



CVI Melles Griot offers a broad range of laser-to-fiber beam-delivery systems for industrial and scientific applications. These systems include laser-to-fiber couplers, fiber-optic patch cords, and fiber-optic collimators. Fiber couplers can be used with single-mode, multimode, and polarization-maintaining fibers, and they are ideal for use with gas lasers (e.g., helium neon and argon-ion lasers). They offer coupling efficiencies of 55 to 90 percent for single-mode fibers and 75 to 95 percent for multimode fibers.

Laser-to-Fiber Couplers

Laser-to-fiber couplers use a lens to focus the light from the laser to a spot matching the size of the fiber core. The coupler is attached directly onto the laser and uses a patented tilt adjustment technique. The coupling optics are precisely aligned with respect to the laser beam through the use of three fine tilt adjustment screws, together with an O-ring, which is used as a pivot. Once the coupler is aligned for maximum coupling efficiency, it is locked using three locking screws, forming a rigid, rugged coupling system. The design is flexible, allowing a wide variety of configurations. Our laser-to-fiber couplers are capable of submicron resolution and provide coupling efficiencies close to the theoretical maximum. The package is rugged and stable and does not require an optical bench for operation. It thus offers superior performance at a fraction of the cost of expensive micropositioner stages.

Standard source couplers feature precision FC connector receptacles and achromat lenses, providing efficient coupling across the visible spectrum. For optimum efficiency, the correct lens must be selected to match the laser beam diameter (see table).

Note that, to minimize reflections at the fiber endface, the laser-to-fiber couplers are designed to work with angled, polished fibers. Conventional angle-polished FC/APC connectors have significant variation in their endface geometries. Our patchcords, however, feature an angled-flat (AFC) polished connector with a beveled endface. The fiber itself is angled, but the ferrule tip is flat, providing optimum repeatability between connections.

The increasing use of polarization-maintaining fibers for applications is driving the demand for polarization-maintaining laser-to-fiber couplers. Our couplers feature better than 20-dB polarization extinction ratios as well as keyed connectors to ease alignment. Alignment tools, offered separately, make aligning these couplers for optimum efficiency and polarization extinction ratios rapid and simple.

Fiber-Optic Laser Beam Delivery System

SPECIFICATIONS:

Laser-to-Fiber Couplers

Wavelength	400–700 nm
Lens Type	Achromat lens
Connector Type	FC, angle flat
Fiber Cable	Polarization maintaining
Power	5 W maximum, cw
Coupling Efficiency	60% to 90%
Back Reflection	<-60 dB
Polarization Extinction Ratio	>20 dB

Laser-to-Fiber Couplers

Achromat Lens Focal Length (mm)	Input Beam Diameter ($1/e^2$) (mm)	PART NUMBER
3.5	0.5 – 0.7	09 LFC 001
4.0	0.7 – 0.9	09 LFC 002
6.0	0.9 – 1.2	09 LFC 003



LFC-series laser-to-fiber couplers



Fiber-Optic Patch Cords

CVI Melles Griot offers both single-mode and polarization-maintaining fibers. Fiber-optic patch cords use special low cutoff wavelength fibers to ensure single-mode operation at your operating wavelength. This in turn ensures that your output signal is truly Gaussian in behavior, guaranteeing you the best possible output beam. The fiber patch cords are 2 m long with a 3-mm outside diameter.

SPECIFICATIONS:

Fiber-Optic Patch Cords

Connector Type	FC/PC, angle flat
Operating Temperature	– 20°C to + 70°C
Cladding Diameter	125 μm
Outside Diameter	3.0 mm
Length	2.0 m

Fiber-Optic Patch Cords

Wavelength Range (nm)	Fiber Core Diameter (μm)	Insertion Loss (dB)	Minimum Extinction Ratio (dB)	Type	PART NUMBER
480 – 630	3.5	<1.5	18	Polarization Maintaining	09 PMF 001
620 – 820	4.0	<1	20	Polarization Maintaining	09 PMF 002
400 – 600	3.5	<1.5	—	Single Mode	09 SMF 001
600 – 800	4.0	<1	—	Single Mode	09 SMF 002

Installation Services

Assembly, installation and alignment of fiber-optic products are available upon purchase of fiber-optic products with a CVI Melles Griot laser. Inquire about CVI Melles Griot installation services at your nearest sales office.



Fiber-Optic Collimators

CVI Melles Griot fiber-optic collimators with low back reflection are designed to restore the light exiting a fiber to a collimated beam with beam properties closely matching the original laser beam. They come with an angle-flat FC receptacle connector and an achromat lens with a 3.5-, 4.5-, or 6.0-mm focal length.

SPECIFICATIONS: Fiber-Optic Collimators

Wavelength	400–700 nm
Lens Type	Achromat lens
Connector Type	FC, angle flat
Fiber Cable	Polarization maintaining
Back Reflection	40 dB
Operating Temperature	– 15°C to + 55°C

Fiber-Optic Collimators

Achromat Lens Focal Length (mm)	PART NUMBER
3.5	09 FCM 001
4.5	09 FCM 002
6.0	09 FCM 003

APPLICATION NOTE

Fiber-Optic Laser Beam Delivery Systems

CVI Melles Griot fiber-optic laser beam delivery systems are designed to meet the demanding needs of commercial laser applications. They set the standard in fiber-delivery efficiency, demonstrating our uncompromising commitment to optical performance.

Back Reflections

Back-reflections are often a source of concern with fiber-optic systems because the reflections from the ends of a straight-cleaved fiber form a low-finesse Fabry-Perot cavity. When the fiber is used with a single-frequency laser, output from the fiber can vary as much as ± 10 percent as thermal and mechanical perturbations change its length. There are several solutions to this problem. Applying an antireflection coating to the ends of the fiber reduce reflections from approximately 4 percent per surface to less than 1 percent per surface.

Polarization-Preserving Fibers

CVI Melles Griot offers both single-mode and polarization-preserving fibers. Standard single-mode fibers have a circular, symmetrical cross-section. If the fiber is perfectly straight, polarization of the input beam can be preserved as the light travels through the fiber, but when the fiber is bent or coiled, stress in the fiber induces birefringence. The outcome is two modes of propagation that recombine with an uncontrollable phase relationship at the output. This results in polarization drift and fading.

Polarization-preserving fiber, on the other hand, is not optically symmetric and exhibits a strong internal birefringence caused by stress-applying sectors engineered into the fiber. The internal birefringence caused by these sectors is much higher than any stress birefringence induced by bending, and as long as the polarization of the laser input is properly aligned with the optic axes of the fiber, polarization will be preserved.



Laser-to-Fiber-Coupler Alignment Kit

CVI Melles Griot offers alignment kits for laser-to-fiber couplers with angle-flat FC/APC compatible receptacles. Every kit includes a multimode patchcord and an instructional video (NTSC or PAL format) or DVD disk. These kits are used for applications with a wavelength range from 400 to 1600 nm.

Laser-to-Fiber-Coupler Alignment Kit

	PART NUMBER
Alignment Kit with Instructional Video, NTSC Format	09 FAK 001
Alignment Kit with Instructional Video, PAL Format	09 FAK 002
Alignment Kit with Instructional DVD	09 FAK 003

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Do you need . . .

POWER AND ENERGY METER

The CVI Melles Griot 13 PEM 001/J power and energy meter can measure optical radiation ranging from the ultraviolet to the far infrared.

- Broadband thermopile detector
- 200-nm to 20- μ m wavelength range
- 10- μ W to 2-W measurement range
- Analog and digital readout
- NIST-traceable calibration

