Fiber Collimators Series 60FC-L-SMA-0

This document provides assistance in installing the fiber collimators series 60FC-L-SMA-0 with a receptacle of type SMA 905 and with an outer diameter 25/28 mm[1]. It describes how a fiber cable is attached and how the collimation setting is adjusted.

Before You Start

The fiber collimator is shipped with a protection cap for the fiber receptacle and with a front cap.

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

There is a threaded cap on the receptacle. Please perform the following steps in order to remove this cap:

Figure 1:

First, remove the threaded cap from the fiber receptacle of the fiber collimator.

The fiber collimators are compatible to all fiber connectors type SMA 905.

Notice:

- Do not touch either the optical surface of the lens or the fiber end-face.
- If the coupler is not in use, reattach both rear and front 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.

1) Additionally type 60FC-L with the optics type M40L.

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1. Attaching a Fiber Cable to the Fiber Collimators

For attaching a fiber cable to the fiber collimator perform the following steps:

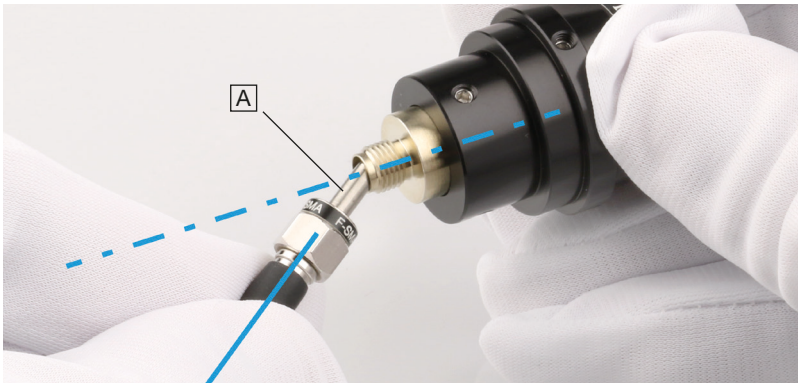

Figure 2:

To prevent damage to the sensitive fiber end-face, always insert the fiber connector`s ferrule A at an angle.

Figure 3:

When the ferrule tip is safely located in the inner cylinder of the receptacle, align the connector to the receptacle axis.

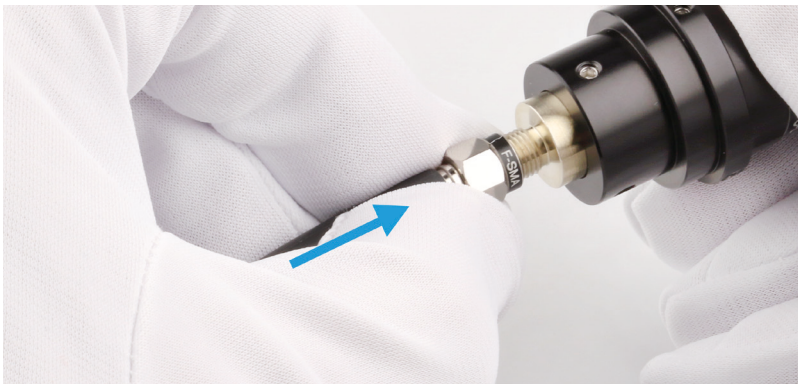

Figure 4:

Carefully introduce the connector into the fiber collimator.

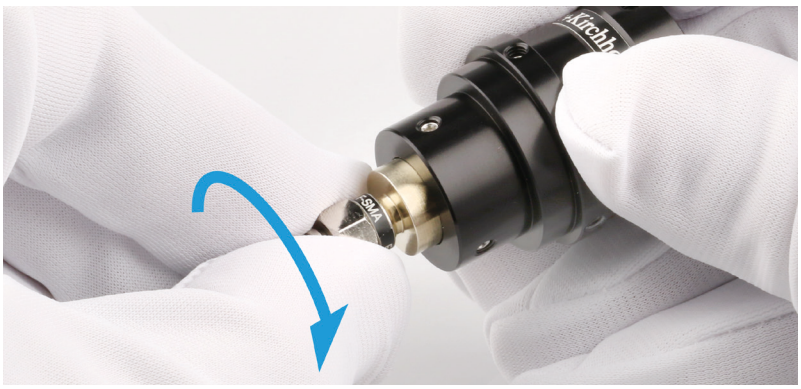

Figure 5:

Gently screw on the connector cap nut onto the receptacle until it is finger-tight.

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2. Adjusting the Collimation Setting

Collimation adjustment (adjustment of the collimating lens in z-direction) is a demanding task and should be performed preferably using a collimating telescope.

Notice: The fiber collimator is shipped pre-adjusted for the given 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.

When adjusting the focus setting without a collimating telescope, the criterion for a proper collimation is different for single-mode or polarization-maintaining fibers compared to multimode fibers.

The fiber collimators series 60FC-L-SMA with a receptacle of type SMA 905 are typically used for multimode fibers. Therefore, only the adjustment for multimode fibers is described in this document.

Notice: For the adjustment of the collimation setting in case of single-mode or PM fiber, pleaser refer to *www.sukhamburg.com/support/technotes/fiberoptics/coupling/collimatingsm/practicalcollimation.html*

2.1 Focus setting for multimode fiber cables

In case of a multimode fiber, a collimated beam has its smallest diameter right after the collimating lens. From this point on, the spot diameter increases linearly with distance to the lens. The divergence θ depends on the core diameter $\varnothing_{core}$ and the collimating focal length f‘:

$$\theta = \frac{\varnothing_{core}}{2 \cdot f'}$$

In some cases it might be more practical to focus the beam in a specific distance D from the fiber collimator, rather than to collimate the beam. A convinient distance D is (NA is the numerical aperture of the fiber):

$$D \approx 2 \cdot (f')^2 \frac{NA}{\varnothing_{core}}$$

When focussing to this distance D, the core diameter $\varnothing_{core}$ is imaged to a spot that has approximately the same size such as the collimated beam right after the fiber collimator.

2.2 Changing the focus setting

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.

For adjusting the collimation setting of the fiber collimator, couple a radiation source of appropriate wavelength into the fiber connected to the fiber collimator.

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When correctly adjusted, the laser spot diameter on a target in a distance about D away must have approximately the same diameter such as the beam directly behind the fiber collimator. Additionally, make sure that there is no focused spot between the fiber collimator and the target at distance D.

The lens position is adjusted manually.

For adjusting the lens position perform the following steps:

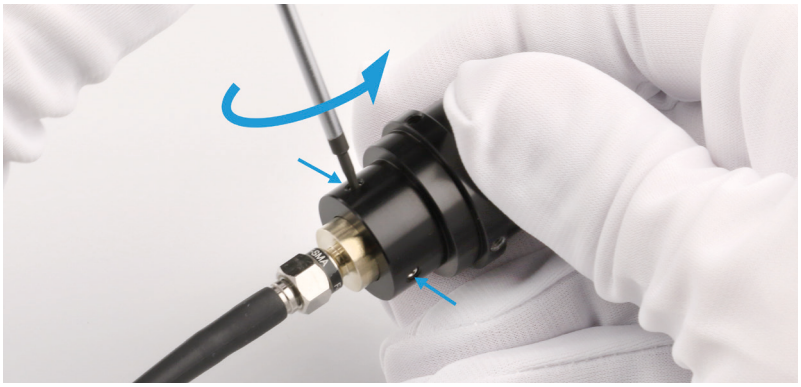

Figure 6:

Loosen the two clamp screws fixing the lens position by means of a screwdriver type 50HD-15.

Notice: The position of the two clamp screws depends on the individual type of fiber collimator. For the exact position of these clamp screws please refer to the technical drawing of the individual fiber collimator, respectively.

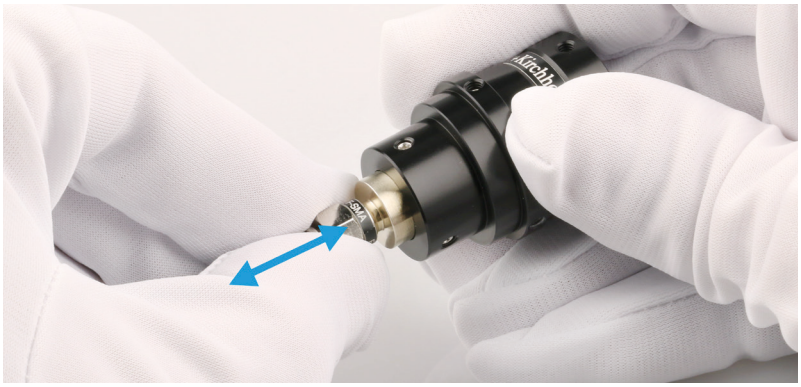

Figure 7:

Now, adjust the focus setting by shifting the rear part manually. Use the shearing interferometer or adjust the collimation by minimizing the size of the laser spot on the target about half the Rayleigh length z_R away.

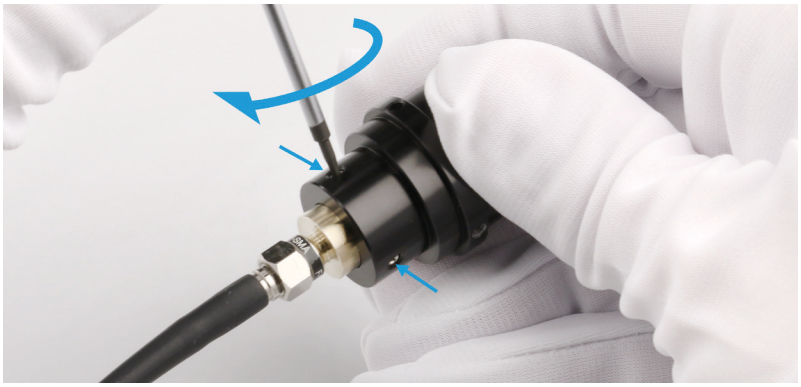

Figure 8:

Finally, fix the clamp screws in order to lock the collimation setting.

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3. Adjustment Tools

For assembling and adjusting the fiber collimators series 60FC-L you need the following tools:

Figure 9:
Hex key 50HD-15

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Date of issue: 06.02.2024

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