

## Fiber Collimators Series 60FC-L

This document provides assistance in installing the fiber collimators series 60FC-L with an outer diameter 25/28 mm<sup>1)</sup>. 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 two-part protection 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.*



*Figure 2:*

*Then, slightly loosen the small pin screw. Use the screwdriver 9D-12. Make sure to not loosen it too far, as it is small and easily lost.*



*Figure 3:*

*Now, pull out the plug.*

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

Now, make sure that the connector of the fiber you want to attach matches the receptacle type of the fiber collimator:

- Use fibers with FC-APC (8°-polish) connectors for fiber collimators with an inclined coupling axis (60FC-L-4).
- Use fibers with FC-PC (0°-polish) connectors for fiber collimators with a coaxial axis (60FC-L-0).

The fiber collimators are compatible to all fiber connectors type FC, including fiber connectors with end caps.

**Notice:**

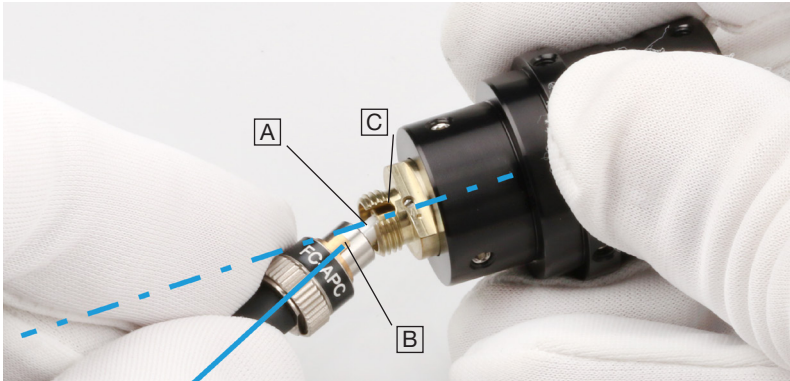
- Do not touch either the optical surface of the lens or the fiber end-face.
- If the coupler is not in use, reattach both rear and front protection caps.

**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.

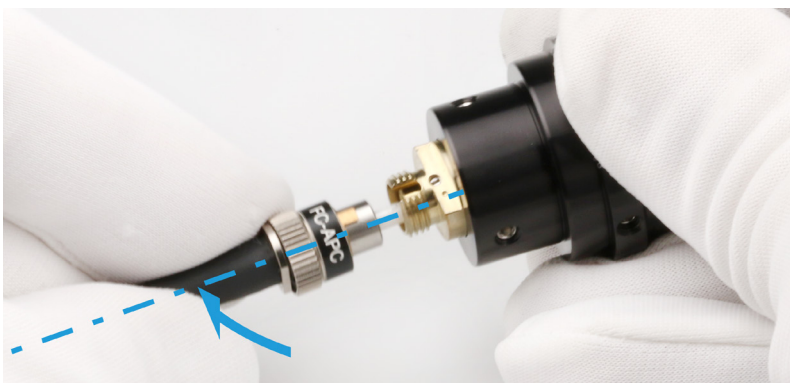
# 1. Attaching a Fiber Cable to the Fiber Collimators

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



**Figure 4:**

To prevent damage to the sensitive fiber end-face, always insert the fiber connector's ferrule **A** at an angle, with the connector key **B** properly aligned to the receptacle notch **C**.



**Figure 5:**

When the ferrule tip is safely located in the inner cylinder of the receptacle, align the connector to the receptacle axis and carefully introduce the connector into the fiber collimator.



**Figure 6:**

Then, orient the connector key in a way that it is pressed gently onto the right-hand side of the receptacle notch.



**Figure 7:**

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



**Figure 8:**

*Finally, gently tighten the fiber grub screw to reduce the free play of the ferrule in the receptacle.*

The free play in between the connector ferrule and receptacle is only a few microns, but necessary for inserting the ferrule without force.

The tightened grub screw and the right-hand orientation rule for the connector, ensure a high reproducibility in mode field position and angle, which is especially important for attaching and reattaching polarization-maintaining fibers reproducibly.

## 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.

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



**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.

There are two options for rating the collimation setting:

- For fiber collimators with a focal length  $f' > 30$  mm it is best to use a shearing interferometer.
- For fiber collimators with a focal length  $f' \leq 30$  mm you can use the following procedure as an alternative:

Direct the beam to a target about half a Rayleigh length  $z_R$  away:

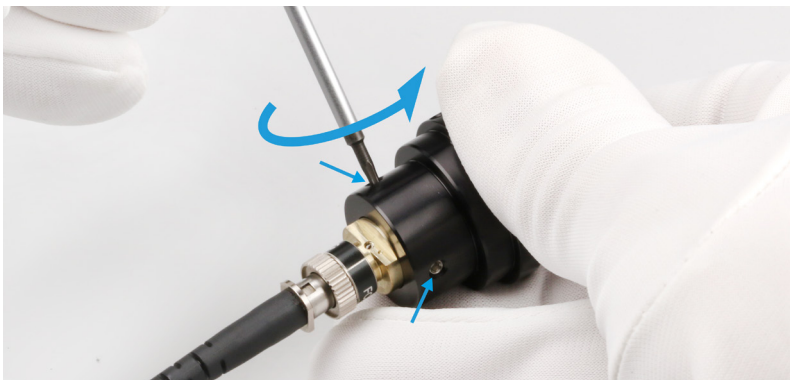
$$\frac{z_R}{2} = \frac{\pi \cdot \varnothing_{\text{beam}}^2}{\lambda \cdot 8}$$

Here  $\lambda$  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 such as the beam directly behind the laser beam coupler. Additionally, make sure that there is no focused spot between the laser beam coupler and the target at  $z_R/2$ .

The lens position is adjusted manually.

For adjusting the lens position perform the following steps:



**Figure 9:**

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

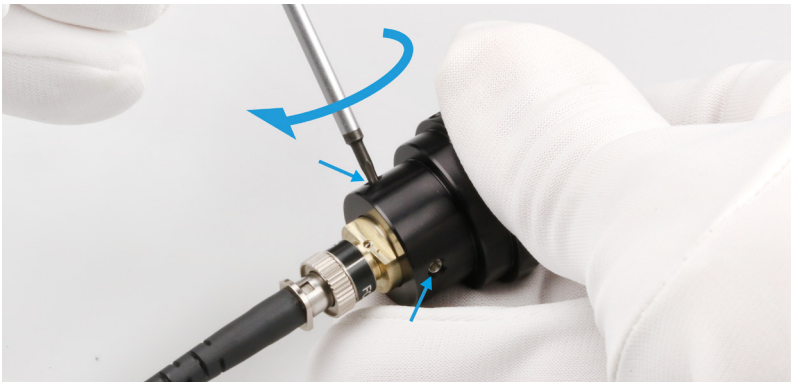
**Notice:**

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 10:*

*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 11:*

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

### 3. Adjustment Tools

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



*Figure 12:*  
Screw driver type 9D-12 and hex key 50HD-15.

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