

Anamorphic Beam Shaping Optics Series 5AN

This document provides assistance in installing the anamorphic beam shaping optics series 5AN. It describes how the collimation setting is adjusted.

1. Principle of Operation

The anamorphic beam shaping optics is an afocal optics. The input radiation has to be a collimated beam. The output beam is a collimated beam as well.

The optics consists of two air-spaced lenses that build a Galilean type telescope.

The lenses are cylindrical lenses. That means, that the telescope only affects one axis of the beam while the other axis is unaffected, see Figure 1.

Depending on the direction the anamorphic optics is built into a setup, one direction of a collimated beam is either reduced or enlarged, creating a collimated elliptical output beam.

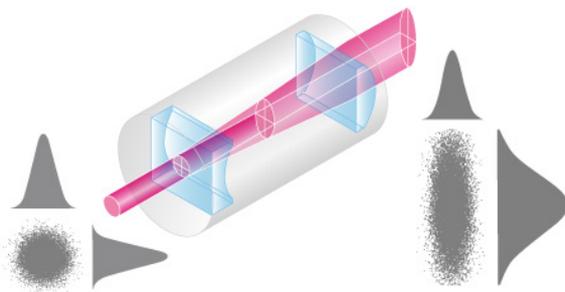


Figure 1:

Galilean type anamorphic beam shaping optics.

2. Before You Start

The beam shaping optics is shipped with two protection caps.



Notice: Please remove all the protection caps first and do not use them as beam dumps (risk of photo contamination).



Notice:

- Do not touch the optical surface of the lens.
- If the beam shaping optics is not in use, reattach both protection caps.



Caution! Refer to the laser instruction manual for all instructions regarding laser safety!

- Do not stare directly into the laser beam (which can cause permanent damage to the eyes).
- Do not stare at the reflected beam from reflective objects.
- Do not point the laser beam to other individuals.

3. Attaching the Anamorphic Beam Shaping Optics

This anamorphic beam shaping optics can be used in two directions. Depending on the direction used, one axis of the input beam is either reduced or enlarged. Please refer to the drawing for the correct installation direction.

You can mount the anamorphic beam shaping optics on its $\varnothing 25$ mm outer diameter or you can use the $\varnothing 19.5$ mm system mount on an appropriate flange adapter, which is described here:



Figure 2:

Locate the three radially arranged tapered pin screws in the adapter flange and loosen them using the hex screwdriver 50HD-15.



Figure 3:

Gently introduce the beam shaping optics into the vacant aperture. Make sure that none of the tapered pin screws are located in the gap.



Attention: The $\varnothing 19.5$ mm system mount of the 5AN anamorphic beam shaping optics has a steel ring. This steel ring has a gap of approx. 2 mm, see Figure 3. Please make sure that none of the three pin screw is located in the gap of the steel ring. Otherwise the connection in-between the adapter and the beam shaping optics is not long-term stable.

The optics only affects one axis of the beam cross-section. Rotate the optics in order to get the desired effect on the right axis, see Figure 4.

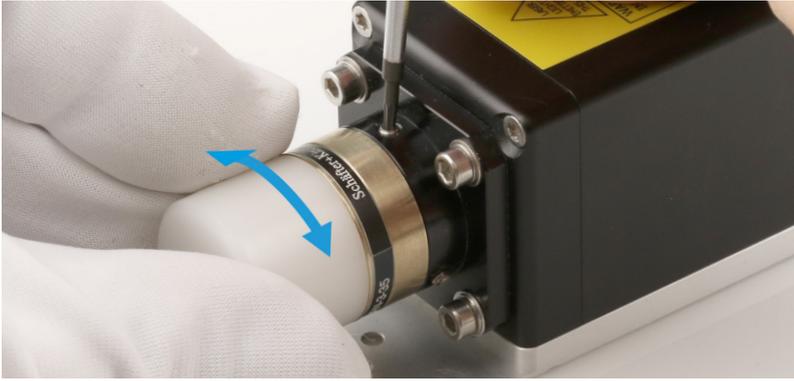


Figure 4:

Now rotate the optics in the adapter in order to achieve the desired effect.



Figure 5:

Now fix the three tapered pin screws at the adapter flange. please use the same torque of about 0.48 Nm for all three pin screws, respectively.

4. Adjusting the Collimation Setting

Collimation adjustment (adjustment of the distance in between the two lenses of this optics) is a demanding task and should be performed preferably using a collimating telescope.



Notice: The beam shaping optics is shipped pre-adjusted for the labeled wavelength and, often, it is not necessary for the customer to readjust the lens position. This is why you can skip this step in most cases.

How the collimation setting can be adjusted without a collimating telescope is described below:

4.1 Collimation setting

For evaluating the collimation setting of the anamorphic beam shaping optics, launch a properly collimated radiation source of appropriate wavelength into the optics. Direct the beam to a target about half a Rayleigh length z_R away:

$$\frac{z_R}{2} = \frac{\pi \cdot \varnothing_{\text{beam}}^2}{\lambda \cdot 8}$$

Here λ is the optical wavelength and $\varnothing_{\text{beam}}$ the collimated beam diameter ($1/e^2$ -level).

When correctly collimated, the laser spot diameter on a target about $z_R/2$ away must have approximately the same diameter and shape such as the beam directly behind the fiber collimator. Additionally, make sure that there is no focused laser line nor spot between the anamorphic beam shaping optics and the target at $z_R/2$.

4.2 Changing the collimation setting

For adjusting the collimation setting of the anamorphic beam shaping optics, launch a collimated radiation source of appropriate wavelength into optics.



Caution! Refer to the laser instruction manual for all instructions regarding laser safety!

- Do not stare directly into the laser beam (which can cause permanent damage to the eyes).
- Do not stare at the reflected beam from reflective objects.
- Do not point the laser beam to other individuals.

The collimation setting is adjusted by means of an eccentric key type 60EX-4.

For adjusting the collimation setting perform the following steps:

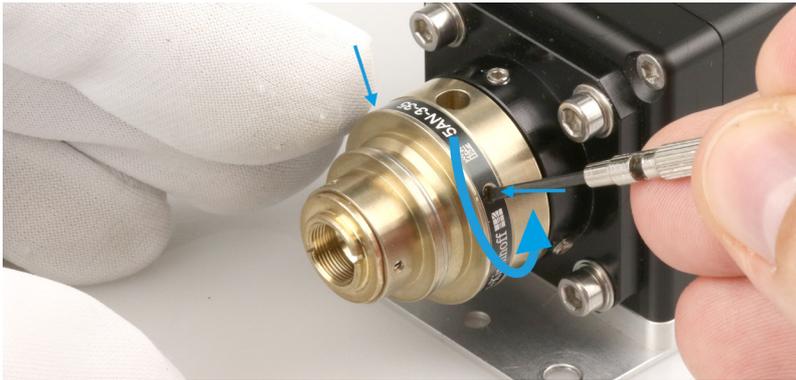


Figure 6:
Loosen the two grub screws fixing the lens position by means of a screwdriver type 9D-12.

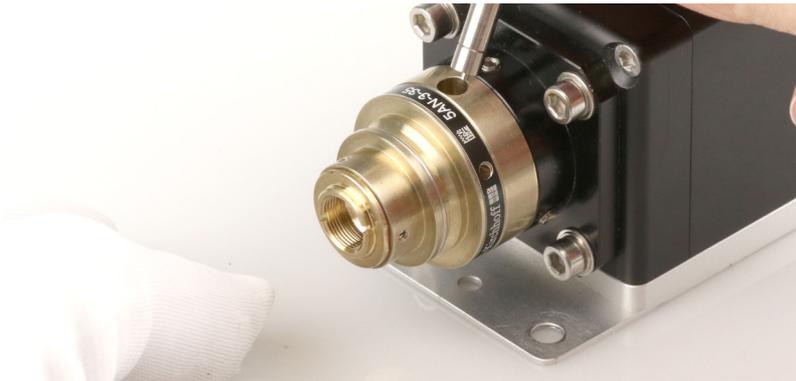


Figure 7:
Insert the eccentric key type 60EX-4 into the large hole so that the pin of the key is placed in one of the circumferential grooves.



Figure 8:
Now, adjust for the focus setting by rotating the eccentric key. Adjust the collimation by minimizing the size of the laser spot on the target about half the Rayleigh length z_R away.

i Notice: In order to cover the entire adjustment range, it might be necessary to switch from one to the next circumferential groove.



Figure 9:
Finally, fix the two grub screws in order to lock the collimation setting.

5. Adjustment tools

For adjusting the fiber collimators series 60FC you need the following tools:



Figure 10:
Screw driver type 9D-12.



Figure 11:
Eccentric key type 60EX-4

6. Accessories



Figure 12:
Adapter flange type 60A19.5-F for flanging the anamorphic beam shaping optics e.g., to a laser.

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Schäfter+Kirchhoff GmbH
Kieler Straße 212, 22525 Hamburg, Germany
Phone: +49 40 85 39 97-0
Fax: +49 40 85 39 97-79
Email: info@sukhamburg.com
Web: <https://www.sukhamburg.com>