

Detailed Installation and Operations Manual





Thank you for purchasing the ZWO EAF. This guide will give you a brief introduction to the installation of your new Electronic Automatic Focuser. Please take the time to read it thoroughly and if you have any other questions, feel free to contact our support team at <u>info@zwoptical.com</u>



Welcome to Your New Focuser Experience

The EAF is a high quality Electronic Automatic Focuser (EAF) designed to suit a wide range of Optical Tube Assemblies (OTA). It is supplied with a versatile mounting bracket system suitable for flexible installation across a wide range of telescope focuser systems.

Product Description

The ZWO EAF is an all metal bodied electronic focus drive system designed for installation across a wide range of Optical Tube Assemblies. The flexible mounting system allows installation across refractors, Newtonians, Cassegrain and many other telescope designs. The included accessories provide for a quick and simple installation using the supplied hardware and wrenches.

Finished in an attractive red anodised finish, the EAF's original design will grace any telescope. The EAF logo uses the Airy spot as an embellishment to reflect its precise focusing performance.

The EAF utilises a 35mm stepper motor which is subdivided into 5760 steps capable of being accurately positioned at any angle.





Features (Standard Version)

- High quality metal focuser with anodized finish.
- Precise focus control for planetary and deep sky imaging.
- Can be used in both autofocus and manual modes.
- Flexible installation for use on a variety of refractors, Newtonians, schmidt cassegrain and other Optical Tube Assemblies.
- Versatile mounting bracket system with other adapters available for purchase.
- ASCOM/INDI compatible drivers available for download interfaces with many well-known astronomy software packages.
- ASICAP support built in.
- Native support in ASIAIR Version 1.1 onwards.
- Integrated USB interface.
- Powered by 12V DC 0.5A.



Features (Advanced Version)

In addition to the features of the Standard version, the Advanced version offers:

- Temperature sensor
- Hand controller

Supplied Accessories



- 1. EAF Body contains the focuser motor and controller.
- 2. **Motor Bracket** for attaching the body to the OTA focuser assembly.
- 3. **Flexible Coupling** to attach the focus motor shaft to the OTA focuser drive shaft.
- 4. **Mounting Hardware** Spacers and screws to mount the focuser body.



- 5. **M4 and M5 Wrenches** for secure the shaft locking screws and bracket hex screws.
- 6. **USB 2.0 Cable** connection of computers or ASIAIR to the focus controller.

EAF Specifications

Construction Material	All metal, red anodised finish
Motor Specification	35mm Stepper Motor
Subdivision Steps	5760 steps
Torque	1.5N/M
Focuser Payload Limit	5KG
Power Requirements	Voltage Range: 11~15V.
	DC 12V@0.5A Recommended.
	Connector - 5.5mm*2.1mm Centre Positive
Data Interface	USB 2.0
Sensor/Hand Controller Interface	3.5mm audio, Centre Positive

The ZWO EAF utilises a USB2.0 interface for data communication which supports ASCOM and can be used in association with a wide variety of astronomy software.

Planetary imagers can use ZWO's ASICAP or other third-party software packages such as Sharpcap, FireCapture.

Deep sky astrophotographers can enjoy support from ZWO's ASIAIR or other well known packages such as Maxim DL, The SkyX, Sequence Generator Pro, Nebulosity and many more. Third party focus software such as FocusMax, is also supported.

Your EAF is also fitted with a small multi-function interface that supports a temperature sensor or external hand controller.

A dedicated temperature sensor can be connected to collect temperature data and allow focuser control from your chosen



software. The hand controller allows for manual control of focuser position and focus motor speed.

Installation

Your EAF is supplied with a bracket for connection to a wide variety of focusers. The standard bracket supports:

SkyWatcher Astrophotography Reflectors, SkyWatcher Black Diam ond, SkyWatcher Dobsonians, SkyWatcher Maksutov-Newtonians. TS Optics,

Astro Tech, Feather Touch, SharpStar telescopes, SkyRover telescopes, Explore Scientific telescopes We recommend you refer to this instruction to confirm whether your

telescopes and focusers are compatible to EAF.

https://www.yuque.com/zwopkb/hardware/eaf-support-list#G2tSm

You can also check the mechanical drawing below to estimate the compatibility by yourself.

A range of brackets for other telescopes are going to be available with time. Please keep your eyes on the ZWO site.



Dimensions



EAF Manual





Remove the coarse adjustment knob of the telescope focuser using a suitable sized wrench



Attach the focuser body to the flexible coupler and tighten the lock screw using the supplied wrench



Check all the mounting bracket is secure. This completes the hardware installation of the EAF. Download and install the required drivers from the ZWO website as required.



Install the flexible coupling on the telescope focuser shaft and tighten the lock screw



Secure the EAF body to the bracket and the bracket to the matching mounting holes in the focuser assembly using the supplied screws



Connect the EAF to a 12V power supply and connect to the USB cable to a computer or ASIAIR.





For curved focusing seats, such as those on the Sharpstar and the Feathertouch focusers, you only need use the original locking screws and 3 spacers to fix the EAF. There are grooves on the bottom of the EAF connecting plate, and the single screw provides sufficient stability.

Connecting your EAF





Connect your EAF to either a PC or ASIAIR using the USB port.
 Attach an optional temperature probe or hand controller as required.

3.Connect 12V DC to the power socket.

4.Install ASCOM drivers as required.

Software Installation and Configuration

ASCOM Installation

The latest version of ASICAP has native support for the EAF. Other software packages will require the use of an ASCOM driver. EAF ASCOM drivers can be found on the ZWO website: <u>https://astronomy-imaging-camera.com/software-drivers</u>

	ASCOM Drivers (optional)		
ASCOM Platform	After installing the ASCOM Platform, please install below ASCOM drivers, then you can use many 3rd party astro software through ASCOM. Note : This software is not from ZWO, we just provide another download node. <u>Official Site</u>	v6.3	Download Previous Version
ASI Cameras	ASI Cameras ASCOM driver to support our cameras.	v1.0.3.23 Change Log	Download Previous Version
EFW	Filter wheel ASCOM driver to support our EFW.	v1.0.0.14 Change Log	Download Previous Version
EAF	ASCOM driver to support our EAF.	v1.0.1.6	Download
USBST4	Telescope ASCOM driver to support our USBST4 convertor.	v1.0.1.16	Download

Download and install the ASCOM driver and launch the EAF dashboard from within your astronomy software.



Connecting EAF to your Astronomy Software

ASICAP

1. Open the focuser control panel.

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	TÖO
Camera(via USB3.0)	~
ZWO ASI1600MM-Cool(05008904)	801
Image	~
Format RAW8 Bin	Binl 👻



2. choose the focuser that you connected.

🥑 Setti	ing		×
\$	General	Switch EAF:	
\bigcirc	EFW		
	ST4 Auto Guide		
0	EAFocuser		

3. Set suitable settings for your EAF.

GOTO an absolute position	Set current position as zer position.	
General General	Switch EAF: ZWO EAF(ID:0)	8
EFW EFW	Current Position: 50000 Set 0	23.4 C
ST4 Auto Guide	Goto position 50000 \$	Reverse the motor
C EAFocuser	Set coarse steps	Beep Every time the motor rotates, there will be
Manual control	Set fine steps < 100 🗘 >	Advanced a sound prompt
1	Set maximum steps 60000 \$	
	Set backlash 0 ‡	Advanced settings, including more settings
Max steps: Limit travel range of the focuser		
	Backlash: the accuracy backlash of the EAF, if you set backlash in capture software, recommend to set	
	0 here. How to measure the backlash, read Appendix I.	

ASIAIR

1.On the ASIAIR main screen find the icon for the EAF.







2. Click the icon and enter the EAF settings page.



3. EAF Advanced Settings .

	(lı-	<	Advanced Settings	×	Max steps: Limit travel
()	0	Max Steps	60000		range of the focuser
Histogram	{	Backlash	0		
Focuser	A	Веер			Backlash: the accuracy backlash of the EAF, if you set backlash in capture
Guide Y					software, recommend to set 0 here. How to measure the backlash read Appendix I
Crosshair 😽	<u>o</u>		Every time the mo rotates, there will a sound prompt	be	bucklash, read Appendix I.
Auto					
Reset 0 1280x960 Gain:0 Temp:27.5°C	•••				

Sharpcap

1. Open Sharpcap settings.





2.Choose ZWO focuser.

SharpCap Settings							
General	Hardware	Filenames	Memory	Plate Solving	Polar Alignment	Startup Scripts	
Focuser:		ZWO Foo	user			¥	Properties
Filter Wh	eel:	None				~	Properties
Mounts:		None				¥	Properties
\checkmark Connect hardware automatically when opening a camera							

FireCapture

1. Open the focuser panel in settings menu.



2.Check "Use ASCOM Focuser"





3. Choose ZWO Focuser in ASCOM panel.



Sequence Generator Pro

🥏 Untitled* - (No equipment profile; No user profile)								
Target List	Target Data		Equipment					
Target List	Selected:	Target 1	Camera:	No Camera 🗸 🗸	چی 🖌			
	Running:	None	Filter Wheel:	No Filter Wheel V	}			
	Directory:	C:\Users\WHY\Downloads Browse	💣 Focuser:	ZWO Focuser V	船 🖌			
	% File Name:	%ft\%tn_%el_%bi_%su_%fn 👂 💌	💉 Telescope:	No Focuser ASCOM Simulator Focuser Drive				
+ T ± 🕑 🗙	±	▼		DXFocuser Arduino Edition				
Sequence Status	Target Status		Delay and Orderin	Generic Hub				
Remaining time: 00:0	0:00 m Total events	s complete: 0/1 🔇 Remaining time: 00:00:00	Delay:	Pipe diagnostic tool				
Elapsed time: 00:0	0:00 m Total frames	complete: 0/1	🔟 Delay first:	Simulator	events			
		0%	X Delay between	ZWO Focuser	ucuts first			

Maxim DL Pro

1.Open "Observatory panel", in "Focuser 1" option, click "Choose...".



🕺 MaxIm DL Pro 5		
<u>File E</u> dit <u>V</u> iew <u>A</u> nalyze <u>P</u> rocess Fil <u>t</u> er <u>C</u> olo	or Pl <u>ug</u> -in <u>W</u> indow <u>H</u> elp	
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	Options 🕨	Choose
	Connect Disconnect	Setup
	Rotator	 Enable for Connect All
	No Device Colorid	

2. Choose ZWO Focuser in ASCOM panel.



Nebulosity

To be added

×



The SkyX

1. Open "Telescope" menu, and select "Telescope Setup"



File Edit Display	Orientation Input Tools	Telescope Help
8888	8 🔶 🔶 🔶 😢	🐺 Telescope Setup
Find		🍫 Connect
🛱 Search for:		📷 TPoint Add On
T. 		🍇 Telescope Limits
and	GEE	🐼 Digital Setting Circles

2.Select "Focuser Setup"

🗙 Imaging System Setup - ImagingSystem

ardware	Selection		Focuser: o Focuser Selected>	Focuser Setup	•	
naging System Mount	<no mount="" selected=""></no>		Status: Not Connected	Choose		
- Focuser	<no focuser="" selected=""></no>	1		Settings		-
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3. select ASCOM Focuser

2	Choose Focuser		×
(Current selection: Ascom ASCOM F	ocuser	
	Focuser	Comment	_
	No Focuser Selected>	Please select your focuser from the list	below.
	📮 Ascom		
	ASCOM Focuser	Any ASCOM Focuser	
	🖽 Astro-Physics		
	Finger Lakes Instrumentation		
	⊡ Gemini		
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	Uptec		▼
			OK Cancel

×



4. Setup the settings of ASCOM focuser.

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Hardware	Selection	Focuser: ASCOM Focuser	Focuser Setup 🔻]	
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Camera Dome Filter Wheel	ASCOM Focuser ASCOM Camera <no dome="" selected=""> <no filter="" selected="" wheel=""></no></no>	Device name: ASCOM Fo Device description: ASCOM Fo Driver information: ASCOM Fo	Connect Disconnect	ion: rsion:	1.60 No Device
Rotator Video Device	<no rotator="" selected=""> <no device="" selected<="" td="" video=""><td></td><td></td><td></td><td></td></no></no>				

5.Choose ZWO Focuser

🔆 ASCOM Focuser Chooser	×
Trace Select the type of focuser you have, to click the Properties button to driver for your focuser.	then be sure configure the
ZWO Focuser 🗸 🗸	Properties
ASCOM Simulator Focuser Driver DXFocuser Arduino Edition FocusMax Focuser Hub Generic Hub Pipe diagnostic tool POTH Hub Simulator	OK Cancel
ZWO Focuser	

Additional Installation Information

There is significant torque from the EAF stepper motor. We recommended setting the 0 position and the maximum number of steps as a first step to prevent possible damage to the focuser.

For the standard bracket installation:

The 0 position is recommended to be set to the position when the focuser is fully retracted.

The maximum number of steps is recommended to be set to a limit position less than or equal to the full focuser stroke.

For the curved saddle installation:

The 0 position is recommended to be set near the focus of the focus of the focus holder.



The maximum number of steps is recommended to be set to a limit position less than or equal to the focus seat stroke.

Manual Focus Control

Your EAF is able to be manually controlled and there are two ways to achieve this. One is via the optional hand controller and secondly via the astronomy software package in use.

We recommend you align your EAF in the daytime and use a distant target such as a building to focus on when setting up the focuser for the first time. This will help you in finding the correct focus position with plenty of light to illuminate the chosen object.

When you have found the correct focus position during the daytime, make a note of the step count number. When observing in the dark later, this will make finding the focus position easier and trouble free.



ASICAP

1. When the image looks very fuzzy, use "coarse" button.



2. When the image looks slightly blurred, use "fine" button.





3.Done



4. Goto ZERO position.

🥌 Sett	Step 2 buttor	2: press Goto n, go back to 0 position.
\$ €	General EFW	Switch ZWO EAF(ID:0) Image: Comparison of the state
	ST4 Auto Guide	Goto position 50000 🗘 🗌 Reverse
Q	EAFocuser	Set coarse steps << 1000 \ddagger >> Beep
		Set fine steps < 100 🗘 > 🖌 Advanced
		Set maximum steps 60000 🌲
		Set backlash 0 🌲



ASIAIR



1. When the image looks very fuzzy, use "coarse" button.

2. When the image looks slightly blurred, use "fine" button.





3. Done



4. Goto ZERO position

		1. Set goto position as 0.	2. Press go to, back to 0 positon.
	((i·	Foc ar Settin	ng ×
(R)	0	F	22.6°C
Histogram		Current Position 24	Set Z #ro
	Ă	Goto Position 0	GO
Guide		Revert Rotation	
Crosshair 😽	Q	Fine Steps	9
Auto		Coarse Steps	300
7376x4928 Gain:0 Temp:30.0°C		Advanced Settings	>



Auto Focus Control

The ASIAIR autofocus will be implemented in a future version of the application. Autofocus is currently supported via a number of other software packages.

Sequence Generator Pro

SGP's autofocus is very easy to use. When using SGP please set the freewheel setting in the ASCOM driver to 0 to avoid affecting the focusing speed.

1. Open the focus control dialog box



2. Enter the settings menu by clicking the setting icon



3. Set the Auto Focus parameters as below



4. Set the focuser backlash settings

	Control Panel X
	🔯 Camera 🍥 Filters 🗳 Focus 💉 Telescope 🌐 Plate Solve 🔝 Auto Guide 🔛 Other
	Connected to ZWO Focuser Other
Manual focus control panel	Focus Information 0 Current position: 0 Temperature: 27.28 Last Focus Temp: NA Last Focus Time: NA Focus Control Set In: Fine Coarse Course Steps: 100 ♀ Out: Fine Coarse Set Focus Frame and Focus Set Focus In: Stop Focuser Frame and Focus Start Take One Exposure: In: Stop Focuser
Software backlash setting: Recommend to set direction OUT and step size 100~200.	Focuser Properties Set absolute focus position for first filter Override maximum steps: Focuser backlash compensation: Compensation direction: Compensation step size: 100 Use environment device for temperature input OK Cancel

5. With the telescope roughly in focus before you start, click the run

button to start the autofocus procedure



Focus Control					
Current position: 0 I Temperature: 27.36 ✓ Last Focus Temp: NA ✓ Last Focus Time: NA					
T In: Fine Coarse Zero					
Steps: 10 🚔	100 🜲	Go To			
↓ Out: Fine	Coarse	Stop			
Auto Focus Settings Min star size at 1x1 (px): 6					
► Run	ttings				

SGP will automatically take exposures and move the focuser steps drawing a V curve tracking the stars HFR value. Once the curve is complete SGP will drive the focuser to the best measured value.





FocusMax

Step 1: Set up the camera. Open the software, click System to enter the settings interface. Click the button 2 as shown below, click Choose to enter the EAF settings menu.

💆 FocusMax My — 🗆 🗙	💆 FocusMax My — 🗆 🗙
<u>F</u> ile <u>O</u> pen Wi <u>z</u> ard <u>S</u> et <u>H</u> elp	<u>F</u> ile <u>O</u> pen Wi <u>z</u> ard <u>S</u> et <u>H</u> elp
Profile Vcurve Log Tele- Scope Jog Mini	Profile Vcurve Log Tele- Scope Jog Mini
Focuser	Focuser
ZWO Focuser 2	ZWO Focuser
Connect Temp Comp	Connect
Disconnect Not Connected	Disconnect Choose
Backlash Comp. ————————————————————————————————————	Backlash Comp. – Setup
Enabled 🗹 100 Steps 💿 Maxim DL Apply when focuser moves: Out 🗸 O CCDSoft	Enabled 2 100 Steps Maxim DL Apply when focuser moves: Dut > O CCDSoft
Profile Position Int. Diff.	Profile Position Int. Diff.
Slope L R	Slope L R
System	_ System
Paths	Paths
MySystem	MySystem
Focus Setup Features System	Focus Setup Features System

Step 2: Select the ZWO Focuser in the dialog and click OK.

ASCOM Focuser Chooser	×
Trace Select the type of focuser you have, to click the Properties button to driver for your focuser.	then be sure configure the
ZWO Focuser 🗸 🗸	Properties
ASCOM Simulator Focuser Driver DXFocuser Arduino Edition FocusMax Focuser Hub Generic Hub Pipe diagnostic tool POTH Hub Simulator	OK Cancel
ZWO Focuser	



Step 3: Next, connect the EAF. Click the Connect button and wait for the connection to be made

💆 FocusMax My — 🗆 🗙	💆 FocusMax My — 🗆 🗙
<u>File Open Wizard S</u> et	<u>File Open Wizard S</u> et
<u>H</u> elp	<u>H</u> elp
Profile Vcurve Log Tele- Scope Jog Mini	Profile Vourve Log Tele-Scope Jog Mini
Focuser	Focuser
ZWO Focuser	ZWO Focuser
Connect Temp Comp Disconnect Not Connected	Connect Temp Comp Disconnect Connected
Backlash Comp. — Camera — Camera	Backlash Comp. ————————————————————————————————————
Enabled 🗹 100 Steps 💿 Maxim DL Apply when focuser moves: Out 🗸 O CCDSoft	Enabled 🗹 100 Steps 💿 Maxim DL Apply when focuser moves: Dut 🗸 OCCDSoft
Profile Position Int. Diff.	Profile Position Int. Diff.
Slope L R	Slope L R
System	System
Paths	Paths
MySystem	MySystem
Focus Setup Features System	Focus Setup Features System

Step 4: Next set the Backlash Compensation and Camera Control

	💆 FocusMax My — 🗆 🗙
	File Open Wizard Set
	Help
	Profile Vcurve Log Tele- Scope Jog Mini
	Focuser
	ZWO Focuser
	Connect Temp Comp
	Disconnect
	Backlash Comp Camera
	Enabled 2 100 Steps O Maxim DL Choose the capture
Set backlash:	focuser moves: Dut V OCCDSoft Software: Support
100-200.	Profile Position Soft. Capture
direction=Out	Int. Diff software and camera
	Slope L R must be installed first,
	System
	Paths
	MySystem
	From Color Factors Sustem
	Pocus Setup Features System





Step 6: Open the Vcurve dialog box and set the number of steps per move (generally set to -10). Run the autofocus routine:



💆 FocusMax My — 🗆 🗙	💆 Vcurve Sequence — 🗆 🗙
<u>F</u> ile <u>O</u> pen Wi <u>z</u> ard <u>S</u> et	File Set
Help	Run 2 Stop
Profile Vcurve Log Tele- Scope Jog Mini	Vcurve Parameters End Half Points Width
Near Focus — Move — Move	Autofocus 🗹 Initial 48 Center 0
HFD 8 Oln Out	Repeat 0 Final 0 Half 24
Exposures 5 Settle Time sec 0	Images 1 Move -10 Steps 5
Autofocus Exp. Flux	1
Frame 100 Min 1.00 100	
TgtStar <mark>1</mark> → Max 10.00 500	
Focus Bin 1 V Base 1.00	
Focus Start	
Position O Position	
HFD 12 O HFD	
Prev. Focus 0 O Current Pos.	Slope Difference
Focus Setup Features System	Position Difference Di

After the V curve is drawn the focuser will be driven to the optimal focus position.

Run	top			
Vcurve Para	ameters Er Pr	nd O	Ha Wid	lf 💿
Autofocus	🗌 Initi	al 1105	Center	955
Repeat 0	Fin	al 805	Half Width	150
Images 1 /position	Mov Inc	e 10	Steps	30
Sold and and and and and and and and and an			đ	8 ^b
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Measuring the Focuser Backlash

It is relatively easy to measure the focuser backlash. The following example uses ASICAP as the software application driving the EAF:

Set the coarse step size to 1000 and the fine step size to 10.

🥑 Sett	ing	×
\\$	General	Switch EAF: ZWO EAF(ID:0)
\bigcirc	EFW	Current Position: 50000 Set 0 23.4 C -
	ST4 Auto Guide	
0	EAFocuser	Goto position
		Set coarse steps << 1000 \ddagger >> Beep
		Set fine steps < 10 🗘 > 🖌 Advanced
		Set maximum steps 60000 🗘
		Set backlash 30 🌲

Click the Coarse Button and move the focuser out by 1000 steps.



Next set the fine tuning steps to 10 and move the focuser in and observe that the focus knob on the side of the focus rotates.





Click the fine adjustment button that moves the focuser inwards and click once. Observing the focuser knob on the opposite side to the EAF note how many steps the EAF moved before the knob moves. The number of times you click x 10 is the number of steps measured as backlash.



Set the number of steps in the Set Backlash settings box

🥑 Set	ting		:	×
\$	General	Switch EAF: ZWO EAF(ID:0)	~ 😣	
\bigcirc	EFW	Current Position: 5	50000 Set 0 23.4 C 🔻	
	ST4 Auto Guide	Goto position	50000 Å	
O	EAFocuser	6000 position		
		Set coarse steps <	< 1000 \$	
		Set fine steps	< 10 💠 > 🖌 Advanced	
		Set maximum steps	60000 \$	
		Set backlash	30	

If you want to measure the backlash setting more accurately then chose Step Size 5 in the fine step setting and repeat the above steps.



For repairs and other services, please contact us. Email address: <u>info@zwoptical.com</u> Tel: 0512-6592 3102 For cameras purchased from agents, please contact your dealer for after-sales service.

6 Warranty and Return Policy

We provide 2-year warranty for our products.

We will offer the repair service for free or replace the item for free if the EAF does not work properly within the warranty period. After the warranty period, we will continue to provide repair support and service on a charged basis.

This warranty does not apply to damage that occurred because of abuse or misuse, or damage caused by a fall, or any other accidental failures after purchase.

The customer must pay for shipping when shipping the EAF back for repair or replacement.

If you get a faulty EAF, please contact us as soon as possible through email: info@zwoptical.com. Please describe the problem in detail, and we will do our best to solve the problem. Most instances are perceived problems which are caused by a bad driver install or software configuration.

For customers who bought the camera from our dealer, the dealer is responsible for the customer service.