

Oasis Focuser

Clutch Electronic Focuser

User Manual

Version 1.4

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1. Product Introduction

Oasis Focuser is an electronic focuser with clutch mechanism, designed for astronomical observation and photography amateurs.

In the past, we have found that the telescope's focusing knob can no longer be used when an electronic focuser is attached to the telescope by means of a coupling. This is an inconvenience for users. For example, when the user wants to focus quickly or to retract the telescope focuser. Then we came up with the idea of designing a better focus controller.

The main goal of the product design is to achieve the clutch function, and also to add the Bluetooth function, and to improve the size and appearance of the electronic focuser. The following is a brief description of these goals.

Clutch function: It should have clutch mechanism to allow both motor and manual focus control.

Bluetooth function: Users can use a mobile device such as a mobile phone for focus adjustment and other operations. When using mobile device to control the focuser, the focuser does not even need to connect to any computer through a USB cable. And users can also use mobile devices to do other operations such as firmware upgrade for the focuser.

Better size and appearance: It should have small size and good appearance.

We made many innovative designs into this product and finally achieved these goals on it after lots of validation, testing and optimization works. It also has some other excellent features. The features of this product are described as follows:

- **Clutch function** — Easy and fast switching between motor and manual focusing.
- **Bluetooth function** — Mobile devices such as mobile phones can be used to control the focuser via Bluetooth
- **Small size** — Round appearance with small size
- **High precision** — Micron precision for each motor step
- **Ability to drive heavy load** — Testing indicates that it can driver net loads more than 5Kg
- **Small backlash** — Carefully selected motor model and product design results in small backlash
- **Easy to install** — Easy to install or uninstall focuser body. Only one screw needs to be used to install or uninstall focuser body. And it can be installed on many telescope focusers.
- **High integrated** — Except for the ambient temperature probe, all functions and components (including motor, controller board etc.) are implemented and integrated in the single small-sized focuser body.

In addition, this product has the following features:

- 1、 Support ASCOM interface
- 2、 Support INDI

- 3、 Support USB HID device interface, driver-free for Windows operation system.
- 4、 Has two temperature sensors, one monitors board temperature, the other monitors ambient temperature
- 5、 Support backlash compensation
- 6、 Support electronic auto-focusing
- 7、 Has beep generator for tips or alarms.

2. Packing list

This product has the following components.



Figure 2-1 Packing List

Descriptions of each component are shown below.

Name	Description
Main Assembly	The main component of this product, which integrates the motor control board and other functional modules. It also includes a small assembled gear.
Clamp	Tightening the clamp to connect Oasis focuser main assembly and telescope focuser. The number on the clamp indicates the diameter of the clamp inner hole. Clamps of different diameters are used to accommodate different telescope focusers.
Clamp Connection Screw	Used to connect clamp and focuser main assembly
Clamp Tightening Screw	Used to tightening clamp onto telescope housing
Gears	Installed on telescope focuser shaft. There are two types of gears. One is an A-type gear with a length of 8mm, and the other is a B-type gear with a length of 16mm. The number in the gear model indicates the diameter of the inner hole, which is the diameter of the shaft of the telescope focuser. Different types of gears are used to accommodate different telescope focuser.
Gear Setscrew	Used to install gear onto the shaft of telescope focuser
Clutch Locking Screw	Tightening this screw when Oasis focuser needs to be in engagement

	state for long periods (For example when the equipment work in remote observation).
Hex Keys	Three hex keys for screw and setscrew tightening and loosen
Temperature Probe	It can be connected to the temperature probe socket of the body to monitor ambient temperature.
USB 2.0 Cable	2-meter long USB 2.0 cable for data communication between Oasis focuser and computers.

3. How the clutch works

Oasis focuser uses two gears instead of a coupling to driver telescope focuser. The two gears have different sizes and teeth numbers. The bigger gear is installed on telescope focuser small shaft, and the smaller gear is installed on the shaft of the Oasis focuser motor. The two gears can be meshed or not meshed by rotate Oasis focuser body. When gears are not meshed, the knob on the other side of telescope focuser can be used to do manually focus.

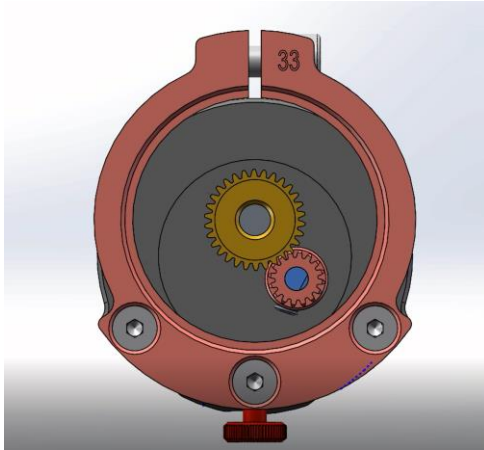


Figure 3-1 Meshed

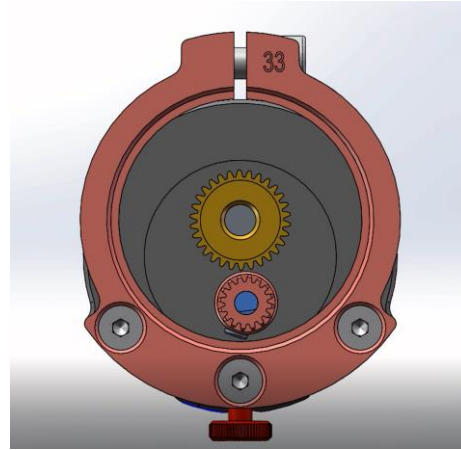


Figure 3-2 Not meshed

Oasis focuser uses a bolt to indicate engaged (ON) and disengaged (OFF) states. It is important to note that when engaging the bolt indicator does not need to be rotated to the right edge of the sliding groove completely, but only needs to be sure that the two gears have been meshed. There will still be a small gap between the bolt indicator and right edge of the sliding groove, which is designed so.



Figure 3-3



Figure 3-4

The position of the bolt in the sliding groove indicates the engaged or disengaged state.

Oasis focuser uses a spring to achieve "self-locking" feature for engaged or disengaged state. This means the engaged or disengaged state is stable when the focuser is switched to ON or OFF state while there is no additional locking operation needed. Of course, we still provide a hand screw locking method, which ensures that the focuser will always be in a stable state when it needs to work in a certain state for a long period of time. For example, it can be used when the equipment works in a remote observation station and the focuser needs to be in engaged state for a long time.

4. Hardware installation

To install Oasis Focuser onto telescopes, please refer to the following document:

Oasis_Focuser_Installation_Reference_Manual_EN.pdf

This document can be downloaded at the following address:

https://www.astroasis.com/download/files/focuser/Oasis_Focuser_Installation_Reference_Manual_EN.pdf

5. Software installation and usage

Oasis focuser body has three ports on the rear cover. They are 12V power input, USB 2.0 data communication port and the ambient temperature probe port, as shown in Figure 6-1.



Figure 5-1

Oasis focuser can be connected to a PC via a USB 2.0 cable and is implemented as an HID device, which is automatically recognized on a Windows PC without the need to install drivers.

In order to use Oasis focuser in applications that support ASCOM, please download and install the ASCOM driver for it.

Please follow the steps below to download and install the ASCOM driver and test the focuser:

- 1、 Download Oasis focuser ASCOM driver at <https://www.astroasis.com/en/download> and install the driver after download completes.
- 2、 Connect 12V power supply to the focuser and connect it to Windows PC using USB 2.0 cable. Turn on the power supply and you can hear two beep sounds which indicate the focuser has started successfully.
- 3、 Switch Oasis focuser to "ON", i.e., the engaged state. In this state, the two gears are meshed together so that the telescope focuser can be driven when the motor is running.
- 4、 Open an astronomical application software that supports ASCOM interface, such as Sharpcap, Sequence Generator Pro, NINA etc.
- 5、 Take Sequence Generator Pro as an example. After ASCOM driver is successfully installed, there will be "Oasis Focuser" item in the ASCOM focuser drop-down selection list. Select "Oasis Focuser" and then click "Setup" button, the setup dialog will appear as shown in figure 6-2. Enter the number of steps in the IN/OUT input box and click on IN or OUT, then with a beep you will see the telescope being driven and the fine-tuning knob on the other side will move.

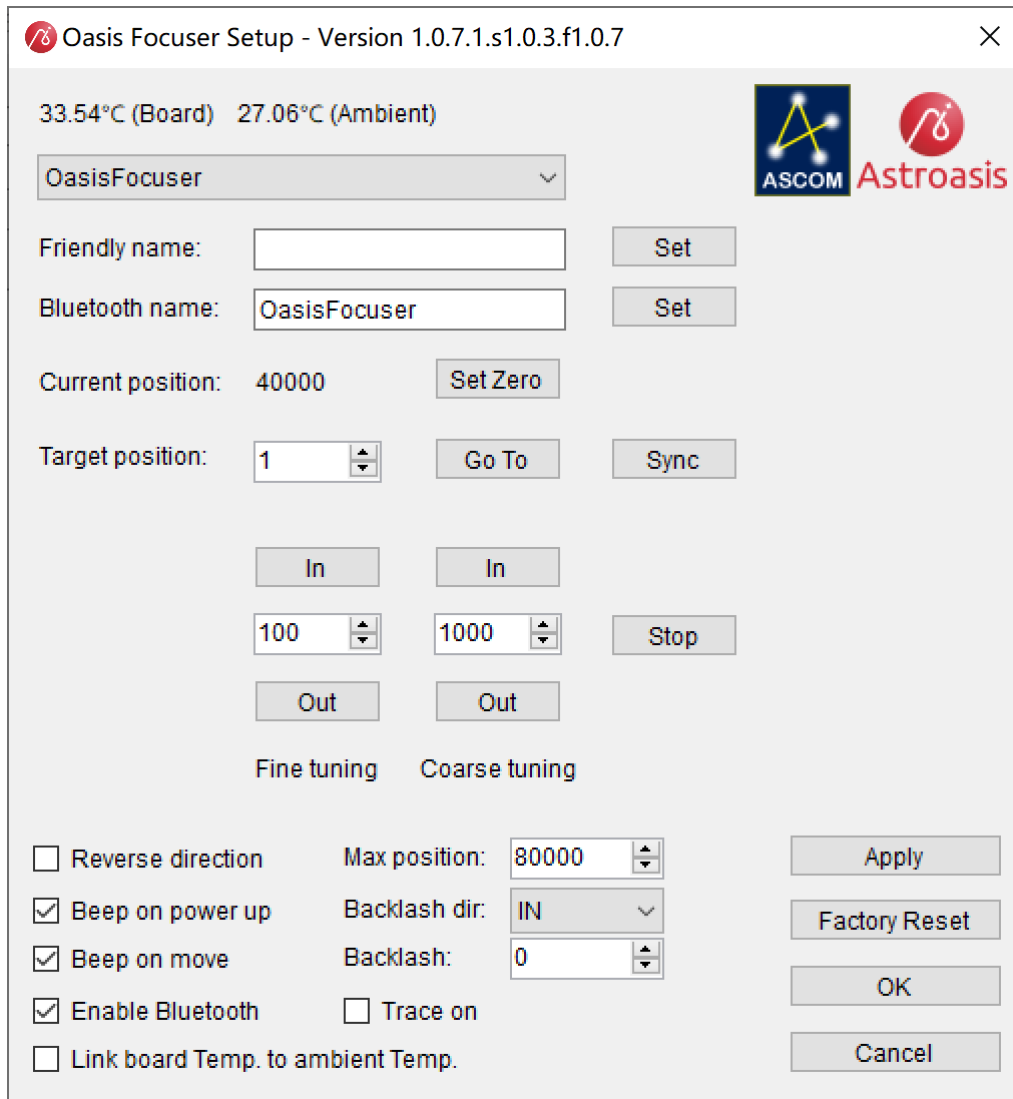


Figure 5-2

You can also perform other operations in this setup dialog.

6. Notes for installation and use

Here are some notes for installation.

1. As there is only limited space around the telescope focuser knob, it is recommended that the clamp be installed at a particular angle as shown in Figure 6-1, otherwise the clamp may touch the telescope focuser shell and the installation may not be stable.



Figure 6-1

2. When switching from disengaged mode to engaged mode, sometimes the gears may not be meshed perfectly although the gears seem already meshed. This can lead to bigger backlash. In this case, there are two methods to correct the engagement.

- 1) The first method is to turn the knob at the other side of the focuser slightly by one hand, while turning the Oasis focuser too by another hand, so that the two gears will have chance to mesh perfectly. Please refer to the clip from the following video starting at 5:12.

<https://youtu.be/KLGeKOnrQnY>

- 2) The second method is to use the move command in the ASCOM setup dialog or in software that supports ASCOM to make the motor (and the gear on motor shaft) move a few steps and then turn the Oasis focuser to engage again. The above operations may be performed repeatedly until the gears are meshed perfectly.

Measuring backlash can be used to check if gears have been meshed perfectly after Oasis focuser is switched from disengaged mode to engaged mode. For the way of backlash measurement, please refer to [Backlash measurement](#).

3. The clutch mechanism of Oasis focuser is self-locking. Most of the time you do not need to use the hand screw to lock for engagement or disengagement. If the focuser needs to stay in engaged state for a long time (for e.g., the equipment works in remote observation station), you can use the clutch locking screw to lock the state to ensure that the state is still stable when used for a long time. The installation position of the clutch locking screw is shown in figure 6-2.



Figure 6-2

7. Position and steps measurement

Oasis focuser uses a motor that has a large reduction ratio. To implement the clutch function, it uses two gears to driver telescope focuser. The gears have different number of teeth which also increases the reduction ratio. Large reduction ratio generates large drive force so Oasis focuser can drive large loads. At the same time, large reduction ratio makes very small focuser movement for each motor step. This helps to improve the focusing accuracy. Oasis focuser can achieve micron level accuracy on most telescope focusers.

In order to understand the relationship between the focuser movement and motor steps, we have made some measurements. Users can also do this on their own equipment. Although this is not necessary, this is useful for you to understand how your equipment work and how to let them work better.

We performed measurement using an Oasis focuser with a SkyRover 102 APO Pro. The steps are as follows:

- 1、 Switch Oasis focuser into disengaged mode
- 2、 Turn the focusing knob to move the telescope focuser to the position 10mm scale. In the Oasis focuser ASCOM setup dialog set the current position to zero steps.
- 3、 Switch Oasis focuser into engaged mode
- 4、 Click on the "OUT" button in the ASCOM setup dialog and move the telescope focuser to 90mm scale.
- 5、 Record the current position (steps) of Oasis focuser in ASCOM setup dialog.

Based on our measurement we found that it took 87900 steps to move telescope focuser from position 10mm to position 80mm. After simple calculation we can know that it takes about 125 steps per 0.1mm movement.

In the same way we measured the relationship between Sharpstar 107PH focuser movement and the number of motor steps. We found it takes about 159 steps per 0.1mm movement.

8. Backlash measurement

Many applications have backlash compensation feature when using electronic focusers. When backlash compensation feature is enabled, the backlash is "transparent" to the user and the user does not have to consider the backlash when moving telescope focuser from direction in to direction out or vice versa. He only needs to send a move command to the focuser with the number of steps that he actually wants the focuser to move.

Usually, before using the backlash compensation feature in an application the user needs to set a backlash value which is measured in steps. The application allows this value to be not exactly the same as the actual backlash value (this may depend on particular backlash compensation mode), but can be larger than the actual backlash. Of course, if the value is set too large it may also affect focusing accuracy.

When using backlash compensation feature in an application, if the backlash compensation value set is smaller than the actual backlash, it will lead to insufficient compensation and bad focusing result. If a value much larger than the actual backlash is set, then too many movement steps may also cause cumulative errors, which also affects the focusing result. It is therefore necessary to measure the actual backlash for your equipments.

The same electronic focusers with different telescope focuser may have different backlash. Therefore, knowing the backlash value of your equipment can help to select proper backlash compensation value in applications and achieve the desired focusing result when backlash compensation feature is enabled.

The backlash value of the electronic focuser and your equipment can be obtained by means of a measurement. This can be done as follows:

- 1、 Open the Oasis focuser setup dialog in an application that supports ASCOM interface
- 2、 As Oasis focuser firmware itself has backlash compensation feature too, you need to disable this feature first before measuring backlash. To disable backlash compensation feature in firmware, enter 0 in the ***Backlash*** field of the setup dialog, as shown in Figure 8-1.

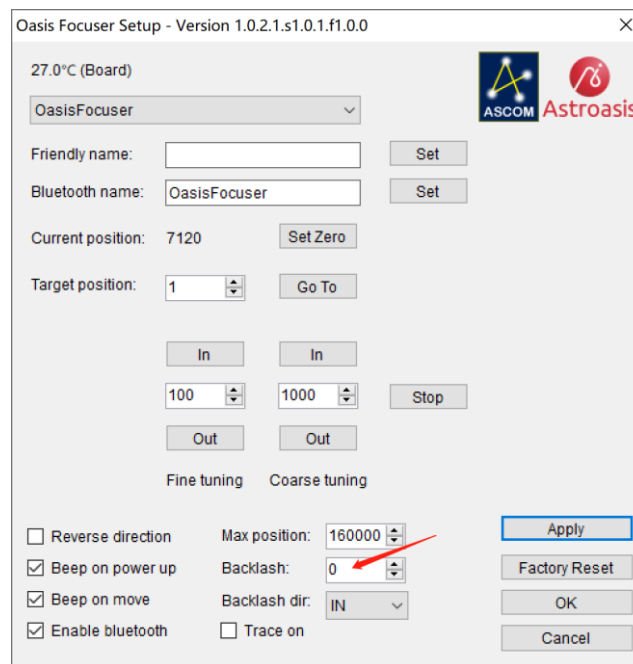


Figure 8-1

- 3、 Click the IN (or OUT) button to move the focuser in a certain direction to ensure that there is a noticeable rotation of the fine-tuning knob.
- 4、 Enter a small number of steps (i.e., the estimated backlash value) in the IN/OUT input box. For e.g., set the number of steps to 100. Then click the OUT (or IN) button to move focuser in the opposite direction.
- 5、 Determine the backlash value:
 - 1) If the fine-tuning knob does not rotate after moving the focuser in the opposite direction in step 4, we can know the backlash is greater than the value entered in step 4. Repeat steps 3 and 4 until you can observe that the fine-tuning knob starts to rotate after moving the focuser in the opposite direction. Then the backlash is approximately equal to the last value entered in step 4.
 - 2) If the fine-tuning knob rotates after moving the focuser in the opposite direction in step 4, we can know the backlash is less than or approximately equal to the value entered in step 4. Then you can decrease the value entered in step 4 and repeat steps 3 and 4.

The backlash measured on SkyRover 102 APO Pro is around 300-400 steps and on Sharpstar 107PH it's around 250 steps. Based on the results of [Position and steps measurement](#), we can know the backlash value on SkyRover 102 APO Pro is equivalent to the number of steps to move 0.3mm. On Sharpstar 107 PH the backlash value is approximately the number of steps to move 0.15mm. This is a small backlash based on our experience of using electronic focusers.

Backlash does not need to be measured precisely, because the value entered for backlash compensation can be slightly larger than the actual backlash value. For examples if the measured backlash is approximately 400 steps, then the value entered for backlash compensation can be

between 500 and 600.

When moving in the opposite direction, if the number of steps is less than the backlash, the electronic focuser cannot drive the telescope focuser, i.e., the fine-tuning knob will not rotate. This is the idea of the above measurement method. However, this does not take into account the backlash of the telescope focuser itself (Most telescope focusers do not have large backlash). If you want to measure the overall backlash of your equipment, one of the good ways is to use an application that supports automatic focusing based on star FWHM calculations.

Measuring backlash by looking at the knob can also be used to quickly determine if the gears are meshed properly. If the backlash is significantly higher than expected, please try to rotate the Oasis focuser body again to mesh the gears properly.