

## Fiber Collimator series 60FC-SMA

specially designed for SMA-905 high power connectors with 5° or 8°-polish.



### FEATURES

High precision fiber coupler optimized for high pointing stability and long-term stability - specially designed for SMA-905 high power connectors with 5° or 8°-polish. Efficient coupling of collimated laser radiation into single-mode and PM fiber cables including PCF fibers.

- Focal lengths up to 30 mm
- Choice of aspheres, singlet, monochromats or achromats
- Various AR coatings for UV - IR
- Compatible with high power SMA-905 connector with 5° or 8°-polish
- Focussing of the optics using an eccentric key
- Integrated TILT adjustment to prevent aberrations from vignetting or clipping
- Front connector accepts attachment optics

## DESCRIPTION

The fiber couplers series 60FC-SMA are designed for coupling into SMA-905 high power connectorized single-mode and polarization-maintaining fiber cables including PCF fibers cables. It can also be used to collimate radiation exiting such fiber cables. Please note that the collimated beam profile strongly depends on specific fiber properties and is not Gaussian for PCF fibers.

### 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](#), [singlet](#)) or a wavelength range (achromat) can be selected for each application. All lenses are AR-coated.

### Adjustment of focus and TILT

The distance between fiber end-face and collimating optics is adjusted by means of an eccentric key. The lens does not rotate when adjusting the focus. The final focus setting is locked by means of two radially arranged clamping screws. Additionally attachment optics can be mounted to the front of the collimator.

Additionally, the collimator has an integrated TILT adjustment. Unlike common FC-type connectors, the SMA-905 High Power Connector does not have a spring-loaded ferrule.

With varying ferrule length, the point of emission not only shifts axially, but also laterally with respect to the optical axis in the case of an inclined polish (5° and 8°-polish).

By using the TILT adjustment, the point of emission can be adjusted onto the mechanical axis of the fiber coupler. When collimating a laser beam, the integrated TILT adjustment for the fiber coupler 60FC-SMA-T prevents vignetting or diffraction arising from a clipped beam.

When coupling into a fiber, high efficiencies can only be reached when the tilt is adjusted properly.

### 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 collimators have a [receptacle](#) of type SMA-905 (F-SMA) and is available for 5° or 8° e.g. for SMA-905 High Power connectors (receptacles for fibers with 0°-polish on request). Unlike the fiber collimators for FC PC or FC APC connectors (60SMS or 60FC-T) the fiber connectors of type high power SMA 905 do not have an index key for alignment of the polarization axis of the fiber cable. A groove in the collimator helps with the manual axis alignment.

### Material

The fiber collimators are made of nickel silver and black anodized aluminum.

### Mounting

The collimator can be placed into a standard mirror mount.

## TECHNOTES

- [Lens Types](#)  
[Differences between aspheres, achromats and apochromats](#)
- [Pre-angled coupling axis](#)  
[Reasons for a pre-angled coupling axis](#)
- [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](#)

## FAQ

### Order Code

#### How do I read the Order Code?

The Order Code of standard Fiber Couplers is fairly easy to read.

Example: 60FC-xxx-T-M125-54

**60FC-T** denotes the series of the Fiber Coupler, in this case series 60FC-T. You can find an overview of available series [here](#).

**xxx** stands for the receptacle type. Standard is FC and the xxx is left out. SMA stands for receptacle type F-SMA, LSA stands for a receptacle type LSA compatible with fiber connectors type DIN, AVIO and AVIM.

**4** stands for the collimator coupling axis. It is either 4 (standard) for 8°-polished fibers or 0 for 0°-polished fibers. For SMA couplers there is also 23 which is for 5°-polished fibers.

**M125** denotes the optics type and the focal length. M stands for monochromat or achromat, A for asphere and S for singlet lens. The focal length is given in mm, in this case 125 mm.

**54** describes the AR-Coating of the lens. Specifics on the coatings can be downloaded on the individual product pages of the fiber couplers.

### Fiber Collimators with receptacle type SMA

#### Why do we not offer fiber couplers without TILT alignment and a receptacle type F-SMA with an angled polish?

The fiber connectors of type SMA do not have a spring-loaded ferrule (such as FC type connectors do).

The receptacles do not have a limit stop.

Since the length of the ferrule is not defined precisely, the emitting point in the fiber coupler is not properly defined.

In case of a 0°-polish this is not a problem since you can adjust for this by adjusting the axial lens position.

However, in case of an SMA fiber connector with an angled polish, the emitting point additionally moves laterally with ferrule length.

In order to compensate for this lateral displacement, a TILT alignment is absolutely necessary.

### Adjustment

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

You can change the focus setting  $\pm 2.0$  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](#).

**My collimator is shipped "prealigned". What does this mean?**

Schäfter+ Kirchhoff ships all collimators prealigned and collimated for either a specific wavelength defined by the customer or a typical wavelength. The collimation is performed using professional collimating telescopes.

**Please note:** The fibers used in the standard adjustment procedure are all equipped with an [end cap](#) when aligning for wavelengths  $\leq 520$  nm. The adjustment wavelength is given on the label for each collimator/coupler. If a fiber with end cap was used it is marked by "EC".

**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.

## 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/collimator. 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/collimators for more details.

**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.

### **Are you using a fiber with an end cap?**

Collimating/coupling with an end cap fiber cable is no different than with a standard fiber cable. However, the focus position might vary a little ( $<200\text{ }\mu\text{m}$ ) when swapping a standard fiber cable for a fiber cable with end cap.

The eccentric key 55EX-5 is used to adjust the focus position. In some cases the stroke is not large enough.

This includes working with very small wavelegths or very large wavelengths. Please try using a different groove instead.

### **Are you using the optimum groove for adjusting the focus setting with the eccentric key?**

The distance lens to fiber end face is changed by means of an eccentric key. This key has a pin. The lens tube has one (or more) circumferential groove(s). The lens tube is shifted axially by rotating the eccentric.

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

Sometimes it is easier to do a coarse alignment by shifting the rear part manually (instead of using the eccentric key). Then, the right groove for a proper fine adjustment with the eccentric will appear in the aperture of the fiber collimator for the eccentric and you can finish the fine adjustment using the eccentric key.

## **It says my coupler/collimator was "precollimated" but the collimation setting seems to not be alright. What might be the problem?**

### **Are you using the same wavelength as the adjustment wavelength?**

Schäfter+ Kirchhoff ships all collimators/couplers prealigned and collimated/preadjusted for either a specific wavelength defined by the customer or a typical wavelength. The prealigned is performed using professional collimating telescopes.

The adjustment wavelength is given on the label for each collimator/coupler. If you are using another wavelength you need to change the focus setting. Please refer to the manual for more details.

### **Are you using the same fiber type as in the adjustment procedure?**

The fibers used in the standard adjustment procedure are all equipped with an [end cap](#) when aligning for wavelengths  $\leq 520\text{ nm}$ . The adjustment wavelength is given on the label for each collimator/coupler. If a fiber with end cap was used it is marked by "EC".

If you are not using a fiber with an end cap but the preadjustment at Schäfter+Kirchhoff was done using an end cap ("EC") or you are using a fiber with an end cap and the preadjustment at Schäfter+Kirchhoff was done without, you might need to change the focus setting. Please refer to the manual for more details.

## ACCESSORIES

### ADJUSTMENT TOOLS FIBER OPTICS

**IRIS DIAPHRAGMS BL** for collimators

**MICRO FOCUS OPTICS** Micro Focus Optics for Fiber Collimators of all series

### POLARIZATION FILTERS

**RETARDATION OPTICS** Retardation optics for fiber collimators

## RELATED PRODUCTS

**FIBER COLLIMATOR  
SERIES 60FC-T** for collimating large beam diameters and with  
additional TILT adjustment

**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

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