# Fiber Collimator series 60FC-MAV

for collimating radiation exiting an optical fiber or as an incoupler

## FEATURES

The fiber collimator 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.

- Focal lengths up to 20 mm
- Choice of aspheres, monochromats, achromats and apochromats
- Various AR coatings for UV - IR
- Mini AVIM ® type receptacle (APC): compatible with fiber connectors type Mini AVIM ® and Midi AVIM ®
- Compact Ø 12 mm housing
- Front connector accepts attachment optics
- Amagnetic titanium
- Vacuum-compatible

NEW!

## DESCRIPTION

The fiber collimators series 60FC 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. Please note that for multimode collimation the intensity profile is not Gaussian and depends on specific 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 (asphere, monochromat) or a wavelength range (achromat or apochromat) 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 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.

**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 centrically. This minimizes aberrations simply resulting from a non-ideal beam path through the lens.

**Receptacle Type Mini AVIM ®**
The fiber coupler has a receptacle of type Mini AVIM ® and is available as PC (for fibers with 0°-polish) and APC (for fibers with 8°-polish). The receptacle type Mini AVIM ® is compatible with fiber connectors type Mini AVIM ® and Midi AVIM ®. Compatible fiber cables can be found on www.diamond-fo.com.

**Material Options**
The fiber collimators are available in amagnetic titanium. 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. The collimators are vacuum-compatible.

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

**Order Options**
This coupler is available with all standard optics, see for example here. Please refer to the respective standard coupler and specify that you need a mini AVIM ® connector for the quotation.

An exemplary coupler can be found here.

Fields of application: Avionics and space as well as ultra-compact and stable instruments.

60FC-MAV-4-Ti-V

## TECHNOTES

- Lens Types
  Differences between aspheres, achromats and apochromats
- Pre-angled coupling axis
  Reasons for a pre-angled coupling axis
- 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-esablished 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?
- Multimode fiber coupling and collimation (5)
  Selection of focal length
  - Multimode fiber coupling
    Selection of focal length
  - Collimating multimode fibers
    Collimated beam diameter and divergence
  - Practical collimation
    Practical collimation tips for single-mode, polarization-maintaining and multimode fibers
  - Producing spots by refocussing multimode fiber collimators
    Calculation of spot diameter
  - Coupling an Extended Source Into a Multimode Fiber
    Beam parameter prodict and étendue
- Mounting options for Ø 12mm Fiber Collimators (Series 60FC and 60FC-SF)
  Mounting options for Fiber Collimators series 60FC and 60FC-SF
- Article - Fiber Coupling to Polarization-Maintaining Fibers and Collimation
  How measured fiber parameters help to choose the best coupling and collimation optics.

# FAQ

## Adjustment

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

For couplers and collimators with a focal length < 12 mm you can change the focus setting ± 0.5 mm. For couplers and collimators with a focal length ≥ 12 mm you can change the focus setting ± 1.0 mm.

### What is the difference between the eccentric keys type 60EX-4 and 60EX-5?

Both eccentric keys are used for the fiber collimators series 60FC and the laser beam couplers series 60SMF/60SMS.The difference between the two eccentric keys is their stroke:

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 ≥ 12 mm. The 60EX-4 is used for focal lenghts < 12 mm.

In some (very, rare) cases it might be necessary to use the eccentric key type 60EX-5 even for couplers with focal lengths shorter than 12 mm:

- When the coupler is used with a fiber connector that has an end cap,

- the coupler is collimated for an extremely long wavelength,

- the coupler is collimated for an extremely short wavelength,

- or the coupler is focussed to a finite distance in order to generate a small spot .

### How do I collimate a coupler with an end cap fiber cable?

Collimating with an end cap fiber cable is no different than with a standard fiber cable. However, the focus position might vary a little (<200 µm) when swapping a standard fiber cable for a fiber cable with end cap.

The eccentric key 60EX-4 is used to adjust the focus position. In some cases the stroke is not large enough. Please use the eccentric key 60EX-5 with a larger stroke instead.

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

Of coarse, 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".

**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.

## DOWNLOADS

Adjustment_60FC-LSA.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

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|---|---|
| **ADJUSTMENT TOOLS FIBER OPTICS** | |
| **MICRO FOCUS OPTICS SERIES 5M** | for transforming a collimated beam into a micro focus spot |
| **RETARDATION OPTICS 5WP** | Retardation optics for fiber collimators with Ø 12 mm |

## RELATED PRODUCTS

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| **ADAPTERS FOR 60FC** | for Ø 12 mm to diameter Ø 25 mm, Ø 1" or with system mount Ø 19.5 mm |

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| **FIBER COLLIMATOR SERIES 60FC** | for collimating radiation exiting an optical fiber or as an incoupler |
| **LASER BEAM COUPLERS SERIES 60SMF** | with fine-thread adjustment screws - for coupling into single-mode and polarization-maintaining fiber cables |
| **FIBER COLLIMATOR SERIES 60FC-SF** | Fiber Collimator/Fiber Coupler with super-fine thread |
| **FIBER COLLIMATOR SERIES 60FC-T** | for collimating large beam diameters and with additional TILT adjustment |
| **60FC-MAV-4-M12-08-TI-V** | Fiber Coupler for collimating radiation exiting an optical fiber or as incoupler |

This is a printout of the page https://sukhamburg.com/products/fiberoptics/fibercoupler/rtype/mav/60fc_mav.html from 5/8/2024

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