

## Laser Beam Couplers series 60SMF-MAV

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

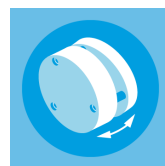


### FEATURES

The fiber couplers series 60SMF with fine-thread adjustment screws are an improved, advanced version of the fiber couplers [60SMS](#). They are high precision fiber couplers optimized for high coupling efficiency, high pointing stability and long-term stability and provide efficient coupling of collimated laser radiation into single-mode and PM fiber cables.

- All appreciated benefits of the well-established 60SMS laser beam coupler including its very high pointing stability and as well as the proven long-term stability.
- Ceramic bearings and adjustment screws with fine thread to ensure an even more precise and easy adjustment.
- For single-mode or PM fiber cables
- System mount Ø 19.5 mm
- Integrated TILT and focusing adjustment
- Focal lengths up to 18 mm
- Choice of aspheres, monochromats, achromats and apochromats
- Various AR coatings for UV - IR
- Mini AVIM type receptacle (PC or APC): compatible with fiber connectors type mini AVIM ® and midi AVIM ®
- Amagnetic titanium

- With integrated TILT adjustment



## DESCRIPTION

The fiber couplers series 60SMF with fine-thread adjustment screws are an improved, advanced version of the fiber couplers series [60SMS](#). They are designed for compact and long-term stable coupling of single-mode laser radiation into a single-mode or polarization-maintaining fiber. For multimode applications please use the series [60FC-A19.5](#) fiber couplers.

### An optics for each application

A large variety of coupling 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%.

### High long-term stability

It's compact size as well as the high-resolution alignment mechanisms allow for a straight-forward, intuitive coupling procedure. The result is a fiber coupling with high thermal stability, pointing stability, that is vibration and shock-insensitive. [Long-term stability tests](#) (see figure on the right) have shown a power stability better than 3% for a temperature range of 15-35°C.

### 6 Degrees of freedom\*

In order to achieve optimum coupling efficiency the fiber coupler needs to provide certain degrees of freedom. You need to adjust

- the angle between laser beam and lens/fiber end-face
- the z-position of the lens
- adjust the polarization axis of the fiber to that of the laser source
- center the lens with respect to the laser beam

The fiber coupler provides all degrees of freedom necessary. It has a TILT adjustment, an independent focus adjustment, can be rotated 360°, and allows for lateral adjustment\* using e.g. the adapter [60A19.5-F](#).

The TILT adjustment is used to maximize the lateral overlap between the mode field of the fiber and the focussed laser spot using 3 adjustment screws. It has ceramic bearings and the adjustment screws have a super-fine thread to ensure an even more precise and easy adjustment. 3 locking screws are used for fine-adjustment and to lock the position for an optimum mechanical stability.

Independent to the TILT adjustment, the distance between fiber end-face and coupling optics is adjusted by means of an eccentric key. The final focus setting is locked by means of two radially arranged clamping screws. Since the focus adjustment is independent, the z-position of the mode field diameter can be placed much more precisely.

The polarization alignment of the fiber to the polarization axis of the laser source is performed by rotating the laser beam coupler. The separation of the fiber coupler and the adapter necessary for centering is essential to allow for a full 360° freedom of rotation. The coupler has a tight-fit cylinder that can be placed into a Ø 19.5 mm receptacle of a corresponding adapter.

The beam can be centered with respect to the aperture of the coupling optics using e.g. the adapter [60A19.5-F](#).

### Optimum lens performance

The angled polish of connectors of type APC causes the beam to exit in an angle and not parallel to the optical axis of the fiber. This is corrected by the [pre-angled mechanical coupling axis](#) of the coupler 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](http://www.diamond-fo.com).

### Material Options

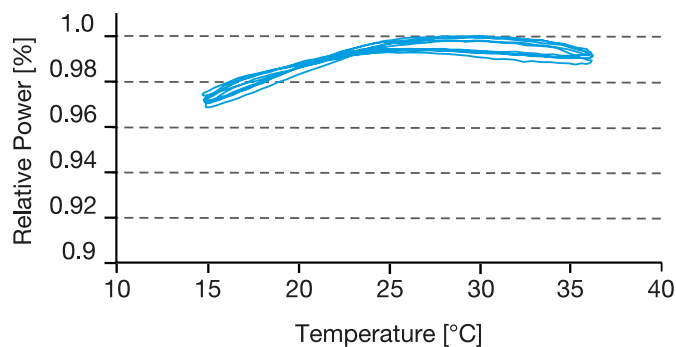
The fiber couplers are available in amagnetic titanium. The linear coefficient of thermal expansion is close to that of the optics so that a thermal stability over a larger temperature range can be expected. The fiber couplers are vacuum-compatible.

### 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.



60SMF-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-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](#)
- [Stability and coupling efficiency of the laser beam couplers type 60SMS](#)  
[Stability measurements during temperature cycling and how incorrect adjustment affects the coupling efficiency](#)

## 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  $\pm 0.5$  mm. For couplers and collimators with a focal length  $\geq 12$  mm you can change the focus setting  $\pm 1.0$  mm.

#### 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.

## DOWNLOADS



[Adjustment\\_60SMF-LSA.pdf \(Manual\)](#)



[010821190800.pdf \(Dimensional drawing\)](#)

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 60SMS, 60SMF, AND 60FC-A19.5** with system mount Ø 19.5 mm

## RELATED PRODUCTS

**LASER BEAM COUPLERS SERIES 60SMF** with fine-thread adjustment screws - for coupling into single-mode and polarization-maintaining fiber cables

**LASER BEAM COUPLERS SERIES 60SMF** with fine-thread adjustment screws - for coupling into single-mode and polarization-maintaining fiber cables

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

**FIBER COLLIMATOR SERIES 60FC-SF** Fiber Collimator/Fiber Coupler with super-fine thread

**60SMF-MAV-4-M12-08-TI-V** Amagnetic Laser Beam Coupler

This is a printout of the page [https://sukhamburg.com/products/fiberoptics/fibercoupler/rtype/mav/60smf\\_mav.html](https://sukhamburg.com/products/fiberoptics/fibercoupler/rtype/mav/60smf_mav.html)  
from 5/3/2024

## 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. [\[more\]](#)

