

## Fiber Collimator series 60FC-SF

Fiber Collimator/Fiber Coupler with super-fine thread



### FEATURES

The Fiber Collimators series 60FC-SF with super-fine thread are an improved, advanced version of the series [60FC-F](#) collimators. They are designed for collimating radiation exiting from an optical fiber cable or used in reverse as a fiber coupler (fiber port) for coupling a beam into an optical fiber cable. The focus adjustment is done using a super-fine-threaded ring.

- All benefits of the [60FC-F](#) Fiber Coupler
- Increased pointing stability and reduced backlash during the focus setting
- Super-fine thread for an even more precise focus setting with 0.35 mm pitch
  
- Focal lengths up to 18 mm
- Choice of aspheres, achromats and apochromats
- Various AR coatings for UV - IR
- Choice of fiber receptacles: FC PC or FC APC (standard), many others available
- Compact Ø 12 mm housing



## DESCRIPTION

The fiber collimators series 60FC-SF with super-fine thread are an improved, advanced version of the series [60FC-F](#) collimators. They are designed for collimating radiation exiting optical fiber cables with high pointing stability. They can also be used in reverse-mode as fiber incouplers. They are suitable for single-mode and polarization-maintaining fiber cables leading to collimated beams with a Gaussian intensity profile.

### **An optics for each application**

A large variety of collimating optics allows that the optimum focal length and the best lens type for a single wavelength ([asphere](#), [monochromat](#)) or a wavelength range ([achromat](#)) can be selected for each application. All lenses are AR-coated. For an ideal Gaussian beam and standard fibers you can reach coupling efficiencies up to 80%.

### **Adjustment of focus**

The distance between fiber end-face and collimating optics is adjusted using a threaded ring with a super-fine thread. The improved mechanics lead to an increased pointing stability and reduced backlash during the focus setting. The lens in these fiber collimators is spring-loaded. The linear bearing ensures that the lens does not rotate when adjusting the focus.

#### *Please note:*

Please do NOT use the two radially arranged screws. These pin screws are now used for a different purpose in the 60FC-SF fiber couplers than for the previous version of the fiber couplers with fine-focusing mechanism 60FC-F.

They are to be used by Schäfter+Kirchhoff only! They are used for adjusting the backlash of the fine adjustment mechanics and are NOT used for fixing the collimation setting.

### **Optimum lens performance**

The angled polish of connectors of type APC is considered by a [pre-angled mechanical coupling axis](#) that compensates the beam deflection and you can use the lens centrally. This minimizes aberrations simply resulting from a non-ideal beam path through the lens.

### **Connector Type**

The fiber collimator can be equipped with FC PC (wide key\*), FC APC (wide key\*) [receptacles](#). Because of the spring loaded ferrule the fiber coupler has an additional grub screw to increase pointing stability. \*Even though the fiber coupler has a wide key receptacle it still can be used with both narrow key and wide key fibers. More information can be found [here](#).

### **Material**

The fiber collimators are available in eco brass ®.

### **Mounting**

The collimator can be placed into a standard mirror mount using the corresponding adapters.

- Lens Types

Differences between aspheres, achromats and apochromats

- Pre-angled coupling axis

Reasons for a pre-angled coupling axis

- [Grub screw for fiber ferrule](#)  
[Why you should tighten the grub screw for the fiber ferrule.](#)
- [Single-mode and PM fiber Coupling \(6\)](#)  
[Selection of focal length, estimated coupling efficiency](#)
  - [Single-mode and PM fiber Coupling](#)  
[Selection of focal length, estimated coupling efficiency](#)
  - [Selection of coupling focal length for an elliptical beam](#)  
[Selection of focal length and effective coupling diameter](#)
  - [Coupling efficiency](#)  
[Sources of loss when fiber-coupling](#)
  - [Industry-grade fiber coupling](#)  
[Industry-grade fiber coupling for different well-established laser systems](#)
  - [Article - Fiber Coupling to Polarization-Maintaining Fibers and Collimation](#)  
[How measured fiber parameters help to choose the best coupling and collimation optics.](#)
  - [Article - Perfectly Coupled](#)  
[Making single-mode fiber coupling smooth and permanent](#)
- [Collimating single-mode fibers \(6\)](#)  
[Collimated beam diameter, beam divergence, pilot beam](#)
  - [Collimated beam diameter of a singlemode fiber](#)  
[Selection of focal length or determination of the resulting beam diameter](#)
  - [Practical collimation](#)  
[Practical collimation tips for single-mode, polarization-maintaining and multimode fibers](#)
  - [Beam divergence](#)  
[Beam divergence of a collimated beam exiting a single-mode fiber](#)
  - [Pilot beam](#)  
[Approximate constant beam diameter across a certain working range](#)
  - [Article - Fiber Coupling to Polarization-Maintaining Fibers and Collimation](#)  
[How measured fiber parameters help to choose the best coupling and collimation optics.](#)
  - [Article - Specialized fiber collimators](#)  
[Cooling and trapping atoms using specially developed fiber collimators](#)
- [Producing spots \(3\)](#)  
[When can you produce a spot by simply refocusing the fiber collimator and when is a micro focus optics necessary?](#)
  - [Refocusing the collimator to produce a focus spot](#)  
[Beam divergence of a collimated beam exiting a single-mode fiber](#)
  - [Producing spots by using a fiber collimator and a micro focus optics](#)  
[Calculation of spot diameter for single-mode fibers](#)

- [Rayleigh range](#)  
[What is the depth of focus of my spot?](#)

## FAQ

### Adjustment

#### **What are the radially arranged screws in the 60FC-SF couplers used for?**

Please do not use the two radially arranged screws. These pin screws are now used for a different purpose in the 60FC-SF fiber couplers than for the previous version of the fiber couplers with fine-focusing mechanism 60FC-F.

They are to be used by Schäfter+Kirchhoff only. They are used for adjusting the backlash of the fine adjustment mechanics and are not used for fixing the collimation setting.

#### **How much can I change the focus setting?**

The coupler has a pitch of 0.35 mm and you can change the focus setting  $\pm 0.8$  mm.

#### **I do not have a collimating telescope to collimate. Can you give me practical advice?**

Of course, a collimating telescope is the best way to collimate. But there are other methods depending on the type of fiber (single-mode and PM vs. multimode) you can use. Please refer to our practical collimating tips [here](#).

#### **I am unsure how to correctly adjust my coupler/collimator. Where do I find details about the adjustment procedure?**

Please refer to the manual in the Downloads section for a detailed adjustment procedure.

### Fiber Receptacle

#### FC PC and FC APC

##### **How do I attach a fiber cable?**

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

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 coupler.

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

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

Gently tighten the fiber grub screw to reduce the free play of the ferrule in the receptacle.

### **What is the "right-hand orientation rule"?**

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 coupler.

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

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.

### **Can I attach a narrow key fiber cable to a fiber coupler with a wide key receptacle?**

Yes you can- without any problem. Simply adhere to the "right-hand orientation rule".

Generally, with any FC PC or FC APC type connector there is a freeplay when inserting the fiber into the fiber coupler. The free play in between the connector ferrule and receptacle is only a few microns, but necessary for inserting the ferrule without force. There is a difference between the receptacle and key width for wide key (2.14 mm) and narrow key (2.0 mm) fibers. If you follow the so-called "right-hand orientation rule" you can reproducibly attach and reattach even PM fibers with narrow key receptacle to fiber couplers with wide key receptacle without difficulty.

"Right-hand orientation rule":

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

## **Troubleshooting**

### **I can't collimate the radiation out of a coupler. Why?**

#### **Have you loosened the grub screws?**

The clamp screws have to be loosened before changing the focus setting, Please refer to the adjustment instructions of the individual couplers for more details.

#### **Have you checked, if the fiber is correctly placed within the fiber receptacle of the coupler?**

The fiber connector might not be placed correctly within the receptacle of the coupler. In particular, please check the small grub screw holding the connector's ferrule (e.g. for FC PC and FC APC type couplers). It might be in the way. Please refer to the adjustment instructions of the individual couplers for more details.

### Have you tried another eccentric key?

Please check, if the eccentric key is damaged or broken.

Please also check, if you are using the appropriate eccentric key. The eccentric key type 60EX-5 has a larger stroke compared to the key type 60EX-4. The 60EX-5 is used for couplers with focal length  $\geq 12$  mm. The 60EX-4 is used for focal lengths  $< 12$  mm.

In some very, very rare cases the stroke of the original eccentric key may be too small for the coupler in your application. (See FAQ "Difference between 60EX-4 and 60EX-5"). Try using the 60EX-5 in this case.

### Have you checked the eccentric key for damage?

The eccentric key might be damaged or broken. If that is the case, try another eccentric key of the same type and (or) contact Schäfter+Kirchhoff for replacement.

## DOWNLOADS



[Adjustment 60FC-SF.pdf \(Manual\)](#)

This downloads section only includes general downloads for the complete series.

Please access the individual product pages (using the product configurator, the product list, order options or the search button if you have a complete order code). Here you will find specific downloads including technical drawings or stepfiles.

## ACCESSORIES

### ADJUSTMENT TOOLS

#### FIBER OPTICS

#### ADAPTERS FOR 60FC

for  $\varnothing 12$  mm to diameter  $\varnothing 25$  mm,  $\varnothing 1"$  or with system mount  $\varnothing 19.5$  mm

## RELATED PRODUCTS

#### FIBER COLLIMATOR SERIES 60FC-F

Fiber Collimator/Fiber Coupler with fine-focussing mechanism

#### FIBER COLLIMATOR SERIES 60FC

for collimating radiation exiting an optical fiber or as an incoupler

#### LASER BEAM COUPLERS SERIES 60SMS

for coupling into single-mode and polarization-maintaining fiber cables

**LASER BEAM  
COUPLERS SERIES  
60SMF**

with fine threaded adjustment screws - for coupling  
into single-mode and polarization-maintaining fiber  
cables

This is a printout of the page <https://sukhamburg.com/products/fiberoptics/fibercoupler/series/60fc-sf.html> from  
6/25/2022

## CONTACT

For more information please contact:

**Schäfter + Kirchhoff GmbH**

**Kieler Str. 212**

**22525 Hamburg**

**Germany**

**Tel: +49 40 85 39 97-0**

**Fax: +49 40 85 39 97-79**

**[info@sukhamburg.de](mailto:info@sukhamburg.de)**

**[www.sukhamburg.com](http://www.sukhamburg.com)**

## LEGAL NOTICE

**Copyright 2020 Schäfter+Kirchhoff GmbH. All rights reserved.**

Text, image, graphic, sound, video and animation files and their arrangement on Schäfter+Kirchhoff GmbH webpages are protected by copyright and other protective laws. The content may not be copied for commercial use or reproduced, modified or used on other websites. [\[more\]](#)