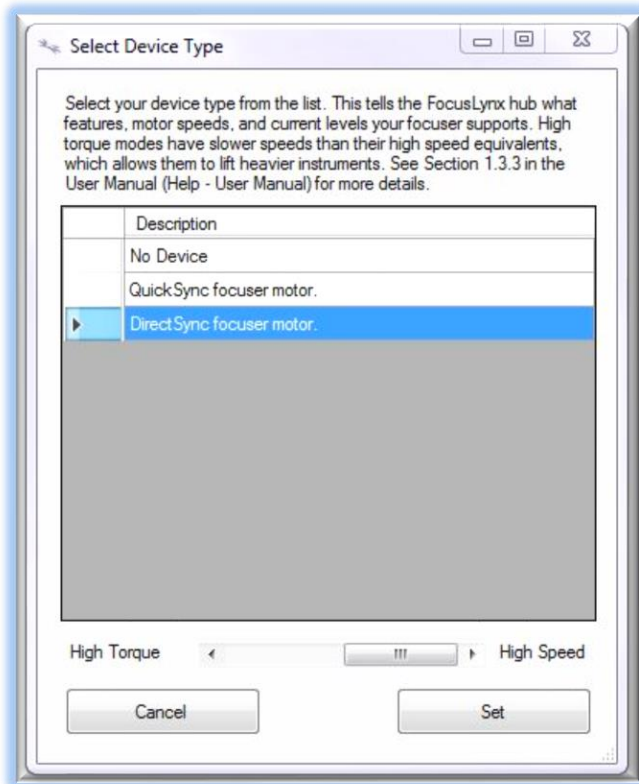
Click OK to exit the setup form and return to the main FocusLynx window.   Click Focusers – **Connect**. Test the focuser movement by engaging the motor (roll the endcap clockwise as viewed from the cable end). Test both IN and OUT functionality with 1000 step increments. You should see the coarse and 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@optecinc.com) if your focus motor cannot be adjusted without slippage or stalling or if you have any troubles configuring the software. Note that some focusers present unique challenges with internal slipping.

Optional Setup Steps

Set the Position Units

The iFocuserV3 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 Astro-Tech focuser drawtubes have a wide variety of travel ranges. The DirectSync ATX25 stepper motor has a step-size of approximately 1.4 microns so the default maximum position of 65,535 steps would allow for about 92mm.   If your focuser has a longer drawtube travel, you may wish to increase the Maximum Position value in the FocusLynx/ThirdLynx Driver Setup screen.

However, some focusers may have a smaller step size and greater travel. To take advantage of the full focuser travel, you may wish to 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.
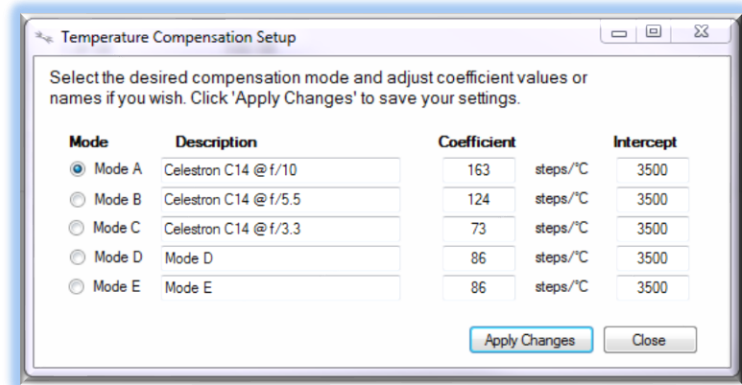
Turn on temperature compensation by selecting "On" just above the Sync button on the main FocusLynx Commander form. The FocusLynx controller will automatically adjust the focus for changing temperatures.

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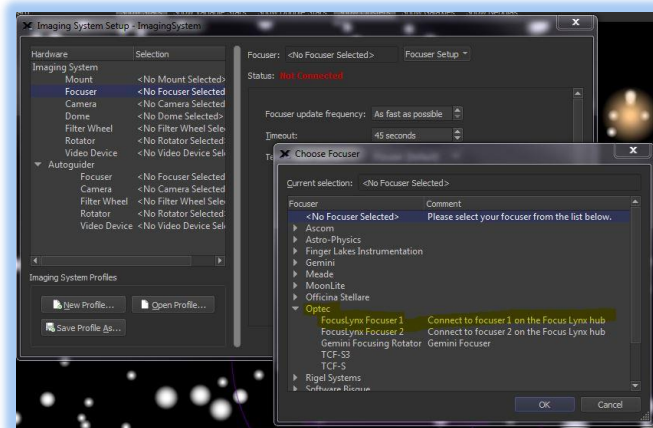
We expect a future daily build to offer the ThirdLynx as a separate option. Under settings, look for the COM port labeled **Optec ThirdLynx USB CDC**.

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.

199 Smith Street · Lowell, Michigan 49331 · U.S.A.
Telephone: 616-897-9351 · Fax: (616) 897-8229 · Toll Free: 888-488-0381
sales@optecinc.com · http://www.optecinc.com · www.optec.us