

Fiber Collimator series 60FC-T

for collimating large beam diameters and with additional TILT adjustment



FEATURES

The fiber collimator series 60FC-T is 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. It has an integrated TILT adjustment to prevent aberrations from vignetting or clipping.

- Large beam diameters: Focal lengths up to 200 mm
- Choice of monochromats or achromats
- Various AR coatings for UV - IR
- Choice of fiber receptacles: FC PC or FC APC (standard), many others available
- Integrated TILT adjustment to prevent aberrations from vignetting or clipping
- Front connector accepts attachment optics

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- With integrated TILT adjustment



DESCRIPTION

The fiber collimators series 60FC-T 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. Please note that for multimode collimation the intensity profile is not Gaussian and depends on certain fiber and radiation properties.

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 ([monochromat](#)) 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 for aligning the beam axis to the mechanical axis. This prevents vignetting of the collimated beam as well as diffraction arising from the clipped beam.

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 [receptacles](#) of type FC PC (wide key*), FC APC (wide key*), ST or LSA (compatible with fiber connectors type DIN, AVIO and AVIM). In case of FC or LSA with a 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 made of nickel silver and black anodized aluminum (standard) or in amagnetic titanium. In case of titanium, the relative permeability is near 1 ($\mu_r=1.00005$) making it almost transparent to magnetic fields. The linear coefficient of thermal expansion is close to that of the optics so that a thermal stability over a larger temperature range can be expected.

Mounting

All Fiber Collimators 60FC-T with diameter Ø25 mm can be placed in a standard mirror mount. 60FC-T with a larger diameter posses a flange for low-strain mounting e.g. using the clamp collars series [CC](#).

TECHNOTES

- [Lens Types](#)
[Differences between aspheres, achromats and apochromats](#)
- [Fiber Connector Options](#)
[FC PC, FC APC etc.](#)

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[How measured fiber parameters help to choose the best coupling and collimation optics.](#)

FAQ

Adjustment

How much can I change the focus setting?

You can change the focus setting ± 2.0 mm.

How can I change the focus setting?

To check the collimation setting of the fiber collimator, couple a radiation source of appropriate wavelength into the fiber connected to the fiber collimator. (Always keep laser safety in mind!)

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.

First, loosen the clamp screws fixing the lens position by means of a screwdriver type 50HD-15. Insert the eccentric key type 55EX-5 into the large hole so that the pin of the key is placed in one of the circumferential grooves.

Now, adjust the focus setting by rotating the eccentric key. In order to cover the entire adjustment range, it might be necessary to switch from one to the next circumferential groove. Finally, fix the clamp screws in order to lock the collimation setting.

You can change the focus setting of these fiber collimators also by just shifting the rear part manually. It is an option to do this for a coarse alignment. Then, the right groove for a proper fine adjustment with the eccentric will appear in the aperture of the fiber collimator for the eccentric.

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 ≤ 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".

The fiber collimator has a TILT alignment. What does this mean?

The collimator has an integrated TILT adjustment for aligning the beam axis to the mechanical axis. This prevents vignetting of the collimated beam as well as diffraction arising from the clipped beam.

If you want to point the collimated laser beam to a certain point and need to tilt the beam axis, DO NOT do this using the TILT mechanism of the 60FC-T. You need to hold the fiber collimator in a adequate holder, e.g. a mirror mount with the respective amounts of freedom.

**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.

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.

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.

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.

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-T.pdf \(Manual\)](#)



[Article_FibercouplingNAe2.pdf \(Technote\)](#)

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

**CLAMP COLLARS
SERIES CC** for all collimators with flange, different sizes

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-L** for collimating large beam diameters

**FIBER COLLIMATOR
60FC-Q** Fiber Collimator for collimating large beam diameters
and with integrated quarter-wave plate

**FIBER COLLIMATOR
SERIES 60FC** for collimating radiation exiting an optical fiber or as
an incoupler

This is a printout of the page <https://sukhamburg.com/products/fiberoptics/fibercoupler/series/60fc-t.html> from 12/3/2022

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