

# Connectorized Aspheric Fiber Optic Collimators

- Diffraction limited performance
- Rugged stainless steel housing
- Pre-aligned for popular wavelengths
- Connectorized for quick assembly
- Threaded exterior for easy mounting
- Epoxy free optical path
- Compact size



LightPath's® line of connectorized aspheric collimator assemblies combine the outstanding performance of glass molded aspheric lenses with the ease of assembly of a fiber connector interface. The assemblies have a threaded exterior, which allows a quick connection to an optical bench or within an instrument. LightPath's® connectorized collimators are available with FC/PC, FC/APC, or SMA fiber optic connectors. Each collimator is individually aligned and tested for the specified wavelength, and will offer excellent performance throughout the entire range of their AR coatings.

Standard design assemblies are available for three of our most popular lens types, but any asphere in our catalog can be mounted into a custom assembly of your choice. Please contact LightPath® sales for more information.

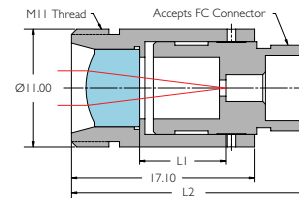
Part Number	Alignment Wavelength	L1* (mm)	L2* (mm)	L3* (mm)	L4* (mm)	Beam** Diameter	Pointing Accuracy	Waist Position
<b>352220</b> (FC/APC/SMA)-A	543nm	7.79	21.99	26.05	26.38	2.2mm	0.5°	Infinity
<b>352220</b> (FC/APC/SMA)-B	780nm	7.97	22.17	26.23	26.56	2.2mm	0.5°	Infinity
<b>352220</b> (FC/APC/SMA)-C	1310nm	8.12	22.32	26.38	26.38	2.0mm	0.5°	Infinity
<b>352220</b> (FC/APC/SMA)-D	1550nm	8.16	22.36	26.42	26.42	2.0mm	0.5°	Infinity
<b>352240</b> (FC/APC/SMA)-A	543nm	5.68	17.33	21.39	21.39	1.6mm	0.5°	Infinity
<b>352240</b> (FC/APC/SMA)-B	780nm	5.81	17.46	21.52	21.52	1.6mm	0.5°	Infinity
<b>352240</b> (FC/APC/SMA)-C	1310nm	5.92	17.57	21.63	21.63	1.5mm	0.5°	Infinity
<b>352240</b> (FC/APC/SMA)-D	1550nm	5.96	17.61	21.67	21.67	1.5mm	0.5°	Infinity
<b>350260</b> (FC/APC/SMA)-A	543nm	13.65	25.04	29.11	29.11	3.0mm	0.5°	Infinity
<b>350260</b> (FC/APC/SMA)-B	780nm	13.91	25.30	29.37	29.37	3.0mm	0.5°	Infinity
<b>350260</b> (FC/APC/SMA)-C	1310nm	14.13	25.52	29.59	29.59	2.8mm	0.5°	Infinity
<b>350260</b> (FC/APC/SMA)-D	1550nm	14.20	25.59	29.66	29.66	2.8mm	0.5°	Infinity

\* See drawings for dimensions

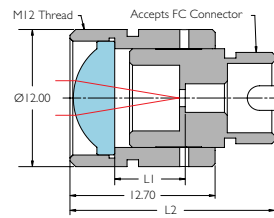
\*\* Typical beam diameter, measured at  $11e^2$ , when using single mode fiber.

## FC/PC Connectors

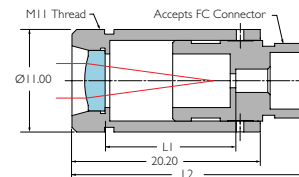
### 352220FC-(A/B/C/D)



### 352240FC-(A/B/C/D)

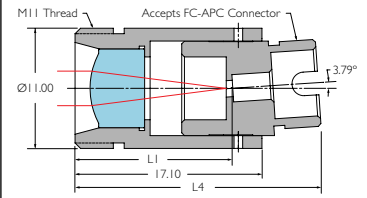


### 350260FC-(A/B/C/D)

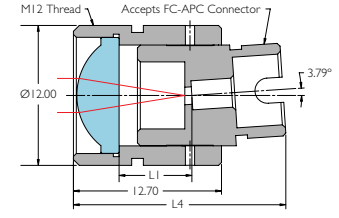


## FC/APC Connectors

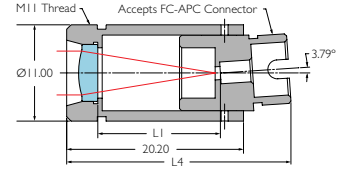
### 352220AFC-(A/B/C/D)



### 352240AFC-(A/B/C/D)

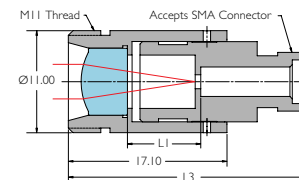


### 350260AFC-(A/B/C/D)

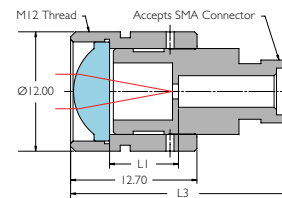


## SMA Connectors

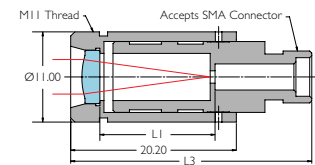
### 352220SMA-(A/B/C/D)



### 352240SMA-(A/B/C/D)



### 350260SMA-(A/B/C/D)



For Fiber Collimator (pig-tailed) see pages 37-40.

- Ideal for fiber laser applications
- Patented Fiber Fusion™ Technology
- Designed for single mode applications up to 100W
- Standard beam diameters up to 12.5mm
- Uses high performance GRADIUM® lenses
- Rugged stainless steel design
- New armored cabling available



## The LightPath® Fusion™ Advantage

LightPath's® High Power Fusion™ Fiber Collimators utilize patented fiber fusion technology to enable the collimators to be used at very high power. The fiber is laser fused directly to a plano-plano silica rod, resulting in an index matched transition from fiber to rod without any glass to air interface to cause unwanted back-reflections. The technology alleviates the need to angle polish the fiber, which allows the system to remain coaxial. The light expands as it passes out of the fiber through the rod, which results in a greatly reduced power density at the exit of the rod. The lower density keeps the collimator stable in the event that contamination falls on its surface. The result is a highly reliable optical system with superior performance and very low loss.

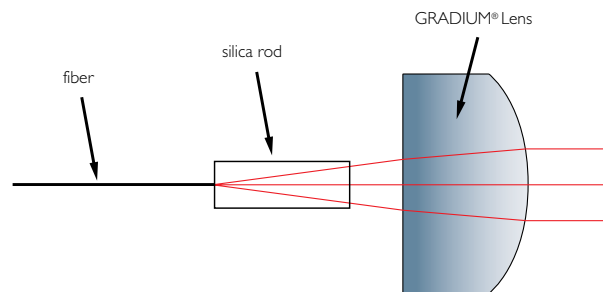
The collimators incorporate LightPath's® proprietary GRADIUM® lens technology, providing aspheric-like performance in a cost-effective package. Standard configurations are available for 1550nm, 1310nm, and 1064nm with beam diameters from 0.9mm to 12.0mm. Custom designs for other beam diameters or wavelengths (from 400 to 2000nm) can also be made per your specific requirements.

The collimators are also available with a variety of different cabling options (Hytrell® tube, Kevlar® cable, or stainless steel armor), providing the appropriate level of protection for the environment the collimator will be exposed to. There are also options for adding a protective window to the output side, a lens cap to seal the collimator when not in use, and fiber connectors to make installation quick and simple.

LightPath® also has a strong capability to design and manufacture fully custom collimators to the specifications of your choice. We have experience working with other fiber types, such as expanded core fibers, polarization maintaining fibers, and multimode fibers. Please contact LightPath® to see how we can build a collimator to meet your specific requirements.

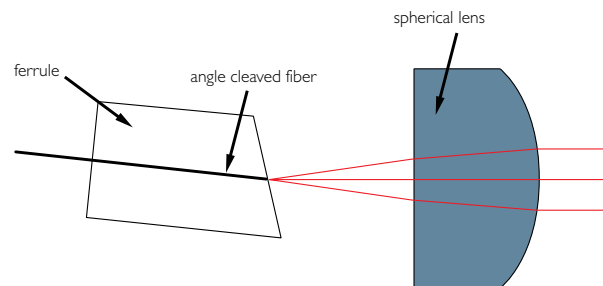
### LightPath's® Patented Fusion™ Technology

LightPath's® patented process fuses the silica fiber directly to a large silica rod. In applications involving Corning® HI1060 fiber, light expands within the silica rod and exits in an area 12,000 times larger than the competitive collimators – greatly reducing the power density and improving the reliability at higher power levels.



### Traditional Angle Cleaved Fiber Collimators

Light exits fiber tip and expands in air until collimated by the spherical lens. Using Corning® HI1060 fiber as an example, energy is concentrated in an area on 6.2mm in diameter at the exit fiber tip. Sub-micron defects from contamination, polishing, or AR coating the fiber will have catastrophic consequences at high power. In this type of system the fiber must also be angle polished and non-coaxial to the package in order to reduce back reflections.



## Customization Template

- Wavelength of application \_\_\_\_\_ nm
- Where in system is the collimator used? \_\_\_\_\_
- Beam diameter \_\_\_\_\_ mm
- Working distance \_\_\_\_\_ mm
- Housing diameter \_\_\_\_\_ mm
  
- Fiber type \_\_\_\_\_
- Fiber length \_\_\_\_\_ meters
- Connector type \_\_\_\_\_
- Power level for lens use \_\_\_\_\_ W
- Mechanical constraints? \_\_\_\_\_
- Other specifications or needs \_\_\_\_\_

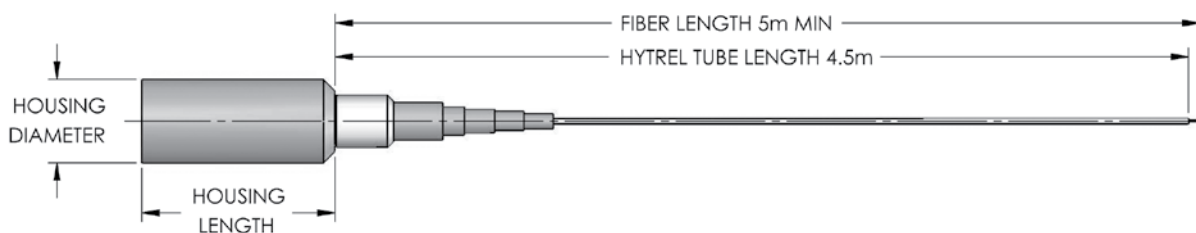
## Custom Options Available:

For custom designs and configurations, please contact LightPath® sales.

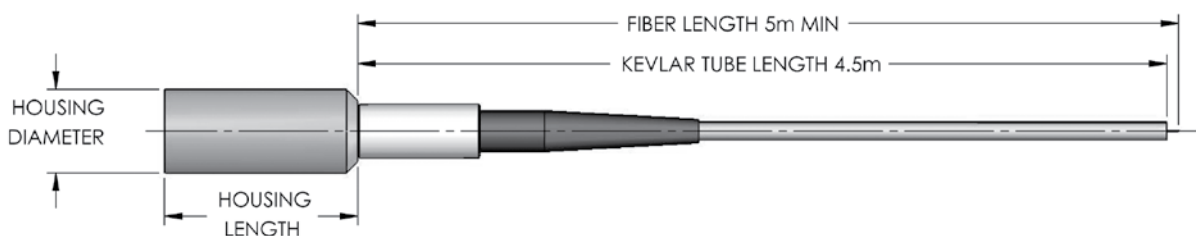
- Metallic housings
- Glass housings
- Epoxy-free strain relief
- Other Design Wavelengths
  - 1550nm
  - 1310nm
  - 1064nm
  - 980nm
  - 780nm
  - 633nm
  - 546nm
  - 532nm
  - 408nm
  - Others
- Connectors Available
  - FC/PC
  - FC/APC
  - SMA
  - ST
  - SC
  - LC
  - MU
  - Others
- Other Fibers Available
  - Corning SMF28
  - Corning TB-II
  - Corning PM15-U25
  - Corning 50/125 MMF
  - Nufern LMA-GDF-20-400
  - Nufern 1060-XP
  - Nufern 1550B-HP
  - Nufern 630-HP
  - HWT-FIB-05D2
  - INO5030I
  - Fujikura SM.98-P-6/125-UV/UV-400
  - Coractive MM-20-125
  - Coractive MM-25-125

Fiber Collimators

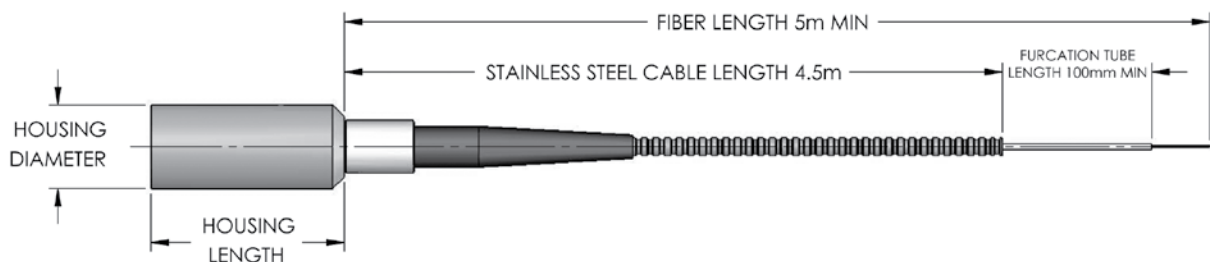
## Fusion™ Fiber Collimator with Hytrel® Tubing



## Fusion™ Fiber Collimator with PVC/Kevlar® Tubing



## Fusion™ Fiber Collimator with Stainless Steel Armor



## 1064nm Fusion™ Fiber Collimators

1064nm Beam Delivery Optics	
Center Wavelength	1064nm
Return Loss	-55dB
Pointing Accuracy	1° max
Beam Roundness	> 90%
M <sup>2</sup>	< 1.2
Output Beam Offset	1.5 mm maximum
Transmission	> 97%
Working Distance	Infinite
Storage Temperature	-40°C to +85°C
Fiber Type	Corning® HI1060
Fiber Length	5 meters

Note: Above specifications are measured and guaranteed at room temperature only.

Part Number	Cable Type	Beam Diameter (I/e <sup>2</sup> , mm)	Divergence (mRad)	Housing Diameter	Housing Length	GRADIUM® Lens Used
I0265164	3.0 mm PVC / Kevlar®	1.0 ± 0.1	1.9	9.5mm	13.1mm	GPX5-5VC8
I0275164	3.0 mm Stainless Steel					
I0265264	3.0 mm PVC / Kevlar®	2.0 ± 0.2	0.96	9.5mm	18.4mm	GPX5-10VC8
I0275264	3.0 mm Stainless Steel					
I0265364	3.0 mm PVC / Kevlar®	2.4 ± 0.2	0.90	14.0mm	20.5mm	GPX10-12.5VC8
I0275364	3.0 mm Stainless Steel					
I0265464	3.0 mm PVC / Kevlar®	3.6 ± 0.4	0.50	14.0mm	25.6mm	GPX10-18VC8
I0275464	3.0 mm Stainless Steel					
I0265664	3.0 mm PVC / Kevlar®	5.1 ± 0.5	0.37	14.0mm	33.2mm	GPX10-25VC8
I0275664	3.0 mm Stainless Steel					
I0265764	3.0 mm PVC / Kevlar®	6.0 ± 0.6	0.30	14.0mm	38.1mm	GPX10-30VC8
I0275764	3.0 mm Stainless Steel					
I0265864	3.0 mm PVC / Kevlar®	8.0 ± 0.8	0.24	21.0mm	48.6mm	GPX15-40VC8
I0275864	3.0 mm Stainless Steel					
I0265964	3.0 mm PVC / Kevlar®	12.0 ± 1.2	0.18	25.0mm	72.1mm	GPX20-60VC8
I0275964	3.0 mm Stainless Steel					

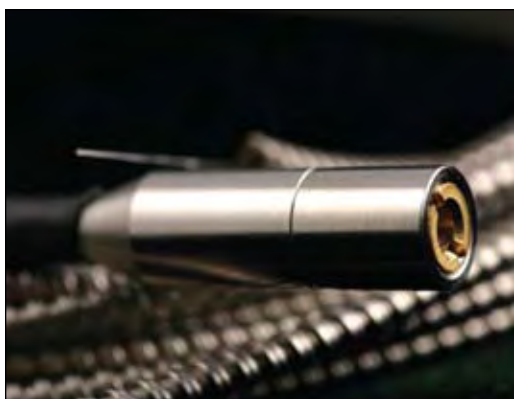
Fiber Collimators

## 1550nm Fusion™ Fiber Collimators

1550nm Beam Delivery Optics	
Center Wavelength	1550nm
Return Loss	- 55dB
Pointing Accuracy	1° maximum
Beam Roundness	> 90%
M <sup>2</sup>	< 1.2
Transmission	> 97%
Working Distance	Infinite
Storage Temperature	-40°C to +85°C
Fiber Type	Corning® SMF28
Fiber Length	5 meters

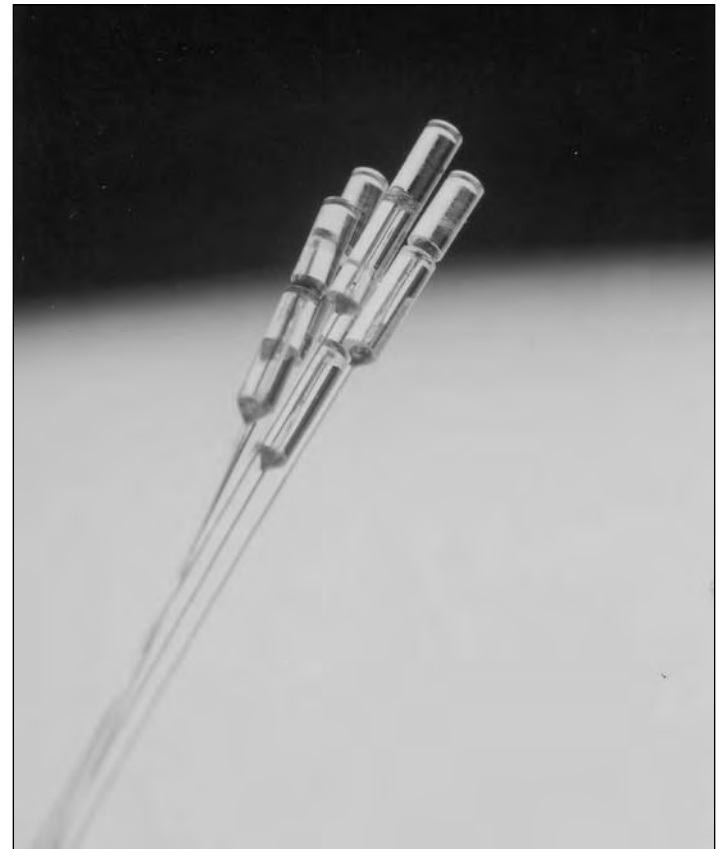
Note: Above specifications are measured and guaranteed at room temperature only.

Part Number	Cable Type	Beam Diameter (I/e <sup>2</sup> , mm)	Divergence (mRad)	Housing Diameter	Housing Length	GRADIUM® Lens Used
I0255100	0.9 mm Hytrel®	0.9 ± 0.1	3.1	9.5mm	13.1mm	GPX5-5DB3
I0265100	3.0 mm PVC / Kevlar®					
I0275100	3.0 mm Stainless Steel					
I0255200	0.9 mm Hytrel®	1.8 ± 0.2	1.6	9.5mm	18.4mm	GPX5-10DB3
I0265200	3.0 mm PVC / Kevlar®					
I0275200	3.0 mm Stainless Steel					
I0255300	0.9 mm Hytrel®	2.2 ± 0.2	1.3	14.0mm	20.5mm	GPX10-12.5DB3
I0265300	3.0 mm PVC / Kevlar®					
I0275300	3.0 mm Stainless Steel					
I0255400	0.9 mm Hytrel®	3.3 ± 0.3	0.82	14.0mm	25.6mm	GPX10-18DB3
I0265400	3.0 mm PVC / Kevlar®					
I0275400	3.0 mm Stainless Steel					
I0255600	0.9 mm Hytrel®	4.5 ± 0.5	0.59	14.0mm	33.2mm	GPX10-25DB3
I0265600	3.0 mm PVC / Kevlar®					
I0275600	3.0 mm Stainless Steel					
I0255700	0.9 mm Hytrel®	5.4 ± 0.5	0.49	14.0mm	38.1mm	GPX10-30DB3
I0265700	3.0 mm PVC / Kevlar®					
I0275700	3.0 mm Stainless Steel					
I0255800	0.9 mm Hytrel®	7.3 ± 0.7	0.38	21.0mm	48.6mm	GPX15-40DB3
I0265800	3.0 mm PVC / Kevlar®					
I0275800	3.0 mm Stainless Steel					
I0255900	0.9 mm Hytrel®	10.8 ± 1.1	0.24	25.0mm	72.1mm	GPX20-60DB3
I0265900	3.0 mm PVC / Kevlar®					
I0275900	3.0 mm Stainless Steel					



# Small Beam Collimators

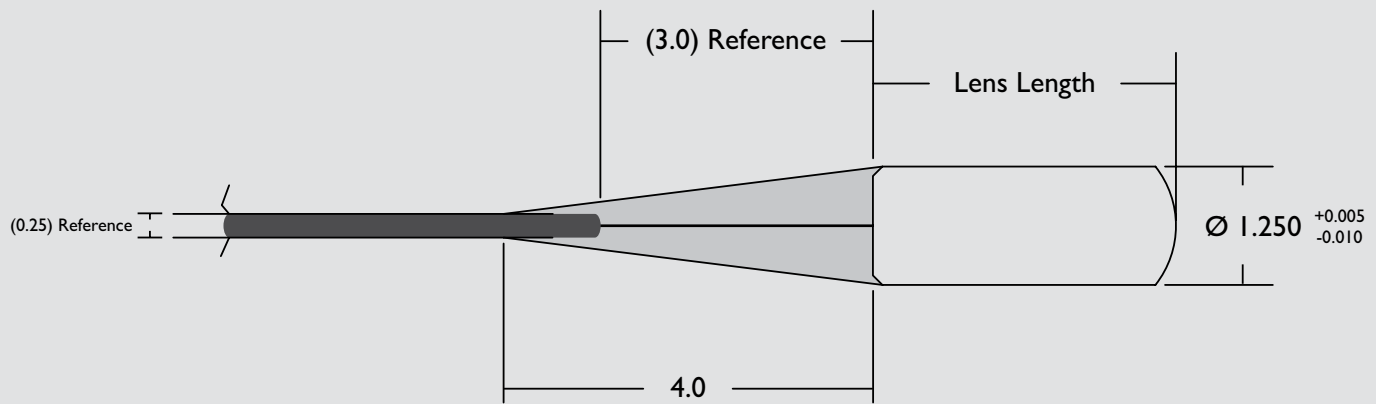
- Aspheric lens profile
- Fiber laser fused directly to lens
- Superior coupling efficiency
- Small form factor



## LIGHTPATH'S® STANDARD SMALL BEAM COLLIMATORS

Center Wavelength	1310 or 1550nm
Return Loss	< -55dB
Pointing Accuracy	1° maximum
M <sup>2</sup>	< 1.3
Lens Diameter	1.25mm +0.005 / -0.010mm
Power Handling	10 Watts CW
Operating Temperature	-20°C to +60°C
Storage Temperature	-40°C to +85°C
Fiber Type	Corning® SMF28
Fiber Length	2 meters

Fiber Collimators



PART NUMBER	CENTER WAVELENGTH	INSERTION LOSS	WORKING DISTANCE	BEAM DIAMETER* 1/e <sup>2</sup> / FULL	LENS LENGTH
I0193141	1550nm	0.5dB	2 – 30mm	0.4 / 0.6mm	3.2mm
I0193142	1310nm	0.5dB	30 – 65mm	0.4 / 0.6mm	3.2mm
T3005S0S1-20A	1550nm	0.5dB	80 – 120mm	0.5 / 0.8mm	4.4mm
T3055S0S1-20A	1310nm	0.5dB	120 – 160mm	0.5 / 0.8mm	4.4mm
T3105S0S1-20A	1550nm	0.5dB	120 – 160mm	0.5 / 0.8mm	4.4mm
T3155S0S1-20A	1310nm	0.5dB	130 – 170mm	0.5 / 0.8mm	4.4mm

\* Beam diameter listed above is the nominal value, without tolerance, measured at exit of collimator.

## High Power Beam Delivery System with Integrated Isolator for Marking Fiber Lasers

- Integrated isolator protects marking fiber lasers from damage from reflected light
- High power qualified (up to 30W)
- Polarization insensitive design
- High transmission and isolation
- Patented Fiber Fusion™ Technology
- Rugged stainless steel roundlock cable



LightPath's® new IsoBeam Fusion™ Collimators combine a high power optical isolator in line with a Fusion™ fiber collimator. The optical isolator acts to suppress back reflection and backscattering - an especially useful feature for fiber lasers. Without this protection, fiber lasers could easily be damaged when working at high peak power (such as in etching and marking applications).

The 1064nm high power isolator features very low insertion loss, high isolation, high power handling, minimal return loss and excellent reliability and environmental stability. The collimator features LightPath's® Fiber Fusion™ technology, where the lens is laser fused directly to the tip of the fiber, virtually eliminating back-reflections without the need to angle cleave the fiber. That, in turn, allows the optical system to remain coaxial through the isolator; keeps return loss very low, and greatly increases the overall reliability of the assembly.

Standard configurations are available for 0.5mm and 1.0mm beam diameters. LightPath® also has the capability to produce custom designs to your specifications with different beam diameters, fiber types, higher power handling capability, and other options.

OPTICAL SPECIFICATIONS		
Beam Diameter (1/e <sup>2</sup> )	0.5mm	1.0mm
Design Wavelength	1064nm	1064nm
Transmission	> 90%	> 90%
Isolation	> 30dB	> 30dB
Return Loss	< -50dB	< -50dB
Maximum Power Handling (average power)	20W	30W
Assembly Diameter	25.4mm	34.9mm
Length (not including strain relief boot)	105mm	127mm
Fiber Type	MM-25-125-LNA or MM-20-125	MM-25-125-LNA or MM-20-125

Fiber Collimators