

# Vixen

## VSD90SS Instruction Manual

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## PREFACE

**Thank you for your purchase of a Vixen VSD90SS refracting telescope.**

The manual describes the VSD90SS optical tube assembly. You should read instructions for your mounting equipment and a camera adapter together, if need arises.

### **WARNING**

 **Never look directly at the sun with the telescope or its finder scope or eyepiece. Permanent and irreversible eye damage may result.**

### **CAUTION**

-  **Do not leave the optical tube uncapped in the daytime. Sunlight passing through the telescope or finder scope may cause a fire.**
-  **Do not use the product while moving or walking, as injuries could result from a collision with objects or from stumbling or falling.**
-  **Keep small caps, plastic bags, or plastic packing materials away from children. These may cause choking or suffocation.**
-  **Do not leave the product inside a car in bright sunshine or in other hot places. Keep any strong heat sources away from the product.**

## HANDLING AND STORAGE

-  When cleaning the body, do not use solvents such as paint thinner or similar products.
-  Do not expose the product to rain, water, dirt, or sand.
-  For storage keep the product in a dry place and do not expose it to direct sunlight.
-  Blow off dust on lenses using a commercially available blower brush.
-  Avoid touching any lens surfaces directly with your hands. If the lens becomes dirty with fingerprints or general smears, gently wipe it using a commercially available lens cleaner and a lens cleaning paper or cloth, or consult your local Vixen dealer. Be sure to touch the lens surface with the most care to prevent it from scratching by accident.

## Limited Warranty

### Terms of Product Repairs

Vixen accepts repairs for Vixen products when such products do not function due to being out of order. We herewith set forth terms and conditions to accept repairs for free for a malfunction during the warranty period according to the contents provided by Vixen if you have been using the product correctly in compliance with the instruction manual.

The customer is requested to apply for warranty repair to the Vixen retail dealer where you purchased the product or Vixen's customer support, subject to the presentation of a proof of purchase (purchased receipt, delivery invoice, or warranty card stamped by vendor).

1. The warranty shall be effective for a period of 5 years from date of original purchase. (Electronic components shall be guaranteed for one year.)
2. If proof of purchase is not submitted, charged repairs shall be optional by request of the customer.
3. The proof of purchase shall be only force of effect in Japan.
4. Please make sure of the contents of the after-sales service written on the other side of this document for provision against charged repairs.
5. Vixen uses personal information provided by the customer with acceptance of repairs in order to practice better repair service activities complying with the law for the protection of personal data.
6. Please note that if Vixen needs to disclose customers' personal information to third parties entrusted by Vixen, Vixen will make them observe the personal data protection law.

## Limited Warranty

### Terms of use for Warranty Repair and After-sales Service

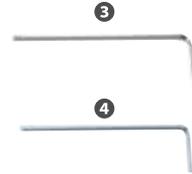
- For the duration of warranty repair, please refer to the front side of this document.
- If the product breaks or does not function during the warranty period under normal usage conditions as described in the instruction manual, it shall be subjected to free of charge. (Any consumable parts like batteries and loss of caps cases, straps, and rubber eyecups shall be exceptions to the warranty.)
- This warranty repair shall be void, and no force of effect in the following cases.
  1. When correct usage of the product according to the instruction manual has not been done.
  2. If the product has been modified or repaired by someone other than Vixen or subjected to damage or malfunction caused by unauthorized repair or disassembling.
  3. If the product malfunction or damage is subjected to breakage by incident, misuse, or mishandling by negligence. Also, if a sign of being dropped or wet in the water has been recognized.
  4. If the product malfunction, or damage is subjected to natural disasters by earthquake, storm and flood damage. Malfunction or breakage caused by fire, salt damage, or abnormal voltage and so on.
  5. If no presentation of the proof of purchase (refer to the rules shown on the front side) is done.
- Please note that Vixen reserves the right to replace the product instead of repair, depending on the part of the failure.
- Spare parts for repair of this product would be kept for five years after we discontinued the production.
- Please note that, generally, the period for which repair parts are available is the period for which repairs are possible.
- The customer is responsible for the cost of shipping the product to be repaired and travel expenses when bringing the product with you.
- Vixen does not provide on-site repair service.
- If you got the product as a gift and have no proof of purchase or the warranty card is not filled by the retailer, please consult with Vixen Customer Support.
- The customer has to pay for repair fees at the Vixen dealer's site where he or she purchased the product. If you apply for repair directly to our customer service, you are requested to pay by bank transfer or cash on delivery. Please note that the customer is responsible for charges by bank transfer and shipping fees with cash on delivery. Please be informed that you reach Vixen Customer Support for details such as Vixen's bank account.

For inquiries, please contact the Vixen dealer where you purchased the product or Vixen Customer Support.

## ● Checking the Package Contents

The VSD90SS package contains the items listed below. Be sure to check if all the items are included.

Contents	Q'ty
❶ VSD90SS Optical tube assembly	1
❷ VSD60.2 to 50.8 Adapter (for 50.8mm push-fit)	1
❸ Allen wrench of 2mm on a side	1
❹ Allen wrench of 1.5mm on a side	1
❺ Instruction manual (This booklet)	1



## ● Optional Accessories (sold separately and not included)



VSD Tube Ring 115S  
(Clamshell type)



Focal Reducer V0.79x



Wide Photo Adapter 60DX



Dual Slide Bar



50mm XY Finder Bracket II



7x50mm Finder scope II  
with illuminated reticle



Storage Case for VSD90SS

## ● Components Guide



- ① **Dew Shield**  
It prevents ghosting from ambient light and reduces getting dew on the lens surface. Reverse-fit to the optical tube is possible. It has a protection rubber on the tip.
- ② **Optical Tube**  
115mm outer diameter
- ③ **Finder Bracket Lock Screw**  
M6 screw (P=1.0mm)
- ④ **Finder Bracket Shoe**  
Vixen standard finder bracket shoe
- ⑤ **M84 Extension Tube**  
84mm thread with pitch 1.0mm, 34mm optical path length
- ⑥ **Ring Lock Screw**  
M5 screw (P=0.8mm)
- ⑦ **42T Extension Tube**  
42mm thread with pitch 0.75mm, 30mm optical path length
- ⑧ **Eyepiece Setscrew**  
M4 screw (P=0.7mm)
- ⑨ **Eyepiece Adapter 42T to 31.7 (Ring A)**  
42mm thread with pitch 0.75mm with stepdown to 31.7mm thread, 30mm optical path length
- ⑩ **Focus Knob**  
Exchangeable to Dual-speed focuser sold separately. Usable with a commercially available electric motor focuser.
- ⑪ **Drawtube Clamp Lever**  
Fastening the drawtube lock lever fixes the movement of the drawtube.
- ⑫ **Squaring Adjustment Ring (Part D: push screws)**  
It is a ring with push-pull screws for squaring adjustments.
- ⑬ **Squaring Adjustment Ring (Part E: pull screws)**  
The rings E and D are part of the squaring adjustment ring.
- ⑭ **60.2 to M60 Ring (Ring C)**  
60.2mm thread with pitch 1.0mm, stepdown to 60mm thread, 11mm optical path length, With 58mm filter thread.
- ⑮ **M60 to 42T Ring (Ring B)**  
60mm thread with pitch 1.0mm, stepdown to 42mm thread with pitch 0.75mm, 8.5mm optical path length
- ⑯ **VSD60.2 to 50.8 Adapter**  
60.2mm thread ring with pitch 1.0mm that changes to 50.8mm push-fit. Used with a Flip mirror diagonal or a 50.8mm eyepiece sold separately.

# ● Attaching the VSD90SS to the Mount

Read an instruction manual for the mount used in conjunction with this manual.

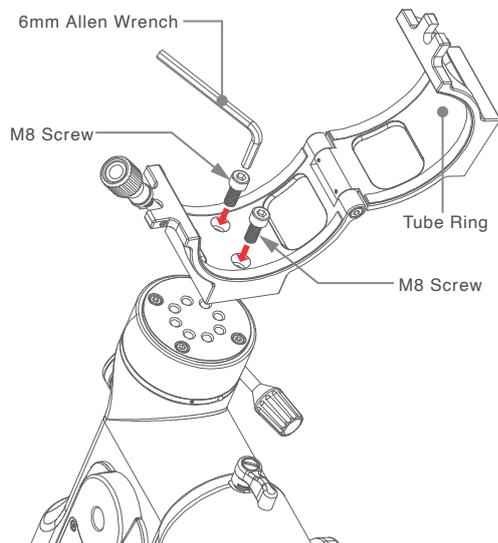
## A. Attaching directly to the equatorial mount

### Mounts: AXD2 / AXJ / SXP2

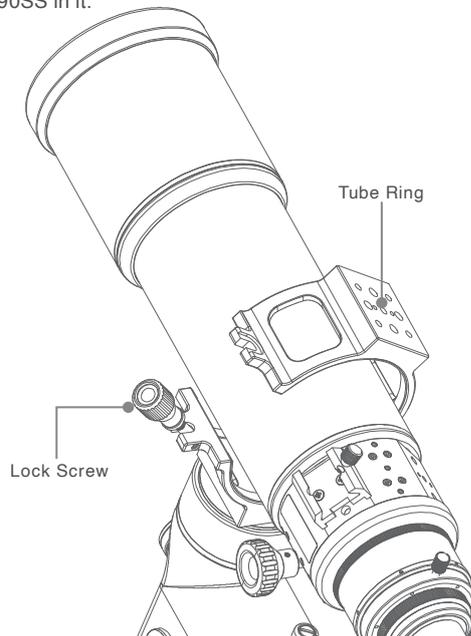
The SXP2 mount is shown by way of example.

You use an optional VSD tube ring 115S to attach the telescope optical tube to the mount.

**1** Place the VSD tube ring 115S on the mount head of the SXP2 and open the clamshell-type tube ring. Attach the tube ring to the mount head using the supplied two M8 screws and an Allen wrench of 6mm on a side.



**2** Place the VSD90SS over the part of a cradle on the tube ring and install the VSD90SS in it.



# Attaching the VSD90SS to the Mount

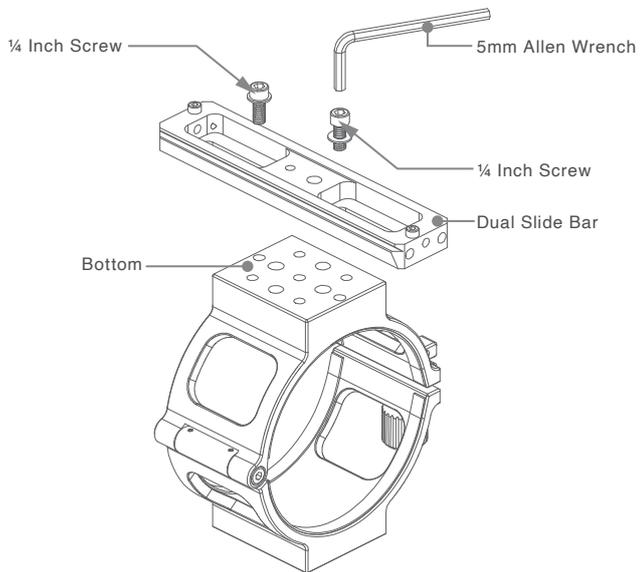
## B. Attaching to the equatorial mount using the Dovetail-plate Mounting Block

### Mounts: SX2, SXD2

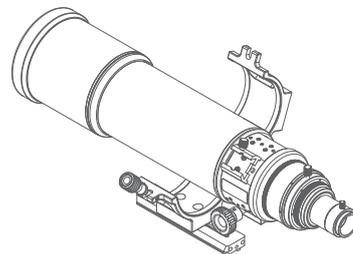
The SXD2 mount is shown by way of example.

You use an optional VSD tube ring 115S and an optional dual slide bar to attach the telescope optical tube to the mount.

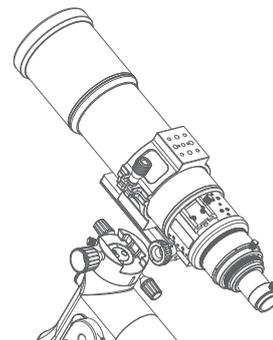
- 1 Place the VSD tube ring 115S bottom side up and put the dual slide bar on it. Attach the dual slide bar using two 1/4-inch-9mm screws provided for the dual slide bar and an Allen wrench of 5mm on a side.



- 2 Open the clamshell-type tube ring and install the VSD90SS in it.



- 3 Place the VSD90SS over the dovetail-plate mounting block on the SXD2 and attach the VSD90SS to it.



# Attaching the Finder Scope (sold separately)

## Overview of Finder Scopes

A finder scope is a subsidiary telescope with low magnification and wide field of view used when searching for a target object. It may often be difficult to search for a target object with astronomical telescopes as they magnify with relatively high magnification. The finder scopes allow for searching for the target object readily if used.

Please read the instruction manual for your finder scope on how to use it.

## Attaching the 7x50mm Finder II with illuminated reticle

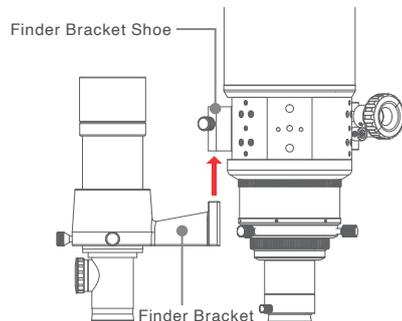
You attach a 50mm XY finder bracket II or a 50mm Low-profile finder bracket(S) to the optical tube to install the finder scope on the VSD90SS.

It is recommended that you use it with the 50mm XY finder bracket II as it has a spring-loaded stud and two adjustment screws to make alignments quickly.

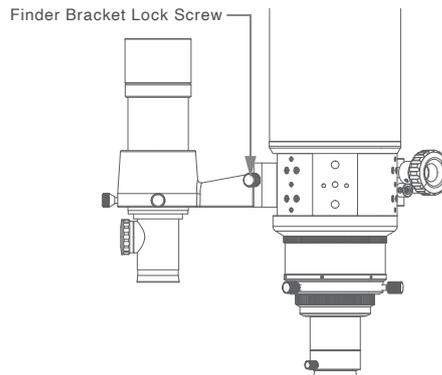
If you use a commercially available CMOS auto-guide camera attached to the back of the finder scope, it is recommendable to use with the 50mm low-profile finder bracket, as it holds the auto-guide camera securely.

### • Setting up the finder scope as shown in the illustration.

\* For knowing how to assemble the finder scope and finder bracket, read the provided instruction manuals for the products.



### • Tighten the finder bracket lock screw securely.



# Visual Observation

## Attaching the Eyepieces

You use eyepieces sold separately for visual observation.

The image cannot be seen without the eyepiece attached. The magnification of an astronomical telescope is determined by the eyepiece.

## The magnification of an astronomical telescope

Dividing the focal length of an objective lens by the focal length of an eyepiece gives the magnification.

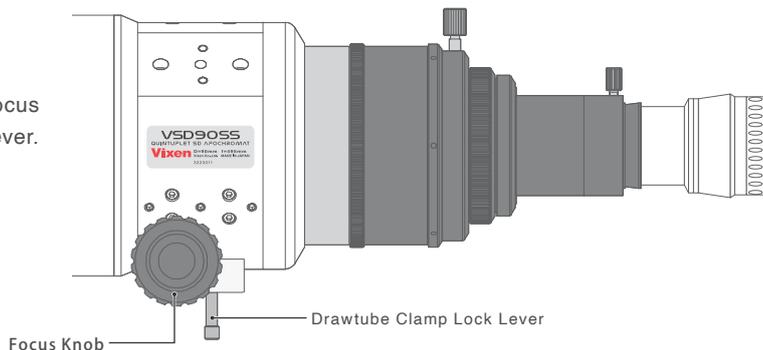
Example: SLV15mm and SLV2.5mm Eyepieces

Optical Tubes	Focal length of objective lens	Focal length of SLV15mm	Focal length of SLV2.5mm
VSD90SS	495mm	$495 \div 15 = 33(33\times)$	$495 \div 2.5 = 198(198\times)$

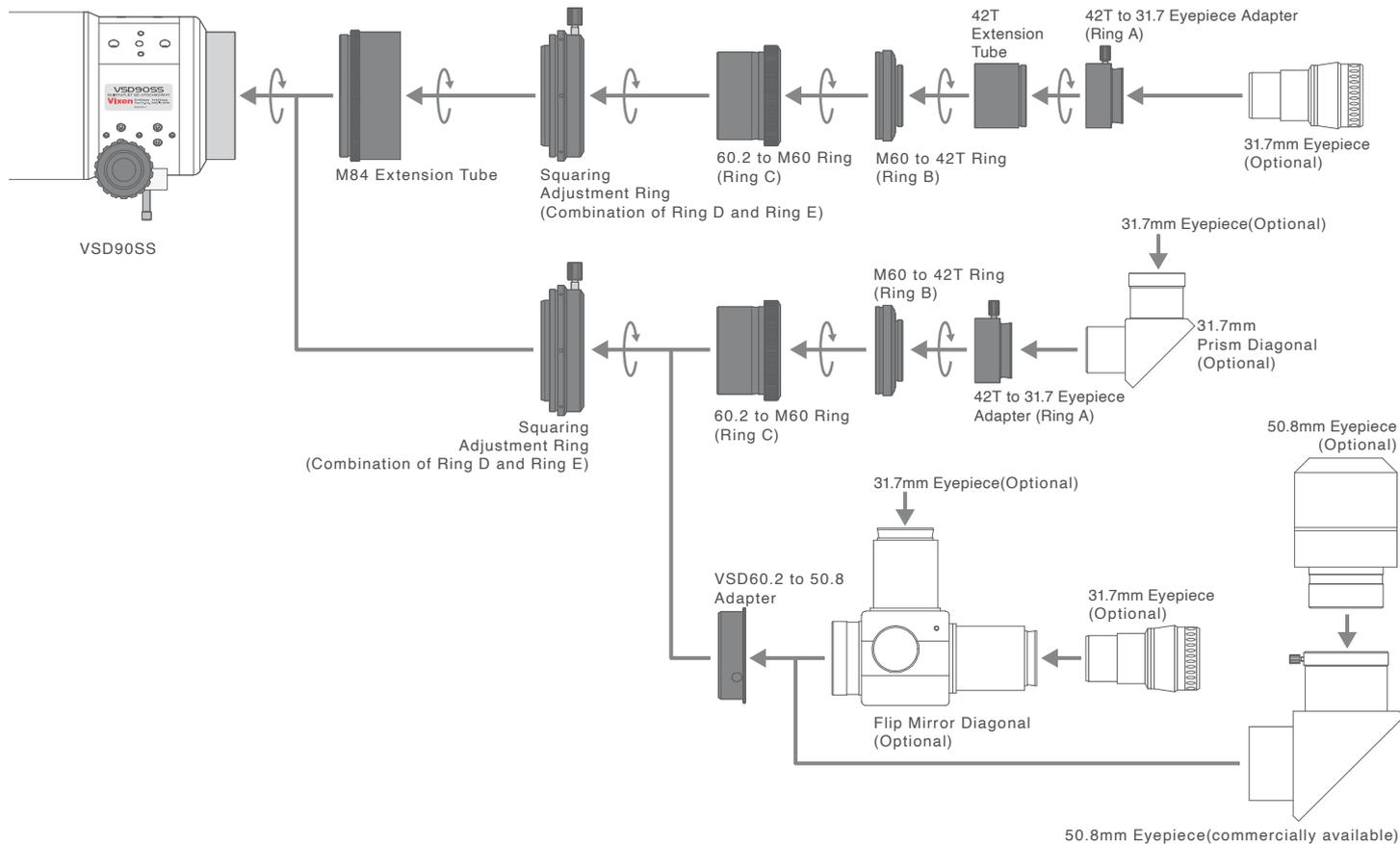
Begin with an eyepiece with long focal length (low magnification). If using an eyepiece with a short focal length (high magnification), the image appears in a narrower field of view and the range of sharp focus gets narrower. As a result, you make it hard to find the target object.

## Focusing the VSD90SS

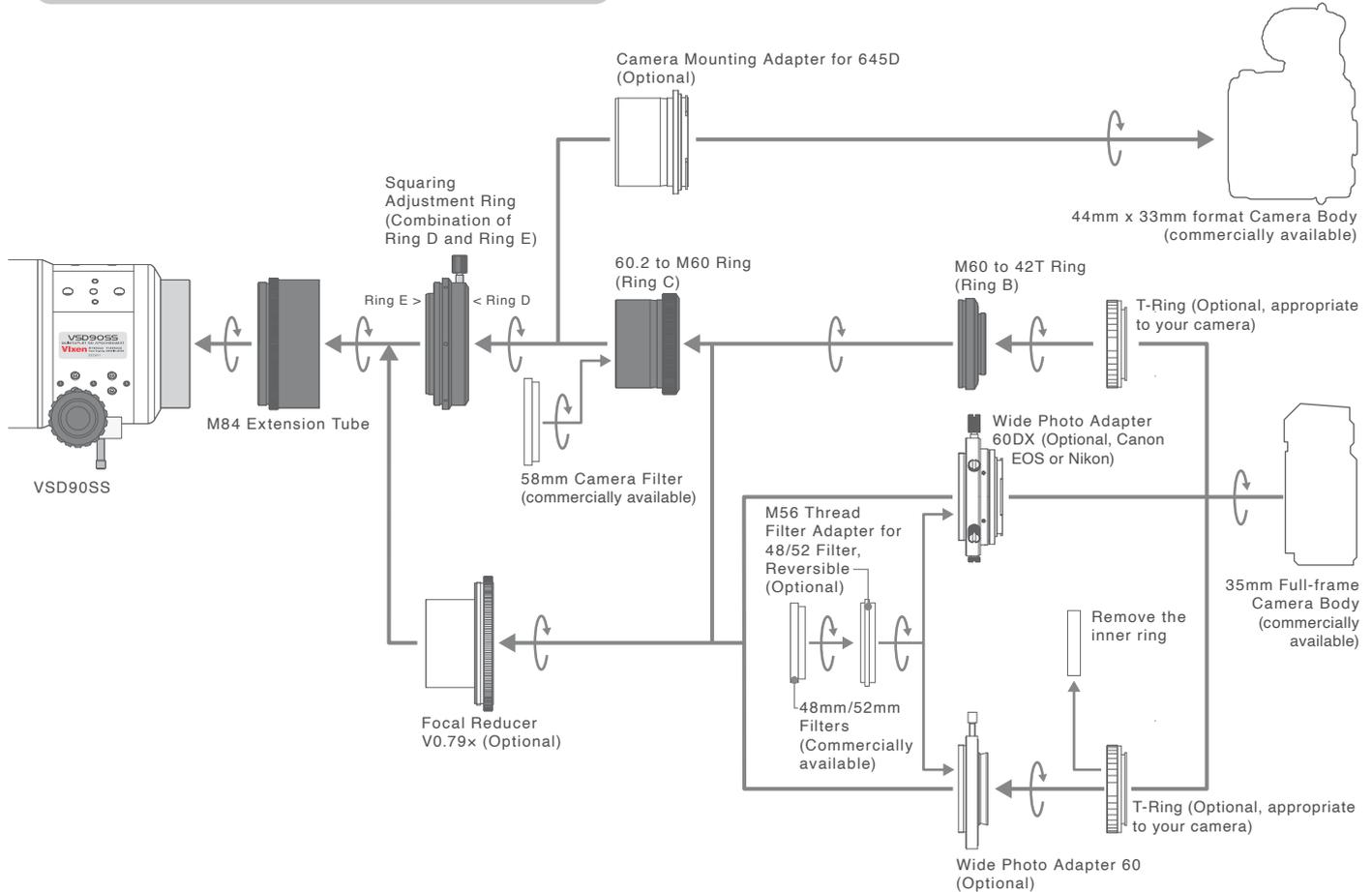
You draw out or draw in the drawtube by turning the focus knob back and forth after you loosen the drawtube clamp lever.



## Attaching Accessories for Visual Observation

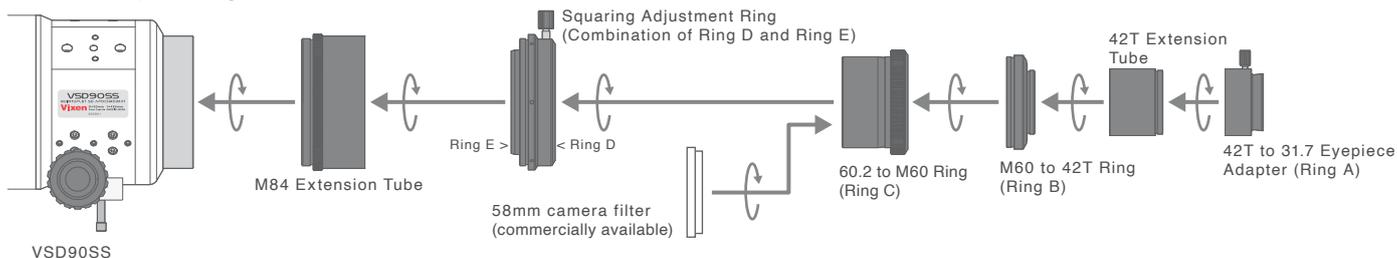


## Attaching Accessories for Prime Focus Photography

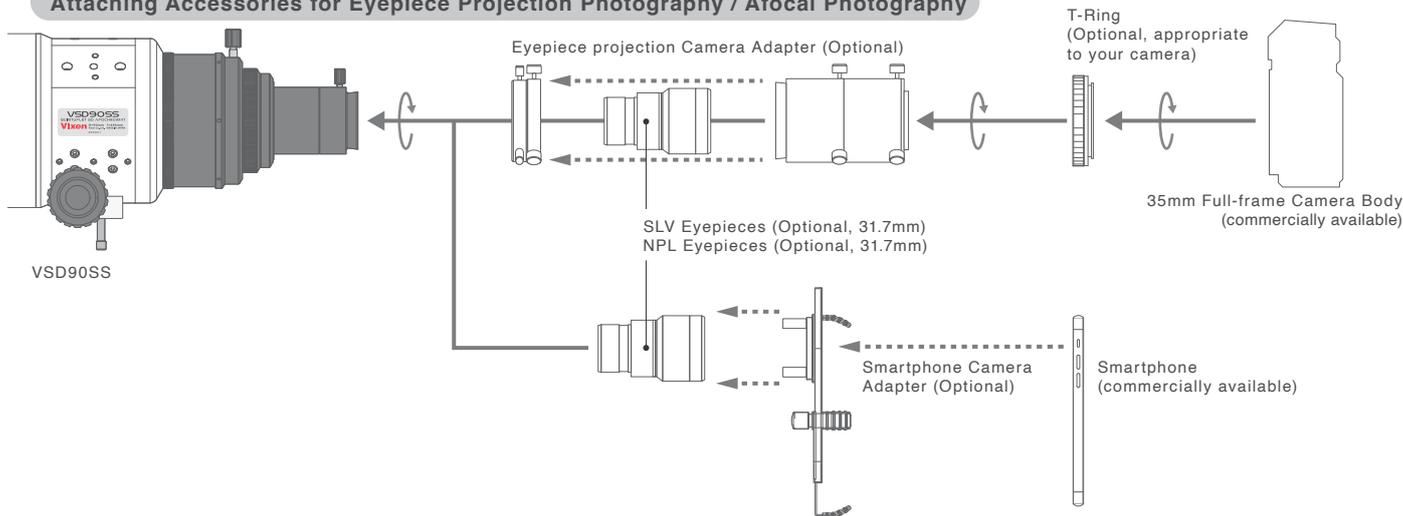


## Attaching a Filter

The 60.2 to M60 ring has the thread for 58mm camera filters.  
A filter may cause ghost if it is attached.



## Attaching Accessories for Eyepiece Projection Photography / Afocal Photography



## ● Focuser Squaring Adjustment

**Never proceed to the focuser squaring adjustment before you read the instructions on this page.**

**You can only use this function on condition that you understand and accept the following.**

The function of focuser squaring adjustment is intended for experienced telescope users (professionals and advanced amateurs) who have in-depth understanding of squaring the focuser. The focuser squaring adjustment require advanced knowledge, skills, equipment, etc., and we do not intend that inexperienced or unconfident people will make adjustments by themselves.

Vixen does not support details of an adjusting method. If you do it yourself, you are responsible for your work on the adjustments.

**Why do you need the squaring adjustment on the focuser?**

Focuser squaring on this product has already been adjusted correctly at Vixen's factory, and usually, it does not require further adjustments by the customer. Because the telescope is excellent for flatness against the focal plane, shooting with a camera having a large sensor (i.e., 44x33mm large format), a deviation\* may be detected very rarely from the flatness of the flange on the camera body. In such a case, you have a correction by making the squaring adjustments on the focuser.

\*It is the deviation from the flatness of the camera flange within the manufacturer's acceptable product range.

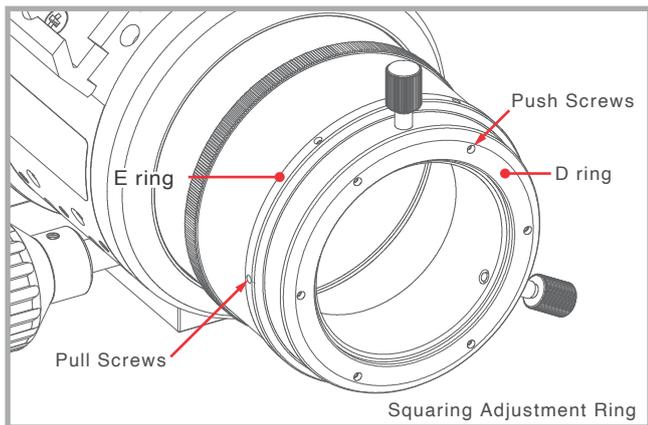
## ● Attention

- 1 If you made squaring adjustments, and when you use the telescope next time for imaging, the camera must be attached to the focuser in the same position and orientation as you placed it on the focuser last time; otherwise, you will fail to get image sharpness entirely over the photographic field.**
- 2 If you made squaring adjustments, and when you change the orientation of a frame of the photographic field of view, you need to rotate the whole telescope.**
- 3 After you make squaring adjustments, the same camera must be attached to the telescope. When you use a different camera, you require the focuser squaring adjustments against that camera.**

## ● Focuser Squaring Adjustment

Be sure to read this page before you proceed to the focuser squaring adjustment.

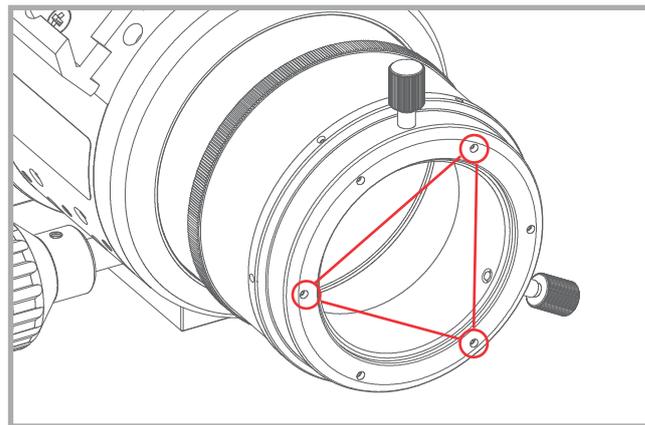
How to make the squaring adjustments on the focuser.



- There are two sets of six adjustment screws on the squaring adjustment ring.
- The six screws on the D ring work as push screws, and another six screws on the E ring work as pull screws. Loosen or tighten those push or pull screws to adjust using an Allen wrench of 1.5mm on a side.

### Restoring to the factory default

Loosen all the push screws and then tighten all the pull screws. After that, lightly tightening every push screw will bring the squaring adjustment ring to the initial setting position at Vixen's factory.



- Choose a set of three screws 120 degrees apart from each other on the squaring adjustment ring and adjust. Loosen another set of three screws beforehand at this stage.
- Slightly loosen two screws on the side of the ring that you want to move back, and tighten other two screws corresponding to the loosened screw.
- When you complete the square adjustment, remember a set of the three screws you loosened earlier. Tighten these three screws lightly to make your squaring adjustment retained.

## ● Installing the Dual-Speed Focuser (sold separately)

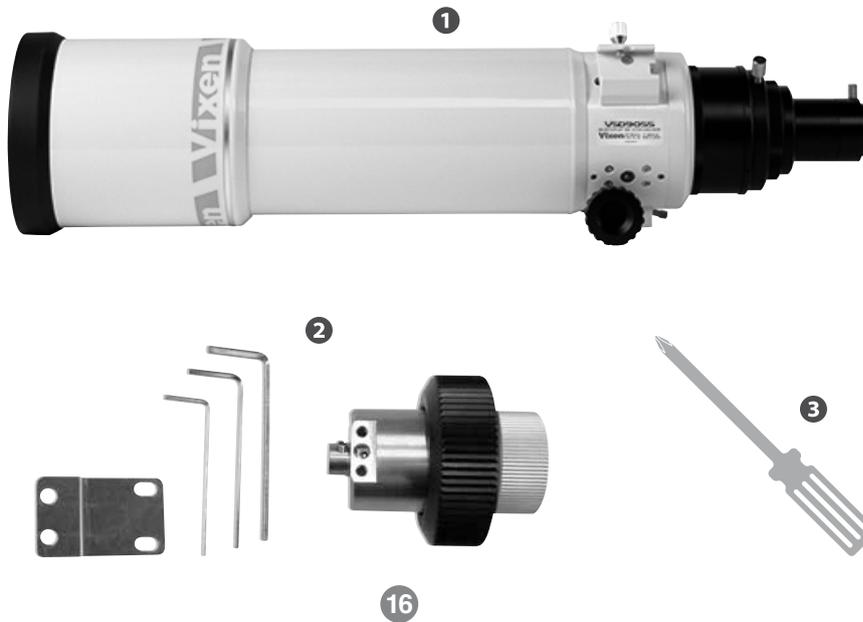
You will enjoy coarse and fine focus adjustments (reduction speed of 1:7) by attaching an optional dual-speed focuser to a focus knob on the VSD90SS.

※ If you install a commercially available electric focuser in the VSD90SS, you are responsible for it. Read this instruction manual along with a manual for your electric focuser.

※ You do not use the dual-speed focuser and an electric focuser together.

### Preparation for Installation

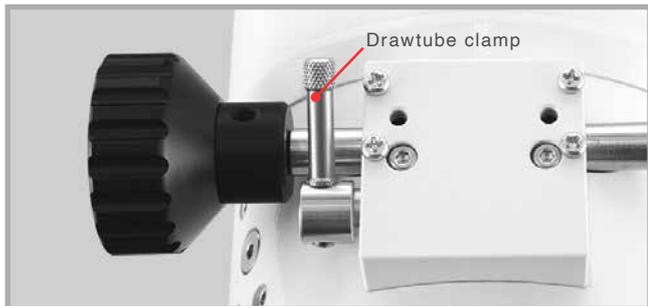
- 1 VSD90SS
- 2 Dual-speed focuser
- 3 Phillips head driver



# How to Install the Dual-Speed Focuser

## How to Install the Dual-Speed Focuser

1. Unfasten the drawtube clamp lever.



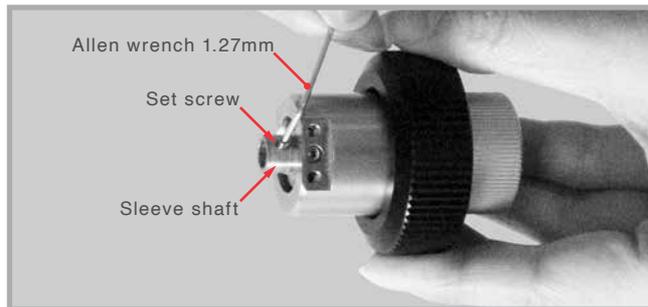
2. Remove the coarse focus knob from the side of the focus shaft where you install the dual-speed focuser. The focus knob is fastened to the pinion gear shaft with grub screws. Remove them using the supplied 2mm Allen wrench.



**Two grub screws are set in series in the screw hole on the focus knob.** Remove the upper grub screw and unfasten the lower grub screw by making one turn of the Allen wrench.

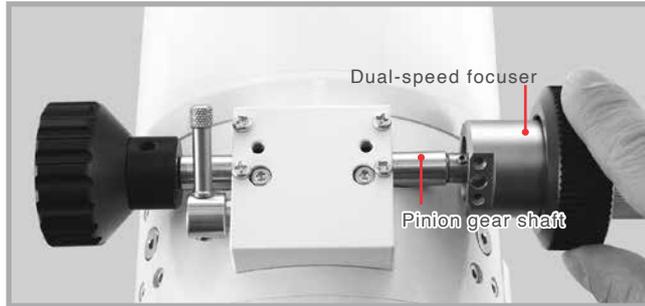
※ It is advisable that you put back the grub screw to the removed focus knob to avoid missing it.

3. Loosen the set screw on the sleeve shaft of the dual-speed focuser until it does not come off by using a 1.27mm Allen wrench provided for dual-speed focuser.

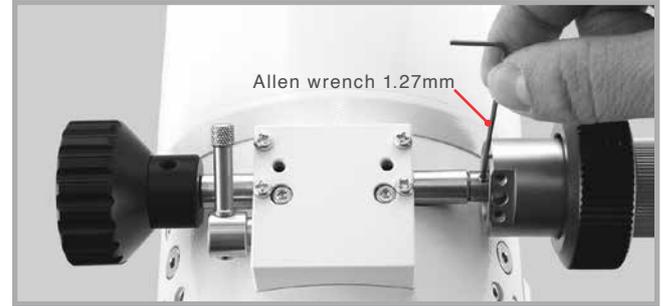


## ● How to Install the Dual-Speed Focuser

4. Fit the dual-speed focuser by inserting the tip of the pinion gear shaft deeply into the sleeve shaft of the dual-speed focuser. Orient the set screw on the sleeve shaft so that it lines up with the flat portion of the pinion gear shaft.

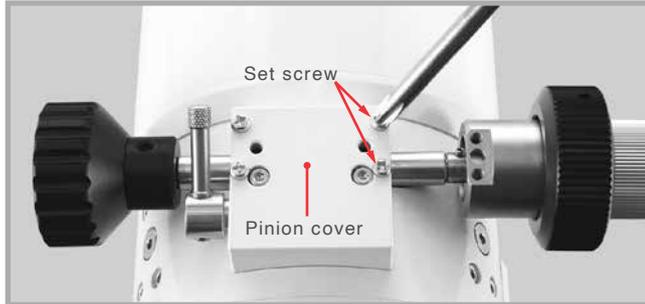


5. Tighten the set screw with the 1.27mm Allen wrench to fix the dual-speed focuser securely in place.

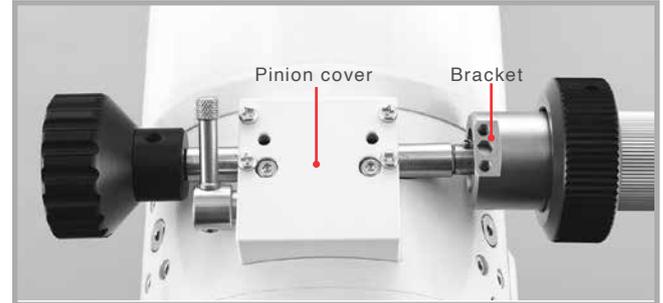


## How to Install the Dual-Speed Focuser

6. Attach the focus knob bracket so as to bridge the dual-speed focuser and the pinion cover plate. Remove the two screws on the pinion cover plate that hold the pinion gear shaft. Do not lose these screws as you use them later.



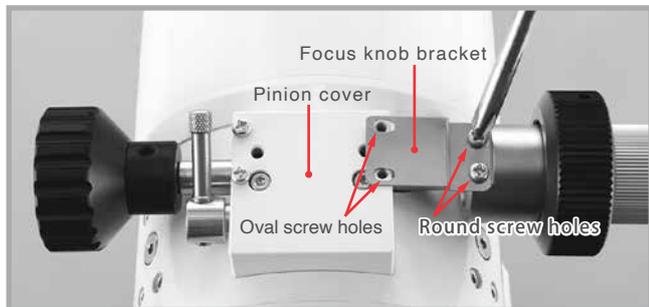
7. Turn the coarse focus knob so that the bracket attaching part on the dual-speed focuser to be level (parallel with the surface of the pinion cover plate).



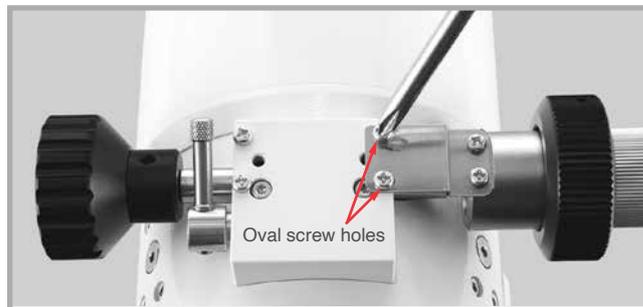
The focus knob may not turn further since it cannot draw in or out of the drawtube further due to a traveling position of the drawtube. Do not turn the focus knob forcibly.

## ● How to Install the Dual-Speed Focuser

8. You see two round screw holes on one side of the focus knob bracket and two oval screw holes on another side. Orient the focus knob bracket so that the side of the two round screw holes face the bracket attaching part on the dual-speed focuser. Using the screws provided for the dual-speed focuser, attach the focus knob bracket to the dual-speed focuser firmly with a Philips head screwdriver.



9. Using the two screws in procedure 2, put the screws through the oval holes on the focus knob bracket to attach the focus knob bracket tightly to the pinion cover plate with a Philips head screwdriver. You have finished installing the dual-speed focuser.

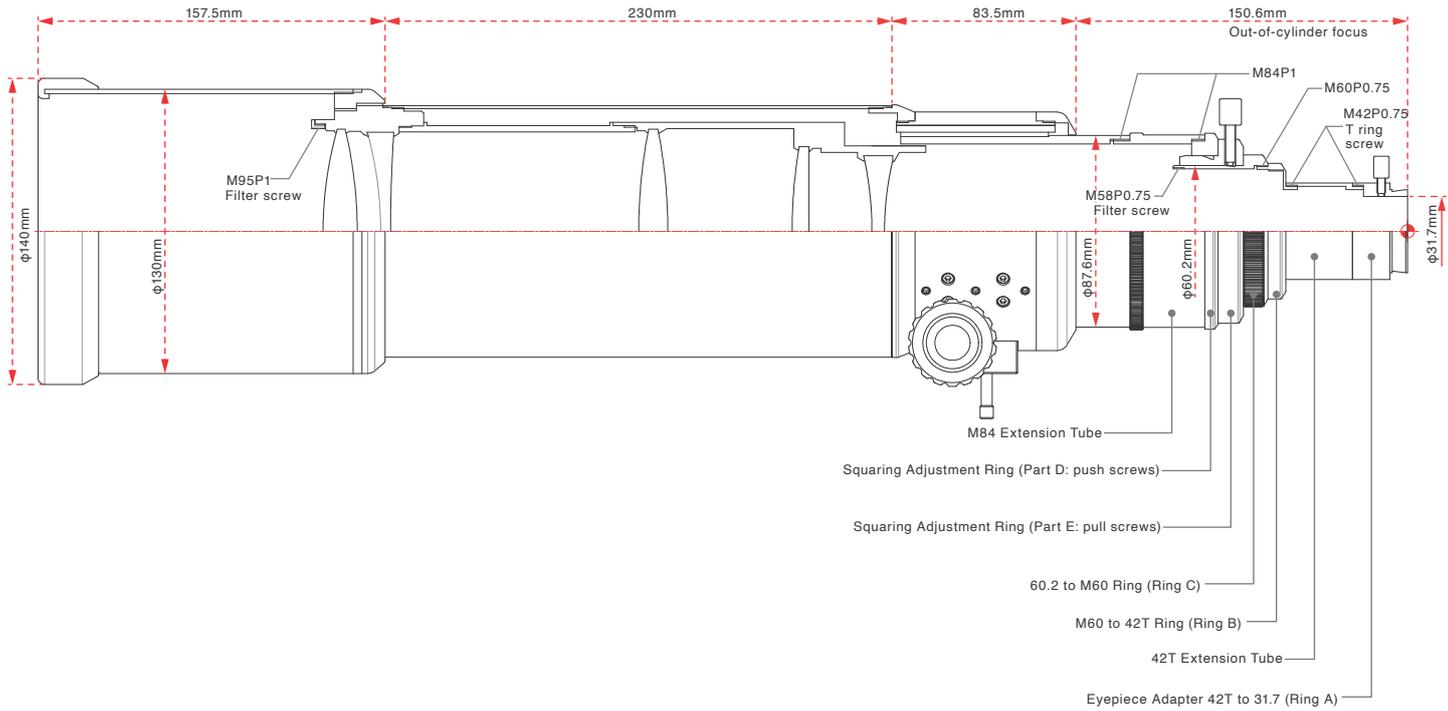


# Specifications

## VSD90SS Optical Tube Assembly

<b>Optical Tube</b>	<b>Objective lens system</b>	SD Apochromat with AS coatings, 5 elements in 5 groups (Incl. two SD lenses and one ED lens)
	<b>Effective aperture (D)</b>	90mm
	<b>Focal length (f)</b>	495mm
	<b>Focal ratio</b>	1:5.5
	<b>Light gathering power</b>	165x unaided eye
	<b>Resolving power</b>	1.29 arc seconds
	<b>Limiting magnitude</b>	11.5
	<b>Image circle</b>	60mm (Over 90% at field edge illumination, suitable for a 44x33mm large format)
	<b>Available filter sizes</b>	95mm (Objective side), 58mm (Eyepiece side)
<b>Focuser</b>	<b>Focusing method</b>	Rack and pinion
	<b>Drawtube diameter</b>	87.5mm
	<b>Threads</b>	84mm (P=1mm), 60mm (P=0.75mm), 42mm (P=0.75mm, for T-ring)
	<b>Visual back (push-fit)</b>	60.2mm, 50.8mm, 31.7mm
<b>Size &amp; Wight</b>	<b>Optical tube length</b>	About 600mm (About 476mm long by reverse-attaching the dew shield, 402mm without the rear rings)
	<b>Outside diameter</b>	115mm
	<b>Weight</b>	4.3 kgs (Excluding tube rings and an attachment plate)
<b>Others</b>	<b>Photography</b>	Prime focus, eyepiece projection, and afocal photography (with a smartphone) are possible with optional accessories for imaging
	<b>Solar observations</b>	Possible with an optional sun projection screen set B
	<b>Supplied accessories</b>	VSD60.2 to 50.8 Adapter, 2mm Allen wrench, 1.5mm Allen wrench
	<b>Suggested optional accessories</b>	VSD tube ring 115S, Dual slide bar, Storage case for VSD90SS, Focal reducer V0.79x, Wide photo adapter 60DX, 7x50mm finder scope II with illuminated reticle, 50mm XY finder bracket II

# Dimensions





# Vixen

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