



Section IX: AF Series Fibers and Fiber Couplers

AF Series Fiber Optic Assemblies

- Bifurcated Bundles
- SingleCore Fibers
- Fiber Bundles
- Liquid Light Guides

AFCM Series

- Direct Coupling Fiber Optic Adapters

AF-L Series

- f/# Matching Fiber Optic Adapters

AF Series Fiber Optic Assemblies

- Available in single fibers and fiber bundles, including line converters.
- Gives excellent transmission from UV through near IR.
- Fits AF Series Fiber Optic Adapters.
- UV-VIS-NIR transmission at low cost.



The AF Series of Fiber Optic Cables provide a simple, flexible means of directing light to or from SP monochromators, spectrometers, and other light delivery systems. These cables attach directly to the entrance or exit slit with use of the AF Series Fiber Optic Adapters.

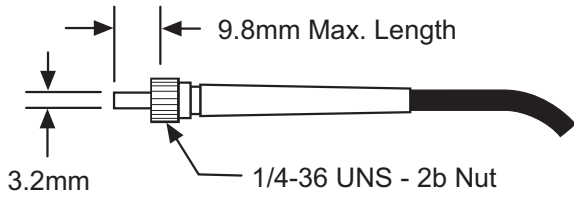
Single Fiber Cables - Single fiber cable, encased in a crush-proof monocoil sheathing. SP catalog fibers range from 100 μ m to 400 μ m core with doped silica cladding. The Numerical Aperture (NA) is .22, so the fiber collects or illuminates within an $f/2$ (25°) focal cone. The minimum recommended bend radius of the cable is 3".

Fiber Bundle Cables - Encased in a crush-proof monocoil jacket.

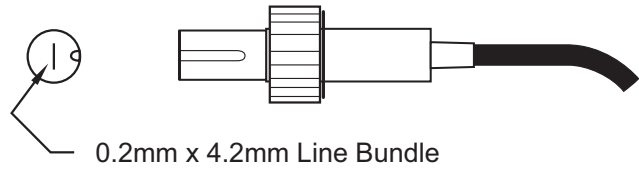
Line Converter Cables - A fiber bundle with a 10mm ferrule termination at one end and an SMA termination at the other. At the ferrule end, the bundle is formed into a line. The SMA end of the bundle is formed into a circular aperture.

The advantage of the line converter's shape is that it optimizes coupling between a bundle and a matching monochromator. In some cases, the line shape may replace the entrance or exit slit of the monochromator. Maximum coupling efficiency may be achieved by using $f/\#$ matching optics with a line converter.

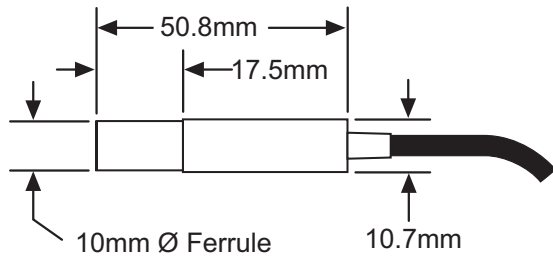
SMA



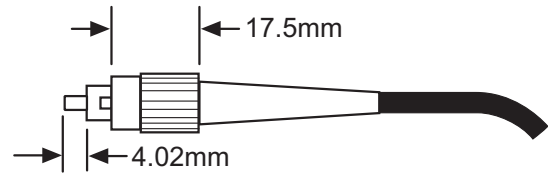
CVI Locking Ferrule (Line)



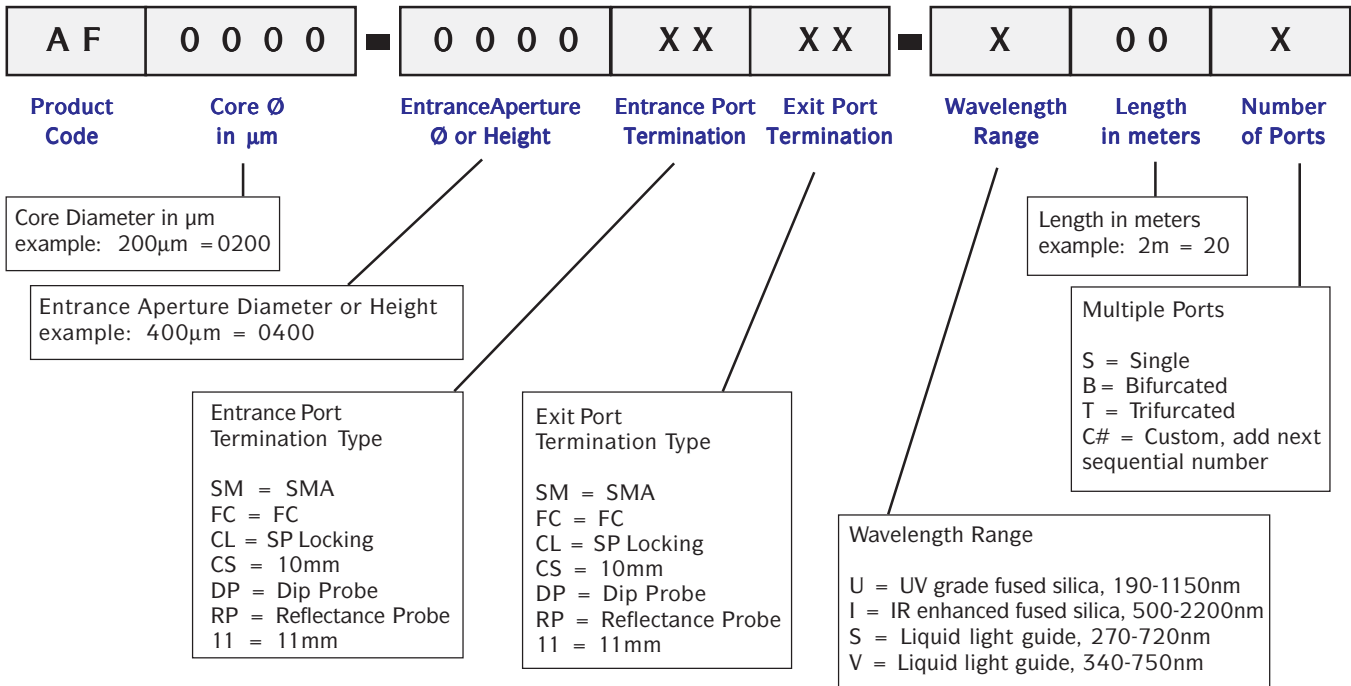
10mm Ferrule



FC



SP Spectral Product's Fiber Naming Convention.



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	Entrance Shape	Exit Shape	Fiber Core Ø in µm	Entrance Dimension	Exit Dimension *	Entrance Termination	Exit Termination	Wavelength Range (nm)	Length (meters)	Numerical Aperture (NA)
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Bifurcated Bundle

AF0200-0200DPSM-U20B	round	round/round	200	-	200	dip probe	sma/sma	190-1150	2	0.22
AF0400-1400MSM-U20B	round	round/round	200/400	1440	200/1440	sma	sma/sma	190-1150	2	0.22
AF0200-2000SMCL-U20B	round	round/line	200	1700	1220/4500	sma	SP Locking	190-1150	2	0.22
AF0400-1500MRP-U20B	round	round/round	400	1500	400/1200	refl. Probe	sma/sma	190-1150	2	0.22
AF0200-4000CSSM-U20B	line	round/round	200	4000	1100/1100	10mm	sma/sma	190-1150	2	0.22
AF0200-4000CSSM-I20B	line	round/round	200	4000	1100/1100	10mm	sma/sma	500-2200	2	0.22

Regular Single Core

AF0400-0400MSM-U20S	round	round	400	400	400	sma	sma	190-1150	2	0.22
AF0200-0200MSM-U20S	round	round	200	200	200	sma	sma	190-1150	2	0.22
AF0100-0100MSM-U20S	round	round	100	100	100	sma	sma	190-1150	2	0.22
AF0400-0400MSM-I10S	round	round	100	100	100	sma	sma	500-2200	1	0.22

Regular Bundle

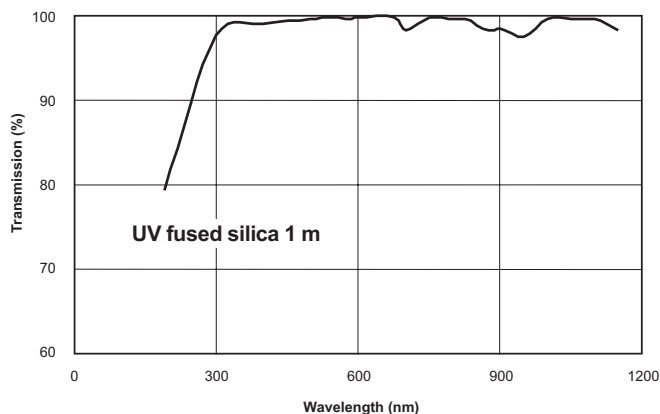
AF0200-2180MSM-U20S	round	round	200	2180	2180	sma	sma	190-1150	2	0.22
AF0100-0625MCS-U20S	round	line	100	625	2375	sma	10mm	190-1150	2	0.22 ²
AF0200-1300MCS-U20S	round	line	200	1300	4500	sma	10mm	190-1150	2	0.22 ³

² Best for CM Series, ³ Best for DK Series

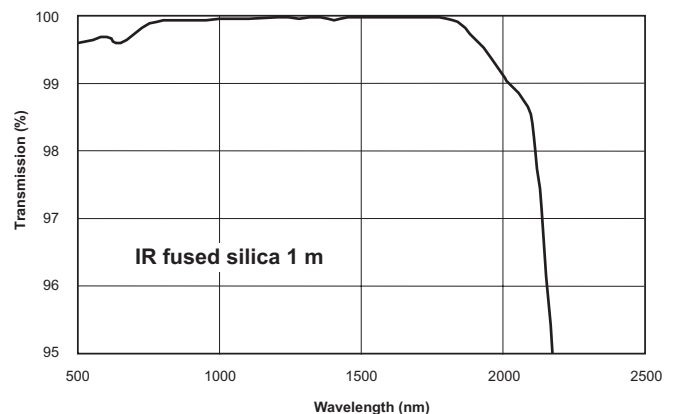
Liquid

AF5000-50001111-S10S	round	round	5000	5000	5000	11 mm ferrule	11 mm ferrule	270-720	1	0.59
AF5000-50001111-V10S	round	round	5000	5000	5000	11 mm ferrule	11 mm ferrule	340-750	1	0.60

* For a line or slit type exit shape, the entrance/exit dimension given is the line height. The line width is given by the fiber core diameter.



Typical light transmittance of Fused Silica for UV and VIS.



Typical light transmittance of Fused Silica for IR.

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AFCM Series

Direct Coupling Fiber Optic Adapters

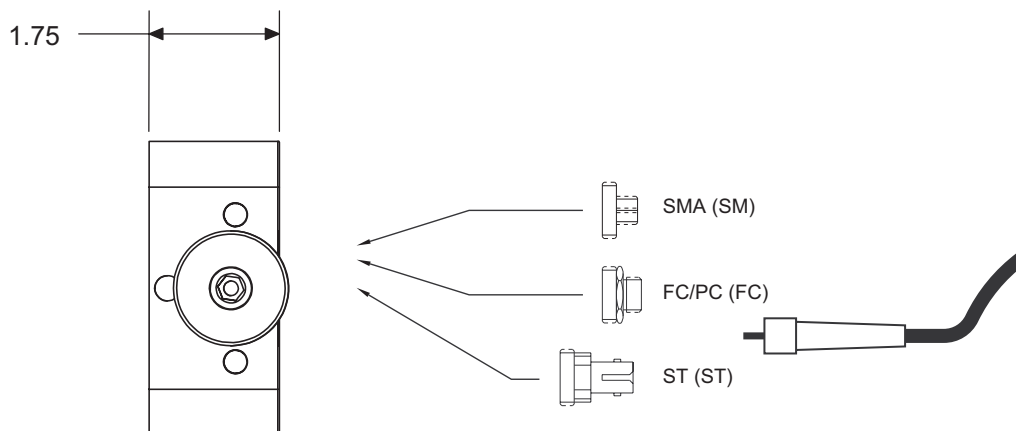
- *Positions fibers precisely.*
- *Allows translation of the critical axis.*
- *Gives optimal coupling efficiency.*



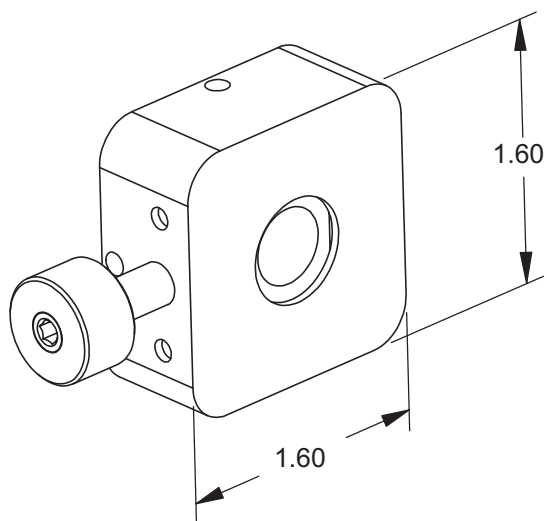
Simple, Accurate, Affordable

The AFCM-D coupler is a quick and inexpensive method for fiber coupling to your CM Series Monochromator or Spectrograph, placing the output of a terminated fiber or fiber bundle directly at the slit plane for optimal non-f# matched input or output. The fixed vertical location sets the fiber at the midpoint of the CM slit, while a smooth adjustment screw precisely controls the critical horizontal positioning.

AFCM-D is available with modular inserts to hold SMA, FC/PC, and ST type fiber terminations. For custom terminations, please contact SP Spectral Products.



Dimensions in inches



Specifications:

Adjustment:

X Axis 80-pitch adjustment screw,
0.0002" linear movement for 5° of adjustment
screw rotation

Warranty: One year

Ordering Information: Please indicate product number plus description when ordering.

AFCM-D-SM	with SMA end plate
AFCM-D-ST	with ST end plate
AFCM-D-FC	with FC/PC end plate

AF-L Series

f/# Matching Fiber Optic Adapters

- *High efficiency.*
- *Enables precise alignment.*
- *Provides a broad spectral range with UV grade lenses.*
- *Allows quick connect/disconnect while maintaining alignment.*
- *Use on input or output ports.*
- *Connects SMA, FC/PC, ST, or 10mm diameter Fiber Connectors.*



The AF-L Series of Fiber Optic Adapters will optically match the Numerical Aperture of a SP fiber ($NA=0.22$) to the $f/\#$ of a SP Monochromator or spectrograph while mechanically joining the two.

As an input adapter, the AF-L Series focuses the light from the fiber onto the entrance slit. The magnified fiber image fills more of the slit. All of the light entering the slit strikes the grating. The efficiency of this coupling is 4 to 20 times better than a direct non-matched coupling.

As an output adapter, the AF-L Series focuses the light from the exit slit onto the fiber. The demagnified slit image concentrates light onto the fiber's face and takes advantage of the fiber's "faster" collection angle. The efficiency of this coupling is 2 to 4 times better than direct non-matched coupling.

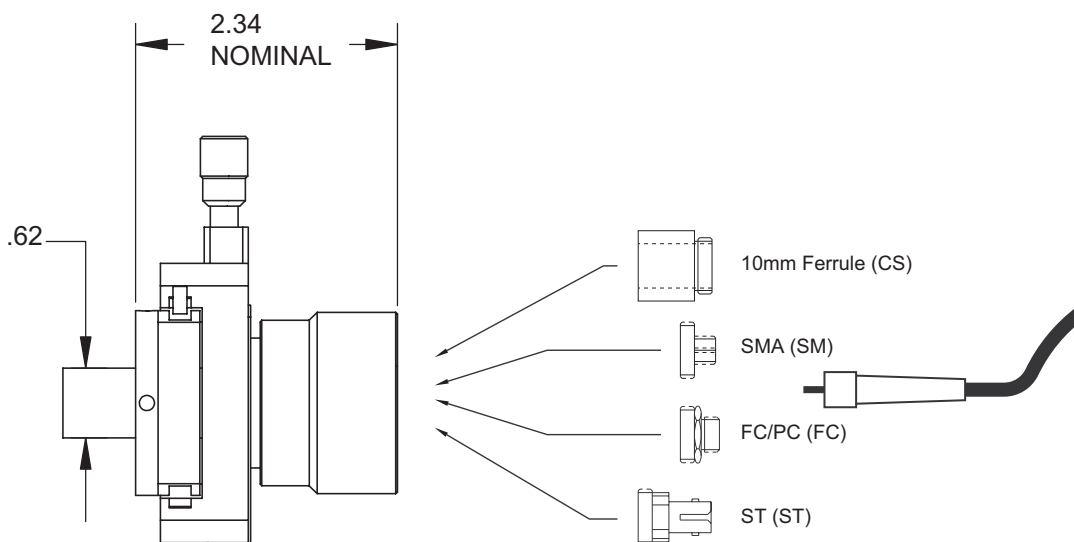
These dramatic increases in efficiency support applications where low light levels make direct fiber coupling impractical.

Fluorescence analysis, spectral analysis of LEDs and laser diodes, and detector characterization all benefit from this efficiency. Fibers used as detection probes with the AF-L Series can take full advantage of their inherent wide acceptance angle for increased light collection. Fibers used as illumination probes with the AF-L Series can deliver up to 4 times more intensity than with direct coupling. In addition, the fiber will illuminate over its full Numerical Aperture.

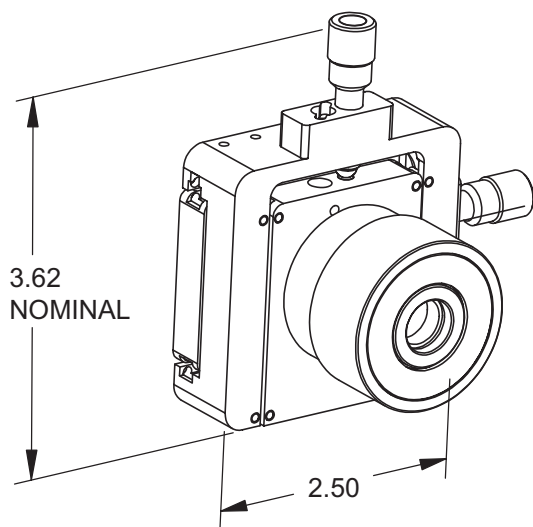
The AF-L Series **allow three axes of precise fiber translation**. Precision of better than 0.001" in linear movement is typical.

Because UV lenses are standard, the AF-L Series provides better than 90% transmission from 200nm to 1900nm.

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Dimensions in inches



Specifications:

Adjustment:

X and Y Axes 80-pitch adjustment screws, 0.0002" linear movement for 5° of adjustment screw rotation; 10mm range

Z-Axis 0.0005" linear movement for 5° of collar rotation; 5mm range

Wavelength Range:

200-1900nm @ > 90% transmission

Warranty: One year

Ordering Information: Please indicate product number plus description when ordering.

f/# matching Fiber Optic Adapter for
CMSeries monochromators/spectrographs

AFCM-L-SM	with SMA end plate
AFCM-L-FC	with FC/PC end plate
AFCM-L-ST	with ST end plate
AFCM-L-CS	with 10mm ferrule end plate

f/# matching Fiber Optic Adapter for
DK240/DK242 monochromators/spectrographs

AFDK240-L-SM	with SMA end plate
AFDK240-L-FC	with FC/PC end plate
AFDK240-L-ST	with ST end plate
AFDK240-L-CS	with 10mm ferrule end plate

f/# matching Fiber Optic Adapter for
DK480 monochromators/spectrographs

AFDK480-L-SM	with SMA end plate
AFDK480-L-FC	with FC/PC end plate
AFDK480-L-ST	with ST end plate
AFDK480-L-CS	with 10mm ferrule end plate

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